FDOT

SR 400 (I-4) Project Development and Environment (PD&E) Study
FM No.: 432100-1-22-01

Pavement Type Selection Report

Segment 3: East of SR 434 to East of US 17/92 – Seminole County, Florida

April 8, 2014

HNTB Corporation
610 Crescent Executive Court
Suite 400
Lake Mary, FL 32746

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Seminole County, Florida

Contract Number:
Financial ID Number: 432100-1-22-01
Federal Aid Project Number: 0041 227 1

Prepared For
Florida Department of Transportation
District 5
DeLand, Florida

April 8, 2014

ROBERT M. DENNEY
LICENSE
No. 58593
STATE OF FLORIDA
PROFESSIONAL ENGINEER

Prepared by:

D Robert Denney, PE
PE No. 58593

4/8/14
Date
4/8/2014

Concurrence by:

Annette K. Brennan, PE
District Design Engineer, District 5

Date

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1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) is proposing to reconstruct and widen I-4 as part of the I-4 Ultimate concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole and Volusia Counties. The concept design proposes the addition of two new express lanes in each direction within the center median of I-4, resulting in the reconstruction of the existing six-lane divided urban interstate to a ten-lane divided highway. The roadway improvements also include reconstruction of 19 local service interchanges and three systems interchanges.

The SR 400 (I-4) Project Development and Environment (PD&E) Study is a reevaluation project which addresses the revision from the original design concept showing two High Occupancy Vehicle (HOV) lanes, as recommended in the Environmental Impact Statement (EIS) for I-4 from SR 528 to SR 472, to the current proposed design concept of four Express Lanes. The Express Lanes are tolled lanes and will extend the full length of the project. The proposed typical section will include three general use lanes, two express lanes, an auxiliary lane (in some areas) and shoulders in each direction, with provision for a 44' rail corridor in the center median from US 27 to SR 528. The express lanes and general use lanes will be separated by two 10- or 12- foot shoulders with a barrier wall in between the shoulders.

The overall SR 400 (I-4) PD&E project limits include a total of approximately 41 miles of roadway improvements divided into two sections east and west of the I-4 Ultimate project. The approximate limits of improvement for the west section are from US 27 in Polk County to west of SR 435 (Kirkman Road) in Orange County and for the east section, from east of SR 434 in Seminole County to east of SR 472 in Volusia County. For purposes of documentation of the SR 400 (I-4) PD&E study, the east and west sections are further subdivided into segments as shown in Table 1.

Table 1: SR 400 (I-4) PD&E Segment Limits

SR 400 (I-4) PD&E West Section	
Segment 1	CR 532 (Osceola/Polk County Line) to W. of SR 528 (Beachline Expressway) in Osceola and Orange Counties (13.5 miles)
Segment 2	W. of SR 528 (Beachline Expressway) to W. of SR 435 (Kirkman Road) in Orange County (3.6 miles)
Segment 5	US 27 to CR 532 (Osceola/Polk County Line) in Polk County (3.2 miles)
SR 400 (I-4) PD&E East Section	
Segment 3	E. of SR 434 to E. of US 17/92 in Seminole County (10.2 miles)
Segment 4	E. of US 17/92 to E. of SR 472 in Volusia County (10.1 miles)

The majority of the proposed improvements (37.4 miles) are within District 5 and a small segment (3.2 miles) is within District 1. The entire corridor is part of the state's Strategic Intermodal System (SIS).

As part of the SR 400 (I-4) PD&E Study, HNTB has prepared this Pavement Type Selection Report for I-4, Segment 3 (East of SR 434 to East of US 17/92) in Seminole County; a project location map is provided in Figure 1. The purpose of this report is to analyze, compare and select the most feasible pavement type for this project, utilizing the methods of the 1993 American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures, adopted by FDOT and described in detail in the FDOT Pavement Type Selection Manual (October, 2013).

2.0 PRINCIPAL FACTORS

2.1 Traffic

Pavement design for new alignment and reconstruction projects requires a structural loading forecast of the 18-KIP Equivalent Single Axle Load (ESAL). The accumulated 18-KIP ESALs are used to determine the Structural Number Required (SN_R) for flexible pavement and the Depth Required (D) for rigid pavement. While the total traffic volume is the main factor in determining roadway geometrics, the percent of commercial traffic and heavy load applications are the major influences in the structural pavement design. The I-4, Segment 3 corridor within the project area is expected to be utilized by local traffic and through traffic. To determine the ESALs for this project, traffic data was obtained from *the I-4 SAMR Update: Design Traffic Technical Memorandum (January, 2013)*. Based on this memo, truck traffic percentages for the Segment 3 corridor range from 6.40 to 12.60 for year 2011. The truck factors for 2011 were reviewed for consistency by evaluating historical data provided by the FDOT Florida Traffic Online database. Based on these considerations, this project utilizes anticipated 24-hour truck traffic of 12.60% and a 20-year design. The future traffic volume projections used in the analysis are summarized in Table 2.

Table 2: Future Traffic Projections

	Year	AADT
Opening Year	2020	110,400
Mid-Design Year	2030	128,800
Design Year	2040	147,200

The 18-KIP ESAL for the roadway is 28,344,000 for flexible pavement and 39,992,000 for rigid pavement. Based on this information, either asphaltic concrete (AC) or Portland cement concrete (PCC) pavement would be sufficient. Traffic information and ESAL calculations are provided in Appendix A.

Figure 1: Project Location Map

2.2 Soil Characteristics

Geotechnical data in the study area was available from the I-4 (SR 400) Interchange at SR 46 widening and rehabilitation project, FPID: 407573-1-32-01. This project is located within the I-4, Segment 3 project and included pavement design data and calculations for the I-4/SR 400 mainline. Soil samples were obtained from 18 locations along the I-4 alignment in the vicinity of the SR 46 interchange. Limerock Bearing Ratio (LBR) tests were performed on the samples using the FDOT 90 percent method. The analysis yielded a recommended design LBR of 32 for the project, which corresponds to a roadway embankment resilient modulus (M_R) of 10,500 psi. This M_R value was used in preparing the PTSR for the I-4, Segment 3 project. The LBR report prepared for the S.R. 400 (I-4), FPID: 407573-1-32-01 project is included in Appendix B.

2.3 Weather

High rainfall intensities are experienced in Florida during portions of the year. These rainfall conditions are expected to equally affect subsoil conditions for both flexible and rigid pavements; thus, the weather does not favor the placement of one type of pavement over the other. Additionally, cross slopes are designed to drain water off the pavement, and drainable base and edge drains were considered in the economic analysis to ensure the runoff would not negatively impact the concrete pavement. Therefore, either AC or PCC pavement type could be constructed with satisfactory wet weather performance and durability.

2.4 Construction Considerations

The interstate will be completely reconstructed. Staged construction will be necessary for either rigid or flexible type of pavement. The available right-of-way will allow for either type to be constructed satisfactorily.

2.5 Recycling

The existing roadway pavement is to be completely reconstructed; therefore, there is an opportunity to recycle the existing asphalt pavement in the initial construction. FDOT has successfully recycled rigid and flexible pavement, therefore, there are future recycling opportunities for both pavement types during rehabilitation of the pavements.

3.0 ECONOMIC ANALYSIS

The present worth method will be used to evaluate the cost of flexible pavement versus rigid pavement. All capital outlays for each alternative, including rehabilitation costs, are converted into today's dollars to compare the alternatives.

3.1 Basis of Comparison

The analysis will be based on the following assumptions:

Analysis Period: 40 years
Initial Pavement Design Life: 20 years
Discount Rate: 3.5%

The following baseline rehabilitation strategies were considered, as recommended in the *Pavement Type Selection Manual (October 2013)* for concrete pavement and from supporting data for lifecycles of asphalt pavement in Seminole County:

Concrete Pavement – Limited Access (Mainline & Shoulder)
23 Year – Concrete Pavement Rehabilitation (3% Slab Replacement)*
33 Year – Concrete Pavement Rehabilitation (5% Slab Replacement)*
*Estimate is based on the percentage of slab area in the truck lane

Asphalt Pavement - Limited Access (Mainline & Shoulder)
16 Year – Mill 3 inches
4" Structural Asphaltic Concrete
32 Year – Mill 3 inches
4" Structural Asphaltic Concrete

3.2 Pavement Data

The initial pavement designs developed for this analysis for both rigid and flexible pavement were based on the following geometry:

# of Lanes=10 (3 GUL+2 SUL in each direction)
Lane Width=12 feet
GUL: Inside Shoulder Width=12 feet, Outside Shoulder Width=12 feet
SUL: Inside Shoulder Width=6 feet, Outside Shoulder Width=10 feet
Note: GUL = general use lane, SUL = special use lane

The typical section used for this analysis is provided in Appendix C and the pavement design calculations are provided in Appendix D.

Rigid Pavement - This pavement design has been prepared in accordance with the most recent Rigid Pavement Design Manual (RPDM) (FDOT Document No. 625-010-006-e, January, 2009). This

project is located in Seminole County. Using the Mechanistic-Empirical Pavement Design Guide (MEPDG) Design Tables, the slab thickness should be 12.5".

Rigid Pavement Design Parameters
18-KIP ESAL=39,992,000
Modulus of Subgrade Reaction (K_G)=200 pci
Reliability (%R)=90%

Mainline
12.5" Concrete Depth
4" Optional Base Group 1 (Type B-12.5 Only)
12" Type B Stabilization

Shoulder
2" Type SP Structural Course (Traffic B)
Optional Base Group 5 (7" LBR 100)
12" Type B Stabilization

Asphalt Pavement - This pavement design has been prepared in accordance with the most recent Flexible Pavement Design Manual (FPDM) (FDOT Document No. 625-010-002-g, March, 2008).

Flexible Pavement Design Parameters
18-KIP ESAL=28,344,000 (Traffic Level D)
18-KIP ESAL for shoulders=3% of mainline=850,320 (Traffic Level B)
Resilient Modulus (M_R)=10,500 psi
Reliability (%R)=90%

Mainline
SN_R =5.15
0.75" Friction Course FC-5 (PG76-22) (Not included in the Life Cycle Cost Analysis)
2" Type SP Structural Course (Traffic D) (PG76-22)
3" Type SP Structural Course (Traffic D)
Optional Base Group 11 (12" Limerock, LBR 100)
12" Type B Stabilization
SN_C =5.32

Shoulder
SN_R=2.98
2" Type SP Structural Course (Traffic B)
Optional Base Group 5 (7" LBR 100)
12" Type B Stabilization
SN_C=3.10

3.3 Cost Data for Economic Analysis

The unit prices used for this economic analysis are weighted averages obtained from FDOT's statewide item average unit costs from 12/01/2012 to 11/30/2013 and from D5 estimates, where available. The unit costs used are provided in Appendix E and are summarized in Table 3.

Table 3: Pavement Unit Prices

Item	Price	Unit
Type B Stabilized (LBR 40)	$3.25	Sq. Yd
OBG-1, Type B-12.5	$9.14	Sq. Yd
OBG-5	$9.54	Sq. Yd
OBG-11	$12.71	Sq. Yd
Milling 1" Avg. Depth	$2.08	Sq. Yd
Milling 3" Avg. Depth	$2.00	Sq. Yd
Type SP Traffic Level B	$85.00	Ton
Type SP Traffic Level D	$85.00	Ton
Type SP Traffic Level D PG76-22	$92.00	Ton
JPCP	$55.00	Sq. Yd
CPR - Slab Replacement (3%)	$400.00	Cu. Yd
CPR - Slab Replacement (5%)	$400.00	Cu. Yd
Edgedrain (Draincrete)	$26.72	Ft
Edgedrain Outlet Pipe (4 in)	$30.68	Ft
Source: FDOT, 12 month moving statewide averages and FDOT - D5 estimates.		

3.4 Cost Comparison

A life cycle economic analysis per mile of concrete pavement and asphalt pavement was performed using an analysis period of 40 years and a discount rate of 3.5%. Based on the life cycle cost analysis, the total present worth costs for concrete pavement is $6,803,632 and for flexible pavement, $5,425,646. The results of the analysis are summarized in Table 4. The details of the analysis are included in Appendix E.

4.0 SECONDARY FACTORS

4.1 Performance of similar pavements in the area

The existing pavement sections, west and east of the I-4 Segment 3 section are both constructed with AC pavement. In general, these sections have not experienced any areas of premature distress and maintenance resurfacing is not excessively disruptive. The average age to rehabilitation for flexible pavements in Seminole County was reviewed. The average age to

rehabilitation over the last 8 years in Seminole County ranged from 12.8 years to 22.1 years. The average age to rehabilitation for FC-2 flexible pavements in Orange County was also reviewed. The average age to rehabilitation over the 7-year period ending in 2011 in Orange County ranged from 12 years to 16.9 years. With improvements made to FC-5 over the years, it is expected that an FC-5 flexible pavement will outperform previous FC-2 sections.

Table 4: Pavement Type Selection Economic Analysis

Concrete Pavement (PCC)

			Cost		P / F		PRESENT WORTH
	Initial	2020	$6,274,943	*	1.00000	=	$6,274,943
23	Year	2043	$595,976	*	0.45329	=	$270,147
33	Year	2053	$804,569	*	0.32134	=	$258,542
					TOTAL AGENCY COSTS	**=**	**$6,803,632**
					USER COSTS	**=**	**N/A**
					SALVAGE VALUE	**=**	**N/A**
					TOTAL PRESENT WORTH LIFE-CYCLE COSTS	**=**	**$6,803,632**

Asphalt Pavement (AC)

			Cost		P / F		PRESENT WORTH
	Initial	2020	$3,838,193	*	1.00000	=	$3,838,193
16	Year	2036	$2,027,373	*	0.57671	=	$1,169,198
32	Year	2052	$2,027,373	*	0.33259	=	$674,284
					TOTAL AGENCY COSTS	**=**	**$5,681,675**
					USER COSTS	**=**	**N/A**
					SALVAGE VALUE	**=**	**$256,029**
					TOTAL PRESENT WORTH LIFE-CYCLE COSTS	**=**	**$5,425,646**

Performance of concrete pavement in Central Florida was also reviewed. In the Orlando area within Orange County, concrete pavement was originally constructed on I-4 through the downtown area. This concrete pavement section has been in service for approximately 50 years and has undergone two major rehabilitations. Other concrete pavement sections in the Central Florida region were reviewed, including the average age to rehabilitation for concrete pavement in Hillsborough County. This data showed that over a 3 year period between 2006 and 2008, the average age for the rehabilitation cycle for these pavements within Hillsborough County were 20 years, 25 years and 22 years. Pavement performance and rehabilitation data is provided in Appendix F.

