

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Contractor's use of premises.
- .2 Owner occupancy.
- .3 Scope of Work.

1.2 CONTRACTOR'S USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, for storage, and access.
- .2 Coordinate use of premises under direction of Owner and Engineer/Consultant.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.3 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.4 SCOPE OF WORK

ASPHALT PAVEMENT

- .1 **Bid Item No. C1.1/C2.1/C3.1:** The cost related to mobilization/demobilization of all tools, materials, and labour required to perform the work as outlined in the specifications. Specifically, it is expected that the Contractor will:
 - .1 Go beyond the minimum to ensure the safety and proper execution of public routing; ensuring temporary access to fire exits if and when they are affected as part of the work.
 - .2 Coordinate all trades to ensure the work is completed as soon as possible.
 - .3 Perform all work according to all Ministry of Labour requirements.
 - .4 Install temporary protection at all locations of work, as required to ensure safe, clean, orderly removal and disposal work and to provide protection for all property, building components, vehicles, pedestrians and occupants.
 - .5 Obtain all service and utility locates for private and public services prior to any excavations.
 - .6 Dispose of all materials at landfill site authorized by authorities having jurisdiction.
 - .7 Accept that weather conditions are considered incidental to the Work and will not be considered additional to Bid Price.
 - .8 Maintain safe access to all store entrances at all times.
 - .9 Phase work to allow the use of a minimum of half the existing parking stalls.

- .10 Provide all flagman, barriers and pylons as required to secure work areas and to provide safe access for patrons.
- .11 Perform daily and final clean-up of the work area and surrounding areas of the site.
- .12 Include for reinstating the site to its original condition or better with the approval of the Owner prior to demobilization.
- .2 **Bid Item No. C1.2/C2.2/C3.2:** An allowance is provided for obtaining third party quality assurance testing of all materials placed on site. The allowance is to include for the preparation of a report detailing testing which will be submitted to the Engineer/Consultant. Costs for this item will be reimbursed at actual cost upon submission of third party's invoice(s) in accordance with the payment submittal procedures. Additional profit and overhead will not be paid for testing.
- .3 **Bid Item No. C1.3/C2.3:** The cost to remove the existing asphalt pavement in accordance with Section 32 12 16, at the direction of the Engineer/Consultant and as delineated in Drawing D1. Specifically:
 - .1 Mill/excavate/remove the full thickness of the existing asphalt pavement and dispose of at an approved site. Site measure and confirm the area to be removed prior to starting work.
 - .2 Dress the existing surface, proof-roll, re-grade, and compact granular material, as directed by Engineer/Consultant.
- .4 **Bid Item No. C3.3:** The cost to remove the existing gravel in accordance with Section 32 12 16, at the direction of the Engineer/Consultant and as delineated in Drawing D1. Specifically:
 - .1 Mill/excavate/remove the 100mm thickness of the existing granular material pavement and dispose of at an approved site. Site measure and confirm the area to be removed prior to starting work.
 - .2 Dress the existing surface, proof-roll, re-grade, and compact granular material, as directed by Engineer/Consultant.
- .5 **Bid Item No. C1.4/C2.4:** The cost to remove the existing base in accordance with Section 32 12 16, at the direction of the Engineer/Consultant and as delineated in Drawing D1. Specifically:
 - .1 Mill/excavate/remove the 250mm thickness of the existing granular material pavement and dispose of at an approved site. Site measure and confirm the area to be removed prior to starting work.
 - .2 Dress the existing surface, proof-roll, re-grade, and compact granular material, as directed by Engineer/Consultant.
- .6 **Bid Item No. C1.5/C2.5:** The cost to remove the existing base in accordance with Section 32 12 16, at the direction of the Engineer/Consultant and as delineated in Drawing D1. Specifically:
 - .1 Supply, place, and compact fresh 250mm thickness of 19mm Crusher Run Limestone. Site measure and confirm the area to be supplied prior to starting work.
 - .2 Dress the existing surface, proof-roll, re-grade, and compact granular material, as directed by Engineer/Consultant.
- .7 **Bid Item No. C1.6/C2.6:** The cost to excavate and properly dispose of contaminated or inadequate base and/or subbase and/or subgrade at the direction of the Engineer/Consultant,

