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16. Abstract

This report summarized the results of field evaluation of the effectiveness of lime and various antistripping additives using the following methods:

(a) Modified Lottman Method (Tex-531-C) and
(b) Boiling Test (Tex-530-C).

Core samples were obtained from the field test sections up to 48 months after construction.

Field data to date show very little evidence of distress which is directly related to moisture damage or stripping. This was anticipated due to the slow rate of moisture ingress under adequate construction compaction.

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by

Ming-Jen Liu
Thomas W. Kennedy

Research Report Number 441-2F

Research Project 3-9-86-441

Treatment of Asphalt Mixtures with Lime and Antistripping Agents

conducted for

Texas Department of Transportation

in cooperation with the

U. S. Department of Transportation
Federal Highway Administration

by the

CENTER FOR TRANSPORTATION RESEARCH

Bureau of Engineering Research

THE UNIVERSITY OF TEXAS AT AUSTIN

November 1991

NOT INTENDED FOR CONSTRUCTION,
PERMIT, OR BIDDING PURPOSES

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Research Supervisor

PREFACE

This is the second and final report for Project 3-9-86-441, "Treatment of Asphalt Mixtures with Lime and Antistripping Agents." This report titled "Field Evaluation of Antistripping and Moisture Damage in Asphalt Pavements Treated with Lime and Antistripping Agents," presents the information and findings based upon performance of the field test sections placed in eight SDHPT Districts.

The assistance and close cooperation of the Texas State Department of Highways and Public Transportation, especially personnel from those Districts directly involved and the Materials and Tests Division, is acknowledged.

Appreciation is also expressed to the Center for Transportation Research staff, Eugene Betts, Richard Ryle, Bess Dougherty and W. E. Elmore.

Ming-Jen Liu

Thomas W. Kennedy

March 1991

LIST OF REPORTS

Report No. 441-1, "Evaluation of Stripping and Moisture Damage in Asphalt Pavements Treated with Lime and Antistripping Agents," by W. Virgil Ping and Thomas W. Kennedy, summarizes the results of determining the moisture susceptibility by four primary test methods and reports findings of comparisons between the laboratory mixtures, plant mixtures and cores obtained from the test sections.

Report No. 441-2F, "Field Evaluation of Stripping and Moisture Damage in Asphalt Pavements Treated with Lime and Antistripping Agents," by Ming-Jen Liu and Thomas W. Kennedy, presents the information and findings based upon performance of the field test sections placed in eight SDHPT Districts.

ABSTRACT

This report summarized the results of field evaluation of the effectiveness of lime and various antistripping additives using the following methods:

(a) Modified Lottman Method (Tex-531-C) and
(b) Boiling Test (Tex-530-C).

Core samples were obtained from the field test sections up to 48 months after construction.

Field data to date show very little evidence of distress which is directly related to moisture damage or stripping. This was anticipated due to the slow rate of moisture ingress under adequate construction compaction.

KEY WORDS: stripping, moisture damage, asphalt mixtures, hydrated lime, antistripping additives, wet-dry indirect tensile test, boiling test.

SUMMARY

Stripping and moisture damage in asphalt mixtures can produce serious pavement distress, reduce pavement performance, and increase maintenance costs. Previous studies have indicated that the primary factors which relate to stripping are the environment, aggregate, asphalt, and/or the use of antistripping agents. However, there has been no formalized study to evaluate the field performance of treated and untreated asphalt mixtures and to relate this performance to treatment and test values.

The purpose of this research was to evaluate the effectiveness of hydrated lime and various antistripping additives under field conditions, to verify the ability of various laboratory testing techniques to predict field performance with respect to stripping and moisture damage, to establish the relationship between different laboratory test results, and possibly in the future, to improve the tests and establish realistic specifications based on the field performance.

This report, Research Report 441-2F, is the final report and summarizes the information related to the construction and monitoring of the eight field experimental projects in Texas, and evaluates the long-term effectiveness of various antistripping agents including hydrated lime.

IMPLEMENTATION

Pending additional information developed in a long-term study of the test pavements constructed as part of this study, it is recommended that the present procedures and specifications in use by the Texas State Department of Highways and Public Transportation be continued. It is also recommended that the subject test pavements be evaluated each year or at shorter periods of time if conditions indicate the need.

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CHAPTER 1

INTRODUCTION

Moisture damage of asphalt mixtures is a major problem for asphalt pavements constructed throughout much of the United States. The seriousness of the problem, which has been studied for decades, is evidenced by the large number of research efforts conducted in the United States during the last ten years.

Moisture damage ranges in severity from stripping to minor softening of the asphalt matrix which causes the mixture to lose stability or load carrying capacity. Stripping is a phenomenon in which an asphalt binder is separated from the surface of an aggregate either by the action of water alone or by the interaction of traffic loads, temperature, and water. Pavement distress resulting from stripping commonly occurs as shoving and rutting, fatigue cracking, and bleeding or flushing. Similar distress, except for bleeding, can occur as the result of softening. Unlike stripping, which is a loss of adhesion, softening is a reduction in the stiffness and strength of the asphalt matrix or possibly a reduction in cohesion.

During the past ten to fifteen years, a number of tests and test procedures were developed to evaluate the moisture damage potential of asphalt-aggregate mixtures. Unfortunately, while there are currently a limited number of basic tests, there are many variations of each test and many different acceptance criteria being used. It is also apparent that these different tests and test variations do not yield the same results and thus do not predict the same amount of moisture damage potential. In addition, it should be noted that the acceptance criteria often have been arbitrarily established or, at best, were based primarily on past performance or the testing of materials with an established performance history related to moisture damage.

An number of procedures and recommendations to eliminate or minimize moisture damage have been formulated. One of these procedures involves treating the asphalt mixture with an antistripping agent such as hydrated lime or other commercially available antistripping additives. Early studies concluded that hydrated lime was much more effective than many of the liquid antistripping additives which were being used at the time of the studies. Since that time, as the result of

(1) the recognition of the severity and importance of moisture damage and

(2) the increase use of hydrated lime,

new and more effective liquid antistripping additives were developed and are being marketed and used in asphalt mixtures.

Generally it has been found that the effectiveness of these additives is dependent on the particular combination of aggregate and asphalt cement. Many engineers and researchers feel that hydrated lime generally is a more effective additive to minimize moisture damage, but recognize that liquid antistripping additives do produce test results that exceed acceptance levels and in many cases are equal to or better than the values produced by hydrated lime. Nevertheless, there are still questions related to the tests, the acceptance levels, and the long-term effectiveness of all antistripping additives.

Finally, hydrated lime has been added to the mixture or aggregates in a variety of ways some of which cause construction problems, decreased production and increased costs. When added as a slurry, the excess moisture must removed by drying, increasing drying costs and more importantly, reducing plant capacity. These problems coupled with the fact that many of the liquid additives are cheaper and are apparently effective have caused many states to accept both hydrated lime and liquid antistripping additives.

In recognition of these problems the Texas State Department of Highways and Public Transportation (SDHPT) funded a research project at The University of Texas at Austin to:

1. evaluate the effectiveness of hydrated lime and various antistripping additives under field conditions,
2. verify the ability of various laboratory testing techniques to predict field performance with respect to stripping and moisture damage,

3. establish the relationship between different laboratory test results, and
4. possibly in the future, improve the tests and establish realistic specifications based on the field performance.

This report, Research Report 441-2F, is the final report and summarizes the findings and information related to the construction and monitoring of the eight field experimental projects in Texas, and evaluates the long-term effectiveness of various antistripping agents including hydrated lime.

Chapter 2 contains a literature review of stripping and moisture damage of asphalt mixtures, and techniques and procedures to minimize moisture damage. Chapter 3 summarizes the information related to the construction, monitoring and testing of the field experimental projects. Test results of field cores are analyzed and discussed in Chapter 4. Conclusions and recommendations based on the results of this study are presented in Chapter 5. Information related to the eight field test projects are summarized in Appendices A through F.

CHAPTER 2

LITERATURE REVIEW: STRIPPING OF ASPHALT MIXTURES

BACKGROUND

Moisture damage of asphalt mixture is a major problem for asphalt pavements constructed throughout much of the United States. The seriousness of the problem, which has been studied for decades, is evidenced by the large number of research efforts conducted in the United States during the last ten years (Refs 1-27).

Moisture damage ranges in severity from stripping to minor softening of the asphalt matrix which causes the mixture to lose stability or load carrying capacity. Stripping is a phenomenon in which an asphalt binder is separated from the surface of an aggregate either by the action of water alone or by the interaction of traffic loads, temperature, and water. Pavement distress resulting from stripping commonly occurs as shoving and rutting, fatigue cracking, and bleeding or flushing. Similar distress, except for bleeding, can occur as the result of softening. Unlike stripping, which is a loss of adhesion, softening is a reduction in the stiffness and strength of the asphalt matrix or possibly a reduction in cohesion.

During the past ten years, a number of tests and test procedures were developed to evaluate the moisture damage potential of asphalt-aggregate mixtures. In addition, a number of procedures and recommendations to eliminate or minimize moisture damage have been formulated. The following section summarizes the stripping process and current approaches to evaluate and minimize moisture damage to asphalt mixtures.

STRIPPING MECHANISMS

Three basic mechanisms of stripping have been identified as follows (Ref 2):

(1) physical-chemical reactions,

(2) surface coatings, and

(3) smooth surface textures.

The first mechanism, physical-chemical reactions, is of primary concern. Numerous investigators have suggested (Refs 2, 24 and 26) such physical-chemical reactions as the cause of stripping in asphalt-aggregate mixtures and include mechanical, chemical, or thermodynamic mechanisms (Table 2.1). Mechanical mechanisms include the surface texture, porosity (absorption), aggregate coating, surface area and particle sizes. Unfortunately, none of these proposed reactions can fully explain the stripping of the asphalt-aggregate mixtures. It is possible that more than one reaction may contribute to the stripping in different types of mixtures under different conditions. Dust and moisture as the

TABLE 2.1 STRIPPING MECHANISMS FOR ASPHALT MIXTURES

Mechanism	Type of Mechanism		
	Mechanical	Chemical	Thermodynamic
Displacment	X		
Detachment		X	X
Pore Pressure	X		X
Chemical Debonding		X	
Blistering and Pitting	X		X
Film Rupture			X
Emulsion Formation			X

surface coating on aggregate minimize the ability of the asphalt and the aggregate to develop adequate adhesion. Washing of the aggregate prior to use can eliminate this cause of stripping. Smooth aggregate textures also prevent adequate adhesion between the asphalt and the aggregate surface. Crushing of the aggregate to produce rough surface with more surface texture will minimize this cause. However, in some instances, aggregate with rough surfaces may find it difficult to maintain complete (uniform) coating of asphalt cement. Consequently the thin films of asphalt cement at the edges of a rough feature may be most susceptible to stripping. It is important to identify the basic cause of stripping in order to select the best method of treatment.

CONTROL OF STRIPPING

A number of procedures and treatments will minimize the stripping potential of mixtures and should reduce the distress due to stripping. These procedures and treatments (Refs 5 and 9) are summarized as follows:

Providing adequate compaction: Adequate compaction will reduce the air voids and the continuity of the air void system. This prevents the penetration of moisture into the mixture, thus reducing the tendency for stripping to occur. In dense graded asphalt mixtures, the air void content should ideally be less than 7 percent. At void contents in excess of 7 percent, water can readily penetrate the mixture. Thus compaction should achieve a relative density of at least 93 percent of the theoretical maximum density. Higher void contents may be acceptable in other mixtures such as sand asphalt.

Eliminating moisture-susceptible materials: It may be desirable to eliminate the use of certain moisture-susceptible aggregates and, to a lesser extent, moisture-susceptible asphalt. Such an approach may be costly, especially in areas with limited aggregate and asphalt sources. However, in view of the long-term maintenance requirements, reduced pavement life and performance, and, in some cases, the rapid and severe failure of the pavement, it may in reality be the most economical solution if the mixture cannot be adequately protected.

Provide adequate drainage: Adequate drainage should be provided to eliminate moisture, which causes stripping to occur. This involves rapid removal of surface water and prevention of moisture movement into the mixture from the subgrade, subbase, and base by drainage of these layers and by maintaining an adequate pavement elevation above the water table. The use of open-graded friction courses has been found to cause stripping by allowing moisture to enter the underlying layers under the action of traffic, especially if the moisture cannot readily drain laterally.

Sealing mixture surfaces: Moisture penetration can be prevented by sealing the top and the underlying surface of the asphalt mixture.

Careful consideration given to the source of moisture is required for this approach in order to prevent the possibility of trapping water in the mixture.

Treating materials: A number of additives have been developed for treating the aggregate and asphalt. These additives are:

(1) hydrated lime,

(2) Portland cement, and

(3) commercial liquid antistripping agents.

Hydrated lime generally has been found to be an effective method of treating aggregates. Portland cement is added to the aggregate and has been reported to be generally effective; however, except for a limited number of states, it has not been used widely. Recently many new commercial liquid antistripping additives have been and are being developed, some of which appear to be effective. Regardless of the method of treatment selected, moisture susceptibility tests should be conducted for each combination of asphalt, aggregate, and antistripping additive.

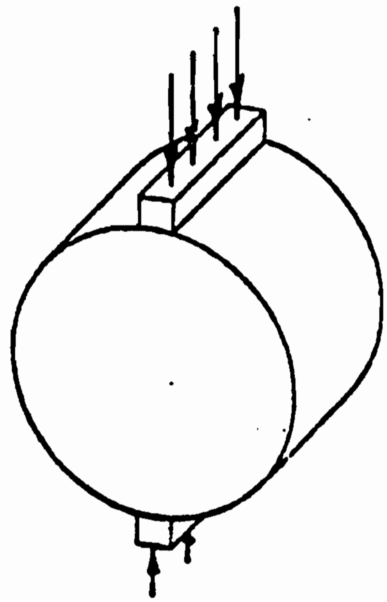
TESTS FOR EVALUATING STRIPPING

A number of tests and test variations have been developed and are being used to evaluate the moisture susceptibility, or stripping potential, of asphalt-aggregate mixtures, with or without additives. These tests are described below:

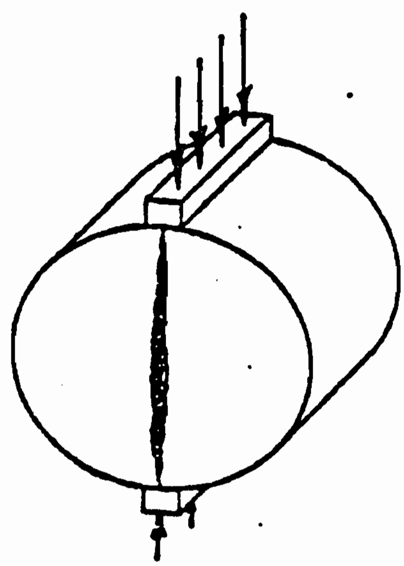
Indirect tensile strength test

This procedure is used to predict moisture-induced damage to asphalt mixtures utilizing molded specimens. The indirect tensile test subjects a cylindrical specimen to compressive load, distributed along two opposite generators, which create a relatively uniform tensile stress perpendicular to and along the diametrical plane which contains the applied load and causes a splitting failure (Figure 2.1). Estimates of the tensile strength, modulus of elasticity, and Poisson's ratio can be calculated from the applied load and corresponding vertical and horizontal deformations. Numerous studies have been conducted using the indirect tensile test to evaluate the potential of moisture damage in asphalt mixtures (Refs 1,8,13,18). The indirect tensile test involves a moisture conditioning by subjecting a submerged sample to a vacuum to produce a constant degree of saturation in the range of 60 to 80 percent. Moisture susceptibility is determined by the ratio of tensile strength in a wet condition to the tensile strength in a dry condition, which is called the tensile strength ratio. Previous studies (Refs 8,9) suggest that mixtures with tensile strength ratio less than 70 percent are moisture susceptible and mixtures with ratio greater than 70 percent are relatively resistant to moisture damage.

The wet-dry indirect tensile test provides an evaluation of the mixture with the proper proportions of aggregates and asphalt



(a) Compressive load being applied.



(b) Specimen failing in tension.

Figure 2.1 Load configuration and failure of indirect tensile test.

and in a density configuration intended to simulate the constructed asphalt aggregate mixture. The test is relatively easy but requires a few days to conduct.

Boiling test

The boiling test involves a visual observation which is made of the extent of stripping of the asphalt from aggregate surfaces after the mixture has been subjected to the boiling action of water for a specified time. To perform this test an asphalt mixture is prepared at 325 degree F and boiled in distilled water for 10 minutes. After boiling, the mixture is allowed to cool, the water is drained, and the contents are emptied on a paper towel and allow to dry. The extent of stripping is visually rated in a range from 0 to 100 percent of the asphalt retained. Boiling test is a quick method to evaluate the susceptibility of the asphalt mixtures and can be performed easily in the field. Boiling test also can be used to evaluate antistripping additives. Based on field performance (Ref 4), mixtures which retain less than 70 percent of the asphalt cement are considered to be moisture susceptible. However, some highway agencies require as high as 99 percent for the minimum acceptable value.

Texas Freeze-Thaw Pedestal Test

Texas Freeze-Thaw Pedestal Test is a procedure designed to maximize the effects of bond, and by the use of uniform aggregate size, minimize the effects of the mechanical properties of the mixture, such as gradation, density, and aggregate interlock. The reheating and mixing procedure is designed to produce a viscosity similar to that of an aged asphalt after 5 years of field use. Moisture susceptibility of an asphalt mixture is evaluated by measuring the number of freeze-thaw cycles required to crack a small asphalt-aggregate briquets seated on a beveled pedestal in distilled water. Mixtures requiring less than 10 cycles are consider to be very moisture susceptible while values in excess of 25 to 35 are relatively resistant (Ref 3). This approach is particularly suited to evaluating the effects of compositional factors, such as changes in asphalt cement on moisture damage potential.

Immersion-Compression Test

The immersion-compression test measures the loss of cohesion resulting from the action of water on compacted bituminous mixtures. All specimens are tested in compression and the index of retained strength is calculated as the ratio of the compressive strength measured after conditioning to that measured before conditioning. This test provides a numerical gauge of stripping and is currently used by many agencies. However, poorer agreement with results expected from the known moisture resistance of the aggregate sources was found for the immersion-compression test than that for the indirect tensile test (Ref 31).

TREATMENT WITH ADDITIVES

A number of procedures and recommendations to eliminate or minimize moisture damage have been formulated. One of these procedures involves treating the asphalt mixture with an antistripping agent, such as hydrated lime or other commercial liquid antistripping additives. Early studies concluded that hydrated lime was much more effective than many of the liquid antistripping additives which were being used at the time of the studies. Since that time, as the result of (1) the recognition of the severity and importance of moisture damage and (2) the increasing use of hydrated lime, new and more effective liquid antistripping additives which were developed and are being marketed and used in asphalt mixtures, many states began to specify or encourage the use of hydrated lime or liquid antistripping additives in asphalt mixtures. Generally it has been found that the effectiveness of these additives is dependent on the particular combination of aggregate and asphalt cement. Many engineers and researchers feel that hydrated lime generally is a more effective additive to minimize moisture damage, but recognize that liquid antistripping additives do produce test results that exceed acceptance levels and in some cases are equal to or better than the values produced by hydrated lime. Nevertheless, there are still questions related to the tests, the acceptance levels, and the long-term effectiveness of all antistripping additives.

Finally, the hydrated lime has been added in a variety of ways some of which cause construction problems and increased costs. When added as a slurry, it requires that the excess moisture be removed by drying, increasing drying costs and more importantly, reducing plant capacity. These problems coupled with the fact that many of the liquid additives are cheaper have caused many states to accept both lime and liquid antistripping additives, resulting in a trend to use liquid antistripping additives.

CHAPTER 3

EXPERIMENTAL PROGRAM

SCOPE OF WORK

The objectives of this study were to determine the long-term effectiveness of hydrated lime and selected liquid antistripping agents, to evaluate field performance for different mixtures using different antistripping agents, to evaluate the relationships between various moisture susceptibility test values, to correlate test values to performance, and, if possible, to develop a predictive performance model.

To achieve these objectives, both field and laboratory studies were developed and conducted in cooperation with the Texas State Department of Highways and Public Transportation (SDHPT). The field experimental program involved eight highway test projects which were constructed in eight different districts and involved a range of traffic and climate conditions, asphalt cements, and aggregates. The testing program involved field cores sampling, test section condition surveys, Texas boiling tests, and wet-dry indirect tensile tests.

FIELD EXPERIMENTAL PROJECTS

Eight full-scale experimental test projects were selected and designed in cooperation with the Materials and Tests Division (SDHPT) and the Districts in which test projects were constructed. Field construction was supervised by District personnel with technical assistance provided by project personnel. Figure 3.1 shows the location of field test projects Table 3.1 gives information on temperature, precipitation, traffic, and the construction date for each test project. The test projects are presented in chronological order of field construction.

Experiment Design

The basic experiment design is shown in Figure 3.2. Hydrated lime and two or more commercially available antistripping additives were included in each project. In addition, control sections with no additive were also included in each test project. The selection of antistripping additives to be included was based upon the experience and recommendation of the Districts and the willingness of the proposed additive manufacturers to participate. Each treatment and control section was constructed with both high and low densities, i.e., low and high air void sections. The low air void sections were targeted for a range of 3 to 8 percent as specified by the Texas SDHPT. The high air void sections were targeted to have approximately 4 percent more air voids than the low air void section.

Materials and Additives

The eight field test projects involved a total of ninety-two

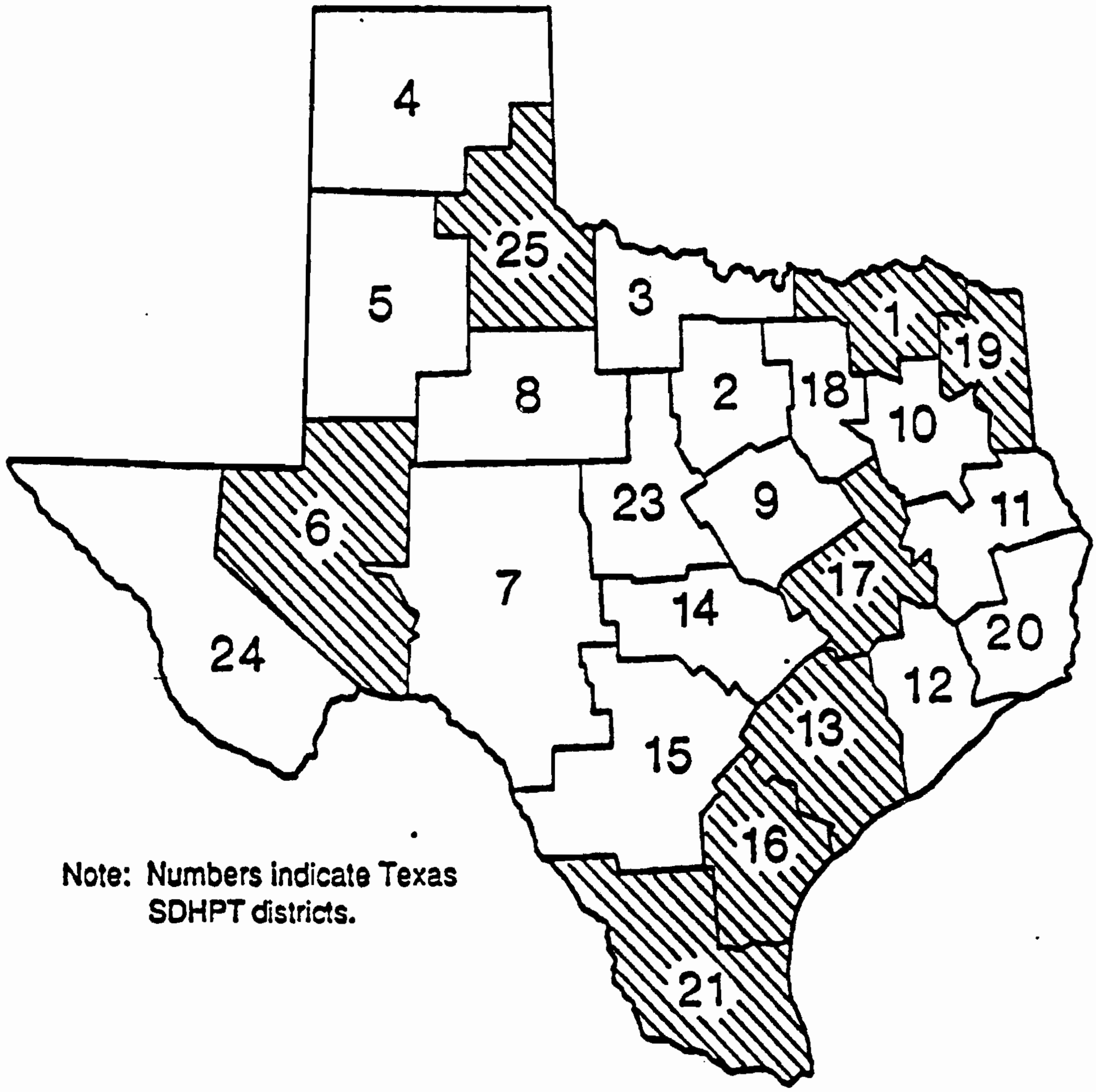


Figure 3.1 Location of field test projects.

Table 3.1 SUMMARY OF THE TRAFFIC AND CLIMATOLOGICAL DATA FOR FIELD TEST PROJECTS

District and Location	Construction Date (Month/Year)	ADT (1)	Average annual Temperature(2) (F)	Average annual Precipitation(3) (inches)
17 - Hearne	7/86	2,000	66.7	36.6
16 - Odom	8/86	11,800	71.6	29.6
13 - Victoria	10/86	4,200	70.6	36.6
6 - Midland	11/86	13,900	63.2	17.1
25 - Childress	5/87	5,800	61.1	24.5
1 - Ector	9/87	5,000	64.0	46.1
19 - De Berry	10/87	6,700	63.7	54.6
21 - Mercedes	10/87	10,600	75.1	19.9

(1) Average Daily Traffic, estimated at the year of construction.
(2) Estimated from data of 1986 - 1988, Texas Water Commission, Austin, Texas.
(3) Estimated from data of 1985 - 1989, Texas Water Commission, Austin, Texas.

TREATMENT	DENSITY: LOW VOIDS	DENSITY: HIGH VOIDS
CONTROL	X	X
HYDRATED LIME	X	X
Antistrip A	X	X
Antistrip B	X	X

Figure 3.2 **Experiment design for field test sections in each district.**

test sections containing a range of asphalt cements, aggregates, and various antistripping additives. Information about source of asphalt, asphalt cement content, and types of aggregate utilized in the eight test projects are summarized in Table 3.2. Gradations of the individual aggregates, the project gradation, percentages of each aggregate combined, and the specification are given in Appendix A. Identical sources of asphalt cement and aggregate were utilized throughout for each field test project. In several cases, the actual asphalt contents used in the field mixtures deviated from the preliminary laboratory design values due to decisions made during construction. Fourteen different antistripping additives, including hydrated lime, were used in the eight projects. The additive information is summarized in Table 3.3. The types and dosages of additive applied in each field project are given in Table 3.4. The plan was to use 1 percent lime by the weight of dry aggregates and 1 percent liquid antistripping additives by the weight of asphalt cement according to the manufacturer's recommended dosage in all mixtures containing antistripping additives. In most cases, the proper amounts were mixed in the field according to the plan; however, in a few cases, the desired dosages were not achieved due to the constraints of field construction.

Construction of Test Sections

All field test sections were constructed as the surface course

TABLE 3.2 SUMMARY OF MATERIALS USED IN THE FIELD TEST PROJECTS

District	Aggregates	Asphalt	Asphalt Content, % Design*	Asphalt Content, % Field**
17	55% Processed gravel 25% Washed sand 10% Coarse sand 10% Fine sand	AC-20 Texas Gulf Refinery	4.9	4.9
16	58% Limestone "D" 22% Limestone Screenings 20% Field sand	AC-20 Gulf States Refinery	4.3	5.1
13	50% Crushed gravel 10% Limestone 20% Limestone Screenings 20% Field sand	AC-20 Texas Fuels & Asphalt Refinery	5.0	5.0
6	56% Rhyolite "D" 37% Screenings 7% Field sand	AC-20 American Petrofina Refinery	6.2	6.2
25	20% Coarse aggregates 34% Intermediate aggregates 46% Screenings	AC-20 Diamond Shamrock Refinery	5.2	5.2
1	55% Coarse sandstone 30% unwashed screenings 15% Field sand	AC-20 Total Petroleum Refinery	6.0	5.5
19	20% Coarse "C" aggregates 40% "D" aggregates 20% Screenings 20% Field sand	AC-20 Lion Oil Refinery	5.3	5.6
21	35% Coarse aggre. 20% Uncrushed aggregates 25% Screenings 20% Field sand	AC-10 Texas Fuel & Asphalt Costal Refinery	5.2	5.2

* Laboratory optimum asphalt content for the mixture design.
** Actual asphalt content used for the field test project mixtures.

TABLE 3.3 SUMMARY OF ANTISTRIPPING ADDITIVES USED IN THE FIELD TEST PROJECTS

Antistripping Additive	SDHPT District*							
	17	16	13	6	25	1	19	21
Control (No additive)	x	x	x	x	x	x	x	x
Hydrated Lime	x	x	x	x	x	x	x	x
ARR-MAZ (Adhere Regular)							x	
ARR-MAZ (Adhere HP)						x		x
Aquashield		x						
Aquashield II					x		x	x
BA 2000	x		x				x	
DOW		x				x		x
FINA-A					x	x		
FINA-B								x
Indulin AS-1						x		
Pavebond LP		x		x				x
Pavebond Special						x		
Perma-Tac				x	x		x	x
Perma-Tac Plus	x		x			x		
Unichem 8150				x	x			
No. of treatments applied in each district:	4	5	4	5	6	8	6	8
No. of test sections** constructed in each district:	8	10	8	10	12	16	12	16
Total No. of test sections constructed:								92

* In chronological order of field construction.

** One low and one high air voids test sections were constructed for each additive/treatment.

TABLE 3.4 TYPE AND DOSAGE OF ANTISTRIPPING ADDITIVES USED IN THE FIELD TEST SECTIONS

District	Test Sections	Additive Dosage*, %
17	Control (No additive)	-
	Hydrated Lime	1.5
	BA 2000	1.0
	Perma-Tac Plus	1.0
16	Control (No additive)	-
	Hydrated Lime	1.0
	Aquashield	0.5
	DOW	0.41
	Pavebond LP	0.5
13	Control (No additive)	-
	Hydrated Lime	2.0
	BA 2000	1.0
	Perma-Tac Plus	1.0
6	Control (No additive)	-
	Hydrated Lime	1.0
	Pavebond LP	1.0
	Perma-Tac	1.0
	Unichem 8150	1.0
25	Control (No additive)	-
	Hydrated Lime	1.0
	Aquashield II	1.0
	FINA-A	1.0
	Perma-Tac	1.0
	Unichem 8150	1.0
1	Control (No additive)	-
	Hydrated Lime	1.5
	ARR-MAZ (Adhere HP)	0.75
	DOW	0.45
	FINA-A	1.0
	Indulin AS-1	1.0
	Pavebond Special	1.0
	Perma-Tac Plus	1.0
19	Control (No additive)	-
	Hydrated Lime	1.0
	ARR-MAZ (Adhere Regular)	1.0
	Aquashield II	0.8
	BA 2000	0.5
	Perma-Tac	1.0
21	Control (No additive)	-
	Hydrated Lime	1.0
	ARR-MAZ (Adhere HP)	1.0
	Aquashield II	0.41
	DOW	0.5
	FINA-B	0.41
	Pavebond LP	1.0
	Perma-Tac	1.0

* The percentage of hydrated lime is measured by the total weight of dry aggregates. The percentage of liquid antistripping additives is measured by the weight of asphalt cement.

of pavement overlay. Seven of the eight field projects utilized drum mix plants and one (District 13) utilized a batch plant. The field application techniques utilized to incorporate the various antistripping additives into the mixture are summarized in Table 3.5. In six projects lime was placed on the aggregates in a slurry form; in two projects (Districts 6 and 19) dry lime was added to the damp aggregates. At the seven drum plants liquid additives were metered into the asphalt cement by means of an in-line blending system, whereas in the batch plant (District 13) liquid additives were mixed with the asphalt cement in the storage tank. The actual dosage levels were obtained by monitoring the meter or scale at the mixing plant for all except the DOW additive. The DOW antistripping additive was in pellet form and was mixed with the asphalt cement either in storage tank (Districts 16 and 1) or at the refinery (District 21) by the DOW Chemical company. Depending on the mixing time and the rate of dissolution, the dosage of DOW antistripping additive was difficult to determine immediately. The percentage of the dosage was determined later in the DOW Chemical's laboratory by analyzing a sample of the blended asphalt cement and additive obtained from the storage tank.

Seven projects involved test sections approximately 1000 feet in length and one project (District 1) approximately 500 feet in length. The goal was to achieve test sections with low and high air voids as outlined in the experiment design. However, it was

TABLE 3.5 SUMMARY OF FIELD APPLICATION TECHNIQUES FOR ANTISTRIPPING TREATMENTS

District	Field Application Method	
	Hydrated Lime	Liquid antistripping agents
17	Lime slurry was applied to the aggregates on cold feed belt of the drum mix plant.	Liquid additives were metered into the asphalt cement by an in-line blending system.
16	Lime slurry was applied to the aggregates on cold feed belt of the drum mix plant.	Liquid additives were metered into the asphalt cement by an in-line blending system. *DOW polyethylene pellets were mixed with asphalt cement in a separate storage tank 12 hours prior to use.
13	Lime slurry was applied to the aggregates on cold feed belt of the batch mix plant.	Liquid additives were mixed with the asphalt cement in the storage tank.
6	Coarse aggregates stockpile was wetted and dry lime was added in layers 12 hours prior to use.	Liquid additives were metered into the asphalt cement by an in-line blending system.
25	Lime slurry was applied to the aggregates on cold feed belt of the drum mix plant.	Liquid additives were metered into the asphalt cement by an in-line blending system.
1	Lime slurry was applied to the aggregates on cold feed belt of the drum mix plant.	Liquid additives were metered into the asphalt cement by an in-line blending system. *DOW polyethylene pellets were mixed in asphalt distributor truck for 1 hour prior to use.
19	Dry lime was added to aggregate stockpiles and sprayed with water to hold lime to aggregates 12 hours prior to use.	Liquid additives were metered into the asphalt cement by an in-line blending system.
21	Lime slurry was applied to the aggregates on cold feed belt of the drum mix plant.	Liquid additives were metered into the asphalt cement by an in-line blending system. *DOW polyethylene pellets were blended with asphalt cement at the refinery.

* DOW antistripping additive was in pellet form.

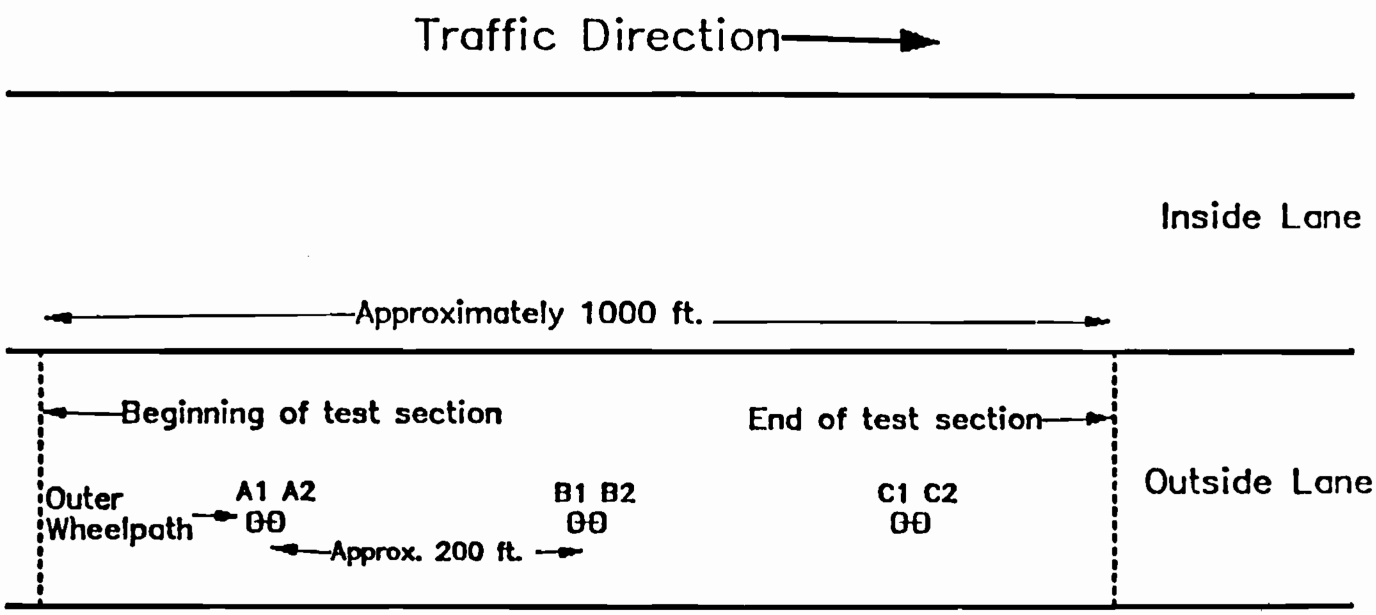
found to be difficult to develop the rolling pattern for a particular target air void content within the time available. Detailed description of the location and layout of test sections for each field test project is included in Appendix B.

TESTING PROGRAM

The testing program developed and conducted for this study involved activities including: field cores sampling, test section condition surveys, Texas boiling tests, and wet-dry indirect tensile strength tests. The following section gives the descriptions of these activities.

Field Core Sampling

Field cores were taken immediately following construction of each of the test sections. Additional field cores were obtained later at six months after construction, and then on a yearly basis after construction over a period of approximately four years. Field cores were 4 inches in diameter and approximately 1 to 2 inches in thickness. Three pairs of cores were obtained in the wheel path from each test section at approximately 200-foot intervals with the first and last pairs of cores located approximately 300 feet from the beginning and the end of the test section. The distance between the two paired cores was approximately 3 to 6 inches (Figure 3.3). In the short test sections (District 1), the distance between two pairs of cores was



Note: Three pairs of cores are obtained as shown (A1,A2,B1,B2,C1 and C2).

Figure 3.3 Coring pattern for field test sections.

proportionally shortened to the length of the test section.

Test Section Condition Survey

Pavement condition surveys have played an important role in the field evaluation. Condition surveys were scheduled and performed at the test sections by the project personnel during each coring. Pavement deterioration information such as cracking, rutting, raveling, bleeding, flushing, as well as the amount, severity level, and location was recorded.

Wet-Dry Indirect Tensile Test

The testing equipment for the wet-dry indirect tensile strength test included a loading frame, load cell, and the MTS close-loop electro-hydraulic system to control the loading and deformation rate. For the static test vertical deformations were monitored by a DC linear variable differential transducer (LVDT) positioned on the upper platen. A loading rate of 2 inches per minute was applied at a test temperature of 77 degree F. The peak loads were obtained by a direct digital readout device.

Exact one dry and one wet were maintained in each pair of field cores, while either dry or wet was randomly assigned for the wet-dry indirect tensile test. The dry (unconditioned) cores were cured at room temperature (77 degree F) for at least 24 hours prior to testing. The wet (conditioned) cores were immersed in distilled water at room temperature and a partial vacuum of 15 to 17 inches of mercury was applied to achieve approximately 60 to 80 percent degree of saturation. The saturated cores were placed in a freezer at 0 degree F for 15 hours, and then were taken from the freezer and placed in a 140 F water bath for 24 hours. After a complete freeze-thaw cycle, the wet conditioned cores were cooled to room temperature in a 77 degree F water bath for approximately three hours prior to testing. All the dry and wet cores were then tested to determined their indirect tensile strength.

Several engineering properties used in the indirect tensile test are described as follows:

Tensile Strength: The indirect tensile strength is the maximum tensile stress which the specimen can withstand. For 4 inches diameter specimens, and with the load-deformation relationship obtained from the static test, tensile strength can be calculated by the following equation:

$$S = 0.156 * P/t \qquad (3.1)$$

where S = tensile strength, psi
P = maximum load carried by the specimen, lbs
t = thickness of the specimen, inches

Tensile Strength Ratio: In order to evaluate the effect of moisture conditioning on the mixtures, a parameter, called tensile strength ratio (TSR), is defined by the following relationship:

$$TSR = S(wet)/S(dry) \qquad (3.2)$$

where TSR = tensile strength ratio
S(wet) = tensile strength of wet (conditioned) specimen, psi
S(dry) = tensile strength of dry (unconditioned) specimen, psi

Texas Boiling Test

The Texas boiling test, Test Method TEX-530-C, involves a visual estimation of the extent of stripping of the asphalt from aggregate surfaces after the mixture has been subjected to the action of boiling water for a specified time.

Field cores were reheated to 200-225 degree F in the oven. After heating the fractured aggregates on the exterior of the cores were removed. Approximately 1000 grams of the loosened mix was allowed to cool to room temperature overnight prior to boiling test. Three hundred grams of the mix was added to boiling water (distilled) in a stainless steel beaker. The water was maintained at a medium boil for 10 minutes, then removed from the heat. Any stripped asphalt from the surface of the water was skimmed off by dipping a paper towel into the beaker. The water was decanted from the beaker and the boiled mix was emptied onto a white paper towel. After the mix had been allowed to dry overnight it was visually examined to estimate the degree of stripping present in the mixture. The results were expressed as the percent of asphalt retained after boiling.

CHAPTER 4

TEST RESULTS AND ANALYSIS

The field condition surveys of all test sections in this study have shown little evidence of distress related to the moisture damage or stripping. Thus the long-term pavement performance is difficult to evaluate with test sections which are only two to four years of age. Nevertheless a data analysis based only on the data available was conducted and included:

1. Field core air voids results,
2. Indirect tensile test results, and
3. Boiling test results.

Both the indirect tensile test (Test Method Tex-531-C) and the Texas boiling test (Test Method Tex-530-C) are used to evaluate the field core samples with or without hydrated lime and liquid antistripping additives in this study. It was assumed that all field cores, both dry and wet specimens taken at the same age, have been exposed to the same amount of field conditioning in each district. Field cores which were wet conditioned in the laboratory for indirect tensile test and boiling test should receive moisture damage produced by laboratory conditioning in addition to their field conditioning. Although the field cores may age-harden over time, the comparisons in terms of test values among the same age groups are not biased.

Appendix C summarizes the results of the indirect tensile strength test. Appendix D presents the results of the Texas boiling test conducted on the field cores.

FIELD CORE AIR VOIDS RESULTS

The targeted air voids (low and high) were not achieved because of the difficulty developing the necessary rolling pattern within the time available. In most cases, difference between the low and high air voids was small, and in a few cases the section designed for low air voids actually had the higher void content. Thus the low and high air void sections data were combined and analyzed.

The air void data measured from the field cores are listed in Appendix C. The growth curves of the air voids are plotted in Figures 4.1 through 4.8. All air voids growth curves indicated the air voids generally decreased substantially during the first year and then remained nearly constant. The exception was in District 21 where the air voids continued to decrease after the first year.

Typically the final air void content of the asphalt mixture achieved under traffic was in the range of 3 to 5 percent. These low air void content minimizes the possibility that water can penetrate the mixture, and probably is responsible for the slow rate of moisture damage.

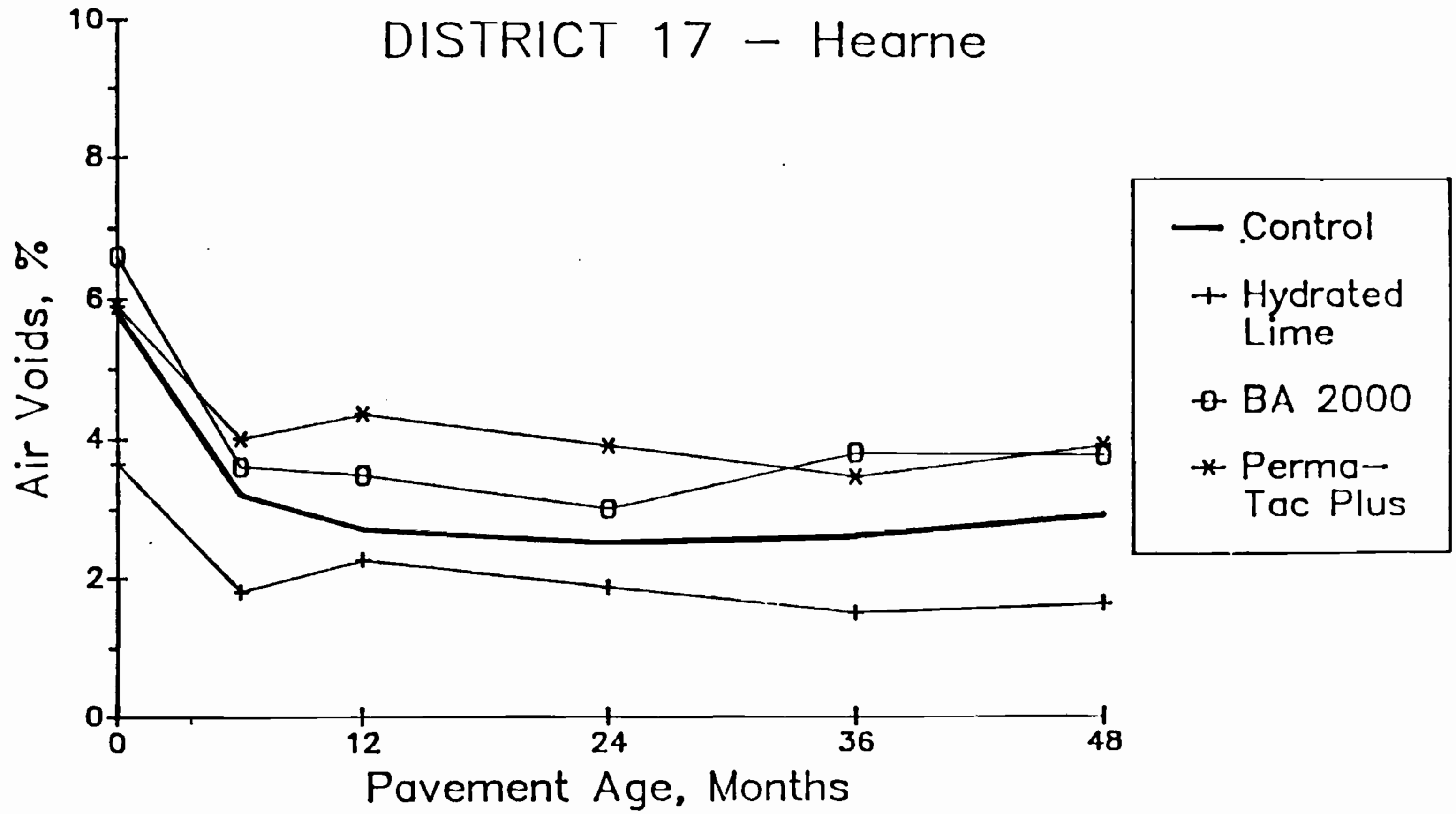


Figure 4.1 Relationship between field core air voids and pavement age for District 17.

