## Section 301. — UNTREATED AGGREGATE COURSES

01 APR 2024 – FP-24

WFL Specification 01 APR 2024 3010010

Include the following when work is required under this Section.

Note: Include SCR 703.05.

Construction Requirements

### 301.03 General.

Delete this Subsection and substitute the following:

Prepare the surface according to Section 204 or 303 as applicable.

After a representative quantity of aggregate is produced, submit target values within the required gradation range shown in Table 703-1 along with a representative 400-pound sample at least 14 days before incorporating the aggregate into the work. Submit aggregate samples to the Vancouver Laboratory.

WFL Specification 01 APR 2024 3010020

Include the following when subbase or base aggregate is used.

Note: If surface aggregate is used, then coordinate with WFL Materials to develop the required language.

Set target values for [INSERT Subbase OR Base] aggregate within the gradation ranges shown in Table 703-2 for the specified grading designation. List the percent passing for all sieve sizes shown in Table 703-1. Target values for non-specification sieves are necessary for performing *The Humphres Method of Granular Soils*.

WFL Specification 01 APR 2024 3010030

Include the following when subbase or base aggregate is used.

Note: If surface aggregate is used, then coordinate with WFL Materials to develop the required language.

### 301.04 Mixing and Spreading.

Delete this Subsection and substitute the following:

Use the optimum moisture content from the Government-performed Humphres Test. Mix aggregate and water to obtain a uniform mixture with a moisture content within 1 percent of the optimum moisture content. Spread and shape uniform lifts of mixtures on prepared surfaces.

Place mixtures in lifts no more than 6 inches in compacted thickness each. Compact each lift according to Subsection 301.05 before placing the next lift. Route hauling equipment uniformly over the full surface width to minimize rutting and uneven compaction.

If the calculated mean value for a tested sieve differs from the target value by more than the allowable deviation for that sieve, terminate placement and submit new target values with another aggregate sample to the Vancouver Laboratory for a new Humphres Test.

### 301.05 Compacting.

Delete the first paragraph and substitute the following:

The Government will determine the maximum density and optimum moisture according to the test procedures described on pages 92 to 98 of Highway Research Board Bulletin No. 319, dated 1962, *The Humphres Method of Granular Soils*.

Delete the third paragraph and substitute the following:

Use the data provided to determine the maximum density based on the gradation of field compaction samples. Compact each lift to at least 95.0 percent of the field maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures.

WFL Specification 01 APR 2024 3010050

Include the following when “subbase aggregate, grading A or B”, “base aggregate, grading C, D, or E” or, “surface aggregate, grading F, G, or H” material is to be statistically evaluated for acceptance.

### 301.08 Acceptance.

Amend as follows:

Delete the second paragraph and substitute the following:

Aggregate gradation, surface course plasticity index, liquid limit, SEP, and fractured faces will be evaluated under Subsection 106.05.

Other aggregate quality properties will be evaluated under Subsections 106.02 and 106.04.

Add the following:

**(c) SE/P200 (SE/P75) Index (SEP).** The lower specification limit for the SEP is 1.000.

**(d) Liquid limit.** The upper specification limit for Subbase or base course aggregate is shown in Subsection 703.05(b)(2). The upper specification limit for Surface course aggregate is shown in Subsection 703.05(b)(2).

**(e) Fractured faces.** The lower specification limit is 50 percent.

WFL Specification 01 APR 2024 3010070

Include the following when aggregate is measured by the cuyd.

Note: Default measurement for this Section is cuyd, talk to Construction and Materials before using a different measurement.

