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Innovative Materials Development and Testing Volume 2: Pothole Repair

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Preface

The results of the experiment described in this volume are confined to the materials, procedures, and equipment used in this SHRP study. Omission of other materials, procedures, and equipment should not be construed as an indication of non- or poor performance due to their not being selected for inclusion in the study. It was not feasible for SHRP to test all materials, procedures, and equipment available in all regions and in all localities. Many agencies are successfully placing repairs using materials, procedures, and equipment that were not included in the SHRP study. Highway agencies are encouraged to evaluate and select materials, procedures, and equipment that provide the most cost-effective repairs.

Acknowledgments

The research described herein was supported by the Strategic Highway Research Program (SHRP). SHRP is a unit of the National Research Council that was authorized by section 128 of the Surface Transportation and Uniform Relocation Assistance Act of 1987. Special thanks to the H-106 project management team at SHRP and to the following agencies:

- California Department of Transportation–Alturas Maintenance Yard
- Department of Public Works, Draper, Utah
- Illinois Department of Transportation–Vandalia Maintenance Yard
- New Mexico Highway and Transportation Department–La Cueva Patrol
- Ontario Ministry of Transportation–Brockville Maintenance Yard
- Oregon Department of Transportation–Klamath Falls Maintenance Yard
- Texas Department of Transportation–Greenville Residency
- Vermont Agency of Transportation–Bradford Maintenance Yard

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Abstract

This pothole repair experiment, conducted as part of the Strategic Highway Research Program (SHRP) H-106 project, is the most extensive attempt to date to improve the state of the practice for pothole repair operations. Pothole repair in asphalt concrete pavements is one of the most commonly performed maintenance operations for most agencies, especially in areas where cold winters and warm, wet springs contribute to accelerated pavement breakup every year. Potholes also hold the distinction of being the most aggravating pavement distress to the traveling public.

For all the time and effort spent to prevent and repair potholes, the SHRP H-106 project was the first major effort undertaken to test cold-mix asphalt patching materials, those most commonly used for winter and springtime pothole repairs. The primary goal of this project was to identify those materials and techniques that are potentially the most cost-effective.

Executive Summary

Beginning in March 1991, 1,250 pothole patches were placed at eight test sites across the United States and Canada as part of the SHRP H-106 project. These patches were placed using different proprietary, state-specified, and local cold-mix patching materials and several different installation techniques in an effort to determine the optimum combination of materials and procedures for improving the cost-effectiveness of patching operations.

Monitoring installation procedures and evaluating the performance of the repairs over time have provided information on the operations' cost-effectiveness. Continued monitoring is essential to realizing the experiment's ultimate objectives. Laboratory testing has provided information on material properties that can be used to create specifications based on the performance of the materials in the field.

Data collected during installation and laboratory testing and during eighteen months of limited field performance of the different repair types have lead to the following preliminary findings:

- Approximately 69 percent of the repairs in this project survived through the final round of performance evaluations, while 27 percent failed. Four percent were lost because of partial overlay at several test sites.

- Patches placed in the dry-freeze region exhibited a higher rate of success than those placed in the wet-freeze region (93 percent versus 48 percent). The lowest rate of survival was observed at the Ontario test site (39 percent).

- The throw-and-roll technique was as effective as the semipermanent procedure for the same materials when the two procedures were compared directly.

- Only four repair types exhibited significantly poorer performance ($\alpha = 0.05$) than the control materials. All are examples of inexpensive, low-quality cold mixes used by some of the participating agencies on an everyday basis.

- All premature failures associated with local materials were due to excessive ravelling of the material out of the pothole.

- No significant difference in patch survival was noted between any of the experimental repair materials included in this project ($\alpha = 0.05$).

- Preliminary testing was found to be necessary to ensure the compatibility of the aggregate and binder used in order to avoid premature pavement failure.

- Spray-injection devices were viable for repairing potholes in asphalt pavements, although the success of the procedure depends on the skill of the operator.

- Crew productivity rates associated with spray-injection devices were essentially the same as for the throw-and-roll procedure.

- Productivity levels noted with the throw-and-roll and spray-injection techniques make them desirable for patching under adverse weather conditions. These procedures can reduce the time crews must spend in traffic, which improves safety for both workers and the traveling public.

1

Introduction

The SHRP H-106 project is the most extensive pothole-patching experiment ever undertaken. Considering the amount of time and money spent annually to repair potholes, an experiment like H-106 can greatly affect the efficiency of patching operations. This experiment can potentially reduce the amount of money spent on pavement maintenance by determining the most cost-effective materials and procedures for placing quality, long-lasting patches. Long-lasting patches reduce the time crews are exposed to traffic by decreasing the need for patching the same areas over and over. Thus, the overall cost of maintenance is reduced as well.

Objectives

The primary goal of the pothole repair experiment was to objectively evaluate different materials and procedures for repairing potholes in asphalt concrete-surfaced pavements. The experiment was designed to compare various repair types in order to determine which are most effective under actual traffic and climatic conditions.

The most meaningful basis for comparison is the overall cost-effectiveness of the repair operations associated with each repair type. These cost-effectiveness values are calculated on the basis of the cost of repair installation, the expected life of the repairs, and user costs from delay and traveling over rough pavements. Information collected during test site installation has provided a good basis for calculating the cost of installing each repair type. Some data for estimating the life expectancy of the repairs have been collected from field performance monitoring. However, because of the low failure rates to date, additional information must be collected before accurate estimates of life expectancy can be made.

One other goal of this experiment was to develop correlations between the field performance of the repair and the material characteristics obtained from laboratory testing. Once again, the generally good performance of the materials in the field has not provided enough differentiation among the repair types to permit a meaningful analysis. Additional

monitoring of the patches as they continue to deteriorate should provide useful correlations between performance and material properties.

Scope

This report presents a summary of all aspects of the H-106 pothole repair experiment, including test site installation, material testing, field performance, and data analysis. Chapter 2 describes the installation process, including test site arrangements, layout and preparation, materials and procedures, and data collection. Chapter 3 details the material tests performed and their results. Chapter 4 presents field performance data collection. Chapter 5 details the statistical methodology used to analyze the data and presents the results of the productivity analysis, field performance, and laboratory performance data. In chapter 6, the preliminary findings of the experiment are outlined, along with recommendations on pothole repair operations based on the findings to date. The appendixes give detailed data on the layout of the test sites, test site installations, laboratory testing, field performance, and cost-effectiveness.

The materials and procedures included in this experiment were identified in a previous SHRP study, H-105.[1] The H-105 project surveyed and interviewed agency personnel and material suppliers to determine the most promising materials and procedures for pothole repair. The materials and procedures listed in table 1 represent the best of those identified by the H-105 project.

Project Overview

Beginning in March 1991, 1,250 pothole patches were placed at eight test sites across the United States and Canada. The repairs were made materials supplied by SHRP and were placed, under SHRP supervision by local maintenance forces from six different state departments of transportation (DOTs), one Canadian province, and one city department of public works. See figure 1 for the locations of the eight test sites and the four different climatic regions. The climatic regions were originally defined for the SHRP Long-Term Pavement Performance (LTPP) projects and were adopted for this project.

The original testing plan for the pothole repair project was based on the findings of the SHRP H-105 project.(1) The materials and procedures included in the actual test site installations were somewhat different from those originally proposed.

The K, L, M, and N patch types, were installed at the Ontario and Oregon sites when it was decided that the edge seal and semipermanent procedures should be placed using more than one material. Inclement weather and premature failure of the unsealed patches in Ontario made placing of the edge seal around the designated patches impractical, so no type B, K, or M patches were placed at that site (table 1). Also, the PennDOT 486 material was unavailable at the time of the Ontario installation.

Table 1. Summary of material/configuration combinations

Patch Type	Material	Procedure	Sites Installed							
			CA	IL	NM	ON	OR	TX	UT	VT
A[a]	UPM High-Performance Cold Mix	Throw-and-roll	■	■	■	■	■	■	■	■
B		Edge seal	■	■	■		■	■	■	■
C		Semipermanent	■	■	■	■	■	■	■	■
D	PennDOT 485	Throw-and-roll	■	■	■	■	■	■	■	■
E	PennDOT 486	Throw-and-roll	■	■	■		■	■	■	■
F	Local material	Throw-and-roll	■	■	■	■	■	■	■	■
G	HFMS-2 w/Styrelf®	Throw-and-roll	■	■	■	■	■	■	■	■
H	Perma-Patch	Throw-and-roll	■	■	■	■	■	■	■	■
I	QPR 2000	Throw-and-roll	■	■	■	■	■	■	■	■
J	Spray injection	Spray injection	■	■	■	■		■	■	■
K	QPR 2000	Edge seal					■			
L		Semipermanent				■	■			
M	PennDOT 485	Edge seal					■			
N		Semipermanent				■	■			
X	Local material	Surface seal		■						
X	Local material	Propane torch					■			

[a]Control patch type for all sites.

Shaded areas represent sets of repairs installed

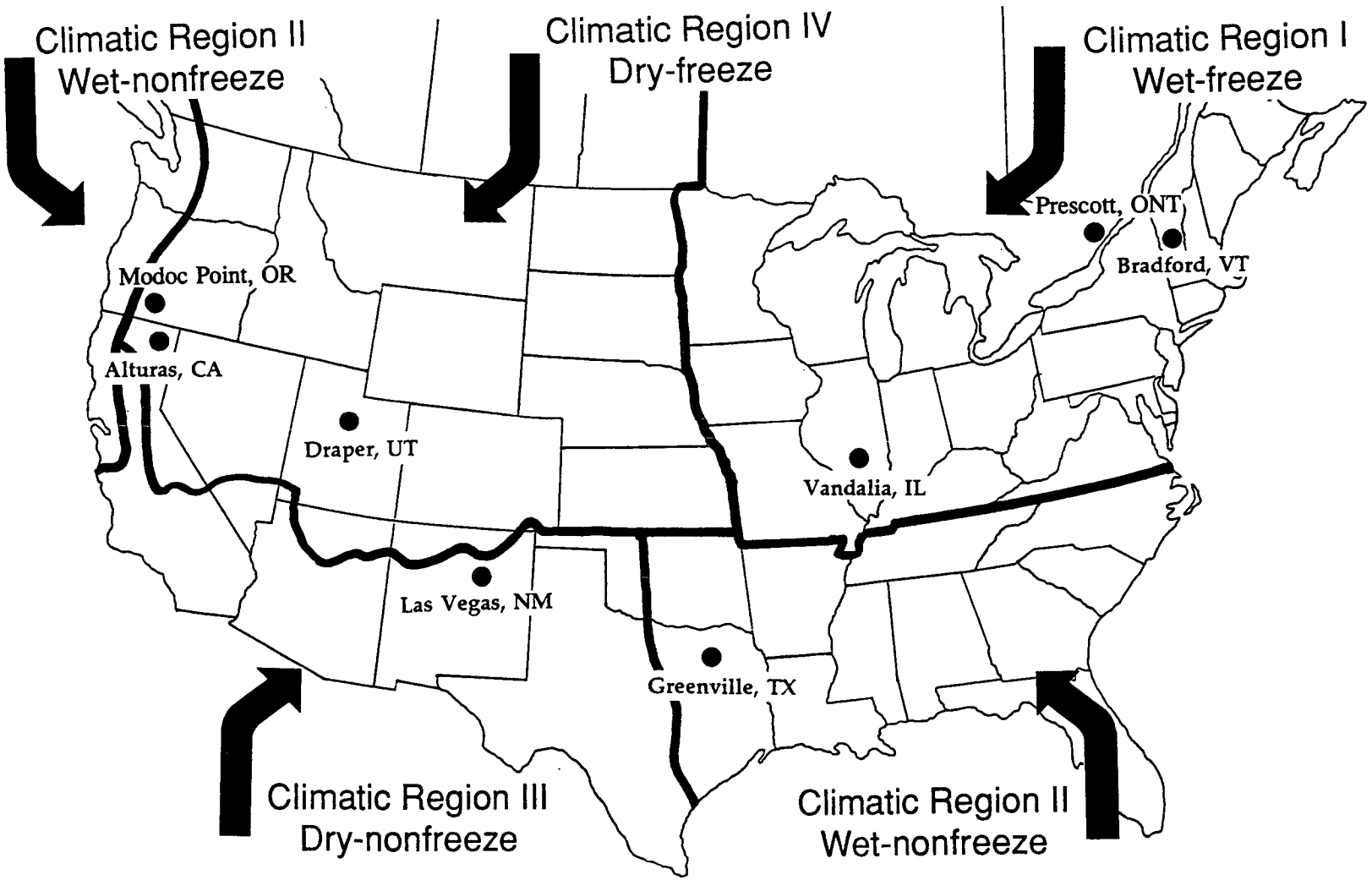


Figure 1. Pothole repair test site locations and climatic regions.

In Oregon, a spray-injection device under evaluation by the Oregon DOT was to place the spray-injection patches at the test sites. Mechanical problems with the device resulted in only one patch being placed during a two-hour period, and no other devices were available to complete the repairs for that test site.

Test Site Characteristics

See table 2 for some of the characteristics of each test site location. A description of each location is provided in the following sections.

Table 2. Test site characteristics for pothole repair project

Test Site	Route	No. of Lanes	2-dir. ADT (vpd)	Annual Precipitation[a]	Annual Days < 32 °F [a]
Alturas, CA	US 395	2	1,000	14 in (0.36 m)	190
Vandalia, IL	I-70	4	15,000	38 in (0.96 m)	100
Las Vegas, NM	Rte 518	2	1,700	14 in (0.36 m)	120
Modoc Point, OR	US 97	2	5,400	16 in (0.41 m)	180
Greenville, TX	FM 1570	2	7,500	40 in (1.02 m)	50
Draper, UT	I-15 Frontage	2	1,500	16 in (0.41 m)	180
Bradford, VT	Rte 25	2	2,100	37 in (0.94 m)	160
Prescott, ON	Rte 2	2	4,500	32 in (0.81 m)	140

[a]Historical averages from the *Climatic Atlas of the United States*, 1968.
°C = (°F - 32) ÷ 1.8.

US 395–Alturas, California

The test site in California is in three areas (figure 2). The first group of patches is located in both the north bound and southbound lanes of US 395, just south of the Modoc/Lassen county line, at approximately milepost (M.P.) 138.5 in Lassen County. The second group of patches is located in the northbound lane of US 395, just north of Likely, at approximately M.P. 5.5 in Modoc County. The third group is located north of Alturas, in both the north bound and southbound lanes of US 395, at between M.P. 31 and M.P. 32 in Modoc County.

The relative infrequency with which potholes occurred along this route forced the lengthening of the original site. Drought conditions for the past few years reduced the amount of breakup along this route, and the lack of precipitation caused less moisture-induced distress among the repair patches. Relatively few new potholes have developed along the route since the installation procedure was completed.

The cross section of this pavement is 4 in (102 mm) of asphalt concrete over 10 in (254 mm) of granular material. The shoulders consist of a strip of asphalt concrete approximately 1 ft (305 mm) wide beyond the edge stripe, and a section of gravel approximately 6 ft (1.83 m) wide.

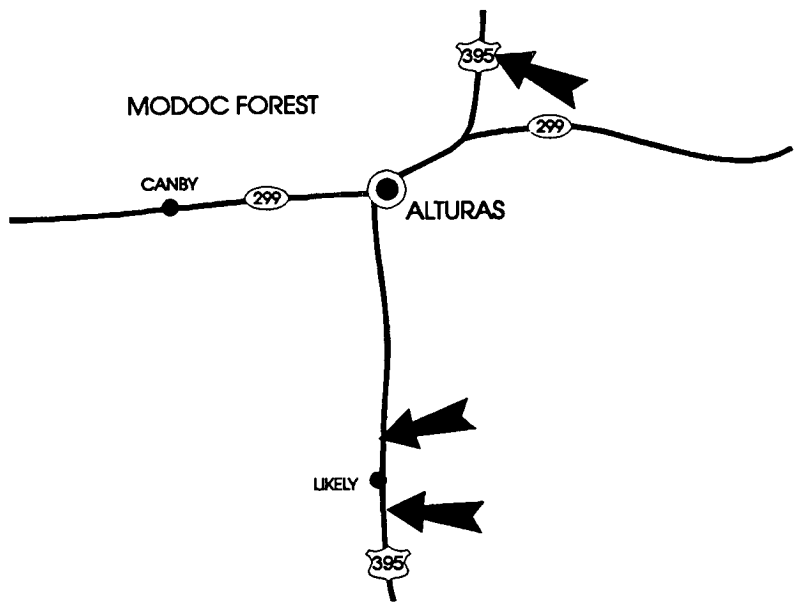


Figure 2. Alturas, California pothole repair test site

I-70—Vandalia, Illinois

This test site is west of Vandalia, in the westbound lane of I-70 in Fayette County (figure 3). All patches are located in the outside, or travel, lane with the majority adjacent to the asphalt concrete shoulder. The patches are located between M.P. 57 and M.P. 63.

This site carries the greatest volume of traffic of any site in the experiment, with approximately 6,000 of the 15,000 two-way ADT classified as trucks. The climate during the test period has been generally warmer and wetter than average. The excessive moisture has caused in the formation of many new potholes along the site.

The cross section of this pavement is 4 in (102 mm) of asphalt concrete over 10 in (254 mm) of CRCP pavement. The shoulders are asphalt concrete on both the inside and outside lanes; the inside shoulder is 4 ft (1.22 m) wide and the outside is 10 ft (3.05 m) wide.

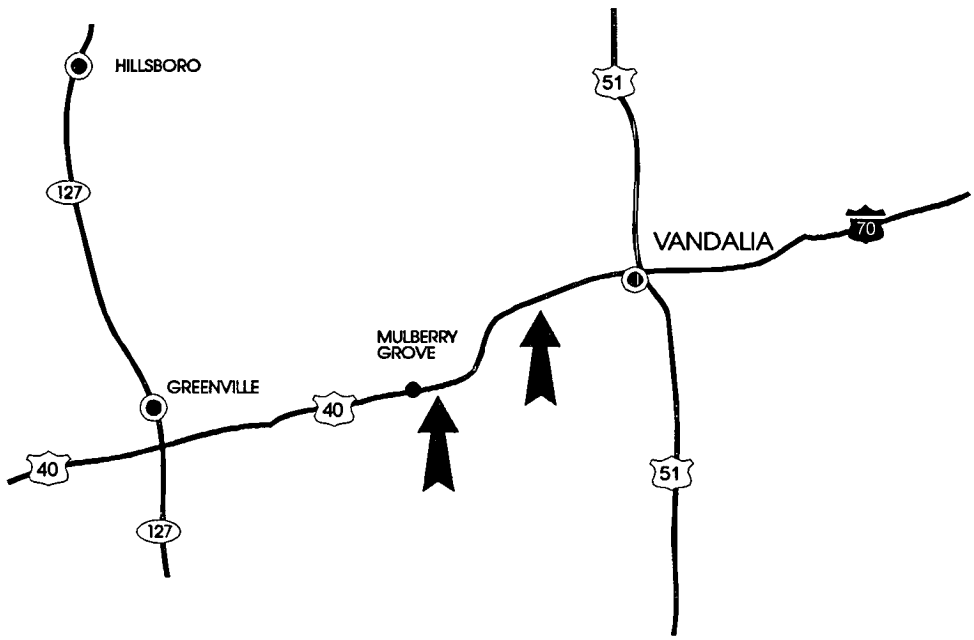


Figure 3. Vandalia, Illinois pothole repair test site

Rte 518—Las Vegas, New Mexico

This test site is north of Las Vegas, in the southbound lane of Route 518 in Mora County, between M.P. 22 and M.P. 16, ending just north of the Mora/San Miguel county line (figure 4).

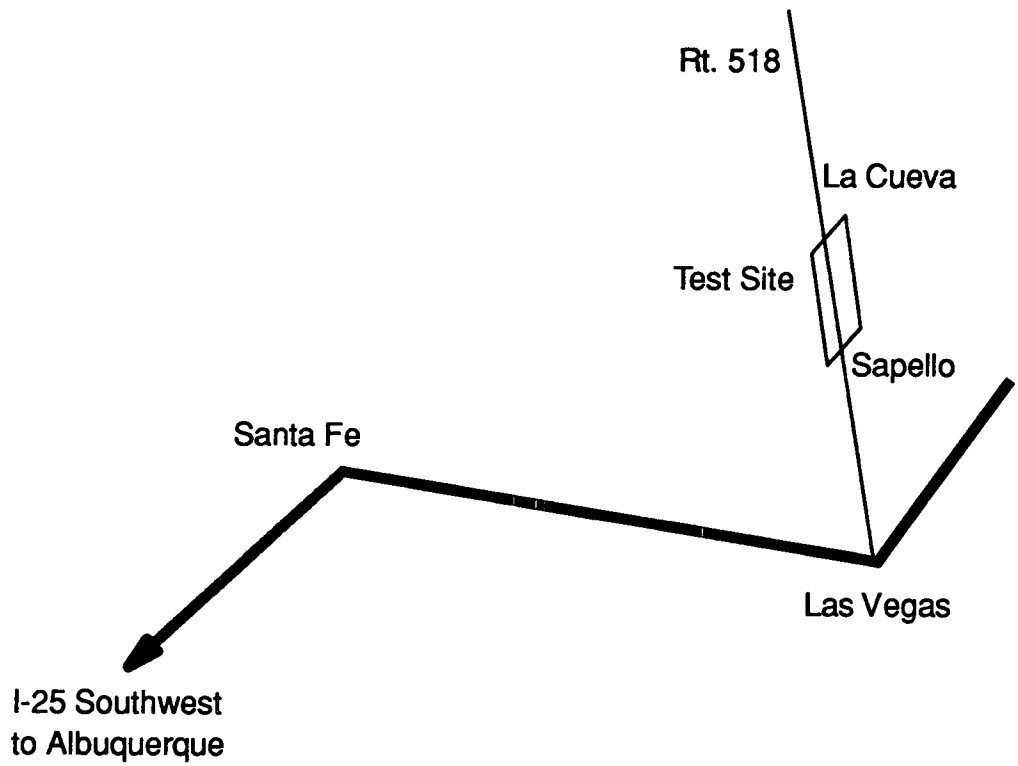


Figure 4, Las Vegas, New Mexico pothole repair test site

The weather has been drier than average during the test period, and relatively few potholes have developed along this test site since the repair installation.

The cross section of this pavement is 4 in (102 mm) of asphalt concrete surface over 15 in (381 mm) of crushed stone. The shoulders throughout the site consist of a strip of asphalt concrete that is 1-ft (305 mm) width of gravel that is 5 ft (1.52 mm).

US 97–Modoc Point, Oregon

The Oregon test site is located along two stretches of the northbound lane of US 97, north of Klamath Falls in Klamath County. The first section is at approximately M.P. 270, and the second section is just south of M.P. 265 (figure 5).

The weather at this site has been significantly drier than average. As a result, almost no new potholes have developed along the test section since the installation was completed. This stretch of US 97 has an estimated 1,900 of its 5,400 two-way ADT classified as trucks. It is an alternate route for vehicles traveling along Interstate 5, which is west of the site, because U.S. 97 is slightly shorter and has fewer grades than the interstate route.

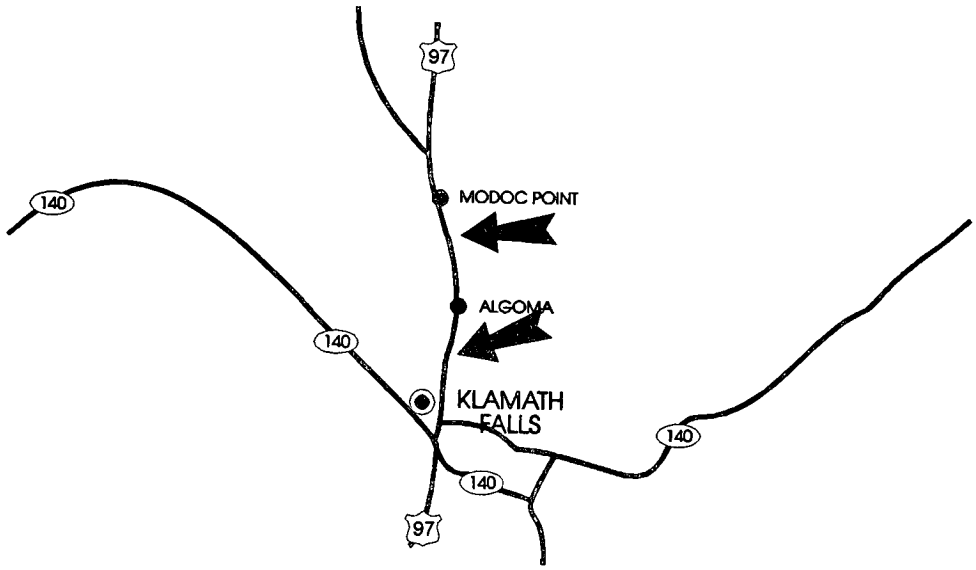


Figure 5. Modoc Point, Oregon pothole repair test site

The cross section of this pavement is 4 in (102 mm) of asphalt concrete surface over 10 in (254 mm) of granular material. The shoulders are approximately 1 ft (305 mm) of asphalt concrete and 5 ft (1.52 m) of gravel.

FM 1570–Greenville, Texas

The Texas test site is southwest of the intersection of Interstate 30 and US 69, south of Greenville, (figure 6). The patches are located west of the intersection of FM 1570 and US 69 in both the east- and westbound lanes.

The weather at this site has been wetter than average, especially during the spring of 1992, when heavy rainfall and a large number of trucks carrying equipment and materials to a factory at the west end of the test section caused major damage to the entire pavement system. Several sections of the test site had to be reconstructed, resulting in the loss of 29 percent of the 150 patches placed. Because the trucks were loaded on their way into the plant, but unloaded on their way out, only the westbound lane experienced this damage.

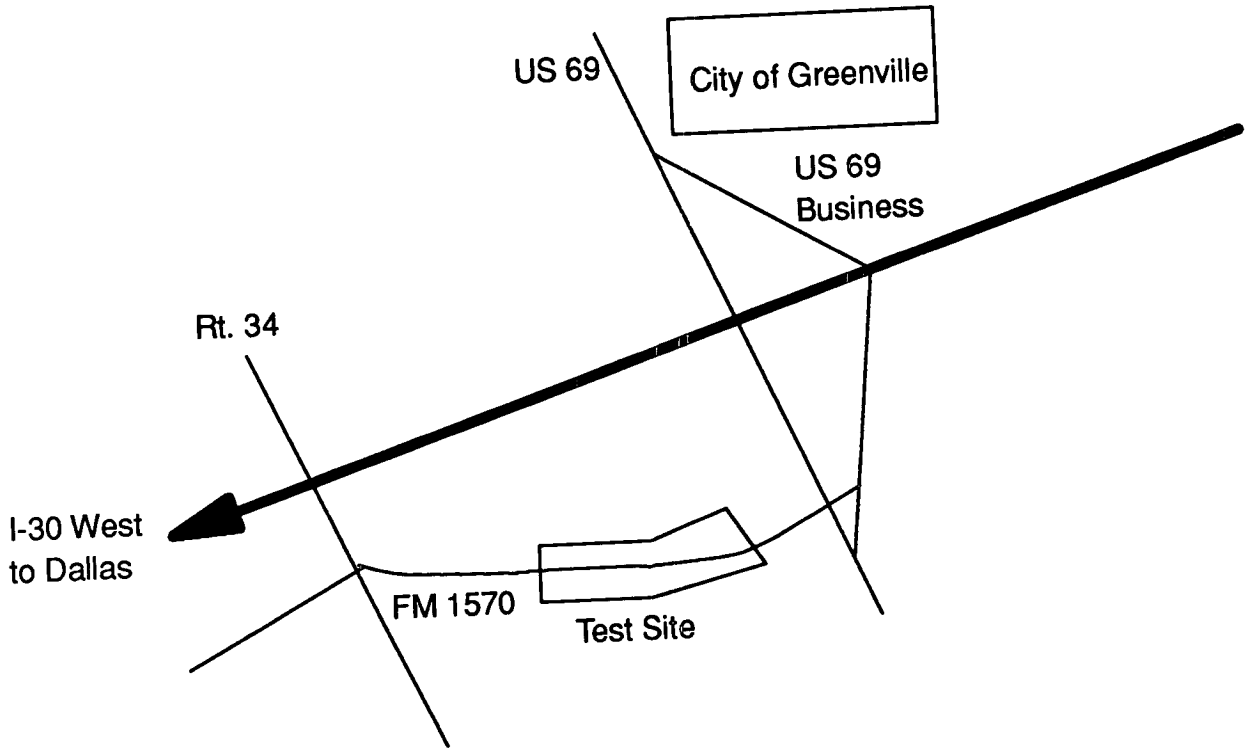


Figure 6. Greenville, Texas pothole repair test site

The cross section of this pavement is 4 in (102 mm) of asphalt concrete over 8 in (205 mm) of gravel. The shoulders consist of a strip of asphalt concrete approximately 2 ft (610 mm) wide and a width of turf that is 6 ft (1.83 mm).

I-15 Frontage Road–Draper, Utah

The test site in Utah is directly east of Interstate 15, south of exit 294, along a frontage road in Draper, (figure 7). The patches are located in the northbound lane of the frontage road, approximately 0.25 miles (0.40 km) south of the intersection of 12300 South Street and Minuteman Drive.

The weather at this site has been slightly wetter than average, especially during the spring of 1992, when thunderstorms were more frequent than usual. This additional moisture accelerated the break up of the pavement directly north of the test section, to the point where major reconstruction is needed.

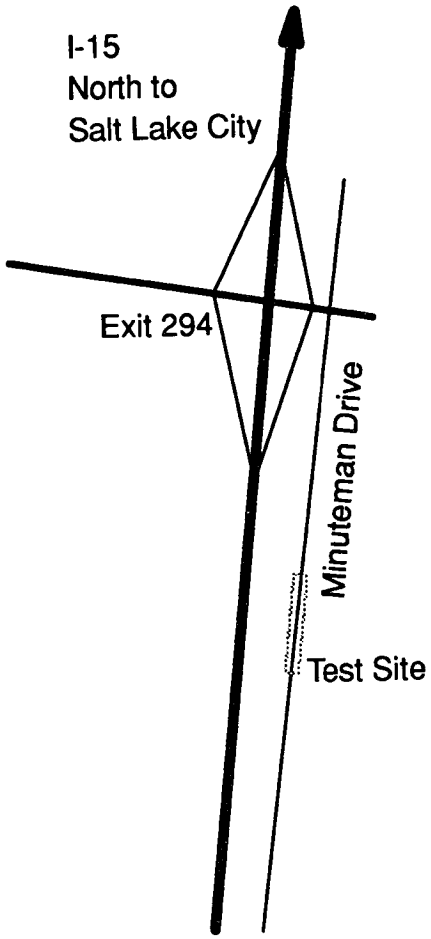


Figure 7. Draper, Utah pothole repair test site

The cross-section of this pavement consists of 3.5 in (89 mm) of asphalt concrete over 8 in (203 mm) of crushed stone. A PCC pavement approximately 8 in (203 mm) thick may underlay the crushed stone. The shoulders along the test site consist of a strip of asphalt concrete that is approximately 1 ft (305 mm) wide and a width of gravel that is 2 ft (610 mm).

Rte 25–Bradford, Vermont

This test site is northwest of the intersection of Interstate 89 and Rte 25 near Bradford in (figure 8). The patches are all in the southbound lane of Rte 25 between M.P. 6.5 and M.P. 5.5.

The weather has been wetter than average, which has caused pavement throughout the test site to break up. If the pavement continues to deteriorate, an overlay will have to be placed at this site in the spring of 1993.

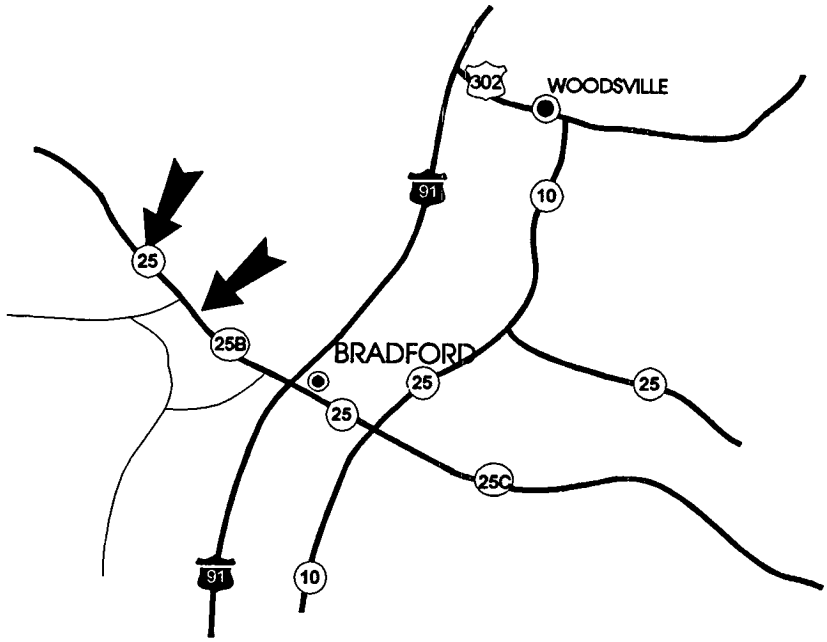


Figure 8. Bradford, Vermont pothole repair test site

The cross section of this pavement consists of approximately 4.5 in (114 mm) of asphalt concrete over 18 in (457 mm) of crushed gravel. The shoulders along the site consist of asphalt concrete that is 1 ft (305 mm) wide and gravel that is 3 ft (914 mm) wide.

Rte 2–Prescott, Ontario

The test site in Ontario is just west of the city limits of Prescott and runs parallel to Highway 401 along the St. Lawrence River (figure 9). The patches are located in both the east- and westbound lanes, for approximately 1.3 miles (4.2 km) starting at the west edge of the city limits.

The weather at this site has been wetter and slightly colder than average. Right after the test site installation was completed, a severe winter storm, occurred, which required plowing and the placement of several tons of salt. This weather was the most severe of any experienced by the test sites so soon after installation.

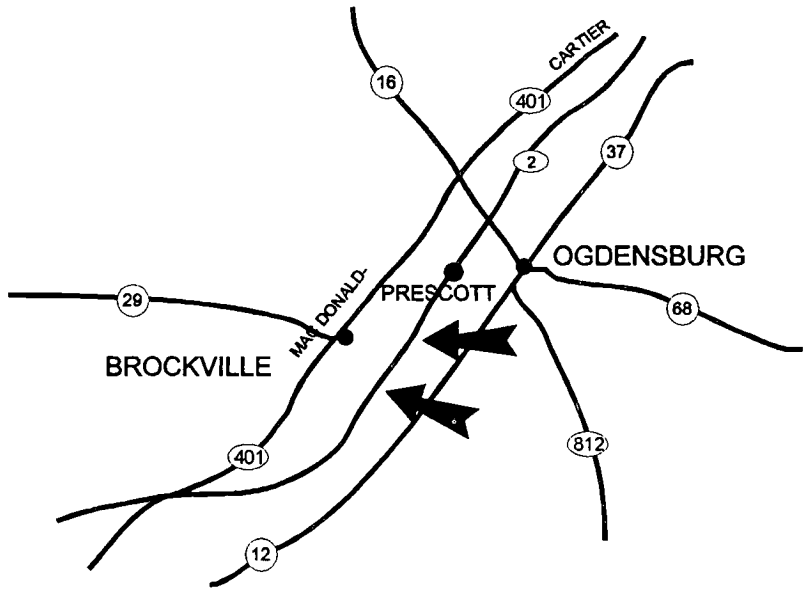


Figure 9. Prescott, Ontario pothole repair test site

The cross-section of this pavement consists of approximately 4 in (102 mm) of asphalt concrete over 8 in (205 mm) of gravel. The shoulders along the site consist of asphalt concrete that is 1 ft (305 mm) wide and gravel that is 5-ft (1.52 m) wide.

Appendix A contains information on the layout and placement order for each set of repairs at each test site.

2

Test Site Installation

This project was designed to evaluate the performance of many different materials, repair procedures, and equipment for the repair of potholes in asphalt concrete-surfaced pavements. While there is no shortage of potholes along the millions of miles of asphalt concrete roadways in the United States and Canada, finding locations suitable for this experiment was much more difficult than originally anticipated.

Test Site Arrangements

Before the installation of a test site could begin, several arrangements had to be made, including obtaining repair materials, shipping the materials to the test site, scheduling the crew for the installation, and notifying manufacturers of the planned installation of their materials. Participating manufacturers were notified of the placement schedule so that a representative could be on hand, if desired. The manufacturers' representatives were present to ensure that placement procedures were consistent from material to material. The successful handling of these details allowed for a smooth installation phase.

Installation Process

The projects original plan called for between 150 and 200 open potholes per test site.[2] These potholes were to be left open until patches using the experimental materials and procedures could be placed. It became apparent early in the site selection process that no highway agency allows that many potholes to remain unrepaired for that long a time because of the danger they pose to the travelling public and the potential damage they can cause to vehicles.

To get around this problem, a compromise was reached: test sites could have patches in place, as long as these patches could be removed and the original potholes used in the project. Although this plan seemed outrageous at first, none of the participating agencies

objected. All of the agencies seemed to have confidence that the experimental patches would work as well as or better than the patches they were currently placing.

Layout

Before any of the experimental patches were placed, the test sites had to be readied for the installation procedure. The layout of the locations for potholes was marked the morning the patches were to be installed. Marking locations earlier would have been impractical because of the nature of pothole development and the speed with which a set of patches can be laid out.

The original test plan for the pothole experiment called for placing a series of 20 patches, alternating control patch types with experimental patch types, until 10 of each had been placed. To conserve materials and reduce the amount of time needed to install a test site, the placement order was modified to a series of 30 patches, alternating between control patches and two types of experimental patches see figures 10 and 11 for the layout of a typical section for both the 20- and 30-patch scenarios. The 30-patch placement order reduced the total number of patches needed from 200 to 150, but still maintained a one to one comparison between control and experimental patches. In cases where there was only one type of experimental patch, the 20-patch placement order was used.

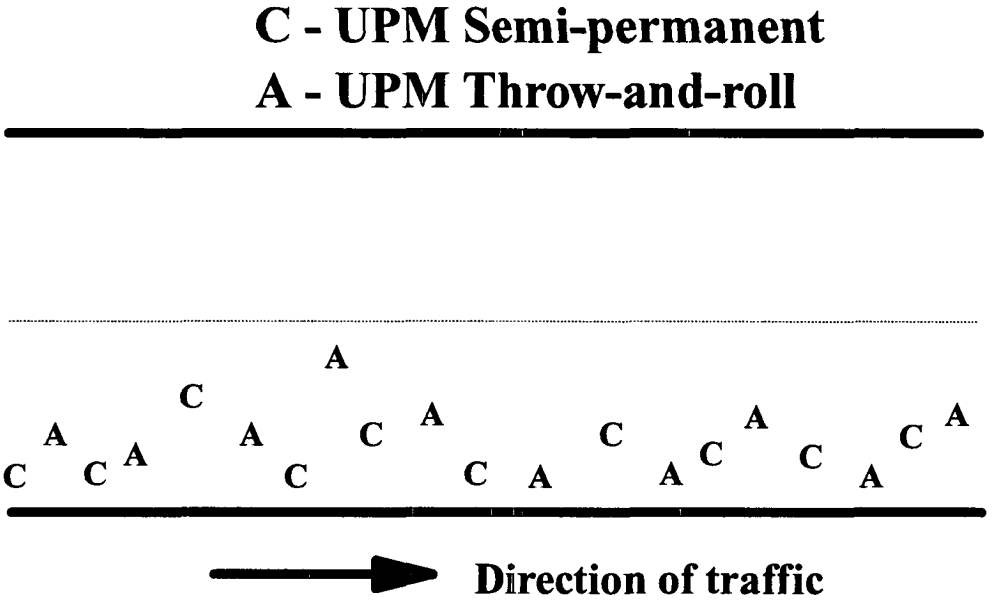


Figure 10. Example of 20-patch placement order.

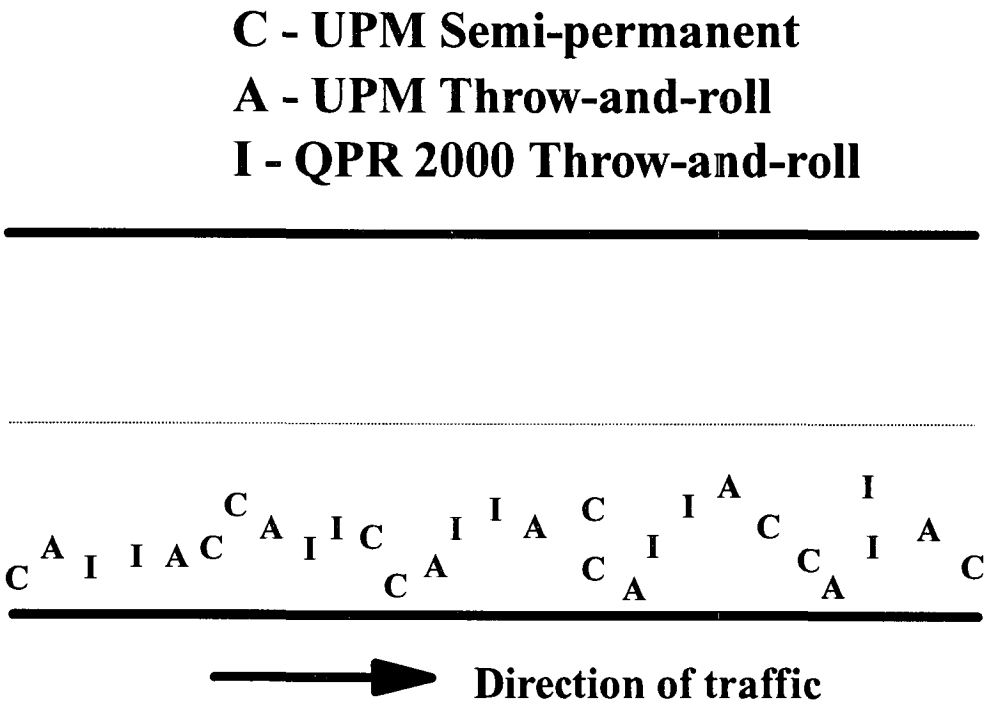


Figure 11. Example of 30-patch placement order.

Laying out the test site identifying areas for creating potholes and designating a patch type for each location. The locations and accompanying designations for a set of patches were marked using with paint on the day the patches were to be placed.

Preparation

The next step in the installing of the test sites was to create potholes by removing existing patches. Patches were removed using a backhoe at six of the sites. Where no backhoe was available, a jackhammer (New Mexico) or hand tools (Ontario) were used.

Once the potholes were opened, the adverse moisture condition was created by filling the holes with water that had been transported to the site. Water could not be added at the Ontario site because of extremely low temperatures. However, some snowfall did provide an adverse moisture condition to go along with the adverse temperature conditions (defined as less than 45 °F [7 °C]). During installation at the other seven sites adverse moisture conditions occurred naturally only one day each in Illinois, New Mexico, and Utah. In order to evaluate the effects of adverse temperature conditions, sites in Ontario and Oregon were installed in January and February 1992. Adverse temperature conditions were present each day of installation, although temperatures in Ontario were colder than in Oregon.

Materials

The repair materials used for the experimental patches were identified during the SHRP H-105 project as having the potential to perform very well.[1] In most instances, participating agencies were not using these materials, which meant that the materials had to be shipped to the test site from wherever they were produced. In most instances, the experimental materials were shipped from a single producer to each test site to reduce variability between sites.

Table 1 lists all the materials used during the test site installations. For the Pennsylvania DOT (PennDOT) 485 and 486, the high-float medium-set emulsion (HFMS-2), and the QPR 2000, the cold mixes were taken from stockpiles and placed into 55-gal (208 L) drums at the source and shipped to the test sites. The Perma-Patch material was shipped to each the test site in 60-lb (27 kg) bags.

The UPM High-Performance Cold Mix was obtained from asphalt plants in the vicinity of each test site. Approximately 12 tons of UPM cold mix was shipped to each site. With the exception of the sites in Utah and New Mexico, which used UPM obtained from the same plant, a different producer supplied each of the test sites.

UPM High-Performance Cold Mix

The UPM High-Performance Cold Mix is a proprietary cold-mix material produced using a specially formulated binder and aggregate available in the vicinity of the plant producing the mix. Samples of local aggregate are tested by UPM to determine local production specifications. In most cases, the initial run of the material through a plant is supervised by a UPM representative to see that the cold mix is of sufficient quality. The UPM High-Performance Cold Mix purchased for this project cost approximately $75 per ton, not including the cost of shipping from the plants to the test sites.

Perma-Patch

The Perma-Patch cold mix is also a proprietary material made with a specially formulated binder. This material could be produced at any asphalt plant using the local aggregate in much the same way that the UPM mix is produced. But for this project, only one plant was used. The Perma-Patch cold mix used for this project cost approximately $75 per ton, excluding the cost of shipping from the plant to the test sites.

QPR 2000

The QPR 2000 cold mix is also a proprietary material made with a specially formulated binder. The material used for this project was produced at a central plant and shipped to the test sites. This material could be produced at any asphalt plant using local aggregate in much the same way that the UPM mix is produced.

Two grades of QPR 2000 were used. The first was a "southern" mix formulated for warmer climates, which was used in Texas and New Mexico. The second was a "northern," mix, which was used at the remaining six test sites. The QPR 2000 used for this project cost approximately $75 per ton, excluding the cost of shipping from the plant to the test sites.

PennDOT 485

The PennDOT 485 material was produced by an asphalt plant in Pennsylvania according to Specification 485, which lists acceptable bituminous binders and additives, as well as fine and coarse aggregate. Gradations for the combined fine and coarse aggregate are also given, along with guidelines for the percent of residue of asphalt cement based on the absorption of the aggregate used. Additional requirements for the actual mixing of the materials and acceptance testing are specified. The PennDOT 485 material used for this project cost approximately $35 per ton, excluding the cost of shipping from the plant to the test sites.

PennDOT 486

The PennDOT 486 material was produced according to Specification 486 in the same manner as PennDOT 485. The major difference between the 485 and 486 specifications is the addition of polypropylene or polyester fibers in the 486 material. For this project, polyester fibers were used. The PennDOT 486 material cost approximately $40 per ton, excluding the cost of shipping from the plant to the site.

HFMS-2 (modified)

The modified HFMS-2 material was produced using a high-float, medium-setting emulsion that has styrene butadiene (trade name Styrelf) added. Two sources for the HFMS-2 cold mix were used, one for the first six sites installed and one for the sites in Ontario and Oregon. Elf Asphalt formulated the modified binder used in both instances. The HFMS-2 material cost approximately $60 per ton, excluding the cost of shipping from the plant to the site.

Spray Injection

The spray-injection materials consisted of a crushed aggregate and an emulsified asphalt. Both materials were transported to the test site, where they were combined by the spray-injection device as the patch was being formed. A single-size aggregate was generally used, with a top size of 3/8 in (9.5 mm). The emulsion was heated in a tank on the spray-injection device, generally to about 140 °F (60 °C).

The cost of spray injection can be calculated over the life of a device or by using the rate charged by companies perform pothole patching services. The average purchase price for a trailer unit without a truck is $35,000, while a single-chassis unit can cost up to $100,000. Daily rates for spray-injection operations range from $700 to $1,000.

Local Materials

The local materials placed at each site are typical of those used by agencies that perform pothole-patching operations on a daily basis. These materials were usually inexpensive cold mixes made with rounded aggregate and very little binder, resulting in a dry-looking material. However, in some instances, local crews used high-quality, proprietary cold mixes rather than the inexpensive ones. The cost of the local materials used for this project ranged from $16 per ton for local cold mixes to over $100 per ton for proprietary cold mixes.

Equipment

For the most part, the equipment used to place the experimental patches was that typically used by maintenance crews everywhere: dump trucks, pickup trucks, shovels, brooms, rakes, jackhammers, compressors, pavement saws, vibratory plate compactors, single-drum vibratory rollers, dual steel-wheeled rollers, and rubber-tired rollers. The only piece of equipment not normally used by maintenance crews was the spray-injection device.

Three types of spray-injection devices were used during the course of this project. The first was a Rosco RA-200, which was used in Illinois and Oregon. The second was a Durapatcher, which was used Texas, New Mexico, Utah, and California. The third was a Wildcat Roadpatcher, which was used Vermont and Ontario. The Rosco and Durapatcher used, aggregate and binder from local sources near the test sites. The Roadpatcher used aggregate and binder supplied by the contractor who provided the patching service.

These spray-injection devices are the two main types of devices used today. The first type consists of a trailer unit that carries a heated tank (generally about 500 gal [1,890 l] capacity) for the binder material and a delivery system that can deliver aggregate, binder or both, or just air to a nozzle that can be directed at the pothole. The vehicle towing the trailer is generally a single-axle dump truck that carries dry, virgin aggregate, that is fed into the delivery system on the trailer. The nozzle for this type of device (which is usually supported by a boom) is generally handled by a worker walking behind the trailer unit. The Durapatcher (figure 12) and the Rosco RA-200 are examples of this type of equipment.

The second type of device combines storage for binder and aggregate with delivery systems on a single chassis. The nozzle for this device is generally controlled by the driver of the vehicle, so that no workers are actually on the roadway. The Wildcat Roadpatcher, which was used in Ontario and Vermont, is an example of this type of equipment (figure 13).

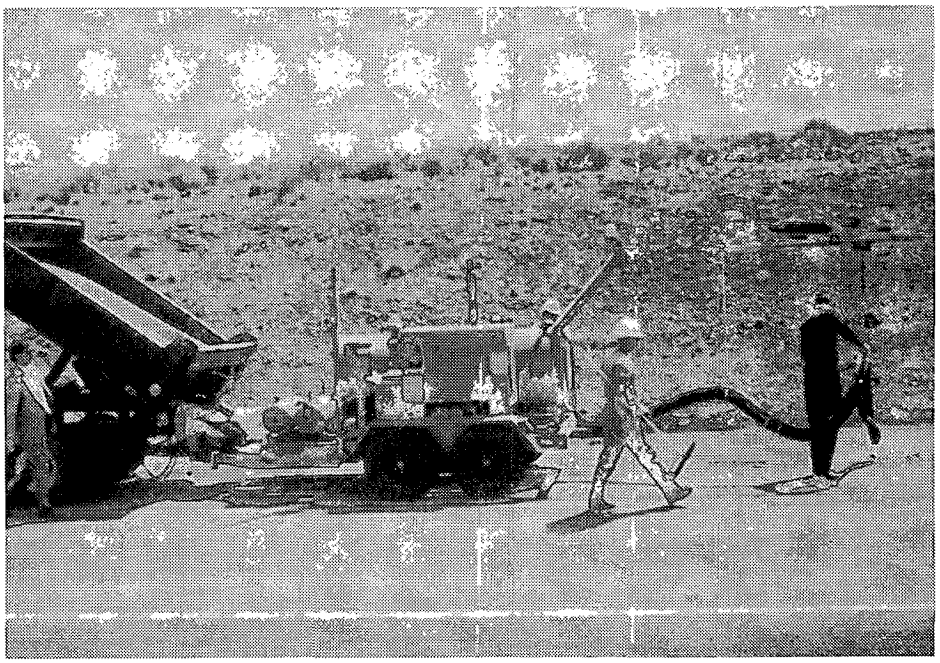


Figure 12. Durapatcher spray-injection device

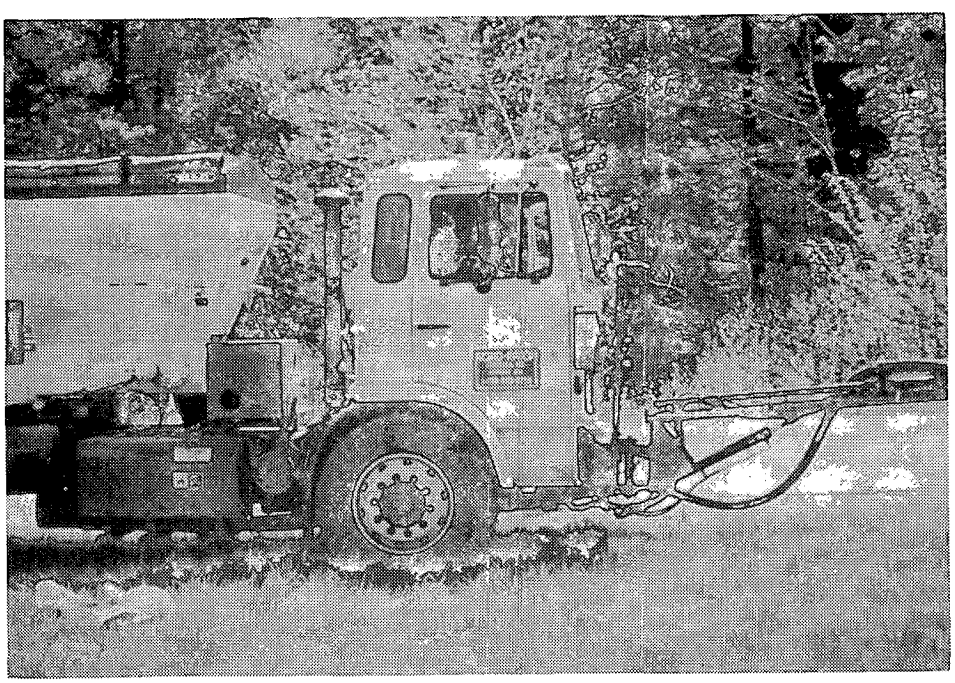


Figure 13. Wildcat Roadpatcher spray-injection device

Procedures

This project used four major repair procedures: throw-and-roll, edge seal, semipermanent, and spray injection. Each procedure was to be used at all sites. Because of various problems, however, Ontario had no edge seal patches and Oregon had no spray-injection patches.

Throw-and-roll

The most prevalent method of patching potholes is the "throw-and-go" or "dump-and-run" method. For this project, the method was altered to include compacting patches with the tires of the material truck, hence the term "throw-and-roll." This was the predominant technique used for placing patches. The steps to the throw-and-roll procedure are as follows:

1. Place material into pothole (no preparation or removal of water and debris was performed prior to material placement).

2. Compact patch using truck tires (between four and eight passes).

3. Check compacted patch for slight crown. (If depression was present after rolling, additional material was added and rolled to bring patch surface above surrounding pavement level.)

4. Move on to next distress location.

The optimum crew size for this operation is two laborers patching, with appropriate traffic control provided.

Edge Seal

The edge seal patches were nothing more than throw-and-roll patches that had the interface between the patch and pavement covered by a bituminous tack material and sand. This procedure is intended to limit the amount of water that penetrates through the edges of the patch. The steps for the edge seal procedure, as it was carried out during the project, are as follows:

1. Place material into pothole (no preparation or removal of water and debris was performed prior to material placement).

2. Compact patch using truck tires (between four and eight passes).

3. Check compacted patch for slight crown. (If depression was present after rolling, additional material was added and rolled to bring patch surface above surrounding pavement level.)

4. Allow pavement and patch surfaces to dry, generally one day after the installation. Place a band of bituminous tack material along the perimeter of the patch, between 4 in and 6 in (102 mm and 152 mm) wide (figure 14).

5. Place a layer of cover aggregate over the tack material to prevent tracking (coarse sand was used at all sites).

6. Move on to next distress location.

The optimum crew size for this operation is two laborers patching, with appropriate traffic control provided. This procedure requires two passes through the distress locations.

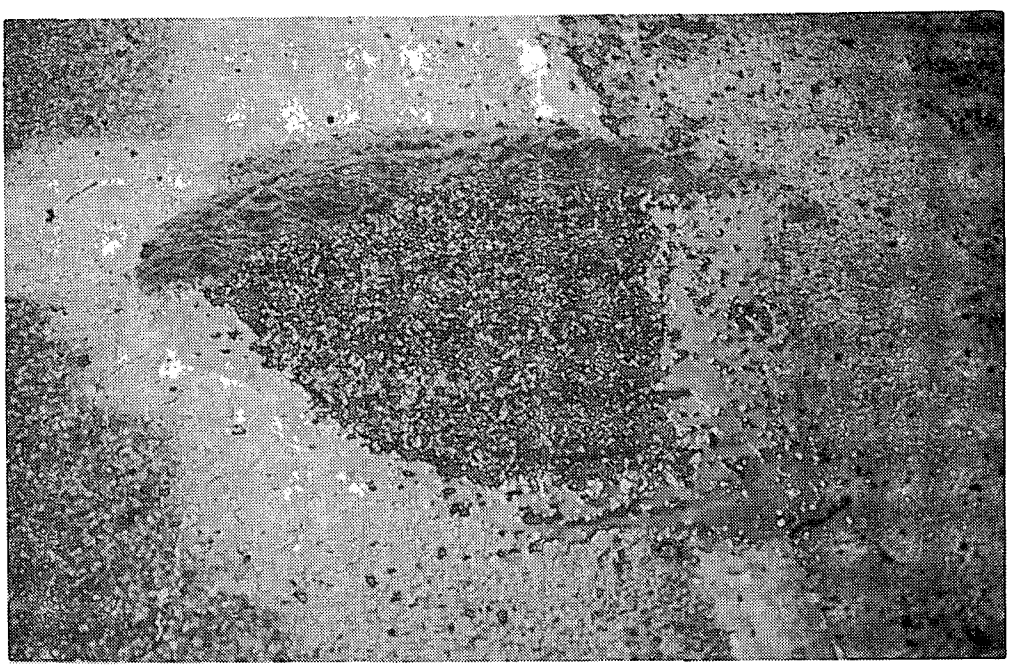


Figure 14. Asphaltic material placed as edge seal around patch

Semi-permanent

The procedure recommended by most agencies and research groups for repairing potholes is the semi-permanent, or "do-it-right" method. It is basically a partial-depth repair. The time and effort to perform this more-involved procedure is thought to improve the success rates for these patches.[3] The steps for the semi-permanent procedure used in this project are as follows:

1. Remove all water and debris from pothole by using compressed air, brooms, shovels, or other available equipment.

2. Square up the sides of the pothole so that they are vertical and have sound pavement on all sides (it is not necessary to create a square or rectangular area as long as the sides are vertical). The squaring up can be achieved by using either a jackhammer equipped with a spade bit or a pavement saw, (figure 15).

3. Place the patching material into the cleaned, squared hole. The material should mound in the center and taper down to the edges so that it meets the surrounding pavement edge.

4. Compact the material starting in the center and working out toward the edges, which will cause the material to pinch into the corners. A one-man compaction device, such as a single-drum vibratory roller or vibratory plate compactor in (figure 16), should be used.

5. Move on to the next distress location.

The optimum crew size for this operation is four laborers patching, with appropriate traffic control provided.

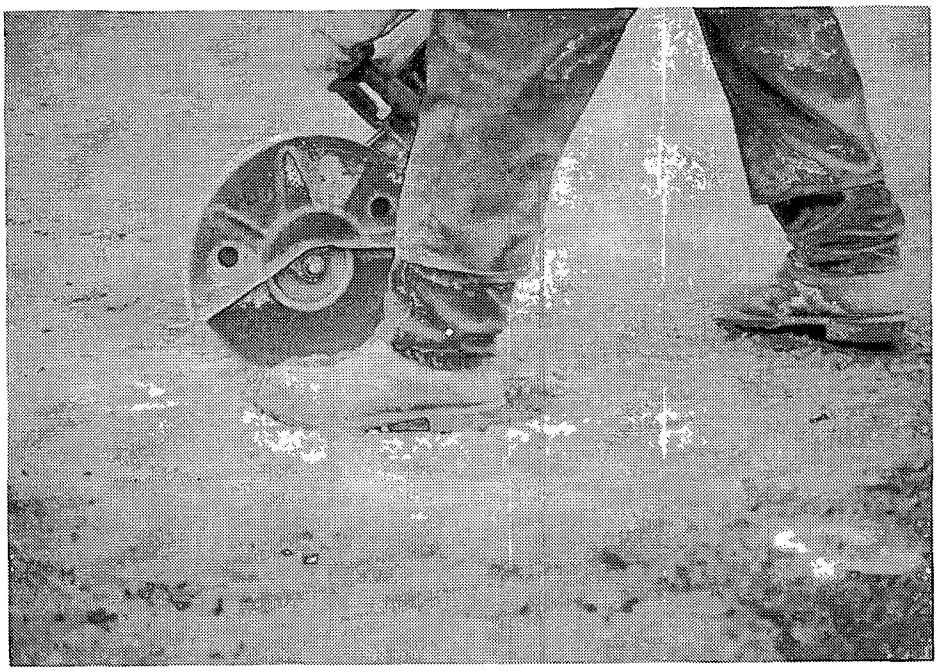


Figure 15. Straightening sides using pavement saw

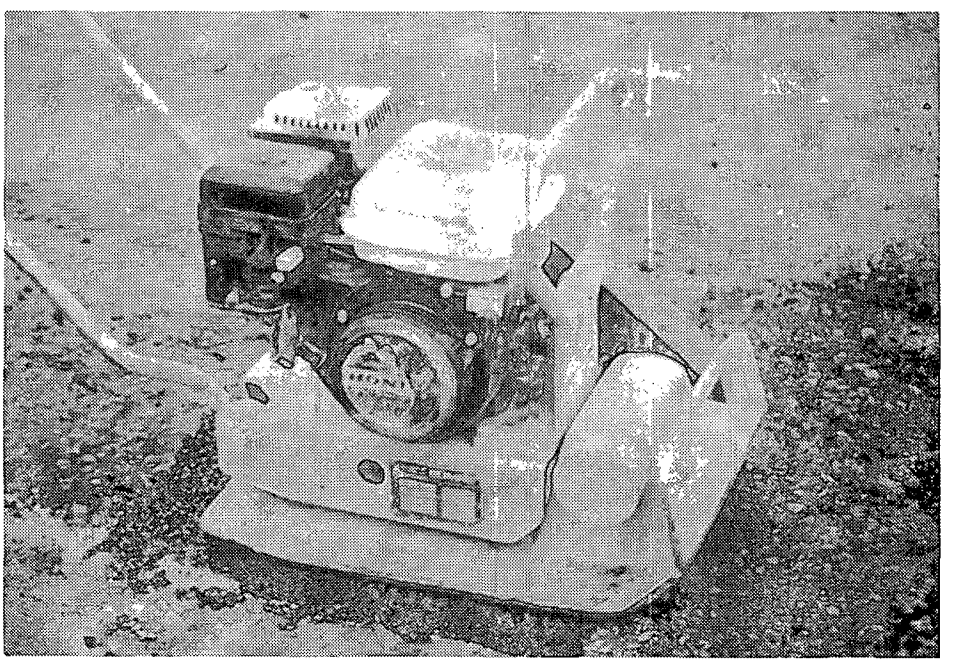


Figure 16. Compaction using vibratory plate compactor

Spray Injection

While three different devices were used for placing spray-injection patches, the same basic procedure was followed in all cases. As in other procedures, the spray-injection procedure began with the pothole filled with water. Spray-injection devices start with aggregate and binder and perform the mixing operation as the materials are being shot into the pothole. The steps used for this project are as follows:

1. Blow water and debris from pothole using air flow from aggregate delivery system.

2. Spray bottom and sides of pothole with binder material to act as tack coat.

3. Spray aggregate and binder into the pothole simultaneously so that the aggregate is coated as it impacts the repair.

4. Continue spraying aggregate and binder into the pothole until it is filled just above the level of the surrounding pavement.

5. Cover the top of the patch with a layer of aggregate only to prevent tracking by passing vehicles.

6. Move on to next distress location.

The optimum crew size for this is two operators patching with a device similar to the Durapatcher or Rosco, or one operator using a device similar to the Roadpatcher. Appropriate traffic control must be provided in all instances.

Other Procedures

Participating agencies were permitted to place one additional material or procedure beyond those already included in the experiment. Agencies in Illinois and Oregon took advantage of this opportunity. The additional repair procedure used in Illinois was as follows:

1. Place material into pothole (no preparation or removal of water and debris was performed prior to material placement).

2. Compact patch using truck tires (between four and eight passes).

3. Check compacted patch for slight crown. (If depression was present after rolling, additional material was added and rolled to bring patch surface up above surrounding pavement level.)

4. Move on to next distress location.

5. The day after the patches are placed, cover the entire surface of the patch using a bituminous material and cover that material with aggregate to prevent tracking.

The optimum crew size for this operation is two laborers patching, with appropriate traffic control provided. This procedure requires two passes through distress locations.

The additional repair procedure used in Oregon was as follows:

1. Remove debris and water from pothole using brooms.

2. Place asphalt emulsion into pothole as tack coat.

3. Heat tack coat using propane torch to get the emulsion to break faster.

4. Heat the cold mix with the propane torch (figure 17) to make it easier to place and to improve the mixtures compaction.

5. Compact patch using material truck (between four and eight passes).

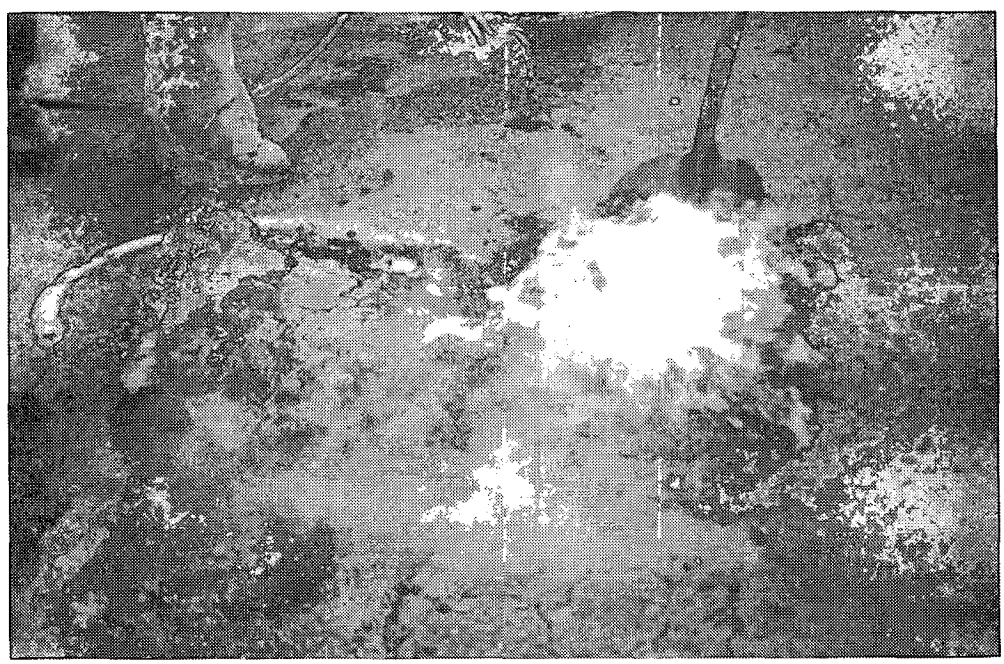


Figure 17. Heating cold mix with propane torch

6. Check compacted patch for slight crown. (If depression was present after rolling, additional material was added and rolled to bring patch surface up above surrounding pavement level.)

7. Move on to next distress location.

The optimum crew size for this operation is two laborers patching, with appropriate traffic control provided.

Documentation

During the installation process, data were collected on the patches placed and the operations performed. The data included the following:

- Installation date
- Patch location (milepost, lane direction, and offset)
- Lane width
- Climatic conditions (temperature and relative humidity)
- Patch dimensions (length, width, and depth)
- Time for preparation of pothole (for semi-permanent only)
- Time for material placement (all procedures).
- Time for compaction (all procedures except spray injection)
- Number of compaction passes (all procedures except spray injection)
- Number of patches compacted together (all procedures except spray injection)

Summaries of the data collected and a copy of the data collection form are included in appendix B of this report.

Productivity and Cost Data

A major goal of the this project was to measure the productivity of different patching operations. During the eight test site installations, data were collected on the productivity of eight crews from eight agencies from the United States and Canada. The agencies were observed using four different repair procedures: throw-and-roll, edge seal, semipermanent, and spray injection. The installation times for each of these procedures were collected and along with information on the size of the potholes, used to calculate productivity rates for the different site, procedure, and material combinations.

Cost data for the equipment and labor rates throughout this report are given as average rates for the purpose of example. Rates that are more accurate for an agency's particular situation can be easily substituted to determine more meaningful cost figures.

Comments

Overall, the installation of the pothole repairs went very smoothly. Thanks to the cooperation of all participating agencies, the repairs were placed with a great deal of consistency within, as well as among, test sites. Other than equipment-specific details, such as types of rollers and trucks available, there was very little deviation among the patches placed from one site to another, despite the different crews.

3

Material Testing

In addition to the data collected as the experimental patches were installed, a series of laboratory tests were performed on the materials used in an attempt to define pertinent characteristics that could be related to their performance in the field. Once these characteristics were identified, specifications regarding the mixing and placement of the materials were developed. The specifications sought to take advantage of those characteristics that indicate good performance and to avoid that indicate poor performance.

Laboratory Tests Performed

The tests performed on the pothole repair materials were intended to characterize properties of the mixture, as well as properties of the aggregate and binder separately. The majority of the tests performed were originally designed for hot-mix asphalt concrete materials. Because of the different properties of cold mixes, samples of the repair materials were aged in an oven to give them some stability for testing. This step was especially necessary for the resilient modulus and Marshall tests. A complete list of the tests performed follows:

- Resilient Modulus
- Marshall Stability and Flow
- Sieve Analysis
- Binder Content
- Penetration (recovered binder only)
- Ductility (recovered binder only)
- Softening Point (recovered binder only)
- Workability
- Maximum and Bulk Specific Gravity
- Anti-stripping
- Viscosity (recovered binder only)

A description of each of the test and the modifications made to accommodate the differences between hot- and cold-mix materials are given in the following section.

Resilient Modulus

The resilient modulus test was performed according to ASTM D 4123 at a temperature of 77 °F (25 °C). Testing was performed at three different frequencies 0.33, 0.50, and 1.00 Hz. In order to get testable samples, the cold-mix materials were aged by heating them overnight at 275 °F (135 °C), compacting them hot using 75 blows per side, and allowing the compacted samples to cool in the molds prior to extrusion. The aging and compaction of these samples made the materials more representative of those that have been in place for several months under traffic.

Marshall Stability and Flow

The Marshall stability and flow test was performed according to ASTM D 1559. As with the resilient modulus samples, the Marshall samples were aged prior to compaction and testing, so the results are more representative of in-situ stability after several months of traffic.

Maximum and Bulk Specific Gravity

The maximum and bulk specific gravity tests were performed according to ASTM D 2041 and ASTM D 2726, respectively. The values from these two tests were used to calculate the percent air voids of the mixes. The compactive effort used to prepare the bulk specific gravity test samples was the same as for the resilient modulus and Marshall sample preparations.

Anti-Stripping

The antistripping test was performed according to ASTM D 1664. This test is one of the few for which no aging or special preparation of the cold-mix samples was necessary.

Workability

The workability test was performed according to procedures documented by the Pennsylvania Transportation Institute (PIT)[3] and utilized a probe developed by PTI that was 0.375-in (9.5 mm) diameter. When this probe was compared directly to the blade attachment, the reading of the blade attachment was approximately 5 times larger. The circular probe seems to work for stiffer mixes because the smaller cross section presents

less resistance. The blade attachment seems to work for softer mixes because the length of the blade in contact with the mix provides more resistance.

Extraction

The extraction testing and binder recovery tests were performed according to ASTM D 2172 and ASTM D 136 respectively.

Viscosity

The viscosity test was performed according to ASTM D 2171 on the binder recovered from the extraction process. Samples of binder were aged in a manner similar to that used for the mixtures: the recovered binder was heated at 140 °F (60 °C) until the reduction in weight stopped, which indicated that the lighter volatiles had been driven off and the material remaining was primarily residual binder.

Penetration

The penetration test was performed according to ASTM D 5. Preparation of the recovered binder samples was the same for this test as for the viscosity test.

Ductility

The ductility test was performed according to ASTM D 113. Preparation of the recovered binder samples were prepared in the same manner as the viscosity test samples. Several samples were too soft to remain above the bottom of the tank where they were stretched in solution. Attempts to raise the specific gravity of the solution did not help.

Softening Point

The softening point test was performed according to ASTM D 36. The recovered binder samples were prepared in the same manner as the viscosity test samples. Several residual binders proved too soft for this test to be performed successfully.

Sieve Analysis

The sieve analysis was performed according to ASTM D 136. Because of the variety of sieves used on the samples, direct comparison of the gradations of the different materials has been difficult.

Laboratory Testing Results

See table 3 for the results from the laboratory testing process. This table contains the mean values for each test performed for each material. Results from the individual sample tests can be found in appendix C.

Field Testing

In addition to laboratory testing, blade penetrometer and rolling-sieve tests were performed in the field during each installation.

Blade Penetrometer

Previous research on asphalt cold-mix materials has attempted to develop devices to quantify workability.[3,4] Two of these devices – called penetrometers – were used in this project to test workability in the laboratory. One was developed by PTI. The other, developed as part of a Federal Highway Administration (FHWA) study on the mix design of cold mixes, used the PTI penetrometer, but changed PTI's bullet-shaped attachment to a specially made blade.

The workability testing consisted of simply inserting the penetrometer into the cold mix and recording the maximum resistance encountered. The scale on the penetrometers ranged from 0 to 4.5 tons/ft^2, so test results ranged from 0 to 4.5 as well.

Head-to-head testing was carried out at one point between the two penetrometers. For the same material at the same temperature, the PTI device provided useful results for stiffer mixes, while the FHWA device was effective on looser materials. Since workability only becomes a problem when mixes get stiff, as happens at lower temperatures, the PTI device provided more meaningful results.

Rolling Sieve

The rolling sieve procedure was developed by the Ontario Ministry of Transportation to evaluate stockpiled patching materials for durability under the abrasive action of traffic.[5] For this project, the procedure was carried out in both the laboratory and the field to see if any correlations could be drawn between the test results and the observed performance. Such correlations would make it possible to develop specifications for acceptance testing of stockpiled material by simply performing the test procedure.

Table 3. Summary of laboratory testing results

Test Procedure	Standard	Conditions (units)	Mean values for given materials (sites given below)									
			485	486	HFMS	Perma	QPR	QPR	UPM	Local	UPM	Local
			All		CA, IL, NM, TX, UT, VT		TX, NM	CA, IL, UT, VT	TX, Spall	TX	IL	IL
Resilient Modulus	ASTM D 4123	77 °F, 0.33 Hz (ksi)	457	34	353	182	160	N/P	290	732	N/P	N/P
		77 °F, 0.50 Hz (ksi)	455	33	343	183	160	N/P	281	742	N/P	N/P
		77 °F, 1.00 Hz (ksi)	468	34	352	186	160	N/P	292	755	N/P	N/P
Marshall Stability and Flow	ASTM D 1559	Stability (lbs)	4550	2570	3680	4620	4400	3190	5080	6640	2400	822
		Flow (0.01 in)	12.3	14.7	12.8	8.7	12.8	11.8	9.7	10.3	11.0	9.1
Bulk Spec. Grav.	ASTM D 2726		2.30	2.26	2.11	2.30	2.24	2.21	2.26	2.12	2.21	2.33
Max. Spec. Grav.	ASTM D 2041		2.50	2.54	2.45	2.66	2.61	2.58	2.54	2.42	2.55	2.51
Air Voids		(percent)	8.3	11.0	13.6	13.4	13.8	14.3	10.9	12.2	12.8	7.4
Antistripping	ASTM D 1664	Modified (percent)	+95	+95	+95	+95	+95	N/P	+95	+95	N/P	N/P
Workability	PTI Method	Ambient Temp.	0.47	0.25	0.40	0.43	0.25	N/P	0.5	0.5	N/P	N/P
AC Content	ASTM D 136	(residual percent)	4.1	4.4	3.8	3.5	5.2	4.2	3.5	4.1	4.2	4.0
Viscosity	ASTM D 2171	140 °F (poise)	311	41	30700	4070	354	693	640	3230	251	17
Penetration	ASTM D 5	77 °F (dmm)	201	+400	34	70	268	165	196	49	229	[a]
Ductility	ASTM D 113	77 °F (cm)	+150	[a]	12	+150	+150	N/P	+150	+100	N/P	N/P
Softening Point	ASTM D 36	(°F)	104	< 86	150	132	102	112	109	128	103	[a]

[a]Recovered binder too soft to test

Table 3. Summary of laboratory testing results (continued)

Test Procedure	Standard	Conditions (units)	Mean values for given materials (sites given below)								
			UPM	Local	QPR	Perma	HFMS	Local	UPM	Local	UPM
			NM, UT	UT	ON, OR			OR	OR	ON	ON
Resilient Modulus	ASTM D 4123	77 °F, 0.33 Hz (ksi)	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P
		77 °F, 0.50 Hz (ksi)	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P
		77 °F, 1.00 Hz (ksi)	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P
Marshall Stability and Flow	ASTM D 1559	Stability (lbs)	4010	3800	2380	4120	5630	2300	4760	1760	2310
		Flow (0.01 in)	11.8	9.8	10.7	14.0	15.7	11.3	14.3	12.0	13.3
Bulk Spec. Grav.	ASTM D 2726		2.16	2.26	2.25	2.28	2.24	2.22	2.19	2.13	2.21
Max. Spec. Grav.	ASTM D 2041		2.30	2.44	2.60	2.57	2.46	2.52	2.49	2.47	2.59
Air Voids		(percent)	6.1	7.4	13.4	11.4	8.9	12.0	12.2	13.9	14.8
Antistripping	ASTM D 1664	Modified](percent)	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P
Workability	PTI Method	Ambient Temp.	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P	N/P
AC Content	ASTM D 136	(residual percent)	4.0	4.3	5.1	3.5	5.0	2.7	4.4	4.7	4.1
Viscosity	ASTM D 2171	140 °F (poise)	290	2170	74	2932	1288	1126	517	42	69
Penetration	ASTM D 5	77 °F (dmm)	350	69	>400	82	159	121	211	>350	>350
Ductility	ASTM D 113	77 °F (cm)	N/P	N/P	N/P	N/P	N/P	N/P	N/P	<86	<86
Softening Point	ASTM D 36	(°F)	97	123	>86	126	115	108	108		

The procedure as it was carried out for this project consisted of the following steps:

1. Fill a standard Marshall mold and collar with approximately 1,000 to 1,200 g of stockpiled cold mix.

2. Using a standard Marshall hammer, compact the material in the mold with only three blows of the hammer.

3. Extrude and record the weight of the compacted sample.

4. Place the compacted sample into a standard sieve with an opening of 1 in (25.4 mm) and a diameter sieve of 12 in (305 mm) so that both the sieve and the sample are standing upright. Place a lid on the sieve so that the sample is contained with the lid on one side and the mesh on the other.

5. Roll the sieve back and forth with the sample inside. The sieve should roll approximately 12 in (305 mm) in each direction. The rolling continues for 20 passes, at approximately one second per pass.

6. After rolling, place the sieve horizontally with the mesh down. There should be enough space to allow loose material to fall through the mesh. After 10 seconds in this position, the sieve and lid should be turned over so that the material left in the sieve falls onto the lid.

7. Weigh the material retained in the sieve. Calculate the percent of material lost ($[(W_{orig} - W_{after}) / (W_{orig})] \times 100$ = Percent Lost). The Ontario report stated that a loss of more than 35 percent was unacceptable.

Because this procedure was performed in the field, the temperature could not be controlled as in the laboratory. Appendix C contains the results from the rolling-sieve tests carried out at each site. The original laboratory procedure was carried out at -10 °C. For this project, the ambient temperatures ranged from 0° to 23 °C, with distinct trends for increasing percent loss as temperatures rose. While this test allowed distinctions to be made between the materials, the field performance to date has not provided enough differentiation to allow for meaningful correlations.

4

Field Performance

A series of field evaluations was conducted to determine the rates of deterioration and cost-effectiveness of the various patch types. Evaluations were scheduled for 1, 3, 6, 12, and 18 months after the installations were completed. In order to reduce variability during the performance monitoring trips, all field performance data were collected by the same individual. Data on the failed repairs were collected, as well as information regarding the types and severities of distress that developed for the surviving patches.