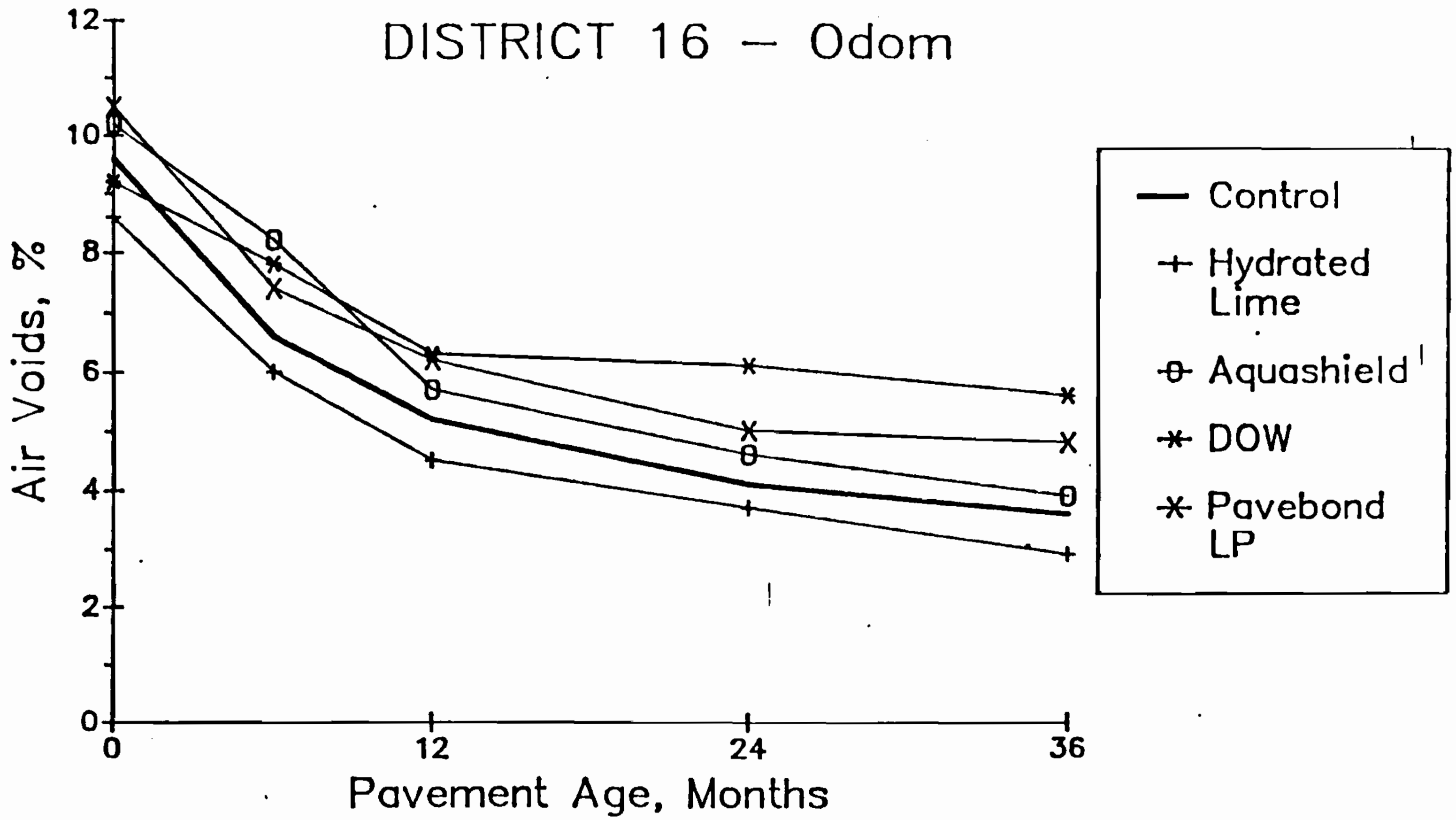


Figure 4.2 **Relationship between field core air voids and pavement age for District 16.**

Figure 4.3 Relationship between field core air voids and pavement age for District 13.

Figure 4.4 Relationship between field core air voids and pavement age for District 6.

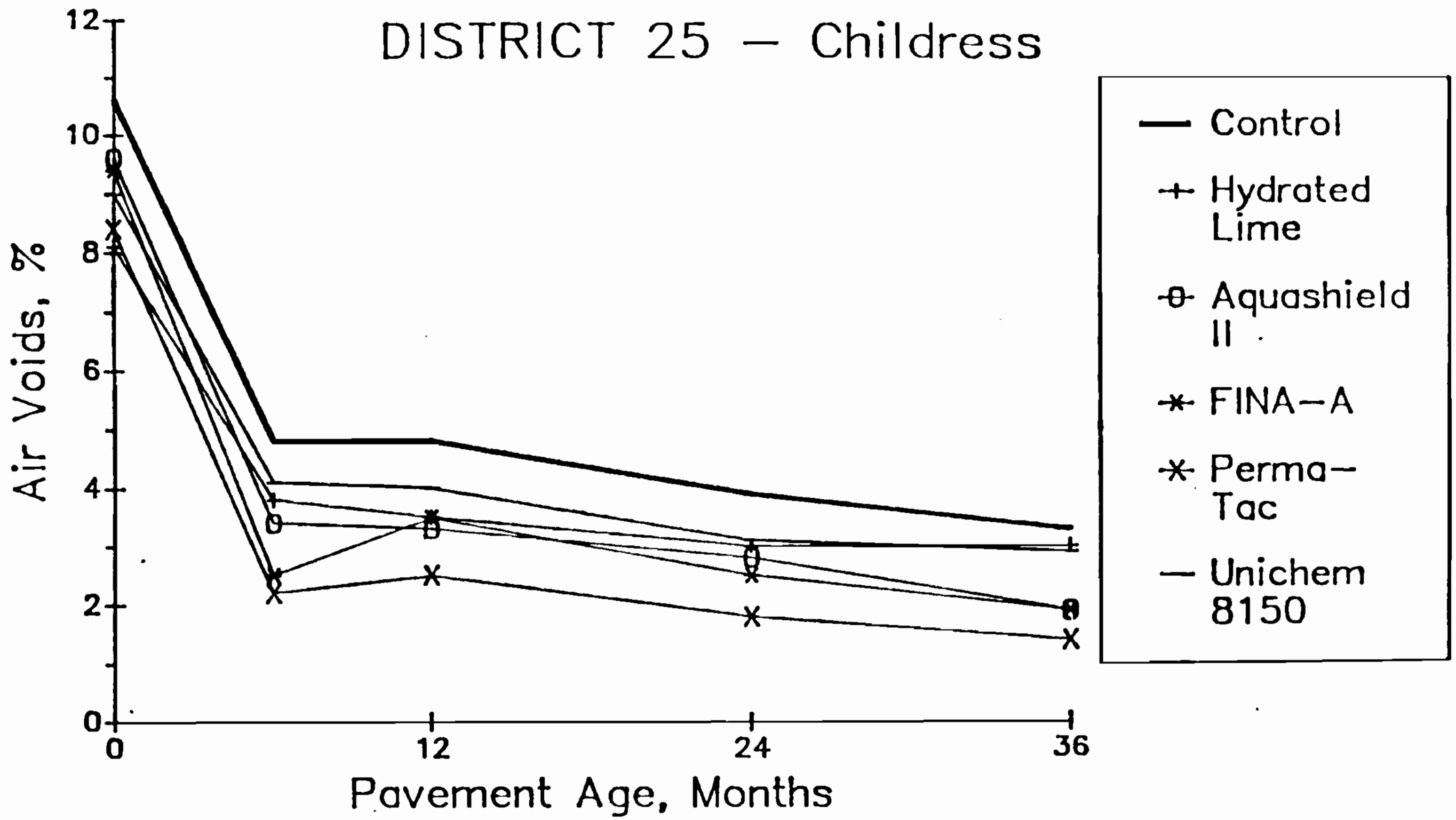


Figure 4.5 Relationship between field core air voids and pavement age for District 25.

Figure 4.6 Relationship between field core air voids and pavement age for District 1.

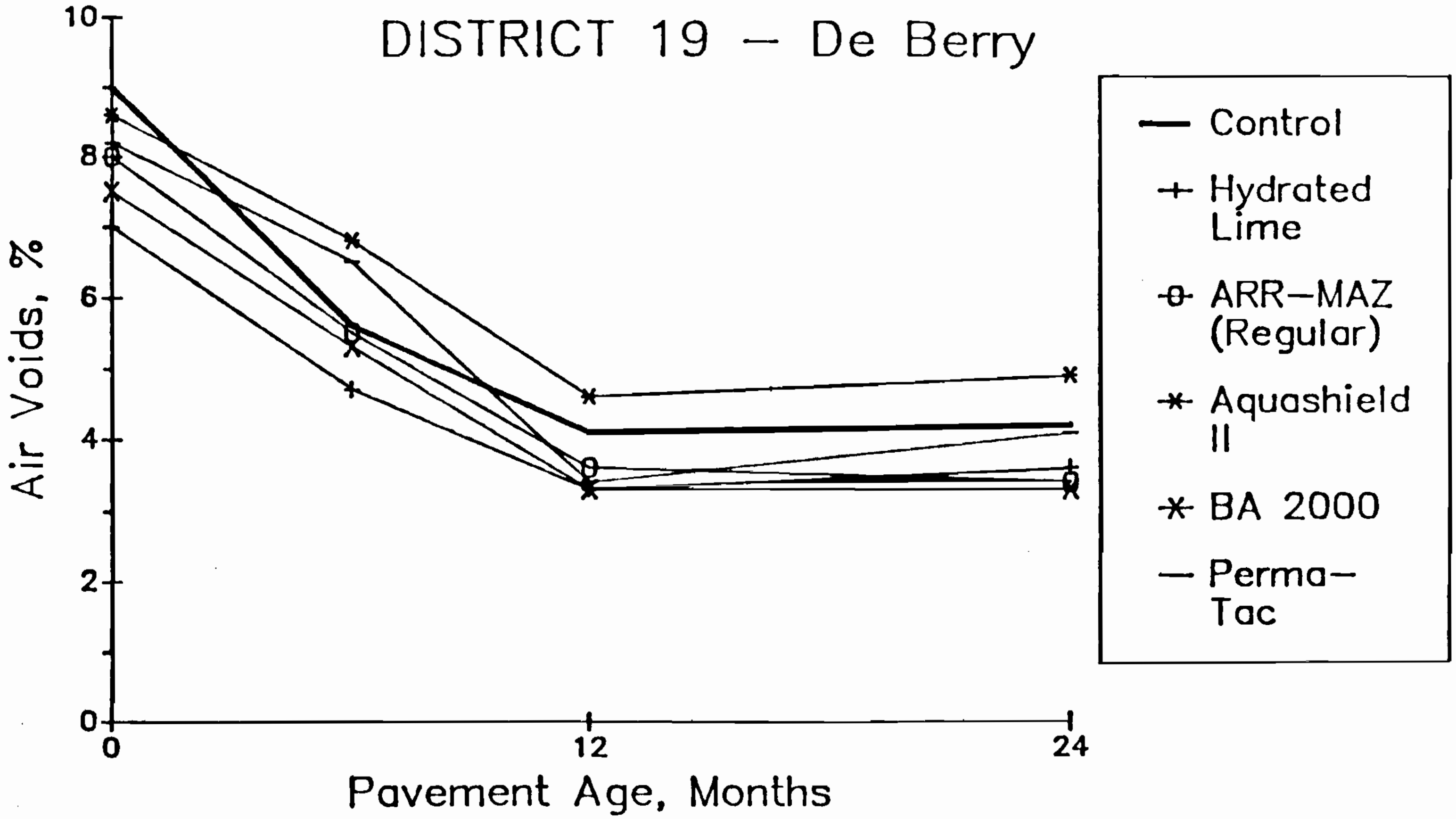


Figure 4.7. Relationship between field core air voids and pavement age for District 19.

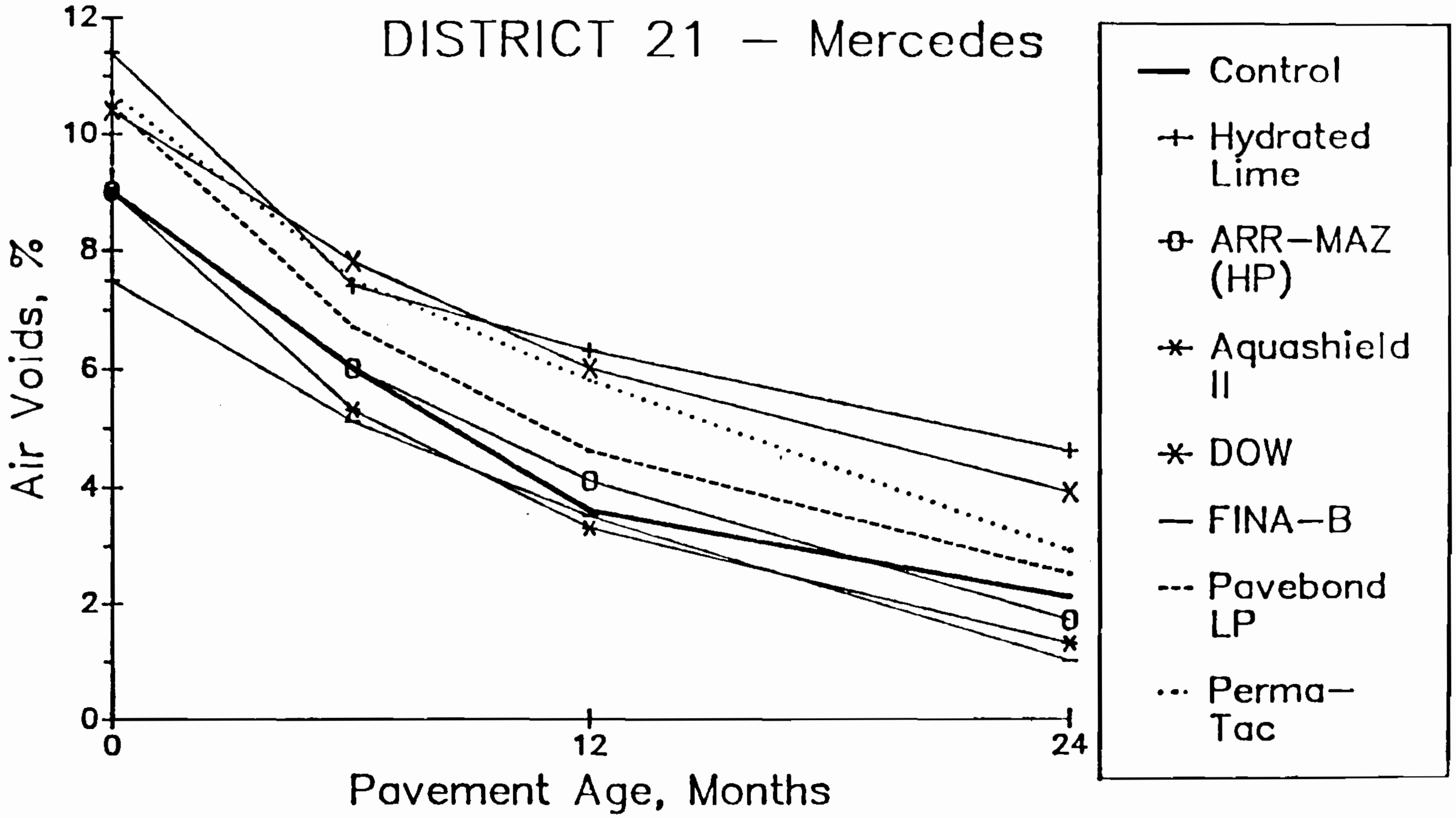


Figure 4.8 **Relationship between field core air voids and pavement age for District 21.**

Air void contents of the lime test sections were consistently lower than that in the control section for all projects except in District 21. This may be related to the mineral filler effect of the hydrated lime in the mixtures.

INDIRECT TENSILE TEST RESULTS

The field core measurements included air voids, dry tensile strength, and wet tensile strength for each test section. The tensile strength ratio (TSR) were calculated by pairing a set of two cores in this study, as shown in Appendix C. This procedure was adopted because a set of two cores taken from one location should be more alike than cores from the same test section taken from different locations.

Paired field cores for the indirect tensile test taken adjacent to one another in the test sections were expected to have approximately equal air voids value, but large air voids differences were found for certain pairs.

Adjustment of TSR to a Common Air Void Level

Air void content in the field cores has an effect on the tensile strength measurement and the TSR value. With the tensile strength and TSR value increasing as air voids decrease. Analysis of covariance, with the measured air voids content of each field core as the covariate, was used to adjust the measured tensile strengths or TSRs to a common air voids level. However, not all of the variation in the tensile strength measurement and TSR can be explained by variation in air voids.

An analysis of covariance procedure was conducted to obtain the adjusted TSR means and to reduce error variance caused by the air voids. In each district, the TSR value was adjusted for the air voids using the individual within-group regression coefficient for each additive group. The statistical computer software, Statistical Package For Social Sciences (SPSS), was utilized to access and analyze the field data. The results of the adjusted TSR means are presented in Appendix E.

Mean Adjusted TSR Trends

The growth curves of the mean adjusted TSR are shown in Figures 4.9 through 4.16. Most of the relationships for mixtures containing antistripping additives generally indicate that TSR values were greater than 70 percent, which is a typical minimum acceptable value used by many highway agencies.

In several districts, it was found that cores from some treated mixtures exhibited a higher wet strength, resulting in a TSR value larger than 100 percent. In a few cases, TSR values greater than 100 percent were measured for the control (no additive) mixtures. This has been observed in numerous previous studies (Ref 27).

Multiple Comparisons of Adjusted TSR Means

Since the mean adjusted TSR represents average characteristics of the growth curves within each antistripping treatment, we are able to compare different additives in terms of mean adjusted TSR. An analysis of variance (ANOVA) with two factors of additive type and age of cores was conducted to determine whether differences in the measured response, i.e., TSR, due to change in one or both factors were really different. In the ANOVA, if the interaction was not significant or was significant but orderly, F-test for the main effects of additive type and age will be meaningful. If the ANOVA indicated significant differences existing due to the type of additive, the multiple comparisons procedure, Fisher's least significant difference (LSD) method, was then used to indicate which additive differs significantly from the control.

The significance level of 5% was used for all statistical tests. Compared to 10% significance level, 5% actually gives less risk of making a type I error, which means rejecting the null hypothesis (means are equal) when it is really true.

The results of the ANOVA and multiple comparisons using mean adjusted TSR values are summarized in Appendix F. In the ANOVA, a p-value (significance probability) was used and it was calculated in the SPSS using the F-test. If effect is significant only if the p-value is equal or less than .05, i.e., significance level of 5%. The results show that the interaction between additive type and age is not significant for most district except in Districts 13, 6 and 1. Figures 4.11, 4.12 and 4.14 indicate the interaction exists, therefore, F-tests for the main effects are questionable. Nevertheless the multiple comparisons are performed for Districts 13, 6 and 1 since the data indicate linear relationship between the treatment sections and the control section.

The results of multiple comparisons using mean adjusted TSR values and the LSDs for comparisons are given in Tables F.1 through F.8 in Appendix F. Table 4.1 presents the summary of the resulting effectiveness evaluation.

Hydrated lime was generally effective as a mean of reducing moisture damage in most districts except in districts 6 and 21 as shown in Table 4.1. The benefit of using antistripping additives varied based on the adjusted TSR comparisons. Districts 17, 13 and 19 show the benefit from the use of all additives, while other districts are not totally benefited by all additives. Several additives, such as BA2000, FINA-A, and Perma-Tac Plus, were effective for all projects, while additives, such as DOW and Unichem 8150, exhibited very little benefit. It should be noted, however, that since there is very little moisture damage-related distress existing in all test sections, none of the antistripping additives applied increased the potential for moisture damage in pavement mixtures.

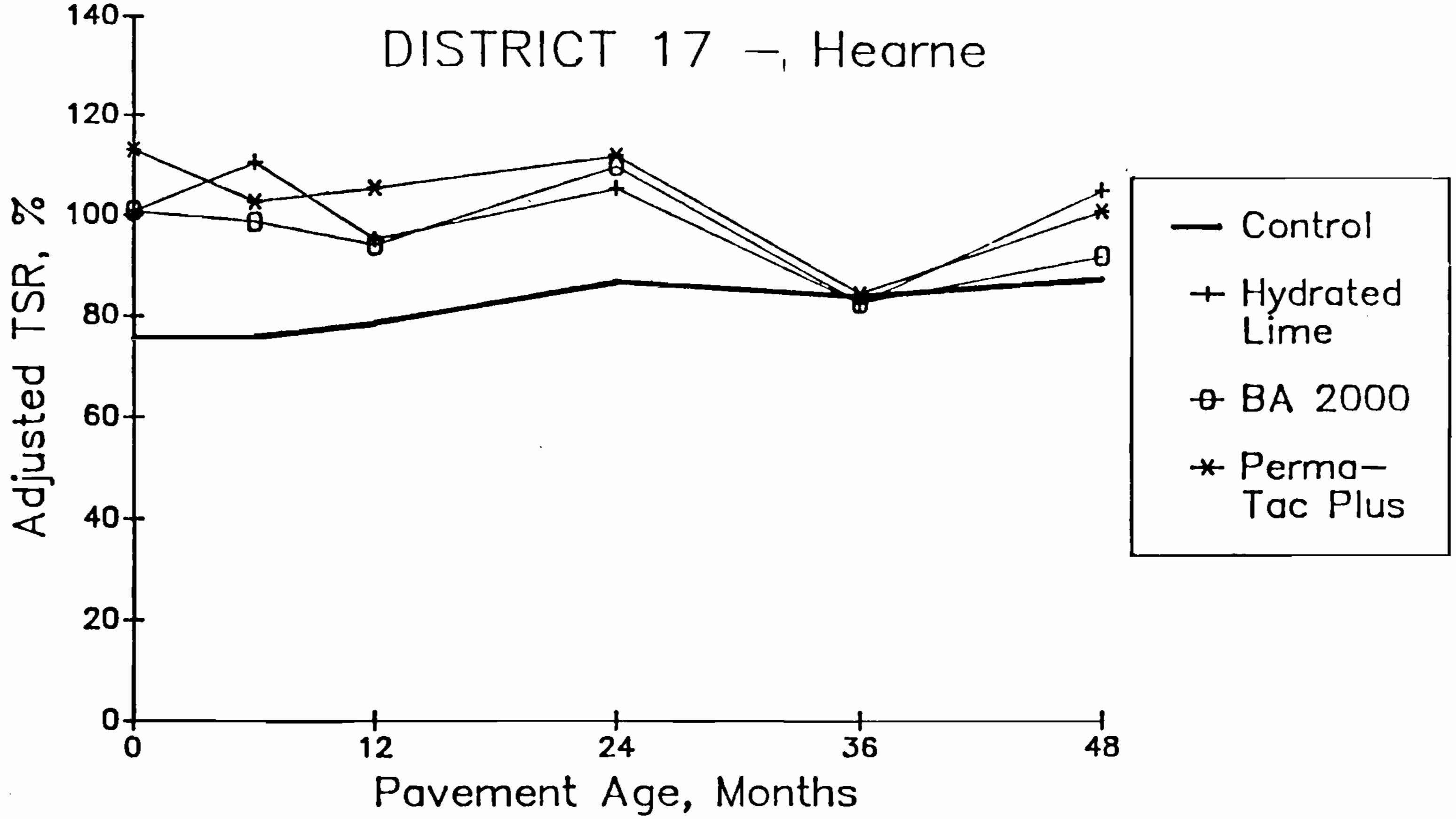


Figure 4.9 Mean adjusted TSR vs. pavement age for District 17.

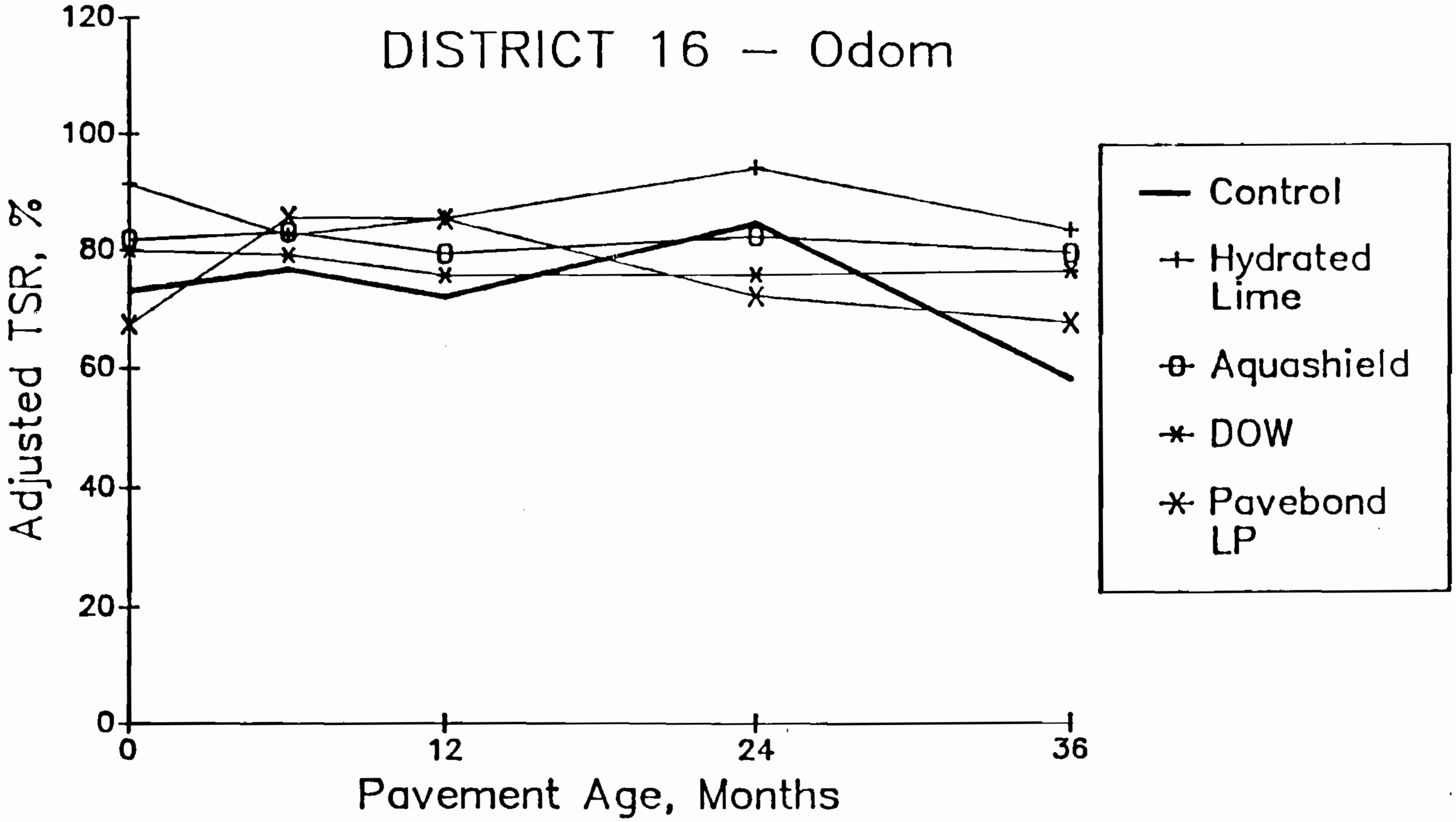


Figure 4.10 **Mean adjusted TSR vs. pavement age for District 16.**

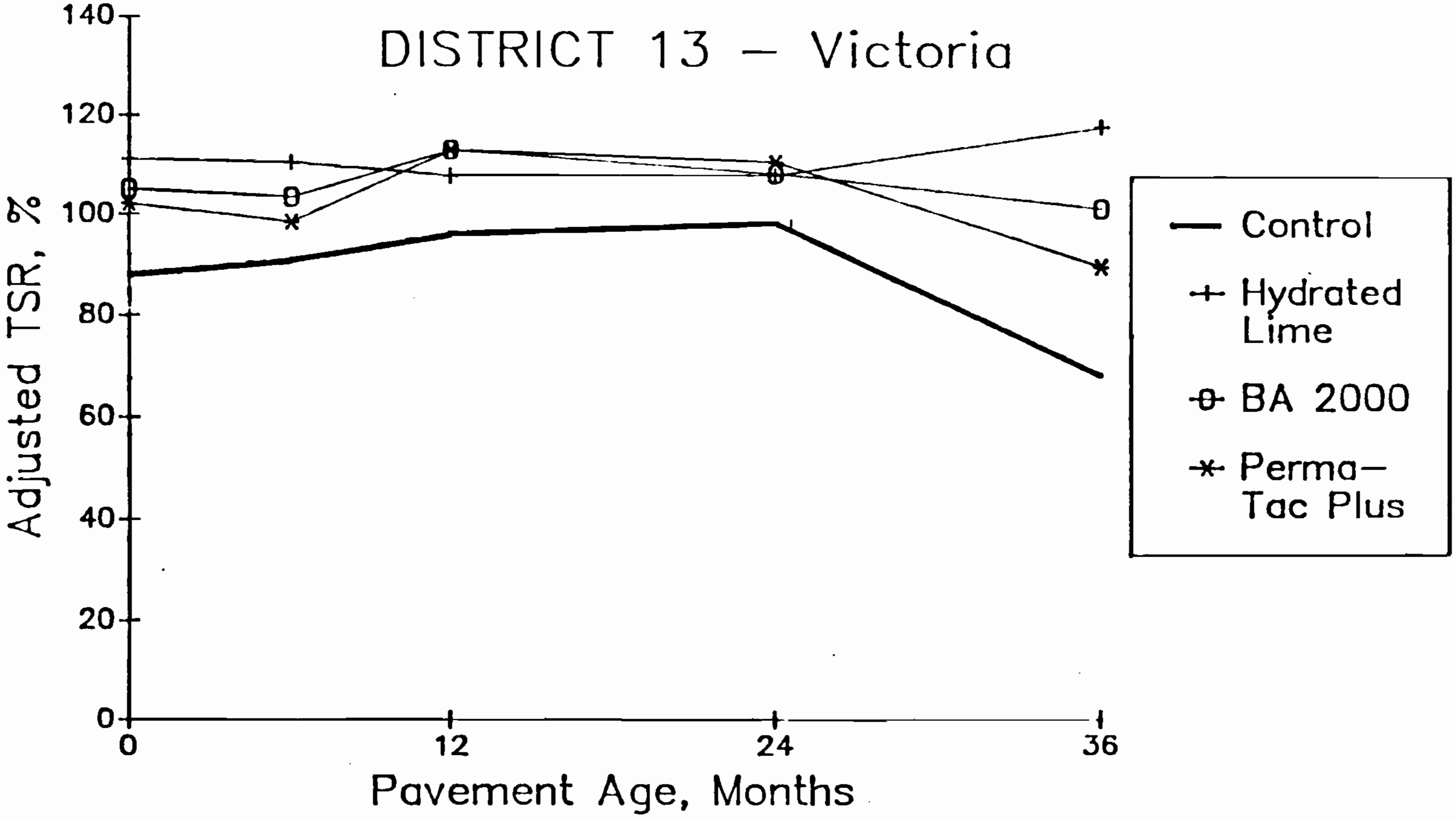


Figure 4.11 Mean adjusted TSR vs. pavement age for District 13.

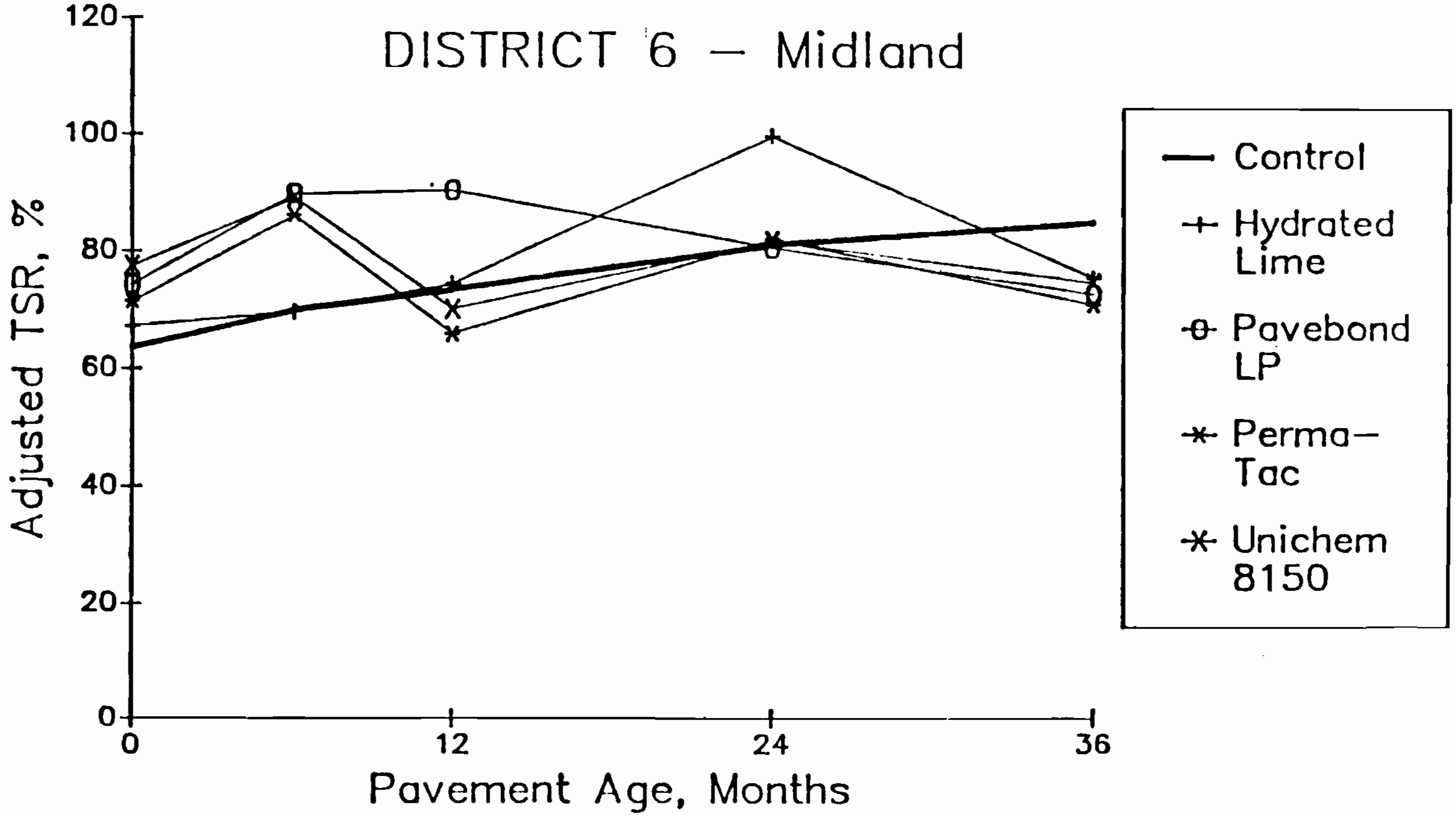


Figure 4.12 Mean adjusted TSR vs. pavement age for District 6.

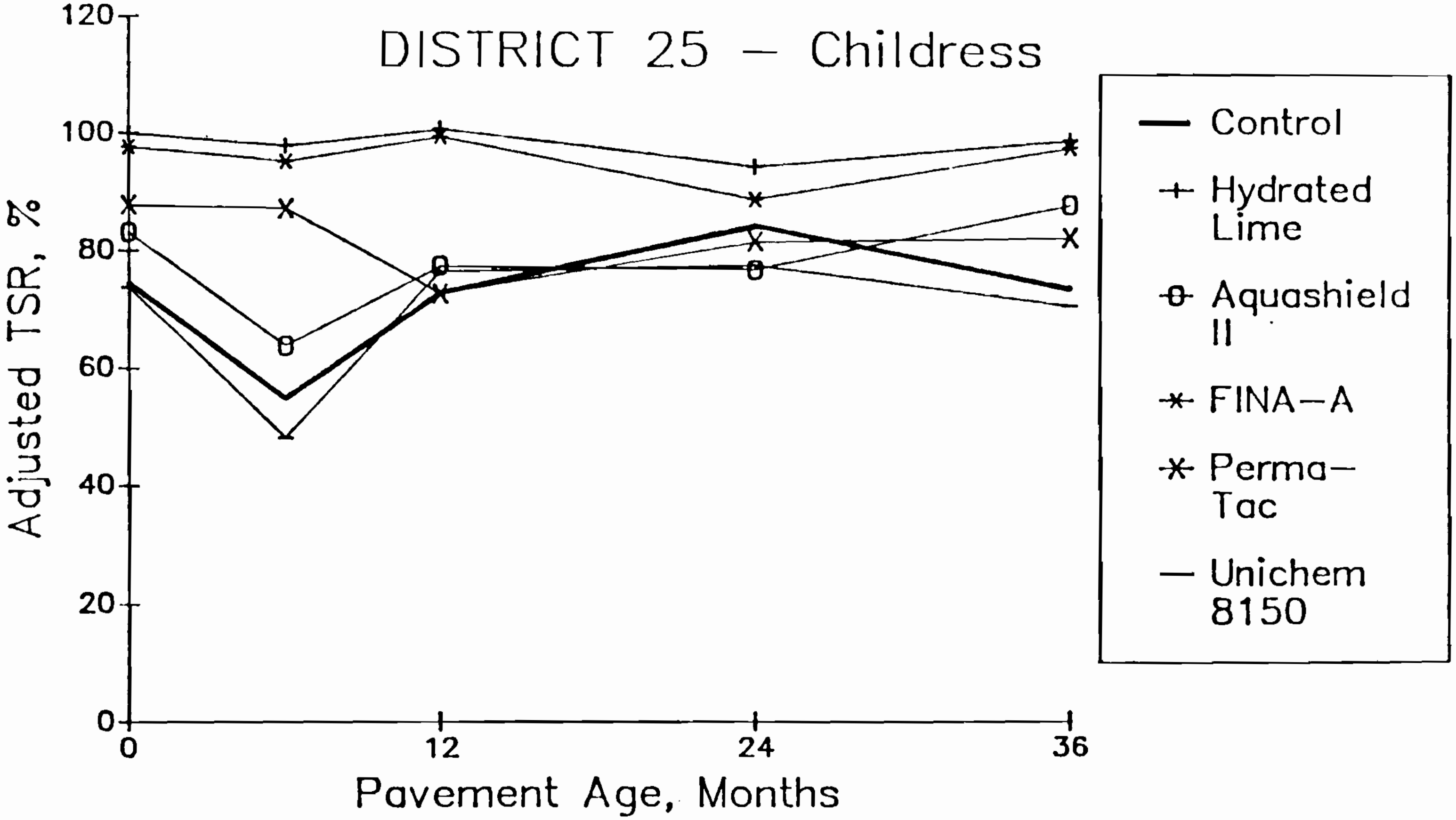


Figure 4.13 Mean adjusted TSR vs. pavement age for District 25.

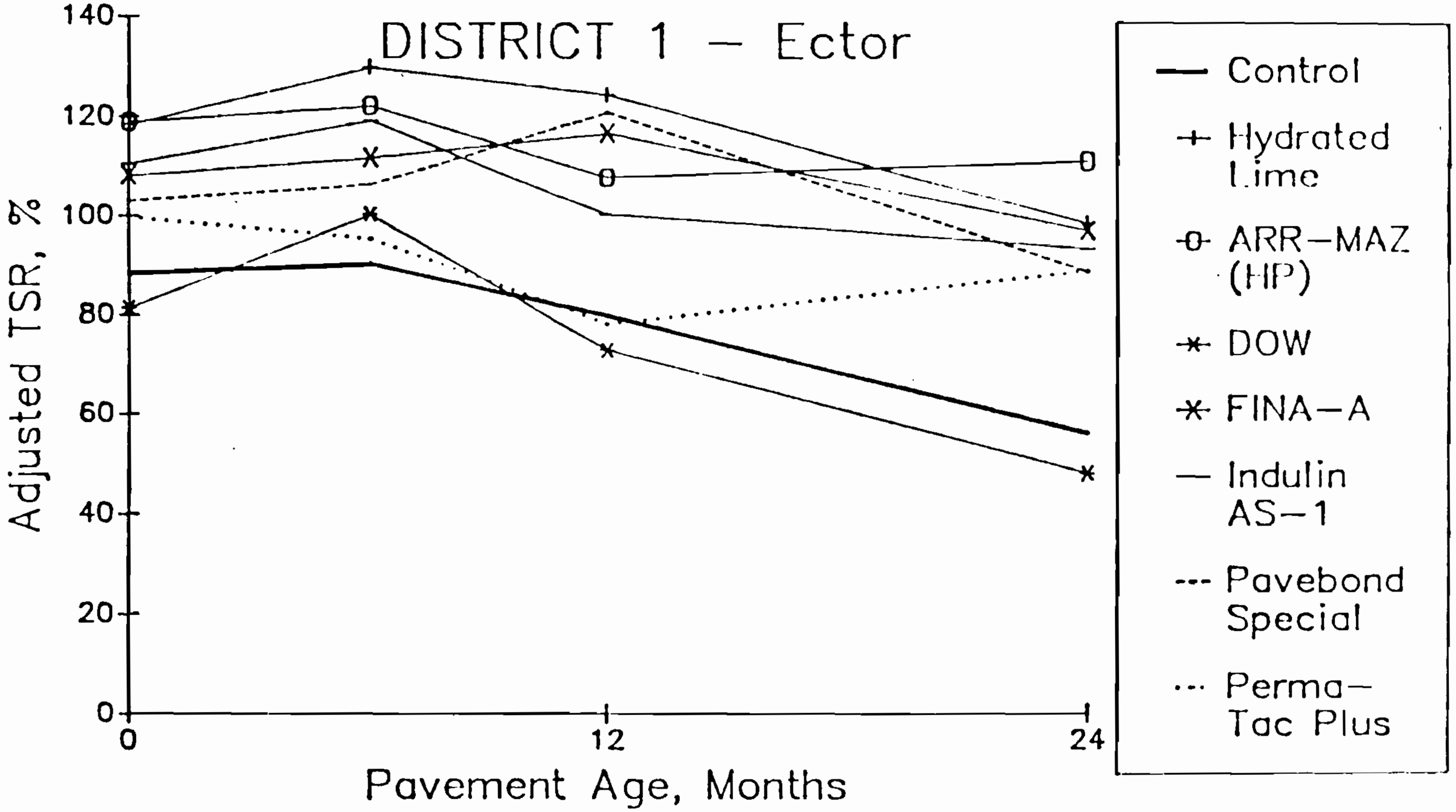


Figure 4.14 **Mean adjusted TSR vs. pavement age for District 1.**

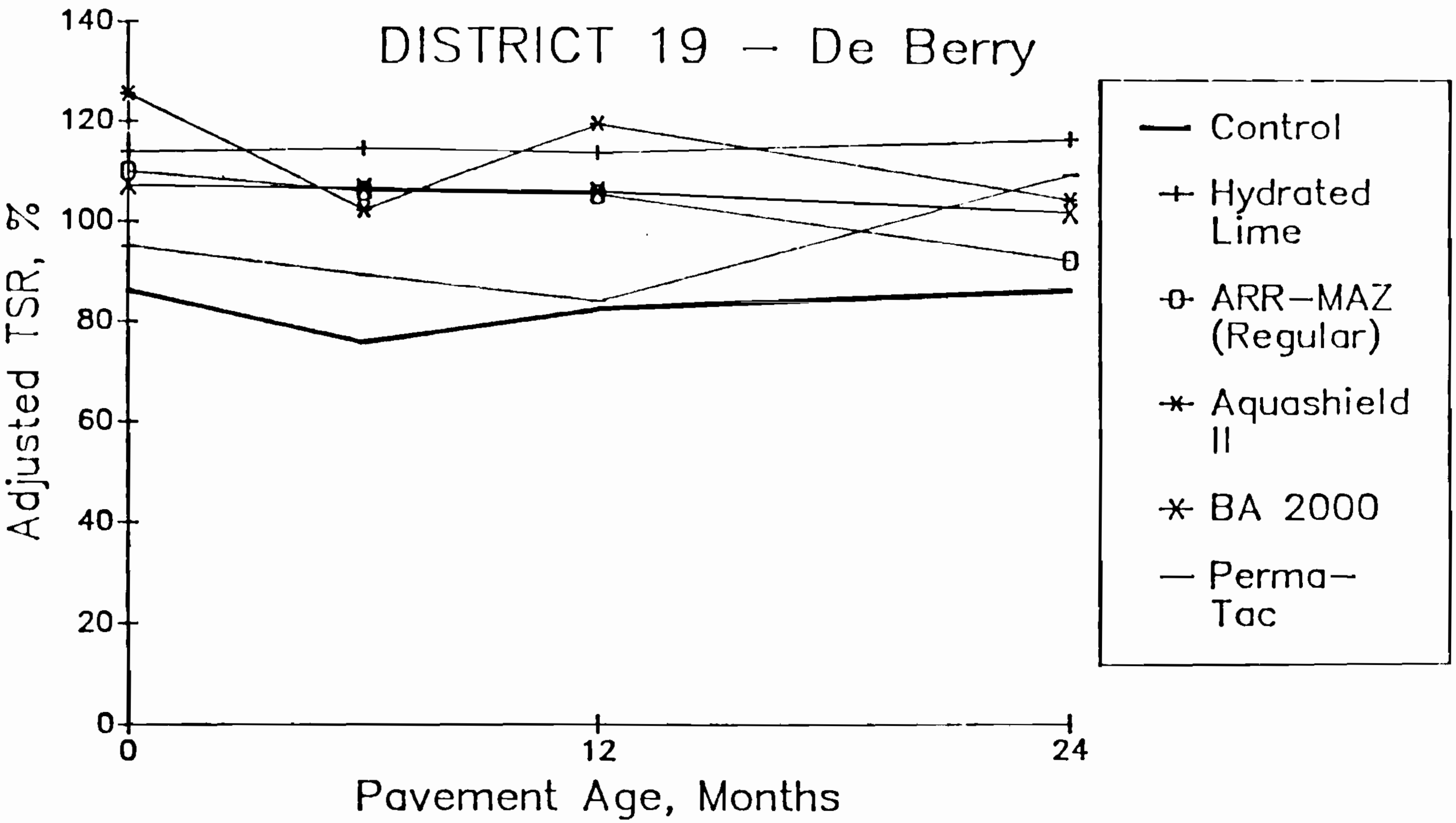


Figure 4.15 **Mean adjusted TSR vs. pavement age for District 19.**

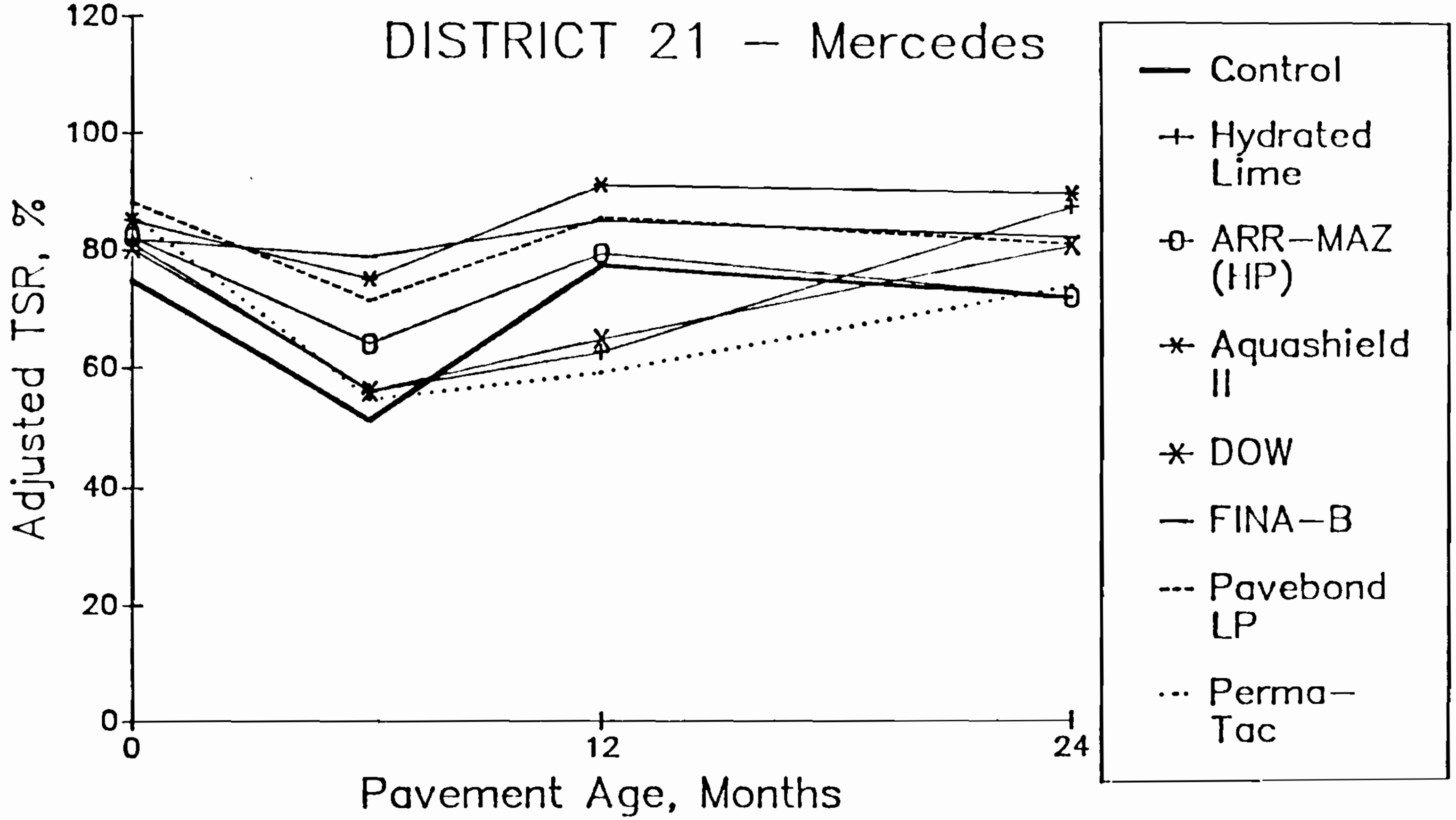


Figure 4.16 Mean adjusted TSR vs. pavement age for District 21.

