

**NIAGARA PENINSULA**

**STANDARD CONTRACT DOCUMENT**

**SPECIAL PROVISIONS**

**CONTRACT ITEMS**





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## A1 - Bonding

Payment at the lump-sum price for this item shall be full compensation for the provision of bonding as specified in the Special Provision and General Condition of this contract.

Full payment will be made under this item in the first progress payment subject to the bonds being acceptable to the Owner.

## A2 - Preconstruction Survey

A precondition survey shall be carried out to document existing interior and exterior conditions of all structures within the area of influence and all additional infrastructure deemed necessary by the Preconstruction Survey Consultant. A Preconstruction Survey Consultant with over 5 years' experience in the effects of vibration to structures and loss control in urban areas shall be retained by the contractor to complete this work. The area of influence is the radius of distance adjacent to heavy construction, within which structures and property are subject to possible damage. At a minimum the radius must extend 30 metres from the limit of construction or to the distance deemed necessary by the Preconstruction Survey Consultant commissioned for the project.

### Procedure

The Contractor shall identify and submit the area of influence to the Contract Administrator for approval before commencing the survey.

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

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

### Documentation Procedure

Each property survey shall include both an interior room-by-room inspection and a complete exterior inspection documenting exterior and interior conditions of each property/item surveyed on a Precondition Survey Summary Sheet. At a minimum the summary shall include:

- Vintage and type of construction;
- Description/depiction/dimension of differential settlements (visible cracks in walls, floors, ceilings) or any other apparent structural or cosmetic damage or defect; and
- The report shall use positive dimensions whenever practical to do so, instead of general terms, e.g. "sagging 1 to 2 inches" as opposed to "sagging badly".

Precondition survey data shall be assembled in a formal comprehensive report, including a Precondition Survey Summary Sheet for each property surveyed. Copies of Introduction Letters, Notification Letters and Refusal Letters (if received from owners) are to be included with the report as well as accompanying USBs/CDs/DVDs containing all field notes, photographs and videos. Photographs deemed necessary by the Contractor shall be taken using high quality photographic equipment only from which detailed enlargements may be made. Video equipment may be used in support of the foregoing, but may not be used to replace same. All documentation is to be labelled by municipal address.

Should a complaint arise, the Preconstruction Survey Consultant will investigate and report on the areas of complaint. The Contractor will provide a complete copy of the precondition survey and field reports to the Owner, together with any subsequent inspection report related to claims investigations, forthwith.

### **Inaccessible Properties**

Should access to a premise be prohibited for any reason (i.e., absent owner/lessor/manager, denial of authorization, vacant, safety hazard, etc.), particulars of efforts made to gain entry are to be recorded on the Precondition Survey Summary Sheet as follows:

- Time and date(s) of contact;
- Means of contact (in person or by telephone);
- Authority (owner/lessor/manager); and
- Reason(s) for entry refusal or inaccessibility.

The Contractor shall make a minimum of three (3) attempts to inspect a property after the initial Notice of Construction has been received; specifically two (2) additional notices and a visit to the property. Each attempted contact shall be on a different day of the week and at a different time of day. Along with the recorded attempts to schedule an inspection (dates and times), the Preconstruction Survey Consultant shall also include copies of the additional notices delivered to the property.

### **Payment**

Payment at the lump sum bid for this item shall be paid in full only upon receipt and approval of the comprehensive report by the Contract Administrator.

### **A3 - Site Office**

The Contractor shall provide for the Engineer's sole use, an insulated, heated and cooled (if necessary) field office with windows, a lockable door and a minimum floor area of 12 square metres in size, with a stool, a desk and chair, a telephone, and shall be lit by electricity.

### 3.1 Basis of Payment

Payment at the lump-sum price bid for this item shall be full compensation for the supply, erection, equipping, servicing and maintenance of the field office and shall include such costs as sanitary facilities, hydro, heating, and telephone servicing, with the exception of long-distance calls placed by Contract Administrator.

For progress payment, fifty (50) percent of the lump sum price will be paid upon satisfactory installation. The balance will be paid upon satisfactory removal and clean-up of site area.

## A4 - Construction Layout

(Note: When this item is included as a tender item, this special provision supersedes Special Provision G14).

The provisions of GC7.02 apply except as amended or extended herein.

Where the Contractor is permitted to use the Owner's CAD drawings to perform construction layout, the Contractor shall verify that the control points have numerical elevations, northings and eastings that are correct and match those shown on the CAD drawings, prior to commencement of construction.

All layout performed by the Contractor's layout surveyor shall be tied to the control points provided by the designer and verified by the layout surveyor.

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.

Any errors occurring as a result of unverified control points will be rectified by the Contractor at no cost to the Owner.

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. For sewer work, stakes shall also be provided for each manhole and catchbasin location. For watermain work, stakes shall also be provided at each appurtenance location (hydrants, bends, tees, valves, etc.).

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.

All survey stakes shall be removed at the end of construction by the Contractor.

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

## 4.1 Basis of Payment

The lump sum price bid shall be full compensation for the provision of all labour, material and equipment necessary to carry out the layout.

For progress payment, fifty (50) percent of the lump sum price will be paid upon the undertaking of the initial layout. The balance will be prorated over the remainder of the working period.

## A5 - Clearing and Grubbing

The provisions of OPSS 201 apply except as amended or extended herein.

This item shall include the complete removal and disposal of all existing trees, tree stumps, brush, shrubs and vegetation as specified on the contract drawings, or as directed by the Contract Administrator.

The Contractor shall limit his work area to the right-of-way. The use of private driveways or lawn area where deemed essential is the responsibility of the Contractor. Prior approval from the property owner shall be obtained by the Contractor in writing and any damage resulting from such use is the sole responsibility of the Contractor.

To avoid danger to traffic, buildings, people and property, the Contractor shall cut the trees in sections from the top down.

The abutting property owner shall have first claim to any salvaged timber for firewood. All remaining material becomes the property of the Contractor who shall be responsible for disposal off site. The sale of salvaged timber on site is prohibited. Burning on-site will not be permitted.

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

## A6 - Tree Relocation

Payment shall be based on the "All Inclusive Price Method" for the transplanting of specified trees, by spade method, to locations as staked in the field.

The work shall be carried out by specialist firms engaged in the type of work specified and using workmen skilled in the various aspects of tree transplanting by spade method.

The spading operation shall be carried out by means of a 2250 mm spade or larger and in accordance with proper arboricultural practices.

The Contractor shall if necessary prune the tree to aid in the transplanting operation. The natural shape or habit of the tree shall not be changed. Pruning shall be carried out in accordance with good arboricultural practices.

The transplanted tree shall be backfilled with topsoil to fill all voids between the planting pit and rootball. When the planting pit has been backfilled to ground level, the surrounding ground will be fine graded so as to present the tree as in its natural growth and original habit.

The transplanting operation shall be undertaken such that the transplanting of any tree is carried out on the same day, unless otherwise directed by the Contract Administrator.

## **A7 - Install, Maintain and Remove Silt Control Devices**

The provisions of OPSS 805 apply except as amended or extended herein. All silt control devices shall be installed before any construction work commences and maintained over the course of the construction. Each siltation control device shall be inspected by the Contractor after every major rain event.

If there have been no major events, the sediment control devices should be inspected every 2 weeks. Necessary repair shall be made promptly. Sediment must be removed when the accumulation reaches fifty (50) percent full. Sediment control devices shall be removed after restoration of the site is complete and/or when entire site is stabilized as directed by the Contract Administrator.

### **7.1 Rock Check Dam**

#### **a. Location**

The Contractor shall install check dams where existing ditches outlet into major creek crossings and where directed by the Contract Administrator.

#### **b. Maintenance**

Sediment shall be removed when it reaches one-half the dam height or sooner. Silt removal must be undertaken with care to minimize downstream sedimentation in the swale or ditch.

c. Removal of Check Dam

The check dam and sediments shall be removed at the direction of the Contract Administrator and disposed of outside the right-of-way in accordance with OPSS 510.

This will normally be required once permanent ground cover is established. The site shall be graded to conform to surrounding contours without damaging adjacent ground cover.

d. Payment

Payment shall be made for each check dam constructed, maintained and removed.

For progress payment, fifty (50) percent of the unit price will be paid upon installation. The balance will be paid upon removal.

## 7.2 Construct Temporary Silt Fence

Prior to the start of construction, the Contractor shall place Temporary Silt Fence so as to prevent sediment carried by sheet flow from leaving the site and entering natural drainage ways and/or the storm sewer system. The Contractor shall install silt fences as indicated on the contract drawings, deemed appropriate in the field and as directed by the Contract Administrator.

During construction, the Contractor shall place Temporary Silt Fence at the base of stockpiled native and imported materials.

Supply and construct 1.2 m high silt fence complete with 50 x 50 mm timber posts or metal T-Bars at 1.2 m c/c and cut off trench, where indicated on the contract drawings. The silt fence material shall be a woven geotextile and shall be attached securely with wire or staples. Install before any construction work commences. Sediment must be removed from silt fence when accumulation reaches 50% of the height of the fence. The silt fence must be inspected immediately after each rainfall event. Dismantle and remove after restoration of the site is complete and/or when entire site is stabilized as directed by the Contract Administrator.

### Payment

Payment at the lump sum price bid shall be full compensation for the provision of all labour, equipment and material necessary to install, maintain during construction and remove the temporary silt fence as indicated on the contract drawings.

For progress payment, fifty (50) percent of the unit price will be paid upon installation. The balance will be paid upon removal.

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### 7.3 Sediment Control at Existing Inlets

The Contractor shall supply and install Silt Bag (Siltsack® and/or Layfield's Catch Basin Sediment Traps (CBST's) or approved equivalent) sediment control devices on the existing catch basins and existing catch basin manholes that maybe affected by the proposed construction or as directed by the Contract Administrator.

The Contractor shall remove the sediment control devices in a manner to prevent any sediment from entering the inlet. Any silt deposited in the catch basin due to a faulty installation of the silt control device or during removal shall be removed by the Contractor at no additional cost to the Owner.

### Payment

The unit price bid shall include all labour, equipment and materials necessary to supply, install, maintain during construction and remove the sediment control devices. Payment shall be for each inlet where a sediment control device is installed, maintained and removed.

## A8 - Construction Signs, Traffic Control, and Traffic Management Plan

The provisions of GC7.06 and OPSS 706 apply except as amended or extended herein. The contractor shall be responsible for the preparation of a traffic management and control plan as per the Ministry of Labour's requirement.

Payment at the lump sum price bid for this item shall be full compensation for all labour, equipment and materials necessary to meet the specified requirements. Fifty (50) percent of the lump sum price will be paid upon initial supply of the construction signs. The balance will be pro-rated over the remainder of the working period.

The traffic management plan shall address both vehicular and pedestrian traffic. During construction which conflicts with existing sidewalks special consideration shall be given to the safety of pedestrian traffic. This shall include but not be limited to signs/directions to alternate routes around construction zones and locations of pedestrian and school crossings. Such alternate routes shall be maintained at all times to ensure unobstructed and safe movement of pedestrian traffic.

After working hours and on weekends or holidays all disturbed sidewalk sections shall either be reinstated to provide a stable hard surface for pedestrians and wheelchairs.

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## A9 - Contingency Allowance

When a lump sum amount for Contingency Allowance is shown in the Schedule of Tender Unit Prices bidders are requested to include this lump sum amount in their tender price.

The amount of Contingency Allowance is provided solely for the purpose of covering only the cost of extra work that may be needed during construction and as authorized by the Contract Administrator using the approved Change Order Forms.

Final payment to the Contractor will exclude all or the balance of the Contingency Allowance amount which has not been utilized for the purpose of extra work.

## A10 - Tree Protection

The provisions of OPSS MUNI 801 shall apply except as amended or extended herein.

Protective barrier fencing shall be 1.2m high wire or plastic mesh fencing outside of the dripline of trees or groups of trees and other plants and shall be placed as indicated on the contract drawings or as directed by the contract administrator.

Tree protection barriers must be erected prior to the commencement of any construction activity that may injure a tree on the site and are to remain in place throughout the entire duration of the project. The contractor shall notify the contract administrator in writing prior to commencing any such activities to confirm that the tree protection barriers are in place.

If some fill or excavated material must be temporarily located near the tree protection barrier, a wooden barrier must be used to ensure no material enters the tree protection zone.

The tree protection barriers specified herein must remain in a condition satisfactory to the contract administrator until all site activities including landscaping are complete.

Do not attach rigging cables to trees.

Except at locations where specification procedures are included in contract drawings, do not alter grades around existing trees/plants without first obtaining approval from the contract administrator.

Measurement for Payment shall be as per OPSS.MUNI 801.

Basis for Payment shall be fifty (50) percent of the unit price will be paid upon installation. The balance will be paid upon removal.

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# A11 – Payment Adjustment for Changes in the Fuel Index

## 11.1 General

- a. The Owner will adjust the payment to the Contractor based on changes to the Ontario Ministry of Transportation's fuel price index. The Ontario Ministry of Energy, Science and Technology will calculate the price index. The price index will be published monthly in the MTO Contract Bulletin for each calendar month and will reflect that month's prices. No mark-up shall be applied to the calculated payment adjustment for changes in the fuel price index regardless of the extent to which work is assigned or sublet to others.
- b. It is agreed by the parties to the contract that it is impracticable and difficult to ascertain actual fuel consumed on the contract, and that the parties hereto agree that for the purpose of calculating the total fuel price adjustments, that the process outlined in this specification will be used.

## 11.2 Payment Adjustment

- a. A payment adjustment will be calculated using monthly progress payment amounts and the change between the fuel price index for the month prior to the tender closing, and fuel price index when the work was completed. The Contractor shall submit the form contained in this specification when both the monthly progress payment amount and the monthly fuel index is known. Payment will be included on the next possible progress payment.
  - i. When the agreed contract progress payment cut-off date is on or before the 15th of the month, then the previous months fuel index shall be used for that progress payment amount. (Example – Progress payment cut-off date is July 10th, then the index for June shall be used with the progress payment amount for the July 10th progress payment.)
  - ii. When the agreed contract progress payment cut-off date is after the 15th of the month, then the current months fuel index shall be used for that progress payment amount. (Example – Progress payment cut-off date is July 20th, then the index for July shall be used with the progress payment amount for the July 20th progress payment.)
- b. The Contractor shall submit the form contained in this specification, NIA 001, on a monthly basis for payment. Failure to submit the form will result in the Owner completing the form and deducting \$500 from monies due to the Contractor for that month.
- c. Payment or Credit will be subject to taxes and hold-back.
- d. The Contractor shall submit the final fuel adjustment form with the Contractor Submission for Completion. A payment adjustment for work done after the approved time for completion of the Contract has expired, including the expiration of any extensions of time that have been granted, shall be the lesser of the fuel index in the last month of the Contract or the month in which the work was completed.

### 11.3 Change Orders

Change Orders are deemed to reflect current fuel pricing at the time the Change Order was issued, and as such, are not subject to payment adjustments for changes in the fuel price index. Fuel price adjustments shall only apply to work identified in the original bid at the time of tender closing.

### 11.4 Extension of Contract Time

Where an extension of contract time has been granted, all work identified in the original bid, at the time of tender closing, shall be eligible for a payment adjustment for changes in the fuel price index up to the new contractual completion date or revised number of working days.

### 11.5 Delays

a. Owner Delays (No extension of contract time granted)

Where the contract duration extends beyond the contractual completion date, or allowable working days, as a result of an Owner delay, the Contractor will be entitled to request a payment adjustment for changes in the fuel price index. The Owner will not be entitled to request a payment adjustment for changes in the fuel price index.

b. Contractor Delays (No extension of contract time granted)

Where the contract duration extends beyond the contractual completion date, or allowable working days, as a result of the Contractors operation or performance of the work, the Owner will be entitled to request a for changes in the fuel price index. The Contractor will not be entitled to request a payment adjustment for changes in the fuel price index.

### 11.6 Fuel Price Adjustment Calculation

- a. A monthly progress payment adjustment will be made when the fuel index for the progress payment month differs by more or less than 15% from the fuel index for the month of the tender closing date. When the fuel index differential is less than 15%, there will be no payment adjustments made.
- b. The progress payment amount will be calculated by multiplying the monthly progress amount by the sum of the relevant “impact percentages”, below which have been pre-determined. The Owner will identify the applicable impact percentage for the project based on the predominant operation identified in the pre-construction cost estimate.
- c. To establish the dollar amount of fuel in the tender. This amount is multiplied by percentage change in the fuel indexes after allowing for a 15% buffer. The following formula will be used to calculate the monthly fuel adjustment.

$$FA = (\text{Monthly Progress Amount} \times IP) \times PFC$$

$$PFC = (((|FTC - FPP|) \div FTC) \times 100) - 15\% (\text{Buffer})$$

Where

- FA = Monthly Fuel Adjustment
- IP = Impact Percentage of fuel in bid, from Table 1
- PFC = Percent Fuel Change
- FTC = Fuel Index for Month Tender Close
- FPP = Fuel Index for Progress Payment Month

When (FTC – FPP) is negative the Contractor will receive a payment.  
 When (FTC – FPP) is positive the Owner will receive a credit.

<b>TABLE 1: IMPACT PERCENTAGES</b>	
Underground Infrastructure (Sewer and watermain)	6%
Road Resurfacing (i.e. Hot Mix programs)	6%
Road Rehabilitations or Full Reconstruction (including underground infrastructure, electrical, and/or landscaping)	7%
Parking Lots	6%
Landscaping	5%
Bridge Rehabilitation or Replacement	2%
Electrical Installation (Signals, Illumination, etc.)	6%
Shoreline Protection (Armour Stone, Sheet Piles, etc.)	6%

Example

A Contract Closes in March 2008 and the Progress Payment at the cut-off date of July 20<sup>th</sup>, 2008 was \$600,000

- FTC March 2008 = 112.72
- FPP July 2008 = 132.20
- IP = pre-determined to be 7%

$$\begin{aligned}
 \text{FA} &= (\text{Monthly Progress Amount} \times \text{IP}) \times \text{PFC} \\
 &= (\$600,000 \times 0.07) \times (\text{PFC}) \\
 \text{PFC} &= (((|\text{FTC} - \text{FPP}|) \div \text{FTC}) \times 100) - 15\% \text{ (Buffer)} \\
 &= (((|112.72 - 132.20|) \div 112.72) \times 100) - 15\% \\
 &= ((19.48 \div 112.72) \times 100) - 15\% \\
 &= 17.28\% - 15\% \\
 &= 2.28\%
 \end{aligned}$$

Therefore:

$$\begin{aligned}
 \text{FA} &= (600,000 \times 0.07) \times (.0228) \\
 &= \$957.60 \text{ (payment to the Contractor)}
 \end{aligned}$$

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## 11.7 Payment

The Progress payment will show the fuel price adjustment as a line item on the applicable progress payment certificate and the completion certificate. The item will be called "Fuel Price Index".

## B1 - Test Pits

The purpose of these test holes is to search for underground utilities and/or other underground services where a design change may be required due to possible conflicts during construction or for any other reason required by the Contract Administrator.

The unit price for this item shall include sawcutting, excavation and removal of all materials to a maximum depth specified in the Form of Tender and backfilling with granular materials and 50 mm of hot or cold mix. Reinstatements shall be completed at the end of each day.

The complete backfilling of Granular 'A', compacted to 100% Proctor Density, and the disposal of all excavated material shall be in accordance with the specifications as further outlined in this contract. Alternatively, clear stone may be used as backfill material where hydrovac excavation equipment is used.

This item shall be used when, and as is, directed by the Contract Administrator. Exploratory test pits shall be at locations and depths as directed by the Contract Administrator and must be witnessed by the Contract Administrator or assigned delegate.

Any normal exploratory excavation for the purpose of installation of sewer and watermain is not considered to be a test pit.

The method used will be identified in the Form of Tender. For open excavation, payment will be by each. For hydrovac excavation, payment will be by the hour with a minimum daily four hour charge.

The quantity of test pits to be paid for will be the number of test pits based on field measurements. Granular bedding, cover and backfill will be paid for under the granular items. Hot or cold mix will be paid for under the appropriate items.

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

## B2 - Earthworks

The provisions of OPSS 206 and Special Provisions - General, G11 shall apply except as amended or extended herein.

Work under this item includes excavating, filling and grading of all materials including asphalt road beds, ditches and widenings in accordance with the design cross-sections and profile. For urban cross-sections, the limits of the excavation shall be 300 mm behind the back of the curb, unless specified otherwise on the contract drawings and/or cross-sections.

The unit price shall also allow for sawcutting existing asphalt, road surfaces and asphalt and concrete driveways in a straight line to ensure a neat and straight joint. Sawcutting shall be to the limits shown on the construction drawings or as directed by the Contract Administrator. Sawcutting operations shall be carried out immediately preceding asphalt paving to ensure proper jointing.

During excavation, the Contractor shall take due precautions to protect existing manhole frames and covers, manholes, valve chambers, valve boxes, curb stops within the right-of-ways. Any of the aforesaid appurtenances, if damaged directly or indirectly by the Contractor's operation, shall be replaced by the Contractor. The unit price bid shall be deemed to have made due allowance for this contingency.

Excavations not shown on the contract drawings or excavation below subgrade to any depth, as authorized by the Contract Administrator, shall be measured on site and paid for under this item.

Earth excavation for subdrain installation and swale construction will not be paid for under this item and shall be included in their respective items.

Earth excavation for sidewalks where the grade difference between the existing ground elevation and new sidewalk elevation is greater than 75mm shall be included in this item.

