DIVISION 3 - AGGREGATE		
Section 03001	Supply of Aggregates	03001_Dec22_2009.pdf
Section 03005	Granular Base Course	03005_Dec22_2009.pdf
Section 03010	Granular Sub-base Course	03010_Dec22_2009.pdf
Section 03015	Stockpiling Aggregates	03015_Jan04_2005.pdf
Section 03020	Testing and Inspection	03020_Jan04_2005.pdf
Section 03050	Hand Placed, Grouted and Random Riprap	03050_Jan04_2005.pdf

INDEX

03001-1 DESCRIPTION

Work under these specifications shall include the supplying, processing, stockpiling, loading, hauling and dumping or spreading of granular material meeting the requirements shown for each classification. Delivery shall be to anywhere within the City of Saskatoon.

03001-2 REFERENCE TO STANDARD SPECIFICATIONS

Reference in these Specifications will be made to the latest edition of the American Society for Testing Materials (A.S.T.M.) and Canadian Standards Association (C.S.A.) covering aggregate and methods of testing aggregates.

03001-3 MATERIALS

3.1 General

3.1.1 Source

The source of the aggregate shall be the locations specified in Schedule "E" - List of Production Locations in the Tender Form or alternate locations acceptable to the Engineer.

3.1.2 Composition

The aggregate shall consist of fragments of durable rock, free from undesirable quantities of soft or flaky particles, shale, loam, vegetation or other deleterious material.

3.1.3 Moisture Content

Except when moisture control is specified, aggregate moisture content (by dry aggregate weight) shall be in the following ranges:

- Maintenance Base Aggregate, 3-6%;
- Dry Maintenance Base Aggregate, 0-3%;
- Street Sanding aggregate, 0 - 4%
- for all other aggregates, 0 - 5%

When moisture control is specified it shall be carried out as a part of processing and stockpiling, and shall be included in the unit costs. Such aggregate (moisture control specified) shall, at time of delivery to site, have a moisture content in the range of 1.5% below optimum to 0.5% above optimum.

All aggregate delivered to the job site, having a moisture content greater than specified in 3.1.3 will be subject to a price adjustment from the contract unit price. The price reduction will be $0.50 per percent moisture for street sand, and $0.40 per tonne per percent moisture for all other aggregate over the maximum specified.

Example 1 – Street Sand

For 2,000 tonnes street sanding aggregate with a moisture content of 6% would be:

Actual	Difference	Rate Reduction
6.0%	6.0% - 4.0% = 2.0%	2,000t x $0.50/t/% x 2% = $2,000.00

Example 2 – Moisture Control

City orders 2,000 tonnes of base aggregate to be supplied at

optimum moisture content (use 7.2%), the corresponding payment reduction for material delivered with a moisture content of 8.0% and 4.9% would be:

Actual	Allowable Difference
8.0%	7.2% + 0.5% = 7.7%
	Rate Reduction 2,000t x (8.0%-7.7%)*$0.40/t/% = $240.00
4.9%	7.2% - 1.5% = 5.7%
	Rate Reduction 2,000t x (5.7%-4.9%)*$0.40/t/% = $640.00

3.1.4 Existing Stockpiles

Material stockpiled by the Contractor both prior to and after the award of the Contract will not be accepted unless:

1. testing was carried out by an approved Testing Agency at the minimum frequency specified in Section 3.3.1.

2. test results indicate the material meets current specifications and is uniform throughout the stockpile, and;

3. random testing by the City at time of delivery confirms the quality of the material.

3.2 Classification

3.2.1 Subbase Aggregate

Subbase aggregate shall be uniformly graded between the following limits:

Sieve Designation	Percent by Weight Passing
50 mm	100
25 mm	75-100
12.5 mm	52-100
5 mm	30-75
2 mm	20-55
400 μm	8-30
71 μm	3-15

The Plasticity Index of the material passing the 400 um sieve shall not exceed 6.

The organic content of the material passing the 5 mm sieve shall not exceed 3.0% by weight.

The material, when compacted to 100% of the maximum density as determined by the Standard Proctor Compaction Test, shall have a minimum CBR of 25 in the unsoaked condition at 0.1" or 0.2" penetration, whichever is greater (ASTM D1883).

