DISTRICT ONE DESIGN

PAVEMENT DESIGN

FOR

431317-1-52-01

Lee County

SR 78

SR 45 (US 41)
to
New Post Road

Michael Baker Jr., Inc.
615 Crescent Executive Court
Suite 200
Lake Mary, FL 32746
Certification of Authorization No. 28861
Contract No. C9089
Vendor No. 251228638

Chris Zeigler
Design Project Manager

PAVEMENT DESIGN PACKAGE

FINANCIAL PROJECT ID:	**431317-1-52-01**
WPI NO.;	**N/A**
STATE PROJECT NO.:	**N/A**
COUNTY SECTION NO.:	**12060-000**
FEDERAL AID PROJECT NO.:	**N/A**
COUNTY:	**LEE COUNTY**
PROJECT NAME:	**SR 78**
FROM:	**US 41/SR 45**
TO:	**NEW POST ROAD**

Table of Contents

Approved By:

Christopher Frank, P.E.
Responsible Engineer

CHRISTOPHER D. FRANK LICENSE No. 64014 STATE OF FLORIDA PROFESSIONAL ENGINEER

8/11/2015
Date

Concurred By:

for BAM

Bernie Masing, P.E.
District Design Engineer

9/10/2015
Date

PAGE 1 OF 3

FLEXIBLE PAVEMENT DESIGN QUALITY CONTROL CHECKLIST

State Proj. No. 78 Federal Aid No. N/A

FP ID No. 431817-1-52-01 County LEE

Flexible Pavement Design Review	**Satisfactory Yes/No/NA**
Pavement Design Summary Sheet.	YES
Project Location and Description	YES
Traffic Data and $ESAL_D$ Calculations	YES
Resilient Modulus (M_R)	YES
Reduced Resilient Modulus (M_R) for base high-water clearance less than 3ft.	N/A
Required Structural Number (SN_R) Calculations. . .	YES
Calculated Structural Number (SN_C) Calculations. .	YES
Base Material Selection.	YES
Friction Course Selection.	YES
Stabilized Subgrade Evaluation	YES
Shoulder Design.	YES
Coordination with Other Offices.	YES
Other Special Details.	N/A
Final Pavement Design Drawing or Narrative	YES

PAGE 2 OF 3

Rehabilitation

Field Evaluation of Project.	YES
Pavement Coring and Evaluation completed	YES
Distress Evaluation.	YES
Existing Cross-Slope and Correction method	N/A MATCH EXIST.
Milling Depth and Purpose.	YES
Overlay Structural Number (SN_O) Calculations . . .	N/A
Overbuild Recommendation.	N/A
Pavement Evaluation Coring and. . . Condition Data Report	YES

Projects That Do Not Require Design Calculations

Existing Pavement Evaluation	N/A
Existing Cross-Slope and Correction method	N/A
Asphalt Thickness.	N/A
Base Type and Thickness.	N/A
Future Milling Considerations.	N/A
Structural Evaluation.	N/A

Plans Review

Plans Conform to Pavement Design	YES
Cross-Slope correction addressed	N/A MATCH EXIST.
Design Details Adequately Covered.	YES

Standard Indexes Properly Referenced . . . . . YES

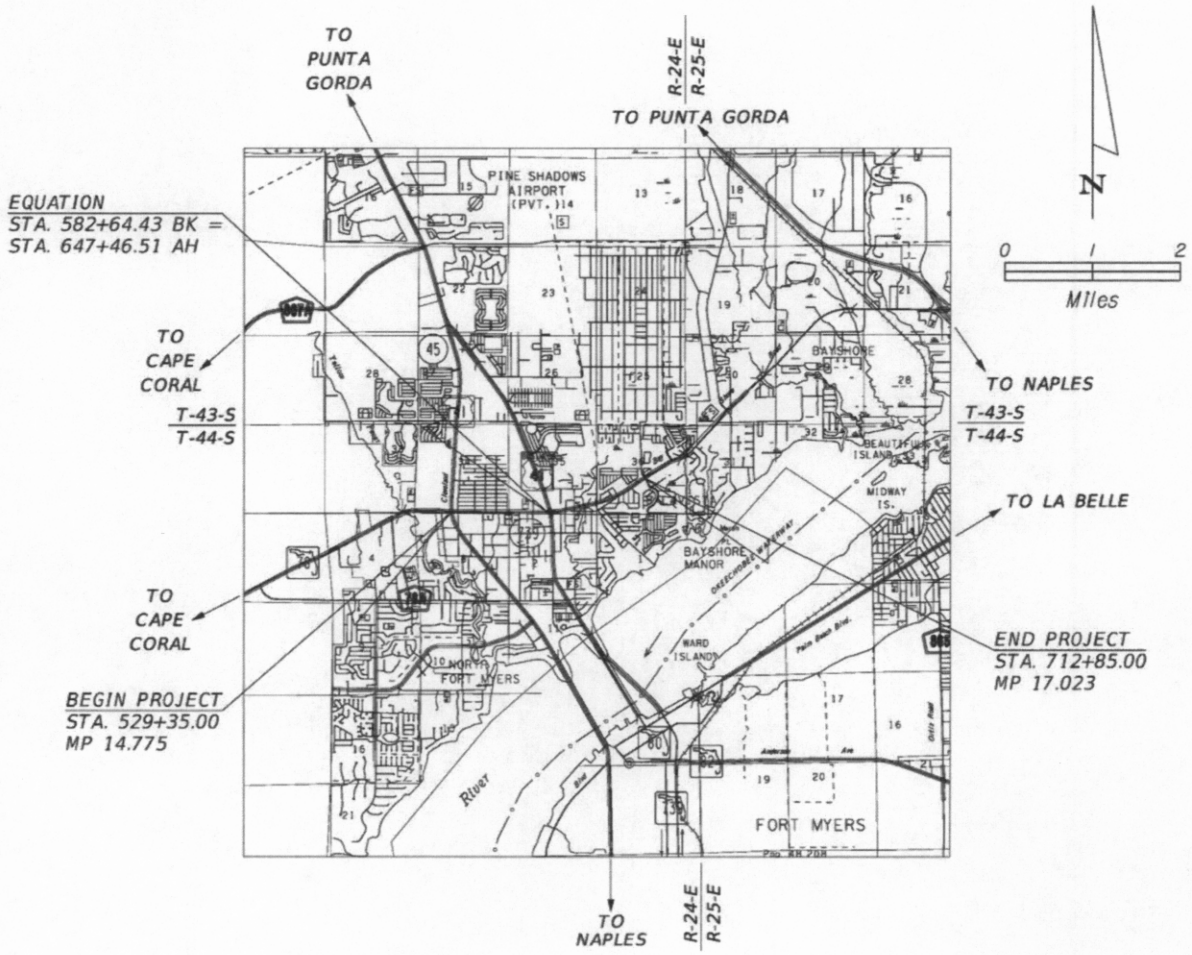
Project is Constructible with Current Technology YES

Comments

QA by [signature] Date 06.12.2015

PROJECT LOCATION MAP

The State Road 78 project begins at SR 45 (US 41) (MP 14.775) and ends at New Post Road (MP 15.893) in Lee County, a total of approximately 1.118 miles.



PROJECT DESCRIPTION

This Pavement Design is being developed to address existing pavement deficiencies along State Road 78 from State Road 45 (US 41) (MP 14.775) to New Post Road (MP 15.893) in Lee County. The primary purpose of the project is to extend the service life of the existing asphalt pavement while enhancing safety along the corridor.

The existing asphalt pavement resurfacing is mostly 14 years old with a small portion near the end of the project that is 26 years old. The pavement condition survey indicates the pavement is in fair condition overall and is experiencing light severity fatigue cracking. Based on pavement condition survey reports received in January 2015, cracking indices range from 6.5 to 8.0 for these project limits.

Both Urban and Rural typical sections exist within the project limits.

Urban

Between MP 14.775 and 15.893 the roadway is an urban four-lane divided facility with 4-foot bike lanes, curb and gutter, and sidewalk within 117-foot (minimum) right-of-way. This first section of road has an ABC base, Type-S structural course, and an open graded FC-2 friction course. The design speed in this section is 45 mph, with a posted speed limit of 40 mph.

Rural

Between MP 15.893 and 17.023 the roadway is a five-lane undivided rural typical section with 4-foot paved shoulders and pedestrian sidewalk on the left side of the right-of-way. This second section of road has a Lime rock base, Type-S structural course, and a close graded FC-4 friction course. This rural section is situated in 180-foot (minimum) right-of-way. The design speed in this section is 55 mph, with a posted speed limit 50 mph.

The Pavement Evaluation Report recommends 3.00 inches of milling and resurfacing on the mainline lanes to correct the noted cracking for the length of this project and 1.50 inches of milling and resurfacing on the shoulders. Considering the two differing typical sections, design speeds, base materials, and friction course requirements, we have developed independent pavement designs for both the urban and the rural segments including the mainline, shoulders (urban bike lane), and turn lanes in each segment. (See Pavement Design Summary Sheets)

In the Urban section mainline lanes, each pavement layer, including the ABC, utilizes the reduced structural coefficients to determine an average existing SN of 2.91. Due to the urban section design speed and existing curb and gutter, a close graded FC-12.5 is selected for the Friction Course. The District Materials office has recommended a 16 year design period with a 90% Reliability factor. Accumulated ESAL's are 8,000,000 (rounded) at 16 years (DY 2032), cross referenced with the 18,000 psi M_R, Table A.4A indicates a SN_R of 3.50. Milling 3.00" and resurfacing with 1.50" Type SP and 1.50" FC-12.5 provides a SN of 3.59, exceeding the SN_R. Traffic Level C will be specified for both SP and FC layers. Friction Course will utilize PG 76-22 (ARB) binder. Turn Lanes will mirror the mainline pavement design.

In the Rural section mainline lanes, each pavement layer, including the limerock base, utilizes the reduced structural coefficients to determine an average existing SN of 4.22. Due to the rural section design speed, existing shoulders, and multi-lane typical section, an open graded FC-5 is selected for the Friction Course. The District Materials office has recommended a 20 year design period with a 95% Reliability factor. Accumulated ESAL's are 10,000,000 (rounded) at 20 years (DY 2036), cross referenced with the 18,000 psi M_R, Table A.4A indicates a SN_R of 3.50. The pavement condition is generally rated as Fair, yet, there are examples of the pavement cores that are cracked to the base (up to 4.90" deep). These two conditions make this a candidate project for utilizing a ¾" Type SP-4.75 crack relief pavement layer. Central office has authorized its use with developmental specifications and the District One materials office has suggested this material as an alternative cost saving solution for this project. The traditional method for addressing such deep cracking would be to design a deeper milling and resurfacing which would increase the cost significantly. Milling 3.50" and resurfacing with ¾" Type SP 4.75, 2.00" Type SP, and ¾" FC-5 provides a SN of 4.62, exceeding the SN_R of 3.86. Traffic Level D will be specified for both SP and FC layers. Friction Course will utilize PG 76-22 (PMA) binder. Turn Lanes will mirror the mainline pavement design.

FLORIDA DEPARTMENT OF TRANSPORTATION
FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

Prepared By:	Christopher Frank, P.E.	**Date Prepared:**	8/19/2014
Financial Project No.:	431317-1-52-01	**Project Name:**	SR 78 (Pine Island Road)
WPI No.:	N/A	**From:**	SR 45 (US 41)
State Project No.:	N/A	**To:**	New Post Road
County Section No.:	12060 000	**Begin MP:**	14.775
FAP No.:	N/A	**End MP:**	17.023
County:	Lee	**Project Length (Mi.):**	2.248
Type of Work:	Milling and Resurfacing		
Opening Year	2016	**%R:**	90
Design Year	2032	**M_R:**	18,000 PSI
$ESAL_D$ - Mainline:	8,000,000	**Design Speed:**	45 MPH
$ESAL_D$ - Shoulder:	240,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.50	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Urban Mainline Lanes (R1, R2, L1, L2) **MILLING** **3.00**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-2	0.43	0.00	0.00
Type S	3.70	0.25	0.93
ABC	6.40	0.16	1.02
Type B	12.00	0.08	0.96
		Existing Total SN	2.91

Milling

Layer	Thickness	Structural Coefficient	SN
FC-2	-0.43	0.00	0.00
Type S	-2.57	0.25	-0.64
	-3.00	**Deduction:**	-0.64

Recommended Urban Mainline Lanes Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-12.5 (Traffic C)	1.50	0.44	0.66
Type SP (Traffic C)	1.50	0.44	0.66
	3.00	**Addition:**	1.32

Existing SN After Milling:	2.27
Design Total SN:	3.59
Required SN for Mainline Lanes (R1, R2, L1, L2):	3.50
Design SN Difference from Required SN:	0.09

Approved By:

CHRISTOPHER D. FRANK LICENSE No. 64014 STATE OF FLORIDA PROFESSIONAL ENGINEER

Christopher Frank, P.E.
Responsible Engineer

Date: 8/10/2015

FLORIDA DEPARTMENT OF TRANSPORTATION
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Type of Work:	Milling and Resurfacing		
Opening Year	2016	**%R:**	90
Design Year	2032	**M_R:**	18,000 PSI
$ESAL_D$ - Mainline:	8,000,000	**Design Speed:**	45 MPH
$ESAL_D$ - Shoulder:	240,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.50	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Urban Shoulder (OR, OL) **MILLING** **1.50**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-2	0.30	0.00	0.00
Type S	2.00	0.25	0.50
ABC	2.80	0.16	0.45
Type B	12.00	0.08	0.96
		Existing Total SN	1.91

Milling

Layer	Thickness	Structural Coefficient	SN
FC-2	-0.30	0.00	0.00
Type S	-1.20	0.25	-0.30
	-1.50	**Deduction:**	-0.30

Recommended Urban Shoulders Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-12.5 (Traffic C)	1.50	0.44	0.66
Type SP (Traffic C)	0.00	0.44	0.00
	1.50	**Addition:**	0.66

Existing SN After Milling:	1.61
Design Total SN:	2.27
Required SN for Urban Shoulders:	2.16
Design SN Difference from Required SN:	0.11

Approved By:

CHRISTOPHER D. FRANK LICENSE No. 64014 STATE OF FLORIDA PROFESSIONAL ENGINEER

Christopher Frank, P.E.
Responsible Engineer

Date: 8/10/2015

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Design Year	2032	**M_R:**	18,000 PSI
$ESAL_D$ - Mainline:	8,000,000	**Design Speed:**	45 MPH
$ESAL_D$ - Shoulder:	240,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.50	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Urban Turn Lanes **MILLING** **3.00**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-2	0.75	0.00	0.00
Type S	3.58	0.25	0.89
ABC	7.00	0.16	1.12
Type B	12.00	0.08	0.96
		Existing Total SN	2.97

Milling

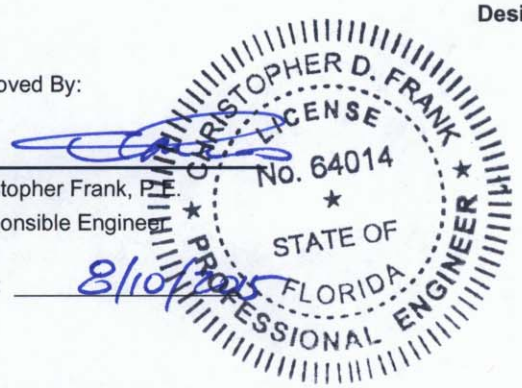
Layer	Thickness	Structural Coefficient	SN
FC-2	-0.75	0.00	0.00
Type S	-2.25	0.25	-0.56
	-3.00	**Deduction:**	-0.56

Recommended Urban Turn Lanes Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-12.5	1.50	0.44	0.66
Type SP	1.50	0.44	0.66
	3.00	**Addition:**	1.32

Existing SN After Milling:	2.41
Design Total SN:	3.73
Required SN for Urban Turn Lanes:	3.50
Design SN Difference from Required SN:	0.23

Approved By:



Christopher Frank, P.E.
Responsible Engineer

Date: 8/10/2015

FLORIDA DEPARTMENT OF TRANSPORTATION
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FAP No.:	N/A	**End MP:**	17.023
County:	Lee	**Project Length (Mi.):**	2.248
Type of Work:	Milling and Resurfacing		
Opening Year	2016	**%R:**	95
Design Year	2036	**M_R:**	18,000 PSI
$ESAL_D$ - Mainline:	10,000,000	**Design Speed:**	55 MPH
$ESAL_D$ - Shoulder:	300,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.86	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Rural Mainline Lanes (R1, R2, L1, L2) **MILLING** **3.50**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-4	0.73	0.15	0.11
Type S	3.95	0.25	0.99
Limerock	12.00	0.18	2.16
Type B	12.00	0.08	0.96
		Existing Total SN	4.22

Milling

Layer	Thickness	Structural Coefficient	SN
FC-4	-0.73	0.15	-0.11
Type S	-2.77	0.25	-0.69
	-3.50	**Deduction:**	-0.80

Recommended Rural Mainline Lanes Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-5	0.75	0.00	0.00
Type SP	2.00	0.44	0.88
SP 4.75 Crack Relief	0.75	0.44	0.33
	3.50	**Addition:**	1.21

Existing SN After Milling:	3.41
Design Total SN:	4.62
Required SN for Mainline Lanes (R1, R2, L1, L2):	3.86
Design SN Difference from Required SN:	0.76

Approved By:

Christopher Frank, P.E.
Responsible Engineer

Date: 8/10/2015

CHRISTOPHER D. FRANK LICENSE No. 64014 STATE OF FLORIDA PROFESSIONAL ENGINEER

FLORIDA DEPARTMENT OF TRANSPORTATION
FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

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County:	Lee	**Project Length (Mi.):**	2.248
Type of Work:	Milling and Resurfacing		
Opening Year	2016	**%R:**	95
Design Year	2036	**M_R:**	18,000 PSI
$ESAL_D$ - Mainline:	10,000,000	**Design Speed:**	55 MPH
$ESAL_D$ - Shoulder:	300,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.86	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Rural Shoulder (OR, OL) **MILLING** **2.75**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-4	0.70	0.15	0.11
Type S	3.80	0.25	0.95
Limerock	12.00	0.18	2.16
Type B	12.00	0.08	0.96
		Existing Total SN	4.18

Milling

Layer	Thickness	Structural Coefficient	SN
FC-4	-0.70	0.15	-0.11
Type S	-2.05	0.25	-0.51
	-2.75	**Deduction:**	-0.62

Recommended Rural Shoulder (OR, OL) Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-5	0.75	0.00	0.00
Type SP	2.00	0.44	0.88
	2.75	**Addition:**	0.88

Existing SN After Milling:	3.56
Design Total SN:	4.44
Required SN for Rural Shoulder (OR):	2.16
Design SN Difference from Required SN:	2.28

Approved By:

Christopher Frank, P.E.
Responsible Engineer

Date: 8/19/2015

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FLORIDA DEPARTMENT OF TRANSPORTATION
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$ESAL_D$ - Shoulder:	300,000	**Functional Class:**	Urban Other Principal Arterial
SN_R - Mainline:	3.86	**Design Seq. No.:**	0.00
SN_R - Shoulder:	2.16	**Cross Slope Correction:**	No

