MATERIAL SPECIFICATION FOR AGGREGATES - HOT MIX ASPHALT

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1003.01 SCOPE

This specification covers material requirements for aggregates for use in hot mix asphalt (HMA).

1003.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

1003.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1003.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Material

OPSS 1001 Aggregates - General

Ontario Ministry of Transportation Publications

MTO Laboratory Testing Manual:

LS-312 Fractionation of Unextracted Reclaimed Asphalt Pavement (RAP) and Hot Mix Aggregate for Testing or Incorporation in Other Test Samples
LS-601 Materials Finer than 75 μm Sieve in Mineral Aggregates by Washing
LS-602 Sieve Analysis of Aggregates
LS-604 Relative Density and Absorption of Coarse Aggregate
LS-606 Soundness of Aggregate by Use of Magnesium Sulphate
LS-607 Percent Crushed Particles in Processed Coarse Aggregate
LS-608 Percent Flat and Elongated Particles in Coarse Aggregate
LS-609 Petrographic Analysis of Coarse Aggregate
LS-613 Insoluble Residue of Carbonate Aggregates
LS-614 Freezing and Thawing of Coarse Aggregate

LS-617 Percent Particles with Two or More Crushed Faces and Uncrushed Particles in Processed Coarse Aggregate
LS-618 Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
LS-619 Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
LS-625 Guidelines for Sampling of Aggregate Materials
LS-629 Uncompacted Void Content of Fine Aggregate
LS-703/704 Liquid Limit, Plastic Limit and Plasticity Index of Soils

ASTM International

D 4791-10 Standard Method of Test for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

D 5821-01(2006) Standard Method of Test for Determining the Percentage of Fractured Particles in Coarse Aggregate

American Association of State Highway and Transportation Officials (AASHTO)

T 176-08 Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

1003.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Air-Cooled Blast Furnace Slag means the material resulting from solidification of molten blast-furnace slag under atmospheric conditions. Subsequent cooling may be accelerated by application of water to the solidified surface.

Bench means a ledge parallel to stratigraphic bedding that in quarries forms a single level of operation above which rock is excavated from a contiguous face.

Blending Method means a production process for monitoring coarse and fine aggregates used in the mix whereby the combined materials are sampled from the cold feed stream at the HMA facility after mixing prior to the addition of liquid asphalt cement.

CCIL means the Canadian Council of Independent Laboratories.

Chip Product means an aggregate co-product from the crushing operation with 100% passing the 9.5 mm sieve, predominantly passing the 4.75 mm sieve, and retained on the 2.36 mm sieve.

Consensus Property means an aggregate property required for use in a Superpave mix.

Copper Slag means the non-metallic product resulting from the production of copper.

Duplicate Samples means two samples taken at the same time and location, one to be used for quality assurance testing and the other for referee testing.

Equivalent Single Axle Load (ESAL) means equating the damage to a pavement structure caused by the passage of a non-standard axle load to a standard 80 kN axle load.

Hot Mix Asphalt (HMA) means hot mixed, hot laid asphaltic concrete. The terms are used interchangeably. HMA may include recycled or specialty mixes.

Nickel Slag means the non-metallic product resulting from the production of nickel.

Physical Property means an inherent attribute or feature of an aggregate material. Tests are carried out to determine a material's resistance to weathering or degradation or both.

Quality Assurance (QA) means a system or series of activities carried out by the Owner to ensure that Materials received from the Contractor meet the requirements specified in the Contract Documents

Reclaimed Asphalt Pavement (RAP) means the processed HMA material that is recovered by partial or full depth removal.

Referee Testing means testing of a material property or attribute for the purpose of resolving acceptance.

Roof Shingle Tabs (RST) means ground roof shingle scrap generated when new shingles are trimmed during production.

Steel Slag means the non-metallic product resulting from the production of steel in a basic oxygen furnace or an electric arc furnace.

Stone Mastic Asphalt or Stone Matrix Asphalt (SMA) means HMA consisting of a gap-graded, stone-on-stone coarse aggregate skeleton with an asphalt binder rich mortar.

Superpave means an acronym for Superior Performing Asphalt Pavements. It is an alternative system to the Marshall method for specifying material components and asphalt mix design using the Superpave gyratory compactor.

1003.05 MATERIALS

1003.05.01 General

Aggregates shall be according to OPSS 1001, unless otherwise specified in this specification.

Aggregates may be sands, gravels, quarried rock, or the aggregate portion of RST, or the aggregate portion of RAP, provided the source is of such a nature and extent as to ensure acceptable processed aggregates of a consistent gradation and quality.

Steel slag, air-cooled blast furnace slag, nickel slag, and copper slag are not acceptable for use in HMA.

RAP containing steel slag is not permitted.

RST containing asbestos is not permitted. Post consumer shingle material is not permitted.

If one or more of the aggregates to be used in the mix requires an anti-stripping agent, then all aggregates shall be treated with the same anti-stripping agent.

When an aggregate stockpile consists of both fine and coarse aggregate in which either component is greater than 15% by mass of the total, both the fine aggregate and coarse aggregate shall meet the respective physical requirements of this specification.

When a change in the character of the aggregate occurs or when the performance of the aggregate is found to be unsatisfactory, use of those aggregates shall be discontinued until the Contractor can prove to the satisfaction of the Contract Administrator that the source remains acceptable or can be made acceptable.

For HL1,

a) Coarse aggregate shall be produced by crushing bedrock or gravel.

b) Coarse aggregate shall be supplied from sources named on the MTO pre-qualified products list.

For Superpave 12.5 FC1, a minimum of 85% of the total aggregate in the mix retained on the 2.36 mm sieve shall be produced from a source named on the MTO pre-qualified products list.

For Superpave 12.5 FC2 and DFC,

a) Coarse and fine aggregates in the mix shall be produced from crushed bedrock material supplied from a source named on the MTO pre-qualified products list.

b) Coarse aggregate may be obtained from a different source than the fine aggregate.

c) When RAP is used, the coarse aggregate portion of the RAP may be derived from a different source or sources than the rest of the coarse aggregate. In all other cases, blending of coarse aggregates from different sources is not permitted, except for the chip product.

d) Blending of fine aggregate from difference sources is permitted providing the aggregate particles retained on the 4.75 mm sieve as part of the blended fine aggregate comprise less than 20% by mass of the total amount of coarse aggregate.