3.2.2 Base Aggregate

Base aggregate shall consist of a homogenous mixture of crushed gravel, sand filler and clay binder with a maximum organic content of 1.0% by weight, and shall be uniformly graded between the following limits:

Sieve Designation	Percent by Weight Passing
25 mm	100
18 mm	87-100
12.5 mm	72-93
5 mm	45-77
2 mm	29-56
900 μm	18-39
400 μm	13-26
160 μm	7-16
71 μm	6-11

At least 50% by weight of the material retained on the 5 mm sieve shall have one or more fractured faces created by the crushing operation. The organic content of the material passing the 5 mm sieve shall not exceed 3.0% by weight.

The material, when compacted to 100% of the maximum density as determined by the Standard Proctor Compaction Test, shall have a minimum CBR of 65 in the unsoaked condition at 0.1" or 0.2" penetration whichever is greater (ASTM D1883).

3.2.3 Asphalt Aggregate

Specifications for all types of asphalt aggregate are contained in the Asphalt Specifications Section 04010 "Asphalt Mix".

3.2.4 Street Sanding Aggregate

Street sanding aggregate shall consist of clean, hard, durable particles free from clay, loam and other objectionable material.

The aggregate shall contain a minimum 25% crushed and/or angular aggregate particles (by weight) retained on the 2.5mm plus sieve.

The aggregate shall be free from frozen lumps under all weather conditions. It will be the Contractor's responsibility to protect his stockpiles from excessive moisture, to waste frozen material, or to take whatever steps necessary to meet this requirement.

Street sanding aggregate shall meet the following grading limits:

Sieve Designation	Percent by Weight Passing
9 mm	100
5 mm	87-95
2.5 mm	50-70
900 um	25-40
400 um	7-22
160 um	0-5
71 um	0-3

The minimum street sanding aggregate requirements are to be met by October 1st.

Sieve analysis and moisture content testing will be performed on samples obtained from the conveyor prior to processing with salt or liquid de-icer. The following payment adjustments for street sand will apply as follows:

a) More than 3% passing by weight on the 71µm sieve

% Passing by Weight	Payment
0% to ≤ 3.2%	100%
> 3.2% to ≤ 3.9%	90%
> 3.9% to ≤ 5.0%	80%
> 5.0% to ≤ 6.0%	70%
> 6.0%	0%

b) Less than 100% passing by weight on the 9mm sieve (these adjustments can be applied to samples taken at point of deliver with or without de-icer additives.

% Passing by Weight	Payment
≥ 99.5%	100%
> 99.0% to < 99.5%	90%

> 98.0% to ≤ 99.0%	80%
≤ 98.0%	0%

c) Material meeting specifications for percent passing the 9mm and 71 µm sieve, but out of specification on any other sieve size. A payment reduction of $0.10/tonne will be assessed against all of the material processed that day.

3.2.5 Concrete Aggregate

Specifications for concrete aggregate are contained in Concrete Specifications Section 06005 "Ready Mixed Concrete".

3.2.6 Plaster Sand

The aggregate shall consist of fine granular material composed of hard, strong, durable mineral particles which are free of injurious amounts of saline, alkaline, organic or other deleterious substances.

The grading shall be from fine to coarse within the following limits:

Sieve Designation	Percent by Weight Passing
5 mm	100
2.5 mm	95-100
1.25 mm	85-96
630 µm	68-93
280 µm	27-79
160 µm	0-59
71 µm	0-9

3.2.7 Pipe Bedding Aggregate

Pipe bedding aggregate shall conform to the following gradation:

Sieve Designation	Percent by Weight Passing
19.00 mm	100
12.50 mm	25-100
4.75 mm	45-70
2.00 mm	28-50
850 µm	18- 36
425 µm	12- 26
150 µm	7- 15
75 µm	5- 10

3.2.8 Crushed Rock

Crushed rock shall be composed of fragments of durable rock, free from undesirable quantities of soft or flaky particles, shale, loam and other deleterious material.

The material shall conform to the following grading limits:

Sieve Designation	Percent by Weight Passing
50 mm	100
25 mm	0-80
12.5 mm	0-18
5 mm	0-12
71 µm	0-5

At least 50% by weight of the material retained on the 5 mm sieve shall have one or more fractured faces created by the crushing operation. Crushed rock shall be delivered as required to one of the City of Saskatoon material reclamation yards, or, if so directed by the Engineer, to the City Yards, or other alternate location.

3.2.9 Pit Run

Shall be of durable aggregate free from deleterious material such as roots, grasses, and topsoil and have a top size of no greater than 150 mm and have a minimum of 35% by weight retained on the plus 5 mm sieve.

