TABLE OF CONTENTS

3.2 AGGREGATE PRODUCTION AND STOCKPILING

3.2.1 GENERAL

This specification covers the general requirements for production, gradation, stockpiling, and pit operations for specified aggregate materials.

3.2.2 MATERIALS

The Contractor shall supply aggregate materials in accordance with Specification 5.2, Supply of Aggregate.

3.2.3 PRODUCTION

3.2.3.1 **General**

Aggregate produced from all sources shall comply fully with the specifications, and the Contractor shall recognize and satisfy himself as to the type and amount of work that may be necessary to produce the material required. The aggregate shall meet the specified requirements as shown on Table 3.2.3.1 for the material specified. The Contractor shall adjust and modify aggregates as required in order to meet specification requirements.

The crushed aggregate shall be composed of sound, hard and durable particles of sand, gravel and rock, and shall be free from elongated particles, injurious quantities of flaky particles, soft shales, organic matter, clay lumps and other foreign matter.

All material up to and including 300 mm diameter in Designated Sources and Department Sources identified in the Contract shall be crushed.

When producing Designation 7 Class 40, "Cement Stabilized Base Course Aggregate" in the event that clay lumps are encountered, the maximum allowable size of material shall be 25 mm.

Acceptance of processed aggregates shall take place when they are in their final position and have met all the requirements of the Contract. The Consultant may test at any time and reject material that does not meet specifications. Final position for a crushing and stockpiling bid item will be the stockpile.

For Designation 1 aggregates used for wearing surfaces (top lift), the Contractor shall produce aggregates such that material retained on the 5 000 micron sieve shall not contain more than 3% detrimental matter based on the total mass of the combined aggregates in the final product.

Prior to the production of any aggregate for use as a wearing surface, the Contractor shall submit a proposal to the Consultant detailing the action to be taken in the event the specification requirement for detrimental matter cannot be achieved. Production of aggregates for use as a wearing surface shall not proceed until such an action plan has been approved by the Consultant.

TABLE 3.2.3.1, SPECIFICATIONS FOR AGGREGATE

DESIGNATION		1			2				3				4			5		6		7	8	9
Class (mm)		10	12.5	16	*16(N2)	20	25	40	12.5AW	12.5BW	12.5C	16	20	25	40	10A	10B	80	125	40	25	8
Percent Passing Metric Sieve (CGSB 8-GP-2M) μm	125 000																		100			
	80 000																	100				
	50 000																	55-100	55-100			
	40 000							100							100					100		
	25 000						100	70-94						100				38-100	38-100		100	
	20 000					100	82-97						100		55-90							
	16 000			100	100	84-94	70-94	55-85				100						32-85	32-85		90-100	
	12 500		100	80-92	89-100				100	100	100	72-95										
	10 000	100	83-92	70-84	78-94	63-86	52-79	44-74	35-65	55-75	70-93	53-82	35-77	30-77	25-72	100	100			85-100	45-75	
	8 000																					100
	5 000	60-75	55-70	50-65	55-70	40-67	35-64	32-62	0-15	0-15	30-60	27-54	15-55	15-55	8-55	70-90	45-70	20-65	20-65		0-15	85-100
	1250	26-45	26-45	26-45	26-45	20-43	18-43	17-43	0-3	0-3	9-28	9-28	0-30	0-30	0-30	20-45	20-45			40-100	0-5	45-75
	630	18-38	18-38	18-38	18-38	14-34	12-34	12-34														30-50
	315	12-30	12-30	12-30	12-30	9-26	8-26	8-26			0-15	0-15				9-22	9-22	6-30	6-30	17-100		18-30
	160	8-20	8-20	8-20	8-20	5-18	5-18	5-18			0-11	0-11				5-15	5-15					10-21
	80	4-10	4-10	4-10	4-10	2-10	2-10	2-10	0-0.3	0-0.3	0-8	0-8	0-12	0-12	0-12	0-10	0-10	2-10	2-15	6-30		5-15
% FRACTURE BY WEIGHT (2 FACES)	ALL +5000	60+	60+	* SEE NOTE (N1)	60+	60+	60+	50+	75+ (100% 1 Face)	75+ (100% 1 Face)	60+	60+	40+	40+	25+	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PLASTICITY INDEX (PI)		NP	NP	NP	NP	NP-6	NP-6	NP-6	N/A	N/A	NP-4	NP-4	NP-8	NP-8	NP-8	NP-6	NP-6	NP-8	NP-8	NP-5	NP-5	NP
L.A. ABRASION LOSS PERCENT MAX.		40	40	40	50	50	50	50	35	35	35	35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35
FLAKINESS INDEX		N/A							MAX 15		N/A											
COEFFICIENT OF UNIFORMITY (Cu)		N/A																		3+	N/A	

