

STATE OF FLORIDA



2005 RESILIENT MODULUS OF ROADBED SOILS FACTS & FIGURES

**Research Report
FL/DOT/SMO/06-488**

January 2006

STATE MATERIALS OFFICE

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PAVEMENT MATERIAL SYSTEMS

The Pavement Material Systems provides the Department with the technical expertise to ensure safe and durable pavement systems. This section interacts and partners with other central and district offices, the Federal Highway Administration, pavement industry, and other stakeholders. To support these goals, presented are the Pavement Material System's Mission, Vision, and Value Statements.

Mission

Make Florida's pavements safer, last longer, and perform better.

Vision

The best pavements in the country.

Values

Do it R.I.T.E (Respect, Integrity, Teamwork, and Excellence), Now!

To learn more about our people, functions, and services, we invite you to visit us at:

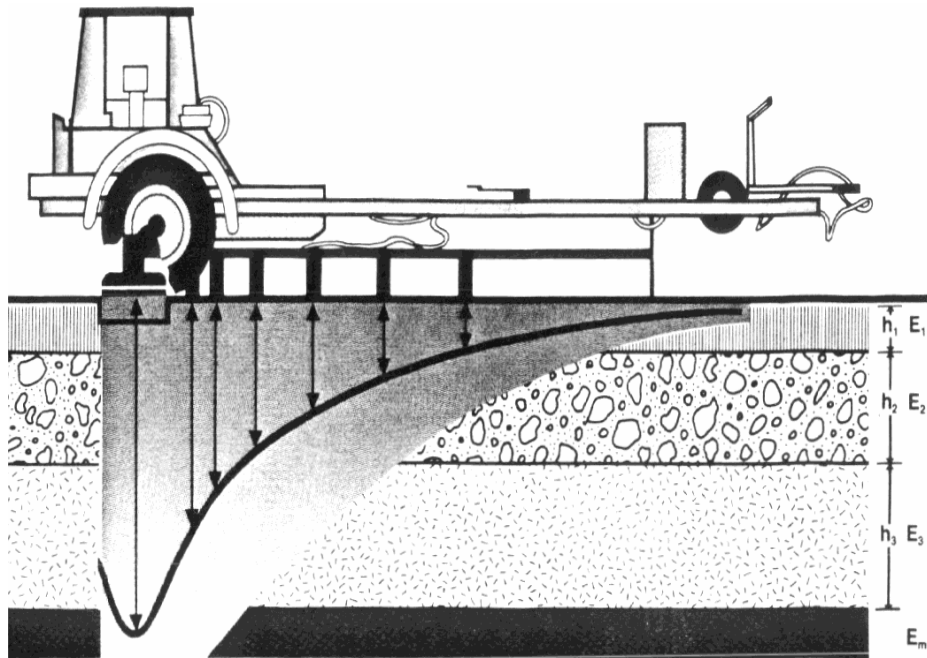
<http://www.dot.state.fl.us/statematerialsoffice/pavement/pavementhome.htm>

EXECUTIVE SUMMARY

One of the primary functions of the Non-Destructive Testing Group, a unit of the State Materials Office in Gainesville, Florida, is to characterize the in-situ properties of Florida's roadbed materials for pavement design purposes. The basis for such a characterization is the resilient modulus (M_R). The resilient modulus is a measure of the material elastic property recognizing its certain nonlinear characteristics. It is estimated, in our case, in-place from deflection measurements. This information has been critical to the Department's effort to support informed highway planning, as well as policy and decision making. This requires the apportionment and allocation of funds as well as the determination of appropriate cost-effective strategies to rehabilitate and preserve existing highway transportation infrastructure.

This report is intended to provide information regarding our program testing procedures, to report current and past M_R values on a statewide basis, and to identify historical regional M_R trends in the various Districts.

PART I: OVERVIEW



INTRODUCTION

One of the primary functions of the Non-Destructive Testing (NDT) program is to characterize the in-situ properties of the Florida's roadbed (embankment) materials for pavement design purposes. The basis for such a characterization is the resilient modulus (M_R). The resilient modulus is a measure of a material's elastic property recognizing its nonlinear characteristics. It is directly estimated, in our case, in-place using deflection-based techniques.

Deflection-Based Techniques

Due to their speed and ease of operation deflection-based techniques are being widely used in the evaluation of the structural integrity and for estimating the elastic moduli of in-place pavement systems. The deflections can be non-destructively induced and measured using various commercially available devices. These devices are designed based on a variety of loading modes and measuring sensors. The loading modes include static, steady-state vibratory, and impulse loading; while the resulting responses are measured with sensors that include geophones, accelerometers, and linear voltage differential transducers (LVDT).

USE OF DEFLECTION-BASED DEVICES: FLORIDA HISTORICAL PERSPECTIVE

The Department implemented the use of the Falling Weight Deflectometer (FWD) in the early 1980s. It has, however for pavement design purposes, initially specified the use of a Benkelman Beam, and then the use of a vibratory-type device (Dynalect).

Benkelman Beam

The Benkelman Beam was the first deflection-based device used in Florida for pavement design purposes. It was developed by A.C. Benkelman during the Western Association of State Highway Officials (WASHO) Road Test. It consists of a measurement probe hinged to a three-legged reference beam, as schematically illustrated in Figure 1. The probe is positioned between the rear dual tires of a truck, and the rebound deflection is measured by a dial placed on the reference beam when the truck is slowly driven away. Although this method is simple and relatively inexpensive, it is also slow and labor intensive. In addition, the measurements are usually limited to maximum deflections only and are produced under unrealistic load durations. Furthermore, the leveled position of the reference beam may, in some cases, be unduly influenced by the deflection basin.

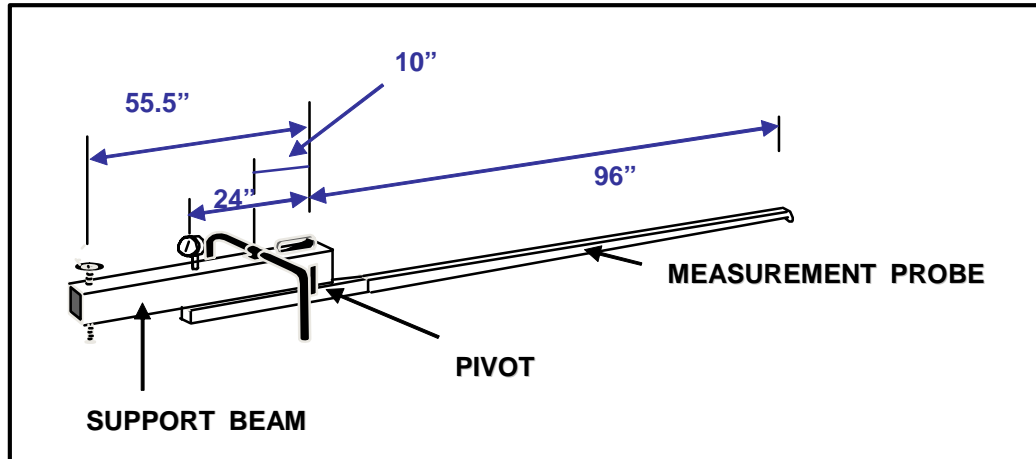


Figure 1. Schematic Illustration of a Benkelman Beam

Dynaflect

In mid-1980s, the Department switched to a steady-state vibratory device, known as Dynaflect. The Dynaflect consists of a relatively lightweight (2,000 lbs.) two-wheel trailer equipped with an automated data acquisition and control system. The deflections are generated by a combination of a sinusoidal dynamic load and the static weight of the trailer. The dynamic loading of a pavement surface is done using two counter-rotating eccentric steel weights. These steel weights, rotating at a constant frequency of eight cycles per second (8 Hz), generate a peak-to-peak dynamic load of approximately 1000 pounds in magnitude. The resulting deflections of a pavement system are measured with geophones. The geophones are electromechanical devices that use a magnetic field to produce an electrical impulse. These geophones are suspended, at set intervals, from the tongue of the trailer.

A primary advantage of the Dynaflect over a static-loading device, such as Benkelman beam, is that a reference frame is not required. In addition, the Dynaflect generates a complete deflection basin at each test location. However, the fixed magnitude and the loading frequency are its major limitations. A photographic illustration of a Dynaflect is given in Figure 2.



Figure 2. Dynaflect Device

Falling Weight Deflectometer

The Falling Weight Deflectometer (FWD) consists of a trailer mounted, falling weight system capable of loading a pavement in a manner that simulates actual wheel loads in both magnitude and duration. An impulse load is generated by dropping a mass from a specified height. The mass is raised hydraulically, then released by an electrical signal and dropped with a buffer system on a 12-inch diameter rigid steel plate. A set of springs between the falling mass and hit bracket mounted above the load cell buffers the impact by decelerating the mass. A thin, neoprene pad rests between the plate and the pavement surface to allow for an even load distribution. When a weight is dropped, an impulse load enters the pavement system creating body and surface waves. The resulting vertical velocity of the pavement surface is picked up through a series of sensors located along the centerline of the trailer. These signals are then used to obtain the maximum deflection from each geophone through analog integrations. A single analog integration of a signal generates the deflection-time trace. The deflection measurements are recorded by the data acquisition system typically located in the tow vehicle. Figure 3 provides a schematic illustration of the FWD loading principle.

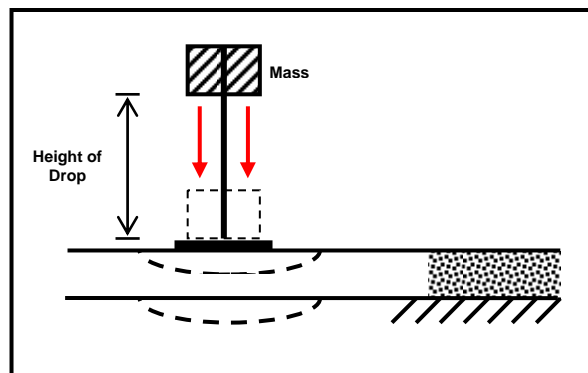


Figure 3. FWD Loading Principle

The use of the Falling Weight Deflectometer (FWD) testing for pavement design and rehabilitation purposes was first introduced by AASHTO in the 1993 Pavement Design Guide. In recent years, the FWD has gained further acceptance among highway agencies because of its versatility, reliability, and ease of use. The FWD loading is believed to better simulate the effects of traffic on pavement structures. Therefore as of March 2001, the Department has implemented the use of FWD for all pavement-related evaluations, including design activities. A photographic illustration of the FWD is shown in Figure 4.