3.2.10 Non-Shrink / Unshrinkable Fill

Non-shrink/unshrinkable fill shall conform to the following specifications:

- 28 day Compressive Strength - 0.30 to 0.50 MPa.
- Strength after 24 hours - a minimum of 0.07 MPa.
- Binder - Type 10 Portland Cement - minimum 30 Kg per cubic metre.
- Air entrainment - 5% to 8%.
- Slump - 150 mm to 200 mm.
- Aggregate shall be a type used for concrete, consisting of clean, hard durable stone or gravel free from lumps, soft and flaky particles, organic matter, salt, alkali and adherent coatings. No more than 10% by weight of the aggregate shall be finer than passing the 75 µm sieve.

3.2.11 Bedding Sand

The aggregate shall consist of fine granular material composed of hard, strong, durable mineral particles which are free of injurious amounts of saline, alkaline, organic or other deleterious substances.

The grading shall be from fine to coarse within the following limits:

Sieve Designation	Percent by Weight Passing
5 mm	95-100
2.5 mm	80-100
1.25 mm	50-85
630 μm	25-60
280 μm	10-30
160 μm	0-15
71 μm	0-5

3.3 Testing

3.3.1 Tests and Frequency

All tests shall be carried out in accordance with current ASTM or CSA Standards. Test frequencies shall apply both to production (quality control) and to delivery (quality assurance).

Material	Minimum Frequency of Test	Test Required
Base and subbase	Every 2,000 tonnes	1. Wash Sieve Analysis 2. Percentage Crush 3. Moisture Content
	Every 6,000 tonnes	1. Standard Proctor 2. CBR Value 3. Plasticity Index 4. Organic Content
Sanding Aggregate	Every 1,000 tonnes	1. Wash Sieve Analysis 2. Moisture Content
Plaster Sand	Every 200 tonnes	1. Wash Sieve Analysis
Pipe Bedding Sand	Every 2,000 tonnes	1. Wash Sieve Analysis
	Every 6,000 tonnes	1. Organic Content
Crushed Rock	Every 2,000 tonnes	1. Wash Sieve Analysis

3.3.2 Testing Services

Sampling and laboratory testing will be conducted by an agency appointed by the City. Copies of all test results will be made available to the Contractor.

In addition, the Contractor may choose to employ his own testing agency at his cost. However, in the event of a discrepancy between test results, those obtained by the City's testing agency will govern.

3.3.3 Notification

The Contractor shall notify the Engineer at least one working day prior to the commencement or the resumption of aggregate production. Whenever possible, sampling will be done from the crusher belt.

3.3.4 Costs

The Contractor shall bear the cost of sampling and testing material in the following situations:

1. Initial testing to bring production into specification requirements.
2. Testing as above when source of material is changed.
3. Retesting of material which failed to meet specifications.

Testing for 1 and 2 may be conducted by the Contractor's agency. If the City conducts the testing, the costs will be deducted from any subsequent progress payments.

The cost of other testing initiated by the City during production will be borne by the City. No compensation will be made to the Contractor for testing initiated by the Contractor during current or previous production.

3.3.5 Sieve Analysis

The gradation of the material, when plotted on a semi-log grading chart, shall appear as a smooth curve within the specified band.

The average of the results of any 5 consecutive Wash Sieve Analysis Tests on material sampled at the crusher belt, or any 2 consecutive Wash Sieve Analysis Tests on material sampled at the delivery location, shall be within the grading limits specified for that material. Failure to meet this requirement shall result in the rejection of the material.

3.4 Enforcement of Specifications

Delivery of material to City locations will not be permitted until test results confirm that it meets specifications, and until the stockpile requirements of Section 5.2 have been fully met.

Any deviation from specifications during the production of material shall require the Contractor to take immediate corrective action. Equipment shall be shifted to ensure that there is no contamination of the current stockpile. A new stockpile shall be started adjacent to the former stockpile only after the product has been proven by testing to again meet specifications. Any material of inferior quality, or not in accordance with this specification, brought to, or incorporated into the work shall be immediately removed by the Contractor, at his own expense. In the event of the Contractor failing to comply with this provision, the Engineer may remove such materials, or cause them to be removed and deduct the cost of same from any subsequent progress payments to the Contractor.

In the event that removal of the inferior material is not required by the Engineer for any reason, then an appropriate payment adjustment as defined by the Engineer shall be applied to all of that material delivered to the site on that day.

03001-4 EQUIPMENT

4.1 Weigh Scales

The City will provide weigh scales at no cost to the Contractor at the City Yards at Ontario Avenue and 26th Street on a year round basis.

The Contractor may weigh large and/or continuous deliveries at the scale most convenient to his source. Small or intermittent deliveries outside the normal construction season shall be weighed over Scale at the City Yards.

