

REQUEST FOR PROPOSALS

SELECTION OF AN OVERCOAT PAINT SYSTEM FOR LOUISIANA BRIDGES LTRC No. 15-4ST, SIO No. DOTLT1000096

PROBLEM STATEMENT

LADOTD's maintains many in-service bridges that have been coated with either two coats of epoxy zinc with a vinyl topcoat or three coats waterborne acrylic. The Department's current list of approved overcoat systems have been tested over "red lead" paint systems but not over other systems currently found on existing bridges. The Department has the need to extend the life of its existing bridge coatings that protect the steel from corroding. The Department's system preservation program is currently removing 40-50 yr. paints from our bridges but needs to find a way to extend the life of the paints that are 20-35 years of age by over coating. Because these in-service paint systems were specially formulated for DOTD, and are not being manufactured any more, actual field application and testing of the recommended paint systems will need to be performed.

OBJECTIVE

Determine the system or systems that can be used to maintain and extend the life of DOTD's existing bridge paints. The project results will support the recommended paint overcoat systems and provide rational logic to support DOTD with the decision to implement.

RESEARCH APPROACH

Louisiana Transportation Research Center (LTRC) is seeking the insight of proposers on how best to achieve the research objectives. Proposers shall describe research plans that can be realistically accomplished within the constraints of available funds and contract time as allowed in this RFP.

Proposals must present the candidate's current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. Task descriptions are intended to provide a framework for conducting the research. The proposal shall address at a minimum, the following tasks:

Task 1. Literature Review

Review the current state of practice. Conduct a literature review of previous and on-going nationwide research projects and case studies on the subject. A search on the TRIS/TRID database is a minimum.

- a. Determine the potential paint systems that can achieve long-term performance (for current in service LADOTD paint systems Specifications refer to Appendix A).

Task 2. Selection of Candidate Bridges

Based on Task 1 and the researcher's independent research and experience, the researcher will recommend at least one bridge for each of the recommended in-service paint systems (See appendix A for list of bridges) from both List A and List B. It is anticipated that one span, all girders, will be painted with the recommended paint systems.

Task 3. Propose a Field Testing Plan

The researcher will, based on the results from Task 1 and Task 2, provide a detailed plan on how to successfully test the field installations. Appendix B contains typical field testing procedures. The proposed tests and timeline are to be submitted to the PRC for approval in Task 4. **PI shall not proceed with remaining tasks before the prior approval of the PRC.**

Task 4. Interim Report

Based on the results of Tasks 1 to 3 prepare an interim report outlining the following:

- The efforts of the literature search
- Candidate bridges
- Field testing plan

Presentation of the interim report to the PRC is a requirement.

Task 5. Field Application and Evaluation

Perform selected treatments to selected bridges. Evaluate for a period minimum of three years performance to determine system capabilities.

Task 6. Final Report and Technical Summary

The researcher will provide a final report that documents the entire research effort for internal future reference and the benefit of others. A Final Draft Report, Technical Summary document (two pages), and summary presentation to the Project Review Committee (PRC) are due three (3) months prior to the project completion date for review and approval. The final report shall recommend future systems that are economical and effective for long term maintenance of in-service bridge paint systems.

DELIVERABLES

The proposal shall include project deliverables for appropriate tasks. Deliverables shall be due as defined in the proposal. The proposal shall include at a minimum the following deliverables:

- Task 1: Literature Review
- Task 2: Candidate Bridge Selection
- Task 3/4: Work Plan, Interim Report and Presentation to the PRC
- Task 5: Field Application and Evaluation
- Task 6: Final Report, Technical Summary, and summary presentation to the PRC

SPECIAL NOTES

- A. LTRC research projects will be conducted in accordance with the LTRC Manual of Research Procedures, 2003 edition.