As with the installations, arrangements were made with participating agencies to provide traffic control during data collection. Depending on the weather and the schedule of the crew, collection was generally completed in one day.

Performance Data Collection

Two main types of data were collected during the field performance evaluations. The first was survival data, which is simply the number of patches still in-service along the test site. In each round of evaluations, the number of surviving patches was collected for every set of experimental and control patches placed at every site.

The second type of data collected concerned the distresses present in the patches that remained in place. Distress included bleeding, cracking, dishing, edge disintegration, missing patch, ravelling, and shoving. Appendix D contains detailed distress data for each site/repair combination.

Summary of Performance Data

Survival Data

The most important indicator of performance for the repairs placed during the project is the percent surviving. Survival data were collected during each monitoring trip and the percent surviving for each repair type was calculated for the particular point in time. Tables 4 through 11 show the percent surviving for each repair type at each site for every monitoring trip. The time of each trip is also given in weeks.

Figures 18 through 21 show the different failure rates of repairs pooled over different categories. The plots represent raw values and do not take into account variability resulting from specific factors such as traffic, pavement structure, climate, etc. The statistical analysis and accompanying results are provided in the following chapter.

Figures 22 through 28 illustrate survival plots for the patch sets at the Ontario test site based on the data presented in table 11. At each site, the repair types are grouped into sets according to how they were installed. This grouping emphasizes the comparison of patches within each set, because these intraset comparisons have the least variability in traffic, cross section, subgrade support, drainage, and other factors.

Only the Ontario site has been shown because it has the lowest overall rate of survival (39 percent) of any of the eight sites. Complete data on the percent surviving for all patch types at all test sites can be found in appendix D.

One of the reasons that the analysis has concentrated on the differences within the groups is the variability of the performance observed from one set of control patches to the other. Figure 29 illustrates the survival plots for each of the 7 sets of control patches placed at the Ontario test site. The percent surviving after 44 weeks varies from 80 to 0 percent, although the materials, placement procedure, and compaction were the same. The most likely source of the variability is differences in the pavement support, drainage, and other in-situ factors, which will also vary for the rest of the repair types. Comparisons between different patch types at different locations throughout the test site would be irrelevant due to the differences in performance caused by site-specific factors.

Table 4. Summary of patch survival–US 395, Alturas, California
(Time since installation given in weeks for each evaluation.)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (5)	Eval. 2 (12)	Eval. 3 (39)	Eval. 4 (55)	Eval. 5 (77)
Local Material (TAR)	100	100	100	90	80
UPM (TAR)	100	90	90	90	90
PennDOT 486 (TAR)	100	100	100	90	90
Spray Injection	90	90	90	90	80
UPM (TAR)	100	100	100	100	100
PennDOT 485 (TAR)	100	100	100	100	90
Perma-Patch (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	100	100
HFMS-2 (TAR)	100	100	100	100	100
UPM (SP)	100	100	90	70	70
UPM (TAR)	100	100	70	50	40
UPM (ES)	100	90	90	80	80
QPR 2000 (TAR)	100	100	90	80	80
UPM (TAR)	100	100	100	70	60

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 5. Summary of patch survival–I-70, Vandalia, Illinois
(Time since installation given in weeks for each evaluation.)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (4)	Eval. 2 (13)	Eval. 3 (31)	Eval. 4 (62)	Eval. 5 (84)
Local Material (TAR)	10	10	0	0	0
UPM (TAR)	100	100	100	78	22
QPR 2000 (TAR)	80	80	70	60	20
Local Material (Local)	80	80	60	50	0
UPM (TAR)	100	100	100	100	10
HFMS-2 (TAR)	100	100	100	90	10
PennDOT 486 (TAR)	100	100	70	70	0
UPM (TAR)	90	90	90	90	30
UPM (ES)	100	100	100	100	30
PennDOT 485 (TAR)	100	100	100	100	70
UPM (TAR)	100	100	100	100	90
Perma-Patch (TAR)	100	100	100	100	80
UPM (SP)	100	100	100	100	100
UPM (TAR)	100	100	100	100	100
Spray Injection	100	100	100	100	100

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 6. Summary of patch survival–Rte 518, Las Vegas, New Mexico
(Time since installation given in weeks for each evaluation)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (6)	Eval. 2 (13)	Eval. 3 (34)	Eval. 4 (61)	Eval. 5 (84)
PennDOT 486 (TAR)	100	100	70	60	60
UPM (TAR)	100	100	90	70	70
Local Material (TAR)	100	100	80	50	50
PennDOT 485 (TAR)	100	100	100	90	70
UPM (TAR)	100	100	90	80	70
HFMS-2 (TAR)	100	100	70	40	30
UPM (SP)	100	100	90	90	90
UPM (TAR)	100	100	90	80	70
UPM (ES)	100	100	100	100	100
Perma-Patch	100	100	100	100	100
UPM (TAR)	100	100	90	90	90
QPR 2000 (TAR)	100	100	100	100	100
		Eval. 2 (7)	Eval. 3 (28)	Eval. 4 (55)	Eval. 5 (78)
Spray injection		100	100	100	100
UPM (TAR)		100	100	90	90

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 7. Summary of patch survival–US 97 Modoc Point, Oregon
(Time since installation given in weeks for each evaluation)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (5)	Eval. 2 (16)	Eval. 3 (25)	Eval. 4 (35)	Eval. 5
PennDOT 485 (TAR)	100	100	100	100	
UPM (TAR)	100	100	100	100	
QPR 2000 (TAR)	100	100	100	100	
QPR 2000 (SP)	100	100	100	100	
UPM (TAR)	100	100	100	100	
PennDOT 485 (SP)	100	100	100	100	
UPM (SP)	100	100	100	100	
UPM (TAR)	100	100	100	100	
Perma-Patch (TAR)	100	100	100	100	
UPM (TAR)	100	100	100	100	
HFMS-2 (TAR)	100	100	100	100	
Local Material (TAR)	60	60	60	60	
UPM (TAR)	100	100	100	100	
PennDOT 486 (TAR)	100	100	100	100	
UPM(ES)	100	100	100	100	
UPM (TAR)	100	100	100	100	
Local Material (Local)	100	100	100	100	
QPR 2000 (ES)	100	100	100	100	
UPM (TAR)	100	100	100	100	
PennDOT 485 (ES)	100	100	100	100	

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 8. Summary of patch survival–FM 1570 Greenville, Texas
(Time since installation given in weeks for each evaluation)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (5)	Eval. 2 (13)	Eval. 3 (26)	Eval. 4 (62)	Eval. 5 (84)
Local Material (TAR)	20	20	20	0	0
UPM (TAR)	100	90	90	67	67
UPM (ES)	100	100	100	100	100
UPM (TAR)	100	100	100	80	80
HFMS-2 (TAR)	100	100	100	100	100
Perma-Patch (TAR)	100	90	90	50	50
UPM (TAR)	100	100	100	100	67
QPR 2000 (TAR)	100	100	100	100	100
PennDOT 485 (TAR)	100	100	100	80	80
UPM (TAR)	100	100	100	90	90
UPM (SP)	100	100	100	90	90
PennDOT 486 (TAR)	100	100	100	20	20
UPM (TAR)	100	100	100	60	60
		Eval. 2 (8)	Eval. 3 (21)	Eval. 4 (57)	Eval. 5 (79)
Spray Injection		100	100	100	100
UPM (TAR)		100	100	100	100

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 9. Summary of patch survival–I-15 Frontage Road, Draper, Utah
(Time since installation given in weeks for each evaluation)

Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (6)	Eval. 2 (13)	Eval. 3 (32)	Eval. 4 (63)	Eval. 5 (79)
PennDOT 486 (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	100	100
PennDOT 485 (TAR)	100	100	100	100	100
HFMS-2 (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	100	100
Spray Injection	100	100	100	100	100
Local Material (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	90	90
Perma-Patch (TAR)	100	100	100	100	100
UPM (ES)	100	100	100	100	100
UPM (TAR)	100	100	100	100	90
UPM (SP)	100	100	100	100	100
QPR 2000 (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	90	90

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 10. Summary of patch survival–Rte 28, Bradford, Vermont
(Time since installation given in weeks for each evaluation)

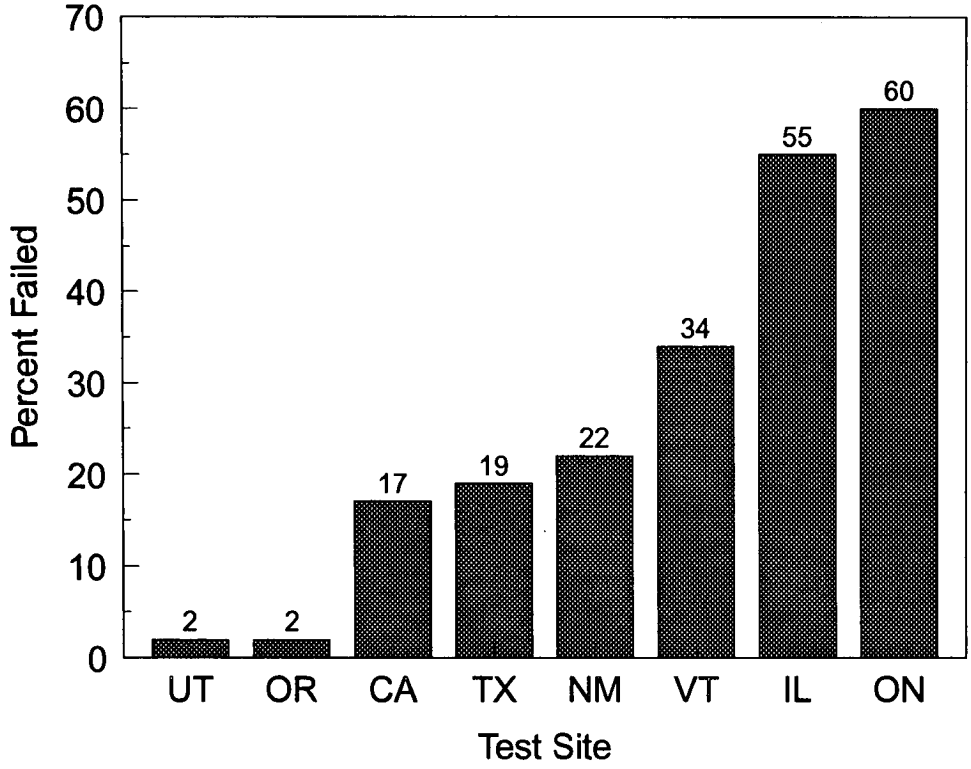
Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (5)	Eval. 2 (12)	Eval. 3 (37)	Eval. 4 (58)	Eval. 5 (74)
Local Material (TAR)	100	100	100	30	20
UPM (TAR)	100	100	100	30	20
UPM (ES)	100	100	90	90	70
UPM (TAR)	100	100	90	60	50
HFMS-2 (TAR)	100	100	100	60	50
Perma-Patch (TAR)	100	100	100	90	70
UPM (TAR)	100	100	100	70	40
QPR 2000 (TAR)	100	100	100	80	70
PennDOT 485 (TAR)	100	100	100	100	100
UPM (TAR)	100	100	100	90	80
PennDOT 486 (TAR)	100	100	100	80	80
Spray Injection	100	100	100	100	90
UPM (TAR)	100	100	100	100	90
UPM (SP)	100	100	100	100	90

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent

Table 11. Summary of patch survival–Rte 2 Prescott, Ontario
(Time since installation given in weeks for each evaluation)

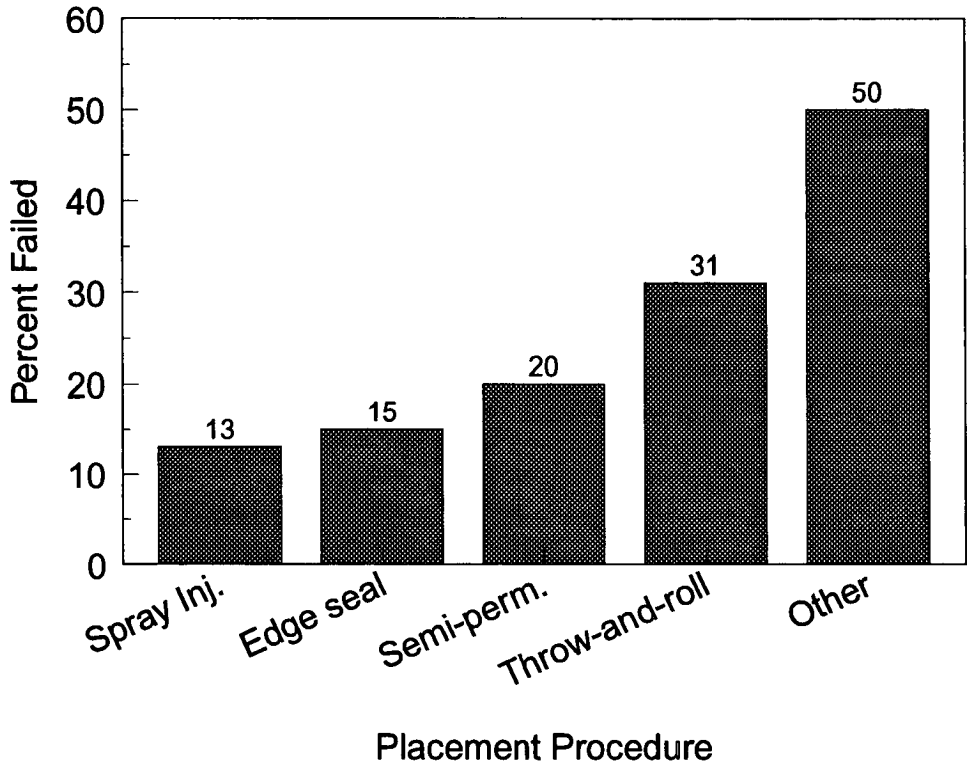
Patch Material (Procedure)	Percent of Patches Surviving at Given Evaluation				
	Eval. 1 (7)	Eval. 2 (14)	Eval. 3 (24)	Eval. 4 (44)	Eval. 5 ()
PennDOT 485	50	40	30	22	
UPM (TAR)	70	30	30	30	
UPM (TAR)	70	50	40	40	
Local Material (TAR)	80	80	60	60	
UPM (TAR)	90	80	80	80	
PennDOT 485 (TAR)	80	70	50	50	
QPR 2000 (TAR)	80	70	50	50	
UPM (TAR)	100	90	30	30	
QPR 2000 (TAR)	90	60	20	20	
Perma-Patch (TAR)	80	70	50	40	
UPM (TAR)	80	70	60	50	
UPM (SP)	70	40	40	30	
QPR 2000 (SP)	90	80	70	60	
UPM (TAR)	80	70	40	30	
PennDOT 485 (SP)	70	50	40	30	
Spray Injection	50	50	40	33	
UPM (TAR)	100	20	10	0	
		Eval. 2 (7)	Eval. 3 (17)	Eval. 4 (37)	
HFMS-2 (TAR)		90	40	40	
UPM (TAR)		60	50	50	

Procedures: **TAR** - Throw-and-roll **ES** - Edge seal **SP** - Semipermanent



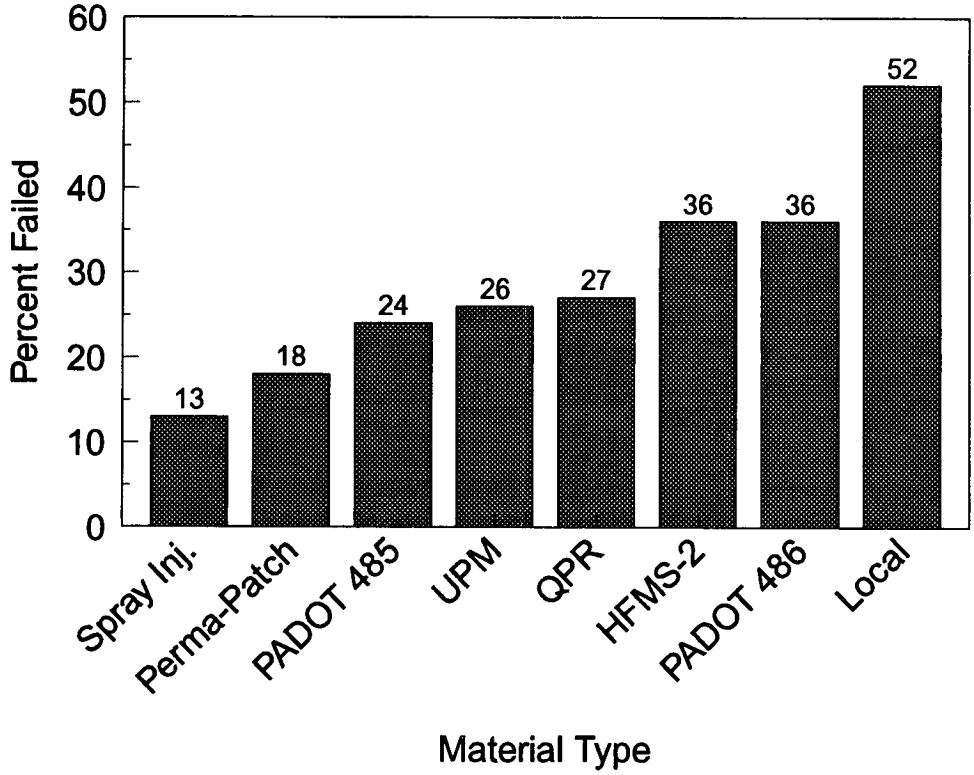
Values from last observations

Figure 18. Patches failed by site



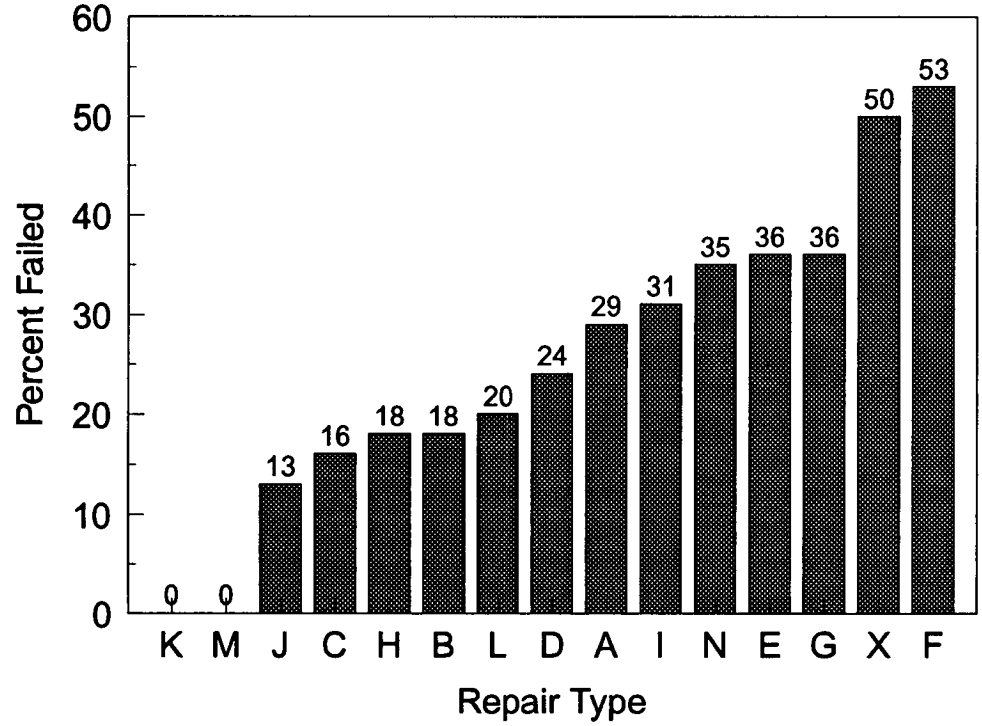
Values from last observations

Figure 19. Patches failed by procedure



Values from last observations

Figure 20. Patches failed by material



Values from last observations

Repair types correspond to table 1.

Figure 21. Patches failed by repair type

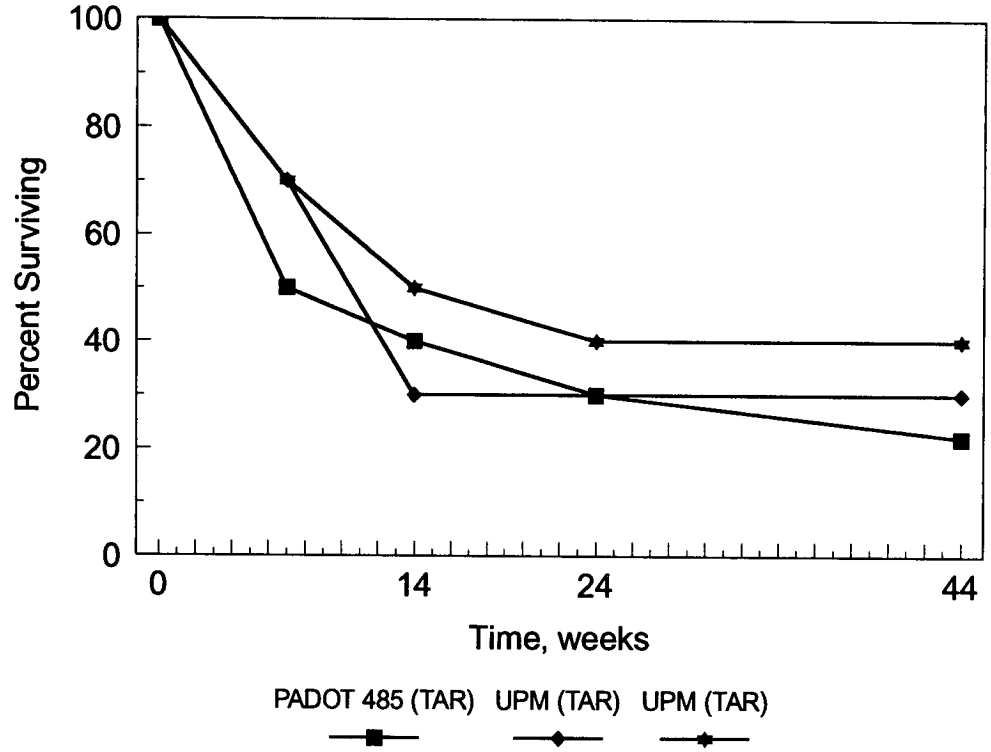


Figure 22. Survival plots for Ontario test site–set 1

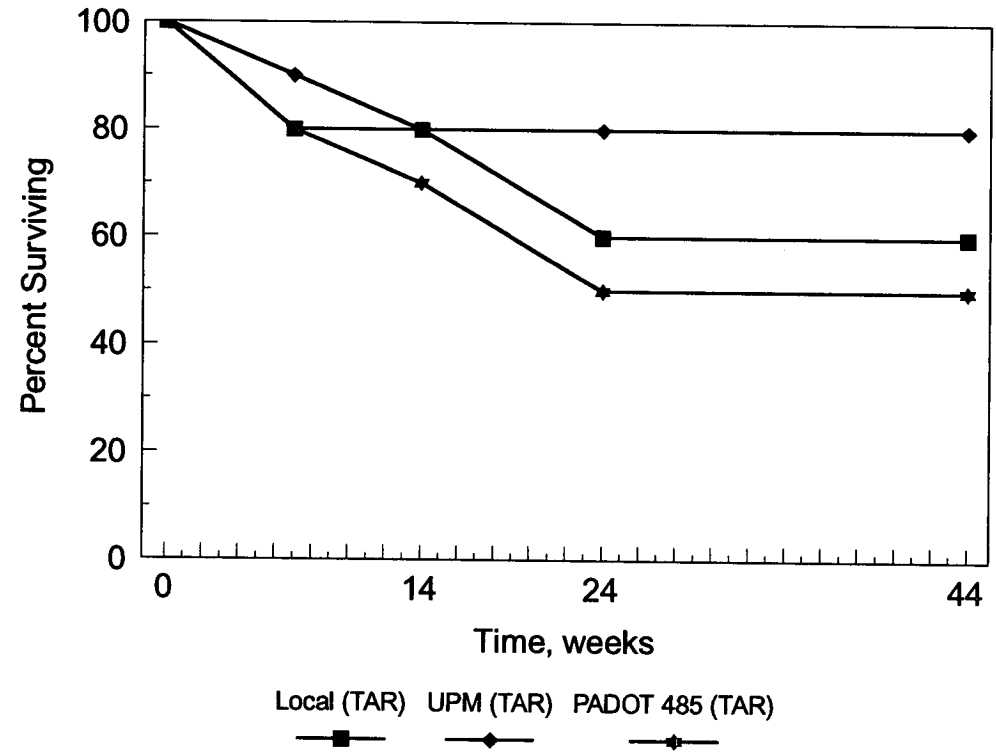


Figure 23. Survival plots for Ontario test site–set 2

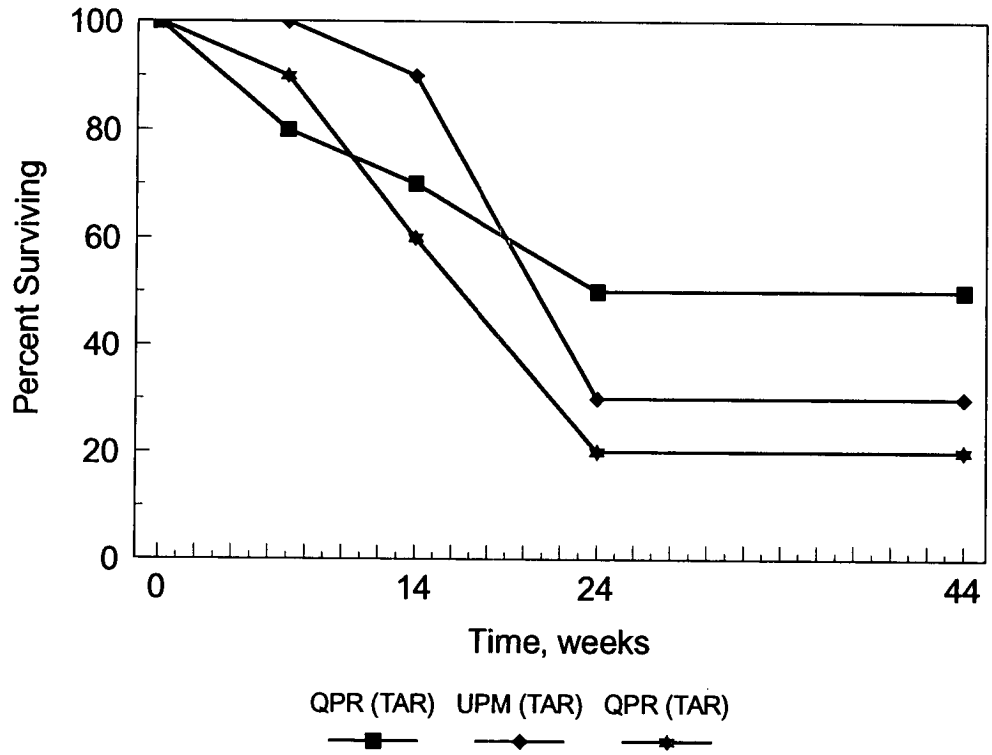


Figure 24. Survival plots for Ontario test site–set 3

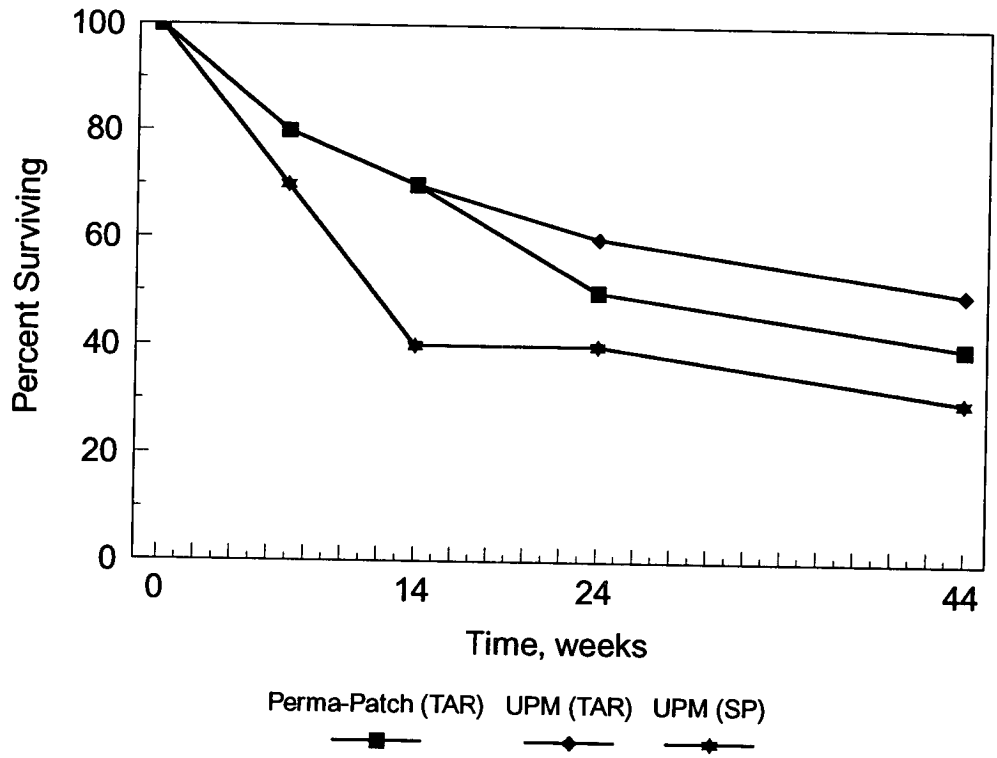


Figure 25. Survival plots for Ontario test site–set 4

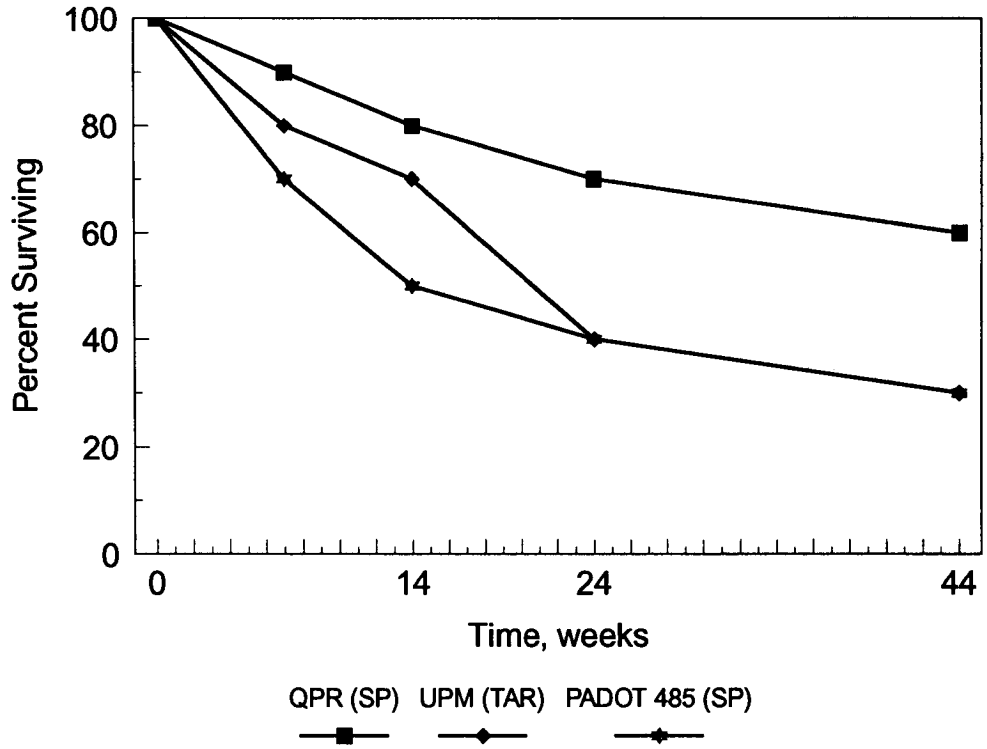


Figure 26. Survival plots for Ontario test site–set 5

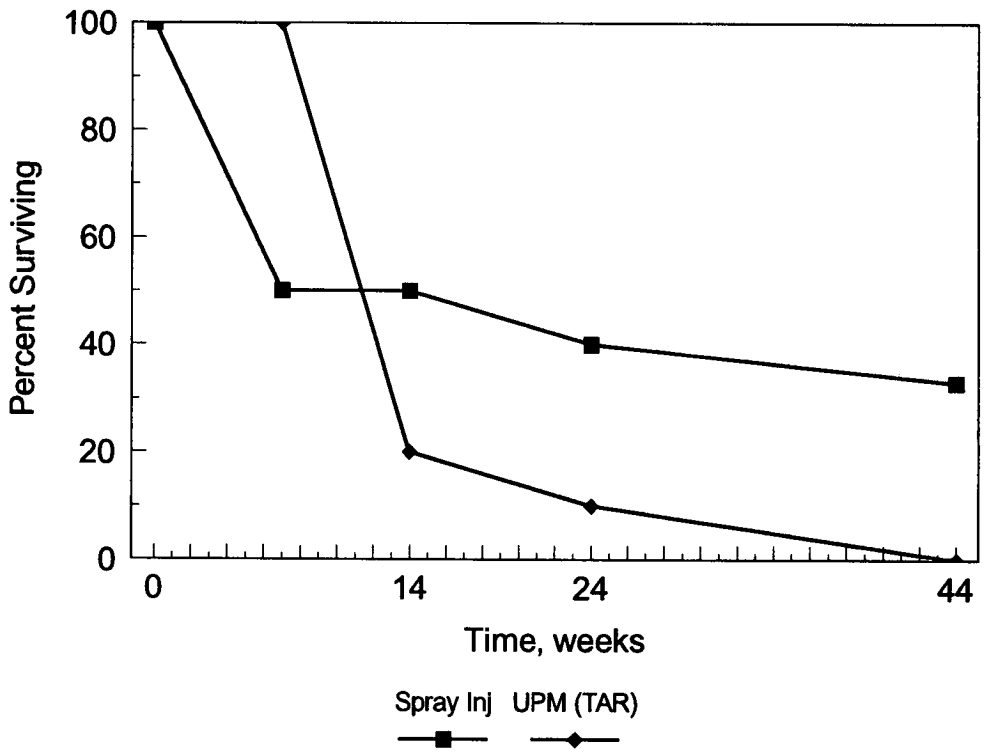


Figure 27. Survival plots for Ontario test site–set 6

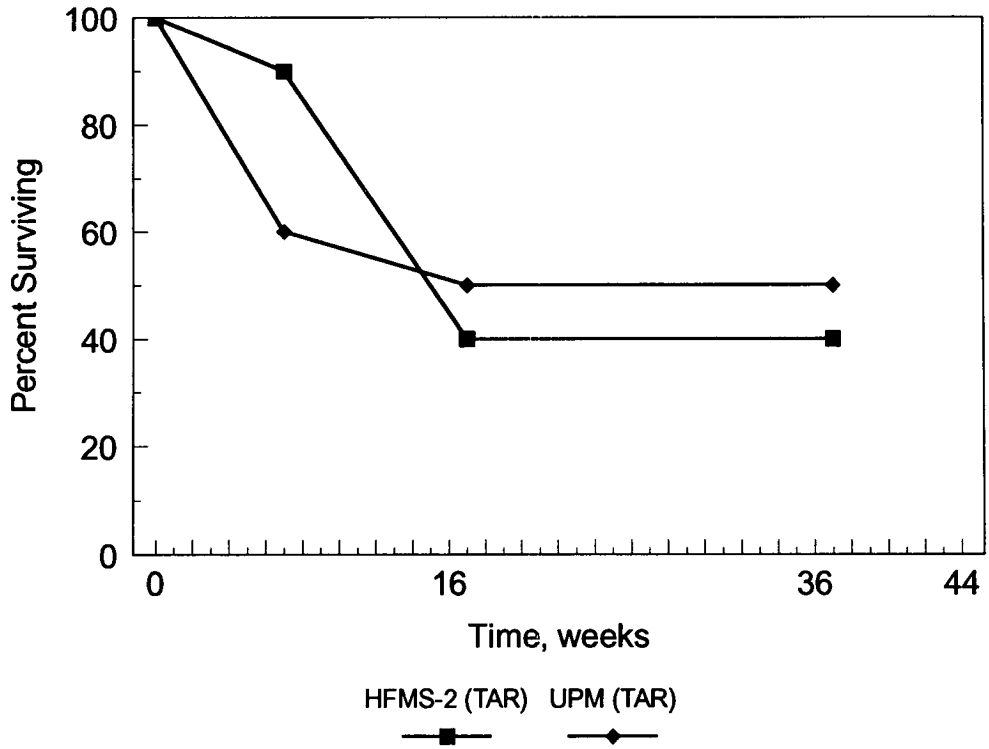


Figure 28. Survival plots for Ontario test site–set 7

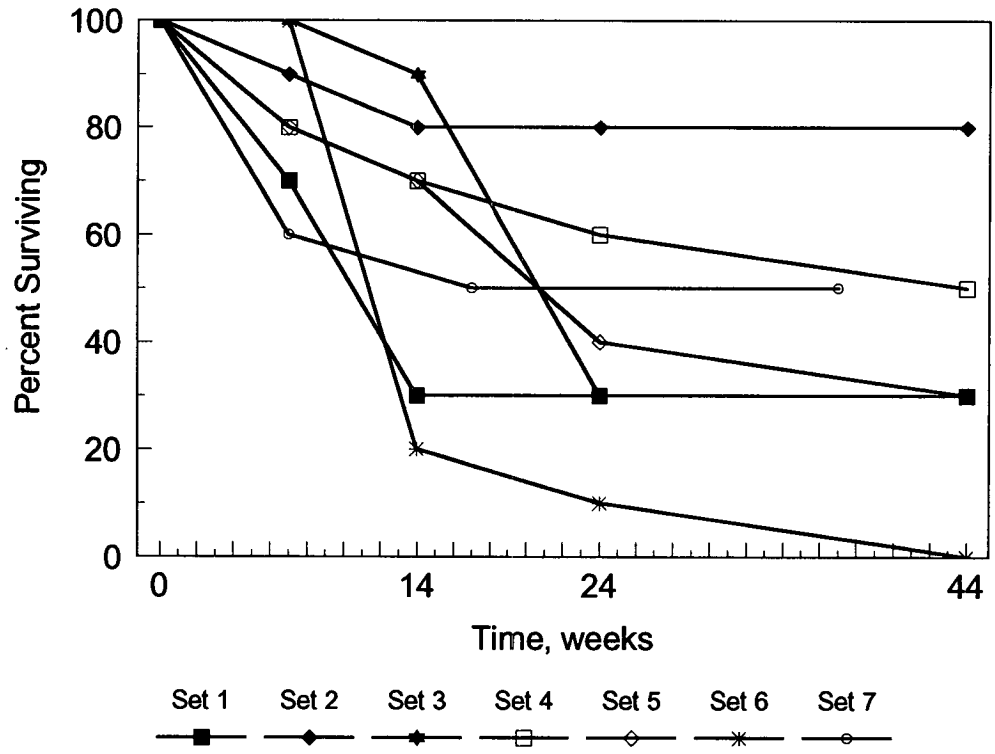


Figure 29. Survival plots for control patches–Ontario test site

Distress Data

During the course of the field evaluations, it became apparent that not all of the distress types being noted would prove meaningful. One case of this was the "missing patch" distress which was intended to be a distress when significant amounts of the patching material were gone for no apparent reason. There were very few patches for which this distress was recorded because patches that developed holes were quickly repaired by the participating agency.

Some of the more significant distresses noted at the test sites included dishing, ravelling, and edge disintegration. Bleeding was also prevalent among the PennDOT 486 patches, but was not widespread among the other patches placed. A detailed account of the distress types and severities can be found in appendix D, along with a description of the distress severity levels and the rating scheme used to record the distress information.

See figures 30 through 34 for examples of the distress types noted in the field.

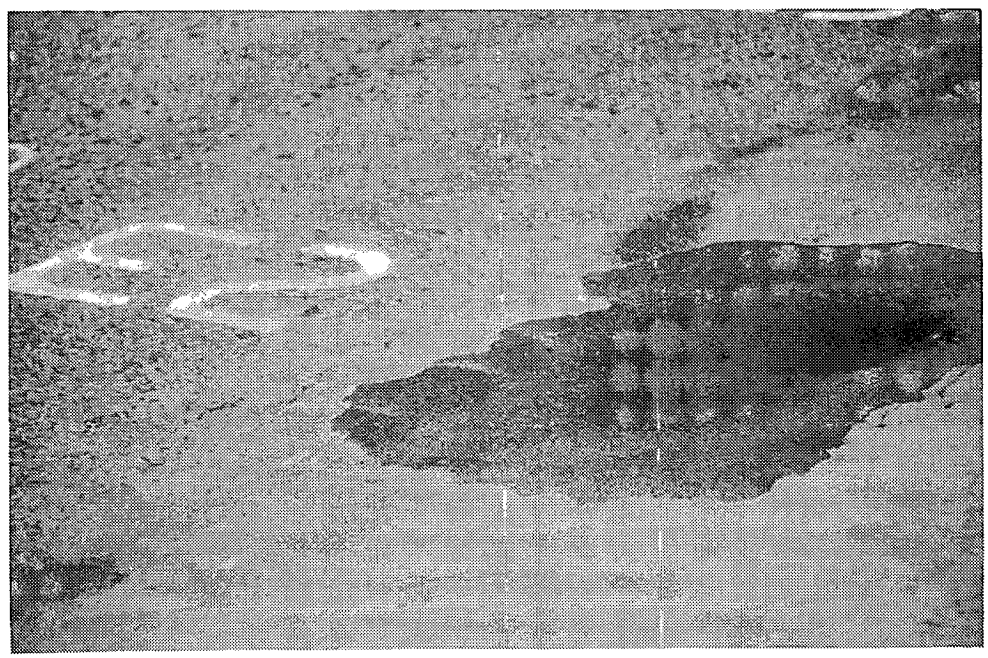


Figure 30. Example of bleeding distress

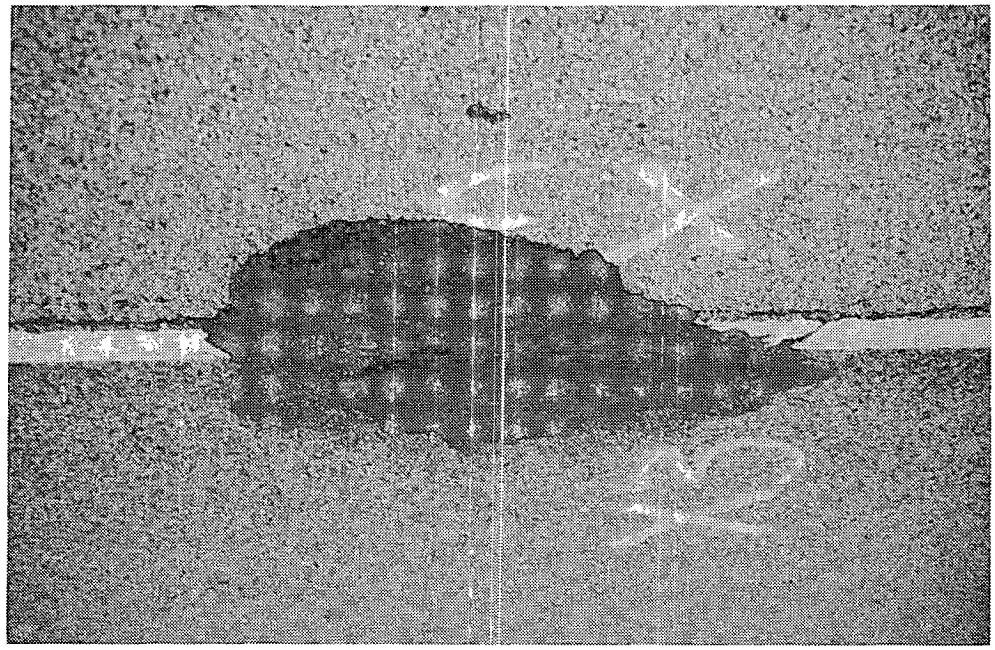


Figure 31. Example of shoving distress

Figure 32. Example of cracking distress

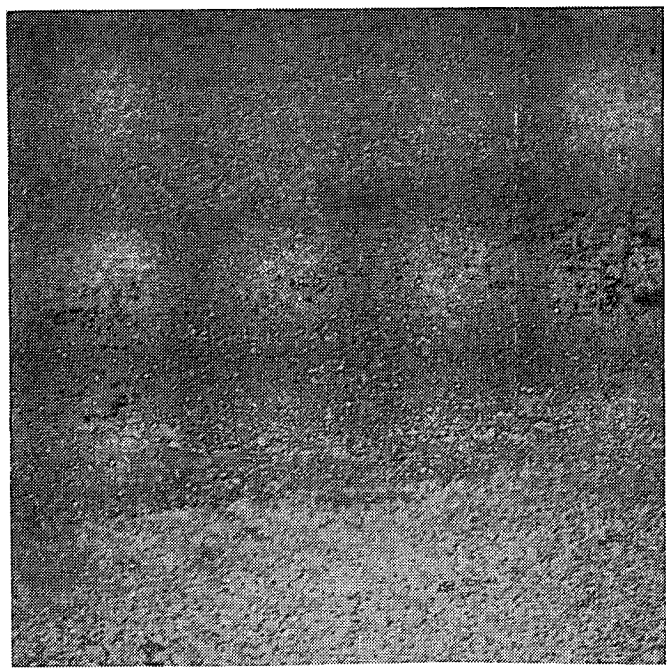


Figure 33. Example of ravelling distress

Figure 34. Example of edge disintegration distress

5

Analysis

A prime objective of this project was to determine the optimum combination of materials and patching procedures for the cost-effective repair of potholes in asphalt concrete-surfaced pavements. Cost-effectiveness was a function of many factors, including material cost, labor cost, equipment cost, productivity, and performance of the repairs.

Another objective was to find correlations between performance observed in the field and material properties determined in the laboratory. Such correlations will help establish material specifications based on desirable material characteristics that are indicative of field performance.

Statistical Methodology

Most of the analysis was performed using the SAS® statistical package. This required the raw data to be in ASCII form and also required the creation of command files. These files consisted of SAS statements to read in the raw data, perform the analysis, and produce the final output.

Comparisons of two groups of repairs included all values for each repair type were included in the analysis. For example, attempts to determine statistically significant differences were based on survival and distress ratings. For correlations between the laboratory and the field average values, the material property and distress ratings for a group were used in all cases.

Field Performance

Two main aspects of field performance were monitored for the pothole repair experiment: survival and distress development. The survival data were used to calculate the estimated service life of the different patch types and as a criteria for determining statistically significant differences between the performance of different repair types.

Patch Survival Ratings

See table 12 for the survival rating values of each repair type placed at each test site. (The letters designating repair types correspond to those used in table 13.) These ratings were derived by calculating the area under the survival plots and dividing by the area that a repair type with no failures would have at the same time. See table 14 for sample survival data that can be used in the worksheet in table 15. This worksheet can be used for any combination of times and percent surviving.

In table 15, each average percent surviving (P_{AVG}) is calculated by averaging the two values for percent surviving (P_{surv}) that straddle the line being calculated, as shown in the two shaded areas. Each time interval (T_T) is calculated by subtracting the smaller time ($T_{(i)}$) from the larger time ($T_{(i+1)}$) for the two straddling lines.

Each partial area (A_{PART}) is calculated by multiplying the P_{AVG} and T_T values for that line. Each total area (A_{TOT}) represents the time interval (T_T) multiplied by 100. The A_{TOT} values represent the best possible performance that can be expected for any repair type– 100 percent survival for the time period observed.

Significant Differences

The performance ratings provided one means of quantifying performance for the different repair types. Another procedure, the SAS® LIFETEST, was used to identify statistically significant differences. A confidence level (α) of 0.05 was used as the threshold of significance for the LIFETEST as well as for other SAS procedures.

SAS analysis of the survival plots for each set of experimental patches indicated relatively few differences when compared the appropriate sets of control patches. Out of a possible 80 experimental-control comparisons (table 12), only four proved significantly different (at α = 0.05). When α was increased to 0.10, four additional significant differences were identified. See table 16 for the statistically significant comparisons.

As the list indicates, three of the eight sites had local materials that were significantly worse than the control material. The PennDOT 486 and HFMS-2 with styrene butadiene were the only other repair types that performed significantly worse than the controls (α = 0.10). The only repair type that performed significantly better was the edge seal in New Mexico (α = 0.10). These results indicate that the majority of experimental repair types have not performed significantly different from the control patches (95 percent at α = 0.05; 90 percent at α = 0.10).

Table 12. Summary of patch performance ratings

Set No.	Test Site Locations															
	CA		IL		NM		OR		TX		UT		VT		ON	
	Type	Rating	Type	Rating	Type	Rating	Type	Rating	Type	Rating	Type	Rating	Type	Rating	Type	Rating
1	F	94.7	F	4.8	E	74.0	D	100.0	F	12.9	E	100.0	F	71.1	D	38.9
	A	91.1	A	82.8	A	84.1	A	100.0	A	80.1	A	100.0	A	71.1	A	41.9
	E	96.1	I	63.4	F	72.6	I	100.0			D	100.0			A[a]	51.5
2	J	88.9	X	54.7	D	92.9	L	100.0	B	100.0	G	100.0	B	90.8	F	70.2
	A	100.0	A	88.2	A	87.1	A	100.0	A	90.5	A	100.0	A	79.9	A	83.2
	D	98.6	G	85.1	G	64.0	N	100.0	G	100.0	J	100.0	G	83.0	D[a]	62.6
3	H	100.0	E	68.7	C	92.8	C	100.0	H	72.0	F	100.0	H	94.0	I	62.6
	A	100.0	A	82.4	A	87.1	A	100.0	A	95.7	A	96.0	A	85.0	A	58.3
	G	100.0	B	90.8	B	100.0			I	100.0	H	100.0	I	91.0	I[a]	45.5
4	C	85.5	D	96.1	H	100.0	H	100.0	D	90.5	B	100.0	D	100.0	H	60.3
	A	70.7	A	98.7	A	92.8	A	100.0	A	95.2	A	99.0	A	95.0	A	66.0
	B	87.2	H	97.4	I	100.0	G	100.0	C	95.2	C	100.0	E	92.0	C	47.3
5	I	89.4	C	100.0	J	100.0	F	62.9	E	61.9	I	100.0	J	99.0	L	75.2
	A	86.9	A	100.0	A	95.3	A	100.0	A	81.0	A	96.0	A	99.0	A	54.7
			J	100.0			E	100.0					C	99.0	N	49.2
6							B	100.0	J	100.0					J	46.7
							A	100.0	A	100.0					A	31.1
							X	100.0								
7							K	100.0							G	57.2
							A	100.0							A	57.0
							M	100.0								

[a] Originally supposed to be edge sealed, but no edge seal was placed.

Table 13. Patch types and corresponding material/procedure combinations

Type	Material	Procedure	Type	Material	Procedure
A	UPM High Performance Cold Mix	TAR	I	QPR 2000	TAR
B		ES	J	Spray injection	SI
C		SP	K	QPR 2000	ES
D	PennDOT 485	TAR	L		SP
E	PennDOT 486	TAR	M	PennDOT 485	ES
F	Local	TAR	N		SP
G	HFMS-2	TAR	X	Local	Local
H	Perma-Patch	TAR			

TAR Throw-and-roll
SP Semipermanent
ES Edge seal
SI Spray injection

Table 14. Sample patch-performance data

Time (weeks) (T_T)	Repairs in Place (R_{IP})	Repairs Failed (R_F)	Repairs Lost to Overlay (R_L)	Percent Surviving (P_{SURV})
0 (Inst.)	30	0	0	100
4	28	2	0	93
10	26	2	2	93
16	24	3	3	89
30	20	7	3	74
40	19	8	3	70
52	15	10	5	60

$$P_{SURV} = \{R_{IP} / (R_F + R_{IP})\} \times 100$$

Table 15. Worksheet for calculating patch survival rate

No. of Observ. (i)	Time (weeks) (T)	Percent Surviving (P_{SURV})	Average Percent Surviving (P_{AVG})	Time Interval (T_T)	Partial Area (A_{PART})	Total Possible Area (A_{TOT})
0	0	100				
1	4	93	96.5	4	386	400
2	10	93	93	6	558	600
3	16	89	91	6	546	600
4	30	74	81.5	14	1141	1400
5	40	70	72	10	720	1000
6	52	60	65	12	780	1200
7						
8						
9						
10						
11						
12						
				Total	4131	5200

Performance Rating

$(A_{PART}/A_{TOT}) \times 100$

$(4131/5200) \times 100 = 79$ percent

$P_{AVG} = (P_{SURV(i)} + P_{SURV(i+1)})/2$

$T_T = T_{(i+1)} - T_{(i)}$

$A_{PART} = P_{AVG} \times T_T$

$A_{TOT} = T_T \times 100$

Table 16. Summary of significant differences in performance comparisons

α level	Test Site	Material Comparison[a]
0.05	IL	F vs. A
0.05	IL	X vs. A
0.05	OR	F vs. A
0.05	TX	F vs. A
0.10	IL	E vs. A
0.10	NM	G vs. A
0.10	NM	A vs. B
0.10	TX	E vs. A

[a]Letters correspond to patch types listed in table 13.

Comparison among different sets of control patches within test sites did show differences in survival rates throughout the same site. (See figure 29 for the control patches at the Ontario site.) These differences indicate that the performance of the control patches was affected by site-specific factors, since the material, placement procedure, and compaction effort were the same for each set.

Expected Repair Life

One piece of information needed for the cost-effectiveness calculations is the expected life of the patches. Because of the success of the repairs, the calculation of expected life at this point provides very conservative estimates since the majority of the patches are still in service. See table 17 for the mean expected life as well as median expected life values for the Ontario test site, as calculated by the SAS LIFETEST. The last column in table 17 contains the mean life for the repair type if all of the patches had failed during the last monitoring trip. Since there are still patches in service, the mean life will continue to increase until they have all failed, meaning that the final values for expected life will be greater than those in the table. Even though the Ontario site is experiencing the lowest survival rates, additional data collection is still needed before meaningful results can be obtained. This data collection is even more critical at those sites where survival rates are higher.

Table 17. Estimates of repair life–Ontario test site

Repair Type	Mean Life (weeks)	Median Life (weeks)	Mean Life if All Fail (weeks)
D	14.5	10.5	20.5
A	11.9	14.0	20.9
A	16.9	19.0	24.9
F	20.6		32.6
A	13.4		31.3
D	19.6		29.6
I	19.6		29.6
A	23.0	24.0	29.0
I	19.3	24.0	23.3
H	29.6	34.0	29.6[b]
A	31.6		31.6[b]
C	23.9	14.0	23.9[b]
L	28.3	24.0	28.3[b]
A	27.6	24.0	27.6[b]
N	24.9	19.0	24.9[b]
J	15.5	15.5	23.5
A	18.0[a]	14.0	18.0[a]
G	16.0	17.0	24.0
A	13.0		23.0

[a]All patches failed by last performance monitoring trip.
[b]Failures noted during last performance monitoring trip.

Laboratory/Field Performance Correlations

In order to identify correlations between the material properties and field performance, comparisons were made between average lab test values and average field performance values, such as survival rating and average distress ratings. SAS analysis using a MANOVA regression model yielded no significant correlations. Continued monitoring of the repairs should provide data for identifying more significant differences in field performance, which should, in turn, improve the likelihood of identifying meaningful correlations between lab data and field performance.

Productivity

A major emphasis of the pothole repair experiment has been to document the productivity of different pothole-patching operations. During the eight test site installations, data were collected on the installation productivity of eight different crews from eight different agencies around the United States and Canada. The agencies were observed using four different repair procedures: throw-and-roll, edge seal, semipermanent, and spray injection. The time to perform each of these procedures was noted and, along with the information collected on the size of the potholes, has been used to calculate the productivity for the different site, procedure, and material combinations.

Patching Times

Different activities make up the overall process of each repair procedure: pothole preparation, material placement, and compaction. In the case of the edge seal procedure or the surface seal procedure used in Illinois, additional activities are performed after the patches have been placed and compacted.

Beginning and ending times were recorded for a given activities during each installation, and the elapsed time from beginning to end was calculated. Thus the patching times for each of the four procedures have been determined for each test site. See table 18 for the resulting values.

Pothole Volumes

Other data collected during the installation procedures included the dimensions of the potholes that were created. Width, length, and depth of the potholes were measured after the previous repairs had been removed and before the experimental patches had been placed. See table 19 for a summary of this information.

Table 18. Summary of patching times
(All times in minutes per patch)

Procedure	Activity	Test Site								Average
		CA	IL	NM	OR	TX	UT	VT	ON	
Throw-and-Roll	Placement	2.0	3.1	2.4	1.2	2.2	1.5	1.5	1.3	
	Compaction	1.0	1.9	0.8	0.3	0.7	0.5	0.3	0.4	
	Total	**3.0**	**5.0**	**3.2**	**1.5**	**2.9**	**2.0**	**1.8**	**1.7**	**2.6**
Edge Seal	Placement	1.4	2.9	2.1	1.2	2.0	1.1	1.2		
	Compaction	1.0	1.5	0.7	0.4	0.5	0.4	0.4		
	Placing seal	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
	Total	**3.4**	**5.4**	**3.8**	**2.6**	**3.5**	**2.5**	**2.6**		**3.2**
Semipermanent	Preparation	2.8	15.2	0.9	24.3	12.1	5.4	4.1	2.0	
	Placement	1.6	3.9	2.5	1.4	4.8	2.7	1.2	1.1	
	Compaction	2.6	2.5	1.0	1.3	1.1	1.0	1.0	1.1	
	Total	**7.0**	**21.6**	**4.4**	**27.0**	**18.0**	**9.1**	**6.3**	**4.2**	**13.3**
Spray Injection	Placement	1.9	2.4	2.7		2.0	3.9	2.3	4.6	
	Total	**1.9**	**2.4**	**2.7**		**2.0**	**3.9**	**2.3**	**4.6**	**2.8**

Table 19. Summary of average pothole volumes
(All values in ft^3)

Procedure	Test Site								Average
	CA	IL	NM	OR	TX	UT	VT	ON	
Throw-and-roll	1.7	1.4	1.1	0.5	2.0	1.3	1.0	0.3	**1.1**
Edge seal	1.9	2.3	0.8	0.4	1.5	1.2	1.6		**1.2**
Semi-permanent	1.8	2.2	0.9	0.8	3.7	1.5	1.5	0.5	**1.2**
Spray injection	1.4	1.1	1.2		1.9	1.6	1.3	0.4	**1.3**

1 ft^3 = 28.3 L

By combining information on the time required to patch potholes and the size of the potholes repaired, the productivity of the patching operation can be calculated. The equation used for the calculation is as follows:

$$P = (V_{avg}/T_{avg}) \times (125 \text{ lb/ft}^3) \times (1/2{,}000 \text{ ton/lb}) \times (60 \text{ min/hr}) \qquad \text{Eq. 1}$$

where

P = Productivity of the patching crew, tons per hour
V_{avg} = Average volume of the potholes being patched, ft^3
T_{avg} = Average time required to patch the potholes, minutes

This equation gives the productivity of the crew while it is patching. See table 20 for the average productivity values for the four procedures included in this experiment.

Table 20. Average productivity values for various operations

Procedure	Average Productivity (tons/hr)	Laborers Recommended	Average Productivity (tons/person-day)
Throw-and-roll	1.6	2	3.2
Edge seal	1.4	2	2.8
Semi-permanent	0.3	4	0.3
Spray injection	1.7	2	3.4

1 ton = 907 kg

The values for productivity in tons/person-day (table 20) assume that patching is performed for half of an 8-hour day. The actual percent of a day spent patching versus setting up, taking breaks and lunches, or traveling between pothole locations could not be taken into account in this project. The presence of persons to monitor the installation for the nationwide experiment did not allow an opportunity to view the crews working as they would on a normal day.

In addition, the potholes created for this project did not develop naturally, so data were lacking as to how far apart naturally occurring potholes would be spaced. The distance between pothole locations affects how much time is spent traveling between patch locations and results in different total productivity figures for different projects.

Cost-Effectiveness

Some of the major elements that influence the cost-effectiveness of a pothole-patching operation are as follows:

- Labor rates
- Material purchase and shipping costs
- Productivity of the patching crew
- Total quantity of potholes to be repaired
- Equipment costs
- Performance of the repairs (either expected life or survival rating)

These elements are used to calculate cost-effectiveness for a specific time frame. Examples of these calculations appear in appendix E. The following section describes inputs needed to complete the calculation.

Labor Rates

The cost of labor for a pothole-patching operation is usually determined by the experience and seniority of the crew members and the number of crew members actually involved. To calculate cost-effectiveness, the information on labor rates should be available on a *per day* basis. The value of labor rates should be given for the entire patching crew, including supervisors. The labor rate can then be multiplied by the number of days needed for patching to get a total cost for the patching operation over one year.

Material Costs

For each type of cold mix available to an agency, there will be an associated purchase cost that can be expressed in *dollars per ton.* There will also be some cost associated with shipping the material from the plant where it is produced to an agency's yard. The total per ton cost associated with buying the cold mix and stockpiling it in the yard should be used to determine material costs.

Productivity of the Patching Operation

Each pothole-patching crew, has a different value for the average productivity achieved. One way of estimating average productivity is to divide the total amount of cold mix placed during a season by the total days spent patching. The value should be expressed in terms of *tons per day* of material placed.

Total Quantity of Potholes to Be Repaired

This value is one of the most difficult to calculate. It is intended to represent only the new potholes that develop during a given year and should not include "repeat" potholes–those that reappear as previously placed material loosens or degrades. For calculating total patching costs, this value should be in *tons* of material. If volume of potholes is easier to estimate, a density of 125 lb/ft^3 (2,030 kg/m^3) can be used to convert volume to mass.

Equipment Costs

Depending on the type of patching operation performed, different pieces of equipment are needed. Trucks, compressors, jackhammers, compaction devices, and spray-injection devices may be used, and each has costs associated with it. For calculating patching costs, the *dollars per day* rate for all necessary equipment should be used.

Performance of the Repairs

Obviously, a major factor in determining the cost-effectiveness of any pothole-patching operation is how the patches perform. Patches that last a long time and require very little repatching greatly reduce the labor and equipment costs for the overall repair operation.

Every patch placed may eventually fail. Because potholes are the result of the original pavement having failed, the chance of patches remaining permanent is unlikely. See table 15 for calculating the performance of the patches placed using a particular material and a certain procedure.

The total patching cost for any patching operation can be calculated using the following equation:

$$C_T = [2 - (PS/100)] \times [(N/P_o) \times (C_L + C_E + C_{TC}) + (N \times C_M)] \qquad \text{Eq. 2}$$

where

C_T = Total cost of patching operation for one year, dollars
PS = Patch survival rating, percent
N = Material needed for initial patching operation, tons
P_O = Productivity of the operation, tons per day
C_L = Cost of labor needed for patching operation, dollars per day
C_E = Cost of equipment needed for patching operation, dollars per day
C_{TC} = Cost of traffic control for patching operation, dollars per day
C_M = Cost of material delivered to yard, dollars per ton

For example, a crew has 200 tons of initial potholes (N), can place 5.0 tons per day (P_o), and has labor costs of $400 per day ($C_L$), equipment costs of $50 per day ($C_E$), and traffic

control costs of $500 per day ($C_{TC}$). The crew decides to use a material costing $80 per ton with a patch survival rating of 95 percent (PS) for one year. The total cost for one year of this patching operation will be $56,700. If the same crew decides to use a less expensive material at $25 per ton with a patch survival rating of 20 percent for one year, the total cost for the patching operation will be $77,400.

Another method for calculating overall cost-effectiveness is to use the expected life of the repairs and to look at two material-procedure combinations over a longer time. The equation is as follows:

$$C_T = [(T_{TOT}/L_{EXP})] \times [(N/P_o) \times (C_L + C_E + C_{TC}) + (N \times C_M)] \quad \text{Eq. 3}$$

where

C_T = Total cost of patching operation for the given time frame, dollars
T_{TOT} = Time for analysis, years
L_{EXP} = Life expectancy for material-procedure combination, years
N = Material needed for patching initial potholes, tons
P_O = Productivity of the operation, tons per day
C_L = Cost of labor needed for patching operation, dollars per day
C_E = Cost of equipment needed for patching operation, dollars per day
C_{TC} = Cost of traffic control for patching operation, dollars per day
C_M = Cost of material delivered to yard, dollars per ton

Assume the same crew and associated costs as in the previous examples, with a 5-year analysis period. If the $80 per ton material had an average life expectancy of 24 months, the total cost of patching **the initial 200 tons** would be $135,000 over 5 years, or a cost of $27,000 per year. If the $20 per ton material had an average life expectancy of 6 months, the total cost of patching **the initial 200 tons** would be $420,000, or a cost of $84,000 per year.

These costs would only be for the initial 200 tons patched the first year and do not include the cost of repairing additional potholes that develop in years 2 through 5. If the additional potholes are factored into the calculation, the cost differential between the two materials becomes even greater.

See table 21 for the comparative evaluation of cost-effectiveness for different material-procedure combinations. Appendix E contains worksheets for the computation of the cost-effectiveness values shown in the table.

Table 21. Summary of inputs for cost-effectiveness examples

Input	Example Number				
	1	2	3	4	5
Material Type	Local	UPM	Local	Spray injection	Local
Repair Procedure	Throw-and-roll	Throw-and-roll	Semi-permanent	Spray injection	Throw-and-roll
Material Cost ($/ton)	20	85	20	0	20
Wages for Repair Crew ($/day)	300	300	600	0	300
Wages for Traffic Control ($/day)	250	250	250	250	250
Equipment Cost for Repair Crew ($/day)	50	50	100	900	50
Equipment Cost for Traffic Control ($/day)	30	30	30	30	30
Productivity (tons/day)	4.0	4.0	1.5	4.0	4.0
Initial Need (tons)	200	200	75	200	200
User Delay Costs ($/day)	1,000	1,000	1,000	1,000	10,000
Estimated Repair Life (months)	3	21	12	21	3
Estimated 5 year Cost ($, without user delay)	710,000	138,570	252,000	168,570	710,000
Estimated 5 year Cost ($, with user delay)	1,710,000	281,430	502,000	311,430	10,710,000
Cost-effectiveness ($/ft^3 of initial need–without user delay)	44.38	8.66	42.08	10.54	44.38
Cost-effectiveness ($/ft^3 of initial need–with user delay)	106.88	17.59	83.75	19.46	669.38

6

Preliminary Findings

The SHRP H-106 project is the most extensive pavement maintenance experiment ever conducted. The potential benefits from timely and cost-effective maintenance operations, to the repair agencies as well as to the traveling public are immeasurable. The information collected during this project should go a long way toward advancing the state of the practice of everyday maintenance activities for agencies of all sizes.

Observations

The pothole repair project has succeeded in monitoring the patches and keeping them from being overlaid, which has permitted the collection of more complete data. Based on the information available to date, the following observations have been made:

- The overall survival rates for dry-freeze sites are significantly higher than for wet-freeze sites– 93 percent versus 48 percent. This difference seems to indicate that precipitation at the wet-freeze sites causes quicker failure. However, the presence of other variables, such as traffic, pavement age, and subgrade support, do not permit a definitive analysis of the effects of precipitation.

- Of the 80 sets of experimental patches placed, only 4 performed significantly poorer than the comparable control patches (at $\alpha = 0.05$). All four of these repair types were placed using inexpensive cold-mix materials. These materials failed by ravelling out until the pothole reappeared. This type of failure was generally observed in less than 1 month.

- The throw-and-roll technique proved just as effective as the semi-permanent procedure for those materials with which the two procedures were compared directly. The semi-permanent procedure has higher labor and equipment costs and lower productivity, thus, the throw-and-roll procedure would be more cost-effective in most situations, when quality materials are used.

- Pothole patches are intended to be temporary repairs, but the success rate observed in this project indicates that materials are available that can remain in service for more than 1 year. With 69 percent of all patches surviving after the last round of performance monitoring, the median age of the repairs is currently greater than 18 months.

- The spray-injection repairs have performed as well as the comparable control patches at all sites. This procedure depends on the expertise of the operator however, as was seen at the California test site when an operator from Mississippi, using volcanic aggregate with higher absorptive characteristics than the operator was accustomed to, failed to use enough binder. The low residual binder content led to ravelling of the aggregate and some premature failures.

- No difference has been observed to date between the performance of the spray-injection repairs and the comparable control patches. At most sites, the spray-injection patches had not set when opened to traffic and appeared soft. In spite of this, the spray-injection patches have performed well at all sites.

- Of the eight agencies that participated in this experiment, three have switched from the inexpensive cold mixes they had used previously to one of the materials provided through the project. One agency has also purchased a spray-injection device to replace its conventional cold-mix patching material for pothole patching.

Recommendations

The SHRP H-106 project has taken a first step toward improving the state of the practice of everyday maintenance operations. While some progress has been made, more room for improvement exists. Some recommendations for further progress follow:

- **Use high-productivity operations in adverse weather.** When weather conditions include cold temperatures and precipitation, the prime objective of the patching operation should be to repair potholes as quickly as possible. The throw-and-roll and spray-injection procedures produced high-quality repairs very quickly in all cases. Quality materials should be used with the throw-and-roll procedure, and the spray- injection device should be well maintained and operated by an experienced technician.

- **Utilize the best materials available to reduce repatching.** The cost of patching the same potholes over and over because of poor-quality material quickly offsets the savings from purchasing a less expensive cold mix. In most cases, the poorer performance associated with inexpensive cold mixes will result in greater overall costs for patching because of increased costs for labor, equipment, traffic control, and user delay.

- **Consider safety and user delay costs in calculating operation costs.** When justifying the purchase of a more expensive cold mix, consider the reduced user delay costs that will result when repatching is avoided. Also, consider the improved safety conditions that less crew time in traffic will allow.

- **Continue monitoring repairs.** The investment made in the installation of these repairs will continue to grow if monitoring continues. More questions will be answered and more improvements made.

- **Set up regional testing centers for continued testing.** While the SHRP H-105 project attempted to identify those materials and procedures that had the most promise, many deserving materials and procedures were not tested. The ability to continually evaluate new materials would be invaluable to those agencies that are involved daily in pavement maintenance.

- **Communicate the findings.** The information gathered by the SHRP program will only benefit the highway community if persons making decisions at the local level are informed of the results. Disseminating the findings to state DOTs, as well as to county and municipal highway agencies, could save hundreds of millions of dollars a year.

- **Testing should be performed to ensure compatibility of aggregate and binder.** Whenever possible, the aggregate and binder to be used for producing a cold mix material should be tested on a small scale to determine it the two are compatible. This testing is especially necessary when new combinations are being used and there is no record of the patching material's past performance.

Appendix A

Test Site Layouts

The order of placement of the repair materials within each test site was determined randomly. In some instances, the order was changed in the field to accommodate the late arrival of certain materials or pieces of equipment. Whenever possible, sets of 30 patches were placed, to minimize the number of control patches while maintaining a direct control-experiment comparison. The use of fewer control patches also reduced the amount of material needed and the time required for installation.

The following pages contain tables showing the layouts of each test site. Repair type indicators corresponding to those in table 1. The numbers following the repair type letters indicate where in the set of 10 patches the repair falls.

Table A-1. Test section layout for California (dry-freeze)

Patch No.	Group Number				
	1	2	3	4	5
1	F1	J1	H1	C1	A41
2	A1	A11	A21	A31	I1
3	E1	D1	G1	B1	A42
4	E2	D2	G2	B2	I2
5	A2	A12	A22	A32	A43
6	F2	J2	H2	C2	I3
7	F3	J3	H3	C3	A44
8	A3	A13	A23	A33	I4
9	E3	D3	G3	B3	A45
10	E4	D4	G4	B4	I5
11	A4	A14	A24	A34	A46
12	F4	J4	H4	C4	I6
13	F5	J5	H5	C5	A47
14	A5	A15	A25	A35	I7
15	E5	D5	G5	B5	A48
16	E6	D6	G6	B6	I8
17	A6	A16	A26	A36	A49
18	F6	J6	H6	C6	I9
19	F7	J7	H7	C7	A50
20	A7	A17	A27	A37	I10
21	E7	D7	G7	B7	
22	E8	D8	G8	B8	
23	A8	A18	A28	A38	
24	F8	J8	H8	C8	
25	F9	J9	H9	C9	
26	A9	A19	A29	A39	
27	E9	D9	G9	B9	
28	E10	D10	G10	B10	
29	A10	A20	A30	A40	
30	F10	J10	H10	C10	

Table A-2. Test section layout for Illinois (wet-freeze)

No.	Group Number				
	1	2	3	4	5
1	F1	X1	E1	D1	C1
2	A1	A11	A21	A31	A41
3	I1	G1	B1	H1	J1
4	I2	G2	B2	H2	J2
5	A2	A12	A22	A32	A42
6	F2	X2	E2	D2	C2
7	F3	X3	E3	D3	C3
8	A3	A13	A23	A33	A43
9	I3	G3	B3	H3	J3
10	I4	G4	B4	H4	J4
11	A4	A14	A24	A34	A44
12	F4	X4	E4	D4	C4
13	F5	X5	E5	D5	C5
14	A5	A15	A25	A35	A45
15	I5	G5	B5	H5	J5
16	I6	G6	B6	H6	J6
17	A6	A16	A26	A36	A46
18	F6	X6	E6	D6	C6
19	F7	X7	E7	D7	C7
20	A7	A17	A27	A37	A47
21	I7	G7	B7	H7	J7
22	I8	G8	B8	H8	J8
23	A8	A18	A28	A38	A48
24	F8	X8	E8	D8	C8
25	F9	X9	E9	D9	C9
26	A9	A19	A29	A39	A49
27	I9	G9	B9	H9	J9
28	I10	G10	B10	H10	J10
29	A10	A20	A30	A40	A50
30	F10	X10	E10	D10	C10

Table A-3. Test section layout for New Mexico (dry-nonfreeze)

No.	Group Number				
	1	2	3	4	5
1	E1	D1	C1	H1	A41
2	A1	A11	A21	A31	J1
3	F1	G1	B1	I1	A42
4	F2	G2	B2	I2	J2
5	A2	A12	A22	A32	A43
6	E2	D2	C2	H2	J3
7	E3	D3	C3	H3	A44
8	A3	A13	A23	A33	J4
9	F3	G3	B3	I3	A45
10	F4	G4	B4	I4	J5
11	A4	A14	A24	A34	A46
12	E4	D4	C4	H4	J6
13	E5	D5	C5	H5	A47
14	A5	A15	A25	A35	J7
15	F5	G5	B5	I5	A48
16	F6	G6	B6	I6	J8
17	A6	A16	A26	A36	A49
18	E6	D6	C6	H6	J9
19	E7	D7	C7	H7	A50
20	A7	A17	A27	A37	J10
21	F7	G7	B7	I7	
22	F8	G8	B8	I8	
23	A8	A18	A28	A38	
24	E8	D8	C8	H8	
25	E9	D9	C9	H9	
26	A9	A19	A29	A39	
27	F9	G9	B9	I9	
28	F10	G10	B10	I10	
29	A10	A20	A30	A40	
30	E10	D10	C10	H10	

Table A-4. Test section layout for Oregon (dry-freeze)

No.	Group Number						
	1	2	3	4	5	6	7
1	D1	L1	A21	H1	F1	B1	K1
2	A1	A11	C1	A31	A41	A51	A61
3	I1	N1	C2	G1	E1	X1	M1
4	I2	N2	A22	G2	E2	X2	M2
5	A2	A12	A23	A32	A42	A52	A62
6	D2	L2	C3	H2	F2	B2	K2
7	D3	L3	C4	H3	F3	B3	K3
8	A3	A13	A24	A33	A43	A53	A63
9	I3	N3	A25	G3	E3	X3	M3
10	I4	N4	C5	G4	E4	X4	M4
11	A4	A14	C6	A34	A44	A54	A64
12	D4	L4	A26	H4	F4	B4	K4
13	D5	L5	A27	H5	F5	B5	K5
14	A5	A15	C7	A35	A45	A55	A65
15	I5	N5	C8	G5	E5	X5	M5
16	I6	N6	A28	G6	E6	X6	M6
17	A6	A16	A29	A36	A46	A56	A66
18	D6	L6	C9	H6	F6	B6	K6
19	D7	L7	C10	H7	F7	B7	K7
20	A7	A17	A30	A37	A47	A57	A67
21	I7	N7		G7	E7	X7	M7
22	I8	N8		G8	E8	X8	M8
23	A8	A18		A38	A48	A58	A68
24	D8	L8		H8	F8	B8	K8
25	D9	L9		H9	F9	B9	K9
26	A9	A19		A39	A49	A59	A69
27	I9	N9		G9	E9	X9	M9
28	I10	N10		G10	E10	X10	M10
29	A10	A20		A40	A50	A60	A70
30	D10	L10		H10	F10	B10	K10

Table A-5. Test section layout for Texas (wet-nonfreeze)

No.	Group Number					
	1	2	3	4	5	6
1	F1	B1	H1	D1	E1	A51
2	A1	A11	A21	A31	A41	J1
3	A2	G1	I1	C1	A42	A52
4	F2	G2	I2	C2	E2	J2
5	F3	A12	A22	A32	E3	A53
6	A3	B2	H2	D2	A43	J3
7	A4	B3	H3	D3	A44	A54
8	F4	A13	A23	A33	E4	J4
9	F5	G3	I3	C3	E5	A55
10	A5	G4	I4	C4	A45	J5
11	A6	A14	A24	A34	A46	A56
12	F6	B4	H4	D4	E6	J6
13	F7	B5	H5	D5	E7	A57
14	A7	A15	A25	A35	A47	J7
15	A8	G5	I5	C5	A48	A58
16	F8	G6	I6	C6	E8	J8
17	F9	A16	A26	A36	E9	A59
18	A9	B6	H6	D6	A49	J9
19	A10	B7	H7	D7	A50	A60
20	F10	A17	A27	A37	E10	J10
21		G7	I7	C7		
22		G8	I8	C8		
23		A18	A28	A38		
24		B8	H8	D8		
25		B9	H9	D9		
26		A19	A29	A39		
27		G9	I9	C9		
28		G10	I10	C10		
29		A20	A30	A40		
30		B10	H10	D10		

Table A-6. Test section layout for Utah (dry-freeze)

No.	Group Number				
	1	2	3	4	5
1	E1	G1	F1	B1	I1
2	A1	A11	A21	A31	A41
3	D1	J1	H1	C1	I2
4	D2	J2	H2	C2	A42
5	A2	A12	A22	A32	I3
6	E2	G2	F2	B2	A43
7	E3	G3	F3	B3	I4
8	A3	A13	A23	A33	A44
9	D3	J3	H3	C3	I5
10	D4	J4	H4	C4	A45
11	A4	A14	A24	A34	I6
12	E4	G4	F4	B4	A46
13	E5	G5	F5	B5	I7
14	A5	A15	A25	A35	A47
15	D5	J5	H5	C5	I8
16	D6	J6	H6	C6	A48
17	A6	A16	A26	A36	I9
18	E6	G6	F6	B6	A49
19	E7	G7	F7	B7	I10
20	A7	A17	A27	A37	A50
21	D7	J7	H7	C7	
22	D8	J8	H8	C8	
23	A8	A18	A28	A38	
24	E8	G8	F8	B8	
25	E9	G9	F9	B9	
26	A9	A19	A29	A39	
27	D9	J9	H9	C9	
28	D10	J10	H10	C10	
29	A10	A20	A30	A40	
30	E10	G10	F10	B10	

Table A-7. Test section layout for Vermont (wet-freeze)

No.	Group Number				
	1	2	3	4	5
1	F1	B1	H1	D1	J1
2	A1	A11	A21	A31	A41
3	F2	G1	I1	E1	C1
4	A2	G2	I2	E2	C2
5	F3	A12	A22	A32	A42
6	A3	B2	H2	D2	J2
7	F4	B3	H3	D3	J3
8	A4	A13	A23	A33	A43
9	F5	G3	I3	E3	C3
10	A5	G4	I4	E4	C4
11	F6	A14	A24	A34	A44
12	A6	B4	H4	D4	J4
13	F7	B5	H5	D5	J5
14	A7	A15	A25	A35	A45
15	F8	G5	I5	E5	C5
16	A8	G6	I6	E6	C6
17	F9	A16	A26	A36	A46
18	A9	B6	H6	D6	J6
19	F10	B7	H7	D7	J7
20	A10	A17	A27	A37	A47
21		G7	I7	E7	C7
22		G8	I8	E8	C8
23		A18	A28	A38	A48
24		B8	H8	D8	J8
25		B9	H9	D9	J9
26		A19	A29	A39	A49
27		G9	I9	E9	C9
28		G10	I10	E10	C10
29		A20	A30	A40	A50
30		B10	H10	D10	J10

Table A-8. Test section layout for Ontario (wet-freeze)

No.	Group Number						
	1	2	3	4	5	6	7
1	D1	F1	I1	H1	L1	J1	A61
2	A1	A11	A21	A31	A41	A51	G1
3	B1	M1	K1	C1	N1	J2	A62
4	B2	M2	K2	C2	N2	A52	G2
5	A2	A12	A22	A32	A42	J3	A63
6	D2	F2	I2	H2	L2	A53	G3
7	D3	F3	I3	H3	L3	J4	A64
8	A3	A13	A23	A33	A43	A54	G4
9	B3	M3	K3	C3	N3	J5	A65
10	B4	M4	K4	C4	N4	A55	G5
11	A4	A14	A24	A34	A44	J6	A66
12	D4	F4	I4	H4	L4	A56	G6
13	D5	F5	I5	H5	L5	J7	A67
14	A5	A15	A25	A35	A45	A57	G7
15	B5	M5	K5	C5	N5	J8	A68
16	B6	M6	K6	C6	N6	A58	G8
17	A6	A16	A26	A36	A46	J9	A69
18	D6	F6	I6	H6	L6	A59	G9
19	D7	F7	I7	H7	L7	J10	A70
20	A7	A17	A27	A37	A47	A60	G10
21	B7	M7	K7	C7	N7		
22	B8	M8	K8	C8	N8		
23	A8	A18	A28	A38	A48		
24	D8	F8	I8	H8	L8		
25	D9	F9	I9	H9	L9		
26	A9	A19	A29	A39	A49		
27	B9	M9	K9	C9	N9		
28	B10	M10	K10	C10	N10		
29	A10	A20	A30	A40	A50		
30	D10	F10	I10	H10	L10		

Appendix B

Installation Data

Forms

See figure B-1 for the form used to record data collected during the test site installations. Information on repair times, pothole dimensions, and types of equipment used for each repair were noted. One sheet was completed for every patch that was placed.