4.2 Adjacent Existing Pavements

The existing roadway sections, adjacent to the I-4 Segment 3 section are both constructed with flexible pavements. In addition, recent widening and rehabilitation projects throughout the corridor have been constructed with flexible pavement. The I-4, Segment 4 section, immediately east of Segment 3, is currently being evaluated for pavement type selection as part of the SR 400 (I-4) PD&E study.

4.3 Conservation of Materials and Energy

There are no significant differences in the energy consumption used to produce, transport or construct either type of pavement.

4.4 Availability of Local Materials or Contractor Capabilities

Materials are available locally for both pavement types. However, the majority of contractors in the Central Florida region are more familiar with asphalt pavement, since it is more commonly used in roadway projects in the area. FDOT District 5 also has prequalified contractors that have experience placing concrete pavement on major projects. Neither of the pavement types uses materials that are particularly scarce in Central Florida.

4.5 Traffic Safety

Current FDOT design guidelines and specifications for both the AC pavement and PCC pavement alternatives provide similar characteristics for wearing course, delineation through pavement and shoulder contrast, reflectivity under highway lighting and the maintenance of a nonskid surface.

4.6 Incorporation of Experimental Features

There are no experimental features included in this pavement type selection report.

4.7 Stimulation of Competition

Stimulation of competition is encouraged to avoid monopoly situations and improve products and methods in the projection of paving products. However, neither pavement type currently indicates a distinct advantage to provide more stimulation of competition over the other.

4.8 Municipal Preference, Participating Local Government Preference, and Recoginition of Local Industry

No preferences apparent for pavement type by FDOT, which will be maintaining and operating this roadway facility.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding life cycle cost analysis and considering all other design factors evaluated in this report, AC pavement has a long term owner's cost advantage of 20%. Therefore, it is recommended that asphalt pavement be considered as the pavement type for the SR 400 (I-4) Segment 3 corridor.

APPENDICES

APPENDIX A

TRAFFIC INFORMATION

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2012 HISTORICAL AADT REPORT

COUNTY: 77 - SEMINOLE

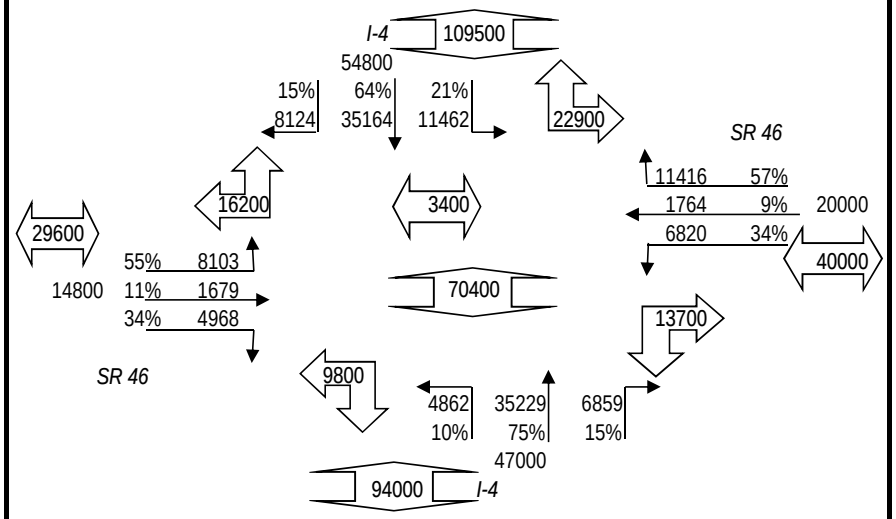
SITE: 0286 - ON I-4, 0.58 MI W OF SR-46 (UCLP)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2012	92500 C	E 44000	W 48500	8.50	54.00	10.90
2011	85500 C	E 39500	W 46000	8.50	54.60	12.60
2010	86000 C	E 39500	W 46500	8.20	54.17	12.00
2009	83000 C	E 37000	W 46000	8.67	54.57	12.60
2008	89000 C	E 41500	W 47500	8.60	54.07	12.40
2007	92500 C	E 43000	W 49500	8.30	56.39	12.90
2006	89000 C	E 41000	W 48000	8.32	52.47	12.40
2005	88000 C	E 41000	W 47000	8.10	52.00	12.90
2004	85500 C	E 39500	W 46000	8.10	51.50	12.90
2002	99000 S	E 49500	W 49500	8.10	52.50	6.40
2001	96000 F	E 48000	W 48000	7.50	53.80	5.20
2000	96000 C	E 48000	W 48000	7.50	53.90	5.30

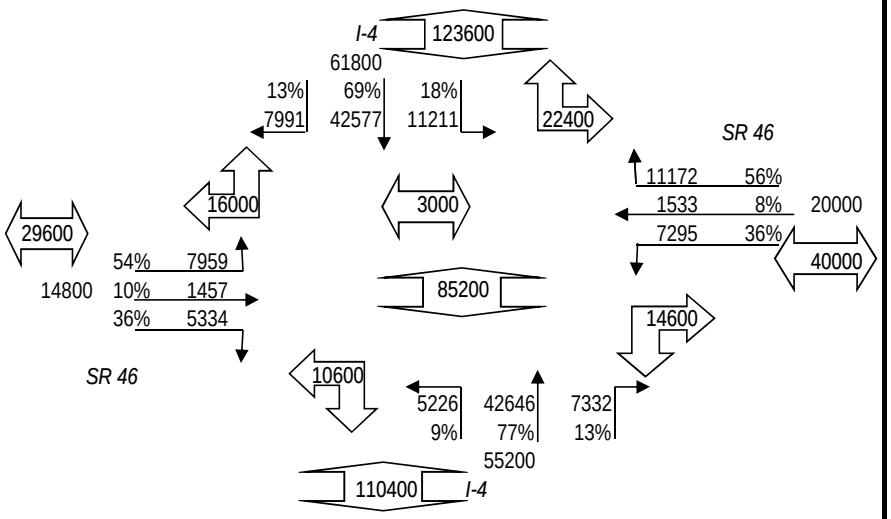
AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

PROJECT TRAFFIC FOR I-4 AT SR 46: TO

2-WAY AADT TURNING MOVEMENTS IN YEAR 2011



2-WAY AADT TURNING MOVEMENTS IN YEAR 2020



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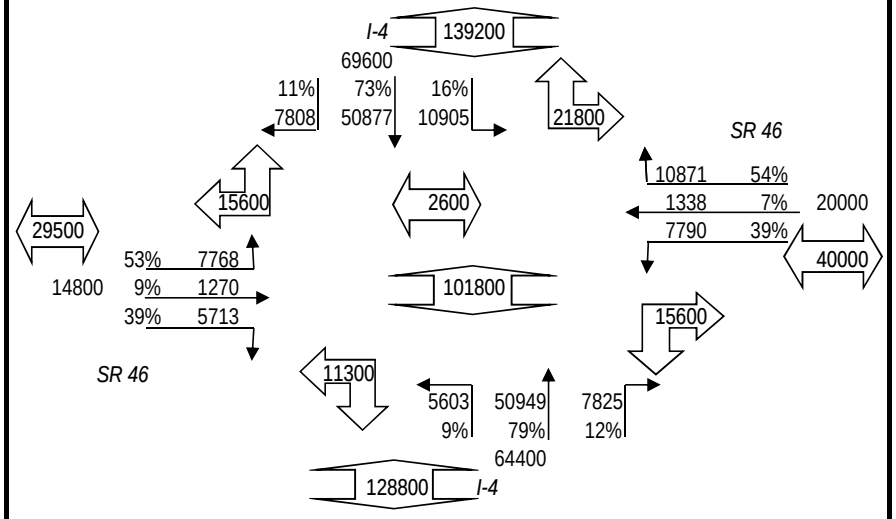
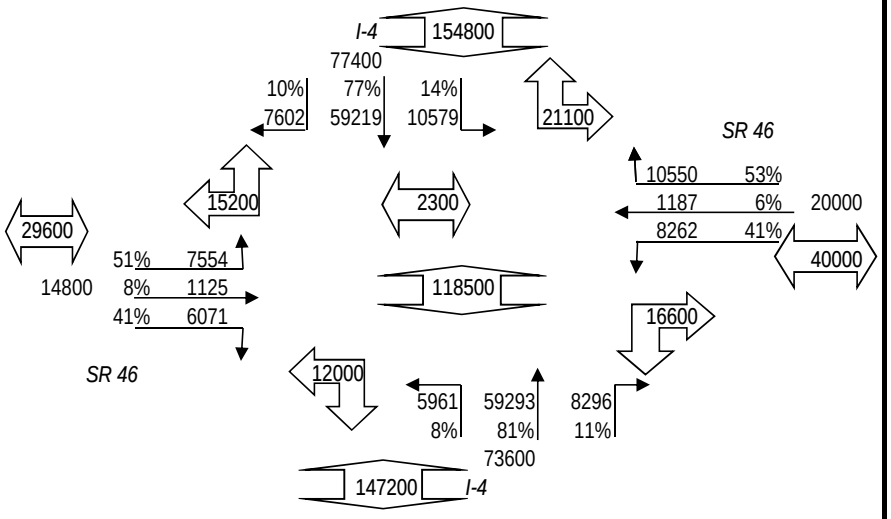


2-WAY AADT TURNING MOVEMENTS IN YEAR 2040



18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS

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

SECTION #: 77160000
SEGMENT #: ML
ITEM #: 0
PROJECT DESCRIPTION: SR 400 (I-4) - S. of SR 46

LOCATION DESCRIPTION: Mainline **LOCATION #:** 1

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: C

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

DESIGN INFORMATION

		AADT
Existing Year	2011	85500
Opening Year	2020	110400
Mid-Design Year	2030	128800
Design Year	2040	147200

Daily Direction Split (50% or 100%): 50%
Lanes in One Direction: 3

T24 values
Existing to Opening Year: 12.60%
Opening to Mid-Year: 12.60%
Mid-Year to Design-Year: 12.60%

1995 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	X	1.270	X
RURAL HIGHWAY:	0.960		1.350	
URBAN HIGHWAY:	0.890		1.220	
OTHER (Enter Factor and X):				

(1) Equivalency Factors are based on Updated Pavement Damage Factors Memorandum, dated July 2, 1998.
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: HNTB — 610 Crescent Executive Ct, Suite 400, Lake Mary, FL 32746 — Robert Denney, PE — 2/28/2014
Org. Unit or Firm — Name — Date

Signature

Reviewed by: Mark Robinson, PE — District 5 Design — FDOT - D5
Name — Title — Org. Unit or Firm — Date

Signature

18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS - LOCATION 1

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

YEARS: *2011 to 2040*

SECTION #: 77160000 **SEGMENT #:** ML **ITEM #:** 0

FLEXIBLE PAVEMENT URBAN FREEWAY 0.900

SN=5/THICK SR 400 (I-4) - S. of SR 46 C

YEAR	AADT	ESAL (1000S)	ACCUM (1000s)	D	T	LF	EF
2011	85500	996	0	0.5	12.60%	0.563	0.900
2012	88200	1023	0	0.5	12.60%	0.560	0.900
2013	91000	1050	0	0.5	12.60%	0.557	0.900
2014	93800	1078	0	0.5	12.60%	0.555	0.900
2015	96500	1104	0	0.5	12.60%	0.553	0.900
2016	99300	1131	0	0.5	12.60%	0.550	0.900
2017	102100	1158	0	0.5	12.60%	0.548	0.900
2018	104800	1184	0	0.5	12.60%	0.546	0.900
2019	107600	1211	0	0.5	12.60%	0.544	0.900
2020	110400	1238	1238	0.5	12.60%	0.541	0.900
2021	112200	1255	2493	0.5	12.60%	0.540	0.900
2022	114000	1272	3765	0.5	12.60%	0.539	0.900
2023	115900	1290	5055	0.5	12.60%	0.537	0.900
2024	117700	1306	6361	0.5	12.60%	0.536	0.900
2025	119600	1324	7685	0.5	12.60%	0.535	0.900
2026	121400	1341	9026	0.5	12.60%	0.534	0.900
2027	123200	1358	10384	0.5	12.60%	0.532	0.900
2028	125100	1376	11760	0.5	12.60%	0.531	0.900
2029	126900	1392	13152	0.5	12.60%	0.530	0.900
2030	128800	1410	14562	0.5	12.60%	0.529	0.900
2031	130600	1426	15988	0.5	12.60%	0.528	0.900
2032	132400	1443	17431	0.5	12.60%	0.526	0.900
2033	134300	1460	18891	0.5	12.60%	0.525	0.900
2034	136100	1477	20368	0.5	12.60%	0.524	0.900
2035	138000	1494	21862	0.5	12.60%	0.523	0.900
2036	139800	1511	23373	0.5	12.60%	0.522	0.900
2037	141600	1527	24900	0.5	12.60%	0.521	0.900
2038	143500	1544	26444	0.5	12.60%	0.520	0.900
2039	145300	1560	28004	0.5	12.60%	0.519	0.900
2040	147200	1578	29582	0.5	12.60%	0.518	0.900

Opening to Mid-Design Year ESAL Accumulation (1000s): 13324

Opening to Design Year ESAL Accumulation (1000s): 28344

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 historical traffic data and other available information.