TABLE 4.1 COMPARISONS BETWEEN ANTISTRIPPING ADDITIVES AND THE CONTROL USING ADJUSTED TSR MEANS

Type of Additive	SDHPT District Number							
	17	16	13	6	25	1	19	21
Hydrated lime	O	O	O	X	O	O	O	X
ARR-MAZ (Adhere Regular)							O	
ARR-MAZ (Adhere HP)						O		X
Aquashield		O						
Aquashield II					X		O	O
BA 2000	O		O				O	
DOW		X				X		X
FINA-A					O	O		
FINA-B								O
Indulin AS-1						O		
Pavebond LP		X		X				O
Pavebond Special						O		
Perma-Tac				X	O		O	X
Perma-Tac Plus	O		O			O		
Unichem 8150				X	X			

Note: 1. An additive is declared effective if its adjusted TSR mean is significantly higher than that of the "control" at 5% significance level.

2. An "O" indicates that the additive is declared effective in that district as compared to control. An "X" indicates that the additive is declared not effective.

BOILING TEST RESULTS

The boiling test, Test Method Tex-530-C, was also used to evaluate the effectiveness of lime and antistripping additives in this field study. Cores from the high air void sections were used to run the boiling test. The results of the boiling test for the field cores are presented in Appendix D.

Boiling Test Rating Trends

The growth curves of boiling test ratings for all test sections are presented in Figures 4.17 through 4.24 for all test projects. Although no well-defined relationships exists, the boiling test ratings for all sections treated with lime or antistripping additives are generally as good as, or better than, that of the control section. Most districts show boiling test ratings higher than 70 percent which is a typical minimum acceptable value used by most highway agencies. One exception is District 21 which has most of its boiling test ratings below the 70 percent level.

There is not much variation in most boiling test ratings growth curves after the first year. Probably because the air void contents in the test sections were low and thus moisture damage was occurring at a very slow rate. It may also be related to the asphalt age-hardening in the mixtures and the increase of asphalt absorption over the period of time.

Multiple Comparison of Boiling Test Ratings

Since the mean boiling test rating represents average characteristics of the growth curves within each antistripping treatment, we are able compare different additives in terms of mean boiling test rating. The analysis of variance and the multiple comparisons using Fisher's least significant difference (LSD) method were conducted.

The results of the ANOVA and multiple comparisons using boiling test ratings are given in Appendix F. The results show that the interaction between additive type and age is not significant for most district except in Districts 17 and 6. Figures 4.17 and 4.20 indicate the interaction exists, therefore, F-tests for the main effects are questionable. Nevertheless the multiple comparisons are performed for Districts 17 and 6 since the data indicate linear relationship between the treatment sections and the control section.

The results of multiple comparisons using boiling test ratings and the LSDs for comparisons are given in Tables F.9 through F.16 in Appendix F. Table 4.2 presents the summary of the resulting effectiveness evaluation.

Districts 17, 25 and 21 show the benefit from the use of hydrated lime, while others do not show any benefit as shown in Table 4.2. Similar results shown that hydrated lime provides less improvement when evaluated by the boiling test than by the wet-dry indirect tensile test (Tables 4.1 and 4.2) were obtained in previous studies. Most liquid antistripping additives were not effective according to the results of the boiling test as shown in Table 4.2.

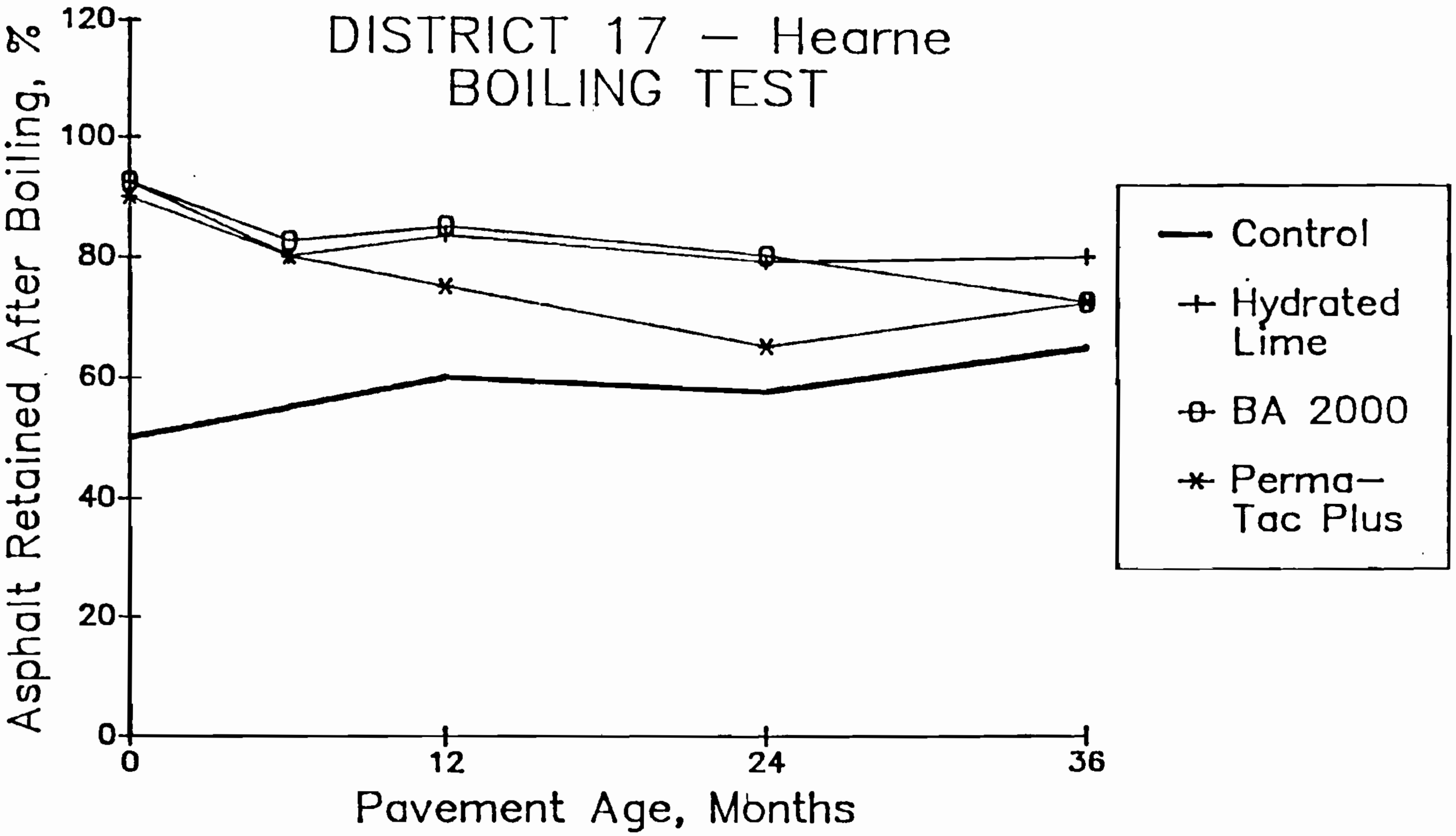


Figure 4.17 Mean Boiling test rating vs. pavement age for District 17.

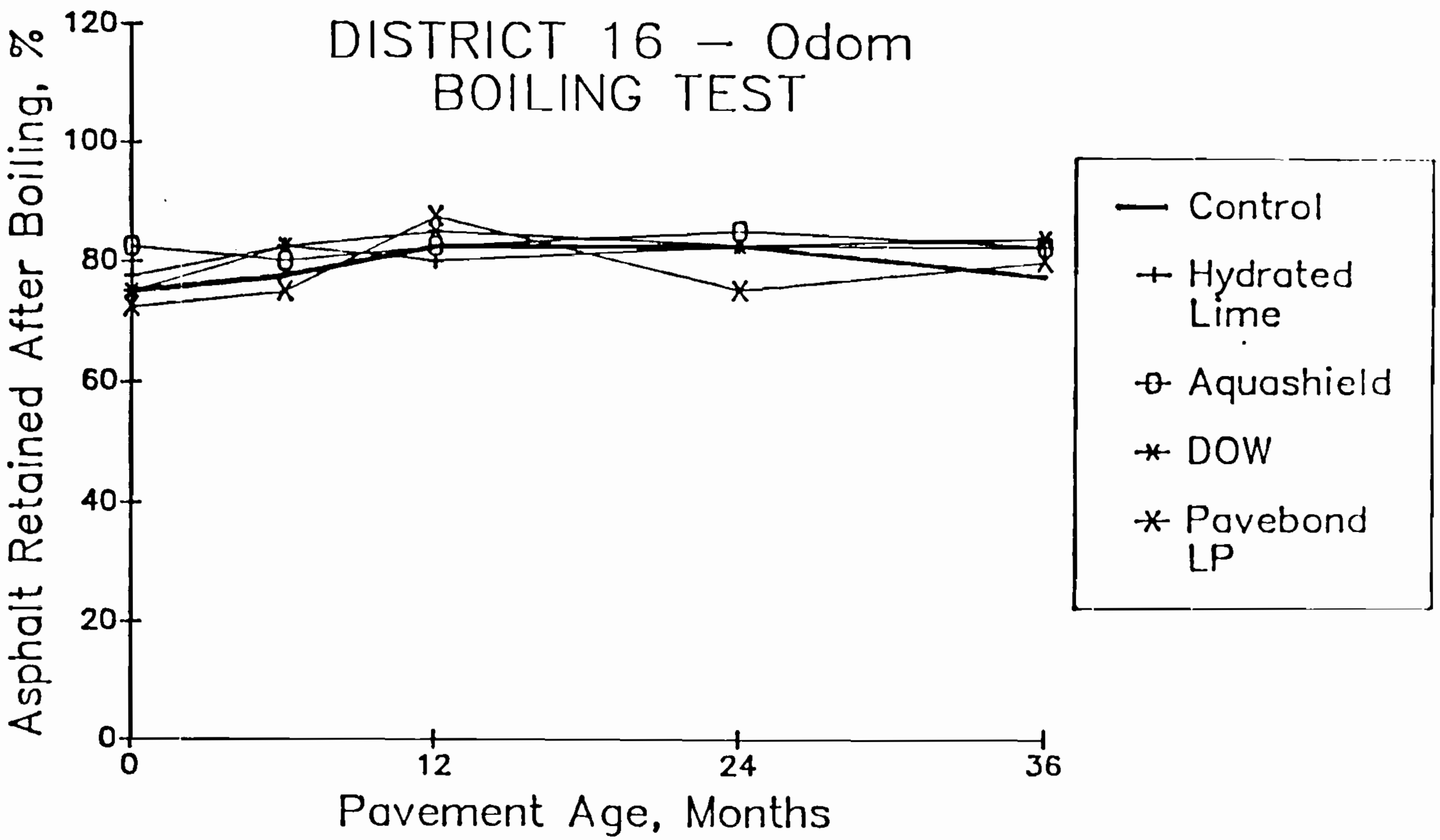


Figure 4.18 Mean Boiling test rating vs. pavement age for District 16.

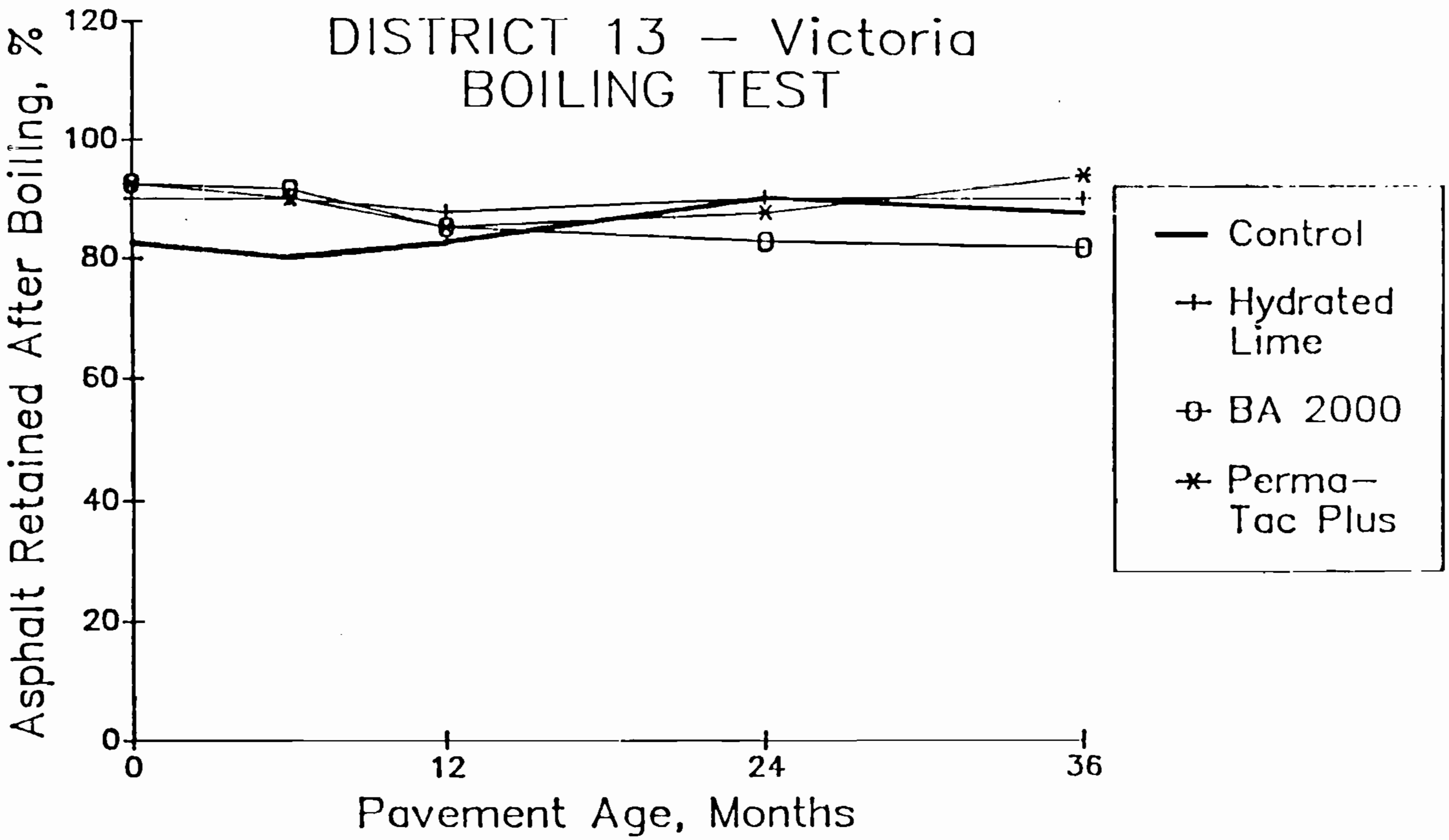


Figure 4.19 Mean Boiling test rating vs. pavement age for District 13.

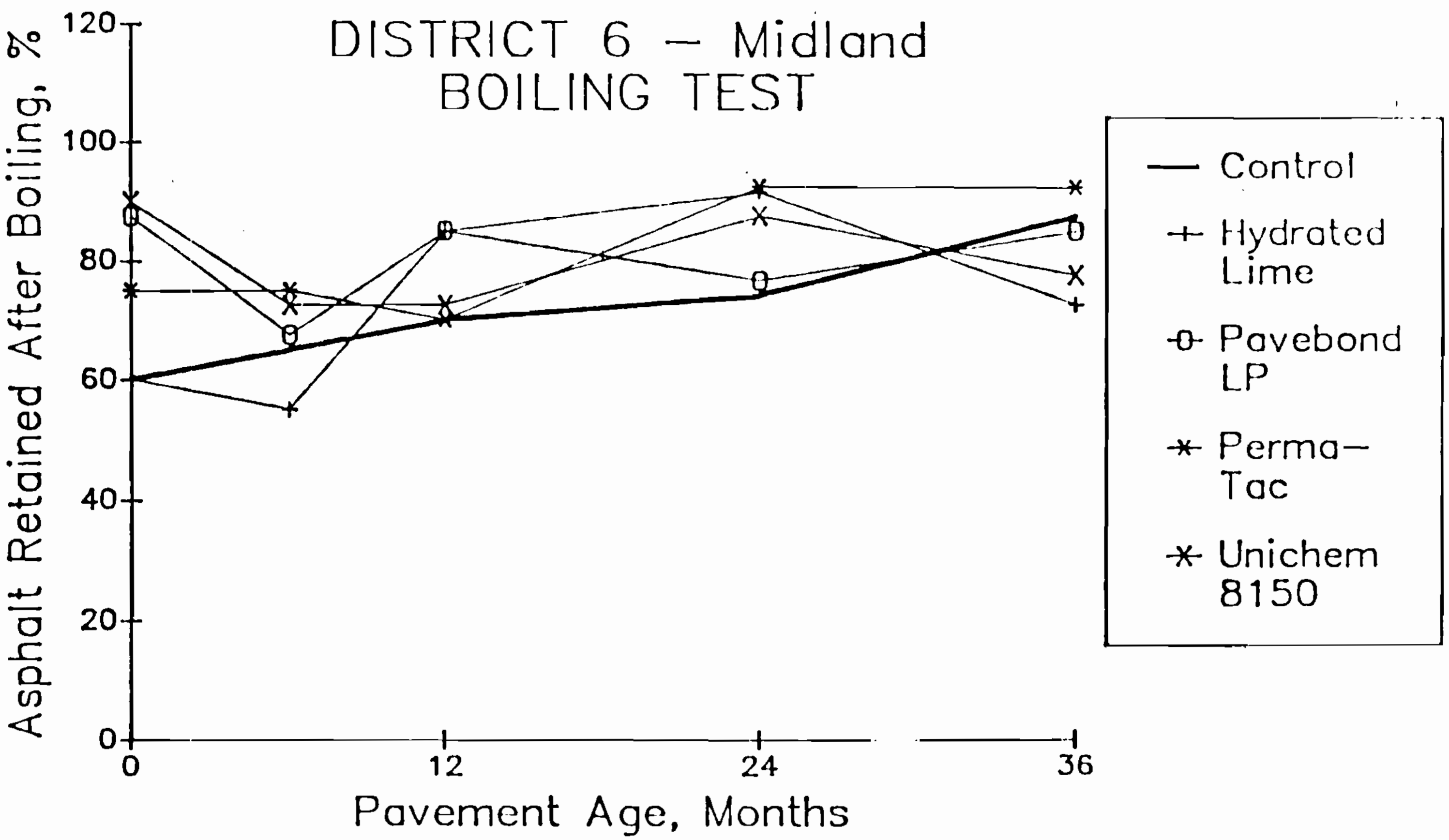


Figure 4.20 Mean Boiling test rating vs. pavement age for District 6.

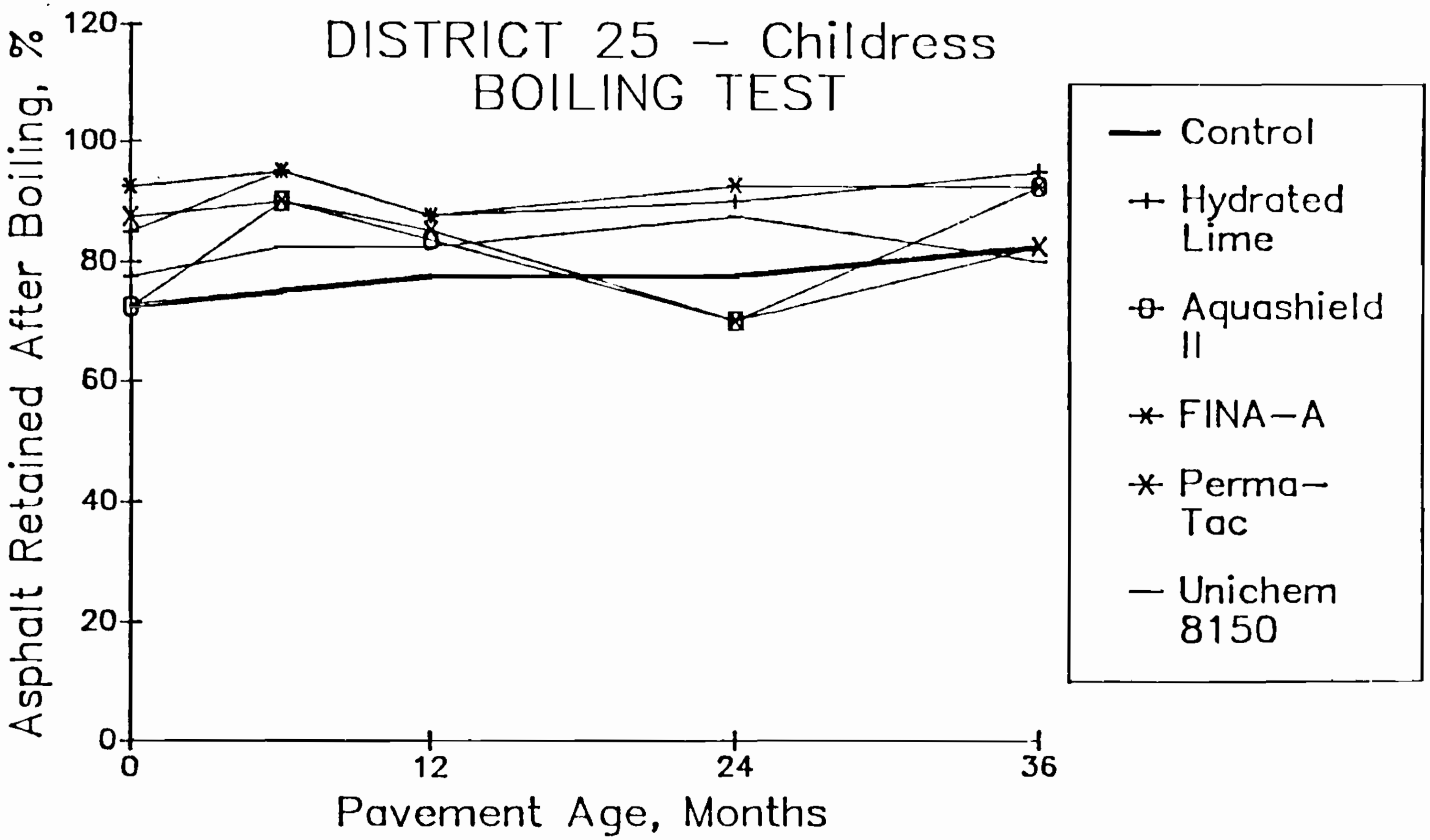


Figure 4.21 Mean Boiling test rating vs. pavement age for District 25.

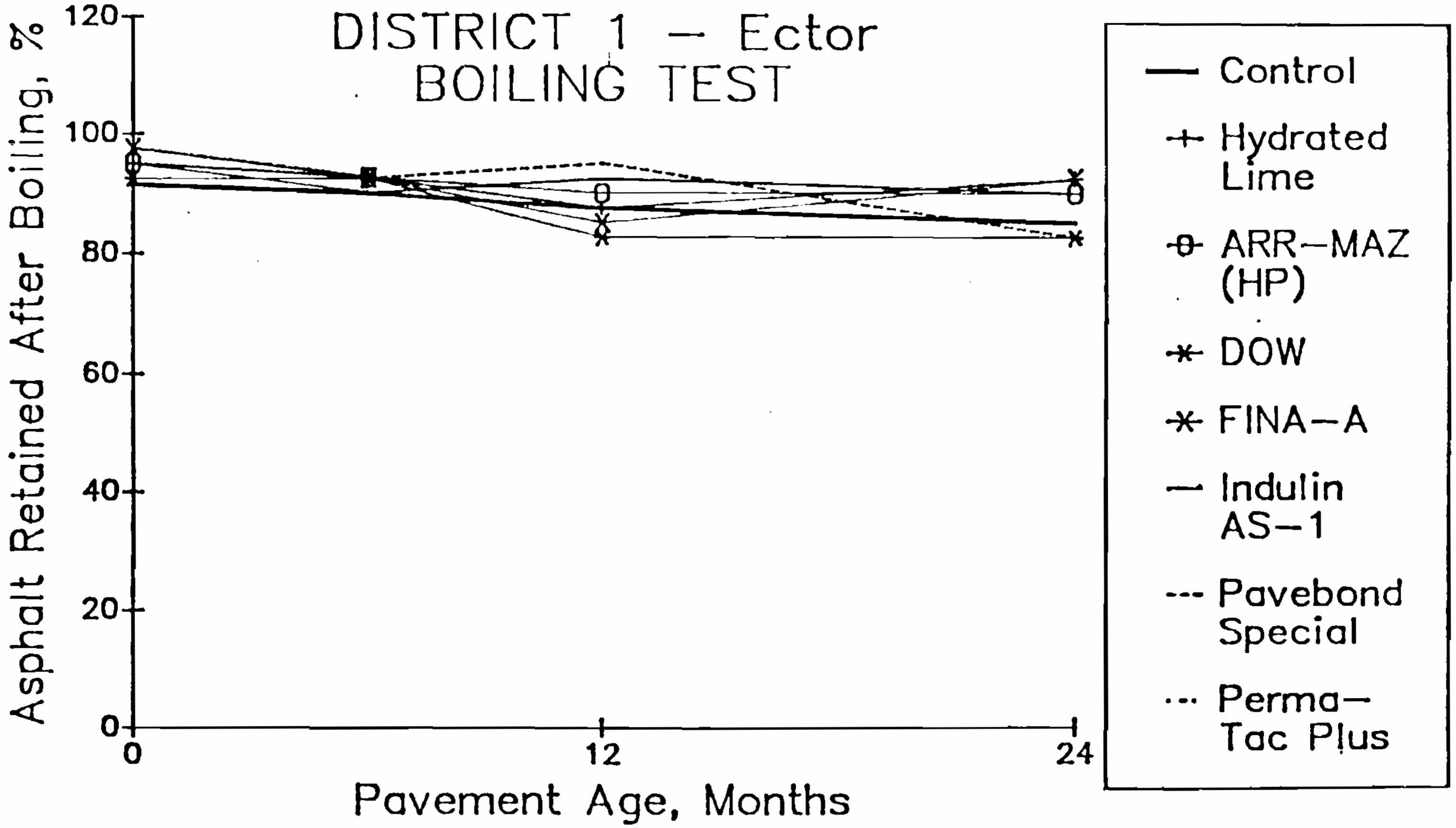


Figure 4.22 Mean Boiling test rating vs. pavement age for District 1.

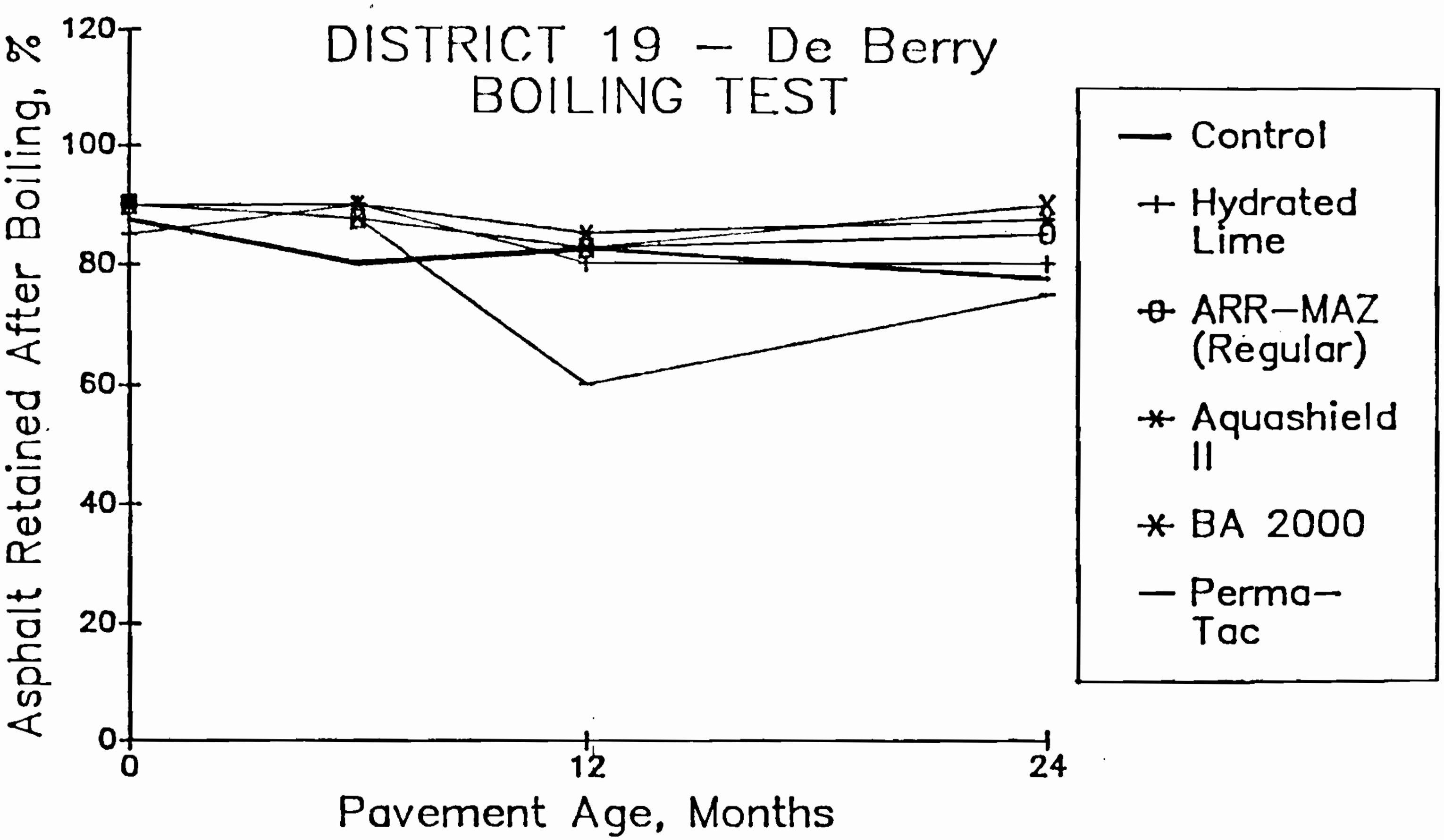


Figure 4.23 Mean Boiling test rating vs. pavement age for District 19.

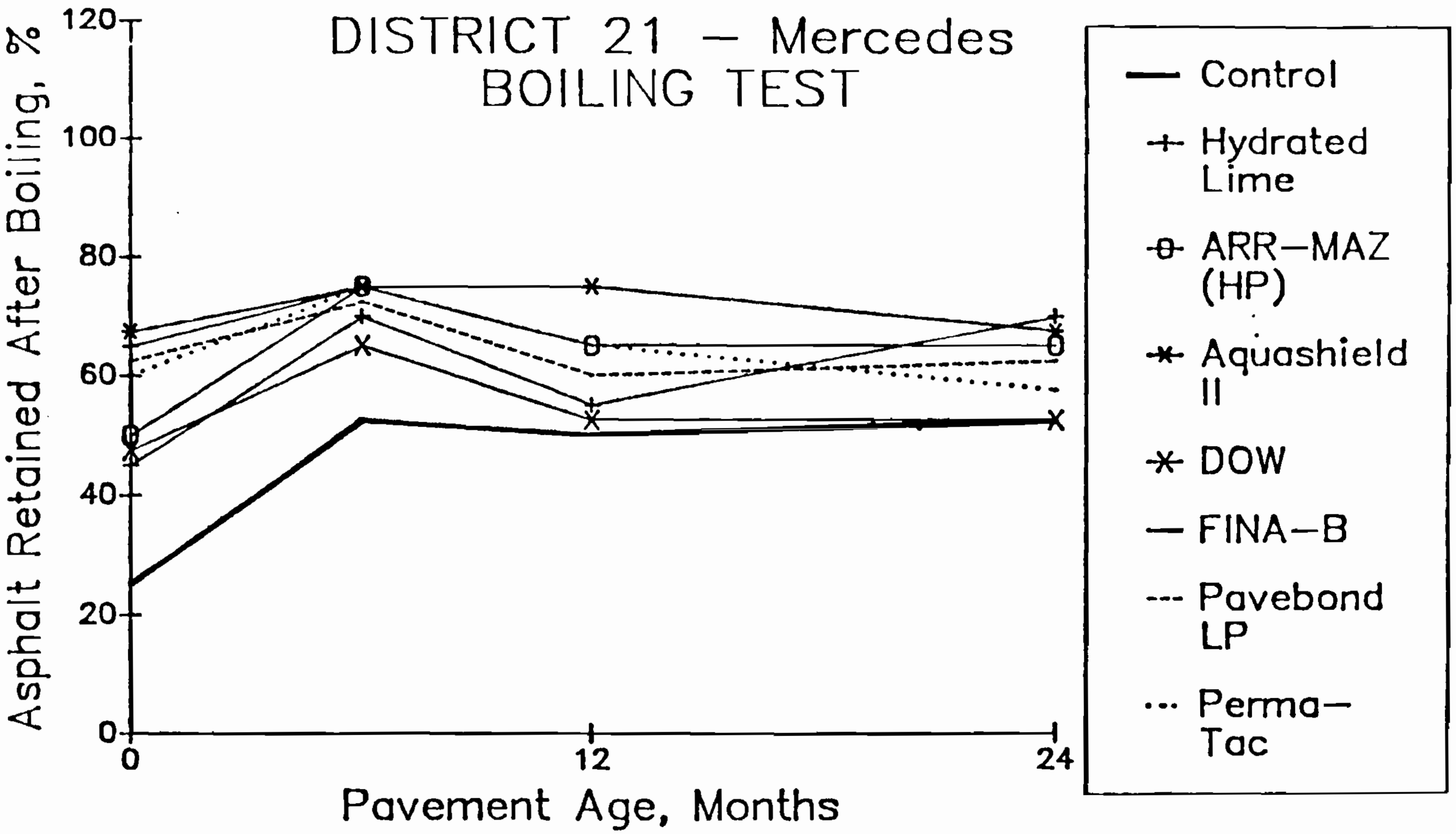


Figure 4.24 Mean Boiling test rating vs. pavement age for District 21.

TABLE 4.2 COMPARISONS BETWEEN ANTISTRIPPING ADDITIVES AND THE CONTROL USING BOILING TEST RATINGS

Type of Additive	SDHPT District Number							
	17	16	13	6	25	1	19	21
Hydrated lime	0	X	X	X	0	X	X	0
ARR-MAZ (Adhere Regular)							X	
ARR-MAZ (Adhere HP)						X		0
Aquashield		X						
Aquashield II					X		X	0
BA 2000	0		X				X	
DOW		X				X		X
FINA-A					0	X		
FINA-B								0
Indulin AS-1						X		
Pavebond LP		X		0				0
Pavebond Special						X		
Perma-Tac				0	X		X	0
Perma-Tac Plus	0		X			X		
Unichem 8150				0	X			

Note: 1. An additive is declared effective if its boiling test rating (percent of asphalt retained after boiling) mean is significantly higher than that of the "control" at 5% significance level.
2. An "0" indicates that the additive is declared effective in that district as compared to control. An "X" indicates that the additive is declared not effective.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The field condition surveys of all test sections in this study have shown little evidence of distress related to the moisture damage or stripping. Thus the long-term pavement performance is difficult to evaluate with test sections which are only two to four years of age. Nevertheless a data analysis based only on the data available was conducted. The conclusions from the analysis of data are summarized as follows:

Air Voids Results:

1. All air voids growth curves indicated the air voids generally decreased substantially during the first year and then remained nearly constant. The exception was in District 21 where the air voids continued to decrease after the first year.
2. The low air void content in the test sections minimizes the possibility that water can penetrate the mixture, and probably is responsible for the slow rate of moisture damage.
3. Air void contents of the lime test sections were consistently lower than that in the control section for all projects except in District 21. This may be related to the mineral filler

effect of the hydrated lime in the mixtures.

Indirect Tensile Test Results:

1. Most of the relationships for mixtures containing antistripping additives generally indicate that TSR values were greater than 70 percent, which is a typical minimum acceptable value used by many highway agencies.
2. In several districts, it was found that cores from some treated mixtures exhibited a higher wet strength, resulting in a TSR value larger than 100 percent. In a few cases, TSR values greater than 100 percent were measured for the control (no additive) mixtures. This has been observed in numerous previous studies.
3. Hydrated lime was generally effective as a means of reducing moisture damage in most districts except in districts 6 and 21, as shown in Table 4.1. The benefit of using antistripping additives varied based on the adjusted TSR comparisons. Districts 17, 13 and 19 show the benefit from the use of all additives, while other districts are not totally benefited by all additives. Several additives, such as BA2000, FINA-A, and Perma-Tac Plus, were effective for all projects, while additives, such as DOW and Unichem 8150, exhibited very little benefit.
4. It should be noted that since there is very little moisture damage related distress existing in all test sections, none of

the antistripping additives applied increases the potential for moisture damage in pavement mixtures.

Boiling Test Results:

1. Although no well-defined relationships exists among the boiling rating growth curves, the boiling test ratings for all sections treated with lime or antistripping additives are generally as good as, or better than, that of the control section. Most districts exhibited boiling test ratings higher than 70 percent which is a typical minimum acceptable value used by most highway agencies. One exception is District 21 which has most of its boiling test ratings below the 70 percent level.
2. There is not much variation in most boiling test ratings growth curves after the first year. Probably because the air void contents in the test sections were low and thus moisture damage is occurring at a very slow rate. It may also be related to the asphalt age-hardening in the mixtures and the increase of asphalt absorption over the period of time.
3. Districts 17, 25 and 21 show the benefit from the use of hydrated lime, while others do not show any benefit as shown in Table 4.2. Similar results shown that hydrated lime provides less improvement when evaluated by the boiling test than by the wet-dry indirect tensile test (Tables 4.1 and 4.2) were obtained in previous studies.

4. Most liquid antistripping additives were not effective according to the results of the boiling test as shown in Table 4.2.

RECOMMENDATIONS

It is recommended that this project be continued until the original objectives are satisfied. It is also recommended that the subject test pavement sections be evaluated each year or at shorter periods of time if conditions indicate the need.

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APPENDIX A

AGGREGATE GRADATIONS FOR THE FIELD TEST PROJECTS

Table A.1 AGGREGATE GRADATION FOR FIELD TEST PROJECTS.

Sieve Size	Dist. 17	Dist. 16	Dist. 13	Dist. 6	Dist. 25	Dist. 1	Dist. 19	Dist. 21	SDHPT Spec. Type D	SDHPT Spec. Type C
plus 5/8 in.	0.0	0.0	0.0	0.0	0.2	0.0	4.2	0.0	0	0-5
5/8 to 1/2 in.	0.0	0.0	0.0	0.0		0.0		0.0	0	
1/2 to 3/8 in.	0.7	6.0	3.0	3.3	18.3	6.4	20.3	5.0	0-15	16-42
3/8 to No. 4	29.4	36.2	34.1	34.3	19.5	39.6	21.3	31.5	21-53	11-37
No. 4 to No. 10	26.8	18.5	24.8	25.1	20.1	13.0	14.4	25.7	11-32	11-32
Plus No. 10	56.9	60.7	61.9	62.7	58.1	59.0	60.2	62.2	54-74	54-74
No. 10 to No. 40	13.7	11.8	16.4	15.8	25.6	11.6	13.0	11.3	6-32	6-32
No. 40 to No. 80	16.8	13.2	14.5	12.5	7.3	13.9	11.8	18.5	4-27	4-27
No. 80 to No. 200	10.7	9.3	4.7	5.1	5.6	11.0	12.5	6.6	3-27	3-27
Minus No. 200	1.9	5.0	2.5	3.9	3.4	4.5	2.5	1.4	1-8	1-8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		

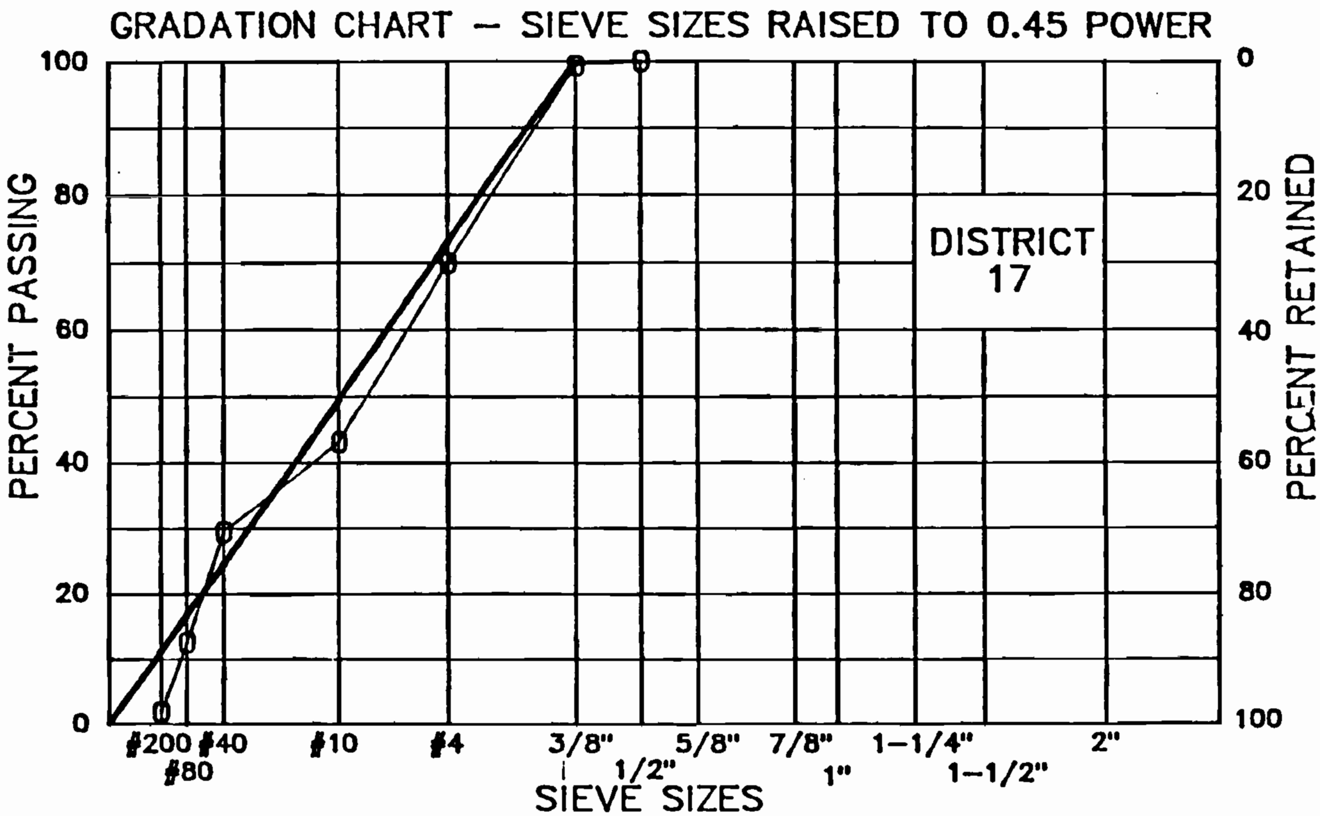


Figure A.1 Aggregate gradation curve for District 17.

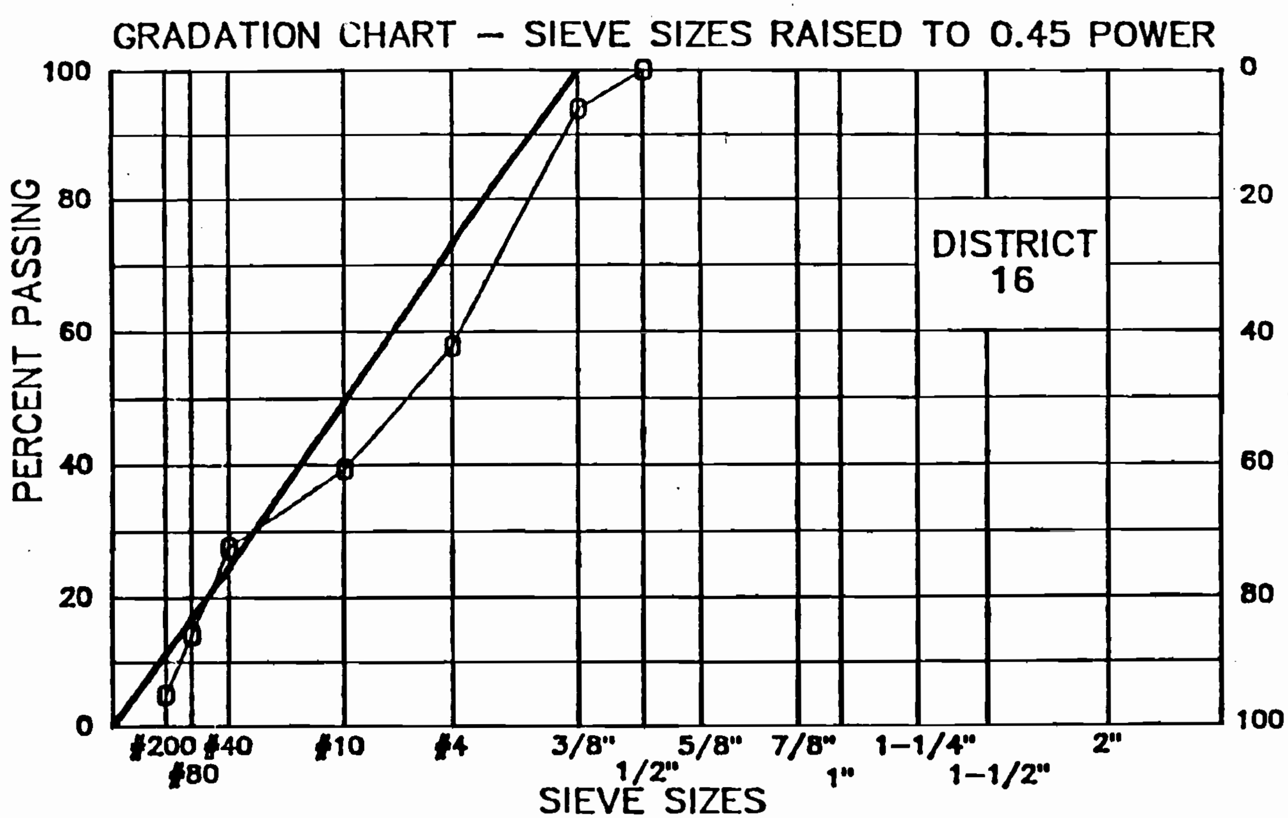


Figure A.2 Aggregate gradation curve for District 16.

