SR 400 (I-4) Project Development and Environment (PD&E) Study

FM No.: 432100-1-22-01

Pavement Type Selection Report

Segment 1: West of CR 532 (Osceola/Polk County Line) to West of SR 528 (Beachline Expressway) - Osceola County (92130) and Orange County (75280)

July 18, 2014

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

4 EXPRESS

Pavement Type Selection Report

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Osceola County (92130) and Orange County (75280), 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

July 18, 2014

Prepared by:

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

Robert Denney, PE — Date 7/21/14
PE No. 58593 — 7/18/2014

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Concurrence by:

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District Design Engineer, District

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

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 four systems interchanges.

The SR 400 (I-4) Project Development and Environment (PD&E) Study is an update which addresses the revision from the original design concept showing two High Occupancy Vehicle (HOV) lanes, as recommended in the Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for I-4 from West of Memorial Boulevard (SR 546) to CR 532 (Polk/Osceola County Line) and from CR 532 (Polk/Osceola County Line) to West of SR 528 (Beachline Expressway) and in the Final Environmental Impact Statement (FEIS) for I-4 from West of SR 528 (Beachline Expressway) 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 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 SR25/US 27 in Polk County to west of SR 435 (Kirkman Road) in Orange County and for the east section, from one mile 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	W. of 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 (3.9 miles)
Segment 5	W. of SR 25/US 27 to W. of CR 532 (Osceola/Polk County Line) in Polk County (3.2 miles)
SR 400 (I-4) PD&E East Section	
Segment 3	1 mile E. of SR 434 to E. of SR 15/600,US 17/92 (Seminole/Volusia County Line) in Seminole County (10.2 miles)
Segment 4	E. of SR 15/600,US 17/92 (Seminole/Volusia County Line) to 1/2 mile E. of SR 472 in Volusia County (10.1 miles)

The majority of the proposed improvements (37.7 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 1 (West of CR 532 to West of SR 528) in Osceola and Orange Counties; 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 1 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 1 corridor range from 4.60 to 19.70 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 16.30% 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	142,000
Mid-Design Year	2030	164,800
Design Year	2040	187,600

The 18-KIP ESAL for the roadway is 45,095,000 for flexible pavement and 63,629,000 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.

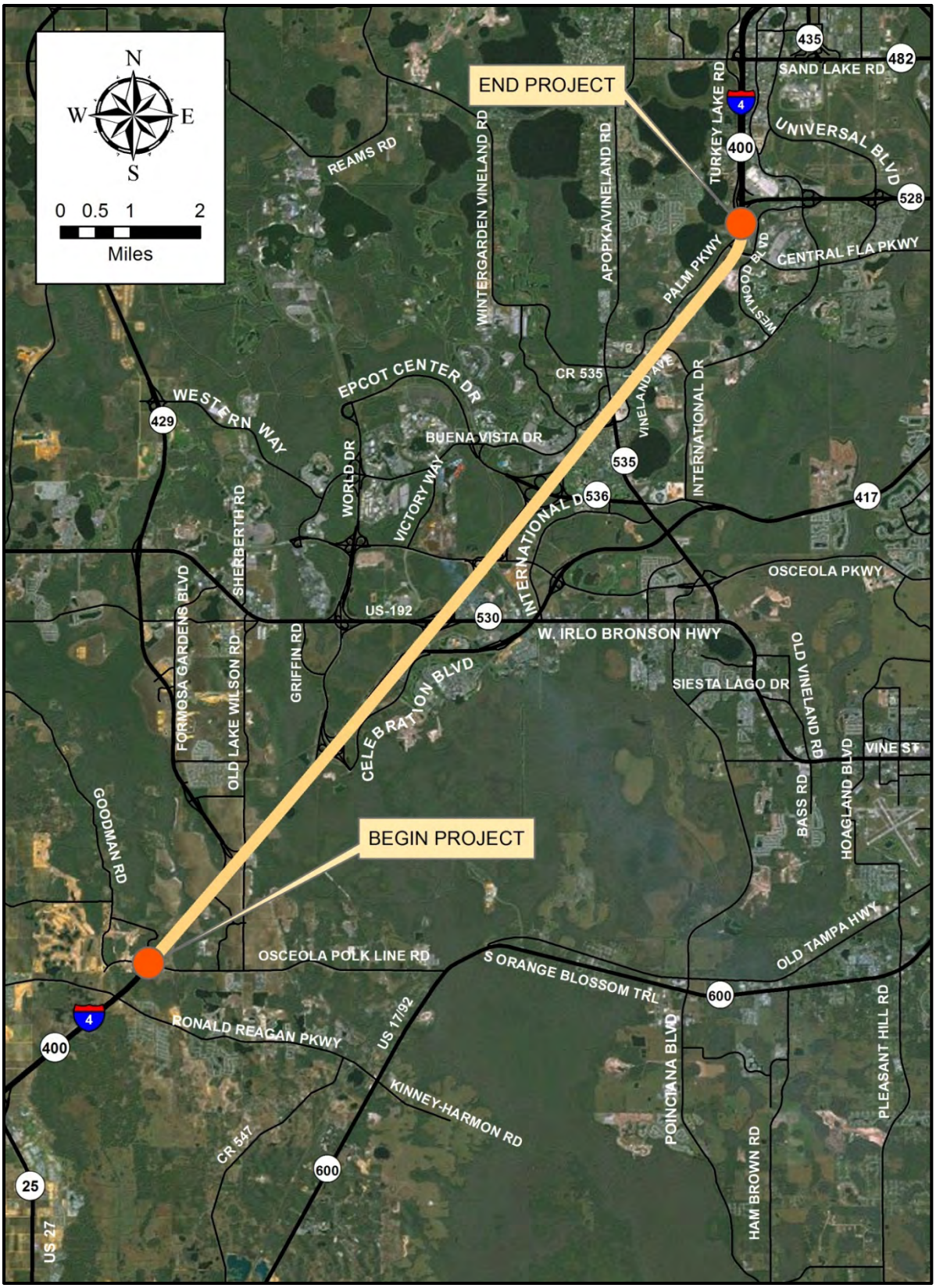


Figure 1: Project Location Map

2.2 Soil Characteristics

Geotechnical data near the study area was available from the report titled: *Final 30 Percent Geotechnical Report for Roadway SR 400 (I-4) From South of SR 435 (Kirkman Road) to South of SR 500/600 (Orange Blossom Trail), FPID: 242484-3-52-01*, which covers the I-4 Ultimate Section located approximately four miles north of the I-4, Segment 1 project. The report included results of Limerock Bearing Ratio (LBR) testing on twenty four soil samples obtained at depths of 0.0 to 1.5 feet below the existing grade adjacent to existing flexible pavement and proposed pond areas in the study corridor. The recommended LBR value for pavement design was 25. Using an LBR of 25 yields a corresponding roadway embankment resilient modulus (M_R) of 8,750 psi. These values were used in preparing the PTSR for the I-4, Segment 1 project. The geotechnical engineering evaluation memo prepared for the S.R. 400 (I-4), FPID: 242484-3-52-01 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 Osceola and Orange Counties:

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)

13 Year – Mill 3 inches
3" Structural Asphaltic Concrete
26 Year – Mill 3 inches
3" 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=10 feet, Outside Shoulder Width=10 feet
Notes: GUL = general use lanes, SUL = special use lanes
Paved inside shoulder for SUL will be modified from 10' to 6' when rail is constructed and barrier wall is in place.

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 Orange and Osceola Counties. Using the Mechanistic-Empirical Pavement Design Guide (MEPDG) Design Tables, the slab thickness should be 13.5".

Rigid Pavement Design Parameters
18-KIP ESAL=63,629,000
Modulus of Subgrade Reaction (K_G)=200 pci
Reliability (%R)=90%

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

Shoulder
2.0" Type SP Structural Course (Traffic B)
Optional Base Group 8 (9.5" 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=45,095,000 (Traffic Level E)
18-KIP ESAL for shoulders=3% of mainline=1,352,850 (Traffic Level B)
Resilient Modulus (M_R)=8,750 psi
Reliability (%R)=90%

Mainline
- SN_R=5.81
- 0.75" Friction Course FC-5 (PG76-22) (Not included in the Life Cycle Cost Analysis)
- 2" Type SP Structural Course (Traffic E) (PG76-22)
- 2" Type SP Structural Course (Traffic E) (PG76-22)
- 2" Type SP Structural Course (Traffic E)
- Optional Base Group 12 (12.5" Limerock, LBR 100)
- 12" Type B Stabilization
- SN_C=5.85

Shoulder
- SN_R=3.44
- 2.0" Type SP Structural Course (Traffic B)
- Optional Base Group 8 (9.5" LBR 100)
- 12" Type B Stabilization
- SN_C=3.55

