State of Florida

Department of Transportation

2009 Resilient Modulus of Roadbed Soils Facts and Figures

FDOT Office
State Materials Office

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Authors
Charles Holzschuher
Ulas Toros

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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:

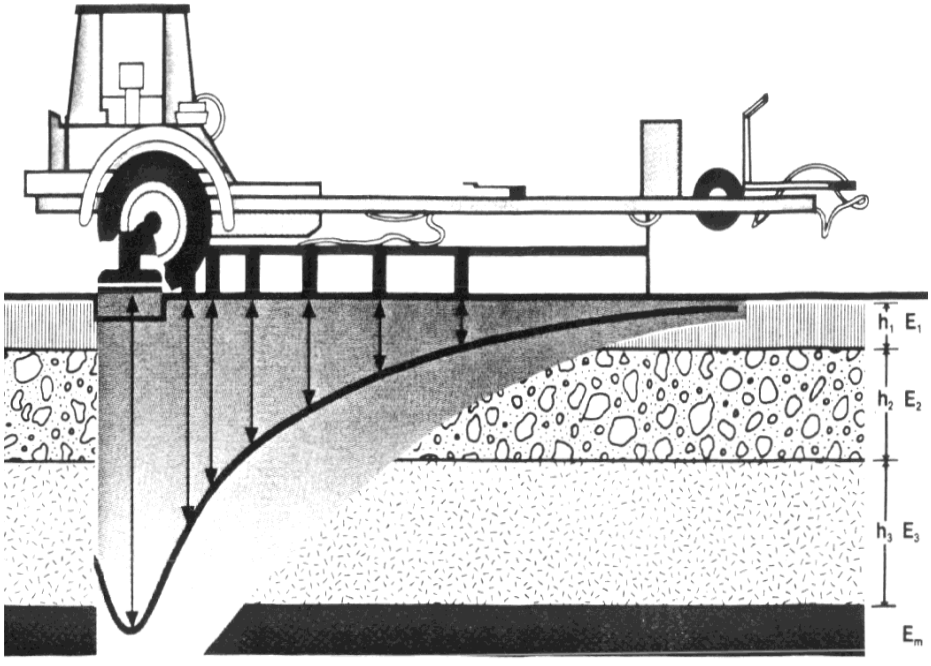
http://www.dot.state.fl.us/statematerialsoffice/pavement/index.shtm

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 it's 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 (Dynaflect).

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 track, 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.

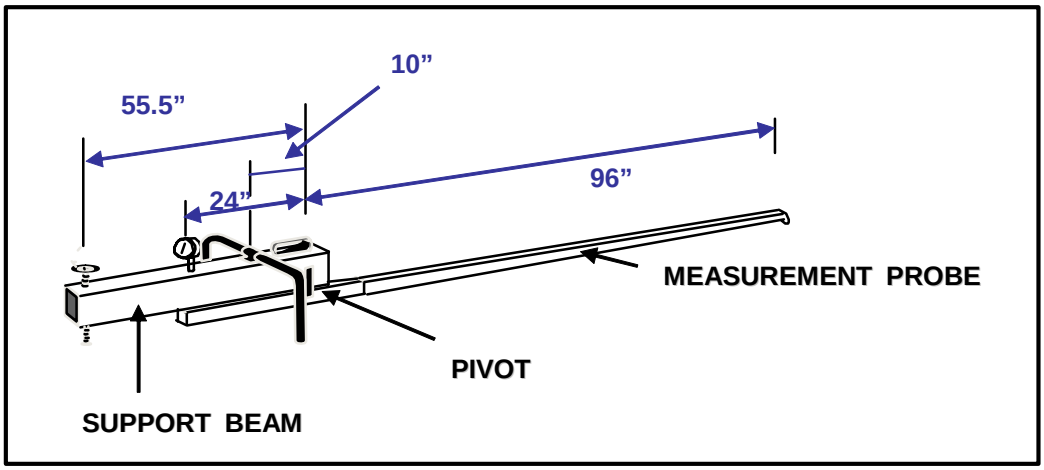


Figure 1. Schematic Illustration of a Benkelman Beam

Dynaflect

In mid-1980s, the Department switched to a steady-state vibratory device, known as a 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 performed 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.

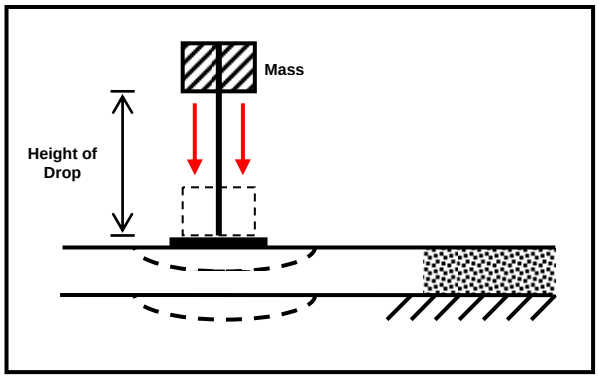


Figure 3. FWD Loading Principle

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.

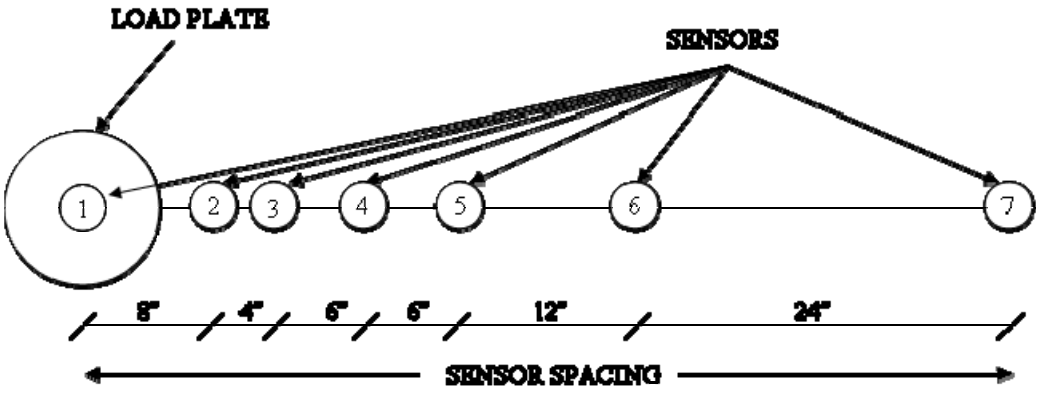


Figure 5. Schematic Illustration of Sensor Configuration

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 (Mr) value is reported based on the mean deflection plus two standard deviations (d_r = mean deflection + 2 σ).

HISTORICAL FWD DATA

For the benefit of district engineers, the FWD historical data from January 1, 2004 to current is provided on the State Materials Office's website at:

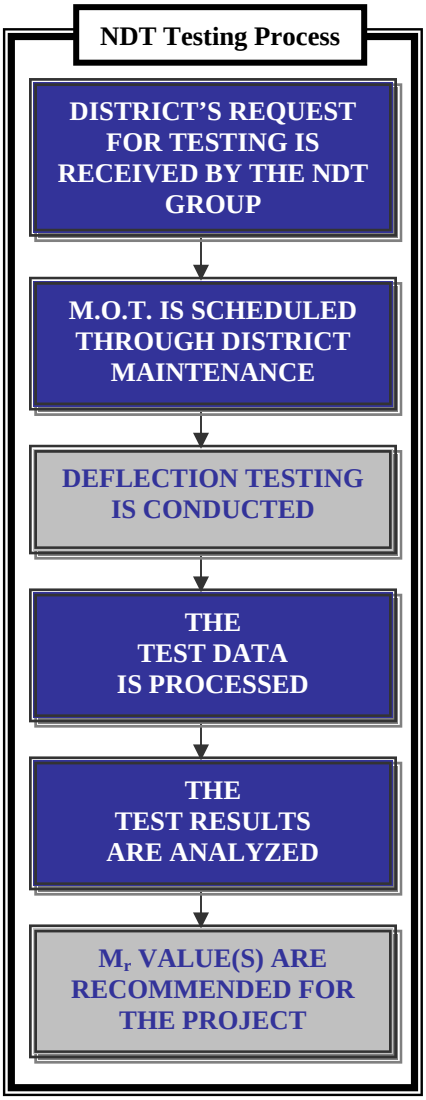
http://databases.sm.dot.state.fl.us/fwddata.htm

The FWD historical data can be searched by; beginning mile post, county, financial project number, project number and year.
Search result include; state road number, project number, beginning and end mile posts, financial project number, date requested, test date, lanes tested, number of lanes and modulus values.

PROJECT TESTING REQUESTS

To request a project to be tested, simply contact the following District FWD coordinators:

District	Name	E-mail
1	Debra Childs	Debra.childs@dot.state.fl.us
2	Chad Townsend	Chad.townsend@dot.state.fl.us
3	Samuel Weede	Samuel.weede@dot.state.fl.us
4	Brent Lee-Shue-Ling	Brent.Lee-Shue-Ling@dot.state.fl.us
5	Timothy Keefe	Timothy.keefe@dot.state.fl.us
6	Cathy Margoshes	Cathy.margoshes@dot.state.fl.us
7	Mary Sheets	Mary.sheets@dot.state.fl.us
Turnpike	Michael Shannon	Michael.Shannon@dot.state.fl.us



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, vibration analysis desired.)
5.) Project Location Map
6.) Recommended Due Date
7.) MOT, Traffic Restrictions

After the District FWD coordinators have gathered the information needed for the requested projects, they will submit the request to the SMO's NDT group. The NDT group will then review the submitted requests and schedule Maintenance of Traffic (MOT) with District Maintenance Offices for deflection testing. 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. For further information on SMO's FWD deflection testing process, contact:

Charles Holzschuher, Nondestructive Testing
charles.holzschuher@dot.state.fl.us
Phone: (352) 955-6341
Fax: (352) 955-6345

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.

