STATE OF FLORIDA

I-10 Rutting Task Team Report

STATE MATERIALS OFFICE

MATERIALS RESEARCH PARK

5007 Northeast 39th Avenue

Gainesville, Florida 32609

Research Report

FL/DOT/SMO/07-503

FEBRUARY 2007

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

In response to premature rutting that occurred on two I-10 projects located in Suwannee and Okaloosa Counties, the Florida Department of Transportation formed a task team to evaluate rutting along the entire I-10 corridor. The team consisted of personnel from the Department, FHWA and the Asphalt Industry. The team's goal was to identify any assignable causes that may account for these isolated instances of poor performance.

Initially, data from the Department's annual Pavement Condition Survey (PCS) was used to assess the overall magnitude of rutting along I-10 and to compare it with rutting along two other major highways, I-75 and I-95. Based on this information, it was concluded that I-10 has experienced more rutting than I-75 and I-95.

The PCS data was also used to identify four pairs of good and poor performing projects along I-10 that could be evaluated in detail. All available design, construction, and post construction information was collected, summarized, and reviewed by the Team for each of these projects. This included pavement designs, mix designs and production data from the Construction Quality Reporting (CQR) database, as well as post construction PCS rutting data. In addition, questionnaires were developed to document interviews with Contractor personnel involved with these projects.

In general, the results of this study are inconclusive with respect to poor rutting performance, as the Team found no specific characteristics or common factors that could be reliably identified as assignable causes. However, the consensus of the team is that there is some evidence to suggest the problem may be partially related to the use of local sands in some of the mix designs and also to low air voids caused by variability in gradation and asphalt content.

PURPOSE

This report describes the evaluation of isolated instances of asphalt pavement rutting along the I-10 corridor in north Florida. The evaluation was performed in response to premature rutting that occurred on two I-10 projects located in Suwannee and Okaloosa Counties.

To address this issue, the Florida Department of Transportation (FDOT) formed a task team consisting of personnel from the Department, FHWA and the Asphalt Industry. The purpose of the task team was to develop a strategy for assessing the problem, including identification of the data/information to be collected, reviewing and analyzing the data, and providing conclusions and recommendations based on the findings.

Team members included:

Frank Kreis – FDOT District 3 Materials Office
Stephen Sedwick – FDOT District 2 Materials Office
David Wang – FDOT State Construction Office
Bruce Dietrich – FDOT State Pavement Management Office
Greg Schiess – Federal Highway Administration
Randy West – National Center For Asphalt Technology
John Chellgren – Consultant
Dave Hay – Consultant
Mike Hammons – Applied Research Associates
Jim Warren – Asphalt Contractors Association of Florida
David Sadler – FDOT State Construction Office
Gale Page – FDOT State Materials Office
Jim Musselman – FDOT State Materials Office
Greg Sholar – FDOT State Materials Office
Pat Upshaw – FDOT State Materials Office

BACKGROUND

In 1998, the Department implemented the Superpave asphalt mix design system as a method to improve the overall performance of asphalt pavements, with the specific intention of reducing/eliminating premature failures due to rutting. Historically, pavements in north Florida have had more problems with rutting than other locations throughout the state. In general, early experience with Superpave has met all expectations, as performance, with some exceptions, was very good, especially on interstate projects along the I-75 and I-10 corridors in north Florida.

DISCUSSION OF PREVIOUS RUTTING INVESTIGATIONS FOR I-10 SUWANNEE & OKALOOSA COUNTY PROJECTS

Two previous studies were conducted to evaluate the premature rutting that occurred on I-10 in Suwannee and Okaloosa Counties. The Suwannee County investigation was performed by the National Center for Asphalt Technology (NCAT) and is documented in a report dated May, 2004, titled *Forensic Analysis of Rutting in Hot Mix Asphalt Placed on I-10 in Suwannee County Florida.*. The Okaloosa County rutting was evaluated in a report completed by District 3 Materials staff titled *Pavement Failure Investigation of I-10 Okaloosa County*. A summary of each study is discussed below and the full reports are provided in Appendix A.

Suwannee County Project

NCAT conducted a comprehensive study of a project constructed by Anderson Columbia Co., Inc. in 1999 (FPN 213560-1-52-01) that began to exhibit rutting shortly after completion. Indicators of potential mix performance problems were evaluated by reviewing all available project quality control and quality assurance test records. Data for forensic analysis of the pavement structure was obtained by cutting full-width transverse slab sections from an outside lane in both rutted and non-rutted sections, along with cutting cores in these same sections. In addition, Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR) data was obtained to evaluate the pavement structure with respect to the underlying base and subgrade.

In general, the forensic data indicated the rutting could most likely be attributed to the recently placed Superpave layers, as there were no apparent significant failures of the underlying structure, base, or subgrade. It was concluded the mix designs were not performing as expected during production due to reasons that included evidence of target asphalt contents being too high and inconsistent control of asphalt content. High percent compaction (% G_{mm}) at N_{max} and high percentage of voids filled with asphalt (VFA) at N_{design} were also cited as indicators of potential mix performance problems. The findings in the report, for the most part, were inconclusive.

Okaloosa County Project

A pavement failure investigation of five different sections of I-10 in Okaloosa County was performed by the Department's District 3 Materials staff. Two of these sections were considered to have good performance, with rut depths less than 0.2 inches. The remaining three sections all exhibited excessive rutting, with rut depths greater than 0.5 inches. Data collected for forensic analysis of the Superpave layers in each section was obtained from testing cores that were cut from various locations in the outside lane (wheelpath and between wheelpath). Testing included bulk specific gravity and maximum specific gravity (for determination of in-place air voids), asphalt content, gradation, recovered viscosity, and rut depth by the asphalt pavement analyzer (APA).

The results were generally inconclusive and did not lead to any particular assignable cause for the rutting.

SUMMARY OF I-10 RUTTING DATA

In order to assess the overall magnitude of rutting along the I-10 corridor, data from the Department's annual Pavement Condition Survey (PCS) was evaluated. This annual survey provides the most current and detailed performance data available. In addition, other data was extracted from the Department's Pavement Management databases in order to determine other project information such as financial project numbers, contractor and type of mix placed (Marshall Type S or Superpave Type SP).

Table 1 summarizes individual project information gathered from the 2006 PCS data for each county along the I-10 corridor. Project locations are described by mile posts (MP) and rut depth data is shown for west bound (WB) and east bound (EB) lanes. This information is also presented graphically in Appendix B.

Table 1 - I-10 Rut Depth Data from 2006 PCS

Location MP to MP	Contractor	Const Year	Mix Type	WB Rutting (in)		EB Rutting (in)	
				AVG	STDEV	AVG	STDEV
Escambia County							
0.222 - 9.730	Anderson Columbia	2003	SP	0.11	0.05	0.12	0.05
9.730 - 10.620	Ballenger Group	1997	S	0.35	0.08	0.23	0.12
13.827 - 16.549	Anderson Columbia	2002	SP	0.13	0.04	0.31	0.16
Santa Rosa County							
2.571 - 5.491	APAC	2004	SP	0.04	0.03	0.05	0.03
5.491 - 10.644	APAC	2002	SP	0.08	0.08	0.09	0.06
11.527 - 15.191	APAC	2002	SP	0.14	0.06	0.16	0.06
15.191 - 25.905	Anderson Columbia	2001	SP	0.11	0.04	0.09	0.04
Okaloosa County							
0.000 - 3.069	Anderson Columbia	2001	SP	0.11	0.05	0.17	0.04
3.609 - 8.277	APAC	2002	SP	0.19	0.07	0.23	0.05
13.354 - 16.991	Couch Construction	1996	S	0.21	0.08	n/a	n/a

Location MP to MP	Contractor	Const Year	Mix Type	WB Rutting (in)		EB Rutting (in)	
				AVG	STDEV	AVG	STDEV
16.991 - 24.554	Anderson Columbia	2002	SP	0.29	0.08	0.30	0.10
Walton County							
4.500 - 11.676	C.W. Roberts	2002	SP	0.16	0.08	0.23	0.09
11.676 - 18.100	C.W. Roberts	2002	SP	0.10	0.07	0.12	0.05
18.100 - 24.061	Okaloosa Asphalt	1993	S	0.21	0.08	0.24	0.07
24.061 - 27.454	C.W. Roberts	2002	SP	0.20	0.05	0.19	0.09
Holmes County							
0.000 - 7.237	White Construction	2002	SP	0.18	0.06	0.25	0.07
7.237 - 8.370	White Construction	2001	SP	0.11	0.03	0.02	0.01
14.195 - 16.682	White Construction	2001	SP	0.06	0.03	0.007	0.01
16.682 - 21.276	APAC	2001	SP	0.13	0.07	0.12	0.06
Washington County							
0.385 - 5.825	White Construction	2001	SP	0.07	0.04	0.02	0.01
12.906 - 23.963	Sandco Inc.	2002	SP	0.15	0.06	0.16	0.06
Jackson County							
0.000 - 10.351	White Construction	1995	S	0.25	0.10	0.31	0.09
13.609 - 19.504	White Construction	1993	S	0.21	0.06	0.23	0.07
19.504 - 33.260	Anderson Columbia	2001	SP	0.08	0.03	0.08	0.04
Gadsden County							
1.127 - 11.771	C.W. Roberts	1999	SP	0.09	0.04	0.13	0.04
11.771 - 20.315	C.W. Roberts	2001	SP	0.11	0.03	0.08	0.04
20.315 - 31.419	C.W. Roberts	1993	S	0.35	0.13	0.34	0.11
31.419 - 33.508	C.W. Roberts	2001	SP	0.15	0.03	0.14	0.03
Leon County							
0.000 - 4.573	Peavy & Son	2002	SP	0.14	0.06	0.15	0.06
4.573 - 15.665	Peavy & Son	1995	S	0.29	0.09	0.34	0.10
15.665 - 22.200	White Construction	2001	SP	0.06	0.03	0.06	0.02
Jefferson County							
0.000 - 4.920	APAC	2001	SP	0.07	0.05	0.08	0.05
4.920 - 10.007	---	2001	SP	0.11	0.04	0.16	0.05
10.007 - 19.487	APAC	2001	SP	0.06	0.04	0.08	0.04
Madison County							
0.000 - 11.333	Couch Construction	1998	SP	0.17	0.05	0.16	0.05
11.333 - 32.960	Couch Construction	1999	SP	0.12	0.05	0.11	0.05
Suwannee County							
0.000 - 5.861	Anderson Columbia	2000	SP	0.34	0.13	0.37	0.15
5.861 - 15.099	Anderson Columbia	1998	SP	0.16	0.06	0.12	0.05
15.099 - 25.523	Anderson Columbia	1997	SP	0.28	0.13	0.29	0.09
Columbia County							
0.000 - 10.105	Anderson Columbia	1999	SP	0.13	0.06	0.14	0.05
10.105 - 20.690	Martin Paving	1997	SP	0.18	0.10	0.15	0.10

Location	Contractor	Const	Mix	WB Rutting (in)		EB Rutting (in)	
MP to MP		Year	Type	AVG	STDEV	AVG	STDEV
Baker County							
0.000 - 9.439	Anderson Columbia	1996	S	0.36	0.13	0.31	0.07
9.439 - 25.462	Anderson Columbia	1996	S	0.23	0.11	0.24	0.08
Duval County							
0.000 - 3.220	Hubbard Construction	1998	SP	0.10	0.06	0.17	0.06
3.220 - 15.112	APAC Inc.	1998	SP	0.15	0.07	0.13	0.04
15.112 - 17.050	---	1998	---	0.13	0.08	0.12	0.06
21.002 - 21.667	---	1991	---	0.49	0.15	0.47	0.24
Nassau County							
0.000 - 0.701	Anderson Columbia	1996	S	0.15	0.07	0.19	0.04

SUMMARY OF I-75 AND I-95 PCS DATA

In order to determine if the magnitude of rutting along I-10 is significantly different from rutting experienced on other interstate highways in Florida, 2006 PCS rut depth data from I-75 and I-95 were collected and reviewed (see Appendix B for graphs of rut depths per individual county and project). This information was plotted for each county/project and is also summarized in Tables 2 and 3. Based on inspection of the plotted and summarized data, it appears that I-10 has experienced more rutting than I-75 and I-95. This becomes more evident when the data is presented as an average rut rate expressed in inches per year. To calculate the rut rate for each interstate, the rut depth for each individual project/section (both directions) was divided by the age of the pavement and then all projects/sections were averaged together. The average rut rates are as shown in Table 4.

Table 2 - I-75 Rut Depth Data from 2006 PCS

County	Location MP to MP	Const. Year	Mix Type	Avg. Rut SB (in)	Avg. Rut NB (in)
Dade	0.000 – 5.442	1992	S	0.16	0.19
Broward	0.000 – 8.693	1992	S	0.17	0.15
	8.693 – 10.784	1992	S	0.13	0.19

County	Location MP to MP	Const. Year	Mix Type	Avg. Rut SB (in)	Avg. Rut NB (in)
Broward	10.784 – 11.442	1991	S	0.12	0.17
	11.442 – 18.977	1991	S	0.21	0.21
	20.060 – 23.257	1991	S	0.26	0.18
	23.257 – 32.081	1991	S	0.21	0.14
	32.081 – 45.410	1991	S	0.20	0.19
Collier	0.000 – 24.325	1993	---	0.16	0.18
	24.325 – 30.192	1993	---	0.17	0.12
	30.192 – 35.601	1991	S	0.17	0.23
	35.601 – 42.231	1991	S	0.20	0.18
	42.231 – 48.845	1991	S	0.19	0.16
	48.845 – 49.248	2001	---	0.07	0.09
	49.248 – 63.504	1989	S	0.17	0.16
Lee	0.000 – 16.418	1990	S	0.08	0.04
	16.418 – 26.538	2004	SP	0.003	0.003
	27.273 – 34.138	2003	SP	0.007	0.006
Charlotte	15.112 – 15.770	2004	SP	0.04	0.05
	17.295 – 22.008	2004	SP	0.12	0.05
Sarasota	0.000 – 14.753	1990	S	0.02	0.004
	14.753 – 29.039	2002	SP	0.07	0.09
	29.039 – 37.095	1995	---	0.21	0.17
	37.095 – 42.615	1997	S	0.16	0.11
Manatee	0.000 – 3.750	1999	S	0.15	0.12
	3.750 – 8.288	1994	S	0.19	0.32
	8.288 – 10.307	1997	S	0.23	0.12
	11.049 – 12.896	1997	S	0.14	0.07
	12.896 – 15.723	1994	S	0.16	0.17
	15.723 – 20.571	2004	SP	0.03	0.10
Hillsborough	0.000 – 6.400	1990	S	0.007	0.02
	6.400 – 19.080	1990	S	0.19	0.15
	30.310 – 39.835	2004	SP	0.07	0.09
Pasco	0.000 – 8.173	1995	S	0.21	0.19
	8.173 – 20.386	1996	S	0.15	0.16
Hernando	0.000 – 3.700	1995	S	0.15	0.15
	3.700 – 11.447	2000	SP	0.11	0.10
Sumter	0.000 – 14.480	1999	S	0.14	0.12
	15.329 – 21.730	1998	S	0.26	0.27
	21.730 – 28.996	1996	S	0.24	0.16
Marion	0.000 – 13.140	1995	S	0.28	0.27
	13.140 – 18.664	1996	S	0.18	0.14
	18.664 – 22.500	1995	S	0.06	0.05
	22.500 – 38.282	1997	S	0.05	0.04

County	Location MP to MP	Const. Year	Mix Type	Avg. Rut SB (in)	Avg. Rut NB (in)
Alachua	0.000 – 16.525	2002	S	0.04	0.03
	16.525 – 17.452	2004	SP	0.03	0.07
	17.452 – 35.190	2002	S	0.02	0.02
Columbia	0.000 – 9.369	1996	SP	0.13	0.15
	9.369 – 19.032	1997	S	0.29	0.24
	19.032 – 27.445	2004	SP	0.09	0.11
	27.445 – 30.447	1998	SP	0.21	0.24
Suwannee	0.000 – 3.277	1998	SP	0.31	0.27
	3.277 – 3.656	1999	SP	0.23	0.21
Hamilton	0.000 – 19.175	1999	S	0.18	0.15
	19.175 – 28.746	1998	SP	0.25	0.26

Table 3 - I-95 Rut Depth Data from 2006 PCS

County	Location MP to MP	Const. Year	Mix Type	Avg. Rut SB (in)	Avg. Rut NB (in)
Dade	13.208 – 13.669	1999	S	0.13	0.21
	13.669 – 17.260	1989	---	0.21	0.23
Broward	0.000 – 6.642	1991	S	0.008	0.007
	6.642 – 8.382	1991	S	0.26	0.23
	8.382 – 8.750	1981	S	0.25	0.13
	8.750 – 10.956	1995	S	0.16	0.21
	10.956 – 14.641	1991	S	0.31	0.36
	14.641 – 25.307	1991	S	0.29	0.23
Palm Beach	7.618 – 16.451	1999	S	0.03	0.06
	24.916 – 26.578	1975?	S	0.07	0.03
	36.956 – 46.018	2004	SP	0.02	0.05
Martin	0.000 – 8.354	2001	SP	0.05	0.05
	8.354 – 11.706	1996	S	0.11	0.11
	11.706 – 24.967	1996	---	0.15	0.14
St. Lucie	0.000 – 15.379	1996	S	0.18	0.19
	15.379 – 27.259	2003	SP	0.07	0.05
Indian River	0.000 – 6.165	2001	SP	0.10	0.13
	6.165 – 19.198	2000	SP	0.12	0.11
Brevard	0.000 – 12.747	1994	S	0.22	0.14
	12.747 – 13.975	1999	---	0.17	0.20
	13.975 – 21.453	2003	SP	0.05	0.11
	21.453 – 31.405	1995	S	0.21	0.12
	31.405 – 41.503	1997	S	0.18	0.16
	41.503 – 46.008	1998	S	0.14	0.15
	46.008 – 46.835	1998	S	0.16	0.15

County	Location MP to MP	Const. Year	Mix Type	Avg. Rut SB (in)	Avg. Rut NB (in)
Brevard	46.835 – 47.641	2001	SP	0.10	0.13
	47.641 – 48.727	2000	SP	0.12	0.17
	48.727 – 59.327	2001	SP	0.08	0.10
	59.327 – 64.061	2004	SP	0.01	0.04
	64.061 – 68.009	1996	S	0.13	0.11
	68.009 – 68.407	1996	S	0.19	0.19
	68.407 – 72.693	1996	S	0.11	0.13
Volusia	0.000 – 6.771	2003	SP	0.05	0.06
	27.149 – 29.978	2002	SP	0.03	0.05
	35.982 – 45.804	1996	S	0.01	0.02
Flagler	0.000 – 18.729	1994	S	0.22	0.19
St. Johns	0.000 – 13.613	1992	S	0.09	0.04
	13.613 – 34.855	2004	SP	0.05	0.05
Duval	4.314 – 10.468	2003	SP	0.17	0.19
	3.301 – 7.881	2000	SP	0.18	0.16
	0.000 – 4.100	2002	SP	0.15	0.12
Nassau	0.000 – 12.226	2001	SP	0.13	0.13

Table 4 – Average Interstate Rutting per Year

Interstate	Rutting (in/year)
I-10	0.027
I-75	0.017
I-95	0.018

I-10 PROJECT ANALYSIS

After the initial meetings of the Task Team (January 6 and 30, 2006), and review of all statewide projects, it was decided to identify several good and poor performing projects along I-10 that could be evaluated in detail. These projects were then paired together based on a number of factors such as Contractor, roadway section, year of construction, pavement performance (good and poor performing) and pavement design.

The “good” performing projects have average pavement rutting in the range of 0.04 to 0.15 inches and have been completed for approximately 4 to 7 years. The “poor” performing projects have average pavement rutting in the range of 0.20 to 0.35 inches and have been completed for approximately 4 to 6 years. It should be noted that the term "poor" is used only in conjunction with the associated "good" paired project, and does not necessarily reflect a pavement failure. Aggregates used in the various project asphalt mixtures include: Alabama limestone, Georgia granite, North Florida limestone (Cabbage Grove), Illinois limestone, Kentucky screenings and granite screenings, as well as local sand and Recycled Asphalt Pavement (RAP). A summary of the four project pairs is provided in Table 5 below.

Table 5 - Project Pairs Chosen for Detailed Evaluation

Pair Number	Financial Project Number	Contractor	County	District
One	222721-1-52-01 222768-1-52-01	Anderson Columbia Co., Inc. Anderson Columbia Co., Inc.	Okaloosa Santa Rosa	3 3
Two	222567-1-52-01 222830-1-52-01	White Construction Co., Inc. White Construction Co., Inc.	Holmes Washington	3 3
Three	213560-1-52-01 213074-1-52-01	Anderson Columbia Co., Inc. Anderson Columbia Co., Inc.	Suwannee Columbia	2 2
Four	222801-1-52-01 222800-1-52-01	C.W. Roberts Contracting, Inc. C.W. Roberts Contracting, Inc.	Walton Walton	3 3

Data Collection for Paired Projects

For each of the paired projects, a final project summary package was prepared, which included the following: project information (Contractor, project location, project description, date of construction, etc.), specification version, pavement design, traffic data, asphalt plant production rate, average project air temperature, and overall project pavement performance. To supplement this information, Contractor personnel involved with these projects were interviewed by District personnel. Contractor questionnaires, developed to summarize project information and identify problems and issues related to the project, were then completed based on the interview results. Also, each year of post construction PCS rutting data was summarized for each paired project.

Existing construction data was also collected (when available) for all projects from the Construction Quality Reporting (CQR) database. The asphalt mix designs and corresponding Contractor's Quality Control (QC) and the Department's Quality Assurance (QA)/Independent Assurance (IA) mix production data was determined for each project. From this data, common factors were identified for the asphalt mix designs such as local sand, percent RAP, aggregate type, design traffic levels, asphalt binder grade used, etc. The QC, QA and IA data was used to identify any test results or characteristics of the mix that might be related to poor performance.

The final project summary packages, including Contractor questionnaires, summarized construction/mix production data, and summarized PCS rutting data are provided in Appendix C.

Individual Project Descriptions

Pair One: These projects were constructed by Anderson Columbia Co. Inc., and are located in Okaloosa and Santa Rosa Counties (District 3) on I-10. Both projects are located in a rural woodland topographic area (see Figure 1).

Figure 1 - Pair One Projects - Anderson Columbia

The poor performing project (FPN 222721-1-52-01) constructed in 2002 is located in Okaloosa County and extends from east of the Shoal River Bridge to the Walton County Line. The total project length is approximately 7.5 miles. The typical section consisted of cracking and seating of the existing Portland Cement Concrete pavement, placement of an asphalt rubber membrane interlayer (ARMI), and overlay with approximately five inches of Superpave Traffic Level 5 asphalt concrete and FC-5 open graded friction course (OGFC). The Superpave asphalt concrete layer was comprised of Alabama limestone (coarse and fine material) and Milton sand (all virgin mixes with no RAP material). The overall pavement performance was poor with an average rut depth for the project of 0.30 inches.

The good performing project (FPN 222768-1-52-01) constructed in 2001 is located in Santa Rosa County and extends from east of SR- 87 to the Okaloosa County line. The total project length is approximately 10.7 miles. The typical section consisted of rubblization of the existing Portland Cement Concrete pavement and overlay with approximately five inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Alabama limestone (coarse and fine material) and Anderson screenings. The overall pavement performance was good with an average rut depth for the project of 0.10 inches.

Pair Two: These projects were constructed by White Construction Co., Inc. and are located in Holmes and Washington Counties (District 3) on I-10. Both projects are located in a rural woodland topographic area (see Figure 2).

Figure 2 - Pair Two Projects - White Construction

The poor performing project (FPN 222567-1-52-01) constructed in 2002 is located in Holmes County and extends from the Walton county line to County Road 181. The total project length is approximately 7.2 miles. The typical section consisted of cracking and seating of the existing Portland Cement Concrete pavement, placement of an ARMI, and overlay with approximately five inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Alabama limestone (coarse and fine material), North Florida limestone (Cabbage Grove), Jones screenings and Diamond sand. The overall pavement performance was poor with an average rut depth for the project of 0.22 inches.

The good performing project (FPN 222830-1-52-01) constructed in 2001 is located in Washington County and extends from the Choctawhatchee River Bridge to the Holmes County line. The total project length is approximately 5.4 miles. The typical section consisted of rubblization of the existing Portland Cement Concrete pavement and overlay with approximately five inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Alabama limestone, North Florida limestone (Cabbage Grove coarse and fine material), and Jones screenings. The overall pavement performance was good with an average rut depth for the project of 0.04 inches.

Pair Three: These projects were constructed by Anderson Columbia Co. Inc., and are located in Suwannee and Columbia Counties (District 2) on I-10. Both projects are located in a rural woodland topographic area (see Figure 3).

Figure 3 - Pair Three Projects - Anderson Columbia

The poor performing project (FPN 213560-1-52-01) constructed in 2000 is located in Suwannee County and extends from the Madison County line to west of SR-10. The total project length is approximately 5.8 miles. The typical section consisted of milling four inches, placement of an ARMI, and resurfacing with approximately 4.75 inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Alabama limestone (coarse and fine material), and Anderson screenings or RAP and Georgia granite (coarse and fine material). The overall pavement performance was poor with an average rut depth for the project of 0.35 inches.

The good performing section (FPN 213074-1-52-01) constructed in 1999 is located in Columbia County and extends from the Suwannee County line to east of SR-47. The total project length is approximately 10.1 miles. The typical section consisted of milling 4.5 inches, placement of an ARMI, and resurfacing with approximately 4.75 inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Georgia granite (coarse and fine material) and Anderson screenings (no Alabama limestone). The overall pavement performance was good with an average rut depth for the project of 0.14 inches.

Pair Four: These projects were constructed by C.W. Roberts Contracting, Inc., and are located in Walton County (District 3) on I-10. Both projects are located in a rural woodland topographic area (see Figure 4).

Figure 4 - Pair Four Projects - C.W. Roberts Contracting

The poor performing section (FPN 222801-1-52-01) constructed in 2002 is located in Walton County and extends from Eglin Air Force Base Railroad to Boy Scout Road. The total project length is approximately 7.2 miles. The typical section consisted of cracking and seating of the existing Portland Cement Concrete pavement, placement of an ARMI, and overlay with approximately 5.5 inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Illinois limestone (coarse and fine material), Kentucky screenings, and Red Bay sand. The overall pavement performance was poor with an average rut depth for the project of 0.20 inches.

The good performing section (FPN 222800-1-52-01) constructed in 2002 is located in Walton County and extends from Boy Scout Road to SR-83. The total project length is approximately 6.4 miles. The typical section consisted of cracking and seating of the existing Portland cement concrete pavement, placement of an ARMI, and overlay with approximately 5.5 inches of Superpave Traffic Level 5 asphalt concrete and FC-5 OGFC. The Superpave asphalt concrete layer was comprised of RAP, Illinois limestone (coarse and fine material), Kentucky screenings, and Red Bay sand. The overall pavement performance was good with an average rut depth for the project of 0.11 inches.

Field Reviews

State Materials Office (SMO) and District Materials Office personnel field reviewed three of the four poor performing projects: FPN 222721-1-52-01 - Okaloosa County, constructed by Anderson Columbia Co., Inc.; FPN 222567-1-52-01 - Holmes County, constructed by White Construction Co., Inc.; and FPN 213560-1-52-01 - Suwannee County, constructed by Anderson Columbia Co., Inc.; and documented the pavement distress/rutting. In the areas with severe distress, the magnitude of the rutting was equivalent in both wheel paths. On the various projects, the overall rutting appeared to be occurring equally in both the eastbound and westbound directions.

On the worst performing projects, a rutting profile was determined using the Transverse Profilograph equipment (see Figures 5 – 8 in Appendix D). Rut depths in the range from 0.6 to 0.8 inches and as high as 1.0 inch were measured. Based on the profiles from Okaloosa County, it appears consolidation rutting is occurring at MP

19.900 and both consolidation rutting and plastic deformation is occurring at MP 22.454 (consolidation rutting is typically due to post-construction pavement densification caused by traffic, while plastic deformation is typically due to an unstable asphalt pavement layer). The profile from MP 7.110 in Holmes County also indicates both types of rutting, while the profile from Suwannee County appears to be plastic deformation.

ANALYSIS

A detailed review and comparison of all available design, construction, and post-construction data was performed for each project in an attempt to identify similar conditions or assignable causes that may have lead to the rutting problems. Possible sources of rutting considered during this review include:

- Pavement Design (insufficient structural thickness, gross under-prediction of traffic loading, poor base and/or subgrade conditions);
- Concrete Rubblization verses Crack-and-Seat Pavement Rehabilitation;
- Production Issues (small quantities/low production, plant shutdowns, poorly maintained plant equipment, material supply problems, inexperienced personnel, temperature/weather issues, lab technician/equipment problems);
- ARMI (Asphalt Rubber Membrane Interlayer, viscosity/rubber content issues, improper application rate of ARB or cover material);
- Mix Design (aggregate types and sources, binder content, RAP content, sand content);
- Low Air Voids (less than 2 percent during mix production);
- Low Dust/Effective Asphalt content or Low Dust (-200) content;
- Low Recovered Asphalt Binder Viscosity;

- Low Density/High In-Place Air Voids.

Summaries of the pre-construction/design information, construction/production data, and post construction/performance data for the paired projects are provided in Tables 6, 7, and 8, respectively. These tables were developed from the detailed project summary packages found in Appendix C.

The pre-construction information includes traffic data, site conditions prior to constructing the new pavements, and pavement design thickness. Pavement design parameters such as percent trucks, ESALs (equivalent single axle loads), traffic level, and subgrade conditions are relatively consistent for both poor and good performing projects. Three of the four project pairs were constructed over existing concrete that was cracked-and-seated or rubblized. The crack-and-seat method was used on all three of the poor performing sections and on one of the good performing sections. Rubblization was used on two good performing sections. All projects, except for the two rubblized sections, included an ARMI layer to prevent reflective cracking. Most of this information is typical for these types of projects and presents no obvious assignable causes for the rutting.

Based on review of the available construction documentation and production data (QC, QA, and IA test results) for each project, the following observations can be made:

- Three different Contractors (Anderson Columbia, White Construction, and C.W. Roberts) were involved with the eight paired projects. All three were associated with both poor and good performing projects. White Construction used different plants on the Pair 2 projects and Anderson Columbia used different plants on the Pair 3 projects. There is no data or other documentation to suggest any connection between a certain plant and the performance of the mixes produced at that plant.

- Several different versions of the Specifications were used on these projects; however, similar versions were used on both poor and good performing projects.
- The minimum, maximum, and average air temperature was similar for all projects.
- There are no known or reported problems associated with the construction of the ARMI layer on these projects.
- There are no known significant or prolonged problems related to mix production on these projects such as poorly maintained plant/lab equipment, inexperienced or incompetent personnel, etc.
- All Superpave mixtures used on these projects were designed to meet the requirements of a Traffic Level 5 (or in some cases traffic level D) mix design per FDOT and AASHTO standards, and were tested, verified, and if necessary revised, for use according to the Specifications. Different mix designs were used for each project (i.e. the same design did not perform well on one project and poorly on another).
- All projects used a 19.0 mm coarse mix as the first lift, and six of the eight projects used a 12.5 mm mix as the top structural lift. The Pair 3 projects used a 9.5 mm mix as the top structural lift. The Pair 1 poor performing project used only virgin mixes; the Pair 2 good performer used virgin mix

in the 12.5 mm lift; the Pair 4 poor performer used virgin mix in the 19.0 mm lift.

- The majority of coarse and fine aggregate types and sources used in the various mixes on these projects were found in both poor and good performing sections. Limestone was the primary aggregate type with the exception of the Pair 3 projects where granite and granite screenings were used. One notable difference is the use of local sands versus screenings in the poor versus good performing sections of the first two project pairs.
- Low air voids (less than 2%) during production occurred in more instances on poor performing projects.
- Other production data that could identify assignable causes for rutting, such as low dust (-200) content, low/high VMA, low recovered asphalt binder viscosity, or low compacted density on the road, do not appear to be significantly different for the poor or good performing projects.

The post-construction PCS data does not include information that can relate directly to an assignable cause of rutting, but it does provide a “history” of the pavement performance. As shown in Table 8, the average rut rates, expressed in inches per year, are significantly different for the poor and good performing projects. The rates range from 0.040 to 0.078 inches per year for the poor performers, and from 0.004 to 0.030 inches per year for the good performers. Also, a significant percentage of the total rut depth on the poor performing projects occurred within the first few years. The good performers exhibit a different behavior, experiencing almost no rutting in the first year (with the exception of the Walton County project WB lanes).

Table 6. Summary of Pre-Construction / Design Information for Paired Projects

		Design Traffic Data			Existing Conditions					New Pavement (2)		
Location & Project No.	**MP to MP Length**	**AADT**	**Trucks (%)**	**ESALs (million)**	**Stabilized Subgrade**	**Limerock Base**	**Pavement (1) Asphalt**	**Pavement (1) Concrete**	**Mr (psi)**	**Traffic Level**	**ARMI (y/n)**	**Design SP Thickness**
Okaloosa County FPN 222721 (Pair 1 - poor)	17.0 - 24.5 7.5 miles	19,800	26.1	17.6	12"	---	---	8" C&S	15,700	5	y	5.1"
Santa Rosa Co. FPN 222768 (Pair 1 - good)	15.2 - 25.9 10.7 miles	24,500	25.3	21.3	12"	---	---	9" Rub.	18,400	5	n	5.1"
Holmes County FPN 222567 (Pair 2 - poor)	0.0 - 7.2 7.2 miles	16,900	34.6	18.7	12"	---	---	9" C&S	17,700	5	y	5.1"
Washington Co. FPN 222830 (Pair 2 - good)	0.4 - 5.8 5.4 miles	16,800	31.2	23.4	12"	---	---	9" Rub.	19,400	5	n	5.1"
Suwannee County FPN 213560 (Pair 3 - poor)	0.0 - 5.8 5.8 miles	17,100	23.9	15.9	12"	10.0"	1.2" Type 1 1.8" Binder	---	27,400	5	y	4.7"
Columbia County FPN 213074 (Pair 3 - good)	0.0 - 10.1 10.1 miles	18,600	26.5	12.6	12"	10.5"	1.6" Binder	---	25,200	5	y	4.7"
Walton County FPN 222801 (Pair 4 - poor)	4.5 - 11.7 7.2 miles	20,100	21.3	24.8	12"	---	---	9" C&S	14,800	5	y	5.5"
Walton County FPN 222800 (Pair 4 - good)	11.7 - 18.1 6.4 miles	20,100	21.3	24.8	12"	---	---	9" C&S	14,800	5	y	5.5"

Notes: (1) Asphalt is estimated thickness after milling. 213560 milled 4", 213074 milled 4.5", C&S = Crack and Seat, Rub. = Rubblized.
(2) All new asphalt layers are Superpave coarse graded mixes. Design thickness is for structural layers. All projects have FC-5 OGFC.
AADT = Average Annual Daily Traffic, ESAL = Equivalent Single Axle Load, Mr = Resilient Modulus of base material.

Table 7. Summary of Construction / Production Data for Paired Projects

Project Location	Contractor	Spec. Yr.	Plant No./ Location	Air Temp (F) Min.	Max.	Avg.	Mix Design Information (1) Mix Types	% RAP	Agg. Types (2)	Production Data/ Comments
Okaloosa Co. FPN 222721 (Pair 1 - poor)	Anderson Columbia	Jan-June 1999 workbook	A0665 Milton, FL	39.4	90.2	67.6	12.5 mm 19.0 mm	0 0	#67 AL, #7 AL, S1B AL, ALScr, Cant., Milton Sand	A few low IA air void results (not significant), good QA density results
Santa Rosa Co. FPN 222768 (Pair 1 - good)	Anderson Columbia	Jan-June 1999 workbook	A0665 Milton, FL	39.4	96.7	64.5	12.5 mm 19.0 mm	10-20 20	#7 AL, #89 AL, S1A & S1B AL, Anderson Scr	Data appears relatively good - a few low air voids and density results
Holmes Co. FPN 222567 (Pair 2 - poor)	White Const.	June-Dec 1999 workbook	A0681 DeFuniak Springs, FL	34.9	90.2	65.7	12.5 mm 19.0 mm	0-25 10	S1A & S1B AL, S1A & S1B CG LS Jones Scr Diamond Sand	Some low avg air voids w/ individual results < 2, some low QA density results, overall avg density looks ok
Washington Co FPN 222830 (Pair 2 - good)	White Const.	Jan-June 1999 workbook	A0326 Cottondale FL	34.9	96.7	67.1	12.5 mm 19.0 mm	0 10	S1A CG LS, S1B AL, Jones Scr	Some low QA density results, avg looks ok
Suwannee Co. FPN 213560 (Pair 3 - poor)	Anderson Columbia	Jan-June 1998 workbook	A0651 Perry, FL	38.0	94.1	66.1	9.5 mm 19.0 mm	15 15	S1A & S1B AL, #89 Granite, Granite Scr, Anderson Scr	Minor air void problems, A few low densities w/9.5mm, QC reported compaction and tender zone issues
Columbia Co. FPN 213074 (Pair 3 – good)	Anderson Columbia	Jan-June 1997 workbook	A0200 Lake City FL	44.5	97.5	68.9	9.5 mm 19.0 mm	15-20 15	#57,67,89 Granite Granite Scr, Anderson Scr	Some high -200/AC avgs, good air voids/density, QC reported problems compacting 9.5 mm
Walton Co. FPN 222801 (Pair 4 - poor)	C.W. Roberts	Jan-June 2000 workbook	A0704 Tallahassee FL	37.9	91.3	68.1	12.5 mm 19.0 mm	10 0	S1A & S1B ILL LS #67,89 ILL LS, ILL Scr, Kent Scr, Red Bay Sand	Slightly high -200/AC avgs for 12.5mm, slightly high air void avg for 19.0mm, ok average density
Walton Co. FPN 222800 (Pair 4 - good)	C.W. Roberts	Jan-June 2000 workbook	A0704 Tallahassee FL	37.9	91.3	68.1	12.5 mm 19.0 mm	0-10 15-20	Kent. Scr, #67, 89 ILL LS, S1A & S1B ILL LS ILL Scr, Red Bay S	Some high air voids >6 overall avg air voids good, good density

Notes: (1) All mix designs are Coarse Traffic Level 5/D (a Fine TL C 12.5 mm was used on 222800 as overbuild).
(2) AL=Alabama Limestone, Scr=Screenings, CG=Cabage Grove, LS=Limestone, ILL=Illinois, Kent=Kentucky

Table 8. Summary of Post-Construction / Performance Data for Paired Projects						
Project Location	Approx. Age (yrs)	Avgerage Rut Depth		Average Rut Rate		Rutting History/ Comments
		EB (in)	WB (in)	EB (in/yr)	WB (in/yr)	
Okaloosa County FPN 222721	4	0.31	0.29	0.078	0.073	> 0.2" in first year ~ 70% of total in 1st year
Santa Rosa Co. FPN 222768	5	0.09	0.11	0.018	0.022	no rutting in 1st year ~ 50% of total in 2nd year
Holmes County FPN 222567	4	0.25	0.18	0.063	0.045	> 0.1" in first year ~ 50% of total in 1st year
Washington Co. FPN 222830	5	0.02	0.07	0.004	0.014	no rut EB in 1st 2 years no rut WB in 1st year
Suwannee County FPN 213560	7	0.37	0.34	0.053	0.049	> 0.1" in first year ~ 0.25" by third year
Columbia County FPN 213074	7	0.15	0.13	0.021	0.019	~ 25% of total in 1st year no change in last 4 yrs
Walton County FPN 222801	4	0.23	0.16	0.058	0.040	> 0.1" in first year ~ 90% of total in 2nd yr
Walton County FPN 222800	4	0.12	0.11	0.030	0.028	EB 30% in first year WB 65% in first year

SUMMARY OF FINDINGS

Based on the analysis and the consensus of the team, the following is a summary of findings:

1. Based on the results of the 2006 PCS, it is apparent that the I-10 corridor has experienced more rutting than the I-75 and I-95 corridors.
2. All mix designs met Superpave mix design criteria, and were verified by the State Materials Office.
3. Traffic loading is similar within each pair and is therefore not the cause of the difference in rutting between sections within a pair.
4. No evidence exists to suggest rutting was related to a pavement design issue.

5. No evidence exists to indicate rutting was related to a particular contractor or personnel involved with a project.
6. There appears to be some correlation between the number of air void failures during production (<2%) and projects that experienced greater rutting.
7. Mix designs were different between good and poor performing sections within a pair. While not conclusive, this may be an assignable cause of the rutting.
8. There is some evidence that the use of local sand as a fine aggregate, as opposed to screenings, resulted in more rutting.
9. Excessive variability of the gradation and asphalt content during production results in mixtures that do not meet Superpave mix design criteria and would likely be more susceptible to rutting.

In general, the results of this study are inconclusive with respect to poor rutting performance, as the Team found no specific characteristics or common factors that could be reliably identified as assignable causes. However, there is evidence to suggest the problem may be partially related to the use of local sands in some of the mix designs and also to low air voids caused by variability in gradation and asphalt content.

RECOMMENDATIONS

Since these projects were constructed, there have been a number of Specification changes that should have a positive impact on rutting performance of asphalt pavements in Florida, such as:

- The addition of a requirement to use a polymer modified asphalt binder (PG 76-22) in the top structural lift on all Traffic Level D projects and in the upper two structural lifts on all

Traffic Level E projects. Polymer modifiers will increase rutting resistance without negatively impacting pavement durability.

- The development of the Value Added Asphalt Pavement (VAAP) Specification will help to reduce the Department's risk of premature rutting on projects by placing the responsibility for pavement performance on the Contractor for three years following Final Acceptance. Rutting is most likely to occur during the first three years of the project's life.
- The development of the Contractor Quality Control (CQC) system shifts a greater responsibility to the Contractor for the control of their product. In addition, the Percent Within Limits (PWL) specification will further help reduce the potential rutting problem on projects by rewarding Contractors for producing and placing a mix that is consistently close to the design targets. Mixes produced and placed closer to the design targets will have a greater likelihood of having good performance.

In addition, the following recommendations may lead to a reduction in the potential for rutting on future projects. These recommendations were made by the Task Team members during a round table discussion of the results of this study in an attempt to identify additional courses of action that could be explored further by the Department.

1. The Department needs to carefully evaluate all high traffic level virgin mixes that include local sands. If possible the designs should be rut tested prior to approval.
2. The Department needs to increase inspections and/or independent verification sampling and testing on projects where the Contractor has a history of building pavements with

rutting problems. Along these lines, the Department might want to consider developing an asphalt plant rating system that is based on the performance of previous projects.

3. The Department should give consideration to monitoring the Effective Specific Gravity (G_{se}) of the mix design during production, similar to what the Virginia DOT (VDOT) uses. The Effective Specific Gravity of an asphalt mixture is related to the aggregate properties and will vary with significant changes in the aggregates. VDOT uses a 0.015 tolerance during production.
4. The Department should give consideration to monitoring and reviewing the Fine Aggregate Angularity (FAA) of the mix design during production.
5. The Department should identify and monitor inexperienced Contractor QC personnel (especially if on a high traffic volume project).
6. Superpave volumetric mix design typically results in mixtures that are rut resistant when constructed as designed, however this method is not foolproof. A performance test is needed to further provide assurance against rutting. National research is leading towards the dynamic modulus test, but this test has not reached the point of widespread implementation.

Appendix A

NCAT Report on I-10 Rutting in Suwannee County

District 3 Failure Investigation of I-10 in Okaloosa County

FORENSIC ANALYSIS OF RUTTING IN HOT MIX ASPHALT PLACED ON I-10 IN SUWANNEE COUNTY FLORIDA

By

Donald E. Watson, P.E.
Research Engineer
National Center for Asphalt Technology

Sponsored by
Florida Department of Transportation
5007 Northeast 39th Avenue
Gainesville, FL 32609

May, 2004

National Center for Asphalt Technology
NCAT
AUBURN UNIVERSITY
277 Technology Parkway • Auburn, AL 36830

FORENSIC ANALYSIS OF RUTTING IN HOT MIX ASPHALT PLACED ON I-10 IN SUWANNEE COUNTY FLORIDA

By

Donald E. Watson, P.E.
Research Engineer
National Center for Asphalt Technology

Sponsored by
Florida Department of Transportation
5007 Northeast 39th Avenue
Gainesville, FL 32609

May, 2004

DISCLAIMER

TABLE OF CONTENTS

ABSTRACT

The National Center for Asphalt Technology (NCAT) was requested to conduct a forensic analysis on mixture placed on I-10/SR 8 in Suwannee County near Faulmouth Road in Florida. The purpose of this forensic investigation was to determine the possible cause of premature rutting on this project.

Project test data was reviewed to determine if Quality Control/Quality Assurance tests might indicate potential mixture performance problems. The data shows that for the 19 mm binder course 34 of the 49 sets of samples (69%) exceeded 98.0 percent of Gmm at Nmax. Of the samples for 9.5 mm mix, 32 of the 39 sets of samples (82%) exceeded 98.0 percent of Gmm at Nmax.

In order to visually determine if the rutting appeared to be confined to the pavement layers, a transverse slab was taken from the full width of the outside travel lane for both a good section and a rutted section. A transverse profile of each layer within the pavement structure was then plotted to see if the rutting might be attributed to a particular layer. The rutting profile of individual layers indicates that the most severe rutting may be attributed to the 19 mm and 9.5 mm layers most recently placed.

In order to determine whether the rutting may be a result of underlying changes in base or subgrade settlement, non-destructive testing was used. A Ground Penetrating Radar (GPR) and Falling Weight Deflectometer (FWD) were used to evaluate the overall condition of the total bound and unbound layers of the roadway structure. Based on these tests, there are no significant failures of the underlying structure nor anomalies that might impact pavement performance.

Based on information from this study, it was determined that a large proportion of samples consistently exceeded the maximum of 98 percent of Gmm at Nmax for both the 9.5 mm and 19 mm mixtures. The failure of these mixtures to consistently meet specification requirements during production should have been an early indication that the mixture was potentially subject to abnormal densification under traffic.

Keywords - Rutting, Quality Control/Quality Acceptance, rutting profile, Ground Penetrating Radar, Falling Weight Deflectometer.

Forensic Analysis Of Rutting In Hot Mix Asphalt Placed On I-10 In Suwannee County Florida

INTRODUCTION

The National Center for Asphalt Technology (NCAT) was requested to conduct a forensic analysis on mixture placed on I-10/SR 8 in Suwannee County near Faulmouth Road in Florida. The area evaluated was constructed between January and June of 1999 by Anderson-Columbia Construction Company on project 21356015201. The project consisted of milling the existing pavement to remove fatigue cracks in the upper pavement layers. The milled area was inlaid with a Superpave 19 mm Nominal Maximum Aggregate Size (NMAS) binder course and a Superpave 9.5 mm NMAS surface mix. The Superpave binder course was completed in April 1999 and the Superpave surface mix was completed in June 1999. Both binder and surface course utilized PG 67-22 asphalt cement. An Open-Graded Friction Course (FC-5) was placed as the final riding surface.

SCOPE

Rutting began to occur on portions of the project shortly after construction had ended. Based on laser profile information, the worst rutting appeared to be between milepost 3.297 to milepost 3.411 in the outside lane of the eastbound direction. The purpose of this forensic investigation was to determine the possible cause of premature rutting on this project.

RESEARCH APPROACH

The experimental approach for this investigation included a review of Quality Control/Quality Acceptance (QC/QA) test data for the mixtures produced and placed on the project to determine if potential problem areas could be identified from the construction data. The investigation also included cutting a transverse slab section from the outside lane of the existing roadway for the full depth of the pavement from the rutted area at milepost 3.354 and from an area with the least rutting at milepost 4.032 in the eastbound direction. Roadway cores were also cut for comparison from the same areas. The cores were tested for gradation and asphalt content, percent air voids, permeability, rutting susceptibility with the Asphalt Pavement Analyzer (APA), and the asphalt cement was recovered to determine the performance grade. Non-destructive tests such as the Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR) were also used to investigate whether there may be significant differences in the underlying roadway foundation that may have influenced the premature rutting of the pavement layers.

DISCUSSION OF TEST RESULTS

Review of QC/QA/IA Test Data

19 mm Mix

Plant mix results of project quality control and acceptance tests were reviewed during the investigation. A total of 29 Lots of 19 mm binder course were placed on this project and 82 extractions for either quality control, quality acceptance, or independent assurance were performed to evaluate mixture quality during production. Production of the 19 mm mix began on January 28, 1999 using mix design SP 99-0221A. From February 5 through February 19, 1999 mixture was produced using a different mix design (SP 99-0221B). Mix design SP 99-0221A was then used for the remainder of the project until the placement of the binder course was completed on April 12, 1999.

The average of all test data shows that the gradation was within 2.0 percent of the mix design target values and the asphalt content averaged within 0.2 percent of the mix design target values for each of the 19 mm mixes produced. The standard deviation and range of test results shown in Table 1 indicates considerable variability of the gradation particularly on the 1/2 inch, 3/8 inch, No. 4, and No. 8 sieves. However, most of this variability occurred during the first two days of production. For example, the highest range in gradation was 37.9 percent for the No.4 sieve and this occurred in a comparison between the first quality control test and the first quality acceptance test. Similarly, the range of 14.0 percent on the No. 8 sieve and the range of 19.9 percent on the 1/2 inch sieve occurred between comparisons of the first quality control test and the first independent assurance test.

TABLE 1. Summary of Plant Mix Results for 19 mm Mix Design SP 99-0221A

Property	Design / % Passing	AVG	STD	MIN	MAX	RNG	CNT
25.0mm (1")	100	100.0	0.00	100.0	100.0	0.0	37.00
19.0mm (3/4")	99	98.0	1.34	94.1	100.0	5.9	37.00
12.5mm (1/2")	90	89.1	3.88	76.4	96.2	19.9	37.00
9.5mm (3/8")	84	82.1	4.71	64.7	87.4	22.6	37.00
4.75mm (#4)	43	44.5	6.75	30.9	68.9	37.9	37.00
2.36mm (#8)	23	22.0	2.68	18.2	32.3	14.0	37.00
1.18mm (#16)	18	16.9	0.98	14.4	18.4	4.0	37.00
600um (#30)	14	13.8	0.78	11.7	14.9	3.2	37.00
300um (#50)	11	10.6	0.73	8.9	12.4	3.5	37.00
150um (#100)	6	6.6	0.88	4.9	9.5	4.5	37.00
75um (#200)	4.00	3.87	0.72	2.22	5.86	3.64	37.00
AC	5.50	5.4	0.27	4.9	5.9	1.0	37.00
%Gmm @ Ni	<89	85.4	0.58	83.8	86.6	2.76	24.00
% Gmm @ Nd	96.0	97.2	0.59	96.0	98.4	2.38	24.00
% Gmm @ Nm	<98	99.1	0.57	98.0	100.2	2.20	24.00
% Air Voids @ Nd	4.0	2.8	0.59	1.6	4.0	2.4	24.00
% VMA @ Nd	≥13	13.3	0.75	11.4	14.2	2.8	24.00
% VFA @ Nd	65-75	79.0	4.04	71.0	86.9	15.9	24.00

The 19 mm mixture produced using mix design SP 99-0221B was more consistent in gradation as evidenced by a lower standard deviation and lower range values as shown in Table 2. However, mixture produced using mix design SP 99-0221B had a higher range in asphalt content. The range of 1.55 percent (from a low of 4.37 percent to a high of 5.92 percent) reflects the inconsistent control in asphalt content for this mix. Nineteen percent of the samples tested using this mix design deviated 0.4 percent, or higher, from the mix design target value of 5.2 percent.

Samples of plant produced mix were compacted during production as part of both quality control and independent assurance requirements. These samples were then tested for percent air voids and percent of maximum mixture specific gravity (Gmm). According to AASHTO specifications

(MP 2-02) and Florida DOT specifications for Superpave mixtures (Section 334), mixtures are required to have no more than 98 percent of Gmm at the maximum number of gyrations (Nmax) specified for the project. This requirement is to ensure that under long-term densification of the pavement there would still be at least 2 percent air voids in the pavement layer to allow for normal expansion and contraction of roadway materials due to changes in thermal conditions. At the design gyration level, mixtures are to have 4.0 percent air voids.

TABLE 2. Summary of Plant Mix Results for 19 mm Mix Design SP 99-0221B

Property	Design/ % Passing	AVG	STD	MIN	MAX	RNG	CNT
25.0mm (1")	100	100.0	0.00	100.0	100.0	0.0	6.0
19.0mm (3/4")	99	97.1	1.42	94.6	98.5	3.9	6.0
12.5mm (1/2")	90	89.3	2.03	87.1	92.8	5.7	6.0
9.5mm (3/8")	84	84.2	2.76	80.2	88.0	7.8	6.0
4.75mm (#4)	43	45.4	2.36	41.7	48.3	6.6	6.0
2.36mm (#8)	23	22.3	3.63	19.4	30.2	10.8	6.0
1.18mm (#16)	18	17.1	1.54	15.5	20.2	4.7	6.0
600um (#30)	14	14.0	1.12	12.8	16.2	3.4	6.0
300um (#50)	11	10.0	2.44	5.2	13.4	8.2	6.0
150um (#100)	6	6.4	0.13	6.2	6.6	0.4	6.0
75um (#200)	4.00	3.68	0.23	3.35	4.10	0.75	6.0
AC	5.20	5.28	0.47	4.37	5.72	1.35	6.0
%Gmm @ Ni	<89	83.5	0.63	82.6	84.5	1.9	5.0
% Gmm @ Nd	96.0	95.5	0.67	94.8	96.8	2.0	5.0
% Gmm @ Nm	<98	97.5	0.69	96.7	98.8	2.1	5.0
% Air Voids @ Nd	4.0	4.5	0.67	3.2	5.2	2.0	5.0
% VMA @ Nd	≥13	12.5	0.32	12.1	12.9	0.8	5.0
% VFA @ Nd	65-75	64.0	5.83	56.6	74.2	17.6	5.0

Project test data shows that 22 of the 24 sets of samples (92%) for mix design SP 99-0221A and 12 of the 25 sample sets(48%) for mix design SP 99-0221B exceeded 98.0 percent of Gmm at Nmax. Samples representing mix design SP 99-0221A averaged 99.1 percent of Gmm and samples representing mix design SP 99-0221B averaged 98.2 percent of Gmm. A comparison between contractor and agency results for mixture produced by mix design SP 99-0221A shows that 18 of 20 (90 percent) quality control (QC) tests by the contractor exceeded the maximum percent Gmm requirements and all 4 tests by the agency's Independent Assurance (IA) exceeded those requirements. There were no quality assurance (QA) tests conducted by the agency of plant-produced mix compacted in the field laboratory.

Superpave mix designs specify optimum air voids at 4.0 percent. However, of the 24 samples for mix SP 99-0221A, the maximum air voids obtained was only 4.0 percent based on QC and IA testing. The average air voids were 2.8 percent with values as low as 1.6 percent.

The amount of air voids filled with asphalt (VFA) is also a good indication that the two 19 mm mixes used on this project had an excessive amount of asphalt cement. The VFA range of 65-75 percent was exceeded 80 percent of the time based on the contractor's QC results and was exceeded 75 percent of the time based on the agency's IA results for mix design SP 99-0221A. The average QC results were 79.5 percent with values as high as 86.9 percent. For mix SP 99-0221B, 55 percent of the QC results exceeded the allowable VFA range with values as high as 86.1 percent. Surprisingly, the agency IA results were quite different. Four of the five agency IA test results indicated the VFA values were too low even though the asphalt content was as much as 0.52 percent higher than the mix design target of 5.20 percent. The test results indicate there may have been inconsistency in the preparation of IA samples. For example, IA tests on mix produced with 5.72 percent asphalt cement on February 11, 1999 had a VFA value of only 63.6 percent while a sample taken on February 17, 1999 with 5.71 percent asphalt had a VFA value of 74.2 percent. Interestingly, 18 of 20 (90 percent) of the contractor's QC tests showed that mix SP 99-0221B met minimum voids in mineral aggregate (VMA) requirements of 13 percent while none of the agency's IA results met the VMA specification.

Since the project average of 79 tests was very close to the mix design target value for asphalt content, it is most likely that the mix design was inaccurate and needed to be adjusted in the field, or redesigned, to correct the problem. The large proportion of samples which consistently exceeded the maximum of 98 percent of Gmm at Nmax and the maximum of 75 percent VFA at Ndesign should have been an early indication that the mixture was potentially subject to abnormal densification under traffic, and either field adjustments should have been made or the mix should have been redesigned.

Roadway compaction tests were taken during construction to evaluate mixture density after placement. The average of all 19 mm mixture placed was 94.6 percent of Gmm, or 5.4 percent air voids. The minimum roadway density was 92.7 percent of Gmm and the maximum density was 95.7 percent of Gmm.

9.5 mm Mix

A total of 39 Lots of 9.5 mm surface course were placed on this project and 57 extractions for either quality control, quality acceptance, or independent assurance were performed to evaluate mixture quality during production. Thirteen of the Lots were placed on the shoulders. Production of the 9.5 mm mix began on March 18, 1999 and continued through April 19, 1999 using mix design SP 99-0260A. From June 3, 1999 until placement was completed on June 9, 1999 mixture was produced using a different mix design (SP 97-0097B).

The average of all test data shows that the gradation was within 3.0 percent of the mix design target values and the asphalt content averaged within 0.1 percent of the mix design target values for each of the 9.5 mm mixes produced. The standard deviation and range of test results shown in Tables 3 and 4 indicate reasonably consistent mixture was produced.

Samples of plant produced mix were also compacted during production for the 9.5 mm mixes. The average air voids of 25 samples for mix SP 99-0260A compacted in the lab were 3.0 percent at Ndesign with values as low as 1.8 percent and a high value of 4.2 percent. Fourteen samples of mix SP 99-0097B also averaged 3.0 with a low value of 2.1 percent and a high value of 4.4 percent. Surprisingly, the samples with the lowest values for percent air voids were reasonably consistent in gradation and asphalt content to the mix design parameters. These results indicate the mix designs may have required an excessive amount of asphalt cement and that the contractor or agency should have requested that field adjustments be made or the mix should have been redesigned.

TABLE 3. Summary of Plant Mix Results for 9.5 mm Mix Design SP 99-0260A

Property	Design / % Passing	AVG	STD	MIN	MAX	RNG	CNT
25.0mm (1")	100	100.0	0.00	100.0	100.0	0.0	8.0
19.0mm (3/4")	100	100.0	0.00	100.0	100.0	0.0	8.0
12.5mm (1/2")	100	99.9	0.15	99.6	100.0	0.4	8.0
9.5mm (3/8")	100	99.5	0.40	98.6	99.9	1.3	8.0
4.75mm (#4)	60	65.5	1.69	62.6	68.3	5.7	8.0
2.36mm (#8)	32	32.8	1.26	31.3	35.6	4.2	8.0
1.18mm (#16)	24	23.6	0.94	22.5	25.5	3.0	8.0
600um (#30)	17	18.0	0.79	17.0	19.5	2.4	8.0
300um (#50)	13	12.8	0.54	12.1	13.7	1.6	8.0
150um (#100)	7	7.4	0.28	7.0	7.8	0.8	8.0
75um (#200)	4.10	3.97	0.22	3.65	4.30	0.65	8.0
AC	6.00	5.98	0.21	5.69	6.45	0.76	8.0
%Gmm @ Ni	<89	86.1	0.60	85.0	87.1	2.1	8.0
% Gmm @ Nd	96.0	97.3	0.64	96.2	98.2	2.0	8.0
% Gmm @ Nm	<98	99.0	0.54	98.0	99.7	1.7	8.0
% Air Voids @ Nd	4.0	2.7	0.64	1.8	3.8	2.0	8.0
% VMA @ Nd	≥15	15.4	0.40	14.9	16.2	1.3	8.0
% VFA @ Nd	73-76	82.8	4.03	75.3	88.2	12.9	8.0

TABLE 4. Summary of Plant Mix Results for 9.5 mm Mix Design SP 97-0097B

Property	Design / % Passing	AVG	STD	MIN	MAX	RNG	CNT
25.0mm (1")	100	100.0	0.00	100.0	100.0	0.0	11.0
19.0mm (3/4")	100	100.0	0.00	100.0	100.0	0.0	11.0
12.5mm (1/2")	100	99.8	0.28	99.2	100.0	0.8	11.0
9.5mm (3/8")	96	95.3	0.86	94.1	96.6	2.5	11.0
4.75mm (#4)	63	65.4	2.71	60.3	69.1	8.8	11.0
2.36mm (#8)	39	39.9	2.60	34.6	42.5	7.8	11.0
1.18mm (#16)	25	26.3	1.90	22.1	28.1	6.0	11.0
600um (#30)	18	19.4	1.24	16.4	21.3	4.8	11.0
300um (#50)	13	13.7	1.10	11.8	16.3	4.5	11.0
150um (#100)	8	8.2	0.98	7.1	11.1	4.0	11.0
75um (#200)	5.00	4.76	0.96	3.86	7.71	3.85	11.00
AC	5.20	5.23	0.19	4.91	5.51	0.60	11.00
%Gmm @ Ni	<89	88.5	0.69	87.0	90.0	3.0	11.0
% Gmm @ Nd	96.0	97.0	0.56	95.6	97.6	1.9	11.0
% Gmm @ Nm	<98	98.2	0.57	96.8	98.8	2.0	11.0
% Air Voids @ Nd	4.0	3.0	0.56	2.5	4.4	1.9	11.0
% VMA @ Nd	≥ 15	16.3	0.50	15.6	17.3	1.7	11.0
% VFA @ Nd	73-76	81.5	3.00	74.4	84.9	10.6	11.0

Of the 9.5 mm mixture, 22 of the 25 sets of samples (88%) for mix design SP 99-0260A and 10 of the 14 sample sets(71%) for mix design SP 97-0097B exceeded 98.0 percent of Gmm at Nmax. Samples representing mix design SP 99-0260A averaged 98.6 percent of Gmm and samples representing mix design SP 97-0097B averaged 98.2 percent of Gmm. A comparison of contractor QC and agency IA samples showed results were closely matched. For mix SP 99-0260A, 15 of 17 QC tests and 7 of 8 IA tests exceeded the maximum allowed for percent Gmm at Nmax. VFA values also exceeded specification tolerances with values as high as 88.2 percent. Similar results were obtained for mix SP 99-0097B where 8 of 11 QC samples failed to meet Percent Gmm at Nmax and 10 of 11 samples failed to meet VFA requirements. Again, the large proportion of samples which consistently exceeded the maximum of 98 percent of Gmm at Nmax and exceeded the allowable VFA range at Ndesign should have been an early indication of potential mix problems.

