DIVISION 4.4
CITY OF SARNIA
DRIVEWAY AND ROADS STANDARDS

2019

DRIVEWAY AND ROADS STANDARDS

A. MATERIALS

1. HOT MIX ASPHALT (HMA)

At the preconstruction meeting, the Contractor shall submit to the City Engineer a mix design prepared by a laboratory, having the Canadian Council of Independent Laboratories Type "A" Certification, for each hot mix asphalt type to be used on a project. Each mix design shall comply with OPSS 1150.04.01.02 be carried out during the calendar year in which the paving is done and be corroborated by a five point Marshall Mix test from the same laboratory. Hot mix asphalt supplied to the project must comply with the requirements of the mix design, OPSS 1003, 1101, 1150 and be placed according to OPSS 310. The asphalt type and its thickness will be detailed in the special specifications or on the drawings or in the soils report.

Asphalt cement shall be performance graded asphalt cement according to OPSS 1101.

Aggregates for hot mix asphalt shall be according to OPSS 1003.

Reclaimed asphalt pavement (RAP) when permitted in HMA shall be according to the aggregate requirements of OPSS 1003.

2. BITUMINOUS TACK COAT

The bituminous tack coat shall be SS-1 emulsified asphalt consisting of the suitable paving asphalt diluted with an equal amount of water, as per OPSS 1103. A solution of asphalt, cut and mixed with diesel fuel, or other petroleum products, shall **not** be used. The addition of polymers or other additives after the manufacturers of emulsified asphalt shall not be permitted.

3. GRANULAR "A" AND "BII"

Granular materials will conform to OPSS 1010 and must be approved prior to use by the City Engineer and shall be supplied

and installed to his satisfaction. Granular “A” and Granular “BII” shall be 100% crushed limestone.
Each pile designated for City use will be tested to ensure conformity to OPSS 1010. At the pre-construction meeting the Contractor will submit the source of the granular material to be used on site.

4. CONCRETE

Concrete shall comply with the requirements of OPSS. MUNI 1350 and the following specific requirements:

Description	Specification
Class of Concrete	Exposure Class C-2
Min. Compressive Strength	32 MPa at 28 days
Max. W/C Ratio	0.45
Coarse Aggregate	19mm nominal size
Air Content	5 to 8%
Maximum Slump	75mm +/- 20 mm

Only ready-mix concrete will be used. Hand-mixed or volume batch concrete will not be allowed.
Contractors must possess a current, valid Certificate of Ready Mixed Concrete production Facilities. A copy of this Certificate must be provided with your submission.

Note: The City reserves the right to hire the services of a third party for concrete testing. If the test confirms compliance with the specifications the City will pay for the test. If the test indicates non-compliance, the contractor shall be responsible for the cost of the test and for replacing the material including associated costs such as removal, disposal and labour to re-set the concrete.

5. PAVEMENT MARKINGS

Pavement markings shall conform to OPSS 710 and be designed in accordance with the Ontario Traffic Manual Book 11. All markings must adhere to any provisions provided for under the Accessibility for Ontarians with Disabilities Act (AODA). All stop bars, cross walks and parking stalls shall be of the “Durable Pavement Marking” type.

B. CONSTRUCTION METHODS

1. EXCAVATION

Excavation shall be carried to the lines and grades as shown on the drawings and described in the Specifications or as directed by the City Engineer. The excavation operations shall proceed in such a manner that proper drainage of the road foundation exists at all times.

i) Preparation of Sub-grade

Prior to placing granular sub-base materials, the sub-grade shall be shaped and thoroughly compacted to conform accurately to the line, grade and cross section shown on the drawings or as specified. No fill, base course materials or concrete shall be placed on the sub-grade until approval is given by the City Engineer. If the subgrade is left exposed to the weather resulting in unacceptable subgrade, all costs to repair will be that of the Contractor.

All soft areas that show up during construction shall be excavated and filled with compacted Granular B"II". All holes, ruts and other defects in the sub-grade shall be similarly excavated, filled and compacted.

