

**MoDOT**

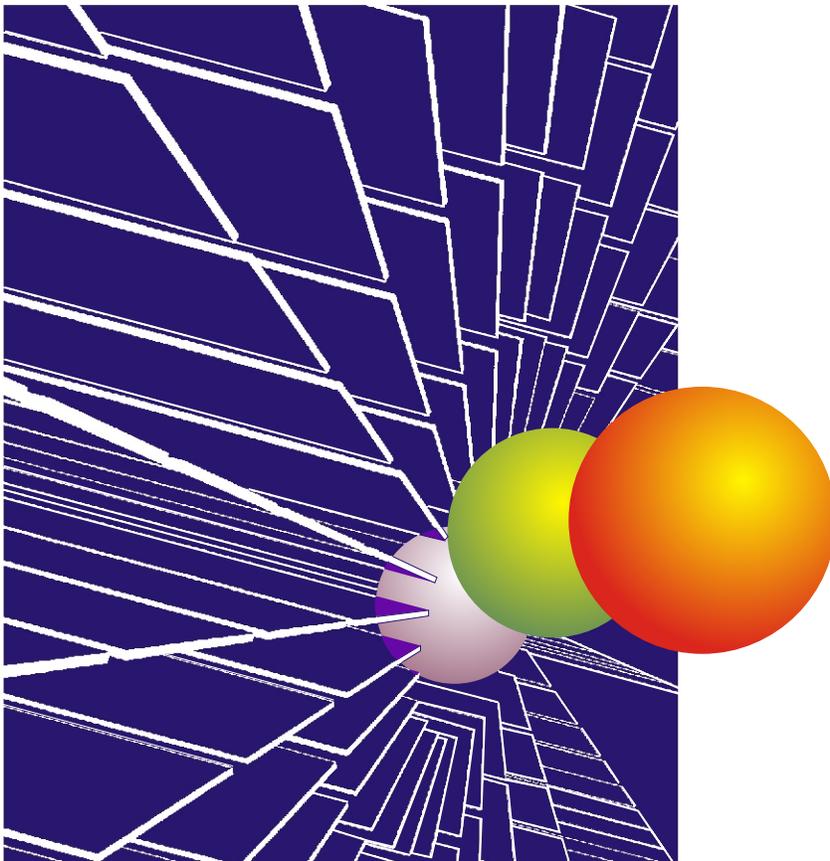
Research, Development and Technology

---

RDT 02-010

# **District 7 Report on Phase 1 and 2 on the Pavement Marking Management System Research Projects**

RI 98-29



November, 2002

RESEARCH INVESTIGATION

RI-98-029

REPORT ON PAVEMENT MARKING  
MANAGEMENT SYSTEM RESEARCH PROJECTS

PREPARED BY  
MISSOURI DEPARTMENT OF TRANSPORTATION  
DISTRICT 7

WRITTEN BY: DARYL WEINKEIN, P.E., OPERATIONS ENGINEER  
RANDY BRANHAM, TRAFFIC SUPERVISOR  
VICKIE GINDER, SR. TRAFFIC TECHNICIAN

JOPLIN, MISSOURI  
DATE SUBMITTED: SEPTEMBER 12, 2002

The opinions, findings, and conclusions expressed in this publication are those of the principal investigator and the Research, Development and Technology Division of the Missouri Department of Transportation.

They are not necessarily those of the Department of Transportation, Federal Highway Administration. This report does not constitute a standard specification or regulation.

**TECHNICAL REPORT DOCUMENTATION PAGE**

1. Report No. 02-010		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle  District 7 report on Phase 1 and 2 on the Pavement Marking Management System research projects				5. Report Date November, 2002	
				6. Performing Organization Code MoDOT	
7. Author(s) District 7 traffic personnel- Daryl Weinkein, Randy Branham, Vickie Ginder				8. Performing Organization Report No.	
9. Performing Organization Name and Address Missouri Department of Transportation Research, Development and Technology P. O. Box 270-Jefferson City, MO 65102				10. Work Unit No.	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address  Missouri Department of Transportation Research, Development and Technology P. O. Box 270-Jefferson City, MO 65102				13. Type of Report and Period Covered Final Report	
				14. Sponsoring Agency Code MoDOT	
15. Supplementary Notes					
16. Abstract  BC Engineering performed two research projects on pavement markings in District 7. BC Engineering's contracts were to evaluate the effectiveness of MoDOT's pavement marking operations and to develop a customized Pavement Marking Management System (PMMS).  This report summarizes BC Engineering's work from two projects and updates the work on other items used to improve the in-house pavement marking operations in District 7 from the viewpoint of District 7's traffic personnel.					
17. Key Words Waterborne pavement markings, management systems for pavement markings, retroreflectivity readings			18. Distribution Statement No restrictions. This document is available to the public through National Technical Information Center, Springfield, Virginia 22161		
19. Security Classification (of this report) Unclassified		20. Security Classification (of this page) Unclassified		21. No. of Pages 123	22. Price

Form DOT F 1700.7 (06/98)

---

## ACKNOWLEDGMENTS

---

District 7 of the Missouri Department of Transportation would like to thank the Research, Development and Technology Division of the Missouri Department of Transportation for allowing District 7 to participate in these research projects. During these projects, we have asked our striping train personnel to give special efforts. Their work and methods were critiqued and often criticized, but they very willingly participated and took the information shared with them to improve our operations.

District 7 would like to thank BC Traffic Engineering for their expertise in pavement markings and their assistance in helping to guide us through this learning process. They were asked numerous questions and often requested to do a little extra, but they were always willing to do what it took.

---

## EXECUTIVE SUMMARY

---

MoDOT needs to manage pavement markings not just inventory pavement markings. With the emphasis on scheduled preventive maintenance and expanding the contract level course program, the time is right to reap substantial benefits by improving out in-house pavement markings.

A decision must be made on what information is valuable and is needed to manage pavement markings (in-house and contract). The Pavement Marking Management System will provide large amounts of information if the information is collected and entered in the software.

MoDOT needs to change its emphasis from quantity to quality for in-house pavement markings

MoDOT needs a statewide champion to improve its in-house pavement markings.

The need for statewide technical assistance, training, verification of consistent processes and adequate quality control and quality assurance should be addressed. BC Engineering proved to be a valuable asset in assisting District 7 with these areas.

Some roads do not need to be restriped every year even with using waterborne paint if pavement markings are applied appropriately.

Application rates of 15 mils wet thickness of paint with 8 lbs of Type 1 beads per gallon of paint should be increased to 17 mils wet thickness of paint with 10 lbs of Type L beads (Visibeads) per gallon of paint. These research projects have demonstrated benefits from increased applications rates. With the 2001 striping season, District 7 started using 23 mil wet thickness of paint with 12 lbs. of Type L beads per gallon of paint. Additional research is needed on application rates to determine which rates are appropriate for optimum durability and retroreflectivity with consideration being given to the area of the state where the stripe is located.

New pavement surfaces should receive a heavier one-time application of material or be striped twice in a season. Application rates should be based on the porosity of the surface. Generally, a one-time application rate should be 20 mils wet thickness of paint with 10 lbs of Type L beads per gallon of paint.

MoDOT needs to do further testing to obtain accurate information on the best combination of beads and paint thickness to yield the best markings for retroreflectivity and durability

MoDOT should change from waterborne paint using 2<sup>nd</sup> generation resins to waterborne paint using 4<sup>th</sup> generation resins. MoDOT cannot continue to use the “cheapest” material and expect to keep up with other state DOT’s. We cannot expect our in-house crews to place high quality pavement marking when the material they are using is not high quality, such as this year when the yellow paint consistently failed to meet performance specification.

Retroreflectivity readings taken by a Laserlux retroreflectometer are needed on in-house markings of a sufficient size sample for quality assurance.

Funding needs to be set up for readings to be taken with a Laserlux mobile retroreflectometer. This resource should be made available to District 7, so the district can continue to work on investigating some of the items that were started but not completed in the research projects.

Retroreflectivity readings from Mirolux 30, LTL 2000 and the Laserlux do not directly correlate with each other and should not be compared to each other.

In-house pavement markings outperformed contractor applied markings in District 7. Efforts need to continue to improve contractor applied pavement markings.

The commitment needs to be made and a program implemented that ensures durable markings are maintained as durables and not just “forgotten” about and striped over with waterborne paint. A set system of roads needs to be selected to be maintained with durable markings (epoxy). Funding should be maintained at General Headquarters to routinely “cap” the durable markings and replace the markings as needed.

The existing financial management system does not provide a method to track and determine the actual cost per foot of in-house pavement markings. This information is critical in order to compare in-house to contractor applied pavement markings (including durables based on life cycle cost). A reasonable practical method must be found. The Pavement Marking Management System will perform this function after a period of information collection and some minor refinements.

## Table of Contents

ACKNOWLEDGMENTS .....	i
Executive Summary .....	ii
Introduction .....	1
Objective.....	2
Objective of Work of Phase 1 (RI98-029) Research Project .....	2
<i>Consultant</i> .....	2
<i>MoDOT</i> .....	2
Objective of Work of Phase 2 (RI98-029B) Research Project.....	2
<i>Consultant</i> .....	2
<i>MoDOT</i> .....	3
Discussion of Present Conditions .....	3
Quality Control.....	3
Quality Assurance.....	4
Retroreflectivity Reading of A Stripe .....	4
History of Striping Practices in District 7 .....	5
Technical Approach.....	5
Results and Discussion (Evaluation).....	5
Markings Meet Minimum Retroreflectivity .....	5
Type L (Large Beads) versus Type 1 (Small Beads).....	7
Heavier Applications Improve Retroreflectivity .....	9
Durability of Waterborne Stripe Placed Over Thermo Spray.....	11
Contractor Applied Markings.....	12
<i>Thermo Spray</i> .....	12

<i>Epoxy</i> .....	13
<i>Thermo Extruded</i> .....	13
<i>Waterborne</i> .....	13
District 7's Striping Program.....	13
Costs of Striping.....	14
Retroreflectivity Readings By Route.....	15
Damage Caused by Snowplow.....	16
Experience with Paint Using 4 <sup>th</sup> Generation Resins.....	18
Software from Phase 2.....	20
Life Expectancy Curves.....	21
Conclusions.....	22
What now.....	22
Recommendations.....	23
Recommendations from Phase 1.....	23
Other Recommendations.....	25
Appendixes.....	27
Appendix A – Statewide Implementation Plan.....	28
Appendix B – Quality Assurance Table On Subjective Ratings.....	30
Appendix C – Heavier Applications Improve Retroreflectivity on New Chip Seals.....	31
Appendix D - Contract Applied Markings.....	32
<i>Thermo spray</i> .....	32
<i>Epoxy</i> .....	34
<i>Thermo Extruded</i> .....	36
<i>Thermo Extruded McDonald County, US71, Asphaltic Hot Mix, Striped 2001</i> .....	38

Appendix E – I-44 Retroreflectivity Readings Before And After Contract Striping .....	39
Appendix F – Criteria For Not Striping Roads in 2000.....	40
Appendix G - Retroreflectivity Readings by Route .....	41
Appendix H – 30 mil Waterborne Paint.....	90
Appendix I- HD21 and DT400 Resins.....	93
Appendix J - Paint Tests in District Seven.....	103
Appendix K – Information Collection Data Sheet and PMMS Reports .....	105

---

## INTRODUCTION

---

These research projects were to review several problems with MoDOT's pavement markings. MoDOT's standard practice in maintaining waterborne pavement markings placed by in-house crews is to stripe them at least once annually. No consideration was given if certain pavement markings should not be striped annually along with what to do if some sections of roads would not hold a stripe through the winter. Contractors were placing pavement markings with waterborne paint and durables with questionable results in District 7. Also the Federal Highway Administration was working on setting minimum retroreflectivity guidelines for pavement markings. The need for a system to manage pavement markings was demonstrated.

MoDOT has made almost no advancements in improving in-house pavement markings with waterborne paint since changing to waterborne paint around 1990 except for a one-time increase in mil thickness and bead application. In 1994, based on a recommendation from District 7, paint thickness was increased from 9-11 mils to 14-16 mils and bead rates were increased from 6 to 8 lbs per gallon of paint. The primary consideration for MoDOT's in-house pavement markings has been "to get the program done" with the concentration on quantity first, quality second. MoDOT's striping personnel statewide are dedicated and trying to do a "good job" but need training on quality control and quality assurance. Over the years, testing on other types of paint and beads has been done but has resulted in no changes to our operations.

This report is to serve as a supplement to BC Engineering's final reports for the Pavement Marking Management System Research Projects Phase 1 and Phase 2. It is from the perspective of MoDOT's District 7 personnel. It will serve to document and explain in more detail the information collected and methods reviewed in the striping operations in District 7, along with some changes in practices in the use of waterborne paint. In many instances, the findings in this report are supported with limited information. Further tracking and information collection is needed to confirm these findings and trends. This report is not intended to be a complete and definitive statement on the information and methods contained in it, but is to serve as documentation of the trends and information collected in District 7's efforts to improve their in-house waterborne striping with the work of BC Engineering, Operations-Traffic, and the Research unit.

District 7 is comprised of 11 counties in southwest Missouri. The in-house striping operations, located at the district office in Joplin, consist of two striping trains, each with a centerline striper using bulk waterborne paint and Type L beads (normally Visibeads). District 7 has a very small quantity of durable markings. The majority of the durable pavement markings are placed by contract.

Over the past several years District 7 has developed several computer programs to inventory length of stripe, type, location of stripe, progress, and date of application. The next logical step after this inventory was a method to actually manage pavement markings.

In 1998, a research contract for this project was awarded to BC Engineering of Woodbury, Minnesota. "Pavement Marking Management System Phase 1" (RDT00-008) was the final report from this project. In 2000, a research contract for work on Phase 2 was also awarded to BC Engineering. Their final report is contained in a separate report. The projects used District 7 computer programs and merged them into a Pavement Marking Management System.

All retroreflectivity readings in this report are from a Laserlux mobile retroreflectometer, unless otherwise noted.