Figure 4. Falling Weight Deflectometer

FLORIDA TESTING PROCEDURE

Deflection Testing

When testing with the FWD for pavement design purposes, two 9-kip load drops are used. However, only the deflection data resulting from the last loadings are considered for roadbed soil characterization. It is generally believed that the deflection data produced under the first impact load may not always be representative of the true pavement response (2). Therefore, the first load is mainly used for the loading plate “seating” purposes. All the deflection data are obtained using the sensor configuration shown in Figure 5.

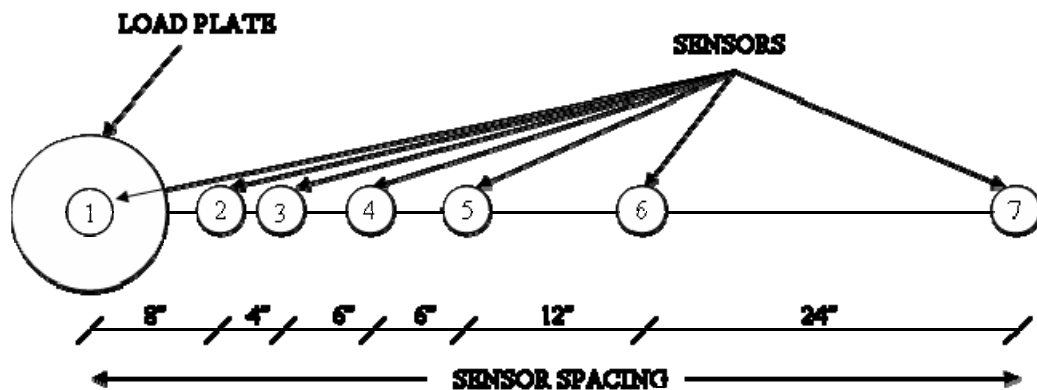


Figure 5. Schematic Illustration of Sensor Configuration

Prediction of In-Place Moduli of Embankment Material

The current procedure for predicting the insitu strength of the embankment material of a pavement system is based on the procedure described in the *AASHTO Guide for Design of Pavements Structures* calibrated to Florida conditions (3). This method was originally proposed by Ullidtz (4), and is based on Boussinesq's theory on a concentrated load applied on an elastic half-space (5). In this procedure, the modulus of an embankment material is estimated as follows:

$$E_r = 0.24P / d_r \cdot r \quad (2)$$

Where:

E_r = Subgrade modulus, in psi;

P = Applied load, in pounds;

d_r = Deflection measured at a radial distance r , in inches; and

r = Radial distance at which the deflection is measured, in inches.

The *AASHTO Design Guide* suggests the deflection used in the above equation be measured as close as possible to the loading plate and yet be sufficiently far from the load. This is suggested to satisfy the assumption that, at points sufficiently distant from the load, the deflections measured at the pavement surface are mainly due to the embankment deformation, and are also independent of the load plate size. Florida's previous experience with non-destructive deflection testing has shown that the pavement deflections measured at 36 inches away from the load are appropriate for the determination of the embankment moduli. Therefore, only the pavement deflections measured at 36 inches ($r = 36$ inches in equation 2) away from the load are considered for design purposes in the Florida procedure. Furthermore, within a project limits, the resilient modulus (M_r) value is reported based on the mean deflection plus two standard deviations ($d_r = \text{mean deflection} + 2 \sigma$).

PROJECT TESTING REQUESTS

To request a project to be tested, simply contact:

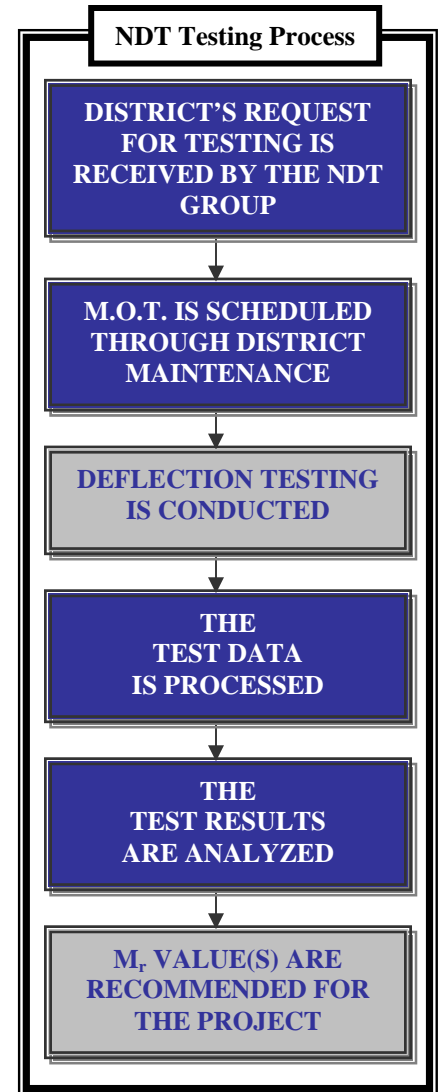
Charles Holzschuher
Nondestructive Testing
charles.holzschuher@dot.state.fl.us
Fax: (352) 955-6345

NOTE: *Please Carbon Copy your District Maintenance Engineer for Maintenance of Traffic.*

Include the following information within the body of the request:

- 1.) Roadway Id
(e.g. SR 91, 91470000, FL Turnpike)
- 2.) County Name
(e.g. Okeechobee)
- 3.) Project Limits
(e.g. MP 181.7 to MP 188.9)
- 4.) Exceptional Needs
(e.g. Extend testing 1000 ft past Begin/End segment limits.)
- 5.) Project Location Map
- 6.) Recommended Due Date
- 7.) MOT, Traffic Restrictions

After the request has been received by the NDT group, the District Maintenance Office will schedule the maintenance of traffic at the request of the SMO and deflection testing will be conducted. The flow chart to the right details the project testing process.



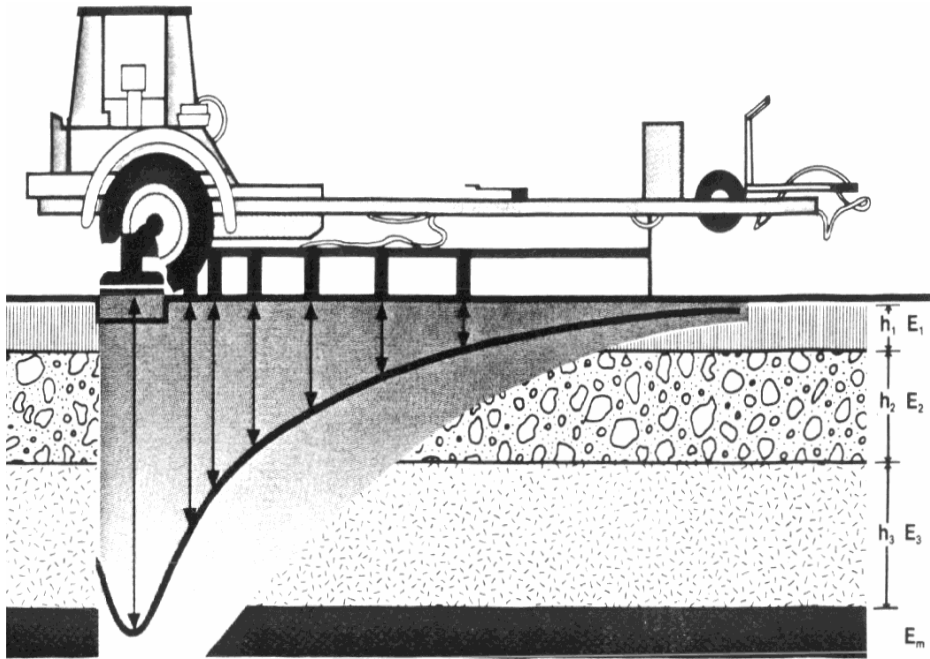
For coordination purposes, it is best to provide the State Materials Office with as much time as possible by submitting any testing requests immediately after the work program has been updated and the project schedules are set. In order to ensure that all requests may be dealt with in a timely and efficient manner, a minimum of 6 months is required by the State Materials Office for testing. Furthermore, an annual district-wide listing of test projects is preferred to properly schedule crew travel times and equipment.

Field Testing Requirements

Generally testing is only conducted on 2-lane projects greater than 1 mile long, or on multi-lane projects greater than 0.5 mile long.

Testing frequency for 2-lane projects is conducted at 28 tests / mile in one direction. For multi-lane projects testing is conducted at 14 tests / mile / each direction.

