Washington State Department of Transportation
State Construction Office

RECYCLED CONCRETE USAGE IN AGGREGATE MATERIALS

2020 ANNUAL REPORT

March 10, 2021

BACKGROUND

Engrossed Substitute House Bill (ESHB) 1695 passed the Washington State Legislature in 2015 and was codified into RCW 70A.205.700 (formally RCW 70.95.805) and RCW 70A.205.705 (formerly RCW 70.95.807). Both statutes were recodified during the 2020 legislative session.

RCW 70A.205.700 requires WSDOT and its implementation partners to collaboratively develop and establish objectives and strategies for the reuse and recycling of construction aggregate and recycled concrete materials, henceforth referred to as *recycled concrete aggregate* (RCA). It also requires the annual use of twenty-five percent of recycled construction aggregates and concrete materials on WSDOT projects, unless recycled products are not readily available or cost effective.

RCW 70A.205.705 requires an annual report to the Legislature summarizing the implementation of RCW 70A.205.700 and the usage of RCA on WSDOT projects. The law included specific opportunities for reuse of RCA through a reference to Table 9-03.21(1) E of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction. ***Table 1*** is provided below listing the potential applications of recycled concrete materials, as highlighted in yellow.

Table 1 - Maximum Allowable Percent of Recycled Material

Maximum Allowable Percent (by weight) of Recycled Material					
		Hot Mix Asphalt	Recycled Concrete Aggregate	Recycled Glass (glass cullet)	Steel Slag
Fine Aggregate for Concrete	9-03.1(2)	0	0	0	0
Coarse Aggregates for Concrete	9-03.1(4)	0	0	0	0
Coarse Aggregate for Concrete Pavement	9-03.1(4)	0	100	0	0
Coarse Aggregate for Commercial Concrete and Class 3000 Concrete	9-03.1(4)	0	100	0	0
Aggregates for Hot Mix Asphalt	9-03.8	See 5-04.2	0	0	20
Ballast	9-03.9(1)	25	100	20	20
Permeable Ballast	9-03.9(2)	25	100	20	20
Crushed Surfacing	9-03.9(3)	25	100	20	20
Aggregate for Gravel Base	9-03.10	25	100	20	20
Gravel Backfill for Foundations – Class A	9-03.12(1)A	25	100	20	20
Gravel Backfill for Foundations – Class B	9-03.12(1)B	25	100	20	20
Gravel Backfill for Walls	9-03.12(2)	0	100	20	20
Gravel Backfill for Pipe Zone Bedding	9-03.12(3)	0	100	20	20
Gravel Backfill for Drains	9-03.12(4)	0	0	20	0
Gravel Backfill for Drywells	9-03.12(5)	0	0	20	0
Backfill for Sand Drains	9-03.13	0	0	20	0
Sand Drainage Blanket	9-03.13(1)	0	0	20	0
Gravel Borrow	9-03.14(1)	25	100	20	20

Select Borrow	9-03.14(2)	25	100	20	20
Select Borrow (greater than 3 feet below Subgrade and side slopes)	9-03.14(2)	100	100	20	20
Common Borrow	9-03.14(3)	25	100	20	20
Common Borrow greater than 3 feet below Subgrade and side slopes)	9-03.14(3)	100	100	20	20
Foundation Material Class A and Class B	9-03.17	0	100	20	20
Foundation Material Class C	9-03.18	0	100	20	20
Bank Run Gravel for Trench Backfill	9-03.19	25	100	20	20

As further background, RCW 70.95.805 and RCW 70.95.807 are no longer available, and the following notes can be found:

70.95.805 Develop and establish objectives and strategies for the reuse and recycling of construction aggregate and recycled concrete materials.

[2015 c 142 § 2.]
Recodified as RCW **70A.205.700** pursuant to 2020 c 20 § 2011.

70.95.807 Report to the legislature.

[2020 c 20 § 1203; 2015 c 142 § 3.]
Recodified as RCW **70A.205.705** pursuant to 2020 c 20 § 2011.

REPORTING

Contracts executed after January 4, 2016 include language requiring a minimum of twenty five percent use of RCA for aggregate related items where RCA is an option as shown in ***Table 1***. Contractors are required to explain circumstances where cost or lack of availability prevent them from meeting the twenty five percent requirement

For the current reporting period November 1, 2019 until December 31, 2020, WSDOT received and accepted 87 Recycled Materials Reports. As shown in ***Table 2*** below, contractors reported using 157 tons of RCA out of the potential 361,479 tons of RCA eligible material used on WSDOT projects. Since 2017, a total of 12,141 tons has been utilized on WSDOT projects.

