

AASHTO Technology Implementation Group
Nomination of Technology Ready for Implementation
2005 NOMINATIONS DUE BY FRIDAY, SEPTEMBER 9, 2005

Sponsoring DOT	1. Sponsoring DOT (State): New Jersey																			
Primary Technical Contact	2. Name: Raj Chawla/Carey Younger Organization: NJDOT Address: PO Box 600 City: Trenton State: NJ Zipcode: 08625-0600 E-mail: Phone: 609.530.5971 Fax: 609.530.3790 carey.younger@dot.state.nj.us																			
Technology Description	3. Name of Technology: Surface-Applied Corrosion Inhibitors																			
	4. Briefly describe the technology. Surface or topically applied corrosion inhibitors to mitigate chloride-induced corrosion of bridge deck reinforcing steel and thereby extend the service life of the structures. (see attached study work plan for more details).																			
	5. Briefly describe the history of its development. Surface applied corrosion inhibitors have been used successfully in rehabilitation projects throughout the United States including bridge decks, parking garages, and public buildings. As part of ongoing efforts in New Jersey to address the problem of premature deck deterioration, the performance of three products will be evaluated.																			
State of Development	6. For how long and in approximately how many applications has your organization used this technology? The performance of six installations will be evaluated over a two to three year period.																			
	7. What additional development is necessary to enable routine deployment of the technology? Performance claims need to be proven accurate.																			
	8. Have other organizations used this technology? If so, please list organization names and contacts. <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Organization</th> <th style="text-align: left;">Name</th> <th style="text-align: left;">Phone</th> <th style="text-align: left;">E-mail</th> </tr> </thead> <tbody> <tr> <td>Virginia DOT</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Virginia Transportation Research Council</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PA Turnpike</td> <td></td> <td></td> <td></td> </tr> <tr> <td>New Jersey Turnpike</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Organization	Name	Phone	E-mail	Virginia DOT				Virginia Transportation Research Council				PA Turnpike				New Jersey Turnpike		
Organization	Name	Phone	E-mail																	
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PA Turnpike																				
New Jersey Turnpike																				
Potential for Payoff	9. What benefits has your organization realized from using this technology? Include cost savings, safety improvements, transportation efficiency or effectiveness, environmental benefits, or other advantages over other existing technologies. We are presently unable to provide this information since the evaluation is scheduled to begin this summer.																			

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Implementation Potential	10. Please describe what actions another transportation agency would need to take to adopt this technology. Contact other users and product manufacturers for additional information.
	11. What is the estimated cost, effort, and length of time required for procurement or adoption by another transportation agency? Contact product manufacturers; other costs may vary widely.
	12. What organization(s) currently supply and provide technical support for this technology? AIMS/C-Probe Systems, Ltd. 51 Glastonbury Dr. Middlewich Cheshire CW10 9HR United Kingdom Tel & Fax +44 (0) 1606 737587 Email: enquiries@c-probe.com
	13. Please describe any legal, regulatory, social, intellectual property, or other issues that could affect ease of implementation. Unknown
Willingness to Champion	14. Is the sponsoring DOT willing to promote this technology to other states, if partially supported by the AASHTO Task Force on Technology Implementation? <input type="checkbox"/> Yes <input type="checkbox"/> No
Date Submitted	15. Date: September 6, 2005

16. Please include image(s) of sketches or photographs, if available Image(s) are attached.*
(See attached work plan)

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AASHTO CONTACT	MARTY VITALE ADMINISTRATIVE COORDINATOR FOR ENGINEERING AASHTO	PHONE: 202.624.5862 FAX: 202.624.5469 mvitale@aaashto.org
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State of New Jersey

DEPARTMENT OF TRANSPORTATION
1035 Parkway Avenue
PO Box 600
Trenton, New Jersey 08625-0600

James E. McGreevey
Governor

John F. Lettiere
Commissioner

Product Field Demonstration
Research in Support of New Technologies and Products:
Rt. I-295 Surface-applied corrosion inhibitors

October 27, 2004

Dennis L. Merida
Division Administrator
Federal Highway Administration
840 Bear Tavern Rd., Suite 310
Trenton, NJ 08628

Attention: Christopher Chang

Dear Mr. Merida:

The following work plan is submitted for your review and approval.