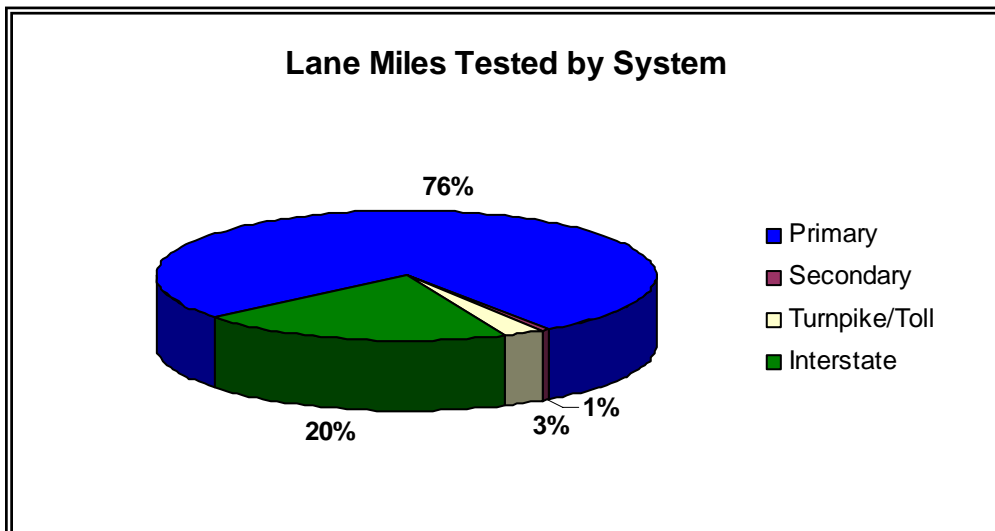
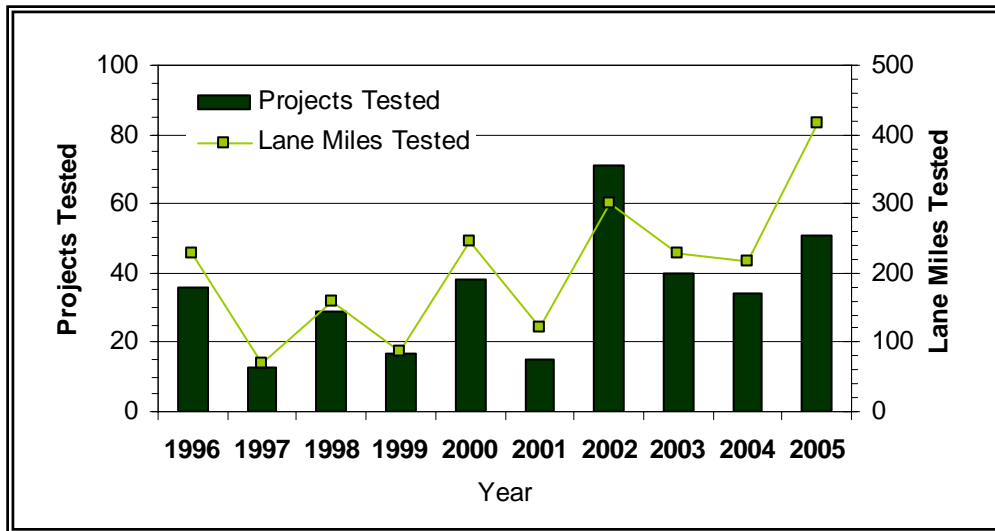
PART II:
FACTS & FIGURES¹



¹ Project resilient modulus values presented are the lowest values recommended for each project. Some projects may have multiple resilient modulus values.

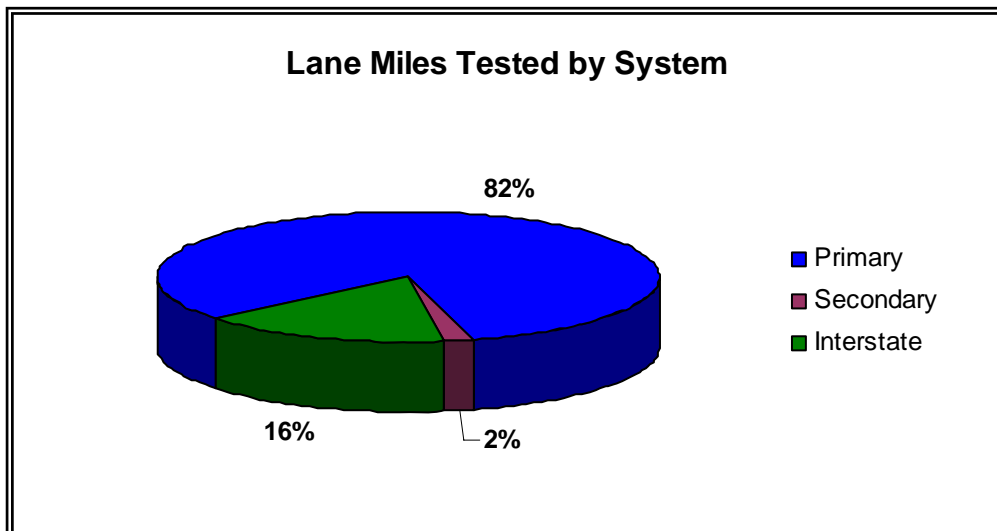
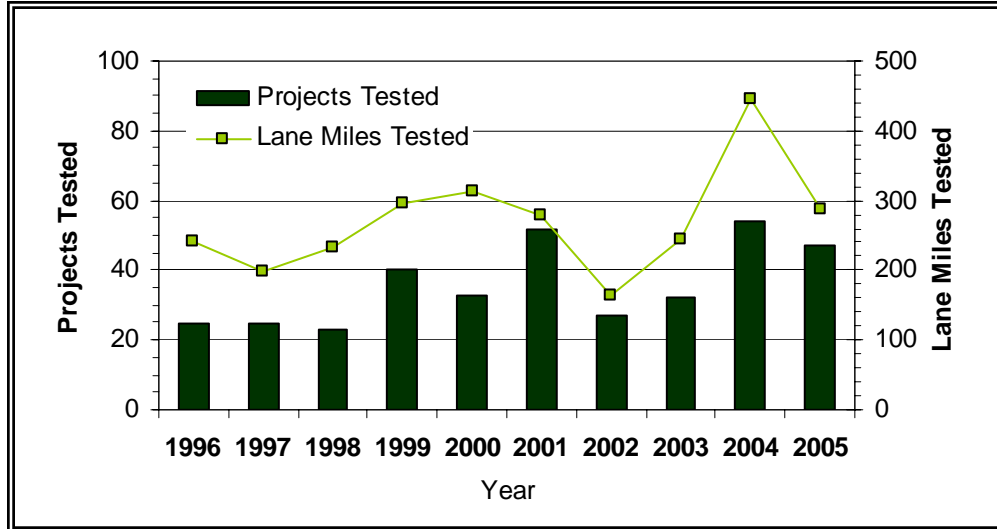
DISTRICT 1 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	36	228.006	0	0.000	0	0.000	0	0.000	36	228.006
1997	12	61.473	0	0.000	0	0.000	1	8.692	13	70.165
1998	27	129.431	0	0.000	0	0.000	2	29.940	29	159.371
1999	15	74.338	2	11.510	0	0.000	0	0.000	17	85.848
2000	33	201.881	0	0.000	0	0.000	5	44.240	38	246.121
2001	11	57.697	0	0.000	1	14.000	3	48.970	15	120.667
2002	68	243.512	0	0.000	0	0.000	3	58.212	71	301.724
2003	32	154.144	0	0.000	0	0.000	8	74.998	40	229.142
2004	31	174.207	1	3.711	0	0.000	2	38.752	34	216.670
2005	41	258.518	0	0.000	1	42.842	9	115.278	51	416.638
Total	306	1583.207	3	15.221	2	56.842	33	419.082	344	2,074.352



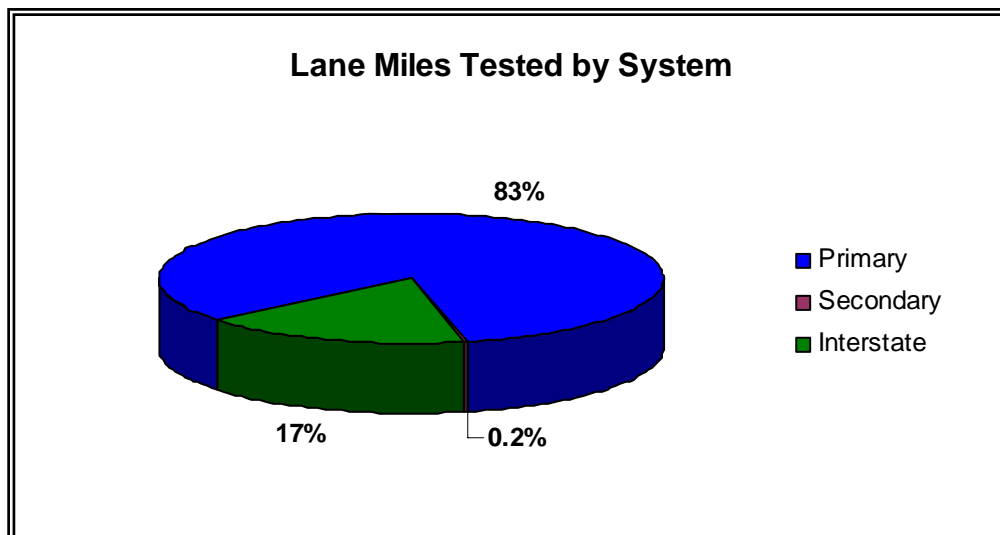
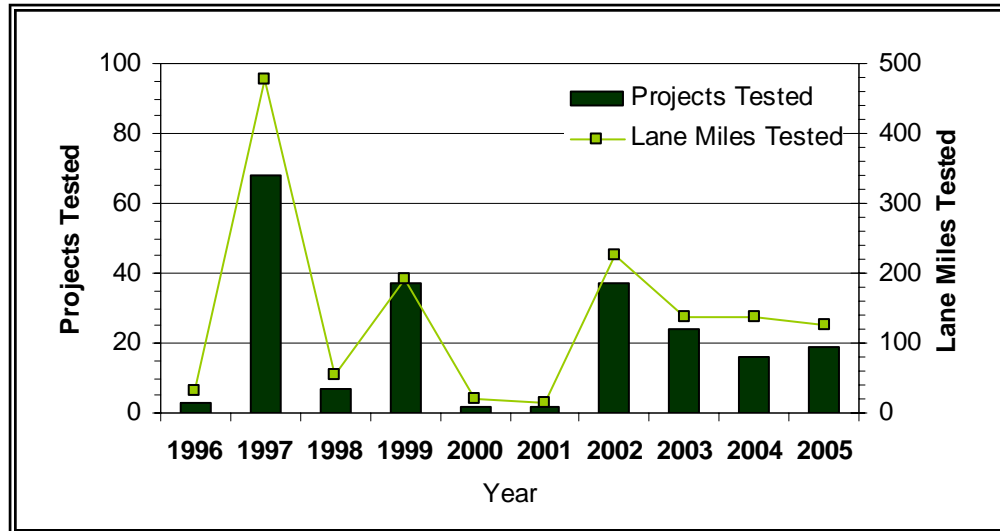
DISTRICT 2 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	19	160.571	1	1.346	0	0.000	5	73.504	25	241.421
1997	17	101.431	0	0.000	0	0.000	8	89.808	25	199.239
1998	22	223.610	0	0.000	0	0.000	1	9.160	23	233.770
1999	40	296.747	0	0.000	0	0.000	0	0.000	40	296.747
2000	30	254.138	1	6.156	0	0.000	2	49.812	33	313.106
2001	49	243.803	1	6.034	0	0.000	2	27.224	52	280.061
2002	26	153.046	0	0.000	0	0.000	1	8.734	27	162.780
2003	27	166.176	2	8.105	0	0.000	3	65.040	32	244.321
2004	47	332.541	0	0.000	0	0.000	7	105.366	54	444.907
2005	40	250.477	6	27.071	0	0.000	1	1.420	47	285.968
Total	317	2182.540	11	48.712	0	0.000	30	430.068	358	2,702.320