For HDBC,

a) Coarse aggregates shall be produced by crushing either bedrock material, gravel, cobble, or boulder material retained on the 50.0 mm sieve.

b) Fine aggregates shall be produced by crushing either bedrock material, gravel, cobble, or boulder material retained on the 9.5 mm sieve.

c) If necessary, coarse and fine aggregates shall be processed to meet the HMA requirements specified in the Contract Documents, including washing and classification.

For SMA,

a) Coarse and fine aggregates shall be produced from crushed bedrock material supplied from sources shown in Table 1.

b) Coarse and fine aggregates shall be obtained from the same source.

c) Aggregate derived from RST may be from a source different than the rest of the aggregates for the SMA.

Irrespective of compliance or non-compliance with the physical requirements, aggregates may be accepted or rejected on the basis of documented field performance. The pavement with which satisfactory field performance is demonstrated shall have been in a similar environment and application to that in which the aggregate is proposed for use and shall be at least 10 years old. A petrographic study shall be conducted to demonstrate that the aggregate in the original pavement is the same as that under consideration. Field performance shall be determined by the Owner.

Blending of aggregates shall be permitted at the hot mix plant.

1003.05.02 Fine Aggregate

1003.05.02.01 Gradation Requirements

Fine aggregates shall be graded so that when combined with other aggregates, they consistently meet the overall gradation of the HMA specified in the Contract Documents.

1003.05.02.02 Physical Property Requirements

Fine aggregates shall be composed of clean, hard, durable particles meeting the requirements shown in Table 2, unless the blending method has been selected.

When the Contract Administrator has received a written request from the Contractor to use the blending method, acceptance for physical properties shall be based on the total combined fine aggregate. In this case the total combined fine aggregate shall meet the requirements shown in Table 2. In addition, for each individual fine aggregate component of the blend, the maximum loss shall not exceed 35%, when tested according to LS-619.

1003.05.02.03 Consensus Property Requirements

For Superpave HMA, the fine aggregate portion of the combined HMA aggregate, including aggregate derived from RAP or RST or both which has been fractionated and proportioned according to LS-312 and the mix design, shall meet the consensus property requirements of AASHTO T 176 and LS-629 shown in Table 3 for the traffic category specified in the Contract Documents. However, for AASHTO T 176 only, the combine fine aggregate portion shall exclude any fine aggregate that is derived from RAP or RST or both.

1003.05.03 Coarse Aggregate

1003.05.03.01 Gradation Requirements

Coarse aggregates shall be graded so that when combined with other aggregates, they consistently meet the overall gradation of the HMA specified in the Contract Documents.

1003.05.03.02 Physical Property Requirements

Coarse Aggregates for use in HMA binder and leveling courses shall meet the physical property requirements shown in Table 4.

Coarse aggregates for use in HMA surface courses shall meet the physical property requirements shown in Table 5.

A chip product shall also meet the appropriate physical property requirements of this specification unless:

a) the chip product is derived:

   i. for Superpave 12.5 FC2 and SMA 12.5 or SMA 9.5, from the same sources as the primary coarse aggregate used in the mix; or
   ii. for Superpave 12.5 FC1, from an aggregate source listed on the MTO pre-qualified products list; or
   iii. for all other mixes, either from an aggregate source listed on the MTO pre-qualified products list or from a coarse aggregate in the mix that meets all of the applicable physical property requirements; and

b) according to the gradation determined from the mix design, the retained 4.75 mm fraction of the chip product does not exceed 15% by mass of the total cumulative combined coarse aggregate fraction of the mix including any aggregate derived from RAP.

When the Contractor elects to sample blended coarse aggregates from the cold feed to show conformance with this specification, the blended coarse aggregate shall also meet the above requirements.

1003.05.03.03 Consensus Property Requirements

For Superpave HMA, the coarse aggregate portion of the combined HMA aggregate, including any coarse aggregate derived from RAP, which has been fractionated and proportioned according to LS-312 and the mix design, shall meet the consensus property requirements shown in Table 3 for the traffic category specified in the Contract Documents.

1003.05.04 Filler

Filler shall consist of mineral filler, hydrated lime, Portland cement, or other material as designated and currently approved by the Owner for use in HMA. For SMA, the filler shall be mineral filler. Mineral filler shall be produced from rock sources acceptable for coarse aggregates meeting the physical property requirements shown in Tables 4 and 5 for Superpave mixes. Mineral filler shall be sufficiently dry so as to flow freely, free from agglomerations, non-plastic according to LS-703/704, and meet the following gradation requirements according to LS-601 and LS-602:

a) 100% passing 600 µm sieve.

b) Not less than 70% passing 75 µm sieve.

c) Not more than 20% passing 20 µm sieve, SMA only.

1003.07 PRODUCTION

1003.07.01 Aggregate Processing, Handling, and Stockpiling

Processed aggregates shall be separated into fine and coarse aggregates and stockpiled separately.

Aggregates separated during processing, aggregate secured from different sources, and aggregates from the same source but of different gradations shall be placed in individual stockpiles. When screenings from primary and secondary crushers are produced separately, they shall be stockpiled separately.

Aggregates that have become mixed with foreign matter of any description or aggregates that have become mixed with each other shall not be used and shall be immediately removed from the stockpile.

Aggregates shall be retained in stockpiles for at least 24 hours prior to use. Suitable stockpile locations are the site of mixing of the HMA, the aggregate source, or any other location acceptable to the Contract Administrator.

1003.08 QUALITY ASSURANCE

1003.08.01 General

QA testing may be carried out by the Owner for the purposes of ensuring that the aggregates used in the work are according to the requirements of this specification. Individual test results may be forwarded to the Contractor, as they become available.

Test data for each aggregate type shall be managed independently. When more than one source is used for supplying materials, test data from each source and product shall be managed independently.

The Contractor shall elect to either:

a) Have QA sampling and testing done on a stockpile basis, when each aggregate stockpile shall meet the physical requirements; or
b) Have QA sampling and testing of the material after the cold feed bins, but before the material is mixed with liquid asphalt cement, when the combined fine aggregates and the combined coarse aggregates shall meet the physical requirements.