Existing Rural Turn Lanes **MILLING** **3.50**

Existing Lanes

Layer	Thickness	Structural Coefficient	SN
FC-4	0.93	0.15	0.14
Type S	3.43	0.25	0.86
Limerock	12.00	0.18	2.16
Type B	12.00	0.08	0.96
		Existing Total SN	4.12

Milling

Layer	Thickness	Structural Coefficient	SN
FC-4	-0.93	0.15	-0.14
Type S	-2.57	0.25	-0.64
	-3.50	**Deduction:**	-0.78

Recommended Rural Turn Lanes Resurfacing Pavement Design

Layer	Thickness	Structural Coefficient	SN
FC-5	0.75	0.00	0.00
Type SP	2.00	0.44	0.88
SP 4.75 Crack Relief	0.75	0.44	0.33
	3.50	**Addition:**	1.21

Existing SN After Milling:	3.33
Design Total SN:	4.54
Required SN for Rural Turn Lanes:	3.86
Design SN Difference from Required SN:	0.68

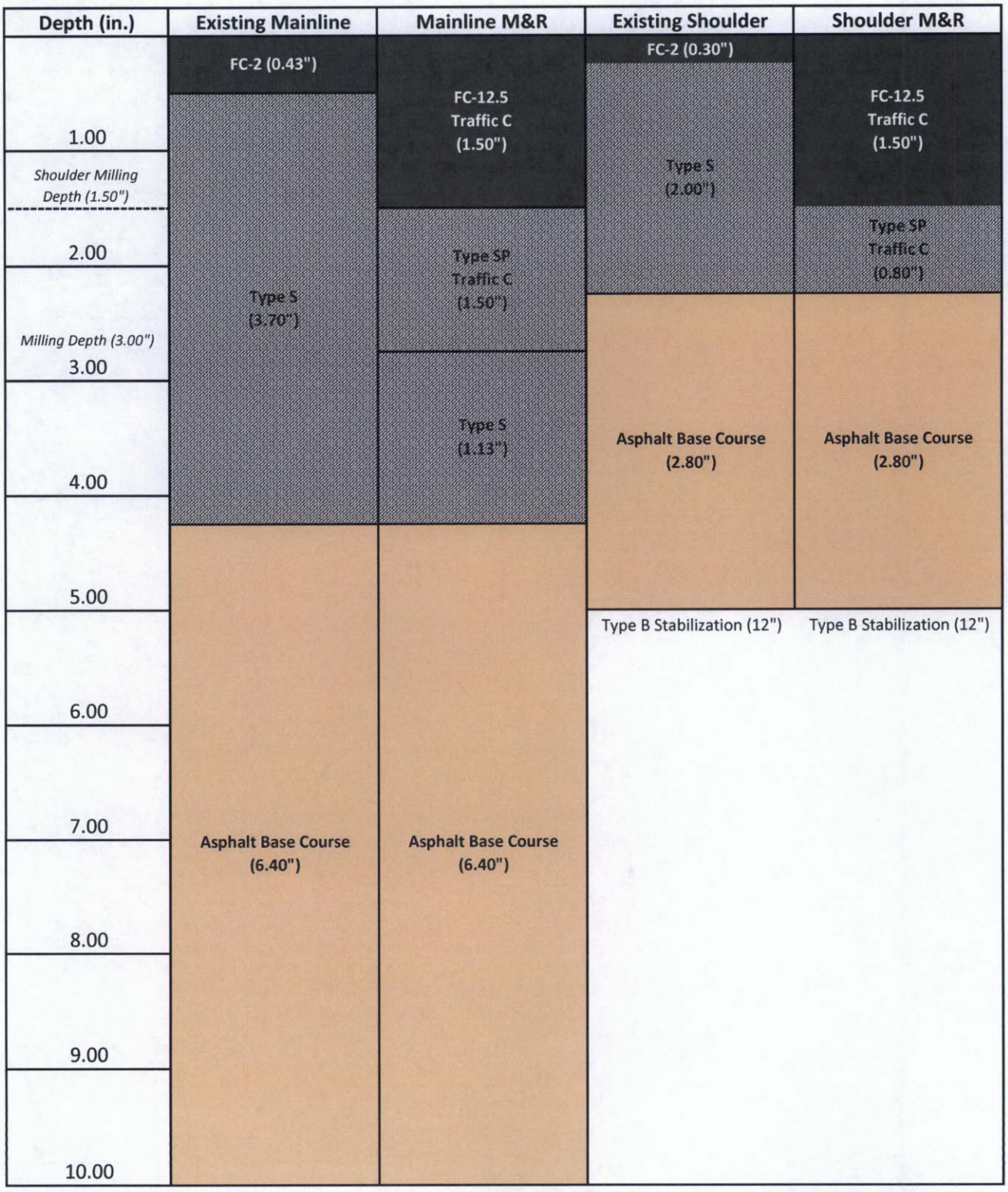
Approved By:

CHRISTOPHER D. FRANK LICENSE No. 64014 STATE OF FLORIDA PROFESSIONAL ENGINEER

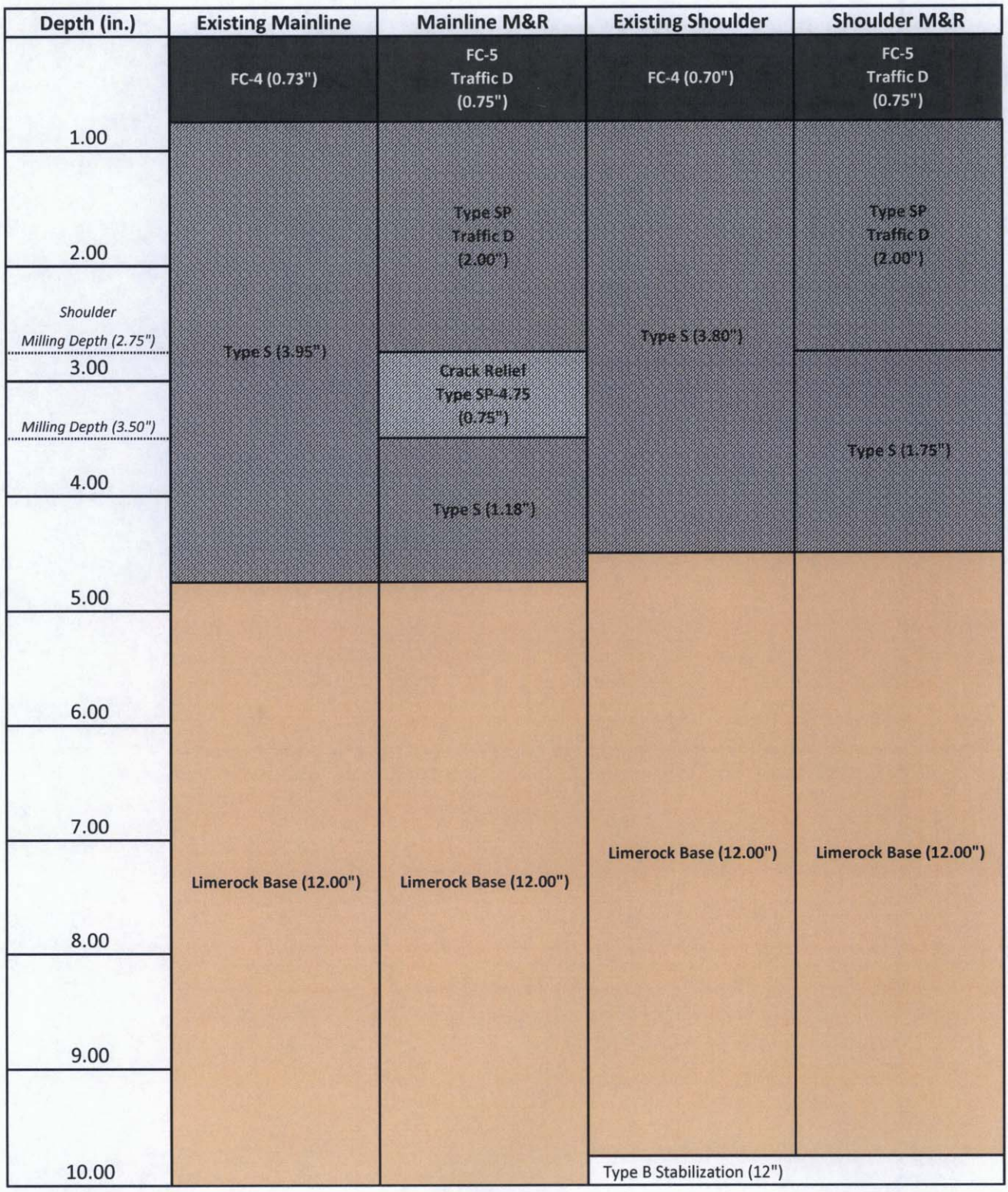
Christopher Frank, P.E.
Responsible Engineer

Date: 8/10/2015

Pavement Sketch
(Milling & Resurfacing Only) (Urban)



Pavement Sketch
(Milling & Resurfacing Only) (Rural)



APPENDIX A

Typical Section and Pavement Details

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

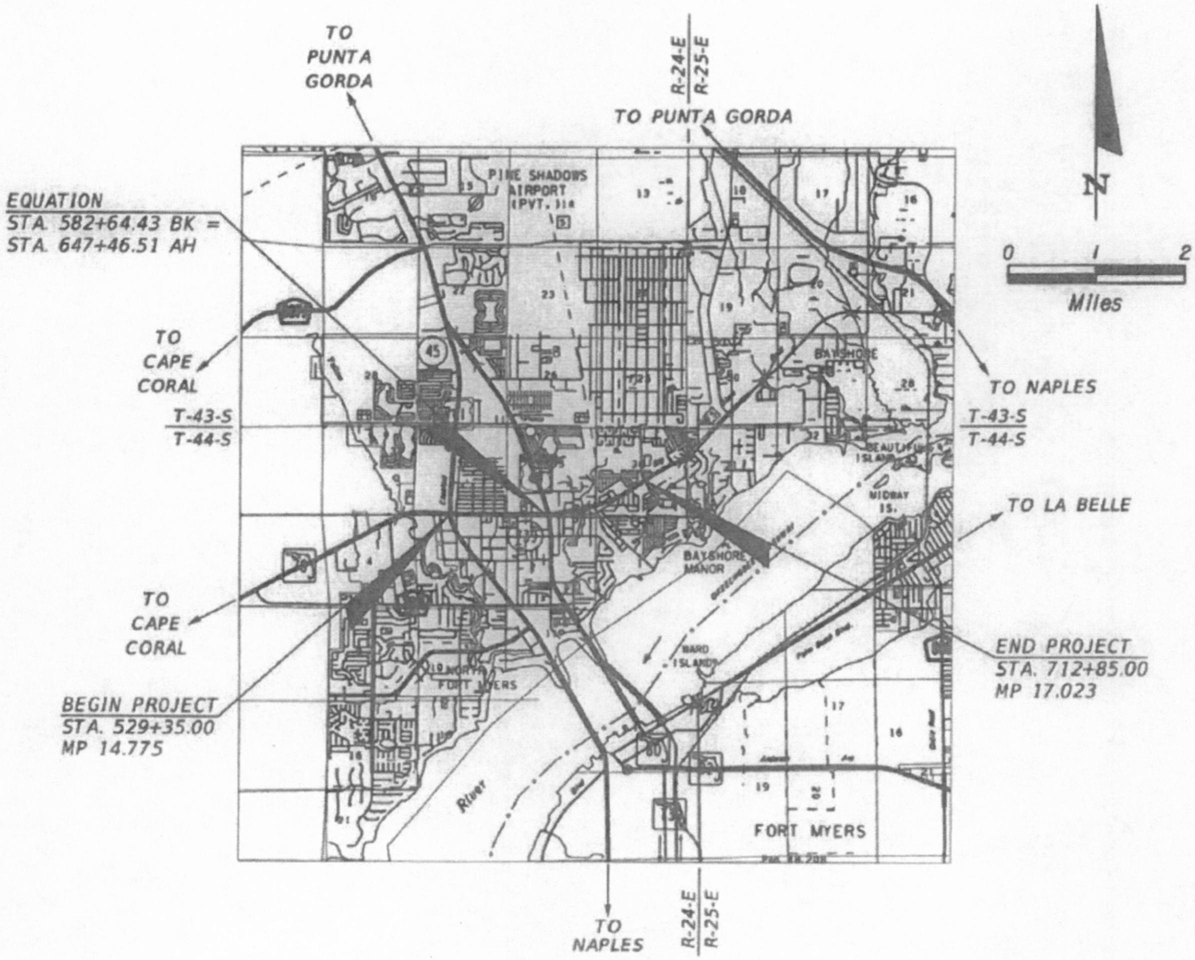
TYPICAL SECTION PACKAGE

SR 78

LEE COUNTY (12060)

FINANCIAL PROJECT ID 431317-1-52-01

FEDERAL AID NO. N/A



LOCATION MAP

3-20-14

JMAllen 3/20/2014 8:41:03 AM Y:\Projects\FDOT D1\9835413210_D1_DW\43131715201_SR78_WO_8\43131715201\roadway\TYPDRD01.DGN

PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 431317-1-52-01 COUNTY (SECTION) LEE (12060)

PROJECT DESCRIPTION MILL AND RESURFACE SR 78 AND CONSTRUCT BIKE LANE KEYHOLES FROM SR 45 (US 41) TO NEW POST ROAD

PROJECT CONTROLS

FUNCTIONAL CLASSIFICATION

( ) RURAL

(X) URBAN

( )	FREEWAY/EXPWY.	( )	MAJOR COLL.
(X)	PRINCIPAL ART.	( )	MINOR COLL.
( )	MINOR ART.	( )	LOCAL

HIGHWAY SYSTEM

Yes	No	
(X)	( )	NATIONAL HIGHWAY SYSTEM
( )	(X)	FLORIDA INTRASTATE HIGHWAY SYSTEM
( )	(X)	STRATEGIC INTERMODAL SYSTEM
(X)	( )	STATE HIGHWAY SYSTEM
( )	(X)	OFF STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

( ) 1 - FREEWAY

( ) 2 - RESTRICTIVE w/Service Roads

( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing

( ) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing

( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing

( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing

(X) 7 - BOTH MEDIAN TYPES

CRITERIA

( ) NEW CONSTRUCTION / RECONSTRUCTION

( ) RRR INTERSTATE / FREEWAY

(X) RRR NON-INTERSTATE / FREEWAY

( ) TDLC / NEW CONSTRUCTION / RECONSTRUCTION

( ) TDLC / RRR

( ) MANUAL OF UNIFORM MINIMUM STANDARDS (FLORIDA GREENBOOK) (OFF-STATE HIGHWAY SYSTEM ONLY)

TRAFFIC

	YEAR	AADT
CURRENT	2014	34,600
OPENING	2016	38,800
DESIGN	2036	52,242

STA. 529+35 TO 667+80

DESIGN SPEED 45

POSTED SPEED 40

DISTRIBUTION

K 9.0 %

D 54.7 %

T_{24} 8.3 %

STA. 667+80 TO 712+85

DESIGN SPEED 55

POSTED SPEED 50

LIST ANY POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION ELEMENTS:

N/A

LIST MAJOR STRUCTURES LOCATION/DESCRIPTION - REQUIRING INDEPENDENT STRUCTURE DESIGN:

N/A

LIST MAJOR UTILITIES WITHIN PROJECT CORRIDOR:

COMCAST	LEE COUNTY BOARD OF COUNTY COMMISIONERS
FGUA/NORTH FT. MYERS UTILITY	LEE COUNTY ELECTRIC CO-OP
FPL FIBERNET LLC	LEE COUNTY UTILITIES
LEE COUNTY SIGNAL DEPARTMENT	TECO PEOPLES GAS-FT. MYERS
LEE COUNTY IRRIGATION	CENTURYLINK FT. MYERS

ROBERT W. HICKEY ... STATE OF FLORIDA ... PROFESSIONAL ENGINEER

3-20-14

LIST OTHER INFORMATION PERTINENT TO DESIGN OF PROJECT:

ADDING BICYCLE LANE KEYHOLES AT RIGHT TURN LANES WHERE NEEDED.

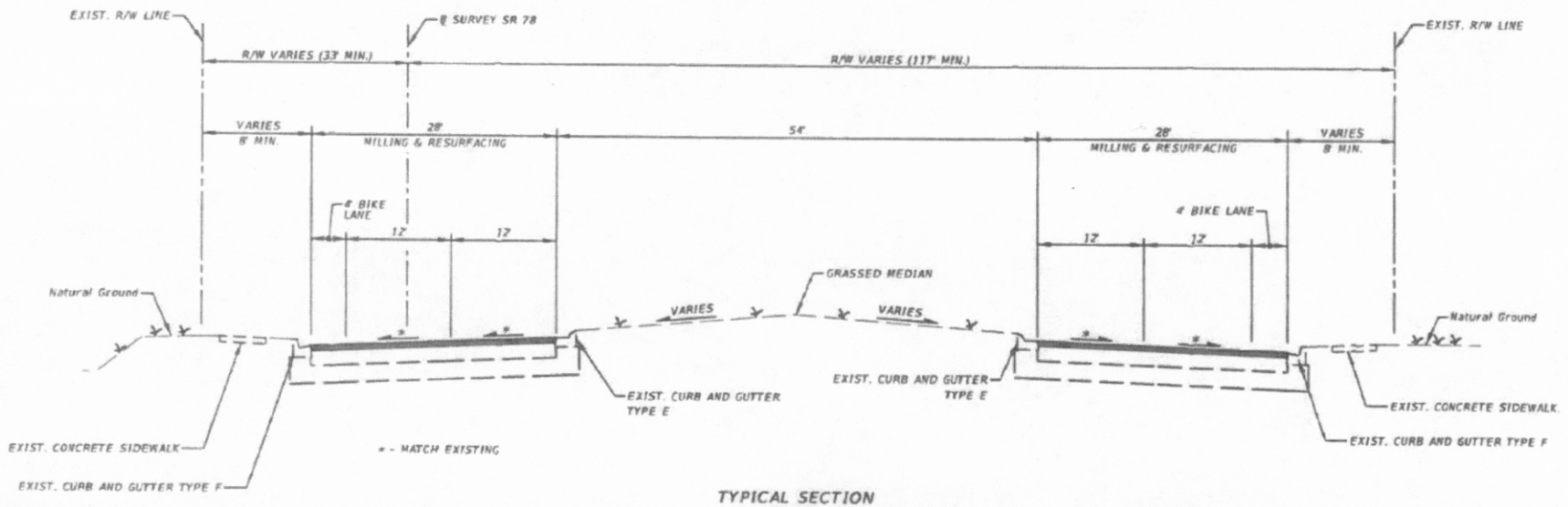
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 431317-1-52-01 FEDERAL AID PROJECT NO. N/A COUNTY NAME LEE

SECTION NO. 12060-000 ROAD DESIGNATION SR 78 LIMITS/MILEPOST MP 14.775 TO MP 15.893

PROJECT DESCRIPTION MILL AND RESURFACE SR 78 AND CONSTRUCT BIKE LANE KEYHOLES AT RIGHT TURN LANES FROM SR 45 (US 41) TO NEW POST ROAD