IDENTIFICATION OF VIBRATION SENSITIVE WORK ZONES

Based on the findings of a recent research project, FDOT developed a methodology for identifying vibration-sensitive portions of resurfacing projects during routine pre-construction testing that does not require a detailed knowledge of the layering of the pavement structure or the geology of the surrounding site (6, 7). When the State Materials Office personnel is informed that a project is potentially vibration-sensitive, the FWD operator will be alerted to record the full FWD displacement time histories on each FWD test performed during pre-design testing. The time history data will then be processed to develop upper bound predictor of the ground motion at the site. By knowing or assuming a frequency for the vibratory roller to be used during construction, the peak particle velocity can be used to identify locations along a given project where vibratory compaction is not recommended. The analysis procedure is outlined in Figure 6.

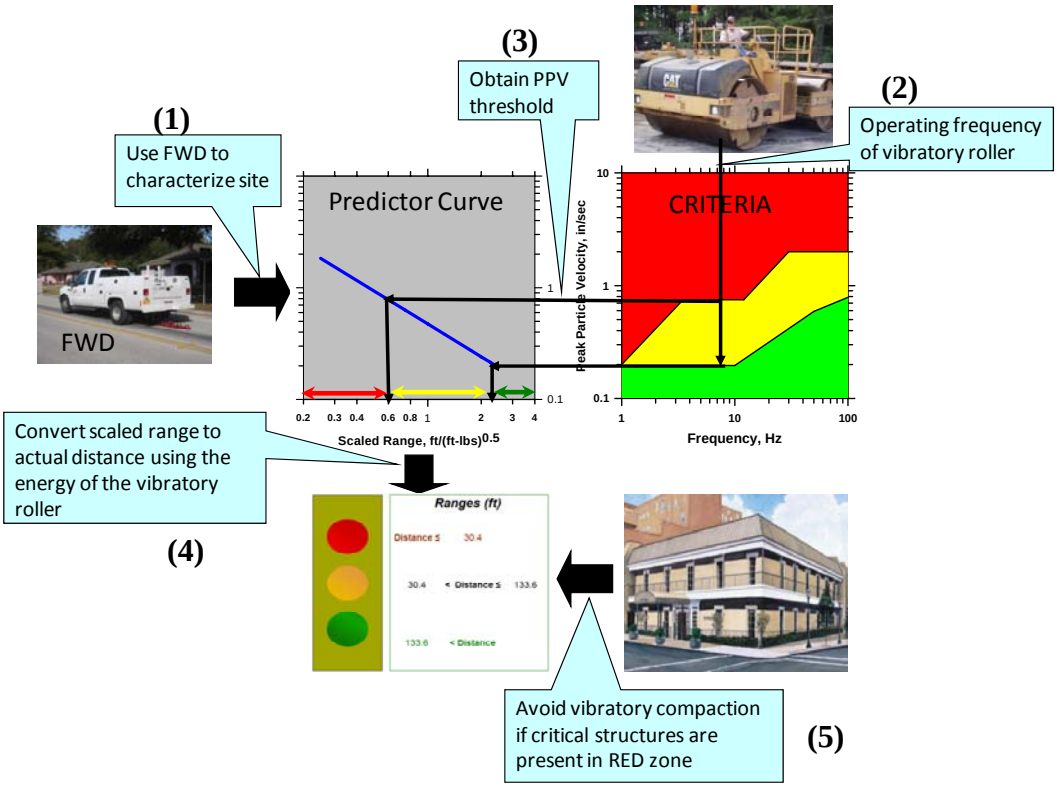


Figure 6. Vibration Analysis Procedures (6, 7)

The outcome of the analysis is a brief report that provides the limits for the "Red", "Yellow" and "Green" zones defined as:

- RED zone: designates a region where the vibratory compaction may cause damage to nearby structures.
- YELLOW zone: designates a region where the vibratory compaction may cause human annoyance, but damage to buildings is unlikely.
- GREEN zone: designates the region where the vibratory compaction may or may not be noticeable, and human annoyance is unlikely.

An example of the project-specific vibration report is shown in Figure 7. If a sensitive structure is found within the limits of the "Red" zone, it is recommended that use of vibratory rollers for compaction of pavement layers be avoided and other means of compacting be considered to prevent major or minor damages in the structure, especially in urban areas.

FWD time histories can be easily collected while the typical deflection testing is performed for determining the resilient modulus values and no other information is necessary to perform the vibration analysis. To submit a request for the vibration report, simply inform the District FWD coordinators that the vibration report is needed when submitting the request for FWD testing. Then, the Nondestructive Testing Unit will provide the vibration report with the resilient modulus recommendations.

Non-Destructive Testing
Vibratory Compaction Criteria Report

PROJECT INFORMATION **DATE** 02/16/07

FIN:	239266-3
COUNTY:	Orange
SECTION ID:	75080
STATE ROAD NUMBER:	15
DIRECTION:	Northbound
COMMENTS:	This is an example problem.

ROLLER INFORMATION

☑ ***Default roller was used.***

Default roller was not used.

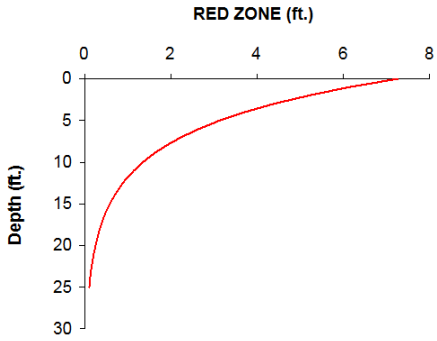
LOAD (lbf):	44,120
AMPLITUDE (in):	0.035
FREQUENCY (Hz):	42
DRUM DIAMETER (in):	59

VIBRATION CRITERIA: SURFACE STRUCTURES

RED ZONE (ft):	Distance (ft) ≤	7.3		
YELLOW ZONE (ft):	7.3	< Distance (ft) ≤	40.8	
GREEN ZONE (ft):	Distance (ft) >	40.8		

Conditions in the RED ZONE should be avoided to prevent possible architectural or structural damage to buildings. Conditions in the YELLOW ZONE are acceptable; however, the department should be prepared to receive complaints from persons who may be annoyed by the vibration. Operations in the GREEN ZONE should incur few, if any, complaints from the public.

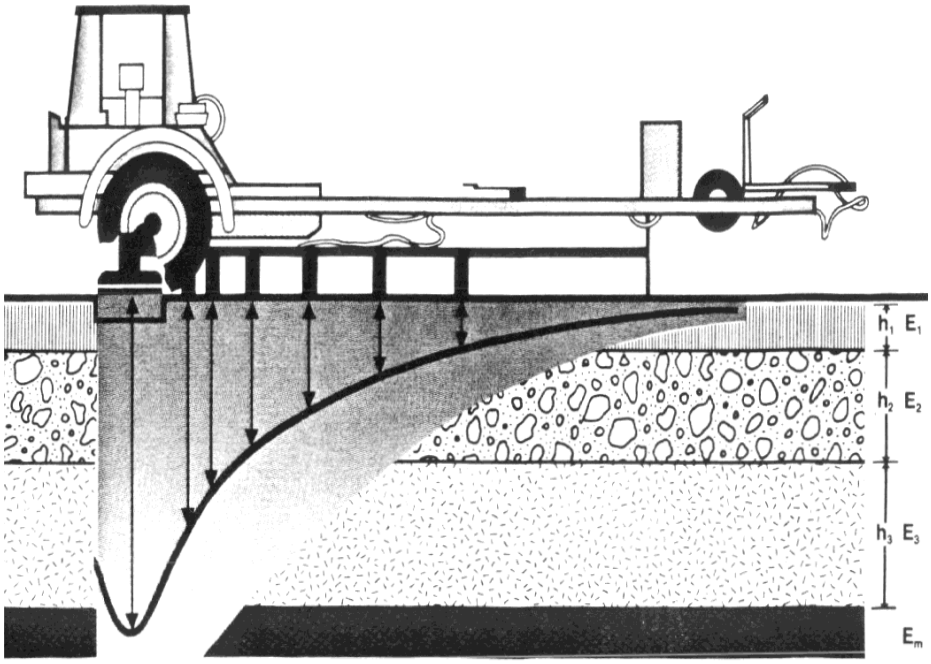
VIBRATION CRITERIA: BURIED STRUCTURES



For fragile buried structures, the plot to the left shows the RED ZONE as a function of depth. Enter the plot at the depth of the buried structure and estimate the RED ZONE from the curve. Vibratory compaction is not recommended within a distance equal to the RED ZONE from the buried structure.