Summary Data

Tables B-1 through B-8 contain data collected during the test site installation for each repair placed at each test site. The first column contains a unique "Patch ID" for every repair. This ID is used for data entry and retrieval purposes. The letters shown in the "Matl" column correspond to the repair types given in table 1.

SHRP H-106 FIELD INSTALLATION FORM - POTHOLE REPAIR EXPERIMENT

Test site number: 41P800 Instal. date: ___/___/91 Overall Sequence No.: _____ ERES pers.: tpw

State: Oregon

Sketch of pothole (from above) show dimensions

District:

County: Klamath

Highway: US 97

Nearest town: Modoc Point

Number of lanes: 2

Direction of traffic: N S

Shoulder type, width: AC

Estimated 2-way ADT (year): 5400 (1989)

Direction of travel →

Experiment: A B C D E F G H I J X

Pothole #: _____ Air Temp.: _____ °F Rel. Hum.:_____ %

Moisture in pothole initially? Yes or No

Previous patch removed? Yes or No

Pavement surrounding pothole cracked? Yes or No

Pothole Location

Milepost:

Station (from milepost): _____ +_____

Offset (from outside shoulder): _____ ft

Total lane width: _____ ft.

COMMENTS:

Area of pothole: _____ sf

Average depth: _____ in

Penetrometer Resistance (uncompacted): _____

Preparation time: Begin ___:___ End ___:___

Quantity of material placed: _____ lbs

Placement time: Begin ___:___ End ___:___

Number of crew members: _____ persons

Compaction time: Begin ___:___ End ___:___

Number of rear axle(s) on truck: _____

Weight on rear axle(s): _____ tons

Rear tire pressure: _____ psi

Compactive effort: _____ passes

Measured density: _____ pcf

Time of Density Measurement: _____:_____

Penetrometer Resistance (compacted): _____

Figure B-1. Sample of data collection form for test site installation

Table B-1. Summary of installation data for US 395, Alturas, California Local material (F), Control (A), and PennDOT 486 (E)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
06P500001	F 1	05/06/1991	138	1479	4	N	24	55	35	26	18	3.3	4	1.1			0	12.52	12.55	3	2	12.56	12.58	2	6	1	2.0	
06P500002	A 1	05/06/1991	138	1514	2	N	24	55	35	30	28	5.8	4	1.9			0	13.07	13.08	1	2	13.10	13.12	2	6	1	2.0	
06P500003	E 1	05/06/1991	138	1546	2	N	24	55	35	36	24	6.0	4	2.0			0	13.10	13.13	3	2	13.14	13.15	1	6	1	1.0	
06P500004	E 2	05/06/1991	138	1584	2	N	24	55	35	30	24	5.0	4	1.7			0	13.15	13.17	2	2	13.19	13.21	2	6	1	2.0	
06P500005	A 2	05/06/1991	138	1586	2	N	24	55	35	24	24	4.0	4	1.3			0	13.19	13.20	1	2	13.20	13.22	2	7	1	2.0	
06P500006	F 2	05/06/1991	138	1588	2	N	24	55	35	20	24	3.3	4	1.1			0	13.03	13.05	2	2	13.07	13.09	2	6	2	1.0	
06P500007	F 3	05/06/1991	138	1594	2	N	24	55	35	30	22	4.6	4	1.5			0	13.03	13.06	3	2	13.07	13.09	2	6	2	1.0	
06P500008	A 3	05/06/1991	138	1649	2	N	24	55	35	30	36	7.5	4	2.5			0	13.28	13.30	2	2	13.33	13.36	3	6	3	1.0	
06P500009	E 3	05/06/1991	138	1652	2	N	24	55	35	54	36	13.5	4	4.5			0	13.24	13.27	3	2	13.33	13.36	3	6	3	1.0	
06P500010	E 4	05/06/1991	138	1661	4	N	24	55	35	18	18	2.3	4	0.8			0	13.44	13.47	3	2	13.47	13.50	3	6	1	3.0	
06P500011	A 4	05/06/1991	138	1697	2	N	24	55	35	36	18	4.5	4	1.5			0	13.30	13.33	3	2	13.33	13.36	3	6	3	1.0	
06P500012	F 4	05/06/1991	138	2248	10	N	24	55	35	18	18	2.3	4	0.8			0	13.35	13.39	4	2	13.39	13.42	3	7	2	1.5	
06P500013	F 5	05/06/1991	138	2251	10	N	24	55	35	20	16	2.2	4	0.7			0	13.38	13.40	2	2	13.41	13.42	1	6	2	0.5	
06P500014	A 5	05/06/1991	138	2512	10	N	24	55	35	20	20	2.8	4	0.9			0	13.39	13.42	3	2	13.42	13.45	3	8	1	3.0	
06P500015	E 5	05/06/1991	138	2565	4	N	24	55	35	28	20	3.9	4	1.3			0	13.52	13.55	3	2	13.56	13.57	1	6	1	1.0	
06P500016	E 6	05/06/1991	138	2572	2	S	24	55	35	30	18	3.8	4	1.3			0	14.10	14.13	3	2	14.14	14.15	1	6	2	0.5	
06P500017	A 6	05/06/1991	138	2572	9	S	24	55	35	18	18	2.3	4	0.8			0	14.07	14.09	2	2	14.14	14.15	1	6	2	0.5	
06P500018	F 6	05/06/1991	138	2515	2	S	24	55	35	24	18	3.0	4	1.0			0	14.15	14.16	1	2	14.19	14.21	2	7	3	0.7	
06P500019	F 7	05/06/1991	138	2500	8	S	24	55	35	28	18	3.5	4	1.2			0	14.17	14.19	2	2	14.19	14.21	2	7	3	0.7	
06P500020	A 7	05/06/1991	138	2349	2	S	24	55	35	28	18	3.5	4	1.2			0	14.24	14.26	2	2	14.27	14.30	3	8	1	3.0	
06P500021	E 7	05/06/1991	138	2332	3	S	24	55	35	14	20	1.9	4	0.6			0	14.16	14.18	2	2	14.19	14.22	3	8	3	1.0	
06P500022	E 8	05/06/1991	138	2143	4	S	24	55	35	28	28	5.4	4	1.8			0	14.30	14.33	3	2	14.35	14.37	2	8	2	1.0	
06P500023	A 8	05/06/1991	138	2128	3	S	24	55	35	30	24	5.0	4	1.7			0	14.33	14.35	2	2	14.35	14.37	2	8	2	1.0	
06P500024	F 8	05/06/1991	138	2088	3	S	24	55	35	34	20	4.7	4	1.6			0	14.36	14.40	4	2	14.41	14.43	2	7	2	1.0	
06P500025	F 9	05/06/1991	138	1958	8	S	24	55	35	20	24	3.3	4	1.1			0	14.43	14.46	3	2	14.47	14.48	1	6	2	0.5	
06P500026	A 9	05/06/1991	138	1952	8	S	24	55	35	30	18	3.8	4	1.3			0	14.39	14.42	3	2	14.47	14.48	1	6	2	0.5	
06P500027	E 9	05/06/1991	138	1938	1	S	24	55	35	32	24	5.3	4	1.8			0	14.33	14.35	2	2	14.36	14.38	2	8	1	2.0	
06P500028	E10	05/06/1991	138	1766	2	S	24	55	35	56	30	11.7	4	3.9			0	14.39	14.41	2	2	14.41	14.42	1	6	2	0.5	
06P500029	A10	05/06/1991	138	1693	1	S	24	55	35	24	28	4.7	4	1.6			0	14.41	14.44	3	2	14.48	14.51	3	8	2	1.5	
06P500030	F10	05/06/1991	138	1665	1	S	24	55	35	24	28	4.7	4	1.6			0	14.45	14.48	3	2	14.48	14.51	3	8	2	1.5	
Average	F											3.5		1.2			0.0			2.7							1.0	
	A											4.4		1.5			0.0			2.2							1.6	
	E											5.9		2.0			0.0			2.6							1.3	

Table B-1. Summary of installation data for US 395, Alturas, California (continued)
Spray injection (J), Control (A), and PennDOT 485 (D)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
06P500031	J 1	05/07/1991	5	1697	10	N	24	70	30	30	14	2.9	4	1.0			0	10.58	11.00	2	2				0	0	0	
06P500032	A11	05/07/1991	5	1701	10	N	24	70	30	30	18	3.8	4	1.3			0	9.54	9.56	2	2	9.57	9.59		2	8	1	2.0
06P500033	D 1	05/07/1991	5	1753	10	N	24	70	30	28	20	3.9	4	1.3			0	10.03	10.04	1	2	10.05	10.08		3	8	4	0.7
06P500034	D 2	05/07/1991	5	1756	4	N	24	70	30	24	22	3.7	4	1.2			0	10.02	10.04	2	2	10.05	10.08		3	8	4	0.7
06P500035	A12	05/07/1991	5	1767	4	N	24	70	30	26	24	4.3	4	1.4			0	9.59	10.00	1	2	10.05	10.08		3	8	4	0.7
06P500036	J 2	05/07/1991	5	1771	4	N	24	70	30	24	22	3.7	4	1.2			0	11.00	11.02	2	2				0	0	0	
06P500037	J 3	05/07/1991	5	1777	5	N	24	70	30	24	18	3.0	4	1.0			0	11.02	11.03	1	2				0	0	0	
06P500038	A13	05/07/1991	5	1793	4	N	24	70	30	24	26	4.3	4	1.4			0	10.00	10.02	2	2	10.05	10.08		3	8	4	0.7
06P500039	D 3	05/07/1991	5	1825	3	N	24	70	30	18	24	3.0	4	1.0			0	10.10	10.12	2	2	10.35	10.38		3	7	1	3.0
06P500040	D 4	05/07/1991	5	1891	10	N	24	70	30	54	20	7.5	4	2.5			0	10.20	10.23	3	2	10.25	10.27		2	6	1	2.0
06P500041	A14	05/07/1991	5	1911	5	N	24	70	30	26	16	2.9	4	1.0			0	10.05	10.08	3	2	10.08	10.10		2	7	1	2.0
06P500042	J 4	05/07/1991	5	1918	5	N	24	70	30	32	20	4.4	4	1.5			0	11.03	11.05	2	2				0	0	0	
06P500043	J 5	05/07/1991	5	1922	5	N	24	70	30	26	26	4.7	4	1.6			0	11.05	11.06	1	2				0	0	0	
06P500044	A15	05/07/1991	5	1933	5	N	24	70	30	23	16	2.6	4	0.9			0	10.37	10.39	2	2	10.57	11.02		5	6	12	0.4
06P500045	D 5	05/07/1991	5	1939	5	N	24	70	30	22	24	3.7	4	1.2			0	10.48	10.50	2	2	10.57	11.02		5	6	12	0.4
06P500046	D 6	05/07/1991	5	1943	5	N	24	70	30	28	18	3.5	4	1.2			0	10.48	10.51	3	2	10.57	11.02		5	6	12	0.4
06P500047	A16	05/07/1991	5	1947	5	N	24	70	30	24	20	3.3	4	1.1			0	10.40	10.42	2	2	10.57	11.02		5	6	12	0.4
06P500048	J 6	05/07/1991	5	1951	5	N	24	70	30	42	18	5.3	4	1.8			0	11.07	11.10	3	2				0	0	0	
06P500049	J 7	05/07/1991	5	1955	5	N	24	70	30	40	16	4.4	4	1.5			0	11.10	11.12	2	2				0	0	0	
06P500050	A17	05/07/1991	5	1961	5	N	24	70	30	22	20	3.1	4	1.0			0	10.37	10.40	3	2	10.57	11.02		5	6	12	0.4
06P500051	D 7	05/07/1991	5	1966	5	N	24	70	30	22	22	3.4	4	1.1			0	10.51	10.52	1	2	10.57	11.02		5	6	12	0.4
06P500052	D 8	05/07/1991	5	1969	5	N	24	70	30	46	26	8.3	4	2.8			0	10.53	10.55	2	2	10.57	11.02		5	6	12	0.4
06P500053	A18	05/07/1991	5	1973	5	N	24	70	30	38	24	6.3	4	2.1			0	10.43	10.45	2	2	10.57	11.02		5	6	12	0.4
06P500054	J 8	05/07/1991	5	1978	5	N	24	70	30	40	28	7.8	4	2.6			0	11.18	11.20	2	2				0	0	0	
06P500055	J 9	05/07/1991	5	1982	5	N	24	70	30	24	14	2.3	4	0.8			0	11.20	11.22	2	2				0	0	0	
06P500056	A19	05/07/1991	5	1986	5	N	24	70	30	28	18	3.5	4	1.2			0	10.45	10.46	1	2	10.57	11.02		5	6	12	0.4
06P500057	D 9	05/07/1991	5	1990	5	N	24	70	30	28	20	3.9	4	1.3			0	10.55	10.56	1	2	10.57	11.02		5	6	12	0.4
06P500058	D10	05/07/1991	5	1994	5	N	24	70	30	36	24	6.0	4	2.0			0	10.56	10.57	1	2	10.57	11.02		5	6	12	0.4
06P500059	A20	05/07/1991	5	2001	5	N	24	70	30	32	20	4.4	4	1.5			0	10.47	10.49	2	2	10.57	11.02		5	6	12	0.4
06P500060	J10	05/07/1991	5	2021	5	N	24	70	30	24	20	3.3	4	1.1			0	11.23	11.25	2	2				0	0	0	
Average	J											4.2		1.4		0.0		1.9										0.0
	A											3.9		1.3		0.0		2.0										0.8
	D											4.7		1.6		0.0		1.8										0.9

Table B-1. Summary of installation data for US 395, Alturas, California (continued) Perma-Patch (H), Control (A), and HFMS-2 (G)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
06P500061	H 1	05/07/1991	5	3308	5	N	24	74	20	18	28	3.5	4	1.2			0	13.02	13.04	2	2	13.20	13.23	3	8	5	0.6	
06P500062	A21	05/07/1991	5	3320	2	N	24	74	20	28	20	3.9	4	1.3			0	13.10	13.12	2	2	13.20	13.23	3	8	5	0.6	
06P500063	G 1	05/07/1991	5	3326	4	N	24	74	20	26	28	5.1	4	1.7			0	13.06	13.09	3	2	13.20	13.23	3	8	5	0.6	
06P500064	G 2	05/07/1991	5	3331	4	N	24	74	20	28	28	5.4	4	1.8			0	13.07	13.09	2	2	13.20	13.23	3	8	5	0.6	
06P500065	A22	05/07/1991	5	3342	4	N	24	74	20	28	28	5.4	4	1.8			0	13.16	13.19	3	2	13.20	13.23	3	8	5	0.6	
06P500066	H 2	05/07/1991	5	3358	4	N	24	74	20	30	26	5.4	4	1.8			0	13.06	13.07	1	2	13.27	13.28	1	6	1	1.0	
06P500067	H 3	05/07/1991	5	3396	4	N	24	74	20	34	22	5.2	4	1.7			0	13.07	13.09	2	2	13.27	13.30	3	6	5	0.6	
06P500068	A23	05/07/1991	5	3408	4	N	24	65	30	32	30	6.7	4	2.2			0	13.25	13.26	1	2	13.27	13.30	3	8	5	0.6	
06P500069	G 3	05/07/1991	5	3425	2	N	24	65	30	34	26	6.1	4	2.0			0	13.17	13.20	3	2	13.27	13.30	3	8	5	0.6	
06P500070	G 4	05/07/1991	5	3440	2	N	24	65	30	36	40	10.0	4	3.3			0	13.24	13.26	2	2	13.27	13.30	3	8	5	0.6	
06P500071	A24	05/07/1991	5	3484	2	N	24	65	30	44	44	13.4	4	4.5			0	13.31	13.33	2	2	13.35	13.36	1	7	5	0.2	
06P500072	H 4	05/07/1991	5	3527	3	N	24	65	30	34	24	5.7	4	1.9			0	13.17	13.19	2	2	13.19	13.21	2	7	1	2.0	
06P500073	H 5	05/07/1991	5	3566	2	N	24	65	30	30	32	6.7	4	2.2			0	13.21	13.22	1	2	13.23	13.25	2	8	1	2.0	
06P500074	A25	05/07/1991	5	3717	9	N	24	65	30	22	26	4.0	4	1.3			0	13.38	13.41	3	2	13.41	13.43	2	8	1	2.0	
06P500075	G 5	05/07/1991	5	3727	3	N	24	65	30	30	26	5.4	4	1.8			0	13.29	13.31	2	2	13.37	13.39	2	7	2	1.0	
06P500076	G 6	05/07/1991	5	3733	3	N	24	65	30	28	28	5.4	4	1.8			0	13.34	13.36	2	2	13.37	13.39	2	7	2	1.0	
06P500077	A26	05/07/1991	5	3747	4	N	24	65	30	28	28	5.4	4	1.8			0	13.45	13.47	2	2	13.48	13.50	2	8	1	2.0	
06P500078	H 6	05/07/1991	5	3765	3	N	24	65	30	58	36	14.5	4	4.8			0	13.34	13.38	4	2	13.42	13.44	2	8	2	1.0	
06P500079	H 7	05/07/1991	5	3779	4	N	24	65	30	26	34	6.1	4	2.0			0	13.39	13.41	2	2	13.42	13.44	2	8	2	1.0	
06P500080	A27	05/07/1991	5	3791	4	N	24	65	30	28	32	6.2	4	2.1			0	13.52	13.54	2	2	13.55	13.56	1	6	1	1.0	
06P500081	G 7	05/07/1991	5	3818	4	N	24	65	30	33	26	6.0	4	2.0			0	13.41	13.43	2	2	13.45	13.47	2	6	1	2.0	
06P500082	G 8	05/07/1991	5	3854	3	N	24	65	30	30	24	5.0	4	1.7			0	13.48	13.50	2	2	13.50	13.52	2	6	1	2.0	
06P500083	A28	05/07/1991	5	3876	2	N	24	65	30	32	24	5.3	4	1.8			0	13.57	13.59	2	2	14.03	14.07	4	8	8	0.5	
06P500084	H 8	05/07/1991	5	3900	2	N	24	65	30	32	40	8.9	4	3.0			0	13.43	13.45	2	2	14.03	14.07	4	8	8	0.5	
06P500085	H 9	05/07/1991	5	3924	4	N	24	65	30	22	30	4.6	4	1.5			0	13.46	13.49	3	2	14.03	14.07	4	8	8	0.5	
06P500086	A29	05/07/1991	5	3950	3	N	24	65	30	36	30	7.5	4	2.5			0	13.59	14.01	2	2	14.03	14.07	4	8	8	0.5	
06P500087	G 9	05/07/1991	5	3967	3	N	24	65	30	36	22	5.5	4	1.8			0	13.54	13.55	1	2	14.03	14.07	4	8	8	0.5	
06P500088	G10	05/07/1991	5	3990	3	N	24	65	30	34	26	6.1	4	2.0			0	13.56	13.58	2	2	14.03	14.07	4	8	8	0.5	
06P500089	A30	05/07/1991	5	3999	2	N	24	65	30	38	36	9.5	4	3.2			0	14.02	14.03	1	2	14.03	14.07	4	8	8	0.5	
06P500090	H10	05/07/1991	5	4020	4	N	24	65	30	38	26	6.9	4	2.3			0	13.51	13.53	2	2	14.03	14.07	4	8	8	0.5	
Average	H											6.7		2.2			0.0			2.1									1.0
	A											6.7		2.2			0.0			2.0									0.8
	G											6.0		2.0			0.0			2.1									0.9

Table B-1. Summary of installation data for US 395, Alturas, California (continued)
UPM (semi-perm.) (C), Control (A), and UPM (edge seal) (B)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
06P500091	C	1	05/09/1991	31	4686	9	S	24	35	30	26	26	4.7	4	1.6	10.05	10.08	3	10.19	10.21	2	4	10.26	10.31	5	6	1	5.0	
06P500092	A	31	05/09/1991	31	4678	8	S	24	35	30	28	26	5.1	4	1.7			0	10.22	10.25	3	2	10.32	10.35	3	8	4	0.7	
06P500093	B	1	05/09/1991	31	4675	8	S	24	35	30	42	26	7.6	4	2.5			0	10.25	10.27	2	2	10.32	10.35	3	8	4	0.7	
06P500094	B	2	05/09/1991	31	4668	8	S	24	35	30	36	24	6.0	4	2.0			0	10.28	10.29	1	2	10.32	10.35	3	8	4	0.7	
06P500095	A	32	05/09/1991	31	4664	8	S	24	35	30	27	26	4.9	4	1.6			0	10.29	10.30	1	2	10.32	10.35	3	8	4	0.7	
06P500096	C	2	05/09/1991	31	4659	8	S	24	35	30	30	28	5.8	4	1.9	10.08	10.10	2	10.31	10.33	2	4	10.35	10.37	2	6	1	2.0	
06P500097	C	3	05/09/1991	31	4611	10	S	24	35	30	28	26	5.1	4	1.7	10.10	10.13	3	10.33	10.34	1	4	10.37	10.40	3	6	1	3.0	
06P500098	A	33	05/09/1991	31	4607	10	S	24	35	30	26	26	4.7	4	1.6			0	10.35	10.38	3	2	10.45	10.48	3	8	4	0.8	
06P500099	B	3	05/09/1991	31	4589	9	S	24	35	30	24	22	3.7	4	1.2			0	10.38	10.40	2	2	10.45	10.48	3	8	4	0.8	
06P500100	B	4	05/09/1991	31	4547	9	S	24	35	30	28	26	5.1	4	1.7			0	10.40	10.41	1	2	10.45	10.48	3	8	4	0.8	
06P500101	A	34	05/09/1991	31	4542	10	S	24	35	30	48	24	8.0	4	2.7			0	10.42	10.43	1	2	10.45	10.48	3	8	4	0.8	
06P500102	C	4	05/09/1991	31	4507	8	S	24	35	30	40	20	5.6	4	1.9	10.14	10.17	3	10.44	10.46	2	4	10.50	10.53	3	6	1	3.0	
06P500103	C	5	05/09/1991	31	4488	9	S	24	35	30	28	34	6.6	4	2.2	10.17	10.19	2	10.46	10.47	1	4	10.53	10.55	2	6	1	2.0	
06P500104	A	35	05/09/1991	31	4472	9	S	24	40	30	24	20	3.3	4	1.1			0	10.47	10.48	1	2	10.58	11.02	4	8	4	1.0	
06P500105	B	5	05/09/1991	31	4456	10	S	24	40	30	24	24	4.0	4	1.3			0	10.49	10.51	2	2	10.58	11.02	4	8	4	1.0	
06P500106	B	6	05/09/1991	31	4450	10	S	24	40	30	60	24	10.0	4	3.3			0	10.51	10.52	1	2	10.58	11.02	4	8	4	1.0	
06P500107	A	36	05/09/1991	31	4440	10	S	24	40	30	32	16	3.6	4	1.2			0	10.53	10.54	1	2	10.58	11.02	4	8	4	1.0	
06P500108	C	6	05/09/1991	31	4435	9	S	24	40	30	28	24	4.7	4	1.6	10.21	10.24	3	10.55	10.57	2	4	11.00	11.02	2	6	1	2.0	
06P500109	C	7	05/09/1991	31	4431	8	S	24	40	30	36	28	7.0	4	2.3	10.24	10.26	2	10.57	10.58	1	4	11.03	11.06	3	6	1	3.0	
06P500110	A	37	05/09/1991	31	4337	1	S	24	40	30	36	28	7.0	4	2.3			0	10.58	10.59	1	2	11.00	11.02	2	7	1	2.0	
06P500111	B	7	05/09/1991	31	4199	9	S	24	40	30	28	24	4.7	4	1.6			0	11.00	11.02	2	2	11.04	11.07	3	8	2	1.5	
06P500112	B	8	05/09/1991	31	4194	8	S	24	40	30	28	28	5.4	4	1.8			0	11.02	11.03	1	2	11.04	11.07	3	8	2	1.5	
06P500113	A	38	05/09/1991	31	4121	8	S	24	40	30	24	26	4.3	4	1.4			0	11.04	11.05	1	2	11.06	11.08	2	8	1	2.0	
06P500114	C	8	05/09/1991	31	4116	9	S	24	40	30	42	20	5.8	4	1.9	10.28	10.31	3	11.06	11.08	2	4	11.10	11.12	2	6	1	2.0	
06P500115	C	9	05/09/1991	31	4108	9	S	24	40	30	24	24	4.0	4	1.3	10.32	10.35	3	11.08	11.09	1	4	11.12	11.14	2	6	1	2.0	
06P500116	A	39	05/09/1991	31	4101	9	S	24	40	30	18	32	4.0	4	1.3			0	11.09	11.10	1	2	11.17	11.20	3	8	4	0.7	
06P500117	B	9	05/09/1991	31	4095	9	S	24	40	30	36	24	6.0	4	2.0			0	11.11	11.12	1	2	11.17	11.20	3	8	4	0.7	
06P500118	B	10	05/09/1991	31	4087	10	S	24	40	30	26	24	4.3	4	1.4			0	11.13	11.14	1	2	11.17	11.20	3	8	4	0.7	
06P500119	A	40	05/09/1991	31	4057	9	S	24	40	30	26	24	4.3	4	1.4			0	11.14	11.15	1	2	11.17	11.20	3	8	4	0.7	
06P500120	C	10	05/09/1991	31	4044	9	S	24	40	30	20	26	3.6	4	1.2	10.38	10.42	4	11.14	11.16	2	4	11.16	11.18	2	6	1	2.0	
Average	C												5.3		1.8			2.8			1.6							2.6	
	A												4.9		1.6			0.0			1.4							1.0	
	B												5.7		1.9			0.0			1.4							1.0	

Table B-1. Summary of installation data for US 395, Alturas, California (continued)
QPR 2000 (I) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
06P500121	A41	05/09/1991	30	5054	7	S	24	45	30	22	24	3.7	4	1.2			0	11.55	11.57	2	2	12.03	12.05	2	6	3	0.7
06P500122	I 1	05/09/1991	30	5028	1	S	24	45	30	48	24	8.0	4	2.7			0	11.58	11.59	1	2	12.03	12.05	2	6	3	0.7
06P500123	A42	05/09/1991	30	5023	1	S	24	45	30	30	22	4.6	4	1.5			0	12.00	12.02	2	2	12.03	12.05	2	6	3	0.7
06P500124	I 2	05/09/1991	30	4820	8	S	24	45	30	30	24	5.0	4	1.7			0	12.07	12.08	1	2	12.09	12.11	2	6	1	2.0
06P500125	A43	05/09/1991	30	4769	6	S	24	45	30	26	20	3.6	4	1.2			0	12.12	12.13	1	2	12.14	12.16	2	6	1	2.0
06P500126	I 3	05/09/1991	30	4731	2	S	24	45	30	26	24	4.3	4	1.4			0	12.13	12.15	2	2	12.16	12.17	1	6	1	1.0
06P500127	A44	05/09/1991	30	4685	8	S	24	45	30	24	28	4.7	4	1.6			0	12.19	12.21	2	2	12.27	12.29	2	6	4	0.5
06P500128	I 4	05/09/1991	30	4683	7	S	24	45	30	26	20	3.6	4	1.2			0	12.25	12.26	1	2	12.27	12.29	2	6	4	0.5
06P500129	A45	05/09/1991	30	4647	1	S	24	45	30	16	30	3.3	4	1.1			0	12.22	12.24	2	2	12.27	12.29	2	6	4	0.5
06P500130	I 5	05/09/1991	30	4495	1	S	24	45	30	16	30	3.3	4	1.1			0	12.25	12.27	2	2	12.27	12.29	2	6	4	0.5
06P500131	A46	05/09/1991	30	4442	8	S	24	45	30	28	24	4.7	4	1.6			0	12.30	12.32	2	2	12.32	12.33	1	6	1	1.0
06P500132	I 6	05/09/1991	30	4401	8	S	24	45	30	34	22	5.2	4	1.7			0	12.35	12.37	2	2	12.38	12.39	1	6	1	1.0
06P500133	A47	05/09/1991	30	4360	2	S	24	45	30	32	22	4.9	4	1.6			0	12.35	12.37	2	2	12.42	12.44	2	6	2	1.0
06P500134	I 7	05/09/1991	30	4330	8	S	24	45	30	28	26	5.1	4	1.7			0	12.40	12.41	1	2	12.42	12.44	2	6	2	1.0
06P500135	A48	05/09/1991	30	4820	8	N	24	45	30	28	22	4.3	4	1.4			0	12.40	12.42	2	2	12.52	12.54	2	6	2	1.0
06P500136	I 8	05/09/1991	30	4841	2	N	24	45	30	18	20	2.5	4	0.8			0	12.50	12.52	2	2	12.52	12.54	2	6	2	1.0
06P500137	A49	05/09/1991	30	4964	8	N	24	45	30	22	22	3.4	4	1.1			0	12.44	12.46	2	2	12.56	12.58	2	6	3	0.7
06P500138	I 9	05/09/1991	30	4969	8	N	24	45	30	26	16	2.9	4	1.0			0	12.54	12.55	1	2	12.56	12.58	2	6	3	0.7
06P500139	A50	05/09/1991	30	4973	8	N	24	45	30	38	22	5.8	4	1.9			0	12.48	12.50	2	2	12.56	12.58	2	6	3	0.7
06P500140	I10	05/09/1991	30	5080	1	N	24	45	30	24	30	5.0	4	1.7			0	12.58	13.01	3	2	13.01	13.03	2	6	1	2.0
Average	A											4.3		1.4			0.0			1.9							0.9
	I											4.5		1.5			0.0			1.6							1.0

Table B-2. Summary of installation data for I-70, Vandalia, Illinois
Local material (F), Control (A), and QPR 2000 (I)

Patch ID	Matl	#	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
17P200001	F	1	04/01/1991	0	65	0	W	24	68	20	32	24	5.3	4	1.8			0	10.38	10.40	2	2	10.40	10.45	5	8	1	5.0	
17P200002	A	1	04/01/1991	0	104	0	W	24	74	20	10	54	3.8	3	0.9			0	10.51	10.53	2	2	10.53	10.58	5	8	1	5.0	
17P200003	I	1	04/01/1991	0	124	0	W	24	67	20	10	57	4.0	3	1.0			0	12.38	12.40	2	2	12.42	12.45	3	8	1	3.0	
17P200004	I	2	04/01/1991	0	139	0	W	24	67	20	11	36	2.8	3	0.7			0	12.29	12.32	3	2	12.33	12.35	2	8	1	2.0	
17P200005	A	2	04/01/1991	0	159	0	W	24	73	20	10	62	4.3	3	1.1			0	10.59	11.01	2	2	11.01	11.03	2	8	1	2.0	
17P200006	F	2	04/01/1991	0	273	0	W	24	73	20	31	28	6.0	5	2.5			0	11.04	11.06	2	2	11.11	11.13	2	8	2	1.0	
17P200007	F	3	04/01/1991	0	288	0	W	24	73	20	28	26	5.1	3	1.3			0	11.07	11.10	3	2	11.11	11.13	2	8	2	1.0	
17P200008	A	3	04/01/1991	0	358	0	W	24	73	20	36	21	5.3	3	1.3			0	11.13	11.16	3	2	11.18	11.20	2	8	1	2.0	
17P200009	I	3	04/01/1991	0	417	0	W	24	69	20	12	60	5.0	3	1.3			0	13.47	13.49	2	2	13.51	13.54	3	8	2	1.5	
17P200010	I	4	04/01/1991	0	422	0	W	24	69	20	18	36	4.5	4	1.5			0	13.48	13.50	2	2	13.51	13.54	3	8	2	1.5	
17P200011	A	4	04/01/1991	0	556	1	W	24	68	20	51	28	9.9	4	3.3			0	12.37	12.40	3	2	12.41	12.42	1	8	1	1.0	
17P200012	F	4	04/01/1991	0	596	0	W	24	68	20	55	30	11.5	4	3.8			0	12.56	12.58	2	2	13.01	13.03	2	8	2	1.0	
17P200013	F	5	04/01/1991	0	626	0	W	24	68	20	26	30	5.4	3	1.4			0	12.58	12.59	1	2	13.01	13.03	2	8	2	1.0	
17P200014	A	5	04/01/1991	0	705	0	W	24	68	20	16	71	7.9	3	2.0			0	12.47	12.50	3	2	12.50	12.52	2	8	1	2.0	
17P200015	I	5	04/01/1991	0	829	0	W	24	69	20	17	11	1.3	3	0.3			0	13.56	14.03	7	2	14.03	14.09	6	8	1	6.0	
17P200016	I	6	04/01/1991	0	909	0	W	24	68	20	20	21	2.9	3	0.7			0	14.12	14.15	3	2	14.16	14.18	2	8	1	2.0	
17P200017	A	6	04/01/1991	0	1306	0	W	24	68	20	38	32	8.4	3	2.1			0	13.02	13.05	3	2	13.07	13.09	2	8	1	2.0	
17P200018	F	6	04/01/1991	0	1351	0	W	24	70	20	36	24	6.0	4	2.0			0	13.18	13.25	7	2	13.26	13.27	1	8	2	0.5	
17P200019	F	7	04/01/1991	0	1366	0	W	24	70	20	20	18	2.5	3	0.6			0	13.18	13.26	8	2	13.26	13.27	1	8	2	0.5	
17P200020	A	7	04/01/1991	0	1371	1	W	24	70	20	23	20	3.2	4	1.1			0	13.12	13.15	3	2	13.15	13.17	2	8	1	2.0	
17P200021	I	7	04/01/1991	0	1381	0	W	24	68	20	16	29	3.2	3	0.8			0	14.24	14.26	2	2	14.32	14.34	2	8	2	1.0	
17P200022	I	8	04/01/1991	0	1410	0	W	24	68	20	29	24	4.8	3	1.2			0	14.27	14.30	3	2	14.32	14.34	2	8	2	1.0	
17P200023	A	8	04/01/1991	0	1425	0	W	24	70	20	30	28	5.8	3	1.5			0	13.20	13.23	3	2	13.23	13.25	2	8	1	2.0	
17P200024	F	8	04/01/1991	0	1679	0	W	24	72	20	36	24	6.0	3	1.5			0	13.30	13.32	2	2	13.33	13.34	1	8	1	1.0	
17P200025	F	9	04/01/1991	0	1733	0	W	24	72	20	30	36	7.5	3	1.9			0	13.37	13.40	3	2	13.41	13.43	2	8	1	2.0	
17P200026	A	9	04/01/1991	0	1748	0	W	24	72	20	41	22	6.3	3	1.6			0	13.27	13.29	2	2	13.29	13.31	2	8	1	2.0	
17P200027	I	9	04/01/1991	0	1832	0	W	24	68	20	32	30	6.7	3	1.7			0	14.40	14.43	3	2	14.44	14.46	2	8	1	2.0	
17P200028	I	10	04/01/1991	0	2215	0	W	24	68	20	36	28	7.0	4	2.3			0	14.53	14.55	2	2	14.46	14.57	11	8	1	11.0	
17P200029	A	10	04/01/1991	0	2245	0	W	24	72	20	33	24	5.5	3	1.4			0	13.35	13.37	2	2	13.37	13.38	1	8	1	1.0	
17P200030	F	10	04/01/1991	0	2264	0	W	24	72	20	32	26	5.8	3	1.4			0	13.54	13.57	3	2	13.58	14.00	2	8	1	2.0	
Average	F												6.1		1.8			0.0			3.3								1.5	
	A												6.0		1.6			0.0			2.6								2.1	
	I												4.2		1.1			0.0			2.9								3.1	

Table B-2. Summary of installation data for I-70, Vandalia, Illinois (continued) Local procedure (X), Control (A), and HFMS-2 (G)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
17P200031	X	1	04/02/1991	0	14784	0	W	24	70	20	9	45	2.8	3	0.7			0	9.48	9.50	2	2	9.50	9.52	2	8	1	2.0	
17P200032	A	11	04/02/1991	0	14789	0	W	24	70	20	12	36	3.0	3	0.8			0	9.58	9.59	1	2	9.59	10.01	2	8	1	2.0	
17P200033	G	1	04/02/1991	0	14799	0	W	24	70	20	14	15	1.5	3	0.4			0	9.52	9.55	3	2	9.55	9.57	2	8	1	2.0	
17P200034	G	2	04/02/1991	0	14819	0	W	24	70	20	14	55	5.3	3	1.3			0	9.57	9.59	2	2	10.00	10.01	1	8	1	1.0	
17P200035	A	12	04/02/1991	0	14833	0	W	24	70	20	13	57	5.1	3	1.3			0	10.02	10.05	3	2	10.05	10.07	2	8	1	2.0	
17P200036	X	2	04/02/1991	0	14843	0	W	24	70	20	14	60	5.8	3	1.5			0	9.53	9.55	2	2	9.55	9.56	1	8	1	1.0	
17P200037	X	3	04/02/1991	0	14918	0	W	24	70	20	25	21	3.6	5	1.5			0	9.56	9.59	3	2	10.01	10.02	1	8	1	1.0	
17P200038	A	13	04/02/1991	0	15022	0	W	24	65	20	23	20	3.2	5	1.3			0	10.10	10.12	2	2	10.12	10.13	1	8	1	1.0	
17P200039	G	3	04/02/1991	0	15121	0	W	24	65	20	22	19	2.9	5	1.2			0	10.03	10.05	2	2	10.06	10.07	1	8	1	1.0	
17P200040	G	4	04/02/1991	0	15201	0	W	24	63	20	45	20	6.3	4	2.1			0	10.09	10.11	2	2	10.12	10.14	2	8	1	2.0	
17P200041	A	14	04/02/1991	0	15290	0	W	24	63	20	6	60	2.5	4	0.8			0	10.19	10.22	3	2	10.24	10.26	2	8	1	2.0	
17P200042	X	4	04/02/1991	0	15295	0	W	24	63	20	4	60	1.7	4	0.6			0	10.04	10.07	3	2	10.08	10.10	2	8	1	2.0	
17P200043	X	5	04/02/1991	0	15414	0	W	24	63	20	30	24	5.0	4	1.7			0	10.10	10.12	2	2	10.13	10.15	2	8	1	2.0	
17P200044	A	15	04/02/1991	0	16035	0	W	24	63	20	8	60	3.3	4	1.1			0	10.28	10.30	2	2	10.45	10.50	5	8	6	0.8	
17P200045	G	5	04/02/1991	0	16040	0	W	24	63	20	10	60	4.2	4	1.4			0	10.20	10.21	1	2	10.45	10.50	5	8	6	0.8	
17P200046	G	6	04/02/1991	0	16055	0	W	24	63	20	10	60	4.2	4	1.4			0	10.24	10.27	3	2	10.45	10.50	5	8	6	0.8	
17P200047	A	16	04/02/1991	0	16060	0	W	24	77	20	10	60	4.2	4	1.4			0	10.41	10.43	2	2	10.45	10.50	5	8	6	0.8	
17P200048	X	6	04/02/1991	0	16070	0	W	24	77	20	10	45	3.1	4	1.0			0	10.15	10.17	2	2	10.45	10.50	5	8	6	0.8	
17P200049	X	7	04/02/1991	0	16075	0	W	24	77	20	10	53	3.7	4	1.2			0	10.18	10.20	2	2	10.45	10.50	5	8	6	0.8	
17P200050	A	17	04/02/1991	0	16105	0	W	24	70	20	12	44	3.7	4	1.2			0	10.51	10.53	2	2	10.53	10.55	2	8	1	2.0	
17P200051	G	7	04/02/1991	0	16110	0	W	24	70	20	12	48	4.0	4	1.3			0	10.30	10.33	3	2	10.34	10.36	2	8	1	2.0	
17P200052	G	8	04/02/1991	0	16681	0	W	24	70	20	12	35	2.9	4	1.0			0	10.41	10.44	3	2	10.44	10.46	2	8	1	2.0	
17P200053	A	18	04/02/1991	0	16686	0	W	24	70	20	10	30	2.1	4	0.7			0	10.59	11.02	3	2	11.06	11.07	1	8	1	1.0	
17P200054	X	8	04/02/1991	0	16725	0	W	24	70	20	15	49	5.1	3	1.3			0	10.25	10.27	2	2	10.30	10.32	2	8	2	1.0	
17P200055	X	9	04/02/1991	0	16730	0	W	24	70	20	10	44	3.1	4	1.0			0	10.26	10.28	2	2	10.30	10.32	2	8	2	1.0	
17P200056	A	19	04/02/1991	0	16765	0	W	24	70	20	18	35	4.4	4	1.5			0	11.09	11.12	3	2	11.14	11.15	1	8	2	0.5	
17P200057	G	9	04/02/1991	0	16770	0	W	24	70	20	6	54	2.3	4	0.8			0	10.55	10.57	2	2	11.14	11.15	1	8	2	0.5	
17P200058	G	10	04/02/1991	0	16899	0	W	24	70	20	12	55	4.6	4	1.5			0	11.08	11.10	2	2	11.15	11.17	2	8	1	2.0	
17P200059	A	20	04/02/1991	0	16904	0	W	24	70	20	10	60	4.2	4	1.4			0	11.18	11.19	1	2	11.21	11.23	2	8	1	2.0	
17P200060	X	10	04/02/1991	0	17004	0	W	24	70	20	12	45	3.8	5	1.6			0	10.37	10.40	3	2	10.43	10.45	2	8	1	2.0	
Average	X												3.8		1.2			0.0			2.3							1.4	
	A												3.6		1.1			0.0			2.2							1.4	
	G												3.8		1.2			0.0			2.3							1.4	

Table B-2. Summary of installation data for I-70, Vandalia, Illinois (continued)
PennDOT 486 (E), Control (A), and UPM (edge seal) (B)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
17P200061	E 1	04/02/1991	0	17010	0	W	24	72	20	10	51	3.5	3	0.9			0	12.35	12.38	3	2	12.39	12.41	2	8	1	2.0	
17P200062	A21	04/02/1991	0	17043	0	W	24	72	20	10	48	3.3	4	1.1			0	12.57	13.00	3	2	13.00	13.02	2	8	1	2.0	
17P200063	B 1	04/02/1991	0	17048	0	W	24	72	20	14	55	5.3	4	1.8			0	12.48	12.49	1	2	12.51	12.53	2	8	1	2.0	
17P200064	B 2	04/02/1991	0	17237	0	W	24	72	20	12	53	4.4	4	1.5			0	12.56	12.59	3	2	12.59	13.02	3	8	1	3.0	
17P200065	A22	04/02/1991	0	17242	0	W	24	72	20	12	61	5.1	4	1.7			0	13.05	13.09	4	2	13.09	13.11	2	8	1	2.0	
17P200066	E 2	04/02/1991	0	17302	0	W	24	72	20	28	22	4.3	4	1.4			0	12.45	12.48	3	2	12.49	12.50	1	8	1	1.0	
17P200067	E 3	04/02/1991	0	17426	0	W	24	72	20	33	19	4.4	4	1.5			0	12.53	12.55	2	2	12.57	12.59	2	8	1	2.0	
17P200068	A23	04/02/1991	0	17500	0	W	24	72	20	32	20	4.4	4	1.5			0	13.15	13.18	3	2	13.18	13.20	2	8	1	2.0	
17P200069	B 3	04/02/1991	0	17535	0	W	24	72	20	51	44	15.6	5	6.5			0	13.05	13.07	2	2	13.09	13.10	1	8	1	1.0	
17P200070	B 4	04/02/1991	0	17595	0	W	24	72	20	32	24	5.3	4	1.8			0	13.11	13.15	4	2	13.15	13.17	2	8	1	2.0	
17P200071	A24	04/02/1991	0	17873	0	W	24	72	20	28	26	5.1	4	1.7			0	13.23	13.27	4	2	13.28	13.29	1	8	1	1.0	
17P200072	E 4	04/02/1991	0	17937	0	W	24	72	20	31	27	5.8	4	1.9			0	13.04	13.07	3	2	13.08	13.10	2	8	1	2.0	
17P200073	E 5	04/02/1991	0	18002	0	W	24	72	20	31	24	5.2	4	1.7			0	13.11	13.13	2	2	13.14	13.16	2	8	1	2.0	
17P200074	A25	04/02/1991	0	18041	0	W	24	72	20	18	54	6.8	4	2.3			0	13.33	13.36	3	2	13.37	13.38	1	8	1	1.0	
17P200075	B 5	04/02/1991	0	18056	0	W	24	72	20	12	56	4.7	4	1.6			0	13.22	13.24	2	2	13.28	13.30	2	8	2	1.0	
17P200076	B 6	04/02/1991	0	18076	0	W	24	72	20	36	40	10.0	4	3.3			0	13.24	13.27	3	2	13.28	13.30	2	8	2	1.0	
17P200077	A26	04/02/1991	0	18146	0	W	24	72	20	32	25	5.6	4	1.9			0	13.45	13.49	4	2	13.49	13.51	2	8	1	2.0	
17P200078	E 6	04/02/1991	0	18275	0	W	24	72	20	10	64	4.4	4	1.5			0	13.35	13.37	2	2	13.40	13.42	2	8	2	1.0	
17P200079	E 7	04/02/1991	0	18280	0	W	24	72	20	10	62	4.3	4	1.4			0	13.37	13.40	3	2	13.40	13.42	2	8	2	1.0	
17P200080	A27	04/02/1991	0	18334	0	W	24	72	20	42	30	8.8	4	2.9			0	13.53	13.55	2	2	13.56	13.58	2	8	1	2.0	
17P200081	B 7	04/02/1991	0	18394	0	W	24	72	20	30	30	6.3	4	2.1			0	13.35	13.38	3	2	13.39	13.41	2	8	1	2.0	
17P200082	B 8	04/02/1991	0	18439	0	W	24	72	20	30	30	6.3	4	2.1			0	13.45	13.48	3	2	13.49	13.50	1	8	1	1.0	
17P200083	A28	04/02/1991	0	18613	0	W	24	72	20	24	24	4.0	4	1.3			0	14.05	14.09	4	2	14.09	14.12	3	8	1	3.0	
17P200084	E 8	04/02/1991	0	18627	0	W	24	72	20	24	18	3.0	4	1.0			0	13.50	13.53	3	2	13.55	13.56	1	8	1	1.0	
17P200085	E 9	04/02/1991	0	18742	0	W	24	72	20	12	42	3.5	4	1.2			0	13.59	14.03	4	2	14.03	14.05	2	8	1	2.0	
17P200086	A29	04/02/1991	0	18747	0	W	24	72	20	6	48	2.0	4	0.7			0	14.15	14.19	4	2	14.20	14.21	1	8	1	1.0	
17P200087	B 9	04/02/1991	0	18886	0	W	24	72	20	30	18	3.8	4	1.3			0	13.55	13.59	4	2	14.04	14.06	2	8	2	1.0	
17P200088	B10	04/02/1991	0	18896	0	W	24	72	20	24	18	3.0	4	1.0			0	13.59	14.03	4	2	14.04	14.06	2	8	2	1.0	
17P200089	A30	04/02/1991	0	18915	0	W	24	72	20	48	48	16.0	5	6.7			0	14.25	14.28	3	2	14.28	14.30	2	8	1	2.0	
17P200090	E10	04/02/1991	0	18990	0	W	24	72	20	24	24	4.0	4	1.3			0	14.10	14.13	3	2	14.14	14.16	2	8	1	2.0	
Average	E											4.2		1.4			0.0			2.8							1.6	
	A											6.1		2.2			0.0			3.4							1.8	
	B											6.5		2.3			0.0			2.9							1.5	

Table B-2. Summary of installation data for I-70, Vandalia, Illinois (continued)
PennDOT 485 (D), Control (A), and Perma-Patch (H)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
17P200091	D 1	04/03/1991	0	19064	0	W	24	68	20	28	18	3.5	4	1.2			0	9.36	9.39	3	2	9.39	9.41	2	8	1	2.0	
17P200092	A31	04/03/1991	0	19367	0	W	24	65	31	10	45	3.1	3	0.8			0	9.51	9.54	3	2	9.54	9.56	2	8	1	2.0	
17P200093	H 1	04/03/1991	0	19372	0	W	24	65	28	10	52	3.6	3	0.9			0	9.45	9.48	3	2	9.48	9.50	2	8	1	2.0	
17P200094	H 2	04/03/1991	0	19511	0	W	24	65	28	29	25	5.0	4	1.7			0	9.51	9.55	4	2	9.55	9.57	2	8	1	2.0	
17P200095	A32	04/03/1991	0	20342	0	W	24	65	28	29	18	3.6	3	0.9			0	10.25	10.28	3	2	10.30	10.31	1	8	1	1.0	
17P200096	D 2	04/03/1991	0	20673	0	W	24	65	28	38	18	4.8	3	1.2			0	9.45	9.49	4	2	9.49	9.52	3	8	1	3.0	
17P200097	D 3	04/03/1991	0	20703	0	W	24	65	28	28	18	3.5	2	0.6			0	9.53	9.57	4	2	9.57	10.00	3	8	1	3.0	
17P200098	A33	04/03/1991	0	20842	0	W	24	65	28	35	20	4.9	2	0.8			0	10.33	10.36	3	2	10.38	10.40	2	8	1	2.0	
17P200099	H 3	04/03/1991	0	20932	0	W	24	65	28	24	12	2.0	2	0.3			0	10.20	10.23	3	2	10.24	10.26	2	8	2	1.0	
17P200100	H 4	04/03/1991	0	20937	0	W	24	65	28	28	15	2.9	2	0.5			0	10.21	10.24	3	2	10.24	10.26	2	8	2	1.0	
17P200101	A34	04/03/1991	0	20976	0	W	24	65	28	24	18	3.0	2	0.5			0	10.44	10.47	3	2	10.48	10.50	2	8	1	2.0	
17P200102	D 4	04/03/1991	0	21890	0	W	24	65	28	23	23	3.7	2	0.6			0	10.30	10.33	3	2	10.36	10.37	1	8	1	1.0	
17P200103	D 5	04/03/1991	0	22451	0	W	24	72	25	20	20	2.8	3	0.7			0	10.42	10.45	3	2	10.45	10.47	2	8	1	2.0	
17P200104	A35	04/03/1991	0	22466	0	W	24	75	25	36	26	6.5	2	1.1			0	10.53	10.57	4	2	10.57	10.59	2	8	3	0.7	
17P200105	H 5	04/03/1991	0	22685	0	W	24	75	25	31	24	5.2	2	0.9			0	11.12	11.21	9	2	11.21	11.25	4	8	1	4.0	
17P200106	H 6	04/03/1991	0	22695	0	W	24	75	25	39	24	6.5	2	1.1			0	11.14	11.18	4	2	11.20	11.25	5	8	1	5.0	
17P200107	A36	04/03/1991	0	22710	0	W	24	75	25	34	24	5.7	2	0.9			0	11.27	11.30	3	2	11.30	11.32	2	8	1	2.0	
17P200108	D 6	04/03/1991	0	22719	0	W	24	75	25	57	28	11.1	4	3.7			0	10.53	10.57	4	2	10.57	10.59	2	8	3	0.7	
17P200109	D 7	04/03/1991	0	22729	0	W	24	75	25	57	28	11.1	4	3.7			0	10.54	10.57	3	2	10.57	10.59	2	8	3	0.7	
17P200110	A37	04/03/1991	0	22744	0	W	24	75	25	37	17	4.4	4	1.5			0	11.40	11.43	3	2	11.44	11.45	1	8	1	1.0	
17P200111	H 7	04/03/1991	0	23405	0	W	24	75	25	39	27	7.3	2	1.2			0	11.28	11.32	4	2	11.33	11.35	2	8	1	2.0	
17P200112	H 8	04/03/1991	0	23425	0	W	24	75	25	36	36	9.0	3	2.3			0	11.36	11.40	4	2	11.41	11.43	2	8	1	2.0	
17P200113	A38	04/03/1991	0	23941	0	W	24	75	25	38	29	7.7	4	2.6			0	11.47	11.50	3	2	11.51	11.53	2	8	2	1.0	
17P200114	D 8	04/03/1991	0	23951	0	W	24	75	25	24	18	3.0	3	0.8			0	11.35	11.40	5	2	11.42	11.45	3	8	1	3.0	
17P200115	D 9	04/03/1991	0	23961	0	W	24	75	25	24	18	3.0	4	1.0			0	11.39	11.42	3	2	11.43	11.45	2	8	1	2.0	
17P200116	A39	04/03/1991	0	23971	0	W	24	75	25	30	18	3.8	3	0.9			0	12.57	13.01	4	2	13.01	13.02	1	8	1	1.0	
17P200117	H 9	04/03/1991	0	24050	0	W	24	75	25	36	30	7.5	3	1.9			0	12.47	12.50	3	2	12.51	12.53	2	8	2	1.0	
17P200118	H10	04/03/1991	0	24080	0	W	24	75	25	24	30	5.0	3	1.3			0	12.54	13.00	6	2	12.57	13.01	4	8	1	4.0	
17P200119	A40	04/03/1991	0	24160	0	W	24	75	25	24	30	5.0	3	1.3			0	13.03	13.07	4	2	13.07	13.09	2	8	1	2.0	
17P200120	D10	04/03/1991	0	24170	0	W	24	75	25	30	24	5.0	3	1.3			0	12.56	13.00	4	2	13.00	13.02	2	8	1	2.0	
Average	D											5.1		1.5			0.0			3.6									1.9
	A											4.8		1.1			0.0			3.3									1.5
	H											5.4		1.2			0.0			4.3									2.4

Table B-2. Summary of installation data for I-70, Vandalia, Illinois (continued)
UPM (semi-perm.) (C), Control (A), and Spray injection (J)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
17P200121	C 1	04/04/1991	0	26811	0	W	24	50	60		30	36	7.5	3	1.9	9.03	9.18	15	9.18	9.23	5	4	9.24	9.27	3	8	1	3.0	
17P200122	A41	04/04/1991	0	26836	0	W	24	50	60		43	32	9.6	3	2.4			0	9.38	9.41	3	2	9.41	9.43	2	8	1	2.0	
17P200123	J 1	04/04/1991	0	26896	0	W	24	50	60		27	26	4.9	3	1.2			0	10.10	10.12	2	2			0	0	0		
17P200124	J 2	04/04/1991	0	27224	0	W	24	50	60		37	24	6.2	3	1.5			0	10.14	10.16	2	2			0	0	0		
17P200125	A42	04/04/1991	0	27452	0	W	24	50	60		32	22	4.9	3	1.2			0	9.44	9.46	2	2	9.47	9.49	2	8	1	2.0	
17P200126	C 2	04/04/1991	0	27661	0	W	24	50	60		45	33	10.3	4	3.4	9.10	9.23	13	9.24	9.29	5	4	9.30	9.32	2	8	1	2.0	
17P200127	C 3	04/04/1991	0	27671	0	W	24	50	60		46	34	10.9	4	3.6	9.16	9.32	16	9.33	9.35	2	4	9.36	9.39	3	8	1	3.0	
17P200128	A43	04/04/1991	0	28391	0	W	24	50	60		38	26	6.9	3	1.7			0	9.51	9.55	4	2	9.56	9.57	1	8	1	1.0	
17P200129	J 3	04/04/1991	0	28420	0	W	24	50	60		33	28	6.4	2	1.1			0	10.19	10.22	3	2			0	0	0		
17P200130	J 4	04/04/1991	0	28470	0	W	24	50	60		26	27	4.9	2	0.8			0	10.23	10.25	2	2			0	0	0		
17P200131	A44	04/04/1991	0	28490	0	W	24	50	60		31	28	6.0	3	1.5			0	9.58	10.01	3	2	10.01	10.03	2	8	1	2.0	
17P200132	C 4	04/04/1991	0	28515	0	W	24	50	60		33	31	7.1	4	2.4	9.23	9.37	14	9.40	9.44	4	4	9.45	9.47	2	8	1	2.0	
17P200133	C 5	04/04/1991	0	28545	0	W	24	50	60		35	25	6.1	4	2.0	9.29	9.44	15	9.45	9.48	3	4	9.49	9.52	3	8	1	3.0	
17P200134	A45	04/04/1991	0	28559	0	W	24	50	60		33	28	6.4	2	1.1			0	10.03	10.06	3	2	10.06	10.08	2	8	1	2.0	
17P200135	J 5	04/04/1991	0	28574	0	W	24	50	60		31	23	5.0	3	1.2			0	10.35	10.38	3	2			0	0	0		
17P200136	J 6	04/04/1991	0	28674	0	W	24	50	60		47	22	7.2	3	1.8			0	10.40	10.42	2	2			0	0	0		
17P200137	A46	04/04/1991	0	28679	0	W	24	50	60		38	30	7.9	2	1.3			0	10.09	10.11	2	2	10.11	10.13	2	8	1	2.0	
17P200138	C 6	04/04/1991	0	28713	0	W	24	50	60		47	36	11.8	2	2.0	9.37	9.53	16	9.54	9.58	4	4	9.58	10.01	3	8	1	3.0	
17P200139	C 7	04/04/1991	0	28718	0	W	24	50	60		32	38	8.4	2	1.4	9.44	9.59	15	10.00	10.04	4	4	10.04	10.06	2	8	1	2.0	
17P200140	A47	04/04/1991	0	28763	0	W	24	50	60		20	20	2.8	3	0.7			0	10.15	10.17	2	2	10.17	10.19	2	8	1	2.0	
17P200141	J 7	04/04/1991	0	28773	0	W	24	50	60		19	23	3.0	3	0.8			0	10.56	10.59	3	2			0	0	0		
17P200142	J 8	04/04/1991	0	28833	2	W	24	50	60		21	21	3.1	3	0.8			0	11.02	11.05	3	2			0	0	0		
17P200143	A48	04/04/1991	0	28867	0	W	24	50	60		22	24	3.7	3	0.9			0	10.21	10.24	3	2	10.24	10.25	1	8	1	1.0	
17P200144	C 8	04/04/1991	0	28977	0	W	24	50	60		36	27	6.8	2	1.1	9.51	10.08	17	10.08	10.12	4	4	10.12	10.14	2	8	1	2.0	
17P200145	C 9	04/04/1991	0	29041	1	W	24	50	60		27	30	5.6	3	1.4	9.57	10.13	16	10.14	10.17	3	4	10.17	10.19	2	8	1	2.0	
17P200146	A49	04/04/1991	0	29056	0	W	24	50	60		37	24	6.2	2	1.0			0	10.27	10.30	3	2	10.30	10.32	2	8	1	2.0	
17P200147	J 9	04/04/1991	0	29086	0	W	24	50	60		31	24	5.2	2	0.9			0	11.30	11.32	2	2			0	0	0		
17P200148	J10	04/04/1991	0	29116	0	W	24	50	60		37	21	5.4	2	0.9			0	11.33	11.35	2	2			0	0	0		
17P200149	A50	04/04/1991	0	29160	0	W	24	50	60		23	45	7.2	2	1.2			0	10.34	10.37	3	2	10.37	10.39	2	8	1	2.0	
17P200150	C10	04/04/1991	0	29185	0	W	24	50	60		34	29	6.8	4	2.3	10.05	10.20	15	10.21	10.26	5	4	10.26	10.29	3	8	1	3.0	
Average	C												8.1		2.2			15.2			3.9								2.5
	A												6.1		1.3			0.0			2.8								1.8
	J												5.1		1.1			0.0			2.4								0.0

Table B-3. Summary of installation data for Rt. 518, Las Vegas, New Mexico PennDOT 486 (E), Control (A), and Local material (F)

Patch ID	Matl	#	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
35P600001	E	1	04/08/1991	18	481	7	S	24	60	20	20	17	2.4	4	0.8			0	11.07	11.09	2	2	11.25	11.29	4	8	4	1.0	
35P600002	A	1	04/09/1991	18	468	8	S	24	60	20	24	19	3.2	4	1.1			0	12.55	12.57	2	3	13.02	13.04	2	8	2	1.0	
35P600003	F	1	04/08/1991	18	462	8	S	24	65	20	22	21	3.2	4	1.1			0	11.16	11.18	2	2	11.25	11.29	4	8	4	1.0	
35P600004	F	2	04/08/1991	18	455	8	S	24	62	20	57	28	11.1	5	4.6			0	11.17	11.21	4	2	11.25	11.29	4	8	4	1.0	
35P600005	A	2	04/09/1991	18	448	9	S	24	60	20	24	19	3.2	5	1.3			0	12.59	13.02	3	3	13.02	13.04	2	8	2	1.0	
35P600006	E	2	04/08/1991	18	444	9	S	24	65	20	36	23	5.8	4	1.9			0	11.12	11.15	3	2	11.25	11.29	4	8	4	1.0	
35P600007	E	3	04/08/1991	18	263	8	S	24	65	20	55	22	8.4	4	2.8			0	11.18	11.21	3	2	11.22	11.24	2	8	1	2.0	
35P600008	A	3	04/09/1991	18	258	8	S	24	65	20	40	18	5.0	4	1.7			0	13.05	13.07	2	3	13.08	13.10	2	8	1	2.0	
35P600009	F	3	04/08/1991	18	254	8	S	24	65	20	24	22	3.7	5	1.5			0	11.28	11.31	3	2	11.34	11.36	2	8	1	2.0	
35P600010	F	4	04/08/1991	17	4407	9	S	24	72	20	24	17	2.8	5	1.2			0	13.08	13.10	2	2	13.10	13.13	3	8	2	1.5	
35P600011	A	4	04/09/1991	17	4400	9	S	24	65	20	39	17	4.6	4	1.5			0	13.16	13.18	2	3	13.19	13.21	2	8	1	2.0	
35P600012	E	4	04/08/1991	17	4387	10	S	24	73	20	48	21	7.0	5	2.9			0	13.04	13.06	2	2	13.10	13.13	3	8	2	1.5	
35P600013	E	5	04/08/1991	17	2232	7	S	24	73	20	35	30	7.3	7	4.3			0	13.53	14.01	8	2	14.01	14.03	2	8	1	2.0	
35P600014	A	5	04/09/1991	17	2255	7	S	24	65	20	28	18	3.5	4	1.2			0	13.39	13.41	2	3	13.50	13.52	2	8	3	0.7	
35P600015	F	5	04/08/1991	17	2220	7	S	24	67	20	22	18	2.8	5	1.1			0	14.02	14.06	4	2	14.07	14.09	2	8	2	1.0	
35P600016	F	6	04/08/1991	17	2170	7	S	24	67	20	33	15	3.4	5	1.4			0	14.03	14.06	3	2	14.07	14.09	2	8	2	1.0	
35P600017	A	6	04/09/1991	17	2167	7	S	24	65	20	23	21	3.4	4	1.1			0	13.42	13.45	3	3	13.50	13.52	2	8	3	0.7	
35P600018	E	6	04/08/1991	17	2163	7	S	24	67	20	28	20	3.9	4	1.3			0	14.04	14.06	2	2	14.10	14.11	1	8	2	0.5	
35P600019	E	7	04/08/1991	17	2116	7	S	24	66	20	30	13	2.7	3	0.7			0	14.07	14.10	3	2	14.10	14.11	1	8	2	0.5	
35P600020	A	7	04/09/1991	17	2109	7	S	24	63	20	29	19	3.8	4	1.3			0	13.46	13.48	2	3	13.50	13.52	2	8	3	0.7	
35P600021	F	7	04/08/1991	17	2103	7	S	24	66	20	30	13	2.7	3	0.7			0	14.11	14.13	2	2	14.14	14.17	3	8	1	3.0	
35P600022	F	8	04/08/1991	16	4752	8	S	24	66	20	29	19	3.8	3	1.0			0	14.46	14.47	1	2	14.53	14.55	2	8	3	0.7	
35P600023	A	8	04/09/1991	16	4731	8	S	24	65	20	42	15	4.4	4	1.5			0	14.29	14.32	3	3	14.37	14.41	4	8	2	2.0	
35P600024	E	8	04/08/1991	16	4703	10	S	24	66	20	22	26	4.0	4	1.3			0	14.49	14.51	2	2	14.53	14.55	2	8	3	0.7	
35P600025	E	9	04/08/1991	16	4696	10	S	24	66	20	24	30	5.0	5	2.1			0	14.50	14.52	2	2	14.53	14.55	2	8	3	0.7	
35P600026	A	9	04/09/1991	16	4690	10	S	24	64	20	36	23	5.8	5	2.4			0	14.33	14.36	3	3	14.37	14.41	4	8	2	2.0	
35P600027	F	9	04/08/1991	16	4621	10	S	24	70	20	35	10	2.4	2	0.4			0	14.48	14.50	2	2	14.58	14.59	1	8	1	1.0	
35P600028	F10		04/08/1991	16	4424	9	S	24	70	20	30	20	4.2	5	1.7			0	15.03	15.07	4	2	15.07	15.09	2	8	1	2.0	
35P600029	A10		04/09/1991	16	4370	10	S	24	62	20	30	18	3.8	5	1.6			0	14.42	14.44	2	3	14.45	14.47	2	8	1	2.0	
35P600030	E10		04/08/1991	16	4322	10	S	24	62	20	20	16	2.2	3	0.6			0	15.00	15.01	1	2	15.02	15.03	1	8	1	1.0	
Average	E												4.9		1.9			0.0			2.8							1.1
	A												4.0		1.5			0.0			2.4							1.4
	F												4.0		1.5			0.0			2.7							1.4

Table B-3. Summary of installation data for Rt. 518, Las Vegas, New Mexico (continued)
PennDOT 485 (D), Control (A), and HFMS-2 (G)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
35P600031	D 1	04/09/1991	20	285	10	S	24	60	20	19	17	2.2	3	0.6			0	9.05	9.07	2	2	9.10	9.12	2	8	3	0.7	
35P600032	A11	04/09/1991	20	281	10	S	24	54	20	16	17	1.9	3	0.5			0	9.07	9.09	2	2	9.10	9.12	2	8	3	0.7	
35P600033	G 1	04/09/1991	20	277	10	S	24	57	20	16	18	2.0	3	0.5			0	9.03	9.05	2	2	9.10	9.12	2	8	3	0.7	
35P600034	G 2	04/09/1991	19	4197	11	S	24	57	20	37	15	3.9	3	1.0			0	9.23	9.25	2	2	9.32	9.34	2	8	3	0.7	
35P600035	A12	04/09/1991	19	4183	11	S	24	57	20	22	18	2.8	3	0.7			0	9.26	9.28	2	2	9.32	9.34	2	8	3	0.7	
35P600036	D 2	04/09/1991	19	4162	10	S	24	55	20	32	15	3.3	3	0.8			0	9.28	9.30	2	2	9.32	9.34	2	8	3	0.7	
35P600037	D 3	04/09/1991	19	3938	11	S	24	60	20	30	15	3.1	4	1.0			0	9.35	9.37	2	2	9.43	9.45	2	8	3	0.7	
35P600038	A13	04/09/1991	19	3926	9	S	24	60	20	24	18	3.0	3	0.8			0	9.37	9.40	3	2	9.43	9.45	2	8	3	0.7	
35P600039	G 3	04/09/1991	19	3896	9	S	24	60	20	32	19	4.2	3	1.1			0	9.39	9.42	3	2	9.43	9.45	2	8	3	0.7	
35P600040	G 4	04/09/1991	19	3244	8	S	24	60	20	24	18	3.0	4	1.0			0	9.46	9.48	2	2	9.56	9.58	2	8	3	0.7	
35P600041	A14	04/09/1991	19	3237	10	S	24	60	20	22	18	2.8	3	0.7			0	9.48	9.52	4	2	9.56	9.58	2	8	3	0.7	
35P600042	D 4	04/09/1991	19	3229	10	S	24	60	20	19	13	1.7	3	0.4			0	9.52	9.55	3	2	9.56	9.58	2	8	3	0.7	
35P600043	D 5	04/09/1991	19	2750	7	S	24	59	20	20	15	2.1	4	0.7			0	10.36	10.38	2	2	10.39	10.41	2	8	3	0.7	
35P600044	A15	04/09/1991	19	2743	10	S	24	59	20	15	15	1.6	3	0.4			0	10.32	10.34	2	2	10.39	10.41	2	8	3	0.7	
35P600045	G 5	04/09/1991	19	2741	10	S	24	60	20	18	13	1.6	4	0.5			0	10.30	10.31	1	2	10.39	10.41	2	8	3	0.7	
35P600046	G 6	04/09/1991	19	2628	8	S	24	60	20	25	18	3.1	4	1.0			0	10.38	10.41	3	2	10.45	10.46	1	8	3	0.3	
35P600047	A16	04/09/1991	19	2621	8	S	24	60	20	26	15	2.7	4	0.9			0	10.40	10.43	3	2	10.45	10.46	1	8	3	0.3	
35P600048	D 6	04/09/1991	19	2610	8	S	24	60	20	16	12	1.3	3	0.3			0	10.42	10.44	2	2	10.45	10.46	1	8	3	0.3	
35P600049	D 7	04/09/1991	19	2480	11	S	24	64	20	16	14	1.6	4	0.5			0	10.48	10.50	2	2	10.51	10.52	1	8	3	0.3	
35P600050	A17	04/09/1991	19	2478	11	S	24	64	20	17	12	1.4	4	0.5			0	10.46	10.48	2	2	10.51	10.52	1	8	3	0.3	
35P600051	G 7	04/09/1991	19	2472	11	S	24	64	20	14	11	1.1	4	0.4			0	10.44	10.47	3	2	10.51	10.52	1	8	3	0.3	
35P600052	G 8	04/09/1991	19	842	10	S	24	64	20	28	19	3.7	3	0.9			0	10.59	11.02	3	2	11.26	11.28	2	8	9	0.2	
35P600053	A18	04/09/1991	19	825	10	S	24	64	20	22	19	2.9	3	0.7			0	11.12	11.14	2	2	11.26	11.28	2	8	9	0.2	
35P600054	D 8	04/09/1991	19	820	10	S	24	64	20	38	19	5.0	3	1.3			0	11.06	11.09	3	2	11.26	11.28	2	8	9	0.2	
35P600055	D 9	04/09/1991	19	812	10	S	24	64	20	22	22	3.4	4	1.1			0	11.08	11.10	2	2	11.26	11.28	2	8	9	0.2	
35P600056	A19	04/09/1991	19	805	10	S	24	64	20	12	14	1.2	3	0.3			0	11.16	11.19	3	2	11.26	11.28	2	8	9	0.2	
35P600057	G 9	04/09/1991	19	802	9	S	24	64	20	27	13	2.4	4	0.8			0	11.11	11.13	2	2	11.26	11.28	2	8	9	0.2	
35P600058	G10	04/09/1991	19	788	9	S	24	58	20	21	16	2.3	4	0.8			0	11.13	11.15	2	2	11.26	11.28	2	8	9	0.2	
35P600059	A20	04/09/1991	19	786	9	S	24	58	20	19	17	2.2	5	0.9			0	11.23	11.25	2	2	11.26	11.28	2	8	9	0.2	
35P600060	D10	04/09/1991	19	782	9	S	24	58	20	17	23	2.7	4	0.9			0	11.18	11.20	2	2	11.26	11.28	2	8	9	0.2	
Average	D											2.6		0.8			0.0			2.2							0.5	
	A											2.2		0.6			0.0			2.5							0.5	
	G											2.7		0.8			0.0			2.3							0.5	

Table B-3. Summary of installation data for Rt. 518, Las Vegas, New Mexico (continued)
UPM (semi-perm.) (C), Control (A), and UPM (edge seal) (B)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
35P600061	C 1	04/10/1991	20	4032	6	S	24	65	20	34	14	3.3	4	1.1	9.48	9.49	1	9.49	9.54	5	4	9.54	9.56	2	7	1	2.0	
35P600062	A21	04/10/1991	20	4022	6	S	24	64	20	21	16	2.3	4	0.8			0	11.33	11.35	2	3	11.38	11.39	1	8	2	0.5	
35P600063	B 1	04/10/1991	20	4012	6	S	24	64	20	21	16	2.3	5	1.0			0	11.34	11.37	3	3	11.38	11.39	1	8	2	0.5	
35P600064	B 2	04/10/1991	20	3962	7	S	24	64	20	22	14	2.1	4	0.7			0	11.42	11.44	2	3	11.47	11.49	2	7	4	0.5	
35P600065	A22	04/10/1991	20	3957	7	S	24	64	20	21	17	2.5	4	0.8			0	11.43	11.45	2	3	11.47	11.49	2	7	4	0.5	
35P600066	C 2	04/10/1991	20	3948	7	S	24	64	20	22	13	2.0	4	0.7	9.58	9.59	1	9.59	10.01	2	4	10.02	10.04	2	9	2	1.0	
35P600067	C 3	04/10/1991	20	3932	7	S	24	64	20	18	14	1.8	4	0.6	9.58	9.59	1	10.01	10.02	1	4	10.02	10.04	2	7	2	1.0	
35P600068	A23	04/10/1991	20	3928	7	S	24	64	20	18	18	2.3	4	0.8			0	11.45	11.47	2	3	11.47	11.49	2	7	4	0.5	
35P600069	B 3	04/10/1991	20	3923	7	S	24	64	20	16	15	1.7	4	0.6			0	11.44	11.46	2	3	11.47	11.49	2	7	4	0.5	
35P600070	B 4	04/10/1991	20	3067	9	S	24	64	20	18	13	1.6	5	0.7			0	12.36	12.38	2	3	12.40	12.41	1	8	2	0.5	
35P600071	A24	04/10/1991	20	3064	9	S	24	64	20	18	16	2.0	4	0.7			0	12.38	12.39	1	3	12.40	12.41	1	8	2	0.5	
35P600072	C 4	04/10/1991	20	3059	8	S	24	64	20	23	16	2.6	4	0.9	10.08	10.09	1	10.09	10.11	2	4	10.12	10.13	1	6	1	1.0	
35P600073	C 5	04/10/1991	20	1694	8	S	24	64	20	39	16	4.3	5	1.8	10.15	10.16	1	10.16	10.17	1	4	10.19	10.20	1	7	1	1.0	
35P600074	A25	04/10/1991	20	1688	8	S	24	64	20	23	20	3.2	3	0.8			0	13.44	13.47	3	3	13.49	13.51	2	8	1	2.0	
35P600075	B 5	04/10/1991	20	1685	8	S	24	64	20	20	12	1.7	2	0.3			0	12.47	12.49	2	3	12.49	12.51	2	8	1	2.0	
35P600076	B 6	04/10/1991	20	1207	8	S	24	64	20	22	17	2.6	4	0.9			0	12.58	12.59	1	3	13.07	13.10	3	8	6	0.5	
35P600077	A26	04/10/1991	20	1200	8	S	24	64	20	29	18	3.6	4	1.2			0	12.59	13.01	2	3	13.07	13.10	3	8	6	0.5	
35P600078	C 6	04/10/1991	20	1186	8	S	24	64	20	20	12	1.7	4	0.6	10.26	10.26	0	10.28	10.30	2	4	10.32	10.34	2	7	3	0.7	
35P600079	C 7	04/10/1991	20	1181	9	S	24	64	20	26	17	3.1	4	1.0	10.26	10.27	1	10.27	10.31	4	4	10.32	10.34	2	7	3	0.7	
35P600080	A27	04/10/1991	20	1177	8	S	24	64	20	21	22	3.2	4	1.1			0	13.02	13.04	2	3	13.07	13.10	3	8	6	0.5	
35P600081	B 7	04/10/1991	20	1172	8	S	24	64	20	22	22	3.4	4	1.1			0	13.03	13.05	2	3	13.07	13.10	3	8	6	0.5	
35P600082	B 8	04/10/1991	20	1166	9	S	24	64	20	28	22	4.3	4	1.4			0	13.04	13.06	2	3	13.07	13.10	3	8	6	0.5	
35P600083	A28	04/10/1991	20	1161	9	S	24	74	20	15	16	1.7	4	0.6			0	13.05	13.07	2	3	13.07	13.10	3	8	6	0.5	
35P600084	C 8	04/10/1991	20	1158	9	S	24	64	60	21	14	2.0	4	0.7	10.27	10.27	0	10.29	10.32	3	4	10.32	10.34	2	7	3	0.7	
35P600085	C 9	04/10/1991	20	1051	9	S	24	64	20	18	15	1.9	5	0.8	10.35	10.37	2	10.37	10.40	3	4	10.40	10.41	1	7	1	1.0	
35P600086	A29	04/10/1991	20	1046	9	S	24	74	20	15	16	1.7	4	0.6			0	13.15	13.17	2	3	13.20	13.21	1	8	2	0.5	
35P600087	B 9	04/10/1991	20	1043	9	S	24	74	20	18	14	1.8	5	0.7			0	13.17	13.20	3	3	13.20	13.21	1	8	2	0.5	
35P600088	B10	04/10/1991	20	656	11	S	24	74	20	22	15	2.3	5	1.0			0	13.25	13.27	2	3	13.29	13.31	2	8	2	1.0	
35P600089	A30	04/10/1991	20	645	11	S	24	74	20	24	15	2.5	5	1.0			0	13.27	13.29	2	3	13.29	13.31	2	8	2	1.0	
35P600090	C10	04/10/1991	20	639	11	S	24	64	20	15	16	1.7	4	0.6	10.42	10.43	1	10.44	10.46	2	4	10.47	10.48	1	7	1	1.0	
Average	C											2.4		0.9			0.9			2.5							1.0	
	A											2.5		0.8			0.0			2.0							0.7	
	B											2.4		0.8			0.0			2.1							0.7	

