**Roadworks Specifications**

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# ROADWORKS SPECIFICATIONS – GENERAL

**Abbreviations**

When the following abbreviations are used in the Roadworks Specifications, they shall have the following meanings:

AADT Annual Average Daily Traffic

AASHTO American Association of State Highway and Transportation Officials

AC Asphalt Cement

ANSI American National Standards Institute

ASTM ASTM International

AWWA American Water Works Association

BBR Extended Bending Beam Rheometer Method

DENT Double Edge Notched Tension Test

C Celsius

CCTV Closed-Circuit Television

CD-ROM Compact Disc, Read -Only -Memory

CEC Cation Exchange Capacity

CGL Commercial General Liability

CGSB Canadian General Standards Board

CHBDC Canadian Highway Bridge Design Code

cm centimetre

CSA Canadian Standards Association (or CSA Group)

CSP Corrugated Steel Pipe

DBH Diameter at Breast Height

DFC Dense Friction Course

DFO Fisheries and Oceans Canada

DSM Designated Sources for Materials

EAM Expanded Asphalt Material

EC Electrical Conductivity

ESCP Erosion and Sediment Control Plan

FM Fineness Modulus

FOB Freight on Board

GPS Global Positioning System

GWMP Ground Water Management Plan

GST/HST Goods and Services Tax/Harmonized Sales Tax

HDBC Heavy Duty Binder Course

HDPE High Density Polyethylene

HEPA High-Efficiency Particulate Air

HMA Hot Mix Asphalt

IHSA Infrastructure Health & Safety Association

ISA International Society of Arboriculture

ITE Institute of Transportation Engineers

ITS Intelligent Transportation System

km kilometre

kPA kilopascals

LSRCA Lake Simcoe Region Conservation Authority

m metre

mm millimetre

MASH AASHTO Manual for Assessing Safety Hardware

MECP Ministry of Environment, Conservation and Parks (Ontario) (formerly MOECC)

MNRF Ministry of Natural Resources and Forestry (Ontario)

MOECC Ministry of the Environment and Climate Change (Ontario)

MOL Ministry of Labour (Ontario)

MSCR Multiple Stress Creep Recovery Test

MTO Ministry of Transportation (Ontario)

N Newton

NASTT North American Society for Trenchless Technology

NTCIP National Transportation Communications for ITS Protocol

NURP National Urban Runoff Program

OCIP Owner Controlled Insurance Program

OCPA Ontario Concrete Pipe Association

OMAFRA Ministry of Agriculture, Food and Rural Affairs (Ontario)

OPS Ontario Provincial Standard

OPSD Ontario Provincial Standard Drawing

OPSS Ontario Provincial Standard Specification

PG Performance Graded

PGAC Performance Graded Asphalt Cement

PE Polyethylene

PPA Polyphosphoric Acid

PTTW Permit to Take Water

PVC Polyvinyl Chloride

QA Quality Assurance

RAP Reclaimed Asphalt Pavement

RCM Reclaimed Concrete Material

ROW Right-of-Way

RSC Revised Statutes of Canada

RSO Revised Statutes of Ontario

SAR Sodium Absorption Ratio

SB Styrene Butadiene

SBR Styrene Butadiene Radial

SBS Styrene Butadiene Styrene

SC Statutes of Canada

SDLC Synchronous Data Link Control

SDR Standard Dimension Ratio

SPMDD Standard proctor maximum dry density

SMA Stone Mastic Asphalt

SO Statutes of Ontario

TCP Traffic Control Persons

TPZ Tree Protection Zone

TRCA Toronto and Region Conservation Authority

TSS Total Suspended Solids

TWSI Tactile Walking Surface Indicator

USB Universal Serial Bus

VFA Voids Filled with Asphalt

WMA Warm Mix Asphalt

# ROADWORKS SPECIFICATIONS – ITEMS

**DESIGNER NOTES:**

Item cross-references are highlighted in blue. Please ensure that all cross-referenced items are included in contract.

Information highlighted in green represent sample language that may need to be revised to suit your contract requirements and/or provides user instructions.

Item names are highlighted to aid in assembly of renewal program specifications.

[Renewal], [Renewal / New Construction] and [New Construction] labels are added to item descriptions to differentiate item use.

## OPSS 100-SERIES

### Item R101 Disposal of Excavated Ditch Material [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).

This item is for the disposal of excavated ditch material identified as having an exceedance of electrical conductivity and sodium adsorption ratio with respect to O. Reg. 153/04 (Records of Site Condition) and O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario *Environmental Protection Act*.

**180.09 MEASUREMENT FOR PAYMENT** is added as follows:

**180.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per cubic metre (m3) of excavated ditch material disposed of off Site as evidenced by weigh scale tickets.

**180.10 BASIS OF PAYMENT** is amended by the addition of the following:

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R102 Removal and Disposal of Winter Sand [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).

At the locations where guide rail is removed, the Contractor shall clean-up and remove all winter sand, debris and other deleterious materials from the Site prior to placing asphalt on the unpaved shoulders and rounding’s adjacent to the new guide rail systems under ***[Select the applicable item]*** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt.

The material removed under this item may have an exceedance of electrical conductivity and sodium adsorption ratio with respect to O. Reg. 153/04 (Records of Site Condition) under the Ontario *Environmental Protection Act*.

In order to prevent the winter sand, debris and deleterious materials from entering any watercourse, the materials shall be removed and disposed of at waste locations as specified in OPSS.MUNI 180.

**180.09 MEASUREMENT FOR PAYMENT** is added as follows:

**180.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per tonne (t) of winter sand, debris and other deleterious materials removed from the Site as evidenced by weigh scale tickets.

**180.10 BASIS OF PAYMENT** is amended by the addition of the following:

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

## OPSS 200-SERIES

### Item R201 Roadway Ditching – Terra Seeds [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).

**206.01 SCOPE** is deleted in its entirety and replaced with the following:

**206.01 SCOPE**

Under this item, the Contractor shall excavate, grade and restore roadway ditches along [Road Name] in accordance with OPSS.MUNI 206.

All exposed ditch areas shall be restored with topsoil and a 50 mm depth of terra seed mix within seven (7) Days of completion of the ditching operations, except for those areas to be restored with sod under Item R801 – Restoration of Topsoil and Sod, as identified by the Owner.

Erosion and sediment control measures including, but not limited to, filter sock fiber rolls are required prior to, and during, construction.

All roadway ditching related activities must be completed in accordance with the pending [Conservation Authority] permit.

Unless indicated otherwise in the Contract Documents, all surplus or unsuitable excavated materials shall be disposed of in accordance with O. Reg 406/19 (On-Site and Excess Soil Management) under the Ontario *Environmental Protection Act* and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

**206.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**206.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per square metre (m2) of roadway ditching completed.

**206.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**206.10 BASIS OF PAYMENT**

**Roadway Ditching – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Environmental protection required for this work shall be deemed to be covered under Item G4 – Environmental Protection.

### Item R202 Clearing and Grubbing [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 201 (Apr 2019).

This item is for the clearing of all trees, except for the single trees identified under Item R203 – Removal of Single Trees, and the grubbing of all trees removed under the Contract.

**201.07.01 GENERAL** is amended by the addition of the following:

Adjacent property owners may receive timber from cut trees if they request it in advance or at the time of cutting. The Contractor shall cut the timber into eight (8) foot maximum lengths. Cut timber shall be removed from the road allowance and placed near the owner's buildings as soon as possible to avoid theft.

The following owners have indicated that they want to receive timber from cut trees:

* ***Designer to insert names and location, if applicable***

An owner who has previously requested to receive timber may decide to accept part or none of the timber at a later date. No claims for damages will be considered if an owner changes their initial request.

Any damage caused by the Contractor's operations to adjacent property shall be the responsibility of the Contractor. Any debris, mud or other material deposited on the roadway by the Contractor shall be removed immediately. Any damage to the existing roadway shall be repaired by the Contractor to the satisfaction of the Owner.

**201.07.07 MANAGEMENT OF EXCESSS MATERIAL** is amended by the addition of the following:

All excess materials generated by clearing and grubbing activities shall become property of the Contractor and shall be disposed of outside the Contract limits at no additional cost to the Owner. The Contractor shall be responsible for obtaining all necessary written approvals from the appropriate landowners and various environmental and municipal agencies required for the disposal of such materials.

For individual stumps that are not part of a row or group of trees and where the tree has been cut prior to measuring for clearing or has been removed under Item R203 – Removal of Single Trees, the areas provided in Table 1 shall be used for determining the areas for payment.

| TABLE 1  Grubbing Area for Stumps (Based on the Average Area  of Trees of the Same Diameter) | | | |
| --- | --- | --- | --- |
| **Dia. (mm)** | **Area (m2)** | **Dia. (mm)** | **Area (m2)** |
| 25 | 5 | 800 | 140 |
| 50 | 10 | 825 | 149 |
| 75 | 16 | 850 | 157 |
| 100 | 21 | 875 | 166 |
| 125 | 25 | 900 | 175 |
| 150 | 31 | 925 | 184 |
| 175 | 36 | 950 | 200 |
| 200 | 42 | 975 | 216 |
| 225 | 45 | 1,000 | 232 |
| 250 | 47 | 1,025 | 248 |
| 275 | 50 | 1,050 | 264 |
| 300 | 53 | 1,075 | 280 |
| 325 | 57 | 1,100 | 292 |
| 350 | 61 | 1,125 | 304 |
| 375 | 66 | 1,150 | 315 |
| 400 | 70 | 1,175 | 327 |
| 425 | 75 | 1,200 | 339 |
| 450 | 79 | 1,225 | 350 |
| 475 | 82 | 1,250 | 360 |
| 500 | 85 | 1,275 | 371 |
| 525 | 88 | 1,300 | 381 |
| 550 | 91 | 1,325 | 391 |
| 575 | 94 | 1,350 | 401 |
| 600 | 96 | 1,375 | 412 |
| 625 | 102 | 1,400 | 422 |
| 650 | 108 | 1,425 | 432 |
| 675 | 114 | 1,450 | 442 |
| 700 | 120 | 1,475 | 452 |
| 725 | 126 | 1,500 | 463 |
| 750 | 131 | 1,525 | 473 |
| 775 | 136 | 1,550 | 483 |

**Restrictions on Open Burning**

Open burning is prohibited on this Contract.

**Federal Migratory Bird Legislation**

The Contractor shall comply with all applicable requirements of the federal *Migratory Birds Convention Act, 1994* when performing the Work under the Contract. Tree clearing is permitted between [specify dates].

**Measurement for Payment**

Measurement for payment shall be per square metre (m2) of area cleared and grubbed.

Grubbing of individual trees removed under Item R203 – Removal of Single Trees will be measured for payment.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R203 Removal of Single Trees [New Construction]

The following Standard Drawings are applicable to the above item: NHF-400, NHF-401, NHF-402, NHF-404 and NHF-405.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 201 (Apr 2019) and OPSS.MUNI 510 (Nov 2018)**.**

An assessment of the trees impacted by the road improvements was undertaken and documented in [provide name of Arborist report / drawings, consultant, date].

This item is for the removal of trees that meet either of the following criteria:

* Trees individually surveyed and marked for removal on the Drawings and/or as identified in the Arborist Report.
* Street trees irrespective of size, age or species planted within the Owner’s road allowance. A street tree may or may not display obvious signs of planting, such as stakes, tree guards, mulch bed or other indicators.

Removal of trees that are equal to, or less than, 150 mm in diameter at breast height and as shown in clearing and grubbing areas on the Drawings is included under Item R202 – Clearing and Grubbing.

The Contractor shall implement the following procedures:

* Trees designated for removal must be clearly marked in the field with the letter ‘R’ using orange or red high-visibility spray paint at DBH height (1.37 m) and at the base of the stem (stump height).
* Tree Protection Zone (TPZ) barriers shall be installed around trees to be protected in advance of tree removal in accordance with NHF-400 unless the barriers would interfere with completion of the approved tree removal. Payment for installation of tree protection barriers will be made under Item R806 – Barrier for Tree Protection.
* All work performed within a TPZ requires a Qualified Tree Professional to be on Site during removals. Payment for work performed by Qualified Tree Professional will be made under Item R213 – Services of Qualified Tree Professional (Cash Allowance).
* Root zone compaction protection and tree stem protection shall be installed if vehicles and/or large equipment used for tree removal (e.g. bucket truck, woodchipper, etc.) will encroach upon the minimum required TPZs of trees to be retained, in accordance with NHF-404 and NHF-405.

All reasonable efforts shall be made to minimize the number of trees removed. Removal of additional trees shall not be undertaken without prior written approval from the Owner.

**510.07.10 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and/or unsuitable material, regardless of the amount.

**201.09.01 Actual Measurement** is amended by the addition of the following:

**Removal of Single Trees**

Measurement for payment shall be a count of each tree removed.

**201.10.01 Basis of Payment** is amended by the addition of the following:

**Removal of Single Trees – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R204 Earth Excavation, Grading [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and   
OPSS.MUNI 206 (Apr 2019).

The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

**206.07.01.04.01 Tolerances for Earth** is amended by the addition of the following:

A grading tolerance of ± 30 mm is specified for subgrade construction. As this is a working tolerance only, it is expected that the Contractor will use it as such and not keep the subgrade consistently low to replace granular material paid for by the cubic metre (m3).

The roadway surfaces shall be maintained to the grades, tolerances and densities currently in place until the surfaces are covered with granular materials. Any marks, ruts or indentations in the subgrade caused by vehicles, equipment or any other cause shall be removed/rectified prior to placing granular materials.

**206.07.03.1.03 Excavation Below Subgrade** is amended by deleting the first sentence and replacing it with the following:

All unsuitable materials under the roadway platform and within 1.2 m of the final grade, other than material excavated from swamps, shall be removed below subgrade as indicated by the Owner and disposed of in accordance with the requirements of subsection 206.07.03.05. The roadway platform for an urban section is defined to be from the back of the curb to the back of the curb on the opposite side of the road, and for a rural cross section to be from the edge of the shoulder to the edge of the shoulder on the opposite side of the road.

**206.07.03.05 Management of Excavated Material** is amended by the addition of the following:

Unless indicated otherwise in the Contract Documents, all surplus or unsuitable excavated materials shall be disposed of in accordance with O. Reg 406/19 (On-Site and Excess Soil Management) under the Ontario *Environmental Protection Act* and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

Surplus material placed outside the road allowance shall be placed in a neat and workmanlike manner so as not to cause a nuisance to the Owner, the Local Municipality or private property owners.

**206.07.03.06 Provision for Temporary Cover** is amended by the addition of the following:

Cut or fill slopes that may be left without vegetative cover/erosion control blanket for more than 30 Days shall be treated with temporary hydraulic mulch, erosion control blanket or vegetative cover. No additional payment will be made for this work. All costs associated with this work shall be included in the unit price for this item.

**206.07.04.01.02 Layer Compaction Method** is amended by the addition of the following to the second paragraph:

When the moisture content is too high, it shall be reduced by mixing dry material with the wet material or by drying the wet material by blading, discing or other Owner-approved methods. When the moisture content is too low, it shall be raised to the optimum moisture content by the addition of water.

No additional payment will be made for drying or adding water to embankment construction material.

**206.08 Quality Assurance** is amended by the addition of the following:

The Owner may conduct random quality assurance checks on the completed subgrade using a level and rod. When requested, the Contractor shall provide the services of a person to assist the Owner in checking the grade.

**206.09.01.01 Earth Excavation, Grading** is amended by the addition of the following:

If excavation is carried out without the approval of the Owner, no payment will be made for the additional excavation.

Excavation additions or deletions shall be calculated from field tape measurements/elevations agreed to by the Owner and the Contractor.

No quantities have been, or will be, included for payment for any cut in boulevards for the placement of topsoil and sod and for the placement of sidewalk. Likewise, no reduction has been made in the quantity of fill (borrow where applicable) for boulevards for the placement of sidewalk, topsoil and sod. The Contractor shall make allowance for this work in the appropriate Contract unit prices.

No quantities have been included for any driveway excavation or fill where the difference between the existing driveway grade and the proposed driveway subgrade at the slope limit of the roadway is 30 cm or less and no measurement will be made for such work. The Contractor shall carry out this work and the cost of this work shall be included in the unit price for this item.

When requested by the Owner, the Contractor shall proof roll the subgrade with a heavy, non-vibratory, compaction unit and the cost of this work shall be included in the unit price for this item.

**206.09.02 Plan Quantity Measurement** is amended by the addition of the following:

The Contractor may dispute the quantity which is specified for payment on a plan quantity basis. Where there is a dispute, it shall be supported by calculations, elevations and any other evidence indicating why the plan quantity is believed to be in error. If the plan quantity is found to be in error, payment will be made in accordance with the adjusted plan quantity.

### Item R205 Earth Borrow [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 212 (Nov 2019).

If cut material is not available for use as fill, the Contractor shall supply and place borrow material.

**212.07.01 General** is amended by the addition of the following:

Surplus excavated material from sewer and culvert installations and road excavation may be used for fill at the Contractor’s option with the Owner’s approval. No quantity has been, or will be, included in the earth balance calculations for such surplus materials.

**212.09.01.01 Earth Borrow and Rock Borrow** is deleted in its entirety and replaced with the following:

**212.09.01.01 Earth Borrow and Rock Borrow**

The quantity of borrow is measured in cubic metres (m3) and calculated as follows:

Borrow Quantity = Fill Required – Available Cut

where

Fill Required = the theoretical volume calculated from the cross-sections and includes embankment fill, driveway fills and fill to replace stripping under fills

Available Cut = the theoretical volume obtained after deductions are made from the total excavation quantity for topsoil, unsuitable material (if any), and any additions to, or deductions from, the theoretical quantities.

No actual measurement will be made of the borrow pit. During construction, if the actual excavation, the amount of topsoil or the quantity of unsuitable material varies from the estimate, then adjustments will be made to account for these variations. When calculating the volume of fill from the theoretical cross-sections, the neat volume will be used and a 15% shrinkage factor will be added. The 30 mm grading tolerance will not apply and will not be used in calculations.

### Item R206 Unsuitable Material Removal, Disposal and Backfill (Provisional) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and   
OPSS.MUNI 206 (Apr 2019).

The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

This item is for the excavation, removal, handling and disposal of unsuitable material and replacement with competent fill and/or material specified for road construction, watermain or sewer installation. Identification, delineation and volume of unsuitable material and competent fill will be determined by the Owner and/or the Owner’s Geotechnical or Environmental Consultant.

The Contractor shall provide documentation satisfactory to the Owner and the Owner’s Geotechnical or Environmental Consultant proving that the replacement competent fill has been adequately tested (as applicable) using a properly certified testing facility, including a statement that the fill is suitable for the intended purpose and does not contain any substances that exceed the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act*). The Contractor shall submit paid invoices for the fill materials, along with analytical results and certified statements regarding fill quality if provided by the fill source site.

**Measurement for Payment**

Measurement for payment shall be per cubic metre (m3) of unsuitable material removed, disposed of and backfilled with suitable material. The Contractor and the Owner shall record the volume of the unsuitable material that is excavated and removed off Site and provide the Owner’s Geotechnical or Environmental Consultant with supporting documentation.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R207 Impacted Material Removal, Disposal and Backfill (Provisional) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).

The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

This item is for the excavation, removal, handling and disposal of impacted and suspected impacted material exceeding the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act* or meeting the definition of a hazardous or subject waste as defined by Reg. 347 (General – Waste Management) under the Ontario *Environmental Protection Act* or waste under Part V of the Ontario *Environmental Protection Act* and replacement with competent fill and/or material specified for road construction, watermain or sewer installation.

Suspected impacted material includes, but is not limited to, soil, water, groundwater and/or sediment which exhibits an unnatural appearance, garbage, debris, staining, sheen or odour that would indicate the possible presence of impacts. Assessment, delineation, treatment and/or removal of impacted or suspected impacted material should take place only under the direction of the Owner and the Owner’s Geotechnical or Environmental Consultant. On Site, the Owner and the Owner’s Geotechnical or Environmental Consultant will assess, delineate, identify and determine the volume of impacted or suspected impacted material and competent fill.

All sampling and testing shall be performed and paid for by the Contractor under the direction of the Owner’s Geotechnical or Environmental Consultant with results issued to the Owner. The sampling and analysis completed must be satisfactory to the Owner and the Owner’s Geotechnical or Environmental Consultant.

Excavated hazardous and waste material must be disposed of at an approved, registered waste disposal site capable of receiving the type of hazardous waste or waste as authorized under Part V of the Ontario *Environmental Protection Act*. Proof of the approval issued by the MECP and an agreement with the site to accept the type of material to be disposed of must be provided to the Owner.

Impacted material that exceeds the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act* may either be (i) disposed of at an approved, registered waste disposal site capable of receiving the type of impacted material as authorized under Part V of the Ontario *Environmental Protection Act* (proof of the approval issued by the MECP and an agreement with the site to accept the type of material to be disposed of must be provided to the Owner); or (ii) used as fill on the this project or another project of the Owner, subject to review and approval by the Owner, if the fill does not exceed the applicable site condition standards that apply to the intended receiving location with the exception of Sodium Absorption Ratio (SAR) and Electrical Conductivity (EC).

The excavated material may need to be separated, stockpiled and tested prior to disposal. Material to be stockpiled shall be placed on a contained impervious surface or surface covering to prevent impacts to underlying or adjacent soils and lands. A waterproof covering or coating shall also be applied over the stockpile(s) to prevent wind and water erosion of materials, minimize dust and prevent run-off transporting excavated materials. Erosion and sediment controls approved by the Owner (e.g. silt fences, straw bales, filter bags, check dams etc.) will be required to prevent run-off from entering any watercourses, along with providing and regular maintenance of settling ponds and sediment basins at all drainage outlets.

The Contractor shall backfill the excavation with competent fill and/or material to the satisfaction of the Owner and the Owner’s Geotechnical or Environmental Consultant. The Contractor shall provide documentation satisfactory to the Owner and the Owner’s Geotechnical or Environmental Consultant proving the replacement competent fill has been adequately tested (as applicable) using a properly certified testing facility, including a statement that the fill is suitable for the intended purpose and does not contain any substances that exceed the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition – Part XV.1 of the Act) under the Ontario *Environmental Protection Act*. The Contractor shall submit paid invoices for the fill materials, along with analytical results and certified statements regarding fill quality if provided by the fill source site.

**Measurement for Payment**

Measurement for payment shall be per cubic metre (m3) of impacted material removed from the Site. The Contractor and the Owner shall record the volume of the unsuitable material that is excavated and removed off Site and provide the Owner’s Geotechnical or Environmental Consultant with supporting documentation.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R208 Geogrid for Sub-Excavation Locations (Provisional) [New Construction]

### Item R209 Geotextile for Sub-Excavation Locations (Provisional) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019).

These items are for the supply and installation of geogrid and geotextile at sub-excavation locations prior to backfilling, as indicated by the Owner.

Geogrid shall be Terrafix BX2500 or Equivalent.

Geotextile (geosynthetic fabric) shall be Terrafix 360R or Equivalent.

**Measurement for Payment**

Measurement for payment shall be per square metre (m2) of geogrid or geotextile supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R210 Earth Excavation and Preparation for Boulevard Soil Trench [New Construction]

The following Standard Drawings are applicable to the above item: NHF-200, NHF-201, NHF-202 and NHF-204.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 206 (Apr 2019).

The Contractor shall comply with the on-site and excess soil requirements of O. Reg. 406/19 (On-Site and Excess Soil Management) under the Ontario Environmental Protection Act and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions.

This item is for preparation of boulevard soil trench and includes the excavation and removal of the existing soil as shown on the Drawings. Payment for planting media will be made under Item R805 – Supply and Install Engineered Growing Media for Planting.

**Excavation**

***[Select the paragraph below for projects with boulevard soil trenches]***

A boulevard soil trench shall be excavated to a depth of 500 mm below the final grade.

***[Select the paragraph below for projects with softscape medians]***

A softscape median soil trench shall be excavated to a depth of 1,000 mm below the final grade.

The bottom and sides of the trench shall be scarified. Scarification shall remove all gladding and surface compaction of the exposed soil. The sides of the trench may be scarified with hand tools while the bottom of the trench may be scarified with equipment. If any deficiencies occur, they shall be rectified prior to the installation of the engineered growing media.

Open excavated trenches must be attended to at all times, or other appropriate measures satisfactory to the Owner shall be taken to ensure public safety.

**Removal and Disposal of Soil**

All trees, stumps, rooting systems, stakes, wire baskets and other existing material within the boulevard soil trenching area shall be removed and disposed of by the Contractor.

Excavated soil shall not be stockpiled on Site. Excavated soil shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The Contractor shall assume all costs associated with the disposal of any earth excavated.

**Site Restoration**

During the excavation of existing soil, surrounding surfaces shall be kept in a generally clean condition. The Site shall be kept free of litter and refuse to prevent the introduction of contaminants into the soil trenches. Litter shall not be buried on Site.

**Measurement for Payment**

Measurement for payment shall be per cubic metre (m3) of earth excavated in preparation of the boulevard soil trench.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R211 Pruning of Trees and Woody Vegetation (Cash Allowance) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and OPSS.MUNI 510 (Nov 2018).

Under this item, the Contractor shall retain the services of a qualified, skilled and experienced arborist who is a Certified Arborist with the ISA, or an Ontario College of Trades Arborist or Arborist Apprentice; no other trades personnel are permitted to prune trees and other woody vegetation.

The arborist shall undertake all pruning in accordance with the following requirements:

* Arborist Safe Work Practices (current version)
* IHSA Electrical Utility Safety Rules (current version)
* A300 (Tree, Shrub and Other Woody Plant Maintenance – Standard Practices) Part 1 (Pruning) (current version)
* ISA Best Management Practices – Pruning (current version)

Pruning of trees and woody vegetation may be required in any of the following circumstances:

* Where pruning is identified in the Arborist Report/Drawings
* Where there is a likelihood of injury of scaffold branches due to contact by construction equipment
* To achieve required 3.0 m vertical clearance in the corridor for vehicular, bicycle and pedestrian traffic
* To achieve the required clearances at reconstructed entrances and private properties

The Contractor shall notify the Owner and a representative from the Owner’s Natural Heritage and Forestry division prior to performing any required pruning to determine if a Site walk is necessary to understand all pruning objectives. A minimum of 48 hours’ notice is required to arrange the Site walk.

Any damage to surrounding areas resulting from pruning activity shall be restored by the Contractor to a condition equal or better at no additional cost to the Owner.

**Basis of Payment**

Payment from the cash allowance will be made based on paid invoices from the arborist for the services provided, without any markup or additional fees. Under no circumstances shall the Contractor be entitled to payment in excess of payments actually made to the Arborist, as substantiated by paid invoices.

### Item R212 Tree Root Exploratory Excavation by Hydro-Vac (Provisional) [New Construction]

The following Standard Drawings are applicable to the above item: NHF-402 and NHF-403.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).

This item is for root excavation that may be required where potential adverse impacts to tree roots may be difficult to accurately determine prior to excavation and, if required, enables tree roots to be pruned to prevent root damage in the unexcavated area through tearing, fracturing or breakage caused by conventional excavation equipment.

The Contractor shall coordinate exposure of the underground rooting systems of trees using a hydro-vac truck in advance of any conventional excavation as identified in the Arborist Report/Drawings and/or as indicated by the Owner.

The Contractor shall coordinate the services of a qualified tree professional associated with this work under Item R213 – Services of Qualified Tree Professional (Cash Allowance).

The Contractor shall arrange a Site walk with the Owner and a representative from the Owner’s Natural Heritage and Forestry division prior to performing any root exploratory excavation or potential root pruning. A minimum of 48 hours’ notice is required to arrange the Site walk.

The Contractor shall:

* Expose roots for the purpose of exploratory excavation by excavating a trench approximately 200 mm wide and 1.0 m deep (or maximum depth of proposed excavation) in the area of proposed conventional excavation.
* Utilize hydro-vac equipment that is set to a sufficiently low pressure to avoid damage to root bark.
* Arrange for the exposed roots to be examined by the retained qualified tree professional and the Owner. If root pruning is required, the trench shall be set as far from the base of the tree as possible and shall extend, at minimum, along the entire length of the proposed excavation within the minimum required TPZ.

Root pruning shall be completed immediately after exposure by qualified tree professional and be paid under Item R213 – Services of Qualified Tree Professional (Cash Allowance).

**Measurement for Payment**

Measurement for payment shall be per hour that the hydro-vac truck is used.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R213 Services of Qualified Tree Professional (Cash Allowance) [New Construction]

The following Standard Drawings are applicable to the above item: NHF-402 and NHF-403.

The Contractor shall retain the services of a qualified tree professional to perform specialized tree care, reporting requirements and other works identified in the Arborist Report/Drawings and/or as indicated by the Owner.

A qualified tree professional is a person who meets at least one (1) of the following requirements:

* Is a Registered Professional Forester (RPF) as described in the *Ontario Professional Foresters Act, 2000*, and registered with the Ontario Professional Foresters Association (OPFA)
* Is a Certified Arborist as certified by the International Society of Arboriculture (ISA)
* Is a Registered Consulting Arborist (RCA) as registered with the American Society of Consulting Arborists (ASCA)

Services to be provided by the qualified tree professional may include but are not limited to:

* Root sensitive excavation and root pruning in accordance with NHF-403
* Assisting with root exploratory excavation under Item R212 – Exploratory Root Excavation by Hydro-Vac (Provisional)
* Providing consulting and reporting services related to tree removal, tree protection and other tree care throughout the Contract
* When assisting with the performance of tree root exploratory excavation:
  + Determine if root pruning is required.
  + Submit a written summary and photographic documentation of what was explored, any pruning completed at the time of the exploratory works and prescribe recommendations for areas explored for each tree (e.g. additional root pruning, relocation of works, etc.).
* When performing root pruning:
  + Prune back exposed roots to the face of trench wall to be retained (i.e. the back face of the trench). No roots greater than 60 mm (2.5”) in diameter shall be pruned without authorization of the Owner.
  + Prune all roots with clean and sharp hand tools only. Shovels, picks, or other construction tools shall not be used to prune roots. Wound dressings or pruning paint shall not be used to cover the ends of any cut.
  + Prune roots in a similar fashion as branches, taking care to maintain the integrity of the root bark ridge, where present. Roots should be pruned back to a lateral root at least one-third (1/3) of the diameter; root stubs must not be left upon completion of root pruning.
  + Submit a written summary and photographic documentation of what has been completed to the Owner once root pruning is complete.

**Basis of Payment**

Payment from the cash allowance will be made based on paid invoices from the Qualified Tree Professional for the services provided, without any markup or additional fees. Under no circumstances shall the Contractor be entitled to payment in excess of payments actually made to the Qualified Tree Professional, as substantiated by paid invoices.

## OPSS 300-SERIES

### Item R300 Plant Produced Trial Batches for Asphalt Mix Design Approval [Renewal / New Construction]

As part of the mix design approval process under Item R301 – Superpave, Binder Course, Warm Mix Asphalt and Item R302 – Superpave, Surface Course, Warm Mix Asphalt, the Contractor shall provide QA samples of plant produced trial batches.

Each trial batch shall be representative of consistent warm mix production and shall be a minimum of two (2) pugmill batches of the size that will be used during warm mix production for batch plants, or a minimum of five (5) tonnes for drum mixing plants. The Contractor shall be responsible for any costs to dispose of the trial batches. The trial batches shall be produced until a complete laboratory mix compliance check indicates conformance with the design mix proportions and properties for each warm mix type to be used.

Under this item, the Owner will pay for up to two (2) trial batches for each warm mix type. Should more than two (2) trial batches be required for any warm mix type, the Contractor shall be responsible for both the cost of the trial batches and the laboratory mix compliance checks for the additional batches.

If the Contractor elects to use more than two (2) mix plants for the production of a warm mix type, the Contractor shall be responsible for the cost of all the trial batches and all the laboratory mix compliance checks for the additional plant(s). The Contractor should note that only materials from the same sources may be used in a warm mix type produced in more than one (1) plant.

**Measurement for Payment**

Measurement for payment shall be a count of each trial batch produced, up to a maximum of two (2) trial batches per mix type.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R301 Superpave, Binder Course, Warm Mix Asphalt [Renewal / New Construction]

### Item R302 Superpave, Surface Course, Warm Mix Asphalt [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017) with Appendices 310-B and 310-C invoked, OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016), OPSS.MUNI 1151 (Apr 2018) and MTO Special Provision No. 103F31 (Oct 2021).

Under Item R301 – Superpave, Binder Course, Warm Mix Asphalt, the Contractor shall supply and place Superpave, Binder Course, WMA in the location(s) and to the depth(s) specified in the Bid Form.

Under Item R302 – Superpave, Surface Course, Warm Mix Asphalt, the Contractor shall supply and place Superpave, Surface Course, WMA in the location(s) and to the depth(s) specified in the Bid Form.

**OPSS.MUNI 310**

**310.02 REFERENCES** is amended by:

* deleting “OPSS 1101 Performance Graded Asphalt Cement” from the list of **Ontario Provincial Standard Specifications, Material** and replacing it with “OPSS.MUNI 1101 Performance Graded Asphalt Cement as modified by these Specifications”
* addingthe following to the list of MTO Laboratory Testing Manuals under the heading **Ontario Ministry of Transportation Publications**:
  + LS-227 Determination of Ash Content
  + LS-296 Method of Test for Calibrating, correlating, and Conducting Surface Smoothness Measurements Using and Inertial Profiler
  + LS-299 Determining Asphalt Cement’s Resistance to Ductile Failure Using Double Edge Notched Tension Test (DENT)
  + LS-308 Determination of Performance Grade of Physically Aged Asphalt Cement Using Extended Bending Beam Rheometer (BBR) Method
* adding the following to the list of **American Association of State Highway and Transportation Officials (AASHTO)** standards:
  + M 332-14 Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**310.04 DESIGN AND SUBMISSION REQUIREMENTS**

**310.04.01 Mix Design Requirements – Materials**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 20 Business Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design must be submitted to the Owner for review and acceptance before the new WMA is incorporated into the Work.

Mix design submissions shall include Hamburg Wheel testing results which comply with the limits outlined in Table B below.

Mix design submissions shall also include trial batch samples for QA testing by the Owner in accordance with Item R300 – Plant Produced Trial Batches for Asphalt Mix Design Approval. Mix design approval will be contingent upon performance testing compliance with the thresholds indicated in Table B below and with the volumetrics indicated in OPSS.MUNI 1151.

Superpave asphalt mixes shall be designed to provide a minimum PGAC content as follows:

|  |  |
| --- | --- |
| **Mix Type** | **Minimum PGAC Content** |
| SP 12.5, SP 12.5 FC1 and SP 12.5 FC2 | 5.0% |
| SP 19 (mix that is covered up with surface asphalt in the same construction season) | 4.8% |
| SP 19 (mix that is **NOT** covered up with surface asphalt in the same construction season) | 5.0% |
| SP 25 | 4.4% |

The materials used in the production of WMA shall be in accordance with   
OPSS.MUNI 1151 for Superpave and SMA mixes.