- and to supply and reinstate with new granular material in accordance with Section 32 12 16. The work performed under this item will be paid in square meters (m²). Specifically:
- .1 Once the asphalt has been removed and the base material exposed, all areas are to be proof roll at the direction of the Engineer/Consultant. Any visibly soft areas would be considered contaminated or of inadequate base, subbase and/or subgrade.
 - .2 Remove 150 mm of granular subbase and/or subgrade is to be removed from these areas and properly disposed of off site.
 - .3 Once areas of full depth removal are completed, the Engineer/Consultant will review excavated areas to determine if additional removal of contaminated subbase and/or subgrade is required.
 - .4 Supply new 150 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities.
- .8 **Bid Item No. C3.5:** The cost to excavate and properly dispose of contaminated or inadequate base and/or subbase and/or subgrade at the direction of the Engineer/Consultant, and to supply and reinstate with new granular material in accordance with Section 32 12 16. The work performed under this item will be paid in square meters (m²). Specifically:
- .1 Once the asphalt has been removed and the base material exposed, all areas are to be proof roll at the direction of the Engineer/Consultant. Any visibly soft areas would be considered contaminated or of inadequate base, subbase and/or subgrade.
 - .2 Remove 300 mm of granular subbase and/or subgrade is to be removed from these areas and properly disposed of off site.
 - .3 Once areas of full depth removal are completed, the Engineer/Consultant will review excavated areas to determine if additional removal of contaminated subbase and/or subgrade is required.
 - .4 Supply new 300 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities.
- .9 **Bid Item No. C1.7/C2.7:** The cost to supply, place and compact 25 mm of Crusher Run Limestone (19 mm) for grading as necessary, as directed by Engineer/Consultant. The work performed under this item will be paid in tonnes.
- .10 **Bid Item No. C1.8/C2.8/C3.7:** The cost to supply, place and compact HL8 Binder Course Asphalt, by machine to 60 mm (Medium Duty Pavement) compacted thickness in accordance with Section 32 12 16. The work performed under this item will be paid in square meters (m²).
- .11 **Bid Item No. C1.9/C2.9/C3.8:** The cost to supply, place and compact HL3 Surface Course Asphalt, by machine to 50 mm compacted thickness in accordance with Section 32 12 16. NB: The height of the finished surface course of HL3 asphaltic concrete should be flush with the curb at all curb cuts and surrounding pavement areas. The work performed under this item will be paid in square meters (m²).
- .12 **Bid Item No. C1.10/C2.10:** The cost to remove and reinstate asphalt speed bumps. Install new speed bump onto SS1 tack coated base course asphalt using Surface Course asphaltic concrete in accordance with Drawing 2AC12 & 2AC06. New speed bumps are to be painted yellow. While constructing the new speed bumps, asphalt to be used for speed bumps; speed bumps to be recessed 50mm (keyed into asphalt); SS1 Tack Coat between key and new speed bump, and finally asphalt Rout and provide sealant at perimeters.

- .13 **Bid Item No. C1.11/1.12/C2.11/C2.12/C3.9:** Reinstate all line markings including symbols, signs, arrows etc. in accordance with Section 32 12 18 or according to local bylaw requirements or site specific variances. If necessary, document by photograph the present lines/marks and/or to ensure new line markings and signage match existing. The cost to produce unit housing number as per the Tender document engineering drawing. The work performed under this item will be paid in Lump Sum (LS) or per unit.
- .14 **Bid Item No. C1.13/C2.13/C3.10:** Apply undiluted SS-1 emulsion (tack coat) to all of the surfaces at a rate of 0.5 l/m². Allow the tack coat to dry and place asphalt against the emulsion while it remains “tacky”. Tack coat to be applied in accordance with Section 32 12 16. The work performed under this item will be paid in square meters (m²).

DRAINAGE:

- .15 **Bid Item No. C1.14/C2.14/C3.14:** The cost to install sub-drains connected to existing catch basins as detailed in Drawing 2AC09 in accordance with Section 32 01 21. The work performed under this item will be paid by linear metre of installed sub-drain and will be full compensation for all labour, equipment and materials used.
- .16 **Bid Item No. C1.15/C2.15/C3.15:** The cost for frost treatment for each catchbasin/manhole completed as delineated in Drawing 2AC10, as per the item description. The work performed under this item will be paid as unit rate.
- .1 The work for this item will include coring (one core) of hole to facilitate connection to the catch basin and parging with concrete, all labour equipment and material necessary to raise or lower manhole and/or catchbasin frames and covers where required to meet the finished pavement grade. The work will also include the saw cutting, removal and reinstatement of the adjacent pavement structure (granular only) around the catchbasin/manhole to a distance of 1.0 m away.
- .2 The adjustments shall include the removal of all existing brick work and the installation of precast concrete interlocking adjustment sections, such as “Moduloc” or an approved alternate, as indicated on OPSD-704.01.
- .3 The cost to install sub-drains connected to existing catch basins as detailed in Drawing 2AC09 in accordance with Section 32 01 21.

CONCRETE PAVEMENT:

- .17 **Bid Item No. C1.16/C2.16/C3.6:** The cost to saw cut, remove, dispose offsite existing deteriorated curbs and, install new concrete curbs using CSA 32 MPa C-2 exposure class concrete in the areas delineated by the Engineer/Consultant and in accordance with Section 32 16 00. The cost to this item includes all necessary restoration of sodding, topsoil, grass, asphalt pavement, or interlock pavement no less than 0.5 meter.
- .18 **Bid Item No. C1.17:** Remove and dispose off localized existing concrete sidewalk and replace it with new 150mm thick concrete sidewalk with monolithic curb using CSA 32 MPa (C-2) concrete on 200mm thick compacted granular base including placement of single layer of welded wire mesh (6”x6”) or fibers. See attached Drawing #2AC15 and 2AC02-A. The work performed under this item will be paid in meter square and shall reflect full compensation for all labour, equipment and materials used.
- .19 **Bid Item No. C1.18:** The cost to excavate and properly dispose any contaminated or inadequate base and/or subbase and/or subgrade at the direction of the Engineer/Consultant, and to supply and reinstate with new granular material in accordance with Section 32 12 16. The work performed under this item will be paid in meters cubed (m³). Specifically:

- .1 Once the concrete sidewalk has been removed and the base material exposed, all areas are to be proof roll at the direction of the Engineer/Consultant. Any visibly soft areas would be considered contaminated or of inadequate base, subbase and/or subgrade.
 - .2 Remove 150 mm of granular subbase and/or subgrade is to be removed from these areas and properly disposed of off site.
 - .3 Once areas of full depth removal are completed, the Engineer/Consultant will review excavated areas to determine if additional removal of contaminated subbase and/or subgrade is required.
 - .4 Supply new 150 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities.
- .20 **Bid Item No. C1.19:** The cost to supply Supply new 200 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities, as delineated in Drawing 2AC02-B. The work performed under this item will be paid in metric tons (MT).

PROVISIONAL ITEM:

- .21 **Bid Item No. C1. 20:** Remove and dispose off existing concrete sidewalk and replace it with new 150mm thick concrete sidewalk with monolithic curb using CSA 32 MPa (C-2) concrete on 200mm thick compacted granular base including placement of single layer of welded wire mesh (6"x6") or fibers. See attached Drawing #2AC15 and 2AC02-A. The work performed under this item will be paid in meter square and shall reflect full compensation for all labour, equipment and materials used.
- .22 **Bid Item No. C1.21/C1.22:** The cost to excavate and properly dispose of contaminated or inadequate base and/or subbase and/or subgrade at the direction of the Engineer/Consultant, and to supply and reinstate with new granular material in accordance with Section 32 12 16. The work performed under this item will be paid in meters cubed (m³). Specifically:
- .1 Once the full concrete sidewalk has been removed and the base material exposed, all areas are to be proof roll at the direction of the Engineer/Consultant. Any visibly soft areas would be considered contaminated or of inadequate base, subbase and/or subgrade.
 - .2 Remove 200 mm of granular subbase and/or subgrade is to be removed from these areas and properly disposed of off site.
 - .3 Once areas of full depth removal are completed, the Engineer/Consultant will review excavated areas to determine if additional removal of contaminated subbase and/or subgrade is required.
 - .4 Supply new 200 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities.
- .23 **Bid Item No. C1. 22:** The cost to supply Supply new 200 mm compacted depth of Crusher Run Limestone (19mm) or conforming to the Granular A designation, consolidated to meet specified densities, as delineated in Drawing 2AC02-B. The work performed under this item will be paid in metric tons (MT).

OTHER:

- .24 **Bid Item No. C2.17:** Supply and install steel 6" bollard of standard height as per attached Drawing # 2AC13B and D3.

1.5 SCOPE OF WORK - APPENDIX C - UNIT PRICES

- .1 **Tender Item No. U1:** The hourly rates for labour to be applied if additional repairs are conducted that are not included in the Scope of Work.

END OF SECTION – 01 11 00

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PART 1 - GENERAL

1.1 RELATED WORK

- .1 Not used

1.2 REFERENCES

- .1 OPSD 8.09.010 – Perforated Pipe drain in granular trench and OPSD 216.03 – Asphalt and Concrete Pavement with Sub-drain, Construction Specification for Compacting.

1.3 MEASUREMENT PROCEDURE

- .1 Unless otherwise specified in the Section “Special Items”, the work performed under this Section will be paid by lineal metre of installed subdrain and will be full compensation for all labour, equipment and materials used.
- .2 Installation of subdrains in areas where the adjacent existing pavement is to be left in-place shall be paid on a lineal metre unit price, including the saw-cutting of the asphalt. Asphalt restoration will be paid under a separate item.

1.4 DEFINITIONS

- .1 Subdrains which are to be installed with the existing asphalt in-place shall include saw-cutting the existing asphalt to a neat edge before asphalt restoration is undertaken.
- .2 Common excavation: Materials of whatever nature, and partially cemented materials which can be ripped and excavated with heavy construction equipment.
- .3 Waste excavation: Material unsuitable for use in the work or surplus to requirements.

1.5 PROTECTION

- .1 Existing Buried Utilities:
 - .1 Size, depth and location of existing utilities as indicated on available plans are for guidance only; completeness and accuracy are not guaranteed.
 - .2 Prior to commencing any excavation work, notify the owner and utility authorities; establish location and state of use of buried services. Clearly mark such locations to prevent disturbance during work.
 - .3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities encountered.
 - .4 Obtain direction of owner and/or utility and Engineer before moving or otherwise disturbing utility.
- .2 Existing Surface Features:
 - .1 Protect existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks and paving located within right-of-way or adjoining properties from damage while work is in progress and repair damage resulting from work.
 - .2 Where excavation necessitates root or branch cutting of trees, do so only as approved by Engineer.