Figure 7. Sample Vibration Report

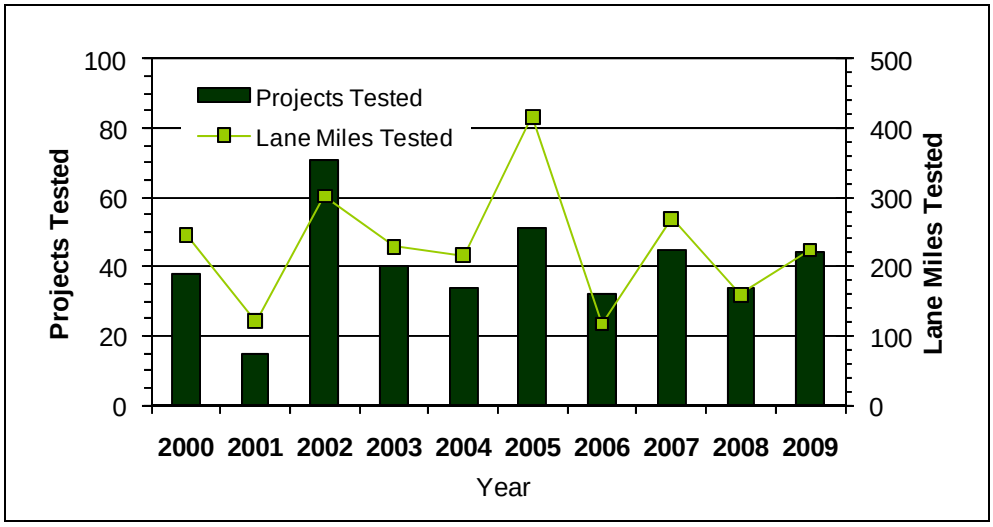
PART II: FACTS & FIGURES[1]

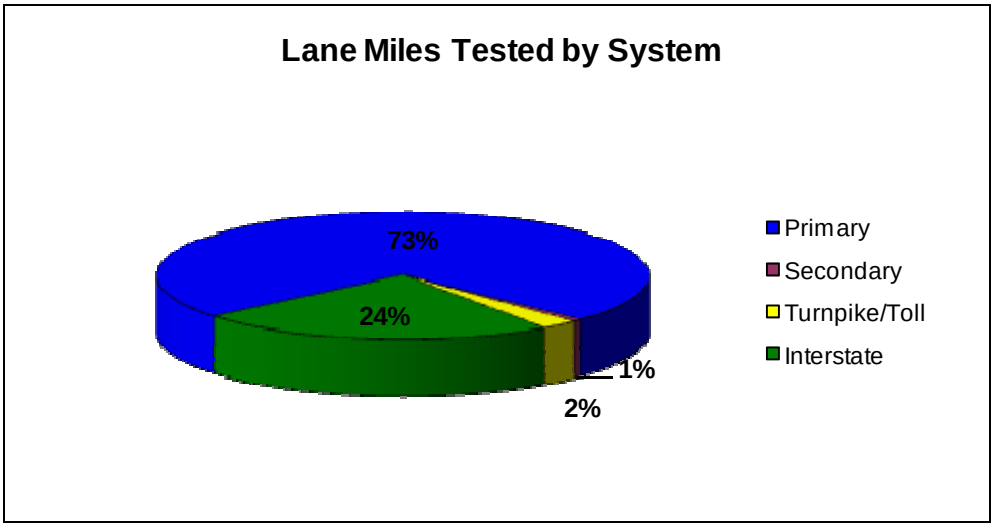


[1] Project resilient modulus values presented are the lowest values recommended for each project. Some projects may have multiple resilient modulus values.

DISTRICT 1 TEN YEAR PRODUCTION SUMMARY

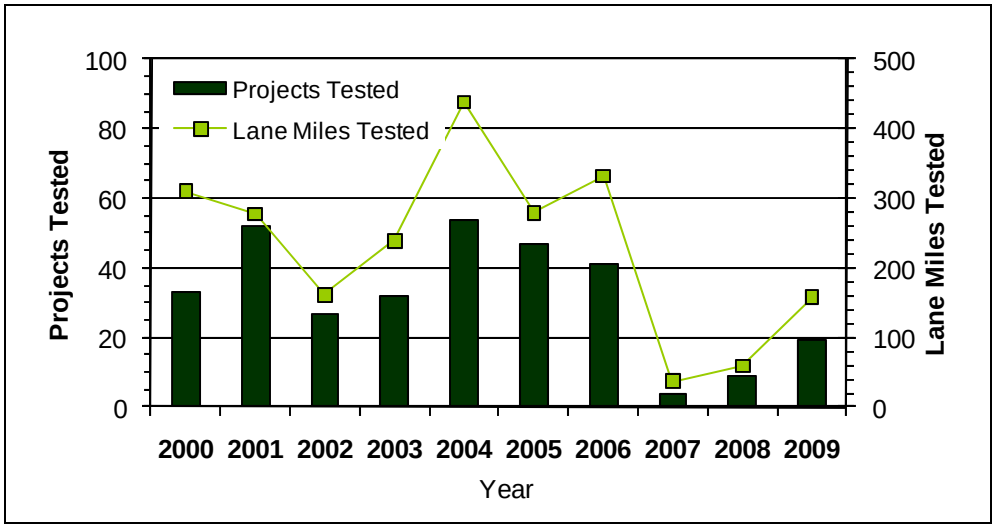
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
2000	33	201.881	0	0.000	0	0.000	5	44.240	38	246.121
2001	11	57.697	0	0.000	1	14.000	3	48.970	15	120.667
2002	68	243.512	0	0.000	0	0.000	3	58.212	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
2006	28	42.635	0	0.000	0	0.000	4	74.100	32	116.735
2007	37	205.964	0	0.000	0	0.000	8	63.750	45	269.714
2008	31	132.085	1	9.944	0	0.000	2	17.402	34	159.431
2009	43	216.59	0	0.000	0	0.000	1	7.500	44	224.090
Total	355	1687.233	2	13.655	2	56.842	45	543.202	404	2300.932

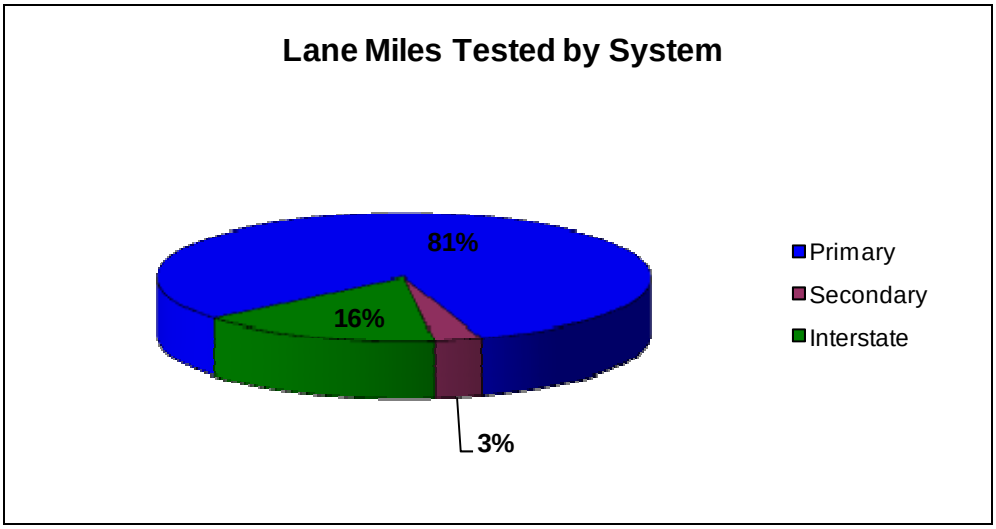




DISTRICT 2 TEN YEAR PRODUCTION SUMMARY

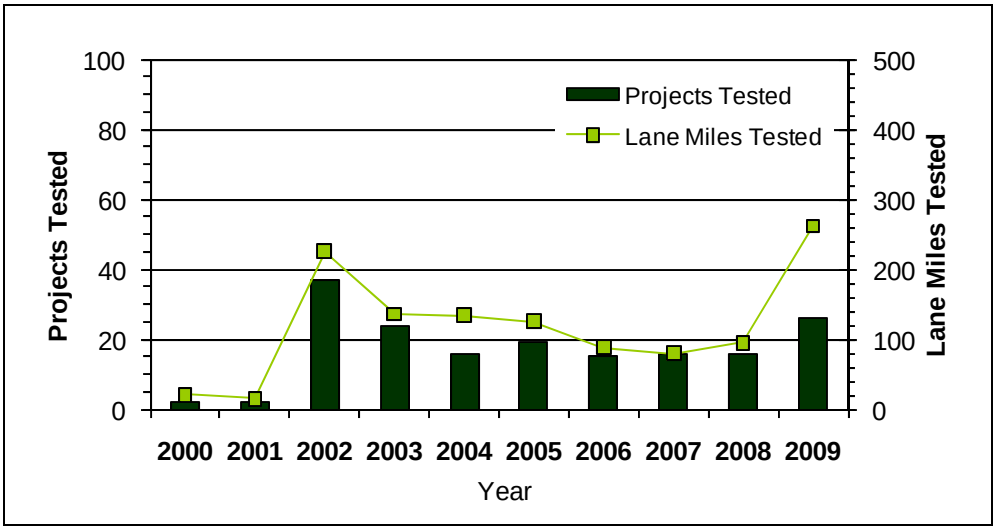
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
2000	30	254.138	1	6.156	0	0.000	2	49.812	33	310.106
2001	49	243.803	1	6.034	0	0.000	2	27.224	52	277.061
2002	26	153.046	0	0.000	0	0.000	1	8.734	27	161.780
2003	27	166.176	2	8.105	0	0.000	3	65.040	32	239.321
2004	47	332.541	0	0.000	0	0.000	7	105.366	54	437.907
2005	40	250.477	6	27.071	0	0.000	1	1.420	47	278.968
2006	34	292.598	3	19.062	0	0.000	4	20.554	41	332.214
2007	4	37.273	0	0.000	0	0.000	0	0.000	4	37.273
2008	7	30.746	0	0.000	0	0.000	2	28.060	9	58.806
2009	15	96.43	1	4.737	0	0.000	3	56.680	19	157.847
Total	279	1857.228	14	71.165	0	0.000	25	362.890	318	2291.283