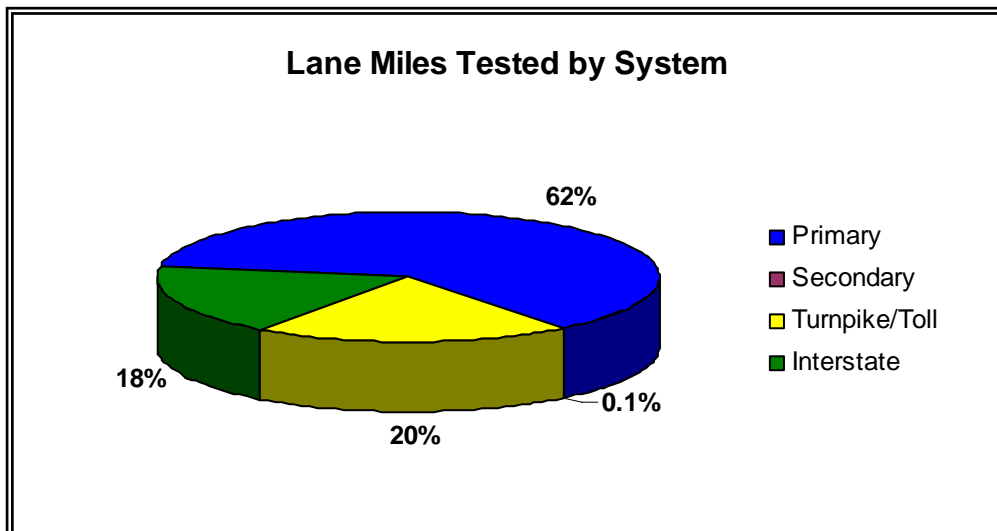
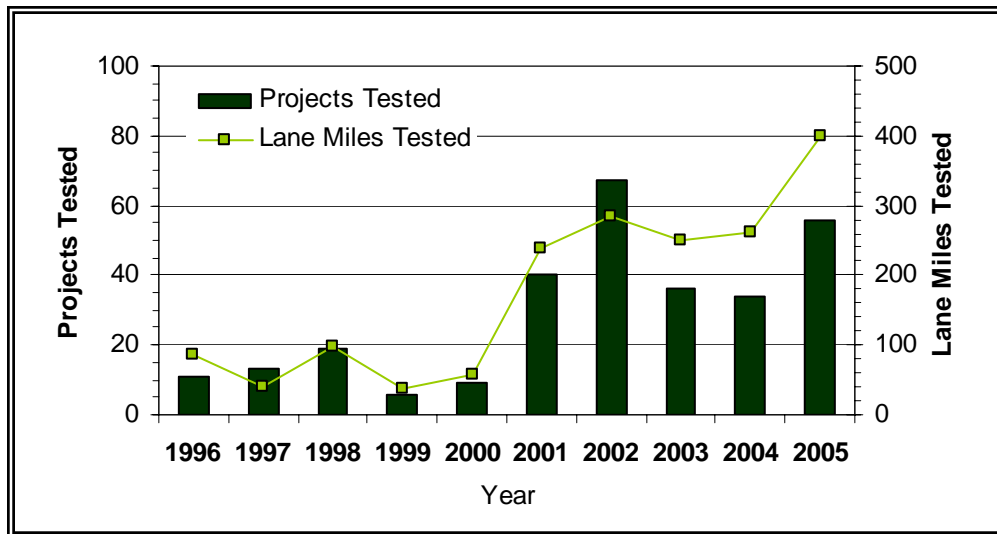
DISTRICT 3 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	3	31.931	0	0.000	0	0.000	0	0.000	3	31.931
1997	59	348.556	0	0.000	0	0.000	9	118.860	68	476.416
1998	7	55.061	0	0.000	0	0.000	0	0.000	7	55.061
1999	31	146.909	0	0.000	0	0.000	6	37.440	37	190.349
2000	2	20.376	0	0.000	0	0.000	0	0.000	2	20.376
2001	2	15.036	0	0.000	0	0.000	0	0.000	2	15.036
2002	37	225.450	0	0.000	0	0.000	0	0.000	37	225.450
2003	23	116.972	0	0.000	0	0.000	1	18.332	24	136.304
2004	13	87.816	1	2.857	0	0.000	2	42.910	16	136.583
2005	17	101.852	0	0.000	0	0.000	2	23.222	19	127.074
Total	194	1149.959	1	2.857	0	0.000	20	240.764	215	1,414.580



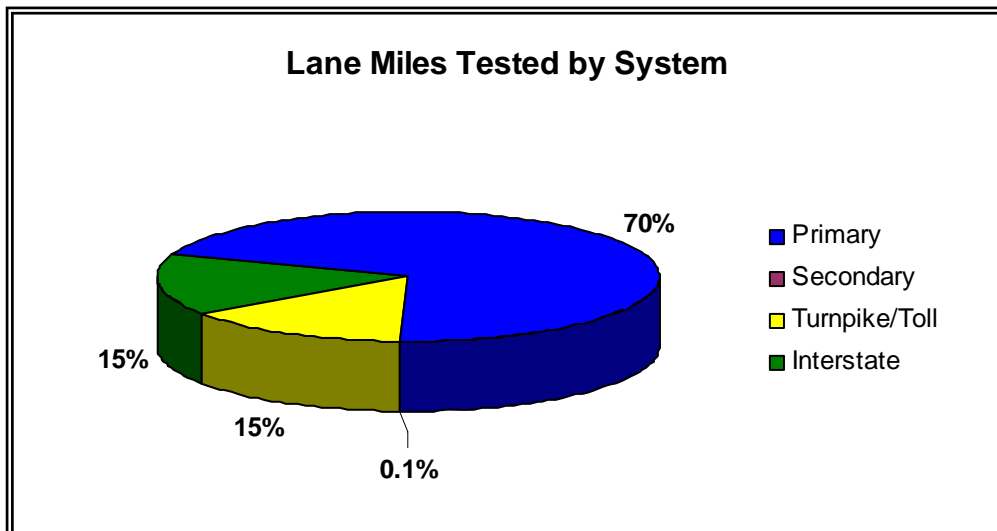
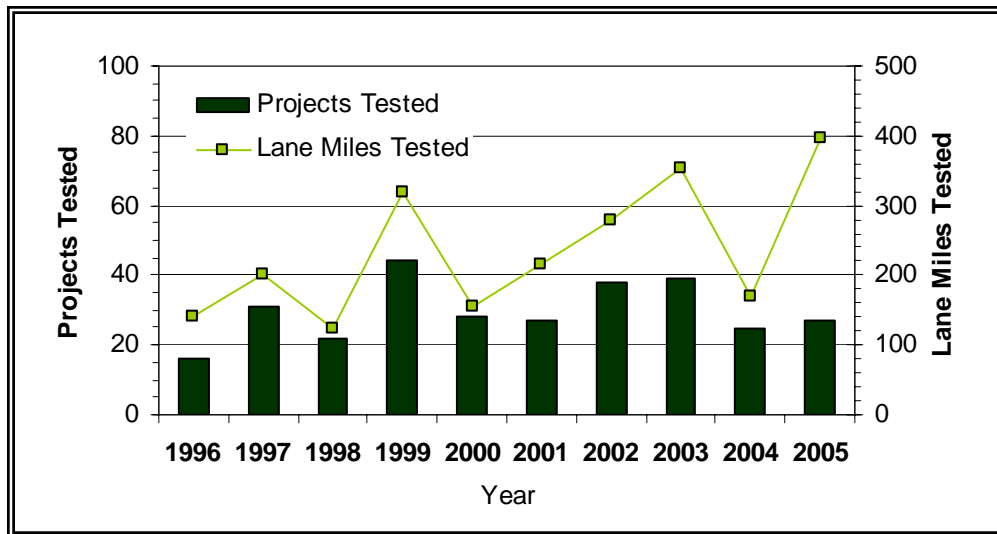
DISTRICT 4 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	6	34.429	0	0.000	0	0.000	5	47.020	11	86.449
1997	13	38.976	0	0.000	0	0.000	0	0.000	13	38.976
1998	15	76.506	0	0.000	2	15.963	2	0.693	19	97.162
1999	5	19.405	0	0.000	1	16.938	0	0.000	6	37.343
2000	6	20.856	0	0.000	0	0.000	3	33.492	9	57.348
2001	28	123.333	0	0.000	5	32.678	7	69.074	40	237.085
2002	58	207.308	1	0.997	2	26.000	6	40.722	67	284.027
2003	28	119.843	0	0.000	3	62.200	5	60.570	36	250.613
2004	29	157.283	0	0.000	5	99.708	0	0.000	34	261.991
2005	50	249.376	1	0.864	2	92.252	3	52.102	56	400.594
Total	238	1047.315	2	1.861	20	345.739	31	303.673	291	1,751.588



