Washington State Department of Transportation

CONSTRUCTION BULLETIN

State Construction Office
Multimodal Development & Delivery

Recycled Concrete Aggregate

Date: October 30th, 2018

Purpose

WA State Department of Transportation has made process changes necessary to maintain compliance with Engrossed Substitute House Bill 1695 which requires the use of recycled concrete aggregates (RCA) on transportation infrastructure projects.

Background

Engrossed Substitute House Bill 1695 became effective on January 1, 2016, codified in law as RCW 70.95.805, requiring a minimum 25% usage of RCA on all WSDOT projects. The RCW references Table 9-03.21(1)E of the Standard Specifications outlining eligible materials for RCA. The RCW also includes an exception when RCA is not readily available and/or cost-effective. RCW 70.95.807 requires WSDOT to report annually on RCA utilization.

Section 1-06.6 – Recycled Materials was added to the Standard Specifications in 2016 requiring contractors to use recycled materials in all projects. The new specification addressed minimum utilization requirements, usage plans, reporting and cost estimates to document when RCA was not readily available and/or cost-effective.

The 2016 and 2017 Annual Recycled Concrete Aggregate Reports demonstrated that RCA utilization was not meeting the 25% minimum set by the Legislature. Therefore, in an effort to increase overall utilization, WSDOT is working with material suppliers and contractors to identify and reduce barriers to using RCA. The main barriers identified were lack of pre-approved sources, costly testing, and unreliable compaction verification methods.

Changes in Recycled Concrete Aggregate Source Approvals

WSDOT considers physical properties, material consistency, and toxicity when evaluating RCA sources for approval. To streamline the source approval process, WSDOT created a three tiered system based on intended use and RCA's origin.

Tier 1 – Recycled concrete aggregates, regardless of source, used in Tier 1 applications do not require evaluation of aggregate source properties such as LA Wear, WSDOT Degradation, and Specific Gravity. Tier 1 applications do require a certification of acceptable toxicity characteristics to be submitted prior to delivery and placement.

Tier 2 – Recycled concrete aggregates that originates from a WSDOT project or that is returned concrete may be used for Tier 2 applications without source property testing or a certification of toxicity

characteristics. Returned concrete is defined as concrete that was returned to the plant that was originally produced from a WSDOT approved aggregate source. Reclamation facilities must participate in WSDOT Standard Practice QC 9 to be listed on the Qualified Products List (QPL) for Tier 2 production.

Tier 3 – Recycled concrete aggregate from unknown stockpiles may be used for Tier 3 applications provided the following. Evaluation of aggregate source properties and certification of acceptable toxicity characteristics is required prior to delivery and placement. Reclamation facilities must participate in WSDOT Standard Practice QC10 to be listed on the QPL for Tier 3 production.

There are currently 16 reclamation facilities listed on the (QPL) for Tier 1, and one facility for Tier 2. The Recycled Concrete Aggregates (RCA) – Tier 1, Tier 2 and Tier 3 Map shows the location of approved facilities statewide, and can be found on the WSDOT QPL webpage.

Changes in Recycled Concrete Aggregate Compaction Acceptance

Due to problems associated with nuclear gauge compaction testing of RCA, Standard Specification 4-04.3(5) and 7-08.3(3) were amended to allow the use of test point compaction evaluation in accordance with WSDOT SOP 738. This test method allows the Contractor and WSDOT to work together to determine the optimum compactive effort required for RCA based on a specified test section and observed rolling pattern.

Changes in Contractor Reporting

Standard Specification 1-06.6 previously required the Contractor to submit a Recycled Materials Utilization Plan as a Type 1 Working Drawing, supplemented by a final report showing actual usage at the end of the project. The final report provided an opportunity to list all recycled material used on the project, including applications that did not allow the use of RCA. This led to a common misconception that all recycled material used on the project could be counted towards the minimum 25% RCA usage requirement.

To simplify the submittal process a new form was created that allows the contractor to submit their utilization plan and actual quantity usage on the same form, WSDOT Form 350-075A. Bid Item information was added to the form to assist Project Office staff with reviewing the plan, ensuring all bid items eligible to use RCA are included. This form will need to be submitted twice; once with the planned utilization quantities (preferably at the pre-con), and then a final copy at the end of the project with the addition of the actual quantities. If the minimum utilization requirement is not met, a cost estimate meeting the requirements of Standard Specification 1-06.6(1)A is required to accompany the report.