Prepared by: HNTB — 610 Crescent Executive Ct, Suite 400, Lake Mary, FL 32746 — Robert Denney, PE — 2/28/2014

Org. Unit or Firm — Name — Date

Signature

Reviewed by: Mark Robinson, PE — District 5 Design — FDOT - D5

Name — Title — Org.Unit or Firm — Date

Signature

18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS - LOCATION 1

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

YEARS: *2011 to 2040*

SECTION #: 77160000 **SEGMENT #:** ML **ITEM #:** 0

RIGID PAVEMENT URBAN FREEWAY 1.270

SN=12/THICK SR 400 (I-4) - S. of SR 46 C

YEAR	AADT	ESAL (1000S)	ACCUM (1000s)	D	T	LF	EF
2011	85500	1405	0	0.5	12.60%	0.563	1.270
2012	88200	1443	0	0.5	12.60%	0.560	1.270
2013	91000	1482	0	0.5	12.60%	0.557	1.270
2014	93800	1521	0	0.5	12.60%	0.555	1.270
2015	96500	1558	0	0.5	12.60%	0.553	1.270
2016	99300	1596	0	0.5	12.60%	0.550	1.270
2017	102100	1634	0	0.5	12.60%	0.548	1.270
2018	104800	1671	0	0.5	12.60%	0.546	1.270
2019	107600	1709	0	0.5	12.60%	0.544	1.270
2020	110400	1746	1746	0.5	12.60%	0.541	1.270
2021	112200	1770	3516	0.5	12.60%	0.540	1.270
2022	114000	1794	5310	0.5	12.60%	0.539	1.270
2023	115900	1820	7130	0.5	12.60%	0.537	1.270
2024	117700	1843	8973	0.5	12.60%	0.536	1.270
2025	119600	1869	10842	0.5	12.60%	0.535	1.270
2026	121400	1892	12734	0.5	12.60%	0.534	1.270
2027	123200	1916	14650	0.5	12.60%	0.532	1.270
2028	125100	1941	16591	0.5	12.60%	0.531	1.270
2029	126900	1964	18555	0.5	12.60%	0.530	1.270
2030	128800	1989	20544	0.5	12.60%	0.529	1.270
2031	130600	2013	22557	0.5	12.60%	0.528	1.270
2032	132400	2036	24593	0.5	12.60%	0.526	1.270
2033	134300	2061	26654	0.5	12.60%	0.525	1.270
2034	136100	2084	28738	0.5	12.60%	0.524	1.270
2035	138000	2108	30846	0.5	12.60%	0.523	1.270
2036	139800	2131	32977	0.5	12.60%	0.522	1.270
2037	141600	2154	35131	0.5	12.60%	0.521	1.270
2038	143500	2179	37310	0.5	12.60%	0.520	1.270
2039	145300	2202	39512	0.5	12.60%	0.519	1.270
2040	147200	2226	41738	0.5	12.60%	0.518	1.270

Opening to Mid-Design Year ESAL Accumulation (1000s): 18798

Opening to Design Year ESAL Accumulation (1000s): 39992

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: HNTB — 610 Crescent Executive Ct, Suite 400, Lake Mary, FL 32746 (Org. Unit or Firm) — Robert Denney, PE (Name) — 2/28/2014 (Date)

Signature

Reviewed by: Mark Robinson, PE (Name) — District 5 Design (Title) — FDOT - D5 (Org.Unit or Firm) — Date

Signature

APPENDIX B

GEOTECHNICAL INFORMATION

Geotechnical
and
Environmental
Consultants, Inc.

December 5, 2005

URS Corporation
315 East Robinson Street, Suite 245
Orlando, Florida 32801

Attention: Mrs. Yassi Myers, P.E.

Subject: Design Limerock Bearing Ratio Evaluation
I-4 / SR 46 INTERCHANGE
FIN No. 407573
Seminole County, Florida
GEC Project No. 2174G

Dear Mrs. Myers:

Geotechnical and Environmental Consultants, Inc. (GEC) has performed 18 Limerock Bearing Ratio (LBR) tests on representative soils encountered along the alignments of interest of the I-4/S.R. 46 Interchange project in Orlando, Florida. Thirteen of the LBR samples were taken from Stratum No. 1 (A-3) and five samples from Stratum No. 2 (A-2-4), which were the predominant shallow soil types encountered in our borings. One LBR value was unusually low, another was unusually high; therefore, they were not considered in the analyses (see attached for more details).

Our design LBR analysis included both the FDOT Mean Method and the 90 Percent Method. The FDOT Mean Method resulted in a design LBR of 33 and the 90 Percent Method resulted in a design LBR of 32. We recommend a design LBR of 32 for this project. The results of our analyses are attached.

GEC trusts the information submitted in this letter will meet your current needs. If you have any questions, or if we may be of further assistance, please call.

Very truly yours,

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS, INC.

12/6/05

Craig G. Ballock, E.I.
Engineer Intern

12/6/05

Gary L. Kuhns, P.E.
Chief Engineer
Florida Registration No. 62418

12/6/05

Rachel F. Andre, P.E.
Project Engineer
Florida Registration No. 62418

CGB/RFA/GLK/aas

1230 East Hillcrest Street, Orlando, FL 32803-4713
407/898-1818 Fax 407/898-1837 E-mail: gec@g-e-c.com
www.g-e-c.com

Table 1
FDOT Mean Method Design LBR Calculations
I-4 / SR 46 INTERCHANGE
GEC Project No. 2174G

Station	Offset (ft)	Stratum No.	Maximum LBR Value	LBR Value at -2% of Moisture at Maximum LBR	LBR Value at +2% of Moisture at Maximum LBR
2858+00	176 LT	1	56	52	50
2857+00	105 LT	1	64	41	23
2787+00	258 LT	1	52	29	47
2783+00	207 LT	1	21	16	15
2778+00	200 LT	1	45	36	34
2757+00	130 LT	2	35	25	30
2744+00	100 LT	2	33	27	24
2726+00	100 LT	1	62	53	30
910+00	CL	1	39	23	17
906+62	CL	1	63	51	41
806+00	CL	1	68	47	34
616+76	17 RT	1	28	18	24
303+40	18 RT	1	42	31	38
272+00	50 LT	1	45	31	33
270+06	60 LT	1	41	39	37
265+75	60 RT	2	37	23	33
Mean Value				34	32
				± 2% Value Average = 33	

Note: LBR tests were performed on soil samples obtained at Stations 304+46, CL and 2832+00, 330'LT, from 0 to 2 ft of depth. Results indicated Soil Type 2 (A-2-4) and maximum LBR values of 15 and 98, respectively. Due to the unsual LBR values, these data points are considered outliers and were not used in the analysis.

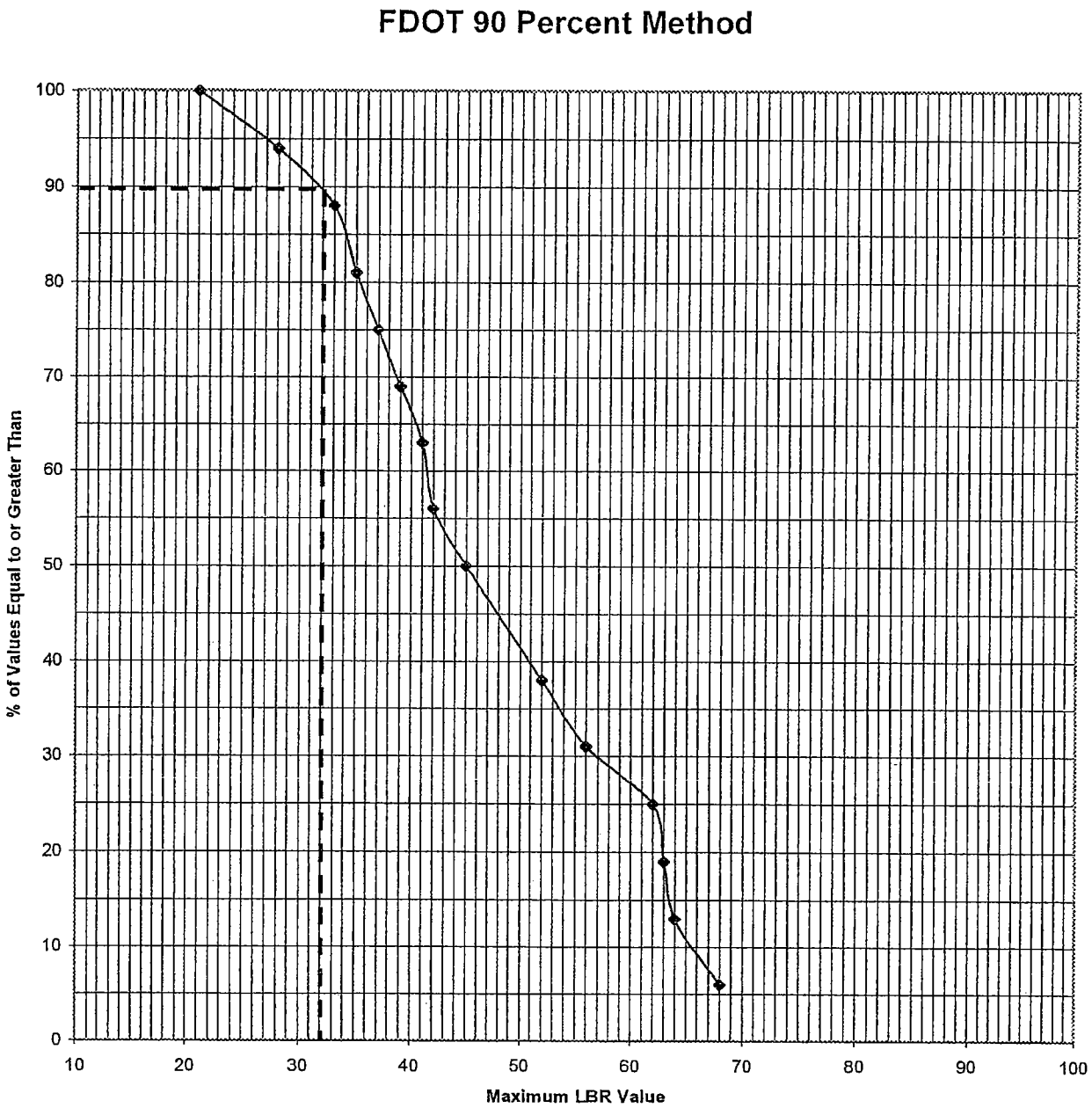
Table 2
FDOT 90 Percent Method Design LBR Calculations
I-4 / SR 46 INTERCHANGE
GEC Project No. 2174G

Station	Offset (ft)	Stratum No.	Maximum LBR Value	No. of Values Equal to or Greater Than	% of Values Equal to or Greater Than
2783+00	207 LT	1	21	16	100%
616+76	17 RT	1	28	15	94%
2744+00	100 LT	2	33	14	88%
2757+00	130 LT	2	35	13	81%
265+75	60 RT	2	37	12	75%
910+00	CL	1	39	11	69%
270+06	60 LT	1	41	10	63%
303+40	18 RT	1	42	9	56%
2778+00	200 LT	1	45	8	50%
272+00	50 LT	1	45	8	50%
2787+00	258 LT	1	52	6	38%
2858+00	176 LT	1	56	5	31%
2726+00	100 LT	1	62	4	25%
906+62	CL	1	63	3	19%
2857+00	105 LT	1	64	2	13%
806+00	CL	1	68	1	6%
90 Percent LBR Value = 32*					

* See Attached Figure 1

Note: LBR tests were performed on soil samples obtained at Stations 304+46, CL and 2832+00, 330'LT, from 0 to 2 ft of depth. Results indicated Soil Type 2 (A-2-4) and maximum LBR values of 15 and 98, respectively. Due to the unsual LBR values, these data points are considered outliers and were not used in the analysis.

Figure 1
FDOT 90 Percent Method Graph
I-4 / SR 46 INTERCHANGE
GEC Project No. 2174G



LIMEROCK BEARING RATIO TEST REPORT

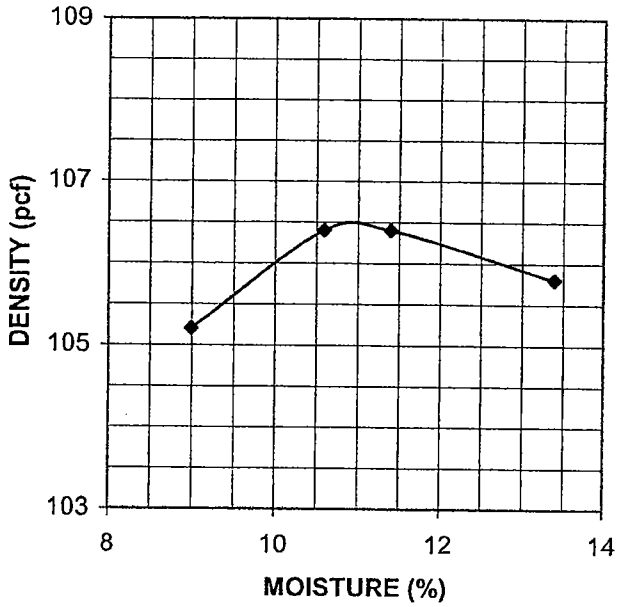


Figure 2: Moisture Content Versus Density

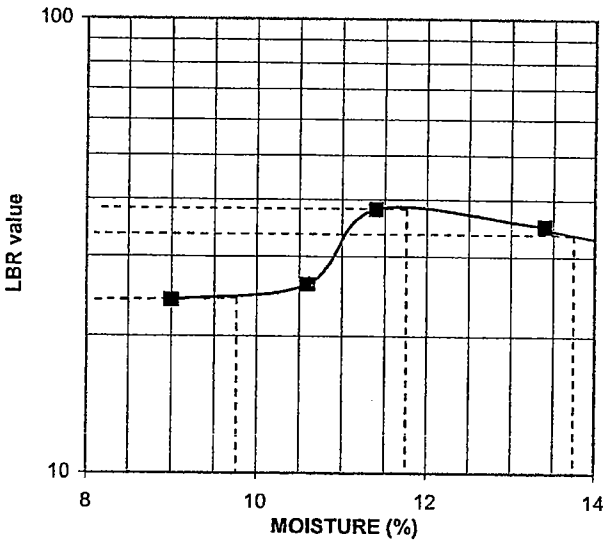


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 265+75 60'RT 0'-2'

Date Tested: 11-19-05

Material Description: (A-2-4)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 10.9

Max. Dry Density (pcf)= 106.5

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 37.0

LBR at -2% of Optimum LBR Moisture= 23.0

LBR at +2% of Optimum LBR Moisture= 33.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

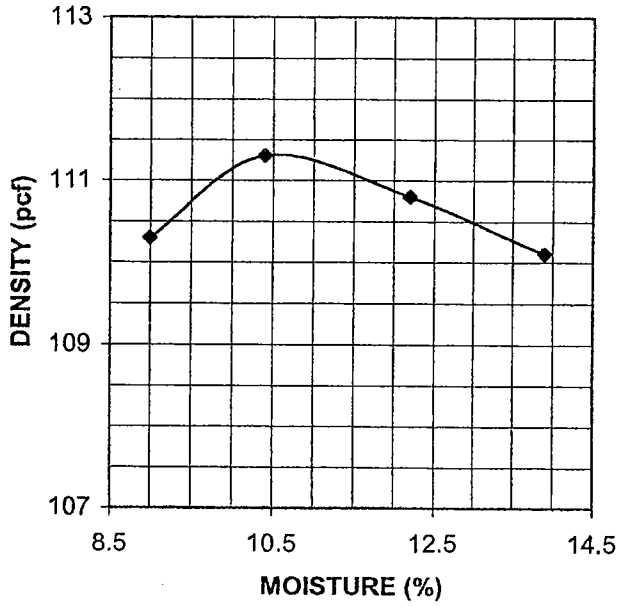


Figure 2: Moisture Content Versus Density

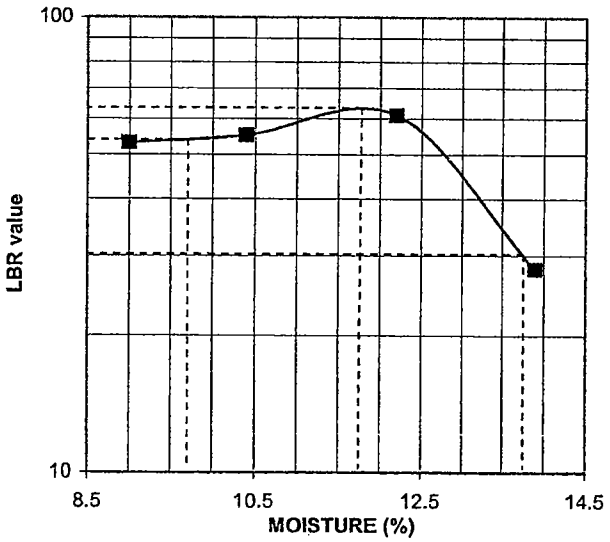


Figure 1: Moisture Content Versus LBR

Project Information

Project Name:	I-4 / SR 46
Client Project No:	
GEC Project No:	2174G

Sample Information

Location:	2726+00 100'LT 0'-2'
Date Tested:	11-19-05
Material Description:	(A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)=	10.5
Max. Dry Density (pcf)=	111.3