The Contractor shall, where indicated in the tendering documents, quote on using his own scale, provided that the scale is certified.

4.2 Trucks

The Contractor may use any trucks of any type capable of delivering in accordance with job requirements. Specific conditions to be met include:

1. Certain delivery points are confined areas such as lanes and parking lots which may prevent the use of trucks larger than tandems.

2. Delivery is either spreading for road construction or dumping in a manner suitable for the project.

3. Centre-dump vehicles will only be permitted where base or subbase is to be spread for roadway construction.

Prior to the start of delivery, the Contractor shall supply a complete list of trucks, owner's names, registration numbers, tare weights and licence load limits. This list shall be updated whenever changes occur.

All trucks shall be weighed when delivery commences and at random times during the Contract.

03001-5 CONSTRUCTION

5.1 Production

5.1.1 Blending

Care shall be taken in the selection of material in the pit so as to produce a uniform product.

If blending of materials from more than one source is required to meet specifications, all such blending shall be done in the production equipment.

5.1.2 Sand Elimination

When it is necessary to eliminate sand to meet the grading specifications, the sand shall be removed prior to the crushing operation.

5.2 Stockpiling

5.2.1 Procedure

Each stockpile shall be constructed to contain not less than 10,000 tonnes or one-half of the remaining estimated contract quantity (whichever is less).

The area where the stockpile is to be located shall be shaped to a uniform smooth surface and graded to ensure positive drainage from the stockpile.

The material shall be placed uniformly on a predetermined area, in layers not exceeding 1 m in thickness.

Construction operations shall be controlled to prevent segregation of the various particle sizes.

If material is dumped by vehicles, it shall be spread with a dozer. The construction of each layer shall progress from outer edges toward the centre.

The material shall not be pushed or dumped over the edges or down the faces of the stockpile.

The material may be stockpiled from a stacker or conveyor belt only if all material is transported from the conveyor belt across the stockpile by means of a dozer or loader.

At the end of each day, the top of the stockpile and gravel pit shall be properly levelled and sloped. When stockpiling is carried out in winter, the Contractor shall take precautions that no snow is incorporated into the stockpile.

The completed stockpile shall be neat and regular in form and shall be constructed to occupy the smallest feasible area.

If different types of material are to be stockpiled, the piles shall be located and constructed so that no intermingling of material will occur.

Any rejected material must be placed a good distance away from an approved stockpile.

Material which does not meet specification within 5,000 tonnes of crushing will therefore be rejected and a new stockpile will be started in a new location clearly away from the rejected material.

5.2.2 Minimum Quantities

During the construction season, the Contractor shall, on his site, maintain the following minimum stockpile quantities of stockpiled, tested and approved material:

Base Aggregate	15,000 tonnes
Subbase Aggregate	15,000 tonnes
Sanding Aggregate	10,000 tonnes
Other Material	5,000 tonnes

All material supplied shall be loaded from a stockpile. Direct delivery from the crusher will not be permitted.

5.3 Delivery

5.3.1 Rate of Delivery

The Contractor shall be prepared to supply the following approximate quantities at a uniform delivery rate during each working day (including Saturdays when prior notice is given).

1. Granular Base and Subbase

If one Contractor has the contract to supply aggregate to both sides of the river, the Contractor shall be prepared to deliver up to 2,000 tonnes of aggregate per day to each side of the river or a total up to 4,000 tonnes per day. If a Contractor has only to supply aggregate to one side of the river, the Contractor shall be prepared to deliver up to 3,000 tonnes of aggregate per day.

2. Other Materials

The Contractor shall be prepared to deliver up to 1,000 tonnes per day of any other aggregate materials.

The Contractor and the Engineer shall be in close contact with the progress of the projects to determine daily delivery requirements. Whenever an appreciable change in delivery quantities or actual requirements is known in advance by either party, one party shall give reasonable notice to the other party.

5.3.2 Breakdown

Whenever the Contractor is unable to deliver any material due to major stationary plant or equipment (trucks and self-mobile equipment excluded) breakdown, the Contractor shall immediately notify the Engineer when delivery of material shall resume. Non-delivery time period for material required by the City shall not be longer than 24 hours.

5.3.3 Alternate Sources

In the event that the Contractor fails to supply any or only supplies a portion of material required, the Engineer under this Contract, shall be at liberty to purchase the required material so in default from any firm which is willing and ready to supply. The Contractor shall pay the City, on demand, any increase in the cost of material so purchased, over and above the cost of similar material under this Contract.