Specification and Construction Manual Revisions

Reducing barriers to the use of recycled concrete aggregate required changes to the Standard Specifications in the sections as follows:

- 1-06.6 Recycled Materials
- 1-06.6(1)A Recycling of Aggregate and Concrete Materials, General
- 4-04.3(5) Shaping and Compaction (*updated April 2018*)
- 7-08.3(3) Backfilling (*updated April 2018*)
- 9-03.21(1)B (new section) Recycled Concrete Aggregate

Related changes to the Construction Manual are as follows:

- SS 1-06.6(1)A Recycling of Aggregate and Concrete Materials, General
- 9-1.3B(1)(VII) Recycled Materials for Aggregate
- 9-4.11 Recycled Materials

Resources

Standard Specification 1-06.6, 1-06.6(1)A, 4-04.3(5), 7-08.3(3) and 9-03.21(1)B
Construction Manual SS 1-06.6(1), 9-1.3B(1) and 9-4.11
RCW 70.95.805, RCW 70.95.807
WSDOT Form 350-075A
WSDOT SOP 738 – Establishing Maximum Field Density for Recycled Concrete Aggregates by Test Point Evaluation
Standard Practices QC9 and QC10
Recycled Concrete Aggregates (RCA) – RCA Tier 1, RCA Tier 2 and RCA Tier 3 Map

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Section 1-06, Control of Material
~~January 2~~October 30, 2018

1-06.1(3) Aggregate Source Approval (ASA) Database
This section is supplemented with the following:

Regardless of status of the source, whether listed or not listed in the ASA database the source owner may be asked to provide testing results for toxicity in accordance with Section 9-03.21(1).

1-06.2(2)D Quality Level Analysis
This section is supplemented with the following new subsection:

1-06.2(2)D5 Quality Level Calculation – HMA Compaction
The procedures for determining the quality level and pay factor for HMA compaction are as follows:

1. Determine the arithmetic mean, X_m, for compaction of the lot:

$$X_m = \frac{\sum x}{n}$$

Where:
x = individual compaction test values for each sublot in the lot.
$\sum x$ = summation of individual compaction test values
n = total number test values

2. Compute the sample standard deviation, “S”, for each constituent:

$$S = \left[\frac{n\sum x^2 - \left(\sum x\right)^2}{n(n-1)} \right]^{\frac{1}{2}}$$

Where:
$\sum x^2$ = summation of the squares of individual compaction test values
$(\sum x)^2$ = summation of the individual compaction test values squared

3. Compute the lower quality index (Q_L):

$$Q_L = \frac{X_m - LSL}{S}$$

Where:
LSL = 91.5

4. Determine P_L (the percent within the lower Specification limit which corresponds to a given Q_L) from Table 1. For negative values of Q_L, P_L is equal to 100 minus the table P_L. If the value of Q_L does not correspond exactly to a figure in the table, use the next higher value.

5. Determine the quality level (the total percent within Specification limits):

   Quality Level = P_L

6. Using the quality level from step 5, determine the composite pay factor (CPF) from Table 2.

7. If the CPF determined from step 6 is 1.00 or greater: use that CPF for the compaction lot; however, the maximum HMA compaction CPF using an LSL = 91.5 shall be 1.05.

8. If the CPF from step 6 is not 1.00 or greater: repeat steps 3 through 6 using an LSL = 91.0. The value thus determined shall be the HMA compaction CPF for that lot; however, the maximum HMA compaction CPF using an LSL = 91.00 shall be 1.00.

1-06.2(2)D4 Quality Level Calculation

The first paragraph (excluding the numbered list) is revised to read:

The procedures for determining the quality level and pay factors for a material, other than HMA compaction, are as follows:

1-06.6 Recycled Materials

The first three sentences of the second paragraph is revised to read:

The Contractor shall submit a Recycled Material Utilization Plan on WSDOT Form 350-075A within 30 calendar days after the Contract is executed. The plan shall provide the Contractor's anticipated usage of recycled concrete aggregates for meeting the requirements of these Specifications. The quantity of recycled concrete aggregate will be provided in tons and as a percentage of the Plan quantity for eligible material listed in Section 9-03.21(1)E Table on Maximum Allowable percent (By Weight) of Recycled Material.