The aggregates used in the mix design shall comply with the following requirements:

|  |  |  |
| --- | --- | --- |
| **Mix Type and Category** | **Coarse and Fine Aggregates** | **Asphalt Sand** |
| SP12.5 FC1 – Category C and D  SP19 and SP25 – Category D and E | 100% crushed | Not permitted |

The RAP content allowed in the various WMA mix types is as follows:

|  |  |
| --- | --- |
| **Mix Type** | **Maximum RAP Percentage Allowed** |
| All Surface Course Mixes | 0% |
| SP 19 and SP 25 | 15% |

The use of recycled shingle tabs in any mix is not permitted.

The use of slag as an aggregate in any mix is not permitted.

The requirements of Appendices 1003-D and 1003-E of OPSS.MUNI 1003 shall apply to this Specification.

310.04.02 Design Requirements for Warm Mix Asphalt

The Contractor shall comply with the following requirements:

1. Use any of the following approved WMA additives:
2. Advera
3. Evotherm
4. Hyper Therm
5. Rediset LQ
6. Prepare the mix design and report all testing results in accordance with test method LS-318 – Practice for the Design of Superpave WMA. With respect to LS-318 section 5.3, item 4 is deleted in its entirety and replaced with the following:

* Rutting resistance using Hamburg Rut Wheel Tester is required.

1. Ensure that the WMA mix design and the job mix formula are at the anticipated WMA production temperature; both of which shall be according to the requirements of this Specification.
2. Ensure that the moisture content of the aggregate coming from the dryers does not exceed 0.5%.

Any proposed equivalent WMA technology not listed in a) above shall be subject to review and approval by the Owner.

310.04.03 Submission Requirements for Warm Mix Asphalt

A minimum of 28 Days prior to paving with WMA, the Contractor shall submit the following information to the Owner in writing:

1. The name of the supplier and the approved WMA technology selected.
2. All test results required under LS-318 and any other details on how the requirements of this Specification will be met.
3. If applicable, the type and dosage of WMA additives, how the additives are to be incorporated to produce the WMA and the WMA technology supplier’s established recommendations for usage.
4. Where a proposed technology is not currently approved, the Contractor shall submit the following information a minimum of 28 Days prior to the proposed paving dates for review and approval:
5. Name of the process, manufacturer, type of process and the technology group.
6. Manufacturer’s recommendations including:
   1. Process description and mix design recommendations
   2. Required plant modification and hauling recommendations
   3. Mixing and compaction temperatures
   4. Construction aspects, if there are any differences from conventional HMA paving besides temperature.
7. Projects where the process has been used including:
   1. Client, including contact information (telephone and email)
   2. Mix designs
   3. Date and location of construction
   4. Performance to date.

In the event that the proposed technology is not approved following review by the Owner, the Contractor shall use an approved technology.

**310.06.02 Paving Equipment** is amended by the addition of the following:

The Contractor shall use a material transfer vehicle that has on-board mixing capabilities and a minimum storage capacity of 25 tonnes. A material transfer system such as a shuttle buggy (Roadtec SB-2500C Shuttle Buggy® or Equivalent) shall be used. There shall be no additional payment for this material transfer vehicle and any and all costs associated with the use of the material transfer system shall be included in the unit price for the asphalt placed.

***[Select the appropriate paragraph]***

Paving shall be done in echelon in order to eliminate the occurrence of cold joints.

In the event echelon paving is not undertaken, joint heaters or an equivalent method approved by Owner shall be used in the construction of longitudinal joints in order to minimize the occurrence of cold joints.

Surface course paving shall be done in echelon and joint heaters (or an equivalent method approved by Owner) shall be used in the construction of longitudinal joints for binder course paving in order to minimize the occurrence of cold joints.

**310.07 CONSTRUCTION** is amended by the addition of the following:

**310.07.16 Adjustments to the Job Mix Formula**

Adjustment to the job mix formula (JMF) to more closely reflect the mix being produced will be permitted. The number of field adjustments to the JMF shall be limited to three (3) for each mix design submitted: one (1) prior to the start of production, one (1) during production and one (1) within five (5) Business Days following production. Field adjustments to the JMF shall be limited in scope to what is identified in Table 8 of OPSS.MUNI 1151 as amended below.

Individual lot JMF adjustments will not be accepted after five (5) Business Days following completion of the lot. The Owner defines lot size as 1,500 tonnes of production.

The adjusted JMF shall be submitted in writing to the Owner. Upon receipt of the JMF adjustment submission, the Owner will give written confirmation of receipt of the adjusted JMF. Within one (1) Business Day of receipt of the JMF adjustment, the Owner will give written notice confirming conformance to the requirements of the Contract Documents or advising of any non-conformance. The revised JMF may be applied to the lot being placed when the JMF adjustment is issued and the previous one (1) lot (comprising a total maximum of 3,000 tonnes) if requested by the Contractor as part of the written submission for a JMF change. If this request is not made, the revised JMF shall only apply to the lot placed after receipt of the revised JMF (i.e. 1,500 tonnes). All JMF adjustments are applicable to future mix production.

**OPSS.MUNI 1151 Table 8 Permitted Field Adjustment to a JMF** is deleted in its entirety and replaced with the following:

Table 8 – Permitted Field Adjustment to a JMF

| **JMF Property** | **Maximum Field Adjustment1** |
| --- | --- |
| Percent asphalt cement content, all mixes except SMA | Minimum AC Content to remain as indicated in subsection 310.04.01 of OPSS.MUNI 310 (added above). |
| Percent asphalt cement content, SMA only | ± 0.4 |
| Percent RAP | -5.0 |
| Percent passing 26.5 mm, 25.0 mm, 19.0 mm, and 16.0 mm sieves | ± 5.0 |
| Percent passing 13.2 mm, 12.5 mm, and 9.5 mm sieves | ± 4.0 |
| Percent passing 4.75 mm, 2.36 mm, and 1.18 mm sieves | ± 3.0 |
| Percent passing 600 µm, 300 µm, and 150 µm sieves | No limits |
| Percent passing 75 µm sieve, all mixes except SMA | ± 1.0 |
| Percent passing 75 µm sieve, SMA only | ± 2.0 |
| Note:  1. No JMF adjustments are allowed beyond the OPSS.MUNI 1151 design limits. | |

**310.07.05.01.01 General** is amended by deleting the reference to “OPSS 1101” and replacing it with “OPSS.MUNI 1101 as modified by these Specifications”.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be provided by the Contractor when requested by the Owner.

**310.07.05.02.01 General** is amended by deleting the first sentence and replacing it with the following:

The Owner will be conducting QA testing, using the requirements of OPSS.MUNI 310, OPSS.MUNI 1101 and OPSS.MUNI 1151 as guidelines. The Contractor shall obtain QA and referee WMA samples using a Quartermaster sample splitter or Equivalent.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30th unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary. Any additional work required to prepare the road for winter shutdown shall be completed under Item G1 – Maintenance of Traffic.

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be adjusted for warm mixes according to the requirements of the mix design.

**310.07.11.01 General** is amended by deleting the second paragraph and replacing it with the following:

Longitudinal and transverse butt or stepped joints between the new WMA pavement and the previously paved pavement shall be constructed by trimming the previously paved pavement edge to a straight, clean, vertical surface of at least 40 mm.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped to the satisfaction of the Owner. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition to the satisfaction of the Owner.

**310.08.01 General** is amended by:

* deleting all references to “OPSS 1101” and replacing them with “OPSS.MUNI 1101 as modified by these Specifications”
* adding the following:

The Owner will be conducting QA testing in accordance with the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151 and the requirements of the Contract Documents.

For the purpose of asphalt acceptance, one (1) lot will be deemed to be 1,500 tonnes of production. A total of three (3) borderline test results for the same attributes representing up to 1,500 tonnes shall result in the work being deemed rejectable.

The Owner will check the Contractor’s production of the design mix using one, or both, of the following methods:

* A sample from a trial batch of the proposed mix from the supply plant.
* A production sample of the proposed mix which the Contractor is currently supplying to another site.

**Asphalt Plant Control Room Access**

The Contractor shall provide the Owner’s QA representative with access to its asphalt plant control room to obtain copies of the batching records and to document/photograph plant operations during the production of WMA for the Contract. The information collected from the Contractor’s asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner’s QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

**Additional Performance Testing Requirements During Production**

The Owner will undertake performance testing on a random basis. The Owner will also use performance testing to address concerns with mix volumetrics, gradation and tack coat performance. The Contractor will be advised of the results and corrective actions/adjustments will be determined/negotiated as necessary.

The following test methods in Table A below will be used by the Owner to assess WMA performance.

The Contractor is responsible for ensuring that the submitted mix design complies with the thresholds indicated in Table B below.

Table A – Summary of Performance Tests

| **Test Method Description** | **Specification** |
| --- | --- |
| Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Warm Mix Asphalt (WMA) | AASHTO T324/LS-335 |
| Standard Method of Test for Determining the Fracture Potential of Asphalt Mixtures Using the Illinois Flexibility Index (I-FIT) | AASHTO T393/LS-334 |
| Standard Test Method for Determining Fracture Energy of Asphalt Mixtures Using the Disk-Shaped Compact Tension (DCT) Geometry | ASTM D7313/LS-336 |
| Standard Method of Test for Determining the Interlayer Shear Strength (ISS) of Asphalt Pavement Layers | AASHTO TP114 |
| Standard Method of Test for Determining Dynamic Modulus of Warm Asphalt Mixtures (WMA) | AASHTO T342/T378 |

Table B – Performance Testing Acceptable Thresholds

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Test** | | **Category** | **Unit** | **Acceptable Limits** | |
| **Min** | **Max** |
| Interlayer Shear Strength (ISS) – Tack Coat Application | | Bond Strength | KPa | 275 | --- |
| Semi Circular Bending (I-FIT)-(SCB) – Category B, C, D and E only with minimum PG 64-28XJ | | Flexibility Index | Unitless | 10 | --- |
| Disk-Shaped Compact Tension (DCT) – Surface Asphalt SP12.5, SP12.5 FC1 and SP12.5 FC2 – Category B, C, D and E only with minimum PG 64-28XJ | | Fracture Energy | J/m2 | 600 | --- |
| Disk-Shaped Compact Tension (DCT) – Base Asphalt SP19, SP25 – Category B, C, D and E only with minimum PG 64-28XJ | | Fracture Energy | J/m2 | 450 | --- |
| Hamburg Double Wheel-Track (HDWT) – Only Applicable to Category D and E Mixes (Surface and Base Asphalt Mixes) | For PG 58-XX at 44ᵒC | Rut Depth | mm | --- | 12.5 |
| For PG 64-XX at 50ᵒC | --- | 12.5 |
| For PG 70-XX at 50ᵒC | --- | 10 |

**310.08.04 Aggregate Gradation and Asphalt Cement Content** is amended by deleting the second paragraph and replacing it with the following:

If the WMA is deemed borderline for aggregate gradation or asphalt cement content according to Table 7, the Contractor shall be notified in writing by the Owner and shall take immediate corrective action through process control at the asphalt plant. A total of three (3) borderline test results for the same attributes representing up to 1,500 tonnes of WMA production shall result in the work being deemed rejectable.

**310.08.05 Hot Mix Asphalt Properties Acceptance** is deleted in its entirety and replaced with the following:

**310.08.05 Warm Mix Asphalt Properties Acceptance**

The production air voids for all WMA mixes shall be evaluated according to Table 9 as amended below. A total of three (3) borderline test results for air voids representing up to 1,500 tonnes of WMA production shall result in the work being deemed rejectable.

Referee samples within the limits of the affected area shall be delivered by the Owner’s quality assurance Consultant to a mutually agreed upon third party referee laboratory to verify Superpave compliance tests or air void results, or both. The Contractor can only invoke referee testing within five (5) Business Days of receiving the QA test results.

When the results from the referee samples are deemed borderline or rejectable according to Table 9 as amended below, the WMA pavement shall be removed and replaced with acceptable WMA pavement. Alternatively, the Owner may accept a guaranteed maintenance bond, an increased maintenance period, or a negotiated price adjustment.

**OPSS.MUNI 310 Table 9 Air Void Criteria for Hot Mix Asphalt Types (LS-265)** is deleted in its entirety and replaced with the following:

Table 9 – Air Void Criteria for Warm Mix Asphalt Types (LS-265)

|  |  |  |  |
| --- | --- | --- | --- |
| **Mix** | **Acceptable %** | **Borderline %** | **Rejectable %** |
| All Mixes | 3.0 to 5.0 | 2.0 to 2.9 and 5.1 to 6.0 | < 2.0 and > 6.0 |

**OPSS.MUNI 310 Table 10 Minimum Pavement Compaction Based on Maximum Relative Density** is deleted in its entirety and replaced with the following:

Table 10 – Minimum Pavement Compaction Based on Maximum Relative Density

|  |  |
| --- | --- |
| **Mix** | **Minimum Compaction %** |
| All Mixes, except SMA | 92.0 |
| SMA | 93.0 |

**310.10.01 BASIS OF PAYMENT** is amended by the addition of the following:

Each course of asphalt shall be placed to the specified thickness. If the specified placement rate is exceeded, payment may be withheld for the excess material placed.

PAYMENT ADJUSTMENT FOR VARIATIONS IN ASPHALT CEMENT IN WMA – BID AC

**Bidding Requirements**

The asphalt cement content of mix designs for bidding purposes shall be those shown in Table C below (Asphalt Cement Content for Bid Purposes (%), or Bid AC).

The minimum asphalt cement content for the mix design must be equal to, or greater than, those shown in Table C below.

The maximum asphalt cement content to be considered for payment adjustment for each mix shall be those shown in Table C below.

The amount of RAP AC will be discounted once the asphalt work is completed (see “Price Adjustments” section below). Therefore, the Contractor should assume only virgin AC is used when calculating its bid prices for all WMA base course asphalt items.

Table C – Superpave Asphalt Cement Content Bid AC, Minimum AC for Mix Design, and Maximum AC Content for Payment Adjustment

|  |  |  |  |
| --- | --- | --- | --- |
| **Mix Type** | **Asphalt Cement Content for Bid Purposes  (%)** | **Minimum Asphalt Cement Content for Mix Design  (%)** | **Maximum Asphalt Cement Content for Payment Adjustment (%)** |
| SP 9.5 | 5.5 | 5.5 | 6.0 |
| SP 12.5 | 5.0 | 5.0 | 5.5 |
| SP 19 | 4.8 | 4.8 | 5.3 |
| SP 25 | 4.4 | 4.4 | 5.1 |

**Price Adjustments**

The Owner will calculate a payment adjustment based on the actual AC in the WMA. The price used to calculate the payment adjustment shall be based on the actual AC incorporated into the WMA based on the QA results and the applicable AC Bid % specified in Table C above.

**Note:** Payment adjustments to be paid to the Contractor will apply up to the maximum AC content as specified in Table C above.

The payment adjustment calculated using this formula shall be full compensation for any and all PGAC grades specified.

Actual AC shall be defined as the average AC content obtained from QA samples taken during paving operations minus the AC content of the RAP in the asphalt mix design.

The AC Price shall reflect the MTO’s PGAC price index appearing monthly in the MTO’s Contract Bulletin.

**Actual AC Calculation – Example 1:**

Asphalt Specified = SP 12.5 PGAC 64-28

Asphalt Qty = 10,000 tonnes

Average AC content obtained from QA samples = 5.3% of Asphalt Qty = 530 tonnes

Actual AC = Average AC from samples = 530 tonnes

Actual AC % = (530 tonnes/10,000 tonnes) x 100%

Actual AC % = 5.3% of PGAC

**Actual AC Calculation – Example 2:**

Asphalt Specified = SP 19 PGAC 64-28

Asphalt Qty = 10,000 tonnes

Asphalt mix design RAP = 15% = 1,500 tonnes

AC Content of RAP = 4% of asphalt mix design RAP = 60 tonnes

Average AC content obtained from QA samples = 5.3% of Asphalt Qty = 530 tonnes

Actual AC = Average AC from samples – AC Content of RAP = 530 – 60 = 470 tonnes

Actual AC % = (470 tonnes/10,000 tonnes) x 100%

Actual AC % = 4.7% of PGAC

WMA Quantity shall be defined as the actual amount of WMA placed and accepted into the Work in tonnes (t).

The Contractor shall bid the WMA item(s) using the content of PGAC specified and should assume only virgin AC is used when calculating its bid prices.

An asphalt payment adjustment will only be considered for those items for which the unit of measurement specified in the Schedule of Prices is “tonne (t)”.

The Owner will use the MTO’s PGAC price index issued the month prior to tender closing to determine the adjustment(s), if any:

Payment adjustment\* = WMA Qty x (Actual AC – Bid AC) x AC Price

\*Negative value indicates payment to the Owner.

**OPSS.MUNI 1101**

**1101.02 REFERENCES** is amended by the addition of the following under **Ontario Ministry of Transportation Publications, Laboratory Testing Manual**:

LS-284 Method of Test for Recovery of Asphalt from Solution by Rotary Evaporator

**1101.03 DEFINTIONS** is amended by deleting the definitions of Low Temperature Performance Grade and Performance Graded Asphalt Cement (PGAC) in their entirety and replacing them with the following:

**Low Temperature Performance Grade (-YY)** means the low temperature performance grade specified elsewhere in the Contract Documents and also referred to as the -YY specified for the performance graded asphalt cement where the PGAC (Performance Graded Asphalt Cement) Grade specified is PG XX-YY, and equal to the minimum design pavement temperature.

**Performance Graded Asphalt Cement (PGAC)** means an asphalt binder that is an asphalt-based cement produced from petroleum residue, modified using polymers, according to the latest version of AASHTO M 320 or M 332 (at the time of bid closing).

**1101.03 DEFINITIONS** is further amended by the addition of the following definition:

**Recovered Performance Graded Asphalt Cement (Recovered PGAC)** means an asphalt binder that has been extracted and recovered from the WMA. Extraction shall use only trichloroethylene (TCE). Fines shall be removed from the solution using a high-speed centrifuge method. Recovery shall be under a nitrogen gas atmosphere according to the Rotavapor method in LS-284 or ASTM D7906-14.

The following recovered PGAC samples are designated by the Owner for acceptance of the WMA: (1) PGAC extracted and recovered from loose WMA quartermaster samples taken during construction of the pavement; or (2) PGAC extracted and recovered from samples saw cut from the finished pavement and tested within a period of 90 Days following the date of Substantial Performance of the Contract. Recovered samples shall be used in place of rolling thin-film oven (RTFO) residues and only further aged in the pressurized aging vessel (PAV) for the purpose of AASHTO M 320, LS-299 and LS-308 grading.

**1101.04.01.01 PGAC Test Documentation** is deleted in its entirety and replaced with the following:

1101.04.01.01 PGAC Test Documentation

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following information to the Owner a minimum of 14 Days prior to the first use of each Product, or concurrently with the submission of the asphalt mix design, whichever is earlier:

1. The PGAC supplier and the facility type and location that the Product will be supplied from.
2. Test results for the Product demonstrating compliance with the requirements of the Contract Documents.
3. Applicable mixing and compaction temperatures for the Product. When paving on bridge decks, the information shall include the minimum temperature recommended by the PGAC supplier for WMA immediately after spreading.
4. Documentation setting out the construction, storage and handling requirements, including the material safety data sheet, recompaction temperature, mix discharge temperature and recommended extraction procedure.
5. When the PGAC contains any PPA and a liquid anti-stripping additive is incorporated into the PGAC at the PGAC supplier’s depot:
   1. information on how much anti-stripping additive was added to the PGAC; and
   2. documentation from the PGAC supplier confirming that the PPA modified PGAC with the liquid anti-stripping additive added at the PGAC supplier’s depot will meet all asphalt cement material requirements specified in the Contract Documents and AASHTO M320 for the PGAC grade specified in the Contract Documents.
6. A two (2) litre sample of the tank asphalt cement for each grade according to Table 2 Sampling Requirements for possible testing by the Owner.
7. All sampling shall be in accordance with AASHTO T 40 and ASTM D 3665.
8. A copy of all LS-227 documentation demonstrating that the Product complies with the requirements of the Contract Documents.
9. Grade and grade loss according to LS-308 along with a copy of all LS-308 documentation demonstrating that the Product complies with the requirements of the Contract Documents.
10. Average of the critical crack tip opening displacement (δt) as determined according to LS‑299 along with a copy of all of the LS-299 documentation demonstrating that the Product complies with the requirements of the Contract Documents.

For test documentation required under h), i) and j) above, the independent laboratory conducting the PGAC testing shall have participated in the most recent AASHTO Materials Reference Laboratory proficiency sample correlation program for PGAC and shall have obtained proficiency ratings in the program, satisfactory to the Owner.

All test samples shall be obtained by the Contractor in the presence of the Owner or its representative and in accordance with the asphalt plant’s health and safety requirements. The asphalt plant’s health and safety plan and procedure for sampling shall be reviewed at the pre-pave meeting.

The Owner will review the test results submitted and provide written confirmation of conformance of the PGAC, or advise the Contractor of any non-conformance, within 10 Business Days from the date of delivery of the samples and test documentation. The mix shall not be placed until the Owner provides written confirmation of conformance of the PGAC to the requirements of the Contract Documents, based on the submitted test results and possible testing by the Owner. The Owner’s confirmation of conformance of the submitted PGAC properties does not constitute any guarantee that the mix can be produced, constructed, or both, in accordance with the requirements of the Contract Documents and shall not relieve the Contractor of its responsibility for ensuring the specified quality of materials and workmanship.

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply the following items to the Owner prior to the commencement of the WMA production:

* PGAC documentation from the asphalt cement supplier in the form of a bill of lading and certificate of analysis, confirming the grade of PGAC. The bill of lading and certificate of analysis shall also be supplied for each subsequent delivery of PGAC that will be used for the WMA production.
* Documentation identifying the PGAC storage tank that the PGAC will be supplied from for the WMA production. The Contractor shall notify the Owner and provide updated documentation prior to changing the storage tank that is being used to supply PGAC for the WMA production.

For each grade of PGAC specified in the Contract Documents, the Contractor shall supply to the Owner, from the plant during the production of the WMA, samples of the asphalt cement being used to produce the WMA for additional testing in accordance with the requirements of AASHTO M-320, R-29 and Table 1 of OPSS.MUNI 1101 (amended below).

**1101.08.03 Sampling** is amended by deleting the fourth sentence and replacing it with the following:

All samples shall be obtained in the presence of a representative of the Owner during the production of the asphalt mix at the asphalt mix plant from the storage tank which is directly feeding the production of the asphalt mix in accordance with AASHTO T 40 and the asphalt plant’s health and safety plan.

**1101.08.03 Sampling** is further amended by the addition of the following:

Recovered PGAC Samples

The Owner will determine the frequency of sampling and testing based on the WMA tender quantity for each grade of PGAC. The QA and referee quartermaster samples for Owner testing shall be taken at the same time.

WMA samples shall be obtained by the Contractor when notified by the Owner. Samples shall be delivered in a condition suitable for testing and sample containers shall be supplied by the Contractor.

All loose WMA samples shall be obtained directly from the paving equipment during the construction of the pavement.

**1101.08.04 Quality Assurance Testing** is deleted in its entirety and replaced with the following:

**1101.08.04 Quality Assurance Testing for Tank and Recovered Samples**

When the Owner elects to carry out QA testing, one (1) of the samples shall be randomly selected for testing by the QA laboratory and the remaining sealed samples shall be retained by the QA laboratory for possible referee testing. QA testing will be evaluated against the requirements as specified herein. For acceptance criteria, refer to Table 1 as amended below.

Test results for samples that do not comply with the performance grading requirements shall be categorized as borderline or rejectable. PGAC shall be categorized based on its test result’s deviation from the individual design maximum or minimum pavement temperature and the sum of the deviations from the design maximum or minimum pavement temperatures as defined below. The actual performance grading that is either higher than the design maximum pavement temperature or lower than the design minimum pavement temperature is not considered a deviation.

**Borderline:** Individual deviations are less than or equal to 3 °C and the sum of deviations is less than or equal to 3 °C.

**Rejectable:** Does not meet the requirements under the ‘Borderline’ section above.

When a sample does not comply with more than one (1) property attribute and PG grading, acceptance of the WMA shall be dealt with using the property attribute or PG grading selected by the Owner.

For any single day of paving with more than two (2) borderline results for AASHTO M320, LS-299 or LS-308 for two (2) separate samples, the production for the entire day shall be rejectable.

The Owner may conduct elemental testing according to ASTM D7343 or other tests to determine if the asphalt cement meets the material requirements as specified in the Materials section.

**1101.08.05 Disposition of HMA Produced with PGAC Not Conforming with the Requirements of the Contract Documents** is deleted in its entirety and replaced with the following:

1101.08.05 Disposition of WMA Produced with PGAC (Tank and Recovered) Not Conforming with the Requirements of the Contract Documents

The Owner will review the test results and determine the disposition of the WMA produced using any PGAC that does not conform to all requirements of the Contract Documents. WMA produced using PGAC for which test results indicate that the product did not conform to the Contract Documents shall be dealt with as follows:

**Borderline:** The WMA shall be accepted at full payment.

**Rejectable:** The WMA shall not be accepted into the Work. The Owner will notify the Contractor in writing within 10 Business Days of receipt of the non-conforming data. The Contractor has the option of either removing the WMA and replacing it with acceptable WMA or invoking referee testing. The Contractor may request a reduced price in lieu of removal of the WMA. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall continue to apply.

When test results indicate non-compliance with the Contract Documents, all costs incurred by the Owner to establish the degree and extent of the non-compliance shall be the responsibility of the Contractor.

The Owner’s review of the test results to determine disposition of the WMA produced shall include all additional testing requirements for which acceptance requirements have been specified.

**1101.08.06 Referee Testing** is deleted in its entirety and replaced with the following:

**1101.08.06 Referee Testing for Tank and Recovered PGAC Samples**

Referee testing by an independent laboratory may be invoked by the Contractor for any sample of PGAC within five (5) Days of receiving all the QA test results for the sample.

Following the Contractor's written notification to invoke referee testing, the Owner will select a third party referee laboratory acceptable to the Contractor. Referee test samples shall be delivered to the referee testing laboratory from the QA laboratory by the Owner.

The referee testing shall determine the actual performance high and low temperatures, rounded to the nearest 0.5 °C of the PGAC and the properties and attributes shown in Table 1 as amended below.

Test results generated by the referee laboratory shall be used to re-evaluate the PGAC to determine whether the product conforms to the Contract Documents and the disposition of the WMA represented by the sample tested.

Referee testing shall be carried out in the presence of the Owner’s designate. The Contractor may observe the testing at no cost to the Owner.

The Contractor and the Owner may send a maximum of two (2) representatives each to observe the referee testing. The Owner will notify the Contractor a minimum of three (3) Business Days in advance of the date of referee testing. Provided that such notice was given, referee testing shall be carried out regardless of the absence of one (1) or more observers.

Observers shall follow the referee laboratory protocols for access to the premises and testing equipment and shall not unnecessarily impede the progress of the testing. Observers shall be permitted to validate sample identification and view sample condition. Subject to safety requirements, test method and equipment limitations, they shall also be permitted to observe test procedures, take notes, view equipment readings, and review completed work sheets while in attendance. The taking of photographs and videos shall not be permitted.

Concerns with sample condition or sample identification shall be made known to all observers prior to commencement of the referee testing. Comments on deviations from the applicable test method shall be made at the time of referee testing. Unresolved concerns shall be specific in nature and submitted in writing to the referee laboratory’s designated representative and the other observers present, at the time of testing.

Referee test results shall be binding on both the Owner and the Contractor.

When referee test results show that the PGAC is rejectable, the WMA represented by the test results shall not be accepted. The Contractor shall remove the WMA at no cost to the Owner. The Contractor may request a reduced price in lieu of removal of WMA produced with PGAC with rejectable test results. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall continue to apply.

If the referee testing results comply with the PGAC specifications, the Owner will be responsible for the testing costs. If the referee testing results do not comply with the PGAC specifications, the Contractor shall be responsible for the testing costs.

**OPSS.MUNI 1101 Table 1 Additional Asphalt Cement Testing Requirements and Acceptance Criteria for All PG Grades** is deleted in its entirety and replaced with the following:

Table 1 – Testing Requirements and Acceptance Criteria for All PGAC Grades

| **PGAC Grade** | **Property** | **Test Method** | | **Acceptance Criteria** | **Borderline** | **Rejectable** |
| --- | --- | --- | --- | --- | --- | --- |
| All Tank Samples | Ash Content, % by mass of residue (%) | LS-227 | | ≤ 0.6 | > 0.6 and ≤ 0.8 | > 0.8 |
| All Recovered Samples | Ash Content, % by mass of residue (%) (See Note 2 for recovered Asphalt) | LS-227 | | ≤ 1.0 | N/A | > 1.0 |
| All Grades Except PG 58-28 and PG 52-34 – Tank and Recovered Samples | PGAC Grade (PG XX-YY) | AASHTO M320 | | XX > 64.0 and YY < -28 | Individual XX and YY deviations ≤ 3.0 and the sum of deviations is ≤ 3.0- | Individual XX and YY deviations > 3.0 or the sum of deviations > 3.0 |
| Non-recoverable creep compliance at 3.2 kPa (Jnr-3.2) (kPa-1) | Multiple Stress Creep and Recovery (MSCR) testing according to AASHTO T350 testing conducted at a temperature of 58°C (Zone 3) | | < 4.5 | N/A | ≥ 4.5 |
| Average percent recovery at 3.2 kPa (R3.2) (%) | Multiple Stress Creep and Recovery (MSCR) testing according to AASHTO T350 testing conducted at a temperature of 58°C (Zone 3) | | ≥ the lesser of [(29.371) (Jnr-3.2) -0.2633] or 55 | < the lesser of [(29.371) (Jnr-3.2) -0.2633] or 55 OR ≥ the lesser of [(29.371) (Jnr-3.2)-0.2633] -10 or 50 () | < the lesser of [(29.371) (Jnr-3.2)-0.2633] -10 or 50 |
| All Tank and Recovered Samples | Average critical crack tip opening displacement (dt) (mm) | LS-299 | PG 58-28 | ≥ 6.0 | < 6.0 and ≥ 4.0 | < 4.0 |
| PG XX-28 | ≥ 10.0 | < 10.0 and ≥ 8.0 | < 8.0 |
| Maximum Grade Loss with reference to the 1-hour results at -YY + 10 (⁰C) | LS-308, 72-hour results at -YY + 10 | | ≤ 6.0 | > 6.0 and ≤ 7.0 | > 7.0 |
| Maximum Grade Loss with reference to the 1-hour results at -YY + 10 (⁰C) | LS-308, 72-hour results at -YY + 20 | | ≤ 4.0 | > 4.0 and ≤ 6.0 | > 6.0 |
| Limiting Grade (LTLG) (⁰C) | LS-308 | PG XX-28 | ≤ -28 | > -28 and ≤ -25 | > -25 |

**Notes:**

.1 For non-recoverable creep compliance, report results rounded to the nearest 0.01. For all others, report results rounded to the nearest 0.1.

.2 Acceptance shall be based on the following:

1. PGAC sampled at the asphalt plant storage tank; and
2. PGAC extracted and recovered from the loose WMA samples taken during construction of the pavement; or
3. PGAC extracted and recovered from samples saw cut from the finished pavement and tested within a period of 90 Days following the date of Substantial Performance of the Contract. Recovered samples shall be used in place of rolling thin film oven (RTFO) residues and only further aged in the pressure aging vessel (PAV) for the purpose of AASHTO M320, LS-299 and LS-308 grading.

.3 All recovered PGAC samples shall be obtained by extraction using only trichloroethylene (TCE) from loose WMA or from saw cut samples from the finished pavement. Fines shall be removed from the solution prior to recovery using a high-speed centrifuge method until Ash Content by mass of residue is below or equal 1.0%. Recovery shall be under a nitrogen atmosphere according to the Rotavapor method in LS-284 or ASTM D7906.

.4 Borderline results allow for testing variability. Acceptance shall be a “simple acceptance” also known as “shared risk” acceptance and measurement uncertainty shall play no role in accept/reject decisions (American Society of Mechanical Engineers. ASME B89.7.3.1:2001 Guidelines for decision rules: Considering measurement uncertainty in determining conformance to specifications. New York, NY, 2001).

Throughout the full duration of the Contract, the Contractor shall provide the Owner with a copy of the Bill of Lading for the WMA additive. The Bill of Lading must clearly indicate the inclusion of the WMA additive to the PGAC.

**OPSS.MUNI 1151**

**1151.02 REFERENCES** is amended by:

* deleting “OPSS 1101 Performance Graded Asphalt Cement” from the list of **Ontario Provincial Standard Specifications, Material** and replacing it with “OPSS.MUNI 1101 Performance Graded Asphalt Cement as modified by these Specifications”.
* adding the following to the list of MTO Laboratory Testing Manuals under the heading **Ontario Ministry of Transportation Publications**:

LS-227 Determination of Ash Content

LS-299 Determining Asphalt Cement’s Resistance to Ductile Failure Using Double Edge Notched Tension Test (DENT)

LS-308 Determination of Performance Grade of Physically Aged Asphalt Cement Using Extended Bending Beam Rheometer (BBR) Method

* adding the following to the list of **American Association of State Highway and Transportation Officials (AASHTO)** standards:

M 332-14 Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test

**1151.05.01 Asphalt Cement** is amended by deleting the reference to “OPSS 1101” in the first sentence and replacing it with “OPSS.MUNI 1101 as modified by these Specifications”.