5.3.4 Loading Procedure

The Contractor shall provide supervision of the loading operation to ensure correct source and procedures. Material loaded from the stockpile shall be removed in a manner which results in mixing of the full height of the stockpile face.

5.3.5 Load Limits

Maximum gross weight of vehicles operating within the City limits shall conform to Section 7 of the Traffic Bylaw No. 7200 and to any current amendments. In addition, the load limit as established by the Saskatchewan licence for each vehicle shall not be exceeded.

Where rural municipal roads are to be used, requirements established by the R.M. Council must be met. This includes road maintenance and load permits.

5.3.6 Truck Routes

Vehicles operating under this Contract shall be confined to routes shown on Schedule No. 8, Division 0, Section 00705 of General Conditions. For purposes of making a delivery, trucks must stay on a designated route to the point closest to the delivery point. The Engineer has the right to assign the final portion of the route, namely over local streets from the designated route to the delivery point.

5.3.7 Maintenance of Haul Routes

The City will, at its own expense, maintain all haul routes within the City limits.

Haul routes outside the limits of the City of Saskatoon shall, insofar as

practical with respect to minimizing haul distance, be on numbered provincial Highways.

Where hauling is required over roads outside the City other than along Provincial Highways, the Contractor shall, prior to commencing this Contract, make formal arrangements for the use of such roads with the municipality having jurisdiction. These shall include the extent of the Contractor's responsibility for maintenance of road surface, for traffic safety and for dust palliation. A copy of the agreement shall be submitted to the City prior to commencement of the Contract.

03001-5 MEASUREMENT

6.1 Aggregate

The unit of measurement shall be the tonne. If City or Contractor's weigh scales are not in operation, the aggregate weight shall be calculated on the basis of actual volume of material delivered and average unit weight determined from previously weighed truck loads of similar material.

6.2 Moisture

The moisture content (dry weight basis) shall be determined by sampling the material at the place of delivery and averaging the results of each one-month period. This average moisture content shall be applied against the total quantity delivered for that same one-month period to calculate a payment reduction.

6.3 Quantity Summaries

The Contractor shall submit monthly statements for each item showing a daily sub-total and a cumulative total for the period.

END OF SPECIFICATION 03001

INDEX

03005-1 DESCRIPTION

The work shall include the supplying of all labour, plant equipment and materials required to construct granular base course at the location and in conformity with the line, grade and dimensions shown on the plans or as designated by the Engineer.

03005-2 MATERIALS

The Contractor shall supply the base course material. Refer to the Aggregates Specifications 03001-3.2.2 "Base Aggregate".

The material passing a 400 μm Sieve shall have a Plasticity Index from 0 to 6.

The material shall consist of fine graded mixtures of sand, silt, and clay, and shall be free from organic or other deleterious material and meet the following requirements:

Sieve Designation	Percent by Weight Passing Canadian Metric Standard Sieves	
	Binder	Filler
5.0 mm	100	100
400 μm	100	90
71 μm	50	25
Plasticity Index	10	0

The allowable moisture content of the base course shall not exceed the optimum moisture content when delivered to the road.

03005-3 APPROVAL FOR BASE COURSE

A representative sample of the base course material shall be supplied to an approved Testing Laboratory. The sample shall contain not less than 35 kg.

The following tests shall be performed.

(a) Wash Sieve Analysis

(b) Plasticity Index

(c) C.B.R. Value

(d) Standard Proctor Compaction Test

(e) Percentage crush of material retained on the 5 mm Sieve.

One copy of the test results shall be submitted to the Engineer at least 7 days before base course construction commences. Base course construction shall not commence unless the material is approved by the Engineer.

The cost of submitting samples and testing by the Testing Laboratory shall be borne by the Contractor until the material is approved by the Engineer. After the material is approved, partial subsequent testing will be carried out at the expense of the Contractor in accordance with the requirements of Testing and Inspection (Specification 03020). Preliminary approval of the material shall not constitute general acceptance of the stockpile, deposit or source of supply**.**

03005-4 CONSTRUCTION

Materials shall be handled in a manner such that segregation of the coarser and finer fractions will not occur.

Base aggregate shall be stockpiled after crushing. Stockpiles shall be constructed in accordance with the requirements for stockpiling aggregates (Specification 03015).

The thickness of any compacted base course lift shall not be less than 75 mm and not greater than 150 mm.

Oversize material shall not be incorporated into the base course.

Base course shall not be spread and compacted if the atmospheric temperature is 2°C and falling.