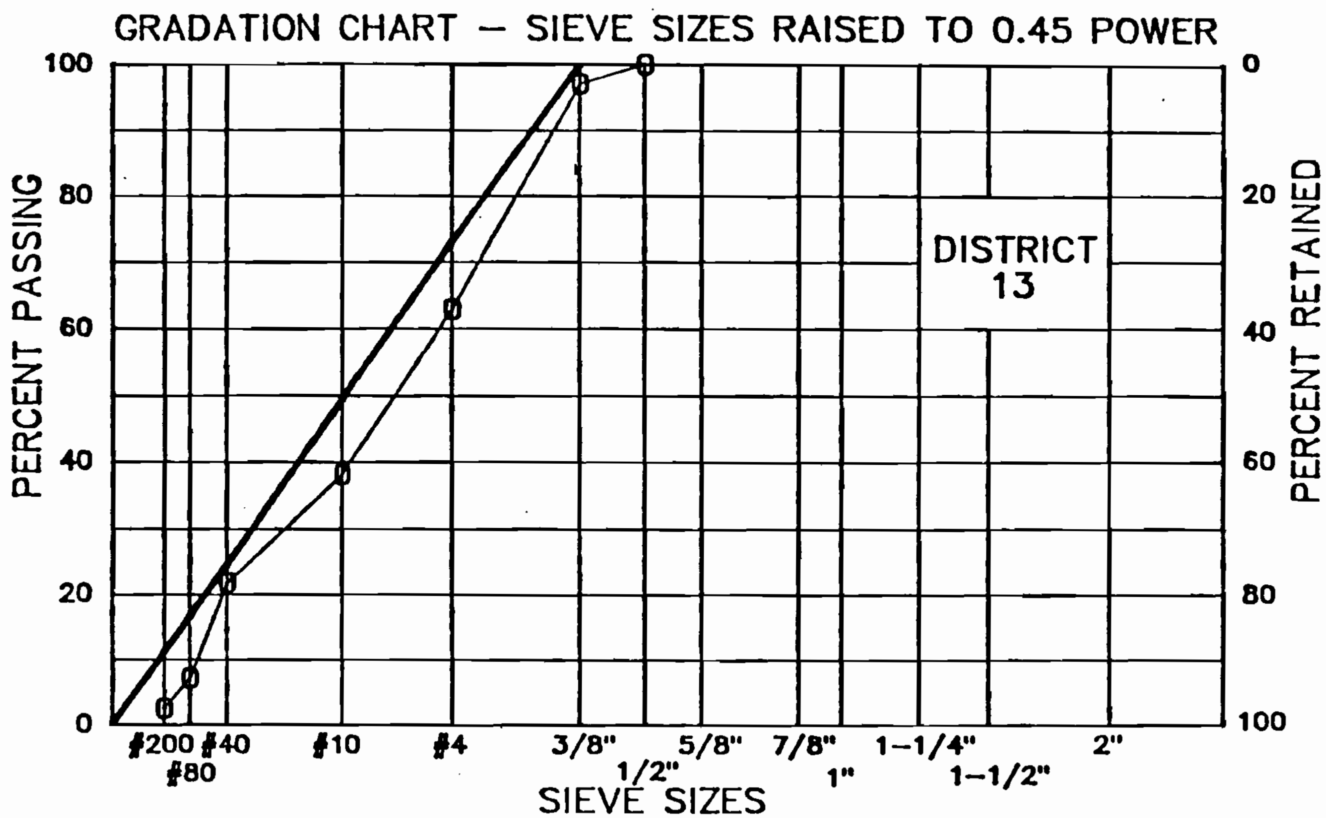


Figure A.3 Aggregate gradation curve for District 13.

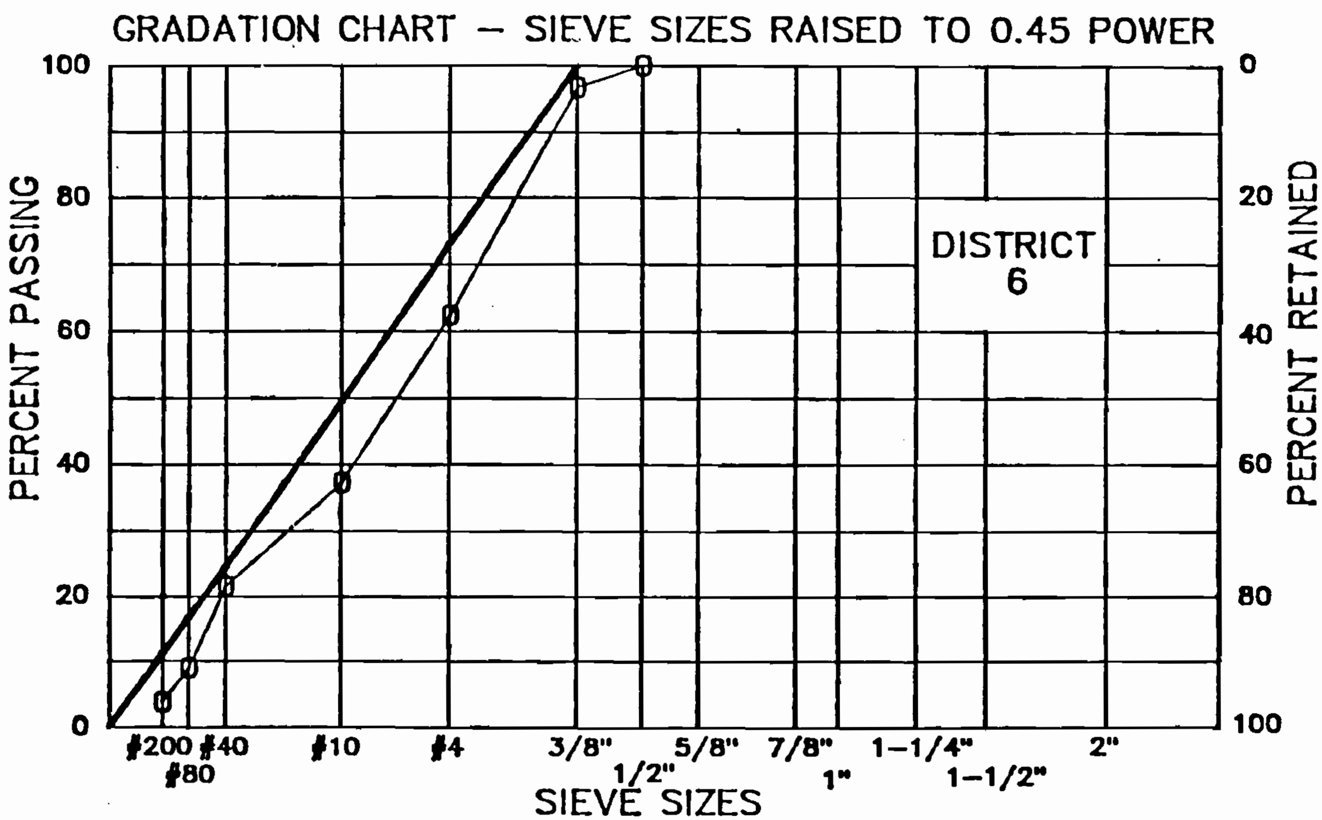


Figure A.4 Aggregate gradation curve for District 6.

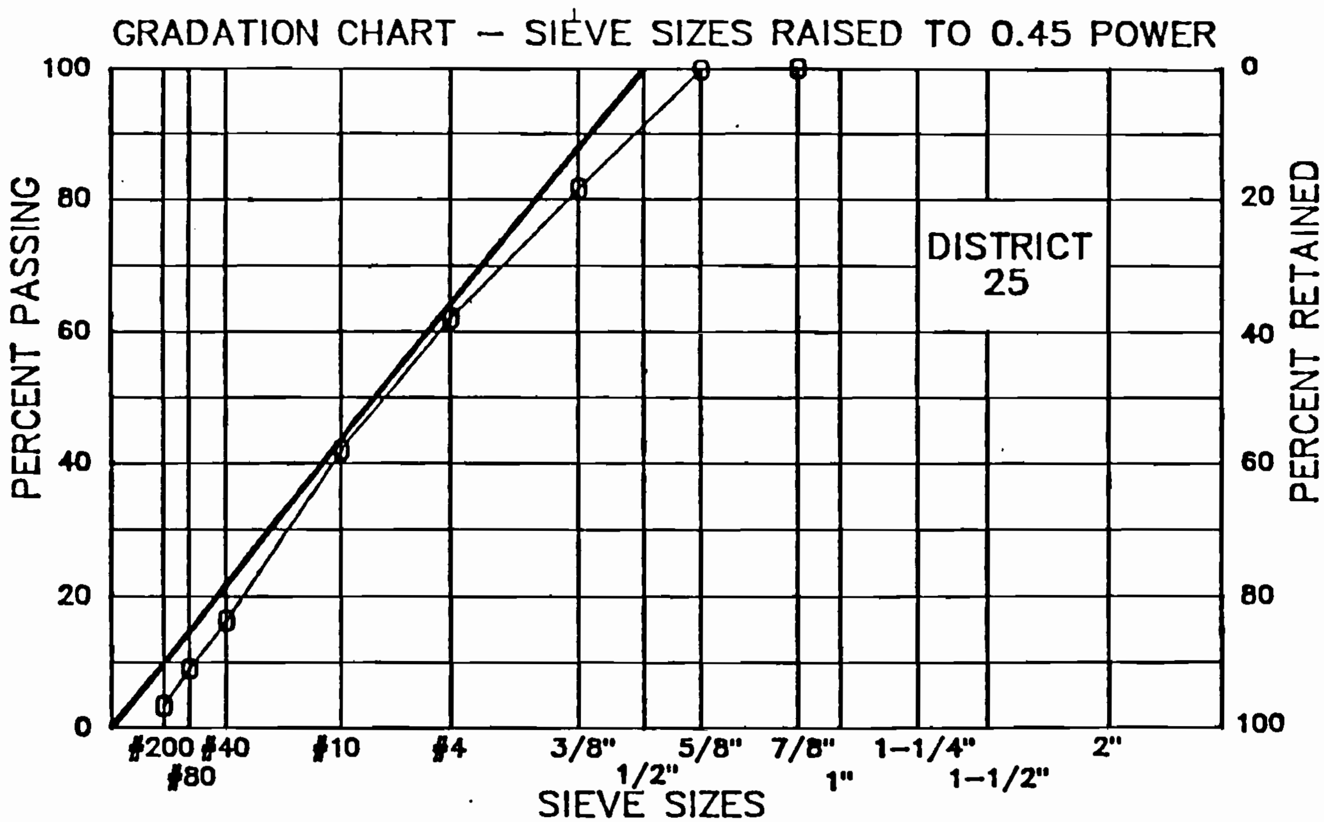


Figure A.5 Aggregate gradation curve for District 25.

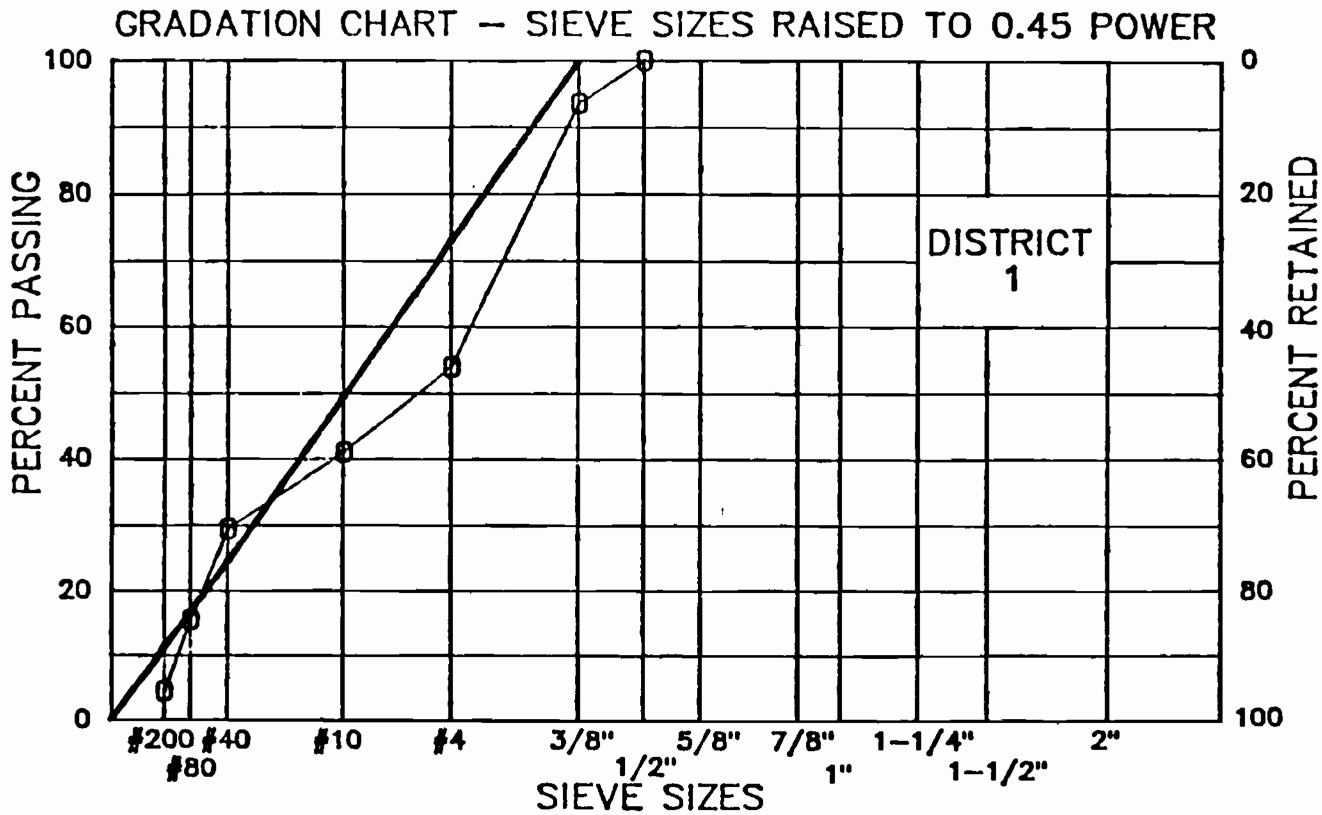


Figure A.6 Aggregate gradation curve for District 1.

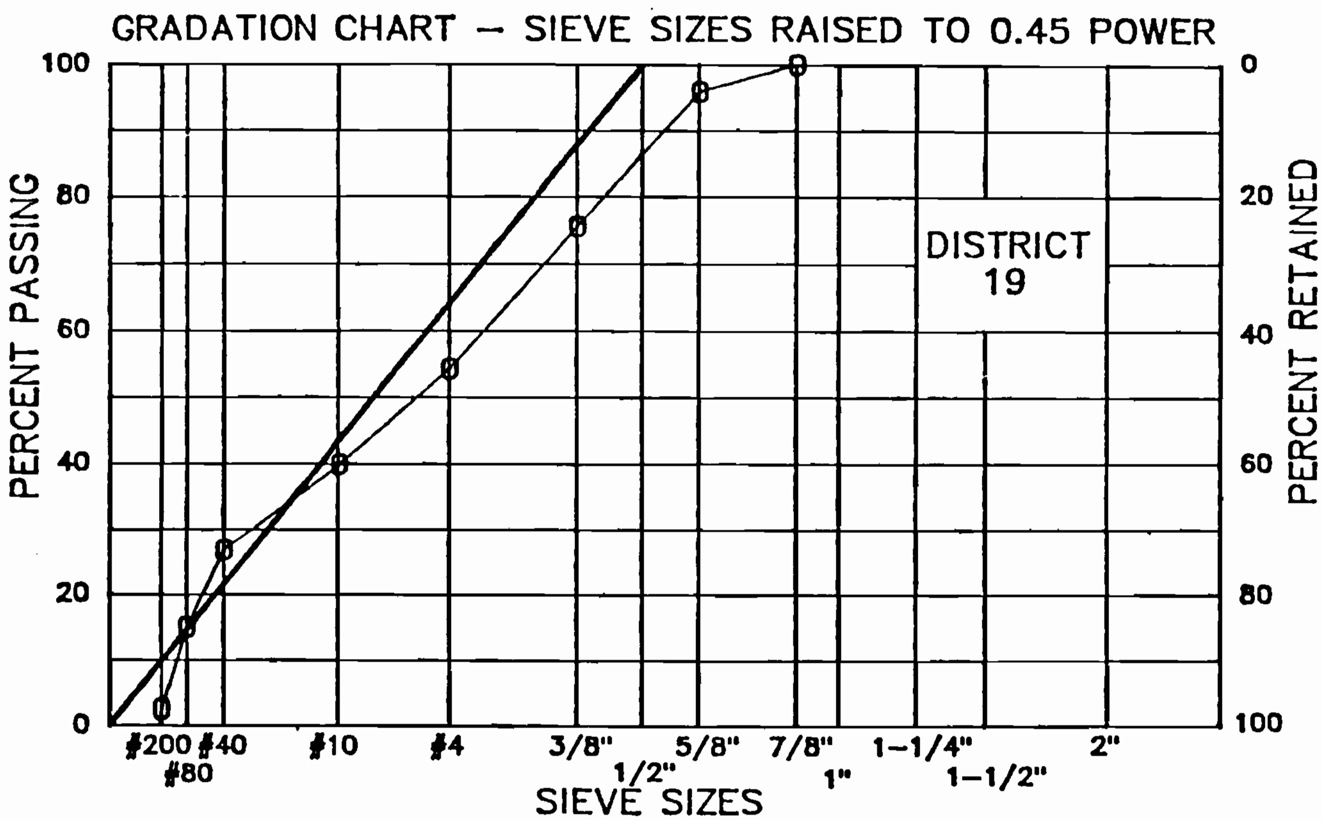


Figure A.7 Aggregate gradation curve for District 19.

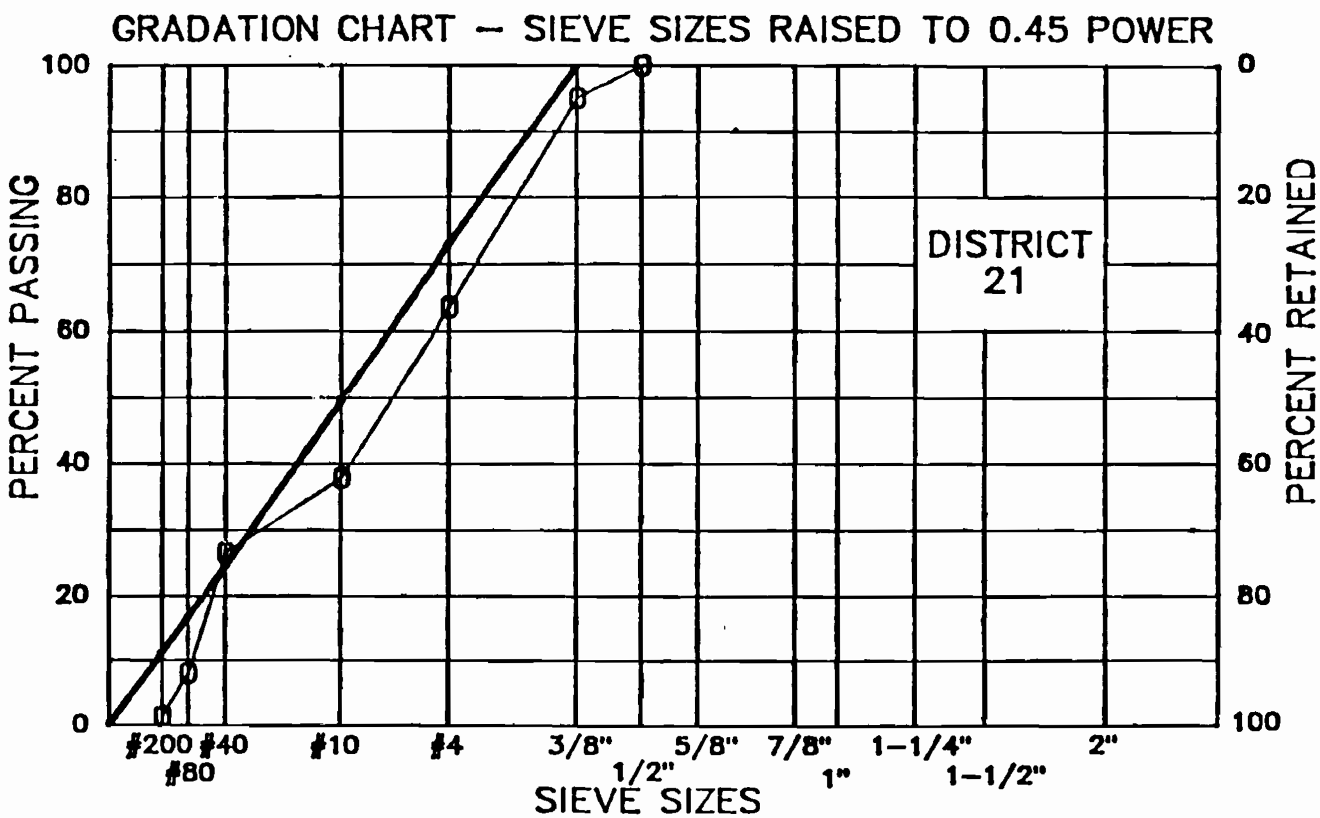


Figure A.8 Aggregate gradation curve for District 21.

APPENDIX B

TEST SECTION LAYOUTS FOR THE FIELD TEST PROJECTS

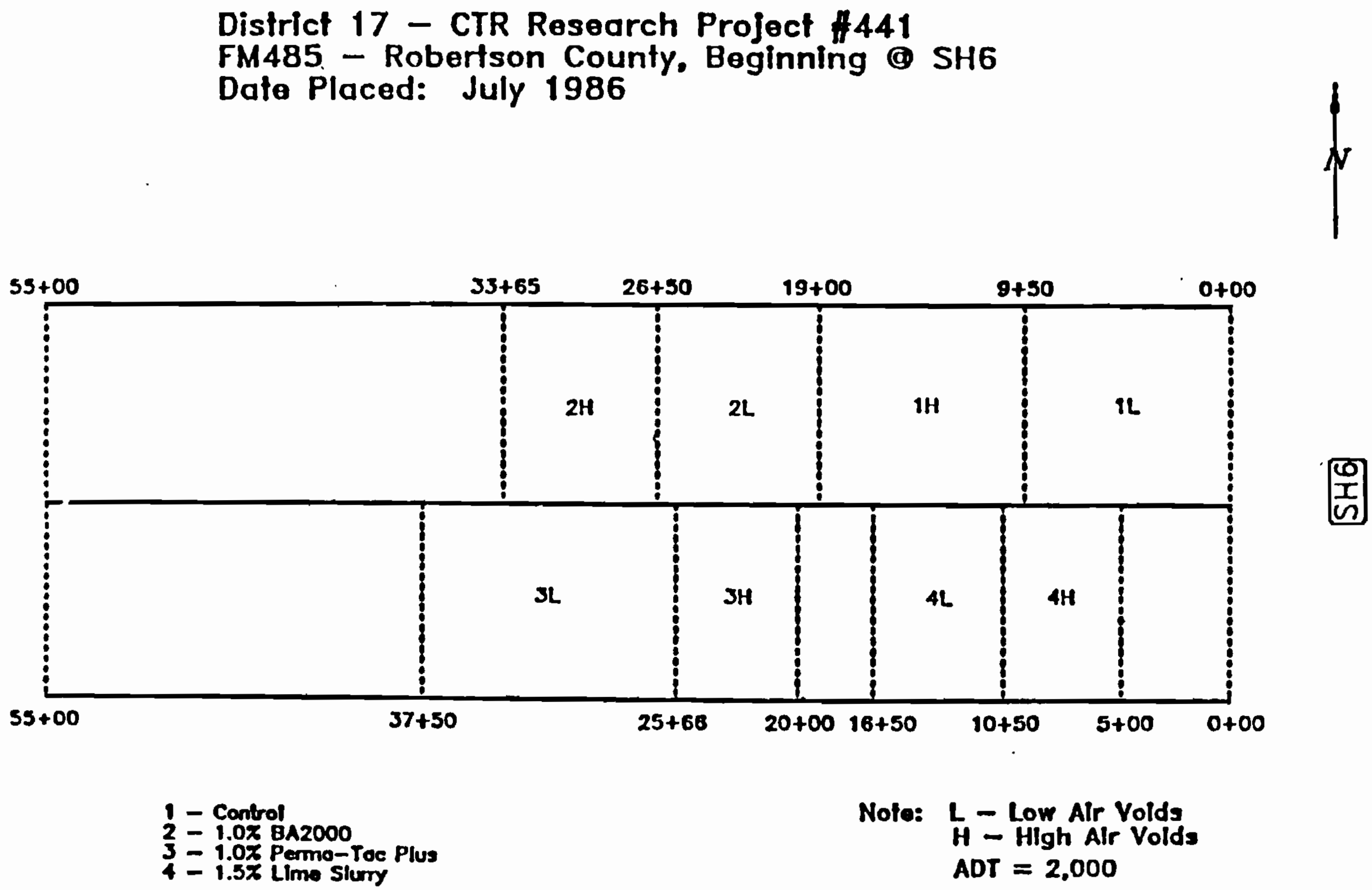
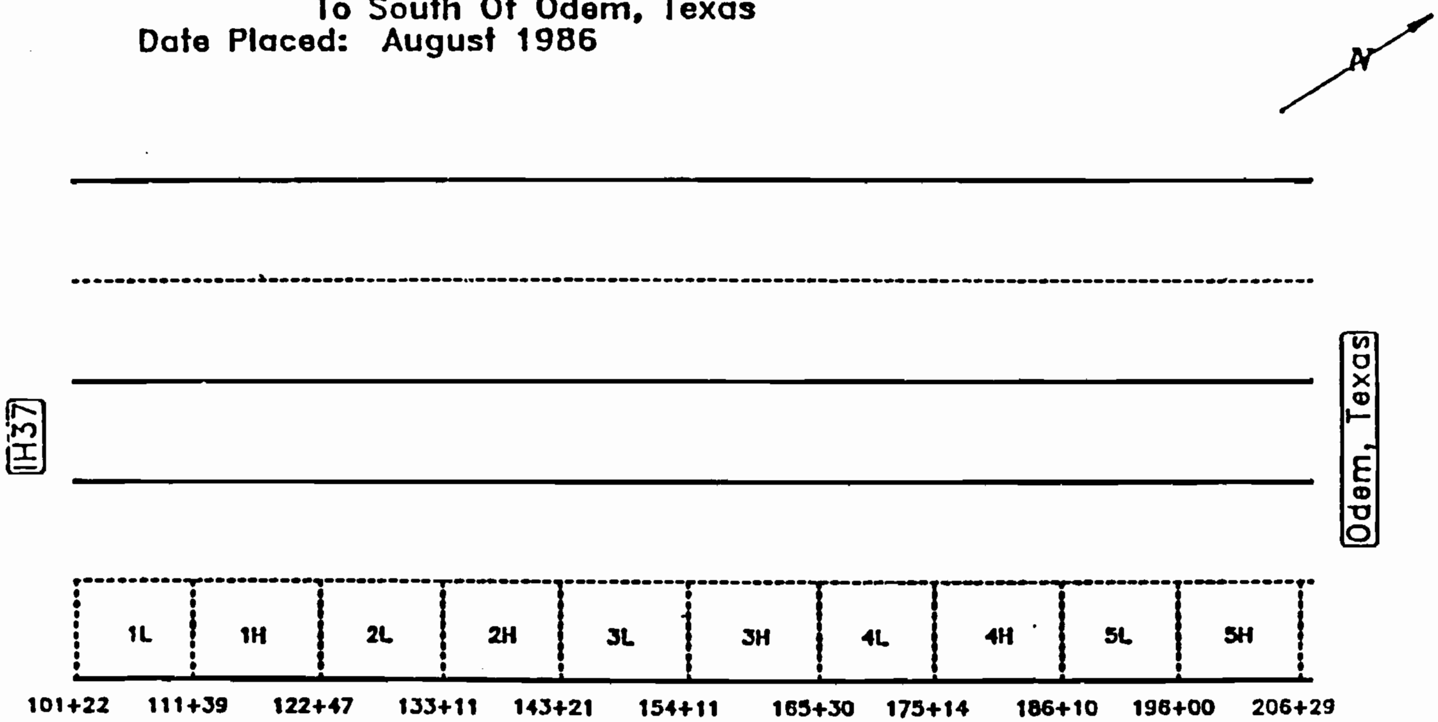


Figure B.1 Location and field test sections layout for District 17.

District 16 – CTR Research Project #441
US77 – San Patricio County, Beginning 1.3 Miles North Of IH37
To South Of Odem, Texas
Date Placed: August 1986

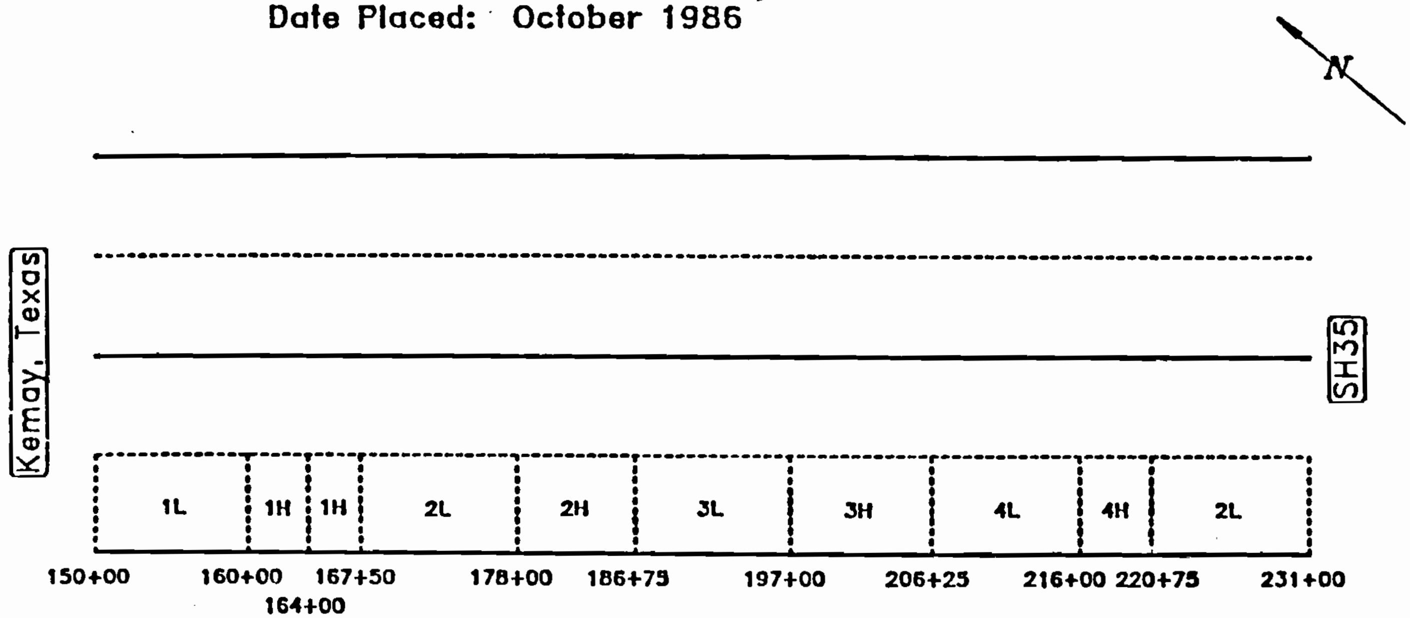


1 – Control
2 – 1.00% Lime
3 – 0.50% PaveBond LP
4 – 0.50% Aquashield
5 – 0.41% Dow

Note: L – Low Air Voids
H – High Air Voids
ADT = 11,800

Figure B.2 Location and field test sections layout for District 16.

District 13 – CTR Research Project #441
US87 – Calhoun County, Beginning @ 19 Miles
South Of Victoria, Texas
Date Placed: October 1986

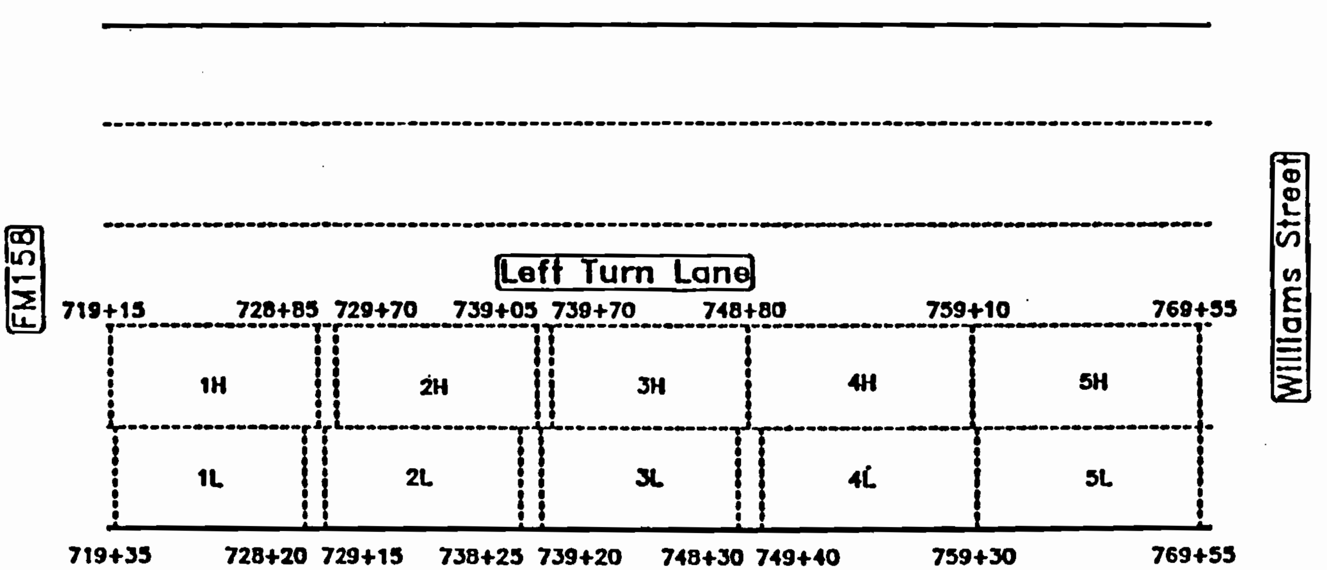


1 – 1% Perma-Tac Plus
2 – Control
3 – 1% BA2000
4 – 2% Lime Slurry

Note: L – Low Air Voids
H – High Air Voids
ADT = 4,200

Figure B.3 Location and field test sections layout for District 13.

District 6 – CTR Research Project #441
SP268 – Midland County, Beginning At Intersection Of
SP268 And FM158, Midland, Texas
Date Placed: November 1986



1 – 1% Perma–Tac
2 – 1% Unichem 8150
3 – 1% PaveBond LP
4 – Control
5 – 1% Lime Slurry

Note: L – Low Air Voids
H – High Air Voids
ADT = 13,900

Figure B.4 Location and field test sections layout for District 6.

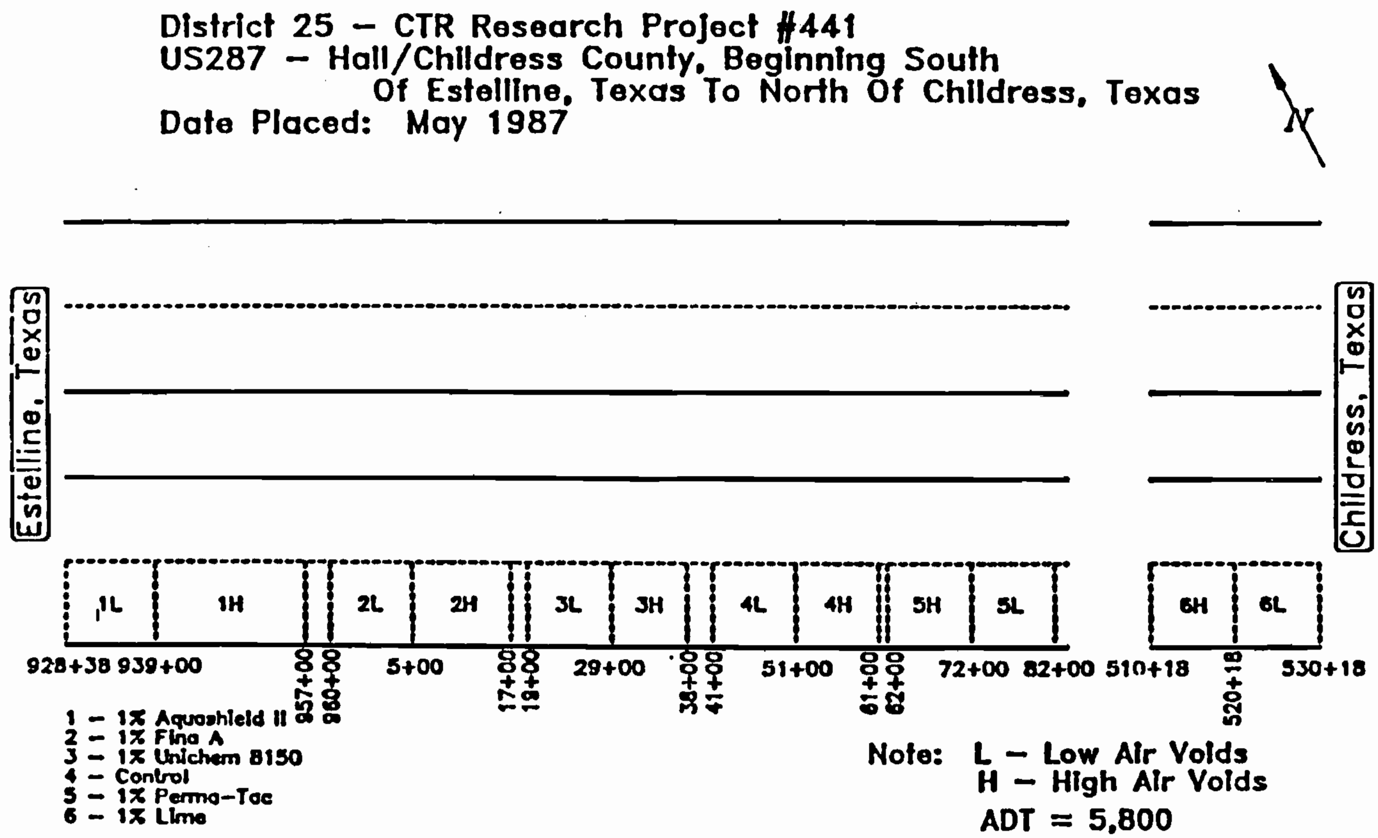


Figure B.5 Location and field test sections layout for District 25.

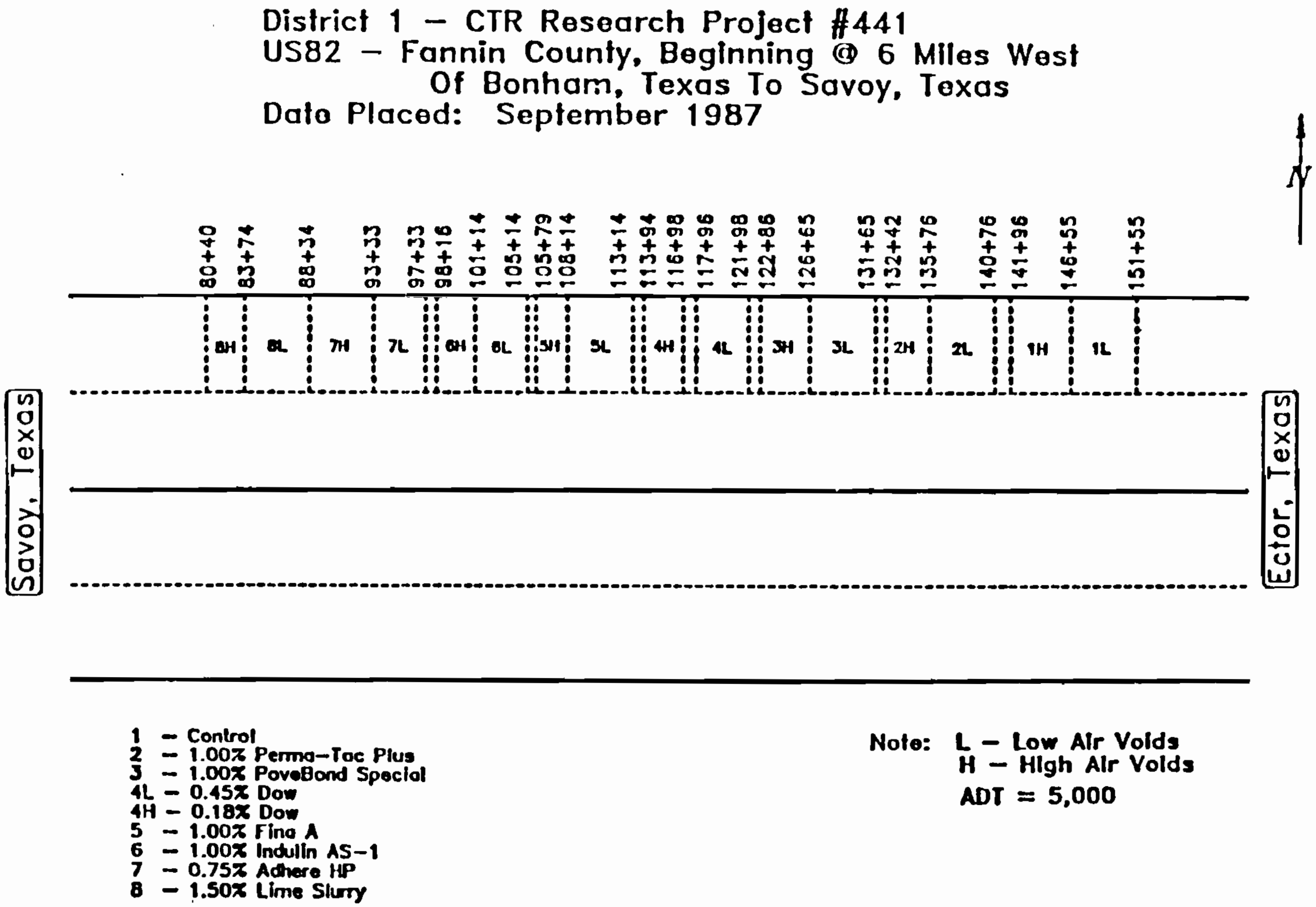
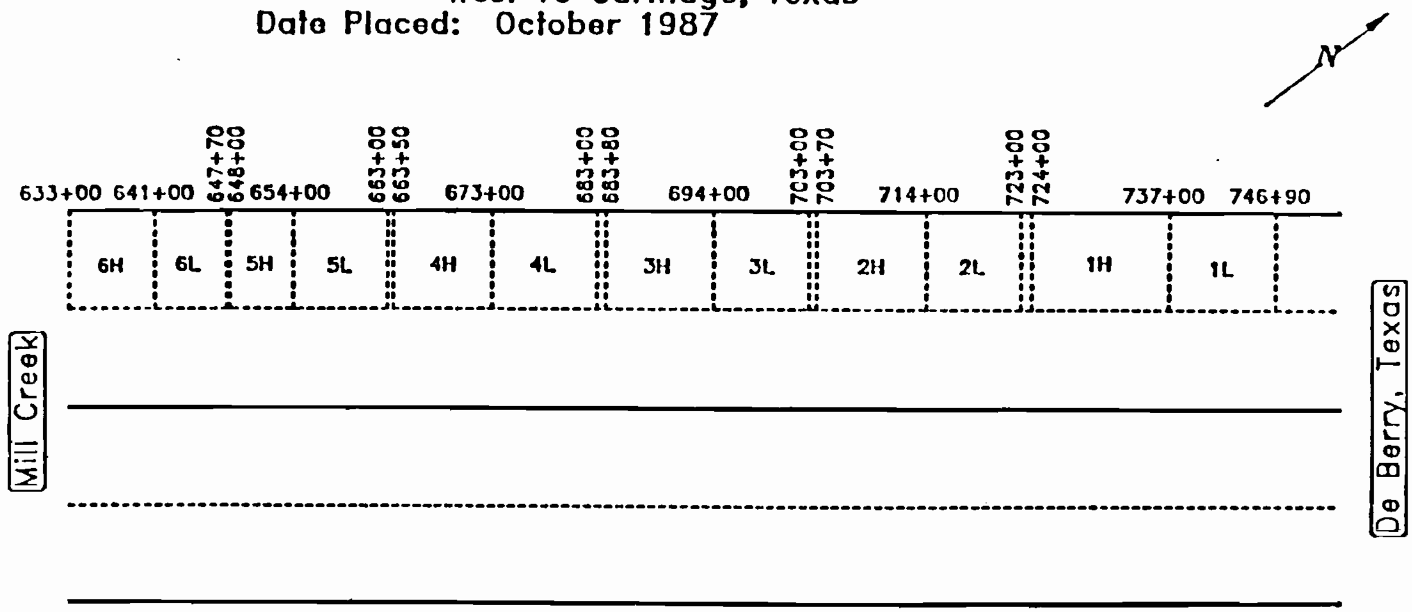


Figure B.6 Location and field test sections layout for District 1.

District 19 – CTR Research Project #441
US79 – Panola County, Beginning @ De Berry, Texas
West To Carthage, Texas
Date Placed: October 1987



1 – 1.0% Adhere Regular
2 – 0.5% BA2000
3 – 0.8% Aquashield II
4 – 1.0% Perma-Tac
5 – Control
6 – 1.0% Lime

Note: L – Low Air Voids
H – High Air Voids
ADT = 6,700

Figure B.7 Location and field test sections layout for District 19.

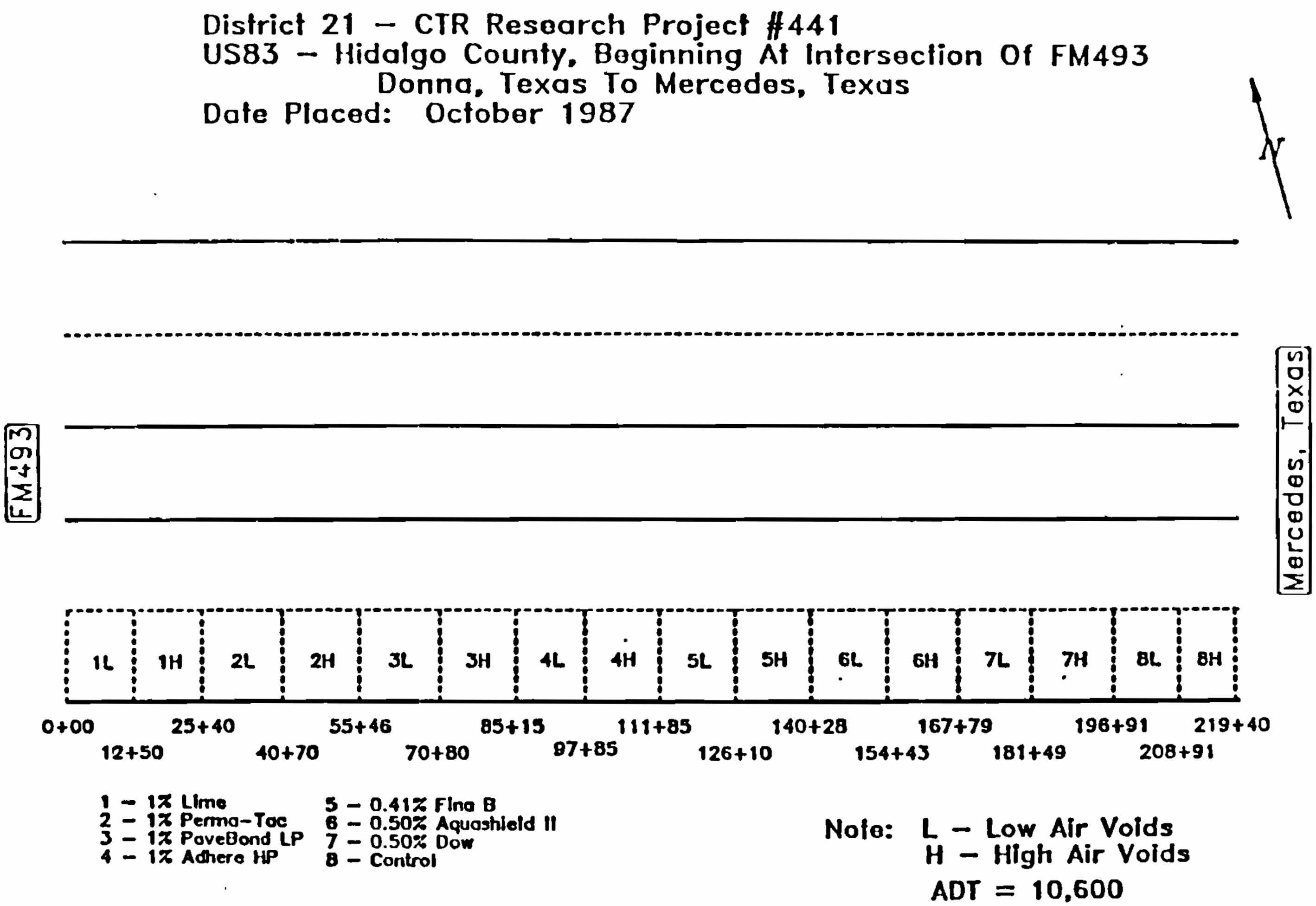


Figure B.8 Location and field test sections layout for District 21.

