Evaluation of Structural Capacity of Shoulder During Rehabilitation of I-10 Near Rayne, Acadia Parish

Technical Assistance Report Number 01-2TA

by

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ABSTRACT

This report presents the evaluation of the structural capacity of pavement shoulders to support diverted traffic during rehabilitation of I-10 near Rayne. The evaluation was conducted on a 12-mile segment of I-10, starting at the intersection of I-10 and state route LA-343 and ending at the intersection of I-10 and LA-111. This segment consists of a 6.2 mile segment consisting of 2-inch HMAC over soil cement base course and a 5.9 mile segment of 2-inch HMAC over a 6.0-inch deep stabilized sand/shell base course layer.

Field and laboratory testing programs were conducted to determine the structural capacity of the existing shoulder during I-10 rehabilitation. The field testing program consisted of continuous intrusion miniature cone penetration tests (MCPT), nondestructive tests using the Dynamic Deflection Determination System (Dynaflect), and coring/ undisturbed sampling of surface, sand/shell base, and subgrade soil. Laboratory tests consisted of determining physical properties of materials and unconfined compressive strength.

The field tests were analyzed. Test results, from both the miniature cone penetration test and the Dynaflect, confirmed that adding a 2-inch HMAC surface layer would improve the structural capacity of the shoulder to enable it to hold the diverted traffic during the I-10 rehabilitation.

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INTRODUCTION

This project was conducted in response to a request by the District-03 design section in Acadia Parish for pavement evaluation on a 12-mile segment of shoulder associated with an I-10 rehabilitation project near the city of Rayne. The segment of I-10 being rehabilitated, as part of state project 450-04-0065, runs from the intersection of I-10 and LA 343 (C.S.L.M. 682+66) to the intersection of I-10 and LA 1111 (C.S.L.M. 44+00). A map showing the test site with related information is displayed in figure 1.

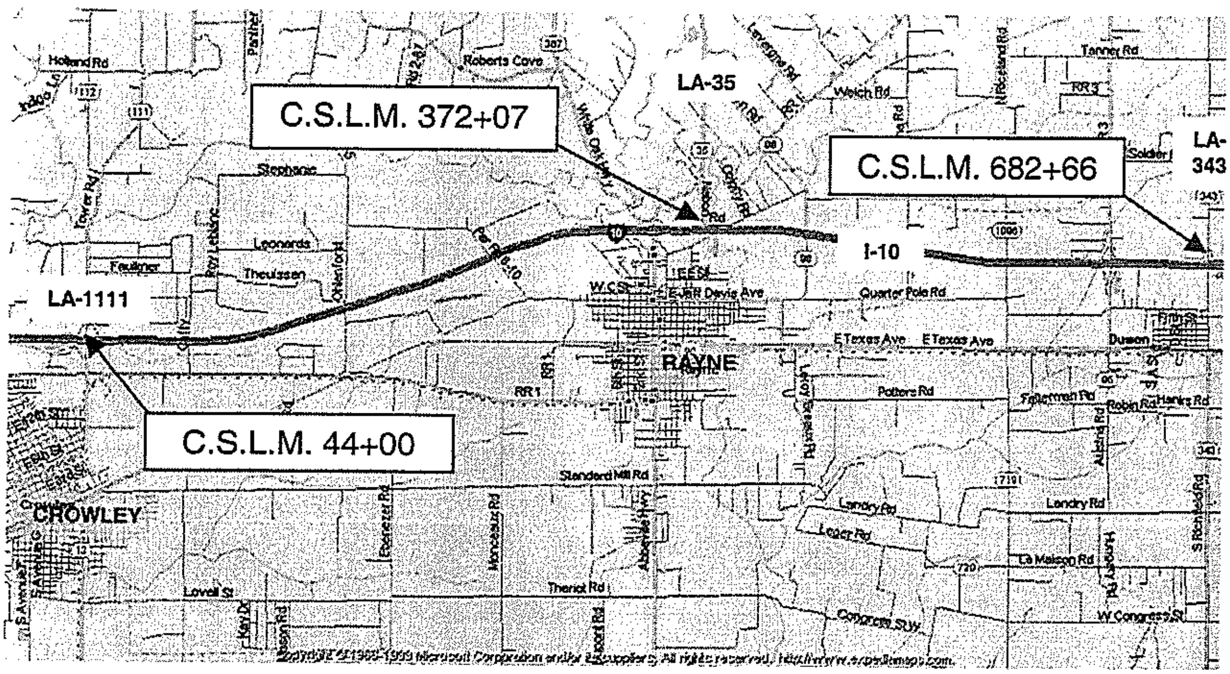

Figure 1
Site Plan

The shoulder has a soil cement base starting close to the LA 1111 intersection (C.S.L.M. 44+00) and ending at a point near the intersection of I-10 with LA 35 (C.S.L.M. 372+07). From here to the end of the section, near LA 342 (C.S.L.M. 682+66), the base material is stabilized sand/shell. During the rehabilitation, the existing shoulder with stabilized sand shell base were to be used as a travel lane. Field and laboratory tests were necessary to determine the existing shoulder's capacity for supporting expected construction loads. Field tests consisted of continuous intrusion miniature cone penetration tests (CIMCPT), nondestructive tests using the Dynaflect, and coring/ undisturbed sampling of surface, sand/shell base, and subgrade soil. Laboratory tests consisted of determining physical properties of materials and unconfined compressive strength.

OBJECTIVE

The objective of this project was to assess the structural capacity of a 5.9 mile segment of shoulder associated with an I-10 rehabilitation project (state project number: 450-04-0065) near the intersection of I-10 with LA 342 to the intersection of I-10 with LA 1111 using the Continuous Intrusion Miniature Cone Penetration Test (CIMCPT) system and nondestructive testing using the Dynamic Deflection Determination System (Dynaflect). These test results will be used to make recommendations for the shoulder's capacity to be used as a travel lane during the construction of other lanes.

SCOPE

The scope of this project was based on the request described in the introduction of this report and is, therefore, limited to the CIMCPT system and Dynaflect testing and design evaluation associated with the I-10 shoulder section outlined in the introduction.

METHODOLOGY

Background

The objective of this project was to assess the structural capacity of the shoulders associated with a 12 mile segment of I-10 specified for rehabilitation (state project number: 450-04-0065) beginning near the intersection of I-10 with LA 342 to a point near the intersection of I-10 with LA 1111. The assessment was to be accomplished using the CIMCPT and Dynaflect system so recommendations associated with its capacity to support traffic during construction of other lanes could be made.