Topsoil gained from stripping may be stockpiled and used in the sodding operation.

Measurement for payment under this item will be as of OPSS 206.09.01.01.

## **B3 - Granular Material**

Work under this item shall include the supply and placing of granular material in roadways, driveways, sidewalk base and for bedding, cover and backfill for storm and sanitary sewers, watermains, forcemains, and associated appurtenance and culverts.

Placement of the granular is to be as per the Construction and Details Drawings and in accordance with OPSS 314, 401 and 402.

For shoulder construction, the Contractor shall supply only Granular "M" limestone aggregate *at a depth as specified in the contract or as indicated on the contract drawings*. Calcium chloride flake shall be applied at the rate of 0.25 kg/m<sup>2</sup> if specified by

the Contract Administrator. Payment for the calcium chloride flake will be included under the item for that material.

The Contractor is responsible to place and 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 Contract Administrator or their representative.

Before paving will be permitted, the finished granular elevations must be checked and approved by the Contract Administrator.

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. Consideration may be given for the use of recycled granular for deep trench backfill.

Where recycled material is imported as a substitution for virgin granular material, the cost savings will go towards the Owner only. The successful Contractor shall submit a written proposal to utilize recycled granular to the Contract Administrator at the pre-construction review meeting. The Contractor must include with the written proposal certified copies of laboratory testing results confirming that the proposed recycled granular material conforms to the provisions of OPSS.MUNI 1010 for both composition (physical properties) and gradation as specified for Granular 'A'.

The Owner reserves the right to undertake any additional confirmatory testing it deems necessary, prior to approving the use of recycled material on this project. Therefore, access to the Contractor's recycled material stockpile(s) is to be made available for sampling and testing by a QA/QC testing company retained by the Owner to verify compliance with the above noted provision. The provisions of NPSCD General - Item G8 will apply to payment for testing in this regard.

Measurement for payment shall be as per OPSS 31

## **B4 - Reprocessing and Compacting of Existing Pavement**

The provisions of OPSS 330 shall apply unless otherwise amended or extended herein.

The equipment shall consist of either a Bomag pulvi-mixer or any equivalent reprocessing

equipment. The equipment to be used must be approved by the Contract Administrator prior to commencement of the project. Bidders shall indicate the type of equipment to be used in Statement 'D' of the Form of Tender.

The entire width of the existing pavement structure shall be reprocessed. The Contractor shall ensure that the existing pavement and the granular base course are thoroughly mixed to a minimum depth of 200 mm unless otherwise specified less by the Contract Administrator. The processing shall be carried out such that 95% of the mix material passes the 26.5 mm sieve and not more than 75% passes the 4.75 mm sieve. The contractor shall be responsible for establishing all lines, elevations, and grades for the pavement reprocessing.

Measurement for payment shall be as per OPSS 330.09.01.01.

## **B5 - On-Site Recycling of Asphalt and Granular Material**

For the unit price bid, the Contractor shall pulverize the existing asphalt, thoroughly mix with the underlying granular materials and utilize same as granular backfill or road base (OPSS 1010). The use of this mixed material shall be continuously monitored by the Contract Administrator and the final volume recycled will depend on its acceptability (including gradation and deleterious inclusions).

All requirements for depth of layers and compaction shall be as per the item for Granular "A". The amount tendered will be dependent upon the continuous acceptability of the material and should this material subsequently be rejected, a similar increase in imported granular material shall be required.

The use of recycled material and the amount utilized may affect the final quantities of the Granular "A" item. If so, no claim shall be considered for variations to final quantities as per G.C. 8.01.02.

Measurement for payment shall be per tonne as calculated by average end areas and tonnage conversion as determined by material testing.

## **B6 - Subdrain**

(Note: The size and type of subdrain should be included in the Schedule of Tender Unit Prices).

The provisions of OPSS 405 apply except as amended on extended herein.

The unit price shall include excavation, regardless of the depth. The unit price bid shall include the required coring connection to the existing structure (if necessary). Granular bedding, cover and backfill will be paid for under the granular items.

The subdrain shall be perforated high density polyethylene pipe with filter wrap.

Measurement for payment shall be as per OPSS 405.09.01.01.

## **B7 - Installation of New Culvert**

Note: The size and minimum thickness of the new culvert should be included in the Schedule of Tender Unit Prices).

The provisions of OPSS 421 apply except as amended or extended herein.

The unit price shall include all labour, material, and equipment required for the culvert installation including sawcutting of the asphalt pavement and minor ditching at each end of culvert. Bed and cover in accordance with OPSD 802.010 for flexible pipe and OPSD 802.030 for rigid pipe. Pipe culvert frost treatment in accordance with OPSD 803.030 and 803.031.

Bedding, cover and backfill for the culvert shall be Granular "A" and shall be included in the Granular "A" Item.

The minimum thickness shall be as specified in the schedule of tender unit prices.

Measurement for payment shall be as per OPSS 421.09.01.01.

## **B8 - Concrete - Curb and Gutter**

The provisions of OPSS 353 apply except as amended or extended herein.

The unit price bid shall include the construction of all types of concrete curbs and gutters, including drop sections at driveways and sidewalk, ramps and curb, and gutter terminations.

The unit price shall also include the recessed catch basin detail where specified on the contract drawings.

The Contractor shall take due precaution to protect fresh concrete, up to 48 hours after placement, from being damaged, marred or defaced, particularly at driveway entrances. In the event that the fresh concrete is marred or damaged in any way, the Contractor shall break out and replace the damaged sections. The unit price bid shall be deemed to have made due allowance for this requirement.

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.





























**14.09.1 Criteria For Price Adjustment Or Rejection And Removal Based On Asphalt Content**

The average asphalt cement content shall be determined for a given lot size of mix production from a single plant location. For an evaluation of a given lot, a minimum of 5 sets of test results shall be used.

Where the average asphalt cement content (AACC) of the in-place mix for the given mix production quantity being evaluated does not meet the requirements of this specification, and the Owner and contractor have agreed to invoke the pay adjustment provisions of the specification, the bid price for the supply and placement of hot mix asphalt by the tonne shall be subject to a price adjustment. A minimum of 5 sets of test results must be used in the evaluation of the mix. This can include asphalt paving over one or more days.

Payment for hot mix asphalt shall be subject to the adjustments in the bid price, per tonne of mix, based on the criteria in Table 5. The pay adjustment shall be determined from the average asphalt cement content (AACC) compared to the Job Mix Formula Asphalt Cement Content ( $JMF_{ACC}$ ).

**TABLE 5-PRICE ADJUSTMENT BASED ON AVERAGE ASPHALT CEMENT CONTENT**

Criteria For Pay Adjustment	Pay Adjustment on Tender Price
$AACC > (JMF_{ACC} + 0.7)$	no payment, mix to be removed
$(JMF_{ACC} + 0.6) < AACC \leq JMF_{ACC} + 0.7)$	2% penalty
$(JMF_{ACC} + 0.5) < AACC \leq JMF_{ACC} + 0.6)$	1% penalty
$(JMF_{ACC} + 0.3) < AACC \leq (JMF_{ACC} + 0.5)$	no pay adjustment
$(JMF_{ACC} + 0.2) < AACC \leq (JMF_{ACC} + 0.3)$	2% bonus
$(JMF_{ACC} + 0.1) < AACC \leq (JMF_{ACC} + 0.2)$	1% bonus
$(JMF_{ACC} - 0.1) \leq AACC \leq JMF_{ACC} + 0.1)$	no pay adjustment
$(JMF_{ACC} - 0.2) \leq AACC < (JMF_{ACC} - 0.1)$	1% penalty
$(JMF_{ACC} - 0.3) \leq AACC < (JMF_{ACC} - 0.2)$	2% penalty
$(JMF_{ACC} - 0.4) \leq AACC < (JMF_{ACC} - 0.3)$	3% penalty
$(JMF_{ACC} - 0.5) \leq AACC < (JMF_{ACC} - 0.4)$	5% penalty
$AACC < (JMF_{ACC} - 0.5)$	no payment, mix to be removed

Where the average asphalt cement content for the asphalt quantity being evaluated is 0.5% or more below the JMF asphalt cement content, the Owner shall direct the

contractor to remove and replace the asphalt mix at no cost to the Owner.

Where the average asphalt cement content for the asphalt quantity being evaluated is 0.7 % or more above the JMF asphalt cement content, the Owner shall direct the contractor to remove and replace the asphalt mix at no cost to the Owner.

Where an individual test result is rejectable (i.e. more than 0.5% below or 0.7% above the JMF average cement content) the test result shall not be included in the price adjustment calculations.

The contractor may request re-testing of the rejected material. All costs of re-testing will be borne by the contractor if the results of the re-test are rejectable. The area represented by the sample shall be subject to removal and replacement of the asphalt mix at no cost to the Owner. The limits of the removal and replacement will be from the mid-point location between the rejected sample and the last acceptable sample, and the next acceptable sample unless the contractor undertakes to determine the limits of the removal area by a coring and testing program at his costs.

**14.09.2 Criteria For Price Adjustment Based On Compaction Determined By Core Densities**

This section of the specification shall only apply to main lane paving operations on full reconstruction projects, or resurfacing contracts that include padding and/or a scratch coat of hot mix asphalt to provide a levelling course.

Where the Average Mix Compaction (AMC) of the in-place mix does not meet the requirements of this specification, payment shall include price adjustment for compaction determined by core densities, as outlined by criteria in Table 6.

**TABLE 6**

**PRICE ADJUSTMENT BASED ON COMPACTION DETERMINED FROM CORE DENSITIES**

Average Mix Compaction (%MRD by Cores)	Price Adjustment
AMC ≥ 95%	Bonus – 2% of bid price
95 > AMC ≥ 94%	Bonus – 1% of bid price
94 > AMC ≥ 92%	no price adjustment
92 > AMC ≥ 91%	penalty price adjustment = 2%
91 > AMC ≥ 90%	penalty price adjustment = 3%
90 < AMC ≥ 89%	penalty price adjustment = 5%
AMC < 89%	mix to be removed

Asphalt layer thicknesses that are less than 35 mm shall not be used in the assessment

of in-place mix compaction.

Where the assessment of asphalt compaction indicates borderline conditions, additional cores and testing may be undertaken to further assess the asphalt mix compaction. If the Owner elects to not undertake additional coring and testing, asphalt compaction will be considered to be acceptable.

## 14.10 Payment For Asphalt Mix

Unless otherwise specified in the tender documents, payment for asphalt satisfactorily placed and compacted will be by the tonne. Where price adjustment provisions are invoked for the contract, the final payment shall reflect the adjustments for asphalt cement content and/or compaction. For all mixes except DFC the pay quantity by the tonne will be based on the weigh tickets for mix supplied to the job site.

### 14.10.1 Dense Friction Course (DFC)

For DFC, the estimated contract tonnage quantity is based on mixes incorporating trap rock aggregate as the baseline material. A multiplier factor will be applied to the weigh ticket total to account for mixes produced with different aggregates that result in lower compacted bulk relative densities. Table 7 provides typical mix densities with different approved aggregates, and the multiplier factor that applies to each aggregate type.

**TABLE 7 - MULTIPLIER FACTORS FOR DFC**

AGGREGATE TYPE	APPROXIMATE MIX DENSITY (t/m <sup>3</sup> )	MULTIPLIER FACTOR
Traprock	2.650	1.000
Diabase	2.570	1.031
Meta-Arkose	2.460	1.077
Dolomitic Sandstone	2.420	1.095

The multiplier factor will be determined by dividing the Traprock mix baseline density by the bulk density of the mix to be used, as established by the mix design, using the following equation:

$$\text{DFC Multiplier Factor} = \frac{2.650 \text{ (t/m}^3\text{)}}{\text{Mix design BRD (t/m}^3\text{)}}$$

### 14.10.2 Asphalt Cement Price Adjustment Based on Price Index

The Owner will adjust the payment to the contractor based on changes to the Ministry of Transportation’s performance graded asphalt cement Price Index, and as set out in

OPSS 310, Appendix 310-B. The Price Index will be used to calculate the amount of the payment adjustment per tonne of asphalt cement accepted into the Work. Payment will be made based on the month the asphalt is laid.

The contractor is advised that the supply of liquid asphalt and the allowance for an adjustment in the supply price of liquid asphalt does not constitute “Extra Work”, “Additional Work”, or “Changes in the Work” as defined in clause GC 3.10 and outlined in payment clause GC 8.02.04 of the General Conditions. Payment for the liquid asphalt price adjustment shall be determined as indicated in OPSS 310, Appendix 310-B. No mark-up shall be applied to the calculated payment for the liquid asphalt price adjustment regardless of the extent to which work is assigned or sublet to others.

Notes:

1. Contractors should bid the hot mix asphalt item using the cost of the PGAC in effect at the time of tender closing unless specified in the Contract Document. The asphalt cement Price Index is only a tool for qualifying hot mix prices and is not intended as a standard asphalt cement price to be incorporated into the contract bid.
2. The payment adjustment calculated is full compensation for any and all PGAC grades specified.

## 14.11 Dispute Resolution

The following outlines the methodology for resolving disputes regarding testing and evaluation of mixes for price adjustment based on asphalt cement content, and compaction based on core densities.

### 14.11.1 Price Adjustment Based On Asphalt Cement Content

Where there is disagreement on the findings of the test results by the Owner's designated QA laboratory, the contractor has the option of requesting the services of a referee laboratory. The referee laboratory shall have current CCIL Type A certification and the selection of the laboratory shall be mutually agreed upon by the Owner and the contractor.

Samples for referee testing shall be from the triplicate plate samples taken during paving. The Owner shall arrange for transfer of referee samples to the designated referee laboratory.

The results of the referee laboratory will be binding on both the Owner and the contractor. Payment for the costs of the referee testing and sample delivery will be the responsibility of the contractor if the test results confirm that the mix material does not meet specification. If the referee laboratory test results indicate that the mix material satisfies the specifications with respect to asphalt cement content, the costs will be borne

by the Owner.

### **14.11.2 Acceptance Or Rejection Of Mix Compaction Based On Core Densities**

Where there is disagreement on the compaction findings from the core test results by the Owner's designated QA laboratory, the contractor has the option of requesting additional cores and using the services of a referee laboratory. The cores shall be taken at locations selected jointly by the contractor and the Owner. At each core location, a parallel core shall be taken by the contractor and provided to the Owner. The contractor and the Owner shall agree on the CCIL certified laboratory to carry out the core testing.

The results of the referee laboratory will be binding on both the Owner and the contractor. Payment for the costs of the coring, referee testing and core sample delivery will be the responsibility of the contractor if the test results confirm that the mix material does not meet the compaction specification. If the referee laboratory test results indicate that the mix compaction satisfies the specifications, the costs will be borne by the Owner.

## **B15 - Asphalt Walkways & Driveways**

Note: This item, when used in conjunction with separate items in the Schedule of Tender Unit Prices for excavation, granular etc., is intended to cover the additional handwork, etc. not covered in the unit prices.) The provisions of OPSS 311, OPSS 314 and Special Provision B14 shall apply except as amended or extended herein.

The following shall be included under this item.

Sawcutting, excavation and placement of Granular "A" base and asphalt to the following depths:

- a. Residential Driveways/Walkways: 50 mm HL3F + 200 mm Granular "A";
- b. Commercial Driveways: 40 mm HL3F + 50 mm HL8 MDBC + 300 mm Granular "A";
- c. Industrial Driveways: 40 mm HL3F + 50 mm HL8 MDBC + 375 mm Granular "A";

The Granular "A" base shall be compacted to 100% of the maximum dry density.

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.

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

The unit price bid for this item shall be complete compensation to restore driveway aprons, and driveways adjacent to sidewalk removals, as necessary, and as directed by the Contract Administrator.

Wherever possible, the Contractor, upon consultation with the Contract Administrator, may adjust the driveway gradient and limits, to allow for positive drainage from the driveway and housewalks. Where the restored driveway has caused avoidable ponding, the Contractor shall adjust and restore the driveway and gradient at no additional cost.

Driveway gradient adjustments must not negatively impact vehicle access.

## **Winter Work**

The Contractor shall make due allowance in the unit prices tendered, for the additional effort required to maintain asphalt driveways during winter construction.

The extent of the driveway restoration will be in accordance with the initial sawcut limit as approved by the Contract Administrator, prior to the asphalt driveway removal. Any subsequent asphalt damage, maintenance and repair will be the Contractor's responsibility at no additional cost to the contract. Once any part of the asphalt is removed to facilitate construction, the Contractor must inspect the driveway on a daily basis to remove any broken asphalt pieces and maintain an even granular surface so as to minimize the risk of damage to pedestrians, vehicles, snowploughs and/or snow blowers.

## **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 to a neat straight sawcut line behind the existing sidewalk. 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 match line become damaged 're-saw cutting' will be required and shall be completed at no additional cost to the Owner.

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

Trenches in the driveways shall be completely backfilled with Granular 'A' with all granular material compacted to 100% S.P.M.D.D. or with native materials compacted to 95% S.P.M.D.D.

No separate payment shall be made for the sawcutting required.

Payment for excavation, granular "A" and asphalt shall be included under the items included in the Schedule of Tender Unit Prices. Where no separate items are identified

in the Schedule of Tender Unit Prices, the unit price for the Asphalt Walkways and Driveways item shall include the excavation and supply and placing of granular "A" and asphalt necessary to complete this item.

Measurement for payment will be as per OPSS 311.09.01.

## **B16 - Concrete Driveways**

(Note: This item, when used in conjunction with separate items in the Schedule of Tender Unit Prices for excavation, granular etc., is intended to cover the additional handwork, etc. not covered in the unit prices.)

OPSS 350 applies to this item and the unit price bid for the concrete driveways shall include the following:

- Sawcutting, excavation and construction of a granular base to the following depth:
  - a. Residential Driveways: 75 mm Granular "A" + 150 mm Concrete;
  - b. Commercial and Industrial Driveways: 150 mm Granular "A" + 150 mm concrete.
- Driveway concrete thickness shall match the existing thickness to a minimum of 150 mm. Increased thickness, when authorized, will be pro-rated.
- Granular "A" base shall be compacted to 100% of the maximum dry density and shall be included in the unit price for this item, unless a separate Granular "A" item is included in the Schedule of Tender Unit Prices.

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

The unit price bid for this item shall be complete compensation to restore private driveways and driveways adjacent to sidewalk removals or as otherwise noted on the contract drawings or directed by the Contract Administrator.

Wherever possible, the Contractor, upon consultation with the Contract Administrator, may adjust the driveway gradient and limits, to allow for positive drainage from the driveway and housewalks. Where the restored driveway has caused avoidable ponding, the Contractor shall adjust and restore the driveway and gradient at no additional cost.

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. The Contractor shall take due precaution to protect fresh concrete, up to 48 hours after placement, from being damaged, marred or defaced, particularly at driveway entrances. In the event that the fresh concrete is marred or damaged in any way, the Contractor shall break out and replace the damaged sections. The unit price bid shall be deemed to have made due allowance for this requirement.

## **Driveways Affected By Services**

Where the installation of sanitary services, cleanouts or water services requires the excavation of existing concrete driveways, the entire driveway bay shall be removed from edge to edge and from the back of curb to a neat straight sawcut line behind the existing sidewalk. 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 match line become damaged 're-saw cutting' will be required and shall be completed at no additional cost to the Owner.

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

Trenches in the driveways shall be completely backfilled with Granular 'A' with all granular material compacted to 100% S.P.M.D.D. or with native materials compacted to 95% S.P.M.D.D.

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, but not limited to, sawcutting, removals, disposals, surface preparation, backfilling, grading, compaction, paving stones and bond breaker.

Payment for excavation, granular "A" and concrete shall be included under the items included in the Schedule of Tender Unit Prices. Where no separate items are identified in the Schedule of Tender Unit Prices, the unit price for the Concrete Pavement and Driveways item shall include the excavation and supply and placing of granular "A" and concrete necessary to complete this item.

Measurement for payment will be as per OPSS 350.09.01.

## **B17 - Adjust Paving (Stone) Brick Driveway**

The unit price bid for this item shall include the disassembling and stockpiling of the paving stones, excavation, filling, construction of a 300 mm granular base with Granular "A" compacted to a density of 100 percent of the maximum dry density and overlain by 50 mm of limestone screenings, placing the paving bricks to the proposed grade and the

filling of the voids in the completed brick work with limestone screenings. The granular base shall be included in the unit price for this item.

The Contractor shall replace any paving bricks broken as a result of this work or stolen from the stockpile, at no additional cost to the Owner.

The work shall include any cutting of the paving stones required to match the new grade. Wherever possible, the Contractor, upon consultation with the Contract Administrator, may adjust the driveway gradient and limits, to allow for positive drainage from the driveway and housewalks. Where the restored driveway has caused avoidable ponding, the Contractor shall adjust and restore the driveway and gradient at no additional cost.

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

Should paving stones be left over and the property owner would like to keep the extra paving units, the Contractor is to stockpile the paving stones in a safe manner and secure place for the owner. If the property owner does not wish to keep the extra paving units, they will become the property of the Contractor for his reuse and/or disposal. Paving stones shall not be removed from site without the permission of the property owner. Any stones that are removed from site without the property owner's permission are to be replaced by the Contractor at no additional cost to the contract.

The quantity of paving brick driveway adjustment to be paid for will be the number of square metres of driveway adjusted based on field measurements.

The unit price bid for this item shall be complete compensation to restore driveway and/or walkways, as necessary, and as directed by the Contract Administrator.

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

## **B18 - Granular Driveways**

(Note: This item, when used in conjunction with separate items in the Schedule of Tender Unit Prices for excavation, granular etc., is intended to cover the additional handwork, etc. not covered in the unit prices.)