APPENDIX C

AIR VOIDS AND INDIRECT TENSILE TEST DATA

TABLE C-1 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 0 MONTH (POSTCONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	WET	3.6	148.1	87	0.76
		DRY	4.2	147.1	115	
		DRY	7.4	142.2	124	
		WET	7.0	142.8	59	0.47
		WET	5.5	145.1	53	0.46
		DRY	5.7	144.7	116	
		DRY	4.1	147.3	125	
		WET	4.3	146.9	78	0.62
		(AVG AV)	5.2		(AVG TSR)	0.58
	HIGH AIR VOIDS SECTION	WET	5.5	145.0	63	0.53
		DRY	4.2	147.1	119	
		DRY	6.3	144.0	98	
		WET	6.0	144.4	66	0.67
		WET	6.3	143.9	55	0.62
		DRY	7.2	142.5	89	
		DRY	7.3	142.4	85	
		WET	8.2	141.0	.61	0.72
		(AVG AV)	6.4		(AVG TSR)	0.63
LIME SLURRY	LOW AIR VOIDS SECTION	WET	2.2	149.4	106	0.99
		DRY	3.1	148.0	107	
		DRY	2.8	148.4	102	
		WET	2.4	149.0	106	1.04
		WET	2.9	148.3	119	1.01
		DRY	3.1	147.9	117	
		(AVG AV)	2.8		(AVG TSR)	1.01
	HIGH AIR VOIDS SECTION	DRY	5.1	145.0	109	
		WET	4.6	145.6	117	1.07
		WET	3.6	147.2	109	0.97
		DRY	4.8	145.4	113	
		DRY	4.9	145.1	97	
		WET	4.4	146.0	90	0.94
		(AVG AV)	4.6		(AVG TSR)	0.99

TABLE C-1 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	WET	6.1	145.4	123	0.98
		DRY	6.6	144.6	126	
		DRY	8.5	141.7	107	
		WET	6.9	144.2	90	0.85
		WET	5.4	146.5	131	0.92
		DRY	4.7	147.5	142	
		DRY	5.7	145.9	117	
		WET	5.6	146.1	120	1.03
		(AVG AV)	6.2		(AVG TSR)	0.94
	HIGH AIR VOIDS SECTION	WET	6.5	144.7	109	0.89
		DRY	6.6	144.7	123	
		DRY	7.8	142.8	98	
		WET	7.5	143.3	115	1.18
		WET	7.7	142.9	79	0.70
		DRY	6.6	144.6	113	
		DRY	5.7	146.0	121	
		WET	N/A	N/A	N/A	N/A
		(AVG AV)	6.9		(AVG TSR)	0.92
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	WET	7.0	144.1	43	0.49
		DRY	6.5	144.7	89	
		DRY	7.4	143.3	95	
		WET	7.5	143.2	56	0.59
		WET	7.0	144.0	61	0.66
		DRY	5.6	146.2	93	
		DRY	8.3	141.9	91	
		WET	7.4	143.3	37	0.41
		(AVG AV)	7.1		(AVG TSR)	0.54
	HIGH AIR VOIDS SECTION	WET	4.8	147.4	90	1.06
		DRY	5.2	146.7	85	
		DRY	4.4	147.9	75	
		WET	4.2	148.4	65	0.87
		WET	4.6	147.7	88	1.00
		DRY	4.9	147.3	88	
		DRY	5.3	146.6	82	
		WET	5.0	147.1	95	1.16
		(AVG AV)	4.8		(AVG TSR)	1.02

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-2 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	W	1.3	150.1	105	0.93
		D	1.5	149.7	114	
		D	3.1	147.4	146	
		W	4.1	145.8	110	0.75
		W	3.7	146.4	72	0.58
		D	3.2	147.1	123	
		D	2.7	147.8	149	
		W	2.7	147.9	116	0.78
		(AVG AV)	2.77		(AVG TSR)	0.76
	HIGH AIR VOIDS SECTION	W	2.0	149.0	130	0.90
		D	1.7	149.5	144	
		D	3.4	146.9	124	
		W	4.0	145.9	98	0.79
		W	4.6	145.1	88	0.69
		D	4.4	145.4	128	
		D	4.7	144.9	112	
		W	4.5	145.2	88	0.79
		(AVG AV)	3.64		(AVG TSR)	0.79
LIME SLURRY	LOW AIR VOIDS SECTION	W	1.0	150.7	148	1.26
		D	1.2	150.4	117	
		D	1.1	150.5	124	
		W	1.3	150.3	147	1.19
		W	1.8	149.5	177	1.25
		D	1.8	149.5	141	
		(AVG AV)	1.33		(AVG TSR)	1.23
	HIGH AIR VOIDS SECTION	D	2.5	148.4	158	
		W	2.6	148.2	162	1.02
		W	1.9	149.3	165	1.13
		D	2.4	148.6	147	
		D	1.7	149.5	149	
		W	2.5	148.4	186	1.25
		(AVG AV)	2.28		(AVG TSR)	1.13

TABLE C-2 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	W	4.0	146.3	157	0.98
		D	3.9	146.5	160	
		D	4.3	145.8	138	
		W	3.8	146.6	165	1.20
		W	2.1	149.2	151	1.05
		D	2.5	148.6	144	
		D	2.8	148.1	168	
		W	2.7	148.3	153	0.91
		(AVG AV)	3.28		(AVG TSR)	1.03
	HIGH AIR VOIDS SECTION	W	3.5	147.1	150	1.09
		D	3.4	147.2	137	
		D	4.7	145.2	132	
		W	4.4	145.8	122	0.93
		W	3.5	147.1	155	0.99
		D	3.6	147.0	156	
		D	3.9	146.4	145	
		W	5.0	144.9	102	0.71
		(AVG AV)	4.01		(AVG TSR)	0.93
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	W	5.1	146.0	73	0.58
		D	5.3	145.7	126	
		D	5.1	145.9	145	
		W	4.9	146.2	91	0.63
		W	2.8	149.6	136	1.08
		D	3.3	148.7	126	
		D	5.9	144.8	115	
		W	6.0	144.6	67	0.58
		(AVG AV)	4.80		(AVG TSR)	0.72
	HIGH AIR VOIDS SECTION	W	3.2	148.9	129	1.13
		D	3.5	148.5	114	
		D	3.2	148.9	90	
		W	3.0	149.2	116	1.29
		W	2.8	149.5	126	1.20
		D	3.0	149.2	105	
		D	3.5	148.4	97	
		W	3.7	148.1	108	1.11
		(AVG AV)	3.25		(AVG TSR)	1.18

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-3 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.4	148.3	112	
		W	1.6	149.6	149	1.33
		W	4.2	145.6	145	0.81
		D	4.9	144.5	180	
		D	3.1	147.3	160	
		W	2.3	148.6	130	0.81
		W	1.7	149.4	139	0.82
		D	1.9	149.2	169	
		(AVG AV)	2.77		(AVG TSR)	0.94
	HIGH AIR VOIDS SECTION	D	1.2	150.2	200	
		W	2.2	148.6	132	0.66
		W	2.2	148.7	117	0.70
		D	2.3	148.5	169	
		D	3.2	147.1	154	
		W	3.8	146.3	102	0.67
		W	3.4	146.8	161	0.90
		D	3.3	147.1	179	
		(AVG AV)	2.69		(AVG TSR)	0.73
LIME SLURRY	LOW AIR VOIDS SECTION	D	1.6	149.8	111	
		W	1.5	149.9	141	1.27
		W	2.3	148.8	114	0.94
		D	2.7	148.1	121	
		D	2.1	149.0	176	
		W	2.0	149.1	195	1.11
		(AVG AV)	2.02		(AVG TSR)	1.11
	HIGH AIR VOIDS SECTION	W	2.5	148.5	177	0.93
		D	2.4	148.5	191	
		D	2.0	149.1	155	
		W	1.8	149.5	N/A	N/A
		W	2.8	147.9	164	0.79
		D	2.8	148.0	208	
		(AVG AV)	2.38		(AVG TSR)	0.86

TABLE C-3 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.0	147.8	222	
		W	2.7	148.4	195	0.88
	LOW	W	3.9	146.5	183	0.94
	AIR	D	3.7	146.8	193	
	VOIDS	D	2.1	149.2	187	
	SECTION	W	2.2	149.0	169	0.90
		W	2.0	149.4	178	1.13
		D	2.5	148.6	158	
		(AVG AV)	2.76		(AVG TSR)	0.96
BA 2000						
		D	3.2	147.6	175	
		W	2.5	148.6	164	0.94
	HIGH	W	4.8	145.2	148	0.94
	AIR	D	4.8	145.1	156	
	VOIDS	D	4.5	145.6	176	
	SECTION	W	4.4	145.8	176	1.00
		W	5.0	144.9	174	0.78
		D	4.6	145.5	222	
		(AVG AV)	4.20		(AVG TSR)	0.92
		D	4.4	147.0	129	
		W	4.3	147.2	82	0.64
	LOW	W	4.3	147.1	130	0.72
	AIR	D	3.4	148.6	181	
	VOIDS	D	3.9	147.9	107	
	SECTION	W	4.0	147.6	102	0.95
		W	6.3	144.1	63	0.54
		D	5.5	145.4	117	
		(AVG AV)	4.52		(AVG TSR)	0.71
PERMA-TAC PLUS						
		D	5.3	145.7	97	
		W	4.1	147.5	111	1.14
	HIGH	W	4.0	147.7	107	1.11
	AIR	D	4.3	147.2	97	
	VOIDS	D	3.4	148.5	91	
	SECTION	W	3.7	148.2	110	1.21
		W	4.6	146.8	105	1.14
		D	4.4	147.1	92	
		(AVG AV)	4.21		(AVG TSR)	1.15

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-4 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	1.2	150.1	91	
		W	1.4	149.8	96	1.06
	LOW	W	2.8	147.8	173	1.11
	AIR	D	3.2	147.2	156	
	VOIDS	D	2.1	148.8	144	
	SECTION	W	1.7	149.4	100	0.69
		W	2.8	147.7	125	0.78
		D	2.8	147.7	160	
NO		(AVG AV)	2.26		(AVG TSR)	0.91
ADDITIVE						
(CONTROL)		D	1.3	150.0	122	
		W	1.5	149.8	129	1.06
	HIGH	W	2.0	148.9	133	0.89
	AIR	D	2.3	148.5	149	
	VOIDS	D	3.3	147.0	148	
	SECTION	W	3.8	146.2	106	0.71
		W	3.7	146.4	171	1.15
		D	3.7	146.3	148	
		(AVG AV)	2.72		(AVG TSR)	0.96
		D	1.7	149.6	114	
	LOW	W	1.5	149.9	142	1.25
	AIR	W	1.3	150.2	123	1.17
	VOIDS	D	1.5	149.9	105	
	SECTION	D	1.4	150.1	149	
		W	1.2	150.3	150	1.00
LIME		(AVG AV)	1.44		(AVG TSR)	1.14
SLURRY						
		W	2.1	149.0	174	1.09
	HIGH	D	2.4	148.6	160	
	AIR	D	1.9	149.3	119	
	VOIDS	W	1.6	149.7	141	1.18
	SECTION	W	2.9	147.7	174	1.08
		D	2.8	148.0	161	
		(AVG AV)	2.29		(AVG TSR)	1.12

TABLE C-4 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	D	3.4	147.2	177	
		W	3.8	146.6	173	0.98
		W	3.5	147.1	179	1.07
		D	4.4	145.8	168	
		D	2.4	148.7	194	
		W	2.3	148.9	180	0.93
		W	2.1	149.2	175	0.99
		D	2.2	149.1	177	
		(AVG AV)	3.04		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	D	2.6	148.4	138	
		W	2.1	149.2	180	1.30
		W	2.7	148.3	174	1.22
		D	2.9	148.0	143	
		D	4.7	145.3	121	
		W	4.0	146.3	145	1.20
		W	2.3	149.0	200	1.18
		D	2.5	148.6	169	
		(AVG AV)	2.98		(AVG TSR)	1.23
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	4.3	147.3	97	
		W	3.4	148.6	113	1.16
		W	4.2	147.4	112	0.74
		D	4.7	146.6	152	
		D	3.0	149.2	110	
		W	3.9	147.8	148	1.35
		W	5.2	145.7	70	0.56
		D	4.7	146.5	125	
		(AVG AV)	4.19		(AVG TSR)	0.95
	HIGH AIR VOIDS SECTION	D	4.2	147.4	94	
		W	3.9	147.8	106	1.12
		W	3.7	148.1	99	1.19
		D	3.6	148.2	83	
		D	3.0	149.2	99	
		W	4.1	147.5	155	1.57
		W	4.0	147.7	130	0.80
		D	2.6	149.8	163	
		(AVG AV)	3.64		(AVG TSR)	1.17

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-5 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 36 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.9	147.6	133	
		W	3.2	147.2	153	1.15
		W	2.9	147.5	131	0.82
		D	2.8	147.7	160	
		D	2.1	148.9	151	
		W	3.3	146.9	141	0.94
		W	1.7	149.4	172	0.83
		D	1.5	149.7	206	
		(AVG AV)	2.55		(AVG TSR)	0.93
	HIGH AIR VOIDS SECTION	D	2.2	148.6	146	
		W	2.3	148.5	128	0.87
		W	2.3	148.5	154	0.94
		D	2.0	149.0	164	
		D	2.8	147.7	203	
		W	2.6	148.0	160	0.79
		W	4.2	145.6	158	0.82
		D	3.4	146.9	192	
		(AVG AV)	2.73		(AVG TSR)	0.85
LIME SLURRY	LOW AIR VOIDS SECTION	D	0.8	150.9	144	
		W	1.2	150.4	125	0.87
		W	0.9	150.8	141	0.98
		D	1.1	150.5	143	
		D	1.0	150.6	179	
		W	1.2	150.4	164	0.91
		(AVG AV)	1.06		(AVG TSR)	0.92
	HIGH AIR VOIDS SECTION	W	1.9	149.3	188	0.86
		D	1.7	149.5	219	
		D	1.2	150.3	151	
		W	1.1	150.5	151	1.00
		W	2.6	148.3	193	0.90
		D	2.5	148.5	215	
		(AVG AV)	1.84		(AVG TSR)	0.92

TABLE C-5 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	4.0	146.3	200	
		W	3.8	146.6	165	0.82
	LOW	W	3.2	147.6	190	0.88
	AIR	D	2.7	148.3	216	
	VOIDS	D	2.4	148.8	198	
	SECTION	W	2.6	148.4	178	0.90
		W	3.5	147.2	145	0.73
		D	2.9	148.0	200	
		(AVG AV)	3.13		(AVG TSR)	0.83
BA 2000						
		D	5.3	144.3	171	
		W	3.4	147.2	169	0.99
	HIGH	W	5.3	144.4	100	0.56
	AIR	D	5.8	143.6	180	
	VOIDS	D	5.3	144.4	182	
	SECTION	W	3.9	146.6	155	0.85
		W	3.3	147.3	193	0.83
		D	2.7	148.3	233	
		(AVG AV)	4.38		(AVG TSR)	0.81
		D	3.4	148.6	198	
		W	3.6	148.3	125	0.63
	LOW	W	3.1	149.1	147	0.68
	AIR	D	2.8	149.6	216	
	VOIDS	D	4.6	146.8	124	
	SECTION	W	3.2	148.8	116	0.93
		W	4.8	146.5	89	0.55
		D	5.2	145.8	162	
		(AVG AV)	3.82		(AVG TSR)	0.70
PERMA-TAC PLUS						
		D	3.1	149.0	126	
		W	3.4	148.5	131	1.04
	HIGH	W	2.9	149.3	101	0.95
	AIR	D	3.3	148.8	106	
	VOIDS	D	2.7	149.7	112	
	SECTION	W	2.8	149.5	104	0.93
		W	3.5	148.5	113	1.08
		D	3.2	148.9	105	
		(AVG AV)	3.11		(AVG TSR)	1.00

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-6 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 17
PAVEMENT AGE = 48 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	2.2	148.7	104.3	
		W	3.4	146.8	129.3	1.24
	LOW	W	6.9	141.4	102.8	0.59
	AIR	D	7.5	140.6	172.7	
	VOIDS	W	2.9	147.7	151.4	0.92
	SECTION	D	2.1	148.8	165.3	
		W	1.9	149.1	157.0	0.83
		D	1.3	150.1	188.5	
NO		(AVG AV)	3.52		(AVG TSR)	0.90
ADDITIVE						
(CONTROL)		D	1.6	149.6	133.9	
		W	2.0	149.0	144.4	1.08
	HIGH	W	1.8	149.3	143.5	0.88
	AIR	D	1.5	149.7	162.3	
	VOIDS	D	2.4	148.4	194.0	
	SECTION	W	2.7	147.9	170.5	0.88
		W	3.3	147.0	163.2	0.88
		D	3.3	147.0	185.5	
		(AVG AV)	2.32		(AVG TSR)	0.93
		D	1.0	150.7	151.7	
	LOW	W	1.1	150.5	199.7	1.32
	AIR	W	1.8	149.4	160.1	1.16
	VOIDS	D	1.2	150.4	137.6	
	SECTION	W	1.6	149.7	171.1	1.04
		D	1.7	149.5	164.3	
LIME		(AVG AV)	1.41		(AVG TSR)	1.17
SLURRY						
		W	1.8	149.4	252.1	1.20
	HIGH	D	1.3	150.2	210.7	
	AIR	W	1.7	149.6	175.1	1.10
	VOIDS	D	1.7	149.6	159.3	
	SECTION	W	2.3	148.6	203.1	1.01
		D	2.3	148.7	201.2	
		(AVG AV)	1.87		(AVG TSR)	1.10

TABLE C-6 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	D	N/A	N/A	N/A	
		W	3.5	147.1	195.1	N/A
		D	2.9	148.0	207.1	
		W	3.2	147.5	209.2	1.01
		W	4.6	145.4	199.1	0.95
		D	2.9	148.1	209.1	
		D	2.7	148.3	189.1	
		W	4.6	145.4	189.0	1.00
		(AVG AV)	3.50		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	D	3.3	147.3	156.7	
		W	5.7	143.8	171.3	1.09
		W	3.9	146.4	162.2	0.81
		D	3.6	146.9	199.1	
		W	3.5	147.0	158.8	0.88
		D	3.3	147.5	179.5	
		W	4.2	146.1	118.2	0.64
		D	4.2	146.0	184.9	
		(AVG AV)	3.97		(AVG TSR)	0.86
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	W	3.9	147.9	153.4	0.83
		D	3.8	148.0	185.2	
		D	3.2	148.8	196.9	
		W	4.2	147.3	153.6	0.78
		W	5.4	145.5	124.3	1.06
		D	3.1	149.0	117.8	
		W	5.7	145.0	91.7	0.55
		D	5.3	145.6	167.4	
		(AVG AV)	4.33		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	D	4.0	147.7	126.3	
		W	4.3	147.2	132.1	1.05
		W	3.1	149.1	145.3	1.20
		D	2.7	149.6	120.8	
		W	4.0	147.7	124.5	1.09
		D	3.4	148.6	114.6	
		W	3.5	148.4	123.8	1.06
		D	3.0	149.2	117.2	
		(AVG AV)	3.51		(AVG TSR)	1.10

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-7 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 16
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		WET	10.1	135.9	47.2	0.54
	LOW	DRY	9.8	136.5	87.1	
	AIR	DRY	9.3	137.1	86.3	
	VOIDS	WET	8.8	137.9	69.5	0.80
	SECTION	WET	10.2	135.8	60.5	0.64
		DRY	9.4	137.1	93.8	
NO		(AVG AV)	9.6		(AVG TSR)	0.66
ADDITIVE						
(CONTROL)		DRY	10.7	135.0	85.7	
	HIGH	WET	10.5	135.3	61.7	0.72
	AIR	WET	9.2	137.3	67.9	0.63
	VOIDS	DRY	9.2	137.4	107.9	
	SECTION	DRY	9.0	137.7	108.1	
		WET	8.6	138.3	83.7	0.77
		(AVG AV)	9.5		(AVG TSR)	0.71
		WET	8.8	137.7	89.0	0.85
	LOW	DRY	9.2	137.1	105.1	
	AIR	DRY	7.8	139.2	115.9	
	VOIDS	WET	8.0	138.9	90.0	0.78
	SECTION	WET	8.9	137.4	96.5	0.95
		DRY	8.9	137.5	101.2	
LIME		(AVG AV)	8.6		(AVG TSR)	0.86
SLURRY						
		DRY	8.6	137.9	101.9	
	HIGH	WET	8.0	138.9	102.0	1.00
	AIR	WET	9.4	136.7	83.8	0.88
	VOIDS	DRY	9.6	136.5	95.6	
	SECTION	DRY	8.3	138.3	110.1	
		WET	8.1	138.6	102.0	0.93
		(AVG AV)	8.7		(AVG TSR)	0.93

TABLE C-7 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUA-SHIELD	LOW AIR VOIDS SECTION	WET	11.3	136.1	59.2	0.58
		DRY	10.3	137.7	102.3	
		DRY	8.9	139.8	118.9	
		WET	9.2	139.3	93.1	0.78
		WET	11.1	136.4	71.9	0.91
		DRY	12.9	133.7	79.1	
		(AVG AV)	10.6		(AVG TSR)	0.76
	HIGH AIR VOIDS SECTION	DRY	12.3	134.6	82.5	
		WET	10.8	136.9	82.4	1.00
		WET	9.7	138.5	88.3	0.78
		DRY	10.3	137.6	112.8	
		DRY	7.9	141.3	135.0	
		WET	8.0	141.2	98.4	0.73
		(AVG AV)	9.8		(AVG TSR)	0.84
DOW ANTI-STRIP	LOW AIR VOIDS SECTION	WET	8.6	138.3	80.1	0.86
		DRY	9.0	137.8	93.5	
		DRY	9.1	137.6	112.2	
		WET	8.8	138.1	66.4	0.59
		WET	8.4	138.7	87.0	0.85
		DRY	8.6	138.4	102.9	
		(AVG AV)	8.7		(AVG TSR)	0.76
	HIGH AIR VOIDS SECTION	DRY	9.2	137.5	101.2	
		WET	9.4	137.2	66.0	0.65
		WET	9.2	137.4	63.7	0.56
		DRY	9.0	137.8	114.5	
		DRY	10.2	135.9	95.5	
		WET	10.4	135.7	64.8	0.68
		(AVG AV)	9.6		(AVG TSR)	0.63

TABLE C-7 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		WET	10.8	135.7	71.6	0.77
	LOW	DRY	10.8	135.7	92.9	
	AIR	DRY	11.3	135.0	88.6	
	VOIDS	WET	11.1	135.2	74.8	0.84
	SECTION	WET	10.2	136.6	83.6	0.94
		DRY	10.8	135.7	88.9	
PAVEBOND LP		(AVG AV)	10.8		(AVG TSR)	0.85
		DRY	10.2	136.6	101.6	
	HIGH	WET	10.6	136.1	75.5	0.74
	AIR	WET	9.2	138.1	78.8	0.65
	VOIDS	DRY	8.8	138.7	122.2	
	SECTION	DRY	10.7	135.8	86.4	
		WET	11.6	134.4	58.7	0.68
		(AVG AV)	10.2		(AVG TSR)	0.69

TABLE C-8 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 16
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	WET	7.2	140.3	99.6	0.71
		DRY	6.8	140.9	139.6	
		DRY	6.5	141.4	148.3	
		WET	6.7	141.1	113.7	0.77
		WET	6.3	141.7	115.8	0.76
		DRY	6.9	140.9	151.5	
		(AVG AV)	6.7		(AVG TSR)	0.75
	HIGH AIR VOIDS SECTION	DRY	6.8	141.0	142.7	
		WET	6.8	140.9	107.8	0.75
		WET	6.1	142.0	115.1	0.78
		DRY	6.1	142.0	147.2	
		DRY	6.7	141.1	152.2	
		WET	6.4	141.6	119.3	0.78
		(AVG AV)	6.5		(AVG TSR)	0.77
LIME SLURRY	LOW AIR VOIDS SECTION	WET	5.9	142.0	103.5	0.67
		DRY	6.1	141.6	154.5	
		DRY	5.4	142.7	170.0	
		WET	5.6	142.4	136.6	0.80
		WET	6.9	140.5	133.1	0.88
		DRY	6.4	141.2	151.5	
		(AVG AV)	6.1		(AVG TSR)	0.78
	HIGH AIR VOIDS SECTION	DRY	5.7	143.7	160.8	
		WET	6.2	141.5	125.7	0.78
		WET	6.6	141.0	128.4	0.86
		DRY	6.1	141.7	149.1	
		DRY	5.9	141.9	162.6	
		WET	5.4	142.7	155.9	0.96
		(AVG AV)	6.0		(AVG TSR)	0.87

TABLE C-8 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUA-SHIELD	LOW AIR VOIDS SECTION	WET	9.0	139.6	102.3	0.71
		DRY	9.5	138.8	144.0	
		DRY	7.3	142.3	155.4	
		WET	6.9	142.9	139.9	0.90
		WET	9.2	139.4	107.4	0.86
		DRY	9.8	138.4	124.6	
		(AVG AV)	8.6		(AVG TSR)	0.82
	HIGH AIR VOIDS SECTION	DRY	8.0	141.2	149.7	
		WET	8.2	140.9	124.6	0.83
		WET	8.1	141.0	125.5	0.86
		DRY	8.9	139.8	145.3	
		DRY	6.4	143.7	169.9	
		WET	6.9	142.9	127.1	0.75
		(AVG AV)	7.7		(AVG TSR)	0.81
DOW ANTI-STRIP	LOW AIR VOIDS SECTION	WET	7.9	139.5	102.9	0.71
		DRY	7.2	140.6	145.5	
		DRY	7.7	139.8	130.3	
		WET	7.0	140.8	104.5	0.80
		WET	7.6	139.8	107.9	0.72
		DRY	7.4	140.3	149.7	
		(AVG AV)	7.5		(AVG TSR)	0.74
	HIGH AIR VOIDS SECTION	DRY	8.3	138.9	131.4	
		WET	7.8	139.6	98.8	0.75
		WET	7.7	139.8	109.1	0.76
		DRY	7.5	140.1	144.3	
		DRY	8.5	138.6	132.5	
		WET	9.0	137.8	90.0	0.68
		(AVG AV)	8.1		(AVG TSR)	0.73

TABLE C-8 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		WET	7.6	140.6	125.3	0.96
	LOW	DRY	7.9	140.2	130.1	
	AIR	DRY	7.7	138.0	129.0	
	VOIDS	WET	7.7	140.4	126.4	0.98
	SECTION	WET	7.7	140.4	119.2	0.79
		DRY	7.4	140.9	151.8	
PAVEBOND LP		(AVG AV)	7.7		(AVG TSR)	0.91
		DRY	6.3	142.5	155.0	
	HIGH	WET	7.0	141.5	123.7	0.80
	AIR	WET	6.3	142.5	138.5	0.91
	VOIDS	DRY	6.4	142.3	151.5	
	SECTION	DRY	8.4	139.3	131.6	
		WET	8.2	139.7	112.0	0.85
		(AVG AV)	7.1		(AVG TSR)	0.85

TABLE C-9 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 16
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	6.0	142.2	131.4	
	LOW	W	4.7	144.1	153.2	1.17
	AIR	W	5.2	143.5	74.9	0.57
	VOIDS	D	5.0	143.6	131.3	
	SECTION	W	5.2	143.4	91.6	0.48
		D	5.8	142.5	189.9	
NO		(AVG AV)	5.3		(AVG TSR)	0.74
ADDITIVE (CONTROL)		W	4.9	143.8	166.8	0.80
	HIGH	D	5.7	142.6	208.8	
	AIR	D	3.9	145.4	167.6	
	VOIDS	W	5.1	143.6	110.9	0.66
	SECTION	W	5.8	142.6	123.2	0.71
		D	5.3	143.2	173.0	
		(AVG AV)	5.1		(AVG TSR)	0.72
		D	4.1	144.7	214.8	
	LOW	W	5.1	143.2	183.2	0.85
	AIR	W	4.5	144.1	160.5	0.75
	VOIDS	D	4.2	144.5	213.6	
	SECTION	D	5.1	143.2	226.0	
		W	5.8	142.2	146.1	0.65
LIME		(AVG AV)	4.8		(AVG TSR)	0.75
SLURRY		W	3.3	145.9	210.2	1.12
	HIGH	D	3.6	145.5	188.3	
	AIR	D	4.8	143.7	162.6	
	VOIDS	W	5.2	143.0	143.9	0.88
	SECTION	W	4.1	144.7	193.3	0.94
		D	4.9	143.5	206.0	
		(AVG AV)	4.3		(AVG TSR)	0.98

TABLE C-9 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUA-SHIELD	LOW AIR VOIDS SECTION	D	7.7	141.5	152.5	
		W	7.0	142.6	123.6	0.81
		W	7.0	142.7	142.4	0.85
		D	7.6	141.7	167.1	
		D	8.6	140.2	146.1	
		W	6.4	143.5	122.5	0.84
		(AVG AV)	7.4		(AVG TSR)	0.83
	HIGH AIR VOIDS SECTION	W	6.7	143.1	134.6	0.74
		D	6.3	143.8	181.1	
		D	6.9	142.7	187.7	
		W	6.7	143.1	153.1	0.82
		W	5.5	144.9	149.0	0.71
		D	5.8	144.5	210.6	
		(AVG AV)	6.3		(AVG TSR)	0.76
DOW ANTI-STRIP	LOW AIR VOIDS SECTION	D	5.8	142.6	185.2	
		W	6.2	142.0	142.8	0.77
		D	5.9	142.5	175.8	
		W	5.9	142.4	127.4	0.73
		D	7.5	140.1	154.4	
		W	7.1	140.6	126.9	0.82
		(AVG AV)	6.4		(AVG TSR)	0.77
	HIGH AIR VOIDS SECTION	W	5.6	143.0	168.4	0.85
		D	6.0	142.4	197.9	
		D	5.7	142.7	204.2	
		W	5.8	142.6	153.2	0.75
		W	6.8	141.1	102.8	0.60
		D	7.5	140.1	171.9	
		(AVG AV)	6.2		(AVG TSR)	0.73

TABLE C-9 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	7.3	141.0	114.3	
	LOW	W	5.8	143.3	161.4	1.41
	AIR	W	5.6	143.7	129.8	0.71
	VOIDS	D	6.0	143.0	183.6	
	SECTION	D	6.1	142.9	190.7	
		W	6.2	142.8	114.1	0.60
PAVEBOND LP		(AVG AV)	6.2		(AVG TSR)	0.91
		W	5.5	143.7	118.1	0.76
	HIGH	D	4.9	144.7	154.7	
	AIR	D	6.8	141.7	194.4	
	VOIDS	W	7.1	141.4	161.7	0.83
	SECTION	W	6.5	142.3	116.9	0.79
		D	6.8	141.8	148.3	
		(AVG AV)	6.3		(AVG TSR)	0.79

TABLE C-10 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 16
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	4.0	145.2	216	
	LOW	W	3.6	145.9	218	1.01
	AIR	W	4.4	144.7	153	0.90
	VOIDS	D	4.5	144.4	169	
	SECTION	D	2.6	147.3	153	
		W	3.4	146.1	134	0.88
NO		(AVG AV)	3.8		(AVG TSR)	0.93
ADDITIVE						
(CONTROL)		W	5.5	142.9	163	0.70
	HIGH	D	4.9	143.9	231	
	AIR	D	3.0	146.7	197	
	VOIDS	W	3.0	146.8	218	1.11
	SECTION	W	5.5	142.9	151	0.63
		D	4.6	144.4	239	
		(AVG AV)	4.4		(AVG TSR)	0.81
		D	4.8	143.7	190	
	LOW	W	5.0	143.4	190	1.00
	AIR	W	3.7	145.3	161	0.87
	VOIDS	D	3.6	145.4	184	
	SECTION	D	4.2	144.5	251	
		W	4.5	144.1	212	0.85
LIME		(AVG AV)	4.3		(AVG TSR)	0.91
SLURRY						
		W	2.0	147.8	242	1.03
	HIGH	D	2.3	147.5	236	
	AIR	D	3.6	145.5	184	
	VOIDS	W	3.7	145.3	185	1.00
	SECTION	W	3.3	145.9	252	0.99
		D	3.4	145.7	254	
		(AVG AV)	3.1		(AVG TSR)	1.01

TABLE C-10 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUA-SHIELD	LOW AIR VOIDS SECTION	D	6.7	143.1	142	
		W	6.5	143.4	84	0.60
		W	5.4	145.1	181	0.73
		D	4.8	146.0	247	
		D	7.0	142.7	164	
		W	6.1	144.1	90	0.55
		(AVG AV)	6.1		(AVG TSR)	0.63
	HIGH AIR VOIDS SECTION	W	5.3	145.3	213	1.11
		D	5.9	144.4	192	
		D	6.2	143.8	196	
		W	6.4	143.5	186	0.95
		W	4.9	145.8	258	1.04
		D	4.7	146.2	248	
		(AVG AV)	5.6		(AVG TSR)	1.03
DOW ANTI-STRIP	LOW AIR VOIDS SECTION	D	6.0	142.3	220	
		W	6.9	141.0	129	0.59
		W	5.2	143.5	178	0.85
		D	5.8	142.6	209	
		D	7.1	140.7	174	
		W	6.8	141.1	126	0.73
		(AVG AV)	6.3		(AVG TSR)	0.72
	HIGH AIR VOIDS SECTION	W	5.6	142.9	167	0.81
		D	5.4	143.3	205	
		D	5.8	142.6	215	
		W	6.3	141.9	151	0.70
		W	6.3	141.8	159	0.88
		D	5.8	142.6	180	
		(AVG AV)	5.9		(AVG TSR)	0.80

TABLE C-10 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
	LOW AIR VOIDS SECTION	D	6.2	142.7	201	
		W	5.2	144.2	203	1.01
		W	5.8	143.4	172	0.75
		D	6.1	142.9	229	
		D	5.9	143.2	213	
		W	5.6	143.5	103	0.49
PAVEBOND LP		(AVG AV)	5.8		(AVG TSR)	0.75
	HIGH AIR VOIDS SECTION	W	3.4	147.0	100	0.65
		D	3.7	146.4	153	
		D	3.4	147.0	176	
		W	3.5	146.8	122	0.69
		W	5.6	143.6	104	0.55
		D	5.8	143.3	190	
		(AVG AV)	4.2		(AVG TSR)	0.63

TABLE C-11 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 16
PAVEMENT AGE = 36 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.7	147.2	218	
		W	3.5	146.0	162	0.74
		W	4.4	144.7	117	0.64
		D	4.2	145.0	182	
		D	3.5	146.0	267	
		W	3.2	146.5	169	0.63
		(AVG AV)	3.6		(AVG TSR)	0.67
	HIGH AIR VOIDS SECTION	W	4.2	144.9	123	0.48
		D	3.8	145.5	258	
		D	2.7	147.2	260	
		W	2.9	146.9	198	0.76
		W	4.0	145.2	125	0.42
		D	4.3	144.8	296	
		(AVG AV)	3.6		(AVG TSR)	0.55
LIME SLURRY	LOW AIR VOIDS SECTION	D	4.3	144.3	143	
		W	4.6	144.0	N/A	N/A
		W	2.9	146.5	169	0.72
		D	2.6	147.0	235	
		D	3.3	145.9	247	
		W	3.8	145.1	202	0.82
		(AVG AV)	3.6		(AVG TSR)	0.77
	HIGH AIR VOIDS SECTION	W	2.0	147.8	283	1.02
		D	2.0	147.9	277	
		D	3.8	145.1	288	
		W	3.1	146.3	241	0.83
		W	3.0	146.3	292	0.88
		D	2.7	146.7	330	
		(AVG AV)	2.8		(AVG TSR)	0.91

TABLE C-11 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	6.0	144.2	164	
	LOW	W	7.0	142.7	99	0.60
	AIR	W	4.7	146.2	277	1.03
	VOIDS	D	4.7	146.2	268	
	SECTION	D	6.0	144.2	241	
		W	5.1	145.6	100	0.41
AQUA-SHIELD		(AVG AV)	5.6		(AVG TSR)	0.68
		W	4.1	147.1	295	1.14
	HIGH	D	4.3	146.8	260	
	AIR	D	5.3	145.2	261	
	VOIDS	W	5.2	145.4	194	0.74
	SECTION	W	4.6	146.3	270	0.89
		D	4.5	146.5	302	
		(AVG AV)	4.7		(AVG TSR)	0.92
		D	5.2	143.5	218	
	LOW	W	5.7	142.8	127	0.58
	AIR	W	4.2	145.1	261	1.11
	VOIDS	D	4.5	144.5	236	
	SECTION	D	5.6	142.9	202	
		W	6.6	141.4	172	0.85
DOW ANTI-STRIP		(AVG AV)	5.3		(AVG TSR)	0.85
		W	5.2	143.5	257	1.01
	HIGH	D	5.9	142.4	254	
	AIR	D	6.0	142.3	206	
	VOIDS	W	5.2	143.4	112	0.54
	SECTION	W	6.6	141.5	161	0.61
		D	6.7	141.2	263	
		(AVG AV)	5.9		(AVG TSR)	0.72

TABLE 2-4 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	5.2	144.2	226	
		W	5.4	143.9	220	0.97
		W	5.7	143.4	194	0.81
		D	6.1	142.8	239	
		D	5.4	143.9	215	
		W	5.9	143.1	79	0.37
		(AVG AV)	5.6		(AVG TSR)	0.72
	HIGH AIR VOIDS SECTION	W	3.1	147.3	146	0.65
		D	2.8	147.9	224	
		D	3.5	146.8	290	
		W	3.2	147.2	131	0.45
		W	5.7	143.5	152	0.58
		D	5.2	144.2	260	
		(AVG AV)	3.9		(AVG TSR)	0.56

TABLE C-12 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 13
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		DRY	5.5	143.8	95.1	
	LOW	WET	5.4	143.9	74.7	0.79
	AIR	WET	6.5	142.2	75.7	0.87
	VOIDS	DRY	6.4	142.3	87.4	
	SECTION	DRY	4.7	144.9	91.5	
		WET	4.9	144.6	86.7	0.95
NO		(AVG AV)	5.6		(AVG TSR)	0.90
ADDITIVE						
(CONTROL)		WET	6.1	142.9	63.0	0.75
	HIGH	DRY	6.4	142.4	84.1	
	AIR	DRY	7.2	141.2	73.2	
	VOIDS	WET	5.7	143.4	80.1	1.09
	SECTION	WET	7.7	140.4	56.7	0.62
		DRY	4.2	145.7	91.2	
		(AVG AV)	6.2		(AVG TSR)	1.08
		DRY	4.4	145.1	91.7	
	LOW	WET	9.6	137.1	52.7	0.58
	AIR	WET	4.4	145.0	93.4	0.99
	VOIDS	DRY	4.4	145.1	94.7	
	SECTION	DRY	4.2	145.3	93.3	
		WET	6.1	142.4	85.1	0.91
LIME		(AVG AV)	5.5		(AVG TSR)	0.82
SLURRY						
	HIGH	WET	6.7	141.6	81.5	1.02
	AIR	DRY	6.4	141.9	80.0	
	VOIDS	DRY	3.9	145.8	87.8	
	SECTION	WET	3.7	146.1	98.3	1.12
		(AVG AV)	5.2		(AVG TSR)	1.07
		DRY	4.4	145.3	99.9	
	LOW	WET	5.6	143.4	77.0	0.77

TABLE C-12 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	AIR VOIDS SECTION	WET	4.8	144.7	94.0	1.12
		DRY	6.8	141.7	84.0	
		DRY	6.0	142.8	93.4	
		WET	7.3	140.9	82.7	0.89
		(AVG AV)	5.8		(AVG TSR)	0.93
	HIGH AIR VOIDS SECTION	WET	7.5	140.6	77.2	0.87
		DRY	5.4	143.8	88.9	
		DRY	5.8	143.1	84.2	
		WET	6.7	141.8	75.9	0.90
		WET	6.2	142.5	76.8	0.87
		DRY	5.0	144.4	88.0	
		(AVG AV)	6.1		(AVG TSR)	0.88
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	WET	4.9	144.8	95.5	0.94
		DRY	3.3	147.2	102.1	
		DRY	4.7	145.1	101.6	
		WET	3.4	147.1	95.5	0.94
		WET	5.4	144.0	85.2	0.82
		DRY	3.8	146.5	104.3	
		(AVG AV)	4.3		(AVG TSR)	0.90
	HIGH AIR VOIDS SECTION	DRY	5.8	143.4	78.9	
		WET	5.6	143.8	86.7	1.10
		WET	5.2	144.4	86.1	1.16
		DRY	5.6	143.8	74.6	
		DRY	4.4	145.6	81.6	
		WET	4.5	145.4	94.1	1.15
		WET	6.7	142.0	73.4	0.88
		DRY	5.9	143.3	83.6	
		DRY	7.1	141.4	70.6	
		WET	4.8	145.0	83.8	1.19
		WET	5.1	144.5	82.9	1.02
		DRY	5.8	143.4	81.4	
		(AVG AV)	5.5		(AVG TSR)	1.08

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-13 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 13
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		WET	3.0	147.6	140.32	
	LOW	DRY	3.9	146.1	N/A	N/A
	AIR	DRY	4.8	144.8	135.71	
	VOIDS	WET	4.2	145.7	119.50	0.88
	SECTION	WET	2.9	147.8	147.52	0.91
		DRY	3.3	147.1	162.62	
NO		(AVG AV)	3.7		(AVG TSR)	0.91
ADDITIVE (CONTROL)		DRY	3.8	146.3	150.77	
	HIGH	WET	4.1	145.9	128.20	0.85
	AIR	WET	3.8	146.4	132.83	0.90
	VOIDS	DRY	3.6	146.7	148.19	
	SECTION	DRY	3.2	147.3	151.13	
		WET	3.4	147.0	144.93	0.96
		(AVG AV)	3.6		(AVG TSR)	0.90
		WET	2.7	147.5	151.59	1.10
	LOW	DRY	3.3	146.7	138.36	
	AIR	DRY	3.3	146.8	137.10	
	VOIDS	WET	3.5	146.4	142.21	1.04
	SECTION	WET	3.9	145.8	156.83	0.99
		DRY	4.3	145.2	158.66	
LIME		(AVG AV)	3.5		(AVG TSR)	1.04
SLURRY		DRY	4.9	144.2	135.06	
	HIGH	WET	4.0	145.7	149.45	1.11
	AIR	WET	2.0	148.7	143.31	1.15
	VOIDS	DRY	2.1	148.4	124.49	
	SECTION	DRY	5.1	143.9	136.78	
		WET	5.0	144.1	122.79	0.90
		(AVG AV)	3.9		(AVG TSR)	1.05
		WET	2.8	147.7	150.08	1.03
	LOW	DRY	2.7	147.8	146.41	

TABLE C-13 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	AIR VOIDS SECTION	DRY	4.5	145.2	148.16	
		WET	4.2	145.5	136.38	0.92
		WET	3.8	146.2	139.12	1.00
		DRY	4.5	145.1	139.71	
		(AVG AV)	3.8		(AVG TSR)	0.98
	HIGH AIR VOIDS SECTION	DRY	3.4	146.8	146.05	
		WET	3.8	146.2	139.87	0.96
		WET	3.2	147.1	140.61	1.11
		DRY	4.5	145.1	126.43	
		DRY	3.5	146.6	147.27	
		WET	3.8	146.2	141.11	0.96
		(AVG AV)	3.7		(AVG TSR)	1.01
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	WET	1.8	149.5	127.45	0.96
		DRY	2.1	149.0	132.40	
		DRY	2.0	149.2	129.86	
		WET	2.4	148.7	125.03	0.96
		WET	2.3	148.7	123.47	
		DRY	3.8	146.5	N/A	N/A
		(AVG AV)	2.4		(AVG TSR)	0.96
	HIGH AIR VOIDS SECTION	DRY	3.8	146.5	135.30	
		WET	3.1	147.6	145.93	1.08
		WET	2.8	148.0	132.46	1.27
		DRY	3.8	146.5	104.50	
		DRY	3.0	147.7	145.46	
		WET	2.6	148.3	144.69	0.99
		WET	2.7	148.1	140.37	1.02
		DRY	4.4	145.5	138.24	
		DRY	3.4	147.0	142.89	
		WET	3.0	147.6	126.66	0.89
		(AVG AV)	3.3		(AVG TSR)	1.05

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-14 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 13
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.1	148.9	166.6	
		W	1.9	149.2	166.3	1.00
		W	2.7	148.0	167.0	0.88
		D	3.1	147.4	189.5	
		D	1.6	149.7	184.1	
		W	1.7	149.6	202.2	1.10
		(AVG AV)	2.2		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	W	2.9	147.8	163.3	1.09
		D	2.8	147.9	149.8	
		D	2.7	148.0	152.7	
		W	2.7	148.1	132.3	0.87
		W	2.7	148.0	139.6	0.85
		D	2.4	148.5	164.2	
		(AVG AV)	2.7		(AVG TSR)	0.94
LIME SLURRY	LOW AIR VOIDS SECTION	D	2.0	148.7	160.1	
		W	1.9	148.8	202.0	1.26
		W	2.4	148.0	166.7	1.05
		D	2.1	148.5	159.1	
		D	2.3	148.3	195.7	
		W	2.5	148.0	213.4	1.09
		(AVG AV)	2.2		(AVG TSR)	1.13
	HIGH AIR VOIDS SECTION	W	2.6	147.7	201.1	1.15
		D	2.6	147.7	175.4	
		D	1.7	149.2	152.4	
		W	1.5	149.4	172.5	1.13
		W	3.1	147.0	194.9	1.07
		D	3.1	147.0	182.1	
		(AVG AV)	2.4		(AVG TSR)	1.12

TABLE C-14 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	D	1.9	149.1	182.5	
		W	1.7	149.4	217.7	1.19
		W	2.8	147.6	202.2	1.07
		D	2.7	147.8	188.3	
		D	2.4	148.4	184.6	
		W	2.4	148.3	185.9	1.01
		(AVG AV)	2.3		(AVG TSR)	1.09
	HIGH AIR VOIDS SECTION	W	2.4	148.3	204.1	1.32
		D	2.8	147.7	154.5	
		D	2.4	148.2	165.0	
		W	2.9	147.5	197.8	1.20
		W	2.2	148.6	215.8	1.14
		D	2.0	148.9	189.5	
		(AVG AV)	2.5		(AVG TSR)	1.22
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	1.9	149.3	140.7	
		W	1.8	149.5	172.6	1.23
		W	2.1	149.1	154.8	1.22
		D	1.5	149.9	127.0	
		D	1.3	150.2	150.0	
		W	2.0	149.2	158.0	1.05
		(AVG AV)	1.8		(AVG TSR)	1.17
	HIGH AIR VOIDS SECTION	W	2.1	149.0	186.3	1.18
		D	2.3	148.7	157.8	
		D	2.6	148.4	148.3	
		W	3.2	147.4	146.2	0.99
		W	1.8	149.5	161.3	1.11
		D	2.0	149.2	145.5	
		(AVG AV)	2.3		(AVG TSR)	1.09

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-15 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 13
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	1.4	150.0	166.0	
		W	1.7	149.5	196.8	1.19
		W	1.8	149.4	201.1	1.01
		D	2.0	149.2	199.5	
		D	1.7	149.6	164.4	
		W	1.2	150.3	175.9	1.07
		(AVG AV)	1.6		(AVG TSR)	1.09
	HIGH AIR VOIDS SECTION	W	2.3	148.6	128.3	0.81
		D	1.9	149.3	157.8	
		D	2.7	148.1	143.9	
		W	2.2	148.9	122.5	0.85
		W	1.9	149.2	189.5	1.03
		D	2.2	148.7	184.5	
		(AVG AV)	2.2		(AVG TSR)	0.90
LIME SLURRY	LOW AIR VOIDS SECTION	D	1.9	148.8	166.2	
		W	2.0	148.7	207.8	1.25
		W	2.2	148.3	174.4	1.08
		D	2.0	148.7	160.7	
		D	1.7	149.1	186.5	
		W	2.1	148.5	209.5	1.12
		(AVG AV)	2.0		(AVG TSR)	1.15
	HIGH AIR VOIDS SECTION	W	2.0	148.7	206.8	1.27
		D	2.3	148.2	163.3	
		D	1.3	149.6	163.8	
		W	1.3	149.8	174.4	1.06
		W	1.9	148.8	185.0	1.13
		D	2.7	147.6	164.4	
		(AVG AV)	1.9		(AVG TSR)	1.15

TABLE C-15 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	D	1.9	149.1	137.6	
		W	1.5	149.6	183.2	1.33
		W	3.0	147.4	196.2	1.02
		D	2.9	147.5	193.3	
		D	1.6	149.5	204.5	
		W	1.9	149.1	203.3	0.99
		(AVG AV)	2.1		(AVG TSR)	1.11
	HIGH AIR VOIDS SECTION	W	2.1	148.7	219.6	1.18
		D	2.1	148.7	186.2	
		D	2.2	148.7	183.6	
		W	1.9	149.1	189.7	1.03
		W	1.6	149.5	216.9	1.18
		D	2.0	148.9	183.3	
		(AVG AV)	2.0		(AVG TSR)	1.13
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	0.8	151.1	130.9	
		W	1.2	150.4	145.7	1.11
		W	1.2	150.4	158.4	1.10
		D	1.2	150.4	144.1	
		D	1.4	150.1	131.7	
		W	1.3	150.3	139.5	1.06
		(AVG AV)	1.2		(AVG TSR)	1.09
	HIGH AIR VOIDS SECTION	W	1.4	150.2	200.6	1.22
		D	1.4	150.2	164.1	
		D	1.8	149.5	133.4	
		W	1.8	149.5	163.6	1.23
		W	1.1	150.5	136.9	0.91
		D	1.4	150.2	150.2	
		(AVG AV)	1.5		(AVG TSR)	1.12

