High-Performance Concrete Bridges- Virginia
Virginia Avenue Over The Clinch River, Richlands

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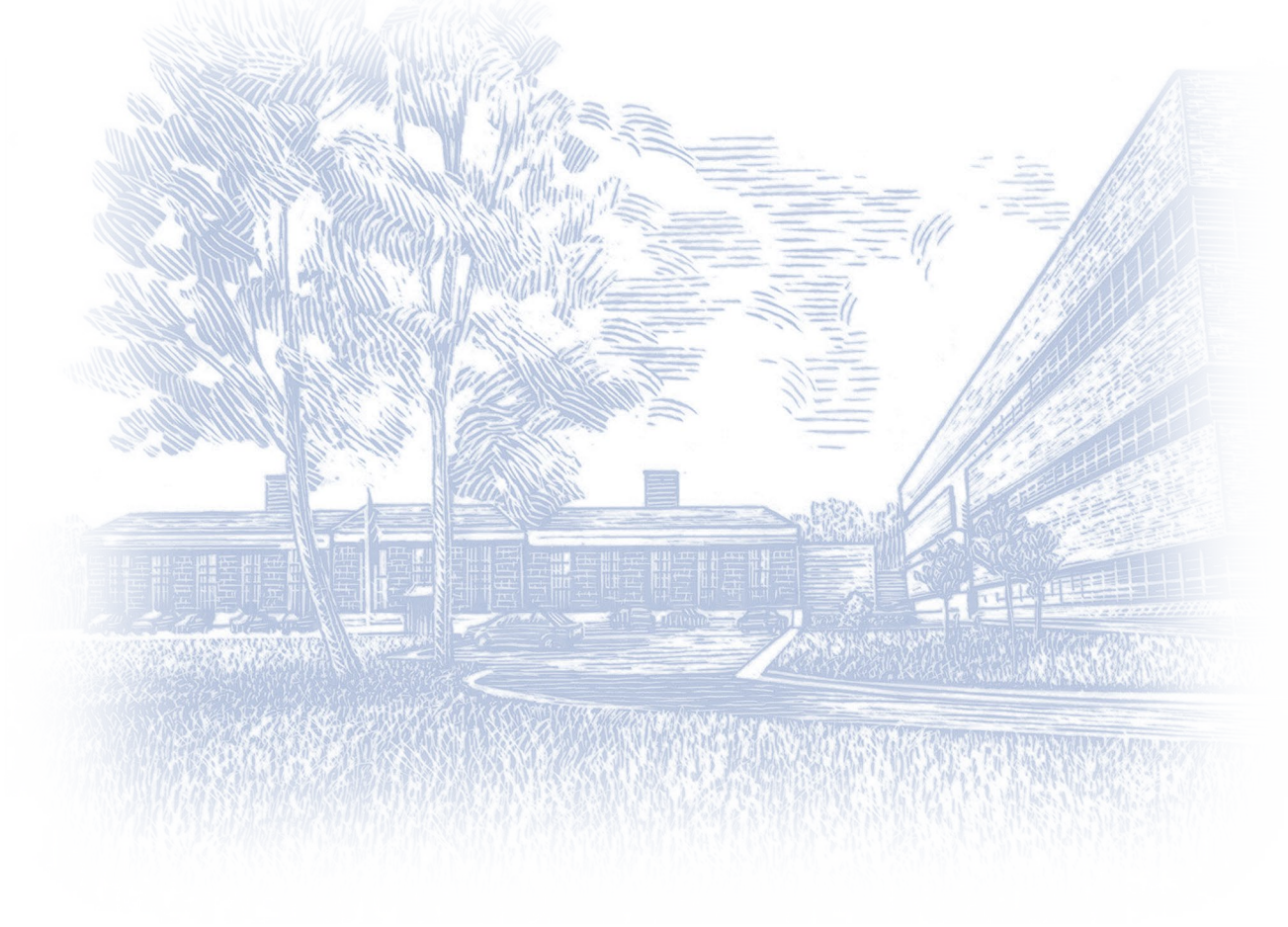

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Federal Highway Administration

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Foreword

High-Performance Concrete - Concrete with enhanced durability and strength characteristics. Under the Strategic Highway Research Program (SHRP), more than 40 concrete and structure products were developed. To implement the new technology of using High-Performance Concrete (HPC), the Federal Highway Administration (FHWA) has a program underway to showcase bridges constructed with HPC. The objective is to advance the use of HPC to achieve economy of construction and long-term performance.

General Description

The initial Virginia Department of Transportation (VDOT) HPC program consisted of seven bridges to be built with HPC in the 1995-1997 construction seasons. The Richlands bridge is one of them and consists of two 22.6 m (74 ft) spans with five Type III AASHTO I-beams per span. The project is being conducted by VDOT in cooperation with the Virginia Transportation Research Council.

Outline of HPC Features

The HPC components will have both compressive strength requirements and chloride permeability requirements according to the application in the structure. The requirements for all elements measured at 28 days are:

Element	Compressive Strength		Chloride Permeability	
	FHWA HPC Performance Grade	MPa (psi)	FHWA HPC Performance Grade	Coulombs
Beams	2	69 (10,000)	2	1,500
Deck	1	41 (6,000)	1	2,500
Substructure		21 (3,000)	1	3,500

Pretensioned Beams

Two Type II AASHTO prestressed concrete I-beams were fabricated to conduct research on the bond of 15.2 mm (0.6 in) pretensioned strands and to develop concrete mixes and fabrication procedures. The beams, pretensioned with 15.2 mm (0.6 in) diameter strands at 51 mm (2 in) spacing, were used to determine transfer and development lengths of the strands, and were tested to failure. All beams failed in flexure at measured loads that exceeded the calculated ultimate load. Pull-out tests were also made on untensioned 15.2 mm (0.6) diameter strands embedded in a concrete block. The beams for the bridge are AASHTO Type III prestressed concrete I-beams containing 15.2 (0.6 in) diameter strands at 51mm (2 in) center-to-center spacing.

Substructure

The substructure will be built using the normal Class A3 concrete with the addition of the permeability requirement.

Deck

The deck will contain low-permeabillity concrete with a compressive strength that is 50 percent higher that that used in conventional decks.

Construction

The contract was let in late 1996 and the bridge will be built during the 1997 construction season.

Benefits

With conventional construction, this two-span bridge would require seven girders. With the HPC design, four girders can be eliminated (two for each span). Additional savings and benefits have not yet been calculated.

For further information on High-Performance Concrete or this project, contact:

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