TECHNICAL REPORT STANDARD PAGE

1. Report No. FHWA/LA.88/313	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Thin Bonded Overlay and Surface Laminates - Construction	5. Report Date February 1998 6. Performing Organization Code	
7. Author(s) Craig Duos, P.E.	8. Performing Organization Report No. 97-2C	
9. Performing Organization Name and Address Louisiana Transportation Research Center 4101 Gourrier Avenue Baton Rouge, LA 70808	10. Work Unit No. 11. Contract or Grant No. **DTFH71-97-TBO-LA-13**	
12. Sponsoring Agency Name and Address Louisiana Transportation Research Center 4101 Gourrier Avenue Baton Rouge, LA 70808	13. Type of Report and Period Covered Interim Report 14. Sponsoring Agency Code	

15. Supplementary Notes

Conducted in Cooperation with the U.S. Department of Transportation, Federal Highway Administration

16. Abstract

In 1997, a Portland Cement Concrete (PCC) Thin Bonded Overlay (TBO) using a one and one-half inch thickness was placed on two bridges, I-10 at the Bonne Carre Spillway and US 90 at Bayou Des Allemands, under the Applied Research & Technology Program of the Intermodal Surface Transportation Efficiency Act (ISTEA), section 6005(e)(7). Section 6005 provides funding for the overlay of deteriorating roadways and/or bridge decks utilizing a thin bonded overlay.

The two sections of bridge decks that the Department of Transportation and Development (DOTD) overlaid are five spans in the east bound lane of I-10 over the Bonne Carre Spillway and eight spans in the east bound lane of US 90 over Bayou Des Allemands, both in St. Charles Parish. These two sites will be used to evaluate the feasibility of and costs and benefits associated with the repair, rehabilitation, and upgrading of highways and bridges with respect to TBOs and surface laminates. This report documents construction activities.

17. Key Words Thin Bonded Overlay	18. Distribution Statement Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price

THIN BONDED OVERLAY AND SURFACE LAMINATES - CONSTRUCTION

by

CRAIG DUOS, P.E.

LTRC PROJECT NO. 97-2C
STATE PROJECT NOS. 005-08-0047 & 450-14-0054
FEDERAL AID PROJECT NOS. BRN-11-9(004) & IM-10-4 (156)212

Conducted by

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
LOUISIANA TRANSPORTATION RESEARCH CENTER

in cooperation with

U.S. DEPARTMENT OF TRANSPORTION
FEDERAL HIGHWAY ADMINISTRATION

February 1998

ABSTRACT

In 1997, a Portland Cement Concrete (PCC) Thin Bonded Overlay (TBO) using a one and one-half inch thickness was placed on two bridges, I-10 at the Bonne Carre Spillway and US 90 at Bayou Des Allemands, under the Applied Research & Technology Program of the Intermodal Surface Transportation Efficiency Act (ISTEA), section 6005(e)(7). Section 6005 provides funding for the overlay of deteriorating roadways and/or bridge decks utilizing a thin bonded overlay.

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INTRODUCTION

In 1997, a Portland Cement Concrete (PCC) Thin Bonded Overlay (TBO) using a one and one-half inch thickness was placed on two bridges, I-10 at the Bonne Carre Spillway and US 90 at Bayou Des Allemands, under the Applied Research & Technology Program of the Intermodal Surface Transportation Efficiency Act (ISTEA), section 6005(e)(7). Section 6005 provides funding for the overlay of deteriorating roadways and/or bridge decks utilizing a thin bonded overlay.

The two sections of bridge decks that the Department of Transportation and Development (DOTD) overlaid are five spans in the east bound lane of I-10 over the Bonne Carre Spillway and eight spans in the east bound lane of US 90 over Bayou Des Allemands, both in St. Charles Parish. These two sites will be used to evaluate the feasibility of and costs and benefits associated with the repair, rehabilitation, and upgrading of highways and bridges with respect to TBOs and surface laminates. This report documents construction activities.

Project Location and Contractor

The research projects are located in St. Charles Parish on I-10 and US 90 over the Bonne Carre Spillway and Bayou Des Allemands. Maps with exact project locations are shown in appendix A.

The contract for these projects were awarded to Coastal Bridge Company, Inc., of Baton Rouge, Louisiana.

Preconstruction

Prior to construction, conditions at each site were evaluated. Falling Weight Deflectometer(FWD) measurements were taken as well as chloride profiles (Appendix D). Additionally, a preinstallation photographic record and pavement distress survey were performed.

The pavement distress survey conducted on the two project sections followed the guidelines outlined in the *Distress Identification Manual for the Long-Term Pavement Performance Project* (appendix D). The only distress identified within the sections was scaling. Scaling refers to the deterioration of the upper concrete slab surface, resulting in the loss of surface mortar. Most of the scaled areas had been patched. The total area of the I-10 project was 11,700 square feet with 6,784 square feet exhibiting scaling (58 %). The total area of the US 90 project was 15,360 square feet with 3,555 square feet exhibiting scaling (23 %).

Other preconstruction activities included a test pour, by and at the contractor's expense, which was used to determine the mixing sequence, workability, curing, and finishing characteristics of the mix.

Construction

The materials and mix specifications were as follows:

Cement Type: Type I, IB, III conforming to DOTD Standard Specifications, Section 901, shall be used.

Cement Content: 6.5 bags of cement per cubic yard.

Silica Fume: Eight percent (equivalent dry weight) by weight of cement. Force 10,000 densified silica fume by Grace Construction Products in 25 pound bags or approved equal shall be used. The densified silica fume shall contain a minimum of 90 percent SiO_2, a maximum of one percent SO_3, a maximum of three percent loss on ignition(LOI), a maximum alkali content of NA_2O of 1.5 percent, and a maximum moisture content of three percent.

Fiber Reinforcement: Fibers shall be monofilament consisting of 100% virgin polypropylene. The fibers shall be 3/4 inch in length and shall be included in the mix at a rate of two pounds per cubic yard. The approved fibers shall be Grace Microfibers by Grace Construction Products or an approved equal.

Water/Cementitious ratio: The ratio shall be 0.40 maximum(including any water in the admixtures).

Air Content: Between three and five percent.

Slump: Between three and five inches.

Strength: A 28 day compressive strength of 6000 psi.

Coarse Aggregate: Grade F, with ratio of coarse to fine aggregate of 60/40. All aggregates shall conform to Subsection 1003.02 of the 1992 *Louisiana Standard Specifications for Roads and Bridges.*

Admixtures: Admixtures shall be used in quantities consistent with the manufacturer's recommendations and shall be added at the concrete plant. Additional water reducers may be added at the job site when required. Air entraining agents and set controlling admixtures may also be used. All admixtures shall be from the Qualified Products List (QPL) and shall be compatible with the other admixtures used.

The actual mix design is included in appendix C.

A request concerning the batching operation was made by the contractor at the pre-construction conference. The owner of Coastal Bridge Co., Inc., requested the following mixing sequence: mix aggregates would be placed into the drum mixer of the truck at La Farge redi-mix plant and, after arriving at the site, cement , admixtures and water would be added. The W.R. Grace representative advised that with proper mixing time this would not be a problem. DOTD personnel also felt that the proposed mixing sequence would not be a problem and would also provide maximum working time for the concrete, so the request was granted.

Surface Preparation

I-10 at Bonne Carre

Concrete was to be removed to a depth of one and one-half inches. The contract provided the contractor with several options for concrete removal, grinding, hydro-blasting, or shot blasting. The contractor choose the grinding option, except in the immediate vicinity of the end dams which was done by rotary impact hammers. Grinding was successful until the fourth span when reinforcing steel was encountered at a depth of one inch. At this time grinding was halted and damaged steel was repaired as per contract specifications. A decision was made by the contractor's representative and DOTD project personnel to use hydro-blasting to remove the remaining surface concrete from spans four and five. However, hydro-blasting was too slow and the contractor, with the Project Engineer's approval, used chipping guns to remove the remaining concrete from span four. After removal of the top one and one-half inches of concrete, the scarified surface was cleaned by air blasting.

US 90 at Bayou Des Allemands

Concrete was to be removed to a depth of one and one-half inches and the contract provided the contractor with several options for concrete removal, grinding, hydro-blasting, or shot blasting. The contractor again chose the grinding option, except in the immediate vicinity of the end dams which was done by rotary impact hammers. The Bayou Des Allemands project was in worse condition than I-10 at Bonne Carre. Practically the entire surface area was scaled and laminated to a depth which exceeded the one and one-half inches the overlay was intended to address and in a few areas the depth of deterioration exceeded three inches. As a result, grinding was not effective in removing all of the deteriorated concrete. A decision was made to use hydro-blasting in order to maintain steel reinforcing integrity; this method was too slow, so chipping guns were used. After removal of the deteriorated concrete, the scarified surface was cleaned by air blasting.

Overlay

I-10 at Bonne Carre Spillway

Overlay operations began at 7:35 a.m. on July 29, 1997. One lane was closed for construction while traffic was channeled to the other. There was some concern about the vibrations caused by traffic, but maintaining traffic did not cause excessive vibrations. As per the pre-construction agreement, the concrete truck had already been charged with fine and coarse aggregate at La Farge's plant. Fibers, admixtures (air entrainment, set retarders, high range water reducers and, silica fume), cement, and water (adjusted for moisture in the fine and coarse aggregate) were added at the job site and mixed thoroughly. Mixing was usually completed by 9:00 a.m.

During mixing, the deck was prepared to receive the overlay by air blasting and water soaking. Immediately prior to placement of the overlay, a bonding grout consisting of equal parts Portland Cement and concrete sand with a water/cement ratio of 0.44 was mixed according to contract specifications to form a slurry and broomed onto the surface. At no time was it necessary for the bonding grout to be re-tempered.

The placement of concrete was usually completed between 30 and 45 minutes after mixing was complete. A Baker Screed with external vibrators was used to initially level and consolidate the concrete. The admixture representative advised that the mix should not be over vibrated and due to the thinness of the overlay all parties agreed that external vibration was sufficient to achieve proper consolidation. Temperatures during overlay operations ranged from 70° F to 92° F, wind speeds were between 5 and 10 mph under partly cloudy skies. Concrete temperatures never exceeded 90° F, except for span 245 which reached 94° F, but compressive strengths still exceeded 6000 psi. Texturing was performed by burlap drag and continuous fogging was used during and immediately after finishing until the overlay could support pre-wetted strips of burlap. The burlap was kept wet for 42 hours or until the concrete had achieved a compressive strength of 3200 psi.

Quality control and acceptance testing was performed by DOTD District 02 personnel with additional testing performed by Louisiana Transportation Research Center (LTRC) and DOTD Materials and Testing personnel. These tests are presented in appendix D. Quality control testing consisted of slump, air content, and temperature, while acceptance was based on compressive strength tests. Additional testing performed by LTRC and the Materials Section included chloride content, half cell potentials, chloride penetrability, flexure strength, splitting tensile, tensile bond strength, chain drag, skid tests, and pre-installation and post-installation Falling Weight Deflectometer which are also included in appendix D.

Although the contractor's personnel were not completely familiar with the mixing, finishing, and curing characteristics of silica fume concrete, the overlay was placed without event. The only problem during the entire project was mechanical in nature. On span four, the screed broke down after three passes and the final finish was done by hand. No additional vibration was done as the project engineer felt that the concrete had been properly consolidated after the initial passes with the screed's external vibrators.