Delete Table 301-1 and substitute the following:

Table 301-1

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | Not required if using Government-provided sources | " | “ | “ | " | Not required if using a pre-crushed commercial source | " |
| Reporting Time |  | Before using in work | " | “ | “ | " | 24 hours | " | " |
| Split Sample |  | Yes | " | “ | “ | " | No | " | " |
| Point of Sampling |  | Source of material | " | “ | “ | Crusher belt or after processing | Crusher belt | " | Crusher belt or after processing |
| Sampling Frequency |  | 1 per type & not less than 5 per source of material(2) | " | “ | “ | " | 2 per day per stockpile minimum | " | " |
| Test Methods Specifications | **Source** | AASHTO T 96 | AASHTO T 104 | AASHTO T 210 | WFLHD-DMSO | AASHTO R 58, T 89, & T 90 | AASHTO T 11  & T27 | ASTM D5821 | AASHTO R 58, T 89, & T 90 |
| Category |  | − | − | − | − | − | − | − | − |
| Characteristic |  | LA abrasion (coarse) | Soundness using sodium sulfate (coarse & fine) | Durability index (coarse & fine) | Accelerated Weathering | Plasticity index | Gradation | Fractured faces | Plasticity index |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04 & 105) |  |  |  | Process Control (153.03) | “ |  | " |
| Material or Product (Subsection) |  | Aggregate quality (703.05(a) (b) (c)) |  |  |  | Surface course aggregate (703.05(c)) | Subbase, base, or surface course aggregate (703.05(b) (c)) | Surface course aggregate (703.05(c)) |

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | − |  |  |  | − | − | − | − |  |  |  |  | − | − | − |
| Reporting Time |  | 4 hours |  |  |  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Split Sample |  | Yes |  |  |  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Point of Sampling |  | From windrow or roadbed after processing | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Sampling Frequency |  | 1 per 500 CUYD  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Test Methods Specifications | **Production** | AASHTO T 27 & T 11 | AASHTO T 176 Alternate Method No. 2, Reference Method | See Note (1) | ASTM D5821 | AASHTO T 27 & T 11 | AASHTO T 176 Alternate Method No. 2, Reference Method | See Note (1) | ASTM D5821 |
| Category |  |  | I | − | II | − | I | II |  | I | I | − | II | − | I | II |
| Characteristic |  | Gradation | No. 4  | No. 200  | Other specified sieves | Sand Equivalent  | SEP | Fractured faces | Gradation | ⅜ inch  | No. 4  | No. 200  | Other specified sieves | Sand equivalent | SEP | Fractured faces |
| Type of Acceptance (Subsection) |  | Statistical (106.05) |  |  |  |  | “ |  |  |  |  |  |  |  |
| Material or Product (Subsection) |  | Subbase course Grading A & B |  |  |  |  | Base course Grading C, D, & E |  |  |  |  |  |

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | Tested by Government | − | − | − |  |  |  | − | − |
| Reporting Time |  | 14 days before use | End of shift | " | 4 hours |  |  |  | “ | " |
| Split Sample |  | Yes | No | " | Yes |  |  |  | “ | " |
| Point of Sampling |  | Stockpile or production output | In-place after compaction | " | From windrow or roadbed after processing | “ | " |
| Sampling Frequency | (continued) | 1 per type & source of material | 1 per 1500 SQYD per layer  | " | 1 per 500 CUYD  | “ | " |
| Test Methods Specifications | **Production** | Humphres Method | AASHTO T 310 or other approved procedures | " | AASHTO T 27 & T 11 | AASHTO T 89, Method A & T 87 | AASHTO R 58, T 89, & T 90 |
| Category |  | − | − | − |  | I | I | II | II | I |
| Characteristic |  | Moisture- density (max density) | Density | Moisture content (in-place) | Gradation | No. 4  | No. 40  | Other specified sieves | Liquid Limit  | Plasticity index |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04) |  | Statistical (106.05) |  |  |
| Material or Product (Subsection) |  | Subbase & base course Grading A, B, C, D, & E |  | Surface course aggregate |  |  |

(1) SEP (SE/P200 (SE/P75) Index) is a measure of a material’s ability to perform based on the quality and quantity of fines present. Quality is represented by the sand equivalent (SE) and quantity is represented by the percent passing the No. 200 sieve (P200 (75)). SEP is computed as follows:

For SE ≥ 29, SEP = SE/(P200 (75) + 25) and for SE < 29, SEP = (SE + 4)/(SE + P200 (75)).