PROPOSED ROADWAY TYPICAL SECTION



TYPICAL SECTION
SR 78
STA. 529+35.00 TO STA. 653+20.00

APPROVED BY	FDOT CONCURRENCE	FHWA CONCURRENCE
Robert W. Joel, P.E. No. 52479 Engineer Of Record 3-20-14 Date	B.A. Masing Bernie A. Masing, P.E. FDOT District Design Engineer 3-24-14 Date	N/A FHWA Transportation Engineer Date

JMAllen 3/20/2014 8:11:05 AM Y:\Projects\FDOT D1\V98354\1320_01_DW\431317I520I_SR78_W0_BV\431317I520I\roadway\TYPOR001.DGN

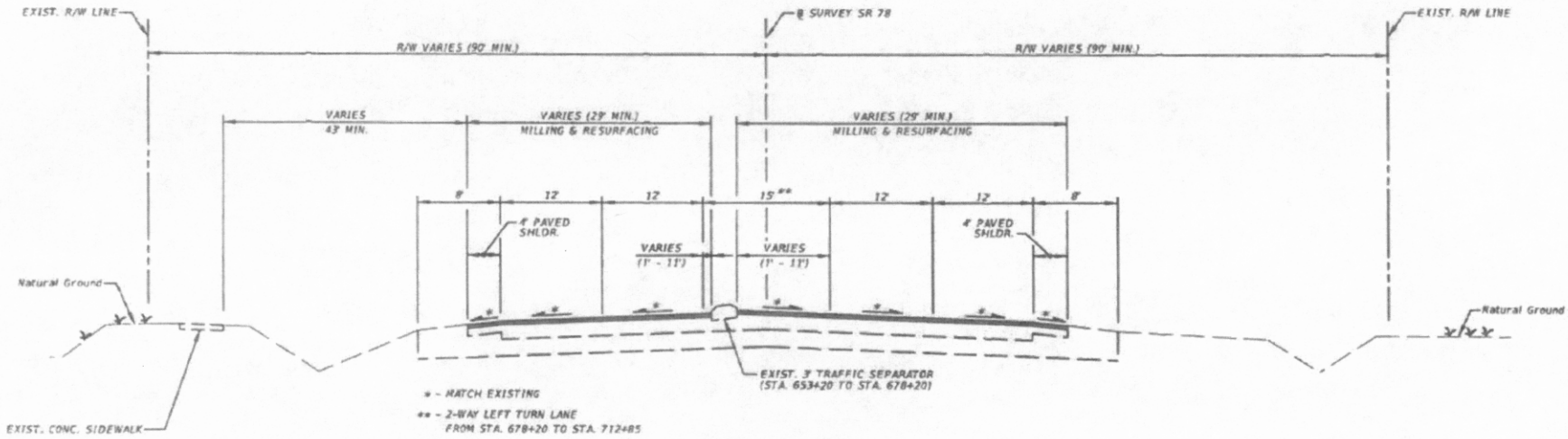
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 431317-1-52-01 FEDERAL AID PROJECT NO. N/A COUNTY NAME LEE

SECTION NO. 12060-000 ROAD DESIGNATION SR 78 LIMITS/MILEPOST MP 15.893 TO MP 16.366

PROJECT DESCRIPTION MILL AND RESURFACE SR 78 AND CONSTRUCT BIKE LANE KEYHOLES AT RIGHT TURN LANES FROM SR 45 (US 41) TO NEW POST ROAD

PROPOSED ROADWAY TYPICAL SECTION



TYPICAL SECTION
SR 78
STA. 653+20.00 TO STA. 712+85.00

APPROVED BY	FDOT CONCURRENCE	FHWA CONCURRENCE
Robert W. Joel, P.E. No. 52479 Engineer Of Record 3-20-14 Date	B.A. Masing Bernie A. Masing, P.E. FDOT District Design Engineer 3-24-14 Date	N/A FHWA Transportation Engineer Date

JMAllen 3/20/2014 8:41:05 AM Y:\Projects\FDOT D1\98354132\0_DI_DW\431317\5201_SR78_WO_8\431317\5201\roadway\TYPORD01.DGN

APPENDIX B

Traffic Data / 18-Kip ESAL Report

Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, PE
SECRETARY

MEMORANDUM

Date: February 18, 2014

To: Chris Zeigler — EXT 2253
Project Management — MS 1-29

From: George Martin, GIS Coordinator/Traffic Count Supervisor

Copies: Lorraine Edwards, Robin LaManna

Subject: Financial Project No: 431317-1-52-01
Roadway ID: 12060000

Project Name: SR 78 (Pine Island Road) from SR 45 (US 41) to New Post Road
County: Lee
Type of Work: Resurfacing
MP 14.723 – MP 17.015

Per your request, the attached traffic data forecasts are provided for the above roadway. These estimates were taken from trends calculated from traffic counts provided by FDOT.

K =	9.0 %
D =	54.7 %
24 hour T =	8.3 %
Design Hour T =	4.1 %
2012 AADT =	25500
Functional Class =	URBAN OTHER PRIN ART

The attached 18-KIP Equivalent Single Axle Loading Accumulations are based on the above information, and have been prepared in accordance with the Central Offices memo of December 1, 2000, reflecting the current Equivalency Factors.

As requested, we have included the 24-hour traffic count for sites 120017.

Please feel free to contact Lorraine Edwards at extension 2352 if you have any questions.

18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS

PROJECT TRAFFIC FOR PD&E and DESIGN ANALYSIS INFO / FACTORS

FIN #: 431317-1-52-01
COUNTY: Lee
ROADWAYID: 12060000
PROJECT DESCRIPTION: SR 78 (Pine Island Road) from SR 45 (US 41) to New Post Road

LOCATION #: 4

LOCATION DESCRIPTION: Resurfacing Sec. 12060000 from 14.723 to 17.015

GROWTH RATE FORMULA

A: Interpolation
B: Enter Growth Rate
C: Enter All AADTs
D: New Facility

If "A" select an interpolation function
If "B" enter rate as decimals (1%=1.01)
If "C", or "D" continue to next section

Choose A, B, C, or D here: A

Linear Growth Rate ____ %
Compounded Growth Rate ____ %
Decaying Growth Rate X % (select one)

DESIGN INFORMATION

		AADT
Existing Year	2012	25500
Opening Year	2016	N/A
Mid-Design Year	2026	N/A
Design Year	2036	52242

Note: AADT values have been rounded to the nearest 100

Daily Direction Split (50% or 100%)	50%
Lanes in One Direction	2
T24 values	
Existing to Opening Year	8.30%
Opening to Mid-Year	8.30%
Mid-Year to Design-Year	8.30%

2000 EQUIVALENCY FACTORS |u(1)|

(selected with an X)	FLEXIBLE PAVEMENT SN = 5/THICK		RIGID PAVEMENT SN = 12/THICK	
RURAL FREEWAY:	1.050	___	1.600	___
URBAN FREEWAY:	0.900	___	1.270	___
RURAL HIGHWAY:	0.960	___	1.350	___
URBAN HIGHWAY:	0.890	X	1.220	___
OTHER (Enter Factor and X):		___		___

(1) Equivalency Factors are based on Updated Pavement Damage Factors Memorandum, dated December 1, 2000.
Lane Factors developed by Copes equation

I have reviewed the 18 kip Equivalent Single Axle Loads (ESAL's) to be used for pavement design on this project. I hereby attest that these have been developed in accordance with the FDOT Project Traffic Forecasting Procedure using historical traffic data and other available information.

Prepared by: Lorraine Edwards — Traffic Count Analyst — FDOT
Name — Title — Org. Unit or Firm
Lorraine R Edwards — Feb/10/2014
Signature — Date

Reviewed by: George Martin, GIS Coordinator/Traffic Count Supervisor — FDOT
Name — Title — Org. Unit or Firm
George A. Martin — 2/18/2014
Signature — Date

18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS - LOCATION 4

PROJECT TRAFFIC FOR PD&E and DESIGN ANALYSIS INFO / FACTORS

YEARS: *2012 to 2036*

SECTION #: 12060000 **COUNTY:** Lee **FIN #:** 431317-1-52-01

FLEXIBLE PAVEMENT URBAN HIGHWAY 0.890

SN=5/THICK SR 78 (Pine Island Road) from SR 45 (US 41) to New Post Road A

YEAR	AADT	ESAL (1000S)	ACCUM (1000s)	D	T	LF	EF
2012	25500	271	0	0.5	8.30%	0.786	0.890
2013	31200	324	0	0.5	8.30%	0.769	0.890
2014	34600	355	0	0.5	8.30%	0.761	0.890
2015	37000	377	0	0.5	8.30%	0.755	0.890
2016	38800	394	394	0.5	8.30%	0.751	0.890
2017	40300	407	801	0.5	8.30%	0.748	0.890
2018	41600	419	1220	0.5	8.30%	0.746	0.890
2019	42700	429	1649	0.5	8.30%	0.744	0.890
2020	43700	437	2086	0.5	8.30%	0.742	0.890
2021	44600	445	2531	0.5	8.30%	0.740	0.890
2022	45400	453	2984	0.5	8.30%	0.739	0.890
2023	46100	459	3443	0.5	8.30%	0.737	0.890
2024	46800	465	3908	0.5	8.30%	0.736	0.890
2025	47400	470	4378	0.5	8.30%	0.735	0.890
2026	47900	475	4853	0.5	8.30%	0.734	0.890
2027	48500	480	5333	0.5	8.30%	0.733	0.890
2028	49000	484	5817	0.5	8.30%	0.732	0.890
2029	49500	489	6306	0.5	8.30%	0.731	0.890
2030	49900	492	6798	0.5	8.30%	0.731	0.890
2031	50300	496	7294	0.5	8.30%	0.730	0.890
2032	50700	499	7793	0.5	8.30%	0.729	0.890
2033	51100	503	8296	0.5	8.30%	0.729	0.890
2034	51500	506	8802	0.5	8.30%	0.728	0.890
2035	51900	509	9311	0.5	8.30%	0.727	0.890
2036	52200	512	9823	0.5	8.30%	0.727	0.890

Opening to Mid-Design Year ESAL Accumulation (1000s): 4459

Opening to Design Year ESAL Accumulation (1000s): 9429

I have reviewed the 18 kip Equivalent Single Axle Loads (ESAL's) to be used for pavement design on this project. I hereby attest that these have been developed in accordance with the FDOT Project Traffic Forecasting Procedure using historical traffic data and other available information.

Prepared by: Lorraine Edwards — Traffic Count Analyst — FDOT

Name — Title — Org. Unit or Firm

Lorraine L Edwards — Feb 10 2014

Signature — Date

Reviewed by: George Martin, GIS Coordinator/Traffic Count Supervisor — FDOT

Name — Title — Org. Unit or Firm

George G. Martin — 2/18/2014

Signature — Date

County: 12
Station: 0017
Description: SR 78, EAST OF HART ROAD LC219
Start Date: 05/09/2012
Start Time: 1100

Time	Direction: E 1st	2nd	3rd	4th	Total	Direction: W 1st	2nd	3rd	4th	Total	Combined Total
0000	21	13	9	11	54	20	15	9	11	55	109
0100	16	8	5	9	38	18	9	14	8	49	87
0200	9	11	6	6	32	5	8	4	9	26	58
0300	12	6	11	13	42	6	5	8	8	27	69
0400	18	18	18	31	85	6	12	16	28	62	147
0500	25	38	53	93	209	25	32	39	55	151	360
0600	102	140	155	195	592	76	126	198	205	605	1197
0700	168	226	252	237	883	186	250	275	262	973	1856
0800	191	219	171	187	768	214	192	221	174	801	1569
0900	165	164	140	158	627	194	199	200	156	749	1376
1000	147	156	151	192	646	171	199	163	172	705	1351
1100	157	180	193	182	712	193	163	190	212	758	1470
1200	171	223	184	199	777	190	170	191	175	726	1503
1300	200	203	187	199	789	214	174	193	149	730	1519
1400	201	226	206	225	858	191	190	221	205	807	1665
1500	214	251	234	232	931	195	201	198	206	800	1731
1600	275	275	260	273	1083	234	237	274	246	991	2074
1700	299	341	298	240	1178	247	331	275	241	1094	2272
1800	234	220	192	196	842	235	187	199	145	766	1608
1900	153	140	131	108	532	111	114	118	109	452	984
2000	118	112	121	135	486	158	122	116	90	486	972
2100	109	104	93	75	381	84	67	69	68	288	669
2200	57	47	40	47	191	63	37	40	32	172	363
2300	40	28	24	18	110	27	27	18	18	90	200
24-Hour Totals:					12846					12363	25209

Peak Volume Information

	Direction: E Hour	Volume	Direction: W Hour	Volume	Combined Directions Hour	volume
A.M.	715	906	715	1001	715	1907
P.M.	1645	1211	1645	1099	1645	2310
Daily	1645	1211	1645	1099	1645	2310

Truck Percentage 7.43 7.27 7.35

Classification Summary Database

Dir	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TotTrk	TotVol
E	110	8134	3648	2	456	107	23	278	86	2	0	0	0	0	0	954	12846
W	106	7962	3396	6	419	82	34	263	89	6	0	0	0	0	0	899	12363

Generated by SPS 5.0.26

Florida Department of Transportation

RICK SCOTT
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

ANANTH PRASAD, P.E.
SECRETARY

Date: 2/10/14

To: **George Martin, GIS Coordinator/Traffic Count Supervisor**

From: FDOT PROJECT MGR: Chris Zeigler
DEPARTMENT: Project Management (158) MS: 1-29
Name (if not FDOT): _____ Phone: x2253
Company: _____
Address: _____

Copies: Lorraine Edwards, Robin LaManna

Subject: **REQUEST FOR PROJECT TRAFFIC DATA** *(updated 08/2013)*
Please E-mail this completed form and Location Map to Lorraine Edwards and cc: to George Martin. NOTE: It could take as long as 30 working days to fill your request. Please plan accordingly.

_____Previous Traffic Report (attached) Needs Update
__X__ 18 KIP ESAL: Flexible __X__ Rigid _____ Both _____
(ESAL report includes Functional Classification and 24-hour counts)
_____Other: _____
Date Requested for Return: 3/14/2014

FPID No: 431317-1-52-01 **County: Lee** **FAP No:** _____

Project Name: SR 78 (Pine Island Road) from SR 45 (US 41) to New Post Road

Co/Section/Subsection: 12060000

From (Include Mile Post): 14.723

To (Include Mile Post): 17.015

Description of Work: Resurfacing

Opening Year: 2016 Existing Total Thru Lanes: 4 Resulting Total Thru Lanes: 4

Other: _____

Attachments: _____

District One – Traffic Operations
801 N Broadway Avenue * Post Office Box 1249 * Bartow, FL 33831-1249
(863) 519-2553 * Fax (863) 534-0915 * MS 1-8
www.dot.state.fl.us

TRAFFIC PROJECTION FROM FSUTMS	ESAL LOCATION NUMBER 1	ESAL LOCATION NUMBER 2	ESAL LOCATION NUMBER 3	ESAL LOCATION NUMBER 4
FM Number:	**431317-1-52-01**	**431317-1-52-01**	**431317-1-52-01**	**431317-1-52-01**
Road name/number:	**SR 78/12060000**	**SR 78/12060000**	**SR 78/12060000**	**SR 78/12060000**
LOCATION DESCRIPTION: FROM	**13.248**	**14.741**	**15.858**	**17.015**
LOCATION DESCRIPTION: TO	**14.741**	**15.858**	**17.015**	**18.235**
TRAFFIC COUNT LOCATION NUMBER	125042	120003	125028	120017
CURRENT YEAR	2012	2012	2012	2012
CURRENT AADT	26000	26000	32000	25500
OPENING YEAR	2016	2016	2016	2016
DESIGN YEAR	2036	2036	2036	2036
MODEL YEAR	2035	2035	2035	2035
PSWADT	50005	43986	86222	78490
MOCF	0.89	0.89	0.89	0.89
MODEL AADT (PSWADT X MOCF)	44504	39148	76738	69856
MODEL AADT minus CURRENT AADT	18504	13148	44738	44356
# YEARS FROM CURRENT TO MODEL YEAR	23	23	23	23
ANNUAL GROWTH FROM CURRENT TO MODEL YEAR	805	572	1945	1929
# YEARS FROM CURRENT TO DESIGN YEAR	24	24	24	24
DESIGN YEAR AADT (MODEL)	**45309**	**39719**	**78683**	**71785**
DESIGN YEAR AADT (TRENDS)	40200	42800	41400	32700
Average	42754	41260	60041	52242
T %	6.3	8.5	6.5	8.3
		URBAN OTHER PRIN ART		
Opening to Mid-Design Year ESAL Accumulation (1000s):	2932	3855	4004	4459
Opening to Design Year ESAL Accumulation (1000s):	6113	8017	8419	9429

APPENDIX C

Resilient Modulus Recommendation

Florida Department of Transportation

RICK SCOTT
GOVERNOR

STATE MATERIALS OFFICE
5007 Northeast 39th Avenue, Gainesville, Florida 32609
Telephone: (352) 955-6341, Fax: (352) 955-6345

ANANTH PRASAD, P.E.
SECRETARY

TO: Debbie Childs, Project Manager

FROM: Hyung S. Lee, Pavement Systems Evaluation

DATE: July 23, 2012

COPIES:

SUBJECT: Resilient Modulus Recommendation

Project Description:	SR 78 MP 14.182 to 17.015
Project Number:	12060
FIN No.:	431317-1
County:	Lee

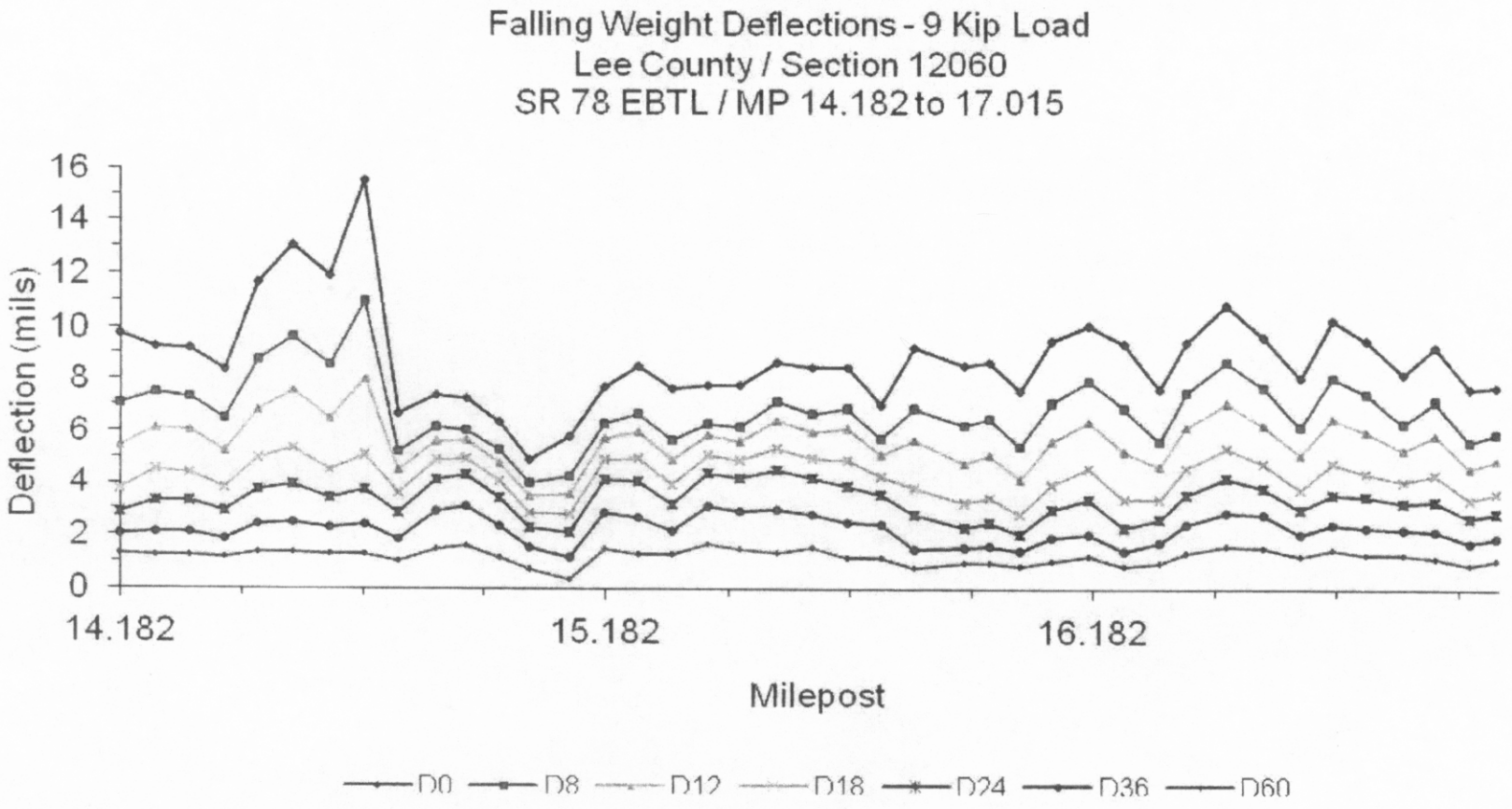
On July 18, 2012 deflection tests were conducted in the eastbound and westbound traffic lanes of SR 78. Evaluation of the data and resulting deflection plots indicate the following Resilient Modulus value is representative of the existing pavement system and is hereby recommended for this project.