**OPSS.MUNI 1151 Table 2 Superpave Aggregate Gradation Control Points** is deleted in its entirety and replaced with the following:

Table 2 – Superpave Aggregate Gradation Control Points

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Hot Mix**  **Asphalt**  **Type** | **Percentage Passing by Dry Mass of Aggregates** | | | | | | | | | |
| **Sieve Size**  **mm** | | | | | | | | | |
| **50.0** | **37.5** | **25** | **19.0** | **12.5** | **9.5** | **4.75** | **2.36** | **1.18** | **0.075** |
| Superpave  4.75 | - | - | - | - | 100 | 95-100 | 90-100 | - | 30-60 | 6-12 |
| Superpave  9.5 | - | - | - | - | 100 | 90-100 | 32-90 | 32-67 | - | 2-10 |
| Superpave  12.5 | - | - | - | 100 | 90-100 | 28-90 | - | 28-58 | - | 2-10 |
| Superpave  12.5 FC1  and  12.5 FC2 | - | - | - | 100 | 90-100 | 45-90 | 45-55 | 28-58 | - | 2-10 |
| Superpave  19.0 | - | - | 100 | 90-100 | 23-90 | - | 45-55 | 23-49 | - | 2-8 |
| Superpave  25.0 | - | 100 | 90-100 | 19-90 | - | - | 45-55 | 19-45 | - | 1-7 |
| Superpave  37.5 | 100 | 90-100 | 15-90 | - | - | - | - | 15-41 | - | 0-6 |

**Surface Smoothness Requirements**

Asphaltic concrete surface smoothness shall be in accordance with MTO Special Provision No. 103F31 as amended by the following:

**8.01.02 Surface Smoothness Measurement** is deleted in its entirety and replaced with the following**:**

**8.01.02 Surface Smoothness Measurement**

The Owner will measure all through lane pavement surfaces using an MTO approved inertial profiler, with the following exceptions:

1. Where the posted speed is 50 km/hr or less.
2. Where a single lift is placed on an existing surface.
3. Within 10 m of the end of a placement where the Contractor is not responsible for the adjoining surface.
4. Bridge decks and within 10 m of bridge deck expansion joints.
5. Detours and other temporary pavement that may be removed or overlaid under the Contract.
6. The first adjacent lane consisting of one (1) or more lifts of newly placed asphalt where the Contractor must match to an existing surface that is not being resurfaced under the Contract.
7. Within 10 m of any maintenance holes, catch basins and valve chambers or similar structures which are located within the lane or within 1.5 m of the outside edge of the lane.
8. Lanes less than 100 m in length.
9. Multi-use trails located in the boulevard(s).

**8.01.02.02 Inertial Profiler Acceptance Testing** is amended by deleting “b) Once within a given calendar year; or” from the first paragraph.

**8.01.02.02 Inertial Profiler Acceptance Testing** is amended by the addition of the following:

For the purposes of surface smoothness requirements, a sublot is defined in accordance with MTO LS-296.

**Average International Roughness Index (IRI)**

Any sublot with an IRI of both wheel paths from a set of three (3) measurements taken by an inertial profiler greater than 2.5 m/km shall be rejected. The Contractor shall repair the rejected sublot(s) in accordance with subsection 8.01.05 such that the 2.5 m/km IRI limit of the Contract is met.

**Average Mean Roughness Index (MRI)**

Any area with a MRI determined from a set of three (3) measurements taken by an inertial profiler run through ProVAL Version 3.4 or 3.5 where the localized roughness is greater than 4.0 m/km shall be rejected. The Contractor shall repair the rejected area(s) in accordance with subsection 8.01.05such that the 4.0 m/km MRI limit of the Contract is met.

**Surface Tolerance**

The surface tolerances of any pavement surface shall be such that when measured with a 3 m straight edge placed anywhere, including the edge of the pavement, in any direction on the surface, except across the crown or drainage gutters, there shall not be a gap between the bottom of the straight edge and the surface of the pavement:

1. Greater than 6 mm for all binder courses, levelling courses and padding; or
2. Greater than 3 mm for all surface courses.

Longitudinal and transverse joints shall be constructed such that the elevation difference across the longitudinal joints shall not exceed 5 mm, when measured with a straight edge placed on the asphalt surface with the higher elevation and overhanging the joint by not more than 50 mm. All joints which exceed the 5 mm tolerance shall be repaired in accordance with subsection 8.01.05 such that the 5 mm surface tolerance limit of the Contract is met.

The Contractor shall provide all traffic control, as required, for the Owner to conduct surface tolerance measurements.

**8.01.05.01 General** is amended by deleting the second paragraph and replacing it with the following:

Any incident of localized roughness shall be repaired.

**10.0 BASIS OF PAYMENT** is deleted in its entirety.

### Item R303 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt [Renewal]

### Item R304 Remove and Replace Asphalt Curb and Gutter [Renewal]

The following Standard Drawing is applicable to Item R304: OPSD 601.010 (Nov 2013).

This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).

Under Item R303 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, the Contractor shall remove existing asphalt and replace it with miscellaneous Superpave 12.5 HMA, PGAC 58-28 or equivalent, as required at existing paved entrances, boulevards and all other areas indicated by the Owner. Superpave 12.5 HMA shall be placed as follows:

* For residential properties – 50 mm
* For commercial properties – 100 mm
* For boulevards, unpaved shoulders and roundings adjacent to new guide rail systems – 50 mm

The Traffic Category shall be ‘A’.

Under Item R304 – Remove and Replace Asphalt Curb and Gutter, the Contractor shall remove and replace approximately xx m of asphalt curb and gutter on xxx from xxx to xxx. Paving limits will be determined by the Owner on Site. Superpave 12.5 HMA, PGAC 58-28 or equivalent, shall be placed in accordance with the Asphalt Mountable Curb with Wide Gutter detail on OPSD 601.010. The Traffic Category shall be ‘A’.

**310.09 MEASUREMENT FOR PAYMENT** is amended by the addition of the following:

**310.09.01.04 Asphalt Curb and Gutter**

Measurement of asphalt curb and gutter shall be per linear metre (m) of HMA curb and gutter satisfactorily replaced.

**Basis of Payment**

No separate payment will be made for removal and disposal work performed under Item R303 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt and Item R304 – Remove and Replace Asphalt Curb and Gutter.

### Item R305 Superpave, Surface Course, Hot Mix Asphalt [Renewal]

### Item R306 Remove and Replace Miscellaneous Superpave Hot Mix Asphalt [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).

Under Item R305 – Superpave, Surface Course, Hot Mix Asphalt, the Contractor shall supply and place Superpave, Surface Course, HMA in one (1) lift from shoulder to shoulder in the location(s) and to the depth(s) specified in the Bid Form.

Under Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, the Contractor shall remove existing asphalt and replace it with miscellaneous Superpave 12.5 HMA, PGAC 58-28, as required at existing paved entrances, boulevards and all other areas indicated by the Owner. Superpave 12.5 HMA shall be placed as follows:

* For residential properties – one (1) 50 mm lift
* For commercial properties – two (2) 50 mm lifts
* For boulevards – one (1) 50 mm lift

The Traffic Category shall be ‘A / B / C’.

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**310.04 DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 10 Working Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design must be submitted to the Owner for review and acceptance before the new HMA is incorporated into the Work.

All PGAC used in the HMA must be compliant with the requirements outlined in Table 1 of OPSS.MUNI 1101.

Superpave asphalt mixes shall be designed to provide a minimum PGAC content as follows:

|  |  |
| --- | --- |
| **Mix Type** | **Minimum PGAC Content** |
| SP 12.5, SP 12.5 FC1 and SP 12.5 FC2 | 5.0% |
| SP 19 (mix that is covered up with surface asphalt in the same construction season) | 4.8% |
| SP 19 (mix that is **NOT** covered up with surface asphalt in the same construction season) | 5.0% |
| SP 25 | 4.4% |

**310.06.02 Paving Equipment** is amended by the addition of the following:

A shuttle buggy is not required for the paving work. No additional payment will be made to the Contractor should the Contractor chose to use a shuttle buggy.

**310.07.05.01.01 General** is amended by the addition of the following:

The unit prices for the hot mix items shall include the supply of the PGAC.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be taken if requested by the Owner.

**310.07.06.01 General** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30th unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary. Any additional work required to prepare the road for winter shutdown shall be completed under Item G1 – Maintenance of Traffic.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be controlled within a temperature range of 135oC to 150oC.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped to the satisfaction of the Owner. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition to the satisfaction of the Owner.

**310.08.01 General** is amended by the addition of the following:

The Owner will be conducting QA testing using the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151 (Superpave mixes).

Voids Filled with Asphalt (VFA) shall be within the specified mix design range.

For the purpose of hot mix sampling and testing, one (1) lot will be deemed to be the total of each Day’s production.

The Owner will check the Contractor’s production of the design mix using one, or both, of the following methods:

* A sample from a trial batch of the proposed mix from the supply plant
* A production sample of the proposed mix which the Contractor is currently supplying to another site

**Asphalt Plant Control Room Access**

The Contractor shall provide the Owner’s QA representative with access to its asphalt plant control room in order to obtain copies of the batching records and to document/photograph plant operations during the production of HMA for the Contract. The information collected from the Contractor’s asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner’s QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

**310.10.02 Hot Mix Asphalt Miscellaneous – Item** is amended by the addition of the following:

**Remove and Replace Miscellaneous Superpave Hot Mix Asphalt – Item**

Each course of asphalt shall be placed to the specified thickness. If the specified placement rate is exceeded, payment may be withheld for the excess material placed.

No separate payment will be made for removal and disposal work performed under these items.

### Item R307 Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course [Renewal]

This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1150 (Nov 2020).

This item is for the removal and restoration of asphalt pavement affected by intersection improvements as noted on the Drawings. The asphalt shall be placed to match existing lift thicknesses up to a depth of 150 mm.

Removals shall be done by saw cutting and excavating, or by cold planning to provide smooth vertical surfaces in the existing asphalt.

Restoration of the existing asphalt shall be carried out no later than twenty-four (24) hours after completion of adjacent intersection improvement work.

The HMA mixes shall have a minimum Marshall Stability of 12,000.

Prior to surface paving, the edges of the existing asphalt shall be ground out 50 mm deep by 300 mm wide to provide a step joint between the existing base asphalt and the new surface asphalt.

The supply and application of tack coat shall be included in the unit price for this item.

**310.07.03.01 Application of Tack Coat** is amended by the addition of the following:

Tack coat shall be applied to all previously paved surfaces, regardless of whether the surfaces have been open to traffic.

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m2) in which binder and surface course asphalt is satisfactorily removed and replaced.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R308 Remove and Replace Miscellaneous Hot Mix Asphalt HL-3 [Renewal]

This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1150 (Nov 2018).

This item is for the removal and restoration of asphalt sidewalks, boulevards and median islands affected by intersection improvements as noted on the Drawings. The new asphalt shall be placed to a depth of 50 mm, and any granular material required for the restoration shall be included in this item.

Removals shall be done by saw-cutting and excavating.

Restoration of the existing asphalt shall be carried out no later than twenty-four (24) hours after completion of the adjacent intersection improvement work.

The HMA mixes shall have a minimum Marshall Stability of 12,000.

**Measurement for Payment**

Measurement for payment shall of the area in square metres (m2) in which asphalt is satisfactorily removed and replaced.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R309 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category ‘D’ (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 1003 (Nov 2013) with Appendices 1003-D and 1003-E invoked, OPSS.MUNI 1101 (Nov 2016) and OPSS.MUNI 1151 (Apr 2018).

**310.07.06.01 General** is amended by the addition of the following:

The Contractor shall supply and place 50 mm Superpave 12.5 surface course patching,

PGAC 64-28 XJ, Category ‘D’ in the location(s) identified by the Owner.

The purpose of the patching is to fix deteriorated pavement locations prior to the required microsurfacing treatment. The Owner will identify and mark the patch locations on Site for the Contractor at the commencement of construction.

**310.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**310.04 DESIGN AND SUBMISSION REQUIREMENTS**

The Contractor shall submit all required asphalt mix designs to the Owner for review and acceptance a minimum of 10 Working Days before asphalt paving is scheduled to be undertaken. If for any reason the asphalt material is changed during the performance of the Work, the new mix design shall be submitted to the Owner for review and acceptance before the new hot mix asphalt is incorporated into the Work.

**310.06.02 Paving Equipment** is amended by the addition of the following:

A shuttle buggy is not required for the paving work. No additional payment will be made to the Contractor should the Contractor choose to use a shuttle buggy.

**310.07.05.01.01 General** is amended by the addition of the following:

The unit price for this item shall include the supply of the PGAC.

**310.07.05.01.02 Frequency and Location** is deleted in its entirety and replaced with the following:

**310.07.05.01.02 Frequency and Location**

A minimum of one (1) sample shall be randomly chosen for each asphalt cement type used on the Contract. Additional samples shall be taken if requested by the Owner.

**310.07.06.01 General** is amended by the addition of the following:

If the granular base is exposed following grinding (for base repairs and roadways where there is only one (1) lift of asphalt), the granular base shall be fine graded and compacted to the satisfaction of the Owner before any asphalt is placed. All faces of the pavement in the excavated area shall be painted with a thin, uniform and continuous coating of tack coat.

Under no circumstances shall top course asphalt paving take place after November 30th unless prior written permission has been received from the Owner. There will be no adjustments to the unit prices for the above item(s) should this work be completed during the next construction season in the event that a winter shutdown is necessary. Any additional work required to prepare the road for winter shutdown shall be completed under Item G1 – Maintenance of Traffic.

Each course of asphalt shall be placed to the specified thickness.

The requirements of Appendices 1003-D and 1003-E of OPSS.MUNI 1003 shall apply to this Specification.

Compaction testing of the placed hot mix will be determined by Nuclear Density Gauge.

**310.07.06.02 Operational Constraints** is amended by the addition of the following:

The placement of the surface course asphalt will not be permitted until all trimming and placement of topsoil, sod and seed is completed.

The temperature of the mixture, as it is discharged from the mixer, shall be controlled within a temperature range of 135oC to 150oC.

**310.07.11.03 Transverse Joints** is amended by the addition of the following:

All transverse construction joints and mat terminations shall be temporarily ramped to minimize the bump. Transverse joints between new and existing pavement shall be prepared no more than 24 hours in advance of paving tie-ins unless the joint is adequately ramped. Existing paved entrances shall be connected to new construction using an appropriate full depth butt or ground step joint to ensure a smooth transition.

**310.08.01 General** is amended by the addition of the following:

The Owner will be conducting QA testing using the requirements of OPSS.MUNI 310 and OPSS.MUNI 1151.

Voids Filled with Asphalt (VFA) shall be within the specified mix design range.

For the purpose of hot mix sampling and testing, one (1) lot will be deemed to be the total of each Day’s production.

The Owner will check the Contractor’s production of the design mix using one, or both, of the following methods:

* A sample from a trial batch of the proposed mix from the supply plant
* A production sample of the proposed mix which the Contractor is currently supplying to another site

**Asphalt Plant Control Room Access**

The Contractor shall provide the Owner’s QA representative with access to its asphalt plant control room in order to obtain copies of the batching records and to document/photograph plant operations during the production of asphalt for the Contract. The information collected from the Contractor’s asphalt control room will be used solely to compare the as-produced mix to the mix design accepted by the Owner. All information collected by the Owner’s QA representative will be shared with the Contractor and will be kept in strict confidence by the Owner.

**OPSS.MUNI 310 Table 10 Minimum Pavement Compaction Based on Maximum Relative Density** is deleted in its entirety and replaced with the following:

Table 10 – Minimum Pavement Compaction Based on Maximum Relative Density

|  |  |
| --- | --- |
| **Mix** | **Minimum Compaction %** |
| All Mixes, except SMA | 92.0 |
| SMA | 93.0 |

### Item R310 Asphalt Binder Course Repair (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 510 (Nov 2018).

Following asphalt removal operations, the Contractor shall repair all soft spots in the existing asphalt base course in the location(s) indicated by the Owner.

In all areas identified for repair by the Owner, the Contractor shall remove 80 mm of the existing base asphalt and/or granular material and properly place 80 mm of Superpave 19.0, PGAC 64-28 Category ‘C’. A shuttle buggy is not required for the asphalt paving performed under this item.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m2) in which existing base asphalt and/or granular material is satisfactorily removed and replaced.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R310A Asphalt Binder Course Repair – Asbestos Containing Materials (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 206 (Apr 2019),   
OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 510 (Nov 2018).

The Contractor is advised that the asphalt removed under this item contains asbestos fibres. Accordingly, asphalt removal and disposal under this item shall be completed in accordance with the requirements set out in the Specification for Item R530 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth and Item R531 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth. For clarity, any asphalt removed and disposed of under this item will be paid for under this item only.

Following asphalt removal operations, the Contractor shall repair all soft spots in the existing asphalt base course in the location(s) indicated by the Owner.

In all areas identified for repair by the Owner, the Contractor shall remove 80 mm of the existing base asphalt and/or granular material and properly place 80 mm of Superpave 19.0, PGAC 64-28 Category ‘B’. A shuttle buggy is not required for the asphalt paving performed under this item.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m²) in which existing base asphalt and/or granular material is satisfactorily removed and replaced.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R311 Aramid Reinforcing Fibers in WMA [Renewal]

The Contractor shall use aramid reinforcing fibers in the WMA placed under ***[Select the applicable item]*** Item R301 – Superpave, Binder Course, Warm Mix Asphalt / Item R302 – Superpave, Surface Course, Warm Mix Asphalt.

The fibers shall be one (1) of the following products:

* Surface Tech Ace XP Fiber (“ACE Fiber”) brand, aramid reinforcing fibers (described on the following website: <https://surface-tech.com/asphalt-ace-xp>)

**Sasobit Coated Aramid Fibers Specifications:**

Materials: Sasobit Wax/Aramid

Length: 38 mm (+/- 10%)

Form: Wax Coated Monofilament Fibers

Specific Gravity: 1.44 (Aramid)

Tensile Strength: 2,500 to 3,000 MPa (Aramid)

Melt Temperature: 88oC (Sasobit) and 400 to 450oC for Aramid – Kevlar

Dosage: 0.0065% aramid by mass of total mix

0.0106% for Sasobit treated aramid by mass of total mix

* FORTA–FI Fiber (“FORTA-FI Fiber”) brand, aramid reinforcing fibers (described on the website <http://www.jas-hes.com/products/construction/forta-fi-fibers>

**Blend of Polyolefin/Aramid Fibers Specifications:**

Materials: Polyolefin/Aramid (Kevlar)

Length: ¾” (19 mm)

Form: Serrated Fibers/Monofilament Fibers

Specific Gravity: 0.91/1.44

Acid/Alkali Resistance: Inert

Tensile Strength: up to 70,000 PSI or 480 Mpa (Polyolefin)

400,000 PSI or 2,760 Mpa (Aramid – Kevlar)

Melt Temperature: 130oC for Polyolefin and 427oC for Aramid – Kevlar

Dosage: 0.0065% aramid by mass of total mix

0.05% for Polyolefin/Aramid by mass of total mix (0.5 kg/metric ton of total mix)

* Or Equivalent

**Measurement for Payment**

Measurement for payment shall be per tonne (t) of WMA with aramid reinforcing fibers placed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R312 Geotextile Stabilized Double Chip Seal [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 303 (Nov 2018).

**303.01 SCOPE** is deleted in its entirety and replaced with the following:

**303.01 SCOPE**

This specification is applicable for the use of paving fabrics, saturated in an emulsified asphalt binder to be used in conjunction with a double seal coat, applied over existing bound or gravel surfaces. The seal can be utilized as an overlay to an existing roadway or as an interlayer where hot mix asphalt is placed on the finished reinforced seal.

The Contractor shall provide a double application of binder and aggregate in accordance with this Specification.

The function of the paving fabric is to act as a waterproofing and stress relieving membrane within the pavement structure.

Paving fabrics are not suitable for cul de sacs, intersections, sharp corners or roadways with maintenance structures. In lieu of paving fabric, these areas shall be overlain with 60 mm of HMA under Item R305 – Superpave, Surface Course, Hot Mix Asphalt, prior to the application of double chip seal.

**303.02 REFERENCES** is amended by the addition of the following:

**ASTM International**

ASTM D 4632 Grab strength

ASTM D 4632 Ultimate elongation

ASTM D 5261 Mass per unit area

ASTM D 276 Melting point

**Ontario Ministry of Transportation Publications**

Designated Sources for Materials:

DSM list #3.05.25 Aggregates, Coarse for Superpave 12.5 FC1, Superpave 12.5 FC2, SMA, HL1, DFC and OFC; and Aggregates, Fine for Superpave 12.5 FC2, SMA, DFC and OFC

DSM list #3.05.30 Emulsified Asphalt

MTO Laboratory Testing Manual (Tests)

LS–224 Coating for Emulsified Asphalts

**303.04.01 Design Requirements** is amended by the addition of the following:

The following information is provided for information purposes:

* Vivian Road from Highway 48 to York/Durham Line – AADT of 1,600, 1% trucks
* Kennedy Road north of Davis Drive – AADT of 170, 6% trucks
* Existing pavement structure – Engtec Consulting Inc. Geotechnical Investigation and Pavement Design Report, of January 27, 2016.

Any reliance on, or use of, this information shall not absolve the Contractor from its responsibility for the design or performance of the geotextile stabilized double chip seal.

The design shall be reviewed and approved for construction, on behalf of the Contractor, by a Professional Engineer qualified in asphalt technology.

**303.04.02.01 Chip Seal Design** is amended by the addition of the following:

Upon completion of the work under this item, the Contractor shall submit a certificate of conformance (the “**Certificate**”) to the Owner confirming compliance with the design and stating the application rates for binder and aggregates. The Certificate shall be reviewed and approved by the Professional Engineer on behalf of the Contractor. The Contractor shall also provide supporting quality control testing and inspection documentation necessary to demonstrate conformance with the requirements of the Contract Documents.

**303.05.02.01 General** is amended by the addition of the following:

Aggregates shall be from the MTO Designated Sources for Materials list #3.05.25.

**303.05.02.03.01 First Application** is amended by the addition of the following:

c) The minimum median size shall be 12.5 mm.

**303.05.03 Compatibility of Asphalt Binder and Aggregate** is amended by the addition of the following:

The Contractor shall perform compatibility testing and provide the results to the Owner a minimum of five (5) Working Days prior to commencing the geotextile stabilized double chip sealing.

**303.05 MATERIALS** is amended by the addition of the following:

**303.05.04 Geotextile**

The geotextile shall be a non-woven polypropylene fabric heat bonded on one (1) side and shall meet the physical requirements in the following table:

Geotextile Properties

|  |  |  |  |
| --- | --- | --- | --- |
| **Property** | **Test Method** | **Units** | **Requirements** |
| Grab strength | ASTM D 4632 | N | 450 |
| Ultimate elongation | ASTM D 4632 | % | ≥50 |
| Mass per unit area | ASTM D 5261 | g/m2 | 140 |
| Melting point | ASTM D 276 | oC | 150 |

**303.06 EQUIPMENT** is amended by the addition of the following:

**303.06.02 Pressure Distributor/Paving Fabric Applicator**

The pressure distributor shall be designed and manufactured to spray binder on the road surface. The pressure distributor shall be capable of applying binder at the specified rates and in a continuous and uniform manner; both longitudinally and transversely for a full lane width.

The emulsion distributor shall be fitted with a paving fabric applicator capable of placing rolls 4.5 m wide. The applicator must be equipped with a tensioning mechanism to ensure that the roll is placed smoothly on the desired surface. The fabric applicator must be mounted to the distributor so that paving fabric is placed immediately onto the sprayed binder.

The applicator shall be fitted with a series of brushes to push the paving fabric evenly across the width of the binder application.

The pressure distributor shall be computerized and capable of applying the emulsion within ±5% of the rate designed by the Contractor in a continuous and uniform manner in both longitudinal and transverse directions.

The emulsion distributor shall be equipped with a rear mounted camera to enable the operator to see the rear of the truck as it is placing the paving fabric.

**303.07 CONSTRUCTION** is amended by the addition of the following:

**303.07.11 Determination of Binder and Aggregate Application Rates**

The application rate for the binder and aggregate shall be determined by a seal coat design methodology, as approved by the Professional Engineer, with the aggregate and binder specified in the Contract Documents.

The Contractor shall demonstrate to the Owner satisfactory compliance to the specified application rates of binder and aggregate. At the Owner’s option, this compliance may include a minimum 300 m, one (1) lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

**303.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**303.09 MEASUREMENT FOR PAYMENT**

**303.09.01 Geotextile Stabilized Double Chip Seal**

Measurement will be by the horizontal area in square metres (m2) of geotextile stabilized double chip seal placed in accordance with the Contract Documents.

**303.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**303.10 BASIS OF PAYMENT**

**303.10.01 Geotextile Stabilized Double Chip Seal**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

The repair, removal, disposal and replacement of any damaged or defective geotextile stabilized double chip seal required prior to the expiration of the warranty period shall be performed by the Contractor at no additional cost to the Owner.

### Item R313 Double Chip Seal [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 303 (Nov 2018).

**303.02 REFERENCES** is deleted in its entirety and replaced with the following:

**303.02 REFERENCES**

**Ontario Ministry of Transportation Publications**

Designated Sources for Materials:

DSM list #3.05.25 Aggregates, Coarse for Superpave 12.5 FC1, Superpave 12.5 FC2, SMA, HL1, DFC and OFC; and Aggregates, Fine for Superpave 12.5 FC2, SMA, DFC and OFC

DSM list #3.05.30 Emulsified Asphalt

MTO Laboratory Testing Manual (Tests)

LS–224 Coating for Emulsified Asphalts

Ontario Ministry of Transportation (MTO), Manual for Condition Rating of Surface Treated Pavement (SP‑021)

**303.04.01 Design Requirements** is amended by the addition of the following:

The following information is provided for information purposes only:

* Old Homestead Road – Warden Avenue-Kennedy Road – AADT of 1,442, 2.9% trucks
* Old Homestead Road – McCowan Road-Valley View Drive – AADT of 920, 2.6% trucks
* Pavement Visual Condition Review and Recommendation – Engtec Consulting Inc. Geotechnical Investigation and Pavement Design Report dated May 6, 2021.

Any reliance on, or use of, this information shall not absolve the Contractor from its responsibility for the design or performance of the double chip seal.

The design shall be reviewed and approved for construction, on behalf of the Contractor, by a Professional Engineer qualified in asphalt technology.

**303.04.02.01 Chip Seal Design** is amended by the addition of the following:

Upon completion of the work under this item, the Contractor shall submit a certificate of conformance (the “**Certificate**”) to the Owner confirming compliance with the design and stating the application rates for binder and aggregates. The Certificate shall be reviewed and approved by the Professional Engineer on behalf of the Contractor. The Contractor shall also provide supporting quality control testing and inspection documentation necessary to demonstrate conformance with the requirements of the Contract Documents.

**303.05.02.01 General** is amended by the addition of the following:

Aggregates shall be from the MTO Designated Sources for Materials list #3.05.25.

Gradation of the aggregate shall comply with the following requirements, at a minimum:

* Base course shall have a median size of not less than 12.5 mm
* The topcoat aggregate shall be no larger than 75% of the base coarse aggregate size

**303.05.02.03.01 First Application** is amended by the addition of the following:

c) The minimum median size shall be 12.5 mm.

**303.05.03 Compatibility of Asphalt Binder and Aggregate** is amended by the addition of the following:

The Contractor shall perform compatibility testing and provide the results to the Owner a minimum of five (5) Working Days prior to commencing the double chip sealing.

**303.07.11 Determination of Binder and Aggregate Application Rates** is added as follows:

**303.07.11 Determination of Binder and Aggregate Application Rates**

The application rate for the binder and aggregate shall be determined by a seal coat design methodology, as approved by the Professional Engineer, with the aggregate and binder specified in the Contract Documents.

The Contractor shall demonstrate to the Owner satisfactory conformance with the specified application rates of binder and aggregate. At the Owner’s option, this compliance may include a minimum 300 m, one (1) lane width trial section to ensure that the binder and aggregate are applied at the specified rate.

### Item R314 Fog Seal [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 304 (Nov 2016), OPSS.MUNI 1006 (Nov 2021) and OPSS.MUNI 1103 (Nov 2019).

**304.01 SCOPE** is deleted in its entirety and replaced with the following:

**304.01 SCOPE**

This Specification covers the requirements for the placement of emulsified asphalt fog seal with the application of cover aggregate (sand) in the location(s) indicated by the Owner.

**304.02 REFERENCES** is amended by the addition of the following:

**Ontario Ministry of Transportation Publications**

Designated Sources for Materials:

DSM list #3.05.30 Emulsified Asphalt

MTO Laboratory Testing Manual (Tests):

LS–224 Coating for Emulsified Asphalts

**304.03 DEFINITIONS** is amended by the addition of the following:

**Fog Seal** means a light spray application of asphalt binder, with or without aggregate (sand) cover, applied to a weathered hot-mix asphalt surface, an open-graded asphalt mix, or the surface of a surface treatment (chip seal or seal coat) to seal the pavement surface, inhibit weathering/raveling, enrich hardened/oxidized asphalt and/or enhance the colour.

**304.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**304.04 DESIGN AND SUBMISSION REQUIREMENTS**

**304.04.01 Submission Requirements**

At least 14 Days prior to the first placement of fog seal, the Contractor shall submit documentation to the Owner identifying the proposed suppliers of the emulsified asphalt and cover aggregate (sand) and any Subcontractor(s) involved in the fog seal placement operations. This documentation shall include the proposed diluted emulsion application rate and cover aggregate application rate, and test results from a qualified laboratory acceptable to the Owner (typically the supplier), demonstrating that the undiluted emulsified asphalt and the cover aggregate meet the requirements of the Contract Documents. The test results shall include the full MTO LS–224 Coating for Emulsified Asphalts Coating Ability and Water Resistance (ASTM D244) testing for samples of the diluted and undiluted emulsion, and cover aggregate proposed for the Work.

Prior to commencing the first placement of the fog seal, the Contractor shall complete a 200 m² trial section of fog seal. The Contractor and the Owner will jointly assess the trial section and the Contractor shall make any necessary adjustments to the materials and application of the fog seal to meet the requirements of the Contract Documents.

**304.05 MATERIALS** is deleted in its entirety and replaced with the following:

**304.05 MATERIALS**

**304.05.01 Emulsified Asphalt**

The emulsified asphalt SS-1h or CSS-1h shall conform to the requirements of OPSS.MUNI 1103 and shall be obtained from an emulsified asphalt supplier listed on the MTO’s DSM list #3.05.30 “Emulsified Asphalt”.

**304.05.02 Cover Aggregate**

The cover aggregate (sand) shall be dry, hard, durable, free from dust and foreign matter, well graded, and shall conform to the requirements of OPSS.MUNI 1006 for Class 4 aggregate, with the additional gradation requirements of 100% passing 2.36 mm and less than 4% passing 75µm.

**304.07.01 Operational Constraints** is amended by the deleting the third and fourth paragraphs and replacing them with the following:

The Contractor shall make every effort to minimize any disruptions to the accessing of adjacent properties. The Contractor shall notify the property occupants in writing a minimum of 48 hours prior to any potential disruption.

Fog seal shall be applied the same Day, over a new surface treatment, unless weather conditions do not permit it, in which case the fog seal shall be placed on the following Day.

**304.07.02.01 Binder** is amended by the addition of the following:

The Contractor shall provide two (2), full 4-litre samples of both the diluted and undiluted binder to the Owner.

**304.07.02.02 Aggregates** is amended by the addition of the following:

For each Day of the fog seal operation, the Contractor shall provide two (2), 5-kg samples of the cover aggregate to the Owner. The Owner will determine the time and/or location of the sampling.

**304.07.06 Application of Binder** is amended by the addition of the following:

The emulsified asphalt shall be diluted with an equal volume of clean, potable water. The Contractor shall clean the surface to be fog sealed by power brooming in order to remove any loose material, dirt and dust. The diluted emulsion shall then be uniformly applied to the dry clean surface at a rate of approximately 0.60 litres/m², or as indicated by the Owner. The diluted emulsion application rate will be determined through the placement of the fog seal trial section. The emulsion application temperature shall conform to the requirements of OPSS.MUNI 1103. Emulsion application shall be avoided prior to probable rainfall and during rain. The pavement and air temperatures shall be above 10ºC and rising. For any applications during hot, dry conditions, care shall be taken to prevent premature breaking of the emulsion.

**304.07.07 Application of Aggregate** is amended by the addition of the following:

Cover aggregate (sand) shall be uniformly applied to the uncured emulsion at a rate of approximately 2.0 kg/m², or as indicated by the Owner. The aggregate application rate will be subject to the results of the fog seal trial section. One (1) to three (3) passes of a light pneumatic-tired roller shall be made over the treated surface to firmly embed the cover aggregate. Any loose cover aggregate that remains after the rolling and curing of the fog seal shall be removed by light power brooming prior to opening the road to traffic.

**304.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**304.09 MEASUREMENT FOR PAYMENT**

Measurement will be by the horizontal area in square metres (m2) of fog seal applied, in accordance with the Contract Documents.

**304.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**304.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R315 Granular Sealing [Renewal / New Construction]

The above item shall be completed in accordance with OPSS.MUNI 305 (Nov 2016).

### Item R316 Type III Modified Microsurfacing [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 336 (Nov 2018), OPSS.MUNI 1001 (Nov 2021), OPSS.MUNI 1003 (Nov 2013), OPSS.MUNI 1103 (Nov 2019) and OPSS.MUNI 1301 (Nov 2018).

The Contractor shall remove the existing durable pavement markings prior to commencing the microsurfacing treatment.

**336.04 DESIGN AND SUBMISSION REQUIREMENTS** is amended by the addition of the following:

The Contractor shall provide mix design and testing data to the Owner for review and approval. This submission shall be carried out in accordance with OPSS.MUNI 336 except as noted otherwise in this Specification. The design shall include the stamp of approval of a Professional Engineer.

The timeline for the submissions of mix design and testing data shall conform to OPSS.MUNI 336 unless otherwise approved in writing by the Owner.

Microsurfacing placement will not be permitted until the submitted mix design and testing data have been reviewed and approved by the Owner.

For the purpose of this Contract only, the latest traffic data available, including AADT and percentage of commercial vehicles, is provided in the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **RIN** | **Road Name** | **From** | **To** | **AADT** | **Per Truck** |
| 31-25 | Davis Drive | Yonge Street | Main Street | 31,220 | 3.1% |
| 31-26 | Davis Drive | Main Street | Prospect Street | 33,376 | 2.1% |
| 31-28 | Davis Drive | Prospect Street | Leslie Street | 30,314 | 2.4% |
| 31-29 | Davis Drive | Leslie Street | Highway 404 | 28,304 | 4.8% |
| 74-26 | Mulock Drive | Yonge Street | Bayview Avenue | 25,889 | 3% |
| 74-28 | Mulock Drive | Bayview Avenue | Leslie Street | 29,472 | 2.6% |
| 74-30 | Mulock Drive | Leslie Street | Highway 404 | 23,651 | 3.1% |

**336.05.03 Mineral Filler** is amended by the addition of the following:

Mineral filler can also be hydrated lime.

**336.05.04 Water** is deleted in its entirety and replaced with the following:

**336.05.04 Water**

Potable water shall be used in the microsurfacing mix.

**336.06.04 Spreading Equipment** is amended by the addition of the following:

The Contractor may elect to use non-continuous placement equipment with the prior approval of the Owner after the trial area is reviewed by the Owner.

**336.07.01 Operational Constraints** is amended by the addition of the following:

The Contractor shall surface the road sections with Type III Modified Microsurfacing with scratch coat and surface coat, in accordance with OPSS.MUNI 336. Refer to the Aerial Photographs for detailed construction limits information.

The Contractor shall place Type III Modified Microsurfacing on the entire area of the paved roadways, including paved shoulders for rural roads.