U.S. 90 at Bayou Des Allemands

Bayou Des Allemands was constructed after the Bonne Carre was completed. The same construction sequence was followed on the Des Allemands project except for the finish. Instead of a burlap drag finish the project engineer requested a broom finish. Overlay operations began on September 8, 1997, and continued until November 21, 1997. All spans were poured in the morning except for span six which was poured between 1:40 p.m. and 2:00 p.m.. Wind speeds ranged from 5 to 20 mph under partly cloudy skies, except for span six which was poured under overcast skies. Temperatures ranged from 40° F to 92° F during overlay operations. Concrete temperatures approached 90° F but never exceeded it. Continuous fogging was again employed until wetted burlap could be placed. There were no problems with equipment and placement of the overlay.

Post Construction Evaluation

Construction of both projects went as well as could be expected given the temperamental nature of the mix and the lack of experience, on the contractor's part, with silica fume mixes. The only problems encountered during pre-overlay operations was with milling. Reinforcement steel was not at a consistent depth throughout the structure and damage by milling operations had to be repaired. This occurred in span 248 of the Bonne Carre project and span seven of the Bayou Des

Allemands project.

During the overlay phase of construction the only problem encountered was with the screed on the Bonne Carre project.

There was a problem with low breaks on both projects. Compressive strengths on span 246 on Bonne Carre right of center line were low with an average compressive strength of 5736 psi. This was due to the contractor exceeding the water/cementitious ratio. Spans seven and eight left of the center line, on Bayou Des Allemands, had average breaks of 5729 psi and 4132 psi, respectively. Nothing in the daily reports, plant reports for moisture, or batch proportions showed up which would explain the low breaks for spans seven and eight. Concrete temperature, slump, and air were all within allowable tolerances, and moisture in the aggregates had been accounted for. However, there were discrepancies in the testing procedures worth noting. When LTRC made and tested cylinders for compressive strength on spans 246 on Bonne Carre right of centerline and span eight left of centerline on Bayou Des Allemands, we arrived at different results than the District 02 laboratory. The cylinders LTRC personnel made and tested for span 246 had an average compressive strength of 5920 psi and span eight had an average compressive strength of 6859 psi. When compared to District 02 tests, the cylinders from span 246 are similar and can be explained by the high water/cementitious ratio used, but the cylinders from span eight are quite different. There is a difference of 2727 psi between cylinders made from the same batch. Also, District 02's seven day breaks, for span eight, were higher than the 28 day breaks for span eight. Seven day breaks averaged 5553 psi, while 28 day breaks averaged 4132 psi. It's believed that the discrepancies are in the fabrication or testing of the cylinders and not, in this case, with the mix proportions.

A chain drag test and impact test performed on 5' x 5' grids revealed no delaminated sections.

Following construction of the microsilica concrete overlay on the project sections of I-10 and US 90, friction testing was conducted. Friction tests were run on US 90 on January 23, 1998, and on I-10 on January 28, 1998. Pavement surface testing for friction, or skid resistance, was done on a test section and a control section for each project site. The test section for each site was the section of roadway with the microsilica concrete overlay, while the control section for each site was the original section of roadway adjacent to the test section.

The data collected includes friction values obtained according to ASTM E 274-90, the *Standard Test Method for Skid Resistance of Paved Surfaces Using a Full-Scale Tire*. The friction values are reported for two tire types, the treaded (standard rib) tire (ASTM E 501-94 Standard Specification) and the blank (standard smooth) tire (ASTM E 524-88 Standard Specification). Both tire types measure the frictional properties of the pavement. However, the treaded tire is more responsive to changes in the microscopic surface texture, while the blank tire is more responsive to changes in the obvious and visible texture that allows water to escape from between the tire and road. All friction tests were run at a vehicle speed of 40 mph ± 1 mph and under simulated wet weather conditions.

Friction testing data for the project sections is displayed in tables in appendix D. Each table contains log miles and skid numbers. The log mile is a linear distance location along a route within a particular highway control section, which is within a parish. The I-10 project is located in highway control section 450-14 in St. Charles Parish. The US 90 project is located in highway control section 005-08 in St. Charles Parish. The skid number is a measurement of skid resistance of a wet pavement surface and can also be viewed as a measurement of friction between a tire and a wet pavement surface.

Friction testing on I-10 yielded an average skid number of 42.6 for the test (microsilica) section and 39.6 for the control section using the treaded tire and an average skid number of 26.0 for the test section and 22.2 for the control section using the blank tire. Friction testing on US 90 yielded an average skid number of 40.7 for the test section and 45.1 for the control section using the treaded tire and an average skid number of 22.3 for the test section and 24.1 for the control section using the blank tire.

The data indicates that skid numbers for the test (microsilica) sections are comparable with that for the control sections at both project sites. Thus, the construction of the microsilica concrete overlays did not significantly affect the surface frictional properties of the pavement.

Structural capacity testing was conducted on the project sections of I-10 and US 90 before and after construction of the microsilica concrete overlay. The structural testing was performed by means of deflection testing of the concrete slab surface with a Dynatest 8000 Falling Weight

Deflectometer. Deflections were measured in thousandths of an inch (mils) when a nondestructive falling load of about 18,000 pounds (lbs) was applied by the FWD at various project locations. The maximum deflection was obtained by the sensor located at the center of the load plate. Deflection testing was linearly located five feet ahead of the joint and also at the midspan of each concrete bridge deck span. The testing was also vertically aligned to not be directly over deck support girders to enhance deflections under heavy loads.

For the I-10 section, structural tests were run on July 10, 1997, before the overlay and on August 11, 1997, after the overlay. The five spans were referenced as spans A, B, C, D, and E traveling eastbound. For the US 90 section, structural tests were run on July 11, 1997, before the microsilica construction and on February 12, 1998, after the microsilica construction. The eight spans were referenced as spans A, B, C, D, E, F, G, and H traveling eastbound. Each test located five feet ahead of the joint was referenced as No.1, while each test located at the midspan was referenced as No.2.

Results of the deflection testing for both project sections are displayed in appendix D. Smaller deflections indicate higher structural capacity of the pavement deck. As expected, deflections were higher at midspan compared to that five feet ahead of the joint. This was due to less structural support beneath the midspan locations. A vivid picture of the midspan deflection results can be seen on the attached bar graphs (appendix D). Maximum midspan deflections ranged from 13.9 to 18.2 mils before the overlay and from 14.5 to 16.0 mils after the overlay for the I-10 project. Maximum midspan deflections ranged from 23.6 to 39.6 mils before the overlay and from 23.1 to 27.1 mils after the overlay for the US 90 project.

The results of the deflection testing on both project sections indicate that the structural capacity of the bridge decks is not affected by the microsilica concrete overlay.

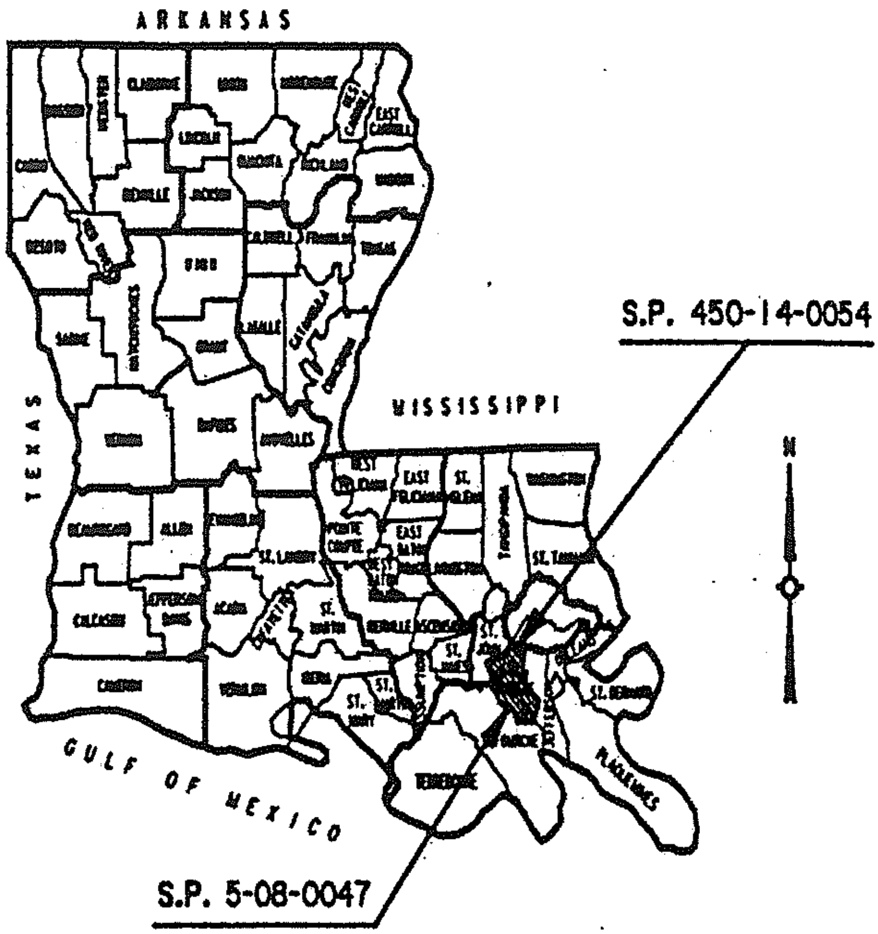
Performance Evaluation

Each site will be evaluated annually, for five years, on or near the date the projects were accepted, December 11. As a minimum, a visual site inspection will be done once a year to document changes if any. Also, any unusual climatic conditions will be documented. This site usually does not experience problems with icing; however, if it does occur and the bridge is salted this will also be documented.