Travel Direction	Beginning Milepost	Ending Milepost	Modulus (psi)	Modulus (MPa)
Northbound/Southbound	14.182	17.015	18,000	124

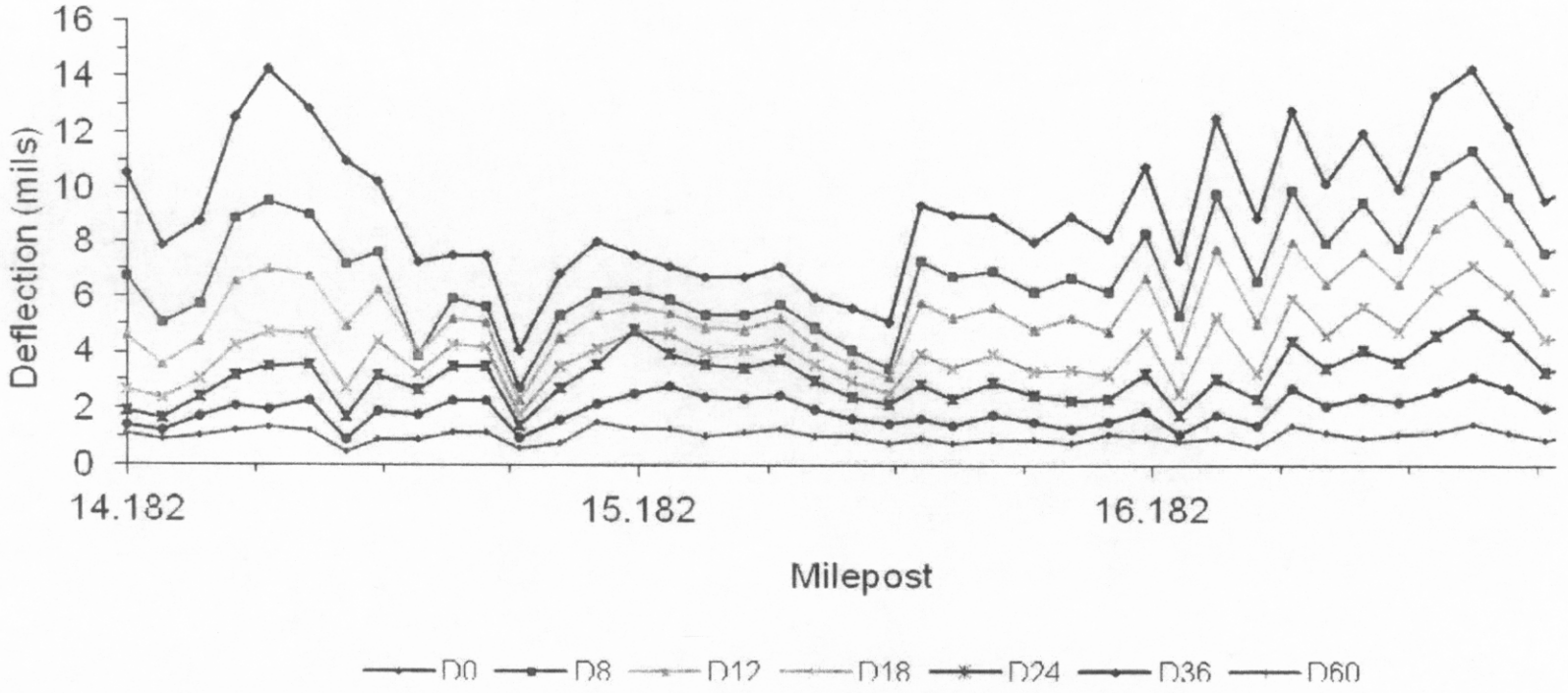
Please let me know if you need further assistance

HSL/kek

Attachment: Deflection Plots


Falling Weight Deflections - 9 Kip Load
Lee County / Section 12060
SR 78 EBTL / MP 14.182 to 17.015
Deflection (mils)
16
14
12
10
8
6
4
2
0
14.182
15.182
16.182
Milepost
D0
D8
D12
D18
D24
D36
D60

Falling Weight Deflections - 9 Kip Load
Lee County / Section 12060
SR 78 WBTL / MP 14.182 to 17.015



SUMMARY OF PAVEMENT SURVEY

COUNTY	Lee	GPR Test Date	13-Sep-12
PROJECT NO.	12060	MPSV Test Date	14-Nov-12
PFN	431317-1		
STATE ROAD	78		
MILEPOST LIMITS (SLMP)	14.182 to 17.015		

PAVEMENT TYPE

Milepost		Lanes			
From	To	L1	R1	L2	R2
14.182	17.015	F			

Legend:
F = Flexible, R = Rigid, B = Composite (HMA / PCC) and W = Composite (PCC/HMA)

Notes:

Please type your notes here.

SUMMARY STATISTICS & PLOT SETTINGS (Please use the menu in this block to modify the settings.)

Display: ☑ Statistics ☑ Plots

Data: ○ Thickness for HMA ○ PCC
○ Cross Slope
◉ Rut Depth

Lanes: ☑ All or ☑ L1R1 ☑ L2R2 ☐ L3R3 ☐ L4R4 ☐ L5R5 ☐ L6R6

Limits:

	Minimum	Maximum	Maj. Unit	Min. Unit
x	14.182	17.015	0.5	0.10
y	0.0	0.6	0.1	0.05

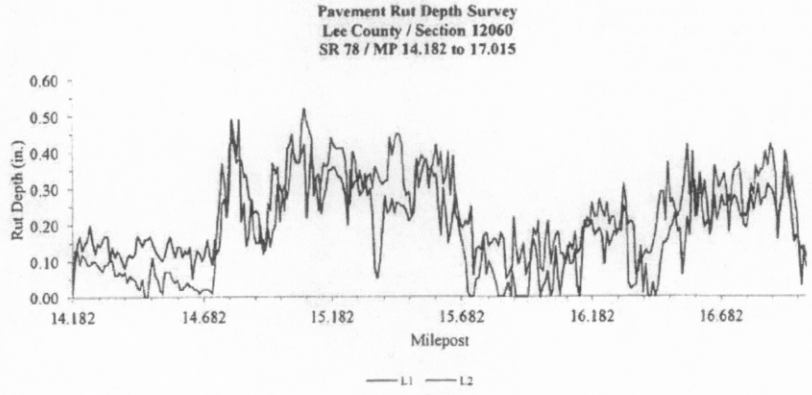
or

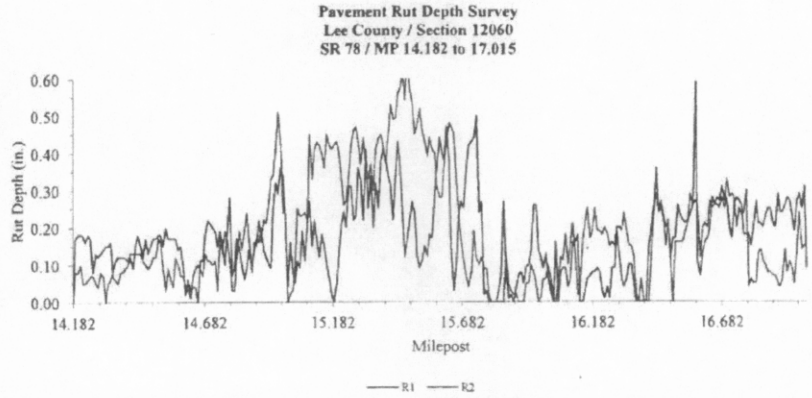
SUMMARY STATISTICS

Units: in.

Lane #	L-Direction				R-Direction			
	Average	Stdev	Max.	Min.	Average	Stdev	Max.	Min.
1	0.2	0.1	0.49	0	0.17	0.11	0.59	0
2	0.22	0.13	0.52	0	0.19	0.15	0.64	0

PLOTS





APPENDIX D

Flexible Pavement Design Manual Tables

FLEXIBLE PAVEMENT DESIGN MANUAL

OFFICE OF DESIGN, PAVEMENT MANAGEMENT SECTION
MARCH 2015
TALLAHASSEE, FLORIDA
Topic #625-010-002

TABLE 3.1

DESIGN PERIODS

The Following Design Periods Will Be Used For Flexible Pavement Designs.

New Construction or Reconstruction	20 Years
Pavement Overlay without Milling	8 to 20 Years
Pavement Overlay with Milling	
Limited Access	12 to 20 Years*
Non-Limited Access	14 to 20 Years*
Pavement Overlay of Rigid Pavement	8 to 12 Years

Notes

* Shorter design periods can be used if there are constraints such as curb and gutter or scheduled future capacity projects that justify limiting overlay thickness. These reasons should be documented in the pavement design package.

TABLE 4.1

FRICTION COURSE SELECTION

The Following Friction Courses are Required For Design Speeds of 35 mph or Greater.

All Projects

Design Speed	Two Lane	Multi Lane
35 thru 45 mph	FC-12.5 or FC-9.5	FC-12.5 or FC-9.5
50 mph Or Greater	FC-12.5 or FC-9.5	FC-5

Low Volume Two Lane Roads

- Type SP Structural Course without a friction course may be used if the five years projected AADT from the opening year is less than 3000 vehicles per day.

TABLE 5.2

RELIABILITY (%R) FOR DIFFERENT ROADWAY FACILITIES

Facility	New	Rehabilitation
Limited Access	80 - 95	95 - 99
Urban Arterials	80 - 90	90 - 97
Rural Arterials	75 - 90	90 - 95
Collectors	75 - 85	90 - 95

Notes

The type of roadway is determined by the Transportation Statistics Office and can be obtained from the Roadway Characteristics Inventory (RCI).

The designer has some flexibility in selecting values that best fits the project when choosing the Reliability (%R).

Considerations for selecting a reliability level include projected traffic volumes and the consequences involved with early rehabilitation, if actual traffic loadings are greater than anticipated. A detailed discussion of reliability concepts can be found in the AASHTO Guide For Design Of Pavement Structures.

For traffic volume ranges, refer to Chapter 2, Design Geometrics and Criteria, of the Plans Preparation Manual - Topic No. 625-000-007.

TABLE 5.4

STRUCTURAL COEFFICIENTS FOR DIFFERENT PAVEMENT LAYERS
(New Construction or Reconstruction)

Layer Type	Layer Coeff. per inch	Spec. Sec.
FC-5	0.00	337
FC-12.5, FC-9.5	0.44	337
Superpave Type SP (SP-9.5, SP-12.5, SP-19.0)	0.44	334
Limerock (LBR 100)	0.18	200
Cememted Coquina (LBR 100)	0.18	200
Shell Rock (LBR 100)	0.18	200
Bank Run Shell (LBR 100)	0.18	200
Graded Aggregate (LBR 100)	0.15	204
Recycled Concrete Aggregate (LBR 120)	0.15	204
Type B-12.5	0.30	234
Limerock Stab. (LBR 70)	0.12	230
Shell Stab. (LBR 70)	0.10	
Sand Clay (LBR 75)	0.12	
Soil Cement (500 psi)	0.20	
Soil Cement (300 psi)	0.15	
Type B Stab. (LBR 40)	0.08	
Type B Stab. (LBR 30)	0.06	
Type C Stab.	0.06	
Cement Treated (300 psi)	0.12	
Lime Treated	0.08	

TABLE 5.4

STRUCTURAL COEFFICIENTS FOR DIFFERENT PAVEMENT LAYERS
(New Construction or Reconstruction)

Layer Type	Layer Coeff. per inch	Spec. Sec.
FC-5	0.00	337
FC-12.5, FC-9.5	0.44	337
Superpave Type SP (SP-9.5, SP-12.5, SP-19.0)	0.44	334
Limerock (LBR 100)	0.18	200
Cememted Coquina (LBR 100)	0.18	200
Shell Rock (LBR 100)	0.18	200
Bank Run Shell (LBR 100)	0.18	200
Graded Aggregate (LBR 100)	0.15	204
Recycled Concrete Aggregate (LBR 120)	0.15	204
Type B-12.5	0.30	234
Limerock Stab. (LBR 70)	0.12	230
Shell Stab. (LBR 70)	0.10	
Sand Clay (LBR 75)	0.12	
Soil Cement (500 psi)	0.20	
Soil Cement (300 psi)	0.15	
Type B Stab. (LBR 40)	0.08	
Type B Stab. (LBR 30)	0.06	
Type C Stab.	0.06	
Cement Treated (300 psi)	0.12	
Lime Treated	0.08	

TABLE 5.6

GENERAL USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS (STANDARD INDEX 514) (inches)

BASE THICKNESS AND OPTIONAL CODES										
			Base Options							
Base Group	Structural Range	Base Group Pay Item Number	Limerock, LBR 100	Cemented Coquina, LBR 100	Shell Rock, LBR 100	Bank Run Shell, LBR 100	Graded Aggregrated Base, LBR 100	Type B-12.5	B-12.5 and 4" Granular Subbase, LBR 100 *	RAP Base
			Structural Number (Per In.)							
			(0.18)	(0.18)	(0.18)	(0.18)	(0.15)	(0.30)	(0.30 & 0.15)	(NA)
1	0.65 - 0.75	701	4"	4"	4"	4"	4 1/2"	Δ 4"		□ 5"
2	0.80 - 0.90	702	5"	5"	5"	5"	5 1/2"	Δ 4"		
3	0.95 - 1.05	703	5 1/2"	5 1/2"	5 1/2"	5 1/2"	6 1/2"	Δ 4"		
4	1.05 - 1.15	704	6"	6"	6"	6"	7 1/2"	Δ 4"		
5	1.25 - 1.35	705	7"	7"	7"	7"	8 1/2"	4 1/2"		
6	1.35 - 1.50	706	8"	8"	8"	8"	9"	5"		
7	1.50 - 1.65	707	8 1/2"	8 1/2"	8 1/2"	8 1/2"	10"	5 1/2"		
8	1.65 - 1.75	708	9 1/2"	9 1/2"	9 1/2"	9 1/2"	11"	5 1/2"		
9	1.75 - 1.85	709	10"	10"	10"	10"	12"	6"	4"	
10	1.90 - 2.00	710	11"	11"	11"	11"	ø 13"	6 1/2"	4 1/2"	
11	2.05 - 2.15	711	12"	12"	12"	12"	ø 14"	7"	5"	
12	2.20 - 2.30	712	12 1/2"	12 1/2"	12 1/2"	12 1/2"		7 1/2"	5 1/2"	
13	2.35 - 2.45	713	ø 13 1/2"	ø 13 1/2"	ø 13 1/2"	ø 13 1/2"		8"	6"	
14	2.45 - 2.55	714	ø 14"	ø 14"	ø 14"	ø 14"		8 1/2"	6 1/2"	
15	2.60 - 2.70	715						9"	7"	

* For granular subbase, the construction of both the subbase and Type B-12.5 will be bid and used as Optional Base. Granular subbases include Limerock, Cemented Coquina, Shell Rock, RCA Base at LBR 120, Bank Run Shell and Graded Aggregate Base at LBR 100. The base thickness shown is Type B-12.5.All subbase thicknesses are 4" minimum.

Φ To be used for widening, three feet or less.

Δ Based on minimum practical thicknesses.

❑ For restrictions on the use of RAP Base, see Specifications Section 283.

TABLE 5.7

LIMITED USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS (STANDARD INDEX 514) (inches)

BASE THICKNESS AND OPTION CODES									
			Base Options						
Base Group	Structural Range	Base Group Pay Item Number	Limerock Stabilized LBR 70	Shell LBR 70	Shell Stabilized LBR 70	Sand-Clay LBR 75	Soil Cement (300 psi)(Plant Mixed)	Soil Cement (300 psi)(Road Mixed)	Soil Cement (500 psi)(Plant Mixed)
			Structural Number (per inch)						
			(0.12)	(0.12)	(0.10)	(0.12)	(0.15)	(0.115)	(0.20)
1	0.65-0.75	701	5"	5"	7"	5"	5"	5"	4" Δ
2	0.80-0.90	702	$6^1/_2$"	$6^1/_2$"	$8^1/_2$"	$6^1/_2$"	$5^1/_2$"	$5^1/_2$"	4"
3	0.95-1.05	703	8"	8"	$9^1/_2$"	8"	$6^1/_2$"	$6^1/_2$"	5"
4	1.05-1.15	704	9"	9"	$10^1/_2$"	9"	$7^1/_2$"	$7^1/_2$"	$5^1/_2$"
5	1.25-1.35	705	10"	10"	12"	10"	$8^1/_2$"	$8^1/_2$"	6"
6	1.35-1.50	706	11"	11"		11"	9"		7"
7	1.50-1.65	707	$12^1/_2$"	$12^1/_2$"		$12^1/_2$"	10"		$7^1/_2$"
8	1.65-1.75	708					11"		$8^1/_2$"
			Not Recommended For 20 year Design Accumulated 18 Kip Equivalent Single Axle (ESAL) Loads Greater Than 1,000,000.						