**336.07.03 Surface Preparation** is amended by deleting the second paragraph and replacing it with the following:

Deteriorating and debonding crack sealing material shall be removed.

**336.07.03 Surface Preparation** is further amended by deleting the fifth paragraph and replacing it with the following:

Tack coat shall not be required where a scratch coat has been placed.

**336.07.04 Mix Application** is amended by deleting the fifth and sixth paragraphs and replacing them with the following:

Wheel track ruts, 19 mm or greater in depth, shall be filled independently with microsurfacing using a rut-filling spreader box prior to the application of other microsurfacing. Ruts greater than 30 mm in depth shall be reduced by grinding the high points of the ruts to reduce the depth to below 30 mm. All rut-filling material shall cure under traffic for a minimum 24-hour period before additional material is applied. All applications shall be scratch and surface.

**336.08 QUALITY ASSURANCE** is amended by the addition of the following:

The Owner will conduct QA testing to ensure that the microsurfacing mix material satisfies the requirements of OPSS.MUNI 336, OPSS.MUNI 1001, OPSS.MUNI 1003, OPSS.MUNI 1103 and OPSS.MUNI 1301.

For the purpose of material sampling and testing, one (1) lot will be deemed to be the total of each Day’s production.

**336.08.01 Sampling and Testing** is amended by the addition of the following:

A material testing consultant retained by the Owner shall be on Site each Day that microsurfacing materials are applied in order to collect samples for testing purposes. The Contractor shall inform the Owner a minimum of three (3) Working Days in advance of the application of any microsurfacing so that the Owner can arrange for the material testing consultant to collect the samples. The Contractor shall fully cooperate with the Owner and the material testing consultant for the required sample collection activities.

### Item R317 Tack Coat [New Construction]

### Item R317 Tack Coat (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.PROV 308 (Apr 2012), OPSS.MUNI 310 (Nov 2017) and OPSS.MUNI 1103 (Nov 2019).

**308.08.01.04 Lot and Sublot Sizes** is deleted in its entirety and replaced with the following:

**308.08.01.04 Lot and Sublot Sizes**

Frequency of sampling shall be one (1) sample per week of paving or at the discretion of the Owner.

**308.08.01.05 Product Acceptance** is deleted in its entirety and replaced with the following:

**308.08.01.05 Product Acceptance**

Tack coat product acceptance shall be based on compliance with results of the residue by distillation test according to LS-216 and residue penetration according to LS-200 on the diluted product.

**308.08.01.06 Referee Testing** is deleted in its entirety and replaced with the following:

**308.08.01.06 Referee Testing**

Referee testing for percent residue and penetration can only be invoked by the Contractor within two (2) Business Days of the Contractor receiving the QA results and if the referee sample received by the laboratory is in a condition suitable for testing.

All referee test results shall replace the respective QA test results for acceptance and shall be binding on both the Owner and the Contractor.

If the referee percent residue test result is less than 27.5% and/or the penetration test results are not within the minimum and maximum range specified in Table 1 of OPSS.MUNI 1103, the Contractor shall be responsible for the cost of the referee testing.

When the results from the referee samples are deemed rejectable, removal and replacement of the tack coat will be at the discretion of the Owner.

**310.07.03.01 Application of Tack Coat** is amended by the addition of the following:

Tack coat shall be applied to all previously paved surfaces regardless of whether the surfaces have been open to traffic.

**Measurement for Payment**

Measurement for payment shall be in square metres (m2) of tack coat satisfactorily placed. Tack coat placed at construction joints will not be measured for payment.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified, regardless of the surface type coated.

### Item R318 Joint Sealant – Re-Instatement Tape [Renewal / New Construction]

Prior to placing the surface course of WMA under ***[Select the applicable item]*** Item R302 – Superpave, Surface Course, Warm Mix Asphalt / Item R307 – Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course / Item R305 – Superpave, Surface Course, Hot Mix Asphalt / Item R309 – 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category ‘D’ (Provisional), the Contractor shall install a cold applied, polymer modified, bituminous strip to provide a smooth, lip free and sealed cold joint.

The tape shall be 2 mm x 50 mm Denso North America, Inc. (“**Denso**”) brand reinstatement tape (described on the website noted below) or Equivalent. The Contractor shall install the tape according to the supplier’s instructions, which may include the use of special primers and/or special equipment.

The tape shall be placed such that it will be 5 mm to 10 mm proud of the existing asphalt surface.

Denso’s instructions can be downloaded at:

<https://www.densona.com/wp-content/uploads/2020/12/Denso-Re-Instatement-Tape.pdf>

Alternate brand product shall meet the requirements of ISO 9001, ISO 14001 and CSA Z245.30-18.

In conjunction with the suppliers’ placement instructions, the Contractor shall rake off any large aggregates present on the edge of the repair area prior to the final rolling application. Large aggregates that are raked off shall be removed and disposed of and shall not be placed back on the new asphalt patch. The transverse cold joints created following daily surface asphalt production, and at the Contract paving limits, shall receive this treatment.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of joint re-instatement tape supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R319 Joint Sealing Compound [Renewal / New Construction]

Prior to placing the surface course of WMA under ***[Select the applicable item]***Item R302 – Superpave, Surface Course, Warm Mix Asphalt / Item R307 – Remove and Replace Hot Mix Asphalt HL-3HS Surface Course and HL-8 Binder Course / Item R305 – Superpave, Surface Course, Hot Mix Asphalt / Item R309 – 50 mm Superpave 12.5 Surface Course, PGAC 64-28 XJ, Category ‘D’ (Provisional), the Contractor shall install a hot applied, polymer modified, bituminous strip to provide a smooth, lip free and sealed cold joint.

The sealant shall be 8 mm x 45 mm Denso North America, Inc. (“**Denso**”) brand hot asphalt joint sealing compound (described on the website noted below) or Equivalent. The Contractor shall install the sealant according to the supplier’s instructions, which may include the use of special primers and/or special equipment.

The sealant shall be placed such that it will be 5 mm to 10 mm proud of the existing asphalt surface.

Denso’s instructions can be downloaded at:

<https://www.densona.com/wp-content/uploads/2020/04/Denso-Band.pdf>

Alternate brand product shall meet the requirements of ISO 9001, ISO 14001 and CSA Z245.30-18.

In conjunction with the suppliers’ placement instructions, the Contractor shall rake off any large aggregates present on the edge of the repair area prior to the final rolling application. Large aggregates that are raked off shall be removed and disposed of, and shall not be placed back on the new asphalt patch. The transverse cold joints created following daily surface asphalt production, and at the Contract paving limits, shall receive this treatment.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of joint sealing compound supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R320 Crack Sealing [Renewal]

### Item R321 Crack Filling [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 341 (Nov 2021).

Under these items, the Contractor shall perform routing and filling of cracks greater than 6 mm but less than 20 mm in width, and filling of cracks 6 mm or less but greater than 3 mm in width, in accordance with OPSS.MUNI 341 as amended herein, on the road sections specified in the Location List appended to the Contract, including all intersections within the specified road sections. Refer to The Regional Municipality of York Road Inventory Network and Ownership by Yard map (the “**Road Identification Network Map**”) appended to the Contract to determine the location of the roads.

For west-east roads, the limit of the work shall be from the stop lines of the eastern leg of the first roadway (‘From’ Column) noted in the Location List to the stop lines of the western leg of the second roadway (‘To’ Column) noted in the Location List.

For south-north roads, the limit of the work shall be from the stop lines of the northern leg of the first roadway (‘From’ Column) noted in the Location List to the stop lines of the southern leg of the second roadway (‘To’ Column) noted in the Location List.

With the exception of the intersections noting the limits of the Road Identification Network Map, all intersection areas shall be crack sealed through the width of the road and terminate at the end of curb radius of the intersecting roads.

The above-noted limits are shown graphically in the York Region Working Limits Per RIN sketch appended to the Contract.

The Contractor shall follow the Owner’s directions on Site regarding the locations and quantities of cracks to be sealed under these items.

All sealant shall be applied with an overband.

**341.05.01 Crack Sealant** is amended by the addition of the following:

The crack sealant compound shall be as specified in ASTM D-6690 Type IV Modified.

**341.05.02 Limestone Screenings** is added as follows:

**341.05.02 Limestone Screenings**

Limestone screenings to be used as a dusting sealant shall have 100% passing through the 1.18 mm sieve and not greater than 25% passing through the 75µm sieve.

**341.05.01 Crack Sealant Barrier Material** is added as follows:

**341.05.01 Crack Sealant Barrier Material**

The crack sealant barrier material to be used for the Work shall be Glenzoil 20 Plus or Equivalent.

**341.06.01 Router** is amended by the addition of the following:

The pavement routing equipment shall be capable of routing all cracks to a minimum width of 20 mm on both sides of the cracks. The minimum depth of routing shall be 20 mm and shall not exceed 25 mm for roads with grades less than, or equal to, 8%.

The pavement routing equipment shall be capable of routing width of cracks to a minimum of 40 mm and reducing the depth to 15 mm on roadways with grades exceeding 8%.

**341.06.02 Heating Kettle** is amended by the addition of the following:

The heating kettle shall meet the requirements of the Technical Standards and Safety Authority.

**341.06.03 Hot-Compressed Air Lance** is amended by the addition of the following:

The hot-compressed air lance shall have an air discharge temperature of approximately 500°C and an air exit velocity of at least 1,000 metres per second. The Contractor shall adhere to the manufacturer’s recommendations and safety manuals in operating the equipment.

**341.06.04 Air Compressor** is added as follows:

**341.06.04 Air Compressor**

The air compressor used to supply the hot-compressed air lance shall be equipped with oil and moisture filters and shall provide a minimum pressure of 700 kPa at a minimum air volume of 4.25 cubic metres per minute (150 cubic feet per minute). The Contractor shall closely follow the equipment manufacturer’s operational manuals and necessary safety recommendations.

**341.07.01 General** is amended by the addition of the following:

Routing and/or sealing shall not be carried out when the pavement is damp or wet, when water is migrating up into the routs or when the pavement surface temperature is greater than 50°C.

The conditions under which cracks shall be routed and sealed or sealed without routing are specified above and based on the average widths of the cracks at the time the work is being completed.

All work shall be performed during daylight hours only. No work shall be performed if the visibility is less than 700 m. The maximum work area shall be 2 km in length.

Crack sealant shall not be applied when the atmospheric temperature at the Site is below 0°C.

**341.07.02 Crack Routing** is amended by the addition of the following:

Routs shall be square or rectangular and shall be centered over the crack.

**341.07.03 Sealant Preparation** is amended by the addition of the following:

Overheating beyond recommended specified temperature range is not permitted. Overheated material is deemed rejectable and shall be disposed at the Contractor’s own expense. Correction of overheated material by blending with new material in any ratio is not permitted under any circumstances.

The Owner shall be informed at least 24 hours prior to the charging of the kettle with sealant compound. The initial charge of sealant shall be placed in an empty kettle at the Site in the presence of the Owner.

The Contractor shall accommodate random sampling of the sealant material for quality assurance purposes.

The Contractor shall be able to provide necessary documentation to verify that all crack sealant delivered and used for the Work is the type and grade specified. Any blending of crack sealants manufactured by different suppliers requires prior approval the Owner.

**341.07.04 Cleaning of Routed and Unrouted Cracks** is amended by the addition of the following:

The Contractor shall take all necessary precautions to prevent the hot compressed air lance from charring or burning the asphalt surface.

**341.07.05 Placing Sealant** is amended by the addition of the following:

Sealant compound shall only be placed if the pavement temperature at the surface is less than, or equal to, 50°C. The placement of the sealant compound shall form a well-defined overband 2 mm to 3 mm above the pavement surface and extending 20 mm to 30 mm on either side of the crack or beyond the edges of the crack. Any excess sealant shall be removed from the pavement surface immediately following application. Removal shall involve use of squeegee, starting from centreline and proceeding to the shoulder.

For all pavement, the Contractor shall ensure that, upon complete cooling to the ambient temperature, the minimum elevation of the sealant compound is at, or above, the adjacent asphalt pavement surface in all cases. If, during construction, the sealant compound is contracting in such a manner that it appears that this requirement is not likely to be met, the Contractor shall “top-up” and strike off the sealant compound as many times as is necessary before it is dusted to meet this requirement.

The Contractor shall anticipate the amount of sealant needed to fill the remaining cracks so that, when leaving the Site at the end of each Day, the Contractor’s kettle melter has been completely drained of any remaining sealant compound. However, the Contractor shall inform the Owner if a situation arises which prevents the sealant from being completely used at the end of the Day (e.g. work is halted due to sudden rain, etc.), then the Owner may require that all remaining sealant be drained from the kettle and the Owner shall be provided with an opportunity to witness when the kettle is drained.

Any work that does not meet the foregoing requirements shall be repaired or reconstructed to the satisfaction of the Owner at the Contractor’s own expense.

Under no circumstances shall the Contractor continuously heat the sealant compound overnight without first discussing this with the sealant’s manufacturer and providing the Owner with a written declaration from the manufacturer clearly stating under what conditions this can be safely done without causing degradation of the sealant. If a written declaration has not been provided to the Owner, and the Contractor’s kettle is not completely empty at the beginning of any Day, then the Owner may require that the Contractor’s kettle be completely drained and that the drained sealant compound be replaced before the Contractor continues with the work.

At least once every hour, the Contractor shall measure the temperature of the sealant compound in the presence of the Owner using a properly calibrated thermometer and record the measurement along with its applicable date and time. The Contractor’s temperature record shall be made available to the Owner at any time, upon request.

If, at any time, the Owner finds that the temperature of the sealant compound is not within the manufacturer’s recommended range, then, at the discretion of the Owner, the Contractor may be required to remove all of the sealant compound that has been placed in the roadway since the last acceptable temperature was verified by the Owner, and any sealant compound remaining in the kettle shall be drained out and replaced with new sealant. All sealant compound that is rejected shall be removed from the Site and replaced with acceptable material at no additional cost to the Owner.

Sealant compound damaged by the Contractor’s operations, including any damage caused by the Contractor opening up the lane to traffic before the sealant has sufficiently cooled, shall be replaced by the Contractor at no additional cost to the Owner.

**341.07.06 Sealant Dusting** is deleted in its entirety and replaced with the following:

**341.07.06 Sealant Dusting**

Where traffic is to be maintained during crack sealing, the surface of the sealant compound shall be dusted with limestone screenings in accordance with the requirements of subsection 341.05.02, in order to eliminate any tackiness, prior to allowing any traffic on the newly crack sealed road surface. This requirement also applies when the traffic includes the travel of the Contractor’s own construction control vehicles on the sealed routs or the sealed unrouted cracks. Alternatively, a soap-water solution may be applied. Portland cement shall not be used.

At all locations, the sealant compound shall only be dusted after it has cooled enough so that the minimum elevation of the sealant compound will be at, or slightly above, the pavement surface after it has completely cooled, and a skin has formed that is still tacky enough for dust to stick to. As stated in subsection 341.07.04, this may require that the affected grooves and cracks be topped-up with sealant compound and then struck off one (1) or more additional times before being dusted.

**341.08 Quality Assurance** is amended by the addition of the following:

All crack sealant supplied for the Work shall be subject to inspection, sampling and testing by the Owner. This involves collection of sealant material prior to use (referred to as ‘Unheated’ or ‘Delivered’) and/or heated sealant as being placed. The Contractor shall cooperate and comply in the inspection and sampling process.

**341.08.01 Sampling and Testing Sealant Compound** is amended by the addition of the following:

**341.08.01.01 Unheated (as Delivered) Sealant Compound**

When requested by the Owner, the Contractor shall provide samples of batches of sealant compound used for the Work. Each sample shall be approximately four (4) litres in volume. All samples of unheated sealant compound shall be placed in security bags, sealed with security seals in the presence of the Owner and delivered in a suitable box, clearly marked with the sampling identification information, along with the following additional information:

* The designated trade name and designation number of the compound
* The manufacturer
* The manufacturer’s batch number
* The size of the applicable batch

Samples shall be delivered to an independent testing lab selected by the Owner.

The Contractor shall supply the Owner with the manufacturer’s quality control test results or the Certification of Authorization meeting the Owner’s requirements for each batch of crack sealant.

**341.08.01.02 Samples During Sealant Placement**

The Contractor, at the direction of and in the presence of the Owner, shall take samples of hot-poured rubberized asphalt joint/crack sealant compound directly from the heating kettle, while the sealant compound is being placed.

A minimum of either three (3) samples at points when approximately ¼, ½ and ¾ of the tender quantity number of linear metres has been placed or a minimum of one (1) sample for each 25,000 linear metres placed, whichever is greater, shall be taken. Additional samples shall be taken when requested by the Owner randomly throughout the duration of the Contract.

Each sample shall be placed in a triple-tight single metal container (e.g. paint can, etc.) with a wire handle and with a minimum volume of 4 litres. The side and top of each metal container shall be clearly marked with the following information:

* The Contract number
* The designated trade name and designation number of the compound
* The manufacturer
* The manufacturer’s batch number
* The point during the Contract at which the sample was taken, i.e. the percentage of the Work completed

An accompanying tag shall also be firmly affixed to the wire handle of the metal container showing all of the sampling identification information listed above, as well as the following additional information:

* The station and offset in the roadway where the sample was taken
* The temperature of the sealant compound when the sample was taken
* Weather conditions (ambient temperature and precipitation)

Samples shall be delivered to an independent testing lab selected by the Owner.

**341.08.02 Deficiencies and Repairs during Construction** is amended by the addition of the following:

If any of the deficiencies listed under the various categories in Table 1 are found during construction, then, at the discretion of the Owner, the sealed crack or routed groove shall be repaired by the Contractor as specified.

| Table 1  Deficiencies and Repairs | | |
| --- | --- | --- |
| **Categories** | **Deficiencies** | **Repairs** |
| Routed groove | Two (2) intersection sides deviating more than 10° form a right angle. | * Remove sealant and reroute groove to no more than 50 mm wide, clean and then seal; or * Re-route to no more than 50 mm wide, clean and then re-seal. |
| Its centreline is more than 4 mm from the centreline of its associated crack. |
| A width less than 16 mm or more than 44 mm. |
| A depth less than 10 mm or more than 12 mm when the groove is in pavement that is not covered with an asphalt overlay. |
| A depth less than 15 mm or more than 19 mm when the groove is in pavement that is being covered with an asphalt overlay. |
| Sealant compound material used | Does not meet the material quality requirements specified in the Contract Documents. | Complete removal and replacement of the sealant compound and pickup and disposal of any debonded or pulled away sealant compound.  **Note:** If removal of the sealant damages the rout or deficiencies are identified with the rout cross-section, the Owner may instruct that the crack be re-routed. |
| Contains:   * imbedded foreign materials (other than limestone screenings); or * entrained bubbles. |
| Has debonded or pulled away from the routed, unrouted sealed crack. |
| Has been excessively heated. |
| Pavement not being covered with an asphalt overlay after sealing | Upon complete cooling, sealant compound is no longer above the pavement surface when an overband is specified. | The method of repair for unacceptable contraction of the sealant compound below the elevation of the pavement surface within an unrouted or routed sealed crack shall be at the direction of the Owner and, depending upon the condition of the sealant compound, may involve either:   * Washing and cleaning of the existing sealant compound of debris from top of the rout with clean water using a low-pressure washer and then topping-up with sealant compound when completely dry; or * Complete removal and replacement of the sealant compound. |
| Upon complete cooling, sealant compound has subsided by more than 1 mm below the adjacent pavement surface when an overband is not specified. |
| Pavement being covered with an asphalt overlay after sealing | Upon complete cooling, subsided more than 7 mm below the existing pavement surface. |

For all repairs, the Contractor shall submit a repair proposal to the Owner for approval. The Contractor shall not commence any repairs until it has received approval of the proposal from the Owner.

Any materials, equipment or procedures used in the repair or replacement of routing and sealing shall be the same as those specified for the original work.

**341.09 MEASUREMENT FOR PAYMENT**

**341.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**341.09.01 Actual Measurement**

Measurement for payment shall be in metres (m), measured using a measuring wheel in a line generally representative of the path of the routed and sealed crack.

Measurements shall be carried out after the sealant is cured, tack dry and dusted. This is to ensure sealant is topped up, as required.

Measurements shall be completed by the Owner in the presence of the Contractor.

All cracks, regardless of the width or depth, shall be paid for at the applicable unit price per metre.

Any work that deviates from these Specifications shall be considered deficient work and the quantities for the full length of the roadway (as per the Road Identification Network Map) that contains the deficient work will not be paid until the deficiency is corrected to the satisfaction of the Owner.

### Item R322 Routing, Cleaning and Sealing Cracks in Hot Mix Asphalt Pavement [New Construction]

The following Standard Drawing is applicable to the above item: OPSD 508.010 (Nov 2015).

This Specification shall be read in conjunction with OPSS.MUNI 341 (Nov 2021).

Under this item, the Contractor shall perform routing and sealing of cracks in accordance with OPSS 341 in the locations deemed appropriate by the Owner. The work shall also be performed in accordance with the Cracks with Asphalt Overlay detail of OPSD 508.010, prior to the overlay.

The Owner will advise the Contractor, on Site, of the locations and quantities of cracks to be routed and sealed under this item.

**341.05.01 Crack Sealant** is amended by the addition of the following:

The crack sealant compound shall be as specified in ASTM D-6690 Type IV Modified.

**341.05.02 Limestone Screenings** is added as follows:

**341.05.02 Limestone Screenings**

Limestone screenings to be used as a dusting sealant shall have 100% passing through the 1.18 sieve and not greater than 25% passing through the 0.075 sieve.

**341.05.03 Crack Sealant Barrier Material** is added as follows:

**341.05.03 Crack Sealant Barrier Material**

The crack sealant barrier material to be used for the Work shall be Glenzoil 20 Plus or Equivalent with prior written authorization from the Owner.

**341.06.02 Heating Kettle** is amended by the addition of the following:

The heating kettle shall meet the requirements of the Technical Standards and Safety Authority.

**341.06.04 Air Compressor** is added as follows:

**341.06.04 Air Compressor**

The air compressor used to supply the hot-compressed air lance shall be equipped with oil and moisture filters and shall provide a minimum pressure of 700 kPa at a minimum air volume of 4.25 cubic metres per minute (150 cubic feet per minute).

**341.07.04 Cleaning of Routed and Unrouted Cracks** is amended by the addition of the following:

The Contractor shall take all necessary precautions to prevent the hot lance from charring or burning the asphalt surface of the cracks.

**341.07.05 Placing Sealant** is amended by the addition of the following:

Sealant compound shall only be placed if the pavement temperature at the surface is less than, or equal to, 50°C.

The Contractor shall anticipate the amount of sealant needed to fill the remaining cracks so that, when leaving the Site at the end of each Day, the Contractor’s kettle melter has been completely drained of any remaining sealant compound. If a situation arises which prevents the sealant from being completely used at the end of the Day (e.g. work is halted due to sudden rain, etc.), the Owner may require that all remaining sealant be drained from the kettle. In such case, the Contractor shall inform the Owner when the kettle is to be drained in order to allow the Owner sufficient opportunity to witness the draining.

Under no circumstances shall the Contractor continuously heat the sealant compound overnight without first discussing this with the sealant’s manufacturer and providing the Owner with a written declaration from the manufacturer clearly stating under what conditions this can be safely done without causing degradation of the sealant. If this written declaration has not been provided to the Owner and the Contractor’s kettle is not completely empty at the beginning of any Day, then the Owner may require that the Contractor’s kettle be completely drained and that the drained sealant compound be replaced before the Contractor continues with this work.

At least once every hour, the Contractor shall measure the temperature of the sealant compound in the presence of the Owner using a properly calibrated thermometer and record the measurement along with its applicable date and time. The Contractor’s temperature record shall be made available to the Owner at any time, upon request.

If, at any time, the Owner finds that the temperature of the sealant compound is not within the manufacturer’s recommended range, then, at the discretion of the Owner, the Contractor may be required to remove all of the sealant compound that has been placed in the roadway since the last acceptable temperature was verified by the Owner, and any sealant compound remaining in the kettle shall be drained out and replaced with new sealant. All sealant compound that is rejected shall be removed from the Site and replaced with acceptable material at no additional cost to the Owner.

Sealant compound damaged by the Contractor’s operations, including any damage caused by the Contractor opening up the lane to traffic before the sealant has sufficiently cooled, shall be replaced by the Contractor at no additional cost to the Owner.

**341.07.06 Sealant Dusting** is deleted in its entirety and replaced with the following:

**341.07.06 Sealant Dusting**

Where traffic is to be maintained during crack sealing, the surface of the sealant compound shall be dusted with limestone screenings in accordance with the requirements of subsection 341.05.02, in order to eliminate any tackiness, prior to allowing any traffic to travel over the crack sealed area. This requirement also applies when the traffic includes the Contractor’s own construction control vehicles travelling on the sealed routs or the sealed unrouted cracks. Alternatively, a soap-water solution may be applied. Portland cement shall not be used.

At all locations, regardless of whether or not an overband is being constructed, the sealant compound shall only be dusted after it has cooled enough so that the minimum elevation of the sealant compound will be at, or slightly above, the pavement surface after it has completely cooled and a skin has formed that is still tacky enough for dust to stick to it. As stated in subsection 341.07.04, this may require the affected grooves and cracks to be topped-up with sealant compound and then struck off one (1) or more additional times before being dusted.

**341.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**341.09.01 Actual Measurement**

Measurement for payment shall be in metres (m), measured using a measuring wheel in a line generally representative of the path of the routed and sealed crack.

Measurements shall be completed by the Owner in the presence of the Contractor.

All cracks, regardless of the width or depth, shall be paid for at the unit price per metre.

### Item R323 Full-Depth Reclamation with Expanded Asphalt Stabilization [Renewal]

### Item R324 Corrective Aggregate [Renewal]

### Item R325 Performance Graded Asphalt Cement [Renewal]

### Item R326 Hydrated Lime [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 301 (Nov 2018) and   
OPSS.MUNI 331 (Nov 2016).

**OPSS.MUNI 331** is amended by the addition of the following:

Under Item R323 – Full-Depth Reclamation with Expanded Asphalt Stabilization, the full depth reclamation and expanded asphalt stabilization process shall be completed in two (2) steps. First, the existing asphalt pavement and underlying granular base shall be reclaimed to a minimum depth of 200 mm for Location B and 150 mm for Location C as specified in the Bid Form and mixed uniformly from shoulder to shoulder (i.e. the entire proposed road width of 11 m). Under the second step, the Contractor shall stabilize the remaining pulverized material with expanded asphalt to a depth of 200 mm for Location B and 150 mm for Location C as specified in the Bid Form from shoulder to shoulder (i.e. the entire proposed road width of 11 m).

The costs to prepare and re-grade the existing shoulders and spread and mix the pulverized material uniformly across the existing paved areas and granular shoulder areas for the preparation of expanded asphalt stabilization shall be included in the unit price for Item R323 – Full-Depth Reclamation with Expanded Asphalt Stabilization (150 mm / 150 mm).

**331.04.01 Design Requirements** is amended by deleting “j) Type, source, and quantity of active filler, if required.” and replacing it with the following:

j) Approximately 1% hydrated lime active filler.

**331.05.03 Performance Graded Asphalt Cement** is amended by the addition of the following:

For each tanker of PGAC, the Contractor shall provide a certificate of analysis to the Owner.

**331.07.01 Operational Constraints** is amended by the addition of the following:

Where the road has been previously crack sealed, the crack sealant shall be removed prior to commencing the full depth reclamation and expanded asphalt stabilization operation. The cost of all labour, material and equipment required to remove the crack sealant shall be included in the unit prices for these items. No additional payment will be made for this work.

The compacted expanded asphalt recycled mix shall be smooth and true to the established crown and grade. The grade and slope of the finished expanded asphalt recycled mix shall meet the requirements of subsection 301.07.03.02 for bituminous surfaces. At existing curb locations, the Contractor shall profile the roadway to allow sufficient depth at the curb edge for the placement of new asphalt layers.

As part of the work of these items, during the curing period of the expanded asphalt stabilization process, the Contractor shall ensure positive drainage off the roadway to the elevation of the stabilized area.

**331.09.01.01 Full-Depth Reclamation with Expanded Asphalt Stabilization** is amended by the addition of the following:

Item R324 – Corrective Aggregate, Item R325 – Performance Graded Asphalt Cement and Item R326 – Hydrated Lime are intended to break out separately the required materials for the expanded asphalt stabilization process in order to fairly compensate the Contractor for the quantities of material used for the expanded asphalt stabilization as calculated on the basis of the approved final mix design.

PGAC, corrective aggregates and hydrated lime will be measured for payment by mass in tonnes. The amount of PGAC, corrective aggregate and hydrated lime shall be as determined by the respective proportions in the approved mix design.

**331.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**331.10 BASIS OF PAYMENT**

**331.10.01 Full-Depth Reclamation with Expanded Asphalt Stabilization – Item**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

Repair of unacceptable EAM shall be carried out at no extra cost to the Owner.

Repair of areas of EAM damaged by traffic shall be completed at no extra cost to the Owner.

Repair, removal, or replacement of an unacceptable trial section shall be completed at no extra cost to the Owner.

**331.10.02 Corrective Aggregate – Item**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

**331.10.03 Performance Graded Asphalt Cement – Item**

**Liquid AC Cost Adjustment**

**Payment Adjustment for Changes in the MTO Performance Graded Asphalt Cement Price Index shall conform to OPSS.MUNI 310 (Nov 2017) Appendix 310-B, 310.10.04.**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

**331.10.04 Hydrated Lime – Item**

Payment at the unit price for the above tender item shall be full compensation for all labour, equipment and material necessary to complete the work as specified.

### Item R327 Granular A – Roadway [New Construction]

### Item R327 Granular A – Entrances [New Construction]

### Item R327 Granular A – Boulevard [New Construction]

### Item R327 Granular A – Shoulders [New Construction]

### Item R328 Granular B – Roadway [New Construction]

### Item R328 Granular B – Entrances [New Construction]

### Item R328 Granular B – Boulevard [New Construction]

The following Standard Drawings are applicable to the above item(s): OPSD 350.010 (Nov 2018) and OPSD 351.010 (Nov 2018).

This Specification shall be read in conjunction with OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (November 2013).

**1010.05.01 General** is amended by the addition of the following:

If the Contractor wishes to use reclaimed concrete material (RCM), it must obtain the Owner’s written approval prior to delivery of the material to the Site. The RCM must be in full compliance with the requirements of OPSS.MUNI 1001 and OPSS.MUNI 1010. The Contractor shall submit the following information to the Owner, at a minimum:

* The sources of the reclaimed concrete material
* The production plant
* The stockpile location
* The date of production
* The quantity of material in stockpile
* Test results for RCM in accordance with Table 1 and Table 2 of OPSS.MUNI 1010
* Written confirmation that no deleterious building construction and demolition waste material is present in the stockpile

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious building construction and demolition waste materials such as drywall and gypsum.

Approval will be considered on a ‘stockpile-basis’ only. Additional submittals and approval will be required, should the stockpile(s) or source(s) change.

1010.05.02 Granular A, Granular M, and Granular S and 1010.05.03 Granular B are amended by the addition of the following:

The combined amount of deleterious material shall not exceed a total of 1% by total mass (total of coarse and fine aggregate).

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following to the first paragraph:

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the subgrade becomes deformed. The subgrade or granular surface shall be shaped and proof rolled to ensure an even and smooth surface free of dips and humps before the subsequent layer of material is placed.

**314.07.03 Edge Ramping of Bituminous Pavement** is amended by the addition of the following:

Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.07.04 Shoulders** is amended by the addition of the following:

Normal cross fall for the new shoulder shall be 6% except that on the high side of super-elevated sections it shall be 2%. The width of placement shall be 2.0 m with a 0.5 m rounding, unless indicated otherwise in the Contract Documents.

**314.07.06 Tolerances** is amended by the addition of the following:

The tolerances specified in this Specification are working tolerances only and it is expected that the Contractor will use them as such and not keep the grade consistently high or low to replace other material.

**314.08.01 General** is amended by the addition of the following:

The Contractor shall supply the services of a person to assist the Owner’s inspector in checking the grade when requested by the Owner.

**314.09 Measurement for Payment** is amended by the addition of the following:

Measurement by the cubic metre (m3) will be made by Plan Quantity (theoretical) as may be revised by Adjusted Plan Quantity and the volumes will be calculated from the end areas of the Granular ‘A’ and Granular ‘B’, Type I, sections as shown on the typical cross-sections on the Drawings.

No measurement or payment will be made for water used for compaction or dust control. Payment for water shall be included in the unit price(s) of the Contract item(s) for the material to be placed or the work to be carried out.

Granular material for driveways is normally calculated at 150 mm of Granular ‘A’ beyond the edge of the shoulder or curb, measured horizontally to the limit of grading shown on the Drawings in accordance with OPSD 350.010 and OPSD 351.010. Any variation from this depth will be shown on the Drawings. The Contractor shall be responsible for any granular material required to maintain access as specified under Item G1 – Maintenance of Traffic. As the cubic metre (m3) payment for granular materials is based on the theoretical quantity calculated as specified in the Contract Documents, the Contractor shall make its own allowances in its unit prices for any loss of Granular ‘A’ into the Granular ‘B’, Type I, and for any Granular ‘A’ required for maintenance of traffic. The Contractor shall also make allowances in its unit prices for any losses of Granular ‘B’ during its operations.

**314.10.01 Granular A – Item, Granular A, Stockpiled – Item, Granular A, from Stockpile – Item, Granular B Type I – Item, Granular B Type I, Stockpiled – Item, Granular B Type I, from Stockpile – Item, Granular B Type II – Item, Granular B Type II, Stockpiled – Item, Granular B Type II, from Stockpile – Item, Granular B Type III – Item, Granular B Type III, Stockpiled – Item, Granular B Type III, from Stockpile – Item, Granular M – Item, Granular M, Stockpiled – Item, Granular M, from Stockpile – Item, Granular O – Item, Granular O, Stockpiled – Item, Granular O, from Stockpile – Item, Granular S – Item, Select Subgrade Material, Compacted – Item, RAP Shouldering – Item** is amended by the addition of the following:

The Contractor shall repair or replace any granular material lost through washouts or bladed-off the roadway and no additional payment will be made for this work. The applicable unit prices for Granular ‘A’ and Granular ‘B’, Type I, shall apply when additions or deletions requested by the Owner cause changes in the tender quantities.

Any additions or deletions shall be calculated from field tape measurements agreed to by the Owner and the Contractor. If there is no agreement on tape measurements then the cross-sections shall be used to calculate the quantity.

### Item R329 Removal, Preparation and Regrading of Existing Shoulders [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 314 (Nov 2023) and OPSS.MUNI 510 (Nov 2018).