---

## OBJECTIVE

---

### OBJECTIVE OF WORK OF PHASE 1 (RI98-029) RESEARCH PROJECT

The purpose of this project was to design and develop a Pavement Marking Management System (PMMS). PMMS would address the issues of a quality assurance plan, quality control plan, system automation, provide assistance in development of life cycle curves, enable the prioritizing of restripe, and provide for the collection and maintenance of data.

#### CONSULTANT

The consultant was to develop a Pavement Marking Management System (PMMS). The system was to be developed in such a manner as to be a practical tool in the tracking of pavement markings, provide a method to develop knowledge on the expected life of particular materials and link to quality control (QC), with a possible link to quality assurance (QA). The consultant was to work with field crews to put in place best practices for QC and develop a QA program. The project was to develop a practical procedure for determining when pavement markings needed to be replaced. PMMS was to be automated. Included in the contract were retroreflectivity readings on 3000 miles of pavement markings to provide data. Data was actually collected on approximately 4500 miles.

#### MODOT

A list of roadways in Jasper County and adjacent counties, with the necessary data (such as roadway surface, existing marking material, and traffic count), was provided for use in the evaluation. This list of roads served as the basis of the information for the project.

### OBJECTIVE OF WORK OF PHASE 2 (RI98-029B) RESEARCH PROJECT

The purpose of this project was to use the findings and knowledge gained from Phase 1 to develop an implementation plan and methodology for the statewide implementation of the Pavement Marking Management System (PMMS). PMMS was to be implemented district wide in District 7 during calendar 2000. Also, this project was to introduce PMMS in Districts 1 (St. Joseph) and 4 (Kansas City) and test the findings of the pilot project in District 7. Appendix A shows the proposed work plan for statewide implementation prepared by Operations-Traffic.

#### CONSULTANT

The consultant was to provide input on the methodology of the sampling procedures for retroreflectivity readings, necessary refinements to PMMS software and a training session for striping personnel in District 1 (St. Joseph) and District 4 (Kansas City). The final report was to include an update on retroreflectivity readings, lessons learned, foreseeable changes necessary for statewide implementation and the feasibility of statewide implementation. Included in the contract were retroreflectivity readings on 5000 miles of pavement markings to provide data.

MODOT

Implementation of PMMS district wide in District 7 was to include the operations of District 7's two striping trains, tracking of a small amount of contract striping and monitoring of experimental material and methods. MoDOT personnel from Operations-Traffic, District 7, and Research was to begin work with the striping personnel in District 1 and 4 to increase their understanding of retroreflectivity, QC, QA, retroreflectivity readings, and PMMS. The project was to develop and test an implementation plan and methodology for statewide implementation. The information collected and processed will continue the building of databases for the development of life expectancy curves. MoDOT personnel involved in the projects were to prepare a final report.

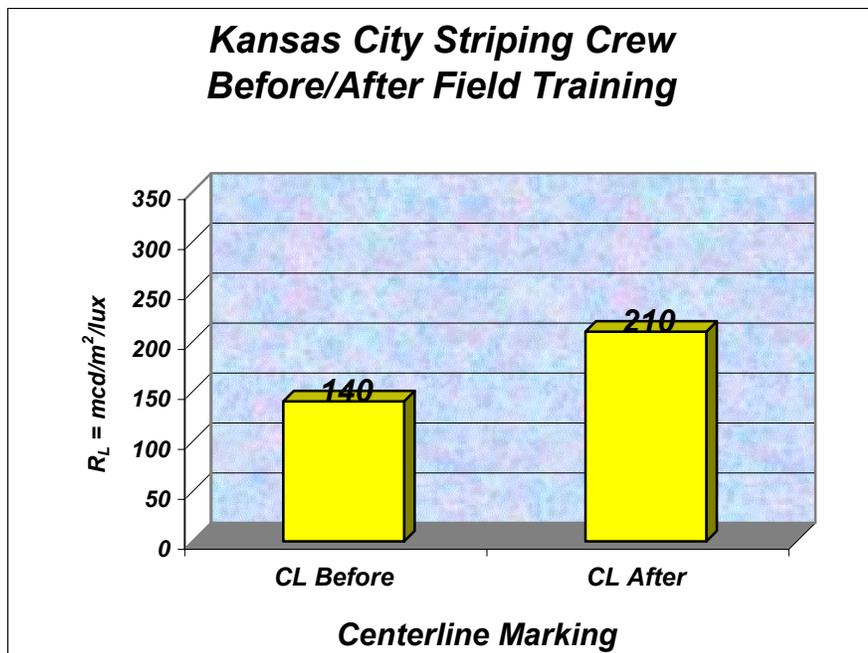
---

## DISCUSSION OF PRESENT CONDITIONS

---

### QUALITY CONTROL

District 7 uses the definition of quality control for pavement markings as the checks done prior to placement of a stripe to ensure its quality. Prior to Phase 1, District 7's quality control was at a level in placing stripe that retroreflectivity readings and visual inspections indicated the stripe had a high level of consistence, so a representative sample could be used. Even with the level of quality control by District 7's striping trains, BC Engineering worked with the crews to substantially improve the quality control. Rick Beck and Jim Carlson demonstrated a unique ability to "talk" to the field crews, evidenced especially in Districts 4 and 7 from working with crews. They have hands on experience with stripers; have worked with numerous state DOT's, and have the Laserlux unit available. They could skillfully discuss the issues involved with placing a good stripe and then use the Laserlux retroreflectivity readings to actually show the crews and supervisory personnel actual improvements. The following chart, developed by BC Engineering, shows the increase in retroreflectivity readings when BC Engineering worked with one of the striping trains in District 4 for a very brief time on calibration and bead gun adjustment.



At the beginning of Phase 2, the following QC measures were being used by both striping trains in District 7 to ensure proper placement of stripe: frequently calibrate beads and paint, monitor pump pressure, monitor application temperature of paint, and apply at the proper speed. All of these components are crucial to know, monitor and understand prior to the material being applied, in order to place a good consistent stripe.

#### **QUALITY ASSURANCE**

District 7 uses the definition of quality assurance for pavement marking as all the checks done after the placement of the stripe to check the quality of the stripe placed.

Prior to the research contracts, District 7 had done some work with personnel from Potters Industries and a demonstrator Laserlux retroreflectometer. While the experience and information collected proved helpful, it quickly clarified that MoDOT did not have the knowledge and was not ready to take the next step in improving in-house pavement markings on our own. The Laserlux unit provides vast amounts of information that is difficult to manage and understand. The Laserlux retroreflectivity readings are obviously more accurate and thorough than the Mirolux 30. (The Mirolux unit [handheld] measures an area 3.5 inches wide and 4 inches long at each set up. The Laserlux unit [mobile] can take 70,000 measurements per hour at highway speeds and can measure an area of 3.5 feet in width continuously. Handheld units require workers to be on the roadway to actually take the readings. Normally this must be done under traffic with the use of traffic control. No special traffic control is needed for the mobile units.) This brought District 7, with the support of Research and Operations-Traffic, to the point of looking for a research contract using a Laserlux unit for retroreflectivity readings.

Once the proper quality control is used and information collected during the placement of a stripe, the Laserlux is the most effective method to provide QA on the pavement markings. Included in Appendix B is the table for subjective measurements developed in Phase 1. These subjective rates range from 5 to 1. 5 is considered a good new stripe, with 1 being no stripe. BC Engineering did not develop a set criterion for each number but recommended that MoDOT do so.

District 7 also uses an LTL 2000 to take handheld retroreflectivity readings for quality assurance. The truck-mounted attenuator (TMA) operator in the striping train provides immediate QA for the striping by measuring the width of the line, measuring the length of the cycle, checking bead coverage and visually checking mil thickness of paint.

#### **RETROREFLECTIVITY READING OF A STRIPE**

A 30-meter geometry has been accepted as the standard for retroreflectivity readings. MoDOT now has experience taking readings with the Mirolux 12, Mirolux 30, LTL 2000 and Laserlux retroreflectometer. Each of MoDOT's 10 districts has a Mirolux 30 unit for use by construction to check retroreflectivity on contractor applied pavement markings. MoDOT's only LTL 2000 unit is in District 7's traffic. MoDOT does not own a Laserlux unit but has done readings during these research contracts. However, MoDOT has in place a contract for obtaining retroreflectivity readings by a Laserlux unit.

The Highway Innovative Technology Evaluation Center (HITEC) has done an evaluation of the different types of instruments to take retroreflectivity readings (CERF report #40525 March 2001). The report states, "No national calibrated standard for retroreflectivity currently exists in the United

States. This means that instruments cannot be calibrated to a known, accepted standard, and it is impossible to determine which instrument measures pavement markings most accurately.”

The readings from the various instruments (Mirolux 30, LTL 2000, Laserlux retroreflectometer) used by MODOT do not directly correlate with each other. Care must be used in comparing readings taken by the different instruments.

Based on District 7’s experience through these projects, a retroreflectivity reading above 250 for white and above 175 for yellow by a Laserlux retroreflectometer on new waterborne paint markings is a good stripe.

#### **HISTORY OF STRIPING PRACTICES IN DISTRICT 7**

District 7 started using waterborne paint in 1989 when one of District 7’s two centerline stripers was replaced with a waterborne striper. In 1996 the second striper was replaced, making District 7’s in-house operations totally waterborne.

In 1994, MoDOT increased the paint application rate from 9-11 mils to 14-16 mils. This change was based on a recommendation from District 7 in the annual striping meeting in the spring of 1993. At that meeting, concern was expressed about striping roads with no passing zones twice a year. District 7 did not see a need for a second stripe on roads with moderate traffic volumes. Approval also was given to use 20 mils on low volume roads. The concern was expressed that the increased thickness would require a longer drying time.

In 1993, Type L (Visibeads) were tested in Missouri. In 1994, District 7 was given approval to use just Visibeads. The application rate was to be 15 mils wet paint thickness of paint with 12 pounds of beads per gallon of paint. Speed of application was not to exceed 10 mph. A Mirolux 12 was purchased and provided to District 7 to properly evaluate the performance of the stripe with the Visibeads. District 7 has used Type L beads 100% since this time.

---

#### **TECHNICAL APPROACH**

---

The instrument used for retroreflectivity readings during the projects was a Laserlux mobile retroreflectometer. All readings used in the report are from this unit unless otherwise noted. The readings used are averages for a given section of road. An average reading for every 0.1 mile was collected for the development of life expectancy curves.

---

#### **RESULTS AND DISCUSSION (EVALUATION)**

---

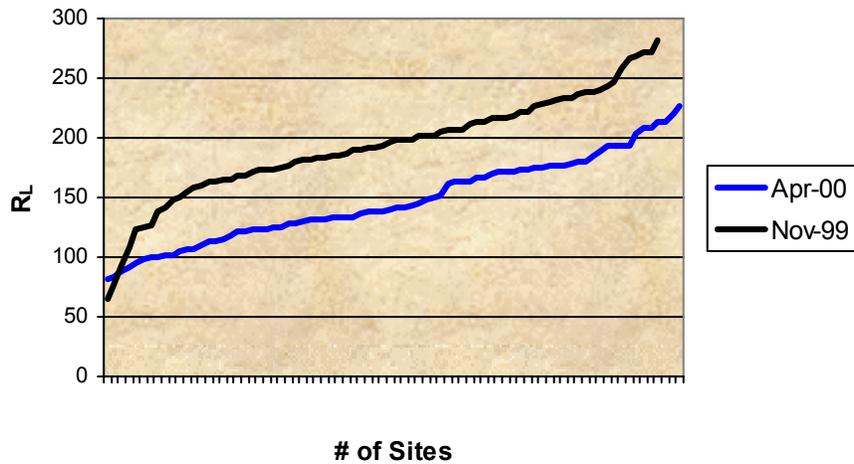
##### **MARKINGS MEET MINIMUM RETROREFLECTIVITY**

During Phase 1, BC Engineering compared District 7’s in-house pavement marking readings to a preset retroreflectivity level. The set levels were 80 mcd/m<sup>2</sup>/lux for yellow markings and 100 mcd/m<sup>2</sup>/lux for white.

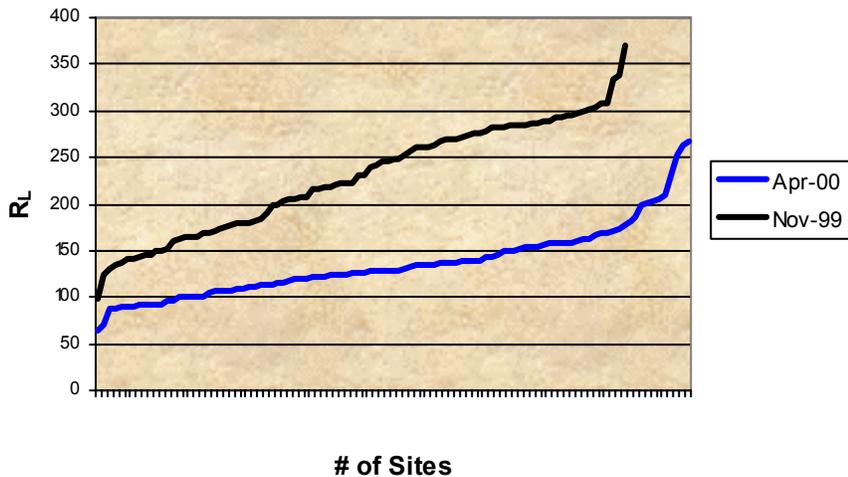
Striping at very few locations did not exceed the preset retroreflectivity levels. All May readings were on lines that were placed in 1998. In May, two (2) yellow readings (1 on paint and 1 on thermo spray) did not exceed 80 and six (6) white readings (4 on paint and 2 on thermo spray) did not exceed 100. It needs to be noted that the 1998 stripe was placed prior to BC Engineering working with District 7's crews on QC and QA.

The following two graphs show deterioration over the winter by comparing retroreflectivity readings from November 1999 to April 2000.

### Retained $R_L$ After Winter Yellow Markings



### Retained $R_L$ After Winter White Markings



These findings are discussed in more details in the Phase 1 report by BC Engineering.

