

## AGGREGATE SPECIFICATION LIMITS & SAMPLING AND TESTING GUIDE

April 21, 2009  
Supersedes October 21, 2008

(See Specifications for Complete Details.)

Matls. IM 209  
Appendix C

| TEST LIMITS                                | Spec # | F & T<br>A  | F & T<br>C | LA<br>Abrasion | Absorption | Chert | Shale    | Clay<br>Lumps | Plastic<br>Index | Mortar<br>Strength | Al <sub>2</sub> O <sub>3</sub><br>Limit | Pore<br>Index | Gradation<br>Number |
|--|--------|---|------------|----------------|------------|-------|----------|---------------|------------------|--------------------|---|---------------|---------------------|
| <b>Fine Aggregate for PCC</b>              |        |   |            |                |            |       |          |               |                  |                    |   |               |                     |
| PCC  | 4110   |   |            |                |            |       | 2        |               |                  | 6000psi            |   |               | 1                   |
|  |        | Note: Maximum 40% between sieves<br>Note: The Engineer may require mortar strength testing for sources where quality changes.<br>Note: Shale + Coal not to exceed 2% max. |            |                |            |       |          |               |                  |                    |   |               |                     |
| PCC, Class L                               | 4111   |   |            |                |            |       | 2        |               |                  | 5200psi            |   |               | 1                   |
|  |        | Note: Only from approved PCC sources.<br>Note: Maximum 45% between sieves.<br>Note: Shale + Coal not to exceed 2% max.  |            |                |            |       |          |               |                  |                    |   |               |                     |
| <b>Coarse Aggregate for PCC</b>            |        |   |            |                |            |       |          |               |                  |                    |   |               |                     |
| Crushed Stone                              | 4115   |   |            |                |            |       |          |               |                  |                    |   |               |                     |
| -Structural                                |        | 6   |            | 50             |            | 2     | 1        | 0.5           |                  |                    | 0.5                                     |               | 3-5                 |
| -Nonstructural                             |        | 6   |            | 50             |            | 3     | 1        | 0.5           |                  |                    | 0.5                                     |               | 3-5                 |
|  |        | Note: See 4115.02 for maximum allowable objectionable materials.  |            |                |            |       |          |               |                  |                    |   |               |                     |
| Gravel                                     | 4115   |   |            |                |            |       |          |               |                  |                    |   |               |                     |
| -Structural                                |        | 6   |            | 35             |            | 2     | 1        | 0.5           |                  |                    |   |               | 3-5                 |
| -Nonstructural                             |        | 6   |            | 35             |            | 3     | 1        | 0.5           |                  |                    |   |               | 3-5                 |
|  |        | Note: See 4115.02 for maximum allowable objectionable materials.  |            |                |            |       |          |               |                  |                    |   |               |                     |
| Bridge Deck                                | 4115   | 4   |            | 40             | 2.5        | 0.5   |          |               |                  |                    | 0.4                                     |               | 6                   |
|  |        | Note: Unsound Chert+Shale+Coal+Iron not to exceed 1%.<br>Note: Unsound Chert particles are defined in 4115.02.  |            |                |            |       |          |               |                  |                    |   |               |                     |
| <b>Class V Aggregate</b>                   | 4117   | 6   |            | 40             |            |       | 2 (+#16) |               |                  | 1.5                |   |               | 7                   |
|  |        | Note: Coarse Aggregates as in 4115 (except abrasion) and Fine Aggregates as in 4110.  |            |                |            |       |          |               |                  |                    |   |               |                     |
| <b>Combination of Materials With Cl. V</b> |        |   |            |                |            |       |          |               |                  |                    |   |               |                     |
| Coarse Limestone                           |        | Note: See 4117 for cement requirements.   |            |                |            |       |          |               |                  |                    |   |               |                     |
| Limestone Screenings                       |        | Note: Acquire limestone from sources meeting the specified coarse aggregate durability class for PCC.   |            |                |            |       |          |               |                  |                    |   |               |                     |
|  |        | Note: Must meet the requirements of 4115 and be only from sources acceptable as coarse aggregate.   |            |                |            |       |          |               |                  |                    |   |               |                     |
|  |        |   |            |                |            |       |          |               |                  |                    |   |               | 8                   |