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture=	62.0
LBR at -2% of Optimum LBR Moisture=	53.0
LBR at +2% of Optimum LBR Moisture=	30.0

Designed by Mike Marshall

GEC
Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

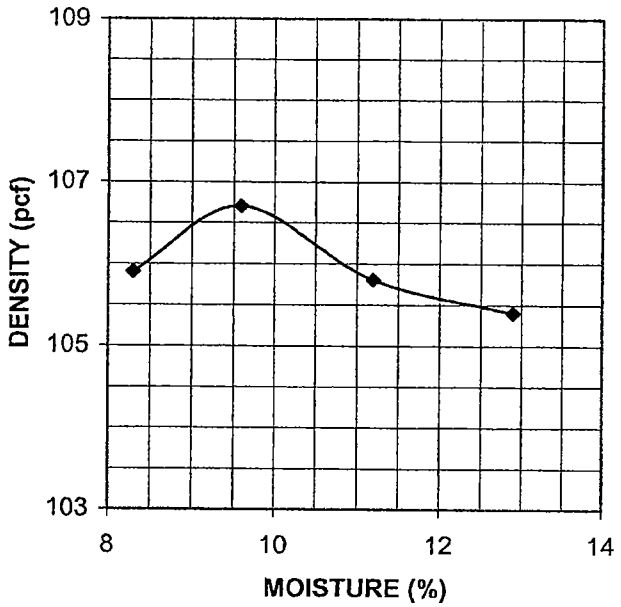


Figure 2: Moisture Content Versus Density

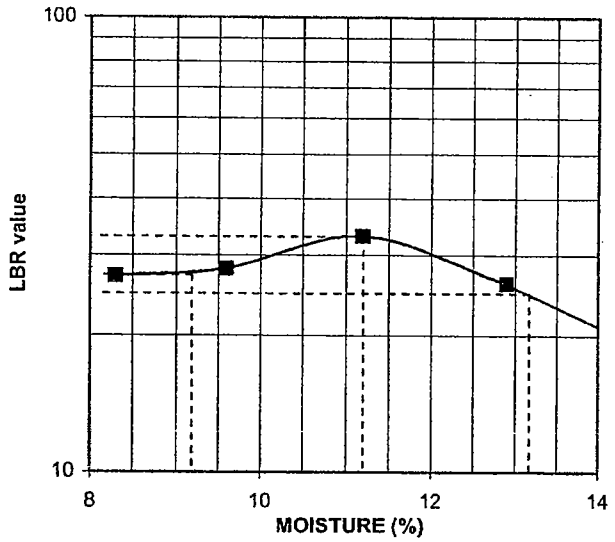


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2744+00 100'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-2-4)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 9.6

Max. Dry Density (pcf)= 106.7

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 33.0

LBR at -2% of Optimum LBR Moisture= 27.0

LBR at +2% of Optimum LBR Moisture= 24.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

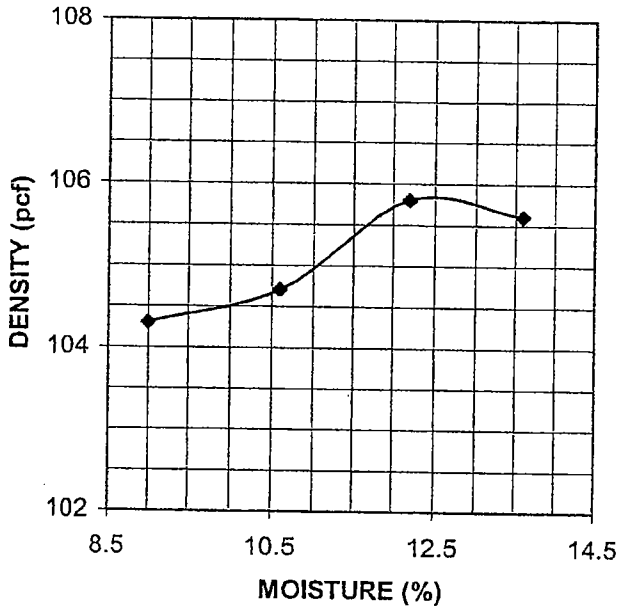


Figure 2: Moisture Content Versus Density

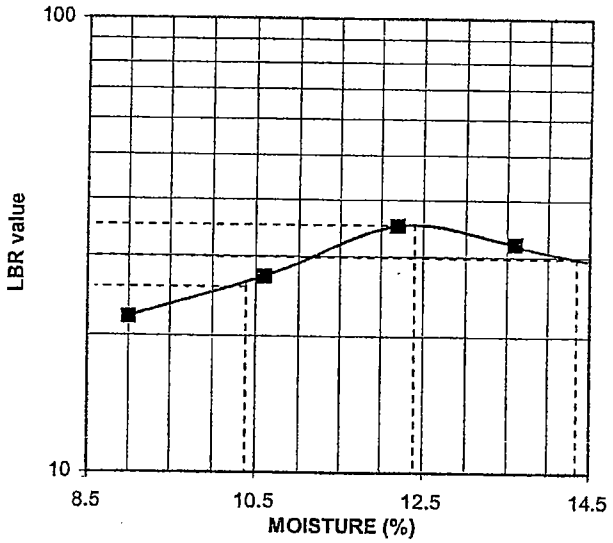


Figure 1: Moisture Content Versus LBR

Project Information

Project Name:	I-4 / SR 46
Client Project No:	
GEC Project No:	2174G

Sample Information

Location:	2757+00 130'LT 0'-2'
Date Tested:	11-19-05
Material Description:	(A-2-4)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)=	12.5
Max. Dry Density (pcf)=	105.9

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture=	35.0
LBR at -2% of Optimum LBR Moisture=	25.0
LBR at +2% of Optimum LBR Moisture=	30.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

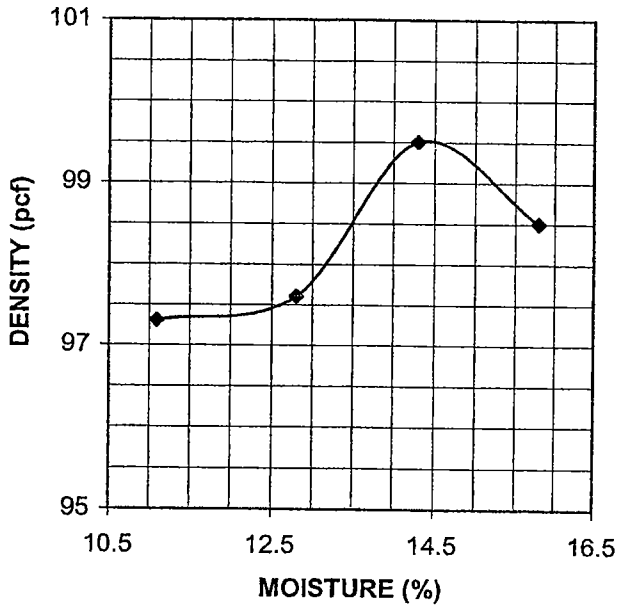


Figure 2: Moisture Content Versus Density

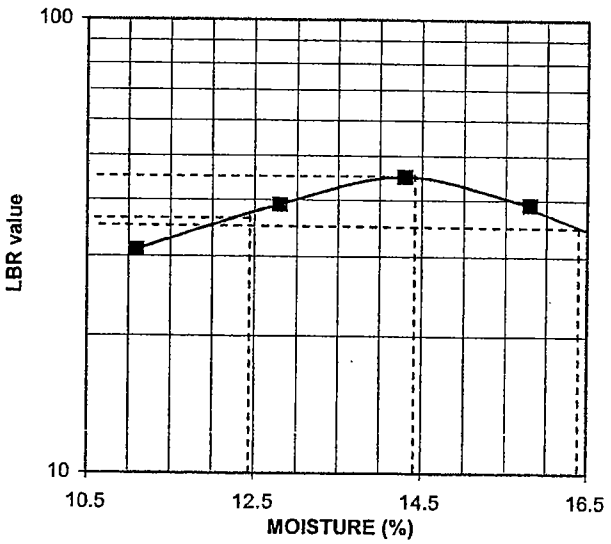


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2778+00 200'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 14.4

Max. Dry Density (pcf)= 99.5

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 45.0

LBR at -2% of Optimum LBR Moisture= 36.0

LBR at +2% of Optimum LBR Moisture= 34.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

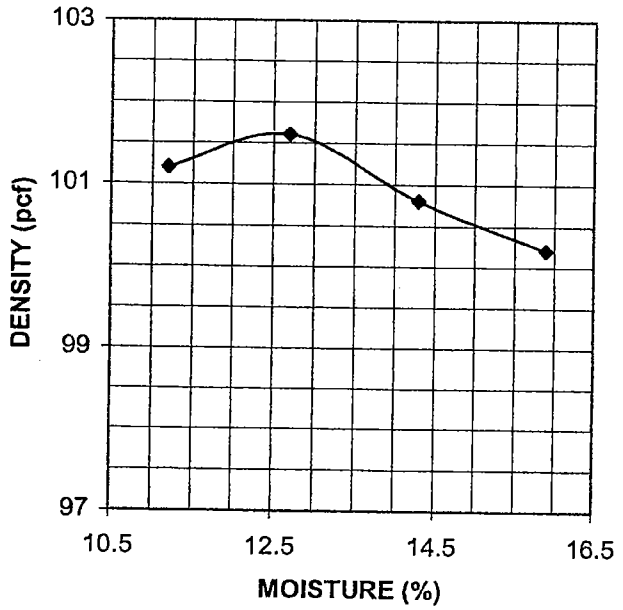


Figure 2: Moisture Content Versus Density

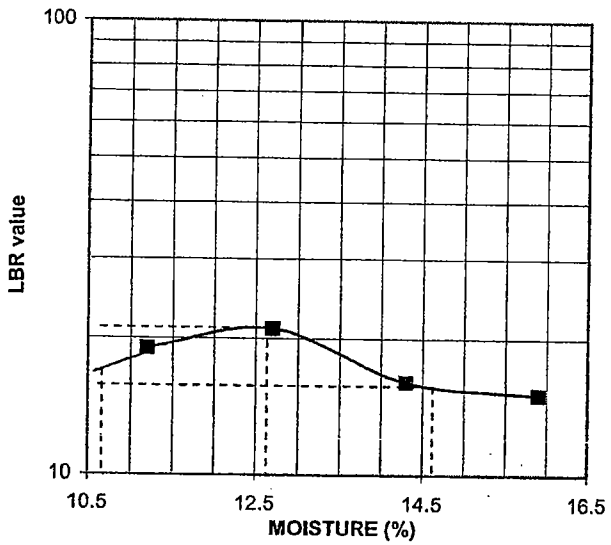


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2783+00 207'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 12.6

Max. Dry Density (pcf)= 101.6

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 21.0

LBR at -2% of Optimum LBR Moisture= 16.0

LBR at +2% of Optimum LBR Moisture= 15.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

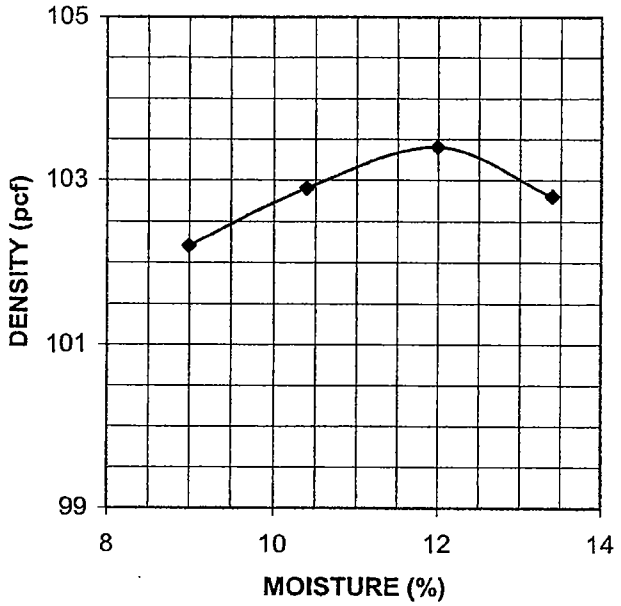


Figure 2: Moisture Content Versus Density

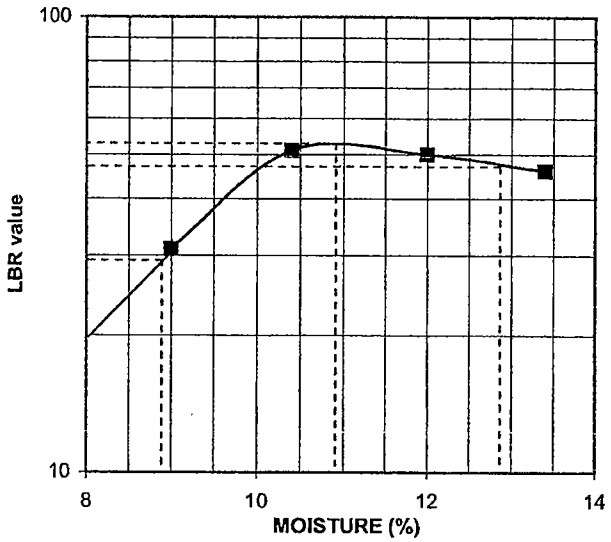


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2787+00 258'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 12.0

Max. Dry Density (pcf)= 103.4

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 52.0

LBR at -2% of Optimum LBR Moisture= 29.0

LBR at +2% of Optimum LBR Moisture= 47.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