As a component of rehabilitation it was desired to use the existing shoulders as support for diverted traffic while rehabilitation progressed. Before rehabilitation could begin, it would be required to determine if the shoulders were structurally adequate for supporting expected construction traffic. And if not adequate, then the test findings could be used to aid in determining the required steps needed to see to the proper strengthening of the shoulders.

To accomplish this required the integration of a number of site-specific details and efforts. Borings had to be taken so that actual layer thicknesses could be determined and core samples would be available for lab evaluations. Traffic studies had to be consulted so that construction traffic could be adequately predicted, allowing the required design strengths to be established. CIMCPT tests were conducted to evaluate subgrade resilient modulus. The layer thicknesses, material properties, and expected traffic figures collected as a result of these efforts made it possible to theoretically evaluate the structural integrity of the shoulders. Field testing became a requirement so that this theoretical could be checked against field measurements.

Dynaflect Testing

"The Dynamic Deflection Determination System (Dynaflect) is a trailer mounted device which induces a dynamic load on the pavement and measures the resulting slab deflections by use of geophones (usually five) spaced under the trailer at approximately one-foot (30.5-cm) intervals from the application of the load. The pavement is subjected to 1000-pound (454-kg) dynamic load at a frequency of eight cycles per second, which is produced by a counter rotation of two unbalanced flywheels. The generated cyclic force is transmitted vertically to the pavement through two steel wheels spaced at 20 inches (50.8 cm) center-to-center. The dynamic force during each rotation of the flywheels at the proper speed varies from 1100 to 2100 pounds (499 to 953 kg). The deflection measurements induced by the system are expressed in terms of milli-inches of deflection (thousandths of an inch).

Figure 2 is a representation of the deflection basin, which the Dynaflect generates. The Dynaflect actually measures the extent of only one half of the deflection bowl, with the other half assumed to be a mirror image of the measured portion. In figure 2 the measurement W_1 is the maximum depth of the deflection bowl and occurs near the force wheels. The terms W_2, W_3, W_4, and W_5 are the deflections related by geophones 2 through 5, respectively.

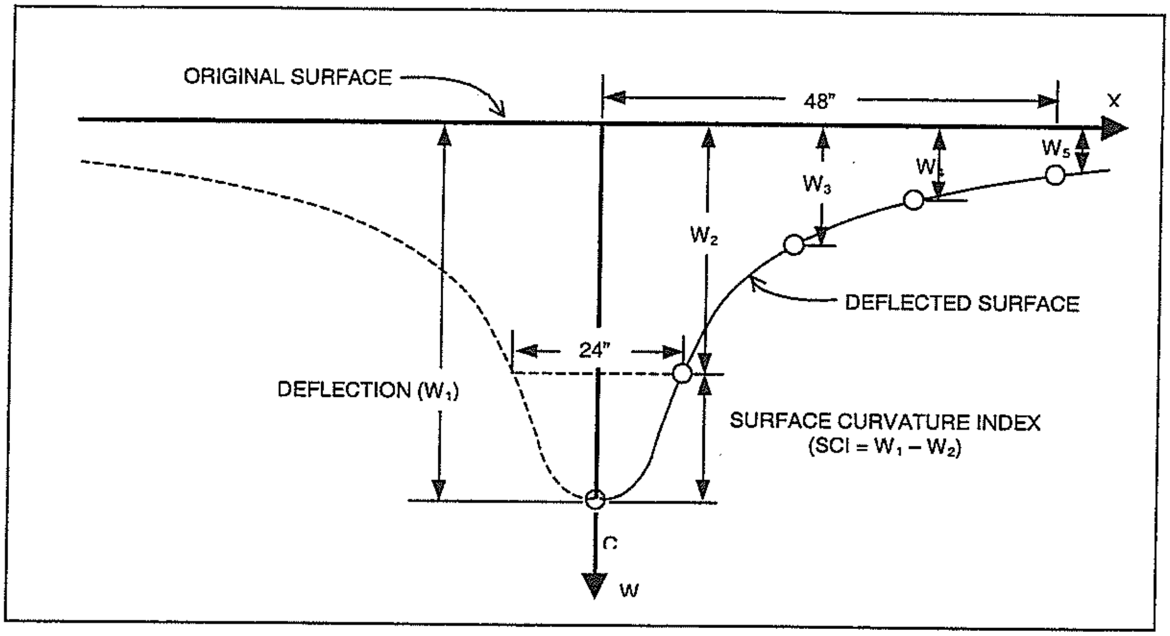

Figure 2
Typical DYNAFLECT Deflection Bowl

The maximum (first sensor) deflection W_1 is an indication of the relative strength of the total road section. The Surface Curvature Index, S.C.I. (W_1 - W_2), provides an indication of the relative strength of the upper (pavement) layers of the road section. The Base Curvature Index, B.C.I. ($W_4 - W_5$), and the fifth sensor value W_5 provide a measure of the relative strength of the foundation. For all four parameters, W_1, S.C.I., B.C.I., and W_5, lower values indicate greater strength." [1]

Louisiana's Continuous Intrusion Miniature CPT System

"At LTRC, Tumay and co-workers *(2,3,4,5,6)* under the Federal Highway Administration's Priority Technologies Program (FHWA/PTP) and other FHWA contracts developed, calibrated, and implemented a continuous intrusion miniature cone penetration test system. The system is designed to characterize the soil at shallow depths for implementation in roadway design and construction. The CIMCPT system consists of a thrust device, coiling mechanism, hydraulic motor, miniature cone penetrometer, and a data acquisition system.

The CIMCPT system is housed in a 4-wheel drive all terrain vehicle with the capability for leveling the force needed to facilitate penetration of the cone. The cone is advanced into the ground by a caterpillar-type continuous push device powered by a hydraulic motor. The continuous pushing mechanism, shown in figure 1b, greatly increases the productivity in the field. The 2 cm^2 miniature cone penetrometer is mounted on a 12.7 mm diameter thrust rod, which consists of a stainless steel coiled tube. The coil is approximately 0.75 m in diameter and is mechanically straightened as the cone is pushed into the ground. A notebook computer is connected to the electric miniature cone penetrometer for data acquisition, processing, and analysis. The CIMCPT system truck also houses a Global Positioning System (GPS) for identification of the test location." *(7)*

Design Considerations

Determination of shoulder support efficacy during construction relates to time of construction as well as character of construction traffic. Rehabilitation was expected to be completed in a period not to exceed six months. The DARWin Pavement Design and Analysis computer program was used to predict, according to load and expected traffic counts, that diverted traffic on the shoulders would be 222,048 ESALs over a 2-month performance period (666,144 ESALs for a 6-month performance period). AASHTO methods were applied to determine that a design structural number of 3.10 would be required to accommodate the 2-month predicted load (Pi=4.3, Pt=2.8, Reliability=97%, Standard Dev.=0.47, Roadbed Soil Resilient Modulus=7500 psi). A structural number of 3.75 would be required for the 6-month performance period. A copy of the DARWin design calculations can be found in Appendix A.