The last paragraph is revised to read:

Within 30 calendar days after Physical Completion, the Contractor shall report the quantity of recycled concrete aggregates that were utilized in the construction of the project for each eligible item listed in Section 9-03.21(1)E. The Contractor's report shall be provided on WSDOT Form 350-075A, Recycled Materials Reporting.

1-06.6(1)A General

Item 1(a) in the second paragraph is revised to read:

a. The estimated costs for the Work for each material with 25 percent recycled concrete aggregate. The cost estimate shall include for each material a documented price quote from the supplier with the lowest total cost for the Work.

Section 9-03, Aggregates
~~August 6~~October 30, 2018

9-03.1 Aggregates for Portland Cement Concrete
This section's title is revised to read:

Aggregates for Concrete

9-03.1(1) General Requirements
The first two sentences of the first paragraph are revised to read:

Concrete aggregates shall be manufactured from ledge rock, talus, or sand and gravel in accordance with the provisions of Section 3-01. Reclaimed aggregate may be used if it complies with the specifications for concrete.

The second paragraph (up until the colon) is revised to read:

Aggregates for concrete shall meet the following test requirements:

The second sentence of the second to last paragraph is revised to read:

The Contractor shall submit test results according to ASTM C1567 through the Engineer to the State Materials Laboratory that demonstrate that the proposed fly ash when used with the proposed aggregates and cement will control the potential expansion to 0.20 percent or less before the fly ash and aggregate sources may be used in concrete.

9-03.1(2) Fine Aggregate for Portland Cement Concrete
This section's title is revised to read:

Fine Aggregate for Concrete

9-03.1(4) Coarse Aggregate for Portland Cement Concrete
This section's title is revised to read:

Coarse Aggregate for Concrete

9-03.1(4)C Grading
The first paragraph (up until the colon) is revised to read:

Coarse aggregate for concrete when separated by means of laboratory sieves shall conform to one or more of the following gradings as called for elsewhere in these Specifications, Special Provisions, or in the Plans:

9-03.1(5) Combined Aggregate Gradation for Portland Cement Concrete
This section's title is revised to read:

Combined Aggregate Gradation for Concrete

9-03.1(5)B Grading
In the last paragraph, "WSDOT FOP for WAQTC/AASHTO T 27/T 11" is revised to read "FOP for WAQTC/AASHTO T 27/T 11".

9-03.2 Aggregate for Job-Mixed Portland Cement Mortar

This section's title is revised to read:

Aggregate for Job-Mixed Portland Cement or Blended Hydraulic Cement Mortar

The first sentence of the first paragraph is revised to read:

Fine aggregate for portland cement or blended hydraulic cement mortar shall consist of sand or other inert materials, or combinations thereof, accepted by the Engineer, having hard, strong, durable particles free from adherent coating.

9-03.4(1) General Requirements

The first paragraph (up until the colon) is revised to read:

Aggregate for bituminous surface treatment shall be manufactured from ledge rock, talus, or gravel, in accordance with Section 3-01. Aggregates for Bituminous Surface Treatment shall meet the following test requirements:

9-03.8(1) General Requirements

The first paragraph (up until the colon) is revised to read:

Aggregates for Hot Mix Asphalt shall meet the following test requirements:

9-03.8(2) HMA Test Requirements

The two tables in the second paragraph are replaced with the following three tables:

Mix Criteria	HMA Class							
	⅜ inch		½ inch		¾ inch		1 inch	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Voids in Mineral Aggregate (VMA), %	15.0		14.0		13.0		12.0	
Voids Filled With Asphalt (VFA), %								
ESAL's (millions)	VFA							
< 0.3	70	80	70	80	70	80	67	80
0.3 to < 3	65	78	65	78	65	78	65	78
≥ 3	73	76	65	75	65	75	65	75
Dust/Asphalt Ratio	0.6	1.6	0.6	1.6	0.6	1.6	0.6	1.6

Test Method	ESAL's (millions)	Number of Passes
Hamburg Wheel-Track Testing, FOP for AASHTO T 324 Minimum Number of Passes with no Stripping Inflection Point and Maximum Rut Depth of 10mm	< 0.3	10,000
	0.3 to < 3	12,500
	≥ 3	15,000
Indirect Tensile (IDT) Strength (psi) of Bituminous Materials FOP for ASTM D6931		175 Maximum