Roadway compaction tests for the 9.5 mm mixture placed on the mainline traveled way averaged 94.3 percent of Gmm, or 5.7 percent air voids. The minimum roadway density was 92.9 percent of Gmm and the maximum density was 96.0 percent of Gmm.

Core Results

Based on laser profile data, it was determined that cores would be taken from the wheelpath of two sections. The area of greatest rutting on the project was determined to be at milepost 3.354 where rutting was approximately one inch deep. The section with the least rutting was at milepost 4.032 where ruts were less than 3/8 inch deep. Cores were taken from the highly rutted area as well as the area of low rutting and samples were tested for percent air voids, gradation, asphalt content, permeability, and rutting susceptibility. Asphalt cement was then recovered from the samples using the Abson recovery method to determine binder properties.

Permeability

FDOT has performed numerous permeability tests on Superpave mixtures and has developed a standard laboratory permeability test procedure (FM 5-565) that was used in this study. The test results values from roadway forensic cores from this project show the mixes to be basically impermeable with which only ranged from 0 to 6 x 10^{-5} cm/sec.

Rutting Susceptibility

Rutting Susceptibility was performed on cores taken from between the wheelpath both the high rutted areas as well as the low rutted areas. Cores from between the wheelpath were chosen for this test because they would not be as likely to have consolidated under traffic as material in the wheelpath. The Asphalt Pavement Analyzer (APA) was used and the test temperature was set at 64 °C. The load was 120 lbs. and the hose pressure was 120 psi as recommended in a draft test procedure for work done in research project NCHRP 9-17 (*1*). The test results indicate that the 19 mm and 12.5 mm mixtures were not highly susceptible to rutting. The maximum rut depth of 3.0 mm is well within the maximum of 5 mm rut depth that is typically allowed for interstate projects. The rut depths after 8,000 cycles of APA testing are shown in Table 5. Since the pavement layers had been in place for four years before cores were taken, the mixtures likely stiffened from aging and exposure to the environment. The additional stiffness may have affected APA results.

TABLE 5. APA Rut Depths from Roadway Cores

Mix Type	9.5 mm mix		19.0 mm mix	
Rutting Area	Low Rut	High Rut	Low Rut	High Rut
Air Voids, %	5.3	5.1	4.7	4.0
Rut Depth, mm	2.7	3.0	2.3	2.0

Percent air voids

The bulk specific gravity (Gmb) for each layer was determined according to AASHTO T166. Each layer was then heated slightly and broken down into small particles and tested for maximum specific gravity (Gmm) according to AASHTO T209.

Test results shown in Table 6 indicate that the 19 mm binder layer from the rutted section had an air void level that was very consistent (4.0 to 4.1 percent). The air voids in the binder layer of cores from the low rutting location were only slightly higher (4.3 and 4.7 percent) than air voids in cores from the rutted area. The 9.5 mm surface mix had air void levels that ranged from 3.8 percent in the wheelpath to 5.1 percent between the wheelpath (BWP) of the highly rutted area. Cores from the low rutting area had 4.2 percent air voids in the wheelpath and 5.3 percent air voids from samples between the wheelpath. These air void levels are within a range of what one might normally consider to be typical for a pavement that has been under traffic for four years.

TABLE 6. Roadway Air Voids Based on Field Cores

Mix Type	9.5 mm mix				19.0 mm mix			
Rutting Area	Low Rut		High Rut		Low Rut		High Rut	
Location	BWP	WP	BWP	WP	BWP	WP	BWP	WP
Air Voids, %	5.3	4.2	5.1	3.8	4.7	4.3	4.0	4.1

Gradation and Asphalt Content

An extraction analysis of roadway cores revealed the asphalt content of the 9.5 mm surface mix ranged from 5.70 to 6.02 percent while the 19 mm intermediate mix ranged from 5.73 to 6.04 percent as shown in Table 7. These results indicate that the asphalt content for the 19 mm mixes exceeded the mix design requirements. The 19 mm mix was as much as 0.54 percent higher in asphalt content than the mix design target. Gradation results were in relatively close conformance to the job mix formula with the exception of the results on the No. 4 sieve of the 19 mm mix which deviated as much as 9.0 percent from the job mix formula.

TABLE 7. Extraction/Gradation Results of Roadway Cores

Mix Type	9.5 mm mix				19.0 mm mix			
Location	Low Rut	High Rut	Mix Design SP 99-0260A	Mix Design SP 97-0097B	Low Rut	High Rut	Mix Design SP 99-0221A	Mix Design SP 99-0221B
% AC	5.70	6.02	6.00	5.20	6.04	5.73	5.50	5.20
Sieve	Percent Passing				Percent Passing			
1"	100	100	100	100	100	100	100	100
3/4"	100	100	100	100	98	99	99	99
1/2"	100	100	100	100	91	92	90	90
3/8"	96	97	100	96	86	87	84	84
No. 4	63	66	60	63	52	50	43	43
No. 8	39	41	32	39	25	24	23	23
No. 50	14	14	13	13	12	12	11	11
No. 200	5.5	5.5	4.1	5.0	4.9	5.4	4.0	4.0

Asphalt Cement Performance Grade

Asphalt binder was recovered from the extracted 19 mm and 9.5 mm cores for comparison and was tested for Superpave binder performance grade using AASHTO MP-1 procedures (*2*). A PG 67-22 performance grade was required for the mixtures placed on the mainline traveled way of this project. Normally, samples of original binder are aged in a rolling thin-film oven (RTFO) to simulate the aging effect on the binder from plant production and construction. Recovered samples were not RTFO aged since plant produced mix has already received the equivalent of RTFO aging. All samples met requirements for performance grade 70-22 properties. The increase in stiffness as related to the change in high temperature binder grade is typical of what would reasonably be expected for a mixture that has been subjected to environmental conditions for a few years.

Slab Results

In order to visually determine if the rutting appeared to be confined to the pavement layers, a transverse slab was taken from the full width of the outside travel lane. A transverse profile of each layer within the pavement structure was then plotted to see to what extent the rutting might be attributed to a particular layer.

From a profile of the low rutting area shown in Figure 1, one can see a slight depressed area at the interface of the 19 mm and 9.5 mm mixes from about 2 feet to about 10 feet across the transverse width. However, the rutting appears to be minimal at that point. The rutting appears to be more pronounced within the 9.5 mm mix. The rutting contour of the FC-5 mix appears to follow very closely the profile of the 9.5 mm mix and shows that the cause of rutting is within the pavement structure but below the FC-5 mix. There is an asphalt rubber membrane interlayer (ARMI) which lies beneath the 19 mm mix but it appears to have a relatively constant slope across the transverse direction. This figure indicates that the rutting is likely originating within either the 9.5 or 19 mm mixes.

A similar profile from the highly rutted area is shown in Figure 2. From this figure the rutting in the 9.5 mm mix is much more evident, but the rutting also extends well into the 19 mm mix. In fact, the contour of the 9.5 mm mix parallels very closely that of the 19 mm mix. Since the ARMI layer is only slightly more distorted than in the low rutted areas and still has a relatively constant cross-slope when compared to the difference in cross-slope of the 19 mm and 9.5 mm layers, the figure indicates that the severe rutting is most likely attributed to the 19 mm layer.

Non-Destructive Testing

In order to determine whether the rutting may be a result of underlying changes in base or subgrade settlement, non-destructive testing was used. A Ground Penetrating Radar (GPR) and a Falling Weight Deflectometer (FWD) were used to evaluate the overall condition of the total

FIGURE 1. Transverse Profile of Low Rutting Area

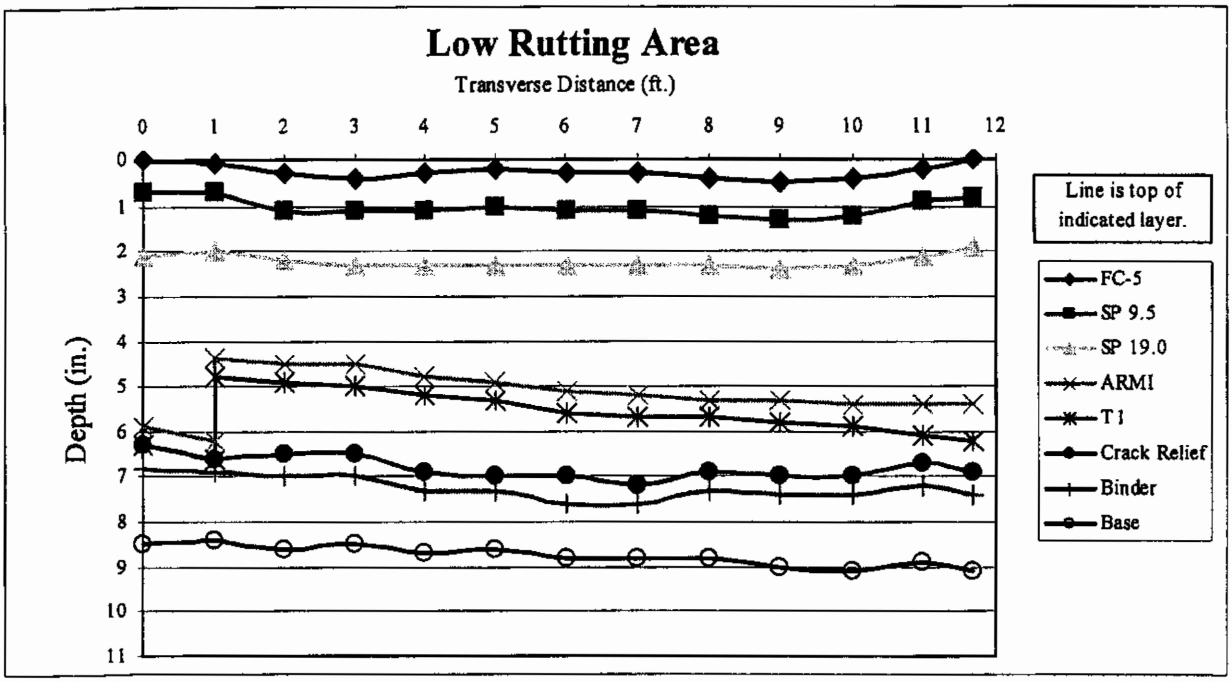
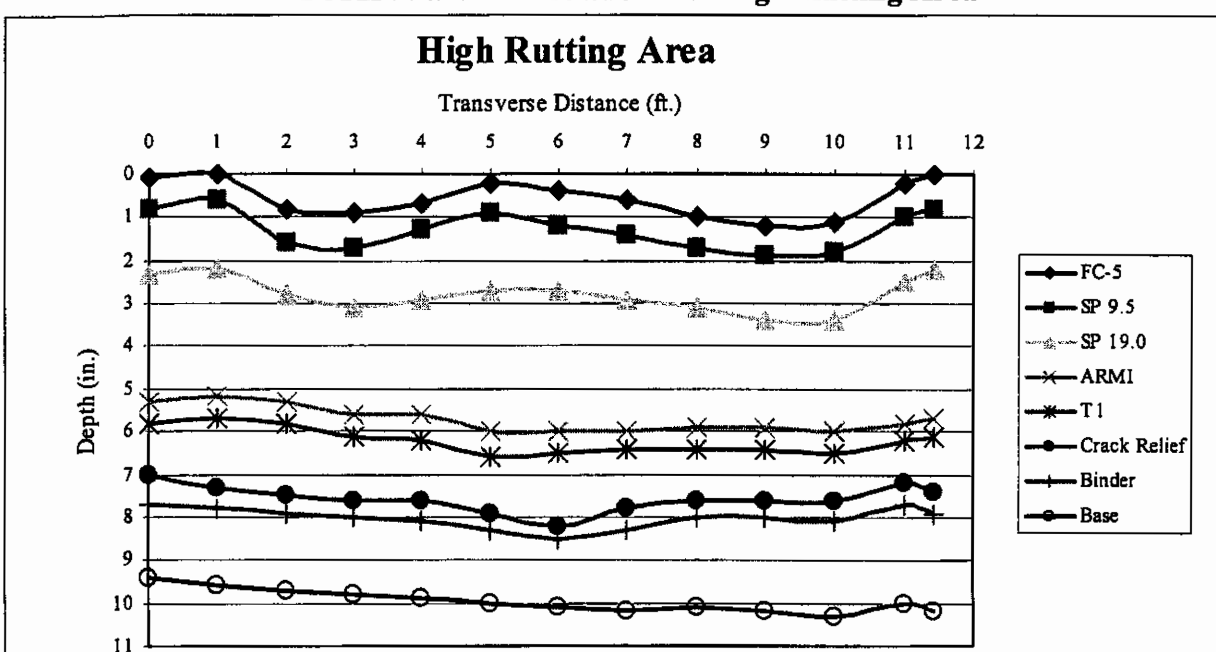


FIGURE 2. Transverse Profile of High Rutting Area



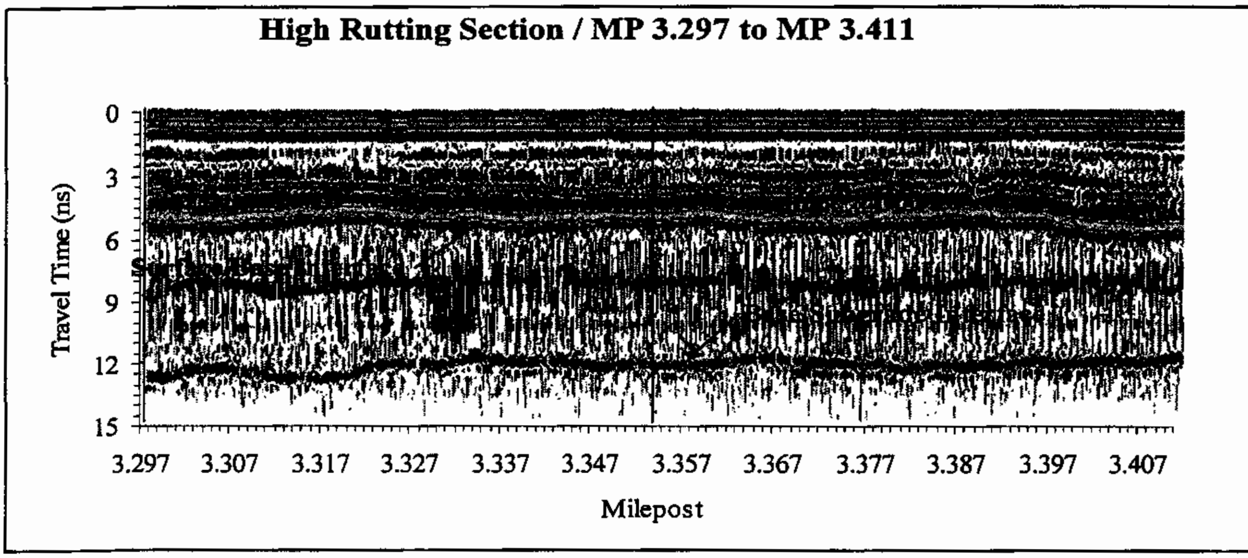
bound and unbound layers of the roadway structure. The tests and analysis of results were conducted by Florida DOT personnel. Based on laser profile data, it was determined that an evaluation would be conducted on two sections. The area of greatest rutting on the project was determined to be at milepost 3.354 and the section with the least rutting was at milepost 4.032. Non-destructive testing was conducted 300 feet before and after these locations.

Ground Penetrating Radar

GPR technology has been available for 30 years and is well known within the industry for its ability to quickly assess pavement structure thickness and any underlying anomalies that may affect pavement performance (*3*). By directing the electromagnetic pulses of GPR toward the roadway, the reflected pulses correspond to layer interfaces so long as there is a contrast in the dielectric properties of two adjacent materials.

Since the dielectric properties of an asphalt pavement and underlying soil are quite different, one can determine if there are underlying conditions beneath the pavement layer that may be influencing the rutting on this project by using this technology. For homogenous layers, the speed of electromagnetic waves is proportional to the speed of light. Therefore, by measuring the time difference between two consecutive reflected pulses, the GPR technology can be used to determine layer thickness. Since cores were taken from these same areas there was no need to determine pavement thickness with the GPR. A GPR scan of the highly rutted section shown in Figure 3 indicates there are no significant failures of the underlying structure nor anomalies that might impact pavement performance. Figure 3 shows a relatively constant longitudinal profile of the rutted area. The vertical line in Figure 3 represents the location where the slab was removed. The GPR results confirm the visual slab profile analysis in that the rutting appears to be confined to the pavement layers.

Figure 3. GPR Results for High Rutting Section of I-10



Falling Weight Deflectometer

The Falling Weight Deflectometer (FWD) was used to measure the pavement response to load in order to determine if there were potentially weak areas within the pavement structure. Geophone sensors were used to determine the pavement deflection as loads of varying magnitude are dropped onto the pavement surface. The first sensor (D0) is located under the center of the load plate and represents the overall response of the pavement. Other sensors are placed at various distances from the load plate to represent the pavement response at greater depths. The two sensors farthest from the load plate (D36 and D60, respectively) generally indicate the influence of the underlying subgrade.

Sensor locations and average deflections are shown in Table 8. These test results indicate that the high rutting area has the least deflection and represents a slightly stiffer pavement. From figures 1 and 2 (and based on core measurements) the 9.5 mm layer was as much as one-half inch thicker in the high rutted areas than in the low rut area. This may indicate that the 19 mm mixture was already beginning to rut before the 9.5 mm surface mix was placed. The additional thickness may also account for the increase in stiffness of the high rut section when measured with the FWD. The overall pavement thickness was 9.3 inches for the high rutting area and 8.5 inches for the low rutting area.

TABLE 8. Average Deflection Values

Pavement Section	Average Deflection at Sensor Offset Locations, mils						
	0 in.	8 in.	12 in.	18 in.	24 in.	36 in.	60 in.
High Rutting	4.71	3.26	2.68	2.12	1.74	1.24	0.78
Low Rutting	5.87	4.13	3.39	2.65	2.10	1.41	0.83

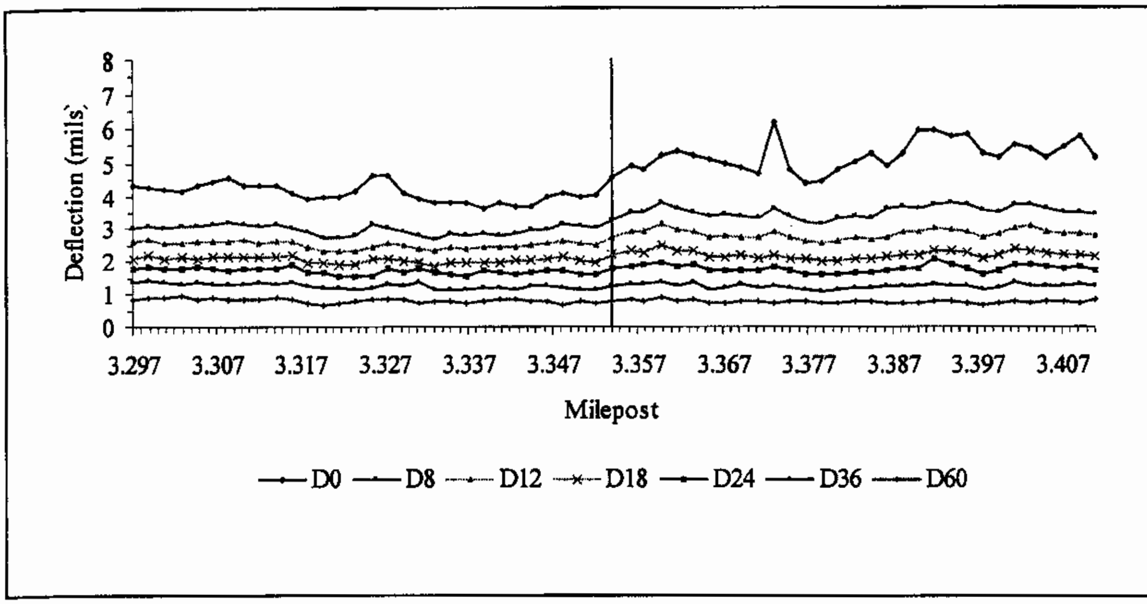
A comparison of surface layer and embankment stiffness is shown in Table 9. This data shows that both the embankment and pavement surface layer have slightly higher stiffness values in the high rutting section than in the low rutting section. However, the standard deviation of the stiffness for the 9.5 mm pavement surface layer is more than twice as much for the high rutting area as compared to the low rutting area. Since the testing was completed in a short period of time, no temperature corrections were needed. This high variability may indicate inconsistency in materials and/or construction procedures at the time of mixture placement.

TABLE 9. Summary of Stiffness Values

	High Rutting Section	Low Rutting Section
Average Surface Layer Stiffness, psi	584,000	528,000
Surface Layer Stiffness Standard Deviation, psi	166,000	73,000
Average Embankment Stiffness, psi	40,600	32,500
Embankment Stiffness Standard Deviation, psi	2,300	1,400

As shown in Figure 4, the deflection profile of underlying areas is consistent and indicates there were no underlying weak spots that may have contributed to or influenced the rutting on this project. The primary variations in deflection are limited to the upper pavement layers.

FIGURE 4. Deflection Profiles from FWD of the High Rutted Section



CONCLUSIONS

The distress investigated on this project was premature rutting on portions of the project. The project QC/QA/IA test data was reviewed to determine if there were potential mixture problems during construction that may have resulted in the premature rutting distress. Cores were taken from a highly rutted area as well as from adjacent areas of typically good performance. These cores are believed to be representative of the various conditions observed on this project. Tests for density, asphalt content, gradation, and recovered binder properties were performed on the cores. Visual observation and a layer profile was made of slabs removed from the full transverse width of the outside travel lane from both high rutting and low rutting areas. Non-destructive testing was also used to evaluate the possibility of underlying weaknesses in the roadway structure that may have adversely influenced the pavement performance.

Based on the forensic evaluation of this project, the following conclusions are made:

1. Air void levels in laboratory compacted samples of plant produced mix during construction averaged 3.0 percent for the 9.5 mm surface mix and ranged from 1.8 to 4.4

percent. The air voids for the 19 mm binder course averaged 3.3 percent with a range from 1.6 to 5.2 percent. The lowest air void values were frequently associated with samples that were reasonably consistent in gradation and asphalt content to the mix design target values. These results indicate the mix design may have required an excessive amount of asphalt cement and that field adjustments should have been requested or the mix should have been redesigned.

2. A review of project QC/QA/IA data shows that of the samples for 9.5 mm mix, 32 of the 39 sets of samples (82%) exceeded 98.0 percent of Gmm at Nmax. VFA values were also higher than the maximum allowed for 34 of the 39 samples. The large proportion of samples which consistently exceeded the maximum of 98 percent of Gmm at Nmax and the maximum value of 76 percent VFA at Ndesign should have been an early indication of potential mix problems. The mixture should have been adjusted in the field or redesigned.
3. Project QC/QA/IA data also shows that for the 19 mm binder course 34 of the 49 sets of samples (69%) exceeded 98.0 percent of Gmm at Nmax and exceeded the maximum of 75 percent VFA at Ndesign. For the 19 mm mixture using mix design SP 99-0221-B (produced and placed from February 5 through February 19, 1999) 19 percent of the project samples deviated 0.4 percent or higher in asphalt content than the mix design target value. The excessive asphalt content in a large number of samples of this mixture may be partially responsible for the premature pavement deformation.
4. Permeability test results of roadway forensic cores from this project show the mixes to be basically impermeable with values which only ranged from 0 to 6 x 10^{-5} cm/sec.
5. Test results from cores tested with the Asphalt Pavement Analyzer indicate that the 19 mm and 12.5 mm mixtures were not highly susceptible to rutting. The maximum rut depth of 3.0 mm is well within the maximum of 5 mm rut depth that is typically allowed for interstate projects. Since the pavement layers had been in place for four years before cores were taken, the mixtures likely stiffened from aging and exposure to the

environment. The additional stiffness may have affected APA results.

6. The percent air voids determined from forensic roadway cores were very consistent for the 19 mm mix and averaged 4.3 percent with a range from 4.0 to 4.7 percent). The 9.5 mm surface mix had air void levels that averaged 4.6 percent and ranged from 3.8 percent to 5.3 percent. These air void levels are within a range of what one might normally consider to be typical for a pavement that has been under traffic for four years.
7. An extraction analysis of forensic roadway cores revealed the asphalt content for the 19 mm mixes exceeded the mix design requirements by as much as 0.54 percent. Inconsistent control of the asphalt content may explain why the deformation was greater in some areas of the project than others.
8. Asphalt cement was recovered from roadway cores to determine the paving grade. PG 67-22 asphalt cement was specified for the project. All recovered samples met requirements for performance grade 70-22. The increase in stiffness as related to the increase in high temperature binder grade is typical of what would reasonably be expected for a mixture that has been subjected to environmental conditions for a few years.
9. A transverse profile of each layer within the pavement structure was plotted to determine the extent of rutting that might be attributed to a particular layer. The layer profiles indicate that the severe rutting is most likely attributed to the 19 mm and 9.5 mm layers placed during recent construction.
10. Non-destructive testing performed with a GPR and with the FWD indicates there are no significant failures of the underlying structure nor anomalies that might impact pavement performance.

RECOMMENDATIONS

It is recommended that FDOT carefully monitor this project and periodically mill the surface course as needed to remove any significant rutting. When the project is later scheduled for maintenance resurfacing, the existing pavement should be milled to a depth that will remove both the 9.5 mm and 19 mm mixtures recently placed before resurfacing.

ACKNOWLEDGMENTS

The author would like to thank Greg Sholar, Bituminous Research Engineer and Charles Holzschuher, Non-destructive Testing Engineer with the Florida Department of Transportation and Greg Schiess, FHWA- Florida for their help and assistance in providing project test results.

REFERENCES

1. Kandhal, Prithvi S., and Allen Cooley Jr., *Accelerated Laboratory Rutting Tests: Asphalt Pavement Analyzer*, Preliminary Draft for NCHRP 9-17, NCHRP/TRB/NRC, November 2002.
2. AASHTO Provisional Standards, Interim Edition, AASHTO, Washington, DC, 2002.
3. Al-Qadi, Imad L., Samer Lahouar, and Amara Loulizi, *Successful Application of GPR for Quality Assurance/Quality Control of New Pavements,* Transportation Research Record 1861, TRB/NRC, Washington, D.C., January, 2003, pg. 86.

APPENDIX

TABLE 10-A. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 99-0260A			Mix Type :	9.5 mm			Page 1
	Date :	03/18/99	03/18/99	03/18/99	03/18/99	03/18/99	04/05/99	04/05/99
	Tested by :	QC	QC	QC	QA	IA	QC	QC
	Sample ID :	TS1-1	TS1-2	TS1-3	9,1	9,1	1	2
	Load # :	4	15	20	11	11		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
9.5mm (3/8")	100.0	99.2	98.7	99.1	99.6	99.3	99.2	99.5
4.75mm (#4)	60.0	59.2	60.2	59.7	61.4	64.0	56.7	59.5
2.36mm (#8)	32.0	30.2	30.1	30.2	30.0	31.7	29.7	30.4
1.18mm (#16)	24.0	22.1	22.0	21.7	21.8	22.7	22.6	21.7
600um (#30)	17.0	16.9	16.7	16.4	16.5	17.1	16.4	16.9
300um (#50)	13.0	11.9	11.9	11.4	11.8	12.1	11.4	11.4
150um (#100)	7.0	6.7	6.8	6.4	6.8	7.0	6.3	6.3
75um (#200)	4.1	3.8	3.6	3.5	3.5	3.7	3.6	3.5
AC	6.00	5.73	5.51	5.80	5.49	5.69	5.62	5.90
Rice MSG (Gmm):		2.474	2.472	2.454	2.465	2.473	2.458	2.442
Avg. Bulk (Gmb):		2.432	2.424	2.418		2.423	2.404	2.397
Hgt.@N int.		130.9	131.6	131.1		132.1	132.6	132.6
Hgt.@N des.		116.2	116.7	116.2		116.7	117.5	118.0
Hgt.@N max.		114.1	114.5	114.1		114.6	115.4	116.1
%Gmm @ Ni	≤89	85.7	85.3	85.8		85.0	85.1	85.9
% Gmm @ Nd	96.0	96.5	96.2	96.8		96.2	96.1	96.6
% Gmm @ Nm	≤98	98.3	98.1	98.5		98.0	97.8	98.2
% Air Voids @ Nd	4.0	3.5	3.8	3.3		3.8	3.9	3.4
% VMA @ Nd	≥ 15	15.0	15.2	15.6		15.3	15.9	16.2
% VFA @ Nd	73-76	76.9	75.0	79.1		75.3	75.2	78.9

TABLE 10-B. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 99-0260A			Mix Type :	9.5 mm			Page 2
	Date :	04/05/99	04/05/99	04/05/99	04/12/99	04/12/99	04/12/99	04/12/99
	Tested by :	QC	QA	IA	QC	QA	QC	QC
	Sample ID :	3	9,2	9,2	TS1	9,3	TS2	TS3
	Load # :		17	21		11		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	100.0	100.0	99.8	100.0	99.8	99.8
9.5mm (3/8")	100.0	99.5	99.5	99.4	99.3	99.4	98.8	99.0
4.75mm (#4)	60.0	58.5	65.4	68.3	57.1	60.0	55.9	57.8
2.36mm (#8)	32.0	31.1	31.5	33.0	30.1	30.6	30.4	30.9
1.18mm (#16)	24.0	22.4	22.6	23.4	22.6	22.4	22.0	22.5
600um (#30)	17.0	17.0	17.2	17.7	17.5	17.2	16.8	17.4
300um (#50)	13.0	11.7	12.3	12.5	12.0	12.3	11.7	12.1
150um (#100)	7.0	6.4	7.1	7.1	6.3	6.9	6.2	6.8
75um (#200)	4.1	3.4	3.8	3.7	3.5	3.6	3.3	3.9
AC	6.00	6.25	5.98	6.45	6.41	6.01	5.89	5.99
Rice MSG (Gmm):		2.403	2.460	2.437	2.440	2.456	2.447	2.444
Avg. Bulk (Gmb):		2.382		2.413	2.410		2.408	2.411
Hgt.@N int.		132.2		131.8	130.5		132.3	131.7
Hgt.@N des.		116.8		116.5	115.9		117.4	117.0
Hgt.@N max.		114.7		114.6	114.3		115.5	115.2
%Gmm @ Ni	≤89	86.0		86.1	86.5		85.9	86.3
% Gmm @ Nd	96.0	97.3		97.4	97.4		96.8	97.1
% Gmm @ Nm	≤98	99.1		99.0	98.8		98.4	98.7
% Air Voids @ Nd	4.0	2.7		2.6	2.6		3.2	2.9
% VMA @ Nd	≥ 15	17.2		16.2	16.0		15.8	15.8
% VFA @ Nd	73-76	84.6		83.9	83.8		79.9	81.8

TABLE 10-C. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 99-0260A			Mix Type :	9.5 mm			Page 3
	Date :	04/12/99	04/13/99	04/13/99	04/14/99	04/14/99	04/14/99	04/15/99
	Tested by :	IA	QC	QC	IA	QA	QA	QC
	Sample ID :	9,3	AM	PM	9,4	9,4	10,1	AM
	Load # :	11			52	41	80	
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	99.6	100.0	100.0	100.0	100.0	99.9	100.0
9.5mm (3/8")	100.0	98.6	99.6	99.6	99.9	99.3	99.3	99.2
4.75mm (#4)	60.0	62.6	58.3	67.8	66.9	66.8	63.1	63.2
2.36mm (#8)	32.0	32.4	30.5	34.4	33.9	34.0	31.8	31.8
1.18mm (#16)	24.0	23.1	22.2	25.0	24.7	24.8	27.8	23.0
600um (#30)	17.0	17.6	17.0	19.1	18.9	19.1	17.4	17.6
300um (#50)	13.0	12.6	11.8	13.6	13.5	13.6	12.3	12.6
150um (#100)	7.0	7.3	6.4	7.7	7.8	7.7	7.0	7.3
75um (#200)	4.1	4.0	3.6	4.0	4.3	4.1	3.8	3.8
AC	6.00	5.86	6.14	6.27	5.96	6.22	6.37	5.90
Rice MSG (Gmm):		2.454	2.446	2.437	2.441			2.457
Avg. Bulk (Gmb):		2.417	2.408	2.414	2.432			2.421
Hgt.@N int.		131.5	131.8	130.8	129.4			131.5
Hgt.@N des.		116.6	116.4	116.7	114.7			115.8
Hgt.@N max.		114.7	114.4	114.9	113.1			113.9
%Gmm @ Ni	≤89	85.9	85.5	87.0	87.1			85.4
% Gmm @ Nd	96.0	96.9	96.8	97.5	98.2			96.9
% Gmm @ Nm	≤98	98.5	98.5	99.1	99.6			98.5
% Air Voids @ Nd	4.0	3.1	3.3	2.5	1.8			3.1
% VMA @ Nd	≥ 15	15.5	16.2	15.9	14.9			15.4
% VFA @ Nd	73-76	79.9	79.9	84.5	88.2			80.0

TABLE 10-D. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 99-0260A			Mix Type :	9.5 mm			Page 4
	Date :	04/15/99	04/15/99	04/15/99	04/15/99	04/16/99	04/16/99	04/16/99
	Tested by :	QC	QA	IA	IA	QC	QC	IA
	Sample ID :	PM	10,2	10,2	10,2	AM	PM	10,3
	Load # :		29	29	47			35
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	99.5	99.7	100.0	99.7	99.7	99.6	100.0
9.5mm (3/8")	100.0	98.5	98.9	99.7	99.4	99.2	99.0	99.9
4.75mm (#4)	60.0	62.4	63.3	65.0	64.9	59.5	59.9	65.2
2.36mm (#8)	32.0	34.1	31.8	32.2	32.6	31.5	29.9	31.3
1.18mm (#16)	24.0	25.6	22.8	23.5	23.5	23.1	21.6	22.5
600um (#30)	17.0	20.2	17.3	17.9	18.1	18.0	16.5	17.0
300um (#50)	13.0	13.8	12.2	12.8	13.1	12.8	11.6	12.2
150um (#100)	7.0	6.9	7.0	7.5	7.5	7.1	6.6	7.1
75um (#200)	4.1	3.6	3.8	4.2	4.1	4.0	3.9	3.8
AC	6.00	6.05	6.07	6.08	5.94	5.75	5.94	5.87
Rice MSG (Gmm):		2.427	2.448	2.445	2.440	2.467	2.463	2.449
Avg. Bulk (Gmb):		2.404		2.420	2.433	2.425	2.401	2.419
Hgt.@N int.		129.1		131.5	131.1	131.1	132.9	131.4
Hgt.@N des.		115.6		115.8	115.5	117.1	117.6	116.4
Hgt.@N max.		114.2		113.9	113.6	115.2	115.6	114.1
%Gmm @ Ni	≤89	87.6		85.7	86.4	86.4	84.8	85.8
% Gmm @ Nd	96.0	97.9		97.4	98.1	96.7	95.8	96.8
% Gmm @ Nm	≤98	99.1		99.0	99.7	98.3	97.5	98.8
% Air Voids @ Nd	4.0	2.2		2.7	1.9	3.3	4.2	3.2
% VMA @ Nd	≥ 15	15.8		15.6	15.0	15.1	16.2	15.7
% VFA @ Nd	73-76	86.4		83.0	87.2	78.2	74.2	79.8

TABLE 10-E. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 99-0260A			Mix Type :	9.5 mm			Page 5
	Date :	04/16/99	04/19/99	04/19/99	04/19/99	04/19/99	04/19/99	04/19/99
	Tested by :	QA	QC	QC	QC	IA	QA	QA
	Sample ID :	10,3	AM	AM	PM	11,1	11,1	11,2
	Load # :	16				26	26	53
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	100.0	100.0	100.0	100.0	99.5	99.8
9.5mm (3/8")	100.0	99.4	99.4	99.0	99.4	99.8	99.2	99.4
4.75mm (#4)	60.0	62.4	65.2	63.0	61.4	66.8	65.3	62.4
2.36mm (#8)	32.0	31.0	32.6	31.4	31.7	35.6	33.2	31.8
1.18mm (#16)	24.0	22.5	23.3	22.9	22.9	25.5	24.3	23.0
600um (#30)	17.0	17.2	17.7	17.6	17.6	19.5	18.8	17.6
300um (#50)	13.0	12.2	12.5	12.3	12.2	13.7	13.2	12.4
150um (#100)	7.0	6.9	7.1	6.5	6.9	7.7	7.3	6.9
75um (#200)	4.1	3.4	3.7	3.0	3.9	4.1	4.0	3.5
AC	6.00	5.73	5.99	5.96	5.63	5.99	6.08	5.70
Rice MSG (Gmm):				2.450	2.452	2.447		
Avg. Bulk (Gmb):				2.411	2.418	2.429		
Hgt.@N int.				130.4	130.5	130.0		
Hgt.@N des.				116.1	116.4	115.2		
Hgt.@N max.				114.2	114.4	113.5		
%Gmm @ Ni	≤89			86.2	86.5	86.7		
% Gmm @ Nd	96.0			96.8	96.9	97.8		
% Gmm @ Nm	≤98			98.4	98.6	99.3		
% Air Voids @ Nd	4.0			3.2	3.1	2.2		
% VMA @ Nd	≥ 15			15.8	15.3	15.1		
% VFA @ Nd	73-76			79.8	79.9	85.4		

TABLE 10-F. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 97-0097B			Mix Type :	9.5 mm			Page 1
	Date :	06/03/99	06/03/99	06/03/99	06/03/99	06/03/99	06/04/99	06/04/99
	Tested by :	QC	QC	IA	QA	QA	QC	QC
	Sample ID :	AM	PM	12,1	12,1	12,2	AM	PM
	Load # :			25	25	59		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	100.0	100.0	100.0	99.8	99.8	100.0
9.5mm (3/8")	96.0	94.4	96.1	96.8	96.5	95.2	94.4	96.0
4.75mm (#4)	63.0	66.1	66.2	68.4	66.8	66.9	64.9	68.3
2.36mm (#8)	39.0	41.7	41.7	42.7	41.7	42.4	41.1	42.2
1.18mm (#16)	25.0	27.7	27.7	28.5	27.7	28.0	28.1	27.8
600um (#30)	18.0	20.3	20.3	20.5	20.1	20.3	21.3	19.9
300um (#50)	13.0	14.4	14.4	14.4	14.0	14.1	16.3	13.8
150um (#100)	8.0	8.4	8.4	8.2	7.9	8.0	11.1	8.1
75um (#200)	5.0	4.5	4.7	4.4	4.1	4.2	7.7	4.7
AC	5.20	4.91	5.20	5.63	5.10	5.34	5.22	5.33
Rice MSG (Gmm):		2.465	2.461	2.459			2.447	2.444
Avg. Bulk (Gmb):		2.410	2.422	2.415			2.412	2.406
Hgt.@N int.		130.8	128.1	129.4			127.9	128.2
Hgt.@N des.		119.6	117.1	118.2			116.4	116.9
Hgt.@N max.		118.2	115.7	116.7			115.0	115.6
%Gmm @ Ni	≤89	88.4	88.9	88.6			88.6	88.8
% Gmm @ Nd	96.0	96.6	97.2	97.0			97.4	97.4
% Gmm @ Nm	≤98	97.8	98.4	98.2			98.6	98.5
% Air Voids @ Nd	4.0	3.4	2.8	3.0			2.6	2.7
% VMA @ Nd	> 15	15.8	15.6	16.3			16.0	16.2
% VFA @ Nd	73-76	78.6	82.3	81.4			83.6	83.7

TABLE 10-G. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 97-0097B			Mix Type :	9.5 mm			Page 2
	Date :	06/04/99	06/05/99	06/05/99	06/07/99	06/07/99	06/07/99	06/07/99
	Tested by :	QA	QC	QA	QC	QC	IA	QA
	Sample ID :	12,3	AM	12,4	AM	PM	13,1	13,1
	Load # :	37		11			35	35
Property	Design :	Property	Design :					
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	100.0	99.5	99.3	100.0	100.0	99.3
9.5mm (3/8")	96.0	94.4	96.0	96.0	94.6	96.6	96.5	95.5
4.75mm (#4)	63.0	59.9	63.0	69.3	60.3	67.2	63.8	62.8
2.36mm (#8)	39.0	35.8	39.0	43.2	34.6	41.3	38.9	37.8
1.18mm (#16)	25.0	23.8	25.0	28.3	22.1	27.3	26.2	25.3
600um (#30)	18.0	17.7	18.0	20.6	16.4	19.9	19.1	18.7
300um (#50)	13.0	12.7	13.0	14.5	11.8	14.0	13.6	13.2
150um (#100)	8.0	7.5	8.0	8.5	7.1	8.3	8.0	7.6
75um (#200)	5.0	4.2	5.0	4.9	3.9	4.8	4.6	4.1
AC	5.20	4.94	5.20	5.23	4.95	5.48	5.44	5.34
Rice MSG (Gmm):		2.451	2.443		2.452	2.441	2.448	
Avg. Bulk (Gmb):			2.382		2.374	2.407	2.425	
Hgt.@N int.			130.5		131.8	129.4	128.4	
Hgt.@N des.			119.1		119.9	117.7	116.6	
Hgt.@N max.			117.6		118.4	116.2	115.2	
%Gmm @ Ni	≤89		87.9		87.0	88.6	88.9	
% Gmm @ Nd	96.0		96.3		95.6	97.4	97.9	
% Gmm @ Nm	≤98		97.5		96.8	98.6	99.1	
% Air Voids @ Nd	4.0		3.7		4.4	2.7	2.1	
% VMA @ Nd	> 15		17.3		17.1	16.5	15.8	
% VFA @ Nd	73-76		78.5		74.4	83.9	86.5	

TABLE 10-H. QC/QA Test Results for 9.5 mm Mix

Mix Design No. :	SP 97-0097B			Mix Type :	9.5 mm				Page 3
	Date :	06/08/99	06/08/99	06/08/99	06/08/99	06/08/99	06/09/99	06/09/99	06/09/99
	Tested by :	IA	QC	QC	QA	QA	QA	QC	QC
	Sample ID :	13,2	AM	PM	13,2	13,3	13,4	AM	PM
	Load # :	37			19	56	14		
Property	Design :			Property	Design :				
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	100.0	100.0	99.9	100.0	100.0	100.0	99.9	100.0	100.0
9.5mm (3/8")	96.0	95.1	94.1	95.1	96.0	96.1	96.1	96.6	95.0
4.75mm (#4)	63.0	60.7	65.3	62.7	63.0	63.5	65.4	69.1	61.5
2.36mm (#8)	39.0	36.5	36.9	37.6	39.0	36.6	34.8	41.6	37.2
1.18mm (#16)	25.0	24.6	24.6	24.4	25.0	22.7	26.3	26.9	24.6
600um (#30)	18.0	17.9	18.3	19.3	18.0	15.6	19.2	19.5	18.3
300um (#50)	13.0	12.8	13.1	12.7	13.0	10.0	13.4	13.7	13.0
150um (#100)	8.0	7.6	7.9	7.7	8.0	4.3	7.5	8.0	7.7
75um (#200)	5.0	4.5	4.6	4.5	5.0	4.3	4.0	4.5	4.3
AC	5.20	5.03	5.07	5.16	5.20	5.42	5.67	5.51	5.23
Rice MSG (Gmm):		2.463	2.451	2.448	2.464			2.448	2.436
Avg. Bulk (Gmb):		2.406	2.416	2.406				2.409	2.407
Hgt.@N int.		129.8	127.1	129.4				128.2	128.9
Hgt.@N des.		118.3	117.5	117.8				116.9	117.4
Hgt.@N max.		116.7	116.0	116.2				115.4	115.9
%Gmm @ Ni	≤89	87.8	90.0	88.3				88.6	88.8
% Gmm @ Nd	96.0	96.4	97.3	97.0				97.1	97.6
% Gmm @ Nm	≤98	97.7	98.6	98.3				98.4	98.8
% Air Voids @ Nd	4.0	3.6	2.7	3.1				2.9	2.5
% VMA @ Nd	> 15	16.2	15.8	16.3				16.4	16.3
% VFA @ Nd	73-76	77.5	83.0	81.3				82.6	84.9

TABLE 11-A. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A			Mix Type :	19 mm			Page 1
	Date :	01/28/99	01/28/99	01/28/99	01/28/99	01/28/99	02/02/99	02/02/99
	Tested by :	QA	IA	QC	QC	QC	QC	QC
	Sample ID :	1,1	1,1	TS1-1	TS1-2	TS1-3	TS2-1	TS2-2
	Load # :	4	15	20	11	11		
Property	Design :							
25.0mm (1")	100	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	90	100.0	100.0	100.0	100.0	100.0	100.0	100.0
9.5mm (3/8")	84	99.2	98.7	99.1	99.6	99.3	99.2	99.5
4.75mm (#4)	43	59.2	60.2	59.7	61.4	64.0	56.7	59.5
2.36mm (#8)	23	30.2	30.1	30.2	30.0	31.7	29.7	30.4
1.18mm (#16)	18	22.1	22.0	21.7	21.8	22.7	22.6	21.7
600um (#30)	14	16.9	16.7	16.4	16.5	17.1	16.4	16.9
300um (#50)	11	11.9	11.9	11.4	11.8	12.1	11.4	11.4
150um (#100)	6	6.7	6.8	6.4	6.8	7.0	6.3	6.3
75um (#200)	4.00	3.8	3.6	3.5	3.5	3.7	3.6	3.5
AC	5.50	5.73	5.51	5.80	5.49	5.69	5.62	5.90
Rice MSG (Gmm):	2.496	2.487		2.477	2.476	2.506	2.479	2.469
Avg. Bulk (Gmb):				2.478	2.480	2.476	2.433	2.441
Hgt.@N int.				132.8	129.6	130.3	133.4	133.2
Hgt.@N des.				116.6	114.0	114.9	117.5	116.9
Hgt.@N max.				114.2	112.0	112.7	115.0	114.5
%Gmm @ Ni	≤89			86.0	86.6	85.5	84.6	85.0
% Gmm @ Nd	96.0			98.0	98.4	96.9	96.1	96.8
% Gmm @ Nm	≤98			100.0	100.2	98.8	98.1	98.9
% Air Voids @ Nd	4.0			2.0	1.6	3.1	3.9	3.2
% VMA @ Nd	≥ 13			12.4	12.2	12.2	14.1	13.8
% VFA @ Nd	65-75			83.7	86.9	74.6	72.1	77.1

TABLE 11-B. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A			Mix Type :	19 mm			Page 2
	Date :	02/02/99	02/02/99	02/02/99	02/04/99	02/04/99	02/04/99	02/04/99
	Tested by :	QC	IA	QA	IA	QA	QC	QC
	Sample ID :	TS-3	2,1	2,1	2,2	2,2	AM	PM
	Load # :		27		16		6	
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	90.0	100.0	100.0	100.0	99.8	100.0	99.8	99.8
9.5mm (3/8")	84.0	99.5	99.5	99.4	99.3	99.4	98.8	99.0
4.75mm (#4)	43.0	58.5	65.4	68.3	57.1	60.0	55.9	57.8
2.36mm (#8)	23.0	31.1	31.5	33.0	30.1	30.6	30.4	30.9
1.18mm (#16)	18.0	22.4	22.6	23.4	22.6	22.4	22.0	22.5
600um (#30)	14.0	17.0	17.2	17.7	17.5	17.2	16.8	17.4
300um (#50)	11.0	11.7	12.3	12.5	12.0	12.3	11.7	12.1
150um (#100)	6.0	6.4	7.1	7.1	6.3	6.9	6.2	6.8
75um (#200)	4.0	3.4	3.8	3.7	3.5	3.6	3.3	3.9
AC	5.50	6.25	5.98	6.45	6.41	6.01	5.89	5.99
Rice MSG (Gmm):	2.496	2.471	2.477	2.464	2.493	2.463	2.472	2.464
Avg. Bulk (Gmb):		2.460	2.452		2.453		2.460	2.456
Hgt.@N int.		130.5	132.6		132.6		131.3	132.0
Hgt.@N des.		114.6	116.5		116.1		115.6	115.9
Hgt.@N max.		112.6	114.1		113.8		113.5	113.7
%Gmm @ Ni	<89	85.9	85.2		84.5		86.0	85.9
% Gmm @ Nd	96.0	97.8	97.0		96.5		97.7	97.8
% Gmm @ Nm	<98	99.6	99.0		98.4		99.5	99.7
% Air Voids @ Nd	4.0	2.2	3.1		3.6		2.3	2.2
% VMA @ Nd	> 13	13.0	13.9		13.8		13.2	13.4
% VFA @ Nd	65-75	83.3	78.0		74.2		82.6	83.5

TABLE 11-C. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A			Mix Type :	19 mm			Page 3
	Date :	02/05/99	02/20/99	02/20/99	02/20/99	02/20/99	02/22/99	02/22/99
	Tested by :	QC	QA	QA	QC	QC	QC	QC
	Sample ID :	AM	7,1	7,2	AM	PM	AM	PM
	Load # :	11			17	56	15	52
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	90.0	99.6	100.0	100.0	100.0	100.0	99.9	100.0
9.5mm (3/8")	84.0	98.6	99.6	99.6	99.9	99.3	99.3	99.2
4.75mm (#4)	43.0	62.6	58.3	67.8	66.9	66.8	63.1	63.2
2.36mm (#8)	23.0	32.4	30.5	34.4	33.9	34.0	31.8	31.8
1.18mm (#16)	18.0	23.1	22.2	25.0	24.7	24.8	27.8	23.0
600um (#30)	14.0	17.6	17.0	19.1	18.9	19.1	17.4	17.6
300um (#50)	11.0	12.6	11.8	13.6	13.5	13.6	12.3	12.6
150um (#100)	6.0	7.3	6.4	7.7	7.8	7.7	7.0	7.3
75um (#200)	4.0	4.0	3.6	4.0	4.3	4.1	3.8	3.8
AC	5.50	5.86	6.14	6.27	5.96	6.22	6.37	5.90
Rice MSG (Gmm):	2.496	2.470	2.478		2.466	2.498	2.476	2.467
Avg. Bulk (Gmb):		2.452			2.454	2.447	2.449	2.456
Hgt.@N int.		132.3			132.5	133.5	133.9	132.6
Hgt.@N des.		116.5			116.5	116.5	117.2	116.3
Hgt.@N max.		114.2			114.3	114.2	114.8	114.2
%Gmm @ Ni	≤89	85.7			85.8	83.8	84.8	85.7
% Gmm @ Nd	96.0	97.3			97.6	96.0	96.9	97.8
% Gmm @ Nm	≤98	99.3			99.5	98.0	98.9	99.6
% Air Voids @ Nd	4.0	2.7			2.4	4.0	3.1	2.2
% VMA @ Nd	≥ 13	14.0			13.3	13.7	13.5	13.5
% VFA @ Nd	65-75	80.7			82.2	71.0	77.0	83.4

TABLE 11-D. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A		Mix Type :	19 mm			Page 4
	Date :	02/22/99	02/22/99	02/24/99	02/24/99	02/24/99	02/24/99	02/25/99
	Tested by :	QA	IA	QC	QC	QA	QA	QC
	Sample ID :	7,3	7,3	AM	PM	7,4	8,1	AM
	Load # :		51	10	54			18
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	90.0	99.5	99.7	100.0	99.7	99.7	99.6	100.0
9.5mm (3/8")	84.0	98.5	98.9	99.7	99.4	99.2	99.0	99.9
4.75mm (#4)	43.0	62.4	63.3	65.0	64.9	59.5	59.9	65.2
2.36mm (#8)	23.0	34.1	31.8	32.2	32.6	31.5	29.9	31.3
1.18mm (#16)	18.0	25.6	22.8	23.5	23.5	23.1	21.6	22.5
600um (#30)	14.0	20.2	17.3	17.9	18.1	18.0	16.5	17.0
300um (#50)	11.0	13.8	12.2	12.8	13.1	12.8	11.6	12.2
150um (#100)	6.0	6.9	7.0	7.5	7.5	7.1	6.6	7.1
75um (#200)	4.0	3.6	3.8	4.2	4.1	4.0	3.9	3.8
AC	5.50	6.05	6.07	6.08	5.94	5.75	5.94	5.87
Rice MSG (Gmm):	2.496		2.475	2.460	2.471			2.469
Avg. Bulk (Gmb):			2.454	2.446	2.455			2.453
Hgt.@N int.			133.6	133.4	132.6			132.7
Hgt.@N des.			116.7	116.9	116.6			116.8
Hgt.@N max.			114.4	114.6	114.3			114.6
%Gmm @ Ni	≤89		84.9	85.4	85.6			85.8
% Gmm @ Nd	96.0		97.2	97.5	97.4			97.5
% Gmm @ Nm	≤98		99.2	99.4	99.4			99.4
% Air Voids @ Nd	4.0		2.8	2.5	2.6			2.5
% VMA @ Nd	≥ 13		11.4	14.0	13.5			13.7
% VFA @ Nd	65-75		75.5	82.0	80.6			81.6

TABLE 11-E. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A			Mix Type :	19 mm			Page 5
	Date :	02/25/99	02/25/99	02/25/99	02/25/99	02/25/99	02/26/99	02/26/99
	Tested by :	QC	QA	QA	IA	QA	QC	QC
	Sample ID :	PM	8,2	8,3	8,3	8,4	AM	PM
	Load # :	60			30		15	65
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12.5mm (1/2")	90.0	100.0	100.0	100.0	100.0	100.0	99.5	99.8
9.5mm (3/8")	84.0	99.4	99.4	99.0	99.4	99.8	99.2	99.4
4.75mm (#4)	43.0	62.4	65.2	63.0	61.4	66.8	65.3	62.4
2.36mm (#8)	23.0	31.0	32.6	31.4	31.7	35.6	33.2	31.8
1.18mm (#16)	18.0	22.5	23.3	22.9	22.9	25.5	24.3	23.0
600um (#30)	14.0	17.2	17.7	17.6	17.6	19.5	18.8	17.6
300um (#50)	11.0	12.2	12.5	12.3	12.2	13.7	13.2	12.4
150um (#100)	6.0	6.9	7.1	6.5	6.9	7.7	7.3	6.9
75um (#200)	4.0	3.4	3.7	3.0	3.9	4.1	4.0	3.5
AC	5.50	5.73	5.99	5.96	5.63	5.99	6.08	5.70
Rice MSG (Gmm):	2.496	2.470			2.471		2.481	2.477
Avg. Bulk (Gmb):		2.447			2.455		2.449	2.447
Hgt.@N int.		132.5			133.4		132.9	132.3
Hgt.@N des.		116.5			116.9		117.1	116.7
Hgt.@N max.		114.3			114.6		114.8	114.5
%Gmm @ Ni	≤89	85.5			85.4		85.3	85.5
% Gmm @ Nd	96.0	97.2			97.4		96.8	96.9
% Gmm @ Nm	≤98	99.1			99.4		98.7	98.8
% Air Voids @ Nd	4.0	2.8			2.6		3.2	3.1
% VMA @ Nd	≥ 13	13.8			11.7		13.6	13.5
% VFA @ Nd	65-75	79.6			77.8		76.3	77.2

TABLE 11-F. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221A			Mix Type :	19 mm			Page 6
	Date :	02/26/99	04/12/99					
	Tested by :	QA	QC					
	Sample ID :	8,5	AM					
	Load # :							
Property	Design :							
25.0mm (1")	100.0	100.0	100.0					
19.0mm (3/4")	99.0	100.0	100.0					
12.5mm (1/2")	90.0	100.0	100.0					
9.5mm (3/8")	84.0	99.4	99.4					
4.75mm (#4)	43.0	62.4	65.2					
2.36mm (#8)	23.0	31.0	32.6					
1.18mm (#16)	18.0	22.5	23.3					
600um (#30)	14.0	17.2	17.7					
300um (#50)	11.0	12.2	12.5					
150um (#100)	6.0	6.9	7.1					
75um (#200)	4.0	3.4	3.7					
AC	5.50	5.73	5.99					
Rice MSG (Gmm):	2.496		2.463					
Avg. Bulk (Gmb):			2.414					
Hgt.@N int.			131.5					
Hgt.@N des.			116.6					
Hgt.@N max.			114.7					
%Gmm @ Ni	≤89		85.5					
% Gmm @ Nd	96.0		96.4					
% Gmm @ Nm	≤98		98.0					
% Air Voids @ Nd	4.0		3.6					
% VMA @ Nd	≥ 13		14.2					
% VFA @ Nd	65-75		74.7					

TABLE 11-G. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 1
	Date :	02/05/99	02/05/99	02/05/99	02/06/99	02/06/99	02/06/99	02/06/99
	Tested by :	IA	QA	QC	QC	QC	QA	QA
	Sample ID :	3,1	3,1	PM	AM	PM	3,2	3,3
	Load # :			42	11	58		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	97.0	96.3	97.6	95.9	95.9	100.0	100.0
12.5mm (1/2")	90.0	87.8	87.0	85.9	89.6	85.8	90.8	95.3
9.5mm (3/8")	84.0	80.2	81.5	79.3	82.8	80.1	85.4	88.8
4.75mm (#4)	43.0	41.7	42.3	42.5	45.9	41.4	46.0	47.1
2.36mm (#8)	23.0	30.2	21.2	20.9	23.3	21.5	23.2	23.4
1.18mm (#16)	18.0	20.2	16.8	16.6	18.8	17.3	18.2	18.4
600um (#30)	14.0	16.2	13.7	13.6	15.6	14.3	14.9	15.0
300um (#50)	11.0	13.4	10.4	10.4	12.0	10.9	11.5	11.5
150um (#100)	6.0	6.4	6.3	6.3	7.5	6.7	7.0	6.9
75um (#200)	4.0	3.7	3.4	3.6	4.4	3.9	3.8	3.8
AC	5.20	5.23	5.13	5.17	4.77	4.94	5.20	5.34
Rice MSG (Gmm):	2.496	2.504	2.481	2.479	2.461	2.476	2.461	
Avg. Bulk (Gmb):		2.436		2.450	2.461	2.464		
Hgt.@N int.		135.0		133.0	131.2	131.5		
Hgt.@N des.		118.0		116.8	115.5	115.7		
Hgt.@N max.		115.5		114.5	113.5	113.6		
%Gmm @ Ni	≤89	83.2		85.1	86.5	86.0		
% Gmm @ Nd	96.0	95.2		96.9	98.3	97.7		
% Gmm @ Nm	≤98	97.3		98.8	100.0	99.5		
% Air Voids @ Nd	4.0	4.8		3.1	1.7	2.3		
% VMA @ Nd	≥ 13	12.2		13.4	12.4	12.6		
% VFA @ Nd	65-75	60.8		76.7	86.1	81.8		

TABLE 11-H. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 2
	Date :	02/08/99	02/08/99	02/08/99	02/08/99	02/08/99	02/09/99	02/09/99
	Tested by :	QA	IA	IA	QC	QC	QA	QA
	Sample ID :	3,4	3,4	3,4	AM	PM	4,1	4,2
	Load # :			29	3	28		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	99.3	94.6	96.0	99.2	99.2	96.7	99.0
12.5mm (1/2")	90.0	97.8	88.0	87.1	88.4	89.9	84.5	94.1
9.5mm (3/8")	84.0	86.9	83.5	83.2	82.3	82.9	80.4	88.4
4.75mm (#4)	43.0	44.4	44.1	43.9	41.9	40.8	41.7	46.7
2.36mm (#8)	23.0	20.2	19.4	19.6	21.3	18.4	20.4	21.7
1.18mm (#16)	18.0	16.0	15.5	15.7	16.8	14.7	16.3	17.1
600um (#30)	14.0	13.2	12.8	13.0	13.4	12.2	13.4	13.9
300um (#50)	11.0	10.2	9.9	5.2	9.9	9.4	10.1	10.6
150um (#100)	6.0	6.6	6.3	6.6	6.0	6.2	6.3	6.8
75um (#200)	4.0	3.9	3.8	4.1	3.4	3.8	3.5	3.9
AC	5.20	5.22	5.10	4.37	4.63	4.65	5.01	5.50
Rice MSG (Gmm):	2.496	2.497		2.497	2.492	2.488	2.473	
Avg. Bulk (Gmb):				2.415	2.435	2.423		
Hgt.@N int.				136.5	133.2	134.8		
Hgt.@N des.				119.0	117.7	118.4		
Hgt.@N max.				116.6	115.5	116.0		
%Gmm @ Ni	≤89			82.6	84.7	83.8		
% Gmm @ Nd	96.0			94.8	95.9	95.4		
% Gmm @ Nm	≤98			96.7	97.7	97.4		
% Air Voids @ Nd	4.0			5.2	4.1	4.6		
% VMA @ Nd	≥ 13			12.1	13.4	13.9		
% VFA @ Nd	65-75			56.6	69.2	67.1		

TABLE 11-I. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 3
	Date :	02/09/99	02/09/99	02/10/99	02/10/99	02/10/99	02/10/99	02/10/99
	Tested by :	QC	QC	QA	QA	QC	QC	IA
	Sample ID :	AM	PM	4,3	4,4	AM	PM	4,4
	Load # :	9	48			13	66	26
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	95.9	97.4	96.4	98.3	96.3	98.5	98.3
12.5mm (1/2")	90.0	86.2	90.3	90.8	93.8	90.8	92.5	91.2
9.5mm (3/8")	84.0	80.8	85.6	86.1	90.1	83.1	87.5	87.6
4.75mm (#4)	43.0	42.2	43.8	46.6	47.7	44.2	48.7	48.0
2.36mm (#8)	23.0	20.4	20.8	21.2	22.5	21.2	24.1	21.7
1.18mm (#16)	18.0	16.2	16.4	16.5	17.7	16.5	19.1	17.1
600um (#30)	14.0	13.3	13.4	13.3	14.5	13.4	15.6	13.9
300um (#50)	11.0	10.0	10.2	10.0	11.0	10.2	11.7	10.5
150um (#100)	6.0	6.2	6.3	6.0	6.9	6.2	7.3	6.4
75um (#200)	4.0	3.5	3.6	3.2	4.0	3.5	4.4	3.6
AC	5.20	4.87	5.37	5.18	5.59	5.44	5.64	5.55
Rice MSG (Gmm):	2.496	2.491	2.484	2.466		2.464	2.459	2.488
Avg. Bulk (Gmb):		2.439	2.434			2.430	2.447	2.426
Hgt.@N int.		133.5	134.9			135.0	133.4	135.9
Hgt.@N des.		117.7	118.4			118.4	117.1	118.6
Hgt.@N max.		115.4	116.1			116.0	114.8	116.2
%Gmm @ Ni	≤89	84.6	84.3			84.7	85.6	83.4
% Gmm @ Nd	96.0	96.0	96.1			96.6	97.6	95.5
% Gmm @ Nm	≤98	97.9	98.0			98.6	99.5	97.5
% Air Voids @ Nd	4.0	4.0	3.9			3.4	2.4	4.5
% VMA @ Nd	≥ 13	13.5	14.1			14.4	13.9	12.8
% VFA @ Nd	65-75	70.4	72.3			76.5	82.5	64.9

TABLE 11-J. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 4
	Date :	02/10/99	02/11/99	02/11/99	02/11/99	02/12/99	02/12/99	02/12/99
	Tested by :	QA	IA	QA	QC	QC	QC	QA
	Sample ID :	5,1	5,2	5,2	AM	AM	PM	5,3
	Load # :		30		9	8		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	98.7	98.3	98.4	97.7	100.0	96.8	96.8
12.5mm (1/2")	90.0	90.6	92.8	88.0	86.6	91.8	88.2	84.6
9.5mm (3/8")	84.0	87.3	88.0	80.3	80.6	82.4	81.9	77.5
4.75mm (#4)	43.0	48.6	48.3	42.8	43.5	44.1	43.7	44.2
2.36mm (#8)	23.0	22.1	21.6	20.9	20.2	20.7	21.5	20.7
1.18mm (#16)	18.0	17.2	17.1	16.6	15.9	16.3	17.1	16.2
600um (#30)	14.0	14.0	14.0	13.7	13.0	13.3	14.0	13.3
300um (#50)	11.0	10.6	10.7	10.6	9.9	10.1	10.4	10.0
150um (#100)	6.0	6.3	6.5	6.6	6.2	6.2	6.4	6.1
75um (#200)	4.0	3.3	3.5	3.7	3.5	3.4	3.8	3.4
AC	5.20	5.55	5.72	5.26	5.13	5.31	5.33	5.10
Rice MSG (Gmm):	2.496	2.466	2.495	2.496	2.488	2.483	2.476	2.477
Avg. Bulk (Gmb):			2.427		2.433	2.417	2.447	
Hgt.@N int.			134.8		134.6	135.6	133.1	
Hgt.@N des.			118.6		118.5	119.4	117.2	
Hgt.@N max.			116.2		116.1	117.0	114.9	
%Gmm @ Ni	≤89		83.9		84.4	84.0	85.3	
% Gmm @ Nd	96.0		95.3		95.8	95.4	96.9	
% Gmm @ Nm	≤98		97.3		97.8	97.3	98.8	
% Air Voids @ Nd	4.0		4.7		4.2	4.6	3.1	
% VMA @ Nd	≥ 13		12.9		14.0	14.7	13.7	
% VFA @ Nd	65-75		63.6		70.1	68.7	77.2	

TABLE 11-K. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 5
	Date :	02/13/99	02/13/99	02/13/99	02/16/99	02/16/99	02/16/99	02/17/99
	Tested by :	QC	QC	QA	QC	QC	QA	QA
	Sample ID :	AM	PM	5,4	AM	PM	6,1	6,2
	Load # :	10	32		9	42		
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	96.1	98.6	100.0	99.3	97.9	98.3	97.4
12.5mm (1/2")	90.0	85.4	92.9	91.5	89.9	90.5	88.9	86.3
9.5mm (3/8")	84.0	78.2	87.2	84.6	81.9	84.5	84.0	81.2
4.75mm (#4)	43.0	40.4	44.7	45.3	43.3	44.8	44.3	43.8
2.36mm (#8)	23.0	19.0	21.5	21.3	19.9	19.4	18.2	21.1
1.18mm (#16)	18.0	15.0	17.0	16.6	15.5	15.1	14.1	16.4
600um (#30)	14.0	12.4	14.0	13.5	12.5	12.2	11.6	13.4
300um (#50)	11.0	9.3	10.8	10.2	9.4	8.5	8.8	10.1
150um (#100)	6.0	5.6	6.7	6.2	5.2	5.9	5.4	6.2
75um (#200)	4.0	3.1	3.8	3.5	2.4	3.4	3.2	3.4
AC	5.20	5.14	5.53	5.53	5.35	5.49	5.55	5.26
Rice MSG (Gmm):	2.496	2.473	2.474	2.470	2.485	2.474		
Avg. Bulk (Gmb):		2.419	2.438		2.424	2.437		
Hgt.@N int.		135.3	134.1		133.6	133.9		
Hgt.@N des.		119.0	117.8		118.4	117.9		
Hgt.@N max.		116.6	115.5		116.1	115.6		
%Gmm @ Ni	≤89	84.3	84.9		84.8	85.0		
% Gmm @ Nd	96.0	95.8	96.6		95.7	96.6		
% Gmm @ Nm	≤98	97.8	98.5		97.5	98.5		
% Air Voids @ Nd	4.0	4.2	3.4		4.3	3.4		
% VMA @ Nd	≥ 13	14.5	14.1		14.5	14.1		
% VFA @ Nd	65-75	71.3	76.1		69.9	75.8		

TABLE 11-L. QC/QA Test Results for 19 mm Mix

Mix Design No. :	SP 99-0221B			Mix Type :	19 mm			Page 6
	Date :	02/17/99	02/17/99	02/17/99	02/17/99	02/19/99	02/19/99	02/19/99
	Tested by :	QA	QC	QC	IA	QC	QC	QA
	Sample ID :	6,3	AM	PM	6,3	AM	PM	6,4
	Load # :		8	44	21	10	31	
Property	Design :							
25.0mm (1")	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
19.0mm (3/4")	99.0	98.6	96.8	97.5	98.5	97.9	99.5	98.6
12.5mm (1/2")	90.0	89.7	89.6	90.4	89.2	89.8	89.9	93.3
9.5mm (3/8")	84.0	84.0	83.8	84.7	82.7	82.0	83.8	85.7
4.75mm (#4)	43.0	46.0	45.8	45.5	46.3	40.9	42.8	43.3
2.36mm (#8)	23.0	21.5	21.4	21.9	21.3	19.4	20.6	19.7
1.18mm (#16)	18.0	16.8	16.8	17.3	16.9	15.4	16.3	15.4
600um (#30)	14.0	13.8	13.7	14.1	13.8	12.6	13.4	12.5
300um (#50)	11.0	10.4	10.4	10.7	10.4	9.6	10.4	9.6
150um (#100)	6.0	6.4	6.3	6.6	6.2	6.0	6.6	5.9
75um (#200)	4.0	3.5	3.5	3.8	3.4	3.5	4.1	3.2
AC	5.20	5.41	5.92	5.54	5.71	5.01	5.37	5.56
Rice MSG (Gmm):	2.496		2.478	2.472	2.467	2.496	2.481	
Avg. Bulk (Gmb):			2.437	2.449	2.437	2.428	2.455	
Hgt.@N int.			133.5	132.6	134.8	135.1	133.2	
Hgt.@N des.			117.9	117.2	117.7	118.9	117.0	
Hgt.@N max.			115.6	114.9	115.3	116.5	114.7	
%Gmm @ Ni	≤89		85.2	85.9	84.5	83.9	85.2	
% Gmm @ Nd	96.0		96.4	97.1	96.8	95.3	97.0	
% Gmm @ Nm	≤98		98.4	99.1	98.8	97.3	99.0	
% Air Voids @ Nd	4.0		3.6	2.9	3.2	4.7	3.0	
% VMA @ Nd	≥ 13		14.5	13.8	12.5	14.1	13.4	
% VFA @ Nd	65-75		75.4	79.1	74.2	66.7	77.7	

Pavement Failure Investigation of I-10 Okaloosa County

Background

Certain areas of I-10 in Okaloosa County have experienced severe rutting. Rut depths as high as 0.7 inches have been measured by staff at the State Materials Office (SMO) with the laser profiler van. District 3 staff obtained 28 cores from five distinct sections of I-10. Two of the sections have experienced little rutting, not exceeding 0.2 inches. The other three sections have experienced rutting of at least 0.5 inches. The cores were sent to the SMO for testing. The pavement structure in the above mentioned section consisted of an OGFC, a 2 inch, 12.5 mm coarse graded layer (SP 01-1108A), and a 3 inch, 19.0 mm coarse graded mix (SP 01-1078A). Both structural layers were comprised of 90% Alabama limestone, 10% local sand, and AC-30 binder.