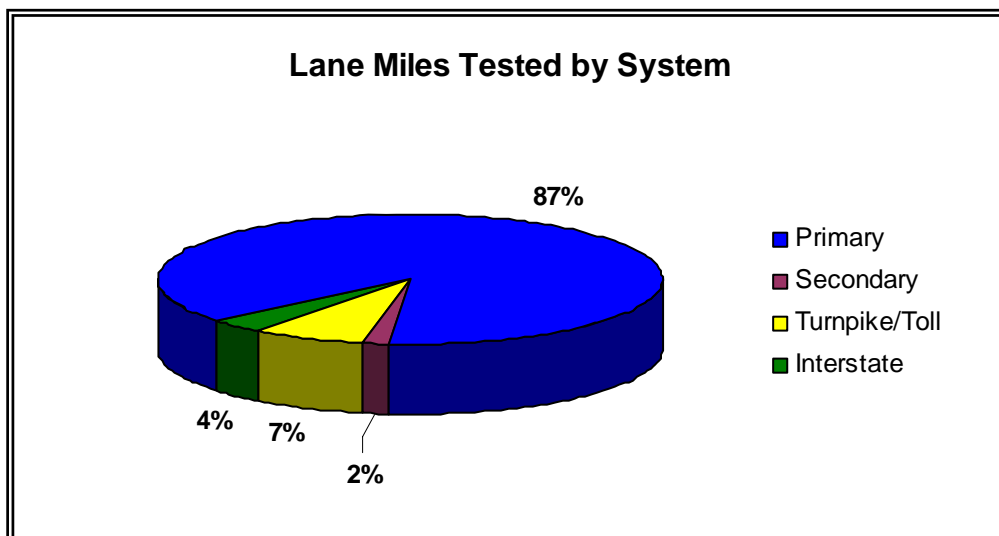
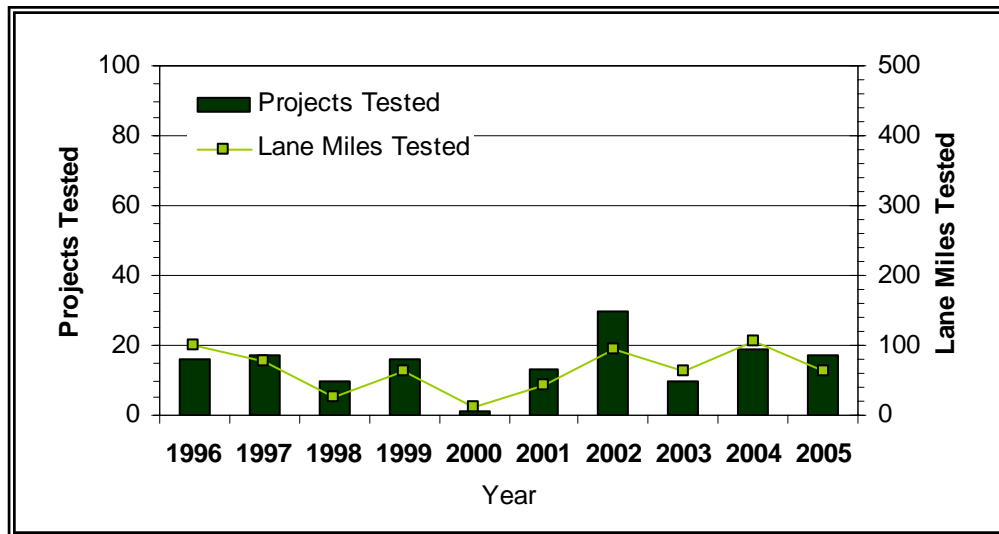
DISTRICT 5 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	14	121.358	0	0.000	1	6.797	1	11.030	16	141.185
1997	29	182.183	0	0.000	0	0.000	2	15.900	31	200.083
1998	18	105.613	0	0.000	0	0.000	4	15.012	22	124.625
1999	32	218.163	0	0.000	7	36.439	5	51.556	44	318.158
2000	18	92.273	1	1.754	5	20.160	4	30.416	28	154.603
2001	20	146.606	0	0.000	3	10.960	4	52.092	27	216.658
2002	35	251.763	0	0.000	3	23.568	0	0.000	38	278.331
2003	28	155.280	1	0.554	4	73.914	6	111.872	39	352.620
2004	24	140.590	0	0.000	0	0.000	1	27.890	25	169.480
2005	23	193.776	0	0.000	2	167.434	2	32.714	27	397.924
Total	241	1607.605	2	2.308	25	339.272	29	348.482	297	2,353.667



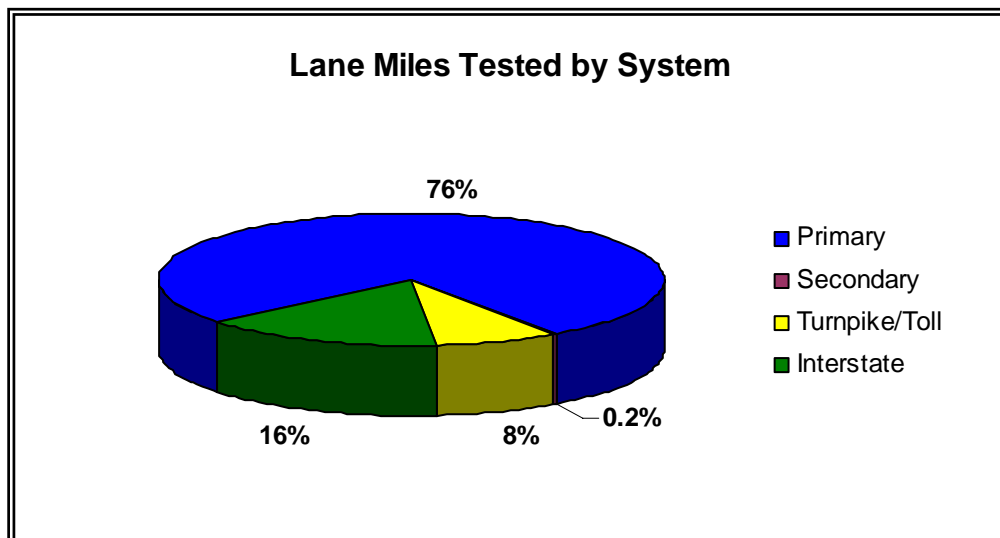
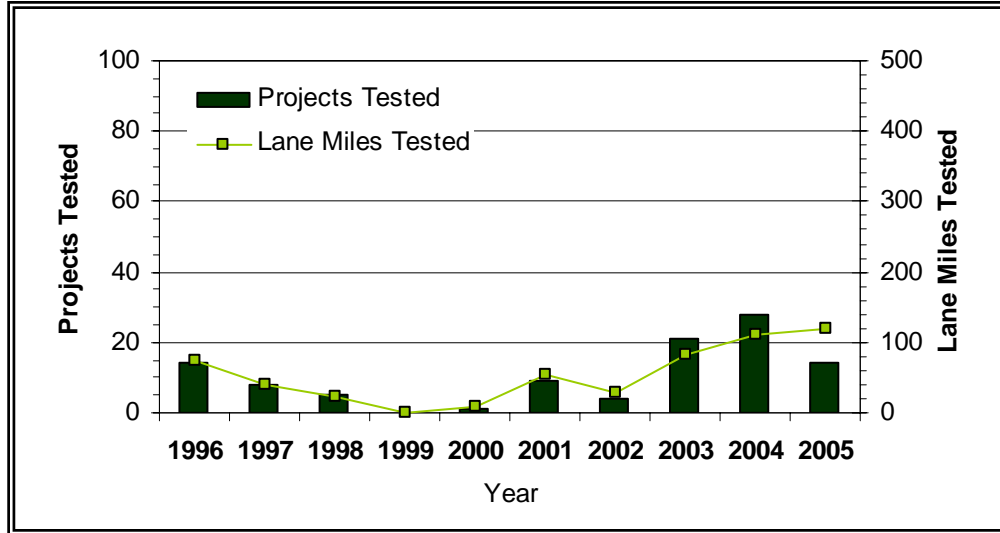
DISTRICT 6 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	14	92.399	0	0.000	2	5.352	0	0.000	16	99.751
1997	17	78.077	0	0.000	0	0.000	0	0.000	17	78.077
1998	10	25.904	0	0.000	0	0.000	0	0.000	10	25.904
1999	16	62.036	0	0.000	0	0.000	0	0.000	16	62.036
2000	1	12.715	0	0.000	0	0.000	0	0.000	1	12.715
2001	12	38.662	0	0.000	0	0.000	1	4.414	13	44.076
2002	29	82.816	1	11.065	0	0.000	0	0.000	30	94.881
2003	8	53.317	0	0.000	0	0.000	2	8.806	10	64.123
2004	18	64.316	0	0.000	1	40.150	0	0.000	19	105.466
2005	16	51.723	0	0.000	0	0.000	1	10.844	17	63.567
Total	141	561.965	1	11.065	3	45.502	4	24.064	149	650.596



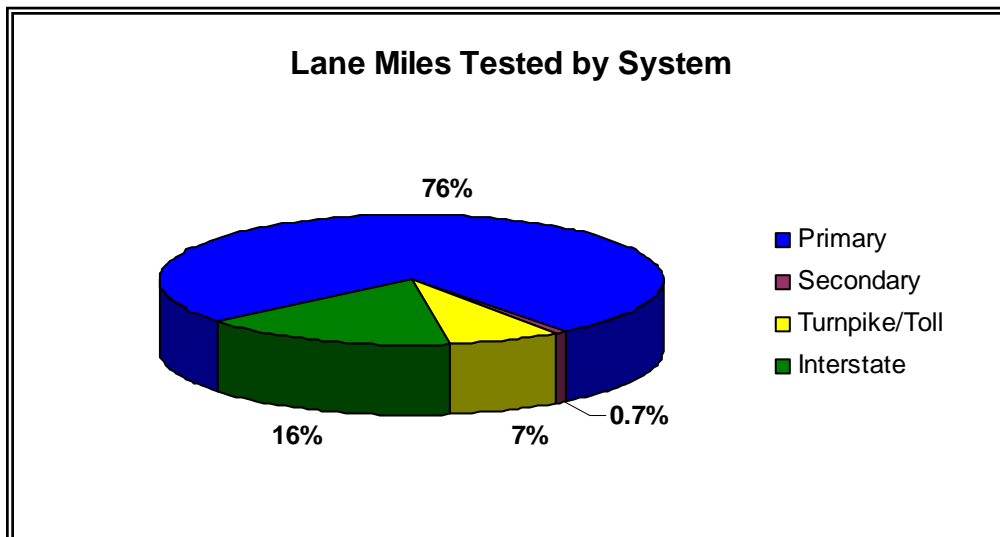
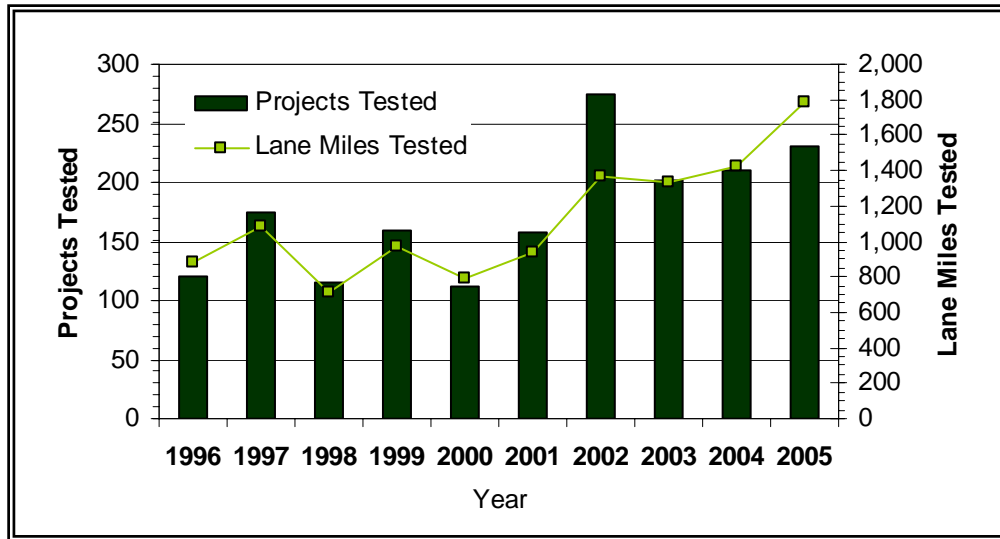
DISTRICT 7 TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	10	44.337	0	0.000	3	10.204	1	15.318	14	73.859
1997	8	40.358	0	0.000	0	0.000	0	0.000	8	40.358
1998	5	21.722	0	0.000	0	0.000	0	0.000	5	21.722
1999	0	0.000	0	0.000	0	0.000	0	0.000	0	0.000
2000	1	7.746	0	0.000	0	0.000	0	0.000	1	7.746
2001	7	33.069	0	0.000	0	0.000	2	19.464	9	54.533
2002	3	9.433	0	0.000	0	0.000	1	19.232	4	29.665
2003	19	60.655	0	0.000	0	0.000	2	18.898	21	81.553
2004	27	109.088	1	0.800	0	0.000	0	0.000	28	110.888
2005	12	77.517	0	0.000	1	30.660	1	9.400	14	119.577
Total	92	403.925	1	0.800	4	40.864	7	82.312	104	539.901