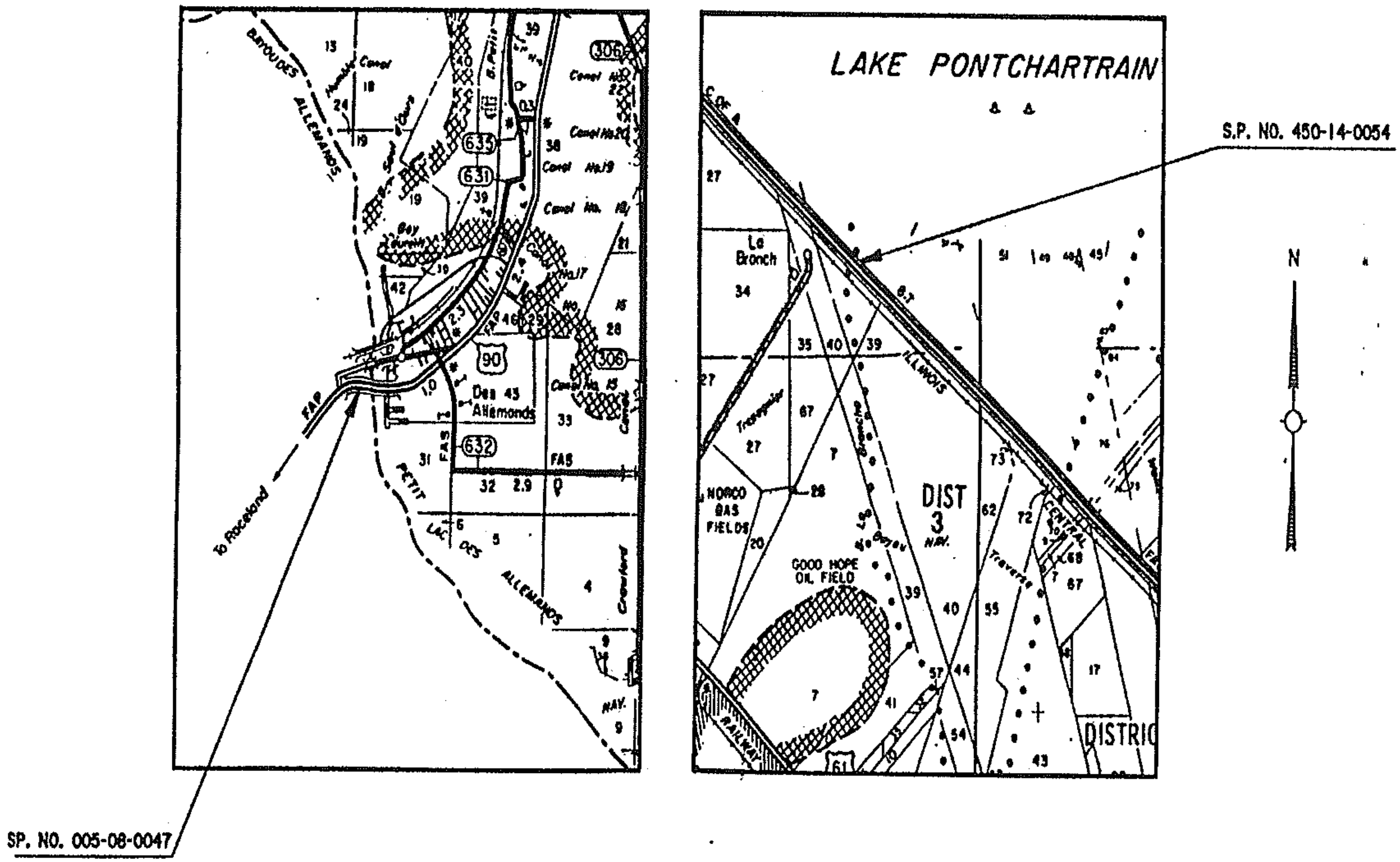
CONCLUSIONS

The overlay is in place and performing well. There were no unexpected problems with the mix, except those already noted. Chain drag and tensile bond tests showed no delaminations and adequate bonding between the existing bridge deck and the overlay. The spans, with low compressive strengths will bear watching; however, it appears from project records that the mix proportions were correct and that the problem was in fabrication or testing of the cylinders.

APPENDIX A

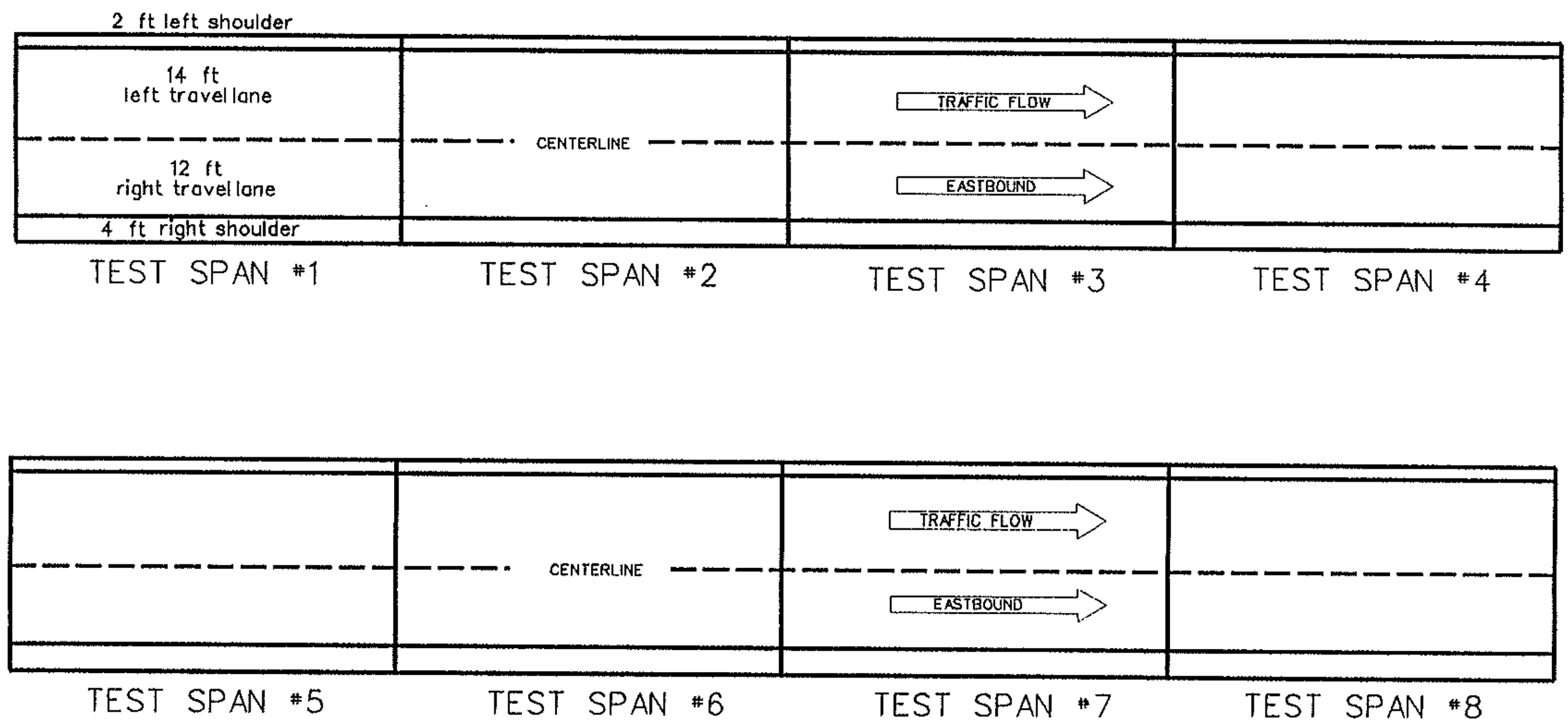


VICINITY MAP


LAKE PONTCHARTRAIN
S.P. NO. 450-14-0054
SP. NO. 005-08-0047
N
DIST 3
GOOD HOPE OIL FIELD
NORCO GAS FIELDS
La Branch
ILLINOIS
CENTRAL
RAILWAY
DISTRIC
Des Allemands
BAYOU DES ALLEMANDS
PETIT LAC DES ALLEMANDS
To Raceland
FAP
FAS
90
306
631
632
635