If excess moisture exists in the base course, it shall be dried to the optimum moisture content as determined by the Standard Proctor Compaction Test.

If necessary for compacting, water shall be added. The optimum moisture content will be determined by the Standard Proctor Compaction Test. Watering and compaction shall be controlled to prevent pumping of fines to the surface or washing fines away.

Each lift shall be compacted to not less than 100% of the maximum density as determined by the Standard Proctor Compaction Test. The density of this section will be considered satisfactory when:

1. Test results average not less than 100% of maximum density; and,
2. All individual test results are greater than 98% of maximum density.

This shall also include base placed under walks and curbs when the grade preparation for the walks and curbs is constructed in conjunction with the roadway.

The finished base course shall be proof-rolled with a piece of heavy equipment such as a fully loaded single or tandem axle truck of sufficient axle load to expose any soft spots. There will be no direct payment for proof-rolling, and it shall be an integral part of base course acceptance. If there is any visual movement the soft spots detected by proof-rolling shall be repaired at the Contractor's expense. If the movement is due to the insitu soils below the subgrade preparation the Engineer will provide direction. Condition of soils below the subgrade preparation are the responsibility of the Engineer.

Failures in the subgrade, subbase course or base course which develop on a section of road upon which base course has been deposited, shall be repaired at the expense of the Contractor.

Base course shall be spread by motor graders or other equipment approved by the Engineer.

Any ruts or irregularities formed on the surface of any layer during compaction shall be bladed smooth during compaction operations. The Contractor shall spread and shape each layer to the cross section shown on the drawings or as designated by the Engineer. The finished surface of the final layer shall conform to the longitudinal grade within a tolerance of 10 mm, but not uniformly high or low**,** and shall have no depressions or high areas more than 6 mm under a straight edge 3 m long when placed in any direction.

A prime coat shall be placed on the finished final lift of base course in accordance with the requirements for Asphalt Prime, Tack and Flush Coat (Specification 04025).

Streets, roads and lanes used for hauling material, that are damaged, shall be repaired by the Contractor at the Contractor's expense.

The sewers and manholes shall be cleaned thoroughly using a high pressure sewer flusher. After base gravel placement, all dirt, sand, rocks and other solids resulting from the cleaning operation shall be removed by vacuum truck at the downstream manhole of the section being cleaned.

All accumulations of debris shall be hauled by the Contractor to the pollution control plant for disposal. The Contractor shall be responsible for cleaning and or any damages that result from debris entering the existing sewer system**.**

The Contractor shall be responsible for removing all debris from catch basins.

03005-5 MEASUREMENT

Granular base course will be measured in tonnes or square metres as specified.

03005-6 PAYMENT

Payment for granular base course will be at the contract unit price per tonne or square metre. The unit price will be full compensation for loading, hauling, dumping, spreading, watering, aerating, compacting, and proof-rolling. The unit price will also be full compensation for adding binder and/or filler sand.

END OF SPECIFICATION 03005

INDEX

3010-1 DESCRIPTION

The work shall include the supplying of all labour, plant, equipment and materials required to construct granular subbase course at the location and in conformity with the line, grade and dimensions shown on the plans or as designated by the Engineer.

03010-2 MATERIALS

The Contractor shall supply the subbase course material. Refer to the Aggregates Specifications 03001-3.2.1 "Subbase Aggregate".

The subbase aggregate shall be composed of fragments of durable rock free from undesirable quantities of soft or flaky particles, shale, loam and organic or other deleterious material.

A higher Plasticity Index may be approved by the Engineer if sufficient load bearing capacity can be obtained from the subbase course.

The allowable moisture content of the subbase course shall not exceed the optimum moisture content when delivered to the road.

03010-3 APPROVAL OF SUBBASE COURSE

A representative sample of the subbase course material shall be supplied to an approved Testing Laboratory. The sample shall contain not less than 35 kg.

The following tests shall be performed.

a) Wash Sieve Analysis

b) Plasticity Index

c) C.B.R. value

d) Standard Proctor Compaction Test

One copy of the test results shall be submitted to the Engineer at least 7 days before subbase course construction commences. Subbase course construction shall not commence unless the material is approved by the Engineer.

The cost of submitting samples and testing by the Testing Laboratory shall be borne by the Contractor until the material is approved by the Engineer. After the material is approved, partial subsequent testing will be carried out at the expense of the Contractor in accordance with the requirements of Testing and Inspection (Specification 03020).

Preliminary approval of the material shall not constitute general acceptance of the stockpile, deposit or source of supply.