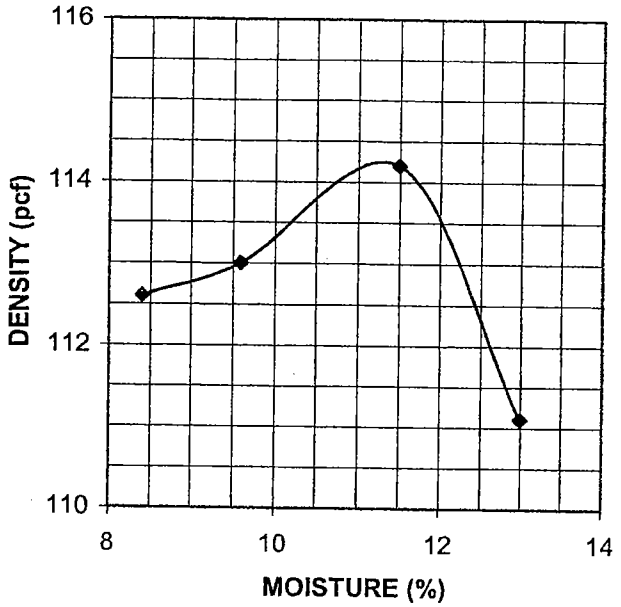


Figure 2: Moisture Content Versus Density

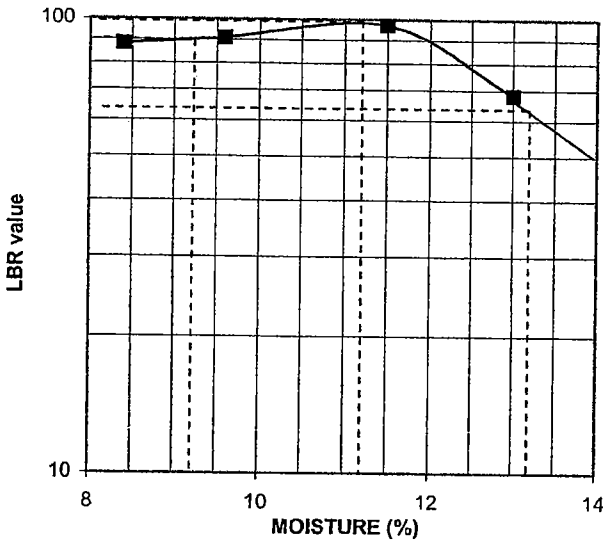


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2832+00 330'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-2-4)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 11.3

Max. Dry Density (pcf)= 114.3

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 98.0

LBR at -2% of Optimum LBR Moisture= 90.0

LBR at +2% of Optimum LBR Moisture= 63.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

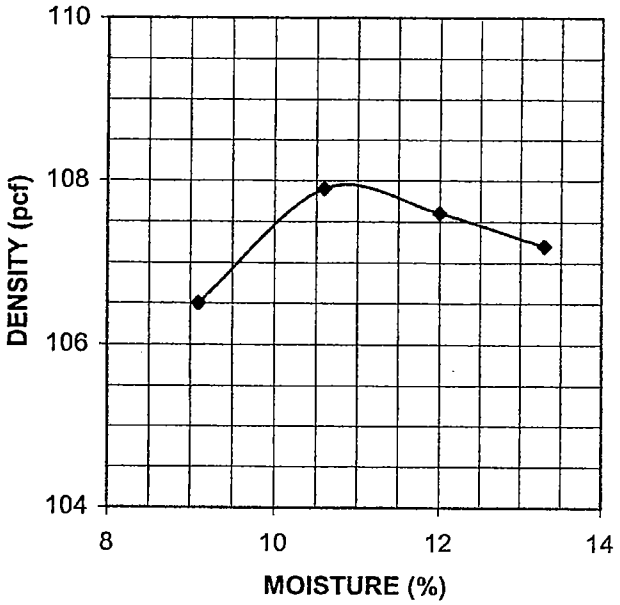


Figure 2: Moisture Content Versus Density

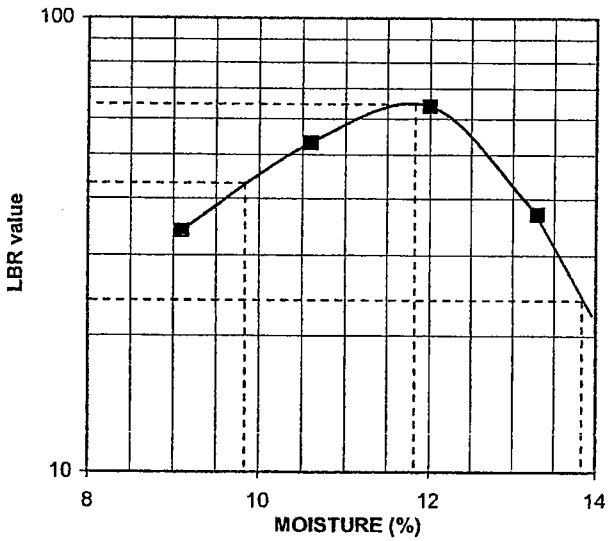


Figure 1: Moisture Content Versus LBR

Project Information

Project Name:	I-4 / SR 46
Client Project No:	
GEC Project No:	2174G

Sample Information

Location:	2857+00 105'LT 0'-2'
Date Tested:	11-19-05
Material Description:	(A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)=	10.9
Max. Dry Density (pcf)=	107.9

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture=	64.0
LBR at -2% of Optimum LBR Moisture=	41.0
LBR at +2% of Optimum LBR Moisture=	23.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

LIMEROCK BEARING RATIO TEST REPORT

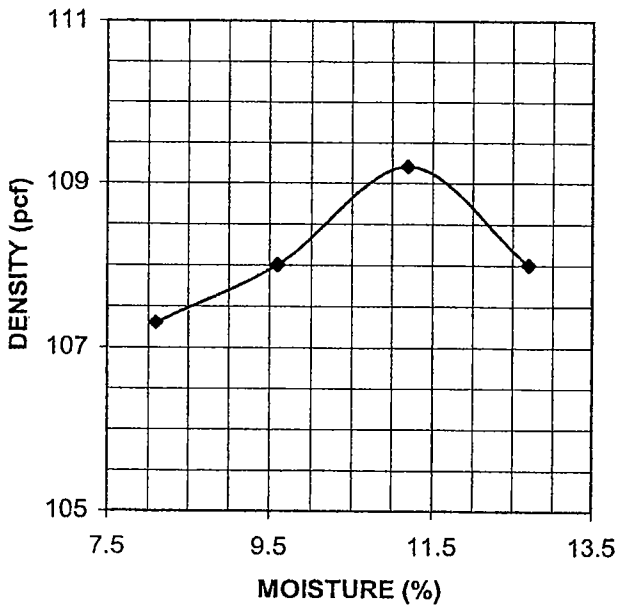


Figure 2: Moisture Content Versus Density

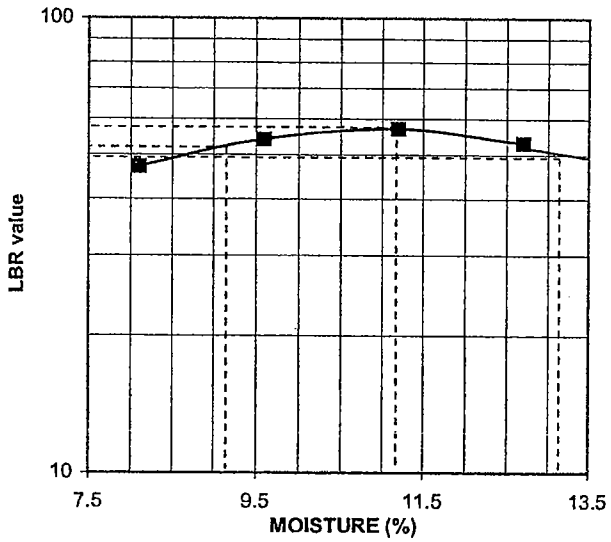


Figure 1: Moisture Content Versus LBR

Project Information

Project Name: I-4 / SR 46
Client Project No:

GEC Project No: 2174G

Sample Information

Location: 2858+00 176'LT 0'-2'

Date Tested: 11-19-05

Material Description: (A-3)

Modified Proctor Test Results (FM 5-521)

Optimum Moisture (%)= 11.2

Max. Dry Density (pcf)= 109.2

LBR Test Results (FM 5-515)

Maximum LBR at Optimum LBR Moisture= 56.0

LBR at -2% of Optimum LBR Moisture= 52.0

LBR at +2% of Optimum LBR Moisture= 50.0

Designed by Mike Marshall

Geotechnical and Environmental Consultants, Inc.

APPENDIX C

TYPICAL SECTION

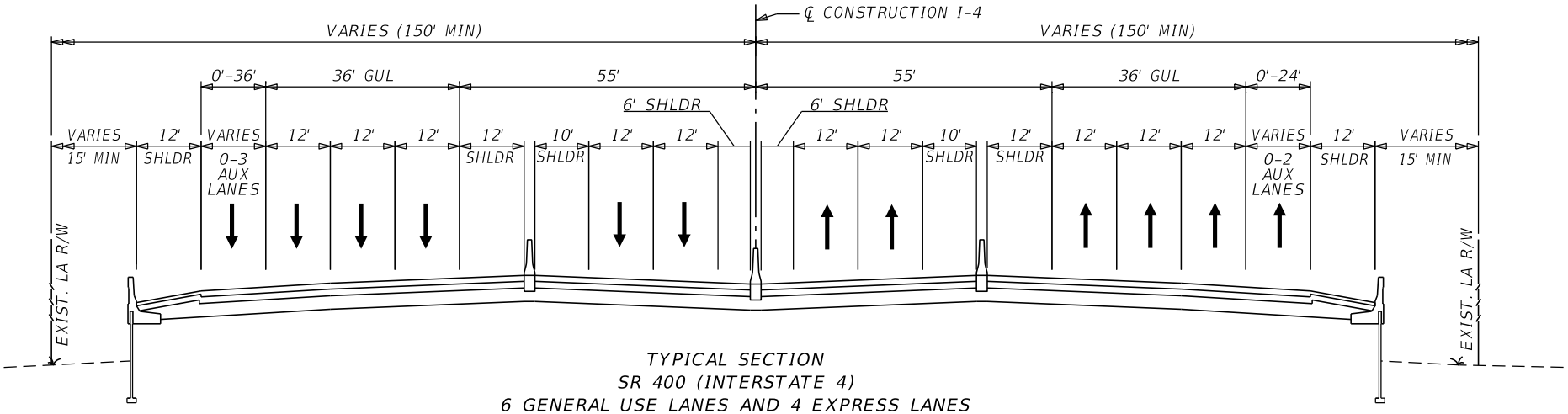
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 432100-1-22-01 FEDERAL AID PROJECT NO. N/A COUNTY NAME SEMINOLE

SECTION NO. 77160 ROAD DESIGNATION I-4 (SR 400) LIMITS/MILEPOST MP 4.050 - 14.135 (SEMINOLE)

PROJECT DESCRIPTION I-4 WIDENING FROM WEST OF EE WILLIAMSON TO EAST OF US 17-92.

PROPOSED ROADWAY TYPICAL SECTION



TYPICAL SECTION
SR 400 (INTERSTATE 4)
6 GENERAL USE LANES AND 4 EXPRESS LANES
MP 3.407 TO 10.101 (SEMINOLE COUNTY)
MP 14.128 TO 14.210 (SEMINOLE COUNTY)
(STA. 2012+60.00 TO STA. 2366+05.50)
(STA. 2578+71.18 TO STA. 2583+00.00)
DESIGN SPEED = 70 MPH

APPROVED BY:	FDOT CONCURRENCE	FHWA CONCURRENCE
ROBERT M. DENNEY, P.E. Date Engineer Of Record 58593 HNTB CORPORATION 610 CRESCENT EXECUTIVE CT. SUITE 400 LAKE MARY, FL 32746 (407) 805-0355 CERT OF AUTH NO 6500	ANNETTE K. BRENNAN, P.E. Date FDOT District Design Engineer	FHWA Transportation Engineer Date

anmiller 3/7/2014 11:20:41 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\43210012201\Segment 3\roadway\TYPDRD301.DGN

APPENDIX D

PAVEMENT DESIGN CALCULATIONS

Pavement Design For New Pavement (Flexible)

Project: SR 400 (I-4) Mainline

Opening + 20 years =

Given: $ESAL_D$ = 28,344,000 — Traffic Level D

M_R = 10,500 psi

Assume a 90% reliability

1.0 From table 5.3, the Structural Number Required (SN_R) = 5.15

2.0

SN_R	=	SN_C										
5.15	=	a_1	D_1	+	a_2	D_2	+	a_3	D_3	+	a_4	D_4
5.15	=	0	0.75	+	a_2	D_2	+	a_3	D_3	+	0.08	12
5.15	=		0.00	+	a_2	D_2	+	a_3	D_3	+		0.96
4.19	=				a_2	D_2	+	a_3	D_3			

3.0 With the following eqn. find the base group from table 5.9

4.19	=	a_2	D_2	+	a_3	D_3

Base group 11 yields a 5.00 inch structural course with an SN of 4.27

Note: the structural number found in table 5.9 must be slightly larger than the $a_2D_2 + a_3D_3$ ratio

4.0

Calculate the Structural number (SN_C), so that it is equal to or larger than SN_R.