The provisions of OPSS 314 apply except as amended or extended herein. This item shall include the following:

- Granular driveways shall include excavation and placement of Granular "A" to the following depths:
- Residential: 200 mm
- Commercial: 300 mm

- Industrial: 375 mm

The Contractor is to note that the granular driveway thicknesses specified in the NPSCD are minimum requirements. Existing driveway depths are to be matched if greater.

Wherever possible, the Contractor, upon consultation with the Contract Administrator, may adjust the driveway gradient and limits, to allow for positive drainage from the driveway and housewalks. Where the restored driveway has caused avoidable ponding, the Contractor shall adjust and restore the driveway and gradient at no additional cost.

Payment for excavation and granular "A" shall be included under the items included in the Schedule of Tender Unit Prices. Where no separate items are identified in the Schedule of Tender Unit Prices, the unit price for the Granular Driveways item shall include the excavation and supply and placing of granular "A" necessary to complete this item.

Measurement for payment will be as per OPSS 314.09.01.01.01.

## **B19 - Regrading of Ditches and Swales**

The provisions of OPSS 206 apply except as amended or extended herein. This item shall include the following:

- Cut and/or fill of existing ditches/swales to provide drainage. The average cut or fill is +/- 150 mm.
- Following regrading, the work area shall be fine graded and made ready for topsoil and sod or seed. Tolerance in elevation shall be 25 mm.

Measurement for payment will be per linear metre, measured along the centre line of the ditch or swale.

## **B20 - Hand Laid Riprap With Filter Cloth**

The provisions of OPSS 511 shall apply except as otherwise amended or extended herein.

This item shall include the following:

Riprap shall be placed as shown on the contract drawings, and as directed by the Contract Administrator. Riprap shall be 200 - 250 mm in size and to be placed to a minimum depth of 300 mm over filter fabric. Wherever riprap is to be placed, the ground is to be over-excavated, so that the finished surface of the riprap is even with the adjacent surface. All fallen trees and debris are to be removed from area of riprap before placement of filter fabric. Filter fabric shall extend at least 300 mm beyond the edge of riprap and shall be towed into a depth of 300 mm at edges. Filter fabric to be 270 g/m<sup>2</sup>, or heavier.

Unit price bid shall include all labour, equipment and materials to install riprap and filter fabric, and shall include the over excavation and disposal of surplus material. Measurement for payment will be in square metres.

## B21 - Topsoil and Sod

- The provisions of OPSS 802, 803, and OPSS.MUNI 804 shall apply to these items, except as amended or extended herein.

Under this Item, the Contractor shall place the topsoil, and sod in accordance with the Contract Drawings and as specified herein.

### Topsoil

#### Topsoil (Imported)

Supply imported and screened topsoil material:

- a fertile, friable, natural loam (A horizon layer), capable of sustaining vigorous plant growth, free of subsoil contamination, roots and stones over 50mm diameter, reasonably free of weeds (as determined by the Contract Administrator), and falling within the following guidelines:

Soil Texture Range: (OMAFRA)	loam to sandy loam	clay loam
pH range:	6.0 to 7.0	5.5 to 7.9
Total Salts (mmhos/cm)	less than 1.5	less than 1.5
Organic Matter (%)	3% to 10%	4% to 15%
N - Nitrogen (ppm)	See below*	See below*
P - Phosphorus (ppm)	10 – 60	10 – 60
K - Potassium (ppm)	80 – 250	80 – 500
Mg - Magnesium (ppm)	100 – 300	100 – 600
Ca - Calcium (ppm)	1000 – 4000	1000 – 7000
Na - Sodium (ppm)	less than 200	less than 200
Cl - Chloride (ppm)	less than 100	less than 100
SAR - Sodium Absorption Rate	less than 15	less than 15

\*Nitrogen: Provide the required amount of nitrogen as identified in the soil test report.

- No material will be supplied under this item without the approval of the Contract Administrator. The Contractor shall supply a sample of the intended topsoil material to the Contract Administrator three weeks in advance of placement.
- The approved topsoil material shall be placed at a minimum compacted depth of 150mm.
- The finished surface shall be smooth, firm against footprints, with a fine, loose texture before sod is placed.

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Payment under this item considers only the topsoil specified to be placed where grading is proposed as indicated on the drawings.

### **Topsoil (Native)**

Native topsoil shall not be stockpiled for use without prior approval from the Contract Administrator.

When approved, native topsoil must conform to the same requirements as imported topsoil.

### **Stockpiling**

OPSS 802.07.01 is hereby amended by the addition of the following:

Topsoil shall be salvaged and stockpiled on-site at a location approved by the Contract Administrator. Stockpiled topsoils shall be stored in mounds no greater than 1.3m in height for less than 1 year. Where space limitations apply, topsoil stockpile mound should not exceed 3.0m where feasible.

Topsoil stockpiles should be stabilized by covering with geotextile material to prevent soil erosion and contamination by weeds during storage. Where stockpiles are intended to store topsoil for periods longer than one year, temporary ground cover vegetation composed of a non-invasive stabilizing ground cover (such as annual rye grass) will be requested.

All stockpiling shall be completely surrounded by the required erosion and sediment control fencing, at no additional cost to the Owner.

Native topsoil may be re-used on-site prior to the import of topsoil to the site.

When re-applying topsoils stockpiles in mounds 1.3m in height or less, the top 30cm of the mound shall be mixed with the remainder of the stockpile.

Topsoil stockpiles in mounds greater than 1.3m or stored longer than 6 months should be amended with compost to re-establish healthy soil structure. To achieve the appropriate amendment rates, a 3:1 ratio of topsoil to compost by volume may be mechanically mixed, or stockpiled topsoil applied to a depth of 110mm with 40mm of compost and incorporated to a depth of 20cm.

- Any areas damaged by the Contractor by their method of construction, or by use of equipment, shall be reinstated at no additional cost to the Owner.

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## Topsoil Testing

The Contractor shall test all imported topsoil from all proposed sources.

Collect one (1) topsoil sample from each pile to be tested and provide to the testing lab according to the following guidelines:

- each sample shall be minimum one (1) litre in volume
- obtain ¼ litre sample at a minimum of four different locations within the main body of the pile and thoroughly mix together to create the 1 litre sample for testing
- label each sample with the name of the project and location of the soil sample.
- Arrange and pay for testing to be carried out by:
  - Agri-Food Laboratories, 1-503 Imperial Road North., Guelph, Ontario, N1H 6T9, 1-800-265-7175, telephone 519-837-1600, fax 519-837-1242, [Website address](#) [www.agtest.com](http://www.agtest.com)
  - A&L Canada Laboratories Inc., 136 Jetstream Road, London, Ontario N5V 3P5, telephone 519-457-2575, fax 519-457-2664, email: [alcanadalabs@alcanada.com](mailto:alcanadalabs@alcanada.com)
  - or an approved equal independent testing company
- Conduct a Basic Topsoil Test from each proposed source which includes:
  - Soil Texture (% Sand, % Silt, % Clay), Total Salts, Organic Matter, pH, Bph, available Nitrogen, Phosphorus, Potassium, Magnesium, Calcium, CEC, Chloride, Sodium, and SAR. If topsoil source is from a former farm field, also conduct a test for Atrazene. Obtain recommendations for amendments and the quantities and type of fertilizers needed to eliminate the deficiencies made evident by the testing.

Submit the results of soil testing and fertiliser recommendations to the Owner's Authorized Representative for approval before commencing with the work.

If the topsoil source is exhausted do not use topsoil from a new source until it has been tested and approved for use.

Provide topsoil results at least 2 weeks prior to delivery to the site.

## Preparation of Existing Grade

Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.

Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials from the existing grade. Remove soil contaminated with calcium chloride, toxic materials and petroleum products. Remove debris which protrudes more than 75 mm above surface. Dispose of removed material off site.

Scarify the approved dry, un-frozen sub-grade to depth of 50 - 100 mm. Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

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Dispose of excavated material on site as directed, so as not to contaminate any topsoil or imported soils used for hauling and spreading has compacted soil.

### **Fertilizing**

Apply a fertilizer of 0-20-0 super phosphate with adequate amount of moisture at a rate of 225 kg/ha prior to sod application. Mix fertilizer with imported topsoil or cultivate to a minimum depth of 150mm to mix fertilizers and spread topsoil.

### **Spreading of Topsoil**

Place topsoil after Contract Administrator has accepted subgrade.

Spread topsoil in uniform layers not exceeding 150 mm, over unfrozen subgrade free of standing water over scarified subgrade.

Spread topsoil to a minimum 150mm depth after settlement and 80% compaction.

Manually spread topsoil around trees, structures, shrubs and obstacles.

### **Fine Grading of Topsoil**

Grade topsoil to eliminate rough spots and low areas and ensure positive drainage.

Prepare loose friable bed by means of cultivation and subsequent raking.

Topsoil shall be placed to a grade which allows sod to be installed at the final lines and levels as indicated on the contract drawings.

Provide a finished topsoil surface that is smooth and firm against footprints, with a fine, loose texture before sod is placed.

Owner's Authorized Representative will inspect topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

Irrigation will be main water source for topsoil; if irrigation is not installed at the time of sod installation, the Contractor is responsible to supply a water source (i.e. water truck). No private hose bibs are to be used as a water source.

## **Sod**

### **Sodding**

Sodding shall not commence until topsoil is approved by Contract Administrator.

During wet weather, allow sod to dry sufficiently to prevent tearing during lifting and handling. During dry weather, protect sod from drying and water sod as necessary to ensure its vitality and prevent dropping of sod in handling. Dry sod will be rejected. Water immediately after sod laying to obtain moisture penetration through sod into top 50mm of topsoil.

Provide adequate protection of sodded areas against erosion. Remove protection after lawn areas have been accepted.

Sod is to be laid in a continuous fashion. No isolated areas of sod, which are to be integrated with main portion of sod, will be accepted.

One month after installation, if broadleaf weeds begin to appear, apply herbicide in accordance with the manufacturer's direction. Avoid decamba solutions near trees and shrubs.

### **Materials**

OPSS 803.05.01 is hereby amended by the following:

Sod shall be rolls of No. 1 premium grade nursery cultivated turfgrass sod, Kentucky Blue Grass/Fine Fescue.

### **Scheduling**

Turfgrass sod shall be installed within 24 hours of delivery, and within 36 hours of harvest, unless otherwise authorized and a suitable preservation method is approved prior to delivery.

Sod not installed within 36 hours of harvesting or within 24 hours of delivery may be rejected if there is any evidence of deterioration.

### **Placement of Sod**

OPSS 803.07.04 is hereby amended with the addition of the following:

Sod shall be placed in boulevards between the sidewalk and curbs, adjacent to concrete sidewalk abutting commercial or residential buildings, driveways and walkways, the bottom of swales and ditches, or as directed in the contract documents or by the Contract Administrator.

### **Staking Sod**

OPSS 803.07.04 is hereby amended by the addition of following:

Sod shall be staked on slopes steeper than 2.5H:1V and in the bottom of all swales or ditches. Sod shall be laid at right angles to slopes or the flow of water. Sodding shall start at the bottom of the slope and shall be laid crosswise and staggered on the slope. Every row shall be pegged with wooden lath pegs, of sufficient length to ensure satisfactory anchorage of the sod, and at intervals of not more than 0.5m (1.5 feet). Pegs shall be driven flush with the sod.

Before pedestrian traffic is permitted on any staked turf, and after the turf is well rooted into the growing medium, pegs or stakes shall be removed or driven at least 5cm (2 inches) below the sod surface.

### **Maintenance of Completed Sod**

OPSS 803.07.05 is hereby amended by the following:

Maintenance for sodded areas shall begin immediately after sodding has been completed, and shall continue for 12 months following Completion of the Contract. Maintenance shall include all measures necessary to establish and maintain grass in accordance with its class, and in a vigorous growing condition, including, but not limited to the following:

- Irrigation shall be scheduled and carried out when required and with sufficient quantities of water to prevent sod and underlying soil from drying out
- When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original

This requirement shall be suspended during the winter dormant period shown in OPSS 803 – Table 1 “Winter Dormant Period”.

### **Acceptance**

OPSS 803.08.01 is hereby amended with the following:

Prior to the end of the Guaranteed Maintenance Period the Contract Administrator shall make an inspection of all placed sod.

Sodded areas will be accepted at final inspection provided that:

- Sodded areas are properly established. The sod shall be in the same location as originally placed and shall not have moved, eroded, slipped, or sloughed. Sod shall show evidence of rooting into the underlying soil.
- Sod is free of bare and dead spots and without weeds.
- No surface soil is visible when grass has been cut to height of 40mm and no competitive growth is seen emerging from the sod or from between the joints.
- Sodded areas shall be rolled with a roller, providing 2.500 kg/m<sup>2</sup> to ensure a good bond between sod and topsoil and to remove minor depressions and irregularities.

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**Basis of Payment**

The Contract price shall include compensation for extended watering as required during the period of construction up to final inspection to ensure good rooting and growth.

The Contract unit price for sodding shall constitute full compensation for supplying and placing of topsoil and sod; watering and fertilizer application as specified, and for all labour, equipment, and materials necessary to complete the work in accordance with the contract documents.

Measurement will be by the square metre of topsoil and sod placed as measured in the field by the Contract Administrator.

Payment for sod is not deemed as final acceptance.

**B22 - Topsoil, Seed and Mulch**

The provisions of OPSS 802 and 804 and Special Provisions B21 apply except as amended or extended herein.

- a. Measurement for payment shall be in metres squared, actually placed.
- b. The Contract Administrator shall choose between hydraulic and straw mulching depending on the time of year during which areas will be ready for seeding.
- c. Topsoil may be stockpiled or imported.
- d. Topsoil, seed and mulching is to be placed to midpoint of the shoulder rounding on rural cross-section.

**B23 - Supply and Apply Calcium Chloride**

The provisions of OPSS 506 apply except as amended or extended herein.

The contractor must have a minimum of one tonne of calcium chloride available on the site at all times for dust control only. This item shall only be used at the direction of the Contract Administrator.

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

Calcium chloride will be measured in tonnes for that quantity used in the work for compaction and dust control. The unit price bid shall be full compensation for the supply and application of calcium chloride.

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## B24 - Application of Water for Dust Control

The Contractor will arrange for the supply of water from the Municipality.

Water may be supplied by the Municipality from approved fire hydrants.

Water shall be applied by means of an approved equipment capable of distributing it uniformly and with proper control.

Measurement for payment shall be as per OPSS 506.09.01.

## B25 - Cold Mix, Open Graded Bituminous Pavement

The provisions of OPSS 309 shall apply except as amended or extended herein.

### Materials

#### Emulsified Asphalt

The bituminous material used for mixing shall meet the requirements of CMS-2, Emulsified Asphalt, as specified in OPSS 1103.

For the duration of this contract, the Contractor's supplier of asphalt cement must be on the MTO designated suppliers list.

Included with the Form of Tender on Statement "B" shall be the name of the asphalt cement supplier. Asphalt cement supplied by companies not on the MTO designated suppliers list will not be accepted on this project.

The unit price bid shall include the supply of asphalt cement used in the mix.

#### Aggregate General

Aggregates of the type and quality specified shall be in accordance with the provisions of OPSS I001, "Material Specification for Aggregate - General" and OPSS 309.05.02, Tables 2 and 3. Sufficient material to complete the work shall be stockpiled prior to commencing the paving operation.

#### Coarse Aggregates

Coarse aggregate for mixing shall meet the gradation and physical requirements of CL-4 open graded aggregate.

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## Choke Aggregate

The aggregate used for choke material shall meet the requirements of OPSS 1006 for Class 3 aggregate.

## Composition of Mixture

The mix proportion shall be determined by the Contractor using established laboratory test methods for each source of aggregate.

The test results shall be submitted to the Owner, one week prior to the production of the mixture on the contract.

The test results shall include:

- i. Test methods employed
- ii. Proposed emulsion content
  - a. percentage by mass
  - b. litres per tonne of aggregate
- iii. Proposed residual asphalt content percentage by mass

No mix shall be supplied under the contract until the proposed mix formula has been approved by the Contract Administrator.

The allowable tolerance of the residual asphalt content as determined by the extraction test shall be  $\pm .3$  per cent - of the mix formula.

## Equipment

The mixture shall be mixed and placed using a Midland Mix Paver or approved equivalent. The mixture shall be compacted with a steel wheeled roller meeting the Class "S" requirements, OPSS 310.06.02. The choke stone shall be rolled using a self-propelled pneumatic-tired roller as per OPSS 310.06.02, Class R.

## Construction Requirements

The mixture shall be placed in accordance with all specification requirements except that a trail application will not be required.

Work can only proceed when the minimum ambient temperature is 10°C and rising.

The clear aggregate and emulsion shall be sufficiently mixed so that the bituminous

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material is uniformly distributed throughout and all aggregate particles are uniformly coated.

The Mix Paver shall be guided by an approved method such as a stringline set from the staked alignment. This means of control shall be established on each side of the road.

The mixture shall be mechanically spread by the Mix Paver at a uniform depth and crossfall (2%) as required. The finished surface of the pavement shall be tested with a 3 m straight edge laid parallel with the centre line of the pavement. Any area exceeding a 7 mm variation from the surrounding area shall be satisfactorily corrected or removed and replaced at the Contractor's expense.

Breakdown rolling shall be delayed until surface breaking of the emulsion has occurred.

The Contractor will be responsible to cover all emulsion runout on the sides of the road with choke aggregate to prevent the pickup and tracking of the emulsion by private vehicles.

Following breakdown rolling, the choke aggregate will be mechanically spread uniformly across the width of the fresh mat. Sufficient choke will be applied to prevent pickup by traffic. The final rolling with a self-propelled pneumatic-tired roller shall key in the choke aggregate and remove any marks remaining from breakdown rolling.

Traffic shall not be allowed on the fresh mat until the choke has been applied and final rolling is complete.

The exposed vertical face at the centreline edge of pavement shall be free of choke aggregate to ensure a good bond at the longitudinal joint. Contamination of the exposed face by the choke aggregate will necessitate removal or spraying with emulsion of the contaminated area.

It is anticipated that the maximum finished lift will be 75 mm in thickness. It may be necessary, if requested by the Contract Administrator, to place a levelling or scratch course in some areas prior to placement of the surface course. Where a scratch coat is necessary, the thickness of the scratch coat will generally be 25 mm. The cost of this scratch test shall be included in the unit price bid for cold-mix asphalt.

When a second course is required, loose choke material shall be broomed from the surface of the binder course prior to placing the surface course. No bituminous mixture shall be placed over a previous course less than 24 hours after final compaction of the latter.

Any area determined to be unacceptable by the Contract Administrator shall be removed and replaced by the Contractor at his expense.

Any aggregate spilled in front of the Mix Paver shall be immediately removed.

### **Measurement for Payment**

For purposes of payment, the quantity of 'coarse' aggregate used in the work shall be

deemed to be the total amount of tonnes of cold-mix placed under this contract. The weight of the emulsion and choke aggregate shall not be taken into consideration for payment purposes.

## **Basis of Payment**

Payment at the contract unit price per tonne shall be payment in full for brooming of the existing road surface; supplying asphalt emulsion as required in the mixture; supplying, handling, hauling, mixing with emulsion, placing, and rolling of the 'coarse' aggregate; supplying, handling, hauling, spreading and rolling of the choke aggregate; and for all other operations necessary to complete the work in accordance with this Special Provision and for which payment is not otherwise provided.

## **Supply and Application of Seal Coat**

### **General**

All work under this contract shall be in accordance with OPSS-304 except that the measurement for payment under each respective item shall be at the unit specified in the Form of Tender.

For the duration of this contract, the Contractor's supplier of asphalt cement must be on the MTO designated suppliers list. Asphalt cement supplied by companies not on the MTO designated suppliers list will NOT be accepted on this project.

Prior to commencement of work, the Contractor shall submit to the Owner, detailed information of the materials, (e.g. aggregate, gradation, source, emulsion type, etc.) intended to be used on this portion of the project and supply sufficient material for testing purposes. Only materials tested and approved by the Contract Administrator shall be used on this project.

The Contractor shall be responsible for the placement of protective covers for manholes, catch basins, valve boxes and curbs to the approval of the Contract Administrator. The protective covers shall be removed at the completion of surface treatment on the roadway or days end, whichever comes first.

The Contractor must provide pedestrian and vehicular access to private homes and commercial properties.

After the placing of the cold-mix asphalt, the Contractor shall apply a "seal coat" to the surface using HF-150 S Emulsion and 6.7 mm clear aggregate.

The surface treatment seal coat shall be applied when a minimum period of 15 days has elapsed following the application of the cold-mix asphalt overlay.

The rates of application for the surface seal of cold-mix asphalt are as follows:

1.65 to 1.9 L/m<sup>2</sup> for emulsion and 12 to 14 kg/m<sup>2</sup> for the 6.7 mm clear aggregate.

### Supply and Application of Aggregates

The 6.7 mm clear aggregate for this item shall be a washed material meeting the following gradation requirements:

Ministry Sieve Designation	Percent Passing
9.5 mm	100
6.7 mm	90-100
4.75 mm	50 – 100
2.36 mm	10 – 40
1.18 mm	0-10
300 m	0-7
150 m	0-5
75 m	0-1

The unit price bid shall include any hand spraying of emulsion and hand spreading of aggregate as may be required.

### Construction Schedule

The Contractor shall submit to the Owner his proposed construction schedule indicating the order of road sections to be surface treated and the estimated time required to complete each section within one week after the awarding of this tender.