**314.07.04 Shoulders** is deleted in its entirety and replaced with the following:

**314.07.04 Shoulders**

This item is for the preparation of the existing shoulders to accept the new, wider, hot mix asphalt surface on [Road Name]. The existing granular shoulders are between 0.5 m and 1.5 m in width, and the new hot mix asphalt to be placed under Item R301 – Superpave, Binder Course, Warm Mix Asphalt and Item R302 – Superpave, Surface Course, Warm Mix Asphalt shall be placed to provide 2.0 m paved shoulders, where possible.

Prior to commencing the hot mix asphalt paving, the existing granular shoulders shall be removed, regraded and compacted.

This item also includes the preparation and compaction of the remaining existing granular to receive the additional hot mix asphalt widths.

As part of the work under this item, the Contractor shall ensure that there is positive drainage off the roadway during the performance of the Work and shall ramp down all existing entrances to meet the interim road surface.

The Contractor shall supply and maintain delineators along the shoulder at maximum intervals of 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

No measurement or payment will be made for water used for compaction or dust control. Payment for water shall be included in the unit price(s) of the Contract item(s) for the material to be placed or the work to be carried out.

The Contractor shall salvage as much suitable granular and reclaimed material as possible for reuse in the new granular shoulders. The Owner will determine, on Site, what material is suitable for reuse and will advise the Contractor accordingly. All excess granular/reclaimed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor, at its own expense.

**314.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**314.09.01 Actual Measurement**

Measurement for payment shall be by the length in metres (m) of existing granular shoulder removed, prepared and regraded as specified in the Contract Documents.

**314.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**314.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R330 Granular ‘A’ Shoulders and Entrances [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following:

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the subgrade becomes deformed.

The Contractor shall supply, place and compact Granular ‘A’ material on the existing gravel driveways and shoulders on [Road Name] in accordance with OPSS.MUNI 314, unless specified otherwise in this Specification, so that a smooth transition is provided from the paved road surface to the shoulders and driveway entrances.

Following paving, the Contractor shall supply, place and compact Granular ‘A’ material on the shoulders in the location(s) indicated by the Owner on Site, to achieve the specified cross falls, in accordance with OPSS.MUNI 314.

**314.07.03** **Edge Ramping of Bituminous Pavement** is amended by the addition of the following:

Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.07.04** **Shoulders** is amended by the addition of the following:

Normal cross fall for the new shoulder is 6% except on the high side of super-elevated sections where it shall be 2%. Width of placement is the available space between the edges of the new pavement and the edge of the existing platform.

**314.07.06 Tolerances** is amended by the addition of the following:

The tolerances specified in this section are working tolerances only and it is expected that the Contractor will use them as such and not keep the grade consistently high or low to replace existing material.

**314.08.01** **General** is amended by the addition of the following:

The Contractor shall provide the services of a representative to assist the Owner’s inspector in checking the grade when requested by the Owner.

**314.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of Items in **314.10.01**:

**Granular ‘A’ Shoulders and Entrances – Item**

**314.10.01** is amended by the addition of the following:

The Contractor shall repair or replace any granular material lost through washouts or bladed-off the roadway and no additional payment will be made for this work. The unit price for this item shall apply when additions or deletions requested by the Owner cause changes in the tender quantities.

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS**

**1010.04.01 Granular Material**

If the Contractor wishes to use RCM, full compliance with OPSS.MUNI 1001 and   
OPSS.MUNI 1010 is required. The Contractor shall submit the following information, prepared by the producer/supplier of the RCM, to the Owner:

* The source(s) of the RCM
* Written confirmation that no waste materials (e.g. drywall, bricks, wood, etc.) were used in the RCM Granular ‘A’ production

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious materials such as drywall and gypsum. Additional approvals may be required should different stockpiles or sources be utilized.

### Item R331 Full Depth Granular Base Repair (Provisional) [Renewal]

### Item R332 Full Depth Granular Sub-Base Repair (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 1001 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).

**314.07.01 Granular Subbase, Base, and Surface** is amended by the addition of the following:

The Contractor shall repair those areas identified and marked on Site by the Owner as requiring full depth granular base / sub-base repair.

The Contractor shall not use heavy vehicles such as tractor trailers to haul gravel if the sub grade becomes deformed.

The depth of the repairs shall be as indicated by the Owner on Site, which will be as deep as deemed necessary by the Owner to remove the existing unsuitable materials from the road base. The removed areas shall be filled with Granular ‘A’ material, compacted and proof rolled to the satisfaction of the Owner. Alternatively, the use of crusher run lime stone in lieu of Granular ‘A’ material may be permitted at the discretion of the Owner depending on the size of the area to be repaired.

All costs associated with the removal of the existing asphalt pavement shall be included in the unit price(s) for the above item(s) and no additional payment will be made for this work.

Any area opened up for full depth granular base repair must be restored to top course asphalt to match the existing pavement grade within the same Day that the area was opened up and prior to reopening the area to traffic.

All removed material shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense in accordance with OPSS.MUNI 180.

The Contractor shall obtain utility locates clearance prior to the commencement of any base excavation. Any damage to underground utilities shall be repaired to the Owner’s satisfaction at the Contractor’s own expense.

**314.07.03** **Edge Ramping of Bituminous Pavement** is amended by the addition of the following:

Where traffic must be maintained, the Contractor shall supply and maintain delineators along the shoulder at intervals of not more than 60 m until the shoulders have been constructed. Delineators shall be weighted in order to prevent them from overturning.

**314.08.01 General** is amended by the addition of the following:

The Contractor shall provide the services of a representative to assist the Owner’s inspector in checking the grade when requested by the Owner.

**314.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of Items in **314.10.01**:

**Full Depth Granular Base Repair – Item**

**Full Depth Granular Sub-Base Repair – Item**

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS** is added as follows:

**1010.04 DESIGN AND SUBMISSION REQUIREMENTS**

**1010.04.01 Granular Material**

If the Contractor wishes to use RCM, full compliance with OPSS.MUNI 1001 and   
OPSS.MUNI 1010 is required. The Contractor shall submit the following information, prepared by the producer/supplier of the RCM, to the Owner:

* The source(s) of the RCM
* Written confirmation that no waste materials (e.g. drywall, bricks, wood, etc.) were used in the RCM Granular ‘A’ production

Submittals shall also include a petrographic analysis of coarse aggregate (in accordance with MTO Laboratory Testing Manual LS-609) and fine aggregate (in accordance with MTO Laboratory Testing Manual LS-616) with specific emphasis on deleterious materials such as drywall and gypsum. Additional approvals may be required should different stockpiles or sources be utilized.

**1010.05.02** and **1010.05.03** are amended in that the combined amount of deleterious material shall not exceed a total of 1% by mass.

### Item R333 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 310 (Nov 2017), OPSS.MUNI 311 (Nov 2018), OPSS.MUNI 314 (Nov 2023) and OPSS.MUNI 1151 (Apr 2018).

**311.05.01 Hot Mix Asphalt** is deleted in its entirety and replaced with the following:

**311.05.01 Hot Mix Asphalt**

The hot mix asphalt for this work shall be according to OPSS.MUNI 1151 for SP 12.5 and SP 19.0.

**311.07.01 General** is amended by the addition of the following:

Asphalt paving shall be carried out in accordance with OPSS.MUNI 310. Granular placement shall conform to OPSS.MUNI 314 and the requirements specified under Item R327 – Granular A – Boulevard.

The temporary asphalt sidewalk and transit pads shall be connected to the drop curb at the intersections, be accessible by wheelchairs and be constructed in accordance with the following requirements:

* Granular base under sidewalk and transit pads shall be a minimum of 150 mm – Granular ‘A’ material, or as otherwise specified on the Drawings.
* Sidewalk widths shall be a minimum of 1.5 m, or as indicated by the Owner.
* Transit pad widths shall be a minimum of 2.0 m, or as indicated by the Owner.
* Sidewalk and transit pad asphalt thickness shall be a minimum of 50 mm SP 12.5, or as otherwise specified on the Drawings.

If the asphalt sidewalk is a replacement of an existing sidewalk, it shall be ready for use before the existing sidewalk is removed.

All costs associated with earth excavation, removal, disposal of material below the top surface of the temporary asphalt, supply, placement, watering and compaction of all granular materials shall be included in the unit price for this item. The removal of temporary asphalt sidewalk and transit pads shall be included in the unit price for this item.

No measurement will be made of granular material or excavation below the top surface of the temporary asphalt.

**311.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**311.09 MEASUREMENT FOR PAYMENT**

**311.09.01.01 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads**

Measurement will be by the horizontal area in square metres (m2) of temporary asphalt sidewalk and transit pads placed regardless of the thickness specified.

**311.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**311.10 BASIS OF PAYMENT**

**311.10.01 Temporary Asphalt SP 12.5 Sidewalk and Transit Pads**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R334 Concrete Curb and Gutter – All Types [Renewal / New Construction]

The following Standard Drawing is applicable to the above item: OPSD 600.040 (Nov 2012).

This Specification shall be read in conjunction with OPSS.MUNI 353 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).

This item is for the construction of all types of concrete curb and gutter, including curb required to be replaced under Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers and Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers.

Concrete curb and gutter shall tie-in to, and match, the existing concrete curb and gutter cross-sections of all types.

All earth excavation, disposal of excess material, replacement Granular ‘A’, watering and compaction of all foundation materials and base preparation required to receive the new curb and gutter shall be included in this item.

### Item R335 Concrete Sidewalk – All Types [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: OPSD 310.010 (Nov 2019),   
OPSD 310.020 (Nov 2019), OPSD 310.030 (Nov 2015), OPSD 600.040 (Nov 2012), DS-121, DS-122 and E-2.20, and MR20 and MR21 **[Only use for mid-block work in the City of Markham]**.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 314 (Nov 2023), OPSS.MUNI 351 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).

***[The following paragraphs should only be used for mid-block work in the City of Markham]*** Concrete sidewalk shall be constructed according to City of Markham Standard Drawings MR20 and MR21.

The Contractor shall place Granular ‘A’ as a base course for the sidewalk where specified on City of Markham Standard Drawings MR20 and MR21. Granular ‘A’ shall be compacted to a minimum of 98% Standard Proctor Density. The minimum thickness of sidewalk shall be 125 mm. The concrete thickness for residential driveways shall be increased to 175 mm. Concrete shall be 32 MPa air entrained.

The Contractor shall construct concrete sidewalk in accordance with OPSD 310.010, OPSD 310.020, OPSD 310.030, DS-121 and the following requirements:

* Sidewalk widths shall be as shown on the Drawings.
* Sidewalk bays shall be 1.5 m to 2.0 m in length, except at ramps for pedestrian crossings, where they shall be 2.0 m in length, or as otherwise shown on the Drawings.
* Granular base under sidewalks shall be a minimum of 75 mm of Granular “A” material, which shall be increased to a minimum of 150 mm for entrances.
* The sidewalk concrete depth shall be increased to 250 mm for the first panel from the curb return at all commercial and industrial entrances.
* Granular “A” shall be compacted to 100% maximum dry density.
* Concrete shall be a minimum of 32 MPa compressive strength at 28 Days with 6.5% ± 1.5% air entrainment.
* Joints shall not be troweled.

All poles and pole bases must be isolated in accordance with Standard Drawing E-2.20.

All costs associated with the required earth excavation, Granular ‘A’, concrete, concrete excavation and disposal of material below the top surface of the sidewalk, and the supply, placement, watering and compaction of all foundation materials shall be included in the unit price for this item.

No measurement will be made of granular material or excavation below the top surface of the sidewalk.

Concrete sidewalk adjacent to an existing curb shall be set into a 50 mm x 100 mm key at the back of the curb in accordance with OPSD 600.040.

Machine laid sidewalk will not be permitted. New sidewalk shall be formed.

An expansion joint shall be constructed at every fourth bay of sidewalk (i.e. every 4.5 m).

**314.07.10** **Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus or unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus or unsuitable material, regardless of the amount.

**351.07.20 Management of Excess Material** is deleted in its entirety and replaced with the following:

**351.07.20 Management of Excess Material**

The disposal of all surplus or unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus or unsuitable material, regardless of the amount.

**351.09.01.01** **Concrete Sidewalk** is deleted in its entirety and replaced with the following:

**351.09.01.01 Concrete Sidewalk**

Concrete sidewalk will be measured in square metres (m2), regardless of the thickness specified.

Payment for TWSI plates shall be made under Item R336 – Tactile Walking Surface Indicator (TWSI) Plates for Concrete Sidewalk Ramps.

### Item R336 Tactile Walking Surface Indicator (TWSI) Plates for Concrete Sidewalk Ramps [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: DS-119, DS-121, DS-408,   
DS-411, DS-412 and E-6.07.

The Contractor shall supply and install square or rectangular TWSI plates for sidewalk ramps to warn visually impaired pedestrians that they are entering the roadway.

The TWSI plates shall be manufactured by Neenah Enterprises, Inc. (Neenah Foundry), East Jordan Iron Works, Inc. (Duralast), Kinesik Engineered Products Inc. (Advantage Cast Iron), or Equivalent, and shall be bare (cast iron) and not coated with paint or other coating materials. The TWSI plates shall visually contrast with the adjacent walking surface (i.e. light-on-dark or dark-on-light). Castings shall be sound, free from pouring faults, cracks, blowholes and other defects, shall be located at the bottom of the curb ramp and extend the full width of the depressed curb, and shall be set back between 150 mm and 200 mm from the back of curb.

The TWSI plates shall be complete with lock lugs and slots for interconnecting to adjacent plates. If the plates are radius plates, they shall be installed with bolts in accordance with the manufacturer’s instructions. The Contractor shall contact the manufacturer a minimum of 21 Days prior to date of installation in order to request the radius plates. The surface of each cast iron plate on both the tops of the truncated domes, and the field between the truncated domes, shall have a minimum wet and dry static coefficient friction of 0.8 when tested in accordance with ASTM C-1028.

The base diameter of the truncated domes shall be a minimum of 22 mm and a maximum of 36 mm. The top diameter shall be a minimum of 50% and a maximum of 65% of the base diameter. The height of the dome shall be 5.1 mm. The centre to centre spacing between the truncated domes shall be a minimum of 41 mm and a maximum of 61 mm. The base edge to edge spacing between the most adjacent domes on a square grid shall be 17 mm.

The initials or trademark of the manufacturer, date of manufacture and country of manufacture shall be distinctly cast and legible in raised letters on the top side of each plate. The Contractor shall provide a certificate from the manufacturer of the TWSI plates, confirming that the product was manufactured and meets the test requirements in accordance with the manufacturer’s quality control standards. The certificate shall include test results from an independent testing laboratory accredited by the Standards Council of Canada and who is otherwise acceptable to the Owner.

The TWSI plates shall be set into wet prepared concrete at each concrete sidewalk ramp in accordance with the Contract Documents and the plate manufacturer’s installation instructions. The sidewalk bay(s) that contain TWSI plates shall be bordered by a true expansion joint (rather than a saw-cut joint) where they are adjoining other bays that do not contain TWSI plates. A concrete vibrator shall be used in the construction of the sidewalk bays that contain the TWSI plates.

The TWSI plates shall be installed in the location(s) shown on the Drawings and in accordance with the manufacturer’s specifications and Standard Drawings DS-119, DS-121, DS-408, DS-411, DS-412 and E-6.07.

**Measurement for Payment**

Measurement for payment shall be a count of each TWSI plate supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R337 Concrete Slab Raised Median [Renewal / New Construction]

The following Standard Drawings are applicable to the above item:

**[Select the applicable drawings]**

* *E-6.03 – Typical Detail for Construction of Concrete Slab Raised Median Islands at Intersections*
* *E-6.05 – Typical Detail for Construction of 1.5 m or Wider Concrete Slab Raised Median Islands at Intersections*
* *E-8.07 – Typical Flexible Delineator Installation in 1.5 m or Wider Concrete Slab Raised Median Island at Intersections*

This Specification shall be read in conjunction with OPSS.MUNI 351 (Nov 2021) and   
OPSS.MUNI 1301 (Nov 2018).

**351.01 SCOPE** is deleted in its entirety and replaced with the following:

**351.01 SCOPE**

The Contractor shall construct a concrete slab type raised median in the location(s) shown on the Drawings.

***[Delete the following paragraph for new construction]***

Construction of the new concrete slab raised median shall be carried out no later than twenty-four (24) hours after asphalt removal under Item R503 – Removal of Asphalt Pavement at New Median – Partial Depth (40 mm).

***[Delete the following paragraph if it does not apply]***

Delineators are required on any concrete slab raised median wider than 1.5 m. The Contractor shall install delineators in the location(s) shown on Standard Drawings E-6.05 and E-8.07 under Item E805 – Supply and Install Flexible Delineator.

**351.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**351.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be per square metre (m2) of concrete slab raised median constructed.

**351.10.01 Concrete Sidewalk – Item** is deleted in its entirety and replaced with the following:

**351.10.01 Concrete Slab Raised Median – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R338 Concrete Bus Shelter Pad and Passenger Standing Area [New Construction]

The following Standard Drawings are applicable to the above item: OPSD 310.010 (Nov 2019) and YRT Transit Drawings 1.01, 1.02 / 1.02 (B), 1.03 / 1.03(B), 1.04 / 1.04(B) and 1.05.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 351 (Nov 2021), OPSS.MUNI 1010 (Nov 2013) and OPSS.MUNI 1350 (Nov 2023).

The Contractor shall install all concrete passenger standing areas, shelter and waste pads, links and sidewalks in accordance with OPSS.MUNI 351. The work under this item shall include excavation and disposal of excess excavated material, compaction of sub-grade, and supply and placement of 150 mm of concrete and 300 mm of Granular ‘A’ in accordance with OPSS.MUNI 1010. In the area of the concrete passenger standing areas and shelter pads, sawed contraction joints shall be used in lieu of dummy joints.

The Contractor shall comply with the following requirements:

* Granular “A” shall be compacted to 100% maximum dry density.
* All sawed contraction joints shall be saw cut within 12 to 24 hours after placement of concrete.
* Sawed contraction joints shall be a minimum of ¼ of the slab depth and no more than 2.0 m apart in each direction.
* Expansion joint material shall be placed abutting all existing concrete surfaces.
* Polyethylene membrane shall be used on subgrade where indicated by the Owner.
* All concrete work shall be constructed with a 2% cross fall (perpendicular to the curb) and consistent with the Ontario *Accessibility for Ontarians with Disabilities Act* (AODA), unless pre-approved by York Region Transit and other municipal authorities.
* All concrete work shall be constructed with a maximum of 8% slope parallel to the curb.
* The pad shall be broom finished (pass a 30 mm smooth edge around the perimeter of the pad) to provide a slip resistant surface.
* Water ponding will not be tolerated; the pad and/or panel shall be removed and replaced.

The Contractor is also responsible for the construction layout of the concrete pads as shown on the YRT Concrete Bus Pad Standard Drawings. The Owner will assist with interpretation of the Standard Drawings, if required.

The Contractor is also responsible for ensuring that the slope of the pad does not exceed 4% of the typical section slope as shown in OPSD 310.010. If the initial layout causes the slope to exceed 4% of the typical section slope, the Contractor shall contact the Owner for instruction and Site review, if necessary, prior to the placement of concrete. Any pad installed which exceeds 4% of the typical section slope shall be removed and replaced at the Contractor’s own expense.

Expansion joint material shall be placed abutting all existing concrete surfaces and every three (3) bays (4.5 m). No saw cutting joints will be permitted.

The Contractor shall note that all formwork shall be removed, all debris shall be collected and removed from the Site and all necessary restoration required to eliminate trip hazards shall be completed within 48 hours of the placement of the concrete. A trip hazard will be considered to be eliminated when there is less than a 25 mm grade differential between the concrete and the abutting surface.

The Contractor shall protect the concrete during the curing process and any panels and/or bays marked shall be removed and replaced at the Contractor’s own expense. This includes, but is not limited to, graffiti, marks from protective covers and tire marks. Patching and/or parging of concrete will not be accepted.

The Contractor shall provide access to the properties. When working within an entrance, the Contractor shall stage its work accordingly to maintain a minimum 3.8 m wide access through an entrance at all times.

If required, contact York Region Transit within two (2) weeks after construction of the bus shelter pads and passenger standing areas is complete to reinstate shelters and waste/recycling receptacles. Transit dispatch can be contract at 1-905-762-1282 extension 75841 or OperationsDispatch@york.ca.

**351.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**351.09 MEASUREMENT FOR PAYMENT**

**351.09.01.01 Concrete Bus Shelter Pad and Passenger Standing Area**

Measurement will be by the horizontal area in square metres (m2) of concrete bus shelter pad and passenger standing area placed.

**351.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**351.10 BASIS OF PAYMENT**

**351.10.01 Concrete Bus Shelter Pad and Passenger Standing Area**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R339 Remove and Restore Interlocking Brick Boulevard [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 355 (Nov 2020).

This item is for the removal, storage and resetting of the existing boulevard paving stones affected by the sidewalk and curb and gutter work under Item R505 – Removal of Asphalt Sidewalk and Item R334 – Concrete Curb and Gutter – All Types. A representative of the Owner will inform the Contractor, on Site, of the extent of this work and will define the limits of this work with spray paint marks.

The re-installation shall be completed using the existing stones. If the existing stones cannot be used or matched they shall be replaced with new stones of a similar quality and style that are acceptable to the Owner.

This item includes the supply and installation of any additional granular material required to provide a flush grade with the existing boulevard.

**Measurement for Payment**

Measurement for payment shall be in square metres (m2) of paving stones removed, stored and restored in the location(s) indicated by the Owner. The restoration limits will be determined by the Owner.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R340 Concrete Curb and Gutter Outlets – All Types [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: OPSD 604.010 (Nov 2012), OPSD 605.010 (Nov 2012) and 605.030 (Nov 2012).

This Specification shall be read in conjunction with OPSS.MUNI 353 (Nov 2021) and OPSS.MUNI 1350 (Nov 2023).

This item is for the construction of all types of concrete curb and gutter outlets as shown on the Drawings and/or as indicated by the Owner.

**Measurement for Payment**

Measurement for payment shall be a count of each concrete curb and gutter outlet constructed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

## OPSS 400-SERIES

### Item R401 Pipe Subdrains [Renewal / New Construction]

The following Standard Drawing is applicable to the above item: OPSD 809.010 (Nov 2018).

This Specification shall be read in conjunction with OPSS.MUNI 405 (Nov 2017) and OPSS.MUNI 1860 (Nov 2018).

**405.05.01 General** is amended by deleting the first paragraph and replacing it with the following:

Subdrain pipe shall be perforated, dual wall, polyethylene pipe with a smooth inner surface, having a minimum stiffness of 320 kPa. Subdrains shall also be wrapped in non-woven geotextile as specified in OPSS.MUNI 1860, Table 1 Class II Non-Woven.

**405.07.06.02.02 Marking of Outlets** is deleted in its entirety and replaced with the following:

**405.07.06.02.02 Marking of Outlets**

Each outlet location shall be marked by a 2.1 m steel fence post driven 0.6 m to 1.0 m into the ground and painted fluorescent green, paint number CGSB 603-401.

**405.08 Quality Assurance** is amended by the addition of the following:

The selection of the subdrain to be inspected will be identified by the Owner. A minimum of 5% of the entire length of subdrain pipe and 100% of the outlet pipes shall be video inspected and recorded in accordance with OPSS.MUNI 405.07.08.

**405.09.02 Plan Quantity Measurement** is amended by the addition of the following:

The 150 mm diameter pipe subdrain connection into storm structures as specified in OPSD 809.010 shall be included in this item.

**405.10.01 Pipe Subdrain – Item** is amended by deleting the second and third paragraphs and adding the following:

The unit price for this item shall include all costs associated with the excavation and material disposal, Granular ‘B’, Type I, bedding and backfill, geotextile, video camera inspection, coring into maintenance holes and catch basins where necessary and all other work as specified.

After a random 5% of the entire length of pipe subdrain is inspected and where defective, damaged, or improperly installed pipe subdrain is encountered, the Owner may request that additional CCTV inspection be completed. No separate payment will be considered for this work, regardless of the amount of pipe subdrain inspected.

### Item R402 Adjust Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 408   
(Nov 2021) and OPSS.MUNI 1351 (Nov 2019).

The Contractor shall supply all labour, material and equipment required to properly adjust maintenance holes, catch basins and valve chambers of any size as described herein. All adjustments under this item shall be less than, or equal to, 300 mm in depth. Any maintenance hole, catch basin or valve chamber that requires an adjustment greater than 300 mm shall be rebuilt under Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers.

All maintenance holes, catch basins and valve chambers requiring adjustment will be [identified on Site by the Owner / shown on the Drawings].

**408.05.05** **Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.10 BASIS OF PAYMENT** is amended by the addition of the following:

This item does not include the supply and replacement of frames and grates. Payment for frames and grates shall be made under Item R405 – Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers.

### Item R403 Rebuild Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021),   
OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 408 (Nov 2021) and OPSS.MUNI 1351 (Nov 2019).

The Contractor shall supply all labour, material and equipment required to properly rebuild maintenance holes, catch basins and valve chambers of any size as described herein. All adjustments under this item shall be greater than 300 mm in depth. Any maintenance hole, catch basin or valve chamber that requires an adjustment less than or equal to 300 mm shall be completed under Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers.

All maintenance holes, catch basins and valve chambers requiring rebuilding will be [identified on Site by the Owner / shown on the Drawings].

**408.05.05** **Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.10 BASIS OF PAYMENT** is amended by the addition of the following:

This item does not include the supply and replacement of frames and grates. Payment for frames and grates shall be made under Item R405 – Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers.

### Item R404 Adjust Water Valves [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 408 (Nov 2021).

The Contractor shall supply all labour, material and equipment required to properly adjust existing water valves.

***[Select the paragraph below for renewal projects]***

The Owner will identify the water valves to be adjusted by marking them with spray paint.

***[Select the paragraph below for new construction projects]***

The water valves to be adjusted are shown on the Drawings.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each water valve adjusted.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

**Adjust Water Valves – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R405 Replace Frames and Grates for Maintenance Holes, Catch Basins and Valve Chambers [Renewal / New Construction]

The following Standard Drawing is applicable to the above item: OPSD 400.110 (Nov 2018).

This Specification shall be read in conjunction with OPSS.MUNI 408 (Nov 2021).

The Contractor shall supply all labour, material and equipment required to properly replace those frames and grates.

***[Select paragraph below for renewal projects]***

The Owner will identify the frames and grates that are to be replaced under this item by marking them with spray paint.

***[Select the paragraph below for new construction projects]***

The frames and grates to be replaced under this item are shown on the Drawings.

The removed frames and grates shall become the property of the Contractor and shall be disposed of outside of the Contract limits at no additional cost to the Owner.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each frame and grate replaced.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

Costs associated with adjusting or rebuilding the maintenance holes, catch basins and valve chambers shall not be included in the unit price for this item. Payment for adjusting and rebuilding maintenance holes, catch basins and valve chambers shall be made under Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers and Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers, respectively.

### Item R406 Supply/Replace and Adjust Rectangular Frame with Two-Piece Cover [Renewal]

The following Standard Drawing is applicable to the above item: OPSD 402.030 (Nov 2019).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 408 (Nov 2021) and OPSS.MUNI 1351 (Nov 2019).

The Contractor shall supply all labour, material and equipment required to properly supply/replace and adjust rectangular frames with two (2) piece covers in the location(s) identified on Site by the Owner.

**408.05.05** **Adjustment Units** is deleted in its entirety and replaced with the following:

**408.05.05 Adjustment Units**

Precast concrete adjustment units shall be in accordance with OPSS.MUNI 1351. No other alternatives will be accepted.

**408.07.06 Excavating, Backfilling, and Compacting** is amended by the addition of the following:

Compaction of granular backfill material shall be 100% of the maximum dry density.

**408.07.10 Site Restoration** is amended by the addition of the following:

The Contractor shall restore the adjacent areas after completing the work of this item, including removing and replacing existing asphalt pavement as required.

**408.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**408.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**408.09 MEASUREMENT FOR PAYMENT**

Measurement for payment shall be a count of each rectangular frame and two-piece cover supplied and adjusted.

**408.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**408.10 BASIS OF PAYMENT**

**408.10.01 Supply/Replace and Adjust Rectangular Frame with Two-Piece Cover -Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R407 Catch Basins including Frame and Grate/Cover [Renewal / New Construction]

### Item R408 Double Catch Basins including Frame and Grate/Cover [Renewal / New Construction]

### Item R409 Ditch Inlets including Frame and Grate/Cover [Renewal / New Construction]

### Item R410 Maintenance Holes including Frame and Grate/Cover [Renewal / New Construction]

The following Standard Drawings are applicable to the above item(s): OPSD 701.010 (Nov 2014), OPSD 701.011 (Nov 2014), 701.012 (Nov 2014), OPSD 701.013 (Nov 2014), OPSD 705.010 (Nov 2019), OPSD 705.020 (Nov 2019), OPSD 705.030 (Nov 2019) and OPSD 809.010 (Nov 2018).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 517 (Nov 2021) and OPSS.MUNI 1010 (Nov 2013).

**402.05.02.01 General** is amended by the addition of the following:

Backfill material shall be Granular ‘B’, Type I material conforming to the requirements of OPSS.MUNI 1010.

**402.07.08.03 Over-Excavation** is amended by deleting the words “95% maximum dry density” and replacing them with “100% maximum dry density”.

**402.09.01.01 Additional Excavating, Backfilling, and Compacting** is deleted in its entirety and replaced with the following:

**402.09.01.01 Additional Excavating, Backfilling, and Compacting**

***[Select the paragraph below for renewal projects]***

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

***[Select the paragraph below for new construction projects]***

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional).

**402.07.12 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**407.07.01 General** is amended by deleting the first paragraph and replacing it with the following:

Structures of the type specified in the Contract Documents shall be installed on 150 mm of Granular ‘A’ in the locations, and to the elevations, specified in the Contract Documents and shall be constructed plumb and true to alignment.

**407.07.01 General** is further amended by the addition of the following:

A 150 mm diameter perforated pipe shall be installed into main line maintenance holes as shown on OPSD 809.010. Payment for this work will be made at the unit price under Item R401 – Pipe Subdrains.

The above item(s) includes bedding, filter cloth, backfill, installation of all frames and grates or covers, and all work required for the dewatering of excavations in accordance with OPSS.MUNI 517 to allow for construction of the catch basins, ditch inlets and maintenance holes in the dry.

**407.07.10 Precast Structures** is amended by the addition of the following:

Precast concrete maintenance holes, catch basins and ditch inlets shall be placed on a 150 mm thick Granular ‘A’ mat.

**407.07.11 Installation of Inlet and Outlet Pipes Into Concrete Structures** is amended by the addition of the following:

Connections of sewer pipes and subdrain shall be cored into the structure unless pre-cut holes at the proper locations are available. The Contractor shall place grout on the walls of the connection holes before inserting the pipes and shall parge the inside and outside of the structure.

**407.07.12 Benching and Channeling** is amended by the addition of the following:

All maintenance holes must be benched, except those in gutter lines.

**407.10.01** is deleted in its entirety and replaced with the following:

**407.10.01 Catch Basins including Frame and Grate/Cover – Item**

**Double Catch Basins including Frame and Grate/Cover – Item**

**Ditch Inlets including Frame and Grate/Cover – Item**

**Maintenance Holes including Frame and Grate/Cover – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified, including but not limited to excavation, dewatering, bedding, filter cloth and backfill and the installation of all frames with grates or covers as shown on the Drawings.

### Item R411 Maintenance Hole Drop Structure [New Construction]

The following Standard Drawings are applicable to the above item: OPSD 1003.010 (Nov 2016) and OPSD 1003.020 (Nov 2016)

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 410 (Nov 2018) and OPSS.MUNI 1350 (Nov 2023).

**407.07.23 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180 and SC 16 – On-Site and Excess Soil Management of the Supplementary Conditions. No separate payment will be considered for the disposal of the surplus and/or unsuitable material, regardless of the amount.

**Measurement for Payment**

Measurement for payment shall be a count of each drop structure installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R412 Break into Existing Maintenance Hole, Catch Basin or Sewer [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 407 (Nov 2021) and OPSS.MUNI 410 (Nov 2018).

Under this item, the Contractor shall make whatever openings are necessary in the existing maintenance holes, catch basins, ditch inlets, pipe culverts and pipe sewers to install the new pipe sewer and connect it to the existing structure in accordance with OPSS.MUNI 407 and OPSS.MUNI 410. Under this item, the Contractor shall supply all fittings required to make the connection to the existing pipe or structure.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of new sewer pipe into existing structure or sewer shall be made by coring. The connections shall be grouted between the pipe and the wall of the structure to the satisfaction of the Owner.

Benching in existing maintenance holes shall be altered to accommodate the flow in the new sewer pipe system.

### Item R413 Oil/Grit Separator – Location and Size [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 402 (Nov 2023), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 501 (Nov 2017), OPSS.MUNI 517 (Nov 2021), OPSS.MUNI 1010 (Nov 2013) and OPSS.MUNI 1351 (Nov 2019).

This item is for the supply and installation of Stormceptor Model Nos. EFO06, EFO08 and EFO12 / Downstream Defender Model Nos. DD6, DD10 and DD12 oil/grit separator structures or Equivalent.

**[Designer to list oil/grit separator locations and sizes]**

The oil/grit separator systems shall be precast concrete Stormceptor EFO units by Imbrium Systems Inc. / Downstream Defender units by Hydro International. Equivalent alternative oil/grit separator systems may also be supplied and installed if approved by the [Conservation Authority] and the Owner, and provided that all required drawing revisions or requirements are addressed by the Contractor at the Contractor’s own expense.

If the Contractor elects to supply and install an Equivalent substitute product and it is approved by the Owner, the Contractor shall be responsible for all costs and delays associated with obtaining re-approval of the [Conservation Authority] Fill, Construction, and Alteration to Waterways Permit. If the amended plan requires a revision in the length of pipe to and from the oil/grit separator as a result of the unit selected, adjustments will be paid for under the respective unit price for the affected pipe.

The separator shall remove oil and sediment from storm water during frequent wet weather events. The separator shall treat a minimum of 75% to 90% of the annual runoff volume and shall be capable of removing 60% of the total suspended sediment load based on ISO 14034 Environmental Technology Verification (ETV) / Canadian ETV particle size distribution and 60% to 95% of the floatable free oil. The separator must be capable of trapping silt and clay size particles in addition to large particles. The separator shall be installed underground as part of the storm sewer system and shall be structurally designed for Canadian Highway Bridge Design Code (CHBDC) traffic loading at the surface. The storage in the separator shall be vertically oriented. The separator shall be maintainable from the surface via one (1) access point without requiring entry into the separator.

The separator shall be capable of holding trapped sediments in storage sump during high flows. Sediment concentration in effluent shall not exceed 10 mg/L during all flows and durations as specified in ISO 14034 ETV / Canadian ETV scour and re-suspension test.