Designations:

Designation 1 - Asphalt Concrete Pavement
Designation 2 - Base Course Aggregate
Designation 3 - Seal Coat Aggregate
Designation 4 - Gravel Surfacing Aggregate
Designation 5 - Sanding Material
Designation 6 - Pit- Run Gravel Fill
Designation 7 - Cement Stabilized Base Course Aggregate
Designation 8 - Granular Filter Aggregate
Designation 9 - Slurry Seal Aggregate

* Notes:

N1. Asphalt Concrete Mix Type 1 - 90+ (98% 1 face)
Asphalt Concrete Mix Type 2 - 70+
Other Asphalt Concrete Mix Types - 60+

N2. Designation 2 Class 16 Material is for ASBC

N3. For crushed aggregates other than all Designation 5 and Designation 9 materials, a tolerance of three percent in the amount passing the maximum size sieve will be permitted provided all oversize material passes the next larger standard sieve size.

3.2.3.2 **Quality Control**

3.2.3.2.1 General

In all sources, quality control testing is the responsibility of the Contractor. Tests performed by the Consultant will not be considered to be quality control tests.

The Contractor shall use professional Engineering services and a qualified testing laboratory licensed to practise in the Province of Alberta to assess and where necessary, modify the aggregate materials being produced to ensure their end use meets all specification requirements.

3.2.3.2.2 Test Methods

The terms "ATT" and "TLT" refer to Alberta Transportation Test methods.

Unless otherwise specified, the latest edition of the test methods shown in Table 3.2.3.2(A) will be used to determine material characteristics.

TABLE 3.2.3.2(A)
TEST METHODS USED TO DETERMINE MATERIAL CHARACTERISTICS

TESTS	STANDARD
Sampling, Gravel and Sand	ATT-38
Sieve Analysis	ATT-25 or 26
Sieve Analysis, 80 000 μm Minus, Part II - Pit-Run Contamination, - 5 000 μm Sieve Analysis	ATT-25, Part II
Determining the Liquid Limit of Soils	AASHTO T 89
Dry Strength, Non-Plastic Aggregates	ATT-54
Determining the Plastic Limit and Plasticity Index of Soils	AASHTO T 90
Percent Fracture	ATT-50
Classification of Soils for Engineering Purposes (for definition of Coefficient of Uniformity, Cu)	ASTM D2487
L.A. Abrasion	AASHTO T 96
Flakiness Index	ATT-49
Detrimental Matter in Coarse Aggregate	TLT-107

Note:

(1) In all Test Methods used as reference in this specification, metric sieves as specified in Canadian General Standards Board specification 8-GP-2M shall be substituted for any other specified wire cloth sieves in accordance with Table 3.2.3.2 (B).

TABLE 3.2.3.2(B)

SIEVES IN ACCORDANCE WITH: AASHTO DESIGNATION: M 92 ASTM DESIGNATION: E 11 (U.S. STANDARD SERIES) (OPENING AND DESIGNATION)			**METRIC SIEVES IN ACCORDANCE WITH: CGSB SPEC. 8-GP-2M**
125.0	mm	5"	125 000
75.0	mm	3"	80 000
63.0	mm	2-1/2"	63 000
50.0	mm	2"	50 000
37.5	mm	1-1/2"	40 000
25.0	mm	1"	25 000
19.0	mm	3/4"	20 000
16.0	mm	5/8"	16 000
12.5	mm	1/2"	12 500
9.5	mm	3/8"	10 000
4.75	mm	#4	5 000
2.36	mm	#8	2 500
2.00	mm	#10	2 000
1.70	mm	#12	1 600
1.18	mm	#16	1 250
0.850	mm	#20	800
0.600	mm	#30	630
0.425	mm	#40	400
0.300	mm	#50	315
0.150	mm	#100	160
0.075	mm	#200	80
0.045	mm	#325	45

3.2.3.2.3 Quality Control Testing

The Contractor shall provide and maintain equipment and qualified personnel to perform all field testing necessary to determine and monitor the characteristics of the materials produced and incorporated into the work.

The Contractor shall provide safe and convenient means for accurately and representatively sampling each aggregate stream being produced during all screening, splitting and crushing processes.

The minimum frequencies of quality control testing are described in Table 3.2.3.2(C) of this specification. Copies of all quality control tests shall be submitted to the Consultant within one working day of the completion of each test.