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 4/01/2013 to 3/31/2014 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	$8.75	Sq. Yd
OBG-8	$25.85	Sq. Yd
OBG-12	$15.00	Sq. Yd
Milling 1" Avg. Depth	$2.45	Sq. Yd
Milling 3" Avg. Depth	$2.05	Sq. Yd
Type SP Traffic Level B	$85.00	Ton
Type SP Traffic Level E	$85.00	Ton
Type SP Traffic Level E PG76-22	$92.00	Ton
JPCP	$51.00	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)	$30.67	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 per mile for concrete pavement is $7,405,436 and for flexible pavement, $6,661,475. 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 I-4, Segment 1 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 Osceola and Orange Counties was reviewed. The average age to rehabilitation in Osceola County over the seven-year period ending in 2013 ranged from 10.6 years to 15.6 years. The average age to rehabilitation for flexible pavements in Orange County was also reviewed. The average age to rehabilitation in Orange County over the eight-year period ending in 2014 ranged from 10.0 years to 16.0 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 (Cost per Mile)

Concrete Pavement (PCC)

			Cost		P / F		PRESENT WORTH
	Initial	2020	$6,814,177	*	1.00000	=	$6,814,177
23	Year	2043	$669,827	*	0.45329	=	$303,623
33	Year	2053	$895,107	*	0.32134	=	$287,636
					TOTAL AGENCY COSTS	**=**	**$7,405,436**
					USER COSTS	**=**	**N/A**
					SALVAGE VALUE	**=**	**N/A**
					TOTAL PRESENT WORTH LIFE-CYCLE COSTS	**=**	**$7,405,436**

Asphalt Pavement (AC)

			Cost		P / F		PRESENT WORTH
	Initial	2020	$4,975,718	*	1.00000	=	$4,975,718
13	Year	2033	$1,565,945	*	0.63940	=	$1,001,272
26	Year	2046	$1,565,945	*	0.40884	=	$640,217
39	Year	2059	$1,565,945	*	0.26141	=	$409,358
					TOTAL AGENCY COSTS	**=**	**$7,026,565**
					USER COSTS	**=**	**N/A**
					SALVAGE VALUE	**=**	**$365,090**
					TOTAL PRESENT WORTH LIFE-CYCLE COSTS	**=**	**$6,661,475**

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 1 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 2 section, immediately east of Segment 1, 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 Recognition 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 10.6%. Therefore, it is recommended that asphalt pavement be considered as the pavement type for the SR 400 (I-4) Segment 1 corridor.

APPENDICES

APPENDIX A

TRAFFIC INFORMATION

FLORIDA DEPARTMENT OF TRANSPORTATION
TRANSPORTATION STATISTICS OFFICE
2012 HISTORICAL AADT REPORT

COUNTY: 92 - OSCEOLA

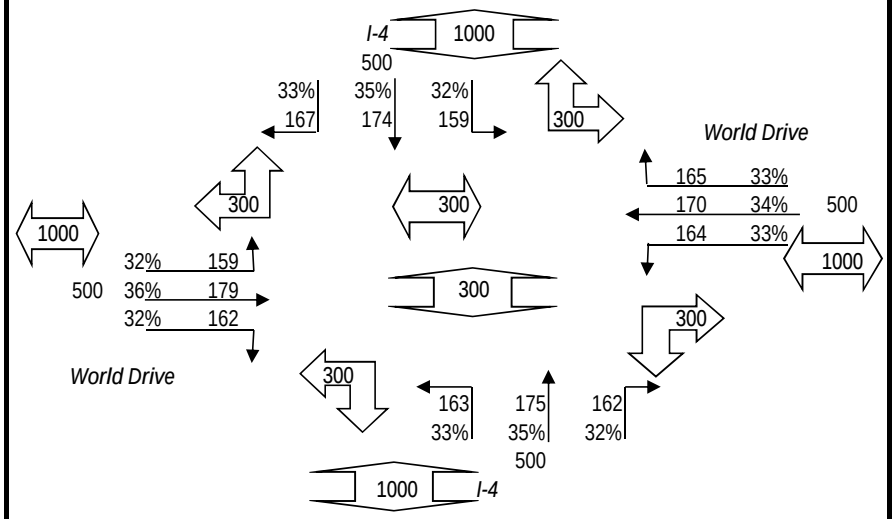
SITE: 0316 - ON I-4, 1.33 MI. E OF WORLD DR. (ITS)

YEAR	AADT	DIRECTION 1	DIRECTION 2	*K FACTOR	D FACTOR	T FACTOR
2012	75500 C	E 37500	W 38000	9.00	51.20	8.60
2011	61000 C	E 29500	W 31500	9.00	51.30	16.30
2010	85500 C	E 42500	W 43000	7.45	52.11	13.50
2009	78500 C	E 39000	W 39500	9.89	55.14	11.50
2008	78000 F	E 38500	W 39500	7.69	51.21	9.10
2007	79000 C	E 39000	W 40000	7.38	51.70	12.50
2006	95500 E	E 47000	W 48500	9.69	53.38	13.20
2005	93000 S	E 46000	W 47000	8.60	52.20	13.80
2004	88000 F	E 43500	W 44500	7.60	51.20	5.10
2003	85000 C	E 42000	W 43000	7.60	53.40	9.90
2002	61000 C	E 28000	W 33000	7.60	55.90	7.40
2001	64500 C	E 32500	W 32000	9.60	55.10	6.70
2000	63000 C	E 31500	W 31500	7.00	51.50	3.50
1999	62000 C	E 31000	W 31000	10.00	57.50	11.90
1998	60500 C	E 31000	W 29500	7.50	51.20	9.20

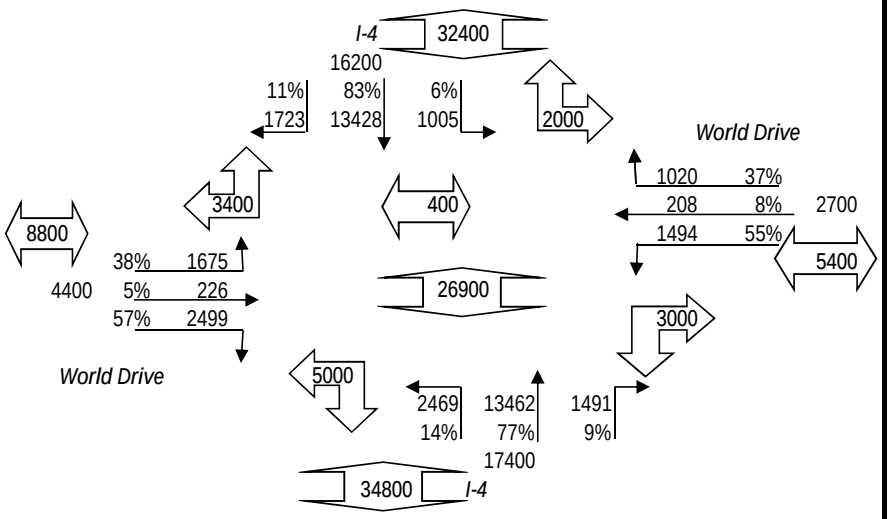
AADT FLAGS: C = COMPUTED; E = MANUAL ESTIMATE; F = FIRST YEAR ESTIMATE
S = SECOND YEAR ESTIMATE; T = THIRD YEAR ESTIMATE; X = UNKNOWN
*K FACTOR: STARTING WITH YEAR 2011 IS STANDARDK, PRIOR YEARS ARE K30 VALUES

PROJECT TRAFFIC FOR I-4 AT World Drive: TO

2-WAY AADT TURNING MOVEMENTS IN YEAR 2011



2-WAY AADT TURNING MOVEMENTS IN YEAR 2013



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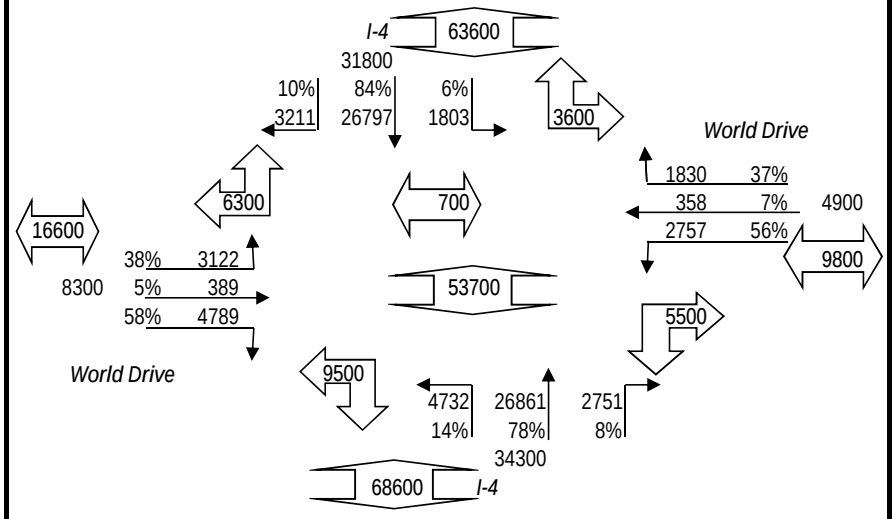