Where such soft areas are due to neglect or faulty construction practices on the part of the Contractor, this work shall be carried out at his expense.

ii) Removal of Existing Concrete and Asphalt

Existing concrete curbs and gutters, concrete sidewalks, asphalt pavement and concrete pavement and base to be removed shall be broken out and removed as required. In executing the work, every effort must be made to minimize damage to adjacent properties and services. Weights dropped from considerable height to cause fracture of pavements will not be permitted.

The Contractor will be required to replace or repair, at his own expense, any damage caused by his operations to adjacent pavement, properties and services.

All match lines between new and existing asphalt shall be constructed with a 450 mm wide X 50 mm deep milled lap joint on the existing pavement.
Material removed shall be disposed of by the Contractor unless otherwise directed by the City Engineer.

iii) Protection of Roadbed During Construction

During the construction of the roadway, the roadbed shall be well-drained at all times. Side ditches, gutters, embankments or otherwise shall be so constructed as to avoid damage by erosion. The contractor shall prevent machinery from driving over the prepared roadbed.

2. TEMPORARY ASPHALT RAMP AT CONCRETE GUTTER

Supply and place a temporary asphalt ramp along the face of the concrete gutter on base asphalt for protection from winter plow damage and building activities. The temporary asphalt ramp must be removed prior to the placement of the final lift.

3. PREPARATION OF THE SUB-GRADE AND SUB-BASE

Before placing the granular base and sub-base courses, the Contractor must ensure that the alignment, grade, cross- section compaction and drainage of the preceding sub-base or sub-grade course conforms to the requirements of the drawings and specifications and has been approved by the City Engineer.

Before placing the sub-base course, the Contractor must ensure that all services and excavations to the road base have been completed.

In no instant will base course asphalt be accepted in the event of the subbase being frozen, muddy or unstable roadbed.

4. PLACING

Tolerance for Granular “A” and “BII” are to be ± ¼” or ±7 mm. The base shall be placed on the prepared sub-grade and sub-base and compacted in layers not exceeding 100 mm after compaction. When more than one layer is required, each layer shall be shaped and compacted before the succeeding layer is placed. The granular thickness shall be specified on the drawings or contract documents.

The placing of material shall begin at the point designated by the Engineer. Placing shall be from vehicles especially equipped to distribute the material in a uniform layer or windrow. The layer shall have the required thickness. **Material shall be placed in a manner that the sub-base material will not be distributed or contaminated.**

When hauling is done over previously placed material, hauling equipment shall be routed as uniformly as possible over the entire area of previously constructed layers. Any damage to the subgrade resulting from the hauling vehicles shall be repaired at the contractor’s expense.

The Granular “BII” grades must be verified by the Engineer and compaction results approved by a Geotechnical Engineer before any Granular “A” shall be placed.

5. SPREADING

As each layer of sub-base and base course material is placed, it shall not be allowed to segregate but be maintained in a uniformly mixed condition. During the spreading and mixing, water may need to be added in the amount necessary to provide the optimum moisture content for compacting as specified. Uniformly mixed material shall be spread smoothly to a uniform thickness or in case of the top layer to the cross section shown on the drawings or specified.

6. ROLLING AND COMPACTING

Immediately following final spreading and smoothing, each layer shall be compacted to the full width by means of pneumatic tired roller or steel wheeled power rollers as specified by the

Geotechnical Engineer. Rolling shall progress gradually from the sides to the centre, parallel with the centre line of the road, and shall continue until the entire surface has been rolled. Any irregularities or depressions that develop shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform.

Along curb, manholes, headers and walls and at all places not accessible to the roller, the base material shall be tamped thoroughly with mechanical tampers. The materials shall be both bladed and rolled until a smooth even surface has been obtained. If the above does not achieve the required compaction density, it shall be the Contractor's responsibility to provide the necessary equipment, material and water to achieve the compaction required.

7. MAINTENANCE

The Contractor shall be responsible for the protection and maintenance of both sub-grade, sub-base and base courses until final acceptance of the work or placing of asphaltic paving materials. Repair, filling of pot holes, regrading, etc. as is required to make good any damage, will be at the Contractor's expense.