DISCUSSION OF RESULTS

Coring Evaluations

The Acadia Parish District Lab was responsible for collecting and evaluating core samples taken from the project site. Samples were transported to the district laboratory in sealed plastic bags, placed in a moisture room overnight, and were subsequently removed from the bags, trimmed (3.4" – 5.2"), and then tested for compressive strength. The strength test results for the cores are indicated in table 1. Site inspection showed that the asphalt layer situated over soil cement was patched, oxidized, and crumbled. The asphalt layer over the sand shell base was found to be similar, but slightly better.

Table 1
Coring Evaluations

Core Number	Station	Location	Thickness (in)		Base Type	Comp. Strength (psi)
			Surface	Core		
1	669+00	westbound, right shoulder	1.75	6	Stab. s/s	1754
2	604+00	westbound, right shoulder	2	6.25	Stab. s/s	1602
3	568+00	westbound, right shoulder	2.25	6.25	Stab. s/s	1392
4	519+00	westbound, right shoulder	1.25	5.75	Stab. s/s	930
5	469+00	westbound, right shoulder	1.5	6.25	Stab. s/s	1573
6	424+00	westbound, right shoulder	2	6	Stab. s/s	2377
7	327+00	westbound, right shoulder	1.5	6.5	s/c	
8	270+00	westbound, right shoulder	1	6.25	s/c	
9	231+00	eastbound, right shoulder	1.5	6	s/c	784
10	323+00	eastbound, right shoulder	1.75	6	s/c	
11	432+00	eastbound, right shoulder	1.5	6.5	Stab. s/s	877
12	478+00	eastbound, right shoulder	2	6	Stab. s/s	1324
13	530+00	eastbound, right shoulder	1.5	6	Stab. s/s	2086
14	580+00	eastbound, right shoulder	1.75	6	Stab. s/s	627
15	632+00	eastbound, right shoulder	2.25	5.25	Stab. s/s	1405
		Average	1.7	6.067	1394 (1448 w/o s/c core)	
		Standard Deviation	0.344	0.295	508 (495 w/o s/c core)	

Dynaflect Evaluations

Dynaflect testing was requested for the inside lanes of both the eastbound and westbound shoulders. 54 tests were conducted along the site on May 23, 2000 (specifics can be found in Appendix A). These test sites are provided in figure 3.

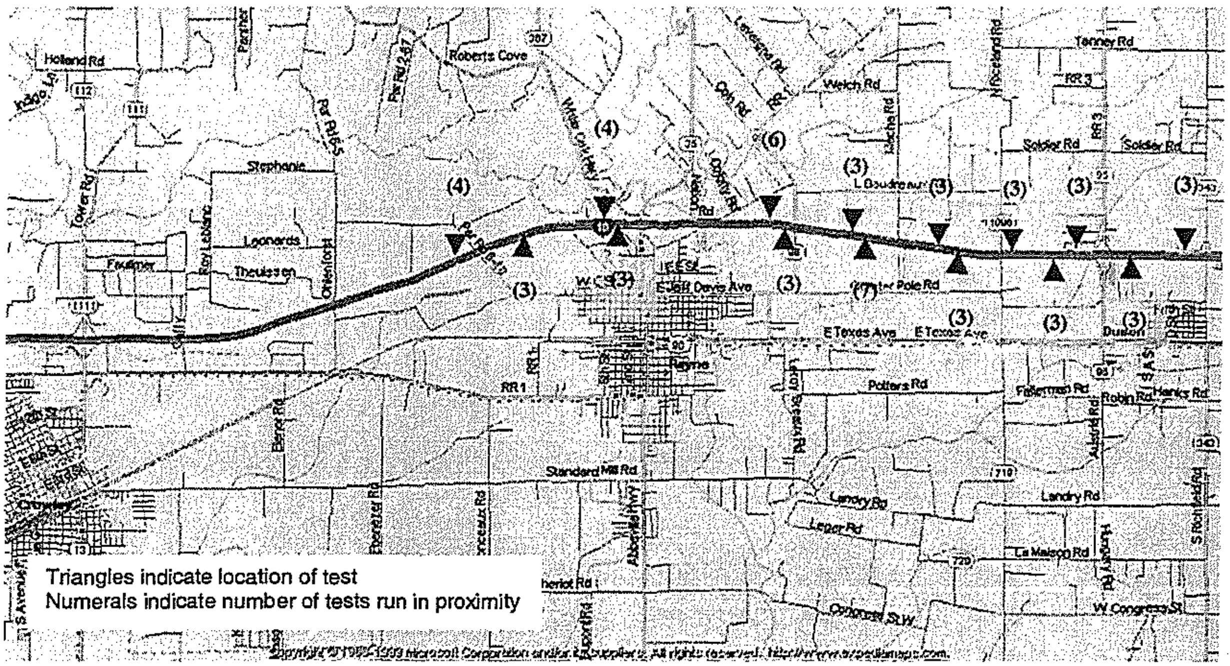

Figure 3

Site Layout for Dynaflect Testing

A summary of the data that was collected can be found in Appendix B. Calculations indicate that the shoulders over a sand shell base have an average structural number equaling (based on a weighted average):

$$\frac{(2.97)19 + (2.74)21}{19 + 21} = 2.85$$

Likewise, shoulders over a soil cement base have an average structural number equaling:

$$1.50$$

CIMCPT Evaluations

As indicated, and for the purposes of predicting subgrade resilient modulus, seven CIMCPTs were run at the site with the results as shown in table 2 (resilient modulus figures are for cohesive soils considered to be in-situ and with traffic loading included):

Table 2

CPT Test Results

Test Number	Predicted Subgrade Resilient Modulus		
	0.25 to 0.55 m	0.25 to 0.75 m	0.25 to 1.00 m
1	7177 psi	6228 psi	5705 psi
2	8239 psi	6313 psi	5757 psi
3	5974 psi	4707 psi	4661 psi
4	7937 psi	7569 psi	7398 psi
5	8200 psi	7558 psi	6994 psi
6	5157 psi	5154 psi	5123 psi
7	6974 psi	5813 psi	5461 psi
Average	7094 psi	6192 psi	5871 psi

The indications are that the average subgrade resilient modulus is 7094 psi throughout the first 0.55 meter of subgrade material. The average modulus drops to 6192 psi when 0.75 meters of subgrade material is included. It drops still further to 5871 psi when a full meter of subgrade material is considered. A plot of Subgrade Resilient Modulus versus Depth of Subgrade is shown in figure 4 and should serve to show how overall strength decreases with depth. The resilient modulus values obtained by CIMCPT were close to the values obtained by Dynaflect at a depth immediately below the base course.