The oil/grit separator system shall be designed to the following specific local conditions:

Location: York Region

Type of Application: Commercial

Rainfall Station: Rainfall Station: Toronto Pearson International Airport, Ontario (1960:2013, HLY03, Toronto Pearson Intl AP, ON, 6158733)

The Total Suspended Solids (TSS) removal and scour and re-suspension performances shall be based upon third party scientific studies that evaluated the unit with a particle size distribution as specified in ISO 14034 ETV / Canadian ETV procedure.

The separator shall be equipped with an internal high flow bypass that is capable of conveying the maximum design flow rate from the treated drainage area with no flow going through the treatment portion of the unit. The bypass area shall be physically separated from the separation area in order to prevent mixing. The separator shall be designed such that captured solids cannot be re-suspended and scoured from the unit during normal operation or bypass conditions.

The separator shall be capable of containing spills of floatable substances such as free oil and not be compromised by temporary backwater conditions (i.e. trapped pollutants should not be re-suspended and scoured from the separator during backwater conditions). The separator shall be installed with properly placed joint sealing material in order to ensure that the structure is watertight.

The separator shall be circular and constructed from concrete. Internal separation components may be manufactured from fiberglass or 316 stainless steel. The concrete structure shall be produced at a facility that is certified to manufacture the structural components under the Provincial Plant Prequalification Program as administered by OCPA.

The difference between the inlet pipe elevation to the separator and the outlet pipe elevation from the separator shall be in accordance with the Drawings. The separator shall be able to be used as a bend structure in the storm sewer system if specified on the Drawings. The access cover for the separator shall clearly indicate that it is an oil/sediment separator or identify the oil/sediment manufacturer’s trade name. Manhole frames and grates shall be as indicated on the Drawings.

Maintenance program for equivalent requests shall match the Stormceptor / Downstream Defender maintenance program, as follows: supplier/manufacturer inspection of unit after installation, 6 months after installation, 12 months after installation, then annually until 5 years after installation, including an inspection report for each inspection.

**Design and Working Drawings**

Regardless of the manufacturer of the oil/grit separator system, the Contractor shall submit six (6) copies of detailed design drawings and six (6) copies of working drawings of the oil/grit separator system to the Owner for approval.

The design drawings and working drawings shall be submitted on minimum 8.5” x 11” paper, six (6) weeks prior to the planned construction of the oil/grit separator system.

If an alternative oil/grit separator chamber is proposed for consideration, and if the alternative is not comprised of OPSD specified precast components manufactured by an OCPA prequalified producer, then the alternative unit shall be designed to the requirements of the Canadian Highway Bridge Design Code (CHBDC). The structural design drawings for the alternative shall bear the seal and signature of a Professional Engineer representing the precast manufacturer supplying the components of the oil/grit separator system. The working drawings shall bear the seal and signature of a Professional Engineer representing the Contractor. Process description and methodologies, including supporting testing by third party scientific studies, must be submitted in support of the proposed alternative as outlined above. The Contractor shall be responsible for obtaining the approval of alternative technologies by the [Conservation Authority] and the MECP. Work shall not proceed until the drawings have been approved in writing by [Conservation Authority], MECP and the Owner.

One approved copy of each drawing shall be available at the Site at all times. One (1) approved copy of each drawing shall be provided to the Owner and one (1) approved copy of each drawing shall be provided to the Owner prior to the beginning of construction of the oil/grit separator.

The separator must be installed according to the manufacturer’s instructions.

**402.07.08.03 Over-Excavation** is amended by deleting the words “95% maximum dry density” and replacing them with “100% maximum dry density”.

**402.07.09.01 Bedding** is deleted in its entirety and replaced with the following:

**402.07.09.01 Bedding**

A 150 mm layer of granular bedding material shall be placed on the bottom of the excavation and compacted according to OPSS.MUNI 501, or as otherwise specified by the product manufacturer, prior to the placing of a structure.

**402.07.10 Additional Excavation, Backfilling, and Compacting** is amended by the addition of the following:

The disposal of all surplus material shall be the responsibility of the Contractor.

Dewatering and/or shoring required to enable installation of the oil/grit separators shall be the responsibility of the Contractor.

**402.09 Measurement of Payment** is amended by the addition of the following:

No measurement will be made of Granular ‘B’, Type 1, backfill material for structures constructed according to the Drawings.

Payment shall be made at the applicable unit price for each oil/grit separator installed, and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

**407.05.05 Adjustment Units** is deleted in its entirety and replaced with the following:

**407.05.05 Adjustment Units**

Only interlocking precast concrete adjustment units on grout shall be used. Precast concrete adjustment units shall be in according to OPSS.MUNI 1351.

**407.07.13 Installation of Inlet and Outlet Pipes into Concrete Structures** is amended by the addition of the following:

Precast concrete manholes shall be placed on a 150 mm thick slab of 20 MPa concrete.

**407.10 Basis of Payment** is amended by the addition of the following:

Payment shall include the supply and placing of the 20 MPa concrete working mat and the Granular ‘B’, Type 1, backfill. The mat shall be a minimum of 150 mm and shall extend beyond the sides of the structure by 300 mm.

Backfill material shall be Granular ‘B’, Type 1, material conforming to the requirements of OPSS.MUNI 1010.

### Item R414 Storm Sewer [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: OPSD 708.020 (Nov 2016) and OPSD 802.010 (Nov 2014).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 409 (Nov 2023), OPSS.MUNI 410 (Nov 2018), OPSS.MUNI 1010 (Nov 2013), OPSS.MUNI 1820 (Nov 2020), OPSS.MUNI 1840 (Nov 2019) and OPSS.MUNI 1841 (Nov 2019).

**401.07.13 Management of Excess Material** is amended by the addition of the following:

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor.

**401.10.01 Trenching, Backfilling, and Compacting** is amended by the addition of the following:

The unit price for this item shall include all costs associated with the restoration of trench cuts as specified under Item G1 – Maintenance of Traffic.

**410.05.01.01 General** is amended by the addition of the following:

All storm sewers larger than 1,500 mm in diameter shall be concrete, unless indicated otherwise in the Contract Documents.

For storm sewers 1,500 mm in diameter and smaller, the Contractor is permitted to use concrete or HDPE with a small inside wall of an equivalent size, unless noted otherwise on the Drawings.

Concrete pipe shall be in accordance with OPSS.MUNI 1820.

HDPE shall meet the requirements of OPSS.MUNI 1840. Pre-manufactured tees shall be used for all connections of catch basin leads to the sewer. The minimum pipe class for HDPE pipe shall be Class 320.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be extended.

The bedding materials specified in OPSS.MUNI 401 include Granular ‘A’ and Granular ‘B’ in accordance with OPSS.MUNI 1010, with 100% passing the 26.5 mm sieve, and unshrinkable fill.

The bedding, embedment and cover materials shall be placed in layers a maximum of 200 mm thick and compacted to minimum 95% SPMDD or vibrated into a dense state in the case of clear stone type bedding.

**410.05.01.03 Corrugated Steel Pipe Products** is amended by the addition of the following:

CSP outlets discharging from the enclosed storm system shall include a Removable Safety Grate or Equivalent.

Item prices for CSP shall include couplers, gaskets, bolts, nuts, safety grates and all parts reasonably inferred for the completion of the proposed Work.

**410.07.02 Removals** is amended by the addition of the following:

Asphalt pavement and concrete removal, including saw cutting, shall be considered to be part of the work of the above item(s).  ***[Delete this removal section for new construction projects]***

**410.07.07 Excavation** is amended by the addition of the following:

Embedment material for flexible pipe shall be Granular ‘B’, Type I.

**410.07.11 Backfilling and Compacting** is amended by the addition of the following:

***[Select the appropriate paragraph]***

Trench backfill and cover material shall be Granular ‘B’, Type I.

Trench backfill material shall be Granular ‘B’, Type I. Trenches off the roadway, 2 m or more from the edge of pavement, shall be backfilled with selected native Site material.

**410.07.12.01 General** is amended by the addition of the following:

Sewer shall be installed in conformance with OPSD 802.010 for flexible pipe.

At maintenance hole and catch basin connections, if concrete pipe is used, the Contractor shall use a concrete cradle in accordance with OPSD 708.020.

At catch basin connections, the Contractor shall use a concrete cradle in accordance with   
OPSD 708.020.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be replaced.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of sewer pipe into maintenance holes and catch basins shall be made by coring. The connections shall be grouted between the pipe and the wall of the structure to the satisfaction of the Owner. No separate payment will be made for connecting sewers to the structures.

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection** is deleted in its entirety and replaced with the following:

**410.07.16.06 Closed Circuit Television (CCTV) Inspection**

CCTV video inspection, as specified in OPSS.MUNI 409, shall be completed prior to acceptance of the pipes. A clear image of the pipe interior shall be submitted to the Owner on a portable USB hard drive, or Equivalent, within five (5) Working Days of completion of the CCTV video inspection.

**410.07.17 Cleaning and Flushing of Pipe Sewers** is deleted in its entirety and replaced with the following:

**410.07.17 Cleaning and Flushing of Pipe Sewers**

All pipes shall be cleaned and flushed just prior to inspection and acceptance. Prior to commencing any flushing the Contractor shall submit a Methodology Summary to the Owner for review and approval. The Methodology Summary shall detail the entire operation including the source of water and the method to be employed to capture and deal with the silt, debris and deleterious materials resulting from the flushing operation. Sewer pipes will not be accepted until the CCTV result is satisfactory to the Owner.

**410.09 Measurement for Payment** is amended by the addition of the following:

***[Select the paragraph below for renewal projects]***

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

***[Select the paragraph below for new construction projects]***

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional).

### Item R415 CCTV Inspection of Storm Sewers [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 409 (Nov 2023).

Close-Circuit Television (CCTV) inspection shall be performed on all mainline storm sewers and on catch basin laterals as indicated by the Owner. The pipeline shall be clean, flushed and pumped dry prior to performing the inspection. No additional payment will be made for cleaning, flushing and pumping. Perform inspection in periods of low flow or in the dry.

**409.07.04.01 General** is amended by the addition of the following:

CCTV shall be performed before surface course asphalt is paved.

**409.07.05.01 Inspection Reporting** is amended by the addition of the following:

Photographs shall be included in the inspection reports.

**409.09.02 Plan Quantity Measurement** is amended by the addition of the following:

In the event of results which are unacceptable to the Owner, the Contractor shall be required to undertake additional CCTV inspection at the Contractor’s own expense. CCTV inspections shall be borne by the Contractor.

**409.10.01 CCTV Inspection – Item,** is amended by the addition of the following:

The Contractor shall be responsible for the cost of re-inspection after the repair work is complete.

### Item R416 Remove and Replace Damaged Storm Sewer Pipe [Renewal]

The following Standard Drawings are applicable to the above item: OPSD 708.020 (Nov 2016) and OPSD 802.010 (Nov 2014).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 407 (Nov 2021), OPSS.MUNI 409 (Nov 2023), OPSS.MUNI 410 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).

This item is for the removal and replacement of damaged storm sewers in the following location(s):

|  |  |  |  |
| --- | --- | --- | --- |
| **Pipe Location** | **Sewer Diameter (mm)** | **Depth (m)** | **Length of Repair (m)** |
| 191 m east of Kipling Avenue crossing Hwy 7 | 250 | 1.5 | 2.5 |
| 234 m east of Kipling Avenue crossing Hwy 7 | 250 | 1.5 | 10 |
| 297 m east of Kipling Avenue crossing Hwy 7 | 250 | 1.5 | 10 |
| 370 m east of Kipling Avenue south side of Hwy 7 | 525 | 1.5 | 2.5 |
| 454 m east of Kipling Avenue crossing Hwy 7 | 300 | 1.5 | 2.5 |
| 454 m east of Kipling Avenue south side of Hwy 7 | 300 | 1.5 | 2.5 |

**401.10.01 Trenching, Backfilling, and Compacting** is amended by the addition of the following:

The unit price for this item shall include all costs associated with the restoration of trench cuts as specified under Item G1 – Maintenance of Traffic.

**410.05.01.02 Concrete Pipe** is amended by the addition of the following:

Concrete pipe shall be Class 65D.

**410.05.01.04 Polyethylene Pipe Products** is deleted in its entirety and replaced with the following:

**410.05.10.04 Polyethylene Pipe Products**

The HDPE pipe shall have a smooth inner wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

**410.07.02 Removals** is amended by the addition of the following:

Asphalt pavement and concrete removal, including saw cutting, shall be considered to be part of the work of this item.

**410.07.11 Backfilling and Compacting** is amended by the addition of the following:

***[Select the appropriate paragraph]***

Trench backfill and cover material shall be Granular ‘B’, Type I.

Trench backfill material shall be Granular ‘B’, Type I. Trenches off the roadway, 2 m or more from the edge of pavement, shall be backfilled with selected native Site material.

**410.07.12.01 General** is amended by the addition of the following:

Sewer shall be installed in conformance with OPSD 802.010 for flexible pipe.

At maintenance hole and catch basin connections, if concrete pipe is used, the Contractor shall use a concrete cradle in accordance with OPSD 708.020.

The Contractor shall use the same pipe material as the existing pipe when the storm sewer is to be replaced.

**410.07.15 Breaking into Maintenance Holes, Catch Basins, Ditch Inlets, Pipe Culverts, and Pipe Sewers** is amended by the addition of the following:

Connections of sewer pipe into maintenance holes and catch basins shall be made by coring. The connections shall be grouted between the pipe and the wall of the catch basin structure and grouted between the pipe joints to the satisfaction of the Owner. No separate payment will be made for connecting sewers to the structures.

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection** is deleted in its entirety and replaced with the following:

**410.07.16.06 Closed-Circuit Television (CCTV) Inspection**

CCTV video inspection, as specified in OPSS.MUNI 409, shall be completed prior to acceptance of the pipes. A clear image of the pipe interior shall be submitted to the Owner on a portable USB hard drive, or Equivalent, within five (5) Working Days of completion of the CCTV video inspection.

**410.07.21 Management of Excess Material** is deleted in its entirety and replaced with the following:

**410.07.21 Management of Excess Material**

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**410.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in **410.10.01**:

**Replace Damaged Storm Sewer Pipe – Item**

### Item R417 Flush, Clean and Inspect Existing Storm Sewers [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 409 (Nov 2023).

Under this item, the Contractor shall flush and clean the existing storm sewers identified below:

* [input sewer information]
* [input sewer information]

The Contractor shall:

* Remove heavy sediment within the length of each storm sewer
* Pressure blast, flush and clean pipes to bare metal/concrete/plastic
* Dispose of all retrieved debris and sediment off Site
* Complete CCTV inspection of storm sewers in accordance with OPSS.MUNI 409

Following the flushing and cleaning work, the Contractor shall conduct a CCTV video inspection of the sewers for submission to the Owner, for review and determination as to whether the Work performed is acceptable. The Owner will review the inspection videos within five (5) Days of the submission. All costs associated with the CCTV inspection of the sewers shall be included in the price for this item.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of storm sewer flushed, cleaned and inspected to the satisfaction of the Owner.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R418 Concrete Headwall for Pipes Less than 900 mm including Grate (OPSD 804.030) [New Construction]

### Item R419 Concrete Headwall with Grate and Chain Link Fence (OPSD 804.040) [New Construction]

The following Standard Drawings are applicable to the above item(s): OPSD 804.030 (Nov 2017), OPSD 804.040 (Nov 2017), OPSD 804.050 (Nov 2021) and OPSD 972.131 (Nov 2012).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 410 (Nov 2018), OPSS.MUNI 501 (Nov 2017) and OPSS.MUNI 1350 (Nov 2023).

Under this item(s), the Contractor shall construct concrete headwalls at storm outfalls as shown on Drawings.

Item R418 – Concrete Headwall for Pipes Less than 900 mm including Grate (OPSD 804.030) shall be constructed in accordance with OPSD 804.030, including grate in accordance with OPSD 804.050.

Item R419 – Concrete Headwall with Grate and Chain Link Fence (OPSD 804.040) shall be constructed in accordance with OPSD 804.040, including grate in accordance with OPSD 804.050 and a 1.2 m non-climbable black vinyl chain link in accordance with OPSD 972.131.

The work under this item(s) shall include the excavation of material and backfilling with Granular ‘B’ Type II, compacted in accordance with OPSS.MUNI 501 to a minimum of 100% maximum dry density.

The disposal of all surplus and/or unsuitable material shall be the responsibility of the Contractor in accordance with OPSS.MUNI 180. No separate payment will be considered for the disposal of surplus and/or unsuitable material, regardless of the amount.

**Measurement for Payment**

Measurement for payment shall be a count of each headwall constructed, including grate and chain link fence.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R420 Entrance Culverts – 525 mm Dia., Type, Class [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).

**421.07.07** **Excavation** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional).

**421.07.11** **Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular ‘B’, Type I, except that 100% shall pass the 26.5 mm sieve.

Backfill for culverts shall be Granular ‘B’, Type I, unless specified otherwise herein.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of entrance culvert installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R421 Remove and Replace Driveway Culvert [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 421 (Nov 2018), OPSS.MUNI 510 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).

Under this item, the Contractor shall remove and replace the existing driveway culverts in the location(s) indicated by the Owner on Site. The Contractor shall also supply and install 525 mm diameter HDPE culverts under the existing roadside driveway entrances that are indicated by the Owner on Site. These culverts are required in conjunction with the road side ditching operations under Item R201 – Roadway Ditching – Terra Seeds in order to provide a continuous roadside drainage system after ditching. The lengths of the driveway culverts to be installed will depend on the width of each driveway and shall be as indicated by the Owner.

The HDPE pipe shall have a smooth wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

The Contractor will not be permitted to re-use the excavated material for backfilling the culvert work. Unless specified otherwise herein, all surplus and unsuitable excavated materials shall become the property of the Contractor and, accordingly, shall be disposed of off Site at no additional cost to the Owner. The excavated material shall be disposed of as specified in OPSS.MUNI 180. The Contractor shall obtain all necessary written approvals from the appropriate land owners and applicable environmental and municipal agencies for the disposal of such material.

Saw cutting and removal of pavement to facilitate the culvert work shall be considered to be included in the work of this item.

**421.07.07** **Excavation** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

**421.07.11** **Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular ‘B’, Type I, except that 100% shall pass the 26.5 mm sieve. Driveway entrance culverts may be installed using suitable native material, unless specified otherwise herein.

Backfill for culverts shall be Granular ‘B’, Type I, unless specified otherwise herein.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of driveway culvert removed and replaced to the satisfaction of the Owner.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R422 Remove and Replace Pipe Culverts [Renewal]

The following Standard Drawings are applicable to the above item: OPSD 802.010 (Nov 2014),   
OPSD 803.030 (Nov 2015) and OPSD 803.031 (Nov 2015).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 1840 (Nov 2019).

The Contractor shall remove and replace the following culverts:

| **LOCATION** | **EXISTING SIZE / TYPE** | **EXISTING COVER** | **REPLACEMENT SIZE / TYPE** | **TRCA / LSRCA PERMIT NO.** |
| --- | --- | --- | --- | --- |
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**421.01 SCOPE** is amended by the addition of the following:

**Erosion/Sediment Control – Conservation Authority Requirements**

The culvert removal and replacement work under this item shall be performed in accordance with the requirements of the pending TRCA (or) LSRCA permit and accompanying documentation including, but not limited to, the following:

* For wet conditions, the Contractor shall use pea gravel bags to build coffer dams, together with filter sock fiber rolls, on both ends of the culverts to create a work area. A pump with by-pass pipes shall be used to direct water.
* Filter sock fiber rolls are required for dry conditions.
* Topsoil and native seed mix treatment are required to restore disturbed areas associated with the culvert work.

**421.05.01.04 Polyethylene Pipe Products** is deleted in its entirety and replaced with the following:

**421.05.01.04 Polyethylene Pipe Products**

The HDPE pipe shall have a smooth inner wall and shall be in accordance with OPSS.MUNI 1840. The minimum pipe class for HDPE pipe shall be Class 320.

For culvert extensions, the Contractor shall confirm the existing culvert size before ordering material in order to ensure an acceptable fit.

**421.07.02 Removals** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R331 – Full Depth Granular Base Repair (Provisional).

The Contractor shall not be permitted to re-use the excavated material for backfilling the culvert work. Unless specified otherwise herein, all surplus and unsuitable excavated materials shall become the property of the Contractor and, accordingly, shall be disposed of off Site at no additional cost to the Owner. The excavated material shall be disposed of as specified in OPSS.MUNI 180.

**421.07.11 Backfilling and Compacting** is amended by the addition of the following:

Pipe bedding and cover material shall be Granular ‘B’, Type I, except that 100% shall pass through the 26.5 mm sieve.

Bedding and cover for all road culverts shall be as shown on OPSD 802.010.

Backfill for culverts shall be Granular ‘B’, Type I, unless specified otherwise herein.

All culverts installed within the frost depth (“f” = 1.2 m) shall have frost tapers (OPSD 803.030 and OPSD 803.031) constructed using Granular ‘B’, Type I, material.

**421.07.18 Management of Excess Material** is deleted in its entirety and replaced with the following:

**421.07.18 Management of Excess Material**

The disposal of all surplus and unsuitable material shall be the responsibility of the Contractor in accordance with the requirements of OPSS.MUNI 180. No separate payment will be considered for the disposal of the surplus and unsuitable material, regardless of the amount.

**421.09** **MEASUREMENT FOR PAYMENT** is deleted in its entirety.

**421.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**421.10 BASIS OF PAYMENT**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under Item G4 – Environmental Protection and/or Item G1 – Maintenance of Traffic, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

### Item R423 Road Culverts – Size, Type, Class [New Construction]

The following Standard Drawings are applicable to the above item: OPSD 802.010 (Nov 2014), OPSD 803.030 (Nov 2015) and OPSD 803.031 (Nov 2015).

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021), OPSS.MUNI 206 (Apr 2019), OPSS.MUNI 401 (Nov 2021), OPSS.MUNI 421 (Nov 2018) and OPSS.MUNI 517 (Nov 2021).

**421.05.01.01 General** is amended by the addition of the following:

All road culverts installed within the frost depth (“f” = 1.2 m or in accordance with the Geotechnical Investigation) shall have frost tapers (OPSD 803.030 and OPSD 803.031) constructed using Granular ‘B’, Type I, material.

**421.05.01.03 Corrugated Steel Pipe Products** is amended by the addition of the following:

CSP culvert couplers shall be annular corrugated bands with bolt and angle attachments.

Culvert pipe shall be corrugated steel pipe, either riveted or Loc-Seam Hel-Cor pipe as manufactured by Armtec Inc. or Equivalent. Hel-Cor pipe shall be provided with annular corrugated ends with a minimum of two (2) annular rings at each end. Couplers shall be annular corrugated bands with bolt and angle attachments.

Culverts in marsh areas shall include clear stone bedding and a geoweb cellular confinement system as required.

Bedding and cover for all CSP culverts shall be as shown on OPSD 802.010, OPSD 803.030 and OPSD 803.031.

Backfill shall be Granular ‘B’, Type I compacted to 100% of maximum dry density.

**421.05.01.04 Polyethylene Pipe Products** is amended by the addition of the following:

HDPE culverts shall be Class 320 with a smooth inner wall and corrugated outer shell (‘Boss 2000’ pipe as manufactured by Big ‘O’ Inc. or Equivalent), complete with watertight joining systems and manufactured fittings.

Embedment and cover material shall be Granular ‘B’ Type 1 and in accordance with OPSD 802.010, OPSD 803.030 or OPSD 803.031, depending on soil conditions.

Backfill shall be Granular ‘B’ Type 1 compacted to 100% of maximum dry density.

**421.09 Measurement for Payment** is amended by the addition of the following:

If, due to unsuitable material, the Owner orders additional excavation beyond 150 mm below the design grade, measurement will be made in cubic metres (m3) of the excavation. Payment for additional excavation and backfill will be made under Item R206 – Unsuitable Material Removal, Disposal and Backfill (Provisional).

### Item R424 Reline Pipe Culvert with Fold and Form HDPE Pipe Liners [Renewal]

The Contractor shall reline the following pipe culverts:

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| --- | --- | --- | --- |
| **LOCATION** | **EXISTING SIZE** | **EXISTING DEPTH** | **LSRCA / TRCA PERMIT NO.** |
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**General**

The Contractor shall monitor weather conditions several Days in advance of the proposed installation date and install the pipe liner when water flow through the pipe is at a minimum in order to avoid unnecessary dewatering. The Contractor shall divert water flow away from the repair area using pea gravel barriers and pumps. All pumped water shall be filtered through sediment filter bags a minimum of 30 m away from the watercourse and all discharged water from the filter bags shall flow through a well-vegetated area.

The Contractor shall field measure the existing CSP pipe diameter and length and select a pipe liner to suit the existing pipe size.

The fold and form HDPE liner, or Equivalent, shall be installed in accordance with the manufacturer’s written recommendations.

The Contractor shall submit a product data sheet for the liner to the Owner for review and approval a minimum of 48 hours prior to ordering the liner.

**Basis of Payment**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under Item G4 – Environmental Protection and/or Item G1 – Maintenance of Traffic, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

### Item R425 Reline Pipe Culvert with Snap-Tite HDPE Pipe [Renewal]

The Contractor shall reline the following pipe culverts:

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| --- | --- | --- | --- |
| **LOCATION** | **EXISTING SIZE** | **EXISTING DEPTH** | **LSRCA / TRCA PERMIT NO.** |
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**General**

The Contractor shall monitor weather conditions several Days in advance of the proposed installation date and install the pipe liner when water flow through the pipe is at a minimum in order to avoid unnecessary dewatering. The Contractor shall divert water flow away from the repair area using pea gravel barriers and pumps. All pumped water shall be filtered through sediment filter bags a minimum of 30 m away from the watercourse and all discharged water from the filter bags shall flow through a well-vegetated area.

The Contractor shall field measure the existing CSP pipe diameter and length and select a pipe liner to suit the existing pipe size.

The Snap-Tite solid-wall HDPE pipe, or Equivalent, shall be installed in accordance with the manufacturer’s written recommendations.

The Contractor shall submit a product data sheet for the liner to the Owner for review and approval a minimum of 48 hours prior to ordering the liner.

**Basis of Payment**

Any environmental protection and/or traffic control required for the work under this item shall be deemed to be included under Item G4 – Environmental Protection and/or Item G1 – Maintenance of Traffic, respectively. No additional payment will be made for any related activities including, but not limited to, dewatering, erosion and sediment control, Site restoration and disposal of excess materials.

Payment shall be made at the lump sum price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment shall be made in one (1) lump sum payment upon completion of all work under this item to the satisfaction of the Owner.

## OPSS 500-SERIES

### Item R501 Removal of Asphalt Pavement – Full Depth (100 mm) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2019).

The existing asphalt pavement to be removed is between 150 mm and 230 mm thick according to borehole information. The dimensions are representative at the borehole locations only. The Contractor shall carry out its own investigation if deemed necessary.

**510.09.01.16 Cutting Existing Pavement** is deleted in its entirety and replaced with the following:

**510.09.01.16 Cutting Existing Pavement**

Saw cutting of existing pavement for removal shall be part of this item and no separate payment will be considered.

### Item R501 Removal of Asphalt Pavement – Full Depth (100 mm) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.06.04 Removal of Asphalt Pavement, Partial-Depth** is deleted in its entirety and replaced with the following:

**510.07.06.04 Removal of Asphalt Pavement, Partial/Full Depth**

Once the Contractor has removed the existing asphalt to an average depth of 50 mm under Item R502 – Removal of Asphalt Pavement – Partial Depth (50 mm), the Contractor shall remove the remaining existing asphalt and underlying granular to a depth of 100 mm on Bayview Avenue from 50 m north of Major Mackenzie Drive to 50 m north of Elgin Mills Road.

The Contractor is advised that following the second stage of asphalt removal under this item, only a very thin layer of existing asphalt will remain and traffic shall not be permitted on this surface. The Contractor shall only remove the remaining 100 mm of asphalt in those areas that can be fine graded and restored with a new WMA driving surface under ***[Select the applicable item]*** Item R301 – Superpave, Binder Course, Warm Mix Asphalt / Item R302 – Superpave, Surface Course, Warm Mix Asphalt, by the end of the work shift.

On tangent sections, removals shall be carried out to achieve a 2% crossfall from the centre line to the existing curb or shoulder, and on superelevated curves, removals shall be carried out by depth to retain the existing crossfall.

Prior to commencing removal operations, all debris, deleterious material, and existing windrows, including material beyond the theoretical roadway width, shall be removed from the roadway surface to provide positive drainage.

Removed asphalt pavement material shall not remain on the roadway after completion of the Day's operations. Stockpiling of the removed material on Site other than when placed on a bituminous surface prior to its removal off Site shall not be permitted.

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

***[Select the appropriate paragraph]***

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The ground material that is removed shall be delivered to the Owner at its North District Yard located at 3525 Baseline Road, Sutton, Ontario.

When the asphalt pavement removal work is completed each Day, normal traffic flow in each direction shall be resumed. In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt. Ramps in the transverse direction shall be sloped at 20:1. The Contractor shall ensure that there are no grade differences between adjacent pavements (existing and milled) in longitudinal directions. The Contractor is advised that prior to opening the road to traffic, temporary hot mix asphalt ramping will be required around catch basins and valve chambers within the roadway after the milling operation has been performed. All temporary ramps around the catch basins and valve chambers shall be completely removed prior to the placement of the new base or surface course asphalt.

**Maintenance Holes**

Following all asphalt removal work, and prior to opening the road to traffic, the Contractor shall install temporary maintenance hole safety ramps at all maintenance holes until the surface course of asphalt is placed. The safety ramps shall be “American Highway Products, Limited” brand or Equivalent.

**Equipment**

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

**Cutting Equipment**

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

### Item R502 Removal of Asphalt Pavement – Partial Depth (50 mm) [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.06.04 Removal of Asphalt Pavement, Partial-Depth** is deleted in its entirety and replaced with the following:

**510.07.06.04 Removal of Asphalt Pavement, Partial/Full Depth**

***[Select the paragraph below for renewal projects]***

The Contractor shall remove the existing asphalt to an average depth of 50 mm on Bayview Avenue from 50 m north of Major Mackenzie Drive to 50 m north of Elgin Mills Road.

***[Select the paragraph below for new construction projects]***

The Contractor shall remove the existing asphalt to the depth and limits identified on the Drawings.

On tangent sections, removals shall be carried out to achieve a 2% crossfall from the centre line to the existing curb or shoulder, and on superelevated curves, removals shall be carried out by depth to retain the existing crossfall.

Prior to commencing removal operations, all debris, deleterious material, and existing windrows, including material beyond the theoretical roadway width, shall be removed from the roadway surface to provide positive drainage.

Removed asphalt pavement material shall not remain on the roadway after completion of the Day's operations. Stockpiling of the removed material on Site other than when placed on a bituminous surface prior to its removal off Site shall not be permitted.

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

***[Choose the appropriate paragraph]***

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

The ground material that is removed shall be delivered to the Owner at its North District Yard located at 3525 Baseline Road, Sutton, Ontario.

When the asphalt pavement removal work is completed each Day, normal traffic flow in each direction shall be resumed. In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt. Ramps in the transverse direction shall be sloped at 20:1. The Contractor shall ensure that there are no grade differences between adjacent pavements (existing and milled) in longitudinal directions. The Contractor is advised that prior to opening the road to traffic, temporary hot mix asphalt ramping will be required around catch basins and valve chambers within the roadway after the milling operation has been performed. All temporary ramps around the catch basins and valve chambers shall be completely removed prior to the placement of the new base or surface course asphalt.

**Maintenance Holes**

Following all asphalt removal work, and prior to opening the road to traffic, the Contractor shall install temporary maintenance hole safety ramps at all maintenance holes until the surface course of asphalt is placed. The safety ramps shall be “American Highway Products, Limited” brand or Equivalent.

**Equipment**

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

**Cutting Equipment**

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

### Item R503 Removal of Asphalt Pavement at New Median – Partial Depth (40 mm) [Renewal]

The following Standard Drawing is applicable to the above item: E-6.03 (Typical Detail for Construction of Concrete Slab Raised Median Islands at Intersections) or E-6.05 (Typical Detail for Construction of 1.5 m or Wider Concrete Slab Raised Median Islands at Intersections).

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

This item is for the removal of asphalt pavement prior to the construction of new median slab islands under Item R337 – Concrete Slab Raised Median.

**510.07.06.04 Removal of Asphalt Pavement, Partial Depth** is amended by the addition of the following:

Cold planing equipment must be used for the Work.

The equipment shall grind or cut the surface irregularities out of the existing asphalt pavement in order to produce a smooth surface and cut the pavement down to predetermined grades. The finished surface shall be free from gouges, ridges, sooting, oil film and other imperfections of workmanship.

The ground material that is removed shall become the property of the Contractor and shall be disposed of off Site by the Contractor at its own expense.

**Equipment**

The asphalt removal work shall be performed using a pavement-cutting machine of a type that has performed successfully on other work comparable to that proposed to be done under this Contract. If water is to be used from fire hydrants on the Site, the Contractor shall obtain, at its own expense, the appropriate permits from the Local Municipality. The Contractor shall not draw any water from areas which are considered to be environmentally sensitive.

**Cutting Equipment**

The cutting-machine to be used to perform the Work under the Contract shall be designed and built for this type of work, be self-propelled and shall have, in combination, the means for cutting the old surface and blading the cuttings into one (1) windrow.

The machine shall be able to cut flush to all curbs and gutters, maintenance holes, catch basins and valve chambers.

### Item R504 Removal of Asphalt Pavement at Structures – Partial Depth (40 mm) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.06.05 Removal of Asphalt Pavement from Concrete Surfaces on Structures** is amended by the addition of the following:

Work on any bridge decks within the Contract limits shall be done in such a way that prevents structural damage to the infrastructure.

The Contractor is advised that expansion joints with concrete end dams exist at some of the structure bridge decks. Care must be exercised to prevent damage to structural expansion joints and end dams when milling on, or near, the structure bridge deck; the use of rotary milling machines (including small hand guided milling machines) will not be permitted within 500 mm of the concrete end dams. Care must be exercised to ensure that the teeth of the milling machine shall at no time come into contact with the concrete end dam and cause damage.

Prior to the commencement of the milling operation, the Contractor shall inspect the bridge deck to locate the expansion joints and end dams. As indicated elsewhere in the Contract Documents, the Contractor shall sawcut, for the entire width of the road,   
40 mm deep through the top course asphalt offset at 500 mm from the edges of the concrete end dams. The saw-cut line shall stop before hitting the raised concrete median, concrete sidewalk or concrete curb and gutter. The Contractor shall remove the 500 mm width of asphalt adjacent to, and on either side of, the concrete end dams using hand held tools. The rest of the asphalt shall then be removed to a depth of   
40 mm by using a rotary milling machine.

In order to restore normal traffic flow, any grade differences between adjacent pavements (existing and milled) in transverse directions shall be ramped with hot mix asphalt.