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| TEST LIMITS                      | Spec #   | F & T A  | F & T C | LA Abrasion | Absorption | Chert | Shale | Clay Lumps | Plastic Index | Mortar Strength | Al <sub>2</sub> O <sub>3</sub> Limit | Pore Index  | Gradation Number           |
|----------------------------------|--|--|---------|-------------|------------|-------|-------|------------|---------------|-----------------|--------------------------------------|-------------|----------------------------|
| <b>Granular Surfacing</b>        |  |  |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Aggregate for Granular Shoulders | 4120.02  | <u>Note:</u> Requirements are equivalent to 4120.04, 4120.05 or 4120.06.   |         |             |            |       |       |            |               |                 |                                      | Per 4120.02 |                            |
| Class C Gravel                   | 4120.03  |  | 15      |             |            |       | 10    |            |               |                 |                                      |             | 10                         |
|                                  |  | <u>Note:</u> Percent of Clay Lumps + percent passing #200 sieve not to exceed 15%.   |         |             |            |       |       |            |               |                 |                                      |             |                            |
|                                  |  | <u>Note:</u> Percent of Clay Lumps + percent of (+4) shale + percent passing #200 not to exceed 20%.   |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Class A Crushed Stone            | 4120.04  |  | 15      | 45          |            |       |       | 4          |               |                 |                                      |             | 11                         |
|                                  |  | <u>Note:</u> For shoulders only; material with Al <sub>2</sub> O <sub>3</sub> not exceeding 0.7 or A-freeze not exceeding 10 may have an abrasion maximum of 55. |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Class B Crushed Stone            | 4120.05  |  | 20      | 55          |            |       |       | 4          |               |                 |                                      |             | 11                         |
|                                  |  | <u>Note:</u> "C" Freeze + Abrasion not to exceed 65%   |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Class D Crushed Stone            | 4120.06  | <u>Note:</u> "C" Freeze, Abrasion, and Gradation to be specified by Contract Documents.  |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Paved Shoulders                  | 4120.07  |  | 15      | 45          |            |       |       | 4          |               |                 |                                      |             | 11                         |
| Fillets                          | <u>Note:</u> Material with Al <sub>2</sub> O <sub>3</sub> not exceeding 0.7 or A-freeze not exceeding 10 may have an abrasion maximum of 55. |  |         |             |            |       |       |            |               |                 |                                      |             |                            |
| <b>Granular Subbase</b>          |  |  |         |             |            |       |       |            |               |                 |                                      |             |                            |
|                                  | 4121   | 25   |         | 50          |            |       |       |            |               |                 | 1.5                                  |             | 12a(Cr. St.)<br>12b(Grav.) |
|                                  |  | <u>Note:</u> Combinations of crushed PCC, sand, crushed gravel, or crushed stone may be used. Specification limits are for crushed stone or crushed gravel.      |         |             |            |       |       |            |               |                 |                                      |             |                            |
| <b>Crushed Stone-Base</b>        |  |  |         |             |            |       |       |            |               |                 |                                      |             |                            |
| Macadam Stone                    | 4122   |  | 10      | 50          |            |       |       |            |               |                 |                                      |             | 13(Visual)<br>Per 4122.02  |
|                                  |  | <u>Note:</u> Choke stone see 4122.03 for details; when produced from Macadam has certified inspection of 1/3000 ton.   |         |             |            |       |       |            |               |                 |                                      |             |                            |

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|--|---------|------------|------------|----------------|------------|-------|-------|---------------|------------------|--------------------|---|---------------|---------------------|
| <b>Modified Subbase</b>  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
|  | 4123    |            | 15         | 45             |            |       |       | 7(Gravel)     |                  |                    | 4.7(-#40)                               |               | 14                  |
| <p><u>Note:</u> Material with Al<sub>2</sub>O<sub>3</sub> not exceeding 0.7 (+4) or A-freeze not exceeding 10 may have an abrasion maximum of 55.</p> <p><u>Note:</u> If gravel only, 75% of +3/8" must be crushed with a minimum of one fractured face.</p> <p><u>Note:</u> Reclaimed pavements meeting Materials IM 209 may be used.</p> |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <b>Aggregate for Slurry Mixture</b>  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
|  | 4124.03 | 10         |            | 40             |            |       | 5     |               |                  |                    | 0.7                                     |               | 22 or 23            |
| <u>Note:</u> Friction Type 4 or better, sand equivalent of not less than 45, and organic materials maximum 0.01%.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <b>Aggregate for Bituminous Sealcoat</b>   |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
|  | 4125.03 |            | 10         | 40             |            |       | 5     |               |                  |                    |   |               | 1, 19-21            |
| <u>Note:</u> Friction Type 4 or better, shale on sand cover aggregate shall not exceed 2% maximum.   |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <b>Coarse Aggregate for HMA</b>  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| Type A   | 4127.02 | 10         |            | 45             | 6.0        |       |       | 0.5           |                  |                    | 0.7                                     |               | Per Form 955        |
| <u>Note:</u> Organic materials maximum 0.01%.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| Type B   |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| Primary  | 4127.02 | 25         | 10         | 45             | 6.0        |       |       |               |                  |                    | 1.5                                     |               | Per Form 955        |
| Non-Primary  | 4127.02 | 45         | 10         | 45             | 6.0        |       |       |               |                  |                    | 2.5                                     |               | Per Form 955        |
| <u>Note:</u> Organic materials maximum 0.01%.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <b>Fine Aggregate for HMA</b>  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
|  | 4127.03 |            |            |                |            |       |       |               |                  |                    |   |               | Per Form 955        |
| <u>Note:</u> Natural sand shall have no more than 50% retained between two consecutive sieves below the #4 sieve.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <u>Note:</u> Organic materials maximum 0.01%.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <u>Note:</u> Crushed gravel or stone processed from coarse aggregate meeting requirements of 4127.02.  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| <b>Combination of Materials</b>  |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| Type A   | 4127.04 |            |            |                |            |       |       |               |                  |                    |   |               | Per Form 955        |
| <u>Note:</u> The fine portion of combined materials shall not exceed 2% shale retained on the #16 sieve.   |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |
| Type B   |         |            |            |                |            |       |       |               |                  |                    |   |               | Per Form 955        |
| <u>Note:</u> The fine portion of combined materials shall not exceed 5% shale retained on the #16 sieve.   |         |            |            |                |            |       |       |               |                  |                    |   |               |                     |