- .3 Maintain unobstructed access to fire and police appurtenances, telephone, electric, water, sewer, gas and other public utilities and private properties.
- .4 Protect open excavated area from flooding and damage from surface water run-off.

PART 2 - PRODUCT DATA

2.1 MATERIALS

- .1 Subdrain pipe shall be 100 mm diameter perforated plastic pipe, such as BIG "O" or an approved alternate.
- .2 Granular drainage material around the subdrain shall be a graded washed aggregate meeting OPSS HL 8 asphalt aggregate gradation specifications.
- .3 Filter fabric to be wrapped around the granular drainage material and subdrain shall be Terrafix 270R, or an approved alternate.

PART 3 - EXECUTION

3.1 EXCAVATION

- .1 Excavate to lines, grades, elevations and dimensions indicated on Drawings.
- .2 Saw-cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
- .3 Unless otherwise authorized by Engineer in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.
- .4 Stockpile suitable excavated materials required for trench backfill in approved location and dispose surplus and unsuitable excavated material off site.
- .5 Where required due to removal of unsuitable material or unauthorized over-excavation, bring bottom of excavation to design grade with approved material.

3.2 BACKFILLING

- .1 Use approved common or granular base-course backfill material as indicated or directed. All underground installations in pavement areas shall be backfilled with granular materials.
- .2 Backfilling around installations place material by hand under, around and over installations until 300 mm of cover is provided. Dumping material directly on installations will not be permitted.
- .3 Do not place backfill in freezing weather without written permission of Engineer.
- .4 Place backfill material in uniform layers not exceeding 150 mm in thickness up to subgrade elevation or top of trench. Compact each layer before placing succeeding layer.

3.3 RESTORATION

- .1 Clean and reinstate areas affected by work as directed.
- .2 Asphalt repairs shall not be undertaken as part of this work but shall be completed and paid for under a separate item.

- .3 The granular trench backfill shall be placed to allow the specified asphalt thicknesses in light-duty and heavy-duty areas.

END OF SECTION – 32 01 21

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 not used

1.2 MEASUREMENT PROCEDURES

- .1 The asphaltic concrete pavement will be measured and paid for in square meters of asphalt concrete actually incorporated into work, including asphalt cement and all materials, equipment and labour needed.
- .2 Granular base and subbase will be measured in tonnes of granular material accepted into the project. Payment tonnage quantity will be based on tonnage total from weigh tickets submitted to the Engineer. Tickets will only be accepted on the same day that material was placed at the site.
- .3 Removal of existing asphalt pavement will be measured and paid for in square metres of area actually removed, regardless of thickness. Payment under this item will include all operations involved in removing, hauling and disposing of asphalt off the property.

1.3 APPLICABLE PUBLICATIONS

- .1 Except where specified otherwise herein, the most recent revision of Ontario Provincial Standard Specifications as follows:
 - .1 OPSS 310, Construction Specification for Hot Mix Asphalt.
 - .2 OPSS 1010, Material Specification for Aggregates – Base, Subbase, Select Subgrade, and Backfill Material.
 - .3 OPSS 501, Construction Specification for Compacting.
 - .4 OPSS 1150, Material Specification for Hot Mix Asphalt.
 - .5 OPSS 1103, Material Specification for Emulsified Asphalt.
 - .6 OPSS 341, Construction Specification for Routing and Sealing Cracks in Hot Mix Asphalt Pavement.
 - .7 OPSS 1212, Material Specification for Hot Poured Rubberized Asphalt Joint Sealing Compound.
- .2 Except where specified otherwise herein, the most recent revision of Ministry of Transportation (MTO) test specifications as follows:
 - .1 MTO Standard Test No. LS-602, Test Method for Sieve Analysis of Aggregates.
 - .2 MTO Standard Test No. LS-264, Theoretical Maximum Relative Density of Bituminous Paving Mixtures.

1.4 PRODUCT DATA

- .1 Submit asphalt concrete mix design Consultant/Owner for review at least two weeks in advance.
- .2 Materials to be tested by independent testing laboratory when requested by Consultant or Owner.

1.5 WARRANTY

- .1 The paving work covered by this section must be repaired at no cost to the owner for a warranty period of two (2) years. The warranty will cover any defects related to material failure or deficient installation procedures, including but now limited to, de-bonding materials, settlement and cracking.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Asphalt cement: Unless otherwise specified, the asphalt cement will be PG 58-28.
- .2 Granular base and subbase material:
 - .1 Granular (see table for designation gradations)
 - .1 New crushed limestone
 - .2 To OPSS 1010
 - .3 Granular B for subbase
 - .4 Granular A for base
 - .5 Granular M for base dressing prior to asphalting

Gradation requirements Percentage Passing by Mass			
MTO Sieve Designation	Granular A	Granular B Type II	Granular M
150 mm	n/a	100	n/a
37.5 mm	n/a	n/a	n/a
26.5 mm	100	50-100	n/a
19 mm	85-100	n/a	100
13.2 mm	65-90	n/a	75-95
9.5 mm	50-73	n/a	55-80
4.75 mm	35-55	20-55	35-55
1.18 mm	15-40	10-40	15-40
300 um	5-22	5-22	5-22
150 um	n/a	n/a	n/a
75 um	2-8	0-10	2-8

Modifications to percentage passing shall be incorporated for aggregate obtained from an iron blast furnace or from a quarry.