In addition, the Alaska Way Viaduct Demolition and Decommissioning Project continues to actively use RCA. Total quantities placed for the project, to date:

- 10,273 tons of 1.25” Crushed RCA
- 78,128 tons of 3” Minus Crushed RCA
- 14,436 tons of Select Borrow

Table 2 – Recycled Concrete Aggregate Use

Summary of Recycled Concrete Usage 87 WSDOT Contracts Completed (Nov 2019 – Dec 2020)		
Material	**Recycled Concrete Used (Tons)**	**Contract Quantities (Tons)**
Coarse Aggregate for Concrete Pavement	0	379
Coarse Aggregate for Commercial Concrete	0	5,633
Ballast	0	33
Permeable Ballast	0	288
Crushed Surfacing	157	127,480
Aggregate for Gravel Base	0	0
Gravel Backfill for Foundations	0	614
Gravel Backfill for Walls	0	13,482
Gravel Backfill for Pipe Zone Bedding	0	1,547
Gravel Borrow	0	60,532
Select Borrow	0	1,284
Common Borrow	0	109,615
Foundation Material Class A and Class B	0	40,592
Foundation material Class C	0	0
Bank Run Gravel for Trench Backfill	0	0
Total:	157	361,479

Table 3 summarizes the contracts that used RCA and the reasons given for contracts that did not use RCA. Of the 83 contractors that did not use RCA, all identified cost as the reason for not meeting the minimum twenty-five percent RCA usage. Reasons that RCA costs exceed native aggregate materials varied. Example justifications for not using RCA include:

- Limited available sources of RCA in some regions of the state
- Stockpile quantity is not adequate/readily available
- Trucking cost and proximity to project site
- Cost to blend RCA with native material to adjust properties
- Testing properties for the application, strength/durability
- RCA not suitable for use on some fish barrier removal projects
- The number of concrete suppliers that utilize RCA are limited in their availability

Table 3 – Summary of Recycled Materials Reports

Category	Number of Projects
Contract work included no RCA-eligible materials	21
Contract work included RCA-eligible materials	66
Of the 66 Contracts that included RCA-eligible materials:	
Met the 25% minimum RCA usage	2
Used some RCA, but didn't meet 25% usage	2

No RCA Usage	62
Reasons given for not meeting the 25% usage	
Cost (transportation and proximity)	57
Not an option because application was below ordinary high-water mark	5

MOVING FORWARD TO INCREASE RCA USAGE

Since the RCA working group first convened on early 2016, much effort and progress has been made to promote the use of RCA.

Since 2016 WSDOT has developed and implemented the following changes:

Issued guidance to WSDOT staff
WSDOT continues to educate Project Engineers and staff through established meetings and using Construction Bulletins to communicate changes. Project office staff are encouraged to revisit Construction Bulletins regularly. RCA usage continues to be a topic at statewide meetings for Project and Construction Engineers.

Modified Field Density Testing requirements
An alternative compaction testing method developed by the Associated General Contractors/WSDOT Roadway Team used to determine material compaction has proven to be successful and continues to be used on WSDOT projects. Projects have developed a best practice that combines the two methods allowed for material compaction acceptance.

Revised the Material Source Approval process to better accommodate RCA
RCA sources listed on WSDOT's Qualified Product List (QPL) provides the locations of pre-approved local sources. Currently, 23 RCA facilities have completed the evaluation process and are approved sources.

Source approvals continue to follow a three-tiered approval system based on the intended use and the ability to determine material origin. RCA source approval continues to follow a three-tiered approval system and current approvals are shown below:

Tier 1 approval – 23 facilities
Tier 2 approval – 3 facilities
Tier 3 approval – 3 facilities

The Qualified Products List is located at:
http://www.wsdot.wa.gov/biz/mats/QPL/QPL_Search.cfm. The applicable search parameter is Standard Specification: 9-03.21(1)B. This site also includes an interactive map of RCA sources in the state.

A flowchart describing the RCA approval process can be found at https://www.wsdot.wa.gov/Business/MaterialsLab/QPL.htm

Modifications to Wall Backfill specifications are being reviewed
Gravel Backfill for Walls specification is under review to allow the use of RCA, adding another application to encourage utilization.

WSDOT will focus on Design-Build Objectives
WSDOT will create a process to credit proposers who demonstrate RCA use on past projects and planned use of RCA on the subject project when evaluating Design Build submittals. WSDOT is working to finalize the criteria that will assign a value for the use of RCA during the proposal phase of targeted design build projects. The credit will be calculated using the proposers committed amount of RCA usage on each project. In addition, if the design-builder does not meet the committed amount of RCA as identified in the proposal, liquidated damages will be assessed based on the difference between the amount used and the amount committed. The proposed contract language was introduced and accepted at the WSDOT/ACG/American Council of Engineering Companies Design Build Committee meeting in October.

Continued close collaboration and coordination with industry partners
WSDOT has and will continue to participate in RCA workgroup meetings to collaborate and assist with resolving issues, improving specifications and procedures. The RCA Working Group, along with AGC, will continue to work together to identify new opportunities, and encourage increased usage.

Conclusion

Although RCA usage appears to be low in 2020, progress on creating a level playing field and opening the door for the use of RCA on WSDOT projects has been completed. Voluntary usage reported in past and current years indicates the progress made towards reaching the shared goal of twenty-five percent annual usage statewide. In addition, the changes implemented in WSDOT Standard Specifications and policies to promote the use of RCA, is influencing increased use of RCA on Local Agency and within other public transportation agencies projects.

WSDOT has removed barriers to increase the use of RCA by working closely with our Industry partners. WSDOT will continue to collaborate and implement changes as the need is identified. Per RCW 70.95.807, this will be the last report developed for RCA usage.