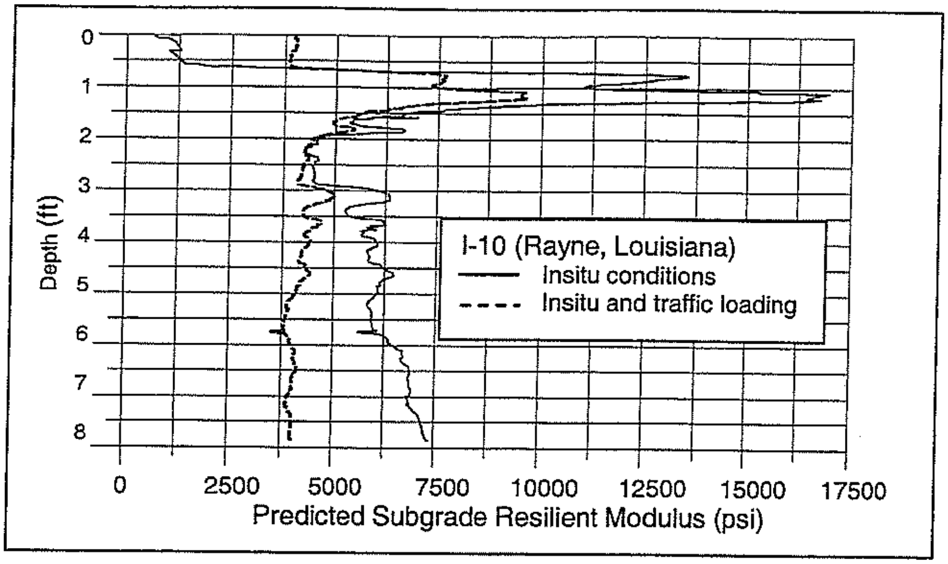

Figure 4
Resilient Modulus Predicted by CPT Model for Cohesive Soil

Design Evaluations

The section of shoulder built over soil cement, having an average structural number of 1.50, is shown as too weak to support expected construction traffic. As such, a total reconstruction of the soil cement shoulder is considered necessary.

SN_d represents the design average structural number, as determined by the design analysis, which corresponds to the required strength that the shoulders will have to exhibit given the expected construction traffic. SN_m represents the average structural number as measured by Dynaflect at the site. These figures, previously derived for the sand/shell shoulders, are summarized as follows:

	Estimated 6 month construction period	Estimated 2 month construction period
SN_d	3.75	3.10
SN_m	2.85	2.85

Since SN_d is greater than SN_m, the indication is that shoulders are currently not nominally strong enough to support the expected construction traffic. This is true for both the estimated six-month or two-month construction times. The structural inadequacies of the shoulders are further magnified when one considers that of the 40 tests conducted on sand/shell, (SN values ranged from 1.2 to 4.0) only 19 pass the constraints required for a two month construction and only four in 40 tests pass the six month construction requirement. The indication is that there should be an effort made to rehabilitate the existing shoulders before construction traffic is allowed. This being the case, it has been determined that the existing HMAC should be removed and replaced with fresh material to increase the strength. This will also remedy the problem of patching, oxidation, and crumbled material found on the existing shoulder.

By replacing the existing old asphalt and adding an additional two inches of thickness, it is possible to achieve a structural number of at least:

$$2.85 + 2(0.44) = 3.73$$

Note that the structural number will be a minimum of 3.73. This is because 2.85 reflects the structural capacity of the existing 2 inches of failed asphalt. Since this will be replaced with new asphalt, the figure will actually be considerably higher. In any case, 4 inches of asphalt are still recommended because geometry requires this thickness for the shoulder to achieve highway grade.

This should be adequate to carry the traffic during construction for the anticipated six month period.

CONCLUSIONS AND RECOMMENDATIONS

Based on the field (CIMCPT and Dynaflect), the following conclusions are made concerning the improvement of the 12-mile segment of shoulder to be used for the I-10 rehabilitation project construction (state project number: 450-04-0065) running from the intersection of I-10 with LA 342 (C.S.L.M. 679+66) to the intersection of I-10 with LA 1111 (C.S.L.M. 44+00):

For the section of shoulder built over soil cement base material:

- From evaluation of the soil cement section of the shoulder, it is concluded that the structure, having a structural number of 1.50, is not strong enough to support the intended construction traffic. It is recommended that the soil cement base be fully reconstructed.

For the section of shoulder built over sand/shell base material:

- For the section of shoulder over the stabilized sand/shell base material, it has been determined that the required design structural number to support the traffic during the construction can be achieved by the cold planning the existing 2 inches of asphalt. It should be replaced with four inches of new HMAC to match the elevation of PCC pavement and slope requirements.

- Where required, failure areas should be patched with flowable fill designed to yield strength of 500 to 1000 PSI.

- Rehabilitation should not exceed six months.

REFERENCES

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2. Tumay, M.T. In Situ Testing at the National Geotechnical Experimentation Sites Phase II, FHWA Contract No. Contract No. DTFH61-97-P-00161, Final Report, USDOT/FHWA, LTRC, Baton Rouge, LA, 1998, 154 pp + CD-ROM.
3. Tumay, M.T., and Titi, H.H. Louisiana Continuous Intrusion Miniature Cone Penetration Test (CIMCPT) System, Research Pays Off Article, TR News, No. 207, Transportation Research Board, Washington, D.C., 2000, pp 26-27.
4. Tumay, M.T., Kurup, P.U. and Boggess, R.L., A Continuous Intrusion Electronic Miniature Cone Penetration Test System for Site Characterization, Proceedings of the First International Conference on Site Characterization, ISC'98, Atlanta, 1998, Vol. 2, pp. 1183-1188.
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6. Titi, H.H., Mohammad, L.N. and Tumay, M.T. Miniature Cone Penetration Tests in Soft and Stiff Clays, the ASTM Geotechnical Testing Journal, Volume 23, No. 4, December 2000.
7. Titi, H.H., and Morvant, M. Implementation of Miniature Cone Penetrometer In Roadway Design and Construction, in press, Journal of the Transportation Research Board, Washington D.C., 2001.
8. Mohammad, L.N., Titi H.H., and Herath, A. Investigation of the Applicability of Intrusion Technology to Estimate the Resilient Modulus of Subgrade Soil, Research Report No. FHWA/LA.2000/332, Louisiana Transportation Research Center, Baton Rouge, 2000.