If the Contractor elects to use process b) above, and one or more components do not by themselves meet this specification, the Contractor shall notify the Contract Administrator and provide a production process satisfactory to the Contract Administrator.

When anti-stripping agent is used, test samples for the physical property requirements shall be taken prior to the addition of hydrated lime. If this is not practical for samples that are coated in hydrated lime, the lime may be removed by washing prior to testing. In this case, the requirements for LS-601 shall be waived.

The Owner shall be responsible for all costs associated with testing for QA purposes, unless otherwise specified in the Contract Documents.

1003.08.02 Laboratory Requirements

The Contract Administrator shall designate the QA laboratories.

An acceptable laboratory conducting tests for physical and consensus properties shall be one that holds a current Type D certificate from CCIL for the applicable test methods and also participates in the annual MTO Proficiency Sample Testing Program for the specific tests, when applicable.

An acceptable laboratory for testing gradation according to LS-602, percent crushed particles according to LS-607, and materials finer than 75 μm by washing of the aggregates according to LS-601 shall be one that holds a current Type C certificate from CCIL.

Testing shall be conducted by qualified laboratory staff that holds a current certificate from CCIL in aggregate testing.

Equal alternate laboratory and technician certifications or laboratory proficiency testing programs may be used to demonstrate similar requirements, provided that they are acceptable to the Contract Administrator.

1003.08.03 Alternative to LS-614

LS-614 shall be used for acceptance, unless written notification to the Contract Administrator to replace it with LS-606 for acceptance is received prior to sampling of the applicable materials for QA purposes. Provided the Contract Administrator has received such a request, LS-606 shall be used. Otherwise, conformance to LS-614 shall be required.

When notification is provided after QA testing using LS-614 has been initiated, the Contractor shall be charged for the cost of the testing using LS-614, administrative charges, and additional sampling, if required.

1003.08.04 Blending Method

The Contractor may select to have QA acceptance of the total combined aggregate conducted according to the blending method. The Contractor shall provide appropriate facilities and equipment for QA sampling otherwise this option shall not be available. To select this method, the Contractor shall notify the Contract Administrator in writing along with a description of the sampling facilities and equipment, prior to paving.

1003.08.05 Sampling

Sampling shall be conducted by the Contractor according to LS-625.

Duplicate samples shall be taken and sealed by the Contractor in the presence of the Contract Administrator from stockpiles at the hot mix plant or from after the cold feed at the plant, but before the addition of liquid asphalt cement. The place of sampling shall be determined by the Contractor.

Duplicate samples taken from stockpiles at the hot mix plant shall be from stockpiles that contain a minimum quantity of 500 tonnes of each aggregate for each HMA.

Duplicate samples taken from after the cold feed during production of the HMA shall be taken at a time determined by the Contract Administrator.

The mass of each sample shall meet the requirements shown in Table 6. When more than 30 kg is required, the total sample shall be recombined by the QA laboratory prior to testing.

In the event that the Contractor is unavailable to take the sample, no further materials shall be placed in the work until the duplicate samples have been taken.

The Contractor shall provide new or clean sample bags or containers that are constructed to prevent the loss of any part of the material or contamination or damage to the contents during shipment. Metal or cardboard containers are unacceptable. QA samples shall be identified both inside and outside of the sample container.

1003.08.06 Testing and Retention of Samples

When the Contract Administrator elects to carry out QA testing, one of the duplicate samples shall be randomly selected for testing by the QA laboratory and the remaining sealed sample shall be retained by the QA laboratory for possible referee testing.

Samples taken from the stockpiles shall be treated as individual samples.

Samples taken from after the cold feed shall be separated on the 4.75 mm sieve and the fine aggregate portion and the coarse aggregate portion tested as the fine or the coarse aggregate of the mix, even though a combination of aggregates may have been used in forming the fine or coarse aggregate.

1003.08.07 Acceptance

QA test results shall be used for acceptance purposes, except when referee testing has been carried out.

When QA test results show that the aggregates meet the requirements of this specification, the aggregates shall be accepted.

When QA test results show that the aggregates do not meet the requirements of this specification, the Contract Administrator shall notify the Contractor that the aggregates represented by the test results shall not be accepted. This notification shall take place in writing within 3 Business Days of receipt of the non-conforming data. The Contractor has the option of either removing the material from the work or invoking referee testing. The Contractor may request a reduced price in lieu of removal for aggregates that fail to meet the requirements of this specification. Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

1003.08.08 Referee Testing

When QA test results do not meet the requirements of this specification, the Contractor has the option of invoking referee testing of the test result that fails to meet the requirements. The Contractor shall notify the Contract Administrator of the selected option in writing within 2 Business Days following written notification of unacceptable material.

The Contract Administrator shall select a referee testing laboratory acceptable to the Contractor, within 3 Business Days following the Contractor's notification to invoke referee testing. Referee test samples shall be delivered to the referee testing laboratory from the QA laboratory by the Contract Administrator. The sealed sample shall be opened in the presence of the Contractor and the Contract Administrator.

Referee testing shall be carried out in the presence of the Contract Administrator. When applicable, the referee testing laboratory shall also test a control aggregate sample for each test method required. The Contractor may observe the testing at no cost to the Owner.

The Contractor and Owner may send a maximum of two representatives each to observe the referee testing. The Contract Administrator shall notify the Owner and Contractor a minimum of 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 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.

Comments on the non-conformity of the test methods shall be made and corrected at the time of testing.

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

When a referee test result shows that the aggregates do not meet the requirements of this specification, the material represented by the test result, including materials in existing stockpiles or in the Work, shall not be accepted. The Contractor shall remove the material from the Work at no cost to the Owner. The Contractor may request a reduced price in lieu of removal of the aggregates that fail to meet the requirements of this specification. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

When a referee test result shows that the aggregates meet the requirements of this specification, the aggregates represented by the sample shall be accepted.

The Owner shall be responsible for the cost of referee testing, provided that the referee test results show that the aggregates meet the applicable specifications. Otherwise, the Contractor shall be responsible for the cost.

