 <b>Manitoba Infrastructure</b> <b>MATERIALS ENGINEERING BRANCH</b>	Standard No.: <b>MEB-P047</b>
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## 1.0 SCOPE

This Standard Practice covers the procedures for collecting samples of aggregate materials for laboratory testing.

## 2.0 REFERENCE STANDARDS

### *ASTM Standards*

- D75 Standard Practice for Sampling Aggregates
- C702 Standard Practice for Reducing Samples of Aggregate to Testing Size
- D3665 Standard Practice for Random Sampling of Construction Materials

## 3.0 GENERAL REQUIREMENTS

All representative samples of aggregates shall be collected by qualified and trained personnel in accordance with *ASTM D75 Standard Practice for Sampling Aggregates*.

## 4.0 SAMPLING REQUIREMENTS

### 4.1 Sampling Equipment

*Brush/Mini Broom/Scraping Tools/Pan:* Tools/accessories to aid in the sample collection process.

*Flat Board(s):* To prevent materials cascading into the sampling area.

*Mechanical Sampling System:* A mechanical device with a mounted sample container that allows for the container to pass perpendicularly through the entire stream of material or able to divert the entire stream of material into the container through manual, hydraulic or pneumatic operation.


*Portable Sample Splitter:* A portable sample splitter to reduce the sample size at the collection point.

*Sample Bag/Container:* bag or container suitable to hold up to 25 kg of material without ripping or tearing during sampling or transportation.

*Sample Tags:* tag attached to each sample used to record all sample information in Section 6.0

*Sampling Plate:* A pair of plates, either joined to each other or separate, which are the shape and width of the aggregate stream belt.

*Square Tipped Shovel or Scoop:* A tool to collect sample.

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## 4.2 Sample Size

Aggregate samples shall be comprised of sufficient material to conduct laboratory testing. Table 1 provides a guideline for sample size:

Table 1 – Minimum Sample Size

Nominal Maximum Size (mm)	Laboratory Test	Minimum Mass (kg)
≥ 25	Gradation, Plasticity Index and other physical properties <sup>1</sup>	50
	Gradation, Plasticity Index and Standard Proctor	75
	Los Angeles Abrasion	75 <sup>2</sup>
≤ 19	Gradation and other physical properties <sup>1</sup>	25
	Gradation and Standard Proctor	50
	Los Angeles Abrasion	75

<sup>1</sup> Particles with Fractured Faces (Crush Count), Plasticity Index, Specific Gravity and Absorption, Sand Equivalent, Fine Aggregate Angularity, Flat and Elongated Particles, Ironstone Content and Lightweight Content

<sup>2</sup> Blast rock and Granular Fill require a minimum of 100 kg sample.

Sample sizes for aggregate with Nominal Maximum Size larger than 75 mm will be determined by the Contract Administrator.

The quantity of materials in each sample bag/container shall not exceed 25 kg. In situations where more than 25 kg of materials is to be sampled, the material shall be collected in multiple bags/containers and none of which shall exceed 25 kg. Each bag/container shall have its own sample tag with all information list in Section 6.0.


## 5.0 SAMPLING PROCEDURES

### 5.1 Sampling from the Conveyor Belt

Sample shall be taken from the conveyor belt only when the crusher plant is operating at its normal capacity and when all the bins are full or nearly full in order to avoid sampling of segregated or residual material.

The conveyor belt shall be randomly stopped from running before the start of aggregate sampling.

Once the conveyor belt is completely stopped, select and block a representative area close to the middle of the belt.

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Collect all the materials from the selected portion of the belt, including any material adhering to the belt, and carefully place them into the sample container(s). Sampling plates may be used to eliminate the risk of contamination when collecting sample from the conveyor belt.

Repeat the above procedure, if required, until the sample size requirements is met.

## 5.2 Sampling from Belt Discharge

Sample from the belt discharge shall be taken only when the plant is operating at its normal capacity and when all the bins are full or nearly full in order to avoid sampling of segregated or residual material.

### 5.2.1 Front-End Loader Method

A front-end loader may be used for sampling aggregate from the belt discharge. The loader bucket shall be clean and dry prior to collecting the sample.

Hold the loader bucket directly under the conveyor discharge to avoid any split of the material during the sample collection. The loader shall be filled to a maximum of one-half (1/2) of its capacity to avoid any spillage of the material during the sample collection.

Collect the entire material from the loader bucket including all the fine aggregates and dust.

Repeat the above procedure, if required, until the sample size requirements is met.