http://www.ltrc.lsu.edu/pdf/research_man03.pdf

- B. Task descriptions are intended to provide a framework for conducting the research. Louisiana Transportation Research Center (LTRC) is seeking the insight of proposers on how best to achieve the research objectives. Proposers are expected to describe research plans that can be realistically accomplished within the constraints of available funds and contract time as highlighted on page 3. Proposals must present the candidate's current thinking in sufficient detail to demonstrate their understanding of the problem and the soundness of their approach. **Any work that is anticipated to be required from LTRC or DOTD forces shall be specifically detailed in the proposal.**
- C. LTRC projects are intended to produce results that will be applied in practice. It is expected that the implementation of the results of this research into practice will evolve as a concerted effort during this project. The final report must contain an implementation plan to include, as a minimum, the following:
- a. The "product" expected from the research;
 - b. A realistic assessment of impediments to successful implementation;
 - c. The activities necessary for successful implementation; and
 - d. The criteria for judging the progress and consequences of implementation.
- D. To assist in the implementation process, the investigators of this research shall present the final results to LA DOTD officials in an oral presentation to be held in Baton Rouge, Louisiana at LA DOTD Headquarters after acceptance of the final report.
- E. The proposal should include travel to meet with the Project Review Committee for a "kick off" meeting, presentation of interim report, and presentation of the final report at a minimum. Funds budgeted for travel shall be limited to what is necessary for the conduct of the research. Funding for technology transfer of research results are available upon request subject to LTRC approval and available funds.
- F. LTRC's mission includes the support of higher education in Louisiana. Consultant and out-of-state institutions submitting proposals are encouraged to cooperate and collaborate with Louisiana universities for the purpose of sharing of knowledge and increasing transportation expertise in the academic community.
- G. Graduate assistance stipends are allowed. Tuition reimbursement or tuition remission rates applied to stipends are not allowed.
- H. To equitably answer any questions regarding this Request for Proposals, the

Louisiana Department of Transportation and Development (LA DOTD) website will be updated with questions and answers and related documents regarding the project.

<http://webmail.dotd.louisiana.gov/agrestat.nsf/WebAdvertisements?OpenPage>

LA DOTD makes these documents available for informational purposes only to aid in the efficient dissemination of information to interested parties. LA DOTD does not warrant the documents against deficiencies of any kind. The data contained within this web site will be periodically updated. Interested parties are responsible to be aware of any updates. Questions regarding this RFP should be submitted in writing to the LTRC contact person. Questions must be received by close of business seven calendar days prior to deadline date.

- I. Consultants and business entities shall be registered with the Secretary of State in order to be able to work in Louisiana prior to award of contract.
<http://www.sos.la.gov/tabid/1011/Default.aspx>
- J. If Sub-Consultants/Entities are used, the Prime Consultant/Entity must perform a minimum of 51% of the work for the overall project.
- K. LTRC reserves the right to withhold invoice payments for delinquent deliverables as defined in the proposal.

ESTIMATED COST OF RESEARCH

\$ 200,000

ESTIMATED COMPLETION TIME

70 Months (*includes 3 months for review and approval of final report - i.e. final report due 67 months; Tasks 1-4 are to be completed within the first 12 months*)

LTRC PRIMARY CONTACT

Walid Alaywan, Ph.D., P.E.
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AUTHORIZATION TO BEGIN WORK:

January, 2016 (estimated)

PROPOSAL FORMAT

All proposals are required to be formatted according to LTRC Manual of Research Procedures. Chapter 2 provides guidance on proposal development. A copy of the Manual may be downloaded from our website (<http://www.ltrc.lsu.edu/publications.html>).

PROPOSAL SELECTION

The Project Review Committee selected for this project will review, evaluate and rank all proposals received using the criteria established on the attached proposal review form.

DEADLINE FOR RECEIPT OF PROPOSALS

Ten copies of the proposal must be received by LTRC by the close of business day of, December 4, 2015.

Proposals should be submitted to:

Mr. Harold Paul, P.E., Director
Louisiana Transportation Research Center
4101 Gourrier Avenue
Baton Rouge, LA 70808

Appendix A

Section 1008 Paints

1008.01 GENERAL.

(a) **Packaging:** Paints shall be delivered in 5-gallon, full lid, shipping containers conforming to Interstate Commerce Commission (ICC) requirements. Used containers will not be permitted unless they have been satisfactorily reconditioned and thoroughly cleaned.

(b) **Identification:** Each paint container shall bear a label with the following information: name and address of manufacturer, trade name or trademark, kind of paint, color of paint, number of gallons, batch number and date of production.

(c) **Storage:** After 1 year from date of manufacture, the material shall not show skinning, settling, color change, thickening or livering that cannot be eliminated by normal mixing procedures. After 1 year, the paint shall be retested prior to use and shall show no change from when originally approved. No material shall be used after the manufacturer's recommended shelf life.