### Field Sampling

The Contractor shall make specific note of this special provision. Field sampling to determine the amount of binder and aggregate application may be required, dependent upon the contractor's quality assurance.

Should the amount of binder and aggregate suspected to be unacceptable by the Contract Administrator, the Contractor shall conduct field sampling in the presence of the Contract Administrator, to determine the amount of binder and aggregate applied to the road in accordance with the Ministry of Transportation Testing Procedures.

### Acceptance

If the test result is within + 5% of the desired application rate, the test result is considered acceptable and work may proceed.

If the test result is not within + 5% of the desired application rate, the test result is considered unacceptable and work must be stopped and adjustments made to the distributor. Field sampling must be repeated in a maximum of 50 m test strips until two consecutive acceptable test results or four unacceptable test results are obtained.

When two consecutive acceptable test results are obtained, work may proceed. When four unacceptable test results are obtained before two consecutive acceptable test results, the distributor shall be permanently removed from the job.

## **Basis of Payment**

Payment at the contract price for the above tender items shall be full compensation for all equipment, labour and materials required to carry out the field sampling and patching.

## **References**

The following publications are referred to in this Special Provision:

MTO "Traffic Control Manual for Roadway Work Operations"  
MTO Manual of Uniform Traffic Control Devices (M.U.T.C.D.)  
Canadian General Specifications Board (C.G.S.B.)

## **B26 - Surface Treatment**

### **Supply and Application of HF150S Emulsion**

The provisions of OPSS 304 apply except as amended or extended herein.

The unit price bid shall be deemed to have included all labour, materials and equipment necessary to supply, heat and place the emulsified asphalt. Payment shall be based upon the tendered unit price and number of litres of emulsion supplied and placed as determined by field readings as recorded by the Owner's representative.

### **Supply and Place Class 1 Aggregate, unless specified otherwise.**

OPSS 304 and 1001 will apply except as amended or extended herein.

The work shall include all labour, materials and equipment necessary for supplying, handling, hauling, spreading, brooming and rolling and for all other operations necessary to complete the work.

Payment shall be based upon the contract unit price and the number of tonnes of material supplied, placed and compacted as determined by weigh tickets received at the site by the Owner's representative.

## Materials

### a. Emulsified Asphalt

The bituminous material used for mixing shall meet the requirements of HF150S, Emulsified Asphalt, as specified in OPSS 1103.

For the duration of this contract, the Contractor's supplier of asphalt cement must be on the MTO designated suppliers list. Included with the Form of Tender on Statement "B" shall be the name of the asphalt cement supplier. Asphalt cement supplied by companies not on the MTO designated suppliers list will not be accepted on this project.

The unit price bid shall include the supply of asphalt cement used in the mix.

### b. Aggregate General

Aggregates of the type and quality specified shall be in accordance with the provisions of OPSS 1001, "Material Specification for Aggregate - General" and OPSS 309.05.02, Tables 2 and 3. Sufficient material to complete the work shall be stockpiled prior to commencing the paving operation.

## Construction Requirements

The emulsified binder and aggregate shall be applied in accordance with all specification requirements.

Work can only proceed when the minimum ambient temperature is 10 °C and rising and the surface has been prepared to the satisfaction of the Contract Administrator.

## Field Sampling

The Contractor shall make specific note of this special provision. Field sampling to determine the quality and the amount of binder and aggregate application may be required, dependent upon the Contractor's quality assurance.

Should the amount of binder and aggregate suspected to be unacceptable by the Contract Administrator, the Contractor shall conduct field sampling in the presence of the Contract Administrator to determine the amount of binder and aggregate applied to the road in accordance with the Ministry of Transportation Testing Procedures.

## Acceptance

If the test result is within +5% of the desired application rate, the test result is considered acceptable and work may proceed.

If the test result is not within +5% of the desired application rate, the test result is considered unacceptable and work must be stopped and adjustments made to the distributor. Field sampling must be repeated in a maximum of 50 m test strips until two consecutive acceptable test results or four unacceptable test results are obtained.

## **B27 - Removal of Existing Items**

- The provisions of OPSS 510 apply except as amended or extended herein. The unit price bid for the various items shall include the following:
- backfilling with Granular "A" and reinstating to existing conditions unless the applicable items are included in the Schedule of Tender Unit Prices
- sawcutting, separating and delivering any concrete or asphalt material to an approved recycling facility.
- Thickness of the concrete and asphalt will vary; Contractors to price based on the greater of 250mm or depth shown on the boreholes. Where depths exceed these depths costs will be prorated.
- Any concrete pavement may contain wire mesh and/or dowels.
- Any concrete curbs may contain steel rebar.
- No additional payment will be made for separating, removing and disposing of concrete pavement with wire mesh, dowels or rebar. The Contractor shall incorporate this into the unit price bid for this item.
- This item shall also include breaking into smaller pieces by mechanical means if required, removal and disposal off site.
- Concrete sidewalk shall be removed in compliance with the Ontarians with Disabilities Act. The removal costs shall include all costs associated with maintaining a safe path of travel.
- The unit price bid per metre for the removal of culverts shall also include the removal of all headwalls.
- Owners shall specify if asphalt removal is payment for removal and disposal or if payment is a handling surcharge.
- Measurement for payment for the various items to be removed will be as per OPSS 510.10.

### **Abandonment of Culverts in Place**

As per OPSS 510.07.03.09 culverts must be grout filled when abandoned, to avoid possible ground depression in the future, culverts which are abandoned should be pressure filled with low strength grout to allow no air pockets and capped at both ends with forms for setting. Cement mix should be similar to OPSS 1359 except appropriate aggregate size for proper pump flow.

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## Removal & Reinstallation of Ex. Bollards & Signage

This item shall be used for the removal of the existing bollards and signage at the site. Bollards and signs shall be salvaged for reinstallation. Only bollards and signage approved for removal by the Contract Administrator shall be removed.

Payment shall be full compensation for all equipment, labour and materials required for the removal and reinstallation of each Item, payment shall be per each Item removed and reinstalled completely.

## Removal & Replacement of Chain Link Fence

The unit price bid shall include the installation or repair of chain link fencing as described in the Schedule of Quantities. Measurement for payment shall be per metre of fence actually installed or repaired.

If requested by the Contract Administrator, the Contractor shall provide all labour, equipment, and materials required to remove a section, or sections, of the chain link fence as necessary for the work proposed under this contract.

The work shall also include re-installation of the chain link fence, including replacement of fencing and/or fastening components which are damaged and/or unsuitable for re-installation, after the work is completed.

## B28 - Steel Handrail

The provisions of OPSS 908 and OPSD 980.101 apply except as amended or extended herein.

Measurement for payment shall be as per OPSS 908.09.

## B29 - Wire Mesh

The provisions of OPSS 905 apply except as amended or extended herein.

- Wire mesh shall be 152 x 152 MW11.1x11.1 (6 x 6 - 9 Gauge).

Measurement for payment for wire mesh will be per square metre of concrete sidewalk or concrete driveway installed with wire mesh.

## B30 - Base Repairs - General

The provisions of OPSS 206, 310 and Special Provision B14 shall apply to this item and shall include the following:

- Pavement removal, excavation to maximum depth of 500 mm, Granular "A" backfill and pavement reinstatement as specified.

- On asphalt surfaces, the base repair area shall be reinstated with a minimum 50 mm HL8 MDBC and 40 mm HL3. On composite (asphalt on concrete) roads, the asphalt depth shall be a minimum of 100 mm HL8 MDBC and 50 mm HL3. Base repairs on roads to be resurfaced will require only HL8 MDBC asphalt. Concrete roads will require 150 mm of 30 MPa concrete. On concrete roads which require dowels, payment for same shall be under a separate item.
- Reinstatements shall be completed within 48 hours of the excavation.

Payment for sawcutting, Granular "A", HL8 and HL3 asphalt will be made under the appropriate items in the Schedule of Tender Unit Prices.

The quantity of base repairs to be paid for will be the number of square metres of base repairs carried out based on field measurements for either:

- a. Asphalt pavement;
- b. Concrete pavement, or;
- c. Composite pavement.

## **B31 - Base Repairs - Flexible Pavement**

The provisions of OPSS 206,310 and Special Provision B14 shall apply except as amended or extended herein.

The Schedule of Tender Items shall be specified as follows:

- a. 75mm Thick Partial Depth Asphalt Repairs
- b. 100mm Thick Partial Depth Asphalt Repairs

For the unit price bid, the Contractor shall be deemed to have made allowance for the following:

- i. Removal and Disposal of Existing Asphalt or Granular Material by Milling Machine or Saw cutting and Excavating to the required depth
- ii. Clean Debris from Milled Surface
- iii. Grade and Compaction of Granular to 98% SPD if present
- iv. Supply and Place Tack Coat SS-1 to Surface and Edges
- v. Supply, Place and Compaction of MDBC to the Specified Partial Depth Repair thickness

The areas requiring base repairs will be painted by the Engineer or Contract Administrator within one working day or less upon completion of milling. These base repair areas will be measured at the same time by the Engineer or Contract Administrator.

Payment for this item shall be based on the number of square meters of base repair as measured in the field.

## B32 - Dowel Bars

The provisions of OPSS 1440 and 1442 apply except as amended or extended herein:

- The unit price bid shall include the supply and installation of 350 mm long, 20 mm diameter GFRP, stainless steel or black steel dowel bars in the existing slabs as specified in the Form of Tender.
- The Contractor shall drill holes spaced at 450 mm centres in the middle of the vertical face at the end of the repair area.
- The work includes the grouting of the dowel bars into the slab with quick setting non-shrink mortar or epoxy.

The quantity of dowel bars to be paid for will be the number of dowel bars installed based on field measurements.

## B33 - Stone Mastic Asphalt (SMA)

The provisions of OPSS 310, 1003 and 1151 shall apply except as amended or extended herein.

### 33.01 - Introduction

Stone Mastic Asphalt is a gap graded hot mix asphalt surfacing material that incorporates fiber stabilized bituminous material. It comprises a high coarse aggregate content forming a skeleton that is partially filled with a mastic binder. SMA mix characteristics include superior rut resistance, excellent macrotexture and skid resistance, and low permeability.

SMA should be specified for use on roads with high traffic volumes and heavy commercial trucks, and/or high volume bus routes. Given that SMA surfaced roads have significantly lower tire noise than conventional hot mix asphalt. Consequently, SMA can be considered for specific sites where high traffic noise levels are an issue.

This specification specifically covers SMA using cellulose or mineral fibers and is applicable to fiber materials in bulk, or in pelletized form. Alternate methods of introducing fibers to hot mix asphalt, such as by shredded shingles, or in asphalt cement, are not covered by this specification.

### 33.02 - References

The following references are specific to SMA mixes and are not provided in the main body of the specifications.

American Association of State Highway and Transportation Officials (AASHTO)  
Standards

T19 Determination of the Unit Weight and Volume of the Voids Between Coarse Aggregate in the Dry Rodded Condition

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- T89 Determination of Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- T283 Resistance of Compacted Bituminous Mixture to Moisture Induced Damage (Determination of Tensile Strength Ratio, TSR)
- T304 Determination of Uncompacted Void Content of Fine Aggregate
- T305 Determination of Draindown Characteristics in Uncompacted Asphalt Mixtures
- MP2 Superpave Volumetric Mix Design
- TP4 Preparing and Determining the Density of Hot Mix Asphalt Specimens by Means of the SHRP Gyrotory Compactor
- MP8-00 Standard Specification for Designing Stone Matrix Asphalt (SMA)
- MP41-00 Standard Practice for Designing Stone Matrix Asphalt (SMA)

### **National Center for Asphalt Technology (NCAT)**

Designing Stone Matrix (Mastic) Asphalt Mixtures Volume IV - Mixture Design Method, Construction Guidelines, And Quality control Procedures; Transportation Research Record, July 1998

## **33.03 - Definitions**

The following definitions are specific to SMA mixes and are not referenced in the main body of the specifications.

### **33.03.1 Draindown Test**

The test determines the portion of material that separates from the main sample of uncompacted SMA mix at elevated temperatures comparable to those encountered during production, transport and placement. Test values are reported in percent by mass. Draindown test procedures shall be used as outlined in AASHTO T305.

### **Stabilising Additives**

Stabilising additives are materials added to the SMA mix to inhibit the loss of bituminous binder by drainage from the aggregate. Commonly used additives are cellulose fibers and mineral fibers. Modified binder asphalts are also used as stabilising additives.

### **Mastic (Mortar)**

Mastic is the mortar comprised of fines, filler, asphalt binder and stabilising additive.

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**Nominal Maximum Aggregate Size (NMAS)**

NMAS is one sieve size larger than the first sieve that retains more than 10 percent of aggregate.

**Voids in Coarse Aggregate ( $V_{CA}$ )**

$V_{CA}$  is the volume in between the coarse aggregate particles. This volume includes filler, fine aggregate, air voids, asphalt binder, and fiber.

**Voids in the Coarse Aggregate - Dry-Rodded Condition ( $V_{CA_{DRC}}$ )**

$V_{DRC}$  is the volume between the coarse aggregate fraction as determined by AASHTO T19.

**33.04 - SMA Mix Specifications**

The SMA mix specifications are presented as follows in terms of mix design and Job Mix Formula (JMF), mix properties, and mix components.

**33.04.1 - Mix Design And JMF**

The asphalt mixture shall be composed of aggregate(s), mineral filler and asphalt cement, plus required additives and shall be combined as necessary to meet the project requirements. The mix design shall be in accordance with either the requirements of AASHTO MP8-00 using the gyratory compactor or the Marshall compaction method (50 blows per face) as outlined in the NCAT document dated July, 1998. The SMA mix design procedure focuses on achieving a specified air void content by adjusting the aggregate gradation to accommodate the required asphalt binder content.

It is the Contractor's responsibility to ensure that, in addition to the aggregate gradation requirements, the produced material will provide an asphalt mixture that conforms to the applicable design parameters listed in Table A-1.

The Contractor shall submit in writing to the Engineer the JMF for approval. The JMF shall include the information specified in the main specification document as well as the following additional information:

- a. The type and amount by weight of mix stabilizer additive to be used.
- b. The plot of the mix blend gradation on the Federal Highway Administration (FHWA) 0.45 power gradation chart.
- c. The mix properties related to the design parameters given in Table A-1.

**TABLE A-1**

**SMA MIX PROPERTIES**

<b>Design Parameters</b>	<b>Specified Value/Range</b>
Voids (%)	4.0 ± 0.5
Asphalt Content (%)	See 4.4, Table A-4
VMA	17.0 min.
Marshall Stability, N	7000 min.
Marshall Flow, 0.25 mm (0.01 inch)	8-16
Voids in Coarse Aggregate (VCA <sub>mix</sub> ) (%)	< VCA <sub>DRC</sub>
Draindown at Production Temp.(%)	0.30 max.
TSR %, @ 6.0% ± 1.0% air voids	70% min.

**33.04.2 - Fine and Coarse Aggregates**

- a. Coarse Aggregate. Coarse aggregate shall be crushed stone and unless otherwise stipulated, shall conform to the quality requirements of Table A-2.

**TABLE A-2**

**SMA AGGREGATE REQUIREMENTS**

<b>ACCEPTABLE COARSE AGGREGATE (S)</b>	<b>ACCEPTABLE FINE AGGREGATE (S)</b>
Trap Rock, Dolomitic Sand Stone, Meta-Arkose, Diabase or Andesite from approved source on MTO DSM	Manufactured from Trap Rock, Dolomitic, Sandstone, Meta-Arkose, Diabase or Andesite

Mixes with relatively pure carbonate aggregates or any aggregates known to polish shall not be used.

- b. Fine Aggregate. Fine aggregate shall consist of a blend of 100% crushed, manufactured sand. It shall conform to the quality requirements of Table A-2. The sodium sulfate soundness loss in 5 cycles shall not exceed 15 percent. In addition, the liquid limit shall not exceed 25 as determined by AASHTO T 89.

**33.04.3 - Blended Aggregate Gradation**

The blended aggregate gradation specification, based on volume, is given in Table A-3. SMA mixes may have aggregates with significantly different bulk specific gravities and for this reason, gradation based on volume is applicable. If the bulk specific gravities of the aggregates vary by 0.02, or less, then gradations based on mass may be used.

**TABLE A-3**

**SPECIFIED SMA GRADATION LIMITS BY VOLUME OF BLENDED AGGREGATE**

Sieve Designation	Percent Passing by Volume	
	Lower Limit	Upper Limit
19.0 mm	100	100
13.2 mm	91	100
9.5 mm	50	85
4.75 mm	20	40
2.36 mm	16	28
1.18 mm	--	--
600 µm	--	--
300 µm	--	--
75 µm	8	11

**33.04.4 - Minimum Asphalt Cement Content**

The minimum asphalt content is based on volume of asphalt as a percentage of the aggregate volume and therefore changes as the bulk specific gravity of the aggregate blend changes. The minimum asphalt binder content shall meet the requirements of Table A-4.

**TABLE A-4**

**MINIMUM ASPHALT CONTENT REQUIREMENTS FOR BLENDED AGGREGATES WITH VARYING BULK SPECIFIC GRAVITIES**

BULK SPECIFIC GRAVITY OF AGGREGATE BLEND	MINIMUM ASPHALT CONTENT, %
2.40	6.8
2.45	6.7
2.50	6.6
2.55	6.5
2.60	6.3
2.65	6.2

BULK SPECIFIC GRAVITY OF AGGREGATE BLEND	MINIMUM ASPHALT CONTENT, %
2.70	6.1
2.75	6.0
2.80	5.9
2.85	5.8
2.90	5.7
2.95	5.6
3.00	5.5

**33.04.5 - Asphalt Cement**

- a. Asphalt cement shall be PG 64-28 unless otherwise specified in the contract.
- b. Asphalt cement shall be mixed at a temperature as required to achieve a viscosity of 170 ± 20 centistokes. The plant mixing temperature for SMA shall not exceed 177°C.

**33.04.6 - Mineral Filler**

- a. Mineral filler should consist of finely divided mineral matter such as limestone dust, lime, or flyash. At the time of use it should be sufficiently dry to flow freely and essentially free from agglomerations. Filler should be free from organic impurities and have a plasticity index not greater than 4. Filler material for the mix shall meet the requirements of AASHTO MP8-00.
- b. Mineral filler added to the SMA mixture shall be limited to less than 20% of its weight smaller in size than 20 µm.

**33.04.7 Stabilizer Additive**

- a. fiber stabilizer, either cellulose or mineral fiber, is to be utilized. The dosage rate for cellulose is 0.3% by mass of the total mix, and for mineral fiber it is 0.4% by weight of total mix. Allowable tolerances of fiber dosage shall be ± 10% of the required fiber weight. The selected fiber should meet the properties in Table 4 of AASHTO MP8-00.

**33.04.8 SMA Mix Production**

Hot mix asphalt plants used for the production of the SMA mixture shall meet the following requirements:

- 
- a. Handling Mineral Filler. Adequate dry storage shall be provided for the mineral filler, and provisions shall be made for proportioning the filler into the mixture uniformly and in the desired quantities. Mineral filler in a batch plant shall be added directly into the weigh hopper. In a drum plant mineral filler shall be added directly into the drum mixer. Special attention is directed to providing appropriate equipment for accurately proportioning the relative large amounts of mineral filler required for an SMA mixture.
  - b. Fiber Addition. Adequate dry storage shall be provided for the fiber additive, and provisions shall be made for proportioning fiber into the mixture uniformly and in the desired quantities.

Batch Plant. Fiber shall be added into the weigh hopper above the pugmill. The addition of fiber should be timed to occur during the hot aggregate charging of the hopper. Adequate dry mixing time is required to ensure proper blending of the aggregate and fiber stabilizer. Dry mixing time shall be increased 5 to 15 seconds above the mixing times for conventional hot mix asphalt. Wet mixing time shall be increased at least 5 seconds for cellulose fibers, and up to 5 seconds for mineral fibers, to ensure adequate blending with the asphalt cement.

Drum Mix Plant. In a drum mix plant fiber shall be added into the drum mixer to ensure complete blending of the fiber into the mix. For this purpose, when adding loose fiber, a separate fiber feeding system shall be utilized that can accurately and uniformly introduce fiber into the drum at such a rate as not to limit the normal production of mix through the drum. At no time shall there be any evidence of fiber in the baghouse or returned/wasted baghouse fines.

- c. Hot-Mixture Storage. When the hot mixture is not to be hauled immediately to the project and placed, suitable bins shall be provided. Such bins shall be either surge bins to balance production capacity with hauling and placing capacity or storage bins which are heated and insulated and which have a controlled atmosphere around the mixture. In no case shall the SMA mixture be kept in storage in excess of 4 hours.

### **33.05 - Mix Transportation**

Haul times for SMA should be as short as possible. The SMA mix temperature shall not be raised to facilitate a longer haul time.

Hauling equipment should be of a type normally used for the transport of hot mix asphalt. Truck beds shall be covered and insulated if necessary, so that the mixture may be delivered on the road at the specified temperature. Truck beds should be cleaned with an approved release agent on a regular basis to avoid a build-up of fiber rich mortar. Diesel fuel shall not be used as a release agent.

### **33.06 - Mix Temperatures For Placing, Finishing, And Opening To Traffic**

The SMA mixture, when delivered to the jobsite, shall have a temperature of between 140°C and 160°C. The mixture temperature shall be measured in the truck just prior to unloading into the asphalt spreader.

Mix temperatures in the SMA mat should be continuously monitored to assess the rate of temperature dissipation under ambient conditions. Rolling operations should be completed prior to the in-place asphalt mat temperature falling below 120°C.