### 5.2.2 Mechanical Sampling Method

An approved mechanical sampling device may be used for sampling aggregate from the belt discharge.

Pass the sampling device, if used, perpendicularly through the full discharge stream of material at a constant speed. The sample container shall be large enough to intercept the entire discharge stream at a uniform rate and hold the required amount of material without over flowing.

Collect the entire material from the container including all the fine aggregates and dust.

Repeat the above procedure, if required, until the sample size requirements is achieved as per Table 1.

## 5.3 Sampling from Stockpiles

### 5.3.1 Front-End Loader Method

A front-end loader may be used to create a sampling pile when collecting aggregate samples from stockpiles. The loader bucket shall enter into the stockpile at least 0.3m above the ground (bottom of the stockpile) level to avoid contaminating the stockpile materials and the samples.

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Aggregate samples shall be collected from a minimum of three (3) locations across faces of the stockpiled material. Collect a full bucket of aggregate materials from each of the selected locations and create separate sampling pile for each location of the stockpile. Keep the loader bucket as low as possible when building the sampling piles to limit the distance the material falls from the bucket and roll the material out of the bucket (rather than dumping it out) to control segregation.

Visually check the aggregate material in each sampling pile for uniformity/consistency. If the material in a sampling pile does not appear to be uniform, discard that pile and create a new one.

If the sampling piles contain visually acceptable materials, back drag the material in each sampling pile with the bottom edge of the loader bucket to flatten the upper 1/2 to 1/3 of the pile.

Insert the square tipped shovel to its full depth into the top of the flattened piles and lift the shovel full materials. Place each shovel full of material into the sampling container. Repeat this process, if required, until the sample size requirement is met.

### 5.3.2 *Manual Shovel Method*

Manual shovel method may be used for materials < 75mm in size.

Examine all faces of the stockpile for determining the representative sample locations.

Coarse aggregates, stockpiled in the shape of a tent or cone, shall be sampled in the following manner:

- Minimum of three (3) samples shall be taken from the bottom third of the stockpile.
- Minimum of two (2) samples shall be taken from the middle of the stockpile.
- Minimum of one (1) sample shall be taken from the upper third of the stockpile.


Fine aggregates stockpiled in the shape of a tent or cone shall be sampled in the following manner:

- Minimum of one (1) samples shall be taken from the bottom third of the stockpile
- Minimum of one (1) samples shall be taken from the middle of the stockpile
- Minimum of one (1) sample shall be taken from the upper third of the stockpile.

Sample from a loader constructed stockpile (a rectangular or square shaped pile of around 3-4 metres in height) shall be collected in the follower manner:

- Collect aggregate materials from various locations across the face of each loader constructed layer to ensure that representative samples are obtained.

At each sample location, insert a flat board vertically into the aggregate materials just above the sample location to prevent cascading of coarser aggregate from the surrounding area into the sample location.

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Once the board is stable, dig out a shelf below the board to remove and discard the potentially unrepresentative material that may exist on the outer surface of the stockpile.

Collect aggregate material from each prepared sample location by digging downward vertically with a square tipped shovel. Be careful to keep as much material on the shovel when transferring it into the sample container. Repeat this process, if required, until the sample size requirement is met.

#### 5.4 Sampling from the Road (In-Place Material)

When sampling an in-place aggregate material from a road construction site, ensure that the material is freshly laid and not contaminated by any other materials.

Collect material from a minimum of three representative locations within the sampling area by digging to the full depth of the material layer to be sampled. Avoid contaminating the sample with any underlying material.

Combine the materials collected from different locations to form a single sample.

Repeat this process, if required, until the sample size requirement is met.


## 6.0 SAMPLE IDENTIFICATION

Samples shall be properly labeled and affixed with a sample tag and shall contain the following information:

- 6.1 Contract number
- 6.2 Project location (PTH or PR)
- 6.3 Region
- 6.4 Pit Location
- 6.5 Stockpile Location
- 6.6 Station
- 6.7 Lane
- 6.8 Date and time sampled
- 6.9 Sampled by
- 6.10 Additional comments

The sample identification tag shall be securely affixed to the outside of the sample bag/container. If the tag must be placed in the bag/container, then it must be placed either in between two bags (double bagging required) or inserted in another smaller plastic bag and placed inside the sample bag/container.

Sample bags/containers shall be completely sealed.

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## 7.0 CHAIN OF CUSTODY

Each sample must be recorded on the Chain of Custody form.