TABLE 1
SMA – Coarse and Fine Aggregate Sources

Source Name	Inventory Number	Owner
Methuen Township Quarry	B02-071	MRT Aggregate Incorporated
Brockville Quarry	B15-039	Lafarge Canada Incorporated
Rosewarne Quarry	B17-013	Fowler Construction Company Limited
Bruce Mines Quarry	B22-072	Ontario Trap Rock-Bruce Mines Limited
Havelock Quarry	C01-054	Drain Brothers Excavating Limited
Marmora Quarry	C01-058	Aecon Construction and Materials Limited
Rideau Road Quarry	O05-067	R.W. Tomlinson Limited
Boyce Quarry	O05-070	Dibblee Paving and Materials Limited
Ottawa Quarry	O05-072	Aecon Construction and Materials Limited
Hawthorne Quarry	O05-155	Lafarge Canada Incorporated

TABLE 2
Physical Property Requirements for Fine Aggregates

Laboratory Test	MTO Test No.	Surface Course				Binder Course
		SMA 9.5, SMA 12.5, DFC, and Superpave 12.5 FC2	HL 1, HL 3, HL 3HS, HL 3F, and Superpave 4.75 and 12.5 FC1	HL 2, HL 4	Superpave 9.5 and 12.5	HL 2, HL 4, HL 4F, HL 8, HDBC, MDBC, SMA 19.0, and Superpave 4.75, 19.0, and 25.0
Acid Insoluble Residue, minimum % (material retained on 2.36 mm sieve only)	LS-613	--	--	--	60 (Note 1)	--
Micro-Deval Abrasion, % maximum loss, (Note 2)	LS-619	15	20	25	25	25
Plasticity Index, maximum	LS-703/704	0	0	0	0	0

Notes:

1. The requirements listed below are only applicable to surface courses placed in the area to the north and west of a boundary defined by the north shore of Lake Superior, the north shore of the St. Mary's River, the south shore of St. Joseph Island, the north shore of Lake Huron easterly to the north and east shore of Georgian Bay (excluding Manitoulin Island), along the Severn River to Washago and a line easterly passing through Norland, Burnt River, Burleigh Falls, Madoc, and hence easterly along Highway 7 to Perth and northerly to Calabogie and easterly to Arnprior and the Ottawa River:

   a) When a fine aggregate for use in a surface course mix is obtained from a gravel pit or quarry source which contains carbonate rock type (e.g., limestone and dolostone) then blending with aggregate from non-carbonate rock types shall be required to increase the soluble residue content to meet the minimum 60% requirement. The method of blending shall be uniform and shall be subject to approval by the Owner.

   b) When the fine aggregate for use in a surface course mix is obtained from a non-carbonate gravel or quarry source, blending with carbonate rock types is not permitted.

2. When the blending method has been selected, this requirement applies to the total fine aggregate blend. In addition, when the blending method has been selected, the Micro-Deval Abrasion loss for each individual fine aggregate in stockpile, prior to blending, shall not exceed 35%.

TABLE 3
Consensus Property Requirements for Superpave Aggregates (Including RAP or RST or Both)

Ontario Traffic Category (Note 1)	Fine Aggregate			Coarse Aggregate		
	AASHTO T 176, Sand Equivalent Method 1 % minimum (Note 2)	**LS-629 Uncompacted Void Content % minimum**		**ASTM D 4791 Flat and Elongated Particles, % maximum at 5:1**	**ASTM D 5821 Fractured Particles in Coarse Aggregate, % minimum** (Note 4)	
		≤100 mm (Note 3)	>100 mm (Note 3)		≤100 mm (Note 3)	>100 mm (Note 3)
A	40	-	-	-	55/-	-/-
B	40	40	40	10	75/-	50/-
C	45	45 (Note 5)	40		85/80	60/-
D	45	45 (Note 5)	40		95/90	80/75
E	50	45 (Note 5)	45 (Note 5)		100/100	100/100

Notes:

1. The Ontario Traffic Category shall be as specified in the Contract Documents.
2. When the total combined fine aggregate includes aggregate derived from RAP or RST or both, this requirement shall be met prior to blending with RAP or RST or both.
3. Denotes the depth of the top of lift below final pavement surface. If less than 25% of a layer is within 100 mm of the surface, the layer may be considered to be below 100 mm.
4. 85/80 denotes that 85% of the coarse aggregate has one fractured face and 80% has two or more fractured faces.
5. An uncompacted void content of 43% is acceptable provided that the selected mix satisfies the mix volumetrics specified in OPSS 1151.

TABLE 4
Physical Property Requirements for Coarse Aggregates – Binder Course

Laboratory Test	MTO Test No.	Superpave 4.75, 9.5, 19.0, 25.0	HL4, HL8	HDBC, SMA 19.0	MDBC
Wash Pass 75 µm sieve, % maximum loss (Note 1)	LS-601 Guideline B	1.3	1.3	1.3	1.3
Absorption, % maximum	LS-604	2.0	2.0	2.0	2.0
Percent Crushed Particles, % minimum	LS-607	--	60	--	95
Flat and Elongated Particles, % maximum at 4:1	LS-608	20 (Note 2)	20	15	15
Unconfined Freeze-Thaw, % maximum loss (Note 3)	LS-614	15	15	15	15
Particles with 2 Faces Crushed, % minimum (Note 4)	LS-617	--	--	95	80 (Note 5)
Micro-Deval Abrasion, % maximum loss	LS-618	21	21	21	21
Alternative Requirement for Unconfined Freeze-Thaw Loss, LS-614					
Magnesium Sulphate Soundness, % maximum loss	LS-606	15	15	15	15

Notes:

1. When quarried rock is used as a source of coarse aggregate, a maximum of 2.0% passing the 75 µm sieve shall be permitted.
2. For Ontario Traffic Categories D and E, Superpave 19.0 shall be 15% maximum.
3. This requirement shall be waived by the Owner when the aggregate meets the alternative magnesium sulphate soundness requirements, LS-606.
4. This only applies to HDBC and MDBC coarse aggregate crushed from gravel sources.
5. The maximum allowable amount of uncrushed particles is 5%, MDBC only.