	ESAL's (millions)	N initial	N design	N maximum
% Gmm	< 0.3	≤ 91.5	96.0	≤ 98.0
	0.3 to < 3	≤ 90.5	96.0	≤ 98.0
	≥ 3	≤ 89.0	96.0	≤ 98.0

Gyratory Compaction (number of gyrations)	< 0.3	6	50	75
	0.3 to < 3	7	75	115
	> 3	8	100	160

9-03.8(7) HMA Tolerances and Adjustments

In the table in item number 1, the fifth row is revised to read:

Asphalt binder	-0.4% to 0.5%		±0.7%

In the table in item number 1, the following new row is inserted before the last row:

Voids in Mineral Aggregate, VMA	-1.5%		

9-03.9(1) Ballast

The second paragraph (up until the colon) is revised to read:

Aggregates for ballast shall meet the following test requirements:

9-03.14(4) Gravel Borrow for Structural Earth Wall

The second sentence of the first paragraph is revised to read:

The material shall be substantially free of shale or other soft, poor durability particles, and shall not contain recycled materials, such as glass, shredded tires, concrete rubble, or asphaltic concrete rubble.

9-03.21(1)B Recycled Concrete Aggregate Approval and Acceptance

This section is supplemented with the following new subsection:

9-03.21(1)B1 Recycled Concrete Aggregate Approval and Acceptance

Recycled concrete aggregate may be approved through a three tiered system that consists of the following:

Tier 1	
Approval Requirements	Approval of the Reclamation Facility is not required.
Acceptance Requirements	Certification of toxicity characteristics in accordance with Section 9-03.21(1). Field acceptance testing in accordance with Section 3-04.
Approved to provide the following Aggregate Materials:	
9-03.10 Aggregate for Gravel Base 9-03.12(1)B Gravel Backfill for Foundations Class B 9-03.12(2) Gravel Backfill for Walls 9-03.12(3) Gravel Backfill for Pipe Zone Bedding 9-03.14(1) Gravel Borrow 9-03.14(2) Select Borrow 9-03.14(2) Select Borrow (greater than 3 feet below subgrade and side slope) 9-03.14(3) Common Borrow 9-03.14(3) Common Borrow (greater than 3 feet below subgrade and side slope) 9-03.17 Foundation Material Class A and Class B	

9-03.18 Foundation Material Class C 9-03.19 Bank Run Gravel for Trench Backfill

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Tier 2	
Approval Requirements	The Reclamation Facility shall have a Quality Control Plan (QCP) in accordance with WSDOT QC 9 “Standard Practice for Approval of Reclamation Facilities of WSDOT Recycled Concrete and Returned Concrete”. The Reclamation Facility’s QCP shall be submitted and approved by the WSDOT State Materials Laboratory. Once accepted, any changes to the QCP will require a new QCP to be submitted for acceptance. Evaluation of aggregate source properties (LA Wear and Degradation) for the recycled concrete aggregate is not required.
Acceptance Requirements	Certification of toxicity characteristics in accordance with Section 9-03.21(1), required if requested. Field acceptance testing in accordance with Section 3-04 is required. Provide certification in accordance with WSDOT QC 9 for every lot. A lot shall be no larger than 10,000 tons.
Approved to provide the following Aggregate Materials:	
Tier 1 aggregate materials 9-03.1 Coarse Aggregate for Commercial Concrete or Concrete class 3000 9-03.9(1) Ballast 9-03.9(2) Permeable Ballast 9-03.9(3) Crushed Surfacing 9-03.12(1)A Gravel Backfill for Foundations Class A	

2

Tier 3	
Approval Requirements	The Reclamation Facility shall have a Quality Control Plan (QCP) in accordance with WSDOT QC 10 “Standard Practice for Approval of Reclamation Facilities of Recycled Concrete Aggregates from Stockpiles of Unknown Sources”. The Reclamation Facility’s QCP shall be submitted and approved by the WSDOT State Materials Laboratory. Once accepted, any changes to the QCP will require a new QCP to be submitted for acceptance. Evaluation of aggregate source properties (LA Wear and Degradation) for the recycled concrete aggregate is required.
Acceptance Requirements	Certification of toxicity characteristics in accordance with Section 9-03.21(1) is required. Field acceptance testing in accordance with