APPENDIX A
DARWin DESIGN CALCULATIONS

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product
LTRC – LA. DOTD
4101 Gourrier Avenue
Baton Rouge
USA

Flexible Structural Design Module

SPN 450-91-0065, I-10 shoulders (ACADIA PARISH: STA. 302+13 to 631+97)

Flexible Structural Design

18-kip ESALs Over Initial Performance	666,144
Initial Serviceability	4.3
Terminal Serviceability	2.8
Reliability Level	97 %
Overall Standard Deviation	0.47
Roadbed Soil Resilient Modulus	7,500 psi
Stage Construction	1
Calculated Design Structural Number	3.75 in

Rigorous ESAL Calculation

Performance Period (years)	0.5
Two-Way Traffic (ADT)	42,000
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %

Vehicle Class	Percent Of ADT	Annual % Growth	Avg. Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs Over Performance Period
1	0.2	2	0.0005	0	4
2	62.9	2	0.0005	0	1,206
3	18	2	0.0188	0	12,978
4	0.5	2	0.1932	0	3,705
5	2.5	2	0.1932	0	18,524
6	0.6	2	0.4095	0	9,423
7	0.2	2	0.4095	0	3,141
8	6	2	0.8814	0	202,817

9	7.5	2	1.1	0	316,398
10	1	2	1.45	0	55,609
11	0.3	2	1.84	0	21,170
12	0.1	2	1.84	0	7,057
13	0.2	2	1.84	0	14,113
Total	100	-	-	-	666,144

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare

Computer Software Product
LTRC – LA. DOTD
4101 Gourrier Avenue
Baton Rouge
USA

Flexible Structural Design Module

SPN 450-91-0065, I-10 shoulders (ACADIA PARISH: STA. 302+13 to 631+97)

Flexible Structural Design

18-kip ESALs Over Initial Performance	222,048
Initial Serviceability	4.3
Terminal Serviceability	2.8
Reliability Level	97 %
Overall Standard Deviation	0.47
Roadbed Soil Resilient Modulus	7,500 psi
Stage Construction	1
Calculated Design Structural Number	3.10 in

Rigorous ESAL Calculation

Performance Period (years)	0.1666667
Two-Way Traffic (ADT)	42,000
Number of Lanes in Design Direction	2
Percent of All Trucks in Design Lane	100 %
Percent Trucks in Design Direction	50 %

Vehicle Class	Percent Of ADT	Annual % Growth	Avg. Initial Truck Factor (ESALs/ Truck)	Annual % Growth in Truck Factor	Accumulated 18-kip ESALs Over Performance Period
1	0.2	2	0.0005	0	1
2	62.9	2	0.0005	0	402
3	18	2	0.0188	0	4,362
4	0.5	2	0.1932	0	1,235
5	2.5	2	0.1932	0	6,175
6	0.6	2	0.4095	0	3,141
7	0.2	2	0.4095	0	1,047
8	6	2	0.8814	0	67,606

9	7.5	2	1.1	0	105,466
10	1	2	1.45	0	18,536
11	0.3	2	1.84	0	7,057
12	0.1	2	1.84	0	2,352
13	0.2	2	1.84	0	4,704
Total	100	-	-	-	222,048

APPENDIX B
DYNAFLECT DATA SHEETS

State Project #:	450-04-0065	Wheel Path:	Shoulder
Date/Time of Test:	5-23-00	Layer Thickness:	2 Inches
Starting Time:	8:30	Lane Identification:	Westbound
Ending Time:	10:30	District:	03 – ACADIA PARISH
Route #:	I-10	Pavement Type:	2" HMAC over sand shell base

Station	Dynaflect Sensor Readings					CMD	%SPD	SN	ES	SCI
	#1	#2	#3	#4	#5					
Westbound										
8:30,92 F	Correction factor:			0.71						
670+00	1.34	1.21	1.02	0.80	0.62	0.95	74	3.4	5600	-0.13
669+00	1.44	1.31	1.09	0.80	0.68	1.02	74	3.1	4500	-0.13
668+00	2.33	1.96	1.44	1.07	0.77	1.65	65	1.7	4500	-0.37
8:45,93 F	Correction factor:			0.74						
605+00	1.52	1.25	0.91	0.64	0.47	1.12	63	2.0	7000	-0.27
604+00	1.41	1.23	0.95	0.72	0.51	1.04	68	2.7	6500	-0.18
603+00	1.52	1.25	0.91	0.66	0.46	1.12	63	2.0	7000	-0.27
9:00,95 F	Correction factor:			0.72						
569+00	1.58	1.32	0.96	0.61	0.49	1.14	63	2.0	7000	-0.26
568+00	1.16	1.02	0.82	0.67	0.51	0.84	72	3.5	7000	-0.14
567+00	1.06	0.98	0.82	0.67	0.49	0.76	76	3.8	6500	-0.08
9:30,98 F	Correction factor:			0.71						
520+00	1.04	0.93	0.73	0.53	0.41	0.74	70	3.5	8500	-0.11
519+00	1.39	1.12	0.78	0.55	0.38	0.99	61	2.0	8500	-0.27
518+00	1.19	1.00	0.74	0.53	0.36	0.84	64	2.7	9000	-0.19
10:00,101 F	Correction factor:			0.71						
470+00	0.99	0.89	0.72	0.56	0.43	0.70	73	3.8	8000	-0.10
469+00	1.44	1.20	0.88	0.66	0.47	1.02	65	2.4	7200	-0.24
468+00	1.11	0.95	0.71	0.51	0.35	0.79	65	2.9	9000	-0.16
10:30,103 F	Correction factor:			0.70						
425+00	1.44	1.19	0.85	0.60	0.42	1.01	63	2.3	7800	-0.25
424+60	1.56	1.23	0.85	0.50	0.40	1.09	58	1.7	9000	-0.33
424+24	1.20	1.02	0.77	0.55	0.39	0.84	66	2.9	8200	-0.18
424+00	1.13	0.97	0.77	0.57	0.40	0.79	68	3.2	8200	-0.16
423+50	1.17	0.99	0.75	0.56	0.40	0.82	66	2.9	8500	-0.18
423+00	1.16	1.02	0.80	0.61	0.44	0.81	69	3.3	7900	-0.14
					Averages:	0.96	0.67	2.74	7400	-0.20