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-16 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 13
PAVEMENT AGE = 36 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	1.6	149.7	208.7	
	LOW	W	2.1	148.9	114.7	0.55
	AIR	W	1.6	149.6	128.1	0.57
	VOIDS	D	1.6	149.6	224.7	
	SECTION	D	1.4	149.9	206.6	
		W	1.3	150.1	203.9	0.99
NO ADDITIVE (CONTROL)		(AVG AV)	1.6		(AVG TSR)	0.70
		W	2.7	148.0	104.6	0.59
	HIGH	D	2.3	148.7	178.7	
	AIR	D	1.8	149.4	161.1	
	VOIDS	W	2.3	148.7	92.5	0.57
	SECTION	W	2.1	148.9	108.1	0.88
		D	2.5	148.3	123.4	
		(AVG AV)	2.3		(AVG TSR)	0.68
		D	2.7	147.7	170.2	
	LOW	W	2.2	148.4	251.5	1.48
	AIR	W	1.6	149.2	244.0	1.16
	VOIDS	D	2.1	148.5	210.7	
	SECTION	D	1.3	149.7	202.3	
		W	1.7	149.2	250.9	1.24
LIME SLURRY		(AVG AV)	1.9		(AVG TSR)	1.29
		W	1.6	149.3	279.2	1.35
	HIGH	D	1.9	148.9	206.4	
	AIR	D	1.3	149.8	193.5	
	VOIDS	W	1.2	149.8	236.4	1.22
	SECTION	W	1.5	149.5	215.5	1.18
		D	1.8	148.9	182.7	
		(AVG AV)	1.6		(AVG TSR)	1.25

TABLE C-16 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	D	1.9	149.0	191.7	
		W	1.4	149.8	200.7	1.05
		W	1.6	149.5	215.8	0.95
		D	1.4	149.9	228.2	
		D	1.8	149.2	232.3	
		W	1.4	149.7	253.0	1.09
		(AVG AV)	1.6		(AVG TSR)	1.03
	HIGH AIR VOIDS SECTION	W	1.8	149.1	269.1	1.39
		D	2.1	148.7	193.2	
		D	1.9	149.1	213.1	
		W	1.9	149.1	219.8	1.03
		W	1.8	149.3	230.8	0.93
		D	1.4	149.8	249.3	
		(AVG AV)	1.8		(AVG TSR)	1.12
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	1.1	150.6	160.6	
		W	1.3	150.3	135.5	0.84
		W	1.4	150.1	144.4	N/A
		D	N/A	N/A	N/A	
		D	1.8	149.5	169.5	
		W	1.7	149.7	157.6	0.93
		(AVG AV)	1.5		(AVG TSR)	0.89
	HIGH AIR VOIDS SECTION	W	1.6	149.8	187.4	0.90
		D	1.9	149.4	207.4	
		D	2.4	148.6	182.3	
		W	2.2	148.9	154.8	0.85
		W	1.2	150.5	169.1	0.96
		D	1.2	150.4	175.5	
		(AVG AV)	1.8		(AVG TSR)	0.91

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-17 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 6
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	DRY	7.9	134.0	85.0	0.50
		WET	8.5	133.1	42.4	
		WET	8.0	133.9	41.9	
		DRY	9.1	132.3	72.7	0.58
		DRY	7.5	134.7	83.9	0.48
		WET	8.1	133.8	40.2	
		(AVG AV)	8.2		(AVG TSR)	0.52
	HIGH AIR VOIDS SECTION	WET	12.1	128.0	19.0	
		DRY	11.9	128.2	49.4	0.38
		DRY	10.1	130.9	73.0	0.40
		WET	10.1	130.9	29.0	
		WET	11.1	129.5	25.7	
		DRY	11.2	129.2	49.1	0.52
		(AVG AV)	11.1		(AVG TSR)	0.44
LIME SLURRY	LOW AIR VOIDS SECTION	WET	8.0	134.1	39.5	
		DRY	8.2	133.8	85.4	0.46
		DRY	8.8	132.8	66.3	0.63
		WET	8.7	133.1	41.4	
		WET	8.7	133.0	37.1	
		DRY	8.4	133.5	87.9	0.42
		(AVG AV)	8.5		(AVG TSR)	0.50
	HIGH AIR VOIDS SECTION	DRY	10.8	130.0	55.6	0.45
		WET	11.3	129.2	24.9	
		WET	10.9	129.8	25.1	
		DRY	10.9	129.8	61.5	0.41
		DRY	9.9	131.2	64.9	0.45
		WET	10.4	130.5	29.4	
		(AVG AV)	10.7		(AVG TSR)	0.44

TABLE C-17 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		WET	9.7	130.9	36.4	
	LOW	DRY	9.5	131.2	55.0	0.66
	AIR	DRY	9.8	130.7	45.1	0.71
	VOIDS	WET	9.2	131.7	32.2	
	SECTION	WET	8.2	133.1	61.5	
		DRY	8.5	132.6	79.5	0.77
PAVEBOND LP		(AVG AV)	9.2		(AVG TSR)	0.72
		DRY	8.6	132.5	77.2	0.63
	HIGH	WET	8.9	132.0	48.7	
	AIR	WET	12.3	127.1	26.8	
	VOIDS	DRY	12.0	127.6	38.4	0.70
	SECTION	DRY	11.0	129.0	47.3	0.60
		WET	10.5	129.8	28.6	
		(AVG AV)	10.6		(AVG TSR)	0.64
		WET	10.2	130.5	33.2	
	LOW	DRY	11.0	129.5	63.1	0.53
	AIR	DRY	10.0	130.9	63.9	0.53
	VOIDS	WET	10.0	130.9	33.7	
	SECTION	WET	7.6	134.4	54.1	
		DRY	8.5	133.1	73.6	0.74
		(AVG AV)	9.3		(AVG TSR)	0.60
PERMA-TAC						
		DRY	8.1	133.6	77.6	0.69
	HIGH	WET	7.9	134.0	53.2	
	AIR	WET	8.8	132.7	45.0	
	VOIDS	DRY	8.8	132.6	58.2	0.77
	SECTION	DRY	7.2	134.9	93.0	0.56
		WET	6.9	135.5	51.7	
		(AVG AV)	8.0		(AVG TSR)	0.67

TABLE C-17 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
UNICHEM 8150	LOW AIR VOIDS SECTION	DRY	8.7	133.1	75.0	0.74
		WET	9.4	132.0	55.7	
		WET	11.1	129.6	28.7	
		DRY	11.0	129.7	45.4	0.63
		DRY	8.8	132.9	75.4	0.57
		WET	9.8	131.4	43.2	
		(AVG AV)	9.8		(AVG TSR)	0.65
	HIGH AIR VOIDS SECTION	WET	8.2	133.9	57.5	
		DRY	8.0	134.1	82.7	0.70
		DRY	12.2	128.0	60.4	0.53
		WET	11.5	129.0	31.7	
		WET	9.0	132.7	56.0	
		DRY	9.1	132.5	75.4	0.74
		(AVG AV)	9.7		(AVG TSR)	0.65

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-18 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 6
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	DRY	6.0	136.9	136.45	0.65
		WET	7.0	135.4	88.41	
		WET	4.6	138.8	121.65	
		DRY	4.8	138.6	142.36	0.85
		DRY	6.3	136.4	120.02	0.76
		WET	5.8	137.1	91.65	
		(AVG AV)	5.7		(AVG TSR)	0.76
	HIGH AIR VOIDS SECTION	WET	10.3	130.6	52.07	
		DRY	9.8	131.3	106.62	0.49
		DRY	8.7	133.0	106.49	0.69
		WET	8.2	133.7	73.36	
		WET	9.1	132.3	63.95	
		DRY	8.5	133.2	107.93	0.59
		(AVG AV)	9.1		(AVG TSR)	0.59
LIME SLURRY	LOW AIR VOIDS SECTION	WET	5.8	137.2	116.73	
		DRY	5.2	138.1	150.16	0.78
		DRY	4.8	138.7	153.79	0.82
		WET	5.2	138.1	126.46	
		WET	4.8	138.7	128.70	
		DRY	4.2	139.5	160.33	0.80
		(AVG AV)	5.0		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	DRY	9.4	132.0	104.41	0.63
		WET	9.0	132.6	65.27	
		WET	8.3	133.6	71.07	
		DRY	8.3	133.7	110.05	0.65
		DRY	8.3	133.6	115.39	0.59
		WET	8.1	133.8	67.75	
		(AVG AV)	8.6		(AVG TSR)	0.62

TABLE C-18 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	WET	7.2	134.5	97.43	
		DRY	7.4	134.2	114.91	0.85
		DRY	6.6	135.4	110.66	0.83
		WET	7.5	134.0	91.76	
		WET	7.4	134.2	89.95	
		DRY	6.5	135.6	112.04	0.80
		(AVG AV)	7.1		(AVG TSR)	0.83
	HIGH AIR VOIDS SECTION	DRY	7.0	134.8	115.96	0.88
		WET	7.0	134.8	101.48	
		WET	10.3	130.0	50.90	
		DRY	9.6	131.0	101.16	0.50
		DRY	8.5	132.7	52.46	1.42
		WET	8.2	133.0	74.36	
		(AVG AV)	8.4		(AVG TSR)	0.93
PERMA-TAC	LOW AIR VOIDS SECTION	WET	7.2	135.0	108.06	
		DRY	8.0	133.8	106.30	1.02
		DRY	4.9	138.3	145.67	0.87
		WET	5.3	137.8	126.72	
		WET	4.9	138.4	130.75	
		DRY	6.7	135.8	133.02	0.98
		(AVG AV)	6.1		(AVG TSR)	0.96
	HIGH AIR VOIDS SECTION	DRY	5.9	136.8	125.01	0.79
		WET	6.0	136.7	99.26	
		WET	7.2	135.0	93.42	
		DRY	7.4	134.7	104.79	0.89
		DRY	5.2	137.8	132.45	0.84
		WET	4.8	138.5	111.67	
		(AVG AV)	6.1		(AVG TSR)	0.84

TABLE C-2 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
UNICHEM 8150	LOW AIR VOIDS SECTION	DRY	8.7	133.1	105.58	1.19
		WET	6.1	136.9	125.51	
		WET	7.8	134.4	90.81	
		DRY	7.0	135.6	112.33	0.81
		DRY	8.2	133.8	106.85	0.83
		WET	7.9	134.2	89.04	
		(AVG AV)	7.6		(AVG TSR)	0.94
	HIGH AIR VOIDS SECTION	WET	7.7	134.5	96.91	
		DRY	7.8	134.4	119.72	0.81
		DRY	9.2	132.4	99.02	0.74
		WET	9.3	132.2	73.10	
		WET	7.0	135.6	88.66	
		DRY	7.0	135.6	118.58	0.75
		(AVG AV)	8.0		(AVG TSR)	0.77

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-19 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 6
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	W	6.2	136.5	99.2	0.68
		D	6.5	136.1	146.4	
		D	5.1	138.2	165.0	
		W	5.3	137.8	114.2	0.69
		W	4.9	138.5	113.6	0.64
		D	4.5	139.0	176.4	
		(AVG AV)	5.4		(AVG TSR)	0.67
	HIGH AIR VOIDS SECTION	D	5.8	137.1	163.6	
		W	5.6	137.4	154.3	0.94
		W	8.0	134.0	99.5	0.79
		D	7.7	134.4	125.5	
		D	5.4	137.7	145.0	
		W	5.3	137.9	152.7	1.05
		(AVG AV)	6.3		(AVG TSR)	0.93
LIME SLURRY	LOW AIR VOIDS SECTION	D	5.1	138.2	171.9	
		W	5.0	138.4	134.9	0.78
		W	3.9	140.0	156.1	0.82
		D	3.5	140.7	191.5	
		D	4.4	139.3	182.0	
		W	3.5	140.5	171.3	0.94
		(AVG AV)	4.2		(AVG TSR)	0.85
	HIGH AIR VOIDS SECTION	W	4.4	139.3	198.2	1.07
		D	3.5	140.6	185.8	
		D	6.2	136.7	154.7	
		W	6.3	136.5	136.9	0.89
		W	6.8	135.9	128.2	0.93
		D	6.5	136.2	138.5	
		(AVG AV)	5.6		(AVG TSR)	0.96

TABLE C-19 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	4.0	139.2	165.7	
		W	5.2	137.4	118.7	0.72
		W	4.6	138.3	147.4	0.95
		D	4.9	137.8	154.4	
		D	5.5	137.0	154.4	
		W	5.6	136.8	114.6	0.74
		(AVG AV)	5.0		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	W	5.1	137.6	162.5	1.00
		D	5.5	136.9	163.1	
		D	6.4	135.7	154.1	
		W	6.1	136.1	131.1	0.85
		W	7.1	134.7	84.7	1.35
		D	6.2	135.9	62.9	
		(AVG AV)	6.1		(AVG TSR)	1.06
PERMA-TAC	LOW AIR VOIDS SECTION	D	5.9	136.8	161.8	
		W	5.7	137.2	112.4	0.69
		W	3.8	139.9	140.9	0.77
		D	3.6	140.2	183.6	
		D	6.0	136.7	135.1	
		W	5.6	137.3	126.4	0.94
		(AVG AV)	4.9		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	W	6.8	135.5	97.8	0.68
		D	6.7	135.8	142.9	
		D	6.9	135.4	139.9	
		W	6.4	136.2	80.6	0.58
		W	7.4	134.7	72.6	0.55
		D	7.4	134.7	131.9	
		(AVG AV)	6.9		(AVG TSR)	0.60

TABLE C-19 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
UNICHEM 8150	LOW AIR VOIDS SECTION	W	6.2	136.7	111.1	0.69
		D	5.7	137.4	161.3	
		D	5.7	137.5	164.4	
		W	5.9	137.2	115.7	0.70
		W	6.1	136.9	110.2	0.75
		D	6.7	136.0	146.6	
		(AVG AV)	6.1		(AVG TSR)	0.71
	HIGH AIR VOIDS SECTION	D	7.4	135.0	137.3	
		W	7.2	135.3	99.0	0.72
		W	7.2	135.3	124.5	0.85
		D	7.2	135.3	145.9	
		D	8.7	133.0	99.7	
		W	9.1	132.5	49.2	0.49
		(AVG AV)	7.8		(AVG TSR)	0.69

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-20 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 6
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	8.5	133.2	91.7	0.80
	LOW	D	9.7	131.4	114.4	
	AIR	D	7.6	134.6	153.6	
	VOIDS	W	7.9	134.1	99.3	0.65
	SECTION	W	8.1	133.7	61.4	0.44
		D	8.1	133.8	139.7	
NO ADDITIVE (CONTROL)		(AVG AV)	8.3		(AVG TSR)	0.63
		D	9.0	132.5	98.1	
	HIGH	W	7.9	134.0	88.7	0.90
	AIR	W	8.6	129.8	84.6	0.63
	VOIDS	D	8.5	133.2	133.6	
	SECTION	D	9.5	131.7	129.2	
		W	7.8	134.2	115.7	0.90
		(AVG AV)	8.6		(AVG TSR)	0.81
		D	7.5	134.8	158.8	
	LOW	W	7.2	135.2	137.7	0.87
	AIR	W	7.7	134.4	115.9	0.89
	VOIDS	D	9.0	132.6	129.9	
	SECTION	D	6.9	135.7	157.7	
		W	6.4	136.5	174.9	1.11
LIME SLURRY		(AVG AV)	7.4		(AVG TSR)	0.96
		W	4.0	139.9	212.4	1.22
	HIGH	D	4.1	139.7	174.3	
	AIR	D	6.7	136.0	152.8	
	VOIDS	W	7.3	135.1	138.1	0.90
	SECTION	W	6.5	136.2	118.0	1.09
		D	7.9	134.2	108.7	
		(AVG AV)	6.1		(AVG TSR)	1.07

TABLE C-20 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	4.8	138.0	190.0	
		W	4.3	138.7	162.7	0.86
		W	4.8	138.1	147.6	0.78
		D	4.3	138.8	190.5	
		D	3.2	140.4	204.7	
		W	2.2	141.8	204.7	1.00
		(AVG AV)	3.9		(AVG TSR)	0.88
	HIGH AIR VOIDS SECTION	W	7.7	133.7	108.8	0.85
		D	7.7	133.8	127.6	
		D	7.1	134.6	134.6	
		W	7.2	134.5	99.2	0.74
		W	6.2	135.9	141.4	0.80
		D	6.1	136.2	177.4	
		(AVG AV)	7.0		(AVG TSR)	0.80
PERMA-TAC	LOW AIR VOIDS SECTION	D	5.8	137.0	166.1	
		W	5.3	137.8	145.6	0.88
		W	4.6	138.7	167.1	0.94
		D	4.4	139.1	177.3	
		D	4.1	139.5	188.4	
		W	4.3	139.2	179.9	0.95
		(AVG AV)	4.8		(AVG TSR)	0.92
	HIGH AIR VOIDS SECTION	W	6.3	136.3	140.2	0.89
		D	5.9	136.9	156.8	
		D	6.9	135.4	146.9	
		W	6.8	135.5	123.0	0.84
		W	7.1	135.2	98.2	0.74
		D	7.5	134.6	131.8	
		(AVG AV)	6.8		(AVG TSR)	0.83

TABLE C-20 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
UNICHEM 8150	LOW AIR VOIDS SECTION	W	4.7	138.9	175.5	1.18
		D	6.4	136.4	149.0	
		D	6.6	136.1	135.6	
		W	7.0	135.6	115.0	0.85
		W	8.0	134.0	95.2	0.59
		D	5.8	137.4	162.6	
		(AVG AV)	6.4		(AVG TSR)	0.87
	HIGH AIR VOIDS SECTION	D	5.7	137.5	175.7	
		W	5.5	137.7	161.5	0.9[illegible]
		W	4.2	139.6	171.6	0.86
		D	3.8	140.3	200.2	
		D	4.6	139.0	184.4	
		W	4.0	139.9	163.8	0.89
		(AVG AV)	4.6		(AVG TSR)	0.89

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-21 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 6
PAVEMENT AGE = 36 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
	LOW AIR VOIDS SECTION	W	6.0	136.9	176.2	0.92
		D	5.7	137.3	191.5	
		D	7.5	134.6	166.5	
		W	7.4	134.7	133.8	0.80
		W	6.3	136.4	163.8	0.81
		D	6.1	136.7	202.1	
NO ADDITIVE (CONTROL)		(AVG AV)	6.5		(AVG TSR)	0.84
	HIGH AIR VOIDS SECTION	D	7.7	134.3	165.8	
		W	7.4	134.8	147.9	0.89
		W	6.2	136.6	180.5	0.99
		D	7.5	134.7	181.7	
		D	7.9	134.1	150.6	
		W	8.5	133.3	99.5	0.66
		(AVG AV)	7.5		(AVG TSR)	0.85
	LOW AIR VOIDS SECTION	D	8.6	133.2	154.2	
		W	8.4	133.5	92.4	0.60
		W	6.9	135.6	135.4	0.85
		D	7.1	135.3	159.0	
		D	8.5	133.3	148.5	
		W	9.1	132.4	86.5	0.58
LIME SLURRY		(AVG AV)	8.1		(AVG TSR)	0.68
	HIGH AIR VOIDS SECTION	W	6.9	135.6	143.6	0.92
		D	7.4	135.0	156.6	
		D	6.8	135.8	199.9	
		W	7.1	135.4	109.4	0.55
		W	7.3	135.1	127.7	0.72
		D	7.2	135.1	178.3	
		(AVG AV)	7.1		(AVG TSR)	0.73

TABLE C-21 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	4.5	138.5	203.9	
		W	4.8	138.0	158.7	0.78
		W	5.5	137.0	104.7	0.58
		D	5.2	137.5	180.8	
		D	3.7	139.5	230.8	
		W	3.2	140.3	184.0	0.80
		(AVG AV)	4.5		(AVG TSR)	0.72
	HIGH AIR VOIDS SECTION	W	5.1	137.5	175.8	0.95
		D	5.4	137.1	185.2	
		D	5.8	136.5	166.3	
		W	4.3	138.7	101.4	0.61
		W	4.2	138.8	119.2	0.92
		D	6.0	136.2	129.0	
		(AVG AV)	5.2		(AVG TSR)	0.83
PERMA-TAC	LOW AIR VOIDS SECTION	D	5.4	137.6	206.0	
		W	5.8	137.0	146.0	0.71
		W	3.8	140.0	194.9	0.86
		D	3.8	140.0	227.3	
		D	4.0	139.6	202.7	
		W	5.4	137.6	148.2	0.73
		(AVG AV)	4.7		(AVG TSR)	0.77
	HIGH AIR VOIDS SECTION	W	4.9	138.3	179.9	0.90
		D	5.0	138.1	199.5	
		D	6.6	135.8	170.2	
		W	6.3	136.2	131.1	0.77
		W	5.7	137.2	146.8	0.75
		D	6.3	136.3	196.9	
		(AVG AV)	5.8		(AVG TSR)	0.81

TABLE C-21 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	4.7	138.9	195.9	0.95
	LOW	D	4.2	139.6	205.4	
	AIR	D	6.5	136.3	159.6	
	VOIDS	W	5.5	137.7	155.3	0.97
	SECTION	W	6.2	136.7	132.5	0.71
		D	6.1	136.9	185.6	
UNICHEM 8150		(AVG AV)	5.6		(AVG TSR)	0.88
		D	5.7	137.5	199.0	
	HIGH	W	6.3	136.6	126.4	0.63
	AIR	W	6.1	136.8	119.2	0.64
	VOIDS	D	5.7	137.5	187.7	
	SECTION	D	4.8	138.8	202.2	
		W	4.4	139.3	190.5	0.94
		(AVG AV)	5.5		(AVG TSR)	0.74

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-22 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 25
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	WET	10.2	137.4	32.9	
		DRY	9.7	138.2	59.3	0.56
		DRY	10.4	137.1	61.7	0.54
		WET	10.3	137.3	33.1	
		WET	9.2	138.9	36.9	
		DRY	9.4	138.6	74.2	0.50
		(AVG AV)	9.9		(AVG TSR)	0.53
	HIGH AIR VOIDS SECTION	DRY	10.9	136.3	54.6	0.68
		WET	11.3	135.8	37.1	
		WET	11.5	135.4	31.4	
		DRY	11.6	135.2	52.9	0.59
		DRY	11.2	135.9	51.3	0.65
		WET	11.0	136.2	33.4	
		(AVG AV)	11.2		(AVG TSR)	0.64
LIME SLURRY	LOW AIR VOIDS SECTION	DRY	8.2	140.3	88.6	0.96
		WET	8.8	139.4	84.7	
		WET	8.8	139.4	86.7	
		DRY	7.4	141.6	93.4	0.93
		DRY	6.8	142.4	86.5	1.07
		WET	7.2	141.9	92.4	
		(AVG AV)	7.9		(AVG TSR)	0.98
	HIGH AIR VOIDS SECTION	WET	8.7	139.5	90.5	
		DRY	8.3	140.1	88.3	1.03
		DRY	7.8	140.9	86.7	1.01
		WET	7.7	141.1	87.4	
		WET	8.8	139.3	75.3	
		DRY	8.2	140.3	77.9	0.97
		(AVG AV)	8.3		(AVG TSR)	1.00

TABLE C-22 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUASHIELD II	LOW AIR VOIDS SECTION	WET	8.1	139.6	38.6	
		DRY	9.1	138.1	64.5	0.60
		DRY	7.7	140.3	70.9	0.61
		WET	7.4	140.7	43.2	
		WET	10.9	135.3	38.2	
		DRY	11.8	134.1	56.0	0.68
		(AVG AV)	9.2		(AVG TSR)	0.63
	HIGH AIR VOIDS SECTION	DRY	8.8	138.6	64.8	0.72
		WET	14.4	130.1	46.5	
		WET	9.4	137.6	59.0	
		DRY	9.5	137.6	52.7	1.12
		DRY	9.2	137.9	60.3	1.03
		WET	9.2	137.9	62.4	
		(AVG AV)	10.1		(AVG TSR)	0.96
FINA-A	LOW AIR VOIDS SECTION	WET	6.9	141.6	79.5	
		DRY	7.3	141.1	69.5	1.14
		DRY	10.5	136.2	47.8	1.21
		WET	9.8	137.2	57.7	
		WET	7.9	140.1	70.2	
		DRY	8.0	139.9	71.5	0.98
		(AVG AV)	8.4		(AVG TSR)	1.11
	HIGH AIR VOIDS SECTION	DRY	10.6	136.0	62.5	0.96
		WET	10.3	136.4	60.3	
		WET	10.3	136.4	66.4	
		DRY	7.9	140.1	59.4	1.12
		DRY	11.7	134.3	60.1	0.99
		WET	11.0	135.4	59.4	
		(AVG AV)	10.3		(AVG TSR)	1.02

TABLE C-22 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PERMA-TAC	LOW AIR VOIDS SECTION	DRY	8.6	139.4	67.1	0.93
		WET	7.9	140.3	62.4	
		WET	6.9	141.9	66.9	
		DRY	7.8	140.5	69.2	0.97
		DRY	10.7	136.1	53.7	0.93
		WET	10.4	136.6	50.0	
		(AVG AV)	8.0		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	WET	10.1	137.0	43.3	
		DRY	9.6	137.8	57.0	0.76
		DRY	7.1	141.7	70.8	0.72
		WET	7.9	140.3	51.1	
		WET	6.8	142.1	69.9	
		DRY	6.4	142.7	75.4	0.93
		(AVG AV)	8.7		(AVG TSR)	0.94
UNICHEM 8150	LOW AIR VOIDS SECTION	WET	9.1	138.2	49.7	
		DRY	8.9	138.5	65.2	0.76
		DRY	7.7	140.4	69.5	0.72
		WET	9.0	138.4	49.8	
		WET	8.1	139.7	62.2	
		DRY	9.3	137.9	59.7	1.04
		(AVG AV)	8.7		(AVG TSR)	0.84
	HIGH AIR VOIDS SECTION	DRY	10.0	136.8	61.5	0.61
		WET	9.8	137.2	37.6	
		WET	9.6	137.5	36.8	
		DRY	10.1	136.7	59.5	0.62
		DRY	8.1	139.8	67.6	0.56
		WET	8.6	139.0	38.1	
		(AVG AV)	9.4		(AVG TSR)	0.60

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-23 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 25
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	4.1	146.8	141.7	
		W	4.2	146.6	88.6	0.63
		W	6.4	143.2	73.0	0.48
		D	5.0	145.4	152.9	
		D	5.3	144.9	147.3	
		W	5.4	144.8	68.0	0.46
		(AVG AV)	5.0		(AVG TSR)	0.52
	HIGH AIR VOIDS SECTION	W	5.1	145.2	92.9	0.63
		D	4.8	145.7	146.6	
		D	5.2	145.1	145.4	
		W	4.9	145.5	58.5	0.40
		W	3.9	147.0	95.0	0.60
		D	3.9	147.1	158.3	
		(AVG AV)	4.6		(AVG TSR)	0.55
LIME SLURRY	LOW AIR VOIDS SECTION	W	3.7	147.2	151.6	1.01
		D	4.0	146.7	150.6	
		D	3.0	148.2	158.4	
		W	3.3	147.8	161.9	1.02
		W	4.3	146.2	148.1	0.93
		D	4.1	146.5	159.1	
		(AVG AV)	3.8		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	D	2.8	148.5	167.1	
		W	2.8	148.6	167.0	1.00
		W	4.0	146.6	148.6	0.93
		D	3.8	147.0	159.1	
		D	5.8	144.0	131.3	
		W	4.1	146.6	127.7	0.97
		(AVG AV)	3.9		(AVG TSR)	0.97

TABLE C-23 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUASHIELD II	LOW AIR VOIDS SECTION	D	3.8	146.2	139.4	
		W	3.6	146.5	55.7	0.40
		W	4.1	145.7	38.1	0.24
		D	4.1	145.7	161.0	
		D	3.6	146.5	155.5	
		W	4.1	145.7	104.1	0.67
		(AVG AV)	3.9		(AVG TSR)	0.43
	HIGH AIR VOIDS SECTION	W	2.9	147.5	115.4	0.81
		D	2.7	147.8	143.2	
		D	3.8	146.2	139.9	
		W	2.9	147.5	118.3	0.85
		W	2.7	147.9	139.1	0.91
		D	2.8	147.6	153.7	
		(AVG AV)	3.0		(AVG TSR)	0.85
FINA-A	LOW AIR VOIDS SECTION	D	2.3	148.6	158.8	
		W	2.5	148.3	156.8	0.99
		W	2.4	148.5	158.8	0.98
		D	2.6	148.2	162.8	
		D	1.7	149.5	167.2	
		W	1.6	149.6	155.1	0.93
		(AVG AV)	2.2		(AVG TSR)	0.96
	HIGH AIR VOIDS SECTION	W	3.7	146.5	136.8	0.91
		D	3.5	146.7	150.5	
		D	1.9	149.2	154.1	
		W	1.8	149.4	151.3	0.98
		W	2.9	147.8	124.3	0.73
		D	2.8	147.9	169.7	
		(AVG AV)	2.8		(AVG TSR)	0.87

TABLE C-23 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	1.8	149.7	182.9	1.09
	LOW	D	2.0	149.3	168.1	
	AIR	D	1.8	149.8	168.1	
	VOIDS	W	1.9	149.5	107.9	0.64
	SECTION	W	3.5	147.1	97.9	0.62
		D	3.3	147.5	159.1	
		(AVG AV)	2.4		(AVG TSR)	0.78
PERMA-TAC						
		D	2.5	148.7	166.0	
	HIGH	W	2.7	148.4	158.0	0.95
	AIR	W	1.2	150.6	158.5	0.99
	VOIDS	D	1.7	149.8	159.6	
	SECTION	D	1.9	149.6	155.6	
		W	1.7	149.8	148.0	0.95
		(AVG AV)	1.9		(AVG TSR)	0.97
		D	4.3	145.6	152.7	
	LOW	W	4.4	145.4	82.4	0.54
	AIR	W	3.2	147.1	117.8	0.75
	VOIDS	D	4.0	146.0	157.5	
	SECTION	D	4.4	145.4	152.8	
		W	4.6	145.1	64.9	0.42
UNICHEM 8150		(AVG AV)	4.1		(AVG TSR)	0.57
		W	4.6	145.0	47.6	0.31
	HIGH	D	5.2	144.1	155.2	
	AIR	D	4.6	145.1	155.8	
	VOIDS	W	4.4	145.4	59.1	0.38
	SECTION	W	3.0	147.5	81.0	0.48
		D	3.0	147.5	167.6	
		(AVG AV)	4.1		(AVG TSR)	0.39

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-24 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 25
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.9	147.0	162.2	
	LOW	W	4.3	146.4	133.1	0.82
	AIR	W	5.2	145.0	111.3	0.80
	VOIDS	D	5.0	145.3	139.4	
	SECTION	D	4.7	145.9	149.1	
		W	4.8	145.6	114.0	0.77
NO ADDITIVE (CONTROL)		(AVG AV)	4.7		(AVG TSR)	0.79
		W	4.7	145.9	102.5	0.74
	HIGH	D	5.2	145.1	137.7	
	AIR	D	5.5	144.6	149.9	
	VOIDS	W	5.9	144.0	77.1	0.51
	SECTION	W	4.9	145.5	81.1	0.63
		D	4.0	147.0	127.9	
		(AVG AV)	5.0		(AVG TSR)	0.63
		W	3.8	146.9	139.5	0.84
	LOW	D	3.7	147.1	165.9	
	AIR	D	3.7	147.2	167.0	
	VOIDS	W	3.6	147.3	177.6	1.06
	SECTION	W	4.1	146.5	168.3	1.10
		D	4.1	146.6	152.6	
LIME SLURRY		(AVG AV)	3.8		(AVG TSR)	1.00
		D	2.7	148.7	168.5	
	HIGH	W	3.0	148.2	167.0	0.99
	AIR	W	2.7	148.6	177.7	1.09
	VOIDS	D	3.1	148.1	163.3	
	SECTION	D	3.8	147.0	161.8	
		W	3.9	146.8	155.3	0.96
		(AVG AV)	3.2		(AVG TSR)	1.01

TABLE C-24 (Continued).

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.6	146.5	151.2	
	LOW	W	3.9	146.0	101.9	0.67
	AIR	W	3.2	144.1	N/A	N/A
	VOIDS	D	3.7	146.3	139.9	
	SECTION	D	2.9	147.5	164.0	
		W	4.5	145.1	54.9	0.33
AQUASHIELD II		(AVG AV)	4.0		(AVG TSR)	0.50
		W	3.8	146.1	114.7	0.94
	HIGH	D	3.9	146.1	122.6	
	AIR	D	3.0	147.4	142.3	
	VOIDS	W	2.6	148.1	139.4	0.98
	SECTION	W	2.5	148.2	138.6	0.98
		D	2.4	148.3	141.6	
		(AVG AV)	3.0		(AVG TSR)	0.96
		D	3.1	147.4	159.0	
	LOW	W	3.2	147.2	136.5	0.86
	AIR	W	3.1	147.4	158.3	1.13
	VOIDS	D	4.2	145.8	139.8	
	SECTION	D	2.0	149.1	154.4	
		W	2.7	148.0	163.2	1.06
		(AVG AV)	3.1		(AVG TSR)	1.02
FINA-A		W	4.7	144.9	157.1	1.04
	HIGH	D	4.1	145.8	151.3	
	AIR	D	1.9	149.2	155.1	
	VOIDS	W	4.9	144.8	128.7	0.83
	SECTION	W	3.6	146.6	133.2	0.96
		D	4.1	145.9	139.2	
		(AVG AV)	3.9		(AVG TSR)	0.94

TABLE C-24 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PERMA-TAC	LOW AIR VOIDS SECTION	W	1.9	149.5	109.7	0.64
		D	2.3	148.9	170.2	
		D	1.5	150.2	164.2	
		W	2.0	149.4	114.1	0.70
		W	4.6	145.4	37.5	0.22
		D	3.4	147.3	171.9	
		(AVG AV)	2.6		(AVG TSR)	0.52
	HIGH AIR VOIDS SECTION	D	3.8	146.7	151.0	
		W	3.9	146.5	131.3	0.87
		W	1.8	149.7	177.0	1.01
		D	1.6	149.9	175.5	
		D	1.7	149.8	164.8	
		W	1.8	149.7	153.4	0.93
		(AVG AV)	2.4		(AVG TSR)	0.94
UNICHEM 8150	LOW AIR VOIDS SECTION	D	4.5	145.2	102.8	
		W	4.6	145.1	113.0	1.10
		W	3.5	146.7	120.8	0.79
		D	3.6	146.6	152.9	
		D	4.2	145.6	128.2	
		W	4.4	145.4	99.5	0.78
		(AVG AV)	4.1		(AVG TSR)	0.89
	HIGH AIR VOIDS SECTION	W	4.7	145.0	77.1	0.48
		D	4.5	145.2	160.6	
		D	4.1	145.9	148.5	
		W	4.0	146.0	104.0	0.70
		W	3.3	147.1	114.9	0.75
		D	3.2	147.2	154.0	
		(AVG AV)	4.0		(AVG TSR)	0.64

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-25 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 25
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	4.7	145.8	164.9	
		W	4.0	146.9	145.8	0.88
		W	3.7	147.4	137.7	0.94
		D	4.0	146.8	146.3	
		D	4.0	146.9	168.7	
		W	3.6	147.5	138.9	0.82
		(AVG AV)	4.0		(AVG TSR)	0.88
	HIGH AIR VOIDS SECTION	W	3.7	147.4	148.6	0.85
		D	3.7	147.3	174.6	
		D	4.5	146.1	153.3	
		W	4.7	145.8	115.7	0.75
		W	3.0	148.4	135.1	0.85
		D	3.3	147.9	158.4	
		(AVG AV)	3.8		(AVG TSR)	0.82
LIME SLURRY	LOW AIR VOIDS SECTION	W	3.4	147.6	149.5	0.91
		D	2.6	148.8	164.1	
		D	3.3	147.8	165.6	
		W	3.1	148.0	159.4	0.96
		W	3.6	147.3	139.7	0.84
		D	3.8	147.0	167.2	
		(AVG AV)	3.3		(AVG TSR)	0.90
	HIGH AIR VOIDS SECTION	D	2.2	149.5	166.1	
		W	2.6	148.9	178.6	1.08
		W	2.6	148.9	157.8	0.94
		D	2.3	149.2	167.1	
		D	3.3	147.7	154.5	
		W	3.3	147.8	143.7	0.93
		(AVG AV)	2.7		(AVG TSR)	0.98

TABLE C-25 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
AQUASHIELD II	LOW AIR VOIDS SECTION	D	2.4	148.2	181.0	
		W	3.1	147.2	144.2	0.80
		W	4.5	145.1	119.3	0.62
		D	2.2	148.5	191.3	
		D	4.5	145.1	163.0	
		W	4.4	145.2	N/A	N/A
		(AVG AV)	3.5		(AVG TSR)	0.71
	HIGH AIR VOIDS SECTION	W	3.4	146.8	140.8	0.81
		D	2.7	147.9	172.8	
		D	2.8	147.7	165.5	
		W	2.9	147.5	135.7	0.82
		W	1.9	149.1	144.4	0.83
		D	1.6	149.5	174.7	
		(AVG AV)	2.6		(AVG TSR)	0.82
FINA-A	LOW AIR VOIDS SECTION	D	3.0	147.6	161.9	
		W	1.9	149.3	120.8	0.75
		W	2.8	147.8	106.9	0.76
		D	2.1	148.9	140.8	
		D	1.5	149.9	160.0	
		W	2.4	148.4	147.5	0.92
		(AVG AV)	2.3		(AVG TSR)	0.81
	HIGH AIR VOIDS SECTION	W	2.9	147.8	152.5	1.08
		D	3.1	147.4	141.3	
		D	2.3	148.6	149.4	
		W	2.4	148.5	124.3	0.83
		W	2.2	148.7	128.0	0.78
		D	2.9	147.7	163.5	
		(AVG AV)	2.6		(AVG TSR)	0.90

TABLE C-25 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PERMA-TAC	LOW AIR VOIDS SECTION	W	1.0	150.8	160.7	1.01
		D	0.9	151.1	158.4	
		D	1.2	150.6	160.9	
		W	2.1	149.3	133.4	0.83
		W	2.7	148.3	107.6	0.63
		D	2.3	149.0	169.8	
		(AVG AV)	1.7		(AVG TSR)	0.83
	HIGH AIR VOIDS SECTION	D	1.9	149.6	165.3	
		W	2.2	149.1	112.5	0.68
		W	2.4	148.7	118.1	0.77
		D	1.1	150.8	153.9	
		D	1.4	150.3	150.4	
		W	2.1	149.3	147.5	0.98
		(AVG AV)	1.8		(AVG TSR)	0.81
UNICHEM 8150	LOW AIR VOIDS SECTION	D	3.1	147.3	169.2	
		W	3.1	147.4	138.6	0.82
		W	3.1	147.3	130.4	0.96
		D	3.4	146.9	135.1	
		D	3.2	147.2	153.3	
		W	3.3	147.1	99.9	0.65
		(AVG AV)	3.2		(AVG TSR)	0.81
	HIGH AIR VOIDS SECTION	W	3.4	146.8	131.3	0.81
		D	3.1	147.3	163.1	
		D	3.2	147.2	150.7	
		W	3.9	146.1	112.0	0.74
		W	1.9	149.2	119.5	0.69
		D	2.4	148.3	173.6	
		(AVG AV)	3.0		(AVG TSR)	0.75

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-26 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 25
PAVEMENT AGE = 36 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	2.5	149.2	147.0	0.86
	LOW	D	2.1	149.8	171.3	
	AIR	W	3.3	147.9	110.7	0.61
	VOIDS	D	3.2	148.0	180.6	
	SECTION	D	3.3	147.9	197.7	
		W	3.7	147.4	144.3	0.73
NO ADDITIVE (CONTROL)		(AVG AV)	3.0		(AVG TSR)	0.73
		W	3.1	148.2	153.3	0.80
	HIGH	D	3.3	147.9	190.8	
	AIR	D	3.4	147.9	184.7	
	VOIDS	W	3.3	147.9	146.0	0.79
	SECTION	W	4.2	146.5	114.8	0.76
		D	4.1	146.8	150.8	
		(AVG AV)	3.6		(AVG TSR)	0.78
		W	3.3	147.8	181.3	0.98
	LOW	D	3.1	148.1	185.2	
	AIR	D	2.5	149.0	207.6	
	VOIDS	W	2.7	148.8	206.9	1.00
	SECTION	D	3.4	147.6	194.9	
		W	3.9	146.8	174.8	0.90
LIME SLURRY		(AVG AV)	3.1		(AVG TSR)	0.96
		D	2.0	149.7	199.6	
	HIGH	W	1.8	150.1	218.7	1.10
	AIR	W	2.3	149.3	194.5	0.99
	VOIDS	D	2.9	148.4	196.7	
	SECTION	D	4.0	146.6	177.9	
		W	3.6	147.3	174.5	0.98
		(AVG AV)	2.8		(AVG TSR)	1.02

TABLE C-26 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	2.5	148.2	N/A	N/A
	LOW	D	2.7	147.8	188.9	
	AIR	W	0.8	150.7	191.9	1.02
	VOIDS	D	1.7	149.4	191.8	
	SECTION	D	2.1	148.7	189.8	
		W	1.7	149.4	172.8	0.91
AQUASHIELD II		(AVG AV)	1.9		(AVG TSR)	0.96
		W	2.0	148.9	177.9	0.86
	HIGH	D	2.5	148.1	206.6	
	AIR	D	2.0	149.0	186.7	
	VOIDS	W	2.4	148.3	120.4	0.65
	SECTION	W	1.5	149.6	171.4	1.04
		D	1.9	149.1	165.3	
		(AVG AV)	2.1		(AVG TSR)	0.85
		W	1.9	149.2	206.9	1.20
	LOW	D	0.7	151.1	173.0	
	AIR	W	2.4	148.4	145.0	0.84
	VOIDS	D	2.0	149.1	172.6	
	SECTION	D	1.4	150.0	192.5	
		W	0.9	150.8	177.9	0.92
		(AVG AV)	1.6		(AVG TSR)	0.99
FINA-A		D	2.5	148.4	172.9	
	HIGH	W	2.7	148.0	161.0	0.93
	AIR	W	1.4	150.0	186.7	0.96
	VOIDS	D	1.6	149.7	194.4	
	SECTION	D	2.9	147.7	168.0	
		W	2.8	147.8	124.9	0.74
		(AVG AV)	2.3		(AVG TSR)	0.88

TABLE C-26 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PERMA-TAC	LOW AIR VOIDS SECTION	W	1.2	150.7	191.1	0.96
		D	1.0	151.0	198.7	
		W	0.8	151.2	133.3	0.67
		D	0.7	151.4	198.0	
		W	2.1	149.2	87.1	0.51
		D	2.4	148.8	171.1	
		(AVG AV)	1.4		(AVG TSR)	0.71
	HIGH AIR VOIDS SECTION	D	1.0	151.0	168.3	
		W	1.5	150.2	160.8	0.96
		D	1.5	150.1	184.4	
		W	1.8	149.7	167.3	0.91
		D	1.7	149.9	159.3	
		W	1.2	150.7	149.8	0.94
		(AVG AV)	1.4		(AVG TSR)	0.93
UNICHEM 8150	LOW AIR VOIDS SECTION	W	3.4	146.9	135.9	0.89
		D	3.1	147.3	151.9	
		D	3.1	147.3	150.9	
		W	2.9	147.7	89.7	0.59
		W	3.3	147.1	68.9	0.44
		D	3.9	146.2	157.3	
		(AVG AV)	3.3		(AVG TSR)	0.64
	HIGH AIR VOIDS SECTION	D	3.0	147.5	192.6	
		W	3.0	147.5	155.1	0.81
		D	3.4	146.9	151.5	
		W	2.5	148.2	100.2	0.66
		D	1.7	149.5	196.1	
		W	1.3	150.1	170.3	0.87
		(AVG AV)	2.5		(AVG TSR)	0.78

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-27 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 1
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	6.1	139.1	63.1	
		W	5.8	139.5	66.0	1.05
		W	4.7	141.2	77.8	0.82
		D	5.0	140.7	94.8	
		D	5.5	139.9	89.8	
		W	6.4	138.6	78.2	0.87
		(AVG AV)	5.6		(AVG TSR)	0.91
	HIGH AIR VOIDS SECTION	W	9.2	134.5	51.5	1.08
		D	9.4	134.2	47.8	
		D	9.2	134.5	49.9	
		W	10.0	133.3	35.5	0.71
		W	9.7	133.8	43.9	0.86
		D	9.8	133.7	51.2	
		(AVG AV)	9.5		(AVG TSR)	0.88
LIME SLURRY	LOW AIR VOIDS SECTION	D	7.7	136.3	63.2	
		W	7.7	136.2	78.2	1.24
		W	6.4	138.1	81.0	1.41
		D	8.7	134.8	57.4	
		D	4.6	140.7	86.0	
		W	4.6	140.9	111.4	1.30
		(AVG AV)	6.6		(AVG TSR)	1.31
	HIGH AIR VOIDS SECTION	W	8.2	135.5	79.4	1.23
		D	7.6	136.3	64.4	
		D	7.2	137.0	71.0	
		W	6.6	137.9	90.4	1.27
		W	4.9	140.4	104.4	1.10
		D	4.9	140.3	94.8	
		(AVG AV)	6.6		(AVG TSR)	1.20

TABLE C-27 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
ARR-MAZ ADHERE HP	LOW AIR VOIDS SECTION	D	6.3	139.1	84.4	
		W	6.6	138.7	87.1	1.03
		W	7.1	137.9	85.3	1.23
		D	6.7	138.6	69.5	
		D	6.8	138.5	74.5	
		W	6.5	138.9	95.4	1.28
		(AVG AV)	6.7		(AVG TSR)	1.18
	HIGH AIR VOIDS SECTION	W	8.8	135.4	68.5	1.26
		D	9.2	134.8	54.3	
		D	8.4	136.1	52.2	
		W	8.4	136.0	74.5	1.43
		W	8.3	136.2	77.3	1.40
		D	9.3	134.6	55.1	
		(AVG AV)	8.8		(AVG TSR)	1.36
DOW	LOW AIR VOIDS SECTION	D	8.7	135.3	55.9	
		W	8.2	136.2	52.9	0.95
		W	8.9	135.0	52.4	1.16
		D	9.6	134.0	45.1	
		D	8.4	135.8	61.1	
		W	8.8	135.2	67.8	1.11
		(AVG AV)	8.8		(AVG TSR)	1.07
	HIGH AIR VOIDS SECTION	W	8.6	135.5	57.0	1.02
		D	8.3	136.0	55.9	
		D	8.3	135.9	54.6	
		W	8.0	136.4	42.3	0.77
		W	8.4	135.8	76.7	1.24
		D	8.7	135.4	61.8	
		(AVG AV)	8.4		(AVG TSR)	1.01

TABLE C-27 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
FINA-A	LOW AIR VOIDS SECTION	D	7.1	136.8	80.2	
		W	6.9	137.0	72.4	0.90
		W	5.5	139.1	79.8	1.06
		D	5.9	138.6	75.3	
		D	5.2	139.6	84.4	
		W	5.2	139.7	85.8	1.02
		(AVG AV)	6.0		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	W	7.1	136.8	79.2	1.18
		D	7.0	136.9	66.9	
		D	5.8	138.7	77.3	
		W	5.7	138.9	84.1	1.09
		W	4.8	140.2	86.7	1.06
		D	4.4	140.7	81.7	
		(AVG AV)	5.8		(AVG TSR)	1.11
INDULIN AS-1	LOW AIR VOIDS SECTION	D	6.5	138.2	79.0	
		W	6.4	138.3	90.0	1.14
		W	5.5	139.6	95.2	1.23
		D	5.6	139.6	77.4	
		D	4.7	140.9	93.9	
		W	4.5	141.1	94.2	1.00
		(AVG AV)	5.5		(AVG TSR)	1.12
	HIGH AIR VOIDS SECTION	W	8.1	135.8	70.1	1.15
		D	8.3	135.5	60.9	
		D	7.8	136.3	59.5	
		W	8.3	135.5	71.3	1.20
		W	8.2	135.7	69.8	1.22
		D	7.9	136.0	57.5	
		(AVG AV)	8.1		(AVG TSR)	1.19