	Section 3-04 is required. Provide certification in accordance with WSDOT QC 10 for every lot. A lot shall be no larger than 10,000 tons
Approved to provide the following Aggregate Materials:	
Tier 1 aggregate materials 9-03.1 Coarse Aggregate for Commercial Concrete or Concrete class 3000 9-03.9(1) Ballast 9-03.9(2) Permeable Ballast 9-03.9(3) Crushed Surfacing 9-03.12(1)A Gravel Backfill for Foundations Class A	

For Reclamation Facilities that do not participate in Tier 2 and Tier 3, approval of recycled concrete aggregate will be in accordance with Section 9-03.21(1), and acceptance will be in accordance with Section 3-04.

9-03.21(1)E Table on Maximum Allowable percent (By Weight) of Recycled Material

"Portland Cement" is deleted from the first two rows in the table.

The first column of the third row is revised to read:

Coarse Aggregate for Commercial Concrete and Class 3000 Concrete

SS 1-06.6 Recycled Materials

SS 1-06.6(1) Recycling of Construction Aggregate and Concrete Materials

Engrossed Substitute House Bill 1695 requires the use of recycled concrete aggregate in the amount of 25 percent on all WSDOT projects, and to report annual usage to the legislature~~. H~~. ~~H~~owever; this requirement only applies to ~~those~~ material~~s~~ included in the Contract that are listed in Standard Specification~~table in Section~~ 9-03.21(1)E and ~~and~~that allow for the use of recycled concrete aggregate.

Recycled concrete is hardened concrete that is crushed and may contain coarse and fine mineral aggregate with Portland cement. The *Standard Specifications* encourage the use of recycled materials~~aggregates~~ and require~~s~~ that recycled concrete aggregates be incorporated into the work by the Contractor.

Because it is important that the Contractor have a plan for using the required percentage of recycled concrete aggregates~~,materials at the beginning of the Contract,~~ the ~~Standard Specifications~~Standard Specifications require the Contractor to submit a utilization plan. ~~n detailing how they will use recycled materials in the work on the Contract.~~ The Contractor's r~~R~~ecycled concrete aggregate~~Materials~~ u~~U~~tilization p~~P~~lan is to be submitted ~~as a Type 1 Working Drawing~~on DOT Form 350-075A – Recycled Concrete Aggregate Reporting - within 30 calendar days of Contract E~~e~~xecution, preferably at the Pre-Construction Conference. ~~of the contract.~~

~~Recycled Materials for use on WSDOT projects must be tested by a certified laboratory and the test results submitted to the Engineer prior to the incorporation of the material into the project. The test results must include a certification that the materials are not Dangerous Waste per WAC 173-303.~~

The r~~R~~ecycled concrete aggregate~~Material~~ u~~U~~tilization p~~P~~lan details how the Contractor will meet the 25 percent requirement. Each bid item that includes eligible material will be listed on the utilization plan and will include the percentage of anticipated recycled concrete aggregate that will be used. ~~is the Contractor's initial plan for including recycled aggregate in the work detailing how they will meet the 25 percent requirement for recycled concrete aggregate.~~ If the plan shows the Contractor will not meet the minimum 25 percent requirement, a cost estimate meeting the requirements of Standard Specification 1-06.6(1)A must be attached. The details of the~~The details of the~~ plan are not required to be static as the Contractor should be actively managing their use of recycled concrete aggregate~~materials~~ throughout the Contract. Therefore, the Contractor may alter the utilization plan at their discretion ~~throughout the Contract~~ without submitting a new one~~plan~~. Should the Contractor alter their plan, the Project Engineer may choose to review it.~~ Should the Contractor alter their plan, the Project Engineer may choose to review with the Contractor their updated plan for meeting the recycling requirement.~~