- .3 Asphalt cement to OPSS 310.
- .4 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.
- .5 Asphalt tack coat to OPSS 310, grade SS-1.

- .6 Crack Sealant shall be hot poured Rubberized Asphalt Joint Sealant compound conforming to OPSS 1212. All dirt, loose asphalt and other foreign materials should be removed from the cracks using a compressed air lance.
- .7 HMA to meet the Minimum Marshal Stability at 60°C, with an assumed A.A.D.T. (Annual Average Daily Traffic) greater than 5000 for a:
 - .1 Surface Course **HL3 HS (High Stability) – 12,000N**
 - .2 Base Course **HL8 – 8,000N**

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Verify grades of paving area for conformity with elevations and sections before placing granular base and sub-base material.
- .2 Where areas are removed and will tie into existing, provide saw cut full depth of existing, see Joints.
- .3 Immediately following excavation, proof roll the exposed subgrade using suitable compaction equipment and place the granular materials immediately following compaction of subgrade.

3.2 PROTECTION

- .1 Provide access to buildings as required. Arrange paving schedule so as not to interfere with normal use of premises.
- .2 Protect pedestrians from excavations with appropriate signage.
- .3 Protect bottoms of excavations from softening or freezing. Should softening occur, remove softened soil and replace with Granular B, at no cost to the Owner.
- .4 Promptly remove all excavated material from site. Do not stockpile excavated materials to interfere with traffic flow at the site.
- .5 Take all measures necessary to control dust.
- .6 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 hours after placement.

3.3 SUB- BASE AND GRANULAR BASE

- .1 Excavating
 - .1 Inform Engineer in advance of excavation operations.
 - .2 Notify Engineer whenever unsuitable materials are encountered in cut sections and remove unsuitable materials to depth and extend directed.
 - .3 Maintain crowns and cross slopes to provide good surface drainage.
 - .4 Where subgrade is on transition from excavation to embankment treat ground slopes as directed by Engineer.
 - .5 Dispose of waste material off project limits at appropriate or approved sites.

- .2 Subgrade Fill
 - .1 Place granular base and sub-base material on clean unfrozen surface, free from snow and ice.
 - .2 Place granular base and sub-base to compacted thicknesses as indicated. Do not place frozen material.
 - .3 Place and compact to full width in uniform layers not exceeding 200 mm loose thickness using OPSS 501 - Construction Specification for Compacting.

3.4 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers for parking lots and driveways:
 - .1 Minimum drum diameter: 750 mm.
 - .2 Frequency of vibrations of the vibratory roller: greater than 2,200 vibrations per minute.
 - .3 Equipped with provision for automatic shutoff of vibrations before coming to a stop.
 - .4 Operating speed of steel-drum rollers: not to exceed 5 km/h and be operated in a manner to avoid undue displacement of the mix.
- .4 Haul trucks: of sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
- .5 Suitable hand tools.

3.5 ASPHALT CONCRETE PAVING

- .1 OPSS 310 governs the laying of the surface course and padding.
- .2 Obtain approval of base and primer from Consultant before placing asphalt mix.
- .3 Place asphalt mix only when base or previous course is dry and air temperature is above 5°C.
- .4 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling.
- .5 Do not place hot mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .6 Minimum 135°C mix temperature required when spreading.
- .7 Maximum 160°C mix temperature permitted at any time.

- .8 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.
- .9 Compact HMA to density between 92.0 and 97.5 % of maximum relative density (MRD) obtained with specimens prepared in accordance with MTO LS-264. Roll until roller marks are eliminated.
- .10 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.
- .11 Moisten roller wheels with water to prevent pick up of material.
- .12 Compact mix with hot tampers or other equipment approved by Consultant, in areas inaccessible to roller, with sufficient effort to obtain required density.
- .13 Prior to placing any HMA, all HMA and concrete surfaces shall be clean of all loose, broken, and foreign materials. Milled surfaces shall be swept with a power broom. The surface of a pavement upon which HMA is to be placed shall be dry at the time of HMA placement. An HMA course shall not be placed on a previously laid course until a minimum 4 hours have elapsed, following final compaction of the previous course, and the temperature of the previous course is 50°C or less.
- .14 Apply undiluted SS-1 emulsion (tack coat) to all of the prepared milled surfaces at a rate of 0.5 L/m². Allow the tack coat to dry and place asphalt against the emulsion while it remains “tacky”.
- .15 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .2 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .3 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.