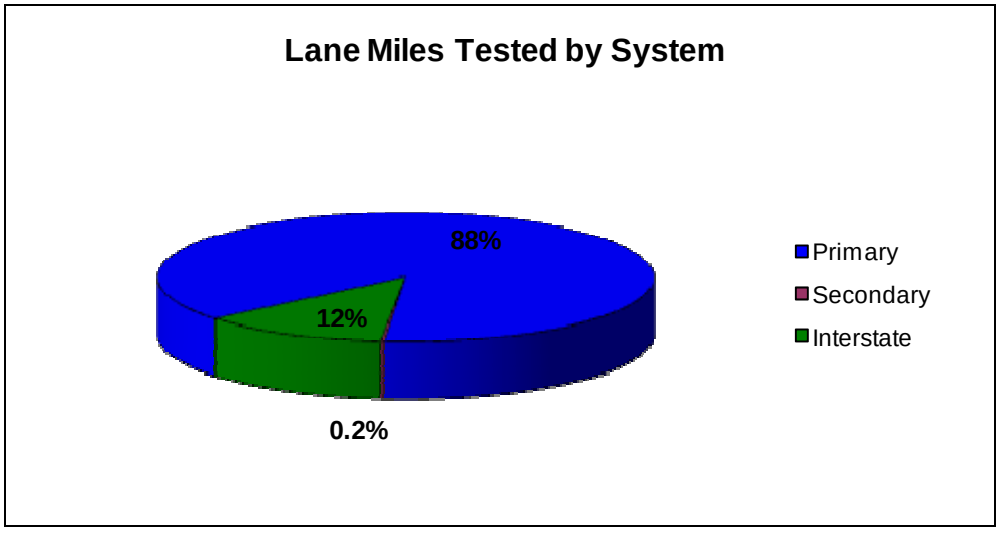




DISTRICT 3 TEN YEAR PRODUCTION SUMMARY

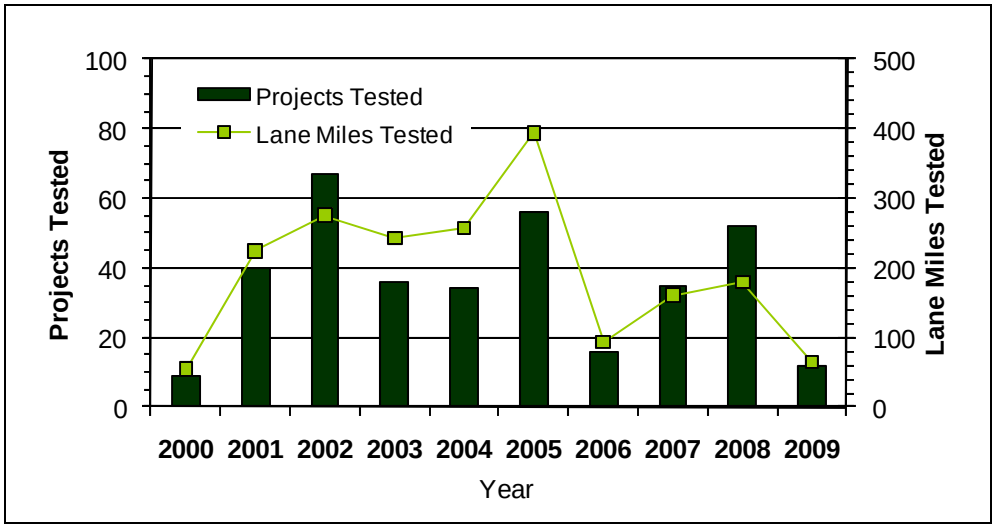
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**
2000	2	20.376	0	0.000	0	0.000	0	0.000	2	20.376
2001	2	15.036	0	0.000	0	0.000	0	0.000	2	15.036
2002	37	225.450	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	135.304
2004	13	87.816	1	2.857	0	0.000	2	42.910	16	133.583
2005	17	101.852	0	0.000	0	0.000	2	23.222	19	125.074
2006	14	73.388	0	0.000	0	0.000	1	15.158	15	88.546
2007	16	79.768	0	0.000	0	0.000	0	0.000	16	79.768
2008	16	94.629	0	0.000	0	0.000	0	0.000	16	94.629
2009	23	216.022	0	0.000	0	0.000	3	44.974	26	260.996
Total	163	1031.309	1	2.857	0	0.000	9	144.596	173	1178.762

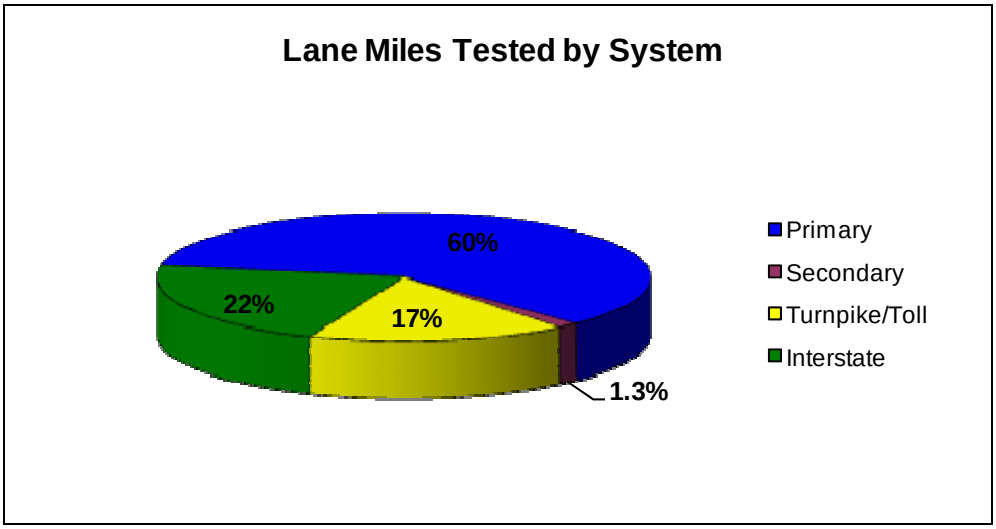




DISTRICT 4 TEN YEAR PRODUCTION SUMMARY

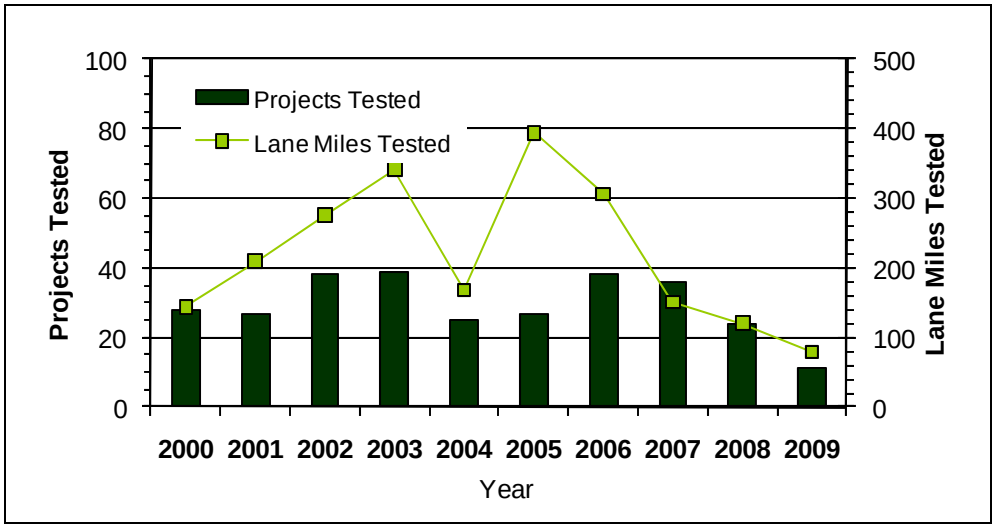
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
2000	6	20.856	0	0.000	0	0.000	3	33.492	9	54.348
2001	28	123.333	0	0.000	5	32.678	7	69.074	40	225.085
2002	58	207.308	1	0.997	2	26.000	6	40.722	67	275.027
2003	28	119.843	0	0.000	3	62.200	5	60.570	36	242.613
2004	29	157.283	0	0.000	5	99.708	0	0.000	34	256.991
2005	50	249.376	1	0.864	2	92.252	3	52.102	56	394.594
2006	9	27.138	2	2.992	0	0.000	5	62.794	16	92.924
2007	28	106.443	3	8.520	1	10.800	3	34.620	35	160.383
2008	48	138.321	2	12.469	1	7.800	1	21.198	52	179.788
2009	7	18.972	1	0.395	0	0.000	4	45.696	12	65.063
Total	291	1168.873	10	26.237	19	331.438	37	420.268	357	1946.816