Some granular materials tend to retain moisture and the material may become too wet for proper acceptance as a base material. If this occurs, the Contractor shall be fully responsible for all costs of removing and replacing all Granular "BII" and Granular "A" material that, in the opinion of the City Engineer, is too wet for use as road base material.

If the Contractor elects to withdraw the wet Granular "BII" or Granular "A" material to allow it to dry, all costs involved in this operation will be the Contractor's responsibility. No extension of working days will be granted for delays in the Contractor's operations caused by waiting for wet Granular materials to dry out. Costs of any delays to other parts of the contract due to wet Granular materials shall be the full responsibility of the Contractor.

Testing and costs for testing and re-testing, if applicable, will be the responsibility of the Contactor.

8. ADJUSTING MANHOLE AND VALVE BOX COVERS

There will be some existing manhole and valve box covers to be raised or lowered by either removing brickwork, or adding pre cast concrete adjustment rings. The cost of such work shall be paid for at the unit price bid on the tender sheet for the supply and installation of manholes and gate valves

9. BITUMINOUS TACK COAT

The contractor shall furnish and evenly apply a solid black bituminous tack coat to the entire surface of the asphalt including, total face of concrete gutters, manhole frames, catch basin frames and all other surfaces against which new asphalt pacing is to be placed. The cost of supplying the material and applying the tack coat shall be included in the unit price bid for asphalt paving. See O.P.S.S Specification 310.07.02.02.

Bituminous Tack Coat may not be required on surfaces that have been prepared using cold milling or other scarified surface as approved by the City Engineer.

10. FINISHED ASPHALT AT GUTTERS

The second lift of asphalt shall be placed to an elevation of 6.5 mm (¼") ± 3.0 mm (1/8") higher than the edge of gutter where the asphalt meets the gutter.

11. ASPHALT DRIVEWAYS

For new driveways, an H.L.3 asphalt mixture shall be placed in accordance with OPSS 311 "Construction Specifications for Asphalt Sidewalk, Driveway, Boulevard and Sidewalk Resurfacing", and shall be laid to a minimum thickness of 50 mm.

Where existing driveways are to be repaired, the driveway shall be neatly saw cut in straight lines where directed by the City Engineer. The face of the existing asphalt cut and the adjoining curb or sidewalk, shall be painted a full cover layer of Tack Coat. The asphalt shall then be placed, levelled, raked and rolled in a manner acceptable to the City Engineer.

Unless otherwise indicated, 150 mm thickness of Granular “A” base and 50 mm of H.L.3 asphalt will be used.

12. DUST SUPPRESSION

The Contractor, depending on dust problems, may be required to supply and spread water or calcium chloride flakes as directed by the City Engineer.

i) Water

If water is to be used it shall be supplied by the City of Sarnia Public Works Department who will install a backflow preventer and meter on a fire hydrant. The Contractor must sign and agree to the terms of the temporary hydrant agreement. The Contractor shall use application equipment which is capable of distribution of the water in a uniform manner as approved by the City Engineer.

ii) Calcium Chloride Flakes

If Calcium Chloride Flakes are to be used, the contractor will supply and spread the calcium as per OPSS 2501 and when directed by the City Engineer at the rate of 0.5 kg per sq. m. The Calcium Chloride shall be loose dry flakes and according to CAN/CGSB 15.1. The Calcium Chloride should be delivered in moisture proof 20kg or 40 kg bags. The Calcium Chloride flakes shall be as manufactured by Dow Chemical of Canada (Dowflake Xtra) or equal. All costs for the above will be included in the appropriate tender item.

C. TESTING PROCEDURES

Testing and costs for testing will be the responsibility of the contractor.

1. HOT MIX ASPHALT (HMA)

Hot mix asphalt supplied to the project must comply with the specifications set out in Standard Specification Driveways and Roads, Materials section Hot mix asphalt. It will be the Contractor's responsibility and expense to do the quality control necessary to ensure and confirm that the hot mix asphalt complies with this specification. The Contractor's quality control will include but not be limited to the following.