Based on the May 1999 readings, District 7 started identifying sections of pavement district wide that did not hold a stripe through a winter. These locations were usually old concrete and oxidized

asphalt on higher volume roads in cities. District 7's initial trials with white contrast tape (3M-380) had been excellent, so District 7 now has an ongoing program to place contrast tape for the white markings instead of using paint in these locations. The contrast tape has proved to be effective since it visually provides a contrast between the white pavement markings and the light colored pavement. This procedure has drastically improved District 7's markings in these problem areas and the district received numerous positive public comments. The oldest contrast tape in District 7 was placed in 1999 and in the summer of 2002 is still providing excellent retroreflectivity. Prior to 2002, 7.84 centerline miles of skip using contrast tape and 1.01 centerline miles of skip using white tape (3M-380) had been placed.

Based on Phase 1 recommendations of the problem of built-up stripe and the chipping from snowplows on old concrete problem areas, District 7 has pursued removing old built-up yellow stripe prior to placing a new stripe. Also on these sections of old polished concrete, concrete pavement with high volumes of turning traffic and other concrete pavement, District 7 has done some testing with waterborne paint with 4<sup>th</sup> generation resins (HD-21 and DT-400) trying to improve the durability of the stripe. See the section later in this report regarding that topic for more details.

**TYPE L (LARGE BEADS) VERSUS TYPE 1 (SMALL BEADS)**

District 7 was looking for information to verify the district's experience that the large beads (Type L) are worth the increased cost compared to small beads (Type 1). Visibeads are Type L beads provided by Potters Industries and Megalux are Type L beads provided by Swarco. District 7 has used Visibeads since 1994 except for 2001 when Megalux were used. Some work was performed on this task during Phase 1. The chart below compares 2001 bead costs.

<b>Type Bead</b>	<b>Cost per pound</b>
<b>L</b>	<b>\$.498</b>
<b>1</b>	<b>\$.187</b>

BC Engineering prepared two reports for Potters Industries "Missouri – Visibeads Evaluation" (May 1999) and "North Carolina Visibeads Survey (November 30, 1998).

In the Missouri study, only yellow markings were analyzed. After one winter season, 54% of the markings with Visibeads were performing above 200, compared to 12% with standard beads. 12% of the Visibeads markings fell below 120 as compared with 22 % of markings with standard beads. The results of the Missouri Study mirrored the North Carolina study.

District 7 selected several test sections to monitor the difference in Visibeads compared with small beads.

Legend for Line Type: CL = center line (yellow)  
REL = right edge line (white)  
LL = lane line (white)  
LEL = left edge line (yellow)

**Newton County, Route 60, Asphaltic Hot Mix, Waterborne Paint, Striped 5/05/99**

Beg Log Point	End Log Point	Direction	Line Type	Type Bead	Date Read	Avg Mcd
0	.40	W	CL (yellow)	L	7-18-1999	246
.60	1.00	W	CL (yellow)	1	7-18-1999	208

**Newton County, Route 86, Asphaltic Hot Mix, Waterborne Paint, Striped 5/05/99**

Beg Log Point	End Log Point	Direction	Line Type	Type Bead	Date Read	Avg Mcd
0	3.80	E	REL (white)	L	7-17-1999	243*
0	3.80	W	REL (white)	1	7-17-1999	235
0	3.90	W	CL (yellow)	L	7-18-1999	265
3.90	7.30	W	CL (yellow)	1	7-18-1999	232
3.90	7.30	W	REL (white)	L	7-17-1999	203*
3.90	7.30	E	REL (white)	1	7-17-1999	270

\*When retroreflectivity readings were taken with a handheld unit, these two lines read 100 mcd brighter in the opposing direction. The Type 1 bead reading did not change with direction. The conclusion must be that the Type L beads were improperly placed, probably due to the striping speed being too fast.

The benefit from Type L (large beads) is that they provide wet nighttime retroreflectivity. Observations by District 7 personnel over the years verified large beads provide a substantial improvement in retroreflectivity under those conditions when compared to adjoining districts and states. We have received positive public comments on the use of large beads.

An additional benefit with using large beads has been the reduction in “paint on vehicle” complaints. When District 7 started using large beads, this type of claim dropped drastically. Striping personnel from District 6 (St. Louis) had the same observations in their process of changing from small beads to large beads and back to small beads. MoDOT does not maintain records on this type of claim/complaint that can be directly related to the public complaints regarding vehicles driving through the wet stripe and throwing paint onto their vehicle. This finding is based on District 7 striping personnel observations and confirmed by observations of District 6 striping personnel.

In 2002, Texas and Kansas started using large beads totally for in-house pavement markings. Other state DOT’s using durables with large beads are Kansas, New York, New Jersey, Connecticut, Rhode Island, Pennsylvania, Utah, Nevada, Illinois, Nebraska, Oregon. State DOT’s using waterborne with large beads are: Kansas, Maryland, Ohio Turnpike, Texas, and limited use in New York, Pennsylvania, Nevada.

The application rate of 12 lbs of large beads per gallon of paint was a manufacturer’s recommendation. District 7 did testing in 1996-1997 on the appropriate application rate of large

beads. Test stripes with 8 lbs., 10 lbs., and 12 lbs. were placed with 15 mils of paint. The 10 lbs. per gallon of paint provided good wet nighttime retroreflectivity.

MoDOT needs to do further testing to obtain accurate information on the best combination of beads and paint thickness to yield the best markings for retroreflectivity and durability.

**HEAVIER APPLICATIONS IMPROVE RETROREFLECTIVITY**

One of the recommendations from the Phase 1 final report by BC Engineering was that some roadways should have received a heavier application of paint. Generally, BC Engineering was looking at stripe placed over surface treatments that were porous (chip seals) and rough texture (cold mix). Nighttime observations by District 7's personnel confirmed that a good stripe had been applied, but due to the texture of the road, retroreflectivity was not high. With these types of surface treatments, readings on a road with a second stripe versus one stripe were higher. An observation by District 7 personnel confirmed that this also applies to hot mix overlays. Some examples of retroreflectivity readings on a first stripe on a new chip seal and on a thin hot mix overlay are included in Appendix C.

In the past, it was MoDOT's standard practice to increase the application rate for first stripe on a new asphalt surface. The 1994 manual still included this practice but it was eliminated in later versions of the striping manual. Personnel from some districts have indicated problems in placing a stripe with a higher application rate. District 7's striping operations have applied heavier applications with no problems.

In the process of researching information for this recommendation, it was confirmed that generally a heavier application improves retroreflectivity.

18 gals/mile (15 mil) with 10 lbs/gallon of Visibeads	white	243	yellow	207
20 gals/mile (17 mil) with 12 lbs/gallon of Visibeads	white	350	yellow	260

Generally application rates can be increased with minimal increase in equipment costs and labor. The increased cost to use a different material or increase application rates is predominantly due to increased material costs. The following chart shows 2001 material costs per foot for yellow markings for different application rates and materials.

Mil	Gal	Lbs of beads per gal of paint	Bead Type	Materials Cost per foot
15	18	8	1	0.019
15	18	10	1	0.021
15	18	10	L	0.031
17	20	10	L	0.035
20	22	10	L	0.038
20	22	12	L	0.041
23	25	12	L	0.045
23*	25	12	L	0.056
Labor and equipment = \$0.020 per foot				

\* 4<sup>th</sup> generation paint

Would it not be more cost effective and a better service to the public if improvements in retroreflectivity and durability were realized with an increase in application rates or a change in materials? How has MoDOT application rates and material being used been determined? Generally, it has been based on initial cost or cost to stripe a district program every year. Prior to the research projects, the retained retroreflectivity and pavement marking's durability through the winter has never been qualitatively addressed. Application rates have come from vendor recommendations, based on their experience. MoDOT needs to do more objective testing to determine the proper application rates for use. The last change in application rates was made in 1994, based on District 7's recommendation to use 14-16 mils of paint with 8 lbs./gallon of Type 1 beads.

With the work involved in the research projects, District 7 has increased wet mil thickness of paint and the bead application rate. At the beginning of the 2001 striping season, the district started routinely using 23 mils with 12 lbs of large beads per gallon of paint. The following chart includes all the readings taken on pavement markings with the heavier application rate.

County	Route	Beg Log Point	End Log Point	Direction	Line Type	Striped	Avg Mcd 5/2001	Avg Mcd 9/2001	Avg Mcd 5/2002
Barton	126	17.50	23.50	E	CL	9-27-2001			223
Barton	126	17.50	23.50	W	CL	9-27-2001			260
Jasper	171	0.00	12.05	N	REL	4-26-2001	293	256	192
Jasper	171	0.00	12.05	S	REL	4-26-2001	290	149	215
Jasper	171	0.00	12.05	N	CL	4-26-2001	167	127	165
Jasper	I-44	13.00	18.00	W	REL	11-13-2001			225
Jasper	I-44	13.00	18.00	W	LEL	10-13-2001			134
Jasper	66	0.00	3.19	E	REL	4-25-2001	262	280	226
Jasper	66	0.00	3.19	E	LEL	4-25-2001	164		170
Jasper	66	0.00	3.19	W	REL	4-25-2001	304	321	238
Jasper	66	0.00	3.19	W	LEL	4-25-2001	172		152
Jasper	66	0.00	3.19	E	LL	4-25-2001	258	142	206
Jasper	66	0.00	3.19	W	LL	4-25-2001	253	159	200
Jasper	AA	0.00	5.95	N	CL	4-25-2001	132	153	211
Jasper	P	6.12	6.60	W	CL	4-25-2001	172	168	138
Jasper	P	6.12	6.60	E	REL	9-13-2001		245	165
Jasper	P	6.12	6.60	W	REL	9-13-2001		270	175
Lawrence	I-44	38.00	43.00	E	REL	11-5-2001			206
Lawrence	I-44	38.00	43.00	W	LEL	11-7-2001			195
McDonald	43	0.00	5.00	N	REL	5-2-2001		281	116
McDonald	43	0.00	5.00	S	CL	5-2-2001		160	193
Newton	43	7.08	12.08	S	CL	5-10-2001		154	250
Newton	43	7.08	12.08	S	REL	6-13-2001		243	249

County	Route	Beg Log Point	End Log Point	Direction	Line Type	Striped	Avg Mcd 5/2001	Avg Mcd 9/2001	Avg Mcd 5/2002
Newton	60	6.39	11.39	W	CL	6-13-2001		139	233
Newton	60	6.39	11.39	E	REL	6-13-2001		260	222

Several of the May 2001 readings taken on a new stripe are substantially lower than expected. These pavement markings were placed on April 25<sup>th</sup> and 26<sup>th</sup> just a few days before the initial reading on May 8, 2001. The markings were placed at the very beginning of the striping season during cooler temperatures with crews just getting started for the season.

During 2001, Swarco supplied Type L (Megalux) beads. Potters Industries supplied the Type L (Visibeads) beads all the other years. Field observations by District 7's personnel do not support that these low readings are typical of the heavier applications.

Due to the timing and work on life expectancy curves of the research projects, additional follow-up work on benefits due to the increased application rates were not performed.

#### **DURABILITY OF WATERBORNE STRIPE PLACED OVER THERMO SPRAY**

During Phase 1 and 2, several test sections included thermo spray markings that had low retroreflectivity readings and were striped over by in-house crews with waterborne paint. The retroreflectivity readings contain some inconsistencies within the set of readings for some markings. The first readings on the yellow markings were good but frequently show a rapid deterioration. The white markings first reading was low but generally did not show as much deterioration as the yellow markings.

#### **Jasper County, Route I-44, Asphaltic Hot Mix, Waterborne over thermo, striped 2000**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
17.30	21.90	E	LEL (yellow)	11-10-2000	155
17.30	21.85	E	LEL (yellow)	5-8-2001	87
17.30	21.85	E	LEL (yellow)	9-28-2001	140
17.30	21.90	E	LL (white)	11-10-2000	168
17.30	21.85	E	LL (white)	5-8-2001	188
17.30	21.85	E	LL (white)	9-27-2001	193
17.30	21.90	W	LEL (yellow)	11-10-2000	187
17.30	21.85	W	LEL (yellow)	5-8-2001	123
17.30	21.85	W	LEL (yellow)	9-28-2001	162
17.30	21.90	W	LL (white)	11-10-2000	212
17.30	21.85	W	LL (white)	5-8-2001	237
17.30	21.85	W	LL (white)	9-27-2001	219

**Lawrence County, MO 39, Hot Mix, Waterborne over thermo, striped 2000**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
25.50	27.40	N	REL (white)	11-10-2000	201
25.54	27.42	N	REL (white)	5-6-2001	102
25.50	27.40	N	CL (yellow)	11-10-2000	203
25.54	27.42	N	CL (yellow)	5-6-2001	77
25.60	27.40	S	CL (yellow)	11-10-2000	217
25.54	27.42	S	CL (yellow)	5-6-2001	70
25.90	27.40	S	REL (white)	11-10-2000	175
25.54	27.42	S	REL (white)	5-6-2001	91

**Lawrence County, Route I-44, Hot Mix, Waterborne over thermo, striped 2000**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
0	.51	W	LEL (yellow)	11-10-2000	196
0	.51	W	LEL (yellow)	6-24-2001	115
0	.51	W	LEL (yellow)	9-28-2001	187
0	.50	W	LL (white)	11-10-2000	197
0	.51	W	LL (white)	5-6-2001	158
0	.51	W	LL (white)	9-27-2001	200
0	.50	W	REL (white)	11-10-2000	198
0	.51	W	REL (white)	5-6-2001	157
0	.51	W	REL (white)	9-27-2001	182

Based on the readings and observations, the concern is that the waterborne paint does not properly adhere to the thermo spray, which would increase the snowplow damage.

**CONTRACTOR APPLIED MARKINGS**

Appendix D contains retroreflectivity readings for various durable pavement markings applied by contract. Some of the set of readings contain some readings that appear inconsistent with the other readings. At this time we do not have an explanation for these inconsistencies.

**THERMO SPRAY**

The yellow markings performed poorly. The initial readings were taken following the first winter after the markings were placed. The readings were already low at that time.

## EPOXY

The readings on the yellow markings had numerous inconsistencies in the readings (did not show a constant rate of deterioration in the retroreflectivity readings). Generally the yellow initial readings were low. The white markings show substantial deterioration during the first winter.

## THERMO EXTRUDED

The retroreflectivity readings were generally not good for the yellow markings and were worse than the white markings.