Note: These base materials may be used on FDOT projects when approved in writing by the District Materials Engineer and shown in the plans.

Δ Based On Minimum Practical Thicknesses.

As a practical matter, Superpave mixes for crossroads and other small sections with quantities less than 1000 tons can be designed with the same mix (i.e. Traffic Level) as the mainline. This should be discussed on a project by project basis with the District Bituminous Engineer.

5.6.5 TRAFFIC LEVELS

TRAFFIC LEVELS FOR DESIGN EQUIVALENT SINGLE AXLE LOADS ($ESAL_D$) RANGE FOR SUPERPAVE ASPHALT CONCRETE STRUCTURAL COURSES

The following are the Traffic Levels for the Design Equivalent Single Axle Loads ($ESAL_D$) ranges for Superpave Asphalt Concrete Structural Courses

AASHTO DESIGN $ESAL_D$ RANGE (MILLION)	TRAFFIC LEVEL
< 0.3	A
0.3 to < 3	B
3 to < 10	C
10 to < 30	D
>= 30	E

5.6.6 LAYER THICKNESS

SPECIFICATION REQUIREMENTS ON LAYER THICKNESS FOR TYPE SP STRUCTURAL COURSES

The layer thickness must be consistent with the following thickness ranges:

FINE MIXES

Type Mix	Minimum	Maximum
SP-9.5	1"	1-½"
SP-12.5	1-½"	2-½"
SP-19.0	2"	3-½"

As a practical matter, Superpave mixes for crossroads and other small sections with quantities less than 1000 tons can be designed with the same mix (i.e. Traffic Level) as the mainline. This should be discussed on a project by project basis with the District Bituminous Engineer.

5.6.5 TRAFFIC LEVELS

TRAFFIC LEVELS FOR DESIGN EQUIVALENT SINGLE AXLE LOADS ($ESAL_D$) RANGE FOR SUPERPAVE ASPHALT CONCRETE STRUCTURAL COURSES

The following are the Traffic Levels for the Design Equivalent Single Axle Loads ($ESAL_D$) ranges for Superpave Asphalt Concrete Structural Courses

AASHTO DESIGN $ESAL_D$ RANGE (MILLION)	TRAFFIC LEVEL
< 0.3	A
0.3 to < 3	B
3 to < 10	C
10 to < 30	D
>= 30	E

5.6.6 LAYER THICKNESS

SPECIFICATION REQUIREMENTS ON LAYER THICKNESS FOR TYPE SP STRUCTURAL COURSES

The layer thickness must be consistent with the following thickness ranges:

FINE MIXES

Type Mix	Minimum	Maximum
SP-9.5	1"	1-½"
SP-12.5	1-½"	2-½"
SP-19.0	2"	3-½"

In addition to the minimum and maximum thickness requirements, the following restrictions are placed on the respective material when used as a structural course:

SP-9.5	Limited to the top two structural layers, two layers maximum.
SP-9.5	May not be used on Traffic Level D and E applications.
SP-19.0	May not be used in the final (top) structural layer below FC-5 mixtures. Type SP-19.0 mixtures are permissible in the layer directly below FC-9.5 and FC-12.5 mixtures.

All overbuild layers must be fine Type SP Asphalt Concrete designed at the traffic level as specified in the Contract Documents. On variable thickness overbuild layers, the minimum and maximum allowable thicknesses will be as specified below, unless called for differently in the Contract Documents.

Type SP-9.5	3/8 to 2-in
Type SP-12.5	1/2 to 3-in
Type SP-19.0	1½ to 3½ -in

Variable thickness overbuild layers constructed using a Type SP-9.5 or SP-12.5 mixtures may be tapered to zero thickness provided the Contract Documents require a minimum of 1-1/2 inches of dense-graded mix placed over the variable thickness overbuild layer.

Overbuild is further discussed in section 7.8.2.

Structural and Friction Courses are shown by thickness in plans, but bid as tonnage items. Bid quantities are estimated using maximum spread rate of 110 # = one square yard inch.

Actual spread rates to construct the plan thickness are determined by specification formula for the mix selected by the contractor.

When construction includes the paving of adjacent shoulders <= 5-ft wide, the traffic level and layer thickness for the upper structural pavement layer and

TABLE 7.1

REDUCED STRUCTURAL COEFFICIENTS OF ASPHALT MATERIALS PER INCH

Recommended Criteria (based on the Pavement Condition Survey ratings)

Good - No Cracking, minor rutting/distortion
Fair - Crack Rated 8 or higher, minor rutting and / or distortion
Poor - Cracking or Rutting rated 7 or less

Layer coefficients for granular base, subbase, and stabilizing are not reduced. Use the values shown in Table 5.4.

Layer	Original Design	Pavement Condition		
		Good	Fair	Poor
FC-2 or FC-5	0			
FC-1 or FC-4	0.20	0.17	0.15	0.12
FC-3	0.22	0.20	0.17	0.15
FC-6	0.44	0.34	0.25	0.15
FC-12.5 or FC-9.5	0.44	0.34	0.25	0.15
Type S or SP	0.44	0.34	0.25	0.15
Type I	0.37	0.30	0.23	0.15
Type II	0.20	0.17	0.15	0.12
Type III	0.30	0.25	0.20	0.15
Binder	0.30	0.25	0.20	0.15
ABC-1	0.20	0.17	0.14	0.10
ABC-2	0.25	0.20	0.16	0.12
ABC-3	0.30	0.25	0.20	0.15
Type B-12.5	0.30	0.25	0.20	0.15
SAHM	0.15	0.13	0.11	0.08
SBRM	0.15	0.13	0.11	0.08

TABLE A.4A

REQUIRED STRUCTURAL NUMBER (SN_R)
90% RELIABILITY (%R)
RESILIENT MODULUS (M_R) RANGE 4,000 PSI TO 18,000 PSI

RESILIENT MODULUS (M_R), (PSI x 1000)

$ESAL_D$	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
100,000	3.02	2.77	2.59	2.44	2.31	2.21	2.12	2.04	1.97	1.91	1.86	1.81	1.76	1.72	1.68
150,000	3.23	2.97	2.77	2.61	2.47	2.36	2.27	2.19	2.11	2.05	1.99	1.94	1.89	1.84	1.80
200,000	3.39	3.11	2.90	2.73	2.60	2.48	2.38	2.30	2.22	2.15	2.09	2.03	1.98	1.94	1.89
250,000	3.52	3.23	3.01	2.84	2.69	2.57	2.47	2.38	2.30	2.23	2.17	2.11	2.06	2.01	1.97
300,000	3.62	3.33	3.10	2.92	2.78	2.65	2.55	2.46	2.37	2.30	2.24	2.18	2.12	2.07	2.03
350,000	3.71	3.41	3.18	3.00	2.85	2.72	2.61	2.52	2.44	2.36	2.30	2.23	2.18	2.13	2.08
400,000	3.79	3.49	3.25	3.07	2.91	2.78	2.67	2.58	2.49	2.42	2.35	2.29	2.23	2.18	2.13
450,000	3.87	3.56	3.32	3.13	2.97	2.84	2.73	2.63	2.54	2.46	2.39	2.33	2.27	2.22	2.17
500,000	3.93	3.62	3.38	3.18	3.02	2.89	2.77	2.67	2.59	2.51	2.44	2.37	2.31	2.26	2.21
600,000	4.05	3.73	3.48	3.28	3.12	2.98	2.86	2.76	2.67	2.58	2.51	2.45	2.39	2.33	2.28
700,000	4.14	3.82	3.57	3.36	3.20	3.05	2.93	2.83	2.73	2.65	2.58	2.51	2.45	2.39	2.34
800,000	4.23	3.90	3.64	3.44	3.27	3.12	3.00	2.89	2.80	2.71	2.63	2.57	2.50	2.44	2.39
900,000	4.31	3.97	3.71	3.51	3.33	3.18	3.06	2.95	2.85	2.76	2.69	2.62	2.55	2.49	2.44
1,000,000	4.38	4.04	3.78	3.57	3.39	3.24	3.11	3.00	2.90	2.81	2.73	2.66	2.60	2.54	2.48
1,500,000	4.65	4.30	4.03	3.81	3.62	3.46	3.33	3.21	3.10	3.01	2.92	2.85	2.78	2.71	2.65
2,000,000	4.85	4.50	4.21	3.99	3.79	3.63	3.49	3.36	3.25	3.16	3.07	2.99	2.91	2.85	2.78
2,500,000	5.01	4.65	4.36	4.13	3.93	3.76	3.62	3.49	3.38	3.27	3.18	3.10	3.02	2.95	2.89
3,000,000	5.14	4.77	4.48	4.25	4.05	3.88	3.73	3.60	3.48	3.37	3.28	3.19	3.12	3.04	2.98
3,500,000	5.25	4.88	4.59	4.35	4.14	3.97	3.82	3.69	3.57	3.46	3.36	3.28	3.20	3.12	3.06
4,000,000	5.35	4.98	4.68	4.44	4.23	4.06	3.90	3.77	3.65	3.54	3.44	3.35	3.27	3.19	3.12
4,500,000	5.44	5.06	4.76	4.52	4.31	4.13	3.98	3.84	3.72	3.61	3.51	3.42	3.33	3.26	3.19
5,000,000	5.52	5.14	4.83	4.59	4.38	4.20	4.04	3.90	3.78	3.67	3.57	3.47	3.39	3.31	3.24
6,000,000	5.66	5.27	4.96	4.71	4.50	4.32	4.16	4.02	3.89	3.78	3.67	3.58	3.49	3.41	3.34
7,000,000	5.78	5.38	5.07	4.82	4.61	4.42	4.26	4.12	3.99	3.87	3.77	3.67	3.58	3.50	3.43
8,000,000	5.88	5.48	5.17	4.91	4.70	4.51	4.35	4.20	4.07	3.95	3.85	3.75	3.66	3.58	3.50
9,000,000	5.97	5.57	5.26	5.00	4.78	4.59	4.43	4.28	4.15	4.03	3.92	3.82	3.73	3.65	3.57
10,000,000	6.06	5.65	5.33	5.07	4.85	4.66	4.50	4.35	4.22	4.10	3.99	3.89	3.79	3.71	3.63
15,000,000	6.39	5.97	5.64	5.37	5.14	4.95	4.77	4.62	4.48	4.36	4.25	4.14	4.05	3.96	3.88
20,000,000	6.63	6.20	5.86	5.59	5.35	5.15	4.98	4.82	4.68	4.55	4.44	4.33	4.23	4.14	4.06
25,000,000	6.82	6.38	6.04	5.76	5.52	5.32	5.14	4.98	4.84	4.71	4.59	4.48	4.38	4.29	4.20
30,000,000	6.98	6.53	6.18	5.90	5.66	5.45	5.27	5.11	4.96	4.83	4.71	4.60	4.50	4.41	4.32
35,000,000	7.12	6.66	6.31	6.02	5.78	5.57	5.38	5.22	5.07	4.94	4.82	4.71	4.61	4.51	4.42
40,000,000	7.24	6.78	6.42	6.13	5.88	5.67	5.48	5.32	5.17	5.04	4.91	4.80	4.70	4.60	4.51
45,000,000	7.34	6.88	6.52	6.22	5.97	5.76	5.57	5.41	5.26	5.12	5.00	4.88	4.78	4.68	4.59
50,000,000	7.44	6.97	6.61	6.31	6.06	5.84	5.65	5.49	5.34	5.20	5.07	4.96	4.85	4.76	4.66
60,000,000	7.61	7.13	6.76	6.46	6.21	5.99	5.79	5.62	5.47	5.33	5.21	5.09	4.98	4.88	4.79
70,000,000	7.76	7.27	6.90	6.59	6.33	6.11	5.91	5.74	5.59	5.45	5.32	5.20	5.09	4.99	4.90
80,000,000	7.88	7.40	7.01	6.70	6.44	6.22	6.02	5.85	5.69	5.55	5.42	5.30	5.19	5.09	4.99
90,000,000	8.00	7.51	7.12	6.80	6.54	6.31	6.11	5.94	5.78	5.64	5.51	5.39	5.28	5.17	5.08
100,000,000	8.10	7.60	7.21	6.90	6.63	6.40	6.20	6.02	5.86	5.72	5.59	5.47	5.35	5.25	5.15

TABLE A.4B

REQUIRED STRUCTURAL NUMBER (SN_R)
90% RELIABILITY (%R)
RESILIENT MODULUS (M_R) RANGE 18,000 PSI TO 32,000 PSI

RESILIENT MODULUS (M_R), (PSI x 1000)

$ESAL_D$	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
100,000	1.68	1.64	1.61	1.57	1.54	1.51	1.49	1.46	1.44	1.41	1.39	1.37	1.35	1.33	1.31
150,000	1.80	1.76	1.73	1.69	1.66	1.63	1.60	1.57	1.55	1.52	1.50	1.48	1.46	1.44	1.42
200,000	1.89	1.85	1.81	1.78	1.75	1.71	1.68	1.66	1.63	1.61	1.58	1.56	1.54	1.51	1.49
250,000	1.97	1.92	1.89	1.85	1.81	1.78	1.75	1.72	1.70	1.67	1.65	1.62	1.60	1.58	1.56
300,000	2.03	1.99	1.95	1.91	1.87	1.84	1.81	1.78	1.75	1.72	1.70	1.67	1.65	1.63	1.61
350,000	2.08	2.04	2.00	1.96	1.92	1.89	1.86	1.83	1.80	1.77	1.75	1.72	1.70	1.67	1.65
400,000	2.13	2.08	2.04	2.00	1.97	1.93	1.90	1.87	1.84	1.81	1.79	1.76	1.74	1.71	1.69
450,000	2.17	2.13	2.08	2.04	2.01	1.97	1.94	1.91	1.88	1.85	1.82	1.80	1.77	1.75	1.73
500,000	2.21	2.16	2.12	2.08	2.04	2.01	1.97	1.94	1.91	1.88	1.86	1.83	1.81	1.78	1.76
600,000	2.28	2.23	2.19	2.15	2.11	2.07	2.04	2.00	1.97	1.94	1.92	1.89	1.86	1.84	1.82
700,000	2.34	2.29	2.24	2.20	2.16	2.13	2.09	2.06	2.03	2.00	1.97	1.94	1.91	1.89	1.87
800,000	2.39	2.34	2.30	2.25	2.21	2.17	2.14	2.10	2.07	2.04	2.01	1.99	1.96	1.93	1.91
900,000	2.44	2.39	2.34	2.30	2.26	2.22	2.18	2.15	2.11	2.08	2.05	2.03	2.00	1.97	1.95
1,000,000	2.48	2.43	2.38	2.34	2.30	2.26	2.22	2.18	2.15	2.12	2.09	2.06	2.03	2.01	1.98
1,500,000	2.65	2.60	2.55	2.50	2.46	2.41	2.38	2.34	2.30	2.27	2.24	2.21	2.18	2.15	2.12
2,000,000	2.78	2.73	2.67	2.62	2.58	2.53	2.49	2.45	2.42	2.38	2.35	2.32	2.29	2.26	2.23
2,500,000	2.89	2.83	2.77	2.72	2.67	2.63	2.59	2.55	2.51	2.47	2.44	2.40	2.37	2.34	2.31
3,000,000	2.98	2.92	2.86	2.81	2.76	2.71	2.67	2.62	2.58	2.55	2.51	2.48	2.45	2.42	2.39
3,500,000	3.06	2.99	2.93	2.88	2.83	2.78	2.73	2.69	2.65	2.61	2.58	2.54	2.51	2.48	2.45
4,000,000	3.12	3.06	3.00	2.94	2.89	2.84	2.80	2.75	2.71	2.67	2.63	2.60	2.57	2.53	2.50
4,500,000	3.19	3.12	3.06	3.00	2.95	2.90	2.85	2.81	2.76	2.72	2.69	2.65	2.62	2.58	2.55
5,000,000	3.24	3.17	3.11	3.05	3.00	2.95	2.90	2.86	2.81	2.77	2.73	2.70	2.66	2.63	2.60
6,000,000	3.34	3.27	3.21	3.15	3.09	3.04	2.99	2.94	2.90	2.86	2.82	2.78	2.74	2.71	2.68
7,000,000	3.43	3.36	3.29	3.23	3.17	3.12	3.07	3.02	2.98	2.93	2.89	2.85	2.82	2.78	2.75
8,000,000	3.50	3.43	3.36	3.30	3.24	3.19	3.14	3.09	3.04	3.00	2.96	2.92	2.88	2.84	2.81
9,000,000	3.57	3.50	3.43	3.37	3.31	3.25	3.20	3.15	3.10	3.06	3.01	2.97	2.94	2.90	2.86
10,000,000	3.63	3.56	3.49	3.43	3.37	3.31	3.25	3.20	3.16	3.11	3.07	3.03	2.99	2.95	2.91
15,000,000	3.88	3.80	3.73	3.66	3.60	3.54	3.48	3.43	3.37	3.33	3.28	3.24	3.20	3.16	3.12
20,000,000	4.06	3.98	3.90	3.83	3.77	3.71	3.65	3.59	3.54	3.49	3.44	3.39	3.35	3.31	3.27
25,000,000	4.20	4.12	4.04	3.97	3.90	3.84	3.78	3.72	3.67	3.62	3.57	3.52	3.48	3.43	3.39
30,000,000	4.32	4.24	4.16	4.09	4.02	3.95	3.89	3.83	3.78	3.73	3.67	3.63	3.58	3.54	3.49
35,000,000	4.42	4.34	4.26	4.19	4.12	4.05	3.99	3.93	3.87	3.82	3.77	3.72	3.67	3.63	3.58
40,000,000	4.51	4.43	4.35	4.27	4.20	4.14	4.07	4.01	3.96	3.90	3.85	3.80	3.75	3.71	3.66
45,000,000	4.59	4.51	4.43	4.35	4.28	4.21	4.15	4.09	4.03	3.97	3.92	3.87	3.82	3.78	3.73
50,000,000	4.66	4.58	4.50	4.42	4.35	4.28	4.22	4.15	4.10	4.04	3.99	3.94	3.89	3.84	3.80
60,000,000	4.79	4.70	4.62	4.54	4.47	4.40	4.34	4.27	4.21	4.16	4.10	4.05	4.00	3.95	3.91
70,000,000	4.90	4.81	4.73	4.65	4.58	4.51	4.44	4.38	4.32	4.26	4.20	4.15	4.10	4.05	4.00
80,000,000	4.99	4.90	4.82	4.74	4.67	4.60	4.53	4.46	4.40	4.35	4.29	4.24	4.19	4.14	4.09
90,000,000	5.08	4.99	4.90	4.82	4.75	4.68	4.61	4.54	4.48	4.42	4.37	4.31	4.26	4.21	4.16
100,000,000	5.15	5.06	4.98	4.90	4.82	4.75	4.68	4.62	4.55	4.49	4.44	4.38	4.33	4.28	4.23

TABLE A.7A

REQUIRED STRUCTURAL NUMBER (SN_R)
95% RELIABILITY (%R)
RESILIENT MODULUS (M_R) RANGE 4,000 PSI TO 18,000 PSI

RESILIENT MODULUS (M_R), (PSI x 1000)

