 <p>PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS Engineering Division • Division de l'ingénierie</p>	Effective Date: March 1 st , 2021
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GUIDELINE FOR SAMPLING GRANULAR MATERIALS	

1. DESCRIPTION

1.1. General

- 1.1.1 The purpose of this guideline is to outline procedures and requirements for sampling granular materials.
- 1.1.2 All samples shall be collected by qualified and trained personnel in the sampling of materials.

1.2. Referenced Standard Construction Specifications

- 1.2.1 ASTM D75 – Standard Practice for Sampling Aggregates
- 1.2.2 ASTM D3665 – Standard Practice for Random Sampling of Construction Materials
- 1.2.3 ASTM C702 – Standard Practice for Reducing Samples of Aggregate to Testing Size
- 1.2.4 CW 3110 – Sub-Grade, Sub-Base and Base Course Construction.

2. SAMPLING PROCEDURES

2.1. Sampling from Existing Stockpiles


- 2.1.1 A front-end loader shall be used to create a sampling pile. The materials shall be collected from a minimum of three (3) locations across faces of the stockpiled material.
- 2.1.2 The loader bucket shall enter into the stockpile at least 0.15 m above the bottom of the stockpile level. Without backing up, the loader shall lift the full bucket of material then tilt the bucket down to gently roll the material out of the bucket back onto a pile, thus re-blending any segregated material on the outside surface of the pile.
- 2.1.3 After re-blending, the loader shall re-enter the stockpile, as before, and obtain a full loader bucket of the re-blended material, tilt back and lift the bucket only high enough to back up slightly, and then tilt the bucket forward to gently roll the material out of the bucket forming a sampling pile. Keep the loader bucket as low as possible when building the sampling piles to limit coarser particles rolling to the outside base of the sampling pile.
- 2.1.4 The material shall be visually inspected by the Contract Administrator and the Contractor to determine discernible variations. If any discernible variations are noted, discard the sampling pile and create a new one to establish homogeneity in the material prior to sampling.
- 2.1.5 If the sampling piles contain visually acceptable materials, back drag the material in the sampling pile with the bottom edge of the loader bucket to flatten the upper 1/2 to 1/3 of the sampling pile. The diameter should be approximately four to eight times the thickness. The loaders shall only back-drag the sampling pile once and avoid ramping up on the sampling pile.
- 2.1.6 Divide the surface pad into four (4) quadrants and sample equal amounts of materials evenly across each quadrant. The sample shall be obtained across the entire flat area, but avoid sampling within 0.3 m of the sample pad edge.

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- 2.1.7 For materials less than or equal 50 mm nominal maximum size, insert the square tipped shovel to its full depth into the top of the flattened piles and lift the shovel full materials. Place the material into the sampling container. Repeat this process, until the sample size requirement is met.
- 2.1.8 For 100 mm materials, use necessary equipment (e.g. excavator or backhoe loader) to collect the sample and directly load it into the truck or the sealed shipping containers. If the necessary equipment is not available, place the materials on a hard, clean, level surface where there will be neither loss of material nor the accidental addition of foreign material. Mix the material thoroughly by turning the entire sample over three times. Carefully, remove the outside 0.3 m of the sample pad edge. Divide the flattened mass into four equal quarters and remove two diagonally opposite quarters (e.g. A and C), including all fine materials. Mix and quarter the remaining material until the sample is reduced to the desired size and load it into the truck or the sealed shipping containers.



Figure 1: Sequence of constructing sampling stockpile from existing stockpile

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2.2. Sampling from Site

- 2.2.1 Where there is insufficient room to sample from site, the Contractor shall submit a request to the Contract Administrator for approval to sample from the quarry. Concurrence from the City's Project Manager is required prior to proceeding with sampling.
- 2.2.2 Create a pile on site using a minimum of one (1) trailer load of material less than or equal to 50 mm nominal maximum size or three (3) trailer loads of 100 mm material.
- 2.2.3 Using a front-end loader, mix the pile by rolling the material over from the end of the pile. Keeping the loader bucket as low as possible, push the bucket into the material until the front of the bucket passes the midpoint of the original pile. The loader bucket should then be slowly raised and rolled forward thus producing a smooth mixing of the material. Go to the opposite end of the pile, and repeat this mixing procedure. If the pile does not appear to be reasonably uniform, additional mixing should be done.
- 2.2.4 Back drag the material in the pile with the bottom edge of the loader bucket without allowing the loader tires to ramp up on the sampling pile to flatten the upper 1/2 to 1/3 of the sampling pile. The diameter should be approximately four to eight times the thickness. The loader shall only back-drag the sampling pile once.
- 2.2.5 Divide the surface pad into four (4) quadrants and sample equal amounts of materials evenly across each quadrant. The sample shall be obtained across the entire flat area, but avoid sampling within 0.3 m of the sample pad edge.
- 2.2.6 For materials less than or equal 50 mm nominal maximum size, insert the square tipped shovel to its full depth into the top of the flattened piles and lift the shovel full materials. Place the material into the sampling container. Repeat this process, until the sample size requirement is met.
- 2.2.7 For 100 mm materials, use necessary equipment (e.g. excavator or backhoe loader) to collect the sample and directly load it into the truck or the sealed shipping containers. If the necessary equipment is not available, place the materials on a hard, clean, level surface where there will be neither loss of material nor the accidental addition of foreign material. Mix the material thoroughly by turning the entire sample over three times. Carefully, remove the outside 0.3 m of the sample pad edge. Divide the flattened mass into four equal quarters and remove two diagonally opposite quarters (e.g. A and C), including all fine materials. Mix and quarter the remaining material until the sample is reduced to the desired size and load it into the truck or the sealed shipping containers.



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Figure 2: Sequence of sampling from site