Material	Thickness	Coefficient	SN_C	
Structural Course	5.00	0.44	2.20	see table 5.4
Base (OBG 11 - 12" Limerock - LBR 100)	12.00	0.18	2.16	see table 5.6
Stabilization (LBR 40)	12.00	0.08	0.96	
Total thickness	29.00 inches	SN_C=	5.32	

$SN_C \geq SN_R$

$5.32 \geq 5.15$

New Pavement Design (Modulus of Subgrade Reaction = 200) (Rigid)

REQUIRED DEPTH (D_R) FOR 90% RELIABILITY — From table 3.2

ESAL 39,992,000

ESAL's — Depth — Region: 2 — Table E.3

40,000,000 — 12" — Table E-7 from the 2009 FDOT Rigid Pavement Design Manual - Based on MEPDG with Tied Concrete Shoulders

use: **12.5"** — When designing with MEPDG tables, Mainline Slab thickness must be increased by 1/2" and a 14' slab used

Pavement Design For New Pavement (Flexible)

Project: SR 400 (I-4) Mainline Shoulder

Opening Year 2020

Design Year 2040

Given: $ESAL_D$ = 850,320 Traffic Level B

M_R = 10,500 psi

Assume a 90% reliability

1.0 From table 5.3 (or A.4a), the Structural Number Required (SN_R) = 2.98

2.0

SN_R	=		SN_C									
2.98	=	a_1	D_1	+	a_2	D_2	+	a_3	D_3	+	a_4	D_4
2.98	=	0	0.75	+	a_2	D_2	+	a_3	D_3	+	0.08	12
2.98	=	0.00		+	a_2	D_2	+	a_3	D_3	+	0.96	
2.02	=				a_2	D_2	+	a_3	D_3			

3.0 With the following eqn. find the base group from table 5.9

2.02	=	a_2	D_2	+	a_3	D_3

Base group 5 yields a 2.00 inch structural course with an SN of 2.05

Note: the structural number found in table 5.9 must be slightly larger than the $a_2D_2 + a_3D_3$ ratio

4.0 Calculate the Structural number (SN_C), so that it is equal to or larger than SN_R.

Material	Thickness	Coefficient	SN_C	
Structural Course (Traffic Level B)	2.00	0.44	0.88	see table 5.4
Base (OBG 5- LBR 100)	7.00	0.18	1.26	see table 5.6
Stabilization (LBR 40)	12.00	0.08	0.96	

SN_C= 3.10

$SN_C \geq SN_R$

3.10 ≥ 2.98

APPENDIX E

LIFE CYCLE COST ANALYSIS

FLORIDA DEPARTMENT OF TRANSPORTATION

PAVEMENT TYPE SELECTION SPREADSHEET

PROJECT DESCRIPTION:

Financial Project ID:	432100-1-22-01
State Road Number:	SR 400
County:	Seminole
Project Length:	10 Miles
Roadway ID:	77160000
Begining MP:	
Ending MP:	
Transportation System:	
Type of Work	
Design Version	

432100-1-22-01				
LIST OF CONSTRUCTION ITEMS				
Pay Item	**Description**	**Mean Price**	**St. Deviation**	**Unit**
160 4	Type B Stabilized (LBR 40)	$3.25		Sq. Yd
285 7	OBG-1, Type B-12.5	$9.14		Sq. Yd
285 7	OBG-5	$9.54		Sq. Yd
285 7	OBG-11	$12.71		Sq. Yd
327 70	Milling 1" Avg. Depth	$2.08		Sq. Yd
327 70	Milling 3" Avg. Depth	$2.00		Sq. Yd
334 1	Type SP Traffic Level B	$85.00		Ton
334 1	Type SP Traffic Level D	$85.00		Ton
334 1	Type SP Traffic Level D PG76-22	$92.00		Ton
350 1	JPCP	$55.00		Sq. Yd
353 70	CPR - Slab Replacement (3%)	$400.00		Cu. Yd
353 70	CPR - Slab Replacement (5%)	$400.00		Cu. Yd
446 1	Edgedrain (Draincrete)	$26.72		Ft
446 71	Edgedrain Outlet Pipe (4 in)	$30.68		Ft

LIFE CYCLE COST ANALYSIS

JOINTED PLAIN CONCRETE PAVEMENT DESIGN (RIGID PAVEMENT)

Financial Project ID:432100-1-22-01, SR No.-SR 400, County:Seminole

Project Length: 10 Miles, Roadway ID: 77160000

Begining MP: , Ending MP:

Definitions:

Length of Section:	5280	Ft			Analysis Period:	40	
Passing Lane Width:	12	Ft			Discount Rate:	3.5	
Travel Lane Width:	14	Ft			Initial Year of Construction:	2020	
Inside Shoulder Width:	18	Ft			No. of Passing Lanes:	3	
Outside Shoulder Width:	18	Ft			No. of Travel Lanes:	2	
Total Pavement Area:	675,840	Sq. Ft			No. of Travel Directions:	2	
Total Shoulder Area:	380,160	Sq. Ft	63,360	Long. Concrete Joints (Ft)	45,056	Trans. Concrete Joints (Ft)	

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
INITIAL CONSTRUCTION IN YEAR:	**0**						
MAINLINE:							
JPCP	12.5	75,093.3	Sq. Yd	$55.00	$0.00	$4,130,133	$4,130,133
OBG-1, Type B-12.5	4	75,093.3	Sq. Yd	$9.14	$0.00	$686,353	$686,353
Type B Stabilized (LBR 40)	12	75,093.3	Sq. Yd	$3.25	$0.00	$244,053	$244,053
Edgedrain (Draincrete)	1	10,560.0	Ft	$26.72	$0.00	$282,163	$282,163
Edgedrain Outlet Pipe (4 in)	1	50.0	Ft	$30.68	$0.00	$1,534	$1,534
SHOULDER:							
Type SP Traffic Level B	2	4,593.6	Ton	$85.00	$0.00	$390,456	$390,456
OBG-5	7	42,240.0	Sq. Yd	$9.54	$0.00	$402,970	$402,970
Type B Stabilized (LBR 40)	12	42,240.0	Sq. Yd	$3.25	$0.00	$137,280	$137,280
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**23**						
MAINLINE:							
CPR - Slab Replacement (3%)	12.5	782.2	Cu. Yd	$400.00	$0.00	$312,889	$141,828
SHOULDER:							
Milling 1" Avg. Depth	1	42,240.0	Sq. Yd	$2.08	$0.00	$87,859	$39,825
Type SP Traffic Level B	1	2,296.8	Ton	$85.00	$0.00	$195,228	$88,494
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				

LIFE CYCLE COST ANALYSIS

JOINTED PLAIN CONCRETE PAVEMENT DESIGN (RIGID PAVEMENT)

Financial Project ID:432100-1-22-01, SR No.-SR 400, County:Seminole

Project Length: 10 Miles, Roadway ID: 77160000

Begining MP: , Ending MP:

Definitions:

Length of Section:	5280	Ft			Analysis Period:	40	
Passing Lane Width:	12	Ft			Discount Rate:	3.5	
Travel Lane Width:	14	Ft			Initial Year of Construction:	2020	
Inside Shoulder Width:	18	Ft			No. of Passing Lanes:	3	
Outside Shoulder Width:	18	Ft			No. of Travel Lanes:	2	
Total Pavement Area:	675,840	Sq. Ft			No. of Travel Directions:	2	
Total Shoulder Area:	380,160	Sq. Ft	63,360	Long. Concrete Joints (Ft)	45,056	Trans. Concrete Joints (Ft)	

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
REHABILITATION IN YEAR:	**33**						
MAINLINE:							
CPR - Slab Replacement (5%)	12.5	1,303.7	Cu. Yd	$400.00	$0.00	$521,481	$167,574
SHOULDER:							
Milling 1" Avg. Depth	1	42,240.0	Sq. Yd	$2.08	$0.00	$87,859	$28,233
Type SP Traffic Level B	1	2,296.8	Ton	$85.00	$0.00	$195,228	$62,735
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**40**						
MAINLINE:							
SHOULDER:							
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:							

TOTAL INITIAL CONSTRUCTION COST (YEAR 2020):	$6,274,943
TOTAL PRESENT WORTH REHABILITATION COST:	$528,690
TOTAL PRESENT WORTH SALVAGE VALUE:	$0
PRESENT WORTH:	$6,803,632

LIFE CYCLE COST ANALYSIS

ASPHALT CONCRETE PAVEMENT DESIGN (FLEXIBLE PAVEMENT)

Financial Project ID:432100-1-22-01, SR No.-SR 400, County:Seminole

Project Length: 10 Miles, Roadway ID: 77160000

Begining MP: , Ending MP:

Definitions:

Length of Section:	5280	Ft	Analysis Period:	40
Passing Lane Width:	12	Ft	Discount Rate:	3.5
Travel Lane Width:	12	Ft	Initial Year of Construction:	2020
Inside Shoulder Width:	18	Ft	No. of Passing Lanes:	5
Outside Shoulder Width:	22	Ft	No. of Travel Lanes:	
Total Pavement Area:	633,600	Sq. Ft	No. of Travel Directions:	2
Total Shoulder Area:	422,400	Sq. Ft		

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
INITIAL CONSTRUCTION IN YEAR:	**0**						
MAINLINE:							
Type SP Traffic Level D PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$704,352
Type SP Traffic Level D	3	11,484.0	Ton	$85.00	$0.00	$976,140	$976,140
OBG-11	12	70,400.0	Sq. Yd	$12.71	$0.00	$894,784	$894,784
Type B Stabilized (LBR 40)	12	70,400.0	Sq. Yd	$3.25	$0.00	$228,800	$228,800
SHOULDER:							
Type SP Traffic Level B	2	5,104.0	Ton	$85.00	$0.00	$433,840	$433,840
OBG-5	7	46,933.3	Sq. Yd	$9.54	$0.00	$447,744	$447,744
Type B Stabilized (LBR 40)	12	46,933.3	Sq. Yd	$3.25	$0.00	$152,533	$152,533
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**16**						
MAINLINE:							
Milling 3" Avg. Depth	3	70,400.0	Sq. Yd	$2.00	$0.00	$140,800	$81,200
Type SP Traffic Level D PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$406,204
Type SP Traffic Level D	2	7,656.0	Ton	$85.00	$0.00	$650,760	$375,297
SHOULDER:							
Milling 1" Avg. Depth	1	46,933.3	Sq. Yd	$2.08	$0.00	$97,621	$56,299
Type SP Traffic Level B	2	5,104.0	Ton	$85.00	$0.00	$433,840	$250,198
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				

LIFE CYCLE COST ANALYSIS

ASPHALT CONCRETE PAVEMENT DESIGN (FLEXIBLE PAVEMENT)

Financial Project ID:432100-1-22-01, SR No.-SR 400, County:Seminole

Project Length: 10 Miles, Roadway ID: 77160000

Begining MP: , Ending MP:

Definitions:

Length of Section:	5280	Ft	Analysis Period:	40
Passing Lane Width:	12	Ft	Discount Rate:	3.5
Travel Lane Width:	12	Ft	Initial Year of Construction:	2020
Inside Shoulder Width:	18	Ft	No. of Passing Lanes:	5
Outside Shoulder Width:	22	Ft	No. of Travel Lanes:	
Total Pavement Area:	633,600	Sq. Ft	No. of Travel Directions:	2
Total Shoulder Area:	422,400	Sq. Ft		

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
REHABILITATION IN YEAR:	**32**						
MAINLINE:							
Milling 3" Avg. Depth	3	70,400.0	Sq. Yd	$2.00	$0.00	$140,800	$46,829
Type SP Traffic Level D PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$234,260
Type SP Traffic Level D	2	7,656.0	Ton	$85.00	$0.00	$650,760	$216,436
SHOULDER:							
Milling 1" Avg. Depth	1	46,933.3	Sq. Yd	$2.08	$0.00	$97,621	$32,468
Type SP Traffic Level B	2	5,104.0	Ton	$85.00	$0.00	$433,840	$144,291
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**48**						
MAINLINE:							
SHOULDER:							
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:							

TOTAL INITIAL CONSTRUCTION COST (YEAR 2020):	$3,838,193
TOTAL PRESENT WORTH REHABILITATION COST:	$1,843,482
TOTAL PRESENT WORTH SALVAGE VALUE:	$256,029
PRESENT WORTH:	$5,425,646

FLORIDA DEPARTMENT OF TRANSPORTATION
PAVEMENT TYPE SELECTION
ECONOMIC ANALYSIS
COST PER MILE

Analysis Period: 40 Years Discount Rate: 3.5%

PCC PAVEMENT

		Cost		P / F		PRESENT WORTH
	Initial	$6,274,943	*	1.00000	=	$6,274,943
23	Year	$595,976	*	0.45329	=	$270,147
33	Year	$804,569	*	0.32134	=	$258,542
40	Year		*		=	
	Year					
				TOTAL AGENCY COSTS	=	**$6,803,632**
				USER COSTS	=	
		Remaining Service Life		**PW of Last Rehab at Year 40**		
SALVAGE VALUE		0 / 7	*	$203,212	=	**$0**
				TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$6,803,632**

AC PAVEMENT

		Cost		P / F		PRESENT WORTH
	Initial	$3,838,193	*	1.00000	=	$3,838,193
16	Year	$2,027,373	*	0.57671	=	$1,169,198
32	Year	$2,027,373	*	0.33259	=	$674,284
48	Year		*		=	
	Year					
				TOTAL AGENCY COSTS	=	**$5,681,675**
				USER COSTS	=	
		Remaining Service Life		**PW of Last Rehab at Year 40**		
SALVAGE VALUE		8 / 16	*	$512,059	=	**$256,029**
				TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$5,425,646**

COST COMPARISON

DIFFERENCE IN TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$1,377,987**
AVERAGE TOTAL PRESENT WORTH	=	**$6,114,639**
PERCENT DIFFERENCE IN TOTAL PRESENT WORTH	=	**22.5%**
DIFFERENCE IN ESTIMATED INITIAL COSTS	=	**$2,436,749**
PERCENT DIFFERENCE IN ESTIMATED INITIAL COSTS	=	**63.5%**
TOTAL PRESENT WORTH COST OF REHAB FOR PCC PAVEMENT	=	**$528,690**
TOTAL PRESENT WORTH COST OF REHAB FOR AC PAVEMENT	=	**$1,843,482**
DIFFERENCE IN TOTAL PRESENT WORTH OF REHAB COSTS (LCCF)	=	**$1,314,792**

Florida Department of Transportation
Item Average Unit Cost
From 2012/12/01 to 2013/11/30