Traffic should not be placed on the newly compacted surface, until the mat has cooled to 50°C or lower.

### **33.07 - Compaction**

- a. SMA mixtures shall be rolled immediately following placement by the spreader. Rolling shall be accomplished with steel wheel rollers of a minimum weight of 9 tonnes (10 tons). The steel drum rollers shall be operated in the non-vibratory mode. Pneumatic tire rollers shall not be used on SMA. Rolling procedures should be adjusted to provide the specified pavement density.
- b. The SMA mix shall be compacted to at least 93% of the JMF Maximum Relative Density (MRD).
- c. Compaction quality control testing during paving should be completed with a nuclear moisture/density gauge that is calibrated for the coarse surface texture of the SMA mix. The calibration should be completed at the time of the test batch and trial paving section and relate nuclear density readings to core densities. An average of at least 5 core and nuclear density determinations shall be completed on the test batch to establish the average correction to be applied to the nuclear density readings.

### **33.08 - Test Batch And Trial Paving Sections**

A test batch and trial paving section shall be completed prior to contract paving. This will facilitate the assessment of the mixing plant process control, placement procedures, SMA surface appearance, compaction patterns, and calibration of the nuclear density gauge.

The test batch should consist of at least 50 tonnes of SMA placed in one full width pass with an asphalt spreader. The trial paving section should include the use of steel drum rollers of the type to be used for contract paving. The location of the test batch shall be agreed upon between the Owner and the contractor.

## 33.09 Quality Control Sampling And Testing

All provisions for quality control sampling and testing as outlined in the main specification document shall apply to SMA paving projects.

## B34 - Tactile Warning Surfaces

The provisions of OPSS 351 shall apply as amended or extended herein.

Plate dimension shall conform to OPSD 310.039. Suppliers include Neenah Foundry Company, Neenah Wisconsin, EJ or approved equal by the Owner. The cast iron detectable warning tiles shall be of uniform quality, free from surface defects and shall be provided with an untreated, natural surface finish as directed by the Contract Administrator. The Contractor shall provide shop drawings and installation layout details (radius and tangent plate layout) for each radius for approval by the Contract Administrator.

The detectable warning system shall be installed in fresh concrete flush with the adjacent sidewalk resulting in a snug fit between tiles to limit water infiltration around the perimeter of the system and between tiles, as directed by the Contract Administrator and installation procedures shall be according to the manufacturer's specifications.

Payment of detectable warning plates shall be by the plate of 610mm width acceptably installed to the specified conditions as measured on site by the Contract Administrator. Payment shall be broken down into straight plates and curved plates as applicable.

Payment at the contract price shall be full compensation for supplying all equipment, labour and materials for the installation of cast iron tiles and all other items of work necessary to complete this item in accordance with the contract requirements.

## B35 - Disposal Of Excavated Contaminated Soils

The provisions of OPSS 180 and Special Provisions – General, G11 shall apply as amended or extended herein.

If the Geotechnical Investigation Report indicates that the Contractor may encounter soils with elevated Sodium Absorption Ratio (SAR) and Electric Conductivity (EC) values during construction the reuse of such soil is considered permissible for backfill within the project limits under the following circumstances:

1. In project areas where municipal water services are provided via piped water system and all other soil parameters that meets Table 3 unless otherwise specified.

2. In project areas where water services are not municipally provided and the use of water wells is present and all others soil parameters that meets Table 2 unless otherwise specified.

The Contractor is advised that under the unit price bid for different items, the Contractor will dispose of all excess excavated materials within a site that can accept elevated SAR and EC.

If based on the Geotechnical Investigation Report it is anticipated that the Contractor may encounter some additional contaminated soils that exceeds Table 3 with respect to SAR and EC during construction, then the following provisions will apply:

The contractor shall load and transport all excess excavated materials to a disposal site selected by the Contractor and in compliance with Ministry of Environment, Conservation and Parks requirements for the disposal of contaminated soils. The Contractor shall submit written approval from the Owner of the disposal site indemnifying the Owner of the project against future liabilities. The Contractor shall not change the disposal site without prior written approval from the Contract Administrator.

The Contractor shall give at least three working days advanced notice to the Contract Administrator of dates that excavated materials are scheduled to be transported to the waste disposal facility for disposal.

Notwithstanding other requirements, all vehicles transporting excavated materials off-site for disposal must cover their loads at all times during the trip to minimize odours and to prevent materials being blown out of the truck during transportation.

For excavated materials that are saturated or can potentially have fluid drain during the disposal trip, only trucks that can contain the fluid and prevent it from leaking should be used. The Contractor is responsible for removing and/or cleaning up any material and/or fluid that escapes from the transporting trucks.

The Contractor shall sweep and flush the haul route at the end of each day as required if such roads are made dirty by the Contractor's vehicles, or more frequent as directed by the Contract Administrator to maintain the haul route clean.

If additional suspect contaminated soils, beyond those identified in the geotechnical report, are uncovered during excavation, these materials will be segregated, stored on site using best practices and tested to determine if they are acceptable for disposal at the Contractor's disposal site. The Owner will arrange for a representative from an approved environmental company with experience in supervising the exhumation of contaminated soil to be on-site during excavation of the soil to identify and segregate any suspect soil. Delineation of the suspect wastes for segregation will be based on visual observations by the inspector or environmental representative, supplemented with field instrument measurements as required. No excavated materials that are suspected of contamination shall be used as backfill or be removed off-site before adequate chemical test results are available to confirm the quality of the material as determined by the Engineer.

The Contractor shall assist and cooperate with the inspector to identify and segregate any suspect contaminated soil uncovered during excavation

If required, the Contractor shall arrange for the collection of representative samples from the site and laboratory testing for waste classification tests to address specific requirements of the Contractor's disposal site, as directed by the Owner's Representative. Laboratory costs shall be paid for by the Owner

Payment for disposal of excavated contaminated material shall be based on tonnage of contaminated material removed from the site based on the weigh tickets received from the disposal site selected by the Contractor. Contractor and inspector shall agree on the number of loads that were sent to the receiving site on a daily basis and the corresponding number of weight tickets shall be provided.

Payment for this item is a premium over and above the excavation item. Accordingly, cost for this item should be limited to hauling and tipping fees.

## **B36 – Tree Planting**

The work included under these specifications shall consist of the supply and planting of trees, and other related material at grade. Work includes all labour, materials, tools, services and incidentals to do all planting, including fine grading, excavation, planting, staking, mulching, care and replacements of unsatisfactory plant material at grade. All work shall be done in accordance with these specifications or as directed by the Contract Administrator.

### **Substitutions**

Supply and install plant material as specified on the plant list. Substitutions with other plant material must be presented in writing and are subject to written approval by the Contract Administrator.

### **Material Inspection**

Make plant materials available for inspection at source of supply when requested in writing by the Contract Administrator.

Give timely notice in writing to the Contract Administrator when such materials are available for inspection.

Approval of plant materials at source of supply shall not impair the right of the Contract Administrator to inspect plants upon arrival on the site or during the course of construction and reject plants which have been damaged or which, in any way, do not conform to the Specifications.

Trees are subject to acceptance by the Contract Administrator. Rejected trees shall be removed from the work site.

Trees may be rejected for any one of the following criteria:

- a. Species not conforming to specifications without approval

- 
- b. Damaged root balls
  - c. Crooked trunk
  - d. Double leaders
  - e. Trunk damage by abrasion, rodent/animal damage, sun scald, or frost cracks
  - f. Girdled trunks
  - g. Poorly developed crown
  - h. Root ball not sized according to table in subsection 2.1
  - i. Poor pruning
  - j. Excessively dried leaves
  - k. Crossing branches or weak branch crotches
  - l. Diseased or insect infested
  - m. Not healthy or not showing signs of vigour

## Guarantee

All plant materials shall be guaranteed for a period of one (1) year commencing on the date of inspection for acceptance of the planting.

During the guarantee period, replace all material that is dead or not in a satisfactory, healthy growing state or which does not meet the requirements of the specifications, at the sole discretion of the Contract Administrator, at no extra cost to the contract.

All replacements must be plants of the same size and species as shown on the plant list, supplied and planted in accordance with the drawings and specifications, or as approved by the Contract Administrator.

## Replacements

All plant materials found dead, or not in a healthy, satisfactory growing condition or which, in any other way, do not meet the requirements of the Specifications, shall be replaced by the Contractor at their own expense.

The cost of replacements resulting from theft, vandalism, carelessness or neglect on the part of others, or any causes due to circumstances beyond the control of the Contractor, shall be borne by the Owner.

All required replacement shall be by plants of the same size and species as specified on the plant list and shall be supplied and planted in accordance with the Drawings and Specifications.

## Digging of Plants

All plants shall be dug and delivered to the site as specified on the Plant List, or in the case of relocation of existing plant material on the site, dug according to the following:

- Plants specified "B/R" shall be moved with bare roots. They shall be dug and moved while dormant, with the major portion of the fibrous root system provided.
- Immediately after digging, the root system shall be wrapped or puddled and shall be kept moist to prevent drying out until planted on the site.

- All plants specified "B & B" shall be moved with solid balls wrapped in burlap.
- No plant shall be used when the ball of earth surrounding the roots has been cracked or broken preparatory to or during the process of planting, or when the burlap and ropes holding the soil ball have been removed prior to planting.

The sizes of root balls for trees shall be as specified below. Ball sizes are minimums and shall be adjusted according to growth habits of plants, and shall be sufficiently large to contain at least 75% of the fibrous root system.

Deciduous Trees – Caliper and Root Ball Diameter requirements

Caliper Size (mm)	Root Ball (m)
25	0.40
50 – 75	0.90
100	1.05
125	1.35
150	1.5
200	1.8
250	2.5

Coniferous Trees – Height and Root Ball Diameter requirements

Height (m)	Root Ball (m)
1.8-2.4	0.75
2.4-3.0	0.90
3.0-3.6	1.05
3.6-4.6	1.20
4.6-5.4	1.35

For deciduous trees with a caliper of more than 250mm and for coniferous trees over 5.4m in height, the diameter of the root ball shall be increased 150mm for every additional 25mm in caliper, or every 300mm in height.

The ball depth-ratio for "B & B" deciduous and coniferous trees shall be not less than as follows:

Root Ball Diameter Depth

- Up to 0.60m Not less than 0.45m
- 0.6m to 1.35m Not less than 0.45m to 0.75
- 1.35m and Over Not less than 50% of ball diameter

All root balls less than 0.45m in diameter shall be burlapped with 140 grams Hessian burlap or approved equal. Balls from 0.45m to 0.75m in diameter shall be double burlapped. Balls 0.90m and larger in diameter shall be double burlapped and drum laced with 6.35mm rope at 200mm spacing.

Plants relocated on site with a Tree Spade shall be moved and planted as soon as possible after digging a pre-dug hole.

Root balls requiring a wire basket shall have the burlap liner drawn tight and fastened by sewing or clamps prior to transportation out of the field.

## Handling of Plants

All plants shall be well protected against damage and drying out from the time of digging until they are planted on the site. Roots shall be protected with wet straw or suitable moisture retaining materials over the roots.

All roots shall be cleanly cut; split roots are not acceptable. Where combing is not practiced, the roots shall be evenly cut at the edges of the ball. The cut ends of all roots 25mm in diameter and larger shall be painted with asphalt emulsion.

Root balls, trunks, branches and leaves shall be protected from sun and wind desiccation.

Transporting trees shall be restricted to closed vans or trucks, or trucks covered with mesh tarpaulin or similar material to prevent windburn and desiccation in transit.

Plants shall be transported with care taken to prevent damage. Branches shall be carefully tied in such a manner so as not to break or damage trunks. Points of contact with equipment shall be padded. Bark should be protected against chafing from chains, cables, equipment, or other trees by a wrapping of cardboard or burlap, especially during transport

Plants with broken or abraded trunks or branches will not be accepted.

## Materials

All tree planting soils, where supplied by the Contractor, shall be fertile, friable and be composed of 50-60% sand, 20-40% silt, 6-10% clay and 2-5% organic matter, with an allowable acidity range of 6.8pH - 7.5pH, and be capable of sustaining vigorous plant growth. It shall be free of any admixture or subsoil, clay lumps and shall be free from stones and roots over 50mm in diameter and other extraneous matter.

Peat Moss - Peat Moss shall be of partially decomposed fibrous or cellular stems and leaves with a texture varying from porous fibrous to spongy fibrous, fairly elastic and substantially homogenous with a pH value of not less than 4.5 and not greater than 6.0. It shall be baled and free of decomposed colloidal residue, wood, sulphur and iron, be brown in colour and finely shredded, suitable for horticultural purposes. Shredded particles shall not exceed 6 mm in size.

Fertilizer - The Contractor shall be prepared to provide all necessary fertilizers to eliminate any chemical deficiencies as indicated by a soil analysis report of imported top

soil. Where top soil is supplied by the Contractor, the quantities of fertilizers required shall be based on the following minimum rates and shall be included in the Contract sum:

- 10-6-4 @ 36g/l mm cal. for trees
- 12-6-4 @ 890g/m<sup>3</sup> of top soil for shrubs

Fertilizers shall be complete, commercial fertilizers containing not less than 60% ureaformaldehyde and the following percentages by weight:

Nitrogen	Phosphoric Acid	Potash
10	6	4
12	6	6

### Plant Material

All plant materials shall meet the latest edition of the Canadian Nursery Stock Standard with respect to grading and quality.

They shall be nursery grown, under proper cultural practices as specified in most current Canadian Nursery Stock Standard.

Nomenclature of specified plants shall conform to the International Code of Nomenclature for Cultivated Plants and shall be in accordance with the approved scientific names given in the latest edition of Standardized Plant Names. The names of varieties not named therein are generally in conformity with the name accepted in the nursery trade.

Any plants dug from nature stands, wood lots, orchards or neglected nurseries and which have not received proper cultural maintenance as advocated by the Canadian Nursery Stock Standard shall be designated as "collected plants".

The use of "collected plants" shall not be permitted unless approved, in writing, by the Contract Administrator.

Plants shall be true to type and structurally sound, well-branched, healthy and vigorous and free of disease, insect infestations, rodent damage, sun scald, frost cracks, and other abrasions or scars to the bark. They shall be densely foliated when in leaf and have a healthy, well developed root system. Pruning wounds shall show vigorous bark on all edges and all parts shall be moist and show live, green cambium tissue when cut.

All plant materials shall conform to the minimum measurements specified in the Plant List except that plants larger than specified may be used. The use of such plants shall not increase the Contract price. If larger plants are used, the ball of earth shall be increased in proportion to the size of the plant, as per the root ball diameter and depth requirements above.

All plants shall be measured when the branches are in their normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to root base or from branch tip to branch tip. Caliper measurements for trees less than

100mm in diameter are taken at 150mm, and trees larger than 100mm in diameter are taken at 300mm above ground as the tree stands in the nursery.

All plants shall come from approved vendors as noted by the Contract Administrator or the Owner.

## Planting Pits

Planting pits for trees and large shrubs shall be excavated to the following minimums.

### *Deciduous Tree Planting Pit Sizes*

Root Ball Diameter (m)	Planting Pit width around root ball (mm)
0.6	120
0.75	230
0.90	300
1.05	380
1.35-1.50	460
1.80 – 2.25	610

### *Coniferous Tree Planting Pit Sizes*

Root Ball Diameter (m)	Planting Pit width around root ball (mm)
0.75 – 0.90	300
1.05 - 1.20	460
1.20 - 1.35	600

Pits shall be deep enough to allow a minimum depth of 150mm of planting soil mixture under the root ball.

The location of all planting pits shall be staked by the Contractor and approved by the Contract Administrator as per the approved planting plan prior to excavation. Major modifications to the planting plan shall be approved by Contract Administrator.

Surface soil of planting pit shall be fractured or scarified and compacted soils shall be decompact prior to planting.

## Plant Installation

Trees are to be planted in the locations as per the contract documents. Any conflicts due to underground, at grade, or overhead utility conflicts must be reported to the Contract Administrator and changes approved by the Contract Administrator.

Planting shall be done during periods suitable with respect to species, weather conditions, and locally accepted practice. Plants shall be set plumb in the centre of the

pits and at the same relation to grade as originally grown, after settlement has taken place.

Plants shall be set in partly filled pits or beds of prepared soil mixture at which time all burlap, ropes, wires, etc. shall be pulled away from the top of the ball. Root ball using a wire basket shall have the top 30cm of the basket cut away prior to planting. A layer of loose, unfrozen planting soil mixture at least 150mm deep shall be placed under each plant and tamped. Bare root plants shall be placed so that their roots lie in their natural position. Planting soil mixture shall be backfilled in layers not exceeding 150mm in depth.

Each layer shall be firmly tamped in place in such a manner that the plant retains its vertical position. Particular care shall be taken to ensure that no air pockets remain under or around the roots. The soil mixture shall be thoroughly watered with a minimum of 40L after backfilling the planting hole.

The planting soil mixture for the filling of planting pits and planting beds shall consist of five (5) parts top soil and one (1) part peat moss. Fertilizer as specified shall then be added to the soil mixture at rates as indicated in the specifications.

All amendments shall be thoroughly mixed prior to backfilling. Planting soil shall not be mixed while in a frozen or muddy condition.

Each plant (other than those in planting beds) shall have an earth saucer at its base which shall have a diameter as large as the excavated area. The saucer shall be constructed so as to retain water around the roots of the plant. The saucer shall be filled to a minimum of 50mm depth with approved hardwood chips. Chips shall be kept away from the trunks of trees, with no chips within 25mm of the trunk. Tree wrapping shall be installed to further protect the main stem.

## **Tree Support/Staking**

All tree stabilization methods shall be such so that they do not damage the tree.

### **Above Ground Staking (TYP)**

- Trees shall be braced upright in position by a minimum of two guys fastened to stakes. Guys shall be placed around the trunk at a point higher than the lowest branches of the trees in such a manner that branches will not be subject to undue strain.
- Acceptable guys: Burlap ties, Arbor Tie or approved equal shall be used.
- Acceptable stakes: Two wooden stakes 50mm square (50mm diameter round) and 1.75m in length shall be placed on either side of the tree and be located parallel with the road wherever possible.
- Stakes shall not penetrate the rootball.
- Stakes shall be driven to a minimum of 60cm deep
- See coniferous or deciduous planting specs as applicable for more detail.

### **Underground Anchoring (where indicated)**

- Root ball anchors shall be equally spaced around the tree pit at a distance of 60cm or more from the outside edge of the tree pit. The top of the anchor shall be 5cm or more below finished grade.

- A minimum of 3 anchors shall be provided.
- Root ball anchor stakes shall be wooden stakes no less than 75cm long

## Pruning

All plants shall be inspected and only dead or broken/injured branches shall be pruned at time of planting. Pruning shall be done in such a manner as to preserve the natural character of the plants. Leaders shall not be removed. A tree whose leader has been damaged will be rejected. Only clean, sharp tools shall be used. All cuts shall be clear and flush leaving no stubs. Cuts, bruises or scars on the bark shall be traced back to living tissue and removed. The affected areas shall be shaped so as not to retain water.

## Mulching

Cultivate planting soil and remove all weeds before placing approved mulch. Install mulch to cover soil of exposed tree saucers to 100mm depth as per details.

For plants not in planting bed, mulch cover shall extend 50mm beyond edge of water saucer.

When the plant is in a bed in which spacing is less than two (2) metres, the entire bed shall be mulched to a depth of 100mm. The mulch cover extends one (1) metre beyond the peripheral plants of the bed.

## Clean-Up

At the completion of planting operations, remove all debris and excess material from the site at no extra cost. Make good all damage resulting from planting operations at no extra cost.

## Maintenance

The maintenance of plant materials during the guarantee period shall be the responsibility of the Contractor.

Such maintenance shall include all measures necessary to establish and maintain all plants in an acceptable, vigorous and healthy growing condition including cultivating and weeding, watering when required, pruning, maintenance of all accessories in good condition.

At time of inspection for acceptance to begin the maintenance period, all planting beds and tree pits shall be freshly cultivated, free of weeds, leaves, broken branches and rubbish, and shall be in a neat and tidy condition.

The removal of stakes shall be completed by the contractor after materials are inspected at the end of the warranty period or as indicated by the Contract Administrator.

## Irrigation

Each plant shall have an appropriately sized drip irrigation bag provided (such as TreeGator or approved equivalent), filled immediately after planting.

Irrigation bags shall be filled once weekly for 4 weeks after both spring and fall planting (not including the initial watering at time of planting). After the initial 4 week watering cycle, irrigation bags shall be filled:

- every two weeks during the first growing season, OR
- when periods of drought occur during the first growing season for longer than 7 days.

For spring planting, the first growing season shall be considered from the date of the tree planting until the tree enters dormancy in the fall. For fall planting, the first growing season shall be considered the growing season after the tree breaks winter dormancy in the spring.

**Acceptance**

Final inspection of all plant material will be made at the end of the specified guarantee period. All plants must be in a healthy growing condition at the time of this inspection, as determined by the Contract Administrator.

**Basis of Payment**

The Contract price shall include compensation for extended watering as required during the period of construction up to final inspection to ensure good rooting and growth.

The Contract unit price for tree planting shall constitute full compensation for supplying and placing of all materials required (trees, irrigation, soils, stakes, etc); watering and fertilizer application as specified, and for all labour, equipment, and materials necessary to complete the work in accordance with the contract documents.

Measurement will be per unit placed as measured in the field by the Contract Administrator.

Payment for tree planting is not deemed as final acceptance.