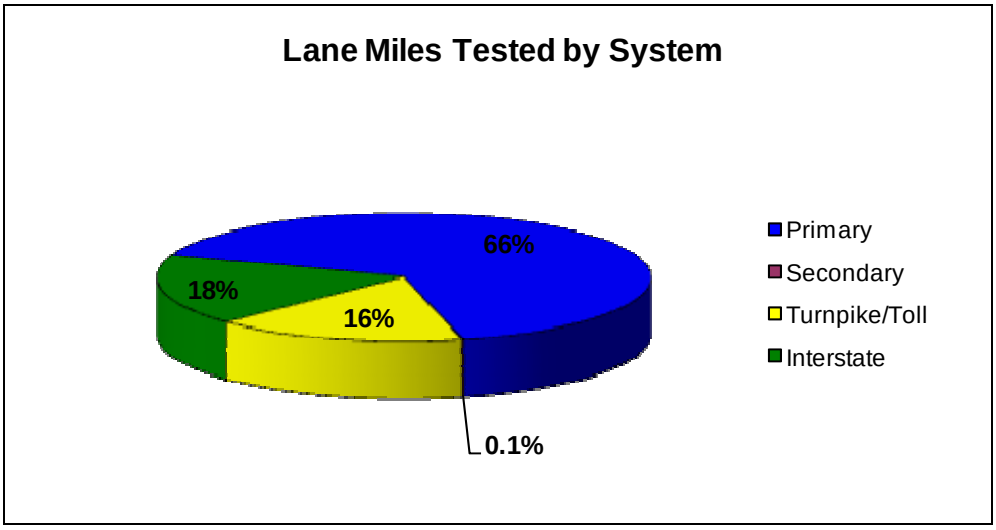




DISTRICT 5 TEN YEAR PRODUCTION SUMMARY

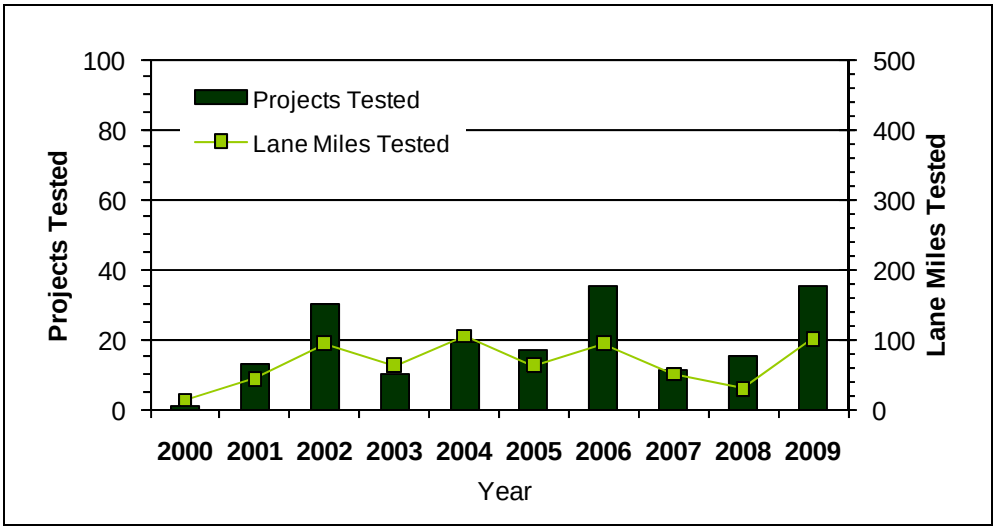
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**	**Projects**	**Lane Miles**
2000	18	92.273	1	1.754	5	20.160	4	30.416	28	144.603
2001	20	146.606	0	0.000	3	10.960	4	52.092	27	209.658
2002	35	251.763	0	0.000	3	23.568	0	0.000	38	275.331
2003	28	155.280	1	0.554	4	73.914	6	111.872	39	341.620
2004	24	140.590	0	0.000	0	0.000	1	27.890	25	168.480
2005	23	193.776	0	0.000	2	167.434	2	32.714	27	393.924
2006	30	169.53	0	0.000	1	21.340	7	115.096	38	305.966
2007	35	138.15	0	0.000	0	0.000	1	12.316	36	150.466
2008	18	77.386	0	0.000	6	43.012	0	0.000	24	120.398
2009	10	69.954	0	0.000	0	0.000	1	8.926	11	78.880
Total	241	1435.308	2	2.308	24	360.388	26	391.322	293	2189.326

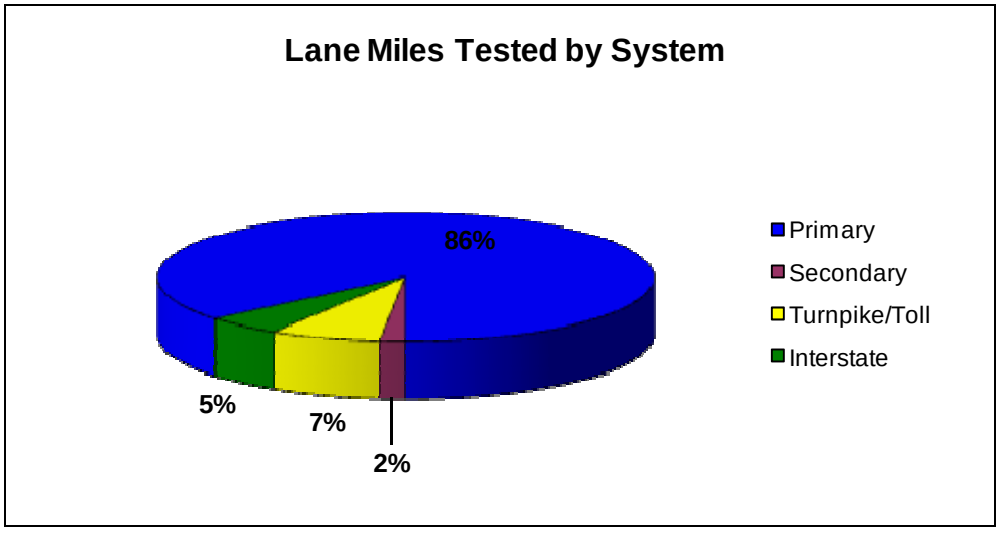




DISTRICT 6 TEN YEAR PRODUCTION SUMMARY

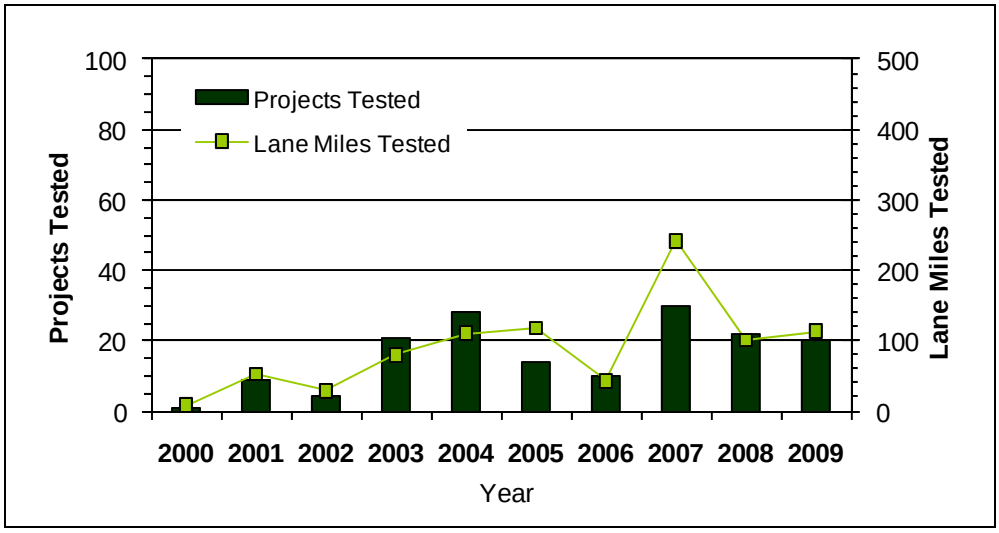
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
2000	1	12.715	0	0.000	0	0.000	0	0.000	1	12.715
2001	12	38.662	0	0.000	0	0.000	1	4.414	13	43.076
2002	29	82.816	1	11.065	0	0.000	0	0.000	30	93.881
2003	8	53.317	0	0.000	0	0.000	2	8.806	10	62.123
2004	18	64.316	0	0.000	1	40.150	0	0.000	19	104.466
2005	16	51.723	0	0.000	0	0.000	1	10.844	17	62.567
2006	34	91.219	0	0.000	0	0.000	1	2.484	35	93.703
2007	8	37.262	0	0.000	1	6.684	2	6.190	11	50.136
2008	15	29.5	0	0.000	0	0.000	0	0.000	15	29.500
2009	35	100.567	0	0.000	0	0.000	0	0.000	35	100.567
Total	176	562.097	1	11.065	2	46.834	7	32.738	186	652.734