Within 30 days after Physical Completion, ~~At the end of the Contract, prior to Physical Completion,~~ the Contractor is required to re-submit the Recycled Concrete Aggregate~~Materials~~ Reporting form (DOT Form 350-075A) to include the actual amounts of recycled concrete aggregate and virgin material used on the project ~~the Project Engineer~~. ~~The Recycled Materials Reporting form will include the quantities of all materials, both recycled and virgin, for aggregates and concretes that were used on the project for the items listed. The Project Engineer should review the quantities submitted on the form.~~ If the final tally of recycled concrete aggregate does not meet the 25 percent requirement, the Contractor is required to attach a cost estimate~~s~~ meeting the requirements of Standard Specification 1-06.6(1)A~~,~~. ~~both with and without the use of recycled concrete aggregate, for each material used on the Contract that is listed in *Standard Specification* Section 9-03.21(1)E that allows recycled concrete aggregate.~~ The Project Engineer should review the cost estimate for reasonableness; an independent verification of detailed costs is not required as the Contractor certifies the accuracy of the information.

The Project Engineer shall submit the Recycled Concrete Aggregate Reporting~~Materials Reporting~~ form to the Region Documentation Engineer for their review and approval prior to a copy of the~~e Recycled Materials Reporting~~ form being sent to the Documentation Engineer at the State Construction Office. These reports~~is~~ will be used by the State Construction Office in the annual report ~~to be~~ submitted to the legislature.

(VII) Recycle Materials for Aggregate

Requirements for recycled materials in aggregates are described in *Standard Specification*ns Section 9-03.21 which applies to recycled hot mix asphalt, recycled concrete aggregate, glass aggregates and steel furnace slag. The Project Engineer is required to verify that recycled material imported to the job site is not classified as a Dangerous Waste per the Dangerous Waste Regulations WAC 173-303. Recycled materials obtained from the Contracting Agency's roadways will not require testing and certification for toxicity testing or certification for toxicity characteristics.

The Project Engineer needs to do the following in order to determine and document the recycled material is not classified as a Dangerous Waste and is acceptable for use on a WSDOT project:

- Have the Contractor provide documentation identifying what recycled materials the Contractor is proposing to use and sampling documentation.
- Have the Contractor provide testing information from representative samples of the recycled material and check to ensure the recycled material is below the Maximum Concentration of Contaminates for the Toxicity Characteristics in the Toxicity Characteristics List in WAC 173-303-090.
- Have the Contractor certify that the recycled material is not a Washington State Dangerous Waste per WAC 173-303.

The Project Engineer can contact the WSDOT Hazardous Materials Program to help evaluate sample approach, lab results, help in determining if changes in the recycled material warrant additional testing, or other assistance as needed. The Hazardous Material Program can be reached at 360-570-6656.

The Contractor is required to do sampling and testing for toxicity of the recycled material at the frequency specified in *Standard Specification*ns Secction 9-03.21(1) prior to combining with other materials and not less than one sample and test from any single source. If the Project Engineer suspects the recycled material may be contaminated based on a change in odor, appearance, or knowledge of the source of material, the WSDOT Hazardous Materials Program should be contacted to determine if a verification sample should be tested for toxicity. Sample results are expected to exhibit the average properties of the stockpile of material being proposed for use. The final blended product shall meet the acceptance requirements for the specified type of aggregate.

Once it has been determined that the recycled material is not classified as a Dangerous Waste the Project Engineer shall code the RAM either as an "8" Source Approved or as a "9" Submit samples for preliminary evaluation depending on what type of aggregate material the recycled material is being proposed for.

The RAM should be coded with an "8 & 1" and noted as "certification and acceptance testing per *Standard Specifications* Section 9-03.21" in the remark field for the following aggregate materials; Section 9-03.8 Aggregates for Hot Mix

Asphalt (recycle HMA only), Section 9-03.10 Aggregate for Gravel Base, Section 9-03.12(1)B Gravel Backfill for Foundations Class B, Section 9-03.12(2) Gravel Backfill for Walls, Section 9-03.12(3) Gravel Backfill for Pipe Zone Bedding, Section 9-03.12(4) Gravel Backfill for Drains, Section 9-03.12(5) Gravel Backfill for Drywells, Section 9-03.13 Backfill for Drains, Section 9-03.13(1) Sand Drainage Blanket, Section 9-03.14(1) Gravel Borrow, and Section 9-03.14(2) Select Borrow.