TABLE 3.2.3.2(C)
QUALITY CONTROL TESTING OF AGGREGATES

TESTS	STANDARD	MINIMUM FREQUENCY
SIEVE ANALYSIS		
1. Crushed Aggregate	ATT-25 or ATT-26	Minimum Frequency not Specified
2. Determining Pit-Run Contamination of Des. 1 (coarse fraction of Mix Types 1, 2, 3 and 4) and Extra Manufactured Fines aggregates.	ATT-25, Part II	Des. 1 - One per 8 hours of plant production. Extra Manufactured Fines - One per 4 hours of plant production.
3. Blend Sand	ATT-26	Minimum Frequency not Specified
4. Extra Manufactured Fines	ATT-26	Minimum Frequency not Specified
5. Chips (Des. 3 Class 12.5AW & 12.5BW), Slurry Seal (Des. 9)	ATT-26	One per four hours of plant production
DRY STRENGTH	ATT-54	Des. 2-one per 20 000 tonnes
PLASTICITY INDEX	AASHTO T 90	Des. 1-minimum frequency not specified Des. 2-one per Source and one per 20 000 tonnes when ATT-54 indicates a non-plastic high result. Other Des.-when requested by the Consultant
PERCENT FRACTURE	ATT-50	One per 5 000 tonnes.
L.A. ABRASION	AASHTO T 96	When requested by the Consultant
FLAKINESS INDEX (DES. 3 CLASS 12.5AW & 12.5BW)	ATT-49	One per source
DETRIMENTAL MATTER IN COARSE AGGREGATE (Paving Aggregates, Coarse Fraction, +5000 μm material)	TLT-107	Minimum of one for first 10 000 tonnes. (Note 1)
The Consultant may require an increase in the frequency of any quality control test which has a specified minimum frequency. The Contractor shall arrange and pay for any additional tests required by the Consultant.		

NOTE 1: Additional tests at rate of one per 10 000 t: if first test indicates deleterious material is $\geq$4%. (Reported on line E of Form MAT 5-730/94)

The Consultant may inspect the aggregate production process and test and monitor the quality of the material being produced by the Contractor at any time and as often as he deems necessary. Such inspection or testing shall not in any way relieve the Contractor of the responsibility for producing aggregates that meet the specifications in all respects.

The Consultant is under no obligation to provide the Contractor with test results.

3.2.3.3 **Stockpiling**

When aggregate stockpiles are specified or used as part of construction operations, the following shall apply:

(i) When stockpiling is specified in the Contract, the stockpile sites shall be located as shown on the plans or as directed by the Consultant.

(ii) If, in order to expedite his construction operation, the Contractor constructs temporary stockpiles at sites of his own choosing, he shall arrange for such sites and be responsible for them in all respects, including all costs for clearing, removal and salvage of overburden and other site preparation and reclamation. The Contractor shall also obtain approvals and clearances from Alberta Environmental Protection and the Archaeological Survey of Alberta for these sites prior to commencement of the Work.

(iii) Stockpiles shall not be constructed at locations or by methods that will interfere with or damage any utilities such as power lines, telephone lines, pipelines, and underground utilities.

(iv) Sites shall be cleared to the required dimensions. Topsoil and subsoil shall be separately excavated to the full depth or 300 mm, whichever is greater, and stockpiled separately. Stockpile sites shall be shaped to a uniform smooth surface and graded to ensure positive drainage.

(v) Stockpiles shall be constructed by first distributing material uniformly over the entire base, and building upwards in successive layers not exceeding a thickness of 2 m.

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

(vii) Crushed aggregate or pit-run shall not be pushed or dumped over the edges or down the faces of stockpiles.

(viii) Stacking conveyors will not be permitted for stockpiling Designation 2, all classes, and Designation 3 Classes 12.5C and 16 crushed aggregate.

Stacking conveyors may be used for Designation 1 material upon approval of the Consultant.

Stacking conveyors may be used for stockpiling all other designations and classes of aggregate.

(ix) For blend sand, newly processed material shall be blended into the stockpile.

(x) Completed stockpiles shall be neat and regular in form and shall be constructed to occupy the smallest feasible area taking into consideration the bearing capacity of the foundation soils and the requirements of the Occupational Health and Safety Act.

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

3.2.3.4 **Aggregate Production**

3.2.3.4.1 General

The Contractor shall produce aggregates conforming to the specifications for the Designations and Classes called for in the Contract.

Prior to any aggregate production, the Contractor shall submit a written proposal to the Consultant, detailing aggregate processing procedures intended to be used. These proposed procedures will require the approval of the Consultant. Aggregates produced prior to this approval will not be accepted.

The Contractor shall notify the Consultant a minimum of two days in advance of the start of aggregate production to allow the visual inspection of the process and testing of the production as deemed necessary by the Consultant.