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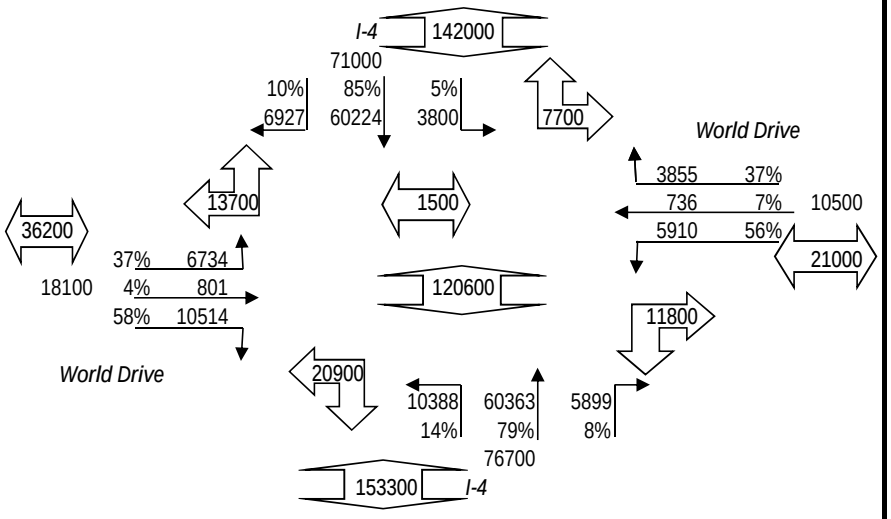
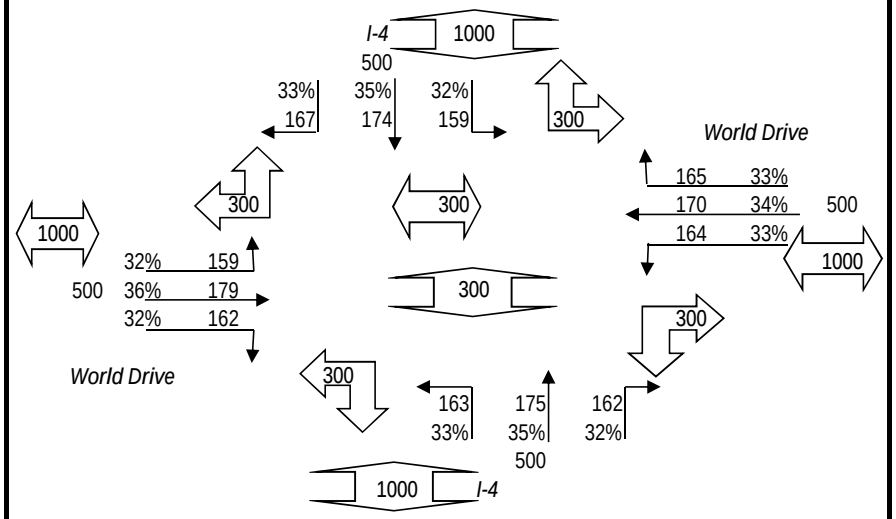
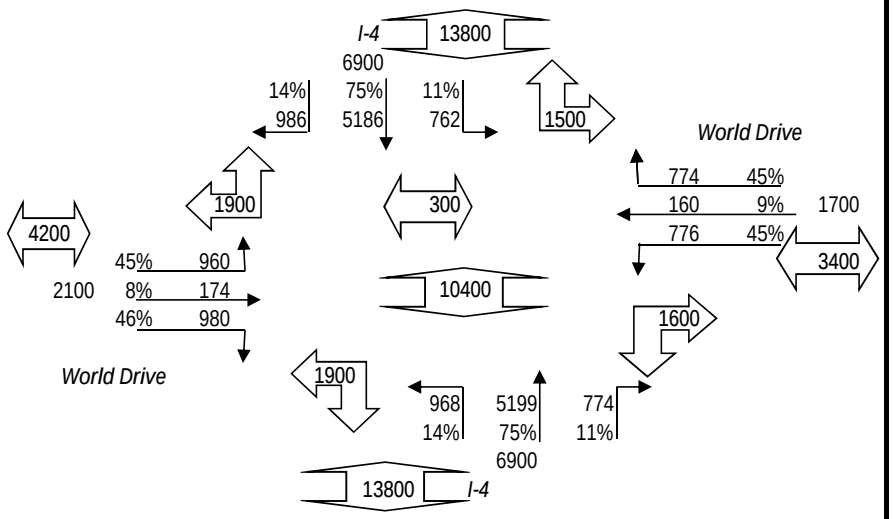


PROJECT TRAFFIC FOR I-4 AT World Drive: TO

2-WAY AADT TURNING MOVEMENTS IN YEAR 2011



2-WAY AADT TURNING MOVEMENTS IN YEAR 2013



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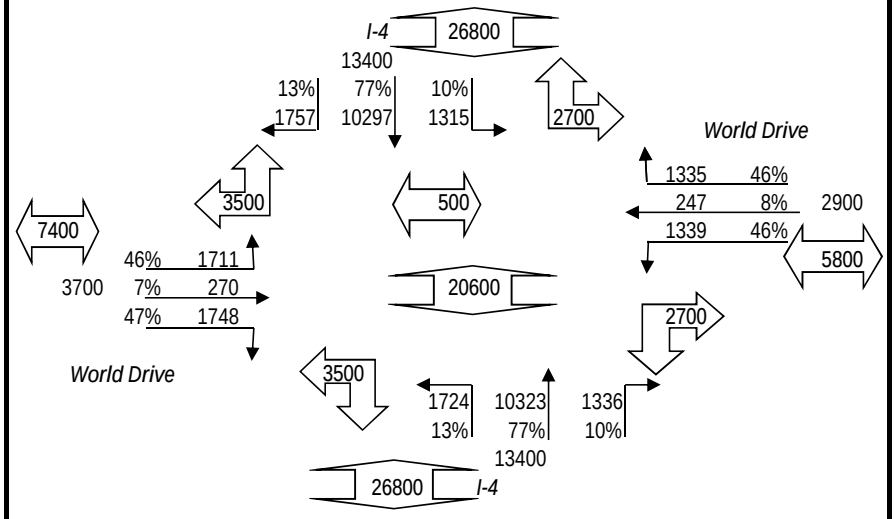
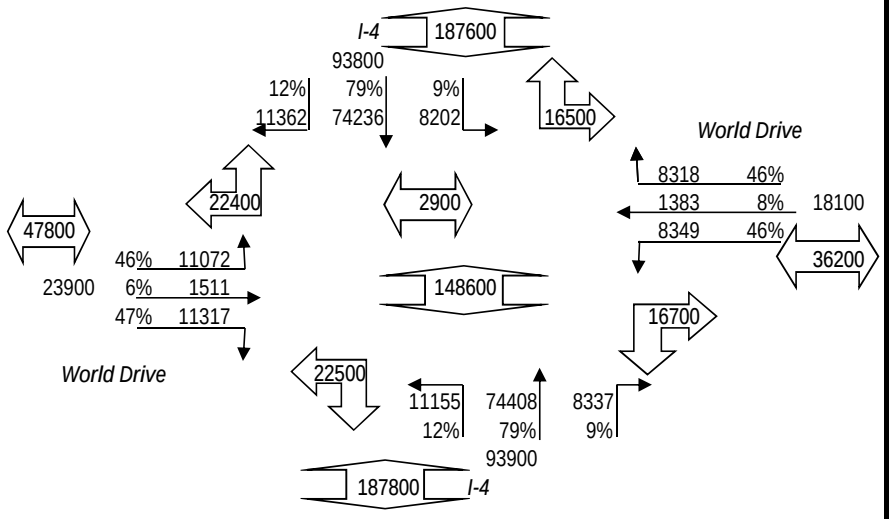


2-WAY AADT TURNING MOVEMENTS IN YEAR 2040



18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS

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

SECTION #: 75280000
SEGMENT #: ML
ITEM #: 0
PROJECT DESCRIPTION: SR 400 (I-4) - E. of World Drive

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	61000
Opening Year	2020	142000
Mid-Design Year	2030	164800
Design Year	2040	187600

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

T24 values
Existing to Opening Year: 16.30%
Opening to Mid-Year: 16.30%
Mid-Year to Design-Year: 16.30%

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.

