

# S-4 GRANULAR BASE and AGGREGATES

---

## TABLE OF CONTENTS

4.01	SCOPE OF WORK.....	1
4.02	RELATED DOCUMENTS AND REFERENCES .....	1
4.03	MATERIALS.....	1
4.04	GENERAL REQUIREMENTS .....	2
4.05	HAULING AND PLACING .....	5
4.05.	COMPACTION .....	5
4.06	COMPACTION REQUIREMENTS .....	6
4.07	FINAL ROLLING AND GRADING .....	6
4.08	MAINTENANCE OF BASE .....	6
4.09	MEASUREMENT FOR PAYMENT .....	7
4.10	BASIS OF PAYMENT .....	7

### 4.01 SCOPE OF WORK

The work shall consist of supplying, weighing, delivering, placing, and compacting as directed, select base course material of a nature that will conform to this specification.

### 4.02 RELATED DOCUMENTS AND REFERENCES

- City of Windsor General Conditions
- City of Windsor S-13,
- City of Windsor Recycled Aggregate Quality Control Program (RAQCP)
- Ontario Provincial Standards (314, 501, 1001, 1004, 1010)
- MTO Laboratory testing manual (LS-602, LS-623, LS-706, LS-704)

### 4.03 MATERIALS

Materials shall be selected or processed so as to conform to the requirements of this specification unless otherwise specified and pre approved by the City of Windsor.

S-4  
GRANULAR BASE and AGGREGATES

Like materials shall come from the same supplier and source for the entire project.

A change in supplier or source, should it be necessary must be pre- approved by the City Engineer.

#### 4.04 GENERAL REQUIREMENTS

##### 4.04.01 Granular “A”

Granular A shall be according to OPSS 1010 and satisfy all requirements of OPSS table 1 and table 2 unless otherwise directed or specified and pre-approved by the City Engineer.

##### 4.04.02 Granular “B”

Granular B shall be according to OPSS 1010 and satisfy all requirements of OPSS 1010 Table 1 and Table 2 unless otherwise directed or specified and pre-approved by the City Engineer.

##### 4.04.03 Sewer Stone

Unless otherwise directed or specified and pre-approved by the City Engineer, sewer stone shall be according to OPSS 1004 Table 1 and Table 2 for 16mm nominal size clear stone.

The gradation requirements are as follows:

<i>Sieve Designation</i>	<i>% passing</i>
<i>26.5 mm</i>	<i>---</i>
<i>19.0 mm</i>	<i>100</i>
<i>16.0 mm</i>	<i>96-100</i>
<i>13.2 mm</i>	<i>67-86</i>
<i>9.5 mm</i>	<i>29-52</i>
<i>4.75 mm</i>	<i>0-10</i>

S-4  
GRANULAR BASE and AGGREGATES

---

**4.04.04 Open Graded Drainage Layer (OGDL)**

OGDL shall be of the type specified in the contract drawings. For asphaltic or portland cement stabilized OGDL refer to City of Windsor S-41. In the case of standalone granular OGDL, the material shall satisfy the physical requirements of OPSS 1010 Table for Granular 'O'. Said material is to be comprised of 100% crushed and non-recycled material and have the following gradation:

<i>Sieve Designation</i>	<i>% passing</i>
<i>37.5mm</i>	<i>100</i>
<i>26.5mm</i>	<i>95 - 100</i>
<i>19.0mm</i>	<i>90 - 100</i>
<i>16.0mm</i>	<i>65 - 100</i>
<i>13.2mm</i>	<i>40 - 86</i>
<i>9.5mm</i>	<i>20 - 55</i>
<i>4.75mm</i>	<i>0 - 10</i>
<i>2.36mm</i>	<i>0 - 5</i>
<i>75um</i>	<i>0 - 2</i>

Granular OGDL shall be placed in the location and at the thickness and grade specified in the contract documents and be consolidated by means of a smooth drum roller so as to satisfy the finished grade tolerances of this specification.

**4.04.05 Reclaimed / Recycled Aggregate**

The use of recycled materials will not be permitted for road base or any frost susceptible application without specific source and stockpile control and written pre approval from the City Engineer.

All material produced of a reclaimed or recycled source shall be according to OPSS 1010 and The City of Windsor Recycled Aggregate Quality Control Program ( R.A.Q.C.P)

All of the requirements of The City of Windsor Recycled Aggregate Quality Control Program (R.A.Q.C.P.) must be completely satisfied, including all testing, analysis, remedial actions, paperwork, and approvals prior to delivery of any reclaimed aggregate whatsoever.

S-4  
GRANULAR BASE and AGGREGATES

---

Prior to the use of recycled aggregate materials on any project, the following procedures are to be implemented :

- A) Application to use recycled aggregate is completed and submitted to the Field Services Office.
- B) The City of Windsor will no longer require Bill of Lading Tickets.
- C) Environmental testing (leach ate) to be submitted for approval annually per source pile under procedures for leach ate extraction in Regulation 309 of the Environmental Protection Act. If addition material is added to the tested stockpile or a new stockpile is generated, a new submission and approval will be required.
- D) Sieve analysis testing, percent asphalt coated particles and plasticity index analysis shall be submitted for approval from the stockpile specifically for that project.

Any reclaimed material delivered without such approval will be immediately removed from the project at the contractor's expense.