A complete battery of tests was performed on the cores. Each test was performed for each layer of each section. The tests included bulk specific gravity and in place air void determination, maximum specific gravity testing, asphalt content and gradation, recovered viscosity, and rut depth in the asphalt pavement analyzer (APA). A summary of the core locations, PCS rut depths, and test data is provided in Tables 1 and 2.

Discussion

Section 1 is located in lane R2 at milepost 19.861 and experienced 0.6 inches of rutting. Seven cores were taken from this section, three from the wheel path (WP) and four from between the wheel path (BWP). The 12.5 mm layer had higher in place air voids compared to the 19.0 mm layer, 5.0% vs. 2.4% BWP and 3.6% vs. 3.1% in the WP. A difference of 1.4 % in air voids was also seen in the WP and BWP cores for the 12.5 mm layer. The in-place air voids in the WP of the 19.0 mm layer are borderline low and could indicate a greater rutting potential for this layer. The gradations were slightly finer than the job mix formula (JMF) for each layer. The recovered asphalt content was 1.1% lower than the JMF in the top layer. Based on the in place air void content of this layer and primary distress of rutting, this value did not make sense. APA testing did not discern a difference between the two structural layers, nor indicate a potential for rutting in either layer. None of the other tests indicated a problem with the pavement in this section either.

Section 2 is located in lane R2 at milepost 22.591 and experienced 0.7 inches of rutting. Four cores were taken from the WP only for this section. The in place air voids were 2.4% for the 12.5 mm layer. The in place voids were 3.5% for the 19.0 mm layer. The 12.5 mm layer also rutted 71% more than the 19.0 mm layer in the APA. The recovered viscosity for the 12.5 mm layer was 5348 poises which was 3663 poises lower than the 19.0 mm layer. The gradation was finer in the 12.5 mm layer and significantly violated the restricted zone, which could indicate that there was too much sand present in the mix. The asphalt content was 1.0 percent low for the 12.5 mm layer. Based on this data, the majority of the rutting probably occurred in the 12.5 mm layer and could be attributed to the poor gradation and low in place air voids.

Section 3 was located in lane R2 at milepost 22.691, only 0.1 miles from section 2. This section only experienced 0.2 inches of rutting. Three cores were taken from the WP for this section. Both layers performed well in the APA. The in place air voids were also higher. The voids for the top layer were almost a little too high at 6.7%. The higher voids probably led to more oxidation in the top layer which correlates with the higher recovered viscosity of 23016 poises. The gradation was coarser than the previous two sections. It was coarser than the JMF on the top side, but finer on the lower sieves. The recovered asphalt content of 3.8% was also low compared to the JMF.

Section 4 was located in lane L2 at milepost 21.104, and all of the cores were taken from the WP. This section only had 0.1 inches of rutting. Both layers had good gradations, asphalt contents, and APA values. The recovered viscosity data was also good. The average in place air voids were 3.8% in the 12.5 mm layer and 6.5% in the 19.0 mm layer.

Section 5 was located in lane L2 at milepost 19.074. This section experienced 0.5 inches of rutting. Three cores were taken from the WP and four from BWP. The in place air voids were 5.1% for the 12.5 mm layer in the WP and 6.8% BWP. The in place air voids were 6.2% in the WP and 5.2% BWP for the 19.0 mm layer. The 12.5 mm had an average APA rut depth of 3.2 mm which was 0.9 mm higher than the 19.0 mm layer. The gradation and asphalt contents were near the JMF for both layers.

Conclusions

Rutting is typically attributed to low laboratory air void content or high in place asphalt content. Laboratory air void data was not available for this investigation. The asphalt contents from the cores in the rutted sections were low, not high. It is possible that extremely low asphalt contents might cause the mix to shove under load, but rutting would have been observed in Section 3 if this were the case. Low in place air void contents can sometimes be attributed to low laboratory air void contents and could have been the cause of the rutting in section 2 in the 12.5 mm layer. Section 2 also had a gradation that significantly violated the restricted zone, which could have been a possible cause of the rutting. The section 1 gradation also violated the restricted zone, but not as severely as section 2. It is possible that this finer gradation could have been part of the cause of the rutting seen in section 1. Some of the rutting in section 1 could also be attributed to the borderline low in place air voids in the 19.0 mm layer.

No results from section 5 were seen as a cause for the rutting that was observed in this section. Coarse graded Superpave mixtures generally contain at least 15% reclaimed asphalt pavement (RAP). It is possible that the lack of RAP in these mixtures might have kept the viscosity of the binder lower, which could have attributed to the rutting. However, the rutting should have been consistent throughout the job if this were the case. One final possibility for the cause of the rutting in this job is the predominant use of Alabama limestone in both mixtures. Some researchers feel that the texture of this aggregate is "slicker" than other aggregates typically used in Florida. In the end, the cause of the rutting may never be known for this job.

Table 1: I-10 Okaloosa County Testing Summary

	Core				PCS Rut	APA Rut Depth (mm)		12.5 mm layer		19.0 mm layer		12.5mm	19.0mm	Viscosity (Poises)		AC Content	
	No.	Milepost	Location	Lane	Depth (in.)	12.5mm	19.0mm	Gmb	in place AV	Gmb	in place AV	Gmm	Gmm	12.5mm	19.0mm	12.5mm	19.0mm
Section 1	1	19.861	BWP	R2	0.6	2.45				2.473	2.5						
	2	19.861	BWP	R2	0.6		2.65	2.420	4.9	2.475	2.4			8348		3.9	
	3	19.861	BWP	R2	0.6	1.85				2.477	2.3						
	4	19.861	BWP	R2	0.6		2.15	2.419	5.0	2.475	2.4						
	5	19.861	WP	R2	0.6	2.20				2.461	2.9		2.536				
	6	19.861	WP	R2	0.6		2.10	2.456	3.5	2.458	3.1						
	7	19.861	WP	R2	0.6			2.455	3.6	2.455	3.2	2.546			9684		4.4
Section 2	8	22.591	WP	R2	0.7	4.25				2.478	3.3		2.564				
	9	22.591	WP	R2	0.7		2.30	2.453	2.5	2.467	3.8	2.515					
	10	22.591	WP	R2	0.7	4.50				2.485	3.1				9011		4.4
	11	22.591	WP	R2	0.7		2.80	2.461	2.2	2.473	3.6			5348		4.0	
Section 3	12	22.691	WP	R2	0.2	2.60				2.429	5.0				9363		4.1
	13	22.691	WP	R2	0.2		1.50	2.388	7.0	2.434	4.8	2.566					
	14	22.691	WP	R2	0.2			2.403	6.4	2.428	5.0		2.557	23016		3.8	
Section 4	15	21.104	WP	L2	0.1	1.35				2.384	7.5		2.578				
	16	21.104	WP	L2	0.1	1.30				2.380	7.7		2.578				
	17	21.104	WP	L2	0.1	1.85				2.375	7.9						
	18	21.104	WP	L2	0.1			2.443	3.8	2.367	8.2			7062		4.7	
	19	21.104	WP	L2	0.1			2.452	3.4	2.456	4.7			7062		4.7	
	20	21.104	WP	L2	0.1		3.00	2.441	3.9	2.457	4.7						
	21	21.104	WP	L2	0.1			2.435	4.1	2.447	5.1	2.539			10331		4.5
Section 5	22	19.074	WP	L2	0.5	1.95				2.393	6.5						
	23	19.074	WP	L2	0.5		2.30	2.386	5.1	2.404	6.0			18743		4.6	
	24	19.074	WP	L2	0.5	3.05				2.405	6.0						
	25	19.074	BWP	L2	0.5		2.25	2.336	7.1	2.420	5.4			16831		5.6	
	26	19.074	BWP	L2	0.5	4.60				2.431	5.0		2.558				
	27	19.074	BWP	L2	0.5		2.35	2.358	6.2	2.425	5.2						
	28	19.074	BWP	L2	0.5			2.335	7.1	2.431	5.0	2.514			8480		4.7

Table 2: I-10 Okaloosa County Core Gradations

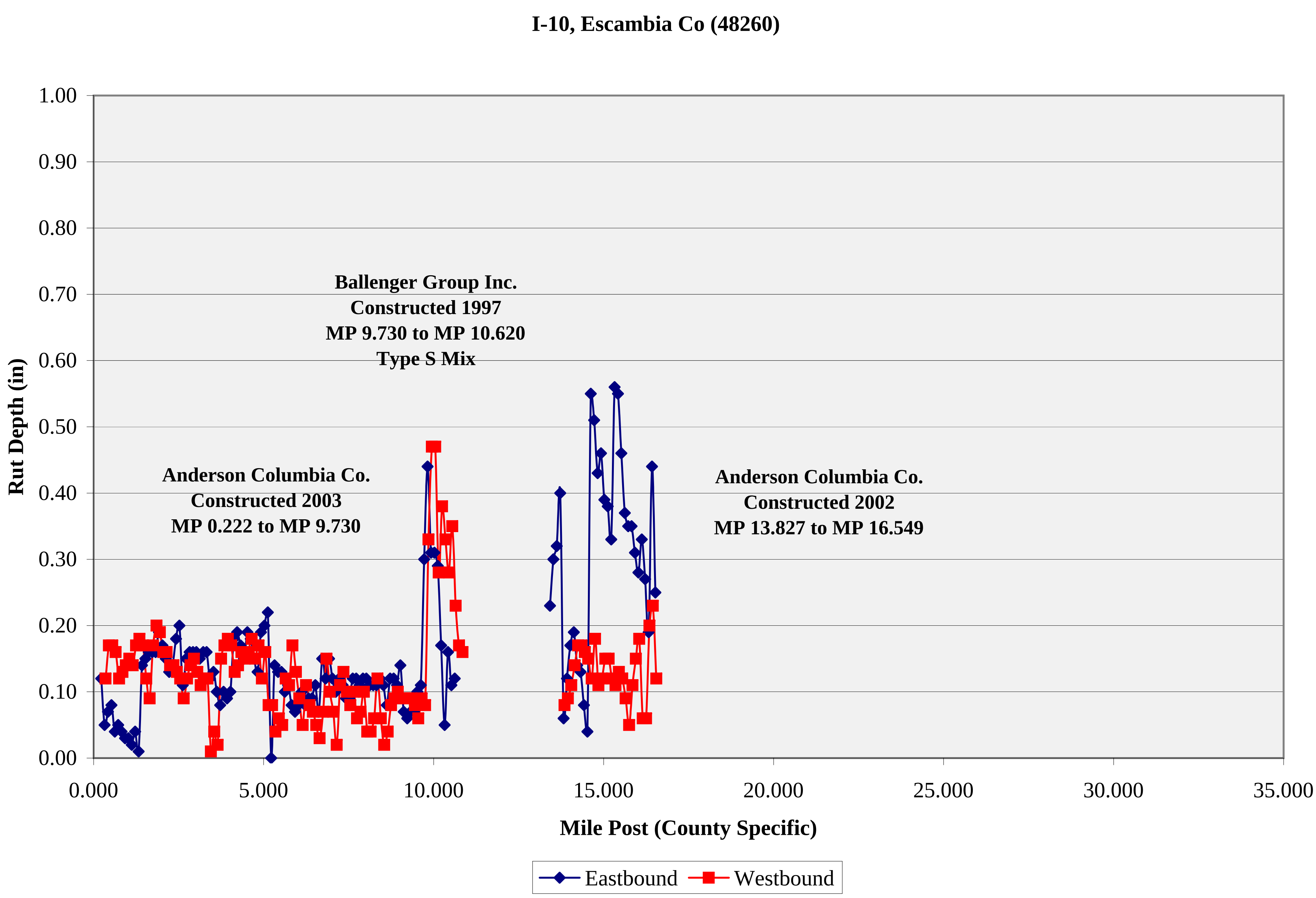
12.5mm Superpave - SP 01-1108A							
	PCS Rut	0.6	0.7	0.2	0.1	0.5	
Sieve size	JMF	Core 2	Core 11	Core 14	Core 18, 19	Core 23	Core 25
3/4"	100	100	100	100	100	100	100
1/2"	100	98	98	96	98	99	97
3/8"	89	91	89	87	89	88	89
#4	54	57	56	50	52	53	54
#8	35	36	37	29	33	34	36
#16	25	26	28	22	25	25	27
#30	18	20	22	17	20	19	20
#50	8	12	13	11	12	11	12
#100	5	6	6	5	5	5	6
#200	4.0	4.7	4.4	3.5	3.8	3.8	4.1
% AC	5.0	3.9	4.0	3.8	4.7	4.6	5.5

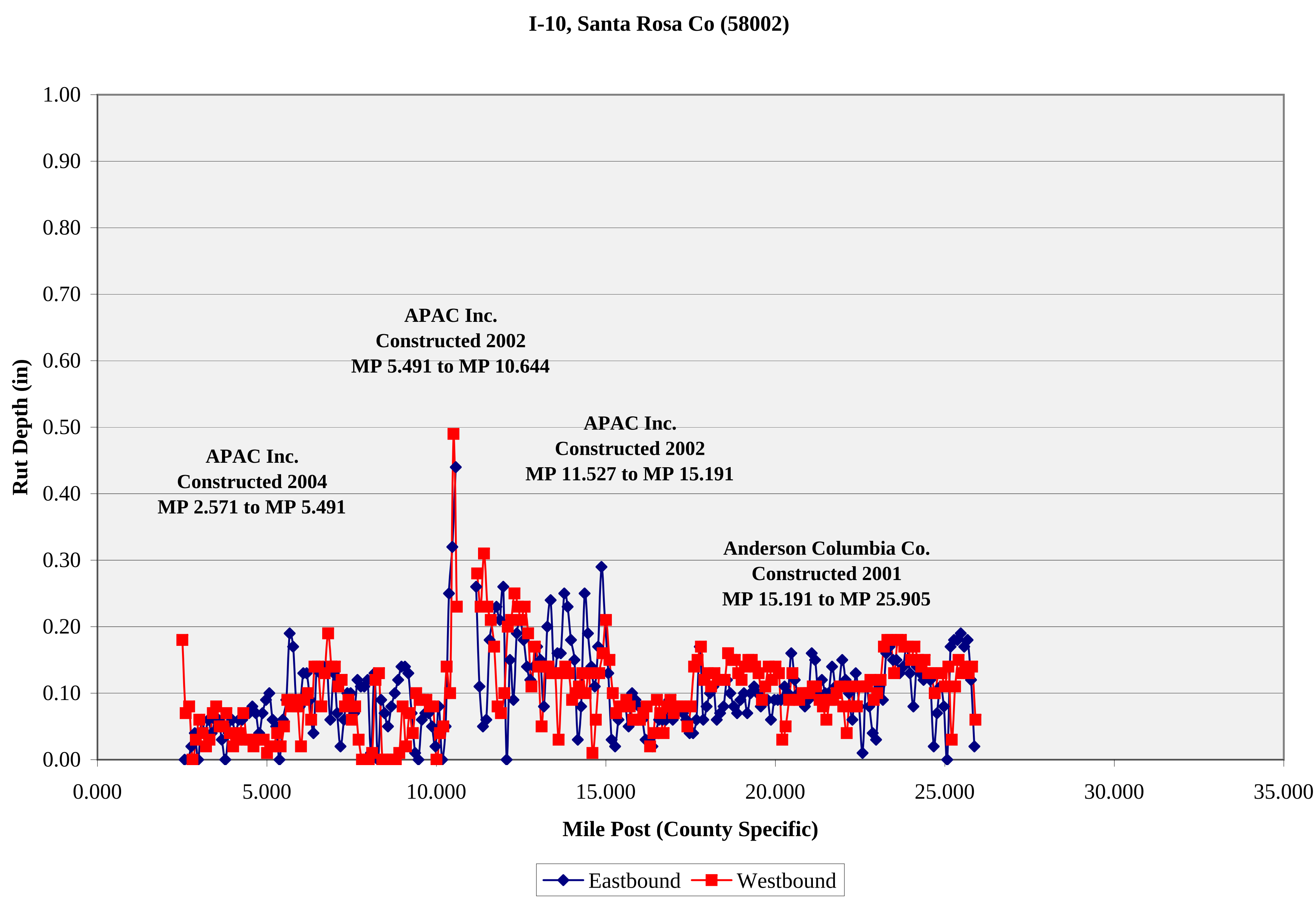
19.0mm Superpave - SP 01-1078A						
	PCS Rut	0.6	0.7	0.2	0.1	0.5
Sieve size	JMF	Core 7	Core 10	Core 12	Core 21	Core 28
3/4"	100	100	98	98	97	100
1/2"	90	89	82	86	83	90
3/8"	79	78	74	77	72	80
#4	45	42	45	45	41	45
#8	28	28	28	27	27	28
#16	20	21	22	21	21	21
#30	15	16	17	16	17	16
#50	8	10	10	10	10	10
#100	4	6	6	5	5	6
#200	3.5	4.1	4.1	3.8	3.6	4.2
% AC	4.5	4.4	4.4	4.1	4.5	4.7

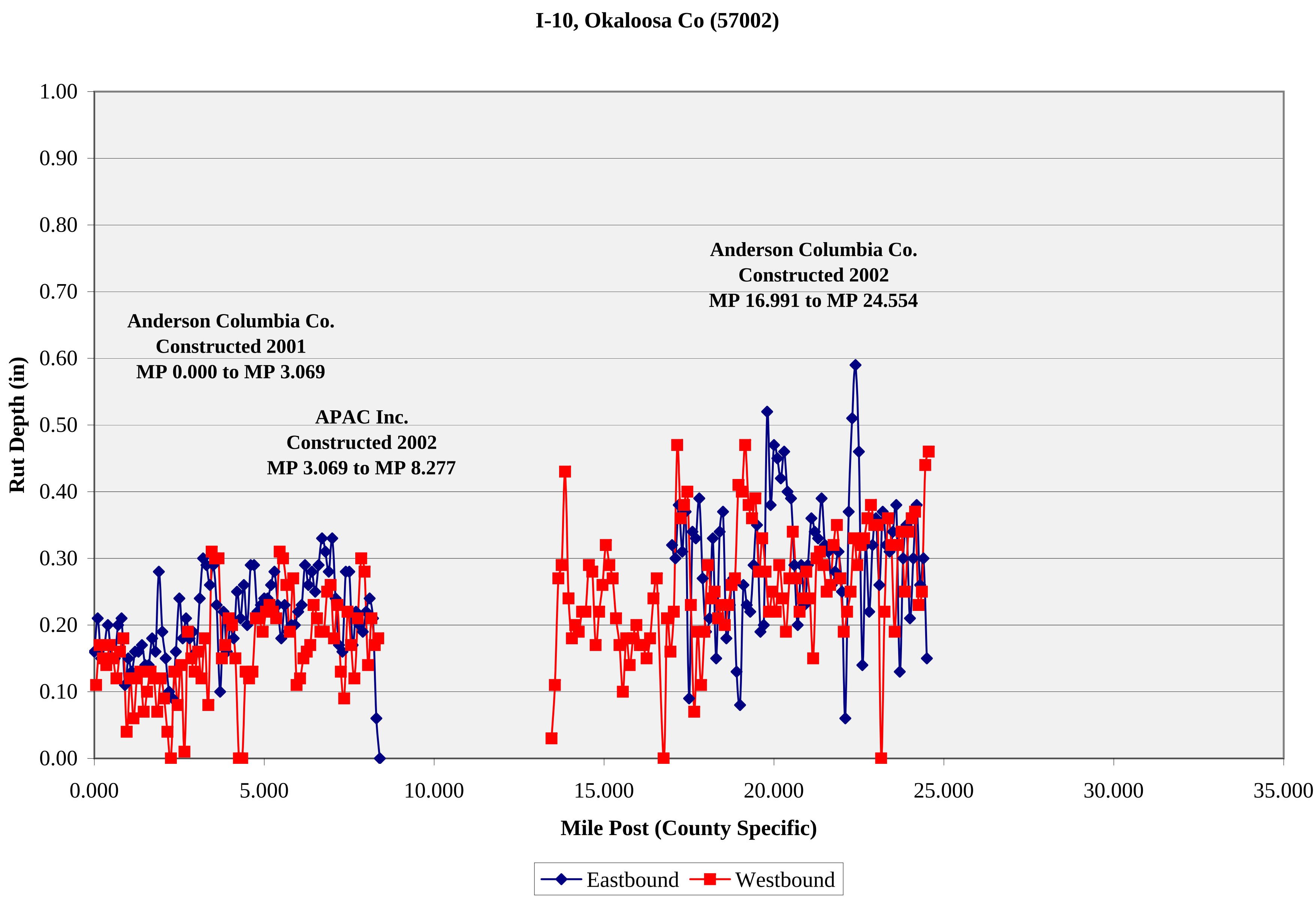
Appendix B

Rut Depth Graphs Plotted for Each County and Project

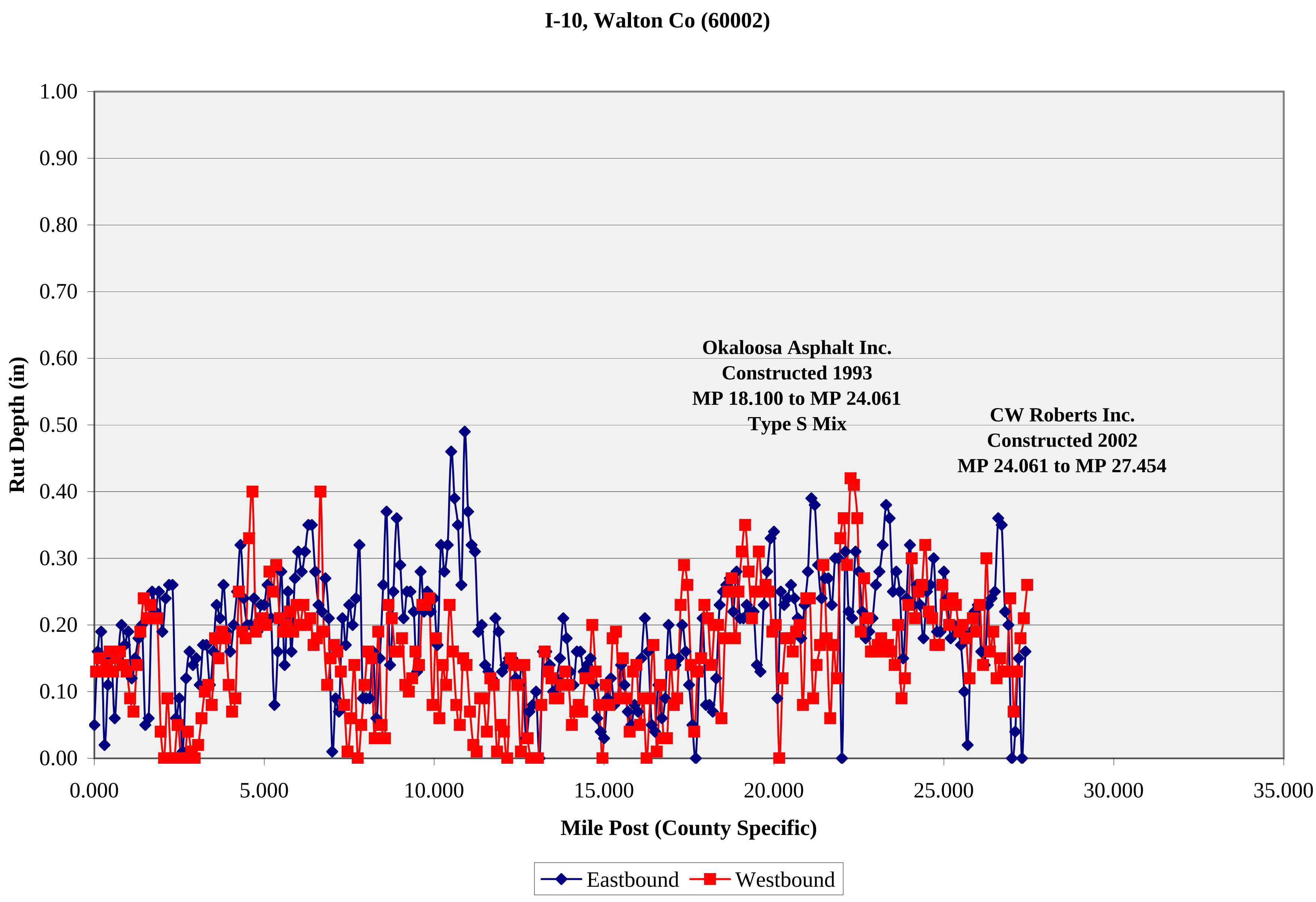
I-10 Graphs
I-75 Graphs
I-95 Graphs


I-10, Escambia Co (48260)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Ballenger Group Inc.
Constructed 1997
MP 9.730 to MP 10.620
Type S Mix
Anderson Columbia Co.
Constructed 2003
MP 0.222 to MP 9.730
Anderson Columbia Co.
Constructed 2002
MP 13.827 to MP 16.549
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

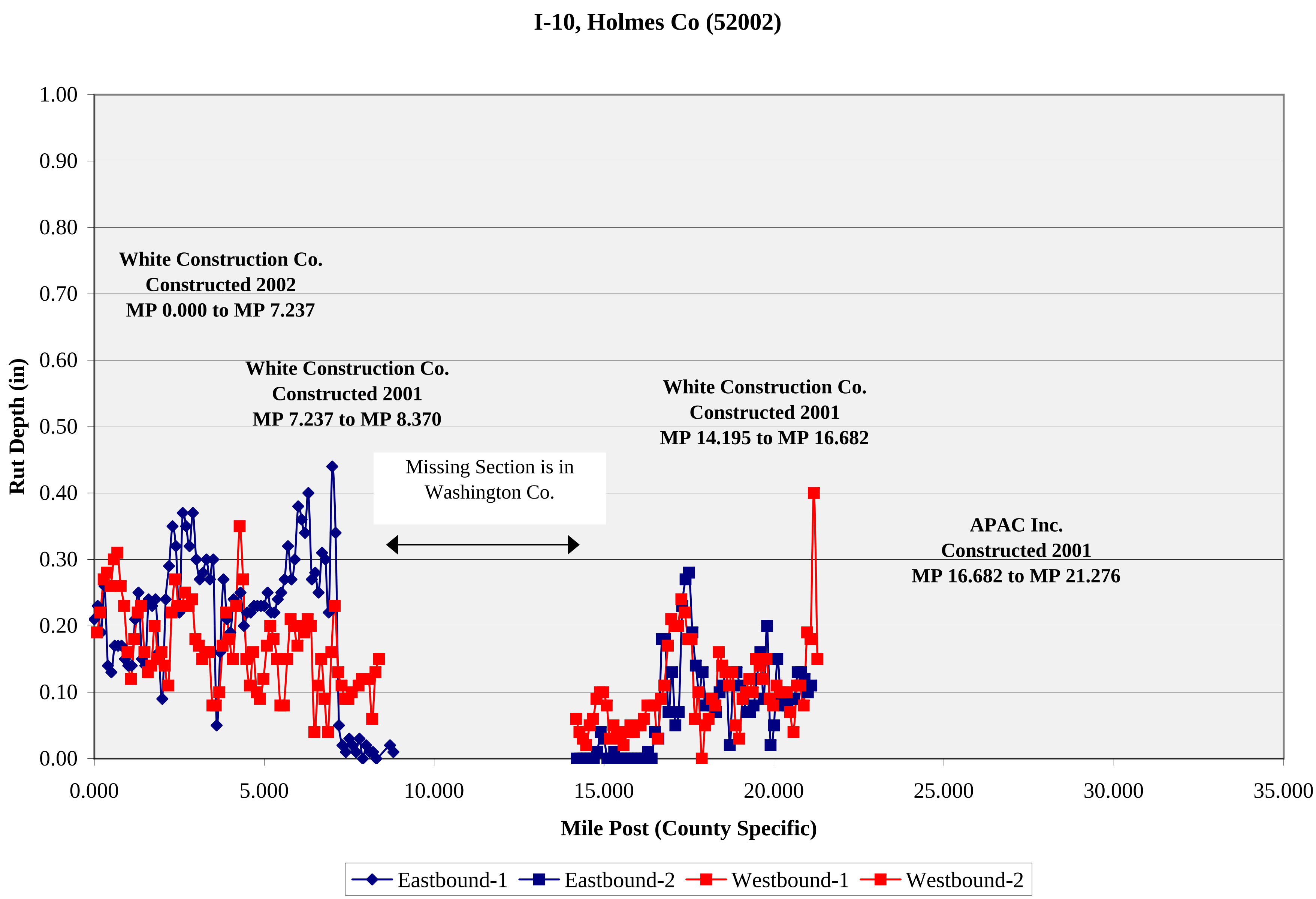

I-10, Santa Rosa Co (58002)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
APAC Inc.
Constructed 2004
MP 2.571 to MP 5.491
APAC Inc.
Constructed 2002
MP 5.491 to MP 10.644
APAC Inc.
Constructed 2002
MP 11.527 to MP 15.191
Anderson Columbia Co.
Constructed 2001
MP 15.191 to MP 25.905
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

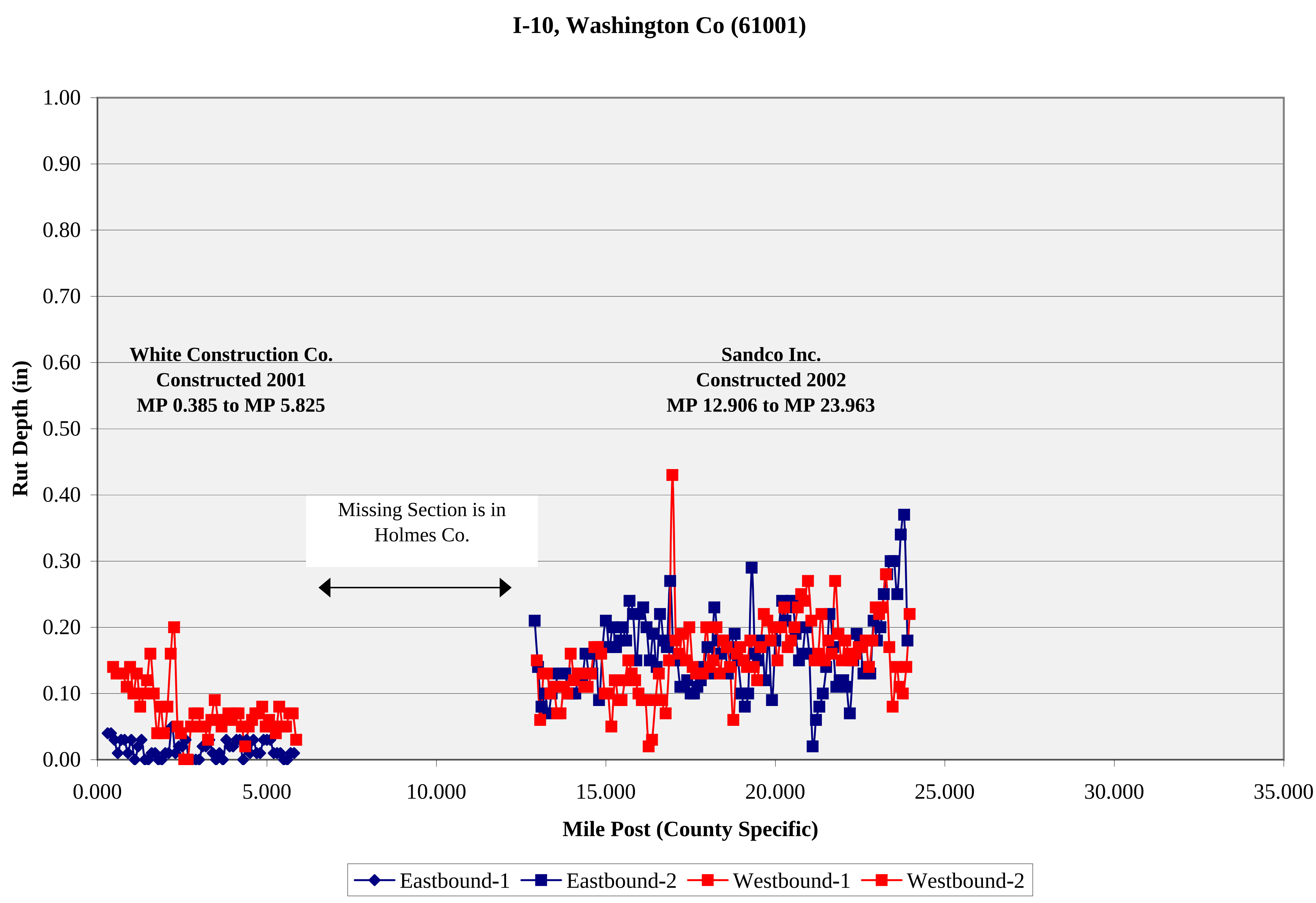


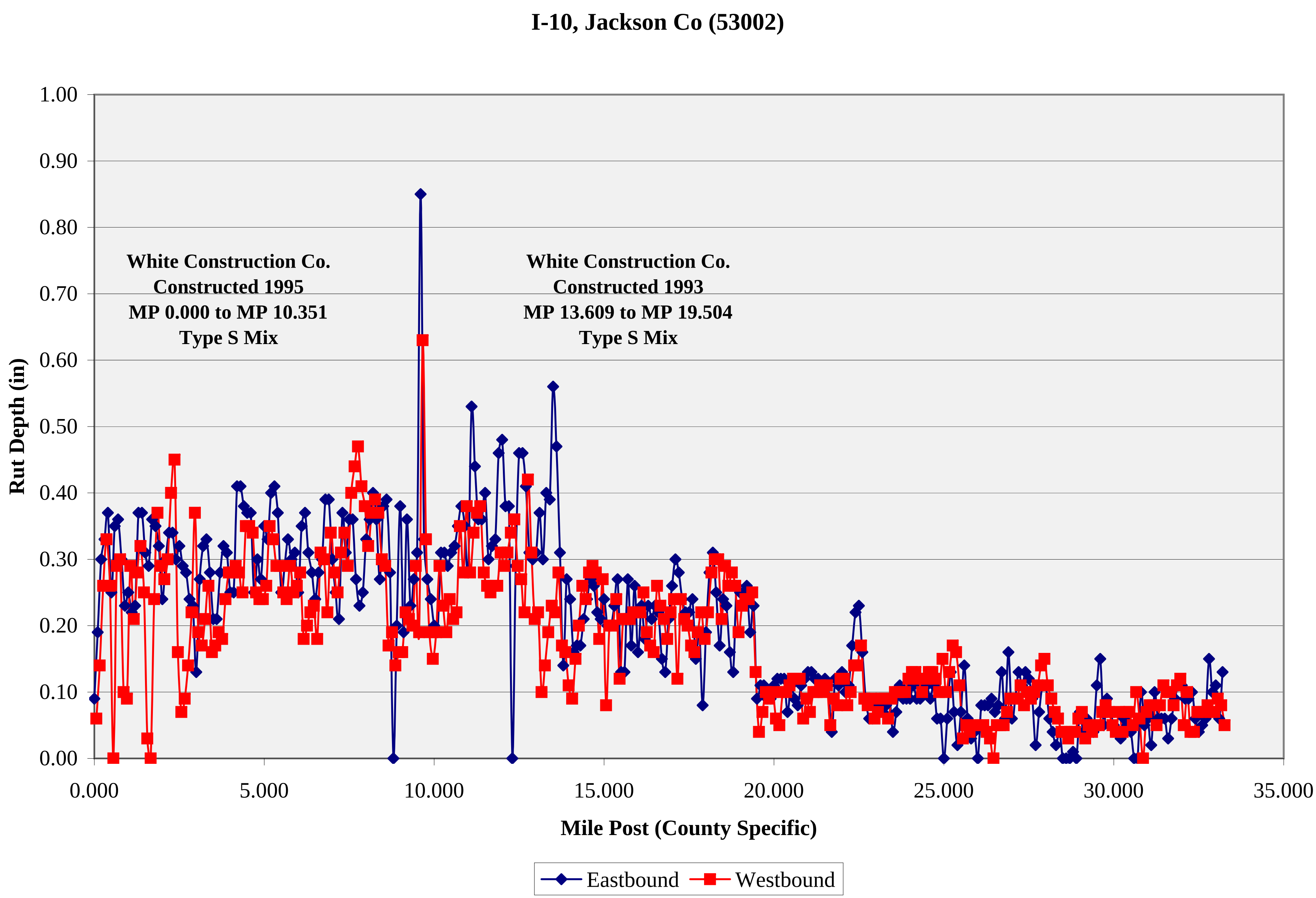
I-10, Okaloosa Co (57002)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Anderson Columbia Co.
Constructed 2001
MP 0.000 to MP 3.069
APAC Inc.
Constructed 2002
MP 3.069 to MP 8.277
Anderson Columbia Co.
Constructed 2002
MP 16.991 to MP 24.554
Eastbound
Westbound

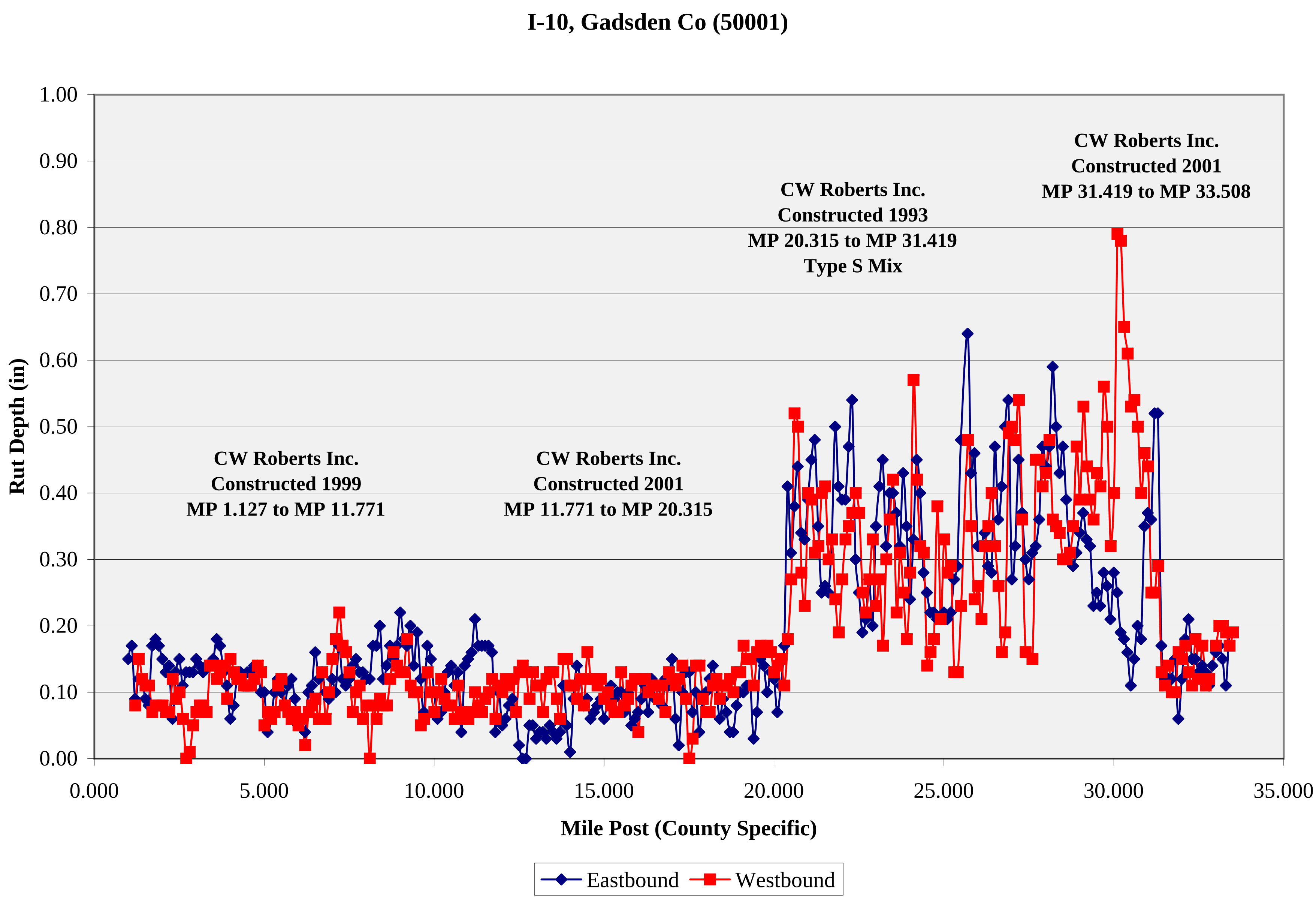


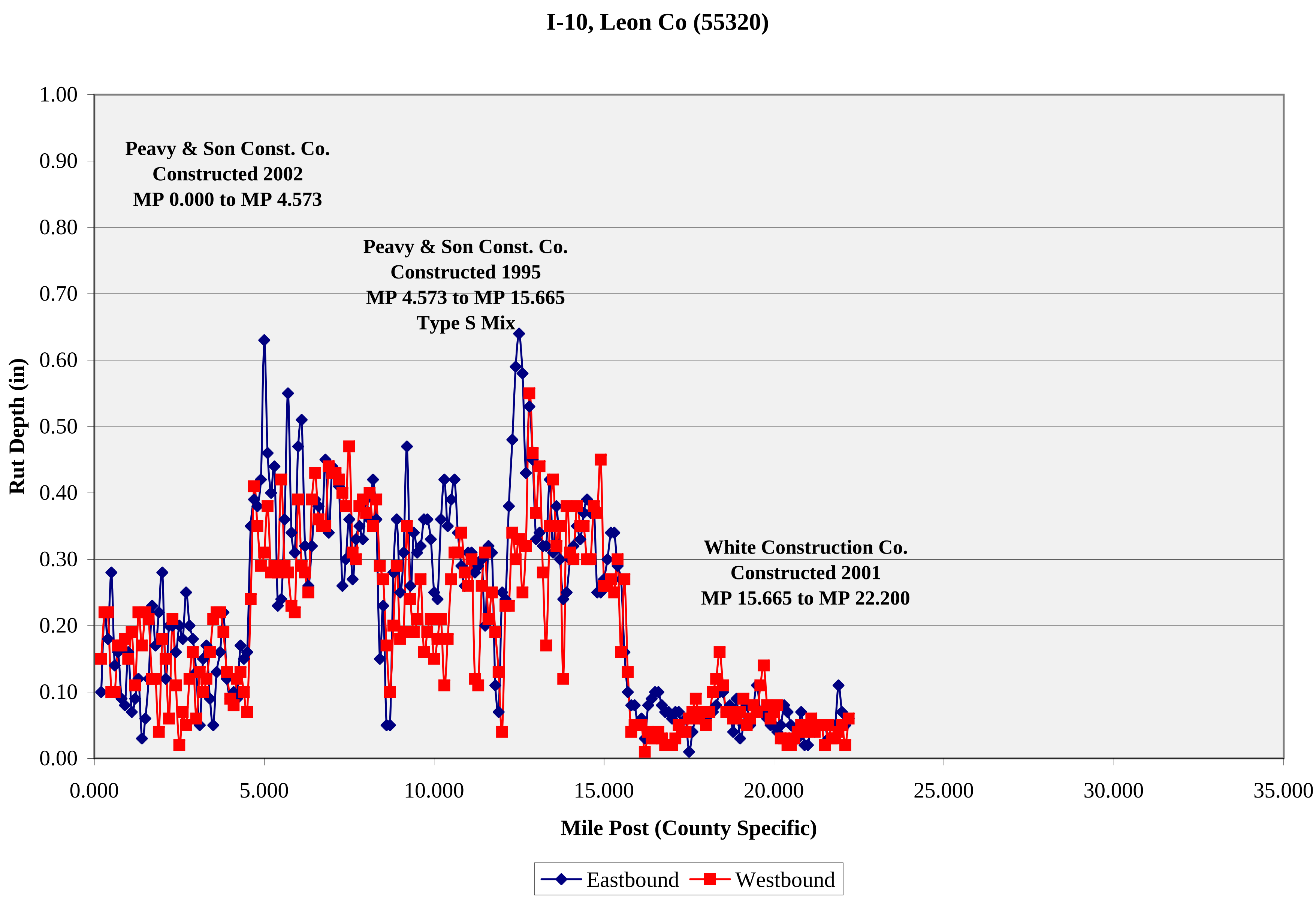
I-10, Walton Co (60002)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Okaloosa Asphalt Inc.
Constructed 1993
MP 18.100 to MP 24.061
Type S Mix
CW Roberts Inc.
Constructed 2002
MP 24.061 to MP 27.454
Eastbound
Westbound

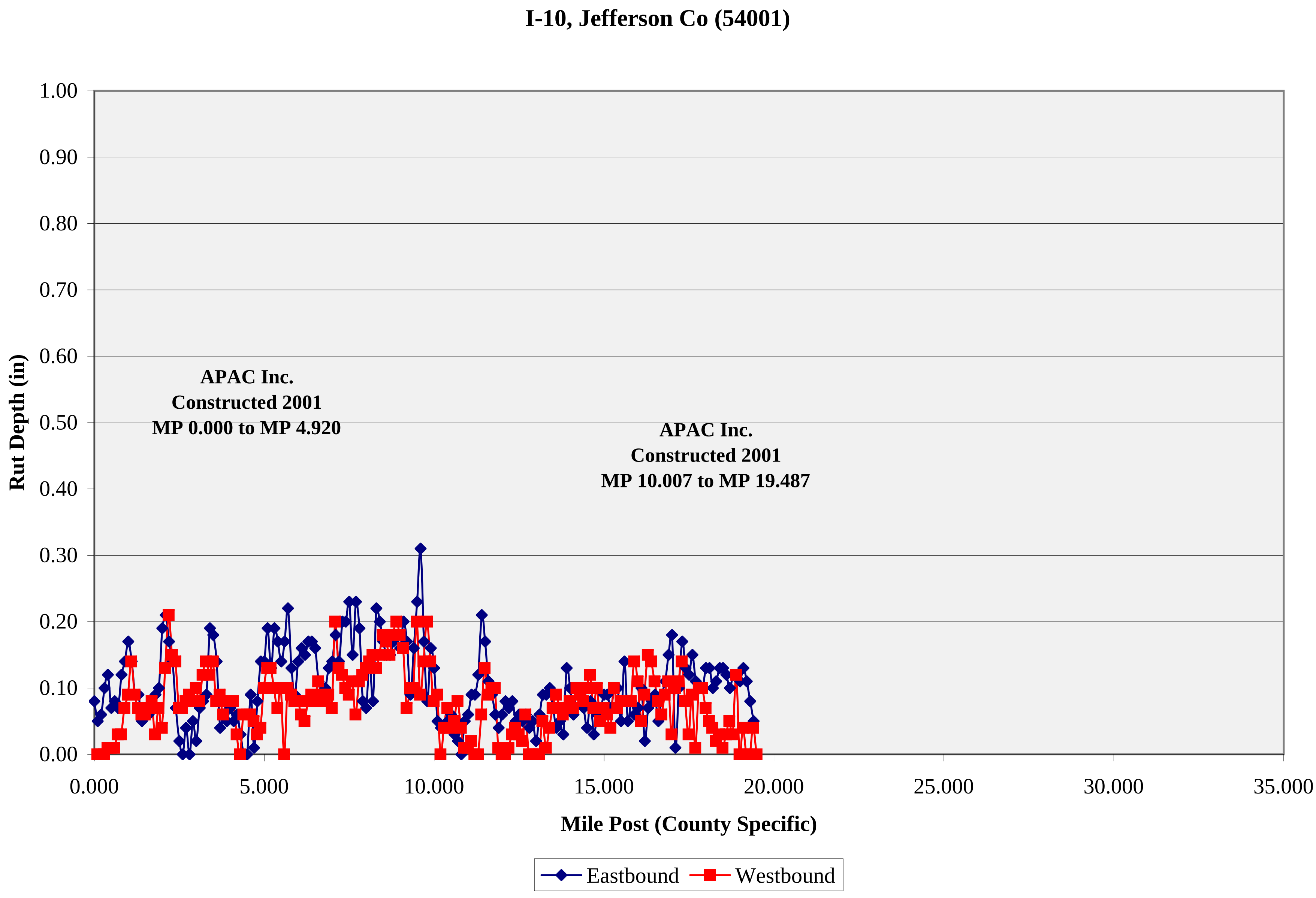

I-10, Holmes Co (52002)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
White Construction Co.
Constructed 2002
MP 0.000 to MP 7.237
White Construction Co.
Constructed 2001
MP 7.237 to MP 8.370
Missing Section is in Washington Co.
White Construction Co.
Constructed 2001
MP 14.195 to MP 16.682
APAC Inc.
Constructed 2001
MP 16.682 to MP 21.276
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound-1
Eastbound-2
Westbound-1
Westbound-2


I-10, Washington Co (61001)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
White Construction Co.
Constructed 2001
MP 0.385 to MP 5.825
Sandco Inc.
Constructed 2002
MP 12.906 to MP 23.963
Missing Section is in
Holmes Co.
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound-1
Eastbound-2
Westbound-1
Westbound-2

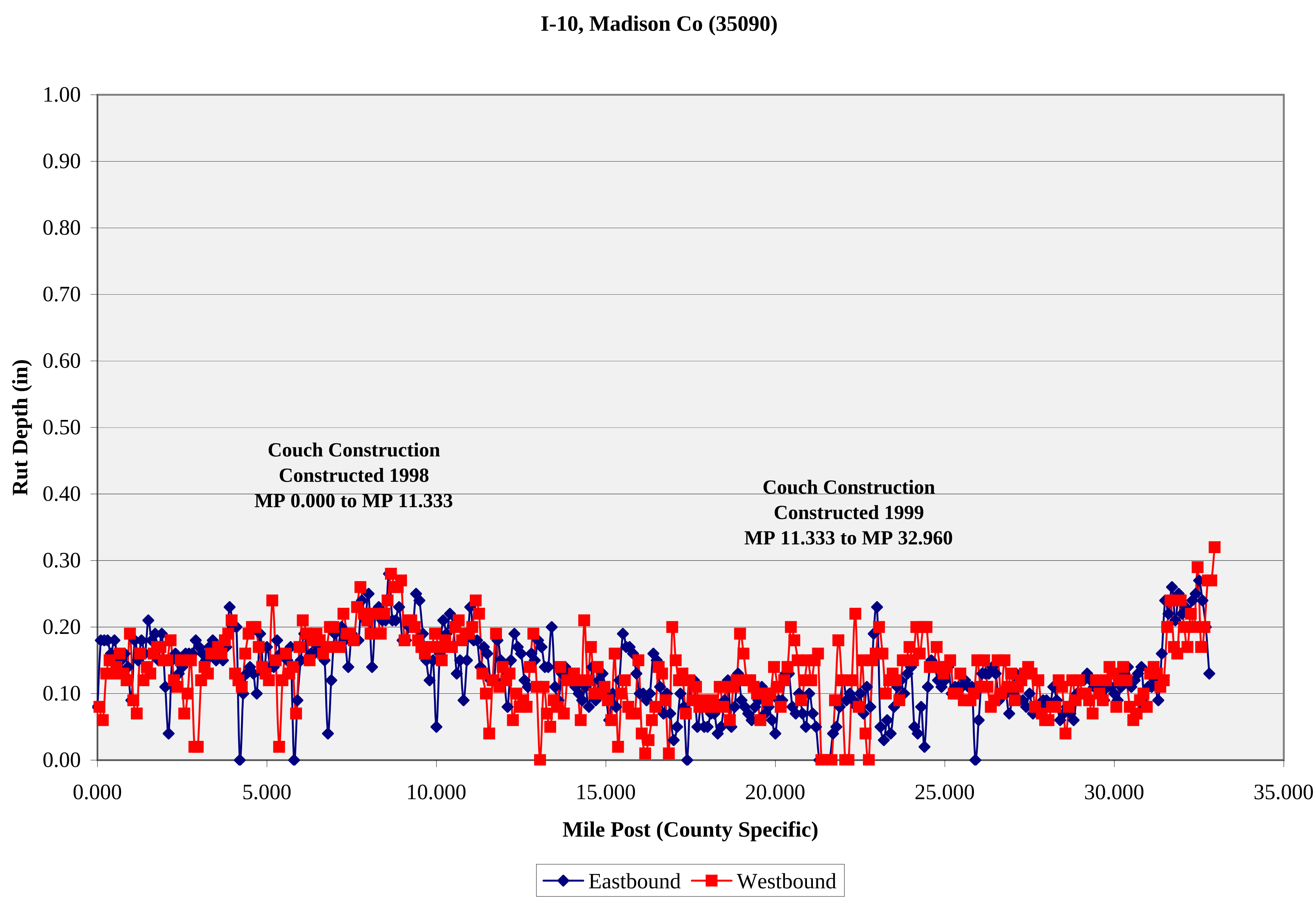

I-10, Jackson Co (53002)
White Construction Co.
Constructed 1995
MP 0.000 to MP 10.351
Type S Mix
White Construction Co.
Constructed 1993
MP 13.609 to MP 19.504
Type S Mix
Rut Depth (in)
Mile Post (County Specific)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Eastbound
Westbound