1008.02 3-COAT ORGANIC ZINC PRIMER AND TOPCOAT SYSTEM. The paint (two primer coats, one topcoat and thinners) shall be an approved product listed in QPL 37. Each system shall be tested for a minimum of 1500 hours in a Salt Spray (Fog) apparatus, a Fluorescent UV-Condensation Exposure apparatus and/or an Operating Light-Exposure apparatus (Carbon Arc Type) with water in accordance with ASTM B 117, G 53 and G 23. The paint system shall show no rusting, blistering, checking, cracking, delamination, or undercutting and only slight chalking or discoloration.

Standard x-ray and infrared curves will be made of all approved coatings. When the project sample deviates from these curves, the material represented by the sample will be rejected.

The following specification is not a formula. The manufacturer assumes all responsibility in formulating products which meet these specification requirements in laboratory testing, field application and performance.

Each paint system shall conform to the following requirements.

(a) **Organic Zinc Primer (2 coats):** The generic type of the vehicle shall be epoxy polyamide (Catalyzed).

(1) Base Composition:

<u>Property</u>	<u>Test Methods</u>	<u>% By Weight</u>
Pigment, Min.	ASTM D 2698	80
Zinc Dust, ASTM D 520, Type I, Min.		97
Thixotropes, Tinting Pigments, anti-settling additives, gassing inhibitors, etc., Max.		3
Vehicle, Max.	ASTM D 2698	20
Epoxy Resin	ASTM D 2369 & D 2698	18-26
Film Forming Additives, Max.		1.1
Solvent Blend (Ethylene glycol monoethyl ether and ethylene glycol monoethyl ether acetate are prohibited)		72.9-82.0

Epoxy Equivalent of the epoxy resin system shall be 450-550 when tested in accordance with DOTD TR 518.

Material shall not settle to the point that it cannot be easily reblended and shall not show signs of gassing. Thixotropes which become part of the vehicle solids will be calculated as resin solids in epoxy equivalent determinations.

(2) **Curing Agent:** The curing agent shall be a clear, nonpigmented solution consisting of the following:

<u>Property</u>	<u>Test Methods</u>	<u>Requirements</u>
Polyamide, % by Weight,	ASTM D 2369	25-29
Solvent Mixture (Ethylene glycol monoethyl ether and ethylene glycol monoethyl ether acetate are prohibited)		
Xylene, % by Weight, Min.		36

Amine value of the polyamide shall be 200-250 when tested in accordance with DOTD TR 519. Thinners shall be from the same manufacturer as the paint.

(3) **Mixed Primer:**

<u>Property</u>	<u>Test Methods</u>	<u>Requirements</u>
Volatiles, % by wt, Max.	ASTM D 2369	20
Solids, % by wt, Min.	ASTM D 2369	80
Wt./gallon, lb, Min.	ASTM D 1475	21.0
Dry to touch, minutes, Max.	ASTM D 1640	30
Dry through, hours, Max.	ASTM D 1640	8
Sag Test (Leneta Anti-Sag) mils, Min.	Federal Test Method 4494	10

The dried finish of painted surfaces shall be free of lumps, agglomerates or other surface imperfections.

The manufacturer shall produce the primers as a 2-component system consisting of a base and a cure. Thinning shall be in accordance with the manufacturer's recommendations, but not exceeding 12 percent by volume.

(4) **Tinting:** Primer shall be tinted for color contrast as follows:

- 1st Coat - Red
- 2nd Coat - Green

(b) **Vinyl Topcoat:**

(1) **Composition, % by Weight:**

<u>Property</u>	<u>Test Methods</u>	<u>Requirements</u>
Vinyl Resin (VAGH & VMCH equal parts), Min.		15.00
Epoxy resin (Epon 828), Max.		0.07
Diethylphthalate (DOP), Max.		3.83
Pigment, Aluminum	ASTM D 2398	
ASTM D 962, Type I Class B leafing, Max.		6.52
or Type II Class B leafing, Max.		10.03
Thixotropes, wetting agents, scavengers, film forming additives, etc., Max.		3.0
Solvents, Min. (Ethylene glycol monoethyl ether and ethylene glycol monoethyl ether acetate are prohibited)		71.0

(2) Property	Test Methods	Requirements
Volatiles, % by wt., Max.	ASTM D 2369	76
Solids, % by wt., Min.	ASTM D 2369	24
Wt./gallon, lb	ASTM D 1475	7.8-8.5
Dry to touch, minutes, Max.	ASTM D 1640	30
Dry through, hours, Max.	ASTM D 1640	3
Viscosity, Krebs Unit	ASTM D 562	70-100
Storage, yr, Min.		1
Viscosity Stability Test, Krebs Unit increase in 4 months storage, Max. (Not to exceed viscosity requirement)		15
Sag Test (Leneta Anti-Sag) mils, Min.	Fed. Test Method 4494	10
Grind, Hegman, Min.	ASTM D 1210	6

Thinning shall be in accordance with the manufacturer's recommendations, but not exceeding 10 percent by volume. Thinners shall be from the same manufacturer as the paint.