The gradation requirements for City of Windsor 0-75 mm recycled shall be:

<i>Sieve Designation</i>	<i>% passing</i>
<i>75.0mm</i>	<i>100</i>
<i>50.0mm</i>	<i>80-100</i>
<i>37.5mm</i>	<i>68-95</i>
<i>26.5mm</i>	<i>50-90</i>
<i>16.0mm</i>	<i>34-80</i>
<i>9.5mm</i>	<i>28-75</i>
<i>4.75mm</i>	<i>20-55</i>
<i>1.18mm</i>	<i>10-40</i>
<i>300um</i>	<i>5-22</i>
<i>75um</i>	<i>0-10</i>

The only physical requirements that apply to recycled aggregate shall be:

- 1. Plasticity Index (LS-704) required.
- 2. Asphalt Coated Particles (LS-621) required.
- 3. Percent Crushed (LS-607) when requested.

S-4  
GRANULAR BASE and AGGREGATES

---

All delivered suspect materials will be refused. Any load of recycled material may be rejected in the field based on visual detection of deleterious materials. Such a rejection will result in the requirement for additional testing of the source stockpile.

The Ministry of the Environment may be notified by the he City of Windsor of the location of any reclaimed aggregates not classified as inert and recyclable by Ontario Regulation 347.

#### **4.05 HAULING AND PLACING**

It is the responsibility of the contractor to consistently deliver the approved granular material to the work site in an appropriate manner and with suitable equipment and to deposit it there in such a way that no contamination or segregation takes place.

Delivered material may be placed directly into the work or be stockpiled on site for use but should not be moved excessively.

All road base material shall be placed in uniform lifts not more than 300mm thick (after compaction) and according to plan grades.

All granular trench backfill shall be placed in uniform lifts not more than 1.0 m thick (after compaction)

The underlying lifts must be completely and uniformly compacted, be free of contaminants and approved by the City Engineer prior to placement of additional material.

Material shall be free of frost and frozen clumps.

Material shall not be placed on frozen material or ground.

Material shall not be transported to the site in a state of excessive moisture.

Any material so compromised may be subject to removal or other remedial action at the contractors' expense on the instructions of the City Engineer under GC 5.03

#### **4.05. COMPACTION**

The rate of placing material shall be controlled by the contractor's ability to achieve the required degree of compaction.

The type of compaction equipment used shall be suited to the material, degree of compaction required and space available.

Water for the purpose of compaction shall be according to OPSS 506 and free be of any contaminants that would adversely affect the material or the environment unless pre-approved and accepted by the City of Windsor (in the case of brine).

S-4  
GRANULAR BASE and AGGREGATES

---

The contractor shall be aware that the cost of any water used in compaction is to be included in the Unit Price bid in the Form of Tender.

All road base material shall be placed and graded in uniform lifts not more than 300mm thick (after compaction) and is to be compacted to its target density over its entire depth and cross section and approved prior to placement of subsequent lifts or pavement structures.

#### **4.06 COMPACTION REQUIREMENTS**

The frequency and locations of compaction tests shall be determined by the City Engineer.

The degree of compaction of granular base materials shall be specified in the contract and will be measured by means of a portable nuclear density gauge that satisfies the requirements of OPSS 501.06.03

Target densities for compaction tests shall be determined by:

1. A specified percentage of a standard proctor density as determined by MTO LS-623 and LS-706
2. A density achieved through the completion of a test strip as per OPSS 501.07.04.01  
When a test strip is required the contractor will facilitate the equipment and personnel as required and at no cost to the City of Windsor in accordance to City of Windsor GC 5.02

#### **4.07 FINAL ROLLING AND GRADING**

Once overall material thickness has been attained, the surface shall be further shaped and compacted so as to be smooth, true to proposed grade and be free from ruts or waves.

The tolerance for the finish granular grade shall not be more than 10mm at any place along a 3.0m straight edge in any direction except across the crown or at design grade changes.

Any area of the granular base that is found to be soft and yielding or is comprised of segregated or contaminated material shall be removed and replaced with suitable material to the satisfaction of the City Engineer.

#### **4.08 MAINTENANCE OF BASE**

It is the sole responsibility of the contractor to completely maintain the base course to the required cross section, free from ruts, potholes, segregation, contamination or any adversities and at the required level of compaction until pavement or structure is placed.

The City of Windsor will incur no costs or responsibilities associated with final grade base maintenance.

S-4  
GRANULAR BASE and AGGREGATES

---

Final acceptance of the base course is at the authority of the City Engineer and will immediately precede paving.

Any pavement or structure placed on a base course without expressed City Engineer approval is subject to removal at the contractor's expense.

#### **4.09 MEASUREMENT FOR PAYMENT**

Measurement for payment of selected Granular Base Course Material will only be made of those materials acceptable for use under this specification.

The unit of measurement will be that as provided for in the tender.

#### **4.10 BASIS OF PAYMENT**

In the case where quantities are based on weight tickets collected at delivery, The City Engineer reserves the right to monitor the supply of the material and through a theoretical calculation, make quantity adjustment based on the outcome of that review. Such calculation can include delivered granular material densities and water content.

Payment will be made at the unit prices bid on the Tender and for the quantities determined by the applicable method of measurement.

Such payment shall constitute full compensation for supplying, weighing, and hauling the material; for placing, spreading, blading, compacting, maintaining, and any other cause whatsoever for all work performed in connection with the supply of the materials and any other incidentals necessary to complete the items that are not herein specified for payment otherwise.