**B37-EXCESS SOILS MANAGEMENT**

In addition to the conditions stipulated in the Niagara Peninsula Standard Contract Document, Item B35, the following shall also apply:

**37.01 SCOPE**

This supplementary special provision covers the requirements for the management of excess soils by the Contractor. This supplementary special provision has been developed for use on this Contract.

**37.02 REFERENCES**

OPSS.MUNI 180 - Management of Excess Materials

On-Site and Excess Soil Management, O.Reg.406/19

Rules for Soil Management and Excess Soil Quality Standards

Records of Site Condition, O.Reg.153/04

General – Waste Management, O.Reg.347

Aggregate Resources Act, R.S.O. 1990, c.a.8

Transportation of Dangerous Goods Act, 1992

### **37.03 DEFINITIONS**

For the purposes of this specification, the definitions under O.Reg. 406/19 shall apply. Additional definitions below shall also apply for clarification.

Owner: As defined under OPSS.MUNI General Conditions shall mean the owner of the project being the Municipality tendering the works.

Project Leader: As defined under O.Reg. 406/19, shall be the Owner.

Project Leader’s Qualified Person (QP-PL): A Qualified Person (QP) as defined under O.Reg. 406/19 who is retained by the Project Leader to act as the Project Leader’s representative to review, accept, and approve soil sampling and management activities and deliverables prepared by the Contractor’s Qualified Person on behalf of the Project Leader.

Contractor’s Qualified Person (QP-C): A Qualified Person (QP) as defined under O.Reg.406/19 who is retained by the Contractor to undertake on-site excess soil, and imported fill, management activities and deliverables in accordance with these specifications. The Contractor must select a QP-C that works for a different company than the QP-PL.

### **37.04 GENERAL**

#### **a) General**

Excess SOILS shall be managed in accordance with On-Site and Excess Soil Management, O.Reg. 406/19 and OPSS 180.MUNI, as supplemented and amended by the following additional requirements.

The Contractor shall comply with Ontario Regulation 406/19 On-Site and Excess Soil Management (O.Reg. 406/19), as amended, and all other documents applicable to O.Reg. 406/19 including, but not limited to, the Soil Rules and Excess Soil Standards. Any reference throughout the document to O.Reg. 406/19 also refers to the Soil Rules and the Excess Soil Standards, as applicable.

#### **b) Acceptable Consultants for Qualified Person Contractor**

- 1) The QP-PL role shall be identified by the Owner.
- 2) The QP-PL and the QP-C roles cannot be undertaken by the same consulting company.
- 3) Acceptable consulting companies to act as the QP-C shall be identified by the Owner.

### **37.05 DESIGN AND SUBMISSION REQUIREMENTS**

#### **a) Sampling, Testing and Analysis by QP-PL**

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Unless otherwise described in the Contract Documents, prior to tender the QP-PL has completed the following in accordance with O.Reg. 406/19 on behalf of the Region:

**1) Assessment of Past Uses**

The Assessment of Past Uses, or Phase 1 Environmental Site Assessment, is intended to identify any potentially contaminating activity within the meaning of Ontario Regulation 153/04 that may affect the Project Area.

**2) Sampling and Analysis Plan (SAP)**

The Sampling and Analysis Plan is intended to describe the proposed methodology for sampling and analysis, including sampling locations and the type of analysis to be conducted.

**3) Soil Characterization Report**

The Soil Characterization Report is intended to include:

- i) The results of sampling and analysis and an assessment of those results, including a description of the parts of the Project Area that were sampled and analysed.
- ii) A description of which soil may be Reused within the Project Area, with or without processing at the Project Area, and which soil may be deposited at a Class 1 soil management site, landfilling site or dump.
- iii) Having regard to the Excess Soil Standards, identification of the type of potential Reuse Sites to which Excess Soil from the Project Area may be transported for final placement Off-Site.

The Soils Characterization Report is included in this document for the use of the Contractor and QP-C in preparing Contractor Submittals. The Contractor and QP-C are solely responsible for their own interpretation of assessments and analytical results made available by the Owner.

**b) Contractor Submittals**

The following submittals are to be provided by the Contractor. The QP-PL will review and comment on the submittals within 10 working days.

All submittals shall be maintained and updated by the Contractor for the duration of the Project. Submittals and updates shall be reviewed, commented and/or accepted by the Contract Administrator prior to implementation.

The Owner, or the QP-PL if designated by the Owner, shall be responsible for filing all necessary information on the Provincial Registry. The Contractor shall not commence excavation activities until the QP-PL has reviewed the submittals and any concerns or required changes have been addressed, and no removal of excess soils from the site will be permitted until the Owner, or QP-PL have confirmed that any necessary information has been filed on the Provincial Registry. Any delays resulting from late, incomplete, or inaccurate submittals shall be the sole responsibility of the Contractor.

**1) Soil Management Plan**

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- i) The Contractor and QP-C shall prepare and submit a Soil Management Plan for the Project Area no later than 20 working days before commencement of any operations that will result in the generation of excess soil.
  - ii) The Soil Management Plan for the Work shall provide a written description of the approach to excess soil management for this contract illustrating the understanding of the requirements, and how they will be addressed. The approach to excess soil management shall include, but not limited to, the following:
    - a) Identification of the Qualified Person who will act as the QP-C including a copy of the individual's resume.
    - b) A list of the reuse sites, approved by the QP-C, proposed for the project.
    - c) Identification of analytical laboratories to be used, including their certifications.
    - d) A copy of the soil analytical data included as part of the Contract Documents, such as the Geotechnical Report, Soil Characterization Report and/or other environmental reports that provide Soil quality information. A copy of the Soil analytical data obtained by the Contractor in accordance with the QP-C's recommendation and/or required by the Receiving Site(s) (if applicable).
    - e) A site plan that identifies all the areas to be excavated, with the estimated volume and soil type and quality of each area, along with a copy of the detailed instructions to on-site contractors/sub-contractors identifying the area and depth of Soil to be excavated for off-site management.
    - f) Protocols for further characterization of Soil and excavated material quality (as required) and determining management, including re-use and/or disposal requirements.
    - g) How soil and excavated materials will be temporarily staged or stored at the Project Area or other worksites for re-use or subsequent transfer to disposal with regard for potential environmental effects and impacts to human health and safety.
    - h) Methods for minimizing the quantity of material requiring excavation and management.
    - i) Methods to maximize the re-use of excavated material within the Project Area.
    - j) How excess soil and excavated material generated by the work will be managed using best management practices and that comply with the soil rules.
    - k) How areas of known contamination (i.e. Soil that have been determined by the QP not to be reusable) will be managed and estimated quantities of

contaminated material to be disposed outside of the Project Area at an applicable licensed facility.

- l) Waste designation in accordance with soil rules.
- m) Identify location and configuration of site entrances, truck queuing and parking, dust control and mud-tracking prevention/truck cleaning, and haul routes between Source Site(s) and Receiving Site(s).
- n) Contractor's plan shall take into account all material characterization, temporary stockpiling and haulage timing restrictions.

## **2) Excess Soil Destination Assessment Report (ESDAR)**

The QP-C shall prepare and approve the ESDAR in accordance O.Reg. 406/19 no later than 20 working days before commencement of any operations that will result in the generation of excess soil.

- i) Estimated volume and quality of excess soil to be removed from the project area as excess soil.
- ii) The types of soil processing, if any, that have been conducted at the Project Area in respect of the soil that will be excess soil.
- iii) The approximate date that excess soil will commence leaving the project area and the approximate date when all excess soil will have been removed from the project area.
- iv) For each reuse site, Class 1 Soil Management Site, local waste transfer facility, landfill or dump at which excess soil will be deposited.
  - a) Municipal address (if applicable) or a description of the location including latitude and longitude, in NAD83 coordinate system.
  - b) Estimated quantity and quality of excess soil to be deposited at the site.
  - c) If the site is a reuse site, based on the assessment of past uses (if applicable), sampling and analysis plan (if applicable) and the soil characterization report, the quality of the excess soil to be deposited at the site.
  - d) Applicable to reuse sites (and confirmed by reuse site owner/operator or reuse site QP):
    - 1) 1) Property use of the reuse site and description of what the excess soil will be used for;
    - 2) 2) Description of characteristics of the reuse site, or nearby properties that influence the excess soil quality standards applicable at the reuse site; and
    - 3) 3) Applicable generic excess soil quality standards or site-specific excess quality standards applicable to the reuse site.

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- e) Description of the legal instrument in place (i.e. Environmental Compliance Approval, by-law or permit issued under a by-law passed under section 142 of the Municipal Act) relevant to the excess soil management planning, if applicable.
  - f) If the disposal site is a landfill or dump, a comparison of the excess soil results to Table 2.1 for residential use (to determine if the excess soil could be used a sensitive site). Note: to be completed beginning in 2025 and onwards.
  - g) If a fill management plan was developed for the site (provide copy).
  - h) Written consent from the operator/owner of the Reuse Site accepting the deposit of the Excess Soils from the Project. Written consent to be provided using a copy of the completed form OPSF 180-1 (July 2021), Site Selection Notification for Stockpiling Materials Managed Through Re-Use, or OPSF 180-2 (July 2021), Site Selection Notification for Material Managed as Disposable Fill, or both as applicable.
  - i) Contingency measures to be implemented in the event that the excess soil cannot be deposited at an intended reuse site, including instructions to be provided to the operator of a vehicle to ensure that excess soil is not deposited at an unplanned site and the location of an alternate site at which excess soil may be deposited if not returned to the project area, Class 2 soil management site or local waste transfer facility.
- v) For each Class 2 Soil Management Site or local waste transfer facility at which excess soil will be stored
- a) Municipal address (if applicable) or description of location including latitude and longitude, in NAD83 coordinate system.
  - b) Confirmation that the Class 2 Soil Management Site is on property owned by a public body or by the project leader for the project in relation to which the soil will be excavated.
  - c) The estimated quantity and quality of excess soil to be stored at the Class 2 soil management site or local waste transfer facility.
  - d) The approximate date that excess soil will be deposited at a Class 2 soil management site or local waste transfer facility and the approximate date when all the excess soil from the project area will have been removed from the Class 2 soil management site or local waste transfer facility.
  - e) A list of the reuse site(s) at which the excess soil will be ultimately deposited on, and dates when the reuse site(s) will accept the excess soil.
  - f) List any site-specific instrument that governs the reuse site, as well as the public body responsible for issuing the instrument and any additional relevant information.

### 3) Fill Management Plan for Project Area

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Submit a Fill Management Plan for the Project Area, prepared by the QP-C, no later than 20 working days prior to receiving Soil.

- i) The Fill Management Plan for the work shall incorporate all pertinent details, background information, recommendations, and mitigation and monitoring measures presented herein, and/or by the Contract Administrator or Contractor's own investigations. The Fill Management Plan shall comply with the Contract Documents, O.Reg. 406/19, and all Applicable Laws, and shall describe and include, at a minimum, the following:
  - a) Procedures to prevent the introduction of invasive plant or animal species.
  - b) Copies of any documentation regarding municipal or Conservation Authority licenses/permits, provisions of provincial plans which apply to the Project Area, and any requirements of provincial ministries.
  - c) Identification of appropriate Soil quality and Soil types for Excess Soil to be received at the Project Area as determined by the Contractor's QP based on site location/sensitivity, anticipated land use, ground water use/sensitivity, pre-existing site conditions or other factors as to ensure that there is no likelihood of adverse effect.
  - d) Dust and noise control measures in accordance with the Contract Documents.
  - e) Erosion and sedimentation control measures in accordance with the Contract Documents.
  - f) Identify location and configuration of site entrances, truck queuing and parking, dust control and mud-tracking prevention/truck cleaning, and haul routes between Source Site(s) and Receiving Site(s).
  - g) Project Area security measures.

**4) Source Site Documentation for Imported Soil (Only on projects requiring Borrow)**

The Contractor shall submit a protocol for imported fill material, prepared by the QP-C, no later than 7 working days prior to receiving soil on site.

- i) The protocol shall include, but not be limited, to the following:
  - a) Identification of the procedures being utilized to ensure that each load is accompanied by documentation, signed by the Source Site QP, which includes appropriate and representative Soil analyses, of the soil at the source site(s), confirming the Soil quality is acceptable for the Project Area receiving location in accordance with O.Reg.406/19.
  - b) A soil placement/segregation protocol sufficient to identify where incoming Excess Soil, from each Source Site, has been placed, such that it can be assessed if required.
  - c) Confirmation that visual and olfactory inspections will be conducted of all incoming loads to screen for odour, visible staining or debris.

- d) Contingency measures for load rejections.
- ii) The QP-C shall review Soil documentation from Source Site where material will be imported from in advance of receipt of materials and shall provide written approval for acceptance at least 7 working days prior to receiving Soil.
- iii) The requirements of O. Reg.406/19 do not apply to imported soil originating from a pit or quarry licensed under the Aggregate Resources Act.

#### **5) Soil Tracking System and Data Management Plan**

The Contractor and/or the QP-C will prepare and submit a Soil Tracking System and Data Management Plan no later than 20 working days before commencement of any operations that will result in the generation of excess soil.

- i) Soil Tracking System and Data Management Plan shall be capable of tracking the following information in respect of each load of excess soil that is removed from the project area:
  - a) The locations of the project area where the soil was excavated and stockpiled, if applicable, and the quality of the soil associated with those locations and stockpiles.
  - b) The quality of the load of excess soil being removed from the project area, unless the excess soil is to be sampled at a Class 2 soil management site or a local waste transfer facility.
  - c) The quantity of the load of excess soil being removed from the project area.
  - d) The location of the site at which the excess soil is to be deposited as communicated to the driver of the vehicle.
  - e) The date and time the excess soil left the project area.
  - f) The person from the project area responsible for overseeing the loading of the excess soil for transportation.
  - g) The name of the corporation, partnership or firm transporting the excess soil, the name of the driver of the vehicle and the number plates issued for the vehicle under the Highway Traffic Act.
  - h) The date and time the excess soil was received at the site where the excess soil has been deposited.
  - i) The contact information of the person who acknowledged receipt of the load of excess soil on behalf of the site where the excess soil was deposited.
  - j) Confirmation that the vehicle that deposited the excess soil and the volume of soil received at the site where the excess soil was deposited is the same as that which left the project area.
- ii) The Soil Tracking System and Data Management Plan should also include:

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- a) Project team and their qualifications. The team should be led by the QP-C with adequate support.
  - b) Description of soil tracking relational database (the Database) and any hardware or software requirements including primary, backup and/or redundant systems required to execute the work.
  - c) Description of data storage and back-up processes to protect collected data.
  - d) Description of data security measures to be implemented.
  - e) Description and live-demonstration of the tracking system, including accessibility and passwords to be used by various parties, including Owner, QP-PL and imported soil supplier (when applicable).
  - f) Using example data, a description of column headers, including units of measurement, assumptions, and any formulas required to calculate or transform the raw data into useable real-world data.
  - g) Demonstrate how the following will be accounted for:
    - 1) Details of daily tracking truck weigh tickets for material transported to a Ministry-approved licensed Off-Site facility and tracking documentation to the QP-PL daily during excavation activities.
    - 2) Details of daily tracking of excavated soil volumes for Reuse in the Project Area, or for transfer to an Off-Site Reuse Site(s).
    - 3) Details of daily tracking of imported soils for use in the Project Area.
    - 4) Details of daily tracking of sampling results from soil samples collected by the Contractor or by others from Off-Site facilities.
    - 5) Details of daily tracking of imported soil sampling results from soil samples collected by Others from Off-Site facilities (when applicable).
    - 6) Details of tracking On-Site soil stockpiles, including location on site, stockpile type (imported, exported, re-use, and/or treated soils) and change management related to stockpile closures or re-use (when applicable).
  - h) Process by which soil approval and rejection between Contractor and QP-C will be managed and communicated to the various parties.
  - i) Details of tracking Environmental Compliance Approvals, operating licenses, or permits for the Ministry-approved licensed Off-Site facility, soil transportation company.
  - j) Details of process and documentation demonstrating acceptance of soil by the receiving facility.
  - k) Anticipated difficulties and proposed resolutions.

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## 37.06 CONSTRUCTION

### a) Contractor Responsibilities

- 1) The Contractor shall review and understand the available environmental data on the excess soils to be generated, as provided within the Soil Characterization Report.
- 2) The Contractor shall be responsible for finding appropriate receiving sites for all excess soil, and all source sites for imported fill, associated with the Project.
- 3) The Contractor shall retain the services of the QP-C for the purposes of completing on-site excess soil, and imported fill, management based on the O.Reg. 406/19 and applicable supporting regulations. The QP-C shall meet the following minimum requirements:
  - i) A minimum 10 years of work-related experience for projects of similar size, scope, and complexity to the Project.
  - ii) A current license with a public body within Ontario such as Professional Engineers of Ontario or Professional Geoscientists of Ontario.
  - iii) Knowledge of relevant federal and Ontario environmental policies, procedures and legislation/regulations.
  - iv) Experience liaising with other specialty consultants, Contractors and Governmental Authorities.
  - v) Experience with similar projects in Ontario.
- 4) The Contractor shall be responsible for the On-Site and Off-Site deposit of Excess Soils from the Project Area and will be responsible for executing the requirements of the Reuse Site in relation to import of Excess Soils originating from another site. This shall include all necessary sampling, documentation and reporting to support placement of material at the Reuse Site(s) including the identified submittals. If required, the Contractor will be responsible to supply the necessary planning documents for a notice on the Registry as identified in O.Reg. 406/19, to be prepared by the QP-PL.
- 5) The Contractor is responsible for management of the imported fill, and on-site soil material, to ensure that the Soil Quality Standards of any imported fill and on-site Soil material is in accordance with O.Reg. 406/19, Applicable Laws and the Contract Documents.
- 6) The Contractor shall provide Excess Soil Management Monthly Monitoring Reports to the Contract Administrator.
- 7) The Contractor shall be responsible for the design of any required On-Site storage areas, processing equipment and areas, testing, and transportation including Off-Site haulage and deposit of the Excess Soils.
- 8) The Contractor shall submit a plan of any temporary On-Site storage areas for the duration of the project. The plan shall include the erosion and sediment controls.

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- 9) The Contractor shall comply with the requirements outlined in a Fill Management Plan, should it exist for the Reuse Site, Excess Soil Destination Assessment Report and/or site-specific Instrument of the Reuse Site where Excess Soil will be placed, as applicable.
  - 10) The soil removed from site shall be dry. Otherwise, hauling of liquid soils will be in accordance with provisions in the soil rules.
  - 11) The Contractor shall determine the consistency, quality, and quantity of excavated material generated as a result of construction activities. Unless otherwise designated, the QP-C shall undertake any required additional sampling and testing of the excavated materials supplemental to the available environmental data and to evaluate the suitability for Reuse either within the Project Area or at an Off-Site Reuse Site.
  - 12) Soil treatment will not be permitted within the Project Area unless otherwise noted in the Contract Documents. Should the Contractor elect to treat, and Reuse Excess Soils generated from the Project Area Off-Site, the Contractor shall be solely responsible for meeting all Regulatory requirements at the Off-Site facility.
  - 13) Prior to Completion, the Contractor shall provide every document and record created or acquired under O.Reg. 406/19 to the Contract Administrator and Owner, including, but not limited to, all reports prepared, hauling records, weigh bills/bills of landing for each load of Excess Soil and any contracts the Contractor entered into relating to the management of Excess Soil from the Project Area including transportation of Excess Soil. The Contractor shall also retain these documents and records for a period of at least seven years after Completion and provide to the Contract Administrator and Owner as requested at any time during this period.

**b) Contractor's Qualified Person Responsibilities**

The responsibilities of the QP-C shall include but are not limited to:

- 1) Review the Contract Documents and other documentation provided by the Contract Administrator and supplement as needed based on the Contractor's construction plans.
- 2) Preparation of a Soil Management Plan for the Project Area.
- 3) Preparation of a Fill Management Plan for the Project Area if excess soils are intended to be received for beneficial reuse at the Project Area as part of the Work (also referred to as imported fill material).
- 4) Preparation of an Excess Soil Destination Assessment Report for the Excess Soil.
- 5) Development and implementation a Soil Tracking System and Data Management Plan, or, where the Owner has implemented its own tracking system, maintain the Owner's tracking system during construction in relation to loads leaving the Project Area and being deposited at the reuse site.