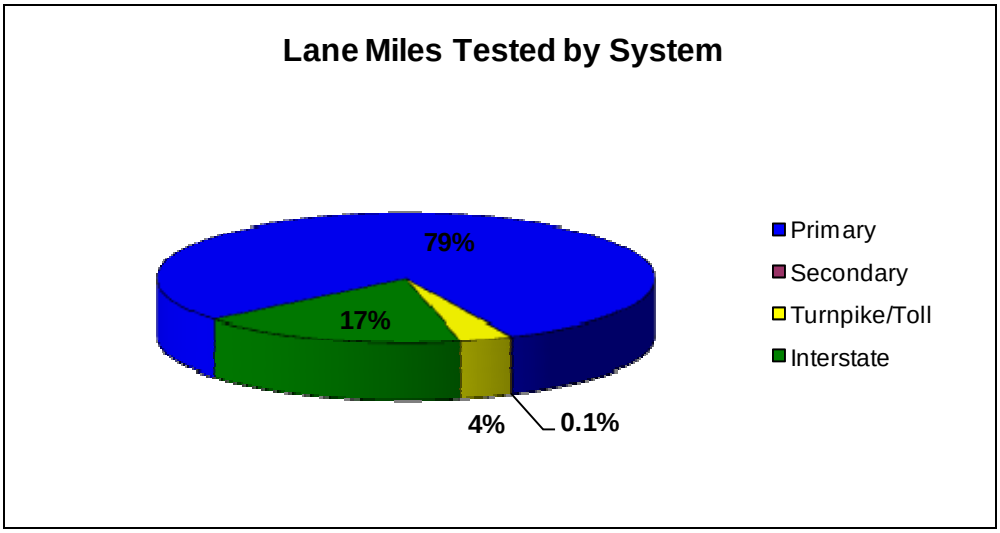




DISTRICT 7 TEN YEAR PRODUCTION SUMMARY

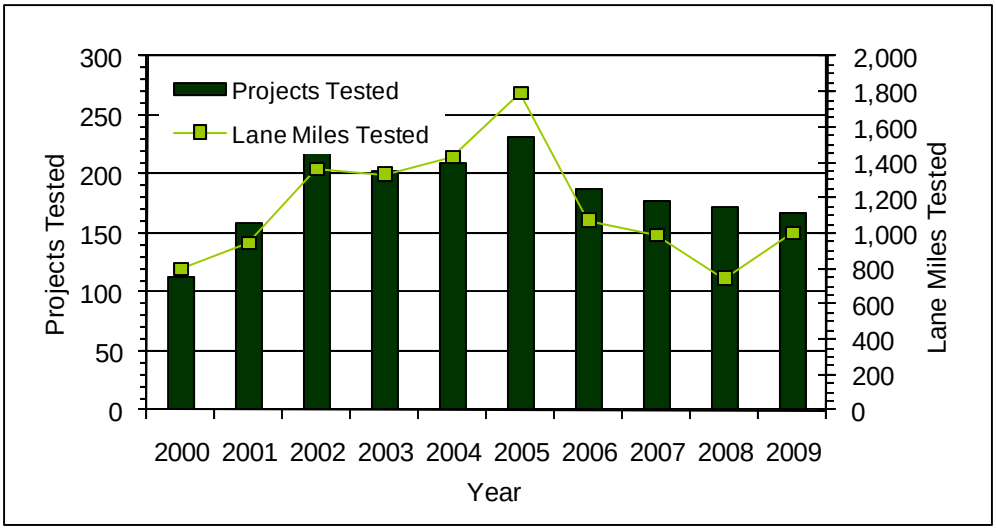
	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
2000	1	7.746	0	0.000	0	0.000	0	0.000	1	7.746
2001	7	33.069	0	0.000	0	0.000	2	19.464	9	52.533
2002	3	9.433	0	0.000	0	0.000	1	19.232	4	28.665
2003	19	60.655	0	0.000	0	0.000	2	18.898	21	79.553
2004	27	109.088	1	0.800	0	0.000	0	0.000	28	109.888
2005	12	77.517	0	0.000	1	30.660	1	9.400	14	117.577
2006	10	42.635	0	0.000	0	0.000	0	0.000	10	42.635
2007	26	177.778	0	0.000	0	0.000	4	64.606	30	242.384
2008	22	101.178	0	0.000	0	0.000	0	0.000	22	101.178
2009	17	89.293	0	0.000	0	0.000	3	24.150	20	113.443
Total	144	708.392	1	0.800	1	30.660	13	155.750	159	895.602

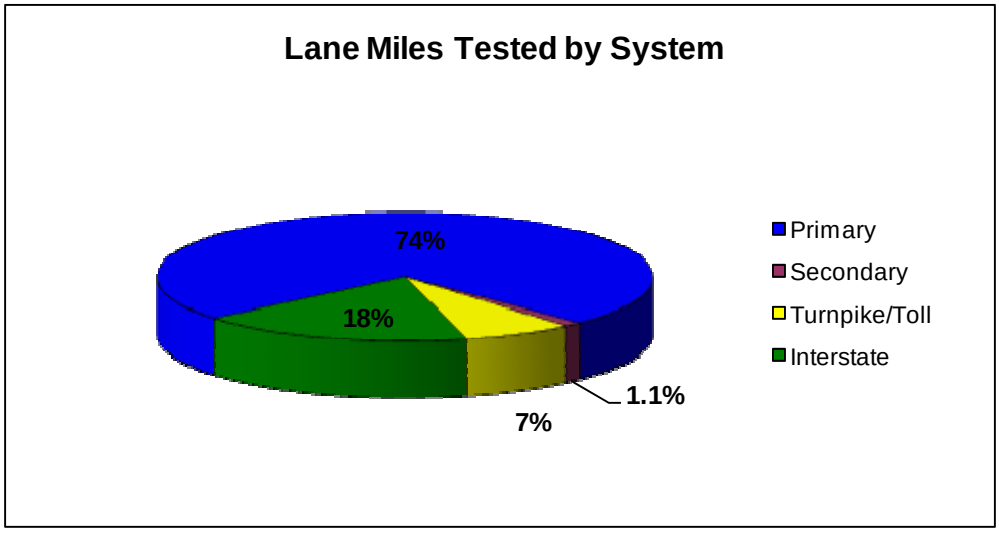




STATEWIDE TEN YEAR PRODUCTION SUMMARY

	Primary		Secondary		Turnpike/Toll		Interstate		All Systems	
	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles	Projects	Lane Miles
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
2006	159	739.143	5	22.054	1	21.340	22	290.186	187	1,072.723
2007	154	782.638	3	8.520	2	17.484	18	181.482	177	990.124
2008	157	603.845	3	22.413	7	50.812	5	66.660	172	743.730
2009	150	807.828	2	5.132	0	0.000	15	187.926	167	1,000.886
Grand Total	1649	8450.440	31	128.087	48	826.162	162	2050.766	1890	11,455.455





2009 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
1040	423638-1	Charlotte	35	ETWT	2.679	3.537	1/13/09	21,000	
7030	423441-1	Hendry	25	NT	0.000	2.172	1/13/09	28,000	
16090	423636-1	Polk	17	ST	13.073	17.073	1/14/09	16,000	
16110	423634-1	Polk	60	ETWT	15.743	20.602	1/14/09	18,000	
16250	423635-1	Polk	37	NT	25.033	25.760	1/14/09	24,000	
13075	422495-1	Manatee	93	NT	0.000	3.750	2/24/09	26,000	
1040	425207-1	Charlotte	35	ETWT	1.470	2.678	4/14/09	27,000	
3030	425209-1	Collier	951	NT	6.332	9.551	3/10/09	25,000	
3080	425210-1	Collier	29	NT	16.511	17.439	3/10/09	32,000	
3080	425212-1	Collier	29	NT	28.578	36.770	3/10/09	22,000	
3080	425215-1	Collier	29	NT	37.820	40.000	3/10/09	16,000	
5010	425220-1	Glades	25	NT	0.000	3.848	3/25/09	30,000	
5040	425221-1	Glades	78	ET	12.933	14.858	4/15/09	32,000	
7030	425223-1	Hendry	25	NT	3.938	7.674	3/11/09	31,000	
7030	425224-1	Hendry	25	NT	7.674	13.258	3/11/09	28,000	
7060	425222-1	Hendry	29	ST	17.008	18.498	4/15/09	17,000	
9030	425225-1	Highlands	25	NTST	6.820	11.550	3/31/09	16,000	
9060	425226-1	Highlands	70	WT	22.298	30.131	3/4/09	6,000	Extremely Weak Embankment
9060	425227-1	Highlands	70	WT	30.131	36.334	3/4/09	19,000	
12040	425228-1	Lee	867	NTST	3.396	3.760	3/23/09	20,000	
12060	425231-1	Lee	78	ET	5.790	7.281	3/24/09	28,000	
12060	425229-1	Lee	78	ETWT	9.639	12.031	3/24/09	32,000	
12060	425230-1	Lee	78	ETWT	12.031	14.748	3/24/09	31,000	
13010	425232-1	Manatee	45	NTST	6.351	7.552	4/21/09	22,000	
13050	425235-1	Manatee	64	ET	11.393	16.835	4/21/09	22,000	
13140	425236-1	Manatee	64	WT	10.735	16.071	4/22/09	19,000	
13150	425239-1	Manatee	64	ET	1.714	2.400	4/30/09	21,000	
13160	425234-1	Manatee	70	WT	9.728	15.567	4/22/09	32,000	
16030	425241-1	Polk	35	NTST	12.320	16.012	4/8/09	26,000	
16040	425250-1	Polk	700	WT	8.700	11.080	4/16/09	17,000	