I-10, Gadsden Co (50001)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
CW Roberts Inc.
Constructed 1999
MP 1.127 to MP 11.771
CW Roberts Inc.
Constructed 2001
MP 11.771 to MP 20.315
CW Roberts Inc.
Constructed 1993
MP 20.315 to MP 31.419
Type S Mix
CW Roberts Inc.
Constructed 2001
MP 31.419 to MP 33.508
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

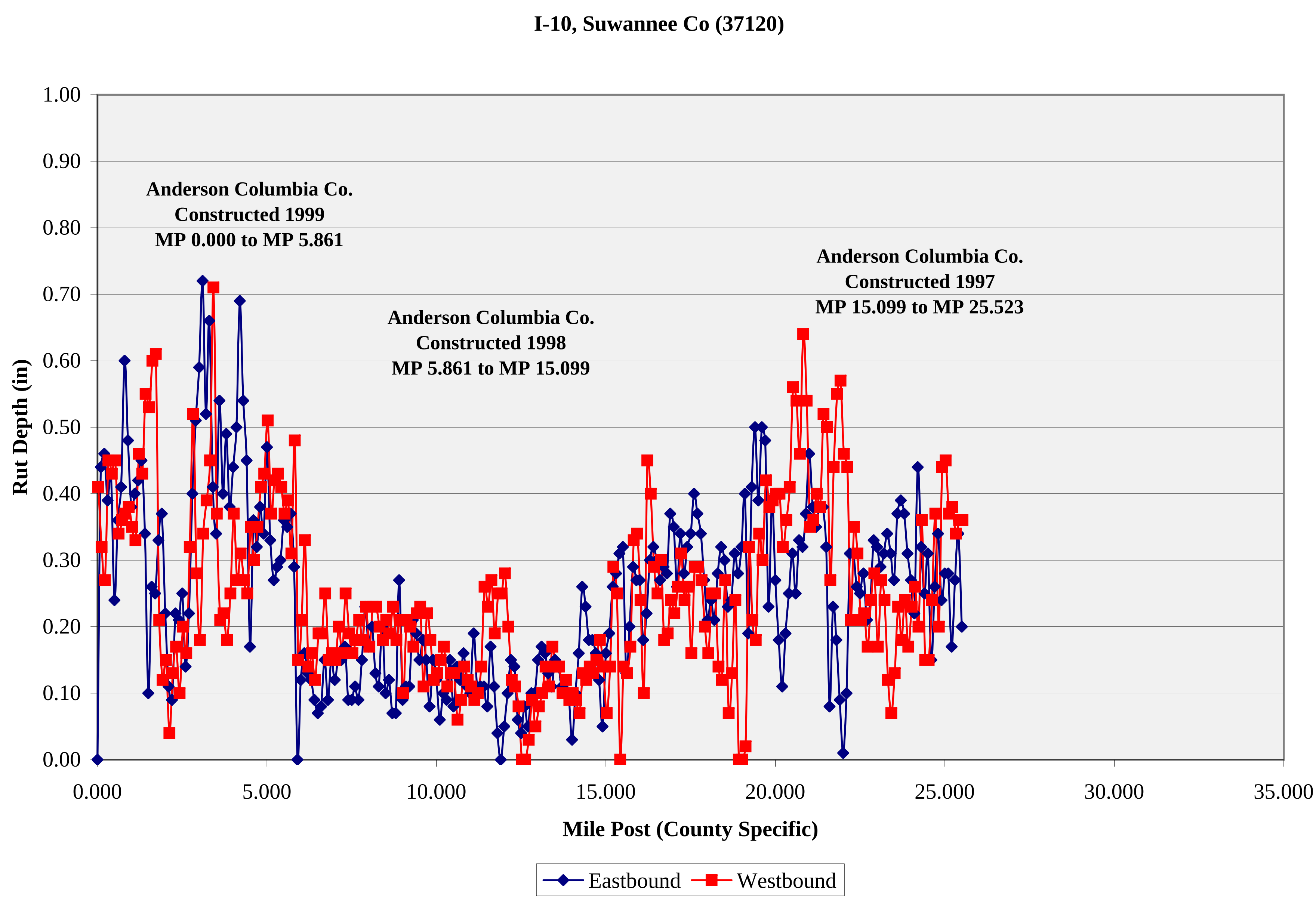

I-10, Leon Co (55320)
Peavy & Son Const. Co.
Constructed 2002
MP 0.000 to MP 4.573
Peavy & Son Const. Co.
Constructed 1995
MP 4.573 to MP 15.665
Type S Mix
White Construction Co.
Constructed 2001
MP 15.665 to MP 22.200
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

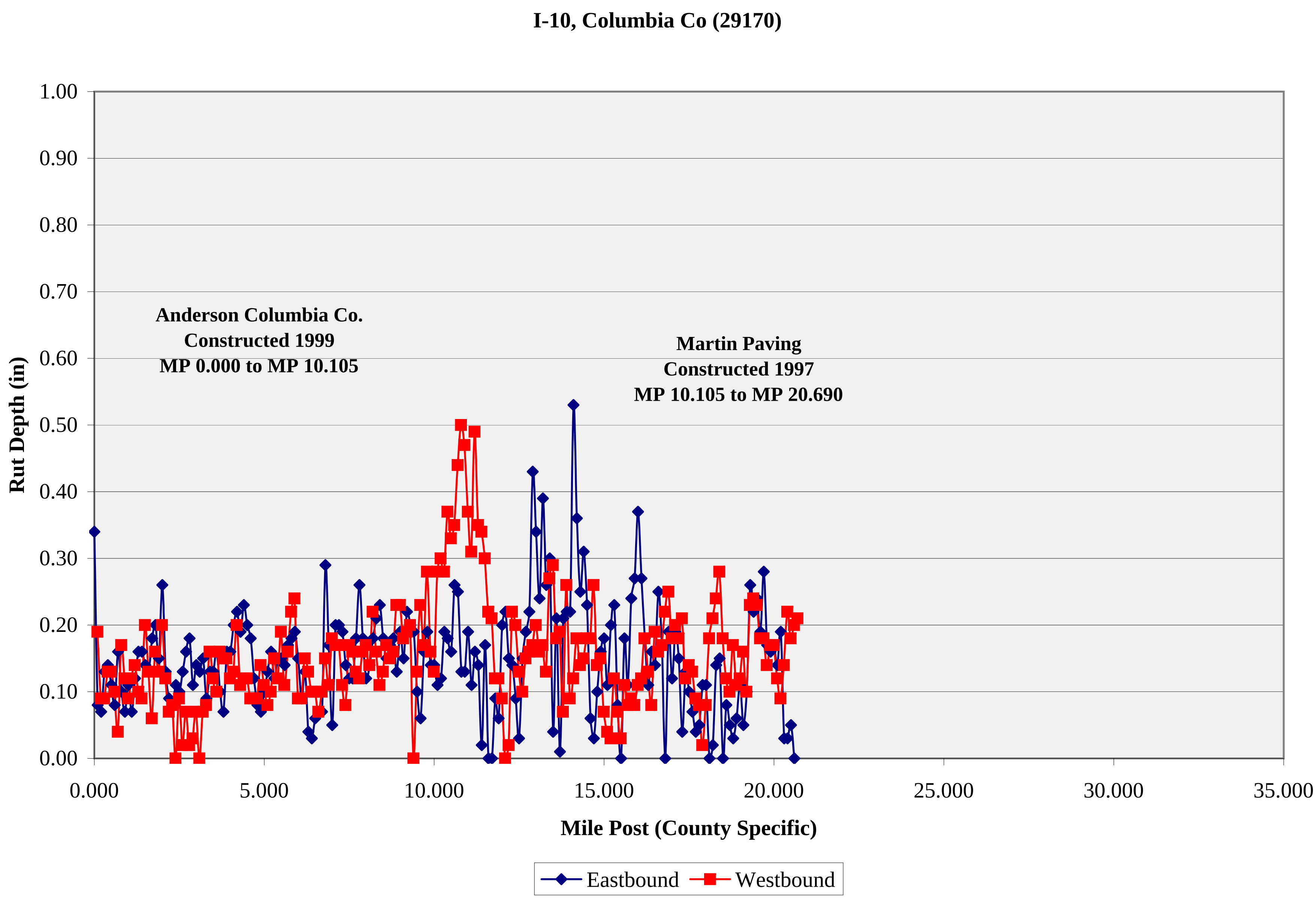


I-10, Jefferson Co (54001)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
APAC Inc.
Constructed 2001
MP 0.000 to MP 4.920
APAC Inc.
Constructed 2001
MP 10.007 to MP 19.487
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

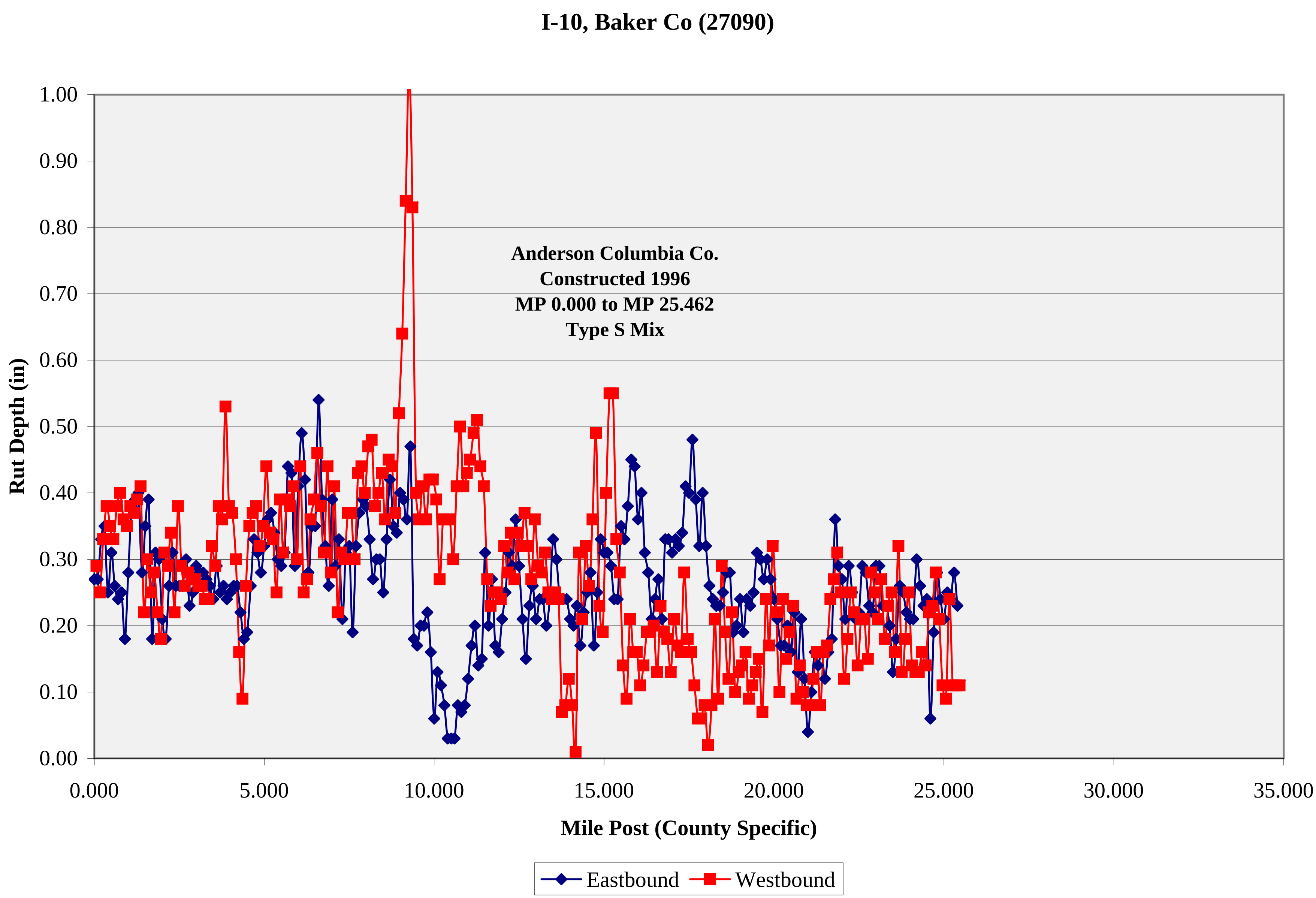


I-10, Madison Co (35090)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Couch Construction
Constructed 1998
MP 0.000 to MP 11.333
Couch Construction
Constructed 1999
MP 11.333 to MP 32.960
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

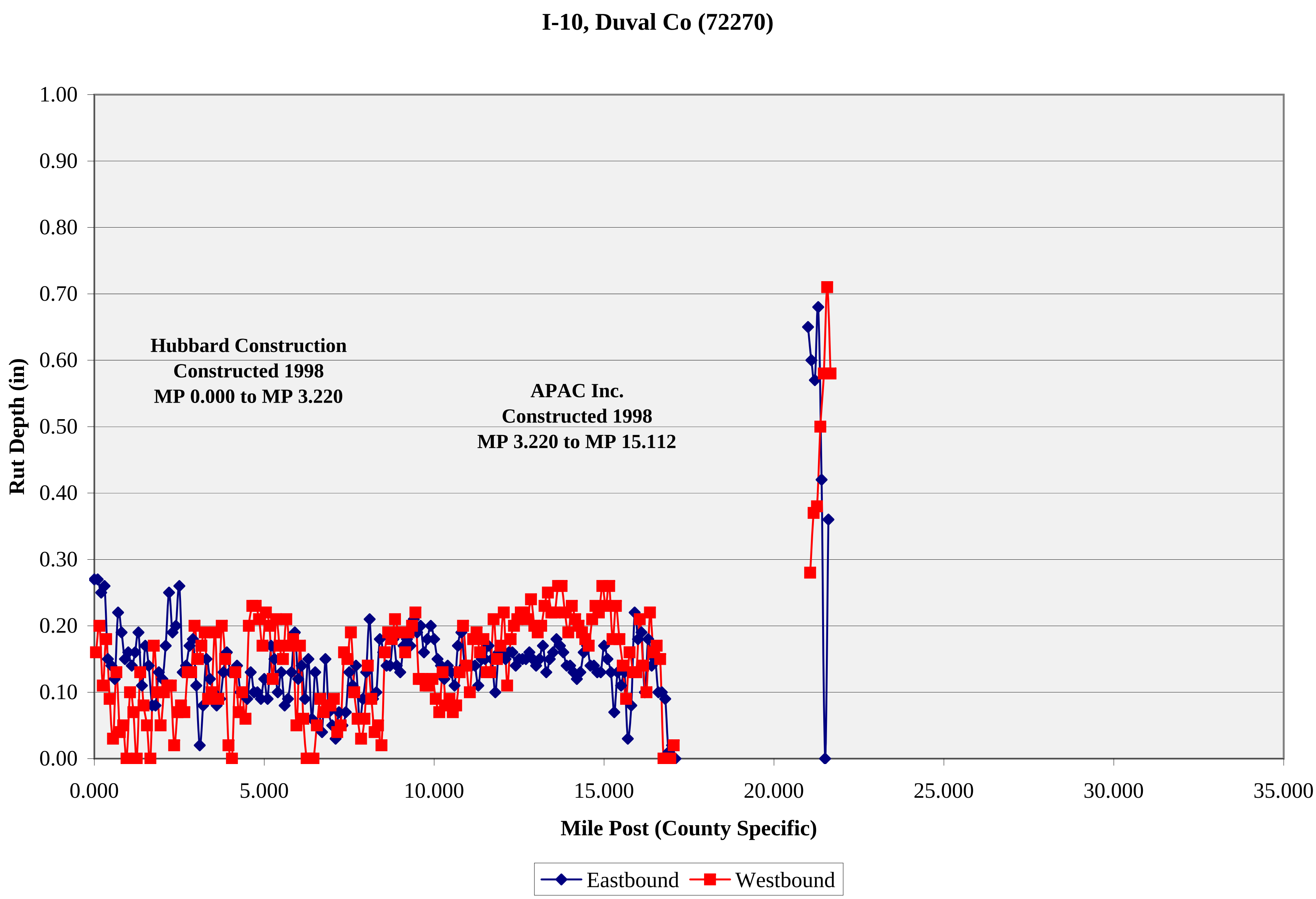

I-10, Suwannee Co (37120)
Anderson Columbia Co.
Constructed 1999
MP 0.000 to MP 5.861
Anderson Columbia Co.
Constructed 1998
MP 5.861 to MP 15.099
Anderson Columbia Co.
Constructed 1997
MP 15.099 to MP 25.523
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

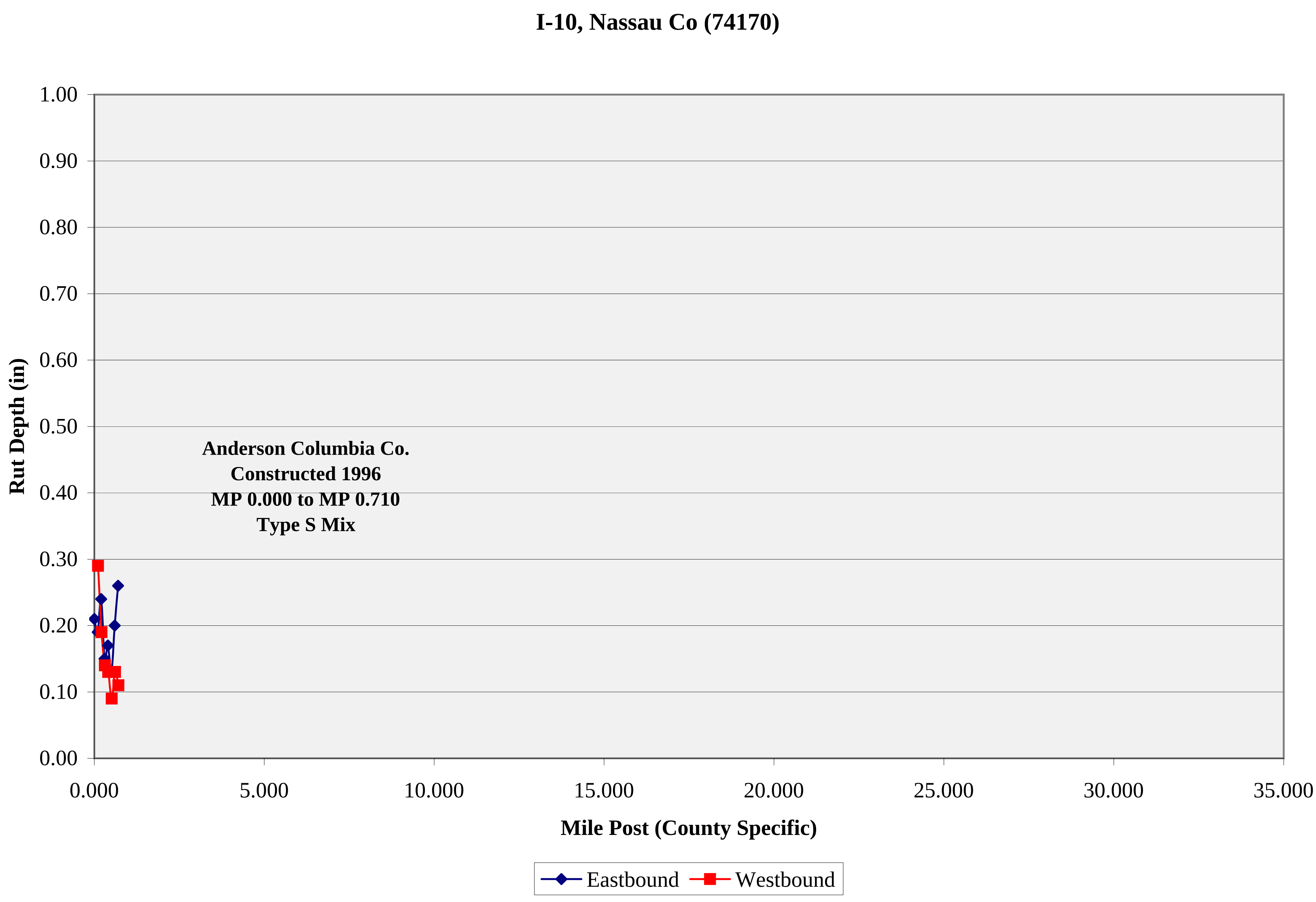


I-10, Columbia Co (29170)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Anderson Columbia Co.
Constructed 1999
MP 0.000 to MP 10.105
Martin Paving
Constructed 1997
MP 10.105 to MP 20.690
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

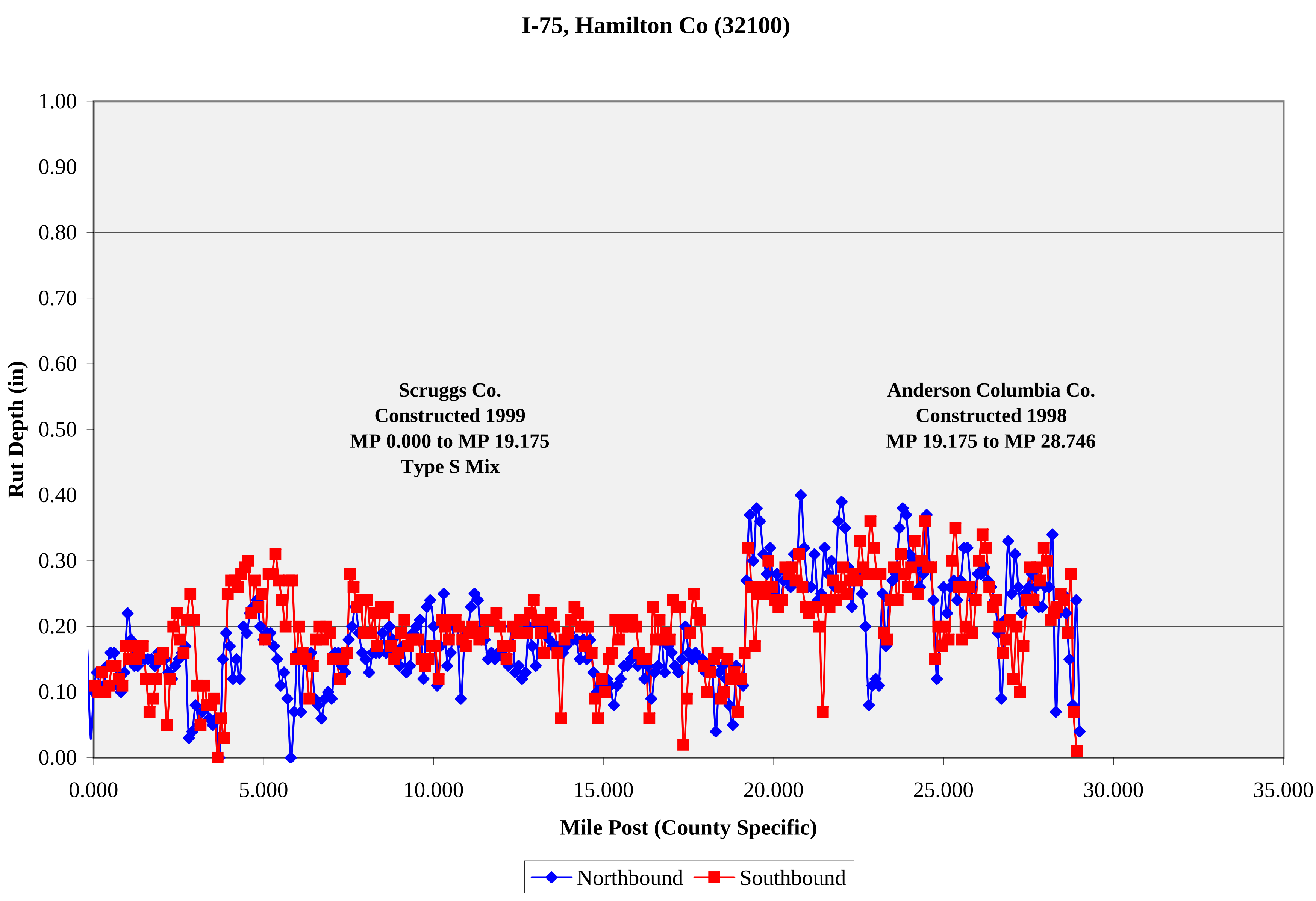


I-10, Baker Co (27090)
Anderson Columbia Co.
Constructed 1996
MP 0.000 to MP 25.462
Type S Mix
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

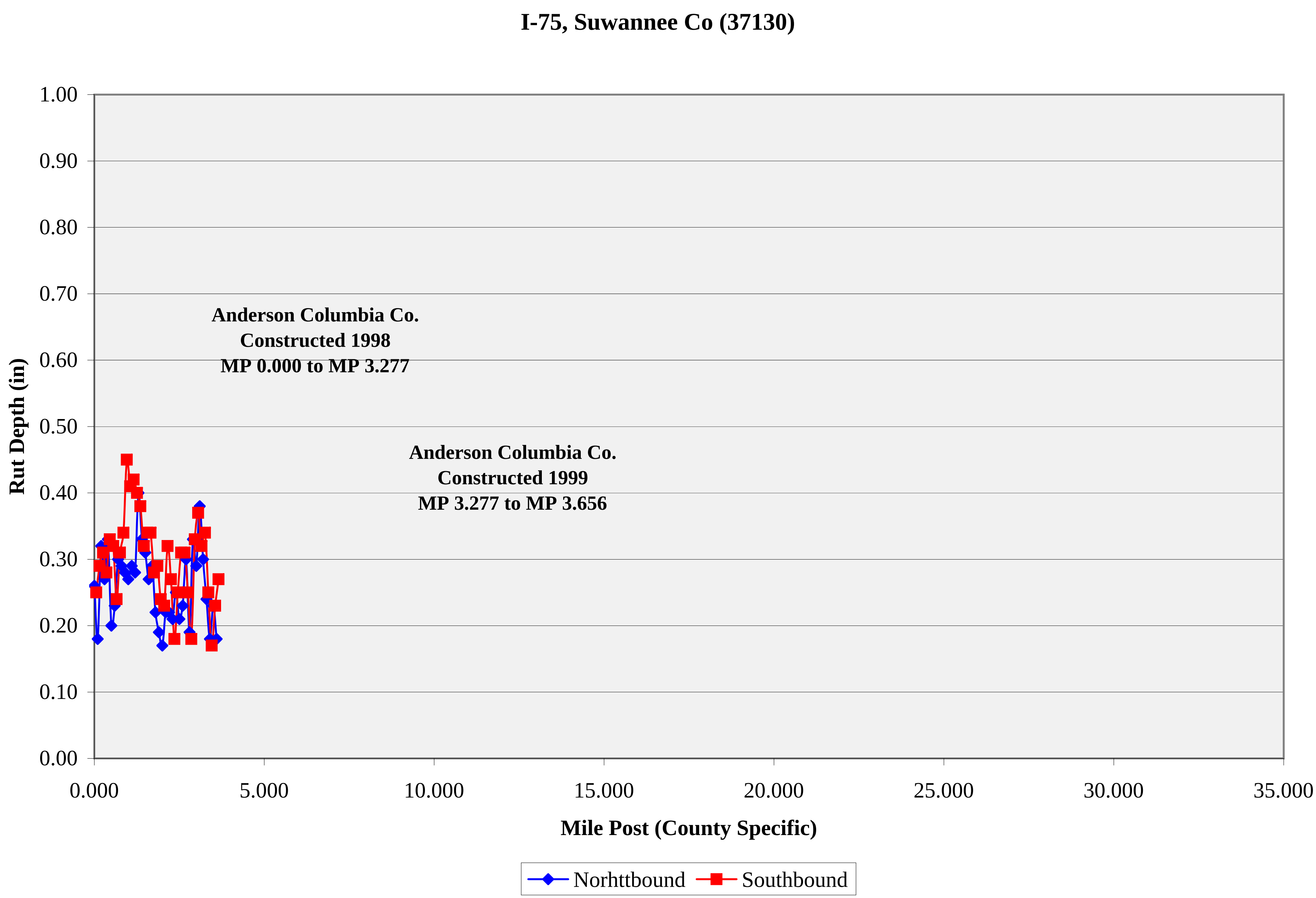

I-10, Duval Co (72270)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Hubbard Construction
Constructed 1998
MP 0.000 to MP 3.220
APAC Inc.
Constructed 1998
MP 3.220 to MP 15.112
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound



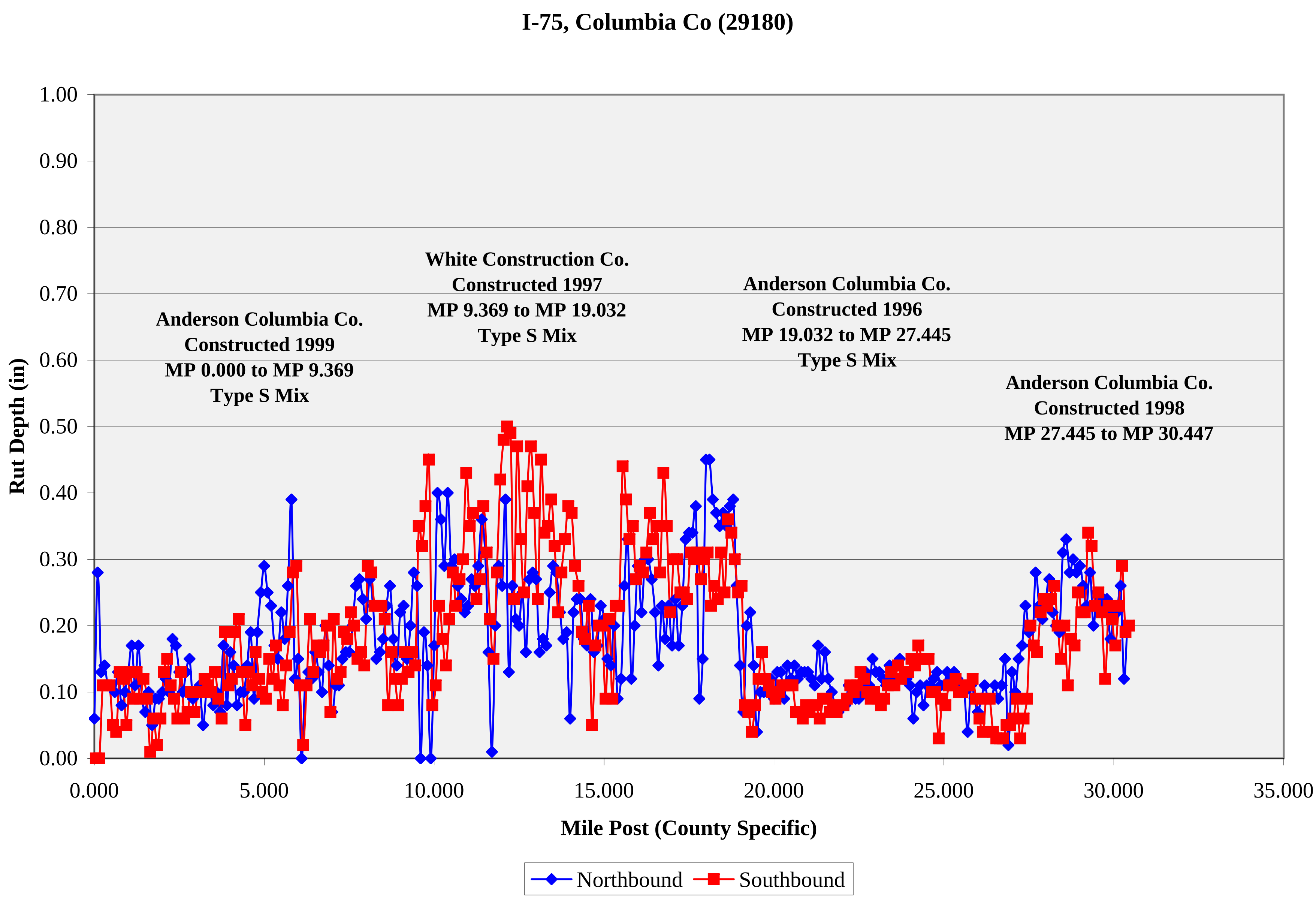
I-10, Nassau Co (74170)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Anderson Columbia Co.
Constructed 1996
MP 0.000 to MP 0.710
Type S Mix
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound

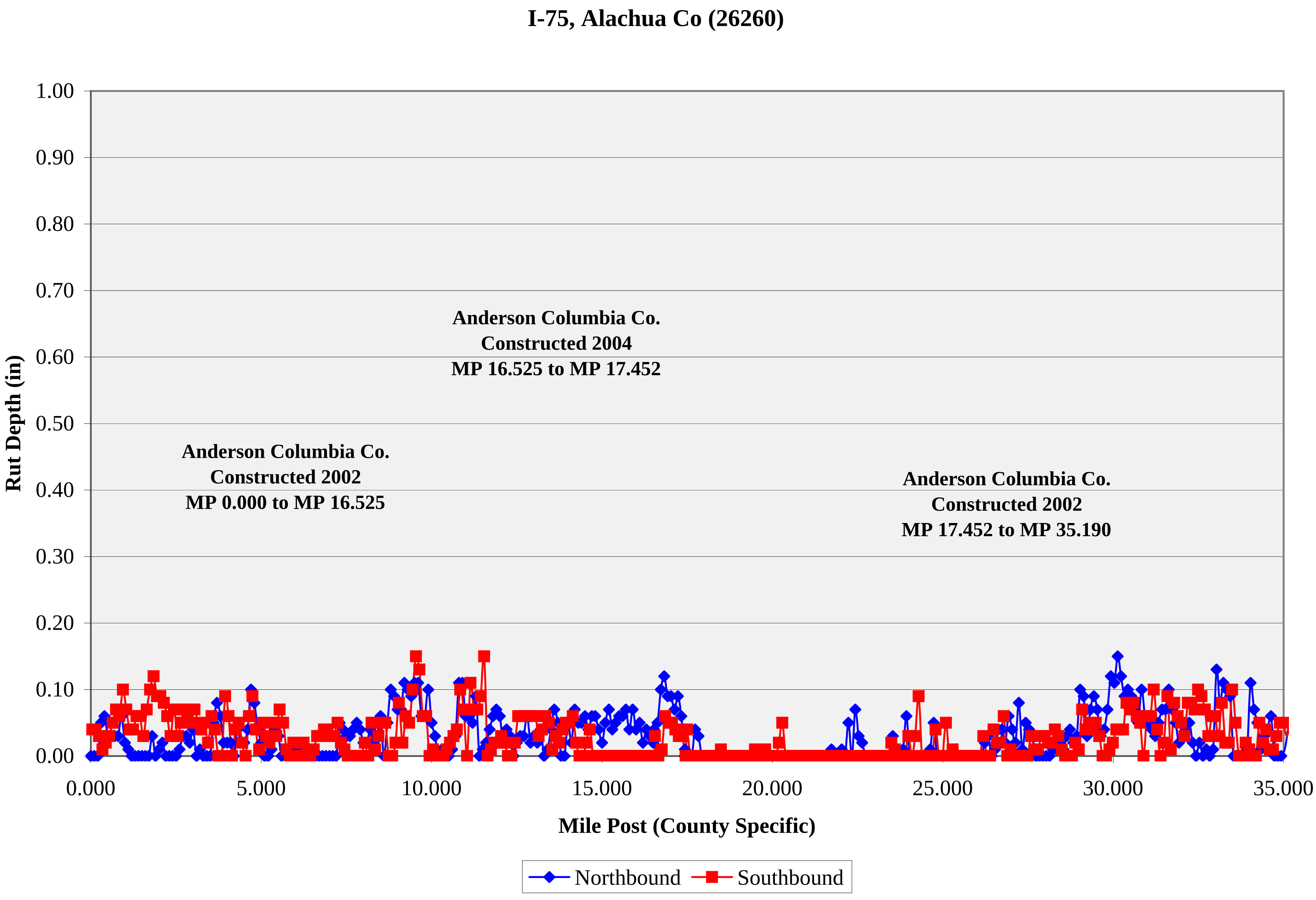


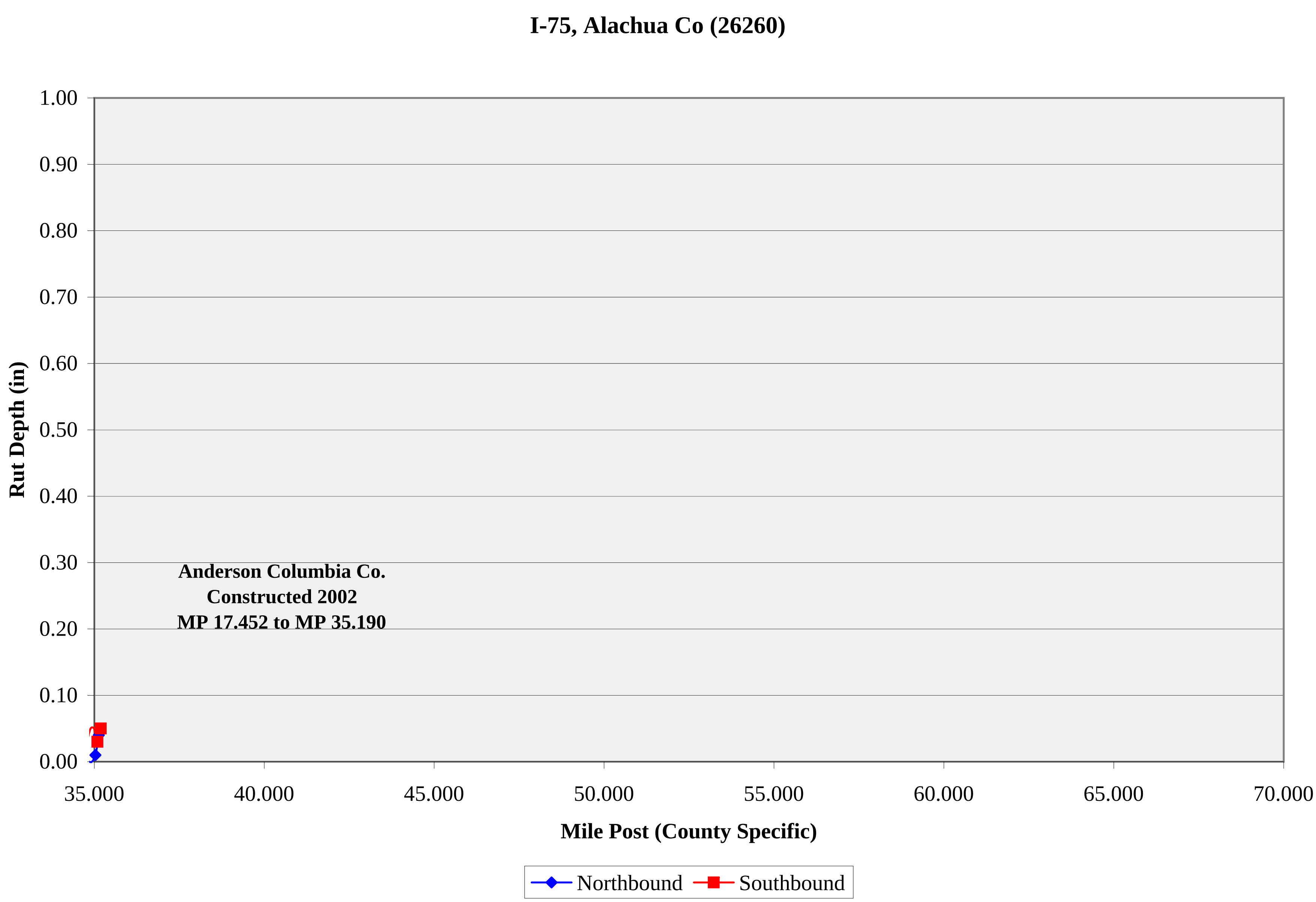
I-75, Hamilton Co (32100)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Scruggs Co.
Constructed 1999
MP 0.000 to MP 19.175
Type S Mix
Anderson Columbia Co.
Constructed 1998
MP 19.175 to MP 28.746
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

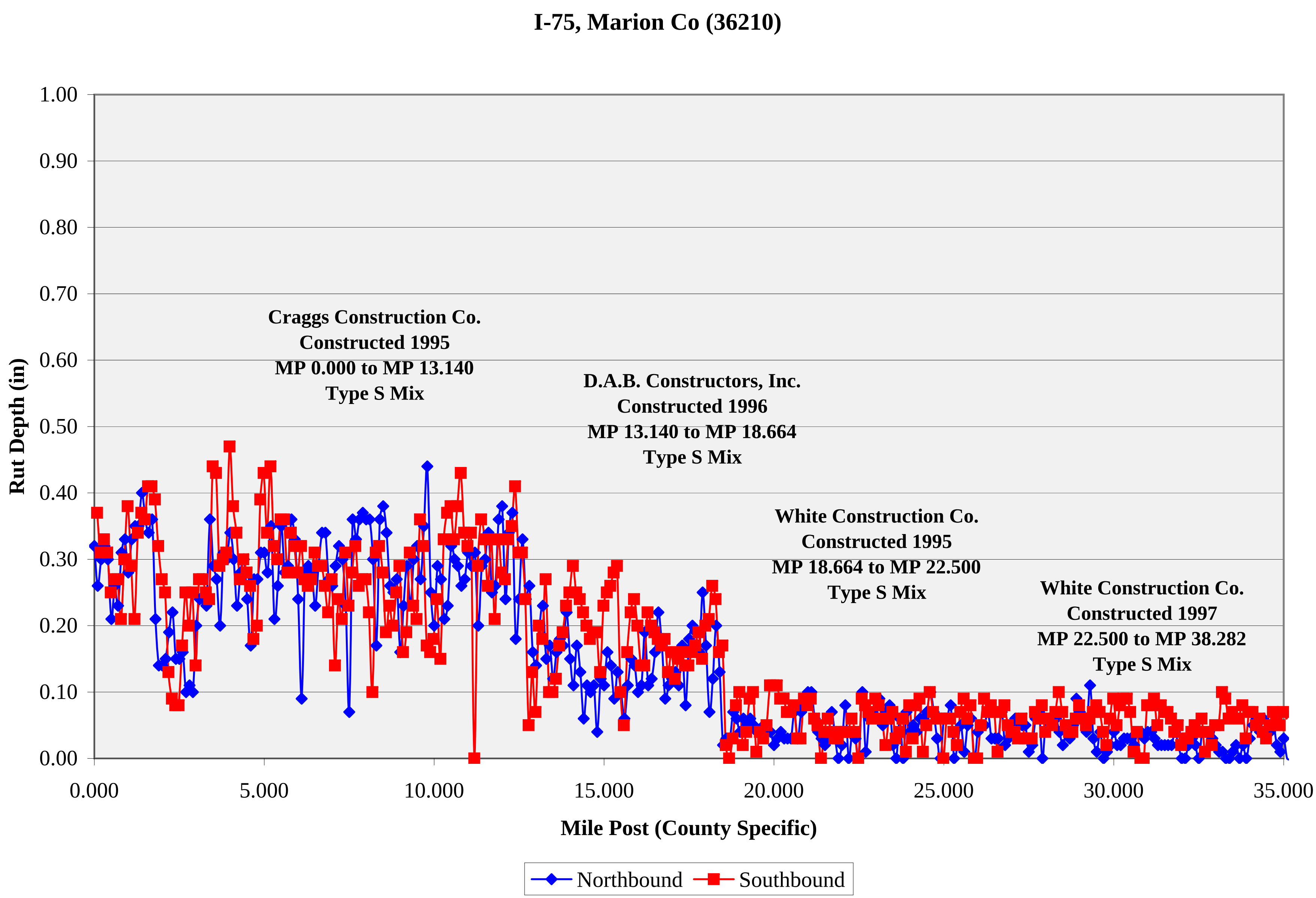


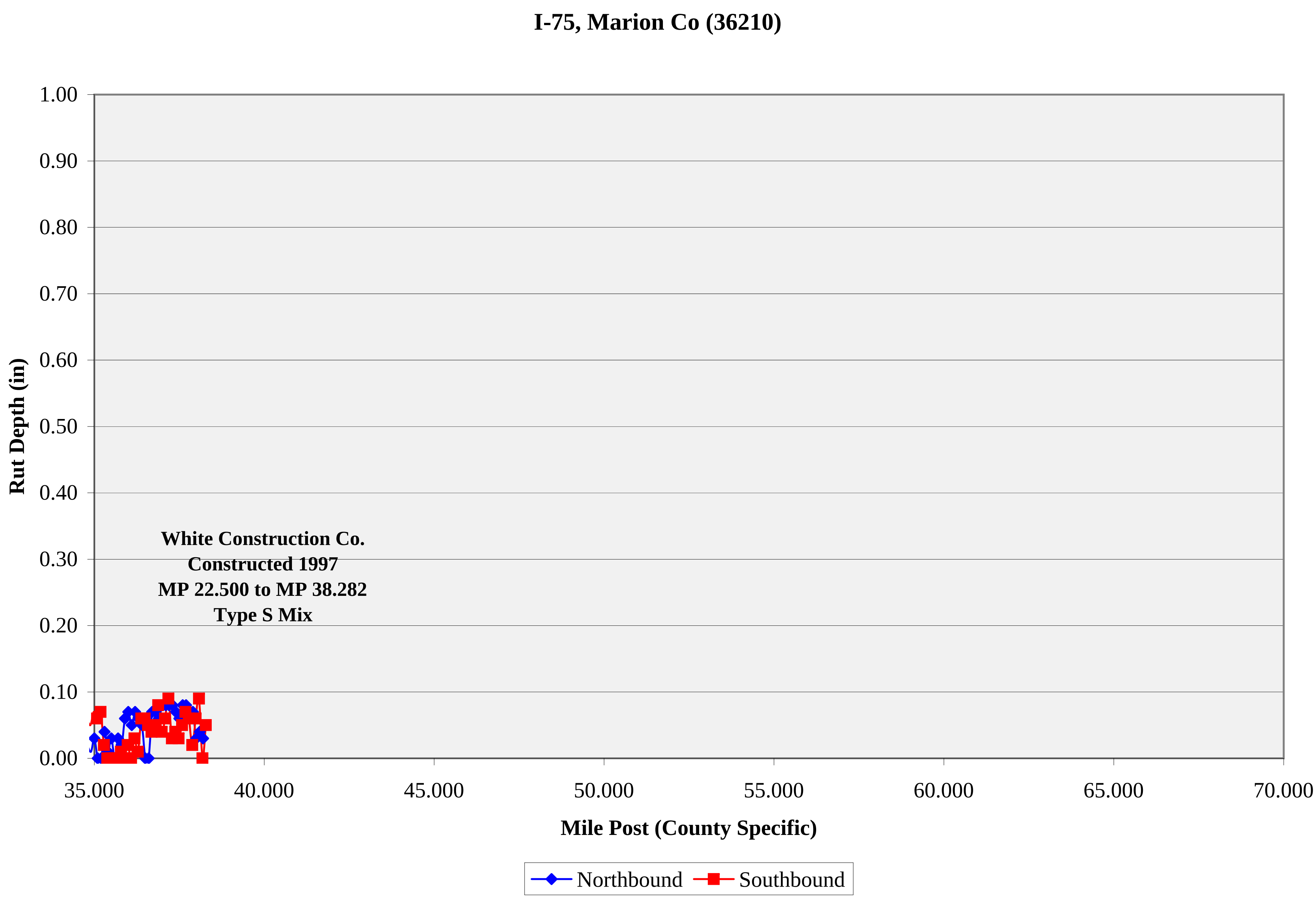
I-75, Suwannee Co (37130)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Rut Depth (in)
Anderson Columbia Co.
Constructed 1998
MP 0.000 to MP 3.277
Anderson Columbia Co.
Constructed 1999
MP 3.277 to MP 3.656
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Norhttbound
Southbound

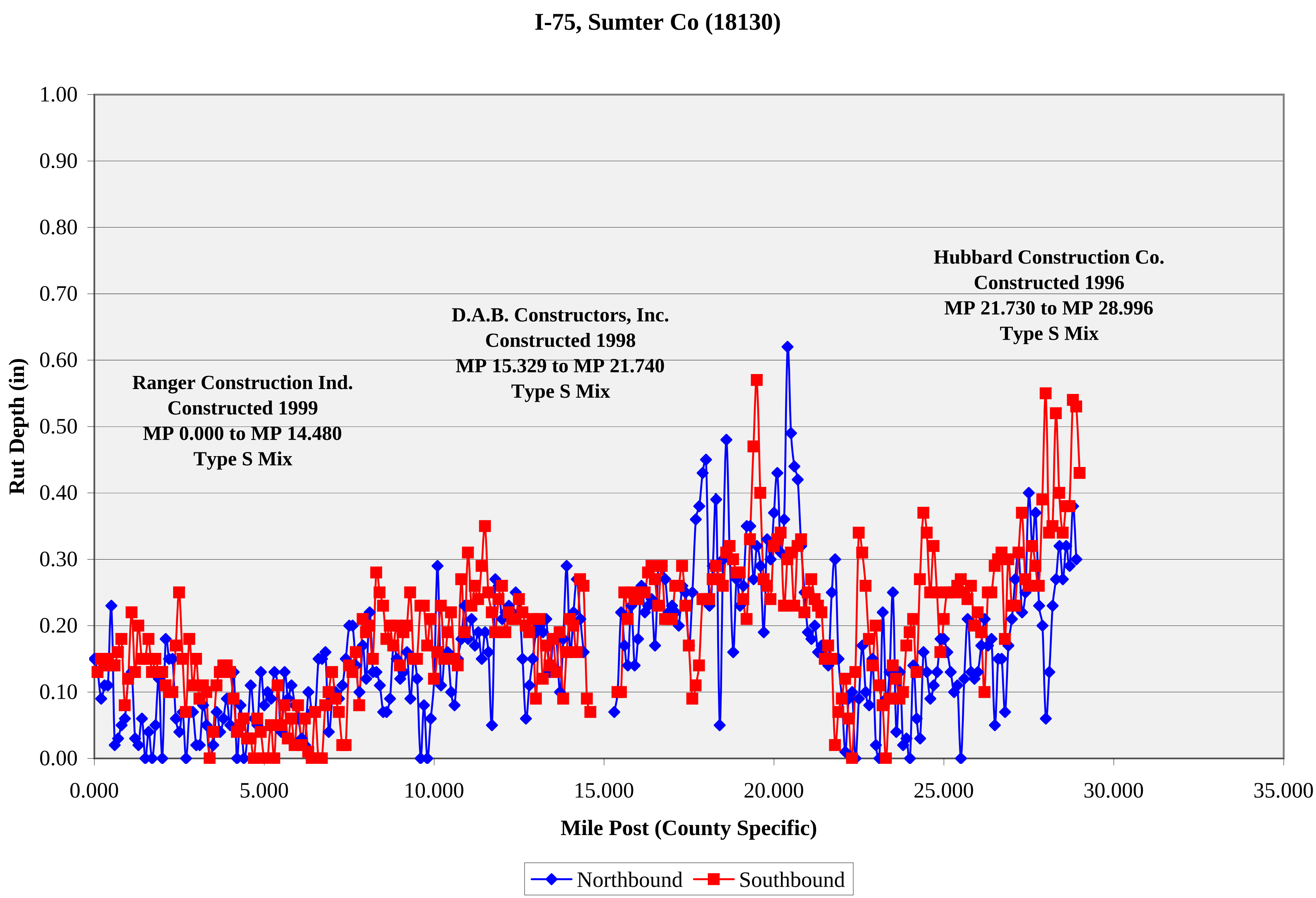

I-75, Columbia Co (29180)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Anderson Columbia Co.
Constructed 1999
MP 0.000 to MP 9.369
Type S Mix
White Construction Co.
Constructed 1997
MP 9.369 to MP 19.032
Type S Mix
Anderson Columbia Co.
Constructed 1996
MP 19.032 to MP 27.445
Type S Mix
Anderson Columbia Co.
Constructed 1998
MP 27.445 to MP 30.447
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound


I-75, Alachua Co (26260)
Anderson Columbia Co.
Constructed 2004
MP 16.525 to MP 17.452
Anderson Columbia Co.
Constructed 2002
MP 0.000 to MP 16.525
Anderson Columbia Co.
Constructed 2002
MP 17.452 to MP 35.190
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

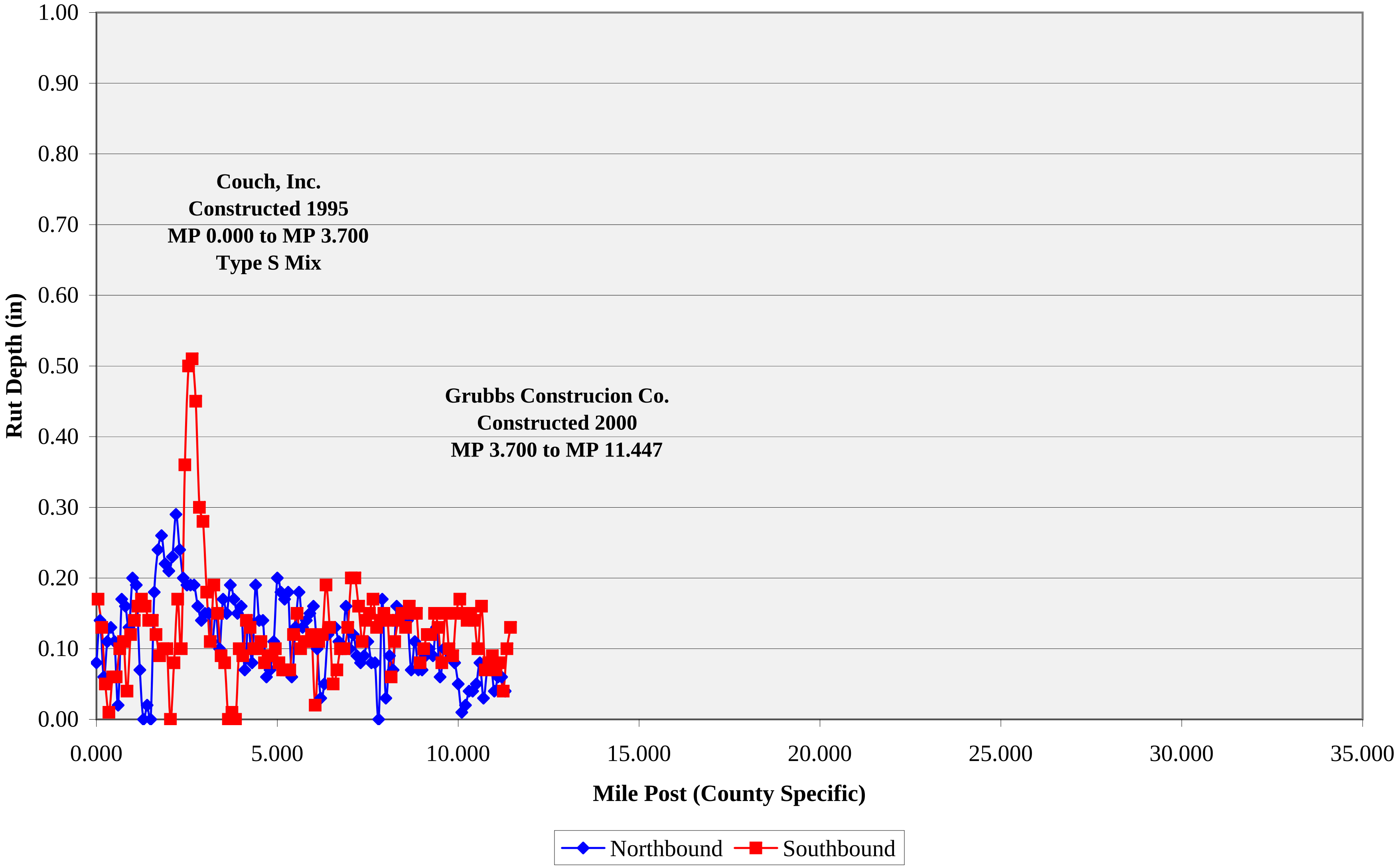

I-75, Alachua Co (26260)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Anderson Columbia Co.
Constructed 2002
MP 17.452 to MP 35.190
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Northbound
Southbound

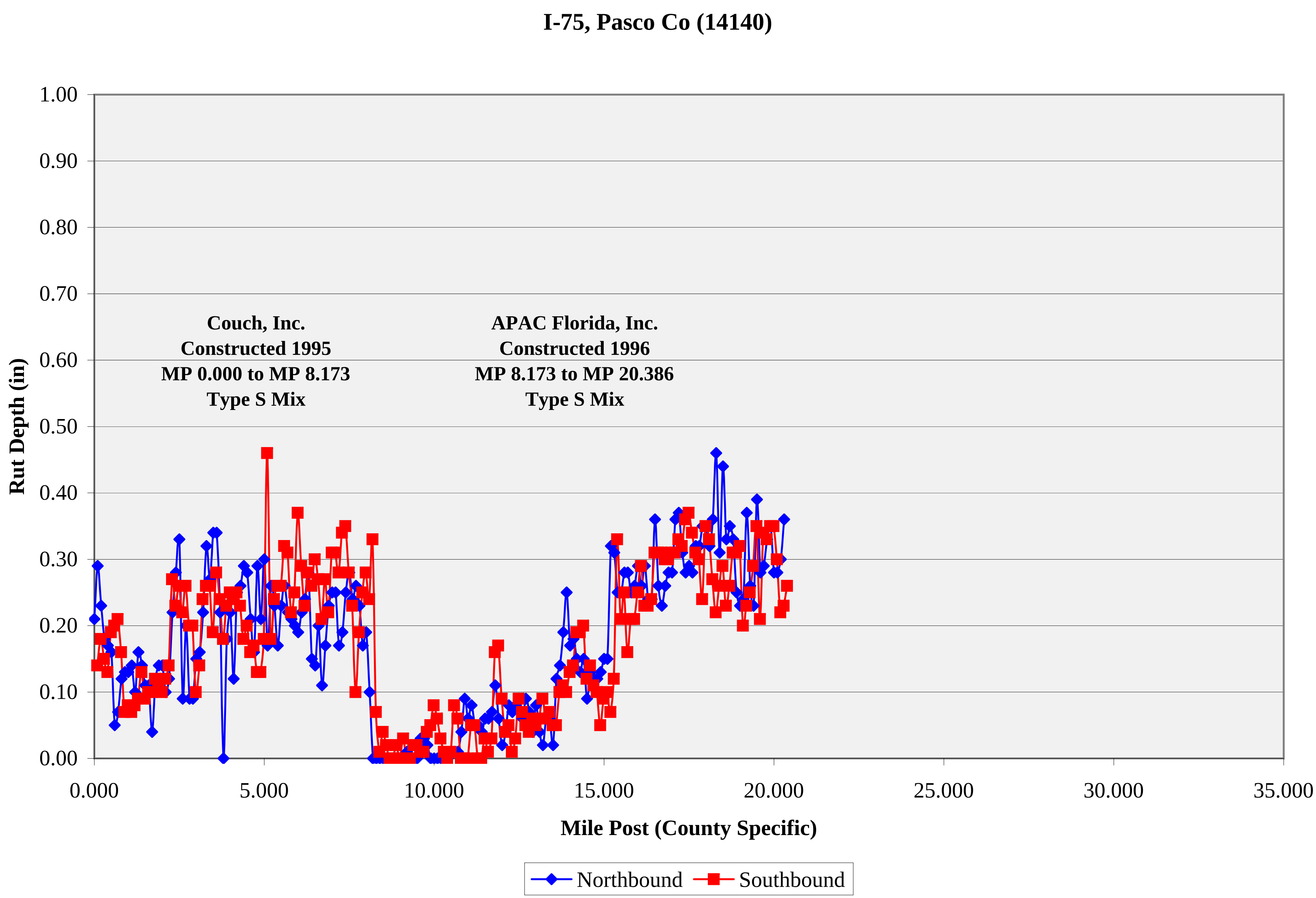

I-75, Marion Co (36210)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Rut Depth (in)
Craggs Construction Co.
Constructed 1995
MP 0.000 to MP 13.140
Type S Mix
D.A.B. Constructors, Inc.
Constructed 1996
MP 13.140 to MP 18.664
Type S Mix
White Construction Co.
Constructed 1995
MP 18.664 to MP 22.500
Type S Mix
White Construction Co.
Constructed 1997
MP 22.500 to MP 38.282
Type S Mix
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

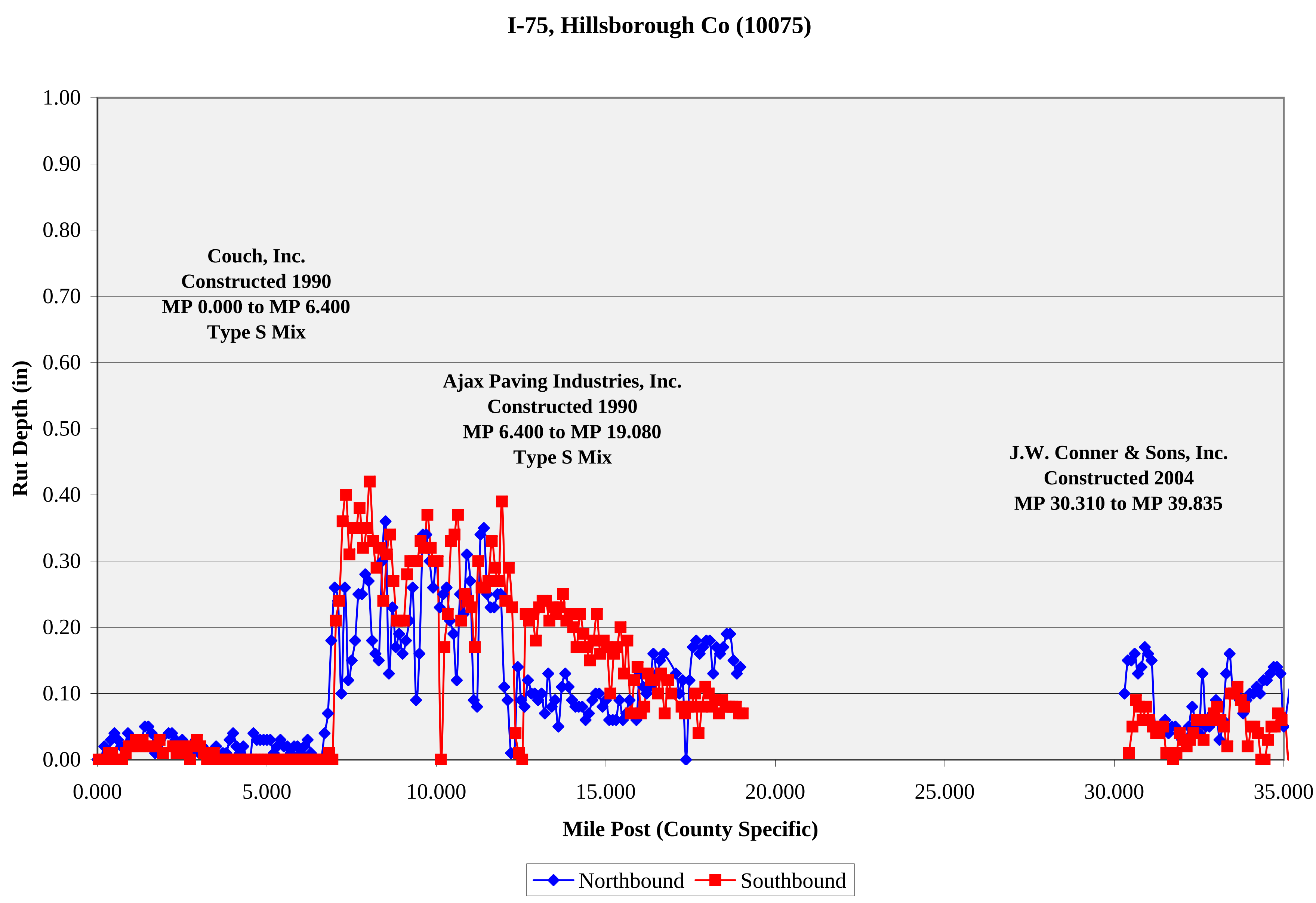

I-75, Marion Co (36210)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
White Construction Co.
Constructed 1997
MP 22.500 to MP 38.282
Type S Mix
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Northbound
Southbound