Remarks: 520+00 IS NEAR LATERAL EDGE DRAIN AND IS CLOGGED, 424+00 IS NEAR EDGE DRAIN

CMD: Corrected Max Deflection, **%SPD**: Percent Spread, **SN**: Structural Number, **ES**: Subgrade Modulus,
SCI: Surface Curvature Index

State Project #:	450-04-0065	Wheel Path:	Shoulder
Date/Time of Test:	5-23-00	Layer Thickness:	2 Inches
Starting Time:	12:00	Lane Identification:	Eastbound
Ending Time:	01:00	District:	03 – ACADIA PARISH
Route #:	I-10	Pavement Type:	2" HMAC over sand shell base

Station	Dynaflect Sensor Readings					CMD	%SPD	SN	ES	SCI
	#1	#2	#3	#4	#5					
Eastbound										
12:00,116 F	Correction factor:			0.66						
431+00	1.80	1.46	0.99	0.65	0.45	1.19	59	1.6	8750	-0.34
432+00	1.15	1.04	0.82	0.62	0.45	0.76	71	3.5	8000	-0.11
433+00	1.58	1.30	0.88	0.57	0.39	1.04	60	1.8	8200	-0.28
12:10,118 F	Correction factor:			0.66						
477+00	1.21	1.09	0.83	0.60	0.43	0.80	69	3.3	8000	-0.12
477+50	1.36	1.09	0.78	0.54	0.38	0.90	61	2.2	9200	-0.27
477+80	1.06	0.95	0.77	0.58	0.42	0.70	71	3.6	8500	-0.11
478+00	1.26	1.08	0.83	0.62	0.45	0.83	67	3.0	8100	-0.18
478+10	1.03	0.92	0.72	0.54	0.39	0.68	70	3.6	8900	-0.11
478+30	1.10	0.98	0.75	0.56	0.41	0.73	69	3.4	8500	-0.12
479+00	0.96	0.87	0.70	0.52	0.38	0.63	71	3.8	9000	-0.09
12:30,120 F	Correction factor:			0.65						
529+00	1.07	1.00	0.82	0.65	0.51	0.70	76	4.0	7200	-0.07
530+00	1.28	1.16	0.90	0.60	0.49	0.83	69	3.2	7600	-0.12
531+00	1.28	1.19	0.91	0.67	0.49	0.83	71	3.3	7100	-0.09
12:45,122 F	Correction factor:			0.64						
579+00	1.47	1.37	1.12	0.87	0.64	0.94	74	3.5	5600	-0.10
580+00	1.34	1.23	0.98	0.75	0.56	0.86	73	3.5	6500	-0.11
581+00	1.54	1.37	1.05	0.77	0.56	0.99	69	2.9	6200	-0.17
1:00,124 F	Correction factor:			0.64						
631+00	2.15	1.64	1.02	0.70	0.52	1.38	56	1.2	7500	-0.51
632+60	1.51	1.26	0.90	0.64	0.46	0.97	63	2.3	8000	-0.25
633+24	1.38	1.18	0.85	0.60	0.44	0.88	64	2.8	8500	-0.20
				Averages:		0.88	0.68	2.97	7861	-0.18

Remarks: 478+10 IS OVER CROSS DRAIN (LARGE SETTLEMENT AND A PATCH EXISTS), 424+00 IS NEAR EDGE DRAIN

CMD: Corrected Max Deflection, **%SPD**: Percent Spread, **SN**: Structural Number, **ES**: Subgrade Modulus, **SCI**: Surface Curvature Index

State Project #:	450-04-0065	Wheel Path:	Shoulder
Date/Time of Test:	5-23-00	Layer Thickness:	2 Inches
Starting Time:	10:40	Lane Identification:	Eastbound/Westbound
Ending Time:	11:00	District:	03 – ACADIA PARISH
Route #:	I-10	Pavement Type:	2" HMAC over soil cement

Station	Dynaflect Sensor Readings					CMD	%SPD	SN	ES	SCI
	#1	#2	#3	#4	#5					
Eastbound										
10:40,104 F	Correction factor:			0.71						
327+90	2.08	1.25	0.78	0.41	0.33	1.48	47	0.2	10000	-0.83
327+00	1.61	1.42	0.98	0.65	0.42	1.14	63	2.1	7100	-0.19
326+00	1.90	1.53	1.10	0.77	0.48	1.35	61	1.6	6500	-0.37
325+50	1.37	1.15	0.84	0.60	0.32	0.97	62	2.2	8500	-0.22
10:45,106 F	Correction factor:			0.70						
271+00	1.78	1.42	1.01	0.71	0.50	1.25	61	1.8	6900	-0.36
270+20	2.40	1.65	0.97	0.61	0.44	1.68	51	0.4	7100	-0.75
269+75	2.19	1.58	0.99	0.68	0.47	1.53	54	0.8	7200	-0.61
269+00	1.68	1.50	1.04	0.73	0.51	1.18	65	2.3	6500	-0.18
Westbound										
10:50,107 F	Correction factor:			0.70						
230+00	1.68	1.50	1.04	0.73	0.51	1.18	65	2.3	6500	-0.18
231+00	1.62	1.61	0.94	0.50	0.41	1.13	63	2.1	7100	-0.01
232+00	1.77	1.42	1.02	0.70	0.47	1.24	61	1.8	6800	-0.35
11:00,114 F	Correction factor:			0.67						
322+00	1.81	1.40	0.86	0.60	0.38	1.21	56	1.3	8500	-0.41
323+00	1.95	1.45	0.71	0.41	0.27	1.31	49	0.5	10000	-0.50
324+00	1.48	1.21	0.82	0.52	0.33	0.99	59	1.8	9000	-0.27
				Averages:		1.26	0.58	1.50	7180	-0.37

Remarks: 270+00 is near a lateral edge drain, 230+00 is near M.P. 45

CMD: Corrected Max Deflection, **%SPD**: Percent Spread, **SN**: Structural Number, **ES**: Subgrade Modulus, **SCI**: Surface Curvature Index