2009 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
16050	425249-1	Polk	600	NT	0.000	1.199	3/5/09	17,000	
16070	425245-1	Polk	33	NTST	2.458	4.434	4/8/09	25,000	
16070	425252-1	Polk	33	ST	4.434	5.103	4/9/09	19,000	
16090	425247-1	Polk	17	NT	17.490	21.086	3/5/09	14,000	
16090	425253-1	Polk	17	NT	23.470	25.082	3/5/09	17,000	
16090	425251-1	Polk	17	NT	33.262	34.807	3/5/09	19,000	
16110	425243-1	Polk	60	ET	20.602	25.268	4/1/09	23,000	
16110	425248-1	Polk	60	ETWT	25.268	29.420	4/1/09	20,000	
16130	425240-1	Polk	60	ETWT	0.000	1.028	4/7/09	23,000	
16170	425242-1	Polk	25	NTST	0.000	6.989	4/7/09	20,000	
16280	425246-1	Polk	542	ET	2.455	3.435	4/16/09	12,000	
16290	425244-1	Polk	557	NTST	6.230	6.729	4/16/09	20,000	
17070	425254-1	Sarasota	72	WT	6.449	9.515	4/14/09	16,000	
17070	425255-1	Sarasota	72	WT	9.515	13.086	4/14/09	16,000	
16250	423635-1	Polk	37	ST	25.033	25.760	1/14/09	29,000	
7030	423441-1	Hendry	25	ST	0.000	2.172	1/13/09	32,000	
13075	422495-1	Manatee	93	ST	0.000	3.750	2/24/09	32,000	
9060	425226-1	Highlands	70	WT	22.298	30.131	3/4/09	13,000	
3030	425209-1	Collier	951	ST	6.332	9.551	3/10/09	32,000	
7030	425223-1	Hendry	25	ST	3.938	7.674	3/11/09	17,000	
7030	425224-1	Hendry	25	ST	7.674	13.258	3/11/09	11,000	
7030	425224-1	Hendry	25	ST	7.674	13.258	3/11/09	22,000	Could not test from 10.674 to 11.624 due to an existing lane closure.
5010	425220-1	Glades	25	ST	0.000	3.848	3/25/09	14,000	
5010	425220-1	Glades	25	ST	0.000	3.848	3/25/09	32,000	
5010	425220-1	Glades	25	ST	0.000	3.848	3/25/09	10,000	
12060	425231-1	Lee	78	WT	5.790	7.281	3/24/09	23,000	
16110	425243-1	Polk	60	WT	20.602	25.268	4/1/09	17,000	
16070	425245-1	Polk	33	NT	2.458	4.434	4/8/09	32,000	
16070	425245-1	Polk	33	ST	2.458	4.434	4/8/09	16,000	

2009 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
17070	425255-1	Sarasota	72	WT	9.515	13.086	4/14/09	26,000	
7060	425222-1	Hendry	29	ST	17.008	18.498	4/15/09	26,000	

2009 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
72050	209137-4	Duval	5	ST	12.870	13.411	9/28/09	18,000	
32010	209804-2	Hamilton	25	NT	0.000	16.538	8/26/09	17,000	
26110	423397-1	Alachua	235	NT	1.040	13.739	6/29/09	20,000	
72030	423405-1	Duval	15	NTST	2.500	4.107	9/28/09	19,000	
72040	423407-1	Duval	115	NTST	7.120	9.640	7/7/09	29,000	
72070	423408-1	Duval	5	NT	6.015	10.140	7/9/09	20,000	
72070	423408-1	Duval	5	ST	6.015	10.140	7/9/09	15,000	
72090	423412-1	Duval	115	NTST	0.000	3.334	9/28/09	17,000	
76050	423424-1	Putnam	20	ET	0.000	12.060	7/1/09	17,000	
76010	424470-1	Putnam	15	NTST	3.930	4.973	9/29/09	25,000	
76010	424470-1	Putnam	15	NT	4.793	6.412	9/29/09	21,000	
74010	424471-1	Nassau	10	ET	0.000	2.173	8/17/09	10,000	
72292	424472-1	Duval	202	ETWT	0.000	1.140	8/10/09	18,000	
26080	424473-1	Alachua	20	ETWT	3.438	8.790	9/10/09	15,000	
35060	424474-1	Madison	145	ST	13.000	20.222	9/2/09	16,000	
72002	424630-1	Duval	9A	NTST	11.232	13.125	9/9/09	24,000	
32100	424631-1	Hamilton	93	NTST	19.175	28.746	8/24/09	26,000	

2009 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
32100	424631-2	Hamilton	93	NTST	0.000	9.780	8/24/09	29,000	
26260058	424632-1	Alachua	25	NT	0.000	1.550	6/29/09	18,000	
72270	424634-1	Duval	8	ETWT	0.000	8.989	8/12/09	24,000	
38580	425399-1	Taylor	CR 361A	WT	9.743	14.480	8/20/09	14,000	

2009 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
46160	419312-1	Bay	30A	ET	5.619	13.574	10/7/09	15,000	
46160	419312-1	Bay	30A	WT	5.619	13.574	10/7/09	20,000	
46080	421640-1	Bay	22	ET	2.962	13.681	10/13/09	12,000	
51030	421641-1	Gulf	22	ET	5.418	12.136	10/20/09	13,000	
58030	421644-2	Santa Rosa	30	ETWT	12.774	24.005	12/16/09	11,000	
46040	423060-1	Bay	75	NTST	16.313	25.231	10/6/09	14,000	
53040	423065-1	Jackson	71	NT	0.000	8.839	10/6/09	17,000	
53130	423066-1	Jackson	69	NT	8.443	24.069	9/21/09	17,000	
55070	423067-1	Leon	20	ET	0.931	19.407	9/22/09	13,000	
55070001	423067-1	Leon	20	ET	0.099	0.656	9/22/09	13,000	
60010	423068-1	Walton	10	ETWT	15.347	17.969	6/16/09	13,000	
60010	423068-1	Walton	10	ET	17.969	21.905	6/16/09	13,000	
60040	423069-1	Walton	83	NT	3.520	4.930	11/5/09	17,000	
54020	423081-1	Jefferson	20	ET	7.120	8.750	9/16/09	26,000	
54020	423081-1	Jefferson	20	ET	8.750	9.864	9/16/09	12,000	

2009 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
54020	423081-1	Jefferson	20	WT	7.120	8.750	9/16/09	32,000	
54020	423081-1	Jefferson	20	WT	8.750	9.864	9/16/09	22,000	
54020	423081-2	Jefferson	20	ET	9.864	13.500	9/16/09	27,000	
54020	423081-2	Jefferson	20	ET	13.500	16.047	9/16/09	19,000	
54020	423081-2	Jefferson	20	WT	9.864	13.500	9/16/09	32,000	
54020	423081-2	Jefferson	20	WT	13.500	16.047	9/16/09	14,000	
54060	424608-1	Jefferson	59	NT	3.893	9.332	9/15/09	13,000	
55050	424609-1	Leon	61	NT	9.764	18.318	9/23/09	32,000	
55050	424609-1	Leon	61	ST	9.764	18.318	9/23/09	18,000	
57060	424610-1	Okaloosa	85	ST	6.978	20.960	11/4/09	13,000	
58010	424611-1	Santa Rosa	10	ET	13.394	18.753	12/9/09	12,000	
58060	424612-1	Santa Rosa	89	NT	13.220	20.662	12/8/09	14,000	
60010	424613-1	Walton	10	ET	0.000	14.517	10/28/09	14,000	
53020	424615-1	Jackson	10	ET	18.625	19.690	9/22/09	32,000	
53020	424615-1	Jackson	10	WT	18.625	19.690	9/22/09	28,000	
55170	424616-1	Leon	369	NT	0.000	1.627	9/21/09	14,000	
50001	424619-1	Gadsden	8	ETWT	1.042	11.766	10/8/09	19,000	
61080	424625-1	Washington	77	NT	26.995	29.826	9/23/09	14,000	
60002	425277-1	Walton	8	ETWT	24.061	27.454	6/17/09	21,000	
52002	425277-2	Holmes	8	ETWT	0.000	8.370	10/7/09	16,000	