I-75, Sumter Co (18130)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Ranger Construction Ind.
Constructed 1999
MP 0.000 to MP 14.480
Type S Mix
D.A.B. Constructors, Inc.
Constructed 1998
MP 15.329 to MP 21.740
Type S Mix
Hubbard Construction Co.
Constructed 1996
MP 21.730 to MP 28.996
Type S Mix
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

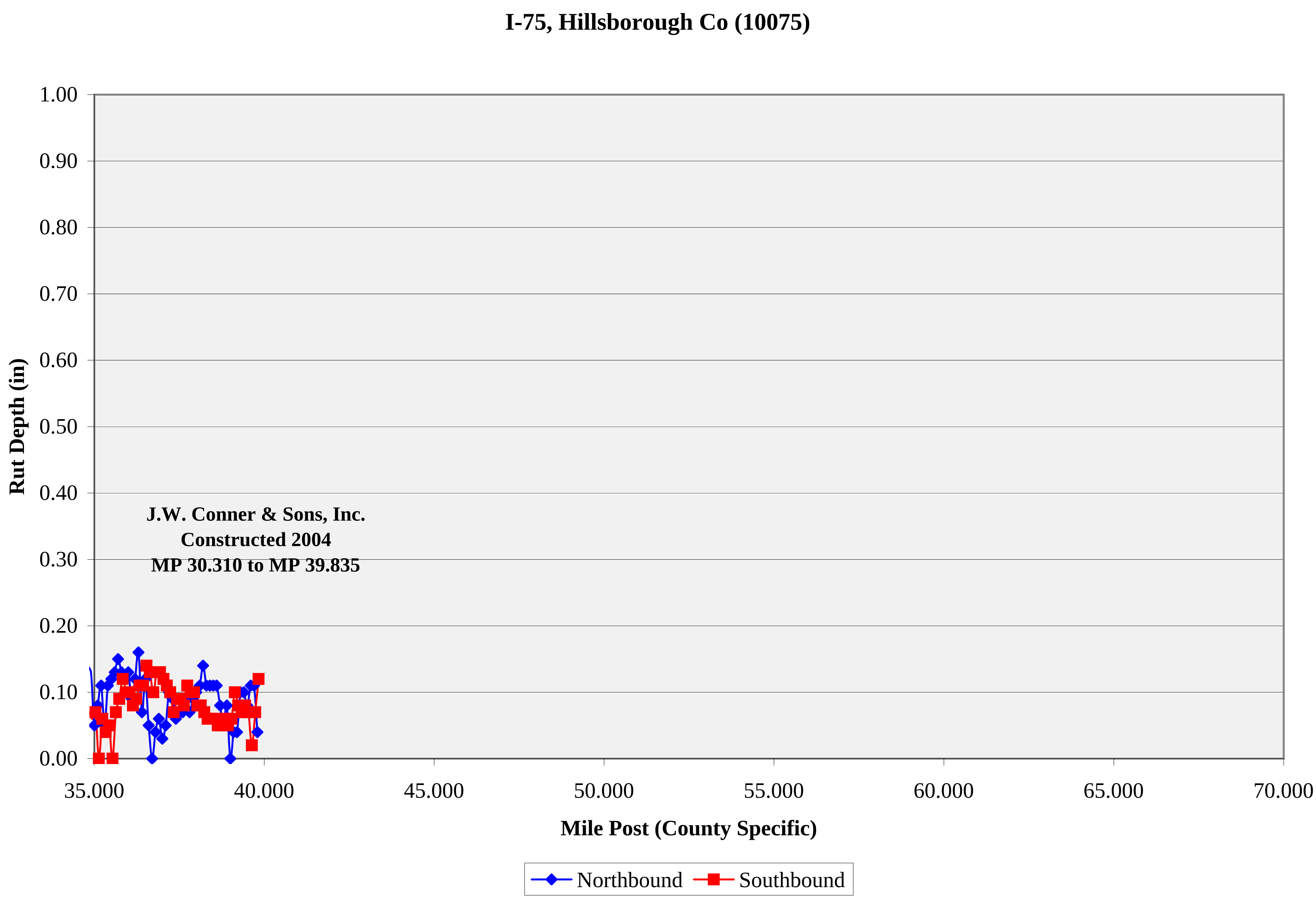
I-75, Hernando Co (08150)

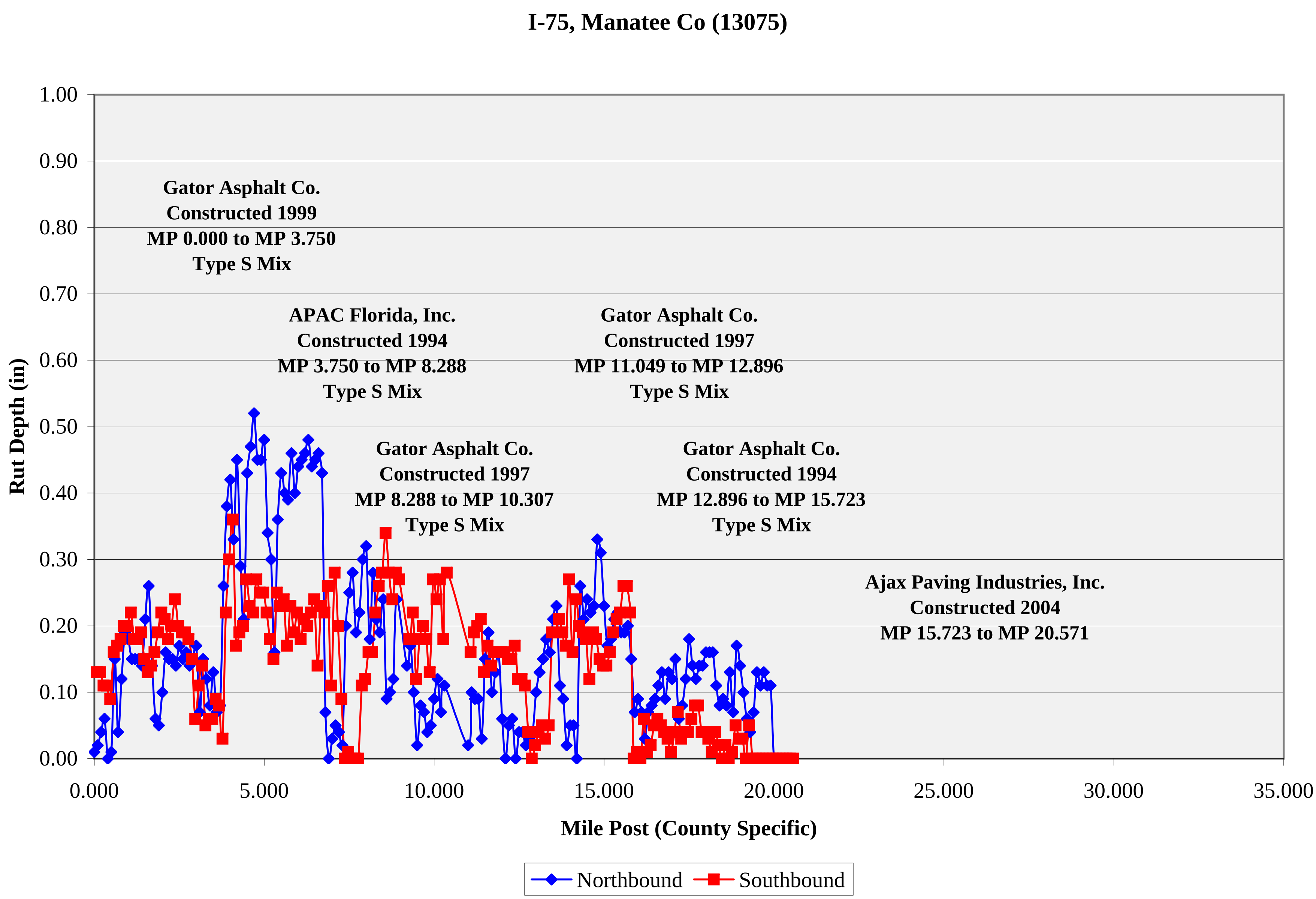


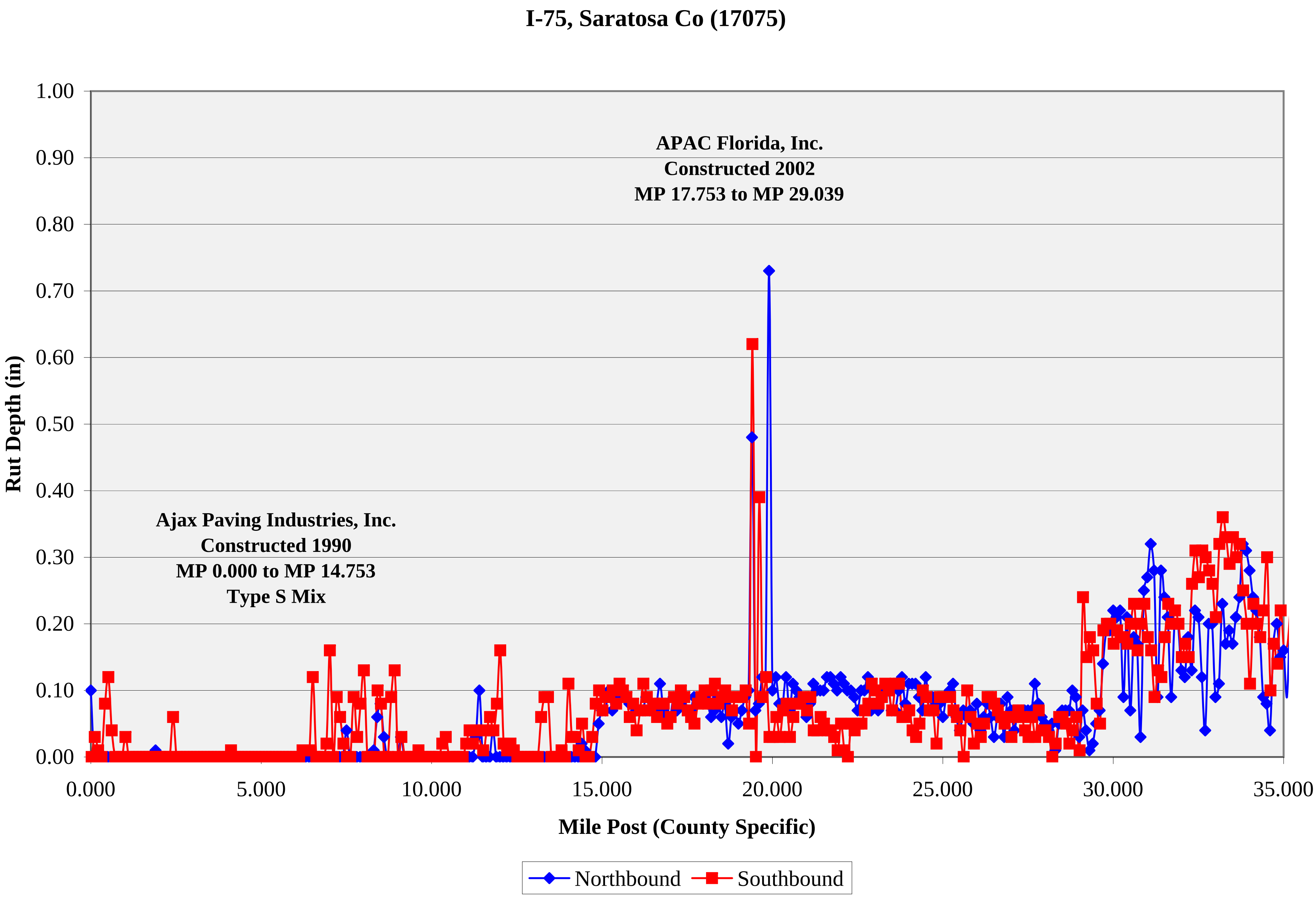

I-75, Pasco Co (14140)
Couch, Inc.
Constructed 1995
MP 0.000 to MP 8.173
Type S Mix
APAC Florida, Inc.
Constructed 1996
MP 8.173 to MP 20.386
Type S Mix
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



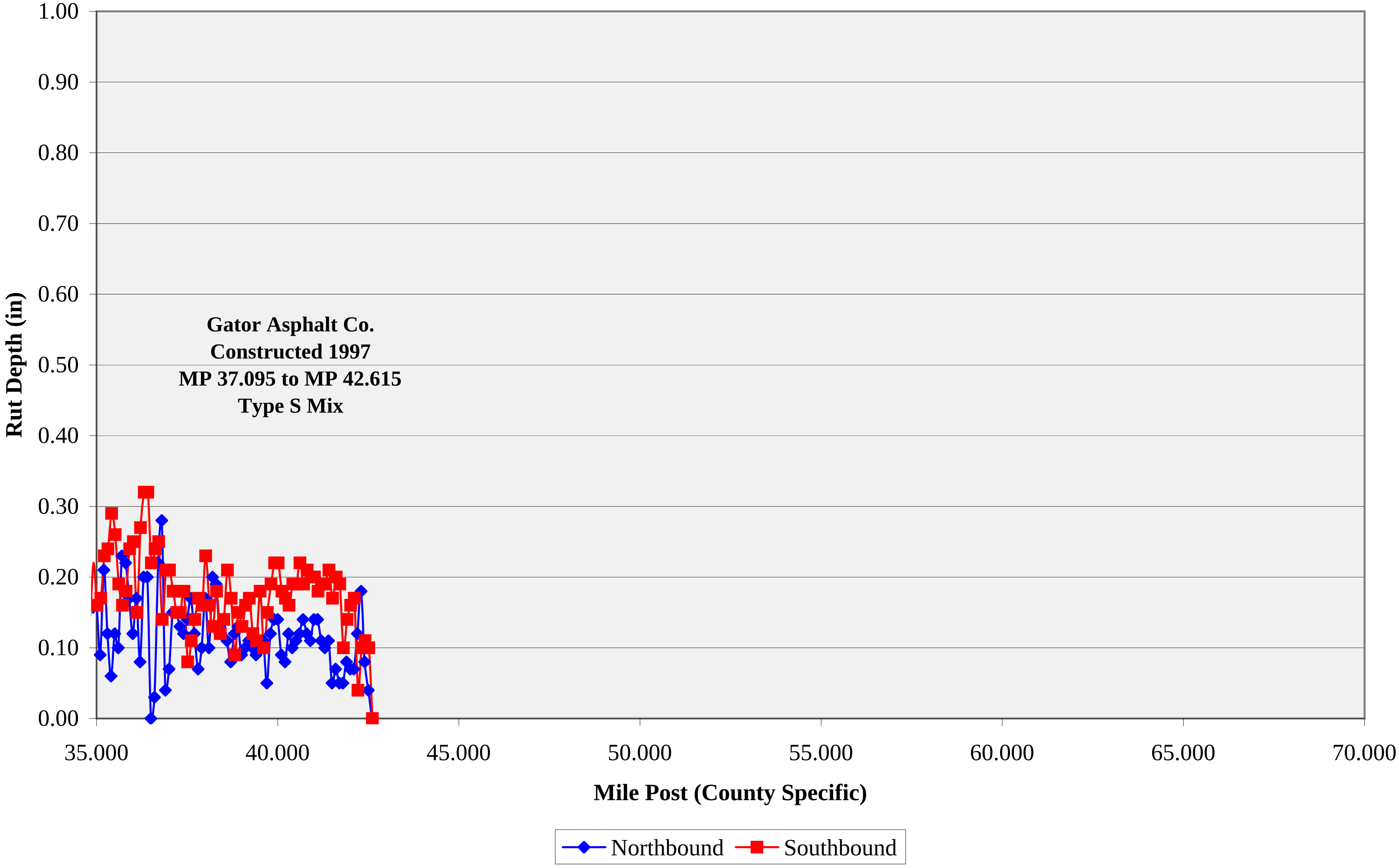
I-75, Hillsborough Co (10075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Couch, Inc.
Constructed 1990
MP 0.000 to MP 6.400
Type S Mix
Ajax Paving Industries, Inc.
Constructed 1990
MP 6.400 to MP 19.080
Type S Mix
J.W. Conner & Sons, Inc.
Constructed 2004
MP 30.310 to MP 39.835
Northbound
Southbound

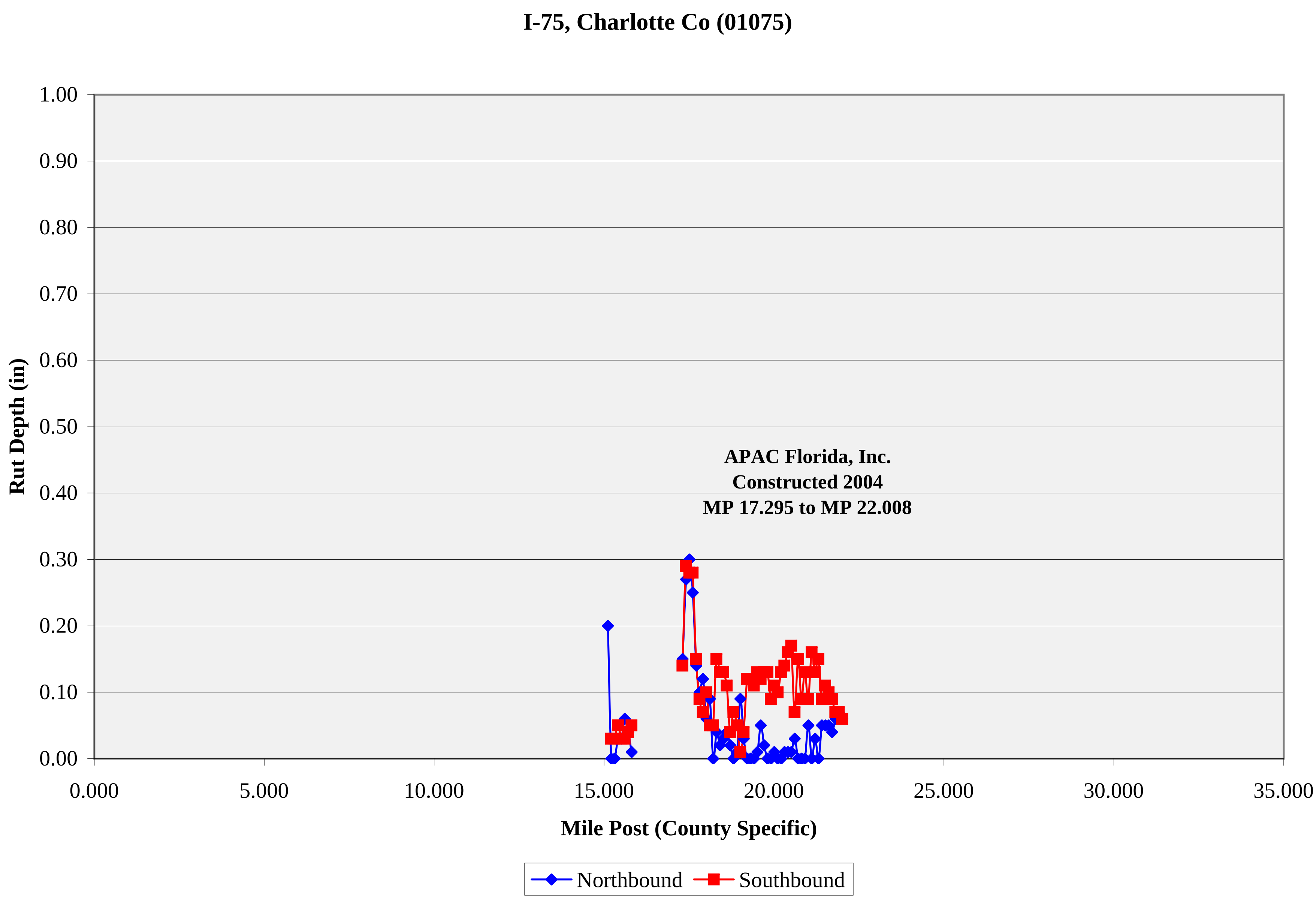

I-75, Hillsborough Co (10075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
J.W. Conner & Sons, Inc.
Constructed 2004
MP 30.310 to MP 39.835
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Northbound
Southbound

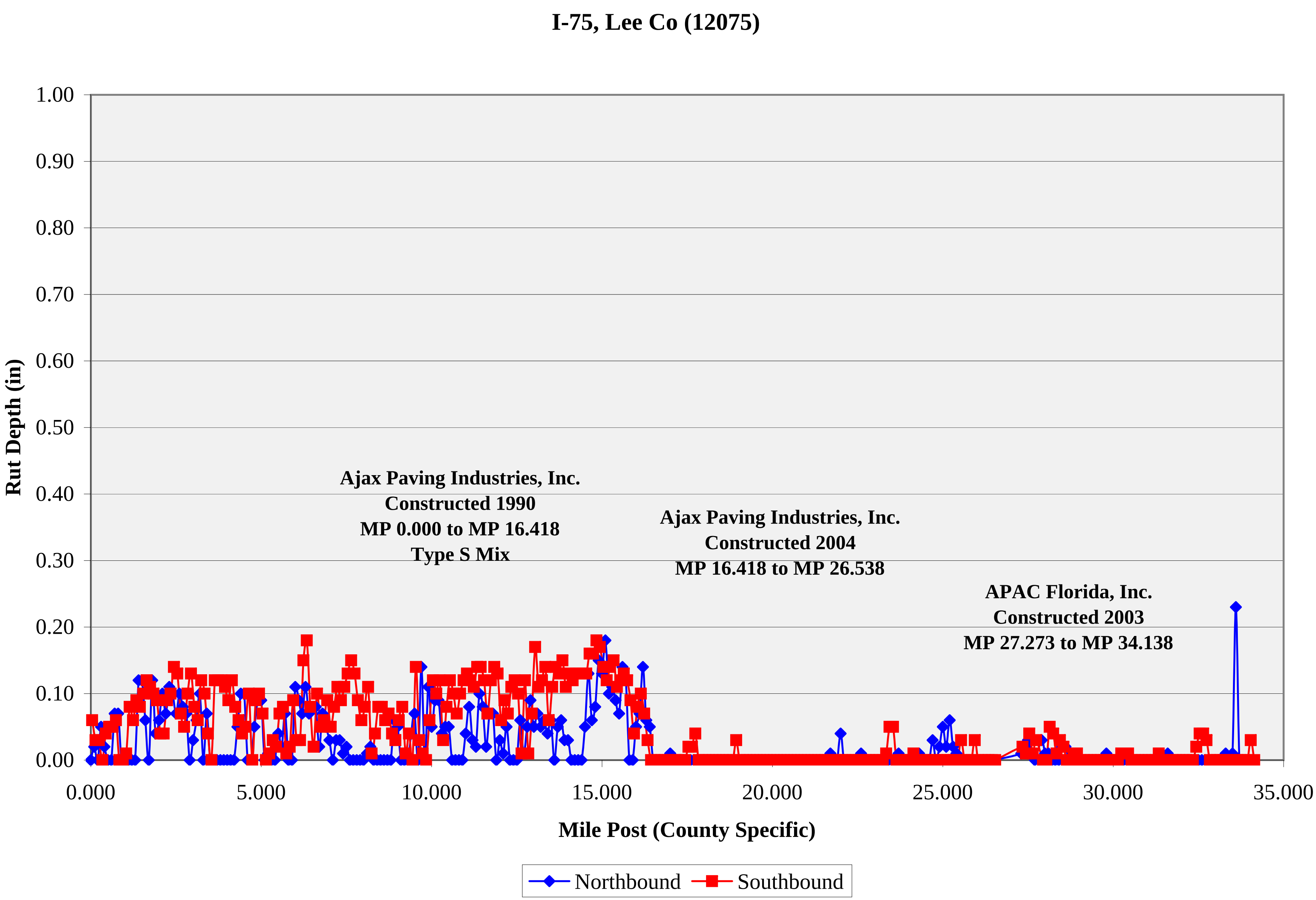

I-75, Manatee Co (13075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Gator Asphalt Co.
Constructed 1999
MP 0.000 to MP 3.750
Type S Mix
APAC Florida, Inc.
Constructed 1994
MP 3.750 to MP 8.288
Type S Mix
Gator Asphalt Co.
Constructed 1997
MP 11.049 to MP 12.896
Type S Mix
Gator Asphalt Co.
Constructed 1997
MP 8.288 to MP 10.307
Type S Mix
Gator Asphalt Co.
Constructed 1994
MP 12.896 to MP 15.723
Type S Mix
Ajax Paving Industries, Inc.
Constructed 2004
MP 15.723 to MP 20.571
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound


I-75, Saratosa Co (17075)
APAC Florida, Inc.
Constructed 2002
MP 17.753 to MP 29.039
Ajax Paving Industries, Inc.
Constructed 1990
MP 0.000 to MP 14.753
Type S Mix
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

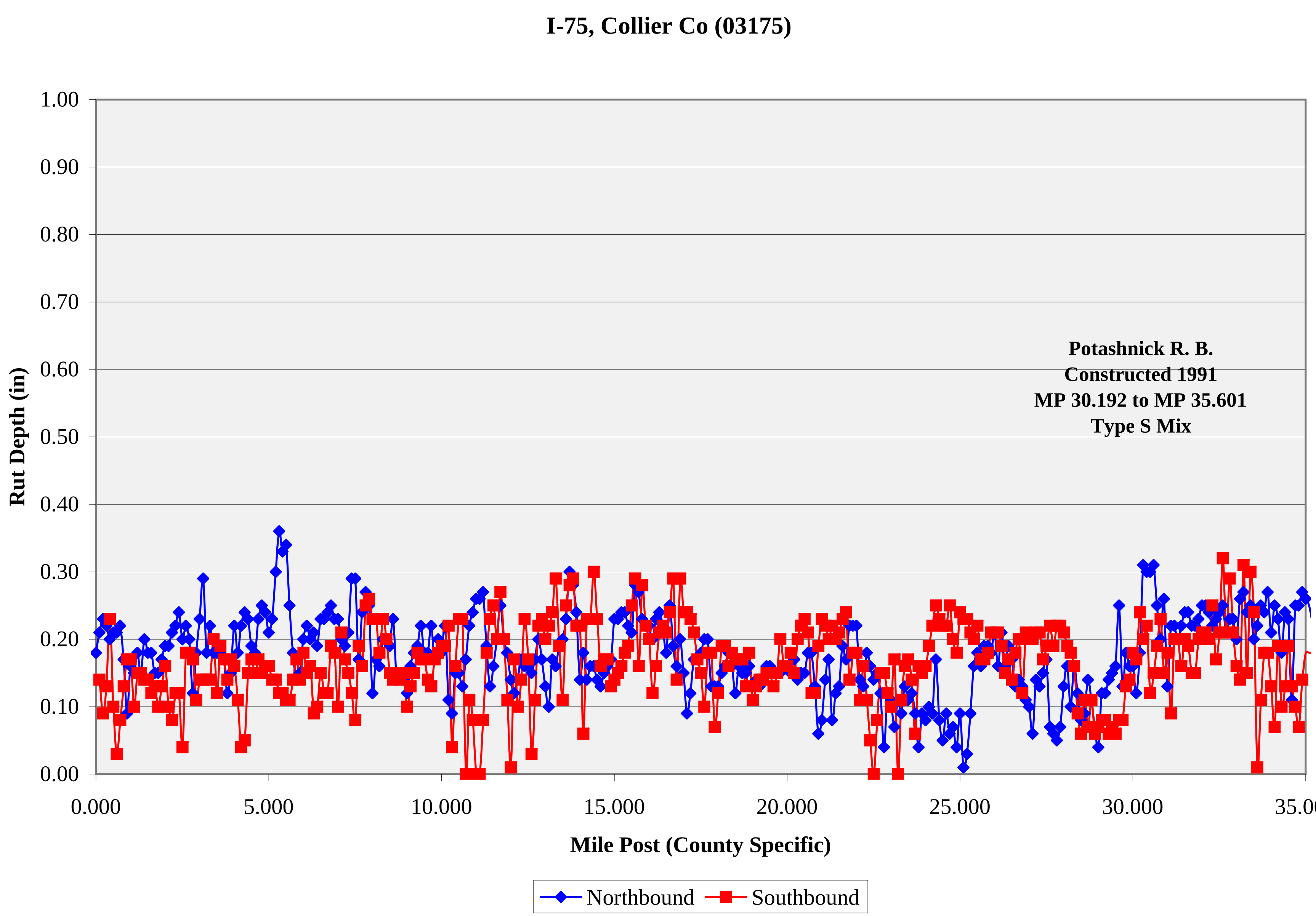
I-75, Saratosa Co (17075)

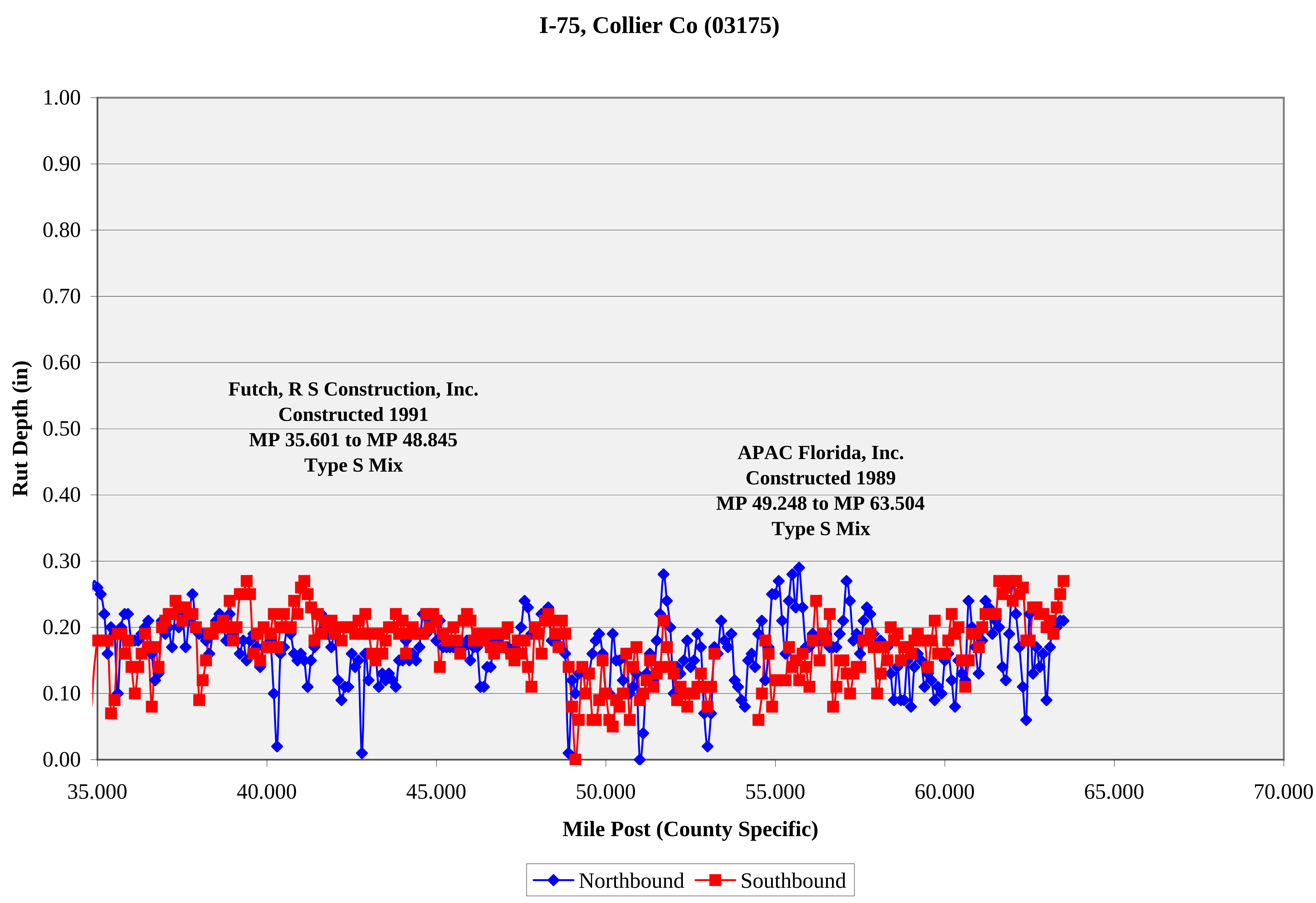



I-75, Charlotte Co (01075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
APAC Florida, Inc.
Constructed 2004
MP 17.295 to MP 22.008
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



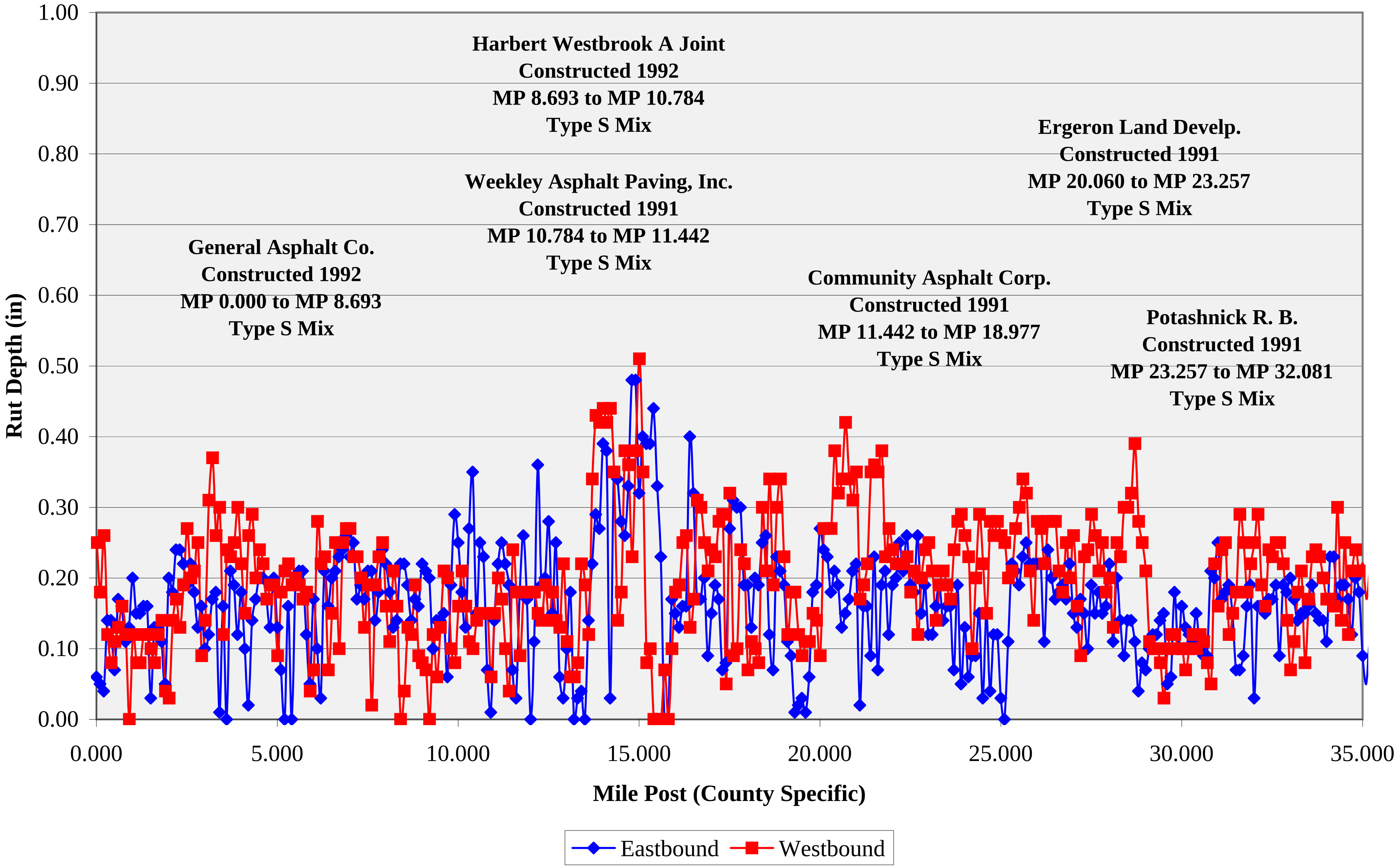
I-75, Lee Co (12075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Ajax Paving Industries, Inc.
Constructed 1990
MP 0.000 to MP 16.418
Type S Mix
Ajax Paving Industries, Inc.
Constructed 2004
MP 16.418 to MP 26.538
APAC Florida, Inc.
Constructed 2003
MP 27.273 to MP 34.138
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

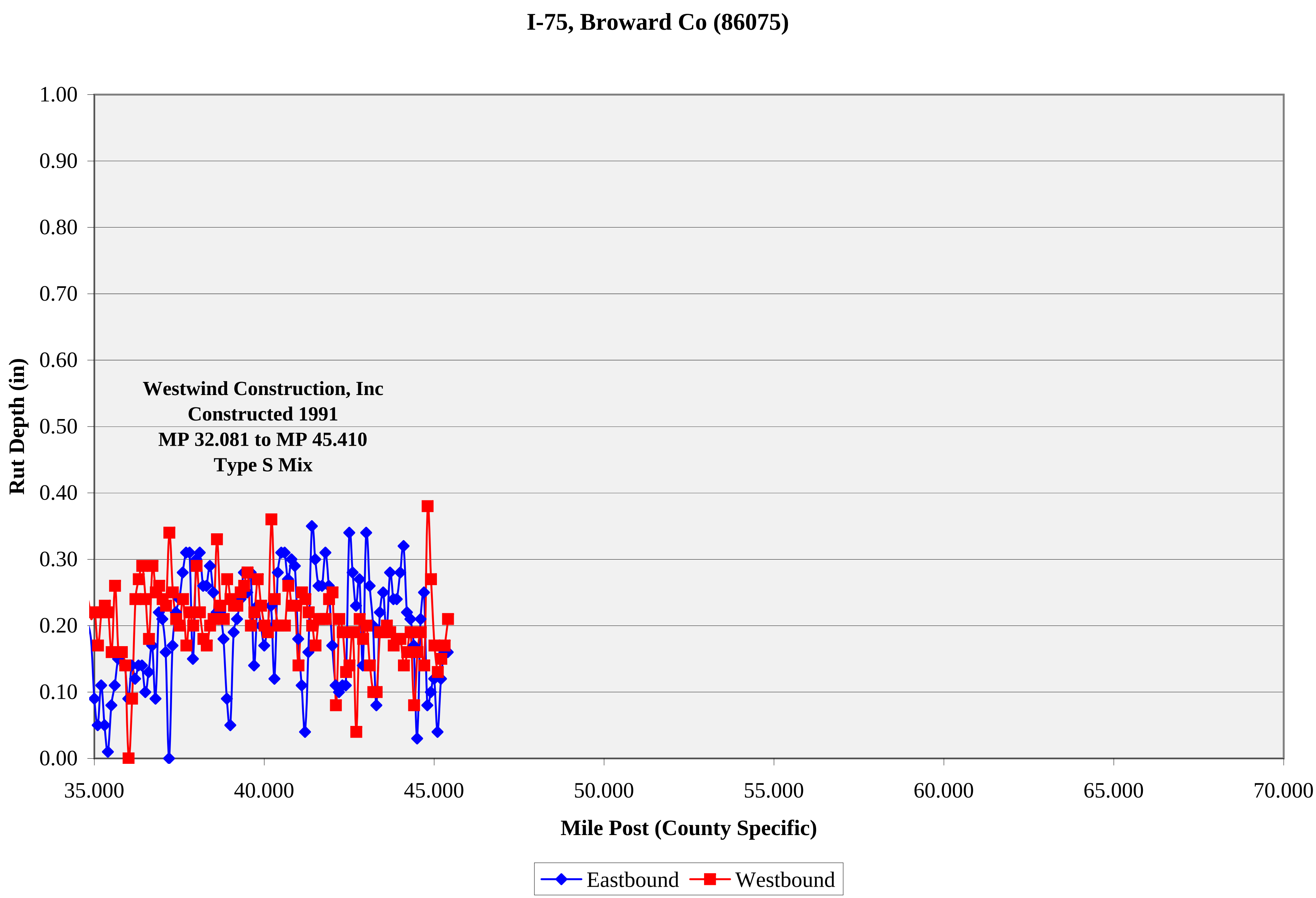

I-75, Collier Co (03175)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Potashnick R. B.
Constructed 1991
MP 30.192 to MP 35.601
Type S Mix
Northbound
Southbound

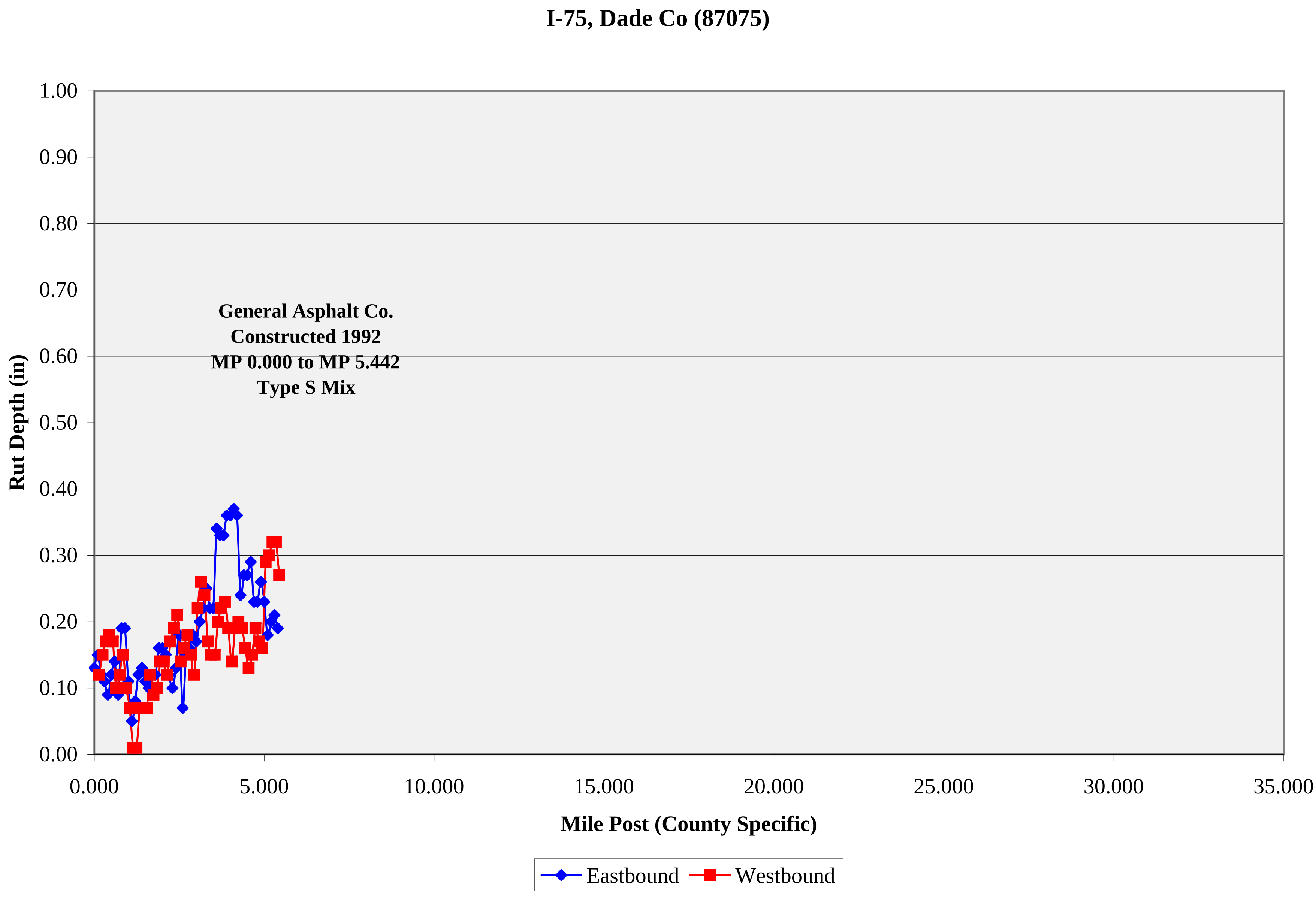


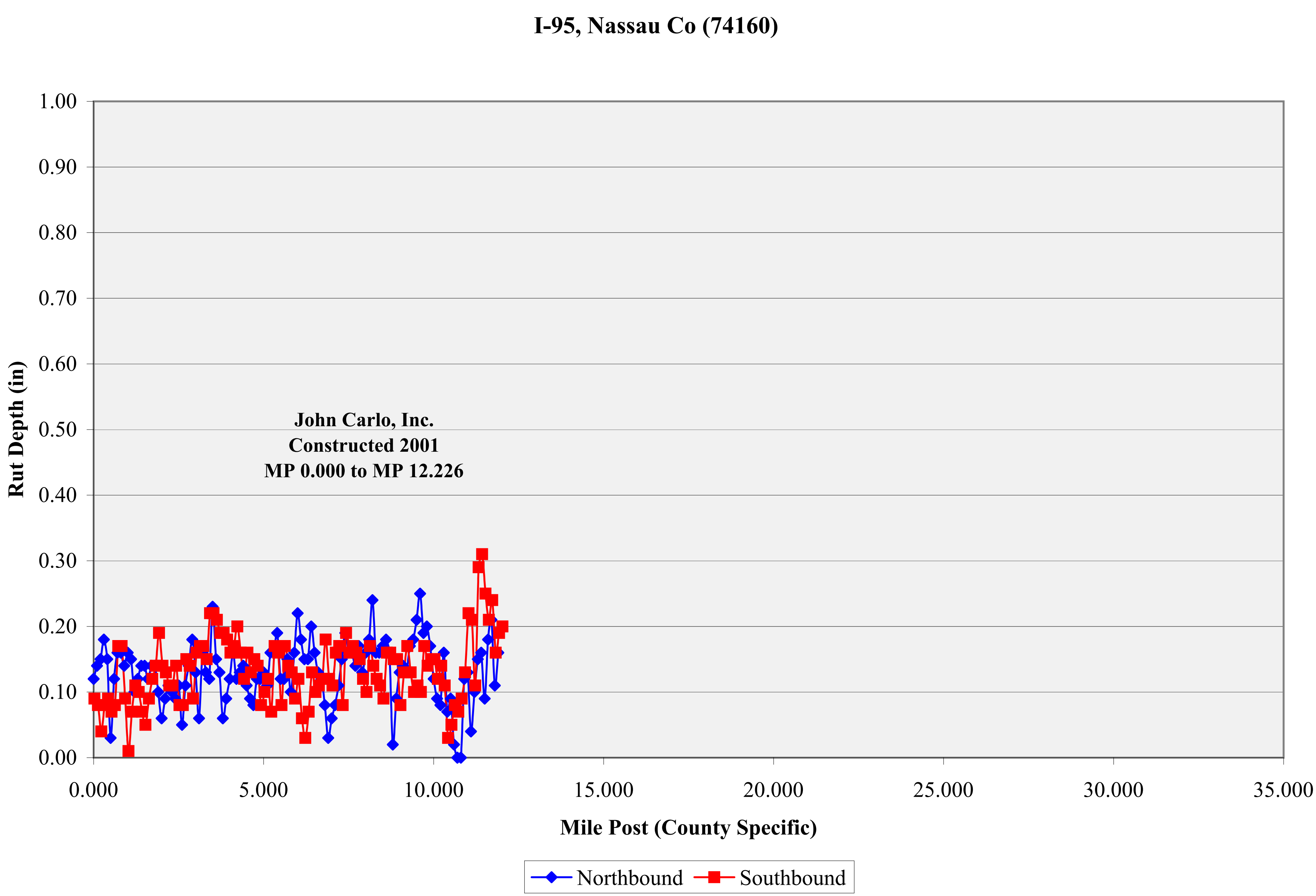
I-75, Collier Co (03175)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Futch, R S Construction, Inc.
Constructed 1991
MP 35.601 to MP 48.845
Type S Mix
APAC Florida, Inc.
Constructed 1989
MP 49.248 to MP 63.504
Type S Mix
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Northbound
Southbound

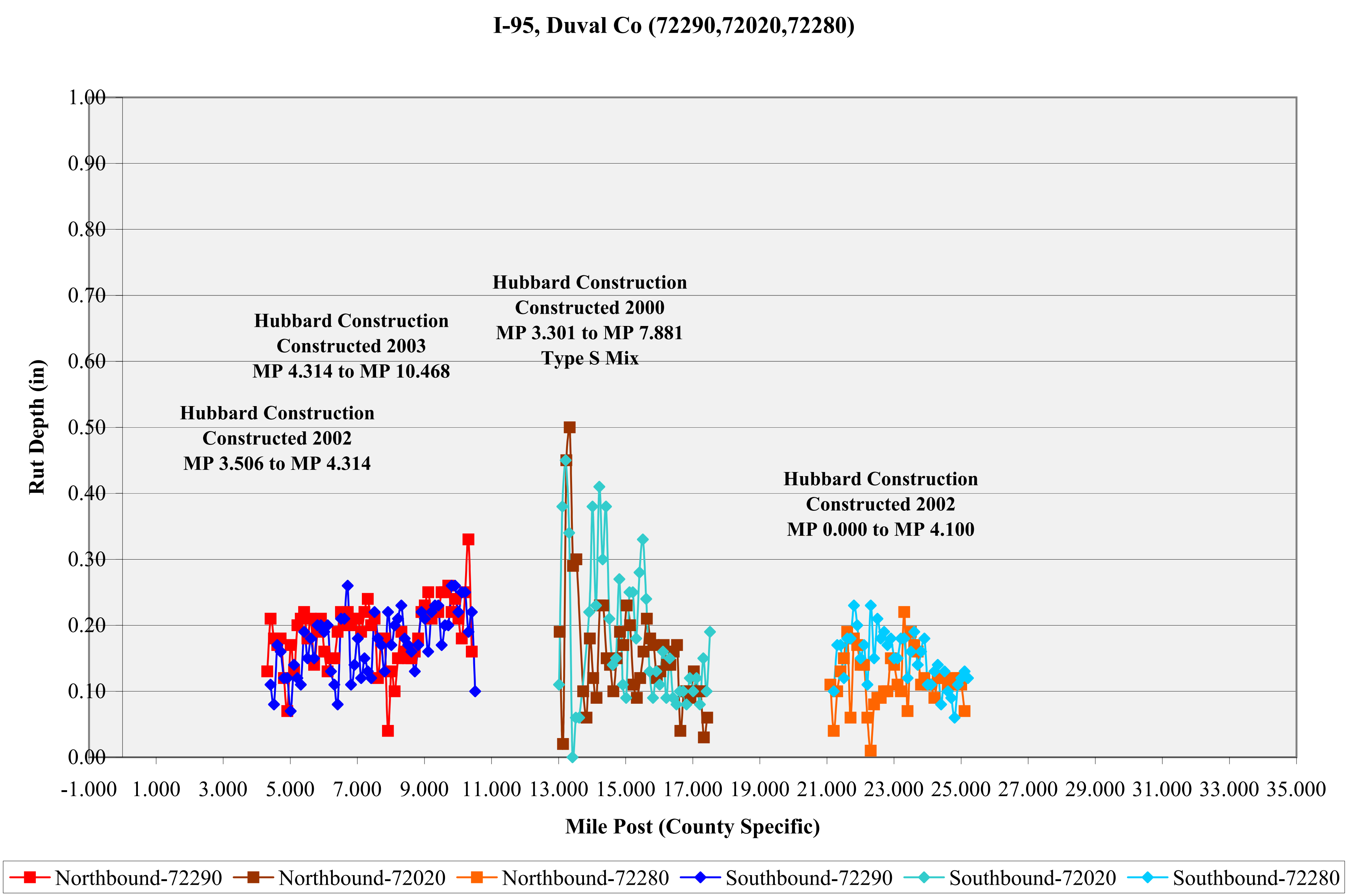
I-75, Broward Co (86075)

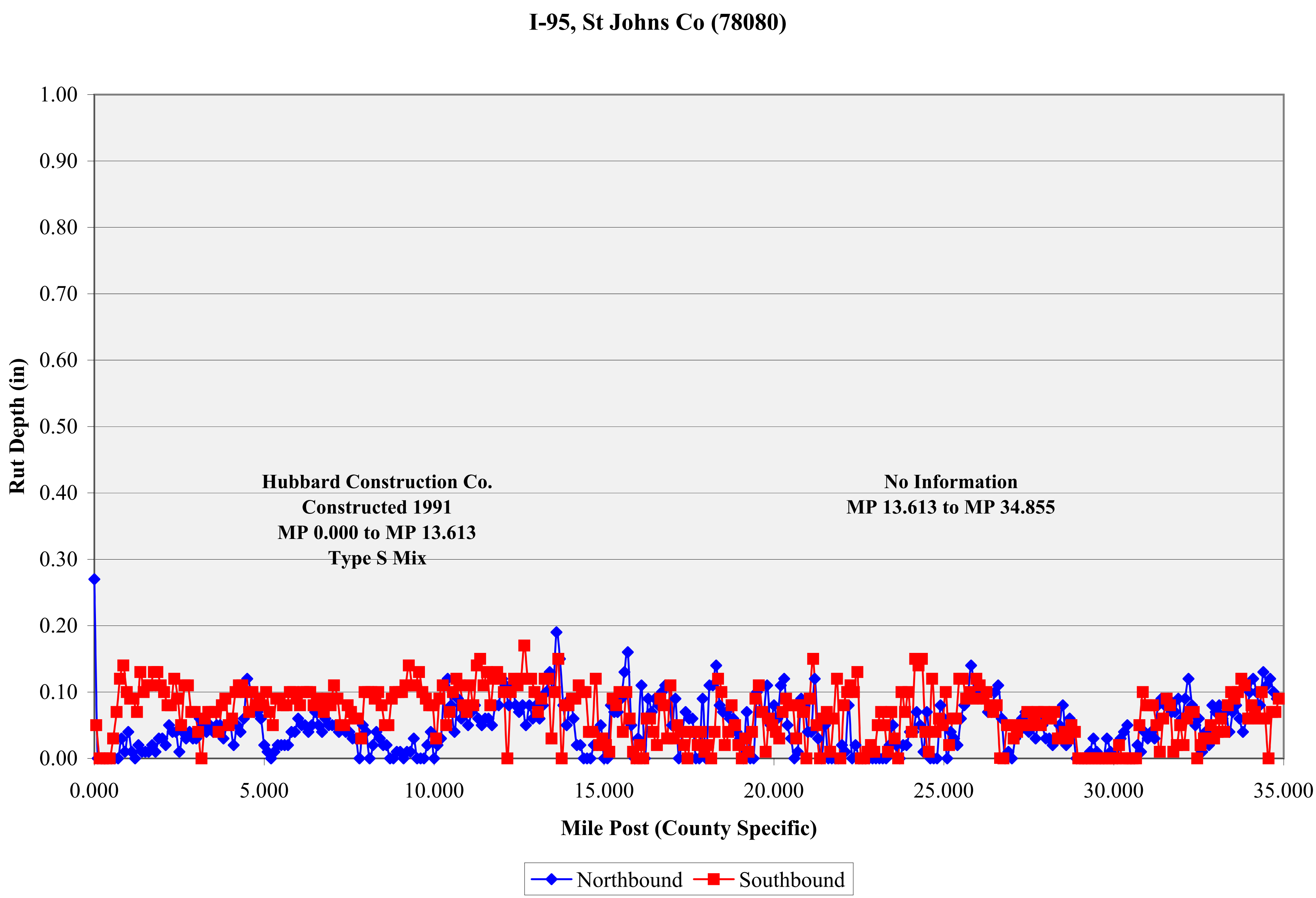


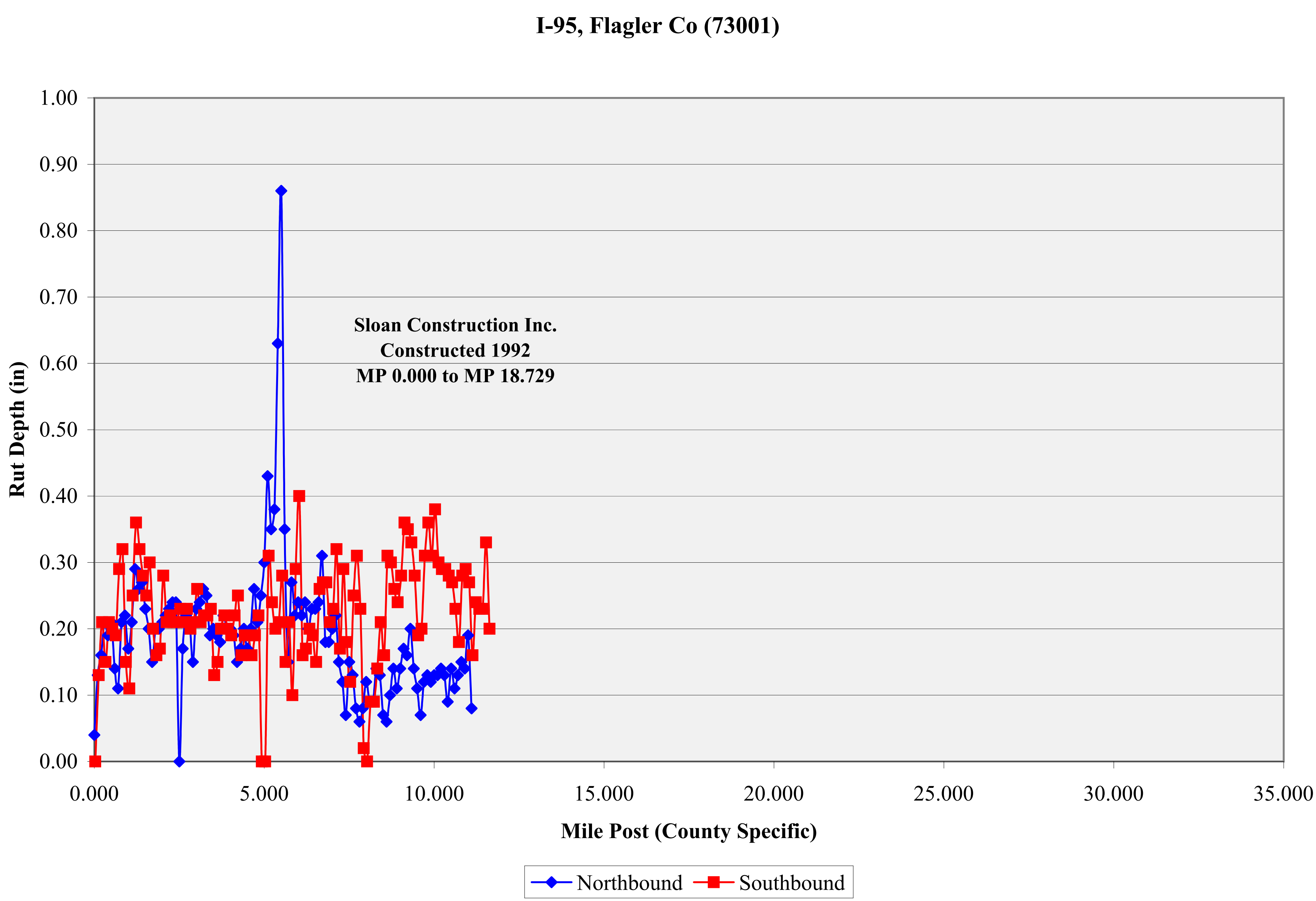

I-75, Broward Co (86075)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Westwind Construction, Inc
Constructed 1991
MP 32.081 to MP 45.410
Type S Mix
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Eastbound
Westbound