## WATERBORNE

A contract was let in early 2002 for waterborne paint to be applied to I-44 from outside of District 6 (St. Louis) to the Oklahoma State Line. This work was performed in late June and early July. The contract called for 15 wet mil thickness with 8 lbs of Type 1 beads per gallon.

The lane line and the left edge line were placed. Wet nighttime observations by District 7 indicated that the contract-applied stripe with Type 1 beads had no wet nighttime retroreflectivity. This is quite obvious when compared to the old right edge line stripe with Type L beads. Also, MoDOT personnel have expressed concern regarding the stripe's lack of thickness and poor bead distribution across the line. During BC Engineering's May 2002 readings, several readings were taken on the old stripe (2001) prior to the contractor placing the waterborne line. BC Engineering also performed retroreflectivity readings on the contract stripe at the same locations. Both sets of readings are included in Appendix E.

MoDOT's construction inspection process has not used retroreflectivity readings until the last few years. At this time a MiroLux 30 is used to take readings. This process is burdensome and has been ineffective in improving contract-applied pavement markings. Usually pavement markings are viewed as "need to get it done so we can open the road." BC Engineering does extensive work in other states with the Laserlux mobile retroreflectometer providing quality assurance on contractor applied pavement markings. MoDOT is in the process of implementing an inspection process with the Laserlux unit.

### DISTRICT 7'S STRIPING PROGRAM

The following was District 7's striping program for 2001:

District 7 Striping in 2001 (length of stripe in miles)		
Program		9,765
Second stripe (not needed)	2,251*	
Durables	293*	
Not Striped (PMMS)	895*	
Total not striped		<u>3,439</u>
	2001 Revised Program	6,326

*\*2251 miles of stripe are roads with edge line that should be considered for a second stripe  
293 miles of durable pavement markings  
895 miles of stripe not restriped due to PMMS*

The program includes all pavement markings by actual length of stripe in miles. District 7's program includes a second stripe on all roads receiving an edge line. Routinely, District 7 only second stripes all waterborne lines inside of cities. At the beginning of the season roads inside city limits are striped because of their poor condition and then restriped prior to winter (District 7 has investigated and found some other options to the process).

MoDOT has no set criteria when a second and third stripe should be used. It is "as needed", based on the district's experience. MoDOT's current "Marking and Procedures Manual" provides a review process for not striping roads, based on retroreflectivity. The measure of retroreflectivity used is determined visually at night. The manual states, "The inspection should be performed on a section of roadway with a constant grade, no overhead lighting, sitting in the travel lane and measuring the length of markings with the high beams of the vehicle on. A line is considered satisfactory if it is visible for a minimum of two hundred (200) feet or five (5) lane line skips ahead of the vehicle."

Attached in Appendix F are the criteria that District 7 developed in Phase I for pavement markings that should not be restriped in 2000. A total of 450 miles of pavement markings were not restriped. In 2001, the criteria of a good daytime presence of the line and good nighttime retroreflectivity of a minimum of 8 skips were used. Note that the 895 miles not striped in the above chart had at least 8 skips visible.

Approximately 10 years ago District 7 started to concentrate on quality before quantity. Since that time we have been able to eliminate almost entirely the second stripe on roads with an edge line outside cities and generally improved the quality of the stripe through the winter.

#### COSTS OF STRIPING

In order to be able to select the most beneficial application rate of paint and beads the cost of the material must be known. The following is the cost per foot of yellow stripe in 2001 for several applications rates. Our best determination of equipment and labor is 0.020 cents per foot. The different application rates will not significantly change this cost.

## Striping Costs Per Foot (2001 for yellow)

Labor and equipment = 0.020

Mil	Gal	lbs of beads per gal of paint	Bead Type	Cost per Foot	
15	18	8	small	0.019	
15	18	10	small	0.021	
15	18	10	large	0.031	
17	20	10	large	0.035	
20	22	10	large	0.038	
20	22	12	large	0.041	
23	25	12	large	0.045	
*	23	25	12	large	0.056

\* 4<sup>th</sup> generation paint

The following chart shows the total cost of striping District 7's program under several different scenarios. Based on past experience, District 7 should be able to reduce their program to 5500 line miles, with MoDOT's future emphasis on preventative maintenance.

<b>Cost of District 7 Program</b>						
Miles	Paint Thickness in mils (gals)	Lbs of bead per gal of paint	Bead Type	Material Costs	Equipment & Labor Cost	Total Costs
9765	15 (18)	8	Type 1	0.980 million	1.031 million	2.011 million
6326	20 (22)	12	Type L	1.369 million	0.668 million	2.037 million
6326	23 (25)	12	Type L	1.503 million	0.668 million	2.171 million
Reduce program to:						
5500	23 (25)	12	Type L	1.307 million	0.580 million	1.887 million
* 5500	23 (25)	12	Type L	1.626 million	0.580 million	2.206 million
*possible reduced program with 4 <sup>th</sup> generation paint						

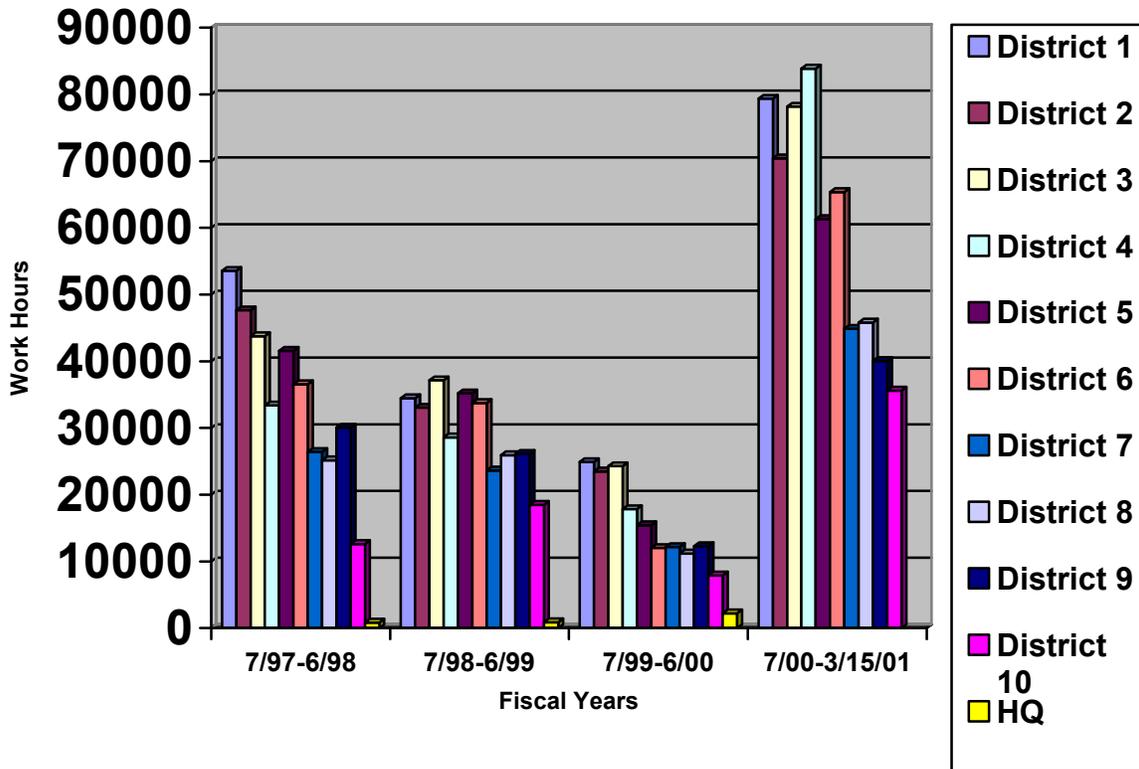
#### **RETROREFLECTIVITY READINGS BY ROUTE**

Appendix G includes the retroreflectivity readings during Phase 1 and 2 by route, in order to summarize the deterioration. We've only included those that had at least three readings or more on a stripe.

### DAMAGE CAUSED BY SNOWPLOW

It is generally accepted that the most damage caused to pavement markings, once the stripe is placed properly and with proper bond to the road surface, is caused by snowplow activity. During Phase 1, a method to measure snowplow activity was researched. No easy, simple method to track this activity was found. The most promising solution found was to use employee hours charged to snow removal as an indicator. The following chart includes one method of displaying this information.

**Statewide Work Hours, Snow Removal, Function 511**



If the initial work started during these projects is successful in developing life expectancy curves, some method of determining snowplow damage will be critical to apply to the life expectancy curves.

Another issue that will need to be addressed in snowplow damage is how much chipping is acceptable. This issue was discussed but not resolved. Generally a range of 20% to 40 % of sporadic chipping as a maximum was being considered. The pavement marking would have excellent nighttime retroreflectivity, but a daytime appearance of less than a “new” marking. This issue also applies to durables.

The following pictures were taken of built-up paint that came from MO FF from US71 Bus to Duquesne Road, Jasper County.



Paint with 4<sup>th</sup> generation resin was placed on the existing built-up waterborne stripe. A new stripe is only as good as the underlying stripe. Dry mil thickness of this piece is approximately 250 mils (probably 10+ stripes). Based on nighttime field observations, the yellow pavement markings on this section of road (concrete) had excellent retroreflectivity but with 30% – 40 % chipping. The line was performing excellent on delineation but appearance was less than desirable. The September 2001 and May 2002 retroreflectivity readings did not confirm the field observations of excellent retroreflectivity.

Line Location	Avg Mcd 9/27/01	Avg Mcd 11/11/01	Avg Mcd 5/21/02
WB CL	92	164	90
EB CL	81	163	96

#### EXPERIENCE WITH PAINT USING 4<sup>TH</sup> GENERATION RESINS

Included in numerous new products, District 7 tested waterborne paint with 4<sup>th</sup> generation resin (Rohm and Haas's HD-21 and Dow's DT-400). MoDOT is currently purchasing paint with 2<sup>nd</sup> generation resins (Rohm and Haas E-2706 and Dow DT-211). Some testing of paint was conducted with 3<sup>rd</sup> generation resins in District 1 (St. Joseph). The results were poor.

A test section with paint using Rohm and Haas 4<sup>th</sup> generation resin HD-21 was placed on US 71, Newton County, from Rte FF (Jasper County Line) to Rte 175. Rohm and Haas supplied the paint. It was applied at 30 mils and 12 lbs of Visibeads per gallon of paint. US 71 is new concrete pavement that had been striped once with waterborne paint. Appendix H includes more details on the application. The following is a chart of retroreflectivity readings and subjective readings on these pavement markings.

#### US 71, Newton County, Concrete, Striped 1998

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd	Subjective Reading
0	6.00	S	REL (white)	5-3-1999	217	3
0	6.00	S	REL (white)	4-1-2000	154	2
0	2.90	S	REL ((white)	11-11-2000	217	4
0	2.87	S	REL (white)	5-5-2001	132	3
0	2.87	S	REL (white)	9-27-2001	150	3
0	6.00	N	REL (white)	5-3-1999	242	4
0	6.00	N	REL (white)	4-1-2000	204	3
0	6.00	N	REL (white)	11-11-2000	160	4
0	6.00	N	REL (white)	5-5-2001	148	3
0	6.00	N	REL (white)	9-27-2001	151	3

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd	Subjective Reading
0	6.00	S	LL (white)	5-3-1999	239	5
0	6.00	S	LL (white)	4-1-2000	230	3
0	6.00	S	LL (white)	11-11-2000	201	3
0	6.00	S	LL (white)	5-5-2001	193	3
0	6.00	S	LL (white)	9-27-2001	170	3
0	6.00	N	LL (white)	4-1-2000	149	3



This material performed well for three winters.



Based on this experience, the test of waterborne paint with the 4<sup>th</sup> generation resin was expanded. Rohm and Haas provided paint using their HD-21 resin and Dow provided paint using their DT-400 resin. These waterborne paints were applied to a variety of roads in October 2000. Appendix I provides more details regarding the application and reflectivity readings and Appendix J provides a follow-up report. Problems experienced in the application of the 30 mil on US 71 were not experienced in the application of these test sections.

This material performed excellent on new asphalt surfaces with mixed results on other surfaces.

An attempt was made to further expand testing of this paint in the late summer of 2001. Waterborne paint with the 4<sup>th</sup> generation resin was bid and awarded with the intention of District 7 completing their striping program with the paint with 4<sup>th</sup> generation resin. Problems with procurement of paint including this material was experienced and resulted in District 7 never applying material that complied with specifications. Retroreflectivity readings on this material are not included in this report. Another attempt was made to procure District 7 waterborne striping paint with 4<sup>th</sup> generation resins during the annual bidding of paint during the winter months. This attempt was unsuccessful. Additional testing of paint with 4<sup>th</sup> generation has stopped at this time.

Another problem that will be experienced if paint with 4<sup>th</sup> generation resin is used to stripe over an existing stripe is failure of the old stripe. A new stripe is only as good as the stripe it is placed over. We observed chipping as a result of the original stripe coming loose from the road surface, especially on concrete pavement.

#### **SOFTWARE FROM PHASE 2**

A part of Phase 1 was to develop a management system to manage striping and not just to inventory pavement markings. For several years, District 7 used computer programs to track length, type, location, striping progress and date of application of pavement markings. These computer programs provided an inventory of striping. This was needed after the districts were “empowered” and General Headquarters stopped tracking pavement markings several years ago.

The first research project merged District 7’s computer programs with a management system to give MoDOT more than a pavement marking inventory. The software will build the inventory during the process of tracking pavement marking applications, along with managing retroreflectivity readings, tracking costs, progress, and providing the possibility of developing life expectancy curves.

The software was to be developed during Phase 1 and refined during Phase 2. BC Engineering experienced extensive problems in the development of the software that were caused by the company contracted to create the software. At the end of Phase 1, the software was found to have extensive problems. The first attempt at creating the software was scraped and a second software package was developed and refined during Phase 2.