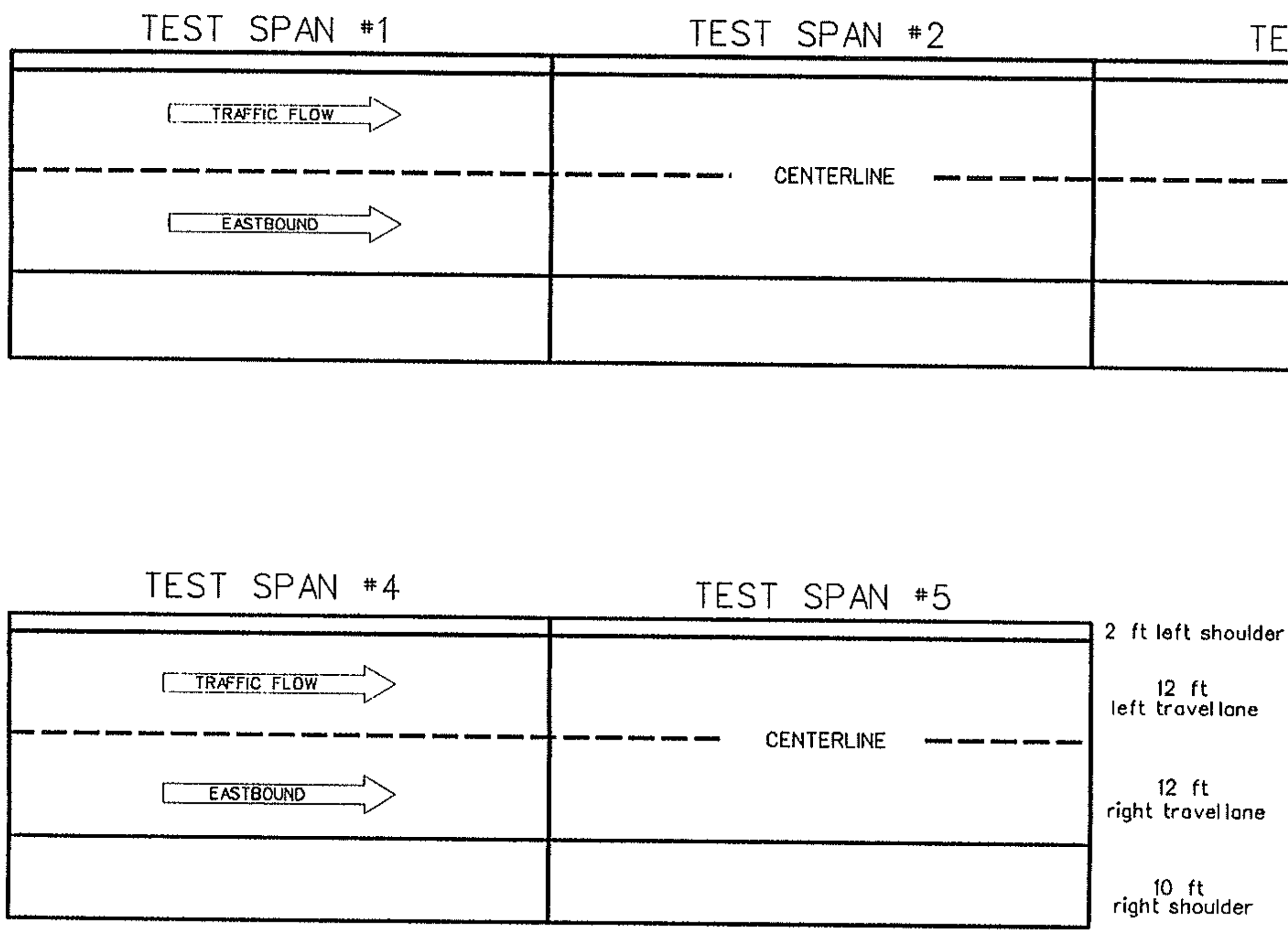
APPENDIX B

PLAN VIEW OF US 90 DECK OVERLAY PROJECT



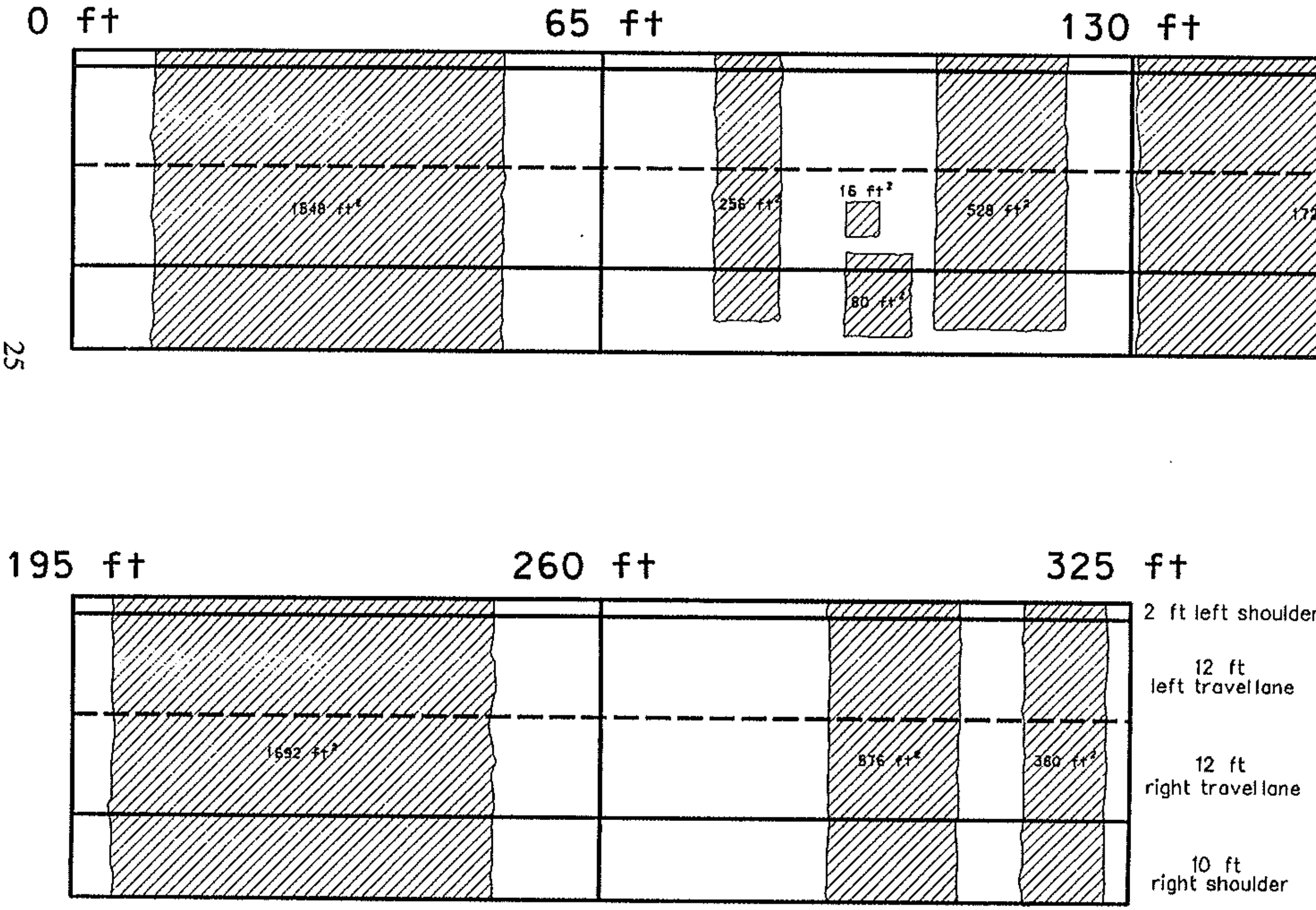
Bayou Des Allemonds, Eastbound
STATE PROJECT No. 005-08-0047

PLAN VIEW OF I-10 DECK OVERLAY PROJECT



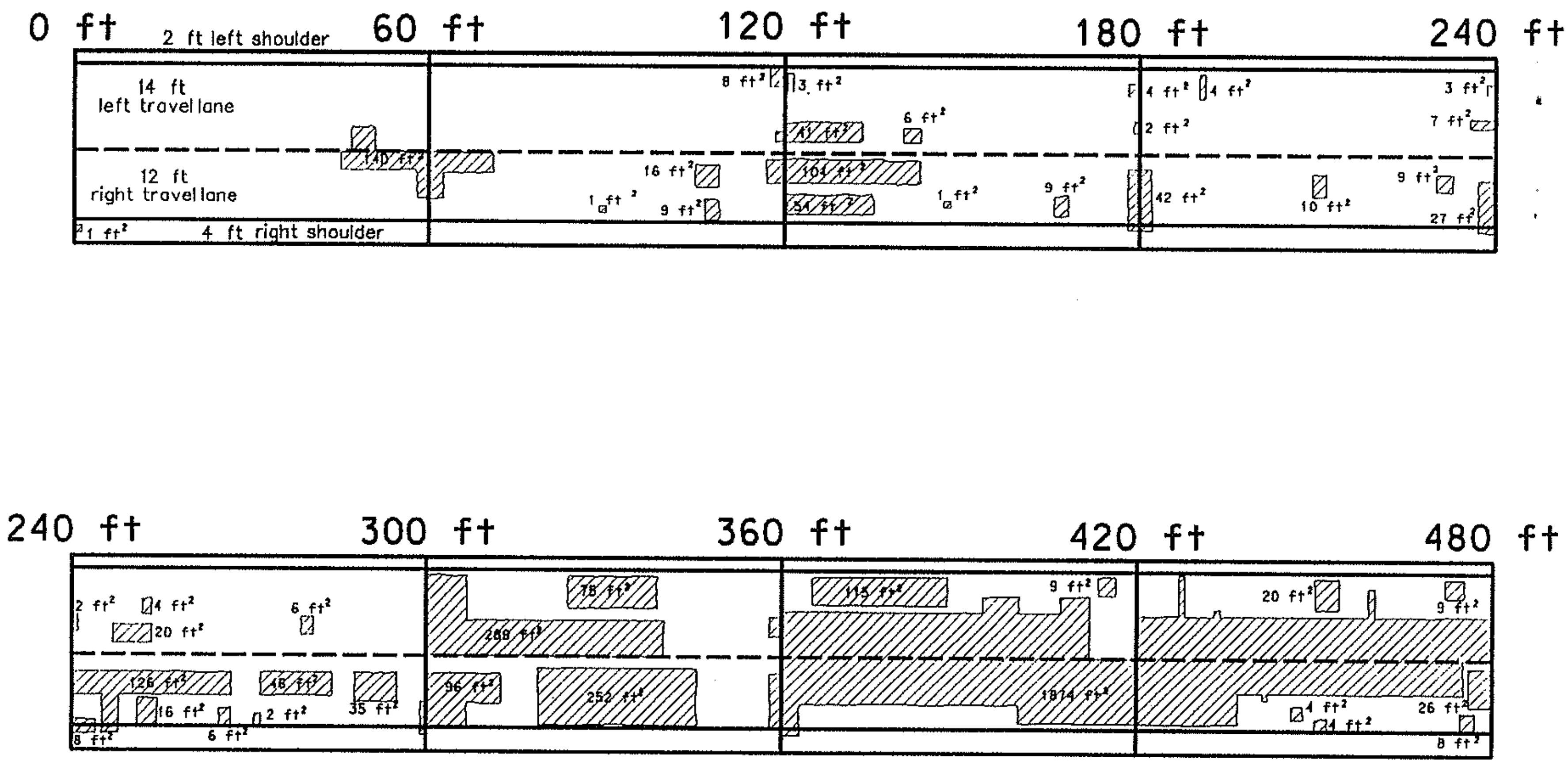
Bonnet Carre, eastbound
STATE PROJECT No. 450-14-0054

PAVEMENT DISTRESS SURVEY
BEFORE CONSTRUCTION
I-10 PROJECT SECTION



All pavement distress is scaling.
Most scaled areas are patched.

PAVEMENT DISTRESS SURVEY
BEFORE CONSTRUCTION
US 90 PROJECT SECTION



All pavement distress is scaling.
Most scaled areas are patched.

APPENDIX C

(C)

MATT MENU SELECTION 30

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

PORTLAND CEMENT CONCRETE MIX DESIGN

DOTD 03-22-0738
REV. 11/80

Mix Design

PROJECT NO. 7159-1141-90514 MATERIAL USE P or S MATERIAL CODE 4,2,4 TYPE/CLASS
PLANT CODE 6 MIX DESIGN NO. 63
Slip Form Paving Y=Yes N=No Mixing Method: 1=Truck Mixer, 2=Central Mixer, 3=Shrink Mixer
F.A.P. Project Name I-10 Bonnet Carre Bridge Deck Resurface Parish

MATERIALS

	Source Code	Company Name	Location	Material Code	Alkali Reactive	Specific Gravity	Absorption Factor	Product Name
Cement	0754	Holnam	Theodore, Al.	1516	Y=Yes N=No			
Fly Ash						.		
Fine Aggregate	A1134	La Industries	Isabell		N	2.62	0.5	
Coarse Aggregate 1	A1134	La Industries	Isabell		N	2.51	2.5	
Coarse Aggregate 2						.	.	
Water Reducer			Normal Set Y=Yes N=No			Set Retarder Y=Yes N=No		
Air Entrainer	5850	Grace						Darevair 1000
Set Accelerator			Chloride Y=Yes N=No			Non-Chloride Y=Yes N=No		
Superplasticizer		Grace						Daracem 19
Special Additive A		Grace		260		2.25		Force 10,000D
Special Additive B		Grace		2517		0.91		Micro Fiber
Special Additive C						.		

Mixing Water: Source of Supply 1=City, 2=Well, 3=Other

Mix Proportions For One Cubic Yard of Concrete

% Volume				UNIT (lbs, gal, ozs)
3.108	Cement	611	lbs	
0.0	Fly Ash	0	lbs	
7.2788	Fine Aggregate(SSD)	1190	lbs	
10.9306	Coarse Aggregate 1 (SSD)	1712	lbs	
0.00	Coarse Aggregate 2 (SSD)	0	lbs	
4.0764	Water	30.5 (31.6)	gal	
0.00	Water Reducer	.0	ozs	
1.08	Air Entrainer	9.00	ozs	
0.00	Set Accelerator	.0	ozs	
0.1278	Superplasticizer	32.00	ozs	
0.3990	Special Additive A	49.00	silica	1 6 5 %
0.0252	Special Additive B	2.00	fibers	1 6 5
0.0	Special Additive C	.0		
26.9958				

Contractor Coastal Bridge Co (0971)
Submitted By Ray Overall Cert Conc Tech (504) 859-2977
Date Submitted

Departmental Use

Yield	27.00	Cubic Feet
Cement Factor	7.0	Bags/Cubic Yard
Fly Ash	0	% By Weight
Water-Cement Ratio	4.5	Gallons/Bag
Water-Cement Ratio	.40	By Weight
Cement with 0.6% or less Alkalies required	N	Y=Yes N=No

Received ______ Project Engineer Code Date

ACCEPTED ☐ REJECTED ☐

District Laboratory Engineer Code Date

Acceptance based on mix proposal meeting specification requirements for yield, cement factor, water cement ratio, materials sources, cement type, fly ash type, admixture types, special additives and MATT Codes.

