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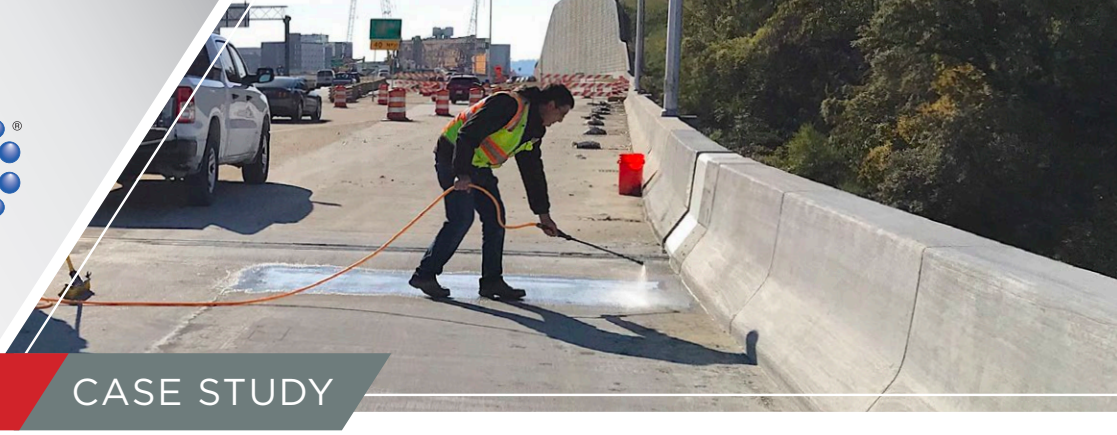
CONCRETE PROTECTION



# TENNESSEE BRIDGE CASE STUDY

## A Challenge Arises

A project in Chattanooga, Tennessee utilized lightweight aggregate concrete for a bridge-widening deck addition. Due to unexpected conditions with the concrete placement, questions arose regarding the in-place concrete's durability related to increased permeability. Testing indicated that the concrete met the designed compressive strength, but the engineering team wanted to explore options for treatments to improve permeability characteristics. The ready-mixed concrete supplier contacted Spray-Lock Concrete Protection (SCP) to see if our colloidal silica technology might offer a solution to the permeability issue.

SCP treatments have been used throughout the world to provide reduced permeability for increased concrete lifespan, even in the harshest exposure conditions. SCP submitted a work plan that included several options for assessing the effectiveness of the colloidal silica treatment. This work plan included the comparison of acceptable untreated areas to unacceptable areas both pre- and post-treatment. **The option to perform surface resistivity testing before and after treatment was selected, using an increase in surface resistivity of at least 25% to indicate a successful remediation.**

## The Application

The bridge deck concrete was still relatively new (approximately 6 months), so cleaning of the surface was accomplished by pressure washing with water. The SCP infrastructure product was applied by a trained application crew from the ready-mix producer following SCP's standard application procedures for existing concrete structures.

## Results *(shown below in table)*

Testing was performed by an independent consulting engineering firm from Atlanta, Georgia. Twenty (20) surface resistivity readings were made from each of the Northbound and Southbound traffic lanes. The concrete was then treated with SCP's recommended colloidal silica product formulated for transportation infrastructure concrete. Fourteen (14) days later, new readings were taken from the exact same locations as previously tested.

## Discussion

The improvement to the surface resistivity results achieved by SCP treatment on this project is an indication that the pore structure of the concrete has been refined. This refinement will restrict the movement of water and chlorides from deicing chemicals, extending the expected lifespan of the bridge. By using SCP technology, the contractor avoided costly repairs that may have otherwise been required. Because colloidal silica modifies the pore structure of the concrete itself, no re-application is needed for the life of the structure.

» **For more information about how SCP can assist in improving the durability of concrete transportation infrastructure visit us at concreteprotection.com.**

### Surface Resistivity Results (kΩ/cm)

**NORTHBOUND**

| TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 41.3 | 50.0 | 6 | 43.6 | 47.8 | 11 | 47.5 | 55.1 | 16 | 58.1 | 60.0 |
| 2 | 42.2 | 60.5 | 7 | 36.4 | 46.9 | 12 | 43.1 | 63.3 | 17 | 37.6 | 54.5 |
| 3 | 33.8 | 51.9 | 8 | 35.9 | 47.6 | 13 | 40.3 | 46.6 | 18 | 34.7 | 56.0 |
| 4 | 37.0 | 53.8 | 9 | 42.0 | 47.2 | 14 | 50.8 | 64.6 | 19 | 42.6 | 49.2 |
| 5 | 47.5 | 61.3 | 10 | 32.0 | 54.2 | 15 | 40.3 | 64.3 | 20 | 51.1 | 62.7 |

*Average Results*

| INITIAL | FINAL |
|---|---|
| 41.9 | 54.9 |

INCREASED % 31.0%

**SOUTHBOUND**

| TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL | TEST # | INITIAL | FINAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 21.0 | 43.9 | 6 | 25.5 | 47.1 | 11 | 48.5 | 60.4 | 16 | 34.0 | 47.5 |
| 2 | 22.7 | 40.0 | 7 | 24.7 | 45.6 | 12 | 38.0 | 52.4 | 17 | 37.0 | 72.6 |
| 3 | 25.5 | 40.4 | 8 | 26.3 | 35.7 | 13 | 41.6 | 62.1 | 18 | 24.0 | 60.5 |
| 4 | 28.5 | 36.9 | 9 | 35.0 | 40.2 | 14 | 40.0 | 59.3 | 19 | 28.0 | 53.8 |
| 5 | 24.4 | 46.2 | 10 | 26.4 | 41.7 | 15 | 32.7 | 56.6 | 20 | 29.0 | 51.4 |

*Average Results*

| INITIAL | FINAL |
|---|---|
| 30.6 | 49.7 |

INCREASED % 62.3%



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