Table B-3. Summary of installation data for Rt. 518, Las Vegas, New Mexico (continued) Perma-Patch (H), Control (A), and QPR 2000 (I)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
35P600091	H 1	04/11/1991	21	1242	7	S	24	60	20	21	22	3.2	6	1.6			0	9.04	9.07	3	2	9.19	9.25	6	8	6	1.0
35P600092	A31	04/11/1991	21	1235	6	S	24	60	20	23	17	2.7	4	0.9			0	9.07	9.09	2	2	9.19	9.25	6	8	6	1.0
35P600093	I 1	04/11/1991	21	1219	6	S	24	61	20	26	15	2.7	3	0.7			0	9.06	9.10	4	2	9.19	9.25	6	8	6	1.0
35P600094	I 2	04/11/1991	21	1164	6	S	24	61	20	24	14	2.3	3	0.6			0	9.16	9.19	3	2	9.19	9.25	6	8	6	1.0
35P600095	A32	04/11/1991	21	1159	6	S	24	61	20	26	14	2.5	4	0.8			0	9.11	9.14	3	2	9.19	9.25	6	8	6	1.0
35P600096	H 2	04/11/1991	21	1154	6	S	24	61	20	24	13	2.2	4	0.7			0	9.15	9.18	3	2	9.19	9.25	6	8	6	1.0
35P600097	H 3	04/11/1991	21	524	6	S	24	61	20	25	13	2.3	3	0.6			0	9.48	9.51	3	2	10.10	10.14	4	8	9	0.4
35P600098	A33	04/11/1991	21	516	6	S	24	64	20	21	15	2.2	4	0.7			0	9.50	9.52	2	2	10.10	10.14	4	8	9	0.4
35P600099	I 3	04/11/1991	21	510	6	S	24	64	20	18	14	1.8	5	0.7			0	9.51	9.53	2	2	10.10	10.14	4	8	9	0.4
35P600100	I 4	04/11/1991	21	504	6	S	24	64	20	29	18	3.6	4	1.2			0	9.56	9.59	3	2	10.10	10.14	4	8	9	0.4
35P600101	A34	04/11/1991	21	498	6	S	24	64	20	21	16	2.3	3	0.6			0	9.57	9.59	2	2	10.10	10.14	4	8	9	0.4
35P600102	H 4	04/11/1991	21	479	6	S	24	64	20	21	16	2.3	4	0.8			0	10.00	10.02	2	2	10.10	10.14	4	8	9	0.4
35P600103	H 5	04/11/1991	21	475	6	S	24	64	20	21	18	2.6	4	0.9			0	10.04	10.06	2	2	10.10	10.14	4	8	9	0.4
35P600104	A35	04/11/1991	21	469	6	S	24	63	20	26	18	3.3	4	1.1			0	10.03	10.05	2	2	10.10	10.14	4	8	9	0.4
35P600105	I 5	04/11/1991	21	465	6	S	24	63	20	26	15	2.7	4	0.9			0	10.05	10.08	3	2	10.10	10.14	4	8	9	0.4
35P600106	I 6	04/11/1991	21	267	6	S	24	63	20	25	17	3.0	2	0.5			0	10.38	10.41	3	2	10.42	10.45	3	8	3	1.0
35P600107	A36	04/11/1991	21	252	6	S	24	63	20	21	15	2.2	2	0.4			0	10.37	10.39	2	2	10.42	10.45	3	8	3	1.0
35P600108	H 6	04/11/1991	21	247	6	S	24	63	20	20	15	2.1	2	0.3			0	10.40	10.42	2	2	10.42	10.45	3	8	3	1.0
35P600109	H 7	04/11/1991	21	152	6	S	24	63	20	23	17	2.7	4	0.9			0	10.49	10.51	2	2	10.58	11.01	3	8	3	1.0
35P600110	A37	04/11/1991	21	149	6	S	24	63	20	26	18	3.3	4	1.1			0	10.51	10.54	3	2	10.58	11.01	3	8	3	1.0
35P600111	I 7	04/11/1991	21	140	6	S	24	63	20	35	17	4.1	4	1.4			0	10.53	10.56	3	2	10.58	11.01	3	8	3	1.0
35P600112	I 8	04/11/1991	20	5010	6	S	24	63	20	26	17	3.1	1	0.3			0	11.19	11.21	2	2	11.40	11.44	4	8	6	0.7
35P600113	A38	04/11/1991	20	5003	6	S	24	63	20	21	14	2.0	2	0.3			0	11.21	11.23	2	2	11.40	11.44	4	8	6	0.7
35P600114	H 8	04/11/1991	20	4998	6	S	24	63	20	31	16	3.4	3	0.9			0	11.21	11.24	3	2	11.40	11.44	4	8	6	0.7
35P600115	H 9	04/11/1991	20	4966	6	S	24	63	20	24	16	2.7	4	0.9			0	11.28	11.30	2	2	11.40	11.44	4	8	6	0.7
35P600116	A39	04/11/1991	20	4960	6	S	24	63	20	23	15	2.4	3	0.6			0	11.27	11.30	3	2	11.40	11.44	4	8	6	0.7
35P600117	I 9	04/11/1991	20	4947	6	S	24	62	20	28	16	3.1	4	1.0			0	11.30	11.38	8	2	11.40	11.44	4	8	6	0.7
35P600118	I10	04/11/1991	20	4507	6	S	24	62	20	27	18	3.4	4	1.1			0	12.03	12.05	2	2	12.07	12.09	2	8	3	0.7
35P600119	A40	04/11/1991	20	4498	6	S	24	62	20	24	18	3.0	4	1.0			0	12.04	12.07	3	2	12.07	12.09	2	8	3	0.7
35P600120	H10	04/11/1991	20	4482	6	S	24	67	20	25	19	3.3	4	1.1			0	12.00	12.02	2	2	12.07	12.09	2	8	3	0.7
Average	H											2.7		0.9			0.0			2.4							0.7
	A											2.6		0.8			0.0			2.4							0.7
	I											3.0		0.8			0.0			3.3							0.7

Table B-3. Summary of installation data for Rt. 518, Las Vegas, New Mexico (continued) Control (A) and Spray injection (J)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
35P600121	A41	05/21/1991	21	1500	6	S	24	45	50	31	16	3.4	3	0.9			0	10.03	10.05	2	3	10.11	10.15	4	8	4	1.0	
35P600122	J 1	05/21/1991	21	1493	6	S	24	45	50	26	17	3.1	4	1.0			0	10.20	10.23	3	2			0	0	0		
35P600123	A42	05/21/1991	21	1479	5	S	24	45	50	32	19	4.2	4	1.4			0	10.06	10.08	2	3	10.11	10.15	4	8	4	1.0	
35P600124	J 2	05/21/1991	21	1469	5	S	24	45	50	32	17	3.8	4	1.3			0	10.24	10.26	2	2			0	0	0		
35P600125	A43	05/21/1991	21	1372	5	S	24	45	50	28	13	2.5	5	1.1			0	10.08	10.09	1	3	10.11	10.15	4	8	4	1.0	
35P600126	J 3	05/21/1991	21	1367	5	S	24	45	50	27	14	2.6	4	0.9			0	10.28	10.31	3	2			0	0	0		
35P600127	A44	05/21/1991	21	1362	5	S	24	45	50	35	14	3.4	5	1.4			0	10.10	10.11	1	3	10.11	10.15	4	8	4	1.0	
35P600128	J 4	05/21/1991	21	1357	5	S	24	45	50	31	12	2.6	5	1.1			0	10.32	10.34	2	2			0	0	0		
35P600129	A45	05/21/1991	21	1348	5	S	24	45	50	33	12	2.8	5	1.1			0	10.17	10.19	2	3	10.24	10.26	2	8	3	0.7	
35P600130	J 5	05/21/1991	21	1338	5	S	24	45	50	34	14	3.3	4	1.1			0	10.35	10.38	3	2			0	0	0		
35P600131	A46	05/21/1991	21	1324	5	S	24	45	50	27	13	2.4	4	0.8			0	10.20	10.22	2	3	10.24	10.26	2	8	3	0.7	
35P600132	J 6	05/21/1991	21	1318	5	S	24	45	50	31	15	3.2	5	1.3			0	10.40	10.42	2	2			0	0	0		
35P600133	A47	05/21/1991	21	1295	6	S	24	45	50	25	18	3.1	4	1.0			0	10.22	10.24	2	2	10.24	10.26	2	8	3	0.7	
35P600134	J 7	05/21/1991	21	1290	6	S	24	45	50	28	15	2.9	4	1.0			0	10.45	10.48	3	2			0	0	0		
35P600135	A48	05/21/1991	21	1280	7	S	24	45	50	31	18	3.9	5	1.6			0	10.28	10.30	2	3	10.39	10.41	2	8	3	0.7	
35P600136	J 8	05/21/1991	21	1274	6	S	24	45	50	34	19	4.5	4	1.5			0	10.59	11.02	3	2			0	0	0		
35P600137	A49	05/21/1991	21	1267	6	S	24	45	50	27	20	3.8	4	1.3			0	10.35	10.37	2	3	10.39	10.41	2	8	3	0.7	
35P600138	J 9	05/21/1991	21	1260	6	S	24	45	50	40	18	5.0	4	1.7			0	11.10	11.13	3	2			0	0	0		
35P600139	A50	05/21/1991	21	1253	6	S	24	45	50	38	18	4.8	5	2.0			0	10.37	10.39	2	3	10.39	10.41	2	8	3	0.7	
35P600140	J10	05/21/1991	21	1248	6	S	24	45	50	26	19	3.4	4	1.1			0	11.17	11.20	3	2			0	0	0		
Average	A											3.4		1.3			0.0			1.8							0.8	
	J											3.4		1.2			0.0			2.7							0.0	

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon PennDOT 485 (D), Control (A), and QPR 2000 (I)

Patch ID	Matl	#	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800001	D	1	02/05/1992	270	4285		N	24	35	20	18	24	3.0	2	0.5			0	8.58	8.59	1		9.13	9.18	5		14	0.4	
41P800002	A	1	02/06/1992	270	4278		N	24	40	15	24	16	2.7	2	0.4			0	11.21	11.22	1		11.41	11.47	6		16	0.4	
41P800003	I	1	02/05/1992	270	4273		N	24	35	20	16	27	3.0	2	0.5			0	8.59	9.00	1		9.13	9.18	5		14	0.4	
41P800004	I	2	02/05/1992	270	4258		N	24	35	20	15	28	2.9	2	0.5			0	9.00	9.01	1		9.13	9.18	5		14	0.4	
41P800005	A	2	02/06/1992	270	4253		N	24	40	15	22	20	3.1	2	0.5			0	11.22	11.23	1		11.41	11.47	6		16	0.4	
41P800006	D	2	02/05/1992	270	4249		N	24	35	20	23	24	3.8	3	1.0			0	9.00	9.02	2		9.13	9.18	5		14	0.4	
41P800007	D	3	02/05/1992	270	4239		N	24	35	20	18	24	3.0	2	0.5			0	9.02	9.03	1		9.13	9.18	5		14	0.4	
41P800008	A	3	02/06/1992	270	4228		N	24	40	15	14	22	2.1	3	0.5			0	11.23	11.24	1		11.41	11.47	6		16	0.4	
41P800009	I	3	02/05/1992	270	4217		N	24	35	20	19	33	4.4	3	1.1			0	9.02	9.04	2		9.13	9.18	5		14	0.4	
41P800010	I	4	02/05/1992	270	4204		N	24	35	20	20	34	4.7	3	1.2			0	9.04	9.05	1		9.13	9.18	5		14	0.4	
41P800011	A	4	02/06/1992	270	4196		N	24	40	15	16	18	2.0	2	0.3			0	11.24	11.25	1		11.41	11.47	6		16	0.4	
41P800012	D	4	02/05/1992	270	4190		N	24	35	20	21	26	3.8	2	0.6			0	9.06	9.07	1		9.13	9.18	5		14	0.4	
41P800013	D	5	02/05/1992	270	4170		N	24	35	20	19	21	2.8	2	0.5			0	9.08	9.09	1		9.13	9.18	5		14	0.4	
41P800014	A	5	02/06/1992	270	4156		N	24	40	15	16	16	1.8	2	0.3			0	11.25	11.26	1		11.41	11.47	6		16	0.4	
41P800015	I	5	02/05/1992	270	4146		N	24	35	20	22	16	2.4	2	0.4			0	9.05	9.07	2		9.13	9.18	5		14	0.4	
41P800016	I	6	02/05/1992	270	4131		N	24	35	20	21	26	3.8	2	0.6			0	9.07	9.08	1		9.13	9.18	5		14	0.4	
41P800017	A	6	02/06/1992	270	4115		N	24	40	15	14	16	1.6	2	0.3			0	11.26	11.27	1		11.41	11.47	6		16	0.4	
41P800018	D	6	02/05/1992	270	4097		N	24	35	20	18	24	3.0	2	0.5			0	9.10	9.11	1		9.13	9.18	5		14	0.4	
41P800019	D	7	02/05/1992	270	4088		N	24	35	20	21	30	4.4	2	0.7			0	9.11	9.12	1		9.13	9.18	5		14	0.4	
41P800020	A	7	02/06/1992	270	4081		N	24	40	15	16	18	2.0	3	0.5			0	11.27	11.28	1		11.41	11.47	6		16	0.4	
41P800021	I	7	02/05/1992	270	4075		N	24	35	20	20	28	3.9	2	0.6			0	9.12	9.13	1		9.13	9.18	5		14	0.4	
41P800022	I	8	02/06/1992	270	4039		N	24	40	15	14	18	1.8	1	0.1			0	11.34	11.35	1		11.41	11.47	6		16	0.4	
41P800023	A	8	02/06/1992	270	4029		N	24	40	15	16	20	2.2	2	0.4			0	11.28	11.29	1		11.41	11.47	6		16	0.4	
41P800024	D	8	02/06/1992	270	4016		N	24	40	15	18	20	2.5	2	0.4			0	11.35	11.36	1		11.41	11.47	6		16	0.4	
41P800025	D	9	02/06/1992	270	3989		N	24	40	15	16	18	2.0	3	0.5			0	11.36	11.37	1		11.41	11.47	6		16	0.4	
41P800026	A	9	02/06/1992	270	3965		N	24	40	15	18	22	2.8	2	0.5			0	11.30	11.31	1		11.41	11.47	6		16	0.4	
41P800027	I	9	02/06/1992	270	3956		N	24	40	15	16	20	2.2	2	0.4			0	11.37	11.38	1		11.41	11.47	6		16	0.4	
41P800028	I	10	02/06/1992	270	3948		N	24	40	15	16	22	2.4	2	0.4			0	11.38	11.39	1		11.41	11.47	6		16	0.4	
41P800029	A	10	02/06/1992	270	3939		N	24	40	15	18	22	2.8	1	0.2			0	11.31	11.32	1		11.41	11.47	6		16	0.4	
41P800030	D	10	02/06/1992	270	3924		N	24	40	15	16	20	2.2	2	0.4			0	11.39	11.41	2		11.41	11.47	6		16	0.4	
Average	D												3.0		0.6			0.0			1.2							0.4	
	A												2.3		0.4			0.0			1.0							0.4	
	I												3.2		0.6			0.0			1.2							0.4	

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued)
QPR 2000 (semi-perm.) (L), Control (A), and PennDOT 485 (semi-perm.) (N)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Ladn Width	Temp	Relm Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800031	L 1	02/06/1992	270	3271		N	24	42	20	22	18	2.8	2	0.5	12.50	13.20	70	13.45	13.47	2		14.09	14.20	11		11		1.0
41P800032	A11	02/07/1992	270	3261		N	24	37	15	20	18	2.5	2	0.4			0	13.03	13.04	1		13.52	13.58	6		20		0.3
41P800033	N 1	02/06/1992	270	3250		N	24	42	20	26	18	3.3	3	0.8	12.51	13.21	70	13.47	13.48	1		14.09	14.20	11		11		1.0
41P800034	N 2	02/06/1992	270	3239		N	24	42	20	26	19	3.4	3	0.9	12.52	13.22	70	13.48	13.50	2		14.09	14.20	11		11		1.0
41P800035	A12	02/07/1992	270	3234		N	24	37	15	24	23	3.8	2	0.6			0	13.05	13.06	1		13.52	13.58	6		20		0.3
41P800036	L 2	02/06/1992	270	3222		N	24	42	20	24	19	3.2	2	0.5	12.53	13.23	70	13.51	13.53	2		14.09	14.20	11		11		1.0
41P800037	L 3	02/06/1992	270	3214		N	24	42	20	24	18	3.0	3	0.8	12.54	13.25	71	13.54	13.56	2		14.09	14.20	11		11		1.0
41P800038	A13	02/07/1992	270	3206		N	24	37	15	28	20	3.9	2	0.6			0	13.07	13.08	1		13.52	13.58	6		20		0.3
41P800039	N 3	02/06/1992	270	3197		N	24	42	20	26	18	3.3	3	0.8	12.55	13.26	71	13.57	13.58	1		14.09	14.20	11		11		1.0
41P800040	N 4	02/06/1992	270	3188		N	24	42	20	23	19	3.0	2	0.5	12.56	13.27	71	13.59	14.01	2		14.09	14.20	11		11		1.0
41P800041	A14	02/07/1992	270	3175		N	24	37	15	27	20	3.8	3	0.9			0	13.10	13.11	1		13.52	13.58	6		20		0.3
41P800042	L 4	02/06/1992	270	3163		N	24	42	20	27	18	3.4	3	0.8	12.57	13.28	71	14.01	14.03	2		14.09	14.20	11		11		1.0
41P800043	L 5	02/06/1992	270	3151		N	24	42	20	24	18	3.0	2	0.5	12.59	13.29	70	14.03	14.05	2		14.09	14.20	11		11		1.0
41P800044	A15	02/07/1992	270	3146		N	24	37	15	25	17	3.0	2	0.5			0	13.12	13.14	2		13.52	13.58	6		20		0.3
41P800045	N 5	02/06/1992	270	3134		N	24	42	20	23	19	3.0	3	0.8	13.00	13.30	30	14.06	14.07	1		14.09	14.20	11		11		1.0
41P800046	N 6	02/06/1992	270	3124		N	24	42	20	24	18	3.0	3	0.8	13.02	13.31	29	14.11	14.15	4		14.09	14.20	11		11		1.0
41P800047	A16	02/07/1992	270	3115		N	24	37	15	29	23	4.6	1	0.4			0	13.15	13.16	1		13.52	13.58	6		20		0.3
41P800048	L 6	02/06/1992	270	3103		N	24	42	20	24	18	3.0	3	0.8	13.03	13.32	29	14.07	14.08	1		14.21	14.25	4		2		2.0
41P800049	L 7	02/06/1992	270	3097		N	24	42	20	30	18	3.8	2	0.6	13.04	13.33	29	14.08	14.10	2		14.21	14.25	4		2		2.0
41P800050	A17	02/07/1992	270	3091		N	24	37	15	24	21	3.5	2	0.6			0	13.17	13.18	1		13.52	13.58	6		20		0.3
41P800051	N 7	02/06/1992	270	3086		N	24	42	20	28	18	3.5	2	0.6	13.05	13.34	29	14.23	14.24	1		14.30	14.37	7		4		1.7
41P800052	N 8	02/06/1992	270	3078		N	24	42	20	23	19	3.0	2	0.5	13.06	13.35	29	14.25	14.26	1		14.30	14.37	7		4		1.7
41P800053	A18	02/07/1992	270	3071		N	24	37	15	25	22	3.8	2	0.6			0	13.19	13.21	2		13.52	13.58	6		20		0.3
41P800054	L 8	02/06/1992	270	3063		N	24	42	20	23	19	3.0	3	0.8	13.07	13.36	29	14.11	14.12	1		14.30	14.37	7		4		1.7
41P800055	L 9	02/06/1992	270	3057		N	24	42	20	25	18	3.1	3	0.8	13.08	13.38	30	14.13	14.14	1		14.30	14.37	7		4		1.7
41P800056	A19	02/07/1992	270	3050		N	24	37	15	23	22	3.5	2	0.6			0	13.22	13.23	1		13.52	13.58	6		20		0.3
41P800057	N 9	02/06/1992	270	3040		N	24	42	20	26	18	3.3	3	0.8	13.09	13.40	31	14.35	14.37	2		14.37	14.39	2		1		2.0
41P800058	N10	02/06/1992	270	3032		N	24	42	20	23	18	2.9	3	0.7	13.10	13.41	31	14.38	14.41	3		14.41	14.43	2		1		2.0
41P800059	A20	02/07/1992	270	3025		N	24	37	15	26	22	4.0	2	0.7			0	13.24	13.26	2		13.52	13.58	6		20		0.3
41P800060	L10	02/06/1992	270	3016		N	24	42	20	24	19	3.2	3	0.8	13.11	13.43	32	14.41	14.44	3		14.44	14.46	2		1		2.0
Average	L											3.1		0.7			50.1			1.8								1.4
	A											3.6		0.6			0.0			1.3								0.3
	N											3.2		0.7			46.1			1.8								1.3

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued)
UPM (semi-perm.) (C) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800061	A21	02/07/1992	270	2999		N	24	37	15	28	23	4.5	1	0.4			0	13.30	13.31	1		13.52	13.58	6		20	0.3	
41P800062	C 1	02/06/1992	270	2990		N	24	42	20	23	18	2.9	3	0.7	15.00	15.12	12	15.28	15.30	2		15.37	15.39	2		2	1.0	
41P800063	C 2	02/06/1992	270	2979		N	24	42	20	24	28	4.7	3	1.2	15.01	15.14	13	15.30	15.31	1		15.37	15.39	2		2	1.0	
41P800064	A22	02/07/1992	270	2965		N	24	37	15	20	18	2.5	2	0.4			0	13.32	13.34	2		13.52	13.58	6		20	0.3	
41P800065	A23	02/07/1992	270	2956		N	24	37	15	16	24	2.7	2	0.4			0	13.35	13.36	1		13.52	13.58	6		20	0.3	
41P800066	C 3	02/06/1992	270	2941		N	24	42	20	24	19	3.2	3	0.8	15.02	15.15	13	15.32	15.33	1		15.39	15.42	3		2	1.5	
41P800067	C 4	02/06/1992	270	2934		N	24	42	20	25	19	3.3	3	0.8	15.03	15.16	13	15.33	15.34	1		15.39	15.42	3		2	1.5	
41P800068	A24	02/07/1992	270	2920		N	24	37	15	24	16	2.7	2	0.4			0	13.39	13.40	1		13.52	13.58	6		20	0.3	
41P800069	A25	02/07/1992	270	2913		N	24	37	15	20	19	2.6	2	0.4			0	13.45	13.46	1		13.52	13.58	6		20	0.3	
41P800070	C 5	02/06/1992	270	2900		N	24	42	20	27	18	3.4	3	0.8	15.05	15.17	12	15.34	15.36	2		15.42	15.44	2		2	1.0	
41P800071	C 6	02/06/1992	270	2893		N	24	42	20	23	19	3.0	3	0.8	15.06	15.19	13	15.36	15.37	1		15.42	15.44	2		2	1.0	
41P800072	A26	02/07/1992	270	2878		N	24	37	15	20	18	2.5	2	0.4			0	13.47	13.48	1		13.52	13.58	6		20	0.3	
41P800073	A27	02/07/1992	270	2871		N	24	37	15	24	21	3.5	3	0.9			0	13.47	13.48	1		13.52	13.58	6		20	0.3	
41P800074	C 7	02/06/1992	270	2854		N	24	42	20	26	18	3.3	3	0.8	15.08	15.20	12	15.37	15.39	2		15.44	15.45	1		2	0.5	
41P800075	C 8	02/06/1992	270	2845		N	24	42	20	27	19	3.6	3	0.9	15.09	15.22	13	15.40	15.42	2		15.44	15.45	1		2	0.5	
41P800076	A28	02/07/1992	270	2820		N	24	37	15	20	22	3.1	3	0.8			0	13.48	13.50	2		13.52	13.58	6		20	0.3	
41P800077	A29	02/07/1992	270	2804		N	24	37	15	23	17	2.7	3	0.7			0	13.49	13.50	1		13.52	13.58	6		20	0.3	
41P800078	C 9	02/06/1992	270	2778		N	24	42	20	29	18	3.6	3	0.9	15.10	15.23	13	15.42	15.45	3		15.45	15.47	2		1	2.0	
41P800079	C10	02/06/1992	270	2758		N	24	42	20	24	19	3.2	3	0.8	15.11	15.24	13	15.46	15.48	2		15.48	15.50	2		1	2.0	
41P800080	A30	02/07/1992	270	2729		N	24	37	15	22	23	3.5	3	0.9			0	13.50	13.51	1		13.52	13.58	6		20	0.3	
Average	A											3.0					0.0			1.2							0.3	
	C											3.4					12.7			1.7							1.2	

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued) Perma-Patch (H), Control (A), and HFMS-2 (G)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800081	H 1	02/08/1992	265	2429		N	24	32	20	24	21	3.5	2	0.6			0	11.03	11.04	1		11.33	11.38	5		30		0.2
41P800082	A31	02/08/1992	265	2416		N	24	32	20	22	22	3.4	2	0.6			0	10.46	10.47	1		11.33	11.38	5		30		0.2
41P800083	G 1	02/08/1992	265	2397		N	24	32	20	26	20	3.6	2	0.6			0	11.04	11.05	1		11.33	11.38	5		30		0.2
41P800084	G 2	02/08/1992	265	2381		N	24	32	20	25	22	3.8	2	0.6			0	11.05	11.07	2		11.33	11.38	5		30		0.2
41P800085	A32	02/08/1992	265	2361		N	24	32	20	27	20	3.8	2	0.6			0	10.47	10.48	1		11.33	11.38	5		30		0.2
41P800086	H 2	02/08/1992	265	2354		N	24	32	20	24	21	3.5	2	0.6			0	11.06	11.08	2		11.33	11.38	5		30		0.2
41P800087	H 3	02/08/1992	265	2346		N	24	32	20	27	19	3.6	2	0.6			0	11.06	11.08	2		11.33	11.38	5		30		0.2
41P800088	A33	02/08/1992	265	2340		N	24	32	20	39	20	5.4	2	0.9			0	10.48	10.50	2		11.33	11.38	5		30		0.2
41P800089	G 3	02/08/1992	265	2323		N	24	32	20	29	26	5.2	2	0.9			0	11.09	11.10	1		11.33	11.38	5		30		0.2
41P800090	G 4	02/08/1992	265	2289		N	24	32	20	26	26	4.7	2	0.8			0	11.11	11.13	2		11.33	11.38	5		30		0.2
41P800091	A34	02/08/1992	265	2270		N	24	32	20	21	15	2.2	1	0.2			0	10.50	10.51	1		11.33	11.38	5		30		0.2
41P800092	H 4	02/08/1992	265	2260		N	24	32	20	30	24	5.0	1	0.4			0	11.13	11.14	1		11.33	11.38	5		30		0.2
41P800093	H 5	02/08/1992	265	2240		N	24	32	20	26	19	3.4	2	0.6			0	11.15	11.16	1		11.33	11.38	5		30		0.2
41P800094	A35	02/08/1992	265	2234		N	24	32	20	25	19	3.3	2	0.5			0	10.51	10.52	1		11.33	11.38	5		30		0.2
41P800095	G 5	02/08/1992	265	2222		N	24	32	20	24	21	3.5	1	0.3			0	11.14	11.16	2		11.33	11.38	5		30		0.2
41P800096	G 6	02/08/1992	265	2210		N	24	32	20	27	18	3.4	2	0.6			0	11.16	11.17	1		11.33	11.38	5		30		0.2
41P800097	A36	02/08/1992	265	2193		N	24	32	20	26	18	3.3	2	0.5			0	10.52	10.53	1		11.33	11.38	5		30		0.2
41P800098	H 6	02/08/1992	265	2179		N	24	32	20	26	18	3.3	2	0.5			0	11.18	11.19	1		11.33	11.38	5		30		0.2
41P800099	H 7	02/08/1992	265	2160		N	24	32	20	26	22	4.0	2	0.7			0	11.19	11.21	2		11.33	11.38	5		30		0.2
41P800100	A37	02/08/1992	265	2140		N	24	32	20	27	16	3.0	2	0.5			0	10.54	10.55	1		11.33	11.38	5		30		0.2
41P800101	G 7	02/08/1992	265	2122		N	24	32	20	35	17	4.1	2	0.7			0	11.23	11.24	1		11.33	11.38	5		30		0.2
41P800102	G 8	02/08/1992	265	2096		N	24	32	20	27	16	3.0	2	0.5			0	11.25	11.26	1		11.33	11.38	5		30		0.2
41P800103	A38	02/08/1992	265	2083		N	24	32	20	28	18	3.5	1	0.3			0	10.56	10.57	1		11.33	11.38	5		30		0.2
41P800104	H 8	02/08/1992	265	2068		N	24	32	20	26	20	3.6	1	0.3			0	11.26	11.28	2		11.33	11.38	5		30		0.2
41P800105	H 9	02/08/1992	265	2052		N	24	32	20	20	18	2.5	2	0.4			0	11.28	11.29	1		11.33	11.38	5		30		0.2
41P800106	A39	02/08/1992	265	2042		N	24	32	20	20	20	2.8	2	0.5			0	10.57	10.58	1		11.33	11.38	5		30		0.2
41P800107	G 9	02/08/1992	265	2031		N	24	32	20	21	19	2.8	2	0.5			0	11.30	11.31	1		11.33	11.38	5		30		0.2
41P800108	G10	02/08/1992	265	2010		N	24	32	20	23	18	2.9	2	0.5			0	11.31	11.32	1		11.33	11.38	5		30		0.2
41P800109	A40	02/08/1992	265	1996		N	24	32	20	28	18	3.5	2	0.6			0	10.58	10.59	1		11.33	11.38	5		30		0.2
41P800110	H10	02/08/1992	265	1981		N	24	32	20	21	14	2.0	1	0.2			0	11.31	11.32	1		11.33	11.38	5		30		0.2
Average	H											3.4		0.5			0.0			1.4								0.2
	A											3.4		0.5			0.0			1.1								0.2
	G											3.7		0.6			0.0			1.3								0.2

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued)
Local material (F), Control (A), and PennDOT 486 (E)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800111	F 1	02/08/1992	265	1971		N	24	42	25	32	16	3.6	1	0.3			0	14.10	14.11	1		15.33	15.41	8		30		0.3
41P800112	A41	02/08/1992	265	1952		N	24	42	25	24	21	3.5	2	0.6			0	14.04	14.05	1		15.33	15.41	8		30		0.3
41P800113	E 1	02/08/1992	265	1943		N	24	42	25	27	13	2.4	2	0.4			0	14.11	14.12	1		15.33	15.41	8		30		0.3
41P800114	E 2	02/08/1992	265	1936		N	24	42	25	29	21	4.2	2	0.7			0	14.12	14.13	1		15.33	15.41	8		30		0.3
41P800115	A42	02/08/1992	265	1910		N	24	42	25	27	17	3.2	2	0.5			0	14.08	14.09	1		15.33	15.41	8		30		0.3
41P800116	F 2	02/08/1992	265	1892		N	24	42	25	22	18	2.8	1	0.2			0	14.13	14.14	1		15.33	15.41	8		30		0.3
41P800117	F 3	02/08/1992	265	1829		N	24	42	25	29	26	5.2	1	0.4			0	14.25	14.26	1		15.33	15.41	8		30		0.3
41P800118	A43	02/08/1992	265	1806		N	24	42	25	26	24	4.3	2	0.7			0	14.30	14.31	1		15.33	15.41	8		30		0.3
41P800119	E 3	02/08/1992	265	1784		N	24	42	25	13	21	1.9	2	0.3			0	14.26	14.27	1		15.33	15.41	8		30		0.3
41P800120	E 4	02/08/1992	265	1752		N	24	42	25	18	22	2.8	1	0.2			0	14.27	14.29	2		15.33	15.41	8		30		0.3
41P800121	A44	02/08/1992	265	1745		N	24	42	25	24	20	3.3	1	0.3			0	14.32	14.33	1		15.33	15.41	8		30		0.3
41P800122	F 4	02/08/1992	265	1724		N	24	42	25	31	23	5.0	1	0.4			0	14.29	14.30	1		15.33	15.41	8		30		0.3
41P800123	F 5	02/08/1992	265	1704		N	24	42	25	21	18	2.6	1	0.2			0	14.52	14.53	1		15.33	15.41	8		30		0.3
41P800124	A45	02/08/1992	265	1692		N	24	42	25	28	23	4.5	1	0.4			0	14.56	14.57	1		15.33	15.41	8		30		0.3
41P800125	E 5	02/08/1992	265	1678		N	24	42	25	20	23	3.2	1	0.3			0	14.53	14.55	2		15.33	15.41	8		30		0.3
41P800126	E 6	02/08/1992	265	1661		N	24	42	25	18	22	2.8	2	0.5			0	14.58	14.59	1		15.33	15.41	8		30		0.3
41P800127	A46	02/08/1992	265	1647		N	24	42	25	22	18	2.8	1	0.2			0	15.00	15.01	1		15.33	15.41	8		30		0.3
41P800128	F 6	02/08/1992	265	1627		N	24	42	25	21	17	2.5	1	0.2			0	15.00	15.01	1		15.33	15.41	8		30		0.3
41P800129	F 7	02/08/1992	265	1620		N	24	42	25	23	19	3.0	2	0.5			0	15.32	15.33	1		15.33	15.41	8		30		0.3
41P800130	A47	02/08/1992	265	1608		N	24	42	25	23	24	3.8	1	0.3			0	15.24	15.25	1		15.33	15.41	8		30		0.3
41P800131	E 7	02/08/1992	265	1598		N	24	42	25	17	20	2.4	1	0.2			0	15.31	15.32	1		15.33	15.41	8		30		0.3
41P800132	E 8	02/08/1992	265	1588		N	24	42	25	24	23	3.8	1	0.3			0	15.30	15.31	1		15.33	15.41	8		30		0.3
41P800133	A48	02/08/1992	265	1574		N	24	42	25	28	21	4.1	1	0.3			0	15.26	15.28	2		15.33	15.41	8		30		0.3
41P800134	F 8	02/08/1992	265	1558		N	24	42	25	24	26	4.3	2	0.7			0	15.29	15.30	1		15.33	15.41	8		30		0.3
41P800135	F 9	02/08/1992	265	1548		N	24	42	25	21	25	3.6	2	0.6			0	15.28	15.29	1		15.33	15.41	8		30		0.3
41P800136	A49	02/08/1992	265	1529		N	24	42	25	20	22	3.1	1	0.3			0	15.28	15.29	1		15.33	15.41	8		30		0.3
41P800137	E 9	02/08/1992	265	1521		N	24	42	25	22	21	3.2	1	0.3			0	15.27	15.28	1		15.33	15.41	8		30		0.3
41P800138	E10	02/08/1992	265	1501		N	24	42	25	21	21	3.1	1	0.3			0	15.26	15.27	1		15.33	15.41	8		30		0.3
41P800139	A50	02/08/1992	265	1485		N	24	42	25	25	20	3.5	2	0.6			0	15.30	15.31	1		15.33	15.41	8		30		0.3
41P800140	F10	02/08/1992	265	1461		N	24	42	25	29	16	3.2	1	0.3			0	15.25	15.26	1		15.33	15.41	8		30		0.3
Average	F											3.6		0.4			0.0			1.0								0.3
	A											3.6		0.4			0.0			1.1								0.3
	E											3.0		0.3			0.0			1.2								0.3

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued) UPM (edge seal) (B), Control (A), and Local procedure (X)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800141	B 1	02/09/1992	265	855		N	24	35	30		23	21	3.4	1	0.3			0	10.07	10.08	1		10.16	10.19	3		6		0.5
41P800142	A51	02/09/1992	265	847		N	24	35	30		20	18	2.5	1	0.2			0	10.07	10.08	1		10.16	10.19	3		6		0.5
41P800143	X 1	02/09/1992	265	835		N	24	35	30		43	21	6.3	1	0.5	10.10	10.12	2	10.12	10.15	3		10.16	10.19	3		6		0.5
41P800144	X 2	02/09/1992	265	825		N	24	35	30		22	19	2.9	1	0.2	10.10	10.13	3	10.13	10.15	2		10.16	10.19	3		6		0.5
41P800145	A52	02/09/1992	265	814		N	24	35	30		14	16	1.6	1	0.1			0	10.08	10.09	1		10.16	10.19	3		6		0.5
41P800146	B 2	02/09/1992	265	800		N	24	35	30		15	18	1.9	1	0.2			0	10.09	10.10	1		10.16	10.19	3		6		0.5
41P800147	B 3	02/09/1992	265	771		N	24	35	30		28	19	3.7	1	0.3			0	10.39	10.40	1		10.57	11.02	5		11		0.5
41P800148	A53	02/09/1992	265	759		N	24	35	30		19	20	2.6	1	0.2			0	10.40	10.41	1		10.57	11.02	5		11		0.5
41P800149	X 3	02/09/1992	265	730		N	24	35	30		23	19	3.0	1	0.3	10.42	10.44	2	10.44	10.45	1		10.57	11.02	5		11		0.5
41P800150	X 4	02/09/1992	265	705		N	24	35	30		26	17	3.1	1	0.3	10.45	10.46	1	10.46	10.47	1		10.57	11.02	5		11		0.5
41P800151	A54	02/09/1992	265	692		N	24	35	30		19	15	2.0	1	0.2			0	10.51	10.52	1		10.57	11.02	5		11		0.5
41P800152	B 4	02/09/1992	265	686		N	24	35	30		21	14	2.0	1	0.2			0	10.51	10.52	1		10.57	11.02	5		11		0.5
41P800153	B 5	02/09/1992	265	675		N	24	35	30		27	13	2.4	1	0.2			0	10.52	10.53	1		10.57	11.02	5		11		0.5
41P800154	A55	02/09/1992	265	669		N	24	35	30		24	14	2.3	1	0.2			0	10.52	10.54	2		10.57	11.02	5		11		0.5
41P800155	X 5	02/09/1992	265	663		N	24	35	30		21	17	2.5	1	0.2	10.54	10.55	1	10.55	10.56	1		10.57	11.02	5		11		0.5
41P800156	X 6	02/09/1992	265	651		N	24	35	30		16	18	2.0	1	0.2	10.56	10.57	1	10.57	10.58	1		10.57	11.02	5		11		0.5
41P800157	A56	02/09/1992	265	641		N	24	35	30		30	18	3.8	2	0.6			0	10.54	10.55	1		10.57	11.02	5		11		0.5
41P800158	B 6	02/09/1992	265	620		N	24	35	30		22	20	3.1	1	0.3			0	11.05	11.06	1		11.07	11.09	2		3		0.7
41P800159	B 7	02/09/1992	265	608		N	24	35	30		23	22	3.5	1	0.3			0	11.06	11.07	1		11.07	11.09	2		3		0.7
41P800160	A57	02/09/1992	265	597		N	24	35	30		19	20	2.6	1	0.2			0	11.06	11.07	1		11.07	11.09	2		3		0.7
41P800161	X 7	02/09/1992	265	591		N	24	35	30		30	19	4.0	2	0.7	11.08	11.10	2	11.11	11.13	2		11.25	11.27	2		6		0.3
41P800162	X 8	02/09/1992	265	584		N	24	35	30		24	25	4.2	1	0.3	11.10	11.12	2	11.12	11.14	2		11.25	11.27	2		6		0.3
41P800163	A58	02/09/1992	265	578		N	24	35	30		26	19	3.4	1	0.3			0	11.19	11.21	2		11.25	11.27	2		6		0.3
41P800164	B 8	02/09/1992	265	573		N	24	35	30		27	22	4.1	2	0.7			0	11.20	11.21	1		11.25	11.27	2		6		0.3
41P800165	B 9	02/09/1992	265	560		N	24	35	30		21	17	2.5	1	0.2			0	11.20	11.22	2		11.25	11.27	2		6		0.3
41P800166	A59	02/09/1992	265	545		N	24	35	30		23	20	3.2	1	0.3			0	11.22	11.23	1		11.25	11.27	2		6		0.3
41P800167	X 9	02/09/1992	265	536		N	24	35	30		17	18	2.1	2	0.4	11.30	11.31	1	11.31	11.32	1		11.38	11.41	3		4		0.7
41P800168	X10	02/09/1992	265	519		N	24	35	30		18	19	2.4	2	0.4	11.30	11.32	2	11.32	11.33	1		11.38	11.41	3		4		0.7
41P800169	A60	02/09/1992	265	506		N	24	35	30		21	19	2.8	1	0.2			0	11.35	11.36	1		11.38	11.41	3		4		0.7
41P800170	B10	02/09/1992	265	497		N	24	35	30		30	16	3.3	1	0.3			0	11.35	11.36	1		11.38	11.41	3		4		0.7
Average	B												3.0		0.3			0.0			1.1							0.5
	A												2.7		0.3			0.0			1.2							0.5
	X												3.2		0.3			1.7			1.5							0.5

Table B-4. Summary of installation data for US 97, Modoc Point, Oregon (continued)
QPR 2000 (edge-seal) (K), Control (A), and PennDOT 485 (edge-seal) (M)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Relm	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
41P800171	K 1	02/09/1992	265	486		N	24	35	40	23	16	2.6	1	0.2			0	13.35	13.36	1		14.35	14.46	11		30	0.4	
41P800172	A61	02/09/1992	265	479		N	24	35	40	22	14	2.1	1	0.2			0	13.42	13.43	1		14.35	14.46	11		30	0.4	
41P800173	M 1	02/09/1992	265	471		N	24	35	40	20	16	2.2	1	0.2			0	13.37	13.38	1		14.35	14.46	11		30	0.4	
41P800174	M 2	02/09/1992	265	463		N	24	35	40	21	22	3.2	2	0.5			0	13.37	13.38	1		14.35	14.46	11		30	0.4	
41P800175	A62	02/09/1992	265	457		N	24	35	40	22	13	2.0	2	0.3			0	13.43	13.44	1		14.35	14.46	11		30	0.4	
41P800176	K 2	02/09/1992	265	453		N	24	35	40	28	15	2.9	1	0.2			0	13.38	13.39	1		14.35	14.46	11		30	0.4	
41P800177	K 3	02/09/1992	265	449		N	24	35	40	32	17	3.8	1	0.3			0	13.39	13.40	1		14.35	14.46	11		30	0.4	
41P800178	A63	02/09/1992	265	443		N	24	35	40	24	19	3.2	1	0.3			0	13.44	13.46	2		14.35	14.46	11		30	0.4	
41P800179	M 3	02/09/1992	265	438		N	24	35	40	20	20	2.8	1	0.2			0	13.40	13.42	2		14.35	14.46	11		30	0.4	
41P800180	M 4	02/09/1992	265	434		N	24	35	40	17	17	2.0	2	0.3			0	13.53	13.54	1		14.35	14.46	11		30	0.4	
41P800181	A64	02/09/1992	265	425		N	24	35	40	16	17	1.9	2	0.3			0	13.54	13.55	1		14.35	14.46	11		30	0.4	
41P800182	K 4	02/09/1992	265	415		N	24	35	40	23	17	2.7	2	0.5			0	13.55	13.57	2		14.35	14.46	11		30	0.4	
41P800183	K 5	02/09/1992	265	397		N	24	35	40	27	16	3.0	3	0.8			0	13.57	13.59	2		14.35	14.46	11		30	0.4	
41P800184	A65	02/09/1992	265	386		N	24	35	40	22	17	2.6	3	0.6			0	14.03	14.04	1		14.35	14.46	11		30	0.4	
41P800185	M 5	02/09/1992	265	378		N	24	35	40	18	16	2.0	2	0.3			0	13.59	14.00	1		14.35	14.46	11		30	0.4	
41P800186	M 6	02/09/1992	265	371		N	24	35	40	18	18	2.3	3	0.6			0	14.00	14.02	2		14.35	14.46	11		30	0.4	
41P800187	A66	02/09/1992	265	364		N	24	35	40	30	19	4.0	3	1.0			0	14.04	14.06	2		14.35	14.46	11		30	0.4	
41P800188	K 6	02/09/1992	265	336		N	24	35	40	26	17	3.1	3	0.8			0	14.07	14.08	1		14.35	14.46	11		30	0.4	
41P800189	K 7	02/09/1992	265	304		N	24	35	40	24	18	3.0	3	0.8			0	14.08	14.10	2		14.35	14.46	11		30	0.4	
41P800190	A67	02/09/1992	265	229		N	24	35	40	25	18	3.1	3	0.8			0	14.14	14.16	2		14.35	14.46	11		30	0.4	
41P800191	M 7	02/09/1992	265	171		N	24	35	40	21	21	3.1	2	0.5			0	14.18	14.20	2		14.35	14.46	11		30	0.4	
41P800192	M 8	02/09/1992	265	164		N	24	35	40	18	20	2.5	3	0.6			0	14.20	14.21	1		14.35	14.46	11		30	0.4	
41P800193	A68	02/09/1992	265	159		N	24	35	40	24	18	3.0	2	0.5			0	14.32	14.33	1		14.35	14.46	11		30	0.4	
41P800194	K 8	02/09/1992	265	146		N	24	35	40	22	17	2.6	2	0.4			0	14.30	14.31	1		14.35	14.46	11		30	0.4	
41P800195	K 9	02/09/1992	265	139		N	24	35	40	24	18	3.0	2	0.5			0	14.30	14.31	1		14.35	14.46	11		30	0.4	
41P800196	A69	02/09/1992	265	132		N	24	35	40	31	20	4.3	2	0.7			0	14.32	14.33	1		14.35	14.46	11		30	0.4	
41P800197	M 9	02/09/1992	265	119		N	24	35	40	25	20	3.5	2	0.6			0	14.29	14.30	1		14.35	14.46	11		30	0.4	
41P800198	M10	02/09/1992	265	112		N	24	35	40	34	18	4.3	1	0.4			0	14.28	14.29	1		14.35	14.46	11		30	0.4	
41P800199	A70	02/09/1992	265	105		N	24	35	40	44	18	5.5	2	0.9			0	14.33	14.34	1		14.35	14.46	11		30	0.4	
41P800200	K10	02/09/1992	265	96		N	24	35	40	39	20	5.4	2	0.9			0	14.27	14.28	1		14.35	14.46	11		30	0.4	
Average	K											3.2		0.5			0.0			1.3								0.4	
	A											3.2		0.6			0.0			1.3								0.4	
	M											2.8		0.4			0.0			1.3								0.4	

Table B-5. Summary of installation data for FM 1570, Greenville, Texas
Local material (F) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
48P300001	F 1	03/25/1991	0	1613	2	N	24	69	57	36	24	6.0	2	1.0			0	9.48	9.51	3	3	9.52	9.54	2	6	1	2.0
48P300002	A 1	03/25/1991	0	1677	3	N	24	69	66	42	24	7.0	3	1.8			0	9.54	9.56	2	3	9.56	9.58	2	7	1	2.0
48P300003	A 2	03/25/1991	0	1887	3	N	24	69	66	30	42	8.8	3	2.2			0	9.58	10.01	3	3	10.07	10.09	2	6	2	1.0
48P300004	F 2	03/25/1991	0	1893	3	N	24	69	66	48	24	8.0	3	2.0			0	9.59	10.05	6	3	10.07	10.09	2	6	2	1.0
48P300005	F 3	03/25/1991	0	2137	9	N	24	69	65	24	12	2.0	2	0.3			0	10.19	10.21	2	3	10.33	10.34	1	6	2	0.5
48P300006	A 3	03/25/1991	0	2140	9	N	24	70	64	24	30	5.0	2	0.8			0	10.31	10.33	2	3	10.33	10.34	1	6	2	0.5
48P300007	A 4	03/25/1991	0	2153	2	N	24	71	63	36	24	6.0	3	1.5			0	10.33	10.35	2	3	10.37	10.39	2	6	6	0.3
48P300008	F 4	03/25/1991	0	2155	9	N	24	71	62	18	24	3.0	3	0.8			0	10.22	10.23	1	3	10.37	10.39	2	6	6	0.3
48P300009	F 5	03/25/1991	0	2162	9	N	24	71	62	36	24	6.0	3	1.5			0	10.25	10.27	2	3	10.37	10.39	2	6	6	0.3
48P300010	A 5	03/25/1991	0	2171	9	N	24	72	60	24	18	3.0	3	0.8			0	10.35	10.36	1	3	10.37	10.39	2	6	6	0.3
48P300011	A 6	03/25/1991	0	2181	9	N	24	72	60	36	30	7.5	3	1.9			0	10.36	10.37	1	3	10.37	10.39	2	6	6	0.3
48P300012	F 6	03/25/1991	0	2185	9	N	24	72	59	24	18	3.0	3	0.8			0	10.29	10.30	1	3	10.37	10.39	2	6	6	0.3
48P300013	F 7	03/25/1991	0	2414	9	N	24	75	58	48	36	12.0	4	4.0			0	10.48	10.54	6	3	10.54	10.56	2	7	2	1.0
48P300014	A 7	03/25/1991	0	2431	2	N	24	75	63	24	12	2.0	3	0.5			0	10.47	10.50	3	3	10.54	10.56	2	7	2	1.0
48P300015	A 8	03/25/1991	0	2965	3	N	24	76	67	36	30	7.5	3	1.9			0	10.59	11.01	2	3	11.15	11.18	3	7	6	0.5
48P300016	F 8	03/25/1991	0	2972	3	N	24	75	68	36	36	9.0	4	3.0			0	11.08	11.10	2	3	11.15	11.18	3	7	6	0.5
48P300017	F 9	03/25/1991	0	2976	3	N	24	74	70	36	36	9.0	4	3.0			0	11.11	11.12	1	3	11.15	11.18	3	7	6	0.5
48P300018	A 9	03/25/1991	0	2984	3	N	24	73	72	60	30	12.5	3	3.1			0	11.02	11.04	2	3	11.15	11.18	3	7	6	0.5
48P300019	A10	03/25/1991	0	3009	3	N	24	71	73	60	30	12.5	3	3.1			0	11.05	11.07	2	3	11.15	11.18	3	7	6	0.5
48P300020	F10	03/25/1991	0	3016	3	N	24	68	77	36	24	6.0	4	2.0			0	11.12	11.13	1	3	11.15	11.18	3	7	6	0.5
Average	F											6.4					0.0				2.5						0.7
	A											7.2					0.0				2.0						0.7

Table B-5. Summary of installation data for FM 1570, Greenville, Texas (continued)
UPM (edge seal) (B), Control (A), and HFMS-2 (G)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
48P300021	B 1	03/26/1991	0	3113	3	N	24	78	66	42	30	8.8	2	1.5			0	9.11	9.12	1	2	9.32	9.36	4	6	12	0.3	
48P300022	A11	03/26/1991	0	3117	3	N	24	76	69	24	18	3.0	3	0.8			0	9.11	9.12	1	2	9.32	9.36	4	6	12	0.3	
48P300023	G 1	03/26/1991	0	3121	3	N	24	76	69	24	18	3.0	2	0.5			0	9.14	9.15	1	2	9.32	9.36	4	6	12	0.3	
48P300024	G 2	03/26/1991	0	3139	2	N	24	76	69	24	12	2.0	4	0.7			0	9.17	9.18	1	2	9.32	9.36	4	6	12	0.3	
48P300025	A12	03/26/1991	0	3143	2	N	24	76	69	42	18	5.3	2	0.9			0	9.13	9.14	1	2	9.32	9.36	4	6	12	0.3	
48P300026	B 2	03/26/1991	0	3147	2	N	24	76	69	30	18	3.8	2	0.6			0	9.14	9.16	2	2	9.32	9.36	4	6	12	0.3	
48P300027	B 3	03/26/1991	0	3170	2	N	24	78	67	42	30	8.8	3	2.2			0	9.16	9.17	1	2	9.32	9.36	4	6	12	0.3	
48P300028	A13	03/26/1991	0	3175	2	N	24	78	67	30	24	5.0	2	0.8			0	9.17	9.19	2	2	9.32	9.36	4	6	12	0.3	
48P300029	G 3	03/26/1991	0	3179	2	N	24	78	67	36	18	4.5	3	1.1			0	9.26	9.29	3	2	9.32	9.36	4	6	12	0.3	
48P300030	G 4	03/26/1991	0	3194	2	N	24	79	66	30	18	3.8	3	0.9			0	9.30	9.32	2	2	9.32	9.36	4	6	12	0.3	
48P300031	A14	03/26/1991	0	3197	2	N	24	79	66	30	24	5.0	4	1.7			0	9.25	9.26	1	2	9.32	9.36	4	6	12	0.3	
48P300032	B 4	03/26/1991	0	3200	2	N	24	79	66	54	24	9.0	4	3.0			0	9.26	9.28	2	2	9.32	9.36	4	6	12	0.3	
48P300033	B 5	03/26/1991	0	4676	2	N	24	79	67	30	24	5.0	4	1.7			0	9.47	9.51	4	2	10.54	10.58	4	6	9	0.4	
48P300034	A15	03/26/1991	0	4680	2	N	24	79	67	30	18	3.8	4	1.3			0	9.51	9.53	2	2	10.54	10.58	4	6	9	0.4	
48P300035	G 5	03/26/1991	0	4683	2	N	24	79	67	24	24	4.0	3	1.0			0	10.37	10.39	2	2	10.54	10.58	4	6	9	0.4	
48P300036	G 6	03/26/1991	0	4698	2	N	24	80	62	30	24	5.0	3	1.3			0	10.40	10.42	2	2	10.54	10.58	4	6	9	0.4	
48P300037	A16	03/26/1991	0	4705	1	N	24	80	65	48	30	10.0	4	3.3			0	10.39	10.41	2	2	10.54	10.58	4	6	9	0.4	
48P300038	B 6	03/26/1991	0	4712	2	N	24	80	62	36	24	6.0	3	1.5			0	10.41	10.44	3	2	10.54	10.58	4	6	9	0.4	
48P300039	B 7	03/26/1991	0	4717	2	N	24	80	65	30	18	3.8	3	0.9			0	10.45	10.46	1	2	10.54	10.58	4	6	9	0.4	
48P300040	A17	03/26/1991	0	4721	2	N	24	80	64	36	30	7.5	4	2.5			0	10.47	10.49	2	2	10.54	10.58	4	6	9	0.4	
48P300041	G 7	03/26/1991	0	4727	2	N	24	79	67	48	18	6.0	3	1.5			0	10.50	10.52	2	2	10.54	10.58	4	6	9	0.4	
48P300042	G 8	03/26/1991	0	5415	4	N	24	81	62	36	30	7.5	4	2.5			0	13.11	13.14	3	2	13.15	13.17	2	8	3	0.7	
48P300043	A18	03/26/1991	0	5419	4	N	24	81	62	30	30	6.3	3	1.6			0	13.06	13.08	2	2	13.15	13.17	2	8	3	0.7	
48P300044	B 8	03/26/1991	0	5425	4	N	24	81	62	30	24	5.0	2	0.8			0	13.08	13.10	2	2	13.15	13.17	2	8	3	0.7	
48P300045	B 9	03/26/1991	0	5622	4	N	24	82	61	30	24	5.0	2	0.8			0	13.20	13.22	2	2	13.34	13.38	4	6	6	0.7	
48P300046	A19	03/26/1991	0	5625	4	N	24	82	61	36	30	7.5	2	1.3			0	13.22	13.24	2	2	13.34	13.38	4	6	6	0.7	
48P300047	G 9	03/26/1991	0	5628	4	N	24	82	61	48	24	8.0	3	2.0			0	13.25	13.28	3	2	13.34	13.38	4	6	6	0.7	
48P300048	G10	03/26/1991	0	5633	3	N	24	82	61	36	30	7.5	2	1.3			0	13.28	13.30	2	2	13.34	13.38	4	6	6	0.7	
48P300049	A20	03/26/1991	0	5644	2	N	24	82	61	36	30	7.5	2	1.3			0	13.27	13.28	1	2	13.34	13.38	4	6	6	0.7	
48P300050	B10	03/26/1991	0	5649	2	N	24	82	61	36	30	7.5	3	1.9			0	13.28	13.30	2	2	13.34	13.38	4	6	6	0.7	
Average	B											6.3		1.5			0.0			2.0							0.5	
	A											6.1		1.5			0.0			1.6							0.5	
	G											5.1		1.3			0.0			2.1							0.5	

Table B-5. Summary of installation data for FM 1570, Greenville, Texas (continued) Perma-Patch (H), Control (A), and QPR 2000 (I)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
48P300051	H 1	03/27/1991	0	7150	2	N	24	72	42	30	36	7.5	4	2.5			0	9.18	9.20	2	2	9.24	9.28	4	7	6	0.7	
48P300052	A21	03/27/1991	0	7155	2	N	24	70	48	36	24	6.0	3	1.5			0	9.09	9.11	2	2	9.24	9.28	4	7	6	0.7	
48P300053	I 1	03/27/1991	0	7160	2	N	24	72	48	36	24	6.0	4	2.0			0	9.14	9.16	2	2	9.24	9.28	4	7	6	0.7	
48P300054	I 2	03/27/1991	0	7164	3	N	24	73	44	24	24	4.0	2	0.7			0	9.14	9.15	1	2	9.24	9.28	4	7	6	0.7	
48P300055	A22	03/27/1991	0	7170	2	N	24	70	48	30	30	6.3	3	1.6			0	9.12	9.14	2	2	9.24	9.28	4	7	6	0.7	
48P300056	H 2	03/27/1991	0	7177	3	N	24	72	42	36	30	7.5	3	1.9			0	9.19	9.20	1	2	9.24	9.28	4	7	6	0.7	
48P300057	H 3	03/27/1991	0	7436	2	N	24	71	39	36	24	6.0	3	1.5			0	9.35	9.38	3	2	9.41	9.43	2	6	3	0.7	
48P300058	A23	03/27/1991	0	7441	2	N	24	71	39	36	30	7.5	3	1.9			0	9.34	9.36	2	2	9.41	9.43	2	6	3	0.7	
48P300059	I 3	03/27/1991	0	7447	2	N	24	71	41	42	24	7.0	4	2.3			0	9.39	9.40	1	2	9.41	9.43	2	6	3	0.7	
48P300060	I 4	03/27/1991	0	7643	4	N	24	76	30	48	48	16.0	3	4.0			0	10.23	10.25	2	2	10.30	10.33	3	8	6	0.5	
48P300061	A24	03/27/1991	0	7648	2	N	24	75	25	30	24	5.0	4	1.7			0	10.13	10.15	2	2	10.30	10.33	3	6	6	0.5	
48P300062	H 4	03/27/1991	0	7653	2	N	24	75	30	30	24	5.0	3	1.3			0	10.19	10.21	2	2	10.30	10.33	3	6	6	0.5	
48P300063	H 5	03/27/1991	0	7657	2	N	24	76	34	36	36	9.0	4	3.0			0	10.20	10.22	2	2	10.30	10.33	3	6	6	0.5	
48P300064	A25	03/27/1991	0	7662	2	N	24	75	32	30	24	5.0	4	1.7			0	10.16	10.18	2	2	10.30	10.33	3	6	6	0.5	
48P300065	I 5	03/27/1991	0	7667	2	N	24	75	32	54	42	15.8	5	6.6			0	10.25	10.28	3	2	10.30	10.33	3	6	6	0.5	
48P300066	I 6	03/27/1991	0	7786	4	N	24	79	20	36	30	7.5	4	2.5			0	11.26	11.29	3	2	11.32	11.34	2	6	6	0.3	
48P300067	A26	03/27/1991	0	7792	2	N	24	83	30	36	30	7.5	4	2.5			0	11.18	11.20	2	2	11.32	11.34	2	4	6	0.3	
48P300068	H 6	03/27/1991	0	7797	3	N	24	83	30	36	30	7.5	4	2.5			0	11.23	11.25	2	2	11.32	11.34	2	6	6	0.3	
48P300069	H 7	03/27/1991	0	7800	3	N	24	82	35	42	30	8.8	3	2.2			0	11.25	11.27	2	2	11.32	11.34	2	6	6	0.3	
48P300070	A27	03/27/1991	0	7803	3	N	24	83	30	30	24	5.0	3	1.3			0	11.20	11.22	2	2	11.32	11.34	2	6	6	0.3	
48P300071	I 7	03/27/1991	0	7807	3	N	24	78	20	42	24	7.0	3	1.8			0	11.30	11.32	2	2	11.32	11.34	2	6	6	0.3	
48P300072	I 8	03/27/1991	0	7903	4	N	24	79	20	36	30	7.5	3	1.9			0	13.01	13.02	1	2	13.03	13.05	2	7	3	0.7	
48P300073	A28	03/27/1991	0	7910	3	N	24	80	20	30	30	6.3	4	2.1			0	12.57	12.59	2	2	13.03	13.05	2	7	3	0.7	
48P300074	H 8	03/27/1991	0	7919	2	N	24	80	20	36	24	6.0	3	1.5			0	12.58	13.00	2	2	13.03	13.05	2	7	3	0.7	
48P300075	H 9	03/27/1991	0	8716	3	N	24	78	20	36	30	7.5	7	4.4			0	13.35	13.37	2	2	13.53	13.56	3	8	6	0.5	
48P300076	A29	03/27/1991	0	8750	2	N	24	78	20	36	24	6.0	5	2.5			0	13.34	13.36	2	2	13.53	13.56	3	8	6	0.5	
48P300077	I 9	03/27/1991	0	8761	4	N	24	77	20	36	30	7.5	4	2.5			0	13.43	13.46	3	2	13.53	13.56	3	8	6	0.5	
48P300078	I10	03/27/1991	0	8770	2	N	24	77	20	42	30	8.8	5	3.6			0	13.45	13.48	3	2	13.53	13.56	3	8	6	0.5	
48P300079	A30	03/27/1991	0	8789	2	N	24	76	20	36	24	6.0	4	2.0			0	13.37	13.40	3	2	13.53	13.56	3	8	6	0.5	
48P300080	H10	03/27/1991	0	8806	2	N	24	75	20	36	36	9.0	4	3.0			0	13.42	13.45	3	2	13.53	13.56	3	8	6	0.5	
Average	H											7.4		2.4			0.0			2.1									0.5
	A											6.1		1.9			0.0			2.1									0.5
	I											8.7		2.8			0.0			2.1									0.5

Table B-5. Summary of installation data for FM 1570, Greenville, Texas (continued)
PennDOT 485 (D), Control (A), and UPM (semi-perm.) (C)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
48P300081	D 1	03/28/1991	0	8891	2	S	24	64	42	36	24	6.0	3	1.5			0	13.45	13.47	2	2	13.47	13.49	2	6	3	0.7	
48P300082	A31	03/28/1991	0	8889	2	S	24	64	42	30	30	6.3	3	1.6			0	13.40	13.42	2	2	13.47	13.49	2	6	3	0.7	
48P300083	C 1	03/28/1991	0	8887	2	S	24	64	42	42	30	8.8	7	5.1	8.45	9.15	30	9.18	9.26	8	4	9.45	9.46	1	8	2	0.5	
48P300084	C 2	03/28/1991	0	8864	2	S	24	74	34	36	36	9.0	3	2.3	9.17	9.27	10	9.36	9.43	7	4	9.45	9.46	1	8	2	0.5	
48P300085	A32	03/28/1991	0	8856	2	S	24	74	34	30	24	5.0	4	1.7			0	13.44	13.47	3	2	13.47	13.49	2	5	3	0.7	
48P300086	D 2	03/28/1991	0	8849	2	S	24	74	34	42	30	8.8	4	2.9			0	13.48	13.50	2	2	13.51	13.53	2	6	1	2.0	
48P300087	D 3	03/28/1991	0	8770	2	S	24	74	34	36	30	7.5	4	2.5			0	13.53	13.55	2	2	13.55	13.57	2	7	2	1.0	
48P300088	A33	03/28/1991	0	8759	2	S	24	74	34	24	24	4.0	3	1.0			0	13.49	13.52	3	2	13.55	13.57	2	7	2	1.0	
48P300089	C 3	03/28/1991	0	8742	2	S	24	74	34	48	36	12.0	5	5.0	9.37	10.00	23	10.00	10.08	8	4	10.09	10.10	1	7	1	1.0	
48P300090	C 4	03/28/1991	0	8576	2	S	24	74	36	42	36	10.5	5	4.4	10.11	10.21	10	10.22	10.28	6	4	10.30	10.32	2	7	1	2.0	
48P300091	A34	03/28/1991	0	8555	2	S	24	74	36	36	30	7.5	4	2.5			0	13.53	13.56	3	2	13.58	13.59	1	7	1	1.0	
48P300092	D 4	03/28/1991	0	8535	2	S	24	74	36	42	30	8.8	4	2.9			0	13.56	13.58	2	2	13.59	14.02	3	7	1	3.0	
48P300093	D 5	03/28/1991	0	7319	2	S	24	74	36	42	24	7.0	4	2.3			0	14.15	14.18	3	2	14.19	14.21	2	8	2	1.0	
48P300094	A35	03/28/1991	0	7309	2	S	24	74	36	36	18	4.5	3	1.1			0	14.13	14.15	2	2	14.19	14.21	2	7	2	1.0	
48P300095	C 5	03/28/1991	0	7299	2	S	24	74	36	36	30	7.5	4	2.5	10.38	10.44	6	10.45	10.49	4	4	10.51	10.52	1	8	1	1.0	
48P300096	C 6	03/28/1991	0	7002	2	S	24	74	36	48	36	12.0	5	5.0	10.47	10.58	11	10.59	11.04	5	4	11.05	11.06	1	8	1	1.0	
48P300097	A36	03/28/1991	0	6993	2	S	24	74	36	30	24	5.0	3	1.3			0	14.18	14.21	3	2	14.25	14.27	2	7	2	1.0	
48P300098	D 6	03/28/1991	0	6978	2	S	24	74	36	36	24	6.0	4	2.0			0	14.21	14.23	2	2	14.25	14.27	2	7	2	1.0	
48P300099	D 7	03/28/1991	0	6606	2	S	24	74	36	36	30	7.5	4	2.5			0	14.30	14.32	2	2	14.33	14.35	2	7	2	1.0	
48P300100	A37	03/28/1991	0	6597	2	S	24	74	36	36	24	6.0	3	1.5			0	14.29	14.31	2	2	14.33	14.35	2	7	2	1.0	
48P300101	C 7	03/28/1991	0	6590	2	S	24	74	36	42	36	10.5	4	3.5	11.07	11.17	10	11.25	11.28	3	4	11.30	11.32	2	8	2	1.0	
48P300102	C 8	03/28/1991	0	6577	2	S	24	74	36	36	30	7.5	5	3.1	11.13	11.18	5	11.19	11.21	2	4	11.30	11.32	2	8	2	1.0	
48P300103	A38	03/28/1991	0	6562	2	S	24	74	36	36	24	6.0	3	1.5			0	14.33	14.35	2	2	14.36	14.38	2	7	1	2.0	
48P300104	D 8	03/28/1991	0	6521	2	S	24	74	36	36	24	6.0	4	2.0			0	14.35	14.37	2	2	14.38	14.39	1	7	1	1.0	
48P300105	D 9	03/28/1991	0	6268	2	S	24	74	36	36	36	9.0	4	3.0			0	14.42	14.44	2	2	14.45	14.47	2	7	2	1.0	
48P300106	A39	03/28/1991	0	6262	2	S	24	74	36	36	30	7.5	3	1.9			0	14.38	14.40	2	2	14.45	14.47	2	7	2	1.0	
48P300107	C 9	03/28/1991	0	6251	2	S	24	74	36	42	30	8.8	5	3.6	11.22	11.32	10	11.33	11.36	3	4	11.37	11.38	1	6	1	1.0	
48P300108	C10	03/28/1991	0	5610	2	S	24	74	36	42	30	8.8	3	2.2	11.37	11.43	6	11.43	11.45	2	4	11.47	11.49	2	8	1	2.0	
48P300109	A40	03/28/1991	0	5603	2	S	24	74	36	42	24	7.0	3	1.8			0	14.42	14.45	3	2	14.52	14.54	2	7	2	1.0	
48P300110	D10	03/28/1991	0	5597	2	S	24	74	36	48	30	10.0	3	2.5			0	14.48	14.50	2	2	14.52	14.54	2	7	2	1.0	
Average	D											7.7		2.4			0.0			2.1							1.3	
	A											5.9		1.6			0.0			2.5							1.0	
	C											9.5		3.7			12.1			4.8							1.1	

Table B-5. Summary of installation data for FM 1570, Greenville, Texas (continued)
PennDOT 486 (E) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg Comp
48P300111	E 1	03/29/1991	0	3540	3	S	24	66	46	30	36	7.5	4	2.5			0	8.48	8.50	2	2	9.34	9.37	3	7	12	0.2
48P300112	A41	03/29/1991	0	3532	2	S	24	67	44	24	36	6.0	2	1.0			0	8.52	8.55	3	2	9.34	9.37	3	7	12	0.2
48P300113	A41	03/29/1991	0	3525	2	S	24	67	44	36	12	3.0	5	1.3			0	8.57	9.00	3	2	9.34	9.37	3	7	12	0.2
48P300114	E 2	03/29/1991	0	3517	2	S	24	67	44	48	24	8.0	4	2.7			0	9.02	9.04	2	2	9.34	9.37	3	7	12	0.2
48P300115	E 3	03/29/1991	0	3511	2	S	24	67	44	42	30	8.8	3	2.2			0	9.05	9.08	3	2	9.34	9.37	3	7	12	0.2
48P300116	A43	03/29/1991	0	3505	2	S	24	67	44	36	24	6.0	6	3.0			0	9.10	9.12	2	2	9.34	9.37	3	7	12	0.2
48P300117	A44	03/29/1991	0	3499	2	S	24	67	44	42	24	7.0	3	1.8			0	9.13	9.15	2	2	9.34	9.37	3	7	12	0.2
48P300118	E 4	03/29/1991	0	3488	2	S	24	66	46	42	36	10.5	4	3.5			0	9.16	9.18	2	2	9.34	9.37	3	7	12	0.2
48P300119	E 5	03/29/1991	0	3477	2	S	24	67	44	36	48	12.0	5	5.0			0	9.19	9.21	2	2	9.34	9.37	3	7	12	0.2
48P300120	A45	03/29/1991	0	3467	2	S	24	67	44	42	36	10.5	4	3.5			0	9.23	9.26	3	2	9.34	9.37	3	7	12	0.2
48P300121	A46	03/29/1991	0	3463	2	S	24	67	44	42	42	12.3	4	4.1			0	9.28	9.30	2	2	9.34	9.37	3	7	12	0.2
48P300122	E 6	03/29/1991	0	3456	2	S	24	67	44	42	30	8.8	4	2.9			0	9.31	9.33	2	2	9.34	9.37	3	7	12	0.2
48P300123	E 7	03/29/1991	0	3416	2	S	24	65	45	36	30	7.5	3	1.9			0	9.38	9.40	2	2	9.40	9.43	3	7	1	3.0
48P300124	A47	03/29/1991	0	3408	2	S	24	65	45	48	36	12.0	5	5.0			0	9.43	9.46	3	2	9.50	9.52	2	7	1	2.0
48P300125	A48	03/29/1991	0	3340	2	S	24	65	45	42	30	8.8	3	2.2			0	9.49	9.52	3	2	10.03	10.05	2	7	3	0.7
48P300126	E 8	03/29/1991	0	3328	2	S	24	65	45	36	12	3.0	3	0.8			0	9.54	9.56	2	2	10.03	10.05	2	7	3	0.7
48P300127	E 9	03/29/1991	0	1650	2	S	24	65	45	36	30	7.5	4	2.5			0	9.57	10.00	3	2	10.03	10.05	2	7	3	0.7
48P300128	A49	03/29/1991	0	1639	2	S	24	65	45	42	24	7.0	4	2.3			0	10.02	10.05	3	2	10.13	10.15	2	7	3	0.7
48P300129	A50	03/29/1991	0	1516	2	S	24	65	45	24	24	4.0	3	1.0			0	10.07	10.09	2	2	10.13	10.15	2	7	3	0.7
48P300130	E10	03/29/1991	0	1511	2	S	24	65	45	36	30	7.5	4	2.5			0	10.10	10.12	2	2	10.13	10.15	2	7	3	0.7
Average	E											8.1					0.0			2.2							0.6
	A											7.7					0.0			2.6							0.5

Table B-5. Summary of installation data for FM 1570, Greenville, Texas (continued)
Control (A) and Spray injection (J)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Relm	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
48P300131	A51	04/30/1991	0	2697	8	S	24	75	40	36	22	5.5	3	1.4			0	9.01	9.03	2	2	9.05	9.07	2	6	1	2.0	
48P300132	J 1	04/30/1991	0	2680	7	S	24	75	40	38	24	6.3	4	2.1			0	9.44	9.46	2	1			0	0	0		
48P300133	A52	04/30/1991	0	2603	9	S	24	75	40	20	20	2.8	4	0.9			0	9.08	9.11	3	2	9.12	9.14	2	6	1	2.0	
48P300134	J 2	04/30/1991	0	2597	8	S	24	75	40	32	24	5.3	4	1.8			0	9.48	9.50	2	1			0	0	0		
48P300135	A53	04/30/1991	0	2593	8	S	24	75	40	28	28	5.4	4	1.8			0	9.16	9.18	2	2	9.20	9.22	2	6	1	2.0	
48P300136	J 3	04/30/1991	0	2588	8	S	24	75	40	30	26	5.4	3	1.4			0	9.52	9.54	2	1			0	0	0		
48P300137	A54	04/30/1991	0	2574	3	S	24	75	40	30	26	5.4	4	1.8			0	9.24	9.27	3	2	9.28	9.29	1	6	1	1.0	
48P300138	J 4	04/30/1991	0	2568	3	S	24	75	40	26	24	4.3	4	1.4			0	9.56	9.58	2	1			0	0	0		
48P300139	A55	04/30/1991	0	2562	8	S	24	75	40	36	18	4.5	3	1.1			0	9.30	9.33	3	2	9.35	9.37	2	6	1	2.0	
48P300140	J 5	04/30/1991	0	2559	4	S	24	75	40	20	18	2.5	4	0.8			0	10.01	10.03	2	1			0	0	0		
48P300141	A56	04/30/1991	0	2557	2	S	24	75	40	32	22	4.9	4	1.6			0	9.36	9.38	2	2	9.39	9.41	2	6	1	2.0	
48P300142	J 6	04/30/1991	0	2555	8	S	24	75	40	30	26	5.4	4	1.8			0	10.05	10.07	2	1			0	0	0		
48P300143	A57	04/30/1991	0	2550	8	S	24	75	40	36	24	6.0	4	2.0			0	9.42	9.45	3	2	9.45	9.46	1	6	1	1.0	
48P300144	J 7	04/30/1991	0	2545	8	S	24	75	40	48	24	8.0	4	2.7			0	10.09	10.11	2	1			0	0	0		
48P300145	A58	04/30/1991	0	2537	7	S	24	75	40	36	30	7.5	3	1.9			0	9.49	9.51	2	2	9.51	9.52	1	6	1	1.0	
48P300146	J 8	04/30/1991	0	2529	6	S	24	75	40	44	34	10.4	3	2.6			0	10.12	10.14	2	1			0	0	0		
48P300147	A59	04/30/1991	0	2369	8	S	24	77	50	40	28	7.8	4	2.6			0	9.57	9.59	2	2	10.04	10.06	2	6	1	2.0	
48P300148	J 9	04/30/1991	0	2359	8	S	24	77	50	36	26	6.5	4	2.2			0	10.15	10.17	2	1			0	0	0		
48P300149	A60	04/30/1991	0	1033	6	S	24	77	50	36	30	7.5	4	2.5			0	10.30	10.32	2	2	10.35	10.37	2	6	1	2.0	
48P300150	J10	04/30/1991	0	1027	6	S	24	77	50	36	30	7.5	4	2.5			0	10.39	10.41	2	1			0	0	0		
Average	A											5.7					0.0			2.4								1.7	
	J											6.2					0.0			2.0								0.0	

Table B-6. Summary of installation data for I-15 Frontage Road, Draper, Utah PennDOT 486 (E), Control (A), and PennDOT 485 (D)

Patch ID	Matl	#	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
49P400001	E	1	04/22/1991	0	15	3	N	24	65	33	17	14	1.7	3	0.4			0	11.34	11.37	3	2	11.51	12.03	12	6	12	1.0	
49P400002	A	1	04/22/1991	0	26	2	N	24	65	33	14	22	2.1	4	0.7			0	11.24	11.26	2	2	11.51	12.03	12	6	12	1.0	
49P400003	D	1	04/22/1991	0	38	3	N	24	65	33	22	16	2.4	4	0.8			0	11.36	11.38	2	2	11.51	12.03	12	6	12	1.0	
49P400004	D	2	04/22/1991	0	42	2	N	24	67	20	26	32	5.8	6	2.9			0	11.38	11.39	1	2	11.51	12.03	12	6	12	1.0	
49P400005	A	2	04/22/1991	0	48	2	N	24	66	30	30	26	5.4	6	2.7			0	11.26	11.27	1	2	11.51	12.03	12	6	12	1.0	
49P400006	E	2	04/22/1991	0	53	2	N	24	66	30	28	30	5.8	8	3.9			0	11.40	11.42	2	2	11.51	12.03	12	6	12	1.0	
49P400007	E	3	04/22/1991	0	58	3	N	24	67	20	31	31	6.7	6	3.3			0	11.43	11.45	2	2	11.51	12.03	12	6	12	1.0	
49P400008	A	3	04/22/1991	0	63	4	N	24	67	20	22	28	4.3	5	1.8			0	11.28	11.29	1	2	11.51	12.03	12	6	12	1.0	
49P400009	D	3	04/22/1991	0	69	9	N	24	67	20	26	16	2.9	5	1.2			0	11.40	11.41	1	2	11.51	12.03	12	6	12	1.0	
49P400010	D	4	04/22/1991	0	69	2	N	24	67	20	24	30	5.0	4	1.7			0	11.42	11.43	1	2	11.51	12.03	12	6	12	1.0	
49P400011	A	4	04/22/1991	0	74	8	N	24	66	25	23	36	5.8	8	3.8			0	11.28	11.30	2	2	11.51	12.03	12	6	12	1.0	
49P400012	E	4	04/22/1991	0	78	4	N	24	66	20	25	30	5.2	4	1.7			0	11.48	11.50	2	2	11.51	12.03	12	6	12	1.0	
49P400013	E	5	04/22/1991	0	81	2	N	24	66	20	20	21	2.9	3	0.7			0	14.20	14.21	1	2	14.55	15.06	11	8	18	0.6	
49P400014	A	5	04/22/1991	0	85	10	N	24	66	20	25	14	2.4	3	0.6			0	14.05	14.06	1	2	14.55	15.06	11	8	18	0.6	
49P400015	D	5	04/22/1991	0	88	10	N	24	66	20	27	17	3.2	3	0.8			0	14.20	14.22	2	2	14.55	15.06	11	8	18	0.6	
49P400016	D	6	04/22/1991	0	91	3	N	24	66	20	22	22	3.4	3	0.8			0	14.22	14.24	2	2	14.55	15.06	11	8	18	0.6	
49P400017	A	6	04/22/1991	0	100	3	N	24	66	20	27	21	3.9	4	1.3			0	14.06	14.08	2	2	14.55	15.06	11	8	18	0.6	
49P400018	E	6	04/22/1991	0	107	1	N	24	66	20	30	24	5.0	3	1.3			0	14.25	14.27	2	2	14.55	15.06	11	8	18	0.6	
49P400019	E	7	04/22/1991	0	110	3	N	24	70	20	23	26	4.2	4	1.4			0	14.32	14.34	2	2	14.55	15.06	11	8	18	0.6	
49P400020	A	7	04/22/1991	0	115	2	N	24	70	20	24	31	5.2	4	1.7			0	14.08	14.09	1	2	14.55	15.06	11	8	18	0.6	
49P400021	D	7	04/22/1991	0	117	11	N	24	70	20	28	22	4.3	3	1.1			0	14.30	14.32	2	2	14.55	15.06	11	8	18	0.6	
49P400022	D	8	04/22/1991	0	125	4	N	24	70	20	25	16	2.8	3	0.7			0	14.33	14.35	2	2	14.55	15.06	11	8	18	0.6	
49P400023	A	8	04/22/1991	0	129	5	N	24	70	20	20	27	3.8	3	0.9			0	14.10	14.12	2	2	14.55	15.06	11	8	18	0.6	
49P400024	E	8	04/22/1991	0	131	3	N	24	70	20	17	12	1.4	3	0.4			0	14.43	14.44	1	2	14.55	15.06	11	8	18	0.6	
49P400025	E	9	04/22/1991	0	147	5	N	24	70	20	24	30	5.0	5	2.1			0	14.44	14.46	2	2	14.55	15.06	11	8	18	0.6	
49P400026	A	9	04/22/1991	0	153	4	N	24	70	20	19	27	3.6	4	1.2			0	14.13	14.15	2	2	14.55	15.06	11	8	18	0.6	
49P400027	D	9	04/22/1991	0	155	3	N	24	70	20	21	26	3.8	4	1.3			0	14.48	14.49	1	2	14.55	15.06	11	8	18	0.6	
49P400028	D	10	04/22/1991	0	161	3	N	24	70	20	30	25	5.2	6	2.6			0	14.50	14.52	2	2	14.55	15.06	11	8	18	0.6	
49P400029	A	10	04/22/1991	0	167	2	N	24	70	20	24	30	5.0	4	1.7			0	14.16	14.17	1	2	14.55	15.06	11	8	18	0.6	
49P400030	E	10	04/22/1991	0	171	3	N	24	66	25	30	26	5.4	4	1.8			0	14.53	14.55	2	2	14.55	15.06	11	8	18	0.6	
Average	E												4.3		1.7			0.0			1.9								0.8
	A												4.1		1.6			0.0			1.5								0.8
	D												3.9		1.4			0.0			1.6								0.8