TABLE 5
Physical Property Requirements for Coarse Aggregates – Surface Course

Laboratory Test	MTO Test No.	HL1	Superpave 12.5 FC1	HL1, DFC, SMA 9.5 and 12.5, Superpave 12.5 FC1 and 12.5 FC2			Superpave 4.75, 9.5, and 12.5	HL 3 HL 3F HL 3HS	HL4 HL 4F
				Quarry Rock					
		Gravel	Gravel	Dolomitic Sandstone	Traprock, Diabase, and Andesite	Meta-Arkose, Meta-Gabbro, and Gneiss			
Wash Pass 75 µm sieve, % maximum loss	LS-601 Guideline B	1.0	1.0	1.0	1.0	1.0	1.3 (Note 1)	1.3 (Note 1)	1.3 (Note 1)
Absorption, % maximum	LS-604	1.0	1.0	1.0	1.0	1.0	2.0	1.75	2.0
Percent Crushed Particles, % minimum	LS-607	--	--	--	--	--	--	60	60
Flat and Elongated Particles, % maximum at 4:1	LS-608	15	15	15	15	15	20	20	20
Petrographic Number (HL), maximum	LS-609	120	120	145	120	145	(Note 2)	--	--
Petrographic Examination, non-carbonate of retained 4.75 mm, % minimum	LS- 609	--	--	--	--	--	--	60 (Note 2)	60 (Note 2)
Insoluble Residue retained 75 µm sieve, % minimum	LS-613	--	--	45	--	--	--	--	--
Unconfined Freeze-Thaw, % maximum loss	LS-614	6	6	7	6	6	6 (Note 3)	6 (Note 3)	6 (Note3)
Particles with 2 Faces Crushed, % minimum	LS-617	80	--	--	--	--	--	--	--
Micro-Deval Abrasion, % maximum loss	LS-618	10	10	15	10	15	17	17	17
Alternative Requirement for Unconfined Freeze-Thaw Loss, LS-614									
Magnesium Sulphate Soundness, % maximum loss	LS-606	--	--	--	--	--	12	12	12

Notes:

1. When quarried rock is used as a source of coarse aggregates, a maximum of 2.0% passing the 75 µm sieve shall be permitted.

2. The requirements listed below are only applicable to surface courses placed in the area to the north and west of a boundary defined by the north shore of Lake Superior, the north shore of the St. Mary's River, the south shore of St. Joseph Island, the north shore of Lake Huron easterly to the north and east shore of Georgian Bay (excluding Manitoulin Island), along the Severn River to Washago and a line easterly passing through Norland, Burnt River, Burleigh Falls, Madoc, and hence easterly along Highway 7 to Perth and northerly to Calabogie and easterly to Arnprior and the Ottawa River:

   a) When the coarse aggregate for use in a surface course mix is obtained from a gravel pit or quarry source containing more than 40% carbonate rock type (e.g., limestone and dolostone) then blending with aggregate from non-carbonate rock types shall be required to increase the minimum non-carbonate rock type content of the coarse aggregate to 60%, as determined by petrographic examination (LS-609). In cases of dispute, LS-613 shall be used with minimum acid insoluble residue of 60%. The method of blending shall be uniform and shall be subject to approval by the Owner.

   b) When the coarse aggregate for use in a surface course mix is obtained from a non-carbonate source, blending with carbonate rock types is not permitted.

3. This requirement shall be waived by the Owner when the aggregate meets the alternative magnesium soundness requirements, LS-606.

TABLE 6
Field Sample Size

Material	**Minimum Mass of Field Sample** (Note 1) **kg**
Fine aggregate	15
Coarse aggregate	25
RAP	10
RST	5
Combined coarse and fine aggregate sampled from the cold feed, prior to the addition of asphalt cement.	45
Hot Mix Asphalt	25
Filler/Baghouse Fines	2

Note:

1. Individual sample containers shall hold no more than 30 kg of aggregate. When more than 30 kg is required, additional sample containers shall be used.

Appendix 1003-A, November 2013
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should be aware that OPSS 1003 includes the introduction of Superpave mixes and new physical test methods.

The designer should specify the following in the Contract Documents:

- Hot mix asphalt (HMA) type requirements. (1003.05.01)

- Storage and delivery requirements for quality assurance (QA) samples. (1003.08.02)

- Ontario traffic category using the following table as a guideline (1003.05.02.03, 1003.05.03.03, Table 3):

Superpave and SMA Design Traffic Categories by ESALs

Ontario Traffic Category	**20-Year Design ESALs** (Note 1)	**Typical Applications**
A	Less than 0.3 million	Low volume roads, parking lots, driveways, and residential roads.
B	0.3 to 3 million	Minor collector roads.
C	3 to 10 million	Major collector and minor arterial roads.
D	10 to 30 million	Major arterial roads and transit routes.
E	Greater than 30 million	Freeways, major arterial roads with heavy truck traffic, and special applications such as truck and bus climbing lanes or stopping areas.

Note:

1. Equivalent Single Axle Load (ESAL) for the projected traffic level expected in the design lane over a 20-year period, regardless of the actual design life of the pavement.

The designer should determine if the following is required and, if so, specify it in the Contract Documents:

- If the grading requirements provided in Appendix 1003-B are to be used, Appendix 1003-B needs to be invoked by reference in the Contract Documents.

- If the sampling and testing frequencies provided in Appendix 1003-C are to be used for QA purposes, Appendix 1003-C needs to be invoked by reference in the Contract Documents.

- If the payment reduction in lieu of aggregate removal provided in Appendix 1003-D is to be used, Appendix 1003-D needs to be invoked by reference in the Contract Documents.

Appendix 1003-A

- If the forms in Appendices 1003-E, 1003-F, and 1003-G are to be used for submission purposes, Appendices 1003-3, 1003-F, and 1003-G need to be invoked by reference in the Contract Documents.

The designer should be aware that fine and coarse aggregate gradations are not given in this specification. For quality control (QC) of any specific operation, the Contractor should develop an average gradation for the particular source and production facilities and control the gradation within reasonable tolerances from this average in such a way as to ensure a suitable HMA meeting the requirements of the Contract Documents. For the information of aggregate suppliers and others, the gradation requirements for fine and coarse aggregate are included in Appendix 1003-B.

