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Market Application

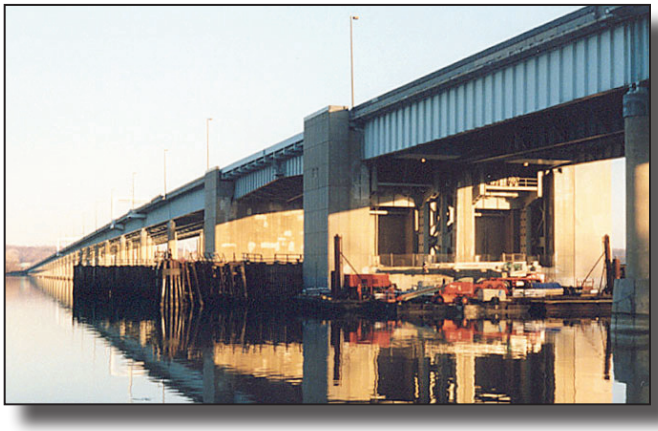
Bridges

Segmental Bridge Construction

Project: Woodrow Wilson Bridge
Designer: Woodrow Wilson Coordination Committee
Year: 2006

The Abstract

The original 5,900 foot long Woodrow Wilson Memorial Bridge (WWB) was constructed between 1958 and 1961. It was the first link between Washington D.C. and the suburbs of Virginia and Maryland on the Capital Beltway. It was fitting for President Dwight D. Eisenhower to sign the bill into law to name the bridge after President Wilson because Wilson signed the Federal Aid Road Act of 1916 which initiated the federal-aid highway program that remains today. This is the only section of interstate highway that is owned by the Federal Highway Administration; however, at the end of this project Maryland and Virginia will begin joint ownership.



The Problem

The original Woodrow Wilson Memorial Bridge was designed to carry 75,000 vehicles per day. This volume of traffic was exceeded only 8 years after opening and today it carries approximately 200,000 vehicles each day. It was not designed to be a major commuter route for local residents, but with the traffic of I-95, it has become one of the worst bottlenecks in the country as the eight-lane Capital Beltway narrows into the six-lane bridge.

According to information from *American Highway Users Alliance, Unclogging America's Arteries*, 1999–2004, this bridge was ranked the 15th worst bottleneck in the country. The same study projects drivers lose more than 15,000 hours per year because of traffic delays on this bridge.

Additionally, the drawbridge is raised 260 times a year for vessels traveling the Potomac River. By the mid 1980's, it was very clear that an improved crossing was necessary.

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Project Description

The $2.4 billion project consists of twin 6-lane bridges that are high enough to reduce drawspan openings to 60 times a year. Ten lanes are available to eliminate the bottleneck and two additional lanes are available for options such as trains, buses, high occupancy vehicles, or express toll lanes. Four new interchanges allow for easier entry and exit from the highway. The lane configuration separates local and long-distance travelers thereby increasing safety and efficiency. Additionally, there will be new parks, pedestrian/bike paths, and other amenities along the 7.5 mile corridor.

The WWB Project Coordination Committee, led by the FWHA, established a Design Center for the project. The Committee had the responsibility of overseeing the planning, location studies, environmental studies, public involvement process and public hearings and was also responsible for preliminary engineering and final design for the project.

The Sika Solution

A Total Sika Bridge product package was offered on this project through various contractors involved in different phases of the project.

Admixtures

State-of-the-art admixtures were used by multiple contractors throughout the course of this project. The high range water reducing admixtures used were Sika ViscoCrete 2100 and 6100, both based on the unique Sika ViscoCrete Polycarboxylate Polymer technology used in self consolidating concrete. The dense reinforcing required concrete that would flow around the rebar and leave no voids. These admixtures were used on this project with tremendous success and excellent results.

The complete range of admixtures used in this project included the following:

- Sika ViscoCrete — High Range Water Reducing admixture
- Plastiment — Water Reducing & Retarding admixture
- Sika AEA-14 — Air Entraining admixture
- Sika CNI — Calcium Nitrate based Corrosion Inhibitor

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Segmental Bridge Project Adhesives: Sikadur SBA

Sikadur 31 SBA was selected to 'butter' the segments allowing for easier alignment, and also to provide bond and seal from water and chlorides after cure. The working time and range of application temperatures made Sikadur 31 SBA an ideal choice. Over 15,500 gallons were used on the project.

Zero Bleed- Post Tensioning Grout

SikaGrout 300 PT was the specified grout for the extensive amount of post-tension cable duct grouting. The zero-bleed grout that had already proven itself on numerous large-scale bridge projects had the performance properties and proven track record the engineers required. The ability to pump long distances, and the reduction of pump equipment wear and tear from the sand-free grout, made SikaGrout 300 PT the preferred choice of the contractors as well. Reducing equipment wear is important when pumping over 4,000,000 pounds of grout.

Epoxy-based Anchorage Protection Grout

Sikadur 42 Grout-Pak PT was selected to protect the anchorages of the post-tensioning tendons because of its impermeable nature and low exotherm for larger pours. The project utilized approximately 1,000 units of the special epoxy grout.

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Other Important Considerations

Sika's production capacity could meet the high volume demand and schedule of delivering multiple truckloads every week. The testing support, certifications, and quality assurance program and reports were all important factors in servicing the project. Local representation committed to excellent technical support for the engineers and contractors proved to be an invaluable benefit during the course of the project.

Sika Products

Sikadur SBA: A unique high modular structured adhesive for bonding hardened concrete to hardened concrete for segmented bridge construction. SBA's are available in different temperature ranges in regular and slow set categories.

Sikagrout 300 PT: A state of the art, sand free, zero bleed cement based grout. This grout is used for horizontal and vertical grouting of ducts within bonded post-tensioned systems.

Sikadur 42 Grout Pak PT: A three component epoxy grout used to protect the anchorages of post-tensioned tendons/bars on segmented bridges.

Sika ViscoCrete: Sika ViscoCrete is a high range water reducing and superplasticizing admixture utilizing Sika's 'ViscoCrete' polycarboxylate polymer technology.

Plastiment: Plastiment is a water-reducing and retarding admixture. Plastiment meets the requirements of ASTM C-494 Types B and D.

Sika AEA-14: Sika AEA-14 admixture is an aqueous solution of organic materials. Sika AEA-14 meets the requirements of ASTM C-260 for air entraining admixtures.

Sika CNI: Sika CNI is a calcium nitrite-based admixture designed to inhibit the corrosion of steel in reinforced concrete. Sika CNI contains a minimum of 30% calcium nitrite by mass and is formulated to meet ASTM C-494 requirements for Type C, accelerating admixture.

References:

www.woodrowwilsonbridge.com

www.roadstothefuture.com

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