Table B-6. Summary of installation data for I-15 Frontage Road, Draper, Utah (continued)
HFMS-2 (G), Control (A), and Spray injection (J)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
49P400031	G 1	04/23/1991	0	173	3	N	24	67	31	30	24	5.0	2	0.8			0	11.34	11.36	2	2	12.01	12.10	9	8	20	0.4	
49P400032	A11	04/23/1991	0	177	3	N	24	67	31	31	21	4.5	2	0.8			0	11.14	11.16	2	2	12.01	12.10	9	8	20	0.4	
49P400033	J 1	04/23/1991	0	183	4	N	24	67	31	30	28	5.8	3	1.5			0	10.42	10.46	4	2			0	0	0		
49P400034	J 2	04/23/1991	0	186	4	N	24	67	31	26	22	4.0	3	1.0			0	10.42	10.46	4	2			0	0	0		
49P400035	A12	04/23/1991	0	190	2	N	24	67	31	30	20	4.2	3	1.0			0	11.16	11.17	1	2	12.01	12.10	9	8	20	0.4	
49P400036	G 2	04/23/1991	0	198	3	N	24	67	31	24	19	3.2	3	0.8			0	11.37	11.39	2	2	12.01	12.10	9	8	20	0.4	
49P400037	G 3	04/23/1991	0	204	3	N	24	67	31	27	28	5.3	3	1.3			0	11.40	11.42	2	2	12.01	12.10	9	8	20	0.4	
49P400038	A13	04/23/1991	0	209	3	N	24	67	31	35	29	7.0	4	2.3			0	11.17	11.18	1	2	12.01	12.10	9	8	20	0.4	
49P400039	J 3	04/23/1991	0	215	2	N	24	67	31	37	26	6.7	4	2.2			0	10.47	10.50	3	2			0	0	0		
49P400040	J 4	04/23/1991	0	223	3	N	24	67	31	27	21	3.9	4	1.3			0	10.50	10.52	2	2			0	0	0		
49P400041	A14	04/23/1991	0	234	3	N	24	67	31	27	20	3.8	3	0.9			0	11.18	11.19	1	2	12.01	12.10	9	8	20	0.4	
49P400042	G 4	04/23/1991	0	238	3	N	24	67	31	30	24	5.0	3	1.3			0	11.43	11.45	2	2	12.01	12.10	9	8	20	0.4	
49P400043	G 5	04/23/1991	0	246	2	N	24	67	31	28	41	8.0	4	2.7			0	11.46	11.48	2	2	12.01	12.10	9	8	20	0.4	
49P400044	A15	04/23/1991	0	253	3	N	24	67	31	28	26	5.1	3	1.3			0	11.20	11.22	2	2	12.01	12.10	9	8	20	0.4	
49P400045	J 5	04/23/1991	0	257	2	N	24	67	31	30	27	5.6	5	2.3			0	10.53	10.57	4	2			0	0	0		
49P400046	J 6	04/23/1991	0	262	2	N	24	67	31	32	26	5.8	4	1.9			0	10.53	10.57	4	2			0	0	0		
49P400047	A16	04/23/1991	0	270	1	N	24	67	31	28	29	5.6	4	1.9			0	11.23	11.25	2	2	12.01	12.10	9	8	20	0.4	
49P400048	G 6	04/23/1991	0	277	5	N	24	67	31	28	20	3.9	3	1.0			0	11.52	11.54	2	2	12.01	12.10	9	8	20	0.4	
49P400049	G 7	04/23/1991	0	281	4	N	24	67	31	24	20	3.3	3	0.8			0	11.58	11.59	1	2	12.01	12.10	9	8	20	0.4	
49P400050	A17	04/23/1991	0	292	3	N	24	67	31	55	22	8.4	3	2.1			0	11.25	11.26	1	2	12.01	12.10	9	8	20	0.4	
49P400051	J 7	04/23/1991	0	303	3	N	24	67	31	36	20	5.0	3	1.3			0	11.00	11.04	4	2			0	0	0		
49P400052	J 8	04/23/1991	0	309	3	N	24	67	31	28	20	3.9	3	1.0			0	11.00	11.04	4	2			0	0	0		
49P400053	A18	04/23/1991	0	315	3	N	24	66	36	28	26	5.1	4	1.7			0	11.27	11.28	1	2	12.01	12.10	9	8	20	0.4	
49P400054	G 8	04/23/1991	0	326	3	N	24	66	36	32	26	5.8	4	1.9			0	11.58	11.59	1	2	12.01	12.10	9	8	20	0.4	
49P400055	G 9	04/23/1991	0	333	3	N	24	68	33	35	22	5.3	3	1.3			0	11.59	12.00	1	2	12.01	12.10	9	8	20	0.4	
49P400056	A19	04/23/1991	0	342	3	N	24	68	33	31	21	4.5	4	1.5			0	11.30	11.32	2	2	12.01	12.10	9	8	20	0.4	
49P400057	J 9	04/23/1991	0	348	3	N	24	68	33	33	20	4.6	4	1.5			0	11.07	11.12	5	2			0	0	0		
49P400058	J10	04/23/1991	0	352	3	N	24	68	33	30	26	5.4	5	2.3			0	11.07	11.12	5	2			0	0	0		
49P400059	A20	04/23/1991	0	363	2	N	24	68	33	24	23	3.8	3	1.0			0	11.32	11.34	2	2	12.01	12.10	9	8	20	0.4	
49P400060	G10	04/23/1991	0	370	3	N	24	68	33	28	26	5.1	4	1.7			0	12.00	12.01	1	2	12.01	12.10	9	8	20	0.4	
Average	G											5.0		1.4		0.0			1.6								0.4
	A											5.2		1.4		0.0			1.5								0.4
	J											5.1		1.6		0.0			3.9								0.0

Table B-6. Summary of installation data for I-15 Frontage Road, Draper, Utah (continued)
Local material (F), Control (A), and Perma-Patch (H)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg Comp
49P400061	F 1	04/23/1991	0	389	3	N	24	78	20	32	27	6.0	4	2.0			0	14.29	14.30	1	2	15.13	15.27	14	8	30	0.5
49P400062	A21	04/23/1991	0	397	3	N	24	78	20	24	27	4.5	4	1.5			0	14.50	14.52	2	2	15.13	15.27	14	8	30	0.5
49P400063	H 1	04/23/1991	0	402	3	N	24	78	20	24	26	4.3	3	1.1			0	15.03	15.04	1	2	15.13	15.27	14	8	30	0.5
49P400064	H 2	04/23/1991	0	406	3	N	24	78	20	24	26	4.3	4	1.4			0	15.03	15.05	2	2	15.13	15.27	14	8	30	0.5
49P400065	A22	04/23/1991	0	411	3	N	24	78	20	21	25	3.6	3	0.9			0	14.52	14.53	1	2	15.13	15.27	14	8	30	0.5
49P400066	F 2	04/23/1991	0	419	2	N	24	78	20	21	28	4.1	4	1.4			0	14.30	14.31	1	2	15.13	15.27	14	8	30	0.5
49P400067	F 3	04/23/1991	0	421	4	N	24	78	20	19	27	3.6	4	1.2			0	14.30	14.32	2	2	15.13	15.27	14	8	30	0.5
49P400068	A23	04/23/1991	0	427	1	N	24	78	20	49	21	7.1	3	1.8			0	14.53	14.55	2	2	15.13	15.27	14	8	30	0.5
49P400069	H 3	04/23/1991	0	427	8	N	24	78	20	15	34	3.5	3	0.9			0	15.05	15.06	1	2	15.13	15.27	14	8	30	0.5
49P400070	H 4	04/23/1991	0	438	3	N	24	78	20	36	20	5.0	4	1.7			0	15.06	15.07	1	2	15.13	15.27	14	8	30	0.5
49P400071	A24	04/23/1991	0	444	3	N	24	78	20	26	24	4.3	4	1.4			0	14.55	14.56	1	2	15.13	15.27	14	8	30	0.5
49P400072	F 4	04/23/1991	0	450	1	N	24	78	20	20	21	2.9	3	0.7			0	14.32	14.33	1	2	15.13	15.27	14	8	30	0.5
49P400073	F 5	04/23/1991	0	455	3	N	24	78	20	38	21	5.5	3	1.4			0	14.33	14.34	1	2	15.13	15.27	14	8	30	0.5
49P400074	A25	04/23/1991	0	463	3	N	24	78	20	20	26	3.6	4	1.2			0	14.56	14.56	0	2	15.13	15.27	14	8	30	0.5
49P400075	H 5	04/23/1991	0	473	2	N	24	78	20	24	31	5.2	4	1.7			0	15.07	15.09	2	2	15.13	15.27	14	8	30	0.5
49P400076	H 6	04/23/1991	0	480	3	N	24	78	20	24	21	3.5	3	0.9			0	15.08	15.09	1	2	15.13	15.27	14	8	30	0.5
49P400077	A26	04/23/1991	0	482	4	N	24	78	20	16	25	2.8	3	0.7			0	14.56	14.57	1	2	15.13	15.27	14	8	30	0.5
49P400078	F 6	04/23/1991	0	488	3	N	24	78	20	22	27	4.1	3	1.0			0	14.34	14.36	2	2	15.13	15.27	14	8	30	0.5
49P400079	F 7	04/23/1991	0	493	3	N	24	78	20	26	23	4.2	3	1.0			0	14.35	14.36	1	2	15.13	15.27	14	8	30	0.5
49P400080	A27	04/23/1991	0	500	3	N	24	78	20	19	19	2.5	3	0.6			0	14.48	14.50	2	2	15.13	15.27	14	8	30	0.5
49P400081	H 7	04/23/1991	0	505	3	N	24	78	20	22	20	3.1	4	1.0			0	15.09	15.10	1	2	15.13	15.27	14	8	30	0.5
49P400082	H 8	04/23/1991	0	510	3	N	24	78	20	24	21	3.5	3	0.9			0	15.09	15.10	1	2	15.13	15.27	14	8	30	0.5
49P400083	A28	04/23/1991	0	514	5	N	24	78	20	25	25	4.3	3	1.1			0	14.52	14.54	2	2	15.13	15.27	14	8	30	0.5
49P400084	F 8	04/23/1991	0	520	2	N	24	78	20	24	21	3.5	3	0.9			0	14.37	14.39	2	2	15.13	15.27	14	8	30	0.5
49P400085	F 9	04/23/1991	0	528	3	N	24	78	20	45	22	6.9	3	1.7			0	14.39	14.41	2	2	15.13	15.27	14	8	30	0.5
49P400086	A29	04/23/1991	0	535	3	N	24	78	20	26	24	4.3	4	1.4			0	14.59	15.00	1	2	15.13	15.27	14	8	30	0.5
49P400087	H 9	04/23/1991	0	539	3	N	24	78	20	29	20	4.0	4	1.3			0	15.10	15.12	2	2	15.13	15.27	14	8	30	0.5
49P400088	H10	04/23/1991	0	545	3	N	24	78	20	31	15	3.2	3	0.8			0	15.12	15.13	1	2	15.13	15.27	14	8	30	0.5
49P400089	A30	04/23/1991	0	549	4	N	24	78	20	24	26	4.3	3	1.1			0	15.00	15.02	2	2	15.13	15.27	14	8	30	0.5
49P400090	F10	04/23/1991	0	554	4	N	24	78	20	28	27	5.3	3	1.3			0	14.42	14.44	2	2	15.13	15.27	14	8	30	0.5
Average	F											4.6		1.3			0.0			1.5							0.5
	A											4.2		1.2			0.0			1.4							0.5
	H											4.0		1.2			0.0			1.3							0.5

Table B-6. Summary of installation data for I-15 Frontage Road, Draper, Utah (continued)
UPM (edge seal) (B), Control (A), and UPM (semi-perm.) (C)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
49P400091	B 1	04/24/1991	0	561	2	N	24	50	20	22	24	3.7	3	0.9			0	13.17	13.18	1	2	13.42	13.50	8	8	20	0.4	
49P400092	A31	04/24/1991	0	565	2	N	24	50	20	17	22	2.6	3	0.6			0	13.19	13.20	1	2	13.42	13.50	8	8	20	0.4	
49P400093	C 1	04/24/1991	0	570	4	N	24	50	20	23	33	5.3	3	1.3	9.48	9.59	11	10.38	10.39	1	4	10.41	10.45	4	8	2	2.0	
49P400094	C 2	04/24/1991	0	575	2	N	24	50	20	22	31	4.7	3	1.2	9.53	9.59	6	10.39	10.40	1	4	10.41	10.45	4	8	2	2.0	
49P400095	A32	04/24/1991	0	579	2	N	24	50	20	26	24	4.3	3	1.1			0	13.20	13.21	1	2	13.42	13.50	8	8	20	0.4	
49P400096	B 2	04/24/1991	0	585	2	N	24	50	20	41	20	5.7	3	1.4			0	13.21	13.22	1	2	13.42	13.50	8	8	20	0.4	
49P400097	B 3	04/24/1991	0	593	2	N	24	50	20	29	20	4.0	3	1.0			0	13.22	13.23	1	2	13.42	13.50	8	8	20	0.4	
49P400098	A33	04/24/1991	0	598	2	N	24	50	20	32	18	4.0	3	1.0			0	13.22	13.24	2	2	13.42	13.50	8	8	20	0.4	
49P400099	C 3	04/24/1991	0	602	1	N	24	50	20	27	28	5.3	3	1.3	10.00	10.05	5	10.45	10.48	3	4	11.10	11.13	3	8	6	0.5	
49P400100	C 4	04/24/1991	0	608	2	N	24	50	20	23	25	4.0	3	1.0	10.02	10.07	5	10.46	10.48	2	4	11.10	11.13	3	8	6	0.5	
49P400101	A34	04/24/1991	0	612	3	N	24	50	20	27	27	5.1	3	1.3			0	13.24	13.25	1	2	13.42	13.50	8	8	20	0.4	
49P400102	B 4	04/24/1991	0	619	3	N	24	50	20	35	26	6.3	3	1.6			0	13.25	13.26	1	2	13.42	13.50	8	8	20	0.4	
49P400103	B 5	04/24/1991	0	624	3	N	24	50	20	30	18	3.8	3	0.9			0	13.27	13.28	1	2	13.42	13.50	8	8	20	0.4	
49P400104	A35	04/24/1991	0	627	5	N	24	50	20	18	26	3.3	3	0.8			0	13.28	13.30	2	2	13.42	13.50	8	8	20	0.4	
49P400105	C 5	04/24/1991	0	630	2	N	24	50	20	28	27	5.3	3	1.3	10.06	10.10	4	10.51	10.54	3	4	11.10	11.13	3	8	6	0.5	
49P400106	C 6	04/24/1991	0	636	3	N	24	50	20	27	30	5.6	3	1.4	10.08	10.13	5	10.54	10.58	4	4	11.10	11.13	3	8	6	0.5	
49P400107	A36	04/24/1991	0	640	3	N	24	50	20	33	22	5.0	3	1.3			0	13.30	13.32	2	2	13.42	13.50	8	8	20	0.4	
49P400108	B 6	04/24/1991	0	645	3	N	24	50	20	28	20	3.9	3	1.0			0	13.32	13.33	1	2	13.42	13.50	8	8	20	0.4	
49P400109	B 7	04/24/1991	0	650	3	N	24	50	20	27	29	5.4	4	1.8			0	13.32	13.33	1	2	13.42	13.50	8	8	20	0.4	
49P400110	A37	04/24/1991	0	654	10	N	24	50	20	30	23	4.8	2	0.8			0	13.33	13.34	1	2	13.42	13.50	8	8	20	0.4	
49P400111	C 7	04/24/1991	0	657	2	N	24	50	20	35	42	10.2	3	2.6	10.15	10.19	4	11.04	11.07	3	4	11.10	11.13	3	8	6	0.5	
49P400112	C 8	04/24/1991	0	661	4	N	24	50	20	32	27	6.0	3	1.5	10.20	10.25	5	11.05	11.09	4	4	11.10	11.13	3	8	6	0.5	
49P400113	A38	04/24/1991	0	668	1	N	24	50	20	30	22	4.6	3	1.1			0	13.34	13.35	1	2	13.42	13.50	8	8	20	0.4	
49P400114	B 8	04/24/1991	0	672	1	N	24	50	20	36	24	6.0	4	2.0			0	13.35	13.36	1	2	13.42	13.50	8	8	20	0.4	
49P400115	B 9	04/24/1991	0	679	3	N	24	50	20	24	16	2.7	3	0.7			0	13.36	13.38	2	2	13.42	13.50	8	8	20	0.4	
49P400116	A39	04/24/1991	0	683	2	N	24	50	20	37	21	5.4	4	1.8			0	13.36	13.38	2	2	13.42	13.50	8	8	20	0.4	
49P400117	C 9	04/24/1991	0	688	2	N	24	50	20	23	29	4.6	3	1.2	10.26	10.31	5	11.15	11.18	3	4	11.19	11.22	3	8	2	1.5	
49P400118	C10	04/24/1991	0	693	3	N	24	50	20	40	30	8.3	3	2.1	10.28	10.32	4	11.16	11.19	3	4	11.19	11.22	3	8	2	1.5	
49P400119	A40	04/24/1991	0	698	2	N	24	50	20	32	24	5.3	3	1.3			0	13.38	13.39	1	2	13.42	13.50	8	8	20	0.4	
49P400120	B10	04/24/1991	0	704	2	N	24	50	20	26	22	4.0	3	1.0			0	13.40	13.41	1	2	13.42	13.50	8	8	20	0.4	
Average	B											4.5		1.2			0.0			1.1								0.4
	A											4.4		1.1			0.0			1.4								0.4
	C											5.9		1.5			5.4			2.7								1.0

Table B-6. Summary of installation data for I-15 Frontage Road, Draper, Utah (continued)
QPR 2000 (I) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
49P400121	I 1	04/25/1991	0	712	3	N	24	39	70	15	21	2.2	3	0.5			0	10.02	10.03	1	2	6	10.29	10.35	6	20	0.3	
49P400122	A41	04/25/1991	0	724	3	N	24	39	70	28	19	3.7	3	0.9			0	10.12	10.13	1	2	6	10.29	10.35	6	20	0.3	
49P400123	I 2	04/25/1991	0	732	3	N	24	39	70	32	17	3.8	3	0.9			0	10.03	10.05	2	2	6	10.29	10.35	6	20	0.3	
49P400124	A42	04/25/1991	0	747	3	N	24	39	70	36	17	4.3	3	1.1			0	10.14	10.15	1	2	6	10.29	10.35	6	20	0.3	
49P400125	I 3	04/25/1991	0	754	4	N	24	39	70	25	15	2.6	3	0.7			0	10.05	10.06	1	2	6	10.29	10.35	6	20	0.3	
49P400126	A43	04/25/1991	0	759	3	N	24	39	70	16	27	3.0	3	0.8			0	10.15	10.16	1	2	6	10.29	10.35	6	20	0.3	
49P400127	I 4	04/25/1991	0	764	3	N	24	39	70	20	23	3.2	3	0.8			0	10.06	10.07	1	2	6	10.29	10.35	6	20	0.3	
49P400128	A44	04/25/1991	0	768	2	N	24	39	70	27	29	5.4	3	1.4			0	10.17	10.18	1	2	6	10.29	10.35	6	20	0.3	
49P400129	I 5	04/25/1991	0	775	3	N	24	39	70	29	22	4.4	3	1.1			0	10.07	10.08	1	2	6	10.29	10.35	6	20	0.3	
49P400130	A45	04/25/1991	0	781	2	N	24	39	70	34	28	6.6	3	1.7			0	10.14	10.21	7	2	6	10.29	10.35	6	20	0.3	
49P400131	I 6	04/25/1991	0	789	3	N	24	39	70	39	28	7.6	3	1.9			0	10.08	10.10	2	2	6	10.29	10.35	6	20	0.3	
49P400132	A46	04/25/1991	0	796	5	N	24	39	70	38	15	4.0	3	1.0			0	10.21	10.22	1	2	6	10.29	10.35	6	20	0.3	
49P400133	I 7	04/25/1991	0	802	3	N	24	39	70	27	28	5.3	3	1.3			0	10.10	10.12	2	2	6	10.29	10.35	6	20	0.3	
49P400134	A47	04/25/1991	0	809	3	N	24	39	70	43	15	4.5	3	1.1			0	10.22	10.23	1	2	6	10.29	10.35	6	20	0.3	
49P400135	I 8	04/25/1991	0	824	1	N	24	39	70	29	15	3.0	3	0.8			0	10.12	10.14	2	2	6	10.29	10.35	6	20	0.3	
49P400136	A48	04/25/1991	0	838	3	N	24	39	70	42	16	4.7	3	1.2			0	10.23	10.24	1	2	6	10.29	10.35	6	20	0.3	
49P400137	I 9	04/25/1991	0	846	3	N	24	39	70	22	20	3.1	3	0.8			0	10.14	10.15	1	2	6	10.29	10.35	6	20	0.3	
49P400138	A49	04/25/1991	0	851	2	N	24	39	70	27	21	3.9	3	1.0			0	10.24	10.26	2	2	6	10.29	10.35	6	20	0.3	
49P400139	I10	04/25/1991	0	856	3	N	24	39	70	24	22	3.7	3	0.9			0	10.15	10.17	2	2	6	10.29	10.35	6	20	0.3	
49P400140	A50	04/25/1991	0	867	3	N	24	39	70	36	21	5.3	3	1.3			0	10.26	10.28	2	2	6	10.29	10.35	6	20	0.3	
Average	I											3.9					0.0			1.5							0.3	
	A											4.5					0.0			1.8							0.3	

Table B-7. Summary of installation data for Rt. 28, Bradford, Vermont
Local material (F) and Control (A)

Patch ID	Matl	#	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
50P100001	F	1	05/13/1991	6	2405	2	S	20	76	40		24	16	2.7	3	0.7			0	13.37	13.38	1	2	13.58	14.04	6	8	20	0.3	
50P100002	A	1	05/13/1991	6	2397	2	S	20	76	40		18	16	2.0	4	0.7			0	13.48	13.49	1	2	13.58	14.04	6	8	20	0.3	
50P100003	F	2	05/13/1991	6	2390	3	S	20	76	40		24	18	3.0	3	0.8			0	13.38	13.39	1	2	13.58	14.04	6	8	20	0.3	
50P100004	A	2	05/13/1991	6	2389	9	S	20	76	40		23	19	3.0	3	0.8			0	13.49	13.50	1	2	13.58	14.04	6	8	20	0.3	
50P100005	F	3	05/13/1991	6	2379	3	S	20	76	40		27	16	3.0	3	0.8			0	13.39	13.40	1	2	13.58	14.04	6	8	20	0.3	
50P100006	A	3	05/13/1991	6	2367	9	S	20	76	40		27	18	3.4	3	0.8			0	13.50	13.51	1	2	13.58	14.04	6	8	20	0.3	
50P100007	F	4	05/13/1991	6	2366	3	S	20	76	40		21	17	2.5	2	0.4			0	13.40	13.41	1	2	13.58	14.04	6	8	20	0.3	
50P100008	A	4	05/13/1991	6	2357	8	S	20	76	40		15	14	1.5	2	0.2			0	13.50	13.51	1	2	13.58	14.04	6	8	20	0.3	
50P100009	F	5	05/13/1991	6	2336	9	S	20	76	40		29	20	4.0	2	0.7			0	13.40	13.41	1	2	13.58	14.04	6	8	20	0.3	
50P100010	A	5	05/13/1991	6	2327	9	S	20	76	40		28	12	2.3	2	0.4			0	13.51	13.52	1	2	13.58	14.04	6	8	20	0.3	
50P100011	F	6	05/13/1991	6	2314	9	S	20	76	40		19	13	1.7	3	0.4			0	13.41	13.42	1	2	13.58	14.04	6	8	20	0.3	
50P100012	A	6	05/13/1991	6	2303	3	S	20	76	40		19	13	1.7	3	0.4			0	13.52	13.53	1	2	13.58	14.04	6	8	20	0.3	
50P100013	F	7	05/13/1991	6	2299	8	S	20	76	40		34	16	3.8	3	0.9			0	13.42	13.43	1	2	13.58	14.04	6	8	20	0.3	
50P100014	A	7	05/13/1991	6	2296	3	S	20	76	40		24	12	2.0	3	0.5			0	13.53	13.54	1	2	13.58	14.04	6	8	20	0.3	
50P100015	F	8	05/13/1991	6	2287	8	S	20	76	40		24	15	2.5	2	0.4			0	13.42	13.43	1	2	13.58	14.04	6	8	20	0.3	
50P100016	A	8	05/13/1991	6	2278	8	S	20	76	40		22	19	2.9	2	0.5			0	13.53	13.54	1	2	13.58	14.04	6	8	20	0.3	
50P100017	F	9	05/13/1991	6	2268	8	S	20	76	40		19	24	3.2	2	0.5			0	13.43	13.44	1	2	13.58	14.04	6	8	20	0.3	
50P100018	A	9	05/13/1991	6	2256	9	S	20	76	40		20	17	2.4	2	0.4			0	13.54	13.55	1	2	13.58	14.04	6	8	20	0.3	
50P100019	F	10	05/13/1991	6	2247	8	S	20	76	40		24	21	3.5	2	0.6			0	13.44	13.45	1	2	13.58	14.04	6	8	20	0.3	
50P100020	A	10	05/13/1991	6	2236	8	S	20	76	40		27	20	3.8	2	0.6			0	13.55	13.56	1	2	13.58	14.04	6	8	20	0.3	
Average	F													3.0					0.0			1.0							0.3
	A													2.5					0.0			1.0							0.3

Table B-7. Summary of installation data for Rt. 28, Bradford, Vermont (continued) UPM (edge seal) (B), Control (A), and HFMS-2 (G)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
50P100021	B 1	05/14/1991	6	2227	9	S	20	63	50	29	18	3.6	2	0.6			0	9.48	9.49	1	2	10.18	10.26	8	6	20	0.4	
50P100022	A11	05/14/1991	6	2212	8	S	20	63	50	32	31	6.9	2	1.1			0	9.50	9.51	1	2	10.18	10.26	8	6	20	0.4	
50P100023	G 1	05/14/1991	6	2202	9	S	20	63	50	36	25	6.3	2	1.0			0	13.06	13.08	2	2	13.34	13.40	6	6	10	0.6	
50P100024	G 2	05/14/1991	6	2179	8	S	20	63	50	48	24	8.0	4	2.7			0	13.08	13.12	4	2	13.34	13.40	6	6	10	0.6	
50P100025	A12	05/14/1991	6	2162	8	S	20	63	50	27	19	3.6	2	0.6			0	9.51	9.52	1	2	10.18	10.26	8	6	20	0.4	
50P100026	B 2	05/14/1991	6	2153	8	S	20	63	50	34	18	4.3	2	0.7			0	9.52	9.53	1	2	10.18	10.26	8	6	20	0.4	
50P100027	B 3	05/14/1991	6	2145	8	S	20	63	50	39	21	5.7	2	0.9			0	9.53	9.54	1	2	10.18	10.26	8	6	20	0.4	
50P100028	A13	05/14/1991	6	2130	9	S	20	63	50	30	18	3.8	3	0.9			0	9.54	9.55	1	2	10.18	10.26	8	6	20	0.4	
50P100029	G 3	05/14/1991	6	2123	9	S	20	63	50	37	24	6.2	3	1.5			0	13.13	13.15	2	2	13.34	13.40	6	6	10	0.6	
50P100030	G 4	05/14/1991	6	2112	9	S	20	63	50	40	20	5.6	2	0.9			0	13.15	13.18	3	2	13.34	13.40	6	6	10	0.6	
50P100031	A14	05/14/1991	6	2101	9	S	20	63	50	36	18	4.5	5	1.9			0	9.55	9.57	2	2	10.18	10.26	8	6	20	0.4	
50P100032	B 4	05/14/1991	6	1928	9	S	20	63	50	38	24	6.3	4	2.1			0	9.57	9.58	1	2	10.18	10.26	8	6	20	0.4	
50P100033	B 5	05/14/1991	6	1923	9	S	20	63	50	44	24	7.3	3	1.8			0	9.58	10.00	2	2	10.18	10.26	8	6	20	0.4	
50P100034	A15	05/14/1991	6	1902	9	S	20	63	50	34	26	6.1	5	2.6			0	10.00	10.02	2	2	10.18	10.26	8	6	20	0.4	
50P100035	G 5	05/14/1991	6	1893	9	S	20	63	50	45	20	6.3	2	1.0			0	13.20	13.21	1	2	13.34	13.40	6	6	10	0.6	
50P100036	G 6	05/14/1991	6	1880	9	S	20	63	50	38	17	4.5	3	1.1			0	13.21	13.23	2	2	13.34	13.40	6	6	10	0.6	
50P100037	A16	05/14/1991	6	1872	9	S	20	63	50	32	22	4.9	5	2.0			0	10.03	10.05	2	2	10.18	10.26	8	6	20	0.4	
50P100038	B 6	05/14/1991	6	1860	9	S	20	63	50	32	16	3.6	6	1.8			0	10.05	10.06	1	2	10.18	10.26	8	6	20	0.4	
50P100039	B 7	05/14/1991	6	1851	9	S	20	63	50	28	16	3.1	5	1.3			0	10.06	10.07	1	2	10.18	10.26	8	6	20	0.4	
50P100040	A17	05/14/1991	6	1842	9	S	20	63	50	30	24	5.0	4	1.7			0	10.07	10.08	1	2	10.18	10.26	8	6	20	0.4	
50P100041	G 7	05/14/1991	6	1813	8	S	20	63	50	41	20	5.7	2	0.9			0	13.23	13.25	2	2	13.34	13.40	6	6	10	0.6	
50P100042	G 8	05/14/1991	6	1806	8	S	20	63	50	60	22	9.2	4	3.1			0	13.25	13.27	2	2	13.34	13.40	6	6	10	0.6	
50P100043	A18	05/14/1991	6	1798	9	S	20	63	50	42	14	4.1	5	1.7			0	10.08	10.09	1	2	10.18	10.26	8	6	20	0.4	
50P100044	B 8	05/14/1991	6	1787	9	S	20	63	50	34	22	5.2	4	1.7			0	10.09	10.10	1	2	10.18	10.26	8	6	20	0.4	
50P100045	B 9	05/14/1991	6	1781	9	S	20	63	50	50	18	6.3	3	1.6			0	10.10	10.12	2	2	10.18	10.26	8	6	20	0.4	
50P100046	A19	05/14/1991	6	1773	9	S	20	63	50	42	18	5.3	3	1.3			0	10.12	10.14	2	2	10.18	10.26	8	6	20	0.4	
50P100047	G 9	05/14/1991	6	1765	9	S	20	63	50	44	23	7.0	3	1.8			0	13.28	13.30	2	2	13.34	13.40	6	6	10	0.6	
50P100048	G10	05/14/1991	6	1755	8	S	20	63	50	36	24	6.0	3	1.5			0	13.30	13.32	2	2	13.34	13.40	6	6	10	0.6	
50P100049	A20	05/14/1991	6	1747	9	S	20	63	50	40	18	5.0	3	1.3			0	10.15	10.16	1	2	10.18	10.26	8	6	20	0.4	
50P100050	B10	05/14/1991	6	1740	9	S	20	63	50	46	20	6.4	6	3.2			0	10.16	10.17	1	2	10.18	10.26	8	6	20	0.4	
Average	B											5.2		1.6			0.0			1.2								0.4
	A											4.9		1.5			0.0			1.4								0.4
	G											6.5		1.6			0.0			2.2								0.6

Table B-7. Summary of installation data for Rt. 28, Bradford, Vermont (continued)
Perma-Patch (H), Control (A), and QPR 2000 (I)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
50P100051	H	1 05/15/1991	5	4752	8	S	20	60	45	16	21	2.3	2	0.4			0	9.24	9.27	3	2	10.05	10.12	7	6	30	0.2	
50P100052	A	21 05/15/1991	5	4747	7	S	20	60	45	16	14	1.6	2	0.3			0	9.46	9.47	1	2	10.05	10.12	7	6	30	0.2	
50P100053	I	1 05/15/1991	5	4741	7	S	20	60	45	27	17	3.2	3	0.8			0	9.25	9.26	1	2	10.05	10.12	7	6	30	0.2	
50P100054	I	2 05/15/1991	5	4731	8	S	20	60	45	36	16	4.0	2	0.7			0	9.26	9.27	1	2	10.05	10.12	7	6	30	0.2	
50P100055	A	22 05/15/1991	5	4722	8	S	20	60	45	44	17	5.2	2	0.9			0	9.47	9.48	1	2	10.05	10.12	7	6	30	0.2	
50P100056	H	2 05/15/1991	5	4717	8	S	20	60	45	36	21	5.3	3	1.3			0	9.27	9.28	1	2	10.05	10.12	7	6	30	0.2	
50P100057	H	3 05/15/1991	5	4708	8	S	20	60	45	30	18	3.8	2	0.6			0	9.28	9.30	2	2	10.05	10.12	7	6	30	0.2	
50P100058	A	23 05/15/1991	5	4702	8	S	20	60	45	38	20	5.3	2	0.9			0	9.48	9.50	2	2	10.05	10.12	7	6	30	0.2	
50P100059	I	3 05/15/1991	5	4692	8	S	20	60	45	38	20	5.3	3	1.3			0	9.29	9.31	2	2	10.05	10.12	7	6	30	0.2	
50P100060	I	4 05/15/1991	5	4680	8	S	20	60	45	28	19	3.7	2	0.6			0	9.31	9.33	2	2	10.05	10.12	7	6	30	0.2	
50P100061	A	24 05/15/1991	5	4675	8	S	20	60	45	29	18	3.6	3	0.9			0	9.50	9.51	1	2	10.05	10.12	7	6	30	0.2	
50P100062	H	4 05/15/1991	5	4669	8	S	20	60	45	35	18	4.4	3	1.1			0	9.32	9.35	3	2	10.05	10.12	7	6	30	0.2	
50P100063	H	5 05/15/1991	5	4662	9	S	20	60	45	38	13	3.4	2	0.6			0	9.32	9.35	3	2	10.05	10.12	7	6	30	0.2	
50P100064	A	25 05/15/1991	5	4654	9	S	20	60	45	36	21	5.3	3	1.3			0	9.52	9.54	2	2	10.05	10.12	7	6	30	0.2	
50P100065	I	5 05/15/1991	5	4649	2	S	20	60	45	25	16	2.8	2	0.5			0	9.35	9.36	1	2	10.05	10.12	7	6	30	0.2	
50P100066	I	6 05/15/1991	5	4647	9	S	20	60	45	32	16	3.6	2	0.6			0	9.36	9.38	2	2	10.05	10.12	7	6	30	0.2	
50P100067	A	26 05/15/1991	5	4638	9	S	20	60	45	33	17	3.9	3	1.0			0	9.54	9.55	1	2	10.05	10.12	7	6	30	0.2	
50P100068	H	6 05/15/1991	5	4636	1	S	20	60	45	29	13	2.6	3	0.7			0	9.37	9.38	1	2	10.05	10.12	7	6	30	0.2	
50P100069	H	7 05/15/1991	5	4629	2	S	20	60	45	25	21	3.6	3	0.9			0	9.38	9.40	2	2	10.05	10.12	7	6	30	0.2	
50P100070	A	27 05/15/1991	5	4623	9	S	20	60	45	59	24	9.8	2	1.6			0	9.56	9.58	2	2	10.05	10.12	7	6	30	0.2	
50P100071	I	7 05/15/1991	5	4620	2	S	20	60	45	27	16	3.0	2	0.5			0	9.39	9.40	1	2	10.05	10.12	7	6	30	0.2	
50P100072	I	8 05/15/1991	5	4615	9	S	20	60	45	28	18	3.5	3	0.9			0	9.40	9.42	2	2	10.05	10.12	7	6	30	0.2	
50P100073	A	28 05/15/1991	5	4608	9	S	20	60	45	25	22	3.8	3	1.0			0	9.58	9.59	1	2	10.05	10.12	7	6	30	0.2	
50P100074	H	8 05/15/1991	5	4604	3	S	20	60	45	27	18	3.4	3	0.8			0	9.45	9.46	1	2	10.05	10.12	7	6	30	0.2	
50P100075	H	9 05/15/1991	5	4598	8	S	20	60	45	67	32	14.9	3	3.7			0	9.47	9.48	1	2	10.05	10.12	7	6	30	0.2	
50P100076	A	29 05/15/1991	5	4593	3	S	20	60	45	32	15	3.3	2	0.6			0	9.59	10.00	1	2	10.05	10.12	7	6	30	0.2	
50P100077	I	9 05/15/1991	5	4591	8	S	20	60	45	33	24	5.5	2	0.9			0	9.50	9.52	2	2	10.05	10.12	7	6	30	0.2	
50P100078	I	10 05/15/1991	5	4588	3	S	20	60	45	33	24	5.5	3	1.4			0	9.52	9.53	1	2	10.05	10.12	7	6	30	0.2	
50P100079	A	30 05/15/1991	5	4571	9	S	20	60	45	47	31	10.1	2	1.7			0	10.00	10.02	2	2	10.05	10.12	7	6	30	0.2	
50P100080	H	10 05/15/1991	5	4565	9	S	20	60	45	30	19	4.0	2	0.7			0	9.54	9.56	2	2	10.05	10.12	7	6	30	0.2	
Average	H											4.8		1.1			0.0			1.9								0.2
	A											5.2		1.0			0.0			1.4								0.2
	I											4.0		0.8			0.0			1.5								0.2

Table B-7. Summary of installation data for Rt. 28, Bradford, Vermont (continued) PennDOT 485 (D), Control (A), and PennDOT 486 (E)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
50P100081	D 1	05/15/1991	5	3661	9	S	20		73		35	32	21	4.7	3	1.2			0	13.42	13.43	1	2	14.18	14.24	6	6	30		0.2
50P100082	A31	05/15/1991	5	3655	9	S	20		73		35	26	22	4.0	2	0.7			0	14.04	14.05	1	2	14.18	14.24	6	6	30		0.2
50P100083	E 1	05/15/1991	5	3649	9	S	20		73		35	32	23	5.1	2	0.9			0	13.43	13.44	1	2	14.18	14.24	6	6	30		0.2
50P100084	E 2	05/15/1991	5	3644	9	S	20		73		35	22	27	4.1	2	0.7			0	13.44	13.45	1	2	14.18	14.24	6	6	30		0.2
50P100085	A32	05/15/1991	5	3635	9	S	20		73		35	20	20	2.8	2	0.5			0	14.05	14.06	1	2	14.18	14.24	6	6	30		0.2
50P100086	D 2	05/15/1991	5	3627	9	S	20		73		35	21	31	4.5	3	1.1			0	13.45	13.47	2	2	14.18	14.24	6	6	30		0.2
50P100087	D 3	05/15/1991	5	3621	9	S	20		73		35	34	27	6.4	2	1.1			0	13.45	13.47	2	2	14.18	14.24	6	6	30		0.2
50P100088	A33	05/15/1991	5	3615	9	S	20		73		35	26	22	4.0	2	0.7			0	14.06	14.07	1	2	14.18	14.24	6	6	30		0.2
50P100089	E 3	05/15/1991	5	3609	9	S	20		73		35	45	23	7.2	3	1.8			0	13.48	13.50	2	2	14.18	14.24	6	6	30		0.2
50P100090	E 4	05/15/1991	5	3603	9	S	20		73		35	26	26	4.7	2	0.8			0	13.50	13.52	2	2	14.18	14.24	6	6	30		0.2
50P100091	A34	05/15/1991	5	3597	9	S	20		73		35	34	21	5.0	2	0.8			0	14.07	14.09	2	2	14.18	14.24	6	6	30		0.2
50P100092	D 4	05/15/1991	5	3591	9	S	20		73		35	29	19	3.8	2	0.6			0	13.52	13.53	1	2	14.18	14.24	6	6	30		0.2
50P100093	D 5	05/15/1991	5	3584	9	S	20		73		35	32	21	4.7	2	0.8			0	13.53	13.54	1	2	14.18	14.24	6	6	30		0.2
50P100094	A35	05/15/1991	5	3578	9	S	20		73		35	26	16	2.9	3	0.7			0	14.09	14.10	1	2	14.18	14.24	6	6	30		0.2
50P100095	E 5	05/15/1991	5	3572	9	S	20		73		35	25	34	5.9	2	1.0			0	13.54	13.55	1	2	14.18	14.24	6	6	30		0.2
50P100096	E 6	05/15/1991	5	3566	9	S	20		73		35	26	29	5.2	2	0.9			0	13.55	13.57	2	2	14.18	14.24	6	6	30		0.2
50P100097	A36	05/15/1991	5	3559	9	S	20		73		35	32	21	4.7	2	0.8			0	14.10	14.12	2	2	14.18	14.24	6	6	30		0.2
50P100098	D 6	05/15/1991	5	3551	9	S	20		73		35	46	39	12.5	2	2.1			0	13.57	13.59	2	2	14.18	14.24	6	6	30		0.2
50P100099	D 7	05/15/1991	5	3545	8	S	20		73		35	28	21	4.1	3	1.0			0	13.59	14.00	1	2	14.18	14.24	6	6	30		0.2
50P100100	A37	05/15/1991	5	3540	8	S	20		73		35	16	19	2.1	3	0.5			0	14.12	14.13	1	2	14.18	14.24	6	6	30		0.2
50P100101	E 7	05/15/1991	5	3467	9	S	20		73		35	20	20	2.8	3	0.7			0	14.00	14.01	1	2	14.18	14.24	6	6	30		0.2
50P100102	E 8	05/15/1991	5	3444	9	S	20		73		35	22	30	4.6	2	0.8			0	14.01	14.03	2	2	14.18	14.24	6	6	30		0.2
50P100103	A38	05/15/1991	5	3436	9	S	20		73		35	24	22	3.7	3	0.9			0	14.13	14.14	1	2	14.18	14.24	6	6	30		0.2
50P100104	D 8	05/15/1991	5	3424	9	S	20		73		35	20	21	2.9	2	0.5			0	14.04	14.05	1	2	14.18	14.24	6	6	30		0.2
50P100105	D 9	05/15/1991	5	3343	9	S	20		73		35	30	12	2.5	2	0.4			0	14.05	14.06	1	2	14.18	14.24	6	6	30		0.2
50P100106	A39	05/15/1991	5	3339	9	S	20		73		35	36	14	3.5	3	0.9			0	14.14	14.15	1	2	14.18	14.24	6	6	30		0.2
50P100107	E 9	05/15/1991	5	3321	9	S	20		73		35	35	26	6.3	2	1.1			0	14.07	14.09	2	2	14.18	14.24	6	6	30		0.2
50P100108	E10	05/15/1991	5	3312	9	S	20		73		35	36	22	5.5	3	1.4			0	14.09	14.11	2	2	14.18	14.24	6	6	30		0.2
50P100109	A40	05/15/1991	5	3303	9	S	20		73		35	32	27	6.0	2	1.0			0	14.15	14.16	1	2	14.18	14.24	6	6	30		0.2
50P100110	D10	05/15/1991	5	3300	9	S	20		73		35	24	21	3.5	2	0.6			0	14.14	14.15	1	2	14.18	14.24	6	6	30		0.2
Average	D													5.0		0.9			0.0			1.3								0.2
	A													3.9		0.7			0.0			1.2								0.2
	E													5.1		1.0			0.0			1.6								0.2

Table B-7. Summary of installation data for Rt. 28, Bradford, Vermont (continued)
Spray injection (J), Control (A), and UPM (semi-perm.) (C)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg Comp
50P100111	J 1	05/16/1991	5	3282	8	S	20	75	30	35	18	4.4	3	1.1			0	11.45	11.47	2	2			0	0	0	
50P100112	A41	05/16/1991	5	3273	9	S	20	75	30	37	26	6.7	2	1.1			0	11.30	11.32	2	2	11.37	11.40	3	6	4	0.8
50P100113	C 1	05/16/1991	5	3266	9	S	20	75	30	37	24	6.2	4	2.1	10.45	10.50	5	10.55	10.56	1	4	10.59	11.01	2	8	2	1.0
50P100114	C 2	05/16/1991	5	3261	9	S	20	75	30	40	24	6.7	4	2.2	10.50	10.54	4	10.56	10.57	1	4	10.59	11.01	2	8	2	1.0
50P100115	A42	05/16/1991	5	3255	9	S	20	75	30	37	25	6.4	4	2.1			0	11.33	11.34	1	2	11.37	11.40	3	6	4	0.8
50P100116	J 2	05/16/1991	5	3249	9	S	20	75	30	34	28	6.6	2	1.1			0	11.49	11.51	2	2			0	0	0	
50P100117	J 3	05/16/1991	5	3243	9	S	20	75	30	28	20	3.9	3	1.0			0	11.51	11.53	2	2			0	0	0	
50P100118	A43	05/16/1991	5	3238	9	S	20	75	30	42	24	7.0	2	1.2			0	11.34	11.35	1	2	11.37	11.40	3	6	4	0.8
50P100119	C 3	05/16/1991	5	3234	9	S	20	75	30	38	21	5.5	3	1.4	10.55	11.00	5	11.07	11.08	1	4	11.10	11.12	2	7	2	1.0
50P100120	C 4	05/16/1991	5	3226	9	S	20	75	30	41	19	5.4	3	1.4	11.01	11.06	5	11.08	11.09	1	4	11.10	11.12	2	7	2	1.0
50P100121	A44	05/16/1991	5	3221	9	S	20	75	30	28	16	3.1	2	0.5			0	11.35	11.37	2	2	11.37	11.40	3	6	4	0.8
50P100122	J 4	05/16/1991	5	3206	9	S	20	75	30	34	21	5.0	3	1.2			0	11.55	11.57	2	2			0	0	0	
50P100123	J 5	05/16/1991	5	3171	9	S	20	75	30	30	16	3.3	3	0.8			0	11.58	12.00	2	2			0	0	0	
50P100124	A45	05/16/1991	5	3165	9	S	20	75	30	31	17	3.7	3	0.9			0	11.40	11.41	1	2	11.48	11.51	3	6	4	0.7
50P100125	C 5	05/16/1991	5	3157	9	S	20	75	30	33	15	3.4	3	0.9	11.07	11.11	4	11.16	11.17	1	4	11.19	11.21	2	8	2	1.0
50P100126	C 6	05/16/1991	5	3144	9	S	20	75	30	37	19	4.9	4	1.6	11.11	11.15	4	11.17	11.18	1	4	11.19	11.21	2	8	2	1.0
50P100127	A46	05/16/1991	5	3130	9	S	20	75	30	41	21	6.0	3	1.5			0	11.41	11.43	2	2	11.48	11.51	3	6	4	0.7
50P100128	J 6	05/16/1991	5	3121	9	S	20	75	30	35	21	5.1	4	1.7			0	12.05	12.08	3	2			0	0	0	
50P100129	J 7	05/16/1991	5	3111	9	S	20	75	30	31	18	3.9	5	1.6			0	12.09	12.11	2	2			0	0	0	
50P100130	A47	05/16/1991	5	3102	9	S	20	75	30	35	18	4.4	4	1.5			0	11.43	11.44	1	2	11.48	11.51	3	6	4	0.7
50P100131	C 7	05/16/1991	5	3093	9	S	20	75	30	46	20	6.4	3	1.6	11.16	11.20	4	11.21	11.23	2	4	11.26	11.28	2	8	2	1.0
50P100132	C 8	05/16/1991	5	3084	9	S	20	75	30	38	22	5.8	4	1.9	11.20	11.23	3	11.24	11.25	1	4	11.26	11.28	2	8	2	1.0
50P100133	A48	05/16/1991	5	3075	9	S	20	75	30	34	20	4.7	3	1.2			0	11.45	11.47	2	2	11.48	11.51	3	6	4	0.7
50P100134	J 8	05/16/1991	5	3067	9	S	20	75	30	36	23	5.8	3	1.4			0	12.15	12.18	3	2			0	0	0	
50P100135	J 9	05/16/1991	5	3061	9	S	20	75	30	36	19	4.8	3	1.2			0	12.19	12.21	2	2			0	0	0	
50P100136	A49	05/16/1991	5	3053	9	S	20	75	30	36	19	4.8	3	1.2			0	11.53	11.54	1	2	11.57	11.59	2	6	2	1.0
50P100137	C 9	05/16/1991	5	3043	9	S	20	75	30	36	18	4.5	3	1.1	11.24	11.28	4	11.32	11.33	1	4	11.36	11.38	2	8	2	1.0
50P100138	C10	05/16/1991	5	3037	9	S	20	75	30	38	16	4.2	3	1.1	11.28	11.31	3	11.33	11.35	2	4	11.36	11.38	2	8	2	1.0
50P100139	A50	05/16/1991	5	3020	9	S	20	75	30	37	24	6.2	4	2.1			0	11.55	11.56	1	2	11.57	11.59	2	6	2	1.0
50P100140	J10	05/16/1991	5	3012	9	S	20	75	30	44	19	5.8	4	1.9			0	12.32	12.35	3	2			0	0	0	
Average	J											4.8		1.3			0.0			2.3							0.0
	A											5.3		1.3			0.0			1.4							0.8
	C											5.3		1.5			4.1			1.2							1.0

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario PennDOT 485 (D), Control (A), and Control (B)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
87P700001	D 1	01/06/1992		54707	8	E	24	36	30	12	12	1.0	2	0.2			0	10.00	10.01	1		10.12	10.14	2	8	6	0.3
87P700002	A 1	01/06/1992		54696	6	E	24	36	30	15	14	1.5	2	0.2			0	10.02	10.03	1		10.12	10.14	2	8	6	0.3
87P700003	B 1	01/06/1992		54684	9	E	24	36	30	15	18	1.9	2	0.3			0	10.02	10.03	1		10.12	10.14	2	8	6	0.3
87P700004	B 2	01/06/1992		54671	10	E	24	36	30	18	12	1.5	2	0.3			0	10.03	10.04	1		10.12	10.14	2	8	6	0.3
87P700005	A 2	01/06/1992		54665	8	E	24	36	30	21	21	3.1	2	0.5			0	10.03	10.04	1		10.12	10.14	2	8	6	0.3
87P700006	D 2	01/06/1992		54662	9	E	24	36	30	20	15	2.1	1	0.2			0	10.02	10.03	1		10.12	10.14	2	8	6	0.3
87P700007	D 3	01/06/1992		54642	2	W	24	36	30	20	12	1.7	1	0.1			0	10.07	10.08	1		10.16	10.19	3	8	3	1.0
87P700008	A 3	01/06/1992		54639	10	W	24	36	30	15	15	1.6	2	0.3			0	10.08	10.09	1		10.16	10.19	3	8	3	1.0
87P700009	B 3	01/06/1992		54612	3	W	24	36	30	15	18	1.9	2	0.3			0	10.09	10.10	1		10.16	10.19	3	8	3	1.0
87P700010	B 4	01/06/1992		54076	12	C	24	36	30	18	12	1.5	2	0.3			0	10.59	11.00	1		11.03	11.06	3	8	6	0.5
87P700011	A 4	01/06/1992		54070	6	E	24	36	30	22	12	1.8	2	0.3			0	10.59	11.01	2		11.03	11.06	3	8	6	0.5
87P700012	D 4	01/06/1992		54067	9	E	24	36	30	18	18	2.3	2	0.4			0	11.00	11.01	1		11.03	11.06	3	8	6	0.5
87P700013	D 5	01/06/1992		54063	6	E	24	36	30	15	15	1.6	1	0.1			0	11.00	11.01	1		11.03	11.06	3	8	6	0.5
87P700014	A 5	01/06/1992		54062	10	E	24	36	30	18	12	1.5	2	0.3			0	11.00	11.02	2		11.03	11.06	3	8	6	0.5
87P700015	B 5	01/06/1992		54059	6	E	24	36	30	24	21	3.5	1	0.3			0	11.01	11.02	1		11.03	11.06	3	8	6	0.5
87P700016	B 6	01/06/1992		52868	8	W	24	36	30	18	15	1.9	2	0.3			0	11.20	11.21	1		11.25	11.26	1	8	6	0.2
87P700017	A 6	01/06/1992		52863	4	W	24	36	30	20	12	1.7	2	0.3			0	11.20	11.22	2		11.25	11.26	1	8	6	0.2
87P700018	D 6	01/06/1992		52862	6	W	24	36	30	12	12	1.0	2	0.2			0	11.21	11.22	1		11.25	11.26	1	8	6	0.2
87P700019	D 7	01/06/1992		52859	6	W	24	36	30	21	15	2.2	2	0.4			0	11.21	11.22	1		11.25	11.26	1	8	6	0.2
87P700020	A 7	01/06/1992		52856	12	C	24	36	30	24	15	2.5	2	0.4			0	11.22	11.23	1		11.25	11.26	1	8	6	0.2
87P700021	B 7	01/06/1992		52845	12	C	24	36	30	15	12	1.3	2	0.2			0	11.23	11.24	1		11.25	11.26	1	8	6	0.2
87P700022	B 8	01/06/1992		52619	9	W	24	36	30	18	12	1.5	2	0.3			0	13.58	13.59	1		14.07	14.10	3	8	12	0.2
87P700023	A 8	01/06/1992		52608	8	W	24	36	30	20	15	2.1	2	0.3			0	13.58	13.59	1		14.07	14.10	3	8	12	0.2
87P700024	D 8	01/06/1992		52592	10	W	24	36	30	18	12	1.5	2	0.3			0	13.58	14.00	2		14.07	14.10	3	8	12	0.2
87P700025	D 9	01/06/1992		52590	1	W	24	36	30	20	20	2.8	2	0.5			0	14.00	14.01	1		14.07	14.10	3	8	12	0.2
87P700026	A 9	01/06/1992		52584	8	W	24	36	30	20	15	2.1	2	0.3			0	14.00	14.02	2		14.07	14.10	3	8	12	0.2
87P700027	B 9	01/06/1992		52581	7	W	24	36	30	20	15	2.1	2	0.3			0	14.01	14.02	1		14.07	14.10	3	8	12	0.2
87P700028	B10	01/06/1992		52573	7	W	24	36	30	20	12	1.7	2	0.3			0	14.01	14.02	1		14.07	14.10	3	8	12	0.2
87P700029	A10	01/06/1992		52563	11	W	24	36	30	21	18	2.6	2	0.4			0	14.02	14.03	1		14.07	14.10	3	8	12	0.2
87P700030	D10	01/06/1992		52554	11	W	24	36	30	20	15	2.1	2	0.3			0	14.02	14.04	2		14.07	14.10	3	8	12	0.2
Average	D											1.8		0.3			0.0			1.2							0.4
	A											2.0		0.3			0.0			1.4							0.4
	B											1.9		0.3			0.0			1.0							0.4

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued)
Local material (F), Control (A), and PennDOT 485 (M)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Reim	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Placement Min	Placement Begin	Placement End	Crew	Compaction Min	Compaction Begin	Compaction End	Passes	Group	Avg	Comp
87P700031	F 1	01/06/1992		52552	11	W	24		36		30	24	15	2.5	2	0.4			0	14.03	14.05	2		14.07	14.10	3	8	12	0.2
87P700032	A11	01/06/1992		52548	11	W	24		36		30	15	12	1.3	2	0.2			0	14.04	14.05	1		14.07	14.10	3	8	12	0.2
87P700033	M 1	01/06/1992		52541	11	W	24		36		30	18	15	1.9	2	0.3			0	14.04	14.05	1		14.07	14.10	3	8	12	0.2
87P700034	M 2	01/06/1992		52453	3	W	24		36		30	24	12	2.0	2	0.3			0	14.21	14.22	1		14.26	14.29	3	8	7	0.4
87P700035	A12	01/06/1992		52448	1	W	24		36		30	21	15	2.2	2	0.4			0	14.21	14.22	1		14.26	14.29	3	8	7	0.4
87P700036	F 2	01/06/1992		52444	1	W	24		36		30	60	15	6.3	2	1.0			0	14.21	14.23	2		14.26	14.29	3	8	7	0.4
87P700037	F 3	01/06/1992		52425	5	W	24		36		30	15	12	1.3	2	0.2			0	14.22	14.23	1		14.26	14.29	3	8	7	0.4
87P700038	A13	01/06/1992		52417	3	W	24		36		30	18	15	1.9	2	0.3			0	14.23	14.25	2		14.26	14.29	3	8	7	0.4
87P700039	M 3	01/06/1992		52413	1	W	24		36		30	20	12	1.7	2	0.3			0	14.23	14.24	1		14.26	14.29	3	8	7	0.4
87P700040	M 4	01/06/1992		52409	6	W	24		36		30	20	15	2.1	2	0.3			0	14.24	14.25	1		14.26	14.29	3	8	7	0.4
87P700041	A14	01/06/1992		52289	2	W	24		36		30	15	15	1.6	2	0.3			0	14.33	14.34	1		14.35	14.37	2	8	6	0.3
87P700042	F 4	01/06/1992		52284	1	W	24		36		30	20	20	2.8	2	0.5			0	14.33	14.34	1		14.35	14.37	2	8	6	0.3
87P700043	F 5	01/06/1992		52279	1	W	24		36		30	24	20	3.3	2	0.6			0	14.33	14.35	2		14.35	14.37	2	8	6	0.3
87P700044	A15	01/06/1992		52276	12	C	24		36		30	18	18	2.3	2	0.4			0	14.34	14.35	1		14.35	14.37	2	8	6	0.3
87P700045	M 5	01/06/1992		52266	12	C	24		36		30	20	12	1.7	2	0.3			0	14.34	14.35	1		14.35	14.37	2	8	6	0.3
87P700046	M 6	01/06/1992		52261	12	C	24		36		30	24	12	2.0	2	0.3			0	14.34	14.35	1		14.35	14.37	2	8	6	0.3
87P700047	A16	01/06/1992		52208	4	W	24		36		30	20	15	2.1	2	0.3			0	14.38	14.39	1		14.48	14.52	4	8	8	0.5
87P700048	F 6	01/06/1992		52202	5	W	24		36		30	15	12	1.3	2	0.2			0	14.38	14.39	1		14.48	14.52	4	8	8	0.5
87P700049	F 7	01/06/1992		52200	12	C	24		36		30	60	20	8.3	2	1.4			0	14.38	14.40	2		14.48	14.52	4	8	8	0.5
87P700050	A17	01/06/1992		52191	1	W	24		36		30	18	18	2.3	2	0.4			0	14.39	14.40	1		14.48	14.52	4	8	8	0.5
87P700051	M 7	01/06/1992		52193	3	W	24		36		30	30	20	4.2	2	0.7			0	14.39	14.41	2		14.48	14.52	4	8	8	0.5
87P700052	M 8	01/06/1992		52186	12	C	24		36		30	20	12	1.7	2	0.3			0	14.40	14.42	2		14.48	14.52	4	8	8	0.5
87P700053	A18	01/06/1992		52180	12	C	24		36		30	18	12	1.5	2	0.3			0	14.41	14.43	2		14.48	14.52	4	8	8	0.5
87P700054	F 8	01/06/1992		52178	4	W	24		36		30	21	15	2.2	2	0.4			0	14.42	14.43	1		14.48	14.52	4	8	8	0.5
87P700055	F 9	01/07/1992		52176	2	W	24		30		40	36	36	9.0	2	1.5			0	9.03	9.04	1		9.06	9.07	1	8	2	0.5
87P700056	A19	01/06/1992		52169	2	W	24		36		30	30	30	6.3	2	1.0			0	14.43	14.44	1		14.48	14.52	4	8	4	1.0
87P700057	M 9	01/06/1992		52152	0	W	24		36		30	20	12	1.7	2	0.3			0	14.43	14.44	1		14.48	14.52	4	8	4	1.0
87P700058	M10	01/06/1992		52142	0	W	24		36		30	30	18	3.8	2	0.6			0	14.44	14.45	1		14.48	14.52	4	8	4	1.0
87P700059	A20	01/06/1992		52137	12	C	24		36		30	30	15	3.1	2	0.5			0	14.45	14.46	1		14.48	14.52	4	8	4	1.0
87P700060	F10	01/07/1992		52133	12	C	24		30		40	30	18	3.8	2	0.6			0	9.04	9.06	2		9.06	9.07	1	8	2	0.5
Average	F													4.1		0.7			0.0			1.5						0.4
	A													2.4		0.4			0.0			1.2						0.5
	M													2.3		0.4			0.0			1.2						0.5

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued) QPR 2000 (I), Control (A), and QPR 2000 (K)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
87P700061	I 1	01/07/1992		52031	7	W	24	30	40	12	12	1.0	2	0.2			0	9.03	9.04	1		9.26	9.29	3	8	6	0.5	
87P700062	A21	01/07/1992		52024	7	W	24	30	40	12	12	1.0	2	0.2			0	9.04	9.05	1		9.26	9.29	3	8	6	0.5	
87P700063	K 1	01/07/1992		52011	7	W	24	30	40	12	12	1.0	2	0.2			0	9.06	9.07	1		9.26	9.29	3	8	6	0.5	
87P700064	K 2	01/07/1992		52007	7	W	24	30	40	24	12	2.0	2	0.3			0	9.06	9.08	2		9.26	9.29	3	8	6	0.5	
87P700065	A22	01/07/1992		51988	12	C	24	30	40	12	18	1.5	2	0.3			0	9.08	9.09	1		9.26	9.29	3	8	6	0.5	
87P700066	I 2	01/07/1992		51971	12	C	24	30	40	12	12	1.0	2	0.2			0	9.09	9.10	1		9.26	9.29	3	8	6	0.5	
87P700067	I 3	01/07/1992		51880	6	W	24	30	40	18	15	1.9	2	0.3			0	9.30	9.31	1		9.34	9.36	2	8	6	0.3	
87P700068	A23	01/07/1992		51876	10	W	24	30	40	18	15	1.9	2	0.3			0	9.30	9.32	2		9.34	9.36	2	8	6	0.3	
87P700069	K 3	01/07/1992		51872	1	W	24	30	40	20	12	1.7	2	0.3			0	9.31	9.33	2		9.34	9.36	2	8	6	0.3	
87P700070	K 4	01/07/1992		51866	1	W	24	30	40	18	12	1.5	2	0.3			0	9.32	9.34	2		9.34	9.36	2	8	6	0.3	
87P700071	A24	01/07/1992		51864	3	W	24	30	40	18	18	2.3	2	0.4			0	9.33	9.34	1		9.34	9.36	2	8	6	0.3	
87P700072	I 4	01/07/1992		51860	2	W	24	30	40	18	15	1.9	2	0.3			0	9.33	9.34	1		9.34	9.36	2	8	6	0.3	
87P700073	I 5	01/07/1992		51780	4	W	24	30	40	15	12	1.3	2	0.2			0	9.53	9.54	1		10.02	10.09	7	8	18	0.4	
87P700074	A25	01/07/1992		51772	2	W	24	30	40	20	15	2.1	2	0.3			0	9.53	9.54	1		10.02	10.09	7	8	18	0.4	
87P700075	K 5	01/07/1992		51766	3	W	24	30	40	24	15	2.5	3	0.6			0	9.53	9.55	2		10.02	10.09	7	8	18	0.4	
87P700076	K 6	01/07/1992		51761	2	W	24	30	40	12	12	1.0	2	0.2			0	9.54	9.55	1		10.02	10.09	7	8	18	0.4	
87P700077	A26	01/07/1992		51756	3	W	24	30	40	24	18	3.0	2	0.5			0	9.54	9.55	1		10.02	10.09	7	8	18	0.4	
87P700078	I 6	01/07/1992		51752	4	W	24	30	40	15	12	1.3	2	0.2			0	9.55	9.56	1		10.02	10.09	7	8	18	0.4	
87P700079	I 7	01/07/1992		51740	3	W	24	30	40	30	15	3.1	2	0.5			0	9.55	9.56	1		10.02	10.09	7	8	18	0.4	
87P700080	A27	01/07/1992		51734	3	W	24	30	40	18	15	1.9	2	0.3			0	9.55	9.57	2		10.02	10.09	7	8	18	0.4	
87P700081	K 7	01/07/1992		51728	12	C	24	30	40	18	12	1.5	2	0.3			0	9.56	9.57	1		10.02	10.09	7	8	18	0.4	
87P700082	K 8	01/07/1992		51714	11	W	24	30	40	15	15	1.6	2	0.3			0	9.56	9.57	1		10.02	10.09	7	8	18	0.4	
87P700083	A28	01/07/1992		51701	2	W	24	30	40	15	12	1.3	2	0.2			0	9.56	9.57	1		10.02	10.09	7	8	18	0.4	
87P700084	I 8	01/07/1992		51688	3	W	24	30	40	20	20	2.8	2	0.5			0	9.56	9.58	2		10.02	10.09	7	8	18	0.4	
87P700085	I 9	01/07/1992		51664	8	W	24	30	40	12	12	1.0	2	0.2			0	9.57	9.59	2		10.02	10.09	7	8	18	0.4	
87P700086	A29	01/07/1992		51661	12	C	24	30	40	12	12	1.0	2	0.2			0	9.58	9.59	1		10.02	10.09	7	8	18	0.4	
87P700087	K 9	01/07/1992		51658	12	C	24	30	40	15	12	1.3	2	0.2			0	9.58	9.59	1		10.02	10.09	7	8	18	0.4	
87P700088	K10	01/07/1992		51655	9	W	24	30	40	15	15	1.6	2	0.3			0	9.59	10.00	1		10.02	10.09	7	8	18	0.4	
87P700089	A30	01/07/1992		51642	12	C	24	30	40	12	12	1.0	2	0.2			0	10.00	10.02	2		10.02	10.09	7	8	18	0.4	
87P700090	I10	01/07/1992		51628	2	W	24	30	40	18	12	1.5	2	0.3			0	10.01	10.02	1		10.02	10.09	7	8	18	0.4	
Average	I											1.7		0.3			0.0			1.2							0.4	
	A											1.7		0.3			0.0			1.3							0.4	
	K											1.6		0.3			0.0			1.4							0.4	

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued)
Perma-Patch (H), Control (A), and UPM (semi-perm.) (C)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
87P700091	H 1	01/07/1992		49543	4	W	24	30	40	15	15	1.6	2	0.3			0	11.07	11.08	1			11.11	11.13	2	8	6	0.3	
87P700092	A31	01/07/1992		49533	1	W	24	30	40	60	12	5.0	2	0.8			0	11.07	11.08	1			11.11	11.13	2	8	6	0.3	
87P700093	C 1	01/07/1992		49526	7	W	24	30	40	20	18	2.5	2	0.4	11.13	11.16	3	11.19	11.20	1			11.24	11.25	1		1	1.0	
87P700094	C 2	01/07/1992		49523	9	W	24	30	40	18	18	2.3	2	0.4	11.16	11.18	2	11.21	11.22	1			11.25	11.26	1		1	1.0	
87P700095	A32	01/07/1992		49520	9	W	24	30	40	24	18	3.0	2	0.5			0	11.08	11.09	1			11.11	11.13	2	8	6	0.3	
87P700096	H 2	01/07/1992		49510	9	W	24	30	40	20	20	2.8	2	0.5			0	11.08	11.09	1			11.11	11.13	2	8	6	0.3	
87P700097	H 3	01/07/1992		49498	8	W	24	30	40	12	12	1.0	2	0.2			0	11.09	11.11	2			11.11	11.13	2	8	6	0.3	
87P700098	A33	01/07/1992		49483	8	W	24	30	40	15	12	1.3	2	0.2			0	11.10	11.11	1			11.11	11.13	2	8	6	0.3	
87P700099	C 3	01/07/1992		49467	11	W	24	30	40	24	15	2.5	2	0.4	11.18	11.20	2	11.24	11.25	1			11.27	11.28	1		1	1.0	
87P700100	C 4	01/07/1992		49348	9	W	24	30	40	15	20	2.1	2	0.3	11.20	11.22	2	11.25	11.27	2			11.28	11.29	1		1	1.0	
87P700101	A34	01/07/1992		49347	2	W	24	30	40	15	15	1.6	2	0.3			0	13.50	13.51	1			14.03	14.03	0	8	6	0.0	
87P700102	H 4	01/07/1992		49327	8	W	24	30	40	15	12	1.3	2	0.2			0	13.50	13.52	2			14.03	14.03	0	8	6	0.0	
87P700103	H 5	01/07/1992		49326	5	W	24	30	40	15	15	1.6	2	0.3			0	13.51	13.53	2			14.03	14.03	0	8	6	0.0	
87P700104	A35	01/07/1992		49319	10	W	24	30	40	20	18	2.5	2	0.4			0	13.52	13.54	2			14.03	14.03	0	8	6	0.0	
87P700105	C 5	01/07/1992		49318	3	W	24	30	40	30	30	6.3	2	1.0	14.10	14.12	2	14.20	14.21	1			14.25	14.26	1		1	1.0	
87P700106	C 6	01/07/1992		49314	8	W	24	30	40	20	20	2.8	2	0.5	14.12	14.15	3	14.22	14.24	2			14.27	14.28	1		1	1.0	
87P700107	A36	01/07/1992		49312	10	W	24	30	40	20	15	2.1	2	0.3			0	13.54	13.55	1			14.03	14.03	0	8	6	0.0	
87P700108	H 6	01/07/1992		49306	11	W	24	30	40	15	12	1.3	2	0.2			0	13.55	13.57	2			14.03	14.03	0	8	6	0.0	
87P700109	H 7	01/07/1992		49111	2	W	24	30	40	20	18	2.5	2	0.4			0	14.16	14.17	1			14.34	14.37	3	8	11	0.3	
87P700110	A37	01/07/1992		49102	2	W	24	30	40	18	18	2.3	2	0.4			0	14.17	14.18	1			14.34	14.37	3	8	11	0.3	
87P700111	C 7	01/07/1992		49097	2	W	24	30	40	30	36	7.5	2	1.3	14.16	14.18	2	14.24	14.26	2			14.29	14.30	1		1	1.0	
87P700112	C 8	01/07/1992		49094	2	W	24	30	40	20	20	2.8	2	0.5	14.18	14.20	2	14.26	14.27	1			14.30	14.31	1		1	1.0	
87P700113	A38	01/07/1992		49090	8	W	24	30	40	12	12	1.0	2	0.2			0	14.18	14.20	2			14.34	14.37	3	8	11	0.3	
87P700114	H 8	01/07/1992		49089	5	W	24	30	40	15	15	1.6	2	0.3			0	14.19	14.20	1			14.34	14.37	3	8	11	0.3	
87P700115	H 9	01/07/1992		49087	4	W	24	30	40	15	15	1.6	2	0.3			0	14.21	14.23	2			14.34	14.37	3	8	11	0.3	
87P700116	A39	01/07/1992		49084	5	W	24	30	40	12	12	1.0	2	0.2			0	14.22	14.23	1			14.34	14.37	3	8	11	0.3	
87P700117	C 9	01/07/1992		49081	9	W	24	30	40	30	30	6.3	2	1.0	14.21	14.22	1	14.28	14.29	1			14.31	14.32	1		1	1.0	
87P700118	C10	01/07/1992		49078	8	W	24	30	40	20	20	2.8	2	0.5	14.23	14.25	2	14.29	14.30	1			14.32	14.33	1		1	1.0	
87P700119	A40	01/07/1992		49089	4	W	24	30	40	15	15	1.6	2	0.3			0	14.23	14.25	2			14.34	14.37	3	8	11	0.3	
87P700120	H10	01/07/1992		49074	8	W	24	30	40	15	18	1.9	2	0.3			0	14.24	14.25	1			14.34	14.37	3	8	11	0.3	
Average	H											1.7		0.3			0.0			1.5								0.2	
	A											2.1		0.4			0.0			1.3								0.2	
	C											3.8		0.6			2.1			1.3								1.0	

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued)
QPR 2000 (semi-perm.) (L), Control (A), and PennDOT 485 (semi-perm.) (N)

Patch ID	Mat'l #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel	Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
87P700121	L 1	01/07/1992		49070	11	W	24		30		40	18	18	2.3	2	0.4	14.25	14.27	2	14.30	14.31	1		14.45	14.47	2		1	2.0	
87P700122	A41	01/07/1992		49065	10	W	24		30		40	18	15	1.9	2	0.3			0	14.26	14.27	1		14.34	14.37	3	8	11	0.3	
87P700123	N 1	01/07/1992		49043	8	W	24		30		40	24	24	4.0	2	0.7	14.39	14.41	2	14.43	14.44	1		14.48	14.49	1		1	1.0	
87P700124	N 2	01/07/1992		48881	3	W	24		30		40	36	36	9.0	2	1.5	14.41	14.43	2	14.47	14.48	1		14.49	14.50	1		1	1.0	
87P700125	A42	01/07/1992		48876	4	W	24		30		40	12	12	1.0	2	0.2			0	14.28	14.29	1		14.34	14.37	3	8	11	0.3	
87P700126	L 2	01/07/1992		48873	9	W	24		30		40	24	24	4.0	2	0.7	14.44	14.47	3	14.49	14.50	1		14.50	14.51	1		1	1.0	
87P700127	L 3	01/07/1992		48862	8	W	24		30		40	36	18	4.5	2	0.8	14.47	14.49	2	14.50	14.51	1		14.52	14.53	1		1	1.0	
87P700128	A43	01/07/1992		48853	9	W	24		30		40	24	15	2.5	2	0.4			0	14.30	14.31	1		14.34	14.37	3	8	11	0.3	
87P700129	N 3	01/07/1992		48849	9	W	24		30		40	18	15	1.9	2	0.3	14.49	14.51	2	14.52	14.53	1		14.53	14.54	1		1	1.0	
87P700130	N 4	01/08/1992		48676	4	W	24		10		20	18	15	1.9	2	0.3	10.52	10.54	2	10.57	10.58	1		10.59	11.01	2		1	2.0	
87P700131	A44	01/08/1992		48660	2	W	24		10		20	15	15	1.6	2	0.3			0	9.20	9.21	1		9.31	9.33	2	8	7	0.3	
87P700132	L 4	01/08/1992		48655	9	W	24		10		20	18	15	1.9	2	0.3	10.54	10.57	3	10.59	11.00	1		11.02	11.03	1		1	1.0	
87P700133	L 5	01/08/1992		48647	2	W	24		10		20	20	18	2.5	2	0.4	10.57	10.59	2	11.02	11.03	1		11.04	11.05	1		1	1.0	
87P700134	A45	01/08/1992		48645	6	W	24		10		20	12	12	1.0	2	0.2			0	9.21	9.23	2		9.31	9.33	2	8	7	0.3	
87P700135	N 5	01/08/1992		48627	9	W	24		10		20	18	15	1.9	2	0.3	10.59	11.01	2	11.04	11.05	1		11.06	11.07	1		1	1.0	
87P700136	N 6	01/08/1992		48623	12	C	24		10		20	24	18	3.0	2	0.5	11.01	11.03	2	11.05	11.06	1		11.07	11.08	1		1	1.0	
87P700137	A46	01/08/1992		48596	12	C	24		10		20	15	15	1.6	2	0.3			0	9.22	9.23	1		9.31	9.33	2	8	7	0.3	
87P700138	L 6	01/08/1992		48587	12	C	24		10		20	15	15	1.6	2	0.3	11.03	11.05	2	11.07	11.08	1		11.09	11.10	1		1	1.0	
87P700139	L 7	01/08/1992		48479	8	W	24		10		20	15	15	1.6	2	0.3	11.05	11.07	2	11.09	11.10	1		11.12	11.13	1		1	1.0	
87P700140	A47	01/08/1992		48471	2	W	24		10		20	12	12	1.0	2	0.2			0	9.24	9.25	1		9.31	9.33	2	8	7	0.3	
87P700141	N 7	01/08/1992		48466	11	W	24		10		20	24	15	2.5	2	0.4	11.07	11.09	2	11.11	11.12	1		11.13	11.14	1		1	1.0	
87P700142	N 8	01/08/1992		48457	10	W	24		10		20	15	15	1.6	2	0.3	11.09	11.11	2	11.13	11.14	1		11.16	11.17	1		1	1.0	
87P700143	A48	01/08/1992		48452	11	W	24		10		20	12	12	1.0	2	0.2			0	9.25	9.27	2		9.31	9.33	2	8	7	0.3	
87P700144	L 8	01/08/1992		48437	9	W	24		10		20	15	15	1.6	2	0.3	11.14	11.16	2	11.18	11.19	1		11.20	11.21	1		1	1.0	
87P700145	L 9	01/08/1992		48436	11	W	24		10		20	24	15	2.5	2	0.4	11.16	11.17	1	11.20	11.21	1		11.22	11.23	1		1	1.0	
87P700146	A49	01/08/1992		48410	11	W	24		10		20	20	12	1.7	2	0.3			0	9.27	9.28	1		9.31	9.33	2	8	7	0.3	
87P700147	N 9	01/08/1992		48406	7	W	24		10		20	24	18	3.0	2	0.5	11.18	11.20	2	11.22	11.23	1		11.24	11.25	1		1	1.0	
87P700148	N10	01/08/1992		48406	11	W	24		10		20	18	12	1.5	2	0.3	11.20	11.21	1	11.23	11.24	1		11.25	11.26	1		1	1.0	
87P700149	A50	01/08/1992		48403	11	W	24		10		20	18	12	1.5	2	0.3			0	9.28	9.30	2		9.31	9.33	2	8	7	0.3	
87P700150	L10	01/08/1992		48397	9	W	24		10		20	18	18	2.3	2	0.4	11.21	11.22	1	11.25	11.26	1		11.27	11.28	1		1	1.0	
Average	L													2.5		0.4			2.0			1.0							1.1
	A													1.5		0.2			0.0			1.3							0.3
	N													3.0		0.5			1.9			1.0							1.1

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued)
Spray injection (J) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
87P700151	J 1	01/08/1992		48389	10	W	24	10	20	18	18	2.3	2	0.4			0	13.56	13.59	3		14.56	14.59	3	8	20		0.1
87P700152	A51	01/08/1992		48376	10	W	24	10	20	15	12	1.3	2	0.2			0	13.38	13.39	1		14.56	14.59	3	8	20		0.1
87P700153	J 2	01/08/1992		48297	2	W	24	10	20	15	12	1.3	2	0.2			0	13.59	14.01	2		14.56	14.59	3	8	20		0.1
87P700154	A52	01/08/1992		48288	11	W	24	10	20	12	12	1.0	2	0.2			0	13.39	13.40	1		14.56	14.59	3	8	20		0.1
87P700155	J 3	01/08/1992		48281	2	W	24	10	20	18	12	1.5	2	0.3			0	14.01	14.04	3		14.56	14.59	3	8	20		0.1
87P700156	A53	01/08/1992		48277	11	W	24	10	20	15	12	1.3	2	0.2			0	13.39	13.41	2		14.56	14.59	3	8	20		0.1
87P700157	J 4	01/08/1992		48274	3	W	24	10	20	30	30	6.3	2	1.0			0	14.05	14.14	9		14.56	14.59	3	8	20		0.1
87P700158	A54	01/08/1992		48267	2	W	24	10	20	18	18	2.3	2	0.4			0	13.41	13.42	1		14.56	14.59	3	8	20		0.1
87P700159	J 5	01/08/1992		48250	8	W	24	10	20	15	15	1.6	2	0.3			0	14.16	14.24	8		14.56	14.59	3	8	20		0.1
87P700160	A55	01/08/1992		48249	4	W	24	10	20	12	12	1.0	2	0.2			0	13.42	13.43	1		14.56	14.59	3	8	20		0.1
87P700161	J 6	01/08/1992		48247	11	W	24	10	20	15	12	1.3	2	0.2			0	14.26	14.30	4		14.56	14.59	3	8	20		0.1
87P700162	A56	01/08/1992		48242	10	W	24	10	20	18	15	1.9	2	0.3			0	13.42	13.44	2		14.56	14.59	3	8	20		0.1
87P700163	J 7	01/08/1992		48239	8	W	24	10	20	18	20	2.5	2	0.4			0	14.30	14.35	5		14.56	14.59	3	8	20		0.1
87P700164	A57	01/08/1992		48230	8	W	24	10	20	15	15	1.6	2	0.3			0	13.44	13.45	1		14.56	14.59	3	8	20		0.1
87P700165	J 8	01/08/1992		48197	9	W	24	10	20	24	18	3.0	2	0.5			0	14.35	14.38	3		14.56	14.59	3	8	20		0.1
87P700166	A58	01/08/1992		47880	11	W	24	10	20	15	12	1.3	2	0.2			0	13.45	13.46	1		14.56	14.59	3	8	20		0.1
87P700167	J 9	01/08/1992		47837	8	W	24	10	20	20	15	2.1	2	0.3			0	14.38	14.42	4		14.56	14.59	3	8	20		0.1
87P700168	A59	01/08/1992		47836	4	W	24	10	20	18	12	1.5	2	0.3			0	13.47	13.48	1		14.56	14.59	3	8	20		0.1
87P700169	J10	01/08/1992		47831	11	W	24	10	20	15	12	1.3	2	0.2			0	14.51	14.56	5		14.56	14.59	3	8	20		0.1
87P700170	A60	01/08/1992		47805	10	W	24	10	20	20	15	2.1	2	0.3			0	13.48	13.49	1		14.56	14.59	3	8	20		0.1
Average	J											2.3					0.0			4.6								0.1
	A											1.5					0.0			1.2								0.1

Table B-8. Summary of installation data for Rt. 2, Prescott, Ontario (continued)
HFMS-2 (G) and Control (A)

Patch ID	Matl #	Install. Date	MP	Sta.	Offset	Dir	Lane	Width	Temp	Rel Hum	Length	Width	Area	Depth	Vol	Preparation Begin	Preparation End	Min	Placement Begin	Placement End	Min	Crew	Compaction Begin	Compaction End	Min	Passes	Group	Avg	Comp
87P700171	A61	02/26/1992		48104	3	E	24	25	30		15	15	1.6	1	0.1														
87P700172	G 1	02/25/1992		48106	8	E	24	25	30		30	24	5.0	1	0.4				14.44	14.45	1		14.45	14.46	1	6	1	1.0	
87P700173	A62	02/26/1992		48110	3	E	24	25	30		22	20	3.1	1	0.3														
87P700174	G 2	02/25/1992		48311	1	E	24	25	30		12	12	1.0	1	0.1				14.49	14.50	1		14.50	14.51	1	6	3	0.3	
87P700175	A63	02/26/1992		48316	1	E	24	25	30		21	15	2.2	1	0.2														
87P700176	G 3	02/25/1992		48319	9	E	24	25	30		18	18	2.3	1	0.2				14.49	14.50	1		14.50	14.51	1	6	3	0.3	
87P700177	A64	02/26/1992		48325	8	E	24	25	30		15	15	1.6	2	0.3														
87P700178	G 4	02/25/1992		48337	8	E	24	25	30		18	18	2.3	1	0.2				14.50	14.50	0		14.50	14.51	1	6	3	0.3	
87P700179	A65	02/26/1992		49624	0	E	24	25	30		20	15	2.1	1	0.2														
87P700180	G 5	02/25/1992		49628	1	E	24	25	30		25	24	4.2	1	0.3				15.00	15.01	1		15.03	15.05	2	6	3	0.7	
87P700181	A66	02/26/1992		49632	2	E	24	25	30		24	12	2.0	2	0.3														
87P700182	G 6	02/25/1992		49637	1	E	24	25	30		20	23	3.2	1	0.3				15.01	15.02	1		15.03	15.05	2	6	3	0.7	
87P700183	A67	02/26/1992		49651	1	E	24	25	30		24	18	3.0	1	0.3														
87P700184	G 7	02/25/1992		49659	2	E	24	25	30		18	24	3.0	2	0.5				15.01	15.02	1		15.03	15.05	2	6	3	0.7	
87P700185	A68	02/26/1992		49951	3	E	24	25	30		18	12	1.5	2	0.3														
87P700186	G 8	02/25/1992		49979	3	E	24	25	30		18	15	1.9	1	0.2				15.07	15.08	1		15.10	15.12	2	6	3	0.7	
87P700187	A69	02/26/1992		49989	3	E	24	25	30		24	21	3.5	1	0.3														
87P700188	G 9	02/25/1992		49995	3	E	24	25	30		24	20	3.3	2	0.6				15.08	15.09	1		15.10	15.12	2	6	3	0.7	
87P700189	A70	02/26/1992		50001	3	E	24	25	30		18	15	1.9	1	0.2														
87P700190	G10	02/25/1992		50007	3	E	24	25	30		24	18	3.0	1	0.3				15.09	15.10	1		15.10	15.12	2	6	3	0.7	
Average	A												2.2					0.0			0.0						0.0	
	G												2.9					0.0			0.9						0.6	

Appendix C

Material Testing Data

This appendix contains the data collected during laboratory and field testing. Tests were conducted to identify different material characteristics that could be correlated to performance in the field. Results are presented for all materials that were tested.