MATT MENU SELECTION 30

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

PORTLAND CEMENT CONCRETE MIX DESIGN

DOTD 03-22-0735
REV. 12/90

PROJECT NO. 450-14-0054 MATERIAL USE S P or S MATERIAL CODE 424 TYPE/CLASS
PLANT CODE C2611 #8274 LaFarge Rennick/Marrero MIX DESIGN NO. 011
Slip Form Paving N Y-Yes N-No Mixing Method: 1 1-Truck Mixer, 2-Central Mixer, 3-Site Mixer
F.A.P. Project Name I-10 Bonnet Carre Spillway Bridge Resurfacing

MATERIALS

	Source Code	Company Name	Location	Material Code	Alkali Reactive	Specific Gravity	Absorption Factor	Product Name
Cement	0754	Holnam	Theodore Al	1654		3.1		
Fly Ash								
Fine Aggregate	A1132	La Industries	Isabell	4120	N	2.62	0.5	
Coarse Aggregate 1	A1132	La Industries	Isabell	4181	N	2.51	2.5	
Coarse Aggregate 2								
Water Reducer	5806	Grace	Normal Set N			Set Retarder N		Daratard 17
Air Entrainer	5850	Grace						Daravair 1000
Set Accelerator			Chloride			Non Chloride		
Superplasticizer		Grace						Daracem 19
Special Additive A		Grace		2610		2.125		Force 10,000 D
Special Additive B		Grace		2517		0.91		Microfiber
Special Additive C				1191		1.00		Eclipse

Mixing Water: Source of Supply 1 1-City, 2-Well, 3-Other

30

Mix Proportions For One Cubic Yard of Concrete

	Quantity		UNIT (lbs, gal, ozs)
Cement	611	lbs	
Fly Ash	0	lbs	
Fine Aggregate (SSD)	1199	lbs	
Coarse Aggregate 1 (SSD)	1711	lbs	
Coarse Aggregate 2 (SSD)	0	lbs	
Water	~~27.8~~ 31.6	gal	
Water Reducer	20.00	ozs	
Air Entrainer	9.00	ozs	
Set Accelerator	0.0	ozs	
Superplasticizer	132.00	ozs	
Special Additive A	49.00		3
Special Additive B	2.00		3
Special Additive C	200.00		025

Contractor Coastal Bridge Co (0971)
Submitted By Ray Overall Cert Conc Tech (504) 352-0653
Date Submitted __-__-__

Departmental Use

Yield	27.00	Cubic Feet
Cement Factor	7.0	Bags/Cubic Yard
Fly Ash	0	% By Weight
Water-Cement Ratio	4.5	Gallons/Bag
Water-Cement Ratio	.40	By Weight
Cement with 0.6% or less Alkalies required	N	Y-Yes N-No

Received ____ Project Engineer ____ Code ____ Date ____

ACCEPTED ☐ REJECTED ☐

____ District Laboratory Engineer ____ Code ____ Date ____

Acceptance based on mix proposal meeting specification requirements for yield, cement factor, water-cement ratio, materials sources, cement type, fly ash type, admixture types, special additives and MATT Codes.

MATT MENU SELECTION 30

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
PORTLAND CEMENT CONCRETE MIX DESIGN

PROJECT NO. 450-114-0054 | MATERIAL USE [ ] P or S | MATERIAL CODE 424
PLANT CODE 0261 or 274-Intercity Kenner/Marrero | MIX DESIGN NO. 01
Slip Form Paving N (Y=Yes N=No) | Mixing Method: 1
F.A.P. | Project Name I-10 Bonnet Carré Bridge Resurface

MATERIALS

	Source Code	Company Name	Location	Material Code	Alkali Reactive	Specific Gravity
Cement	0754	Holnam	Theodore, Al.	156		
Fly Ash						.
Fine Aggregate	A1132	La Industries	Isabell	4170	N	2.62
Coarse Aggregate 1	A1122	La Industries	Isabell	4181	N	2.51
Coarse Aggregate 2						.
Water Reducer	5306	Grace	Normal Set N			Set Retarder Y
Air Entrainer	5850	Grace				
Set Accelerator			Chloride [ ]			Non-Chloride [ ]
Superplasticizer		Grace				
Special Additive A.		Grace		269		2.23
Special Additive B		Grace		259		0.91
Special Additive C						.

Mixing Water: Source of Supply 1 (1=City, 2=Well, 3=Other)

% Volume	Mix Proportions For One Cubic Yard of Concrete			UNIT (lbs, gal, ozs)
3.108	Cement	611	lbs	
0.0	Fly Ash	0	lbs	
7.2788	Fine Aggregate (SSD)	1170	lbs	
10.9242	Coarse Aggregate 1 (SSD)	1711	lbs	
0.00	Coarse Aggregate 2 (SSD)	0	lbs	
4.0630	Water	~~30.4~~ 31.6	gal	
0.0208	Water Reducer	20.00	ozs	
1.08	Air Entrainer	9.00	ozs	
0.00	Set Accelerator	.0	ozs	
0.1378	Superplasticizer	132.00	ozs	
0.3490	Special Additive A	49.00		165
0.0352	Special Additive B	2.00		165
0.00	Special Additive C	.0		
26.9968				

Departmental Use

Yield	27.00
Cement Factor	7.0
~~Fly Ash~~ S.F.	08
Water-Cement Ratio	4.5
Water-Cement Ratio	.40
Cement with 0.6% or less Alkalies required	N

Received ______ Project Engineer ______ Code

ACCEPTED [ ] REJECTED [ ]

______ District Laboratory Engineer ______ Code

% Volume
3.108
0
7.2788
10.9242
0
3.8532
0.0208
1.08
0
0.1378
0.3490
0.0352
0.2088
26.9958

Contractor Coastal Bridge Co (0971)
Submitted By Ray Overall Cert Conc. Tech. (504) 352-0653
Date Submitted __/__/__

Acceptance based on mix proposal meeting specification requirements for yield, cement factor, water-cement ratio, materials sources, cement type, fly ash type, admixture types, special additives and MATT Codes.

Remarks:

APPENDIX D

I-10 @ BONNET CARRE SPILLWAY - COMPRESSIVE STRENGTH, psi								
	DISTRICT O2 RESULTS				LTRC RESULTS			
SPAN	RT OF CENTERLINE		LT OF CENTERLINE		RT OF CENTERLINE		LT OF CENTERLINE	
	7 DAY	28 DAY	7 DAY	28 DAY	24 HRS.	28 DAY	24 HRS.	28 DAY
245	6870	7599	5349	6384			3422	6879
246	4507	5736	5460	6936	2515	5920	2702	6878
247	5732	6847	5959	7539	3074	7033		
248	5501	7479	6073	7118	2599	7619		
249	6057	6252	4031	6208				

US 90 @ BAYOU DES ALLEMANDS - COMPRESSIVE STRENGTH, psi								
	DISTRICT O2 RESULTS				LTRC RESULTS			
SPAN	RT OF CENTERLINE		LT OF CENTERLINE		RT OF CENTERLINE		LT OF CENTERLINE	
	7 DAY	28 DAY	7 DAY	28 DAY	24 HRS.	28 DAY	24 HRS.	28 DAY
1		7430	3107	6812				
2	4864	7413	6224	6387			3757	7533
3	5244	7220	5347	6922			827	6189
4	5146	7395	6336	7347			3346	6943
5	5087	7468	5856	6720				
6	5493	7899	5032	7280	1817	8406		
7	4965	7085	4728	5729	2994	6683		
8	3866	7497	5553	4132	2857	7989	2905	6859

Profilograph testing

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P. O. Box 94245
Baton Rouge, Louisiana 70804-9245

M. J. "MIKE" FOSTER, JR.
GOVERNOR

FRANK M. DENTON
SECRETARY

September 3, 1997
(504) 437-3111

S.P. NO. 005-08-0047 AND 450-14-0054
F.A.P. NOS. BRN-11-9(004) AND IM-10-4(156)212
U.S. 90 DECK OVERLAY (BAYOU DES ALLEMANDS) AND
I-10 DECK OVERLAY (BONNET CARRE)
ROUTES U.S. 90 AND I-10
ST. CHARLES PARISH

MEMORANDUM TO:

Mr. Ozzie Hansen

RE: Profilograph Testing for I-10 EB at Bonne Carre Spillway

Here are the results of profilograph testing on the bridge deck.

Please note the consistent dips at the joints - not necessarily indicative of the inherent surface rideability of the material.

The 60' panels were milled and overlayed with high strength silica fume concrete.

These results are for information only.

Luanna Cambas
District Laboratory Engineer

LC/ccb

cc: Mr. Frank Gradsky
Mr. Craig Duos
Mr. Bobby Overall
Mr. Brian Buckel

REPORT OF PROFILOGRAPH TRACE

PROJECT NO: 005-08-0047 LOT NO: EASTBOUND

FROM STATION: ______ TO STATION: ______

FROM STATION: ______ TO STATION: ______

PAVEMENT TYPE: (✓) PCC PAVING ( ) ASPHALTIC CONCRETE

WHEELPATH TYPE: (✓) TRAVEL LANE ( ) 10' OR WIDER SHOULDER

EVALUATED FOR: (✓) ~~ACCEPTANCE~~ INFO (DOTD) ( ) QUALITY CONTROL (CONTR)

SPECIFICATIONS FOR LOT: INFORMATION ONLY

CALCULATIONS:

(1) ROADWAY: RIGHT LANE LOCATION: RIGHT WHEEL PATH
LENGTH OF TRACE: 322 FT/5280 = 0.061 MILE
PROFILE INDEX: 1.90 IN/ 0.061 MILE = 31.1 IN/MILE
WITHOUT EXCEPTIONS

(2) ROADWAY: RIGHT LANE LOCATION: RIGHT WHEEL PATH
LENGTH OF TRACE: 222 FT/5280 = 0.042 MILE
PROFILE INDEX: .60 IN/ 0.042 MILE = 14.3 IN/MILE
WITH EXCEPTIONS 100' USED FOR EXCEPTION

(3) ROADWAY: RIGHT LANE LOCATION: LEFT WHEEL PATH
LENGTH OF TRACE: 322 FT/5280 = 0.061 MILE
PROFILE INDEX: 1.30 IN/ 0.061 MILE = 21.3 IN/MILE
WITHOUT EXCEPTIONS

(4) ROADWAY: RIGHT LANE LOCATION: LEFT WHEEL PATH
LENGTH OF TRACE: 222 FT/5280 = 0.042 MILE
PROFILE INDEX: .65 IN/ 0.042 MILE = 15.5 IN/MILE
WITH EXCEPTIONS 100' USED FOR EXCEPTION

AVG. PROFILE INDEX: (Average of tests for lot)= ______ IN/MILE

TESTED BY: ______ DATE: ______

CHECKED BY: Warren A Hebert Jr DATE: 8-13-97

FOR INFORMATION ONLY

.N BONDED OVERLAY and SURFACE LAMINATES of BRIDGE DECKS
/-2C, LTRC PROJECT INFORMATION, NOT FOR PUBLICATION
I-10 DECK OVERLAY, BONNET CARRE, EASTBOUND, LEFT OF CENTER LINE
STATE PROJECT No. 450-14-0054
LTRC LAB No. C-2148