Where: SE = Plastic fines in graded aggregates and soils by using the sand equivalent test. See AASHTO T 176, Alternate Method No.2, Referee Method.

P200 (75) = Material finer than the No. 200 sieve in mineral aggregates by washing. See AASHTO T 11.

(2) Furnish a minimum of five reports, but not less than one report per rock type for each source. Reports must be dated within 1 year of intended use. Obtain samples representative of aggregates being furnished. Include rock type and sample location on test reports.

(3) Minimum of 5 points per Proctor.

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | – | − | − | − |  | − |
| Reporting Time |  | 14 days before use | End of shift | " | 4 hours |  | Before placement of next lift or as requested |
| Split Sample |  | Yes | No | " | Yes |  | No |
| Point of Sampling |  | Stockpile or production output | In-place after compaction | " | From windrow on roadbed after processing |  | Surface of final course |
| Sampling Frequency | (continued) | 1 per type & source of material | 1 per 1500 SQYD per layer  | " | 1 per 500 CUYD  | **Finished Product** | As directed |
| Test Methods Specifications | **Production** | AASHTO T 180 Method D (3) | AASHTO T 310 or other approved procedures | ASTM D5821 | Subsection 301.06 |
| Category |  | − | − | − | − |  | − |
| Characteristic |  | Moisture- density (max density) | Density | Moisture content (in-place) | Fractured faces |  | Surface tolerance & grade |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04) |  |  |  | Measured and tested for conformance (106.04) |
| Material or Product (Subsection) |  | Surface course aggregate |  |  |  | Subbase, base, and surface course |

WFL Specification 01 APR 2024 3010070

Include the following when aggregate is measured by the ton.

Note: Default measurement for this Section is cuyd, talk to Construction and Materials before using a different measurement.

Delete Table 301-1 and substitute the following:

Table 301-1

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | Not required if using Government-provided sources | " | “ | “ | " | Not required if using a pre-crushed commercial source | " |
| Reporting Time |  | Before using in work | " | “ | “ | " | 24 hours | " | " |
| Split Sample |  | Yes | " | “ | “ | " | No | " | " |
| Point of Sampling |  | Source of material | " | “ | “ | Crusher belt or after processing | Crusher belt | " | Crusher belt or after processing |
| Sampling Frequency |  | 1 per type & not less than 5 per source of material(2) | " | “ | “ | " | 2 per day per stockpile minimum | " | " |
| Test Methods Specifications | **Source** | AASHTO T 96 | AASHTO T 104 | AASHTO T 210 | WFLHD-DMSO | AASHTO R 58, T 89, & T 90 | AASHTO T 11  & T27 | ASTM D5821 | AASHTO R 58, T 89, & T 90 |
| Category |  | − | − | − | − | − | − | − | − |
| Characteristic |  | LA abrasion (coarse) | Soundness using sodium sulfate (coarse & fine) | Durability index (coarse & fine) | Accelerated Weathering | Plasticity index | Gradation | Fractured faces | Plasticity index |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04 & 105) |  |  |  | Process Control (153.03) | “ |  | " |
| Material or Product (Subsection) |  | Aggregate quality (703.05(a) (b) (c)) |  |  |  | Surface course aggregate (703.05(c)) | Subbase, base, or surface course aggregate (703.05(b) (c)) | Surface course aggregate (703.05(c)) |

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | − |  |  |  | − | − | − | − |  |  |  |  | − | − | − |
| Reporting Time |  | 4 hours |  |  |  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Split Sample |  | Yes |  |  |  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Point of Sampling |  | From windrow or roadbed after processing | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Sampling Frequency |  | 1 per 1000 tons  | “  | “ | “ | “ |  |  |  |  | “ | “ | “ |
| Test Methods Specifications | **Production** | AASHTO T 27 & T 11 | AASHTO T 176 Alternate Method No. 2, Reference Method | See Note (1) | ASTM D5821 | AASHTO T 27 & T 11 | AASHTO T 176 Alternate Method No. 2, Reference Method | See Note (1) | ASTM D5821 |
| Category |  |  | I | − | II | − | I | II |  | I | I | − | II | − | I | II |
| Characteristic |  | Gradation | No. 4  | No. 200  | Other specified sieves | Sand Equivalent  | SEP | Fractured faces | Gradation | ⅜ inch  | No. 4  | No. 200  | Other specified sieves | Sand equivalent | SEP | Fractured faces |
| Type of Acceptance (Subsection) |  | Statistical (106.05) |  |  |  |  | “ |  |  |  |  |  |  |  |
| Material or Product (Subsection) |  | Subbase course Grading A & B |  |  |  |  | Base course Grading C, D, & E |  |  |  |  |  |