APPENDIX C
PROJECT DETAILS

Project No. ____ Plan Change No. ____

		Category 4	Category 3	Category 2	Category 1
Amount of Plan Change	up to $10.000.00	■			
	$10.000.00 - $50.000.00		■		
	greater than $50.000.00			■	
	+/- 25% of original project cost				■
New Item (unit price)	up to $3.000.00	■			
	$3.000.00 - $5.000.00		■		
	$5.000.01 - $20.000.00			■	
	greater than $20.000.00				■
Days	5 and under		■		
	6 thru 10			■	
	over 10				■
Decreasing a MAJOR ITEM	up to 25% or $20.000.00	■			
	up to 25% or $20.000.00 - $50.000.00		■		
	up to 25% and greater than $50.000.00			■	
	over 25%				■
Increasing a MAJOR ITEM more than 25% (new major item)					■
Decreasing a MINOR ITEM	up to 100% or $20.000.00	■			
	up to 100% or $20.000.01 - $50.000.00		■		
	up to 100% or greater than $50.000.00			■ X	
Changes in design/Appr. by Design or Construction Section			■		
Changes in Traffic Control Plan (change in sequence)				■	
Work outside limits of project					■
Change in structural design or geometrics					■
Addition of a feature that changes Plan Intent					■
Change in CONFLICT with Standards and Policies/Legal Issues					■
Change in method of measurement					■
Change approved by Memo or Directive signed by Chief Engineer		■			
Settlement of a claim					■
PAY ADJUSTMENTS	50% Pay or Remove				■
	Pay adjustments as per Specifications	■			
500 and 742 Projects - See E. D. S. M. III.1.1.21				■	■
Other					■

This worksheet is to be used as a guideline for categorizing a plan change. For additional information, re to EDSM III.1.1.1

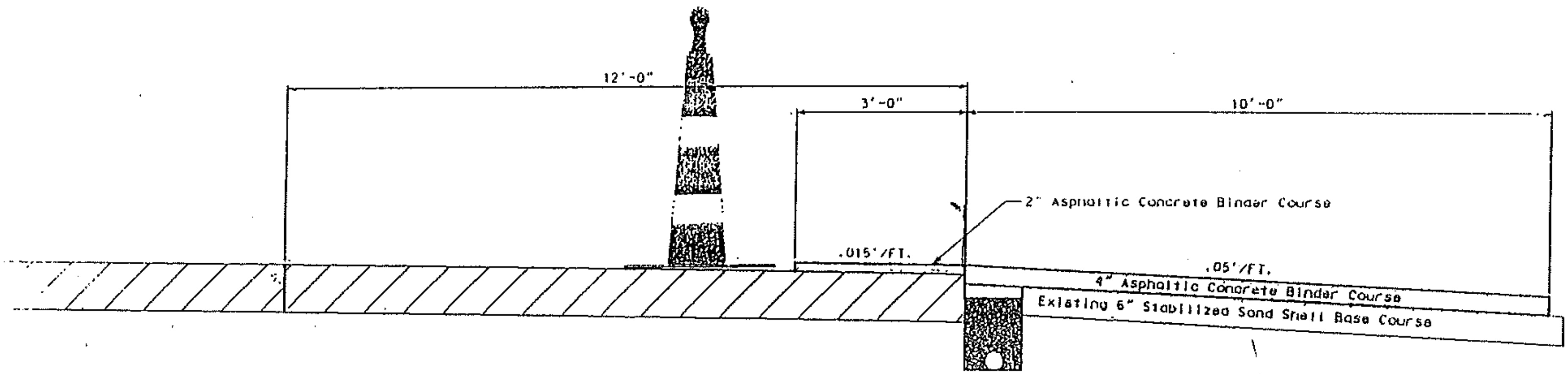
SP 450-04-0065
Crowley - Lafayette Parish Line
I-10
Plan Change for
Stabilized Sand Shell Shoulders

Eastbound			8 1/2" Base Course		Reduction in Binder Course - 2"		Additional 3' Overlay on outside lane - 2" binder		Cold Planing	
Station	Station	Length	Width	S.Y.	Width	Tons	Width	Tons	Width	S.Y.
37747	38450	703	10.5	820.2	10	89.8	3	26.9	3	234
38652	39819	1167	10.5	1361.5	10	149.1	3	44.7	3	389
41015	61862	20847	10.5	24321.5	10	2663.8	3	799.1	3	6949
62291	62370	79	5.5	48.3	5	5.0	3	3.0	3	26
62370	63696	1326	10.5	1547.0	10	169.4	3	50.8	3	442
64838	68266	3428	10.5	3999.3	10	438.0	3	131.4	3	1143

Westbound										
Station	Station	Length	Width	S.Y.	Width	Tons	Width	Tons	Width	S.Y.
37286	38450	1164	10.5	1358.0	10	148.7	3	44.6	3	388
38652	39356	704	10.5	821.3	10	90.0	3	27.0	3	235
39356	39431	75	5.5	45.8	5	4.8	3	2.9	3	25
39977	60966	20989	10.5	24487.2	10	2681.9	3	804.6	3	6996
62103	62200	97	5.5	59.3	5	6.2	3	3.7	3	32
62200	63545	1345	10.5	1569.2	10	171.9	3	51.6	3	448
63990	68266	4276	10.5	4988.7	10	546.4	3	163.9	3	1425
				65427.2		7165.1		2154.3		18733

	Item	Adjustment
303(01)(B)	In-Place Stabilized Base Course	65427.2
303(02)	Cement	39207.3
502(01)(C)	Superpave Asphaltic Concrete	-5010.7
509(01)	Cold Planing	18733

State Project 450-04-0065
Crowley - Lafayette Parish Line



EastBound Shown. WestBound Opposite Hand.
Sta. 377+47 - 682+66 EB & Sta. 372+86 - 682+66 WB

Changes in Sequencing

1. Cold Plane Existing 2" Asphaltic Concrete.
2. Remove Existing and Install New Underdrain System.
3. Place Asphaltic Concrete Cap.(3" Depth)
4. Place 4" Binder Course on Shoulder & 2" on Roadway.
5. Place Traffic on shoulder and perform work under Phase II.
6. Remove 3" Asphaltic Concrete prior to performing work under Phase III.

