



STRATEGIC RECYCLING PROGRAM FACT SHEET

Original Date: FY 2012
Updated: FY 2020

Project:
Crushing Operation for Recycled Concrete Aggregate

Site Location:
PennDOT District 1-0 Interstate 79 (I-79) and I-90 Projects in Erie County

Date of Project:
2012

Recycled Material:
Recycled Concrete Aggregate (RCA)

Partnerships:
The Pennsylvania Department of Environmental Protection provided funding and assistance for this project.

Did you Know?
Annual production of RCA in the US from all sources (both pavements and demolition debris) is approximately 140 million tons.

Introduction

The practice of using Recycled Concrete Aggregate (RCA) was first recorded in the 1860s. However, it appears that the use of RCA increased after it was utilized in the 1940s during the reconstruction of a section of US Route 66 in Illinois.

RCA “consists of high-quality, well-graded aggregates (usually mineral aggregates), bonded by a hardened cementitious paste. The aggregates comprise approximately 60 to 75 percent of the total volume of concrete” (FHWA, 2016).

The use of RCA presents many economic, environmental, and engineering advantages including:

- Reduced costs
- Reduced environmental impact
- Preserves natural resources such as gravel, water, coal, and oil
- Reduced waste in landfills
- Strong, durable material for use in the highway infrastructure.

Summary of Project

To test the performance of RCA, District 1-0 requested funding from PennDOT’s Strategic Recycling Program (SRP) to rent equipment to pulverize slabs of concrete generated from Interstate and other roadway maintenance projects into two types of aggregate.

Source of RCA Material: Most of the material was derived from projects completed on I-79 and I-90 in Erie County. The RCA material was a mixture of pavement, bridge piers and abutments, posts for signs and guiderails, remnants of slab and joint repair work, and other miscellaneous concrete-related materials. Much of the RCA material also contained rebar, which was removed by the equipment and set aside for recovery as scrap for iron/steel recycling/reuse-manufacturing.

Equipment Used for Crushing RCA: The equipment for the project consisted of a Hitachi model excavator, which was used for loading the concrete slabs/pieces into a tractor-mounted crusher (Exeter model), which was tractor-mounted for better mobility.



Concrete Crushing Operations

RCA is typically generated from the demolition of Portland cement concrete elements of roads and structures during road reconstruction, utility excavations, or demolition operations.

With renewed interest from various stakeholders, PennDOT began to examine opportunities for recycling concrete pavements.



Reclaimed Concrete Material from District 1-0 Maintenance Operations

Products and Uses of Materials Generated from Crushing Operations: The crushing operations yielded two distinct materials:

- R4 Stone - was used for repairing roadway washout areas; and,
- 2A Stone - was used as pipe backfill replacement / restoration and roadway shoulder backup. The 2A stone was also blended with the Recycled Asphalt Pavement (RAP) fines generated from the RAP/#8 stone project to create an asphalt binder.

Some of the RCA material was used as shoulder backup material for addressing drop-off conditions on I-90. The material was also used in pipe backfill applications throughout District 1-0.

This crushing project helped District 1-0 leverage buying power by reusing previously purchased concrete into useable reclaimed materials. Utilizing the RCA reduced the amount of virgin aggregate the District needed to purchase.

Project Update

In 2020, the SRP followed-up on the performance of the RCA materials generated and used during this project. It was reported that the RCA materials performed as expected.

In the future, when a District identifies one or more methods to reuse wastes generated from a PennDOT project, if assistance is necessary and requested, the SRP may provide support. See below ‘For Additional Information’ on how to request funding under the SRP.

Project Information:

The primary contractor for the Project was Russell Standard Inc., located at 2002 Pittsburg Avenue, Erie, PA.

For Additional Information:

Go to the Strategic Recycling Program page on the PennDOT website at: <https://www.penndot.gov/ProjectAndPrograms/RoadDesignEnvironment/Environment/PollutionPrevention/Pages/default.aspx>. or send a request to PennDOTSRP@pa.gov.