STATEWIDE TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
1996	102	713.031	1	1.346	6	22.353	12	146.872	121	883.602
1997	155	851.054	0	0.000	0	0.000	20	233.260	175	1,084.314
1998	104	637.847	0	0.000	2	15.963	9	54.805	115	708.615
1999	139	817.598	2	11.510	8	53.377	11	88.996	160	971.481
2000	91	609.985	2	7.910	5	20.160	14	157.960	112	796.015
2001	129	658.206	1	6.034	9	57.638	19	221.238	158	943.116
2002	256	1173.328	2	12.062	5	49.568	11	126.900	274	1,361.858
2003	165	826.387	3	8.659	7	136.114	27	358.516	202	1,329.676
2004	189	1065.841	3	7.368	6	139.858	12	214.918	210	1,427.985
2005	199	1183.239	7	27.935	6	333.188	19	244.980	231	1,789.342
Total	1529	8536.516	21	82.824	54	828.219	154	1848.445	1758	11,296.004



2005 PROJECT LISTING BY DISTRICT
District 1

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
01050	417129-1	Charlotte	776	ETWT	17.000	17.549	03/29/05	27,000	EB 27K / WB 32K
01010	417237-1	Charlotte	45	NTST	21.021	22.042	03/29/05	18,000	NB 25K / SB 18K
03175	415558-1	Collier	93	ETWT	0.000	24.324	03/22/05	32,000	
03175	417238-1	Collier	93	ETWT	24.325	35.601	03/22/05	32,000	
03050	195252-2	Collier	82	ET	0.000	7.058	04/05/05	15,000	mp 0to3 15k / mp 3to7.058 20k
03040	417248-1	Collier	90	WT	0.000	10.355	04/05/05	20,000	
03040	417248-2	Collier	90	WT	10.355	22.014	04/05/05	15,000	
03040	417248-3	Collier	90	WT	22.014	32.308	04/05/05	9,000	mp 22.014to28 15k / mp 28to32.308 9k
03001	195416-2	Collier	84	ETWT	4.003	6.464	11/10/05	22,000	MP4.003-5 30k / MP 5-6.464 22k
04040	193896-1	Desoto	70	ET	14.690	15.529	03/21/05	23,000	
04020	193898-2	Desoto	35	NT	9.588	13.866	09/14/05	20,000	
04020	415490-1	Desoto	35	NT	0.000	4.260	09/14/05	26,000	
05040	193977-2	Glades	78	ET	0.000	4.566	03/29/05	15,000	0-2 15k / 2-4.566 20k
05010	416591-1	Glades	25	NTST	11.125	16.152	03/29/05	20,000	NB11.13-13 27k,13-16.152 23k/SB 20k
06010	417249-1	Hardee	35	NTST	20.140	21.500	02/08/05	25,000	PCC? From MP 20.5-21.5 13K
07010	194201-2	Hendry	80	ET	10.371	12.594	11/10/05	17,000	
07010	408286-3	Hendry	80	ET	28.882	31.822	11/10/05	27,000	
09040	194426-2	Highlands	17	ETWT	10.170	11.147	02/08/05	14,000	
12020102	195587-1	Lee	80	ET	0.643	1.119	03/03/05	17,000	
12010	416519-1	Lee	45	NTST	17.017	21.131	03/31/05	27,000	
12020	417243-1	Lee	80	ETWT	1.666	4.354	03/30/05	19,000	
12070	417244-1	Lee	82	WT	9.829	21.551	03/30/05	17,000	
12004	417246-1	Lee	865	ETWT	9.570	10.726	03/31/05	23,000	EB 23k / WB 26k
12070	195488-2	Lee	82	ETWT	4.100	4.800	09/14/05	32,000	
12070	195488-2	Lee	82	WT	4.800	6.676	09/14/05	24,000	
12075	411035-1	Lee	93	NTST	16.954	20.657	11/09/05	29,000	
12075	411036-1	Lee	93	NTST	20.657	22.201	11/09/05	32,000	
12075	411037-1	Lee	93	NTST	22.201	23.777	11/09/05	31,000	
12075	411038-1	Lee	93	NTST	23.777	25.671	11/09/05	31,000	
12075	411042-1	Lee	93	NTST	25.671	26.557	11/09/05	32,000	
12020	411042-1	Lee	93	ETWT	5.297	6.300	11/09/05	19,000	
12075	413066-1	Lee	93	NTST	26.557	28.390	11/09/05	32,000	

2005 PROJECT LISTING BY DISTRICT
District 1

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
12060	413066-1	Lee	78	ETWT	20.776	21.646	11/09/05	24,000	
13010	195813-3	Manatee	45	NTST	3.017	5.213	01/18/05	19,000	
13050	416120-1	Manatee	64	ETWT	3.531	6.100	01/18/05	20,000	
13050101	417239-1	Manatee	64	WT	0.970	1.510	01/18/05	17,000	
13130	417241-1	Manatee	55	NT	8.510	9.194	01/18/05	30,000	
13060	195968-2	Manatee	62	ET	0.000	19.199	01/19/05	8,000	MP 3-4 8K, everything else 12k
16250	196914-2	Polk	37	NTST	26.125	28.647	02/23/05	28,000	
16060	196960-2	Polk	35	NTST	6.858	7.829	02/23/05	27,000	
16060	196960-3	Polk	35	NTST	8.558	9.426	02/23/05	22,000	NBmp 8.558-9 22K,mp9-9.426 10k/SB 25k
16030	197013-2	Polk	35	NTST	0.000	3.055	02/22/05	21,000	NBmp0-2 21k,mp2-3.055 32k/SB 24k
16250	197252-2	Polk	37	NTST	23.240	25.147	02/23/05	21,000	
16020	197259-2	Polk	600	ETWT	3.300	5.150	02/23/05	24,000	WB may be overlaid PCC, 12K psi
16180	197279-2	Polk	25	NTST	24.330	31.970	02/23/05	23,000	27K NB / 23K SB
16170	197368-3	Polk	25	NTST	6.989	14.929	02/22/05	14,000	NB6.989-13 24k/SBmp6.989-13 21k/mp13-14.929 14k
16090	406759-2	Polk	17	NT	6.274	12.650	02/23/05	16,000	
16293	417245-1	Polk	549	NTST	1.251	2.288	02/23/05	15,000	
16060	408268-2	Polk	35	NTST	0.000	1.000	10/31/05	17,000	
16260	408268-2	Polk	60A	NTST	0.529	1.400	10/31/05	21,000	EB 21k / WB 29k
16180000	411039-1	POLK	27	NTST	11.300	13.150	10/31/05	19,000	
16060	408268-2	Polk	35	NTST	0.521	4.448	11/29/05	24,000	
16060	408268-3	Polk	35	NTST	4.448	8.000	11/29/05	27,000	
16470	417021-1	Polk	570	ETWT	18.462	24.380	05/04/05	22,000	several breakouts, see memo
16470	417021-1	Polk	570	ETWT	0.000	18.462	05/04/05	22,000	several breakouts, see memo
17075	406314-3	Sarasota	93	NTST	20.000	29.600	11/08/05	30,000	