In order for the software to manage pavement markings, information must be collected. The sheet for the collection of information for input into the software and samples of prepared reports available from the software are included in Appendix K. The reports are from data collected during 2001 striping operations in District 7. The various reports are

**Equipment Information:** tracks usage of equipment and scheduled maintenance.

**Daily Product Used By Crew:** tracks daily usage of material by striping train.

**Inventory Usage:** tracks total usage of materials.

**Monthly Striping Progress:** details of striping installations.

**Striping Progress:** summarizes striping by line type, material usage/cost by each month.

**Striping Progress by County, Route Report:** details of striping installation by route.

**Striping Progress by Crew Report:** summarizes striping by line type and material usage/cost by striping train by month.

**Striping Time Chargeout:** tracks actual break down of time by striping trains by day.

**Time Sheet:** weekly report by employee of hours worked.

**Equipment Transaction:** summarizes the usage of different equipment.

**Maintenance Installations:** summarizes the information for each stripe placed.

**Materials Listing:** shows what is entered for material costs and set reorder levels.

**Reflective Readings:** summarizes information on retroreflectivity readings. This report is not included because it is not functioning correctly at this time.

All the information included on the input sheet is not required to be collected. However, some reports may not be available if the information is not entered into the software program.

It will take several years statewide to develop and edit the information in the PMMS software. (This will be true of any software program used.) This software will still need some refinement in order to meet MoDOT requirements (whatever they are determined to be).

#### **LIFE EXPECTANCY CURVES**

One of the primary goals of Phase 2 was to start the development of life expectancy curves for different materials under different conditions. These two research projects generated an enormous amount of data. MoDOT is in the process of organizing the data and developing a methodology to create life expectancy curves. This aspect of the project is still in the initial stages and will not be completed for some time.

A September 1, 1998 article in US Roads ([info@usroads.com](mailto:info@usroads.com)) titled “Useful Life and Cost-Effectiveness of Three Pavement Marking Materials Studied” discussed work done in Utah (1996) and Connecticut (1988) comparing solvent based paint, epoxy paint, and preformed pavement markings on Portland cement concrete and asphaltic concrete. The 1996 study in Utah found that “tape has a much longer useful life than either paint or epoxy, but is considerably more expensive.” The solvent-based paint was found to be the most cost-effective of the three. Included in the report is a graph of the comparison of useful life.

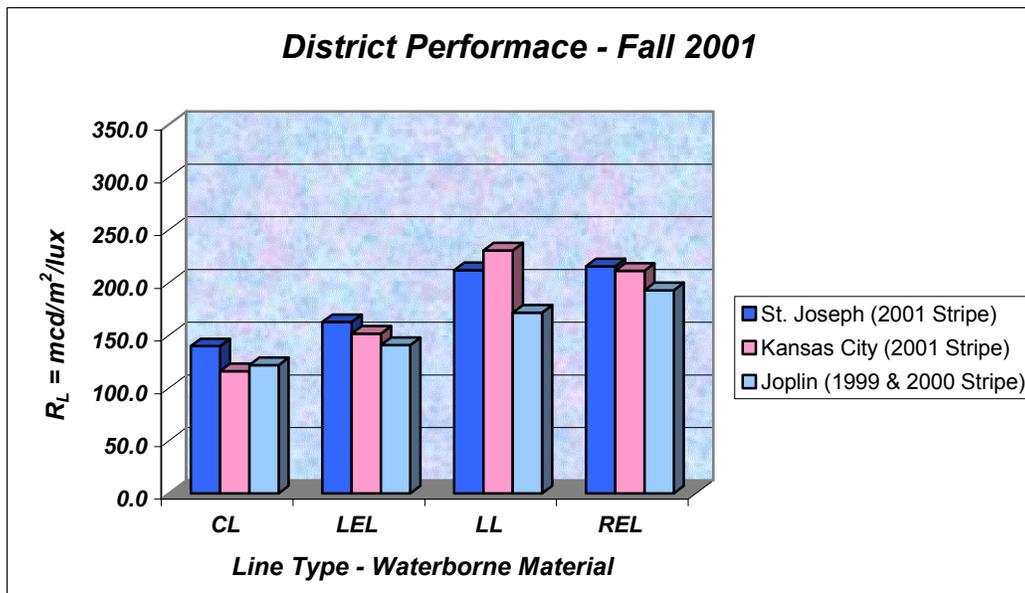
## CONCLUSIONS

### WHAT NOW

What is the public perception of the quality of MoDOT’s in-house and contractor applied pavement markings? MoDOT does receive public complaints about pavement markings. What steps is MoDOT taking to correct the problems? What are we doing to improve in-house applied pavement markings?

The last significant change in MoDOT’s in-house striping operations after converting to waterborne paint around 1990 was in 1994 when mil thickness was increased to 14-16 mils and bead application from 6 to 8 lbs per gallon of paint. With District 7’s concentration on quality instead of quantity, changes to District 7’s striping operations were started but these research projects demonstrated the real possibility of making significant improvements to MoDOT’s in-house pavement marking operations. District 7 has made substantial improvements to pavement markings since 1994.

The management of pavement markings can yield results. The graph below, developed by BC Engineering, compares District 7 pavement markings to District 1 and 4. This graph compares 2001 pavement markings in District 1 and 4 to pavement markings from 2000 and 1999 in District 7. The information is based on a small number of readings from District 1 and 4.



---

## RECOMMENDATIONS

---

### RECOMMENDATIONS FROM PHASE 1

BC Engineering, in their Phase I Final Report (RDT00-008) formulated recommendations based on information collected in District 7. Further details and explanations are available in the report. Following each abbreviated recommendation is District 7's response to that recommendation in italics. The recommendations were:

1. Yellow markings on lower volume roadways should not be striped every year. This becomes very evident after linking the retroreflectivity data collected in conjunction with the subjective ratings for the markings.

*We totally agree with the recommendations.*

2. Roadways that have been chip sealed and/or fog sealed should have a stripe with different mil thickness as opposed to roadways without that type of preventive maintenance. Those roadways that are chip sealed should have a minimum of two applications in the year it is sealed, or increase the mil thickness and bead output.

*We agree with the recommendations. At one time, MoDOT recommended a heavier application on new surfaces as standard practice. Chip seals versus fog seals/scrub seals will need to be treated differently. The method of striping each type of preventive maintenance surface treatment should be determined.*

3. The Department should consider using more of the higher build products (i.e., HD-21). The test areas where HD-21 was applied consistently performed well even after 2 years of wear.

*We agree with the recommendations. As discussed in the report, we see a slight increase in material cost will drastically improve the quality of the stripe.*

4. Some areas of the interstate and high volume US routes have enormous amounts of paint build up. Those areas with excessive layers of product from continual re-striping are not performing as well. These areas are prime candidates for durable markings. One other way to alleviate the build up problem is to re-stripe roadways by tagging skips onto old skips and placing the edge line next to the old edge lines. This might not be preferred but gives the driver an eight-inch edge line and a 20-foot skip providing more delineation.

*These research projects and our observations confirmed a build up stripe suffers more snowplow damage. District 7's experience with durables (except for 3M-380 contrast tape) has been poor. Durables do have a place in our program, but once the commitment is made to place durables on a road, a procedure to maintain that durable marking is needed. Striping over it with waterborne paint does not yield an acceptable result. As we see it, tagging on lines is not desirable due to the appearance of the stripe it will produce.*

5. A predetermined sampling rate for quality control checks should be implemented. The recommended rate is 20% of the district's pavement markings.

*Several years of this type of work is needed to finalize a rate of sampling. 20% would be a good rate to start with but a number of issues must be resolved relating to what is to be accomplished with this information and how it is to be used, monitored, handled and processed. Collecting large amounts of information is not useful and cost effective if it does not yield results. The methodology of how to handle the information and what information is important needs to be determined in advance.*

6. Pavement markings that have been placed under the construction program are not performing for District 7 as well as in-house latex operations. Therefore, it is recommended that the Department institute performance specifications for all contract applied pavement markings irrespective of material type and include those markings in the PMMS.

*Agreed. This recommendation was based on information collected in District 7. A pilot program is being started to provide quality assurance on contract pavement markings with a Laserlux retroreflector by contract.*

7. The need for the Department to develop a new product approval process is essential. In today's changing environment more and more products are coming into the market. Agencies need to evaluate those products without having to pay for them to find out they've failed later on. Products should be worthy enough to stand on their own merits and not rely on DOT's to pay for their lack of product development when they fail.

*Agreed, but MoDOT needs to decide which is the most important-- quantity or quality.*

8. Eliminate the procurement of pavement marking materials by the low bid process. If an agency's overall goal is to raise the level of performance and quality of their pavement marking program, than why buy the cheapest product that meets your specifications? The small increase that agency may pay for better products can be recovered many times over in longer lasting materials that don't need to be restriped as often.

*Agreed. The specifications on pavement marking material needs to be upgraded so that the bid process will result in an upgrade of the material. Even with performance specifications, inspection is still needed at the plant to adequately ensure the material meets our specifications.*

9. Planning. Develop a decision matrix based on qualitative/quantitative factors including remaining roadway life and preventative maintenance practices for when markings need to be replaced.

*Agreed, but Laserlux retroreflectivity readings are critical components in the process.*

## OTHER RECOMMENDATIONS

These two research projects are only just the start; additional work is needed. This work did confirm a number of District 7's postulations and more knowledge was gained. More research is needed in application rates, durability and retroreflectivity and to evaluate the results and findings. The need for statewide technical assistance, training, verification of consistent processes and quality assurance for the districts was demonstrated.

Retroreflectivity readings taken by a Laserlux retroreflectometer are needed on in-house markings of a sufficient size sample for quality assurance.

Funding needs to be set up for readings to be taken with a Laserlux mobile retroreflectometer.

MoDOT should start using paint with 4<sup>th</sup> generation resins. Paint with these resins has generally been accepted nation wide. Kansas is using paint with these resins. It is our understanding that DT 400NA has been tested and approved for use in Iowa, Louisiana, Texas, New Mexico, and Nevada and that Iowa switched one of three contracts from epoxy to this type of "durable paint" this season.

MoDOT needs to change its emphasis from quantity to quality for in-house pavement markings.

New pavement surfaces should receive a heavier one-time application of material or be striped twice in a season. Application rates should be based on the porosity of the surface.

MoDOT needs to set general criteria for second and third stripe.

If a section of road does not hold a stripe through the winter, other measures should be taken. District 7 has found 3M-380 contrast tape to be a good solution.

In-house pavement markings outperformed contractor applied markings in District 7. Efforts need to continue to improve contractor applied pavement markings.

The commitment needs to be made and a program implemented that ensures durable markings are maintained as durables and not just "forgotten" about and striped over with waterborne paint. A set system of roads needs to be selected to be maintained with durable markings (epoxy). Funding should be maintained at General Headquarters to routinely "cap" the durable markings and replace the markings as needed.

The existing financial management system does not provide a method to track and determine the actual cost per foot of in-house pavement markings. This information is critical in order to compare in-house to contractor applied pavement markings (including durables based on life cycle cost). A reasonable practical method must be found. The Pavement Marking Management System will perform this function after a period of information collection and some minor refinements.

A decision must be made if and what will be implemented from these research projects. Who determines how and what is changed? What changes and improvements are made in processes and materials? If this work is to continue, traffic and maintenance must embrace the program in order for it to continue and expand. General Headquarters must support its expansion. A statewide champion is needed to make it happen. If the information and results from the research projects are not accepted and embraced, the possibility exists that District 7's improvements in quality of pavement markings will be ignored and District 7 will be forced to go back to lower standards.

---

**APPENDIXES**

---

APPENDIX A – STATEWIDE IMPLEMENTATION PLAN

**WORKPLAN**

**Title:** Statewide Implementation of the Pavement Marking Management System (PMMS)

**Objective:** To take the PMMS which is being developed in District 7 and implement it in all MoDOT pavement marking operations.

**Background and Significance of Work:** The Federal Highway Administration (FHWA) is proposing establishing minimum standards for the reflectivity of pavement markings. In order to meet these standards an effort has been launched by District 7 and Traffic Engineering to develop a PMMS. The PMMS development was begun in District 7 with a research project launched in May 1999. The goal of this project was to review current striping practices to determine the quality of the marking being produced by MoDOT forces and to produce a process for tracking the efforts of those crews.

A contract was entered in to with B.C. Engineering of Minneapolis to develop the PMMS. Their efforts consisted of measuring the reflectivity of approximately 1000 line miles of markings in the immediate Joplin area. Working with district staff these results were reviewed and repeated over several periods to determine the performance of the markings. B.C. Engineering also produced software to aid the district in recording production information to assist in quality assurance.

An extension of this contract, called phase two, is planned for June of 2000. Phase two will take the results of the initial contract and expand it to cover the entire pavement marking operation in District 7. Phase two will also begin the introduction of the PMMS to Districts 1 and 4.

**Action Plan:** Once phase two is completed Traffic Engineering in General Headquarters will assume responsibility for implementing the PMMS statewide. The following schedule for implementing statewide is planned.

Fall 2000	Introduction to Districts 1 & 4
Summer 2001	Implementation in Districts 1 & 4
Fall 2001	Introduction to Districts 2, 5 & 8
Summer 2002	Implementation in Districts 2,5 & 8
Fall 2002	Introduction in Districts 3 & 6
Summer 2003	Implementation in Districts 3 & 6
Fall 2003	Introduction in Districts 9 & 10
Summer 2004	Implementation in district 9 & 10

**Method of Implementation:** Statewide implementation will consist two parts in a district.

Part 1 will be an introduction to the concept of the PMMS. This will consist of visits to the district, during the fall and winter off peak periods, by Headquarters staff, current users of the PMMS and possibly a contractor who will be assisting in data collection. During this part the district will be asked to evaluate the PMMS to determine how it fits in to their needs. These ideas will then be considered for incorporation in to the PMMS.

Part 2 will consist of implementing the PMMS in the district. This will happen the marking season after the initial visits conducted in part 1.

**Anticipated Benefits:** Implementing a PMMS statewide will have several benefits.

The ability to provide a consistent marking product across the state.

It will serve as both the quality control and quality assurance processes for pavement marking.

The ability to provide the best pavement markings for the best price.

A way to evaluate all pavement markings, including those applied by MoDOT forces as well as by contractors.

A statewide inventory of pavement markings.

A planning tool for scheduling when pavement markings need to be replaced.

A method for meeting the proposed FHWA minimum reflectivity requirements.