DATA AS OF January 5, 1998

DESCRIPTION	TEST SPAN #1	TEST SPAN #2	TEST SPAN #3	TEST SPAN #4	TEST SPAN #5
INITIAL REFERENCE TESTING	BRIDGE SPAN 245	BRIDGE SPAN 246	BRIDGE SPAN 247	BRIDGE SPAN 248	BRIDGE SPAN 249
MATLAB CHEMICAL ANALYSIS CHLORIDE CONTENT (percent) Sample #1 (¼"-½") Sample #2 (½"-1")					
ASTM C 876 HALF CELL POTENTIALS 60' Spans, 5" Test Grid 48 Reading Average (volt DC)					
ASTM C 1202 CHLORIDE PENETRABILITY Core #1 (coulombs/rating) Core #2 (coulombs/rating)					
TESTING OF OVERLAY CONCRETE	LOT #7	LOT #10	LOT #8	LOT #11	LOT #9
DATE OF CONCRETE PLACEMENT CONCRETE TEMPERATURE (°F) SLUMP (inches) AIR CONTENT (percent)	08/20/97 86° 4.00" 4.00%	08/26/97 87° 3.75" 4.25%	08/21/97 87° 4.50" 4.50%	08/27/97 88° 3.00" 4.50%	08/22/97 86° 4.75" 4.50%
ASTM C 39 24 HR COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi	3416 3251 3598 3422	2854 2278 2972 2702			
28 DAY COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi	6972 6834 6830 6879	7040 6613 6980 6878			
ASTM C 78 24 HR FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi	469 466 451 462	435 412 384 410			
28 DAY FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi	798 774 790 787	815 816 743 791			
ASTM C 496 28 DAY SPLITTING TENSILE cylinder #1 cylinder #2 cylinder #3 average	532 610 597 580	353 310 446 370			
ASTM C 1202 28 DAY PENETRABILITY core #1 coulombs/rating core #2 coulombs/rating core #3 coulombs/rating core #4 coulombs/rating average coulombs/rating	1974/LOW 2002/MOD 2592/MOD 1793/LOW 2090/MOD	2139/MOD 1574/LOW 2192/MOD 1978/LOW 1971/LOW			
ACI 503R TENSILE BOND STRENGTH core #1 psi/type failure core #2 psi/type failure					

THIN BONDED OVERLAY and SURFACE LAMINATES of BRIDGE DECKS
97-2C, LTRC PROJECT INFORMATION, NOT FOR PUBLICATION
I-10 DECK OVERLAY, BONNET CARRE, EASTBOUND, RIGHT OF CENTER LINE
STATE PROJECT No. 450-14-0054
LTRC LAB No. C-2146

DATA AS OF January 5, 1998

DESCRIPTION	TEST SPAN #1	TEST SPAN #2	TEST SPAN #3	TEST SPAN #4	TEST SPAN #5
INITIAL REFERENCE TESTING	BRIDGE SPAN 245	BRIDGE SPAN 246	BRIDGE SPAN 247	BRIDGE SPAN 248	BRIDGE SPAN 249
MATLAB CHEMICAL ANALYSIS CHLORIDE CONTENT (percent) Sampled 07/11/97 Sample #1 (¼"-½") Sample #2 (½"-1")	0.03 0.00	0.02 0.00	0.03 0.00	0.02 0.01	0.02 0.00
ASTM C 876 HALF CELL POTENTIALS Bridge Tested 07/16/97 60' Spans, 5" Test Grid 48 Reading Average (volt DC)	0.086	0.083	0.063	0.038	0.096
ASTM C 1202 CHLORIDE PENETRABILITY Cores drilled 07/11/97 Core #1 (coulombs/rating) Core #2 (coulombs/rating)	2460/MOD 2131/MOD		1148/LOW 1418/LOW		1944/LOW 1866/LOW
TESTING OF OVERLAY CONCRETE	LOT #2	LOT #5	LOT #3	LOT #6	LOT #4
DATE OF CONCRETE PLACEMENT CONCRETE TEMPERATURE (°F) SLUMP (inches) AIR CONTENT (percent)	07/29/97 94° 4.00" 3.5%	08/07/97 89° 4.00" 4.5%	07/30/97 87° 5.00" 3.5%	08/08/97 85° 4.50" 4.5%	08/01/97 85° 3.50" 3.5%
ASTM C 39 24 HR COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi **average psi**		2499 2607 2439 2515	3069 3082 3070 3074	2538 2641 2617 2599	
28 DAY COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi **average psi**		6045 5784 5931 5920	7428 6438 7233 7033	7596 7581 7681 7619	
ASTM C 78 24 HR FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi **average psi**		434 441 439 438	456 423 420 433	443 397 441 427	
28 DAY FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi **average psi**		713 718 741 724	795 891 804 830	809 819 858 829	
ASTM C 496 28 DAY SPLITTING TENSILE cylinder #1 cylinder #2 cylinder #3 **average**		392 423 318 378	443 421 479 448	311 525 609 482	
ASTM C 1202 28 DAY PENETRABILITY core #1 coulombs/rating core #2 coulombs/rating core #3 coulombs/rating core #4 coulombs/rating **average coulombs/rating**		1900/LOW 1760/LOW 1615/LOW 1793/LOW 1767/LOW	1463/LOW 1400/LOW 1552/LOW 1856/LOW 1568/LOW	936/V.LOW 978/V.LOW 1406/LOW 1152/LOW 1118/LOW	
ACI 503R TENSILE BOND STRENGTH Tested xx/xx/xx core #1 psi/type failure core #2 psi/type failure					

ED OVERLAY and SURFACE LAMINATES of BRIDGE DECKS
LTRC PROJECT INFORMATION, NOT FOR PUBLICATION
J DECK OVERLAY, BAYOU Des ALLEMANDS, EASTBOUND, LEFT OF CENTER LINE
ATE PROJECT No. 005-08-0047
LTRC LAB No. C-2145

DATA AS OF November 5, 1997

DESCRIPTION	TEST SPAN No. 1	TEST SPAN No. 2	TEST SPAN No. 3	TEST SPAN No. 4
INITIAL REFERENCE TESTING				
MATLAB CHEMICAL ANALYSIS CHLORIDE CONTENT (percent) Sampled 07/10/97 Sample #1 (¼"-½") Sample #2 (½"-1")	0.65 0.60	0.72 0.52	0.13 0.06	0.29 0.37
ASTM C 876 Half Cell Potentials Bridge Tested 07/15/97 60' Spans, 5' Test Grid Average of 33 Readings	0.165	0.131	0.236	0.254
ASTM C 1202 CHLORIDE PENETRABILITY Cores drilled 07/10/97 Core #1 (coulombs/rating) Core #2 (coulombs/rating)	3026/MODERATE 3294/MODERATE			2024/MODERATE
TESTING OF OVERLAY CONCRETE	LOT #19	LOT #18	LOT #13	LOT #14
DATE OF OVERLAY POUR CONCRETE TEMPERATURE (°F) SLUMP (inches) AIR CONTENT (percent)	10/03/97 79° 4.00" 5.00%	09/30/97 82° 4.00" 3.00%	09/08/97 87° 4.50" 4.25%	09/12/97 90° 3.25" 5.00%
ASTM C 39 24 HR COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi		3717 3791 3763 3757	*Concrete not properly mixed at sampling. 1116 404 960 827	3082 3362 3594 3346
28 DAY COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi		6845 7948 7805 7533	6037 6675 5855 6189	6833 6739 7257 6943
ASTM C 78 24 HR FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi		426 425 426 426	354 323 442 373	452 484 505 480
28 DAY FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi		904 861 818 861	728 822 766 772	802 802 827 811
ASTM C 496 28 DAY SPLITTING TENSILE cylinder #1 cylinder #2 cylinder #3 average		345 398 372 372	424 411 437 424	333 552 475 454
ASTM C 1202 28 DAY PENETRABILITY core #1 coulombs/rating core #2 coulombs/rating core #3 coulombs/rating core #4 coulombs/rating average coulombs/rating		1171/LOW 1141/LOW 1286/LOW 1111/LOW 1177/LOW	1504/LOW 1361/LOW 1129/LOW 1108/LOW 1276/LOW	1361/LOW 1104/LOW 1455/LOW 1562/LOW 1370/LOW
ACI 503R TENSILE BOND STRENGTH core #1 psi/type failure core #2 psi/type failure				

OVERLAY and SURFACE LAMINATES of BRIDGE DECKS
TRC PROJECT INFORMATION, NOT FOR PUBLICATION
DECK OVERLAY, BAYOU Des ALLEMANDS, EASTBOUND, LEFT OF CENTER LINE
ATE PROJECT No. 005-08-0047
LTRC LAB No. C-2145

DATA AS OF October 29, 1997

DESCRIPTION	TEST SPAN No. 5	TEST SPAN No. 6	TEST SPAN No. 7	TEST SPAN No. 8
INITIAL REFERENCE TESTING				
MATLAB CHEMICAL ANALYSIS				
CHLORIDE CONTENT (percent)				
Sampled 07/10/97				
Sample #1 (⅛"-½")	0.75	0.24	0.37	0.37
Sample #2 (½"-1")	0.33	0.39	0.19	0.14
ASTM C 876				
Half Cell Potentials				
Bridge Tested 07/15/97				
60' Spans, 5' Test Grid				
Average of 33 Readings	0.188	0.287	0.311	0.278
ASTM C 1202				
CHLORIDE PENETRABILITY				
Cores drilled 07/10/97				
Core #1 (coulombs/rating)	3326/MODERATE			1177/LOW
Core #2 (coulombs/rating)				1884/LOW
TESTING OF OVERLAY CONCRETE	LOT #12	LOT #15	LOT #16	LOT # 17
DATE OF OVERLAY POUR	09/04/97	09/16/97	09/19/97	09/29/97
CONCRETE TEMPERATURE (°F)	86°	86°	86°	86°
SLUMP (inches)	3.00"	4.00"	5.00"	3.00"
AIR CONTENT (percent)	4.00%	5.00%	4.5%	3.5%
ASTM C 39				
24 HR COMPRESSIVE STRENGTH				
cylinder #1 psi				2979
cylinder #2 psi				2803
cylinder #3 psi				2933
average psi				**2905**
28 DAY COMPRESSIVE STRENGTH				
cylinder #1 psi				6867
cylinder #2 psi				6835
cylinder #3 psi				6874
average psi				**6859**
ASTM C 78				
24 HR FLEXURE STRENGTH				
beam #1 psi				488
beam #2 psi				488
beam #3 psi				497
average psi				**491**
28 DAY FLEXURE STRENGTH				
beam #1 psi				681
beam #2 psi				821
beam #3 psi				847
average psi				**783**
ASTM C 496				
28 DAY SPLITTING TENSILE				
cylinder #1				431
cylinder #2				434
cylinder #3				355
average				**407**
ASTM C 1202				
28 DAY PENETRABILITY				
core #1 coulombs/rating				1764/LOW
core #2 coulombs/rating				1946/LOW
core #3 coulombs/rating				1551/LOW
core #4 coulombs/rating				1600/LOW
average coulombs/rating				**1715/LOW**
ACI 503R				
TENSILE BOND STRENGTH				
core #1 psi/type failure				
core #2 psi/type failure				