1008.03 ASPHALTIC VARNISH.

(a) **Material:** Asphaltic varnish shall be composed of hard native asphalts or asphaltites (gilsonite, for example), run (fluxed) and blended with properly treated drying oils, and thinned with suitable solvents with the necessary amount of dryers.

(b) **Appearance:** The film shall be smooth and homogeneous when a thoroughly mixed sample is poured and examined on a clean, clear, glass plate and placed in a vertical position until the excess varnish has drained off. The film will be examined by transmitted light.

(c) **Color:** Color shall be jet black when examined by reflected light.

(d) **Nonvolatile Matter:** Nonvolatile matter shall be not less than 40 percent by weight when tested in accordance with ASTM D 2369.

(e) **Drying of film:**

(1) **Set to Touch:** Film shall set to touch in not more than 8 hours when tested in accordance with ASTM D 1640.

(2) **Dry Through:** Film shall dry through in not more than 36 hours when tested in accordance with ASTM D 1640.

(f) **Working Properties and Appearance of Dried Film:** Varnish shall have good brushing, flowing, covering and leveling properties. Dried film shall be jet black, smooth and free from brush marks, blisters, pin-holes and other defects.

(g) **Water Resistance:** Film shall show no whitening, dulling or other defects after a dried film is immersed in water for 18 hours and air dried for 2 hours.

1008.04 COAL TAR EPOXY-POLYAMIDE PAINT. This paint shall conform to SSPC Paint No. 16.

1008.05 METAL WORK PAINT: These specifications cover material requirements for metal work paint to be used on manhole and catch basin covers and related items. Metal work paint shall be formulated from climate resistant resin and pure petroleum solvents.

Metal work paint shall conform to the following requirements.

1008.02 THREE-COAT WATERBORNE PAINT SYSTEM (Two Primers And One Topcoat).

The Three-Coat Waterborne Paint System (Two Primers and One Topcoat), shall be an approved system listed on QPL 68. Each system shall be tested for a minimum of 1500 hours in a salt spray (fog) apparatus and fluorescent UV-Condensation Exposure Apparatus in accordance with ASTM B 117 and G 154. The paint system shall show no rusting, checking, cracking, delamination or undercutting. There shall be only slight chalking or discoloration and there shall be no blisters larger than number 8 when rated in accordance with ASTM D 714.

Standard X-ray and infrared curves will be made of all approved coatings in accordance with ASTM D 5380 and DOTD TR 610. When the project sample deviates from these curves, the material represented by the sample will be rejected.

The following specification is not a formula. The manufacturer assumes all responsibility in formulating products which meet these specification requirements in laboratory testing, field application, and performance.

Each paint system shall comply with the following requirements.

(a) Primer:

(1) System A:

a.Pigment: The pigment shall be composed of the following materials:

	Percent By Weight (mass)
Zinc Phosphate Dihydrate, Min.	22
Red Iron Oxide (ASTM D 3722), Min.	10
Barium Sulfate (ASTM D 602), Min.	50

The balance of the pigment shall include any application aids, thixotropes, tinting pigments, etc. which may enhance the performance of the material.

b. Vehicle: The vehicle shall be composed of a minimum of 80 percent resin solution with the balance being water, surfactants, antifoam additives, stabilizers, pH adjusters, etc. The resin shall be of vinyl acrylic copolymer latex having a pH between 1 and 2 and a chlorine content of 64 percent based on latex solids.

c.Mixed Paint: The mixed paint shall have the following properties:

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Pigment, % by wt., Min.	ASTM D 3723	23
Weight/gallon, pounds, Min.	ASTM D 1475	12
Solids, % by wt. Min.	ASTM D 3723	60
Non-volatile in Vehicle, % by wt., Min.	ASTM D 3723	49
Viscosity, Ku	ASTM D 562	70 - 90
Fineness of Grind, Hegman Scale, Min.	ASTM D 1210	5
Dry to Touch, Minutes, Max.	ASTM D 1640	30
Dry Through, Hours, Max.	ASTM D 1640	1
PH	ASTM E 70	4.5 - 5.5
Sag, Lenetta, Mils, Min.	ASTM D 4400	12

(2) System B (Color Contrasting Primers):

a. First Coat Primer: See heading 1008.02(a)(1)a.

b. Second Coat Primer: The second coat primer shall meet the vehicle requirements of the first coat primer. The second coat primer pigmentation shall be changed to allow for color contrast between the first coat red primer, second coat primer and gray topcoat.

(b) Topcoat:

(1) Pigment: The pigment shall be composed of 95 percent by weight of Titanium Dioxide (TiO₂) in accordance with ASTM D 476. The balance of the pigments shall include any application aids, thixotropes, tinting pigments, etc., which may enhance the performance of the material.

(2) Vehicle: The vehicle shall be composed of a minimum of 87 percent solution with the balance being water, dispersant, rheological modifiers, stabilizers, etc. The resin shall be a 41.5 percent solids small particle size aqueous dispersion copolymer consisting of acrylic, acrylonitrile and styrene monomers. The resin shall have a personal modulus between 38°C and 42°C and a pH between 7.2 and 7.8.

(3) The topcoat shall be tinted to match the standard "Louisiana Gray" topcoat available from the Materials and Testing Section. The paint shall have the following properties:

<u>PROPERTY</u>	<u>TEST METHOD</u>	<u>REQUIREMENT</u>
Pigment, % by wt., Min.	ASTM D 3723	13
Weight/gallon, pounds, Min.	ASTM D 1475	9.2
Solids, % by wt. Min.	ASTM D 3723	46
Non-volatile in Vehicle, % by wt., Min.	ASTM D 3723	39
Viscosity, Ku	ASTM D 562	90 - 110
Fineness of Grind, Hegman Scale, Min.	ASTM D 1210	5
Dry to Touch, Minutes, Max.	ASTM D 1640	30
Dry Through, Hours, Max.	ASTM D 1640	2
Sag, Resistance, Lenetta, Mils, Min.	ASTM D 4400	12

Appendix B

A. Painted Structures Candidates for Research - On-System Steel Bridges Painted between 1996-2006 (Three Coat Waterborne Systems)

Structure No.	Control Section	Route	Crossing
1. 02298291800001	829-18	LA649	BAYOU LAFOURCHE
2. 08408404300001	840-43	US71	LA 1, FR. ROAD, UP RR
3. 03230550700321	055-07	LA14	DELCHAMBRE CANAL
4. 08400153001871	015-30	US165	US 71, ROCKY BAYOU
5. 02298291000001	829-10	LA654	BAYOU LAFOURCHE
6. 04090780200151	078-02	LA538	TWELVE MILE BAYOU

B. Painted Structures Candidates for Research - On-System Steel Bridges Painted between 1982-1995 (Three Coat Organic Zinc Primer and Top Coat Systems)

Structure No.	Control Section	Route	Crossing
1. 03010570208851	057-02	LA13	STREETS & R.R.
2. 07100310603751	031-06	LA27	HOUSTON RIVER
3. 61174509206431	450-92	I110	LA 408; BADLEY ST;
4. 04090530908342	053-09	LA1	JONES ST/KCS RR
5. 05374510621417	451-06	I20	OVERPASS OFF RAMP
6. 08404550525437	455-05	I49	US 71, UP RR, RAMP A-1

Appendix C

TYPICAL FIELD TEST PERFORMED DURING FIELD EVALUATION OF PAINT SYSTEMS

Adhesion tests (ASTM D4541-02):

1. Adhesion pull tests (3 each test area).

Adhesion Test (ASTM 3359-02)

1. X-cut adhesion tape test (1 each test area).
2. Knife test (1 each test area).

Dry Film Thickness (ASTM D1186-01):

1. Tooke gage readings to determine number and thickness of each coat (3 each test area).
2. Measurements of overall thickness with type II DFT gauge. (5 spot readings each test area)

Visual Observations for each test area (ASTM D4214):

1. Degree of chalking.
2. Degree of rusting percentage of breakdown and type of corrosion.
3. Rating of performance of each test area (Scale 1-10) 5. Photo documentation of all tests.