Laboratory Testing

Table C-1 shows the different material-location-test combinations that were available for this project. These combinations apply only to lab testing. These combinations that were tested are indicated by a reference to tables C-2 through C-20, which contain the raw laboratory data.

See figures C-1 through C-19 for gradation plots determined in the laboratory. Each plot shows the appropriate percent passing of the particular material that passed through each sieve tested. Because different sets of sieves were used for different material samples, not all plots have the same number of points.

Table C-1. Summary of material-location-test combinations covered

Site	Mat'l.	Laboratory Tests											
		Res. Mod.	Stab./ Flow	Bulk SG	Max. SG	Percent Voids	Anti-strip	Work.	Gradation	Visc.	Pen.	Duct.	Soft. Point
CALIFORNIA (06)	UPM												
	485	Table C-6											
	486	Table C-7											
	Local												
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR		Table C-10										
	Spray												
ILLINOIS (17)	UPM		Table C-9										
	485	Table C-6											
	486	Table C-7											
	Local		Table C-11										
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR		Table C-10										
	Spray												
NEW MEXICO (35)	UPM		Table C-12										
	485	Table C-6											
	486	Table C-7											
	Local												
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR	Table C-8											
	Spray												
OREGON (41)	UPM		Table C-18										
	485	Table C-6											
	486	Table C-7											
	Local		Table C-17										
	HFMS		Table C-16										
	Perma		Table C-15										
	QPR		Table C-14										
	Spray												

Table C-1. Summary of material-location-test combinations covered (continued)

Site	Mat'l.	Laboratory Tests											
		Res. Mod.	Stab./ Flow	Bulk SG	Max. SG	Percent Voids	Anti-strip	Work.	Gradation	Visc.	Pen.	Duct.	Soft. Point
TEXAS (48)	UPM	Table C-4											
	485	Table C-6											
	486	Table C-7											
	Local	Table C-5											
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR	Table C-8											
	Spray												
UTAH (49)	UPM		Table C-12										
	485	Table C-6											
	486	Table C-7											
	Local		Table C-13										
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR		Table C-10										
	Spray												
VERMONT (50)	UPM												
	485	Table C-6											
	486	Table C-7											
	Local												
	HFMS	Table C-2											
	Perma	Table C-3											
	QPR		Table C-10										
	Spray												
ONTARIO (87)	UPM		Table C-20										
	485	Table C-6											
	486												
	Local		Table C-19										
	HFMS		Table C-16										
	Perma		Table C-15										
	QPR		Table C-14										
	Spray												

Table C-2. Summary of laboratory testing for HFMS-2–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	482.09	334.51	241.98	352.86
77°F, 0.50 Hz (ksi)	472.00	334.27	223.97	343.41
77°F, 1.00 Hz (ksi)	494.00	331.77	230.60	352.12
Marshall Stability, D 1559 (lbs)	3625	3588	3825	3679
Marshall Flow (0.01 in)	11.5	13.0	14.0	12.8
Bulk Specific Gravity, D 2726	2.113	2.107	2.109	2.110
Maximum Specific Gravity, D 2041	2.452	2.445	2.459	2.452
Air Voids (percent)	13.2	13.2	14.3	13.6
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.41	0.30	0.50	0.40
AC Content, D 2172 (percent)	3.8	3.8	3.7	3.8
Viscosity, D 2171, 140°F (Poise)	31,673	29,799	-	30,736
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	32	37	-	35
Ductility, D 113, 77 °F, 5 cm/min., (cm)	12	12	-	12
Softening Point, D 36 (°F)	150	151	-	150

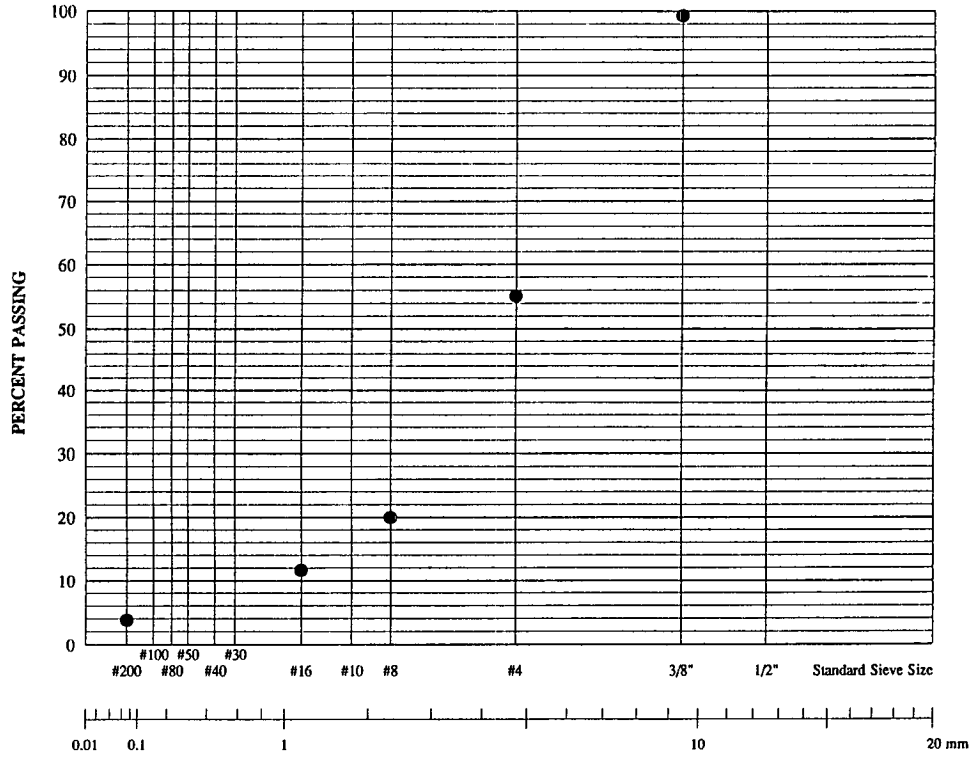


Figure C-1. Gradation for HFMS-2–Texas

Table C-3. Summary of laboratory testing for Perma-Patch–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	96.42	276.59	171.70	181.57
77°F, 0.50 Hz (ksi)	93.80	273.66	181.25	182.90
77°F, 1.00 Hz (ksi)	99.36	270.11	188.94	186.14
Marshall Stability, D 1559 (lbs)	4851	4333	4674	4619
Marshall Flow (0.01 in)	9.5	9.0	7.5	8.7
Bulk Specific Gravity, D 2726	2.297	2.299	2.305	2.300
Maximum Specific Gravity, D 2041	2.655	2.654	2.657	2.655
Air Voids (percent)	13.5	13.4	13.2	13.4
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.30	0.58	0.41	0.43
AC Content, D 2172 (percent)	3.5	3.5	3.6	3.5
Viscosity, D 2171, 140°F (Poise)	4225	3918	-	4072
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	68	72	-	70
Ductility, D 113, 77 °F, 5 cm/min., (cm)	150 +	150 +	-	150 +
Softening Point, D 36 (°F)	134	130	-	132

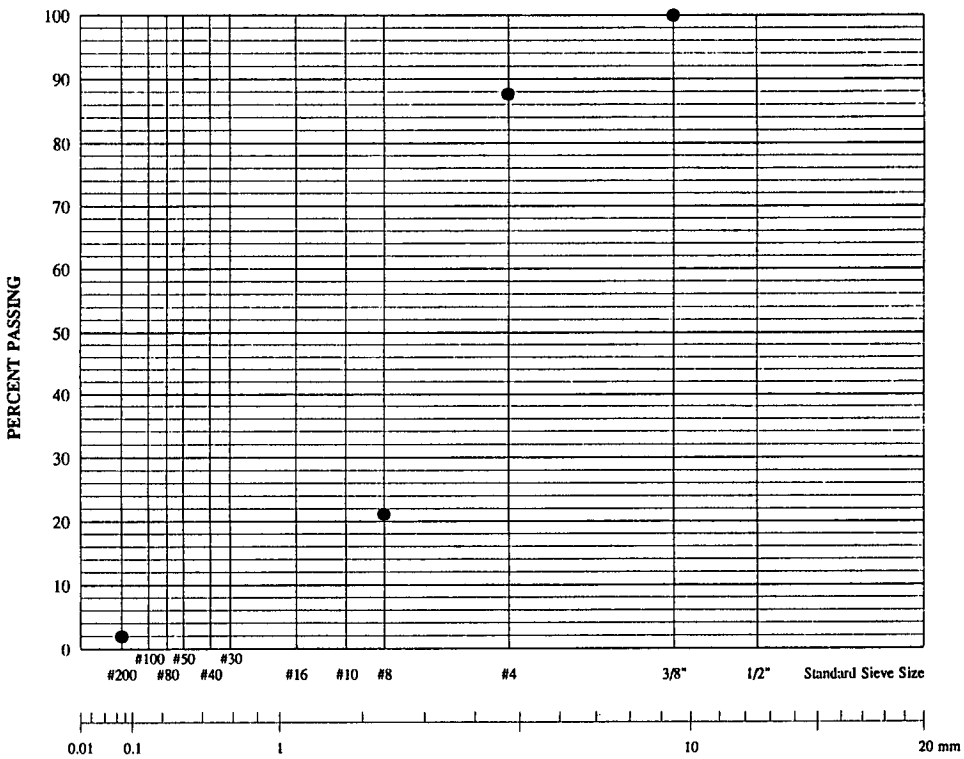


Figure C-2. Gradation for Perma-Patch–Texas

Table C-4. Summary of laboratory testing for UPM–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	319.52	346.38	203.65	289.85
77°F, 0.50 Hz (ksi)	307.66	336.38	199.74	281.26
77°F, 1.00 Hz (ksi)	318.47	351.68	205.91	292.02
Marshall Stability, D 1559 (lbs)	4972	5304	4976	5084
Marshall Flow (0.01 in)	9.0	10.0	10.0	9.7
Bulk Specific Gravity, D 2726	2.260	2.254	2.264	2.259
Maximum Specific Gravity, D 2041	2.535	2.536	2.539	2.537
Air Voids (percent)	10.8	11.1	10.8	10.9
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.5	0.5	0.5	0.5
AC Content, D 2172 (percent)	3.5	3.3	3.6	3.5
Viscosity, D 2171, 140°F (Poise)	621	657	-	639
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	200	192	-	196
Ductility, D 113, 77 °F, 5 cm/min., (cm)	150 +	150 +	-	150 +
Softening Point, D 36 (°F)	108	110	-	109

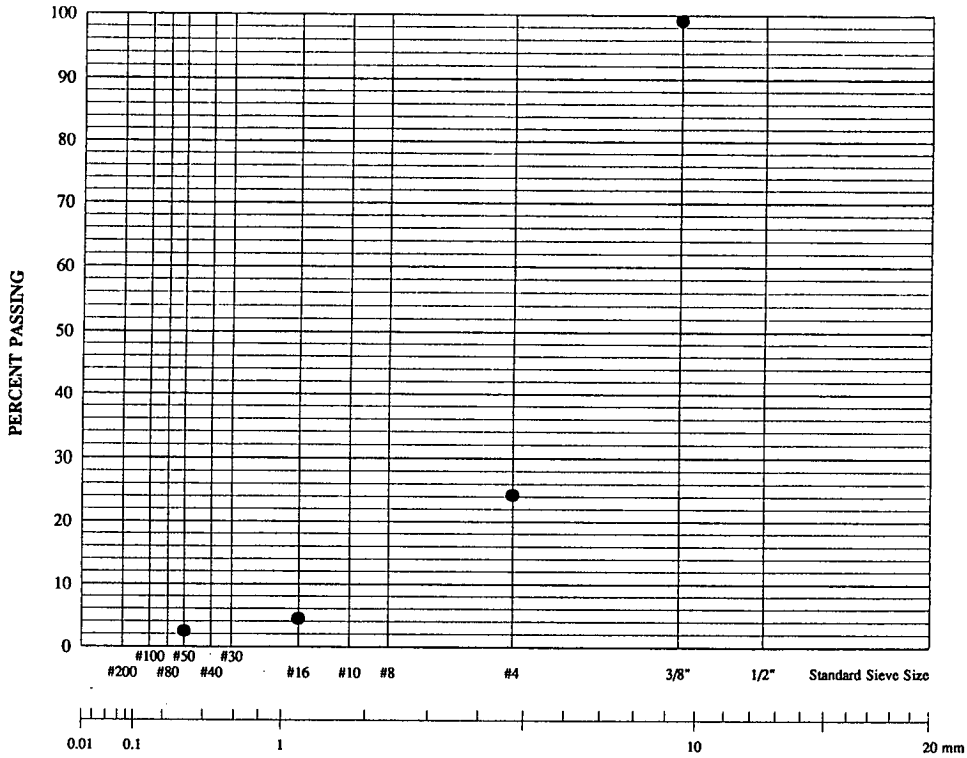


Figure C-3. Gradation for UPM–Texas

Table C-5. Summary of laboratory testing for local material–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	764.74	816.45	632.84	732.01
77°F, 0.50 Hz (ksi)	759.28	824.00	641.66	741.65
77°F, 1.00 Hz (ksi)	762.12	844.55	656.86	754.51
Marshall Stability, D 1559 (lbs)	7089	6134	6691	6638
Marshall Flow (0.01 in)	10.0	10.0	11.0	10.3
Bulk Specific Gravity, D 2726	2.121	2.127	2.125	2.124
Maximum Specific Gravity, D 2041	2.422	2.414	2.417	2.418
Air Voids (percent)	12.6	11.9	12.1	12.2
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.5	0.5	0.5	0.5
AC Content, D 2172 (percent)	4.1	4.2	4.0	4.1
Viscosity, D 2171, 140°F (Poise)	3151	3314	-	3232
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	51	46	-	48
Ductility, D 113, 77 °F, 5 cm/min., (cm)	100 +	100 +	-	100 +
Softening Point, D 36 (°F)	127	129	-	128

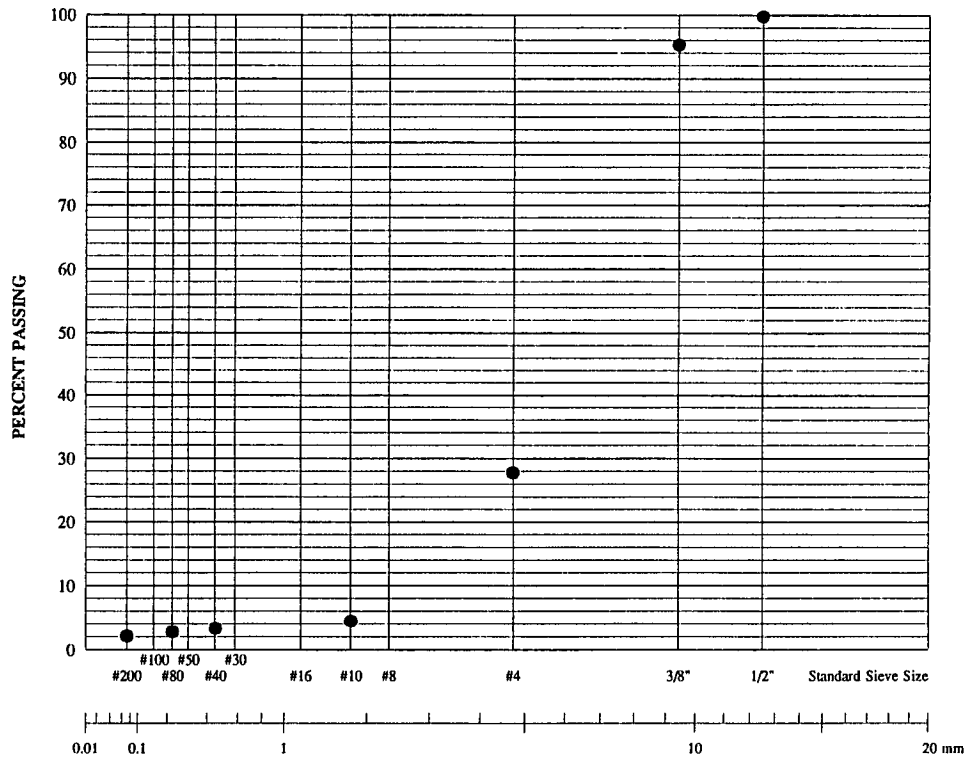


Figure C-4. Gradation for local material–Texas

Table C-6. Summary of laboratory testing for PennDOT 485–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	498.00	276.19	569.50	456.90
77°F, 0.50 Hz (ksi)	495.82	282.97	586.99	455.26
77°F, 1.00 Hz (ksi)	506.78	292.44	604.72	467.98
Marshall Stability, D 1559 (lbs)	4794	4096	4756	4549
Marshall Flow (0.01 in)	12.5	13.5	11.0	12.3
Bulk Specific Gravity, D 2726	2.299	2.291	2.296	2.295
Maximum Specific Gravity, D 2041	2.505	2.498	2.504	2.502
Air Voids (percent)	8.2	8.3	8.3	8.3
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.41	0.50	0.41	0.44
AC Content, D 2172 (percent)	4.2	4.0	4.1	4.1
Viscosity, D 2171, 140°F (Poise)	288	334	-	311
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	208	194	-	201
Ductility, D 113, 77 °F, 5 cm/min., (cm)	150 +	150 +	-	150 +
Softening Point, D 36 (°F)	104.5	104.0	-	104.2

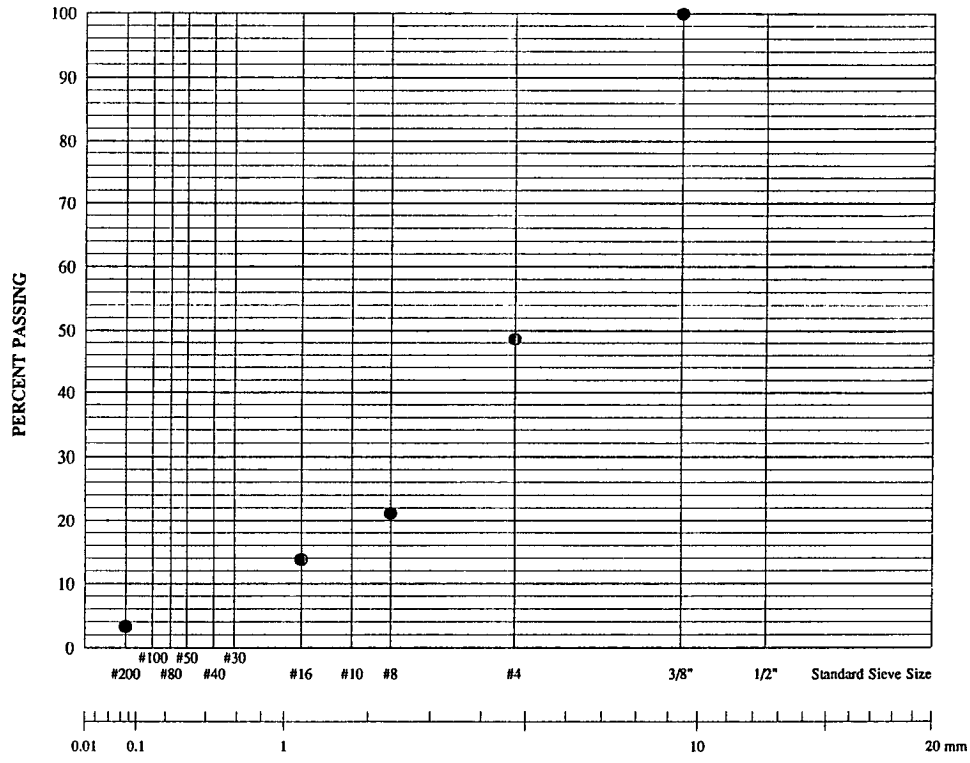


Figure C-5. Gradation for PennDOT 485–Texas

Table C-7. Summary of laboratory testing for PennDOT 486–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	9.13	31.19	60.33	33.55
77°F, 0.50 Hz (ksi)	9.35	31.02	58.21	32.86
77°F, 1.00 Hz (ksi)	10.20	36.29	55.36	33.95
Marshall Stability, D 1559 (lbs)	2573	2477	2663	2571
Marshall Flow (0.01 in)	14.5	15.0	14.5	14.7
Bulk Specific Gravity, D 2726	2.259	2.259	2.263	2.260
Maximum Specific Gravity, D 2041	2.536	2.543	2.544	2.541
Air Voids (percent)	10.9	11.1	11.0	11.0
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.25	0.25	0.25	0.25
AC Content, D 2172 (percent)	4.5	4.3	4.4	4.4
Viscosity, D 2171, 140°F (Poise)	45	36	-	40
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	+ 400	+ 400	-	-
Ductility, D 113, 77 °F, 5 cm/min., (cm)	N/A	N/A	-	-
Softening Point, D 36 (°F)	80	78	-	79

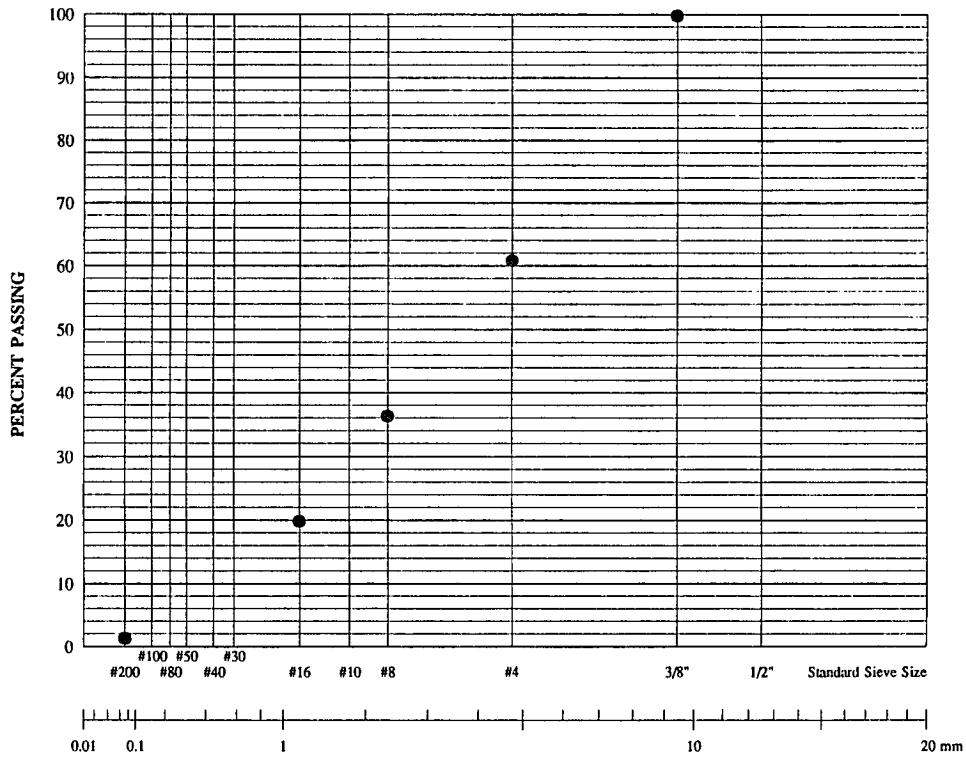


Figure C-6. Gradation for PennDOT 486–Texas

Table C-8. Summary of laboratory testing for QPR 2000–Texas

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123				
77°F, 0.33 Hz (ksi)	199.87	159.81	121.63	160.44
77°F, 0.50 Hz (ksi)	194.79	168.06	116.61	159.82
77°F, 1.00 Hz (ksi)	201.82	160.64	117.12	159.86
Marshall Stability, D 1559 (lbs)	4338	4590	4284	4404
Marshall Flow (0.01 in)	12.0	13.0	13.5	12.8
Bulk Specific Gravity, D 2726	2.244	2.242	2.244	2.243
Maximum Specific Gravity, D 2041	2.616	2.601	2.609	2.609
Air Voids (percent)	14.2	13.2	14.0	13.8
Anti Stripping, Modified D 1664	+ 95 %	+ 95 %	-	-
Workability, PTI Method	0.25	0.25	0.25	0.25
AC Content, D 2172 (percent)	5.0	5.4	5.1	5.2
Viscosity, D 2171, 140°F (Poise)	368	340	-	354
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	266	270	-	268
Ductility, D 113, 77 °F, 5 cm/min., (cm)	150 +	150 +	-	150 +
Softening Point, D 36 (°F)	101	103	-	102

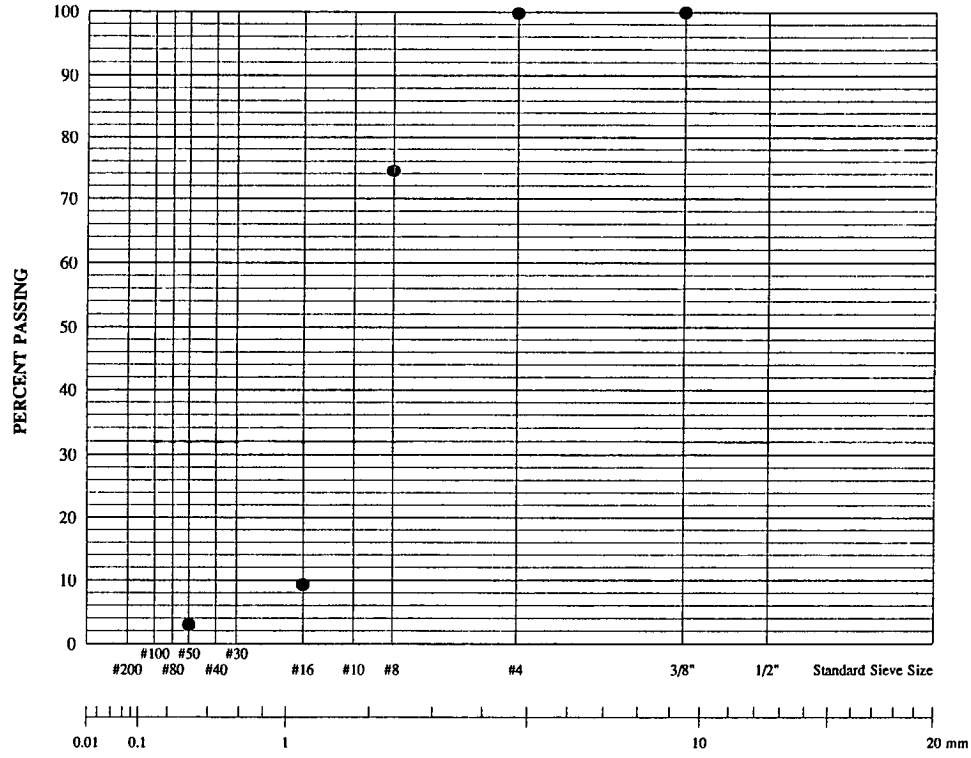


Figure C-7. Gradation for QPR 2000–Texas

Table C-9. Summary of laboratory testing for UPM–Illinois

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	2443 11.0	2633 10.7	2111 11.3	2396 11.0
Bulk Specific Gravity, D 2726	2.207	2.224	2.212	2.214
Maximum Specific Gravity, D 2041	2.583	2.545	2.534	2.554
Air Voids (percent)	13.0	12.6	12.7	12.8
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content (percent)	4.4	4.2	4.0	4.2
Viscosity, D 2171, 140°F (Poise)	265	237	-	251
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	225	232	-	228
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	106.5	99	-	103

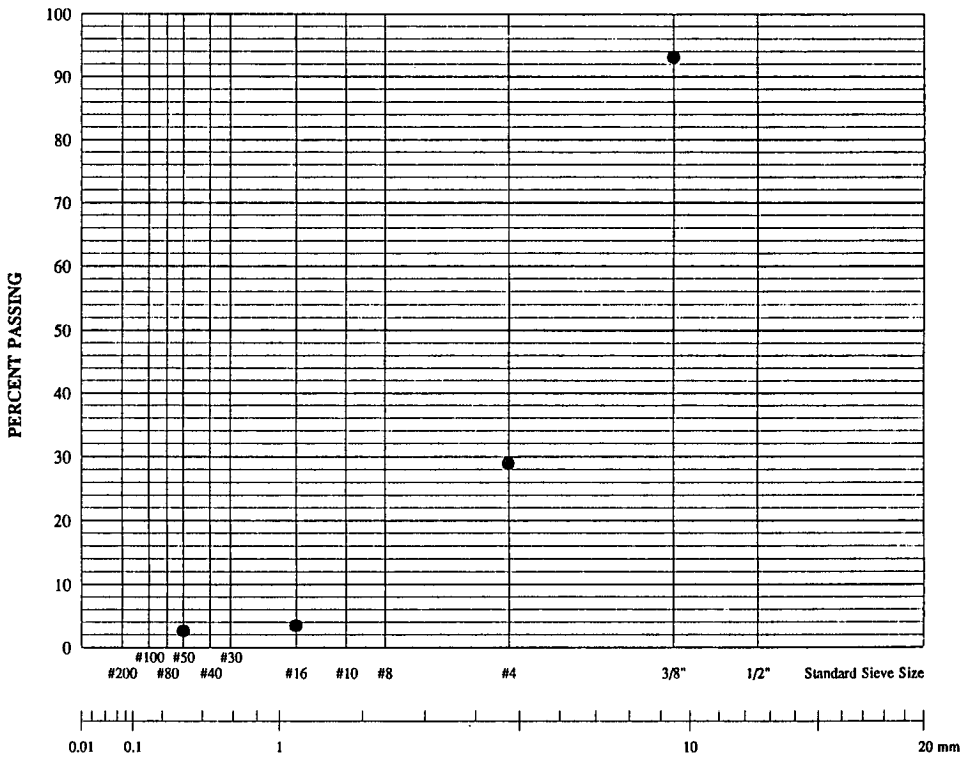


Figure C-8. Gradation for UPM–Illinois

Table C-10. Summary of laboratory testing for QPR 2000–Illinois

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	3242 11.7	2875 11.0	3466 12.7	3194 11.8
Bulk Specific Gravity, D 2726	2.208	2.211	2.207	2.209
Maximum Specific Gravity, D 2041	2.573	2.579	2.577	2.576
Air Voids (percent)	14.2	14.3	14.3	14.3
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.5	4.2	4.0	4.2
Viscosity, D 2171, 140°F (Poise)	779	607	-	693
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	150	180	-	165
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	115	108	-	112

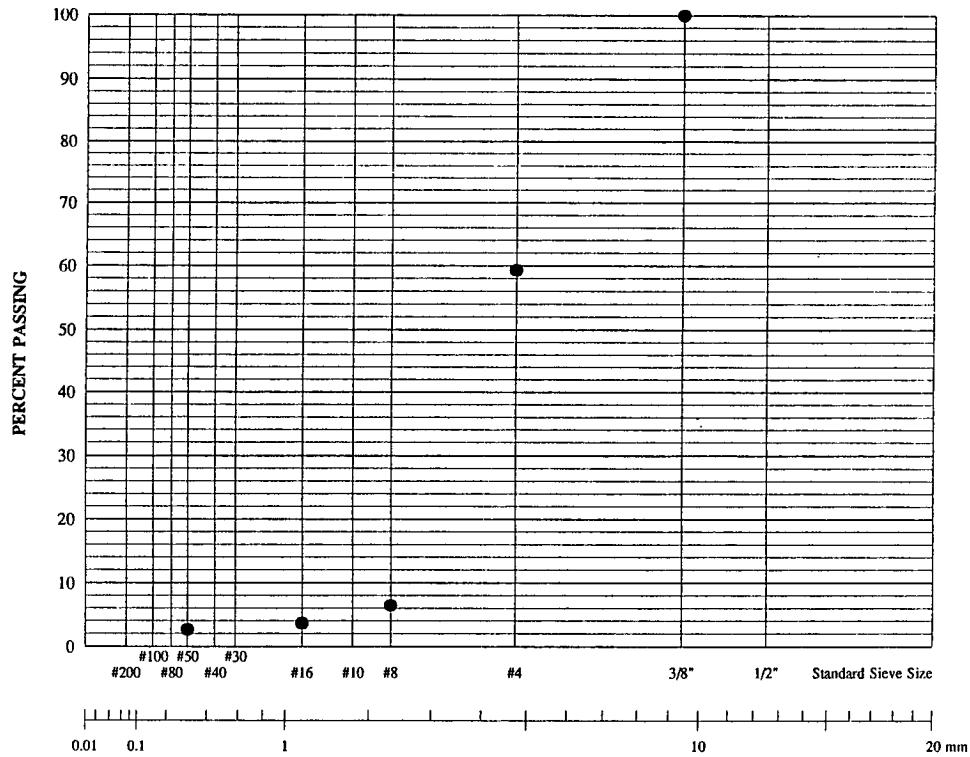


Figure C-9. Gradation for QPR 2000–Illinois

Table C-11. Summary of laboratory testing for local material–Illinois

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	967 9.7	787 8.7	713 9.0	822 9.1
Bulk Specific Gravity, D 2726	2.329	2.336	2.321	2.329
Maximum Specific Gravity, D 2041	2.514	2.509	2.521	2.515
Air Voids (percent)	7.4	6.9	7.9	7.4
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	3.9	4.1	3.9	4.0
Viscosity, D 2171, 140°F (Poise)	15.6	18.1	-	16.8
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	N/A	N/A	-	-
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	N/A	N/A	-	-

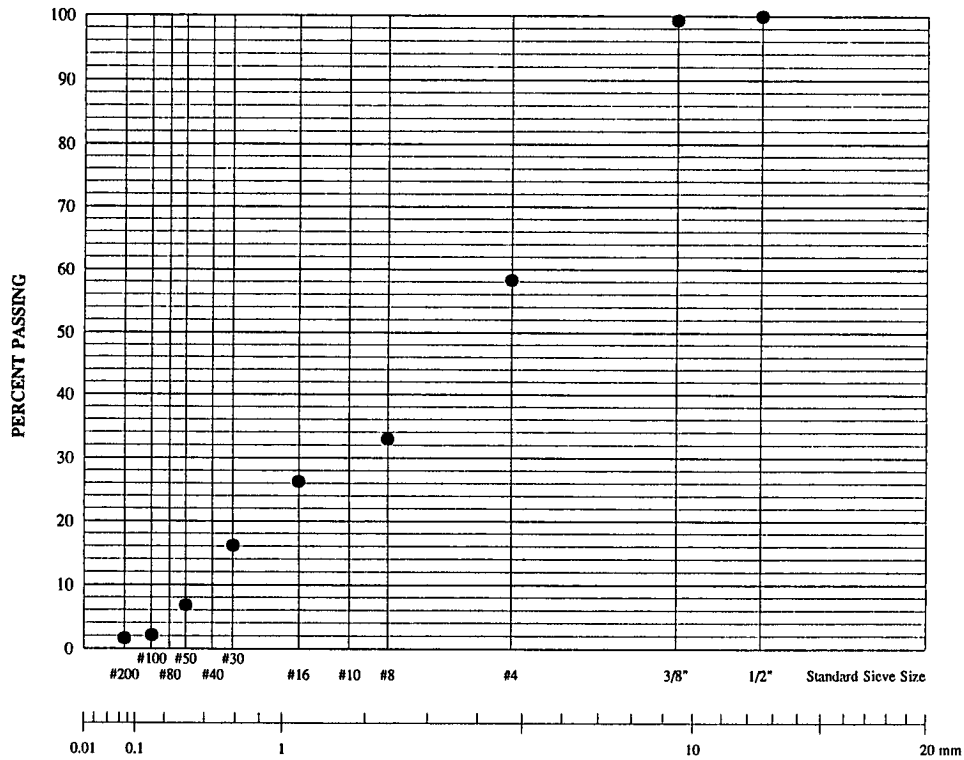


Figure C-10. Gradation for local material–Illinois

Table C-12. Summary of laboratory testing for UPM–Utah

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	4100 12.0	4178 11.3	3742 12.0	4007 11.8
Bulk Specific Gravity, D 2726	2.162	2.173	2.154	2.163
Maximum Specific Gravity, D 2041	2.298	2.315	2.301	2.305
Air Voids (percent)	5.9	6.1	6.4	6.1
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.0	4.0	4.1	4.0
Viscosity, D 2171, 140°F (Poise)	351	229	-	193
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	336	363	-	350
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	100	93	-	96

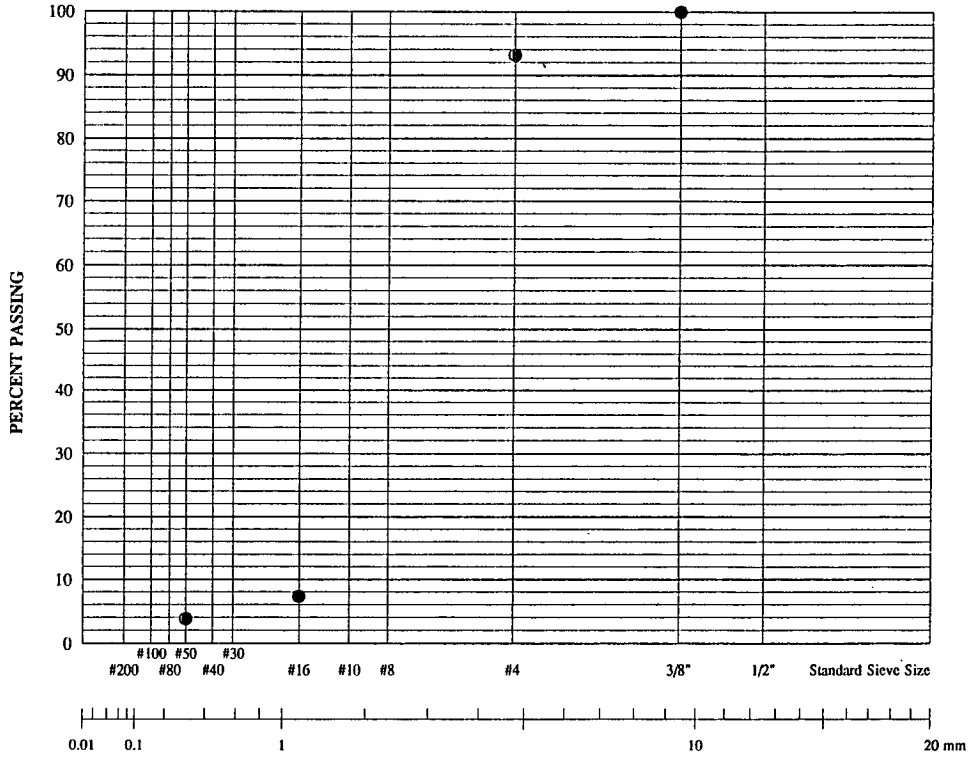


Figure C-11. Gradation for UPM–Utah

Table C-13. Summary of laboratory testing for local material–Utah

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	3533 10.3	4192 10.0	3680 9.0	3802 9.8
Bulk Specific Gravity, D 2726	2.264	2.256	2.269	2.263
Maximum Specific Gravity, D 2041	2.439	2.447	2.446	2.444
Air Voids (percent)	7.2	7.8	7.2	7.4
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.4	4.2	4.3	4.3
Viscosity, D 2171, 140°F (Poise)	2401	1943	-	2172
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	71	67	-	69
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	123.5	121.5	-	122.5

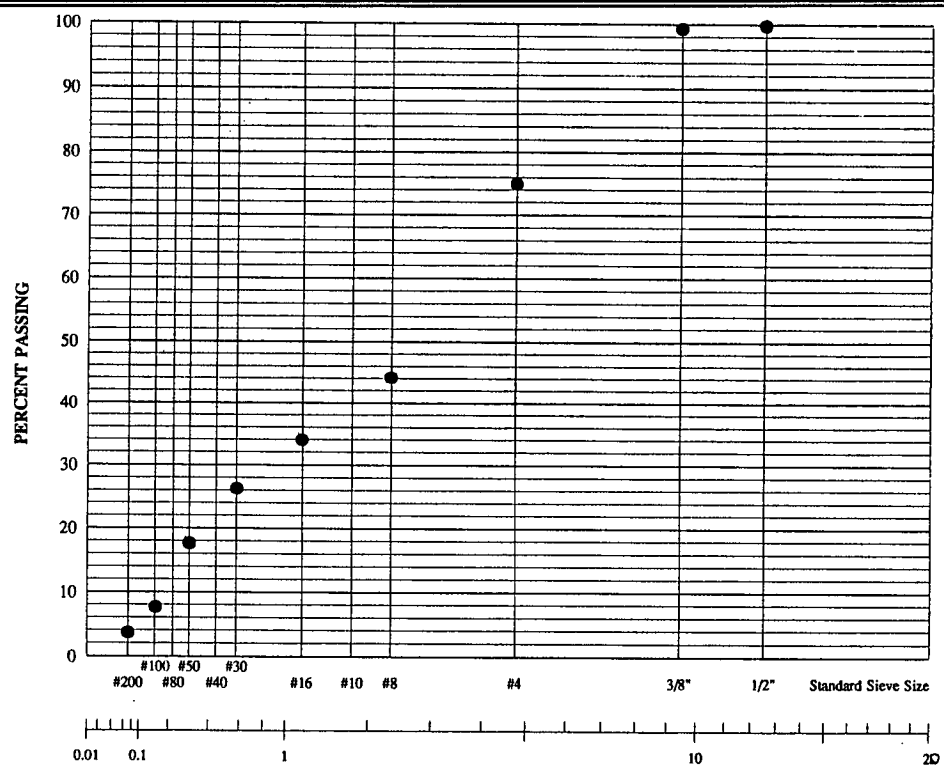


Figure C-12. Gradation for local material–Utah

Table C-14. Summary of laboratory testing for QPR 2000–Oregon

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	2750 10.0	2150 10.0	2250 12.0	2380 10.7
Bulk Specific Gravity, D 2726	2.253	2.247	2.250	2.250
Maximum Specific Gravity, D 2041	2.600	2.596	2.602	2.599
Air Voids (percent)	13.3	13.4	13.5	13.4
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	5.1	-	-	5.1
Viscosity, D 2171, 140°F (Poise)	74	-	-	74
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	+ 400	-	-	-
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	< 86	-	-	-

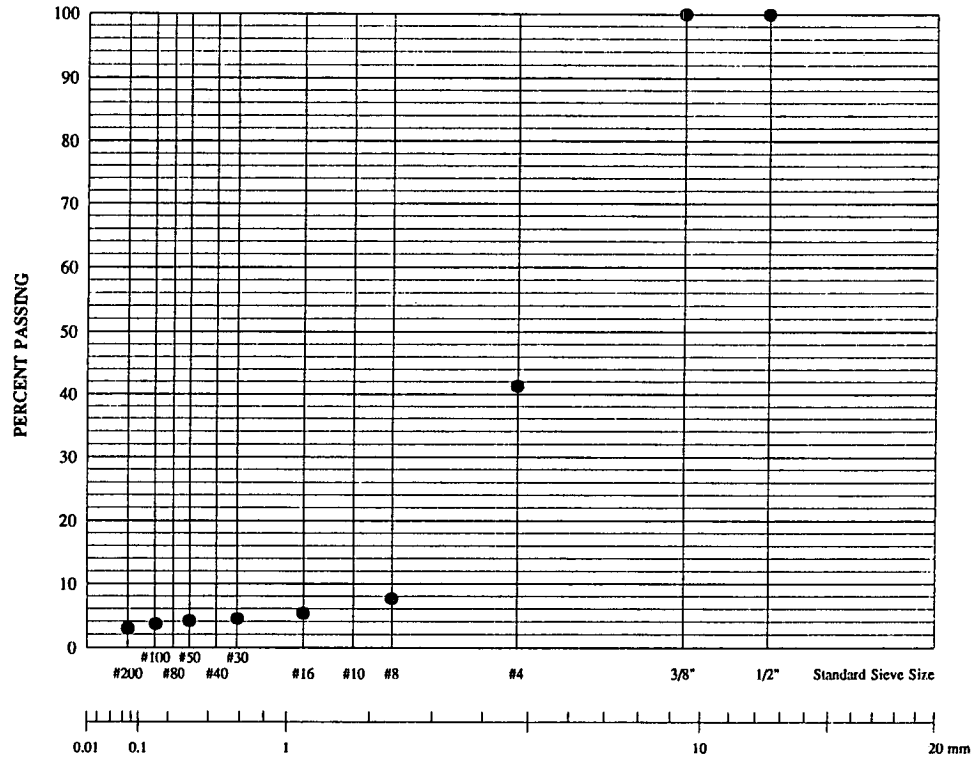


Figure C-13. Gradation for QPR 2000–Oregon

Table C-15. Summary of laboratory testing for Perma-Patch–Oregon

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	3795 14.0	4350 14.0	4050 14.0	4125 14.0
Bulk Specific Gravity, D 2726	2.276	2.279	2.277	2.277
Maximum Specific Gravity, D 2041	2.552	2.597	2.565	2.571
Air Voids (percent)	10.8	12.2	11.2	11.4
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	3.5	-	-	3.5
Viscosity, D 2171, 140°F (Poise)	2932	-	-	2932
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	82	-	-	82
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	126.0	-	-	126.0

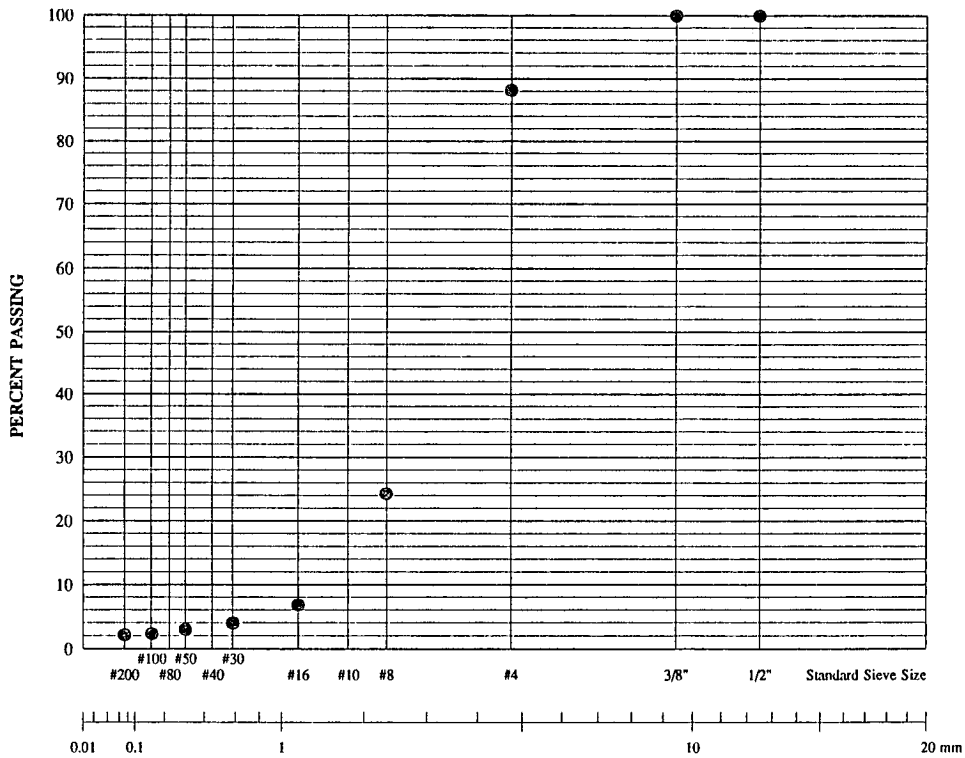


Figure C-14. Gradation for Perma-Patch–Oregon

Table C-16. Summary of laboratory testing for HFMS-2–Oregon

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	5450 15.0	5650 16.0	5800 16.0	5630 15.7
Bulk Specific Gravity, D 2726	2.251	2.249	2.229	2.243
Maximum Specific Gravity, D 2041	2.458	2.465	2.459	2.461
Air Voids (percent)	8.4	8.8	9.4	8.9
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	5.0	-	-	5.0
Viscosity, D 2171, 140°F (Poise)	1288	-	-	1288
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	159	-	-	159
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	115.0	-	-	115.0

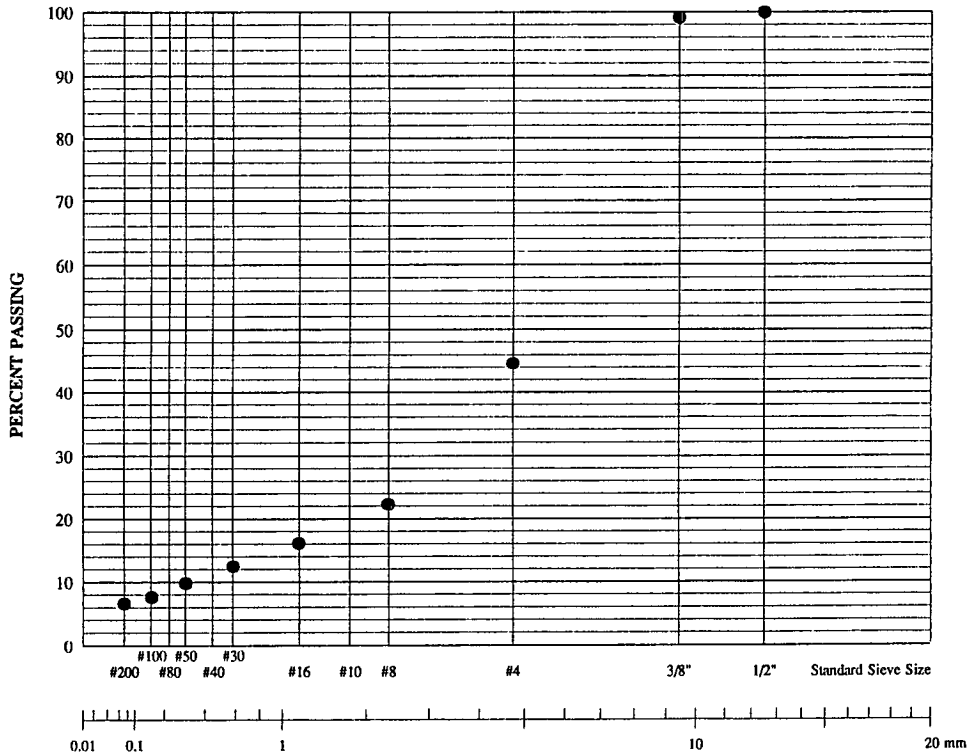


Figure C-15. Gradation for HFMS-2–Oregon

Table C-17. Summary of laboratory testing for local material–Oregon

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	2375 12.0	2625 12.0	1900 10.0	2300 11.3
Bulk Specific Gravity, D 2726	2.207	2.234	2.220	2.220
Maximum Specific Gravity, D 2041	2.523	2.517	2.532	2.524
Air Voids (percent)	12.5	11.2	12.3	12.0
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	2.7	-	-	2.7
Viscosity, D 2171, 140°F (Poise)	1126	-	-	1126
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	121	-	-	121
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	108.5	-	-	108.5

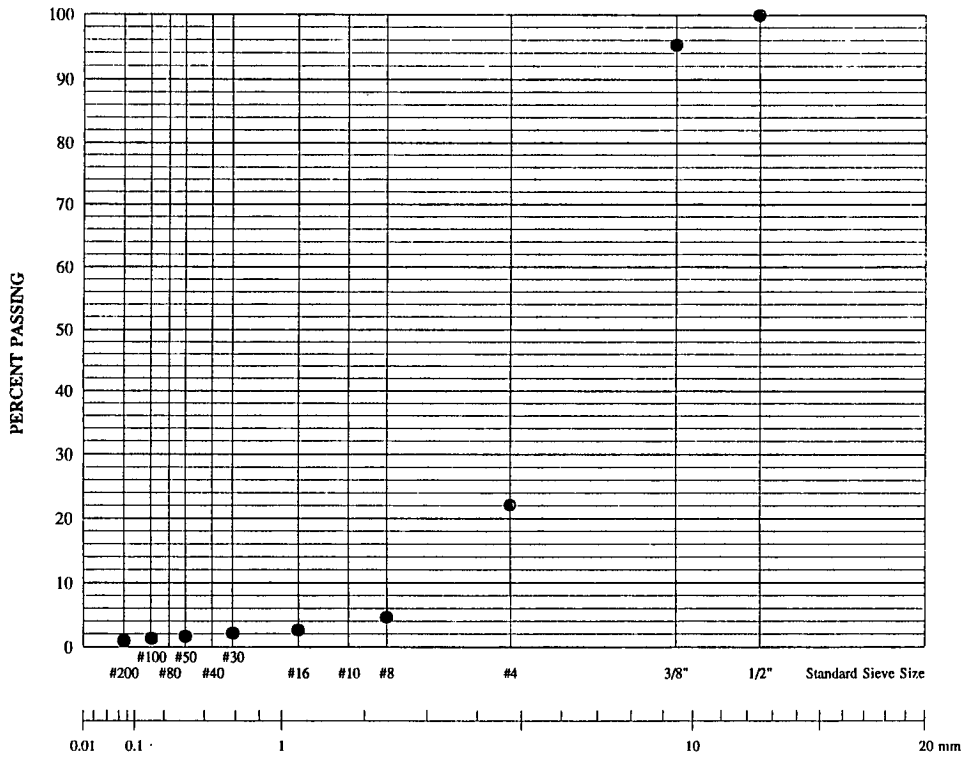


Figure C-16. Gradation for local material–Oregon

Table C-18. Summary of laboratory testing for UPM–Oregon

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	4925 14	4450 15	4890 14	4755 14
Bulk Specific Gravity, D 2726	2.186	2.191	2.188	2.188
Maximum Specific Gravity, D 2041	2.524	2.442	2.511	2.492
Air Voids (percent)	13.4	10.3	12.9	12.2
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.4	-	-	4.4
Viscosity, D 2171, 140°F (Poise)	517	-	-	517
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	211	-	-	211
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	107.5	-	-	107.5

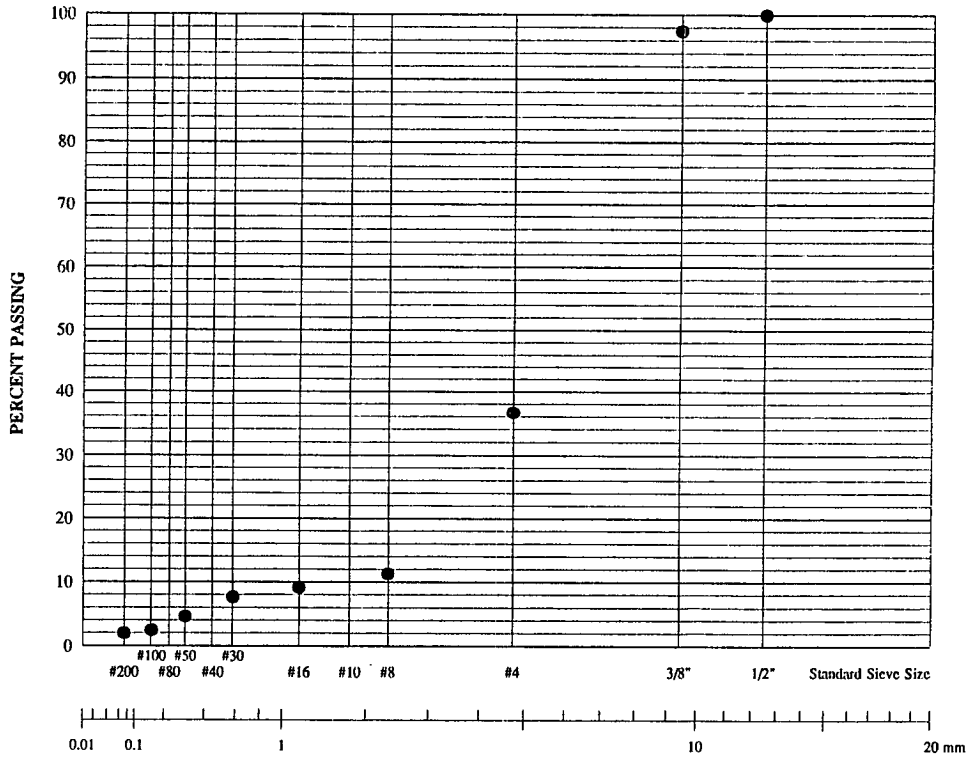


Figure C-17. Gradation for UPM–Oregon

Table C-19. Summary of laboratory testing for local material–Ontario

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	1450 12	2135 12	1700 12	1762 12
Bulk Specific Gravity, D 2726	2.137	2.120	2.124	2.127
Maximum Specific Gravity, D 2041	2.470	2.487	2.449	2.469
Air Voids (percent)	13.5	14.8	13.3	13.9
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.7	-	-	4.7
Viscosity, D 2171, 140°F (Poise)	42	-	-	42
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	+ 350	-	-	+ 350
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	< 86	-	-	<86

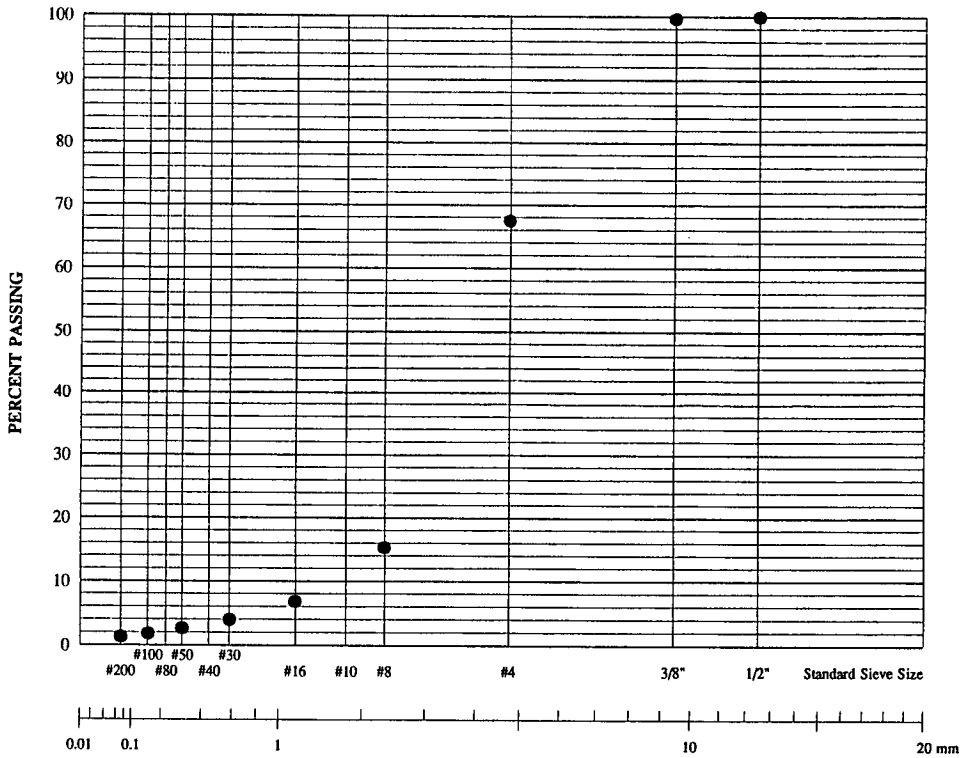


Figure C-18. Gradation for local material–Ontario

Table C-20. Summary of laboratory testing for UPM–Ontario

Test Name, ASTM Designation	Replicate Number			Average values
	1	2	3	
Resilient Modulus, D 4123 77°F, 0.33 Hz (ksi) 77°F, 0.50 Hz (ksi) 77°F, 1.00 Hz (ksi)				
Marshall Stability, D 1559 (lbs) Marshall Flow (0.01 in)	2250 14	2525 14	2165 12	2313 13
Bulk Specific Gravity, D 2726	2.189	2.210	2.224	2.208
Maximum Specific Gravity, D 2041	2.601	2.600	2.573	2.591
Air Voids (percent)	15.8	15.0	13.6	14.8
Anti Stripping, Modified D 1664				
Workability, PTI Method				
AC Content, D 2172 (percent)	4.1	-	-	4.1
Viscosity, D 2171, 140°F (Poise)	69	-	-	69
Penetration, D 5,77 °F, 100 g, 5 sec. (dmm)	+ 350	-	-	+ 350
Ductility, D 113, 77 °F, 5 cm/min., (cm)				
Softening Point, D 36 (°F)	< 86	-	-	< 86

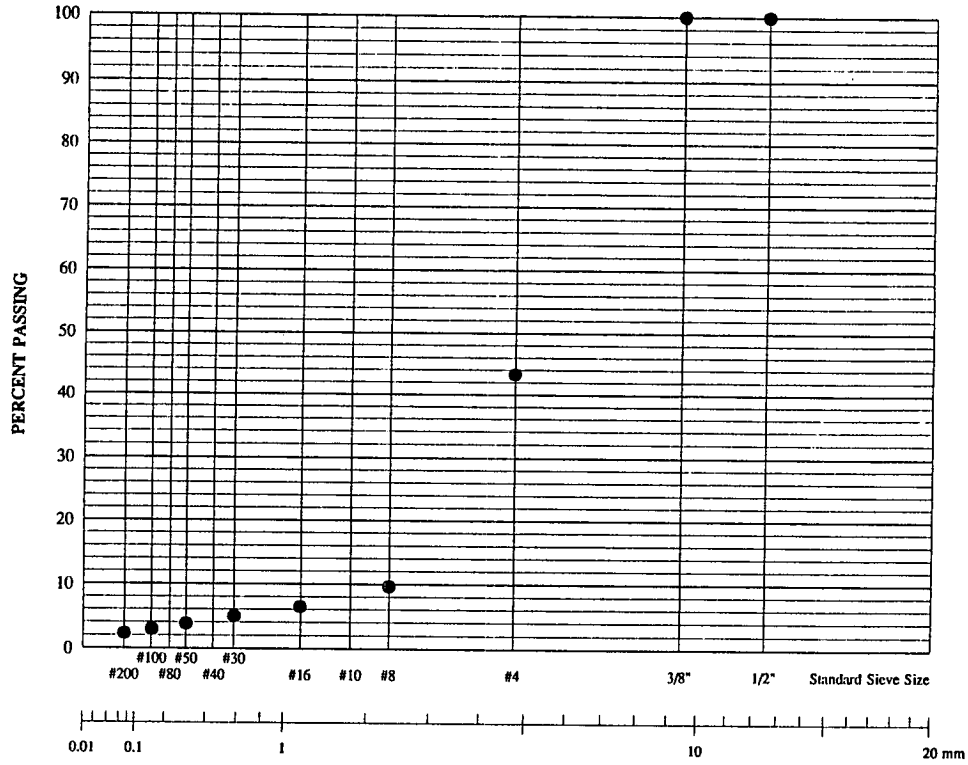


Figure C-19. Gradation for UPM–Ontario

Field Testing Data

In addition to lab testing, tests were performed in the field to provide additional material characteristics. Two procedures were attempted: the blade penetrometer and the rolling sieve. Both are based on laboratory procedures developed at the Ontario Ministry of Transportation for testing cold-mix materials.[4]

However, results of the blade penetrometer testing were consistently greater than the scale of the device (> 4.5), so those data have not been included. The tested materials were shipped in drums and appeared to have compacted during shipment, which resulted in a densely packed material. This consistency was not representative of loose, stockpiled material. When this compacted material was stockpiled, a crust developed on the surface of the stockpile that also resulted in readings beyond the scale of the device.

Tables C-21 through C-24 contain the results of the rolling sieve tests that were conducted in the field. In this procedure, equipment from the Marshall test of hot-mix asphalt concrete (HMAC) was used. The patching materials were placed in a standard Marshall testing mold with a diameter of 4 in (102 mm) and a height of 2.5 in (64 mm). The material was compacted by three blows of a standard Marshall hammer with a weight of 10 lb (4.5 kg) and a drop height of 18 in (457 mm). The compacted brick was extruded from the mold and immediately placed into a standard sieve with a diameter of 12-in (305 mm), and an opening of 1-in (25.0 mm). The sieve was rolled back and forth on its side with a lid in place to prevent material from falling out other than through the mesh.

The percent of material retained after the rolling process was determined by dividing the material's weight after rolling by its weight before rolling. In the laboratory, the test was conducted at a temperature of -10 °C, and the minimum recommended percent retained was 65 percent. In the field, the testing was carried out at the ambient air temperature and to date no criteria have been determined regarding the minimum acceptable percent retained.

Table C-21. Summary of rolling-sieve testing–California and Utah

Site	Date of test	Air temperature during test, °F (°C)	Material	Sample No.	Initial Weight	Final Weight	Percent retained
CALIFORNIA	05/08/91	45 (7)	UPM	1	799 g	636 g	79.6
				2	848 g	786 g	92.7
			QPR 2000	1	808 g	804 g	99.5
				2	834 g	833 g	99.9
			PennDOT 485	1	1001 g	657 g	65.6
				2	737 g	399 g	54.1
			PennDOT 486	1	799 g	699 g	87.5
				2	938 g	800 g	85.3
			Perma-Patch	1	1046 g	912 g	87.2
				2	973 g	813 g	83.6
			HFMS-2	1	689 g	669 g	97.1
				2	689 g	682 g	99.0
			Local material	1	942 g	728 g	77.3
				2	993 g	901 g	90.7
UTAH	06/06/91	65 (18)	UPM	1			
				2			
			QPR 2000	1	2.05 lb	1.75 lb	85.4
				2			
			PennDOT 485	1	2.35 lb	0.45 lb	19.1
				2			
			PennDOT 486	1	1.95 lb	1.20 lb	61.5
				2			
			Perma-Patch	1	2.35 lb	1.20 lb	51.1
				2			
			HFMS-2	1	1.60 lb	1.60 lb	100.0
				2			
			Local material	1			
				2			

Table C-22. Summary of rolling-sieve testing–Vermont and Illinois

Site	Date of test	Air temperature during test, °F (°C)	Material	Sample No.	Initial Weight	Final Weight	Percent retained
VERMONT	05/14/91	65 (18)	UPM	1	1.93 lb	1.54 lb	79.8
				2	2.14 lb	1.82 lb	85.0
	05/15/91	73 (23)	QPR 2000	1	1.91 lb	1.69 lb	88.5
				2	2.02 lb	1.75 lb	86.6
			PennDOT 485	1	2.42 lb	0.56 lb	23.1
				2	2.56 lb	0.36 lb	14.1
			PennDOT 486	1	2.15 lb	1.40 lb	65.1
				2	2.20 lb	1.50 lb	68.2
	05/14/91	65 (18)	Perma-Patch	1	2.56 lb	0.64 lb	25.0
				2	2.39 lb	0.75 lb	31.4
			HFMS-2	1	1.51 lb	1.51 lb	100.0
				2	1.73 lb	1.73 lb	100.0
			Local material	1	2.39 lb	0.10 lb	4.2
				2	2.39 lb	0.13 lb	5.4
ILLINOIS	04/03/91	64 (18)	UPM	1	958 g	565 g	59.0
				2	925 g	652 g	70.5
			QPR 2000	1	992 g	912 g	81.9
				2	1021 g	890 g	87.2
			PennDOT 485	1	1020 g	358 g	35.1
				2	1028 g	306 g	29.8
				3	1084 g	240 g	22.1
			PennDOT 486	1	945 g	701 g	74.2
				2	979 g	792 g	80.9
				3	932 g	550 g	59.0
			Perma-Patch	1	1063 g	110 g	10.3
				2	1150 g	132 g	11.5
			HFMS-2	1	720 g	720 g	100.0
				2	745 g	745 g	100.0
			Local material	1	1040 g	251 g	24.1
				2	1122 g	246 g	21.9

Table C-23. Summary of rolling-sieve testing–Ontario and Oregon

Site	Date of test	Air temperature during test, °F (°C)	Material	Sample No.	Initial Weight	Final Weight	Percent retained
ONTARIO	01/09/92	30 (-1)	UPM	1	757.3 g	740.7 g	97.8
				2	732.9 g	731.8 g	99.8
			QPR 2000	1	721.0 g	695.2 g	96.4
				2	717.4 g	683.7 g	95.3
			PennDOT 485	1	943.9 g	158.7 g	16.8
				2	771.9 g	30.7 g	4.0
			PennDOT 486	1			
				2			
			Perma-Patch	1	661.5 g	656.3 g	99.2
				2	925.8 g	923.4 g	99.7
			HFMS-2	1			
				2			
			Local material	1	769.3 g	334.1 g	43.4
				2	610.9 g	227.4 g	37.2
OREGON	03/12/92	35 (2)	UPM	1	1.669 lb	1.556 lb	93.2
				2	1.954 lb	1.838 lb	94.1
			QPR 2000	1	1.599 lb	1.506 lb	94.2
				2	2.128 lb	2.118 lb	99.5
			PennDOT 485	1	1.720 lb	1.394 lb	81.0
				2	2.038 lb	1.672 lb	82.0
			PennDOT 486	1	1.454 lb	1.420 lb	97.7
				2	1.600 lb	1.511 lb	94.4
			Perma-Patch	1			
				2			
			HFMS-2	1	1.804 lb	1.744 lb	96.7
				2	1.541 lb	1.515 lb	98.3
			Local material	1	1.496 lb	0.225 lb	15.0
				2	1.877 lb	0.852 lb	45.4

Table C-24. Summary of rolling-sieve testing–New Mexico

Site	Date of test	Air temperature during test, °F (°C)	Material	Sample No.	Initial Weight	Final Weight	Percent retained
NEW MEXICO	04/11/91	69 (21)	UPM	1	1.90 lb	0.90 lb	47.4
				2	1.80 lb	0.60 lb	33.3
			QPR 2000	1	2.27 lb	1.39 lb	61.2
				2	2.21 lb	1.52 lb	68.8
			PennDOT 485	1	2.32 lb	1.38 lb	59.5
				2	2.14 lb	0.58 lb	27.1
			PennDOT 486	1	2.10 lb	1.65 lb	78.6
				2	2.19 lb	1.85 lb	84.5
			Perma-Patch	1	2.65 lb	0.71 lb	26.8
				2	2.46 lb	0.82 lb	33.3
			HFMS-2	1	1.70 lb	1.70 lb	100.0
				2	1.80 lb	1.80 lb	100.0
			Local material	1	2.20 lb	0.10 lb	4.5
				2	2.15 lb	0.70 lb	32.6

Appendix D

Field Performance Data

Monitoring of the field performance of the pothole patches entailed visually surveying patch survival and noting what distresses and severity levels were present for those surviving repairs. In addition to the visual survey, photographs were taken of representative repairs to illustrate their performance.

See table D-1 for the distresses that were noted during the monitoring trips and the rating system used for different severity levels. See figure D-1 for a sample of the data collection form used for the performance monitoring trips. One sheet was used for each repair. See tables D-2 through D-9 for the distress information collected for all patches at all sites.

Table D-1. Summary of patch ratings for distress-severity combinations

DISTRESS	ESTIMATED QUANTITY	RATING										
		10	9	8	7	6	5	4	3	2	1	0
Bleeding	Percent of area	0	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Cracking	Quantity of cracks	0	< 6-in	< 12-in	> 12-in	< 6-in	< 12-in	> 12-in	< 6-in	< 12-in	> 12-in	> 12-in
	Width of cracks	0	crack width < 0.0625-in			crack width < 0.25-in			crack width > 0.25-in			alligator
Dishing	Depth of dishing	0	< 0.25-in			0.25-in to 0.50-in			0.50-in to 1.0-in		> 1.0-in	
	Percent of area	0	< 25%	< 50%	> 50%	< 25%	< 50%	> 50%	< 50%	> 50%	< 50%	> 50%
Edge Disintegration	Percent of perimeter	0	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Missing Patch	Percent of area	0	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Ravelling	Severity	None	Loss of small rocks			Loss of larger particles			Top 0.5-in gone		Top 1.0-in gone	
	Percent of area	0	< 25%	< 50%	> 50%	< 25%	< 50%	> 50%	< 50%	> 50%	< 50%	> 50%
Shoving	Height of shoving	0	< 0.25-in			0.25-in to 0.50-in			0.50-in to 1.0-in		> 1.0-in	
	Percent area	0	< 10%	< 25%	> 25%	< 10%	< 25%	> 25%	< 25%	> 25%	< 25%	> 25%

SHRP H-106 FIELD EVALUATION FORM - POTHOLE REPAIR EXPERIMENT

Test site number: 06P500 Overall Sequence Number: _____ ERES personnel: TPW

State: California

District:

County: Modoc

Highway: US 395

Nearest town: Alturas

Number of lanes: 2

Direction of traffic: N S

Shoulder type, width:

Estimated 2-way ADT (year):

Comments
General:

1-month evaluation:

3-month evaluation:

6-month evaluation:

12-month evaluation:

18-month evaluation:

Experiment: A B C D E F G H I J X Pothole Number: _____ Air Temp.: _____ °F

Mark the appropriate box for each distress. Distresses not present marked "10".