$ESAL_D$	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
100,000	3.22	2.95	2.75	2.59	2.46	2.35	2.26	2.18	2.10	2.04	1.98	1.93	1.88	1.83	1.79
150,000	3.44	3.16	2.94	2.77	2.63	2.52	2.42	2.33	2.25	2.18	2.12	2.06	2.01	1.97	1.92
200,000	3.60	3.31	3.09	2.91	2.76	2.64	2.54	2.44	2.36	2.29	2.23	2.17	2.11	2.06	2.02
250,000	3.74	3.43	3.20	3.02	2.87	2.74	2.63	2.54	2.45	2.38	2.31	2.25	2.19	2.14	2.10
300,000	3.85	3.54	3.30	3.11	2.96	2.83	2.71	2.61	2.53	2.45	2.38	2.32	2.26	2.21	2.16
350,000	3.94	3.63	3.39	3.19	3.03	2.90	2.78	2.68	2.59	2.52	2.44	2.38	2.32	2.27	2.22
400,000	4.03	3.71	3.46	3.26	3.10	2.96	2.85	2.74	2.65	2.57	2.50	2.43	2.37	2.32	2.27
450,000	4.10	3.78	3.53	3.33	3.16	3.02	2.90	2.80	2.70	2.62	2.55	2.48	2.42	2.36	2.31
500,000	4.17	3.84	3.59	3.39	3.22	3.07	2.95	2.85	2.75	2.67	2.59	2.53	2.46	2.41	2.35
600,000	4.29	3.96	3.70	3.49	3.32	3.17	3.04	2.93	2.84	2.75	2.67	2.60	2.54	2.48	2.43
700,000	4.39	4.05	3.79	3.58	3.40	3.25	3.12	3.01	2.91	2.82	2.74	2.67	2.61	2.55	2.49
800,000	4.48	4.14	3.87	3.66	3.48	3.32	3.19	3.08	2.98	2.89	2.80	2.73	2.66	2.60	2.55
900,000	4.56	4.22	3.95	3.73	3.54	3.39	3.25	3.14	3.03	2.94	2.86	2.78	2.72	2.65	2.60
1,000,000	4.63	4.28	4.01	3.79	3.60	3.45	3.31	3.19	3.09	2.99	2.91	2.83	2.76	2.70	2.64
1,500,000	4.91	4.56	4.27	4.04	3.85	3.68	3.54	3.41	3.30	3.20	3.11	3.03	2.96	2.89	2.83
2,000,000	5.12	4.75	4.46	4.23	4.03	3.86	3.71	3.58	3.46	3.36	3.26	3.18	3.10	3.03	2.96
2,500,000	5.28	4.91	4.62	4.37	4.17	4.00	3.84	3.71	3.59	3.48	3.39	3.30	3.22	3.14	3.08
3,000,000	5.42	5.04	4.74	4.50	4.29	4.11	3.96	3.82	3.70	3.59	3.49	3.40	3.32	3.24	3.17
3,500,000	5.53	5.15	4.85	4.60	4.39	4.21	4.05	3.92	3.79	3.68	3.58	3.49	3.40	3.32	3.25
4,000,000	5.64	5.25	4.94	4.69	4.48	4.30	4.14	4.00	3.87	3.76	3.66	3.56	3.48	3.40	3.32
4,500,000	5.73	5.33	5.03	4.77	4.56	4.38	4.22	4.07	3.95	3.83	3.73	3.63	3.54	3.46	3.39
5,000,000	5.81	5.41	5.10	4.85	4.63	4.45	4.28	4.14	4.01	3.90	3.79	3.69	3.61	3.52	3.45
6,000,000	5.95	5.55	5.24	4.98	4.76	4.57	4.41	4.26	4.13	4.01	3.90	3.80	3.71	3.63	3.55
7,000,000	6.07	5.67	5.35	5.09	4.87	4.68	4.51	4.36	4.23	4.11	4.00	3.90	3.81	3.72	3.64
8,000,000	6.18	5.77	5.45	5.18	4.96	4.77	4.60	4.45	4.32	4.19	4.08	3.98	3.89	3.80	3.72
9,000,000	6.28	5.86	5.54	5.27	5.05	4.85	4.68	4.53	4.39	4.27	4.16	4.06	3.96	3.87	3.79
10,000,000	6.36	5.95	5.62	5.35	5.12	4.93	4.75	4.60	4.46	4.34	4.23	4.12	4.03	3.94	3.86
15,000,000	6.70	6.27	5.93	5.65	5.42	5.22	5.04	4.88	4.74	4.61	4.50	4.39	4.29	4.20	4.11
20,000,000	6.95	6.51	6.16	5.88	5.64	5.43	5.25	5.09	4.94	4.81	4.69	4.58	4.48	4.39	4.30
25,000,000	7.15	6.70	6.34	6.05	5.81	5.60	5.41	5.25	5.10	4.97	4.85	4.74	4.63	4.54	4.45
30,000,000	7.32	6.86	6.49	6.20	5.95	5.74	5.55	5.39	5.24	5.10	4.98	4.86	4.76	4.66	4.57
35,000,000	7.46	6.99	6.62	6.33	6.07	5.86	5.67	5.50	5.35	5.21	5.09	4.97	4.87	4.77	4.68
40,000,000	7.58	7.11	6.74	6.44	6.18	5.96	5.77	5.60	5.45	5.31	5.19	5.07	4.96	4.86	4.77
45,000,000	7.69	7.21	6.84	6.53	6.28	6.06	5.86	5.69	5.54	5.40	5.27	5.15	5.05	4.95	4.85
50,000,000	7.79	7.31	6.93	6.62	6.36	6.14	5.95	5.77	5.62	5.48	5.35	5.23	5.12	5.02	4.93
60,000,000	7.97	7.48	7.09	6.78	6.52	6.29	6.09	5.92	5.76	5.62	5.49	5.37	5.26	5.15	5.06
70,000,000	8.12	7.62	7.23	6.91	6.65	6.42	6.22	6.04	5.88	5.73	5.60	5.48	5.37	5.27	5.17
80,000,000	8.26	7.75	7.35	7.03	6.76	6.53	6.32	6.14	5.98	5.84	5.70	5.58	5.47	5.36	5.27
90,000,000	8.38	7.86	7.46	7.14	6.86	6.63	6.42	6.24	6.08	5.93	5.80	5.67	5.56	5.45	5.35
100,000,000	8.48	7.96	7.56	7.23	6.95	6.72	6.51	6.33	6.16	6.01	5.88	5.75	5.64	5.53	5.43

TABLE A.7B

REQUIRED STRUCTURAL NUMBER (SN_R)
95% RELIABILITY (%R)
RESILIENT MODULUS (M_R) RANGE 18,000 PSI TO 32,000 PSI

RESILIENT MODULUS (M_R), (PSI x 1000)

$ESAL_D$	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
100,000	1.79	1.75	1.72	1.68	1.65	1.62	1.59	1.57	1.54	1.52	1.49	1.47	1.45	1.43	1.41
150,000	1.92	1.88	1.84	1.81	1.77	1.74	1.71	1.68	1.66	1.63	1.61	1.58	1.56	1.54	1.52
200,000	2.02	1.98	1.94	1.90	1.86	1.83	1.80	1.77	1.74	1.72	1.69	1.67	1.64	1.62	1.60
250,000	2.10	2.05	2.01	1.97	1.94	1.90	1.87	1.84	1.81	1.78	1.76	1.73	1.71	1.69	1.66
300,000	2.16	2.12	2.07	2.03	2.00	1.96	1.93	1.90	1.87	1.84	1.81	1.79	1.76	1.74	1.72
350,000	2.22	2.17	2.13	2.09	2.05	2.01	1.98	1.95	1.92	1.89	1.86	1.84	1.81	1.79	1.77
400,000	2.27	2.22	2.18	2.14	2.10	2.06	2.03	1.99	1.96	1.93	1.91	1.88	1.86	1.83	1.81
450,000	2.31	2.26	2.22	2.18	2.14	2.10	2.07	2.03	2.00	1.97	1.95	1.92	1.89	1.87	1.84
500,000	2.35	2.30	2.26	2.22	2.18	2.14	2.10	2.07	2.04	2.01	1.98	1.95	1.93	1.90	1.88
600,000	2.43	2.38	2.33	2.29	2.24	2.21	2.17	2.14	2.10	2.07	2.04	2.02	1.99	1.96	1.94
700,000	2.49	2.44	2.39	2.35	2.30	2.26	2.23	2.19	2.16	2.13	2.10	2.07	2.04	2.01	1.99
800,000	2.55	2.49	2.44	2.40	2.36	2.32	2.28	2.24	2.21	2.18	2.14	2.12	2.09	2.06	2.04
900,000	2.60	2.54	2.49	2.45	2.40	2.36	2.32	2.29	2.25	2.22	2.19	2.16	2.13	2.10	2.08
1,000,000	2.64	2.59	2.54	2.49	2.44	2.40	2.36	2.33	2.29	2.26	2.23	2.20	2.17	2.14	2.11
1,500,000	2.83	2.77	2.71	2.66	2.62	2.57	2.53	2.49	2.45	2.42	2.38	2.35	2.32	2.29	2.26
2,000,000	2.96	2.90	2.85	2.79	2.74	2.70	2.65	2.61	2.57	2.54	2.50	2.47	2.43	2.40	2.37
2,500,000	3.08	3.01	2.95	2.90	2.85	2.80	2.75	2.71	2.67	2.63	2.59	2.56	2.53	2.49	2.46
3,000,000	3.17	3.10	3.04	2.99	2.93	2.88	2.84	2.79	2.75	2.71	2.67	2.64	2.60	2.57	2.54
3,500,000	3.25	3.19	3.12	3.06	3.01	2.96	2.91	2.87	2.82	2.78	2.74	2.71	2.67	2.64	2.61
4,000,000	3.32	3.26	3.19	3.13	3.08	3.03	2.98	2.93	2.89	2.84	2.80	2.77	2.73	2.70	2.66
4,500,000	3.39	3.32	3.26	3.20	3.14	3.09	3.04	2.99	2.94	2.90	2.86	2.82	2.79	2.75	2.72
5,000,000	3.45	3.38	3.31	3.25	3.19	3.14	3.09	3.04	3.00	2.95	2.91	2.87	2.83	2.80	2.76
6,000,000	3.55	3.48	3.41	3.35	3.29	3.24	3.18	3.13	3.09	3.04	3.00	2.96	2.92	2.88	2.85
7,000,000	3.64	3.57	3.50	3.44	3.38	3.32	3.27	3.21	3.17	3.12	3.08	3.04	3.00	2.96	2.92
8,000,000	3.72	3.65	3.58	3.51	3.45	3.39	3.34	3.29	3.24	3.19	3.15	3.10	3.06	3.03	2.99
9,000,000	3.79	3.72	3.65	3.58	3.52	3.46	3.40	3.35	3.30	3.25	3.21	3.17	3.12	3.09	3.05
10,000,000	3.86	3.78	3.71	3.64	3.58	3.52	3.46	3.41	3.36	3.31	3.27	3.22	3.18	3.14	3.10
15,000,000	4.11	4.03	3.96	3.89	3.82	3.76	3.70	3.64	3.59	3.54	3.49	3.44	3.40	3.36	3.32
20,000,000	4.30	4.22	4.14	4.07	4.00	3.94	3.87	3.82	3.76	3.71	3.66	3.61	3.56	3.52	3.48
25,000,000	4.45	4.36	4.29	4.21	4.14	4.08	4.01	3.95	3.90	3.84	3.79	3.74	3.70	3.65	3.61
30,000,000	4.57	4.49	4.41	4.33	4.26	4.19	4.13	4.07	4.01	3.96	3.90	3.85	3.81	3.76	3.71
35,000,000	4.68	4.59	4.51	4.43	4.36	4.29	4.23	4.17	4.11	4.05	4.00	3.95	3.90	3.85	3.81
40,000,000	4.77	4.68	4.60	4.52	4.45	4.38	4.32	4.25	4.20	4.14	4.08	4.03	3.98	3.94	3.89
45,000,000	4.85	4.76	4.68	4.60	4.53	4.46	4.39	4.33	4.27	4.21	4.16	4.11	4.06	4.01	3.96
50,000,000	4.93	4.84	4.75	4.68	4.60	4.53	4.47	4.40	4.34	4.28	4.23	4.18	4.12	4.08	4.03
60,000,000	5.06	4.97	4.88	4.80	4.73	4.66	4.59	4.52	4.46	4.40	4.35	4.29	4.24	4.19	4.15
70,000,000	5.17	5.08	4.99	4.91	4.84	4.76	4.69	4.63	4.57	4.51	4.45	4.40	4.34	4.29	4.25
80,000,000	5.27	5.17	5.09	5.01	4.93	4.86	4.79	4.72	4.66	4.60	4.54	4.49	4.43	4.38	4.33
90,000,000	5.35	5.26	5.17	5.09	5.01	4.94	4.87	4.80	4.74	4.68	4.62	4.57	4.51	4.46	4.41
100,000,000	5.43	5.34	5.25	5.17	5.09	5.02	4.94	4.88	4.81	4.75	4.69	4.64	4.58	4.53	4.48

CONCLUSION:

Note that the 14 year (2003) accumulated value is 3,997,200 ESALs (rounding $ESAL_D = 4,000,000$).

If the project was delayed one year, the new $ESAL_D$ would be:

4,329,400 - 244,300 = 4,085,100 ESALs

It is important to note that even though ESAL information is needed for only a 14 year period, additional ESAL information beyond that period is sometimes needed for project delays or increased design periods due to different rehabilitation strategies (i.e. resurfacing verses milling and resurfacing). This gives the designer flexibility in design and programming of this project.

APPENDIX E

Pavement Survey and Evaluation Report

DISTRICT I&VII MATERIALS

PAVEMENT SURVEY AND EVALUATION REPORT

FOR

STATE ROAD (SR) 78
LEE COUNTY

Financial Project Number 431317-1

Milepost (MP) 14.723 TO Milepost (MP) 17.015

FDOT

PAVEMENT SURVEY AND EVALUATION REPORT

FOR

STATE ROAD (SR) 78
LEE COUNTY

Financial Project Number 431317-1

MP 14.723 MP 17.015
SECTION # 12060
FROM US 41 TO NEW POST ROAD

April 10, 2014

PREPARED BY
TIMOTHY L. CROUSE
ASPHALT FIELD INVESTIGATION COORDINATOR
MARLENE HEBERT
PAVEMENT DESIGN AND PERFORMANCE COORDINATOR

PAVEMENT SURVEY AND EVALUATION REPORT
SR 78 FROM US 41 TO NEW POST ROAD

INTRODUCTION

This report represents an analysis of information collected during the above referenced pavement survey and evaluation. The 2.292 mile project, located in Lee County on SR 78, begins at US 41 and ends at New Post Road.

DESCRIPTION OF EXISTING TYPICAL SECTIONS

The typical section consists of four lane asphalt pavement roadway with curb and gutter shoulders.

CORING INFORMATION

8 cores were taken along the mainline, 8 cores were taken along the turn lanes and 2 cores were taken along the shoulders. The coring layout is illustrated in appendix 3.

The coring location and information was obtained according to Section 3.2 of the 2006 Flexible Pavement Coring and Evaluation of the Materials Manual-Bituminous Materials. The data for the individual core samples is included in Appendix 1 (Pavement Evaluation Core and Condition Data).

ROADWAY SURFACE CONDITION

The overall condition of this section is fair with light severity fatigue cracking. Cracking is the most serious distress identified during our pavement evaluation. The average asphalt depth in the travel lanes was 4.4 inches with minimum and maximum depths at 3.4 inches and 4.9 inches, respectively. The average asphalt depth in the shoulders was 3.4 inches with minimum and maximum depths at 2.3 inches and 4.5 inches, respectively.

The latest pavement condition survey shows the pavement cracking index to be as shown below.

Mile Post	Pavement Age	Crack	Ride	Rut
14.723 – 15.850	14	9	7.1	8.0
15.850 – 17.008	26	7.5	6.9	8.0
17.008 – 17.026	14	10	8	9

Cross slope measurements were taken in specific locations and should not be considered the actual cross slope typical of this roadway. Cross slopes in specific locations can be found in Appendix 1.

BASE CONDITION

The material encountered in the mainline and shoulders varied between limerock and asphalt base.

REHABILITATION RECOMMENDATIONS

To develop a pavement design for the project we recommend milling the pavement as follows:

MAINLINE

- Mill 3.00" from the entire width and length of the existing asphalt pavement.

SHOULDERS, TURN LANES AND CROSSOVERS

- Mill 1.50" from the existing paved shoulders.

Cracks measured range from 0.4" to 4.9" the recommended milling depth is considered the minimum needed to remove majority of the cracks.

We recommend utilizing overbuild to correct the existing cross slope if it is necessary. Do not use milling to achieve desired cross slope. It is the intent of this office to mill for the entire width and length of the project.

Appendix 2 provides a detail of the assumed pavement design used to develop the milling recommendation.

COMMENTS AND GENERAL NOTES

In addition to the recommendations made within this report, the following items should be considered when preparing the contract documents for the subject project:

Notes to the Designer

1. We recommend that all asphalt overlaying the existing curb and gutter be removed.

2. Due to the allowable construction tolerances specified in Section 327-4 of the Specifications and the frequency in which the preliminary pavement cores were taken, isolated areas of the base may be exposed.

3. Milling may need to be adjusted at the beginning and end of the project, side streets, bridge deck, approach slabs or areas in which constraints dictate. Appropriate plan details need to be illustrated in the plans in accordance with the Plans Preparation Manual (PPM).

Pay Item/Typical Section/General Notes

1. Existing asphalt and base that conflicts with the construction of widening or shoulders shall be removed.

2. The contractor should anticipate that a majority of the base could be exposed during the milling operation and shall require a prime cover prior to paving.

If this report is not used within three years, please contact this office.

Our identification of the differing pavement layers is based on visual classification as well as familiarity with the site. The actual classification may be different because of differential in asphalt mixes and how the roadway was previously constructed. The information in this report is based on the conditions found at the time of our investigation. The engineer shall notify us if the type of work proposed for the project changes and/or existing conditions change prior to the letting of the project. This report is based on the fact the project will be designed and constructed in accordance with the Standard Specifications, Roadway Design Standard Index, Flexible Pavement Design Manual and other available information unless stated otherwise within this report.
Please contact this office if additional service or have any questions regarding this report.