ROBERT M. DENNEY — LICENSED — No. 56593 — STATE OF FLORIDA — PROFESSIONAL ENGINEER

Prepared by: HNTB — 610 Crescent Executive Ct Suite 400 Lake Mary, FL 32746 — Robert Denney, PE — 4/23/2014
Org. Unit or Firm — Name — Date
Signature

Reviewed by: Mark Robinson, PE — District 5 Design — FDOT - D5 — Date
Name — Title — Org. Unit or Firm
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 #: 75280000 **SEGMENT #:** ML **ITEM #:** 0

FLEXIBLE PAVEMENT URBAN FREEWAY 0.900

SN=5/THICK SR 400 (I-4) - E. of World Drive C

YEAR	AADT	ESAL (1000S)	ACCUM (1000s)	D	T	LF	EF
2011	61000	965	0	0.5	16.30%	0.590	0.900
2012	70000	1086	0	0.5	16.30%	0.579	0.900
2013	79000	1204	0	0.5	16.30%	0.569	0.900
2014	88000	1320	0	0.5	16.30%	0.560	0.900
2015	97000	1434	0	0.5	16.30%	0.552	0.900
2016	106000	1547	0	0.5	16.30%	0.545	0.900
2017	115000	1657	0	0.5	16.30%	0.538	0.900
2018	124000	1766	0	0.5	16.30%	0.532	0.900
2019	133000	1874	0	0.5	16.30%	0.526	0.900
2020	142000	1980	1980	0.5	16.30%	0.521	0.900
2021	144200	2006	3986	0.5	16.30%	0.519	0.900
2022	146500	2032	6018	0.5	16.30%	0.518	0.900
2023	148800	2059	8077	0.5	16.30%	0.517	0.900
2024	151100	2086	10163	0.5	16.30%	0.516	0.900
2025	153400	2113	12276	0.5	16.30%	0.514	0.900
2026	155600	2138	14414	0.5	16.30%	0.513	0.900
2027	157900	2164	16578	0.5	16.30%	0.512	0.900
2028	160200	2191	18769	0.5	16.30%	0.511	0.900
2029	162500	2217	20986	0.5	16.30%	0.510	0.900
2030	164800	2243	23229	0.5	16.30%	0.508	0.900
2031	167000	2268	25497	0.5	16.30%	0.507	0.900
2032	169300	2295	27792	0.5	16.30%	0.506	0.900
2033	171600	2321	30113	0.5	16.30%	0.505	0.900
2034	173900	2347	32460	0.5	16.30%	0.504	0.900
2035	176200	2372	34832	0.5	16.30%	0.503	0.900
2036	178400	2397	37229	0.5	16.30%	0.502	0.900
2037	180700	2423	39652	0.5	16.30%	0.501	0.900
2038	183000	2449	42101	0.5	16.30%	0.500	0.900
2039	185300	2474	44575	0.5	16.30%	0.499	0.900
2040	187600	2500	47075	0.5	16.30%	0.498	0.900

Opening to Mid-Design Year ESAL Accumulation (1000s): 21249

Opening to Design Year ESAL Accumulation (1000s): 45095

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.

ROBERT M. DENNEY — LICENSE — No. 56990 — STATE OF FLORIDA — PROFESSIONAL ENGINEER

Prepared by: HNTB — 610 Crescent Executive Ct, Suite 400, Lake Mary, FL 32746 — Robert Denney, PE — 4/23/2014

Org. Unit or Firm — Name — Date

Signature

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

Name — Title — Org.Unit or F — 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 #: 75280000 **SEGMENT #:** ML **ITEM #:** 0

RIGID PAVEMENT URBAN FREEWAY 1.270

SN=12/THICK SR 400 (I-4) - E. of World Drive C

YEAR	AADT	ESAL (1000S)	ACCUM (1000s)	D	T	LF	EF
2011	61000	1361	0	0.5	16.30%	0.590	1.270
2012	70000	1532	0	0.5	16.30%	0.579	1.270
2013	79000	1699	0	0.5	16.30%	0.569	1.270
2014	88000	1863	0	0.5	16.30%	0.560	1.270
2015	97000	2024	0	0.5	16.30%	0.552	1.270
2016	106000	2182	0	0.5	16.30%	0.545	1.270
2017	115000	2338	0	0.5	16.30%	0.538	1.270
2018	124000	2492	0	0.5	16.30%	0.532	1.270
2019	133000	2644	0	0.5	16.30%	0.526	1.270
2020	142000	2794	2794	0.5	16.30%	0.521	1.270
2021	144200	2830	5624	0.5	16.30%	0.519	1.270
2022	146500	2868	8492	0.5	16.30%	0.518	1.270
2023	148800	2906	11398	0.5	16.30%	0.517	1.270
2024	151100	2943	14341	0.5	16.30%	0.516	1.270
2025	153400	2981	17322	0.5	16.30%	0.514	1.270
2026	155600	3017	20339	0.5	16.30%	0.513	1.270
2027	157900	3054	23393	0.5	16.30%	0.512	1.270
2028	160200	3091	26484	0.5	16.30%	0.511	1.270
2029	162500	3128	29612	0.5	16.30%	0.510	1.270
2030	164800	3165	32777	0.5	16.30%	0.508	1.270
2031	167000	3201	35978	0.5	16.30%	0.507	1.270
2032	169300	3238	39216	0.5	16.30%	0.506	1.270
2033	171600	3274	42490	0.5	16.30%	0.505	1.270
2034	173900	3311	45801	0.5	16.30%	0.504	1.270
2035	176200	3348	49149	0.5	16.30%	0.503	1.270
2036	178400	3382	52531	0.5	16.30%	0.502	1.270
2037	180700	3419	55950	0.5	16.30%	0.501	1.270
2038	183000	3455	59405	0.5	16.30%	0.500	1.270
2039	185300	3491	62896	0.5	16.30%	0.499	1.270
2040	187600	3527	66423	0.5	16.30%	0.498	1.270

Opening to Mid-Design Year ESAL Accumulation (1000s): 29983

Opening to Design Year ESAL Accumulation (1000s): 63629

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 (Name) — 4/23/2014 (Date)

Org. Unit or Firm

Signature

ROBERT M. DENNEY LICENSE NO. 68199 STATE OF FLORIDA PROFESSIONAL ENGINEER 4/23/14

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

Signature — Date

APPENDIX B

GEOTECHNICAL INFORMATION

Geotechnical Professional Associates, Inc.
GPA
Geotechnical & Environmental Consultants

December 9, 2003
File No.: 03-1010

Kimley-Horn & Associates, Inc.
Design Division
4431 Embarcadero Drive
West Palm Beach, Florida 33407

Attention: Murray D. Thornburg, Jr. P.E.

Subject: Design LBR Results
State Road 400 (Interstate 4)
From South of S.R. 435 (Kirkman Road)
to South of S.R. 500/600 (Orange Blossom Trail)
Orange County, Florida
FIN No.: 242484-3-32-01

Dear Mr. Thornburg:

As requested and authorized, we have completed design LBR calculations for the S.R. 400 project referenced above. The purpose of performing these analyses was to provide data for pavement design. This letter documents our findings and presents our engineering recommendations.

A total of 24 LBR tests were performed on selected bulk soil samples in accordance with the Florida Method of Tests for Limerock Bearing Ratios, designation FM-5-515. The samples were obtained at depths ranging from 0.0 to 1.5 feet below the existing grade adjacent to existing flexible pavement areas and from within proposed pond areas.

The design LBR value was calculated using the results of the LBR tests. Samples were obtained only for the proposed road as of this date. Results for all 24 LBR tests are presented in the following table.

	Roadway LBR Samples (1 - 24)
Mean Method	30
90% Method	32

Copies of the design LBR calculations are attached. LBR tests were conducted on near surface sandy soils. It should be noted that the majority of the pavement section will be placed on fill and that the actual LBR values of final embankment and/or subgrade soils may vary with the fill source. Therefore, we recommend using an LBR value of 25 for the pavement

5780 Hoffner Avenue • Suite 403
Orlando, Florida 32822
(407) 275-5959 FAX: (407) 275-5129

It has been a pleasure assisting you with this phase of the project. If you have any questions, or when we may be of further assistance to you, please do not hesitate to contact us.

Sincerely,
GEOTECHNICAL PROFESSIONAL ASSOCIATES, INC.

Brendan S. O'Brien. P.E.
Senior Project Engineer
Florida Registration No. 52047

Shelley B. Gisclar, P.E.
President

BSO/SBG/ks
\\Front\main c\2003 Projects\03-1010 I-4 Improvements\LBRs\LBR des let.wpd

cc: Mr. Carl Jones - Fla. Dept. Of Transportation - District V

APPENDIX C

TYPICAL SECTION

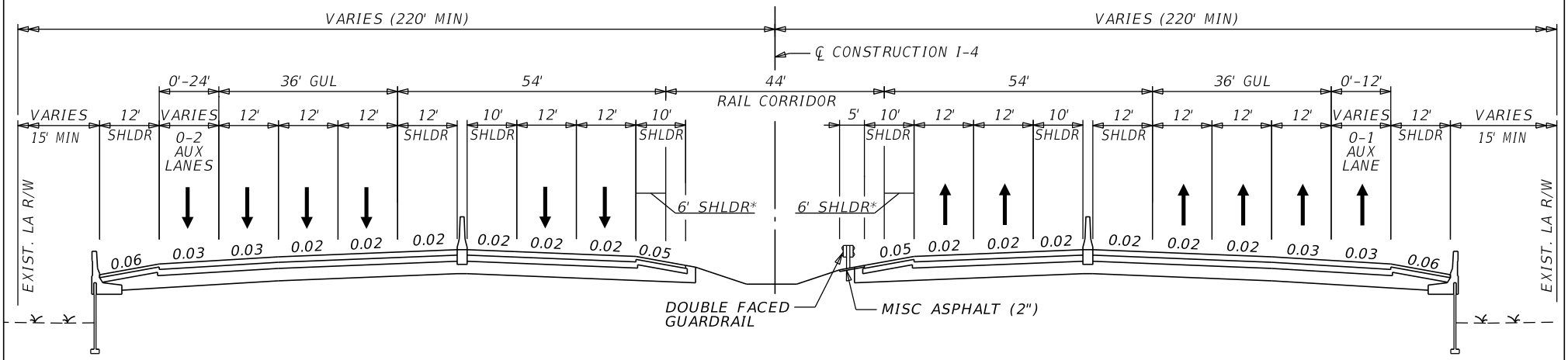
PROJECT IDENTIFICATION

FINANCIAL PROJECT ID 432100-1-22-01 FEDERAL AID PROJECT NO. N/A COUNTY NAME OSCEOLA (92130) ORANGE (75280)

SECTION NO. 92130 & 75820 ROAD DESIGNATION I-4 (SR 400) LIMITS/MILEPOST MP 0.000 – 7.885 (OSCEOLA) MP 0.000 – 5.650 (ORANGE)

PROJECT DESCRIPTION I-4 WIDENING FROM EAST OF CR 54 TO WEST OF SR 528.