DISTRESS TYPES	Distress ratings for patches				
	1-month evaluation __/__/__	3-month evaluation __/__/__	6-month evaluation __/__/__	12-month evaluation __/__/__	18-month evaluation __/__/__
BLEEDING (Percent of total patch surface area)					
CRACKING (Width/condition of cracks in patched area)					
DISHING (Depth of lowest point in subsided patch)					
EDGE DISINTEGRATION (Extent of cracks at patch edge which match pavement)					
MISSING PATCH (Percent of material missing from patch)					
RAVELING (Extent of aggregate loss from patch surface)					
SHOVING (Extent of material upheaval from patch)					

Figure D-1. Sample of field performance data collection form

Table D-2. Summary of distress data for US 395, Alturas, California
Local material (F), Control (A), and PennDOT 486 (E)

			Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Material	#	Bleed	Crack	Disg	Edge	Mist	Ravel	Shove	Bleed	Crack	Disg	Edge	Mist	Ravel	Shove	Bleed	Crack	Disg	Edge	Mist	Ravel	Shove	Bleed	Crack	Disg	Edge	Mist	Ravel	Shove	Bleed	Crack	Disg	Edge	Mist	Ravel	Shove
06P500001	F	1	10	10	6	10	10	10	10	10	10	7	9	10	10	10	10	10	7	8	10	10	10														
06P500002	A	1	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10
06P500003	E	1	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	8	10	10	10	9	7	10	8	10
06P500004	E	2	10	10	6	10	10	10	10	3	10	4	10	10	10	10	5	10	4	8	10	10	10	5	10	4	8	10	10	10	2	10	4	8	10	10	10
06P500005	A	2	10	10	6	10	10	10	10	10	10	7	10	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	8	10	10	10	7	7	10	8	10
06P500006	F	2	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	8	10	10	10	7	7	10	8	10
06P500007	F	3	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	8	10	10	10	7	7	10	7	10
06P500008	A	3	10	10	4	10	10	10	10																												
06P500009	E	3	1	10	3	10	10	8	10	0	10	1	10	10	6	10	2	10	1	10	10	8	6														
06P500010	E	4	5	10	6	10	10	10	10	1	10	6	10	10	10	10	10	10	6	8	10	10	10	0	10	6	7	10	10	10	1	10	6	7	10	10	10
06P500011	A	4	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	8	10	7	10
06P500012	F	4	10	10	10	10	10	9	10	10	10	8	9	10	9	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	9	10	7	10
06P500013	F	5	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	8	9	10	8	10	10	10	8	9	10	7	10
06P500014	A	5	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	10	8	10	10	8	8	10	10	7	10
06P500015	E	5	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	10	10	8	10	9	8	10	10	10	8	10	9	7	10	8	10
06P500016	E	6	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	7	10
06P500017	A	6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	6	10	10	10	10	8	10	5	10
06P500018	F	6	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	7	10	10	10	9	8	10	7	10
06P500019	F	7	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	8	10	10	10	8	8	10	7	10
06P500020	A	7	10	10	7	10	10	10	10	10	10	6	8	10	10	10	10	10	6	8	10	10	10	10	10	6	7	10	8	10	2	10	6	7	10	8	10
06P500021	E	7	1	10	4	9	10	10	10	1	10	5	8	10	10	10	1	10	5	8	10	10	10	2	10	5	8	10	10	10	2	10	5	8	10	8	10
06P500022	E	8	3	10	7	10	10	10	10	2	10	6	10	10	10	10	3	10	5	6	10	10	10	4	10	5	6	10	10	10	4	10	5	6	10	10	10
06P500023	A	8	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	7	6	10	10	10	10	10	7	6	10	8	10	10	10	7	6	10	7	10
06P500024	F	8	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	7	10	10	10	8	6	10	7	10
06P500025	F	9	10	10	5	10	10	10	10	10	10	6	7	10	8	10	10	10	7	7	10	10	10	10	10	7	7	10	8	10							
06P500026	A	9	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	8	10	10	10	7	7	10	8	10
06P500027	E	9	3	10	5	10	10	10	8	1	10	5	10	10	10	6	1	10	5	10	10	10	6	3	10	5	10	10	8	5	3	10	5	10	10	8	5
06P500028	E	10	1	10	6	10	10	10	7	1	10	5	10	10	8	6	0	10	5	10	10	7	6	0	10	5	10	10	6	6	0	10	5	10	10	1	5
06P500029	A	10	10	7	7	10	10	10	10	10	7	6	10	10	8	10	10	8	6	10	10	8	10	10	8	6	10	8	8	10	10	8	6	10	8	8	
06P500030	F	10	10	8	10	10	10	10	10	10	8	9	10	10	8	10	10	8	8	10	10	8	10	10	8	8	10	8	8	10	10	8	7	10	8	8	
Surviving	F		10							10							10							9							8						
	A		10							9							9							9							9						
	E		10							10							10							9							9						

Table D-2. Summary of distress data for US 395, Alturas, California (continued)
Spray injection (J), Control (A), and PennDOT 485 (D)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Matl #																																			
06P500031	J 1	10	10	5	10	10	4	10	10	10	5	10	10	3	10	10	10	5	10	10	3	10	10	10	5	10	10	3	10	10	10	5	10	10	3	10
06P500032	A11	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10
06P500033	D 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10
06P500034	D 2	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	9	10	10	10	10	8	10	9	10	8	10	10	8	10	9	10	8	10
06P500035	A12	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	9	10	9	10	8	10	10	8	10	9	10	8	10
06P500036	J 2	10	10	5	10	10	4	10	10	10	4	10	10	4	10	10	10	4	9	10	4	10	10	10	4	9	10	4	10	10	10	4	9	10	4	10
06P500037	J 3	10	10	6	10	10	4	10	10	10	6	10	10	4	10	10	7	6	10	10	4	10	10	7	6	10	10	4	10	10	7	6	10	10	4	10
06P500038	A13	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	8	10	7	10
06P500039	D 3	10	10	8	10	10	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	8	10	9	10	8	10	10	7	10	9	10	8	10
06P500040	D 4	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10							
06P500041	A14	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	8	8	7	10	10	10	10	8	8	7	10	8	10	10	7	8	7	10	8	10
06P500042	J 4	10	10	4	10	10	4	10	10	10	5	10	10	4	10	10	10	4	10	10	4	10	10	10	4	10	10	4	10	10	10	4	10	10	4	10
06P500043	J 5	10	10	2	10	10	5	10	10	10	3	10	10	4	10	10	9	3	10	10	4	10	10	9	3	10	10	3	10	10	9	3	10	10	3	10
06P500044	A15	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	9	10	9	10	8	10	10	8	10	9	10	8	10
06P500045	D 5	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	9	8	9	10	10	10	10	9	8	9	10	9	10	10	9	8	9	10	9	10
06P500046	D 6	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	9	8	9	10	10	10	10	9	8	9	10	9	10	10	9	8	9	10	9	10
06P500047	A16	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	8	10	10	7	8	7	10	8	10
06P500048	J 6	10	10	3	10	10	4	10	10	10	4	9	10	5	10	10	10	5	9	10	4	10	10	10	5	9	10	3	10	10	10	5	9	10	3	10
06P500049	J 7	10	10	4	10	10	4	10	10	10	3	10	10	4	10	10	10	4	10	10	3	10	10	10	4	10	10	1	10	10	10	3	10	10	1	10
06P500050	A17	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	8	10	8	10
06P500051	D 7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	9	10	10	10	10	7	10	9	10
06P500052	D 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10
06P500053	A18	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	8	10	7	10	8	10
06P500054	J 8																																			
06P500055	J 9	10	10	6	10	10	6	10	10	10	6	10	10	5	10	10	10	6	10	10	5	10														
06P500056	A19	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	8	10	7	10	8	10
06P500057	D 9	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	8	10	10	8	8	10	10	8	10
06P500058	D10	10	10	10	10	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	9	10	10	10	9	7	10	9	10
06P500059	A20	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	9	9	9	10	10	10	10	9	9	9	10	8	10	10	7	9	9	10	8	10
06P500060	J10	10	10	5	10	10	5	10	9	10	5	10	10	4	10	10	10	5	10	10	4	10	10	10	5	10	10	4	10	10	10	5	10	10	4	10
Surviving	J	9							9							9							8							8						
	A	10							10							10							10							10						
	D	10							10							10							10							9						

Table D-2. Summary of distress data for US 395 Alturas, California (continued)
Perma-Patch (H), Control (A), and HFMS-2 (G)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
06P500061	H 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	9	10	10	9	10	8	10	9	10	10	9	10	8	10	7	10
06P500062	A21	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	9	10	10	10	10	8	10	9	10	10	10	10	8	10	8	10
06P500063	G 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10
06P500064	G 2	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	6	10	8	10
06P500065	A22	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	8	10	8	10	10	9	10	8	10	8	10	10	7	10	8	10	7	10
06P500066	H 2	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	9	10	7	10	9	10	10	9	10	7	10	9	10
06P500067	H 3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	9	10	10	9	10	7	10	9	10
06P500068	A23	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10
06P500069	G 3	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	9	10	10	10	8	7	10	9	10
06P500070	G 4	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	6	10
06P500071	A24	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	9	10	7	10	8	10
06P500072	H 4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	7	10	10	10
06P500073	H 5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	7	10	10	10	10	6	10	7	10	10	10
06P500074	A25	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	8	10	10	9	10	6	10	8	10
06P500075	G 5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10
06P500076	G 6	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	8	10	10	7	8	7	10	8	10
06P500077	A26	10	10	9	10	10	10	10	10	10	8	10	10	9	10	10	10	8	9	10	9	10	10	10	8	8	10	8	10	10	7	8	8	10	8	10
06P500078	H 6	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	10	9	10	7	10	10	10
06P500079	H 7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10	10	10
06P500080	A27	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	8	10	8	10	7	10
06P500081	G 7	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	8	10	9	10	10	10	10	7	10	8	10	10	10	10	6	10	8	10
06P500082	G 8	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	8	10	10	7	10	8	10	8	10
06P500083	A28	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	9	10	10	9	10	8	10	8	10	10	8	10	8	10	8	10
06P500084	H 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10	9	10	10	9	10	7	10	9	10
06P500085	H 9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10
06P500086	A29	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	9	10	7	10	10	10	10	8	10	7	10	10	10
06P500087	G 9	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	8	10	10	9	8	7	10	8	10
06P500088	G10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	7	10	8	10	10	8	8	7	10	8	10
06P500089	A30	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	8	10	99	99	99	99	99	99	99
06P500090	H10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	9	10	99	99	99	99	99	99	99
Surviving	H	10							10							10							10							10						
	A	10							10							10							10							10						
	G	10							10							10							10							10						

Table D-2. Summary of distress data for US 395 Alturas, California (continued)
UPM (semi-perm.) (C), Control (A), and UPM (edge seal) (B)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Mat'l #																																			
06P500091	C 1	10	10	9	8	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10
06P500092	A31	10	10	8	7	10	10	10	10	10	8	6	10	10	10																					
06P500093	B 1	5	10	8	10	10	8	10	10	10	7	10	10	6	10	5	10	6	10	10	5	10														
06P500094	B 2	8	10	9	8	10	10	10	7	10	8	8	10	10	10	7	10	10	7	10	9	10	7	10	10	7	10	8	10	6	10	10	7	10	8	10
06P500095	A32	10	10	9	10	10	10	10	10	10	8	9	10	10	10																					
06P500096	C 2	10	10	7	9	10	4	10	10	10	8	8	10	4	10																					
06P500097	C 3	10	10	9	8	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	8	10
06P500098	A33	10	10	9	8	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10
06P500099	B 3	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	10	8	10	10	8	9	10	10	8	10
06P500100	B 4	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	8	10	8	9	8	10	10	8	10
06P500101	A34	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10
06P500102	C 4	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	8	10	10	10	6	10	10	8	10
06P500103	C 5	10	10	7	8	10	10	10	10	10	8	10	10	10	10	9	10	8	7	10	8	10	9	10	8	7	10	6	10	9	10	8	6	10	6	10
06P500104	A35	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	8	10	10	10	8	6	10	7	10
06P500105	B 5	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10
06P500106	B 6	10	10	7	8	10	10	10	10	10	5	8	10	8	10	10	10	5	8	10	6	10	10	10	5	8	10	6	10	10	10	4	8	10	6	10
06P500107	A36	10	10	6	8	10	7	10	10	10	7	8	10	7	10	10	10	7	7	10	5	10	10	10	7	6	10	5	10							
06P500108	C 6	10	10	8	8	10	8	10	10	10	8	7	10	10	10	10	10	8	7	10	5	10	10	10	8	7	10	5	10	10	10	8	7	10	5	10
06P500109	C 7	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10
06P500110	A37	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10
06P500111	B 7	8	10	10	9	10	10	10	7	10	8	8	10	10	10	8	10	8	7	10	10	10	8	10	8	7	10	8	10	8	10	8	7	10	8	10
06P500112	B 8	10	10	7	9	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	9	10	10	10	7	7	10	7	10	10	10	7	6	10	7	10
06P500113	A38	10	10	8	8	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	8	10														
06P500114	C 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	9	10	10	10	10	7	10	9	10
06P500115	C 9	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10														
06P500116	A39	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	9	10														
06P500117	B 9	10	10	8	8	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	9	10	10	10	7	7	10	8	10
06P500118	B10																																			
06P500119	A40	10	10	10	10	10	10	10	5	10	8	9	10	10	10																					
06P500120	C10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	7	10	10	10														
Surviving	C	10							10							9							7							7						
	A	10							10							7							5							4						
	B	9							9							9							8							8						

Table D-2. Summary of distress data for US 395 Alturas, California (continued)
QPR 2000 (I) and Control (A)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Ditch	Edge	Miss	Ravel	Shove	Bleed	Crack	Ditch	Edge	Miss	Ravel	Shove	Bleed	Crack	Ditch	Edge	Miss	Ravel	Shove	Bleed	Crack	Ditch	Edge	Miss	Ravel	Shove	Bleed	Crack	Ditch	Edge	Miss	Ravel	Shove
06P500121	A41	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	8	10	10	9	10	8	10	7	10
06P500122	I 1	10	10	8	10	10	7	10	8	10	7	10	10	5	10	8	10	7	10	10	5	10	8	10	7	10	10	1	10	6	10	7	10	10	1	10
06P500123	A42	10	10	7	10	10	8	10	5	10	6	10	10	6	7	2	10	6	10	10	3	5														
06P500124	I 2	10	10	9	8	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	7	10	10	10	8	7	10	6	10	10	10	8	6	10	5	10
06P500125	A43	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	3	10	10	10	8	8	10	3	10
06P500126	I 3	8	10	9	10	10	10	10	6	10	8	10	10	10	10	5	10	8	10	10	9	10	6	10	8	10	10	6	10	6	10	4	10	10	4	10
06P500127	A44	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	4	10	10	10	8	8	10	4	10
06P500128	I 4	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	9	10	10	10	8	7	10	6	10	10	10	8	7	10	6	10
06P500129	A45	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	7	8	7	10	8	10
06P500130	I 5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	7	10	10	10	10	7	10	7	10
06P500131	A46	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	9	10	10	10	8	8	10	8	10	10	10	8	8	10	8	10
06P500132	I 6	6	10	8	7	10	10	10	2	10	6	6	10	10	10	4	10	6	6	10	10	10														
06P500133	A47	8	10	6	9	10	10	10	7	10	6	8	10	10	10	7	10	6	8	10	9	10	7	10	6	8	10	8	10							
06P500134	I 7	10	10	9	8	10	10	10	8	10	8	8	10	10	10	8	10	8	7	10	8	10	7	10	8	7	10	5	10	7	10	8	6	10	3	10
06P500135	A48	2	10	8	8	10	9	10	2	10	8	8	10	8	10	2	10	8	8	10	7	10	2	10	8	8	10	6	10	1	10	8	8	10	6	10
06P500136	I 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	8	10	10	9	10	8	10	6	10
06P500137	A49	10	10	8	8	10	7	10	8	10	8	7	10	7	10	7	10	8	7	10	8	10														
06P500138	I 9	10	10	10	9	10	10	10	10	10	10	7	10	10	10																					
06P500139	A50	10	10	7	9	10	10	10	10	10	7	8	10	7	10	10	10	7	7	10	8	10														
06P500140	I10	10	10	7	10	10	10	10	10	10	8	9	10	10	10	10	4	8	9	10	10	10	10	4	8	9	10	8	10	10	4	8	9	10	6	10
Surviving	A	10							10							10							7							6						
	I	10							10							9							8							8						

Table D-3. Summary of distress data for I-70, Vandalia, Illinois
Local material (F), Control (A), and QPR 2000 (I)

			Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Material	#	Bleed	Crack	Distress	Edge	Mist	Ravel	Shove	Bleed	Crack	Distress	Edge	Mist	Ravel	Shove	Bleed	Crack	Distress	Edge	Mist	Ravel	Shove	Bleed	Crack	Distress	Edge	Mist	Ravel	Shove	Bleed	Crack	Distress	Edge	Mist	Ravel	Shove
17P200001	F	1	10	10	4	10	10	8	10	2	10	2	9	10	9	10																					
17P200002	A	1	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	6	10	10	10	8	10														
17P200003	I	1	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	6	8	10	10	7	10	10	3	8	10	10	7	10	10	2	8	10	10	6	10
17P200004	I	2	10	10	10	10	10	10	10	10	10	8	10	10	9	10	10	5	8	10	10	8	10	10	2	8	10	10	8	10							
17P200005	A	2	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	7	10	10	10	7	10	10	4	10	10	10	7	10							
17P200006	F	2																																			
17P200007	F	3																																			
17P200008	A	3	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	8	10	10	8	10	10	8	8	10	10	7	10	10	8	8	10	10	7	10
17P200009	I	3	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	8	8	10	10	7	10	10	3	8	10	10	7	10							
17P200010	I	4	10	10	7	10	10	10	10	10	10	4	10	10	8	10																					
17P200011	A	4																																			
17P200012	F	4																																			
17P200013	F	5																																			
17P200014	A	5	10	10	10	10	10	10	10	10	10	10	10	10	8	8	10	6	10	10	10	7	7	10	3	10	10	10	5	7	10	2	10	10	10	5	7
17P200015	I	5																																			
17P200016	I	6	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	8	10	10	10	6	10	10	6	10							
17P200017	A	6	10	10	7	10	10	10	10	10	10	7	10	10	8	10	10	7	10	10	10	8	10														
17P200018	F	6																																			
17P200019	F	7																																			
17P200020	A	7	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	7	9	10	7	10														
17P200021	I	7	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10														
17P200022	I	8	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10							
17P200023	A	8	10	10	9	10	10	10	10	10	10	6	10	10	9	10	10	10	7	10	10	8	10	10	10	7	10	10	8	10							
17P200024	F	8																																			
17P200025	F	9																																			
17P200026	A	9	10	10	9	10	10	10	10	10	10	8	10	10	9	10	10	10	8	9	10	7	10	10	10	8	8	10	7	10							
17P200027	I	9	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	7	8	10	8	10	10	10	7	8	10	7	10							
17P200028	I	10																																			
17P200029	A	10	10	10	9	10	10	10	10	10	10	8	10	10	9	10	10	10	7	7	10	8	9	10	10	7	7	10	7	9							
17P200030	F	10																																			
Surviving	F		1							1							0							0							0						
	A		9							9							9							6							2						
	I		8							8							7							6							1						

Table D-3. Summary of distress data for I-70, Vandalia, Illinois (continued)
Local procedure (X), Control (A), and HFMS-2 (G)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Mass	Ravel	Shove	Bleed	Crack	Dish	Edge	Mass	Ravel	Shove	Bleed	Crack	Dish	Edge	Mass	Ravel	Shove	Bleed	Crack	Dish	Edge	Mass	Ravel	Shove	Bleed	Crack	Dish	Edge	Mass	Ravel	Shove
17P200031	X 1	10	10	8	10	10	10	10	6	10	8	10	10	10	10	10	10	6	10	10	8	8	10	10	4	10	10	8	6							
17P200032	A11	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	7	10	10	7	10	10	4	7	10	10	7	10							
17P200033	G 1	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	7	10	10	7	10	10	10	7	7	10	6	10							
17P200034	G 2	10	10	8	10	10	10	10	10	10	8	8	10	9	10	10	7	7	4	10	8	10	10	7	7	2	10	7	10							
17P200035	A12	10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	9	8	8	10	7	10	10	4	8	4	10	7	10							
17P200036	X 2	10	10	5	10	10	10	10	6	10	4	10	10	6	10	10	7	4	10	10	6	8	10	7	4	10	10	6	8							
17P200037	X 3																																			
17P200038	A13	10	10	9	10	10	10	10	10	10	8	10	10	6	10	10	10	7	9	10	6	10	10	10	7	7	10	3	10							
17P200039	G 3	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	7	10	10	10	8	4	10	6	10							
17P200040	G 4	10	10	6	10	10	10	10	10	10	6	10	10	8	10	10	10	5	9	10	7	8	10	8	5	7	10	7	8							
17P200041	A14	10	10	9	10	10	10	10	10	10	8	10	10	6	10	10	9	8	10	10	6	10	10	2	8	10	10	6	10							
17P200042	X 4	10	10	7	10	10	10	10	6	10	6	10	10	10	10	6	6	5	10	10	10	8	6	6	5	10	10	3	8							
17P200043	X 5																																			
17P200044	A15	10	10	7	10	10	10	10	10	10	7	10	10	8	10	10	6	6	10	10	7	10	10	4	6	5	10	7	10							
17P200045	G 5	10	10	7	10	10	10	10	10	10	7	8	10	8	10	10	8	7	6	10	6	10	10	4	7	4	10	6	10							
17P200046	G 6	10	10	7	10	10	10	10	10	10	7	8	10	9	10	10	10	6	4	10	8	10	10	5	6	4	10	8	10							
17P200047	A16	10	10	6	10	10	10	10	10	10	7	8	10	6	10	10	10	7	6	10	6	10	10	5	7	4	10	6	10							
17P200048	X 6	10	10	4	10	10	10	10	1	10	5	10	10	10	10	1	10	5	9	10	10	5	3	10	5	9	10	10	5							
17P200049	X 7	10	10	4	10	10	10	10	1	10	5	8	10	10	10	1	8	10	8	10	10	6														
17P200050	A17	10	10	7	10	10	10	10	10	10	7	9	10	9	10	10	10	7	6	10	8	10	10	6	7	5	10	7	10							
17P200051	G 7	10	10	5	10	10	10	10	10	10	5	5	10	6	10	10	10	6	4	10	7	10														
17P200052	G 8	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	6	10	7	10	10	5	10	5	10	7	10	10	2	10	5	10	7	10
17P200053	A18	10	10	10	10	10	10	10	10	10	9	8	10	9	10	10	10	8	6	10	8	10	10	10	8	5	10	6	10	10	10	8	3	10	6	10
17P200054	X 8	10	10	3	10	10	10	10	0	10	3	10	10	10	6																					
17P200055	X 9	10	10	3	10	10	10	10	1	10	3	10	10	10	7																					
17P200056	A19	10	10	10	10	10	10	10	10	10	9	8	10	9	10	10	10	8	7	10	7	10	10	10	8	7	10	7	10							
17P200057	G 9	10	10	6	10	10	10	10	10	10	9	10	10	9	10	10	8	8	7	10	8	10	10	4	3	7	10	7	10							
17P200058	G10	10	10	7	10	10	10	10	10	10	8	10	10	8	10	10	10	8	8	10	7	10	10	10	8	7	10	7	8							
17P200059	A20	10	10	7	10	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	7	10	10	10	8	4	10	6	10							
17P200060	X10	10	10	4	10	10	10	10	1	10	4	10	10	10	6	1	10	5	10	10	10	6	4	10	5	10	10	10	6							
Surviving	X	8							8							6							5							0						
	A	10							10							10							10							1						
	G	10							10							10							9							1						

Table D-3. Summary of distress data for I-70, Vandalia, Illinois (continued)
PennDOT 486 (E), Control (A), and UPM (edge seal) (B)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Misc	Ravel	Shove	Bleed	Crack	Dish	Edge	Misc	Ravel	Shove	Bleed	Crack	Dish	Edge	Misc	Ravel	Shove	Bleed	Crack	Dish	Edge	Misc	Ravel	Shove	Bleed	Crack	Dish	Edge	Misc	Ravel	Shove
Patch ID	Mat'l #																																			
17P200061	E 1	10	10	6	10	10	10	10	7	10	8	9	10	10	10	10	9	7	7	10	10	10	10	9	7	5	10	10	10							
17P200062	A21	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	10	8	7	10	8	10	10	10	10	3	10	7	10							
17P200063	B 1	10	10	9	10	10	10	10	10	10	8	10	10	9	10	10	10	8	10	10	8	10	10	10	8	10	10	8	10							
17P200064	B 2	10	10	8	10	10	10	10	10	10	9	10	10	9	10	10	9	7	10	10	8	10	10	8	7	9	10	8	10	10	6	7	9	10	8	10
17P200065	A22	10	10	8	10	10	10	10	10	10	8	7	10	8	10	10	10	8	6	10	7	10	10	10	8	5	10	7	10	10	10	8	3	10	7	10
17P200066	E 2	10	10	7	10	10	10	10	0	10	3	10	10	10	8	4	10	4	10	10	10	6	5	10	4	10	10	8	4							
17P200067	E 3	10	10	7	10	10	10	10	0	10	5	9	10	10	8	5	10	5	7	10	10	5	6	10	5	7	10	10	5							
17P200068	A23	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	8	10	7	10	10	7	10	6	10	7	10
17P200069	B 3	10	10	10	10	10	10	10	10	10	7	10	10	9	10	10	10	7	9	10	8	10	10	10	7	9	10	8	10							
17P200070	B 4	10	10	10	10	10	10	10	10	10	6	10	10	9	10	10	10	6	9	10	8	10	10	10	6	8	10	8	10							
17P200071	A24	10	10	7	10	10	10	10	10	10	4	10	10	9	10	10	10	5	7	10	8	10	10	10	5	7	10	7	10							
17P200072	E 4	10	10	7	10	10	10	10	0	8	2	10	10	10	5																					
17P200073	E 5	10	10	5	10	10	10	10	1	7	1	10	10	10	6																					
17P200074	A25	10	10	10	10	10	10	10	10	10	8	10	10	7	10	10	10	7	8	10	8	10	10	10	7	5	10	6	10	10	10	7	4	10	6	10
17P200075	B 5	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	8	7	9	10	8	10	10	8	7	9	10	8	10	10	8	7	9	10	7	10
17P200076	B 6	10	10	7	10	10	10	10	10	10	5	10	10	8	10	10	10	5	9	10	8	10	10	10	5	9	10	8	10	10	10	5	9	10	6	10
17P200077	A26	10	10	8	10	10	10	10	10	10	6	9	10	9	10	10	10	7	8	10	8	10	10	10	7	7	10	7	10							
17P200078	E 6	10	10	6	10	10	10	10	7	10	6	10	10	10	10	10	8	5	10	10	10	10	8	8	5	7	10	10	10							
17P200079	E 7	10	10	6	10	10	10	10	6	10	5	10	10	10	10	10	7	6	8	10	10	10	10	7	6	6	10	10	8							
17P200080	A27	10	10	8	10	10	10	10	10	10	7	8	10	8	10	10	10	8	8	10	7	10	10	10	8	7	10	7	10							
17P200081	B 7	10	10	8	10	10	10	10	10	9	7	10	10	8	10	10	9	8	9	10	8	10	10	9	8	9	10	7	10							
17P200082	B 8	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	7	8							
17P200083	A28	10	10	8	10	10	10	10	10	10	8	10	10	7	10	10	10	7	9	10	8	10	10	10	7	9	10	8	10							
17P200084	E 8	10	10	7	10	10	10	10	1	6	3	10	10	10	6	4	8	3	10	10	10	4	8	8	3	10	10	10	4							
17P200085	E 9	10	10	7	10	10	10	10	3	10	7	10	10	10	8	3	10	6	9	10	10	8	4	10	6	8	10	10	8							
17P200086	A29	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	9	7	10	10	8	10	10	7	7	10	10	7	10							
17P200087	B 9	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	10	8	9	10	8	10	10	10	8	9	10	7	10							
17P200088	B10	10	10	8	10	10	10	10	10	10	6	10	10	9	10	10	10	7	8	10	8	10	10	9	7	8	10	8	10							
17P200089	A30																																			
17P200090	E10	10	10	7	10	10	10	10	1	8	3	10	10	10	7																					
Surviving	E	10							10							7							7							1						
	A	9							9							9							9							3						
	B	10							10							10							10							3						

Table D-3. Summary of distress data for I-70, Vandalia, Illinois (continued)
PennDOT 485 (D), Control (A), and Perma-Patch (H)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
17P200091	D 1	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10							
17P200092	A31	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	8	10	10	10	6	8	10	7	10							
17P200093	H 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	5	10	7	10	10	10							
17P200094	H 2	10	10	10	10	10	10	10	10	10	8	10	10	10	8	10	10	7	9	10	9	8	10	10	7	9	10	8	7							
17P200095	A32	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	8	10	10	9	10	8	10	8	10	10	7	10	8	10	7	10
17P200096	D 2	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	7	9	10	8	10	10	10	7	8	10	7	10							
17P200097	D 3	10	10	10	10	10	10	10	10	10	10	10	10	9	8	10	8	10	9	10	8	10	10	8	10	9	10	8	10							
17P200098	A33	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	7	10	10	7	10	9	10	7	10	10	7	10	9	10	7	10
17P200099	H 3	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10
17P200100	H 4	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	9	10	9	8	10	10	10	9	10	8	8	10	8	10	9	10	8	8
17P200101	A34	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	7	10	10	10	10	8	10	7	10	10	10	10	7	10	7	10
17P200102	D 4	10	10	10	10	10	10	10	10	10	8	10	10	10	8	10	10	8	10	10	8	8	10	10	8	10	10	3	8	10	10	8	10	10	2	8
17P200103	D 5	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	8	10	7	10
17P200104	A35	10	10	10	10	10	10	10	10	10	8	10	10	9	10	10	10	8	8	10	8	10	10	10	8	8	10	8	10	10	10	6	6	10	8	10
17P200105	H 5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10
17P200106	H 6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	10	10	10	9	10	8	8	10	10	10	9	10	6	8
17P200107	A36	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10
17P200108	D 6	10	10	10	10	10	10	10	10	10	8	10	10	10	8	10	9	8	9	10	10	8	10	9	8	7	10	8	8	10	9	8	7	10	8	8
17P200109	D 7	10	10	10	10	10	10	10	10	10	8	10	10	9	10	10	10	8	10	10	8	10	10	10	8	9	10	8	10	8	10	8	9	10	8	10
17P200110	A37	10	10	10	10	10	10	10	10	10	9	10	10	9	10	10	10	8	9	10	8	10	10	10	8	8	10	6	10	10	10	8	8	10	6	10
17P200111	H 7	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	8	9	10	9	10	10	10	8	9	10	8	10	10	10	8	9	10	6	10
17P200112	H 8	10	10	8	10	10	10	10	10	10	8	10	10	10	8	10	9	8	9	10	9	8	9	10	8	9	10	8	8	9	9	8	9	10	6	8
17P200113	A38	10	10	10	10	10	10	10	10	10	7	10	10	8	10	10	10	7	9	10	7	10	10	10	7	7	10	7	10	10	10	7	5	10	7	10
17P200114	D 8	10	10	8	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	6	10	10	10	10	8	10	6	10	10	10	10	8	10	6	10
17P200115	D 9	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	9	7	9	10	8	10	10	9	7	7	10	8	10	10	9	7	7	10	6	10
17P200116	A39	10	10	8	10	10	10	10	10	10	6	10	10	8	8	10	9	7	9	10	8	8	10	9	7	7	10	8	8	10	9	7	5	10	8	8
17P200117	H 9	10	10	8	10	10	10	10	10	10	8	10	10	10	8	10	9	6	10	10	9	8	10	9	6	8	10	7	8	10	9	6	8	10	7	8
17P200118	H10	10	10	7	10	10	10	10	10	10	7	10	10	10	8	10	10	8	7	10	9	8	10	10	8	7	10	7	8	10	10	8	4	10	7	8
17P200119	A40	10	10	10	10	10	10	10	10	10	8	10	10	9	8	10	10	8	10	10	8	8	10	10	8	10	10	7	8	10	10	8	10	10	7	8
17P200120	D10	10	10	8	10	10	10	10	10	10	8	10	10	10	8	10	10	8	9	10	7	8	10	10	8	7	10	7	8	10	10	8	6	10	7	8
Surviving	D	10							10							10							10							8						
	A	10							10							10							10							9						
	H	10							10							10							10							8						

Table D-3. Summary of distress data for I-70, Vandalia, Illinois (continued)
UPM (semi-perm.) (C), Control (A), and Spray injection (J)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Ddish	Edge	Mist	Ravel	Shove	Bleed	Crack	Ddish	Edge	Mist	Ravel	Shove	Bleed	Crack	Ddish	Edge	Mist	Ravel	Shove	Bleed	Crack	Ddish	Edge	Mist	Ravel	Shove	Bleed	Crack	Ddish	Edge	Mist	Ravel	Shove
17P200121	C 1	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	9	10	10	6	10	10	10	9	9	10	6	10	10	10	9	7	10	6	10
17P200122	A41	10	10	8	10	10	10	10	10	10	5	10	10	8	8	10	10	6	9	10	8	8	10	10	6	7	10	5	8	10	10	6	7	10	3	8
17P200123	J 1	10	10	7	10	10	10	10	8	10	9	10	10	10	10	8	10	8	10	10	8	10	7	10	8	10	10	8	10	3	10	8	10	10	8	10
17P200124	J 2	10	10	6	10	10	10	10	6	10	8	10	10	10	10	6	10	8	10	10	8	10	3	10	8	10	10	8	10	3	10	8	10	10	8	10
17P200125	A42	10	10	10	10	10	10	10	10	10	9	10	10	8	10	10	10	8	9	10	7	10	10	10	8	7	10	7	10	10	10	8	5	10	6	10
17P200126	C 2	10	10	7	10	10	10	10	10	10	7	10	10	8	10	10	10	7	9	10	7	10	10	10	7	8	10	7	10	10	10	7	8	10	7	10
17P200127	C 3	10	10	7	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	8	10	10	10	9	9	10	8	10	10	10	9	8	10	8	10
17P200128	A43	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10
17P200129	J 3	10	10	9	10	10	10	10	6	10	9	10	10	10	10	6	10	9	9	10	8	10	3	10	9	7	10	8	10	3	10	9	7	10	8	10
17P200130	J 4	10	10	8	10	10	10	10	6	10	8	10	10	10	10	5	10	8	10	10	8	10	4	10	8	10	10	8	10	3	10	8	10	10	8	10
17P200131	A44	10	10	10	10	10	10	10	10	10	8	10	10	9	10	10	10	8	9	10	8	10	10	8	8	7	10	8	10	10	8	8	6	10	8	10
17P200132	C 4	10	10	10	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	7	10	10	10	9	10	10	7	10	10	10	9	8	10	7	10
17P200133	C 5	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	9	10	7	10
17P200134	A45	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	6	10	10	10	10	6	10	6	10
17P200135	J 5	10	10	8	10	10	10	10	8	10	9	10	10	10	10	9	9	8	10	10	8	10	10	9	8	10	10	8	10	10	9	8	10	10	8	10
17P200136	J 6	10	10	6	10	10	10	10	9	10	7	10	10	10	10	7	10	6	10	10	8	10	7	10	6	10	10	8	10	6	10	6	10	10	8	10
17P200137	A46	10	10	8	10	10	10	10	10	10	9	10	10	9	10	10	10	9	9	10	8	10	10	10	9	7	10	8	10	10	10	9	5	10	8	10
17P200138	C 6	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	9	9	10	6	10	10	10	9	6	10	6	10
17P200139	C 7	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	7	10	8	10	10	10	10	6	10	6	10
17P200140	A47	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	10	6	10	7	10
17P200141	J 7	10	10	7	10	10	10	10	10	10	8	10	10	10	10	9	10	7	8	10	10	10	10	10	7	8	10	7	10	10	10	7	8	10	7	10
17P200142	J 8	3	10	7	10	10	10	10	1	10	8	10	10	10	10	2	10	7	10	10	10	10	4	10	7	8	10	10	10	2	10	7	8	10	10	10
17P200143	A48	10	10	10	10	10	10	10	10	10	9	10	10	9	10	10	10	9	8	10	9	10	10	10	9	8	10	8	10	10	10	9	6	10	8	10
17P200144	C 8	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	10	9	10	3	10
17P200145	C 9	10	10	10	10	10	10	10	10	10	9	10	10	9	10	10	10	9	9	10	9	10	10	10	9	7	10	8	10	10	10	9	7	10	6	10
17P200146	A49	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	6	10
17P200147	J 9	10	10	7	10	10	10	10	10	10	8	8	10	10	10	9	10	7	8	10	10	10	8	10	7	10	10	8	10	5	10	7	8	10	8	10
17P200148	J10	10	10	7	10	10	10	10	5	10	7	10	10	10	10	6	9	7	10	10	8	10	2	9	7	10	10	8	10	2	9	7	10	10	8	10
17P200149	A50	10	10	8	10	10	10	10	10	10	6	10	10	9	10	10	10	6	9	10	8	10	10	8	6	9	10	8	10	10	2	6	5	10	8	10
17P200150	C10	10	10	8	10	10	10	10	10	10	7	10	10	9	10	10	10	8	10	10	8	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10
Surviving	C	10							10							10							10							10						
	A	10							10							10							10							10						
	J	10							10							10							10							10						

Table D-4. Summary of distress data for Rt. 518, Las Vegas, New Mexico PennDOT 486 (E), Control (A), and Local material (F)

			Evaluation #1						Evaluation #2						Evaluation #3						Evaluation #4						Evaluation #5					
Patch ID	Material	#	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
35P600001	E	1	10	10	8	10	10	8	10	10	10	7	9	10	10	10	10	10	7	9	10	8	10	4	10	7	9	10	8	10	8	10	7	9	10	8	10
35P600002	A	1	10	10	8	10	10	9	10	10	10	9	9	10	10	10	10	10	9	9	10	10	10														
35P600003	F	1	10	10	3	10	10	6	10	10	10	7	8	10	5	10	10	10	7	8	10	3	10														
35P600004	F	2	10	10	7	10	10	4	10	10	10	7	7	10	5	10																					
35P600005	A	2	10	10	9	10	10	9	10	10	10	9	7	10	10	10																					
35P600006	E	2	10	10	5	10	10	8	10	10	10	9	8	10	8	10	10	10	8	7	10	8	10	10	10	8	3	10	8	10	10	10	8	3	10	8	10
35P600007	E	3	10	10	6	7	10	8	10	10	10	7	9	10	10	10																					
35P600008	A	3	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	9	10	10	10	9	8	10	9	10	10	10	9	8	10	8	10
35P600009	F	3	10	10	2	6	10	7	10	10	10	3	7	10	3	10																					
35P600010	F	4	10	10	6	10	10	6	10	10	10	8	10	10	6	10	10	10	5	9	10	5	10	10	10	5	9	10	5	10	10	10	5	9	10	4	10
35P600011	A	4	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	10	9	6	10	8	10	10	10	9	6	10	7	10
35P600012	E	4	10	10	7	10	10	8	10	10	10	9	9	10	10	10	10	10	9	9	10	9	10	10	10	9	8	10	9	10							
35P600013	E	5	10	10	6	10	10	8	10	10	10	7	8	10	9	10	10	10	7	8	10	7	10	4	10	7	8	10	7	10	4	10	7	6	10	7	10
35P600014	A	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10
35P600015	F	5	10	10	6	10	10	7	10	10	10	5	9	10	6	10	10	10	5	9	10	4	10	10	10	5	8	10	4	10							
35P600016	F	6	10	10	6	7	10	8	10	10	10	6	9	10	7	10	10	10	4	8	10	5	10														
35P600017	A	6	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	8	10	10	10	9	7	10	8	10							
35P600018	E	6	10	10	8	10	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	6	10	8	10
35P600019	E	7	10	10	7	10	10	8	10	10	10	9	7	10	9	10	10	10	9	7	10	8	10	5	10	9	7	10	8	10	10	10	9	7	10	8	10
35P600020	A	7	10	10	10	10	10	9	10	10	10	10	9	10	10	10	10	10	9	8	10	8	10	10	10	9	8	10	6	10	10	10	9	8	10	6	10
35P600021	F	7	10	10	7	10	10	7	10	10	10	9	7	10	4	10	10	10	8	7	10	5	10														
35P600022	F	8	10	10	7	10	10	8	10	10	10	8	10	10	6	10	10	10	8	10	10	6	10	10	10	8	10	10	4	10	10	10	8	10	10	4	10
35P600023	A	8	10	10	10	10	10	9	10	10	10	9	9	10	10	10	10	10	8	9	10	8	10	10	10	8	9	10	7	10	10	10	8	9	10	7	10
35P600024	E	8	10	10	8	9	10	8	10	10	10	8	8	10	10	10																					
35P600025	E	9	10	10	7	10	10	10	10	10	10	7	9	10	10	10																					
35P600026	A	9	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	9	10	10	10	8	8	10	7	10	10	10	8	8	10	7	10
35P600027	F	9	10	10	8	10	10	10	10	10	10	8	9	10	7	10	10	10	8	7	10	5	10	10	10	8	7	10	5	10							
35P600028	F	10	10	10	8	10	10	8	10	10	10	7	10	10	7	10	10	10	7	8	10	6	10	10	10	7	8	10	5	10	10	10	7	7	10	5	10
35P600029	A	10	10	10	8	10	10	10	10	10	10	9	9	10	10	10	10	10	9	6	10	8	10														
35P600030	E	10	10	10	8	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10														
Surviving	E		10							10							7							6							5						
	A		10							10							9							7							6						
	F		10							10							8							5							4						

Table D-4. Summary of distress data for Rt. 518, Las Vegas, New Mexico (continued)
PennDOT 485 (D), Control (A), and HFMS-2 (G)

Patch ID	Mat'l #	Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bled	Crack	Disch	Edge	Misse	Ravel	Shove	Bled	Crack	Disch	Edge	Misse	Ravel	Shove	Bled	Crack	Disch	Edge	Misse	Ravel	Shove	Bled	Crack	Disch	Edge	Misse	Ravel	Shove	Bled	Crack	Disch	Edge	Misse	Ravel	Shove
35P600031	D 1	10	10	6	10	10	8	10	10	10	9	9	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10
35P600032	A11	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10
35P600033	G 1	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10														
35P600034	G 2	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	6	10	10	10	9	10	10	6	10
35P600035	A12	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	8	10	8	10							
35P600036	D 2	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10
35P600037	D 3	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10
35P600038	A13	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	8	10	8	10
35P600039	G 3	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10							
35P600040	G 4	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	10	8	8	10	7	10	10	10	8	8	10	6	10	10	10	8	8	10	6	10
35P600041	A14	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	8	10	8	10	10	10	9	4	10	8	10
35P600042	D 4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	9	10	9	10	10	10	10	9	10	9	10
35P600043	D 5	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10
35P600044	A15	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	9	10	10	10	9	7	10	9	10	10	10	9	5	10	9	10
35P600045	G 5	10	10	9	10	10	10	10	10	10	9	9	10	9	10	10	10	9	7	10	8	10														
35P600046	G 6	10	10	8	7	10	10	10	10	10	8	8	10	9	10																					
35P600047	A16	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	9	10	8	10	10	10	9	9	10	7	10
35P600048	D 6	10	10	10	10	10	10	10	10	10	9	10	10	9	10	10	10	9	8	10	8	10	10	10	9	8	10	8	10							
35P600049	D 7	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10
35P600050	A17	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10	10	6	10	7	10
35P600051	G 7	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	7	10	10	10	9	7	10	6	10	10	10	9	6	10	6	10
35P600052	G 8	10	10	8	10	10	8	10	10	10	10	7	10	9	10	10	10	10	7	10	8	10														
35P600053	A18	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10
35P600054	D 8	10	10	8	10	10	8	10	10	10	9	10	10	8	10	10	10	8	9	10	8	10														
35P600055	D 9	10	10	8	10	10	7	10	10	10	8	10	10	9	10	10	10	8	10	10	8	10	10	10	8	7	10	8	10							
35P600056	A19	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10														
35P600057	G 9	10	10	8	10	10	6	10	10	10	9	10	10	9	10																					
35P600058	G10	10	10	7	10	10	7	10	10	10	9	9	10	9	10																					
35P600059	A20	10	10	6	10	10	8	10	10	10	7	10	10	10	10																					
35P600060	D10	10	10	8	10	10	7	10	10	10	8	8	10	9	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10	10	10	8	6	10	7	10
Surviving	D	10							10							10							9							7						
	A	10							10							9							8							7						
	G	10							10							7							4							3						

Table D-4. Summary of distress data for Rt. 518, Las Vegas, New Mexico (continued)
UPM (semi-perm.) (C), Control (A), and UPM (edge seal) (B)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Misc	Rave	Shov	Bleed	Crack	Dish	Edge	Misc	Rave	Shov	Bleed	Crack	Dish	Edge	Misc	Rave	Shov	Bleed	Crack	Dish	Edge	Misc	Rave	Shov	Bleed	Crack	Dish	Edge	Misc	Rave	Shov
Patch ID	Matl #																																			
35P600061	C 1	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	10	10	8	10	10	10	9	10	10	8	10
35P600062	A21	10	10	8	10	10	8	10	10	10	10	10	10	10	10																					
35P600063	B 1	10	10	9	10	10	8	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10
35P600064	B 2	10	10	10	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	8	10
35P600065	A22	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10
35P600066	C 2	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	10	10	10	10	9	6	10	10	10	10	10	9	6	10	10	10
35P600067	C 3	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	8	10	10	10	8	8	10	8	10	10	10	8	8	10	7	10
35P600068	A23	10	10	10	10	10	9	10	10	10	9	9	10	10	10	10	10	9	8	10	8	10	10	10	9	8	10	7	10	10	10	9	8	10	7	10
35P600069	B 3	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	8	9	10	10	8	10	10	8	9	8	10	8	10	10	8	9	8	10	8	10
35P600070	B 4	10	10	8	10	10	8	10	10	10	8	10	10	6	10	10	10	8	10	10	6	10	10	10	8	9	10	6	10	10	10	8	9	10	6	10
35P600071	A24	10	10	8	10	10	10	9	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	8	10	10	10	8	10	10	8	10
35P600072	C 4	10	10	8	8	10	10	10	10	10	8	8	10	10	10																					
35P600073	C 5	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10
35P600074	A25	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10
35P600075	B 5	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	8	10
35P600076	B 6	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	9	10	8	10	10	10	9	9	10	8	10
35P600077	A26	10	10	9	10	10	8	10	10	10	9	10	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10
35P600078	C 6	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10
35P600079	C 7	10	10	10	10	10	9	10	10	10	8	10	10	10	10	10	10	8	9	10	9	10	10	10	8	7	10	9	10	10	10	8	7	10	8	10
35P600080	A27	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10
35P600081	B 7	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	9	10	10	10	9	9	10	7	10	10	10	9	9	10	7	10
35P600082	B 8	10	10	8	10	10	8	10	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	8	10	10	8	10	10	10	8	10	10	8	10
35P600083	A28	10	10	9	10	10	8	9	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	10	10							
35P600084	C 8	10	10	8	10	10	9	10	10	10	8	10	10	9	10	10	10	8	9	10	9	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10
35P600085	C 9	10	10	8	10	10	6	10	10	10	8	10	10	10	10	10	10	8	8	10	7	10	10	10	8	8	10	7	10	10	10	8	7	10	7	10
35P600086	A29	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10														
35P600087	B 9	10	10	8	10	10	7	10	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	8	10	10	7	10	10	10	8	10	10	7	10
35P600088	B10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	8	10	10	10	9	10	10	7	10
35P600089	A30	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	7	10	7	10
35P600090	C10	10	10	8	10	10	10	10	10	10	8	10	10	9	10	10	10	8	8	10	9	10	10	10	8	8	10	8	10	10	10	8	8	10	8	10
Surviving	C	10							10							9							9							9						
	A	10							10							9							8							7						
	B	10							10							10							10							10						

Table D-4. Summary of distress data for Rt. 518, Las Vegas, New Mexico (continued)
Perma-Patch (H), Control (A), and QPR 2000 (I)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Distress	Edge	Major	Ravel	Shove	Bleed	Crack	Distress	Edge	Major	Ravel	Shove	Bleed	Crack	Distress	Edge	Major	Ravel	Shove	Bleed	Crack	Distress	Edge	Major	Ravel	Shove	Bleed	Crack	Distress	Edge	Major	Ravel	Shove
Patch ID	Matl #																																			
35P600091	H 1	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	8	10
35P600092	A31	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	8	10
35P600093	I 1	10	10	10	10	10	8	10	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10
35P600094	I 2	10	10	7	10	10	10	10	10	10	9	10	10	10	10	10	10	8	8	10	9	10	10	10	8	8	10	9	10	10	10	8	8	10	9	10
35P600095	A32	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	10	10	10	10	9	8	10	10	10
35P600096	H 2	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	8	10	9	10	10	10	9	8	10	9	10
35P600097	H 3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	9	10	6	10	10	10	10	9	10	6	10
35P600098	A33	10	10	10	10	10	10	10	10	10	10	10	10	10	10																					
35P600099	I 3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10	10	10	9	10	10	9	10
35P600100	I 4	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10
35P600101	A34	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	7	10	10	10	9	10	10	7	10
35P600102	H 4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	7	10	10	10	10	7	10	6	10	10	10	10	7	10	6	10
35P600103	H 5	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	9	10	8	10	10	10	8	8	10	8	10
35P600104	A35	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	7	10	10	10	8	10	10	6	10
35P600105	I 5	10	10	9	10	10	8	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	8	10	10	10	9	8	10	8	10
35P600106	I 6	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10
35P600107	A36	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10
35P600108	H 6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	9	10	6	10	10	10	10	9	10	6	10
35P600109	H 7	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	7	10	10	10	8	8	10	7	10	10	10	8	8	10	6	10
35P600110	A37	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10
35P600111	I 7	10	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10
35P600112	I 8	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10
35P600113	A38	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	9	10	10	10	9	9	10	8	10	10	10	9	9	10	7	10
35P600114	H 8	10	10	6	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	6	10	10	10	8	8	10	6	10
35P600115	H 9	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	7	10	10	10	8	8	10	7	10	10	10	8	8	10	7	10
35P600116	A39	10	10	6	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	9	10	8	10	10	10	8	9	10	8	10
35P600117	I 9	10	10	6	10	10	9	10	10	10	8	10	10	9	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10
35P600118	I10	10	10	5	10	10	10	10	10	10	8	9	10	10	10	10	8	8	8	10	10	10	10	7	8	8	10	8	10	10	7	8	8	10	8	10
35P600119	A40	10	10	6	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	6	10
35P600120	H10	10	10	5	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	6	10	10	10	8	9	10	6	10
Surviving	H	10							10							10							10							10						
	A	10							10							9							9							9						
	I	10							10							10							10							10						

Table D-4. Summary of distress data for Rt. 518, Las Vegas, New Mexico (continued)
Control (A) and Spray injection (J)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove
Patch ID	Mat'l #																																			
35P600121	A41								10	10	9	9	10	10	10	10	10	8	8	10	9	10															
35P600122	J 1								10	10	9	10	10	10	10	10	10	9	10	10	7	10	10	10	9	10	10	6	10	10	10	9	10	10	6	10
35P600123	A42								10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	8	10	10	10	8	7	10	8	10
35P600124	J 2								10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	6	10	10	10	9	10	10	6	10
35P600125	A43								10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	7	10	9	10
35P600126	J 3								10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	8	10	7	10	7	10
35P600127	A44								10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	9	10
35P600128	J 4								10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	7	10	10	10	8	7	10	6	10
35P600129	A45								10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	9	10	7	10
35P600130	J 5								10	10	9	10	10	10	10	10	10	9	10	10	7	10	10	10	9	10	10	7	10	10	10	9	10	10	6	10
35P600131	A46								10	10	10	10	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10
35P600132	J 6								10	10	7	10	10	10	10	10	10	7	10	10	7	10	10	10	7	10	10	7	10	10	10	7	10	10	6	10
35P600133	A47								10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	10	9	8	10	8	10	10	10	9	6	10	8	10
35P600134	J 7								10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	6	8
35P600135	A48								10	10	9	10	10	9	10	10	10	9	8	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	6	10
35P600136	J 8								10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	7	10
35P600137	A49								10	10	10	10	10	10	10	10	10	10	8	10	9	10	10	10	10	8	10	9	10	10	10	10	7	10	9	10
35P600138	J 9								10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10
35P600139	A50								10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10	10	7	10	7	10
35P600140	J10								10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10
Surviving	A								10							10							9							9						
	J								10							10							10							10						

Table D-5. Summary of distress data for US 97, Modoc Point, Oregon PennDOT 485 (D), Control (A), and QPR 2000 (I)

Patch ID	Material	#	Evaluation #1						Evaluation #2						Evaluation #3						Evaluation #4						Evaluation #5					
			Bleed		Crack	Dish	Edge	Miss	Ravel	Shove	Bleed		Crack	Dish	Edge	Miss	Ravel	Shove	Bleed		Crack	Dish	Edge	Miss	Ravel	Shove	Bleed		Crack	Dish	Edge	Miss	Ravel	Shove
41P800001	D	1	10	10	10	6	10	8	10		10	10	8	6	10	8	10		10	10	8	6	10	7	10		10	10	7	6	10	7	10	
41P800002	A	1	10	10	9	6	10	9	10		10	10	9	6	10	8	10		10	10	8	6	10	7	10		10	10	7	6	10	7	10	
41P800003	I	1	10	10	10	5	10	9	10		10	10	10	5	10	9	10		10	10	9	5	10	8	10		10	10	9	4	10	8	10	
41P800004	I	2	10	10	10	7	10	8	10		10	10	8	7	10	8	10		10	10	8	7	10	7	10		10	10	8	6	10	6	10	
41P800005	A	2	10	10	10	7	10	8	10		10	10	9	7	10	8	10		10	10	8	7	10	7	10		10	10	8	6	10	7	10	
41P800006	D	2	10	10	10	6	10	9	10		10	10	8	6	10	8	10		10	10	8	5	10	7	10		10	10	7	5	10	7	10	
41P800007	D	3	10	10	10	5	10	8	10		10	10	10	5	10	8	10		10	10	10	5	10	7	10		10	10	9	5	10	6	10	
41P800008	A	3	10	10	7	7	10	8	10		10	10	7	7	10	8	10		10	10	6	7	10	6	10		10	10	6	6	10	6	10	
41P800009	I	3	10	10	7	6	10	9	10		10	10	7	6	10	8	10		10	10	6	5	10	8	10		10	10	6	4	10	7	10	
41P800010	I	4	10	10	8	5	10	9	10		10	10	8	5	10	9	10		10	10	7	5	10	8	10		10	10	7	5	10	7	10	
41P800011	A	4	10	10	10	7	10	9	10		10	10	10	6	10	9	10		10	10	10	6	10	8	10		10	10	10	6	10	7	10	
41P800012	D	4	10	10	8	7	10	9	10		10	10	8	7	10	8	10		10	10	7	7	10	7	10		10	10	7	6	10	7	10	
41P800013	D	5	10	10	7	7	10	8	10		10	10	7	7	10	8	10		10	10	6	7	10	7	10		10	10	6	7	10	6	10	
41P800014	A	5	10	10	10	7	10	9	10		10	10	10	7	10	8	10		10	10	10	7	10	7	10		10	10	10	6	10	7	10	
41P800015	I	5	10	10	5	8	10	8	10		10	10	5	8	10	8	10		10	10	5	7	10	7	10		10	10	5	6	10	7	10	
41P800016	I	6	10	10	8	7	10	9	10		10	10	8	7	10	8	10		10	10	7	6	10	8	10		10	10	7	5	10	8	10	
41P800017	A	6	10	10	10	8	10	9	10		10	10	10	7	10	9	10		10	10	10	7	10	8	10		10	10	10	7	10	8	10	
41P800018	D	6	10	10	7	5	10	8	10		10	10	7	5	10	8	10		10	10	7	5	10	7	10		10	10	7	5	10	7	10	
41P800019	D	7	10	10	10	6	10	9	10		10	10	7	6	10	8	10		10	10	6	6	10	8	10		10	10	6	6	10	8	10	
41P800020	A	7	10	10	10	7	10	8	10		10	10	8	7	10	8	10		10	10	8	7	10	8	10		10	10	8	7	10	8	10	
41P800021	I	7	10	10	8	7	10	9	10		10	10	7	7	10	9	10		10	10	7	6	10	9	10		10	10	7	6	10	8	10	
41P800022	I	8	10	10	10	6	10	10	10		10	10	10	6	10	8	10		10	10	10	6	10	8	10		10	10	10	6	10	8	10	
41P800023	A	8	10	10	10	8	10	9	10		10	10	10	8	10	9	10		10	10	10	7	10	9	10		10	10	10	7	10	8	10	
41P800024	D	8	10	10	7	8	10	9	10		10	10	6	8	10	8	10		10	10	6	8	10	8	10		10	10	6	7	10	8	10	
41P800025	D	9	10	10	8	6	10	7	10		10	10	8	6	10	7	10		10	10	8	6	10	7	10		10	10	8	6	10	7	10	
41P800026	A	9	10	10	10	6	10	10	10		10	10	8	6	10	8	10		10	10	8	5	10	8	10		10	10	8	5	10	7	10	
41P800027	I	9	10	10	10	5	10	10	10		10	10	10	5	10	8	10		10	10	10	5	10	8	10		10	10	10	5	10	8	10	
41P800028	I	10	10	10	10	7	10	9	10		10	10	10	5	10	8	10		10	10	10	5	10	8	10		10	10	10	5	10	7	10	
41P800029	A	10	10	10	10	4	10	9	10		10	10	10	4	10	8	10		10	10	10	4	10	8	10		10	10	10	4	10	7	10	
41P800030	D	10	10	10	10	6	10	10	10		10	10	8	6	10	9	10		10	10	8	6	10	9	10		10	10	7	5	10	9	10	
Surviving	D		10								10								10								10							
	A		10								10								10								10							
	I		10								10								10								10							

Table D-5. Summary of distress data for US 97, Modoc Point, Oregon (continued)
QPR (semi-perm.) (L), Control (A), and PennDOT 485 (semi-perm.) (N)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Matl #																																			
41P800031	L 1	10	10	8	6	10	10	10	10	10	7	6	10	9	10	10	10	7	6	10	8	10	10	10	7	5	10	7	10							
41P800032	A11	10	10	7	6	10	8	10	10	10	7	6	10	8	10	10	10	7	6	10	7	10	10	10	7	6	10	6	10							
41P800033	N 1	10	10	7	6	10	9	10	10	10	6	6	10	6	10	10	10	6	5	10	6	10	10	10	6	5	10	6	10							
41P800034	N 2	10	10	7	6	10	8	10	10	10	6	5	10	8	10	10	10	6	5	10	7	10	10	10	6	5	10	6	10							
41P800035	A12	10	10	8	7	10	4	10	10	10	7	7	10	4	10	10	10	7	7	10	4	10	10	10	7	6	10	4	10							
41P800036	L 2	10	10	8	7	10	9	10	10	10	7	7	10	9	10	10	10	7	6	10	8	10	10	10	7	5	10	7	10							
41P800037	L 3	10	10	8	7	10	10	10	10	10	6	7	10	8	10	10	10	6	7	10	8	10	10	10	6	7	10	7	10							
41P800038	A13	10	10	8	7	10	9	10	10	10	8	7	10	7	10	10	10	7	7	10	7	10	10	10	7	6	10	7	10							
41P800039	N 3	10	10	7	6	10	10	10	10	10	7	6	10	9	10	10	10	7	5	10	9	10	10	10	6	5	10	8	10							
41P800040	N 4	10	10	8	6	10	10	10	10	10	8	6	10	9	10	10	10	7	6	10	9	10	10	10	7	6	10	8	10							
41P800041	A14	10	10	7	7	10	9	10	10	10	7	7	10	8	10	10	10	7	6	10	8	10	10	10	6	6	10	8	10							
41P800042	L 4	10	10	7	8	10	10	10	10	10	7	8	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	10	10							
41P800043	L 5	10	10	8	6	10	10	10	10	10	8	6	10	9	10	10	10	7	6	10	9	10	10	10	7	6	10	8	10							
41P800044	A15	10	10	7	6	10	9	10	10	10	6	6	10	9	10	10	10	6	6	10	9	10	10	10	6	6	10	8	10							
41P800045	N 5	10	10	8	5	10	10	10	10	10	8	5	10	9	10	10	10	8	5	10	9	10	10	10	7	5	10	9	10							
41P800046	N 6	10	10	8	5	10	10	10	10	10	8	5	10	8	8	10	10	8	5	10	8	7	10	10	7	5	10	7	7							
41P800047	A16	10	10	10	5	10	9	10	10	10	10	5	10	8	10	10	10	10	5	10	8	10	10	10	10	5	10	8	10							
41P800048	L 6	10	10	8	5	10	10	10	10	10	8	5	10	9	10	10	10	8	5	10	9	10	10	10	7	5	10	8	10							
41P800049	L 7	10	10	9	3	10	10	10	10	10	9	3	10	9	10	10	10	9	3	10	9	10	10	10	8	3	10	9	10							
41P800050	A17	10	10	10	2	10	9	10	10	10	10	2	10	9	10	10	10	10	2	10	8	10	10	10	10	2	10	8	10							
41P800051	N 7	10	10	9	2	10	10	10	10	10	9	2	10	9	10	10	10	8	2	10	9	10	10	10	8	2	10	8	10							
41P800052	N 8	10	10	8	2	10	10	10	10	10	8	2	10	9	10	10	10	8	2	10	7	10	10	10	7	2	10	7	10							
41P800053	A18	10	10	10	3	10	9	10	10	10	8	3	10	9	10	10	10	8	3	10	9	10	10	10	8	2	10	7	10							
41P800054	L 8	10	10	9	2	10	10	10	10	10	9	2	10	10	10	10	10	9	2	10	10	10	10	10	7	2	10	10	10							
41P800055	L 9	10	10	8	2	10	10	10	10	10	8	2	10	10	8	10	10	7	2	10	10	8	10	10	7	2	10	10	7							
41P800056	A19	10	10	8	4	10	10	10	10	10	8	4	10	8	10	10	10	8	4	10	6	10	10	10	8	3	10	6	10							
41P800057	N 9	10	10	8	7	10	10	10	10	10	7	7	10	8	10	10	10	7	7	10	8	10	10	10	7	6	10	8	10							
41P800058	N10	10	10	7	7	10	10	10	10	10	6	7	10	8	10	10	10	6	7	10	8	10	10	10	6	5	10	7	10							
41P800059	A20	10	10	7	6	10	10	10	10	10	7	6	10	8	10	10	10	6	5	10	8	10	10	10	6	4	10	8	10							
41P800060	L10	10	10	8	5	10	10	10	10	10	8	5	10	8	10	10	10	8	5	10	8	10	10	10	7	5	10	7	10							
Surviving	L	10							10							10							10													
	A	10							10							10							10													
	N	10							10							10							10													

Table D-5. Summary of distress data for US 97, Modoc Point, Oregon (continued)
UPM (semi-perm.) (C) and Control (A)

Patch ID	Mat'l #	Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bled	Crack	Dish	Edge	Miss	Ravel	Shove	Bled	Crack	Dish	Edge	Miss	Ravel	Shove	Bled	Crack	Dish	Edge	Miss	Ravel	Shove	Bled	Crack	Dish	Edge	Miss	Ravel	Shove	Bled	Crack	Dish	Edge	Miss	Ravel	Shove
41P800061	A21	10	10	8	6	10	10	10	10	10	7	5	10	8	10	10	10	7	5	10	8	10	10	10	7	4	10	7	10							
41P800062	C 1	10	10	7	8	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	10	10	10	10	7	6	10	10	10							
41P800063	C 2	10	10	7	6	10	10	10	10	10	7	6	10	8	10	10	10	7	6	10	7	10	10	10	7	6	10	7	10							
41P800064	A22	10	10	6	3	10	10	10	10	10	6	3	10	8	10	10	10	6	3	10	7	10	10	10	6	3	10	6	10							
41P800065	A23	10	10	7	2	10	10	10	10	10	6	2	10	9	10	10	10	6	2	10	9	10	10	10	6	2	10	8	10							
41P800066	C 3	10	10	9	7	10	10	10	10	10	9	7	10	8	10	10	10	9	7	10	8	10	10	10	8	6	10	6	10							
41P800067	C 4	10	10	9	6	10	10	10	10	10	9	6	10	9	10	10	10	9	6	10	9	10	10	10	8	5	10	7	10							
41P800068	A24	10	10	7	2	10	10	10	10	10	7	2	10	8	10	10	10	6	2	10	6	10	10	10	6	2	10	6	10							
41P800069	A25	10	10	8	3	10	10	10	10	10	7	3	10	10	10	10	10	7	3	10	10	10	10	10	7	3	10	10	10							
41P800070	C 5	10	10	8	8	10	10	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10							
41P800071	C 6	10	10	9	7	10	10	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10	10	10	8	5	10	7	10							
41P800072	A26	10	10	6	6	10	10	10	10	10	5	6	10	9	10	10	10	5	5	10	9	10	10	10	5	5	10	9	10							
41P800073	A27	10	10	5	7	10	10	10	10	10	5	7	10	8	10	10	10	5	6	10	8	10	10	10	5	6	10	8	10							
41P800074	C 7	10	10	7	8	10	10	10	10	10	7	8	10	9	10	10	10	7	7	10	9	10	10	10	7	6	10	8	10							
41P800075	C 8	10	10	9	7	10	10	10	10	10	8	7	10	9	10	10	10	8	7	10	9	10	10	10	8	6	10	9	10							
41P800076	A28	10	10	8	6	10	10	10	10	10	6	6	10	8	10	10	10	6	5	10	8	10	10	10	6	4	10	7	10							
41P800077	A29	10	10	7	7	10	10	10	10	10	6	7	10	9	10	10	10	6	7	10	8	10	10	10	6	6	10	8	10							
41P800078	C 9	10	10	9	8	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	7	10	10	10	8	6	10	7	10							
41P800079	C10	10	10	9	8	10	10	10	10	10	9	8	10	8	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10							
41P800080	A30	10	10	8	7	10	10	10	10	10	7	7	10	8	10	10	10	7	6	10	8	10	10	10	7	5	10	8	10							
Surviving	C								10							10							10													
	A								10							10							10													

Table D-5. Summary of distress data for US 97 Modoc Point, Oregon (continued)
Perma-Patch (H), Control (A), and HFMS-2 (G)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Ds	Edge	Mis	Ravel	Shove	Bleed	Crack	Ds	Edge	Mis	Ravel	Shove	Bleed	Crack	Ds	Edge	Mis	Ravel	Shove	Bleed	Crack	Ds	Edge	Mis	Ravel	Shove	Bleed	Crack	Ds	Edge	Mis	Ravel	Shove
Patch ID	Mat #																																			
41P800081	H 1	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	10	10							
41P800082	A31	10	10	10	7	10	9	10	10	10	8	7	10	9	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10							
41P800083	G 1	10	10	9	8	10	9	10	10	10	8	6	10	9	10	10	10	8	6	10	8	10	10	10	8	5	10	7	10							
41P800084	G 2	10	10	8	6	10	9	10	10	10	7	6	10	9	10	10	10	7	5	10	9	10	10	10	7	4	10	8	10							
41P800085	A32	10	10	9	7	10	9	10	10	10	7	7	10	9	10	10	10	7	6	10	8	10	10	10	7	6	10	7	10							
41P800086	H 2	10	10	9	6	10	10	10	10	10	9	6	10	10	10	10	10	9	5	10	10	10	10	10	9	4	10	10	10							
41P800087	H 3	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	5	10	10	10	10	10	9	5	10	10	10							
41P800088	A33	10	10	7	6	10	10	10	10	10	7	6	10	8	10	10	10	7	5	10	8	10	10	10	7	4	10	7	10							
41P800089	G 3	10	10	7	7	10	8	10	10	10	7	7	10	8	10	10	10	7	6	10	7	10	10	10	7	5	10	7	10							
41P800090	G 4	10	10	10	8	10	8	10	10	10	9	8	10	8	10	10	10	8	7	10	7	10	10	10	8	6	10	7	10							
41P800091	A34	10	10	10	7	10	9	10	10	10	10	7	10	9	10	10	10	10	6	10	9	10	10	10	10	6	10	8	10							
41P800092	H 4	10	10	9	8	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	10	10							
41P800093	H 5	10	10	9	8	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	10	10							
41P800094	A35	10	10	9	7	10	9	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10	10	10	9	5	10	7	10							
41P800095	G 5	10	10	9	7	10	9	10	10	10	9	7	10	8	10	10	10	8	6	10	7	10	10	10	8	5	10	7	10							
41P800096	G 6	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	8	5	10	8	10	10	10	8	5	10	7	10							
41P800097	A36	10	10	8	7	10	9	10	10	10	8	7	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	7	10							
41P800098	H 6	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	10							
41P800099	H 7	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	5	10	10	10	10	10	10	4	10	10	10							
41P800100	A37	10	10	8	7	10	9	10	10	10	8	7	10	8	10	10	10	8	6	10	6	10	10	10	8	6	10	6	10							
41P800101	G 7	10	10	9	8	10	9	10	10	10	8	8	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10							
41P800102	G 8	10	10	9	6	10	10	10	10	10	9	6	10	9	10	10	10	9	5	10	8	10	10	10	9	5	10	8	10							
41P800103	A38	10	10	10	7	10	9	10	10	10	10	7	10	8	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10							
41P800104	H 8	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	10							
41P800105	H 9	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10							
41P800106	A39	10	10	8	6	10	9	10	10	10	8	6	10	8	10	10	10	8	5	10	8	10	10	10	8	4	10	6	10							
41P800107	G 9	10	10	9	6	10	8	10	10	10	9	6	10	8	10	10	10	9	5	10	7	10	10	10	8	4	10	6	10							
41P800108	G10	10	10	9	6	10	9	10	10	10	9	6	10	8	10	10	10	9	5	10	7	10	10	10	9	4	10	5	10							
41P800109	A40	10	10	8	6	10	9	10	10	10	8	6	10	8	10	10	10	8	5	10	8	10	10	10	7	5	10	6	10							
41P800110	H10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	10							
Surviving	H	10							10							10							10													
	A	10							10							10							10													
	G	10							10							10							10													

Table D-5. Summary of distress data for US 97, Modoc Point, Oregon (continued) Local material (F), Control (A), and PennDOT 486 (E)

Patch ID	Mat'l #	Evaluation #1 Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Evaluation #2 Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Evaluation #3 Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Evaluation #4 Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Evaluation #5 Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove
41P800111	F 1	10	10	9	6	10	3	10	10	10	8	5	10	3	10	10	10	8	5	10	3	10	10	10	8	4	10	2	10							
41P800112	A41	10	10	10	8	10	9	10	10	10	10	8	10	8	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10							
41P800113	E 1	10	10	8	7	10	10	10	4	10	8	6	10	10	10	4	10	8	6	10	10	10	4	10	7	5	10	10	10							
41P800114	E 2	10	10	9	7	10	10	10	4	10	9	6	10	10	10	3	10	8	6	10	10	10	3	10	8	6	10	10	10							
41P800115	A42	10	10	10	9	10	9	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
41P800116	F 2	10	10	10	7	10	5	10	10	10	10	7	10	4	10	10	10	10	6	10	4	10	10	10	10	6	10	4	10							
41P800117	F 3	10	10	10	7	10	6	10	10	10	10	7	10	6	10	10	10	10	6	10	5	10	10	10	10	6	10	4	10							
41P800118	A43	10	10	8	8	10	9	10	10	10	8	8	10	8	10	10	10	8	7	10	7	10	10	10	7	7	10	7	10							
41P800119	E 3	10	10	6	9	10	10	10	6	10	5	9	10	10	10	5	10	5	9	10	10	10	5	10	5	8	10	10	10							
41P800120	E 4	10	10	9	9	10	10	10	5	10	8	9	10	10	10	5	10	8	7	10	10	10	4	10	8	6	10	10	10							
41P800121	A44	10	10	10	8	10	9	10	10	10	9	8	10	8	10	10	10	9	7	10	6	10	10	10	8	6	10	6	10							
41P800122	F 4																																			
41P800123	F 5	10	10	10	8	10	7	10	10	10	10	8	10	6	10	10	10	10	7	10	5	10	10	10	10	7	10	5	10							
41P800124	A45	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10	10	5	10	6	10	10	10	10	5	10	6	10							
41P800125	E 5	10	10	8	8	10	10	10	2	10	7	8	10	10	10	2	10	7	10	10	10	10	4	10	7	6	10	10	10							
41P800126	E 6	10	10	8	7	10	10	10	4	10	7	7	10	10	10	3	10	7	6	10	10	10	4	10	7	5	10	10	10							
41P800127	A46	10	10	10	8	10	9	10	10	10	10	8	10	8	10	10	10	10	7	10	7	10	10	10	10	5	10	7	10							
41P800128	F 6																																			
41P800129	F 7																																			
41P800130	A47	10	10	10	9	10	9	10	10	10	8	8	10	7	10	10	10	8	6	10	5	10	10	10	8	6	10	5	10							
41P800131	E 7	10	10	9	8	10	10	10	3	10	8	8	10	10	10	3	10	8	7	10	10	10	5	10	8	6	10	10	10							
41P800132	E 8	10	10	9	8	10	10	10	2	10	8	8	10	10	10	2	10	8	8	10	10	10	2	10	7	7	10	10	10							
41P800133	A48	10	10	10	9	10	9	10	10	10	10	9	10	8	10	10	10	10	7	10	7	10	10	10	10	7	10	5	10							
41P800134	F 8	10	10	10	8	10	5	10	10	10	10	8	10	4	10	10	10	10	7	10	4	10	10	10	10	7	10	4	10							
41P800135	F 9	10	10	10	9	10	6	10	10	10	10	8	10	5	10	10	10	9	7	10	5	10	10	10	9	7	10	5	10							
41P800136	A49	10	10	10	7	10	9	10	10	10	10	7	10	8	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10							
41P800137	E 9	10	10	8	8	10	10	10	3	10	8	8	10	10	9	3	10	8	6	10	10	8	4	10	8	5	10	10	8							
41P800138	E10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	4	10	8	6	10	10	10	5	10	8	6	10	10	10							
41P800139	A50	10	10	9	8	10	9	10	10	10	9	8	10	8	10	10	10	8	7	10	7	10	10	10	8	5	10	7	10							
41P800140	F10																																			
Surviving	F	6							6							6							6													
	A	10							10							10							10													
	E	10							10							10							10													

Table D-5. Summary of distress data for US 97, Modoc Point, Oregon (continued)
UPM (edge seal) (B), Control (A), and Local procedure (X)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Matl #																																			
41P800141	B 1	10	10	9	9	10	9	10	10	10	9	9	10	8	10	10	10	9	8	10	7	10	10	10	9	8	10	7	10							
41P800142	A51	10	10	10	8	10	9	10	10	10	10	7	10	9	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10							
41P800143	X 1	10	10	10	7	10	6	10	10	10	10	7	10	6	10	10	10	10	6	10	6	10	10	10	10	5	10	6	10							
41P800144	X 2	10	10	10	9	10	6	10	10	10	10	9	10	6	10	10	10	10	8	10	5	10	10	10	10	7	10	5	10							
41P800145	A52	10	10	10	7	10	9	10	10	10	10	7	10	9	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10							
41P800146	B 2	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10							
41P800147	B 3	10	10	10	9	10	9	10	10	10	10	9	10	9	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10							
41P800148	A53	10	10	9	7	10	10	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10	10	10	9	5	10	7	10							
41P800149	X 3	10	10	8	9	10	7	10	10	10	8	8	10	6	10	10	10	8	7	10	6	10	10	10	7	5	10	5	10							
41P800150	X 4	10	10	10	8	10	7	10	10	10	10	8	10	6	10	10	10	10	7	10	5	10	10	10	10	5	10	5	10							
41P800151	A54	10	10	10	9	10	9	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10							
41P800152	B 4	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	7	10	7	10	10	10	10	7	10	7	10							
41P800153	B 5	10	10	10	9	10	9	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	5	10	8	10							
41P800154	A55	10	10	9	8	10	10	10	10	10	9	8	10	8	10	10	10	9	7	10	7	10	10	10	8	7	10	6	10							
41P800155	X 5	10	10	10	6	10	7	10	10	10	10	6	10	6	10	10	10	10	6	10	6	10	10	10	10	5	10	6	10							
41P800156	X 6	10	10	10	8	10	7	10	10	10	10	8	10	5	10	10	10	10	7	10	5	10	10	10	10	7	10	4	10							
41P800157	A56	10	10	7	6	10	9	10	10	10	7	6	10	8	10	10	10	6	5	10	7	10	10	10	6	5	10	7	10							
41P800158	B 6	10	10	9	10	10	10	10	10	10	9	8	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	6	10							
41P800159	B 7	10	10	10	9	10	9	10	10	10	10	7	10	9	10	10	10	10	7	10	9	10	10	10	10	7	10	8	10							
41P800160	A57	10	10	8	8	10	9	10	10	10	8	6	10	8	10	10	10	8	6	10	7	10	10	10	7	5	10	7	10							
41P800161	X 7	10	10	10	9	10	7	10	10	10	8	8	10	6	10	10	10	8	7	10	6	10	10	10	7	7	10	6	10							
41P800162	X 8	10	10	10	7	10	7	10	10	10	8	7	10	6	10	10	10	8	7	10	6	10	10	10	7	7	10	6	10							
41P800163	A58	10	10	10	6	10	9	10	10	10	10	6	10	8	10	10	10	10	5	10	7	10	10	10	10	4	10	7	10							
41P800164	B 8	10	10	8	10	10	9	10	10	10	8	9	10	7	10	10	10	8	8	10	7	10	10	10	7	8	10	7	10							
41P800165	B 9	10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	10	8	7	10	6	10	10	10	8	7	10	6	10							
41P800166	A59	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	7	7	10	8	10	10	10	7	6	10	8	10							
41P800167	X 9	10	10	10	6	10	7	10	10	10	8	6	10	7	10	10	10	7	5	10	6	10	10	10	7	5	10	5	10							
41P800168	X10	10	10	8	9	10	7	10	10	10	8	8	10	6	10	10	10	7	8	10	5	10	10	10	6	6	10	5	10							
41P800169	A60	10	10	10	9	10	9	10	10	10	10	8	10	8	10	10	10	10	5	10	8	10	10	10	10	5	10	7	10							
41P800170	B10	10	10	9	10	10	10	10	10	10	9	8	10	8	10	10	10	7	7	10	6	10	10	10	7	7	10	5	10							
Surviving	B	10							10							10							10													
	A	10							10							10							10													
	X	10							10							10							10													

Table D-5. Summary of distress data for US 97 Modoc Point, Oregon (continued) QPR 2000 (edge seal) (K), Control (A), and PennDOT 485 (edge seal) (M)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Distress	Edge	Miss	Ravel	Shove	Bleed	Crack	Distress	Edge	Miss	Ravel	Shove	Bleed	Crack	Distress	Edge	Miss	Ravel	Shove	Bleed	Crack	Distress	Edge	Miss	Ravel	Shove	Bleed	Crack	Distress	Edge	Miss	Ravel	Shove
Patch ID	Mat'l #																																			
41P800171	K 1	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	6	10	10	10	10	10	7	6	10	10	10							
41P800172	A61	10	10	8	7	10	10	10	10	10	8	5	10	8	10	10	10	7	5	10	8	10	10	10	7	5	10	8	10							
41P800173	M 1	10	10	9	9	10	10	10	10	10	8	8	10	8	10	10	10	8	7	10	7	10	10	10	8	7	10	7	10							
41P800174	M 2	10	10	7	10	10	10	10	10	10	7	9	10	9	10	10	10	7	8	10	8	10	10	10	7	8	10	8	10							
41P800175	A62	10	10	8	6	10	10	10	10	10	8	6	10	8	10	10	10	8	5	10	8	10	10	10	7	4	10	7	10							
41P800176	K 2	10	10	9	10	10	9	10	10	10	9	9	10	8	10	10	10	7	8	10	6	10	10	10	7	8	10	6	10							
41P800177	K 3	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10							
41P800178	A63	10	10	8	7	10	10	10	10	10	8	7	10	8	10	10	10	7	6	10	6	10	10	10	7	6	10	6	10							
41P800179	M 3	10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	10	9	7	10	8	10	10	10	8	7	10	6	10							
41P800180	M 4	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	10	10	7	10	10	10	9	10	10	7	10							
41P800181	A64	10	10	8	6	10	10	10	10	10	8	5	10	8	10	10	10	7	4	10	8	10	10	10	7	4	10	6	10							
41P800182	K 4	10	10	8	9	10	9	10	10	10	8	9	10	7	10	10	10	8	7	10	7	10	10	10	8	6	10	7	10							
41P800183	K 5	10	10	9	9	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	6	10	10	10	8	7	10	5	10							
41P800184	A65	10	10	8	8	10	2	10	10	10	8	7	10	2	10	10	10	7	6	10	2	10	10	10	7	5	10	2	10							
41P800185	M 5	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10							
41P800186	M 6	10	10	8	9	10	10	10	10	10	8	9	10	9	10	10	10	8	7	10	9	10	10	10	8	7	10	8	10							
41P800187	A66	10	10	9	8	10	10	10	10	10	9	7	10	8	10	10	10	8	7	10	6	10	10	10	8	7	10	6	10							
41P800188	K 6	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	8	10	8	10	10	10	8	7	10	8	10							
41P800189	K 7	10	10	9	9	10	9	10	10	10	9	8	10	8	10	10	10	8	7	10	5	10	10	10	8	7	10	5	10							
41P800190	A67	10	10	8	7	10	9	10	10	10	8	6	10	8	10	10	10	7	6	10	8	10	10	10	7	5	10	7	10							
41P800191	M 7	10	10	8	9	10	10	10	10	10	8	9	10	9	10	10	10	8	8	10	7	10	10	10	7	8	10	7	10							
41P800192	M 8	10	10	7	9	10	10	10	10	10	7	9	10	8	10	10	10	7	7	10	7	10	10	10	6	6	10	6	10							
41P800193	A68	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	6	10	10	10	10	7	10	5	10							
41P800194	K 8	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	8	7	10	8	10	10	10	8	6	10	7	10							
41P800195	K 9	10	10	8	10	10	9	10	10	10	8	9	10	8	10	10	10	7	8	10	6	10	10	10	7	7	10	6	10							
41P800196	A69	10	10	8	4	10	2	10	10	10	8	4	10	2	10	10	10	7	3	10	2	10	10	10	7	3	10	2	10							
41P800197	M 9	10	10	8	9	10	10	10	10	10	8	9	10	7	10	10	10	7	6	10	7	10	10	10	7	6	10	7	10							
41P800198	M10	10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	7	10	10	7	10	10	10	7	10	10	5	10							
41P800199	A70	10	10	8	6	10	9	10	10	10	8	6	10	8	10	10	10	8	5	10	8	10	10	10	7	4	10	8	10							
41P800200	K10	10	10	8	9	10	10	10	10	10	8	9	10	9	10	10	10	8	9	10	7	10	10	10	8	7	10	7	10							
Surviving	K	10							10							10							10													
	A	10							10							10							10													
	M	10							10							10							10													