2009 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
86000187	230724-1	Broward	N/A	NT	0.000	0.395	8/4/09	31,000	
93220	409355-3	Palm Beach	9	NTST	5.520	7.000	8/5/09	17,000	
93220	409355-3	Palm Beach	9	NTST	7.000	8.100	8/5/09	32,000	
93220	412420-2	Palm Beach	9	NTST	1.650	5.520	8/5/09	29,000	
94001	413047-1	St. Lucie	9	NTST	23.894	27.259	8/6/09	32,000	
93040	417506-1	Palm Beach	5	NTST	9.926	10.527	8/4/09	22,000	
89010	422952-1	Martin	5	NTST	1.400	2.000	1/27/09	22,000	
94030	422956-1	St. Lucie	70	ETWT	21.600	25.225	3/3/09	18,000	
88060	424638-1	Indian River	60	ET	26.100	27.200	1/29/09	17,000	
88060	424638-1	Indian River	60	WT	26.100	27.200	1/29/09	22,000	
89040	424639-1	Martin	A1A	ETWT	3.140	3.500	1/27/09	18,000	
89060	424640-1	Martin	76	ET	24.300	26.000	1/27/09	21,000	
89060	424640-1	Martin	76	WT	24.300	26.000	1/27/09	17,000	
94005	424762-1	St. Lucie	615	NTST	0.970	2.470	1/28/09	18,000	
88081	425193-1	Indian River	9	NTST	6.165	14.600	4/28/09	24,000	
88081	425193-1	Indian River	9	NTST	14.600	19.198	4/28/09	32,000	
86000187	230724-1	Broward	N/A	NT	0.000	0.395	8/4/09	31,000	
93220	409355-3	Palm Beach	9	NTST	5.520	7.000	8/5/09	17,000	
93220	409355-3	Palm Beach	9	NTST	7.000	8.100	8/5/09	32,000	

2009 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
18070	421988-1	Sumter	44	ETWT	7.987	12.460	2/10/09	20,000	
79190	422032-1	Volusia	5A	NT	3.307	6.174	2/12/09	24,000	
79190	422032-1	Volusia	5A	ST	3.307	6.174	2/12/09	15,000	
70020	423351-1	Brevard	5	NT	9.511	12.600	3/30/09	14,000	
70020	423351-1	Brevard	5	NT	12.600	14.188	3/30/09	6,000	Extremely weak embankment
70020	423351-1	Brevard	5	ST	9.511	12.600	3/30/09	21,000	
70020	423351-1	Brevard	5	ST	12.600	14.188	3/30/09	17,000	
92030	423361-1	Osceola	500	ET	7.697	9.786	2/18/09	23,000	
92030	423361-1	Osceola	500	WT	7.697	9.786	2/18/09	28,000	
92030	423362-1	Osceola	500	ETWT	9.786	12.745	2/18/09	19,000	
70060	423630-1	Brevard	A1A	NTST	33.999	35.600	4/6/09	30,000	
70060	423630-1	Brevard	A1A	NTST	35.600	36.148	4/6/09	24,000	
18010	424883-1	Sumter	35	NT	6.842	13.157	2/9/09	13,000	
18010	424883-1	Sumter	35	ST	6.842	13.157	2/9/09	17,000	
70020	424886-1	Brevard	5	NTST	0.000	4.511	3/16/09	16,000	
70110	424890-1	Brevard	50	ETWT	5.066	8.540	4/6/09	23,000	
77080	424901-1	Seminole	436	ETWT	0.674	2.137	2/11/09	18,000	
75280	425174-1	Orange	400	ETWT	8.337	12.800	8/31/09	20,000	

2009 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
87053001	418312-2	Dade	968	ET	0.793	2.351	6/9/09	24,000	
87055	422614-1	Dade	986	ETWT	4.185	6.718	6/3/09	32,000	
90020	423136-1	Monroe	5	NT	11.388	14.899	1/6/09	12,000	
87120	425145-1	Dade	90	ETWT	6.000	10.054	6/3/09	32,000	
87020	425348-1	Dade	5	NTST	15.171	17.386	6/2/09	32,000	
87060	425504-1	Dade	A1A	NTST	4.800	5.650	6/9/09	24,000	
87020	425513-1	Dade	5	NTST	17.386	19.753	6/2/09	32,000	
87140	425589-1	Dade	7	NTST	0.968	2.850	6/9/09	29,000	
90060	425599-1	Monroe	5	NT	16.313	17.105	1/6/09	32,000	
90060	425599-1	Monroe	5	ST	16.313	17.105	1/6/09	23,000	
90050	425600-1	Monroe	5	NT	0.218	13.645	5/13/09	14,000	
90060	425600-2	Monroe	5	NT	10.240	11.000	5/19/09	22,000	
90060	425600-2	Monroe	5	NT	11.000	11.720	5/19/09	32,000	
90060	425600-3	Monroe	5	NT	7.675	10.240	5/19/09	32,000	
90040	425600-4	Monroe	5	NT	6.478	9.587	5/12/09	15,000	
90040	425600-5	Monroe	5	NT	0.000	0.022	5/12/09	11,000	
90030	425600-5	Monroe	5	NT	16.060	16.872	5/12/09	11,000	
90060	425600-6	Monroe	5	NT	3.741	6.000	5/19/09	22,000	
90060	425600-6	Monroe	5	NT	6.000	7.675	5/19/09	32,000	
90020	425600-7	Monroe	5	NT	10.155	10.730	1/6/09	23,000	
90060	425600-8	Monroe	5	NTST	17.105	18.211	5/20/09	32,000	
90060	425600-9	Monroe	5	NTST	18.211	19.170	5/20/09	30,000	
87140	425637-1	Dade	7	NT	10.718	11.087	1/7/09	17,000	
87140001	425637-1	Dade	7	ST	0.748	0.965	1/7/09	32,000	
87015	425647-1	Dade	989	NT	1.008	1.713	1/7/09	23,000	
87015	425647-1	Dade	989	ST	1.008	1.713	1/7/09	32,000	
87015	425647-2	Dade	989	NT	0.348	0.644	1/7/09	19,000	

2009 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
87015	425647-2	Dade	989	ST	0.348	0.644	1/7/09	32,000	
87240	425659-1	Dade	9	NTST	8.848	9.648	1/7/09	22,000	
90060	425717-1	Monroe	5	NTST	22.457	26.088	5/20/09	32,000	
87072	425913-1	Dade	985	NTST	0.000	1.000	6/2/09	32,000	
90003	N/A	Monroe	A1A	NTST	0.000	0.759	5/12/09	8,000	Weak Embankment
87026005	N/A	Dade	860	WT	0.000	0.406	6/10/09	32,000	
87030	N/A	Dade	5	NTST	0.840	1.635	6/3/09	32,000	
87060	N/A	Dade	A1A	NT	16.272	17.717	6/10/09	29,000	
87150	N/A	Dade	997	ST	14.145	17.431	6/16/09	32,000	
87008	N/A	Dade	916	ET	0.000	1.011	6/10/09	25,000	
87026	N/A	Dade	860	ETWT	1.110	2.820	6/10/09	17,000	
87110	N/A	Dade	90	ST	0.000	3.967	6/16/09	12,000	
87281	N/A	Dade	953	NTST	5.950	8.210	6/9/09	31,000	
87060	N/A	Dade	A1A	ST	16.272	17.717	6/10/09	17,000	

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District 7

County Section	Financial Project Number	County	State Road	Travel Direction	Beginning Milepost	Ending Milepost	Test Date	Mr (psi)	Comments
14090	416561-2	Pasco	54	ET	11.566	16.116	3/17/09	21,000	
20500	421527-1	Citrus	44	ETWT	4.711	10.286	2/16/09	21,000	
20500	421527-2	Citrus	44	ETWT	10.286	15.906	2/16/09	21,000	
10020	423050-1	Hillsborough	685	NTST	8.510	9.682	4/20/09	19,000	
80400	423052-1	Hernando	50	ET	6.017	9.859	3/19/09	28,000	
80400	423052-1	Hernando	50	WT	6.017	9.859	3/19/09	23,000	

2009 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
10150	423089-1	Hillsborough	580	ETWT	6.722	7.253	2/25/09	21,000	
10330	424553-1	Hillsborough	583	NTST	0.268	6.169	6/23/09	25,000	
8010	424555-1	Hernando	45	NTST	5.570	7.362	2/5/09	21,000	
10310	424557-1	Hillsborough	580	ETWT	0.170	1.320	4/23/09	32,000	
8050	424558-1	Hernando	50	NTST	6.117	10.127	2/5/09	24,000	
10020	424559-1	Hillsborough	685	NT	0.000	2.961	4/20/09	17,000	
10140	424561-1	Hillsborough	60	ETWT	0.000	4.870	5/5/09	16,000	
10002	424710-1	Hillsborough	618	ETWT	9.143	10.863	6/24/09	28,000	
14570	424972-1	Pasco	54A	ET	10.444	11.284	9/1/09	23,000	
10190	425084-1	Hillsborough	400	ETWT	21.476	24.713	6/22/09	32,000	
81500	425085-1	Hernando	93	NTST	3.739	11.381	3/18/09	32,000	
15190900	425146-1	Pinellas	55	NTST	0.000	1.196	2/19/09	27,000	
10340	425335-1	Hillsborough	574	ETWT	3.330	5.673	4/23/09	19,000	
10040	425502-1	Hillsborough	45	NTST	5.625	7.019	4/20/09	20,000	
15150900	425666-1	Pinellas	55	ST	0.000	1.102	2/19/09	24,000	

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