03010-4 CONSTRUCTION

Materials shall be handled in a manner such that segregation of the coarser and finer fractions will not occur.

Stockpiles shall be constructed in accordance with the requirements for stockpiling aggregates (Specification 03015).

The compacted lift of subbase course shall not exceed 150 mm in depth.

Oversize material shall not be incorporated into the subbase course.

Subbase course shall not be spread and compacted if the atmospheric temperature is 2°C and falling.

If excess moisture exists in the subbase course, it shall be dried to the optimum moisture content as determined by the Standard Proctor Compaction Test.

If necessary for compacting, water shall be added with a pressure distributor. The optimum moisture content will be determined by the Standard Proctor Compaction Test. Watering and compacting shall be controlled to prevent pumping of fines to the surface or washing fines away.

Each lift shall be compacted to not less than 100% of the maximum density as determined by the Standard Proctor Compaction Test. The density of this section will be considered satisfactory when:

1. Test results average not less than 100% of maximum density; and,
2. All individual test results are greater than 98% maximum density.

The finished base course shall be proof-rolled with a piece of heavy equipment such as a fully loaded single or tandem axle truck of sufficient axle load to expose any soft spots. There will be no direct payment for proof-rolling, and it shall be an integral part of base course acceptance. Soft spots detected by proof-rolling shall be repaired at the Contractor's expense.

Failures in the subgrade, or subbase course, which develop on a section of roadway upon which subbase course has been deposited, shall be repaired at the expense of the Contractor.

Subbase course shall be spread by motor graders or other equipment approved by the Engineer.

Any ruts or irregularities formed on the surface of any layer during compaction shall be bladed smooth during compaction operations. The Contractor shall spread and shape each layer to the cross section shown on the drawings or as designated by the Engineer. The finished surface of the final layer shall conform to the longitudinal grade within a tolerance of 15 mm, but not uniformly high or low**,** and shall have no depression or high areas more than 10 mm under a straight edge 3 m long when placed in any direction.

The final lift of subbase course shall have sufficient stability such that when compacted, it will not rut or break through during the hauling and placing of the bottom lift of base course.

Streets, roads and lanes used for hauling material, that are damaged, shall be repaired by the Contractor at the Contractor's expense.

03010-5 MEASUREMENT

Granular subbase course will be measured in tonnes or square metres as specified.

03010-6 PAYMENT

Payment for granular subbase course will be at the contract unit price per tonne or square metre. The unit price will be full compensation for loading, hauling, dumping, spreading, watering, aerating, compacting and proof-rolling.

END OF SPECIFICATION 03010

INDEX

Page

03015-1 DESCRIPTION

The work shall consist of placing aggregates in stockpiles and shall apply to all aggregates stockpiled by the Contractor.

03015-2 MATERIALS

The aggregate shall conform to the requirements of the specification for the material being stockpiled.

03015-3 CONSTRUCTION

The area where the stockpile is to be located shall be shaped to a uniform smooth surface and graded to ensure positive drainage from the stockpile.

Construction operations shall be controlled to prevent segregation of the various particle sizes.

The material shall be placed uniformly, on a predetermined area, in layers not greater than 1 m in thickness. If material is dumped by vehicles, it shall be spread with a dozer. The construction of each layer shall progress from outer edges toward the centre.

The material shall not be pushed or dumped over the edges or down the faces of the stockpile.

The material may be stockpiled from a conveyor belt only if it is transported from the conveyor belt across the stockpile by means of a dozer.

The side slopes of the stockpile shall not be steeper than 1-1/2 : 1

The completed stockpile shall be neat and regular in form and shall be constructed to occupy the smallest feasible area.

If different types of material are to be stockpiled, the piles shall be located and constructed so that no intermingling of material will occur.

03015-4 PAYMENT

Stockpiling aggregates in accordance with this specification will not be paid for directly, but will be considered a subsidiary obligation of the Contractor under other contract items.

END OF SPECIFICATION 03015

INDEX

03020-1 DESCRIPTION

The work covered by this specification shall include the inspection and testing of materials at the production site and also in the field with material in its final position.

03020-2 MATERIAL TESTING

All tests performed shall be carried out according to the current A.S.T.M. or C.S.A. standards.

All sieve analysis in this specification shall refer to a wash sieve analysis.

After the Contractor has been awarded the contract for supplying aggregate, the Contractor shall notify the Engineer when aggregate processing shall commence.

A representative sample of the surfacing material shall be supplied to an approved Testing Laboratory. The sample shall contain not less than 22 kg.

The following tests on each sample shall be performed.