### Item R505 Removal of Asphalt Sidewalk [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and   
OPSS.MUNI 510 (Nov 2018).

The Contractor shall completely remove and dispose of the existing asphalt sidewalk in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All asphalt removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

### Item R506 Removal of Concrete Curb and Gutter – All Types [New Construction]

The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).

### Item R506 Removal of Concrete Curb and Gutter – All Types [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

The Contractor shall remove concrete curb and gutter in the location(s) shown on the Drawings and/or indicated by the Owner on Site, including all curbs to be removed in connection with Item R334 – Concrete Curb and Gutter, Item R402 – Adjust Maintenance Holes, Catch Basins and Valve Chambers and Item R403 – Rebuild Maintenance Holes, Catch Basins and Valve Chambers. A representative of the Owner will inform the Contractor, on Site, of the extent of this work and will define the limits of this work with spray paint marks.

The Contractor shall saw cut the existing concrete curb and gutter and shall tie-in to, and match, the existing concrete curb and gutter cross-sections.

The Contractor shall remove existing curb and gutter in a manner that does not damage the adjacent roadway pavement, sidewalk, bus pads or adjacent boulevards (asphalt, interlocking brick and sod). Should any damage occur, the Contractor shall reinstate the roadway pavement, sidewalk, bus pads and boulevards to the satisfaction of the Owner at the Contractor's own expense.

The Contractor shall sawcut, remove and dispose of all material off Site at no additional cost to the Owner.

### Item R507 Removal of Concrete Sidewalk/Median Island [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and   
OPSS.MUNI 510 (Nov 2018).

The Contractor shall sawcut, completely remove and dispose of the existing concrete sidewalk/median island in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All concrete removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

**510.09.01.22 Removal of Concrete Sidewalk** is deleted in its entirety and replaced with the following:

**510.09.01.22 Removal of Concrete Sidewalk/Median Island**

Measurement of removal of concrete sidewalks and median islands shall be by horizontal area in square metres (m2).

### Item R508 Removal of Concrete Sidewalk [New Construction]

The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).

### Item R509 Removal of Median Island [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Median Island**

Measurement of removal of median island shall be by square metres (m2).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT**

**Removal of Median Island – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R510 Removal of Unit Pavers [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Unit Pavers**

Measurement of removal of unit pavers shall be by square metres (m2).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT**

**Removal of Unit Pavers – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R510a Removal of Unit Paver Crosswalks within Roadway [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

This item is for the removal of existing unit paver crosswalks within the asphalt roadway at the following intersections:

* List location
* List location

The Contractor shall coordinate and completely remove the unit paver crosswalks in advance of asphalt milling operations. There shall be no delay between the unit paver removal work and milling operations that results in an uneven driving or walking surface at the crosswalk locations. If required, the Contractor shall restore the area with temporary asphalt to maintain a smooth driving or walking surface until the milling operations is complete. All costs associated with supplying temporary asphalt shall be included in the unit price for this item. No separate payment will be made for any temporary asphalt work performed.

The Contractor shall ensure that there is no uneven surface as a result of the removal of the unit paver cross walk before, during or after milling or paving operations for the travelling public (vehicles/pedestrians) to traverse. If the asphalt roadway is to be left in a milled state, the Contractor shall restore any elevation variation as a result of the crosswalk removal with use of base course and/or temporary asphalt.

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Unit Pavers**

Measurement of removal of unit pavers shall be by horizontal area in square metres (m2).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT**

**Removal of Unit Pavers – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R511 Removal of Concrete Bus Pads [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021) and   
OPSS.MUNI 510 (Nov 2018).

The Contractor shall sawcut, completely remove and dispose of the existing concrete bus pads in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

All concrete removed under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

If shelters and/or waste/recycling receptacles need to be removed to accommodate construction, contact York Region Transit a minimum of two (2) weeks’ in advance of commencement of the work. Transit dispatch can be contacted at 1-905-762-1282 extension 75841 or OperationsDispatch@york.ca.

**510.09 MEASUREMENT FOR PAYMENT** is amended by the addition of the following:

**510.09.01.25 Removal of Concrete Bus Pads**

Measurement of removal of concrete bus pads shall be by horizontal area in square metres (m2).

### Item R512 Removal of Pipe Subdrains [New Construction]

### Item R513 Removal of Maintenance Holes, Catch Basins and Ditch Inlets [New Construction]

The above item(s) shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).

### Item R514 Removal of Pipes and Culverts [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.01 General** is amended by the addition of the following:

This item includes saw cutting the asphalt pavement, removing the storm sewers and/or culverts, backfilling and restoring the trench cuts to the satisfaction of the Owner.

Backfill material shall be Granular ‘B’ on the road and unshrinkable backfill within intersections.

Where there is no separate item elsewhere in the Contract Documents, asphalt pavement and concrete removal shall be considered to be included in the work of this item.

**510.07.03.08 Removal of Pipes and Culverts** is amended by the addition of the following:

The openings, resulting from this work, in existing drainage structures that are to be left in service shall be sealed with concrete brick and mortar. Clay brick, stones and rubble shall not be used. The inside wall shall have a smooth mortar finish.

### Item R515 Abandon Sewers and Laterals [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

Under this item, as approved by the Owner, the Contractor shall completely fill abandoned pipe with grout to provide a water tight seal in accordance with OPSS.MUNI 510.

**510.09.01.07 Abandonment of Pipes and Culverts** is deleted in its entirety and replaced with the following:

**510.09.01.07 Abandon Sewers and Laterals**

Measurement for payment shall be by length in metres (m) horizontally along the abandoned pipe.

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT**

**Abandon Sewers and Laterals**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R516 Removal of Concrete – Headwall, Toe Wall [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **510.09.01.20**:

**Removal of Concrete – Headwalls**

**Removal of Concrete – Toe Walls**

### Item R517 Removal of Rip Rap [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.09.01 Actual Measurement** is amended by the addition of the following:

**510.09.01.25 Removal of Rip Rap**

Measurement of removal of rip rap shall be by square metres (m2).

**510.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**510.10 BASIS OF PAYMENT**

**Removal of Rip Rap – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R518 Removal of Gabions [New Construction]

The above item shall be completed in accordance with OPSS.MUNI 510 (Nov 2018).

### Item R519 Removal of Three-Cable Guide Rail [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

### Item R520 Removal of Anchor Blocks [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

Anchor blocks at three-cable guide rail locations shall be removed and backfilled with   
Granular ‘A’. The Contractor shall identify the location of each anchor block to be removed. The Contractor shall ensure that the removal of the anchor block does not cause any damage to the paved road surface. If the Contractor determines that the removal of an anchor block may cause damage to the paved road surface, the Contractor shall only remove the anchor block with the prior approval of the Owner.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

### Item R521 Removal of Steel Beam Guide Rail [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.05.02 Removal of Guide Rail Systems** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

All removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

### Item R522 Removal of Energy Attenuators [Renewal / New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.05.04 Removal of Energy Attenuators** is amended by the addition of the following:

For guide rail installation locations that are referenced from existing guide rail termination locations, as shown on the Drawings, the Contractor shall record the termination reference locations prior to removal to facilitate installation.

Unless indicated otherwise in the Contract Documents, all removed materials shall become the property of the Contractor and, accordingly, shall be disposed of outside of the Contract limits at no additional cost to the Owner.

### Item R523 Removal of Fence – All Types [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.04.01 Removal of Fence** is amended by the addition of the following:

Before removing any fence , the Contractor shall contact the owner or tenant to inquire whether the field is being used to keep animals. If animals are being kept in the field, the Contractor shall erect the new fence before the old fence is removed unless other arrangements are made by the Contractor with the owner or the tenant.

If new fence is being installed, and the owner wants to keep the old fence material that is being removed, the Contractor shall remove the fence and place the old materials in a neat manner near the owner's building(s). If the owner does not want the old fence, the Contractor shall remove and dispose of it at no additional cost to the Owner.

When a board or rail line fence must be removed and the property line intercepts the fence part way along a panel, a new post (or salvaged existing post if suitable for re-use) of the same type as the original post shall be placed on the property line and the boards or rails fastened to it at no additional cost to the Owner. The boards or rails shall be trimmed so as not to extend out onto the road allowance.

Holes left by the removal of fence posts shall be filled with suitable backfill material, thoroughly compacted, so that they will not be a hazard for animals or pedestrians.

### Item R524 Removal of Noise Barriers – All Types [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

**510.07.04.02 Removal of Noise Barriers** is amended by the addition of the following:

Before removing any noise barrier, the Contractor shall contact the owner or tenant to arrange for temporary fence, if required. The Contractor shall erect a temporary fence before the noise barrier is removed unless other arrangements are made by the Contractor with the owner or the tenant.

Holes left by the removal of concrete footing shall be filled with suitable backfill material, thoroughly compacted, so that they will not be a hazard.

### Item R525 Relocate Canada Post Super Box on New Concrete Pad [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

Under this item, the Contractor shall relocate the existing Canada Post Super Box at [location] to accommodate construction, in accordance with the following requirements:

Contact Canada Post a minimum of six (6) weeks in advance to confirm the new Super Box location and to coordinate the work.

1. Excavate and construct a new concrete pad at the approved Canada Post location that meets the following specifications:

* 2.0 m2 in size
* 200 mm thick concrete pad
* 100 mm thick compacted Granular ‘A’ base

1. Relocate the Super Box and anchor it to the concrete pad with expansion wedge anchors.

**Measurement for Payment**

Measurement for payment shall be a count of each Super Box relocated.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R526 Rip Rap Stone with Geotextile [Renewal / New Construction]

The following Standard Drawings are applicable to the above item: OPSD 810.010 (Nov 2018) and OPSD 810.020 (Nov 2018).

This Specification shall be read in conjunction with OPSS.MUNI 511 (Nov 2019) and OPSS.MUNI 1860 (Nov 2018).

Rip rap stone shall be hand-placed to a depth of 0.3 m and underlain with filter fabric.

Stone shall be angular and contain no deleterious material such as shale, sandstone, argillite, siltstone or similar sedimentary materials. Stone shall be washed and meet the following gradation:

| **RIP RAP GRADATION** | |
| --- | --- |
| **STONE SIZE** | **% PASSING** |
| 250 | 100 |
| 100 | 45 to 55 |
| 25 | 30 to 35 |
| 19 mm CLEAR STONE | 20 (FILL VOIDS) |

Filter fabric shall be Terrafix 270R or Equivalent.

### Item R527 River Run Stone [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 511 (Nov 2018).

**511.01 Scope** is amended by the addition of the following:

Under this item, the Contractor shall supply and install stone substrate through the proposed culvert, inlet and outlet treatments and temporary channel as indicated on the Drawings and/or as indicated by the Owner.

The Contractor shall supply all materials required for this item. Stone substrate should be round (river stone) to subangular, have a gradation as specified on the Drawings, be washed and clean of all fines prior to placement.

The unit price for this item shall be full compensation for the supply of the stone substrate, the hauling and placing of the stone substrate, and all items incidental to the completion of the work as shown on the Drawings and in accordance with these Specifications.

The finished grades of the proposed stone substrate through the culverts shall match the proposed grades of the inlet and outlet treatments as shown on the Contract Documents. At all times the Contractor shall ensure that all proper erosion and sediment controls installed are fully functional.

Work under this item shall also include any necessary excavation, shaping, re-shaping as necessary to satisfy [the relevant conservation authority (LSRCA, TRCA)], and the removal and disposal of any surplus material.

**511.05.01 Rip-Rap, Rock Protection, and Granular Sheeting** is amended by the addition of the following:

The stone placed under this item shall meet the following requirements:

* Be less than 10 times the Leachate Quality Criteria as defined by Schedule 4 in Reg. 347 (General – Waste Management) under the Ontario *Environmental Protection Act*
* Not contain any sulphides
* Have a Neutralization Potential/Acid Potential ratio greater than 5.0
* Be either a limestone, dolomitic-limestone or dolomite containing no deleterious material such as shale, sandstone, argillite, siltstone or other similar sedimentary units
* Be a washed product and free of dirt
* Be composed of graded aggregate between 50 mm and 150 mm in size
* Consist of sound, natural, washed river run stone with a uniform gradation with minimum 50% by volume 150 mm in diameter
* Not be used on slope greater than 2:1

The Contractor shall advise the Owner of the stone source location. The Owner shall inspect and approve the source materials prior to delivery to the Site.

**511.07.02.03 Rock Protection** is amended by the addition of the following:

A low flow channel shall be shaped and created within the river run stone. Stones shall be placed to the neat lines shown on the Drawings.

The Contractor shall coordinate with the Owner and representatives of the [relevant conservation authority (LSRCA, TRCA)] prior to placement of the stone. Stone placement shall be carried out in such a manner that the surface of the finished stone shall have a uniform planar appearance and be without segregation. The top surface of the layer shall be shaped to create a low flow profile as shown on the Drawings. The depth of stone shall be as shown on the Drawings.

**511.09.01.02 Rock Protection** is deleted in its entirety and replaced with the following:

**5.11.09.01.02 River Sun Stone**

Measurement of river run stone shall be by square metres (m2).

**511.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**511.10 BASIS OF PAYMENT**

**511.10.01 River Run Stone**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R528 Removal of Concrete Barrier [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018).

The Contractor shall sawcut, completely remove and dispose of the existing concrete barrier in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 510.

The Contractor shall remove the existing concrete barrier in a manner that does not damage the adjacent roadway pavement, sidewalk, bus pads or adjacent boulevards (asphalt, interlocking brick, and sod). Should any damage occur, the Contractor shall reinstate the roadway pavement, sidewalk, bus pads and boulevards to the satisfaction of the Owner at the Contractor's own expense.

This item shall also include regrading of the slope behind the concrete barrier after its removal, such that the regraded slope matches the grade of the existing slope and transitions to the exiting sidewalk/boulevard elevations. All regraded and exposed slope areas shall be restored with topsoil and sod, as identified by the Owner. Payment for the topsoil and sod restoration will be made under Item R801 – Restoration of Topsoil and Sod (Provisional).

All concrete removed and soil excavated from the regraded slope under this item shall be disposed of at an Owner-approved disposal site outside the limits of the Contract at no additional cost to the Owner.

### Item R530 Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]

### Item R531 Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth [Renewal]

The Contractor is advised that asphalt pavement containing asbestos has been identified within the Contract limits. The geotechnical report that has been provided as a reference document shows the exact locations where 0.5 percent or more contents of asbestos was detected. The Contractor shall refer to the geotechnical report for additional information.

The Contractor shall be responsible for determining the actual limits of asbestos-containing asphalt pavement based on the information contained in the geotechnical report. The Drawings identify streets containing asbestos; however, the Contractor shall not rely on the demarcations shown on the Drawings to determine the limits of asbestos-containing asphalt pavement. Should there be a discrepancy between the Drawings and the geotechnical report, the geotechnical report shall govern. No additional payment will be made in relation to errors caused by the Contractor’s sole reliance on the information shown on the Drawings.

Within five (5) Working Days following the date of Contract award notification, the Contractor shall prepare and submit a detailed asbestos-containing asphalt pavement removal and disposal plan to the Owner for review and approval. The plan shall show the detailed procedure, sequence, protection of Site personnel and timing of the removal and disposal work. The Contractor shall not commence any work under this item(s) until the Owner has approved the plan.

The Contractor shall remove the asbestos-containing asphalt pavement to the depth specified in the Bid Form and dispose of it in accordance with the requirements of this Specification.

This Specification also applies to:

* pavement adjacent to the curb and gutter and roadway structures (i.e. entrances, driveways, boulevards, sidewalks and paved medians, etc.) containing asbestos; and
* asbestos removal in the pavement structure within the trench limits.

This Specification does not apply to the non-asbestos-containing streets within the Contract limits.

The standard asphalt pavement removal and the asbestos-containing asphalt pavement removal shall be completed in separate and distinct operations to ensure proper disposal of the waste material. A typical scenario would be to remove all standard surface asphalt first, then remove the surface and base containing asbestos, followed by removal of the standard base asphalt.

The Contractor is advised that following the asphalt removal under Item R530 – Cold Wet Mill and Disposal of Asphalt Pavement Containing Asbestos – Partial/Full Depth, only a thin asphalt/granular surface will remain and traffic shall not be permitted on this surface. The Contractor shall only remove asphalt in those areas that can be fine graded and restored with a new WMA driving surface under Item R301 – Superpave, Binder Course, Warm Mix Asphalt, by the end of the work shift.

**The Ministry of Labour Operational Approach**

The Contractor shall comply with O. Reg. 278/05 (Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations) under the Ontario *Occupational Health and Safety Act* (“**O. Reg. 278/05**”) during the performance of the Work. The Contractor shall further comply with the latest Ministry of Labour operational approach, measures and procedures, as outlined in O. Reg. 278/05, as follows:

* Measures and procedures for Type 2 operations may be applied for operations carried out with power tools if the power tools are attached to dust-collecting devices equipped with HEPA filters or if the asbestos-containing asphalt is wetted to control the spread of dust or fibres.
* For non-classified operations such as scarifying or milling, measures and procedures for Type 2 operations may be applied if the equipment is attached to dust-collecting devices equipped with HEPA filters or if the asbestos-containing asphalt is wetted to control the spread of dust or fibres.
* Measures and procedures for Type 3 operations may be applied for operations carried out with power tools not attached to dust-collecting devices equipped with HEPA filters and where the asbestos-containing asphalt is not wetted to control the spread of dust or fibres.
* For non-classified operations whereby the asbestos-containing material is not wetted to control the spread of dust or fibres and the equipment is not attached to dust-collecting devices equipped with HEPA filters, measures and procedures for Type 3 operations shall continue to apply.

**Measures and Procedures for Type 2 Operations**

The Contractor shall perform the asbestos-containing pavement removal/milling operations in such a way that the measures and procedures for Type 2 operations can be applied.

In the event a circumstance arises in which the Contractor cannot control dust (through either the attachment of HEPA-filtered dust collecting devices to the equipment or wetting), the Owner shall be notified and Type 3 measures and procedures shall be followed during the performance of the Work.

The Contractor must provide written notice of measures or procedures to be followed when performing the Work to the Contractor's joint health and safety committee/health and safety representative.

The Contractor shall comply with the following requirements:

1. *Health and Safety Training*

The Contractor shall ensure that all workers performing work under the Contract are trained in following:

* the hazards of asbestos exposure;
* the use, care and disposal of protective equipment and clothing to be used and worn when performing the Work;
* personal hygiene to be observed when performing the Work; and
* the measures and procedures prescribed by O. Reg. 278/05.

At least seven (7) Days prior to commencing any asbestos-containing asphalt pavement removal work, the Contractor shall provide written confirmation to the Owner of its compliance with the health and safety training requirements above.

1. *Respirators*

If a worker requests a respirator, the Contractor shall provide the worker with a respirator in accordance with section 14, paragraph 12 of O. Reg. 278/05. The respirators shall be as described in section 13 and Table 2 of O. Reg. 278/05.

Workers who are using respirators shall follow the instructions described in section 13 of O. Reg. 278/05.

To address heat stress during hot weather, the Contractor shall develop a hot weather plan and ensure the plan is followed.

1. *Protective Clothing*

If a worker requests protective clothing, the Contractor shall provide the worker with protective clothing in accordance with section 14, paragraph 13 of O. Reg. 278/05. The protective clothing shall be as described in section 15, paragraph 12 of O. Reg. 278/05.

Workers who are using protective clothing shall follow the instructions provided in section 14, paragraph 14 of O. Reg. 278/05.

1. *Eating and Drinking Prohibition*

The Contractor shall advise workers of the prohibition against eating, drinking, chewing or smoking in the work area.

1. *Dust Control*

The Contractor shall prevent the spread of dust from the work area by using the following dust suppressant control measures:

* wet down the work area prior to commencing operations;
* continue wetting throughout the duration of the operation by means of the equipment’s own wetting-down mechanism, in the case of the milling machine, and an available water truck; and
* frequently and at regular intervals during the performance of the Work and immediately upon completion of the Work, clean up dust and waste, remove it using wet sweeping and place it in a container for asbestos waste.

Under no circumstances shall compressed air be allowed for any dust cleanup.

The Contractor shall prevent slurry from entering the sewers by placing geotextile or similar filters into affected catch basins. Upon completion of the Work, the filters shall be removed from the catch basins and deposited in containers for asbestos waste.

The Contractor shall submit a plan for Site housekeeping to the Owner that ensures efficient removal of the dust from the Site and prevention of dust spreading into the environment.

1. *Facilities for Washing*

The Contractor shall have facilities on Site for washing of the hands and face. The Contractor shall advise all workers to use these facilities when leaving the work area.

1. *Containers for Dust and Waste*

Dust and waste shall be deposited immediately in a truck covered with a tarpaulin. The truck load shall be identified as asbestos waste, as required by Reg. 347 (General – Waste Management) under the Ontario Environmental Protection Act (“**Reg. 347**”).

Transportation and disposal of asbestos waste off Site shall be completed in accordance with item 8 below (Transportation and Disposal of Asbestos Waste). All costs associated with disposal shall be included in the unit price for this item(s).

1. *Transportation and Disposal of Asbestos Waste*

Blending of asbestos-containing and non-asbestos-containing asphalt waste in a single shipment for transportation and disposal is not permitted.

The transportation and disposal of asbestos waste under shall be managed in accordance with Reg. 347 and the federal Transportation of Dangerous Goods Act.

All asbestos waste shall be disposed of at a site licensed for the acceptance and disposal of asbestos waste. The Contractor shall provide the Owner with the name and address of the waste disposal site at the pre-construction meeting.

**Measurement for Payment**

Measurement for payment shall be per square metre (m²) of asbestos-containing asphalt pavement removed and disposed of.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

## OPSS 700-SERIES

### Item R701 Supply and Install Steel Beam Guide Rail [Renewal / New Construction]

### Item R702 Steel Beam Guide Rail Structure Connections [Renewal / New Construction]

### Item R703 Supply and Install Guide Rail End Treatment [Renewal / New Construction]

The following Standard Drawings are applicable to above item(s):

**[Select the applicable drawings]**

* *OPSD 912.186 (Nov 2016) – Guide Rail System, Steel Beam Type M20 – Adjacent to 2H:1V Slope Installation – Rail at Shoulder*
* *OPSD 912.188 (Nov 2019) – Guide Rail System, Steel Beam Type M30 – Adjacent to Concrete Curb Installation*
* *OPSD 912.255 (Nov 2018) – Guide Rail System, Steel Beam Type M20 and M30 Leaving End Treatment Installation*
* *OPSD 912.531 (Nov 2008) – Guide Rail System, Steel Beam Installation – Entrances and Intersection Roadways*
* *OPSD 922.165 (Nov 2022) – Energy Attenuator, End Treatment Steel Beam Energy Attenuating Terminal MASH Softstop Terminal System Installation*
* *OPSD 922.186 (Nov 2018) – Energy Attenuator, End Treatment Steel Beam Energy Attenuating Terminal MASH Sequential Kinking Terminal System – Installation*

This Specification shall be read in conjunction with OPSS.MUNI 721 (Apr 2024), OPSS.MUNI 732 (Nov 2019) and MTO Special Provision No. 799S05 (Sep 2023).

**[Delete the paragraph below for new construction projects]**

**721.07.01 General** is amended by the addition of the following:

The Contractor shall pave all unpaved shoulders and roundings adjacent to new guide rail systems with asphalt under ***[Select the applicable item]*** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, unless indicated otherwise by the Owner.

Where underground utilities exist in direct conflict with the proposed guide rail system, the Contractor shall use a hydro-vac truck to facilitate the work.

**721.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in 721.10.02:

**Supply and Install Steel Beam Guide Rail**

**Supply and Install Steel Beam Guide Rail with Channel**

**Supply and Install Steel Beam Guide Rail – Nu-Guard Assembly**

**Supply and Install Steel Beam Guide Rail – M20**

**Supply and Install Steel Beam Guide Rail – M30**

**Supply and Install Guide Rail End Treatment – Entrances and Intersecting Roadways**

**Supply and Install Guide Rail End Treatment – Leaving End Treatment**

**732.07.01 General** is amended by the addition of the following:

***[Delete the first paragraph for new construction projects]***

The Contractor shall pave all unpaved shoulders and roundings adjacent to new guide rail systems with asphalt under ***[Select the applicable item]*** Item R303 – Remove and Replace Miscellaneous Superpave Warm Mix Asphalt / Item R306 – Remove and Replace Miscellaneous Superpave Hot Mix Asphalt, unless indicated otherwise by the Owner.

SoftStop and Sequential Kinking end treatments shall be installed in accordance with OPSD 922.165 and OPSD 922.186 modified as follows:

Steel beam guide rail shall be installed 0.304 m from the shoulder rounding breakpoint.

SoftStop and Sequential Kinking terminals shall be installed on the shoulder rounding breakpoint.

**Certification of Safety Items**

Certification for SoftStop and Sequential Kinking end treatments shall be in accordance with MTO Special Provision No. 799S05.

**732.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in 732.10.01:

**Supply and Install Guide Rail End Treatment – MASH SoftStop Terminal System**

**Supply and Install Guide Rail End Treatment – MASH Sequential Kinking Terminal System**

### Item R704 Bicycle Railing [New Construction]

***[Designer to use Local Municipality Design Standard Drawings and Specification when applicable]***

This Specification shall be read in conjunction with OPSS.MUNI 908 (Nov 2022).

This item is for the supply and installation of bicycle railing in the location(s) shown on the Drawings.

**Materials**

Materials for the steel railing and railing base plate shall be as specified on the Drawings.

**Fabrication and Erection**

Components of the railing shall be joined by means of bolts, screws and welds as called for on the Drawings. Rails and posts shall be erected true to line and level as shown on the Drawings or as required by the Owner.

**Shop Drawings**

The Contractor shall submit Shop Drawings to the Owner for review a minimum of three (3) weeks prior to fabrication. The Contractor shall check the layout detailed on the Drawings and verify all dimensions before preparing the Shop Drawings. Any discrepancies shall be reported for clarification.

**Measurement for Payment**

Measurement for payment shall be in linear metres (m) along the centreline of the installed railing, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R705 Pedestrian Barricade [Renewal / New Construction]

***[Designer to use Local Municipality Design Standard Drawings and Specification when applicable]***

The following Standard Drawing is applicable to the above item: OPSD 980.101 (Nov 2017).

The Contractor shall supply and install pedestrian barricade, including footings, in the location(s) shown on the Drawings and in accordance with OPSD 980.101.

**Shop Drawings**

The Contractor shall submit Shop Drawings to the Owner for review a minimum of three (3) weeks prior to fabrication. The Contractor shall check the layout detailed on the Drawings and verify all dimensions prior to preparing the Shop Drawings. Any discrepancies shall be reported to the Owner for clarification.

**Measurement for Payment**

Measurement for payment shall be in linear metres (m) along the centreline of the installed barricade, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R706 Temporary Concrete Barriers [New Construction]

### Item R707 Temporary Concrete Barriers, Relocation [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 723 (Nov 2021) and OPSS.MUNI 741 (Nov 2021).

Under this item, the Contractor shall supply, install and remove precast concrete barriers at the location(s) shown on the Construction Staging Plan and/or indicated by the Owner on Site. The Contractor shall relocate temporary concrete barriers as required to set up and to accommodate the change in traffic patterns from one construction phase to the next.

**741.07.01 Temporary Concrete Barrier** is amended by the addition of the following:

The Contractor shall place traffic markers and reflective devices on the temporary concrete barriers where indicated by the Owner. On completion of the Work, the Contractor shall remove all the barriers from the Site.

**741.09.01.01 Temporary Concrete Barrier** is amended by the addition of the following:

Payment shall be made at the unit price per linear metre (m) of barrier installed and removed, as follows:

* 75% of the unit price upon satisfactory installation of the barrier
* 25% of the unit price upon satisfactory removal of the barrier

### Item R708 Energy Attenuator – Temporary – Type [New Construction]

### Item R709 Energy Attenuator – Relocation – Type [New Construction]

The above item(s) shall be completed in accordance with OPSS.MUNI 723 (Nov 2021).

### Item R710 Construction Fence [New Construction]

Snow fence shall be installed to delineate the work area from private property and/or to restrict entrance onto private property where indicated by the Owner. The fence shall be a minimum of 1.2 m high and installed with metal T-posts using metal ties to secure the fence to the T-posts.

The Contractor shall erect a construction fence along the property line, grading easement or grading limit at all locations where heavy duty silt fence or tree protection fence is not indicated on the Drawings.

**Measurement for Payment**

Measurement for payment shall be per linear metre (m) of construction fence erected, maintained and removed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment will be made as follows:

* 40% of the unit price upon satisfactory installation of the fence
* 50% of the unit price for maintaining the fence during construction; the actual amount to be decided by the Owner as described below
* 10% of the unit price upon satisfactory removal of the fence

The Contractor’s maintenance activities will be documented to assess the value of payment each month. Failure to maintain the fence to the satisfaction of the Owner may result in less than 100% payment for this item in the event that the Owner deems that the Contractor did not perform adequate maintenance.

### Item R711 Highway Fence [New Construction]

The following Standard Drawing is applicable to the above item: OPSD 971.101 (Apr 2022).

This Specification shall be read in conjunction with OPSS.MUNI 771 (Apr 2022).

This item is for supply and installation of highway fence, complete with brace panels and gate(s), in the location(s) shown on the Drawings and in accordance with OPSD 971.101.

**771.09 MEASUREMENT FOR PAYMENT** is deleted in its entirety and replaced with the following:

**771.09 MEASUREMENT FOR PAYMENT**

Measurement of highway fence shall be by length in metres (m) along the contour of the ground for the actual length of highway fence installed and shall include gate openings and brace panels.

**771.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**771.10 BASIS OF PAYMENT**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R712 Chain Link Fence [New Construction]

### Item R713 Chain Link Gate [New Construction]

The following Standard Drawings are applicable to the above item(s): OPSD 972.102 (Nov 2012) and OPSD 972.130 (Nov 2012).

This Specification shall be read in conjunction with OPSS.MUNI 772 (Apr 2019).

Chain link fence shall be in accordance with OPSD 972.130 and installed as shown on the Drawings.

Chain link gates shall be 6 m double swing in accordance with OPSD 972.102 and installed as shown on the Drawings.

The Contractor shall coordinate the exact limits of the fence installation with the Owner.

### Item R714 Wildlife Fence – Large Animals [New Construction]

The following Standard Drawings are applicable to the above item:

***[Select the applicable drawings]***

* *OPSD 972.101 (Nov 2012) – Fence, Chain-Link Component – Barbed Wire*
* *OPSD 972.130 (Nov 2012) – Fence, Chain-Link, Installation, Roadway*
* *OPSD 972.132 (Nov 2012) – Fence, Chain-Link, Details and Table*
* *OPSD 973.131 (Nov 2022) – Wildlife Fence, Type A, With Apron of Type B Fence Fabric,*
* *OPSD 973.140 (Nov 2022) – Wildlife Fence, Steel Post Footing Details*
* *OPSD 973.142 (Nov 2022) – Wildlife Fence, Miscellaneous Details*
* *OPSD 973.143 (Nov 2022) – Wildlife Fence, Tie-in at Culverts or Wildlife Crossing Structures*

This Specification shall be read in conjunction with OPSS.MUNI 773 (Nov 2022) and OPSS.MUNI 1540 (Apr 2022).

This item is for the supply, installation and maintenance of wildlife fences and ungulate gates. The Contractor shall provide the Owner with sample drawings and a sample product list with full details for the Owner’s review and approval prior to the Contractor ordering the wild life fence. The Contractor shall obtain written approval from the Owner prior to commencing any work related to this item.

**MATERIALS**

Wire fence – 2.4 m knotted joint woven wire fence specifications:

* All wires shall be single strand, galvanized steel wire conforming to CAN/CGSB-138.2-2019.
* Minimum 12 ½ gauge high tensile strength wire.
* Minimum spacing between vertical wires shall be 420 mm.
* Minimum spacing between horizontal wires shall be 230 mm.
* Class 3 galvanization.
* Wire arm shall be in accordance with OPSD 972.101.
* 0.75 m wire mesh made up of galvanized steel in the bottom connected to steel posts.

Steel posts specifications:

* All posts shall be galvanized steel pipe and shall conform to CAN/CGSB-138.2-2019; hot dipped galvanized conforming to the requirements of CAN/CSA-G164-M92(R2003).
* Holes to tie through as required.
* The steel pipe shall not have an outside diameter less than 73 mm. The length of steel pipe may vary between 3,560 mm and 4,500 mm according to installation conditions.
* Any damage to galvanized coatings must be repaired by the Contractor at no additional cost to the Owner. For damaged or cut galvanized steel posts and braces, two (2) coats of an organic, zinc rich paint shall be applied on a thoroughly cleaned surface.
* Steel post footings shall be installed in accordance with OPSD 973.140.
* Steel posts shall be installed with galvanized steel post caps.

Bracing wire must be galvanized and a minimum of 9 gauge.

**CONSTRUCTION**

**2.4 m High Fence Installation**

* Fence shall be installed by a contractor experienced in installing high tensile strength wire fences and that is acceptable to the Owner.
* Only steel posts shall be used.
* Fencing shall not cross sensitive watercourses. The following watercourses within the fencing limits contain, or are suspected to contain, fish habitat:
* <provide name of creek / waterway>
* There shall be no gaps greater than 100 mm between the fence posts and the structures/culverts.
* At the discretion of the Owner, the fence may be discontinued at large rock outcrops, unstable terrain or other barriers that will prevent wildlife from traveling around the fence and into the right-of-way (ROW). In such case, the fence shall be tied into the barrier or angle away from ROW to prevent passage.
* Steel posts shall be spaced 5 m apart, measured horizontally, unless indicated otherwise in the Contract Documents.
* Posts shall be installed plumb, going across slopes, and shall be installed 3 degrees off vertical angle away from the highway.
* Brace posts shall be installed at fence ends and at other stress points where required. The spacing between adjacent, intermediate brace panels and between intermediate brace panels and end post panels shall not be more than 54 m.
* The Contractor shall provide Shop Drawings to the Owner for review and approval. The Contractor shall allow 10 Working Days for the Owner’s review process. Approval of the Owner is required prior to the Contractor ordering the wildlife fence.

**MAINTENANCE**

The fence shall be maintained in an effective, functioning, stable condition, without holes, tears, and punctures or sagging for a minimum of two (2) years after initial installation, or until the end of the Contract warranty period, whichever is longer. The Contractor shall inspect and repair all fences between April 1 and June 30 of each year following construction. Any major concerns with the integrity of the fence should be communicated to the Owner immediately.

**Measurement for Payment**

Measurement for payment will be by Plan Quantity Payment, in metres (m) of fence supplied, installed and maintained.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified, including but not limited to the supply and installation of brace panels. Payment will be made as follows:

* 50% of the unit price upon satisfactory installation of the fence
* 50% of the unit price for maintaining the fence during construction, which will be paid upon completion of the Work

### Item R715 Wildlife Fence – Small Animals [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 501 (Nov 2017) and OPSS.MUNI 1540 (Apr 2022).