2005 PROJECT LISTING BY DISTRICT

District 2

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
26020	207482-1	Alachua	20	ETWT	2.890	6.217	09/20/05	21,000	
26130	207580-2	Alachua	26	ETWT	0.000	11.690	09/21/05	12,000	mp 0to3 20k / mp 3to11.690 12k
26020	207648-3	Alachua	20	NTST	16.802	19.743	09/20/05	27,000	NB 31k / SB 27k
26003	207700-2	Alachua	120	ETWT	0.000	1.322	09/19/05	18,000	
26220	207734-4	Alachua	121	ET	0.000	8.698	09/21/05	19,000	
26060	207756-3	Alachua	200	NTST	1.220	2.828	09/20/05	20,000	
26130	207796-3	Alachua	26	NTST	6.182	8.959	09/07/05	11,000	
26005	207849-9	Alachua	25	NTST	13.444	17.471	09/19/05	14,000	mp13.444t-4.1 14k (overlaid PCC possible)/mp14.1-17.471 22k
26005	207611-3	Alachua	222	ETWT	5.546	10.691	10/11/05	17,000	
26250	207712-3	Alachua	121	NT	3.540	8.043	10/31/05	23,000	mp 3.540-4.2 23k, 4.2-4.4 11k, 4.4-5.5 32k, 5.5-8.043 23k
27070	207915-3	Baker	CR 228	ET	0.000	5.617	01/11/05	13,000	
71040	208187-2	Clay	100	WT	0.000	5.304	03/10/05	17,000	
71020	208207-3	Clay	15	NTST	8.261	10.923	03/10/05	15,000	
71070	208211-3	Clay	21	NTST	3.106	7.137	03/10/05	15,000	
71293	208225-5	Clay	23	NT	3.863	6.221	03/10/05	20,000	
72050	209137-2	Duval	5	NTST	7.152	8.851	02/28/05	PCC	Looks like PCC
72004	209361-4	Duval	A1A	NTST	0.000	0.692	02/28/05	15,000	
72291	209451-3	Duval	111	NTST	10.882	11.875	02/28/05	12,000	
72190	209513-9	Duval	212	ETWT	6.739	7.744	02/28/05	14,000	
72100	209531-2	Duval	10	ETWT	0.000	3.199	02/28/05	14,000	
72050	209342-5	Duval	211	ST	3.124	7.096	03/01/05	8,000	
72260	209441-2	Duval	105	NT	0.000	9.453	03/01/05	8,000	13K from mp 1.000 to 7
72170	209698-2	Duval	21	NTST	0.000	4.100	10/06/05	15,000	
32070	212218-2	Hamilton	CR 143	ST	4.715	10.034	01/31/05	12,000	
32070	212218-3	Hamilton	CR 143	ST	0.000	4.715	01/31/05	11,000	
33010	210067-2	Lafayette	20	WT	4.582	13.371	10/04/05	19,000	
34150	210292-2	Levy	320	WT	0.000	6.624	09/08/05	14,000	

2005 PROJECT LISTING BY DISTRICT

District 2

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
35060	210530-2	Madison	145	NT	6.702	13.000	04/18/05	14,000	
35010	210538-2	Madison	10	ETWT	19.742	21.377	04/18/05	20,000	
35540	212517-2	Madison	CR360	ST	10.990	16.606	04/18/05	12,000	
74040	210687-3	Nassau	200	NT	16.053	22.183	01/11/05	10,000	
74040	210683-4	Nassau	200	NT	0.000	8.513	04/26/05	15,000	
74060	210688-2	Nassau	A1A	ETWT	7.620	11.398	04/26/05	20,000	
74020	210673-2	Nassau	5	SB	10.737	13.375	12/14/05	19,000	
74020	210673-2	Nassau	5	SB	10.737	13.375	12/14/05	NA	Asphalt overlaid PCC
74040	210711-1	Nassau	200	NB	27.567	30.548	12/13/05	13,000	
74040	210711-1	Nassau	200	SB	27.567	30.548	12/13/05	20,000	
74060	210712-1	Nassau	200	EB	0.000	7.020	12/13/05	21,000	
74060	210712-1	Nassau	200	WB	0.000	7.020	12/13/05	17,000	
74060	210712-1	Nassau	200	WB	0.000	7.020	12/13/05	13,000	Overlaid PCC?
74060	210712-1	Nassau	200	WB	0.000	7.020	12/13/05	13,000	
74170	213470-3	Nassau	8	EB/WB	0.000	0.710	12/14/05	21,000	
76070	209880-2	Putnam	21	NT	0.000	7.781	02/17/05	13,000	
76080	209920-2	Putnam	26	ET	0.000	5.702	02/17/05	12,000	
76030	210020-5	Putnam	15	NTST	1.298	4.444	02/17/05	16,000	NB 16k / SB 19k
78010	210424-3	St Johns	5	NTST	11.945	15.083	10/25/05	9,000	mp11.95-13.5 22k, mp13.5-14.5 14k, EBmp 14.5-15.1 28k, WBmp14.5-15.1 9k
78060	210447-3	St Johns	16	ETWT	14.421	15.892	10/25/05	12,000	EB mp 14.421to15.3 12k, mp 15.3to15.892 18k / WB 18k
3700043	210750-2	Suwannee	51	NTST	24.172	27.570	02/01/05	13,000	MP 24.17-25 13K / MP 25-27.57 22K
37040	212664-2	Suwannee	CR 248	ET	0.000	4.637	02/01/05	12,000	
38030	210865-3	Taylor	20	WT	6.704	14.697	10/04/05	19,000	
38090	210883-2	Taylor	30	ET	0.000	11.861	11/22/05	23,000	EB MP 0-3 32k, mp 3-11.861 23k
39502	410713-2	Union	CR240	ET	0.000	1.167	02/07/05	15,000	

2005 PROJECT LISTING BY DISTRICT

District 3

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
46010	409023-1	Bay	30	ETWT	13.743	15.554	10/20/05	19,000	EB 19k / WB 24k
46020003	413432-1	Bay	30A	ETWT	4.649	5.778	10/19/05	10,000	
46040	413433-1	Bay	75	NTST	1.130	10.510	10/19/05	7,000	NB mp 1.13-4.0 7k, mp 4.0-9.0 11k, mp 9.0-10.510 16k / SB 18k
46020	416917-1	Bay	30	ETWT	0.639	2.980	10/19/05	14,000	
48050	415376-1	Escambia	292	ET	6.995	17.295	11/15/05	9,000	EB mp6.995-13 17k, mp13-17.295 9k
48012	416914-1	Escambia	296	NT	6.264	7.740	11/15/05	10,000	Transverse cracking - Overlaid PCC?
48030	416918-1	Escambia	290	WT	4.734	5.480	11/15/05	12,000	
48030	416918-2	Escambia	290	WT	0.000	0.278	11/15/05	17,000	
50080	218949-1	Gadsden	267	NTST	0.000	12.210	07/06/05	13,000	MP0-8 13k/MP 8-9 23k/MP 9-12.210 32k
50010	411695-1	Gadsden	10	ET	0.000	16.477	11/17/05	15,000	
50030	416915-1	Gadsden	10	ETWT	0.000	5.257	11/17/05	16,000	EBmp0-1.5 & mp3-5.257 16k, mp1.5-3 32k/WB mp0-1.5&mp4-5.257 23k,mp1.5-4 32k
52010	416932-1	Holmes	10	ETWT	21.814	23.762	11/16/05	18,000	
55020	416916-1	Leon	10	ETWT	7.358	8.268	04/25/05	15,000	EB 15K / WB 32K (may be PCC)
55320	417643-1	Leon	8	ETWT	10.000	15.665	06/23/05	24,000	
56050	218949-2	Liberty	267	NTST	0.000	0.422	07/06/05	17,000	
57010	415381-2	Okaloosa	10	ET	10.682	11.055	10/18/05	16,000	
57050	416936-1	Okaloosa	85	NTST	17.410	18.391	10/18/05	11,000	
58010	416937-1	Santa Rosa	10	ETWT	3.099	9.127	11/16/05	18,000	
60002	416909-1	Walton	8	ETWT	18.084	24.030	10/18/05	20,000	

2005 PROJECT LISTING BY DISTRICT

District 4

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
86100	409138-1	Broward	7	NTST	3.000	4.244	06/14/05	16,000	
86010	413829-1	Broward	5	NTST	4.100	5.948	06/16/05	23,000	
860100001	413830-1	Broward	5	NTST	0.000	1.200	06/16/05	32,000	
860100001	413831-1	Broward	5	NTST	0.825	2.476	06/16/05	32,000	NB mp 1to1.3 12K
86040	415152-2	Broward	93	ETWT	3.462	4.086	06/14/05	32,000	
86040	415152-2	Broward	820	NTST	5.464	6.007	06/14/05	32,000	
86060	416242-1	Broward	25	NTST	7.134	27.768	06/14/05	27,000	NB7.13-25 32k, 25-27.77 27k / SB 32k
86100	416876-1	Broward	7	NTST	6.500	8.400	06/16/05	24,000	NB 29K / SB 24K
86040	413835-1	Broward	820	ETWT	18.371	19.956	08/24/05	3,000	mp18.371-18.7 16k/mp 18.7-19.96 3K
86030	416869-1	Broward	A1A	NTST	1.250	2.000	08/23/05	6,000	May be overlaid PCC
86040	416870-1	Broward	820	ETWT	7.430	10.570	08/23/05	14,000	32k WB 7.43 to 9
86050	416871-1	Broward	A1A	NTST	0.626	3.320	08/24/05	32,000	Overlaid PCC? mp 0.626 to 2.0 5K
86050	416872-1	Broward	A1A	NTST	4.310	5.380	08/24/05	32,000	
86110	416879-1	Broward	838	ETWT	2.700	6.100	08/24/05	26,000	EB 2.7-4.75 26k,4.75-5 9k,5-6.1 31k/WB 31k
86180	416881-1	Broward	A1A	NTST	0.000	0.910	08/24/05	10,000	May be overlaid PCC
86230	416883-1	Broward	822	EB/WB	0.000	2.600	08/23/05	26,000	
86230	416883-1	Broward	822	EB/WB	0.000	2.600	08/23/05	32,000	
86020	416884-1	Broward	5	NTST	0.000	1.890	08/24/05	22,000	
86080500	228241-1	Broward	84	ET	10.000	12.460	10/13/05	25,000	
86020	403575-3	Broward	5	NTST	14.750	15.235	10/13/05	23,000	
86220	415322-1	Broward	817	NTST	13.400	18.006	10/12/05	32,000	
86080500	415323-1	Broward	84	ET	4.000	5.500	10/13/05	32,000	
86075	415394-1	Broward	93	NTST	18.600	30.760	10/11/05	32,000	
86012	416868-1	Broward	869	ETWT	0.000	1.520	10/13/05	25,000	
86065	416873-1	Broward	845	NTST	2.100	3.000	10/12/05	19,000	
86100	416877-1	Broward	7	NTST	16.000	16.500	10/12/05	27,000	
86100	416878-1	Broward	7	NTST	17.900	21.780	10/12/05	23,000	NB 23k / SB 17.9-18.25 14k, 18.25to21.78 30k
86039	416880-1	Broward	814	ETWT	0.000	2.482	10/13/05	28,000	
88000	230879-1	Indian River	82nd Ave	NT	0.000	0.864	04/19/05	9,000	