TABLE C-27 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND SPECIAL	LOW AIR VOIDS SECTION	D	7.1	136.9	69.5	
		W	6.6	137.6	69.4	1.00
		W	5.7	138.9	88.3	1.07
		D	5.5	139.2	82.8	
		D	6.2	138.3	65.9	
		W	6.1	138.4	66.7	1.01
		(AVG AV)	6.2		(AVG TSR)	1.03
	HIGH AIR VOIDS SECTION	W	9.1	133.9	48.5	1.19
		D	9.9	132.8	40.6	
		D	9.0	134.1	58.3	
		W	8.9	134.3	53.9	0.92
		W	9.6	133.2	48.6	0.94
		D	9.3	133.6	51.8	
		(AVG AV)	9.3		(AVG TSR)	1.02
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	7.3	137.7	67.3	
		W	7.3	137.8	77.3	1.15
		W	7.2	137.8	80.2	1.26
		D	6.6	138.7	63.5	
		D	6.0	139.7	81.3	
		W	5.5	140.4	78.6	0.97
		(AVG AV)	6.6		(AVG TSR)	1.13
	HIGH AIR VOIDS SECTION	W	9.3	134.8	67.1	1.13
		D	9.5	134.5	59.6	
		D	9.8	134.1	58.9	
		W	9.4	134.6	60.2	1.02
		W	8.9	135.3	64.1	1.25
		D	9.5	134.5	51.2	
		(AVG AV)	9.4		(AVG TSR)	1.13

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-28 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 1
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.7	142.1	105.4	
		W	2.8	141.8	105.7	1.00
		W	3.7	140.5	81.4	0.67
		D	3.0	141.5	122.2	
		D	3.6	140.6	87.1	
		W	4.0	140.2	94.0	1.08
		(AVG AV)	3.3		(AVG TSR)	0.92
	HIGH AIR VOIDS SECTION	W	6.3	136.8	59.2	0.92
		D	7.7	134.6	64.0	
		D	4.9	138.8	45.4	
		W	5.9	137.4	43.7	0.96
		W	5.3	138.3	59.5	0.77
		D	5.6	137.8	77.5	
		(AVG AV)	5.9		(AVG TSR)	0.88
LIME SLURRY	LOW AIR VOIDS SECTION	D	3.6	140.0	101.0	
		W	4.0	139.5	120.0	1.19
		W	3.4	140.2	123.4	1.40
		D	3.7	139.8	88.0	
		D	2.7	141.3	115.7	
		W	2.9	141.0	130.6	1.13
		(AVG AV)	3.4		(AVG TSR)	1.24
	HIGH AIR VOIDS SECTION	W	4.6	138.5	109.1	1.14
		D	4.3	139.0	95.9	
		D	4.0	139.4	100.4	
		W	3.2	140.6	130.3	1.30
		W	1.8	142.5	154.5	1.26
		D	1.8	142.6	122.9	
		(AVG AV)	3.3		(AVG TSR)	1.23

TABLE C-28 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
ARR-MAZ ADHERE HP	LOW AIR VOIDS SECTION	D	1.9	140.7	92.4	
		W	2.1	140.4	123.8	1.34
		W	2.2	140.2	124.3	1.28
		D	2.0	140.6	97.1	
		D	1.7	141.0	113.0	
		W	2.5	139.8	102.0	0.90
		(AVG AV)	2.1		(AVG TSR)	1.17
	HIGH AIR VOIDS SECTION	W	3.9	137.8	99.4	1.17
		D	3.6	138.3	85.1	
		D	3.3	138.7	78.0	
		W	3.3	138.7	92.7	1.19
		W	3.4	138.5	95.5	1.10
		D	3.5	138.4	86.6	
		(AVG AV)	3.5		(AVG TSR)	1.15
DOW	LOW AIR VOIDS SECTION	D	4.3	139.1	79.4	
		W	4.4	139.1	72.2	0.91
		W	3.8	139.8	98.0	1.08
		D	4.3	139.1	90.5	
		D	4.9	138.3	72.6	
		W	4.8	138.4	71.9	0.99
		(AVG AV)	4.4		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	W	4.4	139.0	78.2	1.00
		D	4.4	139.0	78.3	
		D	5.1	138.0	82.1	
		W	4.8	138.5	73.8	0.90
		W	4.2	139.3	59.4	1.02
		D	4.5	138.8	58.3	
		(AVG AV)	4.6		(AVG TSR)	0.97

TABLE C-28 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
FINA-A	LOW AIR VOIDS SECTION	D	4.6	139.2	85.7	
		W	4.2	139.7	77.3	0.90
		W	3.8	140.4	111.2	1.04
		D	3.7	140.6	107.3	
		D	3.1	141.3	109.9	
		W	2.9	141.7	126.1	1.15
		(AVG AV)	3.7		(AVG TSR)	1.03
	HIGH AIR VOIDS SECTION	W	4.4	139.5	122.8	1.30
		D	4.3	139.6	94.7	
		D	4.5	139.4	98.4	
		W	4.3	139.6	116.2	1.18
		W	3.6	140.6	129.4	1.30
		D	3.4	140.9	99.3	
		(AVG AV)	4.1		(AVG TSR)	1.26
INDULIN AS-1	LOW AIR VOIDS SECTION	D	2.7	140.2	103.8	
		W	2.7	140.1	120.4	1.16
		W	2.1	141.0	129.6	1.19
		D	2.0	141.1	108.6	
		D	1.4	142.1	112.6	
		W	1.4	142.1	138.1	1.23
		(AVG AV)	2.0		(AVG TSR)	1.19
	HIGH AIR VOIDS SECTION	W	3.9	138.4	100.9	1.16
		D	3.8	138.6	86.7	
		D	3.8	138.5	89.6	
		W	4.1	138.2	102.0	1.14
		W	3.9	138.4	91.6	0.99
		D	4.2	137.9	92.1	
		(AVG AV)	3.9		(AVG TSR)	1.10

TABLE C-28 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
	LOW AIR VOIDS SECTION	D	4.7	139.7	80.6	
		W	4.4	140.1	96.8	1.20
		W	4.1	140.5	111.8	1.08
		D	4.2	140.5	103.6	
		D	4.2	140.5	101.5	
		W	4.0	140.7	116.7	1.15
PAVEBOND SPECIAL		(AVG AV)	4.3		(AVG TSR)	1.14
	HIGH AIR VOIDS SECTION	W	6.9	136.4	76.8	0.93
		D	5.9	137.9	82.6	
		D	6.7	136.8	N/A	
		W	6.0	137.7	93.2	N/A
		W	6.9	136.5	70.3	0.96
		D	6.1	137.7	73.5	
		(AVG AV)	6.4		(AVG TSR)	0.94
	LOW AIR VOIDS SECTION	D	3.7	140.2	96.5	
		W	4.4	139.2	72.9	0.76
		W	4.0	139.8	59.4	0.69
		D	4.0	139.7	86.4	
		D	2.8	141.6	98.3	
		W	2.7	141.6	102.5	1.04
PERMA-TAC PLUS		(AVG AV)	3.6		(AVG TSR)	0.83
	HIGH AIR VOIDS SECTION	W	5.4	137.8	79.1	1.06
		D	5.5	137.6	74.9	
		D	5.2	138.0	75.3	
		W	5.6	137.4	78.1	1.04
		W	5.3	137.9	83.2	1.05
		D	5.3	137.8	79.3	
		(AVG AV)	5.4		(AVG TSR)	1.05

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-29 INDIRECT TENSILE TEST RESULTS OF FIELD-CORES
DISTRICT 1
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	3.5	143.0	188.8	
		W	3.9	142.3	201.9	1.07
		W	3.4	143.1	180.8	0.91
		D	2.8	144.0	198.8	
		D	3.3	143.2	175.8	
		W	3.8	142.6	167.4	0.95
		(AVG AV)	3.5		(AVG TSR)	0.98
	HIGH AIR VOIDS SECTION	W	5.4	140.1	74.1	0.64
		D	5.3	140.3	115.6	
		D	5.7	139.7	90.1	
		W	5.2	140.4	54.6	0.61
		W	5.6	139.8	59.2	0.59
		D	5.5	140.1	99.9	
		(AVG AV)	5.5		(AVG TSR)	0.61
LIME SLURRY	LOW AIR VOIDS SECTION	D	4.4	141.1	141.5	
		W	3.4	142.5	164.0	1.16
		W	4.6	140.7	140.9	1.36
		D	4.7	140.6	103.3	
		D	3.5	142.4	134.6	
		W	3.3	142.7	161.3	1.20
		(AVG AV)	4.0		(AVG TSR)	1.24
	HIGH AIR VOIDS SECTION	W	4.8	140.5	167.5	1.17
		D	4.4	141.0	143.1	
		D	3.4	142.6	145.6	
		W	3.2	142.9	178.0	1.22
		W	2.6	143.8	175.6	1.08
		D	3.2	142.9	162.7	
		(AVG AV)	3.6		(AVG TSR)	1.16

TABLE C-29 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
ARR-MAZ ADHERE HP	LOW AIR VOIDS SECTION	D	3.5	143.4	148.1	
		W	3.2	143.7	204.7	1.38
		W	3.5	143.3	160.2	1.18
		D	3.3	143.6	135.3	
		D	3.0	144.1	144.9	
		W	3.7	143.0	95.9	0.66
		(AVG AV)	3.4	-	(AVG TSR)	1.08
	HIGH AIR VOIDS SECTION	W	4.0	142.5	96.0	1.00
		D	3.9	142.7	96.5	
		D	4.0	142.5	108.7	
		W	3.6	143.1	152.9	1.41
		W	5.3	140.6	65.6	0.67
		D	4.9	141.2	97.4	
		(AVG AV)	4.3		(AVG TSR)	1.03
DOW	LOW AIR VOIDS SECTION	D	5.4	140.3	94.7	
		W	5.0	140.8	59.7	0.63
		W	4.5	141.6	64.0	0.64
		D	4.5	141.6	99.5	
		D	5.6	139.9	113.7	
		W	5.8	-139.7	101.6	0.89
		(AVG AV)	5.1		(AVG TSR)	0.72
	HIGH AIR VOIDS SECTION	W	4.7	141.3	120.1	0.84
		D	5.0	140.8	142.5	
		D	4.8	141.2	94.9	
		W	4.5	141.6	81.4	0.86
		W	5.1	140.6	53.7	0.58
		D	5.4	140.2	93.1	
		(AVG AV)	4.9		(AVG TSR)	0.76

TABLE C-29 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
FINA-A	LOW AIR VOIDS SECTION	D	3.6	142.0	119.1	
		W	2.9	143.0	181.7	1.52
		W	4.1	141.2	106.9	0.88
		D	3.2	142.5	121.5	
		D	2.8	143.1	115.8	
		W	2.6	143.4	169.8	1.47
		(AVG AV)	3.2		(AVG TSR)	1.29
	HIGH AIR VOIDS SECTION	W	4.2	141.2	127.6	1.14
		D	4.6	140.4	112.2	
		D	3.5	142.1	134.4	
		W	3.4	142.3	151.3	1.13
		W	3.2	142.6	131.2	1.09
		D	3.7	141.9	120.7	
		(AVG AV)	3.8		(AVG TSR)	1.12
INDULIN AS-1	LOW AIR VOIDS SECTION	D	3.5	142.6	110.4	
		W	3.1	143.2	126.8	1.15
		W	3.2	143.0	118.1	0.74
		D	2.7	143.8	158.7	
		D	2.1	144.7	172.6	
		W	2.3	144.3	146.1	0.85
		(AVG AV)	2.8		(AVG TSR)	0.91
	HIGH AIR VOIDS SECTION	W	4.8	140.7	92.9	0.95
		D	4.9	140.5	97.4	
		D	4.3	141.4	102.2	
		W	4.5	141.2	133.8	1.31
		W	4.8	140.7	104.4	0.85
		D	5.3	139.9	122.4	
		(AVG AV)	4.8		(AVG TSR)	1.04

TABLE C-29 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	4.0	141.5	101.6	
	LOW	W	3.2	142.7	122.7	1.21
	AIR	W	2.6	143.6	139.4	1.24
	VOIDS	D	3.2	142.7	112.4	
	SECTION	D	2.9	143.1	143.6	
		W	2.9	143.2	146.7	1.02
PAVEBOND SPECIAL		(AVG AV)	3.1		(AVG TSR)	1.16
		W	4.2	141.1	146.5	1.42
	HIGH	D	4.1	141.3	103.4	
	AIR	D	4.7	140.4	85.5	
	VOIDS	W	3.8	141.7	113.7	1.33
	SECTION	W	5.8	138.9	121.0	1.04
		D	5.6	139.1	116.1	
		(AVG AV)	4.7		(AVG TSR)	1.26
		D	5.4	140.6	103.5	
	LOW	W	4.8	141.4	72.6	0.70
	AIR	W	4.1	142.4	73.2	0.61
	VOIDS	D	3.6	143.2	120.5	
	SECTION	D	3.4	143.5	150.1	
		W	3.2	143.8	155.0	1.03
PERMA-TAC PLUS		(AVG AV)	4.1		(AVG TSR)	0.78
		W	5.2	140.9	71.6	0.75
	HIGH	D	4.8	141.4	95.8	
	AIR	D	5.3	140.8	93.1	
	VOIDS	W	5.2	140.8	59.6	0.64
	SECTION	W	3.9	142.7	98.5	0.87
		D	4.7	141.6	113.3	
		(AVG AV)	4.9		(AVG TSR)	0.75

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-30 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 1
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.8	142.4	140.5	
	LOW	W	3.8	142.5	103.7	0.74
	AIR	W	3.6	142.7	189.9	0.97
	VOIDS	D	4.2	141.9	195.4	
	SECTION	D	3.4	143.1	213.7	
		W	3.8	142.5	56.3	0.26
NO ADDITIVE (CONTROL)		(AVG AV)	3.8		(AVG TSR)	0.66
		W	4.9	140.8	70.5	0.58
	HIGH	D	5.2	140.4	121.6	
	AIR	D	5.2	140.5	113.2	
	VOIDS	W	5.4	140.1	31.5	0.28
	SECTION	W	5.5	140.0	72.9	0.51
		D	5.4	140.1	143.0	
		(AVG AV)	5.3		(AVG TSR)	0.46
		D	4.8	140.1	147.3	
	LOW	W	4.6	140.5	151.2	1.03
	AIR	W	4.0	141.4	110.7	0.86
	VOIDS	D	3.9	141.5	129.4	
	SECTION	D	2.2	144.0	202.6	
		W	2.2	144.0	200.4	0.99
LIME SLURRY		(AVG AV)	3.6		(AVG TSR)	0.96
		W	4.0	141.4	201.7	1.01
	HIGH	D	3.3	142.4	198.8	
	AIR	D	2.4	143.7	191.6	
	VOIDS	W	2.8	143.2	179.9	0.94
	SECTION	W	2.4	143.7	140.3	0.70
		D	3.2	142.5	200.1	
		(AVG AV)	3.0		(AVG TSR)	0.88

TABLE C-30 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
ARR-MAZ ADHERE HP	LOW AIR VOIDS SECTION	D	2.8	144.4	174.6	
		W	2.5	144.8	222.8	1.28
		W	2.7	144.5	169.5	1.00
		D	3.1	144.0	169.8	
		D	3.5	143.3	120.7	
		W	5.0	141.1	N/A	N/A
		(AVG AV)	3.3		(AVG TSR)	1.14
	HIGH AIR VOIDS SECTION	W	3.6	143.2	104.9	0.91
		D	3.5	143.4	115.4	
		D	2.9	144.2	172.1	
		W	2.7	144.5	185.4	1.08
		W	4.7	141.5	128.7	1.10
		D	5.4	140.4	116.5	
		(AVG AV)	3.8		(AVG TSR)	1.03
DOW	LOW AIR VOIDS SECTION	D	5.3	140.4	100.3	
		W	5.6	139.9	39.3	0.39
		W	5.1	140.7	42.1	0.43
		D	5.1	140.7	99.0	
		D	5.4	140.3	100.6	
		W	5.0	140.8	55.9	0.56
		(AVG AV)	5.3		(AVG TSR)	0.46
	HIGH AIR VOIDS SECTION	W	4.5	141.7	77.1	0.64
		D	4.0	142.4	120.6	
		D	5.5	140.1	85.6	
		W	5.4	140.2	46.4	0.54
		W	5.4	140.2	40.0	0.45
		D	6.0	139.4	88.8	
		(AVG AV)	5.1		(AVG TSR)	0.54

TABLE C-30 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.1	142.7	127.4	
	LOW	W	2.9	143.0	134.9	1.06
	AIR	W	3.4	142.3	112.7	1.08
	VOIDS	D	3.6	142.0	104.0	
	SECTION	D	2.3	143.9	151.6	
		W	2.5	143.6	157.8	1.04
		(AVG AV)	3.0		(AVG TSR)	1.06
FINA-A						
		W	3.8	141.7	130.7	1.10
	HIGH	D	3.6	141.9	118.3	
	AIR	D	3.6	142.0	121.8	
	VOIDS	W	3.6	142.0	116.2	0.95
	SECTION	W	3.4	142.3	101.1	0.84
		D	3.2	142.5	120.0	
		(AVG AV)	3.5		(AVG TSR)	0.97
		D	3.0	143.3	118.8	
	LOW	W	3.1	143.1	106.3	0.89
	AIR	W	2.3	144.3	181.4	1.00
	VOIDS	D	2.2	144.5	182.0	
	SECTION	D	2.0	144.8	177.3	
		W	2.3	144.4	145.1	0.82
INDULIN AS-1		(AVG AV)	2.5		(AVG TSR)	0.90
		W	4.6	140.9	93.4	0.82
	HIGH	D	4.5	141.1	114.0	
	AIR	D	3.2	143.0	178.9	
	VOIDS	W	3.4	142.8	177.7	0.99
	SECTION	W	4.5	141.1	80.0	0.85
		D	4.9	140.5	93.9	
		(AVG AV)	4.2		(AVG TSR)	0.89

TABLE C-30 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND SPECIAL	LOW AIR VOIDS SECTION	D	3.1	142.8	118.4	
		W	3.0	143.0	130.4	1.10
		W	4.0	141.5	94.3	0.82
		D	3.7	141.9	114.6	
		D	1.8	144.7	167.1	
		W	2.1	144.3	140.3	0.84
		(AVG AV)	3.0	-	(AVG TSR)	0.92
	HIGH AIR VOIDS SECTION	W	3.6	142.1	98.3	0.64
		D	2.4	143.8	153.3	
		D	3.7	141.9	109.2	
		W	2.7	143.4	117.6	1.08
		W	4.4	141.0	97.1	0.86
		D	4.1	141.3	113.4	
		(AVG AV)	3.5		(AVG TSR)	0.86
PERMA-TAC PLUS	LOW AIR VOIDS SECTION	D	3.7	143.0	127.9	
		W	4.3	142.2	101.0	0.79
		W	3.5	143.4	66.3	0.73
		D	5.1	141.1	90.3	
		D	3.5	143.4	121.4	
		W	2.6	144.7	182.4	1.50
		(AVG AV)	3.8		(AVG TSR)	1.01
	HIGH AIR VOIDS SECTION	W	4.3	142.2	98.3	1.00
		D	5.0	141.2	98.6	
		D	5.7	140.1	106.1	
		W	5.3	140.7	63.3	0.60
		W	4.1	142.5	64.2	0.57
		D	4.5	141.9	111.9	
		(AVG AV)	4.8		(AVG TSR)	0.72

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-31 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 19
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	W	11.3	132.1	28.3	0.74
		D	11.3	132.1	38.4	
		D	9.9	134.1	58.0	
		W	9.9	134.1	43.8	0.76
		W	8.6	136.0	55.5	0.86
		D	8.4	136.3	64.3	
		(AVG AV)	9.9		(AVG TSR)	0.79
	HIGH AIR VOIDS SECTION	D	9.0	135.5	54.6	
		W	8.5	136.2	53.9	0.99
		W	7.7	137.3	58.9	0.89
		D	7.6	137.6	66.3	
		D	7.9	137.1	70.3	
		W	8.0	136.9	52.0	0.74
		(AVG AV)	8.1		(AVG TSR)	0.87
LIME SLURRY	LOW AIR VOIDS SECTION	W	6.6	139.3	88.5	1.12
		D	6.7	139.2	79.0	
		D	6.4	139.7	69.9	
		W	6.6	139.4	69.7	1.00
		W	5.4	141.3	103.2	1.18
		D	5.3	141.4	87.4	
		(AVG AV)	6.2		(AVG TSR)	1.10
	HIGH AIR VOIDS SECTION	D	7.6	138.0	65.7	
		W	7.4	138.2	94.0	1.43
		W	8.8	136.1	71.8	1.10
		D	9.4	135.2	65.3	
		D	6.8	139.1	73.2	
		W	7.0	138.8	84.0	1.15
		(AVG AV)	7.8		(AVG TSR)	1.23

TABLE C-31 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	8.9	135.6	65.4	
	LOW	W	8.4	136.4	77.6	1.19
	AIR	W	8.0	137.0	66.2	1.05
	VOIDS	D	8.3	136.5	63.3	
	SECTION	D	8.4	136.4	62.6	
		W	8.5	136.2	69.5	1.11
ARR-MAZ		(AVG AV)	8.4		(AVG TSR)	1.12
ADHERE						
REGULAR		W	6.4	139.4	102.5	1.23
	HIGH	D	6.2	139.7	83.4	
	AIR	D	7.6	137.6	61.8	
	VOIDS	W	7.4	137.8	84.1	1.36
	SECTION	W	8.6	136.1	76.6	1.14
		D	9.8	134.3	67.0	
		(AVG AV)	7.7		(AVG TSR)	1.24
		W	10.7	134.8	74.2	1.16
	LOW	D	10.7	134.8	63.7	
	AIR	D	8.4	138.2	70.0	
	VOIDS	W	8.0	138.9	107.8	1.54
	SECTION	W	7.6	139.4	85.0	1.37
		D	7.6	139.4	62.1	
AQUASHIELD		(AVG AV)	8.8		(AVG TSR)	1.36
II						
		D	8.6	138.0	70.7	
	HIGH	W	8.8	137.6	108.2	1.53
	AIR	W	7.4	139.8	122.8	1.59
	VOIDS	D	7.1	140.3	77.1	
	SECTION	D	9.0	137.3	51.0	
		W	9.4	136.7	101.1	1.98
		(AVG AV)	8.4		(AVG TSR)	1.70

TABLE C-31 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	8.2	136.3	91.9	1.12
	LOW	D	7.3	137.6	82.0	
	AIR	D	6.5	138.9	76.9	
	VOIDS	W	6.1	139.4	84.0	1.09
	SECTION	W	7.8	136.9	103.6	1.05
		D	7.1	137.9	98.9	
		(AVG AV)	7.2		(AVG TSR)	1.09
BA 2000						
		D	6.6	138.6	91.4	
	HIGH	W	7.1	138.0	97.7	1.07
	AIR	W	7.8	136.9	89.9	1.10
	VOIDS	D	7.6	137.2	81.6	
	SECTION	D	8.2	136.4	80.9	
		W	9.2	134.9	95.2	1.18
		(AVG AV)	7.8		(AVG TSR)	1.12
		W	8.1	137.0	77.9	1.10
	LOW	D	7.9	137.4	71.0	
	AIR	D	8.5	136.4	66.6	
	VOIDS	W	8.6	136.3	74.5	1.12
	SECTION	W	7.2	138.4	61.0	0.94
		D	7.5	137.9	64.6	
		(AVG AV)	8.0		(AVG TSR)	1.05
PERMA-TAC						
		D	8.5	136.4	70.4	
	HIGH	W	9.2	135.5	74.8	1.06
	AIR	W	7.8	137.5	76.3	1.06
	VOIDS	D	8.0	137.2	72.2	
	SECTION	D	8.1	137.0	61.6	
		W	8.4	136.6	60.8	0.99
		(AVG AV)	8.3		(AVG TSR)	1.04

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-32 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 19
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	W	7.7	137.4	N/A	N/A
		D	5.3	140.9	109.8	
		D	5.3	140.9	96.6	
		W	5.3	140.9	74.5	0.77
		W	7.0	138.4	71.5	0.72
		D	6.6	139.0	98.7	
		(AVG AV)	6.2		(AVG TSR)	0.75
	HIGH AIR VOIDS SECTION	D	5.6	140.5	101.4	
		W	5.7	140.4	64.0	0.63
		W	4.8	141.7	81.9	0.77
		D	5.2	141.0	106.9	
		D	5.4	140.8	78.1	
		W	5.5	140.6	68.2	0.87
		(AVG AV)	5.4		(AVG TSR)	0.76
LIME SLURRY	LOW AIR VOIDS SECTION	W	5.2	141.5	129.6	1.29
		D	4.7	142.3	100.3	
		D	5.2	141.5	107.7	
		W	4.9	142.0	133.7	1.24
		W	5.0	141.8	133.3	0.93
		D	4.2	143.0	143.0	
		(AVG AV)	4.8		(AVG TSR)	1.16
	HIGH AIR VOIDS SECTION	D	5.4	141.2	110.7	
		W	5.4	141.2	121.4	1.10
		W	3.8	143.6	134.4	1.12
		D	3.6	143.9	120.0	
		D	4.8	142.0	111.7	
		W	4.5	142.6	124.8	1.12
		(AVG AV)	4.6		(AVG TSR)	1.11

TABLE C-32 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	6.6	139.1	104.0	
	LOW	W	6.8	138.7	94.9	0.91
	AIR	W	6.7	138.9	85.1	0.84
	VOIDS	D	6.2	139.6	100.9	
	SECTION	D	8.3	136.5	77.8	
		W	8.2	136.7	N/A	N/A
ARR-MAZ		(AVG AV)	7.1		(AVG TSR)	0.88
ADHERE						
REGULAR		W	4.2	142.7	145.8	1.25
	HIGH	D	4.6	142.1	116.4	
	AIR	D	5.5	140.7	104.0	
	VOIDS	W	6.5	139.2	113.8	1.09
	SECTION	W	3.9	143.1	142.3	1.21
		D	4.2	142.7	118.0	
		(AVG AV)	4.8		(AVG TSR)	1.18
		W	6.6	140.9	125.3	1.20
	LOW	D	6.7	140.8	104.3	
	AIR	D	6.6	140.9	92.1	
	VOIDS	W	6.8	140.7	108.1	1.17
	SECTION	W	6.0	141.8	115.9	1.18
		D	7.0	140.3	98.2	
AQUASHIELD II		(AVG AV)	6.6		(AVG TSR)	1.18
		D	7.0	140.4	110.5	
	HIGH	W	7.0	140.5	133.6	1.21
	AIR	W	6.3	141.4	94.7	1.12
	VOIDS	D	6.6	140.9	84.3	
	SECTION	D	6.8	140.6	106.6	
		W	7.6	139.5	100.7	0.94
		(AVG AV)	6.9		(AVG TSR)	1.09

TABLE C-32 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	W	7.0	138.2	91.2	0.86
		D	6.4	138.9	105.8	
		D	5.5	140.4	112.2	
		W	5.1	140.9	115.8	1.03
		W	4.9	141.3	146.2	1.07
		D	4.9	141.2	136.7	
		(AVG AV)	5.6		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	D	5.6	140.2	130.3	
		W	5.1	141.0	142.2	1.09
		W	3.9	142.8	149.8	1.27
		D	4.6	141.7	117.7	
		D	5.3	140.6	121.2	
		W	5.0	141.0	126.0	1.04
		(AVG AV)	4.9		(AVG TSR)	1.13
PERMA-TAC	LOW AIR VOIDS SECTION	W	7.6	137.8	75.5	0.73
		D	6.8	139.0	103.0	
		D	5.3	141.2	104.5	
		W	5.5	140.9	82.9	0.79
		W	8.5	136.4	80.9	1.12
		D	7.9	137.3	72.2	
		(AVG AV)	6.9		(AVG TSR)	0.88
	HIGH AIR VOIDS SECTION	D	4.9	141.8	105.4	
		W	5.9	140.4	104.6	0.99
		W	6.4	139.6	82.2	0.95
		D	7.0	138.7	86.2	
		D	5.7	140.7	100.9	
		W	5.9	140.3	98.0	0.97
		(AVG AV)	6.0		(AVG TSR)	0.97

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-33 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 19
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	3.8	143.1	28.6	0.24
	LOW	D	5.0	141.4	120.3	
	AIR	D	3.8	143.1	133.9	
	VOIDS	W	3.5	143.7	156.9	1.17
	SECTION	W	4.3	142.4	99.8	0.66
		D	3.9	143.1	150.4	
NO ADDITIVE (CONTROL)		(AVG AV)	4.0		(AVG TSR)	0.69
		D	4.2	142.6	121.6	
	HIGH	W	4.4	142.3	157.5	1.30
	AIR	W	4.3	142.4	110.9	0.77
	VOIDS	D	4.2	142.6	143.2	
	SECTION	D	3.9	143.0	133.0	
		W	3.9	143.0	115.0	0.86
		(AVG AV)	4.2		(AVG TSR)	0.98
		W	3.1	144.7	161.0	0.96
	LOW	D	3.4	144.2	167.3	
	AIR	D	3.1	144.7	166.4	
	VOIDS	W	2.7	145.2	151.5	0.91
	SECTION	W	3.3	144.3	194.4	1.23
		D	2.7	145.3	158.6	
LIME SLURRY		(AVG AV)	3.0		(AVG TSR)	1.03
		D	4.4	142.7	139.7	
	HIGH	W	3.9	143.5	163.2	1.17
	AIR	W	3.2	144.4	142.4	1.30
	VOIDS	D	2.6	145.4	109.4	
	SECTION	D	4.0	143.2	149.5	
		W	3.9	143.5	156.1	1.04
		(AVG AV)	3.7		(AVG TSR)	1.17

TABLE C-33 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	6.7	139.0	116.9	
	LOW	W	5.8	140.3	111.1	0.95
	AIR	W	3.6	143.6	150.2	0.98
	VOIDS	D	3.7	143.4	152.5	
	SECTION	D	2.9	144.5	119.2	
		W	3.6	143.6	137.8	1.16
ARR-MAZ ADHERE REGULAR		(AVG AV)	4.4		(AVG TSR)	1.03
		W	2.2	145.7	156.4	0.99
	HIGH	D	2.3	145.5	157.3	
	AIR	D	2.5	145.1	149.6	
	VOIDS	W	2.1	145.7	138.1	0.92
	SECTION	W	3.7	143.4	154.3	0.97
		D	3.6	143.5	159.8	
		(AVG AV)	2.8		(AVG TSR)	0.96
		W	6.1	141.8	149.2	1.00
	LOW	D	5.7	142.3	148.5	
	AIR	D	4.5	144.1	125.5	
	VOIDS	W	4.2	144.6	165.3	1.32
	SECTION	W	4.5	144.2	160.4	1.02
		D	4.3	144.5	157.5	
AQUASHIELD II		(AVG AV)	4.9		(AVG TSR)	1.11
		D	5.2	143.1	140.7	
	HIGH	W	4.5	144.2	178.4	1.27
	AIR	W	3.7	145.3	165.5	1.07
	VOIDS	D	4.2	144.6	155.1	
	SECTION	D	4.2	144.6	142.4	
		W	4.4	144.4	157.5	1.11
		(AVG AV)	4.4		(AVG TSR)	1.15

TABLE C-33 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
BA 2000	LOW AIR VOIDS SECTION	W	3.4	143.4	103.7	0.77
		D	3.8	142.9	135.4	
		D	2.6	144.6	155.0	
		W	3.0	144.0	185.5	1.20
		W	3.9	142.7	178.3	0.94
		D	3.1	143.9	189.9	
		(AVG AV)	3.3		(AVG TSR)	0.97
	HIGH AIR VOIDS SECTION	D	3.6	143.2	176.6	
		W	3.2	143.8	199.9	1.13
		W	2.5	144.7	180.6	1.04
		D	2.3	145.1	174.5	
		D	4.2	142.2	171.1	
		W	3.9	142.8	184.8	1.08
		(AVG AV)	3.3		(AVG TSR)	1.08
PERMA-TAC	LOW AIR VOIDS SECTION	W	2.7	145.2	49.4	0.48
		D	2.8	145.0	102.2	
		D	2.7	145.1	100.2	
		W	2.8	145.0	44.9	0.45
		W	3.8	143.4	152.8	1.00
		D	3.5	143.9	152.1	
		(AVG AV)	3.1		(AVG TSR)	0.65
	HIGH AIR VOIDS SECTION	D	3.0	144.7	153.1	
		W	2.6	145.3	175.9	1.15
		W	4.5	142.5	61.7	0.64
		D	4.1	143.0	96.0	
		D	3.7	143.7	168.6	
		W	4.2	142.8	153.0	0.91
		(AVG AV)	3.7		(AVG TSR)	0.90

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C 34 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 19
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	W	3.6	143.5	111.9	0.76
		D	4.0	142.8	147.5	
		D	4.3	142.5	168.4	
		W	4.4	142.3	160.9	0.96
		W	3.6	143.4	133.2	0.86
		D	3.9	143.0	154.7	
		(AVG AV)	4.0		(AVG TSR)	0.86
	HIGH AIR VOIDS SECTION	D	4.2	142.6	154.6	
		W	4.0	142.9	169.6	1.10
		W	3.8	143.2	109.2	0.63
		D	4.7	141.9	172.9	
		D	4.4	142.2	178.3	
		W	5.1	141.3	165.3	0.93
		(AVG AV)	4.4		(AVG TSR)	0.89
LIME SLURRY	LOW AIR VOIDS SECTION	W	3.4	144.1	198.3	1.16
		D	3.6	143.8	171.3	
		D	3.6	143.9	162.1	
		W	3.8	143.6	193.8	1.20
		W	3.9	143.4	188.2	1.25
		D	5.1	141.7	150.9	
		(AVG AV)	3.9		(AVG TSR)	1.20
	HIGH AIR VOIDS SECTION	D	3.4	144.2	171.5	
		W	3.3	144.3	184.7	1.08
		W	3.5	144.0	205.6	1.05
		D	3.3	144.3	196.3	
		D	3.1	144.7	164.0	
		W	3.1	144.7	178.9	1.09
		(AVG AV)	3.3		(AVG TSR)	1.07

TABLE C-4 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	6.4	139.4	151.1	
	LOW	W	6.2	139.7	137.3	0.91
	AIR	W	3.6	143.6	152.3	0.82
	VOIDS	D	3.1	144.3	186.8	
	SECTION	D	2.6	145.0	139.2	
		W	2.7	144.9	85.2	0.61
ARR-MAZ ADHERE REGULAR		(AVG AV)	4.1		(AVG TSR)	0.78
		W	2.7	144.8	161.7	0.84
	HIGH	D	2.7	144.9	191.6	
	AIR	D	1.6	146.4	165.8	
	VOIDS	W	1.5	146.7	177.3	1.07
	SECTION	W	3.8	143.2	172.0	0.91
		D	3.4	143.8	188.6	
		(AVG AV)	2.6		(AVG TSR)	0.94
		W	5.7	142.4	164.0	0.91
	LOW	D	5.1	143.3	180.8	
	AIR	D	4.6	144.0	169.1	
	VOIDS	W	4.7	143.9	164.7	0.97
	SECTION	W	4.7	143.9	172.4	1.01
		D	4.8	143.8	170.0	
AQUASHIELD II		(AVG AV)	4.9		(AVG TSR)	0.96
		D	5.2	143.1	166.6	
	HIGH	W	5.2	143.1	183.0	1.10
	AIR	W	4.9	143.5	173.1	1.05
	VOIDS	D	4.8	143.7	164.2	
	SECTION	D	4.9	143.5	165.2	
		W	4.9	143.6	162.8	0.99
		(AVG AV)	5.0		(AVG TSR)	1.05

TABLE C-34 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		W	3.1	143.9	186.5	0.94
	LOW	D	2.8	144.3	198.4	
	AIR	D	2.9	144.3	196.8	
	VOIDS	W	3.3	143.7	169.0	0.86
	SECTION	W	3.4	143.4	199.3	0.99
		D	3.5 -	143.2	201.8	
		(AVG AV)	3.2		(AVG TSR)	0.93
BA 2000						
		D	2.6	144.7	185.9	
	HIGH	W	3.1	143.9	208.7	1.12
	AIR	W	3.5	143.4	187.3	0.94
	VOIDS	D	3.9	142.7	199.1	
	SECTION	D	4.2	142.3	198.0	
		W	3.9	142.7	210.2	1.06
		(AVG AV)	3.5		(AVG TSR)	1.04
		W	4.4	142.5	138.0	0.86
	LOW	D	4.7	142.1	160.9	
	AIR	D	3.8	143.5	142.9	
	VOIDS	W	4.2 -	142.9	180.3	1.26
	SECTION	W	4.1	143.0	148.1	0.89
		D	4.3	142.7	167.2	
		(AVG AV)	4.3		(AVG TSR)	1.00
PERMA-TAC						
		D	4.5	142.4	164.6	
	HIGH	W	4.1	143.0	186.9	1.14
	AIR	W	3.3	144.2	119.1	1.10
	VOIDS	D	3.6	143.8	108.1	
	SECTION	D	4.5	142.4	164.6	
		W	4.1	143.1	174.7	1.06
		(AVG AV)	4.0		(AVG TSR)	1.10

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-35 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 21
PAVEMENT AGE = 0 MONTH (POST-CONSTRUCTION)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	7.8	136.5	64.2	
		W	7.8	136.6	34.1	0.53
		W	8.0	136.3	31.1	0.50
		D	7.9	136.4	62.7	
		D	9.5	134.0	47.9	
		W	8.8	135.1	31.0	0.65
		(AVG AV)	8.3		(AVG TSR)	0.56
	HIGH AIR VOIDS SECTION	W	9.5	134.0	23.4	0.47
		D	9.8	133.6	49.2	
		D	10.4	132.7	41.6	
		W	9.6	133.9	26.5	0.64
		W	9.5	134.0	19.4	0.48
		D	9.5	134.1	40.5	
		(AVG AV)	9.7		(AVG TSR)	0.53
LIME SLURRY	LOW AIR VOIDS SECTION	D	11.0	133.2	34.8	
		W	11.2	133.1	21.7	0.62
		W	10.2	134.4	40.1	1.02
		D	10.7	133.8	39.4	
		D	11.3	132.9	42.9	
		W	10.9	133.4	28.3	0.66
		(AVG AV)	10.9		(AVG TSR)	0.77
	HIGH AIR VOIDS SECTION	W	14.0	128.8	38.3	1.47
		D	13.0	130.3	26.0	
		D	11.3	132.9	36.7	
		W	11.5	132.5	36.5	0.99
		W	10.6	133.8	49.9	1.16
		D	10.8	133.6	43.0	
		(AVG AV)	11.9		(AVG TSR)	1.21

TABLE C-35 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
ARR-MAZ ADHERE HP	LOW AIR VOIDS SECTION	D	7.7	137.8	51.2	
		W	7.3	138.4	40.5	0.79
		W	8.7	136.4	38.8	0.70
		D	8.3	136.9	55.7	
		D	8.7	136.3	48.8	
		W	8.3	137.0	44.2	0.91
		(AVG AV)	8.2		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	W	7.6	138.0	36.1	0.80
		D	7.5	138.2	45.3	
		D	9.2	135.5	48.0	
		W	9.3	135.4	30.6	0.64
		W	12.0	131.4	26.1	0.69
		D	12.9	130.1	37.9	
		(AVG AV)	9.7		(AVG TSR)	0.71
AQUASHIELD II	LOW AIR VOIDS SECTION	D	6.4	139.2	64.0	
		W	6.4	139.2	58.7	0.92
		W	6.7	138.7	34.7	0.49
		D	6.4	139.2	70.8	
		D	7.2	138.0	64.2	
		W	7.1	138.1	49.8	0.78
		(AVG AV)	6.7		(AVG TSR)	0.73
	HIGH AIR VOIDS SECTION	W	9.5	136.3	57.7	1.09
		D	14.7	136.3	52.9	
		D	11.2	136.9	55.1	
		W	14.8	137.0	48.8	0.88
		W	9.7	137.4	50.6	0.87
		D	7.5	137.6	58.1	
		(AVG AV)	11.2		(AVG TSR)	0.95

TABLE C-35 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
DOW	LOW AIR VOIDS SECTION	D	9.3	137.3	57.5	
		W	9.0	137.7	44.7	0.78
		W	7.8	139.5	39.9	0.59
		D	7.9	139.4	67.1	
		D	9.4	137.1	52.1	
		W	9.3	137.3	25.2	0.48
		(AVG AV)	8.8		(AVG TSR)	0.62
	HIGH AIR VOIDS SECTION	W	10.5	135.5	28.2	0.54
		D	10.7	135.1	52.6	
		D	12.1	133.0	43.9	
		W	11.8	133.5	29.1	0.66
		W	13.8	130.4	15.5	0.39
		D	13.1	131.5	40.0	
		(AVG AV)	12.0		(AVG TSR)	0.53
FINA-B	LOW AIR VOIDS SECTION	D	6.7	138.2	62.9	
		W	6.9	138.0	50.5	0.80
		W	7.7	136.8	36.4	0.69
		D	7.5	137.1	52.6	
		D	6.9	137.9	57.1	
		W	6.9	137.9	44.7	0.78
		(AVG AV)	7.1		(AVG TSR)	0.76
	HIGH AIR VOIDS SECTION	W	7.2	137.6	48.2	0.84
		D	7.5	137.1	57.4	
		D	10.1	133.3	43.9	
		W	9.7	133.9	32.6	0.74
		W	7.5	137.0	47.8	0.67
		D	5.3	140.4	71.9	
		(AVG AV)	7.9		(AVG TSR)	0.75

TABLE C-35 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	9.2	136.2	52.8	
		W	9.0	136.4	52.7	1.00
		W	9.7	135.3	27.5	0.61
		D	9.6	135.6	44.9	
		D	8.4	137.3	53.0	
		W	8.6	137.1	41.4	0.78
		(AVG AV)	9.1		(AVG TSR)	0.80
	HIGH AIR VOIDS SECTION	W	12.9	130.5	22.3	0.48
		D	13.6	129.6	46.1	
		D	12.3	131.4	33.6	
		W	13.1	130.4	24.9	0.74
		W	9.8	135.3	38.4	0.97
		D	9.9	135.1	39.5	
		(AVG AV)	11.9		(AVG TSR)	0.73
PERMA-TAC	LOW AIR VOIDS SECTION	D	8.9	136.4	52.5	
		W	9.0	136.4	50.9	0.97
		W	9.6	135.5	46.8	1.00
		D	9.5	135.6	46.8	
		D	8.3	137.4	46.8	
		W	7.9	138.0	47.1	1.01
		(AVG AV)	8.9		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	W	11.7	132.3	24.7	0.78
		D	12.3	131.4	31.8	
		D	13.3	129.9	38.9	
		W	12.8	130.6	21.0	0.54
		W	12.2	131.5	25.8	0.72
		D	12.7	130.8	36.0	
		(AVG AV)	12.5		(AVG TSR)	0.68

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-36 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 21
PAVEMENT AGE = 6 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	5.2	140.5	94.8	
		W	5.4	140.2	49.4	0.52
		W	5.3	140.3	52.3	0.48
		D	5.5	139.9	109.0	
		D	6.1	139.1	98.7	
		W	6.2	139.0	46.7	0.47
		(AVG AV)	5.6		(AVG TSR)	0.49
	HIGH AIR VOIDS SECTION	W	5.7	139.6	50.9	0.50
		D	6.0	139.3	101.3	
		D	7.1	137.6	92.8	
		W	6.8	138.1	40.1	0.43
		W	6.2	139.0	59.6	0.62
		D	6.1	139.2	96.7	
		(AVG AV)	6.3		(AVG TSR)	0.52
LIME SLURRY	LOW AIR VOIDS SECTION	D	6.8	139.5	104.4	
		W	7.1	139.1	41.9	0.40
		W	7.1	139.1	39.5	0.40
		D	7.7	138.2	98.3	
		D	7.5	138.5	91.3	
		W	7.5	138.5	84.5	0.93
		(AVG AV)	7.3		(AVG TSR)	0.58
	HIGH AIR VOIDS SECTION	W	7.5	138.5	49.6	0.56
		D	7.8	138.0	88.0	
		D	6.9	139.4	95.9	
		W	7.3	138.8	68.1	0.71
		W	8.0	137.8	56.8	0.67
		D	7.8	138.1	85.3	
		(AVG AV)	7.6		(AVG TSR)	0.65

TABLE C-36 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	4.9	142.0	100.2	
	LOW	W	4.9	142.0	70.9	0.71
	AIR	W	5.9	140.5	56.2	0.72
	VOIDS	D	6.1	140.2	78.1	
	SECTION	D	5.8	140.6	91.3	
		W	6.2	140.1	50.9	0.56
ARR-MAZ ADHERE HP		(AVG AV)	5.6		(AVG TSR)	0.66
		W	5.6	141.0	72.5	0.72
	HIGH	D	5.6	140.9	100.9	
	AIR	D	6.5	139.7	90.2	
	VOIDS	W	6.4	139.7	44.1	0.49
	SECTION	W	6.8	139.2	56.4	0.62
		D	6.8	139.1	90.6	
		(AVG AV)	6.3		(AVG TSR)	0.61
		D	5.5	140.5	86.1	
	LOW	W	5.3	140.9	73.2	0.85
	AIR	W	4.8	141.6	75.9	0.66
	VOIDS	D	4.8	141.5	114.2	
	SECTION	D	4.9	141.5	105.2	
		W	4.6	141.9	83.7	0.80
AQUASHIELD II		(AVG AV)	5.0		(AVG TSR)	0.77
		W	5.8	140.0	66.1	0.69
	HIGH	D	6.0	139.8	95.6	
	AIR	D	5.7	140.2	94.5	
	VOIDS	W	5.6	140.3	70.3	0.74
	SECTION	W	5.4	140.7	66.7	0.76
		D	5.7	140.3	87.5	
		(AVG AV)	5.7		(AVG TSR)	0.73

TABLE C-3b (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
DOW	LOW AIR VOIDS SECTION	D	6.8	141.0	96.3	
		W	6.6	141.3	48.1	0.50
		W	6.4	141.6	52.7	0.47
		D	6.6	141.4	113.0	
		D	8.4	138.6	79.4	
		W	8.1	139.0	38.0	0.48
		(AVG AV)	7.2		(AVG TSR)	0.48
	HIGH AIR VOIDS SECTION	W	8.2	139.0	40.8	0.44
		D	8.1	139.0	92.8	
		D	8.8	138.0	93.6	
		W	8.8	138.0	35.0	0.37
		W	8.3	138.7	41.1	0.50
		D	8.9	137.9	82.7	
		(AVG AV)	8.5		(AVG TSR)	0.44
FINA-B	LOW AIR VOIDS SECTION	D	4.0	142.2	93.9	
		W	4.5	141.6	89.4	0.95
		W	4.4	141.7	73.8	0.75
		D	4.2	142.0	98.2	
		D	4.1	142.1	102.0	
		W	4.4	141.7	82.4	0.81
		(AVG AV)	4.3		(AVG TSR)	0.84
	HIGH AIR VOIDS SECTION	W	5.7	139.7	69.6	0.79
		D	5.8	139.6	87.6	
		D	6.5	138.6	80.1	
		W	6.5	138.5	59.9	0.75
		W	5.3	140.3	78.6	0.85
		D	5.3	140.4	92.7	
		(AVG AV)	5.9		(AVG TSR)	0.80

TABLE C-36 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	7.5	138.6	78.8	
		W	7.0	139.4	65.2	0.83
		W	6.8	139.7	57.1	0.63
		D	6.7	139.8	90.0	
		D	5.6	141.5	115.2	
		W	6.1	140.8	76.4	0.66
		(AVG AV)	6.6		(AVG TSR)	0.71
	HIGH AIR VOIDS SECTION	W	5.9	141.1	53.0	0.65
		D	6.6	140.1	82.0	
		D	7.1	139.3	81.0	
		W	7.5	138.8	49.8	0.62
		W	6.5	140.2	65.4	0.76
		D	6.5	140.2	85.7	
		(AVG AV)	6.7		(AVG TSR)	0.67
PERMA-TAC	LOW AIR VOIDS SECTION	D	6.0	140.8	102.4	
		W	6.0	140.9	66.2	0.65
		W	7.7	138.3	43.4	0.42
		D	7.2	139.1	104.0	
		D	5.6	141.4	103.1	
		W	5.7	141.2	66.9	0.65
		(AVG AV)	6.4		(AVG TSR)	0.57
	HIGH AIR VOIDS SECTION	W	7.5	138.6	49.0	0.58
		D	7.5	138.6	84.2	
		D	9.0	136.3	85.1	
		W	9.4	135.8	43.3	0.51
		W	9.6	135.5	36.2	0.43
		D	9.2	136.0	85.0	
		(AVG AV)	8.7		(AVG TSR)	0.51

