AASHTO

AASHTO INNOVATION INITIATIVE

FAST FACTS:

Carbon Fiber Reinforced Polymer Strands

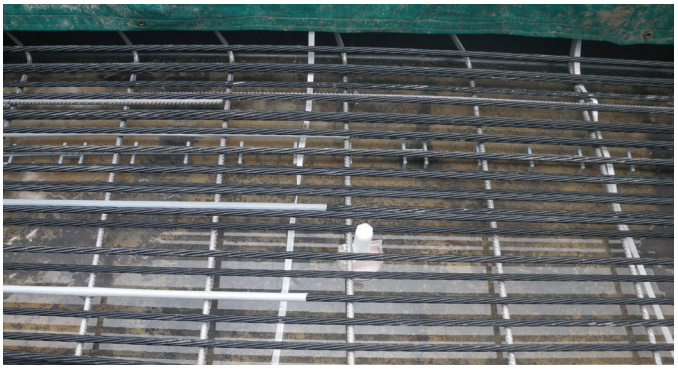
PROJECT LOCATION:	Senaca County, Ohio
AGENCY	Ohio Department of Transportation
URL:	*aii.transportation.org* (select *Carbon Fiber Reinforced Polymer Strands*)
PROJECT NAME:	Bridge Removal and Replacement on State Route 635
PROJECT DESCRIPTION:	This project replaced the existing bridge structure on SR 635 over Plum Run Creek with a prestressed concrete box beam with carbon fiber composite cable (CFCC) strands. New Structure File Number: 7403910.
PROJECT PURPOSE AND NEED:	The existing facility is a continuous concrete slab bridge structure with asphalt concrete wearing surface that was built in 1960. The 2017 inspection indicated that the bridge structure was in poor condition with a sufficiency rating of 60.9. The existing structure was to be replaced with a new structure with improved features to provide longer service life.
OVERALL BUDGET / COST ESTIMATE:	$912,362.75

WHAT WAS UNIQUE ABOUT THIS PROJECT?	The new project included a single span prestressed concrete composite box beams with CFCC strands and integral abutments.
DESCRIBE TRADITIONAL APPROACH:	The traditional approach utilized box beam non-composite bridges with conventional steel strands, epoxy coated steel rebar and asphalt concrete wearing surface.
DESCRIBE NEW APPROACH:	The new approach utilized a box beam composite bridge with CFCC strands, integral abutments and concrete wearing surface.
TOP INNOVATIONS EMPLOYED:	Carbon Fiber Composite Cable strands for box beams. Each strand is a braid of 7 wires of carbon fibers. Each wire contained carbon fibers of 7-micrometer diameter size twisted with epoxy resin. Stainless steel reinforcement in beams and deck used for added corrosion resistance.
PRIMARY BENEFITS REALIZED TO DATE:	Excellent performance to date.
OTHER BENEFITS REALIZED / EXPECTED:	Improved resistance to corrosion, longer service life, and lower lifecycle costs.
PROJECT START DATE / SUBSTANTIAL COMPLETION DATE:	April-August, 2019
AFFILIATIONS:	State DOT, FHWA
PROJECT CONTACT:	Omar Abu-Hajar *omar.abuhajar@dot.state.oh.us* 614-387-1257
LINK TO ATTACHMENTS:	Calculations, Inspection Report

An exterior box beam being launched to set onto the beam seat.

Completed bridge with a view of the finished deck.

Prestressed concrete box beam casting bed with the CFCC strand and the bottom stainless steel U-rebars used for shear reinforcement installed in place. Note the rectangular block out at the lower left side of the photo of the exterior beam used to run the tie rods through beams during the bam installation operation.



Prestressed concrete box beam casting bed with the CFCC strand, strand debonding plastic sleeves, and the bottom stainless steel U-rebars used for shear reinforcement installed in place near the beam end.

Prestressed concrete box beam casting bed with the CFCC strand and the bottom stainless steel U-rebars used for shear reinforcement installed in place. Note the bond breaking plastic sleeve being installed.

Prestressed concrete box beam casting bed with the bulkhead and prestressting chucks set in place color coded for the stressing operation sequences. Note the stressting jack will fit between two chucks to normally function.

Prestressed concrete box beam casting bed with the CFCC strands being set in place.

Looking at beam end of the prestressed concrete box beam casting bed with the CFCC strand and the bottom stainless steel U-rebars used for shear/confinement reinforcement installed in place.