APPENDIX B – QUALITY ASSURANCE TABLE ON SUBJECTIVE RATINGS

*YELLOW MARKINGS (CONDITION MATRIX)*

		R <sub>L</sub> = mcd/m <sup>2</sup> /lux					
		< 100	100 -125	125- 150	150 -175	> 175	
5		C	C	B	A	A	
4		C	C	B	A	A	
3		D	D	C	B	B	
2		F	D	C	C	C	
1		F	F	D	D	D	

SR = SUB RATING

A = DO NOT STRIPE  
 \* B = ADT HIGH – RESTRIPE?  
 \* B = ADT LOW – DO NOT RESTRIPE?  
 C = RESTRIPE AS PLANNED  
 D = RESTRIPE SOON  
 F = RESTRIPE ASAP

*WHITE MARKINGS (CONDITION MATRIX)*

		R <sub>L</sub> = mcd/m <sup>2</sup> /lux					
		< 100	100 -150	150- 200	200 -250	> 250	
5		C	C	B	A	A	
4		C	C	B	A	A	
3		D	D	C	B	B	
2		F	D	C	C	C	
1		F	F	D	D	D	

SR = SUB RATING

A = DO NOT STRIPE  
 \* B = ADT HIGH – RESTRIPE?  
 \* B = ADT LOW – DO NOT RESTRIPE?  
 C = RESTRIPE AS PLANNED  
 D = RESTRIPE SOON  
 F = RESTRIPE ASAP  
 \* MODOT NEEDS TO DEFINE THE PARAMETERS AND ACTION

**APPENDIX C – HEAVIER APPLICATIONS IMPROVE RETROREFLECTIVITY ON NEW CHIP SEALS**

**Barton County, Route T, log mile 0.0 to 10.0, centerline stripe**

Date Read	Avg Mcd	Comments
5-1-1999	176	On 1998 stripe
8-1-1999	236	On 1999 stripe
3-31-2000	193	On 1999 stripe
11-9-2000	144	On 2000 stripe placed on new chip seal

The new stripe placed on a chip seal read lower than a stripe (twice) read after a winter

**Barton County, Route KK, log mile 0.0 to 3.80, centerline stripe**

Date Read	Avg Mcd	Comments
11-9-2000	154	Sealed September 2000 and striped

**Lawrence County, Route 96, log mile 12.10 to 16.10, centerline stripe, hot mix**

Date Read	Avg Mcd	Comments
11-10-2000	157	Overlaid 2000 and striped

Initial readings are not high on stripe; the first stripe placed on a new seal.

**APPENDIX D - CONTRACT APPLIED MARKINGS**

THERMO SPRAY

**Barry County, Route YY, Hot Mix, Striped 1999**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
0	2.80	W	CL (yellow)	11-10-2000	118
0	2.80	W	CL (yellow)	5-6-2001	83
0	2.80	W	CL (yellow)	9-27-2001	69
0	2.80	W	CL (yellow)	5-21-2002	84
0	2.80	E	REL (white)	11-10-2000	277
0	2.80	E	REL (white)	5-6-2001	162
0	2.80	W	REL (white)	11-10-2000	293
0	2.80	W	REL (white)	5-6-2001	148

**Cedar County, Route 54, Hot Mix, Striped 1999**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
3.00	13.00	E	CL (yellow)	11-18-2000	129
3.05	13.00	E	CL (yellow)	5-4-2001	78
3.05	13.00	E	CL (yellow)	9-28-2001	70
3.05	13.00	W	CL (yellow)	5-20-2002	71
13.00	14.70	W	REL (white)	11-18-2000	168
13.00	14.70	W	REL (white)	5-5-2001	133
13.00	14.70	W	REL (white)	5-22-2002	188

**St. Clair County, Route 54, Hot Mix, Striped 1999**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
0	4.20	W	REL (white)	11-18-2000	179
0	4.23	W	REL (white)	5-5-2001	134
0	4.23	W	REL (white)	9-27-2001	190
0	4.23	W	RE (white)	5-22-2002	206
4.20	10.90	E	REL (white)	11-18-2000	138
4.23	10.92	E	REL (white)	5-5-2001	118
4.23	10.92	E	REL (white)	5-22-2002	166
4.20	10.90	W	CL (yellow)	11-18-2000	113
4.23	10.92	W	CL (yellow)	6-23-2001	86
4.23	10.92	W	CL (yellow)	9-28-2001	74
4.23	10.92	W	CL (yellow)	5-20-2002	81

EPOXY

**Jasper County, Route I-44, Asphaltic Hot Mix, Striped 2000**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
0	2.10	E	LEL (yellow)	5-7-2001	106
0	2.10	E	LEL (yellow)	9-28-2001	80
0	2.10	E	LEL (yellow)	5-22-2002	123
0	2.10	E	LL (white)	11-11-2000	436
0	2.10	E	LL (white)	5-7-2001	195
0	2.10	E	LL (white)	9-28-2001	189
0	2.10	E	LL (white)	5-21-2002	131
0	2.10	E	REL (white)	11-11-2000	320
0	2.10	E	REL (white)	5-7-2001	134
0	2.10	E	REL (white)	9-27-2001	126
0	2.10	E	REL (white)	5-21-2002	122
0	2.10	W	LEL (yellow)	5-7-2001	116
0	2.10	W	LEL (yellow)	9-28-2001	77
0	2.10	W	LEL (yellow)	5-22-2002	167
0	2.10	W	LL (white)	11-11-2000	448
0	2.10	W	LL (white)	5-7-2001	176
0	2.10	W	LL (white)	9-27-2001	200
0	2.10	W	LL (white)	5-21-2002	138
0	2.10	W	REL (white)	11-11-2000	308
0	2.10	W	REL (white)	5-7-2001	163
0	2.10	W	REL (white)	9-27-2001	165
0	2.10	W	REL (white)	5-21-2002	120

**Newton County, IS 44, Asphaltic Hot Mix, Striped 2000**

<b>Beg Log Point</b>	<b>End Log Point</b>	<b>Direction</b>	<b>Line Type</b>	<b>Date Read</b>	<b>Avg Mcd</b>
8.80	10.70	E	LEL (yellow)	11-11-2000	257
8.76	10.67	E	LEL (yellow)	6-24-2001	157
8.76	10.67	E	LEL (yellow)	9-28-2001	88
8.76	10.67	E	LEL (yellow)	5-21-2002	135
8.80	10.70	E	LL (white)	11-11-2000	367
8.76	10.67	E	LL (white)	6-24-2001	296
8.76	10.67	E	LL (white)	9-27-2001	193
8.76	10.67	E	LL (white)	5-21-2002	123
8.80	10.70	E	REL (white)	11-11-2000	325
8.76	10.67	E	REL (white)	5-7-2001	162
8.76	10.67	E	REL (white)	9-27-2001	155
8.76	10.67	E	REL (white)	5-21-2002	92
8.80	10.70	W	LEL (yellow)	11-11-2000	230
8.76	10.67	W	LEL (yellow)	6-24-2001	158
8.76	10.67	W	LEL (yellow)	9-28-2001	90
8.76	10.67	W	LEL (yellow)	5-21-2002	139
8.80	10.70	W	LL (white)	11-11-2000	327
8.76	10.67	W	LL (white)	6-24-2001	294
8.76	10.67	W	LL (white)	9-27-2001	216
8.76	10.67	W	LL (white)	5-21-2002	136
8.80	10.67	W	REL (white)	11-11-2000	322
8.76	10.67	W	REL (white)	5-7-2001	156
8.76	10.67	W	REL (white)	9-27-2001	185
8.76	10.67	W	REL (white)	5-21-2002	128

THERMO EXTRUDED

Jasper County, I-44, Asphaltic Hot Mix, striped 1998

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
17.00	22.00	E	LEL (yellow)	4-30-1999	98
17.00	22.00	E	LEL (yellow)	7-31-1999	88
16.90	21.90	E	LEL (yellow)	11-7-1999	201
16.00	21.90	E	LEL (yellow)	4-1-2000	100
17.00	22.00	E	LL (white)	7-31-1999	263
16.90	21.90	E	LL (white)	11-8-1999	287
16.90	21.90	E	LL (white)	3-30-2000	174
17.00	22.00	E	REL (white)	4-30-1999	125
17.00	22.00	E	REL (white)	7-31-1999	110
16.90	21.90	E	REL (white)	11-7-1999	285
16.90	21.90	E	REL (white)	3-30-2000	120
17.00	22.00	W	LEL (yellow)	4-30-1999	91
17.00	22.00	W	LEL (yellow)	7-31-1999	88
16.90	21.90	W	LEL (yellow)	11-7-1999	76
16.90	21.90	W	LEL (yellow)	4-1-2000	81
17.00	22.00	W	LL (white)	4-30-1999	169
17.00	22.00	W	LL (white)	5-2-1999	135
17.00	22.00	W	LL (white)	7-31-1999	144
16.90	21.90	W	LL (white)	11-8-1999	180
16.90	21.80	W	LL (white)	3-30-2000	127
17.00	22.00	W	REL (white)	4-30-1999	143
17.00	22.00	W	REL (white)	7-31-1999	104
16.90	21.90	W	REL (white)	11-7-1999	134
16.90	21.90	W	REL (white)	3-30-2000	101

**Jasper County, Route TT, Asphaltic Hot Mix, Striped 1998**

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
0	1.90	E	CL (yellow)	5-4-1999	96
0	1.00	E	CL (yellow)	8-1-1999	102
0	1.90	E	CL (yellow)	11-7-1999	124
0	1.90	E	CL (yellow)	4-1-2000	89
0	1.90	E	LL (white)	5-4-1999	140
0	1.90	E	LL (white)	8-1-1999	131
0	1.00	E	LL (white)	11-7-1999	164
0	1.00	E	LL (white)	4-1-2000	114
0	1.00	W	CL (yellow)	5-4-1999	119
0	1.00	W	CL (yellow)	8-1-1999	95
0	1.00	W	CL (yellow)	11-7-1999	108
0	1.00	W	CL (yellow)	4-1-2000	83
0	1.90	W	LL (white)	5-4-1999	133
0	1.09	W	LL (white)	8-1-1999	129
0	1.00	W	LL (white)	11-7-1999	163
0	1.00	W	LL (white)	4-1-2000	128

After one year it had generally failed.

THERMO EXTRUDED MCDONALD COUNTY, US71, ASPHALTIC HOT MIX, STRIPED 2001

Beg Log Point	End Log Point	Direction	Line Type	Date Read	Avg Mcd
6.33	7.33	N	LE (yellow)	5-7-2001	124
6.33	7.33	N	LEL (yellow)	9-27-2001	101
6.33	7.33	N	LEL (yellow)	5-21-2002	78
6.33	7.33	N	REL (white)	5-7-2001	291
6.33	7.33	N	REL (white)	9-27-2001	233
6.33	7.33	N	REL (white)	5-21-2002	140
6.33	7.33	S	LEL (yellow)	5-7-2001	76
6.33	7.33	S	LEL (yellow)	9-27-2001	86
6.33	7.33	S	LEL (yellow)	5-21-2002	84
6.33	7.33	S	REL (white)	5-7-2001	282
6.33	7.33	S	REL (white)	9-27-2001	304
6.33	7.33	S	REL (white)	5-21-2002	166

The initial retroreflectivity readings of the yellow was poor with the white the markings being good. The white markings retroreflectivity substantially dropped over one winter.

**APPENDIX E – I-44 RETROREFLECTIVITY READINGS BEFORE AND AFTER CONTRACT STRIPING**

<b>County</b>	<b>Beg Log Point</b>	<b>End Log Point</b>	<b>Direction</b>	<b>Line Type</b>	<b>Date Striped In-house</b>	<b>Date Read</b>	<b>Avg Mcd</b>	<b>Date Striped Contract</b>	<b>Date Read</b>	<b>Avg Mcd</b>
Jasper	13.00	18.00	W	LEL (yellow)	10-13-2001	5-20-2002	134	6-15-2002	6-24-2002	147
Jasper	13.00	18.00	E	LEL (yellow)				6-15-2002	6-24-2002	209
Jasper	13.00	18.00	W	REL (white)	11-13-2001	5-21-2002	225			
Jasper	13.00	18.00	W	LL (white)				6-15-2002	6-26-2002	246
Jasper	13.00	18.00	E	LL (white)				6-15-2002	6-25-2002	259*
Lawrence	5.47	10.47	W	LEL (yellow)	11-5-2001	5-21-2002	195	6-15-2002	6-24-2002	175
Lawrence	5.47	10.47	E	LEL (yellow)				6-15-2002	6-24-2002	202
Lawrence	5.47	10.47	E	REL (white)	11-7-2001	5-21-2002	206			
Lawrence	5.47	10.47	W	LL (white)				6-15-2002	6-26-2002	295**
Lawrence	5.47	10.47	E	LL (white)				6-15-2002	6-25-2002	238

\* Between log point 13 and 13.4 there was a construction zone and readings were not taken

\*\* Between log point 9.00 and 9.6 there was a construction zone and readings were not taken

APPENDIX F – CRITERIA FOR NOT STRIPING ROADS IN 2000

Roads must meet the following criteria before we will not stripe it:

- 1) Must be a yellow stripe
- 2) Cannot be a first stripe
- 3) Cannot be applied over a material other than waterborne paint
- 4) ADT must be less than 1700
- 5) Functional classification must be minor arterial, major collector or minor collector
- 6) Road must be non-urban (urban is within the city limits of a city population greater than 2500)
- 7) If road is hot mix, the surface must have been laid in 1992 or more recent
- 8) If road is oil aggregate the surface must have two existing stripes on at least 75% of the section of road
- 9) Must satisfy a daytime\* visual inspection. The inspection includes a review of chipping, bead retainage and distribution, smoothness of surface of striping so beads are properly oriented to reflect light, and patching of roadway

The two exceptions to this are:

Jasper YY	171 to Kansas State Line
Jasper H	171 to 43

All of the centerline and edgelines will not be striped since BC Engineering has good retroreflectivity readings on this stripe.

---

\* Nighttime inspection is not necessary due to the excellent retroreflectivity provided with visibeads. Thus, reflectivity exceeds the requirements of the striping manual.