PROPOSED ROADWAY TYPICAL SECTION



TYPICAL SECTION
SR 400 (INTERSTATE 4)
MP 0.000 TO 7.885 (OSCEOLA COUNTY)
MP 0.000 TO 5.650 (ORANGE COUNTY)
(STA. 626+39.92 TO STA. 1345+48.48)

DESIGN SPEED = 70 MPH

* PAVED INSIDE SHOULDER FOR EXPRESS LANES MODIFIED FROM 10 FT TO 6 FT WHEN RAIL IS CONSTRUCTED AND BARRIER WALL IS IN PLACE

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 3/13/2014 10:15:06 AM \\LKMw00\pmwork3\Jobs\59219 - I4 SAMR\TECHPROD\43210012201\Segment 1\roadway\TYPDRD101.DGN

APPENDIX D

PAVEMENT DESIGN CALCULATIONS

TABLE A.4A

REQUIRED STRUCTURAL NUMBER (SN_R)
90% RELIABILITY (%R)
RESILIENT MODULUS (M_R) RANGE 4000 PSI TO 18000 PSI

RESILIENT MODULUS (M_R), (PSI x 1000)

M_R = 8.75

$ESAL_D$	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

$ESAL_D$ I-4 Mainline Shoulder = 1,352,850

$ESAL_D$ I-4 Mainline = 45,095,000

Pavement Design For New Pavement (Flexible)

Project: SR 400 (I-4) Mainline

Opening + 20 years = 2040

Given: $ESAL_D$ = 45,095,000 Traffic Level E page 2.5.0

M_R = 8,750 psi

Assume a 90% reliability

1.0 From table 5.3 (or A.4A), the Structural Number Required (SN_R) = 5.81

2.0

SN_R	=	SN_C										
5.81	=	a_1	D_1	+	a_2	D_2	+	a_3	D_3	+	a_4	D_4
5.81	=	0	0.75	+	a_2	D_2	+	a_3	D_3	+	0.08	12
5.81	=		0.00	+	a_2	D_2	+	a_3	D_3	+		0.96
4.85	=				a_2	D_2	+	a_3	D_3			

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

4.85	=	a_2	D_2	+	a_3	D_3

Base group 12 yields a 6.00 inch structural course with an SN of 4.89

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	6.00	0.44	2.64	see table 5.4
Base (OBG 12 - 12.5" LBR 100)	12.50	0.18	2.25	see table 5.6
Stabilization (LBR 40)	12.00	0.08	0.96	
Total thickness	30.50 inches		SN_C=	5.85

$SN_C \geq SN_R$

$5.85 \geq 5.81$

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

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

ESAL 63,629,000

ESAL's (000)	Depth	Region: 2 Table E.3
63,500,000	**13"**	Table E-7 from the 2009 FDOT Rigid Pavement Design Manual - Based on MEPDG with Tied Concrete Shoulders
	use: **13.5**	When an ashphalt shoulder is used, Mainline Slab thickness must be increased by 1/2" and a 14' wide slab used.

Pavement Design For New Pavement (Flexible)

Project: SR 400 (I-4) Mainline Shoulder

Opening Year 2020

Design Year 2040

Given: $ESAL_D$ = 1,352,850 Traffic Level B

M_R = 8,750 psi

Assume a 90% reliability

1.0 From table 5.3, the Structural Number Required (SN_R) = 3.44

2.0

SN_R	=	SN_C									
3.44	=	a_1	D_1	+	a_2	D_2	+	a_3	D_3	+	a_4 D_4
3.44	=	0	0.75	+	a_2	D_2	+	a_3	D_3	+	0.08 12
3.44	=	0.00		+	a_2	D_2	+	a_3	D_3	+	0.96
2.48	=				a_2	D_2	+	a_3	D_3		

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

2.48	=	a_2	D_2	+	a_3	D_3

Base group 8 yields a 2.00 inch structural course with an SN of 2.50

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 8 - 9.5" LBR 100)	9.50	0.18	1.71	see table 5.6
Stabilization (LBR 40)	12.00	0.08	0.96	

SN_C= 3.55

SN_C	≥	SN_R
3.55	≥	3.44

APPENDIX E

LIFE CYCLE COST ANALYSIS

Florida Department of Transportation
Item Average Unit Cost
From 2013/04/01 to 2014/03/31

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	
0125 1	5	$12.25	$189,709.27	15,484.000	CY	N	EXCAVATION FOR STRUCTURES	
0142 70	2	$8.30	$254,775.45	30,698.900	CY	N	FILL SAND	
0145 1	1	$2.80	$34,034.00	12,155.000	SF	N	GEOSYNTHETIC REINFORCED SOIL SLOPE	
0145 2	5	$4.13	$128,153.92	31,015.000	SY	N	GEOSYNTHETIC REINF FND OVER SOFT SOIL	
0145 71	2	$4.96	$126,655.10	25,537.000	SY	N	REINFORCEMENT GRID FOR SOIL STABILIZAT	
0160 4	75	$2.94	$6,786,939.17	2,306,819.900	SY	N	TYPE B STABILIZATION	Use $3.25
0162 1 11	47	$.75	$1,073,381.04	1,432,882.500	SY	N	PREPARED SOIL LAYER, FINISH SOIL, 6"	
0162 1 12	2	$6.00	$152,781.16	25,473.000	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	$1.53	$13,705.98	8,952.000	SY	N	REWORKING LIMEROCK BASE, 3"	
0210 2	3	$30.06	$29,907.33	995.000	CY	N	LIMEROCK-NEW MATERIAL FOR REWORKING BASE	
0285701	43	$8.75	$2,143,465.88	245,052.400	SY	N	OPTIONAL BASE,BASE GROUP 01	
0285702	8	$9.74	$1,316,487.12	135,111.600	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	14	$12.30	$1,540,733.48	125,247.100	SY	N	OPTIONAL BASE,BASE GROUP 04	
0285705	5	$9.81	$215,501.27	21,972.500	SY	N	OPTIONAL BASE,BASE GROUP 05	
0285706	24	$16.77	$2,598,586.70	154,945.500	SY	N	OPTIONAL BASE,BASE GROUP 06	
0285707	6	$16.12	$571,196.20	35,437.000	SY	N	OPTIONAL BASE,BASE GROUP 07	
0285708	2	$25.85	$31,955.10	1,236.000	SY	N	OPTIONAL BASE,BASE GROUP 08	
0285709	43	$19.54	$6,117,979.92	313,132.900	SY	N	OPTIONAL BASE,BASE GROUP 09	
0285710	13	$12.09	$2,245,598.32	185,675.000	SY	N	OPTIONAL BASE,BASE GROUP 10	
0285711	14	$12.81	$7,766,775.03	606,371.300	SY	N	OPTIONAL BASE,BASE GROUP 11	
0285712	7	$11.34	$1,839,643.30	162,288.400	SY	N	OPTIONAL BASE,BASE GROUP 12	Use $15.00
0285713	7	$39.77	$1,296,066.58	32,589.000	SY	N	OPTIONAL BASE,BASE GROUP 13	
0285715	10	$44.62	$2,866,270.26	64,240.900	SY	N	OPTIONAL BASE,BASE GROUP 15	
0286 1	26	$13.30	$1,154,612.48	86,788.100	SY	N	TURNOUT CONSTRUCTION	
0286 2	2	$151.17	$48,737.50	322.400	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	52	$2.45	$2,864,985.08	1,169,586.100	SY	N	MILLING EXIST ASPH PAVT, 1" AVG DEPTH	
0327 70 2	8	$2.35	$719,563.62	305,678.200	SY	N	MILLING EXIST ASPH PAVT,3 1/2" AVG DEPTH	
0327 70 3	1	$1.80	$3,600.00	2,000.000	SY	N	MILLING EXIST ASPH PAVT,4 1/2" AVG DEPTH	
0327 70 4	24	$2.05	$2,458,346.15	1,197,643.100	SY	N	MILLING EXIST ASPH PAVT, 3" AVG DEPTH	
0327 70 5	32	$2.90	$3,015,433.62	1,039,975.400	SY	N	MILLING EXIST ASPH PAVT, 2" AVG DEPTH	
0327 70 6	63	$1.48	$3,281,473.57	2,214,828.040	SY	N	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH	
0327 70 7	4	$3.93	$499,059.98	126,869.000	SY	N	MILLING EXIST ASPH PAVT, 4" AVG DEPTH	
0327 70 8	20	$1.94	$1,999,793.25	1,033,019.000	SY	N	MILLING EXIST ASPH PAVT,2 1/2" AVG DEPTH	
0327 70 10	1	$8.00	$15,888.00	1,986.000	SY	N	MILLING EXIST ASPH PAVT, 5" AVG DEPTH	