3.6 JOINTS

- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
- .2 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .3 For cold joints, cut back to full depth vertical face and tack face with hot asphalt.
- .4 For multiple lifts of HMA, the width of subsequent courses shall be staggered to an offset of 150 to 300 mm so that longitudinal joints do not coincide.
- .5 When resurfacing against a rigid object, a butt joint shall be constructed by milling the existing pavement to provide an exposed vertical surface of at least 25 mm at the face of the rigid object. The milling shall be feathered out to zero over a minimum length of 1.25 m from and parallel to the exposed face of the rigid object providing a minimum of 40 mm of resurfacing material over the area of removal.
- .6 Joints between HMA pavement laid under this Contract and existing HMA courses not laid under this Contract shall be constructed as follows:

- .1 Where a binder course is placed flush against an existing HMA pavement and a butt joint is to be made, the existing pavement shall be trimmed back to form a straight vertical surface.
- .2 Where a surface course is placed flush against an existing HMA pavement, a stepped joint shall be prepared by removing the existing surface course to its full depth for a minimum length of 0.5 m and the remaining face shall be trimmed to form a straight vertical surface.
- .3 Where a binder course and surface course are not placed flush against an existing HMA pavement, the binder course shall be feathered out and the surface course shall be butt jointed by removing the existing surface course to a minimum depth of 40 mm and for a longitudinal distance not less than 3m.

3.7 TOLERANCES AND APPEARANCE

- .1 After final compaction, each course shall be smooth and true to the established crown and grade. HMA binder and surface courses shall be free from deviations exceeding 6 and 3 mm, respectively, as measured in any direction with a 3 m straight edge.
- .2 Each course after final compaction shall be of uniform texture and shall be free of defects such as segregation, fat spots, oil spills, roller marks, and any other defects. Defective areas shall be removed and replaced with HMA of the same type and compacted to the satisfaction of the Consultant.

3.8 INSPECTION AND TESTING

- .1 Inspection and testing of asphalt pavement will be carried out by independent testing laboratory as approved by Consultant/Owner.
- .2 Costs of tests will be paid under testing allowance (Lump sum). Testing invoices to be attached at invoicing without mark up. In the event of extra site visits and hours of working by the testing company should justify with the proof of work performed. Any delays, cancellations and wait occur due to contractor change in schedule will be paid by the contractor.
- .3 Asphalt pavement (Binder and Surface Course) shall be tested regularly during paving operation for compaction. The testing company shall provide the compaction test points using the site drawing or handmade sketch on the company letterhead.
- .4 The testing company site visit dates should match with contractor schedule or in case of change in schedule a proof of 48 hours' notice required by the contractor.
- .5 The testing company days of work should reflect hours on site and millage from office to site
- .6 Inspection and testing of asphalt pavement will be carried out by independent testing laboratory as approved by Consultant/Owner.
- .7 Cooperate with the Consultant and testing company by scheduling the placing and the compacting of backfill so tests can be progressively taken. Notice of any required inspection must be given 48 hours in advance.
- .8 Base and subbase course testing will include standard sieve analysis for gradation for each type placed. Random sampling of compacted layers of base courses will be completed using a Nuclear Density Gauge.

- .9 Asphalt laboratory testing will include a standard set of Marshall Property tests for each type of asphaltic concrete placed at the site, including one standard sieve analysis for gradation for each Marshall test.
- .10 Field testing of asphalt will include random sampling of compaction using a Nuclear Radiation Backscatter Gauge. If any daily average of the compaction test is below specified density, or if any single test falls below 92% of that specified, the Contractor must at their own expense have an independent testing agency extract cores for laboratory testing. If tests yield data confirming that compaction does not meet specified densities, the deficient asphalt pavement must be replaced at the Contractor's expense.
- .11 Obtain approval of subgrade by Consultant before placing granular subbase and base.

3.9 CLEAN UP

- .1 At the completion of this Work, remove any excess materials, debris and equipment from the site.
- .2 Where perimeter landscaping has been disturbed as a result of the asphalt paving work, make good with existing.
- .3 All spatter or staining on existing elements as the result of the asphalt paving work shall be removed at the Contractor's cost. Contractor shall assume responsibility of existing elements and new asphalt where solvents required to remove spatter and staining will adversely affect the elements to be cleaned.

END OF SECTION – 32 12 16

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PART 1 - GENERAL

1.1 DESCRIPTION

- .1 The works under this specification includes all labour equipment and material necessary to layout and paint the pavement markings.

1.2 MEASUREMENT PROCEDURE

- .1 Pavement marking to be measured in (linear metres).

PART 2 - PRODUCT DATA

2.1 MATERIALS

- .1 The Contractor shall provide written confirmation that the materials as installed shall be guaranteed to remain in place for a period of 2 years, while being subjected to traffic and normal summer and winter pavement maintenance procedures
- .2 Paint: types as indicated in the Master Painters Institute (MPI) Architectural Painting Specification Manual (Code – EXT 2.1A) Latex Zone/Traffic Marking, for painting system specified. All paints to be VOC compliant type paint having Eco Logo certification.

PART 3 - EXECUTION

3.1 EQUIPMENT REQUIREMENTS

- .1 Paint applicator of an approved pressure type distributor capable of applying paint in single and dashed lines and that will ensure uniform application and a positive means of shut-off.