Any recombining of aggregates or addition of blend materials shall be performed so that a uniform mix of the various sizes is achieved.

Unless otherwise specified, the Contractor shall ensure that manufactured fines are retained in the crushed aggregate stockpile.

There will be no separate payment made for any additional work associated with the Contractor's proposal in achieving the specification requirements for detrimental matter and all related costs shall be included in the unit price bid for "Asphalt Concrete Pavement" for the class of material used.

3.2.3.4.2 Production of Designation 1 Aggregates

The Contractor shall split aggregates for Designation 1 material into coarse and fine fractions prior to crushing of the coarse fraction. The crushed coarse and the fine fractions shall be stockpiled separately.

The Contractor shall select a screen size at which splitting will take place. Splitting of aggregates shall be controlled such that the coarse aggregate fraction, before crushing, shall contain no more than 5% passing the 5000 sieve for mix types 1, 2, 3 and 4.

In Department sources, the fine fraction shall contain no more than 20% of material retained on the 5000 sieve size.

Further splitting of the crushed coarse aggregate into separate stockpiles may be performed at the Contractor's option. No additional payment will be made for this work.

3.2.3.4.3 Production and Addition of Blend Sand

When the aggregate being produced is destined for further processing through a mixing plant, the addition of any required blend sand shall take place at the mixing plant.

Prior to the mix production, blend sand shall be separately stockpiled so that a representative sample can be obtained in order to establish a mix design.

All blend sand shall be screened before being incorporated into the mix, to remove clay lumps, roots and other deleterious materials. All blend sand so screened shall pass the 5 000 sieve.

Blend sand shall be dried if necessary to ensure a uniform feed.

All other aggregates requiring an addition of blend sand to meet the gradation requirements shall be adjusted at the crushing stage by means of a separate conveyor or other approved device capable of metering the blend sand at a specified uniform rate. The blend sand shall be added prior to or onto the crusher screen deck.

3.2.3.4.4 Production of Extra Manufactured Fines

Manufactured fines are defined as that portion of the material passing the 5 000 sieve size which is produced by the crushing process.

In the event the manufactured fines in the total combined aggregate do not meet the requirement for the specified Asphalt Concrete Mix Type, extra manufactured fines shall be produced by screening the pit-run material so that the screened material contains no more than 5% material passing a 5 000 sieve. This screened material shall then be crushed so that 100% passes the 10 000 sieve and a minimum of 95% passes the 5 000 sieve. All material produced by this crushing process shall be placed in a separate stockpile and designated as Extra Manufactured Fines.

3.2.3.5 **Interim Payment for Producing and Stockpiling Crushed Aggregates**

3.2.3.5.1 General

Interim payments for producing and stockpiling certain designations and classes of crushed aggregates will be made under the following conditions:

(i) The Contractor submits a written request for interim payment to the Consultant.

(ii) The producing and stockpiling has been completed in accordance with the specifications.

(iii) There are no separate payments specified for crushing and stockpiling aggregates.

(iv) The Contractor provides the Consultant with written consent of Surety to the interim payment, or with security in the form of an Irrevocable Letter of Credit in the amount of the total interim payment.

Interim payment will not imply acceptance of the crushed aggregate by the Consultant. Interim payment will not be made for reject or surplus material.

3.2.3.6 **Surplus Crushed Aggregates**

3.2.3.6.1 Definitions

For the purposes of this specification only, the following definitions will apply:

3.2.3.6.1.1 Surplus Crushed Aggregates

Aggregates which have been produced from Designated Sources or Department Sources identified in the Contract for use on this Contract, and which remain in stockpile after completion of the Work. These aggregates are the property of the Department.

3.2.3.6.1.2 Quantity Placed

The quantity of any particular material incorporated into the Work and accepted by the Consultant.

3.2.3.6.1.3 Tender Quantity

The quantity shown in the Unit Price Schedule for the particular material.

3.2.3.6.1.4 Modified Tender Quantity

For any particular material, the Modified Tender Quantity will be either:

(i) the greater of

(a) the Tender Quantity, or
(b) the increased amount of material to be crushed as ordered by the Consultant, or
(c) the Quantity Placed, or

(ii) in the case where the Consultant orders a reduction in the Quantity to be placed, before the crushing of the material in question was completed, the Modified Tender Quantity will be the greater of

(a) the reduced Quantity as ordered, or
(b) the Quantity Placed.

3.2.4 MEASUREMENT AND PAYMENT

3.2.4.1 **General**

In all sources, the production of aggregates including the processing, hauling and addition of blend sand, the production and addition of extra manufactured fines, and any other aggregate gradation adjustments and modifications will not be paid for separately. The cost of this work will be considered included in the unit price of the Contract item for which the aggregates are being produced.