Florida Department of Transportation
Item Average Unit Cost
From 2013/04/01 to 2014/03/31

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 11	17	$1.56	$2,923,614.12	1,871,617.500	SY	N	MILLING EXIST ASPH PAVT,2 1/4" AVG DEPTH	
0327 70 12	4	$1.95	$133,787.48	68,539.000	SY	N	MILLING EXIST ASPH PAVT,1 1/4" AVG DEPTH	
0327 70 13	11	$2.13	$1,114,376.81	523,739.000	SY	N	MILLING EXIST ASPH PAVT,1 3/4" AVG DEPTH	
0327 70 15	9	$1.61	$1,240,974.34	771,417.000	SY	N	MILLING EXIST ASPH PAVT,2 3/4" AVG DEPTH	
0327 70 16	7	$1.16	$100,825.40	86,892.000	SY	N	MILLING EXIST ASPH PAVT, 1/2" AVG DEPTH	
0327 70 17	5	$2.00	$1,179,734.15	589,214.300	SY	N	MILLING EXIST ASPH PAVT,3 1/4" AVG DEPTH	
0327 70 19	20	$1.57	$761,476.82	485,441.000	SY	N	MILLING EXIST ASPH PAVT, 3/4" AVG DEPTH	
0327 70 20	3	$1.55	$302,718.58	194,784.000	SY	N	MILLING EXIST ASPH PAVT,3 3/4" 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 30	1	$4.28	$64,957.56	15,177.000	SY	N	MILLING EXIST ASPH PAVT,11.5" AVG DEPTH	
0334 1 11	11	$95.06	$802,726.60	8,444.750	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC A	
0334 1 12	22	$81.26	$7,519,027.79	92,531.440	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	Use $85.00
0334 1 13	53	$83.22	$40,817,029.94	490,443.100	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	
0334 1 14	9	$83.17	$7,012,333.90	84,315.100	TN	N	SUPERPAVE ASPHALTIC CONC, TRAFFIC D	
0334 1 22	16	$85.25	$9,503,952.79	111,481.900	TN	N	SUPERPAVE ASPH CONC, TRAF B, PG76-22,PMA	
0334 1 23	24	$88.67	$21,926,641.13	247,287.200	TN	N	SUPERPAVE ASPH CONC, TRAF C, PG76-22,PMA	
0334 1 24	20	$90.24	$24,497,134.59	271,468.400	TN	N	SUPERPAVE ASPH CONC, TRAF D, PG76-22,PMA	Use $92.00 as recommended for SP TRAF D, PG76-22
0334 1 25	2	$83.95	$5,003,179.12	59,598.600	TN	N	SUPERPAVE ASPH CONC, TRAF E, PG76-22,PMA	
0334 1 33	1	$129.49	$77,875.29	601.400	TN	N	SUPERPAVE ASPH CONC, TRAF C, PG82-22,PMA	
0337 7 22	30	$120.68	$20,017,257.02	165,872.000	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	15	$94.62	$6,178,002.65	65,292.800	TN	N	ASPH CONC FC,TRAFFIC B,FC-9.5,PG 76-22	
0337 7 41	2	$84.64	$650,506.31	7,685.900	TN	N	ASPH CONC FC,TRAFFIC B,FC-12.5,PG 76-22	
0337 7 42	9	$96.64	$5,720,697.02	59,193.000	TN	N	ASPH CONC FC,TRAFFIC C,FC-9.5,PG 76-22	
0337 7 43	18	$97.90	$9,187,654.92	93,844.000	TN	N	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	
0337 7 45	5	$104.36	$1,410,325.09	13,513.500	TN	N	ASPH CONC FC,TRAFFIC D,FC-12.5,PG 76-22	
0337 7 55	1	$87.00	$701,829.00	8,067.000	TN	N	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 82-22	
0337 7 71	2	$125.55	$401,813.44	3,200.400	TN	N	ASPH CONC FC,TRAF B,FC-9.5,PG 76-22, ARB	
0337 7 72	1	$149.00	$210,239.00	1,411.000	TN	N	ASPH CONC FC,TRAF B,FC-12.5,PG 76-22,ARB	
0337 7 73	11	$108.23	$3,802,934.94	35,137.560	TN	N	ASPH CONC FC,TRAF C,FC-9.5,PG 76-22, ARB	
0337 7 74	4	$103.90	$5,272,087.04	50,743.690	TN	N	ASPH CONC FC,TRAF C,FC-12.5,PG 76-22,ARB	
0339 1	70	$147.41	$2,725,380.62	18,488.000	TN	N	MISCELLANEOUS ASPHALT PAVEMENT	
0341 70	2	$6.01	$326,969.28	54,368.000	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"	
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"	

Florida Department of Transportation
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Item	No. of Conts	Weighted Average	Total Amount	Total Quantity	Unit Meas	Obs?	Description	
0350 72	4	$1.81	$1,170,093.83	645,760.000	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	$3.62	$1,905,950.84	525,880.000	SY	N	GRINDING CONCRETE PAVT	
0353 70	4	$565.74	$11,234,177.50	19,857.450	CY	N	CONC PAVT SLAB REPLACEMENT	Use $400.00
0370 1	1	$85.00	$4,930.00	58.000	LF	N	BRIDGE APPR EXP JOINT FOR CONC PVMT	
0400 0 11	34	$472.70	$2,566,357.06	5,429.200	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	29	$859.08	$603,008.67	701.920	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 2	1	$806.90	$32,598.76	40.400	CY	N	CONC CLASS II, ENDWALLS	
0400 2 4	12	$591.73	$5,231,953.29	8,841.800	CY	N	CONC CLASS II, SUPERSTRUCTURE	
0400 2 5	7	$743.79	$650,001.78	873.900	CY	N	CONC CLASS II, SUBSTRUCTURE	
0400 2 10	17	$396.34	$1,185,093.76	2,990.100	CY	N	CONC CLASS II, APPROACH SLABS	
0400 2 11	2	$670.05	$74,509.50	111.200	CY	N	CONC CLASS II, RETAINING WALLS	
0400 2 12	1	$345.00	$29,980.50	86.900	CY	N	CONC CLASS II, TRENCH SLAB	
0400 2 41	1	$1,000.00	$151,800.00	151.800	CY	N	CONC CLASS II, PRECAST DECK OVERLAY	
0400 2 46	1	$624.15	$46,624.01	74.700	CY	N	CONC CLASS II, CIP COMP TOP W/ ADMIX	
0400 3 8	1	$765.62	$14,699.90	19.200	CY	N	CONC CLASS III, BULKHEAD	
0400 3 20	2	$403.44	$70,803.00	175.500	CY	N	CONC CLASS III, SEAL	
0400 4 1	9	$867.28	$1,636,044.97	1,886.400	CY	N	CONC CLASS IV, CULVERTS	
0400 4 4	8	$736.50	$2,118,909.00	2,877.000	CY	N	CONC CLASS IV, SUPERSTRUCTURE	
0400 4 5	19	$864.89	$3,429,894.14	3,965.700	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	7	$602.54	$1,308,291.05	2,171.300	CY	N	CONC CLASS IV, BULKHEAD	
0400 4 11	7	$603.33	$1,694,162.28	2,808.000	CY	N	CONC CLASS IV, RETAINING WALLS	
0400 4 25	4	$755.87	$1,327,149.00	1,755.800	CY	N	CONC CLASS IV, MASS, SUBSTRUCTURE	
0400 7	3	$11.30	$33,745.26	2,986.000	SY	N	BRIDGE DECK GROOVING, LESS THAN 8.5"	
0400 9	14	$9.62	$257,782.14	26,804.000	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	$48,223.11	$192,892.43	4.000	LS	N	CATHODIC PROTECTION-ELECT WORK, AC POW	
0400 60 3	4	$61.31	$889,018.82	14,500.000	LF	N	CATHODIC PROTECTION-ELECT WORK, CODUIT,	
0400 60 4	4	$100,605.61	$402,422.43	4.000	LS	N	CATHODIC PROTECTION-ELECT WORK, EQUIP,	
0400 91	1	$2,500.00	$5,000.00	2.000	EA	N	DEWATERING FOR SPREAD FOOTINGS	
0400128	1	$10.00	$14,120.00	1,412.000	LF	N	GRTNING PRCST DECK PNL, NON-SHRINK GRTN	
0400140 1	1	$1,250.00	$90,000.00	72.000	EA	N	NEOPRENE PAD REPLACEMENT, BENT/PIER	
0400142 3	2	$45.67	$491,073.00	10,752.000	SF	N	CATHODIC PROTECTION SYSTEM, ZINC ALUM SP	
0400142 7	2	$46.83	$868,784.70	18,552.000	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	7	$.97	$331,702.60	340,723.200	SF	N	CLEAN & COAT CONCRETE SURF , CLASS 5	