Table D-6. Summary of distress data for FM 1570 Greenville, Texas Local material (F) and Control (A)

			Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
			Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove
Patch ID	Material	#																																			
48P300001	F	1																																			
48P300002	A	1	10	10	6	10	10	10	8	10	10	4	10	10	10	8	10	10	4	10	10	9	9	10	10	4	10	10	8	8	10	10	4	10	10	7	8
48P300003	A	2	10	10	8	10	10	10	10	10	10	5	10	10	10	9	10	10	6	9	10	10	9	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300004	F	2																																			
48P300005	F	3																																			
48P300006	A	3	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	9	9	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300007	A	4	10	8	9	10	10	10	10																												
48P300008	F	4																																			
48P300009	F	5																																			
48P300010	A	5	10	10	8	10	9	10	10	10	10	8	7	10	10	10	10	10	5	7	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300011	A	6	10	10	8	10	10	10	10	10	10	5	10	10	10	10	10	10	5	9	10	8	9	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300012	F	6																																			
48P300013	F	7																																			
48P300014	A	7	10	10	8	10	10	10	8	10	10	3	10	10	10	10	10	10	3	8	10	7	7	10	0	3	5	10	7	7	10	0	3	5	10	4	7
48P300015	A	8	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	4	10	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300016	F	8	10	10	9	10	10	10	10	10	10	5	10	10	10	10	10	10	6	10	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300017	F	9																																			
48P300018	A	9	10	10	5	10	10	10	10	10	10	2	8	10	10	10	10	10	2	8	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300019	A	10	10	10	8	10	10	10	9	10	10	3	9	10	10	10	10	10	1	9	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300020	F	10	10	10	6	10	10	10	10	10	10	6	9	10	10	10	10	10	3	6	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Surviving	F		2							2							2							0							0						
	A		10							9							9							2							2						

Table D-6. Summary of distress data for FM 1570, Greenville, Texas (continued)
UPM (edge seal) (B), Control (A), and HFMS-2 (G)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
48P300021	B 1	10	10	10	10	10	8	10	10	10	7	6	10	9	10	10	10	8	7	10	9	10	10	10	7	5	10	8	10	10	10	7	5	10	8	10
48P300022	A11	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	9	10	10	4	8	8	10	8	10	10	4	8	8	10	8	10
48P300023	G 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	10	8	8	10	2	9	9	10	8	8	10	2	9	9	10	6	8
48P300024	G 2	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	3	10	9	10	8	10	10	3	10	9	10	8	10
48P300025	A12	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	5	10	10	8	8	10	4	5	10	10	8	8	10	4	5	10	10	6	8
48P300026	B 2	10	10	6	10	10	8	10	10	10	5	8	10	9	10	10	10	4	8	10	7	9	10	5	4	8	10	7	9	10	5	4	8	10	6	9
48P300027	B 3	10	10	7	10	10	8	10	10	10	6	8	10	9	10	10	10	5	9	10	6	10	10	8	5	7	10	6	10	10	8	5	7	10	6	10
48P300028	A13	10	10	5	10	10	10	10	10	10	6	9	10	10	10	10	10	3	9	10	7	10	10	0	3	9	10	7	10	10	0	3	9	10	5	10
48P300029	G 3	10	10	8	10	10	8	10	10	10	8	9	10	10	10	10	10	5	9	10	8	10	10	6	5	9	10	8	10	10	6	5	9	10	6	10
48P300030	G 4	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	6	8	10	10	8	10	10	4	8	10	10	8	10
48P300031	A14	10	10	7	10	10	10	10	10	10	7	9	10	10	10	10	10	5	9	10	7	10	10	3	5	7	10	7	10	10	3	5	7	10	5	10
48P300032	B 4	10	10	10	8	10	9	10	10	10	8	9	10	10	10	10	10	6	9	10	7	10	10	8	6	7	10	7	10	10	8	6	7	10	6	10
48P300033	B 5	10	10	8	10	10	9	10	10	10	5	9	10	10	10	10	10	3	8	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300034	A15	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	10	7	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300035	G 5	10	10	9	10	9	10	10	10	10	9	9	10	10	10	10	10	8	7	10	8	8	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300036	G 6	10	10	10	10	9	10	10	10	10	8	10	10	10	10	10	10	7	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300037	A16	10	10	6	10	10	10	8	10	10	3	10	10	10	6	10	10	4	7	10	7	7	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300038	B 6	10	10	8	10	10	8	10	10	10	3	8	10	10	10	10	10	5	9	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300039	B 7	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	5	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300040	A17	10	10	7	10	10	10	8	10	10	4	10	10	10	7	10	10	4	8	10	8	8	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300041	G 7	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	8	10	10	9	8	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300042	G 8	10	10	9	10	10	10	9	10	10	8	10	10	10	10	10	10	7	10	10	8	8	10	4	7	10	10	8	8	10	4	7	10	10	8	8
48P300043	A18	10	10	10	10	10	10	9	10	10	7	10	10	10	9	10	10	5	9	10	7	7														
48P300044	B 8	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	8	8	10	8	10	10	8	7	7	10	8	10	10	8	7	6	10	8	10
48P300045	B 9	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300046	A19	10	10	9	10	10	10	10	10	10	6	10	10	10	10	10	10	6	9	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300047	G 9	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	6	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300048	G10	10	10	10	10	10	10	8	10	10	9	10	10	10	10	10	10	8	10	10	9	9	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300049	A20	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	4	10	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300050	B10	10	10	10	10	10	8	8	10	10	5	8	10	10	10	10	10	5	8	10	7	8	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Surviving	B	10							10							10							5							5						
	A	10							10							10							4							4						
	G	10							10							10							5							5						

Table D-6. Summary of distress data for FM 1570, Greenville, Texas (continued)
Perma-Patch (H), Control (A), and QPR 2000 (I)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Material #	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
48P300051	H 1	10	10	8	10	10	10	10	10	10	5	10	10	10	10	10	10	6	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300052	A21	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300053	I 1	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300054	I 2	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	9	10	10	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300055	A22	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	5	10	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300056	H 2	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300057	H 3	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	5	10	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300058	A23	10	10	8	10	10	10	10	10	10	5	10	10	10	10	10	10	4	10	10	7	10	10	8	5	10	10	8	10	10	7	5	10	10	6	10
48P300059	I 3	10	10	6	10	10	10	10	10	10	7	10	10	9	10	10	10	4	9	10	9	10	10	5	4	10	10	7	10							
48P300060	I 4	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	8	10	9	10	10	8	4	9	10	8	10	10	8	4	7	10	8	10
48P300061	A24	10	10	5	10	10	10	10	10	10	5	9	10	10	10	10	10	4	9	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300062	H 4	10	10	4	10	9	4	10																												
48P300063	H 5	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	7	9	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300064	A25	10	10	8	10	10	10	10	10	10	7	10	10	9	10	10	10	9	8	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300065	I 5	10	10	5	10	10	10	10	10	10	3	9	10	10	10	10	10	5	6	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300066	I 6	10	10	9	10	10	10	10	10	10	5	10	10	10	10	10	10	5	9	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300067	A26	10	10	5	10	10	10	10	10	10	5	10	10	10	10	10	10	6	10	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300068	H 6	10	10	4	10	10	10	10	10	10	3	10	10	8	10	10	10	4	8	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300069	H 7	10	10	7	10	10	10	10	10	10	4	10	10	9	10	10	10	5	9	10	8	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300070	A27	10	10	8	10	10	10	10	10	10	5	10	10	10	10	10	10	6	10	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300071	I 7	10	10	8	10	10	10	10	10	10	6	9	10	10	10	10	10	7	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300072	I 8	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	6	9	10	9	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300073	A28	10	10	6	10	10	10	10	10	10	4	10	10	7	10	10	10	4	9	10	6	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300074	H 8	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	5	10	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300075	H 9	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	5	9	10	8	8														
48P300076	A29	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	6	9	10	10	8	10	10	6	8	10	10	8	10	10	6	8
48P300077	I 9	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	10	10	10	9	9	10	10	10	5	10	9	9	10	7	10	5	10	9	9
48P300078	I10	10	10	8	10	9	7	10	10	10	8	10	10	4	10	10	3	6	10	10	8	10	10	1	6	10	10	8	10	10	1	6	10	10	7	10
48P300079	A30	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	7	10	10	8	8	10	10	6	10	10	8	8	10	10	6	10
48P300080	H10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	4	10	10	8	7	10	10	4	7	10	8	7	10	10	4	7	10	8	7
Surviving	H	10							9							9							2							2						
	A	10							10							10							3							2						
	I	10							10							10							3							3						

Table D-6. Summary of distress data for FM 1570, Greenville, Texas (continued)
PennDOT 485 (D), Control (A), and UPM (semi-perm.) (C)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
48P300081	D 1	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10
48P300082	A31	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	8	9	10	6	7	10	10	8	9	10	6	7	10	10	7	9
48P300083	C 1	10	10	4	10	10	10	10	10	10	6	10	10	8	10	10	10	7	8	10	6	10														
48P300084	C 2	10	10	9	10	10	10	10	10	10	8	10	10	10	6	10	10	8	9	10	8	8	10	10	8	8	10	8	8	10	10	8	8	10	8	8
48P300085	A32	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	7	8	10	8	10	10	10	7	8	10	8	10
48P300086	D 2	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	10	8	9	10	10	6	10	10	8	9	10	10	6	10	10	8	9
48P300087	D 3	10	10	6	10	10	10	10	9	10	8	10	10	10	10	10	10	3	10	10	8	10	10	10	3	7	10	8	10	10	10	3	7	10	8	10
48P300088	A33	10	10	10	10	10	9	10	10	10	7	10	10	10	10	10	10	7	9	10	7	10	10	10	6	7	10	7	10	10	10	6	7	10	7	10
48P300089	C 3	10	10	7	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	10	8	8	10	10	6	8	10	8	8	10	10	6	8	10	7	8
48P300090	C 4	10	10	6	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	10	7	10	10	10	7	7	10	7	10	10	10	7	6	10	7	10
48P300091	A34	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	7	10	10	10	8	10	10	7	10
48P300092	D 4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9
48P300093	D 5	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	8	8	10	10	4	10	10	8	8	10	10	4	8	10	8	8
48P300094	A35	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	7	9	10	6	8	8	10	7	9	10	6	8	8	10	7	9
48P300095	C 5	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	8	8	7	10	8	10	10	8	8	7	10	7	10
48P300096	C 6	10	10	9	10	10	10	10	10	10	10	10	10	10	9	10	10	8	10	10	6	9	10	10	8	10	10	6	9	10	10	8	9	10	6	9
48P300097	A36	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	4	10	10	7	8	10	7	4	10	10	7	8	10	7	4	10	10	7	8
48P300098	D 6	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	5	10	10	8	10	10	10	5	10	10	7	10	10	8	5	10	10	7	10
48P300099	D 7	8	10	6	10	10	10	9	6	10	5	10	10	10	10	10	10	3	10	10	8	7	10	10	3	10	10	8	7	10	10	3	10	10	7	7
48P300100	A37	10	10	6	10	10	10	10	10	10	7	10	10	10	10	10	10	5	10	10	8	9	10	10	5	7	10	8	9	10	10	5	7	10	7	9
48P300101	C 7	10	10	5	10	10	10	10	10	10	8	10	10	10	10	10	10	4	9	10	9	9	10	10	4	7	10	8	9	10	10	4	7	10	7	9
48P300102	C 8	10	10	10	10	8	10	10	10	10	9	6	10	10	10	10	10	3	8	10	9	10	10	10	3	7	10	8	10	10	10	3	7	10	7	10
48P300103	A38	10	10	10	10	9	6	10	10	10	8	9	10	4	10	10	10	5	10	10	6	9	10	8	5	10	10	2	9	10	8	5	9	10	2	9
48P300104	D 8	10	10	8	10	10	10	10	9	10	8	10	10	10	10	10	10	7	9	10	10	9														
48P300105	D 9	9	10	7	10	10	10	10	6	10	6	10	10	10	10	10	10	5	10	10	9	8	10	10	5	10	10	8	7	7	10	5	10	10	7	7
48P300106	A39	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	10	7	9	10	0	7	10	10	7	9	10	0	7	10	10	7	9
48P300107	C 9	10	10	8	10	10	10	9	10	10	6	10	10	10	10	10	10	5	10	10	8	9	10	0	5	10	10	8	9	10	0	5	10	10	7	9
48P300108	C10	10	10	9	10	10	9	10	10	10	8	10	10	10	10	10	10	8	9	10	10	9	10	0	8	7	10	4	9	10	0	8	6	10	4	9
48P300109	A40	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	5	10	10	8	10														
48P300110	D10	6	10	6	10	9	6	10	4	10	2	10	10	3	10	8	10	3	10	10	3	7														
Surviving	D	10							10							10							8							8						
	A	10							10							10							9							9						
	C	10							10							10							9							9						

Table D-6. Summary of distress data for FM 1570, Greenville, Texas (continued)
PennDOT 486 (E) and Control (A)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
Patch ID	Mat'l #																																			
48P300111	E 1	3	10	7	10	10	10	10	0	10	1	8	10	10	10	3	10	4	10	10	10	7														
48P300112	A41	10	10	7	10	10	10	10	10	10	7	8	10	10	10	10	10	5	9	10	6	8														
48P300113	A42	10	10	7	10	10	10	10	10	10	7	9	10	10	10	10	10	5	10	10	7	10														
48P300114	E 2	7	10	5	10	10	10	10	1	10	3	10	10	10	10	4	10	4	9	10	10	10														
48P300115	E 3	9	10	6	10	10	10	10	0	10	3	10	10	10	10	2	10	4	10	10	10	8														
48P300116	A43	10	10	7	10	10	10	10	10	10	9	6	10	10	10	10	10	8	8	10	8	9	10	0	7	6	10	8	9	10	0	7	5	10	7	9
48P300117	A44	10	10	10	10	10	10	10	10	10	9	10	10	10	8	10	10	7	7	10	8	10	10	0	6	6	10	8	10	10	0	6	6	10	8	10
48P300118	E 4	6	10	9	10	10	10	10	1	10	3	10	10	10	10	2	10	5	10	10	10	8														
48P300119	E 5	2	10	5	10	10	10	10	0	10	1	10	10	10	10	1	10	4	6	10	10	7														
48P300120	A45	10	10	5	10	10	10	10	10	10	4	8	10	10	10	10	10	5	7	10	8	9														
48P300121	A46	10	10	6	10	10	10	10	10	10	4	10	10	10	10	10	10	5	7	10	9	9														
48P300122	E 6	7	10	4	10	9	7	9	0	10	6	10	10	2	10	2	10	2	10	10	3	8														
48P300123	E 7	4	10	7	10	10	10	10	0	10	2	10	10	10	10	1	10	5	10	10	10	10	1	10	4	10	10	10	10	0	8	4	10	10	10	10
48P300124	A47	10	10	6	10	10	10	10	10	10	3	10	10	10	9	10	10	8	9	10	9	8	10	2	8	7	10	9	8	10	2	8	7	10	7	8
48P300125	A48	10	9	5	10	10	10	10	10	10	5	7	10	10	10	10	10	4	9	10	8	10	10	0	4	7	10	8	10	10	0	4	7	10	6	10
48P300126	E 8	2	10	8	10	10	10	10	0	10	4	9	10	10	10	1	10	4	10	10	10	8	1	10	4	10	10	10	8	0	10	4	10	10	10	8
48P300127	E 9	1	10	5	10	10	10	10	2	10	4	10	10	10	10	3	10	4	10	10	8	9														
48P300128	A49	10	9	7	10	10	10	10	10	10	5	10	10	10	10	10	10	5	10	10	8	9	10	4	5	10	10	7	9	10	4	5	7	10	5	9
48P300129	A50	10	10	7	10	10	10	10	10	10	5	10	10	10	10	10	10	7	9	10	8	10	10	8	7	7	10	7	10	10	8	7	7	10	7	10
48P300130	E10	0	10	5	10	10	9	8	0	10	4	10	10	4	10	1	10	4	10	10	6	8														
Surviving	E	10							10							10							2							2						
	A	10							10							10							6							6						

Table D-6. Summary of distress data for FM 1570, Greenville, Texas (continued)
Control (A) and Spray injection (J)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Mat'l #																																			
48P300131	A51								10	10	8	9	10	10	10	10	10	6	10	10	9	9	10	10	6	7	10	8	9	10	10	6	7	10	7	9
48P300132	J 1								10	10	10	10	10	10	10	10	10	8	10	10	7	10	10	10	8	10	10	5	10	10	10	8	10	10	5	10
48P300133	A52								10	10	10	10	10	10	10	10	10	9	9	10	8	9	10	0	9	7	10	8	9	10	0	9	6	10	7	9
48P300134	J 2								8	10	10	10	10	10	10	9	10	10	9	10	8	10	10	10	10	9	10	6	10	9	10	10	9	10	5	10
48P300135	A53								10	10	10	10	10	10	10	10	10	8	9	10	9	10	10	1	8	7	10	9	10	10	1	8	7	10	9	10
48P300136	J 3								10	10	10	10	10	10	10	10	10	9	10	10	8	10														
48P300137	A54								10	10	9	10	10	10	10	10	10	6	10	10	9	8	10	10	6	10	10	7	8	10	10	6	10	10	7	8
48P300138	J 4								10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	8	10	6	10	10	10	10	8	10	5	10
48P300139	A55								10	10	8	10	10	10	10	10	10	7	9	10	8	10	10	10	7	9	10	7	10	10	10	7	9	10	7	10
48P300140	J 5								10	10	10	10	10	9	10	10	10	9	8	10	8	10	10	10	9	8	10	6	10	10	10	9	8	10	6	10
48P300141	A56								10	10	10	9	10	10	10	10	10	10	8	10	9	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10
48P300142	J 6								10	10	10	10	10	10	10	10	10	9	10	10	7	10	10	10	9	10	10	6	10	10	10	9	10	10	5	10
48P300143	A57								10	10	8	10	10	10	10	10	10	7	10	10	8	8	10	10	6	10	10	7	8	10	10	6	9	10	7	8
48P300144	J 7								8	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	8	10	6	10	10	10	10	8	10	6	10
48P300145	A58								10	10	9	10	10	10	10	10	10	10	8	10	10	8	10	10	8	8	10	7	8							
48P300146	J 8								9	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	8	10	6	10							
48P300147	A59								10	10	9	10	10	10	10	10	10	7	10	10	9	7	10	10	7	10	10	7	7	10	10	7	10	10	7	7
48P300148	J 9								10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	5	10	10	10	10	10	10	5	10
48P300149	A60								10	10	9	10	10	10	10	10	10	9	10	10	8	9	99	99	99	99	99	99	99	99	99	99	99	99	99	99
48P300150	J10								10	10	10	10	10	10	10	10	10	9	10	10	7	10	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Surviving	A								10							10							9							8						
	J								10							10							8							7						

Table D-7. Summary of distress data for I-15 Frontage Road, Draper, Utah PennDOT 486 (E), Control (A), and PennDOT 485 (D)

			Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat	#	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
49P400001	E	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	9	10	10	8	10	8	10	9	10	10	8	10	8	10	9	10
49P400002	A	1	10	10	8	9	10	10	10	10	10	9	9	10	10	10	10	7	8	8	10	10	10	10	7	8	7	10	10	10	10	6	8	7	10	6	10
49P400003	D	1	10	10	9	10	9	10	10	10	10	9	10	9	10	10	10	9	9	9	9	10	10	10	9	9	7	9	10	9	10	8	9	7	9	10	9
49P400004	D	2	10	10	7	10	9	10	10	10	10	6	10	9	10	10	10	9	7	8	9	10	10	10	9	7	6	9	10	10	10	7	7	6	9	10	10
49P400005	A	2	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	8	6	10	10	9	10	10	8	6	6	10	9	10	10	8	6	6	10	9	10
49P400006	E	2	10	10	7	9	10	10	10	10	10	7	9	10	10	10	8	9	7	8	10	10	10	8	9	7	7	10	10	10	8	9	7	7	10	10	10
49P400007	E	3	10	10	6	10	10	10	10	8	10	7	10	10	10	10	7	10	7	8	10	10	10	8	10	7	6	10	10	10	7	10	7	6	10	10	10
49P400008	A	3	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	7	7	8	10	10	10	10	7	7	7	10	10	10	10	7	7	7	10	10	10
49P400009	D	3	10	10	5	10	10	10	10	10	10	6	9	10	10	10	10	10	6	8	10	10	10	10	10	6	6	10	10	10	10	10	6	6	10	8	10
49P400010	D	4	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10	10	8	8	7	10	10	10
49P400011	A	4	10	10	9	9	10	10	10	10	10	8	9	10	10	9	10	10	8	8	10	10	8	10	10	8	7	10	10	8	10	10	8	7	10	10	8
49P400012	E	4	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	9	10	10
49P400013	E	5	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	10	10	10	8	8	8	10	10	10
49P400014	A	5	10	10	7	9	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10
49P400015	D	5	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	9	7	9	10	10	10	10	9	7	8	10	10	10	10	9	7	7	10	10	10
49P400016	D	6	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	9	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10
49P400017	A	6	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10	10	9	8	6	10	10	10
49P400018	E	6	10	10	7	9	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	10	9	10	10	7	7	10	10	9	10	10	7	6	9	10	9
49P400019	E	7	10	10	6	10	10	10	10	10	10	6	9	10	10	10	10	9	6	9	10	10	10	10	9	6	6	10	10	10	10	9	6	6	10	10	10
49P400020	A	7	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	7	7	7	10	10	10	10	7	7	6	10	10	10	10	7	7	5	10	10	10
49P400021	D	7	10	10	7	9	10	10	10	10	10	7	9	10	10	10	10	9	7	10	10	10	10	10	9	7	7	10	10	10	10	9	7	7	10	10	10
49P400022	D	8	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	7	10	9	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10	10	10
49P400023	A	8	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10
49P400024	E	8	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	9	9	8	10	10	10	10	8	9	8	10	10	10
49P400025	E	9	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	9	9	8	8	10	10	10	9	9	8	8	10	10	10
49P400026	A	9	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	8	10	10	10	10	9	8	8	9	8	10
49P400027	D	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	9	10	8	10	10	9	10	9	10	8	10	10	9
49P400028	D	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	9	10	10	10	10	10	6	8	10	10	10	10	10	6	8	10	10	10
49P400029	A	10	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	9	10	10	9	8	7	10	9	10	10	9	8	6	10	9	10
49P400030	E	10	10	10	7	10	10	10	10	10	10	8	9	10	10	10	10	9	7	8	10	9	10	10	9	7	8	10	8	10	10	9	7	7	10	8	10
Surviving	E		10							10							10							10							10						
	A		10							10							10							10							10						
	D		10							10							10							10							10						

Table D-7. Summary of distress data for I-15 Frontage Road, Draper, Utah (continued)
HFMS-2 (G), Control (A), and Spray injection (J)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Ditch	Edge	Mix	Rave	Shov	Bleed	Crack	Ditch	Edge	Mix	Rave	Shov	Bleed	Crack	Ditch	Edge	Mix	Rave	Shov	Bleed	Crack	Ditch	Edge	Mix	Rave	Shov	Bleed	Crack	Ditch	Edge	Mix	Rave	Shov
Patch ID	Matl #																																			
49P400031	G 1	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	9	9	6	10	10	10	10	9	9	6	10	10	10	10	8	9	6	10	6	10
49P400032	A11	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	7	8	7	10	10	10	10	7	8	7	10	10	10	10	6	8	7	10	10	10
49P400033	J 1	10	10	6	10	10	10	10	10	10	5	10	10	10	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10
49P400034	J 2	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10
49P400035	A12	10	10	8	9	10	10	10	10	10	7	9	10	10	10	10	8	7	6	10	10	10	10	8	7	6	10	10	10	10	8	7	6	10	10	10
49P400036	G 2	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	6	10
49P400037	G 3	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	9	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	7	10
49P400038	A13	10	10	6	10	10	10	10	10	10	6	9	10	10	10	10	8	7	8	10	10	10	10	8	7	7	10	10	10	10	7	7	7	10	10	10
49P400039	J 3	10	10	5	10	10	8	10	10	10	6	10	10	7	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10
49P400040	J 4	10	10	6	10	10	8	10	10	10	6	10	10	7	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10	10	10	6	10	10	6	10
49P400041	A14	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10
49P400042	G 4	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	9	9	8	10	10	10	10	9	9	7	10	10	10	10	9	9	7	10	10	10
49P400043	G 5	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	10	10
49P400044	A15	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10
49P400045	J 5	10	10	6	10	10	10	10	10	10	5	10	10	8	10	10	10	6	10	10	7	10	10	10	6	10	10	7	10	10	10	6	10	10	7	10
49P400046	J 6	10	10	7	10	10	8	10	10	10	6	10	10	8	10	10	10	6	10	10	7	10	10	10	6	10	10	7	10	10	10	6	10	10	7	10
49P400047	A16	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10
49P400048	G 6	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10
49P400049	G 7	10	10	7	10	10	10	10	10	10	7	9	10	10	10	10	10	8	8	10	6	10	10	10	8	8	10	6	10	10	10	8	8	10	6	10
49P400050	A17	10	10	6	8	10	10	10	10	10	7	9	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10
49P400051	J 7	10	10	4	10	10	8	10	10	10	5	10	10	7	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10
49P400052	J 8	10	10	6	10	10	8	10	10	10	5	10	10	7	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10
49P400053	A18	10	10	6	10	10	10	10	10	10	5	9	10	10	10	10	10	6	8	10	10	10	10	10	6	7	10	10	10	10	10	6	7	10	10	10
49P400054	G 8	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10
49P400055	G 9	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	10	10
49P400056	A19	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	8	6	8	10	10	10	10	8	6	8	10	10	10	10	7	6	8	10	10	10
49P400057	J 9	10	10	5	10	10	8	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10	10	10	5	10	10	6	10
49P400058	J10	10	10	5	10	10	6	10	10	10	5	10	10	5	10	10	10	5	10	10	6	10	10	10	5	10	10	4	10	10	10	5	10	10	5	10
49P400059	A20	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	9	8	7	10	10	10	10	8	8	7	10	8	10
49P400060	G10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10
Surviving	G	10							10							10							10							10						
	A	10							10							10							10							10						
	J	10							10							10							10							10						

Table D-7. Summary of distress data for I-15 Frontage Road, Draper, Utah (continued)
Local material (F), Control (A), and Perma-Patch (H)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Material #	Bleed	Crack	Disg	Edge	Mist	Ravel	Shov	Bleed	Crack	Disg	Edge	Mist	Ravel	Shov	Bleed	Crack	Disg	Edge	Mist	Ravel	Shov	Bleed	Crack	Disg	Edge	Mist	Ravel	Shov	Bleed	Crack	Disg	Edge	Mist	Ravel	Shov
49P400061	F 1	10	10	8	10	10	9	10	10	10	7	10	10	8	10	10	9	7	8	10	7	10	10	9	7	8	10	7	10	10	9	7	8	10	7	10
49P400062	A21	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10
49P400063	H 1	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10	10	8	8	7	10	10	10
49P400064	H 2	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	8	7	8	10	10	10	10	8	7	8	10	10	10	10	8	7	8	10	10	10
49P400065	A22	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	8	10
49P400066	F 2	10	10	7	10	10	10	10	10	10	8	9	10	10	10	10	7	8	6	10	10	10	10	7	8	6	10	10	10	10	7	8	6	10	10	10
49P400067	F 3	10	10	6	9	10	10	10	10	10	5	9	10	10	10	10	10	5	7	10	10	10	10	10	5	6	10	10	10	10	10	5	6	10	10	10
49P400068	A23	10	10	8	10	10	10	10	10	10	7	9	10	8	10	10	10	7	7	10	10	10	10	10	7	7	10	9	10	10	8	7	7	10	9	10
49P400069	H 3	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	8	8	7	10	10	10	10	8	8	7	10	10	10	10	8	8	7	10	10	10
49P400070	H 4	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	8	8	10	10	8	10	10	8	7	10	10	8	10	8	8	7	10	10	8
49P400071	A24	10	10	7	9	10	10	10	10	10	8	9	10	10	10	10	8	8	7	10	10	10	10	8	8	7	10	10	10	10	6	8	7	10	10	10
49P400072	F 4	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	8	7	7	10	10	10	10	8	7	7	10	10	10	10	8	7	6	10	10	10
49P400073	F 5	10	10	6	10	10	8	10	10	10	7	9	10	8	10	10	7	7	7	10	8	10	10	7	7	7	10	8	10	10	7	7	7	10	8	10
49P400074	A25	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	8	8	8	10	10	10														
49P400075	H 5	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	8	8	7	10	10	10	10	7	8	7	10	10	10	10	7	8	7	10	10	10
49P400076	H 6	10	10	9	10	10	10	10	10	10	8	8	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	10	10	10	7	8	7	10	10	10
49P400077	A26	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	9	8	7	10	10	10	10	8	8	7	10	10	10	10	8	8	7	10	10	10
49P400078	F 6	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	8	7	7	10	10	10	10	8	7	6	10	10	10	10	8	7	6	10	10	10
49P400079	F 7	10	10	8	9	10	10	10	10	10	7	8	10	10	10	10	8	7	6	10	10	10	10	8	7	6	10	10	10	10	8	7	6	10	10	10
49P400080	A27	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	9	8	6	10	8	10	10	8	8	6	10	8	10	10	7	8	6	10	8	10
49P400081	H 7	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	9	10	8	8	7	10	10	9	10	8	8	7	10	10	9
49P400082	H 8	10	10	8	9	10	10	10	10	10	7	8	10	10	10	10	9	8	5	10	10	10	10	8	8	5	10	10	10	10	8	8	5	10	10	10
49P400083	A28	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	8	8	6	10	10	10	10	8	8	6	10	10	10	10	8	8	6	10	10	10
49P400084	F 8	10	10	6	10	10	10	10	10	10	5	9	10	10	10	10	10	6	7	10	8	10	10	10	6	7	10	8	10	10	10	5	7	10	8	10
49P400085	F 9	10	10	7	10	10	8	10	10	10	6	9	10	8	10	10	10	6	5	10	8	10	10	10	6	5	10	8	10	10	8	6	5	10	8	10
49P400086	A29	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	6	10	10	10	10	9	8	6	10	10	10	10	9	8	6	10	10	10
49P400087	H 9	10	10	8	10	10	10	10	10	10	7	8	10	10	10	10	9	7	6	10	10	10	10	9	7	5	10	10	10	10	8	7	5	10	10	10
49P400088	H10	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10
49P400089	A30	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	8	8	6	10	10	10	10	8	8	6	10	10	10	10	8	8	6	10	10	10
49P400090	F10	10	10	8	10	10	8	10	10	10	7	9	10	8	10	10	10	7	5	10	7	10	10	10	7	5	10	7	10	10	10	7	5	10	7	10
Surviving	F	10							10							10							10							10						
	A	10							10							10							9							9						
	H	10							10							10							10							10						

Table D-7. Summary of distress data for I-15 Frontage Road, Draper, Utah (continued)
UPM (edge seal) (B), Control (A), and UPM (semi-perm.) (C)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove	Bleed	Crack	Ditch	Edge	Mist	Ravel	Shove
Patch ID	Mat'l #																																			
49P400091	B 1	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	8	8	9	10	10	10	10	8	8	9	10	10	10	10	6	8	9	10	10	10
49P400092	A31	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	9	8	10	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	10	10
49P400093	C 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10	10	10
49P400094	C 2	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	9	10
49P400095	A32	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10
49P400096	B 2	10	10	9	10	10	10	10	10	10	8	8	10	10	10	10	9	8	8	10	10	10	10	9	8	8	10	8	10	10	9	8	8	10	8	10
49P400097	B 3	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	8	10	10	9	8	9	10	8	10
49P400098	A33	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10	10	10	10	9	10	7	10	10	10
49P400099	C 3	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	9	7	10	10	10	10	8	9	7	10	10	10	10	8	9	7	10	9	10
49P400100	C 4	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	9	10
49P400101	A34	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	9	5	10	10	10	10	10	9	5	10	10	10	10	9	9	5	10	10	10
49P400102	B 4	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	9	10
49P400103	B 5	10	10	8	9	10	10	10	10	10	7	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	9	10
49P400104	A35	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	8	7	10	10	10
49P400105	C 5	10	10	9	10	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	9	10
49P400106	C 6	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	5	10	10	10	10	9	8	5	10	10	10	10	9	8	5	10	10	10
49P400107	A36	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10
49P400108	B 6	10	10	9	9	10	10	10	10	10	7	8	10	10	10	10	10	7	8	10	10	10	10	10	7	8	10	8	10	10	10	7	8	10	8	10
49P400109	B 7	10	10	6	9	10	10	10	10	10	7	9	10	10	10	10	10	7	8	10	10	10	10	10	7	8	10	8	10	10	10	7	8	10	8	10
49P400110	A37	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	8	8	4	10	10	10	10	8	8	4	10	10	10	10	8	8	4	10	9	10
49P400111	C 7	10	10	6	9	10	10	10	10	10	6	8	10	10	10	10	10	8	5	10	9	10	10	10	8	5	10	9	10	10	7	8	5	10	9	10
49P400112	C 8	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	9	9	7	10	10	10	10	9	9	7	10	10	10	10	9	9	7	10	9	10
49P400113	A38	10	10	7	9	10	10	10	10	10	8	9	10	10	10	10	9	8	8	10	10	10	10	9	8	7	10	10	10	10	8	8	7	10	10	10
49P400114	B 8	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	9	10	10	10	7	8	10	7	10
49P400115	B 9	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	8	10	10	10	8	10	10	6	10
49P400116	A39	10	10	6	9	10	10	10	10	10	5	9	10	10	10	10	9	6	7	10	10	10	10	9	6	7	10	10	10							
49P400117	C 9	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	9	10	10	10	8	8	10	9	10	10	8	8	8	10	9	10
49P400118	C10	10	10	10	9	10	10	10	10	10	8	9	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	10	10	10	9	8	7	10	6	10
49P400119	A40	10	10	8	9	10	10	10	10	10	7	9	10	10	10	10	10	8	5	10	9	10	10	10	8	5	10	7	10	10	10	8	5	10	6	10
49P400120	B10	10	10	7	9	10	10	10	10	10	6	8	10	10	10	10	10	7	8	10	9	10	10	10	7	8	10	9	10	10	10	7	8	10	8	10
Surviving	B	10							10							10							10							10						
	A	10							10							10							10							9						
	C	10							10							10							10							10						

Table D-7. Summary of distress data for I-15 Frontage Road, Draper, Utah (continued)
QPR 2000 (I) and Control (A)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Material #	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove
49P400121	I 1	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	8	10
49P400122	A41	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	9	9	6	10	10	10	10	9	9	6	10	10	10	10	8	9	6	10	10	10
49P400123	I 2	10	10	9	8	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	9	10	10	8	8	7	10	9	10	10	8	8	7	10	9	10
49P400124	A42	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	8	10
49P400125	I 3	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10	10	10	10	7	10	7	10	10	10
49P400126	A43	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	9	10	10	10	10	6	10	9	10	10	10	10	6	10	8	10
49P400127	I 4	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10
49P400128	A44	10	10	10	9	10	10	10	10	10	8	9	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	8	10
49P400129	I 5	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	8	10
49P400130	A45	10	10	9	9	10	10	10	10	10	8	8	10	10	10	10	9	8	6	10	10	10														
49P400131	I 6	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	8	10
49P400132	A46	10	10	9	9	10	10	10	10	10	8	8	10	10	10	10	10	8	4	10	10	10	10	10	8	4	10	10	10	10	10	8	4	10	8	10
49P400133	I 7	10	10	7	9	10	10	10	10	10	8	9	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10
49P400134	A47	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	6	10	9	10	10	10	9	6	10	9	10	10	10	9	6	10	8	10
49P400135	I 8	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10	10	10	8	5	10	10	10
49P400136	A48	10	10	9	8	10	10	10	10	10	8	8	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	5	10	8	10
49P400137	I 9	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	4	10	10	10	10	10	8	4	10	7	10	10	10	8	4	10	6	10
49P400138	A49	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	9	8	7	10	10	10	10	9	8	6	10	6	10	10	9	8	6	10	6	10
49P400139	I10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	5	10	10	10	10	8	10	5	10	10	10	10	7	10	5	10	10	10
49P400140	A50	10	10	8	9	10	10	10	10	10	8	9	10	10	10	10	10	8	6	10	10	10	10	10	8	5	10	10	10	10	8	8	5	10	9	10
Surviving	I	10							10							10							10							10						
	A	10							10							10							9							9						

Table D-8. Summary of distress data for Rt. 28, Bradford, Vermont. Local material (F) and Control (A)

			Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
			Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove	Bleed	Crack	Ditch	Edge	Misc	Ravel	Shove
Patch ID	Material	#																																			
50P100001	F	1	10	10	10	10	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	7	10														
50P100002	A	1	10	10	10	9	10	10	10	10	10	9	8	10	6	10	10	10	8	8	10	6	10	10	10	8	8	10	6	10							
50P100003	F	2	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10							
50P100004	A	2	10	10	7	10	10	10	10	10	10	8	7	10	6	10	10	10	7	6	10	6	10														
50P100005	F	3	10	10	8	9	10	10	10	10	10	7	9	10	7	10	10	10	7	7	10	6	10	10	10	7	6	10	6	10	10	10	7	6	10	5	10
50P100006	A	3	10	10	8	10	10	10	10	10	10	7	8	10	6	10	10	10	7	6	10	4	10	10	10	7	6	10	4	10	10	10	7	6	10	4	10
50P100007	F	4	10	10	9	10	10	10	10	10	10	9	10	10	9	10	10	10	9	10	10	6	10														
50P100008	A	4	10	10	10	10	10	10	10	10	10	10	9	10	6	10	10	10	10	8	10	6	10														
50P100009	F	5	7	10	8	10	10	10	10	7	10	9	9	10	7	10	10	10	8	8	10	7	10														
50P100010	A	5	10	10	7	10	10	10	10	10	10	9	10	10	5	10	10	10	8	7	10	6	10														
50P100011	F	6	7	10	7	10	10	10	10	8	10	8	10	10	7	10	10	10	8	7	10	6	10														
50P100012	A	6	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	8	10	10	10	10	6	10	6	10	10	10	10	6	10	6	10
50P100013	F	7	8	10	8	10	10	10	10	10	10	9	8	10	8	10	10	10	9	8	10	6	10														
50P100014	A	7	10	10	9	10	10	10	10	10	10	9	8	10	9	10	10	10	9	5	10	8	10														
50P100015	F	8	10	10	10	10	10	10	10	8	10	9	9	10	8	10	10	10	9	8	10	8	10														
50P100016	A	8	10	10	10	10	10	10	10	10	10	10	10	10	6	10	10	10	10	8	10	6	10														
50P100017	F	9	10	10	9	10	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	10	10
50P100018	A	9	10	10	10	9	10	10	10	10	10	10	7	10	7	10	10	10	10	7	10	6	10														
50P100019	F	10	10	10	9	10	10	10	10	9	10	9	10	10	8	10	10	10	8	7	10	8	10														
50P100020	A	10	10	10	10	10	10	10	10	10	10	10	10	10	6	10	10	10	10	8	10	5	10														
Surviving	F		10							10							10							4							2						
	A		10							10							10							3							2						

Table D-8. Summary of distress data for Rt. 28, Bradford, Vermont (continued)
UPM (edge seal) (B), Control (A), and HFMS-2 (G)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove
Patch ID	Matl #																																			
50P100021	B 1	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	9	10	10	10	10	8	10	7	10							
50P100022	A11	10	10	7	10	10	10	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10														
50P100023	G 1	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	9	10	7	10	10	10	10	9	10	4	10	10	10	10	7	10	4	10
50P100024	G 2	10	10	8	10	10	10	10	10	10	10	5	10	8	10	10	10	8	5	10	8	10														
50P100025	A12	10	10	8	9	10	10	10	10	10	8	7	10	10	10																					
50P100026	B 2	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	3	10
50P100027	B 3	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	8	10	10	10	9	8	10	8	10	10	10	9	7	10	5	10
50P100028	A13	10	10	10	10	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	8	10	10	10	9	6	10	6	10	10	10	9	6	10	6	10
50P100029	G 3	10	10	9	10	10	10	10	10	10	8	9	10	9	10	10	10	8	6	10	6	10	10	10	8	6	10	5	10	10	10	8	6	10	5	10
50P100030	G 4	10	10	9	10	10	10	10	10	10	8	9	10	8	10	10	10	8	6	10	7	10	10	10	8	6	10	5	10	10	10	8	6	10	5	10
50P100031	A14	10	10	10	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	9	10	10	10	9	7	10	9	10	10	10	9	6	10	8	10
50P100032	B 4	10	10	10	10	10	10	10	10	10	10	10	10	10	10																					
50P100033	B 5	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10
50P100034	A15	10	10	10	9	10	10	10	10	10	9	8	10	10	10	10	10	8	7	10	9	10														
50P100035	G 5	10	10	9	10	10	10	10	10	10	8	9	10	7	10	10	10	8	8	10	5	10	10	10	8	8	10	5	10	10	10	8	8	10	5	10
50P100036	G 6	10	10	8	9	10	10	10	10	10	7	9	10	8	10	10	10	8	8	10	6	10	10	10	8	8	10	5	10	10	10	8	7	10	4	10
50P100037	A16	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10							
50P100038	B 6	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	7	9	10	10	10	10	10	7	9	10	10	10
50P100039	B 7	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	9	10	10	10	9	9	10	9	10	10	10	9	9	10	9	10
50P100040	A17	10	10	7	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10
50P100041	G 7	10	10	9	10	10	10	10	10	10	8	10	10	7	10	10	10	8	7	10	5	10														
50P100042	G 8	10	10	8	10	10	10	10	10	10	6	8	10	7	10	10	10	7	7	10	6	10														
50P100043	A18	10	10	7	10	10	10	10	10	10	7	9	10	10	10	10	10	7	8	10	10	10	10	10	7	6	10	10	10	10	10	7	6	10	9	10
50P100044	B 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	9	10
50P100045	B 9	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	9	10
50P100046	A19	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10														
50P100047	G 9	10	10	9	9	10	10	10	10	10	8	9	10	8	10	10	10	8	8	10	6	10	10	10	8	8	10	5	10							
50P100048	G10	10	10	9	10	10	10	10	10	10	8	10	10	8	10	10	10	8	8	10	6	10														
50P100049	A20	10	10	8	9	10	10	10	10	10	10	7	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10
50P100050	B10	10	10	8	10	10	10	10	10	10	7	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10							
Surviving	B	10							10							9							9							7						
	A	10							10							9							7							5						
	G	10							10							10							6							5						

Table D-8. Summary of distress data for Rt. 28, Bradford, Vermont (continued)
Perma-Patch (H), Control (A), and QPR 2000 (I)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Matl #																																			
50P100051	H 1	10	10	9	9	10	10	10	10	10	10	9	10	9	10	10	10	10	7	10	10	10	10	10	10	6	10	8	10							
50P100052	A21	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10							
50P100053	I 1	10	10	9	9	10	10	10	10	10	8	9	10	8	10	10	10	8	8	10	7	10	10	10	8	8	10	6	10	10	10	8	7	10	6	10
50P100054	I 2	10	10	10	10	10	10	10	10	10	10	9	10	9	10	10	10	10	8	10	8	10	10	10	10	7	10	6	10	10	10	10	7	10	6	10
50P100055	A22	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	8	10	10	10	10	6	10	8	10
50P100056	H 2	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10														
50P100057	H 3	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10
50P100058	A23	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	8	10
50P100059	I 3	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	7	10	10	10	10	9	10	6	10
50P100060	I 4	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	9	10														
50P100061	A24	10	10	10	9	10	10	10	10	10	9	9	10	7	10	10	10	9	8	10	7	10														
50P100062	H 4	10	10	9	9	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10							
50P100063	H 5	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	10	8	10	10	10	9	8	10	8	10	10	10	9	8	10	7	10
50P100064	A25	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	8	10	8	10														
50P100065	I 5	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	10	9	10	10	10	10	7	10	8	10	10	10	10	7	10	6	10
50P100066	I 6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	7	10	10	10	10	7	10	7	10	10	10	10	7	10	6	10
50P100067	A26	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	9	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	3	10
50P100068	H 6	10	10	9	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	10	7	10	10	10	8	9	10	7	10	10	10	8	7	10	7	10
50P100069	H 7	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	7	10
50P100070	A27	10	10	10	10	10	10	10	10	10	8	10	10	8	10	10	10	8	8	10	8	10														
50P100071	I 7	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10														
50P100072	I 8	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	9	10	10	10	9	7	10	7	10	10	10	9	7	10	5	10
50P100073	A28	10	10	10	9	10	10	10	10	10	9	9	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	8	10							
50P100074	H 8	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	9	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	6	10
50P100075	H 9	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	10	10	10	10	9	6	10	10	10	10	10	9	6	10	10	10
50P100076	A29	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	9	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10
50P100077	I 9	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	6	10							
50P100078	I10	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	9	10	8	10	10	10	9	9	10	6	10	10	10	9	9	10	6	10
50P100079	A30	10	10	10	9	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	6	10	8	10							
50P100080	H10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10
Surviving	H	10							10							10							9							7						
	A	10							10							10							7							4						
	I	10							10							10							8							7						

Table D-8. Summary of distress data for Rt. 28, Bradford, Vermont (continued)
PennDOT 485 (D), Control (A), and PennDOT 486 (E)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Mat'l #	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
50P100081	D 1	10	10	10	10	10	10	10	10	10	8	10	10	9	10	10	10	8	9	10	9	10	10	10	8	7	10	9	10	10	10	8	6	10	8	10
50P100082	A31	10	10	10	9	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	8	10
50P100083	E 1	10	10	9	9	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	5	10	8	10
50P100084	E 2	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	8	10	8	10														
50P100085	A32	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	9	8	10	9	10	10	10	9	7	10	9	10	10	10	9	7	10	8	10
50P100086	D 2	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	8	10	10	10	8	6	10	7	10
50P100087	D 3	10	10	9	10	10	10	10	10	10	6	9	10	10	10	10	10	6	9	10	10	10	10	10	6	7	10	10	10	10	10	6	5	10	8	10
50P100088	A33	10	10	8	10	10	10	10	10	10	9	10	10	8	10	10	10	8	9	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	7	10
50P100089	E 3	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	10	10	10	10	8	6	10	8	10
50P100090	E 4	10	10	9	9	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	9	9	10	10	9	5	10	9	10	10	10	9	5	10	8	10
50P100091	A34	10	10	8	10	10	10	10	10	10	9	10	10	10	10	10	10	9	6	10	9	10	10	10	9	5	10	8	10	10	10	9	5	10	8	10
50P100092	D 4	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	8	10	8	10	10	10	8	6	10	8	10	10	10	8	5	10	7	10
50P100093	D 5	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10
50P100094	A35	10	10	10	10	10	10	10	10	10	9	7	10	10	10	10	10	9	6	10	10	10														
50P100095	E 5	10	10	9	10	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	9	10	10	10	10	6	10	8	10	10	10	10	5	10	8	10
50P100096	E 6	10	10	6	10	10	10	10	10	10	5	9	10	10	10	10	10	5	8	10	10	10	10	10	5	7	10	10	10	10	10	5	7	10	10	10
50P100097	A36	10	10	8	10	10	10	10	10	10	8	8	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	7	10	10	10	8	6	10	7	10
50P100098	D 6	10	10	8	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10
50P100099	D 7	10	10	9	10	10	10	10	10	10	10	9	10	9	10	10	10	10	7	10	9	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10
50P100100	A37	10	10	9	10	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	5	10	10	10							
50P100101	E 7	10	10	9	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10
50P100102	E 8	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	7	10	8	10	10	10	9	6	10	8	10	10	10	9	6	10	8	10
50P100103	A38	10	10	10	9	10	10	10	10	10	7	9	10	10	10	10	10	7	5	10	9	10	10	10	7	5	10	7	10	10	10	7	4	10	6	10
50P100104	D 8	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10
50P100105	D 9	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	9	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10
50P100106	A39	10	10	10	10	10	10	10	10	10	9	8	10	10	10	10	8	9	7	10	9	10	10	8	9	7	10	8	10	10	8	9	7	10	8	10
50P100107	E 9	10	10	9	10	10	10	10	10	10	8	9	10	10	10	10	10	8	7	10	10	10														
50P100108	E10	10	10	9	10	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	10	10
50P100109	A40	10	10	8	10	10	10	10	10	10	8	8	10	10	10	10	10	8	8	10	10	10	10	10	8	7	10	10	10	10	10	8	7	10	8	10
50P100110	D10	10	10	7	9	10	10	10	10	10	9	8	10	10	10	10	10	9	7	10	8	10	10	10	9	7	10	8	10	10	10	9	7	10	8	10
Surviving	D	10							10							10							10							10						
	A	10							10							10							9							8						
	E	10							10							10							8							8						

Table D-8. Summary of distress data for Rt. 28, Bradford, Vermont (continued)
Spray injection (J), Control (A), and UPM (semi-perm.) (C)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
Patch ID	Matl #																																			
50P100111	J 1	1	10	5	10	10	10	10	0	10	7	10	10	10	10	0	10	6	10	10	10	10	2	10	6	10	10	10	10	2	10	6	10	10	10	10
50P100112	A41	10	10	8	9	10	10	10	10	10	8	9	10	9	10	10	10	8	6	10	8	10	10	10	8	6	10	8	10	10	10	8	6	10	7	10
50P100113	C 1	9	10	8	10	10	10	10	10	10	10	9	10	10	10	10	10	10	7	10	7	10	10	10	10	7	10	7	10	10	10	10	7	10	7	10
50P100114	C 2	10	10	9	10	10	10	10	10	10	6	8	10	10	10	10	10	6	7	10	7	10	10	10	6	7	10	7	10							
50P100115	A42	10	10	8	8	10	10	10	10	10	6	8	10	7	10	10	10	6	5	10	7	10	10	10	6	5	10	7	10	10	10	6	5	10	7	10
50P100116	J 2	1	10	7	10	10	8	10	0	10	7	10	10	10	10	1	10	7	10	10	9	10	2	10	7	10	10	9	10	1	10	7	10	10	9	10
50P100117	J 3	6	10	8	10	10	10	10	6	10	9	10	10	9	10	7	10	9	10	10	8	10	8	10	9	10	10	8	10	8	10	9	10	10	8	10
50P100118	A43	10	10	8	9	10	10	10	10	10	7	9	10	6	10	10	10	7	6	10	6	10	10	10	7	6	10	6	10	10	10	7	5	10	6	10
50P100119	C 3	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	7	10	7	10	10	10	9	7	10	7	10	10	10	9	7	10	7	10
50P100120	C 4	10	10	8	10	10	10	10	10	10	8	9	10	9	10	10	8	8	7	10	8	10	10	8	8	7	10	8	10	10	8	8	7	10	8	10
50P100121	A44	10	10	9	9	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	9	10	10	10	10	6	10	9	10							
50P100122	J 4	3	10	8	10	10	8	10	3	10	8	10	10	10	10	3	10	8	10	10	9	10	4	10	8	10	10	7	10	2	10	8	10	10	7	10
50P100123	J 5	5	10	10	10	10	9	10	7	10	9	10	10	10	10	7	10	9	10	10	8	10	8	10	9	10	10	8	10	9	10	9	10	10	7	10
50P100124	A45	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	6	10	8	10	10	10	10	6	10	8	10	10	10	10	5	10	8	10
50P100125	C 5	10	10	9	10	10	10	10	10	10	9	10	10	10	10	10	10	9	7	10	8	10	10	8	9	7	10	8	10	10	8	9	7	10	8	10
50P100126	C 6	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10	10	10	8	7	10	8	10
50P100127	A46	10	10	9	10	10	9	10	10	10	7	9	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10	10	10	7	7	10	10	10
50P100128	J 6	10	10	8	10	10	10	10	1	10	8	10	10	10	10	2	10	8	10	10	9	10	2	10	8	10	10	8	10	2	10	8	10	10	8	0
50P100129	J 7	2	10	8	10	10	8	10	2	10	5	10	10	8	10	4	10	5	10	10	8	10	6	10	5	10	10	6	10	2	10	5	10	10	6	10
50P100130	A47	10	10	8	10	10	10	10	10	10	7	9	10	10	10	10	10	7	5	10	10	10	10	10	7	5	10	10	10	10	10	7	5	10	8	10
50P100131	C 7	10	10	9	10	10	10	10	10	10	7	9	10	10	10	10	10	8	7	10	9	10	10	10	8	7	10	9	10	10	10	8	6	10	9	10
50P100132	C 8	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	7	10	9	10	10	10	8	7	10	9	10	10	10	8	7	10	8	10
50P100133	A48	10	10	8	9	10	10	10	10	10	7	9	10	10	10	10	10	7	6	10	10	10	10	10	7	5	10	10	10	10	10	7	5	10	8	10
50P100134	J 8	5	10	9	10	10	10	10	5	10	9	10	10	10	10	7	10	9	10	10	9	10	7	10	9	10	10	8	10							
50P100135	J 9	3	10	10	10	10	9	10	3	10	8	10	10	10	10	3	10	8	10	10	9	10	5	10	8	10	10	10	8	7	10	8	10	10	8	10
50P100136	A49	10	10	9	10	10	10	10	10	10	9	9	10	10	10	10	10	9	7	10	10	10	10	10	9	7	10	8	10	6	10	9	7	10	7	10
50P100137	C 9	9	10	10	10	10	9	10	10	10	6	10	10	10	10	10	10	7	9	10	8	10	10	10	7	7	10	8	10	10	10	7	7	10	8	10
50P100138	C10	9	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	8	9	10	8	10	10	10	8	8	10	8	10	10	10	8	8	10	8	10
50P100139	A50	10	10	8	9	10	10	10	10	10	9	9	10	10	10	10	10	9	8	10	9	10	10	10	9	8	10	9	10	10	10	9	8	10	9	10
50P100140	J10	1	10	8	10	10	10	10	1	10	8	10	10	10	10	1	10	8	10	10	10	10	3	10	8	10	10	8	10	3	10	8	10	10	8	10
Surviving	J	10							10							10							10							9						
	A	10							10							10							10							9						
	C	10							10							10							10							9						

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario PennDOT 485 (D), Control (A), and Control (B)

Patch ID	Mat'l	#	Evaluation #1 Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Evaluation #2 Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Evaluation #3 Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Evaluation #4 Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Evaluation #5 Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
87P700001	D	1	10	10	8	7	10	10	10	10	10	8	7	10	10	10	10	10	8	6	10	10	10	99	99	99	99	99	99	99							
87P700002	A	1	10	10	6	8	8	10	10																												
87P700003	B	1	10	10	10	8	9	10	10																												
87P700004	B	2	10	10	10	9	10	7	10	10	10	10	6	10	7	10																					
87P700005	A	2	10	10	10	6	10	10	10																												
87P700006	D	2	10	10	10	7	10	8	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10	10	10	10	4	10	7	10							
87P700007	D	3																																			
87P700008	A	3																																			
87P700009	B	3	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	4	10	10	10							
87P700010	B	4	1	10	10	8	10	10	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10							
87P700011	A	4	10	10	10	7	10	10	10																												
87P700012	D	4																																			
87P700013	D	5																																			
87P700014	A	5																																			
87P700015	B	5																																			
87P700016	B	6	10	10	10	5	10	8	10																												
87P700017	A	6	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10	10	10	10	6	10	7	10							
87P700018	D	6	10	10	8	9	10	8	10	10	10	8	8	10	7	10	10	10	8	6	10	7	10	10	10	8	5	10	7	10							
87P700019	D	7	10	10	10	7	10	7	10																												
87P700020	A	7	10	10	8	10	10	7	10																												
87P700021	B	7	10	10	10	7	10	8	10	10	10	10	6	10	8	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10							
87P700022	B	8	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	7	10							
87P700023	A	8	10	10	10	7	10	8	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10	10	10	10	5	10	7	10							
87P700024	D	8																																			
87P700025	D	9																																			
87P700026	A	9																																			
87P700027	B	9																																			
87P700028	B	10																																			
87P700029	A	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	6	10	8	10	10	10	10	5	10	8	10							
87P700030	D	10	10	10	10	10	10	7	10	10	10	8	10	10	7	10																					
Surviving	D		5							4							3							2													
	A		7							3							3							3													
	B		7							5							4							4													

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario (continued) Local material (F), Control (A), and PennDOT 485 (M)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Matl #	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
87P700031	F 1	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	10	10	8	10	7	10	10	10	10	6	10	7	10							
87P700032	A11	10	10	10	8	10	7	10	10	10	10	8	10	7	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10							
87P700033	M 1	10	10	10	7	10	8	10	8	10	10	6	10	8	10	8	10	10	6	10	8	10	10	10	10	5	10	8	10							
87P700034	M 2																																			
87P700035	A12																																			
87P700036	F 2																																			
87P700037	F 3	10	10	10	8	10	10	10	8	10	10	7	10	8	10	8	10	10	7	10	8	10	8	10	10	7	10	8	10							
87P700038	A13	10	10	10	7	10	8	10	10	10	10	6	10	6	10	10	10	10	6	10	6	10	10	10	10	6	10	4	10							
87P700039	M 3	10	10	10	8	10	8	10	10	10	8	6	10	7	10																					
87P700040	M 4	10	10	8	7	10	7	10	10	10	8	6	10	7	10	10	10	8	6	10	7	10	10	10	8	5	10	7	10							
87P700041	A14	10	10	10	7	10	6	10	10	10	10	7	10	6	10	10	10	10	7	10	6	10	10	10	10	6	10	6	10							
87P700042	F 4	10	10	10	6	10	7	10	10	10	7	6	10	7	10																					
87P700043	F 5	10	10	10	8	10	8	10	10	10	8	7	10	6	10																					
87P700044	A15	10	10	10	6	10	8	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10	10	10	10	6	10	7	10							
87P700045	M 5	10	10	10	7	10	7	10																												
87P700046	M 6	10	10	10	10	10	8	10	10	10	8	9	10	8	10																					
87P700047	A16	10	10	10	9	10	8	10																												
87P700048	F 6	10	10	10	10	10	8	10	10	10	8	9	10	8	10	10	10	7	8	10	8	10	10	10	7	7	10	8	10							
87P700049	F 7	10	10	10	9	10	10	10	10	10	8	9	10	9	10	10	10	8	8	10	9	10	10	10	8	8	10	8	10							
87P700050	A17	10	10	10	10	10	9	10	10	10	8	8	10	8	10	10	10	8	8	10	7	10	10	10	8	6	10	7	10							
87P700051	M 7																																			
87P700052	M 8	10	10	10	8	10	7	10	10	10	10	8	10	7	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10							
87P700053	A18	10	10	10	10	10	8	10	10	10	10	8	10	6	10	10	10	10	7	10	6	10	10	10	10	6	10	6	10							
87P700054	F 8																																			
87P700055	F 9	10	10	10	10	10	10	10	10	10	7	8	10	10	10	10	10	7	8	10	8	10	10	10	6	8	10	8	10							
87P700056	A19	10	10	10	10	10	10	10	10	10	8	9	10	10	10	10	10	7	9	10	8	10	10	10	7	7	10	8	10							
87P700057	M 9	10	10	10	10	10	10	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10							
87P700058	M10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	7	10	10	10							
87P700059	A20	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	10	8	10	8	10	10	10	10	6	10	8	10							
87P700060	F10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10							
Surviving	F	8							8							6							6													
	A	9							8							8							8													
	M	8							8							5							5													

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario (continued)
QPR 2000 (I), Control (A), and QPR 2000 (K)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
Patch ID	Matl #	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove	Bleed	Crack	Disgh	Edge	Miss	Ravel	Shove
87P700061	I 1	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10	10	10	10	6	10	8	10							
87P700062	A21	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	5	10	8	10	10	10	10	5	10	7	10							
87P700063	K 1	10	10	10	8	10	6	10	10	10	10	5	10	6	10																					
87P700064	K 2	10	10	10	7	10	6	10																												
87P700065	A22	10	10	10	7	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10							
87P700066	I 2	10	10	10	9	10	8	10	10	10	10	7	10	8	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10							
87P700067	I 3																																			
87P700068	A23	10	10	10	8	10	10	10	10	10	10	8	10	8	10																					
87P700069	K 3	10	10	10	9	10	8	10																												
87P700070	K 4	10	10	10	8	10	8	10																												
87P700071	A24	10	10	10	6	10	8	10																												
87P700072	I 4	10	10	10	9	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	6	10	7	10							
87P700073	I 5	10	10	10	5	10	8	10	10	10	8	5	10	8	10	10	10	8	5	10	8	10	10	10	8	4	10	8	10							
87P700074	A25	10	10	10	8	10	7	10	10	10	7	8	10	7	10																					
87P700075	K 5	10	10	10	6	10	7	10	10	10	8	5	10	7	10																					
87P700076	K 6	10	10	10	6	10	10	10	10	10	10	6	10	8	10																					
87P700077	A26	10	10	10	7	10	9	10	10	10	9	7	10	8	10																					
87P700078	I 6	10	10	10	5	10	8	10																												
87P700079	I 7	10	10	10	7	10	7	10	10	10	7	6	10	7	10	10	10	6	6	10	7	10	10	10	6	6	10	7	10							
87P700080	A27	10	10	10	5	10	8	10	10	10	7	5	10	8	10																					
87P700081	K 7	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	10	10	7	10	7	10	10	10	10	7	10	7	10							
87P700082	K 8	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	10	10	7	10	7	10	10	10	10	7	10	6	10							
87P700083	A28	10	10	10	5	10	8	10	10	10	10	5	10	8	10																					
87P700084	I 8	10	10	10	8	10	10	10	10	10	10	6	10	8	10																					
87P700085	I 9																																			
87P700086	A29	10	10	10	10	10	6	10	10	10	10	8	10	6	10																					
87P700087	K 9	10	10	10	10	10	8	10	10	10	10	7	10	8	10																					
87P700088	K10																																			
87P700089	A30	10	10	10	10	10	6	10	10	10	10	8	10	6	10	10	10	10	7	10	6	10	10	10	10	7	10	6	10							
87P700090	I10	10	10	10	6	10	10	10	10	10	10	6	10	8	10																					
Surviving	I	8							7							5							5													
	A	10							9							3							3													
	K	9							6							2							2													

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario (continued)
Perma-Patch (H), Control (A), and UPM (semi-perm.) (C)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	CrackHigh	Ditch	Edge	Misc	Ravel	Shove	Bleed	CrackHigh	Ditch	Edge	Misc	Ravel	Shove	Bleed	CrackHigh	Ditch	Edge	Misc	Ravel	Shove	Bleed	CrackHigh	Ditch	Edge	Misc	Ravel	Shove	Bleed	CrackHigh	Ditch	Edge	Misc	Ravel	Shove
Patch ID	Matl #																																			
87P700091	H 1	10	10	10	10	10	10	10	10	10	7	8	10	10	10	10	10	7	7	10	10	10	10	10	7	6	10	10	10							
87P700092	A31	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10							
87P700093	C 1																																			
87P700094	C 2																																			
87P700095	A32	10	10	10	6	10	8	10	10	10	10	6	10	8	10	10	10	10	6	10	7	10	10	10	10	5	10	7	10							
87P700096	H 2	10	10	10	7	10	8	10	10	10	9	7	10	8	10																					
87P700097	H 3	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
87P700098	A33																																			
87P700099	C 3	10	10	10	8	10	9	10	10	10	10	8	10	9	10	10	10	10	8	10	8	10	10	10	10	6	10	8	10							
87P700100	C 4	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
87P700101	A34	10	10	10	6	10	10	10	10	10	9	6	10	8	10	10	10	9	6	10	6	10														
87P700102	H 4																																			
87P700103	H 5	10	10	10	8	10	10	10	10	10	9	7	10	10	10																					
87P700104	A35	10	10	10	7	10	8	10																												
87P700105	C 5	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	7	10	8	10														
87P700106	C 6	10	10	10	8	6	10	10																												
87P700107	A36	10	10	10	7	10	8	10	10	10	10	6	10	8	10																					
87P700108	H 6	10	10	10	10	10	9	10	10	10	10	9	10	9	10	10	10	10	8	10	9	10	10	10	10	6	10	9	10							
87P700109	H 7	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	7	10							
87P700110	A37	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10							
87P700111	C 7	10	10	10	7	10	10	10																												
87P700112	C 8																																			
87P700113	A38																																			
87P700114	H 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	8	10														
87P700115	H 9																																			
87P700116	A39	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10							
87P700117	C 9	10	10	10	9	10	8	10																												
87P700118	C10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	7	10							
87P700119	A40	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
87P700120	H10	10	10	10	10	10	10	10																												
Surviving	H	8							7							5							4													
	A	8							7							6							5													
	C	9							4							4							3													

Table D-9. Summary of performance data for Rt. 2, Prescott, Ontario (continued)
QPR 2000 (semi-perm.) (L), Control (A), and PennDOT 485 (semi-perm.) (N)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove	Bleed	Crack	Dish	Edge	Mist	Ravel	Shove
Patch ID	Mat'l #																																			
87P700121	L 1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
87P700122	A41	10	10	10	7	10	10	10	10	10	10	7	10	10	10																					
87P700123	N 1																																			
87P700124	N 2	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	6	10	10	10														
87P700125	A42	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10	10	10	8	10	8	10	10	10	10	6	10	8	10							
87P700126	L 2	10	10	10	8	10	10	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10														
87P700127	L 3	10	10	10	10	9	10	10	10	10	10	8	9	10	10	10	10	10	8	9	8	10	10	10	10	6	9	8	10							
87P700128	A43																																			
87P700129	N 3																																			
87P700130	N 4	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	6	10	7	10							
87P700131	A44	10	10	10	7	10	10	10	10	10	10	7	10	10	10																					
87P700132	L 4																																			
87P700133	L 5	10	10	10	8	10	10	10	10	10	10	8	10	10	10																					
87P700134	A45	10	10	10	10	10	10	10	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10							
87P700135	N 5																																			
87P700136	N 6	10	10	10	10	9	6	10																												
87P700137	A46	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	10	10	8	10	7	10														
87P700138	L 6	10	10	10	10	10	8	10	10	10	10	8	10	8	10	10	10	10	7	10	8	10	10	10	10	7	10	8	10							
87P700139	L 7	10	10	10	10	10	7	10	10	10	10	10	10	7	10	10	10	10	8	10	7	10	10	10	10	8	10	7	10							
87P700140	A47	10	10	10	9	10	10	10	10	10	10	8	10	8	10																					
87P700141	N 7	10	10	10	9	10	10	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10	10	10	10	8	10	8	10							
87P700142	N 8	10	10	10	10	10	7	10	10	10	9	10	10	7	10	10	10	9	8	10	7	10	10	10	9	6	10	7	10							
87P700143	A48																																			
87P700144	L 8	10	10	10	10	9	8	10																												
87P700145	L 9	10	10	10	10	10	8	10	10	10	10	10	10	8	10	10	10	10	9	10	8	10	10	10	10	9	10	6	10							
87P700146	A49	10	10	10	10	10	7	10	10	10	10	8	10	7	10	10	10	10	8	10	9	10	10	10	10	7	10	7	10							
87P700147	N 9	10	10	10	9	10	8	10	10	10	10	7	10	6	10																					
87P700148	N10	10	10	10	10	9	8	10																												
87P700149	A50	10	10	10	10	9	8	10																												
87P700150	L10	10	10	10	10	10	7	10	10	10	10	9	10	7	10	10	10	10	7	10	7	10	10	10	10	6	10	7	10							
Surviving	L	9							8							7							6													
	A	8							7							4							3													
	N	7							5							4							3													

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario (continued)
Spray injection (J) and Control (A)

		Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove	Bleed	Crack	Dish	Edge	Miss	Ravel	Shove
Patch ID	Mat'l #																																			
87P700151	J 1	10	10	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	9	10	7	10	4	10	10	9	10	7	10							
87P700152	A51	10	10	10	7	10	8	10																												
87P700153	J 2	10	10	10	10	10	4	10	10	10	5	10	10	4	10	2	10	5	10	10	4	10	2	10	3	10	10	4	10							
87P700154	A52	10	10	10	9	10	8	10																												
87P700155	J 3																																			
87P700156	A53	10	10	10	8	10	9	10																												
87P700157	J 4																																			
87P700158	A54	10	10	10	9	10	10	10	10	10	10	7	10	8	10																					
87P700159	J 5	10	10	10	10	10	5	10	10	10	5	10	10	5	10																					
87P700160	A55	10	10	10	10	10	10	10	10	10	10	7	10	10	10	10	10	10	7	10	8	10														
87P700161	J 6																																			
87P700162	A56	10	10	10	8	10	6	10																												
87P700163	J 7																																			
87P700164	A57	10	10	10	10	10	7	10																												
87P700165	J 8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	2	10	10	9	10	10	10	1	10	10	9	10	10	10							
87P700166	A58	10	10	10	8	10	7	10																												
87P700167	J 9	10	10	10	7	10	10	10	10	10	10	7	10	10	10	1	10	10	7	10	10	10	99	99	99	99	99	99	99							
87P700168	A59	10	10	10	10	8	8	10																												
87P700169	J10																																			
87P700170	A60	10	10	10	9	8	8	10																												
Surviving	J	5							5							4							3													
	A	10							2							1							0													

Table D-9. Summary of distress data for Rt. 2, Prescott, Ontario (continued)
HFMS-2 (G) and Control (A)

Patch ID	Mat'l #	Evaluation #1							Evaluation #2							Evaluation #3							Evaluation #4							Evaluation #5						
		Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove	Bleed	Crack	Disch	Edge	Mist	Ravel	Shove
87P700171	A61																																			
87P700172	G 1								10	10		9	7	10	10	10																				
87P700173	A62								10	10	10		8	10	10	10	10	10		7	10		8	10	10	10	10		7	10		8	10				
87P700174	G 2								10	10	10	10	10	10	10	10	10	10		8	10	10	10	10	10	10		7	10	10	10					
87P700175	A63								10	10	10		9	10	10	10																				
87P700176	G 3								10	10	10		9	10		8	10	10	10		8	10		8	10	10	10		6	10		8	10				
87P700177	A64																																			
87P700178	G 4																																			
87P700179	A65								10	10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10		8	10		8	10				
87P700180	G 5								10	10	10	10	10		8	10																				
87P700181	A66								10	10	10	10	10	10	10	10	10	10	10	10	8	10	10	10	10		8	10		8	10					
87P700182	G 6								10	10		9	9	10	10	10																				
87P700183	A67																																			
87P700184	G 7								10	10	10	10	10	10	10	10	10	10		7	10	10	10	10	10	10		6	10		7	10				
87P700185	A68								10	10		9	10	10	10	10	10		9		8	10		8	10	10		9		8	10		8	10		
87P700186	G 8								10	10	10		8	10	10	10																				
87P700187	A69																																			
87P700188	G 9								10	10	10		9	10	10	10																				
87P700189	A70								10	10	10	10	10	10	10	10	10	10		9	10		8	10	10	10		6	10		8	10				
87P700190	G10								10	10	10		8	10	10	10	10	10		7	10	10	10	10	10	10		6	10	10	10					
Surviving	A								6							5							5													
	G								9							4							4													

Appendix E

Sample Cost-Effectiveness Calculations

Calculating the cost-effectiveness of any repair operation requires information on the cost of materials, equipment, labor, traffic control, and user delay, as well as information on the quantity of repairs to be made and the productivity of the operation. Figure E-1 is a blank cost-effectiveness worksheet that can be used to record information regarding cost and productivity and to estimate cost-effectiveness.

See figures E-2 through E-6 for examples of how the data in table 21 were used to calculate cost-effectiveness.

Inputs

Material Cost	_____	$/ton	(A)
Initial Need	_____	tons	(B)
Repair Crew Wages	_____	$/day	(C)
Traffic Control Wages	_____	$/day	(D)
Repair Crew Equipment Cost	_____	$/day	(E)
Traffic Control Equipment Cost	_____	$/day	(F)
Productivity	_____	tons/day	(G)
User Delay Costs	_____	$/day	(H)
Estimated Average Repair Life	_____	months	(I)

Calculations

Initial Material Cost (A × B)	_____	$	(J)
Expected Days of Patching (B ÷ G)	_____	days	(K)
Total Labor Costs [K × (C + D)]	_____	$	(L)
Total Equipment Costs [K × (E + F)]	_____	$	(M)
Total User Delay Costs (K × H)	_____	$	(N)
Initial Repair Operation Cost (J + L + M)	_____	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	_____	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	_____	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	_____	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	_____	$/ft^3	(S)

Figure E-1. Cost-effectiveness worksheet for pothole repair operation

Inputs

Material Cost	20	$/ton	(A)
Initial Need	200	tons	(B)
Repair Crew Wages	300	$/day	(C)
Traffic Control Wages	250	$/day	(D)
Repair Crew Equipment Cost	50	$/day	(E)
Traffic Control Equipment Cost	30	$/day	(F)
Productivity	4	tons/day	(G)
User Delay Costs	1,000	$/day	(H)
Estimated Average Repair Life	3	months	(I)

Calculations

Initial Material Cost (A × B)	4,000	$	(J)
Expected Days of Patching (B ÷ G)	50	days	(K)
Total Labor Costs [K × (C + D)]	27,500	$	(L)
Total Equipment Costs [K × (E + F)]	4,000	$	(M)
Total User Delay Costs (K × H)	50,000	$	(N)
Initial Repair Operation Cost (J + L + M)	35,500	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	710,000	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	1,710,000	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	44.38	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	106.88	$/ft^3	(S)

Figure E-2. Cost-effectiveness worksheet for example 1

Inputs

Material Cost	85	$/ton	(A)
Initial Need	200	tons	(B)
Repair Crew Wages	300	$/day	(C)
Traffic Control Wages	250	$/day	(D)
Repair Crew Equipment Cost	50	$/day	(E)
Traffic Control Equipment Cost	30	$/day	(F)
Productivity	4	tons/day	(G)
User Delay Costs	1,000	$/day	(H)
Estimated Average Repair Life	21	months	(I)

Calculations

Initial Material Cost (A × B)	17,000	$	(J)
Expected Days of Patching (B ÷ G)	50	days	(K)
Total Labor Costs [K × (C + D)]	27,500	$	(L)
Total Equipment Costs [K × (E + F)]	4,000	$	(M)
Total User Delay Costs (K × H)	50,000	$	(N)
Initial Repair Operation Cost (J + L + M)	48,500	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	138,570	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	281,430	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	8.66	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	17.59	$/ft^3	(S)

Figure E-3. Cost-effectiveness worksheet for example 2

Inputs

Material Cost	20	$/ton	(A)
Initial Need	75	tons	(B)
Repair Crew Wages	600	$/day	(C)
Traffic Control Wages	250	$/day	(D)
Repair Crew Equipment Cost	100	$/day	(E)
Traffic Control Equipment Cost	30	$/day	(F)
Productivity	1.5	tons/day	(G)
User Delay Costs	1,000	$/day	(H)
Estimated Average Repair Life	12	months	(I)

Calculations

Initial Material Cost (A × B)	1,500	$	(J)
Expected Days of Patching (B ÷ G)	50	days	(K)
Total Labor Costs [K × (C + D)]	42,500	$	(L)
Total Equipment Costs [K × (E + F)]	6,500	$	(M)
Total User Delay Costs (K × H)	50,000	$	(N)
Initial Repair Operation Cost (J + L + M)	50,500	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	252,500	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	502,500	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	42.08	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	83.75	$/ft^3	(S)

Figure E-4. Cost-effectiveness worksheet for example 3

Inputs

Material Cost	-----	$/ton	(A)
Initial Need	200	tons	(B)
Repair Crew Wages	-----	$/day	(C)
Traffic Control Wages	250	$/day	(D)
Repair Crew Equipment Cost	900	$/day	(E)
Traffic Control Equipment Cost	30	$/day	(F)
Productivity	4	tons/day	(G)
User Delay Costs	1,000	$/day	(H)
Estimated Average Repair Life	21	months	(I)

Calculations

Initial Material Cost (A × B)	-----	$	(J)
Expected Days of Patching (B ÷ G)	50	days	(K)
Total Labor Costs [K × (C + D)]	12,500	$	(L)
Total Equipment Costs [K × (E + F)]	46,500	$	(M)
Total User Delay Costs (K × H)	50,000	$	(N)
Initial Repair Operation Cost (J + L + M)	59,000	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	168,570	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	311,430	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	10.54	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	19.46	$/ft^3	(S)

Figure E-5. Cost-effectiveness worksheet for example 4

Inputs

Material Cost	20	$/ton	(A)
Initial Need	200	tons	(B)
Repair Crew Wages	300	$/day	(C)
Traffic Control Wages	250	$/day	(D)
Repair Crew Equipment Cost	50	$/day	(E)
Traffic Control Equipment Cost	30	$/day	(F)
Productivity	4	tons/day	(G)
User Delay Costs	10,000	$/day	(H)
Estimated Average Repair Life	3	months	(I)

Calculations

Initial Material Cost (A × B)	4,000	$	(J)
Expected Days of Patching (B ÷ G)	50	days	(K)
Total Labor Costs [K × (C + D)]	27,500	$	(L)
Total Equipment Costs [K × (E + F)]	4,000	$	(M)
Total User Delay Costs (K × H)	500,000	$	(N)
Initial Repair Operation Cost (J + L + M)	35,500	$	(O)
Cost Over 5 years (no user costs) [O × (60 ÷ I)]	710,000	$	(P)
Cost Over 5 years (with user costs) [(N + O) × (60 ÷ I)]	10,710,000	$	(Q)
Cost-effectiveness (no user costs) {[P ÷ (B × 5)] ÷ 16}	44.38	$/ft^3	(R)
Cost-effectiveness (with user costs) {[Q ÷ (B × 5)] ÷ 16}	669.38	$/ft^3	(S)

Figure E-6. Cost-effectiveness worksheet for example 5

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