**APPENDIX G - RETROREFLECTIVITY READINGS BY ROUTE**

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT
													for the appropriate year
BARRY	60 Bus	1.00	1.70	CL	E	10-Nov-00	Waterborne	2000	3	161	31	Hot Mix	4286
	60 Bus	1.00	1.70	CL	E	24-Jun-01	Waterborne	2001	4	277	79	Hot Mix	6226
	60 Bus	1.00	1.70	CL	E	27-Sep-01	Waterborne	2001	3	105	33	Hot Mix	6226
	60 Bus	1.00	1.70	CL	E	20-May-02	Waterborne	2001	3	168	54	Hot Mix	Not Available
BARRY	60 Bus	1.00	1.70	CL	W	10-Nov-00	Waterborne	2000	3	164	30	Hot Mix	4286
	60 Bus	1.00	1.70	CL	W	24-Jun-01	Waterborne	2001	3	209	49	Hot Mix	6226
	60 Bus	1.00	1.70	CL	W	27-Sep-01	Waterborne	2001	3	100	29	Hot Mix	6226
	60 Bus	1.00	1.70	CL	W	20-May-02	Waterborne	2001	3	205	24	Hot Mix	Not Available
BARRY	76	15.10	19.40	CL	W	10-Nov-00	Waterborne	2000	4	186	41	Hot Mix	3659
	76	15.16	19.38	CL	W	06-May-01	Waterborne	2000	3	129	40	Hot Mix	3843
	76	15.16	19.38	CL	W	27-Sep-01	Waterborne	2000	3	101	32	Hot Mix	3843
	76	15.16	19.38	CL	W	20-May-02	Waterborne	2000	2	113	34	Hot mix	Not Available
BARRY	86	14.00	19.00	CL	W	10-Nov-00	Waterborne	2000	4	220	48	Hot Mix	1362
	86	14.06	18.95	CL	W	06-May-01	Waterborne	2000	3	134	37	Hot Mix	1703
	86	14.06	18.95	CL	W	27-Sep-01	Waterborne	2000	3	117	30	Hot Mix	1703
	86	14.06	18.95	CL	W	20-May-02	Waterborne	2000	2	147	39	Hot mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
BARRY	86	19.00	23.00	CL	E	10-Nov-00	Waterborne	2000	4	214	53	Hot Mix	2635
	86	18.95	23.00	CL	E	06-May-01	Waterborne	2000	3	118	33	Hot Mix	2530
	86	18.95	23.00	CL	E	27-Sep-01	Waterborne	2000	3	116	29	Hot mix	2530
	86	18.95	23.00	CL	E	20-May-02	Waterborne	2000	2	112	31	Hot Mix	Not Available

BARRY	86	23.00	27.00	CL	E	10-Nov-00	Waterborne	2000	4	193	51	Hot Mix	2879
	86	23.00	26.87	CL	E	24-Jun-01	Waterborne	2000	3	167	55	Hot Mix	2184
	86	23.00	26.87	CL	E	27-Sep-01	Waterborne	2000	3	115	30	Hot Mix	2184
	86	23.00	26.87	CL	E	20-May-02	Waterborne	2000	2	134	34	Hot Mix	Not Available

BARRY	BB	0.00	5.80	CL	E	10-Nov-00	Waterborne	1999	4	192	42	Oil Aggregate	596
	BB	0.00	5.76	CL	E	06-May-01	Waterborne	1999	3	127	37	Oil Aggregate	594
	BB	0.00	5.76	CL	E	27-Sep-01	Waterborne	1999	3	115	26	Oil Aggregate	594
	BB	0.00	5.76	CL	E	20-May-02	Waterborne	1999	2	135	32	Oil Aggregate	Not Available

BARRY	V V	0.00	5.60	CL	S	10-Nov-00	Waterborne	2000	4	186	41	Oil Aggregate	316
	V V	0.00	5.56	CL	S	06-May-01	Waterborne	2000	3	136	43	Oil Aggregate	314
	V V	0.00	5.56	CL	S	27-Sep-01	Waterborne	2000	3	127	34	Oil Aggregate	314
	V V	0.00	5.56	CL	S	20-May-02	Waterborne	2000	3	146	44	Oil Aggregate	Not Available

BARRY	YY	0.00	2.80	CL	W	10-Nov-00	Thermo Spray	1999	3	118	32	Hot Mix	2478
	YY	0.00	2.80	CL	W	06-May-01	Thermo Spray	1999	3	83	19	Hot Mix	2060
	YY	0.00	2.80	CL	W	27-Sep-01	Thermo Spray	1999	2	69	16	Hot Mix	2060
	YY	0.00	2.80	CL	W	20-May-02	Thermo Spray	1999	2	84	17	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
BARRY	Z	0.00	8.50	CL	W	10-Nov-00	Waterborne	2000	4	183	35	Hot Mix	1343
	Z	0.00	8.46	CL	W	06-May-01	Waterborne	2000	3	164	47	Hot Mix	1402
	Z	0.00	8.46	CL	W	27-Sep-01	Waterborne	2000	3	150	39	Hot Mix	1402
	Z	0.00	8.46	CL	W	20-May-02	Waterborne	2000	3	165	33	Hot Mix	Not Available
BARTON	126	0.00	7.40	CL	W	18-Nov-00	Waterborne	2000	4	172	34	Hot Mix	1046
	126	0.00	7.40	CL	W	05-May-01	Waterborne	2000	4	236	53	Hot Mix	1118
	126	0.00	7.40	CL	W	28-Sep-01	Waterborne	2000	4	180	41	Hot Mix	1118
	126	0.00	7.40	CL	W	20-May-02	Waterborne	2000	3	216	45	Hot Mix	Not Available
BARTON	160	18.30	20.10	CL	E	9-Nov-00	Waterborne	2000	4	149	35	Hot Mix	6585
	160	18.30	20.10	CL	E	5-May-01	Waterborne	2000	3	108	38	Hot Mix	6731
	160	18.30	20.10	CL	E	26-Sep-01	Waterborne	2000	3	85	32	Hot Mix	6731
BARTON	160	18.30	20.10	REL	E	9-Nov-00	Waterborne	2000	3	125	33	Hot Mix	6585
	160	18.30	20.10	REL	E	5-May-01	Waterborne	2000	2	125	43	Hot Mix	6731
	160	18.30	20.10	REL	E	26-Sep-01	Waterborne	2000	3	141	36	Hot Mix	6731
BARTON	160	18.30	20.10	REL	W	9-Nov-00	Waterborne	2000	3	129	31	Hot Mix	6585
	160	18.30	20.10	REL	W	5-May-01	Waterborne	2000	2	118	40	Hot Mix	6731
	160	18.30	20.10	REL	W	26-Sep-01	Waterborne	2000	3	153	39	Hot Mix	6731
BARTON	A	4.00	10.10	CL	N	09-Nov-00	Waterborne	2000	3	143	22	Oil Aggregate	935
	A	4.03	10.13	CL	N	05-May-01	Waterborne	2000	4	196	60	Oil Aggregate	700
	A	4.03	10.13	CL	N	28-Sep-01	Waterborne	2000	3	125	34	Oil Aggregate	700
	A	4.03	10.13	CL	N	20-May-02	Waterborne	2000	3	155	47	Oil Aggregate	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
BARTON	J	0.00	9.60	CL	S	01-May-99	Waterborne	1998	0	175	36	Hot Mix	215
	J	0.00	9.60	CL	S	07-Nov-99	Waterborne	1998	0	172	37	Hot Mix	215
	J	0.00	9.60	CL	S	31-Mar-00	Waterborne	1998	2	176	39	Hot Mix	214
BARTON	KK	0.00	3.80	CL	N	09-Nov-00	Waterborne	2000	4	150	27	Oil Aggregate	1218
	KK	0.00	3.75	CL	N	05-May-01	Waterborne	2000	3	129	38	Oil Aggregate	1212
	KK	0.00	3.75	CL	N	26-Sep-01	Waterborne	2000	3	118	34	Oil Aggregate	1212
	KK	0.00	3.75	CL	N	20-May-02	Waterborne	2000	2	102	28	Oil Aggregate	Not Available
BARTON	KK	0.00	3.80	CL	S	09-Nov-00	Waterborne	2000	4	158	26	Oil Aggregate	1218
	KK	0.00	3.75	CL	S	05-May-01	Waterborne	2000	3	160	51	Oil Aggregate	1212
	KK	0.00	3.75	CL	S	26-Sep-01	Waterborne	2000	3	130	38	Oil Aggregate	1212
	KK	0.00	3.75	CL	S	20-May-02	Waterborne	2000	2	120	33	Oil Aggregate	Not Available
BARTON	NN	0.00	5.00	CL	S	18-Nov-00	Waterborne	2000	4	155	34	Oil Aggregate	638
	NN	0.00	5.05	CL	S	05-May-01	Waterborne	2000	3	135	44	Oil Aggregate	658
	NN	0.00	5.05	CL	S	28-Sep-01	Waterborne	2000	2	76	28	Oil Aggregate	658
BARTON	T	0.00	10.00	CL	N	01-May-99	Waterborne	1998	0	176	43	Oil Aggregate	828
	T	0.00	10.00	CL	N	01-Aug-99	Waterborne	1999	4	236	41	Oil Aggregate	828
	T	0.00	10.00	CL	N	31-Mar-00	Waterborne	1999	3	193	47	Oil Aggregate	824
	T	0.00	10.00	CL	N	09-Nov-00	Waterborne	1999	3	140	28	Oil Aggregate	824
	T	0.00	10.03	CL	N	05-May-01	Waterborne	1999	3	163	55	Oil Aggregate	555
	T	0.00	10.03	CL	N	28-Sep-01	Waterborne	1999	3	120	33	Oil Aggregate	555

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
BARTON	T	0.00	10.00	CL	S	08-Nov-99	Waterborne	1999	4	237	63	Oil Aggregate	828
	T	0.00	10.00	CL	S	09-Nov-00	Waterborne	1999	3	149	33	Oil Aggregate	824
	T	0.00	10.03	CL	S	05-May-01	Waterborne	1999	3	150	51	Oil Aggregate	555
	T	0.00	10.03	CL	S	28-Sep-01	Waterborne	1999	3	90	33	Oil Aggregate	555
BATES	52	0.00	5.40	CL	W	18-Nov-00	Waterborne	2000	4	235	50	Hot Mix	1016
	52	0.00	5.36	CL	W	08-May-01	Waterborne	2000	3	157	44	Hot Mix	1044
	52	0.00	5.36	CL	W	28-Sep-01	Waterborne	2000	4	170	65	Hot Mix	1044
	52	0.00	5.36	CL	W	20-May-02	Waterborne	2000	3	164	54	Hot Mix	Not Available
CEDAR	215	0.00	9.30	CL	S	18-Nov-00	Waterborne	2000	4	154	33	Hot Mix	890
	215	0.00	9.32	CL	S	08-May-01	Waterborne	2000	3	156	48	Hot Mix	886
	215	0.00	9.32	CL	S	28-Sep-01	Waterborne	2000	3	106	40	Hot Mix	886
	215	0.00	9.32	CL	S	20-May-02	Waterborne	2000	2	105	33	Hot Mix	Not Available
CEDAR	32	0.00	6.40	CL	S	18-Nov-00	Waterborne	2000	4	222	51	Hot Mix	2442
	32	0.00	6.41	CL	S	04-May-01	Waterborne	2000	4	178	63	Hot Mix	2510
	32	0.00	6.41	CL	S	28-Sep-01	Waterborne	2000	3	142	52	Hot Mix	2510
CEDAR	32	6.40	13.20	REL	S	18-Nov-00	Waterborne	2000	4	278	65	Hot Mix	1139
	32	6.41	13.25	REL	S	05-May-01	Waterborne	2000	3	197	65	Hot Mix	1171
	32	6.40	13.20	REL	S	26-Sep-01	Waterborne	2000	3	188	69	Hot Mix	1171
CEDAR	32	20.00	21.70	CL	S	18-Nov-00	Waterborne	2000	4	243	48	Hot Mix	4139
	32	19.98	21.66	CL	S	24-Jun-01	Waterborne	2000	3	146	55	Hot Mix	4254
	32	19.98	21.66	CL	S	28-Sep-01	Waterborne	2000	2	88	37	Hot Mix	4254

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
CEDAR	32	20.00	21.70	REL	N	18-Nov-00	Waterborne	2000	3	231	48	Hot Mix	4139
	32	19.98	21.66	REL	N	05-May-01	Waterborne	2000	1	154	64	Hot Mix	4254
	32	19.98	21.66	REL	N	26-Sep-01	Waterborne	2000	3	193	76	Hot Mix	4254
CEDAR	32	20.00	21.70	REL	S	18-Nov-00	Waterborne	2000	3	246	70	Hot Mix	4139
	32	19.98	21.66	REL	S	05-May-01	Waterborne	2000	1	145	60	Hot Mix	4254
	32	19.98	21.66	REL	S	26-Sep-01	Waterborne	2000	3	219	76	Hot Mix	4254
CEDAR	32	21.70	29.20	REL	N	18-Nov-00	Waterborne	2000	3	191	45	Hot Mix	2372
	32	21.66	29.25	REL	N	05-May-01	Waterborne	2000	2	130	46	Hot Mix	2439
	32	21.66	29.25	REL	N	26-Sep-01	Waterborne	2000	3	164	66	Hot Mix	2439
CEDAR	39	0.00	8.00	REL	S	18-Nov-00	Waterborne	2000	4	211	58	Hot Mix	366
	39	0.00	8.03	REL	S	05-May-01	Waterborne	2000	2	135	55	Hot Mix	364
	39	0.00	8.03	REL	S	28-Sep-01	Waterborne	2000	3	178	70	Hot Mix	364
CEDAR	39	0.00	14.60	CL	S	18-Nov-00	Waterborne	2000	4	222	52	Hot Mix	472
	39	0.00	14.62	CL	S	08-May-01	Waterborne	2000	3	158	46	Hot Mix	469
	39	0.00	14.62	CL	S	28-Sep-01	Waterborne	2000	3	118	48	Hot Mix	469
	39	0.00	14.62	CL	S	20-May-02	Waterborne	2000	2	113	44	Hot Mix	Not Available
CEDAR	39	8.00	14.60	REL	N	18-Nov-00	Waterborne	2000	4	238	57	Hot Mix	602
	39	8.03	14.62	REL	N	05-May-01	Waterborne	2000	2	137	49	Hot Mix	598
	39	8.03	14.60	REL	N	26-Sep-01	Waterborne	2000	3	176	68	Hot Mix	598