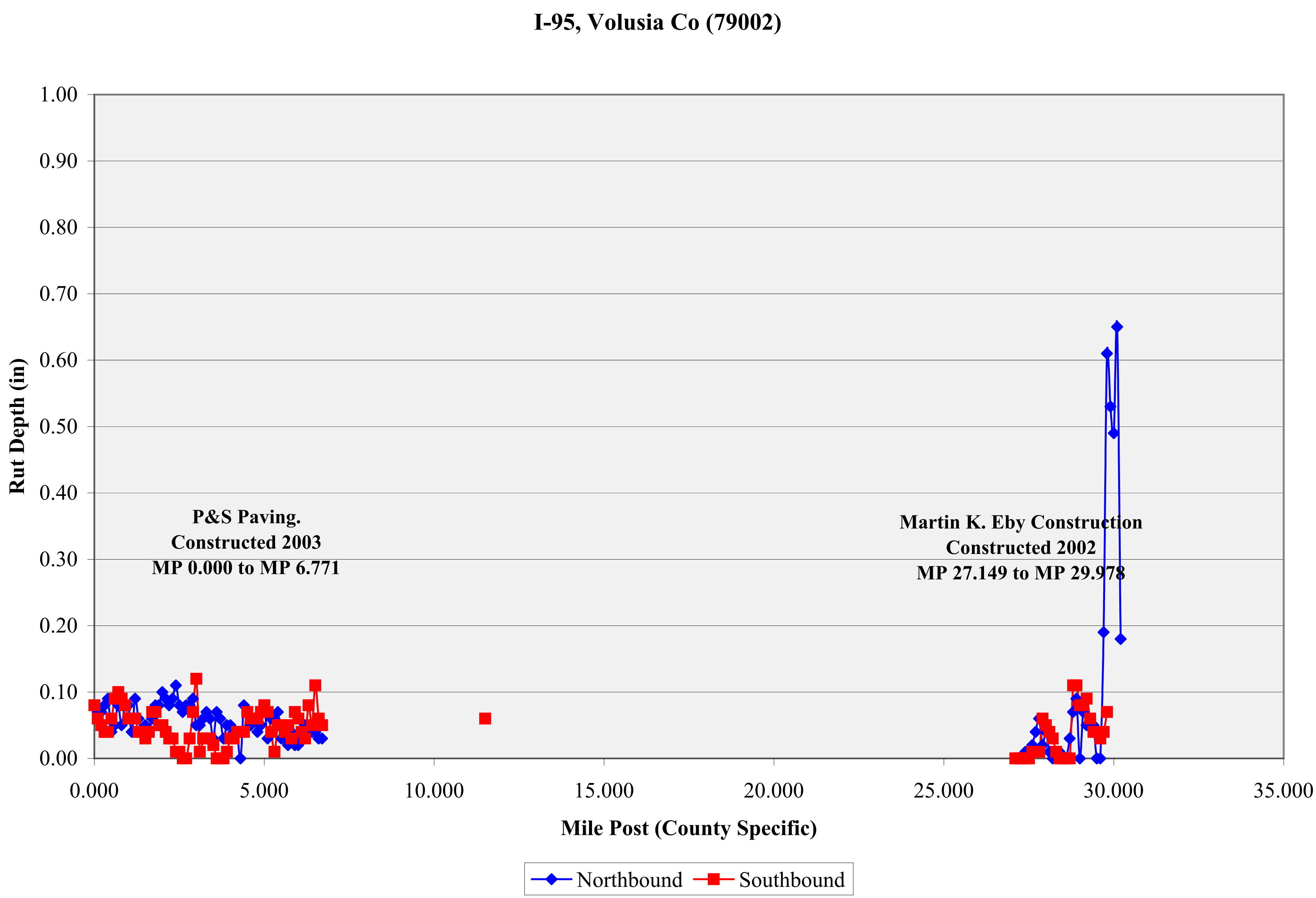

I-75, Dade Co (87075)
General Asphalt Co.
Constructed 1992
MP 0.000 to MP 5.442
Type S Mix
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Eastbound
Westbound


I-95, Nassau Co (74160)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
John Carlo, Inc.
Constructed 2001
MP 0.000 to MP 12.226
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

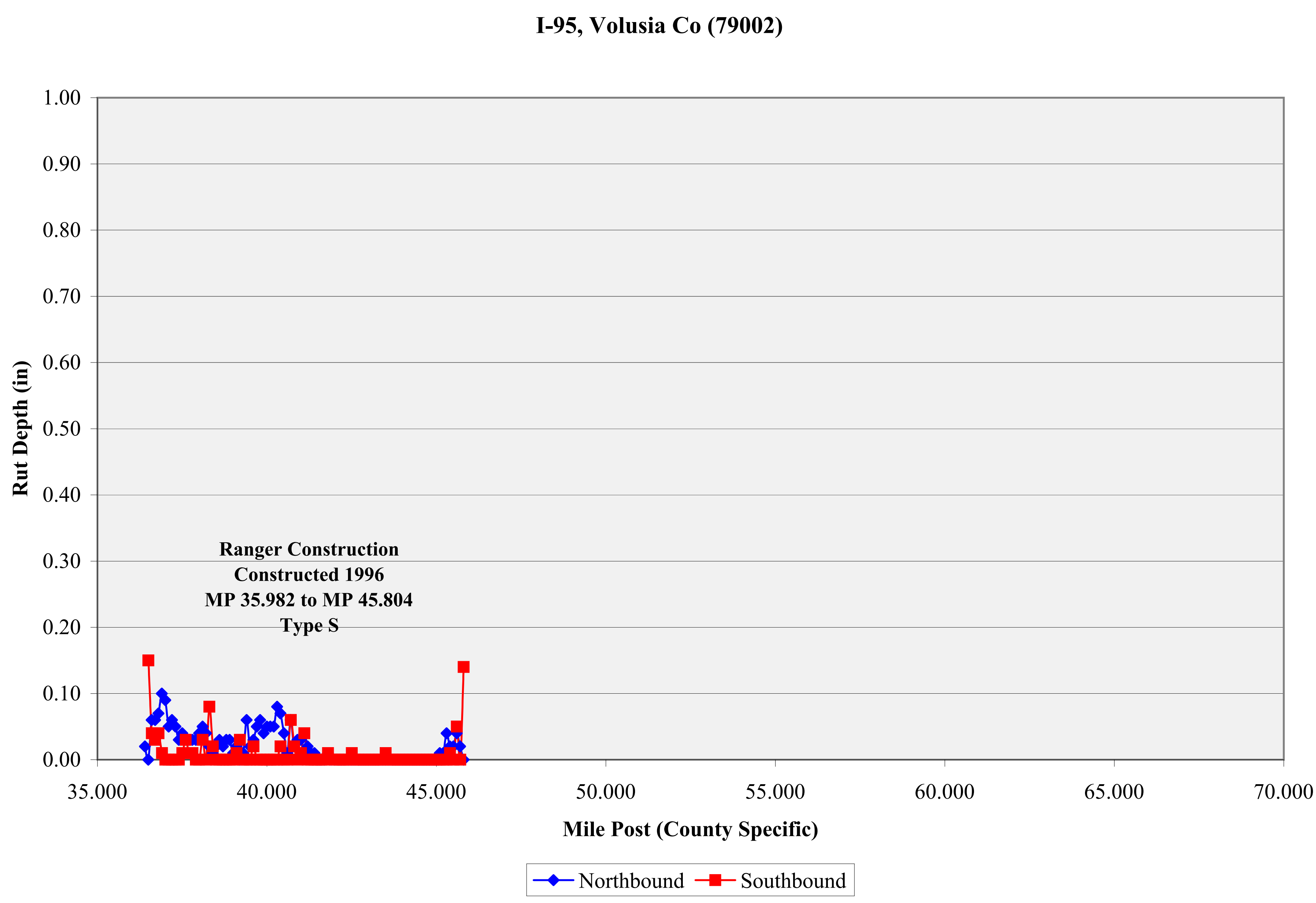

I-95, Duval Co (72290,72020,72280)
Hubbard Construction
Constructed 2002
MP 3.506 to MP 4.314
Hubbard Construction
Constructed 2003
MP 4.314 to MP 10.468
Hubbard Construction
Constructed 2000
MP 3.301 to MP 7.881
Type S Mix
Hubbard Construction
Constructed 2002
MP 0.000 to MP 4.100
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
-1.000 1.000 3.000 5.000 7.000 9.000 11.000 13.000 15.000 17.000 19.000 21.000 23.000 25.000 27.000 29.000 31.000 33.000 35.000
Mile Post (County Specific)
Northbound-72290
Northbound-72020
Northbound-72280
Southbound-72290
Southbound-72020
Southbound-72280

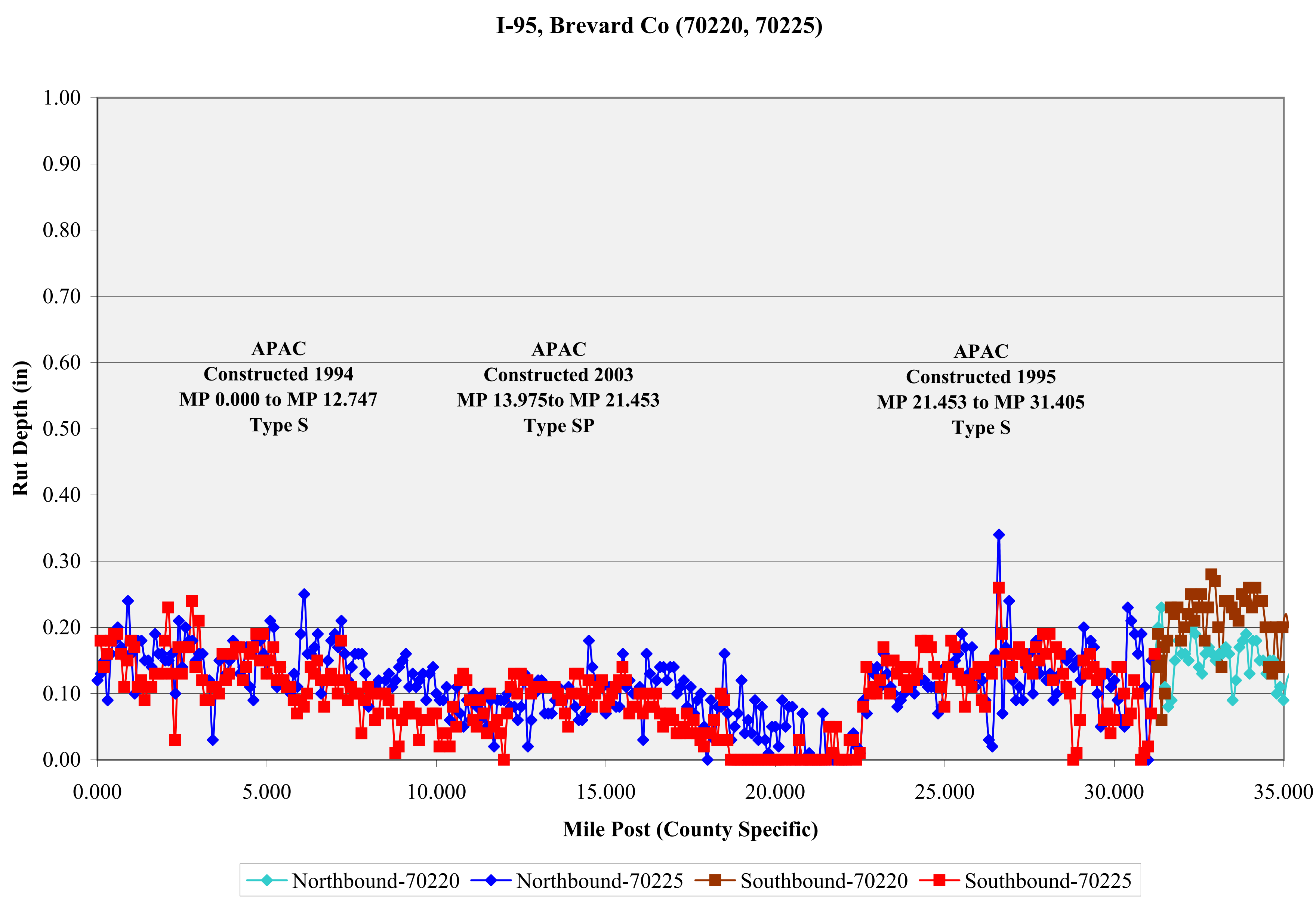

I-95, St Johns Co (78080)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Hubbard Construction Co.
Constructed 1991
MP 0.000 to MP 13.613
Type S Mix
No Information
MP 13.613 to MP 34.855
Northbound
Southbound


I-95, Flagler Co (73001)
Sloan Construction Inc.
Constructed 1992
MP 0.000 to MP 18.729
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



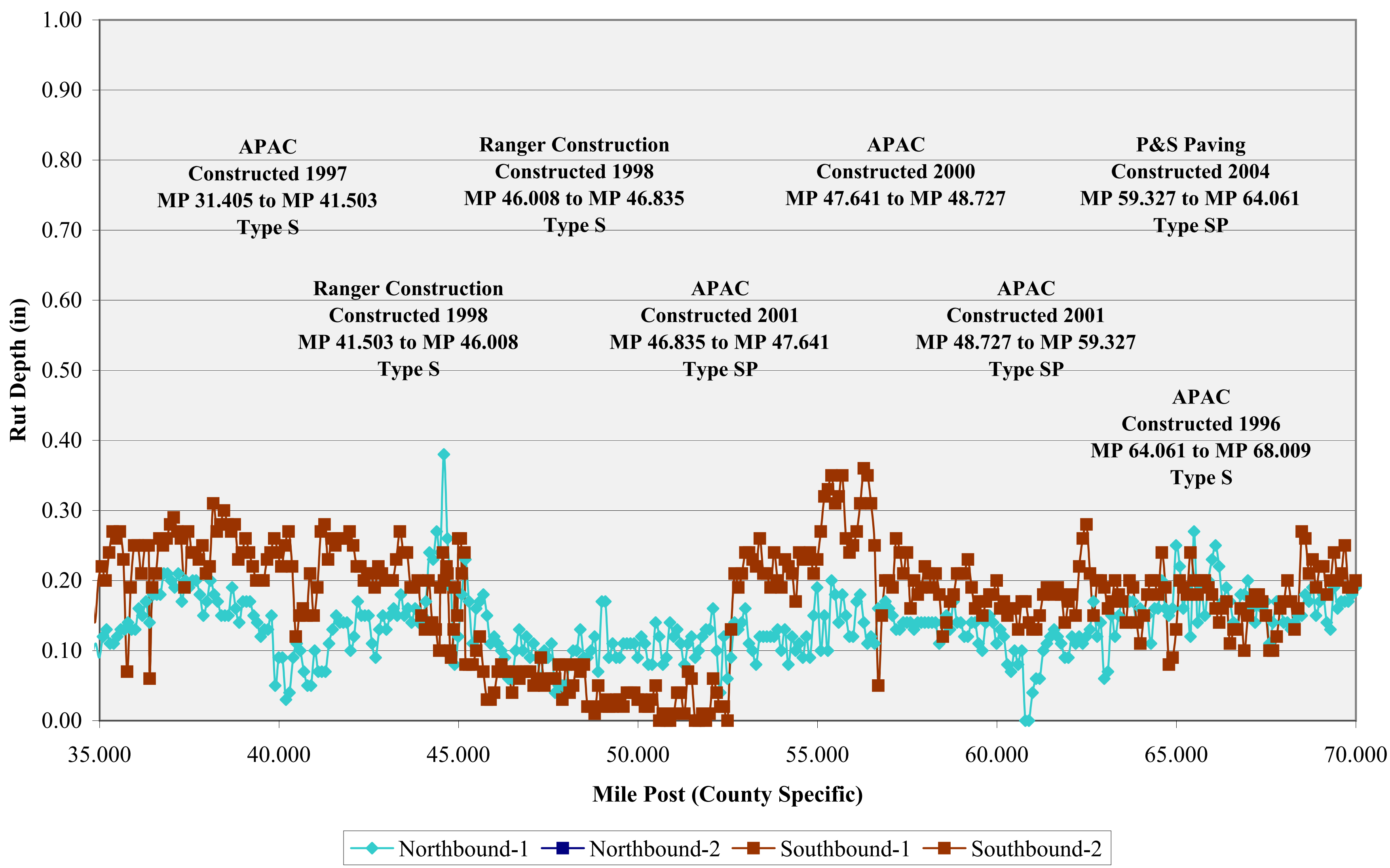
I-95, Volusia Co (79002)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Rut Depth (in)
P&S Paving.
Constructed 2003
MP 0.000 to MP 6.771
Martin K. Eby Construction
Constructed 2002
MP 27.149 to MP 29.978
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

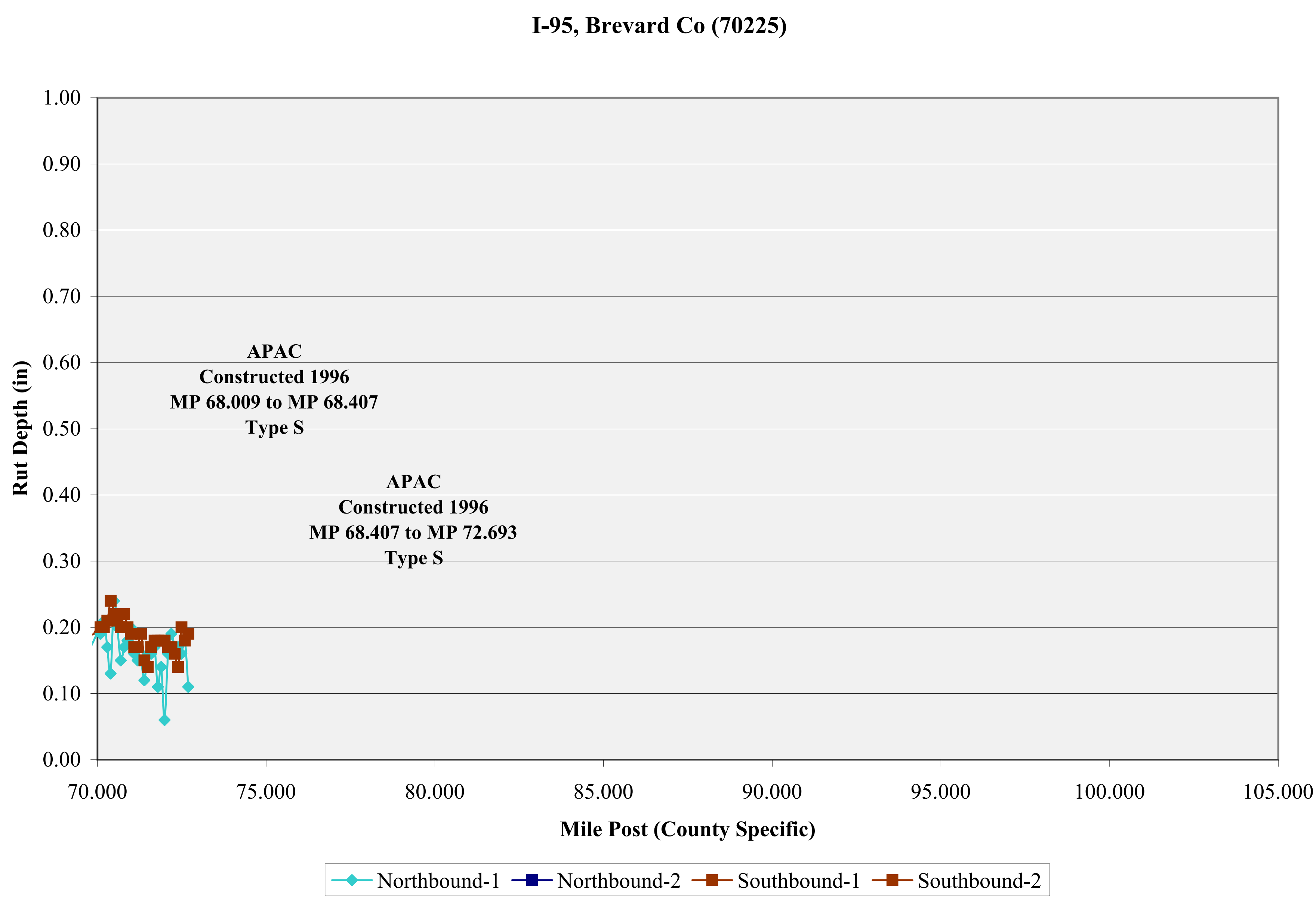

I-95, Volusia Co (79002)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Ranger Construction
Constructed 1996
MP 35.982 to MP 45.804
Type S
35.000
40.000
45.000
50.000
55.000
60.000
65.000
70.000
Mile Post (County Specific)
Northbound
Southbound

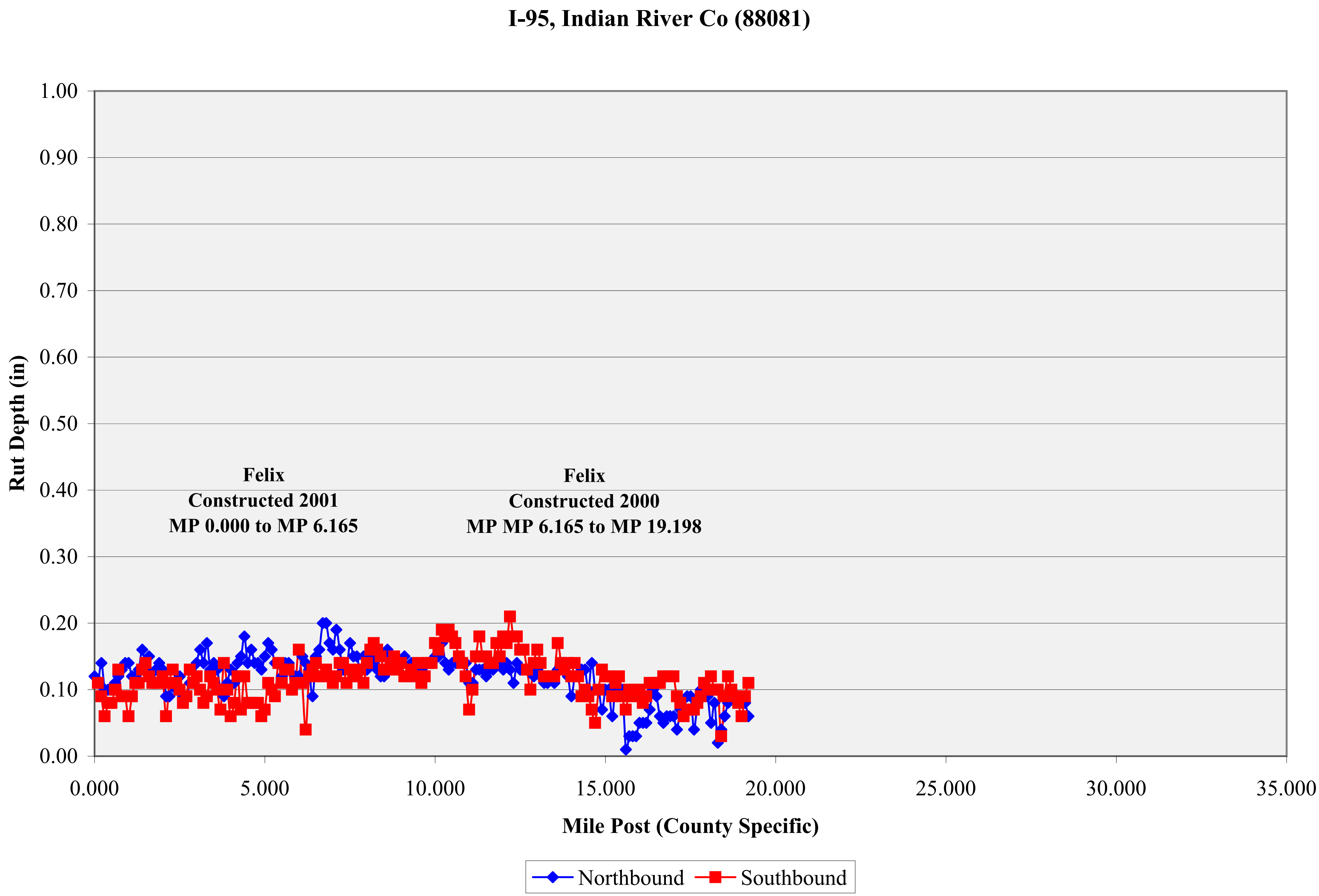


I-95, Brevard Co (70220, 70225)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
APAC
Constructed 1994
MP 0.000 to MP 12.747
Type S
APAC
Constructed 2003
MP 13.975to MP 21.453
Type SP
APAC
Constructed 1995
MP 21.453 to MP 31.405
Type S
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound-70220
Northbound-70225
Southbound-70220
Southbound-70225

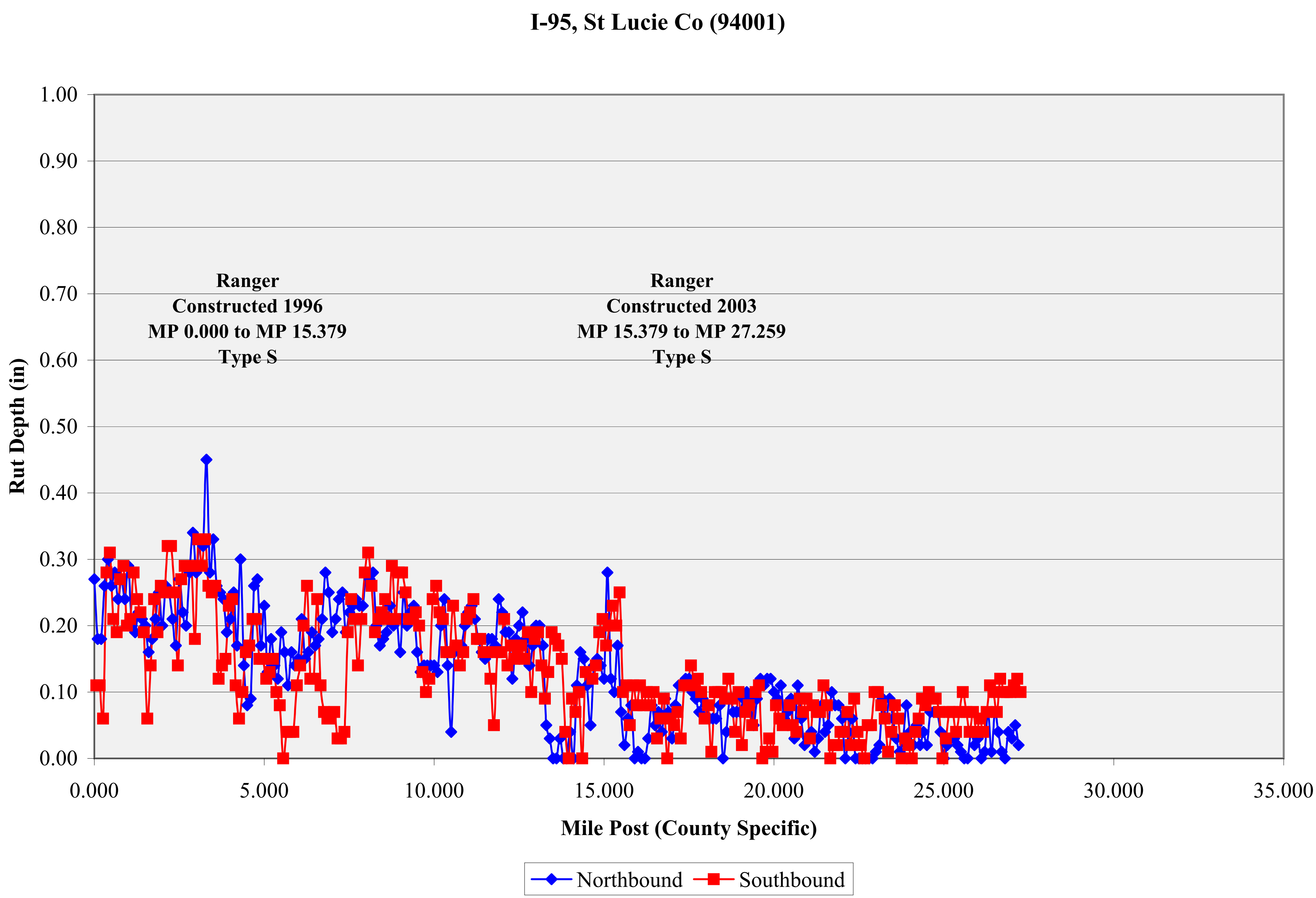
I-95, Brevard Co (70225)



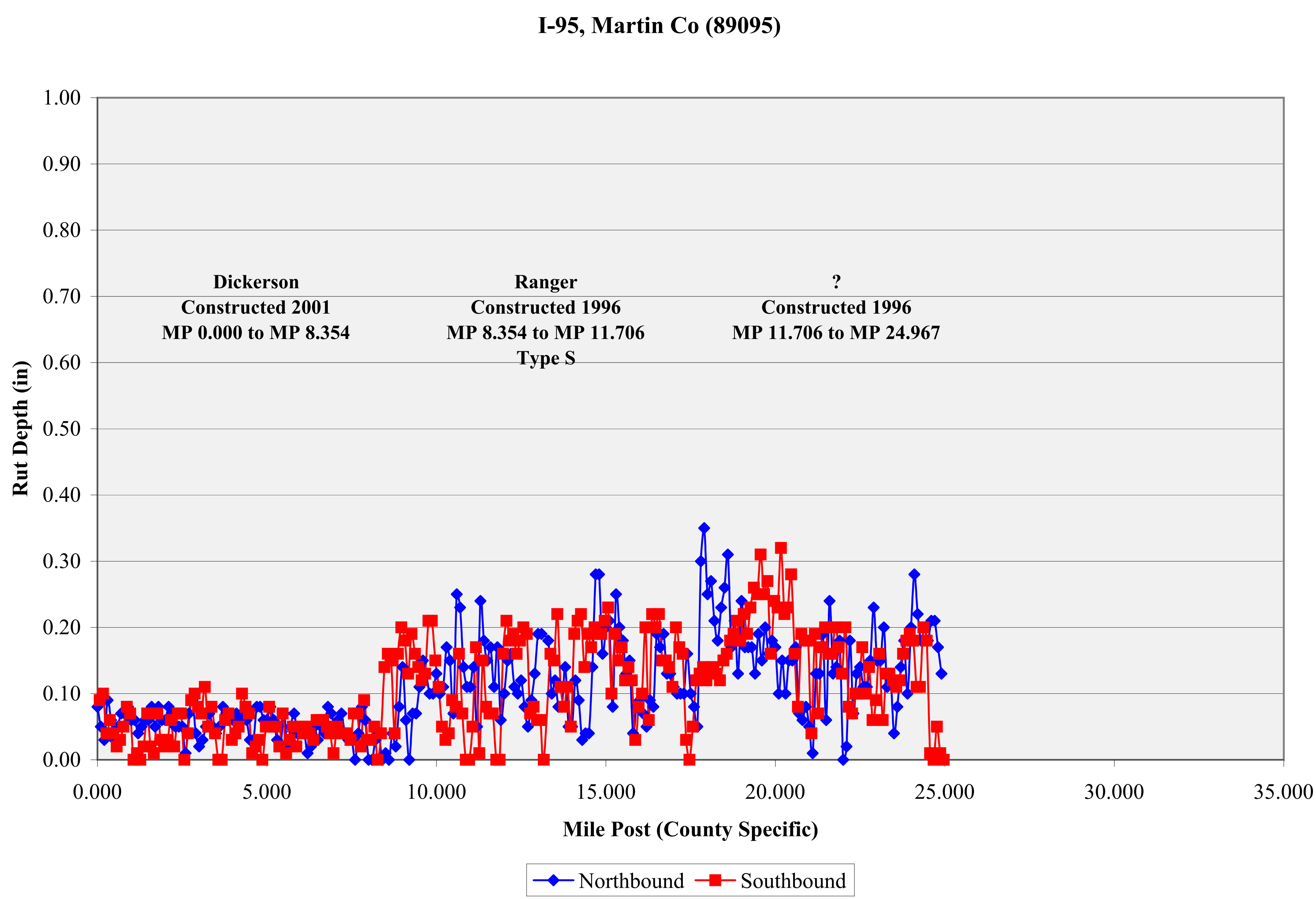

I-95, Brevard Co (70225)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
APAC
Constructed 1996
MP 68.009 to MP 68.407
Type S
APAC
Constructed 1996
MP 68.407 to MP 72.693
Type S
70.000
75.000
80.000
85.000
90.000
95.000
100.000
105.000
Mile Post (County Specific)
Northbound-1
Northbound-2
Southbound-1
Southbound-2



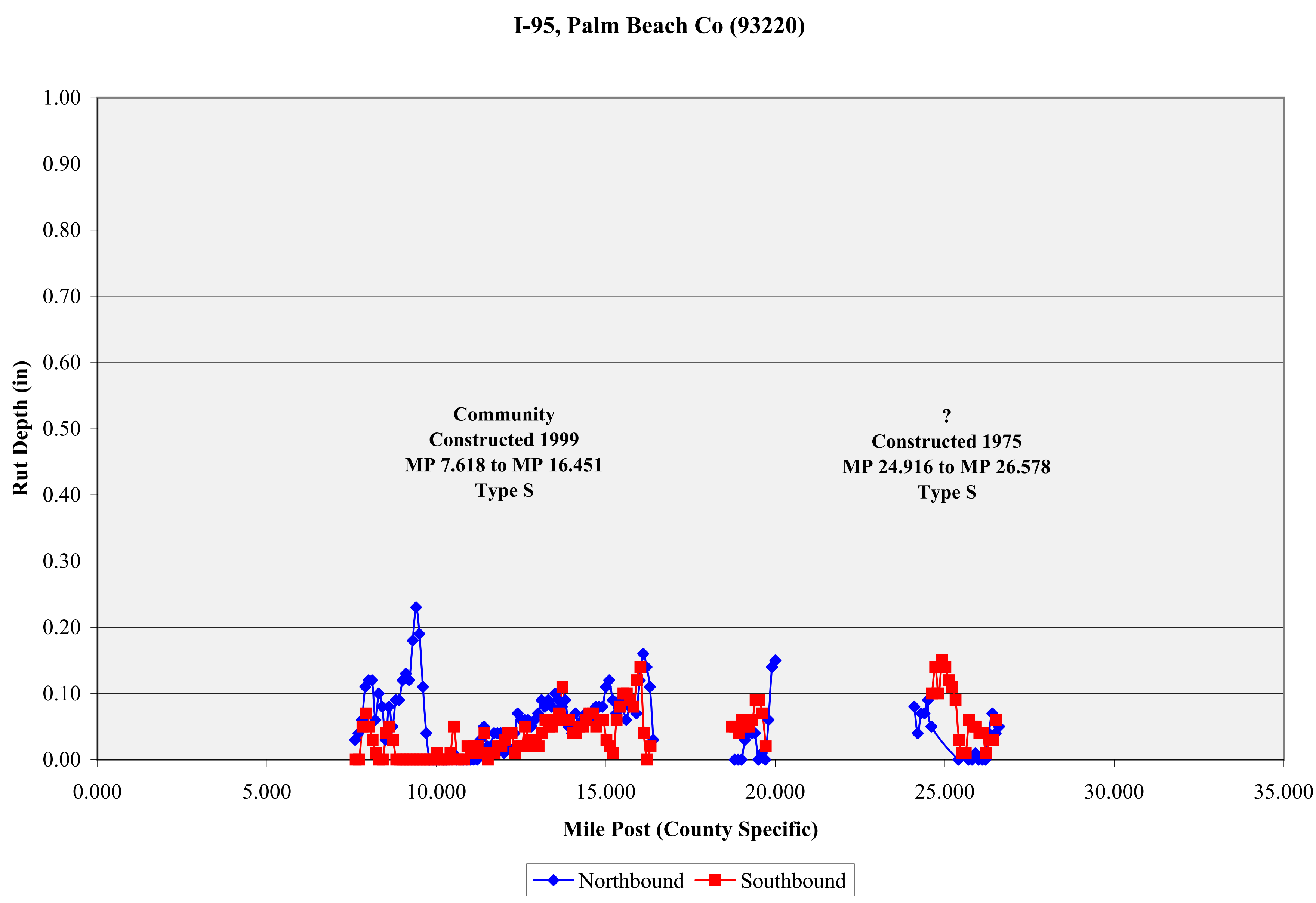
I-95, Indian River Co (88081)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Felix
Constructed 2001
MP 0.000 to MP 6.165
Felix
Constructed 2000
MP MP 6.165 to MP 19.198
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



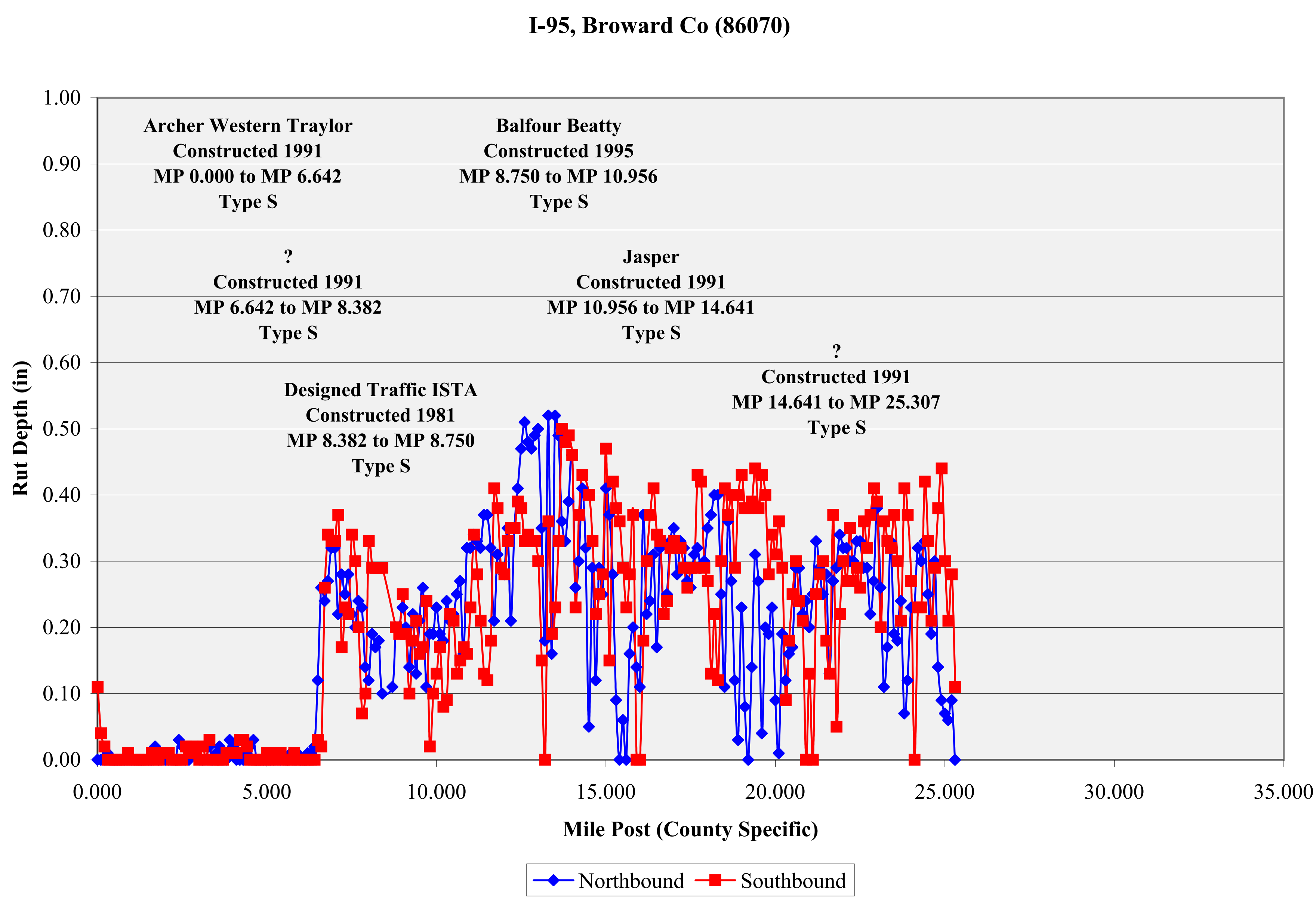
I-95, St Lucie Co (94001)
Ranger
Constructed 1996
MP 0.000 to MP 15.379
Type S
Ranger
Constructed 2003
MP 15.379 to MP 27.259
Type S
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



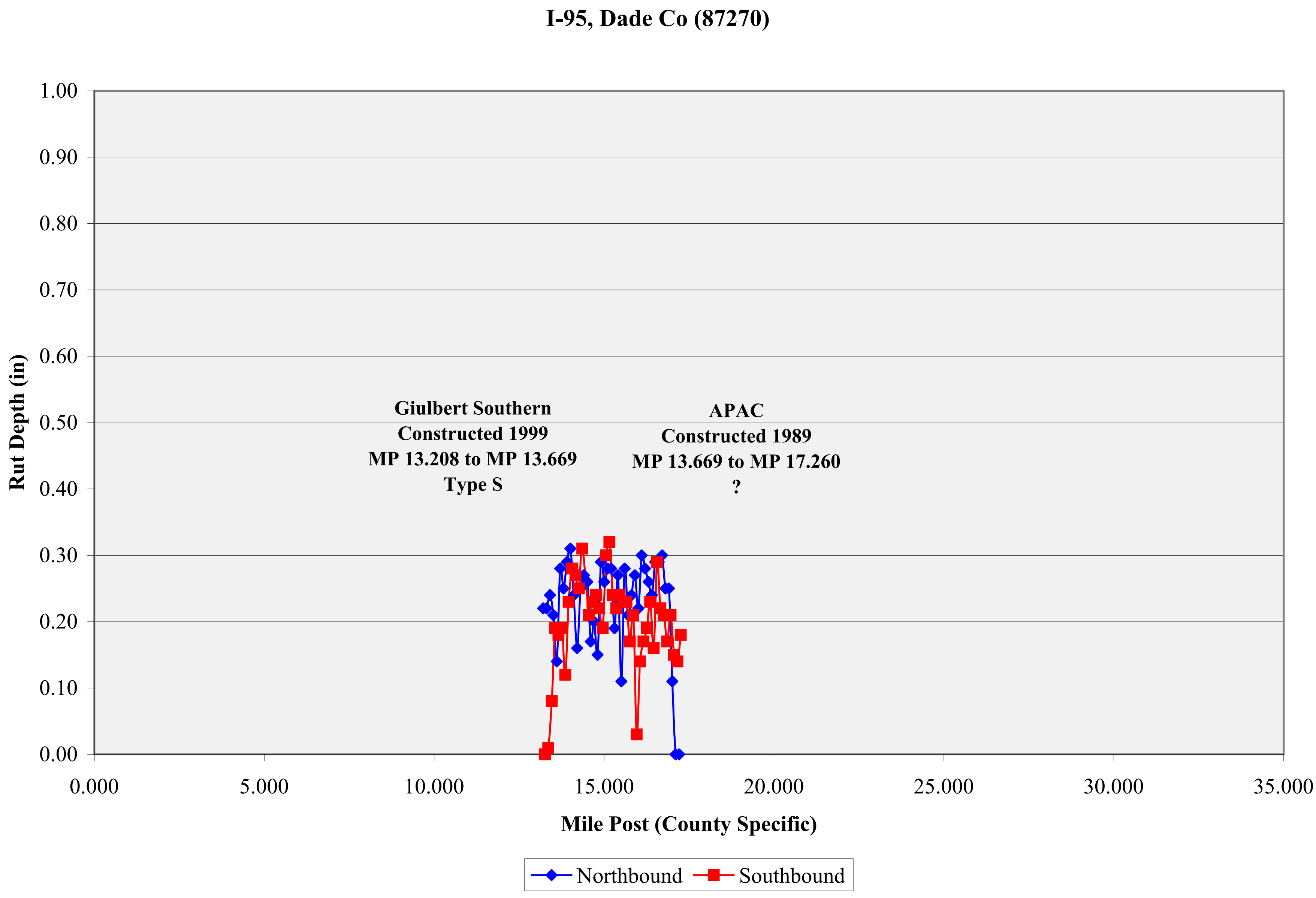
I-95, Martin Co (89095)
Dickerson
Constructed 2001
MP 0.000 to MP 8.354
Ranger
Constructed 1996
MP 8.354 to MP 11.706
Type S
?
Constructed 1996
MP 11.706 to MP 24.967
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



I-95, Palm Beach Co (93220)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Community
Constructed 1999
MP 7.618 to MP 16.451
Type S
?
Constructed 1975
MP 24.916 to MP 26.578
Type S
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound



I-95, Broward Co (86070)
Archer Western Traylor
Constructed 1991
MP 0.000 to MP 6.642
Type S
Balfour Beatty
Constructed 1995
MP 8.750 to MP 10.956
Type S
?
Constructed 1991
MP 6.642 to MP 8.382
Type S
Jasper
Constructed 1991
MP 10.956 to MP 14.641
Type S
?
Constructed 1991
MP 14.641 to MP 25.307
Type S
Designed Traffic ISTA
Constructed 1981
MP 8.382 to MP 8.750
Type S
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound


I-95, Dade Co (87270)
Rut Depth (in)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Giulbert Southern
Constructed 1999
MP 13.208 to MP 13.669
Type S
APAC
Constructed 1989
MP 13.669 to MP 17.260
?
0.000
5.000
10.000
15.000
20.000
25.000
30.000
35.000
Mile Post (County Specific)
Northbound
Southbound

Appendix C

Individual Paired Project Summary Packages

Includes:

Project Information Sheets
Summarized PCS Rutting Data
Summarized QA, IA, and QC Production Data
Flexible Pavement Design Summary Sheets
Project Questionnaire

Project Information

Fin. Project ID:	**222721-1-52-01**
Contractor:	**Anderson Columbia Co., Inc.**
County / District:	**Okaloosa Co. / District 3**
Begin / End M.P.:	**16.991 - 24.554**
Proj. Description:	**I-10 - From East Of Shoal River Bridge to Walton County Line**
Date Of Construction:	**4/3/2001 - 4/29/2002**
Plant No.:	**A0665 - Milton, FL 32530**
Spec. Version:	**Letting: 12/6/00; Jan-June 1999 Workbook**
Pavement Design:	**Portland Cement Concrete, Cracked and Seated - 200mm (7.87in) ; ARMI Layer; 286 kg/m2 (5.12 in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 19800; % Truck = 26.11**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	
Air Temp. (Avg.):	**Min: 39.4F; Max: 90.2F; Avg: 67.6F**
Comments:	**Poor Performing Job; Paired w/ Project # 222768-1-52-01 (Pair 1)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 57002 FINANCIAL PROJECT NO. 222721 1 52 01
OKALOOSA COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	11/6/2002	10/29/2003	11/3/2004	11/7/2005
MIN	0.01	0.08	0.00	0.00
MAX	0.47	0.52	0.63	0.66
Std Dev.	0.07	0.07	0.11	0.12
AVERAGE	0.23	0.25	0.32	0.31

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	11/6/2002	10/29/2003	11/3/2004	11/7/2005
MIN	0.05	0.00	0.00	0.00
MAX	0.40	0.40	0.70	0.62
Std Dev.	0.05	0.06	0.09	0.10
AVERAGE	0.20	0.20	0.30	0.29

Department - QA Production Data

Coarse 19.0 mm TL-D : 27% #67 Alabama Limestone, 10% #7 Alabama Limestone, 35% S1B Alabama Limestone, 18% Alabama Limestone screenings, 10% Cantonment sand

SP 01-1078A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	3.50	3.29	0.27	2.72	3.77	1.05	31
ASPHALT CONTENT	4.50	4.44	0.20	3.99	4.79	0.80	31
MAX. SP. GRAVITY (GMM)	2.565	2.552	0.004	2.545	2.556	0.011	23
LOT SP. GRAVITY (GMB)		2.421	0.013	2.396	2.443	0.047	23
% MAX. SP. GRAVITY (GMM)		94.8	0.53	93.8	95.9	2.1	23
% PAY		100.0	0.0	100.0	100.0	0.0	25

Coarse 12.5 mm TL-D : 25% #7 Alabama Limestone, 40% S1B Alabama Limestone, 35% Alabama Limestone screenings.

SP 01-1084A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	4.90	0.02	4.88	4.91	0.03	2
ASPHALT CONTENT	5.00	4.66	0.06	4.60	4.71	0.11	2
MAX. SP. GRAVITY (GMM)	2.548	2.542	0.000	2.542	2.542	0.000	2
LOT SP. GRAVITY (GMB)		2.392	0.011	2.381	2.402	0.021	2
% MAX. SP. GRAVITY (GMM)		94.0	0.40	93.6	94.4	0.8	2
% PAY		100.0	0.0	100.0	100.0	0.0	3

LOT 1 CLOSED OUTDUE TO CO TRACTORS LOW AIRVOIDS ON VOLUMETRICS. CHANGED MI DESIGN TO SP 01-1108A.

Coarse 12.5 mm TL-D : 25% #7 Alabama Limestone, 40% S1B Alabama Limestone, 25% Alabama Limestone screenings, 10% Milton sand.

SP 01-1108A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	3.70	0.24	3.13	4.21	1.08	20
ASPHALT CONTENT	5.00	4.88	0.22	4.58	5.50	0.92	19
MAX. SP. GRAVITY (GMM)	2.533	2.539	0.006	2.532	2.550	0.018	17
LOT SP. GRAVITY (GMB)		2.386	0.019	2.331	2.425	0.094	17
% MAX. SP. GRAVITY (GMM)		93.9	0.60	92	95.1	3.1	17
% PAY		99.5	2.2	90.0	100.0	10.0	20

District - IA Production Data

Coarse 19.0 mm TL-D : 27% #67 Alabama Limestone, 10% #7 Alabama Limestone, 35% S1B Alabama Limestone, 18% Alabama Limestone screenings, 10% Cantonment sand

SP 01-1078A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	3.50	3.37	0.24	3.05	4.06	1.01	15
Ext. AC %:	4.50	4.42	0.31	4.01	5.22	1.21	15
MAX. SP. GRAVITY (GMM)	2.565	2.553	0.011	2.530	2.569	0.039	15
% AIR VOIDS @ Nd	4.00	3.65	0.97	1.60	5.40	3.80	15
% VMA @ Nd	13.10	13.21	0.51	12.30	14.20	1.90	15

Coarse 12.5 mm TL-D : 25% #7 Alabama Limestone, 40% S1B Alabama Limestone, 25% Alabama Limestone screenings, 10% Milton sand.

SP 01-1108A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	3.55	0.40	2.90	4.37	1.47	8
ASPHALT CONTENT	5.00	4.67	0.20	4.41	5.04	0.63	8
MAX. SP. GRAVITY (GMM)	2.533	2.534	0.009	2.518	2.546	0.028	8
% AIR VOIDS @ Nd	4.00	2.89	0.73	1.50	3.60	2.10	8
% VMA @ Nd	14.60	13.24	0.51	12.60	14.20	1.60	8

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN (CHANGES IN REST AREAS)

Prepared By: [signature] Date: May 25, 2000

Charles Dunn, P.E.

WPIS Number: 222721-1 U.S. / S.R. No. I - 10

Section No.: 57002-1425 Type Work Rigid Pavement Rehab

W.P.I. No.: 3146879 Project Length: 12.09 km

County: Okaloosa Mileposts: 17.041 to 24.556

Description: I-10, East of Shoal River to Walton County Line

Date of Last Resurfacing: ______

EXISTING PAVEMENT:

ROADWAY

Stabilized Subgrade	310mm	@ 0.003	0.93
Portland Cement Concrete, Cracked and Seated	200mm	@ 0.011	2.20
Existing SN		=	3.13

REST AREA

Stabilized Subgrade	310mm	@ 0.003	0.93
SAHM Base	170mm	@ 0.004	0.68
Binder	50mm	@ 0.008	0.40
Type 1	20mm	@ 0.010	0.20
Existing SN		=	2.21

DESIGN DATA:

Year of Opening: 2002

Design Year: 2021

Loading: 17,584,000

Reliability (%R): 99

Std. Deviation (So): 0.45

Resilient Modulus (Mr) 108 MPa

Soil Support Value: NA

Change in PSI: 1.7

SN Required: 4.85

Design LBR: NA

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

ARMI		0.00
286 kg/m2 Type SP (Traf. Lev. D)		2.21
44 kg/m2 FC - 5 (Rubber)		0.00
Additional SN	=	2.21
	+	3.13
SN Provided	=	5.34

REST AREAS

Mill 40mm

88 kg/m2 FC - 6 (Rubber)

NOTES:

Florida DOT Approval By: ______

Date: ______

Concurrence By: ______

Date: ______

FHWA Approval By: ______

Date: ______

Project Information

Fin. Project ID:	**222768-1-52-01**
Contractor:	**Anderson Columbia Co., Inc.**
County / District:	**Santa Rosa Co. / District 3**
Begin / End M.P.:	**15.191 - 25.905**
Proj. Description:	**I-10 - From East Of SR 87 to Okaloosa County Line**
Date Of Construction:	**11/291999 - 5/1/2001**
Plant No.:	**A0665 - Milton, FL 32530**
Spec. Version:	**Letting: 6/23/99; Jan-June 1999 Workbook**
Pavement Design:	**Rubblized Portland Cement Concrete - 225mm (8.86in) ; 286 kg/m2 (5.12 in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 24500; % Truck = 25.28**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	
Air Temp. (Avg.):	**Min: 34.9F; Max: 96.7F; Avg: 64.5F**
Comments:	**Good Performing Job; Paired w/ Project # 222721-1-52-01 (Pair 1)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 58002 FINANCIAL PROJECT NO. 222768 1 52 01
SANTA ROSA COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2002	2003	2004	2005	2006
DATE SURVEYED	9/12/2001	10/16/2002	11/18/2003	11/16/2004	11/09/2005
MIN	0.00	0.00	0.00	0.00	0.00
MAX	0.00	0.14	0.17	0.21	0.24
Std Dev.	0.00	0.03	0.04	0.04	0.04
AVERAGE	0.00	0.04	0.04	0.10	0.09

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2002	2003	2004	2005	2006
DATE SURVEYED	9/12/2001	10/16/2002	11/18/2003	11/16/2004	11/02/2005
MIN	0.00	0.00	0.00	0.00	0.00
MAX	0.00	0.13	0.15	0.23	0.25
Std Dev.	0.00	0.03	0.03	0.04	0.04
AVERAGE	0.00	0.07	0.06	0.10	0.11

Department - QA Production Data

Coarse 12.5 mm Recycle / TL-5: 20% Mill Material, 22% #7 Alabama Limestone, 20% S1B Alabama Limestone, 26% #89 Alabama Limestone, 12% Anderson screenings

SP 99-0534A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	4.57	0.14	4.38	4.70	0.32	3
ASPHALT CONTENT	5.50	5.30	0.09	5.18	5.39	0.21	3
MAX. SP. GRAVITY (GMM)	2.481	2.509	0.012	2.485	2.528	0.043	7
LOT SP. GRAVITY (GMB)		2.353	0.040	2.299	2.412	0.113	7
% MAX. SP. GRAVITY (GMM)		93.7	1.54	91.2	95.9	4.7	7
% PAY		97.2	4.2	90.0	100.0	10.0	9
VISCOSITY @ 60C		1189	72.5	1116	1261	145	2

Coarse 19.0 mm Recycle / TL-5: 20% Mill Material, 24% S1A Alabama Limestone, 8% #7 Alabama Limestone, 42% #89 Alabama Limestone, 6% Anderson screenings

SP 99-0535A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	4.33	0.31	3.69	4.73	1.04	30
ASPHALT CONTENT	5.10	4.92	0.16	4.60	5.33	0.73	30
MAX. SP. GRAVITY (GMM)	2.515	2.517	0.007	2.503	2.531	0.028	26
LOT SP. GRAVITY (GMB)		2.389	0.017	2.333	2.418	0.085	26
% MAX. SP. GRAVITY (GMM)		94.9	0.72	92.3	96.1	3.8	26
% PAY		102.2	2.5	100.0	105.0	5.0	38
VISCOSITY @ 60C		762	116.8	590	977	387	9

Coarse 12.5 mm Recycle / TL-5: 10% Mill Material, 21% #7 Alabama Limestone, 48% S1B Alabama Limestone, 21% Anderson screenings

SP 00-0706A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	4.84	0.12	4.67	4.96	0.29	3
ASPHALT CONTENT	6.20	6.01	0.12	5.84	6.12	0.28	3
MAX. SP. GRAVITY (GMM)	2.411	2.448	0.004	2.443	2.451	0.008	5
LOT SP. GRAVITY (GMB)		2.280	0.036	2.222	2.320	0.098	5
% MAX. SP. GRAVITY (GMM)		93.1	1.60	90.6	94.9	4.3	5
% PAY		96.9	5.6	90.0	105.0	15.0	8
VISCOSITY @ 60C		751	56.5	672	799	127	3

Coarse 19.0 mm Recycle / TL-5: 20% Mill Material, 24% S1A Alabama Limestone, 8% #7 Alabama Limestone, 40% S1B Alabama Limestone, 8% Anderson screenings

SP 00-0707A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	4.11	0.27	4.11	4.76	0.65	3
ASPHALT CONTENT	4.90	4.83	0.19	4.52	4.97	0.45	3
MAX. SP. GRAVITY (GMM)	2.473	2.497	0.000	2.497	2.497	0.000	2
LOT SP. GRAVITY (GMB)		2.350	0.021	2.329	2.371	0.042	2
% MAX. SP. GRAVITY (GMM)		94.1	0.85	93.2	94.9	1.7	2
% PAY		100.0	4.1	95.0	105.0	10.0	3
VISCOSITY @ 60C		893	11.0	879	906	27	3

Coarse 12.5 mm TL-5: 20% #7 Alabama Limestone, 45% #89 Alabama Limestone, 35% Anderson screenings

SP 00-0784B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	4.69	0.26	4.27	5.14	0.87	16
ASPHALT CONTENT	6.70	6.59	0.16	6.28	6.89	0.61	16
MAX. SP. GRAVITY (GMM)	2.400	2.422	0.004	2.417	2.429	0.012	17
LOT SP. GRAVITY (GMB)		2.277	0.014	2.251	2.300	0.049	17
% MAX. SP. GRAVITY (GMM)		94.0	0.60	93	95.1	2.1	17
% PAY		99.8	3.2	95.0	105.0	10.0	22

District - IA Production Data

Coarse 12.5 mm Recycle / TL-5: 20% Mill Material, 22% #7 Alabama Limestone, 20% S1B Alabama Limestone, 26% #89 Alabama Limestone, 12% Anderson screenings

SP 99-0534A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.50	3.87	0.00	3.87	3.87	0.00	3
Ext. AC %:	5.50	5.36	0.06	5.32	5.45	0.13	3
MAX. SP. GRAVITY (GMM)	2.481	2.517	0.010	2.510	2.531	0.021	3
% AIR VOIDS @ Nd	4.00	3.10	0.99	2.40	4.50	2.10	3
% VMA @ Nd	14.20	12.20	0.42	11.90	12.80	0.90	3

Coarse 19.0 mm Recycle / TL-5: 20% Mill Material, 24% S1A Alabama Limestone, 8% #7 Alabama Limestone, 42% #89 Alabama Limestone, 6% Anderson screenings

SP 99-0535A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.50	4.44	0.44	3.71	5.77	2.06	18
Ext. AC %:	5.10	4.87	0.37	3.58	5.33	1.75	18
MAX. SP. GRAVITY (GMM)	2.515	2.528	0.012	2.517	2.557	0.040	18
% AIR VOIDS @ Nd	4.00	3.52	0.51	2.70	4.40	1.70	18
% VMA @ Nd	13.50	12.56	0.61	11.50	13.90	2.40	18

Coarse 12.5 mm Recycle / TL-5: 10% Mill Material, 21% #7 Alabama Limestone, 48% S1B Alabama Limestone, 21% Anderson screenings

SP 00-0706A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.50	5.02	0.23	4.72	5.37	0.65	4
Ext. AC %:	6.20	5.96	0.16	5.71	6.11	0.40	4
MAX. SP. GRAVITY (GMM)	2.411	2.439	0.005	2.434	2.448	0.014	4
% AIR VOIDS @ Nd	4.00	2.44	0.01	2.43	2.45	0.01	4
% VMA @ Nd	14.30	11.28	0.78	10.20	12.40	2.20	4

Coarse 19.0 mm Recycle / TL-5: 20% Mill Material, 24% S1A Alabama Limestone, 8% #7 Alabama Limestone, 40% S1B Alabama Limestone, 8% Anderson screenings

SP 00-0707A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.00	4.55	0.25	4.29	4.80	0.51	2
Ext. AC %:	4.90	4.72	0.03	4.69	4.75	0.06	2
MAX. SP. GRAVITY (GMM)	2.473	2.513	0.016	2.497	2.529	0.032	2
% AIR VOIDS @ Nd	4.00	4.40	0.00	4.40	4.40	0.00	2
% VMA @ Nd	13.40	12.70	0.00	12.70	12.70	0.00	3

Coarse 12.5 mm TL-5: 20% #7 Alabama Limestone, 45% #89 Alabama Limestone, 35% Anderson screenings

SP 00-0784A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.00	4.87	0.27	4.35	5.47	1.12	10
Ext. AC %:	7.00	6.63	0.22	6.40	7.19	0.79	10
MAX. SP. GRAVITY (GMM)	2.400	2.424	0.012	2.396	2.442	0.046	10
% AIR VOIDS @ Nd	4.00	3.72	0.90	1.60	5.50	3.90	10
% VMA @ Nd	14.20	11.82	0.74	10.60	13.20	2.60	10

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN

Prepared By: Charles Dunn, P.E.
W.P.I. Number: 3148545
State Project No.: 58002-1409
Federal Proj. No: IM-10-1(150) 43
County: Santa Rosa 222768-1

Date: March 10, 1999
U.S. / S.R. No. I-10
Type Work: Rigid Pav't, Rehabilitation
Project Length: 17.04 km

Description: I-10, East of SR 87 to Okaloosa County Line

EXISTING PAVEMENT:

310mm Stabilized Subgrade @ 0.003 0.93
225 mm Portland Cement Concrete
Rubblized @ 0.009 2.02
Existing SN = 2.95

DESIGN DATA:

Year of Opening: 2000
Design Year: 2019
Loading: 21,285,000
Reliability (%R): 99
Std. Deviation (So): 0.45
Resilient Modulus (Mr): 127 MPa
Soil Support Value: NA
Change in PSI: 1.7
SN Required: 4.83
Design LBR: NA
Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

RESURFACING

286 kg/m2 Type SP (Traffic Level 5) 2.21
44 kg/m2 FC - 5 (Rubber) 0.00
Additional SN = 2.21
+ 2.95
SN Provided = 5.16

SHOULDERS

286 kg/m2 Type SP (Traffic Level 5)

RECONSTRUCTION (IF NEEDED)

310mm Stabilized Subgrade (Exist.) 0.93
495 kg/m2 Type SP (Traff. Level 5) 3.83
SN Provided = 4.76

SHOULDERS IN RECONSTRUCTION AREAS
Mill 50mm
110 kg/m2 Type SP (Traffic Level 5)

Sam -
All these indicate rubblizing.
I'm not sure they all were. Could be the plans were changed without a revised pavement design.
Charles

Concurrence By: ______
Date: ______

FHWA Approval By: ______
Date: ______

NOTES:

Re-construction is to be used only in areas where the existing concrete pavement is to be removed. The plans should state that the existing subgrade is to be re-compacted if disturbed prior to placing asphalt on it.