Contract Type: CC STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0120 72	3	$78.08	$56,452.28	723.000	CY	N	GRAVEL FILL
0120 74	1	$10.00	$3,000.00	300.000	CY	N	SURCHARGE EMBANKMENT
0121 70	25	$117.27	$1,068,258.55	9,109.320	CY	N	FLOWABLE FILL
0125 1	6	$45.35	$746,136.64	16,453.000	CY	N	EXCAVATION FOR STRUCTURES
0125 3	1	$24.00	$12,192.00	508.000	CY	N	SELECT BEDDING MATERIAL
0142 70	1	$8.00	$244,776.00	30,597.000	CY	N	FILL SAND
0145 1	1	$2.80	$34,034.00	12,155.000	SF	N	GEOSYNTHETIC REINFORCED SOIL SLOPE
0145 2	5	$2.40	$229,567.54	95,489.000	SY	N	GEOSYNTHETIC REINF FND OVER SOFT SOIL
0145 71	4	$4.51	$114,157.00	25,289.000	SY	N	REINFORCEMENT GRID FOR SOIL STABILIZAT
0145 72	1	$36.00	$68,256.00	1,896.000	SY	N	CELLULAR CONFINEMENT FOR SOIL STABILIZAT
0160 4	91	$2.90	$9,209,039.24	3,175,666.600	SY	N	TYPE B STABILIZATION
0162 1 11	54	$.78	$1,392,783.57	1,789,858.900	SY	N	PREPARED SOIL LAYER, FINISH SOIL, 6"
0162 1 12	3	$6.73	$192,723.16	28,643.000	SY	N	PREPARED SOIL LAYER, FINISH SOIL, 12"
0162 1 33	2	$6.47	$19,914.72	3,078.000	SY	N	PREPARED SOIL LAYER, BLANKET, SPECIAL
0210 1 1	3	$.84	$15,497.22	18,428.000	SY	N	REWORKING LIMEROCK BASE, 6"
0210 1 8	1	$5.25	$7,612.50	1,450.000	SY	N	REWORKING LIMEROCK BASE, 4"
0210 1 9	2	$5.11	$27,265.79	5,330.600	SY	N	REWORKING LIMEROCK BASE, 3"
0210 2	3	$28.00	$25,730.61	919.000	CY	N	LIMEROCK-NEW MATERIAL FOR REWORKING BASE
0285701	61	$9.14	$2,552,912.05	279,227.300	SY	N	OPTIONAL BASE,BASE GROUP 01
0285702	9	$8.33	$1,098,688.77	131,946.000	SY	N	OPTIONAL BASE,BASE GROUP 02
0285703	4	$20.07	$424,418.92	21,145.000	SY	N	OPTIONAL BASE,BASE GROUP 03
0285704	20	$9.90	$3,108,391.62	313,968.600	SY	N	OPTIONAL BASE,BASE GROUP 04
0285705	6	$9.54	$314,141.27	32,932.500	SY	N	OPTIONAL BASE,BASE GROUP 05
0285706	21	$17.21	$2,161,346.02	125,594.000	SY	N	OPTIONAL BASE,BASE GROUP 06
0285707	7	$16.21	$588,736.20	36,314.000	SY	N	OPTIONAL BASE,BASE GROUP 07
0285708	4	$17.29	$128,881.10	7,454.000	SY	N	OPTIONAL BASE,BASE GROUP 08
0285709	50	$15.13	$9,050,910.62	598,203.000	SY	N	OPTIONAL BASE,BASE GROUP 09
0285710	15	$13.17	$3,215,051.65	244,208.000	SY	N	OPTIONAL BASE,BASE GROUP 10
0285711	16	$12.71	$9,097,582.24	715,591.000	SY	N	OPTIONAL BASE,BASE GROUP 11
0285712	11	$14.58	$3,604,357.56	247,243.000	SY	N	OPTIONAL BASE,BASE GROUP 12
0285713	9	$42.16	$1,412,490.07	33,504.000	SY	N	OPTIONAL BASE,BASE GROUP 13
0285714	1	$92.00	$69,828.00	759.000	SY	N	OPTIONAL BASE,BASE GROUP 14
0285715	19	$53.08	$7,900,891.59	148,858.500	SY	N	OPTIONAL BASE,BASE GROUP 15
0286 1	29	$11.55	$1,088,300.79	94,231.600	SY	N	TURNOUT CONSTRUCTION
0286 2	4	$136.00	$79,340.30	583.400	TN	N	TURNOUT CONSTRUCTION-ASPHALT
0287 1	1	$160.00	$929,600.00	5,810.000	CY	N	ASPHALT TREATED PERMEABLE BASE
0288001	1	$800.00	$357,600.00	447.000	CY	N	CEMENT TREATED PERMEABLE BASE
0327 70 1	62	$2.08	$3,371,283.27	1,620,037.000	SY	N	MILLING EXIST ASPH PAVT, 1" AVG DEPTH
0327 70 2	12	$2.15	$1,100,398.61	510,977.000	SY	N	MILLING EXIST ASPH PAVT,3 1/2" AVG DEPTH
0327 70 3	1	$6.25	$2,406.25	385.000	SY	N	MILLING EXIST ASPH PAVT,4 1/2" AVG DEPTH

Florida Department of Transportation
Item Average Unit Cost
From 2012/12/01 to 2013/11/30

Contract Type: CC STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0327 70 4	24	$2.00	$1,947,084.86	974,402.000	SY	N	MILLING EXIST ASPH PAVT, 3" AVG DEPTH
0327 70 5	38	$2.20	$4,209,995.91	1,909,682.000	SY	N	MILLING EXIST ASPH PAVT, 2" AVG DEPTH
0327 70 6	68	$1.65	$4,167,009.98	2,526,141.640	SY	N	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH
0327 70 7	6	$3.81	$542,965.39	142,401.100	SY	N	MILLING EXIST ASPH PAVT, 4" AVG DEPTH
0327 70 8	24	$2.02	$2,160,405.76	1,071,764.000	SY	N	MILLING EXIST ASPH PAVT,2 1/2" AVG DEPTH
0327 70 11	19	$1.80	$3,095,293.95	1,720,353.000	SY	N	MILLING EXIST ASPH PAVT,2 1/4" AVG DEPTH
0327 70 12	8	$1.55	$186,218.46	119,866.000	SY	N	MILLING EXIST ASPH PAVT,1 1/4" AVG DEPTH
0327 70 13	19	$2.16	$1,287,118.40	596,456.000	SY	N	MILLING EXIST ASPH PAVT,1 3/4" AVG DEPTH
0327 70 15	17	$1.47	$2,178,084.95	1,479,418.000	SY	N	MILLING EXIST ASPH PAVT,2 3/4" AVG DEPTH
0327 70 16	7	$1.48	$172,079.97	116,349.000	SY	N	MILLING EXIST ASPH PAVT, 1/2" AVG DEPTH
0327 70 17	5	$1.99	$1,190,474.38	598,791.000	SY	N	MILLING EXIST ASPH PAVT,3 1/4" AVG DEPTH
0327 70 19	26	$1.48	$1,285,958.40	868,739.000	SY	N	MILLING EXIST ASPH PAVT, 3/4" AVG DEPTH
0327 70 20	4	$1.59	$319,032.36	200,917.000	SY	N	MILLING EXIST ASPH PAVT,3 3/4" AVG DEPTH
0327 70 21	1	$8.00	$8,632.00	1,079.000	SY	N	MILLING EXIST ASPH PAVT, 7" AVG DEPTH
0327 70 22	2	$2.46	$22,249.15	9,061.000	SY	N	MILLING EXIST ASPH PAVT,4 1/4" AVG DEPT
0327 70 23	1	$7.45	$72,607.70	9,746.000	SY	N	MILLING EXIST ASPH PAVT, 6" AVG DEPTH
0327 70 26	2	$3.16	$51,215.01	16,197.000	SY	N	MILLING EXIST ASPH PAVT,4 3/4" AVG DEPTH
0327 70 30	1	$4.28	$64,957.56	15,177.000	SY	N	MILLING EXIST ASPH PAVT,11.5" AVG DEPTH
0334 1 11	14	$88.05	$1,338,400.29	15,200.090	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC A
0334 1 12	27	$80.30	$8,576,078.27	106,796.970	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC B
0334 1 13	69	$82.87	$58,366,261.83	704,300.840	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC C
0334 1 14	8	$81.94	$7,867,076.97	96,009.700	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC D
0334 1 22	16	$87.73	$7,363,169.34	83,927.400	TN	N	SUPERPAVE ASPH CONC, TRAF B, PG76-22,PMA
0334 1 23	26	$88.47	$27,114,100.74	306,488.300	TN	N	SUPERPAVE ASPH CONC, TRAF C, PG76-22,PMA
0334 1 24	21	$89.64	$24,005,122.54	267,782.500	TN	N	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA
0334 1 25	4	$82.67	$10,920,063.68	132,085.500	TN	N	SUPERPAVE ASPH CONC, TRAF E, PG76-22,PMA
0337 7 22	34	$119.11	$27,297,969.19	229,174.300	TN	N	ASPH CONC FC,INC BIT,FC-5,PG76-22,PMA
0337 7 24	2	$148.15	$925,548.50	6,247.300	TN	N	ASPH CONC FC, FC-5, PG 76-22, ARB
0337 7 40	14	$101.64	$3,797,296.10	37,360.000	TN	N	ASPH CONC FC,TRAFFIC B,FC-9.5,PG 76-22
0337 7 41	1	$83.08	$537,344.82	6,467.800	TN	N	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22
0337 7 42	8	$98.37	$6,188,539.15	62,912.000	TN	N	ASPH CONC FC,TRAFFIC C,FC-9.5,PG 76-22
0337 7 43	21	$99.46	$7,312,815.97	73,523.400	TN	N	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22
0337 7 45	7	$107.65	$1,426,399.09	13,250.000	TN	N	ASPH CONC FC,TRAFFIC D,FC-12.5,PG 76-22
0337 7 71	1	$115.00	$324,340.25	2,820.350	TN	N	ASPH CONC FC,TRAF B,FC-9.5,PG 76-22, ARB
0337 7 73	5	$94.89	$1,466,351.62	15,453.670	TN	N	ASPH CONC FC,TRAF C,FC-9.5,PG 76-22, ARB
0337 7 74	2	$96.73	$3,465,324.27	35,824.300	TN	N	ASPH CONC FC,TRAF C,FC-12.5,PG 76-22,ARB
0339 1	89	$160.05	$3,314,504.33	20,709.140	TN	N	MISCELLANEOUS ASPHALT PAVEMENT
0341 70	4	$6.01	$445,994.48	74,192.000	SY	N	ASPHALT RUBBER MEMBRANE INTERLAYER
0350 1 1	1	$50.00	$18,150.00	363.000	SY	N	PLAIN CEMENT CONC PAVT, 6"
0350 1 3	1	$55.00	$861,465.00	15,663.000	SY	N	PLAIN CEMENT CONC PAVT, 8"

Florida Department of Transportation
Item Average Unit Cost
From 2012/12/01 to 2013/11/30

Contract Type: CC STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0350 1 4	1	$60.00	$38,280.00	638.000	SY	N	PLAIN CEMENT CONC PAVT, 9"
0350 1 13	1	$51.00	$1,922,190.00	37,690.000	SY	N	PLAIN CEMENT CONC PAVT, 11 1/2"
0350 1 20	1	$62.23	$2,052,220.94	32,978.000	SY	N	PLAIN CEMENT CONC PAVT, 9 1/2"
0350 2 10	1	$86.00	$25,800.00	300.000	SY	N	CEMENT CONC PAVT REINFORCED,12"
0350 72	4	$1.97	$630,256.10	319,577.000	LF	N	CLEANING & RESEALING JOINTS - CONC PVMT
0350 78	3	$3.44	$67,170.00	19,506.000	LF	N	CLEANING & SEALING RAN CRACKS CONC PVMT
0352 70	6	$3.98	$1,280,228.49	321,803.000	SY	N	GRINDING CONCRETE PAVT
0353 70	3	$469.87	$4,364,490.00	9,288.700	CY	N	CONC PAVT SLAB REPLACEMENT
0370 1	1	$85.00	$4,930.00	58.000	LF	N	BRIDGE APPR EXP JOINT FOR CONC PVMT
0400 0 11	41	$432.15	$3,706,945.66	8,578.000	CY	N	CONC CLASS NS, GRAVITY WALL
0400 0 13	3	$1,549.72	$18,751.64	12.100	CY	N	CONC CLASS NS, STEPS
0400 1 2	39	$801.84	$728,940.07	909.080	CY	N	CONC CLASS I, ENDWALLS
0400 1 11	1	$2,361.61	$6,140.19	2.600	CY	N	CONC CLASS I, RETAINING WALLS
0400 2 1	3	$788.11	$1,332,537.58	1,690.800	CY	N	CONC CLASS II, CULVERTS
0400 2 4	18	$613.85	$8,745,000.56	14,246.200	CY	N	CONC CLASS II, SUPERSTRUCTURE
0400 2 5	11	$726.77	$1,647,234.62	2,266.500	CY	N	CONC CLASS II, SUBSTRUCTURE
0400 2 10	26	$375.80	$1,929,119.73	5,133.300	CY	N	CONC CLASS II, APPROACH SLABS
0400 2 11	6	$531.10	$590,587.50	1,112.000	CY	N	CONC CLASS II, RETAINING WALLS
0400 2 12	3	$675.38	$261,303.74	386.900	CY	N	CONC CLASS II, TRENCH SLAB
0400 2 25	2	$442.43	$143,745.00	324.900	CY	N	CONC CLASS II, MASS, SUBSTRUCTURE
0400 3 20	3	$1,165.88	$277,713.00	238.200	CY	N	CONC CLASS III, SEAL
0400 4 1	11	$768.29	$1,557,250.44	2,026.900	CY	N	CONC CLASS IV, CULVERTS
0400 4 4	9	$843.44	$2,766,077.46	3,279.500	CY	N	CONC CLASS IV, SUPERSTRUCTURE
0400 4 5	23	$968.30	$5,034,251.58	5,199.080	CY	N	CONC CLASS IV, SUBSTRUCTURE
0400 4 6	1	$250.00	$28,000.00	112.000	CY	N	CONC CLASS IV, COUNTERWEIGHT
0400 4 8	9	$648.87	$1,458,020.86	2,247.000	CY	N	CONC CLASS IV, BULKHEAD
0400 4 11	9	$567.51	$1,941,408.17	3,420.900	CY	N	CONC CLASS IV, RETAINING WALLS
0400 4 25	6	$695.90	$1,565,505.00	2,249.600	CY	N	CONC CLASS IV, MASS, SUBSTRUCTURE
0400 7	6	$4.26	$103,002.55	24,153.000	SY	N	BRIDGE DECK GROOVING, LESS THAN 8.5"
0400 9	18	$9.19	$288,351.28	31,372.000	SY	N	BRIDGE DECK GROOV &PLANING, DECK 8.5"&>
0400 32	1	$14,800.00	$128,760.00	8.700	CY	N	CONCRETE FOR JOINT REPAIR
0400 60 1	4	$39,460.60	$197,303.00	5.000	LS	N	CATHODIC PROTECTION-ELECT WORK, AC POW
0400 60 3	4	$80.27	$939,256.70	11,701.000	LF	N	CATHODIC PROTECTION-ELECT WORK, CODUIT,
0400 60 4	4	$137,303.98	$686,519.90	5.000	LS	N	CATHODIC PROTECTION-ELECT WORK, EQUIP,
0400 91	1	$2,500.00	$5,000.00	2.000	EA	N	DEWATERING FOR SPREAD FOOTINGS
0400142 3	4	$22.03	$1,726,983.85	78,409.000	SF	N	CATHODIC PROTECTION SYSTEM, ZINC ALUM SP
0400142 7	3	$52.19	$1,820,808.74	34,889.600	SF	N	CATHODIC PROTECTION SYSTEM,TITANIUM MESH
0400142 9	1	$148.00	$258,556.00	1,747.000	SF	N	CATHODIC PROTECTION SYSTEM,OTHER MATRL
0400143	10	$1.04	$474,547.92	457,295.200	SF	N	CLEAN & COAT CONCRETE SURF , CLASS 5
0400145	1	$1.10	$2,472.80	2,248.000	SF	N	CLEANING CONC SURFACE

Florida Department of Transportation
Item Average Unit Cost
From 2012/12/01 to 2013/11/30

Contract Type: CC STATEWIDE
Displaying: VALID ITEMS WITH HITS
From: 0102 1 To: 9999999

Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description
0431 1 1	5	$106.03	$302,918.35	2,857.000	LF	N	PIPE LINER, OPTIONAL MATERIAL, 0-24"
0431 1 2	2	$146.39	$43,624.00	298.000	LF	N	PIPE LINER, OPTIONAL MATERIAL, 25-36"
0431 1 3	1	$275.00	$215,325.00	783.000	LF	N	PIPE LINER, OPTIONAL MATERIAL, 37-48"
0432 3 7	1	$3,000.00	$3,000.00	1.000	EA	N	CHEM GROUT REPAIR, PIPE,NON-TEST,42"
0433 1	1	$780.00	$35,880.00	46.000	EA	N	CHEM GROUT REPAIR, MANHOLE / INLET
0436 1 1	10	$144.83	$235,178.54	1,623.850	LF	N	TRENCH DRAIN, STANDARD
0440 1 10	1	$33.03	$40,759.02	1,234.000	LF	N	UNDERDRAIN, TYPE I
0440 1 20	5	$24.10	$209,565.63	8,694.000	LF	N	UNDERDRAIN, TYPE II
0440 1 50	1	$40.00	$10,400.00	260.000	LF	N	UNDERDRAIN, TYPE V
0440 1 60	1	$94.50	$10,395.00	110.000	LF	N	UNDERDRAIN, TYPE SPECIAL
0440 70	3	$1,181.27	$30,712.90	26.000	EA	N	UNDERDRAIN INSPECTION BOX
0440 73 1	3	$40.55	$4,744.04	117.000	LF	N	UNDERDRAIN OUTLET PIPE, 4"
0440 73 2	3	$18.46	$16,296.61	883.000	LF	N	UNDERDRAIN OUTLET PIPE, 6"
0440 73 3	1	$32.73	$7,233.33	221.000	LF	N	UNDERDRAIN OUTLET PIPE, 8"
0443 70 3	3	$148.41	$47,936.30	323.000	LF	N	FRENCH DRAIN, 18"
0443 70 4	7	$116.83	$1,025,962.00	8,782.000	LF	N	FRENCH DRAIN, 24"
0443 70 6	2	$170.95	$77,099.50	451.000	LF	N	FRENCH DRAIN, 36"
0444 70 11	3	$172.32	$41,356.60	240.000	LF	N	DEEP WELL- OPEN HOLE, 24"
0444 71 11	3	$186.16	$180,573.10	970.000	LF	N	DEEP WELL CASING, 24"
0444 72 11	1	$53.99	$16,197.00	300.000	LF	N	DEEP WELL CLEANING, 24"
0446 1 1	2	$26.72	$213,892.08	8,004.000	LF	N	EDGEDRAIN DRAINCRETE, STANDARD
0446 71 1	5	$30.68	$56,568.70	1,844.000	LF	N	EDGEDRAIN OUTLET PIPE, 4"
0448 73	2	$2,796,237.41	$5,592,474.82	2.000	LS	N	PUMPING STATION- DRAINAGE
0450 1251	1	$175.00	$253,750.00	1,450.000	LF	N	PREST BEAMS, INVERTED T FROM FIB, 26.5"
0450 2 36	8	$198.05	$3,581,784.20	18,085.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 36"
0450 2 45	6	$201.47	$2,155,972.99	10,701.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 45"
0450 2 54	2	$219.80	$1,522,740.00	6,928.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 54"
0450 2 63	1	$215.00	$365,930.00	1,702.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 63"
0450 2 84	1	$250.00	$332,250.00	1,329.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 84"
0450 82	1	$175.00	$36,750.00	210.000	LF	N	BEAMS REPAIR
0450 83 1	2	$587.42	$56,392.40	96.000	EA	N	BEAM REPAIR, STRAND SPLICES
0450 88 20	1	$71.00	$127,161.00	1,791.000	SF	N	PRESTR SLAB UNITS TRANSV POST TENS, 20"
0451 70	3	$3,253.50	$1,063,894.32	327.000	EA	N	PREST SOIL ANCHORS
0451 70 1	3	$782.28	$32,073.55	41.000	EA	N	PREST SOIL ANCHOR, PERFORMANCE TEST
0451 70 2	3	$1,095.52	$29,579.03	27.000	EA	N	PREST SOIL ANCHOR, CREEP TEST
0455 14 3	2	$89.64	$520,335.80	5,805.000	LF	N	CONC SHEET PILING, 10"X30"
0455 14 4	1	$379.05	$191,041.20	504.000	LF	N	CONC SHEET PILING, 12"X30"
0455 18	10	$9,542.16	$314,891.21	33.000	LS	N	PROTECTION OF EXISTING STRUCTURES
0455 34 2	2	$72.14	$1,206,550.00	16,726.000	LF	N	PRESTRESSED CONCRETE PILING, 14" SQ.
0455 34 3	9	$70.25	$3,470,413.05	49,398.000	LF	N	PRESTRESSED CONCRETE PILING, 18" SQ

APPENDIX F

PAVEMENT PERFORMANCE DATA

Rehabilitation Age by Year

For Seminole County
27FEB2014
Other Conditions: Pavement= Asphalt

Year Rehabilitated	Lane Miles Rehabilitated	Average Rehabilitation Age	Standard Deviation
2006	17.1	20.0	5.3
2007	29.5	12.8	3.2
2008	42.3	20.1	9.2
2009	15.1	13.9	6.6
2010	43.6	16.0	1.9
2011	33.2	22.1	11.3
2012	6.5	15.0	0.0
2013	39.9	14.7	5.3

Deficient Rehabilitation age by Year

13JUN2012

For Orange County

Other Conditions: Pavement= Asphalt
Surface Type in (FC2)

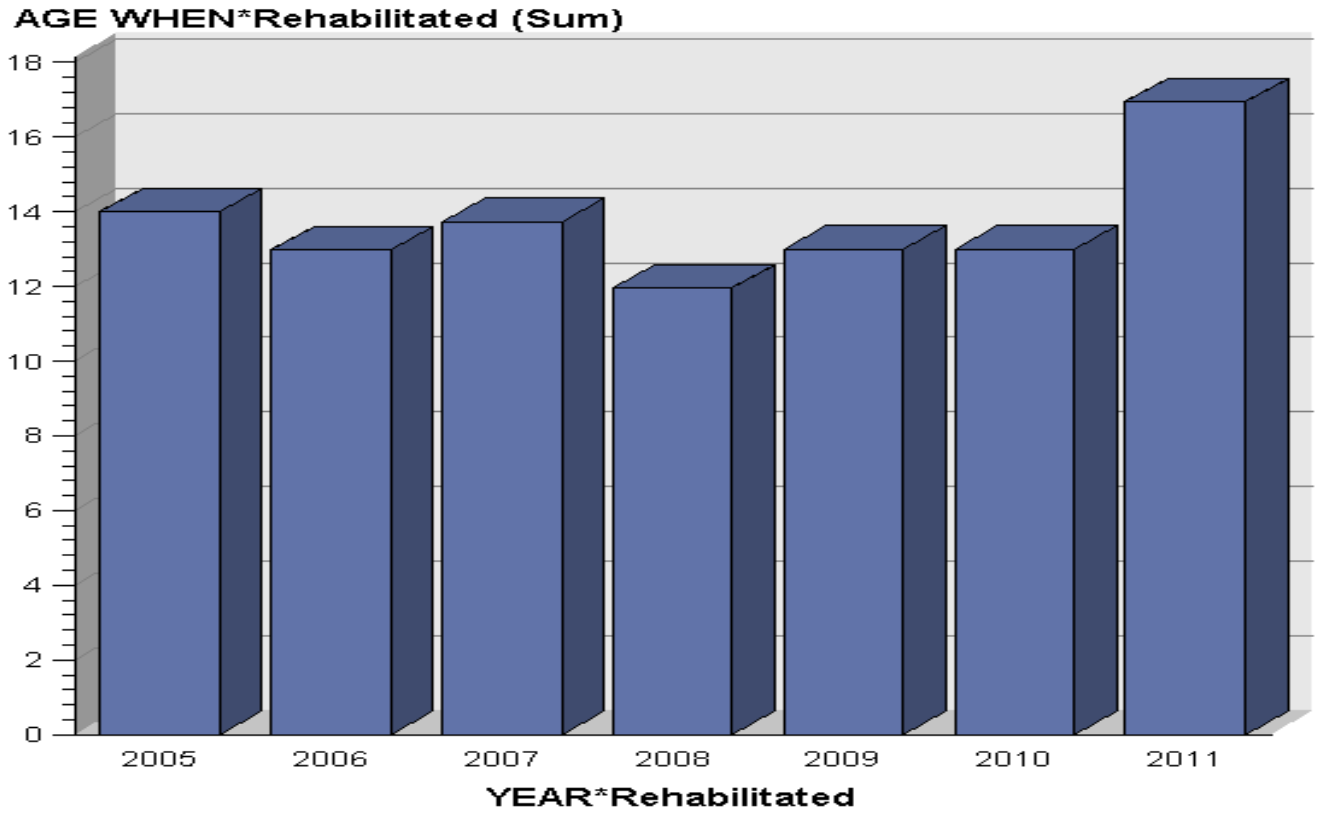
Year Rehabilitated	Lane Miles Rehabilitated	Average Rehabilitation Age	Standard Deviation
2005	5.0	14.0	0.0
2006	7.5	13.0	1.1
2007	62.6	13.7	2.6
2008	36.4	12.0	0.2
2009	35.6	13.0	0.0
2010	11.3	13.0	0.0
2011	27.8	16.9	3.1

Deficient Rehabilitation age by Year

13JUN2012

For Orange County

Other Conditions: Pavement= Asphalt
Surface Type in (FC2)



13JUN2012

Deficient Rehabilitation age by Year

For Hillsborough County

Other Conditions: Pavement= Concrete

Surface Type in (CONC)

Year Rehabilitated	Lane Miles Rehabilitated	Average Rehabilitation Age	Standard Deviation
2006	10.8	20	0
2007	26.7	25	0
2008	9.3	22	0

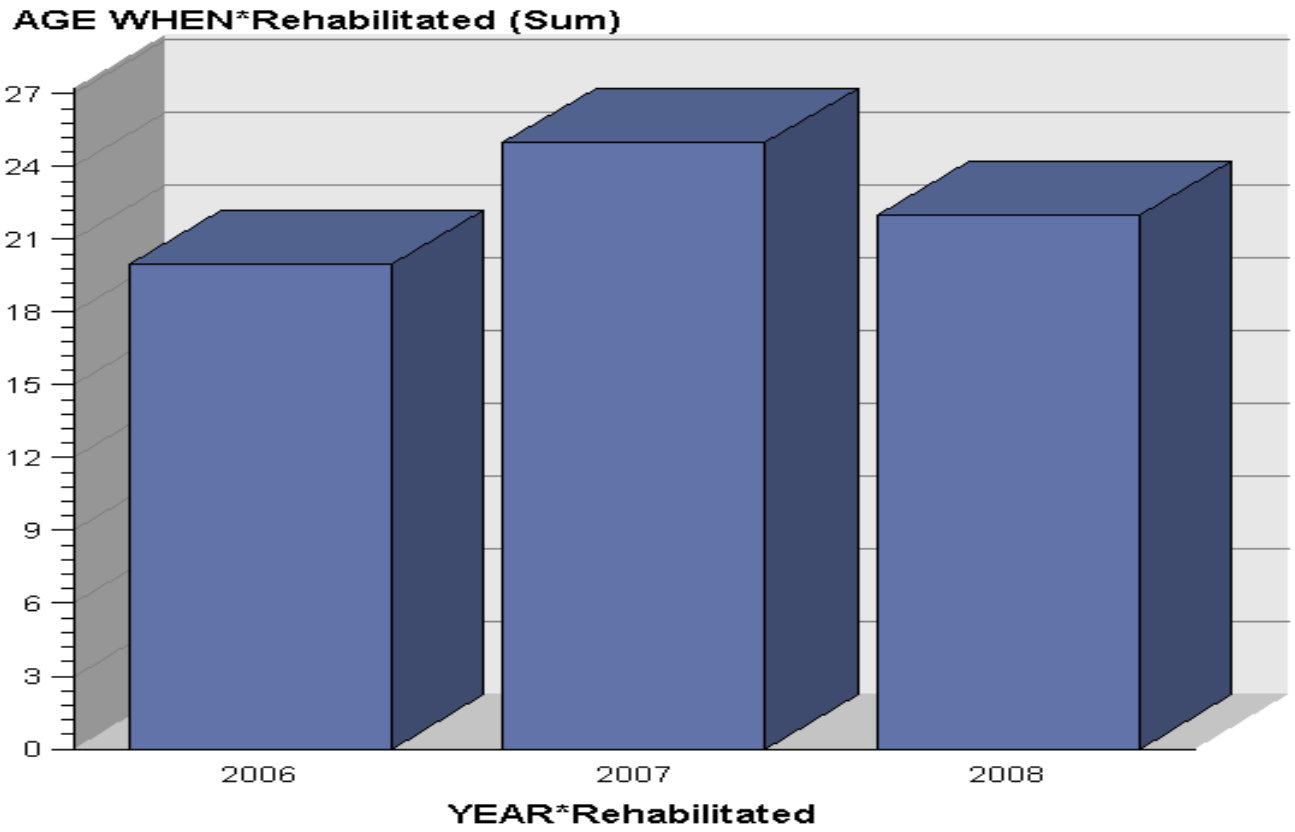
13JUN2012

Deficient Rehabilitation age by Year

For Hillsborough County

Other Conditions: Pavement= Concrete

Surface Type in (CONC)



APPENDIX G

QUALITY CONTROL CHECKLIST

PAVEMENT TYPE SELECTION

QUALITY CONTROL CHECKLIST

	Satisfactory Yes / No
Project Description	yes
Financial Project ID / Annual Report	yes
State Road No	yes
County	yes
Project Length	yes
Transportation System	yes
Flexible Pavement Design	
ESAL	yes
Level of Reliability	yes
Initial Design Period	yes
Structural Number	yes
Friction Course	yes
Structural Thickness	yes
Base Thickness	yes
Number of Through Lanes	yes
Lane Width	yes
Shoulder Width	yes
Rigid Pavement Design	
ESAL	yes
Level of Reliability	yes
Initial Design Period	yes
Thickness	yes

Base Thickness	yes
Base Type	yes
Number of Through Lanes	yes
Lane Width	yes
Shoulder Width	yes
Design Method (AASHTO 1993 or MEPDG)	yes

PROJECT MILE ESTIMATES

Initial

Mainline Quantities	yes
Shoulder Quantities	yes
Unit Prices Reasonable	yes

Rehabilitation

Mainline Quantities	yes
Shoulder Quantities	yes
Unit Prices Reasonable	yes

Reviewer Signature

3/11/14
Date