The RAM should be coded with a "9" and noted "source properties evaluation and indicate the standard specification being proposed" in the remarks field for the following aggregate materials; Section 9-03.8 Aggregates for Hot Mix Asphalt (recycle steel furnace slag only), Section 9-03.9(1) Ballast, Section 9-03.9(2) Permeable Ballast, Section 9-03.9(3) Crush Surfacing, Section 9-03.12(1)A Gravel Backfill for Foundations Class A, and Section 9-13.1 Riprap and Quarry Spalls. Include copies of the toxicity tests results with the preliminary sample that is submitted to the State Materials Laboratory for evaluation of source properties.

Engrossed Substitute House Bill 1695 requires the use of recycled concrete aggregates (RCA) in the amount of 25 percent on all WSDOT projects. This requirement only applies to those materials listed in Standard Specification Section 9-03.21 table that allow the use of RCA, see Section SS 1-06.6. To encourage and streamline the use or RCA on WSDOT projects the State Materials Laboratory developed quality control plans for RCA. There are three tiers of quality for RCA;

- Tier 1 pertains to those aggregate materials that do not require preliminary testing for source property requirements such as LA Wear, WSDOT Degradation, and Specific Gravity and applies to Standard Specifications Sections 9-03.10 Aggregates for Gravel Base, 9-03.12(1)B Gravel Backfill for Foundations Class B, 9-03.12(2) Gravel Backfill for Walls, 9-03.12(3) Gravel Backfill for Pipe Zone Bedding, 9-03.14(1) Gravel Borrow, 9-03.14(2) Select Borrow, 9-03.14(2) Select Borrow (greater than 3 feet below subgrade and side slope), 9-03.14(3) Common Borrow, 9-03.14(3) Common Borrow (greater than 3 feet below subgrade and side slope), 9-03.17 Foundation Material Class A and Class B, 9-03.18 Foundation Material Class C, and 9-03.19 Bank Run Gravel for Trench Backfill. See Section 9-4.11 for approval and acceptance requirements.
- Tier 2 pertains to RCA from WSDOT projects and returned concrete. Returned concrete is concrete that was returned to the concrete plant that was produced from a WSDOT approved aggregate source. For a reclamation facility to participate in Tier 2 the reclamation facility must be compliant with WSDOT Standard Practice QC 9 "Standard Practice for Approval of Reclamation Facilities for WSDOT Recycled Concrete and Returned Concrete". See Section 9-4.11 for approval and acceptance requirements.
- Tier 3 pertains to RCA from stockpiles of unknown sources. For reclamation facility to participate in Tier 3 the reclamation facility must be compliant with

WSDOT Standard Practice QC 10 “Standard Practice for Approval of Recycled Materials Facilities from Stockpiles of Unknown Sources” See Section 9-4.11 for approval and acceptance requirements.

Reclamation facilities that are compliant with WSDOT’s quality control plans will be listed on the QPL under *Standard Specifications* Section 9-03.21(1)B.

9-4.11 Recycled Materials

1. **Approval of Materials** – In accordance with *Standard Specifications* Section 1-06 approval of recycled material is required prior to use. Recycled materials will be approved by the *Qualified Products List* (QPL) or Request for Approval of Materials (RAM) DOT Form 350-071.

   Source approval is not required for Recycled Concrete Aggregates used in Commercial Concrete as described in *Standard Specifications* Section 6-02.3(2).

   RAM Submittal – The Project Engineer can approve the RAM. The Region Materials Engineer can assist the Project Engineer in evaluating these submittals.

2. **Preliminary Samples**

   a. **Recycled Materials from the Contracting Agency's Roadway** – Certification for toxicity characteristics in accordance with *Standard Specifications* Section 9-03.21(1) is not required. Contact Region Materials Engineer to determine if preliminary sample is required.

   b. **Recycled Concrete Aggregate Reclamation Facilities listed on the QPL** - For those reclamation facilities that are not participating in WSDOT's quality control programs and are not listed on the QPL, preliminary samples shall be in accordance with Section 2c2 - Recycled Concrete Aggregate. For those reclamation facilities that are participating in WSDOT's quality control programs and are listed on the QPL, preliminary samples shall be accordance with the following:

      1. **Tier 1** - Preliminary sample for aggregate source properties (LA Wear, Degradation, and Specific Gravity) are not required. Certification for toxicity characteristics in accordance with *Standard Specifications* Section 9-03.21(1) is required prior to delivery and placement.