2005 PROJECT LISTING BY DISTRICT
District 4

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
88010	415291-1	Indian River	5	NTST	5.840	7.900	04/19/05	14,000	mp 5.84 to 7.19k / mp 7to7.9 14k
89060	415304-1	Martin	76	WT	23.400	24.270	09/22/05	14,000	
89095	415396-1	Martin	9	NTST	11.700	24.967	09/21/05	19,000	several breakouts, see memo
89050	416888-1	Martin	15	NT	3.870	12.330	09/22/05	6,000	mp 3.87to7.6k / mp 7to9.5 11k / mp 9.5to12.33 24k
93001	229396-1	P Beach	786	WT	0.000	3.999	04/28/05	24,000	
93030	229786-1	P Beach	806	ET	0.000	1.100	04/28/05	25,000	
93030	413840-1	P Beach	806	ETWT	7.513	9.197	04/28/05	14,000	EB 19k / WB 14k
93030	413841-1	P Beach	806	ETWT	4.298	7.158	04/28/05	17,000	
93130	413799-1	P Beach	80	NTST	0.000	0.240	08/09/05	2,000	Extremely weak embankment
93100	413842-1	P Beach	25	NTST	0.000	12.617	08/09/05	16,000	several breakouts, see memo
93140	415317-1	P Beach	700	WT	5.140	19.270	08/10/05	2,000	Extremely weak embankment
93230	415319-1	P Beach	729	ST	0.000	2.270	08/10/05	2,000	Extremely weak embankment
93030	229567-1	P Beach	806	NTST	1.549	3.781	09/13/05	25,000	
93010	415310-1	P Beach	5	NTST	0.000	1.410	09/13/05	20,000	NB 25k / SB 20k
93010	415311-1	P Beach	5	NTST	15.100	17.370	09/13/05	23,000	
93090	415314-1	P Beach	811	NTST	0.000	3.587	09/14/05	18,000	mp 0to2.25 18k / mp 2.25to3.587 27k
93010	416897-1	P Beach	5	NTST	5.100	7.000	09/13/05	15,000	NB 16k / SB mp 5.1to6.2 20k, mp 6.2to7.15k (looks like overlaid PCC)
93020	416899-1	P Beach	5	NT	0.700	1.800	09/14/05	19,000	
93040	416901-1	P Beach	5	NTST	9.500	10.100	09/14/05	20,000	
93190	416905-1	P Beach	706	ETWT	13.740	16.070	09/14/05	17,000	
93150	416911-1	P Beach	809	NTST	0.000	1.720	09/14/05	23,000	
93470	417024-1	P Beach	91	WT	0.000	44.606	08/03/05	18,000	several breakouts, see memo
94010	413847-1	St Lucie	5	NTST	11.895	13.532	04/20/05	15,000	
94010	230288-3	St. Lucie	5	NTST	8.102	10.772	04/20/05	17,000	
94004	230338-2	St. Lucie	614	ET	2.583	3.584	04/20/05	17,000	
94030	415298-1	St. Lucie	70	ETWT	17.000	20.800	04/20/05	19,000	
94120	415302-1	St. Lucie	716	ETWT	5.110	7.824	04/20/05	18,000	

2005 PROJECT LISTING BY DISTRICT

District 5

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
70225	405506-2	Brevard	9	NTST	5.347	15.546	02/11/05	17,000	NB MP 5.347-8 26K, MP 8-15.546 20K / SB MP 5.347-14 24K, 14-15.546 17K
70011	237567-1	Brevard	501	NTST	0.000	3.158	03/02/05	14,000	
70140	417153-1	Brevard	5	NT	3.858	9.755	03/02/05	15,000	mp 3.858 to 8 15K, mp 8 to 9.755 26K
70080	417159-1	Brevard	A1A	NTST	0.000	3.200	03/02/05	21,000	
70010	417166-1	Brevard	5	ST	0.000	5.686	03/02/05	14,000	18k except for mp 3.5 to 4.5
70220	416938-1	Brevard	9	ST	0.000	12.316	07/27/05	26,000	MP 0to4 26k/mp 4to7 32k/mp 7to12.316 26k
70060	417188-1	Brevard	A1A	NT	0.000	14.345	11/10/05	23,000	
73050	417141-1	Flagler	11	NT	0.000	15.507	04/12/05	11,000	
73030	417158-1	Flagler	A1A	NT	0.000	3.385	04/12/05	23,000	
73040	417183-1	Flagler	100	WT	0.000	16.978	07/26/05	7,000	Several Break Outs - See Folder
11010047	417163-1	Lake	500	NTST	0.000	2.463	05/18/05	18,000	NB 23k / SB 18k
11130	417165-1	Lake	46	WT	0.603	4.583	05/18/05	13,000	
11020	417164-1	Lake	33	NT	0.000	13.795	06/20/05	16,000	
36050	411256-4	Marion	35	NT	1.723	3.887	05/17/05	17,000	
36080	417160-1	Marion	40	WT	6.499	9.640	05/17/05	10,000	mp 6.499to7.5 16k / mp 7.5to9.640 10k
36030	417162-1	Marion	25	NTST	16.399	22.764	05/17/05	21,000	
36110	417182-1	Marion	40	ET	6.600	19.979	05/16/05	14,000	mp6.6-15 20k / mp15-17 14k/mp 17-19.979 17k
75220	239304-1	Orange	530	ETWT	0.000	1.726	05/02/05	20,000	EB 24k / WB 20k
75003	417186-1	Orange	436	NTST	5.092	11.056	05/02/05	22,000	
75470	406146-1	Orange	91	NTST	0.000	24.913	06/28/05	15,000	several breakouts, see memo
92470	415429-1	Osceola	91	NTST	0.000	18.044	01/24/05	13,000	See Letter, several breakouts
92471	415429-1	Osceola	91	NTST	0.000	40.760	01/24/05	12,000	See Letter, several breakouts
77040	417178-1	Seminole	46	ETWT	3.860	16.100	11/03/05	12,000	EB mp 3.86-6 16k / 6-9.5 12k, 9.5-11 17k, 11-15.4 14k, 15.4-16.1 6k
18010	417176-1	Sumter	35	NT	0.000	6.042	05/10/05	20,000	20k mp 0-1.5 & 5-6.042 / 25k 1.5-5
18010	417177-1	Sumter	35	NT	13.157	19.429	05/10/05	12,000	13.16-15&16-19 18k/15-16 14k/ 19-19.43 12k
79160	417155-1	Volusia	15A	NTST	1.656	3.766	03/15/05	17,000	
79181	417157-1	Volusia	472	ETWT	0.376	2.856	04/11/05	22,000	
79100	417154-1	Volusia	40	ET	6.535	19.871	08/15/05	17,000	MP 6.535-15 21k, 15-19.871 17k

2005 PROJECT LISTING BY DISTRICT

District 6

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
87054	412475-1	Dade	972	ETWT	3.040	4.627	04/26/05	32,000	
87027	414622-1	Dade	969	NTST	0.000	2.411	04/26/05	32,000	
87030	414624-1	Dade	5	NTST	11.879	13.635	04/26/05	14,000	NB mp 11.879-12.75 18k, mp 12.75-13.635 14k (may be PCC) / SB 25k
87220	418065-1	Dade	948	ETWT	3.391	3.998	04/26/05	32,000	
87075	251630-2	Dade	93	NTST	0.000	5.422	09/28/05	32,000	
87110	405636-1	Dade	90	WT	13.131	24.398	09/27/05	10,000	13.131to16 19k / 16to19 27k / 19to22 19k / 22to24.398 10k
87008001	414618-1	Dade	916	NTST	0.414	2.555	09/13/05	14,000	mp 0.414to2 32k / 2to2.555 14k
87008	414618-1	Dade	916	ET	5.102	7.241	09/13/05	25,000	
87015	414621-1	Dade	989	WT	1.912	3.032	09/27/05	32,000	
87060001	414725-1	Dade	A1A	NTST	1.017	3.014	09/13/05	12,000	NB 23k / SB 12k
87038	417914-1	Dade	932	ETWT	3.410	4.886	09/13/05	32,000	
87080900	418066-1	Dade	934	ETWT	33.317	34.192	09/13/05	22,000	
87066	418071-1	Dade	922	ETWT	3.063	3.703	09/13/05	11,000	11k EB / 15k WB
90030	418083-1	Monroe	5	NT	0.000	0.640	09/29/05	29,000	
90030	418085-1	Monroe	5	NT	0.640	1.899	09/29/05	12,000	
90040	418087-1	Monroe	5	NT	8.458	11.713	09/29/05	13,000	mp8.458-10.1 13k / mp10.1-11.713 25k
90050	418087-2	Monroe	5	NT	0.000	0.729	09/29/05	14,000	
90020	418100-1	Monroe	5	NT	16.469	18.178	09/29/05	12,000	

2005 PROJECT LISTING BY DISTRICT
District 7

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
08040	407951-2	Hernando	50	ETWT	3.877	5.897	08/22/05	32,000	
10030	411337-1	Hillsborough	600	WT	6.637	19.179	04/13/05	16,000	
10120	411333-1	Hillsborough	674	ET	8.500	15.773	08/23/05	22,000	Loclized area from mp 12.7-13 10k
10160	255833-1	Hillsborough	597	NTST	2.063	4.486	09/29/05	19,000	nb mp2.063to3 19k, mp 3to4.846 32k / sb 22k
10002	410988-1	Hillsborough	618	ETWT	12.643	14.123	09/29/05	29,000	PCC from 13.75 to 14.123
10060	413399-1	Hillsborough	45	NTST	8.884	17.376	09/28/05	19,000	several breakouts, see memo
10110	413405-1	Hillsborough	60	ETWT	20.273	23.740	09/29/05	28,000	EB 32k / WB 28k
10290	416858-1	Hillsborough	582	ETWT	2.000	5.413	09/29/05	24,000	
10310	413407-1	Hillsborough	580	ETWT	2.777	6.863	11/01/05	22,000	
10470	417017-1	Hillsborough	589	NTST	0.000	12.311	04/19/05	26,000	
10471	417017-1	Hillsborough	586	ETWT	0.000	3.019	08/17/05	27,000	
14120	406550-1	Pasco	52	ETWT	32.217	33.403	09/07/05	13,000	
14140	408459-4	Pasco	93	ETWT	1.400	6.100	09/07/05	24,000	
15120	409154-1	Pinellas	688	ETWT	6.574	7.460	08/22/05	32,000	
15120	409155-1	Pinellas	688	ETWT	5.176	6.574	08/22/05	30,000	

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