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- 6) Undertake Soil sampling and analysis, management of Soil activities and deliverables in accordance with O.Reg. 406/19 and the Contract Documents.
  - 7) Obtain and review a copy of the Receiving Site's Fill Management Plan to confirm that the soil quality at the Source Site is acceptable for reuse at the intended Receiving Site. Written documentation from the Receiving Site should be obtained to confirm that the soil was received, and the quality and quantity were acceptable.
  - 8) Complete the applicable declarations as outlined in the Soil Rules.
  - 9) Review the existing analytical soil data provided in the Contract Documents and compare it against the applicable Excess Soil Standards and determine whether the existing data is sufficient. If the QP-C recommends additional sampling, the contractor shall undertake additional sampling, testing, analysis and reporting to the satisfaction of the QP-C and as approved by the QP-PL and/or the Contract Administrator.
  - 10) If the owner or operator of the Receiving Site(s) require additional Soil sampling and analysis, beyond what has been provided in the Contract Documents, the QP-C shall carry out all additional sampling, analysis and reporting as required.
  - 11) Comprehending and approving all soil management related submittals prepared by other personnel in the Contractor's Project team prior to submitting to the Contract Administrator and coordinating all such submittals and activities to provide a coherent process.
  - 12) On projects requiring borrow material, prepare a Source Site Documentation for Imported Soil Review. If additional sampling and characterization prior to accepting the materials is required, the Contractor shall undertake additional sampling, testing, analysis and reporting to the satisfaction of the QP-C and as accepted by the QP-PL and Contract Administrator. All costs associated with additional sampling, testing, analysis and reporting shall be borne by the Contractor.
  - 13) Ensuring regulatory compliance to applicable environmental legislation and laws for soil management.
  - 14) Retain any document or record prepared by the QP-C or prepared under the oversight of the QP-C under this Contract for a period of at least seven years after the date that the document or record is prepared.
  - 15) Enforcing adherence within the Contractor's organization, including subcontractors and suppliers, to the requirements for excess soils management identified in this specification.
  - 16) Resolving recommended actions to mitigate hazards.
  - 17) Documenting all environmental and compliance issues and resolution of follow-up actions related to soil management.
- c) **Additional Sampling, Testing and Analysis by Contractor**
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- 1) If, for the purpose of accepting Excess Soils, the Reuse or Disposal Sites selected by the Contractor require additional sampling, testing and analysis beyond that provided in the Soil Characterization Report, the QP-C shall complete such work prior to the start of excavation.
  - 2) If, after the start of construction, areas of potentially contaminated material are encountered that were not identified in the Soil Characterization Report and if, at the QP-PL's discretion, it is necessary to conduct additional sampling, testing and analysis within the Project Area to comply with O.Reg 406/19 requirements, the QP-C shall undertake such work. Separate payment for this work will only be made if, further acceptance by the QP-PL on the need for the additional testing, approval is provided by the Contract Administrator in advance of undertaking the additional sampling, testing and analysis.
  - 3) Prior to proceeding with any additional sampling, testing and analysis, the QP-C shall outline the work required for review and acceptance by the QP-PL.
  - 4) Samples to be tested shall be collected under the direction of the QP-C.
  - 5) Testing services shall be performed by a testing agency approved by the QP-PL.
  - 6) Test reports, including results and interpretations of results compared to the applicable criteria, and certification of conformance with specified requirements, shall be transmitted directly from the testing agency to the QP-C and QP-PL. Copies of the analytical data shall be appended to the body of the report in an electronic data delivery (EDD) format acceptable to the QP-PL.
  - 7) Testing reports shall be prepared under the direction QP-C and submitted to the QP-PL.
  - 8) The QP-PL will be responsible for updating the Soil Characterization Report as necessary.
- d) Storage, Processing, Site Transport and Off-haul**
- 1) Storage, processing, site transport and off-haul shall be undertaken in accordance with the Soil Rules and the reviewed submittals.
  - 2) Storage, transportation and processing of liquid soils shall be undertaken by the Contractor in accordance with O.Reg.406/19, including the requirements detailed within the Soil Rules. No more than 10,000 m<sup>3</sup> of liquid soils, processed or dewatered or solidified soil and process residues may be present at the site at any one time. Liquid soils shall be stored in a leak-proof container on an impermeable surface to contain and prevent the material from leaking into the natural environment.
  - 3) Transport and disposal of classified hazardous materials shall be handled in accordance with applicable regulations including O.Reg.347 and the Transportation of Dangerous Goods Act.

**e) Tracking System**

Contractor Developed

- 1) The Contractor and/or the QP-C shall develop a tracking system to track each load of Excess Soils, during the transportation and deposit at an On-Site or Off-Site Reuse Site or at a disposal site if soil is unsuitable for Reuse. The tracking system shall provide the information identified in section 20XX.04 c) 3).
- 2) A person who is operating a vehicle for the purpose of transporting the Excess Soils, shall provide the tracking information to any provincial officer, upon request to ensure compliance with Section 18 of O.Reg 406/19.
- 3) The Contractor and the QP-C shall determine the appropriate means of estimating the quantities of Excess Soils loaded, transported and received.

#### Owner Directed

Utilization of SoilFlo software to undertake the tracking of excess soils in accordance with the Ontario Regulation O.Reg. 406/19. The use of this software is mandatory for this project.

#### **1) Software License**

- i) The Contractor will be required to obtain a license with SoilFlo for this project. An allowance is included in the Pricing Table for the purpose of covering costs for the SoilFlo license.

#### **2) Tracking System Management**

- i) The Contractor and the QP-C will be responsible for the day-to-day documentation (i.e. truck information, load tickets, etc.) for all loads leaving the project site, and delivered to the re-use site using SoilFlo software. The Contractor shall update truck information (i.e. trucking company, license plate, truck number, driver, etc.) on a daily basis.
- ii) The Contractor shall arrange to have competent and consistent staff, with reliable devices (i.e. daily charged phone, tablet, computer, etc. with back up external charging devices or the ability to recharge), to properly log the truck tickets for loads leaving the project site and arriving at the re-use site(s). The Contractor's staff responsible for the soil tracking shall: be adequately trained in the use of the software; be adequately trained to discern between the different soil types; and coordinate any segregation of soils with the Site Inspector, Contract Administrator, and/or the Qualified Person.
- iii) The Contractor and/or the QP-C shall coordinate with the Contract Administrator and the QP-PL to determine an appropriate method of logging loads arriving at the re-use site(s). At the end of each working day, the Contractor shall be responsible for reconciling in SoilFlo (i.e. closing open tickets) all loads arriving at the re-use site(s) at the end of each working day. The Contractor shall be able to provide suitable documentation to verify the chain of custody requirements in accordance with O.Reg. 406/19. The Contractor shall coordinate daily with the re-use site(s) to ensure the efficient transfer of excess soil.
- iv) A mandatory training session, included in the cost of the license, will be provided for any, and all, of the Contractor's staff that will be utilizing the software. SoilFlo

is readily available during the tendering process for demonstrations/trials/support prior to bid submission and during the active project.

SoilFlo Contact:  
Kevin Goldberg  
President, SoilFlo  
www.soilflo.com  
Phone: 416-904-1180  
Email: Kevin.goldberg@soilflo.com

- v) A person who is operating a vehicle for the purpose of transporting the Excess Soils, shall provide the information required under Section 18 of O.Reg 406/19 to any provincial officer, upon request.

**f) Reuse and Disposal Sites**

- 1) For greater certainty, the Owner has not designated or identified specific haulers, receivers, Reuse Sites and/or disposal sites for excess materials generated under this Contract. The Contractor is solely responsible for identifying and selecting appropriate haulers, receivers, and/or disposal sites required to complete the work of this Contract.
- 2) The Contractor shall confirm the Receiving Site of any hauled material is governed by an instrument (i.e. permit). If the Receiving Site is not governed by an instrument, the following conditions must be satisfied:
- i) Soil quality must not exceed the applicable Excess Soil Standards or site-specific standards (if applicable).
  - ii) The primary use of the Reuse Site must not be the deposit of Excess Soil.
  - iii) A beneficial purpose for which the Excess Soil is to be used at the Reuse Site is to be identified (e.g. backfill, final grading, etc.)
  - iv) The quantity of deposited Excess Soil at the Reuse Site must not exceed the quantity necessary for the beneficial purpose identified.
  - v) The Excess Soil must be finally placed no later than two years after it is deposited at the Reuse Site (does not apply if the Excess Soil is to be finally placed at a reuse site that is part of an undertaking related to infrastructure).
  - vi) The Excess Soil must be finally placed in accordance with any requirements set out in the Soil Rules.

**g) Excess Earth Quantity Report**

The Contractor shall have Form OPSF 180-6 (July 2021), Excess Earth Quantity Report, completed during construction by the QP-C and made available to the QP-PL and/or Contract Administrator upon request within 3 Business Days of such request being made, for information purposes only. The form shall account for all excess earth managed as disposable fill, by stockpiling, and by re-use. Revisions shall be highlighted. The form shall confirm the submission date of the corresponding Notification of Site

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Selection and Property Owner Release forms. The Contractor shall have the QP-C provide a final completed Quantity Report Form OPSF 180-6, to the QP-PL and Contract Administrator prior to Contract Completion, for information purposes only.

**h) Verification of Excess Soil Reuse Plan**

Within 14 Days of the completion of the excess soil reuse plan, the Contractor shall have the QP-C provide a report to the QP-PL and Contract Administrator verifying that excess soil has been placed to the correct reuse site(s) for the quantity and the beneficial purpose identified in the excess soil reuse plan, as amended, for information purposes only. Amendments to the plan shall be identified in the report.

## **37.07 BASIS OF PAYMENT**

**a) Software License**

An allowance is included in the Pricing Table for the purpose of covering costs for the SoilFlo license. Payment for the software license will be made on a monthly or lump sum basis based on the provision of a paid invoice and will be applied against the allowance amount. Payment will be made on the value of the invoice with no mark-up applied.

**b) Qualified Person**

- 1) An allowance is included in the Pricing Table to cover the costs for the QP-C to meet the requirements of the specification.
- 2) Payment for this item will be made based on the provision of a paid invoice and will be applied against the allowance amount.

**c) Additional Soil Sampling and Testing**

- 1) An allowance is included in the Pricing Table to cover the costs for additional sampling, testing, and analysis, beyond that provided in the Soils Characterization Report, that may be required by the Reuse or Disposal Sites selected by the Contractor, or areas of potentially contaminated material are encountered that were not identified in the Soil Characterization Report
- 2) Payment for this item will be made on a monthly or lump sum basis based on the provision of a paid invoice and will be applied against the allowance amount.

## C1 – Sewers

The provisions of OPSS 410 apply except as amended or extended herein.

The work under this item shall include, without limitation, all labour, material and equipment required for the supply and installation of storm and sanitary sewers in the material, sizes and classes as specified herein and to the elevations, grades and locations as detailed on the contract drawings. Installation (unless otherwise specified) shall be vertical trench open cut method and shall include all sheeting, shoring, dewatering, excavation in the trench in all types of soils and disposal of surplus excavated materials and backfill.

All sewers shall be installed in a supported excavation (vertical trench) in accordance with OPSD 802.010, 802.013, 802.014, and 802.020 for flexible pipe and OPSD 802.030, 802.031, 802.032, or 802.033 for rigid pipe. The width of trench shall be approved by the Contract Administrator. The work under this item shall include any form of trench support required. Such trench support, if used, shall be approved by the Ministry of Labour under the Occupational Health and Safety Act and Regulations prior to its use. All

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

PSM type polyvinylchloride (PVC) sewer pipe - smooth wall (CSA B182.2) - 100mm - 600mm inclusive;

Reinforced Circular Concrete Sewer Pipe – CSA A257.2

All PVC fabricated and molded fittings shall be CSA Certified.

All bedding and cover material shall be virgin Granular 'A', recycled materials will not be accepted. Trench backfill under the travelled portion of the road, sidewalks and driveways shall be Granular A' conforming to OPSS 1010 and compacted to 100% S.P.D. unless specified otherwise. Select native material, as approved by the Contract Administrator, shall be used for backfill for all other areas and shall be compacted to 95% S.P.D.

The Contractor shall trace and confirm the location and depth, at the R.O.W. limit, of all existing sanitary laterals for each residence prior to placing the pre-manufactured tee on the proposed sanitary sewer.

All catchbasin leads shall be 250 mm (10") dia. or 300 mm (12") dia. PVC DR-35 at a minimum slope of 0.5% unless specified otherwise.

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. Should the Contractor choose to make temporary connections to ensure the same, these connections shall be removed in full

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 or damaged, the Contractor shall replace or repair the same regardless of the material.

Upon completion, all sewers shall be flushed and CCTV inspected. Payment for the CCTV inspection and flushing of sewers shall be included under the appropriate contract item. Should the CCTV inspection reveal a defect in the sewer or either of the deflection tests (flexible sewer pipe only) fail, the Contractor shall be responsible for the repair of the sewer and shall bear the cost of the repair, including all reinstatements, re-testing and a second CCTV inspection. The method of repair shall be approved by the Contract Administrator.

Payment for granular material specified for backfill, cover and bedding shall be included under the appropriate granular item.

Measurement for payment under this item shall be as per OPSS 410.09.01.01. Payment at the tendered unit price shall be full compensation for all related costs, including sawcutting.

The following provisions shall apply to flexible or rigid sewer pipes respectively:

## **Flexible Sewer Pipe**

For the purpose of this specification, flexible storm sewer pipe shall be treated in the same way as flexible sanitary sewer pipe. Accordingly, all work shall be carried out in accordance with OPSS 410 and OPSD 802.0 10.

All flexible sewer pipes, 200 mm (8") dia. and greater, shall be PVC class DR35 (or approved equal) unless specified otherwise. All flexible sewer pipes, less than 200 mm 8") dia., shall be PVC class DR28.

All connections to structures, manholes or other pipes shall be made with Kor'n'Seal adaptors or approved equivalent.

All service and/or catchbasin Lead connections to the proposed flexible sewer pipe shall be made with pre-manufactured tees (or as specified on OPSD 1006.020).

The work under this item shall include deflection testing, generally in accordance with OPSS 410.07.1605. A mandrel or pig, not less than 95% of the base inside diameter (as defined in the CSA or ASTM standard to which the pipe is manufactured), shall be successfully drawn through the flexible sewer pipe installed under this contract. A total of two tests shall be completed; one upon substantial performance and the second at the end of the one year maintenance period. All tests shall be carried out in the presence of the Contract Administrator, or their representative.

## **Rigid Sewer Pipe**

The work shall conform to OPSS 410, 514 and 516 and OPSD 802.030 — Class B'.

All rigid sewer pipe shall be concrete CL 65-D, Type 50 cement unless specified otherwise.

All connections to manholes shall be affected by use of non-shrink fill in accordance with OPSD 708.020.

All service and/or catchbasin lead connections to the proposed rigid sewer pipe shall be made with pre-manufactured tees (or as specified on OPSD 1006.010).

## **C2 - Sewer Laterals**

The provisions of OPSS 410 and Special Provision C1 shall apply except as amended or extended herein.

Connections to the sewer shall be made by a proper tee or approved saddle and shall allow for the following:

- Vertical risers, where the angle of the lateral at the main sewer is 30 degrees or more from horizontal.
- Sweep bends for required bends.
- Connections to the existing lateral and/or sewer main are paid for under item C4.

Measurement for payment shall be as per OPSS 410.09.01.02.

## **C3 – SANITARY SEWERS LOW PRESSURE AIR TESTING FOR NEW SEWERS**

### **LOW PRESSURE AIR TESTING**

Where an item is included in the form of tender, a low-pressure air test shall be conducted on all sanitary sewer systems and all laterals as per OPSS 410.07.16.04.03. In addition to the procedure outlined in this section, the Contractor will be required to seal each of the sanitary lateral cleanouts making them airtight for the test and to notify the residents in writing of the time and date of the test. Any and all defects discovered during this testing shall be immediately repaired as directed and the system retested to the satisfaction of the Contract Administrator.

### **PAYMENT**

Payment shall be defined per length of each section between two consecutive Maintenance Holes.

## **C4 - Reconnect Existing Sewer Laterals**

The provisions of OPSS 410 and Special Provisions C1 and C2 apply except as amended or extended herein.

Bedding conforming to OPSD 802.010 shall be used and a watertight connection to the existing lateral is to be made with an approved rubber coupler with stainless steel connecting bands.

It is the intention of this contract to provide one (1) new sanitary sewer service connection to each property along the new sanitary sewer main within the limits of this contract. It is possible that some buildings may have more than one active existing service. Additional 'extra' connections shall not to be made until it is completely reviewed, inspected and approved by the Contract Administrator

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 the disruption to a maximum four (4) hours.

The unit price bid for this item shall include the reconnection of the sewer lateral at the main sewer or riser and at the existing sewer lateral with the appropriate couplings. The Contractor is advised that records of existing pipe diameter and material types may be inaccurate and thus the true quantity of replacement materials may be uncertain. As such, it is advisable to have couplings of varying diameters available on site to facilitate an efficient reconnection. The Contractor shall make due allowance in the unit prices to account for this.

The unit price shall also allow for up to two metres of additional sewer piping and suitable size coupling. Additional piping required for the sewer lateral reconnection beyond two metres will be paid under the sewer lateral item.

## **Reconnect Sewer Laterals**

Once exposed and confirmed to be active, the Contractor shall connect the new lateral pipe to the existing lateral with all necessary connectors and adapters, including but not limited to sweep bends and eccentric reducers if necessary. The new lateral shall be a minimum of 2.0 m deep, or as deep as possible given the grade of the main sewer.

## **CCTV Lateral for Investigation**

The work for this item shall include the supply of all labour, equipment and materials necessary to undertake, the closed circuit television (CCTV) inspection of sewer laterals as identified by the Construction Inspector in order to determine connectivity of the lateral. Connectivity is to be confirmed prior to the lateral being reconnected. No digital report is required for this item.

## **Dye Test Building to Confirm Connectivity**

If the T.V. inspection of the sanitary lateral is not conclusive about where the source connection is, the Contractor shall be required to Dye Test the sanitary lateral.

Prior to any work being undertaken, and for each building designated by the Contract Administrator, the Contractor shall confirm with dye testing which sewer the building is connected to. The Contractor shall arrange with the building owner (or occupant) to

investigate the internal plumbing of each building and dye test as many fixtures as necessary to confirm the connectivity.

## **Plug Abandoned Laterals**

Any exposed laterals deemed to be abandoned shall be plugged with concrete. Measurement for payment will be for each lateral that is plugged.

Measurement for payment under this item shall be for each lateral reconnected.

## **C5 - Flush and T.V. Inspect Sewers**

The provisions of OPSS 409 apply except as amended or extended herein.

Upon completion of installation, the sewer main will be flushed and T.V. inspected. The contractor will be fully responsible for the materials supplied and workmanship; including the supply of two (2) copies of the written reports and digital video files in approved format, after completion of each inspection. The written report shall include a photograph at every service connection.

The basis of payment for this item shall be per metre for mainline sewer inspection and flushing; the TV inspection of sanitary sewer laterals shall be per individual lateral inspected (e.g. each), irrespective of the length, condition or outcome of the lateral inspection and it will be paid, as identified in the Schedule of Quantities.

The Contractor's price bid shall represent the entire cost to complete this testing, any required retesting and all necessary equipment, labour and materials until the Contract Administrator deems the entire system satisfactory. No further payments will be made for these requirements.

## **PAYMENT**

Payment for flushing and TV inspection, will be withheld until the final report is completed and submitted.

Completion will not be established until reports have been submitted, reviewed and accepted by the Contract Administrator.

## **C6 - Pre-Cast Concrete Manholes Catch Basins and Ditch Inlets**

The provisions of OPSS 407 apply except as amended or extended herein.

A minimum clearance of 500mm shall be provided between the concrete structure and the trench wall to facilitate proper compaction of the specified backfill material.

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.

A 20 MPa concrete cradle shall be provided from and around the manhole to the first pipe joint of inlet and outlet pipes (OPSD 708.020).

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). Unless specifically noted, catchbasins do not require pre-manufactured water tight connections.

For sanitary sewer maintenance holes, 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 1mm thick and 150mm wide, wrapped around the outside of joint, 75mm overlap on each side of the joint.

The unit price bid for this item shall be complete compensation for all labour, equipment and material (frames, covers and/or grates, aluminium safety rungs, safety gratings, bulkheads, adjustment units, couplings) to complete the work, including any bypass pumping, dewatering, sheathing, shoring and bracing to complete the work. Excavation, removal and disposal of surplus excavated materials shall also be included in the unit price. The removal and disposal of any existing structure shall be paid under the appropriate item.

## C7 - Cleanouts

The unit price bid shall cover the supply and installation of cleanout units at or near the property line, all as detailed in the municipality's standard drawing, and shall include the cost of all connections to the sanitary sewer laterals and reinstatement of the site.

Cleanout units shall consist of PVC class SDR 28 pipe material and shall be delivered complete of all components such as cap, stem, tee, reducers, couplings etc.

Cleanout caps shall be Crawl type or as manufactured by Duratron Systems Limited or similar approved types.

Cleanouts installed within paved areas shall have caps consisting of flat metal plates with no protruding bolts or nuts and shall be installed flush with the surrounding asphalt or concrete surface. In all other areas caps shall be placed approximately 50 mm below the ground surface.

Prior to the cleanout installation the Contractor shall submit a sample of the cleanout unit to the Contract Administrator for approval.

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## D1 - Watermains

The provisions of OPSS 441, the Niagara Peninsula Contract Document – Item D1, D4, D5, D6, and D7 apply, except as amended or extended herein.

All watermain fittings, pipe and fixtures are to be “lead free” and shall comply with NSF/ANSI 61: Drinking Water System Components – Health Effects (2016 as amended) and with NSF/ANSI 372: Drinking Water System Components – Lead Content (2016 as amended). All fittings must be certified as compliant by an industry recognized and accredited third party per the requirements of NSF/ANSI 61 and NSF/ANSI 372.

At the request of the contract administrator, the contractor shall supply manufacturers’ documentation stating their compliance with said standard.

Any pipes, fittings or fixtures installed where documentation of NSF/ANSI 61 and NSF/ANSI 372 compliance is not provided shall be removed and replaced by contractor at their cost. No additional costs will be entertained for any works associated with the replacement of a non-conforming component.

The work under this item shall include, without limitation, all labour, material and equipment required for the supply and installation of watermains in the material, sizes and classes as specified and to the elevations, grades and locations as detailed on the contract drawings.

All watermains shall be installed in a supported excavation (vertical trench) in accordance with OPSD 802.010, 802.013, 802.030, 802.031, 802.032, 802.033, or 806.060. The width of trench shall be approved by the Engineer. The work under this item shall include any form of trench support required. Such trench support, if used, shall be approved by the Ministry of Labour under the Occupational Health and Safety Act and Regulations prior to its use.

