CASE STUDY

Bridge Rehabilitation
Sussex County, New Jersey

Rehabilitation of Sussex County Bridge V-39

<table>
<thead>
<tr>
<th>Structure:</th>
<th>CR-642 (aka Owens Station Road) Bridge V-39 over Wallkill River, Vernon Twp., NJ</th>
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</thead>
<tbody>
<tr>
<td>Application:</td>
<td>Rehabilitation of bridge deck</td>
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<tr>
<td>Owner:</td>
<td>County of Sussex, New Jersey</td>
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<tr>
<td>Engineer:</td>
<td>Pickering, Corts &amp; Summerson, Inc.</td>
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<td>General Contractor:</td>
<td>Sparwick Contractors, Inc.</td>
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<tr>
<td>Ready Mix Provider:</td>
<td>County Concrete Corp.</td>
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Introduction
Bridge V-39 was constructed in 1968 as a 159-ft long 2-span structure with a 38-ft wide, two-lane concrete deck, on a side-by-side prestressed concrete box beam superstructure. The substructures consisted of pile supported reinforced concrete abutments and a center pier with a spread footing.

Challenge
Since its construction 47 years ago, Bridge V-39 has been exposed to winter roadways salts which have caused severe deterioration to the asphalt-overlaid concrete deck and the substructure surfaces below that were exposed to joint leakage. Except for the above noted localized deterioration, which caused the bridge to be rated in POOR condition, the box beam superstructure was in FAIR condition with significant excess load capacity. The challenge was to avoid an expensive $3.8 million full bridge replacement by creating a Value Engineered (VE) rehabilitation design for Bridge V-39 which would rectify the deteriorated concrete deck condition, remedy the leaking deck joints and repair substructures.

The Sussex County Division of Engineering is continuously looking for ways to value engineer their projects.

Rather than pursue an expensive $3.8 million full replacement of Bridge V-39, the County created a value engineered (VE) design that cost-effectively rehabilitated this bridge for under $1.1 million.

Part of the County’s VE strategy to extend the service of the rehabilitated bridge was to use Hycrête in the retrofitted new concrete deck to delay the adverse effects of roadway salts.

Bridge V-39 during bridge deck concrete rehabilitation
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Solution
The County's value engineered solution called for:

- The removal and replacement of the existing badly deteriorated bridge deck with a new Class A concrete using Hycrete hydrophobic admixture
- Elimination of all deck joints
- Repairs of all concrete substructures

While a conventional concrete deck replacement can add up to 30+ years of service life to an existing bridge, the County of Sussex used Hycrete to cost-effectively extend this an additional 20+ years. The end result is a fully rehabilitated 47 year old bridge for under $1.1 million which is expected to last another 50+ years.

Result
Hycrete's waterproofing and corrosion protection admixture was used in the concrete of the rehabbed bridge deck. The engineer analyzed the annualized ownership cost of several available options for remedying the damaged deck. Using Hycrete in a rehabbed deck saved the county over $27,000 each year over the useful life of the structure compared to doing a full bridge replacement.

Ownership Cost
When evaluating different options to address the problem deck, the engineer looked at the annualized cost of ownership. Building a new deck would cost $50,000/year compared with $23,000/year for rehabbing the deck utilizing Hycrete in the mix.

Bridge V-39 after rehabilitation