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-37 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 21
PAVEMENT AGE = 12 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.1	145.0	136.7	
		W	2.3	144.7	113.1	0.83
		W	3.4	143.1	119.9	0.93
		D	3.5	142.9	128.8	
		D	4.0	142.2	129.8	
		W	3.9	142.4	106.3	0.82
		(AVG AV)	3.2		(AVG TSR)	0.86
	HIGH AIR VOIDS SECTION	W	4.1	142.0	113.7	0.96
		D	3.8	142.5	118.4	
		D	4.3	141.7	118.7	
		W	3.1	143.6	115.4	0.97
		W	4.5	141.5	112.2	0.96
		D	4.3	141.7	116.3	
		(AVG AV)	4.0		(AVG TSR)	0.97
LIME SLURRY	LOW AIR VOIDS SECTION	D	7.2	139.0	111.4	
		W	7.3	138.8	45.5	0.41
		W	6.4	140.2	57.4	0.48
		D	6.5	140.1	120.0	
		D	5.9	140.9	114.1	
		W	6.1	140.7	65.8	0.58
		(AVG AV)	6.6		(AVG TSR)	0.49
	HIGH AIR VOIDS SECTION	W	5.9	141.0	86.9	0.93
		D	6.5	140.0	93.2	
		D	5.2	142.0	104.5	
		W	5.3	141.8	87.1	0.83
		W	6.5	140.0	66.4	0.60
		D	6.6	139.9	109.8	
		(AVG AV)	6.0		(AVG TSR)	0.79

TABLE C-37 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	3.4	144.2	133.9	
	LOW	W	3.8	143.7	137.6	1.03
	AIR	W	4.0	143.4	124.5	0.92
	VOIDS	D	4.1	143.3	135.9	
	SECTION	D	3.4	144.3	146.9	
		W	4.8	142.1	63.7	0.43
ARR-MAZ ADHERE HP		(AVG AV)	3.9		(AVG TSR)	0.79
		W	3.6	144.0	121.7	1.90
	HIGH	D	3.4	144.2	64.0	
	AIR	D	4.1	143.2	151.7	
	VOIDS	W	4.2	143.0	51.2	0.34
	SECTION	W	5.3	141.3	50.1	0.37
		D	5.4	141.2	136.0	
		(AVG AV)	4.4		(AVG TSR)	0.87
		D	2.9	144.4	122.9	
	LOW	W	3.3	143.7	112.0	0.91
	AIR	W	3.3	143.8	120.8	0.99
	VOIDS	D	3.3	143.7	121.9	
	SECTION	D	2.2	145.4	142.7	
		W	2.6	144.8	133.9	0.94
AQUASHIELD II		(AVG AV)	3.0		(AVG TSR)	0.95
		W	4.6	141.9	113.1	0.94
	HIGH	D	4.3	142.3	120.0	
	AIR	D	3.5	143.5	122.6	
	VOIDS	W	3.1	144.1	133.5	1.09
	SECTION	W	3.5	143.5	81.7	0.65
		D	3.3	143.8	126.3	
		(AVG AV)	3.7		(AVG TSR)	0.89

TABLE C-37 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
DOW	LOW AIR VOIDS SECTION	D	5.5	143.0	115.4	
		W	5.3	143.2	78.6	0.68
		W	5.4	143.2	113.0	0.89
		D	4.5	144.5	127.1	
		D	6.6	141.4	115.3	
		W	6.2	141.9	31.3	0.27
		(AVG AV)	5.6		(AVG TSR)	0.61
	HIGH AIR VOIDS SECTION	W	7.0	140.7	90.7	0.72
		D	6.0	142.2	125.4	
		D	6.9	140.9	101.3	
		W	6.8	141.1	63.1	0.62
		W	7.1	140.5	61.3	N/A
		D	6.9	140.8	N/A	
		(AVG AV)	6.8		(AVG TSR)	0.67
FINA-B	LOW AIR VOIDS SECTION	D	2.7	144.2	119.2	
		W	2.8	144.1	124.5	1.04
		W	2.9	143.9	113.5	0.95
		D	3.2	143.5	119.9	
		D	3.5	143.0	135.1	
		W	3.1	143.5	132.5	0.98
		(AVG AV)	3.0		(AVG TSR)	0.99
	HIGH AIR VOIDS SECTION	W	4.0	142.3	111.9	0.98
		D	3.7	142.7	114.0	
		D	4.3	141.8	124.0	
		W	4.1	142.2	111.7	0.90
		W	4.0	142.2	89.7	0.79
		D	3.7	142.8	114.0	
		(AVG AV)	4.0		(AVG TSR)	0.89

TABLE C-37 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	4.5	143.3	113.5	
		W	4.7	143.0	125.7	1.11
		W	5.6	141.6	98.2	0.87
		D	4.9	142.6	113.5	
		D	4.5	143.2	124.5	
		W	4.8	142.8	83.0	0.67
		(AVG AV)	4.8		(AVG TSR)	0.88
	HIGH AIR VOIDS SECTION	W	2.9	145.5	148.0	1.15
		D	2.7	145.8	128.7	
		D	5.6	141.6	117.5	
		W	5.5	141.7	71.6	0.61
		W	5.2	142.1	95.0	0.90
		D	4.7	142.8	105.1	
		(AVG AV)	4.5		(AVG TSR)	0.89
PERMA-TAC	LOW AIR VOIDS SECTION	D	4.4	143.2	137.4	
		W	4.7	142.8	93.2	0.68
		W	5.5	141.6	66.0	0.55
		D	5.5	141.5	119.7	
		D	5.5	141.6	127.5	
		W	5.4	141.7	56.5	0.44
		(AVG AV)	5.2		(AVG TSR)	0.56
	HIGH AIR VOIDS SECTION	W	5.7	141.3	82.2	0.71
		D	5.6	141.4	116.4	
		D	6.7	139.8	111.3	
		W	6.3	140.4	67.3	0.60
		W	7.3	138.9	59.8	0.56
		D	7.3	138.9	106.6	
		(AVG AV)	6.5		(AVG TSR)	0.62

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

TABLE C-38 INDIRECT TENSILE TEST RESULTS OF FIELD CORES
DISTRICT 21
PAVEMENT AGE = 24 MONTHS

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
NO ADDITIVE (CONTROL)	LOW AIR VOIDS SECTION	D	2.2	144.9	90.3	
		W	2.3	144.7	119.7	1.33
		W	0.7	147.1	137.3	0.97
		D	0.9	146.7	140.9	
		D	2.6	144.3	142.0	
		W	2.5	144.5	120.0	0.85
		(AVG AV)	1.9		(AVG TSR)	1.05
	HIGH AIR VOIDS SECTION	D	2.1	145.0	161.3	
		W	N/A	N/A	N/A	N/A
		D	2.9	143.9	172.8	
		W	2.3	144.7	117.2	0.68
		W	2.4	144.5	138.0	N/A
		D	N/A	N/A	N/A	
		(AVG AV)	2.4		(AVG TSR)	0.68
LIME SLURRY	LOW AIR VOIDS SECTION	D	6.7	139.8	130.5	
		W	6.7	139.8	91.2	0.70
		W	3.8	144.1	116.4	0.77
		D	4.0	143.7	152.1	
		D	5.2	142.0	125.6	
		W	5.5	141.6	110.4	0.88
		(AVG AV)	5.3		(AVG TSR)	0.78
	HIGH AIR VOIDS SECTION	W	3.1	145.1	143.1	1.03
		D	3.4	144.7	138.9	
		D	4.4	143.1	152.0	
		W	4.5	143.0	114.4	0.75
		W	4.0	143.7	131.9	0.88
		D	4.2	143.4	149.3	
		(AVG AV)	4.0		(AVG TSR)	0.89

TABLE C-38 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
		D	0.9	147.9	185.7	
	LOW	W	1.3	147.4	170.7	0.92
	AIR	W	2.1	146.2	134.0	0.81
	VOIDS	D	2.2	146.1	165.3	
	SECTION	D	1.6	146.9	166.9	
		W	1.4	147.3	151.0	0.90
ARR-MAZ ADHERE HP		(AVG AV)	1.6		(AVG TSR)	0.88
		W	2.6	145.4	98.3	0.65
	HIGH	D	1.8	146.7	150:8	
	AIR	D	2.0	146.4	160.3	
	VOIDS	W	1.7	146.8	151.3	0.94
	SECTION	W	1.8	146.7	104.3	0.62
		D	1.1	147.7	169.1	
		(AVG AV)	1.8		(AVG TSR)	0.74
		D	1.1	147.0	166.3	
	LOW	W	0.9	147.4	189.8	1.14
	AIR	W	1.1	147.0	134.5	0.79
	VOIDS	D	0.9	147.3	170.1	
	SECTION	D	1.3	146.7	177.3	
		W	2.1	145.6	157.3	0.89
AQUASHIELD II		(AVG AV)	1.2		(AVG TSR)	0.94
		W	2.1	145.6	134.3	0.83
	HIGH	D	2.2	145.4	162.0	
	AIR	D	1.1	147.0	183.8	
	VOIDS	W	1.3	146.8	154.4	0.84
	SECTION	W	0.9	147.4	169.8	0.99
		D	0.9	147.4	171.0	
		(AVG AV)	1.4		(AVG TSR)	0.89

TABLE C-38 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
DOW	LOW AIR VOIDS SECTION	D	3.0	146.7	166.0	
		W	3.3	146.4	152.2	0.92
		W	2.9	146.9	142.7	0.99
		D	3.1	146.7	144.3	
		D	3.3	146.3	159.6	
		W	3.5	146.0	143.7	0.90
		(AVG AV)	3.2		(AVG TSR)	0.94
	HIGH AIR VOIDS SECTION	W	4.7	144.2	114.7	0.85
		D	5.1	143.6	134.5	
		D	N/A	N/A	N/A	
		W	4.5	144.6	142.7	N/A
		W	5.6	142.9	117.2	0.86
		D	4.5	144.5	137.0	
		(AVG AV)	4.9		(AVG TSR)	0.85
FINA-B	LOW AIR VOIDS SECTION	D	1.1	146.6	121.5	
		W	1.2	146.5	158.2	1.30
		W	1.3	146.2	155.1	0.97
		D	1.2	146.5	160.5	
		D	0.6	147.3	164.9	
		W	0.4	147.6	176.0	1.07
		(AVG AV)	1.0		(AVG TSR)	1.11
	HIGH AIR VOIDS SECTION	W	0.6	147.3	161.1	0.95
		D	0.8	147.1	169.3	
		D	0.7	147.1	183.8	
		W	1.0	146.7	143.6	0.78
		W	1.6	145.9	154.1	0.98
		D	1.5	146.0	156.9	
		(AVG AV)	1.0		(AVG TSR)	0.91

TABLE C-38 (Continued)

TYPE OF ADDITIVE	TEST SECTION	WET OR DRY	AIR VOIDS, %	SAMPLE DENSITY, PCF	TENSILE STRENGTH, PSI	TSR*
PAVEBOND LP	LOW AIR VOIDS SECTION	D	2.5	146.3	167.6	
		W	2.4	146.3	174.2	1.04
		W	2.1	146.8	162.7	1.01
		D	2.2	146.6	160.6	
		D	2.2	146.7	162.5	
		W	2.9	145.5	99.2	0.61
		(AVG AV)	2.4		(AVG TSR)	0.89
	HIGH AIR VOIDS SECTION	W	3.0	145.4	128.2	0.89
		D	3.3	145.0	144.6	
		D	2.4	146.3	159.2	
		W	2.6	146.0	155.6	0.98
		W	2.4	146.3	142.4	0.81
		D	2.2	146.7	175.4	
		(AVG AV)	2.7		(AVG TSR)	0.89
PERMA-TAC	LOW AIR VOIDS SECTION	D	N/A	N/A	N/A	
		W	2.7	145.8	103.9	N/A
		W	1.9	147.0	151.3	0.88
		D	2.0	146.8	171.1	
		W	N/A	N/A	N/A	N/A
		D	2.2	146.5	168.1	
		(AVG AV)	2.2		(AVG TSR)	0.88
	HIGH AIR VOIDS SECTION	W	3.7	144.3	70.4	0.47
		D	4.5	143.1	149.4	
		D	2.8	145.6	134.0	
		W	2.4	146.2	102.5	0.76
		W	2.9	145.5	144.1	0.89
		D	3.0	145.3	162.5	
		(AVG AV)	3.2		(AVG TSR)	0.71

*TSR = Tensile Strength Ratio
= Tensile Strength (Wet)/Tensile Strength (Dry)

APPENDIX D

TEXAS BOILING TEST DATA

TABLE D-1 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 17

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	50	50	50.0
LIME SLURRY	0	95	90	92.5
BA 2000	0	95	90	92.5
PERMA-TAC PLUS	0	95	85	90.0
NO ADDITIVE	6	60	50	55.0
LIME SLURRY	6	80	80	80.0
BA 2000	6	80	85	82.5
PERMA-TAC PLUS	6	80	80	80.0
NO ADDITIVE	12	70	50	60.0
LIME SLURRY	12	82	85	83.5
BA 2000	12	85	85	85.0
PERMA-TAC PLUS	12	75	75	75.0
NO ADDITIVE	24	65	50	57.5
LIME SLURRY	24	78	80	79.0
BA 2000	24	80	80	80.0
PERMA-TAC PLUS	24	60	70	65.0
NO ADDITIVE	36	70	60	65.0
LIME SLURRY	36	80	80	80.0
BA 2000	36	75	70	72.5
PERMA-TAC PLUS	36	75	70	72.5

* Note: The field cores were obtained from the high voids test section.

TABLE D-2 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 16

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	70	80	75.0
LIME SLURRY	0	75	80	77.5
AQUASHIELD	0	80	85	82.5
DOW	0	70	80	75.0
PAVEBOND LP	0	65	80	72.5
NO ADDITIVE	6	80	75	77.5
LIME SLURRY	6	85	80	82.5
AQUASHIELD	6	85	75	80.0
DOW	6	85	80	82.5
PAVEBOND LP	6	80	70	75.0
NO ADDITIVE	12	90	75	82.5
LIME SLURRY	12	85	75	80.0
AQUASHIELD	12	85	80	82.5
DOW	12	90	80	85.0
PAVEBOND LP	12	95	80	87.5
NO ADDITIVE	24	80	85	82.5
LIME SLURRY	24	80	85	82.5
AQUASHIELD	24	85	85	85.0
DOW	24	80	85	82.5
PAVEBOND LP	24	75	75	75.0
NO ADDITIVE	36	80	75	77.5
LIME SLURRY	36	90	75	82.5
AQUASHIELD	36	90	75	82.5
DOW	36	98	70	84.0
PAVEBOND LP	36	80	80	80.0

TABLE D-3 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 13

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	85	80	82.5
LIME SLURRY	0	90	90	90.0
BA 2000	0	95	90	92.5
PERMA-TAC PLUS	0	95	90	92.5
NO ADDITIVE	6	85	75	80.0
LIME SLURRY	6	95	85	90.0
BA 2000	6	98	85	91.5
PERMA-TAC PLUS	6	95	85	90.0
NO ADDITIVE	12	90	75	82.5
LIME SLURRY	12	90	85	87.5
BA 2000	12	90	80	85.0
PERMA-TAC PLUS	12	90	80	85.0
NO ADDITIVE	24	90	90	90.0
LIME SLURRY	24	90	90	90.0
BA 2000	24	80	85	82.5
PERMA-TAC PLUS	24	85	90	87.5
NO ADDITIVE	36	85	90	87.5
LIME SLURRY	36	90	90	90.0
BA 2000	36	83	80	81.5
PERMA-TAC PLUS	36	93	95	94.0

TABLE D-4 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 6

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	60	60	60.0
LIME SLURRY	0	60	60	60.0
PAVEBOND LP	0	85	90	87.5
PERMA-TAC	0	70	80	75.0
UNICHEM 8150	0	90	90	90.0
NO ADDITIVE	6	70	60	65.0
LIME SLURRY	6	50	60	55.0
PAVEBOND LP	6	60	75	67.5
PERMA-TAC	6	70	80	75.0
UNICHEM 8150	6	70	75	72.5
NO ADDITIVE	12	70	70	70.0
LIME SLURRY	12	85	85	85.0
PAVEBOND LP	12	85	85	85.0
PERMA-TAC	12	65	75	70.0
UNICHEM 8150	12	70	75	72.5
NO ADDITIVE	24	78	70	74.0
LIME SLURRY	24	98	85	91.5
PAVEBOND LP	24	78	75	76.5
PERMA-TAC	24	95	90	92.5
UNICHEM 8150	24	95	80	87.5
NO ADDITIVE	36	90	85	87.5
LIME SLURRY	36	75	70	72.5
PAVEBOND LP	36	90	80	85.0
PERMA-TAC	36	95	90	92.5
UNICHEM 8150	36	80	75	77.5

TABLE D-5 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 25

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	75	70	72.5
LIME SLURRY	0	90	80	85.0
AQUASHIELD II	0	75	70	72.5
FINA-A	0	95	90	92.5
PERMA-TAC	0	90	85	87.5
UNICHEM 8150	0	80	75	77.5
NO ADDITIVE	6	80	70	75.0
LIME SLURRY	6	100	90	95.0
AQUASHIELD II	6	100	80	90.0
FINA-A	6	100	90	95.0
PERMA-TAC	6	100	80	90.0
UNICHEM 8150	6	90	75	82.5
NO ADDITIVE	12	85	70	77.5
LIME SLURRY	12	90	85	87.5
AQUASHIELD II	12	87	80	83.5
FINA-A	12	90	85	87.5
PERMA-TAC	12	90	80	85.0
UNICHEM 8150	12	90	75	82.5
NO ADDITIVE	24	80	75	77.5
LIME SLURRY	24	95	85	90.0
AQUASHIELD II	24	70	70	70.0
FINA-A	24	95	90	92.5
PERMA-TAC	24	70	70	70.0
UNICHEM 8150	24	95	80	87.5
NO ADDITIVE	36	80	85	82.5
LIME SLURRY	36	95	95	95.0
AQUASHIELD II	36	95	90	92.5
FINA-A	36	95	90	92.5
PERMA-TAC	36	80	85	82.5
UNICHEM 8150	36	80	80	80.0

TABLE D-6 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 1

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	98	85	91.5
LIME SLURRY	0	100	90	95.0
ARR-MAZ (HP)	0	100	90	95.0
DOW	0	100	85	92.5
FINA-A	0	100	95	97.5
INDULIN AS-1	0	100	90	95.0
PAVEBOND SP	0	100	95	97.5
PERMA-TAC PLUS	0	100	90	95.0
NO ADDITIVE	6	95	85	90.0
LIME SLURRY	6	100	85	92.5
ARR-MAZ (HP)	6	100	85	92.5
DOW	6	100	85	92.5
FINA-A	6	100	85	92.5
INDULIN AS-1	6	100	80	90.0
PAVEBOND SP	6	100	85	92.5
PERMA-TAC PLUS	6	100	85	92.5
NO ADDITIVE	12	95	80	87.5
LIME SLURRY	12	95	80	87.5
ARR-MAZ (HP)	12	95	85	90.0
DOW	12	80	85	82.5
FINA-A	12	80	90	85.0
INDULIN AS-1	12	95	90	92.5
PAVEBOND SP	12	95	95	95.0
PERMA-TAC PLUS	12	95	80	87.5
NO ADDITIVE	24	90	80	85.0
LIME SLURRY	24	95	90	92.5
ARR-MAZ (HP)	24	95	85	90.0
DOW	24	85	80	82.5
FINA-A	24	95	90	92.5
INDULIN AS-1	24	95	85	90.0
PAVEBOND SP	24	85	80	82.5
PERMA-TAC PLUS	24	90	80	85.0

TABLE D-7 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 19

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	95	80	87.5
LIME SLURRY	0	90	80	85.0
ARR-MAZ (REG)	0	95	85	90.0
AQUASHIELD II	0	95	85	90.0
BA 2000	0	95	85	90.0
PERMA-TAC	0	95	85	90.0
NO ADDITIVE	6	85	75	80.0
LIME SLURRY	6	95	85	90.0
ARR-MAZ (REG)	6	95	80	87.5
AQUASHIELD II	6	95	85	90.0
BA 2000	6	95	80	87.5
PERMA-TAC	6	90	85	87.5
NO ADDITIVE	12	80	85	82.5
LIME SLURRY	12	80	80	80.0
ARR-MAZ (REG)	12	80	85	82.5
AQUASHIELD II	12	85	85	85.0
BA 2000	12	80	85	82.5
PERMA-TAC	12	60	60	60.0
NO ADDITIVE	24	80	75	77.5
LIME SLURRY	24	85	75	80.0
ARR-MAZ (REG)	24	85	85	85.0
AQUASHIELD II	24	90	85	87.5
BA 2000	24	90	90	90.0
PERMA-TAC	24	80	70	75.0

TABLE D-8 BOILING TEST RESULTS OF FIELD CORES
DISTRICT 21

TYPE OF ADDITIVE	PAVEMENT AGE, MONTH	ASPHALT RETAINED AFTER BOILING, % RATING 1	RATING 2	AVG.
NO ADDITIVE	0	20	30	25.0
LIME SLURRY	0	50	40	45.0
ARR-MAZ (HP)	0	50	50	50.0
AQUASHIELD II	0	65	70	67.5
DOW	0	50	45	47.5
FINA-B	0	60	70	65.0
PAVEBOND LP	0	65	60	62.5
PERMA-TAC	0	60	60	60.0
NO ADDITIVE	6	60	45	52.5
LIME SLURRY	6	75	65	70.0
ARR-MAZ (HP)	6	80	70	75.0
AQUASHIELD II	6	80	70	75.0
DOW	6	75	55	65.0
FINA-B	6	75	75	75.0
PAVEBOND LP	6	75	70	72.5
PERMA-TAC	6	75	75	75.0
NO ADDITIVE	12	50	50	50.0
LIME SLURRY	12	60	50	55.0
ARR-MAZ (HP)	12	70	60	65.0
AQUASHIELD II	12	80	70	75.0
DOW	12	55	50	52.5
FINA-B	12	80	70	75.0
PAVEBOND LP	12	65	55	60.0
PERMA-TAC	12	70	60	65.0
NO ADDITIVE	24	55	50	52.5
LIME SLURRY	24	80	60	70.0
ARR-MAZ (HP)	24	70	60	65.0
AQUASHIELD II	24	75	60	67.5
DOW	24	55	50	52.5
FINA-B	24	75	60	67.5
PAVEBOND LP	24	70	55	62.5
PERMA-TAC	24	65	50	57.5

APPENDIX E

ADJUSTED TENSILE STRENGTH RATIO BY PROJECT

TABLE E.1 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 17 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Samples
Control	0	5.8	60.7	14.8	75.5	8
Control	6	3.2	77.7	-2.1	75.6	8
Control	12	2.7	83.5	-5.1	78.4	8
Control	24	2.5	93.4	-6.7	86.7	8
Control	36	2.6	89.4	-5.7	83.7	8
Control	48	2.9	91.3	-3.9	87.4	8
	AVG. =	3.3	82.7	-1.5	81.2	
Lime Slurry	0	3.7	100.2	0.6	100.8	6
Lime Slurry	6	1.8	118.4	-8.0	110.4	6
Lime Slurry	12	2.3	100.9	-5.9	95.0	6
Lime Slurry	24	1.9	112.9	-7.7	105.2	6
Lime Slurry	36	1.5	92.0	-9.7	82.3	6
Lime Slurry	48	1.6	113.8	-8.9	104.9	6
	AVG. =	2.1	106.4	-6.6	99.8	
BA 2000	0	6.6	93.5	7.3	100.8	8
BA 2000	6	3.6	98.3	0.3	98.6	8
BA 2000	12	3.5	94.0	-0.1	93.9	8
BA 2000	24	3.0	110.8	-1.2	109.6	8
BA 2000	36	3.8	81.9	0.5	82.4	8
BA 2000	48	3.8	91.3	0.6	91.9	8
	AVG. =	4.0	95.1	1.1	96.2	
Perma-Tac Plus	0	5.9	77.9	35.1	113.0	8
Perma-Tac Plus	6	4.0	95.2	7.3	102.5	8
Perma-Tac Plus	12	4.4	93.0	12.2	105.2	8
Perma-Tac Plus	24	3.9	106.0	5.7	111.7	8
Perma-Tac Plus	36	3.5	84.9	-0.7	84.2	8
Perma-Tac Plus	48	3.9	95.0	5.8	100.8	8
	AVG. =	3.5	92.0	10.9	102.9	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.2 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 16 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	9.6	68.6	4.1	72.7	6
Control	6	6.6	76.1	0.3	76.4	6
Control	12	5.2	73.2	-1.5	71.7	6
Control	24	4.1	87.1	-2.9	84.2	6
Control	36	3.6	61.3	-3.6	57.7	6
	AVG. =	5.8	72.3	0.2	72.5	
Lime Slurry	0	8.6	89.7	1.5	91.2	6
Lime Slurry	6	6.0	82.6	-0.3	82.3	6
Lime Slurry	12	4.5	86.5	-1.3	85.2	6
Lime Slurry	24	3.7	95.7	-2.0	93.7	6
Lime Slurry	36	2.9	85.5	-2.5	83.1	6
	AVG. =	5.2	88.1	-1.0	87.1	
Aquashield	0	10.2	79.7	3.1	82.8	6
Aquashield	6	8.2	81.9	1.5	83.4	6
Aquashield	12	6.9	79.5	0.3	79.8	6
Aquashield	24	5.9	83.0	-0.5	82.5	6
Aquashield	36	5.2	80.4	-1.0	79.4	6
	AVG. =	7.3	80.9	0.7	81.6	
DOW	0	9.2	69.7	9.7	79.4	6
DOW	6	7.8	73.6	4.9	78.5	6
DOW	12	6.3	75.3	-0.3	75.0	6
DOW	24	6.1	76.0	-1.0	75.0	6
DOW	36	5.6	78.4	-2.7	75.7	6
	AVG. =	7	74.6	2.1	76.7	
Pavebond LP	0	10.5	77.0	-9.3	67.7	6
Pavebond LP	6	7.4	88.2	-2.3	86.0	6
Pavebond LP	12	6.2	85.0	0.4	85.4	6
Pavebond LP	24	5.0	69.1	3.1	72.2	6
Pavebond LP	36	4.8	64.0	3.7	67.7	6
	AVG. =	6.8	76.7	-0.9	75.8	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.3 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 13 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	5.9	84.4	3.5	87.9	6
Control	6	3.7	89.9	0.8	90.7	6
Control	12	2.4	96.4	-0.6	95.8	6
Control	24	1.9	99.3	-1.3	98.0	6
Control	36	2.0	69.1	-1.2	67.9	6
	AVG. =	3.2	87.7	0.4	88.1	
Lime Slurry	0	5.4	92.3	18.7	111.0	6
Lime Slurry	6	3.7	104.6	5.5	110.1	6
Lime Slurry	12	2.3	112.5	-5.1	107.4	6
Lime Slurry	24	2.0	115.3	-7.8	107.5	6
Lime Slurry	36	1.7	127.2	-9.6	117.6	6
	AVG. =	2.9	111.0	-0.3	110.7	
BA 2000	0	5.9	90.3	14.7	105.0	6
BA 2000	6	3.7	99.5	3.7	103.2	6
BA 2000	12	2.4	115.5	-2.8	112.7	6
BA 2000	24	2.1	112.3	-4.5	107.8	6
BA 2000	36	1.7	107.2	-6.2	101.0	6
	AVG. =	3.2	105.0	0.9	105.9	
Perma-Tac Plus	0	5.1	102.0	0.1	102.1	6
Perma-Tac Plus	6	2.9	102.4	-4.1	98.3	6
Perma-Tac Plus	12	2.1	112.9	-0.2	112.7	6
Perma-Tac Plus	24	1.3	110.5	-0.4	110.1	6
Perma-Tac Plus	36	1.6	89.8	-0.3	89.5	6
	AVG. =	2.9	103.8	-1.3	102.5	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.4 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 6 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	9.6	47.7	15.8	63.5	6
Control	6	7.4	67.3	2.5	69.8	6
Control	12	5.9	80.1	-6.9	73.2	6
Control	24	8.4	72.0	8.7	80.7	6
Control	36	7.0	84.7	0.1	84.8	6
	AVG. =	7.7	70.3	4.1	74.4	
Lime SLurry	0	9.6	47.0	20.2	67.2	6
Lime SLurry	6	6.8	71.0	-1.5	69.5	6
Lime SLurry	12	4.9	90.3	-16.1	74.2	6
Lime SLurry	24	6.8	101.3	-1.9	99.4	6
Lime SLurry	36	7.6	70.2	4.9	75.1	6
	AVG. =	7.1	76.0	1.1	77.1	
Pavebond LP	0	9.9	68.0	6.3	74.3	6
Pavebond LP	6	7.8	87.9	1.8	89.7	6
Pavebond LP	12	5.5	93.4	-3.2	90.2	6
Pavebond LP	24	5.5	83.6	-3.4	80.2	6
Pavebond LP	36	4.8	77.2	-4.8	72.4	6
	AVG. =	6.7	82.1	-0.7	81.4	
Perma-Tac	0	8.7	63.4	8.0	71.4	6
Perma-Tac	6	6.1	90.0	-4.0	86.0	6
Perma-Tac	12	6.0	70.1	-4.4	65.7	6
Perma-Tac	24	5.7	87.5	-5.7	81.8	6
Perma-Tac	36	5.3	78.6	-8.0	70.6	6
	AVG. =	6.4	77.9	-2.8	75.1	
Unichem 8150	0	9.7	65.2	12.3	77.5	6
Unichem 8150	6	7.8	85.4	3.6	89.0	6
Unichem 8150	12	6.9	70.2	-0.3	69.9	6
Unichem 8150	24	5.5	87.9	-6.5	81.4	6
Unichem 8150	36	5.5	80.9	-6.6	74.3	6
	AVG. =	7.1	77.9	0.5	78.4	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.5 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 25 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	10.6	58.6	15.9	74.5	6
Control	6	4.8	53.3	1.4	54.7	6
Control	12	4.8	71.3	1.4	72.7	6
Control	24	3.9	85.1	-1.0	84.1	6
Control	36	3.3	75.9	-2.5	73.4	6
	AVG. =	5.5	68.9	3.0	71.9	
Lime SLurry	0	8.1	99.2	0.7	99.9	6
Lime SLurry	6	3.8	97.8	-0.1	97.7	6
Lime SLurry	12	3.5	100.8	-0.2	100.6	6
Lime SLurry	24	3.0	94.3	-0.2	94.1	6
Lime SLurry	36	3.0	99.0	-0.3	98.7	6
	AVG. =	4.3	98.2	0.0	98.2	
Aqushield II	0	9.6	79.4	3.7	83.1	6
Aqushield II	6	3.4	64.3	-0.6	63.7	6
Aqushield II	12	3.3	78.0	-0.7	77.3	6
Aqushield II	24	2.8	77.6	-1.0	76.6	6
Aqushield II	36	1.9	89.4	-1.7	87.7	6
	AVG. =	4.4	77.3	0.4	77.7	
FINA-A	0	9.4	106.6	-9.0	97.6	6
FINA-A	6	2.5	91.9	3.2	95.1	6
FINA-A	12	3.5	97.9	1.4	99.3	6
FINA-A	24	2.5	85.4	3.2	88.6	6
FINA-A	36	1.9	93.2	4.2	97.4	6
	AVG. =	3.9	95.0	0.6	95.6	
Perma-Tac	0	8.4	87.2	0.6	87.8	6
Perma-Tac	6	2.2	87.3	-0.2	87.1	6
Perma-Tac	12	2.5	72.8	-0.3	72.6	6
Perma-Tac	24	1.8	81.8	-0.4	81.4	6
Perma-Tac	36	1.4	82.4	-0.3	82.1	6
	AVG. =	3.2	82.3	-0.1	82.2	
Unichem 8150	0	9.0	71.9	1.9	73.8	6
Unichem 8150	6	4.1	48.0	0.0	48.0	6
Unichem 8150	12	4.0	76.5	-0.1	76.4	6
Unichem 8150	24	3.1	77.9	-0.5	77.4	6
Unichem 8150	36	2.9	71.0	-0.5	70.5	6
	AVG. =	4.6	69.1	0.1	69.2	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.6 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 1 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	7.6	89.7	-1.4	88.3	6
Control	6	4.6	90.0	0.1	90.1	6
Control	12	4.5	79.5	0.2	79.7	6
Control	24	4.5	55.7	0.1	55.8	6
	AVG. =	5.3	78.7	-0.2	78.5	
Lime Slurry	0	6.6	125.9	-7.5	118.4	6
Lime Slurry	6	3.3	123.6	6.2	129.8	6
Lime Slurry	12	3.8	119.9	4.3	124.2	6
Lime Slurry	24	3.3	92.1	6.3	98.4	6
	AVG. =	4.3	115.4	2.3	117.7	
ARR-MAZ (HP)	0	7.7	127.2	-8.2	119.0	6
ARR-MAZ (HP)	6	2.8	116.4	5.7	122.1	6
ARR-MAZ (HP)	12	3.8	105.1	2.7	107.8	6
ARR-MAZ (HP)	24	3.4	107.3	4.0	111.3	6
	AVG. =	4.5	114.3	0.8	115.1	
DOW	0	8.6	104.2	-22.8	81.4	6
DOW	6	4.5	98.3	1.9	100.2	6
DOW	12	5.0	74.1	-1.4	72.7	6
DOW	24	5.2	50.1	-2.3	47.8	6
	AVG. =	5.8	81.7	-6.2	75.5	
FINA-A	0	5.9	105.2	3.1	108.3	6
FINA-A	6	3.9	114.4	-2.6	111.8	6
FINA-A	12	3.5	120.4	-3.8	116.6	6
FINA-A	24	3.2	101.4	-4.5	96.9	6
	AVG. =	4.1	110.4	-2.0	108.4	
Indulin AS-1	0	6.8	115.7	-5.0	110.7	6
Indulin AS-1	6	3.0	114.6	4.6	119.2	6
Indulin AS-1	12	3.8	97.6	2.5	100.1	6
Indulin AS-1	24	3.3	89.6	3.6	93.2	6
	AVG. =	4.2	104.4	1.4	105.8	

TABLE E.6 (CONTINUED)

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Pavebond Sp.	0	7.8	102.2	0.9	103.1	6
Pavebond Sp.	6	5.1	106.3	0.1	106.4	6
Pavebond Sp.	12	3.9	121.0	-0.3	120.7	6
Pavebond Sp.	24	3.2	89.0	-0.5	88.5	6
	AVG. =	5.0	104.5	0.2	104.7	
Perma-Tac Plus	0	8.0	113.0	-13.4	99.6	6
Perma-Tac Plus	6	4.5	93.8	1.4	95.2	6
Perma-Tac Plus	12	4.5	76.6	1.4	78.0	6
Perma-Tac Plus	24	4.3	86.6	2.2	88.8	6
	AVG. =	5.3	92.5	-2.1	90.4	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.7 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 19 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	9.0	82.9	3.3	86.2	6
Control	6	5.6	75.3	0.3	75.6	6
Control	12	4.1	83.5	-1.2	82.3	6
Control	24	4.2	87.2	-1.1	86.1	6
	AVG. =	5.7	82.5	0.1	82.6	
Lime Slurry	0	7.0	116.3	-2.5	113.8	6
Lime Slurry	6	4.7	113.3	1.0	114.3	6
Lime Slurry	12	3.3	110.2	3.1	113.3	6
Lime Slurry	24	3.6	113.6	2.7	116.3	6
	AVG. =	4.7	113.4	1.0	114.4	
ARR-MAZ	0	8.0	118.0	-8.2	109.8	6
ARR-MAZ	6	5.5	106.2	-0.5	105.7	6
ARR-MAZ	12	3.6	99.6	5.4	105.0	6
ARR-MAZ	24	3.4	86.0	6.0	92.0	6
	AVG. =	5.1	102.3	0.9	103.2	
Aquashield II	0	8.6	153.0	-27.5	125.5	6
Aquashield II	6	6.8	113.9	-11.9	102.0	6
Aquashield II	12	4.6	113.0	6.2	119.2	6
Aquashield II	24	4.9	100.6	3.4	104.0	6
	AVG. =	6.2	120.1	-7.4	112.7	
BA 2000	0	7.5	110.1	-3.0	107.1	6
BA 2000	6	5.3	106.1	0.1	106.2	6
BA 2000	12	3.3	102.5	3.0	105.5	6
BA 2000	24	3.3	98.5	2.9	101.4	6
	AVG. =	4.8	104.3	0.8	105.1	
Perma-Tac	0	8.2	104.4	-9.3	95.1	6
Perma-Tac	6	6.5	92.7	-3.6	89.1	6
Perma-Tac	12	3.4	77.2	6.6	83.8	6
Perma-Tac	24	4.1	105.1	4.0	109.1	6
	AVG. =	5.5	94.9	-0.6	94.3	

* TSR Means adjusted for differences in the covariable air voids.

TABLE E.8 ADJUSTED TENSILE STRENGTH RATIO (TSR) MEANS FOR DISTRICT 21 FIELD CORES

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Control	0	9.0	54.4	20.4	74.8	6
Control	6	6.0	50.4	0.8	51.2	6
Control	12	3.6	91.3	-14.1	77.2	6
Control	24	2.1	95.6	-24.0	71.6	6
	AVG. =	5.4	70.9	-2.2	68.7	
Lime Slurry	0	11.4	98.8	-17.6	81.2	6
Lime Slurry	6	7.4	61.1	-5.1	56.0	6
Lime Slurry	12	6.3	63.9	-1.4	62.5	6
Lime Slurry	24	4.6	83.5	3.8	87.3	6
	AVG. =	7.4	76.8	-5.0	71.8	
ARR-MAZ (HP)	0	9.0	75.3	6.9	82.2	6
ARR-MAZ (HP)	6	6.0	63.6	0.3	63.9	6
ARR-MAZ (HP)	12	4.1	83.1	-3.8	79.3	6
ARR-MAZ (HP)	24	1.7	80.8	-9.2	71.6	6
	AVG. =	5.2	75.7	-1.5	74.2	
Aquashield II	0	9.0	83.8	1.3	85.1	6
Aquashield II	6	5.3	75.1	-0.2	74.9	6
Aquashield II	12	3.3	92.0	-1.0	91.0	6
Aquashield II	24	1.3	91.3	-1.8	89.5	6
	AVG. =	4.7	85.6	-0.5	85.1	
DOW	0	10.4	57.3	22.9	80.2	6
DOW	6	7.8	45.9	10.1	56.0	6
DOW	12	6.0	63.7	1.0	64.7	6
DOW	24	3.9	90.3	-9.7	80.6	6
	AVG. =	7.2	63.2	7.2	70.4	
FINA-B	0	7.5	75.4	6.5	81.9	6
FINA-B	6	5.1	81.7	-3.0	78.7	6
FINA-B	12	3.5	94.0	-9.1	84.9	6
FINA-B	24	1.0	100.8	-18.9	81.9	6
	AVG. =	4.3	88.0	-6.2	81.8	

TABLE E.8 (CONTINUED)

Type of Additive	Core Age, Month	Air Voids Mean, %	Observed TSR Mean, %	Covariance Adjustment %	Adjusted* TSR Mean, %	Number of Sample
Pavebond LP	0	10.5	76.5	11.7	88.2	6
Pavebond LP	6	6.7	69.2	2.0	71.2	6
Pavebond LP	12	4.6	88.4	-3.0	85.4	6
Pavebond LP	24	2.5	89.0	-8.3	80.7	6
	AVG. =	6.1	80.7	0.7	81.4	
Perma-Tac	0	10.7	83.4	2.6	86.0	6
Perma-Tac	6	7.5	53.8	0.9	54.7	6
Perma-Tac	12	5.8	59.1	0.0	59.1	6
Perma-Tac	24	2.9	75.2	-1.6	73.6	6
	AVG. =	7.1	67.2	1.2	68.4	

* TSR Means adjusted for differences in the covariable air voids.

APPENDIX F

ANOVA AND MULTIPLE COMPARISONS BY PROJECT

TABLE F.1 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 17.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	12967.40	3	4322.47	18.71	0.000
AGE	6465.67	5	1293.13	5.60	0.000
Interaction	5345.11	15	356.34	1.54	0.096
Error	36043.99	156	231.05		
Total	60822.18	179			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	81.22	---
Lime	99.76	Significant
BA 2000	96.19	Significant
Perma-Tac +	102.89	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 6.64

TABLE F.2 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 16.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	3889.77	4	972.44	4.12	0.004
AGE	1532.84	4	383.21	1.62	0.172
Interaction	3546.77	16	221.67	0.94	0.527
Error	29491.53	125	235.93		
Total	38460.90	149			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	72.51	---
Lime	87.10	Significant
Aquashield	81.59	Significant
DOW	76.69	Not significant
Pavebond LP	75.79	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 7.89

TABLE F.3 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 13.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	8566.00	3	2855.33	20.46	C.000
AGE	2581.33	4	645.33	4.62	0.020
Interaction	3867.46	12	322.29	2.31	0.012
Error	13954.86	100	139.55		
Total	28969.65	119			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	88.05	---
Lime	110.69	Significant
BA 2000	105.92	Significant
Perma-Tac +	102.53	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 6.78

TABLE F.4 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 6.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	934.26	4	233.57	1.27	0.286
AGE	3602.52	4	900.63	4.89	0.001
Interaction	6776.85	16	423.55	2.30	0.005
Error	23001.90	125	184.02		
Total	34315.54	149			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	74.39	---
Lime	77.07	Not significant
Pavebond LP	81.37	Not significant
Perma-Tac	75.10	Not significant
Unichem 815	78.40	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. The main effect is not significant, therefore we declare no significant differences between means.

TABLE F.5 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 25.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	21941.63	5	4388.33	19.55	0.000
AGE	3129.13	4	782.28	3.48	0.009
Interaction	6580.66	20	329.03	1.47	0.102
Error	33677.56	150	224.52		
Total	65328.99	179			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	71.88	---
Lime	98.18	Significant
Aquashield	77.68	Not significant
FINA-A	95.63	Significant
Perma-Tac	82.18	Significant
Unichem 815	69.21	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 8.04

TABLE F.6 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 1.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	43619.40	7	6231.34	22.23	0.000
AGE	15426.89	3	5142.30	18.34	0.000
Interaction	10079.17	21	479.96	1.71	0.034
Error	44859.56	160	280.37		
Total	113985.03	191			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	78.49	---
Lime	117.69	Significant
ARR-MAZ HP	115.07	Significant
DOW	75.54	Not significant
FINA-A	108.40	Significant
Indulin AS	105.80	Significant
Pavebond Sp	104.68	Significant
Perma-Tac +	90.40	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 11.14

TABLE F.7 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 19.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	17182.35	5	3436.47	12.43	0.000
AGE	1038.85	3	346.28	1.25	0.294
Interaction	5138.51	15	342.57	1.24	0.252
Error	33169.43	120	276.41		
Total	56529.29	143			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	82.55	---
Lime	114.39	Significant
ARR-MAZ	103.14	Significant
Aquashield	112.66	Significant
BA 2000	105.0485	Significant
Perma-Tac	94.27	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 9.65

TABLE F.8 RESULTS OF MULTIPLE COMPARISONS USING ADJUSTED TSR MEANS FOR DISTRICT 21.

1. Analysis of variance: TSR by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	7344.24	7	1049.18	3.30	0.003
AGE	10208.22	3	3402.74	10.69	0.000
Interaction	5890.08	21	280.48	0.88	0.616
Error	50941.79	160	318.39		
Total	74384.33	191			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean TSR	Control
Control	68.69	---
Lime	71.75	Not significant
ARR-MAZ HP	74.24	Not significant
Aquashield	85.13	Significant
DOW	70.38	Not significant
FINA-B	81.83	Significant
Pavebond LP	81.37	Significant
Perma-Tac	68.35	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 10.87

TABLE F.9 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 17.

1. Analysis of variance: BOILING by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	4286.88	3	1428.96	49.15	0.000
AGE	542.25	4	135.56	4.66	0.008
Interaction	1071.75	12	89.31	3.07	0.013
Error	581.50	20	29.08		
Total	6482.38	39			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOILING	Control
Control	57.5	---
Lime	83.0	Significant
BA 2000	82.5	Significant
Perma-Tac +	76.5	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 7.09

TABLE ‹P.10 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 16.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	144.32	4	36.08	0.65	0.630
AGE	276.32	4	69.08	1.25	0.315
Interaction	288.28	16	18.02	0.33	0.988
Error	1379.50	25	55.18		
Total	2088.42	49			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	79.0	---
Lime	81.0	Not significant
Aquashield	82.5	Not significant
DOW	81.8	Not significant
Pavebond LP	78.0	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.

2. The main effect is not significant, therefore we declare no significant differences between means.

TABLE F.11 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 13.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	190.60	3	63.53	2.35	0.103
AGE	83.35	4	20.84	0.77	0.557
Interaction	376.65	12	31.39	1.16	0.371
Error	541.00	20	27.05		
Total	1191.60	39			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	84.50	---
Lime	89.50	Not Significant
BA 2000	86.60	Not significant
Perma-Tac +	89.80	Not Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. The main effect is not significant, therefore we declare no significant differences between means.

TABLE F.12 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 6.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	859.88	4	214.97	7.20	0.001
AGE	1972.28	4	493.07	16.52	0.000
Interaction	2877.52	16	179.85	6.03	0.000
Error	746.00	25	29.84		
Total	6455.68	49			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	71.3	---
Lime	72.8	Not significant
Pavebond LP	80.3	Significant
Perma-Tac	81.0	Significant
Unichem 815	80.0	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.

TABLE F.13 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 25.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	1647.33	5	329.47	7.39	0.000
AGE	504.60	4	126.15	2.83	0.042
Interaction	1241.00	20	62.05	1.39	0.201
Error	1337.00	30	44.57		
Total	4729.93	59			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	77.0	---
Lime	90.5	Significant
Aquashield	81.7	Not significant
FINA-A	92.0	Significant
Perma-Tac	83.0	Not significant
Unichem 815	82.0	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 6.78

TABLE F.14 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 1.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	179.73	7	25.68	0.40	0.896
AGE	546.67	3	182.22	2.83	0.054
Interaction	374.20	21	17.82	0.28	0.998
Error	2059.50	32	64.36		
Total	3160.11	63			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	88.5	---
Lime	91.9	Not significant
ARR-MAZ HP	91.9	Not significant
DOW	87.5	Not significant
FINA-A	91.9	Not significant
Indulin AS	91.9	Not significant
Pavebond Sp	91.9	Not significant
Perma-Tac +	90.0	Not significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.

2. The main effect is not significant, therefore we declare no significant differences between means.

TABLE P.15 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 19.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	583.85	5	116.77	3.07	0.028
AGE	739.06	3	246.35	6.48	0.002
Interaction	814.06	15	54.27	1.43	0.212
Error	912.50	24	38.02		
Total	3049.48	47			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	81.9	---
Lime	83.8	Not Significant
ARR-MAZ	86.3	Not Significant
Aquashield	88.1	Not Significant
BA 2000	87.5	Not Significant
Perma-Tac	78.1	Not Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 7.72

TABLE F.16 RESULTS OF MULTIPLE COMPARISONS USING BOILING TEST RATINGS FOR DISTRICT 21.

1. Analysis of variance: BOIL by ADDITIVE, AGE

Source of variation	Sum of squares	Degree of freedom	Mean square	F-value	p-value
ADDITIVE	4198.44	7	599.78	11.29	0.000
AGE	2370.31	3	790.10	14.87	0.000
Interaction	1392.19	21	66.29	1.25	0.280
Error	1700.00	32	53.13		
Total	9660.94	63			

2. Multiple comparisons using Fisher's protected LSD: (significant level = 5%)

Additive Type	Mean BOIL	Control
Control	45.0	---
Lime	60.0	Significant
ARR-MAZ HP	63.8	Significant
Aquashield	71.3	Significant
DOW	54.4	Not significant
FINA-B	70.6	Significant
Pavebond LP	64.4	Significant
Perma-Tac	64.4	Significant

Note: 1. The effect is significant if the p-value (significance probabilities) is equal or less than .05, i.e., significance level of 5%.
2. LSD = 9.88