DESCRIPTION	TEST SPAN No. 1	TEST SPAN No. 2	TEST SPAN No. 3	TEST SPAN No. 4
INITIAL REFERENCE TESTING				
MATLAB CHEMICAL ANALYSIS CHLORIDE CONTENT (percent) Sampled 07/10/97 Sample #1 (¼"-½") Sample #2 (½"-1")				
ASTM C 876 Half Cell Potentials Bridge Tested 07/15/97 60' Spans, 5' Test Grid Average of 33 Readings				
ASTM C 1202 CHLORIDE PENETRABILITY Cores drilled 07/10/97 Core #1 (coulombs/rating) Core #2 (coulombs/rating)				
TESTING OF OVERLAY CONCRETE	LOT #26	LOT #25	LOT #27	LOT #22
DATE OF OVERLAY POUR CONCRETE TEMPERATURE (°F) SLUMP (inches) AIR CONTENT (percent)	11/19/97 65° 4.00" 4.50%	11/17/97 62° 3.75" 3.75%	11/21/97 62° 4.50" 4.00%	10/30/97 72° 4.50" 4.00%
ASTM C 39 24 HR COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi **average psi** 28 DAY COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi **average psi**				
ASTM C 78 24 HR FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi **average psi** 28 DAY FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi **average psi**				
ASTM C 496 28 DAY SPLITTING TENSILE cylinder #1 cylinder #2 cylinder #3 **average**				
ASTM C 1202 28 DAY PENETRABILITY core #1 coulombs/rating core #2 coulombs/rating core #3 coulombs/rating core #4 coulombs/rating **average coulombs/rating**				
ACI 503R TENSILE BOND STRENGTH core #1 psi/type failure core #2 psi/type failure				

DESCRIPTION	TEST SPAN No. 5	TEST SPAN No. 6	TEST SPAN No. 7	TEST SPAN No. 8
INITIAL REFERENCE TESTING				
MATLAB CHEMICAL ANALYSIS CHLORIDE CONTENT (percent) Sampled 07/10/97 Sample #1 (¼"-½") Sample #2 (½"-1")				
ASTM C 876 Half Cell Potentials Bridge Tested 07/15/97 60' Spans, 5' Test Grid Average of 33 Readings				
ASTM C 1202 CHLORIDE PENETRABILITY Cores drilled 07/10/97 Core #1 (coulombs/rating) Core #2 (coulombs/rating)				
TESTING OF OVERLAY CONCRETE	LOT #24	LOT #28	LOT #23	LOT #20
DATE OF OVERLAY POUR CONCRETE TEMPERATURE (°F) SLUMP (inches) AIR CONTENT (percent)	11/07/97 68° 3.00" 4.50%	10/28/97 76° 4.50" 4.75%	11/04/97 74° 3.75" 4.50%	10/21/97 84° 3.50" 4.50%
ASTM C 39 24 HR COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi		1834 1861 1757 1817	2949 2986 3048 2994	2722 2931 2917 2857
28 DAY COMPRESSIVE STRENGTH cylinder #1 psi cylinder #2 psi cylinder #3 psi average psi		8163 8455 8601 8406	6740 8303 5004 6683	7989 7861 8118 7989
ASTM C 78 24 HR FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi		234 224 173 210	284 309 365 319	563 541 560 555
28 DAY FLEXURE STRENGTH beam #1 psi beam #2 psi beam #3 psi average psi		864 805 756 808	844 871 876 864	941 941 920 934
ASTM C 496 28 DAY SPLITTING TENSILE cylinder #1 cylinder #2 cylinder #3 average		575 613 577 588	349 504 352 402	562 423 485 490
ASTM C 1202 28 DAY PENETRABILITY core #1 coulombs/rating core #2 coulombs/rating core #3 coulombs/rating core #4 coulombs/rating average coulombs/rating		1351/LOW 1228/LOW 1401/LOW 1201/LOW 1295/LOW	1182/LOW 1260/LOW 1259/LOW 1269/LOW 1242/LOW	1170/LOW 963/V.LOW 1177/LOW 1131/LOW 1110/LOW
ACI 503R TENSILE BOND STRENGTH core #1 psi/type failure core #2 psi/type failure				

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
LOUISIANA TRANSPORTATION RESEARCH CENTER
Concrete Research Laboratory

TENSILE BOND STRENGTH OF OVERLAY MATERIALS
ACI 503R

LAB NO. : C-2146 **DATE OF TEST:** 01/29/98

PROJECT : 97-2C, THIN BONDED OVERLAY AND SURFACE LAMINATES OF BRIDGES

MATERIAL: I-10, BONNET CARRE SPILLWAY, RIGHT LANE, EASTBOUND

SPAN No.-SAMPLE No.	FROM START	FROM CURB	DATE OF OVERLAY	AGE DAYS	CROSS SEC. AREA SQ. IN.	STRESS AT FAILURE LBS	STRESS AT FAILURE PSI	TYPE FAILURE
1-1	13'	4'	07/29/97	184	12.56	750	60	ADHESIVE
1-2	33'	4"	07/29/97	184	12.56	1000	80	ADHESIVE
3-1	13'	4'	07/30/97	183	12.56	1850	147	COHESIVE
3-2	23'	4'	07/30/97	183	12.56	1550	123	ADHESIVE
5-1	14'	4'	08/01/97	182	12.56	1850	147	COHESIVE
5-2	43'	4'	08/01/97	182	12.56	1950	155	COHESIVE

NOTE: Adhesive Failure: Failure between cap and epoxy or failure between epoxy and overlay.
Cohesive Failure: Failure between overlay and original pavement.

VISUAL OBSERVATIONS

1-1 : Scaling type failure between epoxy adhesive and surface of overlay. Some overlay surface material removed. Core removed manually. Separation of original pavement surface. Some aggregate failure visible.

1-2 : Failure between epoxy adhesive and pipe cap. Core removed manually. Separation of original pavement surface. Some aggregate failure visible.

3-1 : Failure of old pavement at overlay. Some aggregate failure visible.

3-2 : Failure between epoxy adhesive and pipe cap. Core removed manually. Separation of original pavement surface. Some aggregate failure visible.

5-1 : Failure of old pavement at overlay. Some aggregate failure visible.

5-2 : Failure of old pavement at overlay. Some aggregate failure visible.

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
LOUISIANA TRANSPORTATION RESEARCH CENTER
Concrete Research Laboratory

TENSILE BOND STRENGTH OF OVERLAY MATERIALS
ACI 503R

LAB NO. : C-2145 **DATE OF TEST:** 02/12+13/98

PROJECT : 97-2C, THIN BONDED OVERLAY AND SURFACE LAMINATES OF BRIDGES

MATERIAL: US 90, BAYOU DES ALLEMANDS BRIDGE, LEFT LANE, EASTBOUND

SPAN No. - SAMPLE No.	FROM START	FROM CURB	DATE OF OVERLAY	AGE DAYS	CROSS SEC. AREA SQ. IN.	STRESS AT FAILURE LBS	STRESS AT FAILURE PSI	TYPE FAILURE
1-1	10'	5'	10/03/97	132	12.56	1450	115	COHESIVE
1-2	13'	5"	10/03/97	132	12.56	1600	127	COHESIVE
3-1	12'	5'	09/08/97	161	12.56	500	40	COHESIVE
3-2	15'	5'	09/08/97	162	12.56	1650	131	ADHESIVE
5-1	9'	5'	09/04/97	166	12.56	1550	123	ADHESIVE
5-2	11'	5'	09/04/97	166	12.56	1850	147	ADHESIVE
7-1	4'	5'	09/19/97	147	12.56	1250	100	ADHESIVE
7-2	6'	5'	09/19/97	147	12.56	1300	104	ADHESIVE

NOTE: Adhesive Failure: Failure between cap and epoxy or failure between epoxy and overlay.
Cohesive Failure: Failure between overlay and original pavement.

VISUAL OBSERVATIONS

Span 1 Cores average depth of 2". Core drilled for ASTM C1202 seperated at overlay removing top of old concrete and covering 95% of core bottom with visible aggregate failure.

1-1 : Failure of old pavement at overlay. 90% of core bottom, old pavement, aggregate failure visible.

1-2 : Failure of old pavement at overlay. 85% of core bottom, old pavement, large aggregate failure visible.

Span 3 Cores average depth of 1¼". Core drilled for ASTM C1202 seperated at overlay removing top of old concrete and covering 100% of core bottom with visible aggregate failure.

3-1 : Failure of old pavement at overlay. 25% of core bottom, old pavement, aggregate failure visible.

3-2 : Failure between epoxy adhesive and pipe cap. Core removed manually. Separation at original pavement surface with 60% of old pavement on core bottom. Aggregate failure visible.

Span 5 Cores average depth of 2¼" and difficult to remove. Core drilled for ASTM C1202 seperated at overlay removing top of old concrete and covering 25% of core bottom with visible aggregate failure.

5-1 : Failure between epoxy adhesive and pipe cap. Core removed manually but difficult causing damage to core surface. Separation at original pavement surface with 60% of old pavement on core bottom. Aggregate failure visible.

5-2 : Failure between epoxy adhesive and pipe cap. Attempt to remove core manually unsuccessful. Core destroyed. Unable to break bond to original pavement surface.

Span 7 Cores average depth of 2¼". Core drilled for ASTM C1202 difficult to remove with surface damage and failure of overlay material with no old pavement removed.

7-1 : Failure between epoxy adhesive and concrete overlay. Core removed mannually. Separation at old pavement with aggregate failure visible. Steel repar exposed.

7-2 : Failure between epoxy adhesive and pipe cap. Core removed manually. Separation at original pavement surface with 90% of old pavement on core bottom. Aggregate failure visible.

CONCLUSIONS

Thin bonded concrete overlay on this job appears to have excellant bond with the old pavement. In most cores difficulty was encounted during removal with the old concrete failing.