All bedding and initial backfill to 300 mm above the pipe shall be granular material, not greater than 25 mm in size.

All reinstatements to match existing conditions including driveways and sodded areas.

All connections, bends, etc., which cannot be adequately blocked shall be secured utilizing retaining glands and/or tie rods acceptable to the pipe manufacturer and the Contract administrator. The rods shall be protected with an approved bituminous material and waterproof wrapping.

Trench backfill under the travelled portion of the road, sidewalks and driveways shall be granular "A" compacted to 100% standard Proctor density unless otherwise indicated. Select native material will be allowed for all other areas and shall be compacted to 95% standard Proctor density.

Disinfection of watermains shall be conducted in accordance with the most recent MECP’s

watermain disinfection procedure, as amended.

The Contractor shall take due precaution during the chlorination testing, charging and flushing of the watermain so as not to cause contamination to the municipalities distribution system. The Contractor shall also take all necessary precautions to prevent freezing of all exposed mains and laterals. The unit price bid shall be deemed to have made due allowance for these requirements.

The Contractor shall notify all business and property owners 48 hours prior to plant disruption and shall ensure that these properties and businesses are inconvenienced as little as possible.

The following shall apply for watermains installed by means of boring and jacking:

- For the installation of watermains 100 mm in diameter or larger, a full bore augering method shall be used rather than a “torpedo” or soil displacement method.
- The size of the bore and the method for pulling the pipe through the bore shall be in accordance with the pipe manufacturers’ specifications. Skids shall be used to support the pipe and prevent it from resting on the bells.

The unit price bid shall be for the complete supply and installation of the watermains with minimum cover as specified on the contract drawings, by the vertical trench open-cut method, and shall include all necessary sheeting, shoring, dewatering, excavation in the trench in all types of soils and disposal of surplus excavated materials, and backfill. The unit price bid shall also allow for the supply and installation of all special pipe sections, reducers, bends, couplings, crosses, tees, fittings, adaptors, concrete thrust blocks, tie rods or retainer glands, connections to the existing mains, and temporary and permanent support of all utilities encountered in the trench

Payment for granular material specified for backfill, cover and/or bedding will be included under the appropriate granular item.

Once a watermain has been disinfected and approved by the contract administrator, it should be connected to the live system within seven (7) calendar days. Should the watermain not be connected within seven (7) calendar days, the watermain shall require re-flushing with source water.

## D2 - Valves

OPSS 441 and Special Provision D1 - apply to this item and shall include the following:

- Installation of valve and valve box.
- All valves to open left-handed with a 50 mm square operating nut.

- Gate valves shall be either Canada Valve 55, Mueller Limited No. A2360-23, McAvity No. 20075-R or Clow F6100 or per the owner's approved materials list as amended.

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 operation of all valves shall be confirmed by the Contract Administrator or designate.

The unit price bid shall allow for the supply of new 130 mm I.D. valve boxes and making the final adjustment to the valve boxes.

Measurement for payment will be as per OPSS 441.09.01.02.

## D3 - Hydrant Sets

The provisions of OPSS 441, Special Provisions D1 and OPSD 1105.01 apply except as amended or extended herein.

Hydrant valves to open left-handed with a 50 mm nut.

The fire hydrant supplied shall:

- be two piece barrel and stem;
- have two - 2-1/2 inch hose outlets with CSA threads;
- have steamer nozzle with thread Gauge No. 36B (4-13/16 O.D. x 5 T.P.I.);
- The type of hydrant shall be as specified on the Contract Drawings or in the Schedule of Tender Unit Prices, and shall be painted in the Owner's standard colour.

The unit price bid shall allow for a hydrant installation with a standard cover depth of 1.8 m and shall be full compensation for all equipment, labour and materials required to complete the work.

The cost for any extension pieces necessary due to a change in elevation shall be negotiated with the Owner.

Measurement for payment will be as per OPSS 441.09.01.03

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## D4 - Water Services

The provisions of OPSS 441 and Special Provisions D1 apply except as amended or extended herein.

The unit price bid for this item shall be complete compensation for the supply and installation of a water service with a minimum of 1.5 m depth of cover from the new main stop to the curb stop at the property line. Main stops and curb boxes installed, if required, shall be paid for separately under the appropriate item(s) in the Form of Tender.

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

The tenderer shall note that all couplings shall be one piece type, Mueller or Cambridge Brass compression type or approved equal.

For non-metallic services, the Contractor shall include the installation of a 10-gauge, 7 strand insulated wire placed along the spring-line of the service and connected to the fittings as specified by the manufacturer.

All water services shall have an approved zinc anode installed, (12lb anode on curb boxes are required, anodes will be paid under the appropriate unit rate.

### **Services installed by Boring & Jacking and Horizontal Direction Drilling (HDD)**

OPSS 416 shall also apply to Boring and Jacking.

OPSS 450 shall also apply to Horizontal Directional Drilling.

For the installation of water services and watermains 100mm in diameter or larger, a full bore augering method shall be used rather than a "torpedo" or soil displacement method.

The size of the bore and the method of pulling the pipe through the bore shall be in accordance with the pipe manufacturer's specifications. Skids shall be used to support

The unit price bid for this item shall also include the complete supply and installation of service saddles for the mainstop, as shown in OPSD 1104.01 and 1104.02. The saddles shall be stainless steel Cambridge Brass, Robar, Mueller or approved equal.

## D5 Main Stop

OPSS 441, Special Provisions D1 and related Special Provisions apply to this item except as amended or extended herein. The unit price bid for this item shall include the complete supply and installation of new corporation main stops or replacement of existing main stops.

Tenderers shall note that all main stops shall be either Mueller II Ori-seal, Cambridge Sries 301 (Ball Style) or approved equal, utilizing stainless steel service saddle with double stainless steel bolts as noted in OPSD 1104.01 and 1104.02. The quantity of main stops to be paid for will be the number of main stops installed.

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

## D6 - Curb Stops

OPSS 441, Special Provisions D1 and related Special Provisions apply to this item and shall include the following:

- Installation of new curb stops or the replacement of existing stops. Replacement of curb stops shall include suitable adaptors to re-connect existing services as well as the removal and disposal of surplus material.

The quantity of curb stops to be paid for will be the number of curb stops installed based on field measurements.

The Contractor shall not leave existing curb stops on any new water service installations. There shall not be multiple curb stops left on any new water service installation.

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

## D7 - Curb Box

OPSS 441, Special Provisions D1 and related Special Provisions apply to this item and shall include the following:

- Installation of new curb boxes or the replacement of existing curb boxes.

The curb boxes shall be Mueller A726, Clow #8D1, Bibby VSB1-6 or approved equal.

The quantity of curb boxes to be paid for will be the number of curb boxes installed based on field measurements.

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

## D8 - Reconnect Water Services

(Note: It is recommended to have separate items for varying sizes of water services, where known, in the Form of Tender.)

OPSS 441, Special Provisions D1 and any details indicated on the Contract Drawings, apply to this item and shall include the following:

The Contractor shall reconnect all water services to the new watermain with approved water service pipe. The size of the connecting pipe, coupling, main stop and saddle, must match the existing service. Water services less than 20mm diameter shall be replaced with minimum size of 20mm including all appurtenances.

The unit price shall include all exploratory excavations to determine the location, size, and type of water service, disconnection of existing service, including turning off main stop on abandoned watermain (if required).

The unit price bid shall also allow for up to two metres of additional water service piping and suitable size coupling. Additional piping required for the service reconnection beyond two metres will be paid for under the water service item.

Measurement for payment will be based on the number of water service reconnections undertaken.

## D9 - Insulation of Services/Watermain

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 1.2 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 (m)
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 of each thickness unless otherwise specified. Square meters shall be the total of both vertical and horizontal faces.

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

## **D10 - Cathodic Protection of Watermains & Appurtenances**

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

The provisions of OPSS 442 apply except as amended or extended herein.

### **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 though 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% ( $\pm 2$ ) Bentonite 15% ( $\pm 1$ ) Sodium Sulphate 8% ( $\pm 1$ ).

- 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.

The backfill material shall have an electrical resistivity between 40 and 200 ohm-cm when wet.

### **2. Anode Installation**

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

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- 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.

### 3. Anode Bank Installation

- a. The anodes shall not be lowered into the augured hole by its lead wire. The augured hole shall be a minimum 200 mm to a maximum 300 mm diameter and shall be a minimum of 1.8 m in depth to provide a minimum of 300 mm of cover at ground elevation.
- b. The anodes shall be installed in accordance with the detailed drawings provided with this specification and at location as shown on the contract drawings.
- c. The anodes shall be placed a minimum distance of 0.6 m from the watermain, water service or other underground utility plant in a vertical position.
- d. At least 300 mm of backfill shall be packed uniformly around the anode to eliminate voids or 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.
- f. The anode lead shall be thermite welded to the watermain/fitting/valve/hydrant, using an Erico model CAHAA-1G welder and suitable cartridges (#CA15 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.
- h. Where the anode lead cable is required to cross the road or driveways to make the necessary connections, it shall be bored.

## D11 - Abandon Old Watermains

OPSS 441, Special Provisions D1 and related Special Provisions - apply to this item and shall include the following:

The Contractor shall abandon the old watermain after the new watermain is in service and all water services have been connected to it. This work shall include sawcutting, excavating and removal of any surplus material as per Special Provisions General - Item in order to carry out the following works:

- a. Where the abandoned watermain is disconnected from an in-service watermain, the abandoned connection at the in-service watermain shall be properly repaired. If the connection was by means of a cross, the abandoned leg of the cross shall be plugged with an approved mechanically restrained cap and a thrust block. If the connection was by means of a tee, the tee shall be removed and the in-service watermain repaired with an appropriate size closure pipe with approved sleeves. The unit price bid shall include all necessary caps, closure pieces, sleeves, mechanical restraints and thrust blocks as necessary.
- b. Where only the removal of the valve box is required on the abandoned watermain, the valve shall be closed before the valve box is removed. The valve box shall be returned to the municipality.
- c. All fire hydrant assemblies, including branch valves and valve boxes connected to the abandoned watermains, shall be removed and returned to the municipality. The end of the pipe remaining in the ground shall be sealed with concrete and the costs for this item shall be included under this item.
- d. Where the old watermain is abandoned and no longer connected to an existing watermain, the end of the pipe remaining in the ground shall be sealed with watertight seal plugs. Concrete for concrete seals shall be according to OPSS 1350 with minimum specified 28-Day compressive strength of 30 MPa.

Measurement for payment will be based on field measurements for each plug installed, valve or valve box removed or fire hydrant assembly removed or each sealed pipe as outlined in items (a), (b) (c) and (d) above.

- e. Where the abandoned watermain is to be grouted as noted on the contract drawings or otherwise directed by the Contract Administrator, sections of the existing watermain 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.

Measurement for payment will be per linear meter.

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

## D12 - Temporary Water Supplies

The provisions of OPSS 493 and Special Provisions D1 apply except as amended or extended herein.

Contractor's tender price shall include for the provision of temporary water supplies to all premises affected whenever such water supplies are interrupted, cut off, or turned off by the Contractor during the course of the work.

Temporary water lines shall be chlorinated, protected and removed upon completion of the work.

It will be the responsibility of the Contractor to notify one day in advance all water users who will be affected by shutting off the water supply.

The Contractor shall be solely responsible for all damages and claims that may result from inadequate water supplies or failure to give proper notice to all water users in the area.

## D13 - Watermain Disinfection and Testing

The provisions of OPSS 441 shall apply except as amended or extended herein.

### Connection to an Existing Distribution System

For a new watermain installation, the "source" connection to the existing distribution system shall only be made with a new tapping sleeve and valve or cut-in tee and valve.

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A new main shall not be pressure tested against an existing valve. All pipe sections and associated fittings associated with the final connections and tie-ins shall be spray disinfected or swabbed with a 1-5% solution of chlorine. The source valve shall only be operated by the Owner, unless otherwise approved.

### **Testing and Acceptance of Watermains**

Prior to the commencement of any watermain construction, the Contractor shall submit a chlorine residual and bacteriological test sampling plan to the Owner for approval. This plan shall detail the source water locations, the final connection locations and the sampling locations. The Contractor shall allow 2 weeks for approval. Appropriate coding or labelling must be provided on the plan to clearly collate the sample results to the sampling locations. All samples shall be taken by the Owner or his designate. Samples shall only be taken between the hours of 8:00 a.m. and 2:30 p.m., Monday to Friday, unless otherwise approved by the Owner. The Contractor shall be responsible for the scheduling of all samples and shall provide the Owner at least 24 h notice.

In order for a watermain to be considered for acceptance by the Owner, the following procedures and tests must be successfully completed in the presence of the Contract Administrator. A "Disinfection and Testing Checklist", similar in form shall be prepared for each sample location. All checklists shall be maintained on-site and available for review.

### **Swabbing**

Prior to disinfection, all sections of watermain shall be swabbed using a minimum of four new foam swabs. Swabs shall be polyurethane with a density of 24.7 kg/m<sup>3</sup>, have a minimum diameter 50 mm larger than the inside diameter of the watermain and have a minimum length of one and one half times its diameter. The Contractor shall mark, number and demonstrate to the Contract Administrator that all swabs, or parts thereof, have been retrieved.

### **Hydrostatic Testing**

Hydrostatic pressure testing shall be in accordance with OPSS 441.

### **Chlorination for Disinfection**

Upon successful completion of the hydrostatic testing for the new watermain, the main shall be flushed with source water. After flushing is complete, source water shall be allowed to flow, at a controlled rate, into the new main. Liquid chlorine shall be applied so that the chlorine solution is a minimum of 50 mg/L throughout the entire section.

The main shall be left charged with the chlorine solution for a minimum of 24 h. After 24 h, the chlorine residual shall be tested. If the chlorine residual is less than 25 mg/L, the chlorination procedure shall be repeated. If the chlorine residual is greater than 25 mg/L, the main shall be flushed with source water to clear the chlorinated water. Prior to

disposal into the environment, an approved neutralizing chemical shall be applied to all chlorinated water used for disinfecting, testing or flushing.

### **Bacteriological Testing**

Upon successful completion of the chlorination procedure, the main shall be flushed and recharged with source water until the chlorine residual is equal to that of the source water or between 0.2 mg/L and 4 mg/L. The main shall be left charged for a minimum of 24 h. After 24 h, samples will be taken for bacteriological testing. The main is not to be flushed prior to taking these samples. Chlorine residuals may also be taken at this time, however they are not necessary.

Samples for bacteriological testing shall be taken from points every 350 m along the new main, including one sample at each end of the new main and every branch greater than 6 m in length.

If the bacteriological tests indicate contamination, the entire chlorination procedure shall be repeated. If the tests pass, prior to reconnecting any services, the chlorine residual shall be checked and, if required, the new main shall be flushed with source water again to establish a chlorine residual greater than 0.2 mg/L.

### **Disinfection and Testing Checklist**

A disinfection and testing checklist, similar to the following, shall be completed for each sample location. The sample plan and all checklists shall be maintained on-site and available for review.

<b>NEW WATERMAIN DISINFECTION AND TESTING CHECKLIST</b>				
<b>Project Name:</b>		<b>Project Number:</b>		
<b>Contractor:</b>		<b>Site Supervisor:</b>		
<b>Contract Administrator:</b>		<b>Construction Inspector:</b>		
<b>SAMPLE LOCATION:</b>				
Procedure Step	Approval Date	Contractor's Signature	Contract Administrator's Signature	Results/ Comments
<b>1. Sampling Plan (Attached)</b>				
<b>2. Swabbing</b>				
<b>3. Hydrostatic Pressure Test</b>				
<b>4. Chlorine Residual (Initial)</b>				
<b>5. Chlorine Residual (24-Hour)</b>				
<b>6. Chlorine Residual (Post Flushing)</b>				

<b>NEW WATERMAIN DISINFECTION AND TESTING CHECKLIST</b>				
<b>Project Name:</b>		<b>Project Number:</b>		
<b>Contractor:</b>		<b>Site Supervisor:</b>		
<b>Contract Administrator:</b>		<b>Construction Inspector:</b>		
<b>SAMPLE LOCATION:</b>				
Procedure Step	Approval Date	Contractor's Signature	Contract Administrator's Signature	Results/ Comments
<b>7. Bacteriological Test (Sample Taken)</b>				
<b>8. Bacteriological Test (Result Received)</b>				

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.

Measurement for payment will be lump sum and include all sampling taken on the new main.

## D14 - TRACER WIRE

This specification covers the requirements for installation of tracer wire on all new non-metallic watermains or forcemains.

The provisions of the latest revisions of OPSS 412, OPSS 441, and Special provisions D1 shall apply except as amended or extended herein.

Tracer wire shall be either 8-gauge, 7 strand copper insulated wire or #10 AWG Solid steel core soft drawn high strength tracer wire as supplied by Copperhead, or approved equal, as specified in the Form of Tender. For directional drilling, auguring or boring installations, tracer wire shall be 12 AWG Solid EHS-CCS Horizontal Directional Drill

tracer wire as supplied by Copperhead, or approved equal.

Install electrically continuous trace wire on all water mains, force mains, hydrant laterals and service laterals except where such pipe is of copper material. The wire shall be installed in such a manner as to be easily accessible and able to properly trace all water mains, force mains, hydrant laterals and services without loss or deterioration of signal or without the transmitted signal migrating off of the tracer wire.

All tracer wire welds shall be made to ensure zero pull-out and must be completely sealed using a mastic sealer specifically manufactured for underground use (T.C. Mastic or reviewed equal). The mastic sealer must be applied in a thick coat (min. 12m thick) and shall be protected from contamination by backfill material with the use of a plastic membrane.

Tracer wire shall be installed in the same trench and inside bored holes and casings during pipe installation. It shall be secured to the top of the pipe for its entire length and strapped to the pipe at a minimum of 3 meter intervals. The wire shall be extended and made continuous through all valve chambers, and brought to the surface at each hydrant, valve box, or tracer wire test station in accordance with the standard detail provided by the Owner.

All spliced or repaired wire connections in the tracer wire shall be made using a silicone filled enclosure designed for direct bury applications, (Dryconn, model no: 90750 or approved equal)

At all water main end caps, a minimum, of 2 meters of tracer wire shall be extended beyond the end of the pipe, coiled and secured for future connections.

For directional drilling, auguring or boring installations, three separate lengths of tracer wire shall be installed with the pipe and connected to the direct buried tracer wire at both ends, or cad welded to the existing iron pipe at both ends.

Prior to the final connection of the watermain/forcemain to the existing system, the Contractor shall carryout a continuity test of the tracer wire and submit the test results. Contractor shall hire a certified Damage Prevention Technician (DPT) to perform the continuity test on all tracer wire access locations in the presence of the Engineer or the Engineers' designate. The results of this continuity test are to be documented using the following form and submitted to the Contract Administrator. If the tracer wire is found to be not continuous after testing, Contractor shall repair or replace the failed segment of wire.

No separate payment shall be made to meet the requirements of this specification. Costs are to be included as part of the appropriate pipe item in the Schedule of Tender Prices.

**TRACER WIRE INSPECTION SHEET**

Project Name and Contract No.: \_\_\_\_\_

Damage Prevention Technician Name: \_\_\_\_\_

Company: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Date: \_\_\_\_\_

Are you certified by the Ontario Regional Common Ground Alliance as a Damage Prevention Technician (DPT)?

Yes       No

Date of DPT Certification: \_\_\_\_\_

Tracer Wire Test Station #	UTM Northing Location	UTM Easting Location	Continuity Test Results	
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail
			<input type="checkbox"/> Pass	<input type="checkbox"/> Fail

Damage Prevention Technician Signature \_\_\_\_\_

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## D15 - PETROLATUM TAPE CORROSION PROTECTION

The provisions of the latest revisions of OPSS 442 and AWWA C217 shall apply except as amended or extended herein.

Petrolatum Tape Systems shall be applied in three (3) parts comprising of a Primer, Profiling Mastic, and Petrolatum Tape for low temperature application. The supplied system shall meet International Organization for Standardization 9001 (ISO 9001 Standards), and, prior to application, the contractor shall provide proof to the contract administrator that the supplied system meets this standard.

The Petrolatum Tape System is to be applied on all direct buried metallic pipes, valves, fittings, and appurtenances.

Application of the Petrolatum Tape System will be in accordance with the manufacturer's recommendations and specifications. The contractor is to ensure that all persons installing the petrolatum tape receive proper training, and obtain certification, from the manufacturer.

Payment at the lump sum contract price for the above tender items shall be full compensation for all labour, equipment, and material to do the work.

## D16 – CHAMBERS

The provisions of the latest revisions of OPSS 407, OPSS.MUNI 441, and Special Provisions C6 and D2 shall apply except as amended or extended herein.

The work under this item shall be for the installation of an operational valve/meter chamber as indicated on the contract drawings up to a minimum of 1000mm outside of the chamber, or to the limits indicated on the contract drawings, including all: precast concrete chambers, valves, meters, fittings, restraints, couplings, seals, piping, supports, waterproofing, thrust restraint, steps, ladders, and all other appurtenances as indicated.

No products shall be supplied to site prior to the engineer returning reviewed shop drawings.

All concrete chambers will be constructed using sulphate resistant cement (i.e. Type HS).

All piping, fittings and equipment are to have flanged connections unless otherwise indicated on the contract drawings. Piping and fittings shall be of material and class indicated on the contract drawings unless otherwise specified herein.

Payment shall be full compensation for all labour, equipment, and material required to do the work to the limits indicated on the contract drawings.