Material	**Frequency of test**	**Test Required**
Base Aggregate and Subbase Aggregate	Every 6,000 tonnes	1. Wash Sieve Analysis 2. Plasticity Index 3. Percentage Crush retained on 5 mm (No. 4) Sieve 4. Moisture content 5. C.B.R. Value 6. Standard Proctor Compaction Test

One copy of the test results shall be submitted directly to the Engineer, by the Testing Laboratory, hired by the Contractor. The Contractor shall notify the Engineer when the testing will be carried out by the Testing Laboratory. The test results shall be forwarded to the Engineer as soon as they are available and the written report submitted to the Engineer within 2 days after the results are available.

When test results are not provided as specified, the Engineer may engage a Testing Laboratory to carry out the specified testing. The cost of the testing will be at the expense of the Contractor.

When additional testing is required because of frequent changes in crusher location or aggregate supply, the cost of the additional testing shall be done at the expense of the Contractor. When the quality of the material is in question, the cost of all additional testing required shall be paid for by the Contractor. The cost of original density tests will be paid for by the City of Saskatoon. If the density test does not meet the specifications, any additional testing shall be paid for by the Contractor.

END OF SPECIFICATION 03020

INDEX

03050-1 DESCRIPTION

The work shall consist of a protective covering of stone constructed with or without grout on an earth bed or granular filter blanket. Riprap shall be constructed at the locations shown on the plans or as designated by the Engineer.

The Contractor shall supply all labour, material, and equipment necessary to complete the work to the satisfaction of the Engineer.

03050-2 MATERIALS

2.1 Riprap material for culverts and other drainage work, shall consist of hard durable field stones, boulders or quality rock.

2.1.1 **Type A Riprap:** The minimum requirements of Type A Riprap are: Fifty (50) percent of the material must be greater than forty-five (45) kilograms and ninety (90) percent must be greater than twenty-seven (27) kilograms.

2.1.2 **Type B Riprap:** The minimum requirements of Type B Riprap are: Fifty (50) percent of material must be greater than thirty-four (34) kilograms and ninety (90) percent must be greater than fourteen (14) kilograms.

No stone shall be less than one hundred and fifty (150) mm dimension, with dimension being defined as length, width and depth.

2.2 The grout shall consist of a mixture of one (1) part Portland Cement and three (3) parts fine clean sand, or as otherwise designated by the Engineer. The consistency shall be such, that it can be easily worked into the spaces between the stones with a mason's trowel.

03050-3 CONSTRUCTION

3.1 Excavation

3.1.1 Hand Placed and Grouted Riprap

The aprons and slopes to be riprapped shall be excavated and trimmed to an even, uniform surface so as to provide an adequate foundation upon which the riprap shall be placed. The depth of excavation shall be carried out as shown on plans or as designated by the Engineer.

3.1.2 Random Riprap

The aprons and slopes to be riprapped shall be excavated as shown on the plans or as designated by the Engineer, so as to provide a ledge or support upon which the stones may be dumped.

3.2 Placement of Materials

3.2.1 Hand Placed Riprap

The stones shall be placed by hand, on the prepared aprons and slopes, with the largest stones being placed at the bottom of the slope.

The stones shall be placed as close together as possible without any shaping of the stones themselves.

3.2.2 Grouted Riprap

The stones shall be placed as in 3.2.1 above. Before placement of the grout, the stones shall be thoroughly wetted. The grout shall then be placed, commencing from the bottom of the slope and progressing upward, ensuring that all voids between the stones are filled with grout. The stones shall project a distance of fifty (50) to one hundred (100) millimetres above the grouted surface, depending upon the dimension of the stone itself. After grouting, the surface shall be thoroughly brushed to expose the stone surface to the extent designated above.

Grout shall not be placed when the temperature is four (4) degrees Celsius and falling.

The finished grouted surface shall, after sufficient setting, be sprayed with a curing compound supplied by the City of Saskatoon.

3.2.3 Random Riprap

Random riprap shall be dumped onto the prepared surface and sufficient handwork utilized, to provide a uniform surface to the satisfaction of the Engineer.

03050-4 MEASUREMENT

Measurements shall be based upon surface area (m^2) as measured on the accepted completed product and upon one (10 layer of riprapping.

03050-5 PAYMENT

Payment for hand placed, grouted, or random riprap shall be at the contract unit price per square metre as specified on the Tender Form, and be full compensation for supplying, hauling, placing and supplying all labour and equal parts necessary to complete the work to the satisfaction of the Engineer.

END OF SPECIFICATION 03050