The Contractor shall install wildlife fence for small animals to the limits detailed on the Drawings. The wildlife fence shall be AMX 48 Wildlife Fencing, Semi-Permanent Applications (AMX-SP) as manufactured by Animex International, or Equivalent, and shall be installed in accordance with the manufacturer’s instructions.

The Contractor shall design the wildlife fence installation plan and submit it to the Owner for approval prior to installation. The Contractor shall notify the Owner 24 hours prior to installing the wildlife fence.

**Measurement for Payment**

Measurement for payment shall be by length in metres (m) along the actual fence installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment shall be made upon installation of the wildlife fence to the satisfaction of the Owner.

### Item R716 Cast in Place Concrete Barrier [Renewal]

The following Standard Drawing is applicable to above item:

* *OPSD 911.130 (Apr 2021) – Guide Rail System, Concrete Barrier Cast-in-Place, Type A Installation*

This Specification shall be read in conjunction with OPSS.MUNI 740 (Nov 2021).

Cast in place concrete barrier shall be installed in the location(s) shown on the Drawings and in accordance with OPSS.MUNI 740.

**Measurement for Payment**

Measurement for payment shall be in linear metres (m) along the centreline of the installed cast in place concrete barrier, as measured on Site.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

## OPSS 800-SERIES

### Item R801 Restoration of Topsoil and Sod (Provisional) [Renewal]

This Specification shall be read in conjunction with OPSS.MUNI 510 (Nov 2018), OPSS.MUNI 802 (Nov 2019) and OPSS.MUNI 803 (Apr 2018).

This item is for the restoration of topsoil and sod if requested by the Owner. The restoration limits will be determined by the Owner.

**803.09.01.01 Sod** is amended by the addition of the following:

This measurement shall include the supply of topsoil or the disposal of excess topsoil and/or sod necessary to complete the restoration work.

**803.10 BASIS OF PAYMENT** is amended by the addition of the following to the list of items in **803.10.01**:

**Restoration of Topsoil and Sod – Item**

**Measurement for Payment**

Measurement for payment shall be of the area in square metres (m2) in which topsoil and sod is restored.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R802 Topsoil [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 802 (Nov 2019).

**802.05.01 Topsoil** is amended by the addition of the following:

Soil quality must meet the applicable generic full depth site condition standards of O. Reg. 153/04 (Records of Site Condition) under the Ontario *Environmental Protection Act*.

**802.07.03 Placement of Topsoil** is amended by deleting the first paragraph and replacing it with the following:

Only screened topsoil is permitted unless indicated otherwise in the Contract Documents. Topsoil thickness shall be as specified on the Drawings and shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**802.09.01 Actual Measurement** is deleted and the replaced with the following:

Measurement for payment shall be by volume in cubic metres (m3). This volume shall be calculated by multiplying the area measured for payment for seeding and/or sodding and/or erosion control blanket by the depth of topsoil specified in the Contract Documents.

Areas that have been damaged by the Contractor beyond the slope limits shall be restored with topsoil where necessary prior to carrying out sod or seed repairs. No measurement or payment will be made for this repair work. Topsoil will be free of foreign debris and waste of any nature.

### Item R803 Sodding [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 803 (Apr 2018).

**803.07.01 Operational Constraints** is amended by the addition of the following:

Areas where the ground cover has been damaged by the Contractor beyond the slope limits shall be restored at the Contractor’s own expense and shall not be included in the area measured for payment.

**803.07.04 Placement of Sod** is amended by the addition of the following:

The Contractor shall roll the sod in front of residential areas and other areas where the grass is cut.

Sod shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**803.07.05 Maintenance of Completed Sodding** is amended by the addition of the following:

The Contractor shall water the sod as required in order to obtain growth acceptable to the Owner.

If sodding has not been completed by October 1st of any year, such areas will not be accepted until the following year when it can be determined that acceptable growth has taken place, unless it is obvious to the Owner that acceptable growth has taken place.

The Contractor shall be responsible for the mowing and protection of all sodded areas. This protection shall include the repair of sodded areas with additional sod, including the restoration of the slope itself and the supply of additional topsoil, until the Total Performance of the Contract.

**803.08 Quality Assurance** is deleted.

**803.09 Measurement for Payment** is amended by the addition of the following:

If the Contractor requests a re-measurement of the sodded area and the re-measured area differs from the area measured for proposed payment, the re-measured area shall be used for payment.

### Item R804 Seeding and Erosion Control Blanket [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 804 (Nov 2014).

**804.05.01 Seed** is amended by the addition of the following:

Seed for all applications under the Contract shall consist of seeded compost material applied to a minimum depth of 5 cm using a pneumatic blower.

[Seed mix and seeding rate to be determined by the York Region Environmental Specialist]

**804.05.04.05 Erosion Control Blanket (ECB)** is amended by the addition of the following:

Erosion control blanket shall contain a fibre density of at least 350 g/m2 and consist of wood or coconut based fibres/materials. Erosion control blanket shall be free of any synthetic, jute, or straw based fibres or materials. Erosion control blankets shall not be installed over gullies, rills, stones, tree roots or any other foreign objects which protrude from the ground surface.

**804.07 Construction** is amended by the addition of the following:

Topsoil, seed, fertilizer and mulch or erosion control blanket shall be placed to the mid-point of the shoulder rounding on rural cross-sections.

**804.07.05 Cover Applications** is amended by the addition of the following:

Temporary ground cover applied to all areas that may be left without vegetative cover/erosion control blanket for more than 30 Days shall be included under Item R204 – Earth Excavation, Grading.

**804.07.05.04 Erosion Control Blanket (ECB) Application** is amended by the addition of the following:

Erosion control blanket shall be provided on all slopes steeper than 2:1 (H:V) and higher than 1.0 m, in accordance with OPSS.MUNI 804 and the Drawings.

Blankets shall be rolled out flat, even and smooth without stretching and be properly anchored to the sub grade. Installation of erosion control blankets shall not take place over snow covered, frozen or saturated soils.

**804.08 Quality Assurance** is deleted in its entirety and replaced with the following:

**804.08 Quality Assurance**

Total Performance of the Contract shall not be issued until seeded areas have established growth in accordance with the performance measures and acceptable to the Owner.

Performance Measures at Total Performance of the Contract:

* The specified permanent seed species shall be at an average height of 50 mm in an evenly dispersed, uniform cover.
* There shall not be any significant bare areas, both in terms of quantity and size.
* Non-seeded, non-specified vegetation shall not exceed 20% of the seeded earth area.

The Contractor shall be responsible for the maintenance of seeded areas which shall include the repair of any seeded area with additional seeding, including the repair of the slope itself and the supply of additional topsoil, until Total Performance of the Contract.

For areas that need to be repaired, the following requirement shall be met:

* All slippages and wash-outs must be repaired with acceptable topsoil.
* Surface preparation as specified in subsection 804.07.02 shall be carried out.
* Reseeding must be carried out as indicated in subsections 804.07.04 and 804.07.05.

**804.09.01 Actual Measurement** is deleted in its entirety and replaced with the following:

**804.09.01 Actual Measurement**

Measurement for payment shall be by area in square metres (m2). Areas where the original ground cover is damaged by the Contractor beyond the slope limits shall be restored at the Contractor's own expense and shall not be included in the area measured for payment. Areas of overlap shall not be measured for payment.

If the Contractor requests a re-measurement of the seeded area and the re-measured area differs from the area measured for proposed payment, the re-measured area shall be used for payment.

### Item R805 Supply and Install Engineered Growing Media for Planting [New Construction]

The following Standard Drawings are applicable to the above item: NHF-200, NHF-201, NHF-202 and NHF-204.

This Specification shall be read in conjunction with OPSS.MUNI 180 (Nov 2021).

The work under this item shall include the supply and installation of engineered growing media for planting in boulevard soil trenches and center medians, boulevard planters, tree grate planters and other planting beds in accordance with the Drawings.

Supply and installation of engineered growing media shall include, but is not limited to, the following:

1. Submitting samples and test results of the engineered growing media mix and its components to the Owner in accordance with the ‘Submission of Product and Component Samples and Testing Requirements’ section of this Specification.
2. Owner approval of the submitted mix and its components prior to supply and installation on Site.
3. Blending of topsoil, sand and various types of organic matter to create the engineered growing media mix that meets the specifications detailed in the ‘Engineered Growing Media Components’ section of this Specification and has been manufactured in accordance with the ‘Engineered Growing Media Mix Preparation and Manufacture’ section of this Specification.
4. Installation of engineered growing media.
5. Compaction and grading of engineered growing media in place.

**Coordination of Related Works**

During the construction of all areas to be supplied and installed with engineered growing media, surrounding surfaces shall be kept in a generally clean condition. The Site shall be kept free of litter and refuse to prevent the introduction of contaminants into the engineered growing media areas for planting. Litter shall not be buried on Site. All excess engineered growing media shall be disposed of off Site.

If significant time delays are expected between the supply and install of engineered growing media for planting and the appropriate material to cover the area (i.e. sodding, plant material and/or mulch products, etc.), during spring, summer and fall months, a suitable temporary method to prevent contamination of the planting areas shall be arranged with the Owner. Payment for placement of topsoil will be made under Item R802 – Topsoil. Payment for installation of sodding for applicable trenches will be made under Item R803 – Sodding.

**Engineered Growing Media Components**

The Contractor shall prepare engineered growing media utilizing components in accordance with the following requirements:

Topsoil (Imported) Component

Topsoil used to manufacture the engineered growing media shall meet the following requirements:

* Topsoil used in the engineered growing media shall be silt loam, sandy loam or loam, as described in The Canadian System of Soil Classification. Topsoil shall consist of greater than 5% clay but no greater than 20%, 3% to 7% organic matter (by weight) and less than 8% combined gravel content.
* Topsoil pH shall range between 6.0 and 7.8.
* Topsoil cation exchange capacity shall be greater than 5 meq/100g
* Topsoil salinity shall not exceed 2.0 mmhos/cm at 25°C.
* Topsoil shall be free of contaminants and deleterious materials such as litter, construction materials, stones greater than 2.5 mm in diameter, or any other contaminants that may damage or otherwise impair plants or plant growth.
* Plant material including noxious weeds and/or their seeds, tubers, rhizomes, sod, crabgrass, couchgrass, or roots shall not be acceptable in the topsoil.
* A mix of sand, fertilizers, organic matter and/or other component parts assembled to meet the structural, chemical and other requirements of topsoil shall not be substituted for the imported topsoil
* The topsoil source location shall be submitted for approval.

Coarse Sand Component

Coarse sand used to manufacture the engineered growing media shall meet the following requirements:

* Sand used in the engineered growing media shall be clean, sharp, coarse grade silica sand with a Fineness Modulus Index (FM) of 2.8 to 3.2, and/or a D90/D10 gradation index of less than 8.
* The presence of limestone, shale and/or slate particles in the sand mixture will result in the rejection of the sand.
* Sand shall consist of less than 0.75% organic matter (by dry weight).
* pH of sand shall be less than or equal to 7.5.
* Calcium carbonate shall range between 0% to 5%.

High Lignin Organic Matter Component

High lignin organic matter used to manufacture the engineered growing media shall meet the following requirements:

* High-lignin organic matter shall consist of composted pine, spruce, fir or other conifer bark with a dark brown colour.
* 95% of the total weight of the high lignin organic matter shall be less than 15 mm in particle size.
* pH shall not exceed 6.5.
* Electrical conductivity shall not exceed 2.5 mmhos/cm at 25°C.
* Organic matter content shall be greater than 80% (by dry weight).

Compost Component

Compost used as a surface amendment for engineered growing media, or to manufacture organic matter amendment materials, shall meet the following requirements:

* Compost shall conform to standards of Category ‘AA’ or ‘A’ compost as outlined in the Ontario Compost Quality Standard, which can be found at the following link: <https://www.ontario.ca/page/ontario-compost-quality-standards>.
* Compost shall have a Solvita® Compost Maturity Index of 7 or 8.
* Compost pH shall be less than 8.5.
* Carbon to nitrogen (C:N) ratio shall range between 10:1 and 20:1.
* Compost salinity (electrical conductivity) shall not exceed 4.0 mmhos/cm at 25°C.

**Engineered Growing Media Mix Preparation and Manufacture**

The Contractor shall prepare engineered growing media in accordance with the following requirements:

Preparation

The engineered growing media mix shall be prepared using the following proportions of the engineered growing media components by volume:

* High-lignin organic matter – 10% +/-2%
* Coarse sand – 50% +/-10%
* Topsoil (imported) 40% +/- 10%

The engineered growing media mix shall meet the following requirements:

* 60 to 80% sand content
* 2 to 11% clay content
* Greater than 3% organic matter content
* 6.0 to 7.8 pH
* Less than or equal to 2.0 mmhos/cm at 25°C for electrical conductivity

Manufacture and Storage

The engineered growing media shall be manufactured and stored in accordance with the following requirements:

* Engineered growing media components shall not be blended until all individual components are approved by the Owner.
* Engineered growing media shall be mixed with a front-end loader bucket. Soil blending machines shall not be used and assembled planting soil shall not be screened.
* Sand and required high-lignin organic matter materials shall be mixed prior to the addition of topsoil. Once the sand and high-lignin organic matter is mixed, the topsoil can be mixed in. Care shall be taken to avoid over-mixing and disturbing soil peds and homogenizing soil structure.

Chemical Additives

The engineered growing media mix shall be prepared, manufactured and stored in consideration of the following requirements:

* Chemical additives to modify soil fertility shall not be used in the preparation of the engineered growing media.
* Hydrated lime shall not be used to stabilize engineered growing media or promote soil aggregation.
* Due to the difficulty of permanently altering soil pH levels, chemical additives to alter pH shall only be used if approved, in advance, by the Owner.

**Submission of Product and Component Samples**

The Contractor shall complete product and mix testing and submit product samples and testing results in accordance with the following requirements:

1. Submit samples and testing results of all engineered growing media components, final engineered growing media mix and organic matter amendment components to the Owner for approval a minimum of 15 Working Days prior to the planned commencement of engineered growing media or organic matter amendment installation.
2. Samples of each component and final engineered growing media mix with accompanying test results shall be submitted to the Owner, including two (2) duplicate samples of each of the following items:

* Topsoil (Imported)
* Coarse sand
* High-lignin organic matter
* Compost
* Engineered growing media mix

1. Samples shall be comprised of random samples from each component or mix source.
2. Samples shall be clearly labelled with relevant identifying characteristics including, but not limited to, the type of material, source and stockpile location, and manufacturer contact information. The Contractor is solely responsible for ensuring that the materials comply with all other specifications and requirements.
3. The engineered growing media mix sample shall be labelled with the percentage of each component material.
4. Manufacturer product data and literature describing all engineered growing media and organic matter amendment components, and certificates indicating that the materials meet the specification requirements, shall accompany all sample submissions.
5. All samples of the engineered growing media and organic matter amendment components shall be submitted for review and acceptance at the same time.
6. The Owner may reject any or all engineered growing media or organic matter amendment components or engineered growing media mix at its sole discretion. No rejected materials shall be installed or used in the manufacture of the engineered growing media or organic matter amendment. Delivered materials shall match the samples provided to, and approved by, the Owner.
7. All components and the engineered growing media shall be submitted for testing to a testing laboratory accredited by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA).
8. All testing shall be at the expense of the Contractor.
9. All test reports shall have been completed in the last four (4) months.

**Testing Requirements for Engineered Growing Media Components and Final Mix**

The Contractor shall complete product and mix testing and submit product samples and testing results in accordance with the following requirements:

Topsoil (Imported) Report

The topsoil test analysis report shall include the following information, at a minimum:

* pH (1:2 – soil: water ratio)
* Organic matter percentage (Walkley-Black or Loss on Ignition)
* Particle size analysis by ASTM D422 (hydrometer test) or ASTMF1632 (pipette test)
* Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
* Cation Exchange Capacity (CEC)

Coarse Sand Report

The coarse sand test analysis report shall include the following information, at a minimum:

* pH (1:2 – soil: water ratio)
* Organic matter percentage (Walkley-Black or Loss on Ignition)
* Particle size analysis by ASTM D422 (hydrometer test) or ASTMF1632 (pipette test)
* Fineness Modulus Index (FM) and/or D90/D10 Gradation Index
* Calcium carbonate test

High Lignin Organic Matter Report

The high lignin organic matter test analysis report shall include the following information, at a minimum:

* pH (1:2 – soil: water ratio)
* Organic matter percentage (Walkley-Black or Loss on Ignition)
* Particle size analysis by ASTM D422 (hydrometer test) or ASTMF1632 (pipette test)
* Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.

Compost Report

The compost test analysis report shall include the following information, at a minimum:

* pH (1:2 – soil: water ratio)
* Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
* C:N ratio
* Solvita® Compost Maturity Index

Engineered Growing Media Mix Report

The engineered growing media mix test analysis report shall include the following information, at a minimum:

* pH (1:2 – soil: water ratio)
* Organic matter percentage (Walkley-Black or Loss on Ignition)
* Electrical conductivity (soluble salt; 1:2 – soil: water ratio). If method deviates from this, the ratio mix between soil and water must be indicated.
* Particle size analysis by ASTM D422 (hydrometer test) or ASTMF1632 (pipette test)
* Cation Exchange Capacity (CEC)

The Owner may require additional testing of the engineered growing media components or engineered growing media at any time that such samples are deemed necessary to verify conformance to specification requirements.

**Rejection of Materials**

If the supplied engineered growing media does not meet the required specifications, and if, in the Owner’s sole estimation, the supplied engineered growing media differs substantially enough from the required specifications to create a reasonable likelihood that the installed engineered growing media trenches will not function as intended, the supplied materials will be rejected.

Rejected materials shall be removed and replaced with an engineered growing media that meets the required specifications at no addition cost to the Owner.

**Installation of Engineered Growing Media Mix for Planting**

The Contractor shall install engineered growing media in accordance with the following requirements:

Site Preparation and Grading

Excavation and preparation of the boulevard soil trenches shall be completed under Item R210 – Earth Excavation and Preparation for Boulevard Soil Trench.

For boulevard soil trenches directly adjacent to the roadway, pipe subdrains shall be installed and connected to storm infrastructure and shall be constructed prior to the installation of engineered growing media and constructed under Item R401 – Pipe Subdrains in accordance with NHF-200.

***[Include the below sentence for projects with proposed planting in landscaped center median planters, boulevard planters, tree grate planters, or other enhanced planting beds outside of a boulevard soil trench for tree planting]***

For center medians, boulevard planters, tree grate planters and other planting beds, the Contractor shall be responsible for ensuring that these areas are prepared and constructed in accordance with the Drawing and are approved by the Owner prior to the installation of engineered growing media. If any deficiencies are present, the deficiencies shall be rectified as required prior to installation of the engineered growing media.

Placement of Engineered Growing Media

Engineered growing media shall only be installed during periods when mix and subgrade soils are friable. Engineered growing media shall not be installed when saturated, frozen or excessively dry. Engineered growing media shall be installed as soon as the subgrade preparation is completed.

For boulevard soil trench areas, tracked or large-tired equipment shall be used to install the engineered growing media, and repeated passes over areas of soil installation shall be avoided to the greatest extent possible.

For all areas to be installed with engineered growing media, cranes or conveyors shall be used to deliver engineered growing media from stockpiles to the installation area, where possible. Slinger trucks may be used to install engineered growing media. Soil blowers and soil pumps shall not be used to install the engineered growing media.

Engineered growing media shall be installed in lifts as specified below:

* Finished subgrade soil shall be scarified using a toothbar attachment on an excavator or other Owner-approved equivalent equipment to a depth of 100 mm or greater prior to installation of the first lift of the engineered growing media. Scarification will improve the transition between soil types, facilitate movement of water and nutrients, and improve root penetration into lower soil profiles.
* The first lift of the engineered growing media shall be placed to a depth of 25 mm to 50 mm. The first lift shall be tilled into subgrade soil using a toothbar attachment on an excavator or other Owner-approved equivalent equipment in order to provide a gradual transition between the engineered growing media and subgrade soil.
* Remaining engineered growing media shall be installed in multiple lifts of 150 mm to 300 mm. A minimum of two (2) lifts is required.
* Lifts and compaction shall be repeated until the soil depth, including any organic material which has been added, meets the requirements of the final grading.
* The engineered growing media shall be compacted to between 75% and 80% of maximum dry density (Proctor).
* Installation of the engineered growing media shall be suspended if the engineered growing media becomes overly saturated, overly dry or frozen. The engineered growing media shall not be placed on wet or frozen subgrade soil.

Addition of Compost into Installed Engineered Growing Media Mix

The Contractor shall till an additional 40 mm of organic matter (compost) into the top layer of the installed engineered growing media to a depth of 60 mm to 90 mm.

As an alternative to tilling, the Contractor may also directly apply a mixture of compost and engineered growing media for the top 60 to 90 mm layer of the trench being installed provided the following requirements are met:

* The quantity of compost utilized is not altered, and is equal to the quantity that would be required for a 40 mm top dressing of compost applied to the entire trench area.
* The finished surface of a boulevard soil trench shall be smooth, uniform and firm, and be 50 to 75 mm higher than the surrounding boulevard to allow for settlement in the first year.
* ***[Include this bullet for projects with proposed planting in landscaped center median planters, boulevard planters, tree grate planters, or other enhanced planting beds outside of a boulevard soil trench for tree planting]*** The finished surface of the installed engineered growing media for other planting areas shall be 50 to 75 mm higher than the intended finished grade to allow for settlement.

Fine Grading and Boulevard Restoration

The engineered growing media shall be fine graded to eliminate rough spots or low areas and to ensure positive drainage and all areas shall be prepared by means of cultivation and subsequent raking.

Finished surfaces shall be 50 mm to 75 mm higher than the final grades to allow for settlement in the first year. All finished grades shall be smooth, uniform and firm against deep foot printing.

Once the installation is complete, the Contractor shall be responsible for the restoration of the area surrounding boulevard soil trenches, with the placement of topsoil and sod in accordance with the Contract.

Warranty Period

During the warranty period, or at such other time(s) as the Owner may deem appropriate, the Owner may inspect the engineered growing media sites and identify those areas in which grades have settled below the expected grade. Following the inspection, the Owner will supply the Contractor with a written list of areas which require additional engineered growing media. The Contractor shall remove and dispose of any existing sod or other materials, add soil and restore the area in accordance with the Specifications.

**Measurement for Payment**

Measurement for payment shall be in cubic metres (m3) of engineered growing media supplied and installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R806 Barrier for Tree Protection [New Construction]

The following Standard Drawings are applicable to the above item: NHF-400, NHF-401, NHF-402, NHF-404 and NHF-405.

This Specification shall be read in conjunction with OPSS.MUNI 801 (Apr 2018).

The Contractor shall supply and install a barrier for tree protection, including required signage as shown on Drawings. The minimum height of fence shall be 1.2 m in accordance with NHF-400.

The Contractor shall arrange a Site walk with the Owner and a representative from the Owner’s Natural Heritage and Forestry division prior to installing the barrier for tree protection. A minimum of 48 hours’ notice is required to arrange the Site walk.

The Contractor shall inspect, repair and maintain tree protection measures on a weekly basis to the satisfaction of the Owner.

**801.10.01 Barrier for Tree Protection – Item** is deleted in its entirety and replaced with the following:

**801.10.01 Barrier for Tree Protection – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment will be made as follows:

* 20% of the unit price upon satisfactory construction of the barrier
* 60% of the unit price for repairing and maintaining the barrier during construction; the actual amount to be decided by the Owner as described below
* 20% of the unit price upon satisfactory removal of the barrier

The Contractor’s repair and maintenance activities will be documented to assess the value of payment each month. Failure to repair and maintain tree protection measures to the satisfaction of the Owner may result in less than 100% payment for this item in the event that the Owner deems that the Contractor did not perform adequate repairs or maintenance.

### Item R807 Filter Sock Fiber Rolls – 600 mm [Renewal / New Construction]

### Item R808 Filter Sock Fiber Roll Check Dams – 600 mm [Renewal / New Construction]

The following Standard Drawing is applicable to Item R807: OPSD 219.120 (Nov 2021).

The following Standard Drawing is applicable to Item R808: OPSD 219.191 (Nov 2021).

This Specification shall be read in conjunction with OPSS.MUNI 805 (Nov 2021).

**805.07.02.03 Light-Duty Fibre Roll Barriers** and **805.07.05.02 Fibre Roll Flow Check Dams** are amended by the addition of the following:

These items are for the supply, installation and maintenance of filter sock fiber rolls and filter sock fiber roll check dams. Filter sock fiber rolls and filter sock fiber roll check dams shall be made from clean filter media contained in a mesh tube that can be used to filter channel flow of sediment-laden runoff.

The Owner will notify the Contractor if any filter sock fiber rolls and/or filter sock fiber roll check dams are to remain as permanent installations. Any installations not deemed to be permanent shall be removed by the Contractor.

If a filter sock fiber roll is to be left as a permanent filter, or part of the natural landscape, it may be seeded at the time of installation for establishment of permanent vegetation.

**Materials**

The filter sock fiber roll material to be used shall be a Filtrexx® SiltSoxx™ or Equivalent. If the Contractor chooses to use an Equivalent product, the Contractor shall submit to the Owner, a minimum of 14 Days prior to delivering the material to the Site, back-up documentation proving its equivalency. The back-up documentation shall include the following sock material composition information, at a minimum:

* Material type (e.g. polypropylene, HDPE, etc.)
* Mesh opening size
* Degradation characteristics (e.g. photodegradable, oxobiodegradable, biodegradable, etc.)
* Tensile strength
* Longevity (expected lifespan of the material)

**Filter Media**

Filter media shall be clean, weed free, non-invasive, natural material that, combined with the sock, is capable of meeting the minimum Testing and Performance Characteristics as set out in Table 1 below.

The filter media shall be sized such that 60% of the material is retained by a 9.5 mm sieve.

Testing shall be in accordance with ASTM D-7351-13 and ASTM D-6459-15 and shall be completed by a third-party institution or testing body approved by the Owner.

Sock material and performance characteristics shall be supported by third party scientific testing/studies approved by the Owner.

Table 1 – Testing and Performance Characteristics

|  |  |
| --- | --- |
| **Parameters** | **Minimum Requirements** |
| Total Solids Removal | 90% |
| Total Suspended Solids Removal | 75% |
| Turbidity Reduction | 60% |
| Total Silt Removal (0.002 to 0.05 mm) | 60% |
| Total Clay Removal (<0.002 mm) | 60% |
| Hydraulic Flow Through Rate  (Per Inch of Filter Sock Diameter) | 180 to 228 litres/second |
| Minimum Functional Longevity | 2 years |

The Contractor shall also obtain approval of an Equivalent product from the conservation authority, MECP, DFO, MNRF and any other applicable environmental agencies. The Contractor shall also be responsible for updating the permit drawing(s), resubmitting the application(s) and obtaining revised permit(s). Work shall not proceed until the drawings have been approved, in writing, by the Owner, conservation authority, MECP, DFO and MNRF, as applicable. Two (2) copies of the revised permit(s) and associated drawings shall be provided to the Owner within 10 Days of approval for filing and an additional copy shall be provided to the Owner’s Site office and be available for viewing at all times.

**Construction**

The standard size of filter sock fiber roll for normal protection shall be 600 mm in diameter. Filter sock fiber rolls and filter sock fiber roll check dams shall be constructed of a continuous tubular sock where possible. When breaks are required there must be an overlap at the joints of at least 1 m.

Filter media shall be blown into the sock and the sock shall be constructed in a continuous manner.

The filter sock fiber rolls and filter sock fiber roll check dams shall be anchored to the soil using wooden or T-bar stakes, where required. Stakes should be installed on the opposite side of water flow.

**Maintenance**

The Contractor shall maintain filter sock fiber rolls and filter sock fiber roll check dams in a functional condition at all times during construction. The Contractor shall inspect filter sock fiber rolls and filter sock fiber roll check dams before and after all rain or melt events. Maintenance shall include cleaning silt and debris accumulations, and repairing or replacing damaged sections as required at no additional cost to the Owner. The Contractor shall remove sediments collected at the base of the filter sock fiber rolls and filter sock fiber roll check dams when they reach 50% of the exposed height of the fiber roll, or as otherwise indicated by the Owner.

**805.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **805.09.01.01**:

**Filter Sock Fiber Roll – 600 mm**

**805.09.01 Actual Measurement** is amended by the addition of the following to the list of Items in **805.09.01.02**:

**Filter Sock Fiber Roll Check Dams – 600 mm**

**805.10 BASIS OF PAYMENT** is deleted in its entirety and replaced with the following:

**805.10 BASIS OF PAYMENT**

**Filter Sock Fiber Roll – 600 mm – Item**

**Filter Sock Fiber Roll Check Dams – 600 mm – Item**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified. Payment will be made as follows:

* 20% of the unit price upon satisfactory construction of the item
* 60% of the unit price for cleaning and maintaining the item during construction; the actual amount to be decided by the Owner as described below
* 20% of the unit price upon satisfactory removal of the item (for temporary filter sock locations) or upon completion of the Work (for permanent filter sock locations which are not removed)

The Contractor shall clean out the silt deposits if the control measures become more than 50% full at any time. The Contractor’s cleaning and maintenance activities will be documented to assess the value of payment each month. Failure to clean and maintain the control measures to the satisfaction of the Owner may result in less than 100% payment for these items in the event that the Owner deems that the Contractor did not perform adequate cleaning or maintenance.

### Item R809 Silt Barrier Socks for Catch Basin Inlet Protection [Renewal]

Under this item, the Contractor shall supply, install and maintain water permeable filter media silt socks as indicated by the Owner.

Silt barrier socks, such as Filtrexx® SiltSoxxTM (200 mm typical diameter), or an Equivalent product approved by the Owner, shall be installed at all catch basins within the Contract limits to prevent sediment created during construction from entering adjacent watercourses through the storm sewer.

The Contractor shall remove sediments collected at the base of the silt socks when they reach half the height of the silt sock. The silt socks shall be inspected weekly and after all rainfall events to ensure that they are in working order.

When construction is completed, the silt socks shall be removed from the Site and disposed of at the Contractor’s own expense.

**Measurement for Payment**

Measurement for payment shall be a count of each catch basin where silt barrier sock is installed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

## MISCELLANEOUS

### Item R901 Hydro-Vac Test Holes (Provisional) [Renewal]

Where underground utilities, sewers or watermains exist that may conflict with the proposed guide rail system or ditching works, the Contractor shall expose the underground utilities using a hydro-vac truck in advance of construction, up to a depth of 4 m. Exposure holes shall be backfilled with compacted native material.

**Measurement for Payment**

Measurement for payment shall be per hour that the hydro-vac truck is used.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R902 Expose Existing Utilities by Hydro-Vac (X m – X m deep) (Provisional) [New Construction]

If required by the Owner, the Contractor shall carry out the following work in order to locate existing utilities that may conflict with the proposed Work:

* Obtain utility clearances
* Excavate utilities using hydro-vac at the location(s) indicated by the Owner
* Record the location, elevation and other details of the exposures, and provide a written copy to the Owner
* Backfill, temporarily restore and maintain the location of the test pit until the permanent Works have been completed

The Contractor shall be responsible for disposal of the unsuitable excavated material and this work shall be included in the unit price for this item.

**Measurement for Payment**

Measurement for payment shall be a count of each utility exposed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified.

### Item R903 Unshrinkable Fill (Provisional) [New Construction]

This Specification shall be read in conjunction with OPSS.MUNI 1359 (Nov 2016).

Where adequate backfill and compaction cannot be achieved adjacent to, between or under exposed utilities, flowable fill shall be used. The Contractor shall demonstrate care in controlling volume of fill material required. Use of bond breaker (plastic sheeting) will be required where flowable fill will completely encase any utility, pipe or watermain. Unshrinkable fill shall terminate at the subgrade level.

**Measurement for Payment**

Measurement for payment shall be per cubic metre (m3) of unshrinkable fill placed.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R904 Insulate Storm Sewer [New Construction]

The following Standard Drawing is applicable to the above item: OPSD 1109.030 (Nov 2020).

This Specification shall be read in conjunction with OPSS.MUNI 1605 (Nov 2018).

The Contractor shall supply and install insulation in the sewer trench above, and along, the sides of the storm sewers in accordance with OPSD 1109.030.

The insulation materials shall be 50 mm thick, rigid extruded polystyrene foam meeting ASTM 578, Type VI, 60 PSI compressive strength (Grade HI-60 or Equivalent).

The insulation shall be placed on a well-compacted, smooth graded surface. Pipe embedment and backfill material shall be free from large stones and shall be placed on the insulation in a manner that prevents damage to the insulation. The Contractor shall store and protect the insulation material from damage at all times during construction. Vibration control may be necessary to prevent damage to the underlying storm sewer and insulation during all stages of the road construction.

**Measurement for Payment**

Measurement for payment shall be by length in linear metres (m) of insulation supplied and installed, measured horizontally over the centerline of the pipe.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R905 Well Abandonment [New Construction]

This item is for the abandonment of existing water wells located within the Contract limits as indicated by the Owner. The Contractor shall retain the services of a licensed well contractor in accordance with Reg. 903 (Wells) under the *Ontario Water Resources Act*. The MECP’s Water Supply Wells: Requirements and Best Practices guide shall be considered a minimum standard for any water well abandonment activities in the Region of York and can be found at the following link: <https://www.ontario.ca/document/water-supply-wells-requirements-and-best-practices>.

The item includes removal of casing 2 m below the final surface. The Site shall be restored to final condition.

The item also includes completion of well abandonment records as required by Reg. 903 (Wells) under the *Ontario Water Resources Act*. The well contractor shall complete the Owner’s Well Grouting / Plugging form and submit it to the Owner along with the abandonment record.

**Measurement for Payment**

Measurement for payment shall be a count of each well abandoned.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete this work as specified.

### Item R906 Remove and Re-Instate Mail and Paper Boxes [New Construction]

The Contractor shall remove all mail and paper boxes as required for the completion of the Work and shall immediately re-instate them in their permanent locations after the completion of the shouldering. Mail and paper boxes shall be re-instated on new wooden posts similar to the existing. Old wood posts shall become property of the Contractor and shall be disposed of outside the Contract limits at no additional cost to the Owner. The Contractor shall be responsible for any damage that may occur to the mail and paper boxes during construction.

**Measurement for Payment**

Measurement for payment shall be a count of each mail and paper box re-instated. Where the mail and paper boxes share the same post, the measurement shall be considered as one (1) unit.

**Basis of Payment**

Payment shall be made at the unit price and shall be full compensation for all labour, equipment and materials necessary to complete the work as specified. Payment will be made after the mailboxes have been re-instated in their permanent locations.