Use Type SP 12.5 in the upper course. Use Type SP 19.0, if possible, in layers under this.

Use 40 kg/m2 of Type SP 9.5 (fine) overbuild on the outside shoulder adjacent to the roadway pavement. Do not use overbuild on the inside shoulder.

Project Information

Fin. Project ID:	**222567-1-52-01**
Contractor:	**White Construction Co., Inc.**
County / District:	**Holmes Co. / District 3**
Begin / End M.P.:	**0.000 - 7.237**
Proj. Description:	**I-10 - From Walton County Line to CR 181**
Date Of Construction:	**9/5/2000 - 6/7/2002**
Plant No.:	**A0681 - DeFuniak Springs, FL 32435**
Spec. Version:	**Letting: 5/24/00; June-Dec 1999 Workbook**
Pavement Design:	**Crack and Seat Concrete - 225mm (8.86in) ; ARMI Layer; 286 kg/m2 (5.12 in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 16900; % Truck = 34.55**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	
Air Temp. (Avg.):	**Min: 34.9F; Max: 90.2F; Avg: 65.7F**
Comments:	**Poor Performing Job; Paired w/ Project # 222830-1-52-01 (Pair 2)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 52002 FINANCIAL PROJECT NO. 222567 1 52 01
HOLMES COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	11/5/2002	11/17/2003	12/8/2004	11/30/2005
MIN	0.00	0.00	0.00	0.01
MAX	0.40	0.42	0.52	0.61
Std Dev.	0.08	0.10	0.12	0.09
AVERAGE	0.11	0.13	0.16	0.25

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	11/5/2002	11/17/2003	12/7/2004	11/30/2005
MIN	0.00	0.03	0.00	0.00
MAX	0.25	0.33	0.41	0.44
Std Dev.	0.05	0.05	0.06	0.07
AVERAGE	0.11	0.13	0.17	0.18

Department - QA Production Data

Coarse 19.0 mm Recycle TL-5 : 10% Mill Material, 25% S1A Alabama Limestone, 40% S1B Alabama Limestone, 25% Cabbage Grove screenings

SP 00-0848A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.20	4.02	0.61	3.17	5.01	1.84	9
ASPHALT CONTENT	5.80	6.05	0.25	5.67	6.43	0.76	9
MAX. SP. GRAVITY (GMM)	2.469	2.459	0.009	2.448	2.476	0.028	14
LOT SP. GRAVITY (GMB)		2.303	0.023	2.247	2.339	0.092	14
% MAX. SP. GRAVITY (GMM)		93.6	1.02	91.3	95.5	4.2	14
% PAY		97.1	4.5	90.0	100.0	10.0	14
VISCOSITY @ 60C		844	176.9	581	1379	798	13

Coarse 19.0 mm Recycle TL-5 : 10% Mill Material, 23% S1A Cabbage Grove Limestone, 43% S1B Alabama Limestone, 24% Jones screenings

SP 00-0885A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.10	5.27	0.20	5.01	5.59	0.58	7
ASPHALT CONTENT	6.50	6.35	0.12	6.15	6.57	0.42	7
MAX. SP. GRAVITY (GMM)	2.402	2.396	0.004	2.391	2.404	0.013	10
LOT SP. GRAVITY (GMB)		2.269	0.017	2.246	2.301	0.055	10
% MAX. SP. GRAVITY (GMM)		94.7	0.72	93.7	96.1	2.4	10
% PAY		100.0	0.0	100.0	100.0	0.0	11
VISCOSITY @ 60C		710	110.2	547	884	337	7

Coarse 12.5 mm Recycle TL-5 : 10% Mill Material, 14% S1A Alabama Limestone, 50% S1B Alabama Limestone, 15% Jones screenings, 11% Diamond sand

SP 00-0895A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	3.50	3.34	0.30	2.98	3.84	0.86	9
ASPHALT CONTENT	5.90	5.83	0.24	5.50	6.21	0.71	9
MAX. SP. GRAVITY (GMM)	2.475	2.473	0.007	2.460	2.485	0.025	15
LOT SP. GRAVITY (GMB)		2.317	0.027	2.238	2.351	0.113	15
% MAX. SP. GRAVITY (GMM)		93.7	0.96	90.6	94.7	4.1	15
% PAY		98.9	3.1	90.0	100.0	10.0	19
VISCOSITY @ 60C		788	148.4	510	1028	518	9

Coarse 12.5 mm TL-5 :15% S1A Alabama Limestone, 55% S1B Cabbage Grove Limestone, 22% Jones screenings, 8% Diamond sand

SP 01-1273A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	5.00	4.87	0.04	4.83	4.91	0.08	2
ASPHALT CONTENT	8.10	8.09	0.20	7.89	8.28	0.39	2
MAX. SP. GRAVITY (GMM)	2.360	2.340	0.004	2.337	2.347	0.010	5
LOT SP. GRAVITY (GMB)		2.180	0.029	2.127	2.211	0.084	5
% MAX. SP. GRAVITY (GMM)		93.1	1.37	90.6	94.5	3.9	5
% PAY		97.1	4.5	90.0	100.0	10.0	7

Coarse 12.5 mm TL-5 : 25% S1A Alabama Limestone, 38% S1B Georgia Granite, 30% Jones screenings, 7% Diamond sand

SP 01-1301A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	3.50	2.87	0.19	2.59	3.12	0.53	5
ASPHALT CONTENT	7.30	7.34	0.21	7.10	7.63	0.53	5
MAX. SP. GRAVITY (GMM)	2.400	2.401	0.012	2.388	2.417	0.029	7
LOT SP. GRAVITY (GMB)		2.271	0.015	2.255	2.293	0.038	7
% MAX. SP. GRAVITY (GMM)		94.6	0.71	93.7	96	2.3	7
% PAY		100.0	0.0	100.0	100.0	0.0	7

IA Production Data

Coarse 19.0 mm Recycle TL-5 : 10% Mill Material, 25% S1A Alabama Limestone, 40% S1B Alabama Limestone, 25% Cabbage Grove screenings

SP 00-0848A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.20	4.58	0.31	4.15	5.11	0.96	8
Ext. AC %:	5.80	5.81	0.27	5.52	6.40	0.88	8
MAX. SP. GRAVITY (GMM)	2.469	2.458	0.013	2.432	2.479	0.047	8
% Gmm @ Nm	97.60	98.78	0.30	98.30	99.10	0.80	8
% AIR VOIDS @ Nd	4.00	2.84	0.29	2.50	3.30	0.80	8
% VMA @ Nd	13.00	12.36	0.49	11.80	13.50	1.70	8

Coarse 19.0 mm Recycle TL-5 : 10% Mill Material, 23% S1A Cabbage Grove Limestone, 43% S1B Alabama Limestone, 24% Jones screenings

SP 00-0885A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.10	5.11	0.37	4.72	5.53	0.81	4
Ext. AC %:	6.50	6.41	0.43	5.98	6.90	0.92	4
MAX. SP. GRAVITY (GMM)	2.402	2.400	0.016	2.384	2.427	0.043	4
% Gmm @ Nm	97.70	98.83	0.79	98.30	100.20	1.90	4
% AIR VOIDS @ Nd	4.00	2.78	0.86	1.30	3.40	2.10	4
% VMA @ Nd	14.10	12.95	0.32	12.50	13.30	0.80	4

Coarse 12.5 mm TL-5 : 25% S1A Alabama Limestone, 38% S1B Georgia Granite, 30% Jones screenings, 7% Diamond sand

SP 01-1301A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	3.50	3.25	0.24	2.91	3.53	0.62	4
Ext. AC %:	7.30	7.43	0.21	7.11	7.66	0.55	4
MAX. SP. GRAVITY (GMM)	2.400	2.413	0.009	2.401	2.425	0.024	4
% Gmm @ Nm	97.40	97.95	1.50	95.50	99.50	4.00	4
% AIR VOIDS @ Nd	4.00	3.43	1.46	1.90	5.80	3.90	4
% VMA @ Nd	15.00	14.13	1.45	12.70	16.50	3.80	4

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN

Prepared By: Charles Dunn, P.E.
W.P.I. Number: 3144478
State Project No.: 52002-3407
Federal Proj. No: IM-10-2(127)104
County: Holmes

Date: March 9, 1999
U.S. / S.R. No. I-10
Type Work: Conc. Pav't Rehab.
ProjectLength: 10.38 km

222567

Description: I-10, CR-181 to Washington County Line M.P. 7.238 to 8.316

EXISTING PAVEMENT:

Stabilized Subgrade 310 mm @ 0.003	0.93
225 mm Portland Cement Concrete Rubblized @ 0.009	2.02
Existing SN =	2.95

Don't have FPN for either of these. See if one of them is 222567.

DESIGN DATA:

Year of Opening: 2000
Design Year: 2019
Loading: 18,662,000
Reliability (%R): 99
Std. Deviation (So): 0.45
Resilient Modulus (Mr): 122 mPa
Soil Support Value: NA
Change in PSI: 1.7
SN Required: 4.77
Design LBR: NA
Design Speed: 110 km/h

SIGN:

ROADWAY RESURFACING

286 kg/m2 Type SP (Traffic Level 5)	2.21
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN =	2.21
	+2.95
SN Provided =	5.16

SHOULDER RESURFACING

286 kg/m2 Type SP (Traffic Level 5)

RECONSTRUCTION (IF NEEDED)

310mm Stabilized Subgrade (Exist.)	0.93
495 kg/m2 Type SP (Traffic Level 5)	3.83
44 kg/m2 FC - 5 (Rubber)	0.00
SN Provided =	4.76

SHOULDERS IN RECONSTRUCTION AREAS

Mill 50mm
110 kg/m2 Type SP (Traffic Level 5)

Florida DOT Approval By: ____________ Date: ____________

Concurrence By: ____________ Date: ____________

FHWA Approval By: ____________ Date: ____________

NOTES:

Re-construction is to be used only in areas where the existing concrete pavement is to be removed. The plans should state that the existing subgrade is to be re-compacted if disturbed prior to placing asphalt on it.

Use Type SP 12.5 in the upper course. Use Type SP 19.0, if possible, in layers under this.

Use 40 kg/m2 of Type SP 9.5 (fine) overbuild on the outside shoulder adjacent to the roadway pavement. Do not use overbuild on the inside shoulder.

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN

Prepared By: ____________________ Charles Dunn, P.E.

Date: March 9, 1999

W.P.I. Number: 3144479

U.S. / S.R. No. I-10

State Project No.: 52002-3408

Type Work: Conc. Pav't Rehab.

Federal Proj. No: IM-10-2(123)110

ProjectLength: 4.00km

County: Holmes

222567

Description: I-10, Washington County Line To East of CR-173

EXISTING PAVEMENT:

Stabilized Subgrade 310 mm @ 0.003	0.93
225 mm Portland Cement Concrete Rubblized @ 0.009	2.02
Existing SN =	2.95

DESIGN DATA:

Year of Opening: 2000
Design Year: 2019
Loading: 23,438,000
Reliability (%R): 99
Std. Deviation (So): 0.45
Resilient Modulus (Mr): 138 mPa
Soil Support Value: NA
Change in PSI: 1.7
SN Required: 4.72
Design LBR: NA
Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

286 KG/M2 Type SP (Traffic Level 5)	2.21
44 KG/M2 FC - 5 (Rubber)	0.00
Additional SN =	2.21
	+ 2.95
SN Provided =	5.16

SHOULDER RESURFACING

286 KG/M2 Type SP (Traffic Level 5)

RECONSTRUCTION, IF NEEDED

310mm Stabilized Subgrade (Exist.)	0.93
495 KG/M2 Type SP (Traffic Level 5)	3.83
44 KG/M2 FC - 5 (Rubber)	0.00
SN Provided =	4.76

SHOULDERS IN RECONSTRUCTION AREAS

Mill 50mm
110 KG/M2 Type SP (Traffic Level 5)

Florida DOT Approval By: ____________________ Date: ____________________

Concurrence By: ____________________ Date: ____________________

FHWA Approval By: ____________________ Date: ____________________

NOTES:

Re-construction is to be used only in areas where the existing concrete pavement is to be removed. The plans should state that the existing subgrade is to be re-compacted if disturbed prior to placing asphalt on it.

Use Type SP 12.5 in the upper course. Use Type SP 19.0, if possible, in layers under this.

Use 40 kg/m2 of Type SP 9.5 (fine) overbuild on the outside shoulder adjacent to the roadway pavement. Do not use overbuild on the inside shoulder.

THIS CONTRACT PLAN SET INCLUDES

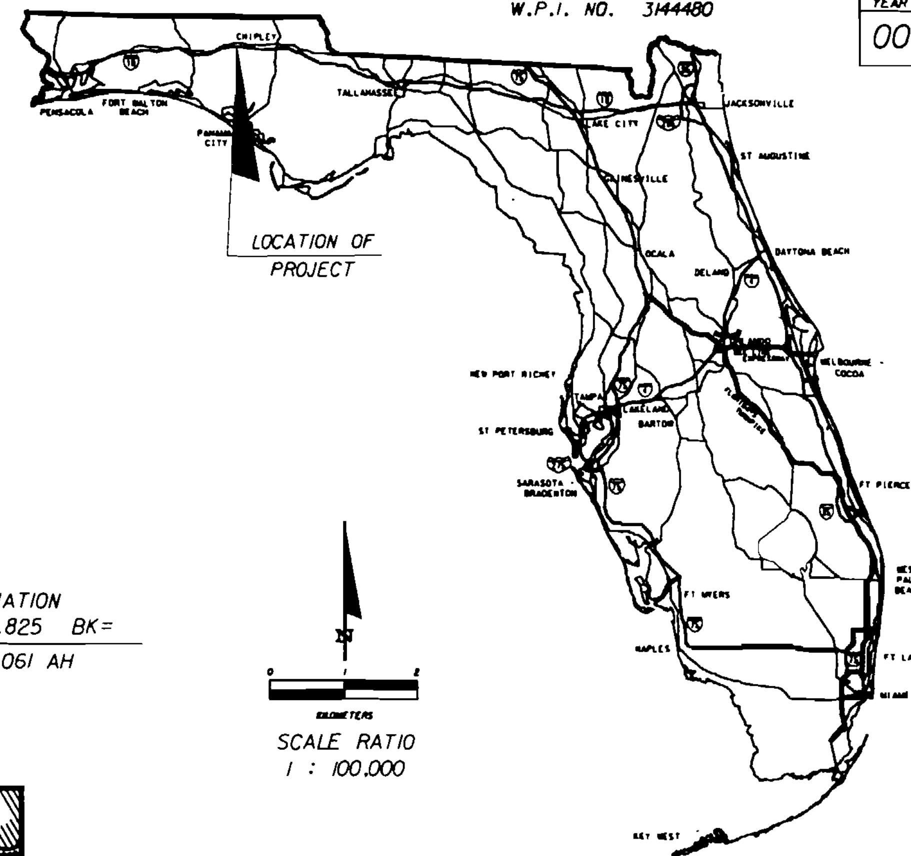
ROADWAY PLANS
SIGNING AND PAVEMENT MARKING PLANS

A DETAILED INDEX APPEARS ON THE KEY SHEET OF EACH COMPONENT SET OF PLANS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

W.P.I. NO. 3144480

FISCAL YEAR	SHEET NO.
00	1



SCALE RATIO
1 : 100,000

CONTRACT PLANS

FINANCIAL PROJECT ID 222567-1-52-01

STATE PROJECT NO. 52002-3409

(FEDERAL FUNDS)

HOLMES COUNTY

STATE ROAD NO. 8

INDEX OF ROADWAY PLANS

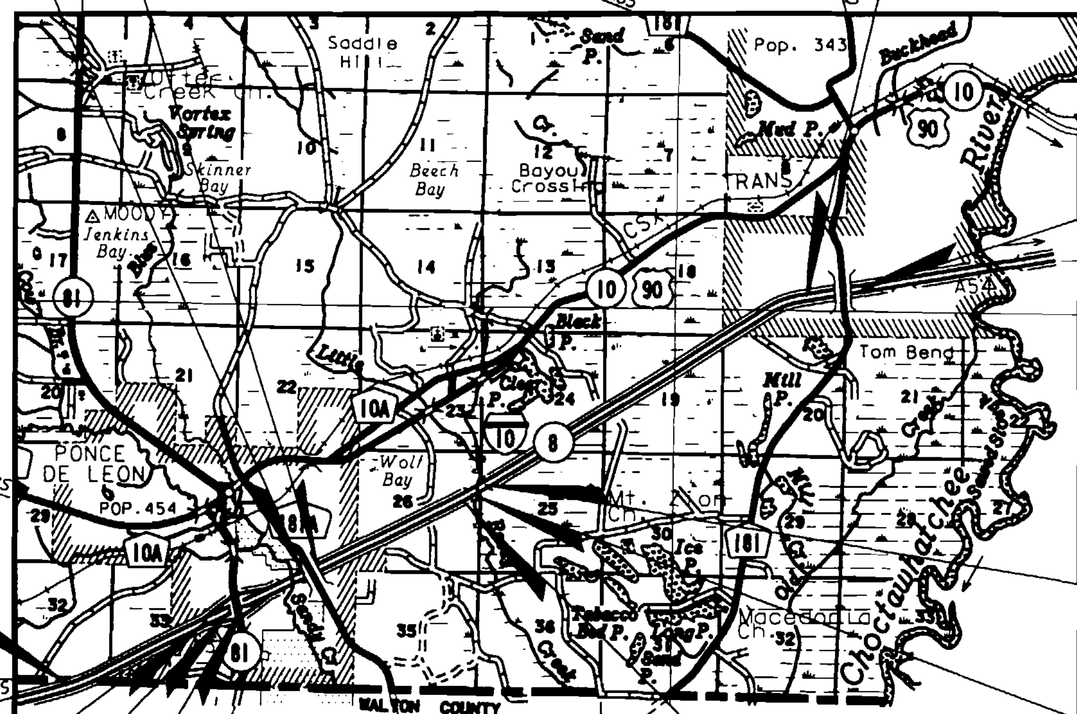
SHEET NO.	SHEET DESCRIPTION
1	Key Sheet
2-2A	Summary of Pay Items
3-7	Typical Sections
8	Typical Sections Details and Notes
9	Grade Transition Detail
10-14	Summary of Quantities
15	Summary of Drainage Structures
16-20	Reference Points
21-22	General Notes
23-29	Project Layout
30-44	Plan Sheets
45-46	Profile - I-10 at S.R. 81, Left
47-48	Profile - I-10 at S.R. 81, Right
49-50	Profile - I-10 at C.R. 181A
51	Profile - I-10 at C.R. 181
52-55	Profile - On & Off Ramps
56-70	Cross Sections
71-78	Cross Sections - Ramps
79	Layout Sheet - S.R. 81 Rest Area
80-83	Plan Sheets - S.R. 81 Rest Area
84-91	Cross Sections - S.R. 81 Rest Area
92	Edgedrain Details
93	Motorist Aid Call Box Concrete Pad
94	Typical Environmental Control Plan
95-96	Environmental Control Features Typical Details
97	Stormwater Pollution Prevention Plan
98	Traffic Control Notes
99-115	Traffic Control Sheets
116-119	Interim Standards and Temporary Crossover Details

END BRIDGE
END EXCEPTION
STA. 55+74.263, LEFT RDWY.
STA. 55+63.947, RIGHT RDWY.

BEGIN BRIDGE
BEGIN EXCEPTION
STA. 54+69.877, LEFT RDWY.
STA. 54+58.801, RIGHT RDWY.

STATION EQUATION
STA. 133+73.825 BK=
STA. 133+74.061 AH

END PROJECT
STA. 138+80.000
kp 11.64= MP 7.23



BEGIN PROJECT
STA. 22+38.312
kp 0.000 = MP 0.000

END BRIDGE
END EXCEPTION
STA. 82+72.442, LEFT RDWY.
STA. 82+61.660, RIGHT RDWY.

BEGIN BRIDGE
BEGIN EXCEPTION
STA. 81+61.250, LEFT RDWY.
STA. 81+51.873, RIGHT RDWY.

ABANDON EXIST CLASSIFICATION MONITORING SITE 2001
STA. 80+49.312
kp 5.811

ABANDON EXIST VOLUME MONITORING SITE 2001
kp 2.482

BEGIN BRIDGE
BEGIN EXCEPTION
STA. 46+87.753, LEFT RDWY.
STA. 46+81.833, RIGHT RDWY.

END BRIDGE
END EXCEPTION
STA. 47+61.814, LEFT RDWY.
STA. 47+55.974, RIGHT RDWY.

GOVERNING STANDARDS AND SPECIFICATIONS: FLORIDA DEPARTMENT OF TRANSPORTATION, ROADWAY AND TRAFFIC DESIGN STANDARDS DATED JANUARY 1998, AND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION DATED 1999, AS AMENDED BY CONTRACT DOCUMENTS

REVISIONS
THESE PLANS ARE COMPLETELY REVISED

RECYCLED PAPER

NOTE: REST AREA ENTRANCE ROAD AND REST AREA PARKING LOTS AND ROADS NOT INCLUDED IN LENGTHS.

PLANS PREPARED BY

Varnum & Associates, Inc.
709 7th Street, Suite 3 - Chipley, Fl 32428
(850) 638-1505
Vendor No. VF-592241856-001

NOTE: THE SCALE OF THESE PLANS MAY HAVE CHANGED BY REPRODUCTION.

NOTE: THIS IS A METRIC UNIT PROJECT

LENGTH OF PROJECT	
	METERS
ROADWAY	11 352.096
BRIDGES	000.000
NET LENGTH OF PROJ.	11 352.096
EXCEPTIONS	289.356
GROSS LENGTH OF PROJ.	11 641.452

KEYSHEET REVISIONS

DATE	BY	DESCRIPTION

ROADWAY PLANS ENGINEER OF RECORD: ELLIOTT VARNUM, P.E. 2-16-00

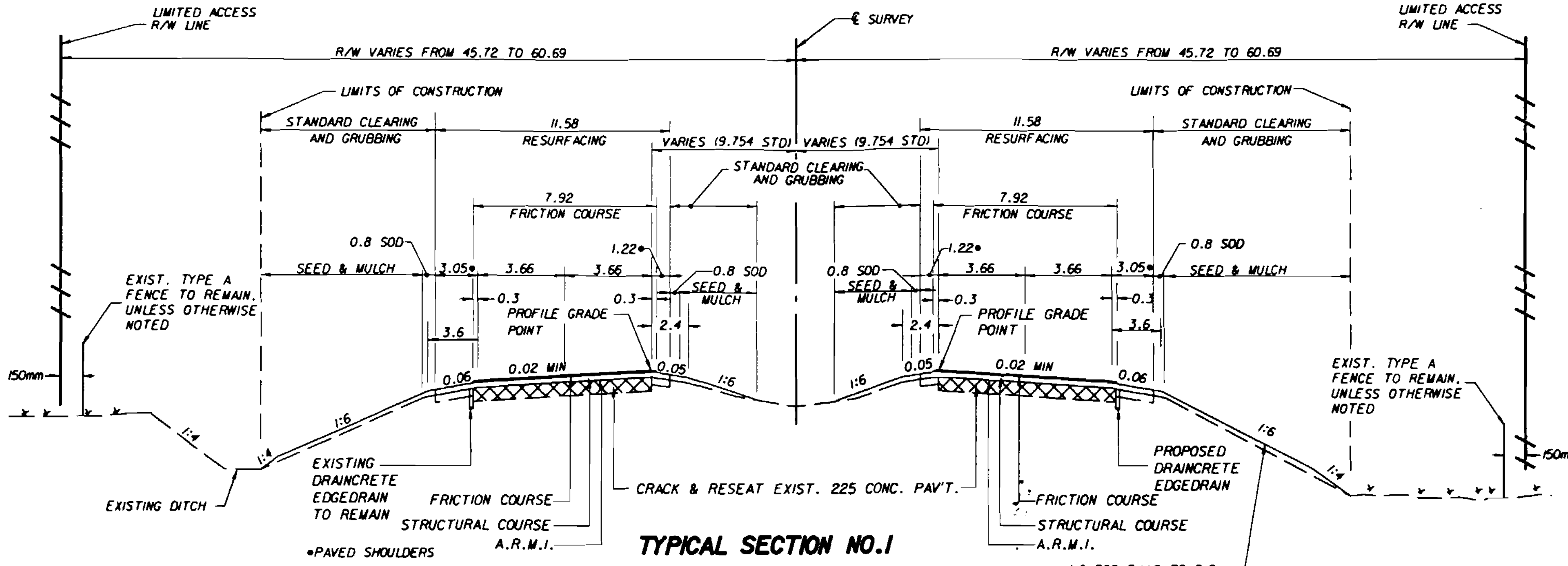
P.E. NO.: 24905

FDOT PROJECT MANAGER : BLAIR GOLDEN, P.E.

DESCRIPTION: SR 8 (I-10) FROM WALTON CO. LINE TO CR 181

p: \52002\3409\keysrd02.dgn Feb. 14, 2000 12:00:29

FINANCIAL PROJECT ID	STATE PROJ. NO.	SHEET NO.
222567-1-52-01	52002-3409	3



TYPICAL SECTION NO.1

CRACKING, RESEATING AND RESURFACE

S.R. 8 (I-10)

1:6 FOR FILLS TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m
SOD SLOPES STEEPER THAN 1:3
CLEAR ZONE = 9 M

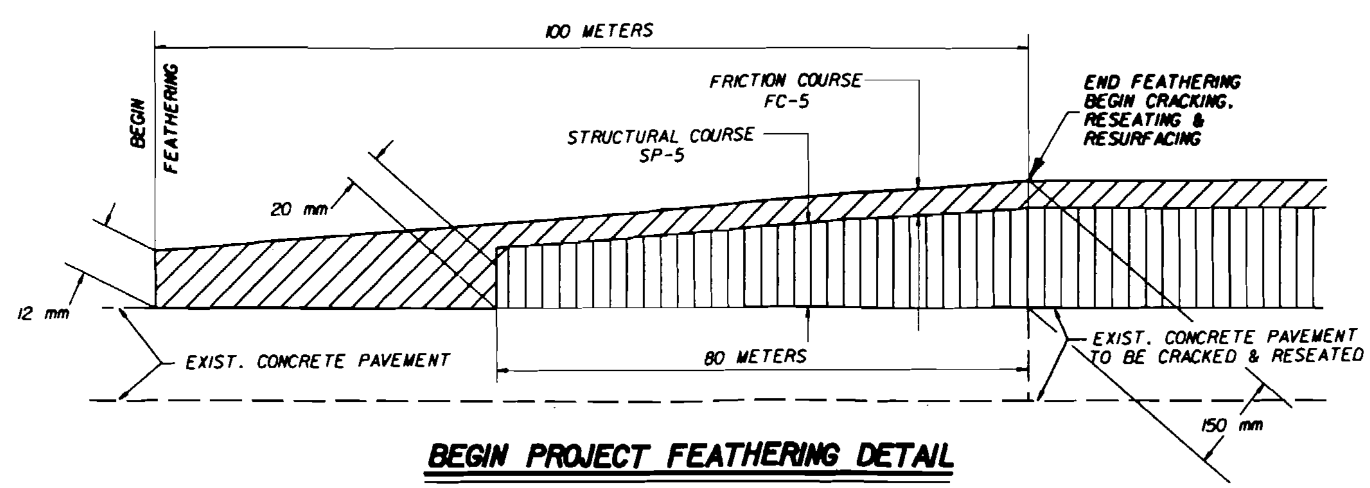
LEFT ROADWAY	RIGHT ROADWAY
STA. 23+38.312 TO STA. 45+96.022	**STA. 23+38.312 TO STA. 45+96.022**
STA. 48+41.508 TO STA. 53+69.877	**STA. 48+41.508 TO STA. 53+58.801**
STA. 59+00.000 TO STA. 80+61.250	**STA. 59+00.000 TO STA. 80+51.873**
STA. 83+72.442 TO STA. 137+75.000	**STA. 83+61.660 TO STA. 137+75.000**

RESURFACING

A.R.M.I. (3.6 L/M2)
TYPE SP STRUCTURAL COURSE (TRAFFIC 5) (286kg/m2)
AND FRICTION COURSE FC-5 (44kg/m2)[RUBBER]

SHOULDER PAVEMENT

TYPE SP STRUCTURAL COURSE (TRAFFIC 5) (286kg/m2)



BEGIN PROJECT FEATHERING DETAIL

N.T.S.

TRAFFIC DATA

2001 AADT = 20100
2002 EST. AADT = 21100
2007 EST. AADT = 26300
2012 EST. AADT = 31500
2020 EST. AADT = 40100
K30= 11.59% D30 = 55% T = 21% (24 HOUR)
DESIGN HOUR T = 11%
DESIGN HOUR HEAVY T = 9%
DESIGN HOUR MEDIUM T = 2%
DESIGN SPEED = 110 km/h

FEB 0 9 2000

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Varnum & Associates, Inc.
709 7th Street, Suite 3 - Chipley, FL 32428

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION

p:\52002\3409\typsrd01.dgn Feb. 08, 2000 14:23:55

Project Information

Fin. Project ID:	**222830-1-52-01**
Contractor:	**White Construction Co., Inc.**
County / District:	**Washington Co. / District 3**
Begin / End M.P.:	**0.385 - 5.825**
Proj. Description:	**I-10 - From Choctawhatchee River Bridge to Holmes County Line**
Date Of Construction:	**10/11/1999 - 11/8/2001**
Plant No.:	**A0326 - Cottondale, FL 32431**
Spec. Version:	**Letting: 6/23/99; Jan-June 1999 Workbook**
Pavement Design:	**Rubblized Portland Cement Concrete - 225mm (8.86in); 286 kg/m2 (5.12 in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 16800; % Truck = 31.88**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	
Air Temp. (Avg.):	**Min: 34.9F; Max: 96.7F; Avg: 67.1F**
Comments:	**Good Performing Job; Paired w/ Project # 222567-1-52-01 (Pair 2)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 61001 FINANCIAL PROJECT NO. 222830 1 52 01
WASHINGTON COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE

RUT AVERAGE					
SURVEY YEAR	**2002**	**2003**	**2004**	**2005**	**2006**
DATE SURVEYED	**11/01/2001**	**11/04/2002**	**11/17/2003**	**12/07/2004**	**11/29/2005**
MIN	0.00	0.00	0.00	0.00	0.00
MAX	0.00	0.08	0.12	0.15	0.22
Std Dev.	0.00	0.01	0.01	0.02	0.02
AVERAGE	0.00	0.00	0.01	0.02	0.02

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2002	2003	2004	2005	2006
DATE SURVEYED	**11/01/2001**	**11/04/2002**	**11/17/2003**	**12/07/2004**	**11/29/2005**
MIN	0.00	0.00	0.00	0.00	0.00
MAX	0.11	0.23	0.29	0.25	0.49
Std Dev.	0.00	0.04	0.04	0.05	0.05
AVERAGE	0.00	0.05	0.06	0.08	0.07

Department - QA Production Data

Coarse 12.5 mm TL-5 : 25% S1A Cabbage Grove Limestone, 23% S1B Alabama Limestone, 15% Coarse Cabbage Grove screenings, 37% Jones screenings

SP 00-0543B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	3.20	6.08	0.42	5.60	6.72	1.12	4
ASPHALT CONTENT	8.00	7.61	0.21	7.38	7.95	0.57	4
MAX. SP. GRAVITY (GMM)	2.353	2.352	0.016	2.318	2.377	0.059	7
LOT SP. GRAVITY (GMB)		2.193	0.007	2.178	2.200	0.022	7
% MAX. SP. GRAVITY (GMM)		93.2	0.73	92	94.5	2.5	7
% PAY		96.9	5.0	90.0	105.0	15.0	8

Coarse 19.0 mm Recycle / TL-5 : 10% Mill Material, 24% S1A Cabbage Grove Limestone, 28% S1B Alabama Limestone, 16% Coarse Cabbage Grove screenings, 22% Jones screenings

SP 00-0610A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	5.36	0.36	4.73	5.80	1.07	9
ASPHALT CONTENT	6.90	7.04	0.20	6.73	7.28	0.55	9
MAX. SP. GRAVITY (GMM)	2.381	2.380	0.012	2.360	2.396	0.036	9
LOT SP. GRAVITY (GMB)		2.223	0.014	2.191	2.239	0.048	9
% MAX. SP. GRAVITY (GMM)		93.4	0.91	91.4	94.8	3.4	9
% PAY		97.3	4.9	90.0	105.0	15.0	11

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN

Prepared By: ______________________
Charles Dunn, P.E.

Date: March 11, 1999

W.P.I. Number: 3149878

U.S. / S.R. No. I-10

State Project No.: 61001-1400

Type Work: Conc. Pav't Rehab.

Federal Proj. No: IM-10-2(125)116

ProjectLength: 8.76 km

County: Washington

222830

Description: I-10, Choctawhatchee River Bridge to Holmes County Line M.P. 0.379 to 5.823.

EXISTING PAVEMENT:

Stabilized Subgrade 310 mm @ 0.003	0.93
225 mm Portland Cement Concrete Rubblized @ 0.009	2.02
Existing SN =	2.95

See if this
is 222830

DESIGN DATA:

- Year of Opening: 2000
- Design Year: 2019
- Loading: 23,438,000
- Reliability (%R): 99
- Std. Deviation (So): 0.45
- Resilient Modulus (Mr): 134 mPa
- Soil Support Value: NA
- Change in PSI: 1.7
- SN Required: 4.77
- Design LBR: NA
- Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

286 kg/m2 Type SP (Traffic Level 5)	2.21
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN =	2.21
+	2.95
SN Provided =	5.16

SHOULDER RESURFACING

286 KG/M2 Type SP (Traffic Level 5)

RECONSTRUCTION

310mm Stabilized Subgrade (Exist.)	0
495 kg/m2 Type SP (Traffic Level 5)	3
44 kg/m2 FC - 5 (Rubber)	0
SN Provided =	4

SHOULDER IN RECONSTRUCTION AREA

Mill 50mm
110 kg/m2 Type SP (Traffic Level 5)

Florida DOT Approval By: ______________________
Date: ______________________

Concurrence By: ______________________
Date: ______________________

FHWA Approval By: ______________________
Date: ______________________

NOTES:

Re-construction is to be used only in areas where the existing concrete pavement is to be removed. The plans should state that the existing subgrade is to be re-compacted if disturbed prior to placing asphalt on it.

Use Type SP 12.5 in the upper course. Use Type SP 19.0, if possible, in layers under this.

Use 40 kg/m2 of Type SP 9.5 (fine) overbuild on the outside shoulder adjacent to the roadway pavement. Do not use overbuild on the inside shoulder.

Project Information

Fin. Project ID:	**213560-1-52-01**
Contractor:	**Anderson Columbia Co., Inc.**
County / District:	**Suwannee Co. / District 2**
Begin / End M.P.:	**0.000 - 5.861**
Proj. Description:	**I-10 - From Madison Co. Line to West of SR10**
Date Of Construction:	**1/3/1999 - 4/11/2000**
Plant No.:	**A0651 - Perry, FL 32347**
Spec. Version:	**Letting: 9/30/98; Jan/June 98 WorkBook**
Pavement Design:	**Milling - 100mm; ARMI Layer - 10mm; Bottom Lift of SP-19.0 - 80mm; Top Lift of SP-9.5 - 40mm; FC-5**
Traffic:	**Section AADT = 17100; % Truck = 23.94**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	**150 - 200 Tons Per Hour (TPH)**
Air Temp. (Avg.):	**Min: 38.0F; Max: 94.1F; Avg: 66.1F**
Comments:	**Poor Performing Job; Paired w/ Project # 213074-1-52-01 (Pair 3)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 37120 FINANCIAL PROJECT NO. 213560 1 52 01
SUWANNEE COUNTY SR 8 / I-10 DISTRICT 2

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2000	2001	2002	2003	2004	2005	2006
DATE SURVEYED	8/24/1999	9/26/2000	9/12/2001	9/10/2002	9/02/2003	8/24/2004	9/14/2005
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAX	0.25	0.39	0.53	0.70	0.70	0.75	0.85
Std Dev.	0.04	0.07	0.09	0.11	0.11	0.13	0.17
AVERAGE	0.11	0.21	0.25	0.34	0.30	0.36	0.37

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2000	2001	2002	2003	2004	2005	2006
DATE SURVEYED	8/24/1999	9/26/2000	9/12/2001	9/10/2002	9/02/2003	8/24/2004	9/14/2005
MIN	0.00	0.00	0.00	0.04	0.00	0.00	0.00
MAX	0.23	0.30	0.47	0.64	0.78	0.79	0.84
Std Dev.	0.04	0.06	0.10	0.12	0.13	0.14	0.16
AVERAGE	0.11	0.08	0.24	0.34	0.29	0.35	0.34

Department - QA Production Data

Coarse 9.5 mm Recycle / TL-5 : 15% RAP, 50% #89 granite stone, 35% granite screenings

SP 99-0097 B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	5.00	4.29	0.40	3.70	4.92	1.22	8
ASPHALT CONTENT	5.20	5.36	0.25	4.94	5.74	0.80	8
MAX. SP. GRAVITY (GMM)	2.489	2.448	0.005	2.442	2.463	0.021	13
LOT SP. GRAVITY (GMB)		2.311	0.015	2.289	2.347	0.058	13
% MAX. SP. GRAVITY (GMM)		94.4	0.67	93.3	95.9	2.6	13
% PAY		99.2	3.3	95.0	105.0	10.0	13
VISCOSITY @ 60C		865	74.9	797	969	172	3

Coarse 19.0 mm Recycle / TL-5 : 15% Milled Material, 26% S1A Alabama limestone, 44% S1B Alabama limestone, 15% Anderson screenings

SP 99-0221 A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	3.52	0.42	3.21	4.11	0.90	3
ASPHALT CONTENT	5.50	5.10	0.20	4.93	5.38	0.45	3
MAX. SP. GRAVITY (GMM)	2.496	2.472	0.008	2.463	2.486	0.023	5
LOT SP. GRAVITY (GMB)		2.341	0.017	2.322	2.372	0.050	5
% MAX. SP. GRAVITY (GMM)		94.7	0.48	94	95.4	1.4	5
% PAY		101.0	2.0	100.0	105.0	5.0	5
VISCOSITY @ 60C		709	78.3	583	817	234	7

Coarse 19.0 mm Recycle / TL-5 : 15% Milled Material, 26% S1A Alabama limestone, 44% S1B Alabama limestone, 15% Anderson screenings

SP 99-0221 B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.00	3.67	0.26	3.19	4.04	0.85	11
ASPHALT CONTENT	5.20	5.28	0.18	5.01	5.59	0.58	11
MAX. SP. GRAVITY (GMM)	2.496	2.476	0.012	2.456	2.490	0.034	10
LOT SP. GRAVITY (GMB)		2.326	0.018	2.290	2.349	0.059	10
% MAX. SP. GRAVITY (GMM)		93.9	0.91	92.3	95.3	3	10
% PAY		97.0	4.6	90.0	105.0	15.0	10

Contractor - QC Production Data

Coarse 9.5 mm Recycle / TL-5 : 15% RAP, 50% #89 granite stone, 35% granite screenings

SP 99-0097 B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	5.00	4.77	0.96	3.96	7.71	3.75	11
Ext. AC %:	5.20	5.23	0.19	4.91	5.51	0.60	11
MAX. SP. GRAVITY (GMM)	2.489	2.449	0.008	2.436	2.465	0.029	11
% Gmm @ Nm	97.30	98.20	0.57	96.82	98.81	1.99	11
% AIR VOIDS @ Nd	4.00	3.02	0.56	2.45	4.39	1.94	11
% VMA @ Nd	15.90	16.30	0.50	15.63	17.30	1.67	11

	AVG	STD	MIN	MAX	RNG	CNT
Average Core Gmb	2.305	0.026	2.227	2.347	0.120	16
Average Daily QC Gmm	2.447	0.005	2.442	2.463	0.021	16
% of Sublot Gmm	94.17	1.10	91.05	95.95	4.90	16
% Pay	99.5	3.5	95.0	105.0	10.0	10

Coarse 19.0 mm Recycle / TL-5 : 15% Milled Material, 26% S1A Alabama limestone, 44% S1B Alabama limestone, 15% Anderson screenings

SP 99-0221 A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.00	3.61	0.37	2.98	4.19	1.21	10
Ext. AC %:	5.50	5.26	0.27	4.89	5.86	0.97	10
MAX. SP. GRAVITY (GMM)	2.496	2.475	0.012	2.463	2.506	0.043	10
% Gmm @ Nm	97.70	99.20	0.70	98.01	100.16	2.15	10
% AIR VOIDS @ Nd	4.00	2.68	0.71	1.60	3.94	2.34	10
% VMA @ Nd	13.90	13.31	0.84	12.17	14.81	2.64	10

	AVG	STD	MIN	MAX	RNG	CNT
Average Core Gmb	2.308	0.050	2.208	2.343	0.135	5
Average Daily QC Gmm	2.444	0.050	2.345	2.473	0.128	5
% of Sublot Gmm	94.43	0.36	93.99	94.93	0.94	5
% Pay	98.9	2.2	94.5	100.0	5.5	5

Coarse 19.0 mm Recycle / TL-5 : 15% Milled Material, 26% S1A Alabama limestone, 44% S1B Alabama limestone, 15% Anderson screenings

SP 99-0221 B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.00	3.72	0.31	3.35	4.38	1.03	16
Ext. AC %:	5.20	5.13	0.38	4.37	5.72	1.35	16
MAX. SP. GRAVITY (GMM)	2.496	2.483	0.013	2.459	2.504	0.045	16
% Gmm @ Nm	97.70	98.14	0.93	96.72	100.00	3.28	16
% AIR VOIDS @ Nd	4.00	3.79	0.98	1.73	5.23	3.50	16
% VMA @ Nd	13.90	13.37	0.79	12.05	14.72	2.67	16

	AVG	STD	MIN	MAX	RNG	CNT
Average Core Gmb	2.323	0.018	2.290	2.350	0.060	9
Average Daily QC Gmm	2.477	0.011	2.456	2.490	0.034	9
% of Sublot Gmm	93.80	0.81	92.38	94.72	2.34	9
% Pay	98.6	2.3	95.0	100.0	5.0	7

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2149144
STATE JOB NO. 37120-3427
FAP NO.: -IM - 10-4(96)268
COUNTY: SUWANNEE
PROJ. LGTH.: 9.432 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 15.866 MILLION
SN REQUIRED: 3.70
NAME: I-10

DATE PREP.: 09/08/97
US NO. I 10 SR NO. SR 8
FROM: MADISON CO. LINE
TO: W. OF SR-10
BEGIN KILOPOST: 0.000
END KILOPOST: 9.432
DESIGN LBR: .
MR: 189 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 1
TRAVEL LANES

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	120.00	0.006	0.72
BINDER COURSE	45.00	0.006	0.27
LIMEROCK	250.00	0.007	1.75
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		3.64

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP AC TRAFFIC 5	120.00	0.017	2.04
ASPH RUB MEMB INTERLAYER	10.00	0.000	0.00
MILLING	100.00		- 0.54
EXISTING			3.64
	TOTAL SN PROVIDED:		5.14

(1) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED IN TWO LIFTS: A BOTTOM LIFT OF TYPE SP-19.0 AT 80MM AND A TOP LIFT OF TYPE SP-9.5 AT 40MM.
(2) ASPHALT RUBBER MEMBRANE INTERLAYER (ARMI) SHALL CONSIST OF STONE #6 PLACED AT 0.0088-0.0112 M3/M2 & RUBBER MODIFIED ASPHALT BINDER PLACED AT 2.7-3.6 L/M2; TYPE SP AT 80MM MINIMUM SHALL IMMEDIATELY FOLLOW.
(3) MILL EXISTING PAVEMENT FROM 100MM AT PAVEMENT CENTERLINE ON A .02 CROSS-SLOPE TO 120MM AVERAGE AT INSIDE LANE EDGE AND 110MM AVERAGE AT OUTSIDE LANE EDGE. SHOW DETAILS IN PLANS.
(4) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(5) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(6) MILLING DEPTH AND/OR RESURFACING THICKNESS AT CROSS-ROAD OVERPASSES MAY VARY TO PROVIDE ADEQUATE BRIDGE CLEARANCE OVER THE ROADWAY. SHOW DETAILS IN PLANS.
(7) PAVEMENT IS OVER-DESIGNED TO PROVIDE MINIMUM STRUCTURAL LAYERS FOR SUPERPAVE ASPHALT AND TO MITIGATE PAVEMENT DROP-OFF BETWEEN LANES.
(8) MILLED SURFACE SHALL BE OVERLAID WITH A MINIMUM OF ARMI LAYER AND THE BOTTOM STRUCTURAL LAYER WITHIN THE SAME DAY.

Phillip G. Davis	[signature]	______________
APPROVED BY	CONCURRENCE BY	CONCURRENCE BY
RESPONSIBLE ENGINEER	DIST DESIGN ENGINEER	FHWA (IF NEEDED)
DATE: 3-5-98	DATE: 6-3-98	DATE: ___________

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2149144
STATE JOB NO. 37120-3427
FAP NO.: -IM - 10-4(96)268
COUNTY: SUWANNEE
PROJ. LGTH.: 9.432 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 0.476 MILLION
SN REQUIRED: 2.07
NAME: I-10

DATE PREP.: 09/08/97
US NO. I 10 SR NO. SR 8
FROM: MADISON CO. LINE
TO: W. OF SR-10
BEGIN KILOPOST: 0.000
END KILOPOST: 9.432
DESIGN LBR: .
MR: 189 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 2
OUTSIDE SHOULDER PAVEMENT

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	105.00	0.006	0.63
LIMEROCK	150.00	0.007	1.05
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		2.58

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-12.5 AC TRAFFIC 2	40.00	0.017	0.68
MILLING	20.00		- 0.06
EXISTING			2.58
	TOTAL SN PROVIDED:		3.20

(1) MILL EXISTING PAVEMENT 20MM AT TRAVEL LANE EDGE TO CROSS-SLOPE SHOWN IN PLANS.
(2) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(3) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(4) MINIMUM PAVEMENT DESIGN FOR SHOULDERS TO FACILITATE FRICTION COURSE OVERLAY, RUMBLE STRIP CONSTRUCTION AND CROSS-SLOPE CORRECTION.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-5-98

CONCURRENCE BY
DIST DESIGN ENGINEER
DATE:______________

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2149144
STATE JOB NO. 37120-3427
FAP NO.: -IM - 10-4(96)268
COUNTY: SUWANNEE
PROJ. LGTH.: 9.432 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 0.476 MILLION
SN REQUIRED: 2.07
NAME: I-10

DATE PREP.: 09/08/97
US NO. I 10 SR NO. SR 8
FROM: MADISON CO. LINE
TO: W. OF SR-10
BEGIN KILOPOST: 0.000
END KILOPOST: 9.432
DESIGN LBR: .
MR: 189 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 3
INSIDE SHOULDER PAVEMENT

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	105.00	0.006	0.63
LIMEROCK	150.00	0.007	1.05
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		2.58

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-9.5 AC TRAFFIC 5	40.00	0.017	0.68
MILLING	30.00		- 0.12
EXISTING			2.58
	TOTAL SN PROVIDED:		3.14

(1) MILL EXISTING PAVEMENT 30MM AT TRAVEL LANE EDGE TO CROSS-SLOPE SHOWN IN PLANS.
(2) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(3) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(4) MINIMUM PAVEMENT DESIGN FOR SHOULDERS TO FACILITATE FRICTION COURSE OVERLAY, RUMBLE STRIP CONSTRUCTION AND CROSS-SLOPE CORRECTION.
(5) TRAFFIC LEVEL IS SAME AS I-10 TRAVEL LANES SINCE PAVING FOR I-10 INSIDE SHOULDER WILL BE DONE IN SAME OPERATION AS INSIDE TRAVEL LANE.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-5-98

CONCURRENCE BY
DIST DESIGN ENGINEER
DATE:______________

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2149144
STATE JOB NO. 37120-3427
FAP NO.: -IM - 10-4(96)268
COUNTY: SUWANNEE
PROJ. LGTH.: 9.432 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 3.967 MILLION
SN REQUIRED: 2.94
NAME: I-10

DATE PREP.: 09/08/97
US NO. I 10 SR NO. SR 8
FROM: MADISON CO. LINE
TO: W. OF SR-10
BEGIN KILOPOST: 0.000
END KILOPOST: 9.432
DESIGN LBR: .
MR: 189 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 4
ACCEL/DECEL LANES & RAMPS

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	15.00	0.000	0.00
TYPE S STRUCTURAL COURSE	110.00	0.006	0.66
LIMEROCK	250.00	0.007	1.75
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		3.31

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-12.5 AC TRAFFIC 4	40.00	0.017	0.68
MILLING	40.00		- 0.15
EXISTING			3.31
	TOTAL SN PROVIDED:		3.84

(1) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(2) PAVEMENT DESIGN ABOVE INCLUDES EXISTING SHOULDER PAVEMENT ON ACCEL/ DECEL LANES & RAMPS.
(3) MILL TRANSITION BEGINNING AT ACCEL/DECEL LANE ADJACENT TO TRAVEL LANE AT 20MM ON A 1:600 RATIO TO 40MM MAXIMUM. TYPE SP-12.5 SUPERPAVE ASPHALTIC CONCRETE WILL TRANSITION FROM 40MM AVERAGE (VARIABLE THICKNESS) AT ACCEL/DECEL LANE ADJACENT TO TRAVEL LANE ON A 1:600 RATIO TO 40MM. SHOW DETAILS IN PLANS.
(4) MINIMUM PAVEMENT DESIGN FOR I-10 ACCEL/DECEL LANES & RAMPS TO FACILITATE RESURFACING OF I-10 TRAVEL LANES & SHOULDERS.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-5-98

CONCURRENCE BY
DIST DESIGN ENGINEER
DATE:______________

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

PROJECT QUESTIONNAIRE

Project 213560-1-52-01
County Suwannee
Location MP 0 to MP 6
Paving Contractor Anderson Columbia Co.

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	**Days**	Nights		Month	Apr-June 99
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		Medium		**Hot > 85**
4	Paved Under Traffic	No		**Yes**		
5	Traffic on Completed Mat	<30 min	1 hr	**3 hr**	6 hr	1 Day +
6	Roadway Equipment Breakdowns	**Seldom**		Average		Often
7	Roadway Equipment Condition	**Good**		Average		Poor
8	Crew Experience/Skill	**Good**		Average		Poor
9	Name of Roadway Superintendent		Frank Crawford			
10	Project Management	**Good**		Average		Poor
11	Name of Project Manager		Tony Williams			
12	Plant Problems	**Seldom**		Average		Often
13	Plant Type	Batch		Drum		
14		**Counter Flow**		Parallel Flow		
15		**Modern**		Normal		Outdated
16	Plant Brand Name	**Astec**	CMI	Standard Havens		Other ____
17	Plant Drum Diameter	6'	**7'**	8'	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	Center	**Outer Drum**	2nd Drum		Other ____
20	Plant Condition/Maintainence	**Good**	Average	Poor	Age	________
21	Plant Crew Experience/Skill	Good		**Average**		Poor
22	Name of Plant Superintendent		Daryl Orhmond			
23	Lab Tech Experience/Skill	Good		**Average**		Poor
24	Name of Lab Tech		Andy gaylord			
25	Mix Consistency	Good		**Average**		Poor
26	Virgin Aggregate Consistency	Good		**Average**		Poor
27	RAP Consistency	Good		**Average**		Poor
28	Mix Temperature Consistency	Good		**Average**		Poor
29	Plant Production Rate (TPH)	<100		101 to 150		**151 to 200**
		201 to 250		251 to 300		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	**<10 miles**	10 to 34	35 to 60	61to 90	> 90 miles

31 Any special issues/problems during asphalt construction?
Compaction was very difficult especially with the 1½" 9.5/D mix. The 4' inside shoulder was paved with the inside lane.
The mix wanted to crawl before the require 95% Gmm was obtained, which caused a hump or crack between the shoulder and the inside lane.

32 Comments The mixes for this project incorpurated: RAP, Calera Blue Limestone coarse Agg and No. FL Limestone fine agg (highly absorptive).
This project was completed before FDOT required gyratory samples be cured.
The density spec was 95% Gmm (105% pay) 94% (100% pay). The AC content was run at or slightly above target (0.2%) in order to achieve the high density level required.

33 What could have been done to improve the future performance of this pavement?
Use of granite or oolite aggregates.
Cure specimens so that volumetrics are more accurate.
Lower density requirement so that compaction could be achieved with an AC content at target or slightly below.
N-mat should be monitored so that a red flag will go up when mixes are susceptable to rutting.

Add extra sheets if needed for answers

34 Form completed by Ken Murphy
35 Title President
36 Employer Asphalt Technologies Inc.

37 Your position relative to the project
QC Management

PROJECT QUESTIONNAIRE

Project	213560-1-52-01
County	Suwannee
Location	MP 0 to MP 6
Paving Contractor	

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	Days	Nights		Month	________
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		Medium		Hot > 85
4	Paved Under Traffic	No		Yes		
5	Traffic on Completed Mat	<30 min	1 hr	3 hr	6 hr	1 Day +
6	Roadway Equipment Breakdowns	Seldom		Average		Often
7	Roadway Equipment Condition	Good		Average		Poor
8	Crew Experience/Skill	Good		Average		Poor
9	Name of Roadway Superintendent		________			
10	Project Management	Good		Average		Poor
11	Name of Project Manager		________			
12	Plant Problems	Seldom		Average		Often
13	Plant Type	Batch		Drum		
14		Counter Flow		Parallel Flow		
15		Modern		Normal		Outdated
16	Plant Brand Name	Astec	CMI	Standard Havens		Other ____
17	Plant Drum Diameter	6'	7'	8'	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	Center	Outer Drum	2nd Drum		Other ____
20	Plant Condition/Maintainence	Good	Average	Poor	Age	________
21	Plant Crew Experience/Skill	Good		Average		Poor
22	Name of Plant Superintendent		________	Tommy Hudson		
23	Lab Tech Experience/Skill	Good		Average		Poor
24	Name of Lab Tech		________	Andy Gaylord		
25	Mix Consistency	Good		Average		Poor
26	Virgin Aggregate Consistency	Good		Average		Poor
27	RAP Consistency	Good		Average		Poor
28	Mix Temperature Consistency	Good		Average		Poor
29	Plant Production Rate (TPH)	<100		101 to 150		151 to 200
		201 to 250		251 to 300		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	<10 miles	10 to 34	35 to 60	61to 90	> 90 miles
31	Any special issues/problems during asphalt construction?					

1.) Some density problems
2.) Gmm fluctuations
3.) Andy only worked the project as a substitute for Aimee Chauncey.
4.) During the US 301 project in 1998 out of Maxville, the practice of conditioning of the rice samples was started.

32 Comments:
Blue limestone and Anderson screenings were used.

33 What could have been done to improve the future performance of this pavement?

1.) Polymer modified asphalt binder
2.) CQC will help

34	Form completed by	Andy Gaylord
35	Title	Lab Tech
36	Employer	______________________________

37 Your position relative to the project

PROJECT QUESTIONNAIRE

Project	213560-1-52-01
County	Suwannee
Location	MP 0 to MP 6
Paving Contractor	

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	Days	Nights		Month	________
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		Medium		Hot > 85
4	Paved Under Traffic	No		Yes		
5	Traffic on Completed Mat	<30 min	1 hr	3 hr	6 hr	1 Day +
6	Roadway Equipment Breakdowns	Seldom		Average		Often
7	Roadway Equipment Condition	Good		Average		Poor
8	Crew Experience/Skill	Good		Average		Poor
9	Name of Roadway Superintendent		________________			
10	Project Management	Good		Average		Poor
11	Name of Project Manager		________________			
12	Plant Problems	Seldom		Average		Often
13	Plant Type	Batch		Drum		
14		Counter Flow		Parallel Flow		
15		Modern		Normal		Outdated
16	Plant Brand Name	Astec	CMI	Standard Havens		Other ____
17	Plant Drum Diameter	6'	7'	8'	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	Center	Outer Drum	2nd Drum		Other ____
20	Plant Condition/Maintainence	Good	Average	Poor	Age	_______
21	Plant Crew Experience/Skill	Good		Average		Poor
22	Name of Plant Superintendent		________	Daryl Orbman/Tommy Hudson		
23	Lab Tech Experience/Skill	Good		Average		Poor
24	Name of Lab Tech		________________			
25	Mix Consistency	Good		Average		Poor
26	Virgin Aggregate Consistency	Good		Average		Poor
27	RAP Consistency	Good		Average		Poor
28	Mix Temperature Consistency	Good		Average	*********	Poor
29	Plant Production Rate (TPH)	<100		101 to 150		151 to 200
		201 to 250		251 to 300		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	<10 miles	10 to 34	35 to 60	61to 90	> 90 miles

31 Any special issues/problems during asphalt construction?

32 Comments:

1.) The mix met specifications.
2.) He did not like the way the mix ran.
3.) There were some density problem.