The designer should be aware that quality assurance (QA) testing for purposes of ensuring material used in the Work meets the requirements of OPSS 1003 is not mandatory, unless specifically included in the Contract Documents. The designer should determine the need for QA testing based on the size and complexity of the work and specify the required frequency of QA sampling and testing (1003.08.01). Appendix 1003-C provides recommended QA sampling and testing frequencies.

The designer should be aware that in cases of high traffic volumes and high frictional demand, the use of HL1 and DFC or SMA, Superpave 12.5 FC1 and 12.5 FC2 aggregates may be necessary to give adequate frictional properties. In this case, the designer should provide a list of prequalified aggregate sources for SMA, DFC, Superpave 12.5 FC2 coarse and fine aggregates, and HL1 and Superpave 12.5 FC1 coarse aggregate. (1003.05.01)

Although this specification does not include testing for frictional properties, prequalified aggregate sources that have met specific friction property criteria may be found listed on the MTO pre-qualified products list: Designated Sources for Materials (DSM) #3.05.25 Asphalt - 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.

The designer should be aware that the use of steel slag is prohibited because of deleterious expansion associated with the hydration of lime (CaO) and periclase (MgO) within the slag. Nickel and copper slags are prohibited because of performance concerns.

The designer should be aware that blending to improve the physical properties of aggregates is not permitted by OPSS 1001, except to increase the percentage of crushed particles or decrease the percentage of flat and elongated particles. In this specification, blending of aggregates shall be permitted at the hot mix plant, provided it takes place at the cold feed and it is possible to take a sample of the blended aggregate. This permits the use of small amounts of material such as coarse crusher screenings that do not normally meet the specification, provided that the overall physical properties of the aggregate mix meet the specification. The Contractor may elect to either have quality assurance (QA) testing done on a stockpile basis, in which case each aggregate stockpile shall meet the physical requirements, or have QA testing done of the material after the cold feed bins, but before the material is mixed with asphalt cement.

The specification requires that coarse and fine aggregates for SMA be from the same aggregate source.

The designer should be aware of any additional referee testing laboratory requirements, including time lines, selection criteria, or roster for referee laboratories and include them in the Contract Documents.

The designer should be aware that the requirement for a minimum of 60% non-carbonate aggregate outlined in Table 2 and Table 5, in certain parts of the province is based on the following considerations: Carbonate aggregates due to their low resistance to abrasion polish easily under traffic, and depending on traffic volume may result in pavements with relatively differing frictional properties. In areas of the province with a predominant type of rock, siliceous or carbonate, it has been found that it is best to give consistent frictional properties to pavement surfaces.

Appendix 1003-A

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.

Appendix 1003-B, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents.

OPSS.MUNI 1003 is modified by the addition of the following gradation requirements for fine and coarse aggregates:

TABLE B-1
OPSS 1003 - Gradation for Fine Aggregate, LS-602

MTO Sieve Designation	Percent Passing by Mass				
	DFC	HL 1 and HL 3	HL 2	HL 4, HL 8, and MDBC	HDBC
9.5 mm	100	100	100	100	100
4.75 mm	85 - 100	90 - 100	85 - 100	85 - 100	95 - 100
2.36 mm	65 - 95	70 - 100	70 - 90	60 - 100	80 - 100
1.18 mm	48 - 80	50 - 90	50 - 75	34 - 90	50 - 90
600 µm	25-60	30 - 70	30 - 55	17 - 70	28 - 70
300 µm	10 - 35	15 - 40	15 - 35	9 - 40	10 - 40
150 µm	5 - 15	5 - 15	5 - 15	3 - 15	0 - 15
75 µm	0 - 6	0 - 5	3 - 8	0 - 7	0 - 5

Note:

A. The difference between the amount retained between any two consecutive sieves, excluding the 75 µm sieve shall not be less than 5%.

TABLE B-2
OPSS 1003 - Gradation for Coarse Aggregate, LS-602

MTO Sieve Designation	Percent Passing by Mass		
	HL 1, DFC, and HL 3	HL 4	HL 8, MDBC, and HDBC
26.5 mm	-	-	100
19.0 mm	-	100	90 - 100
16.0 mm	100	96 - 100	65 - 90
13.2 mm	96 - 100	67 - 86	-
9.5 mm	50 - 73	29 - 52	20 - 55
6.7 mm	-	-	-
4.75 mm	0 - 10	0 - 10	0 - 10

Appendix 1003-C, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplementary Requirements for Quality Assurance Sampling and Testing Frequencies

OPSS.MUNI 1003, Aggregates – Hot Mix Asphalt, is amended as follows:

1003.08 Quality Assurance

1003.08.01 General

The first paragraph of subsection 1003.08.01 is deleted in its entirety and replaced with the following:

QA sampling and testing shall be carried out by the Owner for the purposes of ensuring that the aggregates used in the work are according to the requirements of the Contract Documents. QA sampling and testing shall be carried out at the frequency specified in Table C-1. Individual test results may be forwarded to the Contractor as they become available.

Table C-1 is added.

TABLE C-1
Sampling and Testing Frequency for Physical and Consensus Properties, Note 1

HMA Production per HMA Type, t	**Minimum Frequency Each Aggregate Type Per Each HMA Type**
≤ 10,000	One sample.
> 10,000 (Note 2)	One sample per 10,000 tonnes.

Note:

1. Sampling and testing for consensus properties is applicable to Superpave HMA aggregates only.

2. When the quantity of material is:

   a) Less than one-half the quantity required for a sample, then that quantity shall be added to the quantity representing the previous sample.

   b) Greater than or equal to one-half the quantity required for a sample, then that quantity shall require its own sample.

Appendix 1003-D, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplementary Requirements for a Price Reduction In Lieu of Removal of Aggregates

When a tested sample of aggregates shows that the aggregates do not meet the requirements of this specification, the aggregates represented by the test result, including material in existing stockpiles or in the Work, shall not be accepted. The Contractor may request a reduced price in lieu of removal provided the applicable test results:

a) Do not exceed the requirement for LS-614, or LS-606 if it has replaced LS-614, by more than 25% of the specified value.

b) Do not exceed the requirement for LS-618 by more than 10% of the specified value.

c) Do not exceed the requirement for LS-619 by more than 15% of the specified value.

d) Meet all other requirements of this specification.