4-10-14

Robert D Lopes, P.E. 68427
District Bituminous Engineer

EAST BOUND

WEST BOUND


03 20 2014 12:26


03 20 2014 12:26


03 20 2014 12:26


03 20 2014 12:27


03 20 2014 12:27


03 20 2014 12:28


03 20 2014 12:28


03 20 2014 12:31

APPENDIX

1. **Pavement Evaluation Core and Condition Data**

2. **Assumed Pavement Design Used To Determine Milling Depths**

3. **Pavement Coring Layout**

4. **Asphalt Survey Request**

5. **Project Location Map**

APPENDIX 1

Pavement Evaluation Core and Condition Data

FLORIDA DEPARTMENT OF TRANSPORTATION
PAVEMENT CORING REPORTING

PAVEMENT EVALUATION CORING AND CONDITION DATA

FIN PROJ: 431317-1-31-01
TYP SECT: 01

FA PROJ:
COUNTY: LEE
SR NUMBER: SR 78

MEDIAN: 02 RAISED TRAFFIC SEPARATOR
CURBED: YES

NAME: PINE ISLAND RD
FROM: US 41
TO: NEW POST RD

BEG MP: 14.72
END MP: 17.01 LENGTH: 2.29

PROJECT MEASUREMENT: ENGLISH

CORED BY: TIM CROUSE
DATE: 2014-04-02
LANES: 4 @ 12 FEET

SHOULDER TYPE
INSIDE: 6 CURB&
OUTSIDE: 6 CURB&
CURB & GUTTER: YES

FLORIDA DEPARTMENT OF TRANSPORTATION
PAVEMENT CORING REPORTING

PAVEMENT EVALUATION CORING AND CONDITION DATA

CORE NO.	MILE POST	VFY	LN	W P	--TOP	-------	PAVEMENT LAYER ------				CORE LNGTH	BASE	SUB	----- DEPTH	CRACK TYP	CRACK CLSS	CRACK EXT	PMT CND	RUT DPTH	CROSS SLOPE	COMMENTS
					FC2	S						ABC	STAB								
1	15.213	N	R1	Y	.60	4.00					4.60	6.8	12.0	1.00	C	IB	L	F	.20	1.90	
2	15.715	N	R2	Y	.40	3.00					3.40	6.8	12.0	.40	C	IB	L	F	.20	1.90	
					FC4	S						LR	STAB								
3	16.368	N	R1	N	.50	4.20					4.70	12.0	12.0	4.70	C	IB	S	P	.20	1.90	
4	16.965	N	R2	N	1.50	3.00					4.50	12.0	12.0					F	.20	1.90	
					FC2	S						ABC	STAB								
5	15.300	N	L1	Y	.20	3.80					4.00	6.0	12.0	2.30	C	IB	L	F	.20	1.90	
6	15.533	N	L2	Y	.50	4.00					4.50	6.0	12.0	1.50	C	IB	L	F	.20	1.90	
					FC4	S						LR	STAB								
7	16.100	N	L1	N	.50	4.40					4.90	12.0	12.0	4.90	C	IB	M	F	.20	1.90	
8	16.897	N	L2	N	.40	4.20					4.60	12.0	12.0	2.80	C	IB	M	F	.20	1.90	
					FC2	S						ABC	STAB								
9	14.926	N	R2	N	.80	3.00					3.80	7.8	12.0		C	IB	L	F			RT TURN
10	15.700	N	OR	N	.30	2.00					2.30	2.8	12.0					F			
					FC4	S						LR	STAB								
11	16.013	N	R2	N	.40	2.70					3.10	12.0	12.0		C	IB	L	F			MERGE
12	16.328	N	R2	N	.90	3.90					4.80	12.0	12.0	3.00	C	IB	L	F			RT TURN
13	16.897	N	OL	N	.70	3.80					4.50	12.0	12.0					F			
					FC2	S						ABC	STAB								
14	15.213	N	R1	N	.70	4.00					4.70	6.5	12.0	2.50	C	IB	L	F			LT TURN
15	15.704	N	R1	N	.60	4.00					4.60	7.2	12.0	.60	C	IB	L	F			LT TURN
					FC4	S						LR	STAB								
16	16.368	N	R1	N	1.70	3.00					4.70	12.0	12.0		C	IB	L	F			LT TURN
17	16.739	N	C	N	.70	4.10					4.80	12.0	12.0					F			CENTER TURN
					FC2	S						ABC	STAB								
18	15.300	N	L1	N	.90	3.30					4.20	6.5	12.0	.90	C	IB	L	F			LT TURN

CODE DESCRIPTIONS

CRACK TYPE	TYPE DESCRIPTION
A	ALLIGATORING IN WHEELPATH
B	BLOCK CRACKING
C	COMBINATION OF TYPES

CRACK EXTNT	EXTENT DESCRIPTION
L	LIGHT
M	MEDIUM
S	SEVERE

CRACK CLASS	CLASS DESCRIPTION
IB	UNKNOWN
II	UNKNOWN
III	UNKNOWN

CODE DESCRIPTIONS

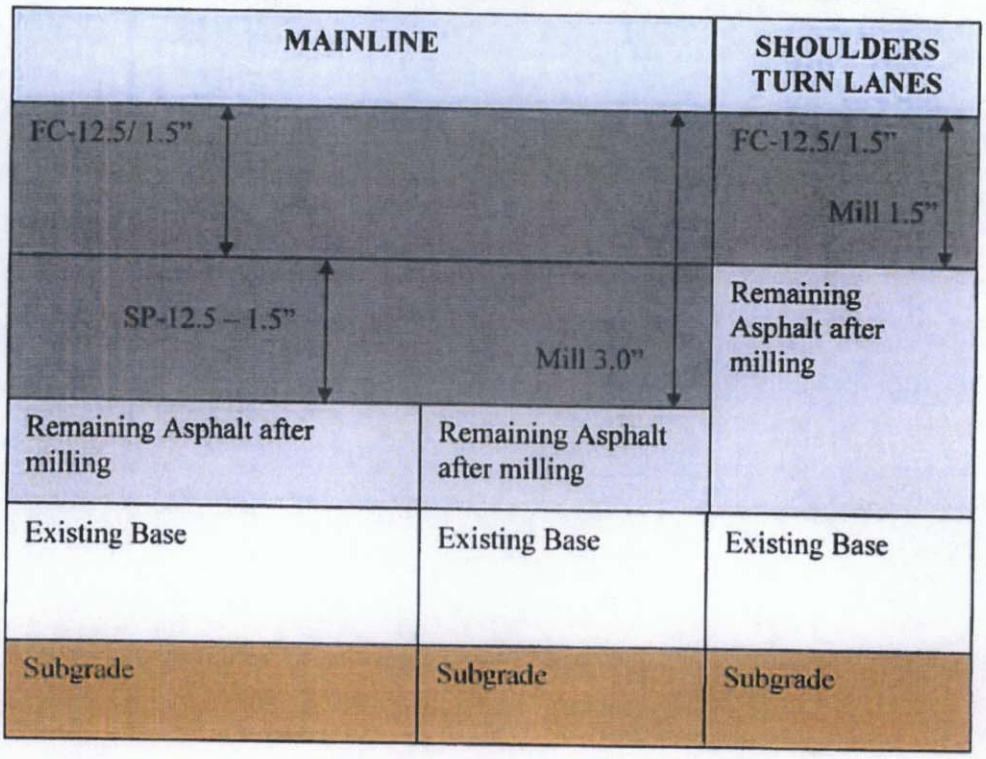
SURFACE LAYER CODE	DESCRIPTION
ARMI	ASPHALT RUBBER MEMBRANE INTERL
BIND	ASPHALT BINDER COURSE
BRCK	BRICK PAVERS
CONC	PORTLAND CEMENT CONCRETE
CRL	CRACK RELIEF LAYER
FAB	PAVEMENT OVERLAY FABRIC
FC	FRICTION COURSE
FC1	FRICTION COURSE 1
FC2	FRICTION COURSE 2
FC3	FRICTION COURSE 3
FC4	FRICTION COURSE 4
FC5	FRICTION COURSE 5
FC5B	FRICTION COURSE 5 BONDED
FC6	FRICTION COURSE 6
F12M	FRIC. COURSE 12.5 MODIFIED
F125	FRICTION COURSE 12.5
F95	FRICTION COURSE 9.5
F95M	FRIC. COURSE 9.5 MODIFIED
S	TYPE S ASPHALTIC CONCRETE
SAHM	SAND ASPHALT HOT MIX
SP1C	9.5 SUPERPAVE COARSE GRADED
SP1F	9.5 SUPERPAVE FINE GRADED
SP2C	12.5 SUPERPAVE COARSE GRADED
SP2F	12.5 SUPERPAVE FINE GRADED
SP3C	19.0 SUPERPAVE COARSE GRADED
SP3F	19.0 SUPERPAVE FINE GRADED
ST	SURFACE TREATMENT
S1	TYPE S-I ASPHALTIC CONCRETE
S2	TYPE S-II ASPHALTIC CONCRETE
S3	TYPE S-III ASPHALTIC CONCRETE
T1	TYPE I ASPHALTIC CONCRETE
T2	TYPE II ASPHALTIC CONCRETE
T3	TYPE III ASPHALTIC CONCRETE
UNIM	UNIMPROVED SURFACE
UNKW	UNKNOWN
WC	WEARING COURSE
WC1	WEARING COURSE 1
WC2	WEARING COURSE 2
WC3	WEARING COURSE 3
WC4	WEARING COURSE 4
WC5	WEARING COURSE 5
WC6	WEARING COURSE 6
WC7	WEARING COURSE 7
WC8	WEARING COURSE 8

APPENDIX 2

Assumed Pavement Design Used To Determine Milling Depths

Assumed Pavement Design Used To Determine Milling Depths

Design Sketch Not Drawn To Scale



Note:

- **Structural requirements were not calculated in this design.**
- **In the event that the depicted pavement design will not be adequate based on structural calculations, overbuild thickness should be adjusted to meet the required structural number and/or other constructability purposes. If modification to the milling depth will be necessary to meet the required structural number contact this office for a revised recommendation.**

APPENDIX 3

Section Map & Coring Layout

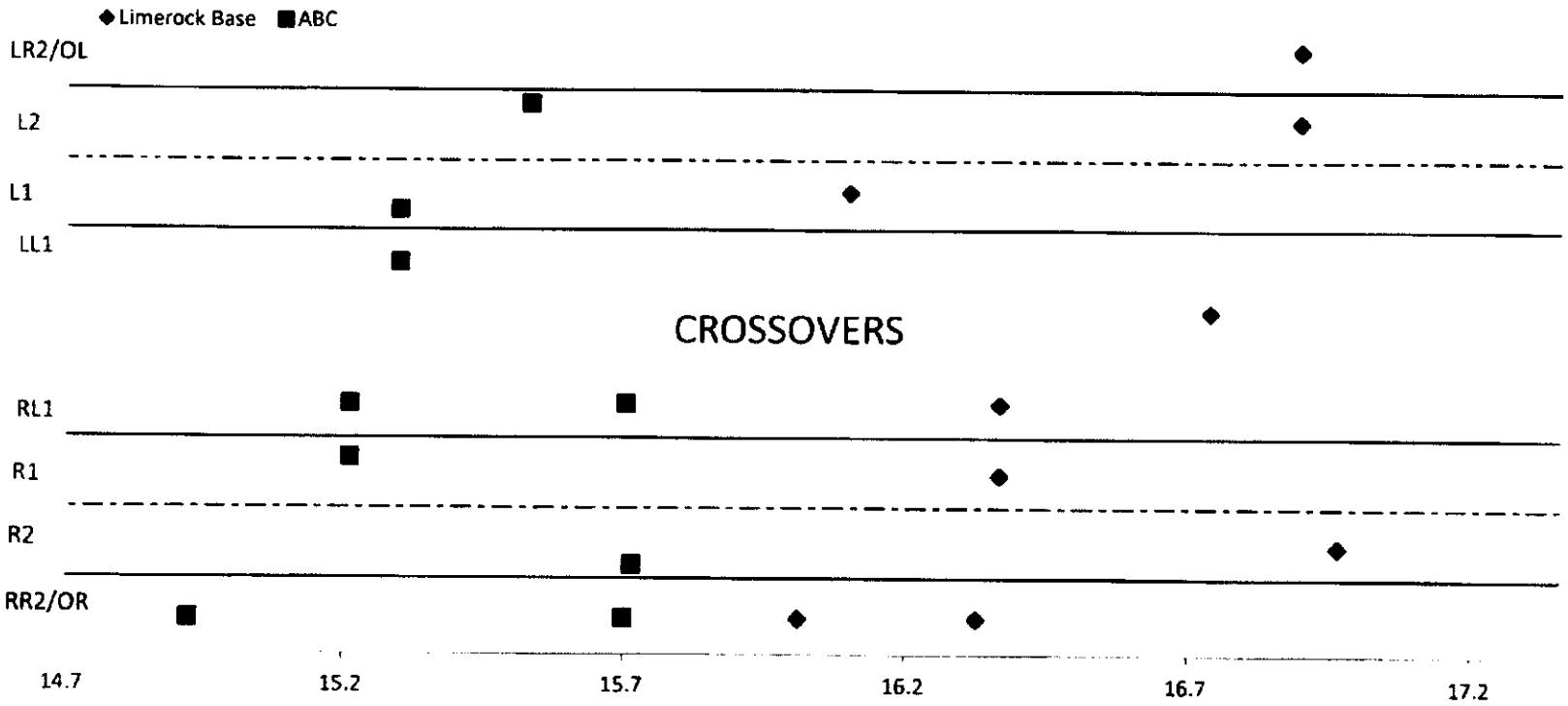
431317-1 SR 78 LEE COUNTY

MAINLINE							TOTAL ASPHALT THICKNESS	SUB-BASE			
CORE	MP	LANE	W/P	FC-2	FC4	S		LR	ABC	STAB	COMMENTS
1	15.213	R1	Y	0.6		4	4.6		6.8	12	
2	15.715	R2	Y	0.4		3	3.4		6.8	12	
3	16.368	R1	N		0.5	4.2	4.7	12		12	
4	16.965	R2	N		1.5	3	4.5	12		12	
5	15.3	L1	Y	0.2		3.8	4		6	12	
6	15.533	L2	Y	0.5		4	4.5		6	12	
7	16.1	L1	N		0.5	4.4	4.9	12		12	
8	16.897	L2	N		0.4	4.2	4.6	12		12	
AVG				0.425	0.725	3.825	4.400	12.000	6.400	12.000	

TURN LANES / CROSSOVERS							TOTAL ASPHALT THICKNESS	SUB-BASE			
CORE	MP	LANE	W/P	FC-2	FC4	S		LR	ABC	STAB	COMMENTS
9	14.926	RR2	N	0.8		3	3.8		7.8	12	
11	16.013	RR2	N		0.4	2.7	3.1	12		12	
12	16.328	RR2	N		0.9	3.9	4.8	12		12	
14	15.213	RL1	N	0.7		4	4.7		6.5	12	
15	15.704	RL1	N	0.6		4	4.6		7.2	12	
16	16.368	RL1	N		1.7	3	4.7	12		12	
17	16.739	C	N		0.7	4.1	4.8	12		12	
18	15.3	LL1	N	0.9		3.3	4.2		6.5	12	
AVG				0.750	0.925	3.500	4.338	12.000	7.000	12.000	

SHOULDERS							TOTAL ASPHALT THICKNESS	SUB-BASE			
CORE	MP	LANE	W/P	FC-2	FC4	S		LR	ABC	STAB	COMMENTS
10	15.7	OR	N	0.3		2	2.3		2.8	12	
13	16.897	OL	N		0.7	3.8	4.5	12		12	
AVG.				0.300	0.700	2.900	3.400	12.000	2.800	12.000	

PAVEMENT CORING LAYOUT



APPENDIX 4

Pavement Survey Request

Florida Department of Transportation

RICK SCOTT
GOVERNOR

ANANTH PRASAD
SECRETARY

MEMORANDUM

Date: **February 10, 2014**

To **Marlene Hebert, District Materials (MS 1-9)**

From: **Chris Zeigler, Project Manager**

Copies: **File**

Subject: **REQUEST FOR ASPHALT SURVEY**
FM No.: **431317-1-52-01**
State Project No.: **SR 78**
County/Section: **Lee/12060**
Description: **Mill and Resurfacing**
Begin MP **14.723** End MP **17.015**

BACKGROUND INFORMATION: Skid Hazard **RRR** Intersection Safety
(Shoulder/Widening)
Scope of Project: **Mill and Resurface**

Review of Project by Project Manager: _____

Typical Section: *Urban and Rural* *Spec Year: 2013* *Friction Course Type:* *FC-4*

Traffic Data: *ESAL 6,000,000* *(M_R) 18,000* *Traffic Level: A B C D*

Cracking: *Longitudinal* *Horizontal* *Alligator*

Pavement Condition: *Rutting* *Cracking* *Shoving* *Spalling*

Change in Pavement: *Sections with noticeable change Mile Post/Lane* _____
Major patches/repairs to Roadway Mile Post/Lane _____
Pavement Depressions Mile Post/Lane _____

Structures: *Bridges* *Manholes* *Tractor Crossings* *Cross Drain*

Areas of Concern: *Additional cores should be taken at:* _____

These attached items are for your information in obtaining the necessary asphalt data needed for our preparation of the pavement design package:
Location Map X Plan and Profile Sheet___ Proposed Typical Sections___ Old Pavement Typical _____

Is this a "Goes With" project? If so, Lead Project Number _____

In your signed and sealed report please provide the types of asphalt and their thicknesses, the type of base and thickness, the type of stabilization and thickness, the condition of the roadway surface, and a milling recommendation.