Control Section = 005 08 District = 02 Parish = St. Charles Route = U.S. 0090
Blank Tire
Control Tests

LOGMILE	SKIDNUMBER
0.09	24.10
0.10	24.40
0.10	24.00
0.14	24.30
0.14	23.40
0.14	24.20
Average Skidnumber =	24.07

Beginning Logmile of Test Section = 0.0
Ending Logmile of Test Section = 0.1

Control Section = 005 08 District = 02 Parish = St. Charles Route = U.S. 0090
Blank Tire
Inside Test Section

LOGMILE	SKIDNUMBER
0.01	20.10
0.01	20.20
0.01	20.10
0.05	25.10
0.05	25.40
0.05	23.00

Average Skidnumber = 22.32

Beginning Logmile of Test Section = 0.0
Ending Logmile of Test Section = 0.1

:ontrol Section = 005 08 District =02 Parish = St. Charles Route = U.S. 0090
'readed Tire
:ontrol Tests

LOGMILE	SKIDNUMBER
0.09	44.60
0.10	44.40
0.10	44.80
0.14	43.90
0.14	45.80
0.14	47.30

.verage Skidnunber = 45.13

eginning Logmile of Test Section = 0.0
nding Logmile of Test Section = 0.1

Control Section = 005 08 District = 02 Parish = St. Charles Route = U.S. 0090
Treaded Tire
Inside Test Section

LOGMILE	SKIDNUMBER
0.01	42.60
0.01	42.30
0.01	43.70
0.05	37.20
0.05	37.30
0.05	41.20

Average Skidnumber = 40.72

Beginning Logmile of Test Section = 0.0
Ending Logmile of Test Section = 0.1

Control Section =450 14 District = 02 Parish = St. Charles Route = I-0010

Treaded Tire

Inside Test Section

LOGMILE	SKIDNUMBER
3.03	42.70
3.04	42.70
3.04	42.40

Average Skidnumber = 42.60

Beginning Logmile of Test Section = 3.03

Ending Logmile of Test Section = 3.10

Control Section = 450 14 District = 02 Parish = St. Charles Route = I-0010
Blank Tire
Inside Test Section

LOGMILE	SKIDNUMBER
3.04	25.50
3.04	26.70
3.04	25.70

Average Skidnumber = 25.97

Beginning Logmile of Test Section = 3.03
Ending Logmile of Test Section = 3.10

Control Section = 450 14 District = 02 Parish = St. Charles Route = I-0010
Treaded Tire
Control Test

LOGMILE	SKIDNUMBER
3.10	40.50
3.10	39.80
3.10	38.60

Average Skidnumber = 39.63

Beginning Logmile of Test Section = 3.03
Ending Logmile of Test Section = 3.10

Control Section = 450 14 District = 02 Parish = St. Charles Route = I-0010
Blank Tire
Control Test

LOGMILE	SKIDNUMBER
3.10	22.80
3.10	21.90
3.10	21.90

Average Skidnumber = 22.20

Beginning Logmile of Test Section = 3.03
Ending Logmile of Test Section = 3.10

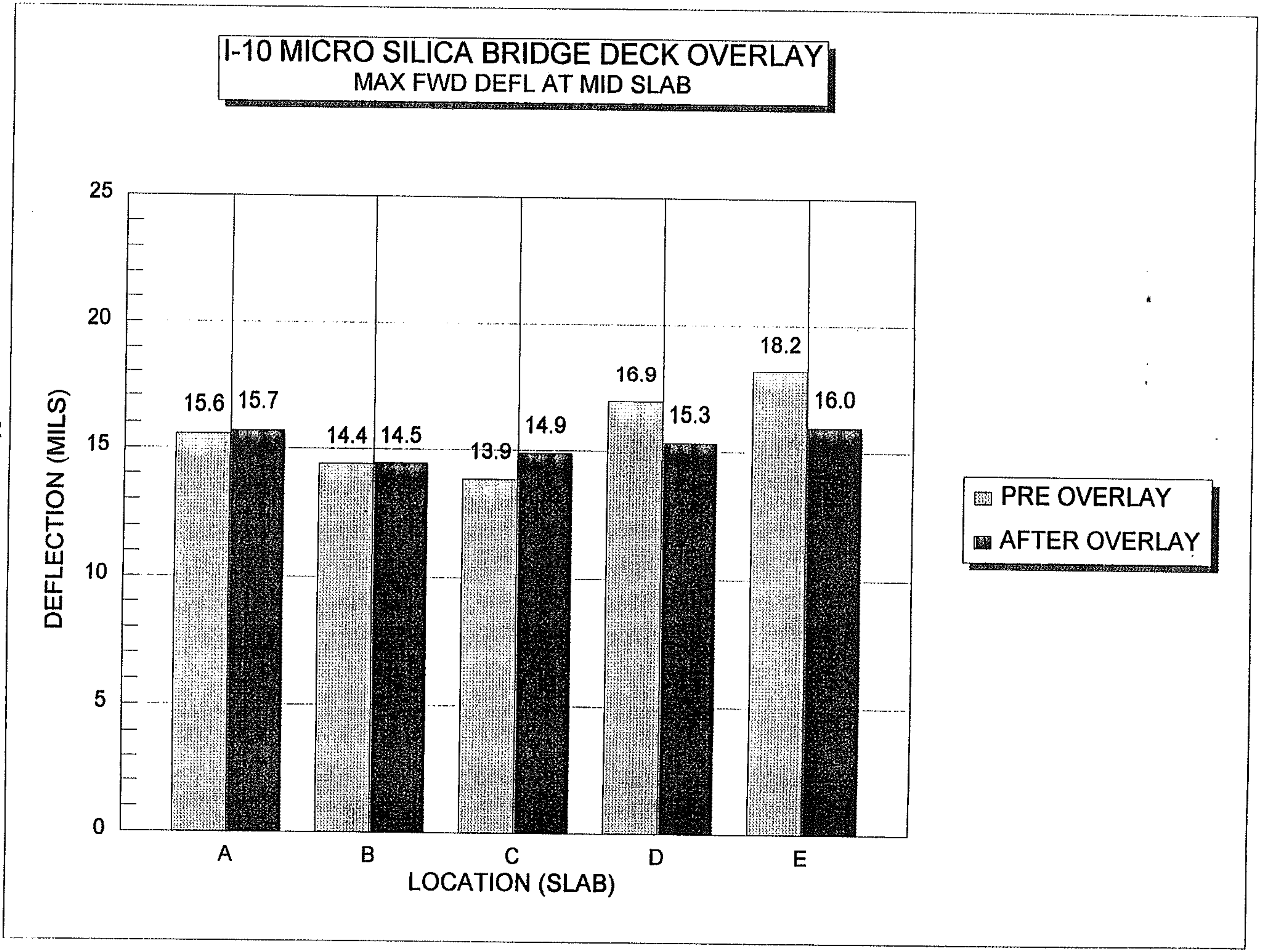
I-10 BONNETT CARRE SPILLWAY, MICRO SILICA BRIDGE DECK OVERLAY
FWD READINGS IN MILS AT THE CENTER OF THE LOAD PLATE (MAXIMUM DEFLECTION)

LOCATION	PRE-OL (7-10-97)	AFTER OL (8-11-97)
A-1	9.74	8.88
A-2	15.57	15.70
B-1	8.54	8.62
B-2	14.42	14.45
C-1	8.56	7.70
C-2	13.85	14.88
D-1	8.16	8.20
D-2	16.91	15.34
E-1	8.86	8.48
E-2	18.18	15.96

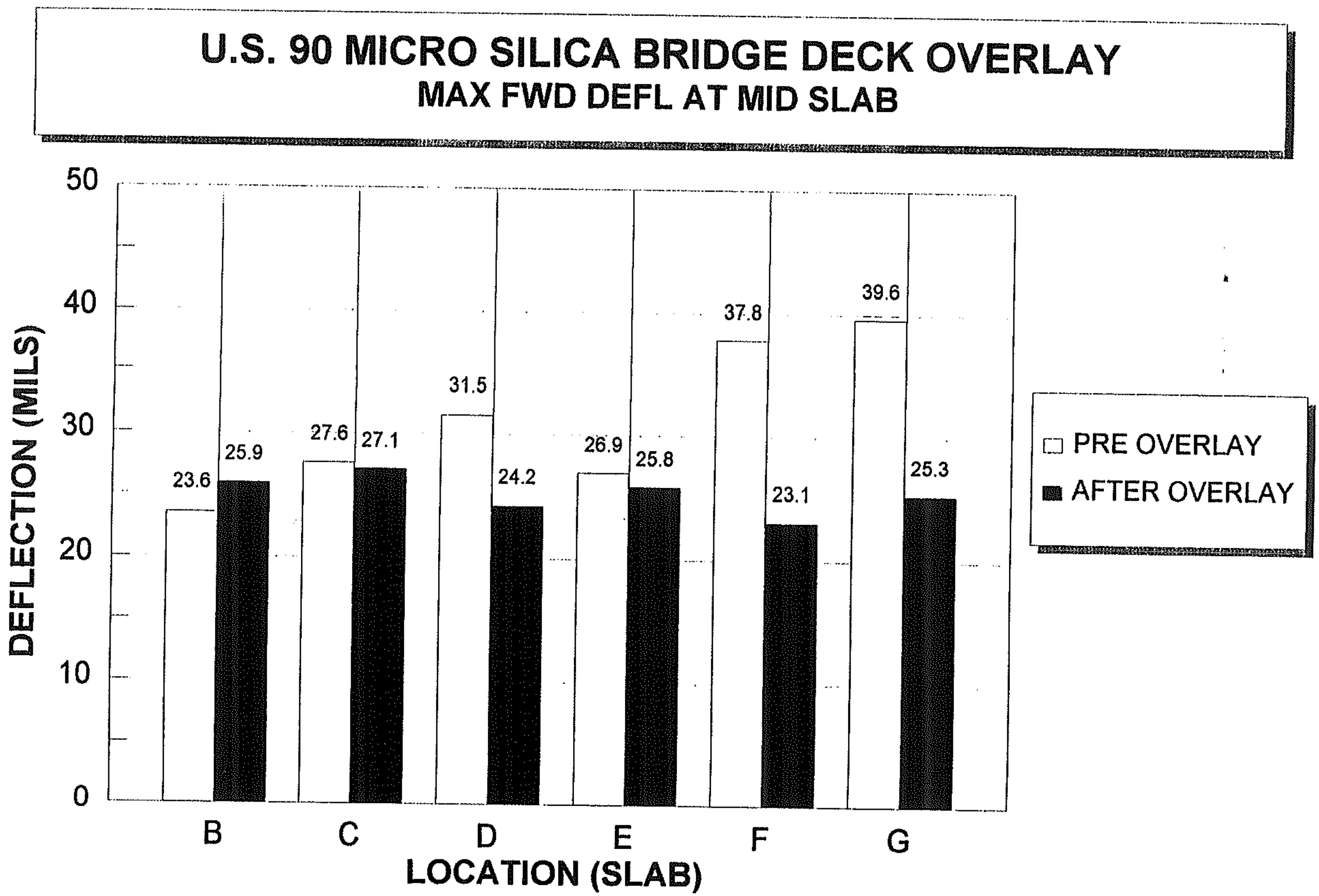
U.S. 90 - DES ALLEMANDS - MICRO SILICA BRIDGE DECK OVERLAY
FWD READINGS IN MILS AT THE CENTER OF THE LOAD PLATE (MAXIMUM DEFLECTION)

LOCATION	PRE-OL (7-11-97)	AFTER OL (2-12-98)
B-1	18.94	20.78
B-2	23.56	25.90
C-1	23.77	20.20
C-2	27.61	27.08
D-1	18.76	18.61
D-2	31.48	24.16
E-1	19.96	18.69
E-2	26.89	25.81
F-1	33.12	17.87
F-2	37.84	23.06
G-1	19.54	20.53
G-2	39.59	25.34

LOCATION 1 IS 5 FT AHEAD OF JOINT, LOCATION 2 IS 30 FT AHEAD OF JOINT



I-10 MICRO SILICA BRIDGE DECK OVERLAY
MAX FWD DEFL AT MID SLAB
DEFLECTION (MILS)
25
20
15
10
5
0
15.6
15.7
14.4
14.5
13.9
14.9
16.9
15.3
18.2
16.0
A
B
C
D
E
LOCATION (SLAB)
PRE OVERLAY
AFTER OVERLAY


U.S. 90 MICRO SILICA BRIDGE DECK OVERLAY
MAX FWD DEFL AT MID SLAB
DEFLECTION (MILS)
50
40
30
20
10
0
23.6
25.9
27.6
27.1
31.5
24.2
26.9
25.8
37.8
23.1
39.6
25.3
B
C
D
E
F
G
LOCATION (SLAB)
PRE OVERLAY
AFTER OVERLAY

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