Irrespective of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

Appendix 1003-E, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents.

OPSS 1003 - HOT MIX AGGREGATE TEST DATA
PHYSICAL PROPERTIES - FINE AGGREGATE

Contract No.:	Contractor:	Contract Location:	
Testing Laboratory:		Telephone No.:	Fax No.:
Sampled By (Print Name):		Date Sampled (YY/MM/DD):	
Mix Type:		Sample Type: Stockpile [ ] Cold Feed (Blended FA) [ ]	

Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:

Note: All sources of fine aggregates used in blend should be included in the table given above.

Laboratory Test and Number	Requirement					Reference Material Results	Sample Test Results	Meets Requirement (Y/N)
	Surface Course				Binder Course			
	SMA 9.5 and 12.5, DFC, Superpave 12.5 FC2	HL 1, HL 3, HL 3HS, Supepave 4.75 and 12.5 FC1	HL 2, HL 4	Superpave 9.5 and 12.5	HL 2, HL 4, HL 4F, HL 8, HDBC, MDBC, SMA 19.0, Superpave 4.75, 19.0, and 25.0			
Acid Insoluble Residue, Minimum % retained on 2.36 mm sieve, LS-613	--	--	--	60 (Note 1)	--			
Micro-Deval Abrasion, % maximum loss, LS-619 (Note 2)	15	20	25	25	25			
Plasticity Index, Maximum, LS-703/704	0							

I hereby certify that testing has been carried out by a properly qualified/certified test technician:

Issued by:

PRINT NAME	TESTING LABORATORY REPRESENTATIVE SIGNAURE	DATE

Received by:

PRINT NAME	CONTRACT ADMINISTRATOR REPRESENTATIVE SIGNATURE	DATE

Copies to: ☐ Contract Administrator ☐ Contractor

Appendix 1003-E

Notes:

1. The requirements listed below are only applicable to surface courses placed in the area to the north and west of a boundary defined by the north shore of Lake Superior, the north shore of the St. Mary's River, the south shore of St. Joseph Island, the north shore of Lake Huron easterly to the north and east shore of Georgian Bay (excluding Manitoulin Island), along the Severn River to Washago and a line easterly passing through Norland, Burnt River, Burleigh Falls, Madoc, and hence easterly along Highway 7 to Perth and northerly to Calabogie and easterly to Arnprior and the Ottawa River:

    a) When a fine aggregate for use in a surface course mix is obtained from a gravel pit or quarry source which contains carbonate rock type (e.g., limestone and dolostone) then blending with aggregate from non-carbonate rock types shall be required to increase the soluble residue content to meet the minimum 60% requirement. The method of blending shall be uniform and shall be subject to approval by the Owner.

    b) When the fine aggregate for use in a surface course mix is obtained from a non-carbonate gravel or quarry source, blending with carbonate rock types is not permitted.

2. For blended aggregates sampled from the cold feed, the Micro-Deval Abrasion loss for each individual fine aggregate in stockpile, prior to blending, shall not exceed 35 percent.

Appendix 1003-F, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents.

OPSS 1003 - HOT MIX AGGREGATE TEST DATA
PHYSICAL PROPERTIES – COARSE AGGREGATE

Contract No.:	**Contractor:**	**Contract Location:**	
Testing Laboratory:		**Telephone No.:**	**Fax No.:**
Sampled By (Print Name):		**Date Sampled (YY/MM/DD):**	
Mix Type:	**Source Name/Location:**	**Aggregate Inventory Number (AIN):**	

HL1, DFC, SMA 9.5 and 12.5, Superpave 12.5 FC1 and 12.5 FC2									
Laboratory Test and Number	**Requirements**					**Rock Type** (Note 1)	**Test Results**		
	Gravel (G)		**Quarry Rock**						
	HL 1	**Superpave 12.5 FC1**	**Dolomitic Sandstone (D)**	**Traprock, Diabase, and Andesite (T)**	**Meta-Arkose, Meta-Gabbro, Gneiss, Granite (M)**		**Reference Material**	**Sample**	**Meets Requirements (Y/N)**
Wash Pass 75 µm sieve, % maximum loss, LS-601, Guideline B	1.0	1.0	1.0	1.0	1.0				
Absorption, % maximum, LS-604	1.0	1.0	1.0	1.0	1.0				
Flat and Elongated Particles, % maximum at 4:1, LS-608	15	15	15	15	15				
Petrographic Number (HL), Maximum, LS-609	120	120	145	120	145				
Insoluble Residue retained 75 µm sieve, % minimum, LS-613			45						
Unconfined Freeze-Thaw, % maximum loss, LS-614	6	6	7	6	6				
Particles with 2 Faces Crushed, % minimum, LS-617	80								
Micro-Deval Abrasion, % maximum loss, LS-618	10	10	15	10	15				

Superpave 4.75, 9.5, 12.5, 19.0, and 25.0, HL 3, HL 3F, HL 3HS, HL 4, HL 4F, HL 8, SMA 19.0, HDBC, MDBC										
Laboratory Test and Number	**Requirements**							**Test Results**		
	Surface Course			**Binder Course**						
	Superpave 4.75, 9.5, and 12.5	**HL 3, HL 3F, HL 3HS**	**Results**	**Superpave 4.75, 9.5, 12.5, 19.0, and 25.0**	**HL 4, HL 8**	**SMA 19.0, HDBC**	**MDBC**	**Reference Material**	**Sample Test Results**	**Meets Requirements (Y/N)**
Wash Pass 75 µm sieve, % maximum loss, LS-601-Guideline B, (Note 2)	1.3	1.3	1.3	1.3	1.3	1.3	1.3			
Absorption, % maximum, LS-604	2.0	1.75	2.0	2.0	2.0	2.0	2.0			
Percent Crushed Particles, % minimum, LS-607	--	60	60	--	60	--	95			
Flat and Elongated Particles, % maximum at 4:1, LS-608	20	20	20	20 (Note 3)	20	15	15			
Petrographic Number (HL), maximum, LS-609	Note 4	--	--	--	--	--	--			
Petrographic Examination, non-carbonate of retained 4.75 mm, % minimum, LS-609	--	60 (Note 4)	60 (Note 4)	--	--	--	--			
Unconfined Freeze-Thaw, % maximum loss, LS-614 (Note 5)	6	6	6	15	15	15	15			
Particles with 2 Faces Crushed, % minimum, LS-617 (Note 6)	--	--	--	--	--	95	80 (Note 7)			
Micro-Deval Abrasion, % maximum loss, LS-618	17	17	17	21	21	21	21			
Alternative Requirement for Unconfined Freeze-Thaw Loss, LS-614										
Magnesium Sulphate Soundness, % maximum loss, LS-606	12	12	12	15	15	15	15			