As part of the ongoing evaluation of new technologies and products, the Bureau of Value Management, with the support of Construction Engineering, Capital Program Management and the Bureau of Materials will conduct a demonstration project evaluating the performance of three surface-applied corrosion inhibitors: (1) RADCON Formula #7 Concrete Waterproofing and Protection, (2) SURTREAT - Total Performance System (TPS) Concrete Restorer and (3) SIKAFLO 903 Corrosion Inhibiting Coating in protecting twelve (12) decks on structures on Rt. I-295, County of Mercer, Hamilton and Lawrence Townships. The manufacturers report that these products can provide low cost corrosion protection, thus extending the service life of a reinforced concrete structure. All of the above products have been used successfully on several rehabilitation projects throughout the United States including highway bridges, parking garages and public buildings. Additionally, two other SURTREAT products are currently under evaluation by the Department on new and existing bridge decks.

OBJECTIVE

The objective of this field demonstration is to determine and compare the effectiveness of the above treatments in mitigating corrosion under New Jersey conditions, thus preventing premature deterioration of the concrete caused by chloride-induced corrosion of deck reinforcement and freeze-thaw damage.

TEST SITE DESCRIPTION & LOCATION (see Attachment A)

Route: I-295 Resurfacing Project

Federal Project No.: IM-295-2(106)

Construction Project: Location: Mercer County, Lawrence and Hamilton Twps.

PRODUCT DESCRIPTION

- (1) SURTREAT-Total Protection System (TPS) -- a surface-applied, water soluble, odorless, clear, non-toxic, non-petroleum solution that is environmentally safe and used to protect existing reinforced concrete structures from future corrosion. TPS reacts with Portland cement to form a polymeric solid which will raise and control the pH to inhibit corrosion of the rebar. In addition, SURTREAT claims to reduce water penetration, purge and stabilize contaminants, and substantially reduce porosity.
- (2) RADCON Formula #7 – surface-applied, silicate based material using advanced biochemical technology to waterproof both concrete matrix and leaking cracks permanently.
- (3) SIKA Ferrogard 903 – surface-applied, designed to penetrate the surface and then to diffuse in vapor or liquid form to the steel reinforcing bars embedded in the concrete. Sika FerroGard 903 forms a protective layer on the steel surface which inhibits corrosion caused by the presence of chlorides as well as by carbonation of concrete.

BENEFITS

The benefits and advantages of using these products are as follows:

SIKA Ferrogard 903	SURTREAT TPS	RADCON FORMULA #7
<ul style="list-style-type: none"> • Delays onset of corrosion • Reduces rate of corrosion • Extends service life 	<ul style="list-style-type: none"> • Deck restored to crack free condition for its service life • Concrete strengths increased, water intrusion decreased, reinforcing steel protected low cost corrosion protection/crack sealing for large areas • Reduce future deck corrosion damage and repairs • Maintenance free; no re-application of material required • Claims of 7 to 15 year warranty against spalling (depends upon deck condition) 	<ul style="list-style-type: none"> • 100% Trafficability • Hot asphalt compatible • Extends service life • Increases abrasion resistance by 30% • Reduces chloride ingress and freeze-thaw damage by 89% • Claims of 10 to 15 year warranty for performance.

EVALUATION METHODS

The performance of six treated decks (2 per protective system) will be compared to that of two untreated control decks within close proximity of the test decks to determine product effectiveness and to substantiate manufacturer's claims.

The following performance testing (items 1 through 6) will be conducted in accordance with Attachment B by Advanced Infrastructure Design, Inc. (A.I.D.) C-Probe Systems, Ltd. The NJDOT Bureau of Materials will conduct Freeze-thaw Resistance, and Scaling Resistance prior to the installation of the protective systems and in the final year of the study.

1. Preliminary visual condition survey
2. Preliminary delamination survey
3. Chloride Content (AASHTO T-260)
4. Corrosion Activity (ASTM C876-91;1999) -- Standard Test Method for Half-Cell Potentials of Uncoated Reinforcing Steel in Concrete
5. Corrosion Rate (ASTM G102) -- Standard Practice for Calculation of Corrosion Rates and Related Information from Electrochemical Measurements
6. Chloride Permeability (ASTM - C1202-97) -- Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
7. Freeze-thaw Resistance (ASTM 161; ASTM C666)
8. Scaling Resistance (C672/C672M-98e1) -- Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals

REPORTING

A memorandum report documenting the installation phase of the study and a suitable final report will be prepared by the New Technologies and Products section. The report will include an analysis of test results and recommendations for future use of the tested systems.