Payment for the supply of aggregate materials incorporated into the Work will be made in accordance with Specification 5.2, Supply of Aggregate.

If the Contract calls only for crushing and stockpiling aggregates or stockpiling of pit-run aggregates, then measurement will be made in tonnes or cubic metres measured in the vehicle. Payment will be made at the applicable unit price bid for the quantity produced.

The cost of erecting and removal of temporary fences associated with Designated Sources will be paid for as Extra Work in accordance with Specification 1.2, General.

The Contractor shall be responsible for the cost of quality control. The Contractor shall be responsible for

the cost of all consulting services retained by him.

When stockpiling is specified in the Contract, haul to stockpile will be measured and paid for if applicable, in accordance with the requirements in Specification 4.5, Hauling.

When required, a conversion factor of 1 m^3 = 1.632 tonne will be used.

3.2.4.2 **Interim Crushing and Stockpiling**

Measurement for interim payments will be based on the quantity of crushed aggregate in stockpile, the tender quantity for the bid item incorporating the crushed aggregate, or the amount of material to be crushed as ordered by the Consultant, whichever is least.

Interim payments for producing and stockpiling crushed aggregates will be made monthly and in accordance with the following:

(i) Interim payment is considered a portion of the unit price bid for the material placed on the roadway which incorporates the crushed aggregate. The interim payment will be deducted when payment is made under the applicable bid item or when all Work covered by applicable bid item has been completed.

(ii) Interim payment will be made at the following rates or at the unit price bid for the Work incorporating the crushed aggregate, whichever is least, for the Designation and Class specified:

Designation	Mix Type Or Class	Rate
1	Mix Types 1, 2 and 8	$ 5.00 per tonne
1	Mix Types 3-7	$ 3.50 per tonne
Superpave	All Mix Types	$ 5.00 per tonne
2	All Classes	$ 2.50 per tonne
3	12.5AW and BW	$10.00 per tonne
3	12.5C	$ 5.00 per tonne
4	All Classes	$ 2.00 per tonne

Extra manufactured fines will be classified as Designation 1 material for interim payment.

Interim payment will be made for the portion of natural fines which will be incorporated into the Work.

Interim payment for premixing asphalt stabilized base course to stockpile will be made at the rate of 35% of the unit price bid for Asphalt Stabilized Base Course.

For Chip Seal Coat work with payment made on a square metre basis, the rate of interim payment shall also be on a square metre basis using a conversion factor of 20 kilograms per square metre.

3.2.4.3 **Surplus Crushed Aggregates**

Surplus Crushed Aggregates for which payment will be made are shown in Table 3.2.4.3. These aggregates will be measured in cubic metres by the Consultant by cross-sectioning the piles.

Payment for Surplus Crushed Aggregates will be made at the applicable rates shown in Table 3.2.4.3 or

at the bid price for crushing and placing, whichever is lower, in accordance with the following:

(i) at Rate No. 1, for the quantity of Surplus Crushed Aggregate which when added to the Quantity Placed will be up to but will not exceed the Modified Tender Quantity; and

(ii) at Rate No. 2, for the quantity which equals the total measured Surplus Quantity minus the amount determined in (i) above, up to a maximum of 10% of the Modified Tender Quantity.

No payment will be made for the following:

(i) Quantities of surplus crushed aggregate in excess of those calculated in (i) and (ii) above.

(ii) Material which was rejected by the Consultant or which does not meet the applicable specifications.

(iii) The natural fines portion of a split aggregate.

(iv) Rejected fines.

(v) Material produced under a "Crush to Stockpile" bid item.

(vi) Reject over size aggregate.

TABLE 3.2.4.3
SURPLUS CRUSHED AGGREGATE

Designation	Class	Rate No. 1	Rate No. 2
1	10, 12.5 and 16 **	$ 3.50/t	$ 2.75/t
Superpave	All Mix Types **	$4.00/t	$3.00/t
2	16, 20 and 25	$ 2.00/t	$ 1.35/t
2	40 and 50	$ 1.50/t	$ 1.00/t
* 2	16 (mixed with asphalt)	$ 15.00/t	$ 12.00/t
4	20 and 25	$ 1.75/t	$ 1.25/t
4	40	$ 1.50/t	$ 1.00/t
8	25	$ 2.75/t	$ 2.00/t

* These rates are for Surplus Crushed Aggregate which was mixed with asphalt and intended for Asphalt Stabilized Base Course.

** Includes only the coarse fraction and extra manufactured fines.