Appendix 1003-F

I hereby certify that testing has been carried out by a properly qualified/certified test technician:

Issued by:	_____	_____	_____
	PRINT NAME	**TESTING LABORATORY REPRESENTATIVE SIGNAURE**	**DATE**
Received by:	_____	_____	_____
	PRINT NAME	**CONTRACT ADMINISTRATOR REPRESENTATIVE SIGNATURE**	**DATE**

Copies to: ☐ Contract Administrator ☐ Contractor

Notes:

1. Enter the type of rock or material used in the mix as follows:

   G – gravel
   D – dolomitic sandstone
   T – traprock, diabase, andesite
   M – meta-arkose, meta-gabbro, gneiss, granite

2. When quarried rock is used as a source of coarse aggregates, a maximum of 2% passing the 75 µm sieve shall be permitted.

3. For Ontario Traffic Categories D and E, Superpave 19.0 shall be 15% maximum.

4. The requirements listed below are only applicable to surface course placed in the area to the north and west of a boundary defined by the north shore of Lake Superior, the north shore of the St. Mary's River, the south shore of St. Joseph Island, the north shore of Lake Huron easterly to the north and east shore of Georgian Bay (excluding Manitoulin Island), along the Severn River to Washago and a line easterly passing through Norland, Burnt River, Burleigh Falls, Madoc, and hence easterly along Highway 7 to Perth and northerly to Calabogie and easterly to Arnprior and the Ottawa River.

   a) When the coarse aggregate for use in surface course mix is obtained from a gravel pit or quarry source containing more than 40% carbonate rock type (e.g., limestone and dolostone) then blending with aggregate of non-carbonate rock types shall be required to increase the minimum non-rock carbonate rock type content of the coarse aggregate to 60%, as determined by petrographic examination, LS-609. The method of blending shall be uniform and shall be subject to approval by the Owner. In cases of dispute, LS-613 shall be used with a minimum acid insoluble residue of 60%.

   b) When the coarse aggregate for use in surface course mix is obtained from a non-carbonate source, blending with carbonate rock types shall not be permitted.

5. This requirement shall be waived by the Owner when the aggregate meetings the alternative magnesium sulphate soundness requirement, LS-606.

6. This only applies to coarse aggregate crushed from gravel sources.

7. The maximum allowable amount of uncrushed particles is 5%.

Appendix 1003-G, November 2013
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents.

OPSS 1003 - HOT MIX AGGREGATE TEST DATA
SUPERPAVE CONSENSUS PROPERTY REQUIREMENTS

Contract No.:	Contractor:	Contract Location:	
Testing Laboratory:		Telephone No.:	Fax No.:
Sampled By (Print Name):		Date Sampled (YY/MM/DD):	
Superpave Mix Type: 4.75 [ ] 9.5 [ ] 12.5 [ ] 12.5 FC1 [ ] 12.5 FC2 [ ] 19.0 [ ] 25 [ ]			Sample Type (Stockpile, Belt, etc.):

FINE AGGREGATES			
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:

Laboratory Test and Number		**Requirement**					**Test Result**	
		Traffic Category (Note 1)					**Sample Test Result**	**Meets Requirement (Y/N)**
		A	**B**	**C**	**D**	E		
Uncompacted Void Content, % minimum, LS-629	≤ 100 mm (Note 2)	--	40	45 (Note 3)	45 (Note 3)	45 (Note 3)		
	> 100 mm (Note 2)	--	40	40	40	45 (Note 3)		
Sand Equivalent Method 1, % minimum, AASHTO T 176 (Note 4)		40	40	45	45	50		

COARSE AGGREGATES			
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:
Source Name/Location:	Aggregate Inventory Number (AIN):	Pit (P) or Quarry (Q):	% of Mix:

Laboratory Test and Number		**Requirement**					**Test Result**	
		Traffic Category (Note 1)					**Sample Test Result**	**Meets Requirement (Y/N)**
		A	**B**	**C**	**D**	E		
Fractured Particles in Coarse Aggregate, % minimum, ASTM D 5821 (Note 5)	≤ 100 mm (Note 2)	55/-	75/-	85/80	95/90	100/100		
	> 100 mm (Note 2)	-/-	50/-	60/-	80/75	100/100		
Flat and Elongated Particles (5:1), % maximum, ASTM D 4791		--	10					

Appendix 1003-G

I hereby certify that testing has been carried out by a properly qualified/certified test technician:

Issued by:	_____	_____	_____
	PRINT NAME	**TESTING LABORATORY REPRESENTATIVE SIGNAURE**	**DATE**
Received by:	_____	_____	_____
	PRINT NAME	**CONTRACT ADMINISTRATOR REPRESENTATIVE SIGNATURE**	**DATE**

Copies to: ☐ Contract Administrator ☐ Contractor

Notes:

1. The Ontario Traffic Category shall be as specified in the Contract Documents.

2. Denotes the depth of the top lift below the final pavement surface. If less than 25% of a layer is within 100 mm of the surface, the layer may be considered to be below 100 mm.

3. A minimum uncompacted void content of 43% is acceptable provided that the selected mix satisfies the mix volumetrics specified in the Contract Documents.

4. When the total combined fine aggregate includes aggregate derived from RAP or RST or both, this requirement shall be met prior to blending with RAP or RST or both.

5. 85/80 denotes that 85% of the coarse aggregate has one fractured face and 80% has two or more fractured faces.