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | Tested by Government | − | − | − |  |  |  | − | − |
| Reporting Time |  | 14 days before use | End of shift | " | 4 hours |  |  |  | “ | " |
| Split Sample |  | Yes | No | " | Yes |  |  |  | “ | " |
| Point of Sampling |  | Stockpile or production output | In-place after compaction | " | From windrow or roadbed after processing | “ | " |
| Sampling Frequency | (continued) | 1 per type & source of material | 1 per 500 tons  | " | 1 per 1000 tons  | “ | " |
| Test Methods Specifications | **Production** | WFLHD Humphres  | AASHTO T 310 or other approved procedures | " | AASHTO T 27 & T 11 | AASHTO T 89, Method A & T 87 | AASHTO R 58, T 89, & T 90 |
| Category |  | − | − | − |  | I | I | II | II | I |
| Characteristic |  | Moisture- density (max density) | Density | Moisture content (in-place) | Gradation | No. 4  | No. 40  | Other specified sieves | Liquid Limit  | Plasticity index |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04) |  | Statistical (106.05) |  |  |
| Material or Product (Subsection) |  | Subbase & base course Grading A, B, C, D, & E |  | Surface course aggregate |  |  |

(1) SEP (SE/P200 (SE/P75) Index) is a measure of a material’s ability to perform based on the quality and quantity of fines present. Quality is represented by the sand equivalent (SE) and quantity is represented by the percent passing the No. 200 sieve (P200 (75)). SEP is computed as follows:

For SE ≥ 29, SEP = SE/(P200 (75) + 25) and for SE < 29, SEP = (SE + 4)/(SE + P200 (75)).

Where: SE = Plastic fines in graded aggregates and soils by using the sand equivalent test. See AASHTO T 176, Alternate Method No.2, Referee Method.

P200 (75) = Material finer than the No. 200 sieve in mineral aggregates by washing. See AASHTO T 11.

(2) Furnish a minimum of five reports, but not less than one report per rock type for each source. Reports must be dated within 1 year of intended use. Obtain samples representative of aggregates being furnished. Include rock type and sample location on test reports.

(3) Minimum of 5 points per Proctor.

Table 301-1 (continued)

Sampling, Testing, and Acceptance Requirements

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Remarks |  | – | − | − | − |  | − |
| Reporting Time |  | 14 days before use | End of shift | " | 4 hours |  | Before placement of next lift or as requested |
| Split Sample |  | Yes | No | " | Yes |  | No |
| Point of Sampling |  | Stockpile or production output | In-place after compaction | " | From windrow on roadbed after processing |  | Surface of final course |
| Sampling Frequency | (continued) | 1 per type & source of material | 1 per 500 tons  | " | 1 per 1000 tons  | **Finished Product** | As directed |
| Test Methods Specifications | **Production** | AASHTO T 180 Method D (3) | AASHTO T 310 or other approved procedures | ASTM D5821 | Subsection 301.06 |
| Category |  | − | − | − | − |  | − |
| Characteristic |  | Moisture- density (max density) | Density | Moisture content (in-place) | Fractured faces |  | Surface tolerance & grade |
| Type of Acceptance (Subsection) |  | Measured and tested for conformance (106.04) |  |  |  | Measured and tested for conformance (106.04) |
| Material or Product (Subsection) |  | Surface course aggregate |  |  |  | Subbase, base, and surface course |