Two weeks before placing hot mix asphalt, the Contractor must submit test results showing aggregate gradation and asphalt cement content from samples of each type of asphalt to be used that were taken from the asphalt plant within the most recent month of operation. These tests are to prove that the plant is producing hot mix asphalt that meets the design mix. These tests must be submitted and each asphalt approved by the City Engineer before it can be laid on the project.

During the process of placing the hot mix asphalt, random tests showing the aggregate gradation, percent air voids, asphaltic cement content and compaction will be taken from every 400 tonne lot or part lots of asphalt placed. The minimum number of the above tests will be three (3) or at least one test from each lane of the road way. Each test will include enough asphalt material to allow a full Marshall test to be done at a later date should it be required.

The above testing by the Contractor does not prevent the City from taking its own tests to ensure integrity and confirm tests arranged by the Contractor. They City will pay for only those tests which it takes on its own. All other testing and quality control will be included in the Contractor's price quoted on the tender form for the supply and placing of hot mix asphalt.

All the above testing will be done by a laboratory that has the Canadian Council of Independent Laboratories Type “A” Certification, that is qualified in asphalt testing and that is approved for this purpose by the City Engineer.
If the hot mix asphalt does not comply with City of Sarnia specifications and OPSS for materials or placing and is not free from all deficiencies and defects, then, at the Contractor’s expense, the asphalt shall be removed and replaced with asphalt that does comply and is without deficiencies and defects.

None of the top course of asphalt may be laid until testing has proved that the base course has met the material and placing specifications above, is free from all defects and deficiencies and has been approved by the City Engineer.

2. GRANULAR “A” & B”II”

Testing to prove conformity to OPSS 1010 will be at the cost of the Contractor. Specific truckloads of material when delivered and observed on site to be substandard, based on the opinion of the City Engineer, will be rejected and removed from the site immediately at no cost to the City for the material, delivery or removal. When on site quality controlled testing finds that a large portion of the delivered material is substandard then the City Engineer will determine what remedial action, the quality control testing and any additional testing will be paid for by the Contractor. See Standard Specification No. 1 Section 51.

3. CONCRETE

When concrete cylinders are tested for compression, the compressive strengths will be calculated in accordance with:

CAN/CSA-A23.1-M90 Section 17.5.7.1.
CAN/CSA-A23.1-M90 Section 17.5.7 Compression strength requirements,
CAN/CSA-A23.1-M90 section 17.5.7.1 Standard Cured Cylinders

The strength level of each class of concrete shall be considered satisfactory if the averages of all sets of three consecutive strength tests for that class at one age equal or exceed the specified strength, and no individual strength test is more than 3.5 MPa below the specified strength. These requirements shall not apply to field-cured specimens.

Compressive strength testing shall conform to CAN/CSA-A23.2-M -3C and -9C and with the following requirements:

- Only cardboard moulds shall be used to cast the test cylinders. A disc of wax paper matching the inside diameter of the cylinder mould shall be placed at the base of the cylinder mould prior to casting. The interior side walls of the cardboard mould shall be treated with a light coating of release agent to assist in the demoulding operation.
- The cylinders shall only be demoulded on the same day of testing for compressive strength.
- The load indicating mechanism of the compression testing machine shall be capable of showing load changes of 100 newtons or less.
- The minimum test requirement shall be one set of test cylinders, per supplier, per day.

4. SUBGRADE

Approval of subgrade will only be given when the degree of compaction is a minimum of 95 percent of the maximum dry density as determined by method “A” of OPSS 501.08 and the Geotechnical Engineer.

Before placing the granular on sub-base the Contractor shall proof-roll the base and be approved by the Geotechnical Engineer before placing of sub-base granulars.

5. GRANULAR SUBASE

Each layer shall be compacted to a minimum of 100% of the maximum dry density. The maximum dry density and the field density determination will be in accordance with OPSS 501.

Approval will only be given when the degree of compaction of the Granular “A” and “BII” is a minimum of 100 percent of the maximum dry density as determined by method “A” of OPSS 501.08 and the Geotechnical Engineer.