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|------------------------------------|---------|---|------------|----------------|--------------------------|-------|-------|---------------|--|--------------------|---|---------------|---------------------|
| <b>Revetment Stone</b>             |         | <b>Note:</b> Rocks that split into layers less than 4" thick shall not be used.   |            |                |                          |       |       |               |  |                    |   |               |                     |
| Class A                            | 4130.01 | 10*   | 5**        | 50             | (*Primary/**Non-primary) |       |       |               |  |                    | 0.7                                     | 25            | Visual              |
| Class B                            | 4130.01 | 10*   | 5**        | 50             |                          |       |       |               |  |                    | 0.7                                     | 25            | Visual              |
| Class D                            | 4130.01 |   | 10         | 50             |                          |       |       |               |  |                    |   |               | Visual              |
| Class E                            | 4130.01 |   | 10         | 50             |                          |       |       |               |  |                    | 0.7                                     | 25            | Visual              |
| Erosion Stone                      |         | <b>Note:</b> See Specification 4130.01 for bedding plane/concrete slab thickness requirements.  |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    | 4130.05 |   | 15         | 50             |                          |       |       | 5             | <b>Note:</b> See 4130.04 for gradation requirements. |                    |   |               | Visual              |
| Gabion Stone                       | 4130.08 |   | 10         | 50             |                          |       |       |               |  |                    | 0.7                                     |               | Visual              |
|                                    |         | <b>Note:</b> See 4130.07 for gradation requirements.  |            |                |                          |       |       |               |  |                    |   |               |                     |
| <b>Porous Backfill</b>             |         |   |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    | 4131    |   | 10         | 45             |                          |       | 5(+4) |               |  |                    | 0.7                                     |               | 29                  |
|                                    |         | <b>Note:</b> Material shall be free of visible clay and objectionable clay coating.   |            |                |                          |       |       |               |  |                    |   |               |                     |
| <b>Special Backfill</b>            |         |   |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    | 4132.01 |   |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    |         | Crushed Stone/PCC/CCP/Reclaimed HMA; Mixtures of Gravel, Sand and Soil or Uniformly blended combinations of the above.                            |            |                |                          |       |       |               |  |                    |   |               |                     |
| Gravel                             | 4132.03 |   |            |                |                          |       |       |               | 10   |                    |   |               | 31                  |
|                                    |         | <b>Note:</b> Organic material of no more than 1% on fraction passing the #40 sieve.   |            |                |                          |       |       |               |  |                    |   |               |                     |
| <b>Granular Backfill</b>           |         |   |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    | 4133    |   | 20         | 55             |                          |       |       | 4             |  |                    |   |               | 32*,**              |
|                                    |         | <b>Note:</b> "C" Freeze + Abrasion not to exceed 65%.   |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    |         | *See 4133.04 for gradation when backfill is under flowable mortar.  |            |                |                          |       |       |               |  |                    |   |               |                     |
|                                    |         | **See 4133.05 for gradation when used as floodable backfill.  |            |                |                          |       |       |               |  |                    |   |               |                     |
| <b>Recycled PCC</b>                |         | <b>Note:</b> Recycled PCC must meet gradation and sampling frequency of the intended product; and meet the requirements of IM 210.                |            |                |                          |       |       |               |  |                    |   |               |                     |
| <b>Recycled Composite Pavement</b> |         | <b>Note:</b> Recycled composite pavement must meet gradation and sampling frequency of the intended product; and meet the requirements of IM 210. |            |                |                          |       |       |               |  |                    |   |               |                     |