33 What could have been done to improve the future performance of this pavement?

34	Form completed by	Gene Pettyjohn
35	Title	District Bituminous Engineer
36	Employer	FDOT - District 2 Materials

37 Your position relative to the project
DBE

Project Information

Fin. Project ID:	**213074-1-52-01**
Contractor:	**Anderson Columbia Co., Inc.**
County / District:	**Columbia Co. / District 2**
Begin / End M.P.:	**0.000 - 10.105**
Proj. Description:	**I-10 - From Suwannee Co. Line to east of SR47**
Date Of Construction:	**1/5/1998 - 5/5/1999;**
Plant No.:	**A0200 - Lake City, FL 32055**
Spec. Version:	**Letting: 8/27/97; Jan/June 97 WorkBook**
Pavement Design:	**Milling - 110mm; ARMI Layer - 10mm; Bottom Lift of SP-19.0 - 80mm; Top Lift of SP-9.5 - 40mm; FC-5 - 19mm**
Traffic:	**Section AADT = 18600; % Truck = 26.45**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	**200 - 250 Tons Per Hour (TPH)**
Air Temp. (Avg.):	**Min: 44.5F; Max: 97.5F; Avg: 68.9F**
Comments:	**Good Performing Job; Paired w/ Project # 213560-1-52-01 (Pair 3)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 29170 FINANCIAL PROJECT NO. 213074 1 52 01
COLUMBIA COUNTY SR 8 / I-10 DISTRICT 2

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2000	2001	2002	2003	2004	2005	2006
DATE SURVEYED	8/17/1999	7/25/2000	9/12/2001	9/09/2002	9/02/2003	9/21/2004	10/25/2005
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAX	0.13	0.16	0.28	0.53	0.43	0.36	0.80
Std Dev.	0.03	0.03	0.05	0.06	0.06	0.06	0.07
AVERAGE	0.04	0.04	0.09	0.16	0.12	0.14	0.15

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2000	2001	2002	2003	2004	2005	2006
DATE SURVEYED	8/17/1999	7/25/2000	9/12/2001	9/09/2002	9/02/2003	9/21/2004	10/25/2005
MIN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MAX	0.14	0.17	0.26	0.36	0.33	0.43	0.48
Std Dev.	0.03	0.03	0.04	0.06	0.06	0.06	0.07
AVERAGE	0.03	0.03	0.08	0.14	0.10	0.12	0.13

Department - QA Production Data

Coarse 19.0 mm Recycle / TL-5 : 15% Mill Material, 10% #57 granite stone, 12% #67 granite stone, 45% #89 granite stone, 18% Anderson screenings

SP 97-0073A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.30	5.48	0.28	4.80	5.88	1.08	19
ASPHALT CONTENT	5.40	5.30	0.19	4.96	5.60	0.64	19
MAX. SP. GRAVITY (GMM)	2.475	2.479	0.012	2.462	2.495	0.033	17
LOT SP. GRAVITY (GMB)		2.383	0.028	2.350	2.476	0.126	17
% MAX. SP. GRAVITY (GMM)		95.9	0.71	94.5	96.8	2.3	17
% PAY		104.1	1.9	100.0	105.0	5.0	17
VISCOSITY @ 60C		717	175.5	281	832	551	6

Coarse 19.0 mm Recycle / TL-5 : 20% Mill Material, 10% #57 granite stone, 12% #67 granite stone, 44% #89 granite stone, 14% Anderson screenings

SP 97-0077A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.10	5.53	0.48	4.79	6.19	1.40	8
ASPHALT CONTENT	5.50	5.62	0.35	5.14	6.30	1.16	8
MAX. SP. GRAVITY (GMM)	2.485	2.486	0.005	2.479	2.495	0.016	7
LOT SP. GRAVITY (GMB)		2.426	0.025	2.397	2.479	0.082	7
% MAX. SP. GRAVITY (GMM)		97.1	0.52	96.3	98	1.7	7
% PAY		105.0	0.0	105.0	105.0	0.0	7
VISCOSITY @ 60C		975	179.2	765	1203	438	3

Coarse 9.5 mm Recycle / TL-5 : 15% Mill Material, 50% #89 granite stone, 35% granite screenings

SP 97-0097A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.50	5.66	0.28	5.22	6.03	0.81	6
ASPHALT CONTENT	5.40	5.54	0.15	5.35	5.77	0.42	6
MAX. SP. GRAVITY (GMM)	2.489	2.465	0.007	2.450	2.475	0.025	12
LOT SP. GRAVITY (GMB)		2.332	0.010	2.317	2.353	0.036	12
% MAX. SP. GRAVITY (GMM)		94.6	0.48	93.8	95.4	1.6	12
% PAY		100.8	2.8	95.0	105.0	10.0	12
VISCOSITY @ 60C		808	94.4	695	918	223	5

Coarse 9.5 mm Recycle / TL-5 : 15% Mill Material, 50% #89 granite stone, 35% granite screenings

SP 97-0097B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	5.00	5.49	0.38	5.08	6.22	1.14	6
ASPHALT CONTENT	5.20	5.62	0.14	5.41	5.78	0.37	6
MAX. SP. GRAVITY (GMM)	2.489	2.463	0.008	2.453	2.475	0.022	9
LOT SP. GRAVITY (GMB)		2.329	0.007	2.318	2.339	0.021	9
% MAX. SP. GRAVITY (GMM)		94.5	0.53	93.7	95.3	1.6	9
% PAY		100.0	3.3	95.0	105.0	10.0	9
VISCOSITY @ 60C		808	94.4	695	918	223	5

Contractor - QC Production Data

Coarse 19.0 mm Recycle / TL-5 : 15% Mill Material, 10% #57 granite stone, 12% #67 granite stone, 45% #89 granite stone, 18% Anderson screenings

SP 97-0073A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.30	5.34	0.31	4.96	5.91	0.95	10
Ext. AC %:	5.40	5.51	0.18	5.22	5.78	0.56	10
MAX. SP. GRAVITY (GMM)	2.475	2.485	0.010	2.471	2.505	0.034	10
% Gmm @ Nm	97.50	96.70	0.60	95.63	97.43	1.80	10
% AIR VOIDS @ Nd	4.00	4.84	0.58	4.15	5.87	1.72	10
% VMA @ Nd	13.80	14.32	0.74	13.32	15.97	2.65	10

Average Core Gmb	2.373	0.017	2.350	2.399	0.049	9
Average Daily QC Gmm	2.483	0.009	2.474	2.495	0.021	9
% of Sublot Gmm	95.58	0.63	94.70	96.79	2.09	9
% Pay	103.9	2.1	100.0	105.0	5.0	9

Coarse 9.5 mm Recycle / TL-5 : 15% Mill Material, 50% #89 granite stone, 35% granite screenings

SP 97-0097A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.50	5.49	0.29	4.92	5.84	0.92	8
Ext. AC %:	5.40	5.40	0.12	5.20	5.62	0.42	8
MAX. SP. GRAVITY (GMM)	2.489	2.464	0.005	2.451	2.468	0.017	8
% Gmm @ Nm	97.30	97.84	0.29	97.12	98.12	1.00	8
% AIR VOIDS @ Nd	4.00	3.37	0.32	2.98	4.12	1.14	8
% VMA @ Nd	15.90	16.25	0.29	15.84	16.85	1.01	8

Average Core Gmb	2.331	0.012	2.307	2.353	0.046	11
Average Daily QC Gmm	2.464	0.007	2.450	2.470	0.020	11
% of Sublot Gmm	94.62	0.54	93.48	95.50	2.02	11
% Pay	100.9	2.9	95.0	105.0	10.0	11

Coarse 9.5 mm Recycle / TL-5 : 15% Mill Material, 50% #89 granite stone, 35% granite screenings

SP 97-0097B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	5.00	5.44	0.15	5.22	5.57	0.35	6
Ext. AC %:	5.20	5.39	0.15	5.22	5.66	0.44	6
MAX. SP. GRAVITY (GMM)	2.489	2.466	0.008	2.459	2.484	0.025	6
% Gmm @ Nm	97.30	97.87	0.56	97.02	98.58	1.56	6
% AIR VOIDS @ Nd	4.00	3.33	0.56	2.61	4.22	1.61	6
% VMA @ Nd	15.90	16.13	0.27	15.76	16.55	0.79	6

Average Core Gmb	2.330	0.006	2.321	2.338	0.017	6
Average Daily QC Gmm	2.466	0.006	2.461	2.475	0.014	6
% of Sublot Gmm	94.48	0.39	93.98	94.96	0.98	6
% Pay	99.2	1.9	95.0	100.0	5.0	6

Coarse 19.0 mm Recycle / TL-5 : 15% Mill Material, 10% #57 granite stone, 12% #67 granite stone, 45% #89 granite stone, 18% Anderson screenings

SP 98-0121A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.50	4.95	0.48	4.29	5.91	1.62	9
Ext. AC %:	4.70	4.85	0.13	4.67	5.07	0.40	9
MAX. SP. GRAVITY (GMM)	2.529	2.536	0.011	2.525	2.564	0.039	9
% Gmm @ Nm	97.30	96.44	0.49	95.63	97.23	1.60	9
% AIR VOIDS @ Nd	4.00	4.90	0.46	4.17	5.69	1.52	9
% VMA @ Nd	12.60	14.94	0.25	14.44	15.24	0.80	9

Average Core Gmb	2.406	0.014	2.384	2.426	0.042	5
Average Daily QC Gmm	2.536	0.006	2.526	2.543	0.017	5
% of Sublot Gmm	94.86	0.73	93.76	95.78	2.02	5
% Pay	101.0	3.7	95.0	105.0	10.0	5

FLORIDA DEPARTMENT OF TRANSPORTATION
FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2141614
STATE JOB NO. 29170-3455
FAP NO.: - - - ( )
COUNTY: COLUMBIA
PROJ. LGTH.: 16.186 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 12.634 MILLION
SN REQUIRED: 3.67
NAME: I-10

DATE PREP.: 02/28/97
US NO. I 10 SR NO. SR 8
FROM: SUWANNEE CO. LINE
TO: E. OF SR 47
BEGIN KILOPOST: 0.000
END KILOPOST: 16.186
DESIGN LBR: .
MR: 174 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 1
TRAVEL LANES

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	105.00	0.009	0.95
BINDER COURSE	40.00	0.008	0.32
LIMEROCK	265.00	0.007	1.85
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		4.02

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF		SN
FC-5 FRICTION COURSE	19.00	0.000		0.00
TYPE SP AC TRAFFIC 5	120.00	0.017		2.04
ASPH RUB MEMB INTERLAYER	10.00	0.000		0.00
MILLING	110.00		-	0.90
EXISTING				4.02
	TOTAL SN PROVIDED:			5.16

(1) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED IN TWO LIFTS: A BOTTOM LIFT OF TYPE SP-19.0 AT 80MM AND A TOP LIFT OF TYPE SP-9.5 AT 40MM.
(2) ASPHALT RUBBER MEMBRANE INTERLAYER (ARMI) SHALL CONSIST OF STONE #6 PLACED AT 0.0088-0.0112 M3/M2 & RUBBER MODIFIED ASPHALT BINDER PLACED AT 2.7-3.6 L/M2; TYPE SP AT 80MM MINIMUM SHALL IMMEDIATELY FOLLOW.
(3) MILL EXISTING PAVEMENT FROM 110MM AT PAVEMENT CENTERLINE ON A .02 CROSS-SLOPE TO 90MM AVERAGE AT INSIDE LANE EDGE AND 120MM AVERAGE AT OUTSIDE LANE EDGE. SHOW DETAILS IN PLANS.
(4) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(5) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(6) MILLING DEPTH AND/OR RESURFACING THICKNESS AT CROSS-ROAD OVERPASSES MAY VARY TO PROVIDE ADEQUATE BRIDGE CLEARANCE OVER THE ROADWAY. SHOW DETAILS IN PLANS.
(7) PAVEMENT IS OVER-DESIGNED TO PROVIDE MINIMUM STRUCTURAL LAYERS FOR SUPERPAVE ASPHALT AND TO MITIGATE PAVEMENT DROP-OFF BETWEEN LANES.
(8) MILLED SURFACE SHALL BE OVERLAID WITH A MINIMUM OF ARMI LAYER AND THE BOTTOM STRUCTURAL LAYER WITHIN THE SAME DAY.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-31-97

[signature]
CONCURRENCE BY
DIST DESIGN ENGINEER
DATE: 5-1-97

CONCURRENCE BY
FHWA (IF NEEDED)
DATE: ____________

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2141614
STATE JOB NO. 29170-3455
FAP NO.: - - - ( )
COUNTY: COLUMBIA
PROJ. LGTH.: 16.186 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 0.379 MILLION
SN REQUIRED: 2.05
NAME: I-10

DATE PREP.: 03/01/97
US NO. I 10 SR NO. SR 8
FROM: SUWANNEE CO. LINE
TO: E. OF SR 47
BEGIN KILOPOST: 0.000
END KILOPOST: 16.186
DESIGN LBR: .
MR: 174 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 2
OUTSIDE SHOULDER PAVEMENT

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	40.00	0.009	0.36
SURFACE TREATMENT	5.00	0.000	0.00
LIMEROCK	165.00	0.007	1.15
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		2.41

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-12.5 AC TRAFFIC 2	40.00	0.017	0.68
MILLING	30.00		- 0.18
EXISTING			2.41
	TOTAL SN PROVIDED:		2.91

(1) MILL EXISTING PAVEMENT 30MM AT TRAVEL LANE EDGE TO CROSS-SLOPE SHOWN IN PLANS.
(2) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(3) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(4) MINIMUM PAVEMENT DESIGN FOR SHOULDERS TO FACILITATE FRICTION COURSE OVERLAY, RUMBLE STRIP CONSTRUCTION AND CROSS-SLOPE CORRECTION.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-31-97

CONCURRENCE BY
DIST DESIGN ENGINEER
DATE: 5-1-97

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2141614
STATE JOB NO. 29170-3455
FAP NO.: - - - ( )
COUNTY: COLUMBIA
PROJ. LGTH.: 16.186 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 0.379 MILLION
SN REQUIRED: 2.05
NAME: I-10

DATE PREP.: 03/01/97
US NO. I 10 SR NO. SR 8
FROM: SUWANNEE CO. LINE
TO: E. OF SR 47
BEGIN KILOPOST: 0.000
END KILOPOST: 16.186
DESIGN LBR: .
MR: 174 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 3
INSIDE SHOULDER PAVEMENT

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	35.00	0.009	0.32
LIMEROCK	165.00	0.007	1.15
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		2.37

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-9.5 AC TRAFFIC 5	50.00	0.017	0.85
MILLING	10.00		- 0.00
EXISTING			2.37
	TOTAL SN PROVIDED:		3.22

(1) MILL FRICTION COURSE (APPROXIMATELY 10MM THICK) OFF SHOULDER PAVEMENT FROM TRAVEL LANE EDGE TO APPROXIMATELY 0.6M ONTO THE SHOULDER.
(2) SUPERPAVE ASPHALTIC CONCRETE SHALL BE PLACED WITH A MECHANICAL SPREADER EQUIPPED WITH ELECTRONIC TRANSVERSE & AUTOMATIC LONGITUDINAL SCREED CONTROLS.
(3) FC-5 FRICTION COURSE SHALL EXTEND 0.3M FROM THE TRAVEL LANE EDGE ONTO THE SHOULDER PAVEMENT ON LIMITED-ACCESS SECTIONS.
(4) MINIMUM PAVEMENT DESIGN FOR SHOULDERS TO FACILITATE FRICTION COURSE OVERLAY, RUMBLE STRIP CONSTRUCTION AND CROSS-SLOPE CORRECTION.
(5) TRAFFIC LEVEL IS SAME AS I-10 TRAVEL LANES SINCE PAVING FOR I-10 INSIDE SHOULDER WILL BE DONE IN SAME OPERATION AS INSIDE TRAVEL LANE.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-31-97

CONCURRENCE BY
DIST DESIGN ENGINEER
DATE: 5-1-97

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

FLORIDA DEPARTMENT OF TRANSPORTATION 18MAR97 PAGE 4
FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET 10:36 OF 6

PREPARED BY: PHILLIP G. DAVIS
W.P. ITEM NO. 2141614
STATE JOB NO. 29170-3455
FAP NO.: - - - ( )
COUNTY: COLUMBIA
PROJ. LGTH.: 16.186 KM
YEAR OF OPENING: 1999
DESIGN YEAR: 2018
DESIGN 80 KN: 3.159 MILLION
SN REQUIRED: 2.93
NAME: I-10

DATE PREP.: 03/01/97
US NO. I 10 SR NO. SR 8
FROM: SUWANNEE CO. LINE
TO: E. OF SR 47
BEGIN KILOPOST: 0.000
END KILOPOST: 16.186
DESIGN LBR: .
MR: 174 R: 97 %
DESIGN SPEED: 110
PAVT. DESIGN SEQ. NO. 4
ACCEL/DECEL LANES & RAMPS

EXISTING PAVEMENT STRUCTURE

LAYER	THICKNESS	COEFF	SN
FC-2 FRICTION COURSE	10.00	0.000	0.00
TYPE I ASPHALTIC CONCRETE	75.00	0.009	0.68
BINDER COURSE	40.00	0.008	0.32
LIMEROCK	265.00	0.007	1.85
STABILIZATION	300.00	0.003	0.90
	TOTAL EXISTING SN :		3.75

RECOMMENDED RESURFACING PAVEMENT DESIGN

LAYER	THICKNESS	COEFF	SN
FC-5 FRICTION COURSE	19.00	0.000	0.00
TYPE SP-12.5 [illegible]	[illegible]	[illegible]	0.68
MILLING		-	0.27
EXISTING			3.75
[illegible]):			4.16

Note: Chang[illegible]

(1) SUPERPAVE ASPH[illegible] WITH A MECHANICAL SPREADER EQUIP[illegible] & AUTOMATIC LONGITUDINAL SCREED CONTROL[illegible]
(2) PAVEMENT DESIG[illegible] .DER PAVEMENT ON ACCEL/ DECEL LANES & [illegible]
(3) MILL TRANSITIO[illegible] ADJACENT TO TRAVEL LANE AT 30MM ON A 6[illegible] YPE SP-12.5 SUPERPAVE ASPHALTIC CONC[illegible] AVERAGE (VARIABLE THICK- -NESS) AT ACCE[illegible] LANE ON A 600:1 RATIO TO 40MM. SHOW[illegible]
(4) MINIMUM PAVEME[illegible] LANES & RAMPS TO FACILITATE RES[illegible] & SHOULDERS.
(5) REST AREA PAVE[illegible]
AUTO/TRUCK PARKING: MILL 90MM
TYPE SP-9.5 AC TRAFFIC 5 AT 40MM(VIRGIN MIX)
TYPE SP-12.5 AC TRAFFIC 5 AT 50MM
PICNIC LOOP: MILL TO BASE (APPROXIMATELY ~~80MM)~~ 40mm
TYPE SP-9.5 AC TRAFFIC ~~1~~5 AT ~~20~~MM(VIRGIN MIX)
TYPE SP-12.5 AC TRAFFIC 3 AT 50MM 40mm
Change in Construction PGD 5-5-98
NOTE: MILLED MATERIAL SHALL NOT BE USED FROM THIS AREA. MILLED MATERIAL SHALL BE DELIVERED TO DOT MAINTENANCE. CONTACT LOCAL MAINTENANCE UNIT FOR DETAILS.

Phillip G. Davis
APPROVED BY
RESPONSIBLE ENGINEER
DATE: 3-31-97

[signature]
CONCURRENCE BY
DIST DESIGN ENGINEER
DATE: 5-21-97

CONCURRENCE BY
FHWA (IF NEEDED)
DATE:____________

PROJECT QUESTIONNAIRE

Project 213074-1-52-01
County Columbia
Location MP 0 to MP Approx 9
Paving Contractor Anderson Columbia Co.

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	**Days**	Nights		Month	6-12 1998
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		**Medium**		Hot > 85
4	Paved Under Traffic	No		**Yes**		
5	Traffic on Completed Mat	<30 min	1 hr	**3 hr**	6 hr	1 Day +
6	Roadway Equipment Breakdowns	**Seldom**		Average		Often
7	Roadway Equipment Condition	**Good**		Average		Poor
8	Crew Experience/Skill	**Good**		Average		Poor
9	Name of Roadway Superintendent		Frank Crawford			
10	Project Management	**Good**		Average		Poor
11	Name of Project Manager		Tony Williams			
12	Plant Problems	**Seldom**		Average		Often
13	Plant Type	Batch		**Drum**		
14		Counter Flow		**Parallel Flow**		
15		Modern		**Normal**		Outdated
16	Plant Brand Name	**Astec**	CMI	Standard Havens		Other ____
17	Plant Drum Diameter	6'	**7'**	8'	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	**Center**	Outer Drum	2nd Drum		Other ____
20	Plant Condition/Maintainence	**Good**	Average	Poor	Age	________
21	Plant Crew Experience/Skill	**Good**		Average		Poor
22	Name of Plant Superintendent		Bo Cothran			
23	Lab Tech Experience/Skill	Good		**Average**		Poor
24	Name of Lab Tech		Andy Gaylord			
25	Mix Consistency	**Good**		Average		Poor
26	Virgin Aggregate Consistency	**Good**		Average		Poor
27	RAP Consistency	**Good**		Average		Poor
28	Mix Temperature Consistency	**Good**		Average		Poor
29	Plant Production Rate (TPH)	<100		101 to 150		151 to 200
		201 to 250		251 to 300		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	**<10 miles**	10 to 34	35 to 60	61to 90	> 90 miles

31 Any special issues/problems during asphalt construction?

Compaction of the 1½" 9.5/D layer was vey difficult.
Several areas were removed and replaced due to low density and failing permeability.

32 Comments The mixes on this project incorparated:

RAP (15-20%) Granite coarse aggregate and a combination of granite and limestone fine aggregate.
Gyratory samples were not cured, but this did not cause a major problem with volumetrics since the mix only contained a small amount of absorptive aggregate.
The density spec was 95% Gmm, which made it difficult to obtain compaction especially on the 9.5mm mix.

33 What could have been done to improve the future performance of this pavement?

This project has performed satisfactorily.
Nmax should be monitored on all projects to assure that mix is not susceptable to rutting.
The Nmax values on this project were below 98% with few exceptions (test sections, etc).

34 Form completed by Ken Murphy
35 Title President
36 Employer Asphalt Technologies Inc.

37 Your position relative to the project

QC Management

Project Information

Fin. Project ID:	**222801-1-52-01**
Contractor:	**C. W. Roberts Contracting, Inc.**
County / District:	**Walton Co. / District 3**
Begin / End M.P.:	**4.500 - 11.676**
Proj. Description:	**I10 - From Eglin AFB Railroad to Boy Scout Road**
Date Of Construction:	**2/20/2001- 6/10/2002**
Plant No.:	**A0704 - Tallahassee, FL 32304**
Spec. Version:	**Letting: 10/25/00; Jan-June 2000 Workbook**
Pavement Design:	**Crack and Seat Concrete - 225mm (8.86in); ARMI Layer; 308 kg/m2 (5.51in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 20112; % Truck = 21.26**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	**250 - 300 Tons Per Hour (TPH)**
Air Temp. (Avg.):	**Min: 37.9F; Max: 91.3F; Avg: 68.1F**
Comments:	**Poor Performing Job; Paired w/ Project # 222800-1-52-01 (Pair 4)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 60002 FINANCIAL PROJECT NO. 222801 1 52 01
WALTON COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	10/09/2002	10/22/2003	10/27/2004	10/12/2005
MIN	0.00	0.00	0.00	0.00
MAX	0.41	0.56	0.52	0.58
Std Dev.	0.08	0.09	0.09	0.10
AVERAGE	0.12	0.20	0.20	0.23

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	10/09/2002	10/22/2003	10/27/2004	10/12/2005
MIN	0.00	0.00	0.00	0.00
MAX	0.37	0.44	0.44	0.54
Std Dev.	0.06	0.07	0.07	0.09
AVERAGE	0.10	0.14	0.18	0.16

Department - QA Production Data

Coarse 19.0 mm TL-D : 20% #67 Illinois Stone, 45% #89 Illinois LimeStone, 20% Kentucky screenings, 5% Illinois screenings,10% Red Bay Sand

SP 01-1040A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.60	4.39	0.37	3.80	5.27	1.47	23.00
ASPHALT CONTENT	5.30	5.32	0.16	4.98	5.57	0.59	23.00
MAX. SP. GRAVITY (GMM)	2.485	2.484	0.009	2.473	2.510	0.037	16
LOT SP. GRAVITY (GMB)		2.332	0.010	2.316	2.359	0.043	16
% MAX. SP. GRAVITY (GMM)		93.8	0.28	93.5	94.4	0.9	16
% PAY		100.0	0.0	100.0	100.0	0.0	16

Coarse 12.5 mm Recycle / TL-D : 10% RAP, 20% S1A Illinois LimeStone, 40% S1B Illinois LimeStone, 10% Kentucky screenings, 10% Illinois sand, 10% Red Bay Sand

SP 01-1174 A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	3.90	4.16	0.46	3.64	5.63	1.99	15
ASPHALT CONTENT	5.00	5.17	0.14	4.87	5.38	0.51	13
MAX. SP. GRAVITY (GMM)	2.485	2.494	0.012	2.480	2.518	0.038	20
LOT SP. GRAVITY (GMB)		2.341	0.013	2.322	2.366	0.044	20
% MAX. SP. GRAVITY (GMM)		93.8	0.27	93.5	94.5	1	20
% PAY		100.0	0.0	100.0	100.0	0.0	20
VISCOSITY @ 60C		567	111.1	404	807	403	14

District - IA Production Data

Coarse 19.0 mm TL-D : 20% #67 Illinois Stone, 45% #89 Illinois LimeStone, 20% Kentucky screenings, 5% Illinois screenings,10% Red Bay Sand

SP 01-1040A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.60	4.31	0.35	3.73	4.90	1.17	13
Ext. AC %:	5.30	5.27	0.28	4.82	5.62	0.80	13
MAX. SP. GRAVITY (GMM)	2.485	2.486	0.006	2.476	2.495	0.019	13
% AIR VOIDS @ Nd	4.00	5.44	1.32	3.40	8.20	4.80	13
% VMA @ Nd	14.10	15.30	1.18	13.20	18.20	5.00	13

Coarse 12.5 mm Recycle / TL-D : 10% RAP, 20% S1A Illinois LimeStone, 40% S1B Illinois LimeStone, 10% Kentucky screenings, 10% Illinois sand, 10% Red Bay Sand

SP 01-1174A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	3.90	4.33	0.46	3.68	5.45	1.77	9
Ext. AC %:	5.00	5.25	0.25	4.95	5.72	0.77	9
MAX. SP. GRAVITY (GMM)	2.485	2.494	0.012	2.474	2.512	0.038	9
% AIR VOIDS @ Nd	4.00	3.66	0.87	1.90	4.60	2.70	9
% VMA @ Nd	14.00	13.57	0.58	12.40	14.50	2.10	9

FLORIDA DEPARTMENT OF TRANSPORTATION
LAWTON CHILES
GOVERNOR
THOMAS F. BARRY, Jr.
SECRETARY

MEMORANDUM

DISTRICT THREE MATERIALS AND RESEARCH

Date: June 16, 1998

To: A. S. Graves, District Materials Engineer

From: F. M. Kreis, District Bituminous Engineer *Frank M. Kreis*

Copies: A. T. Clark, C. Dunn, E. B. Ferguson, File

Subject: **PAVEMENT SURVEY AND RECOMMENDATIONS FOR REHABILITATION, REPAIR OR RESURFACING**

Project No :60002-3429 FPN No : 22280115201
County : Walton F. A. P. No. :
Description :SR (I-10) from Eglin AFB Railroad to Boy Scout Road
(7.197 Miles)

Percent Curb and Gutter: 0 Percent Widening: A pavement survey was conducted by this office on 5-31-98 to obtain data for pavement analysis and recommendations. This survey consisted of measurement and samples of the existing roadway (and shoulders if applicable). Visual examinations of other pavement distress were examined. Attached is a summary of findings. Evaluation of these findings result in the following recommendations:

Base:
Leveling:
Surface: 44Kg/m^2 FC-5 with Ground Tire Rubber
Structural Course: SUPERPAVE Mixtures
Overbuild: 44 Kg/m^2, 9.5mm SUPERPAVE (Level 4)
Patching:
Milling:
Crack Relief Layer:

Remarks: (1) Rubblization has been recommended as the rehabilitation strategy for the concrete pavement.

(2) Recommend SUPERPAVE Mixtures for roadway be limited to 19.0 mm.

(3) The shoulders were cored and the pavement structure includes 25mm of structural course and 130mm of SAHM. Shoulder pavement includes rumble strips and significant amounts of grass. Application of soil sterilant or herbicide is recommended for shoulder pavement to include removal of grass. Work to be included in the costs for Rubblization or Superpave asphalt.

(4) Overbuild has been recommended for the purpose of leveling the shoulders as required for MOT support.

FMK:ls

FLORIDA **DEPARTMENT OF TRANSPORTATION**

LAWTON CHILES
GOVERNOR

THOMAS F. BARRY, Jr.
SECRETARY

MEMORANDUM
DISTRICT THREE MATERIALS AND RESEARCH

Date: June 16, 1998

To: A. S. Graves, District Materials Engineer

From: F. M. Kreis, District Bituminous Engineer *Frank M. Kreis*

Copies: A. T. Clark, C. Dunn, E. B. Ferguson, File

Subject: **PAVEMENT SURVEY AND RECOMMENDATIONS FOR REHABILITATION, REPAIR OR RESURFACING**

Project No :60002-3429
County : Walton FPN No : 22280115201
Description :SR (I-10) from Eglin AFB Railroad to Boy Scout Road F. A. P. No. :
(7.197 Miles)

Percent Curb and Gutter: 0 Percent Widening:

A pavement survey was conducted by this office on 5-31-98 to obtain data for pavement analysis and recommendations. This survey consisted of measurement and samples of the existing roadway (and shoulders if applicable). Visual examinations of other pavement distress were examined. Attached is a summary of findings. Evaluation of these findings result in the following recommendations:

Base:
Leveling:
Surface: 44Kg/m² FC-5 with Ground Tire Rubber
Structural Course: SUPERPAVE Mixtures
Overbuild: 44 Kg/m², 9.5mm SUPERPAVE (Level 4)
Patching:
Milling:
Crack Relief Layer:

Remarks: (1) Rubblization has been recommended as the rehabilization strategy for the concrete pavement.

(2) Recommend SUPERPAVE Mixtures for roadway be limited to 19.0 mm.

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

Prepared By: [signature]
Charles Dunn, P.E.

Date: June 22, 1998

W.P.I. Number: 3149780
State Project No.: 60002-3429
FM No.: 222801-1
County: Walton
Description: I - 10, Eglin AFB RR to Boy Scout Road
Date of Last Resurfacing: ____

U.S. / S.R. No. I - 10
Type Work Rigid pavement rehab.
Project Length: 11.58 km
Mileposts: 4.479 to 11.676

EXISTING PAVEMENT:

310mm Stabilized Subgrade @ 0.003	0.93
225mm Portland Cement Concrete Rubbilized @ 0.009	2.02
Existing SN =	2.95

DESIGN DATA:

Year of Opening: 2001
Design Year: 2020
Loading: 24,796,000
Reliability (%R): 99
Std. Deviation (So): 0.45
Resilient Modulus (Mr) 102 MPa
Soil Support Value: NA
Change in PSI: 0.7
SN Required: 5.27
Design LBR: NA
Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

308 kg/m2 Type SP (Traffic Level 5)	2. 38
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN =	2.38
+	2.95
SN Provided =	5.33

SHOULDERS

308 kg/m2 Type SP (Traffic Level 5)

RECONSTRUCTION

310 mm Stabilized Subgrade (exist.)	0.93
495 kg/m2 Type SP (Traffic Level 5)	3.83
44 kg/m2 FC - 5 (Rubber)	0.00
SN Provided =	4.76

SHOULDERS IN RECONSTRUCTION AREAS

Mill 40mm
88 kg/m2 Type SP (Traffic Level 5)

NOTES:
Use only 12.5mm or 19.0mm SP.
The existing paved shoulders have a significant amount of grass on them. Include an application of soil sterilant or herbicide. ~~Pay for under rubblizing item.~~
Reconstruction is to be used only in areas where the concrete pavement is removed.
The existing subgrade is to be re-compacted if disturbed.

Florida DOT Approval By: [signature]
Date: 7/8/98

Concurrence By: ____
Date: ____

FHWA Approval By: ____
Date: ____

Flexible Pavement Design Summary Sheet

Supplemental Revised Design

Prepared By: Phillip Gainer (PE No. 43943)

WPI No.: 3149780

State Job No.: 60002-3429

FM No.: 222801

County: Walton

Description: I-10, Eglin AFB RR to Boy Scout Road

Date of Last Resurfacing:

Date: March 13, 2000

US / SR No.: I-10 (SR 8)

Type Work: Concrete Pavement Rehabilitation

Project Length: 11.58 km

Mileposts: 4.479 to 11.676

Existing Pavement:

310 mm Stabilized Subgrade @ .003	0.93
225mm Portland Cement Concrete Crack & Seat @ 0.011	2.47
Existing SN	3.40

Design Data:

Year of Opening: 2001

Design Year: 2020

Loading: 24,796,000

Reliability (%R): 99

Resilient Mod. (MR): 102 MPa

SSV:

Δ PSI: 0.7

SN Required: 5.27

Design LBR:

Recommended Pavement Design:

Resurfacing:

Roadway Resurfacing

ARMI

308 kg/m2 Type SP (TL-D)	2.38
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN	2.38
+	3.40
Provided SN	5.78

NOTES:
Extra structural design provided to enhance reflective crack resistance.

Florida DOT
Approved By: [signature]

Date: 3/13/00

Concurrence By:

Date:

FHWA Approved By:

Date:

I-10 Rutting Team

PROJECT QUESTIONNAIRE

Draft

Project 22280115201/22280015201
County Walton
Location MP to MP
Paving Contractor C.W. Roberts

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	**Days**	Nights		Month	MAR, July
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		**Medium**		**Hot > 85**
4	Paved Under Traffic	No		**Yes**		
5	Traffic on Completed Mat	<30 min	1 hr	**3 hr**	6 hr	1 Day +
6	Roadway Equipment Breakdowns	**Seldom**		Average		Often
7	Roadway Equipment Condition	**Good**		Average		Poor
8	Crew Experience/Skill	**Good**		Average		Poor
9	Name of Roadway Superintendent	DONALD TATE				
10	Project Management	Good		Average		Poor
11	Name of Project Manager	DARRYL CARPENTER				
12	Plant Problems	**Seldom**		Average		Often
13	Plant Type	Batch		**Drum**		
14		**Counter Flow**		Parallel Flow		
15		**Modern**		Normal		Outdated
16	Plant Brand Name	Astec	**CMI**	Standard Havens		Other ____
17	Plant Drum Diameter	6'	7'	**8'**	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	Center	**Outer Drum**	2nd Drum		Other ____
20	Plant Condition/Maintainence	**Good**	Average	Poor	Age	NEW
21	Plant Crew Experience/Skill	**Good**		Average		Poor
22	Name of Plant Superintendent	DARREN PHILLIPS				
23	Lab Tech Experience/Skill	**Good**		Average		Poor
24	Name of Lab Tech	CRAIG M. CLARK				
25	Mix Consistency	**Good**		Average		Poor
26	Virgin Aggregate Consistency	**Good**		Average		Poor
27	RAP Consistency	**Good**		Average		Poor
28	Mix Temperature Consistency	**Good**		Average		Poor
29	Plant Production Rate (TPH)	<100		101 to 150		151 to 200
		201 to 250		**251 to 300**		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	<10 miles	**10 to 34**	35 to 60	61to 90	> 90 miles

31 Any special issues/problems during asphalt construction?

NONE

Add extra sheets if needed for answers

34 Form completed by DARREN PHILLIPS
35 Title PLANT / QC MGR
36 Employer C.W. ROBERTS

37 Your position relative to the project

PLANT / QC MGR.

Project Information

Fin. Project ID:	**222800-1-52-01**
Contractor:	**C. W. Roberts Contracting, Inc.**
County / District:	**Walton Co. / District 3**
Begin / End M.P.:	**11.676 - 18.100**
Proj. Description:	**I-10 - From Boy Scout Road to SR 83 (US 331)**
Date Of Construction:	**2/20/2001 - 6/27/2002**
Plant No.:	**A0704 - Tallahassee, FL 32304**
Spec. Version:	**Letting: 10/25/00; Jan-June 2000 Workbook**
Pavement Design:	**Crack and Seat Concrete - 225mm (8.86in); ARMI Layer; 308 kg/m2 (5.51in) - Type-SP (TL 5); 44 kg/m2 (.78in) - FC-5**
Traffic:	**Section AADT = 20112; % Truck = 21.26**
Production Data:	**(see attached)**
Mix Design No.:	**(see attached)**
Production Rate:	**250 - 300 Tons Per Hour (TPH)**
Air Temp. (Avg.):	**Min: 37.9F; Max: 91.3F; Avg: 68.1F**
Comments:	**Good Performing Job; Paired w/ Project # 222801-1-52-01 (Pair 4)**

FLORIDA DEPT OF TRANSPORTATION LASER PROFILER
COUNTY SECTION NO. 60002 FINANCIAL PROJECT NO. 222800 1 52 01
WALTON COUNTY SR 8 / I-10 DISTRICT 3

EASTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	10/09/2002	10/22/2003	10/27/2004	10/12/2005
MIN	0.00	0.00	0.00	0.00
MAX	0.12	0.23	0.23	0.35
Std Dev.	0.03	0.04	0.05	0.06
AVERAGE	0.04	0.07	0.07	0.12

WESTBOUND TRAFFIC LANE
RUT AVERAGE

SURVEY YEAR	2003	2004	2005	2006
DATE SURVEYED	10/09/2002	10/22/2003	10/27/2004	10/12/2005
MIN	0.00	0.00	0.00	0.00
MAX	0.31	0.33	0.44	0.35
Std Dev.	0.05	0.06	0.06	0.07
AVERAGE	0.07	0.09	0.12	0.11

Department - QA Production Data

Coarse 19.0 mm TL-D : 20% #67 Illinois Stone, 45% #89 Illinois LimeStone, 20% Kentucky screenings, 5% Illinois screenings,10% Red Bay Sand

SP 01-1040A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
PASSING 75 MICRON SIEVE	4.60	4.13	0.39	3.40	4.73	1.33	11
ASPHALT CONTENT	5.30	5.23	0.15	4.99	5.55	0.56	11
MAX. SP. GRAVITY (GMM)	2.485	2.481	0.005	2.476	2.487	0.011	6
LOT SP. GRAVITY (GMB)		2.330	0.005	2.324	2.337	0.013	6
% MAX. SP. GRAVITY (GMM)		93.9	0.17	93.7	94.2	0.5	6
% PAY		100.0	0.0	100.0	100.0	0.0	7

District - IA Production Data

Fine 12.5 mm TL-C : 45% S1A Alabama Stone, 10% FC-1 Granite Screenings, 35% Alabama Screenings, 10% Local Sand Freeport

SP 01-0961A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.00	4.19	0.13	4.06	4.31	0.25	2
Ext. AC %:	5.30	4.98	0.09	4.89	5.06	0.17	2
MAX. SP. GRAVITY (GMM)	2.513	2.510	0.002	2.508	2.511	0.003	2
% AIR VOIDS @ Nd	4.00	4.25	0.35	3.90	4.60	0.70	2
% VMA @ Nd	14.90	14.95	0.35	14.60	15.30	0.70	2

Coarse 19.0 mm TL-D : 20% #67 Illinois Stone, 45% #89 Illinois LimeStone, 20% Kentucky screenings, 5% Illinois screenings,10% Red Bay Sand

SP 01-1040A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.60	4.12	0.68	2.71	5.13	2.42	7
Ext. AC %:	5.30	4.94	0.32	4.51	5.34	0.83	7
MAX. SP. GRAVITY (GMM)	2.485	2.488	0.010	2.473	2.508	0.035	7
% AIR VOIDS @ Nd	4.00	4.90	1.27	2.80	6.30	3.50	7
% VMA @ Nd	14.10	14.43	0.78	13.50	15.70	2.20	7

Coarse 12.5 mm Recycle / TL-D : 10% RAP, 20% S1A Illinois LimeStone, 40% S1B Illinois LimeStone, 10% Kentucky screenings, 10% Illinois sand, 10% Red Bay Sand

SP 01-1174B	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	3.90	4.13	0.23	3.74	4.44	0.70	8
Ext. AC %:	5.20	5.20	0.23	4.85	5.45	0.60	8
MAX. SP. GRAVITY (GMM)		2.489	0.012	2.468	2.513	0.045	8
% AIR VOIDS @ Nd		4.61	1.35	2.90	6.80	3.90	8
% VMA @ Nd		14.56	0.89	12.90	15.60	2.70	8

Coarse 19.0 mm Recycle / TL-D : 15% RAP, 25% #67 Illinois LimeStone, 40% #89 Illinois LimeStone, 12% Kentucky screenings, 8% Red Bay Sand

SP 01-1262A	DESIGN	AVG	STD	MIN	MAX	RNG	CNT
75um (#200)	4.40	4.16	0.32	3.63	4.54	0.91	7
Ext. AC %:	5.00	5.14	0.33	4.61	5.68	1.07	7
MAX. SP. GRAVITY (GMM)	2.505	2.498	0.008	2.482	2.509	0.027	7
% AIR VOIDS @ Nd	4.00	3.90	0.75	2.90	5.20	2.30	7
% VMA @ Nd	13.50	13.77	0.72	12.60	14.80	2.20	7

FLORIDA
LAWTON CHILES
GOVERNOR

DEPARTMENT OF TRANSPORTATION

THOMAS F. BARRY, Jr.
SECRETARY

MEMORANDUM
DISTRICT THREE MATERIALS AND RESEARCH

Date: June 16, 1998

To: A. S. Graves, District Materials Engineer

From: F. M. Kreis, District Bituminous Engineer *Frank M. Kreis*

Copies: A. T. Clark, C. Dunn, E. B. Ferguson, File

Subject: **PAVEMENT SURVEY AND RECOMMENDATIONS FOR REHABILITATION, REPAIR OR RESURFACING**

Project No. : 60002-3428
County : Walton FPN No : 22280013101
Description : SR 8 (I-10) from Boy Scout Rd to SR 83 (US331) F. A. P. No. :
(6.409 Miles)

Percent Curb and Gutter: 0 Percent Widening: ______

A pavement survey was conducted by this office on 5-31-98 to obtain data for pavement analysis and recommendations. This survey consisted of measurement and samples of the existing roadway (and shoulders if applicable). Visual examinations of other pavement distress were examined. Attached is a summary of findings. Evaluation of these findings result in the following recommendations:

Base: ______
Leveling: ______
Surface: 44Kg/m^2 FC-5 with Ground Tire Rubber
Structural Course: SUPERPAVE Mixtures
Overbuild: 44 Kg/m^2, 9.5mm SUPERPAVE (Level 4)
Patching: ______
Milling: ______
Crack Relief Layer: ______

Remarks:

(1) Rubblization has been recommended as the rehabilization strategy for the concrete pavement.

(2) Recommend SUPERPAVE Mixtures for roadway be limited to 19.0 mm.

(3) The shoulders were cored and the pavement structure includes 25mm of structural course and 130mm of SAHM. Shoulder pavement includes rumble strips and significant amounts of grass.

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

Prepared By: Charles Dunn, P.E. (signature)
W.P.I. Number: 3149779
State Project No.: 60002-3428
FM No.: 222800-1
County: Walton
Description: I - 10, Boy Scout Road to U.S. 331
Date of Last Resurfacing:

Date: June 23, 1998
U.S. / S.R. No. I - 10
Type Work Rigid Pavt. Rehab.
Project Length: 10.31 km
Mileposts: 11.676 to 18.085

EXISTING PAVEMENT:

Stabilized Subgrade 310mm @ 0.003		0.93
Portland Cement Concrete(Rubblized) 225mm @ 0.009		2.02
Existing SN	=	2.95

DESIGN DATA:

Year of Opening: 2001
Design Year: 2020
Loading: 24,796,000
Reliability (%R): 99
Std. Deviation (So): 0.45
Resilient Modulus (Mr)
Soil Support Value: NA
Change in PSI: 0.7
SN Required: 5.27
Design LBR: NA
Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

308 kg/m2 Type SP (Traffic Level 5)		2.38
44 kg/m2 FC - 5 (Rubber)		0.00
Additional SN	=	2.38
	+	2.95
SN Provided	=	5.33

SHOULDERS

308 kg/m2 Type SP (Traffic Level 5)

RECONSTRUCTION

310mm Stabilized Subgrade (Exist.)		0.93
495 kg/m2 Type SP (Traffic Level5)		3.83
FC - 5 (Rubber) 44 kg/m2		0.00
SN Provided	=	4.76

SHOULDERS IN RECONSTRUCTION AREAS

Mill 40mm
88 kg/m2 Type SP (Traffic Level 5)

NOTES:

Use only 12.5 or 19.0mm SP.
Reconstruction is to be used only in areas where the existing pavement is removed.
The existing subgrade shall be re-compacted if disturbed.

Florida DOT Approval By: (signature)
Date: 6/29/98

Concurrence By:
Date:

FHWA Approval By:
Date:

FLEXIBLE PAVEMENT DESIGN SUMMARY SHEET

REVISED DESIGN

Prepared By: [signature] Charles Dunn, P.E.

Date: March 11, 1999

W.P.I. Number: 3149779

State Project No.: 60002-3428

FM No.: 222800-1

County: Walton

U.S. / S.R. No. I - 10

Type Work Rigid Pavt. Rehab.

Project Length: 10.31 km

Mileposts: 11.676 to 18.085

Description: I - 10, Boy Scout Road to U.S. 331

Date of Last Resurfacing: ____

EXISTING PAVEMENT:

Stabilized Subgrade 310mm @ 0.003	0.93
Portland Cement Concrete (Rubblized) 225mm @ 0.009	2.02
Existing SN =	2.95

DESIGN DATA:

Year of Opening: 2001

Design Year: 2020

Loading: 24,796,000

Reliability (%R): 99

Std. Deviation (So): 0.45

Resilient Modulus (Mr) ____

Soil Support Value: NA

Change in PSI: 0.7

SN Required: 5.27

Design LBR: NA

Design Speed: 110 km/h

RECOMMENDED PAVEMENT DESIGN:

ROADWAY RESURFACING

308 kg/m2 Type SP (Traffic Level 5)	2.38
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN =	2.38
	+ 2.95
SN Provided =	5.33

SHOULDERS

308 kg/m2 Type SP (Traffic Level 5)

RECONSTRUCTION

310mm Stabilized Subgrade (Exist.)	0.93
495 kg/m2 Type SP (Traffic Level5)	3.83
FC - 5 (Rubber) 44 kg/m2	0.00
SN Provided =	4.76

SHOULDERS IN RECONSTRUCTION AREAS

Mill 50mm

110 kg/m2 Type SP (Traffic Level 5)

Florida DOT Approval By: [signature] Graves

Date: 3/15/99

Concurrence By: ____

Date: ____

FHWA Approval By: ____

Date: ____

Flexible Pavement Design Summary Sheet

Supplemental Revised Design

Prepared By: Phillip Gainer (PE No. 43943)

WPI No.: 3149779

State Job No.: 60002-3428

FM No.: 222800

County: Walton

Description: I-10 , Boy Scout Road to US 331

Date of Last Resurfacing:

Date: March 13, 2000

US / SR No.: I-10 (SR 8)

Type Work: Concrete Pavement Rehabilitation

Project Length: 10.31 km

Mileposts: 11.676 to 18.085

Existing Pavement:

310 mm Stabilized Subgrade @ .003	0.93
225mm Portland Cement Concrete Crack & Seat @ 0.011	2.47
Existing SN	3.40

Design Data:

Year of Opening: 2001

Design Year: 2020

Loading: 24,796,000

Reliability (%R): 99

Resilient Mod. (MR): 102 MPa

SSV:

Δ **PSI:** 0.7

SN Required: 5.27

Design LBR:

Recommended Pavement Design:

Resurfacing:

Roadway Resurfacing

ARMI

308 kg/m2 Type SP (TL-D)	2.38
44 kg/m2 FC - 5 (Rubber)	0.00
Additional SN	2.38
+	3.40
Provided SN	5.78

NOTES: Resilient Modulus assumed from Project 222801.
Extra structural design provided to enhance reflective crack resistance.

Florida DOT Approved By:	Concurrence By:	FHWA Approved By:
ASGraves		
Date: 3/13/00	Date:	Date:

I-10 Rutting Team

PROJECT QUESTIONNAIRE

Draft

Project 22280115201/22280015201
County Walton
Location MP to MP
Paving Contractor C.W. Roberts

Project Conditions

Final Structural Layer Paving
Circle correct answer if known
Fill in blanks

1	Work Schedule	(Days)	Nights		Month	MAR, July
2	Weather	Dry		Wet/Rainy		
3	Temperature	Cold < 55		(Medium)		(Hot > 85)
4	Paved Under Traffic	No		(Yes)		
5	Traffic on Completed Mat	<30 min	1 hr	(3 hr)	6 hr	1 Day +
6	Roadway Equipment Breakdowns	(Seldom)		Average		Often
7	Roadway Equipment Condition	(Good)		Average		Poor
8	Crew Experience/Skill	(Good)		Average		Poor
9	Name of Roadway Superintendent		DONALD TATE			
10	Project Management	Good		Average		Poor
11	Name of Project Manager		DARRYL CARPENTER			
12	Plant Problems	(Seldom)		Average		Often
13	Plant Type	Batch		(Drum)		
14		(Counter Flow)		Parallel Flow		
15		(Modern)		Normal		Outdated
16	Plant Brand Name	Astec	(CMI)	Standard Havens		Other ____
17	Plant Drum Diameter	6'	7'	(8')	9'	Other ____
18	Plant Batch Size	6000 lb	8000 lb	10000 lb	N/A	Other ____
19	RAP Inlet Location	Center	(Outer Drum)	2nd Drum		Other ____
20	Plant Condition/Maintainence	(Good)	Average	Poor	Age	NEW
21	Plant Crew Experience/Skill	(Good)		Average		Poor
22	Name of Plant Superintendent		DARREN PHILLIPS			
23	Lab Tech Experience/Skill	(Good)		Average		Poor
24	Name of Lab Tech		CRAIG M. CLARK			
25	Mix Consistency	(Good)		Average		Poor
26	Virgin Aggregate Consistency	(Good)		Average		Poor
27	RAP Consistency	(Good)		Average		Poor
28	Mix Temperature Consistency	(Good)		Average		Poor
29	Plant Production Rate (TPH)	<100		101 to 150		151 to 200
		201 to 250		(251 to 300)		301 to 350
		351 to 400		401 to 450		> 451
30	Haul Distance	<10 miles	(10 to 34)	35 to 60	61to 90	> 90 miles

31 Any special issues/problems during asphalt construction?

NONE

32 Comments:

33 What could have been done to improve the future performance of this pavement?

Add extra sheets if needed for answers

34 Form completed by DARREN PHILLIPS
35 Title PLANT / QC MGR
36 Employer C.W. ROBERTS

37 Your position relative to the project

PLANT / QC MGR.

Appendix D

Rut Profiles from Transverse Profilograph

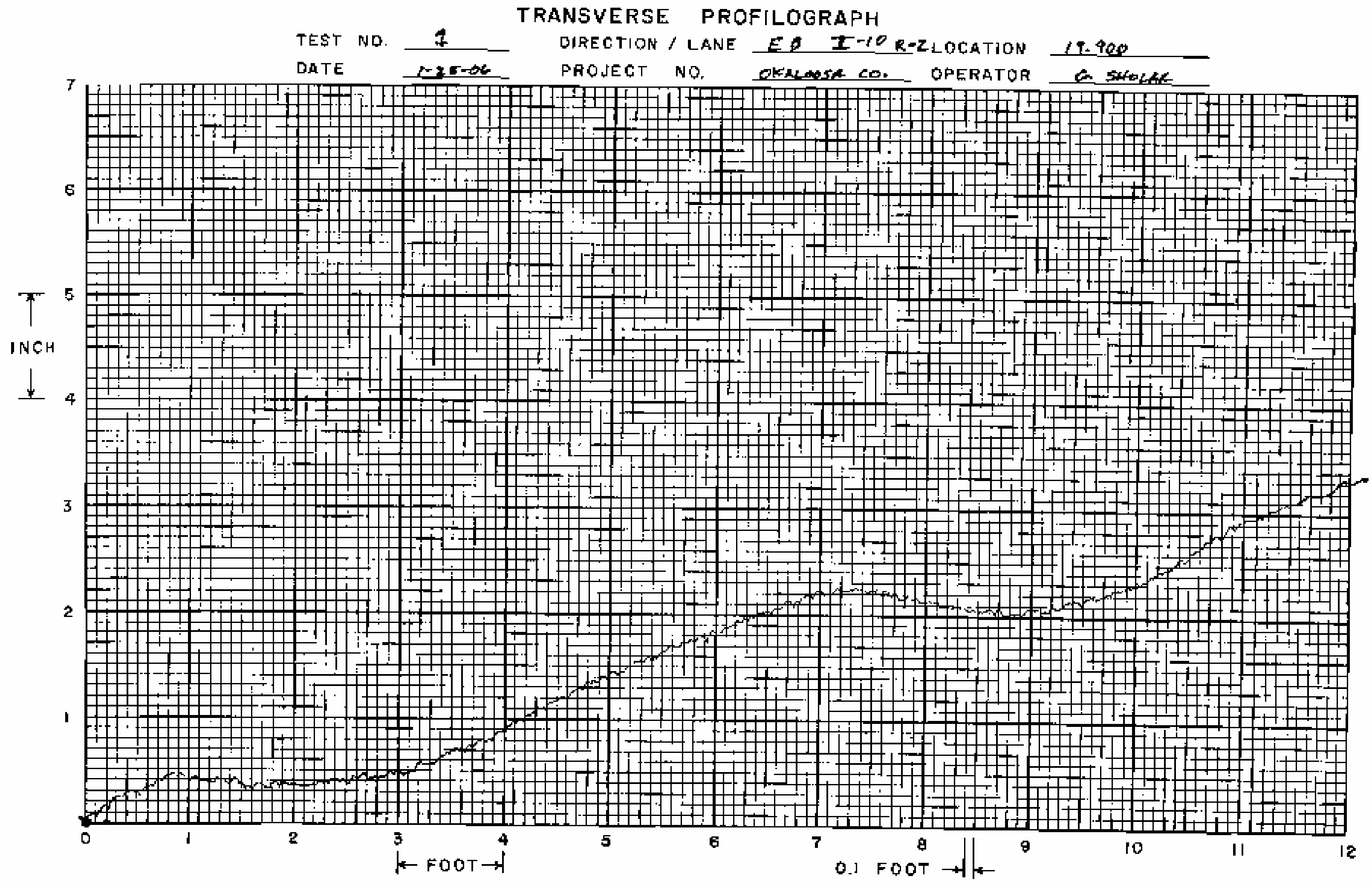


Figure 5 - Project 222721-1-52-01 Transverse Profilograph - Anderson Columbia Co., Inc.

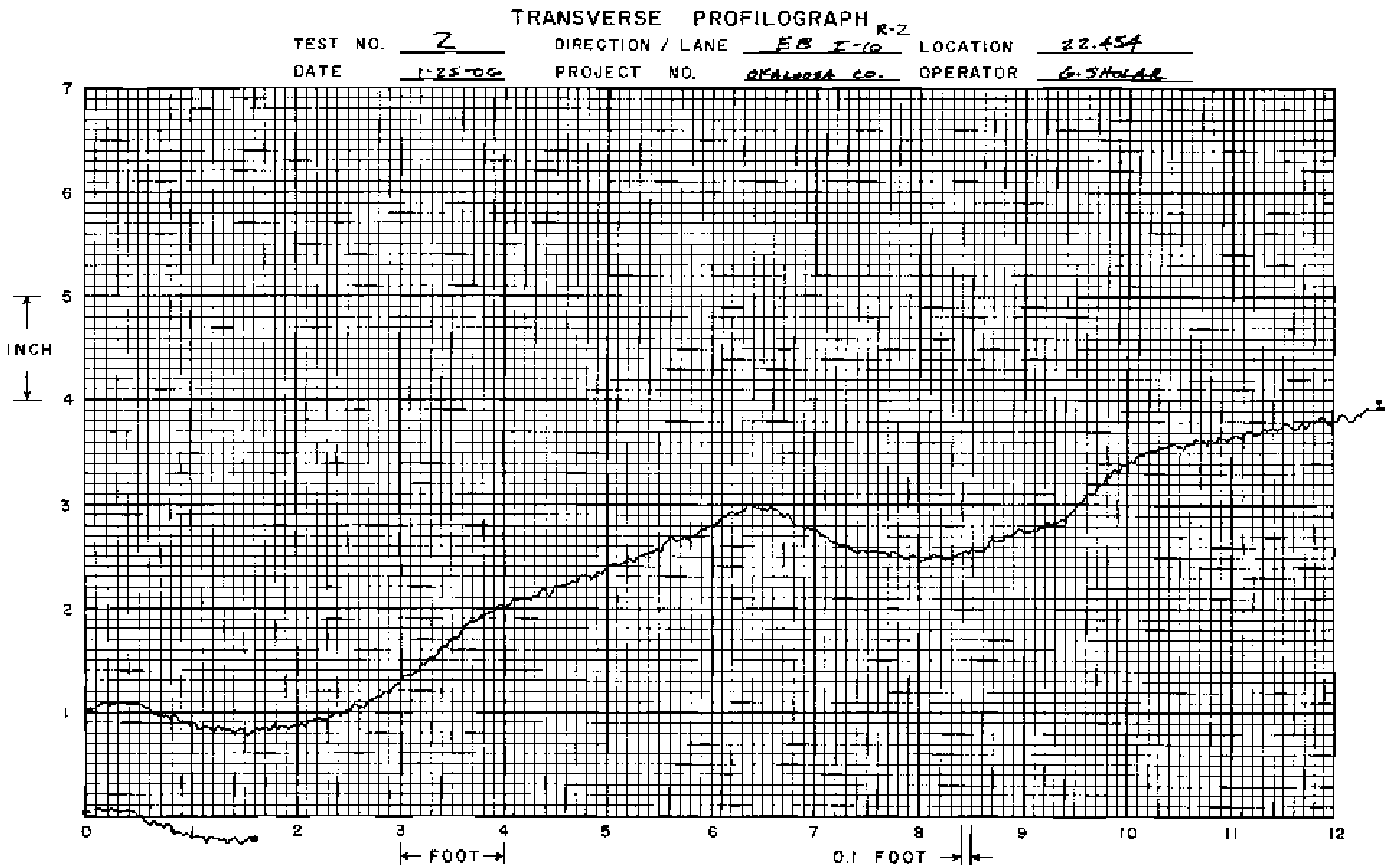


Figure 6 - Project 222721-1-52-01 Transverse Profilograph - Anderson Columbia Co., Inc.

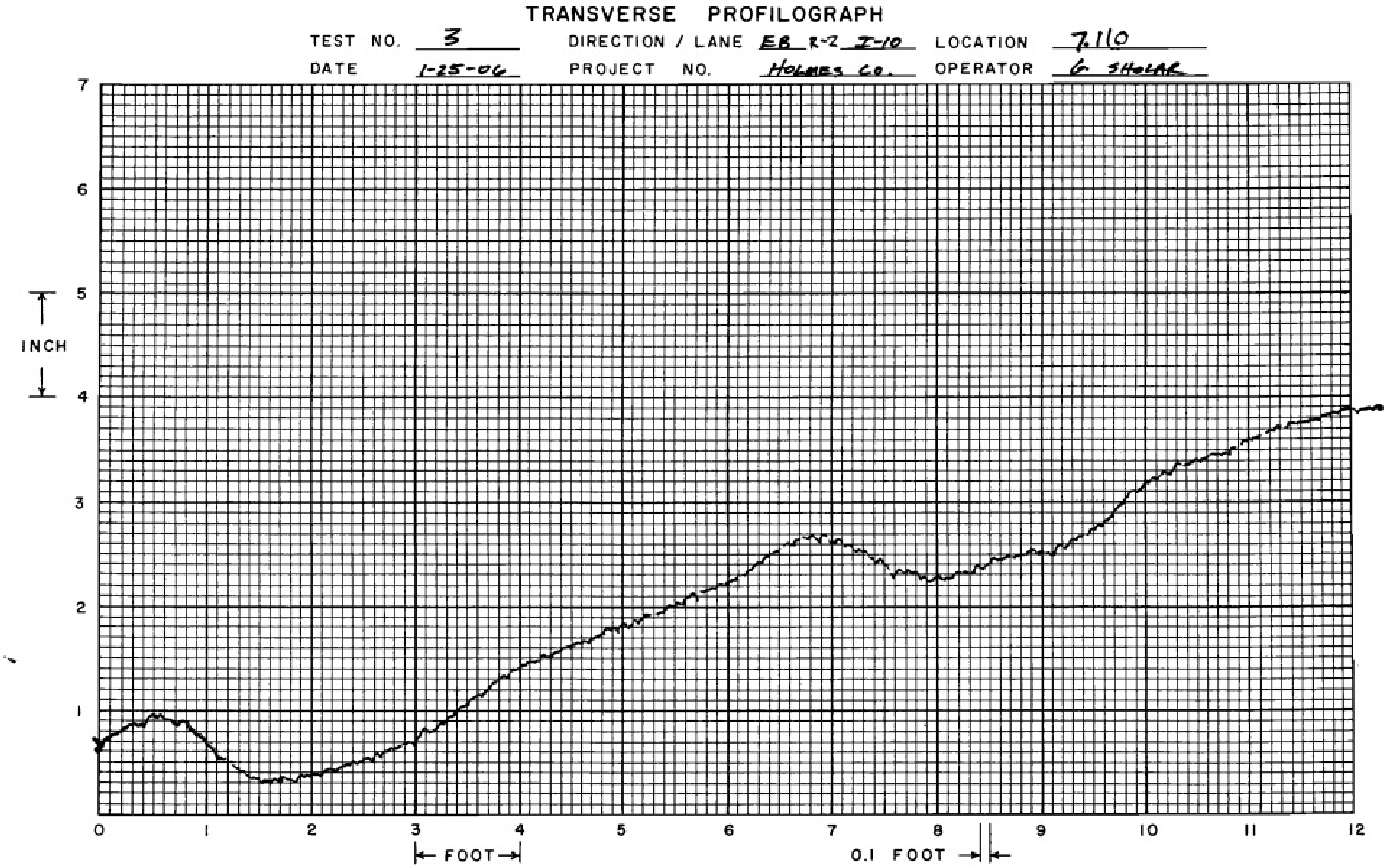


Figure 7 - Project 222567-1-52-01 Transverse Profilograph – White Construction Co., Inc.

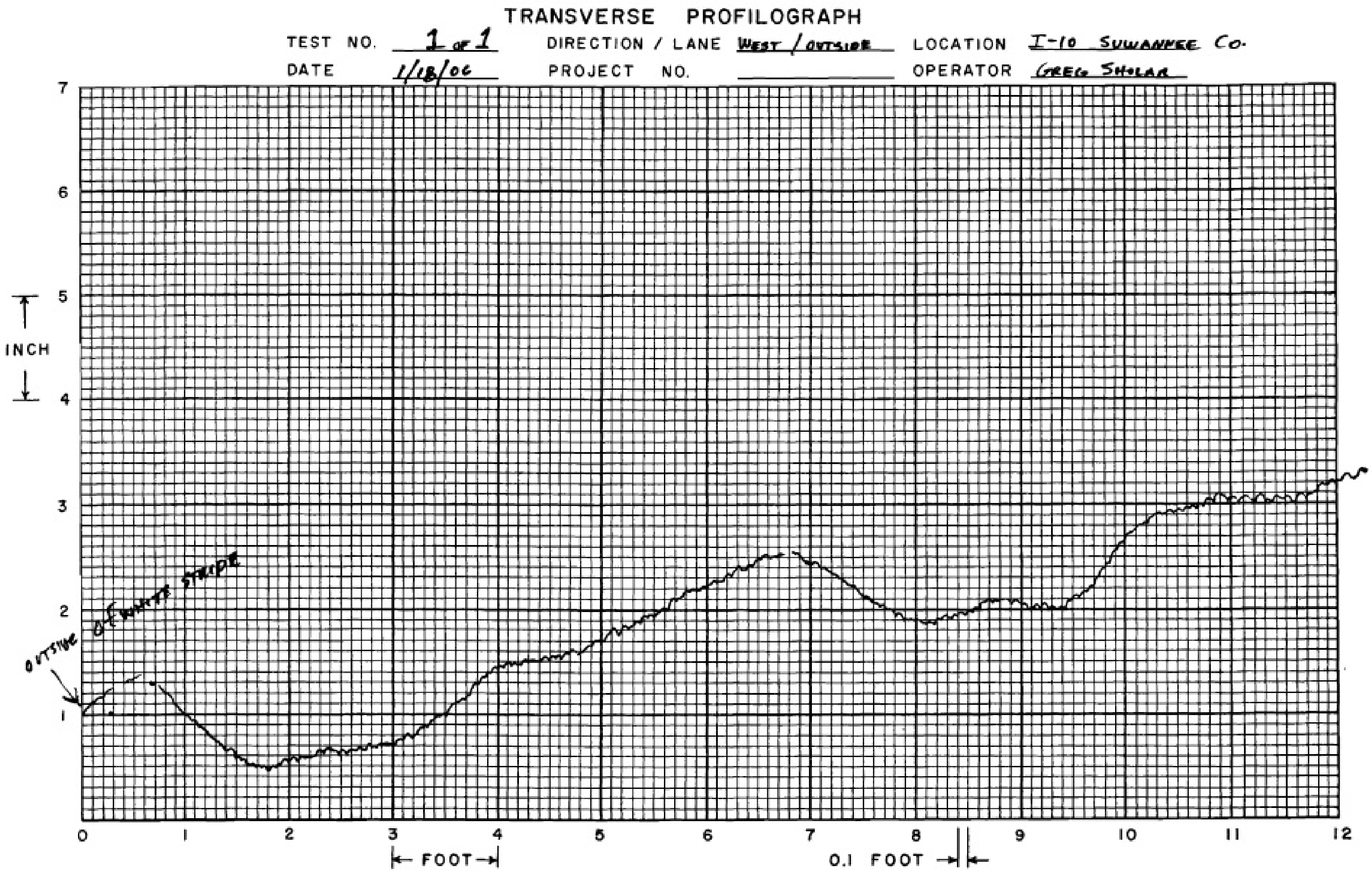


Figure 8 - Project 213560-1-52-01 Transverse Profilograph - Anderson Columbia Co., Inc.