Florida Department of Transportation
Item Average Unit Cost
From 2013/04/01 to 2014/03/31

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
0446 1 1	2	$26.72	$213,892.08	8,004.000	LF	N	EDGEDRAIN DRAINCRETE, STANDARD
0446 71 1	4	$30.67	$56,408.70	1,839.000	LF	N	EDGEDRAIN OUTLET PIPE, 4"
0448 73	1	$873,909.95	$873,909.95	1.000	LS	N	PUMPING STATION- DRAINAGE
0450 2 36	5	$237.53	$3,113,565.00	13,108.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 36"
0450 2 45	3	$176.33	$1,214,937.01	6,890.000	LF	N	PREST BEAMS: FLORIDA-I BEAM 45"
0450 2 54	1	$210.00	$1,180,830.00	5,623.000	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 3 15	1	$160.00	$50,240.00	314.000	LF	N	PRESTRESSED SLAB UNITS,48" X 15"
0450 3 25	1	$160.00	$150,400.00	940.000	LF	N	PRESTRESSED SLAB UNITS,60" X 15"
0450 3 95	1	$160.00	$50,240.00	314.000	LF	N	PRESTRESSED SLAB UNITS,VAR WI 30-47", 15
0450 6	1	$19,464.85	$19,464.85	1.000	LS	N	PRESTRESSED SLAB BEAMS, INSTALL
0450 82	1	$400.00	$90,000.00	225.000	LF	N	BEAM REPAIR
0450 83 1	1	$2,050.00	$8,200.00	4.000	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"
0455 2	1	$1.00	$4,230.00	4,230.000	LF	N	TREATED TIMBER PILING
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	6	$23,104.14	$138,624.82	6.000	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	4	$77.11	$1,668,295.75	21,634.000	LF	N	PRESTRESSED CONCRETE PILING, 18" SQ
0455 34 5	9	$102.39	$4,084,021.40	39,887.000	LF	N	PRESTRESSED CONCRETE PILING, 24" SQ
0455 35 6	1	$80.00	$9,680.00	121.000	LF	N	STEEL PILING, HP 14 X 89
0455 35 8	1	$152.45	$134,156.00	880.000	LF	N	STEEL PILING, HP 14 X 117
0455 35 21	1	$166.92	$238,862.52	1,431.000	LF	N	STEEL PILING, 20" DIA. PIPE
0455 35 22	3	$117.76	$627,170.00	5,326.000	LF	N	STEEL PILING, 24" DIA. PIPE
0455 81101	1	$5,000.00	$20,000.00	4.000	EA	N	CATHODIC PROT,F&I,PILE,ZINC ANODE ASSEM
0455 81105	1	$6,875.00	$385,000.00	56.000	EA	N	CATHODIC PROT,F&I,PIER,TITANIUM ANODE
0455 87	3	$368.90	$29,881.30	81.000	EA	N	ANCHOR BAR, STEEL
0455 88 5	1	$335.72	$692,926.08	2,064.000	LF	N	DRILLED SHAFT, 48" DIA
0455101 1	1	$215,459.75	$215,459.75	1.000	EA	N	TEST LOAD, OSTERBERG CELL, < FIVE CELLS
0455107 5	1	$169.99	$34,677.96	204.000	LF	N	DRILLED SHAFT CASING, 48" DIA
0455111	1	$78.25	$175,280.00	2,240.000	LF	N	CORE-PILOT HOLE,DRILLED SHAFT EXCAV
0455120 7	3	$677.78	$67,100.00	99.000	EA	N	PILE POINT PROTECTION, 24" ROUND
0455122 5	1	$199.17	$379,219.68	1,904.000	LF	N	UNCLASSIFIED SHAFT EXCAVATION, 48" DIA
0455133 2	11	$17.49	$2,152,963.28	123,125.000	SF	N	SHEET PILING STEEL, TEMPORARY-CRITICAL
0455133 3	10	$30.08	$4,823,094.04	160,361.000	SF	N	SHEET PILING STEEL, F&I PERMANENT
0455133 5	2	$13.31	$1,393,684.70	104,743.000	SF	N	SHEET PILING VINYL, F&I PERMANENT
0455142	1	$1,983.23	$55,530.44	28.000	EA	N	CROSSHOLE SONIC LOGGING
0455143 3	4	$218.88	$552,675.10	2,525.000	LF	N	TEST PILES-PREST CONCRETE,18" SQ

FLORIDA DEPARTMENT OF TRANSPORTATION

PAVEMENT TYPE SELECTION SPREADSHEET
PROJECT DESCRIPTION:

Financial Project ID:	432100-1-22-01
State Road Number:	SR 400
County:	Osceola, Orange
Project Length:	13.535 Miles
Roadway ID:	92130000, 75280000
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	$8.75		Sq. Yd
285 7	OBG-8	$25.85		Sq. Yd
285 7	OBG-12	$15.00		Sq. Yd
327 70	Milling 1" Avg. Depth	$2.45		Sq. Yd
327 70	Milling 3" Avg. Depth	$2.05		Sq. Yd
334 1	Type SP Traffic Level B	$85.00		Ton
334 1	Type SP Traffic Level E	$85.00		Ton
334 1	Type SP Traffic Level E PG76-22	$92.00		Ton
350 1	JPCP	$51.00		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)	$30.67		Ft

LIFE CYCLE COST ANALYSIS

JOINTED PLAIN CONCRETE PAVEMENT DESIGN (RIGID PAVEMENT)

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

Project Length: 13.535 Miles, Roadway ID: 92130000, 75280000

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:	22	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:	422,400	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	13.5	75,093.3	Sq. Yd	$51.00	$0.00	$3,829,760	$3,829,760
OBG-1, Type B-12.5	4	75,093.3	Sq. Yd	$8.75	$0.00	$657,067	$657,067
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	$30.67	$0.00	$1,534	$1,534
SHOULDER:							
Type SP Traffic Level B	2	5,104.0	Ton	$85.00	$0.00	$433,840	$433,840
OBG-8	9.5	46,933.3	Sq. Yd	$25.85	$0.00	$1,213,227	$1,213,227
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:	**23**						
MAINLINE:							
CPR - Slab Replacement (3%)	13.5	844.8	Cu. Yd	$400.00	$0.00	$337,920	$153,174
SHOULDER:							
Milling 1" Avg. Depth	1	46,933.3	Sq. Yd	$2.45	$0.00	$114,987	$52,122
Type SP Traffic Level B	1	2,552.0	Ton	$85.00	$0.00	$216,920	$98,327
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:Osceola, Orange

Project Length: 13.535 Miles, Roadway ID: 92130000, 75280000

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:	22	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:	422,400	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%)	13.5	1,408.0	Cu. Yd	$400.00	$0.00	$563,200	$180,980
SHOULDER:							
Milling 1" Avg. Depth	1	46,933.3	Sq. Yd	$2.45	$0.00	$114,987	$36,950
Type SP Traffic Level B	1	2,552.0	Ton	$85.00	$0.00	$216,920	$69,706
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):	$6,814,177
TOTAL PRESENT WORTH REHABILITATION COST:	$591,259
TOTAL PRESENT WORTH SALVAGE VALUE:	$0
PRESENT WORTH:	$7,405,436

LIFE CYCLE COST ANALYSIS

ASPHALT CONCRETE PAVEMENT DESIGN (FLEXIBLE PAVEMENT)

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

Project Length: 13.535 Miles, Roadway ID: 92130000, 75280000

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:	22	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:	464,640	Sq. Ft		

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
INITIAL CONSTRUCTION IN YEAR:	**0**						
MAINLINE:							
Type SP Traffic Level E PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$704,352
Type SP Traffic Level E PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$704,352
Type SP Traffic Level E	2	7,656.0	Ton	$85.00	$0.00	$650,760	$650,760
OBG-12	12.5	70,400.0	Sq. Yd	$15.00	$0.00	$1,056,000	$1,056,000
Type B Stabilized (LBR 40)	12	70,400.0					
SHOULDER:							
Type SP Traffic Level B	1.5	4,210.8	Ton	$85.00	$0.00	$357,918	$357,918
OBG-8	9.5	51,626.7	Sq. Yd	$25.85	$0.00	$1,334,549	$1,334,549
Type B Stabilized (LBR 40)	12	51,626.7	Sq. Yd	$3.25	$0.00	$167,787	$167,787
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**13**						
MAINLINE:							
Milling 3" Avg. Depth	3	70,400.0	Sq. Yd	$2.05	$0.00	$144,320	$92,279
Type SP Traffic Level E PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$450,366
Type SP Traffic Level E PG76-22	1	3,828.0	Ton	$92.00	$0.00	$352,176	$225,183
SHOULDER:							
Milling 1" Avg. Depth	1	51,626.7	Sq. Yd	$2.45	$0.00	$126,485	$80,875
Type SP Traffic Level B	1	2,807.2	Ton	$85.00	$0.00	$238,612	$152,570
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:Osceola, Orange