      2. **Tier 2** - Preliminary sample for aggregate source properties (LA Wear, Degradation, and Specific Gravity) are not required unless determined by the Project Engineer. Certification for toxicity characteristics in accordance with *Standard Specifications* Section 9-03.21(1) is not required unless determined by the Project Engineer.

      3. **Tier 3** - Preliminary sample will be required if the recycled concrete aggregate is being proposed for Standard Specification Sections; 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crush Surfacing, 9-03.12(1)A Gravel Backfill for Foundations Class A, and 9-13.1 Riprap and Quarry Spalls. Certification for toxicity characteristics in accordance *Standard Specifications* Section 9-03.21(1) is required prior to delivery and placement.

c. **Recycled Materials from Other Sources** – Certification for toxicity characteristics in accordance with *Standard Specifications* Section 9-03.21(1) is required prior to delivery and placement.

   1. **Recycled HMA/Recycled Asphalt Pavement (RAP)** – A preliminary sample will be required if the recycled HMA is being proposed for *Standard Specifications* Sections; 9-03.8 Aggregate for HMA, 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crushed Surfacing, and 9-03.12(1)A Gravel Backfill for Foundations Class A.

   2. **Recycled Concrete Aggregate** – A preliminary sample will be required if the recycled concrete aggregate is being proposed for *Standard Specifications* Sections; 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crushed Surfacing, 9-03.12(1)A Gravel Backfill for Foundations Class A, and 9-13.1 Riprap and Quarry Spalls.

   3. **Recycled Glass (glass cullet)** – A preliminary sample will be required if the recycled glass is being proposed for *Standard Specifications* Sections; 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crushed Surfacing, and 9-03.12(1)A Gravel Backfill for Foundations Class A.

   4. **Reclaimed Aggregate** – Reclaimed aggregate is aggregate that has been recovered from the plastic concrete by washing away the cementitious materials. Reclaimed aggregate is permitted to be used for *Standard Specifications* Section 9-03.1(1). A preliminary sample and certification of toxicity characteristics is not required.

   5. **Re-Used Aggregate** – A preliminary sample will be required if the re-used aggregate is being proposed for *Standard Specifications* Sections; 9-03.1 Fine and Coarse Concrete Aggregate, 9-03.4 Aggregate for Bituminous Surface Treatment, 9-03.8 Aggregate for Hot Mix Asphalt, 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crushed Surfacing, 9-03.11 Streambed Aggregates, 9-03.12(1)A Gravel Backfill for Foundations Class A, Section 9-03.14(4) Gravel Borrow for Structural Earth Walls, and 9-13 Riprap and Quarry Spalls.

   6. **Steel Furnace Slag** – A preliminary sample will be required if the steel furnace slag is being proposed for *Standard Specifications* Sections; 9-03.9(1) Ballast, 9-03.9(2) Permeable Ballast, 9-03.9(3) Crushed Surfacing, and 9-03.12(1)A.

3. **Acceptance**

   a. **Concrete Aggregate** – See Section 9-4.4.

   b. **Aggregate for Bituminous Surface Treatment, Ballast, Permeable Ballast, Crush Surfacing, Maintenance Rock, and Gravel Backfill for Foundations Class A** – See Section 9-4.5.

c. **Aggregate for Hot Mix Asphalt (HMA)** – See Section 9-4.6.

d. **Gravel Backfill for Walls** – See Section 9-4.9.

e. **Gravel Base, Gravel Backfill for Foundations Class B, Gravel Backfill for Pipe Zone Bedding, Gravel Backfill for Drains, Gravel Backfill for Drywells, Backfill for Sand Drains, Sand Drainage Blanket, Gravel Borrow, Select Borrow, Common Borrow, Foundation Material Class A, B, and C, and Bank Run Gravel for Trench Backfill** – See Section 9-4.10.

f. **Riprap and Quarry Spalls** – See Section 9-4.42.

4. **Field Inspection** – Field Verify per Section 9-1.5. Verify the recycled material is not contaminated based on a change of odor, appearance, or knowledge of the source of material. If the recycled is suspected of contamination refer to SubSection VII of Section 9-1.3B(1).

5. **Specification Requirements** – See *Standard Specifications* Section 9-03. Review contract documents to determine if supplemental specifications apply.

Other Requirements – If there is questions about the recycled material and its intended use contact the Region Materials Engineer.