EPT. OF TRANSPORTATION & DEVELOPMENT
AN CHANGE AND/OR SPECIAL AGREEMENT

DATE: 06/16/00

S.P. NO.: 450-04-0065

F.A.P. NO.: IM-10-1(165)081

AME: Crowley - Lafayette Parish Line
ROUTE: I-10

PARISH: Acadia

APPROVED BY F.H.W.A. ____

PLAN CHANGE CATEGORIES
MAJOR 1 MINOR (2) 3 4

NGINEERS DESCRIPTION, EXPLANATION AND ESTIMATED COST OF PROPOSED REVISION

This plan change is to utilize the existing stabilized sand shell base on the 10 foot shoulders between Stations 72+86 and 682+66 to maintain temporary traffic during rubblization and overlay operation under Phase II.

Item 303(01)(B), In-Place Stabilized Base Course (8 ½" Thick), decreased by 65,427.0 Sq. Yds. or 35.4%
Item 303(03), Cement, decreased by 39,207.3 CWT or 35.4%
Item 502(01)(C), Superpave Asphaltic Concrete (Level 3), decreased by 5,010.8 Tons or 1.6%
Item 509(01), Cold Planing Asphaltic Pavement, increased by 18,733.0 Sq. Yds. or 10.2%

Attachments: Explanation of Items
Typical Section
Breakdown of Item Quantity Adjustment

THE ABOVE WILL NECESSITATE THE FOLLOWING CHANGES IN QUANTITIES (IF SPACE IS NOT SUFFICIENT, USE EXTRA FORMS)

ITEM NO.	ITEM	UNIT	UNIT PRICE	REVISED QTY.	REVISED AMT	ORIGINAL QTY.	ORIGINAL AMT
03(01)(B)	IN-PLACE CEMENT STAB. BASE COURSE	SY	1.12	119,399	133,726.88	184,826	207,005.12
303(02)	CEMENT	CWT	4.86	71,549.7	347,731.54	110,757.0	538,279.02
02(01)(C)	SUPERPAVE ASPH. CONC. (LEVEL 3)	TON	36.01	317,421.9	11,430,362.61	322,432.7	11,610,801.52
509(01)	COLD PLANING ASPHALTIC CONCRETE	SY	0.88	201,732	177,524.16	182,999	161,039.12
DDITIONAL CONTRACT DAYS REQUESTED NONE	AMOUNT OF UNDERRUN $427,779.59			TOTAL	$12,089,345.19	TOTAL	$12,517,124.78

T IS MUTUALLY AGREED TO PERFORM AND ACCEPT THE ABOVE REVISIONS IN ACCORDANCE WITH ORIGINAL CONTRACT AND APPLICABLE SPECIFICATIONS AT THE ABOVE PRICES. APPROV OF THIS CHANGE BY THE DOTD CHIEF ENGINEER IS SUBJECT TO AND CONDITIONED UPON APPROVAL BY OTHER PARTICIPATING AGENCIES AND BECOMES OFFICIAL UPON DISTRIBUTION.

REQUESTED BY:

[signature] 06/16/00
PROJECT ENGINEER — DATE
ILLIAM J. OLIVER, JR., P. E.

RECOMMENDED BY:

[signature] 6-27-00
DISTRICT ADMINISTRATOR — DATE

[signature] 7/11/00
DOTD CHIEF CONST. ENGINEER — DATE

ACCEPTED BY:

DIAMOND B CONSTRUCTION CO., INC. 06-21-00
CONTRACTOR — DATE

BY: [signature]

APPROVED:

[signature] 7/11/00
CHIEF ENGINEER — DATE

Chris Abadie 7/6/00

ORWARD TO BATON ROUGE FOUR (4) COPIES ON ALL PROJECTS

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P.O. Box 1210
Crowley, Louisiana 70527-1210
(337) 788-7501 or 324-1281

June 16, 2000

M.J. "MIKE" FOSTER
GOVERNOR

KAM K. MOVASSAGHI
SECRETARY

REFERRED TO
~~Construction~~ Audit

___ REFERRED FOR ACTION
___ ANSWER FOR MY SIGNATURE
___ FOR FILE
___ FOR YOUR INFORMATION
___ RETURN TO ME
___ PLEASE SEE ME
✓ FOR REVIEW & FURTHER HANDLING
___ FOR APPROVAL
___ PLEASE ADVISE ME

BY DE DATE 6-27-00
BY ______ DATE ______
BY ______ DATE ______

STATE PROJECT NO. 450-04-0065
F.A.P. NO. IM-10-1(0183)081
CROWLEY - LAFAYETTE PARISH LINE
ROUTE I-10
ACADIA PARISH

Mr. William K. Fontenot
District Administrator
Dept. of Transportation & Development
P. O. Box 3648
Lafayette, LA 70502-3648

ATTN: Mr. Michael Eldridge
District Construction Engineer

Dear Sir:

I am forwarding herewith, for your consideration, Plan Change No. Three (3) of the captioned project. This is a minor plan change, Category 2.

Your approval is hereby requested.

Very truly yours,

William J. Oliver, Jr., P. E.
Resident Construction Engineer

WJO:dm

6-21- JUN 2 1 2000

STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
P.O. Box 1210
Crowley, Louisiana 70527-1210
(337) 788-7501 or 324-1281

June 16, 2000

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✓ FOR REVIEW & FURTHER HANDLING
___ FOR APPROVAL
___ PLEASE ADVISE ME

BY DE DATE 6-22-00
BY ____ DATE ____
BY ____ DATE ____

STATE PROJECT NO. 450-04-0065
F.A.P. NO. IM-10-1(0183)081
CROWLEY - LAFAYETTE PARISH LINE
ROUTE I-10
ACADIA PARISH

Mr. William K. Fontenot
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William J. Oliver, Jr., P. E.
Resident Construction Engineer

WJO:dm

LAN CHANGE DATA SHEET DATE PREPARED: 06/19/00

TATE CONTRACT NUMBER: 450-04-0065 P/C#: 003 CATEGORY 2
ONTRACT NAME: CROWLEY - LAFAYETTE PARISH LINE ROUTE: I-0010
/C DESCRIPTION : UTILIZE SAND SHELL BASE ON 10' SHOULDERS

Jimmy

ROJECT ENGINEER: OLIVER, WILLIAM J.
ONTRACTOR : DIAMOND B CONSTRUCTION CO INC
OTAL CONTRACT COST: $17,779,908.42

===

VDJ 6/30/00

TATE PROJECT NUMBER: 450-04-0065
ROJECT COST: $17,779,908.42
LAN CHANGE AMOUNT: $427,779.59-
URRENT OVERRUN/UNDERRUN: $433,854.59- % OF PROJECT COST: 2.4
UNDS AVAILABLE: $967,251.84

EMARKS

AL Gave Verbal 6/28/00