3.2 CONDITION OF SURFACE

- .1 Pavement surface to be free from surface water, frost, ice, dust, oil, grease and other foreign materials.

3.3 APPLICATION

- .1 Pavement line markings to be laid out by the Contractor and approved by the Engineer and/or owner.
- .2 Unless otherwise approved by the Engineer apply paint only when air temperature is above 10°C and no rain is forecast. Surface of pavement must be dry and free of dirt, dust, grease and other contaminants which could be detrimental to bond.
- .3 Apply traffic paint evenly to achieve a dry thickness of 10 to 12 mils. Paint marking shall be fast-dry and not track 10 minutes after application.
- .4 Symbols and letters to conform to dimensions indicated in Uniform Traffic Control Devices of Canada.
- .5 Do not use thinner unless approved by Engineer.
- .6 Unless otherwise directed by Engineer, paint lines must be of a uniform line width of 100 mm and of uniform colour and density with sharp edges.

3.4 TOLERANCE / PROTECTION

- .1 Paint markings to be within ± 12 mm of dimensions specified.
- .2 Protect pavement markings until dry.

END OF SECTION – 32 12 18

PART 1 - GENERAL

1.1 RELATED SECTIONS

- .1 Section 32 12 16 – Asphalt Paving.

1.2 APPLICABLE PUBLICATIONS

- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- .2 Canadian Standards Association (CSA), most current revision of:
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-A23.2, Methods of Test and Standard Practices for Concrete.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with local and provincial requirements.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely.

1.4 MATERIAL CERTIFICATION

- .1 Submit to Engineer at least one week prior to concrete placement, the concrete mix design data and certification that materials meet requirements of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Concrete for Sidewalks, Curbs and Paving Slabs:
 - .1 32MPa, 40 +/-20mm slump, C-2 exposure class, max w/c 0.45, 5-8% air
- .2 Reinforcing steel:
 - .1 Deformed “Hi-Bond” grade 400 conforming with CAN/CSA-G30.18, unless indicated otherwise. All bars to have Typical Identification Patterns of Canadian Producers and standard identification requirements as shown in the RSIC Manual of Standard Practice.
- .3 Granular Material:
 - .1 Granular “B” conforming to OPSS 314 and 1010. Nominal 50 mm crushed limestone meeting gradation limits of Granular “B”. Reclaimed materials will not be acceptable unless specified otherwise.
 - .2 Granular “A” conforming to OPSS 314 and 1010. Nominal 20 mm crushed limestone meeting gradation limits of Granular “A”. Reclaimed materials will not be acceptable unless specified otherwise.

- .4 Non-staining mineral type form release agent: chemically active release agents containing compounds that react with free lime to provide water soluble soap.

PART 3 - EXECUTION

3.1 GRANULAR BASE

- .1 Obtain Consultant's approval of subgrade before placing granular base.
- .2 Place granular base material to lines, widths, and depths as indicated or to match existing.
- .3 Compact granular base to at least 98% of maximum density to ASTM D698.

3.2 PREPARATION

- .1 Obtain Consultants approval before placing concrete. Provide 48 hours' notice prior to placing of concrete.
- .2 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy anchorage; hold dowels in positions until set time has elapsed in accordance with the epoxy manufacturer's specification.
- .3 Equipment and materials capable of maintaining adequate temperature, humidity, and protection shall be available on site and be ready for operation when any concrete is placed
- .4 All dirt, chips, sawdust, water, snow, ice and other foreign matter must be removed from formed area.
- .5 Prior to placing of concrete obtain Consultant's approval of proposed method for protection of concrete during placing and curing.
- .6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature, and test samples taken.
- .7 Do not place load upon new concrete until authorized by Consultant.

3.3 FORMWORK

- .1 Fabricate and install formwork to provide straight lines and levels, consistent curves and radii of new concrete.
- .2 Forms shall be aligned and fitted to enable the new area to match the lines and levels of the existing adjacent concrete.
- .3 Coat forms with non-staining mineral type form release agent.
- .4 Obtain approval of forms before placing concrete.
- .5 Slip forming may be approved subject to evaluation of mechanical equipment proposed for use.

3.4 CONSTRUCTION

- .1 Perform cast-in-place concrete work in accordance with CAN/CSA-A23.1.
- .2 Placing Concrete