Project Length: 13.535 Miles, Roadway ID: 92130000, 75280000

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:	22	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:	464,640	Sq. Ft		

CONSTRUCTION ITEMS	THK.	QTY.	UNIT	UNIT PRICE	ST DEV	COST	PRESENT WORTH
REHABILITATION IN YEAR:	**26**						
MAINLINE:							
Milling 3" Avg. Depth	3	70,400.0	Sq. Yd	$2.05	$0.00	$144,320	$59,003
Type SP Traffic Level E PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$287,966
Type SP Traffic Level E PG76-22	1	3,828.0	Ton	$92.00	$0.00	$352,176	$143,983
SHOULDER:							
Milling 1" Avg. Depth	1	51,626.7	Sq. Yd	$2.45	$0.00	$126,485	$51,712
Type SP Traffic Level B	1	2,807.2	Ton	$85.00	$0.00	$238,612	$97,554
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**39**						
MAINLINE:							
Milling 3" Avg. Depth	3	70,400.0	Sq. Yd	$2.05	$0.00	$144,320	$37,727
Type SP Traffic Level E PG76-22	2	7,656.0	Ton	$92.00	$0.00	$704,352	$184,126
Type SP Traffic Level E PG76-22	1	3,828.0	Ton	$92.00	$0.00	$352,176	$92,063
SHOULDER:							
Milling 1" Avg. Depth	1	51,626.7	Sq. Yd	$2.45	$0.00	$126,485	$33,065
Type SP Traffic Level B	1	2,807.2	Ton	$85.00	$0.00	$238,612	$62,376
DESIGN COSTS:			Subtotal				
MOT COSTS:			Subtotal				
CEI COSTS:			Subtotal				
REHABILITATION IN YEAR:	**52**						

TOTAL INITIAL CONSTRUCTION COST (YEAR 2020):	$4,975,718
TOTAL PRESENT WORTH REHABILITATION COST:	$2,050,847
TOTAL PRESENT WORTH SALVAGE VALUE:	$365,090
PRESENT WORTH:	$6,661,475

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	$6,814,177	*	1.00000	=	$6,814,177
23	Year	$669,827	*	0.45329	=	$303,623
33	Year	$895,107	*	0.32134	=	$287,636
40	Year		*		=	
	Year					
				TOTAL AGENCY COSTS	=	**$7,405,436**
				USER COSTS	=	
		Remaining Service Life		**PW of Last Rehab at Year 40**		
SALVAGE VALUE		0 / 7	*	$226,079	=	**$0**
				TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$7,405,436**

AC PAVEMENT

		Cost		P / F		PRESENT WORTH
	Initial	$4,975,718	*	1.00000	=	$4,975,718
13	Year	$1,565,945	*	0.63940	=	$1,001,272
26	Year	$1,565,945	*	0.40884	=	$640,217
39	Year	$1,565,945	*	0.26141	=	$409,358
52	Year					
				TOTAL AGENCY COSTS	=	**$7,026,565**
				USER COSTS	=	
		Remaining Service Life		**PW of Last Rehab at Year 40**		
SALVAGE VALUE		12 / 13	*	$395,515	=	**$365,090**
				TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$6,661,475**

COST COMPARISON

DIFFERENCE IN TOTAL PRESENT WORTH LIFE-CYCLE COSTS	=	**$743,961**
AVERAGE TOTAL PRESENT WORTH	=	**$7,033,455**
PERCENT DIFFERENCE IN TOTAL PRESENT WORTH	=	**10.6%**
DIFFERENCE IN ESTIMATED INITIAL COSTS	=	**$1,838,459**
PERCENT DIFFERENCE IN ESTIMATED INITIAL COSTS	=	**36.9%**
TOTAL PRESENT WORTH COST OF REHAB FOR PCC PAVEMENT	=	**$591,259**
TOTAL PRESENT WORTH COST OF REHAB FOR AC PAVEMENT	=	**$2,050,847**
DIFFERENCE IN TOTAL PRESENT WORTH OF REHAB COSTS (LCCF)	=	**$1,459,588**

APPENDIX F

PAVEMENT PERFORMANCE DATA

Rehabilitation Age by Year

For Osceola County
18APR2014
Other Conditions: Pavement= Asphalt

Year Rehabilitated	Lane Miles Rehabilitated	Average Rehabilitation Age	Standard Deviation
2007	30.5	14.5	4.2
2008	138.4	10.6	3.2
2009	66.0	12.3	3.3
2010	5.1	15.0	0.0
2011	4.2	14.0	0.0
2012	23.4	13.7	2.2
2013	20.0	15.6	0.5

Rehabilitation Age by Year

For Orange County
18APR2014
Other Conditions: Pavement= Asphalt

Year Rehabilitated	Lane Miles Rehabilitated	Average Rehabilitation Age	Standard Deviation
2007	196.8	15.1	6.6
2008	177.4	10.0	3.2
2009	229.9	12.3	7.7
2010	142.5	16.0	10.1
2011	67.4	15.9	6.8
2012	122.2	11.7	3.1
2013	60.2	12.0	5.6
2014	56.6	10.6	6.3

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

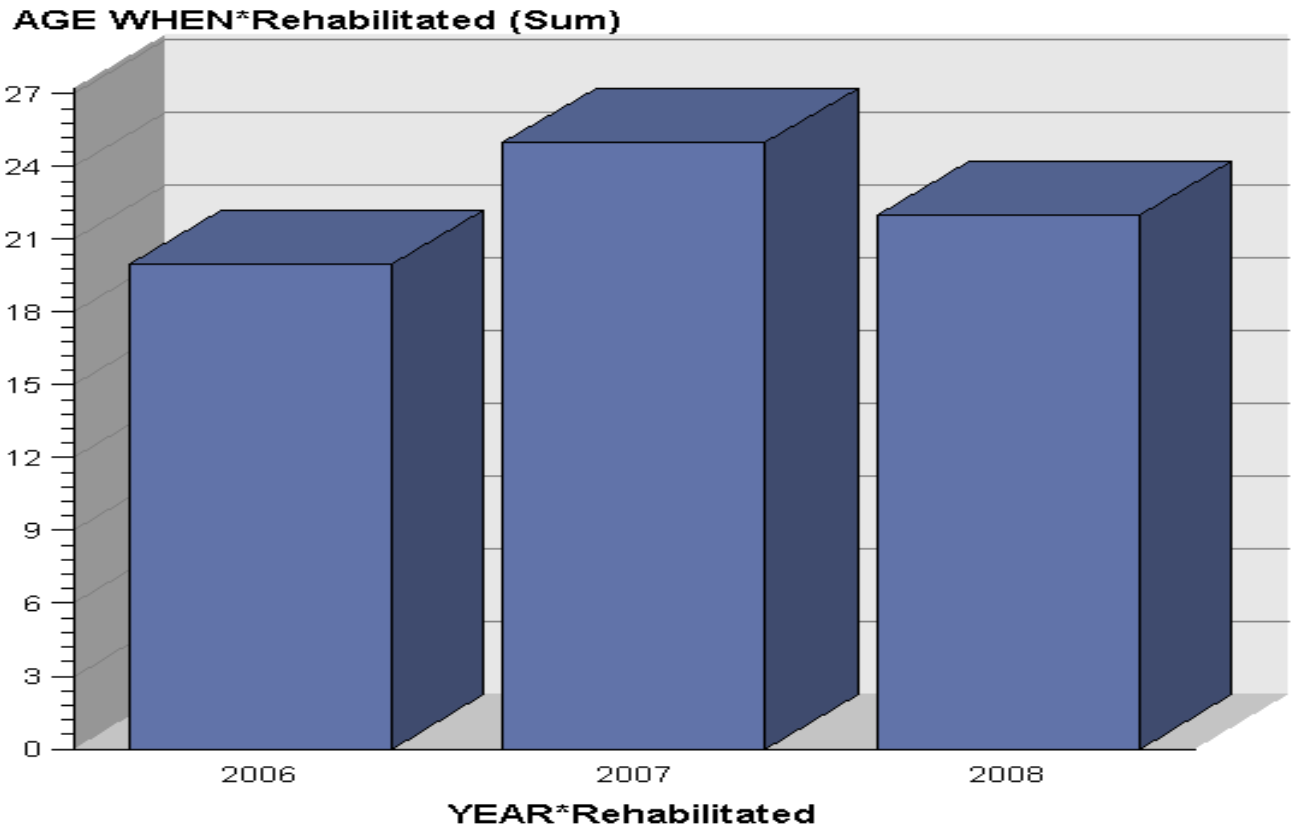
13JUN2012

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	yes
Lanes.....	
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

7/14/14
Date