Charge to Financial Project ID 431317-1 for all preliminary engineering work performed on this project.
In order to keep our project on schedule, we are requesting a return date of **April 8, 2014**

If you have any questions, please contact me at 863-519-2253

APPENDIX 5

Project Location Map

PROJECT LOCATION MAP

FLORIDA DEPARTMENT OF TRANSPORTATION

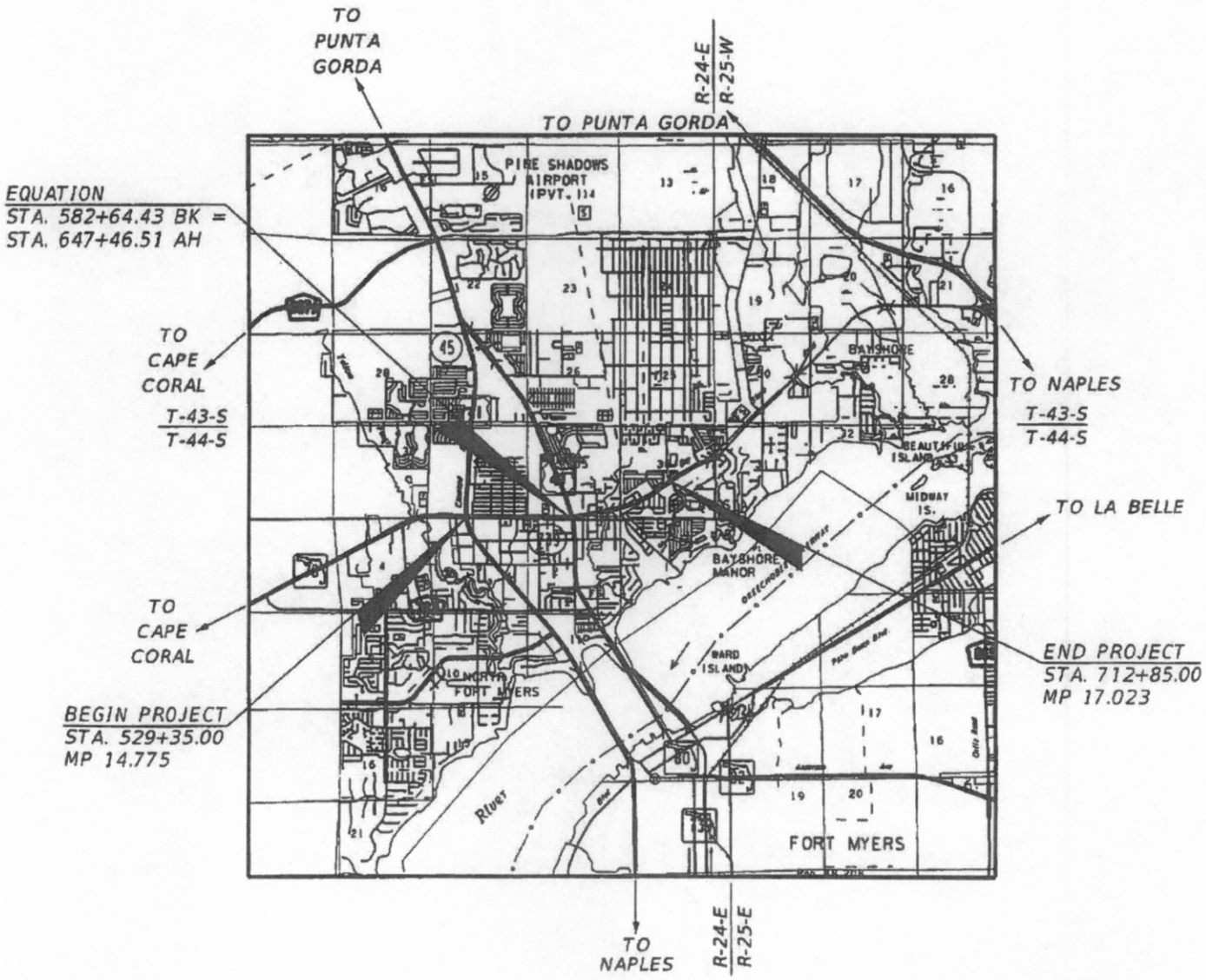
FINANCIAL PROJECT ID: 431317-1-52-01

SR 78

FROM US 41/SR 45 to NEW POST ROAD

SECTION 12060

LEE COUNTY



APPENDIX F

Correspondence for Revised Design Criteria

Ponce, Eduardo A

From: Uwaibi, Emmanuel
Sent: Thursday, July 16, 2015 8:41 AM
To: Ponce, Eduardo A; Musselman, Jim; Sholar, Greg
Cc: Taylor, Rhonda; Choubane, Bouzid; Nazef, Abdenour
Subject: RE: Seeking recommendation and approval for use of SP 4.75 //FPID 431317-1 // SR 78 from US 41 to New Post Road // Lee County

Ed,

Rhonda is out this week, but we do support your effort to use the SP-4.75 crack relief layer. Please coordinate with Jim Musselman or Greg Sholar at SMO for specific recommendations for use of this material on this project.

Thanks
Emmanuel Uwaibi, P.E
Pavement Design Engineer
850-414-4372

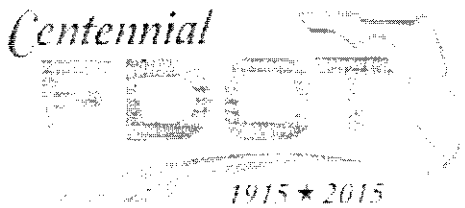
From: Ponce, Eduardo A
Sent: Monday, July 13, 2015 5:39 PM
To: Taylor, Rhonda; Uwaibi, Emmanuel
Cc: Zeigler, Chris; Ellis, Scott; Hebert, Marlene; Blair, Amy
Subject: Seeking recommendation and approval for use of SP 4.75 //FPID 431317-1 // SR 78 from US 41 to New Post Road // Lee County

Rhonda/Manny – D1 is working on a resurfacing project as noted above and a request has been made for use of SP-4.75 crack relief layer. What are your recommendations/guidance and what might be needed to seek approval of its use?

The consultant is in the process of revising the pavement design package for resubmittal to the District. Once the package is complete, it can be provided to your office for review. Please advise.

Thank you,
Ed

Eduardo (Ed) Ponce, PE
District Roadway Design Engineer
FDOT District One
Phone: (863) 519-2281
Cell: (863) 280-0250
Fax: (863) 519-2892
eduardo.ponce@dot.state.fl.us



Frank, Christopher D

From: Zeigler, Chris <Chris.Zeigler@dot.state.fl.us>
Sent: Tuesday, June 09, 2015 11:26 AM
To: Frank, Christopher D
Cc: Umlauf, William FC; Ellis, Scott; Peronto, Mark
Subject: Re: SR 78 Pavement Design/ FC-5 Mill Depths

Looks good to me.

Thanks,

Chris

Sent using OWA for iPhone

From: Frank, Christopher D <Christopher.Frank@mbakerintl.com>
Sent: Tuesday, June 9, 2015 10:18:20 AM
To: Zeigler, Chris
Cc: Umlauf, William FC; Ellis, Scott; Peronto, Mark
Subject: RE: SR 78 Pavement Design/ FC-5 Mill Depths

Good morning Chris,

As you are aware we received further communication and recommendations from the materials office regarding the milling/resurfacing operations on this project. We recommend the following pavement designs, and would like to know if you concur:

Urban section (utilizing 16 year design period, 90% R, 8M ESALs) SNr = 3.50:

- Mainline & Turn Lanes: Mill 3.00", Resurface with 1.50" SP Traffic Level C, 1.50" FC-12.5: SN provided = 3.59

- Shoulder: Mill 1.50", Resurface with 1.50" SP Traffic Level C, 1.50" FC-12.5

Rural section (utilizing 20 year design period, 95% R, 10M ESALs) SNr = 3.86:

- Mainline & Turn Lanes: Mill 3.50", Resurface with ¾" SP 4.75 (crack relief), 2.00" SP Traffic Level D, ¾" FC-5: SN provided = 4.62
- Shoulder: Mill 2.75", Resurface with 2.00" SP Traffic Level D, ¾" FC-5

The ¾" SP 4.75 is a crack relief pavement mix being utilized successfully in other states and central office has been looking for candidate projects to test its performance. The rural section of this project has some severe cracking to the base, but the pavement is otherwise in Fair condition and therefore structural number requirements are easily met making it a good candidate to test this crack relief mix. Use of this material will require using its developmental specs (330-475, 334-475, and possibly 337-475).

Considering the original pavement design (Urban: 4.50" Milling/Resurfacing, Rural: 3.00" Milling/Resurfacing) we are showing a savings of 1.50" in the Urban section while increasing the Rural section by 0.50" on the mainline and 1.00" on the shoulder. I have not put together a cost comparison by linear foot, but both sections are approximately 1.0 mile long so, overall, project savings are anticipated.

I have spoken with the materials office last week and this morning about these recommendations and they agree with this methodology. Please let me know if you concur and we will finalize the pavement design this week.

Thanks,
Chris
Christopher D Frank | Sr. Roadway Engineer | Michael Baker International
615 Crescent Executive Court | Lake Mary, FL, 32746 | [O] 407-562-4112 | [M] 407-766-3191
Christopher.Frank@mbakerintl.com | www.mbakerintl.com

Michael Baker
INTERNATIONAL

From: Umlauf, William FC
Sent: Monday, June 08, 2015 11:49 AM
To: Frank, Christopher D
Subject: FW: SR 78 Pavement Design/ FC-5 Mill Depths

William F.C. Umlauf, P.E. I Project Manager I Michael Baker Jr., Inc.
615 Crescent Executive Court, Suite 200 I Lake Mary, FL 32746
407-562-4200 (office) I 407-562-4126 (direct) I 407-212-0692 (cell)
wfcumlauf@mbakerintl.com I www.mbakerintl.com

Michael Baker
INTERNATIONAL

75 YEARS

We Make a Difference

From: Zeigler, Chris [mailto:]
Sent: Monday, June 08, 2015 9:00 AM
To: Umlauf, William FC
Subject: FW: SR 78 Pavement Design/ FC-5 Mill Depths

FYI

Christopher M. Zeigler, CPM, TOPS
Project Manager
Florida Department of Transportation - District 1
Project Management
801 N. Broadway Avenue
Bartow, FL 33830
Office - 863-519-2253
Fax – 863-519-2892
chris.zeigler@dot.state.fl.us

From: Ellis, Scott
Sent: Friday, June 05, 2015 4:48 PM
To: Zeigler, Chris
Cc: Peronto, Mark
Subject: SR 78 Pavement Design/ FC-5 Mill Depths

Chris,

Mark Peronto asked me to look into the pavement design for SR 78. I quickly typed up the following explanation (2 pages) of where I think that the report went wrong on the recommended mill depths with the FC-5 sections, and gave some options for mill depths. I sent this to Chris Frank and I also called him just now to explain everything.

If you need anything further, let me know. Have a good weekend.

Sincerely,

Scott M. Ellis, E.I.
Pavement Manager
FDOT District One and Seven
Bartow, Fl 33831-1249
Phone (863)519-4221
Scott.Ellis@dot.state.fl.us

Frank, Christopher D

From: Ellis, Scott <Scott.Ellis@dot.state.fl.us>
Sent: Friday, June 05, 2015 4:27 PM
To: Frank, Christopher D
Subject: 431317
Attachments: 431317 FC-5 Milling Rec.docx

Chris,

See attached.

Scott M. Ellis, E.I.
Pavement Manager
FDOT District One and Seven
Bartow, Fl 33831-1249
Phone (863)519-4221
Scott.Ellis@dot.state.fl.us

From: Ellis, Scott
Sent: Friday, June 05, 2015 4:06 PM
To: 'christopher.frank@mbakerintl.com'
Subject: video log

http://webapp01.dot.state.fl.us/videolog/default.asp

Scott M. Ellis, E.I.
Pavement Manager
FDOT District One and Seven
Bartow, Fl 33831-1249
Phone (863)519-4221
Scott.Ellis@dot.state.fl.us

The recommendation for 431317-1 included one mill depth of 3.0 in with a recommended put back of 2 lifts of SP 12.5. Design has contacted us about the fact that the project should have FC-5 on parts of the project.

Oddly enough, the project previously had open graded material on areas that should be zoned for dense graded asphalt (Multi-Lane Curb and Gutter, 40 mph posted speed, design speed 45. This is approximately MP 14.723 to MP 15.64).

The project also had dense graded material on areas that should be zoned for open grade (Multi-Lane paved shoulder, 50 mph posted speed, design speed 55 mph. This is approximately MP 16.2 to MP 10.015)

There was one gray area where I am unsure what the intended design speed moving forward is. This area currently has dense graded material but it is in an area with the paved shoulder typical section and it has a posted speed of 40 mph. This is at approximately MP 15.64 to 16.2.

What I think happened with the preliminary engineering report that went out in April 2014 is one of two possibilities:

1. Our coring crew went out and cored the open-graded areas and noticed that the posted speed was 40 mph, so they recommended changing the friction course to dense graded. They then saw the pavement change where they obtained cores that had dense graded friction, and there were a few posted speed limit signs of 40 mph, so they assumed it would all get dense graded as well. They then might have missed the 50 mph posted speed limit sign for the last 0.8 miles of the job.
2. Sometimes when we make recommendations we catch the speed limit differences and ask the designer what they prefer us to recommend if it is only a small area of the job. If the speed limit is borderline and less than 1 mile, sometimes they us to recommend dense graded for the entire project limits. This would be hard to confirm because Marlene is not here today and it would likely be in her emails if this were the case.

In either case, we are now faced with changing the mill recommendation for the areas that we intend to put FC-5. We usually average the crack depths and recommend a mill depth that removes at least 90% of the average. If we cannot meet this, we are required to put in a crack relief measure. In the original report, the open graded areas had shallow cracking, and the dense graded cracking had deep cracks. When averaged out, 3.00" was more than sufficient to remove the cracks. If we want to focus on the fact that the latter half of the project has significantly deeper cracks, we can average them separately to ensure a longer lasting design. However, where the FC-5 will start is important to denote as it determines where the existing cracks average into.

Here is where it gets tricky: If the intent of the design is to use FC-5 from where the first 50 mph sign starts, a 3.25 in. mill would remove 90% of the cracks. If the intent is to start the FC-5 where the paved shoulders start, then 3.75 in. mill would remove 90% of the cracks. This is mainly due to the fact that a 4.9 in. crack would fall into two different areas depending on which it lands under, which is just a little bit of "crack gerrymandering." At the end of the day, I think a 3.75 in. mill would be better in general but if we are tight on money we could recommend a 3.25 in. mill for the FC-5 areas, and be able to get away with it.

Please keep in mind that even though the first mile of the project has shallow cracks, we would still recommend a mill depth of 3 in. in this area. This in mainly due to the fact that the crack mechanism in this area is top down cracking, and between the time this report was finished and by the time the job hits construction, the crack depths are likely to get deeper due to water penetration and asphalt binder stripping.

	Cracks by Friction Course Type			Cracks by Posted Speed		
	All Cracks (in.)	Open Graded Cracks (in.)	Dense Graded Cracks (in.)	All Cracks (in.)	40 MPH Zone Cracks (in.)	50 MPH Zone Cracks (in.)
	1	1	4.7	1	1	4.7
	0.4	0.4	4.9	0.4	0.4	2.8
	4.7	2.3	2.8	4.7	2.3	3
	2.3	1.5	3	2.3	1.5	
	1.5	2.5		1.5	2.5	
	4.9	0.6		4.9	0.6	
	2.8	0.9		2.8	0.9	
	3			3	4.9	
	2.5			2.5		
	0.6			0.6		
	0.9			0.9		
Average	2.236363636	1.314285714	3.85	2.236363636	1.7625	3.5
90% of Avg	2.012727273	1.182857143	3.465	2.012727273	1.58625	3.15

Recommendations:

My preferred option is to mill 3.75 in. in the FC-5 areas, with two lifts of SP 1.5 (total 3 in.), and one lift of FC (0.75 in.). This option would be superior but more costly. My second choice option, is to mill 3.25 in., which should still take out a good amount of the cracks and we could justify it.

We also have one other option, and that would be if we would like to keep the 3.00 in. mill for the FC-5 area and use a 0.75 in. SP 4.75 mix in the bottom layer. State Materials Office and Central Office (both Greg Sholar and Rhonda Taylor) has been looking for projects where they could use this mix as a crack relief layer, as it has worked in other states. This would keep the constant mill depth of 3.00" and may save money compared to the 3.75" mill, while still preventing cracks (but might not save much money compared to the 3.25" mill). This option would require coordination with SMO to try this out, as 4.75mm mixes are a developmental specification.

Frank, Christopher D

From: Zeigler, Chris <Chris.Zeigler@dot.state.fl.us>
Sent: Friday, August 07, 2015 3:17 PM
To: Umlauf, William FC
Cc: Frank, Christopher D
Subject: FW: 43131715201, SR 78, Lee County, Developmental Specifications
Attachments: Dev337 July 2015 with 4.75 mix requirements.doc; Dev330 July 2015 with 4.75 mix requirements.doc; Dev334 July 2015 with 4.75 mix requirements.doc

Bill,

Attached are the approved developmental specifications for the crack relief layer.

Thanks,

Christopher M. Zeigler, CPM, TOPS
Project Manager
Florida Department of Transportation - District 1
Project Management
801 N. Broadway Avenue
Bartow, FL 33830
Office - 863-519-2253
Fax – 863-519-2892
chris.zeigler@dot.state.fl.us

From: Jackson, Fern
Sent: Friday, August 07, 2015 3:13 PM
To: Zeigler, Chris
Cc: Loeser, Benjamin; Grimes, Melissa
Subject: 43131715201, SR 78, Lee County, Developmental Specifications

Chris,

Please see attached the approved Developmental Specifications for inclusion to the specifications package.

Let me know if you have any questions.

Fern Jackson

Fern Jackson
Specifications Coordinator
Florida Department of Transportation
801 N. Broadway Avenue
Mail Station 1-12
Bartow, Fl. 33830
(863) 519-2242
Fern.Jackson@dot.state.fl.us

Frank, Christopher D

From: Zeigler, Chris <Chris.Zeigler@dot.state.fl.us>
Sent: Friday, August 07, 2015 4:05 PM
To: Umlauf, William FC
Cc: Frank, Christopher D
Subject: FW: Developmental Specification Request for 431317-1-52-01 has been approved.
Attachments: Dev334 July 2015 with 4.75 mix requirements.doc

Use this spec instead of the other 334 spec that was just sent.

thanks,

Christopher M. Zeigler, CPM, TOPS
Project Manager
Florida Department of Transportation - District 1
Project Management
801 N. Broadway Avenue
Bartow, FL 33830
Office - 863-519-2253
Fax – 863-519-2892
chris.zeigler@dot.state.fl.us

From: Jackson, Fern
Sent: Friday, August 07, 2015 3:57 PM
To: Townsend, Olivia
Cc: Toole, Deborah; Thomas, Frances; Zeigler, Chris; Loeser, Benjamin; Grimes, Melissa
Subject: FW: Developmental Specification Request for 431317-1-52-01 has been approved.

Will do!

Thanks,

Fern Jackson

Fern Jackson
Specifications Coordinator
Florida Department of Transportation
801 N. Broadway Avenue
Mail Station 1-12
Bartow, Fl. 33830
(863) 519-2242
Fern.Jackson@dot.state.fl.us

From: Townsend, Olivia
Sent: Friday, August 07, 2015 3:55 PM
To: Jackson, Fern
Cc: Toole, Deborah; Thomas, Frances
Subject: RE: Developmental Specification Request for 431317-1-52-01 has been approved.

Fern,

Please use the attached 334 instead of the one I previously sent. Greg made a last minute change that came in after I sent the files to you.

Thanks!
Olivia

From: Jackson, Fern
Sent: Friday, August 07, 2015 3:02 PM
To: Townsend, Olivia
Cc: Toole, Deborah; Thomas, Frances
Subject: RE: Developmental Specification Request for 431317-1-52-01 has been approved.

Files received - Thanks!

Fern Jackson

Fern Jackson
Specifications Coordinator
Florida Department of Transportation
801 N. Broadway Avenue
Mail Station 1-12
Bartow, Fl. 33830
(863) 519-2242
Fern.Jackson@dot.state.fl.us

From: Townsend, Olivia
Sent: Friday, August 07, 2015 3:00 PM
To: Jackson, Fern
Cc: Toole, Deborah; Thomas, Frances
Subject: RE: Developmental Specification Request for 431317-1-52-01 has been approved.

Good Afternoon Fern,

Your files are attached.

Olivia

From: Specifications Development [mailto:sharepoint.administrator@dot.state.fl.us]
Sent: Friday, August 07, 2015 2:54 PM
To: Jackson, Fern; Townsend, Olivia; Toole, Deborah; Thomas, Frances
Subject: Developmental Specification Request for 431317-1-52-01 has been approved.

Your request for **431317-1-52-01** - Dev330-475mix, Dev334-475mix, Dev337-475mix Hot Mix Asphalt – 4.75 Mix is approved.

You will recieve the word file via separate email from the CO Specifications Office.

Please see the monitor comments (if applicable) below:

Note: The Specs office and SMO have updated these specifications to be compliant with the latest July 2015 versions of 330, 334 and 337.

CLICK HERE to access your request.