- .1 Notify the Consultant at least 48 hours before any concreting operation is to proceed, for a review of the preparations.
 - .2 Concrete shall be conveyed to the site by methods which will prevent the segregation or loss of material. Maximum time between adding mix water and complete discharge into the forms shall be 120 minutes. Exemptions to this time frame shall only be permitted with the approval by the Consultant when previously approved chemical additives are used.
 - .3 Conveying and placement equipment shall be such that when concreting has started, the depositing of concrete shall be at such a rate and of such sequence that the concrete is at all times sufficiently plastic to ensure proper bonding of successive batches.
 - .4 Internal vibrators shall be applied at the point of deposit in the areas of freshly placed concrete, allowed to sink by their own weight in the concrete until they penetrate into the previous layer of concrete. They shall be withdrawn immediately at the same rate at which they sank, moved about 300mm (12") to a new location and the process repeated. Extreme care shall be taken to ensure that internal type vibrators do not disturb the reinforcing steel or the forms.
 - .5 Plastic coated vibrators shall be used to consolidate concrete reinforced with epoxy coated bars.
 - .6 Do not place concrete when it is raining or likely to rain. If rain begins after concrete is placed and before it is set, protect with waterproof covers until set.
- .3 Cold Weather Conditions
- .1 When air temperature is at or below or forecast to be at or below 5°C, conform to the requirements of CAN/CSA A23.1 including, but not limited to the following:
 - .1 Job Preparation.
 - .2 Concrete temperature.
 - .3 Concrete Placing.
 - .4 Protection Requirements and Methods.
 - .5 Heated Enclosures.
 - .6 Protective Covers and Insulation.
 - .7 Cooling after protection.
 - .8 Cold-Weather Curing.
 - .2 All materials and equipment needed for adequate protection and curing shall be on hand and ready for use before concrete placement has started.
- .4 Hot Weather Protection
- .1 Conform to the requirements of CAN/CSA A23.1 and the recommendations of ACI Standard 305, Hot Weather Concreting.

3.5 FINISHING

- .1 Finish surfaces to within 3 mm in 3 m as measured with 3 m straightedge placed on surface.

- .2 Immediately after floating, give sidewalk and patio area surfaces a uniform broom finish to produce regular corrugations not exceeding 2 mm deep, by drawing broom in direction normal to centre line.
- .3 Install sidewalk with panels that create a 1:1 aspect ratio with width. Panels other than Expansion/Contraction and Isolation joints to be created using radius edging tool and a straight edge. Sidewalk panels not exceed 1500mm.
- .4 All edges of curbs, sidewalks and gutters with monolithic curb shall receive edging with a 10 mm radius edging tool.
- .5 If ponding occurs after completion location will be replaced at no cost to the owner.
- .6 Follow manufacturer's instructions for coloured and patterned concrete.

3.6 EXPANSION/CONTRACTION AND ISOLATION JOINTS

- .1 Expansion/Contraction and Isolation joints to be constructed by using a single layer of 12mm asphalt-impregnated fibre board.
- .2 In sidewalks install expansion/contraction joint at intervals of 4000mm. This to occur at location of a sidewalk panel.
- .3 Install isolation joints around manholes and catch basins and along length adjacent to concrete curbs, catch basins, buildings, or permanent structure.

3.7 SAWCUTTING

- .1 Install in curbs and gutters 50mm deep saw cuts a maximum of 24hrs after placement to mitigate shrinkage cracking.
- .2 Where concrete paving is required to create a patio area, saw cut a square pattern, with a maximum single dimension of 2400mm. Maintain a 1:1 aspect ratio through the field and make up differences at the perimeter panels. If the perimeter abuts entrances or patio area requires a detailed pattern appearance, request direction from Consultant.
- .3 At all Curbs and Gutters and where a sidewalk is to be sawcut, install sawcut at intervals no greater than 2400mm
- .4 When sidewalk or patio area is adjacent to curb, make joints of curb, gutters and sidewalk coincide.

3.8 CURING

- .1 Cure concrete by adding moisture continuously in accordance with CAN/CSA-A23.1 to exposed finished surfaces for at least 72 hrs after placing, or sealing moisture in by a curing compound.
- .2 Where burlap is used for moist curing, place two pre-wetted layers on concrete surface and keep continuously wet during curing period.
- .3 Apply curing compound evenly to form continuous film. In accordance with manufacturer's requirements.

3.9 MATCHING EXISTING

- .1 Where new elements tie into existing ensure levels and lines are maintained.

- .2 If new joint does not act as an Expansion/Contraction or Isolation joint, roughen surface of existing to amplitude of 6mm.
- .3 Where existing has not been terminated at a location that will be aesthetically acceptable or provide for proper matching, request direction from consultant.

3.10 BACKFILL

- .1 Allow concrete to cure for a minimum of 3 days prior to backfilling.
- .2 Backfill to designated elevations with suitable material, compact and shape to required contours as indicated or directed.

3.11 INSPECTION AND TESTING

- .1 Inspection and testing of materials will be carried out by independent testing laboratory as approved by Consultant/Owner.
- .2 Notice of any required inspection must be given 48 hours in advance.
- .3 Costs of tests will be paid under testing allowance. Testing invoices to be attached at invoicing without mark up.
- .4 Base and sub-base material testing will include standard sieve analysis for gradation for each type placed. Random sampling of compacted layers of base courses will be completed using a Nuclear Density Gauge.
- .5 Concrete laboratory testing will include a set of 3 cylinders for strength for each batch of concrete placed at the site. Field testing will also include slump and air content for each batch placed.
- .6 Field testing of base materials will include random sampling of compaction using a Nuclear Radiation Gauge.

END OF SECTION – 32 16 00

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