COSTS

The estimated installed cost for all work described herein, including testing by A.I.D. and C-Probe, is \$663,356. Detailed costs are shown in Attachment B. The products and services will be purchased under the project using Federal funds and applied by the manufacturer's personnel. In-house costs for NTP will be funded by the study "Research in Support of New Technologies & Products which was included in the SPR 2003-2005 work program.

Sincerely,

FHWA Approval

Lynn Rich
Director, Quality Management Services

_____ Date _____
Dennis L. Merida
Division Administration

- C: R. Dunne
- B. Strizki
- S. Thorn
- M. Martynenko
- E. Sheehy
- R. Jaffe
- R. Chawla
- A. Mendola
- C. Younger
- QMS file

**ATTACHMENT A:
ROUTE 1-295 SURFACE APPLIED CORROSION INHIBITOR TEST BRIDGES**

STRUCTURE NO.	NAME	APPROX. MILEPOST	ADT	NO. SPANS	STRUCTURE LENGTH (ft.)	WIDTH curb to curb (Feet)	DECK SURFACE AREA (sf)	TREATMENT
1137171	I-295 NB OVER HAMILTON AVE.(CT RT606)	64.08	24,580	1	110	81.7	8,987	RADCON
1137172	I-295 SB OVER HAMILTON AVENUE (CR606)	64.08	24,580	1	110	63.9	7,029	SIKA
1137174	I-295 NB/NOTTINGHAM WAY(NJ RT.33)	64.15	26,350	1	142	78.2	11,104	SIKA
1137175	I-295 SB/NOTTINGHAM WAY(NJ RT.33)	64.15	26,550	1	142	71.4	10,139	SIKA
1138150	I-295NB/E.STATE ST.EXT. (CO.535)	64.70	25,300	1	136	54.0	7,344	RADCON
1138151	I-295 SB/E.STATE ST. EXT.(RT.535)	64.70	21,421	1	134	64.5	8,643	SURTREAT
1138156	I-295 NB/AMTRAK(NE CORRIDOR)	66.30	33,460	2	288	54.5	15,696	CONTROL
1138157	I-295 SB/NE CORRIDOR LINE(AMTRAK)	66.30	33,456	2	288	54.5	15,696	CONTROL
1138160	RT I-295 NB OVER BAKERS BASIN RD	66.80	28,600	1	109	54.5	5,941	SIKA
1138161	I-295 SB OVER LAWRENCE STA RD	66.80	32,497	1	109	55.1	6,006	RADCON
1138162	I-295 NB OVER RAMP C OF I-295	67.62	32,800	1	76	75.3	5,723	SURTREAT
1138163	I-295 SB OVER I-295 RAMP C	67.62	33,150	1	80	60.7	4,856	SURTREAT
1138164	I-295 NB/U.S 1 & I-295 RAMPS"A"&"B".	67.78	32,500	1	191	90.0	17,190	SURTREAT
1138165	I-295 SB OVER US 1 AND I-295 RAMP	67.78	32,500	1	180	62.1	11,178	RADCON

**ATTACHMENT B:
ESTIMATED COSTS¹
RT. I-295 SURFACE-APPLIED CORROSION INHIBITOR STUDY**

Systems Installed²	Year 1	Year 2	Year 3	Totals
Radcon#7	\$68,200	----	----	\$68,200
Surtreat TPS	94,000	----	----	94,000
SIKA Ferrogard 903	105,000	----	----	105,000
Subtotal (S1)	267,200	----	----	267,200
A.I.D. Monitoring³	----	----	----	
Chloride Testing	18,763	----	18,763	37,526
Permeability Testing	8,800	----	8,800	17,600
MPT	27,500	----	27,500	55,000
Fees & O/H	46,681	----	51,349	98,030
Corrosion Rate Testing⁴	188,000	----	----	188,000
Subtotal (S2)	289,744		106,412	396,156
TOTALS (S1 + S2)	\$ 556,944	----	\$ 106,412	\$663,356

¹ Prime Contractor costs not included.

² Material and labor costs of product applied to 12 decks (4 each by RADCON, SURTREAT, and SIKA), not including traffic control.

³ Monitoring of 8 decks (incl. 2 control decks) by A.I.D. -- Preliminary Visual Condition Survey, Preliminary Delamination survey, Chloride Content Analysis, Corrosion Rate (ASTM C876), Permeability Testing (AASHTO T277), and Reporting.

⁴ Design of installation and instrumentation of monitoring equipment, Corrosion rate monitoring of 8 decks (ASTM G102) by C-Probe Systems Ltd.