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
CEDAR	39	14.60	24.30	CL	S	18-Nov-00	Waterborne	2000	4	228	50	Hot Mix	2939
	39	14.60	24.30	CL	S	24-Jun-01	Waterborne	2000	3	148	67	Hot Mix	3022
	39	14.60	24.30	CL	S	28-Sep-01	Waterborne	2000	2	107	40	Hot Mix	3022
	39	14.60	24.30	CL	S	20-May-02	Waterborne	2000	2	124	48	Hot Mix	Not Available

CEDAR	39	14.60	24.30	REL	N	18-Nov-00	Waterborne	2000	4	264	54	Hot Mix	2939
	39	14.60	24.30	REL	N	05-May-01	Waterborne	2000	3	170	47	Hot Mix	3022
	39	14.60	24.30	REL	N	26-Sep-01	Waterborne	2000	3	221	71	Hot Mix	3022

CEDAR	39	14.60	24.30	REL	S	18-Nov-00	Waterborne	2000	4	270	47	Hot Mix	2939
	39	14.60	24.30	REL	S	05-May-01	Waterborne	2000	3	156	48	Hot Mix	3022
	39	14.60	24.30	REL	S	26-Sep-01	Waterborne	2000	3	214	78	Hot Mix	3022

CEDAR	54	0.00	2.00	CL	E	18-Nov-00	Paint over Thermo	1998	4	123	27	Hot Mix	7800
	54	0.00	2.00	CL	E	04-May-01	Paint over Thermo	1998	3	103	21	Hot Mix	7940
	54	0.00	2.00	CL	E	28-Sep-01	Paint over Thermo	1998	3	100	25	Hot Mix	7940
	54	0.00	2.00	CL	E	20-May-02	Paint over Thermo	1998	3	122	26	Hot Mix	Not Available

CEDAR	54	0.00	2.04	CL	W	18-Jul-99	Paint over Thermo	1998	3	159	56	Hot Mix	5804
	54	0.00	2.00	CL	W	18-Nov-00	Paint over Thermo	1998	4	135	36	Hot Mix	7800
	54	0.00	2.00	CL	W	04-May-01	Paint over Thermo	1998	3	100	19	Hot Mix	7940
	54	0.00	2.00	CL	W	28-Sep-01	Paint over Thermo	1998	3	100	22	Hot Mix	7940

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
CEDAR	54	0.00	2.04	REL	E	18-Jul-99	Thermo Extruded	1997	4	252	63	Hot Mix	5804
	54	0.00	2.00	REL	E	18-Nov-00	Thermo Extruded	1997	4	287	50	Hot Mix	7800
	54	0.00	2.00	REL	E	05-May-01	Thermo Extruded	1997	3	146	47	Hot Mix	7940
	54	0.00	2.00	REL	E	26-Sep-01	Thermo Extruded	1997	3	253	74	Hot Mix	7940
	54	0.00	2.00	REL	E	20-May-02	Thermo Extruded	1997	2	170	48	Hot Mix	Not Available

CEDAR	54	0.00	2.04	REL	W	18-Jul-99	Thermo Extruded	1997	4	222	63	Hot Mix	5804
	54	0.00	2.00	REL	W	18-Nov-00	Thermo Extruded	1997	4	218	39	Hot Mix	7800
	54	0.00	2.00	REL	W	05-May-01	Thermo Extruded	1997	3	126	33	Hot Mix	7940
	54	0.00	2.00	REL	W	26-Sep-01	Thermo Extruded	1997	3	191	59	Hot Mix	7940
	54	0.00	2.00	REL	W	20-May-02	Thermo Extruded	1997	2	182	50	Hot Mix	Not Available

CEDAR	54	2.00	3.00	CL	E	18-Nov-00	Waterborne	2000	4	175	43	Hot Mix	18606
	54	2.00	3.00	CL	E	04-May-01	Waterborne	2000	2	85	29	Hot Mix	18940
	54	2.00	3.00	CL	E	28-Sep-01	Waterborne	2000	1	76	27	Hot Mix	18940

CEDAR	54	2.00	3.00	CL	W	18-Nov-00	Waterborne	2000	4	169	43	Hot Mix	18606
	54	2.00	3.00	CL	W	04-May-01	Waterborne	2000	3	112	32	Hot Mix	18940
	54	2.00	3.00	CL	W	28-Sep-01	Waterborne	2000	1	76	31	Hot Mix	18940

CEDAR	54	2.00	3.00	REL	E	18-Nov-00	Waterborne	2000	3	274	80	Hot Mix	18606
	54	2.00	3.00	REL	E	05-May-01	Waterborne	2000	1	144	65	Hot Mix	18940
	54	2.00	3.00	REL	E	26-Sep-01	Waterborne	2000	1	124	36	Hot Mix	18940

CEDAR	54	2.00	3.00	REL	W	18-Nov-00	Waterborne	2000	3	259	76	Hot Mix	18606
	54	2.00	3.00	REL	W	05-May-01	Waterborne	2000	1	148	56	Hot Mix	18940
	54	2.00	3.00	REL	W	26-Sep-01	Waterborne	2000	1	135	41	Hot Mix	18940

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
CEDAR	54	3.00	13.00	CL	E	18-Nov-00	Thermo Spray	1999	4	129	27	Hot Mix	3242
	54	3.05	13.00	CL	E	04-May-01	Thermo Spray	1999	2	78	19	Hot Mix	3300
	54	3.05	13.00	CL	E	28-Sep-01	Thermo Spray	1999	3	70	20	Hot Mix	3300
	54	3.05	13.00	CL	W	20-May-02	Thermo Spray	1999	2	71	11	Hot Mix	Not Available
CEDAR	54	13.00	14.70	REL	W	18-Nov-00	Thermo Spray	1999	4	168	42	Hot Mix	1781
	54	13.00	14.70	REL	W	05-May-01	Thermo Spray	1999	2	133	40	Hot Mix	1813
	54	13.00	14.70	REL	W	22-May-02	Thermo Spray	1999	2	188	55	Hot Mix	Not Available
CEDAR	82	0.00	3.00	CL	W	18-Nov-00	Waterborne	2000	4	204	58	Hot Mix	5596
	82	0.00	3.00	CL	W	04-May-01	Waterborne	2000	3	115	49	Hot Mix	6116
	82	0.00	3.00	CL	W	28-Sep-01	Waterborne	2000	2	102	45	Hot Mix	6116
	82	0.00	3.00	CL	E	20-May-02	Waterborne	2000	3	172	51	Hot Mix	Not Available
CEDAR	82	0.00	3.00	REL	E	18-Nov-00	Waterborne	2000	3	308	81	Hot Mix	5596
	82	0.00	3.00	REL	E	05-May-01	Waterborne	2000	2	127	41	Hot Mix	6116
	82	0.00	3.00	REL	E	22-May-02	Waterborne	2001	2	203	86	Hot Mix	Not Available
CEDAR	82	0.00	3.00	REL	W	18-Nov-00	Waterborne	2000	3	201	47	Hot Mix	5596
	82	0.00	3.00	REL	W	05-May-01	Waterborne	2000	3	146	50	Hot Mix	6116
	82	0.00	3.00	REL	W	22-May-02	Waterborne	2001	3	244	90	Hot Mix	Not Available
CEDAR	97	0.00	3.60	CL	N	18-Nov-00	Waterborne	2000	3	170	38	Hot Mix	758
	97	0.00	3.55	CL	N	04-May-01	Waterborne	2000	3	121	38	Hot Mix	754
	97	0.00	3.55	CL	S	28-Sep-01	Waterborne	2000	3	133	49	Hot Mix	754

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
CEDAR	B	2.10	10.80	CL	W	18-Nov-00	Waterborne	2000	4	220	42	Hot Mix	727
	B	2.13	10.75	CL	W	08-May-01	Waterborne	2000	3	141	50	Hot Mix	722
	B	2.13	10.75	CL	W	28-Sep-01	Waterborne	2000	3	151	44	Hot mix	722
	B	2.13	10.75	CL	W	20-May-02	Waterborne	2000	3	166	52	Hot Mix	Not Available
CEDAR	C	0.00	5.30	CL	W	18-Nov-00	Waterborne	2000	2	148	33	Oil Aggregate	286
	C	0.00	5.26	CL	W	08-May-01	Waterborne	2000	4	190	48	Oil Aggregate	284
	C	0.00	5.26	CL	W	28-Sep-01	Waterborne	2000	3	157	53	Oil Aggregate	284
	C	0.00	5.26	CL	W	20-May-02	Waterborne	2000	2	107	41	Oil Aggregate	Not Available
CEDAR	EE	0.00	3.60	CL	N	18-Nov-00	Waterborne	2000	4	240	54	Hot Mix	712
	EE	0.00	3.61	CL	N	04-May-01	Waterborne	2000	4	189	53	Hot Mix	708
	EE	0.00	3.61	CL	N	28-Sep-01	Waterborne	2000	4	172	48	Hot Mix	708
	EE	0.00	3.61	CL	N	20-May-02	Waterborne	2000	3	120	36	Hot Mix	Not Available
DADE	215	2.10	8.80	CL	S	18-Nov-00	Waterborne	2000	4	208	44	Hot Mix	879
	215	2.07	8.80	CL	S	05-May-01	Waterborne	2000	4	142	51	Hot Mix	634
	215	2.07	8.80	CL	S	28-Sep-01	Waterborne	2000	3	114	44	Hot Mix	634
	215	2.07	8.80	CL	S	20-May-02	Waterborne	2000	3	142	54	Hot Mix	Not Available
DADE	39	11.80	14.80	CL	S	18-Nov-00	Waterborne	2000	4	197	44	Concrete	2028
	39	11.80	14.80	CL	S	05-May-01	Waterborne	2000	3	126	50	Concrete	2093
	39	11.80	14.80	CL	S	28-Sep-01	Waterborne	2000	3	107	47	Concrete	2093
	39	11.80	14.80	CL	S	20-May-02	Waterborne	2000	2	125	53	Concrete	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
DADE	39	11.80	14.80	REL	S	18-Nov-00	Waterborne	2000	4	241	64	Concrete	2028
	39	11.80	14.80	REL	S	27-Sep-01	Waterborne	2000	3	164	72	Concrete	2093
	39	11.80	14.80	REL	S	21-May-02	Waterborne	2000	2	144	48	Concrete	Not Available
DADE	D	5.20	12.30	CL	N	18-Nov-00	Waterborne	2000	4	179	38	Oil Aggregate	613
	D	5.19	12.24	CL	N	05-May-01	Waterborne	2000	4	168	45	Oil Aggregate	498
	D	5.19	12.24	CL	N	28-Sep-01	Waterborne	2000	3	127	41	Oil Aggregate	498
DADE	K	0.00	7.30	CL	E	01-May-99	Waterborne	1998	0	154	42	Oil Aggregate	462
	K	0.00	7.30	CL	E	16-Jul-99	Waterborne	1998	4	165	55	Oil Aggregate	462
	K	0.00	7.30	CL	E	08-Nov-99	Waterborne	1998	4	180	42	Oil Aggregate	462
DADE	Y	0.00	9.40	CL	W	18-Nov-00	Waterborne	2000	4	209	46	Hot Mix	650
	Y	0.00	9.37	CL	W	05-May-01	Waterborne	2000	3	145	51	Hot Mix	658
	Y	0.00	9.37	CL	W	28-Sep-01	Waterborne	2000	4	137	50	Hot Mix	658
JASPER	171	0.00	12.05	CL	N	07-May-01	Waterborne	2001	4	167	41	Hot Mix	4849
	171	0.00	12.05	CL	N	28-Sep-01	Waterborne	2001	3	127	37	Hot Mix	4849
	171	0.00	12.05	CL	N	21-May-02	Waterborne	2001	3	165	55	Hot Mix	Not Available
JASPER	171	0.00	12.05	REL	N	04-May-01	Waterborne	2001	4	293	54	Hot Mix	4849
	171	0.00	12.05	REL	N	27-Sep-01	Waterborne	2001	4	256	62	Hot Mix	4849
	171	0.00	12.05	REL	N	21-May-02	Waterborne	2001	3	192	55	Hot Mix	Not Available
JASPER	171	0.00	12.05	REL	S	04-May-01	Waterborne	2001	4	290	47	Hot Mix	4849
	171	0.00	12.05	REL	S	27-Sep-01	Waterborne	2001	3	149	53	Hot Mix	4849
	171	0.00	12.05	REL	S	21-May-02	Waterborne	2001	3	215	66	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	171	0.00	15.10	CL	S	03-May-99	Waterborne	1998	3	143	52	Hot Mix	6393
	171	0.00	15.10	CL	N	16-Jul-99	Waterborne	1999	4	184	45	Hot Mix	6393
	171	0.00	15.10	CL	N	17-Jul-99	Waterborne	1999	3	160	49	Hot Mix	6393
	171	0.00	15.10	CL	S	07-Nov-99	Waterborne	1999	0	163	46	Hot Mix	6393
JASPER	171	0.00	15.10	REL	N	02-May-99	Waterborne	1998	2	123	37	Hot Mix	6393
	171	0.00	15.10	REL	N	17-Jul-99	Waterborne	1999	3	143	35	Hot Mix	6393
	171	0.00	15.10	REL	N	07-Nov-99	Waterborne	1999	3	123	33	Hot Mix	6393
	171	0.00	15.40	REL	N	31-Mar-00	Waterborne	1999	3	93	24	Hot Mix	6569
JASPER	171	0.00	15.10	REL	S	02-May-99	Waterborne	1998	2	139	50	Hot Mix	6393
	171	0.00	15.10	REL	S	17-Jul-99	Waterborne	1999	4	216	57	Hot Mix	6393
	171	0.00	15.10	REL	S	07-Nov-99	Waterborne	1999	3	145	32	Hot Mix	6393
	171	0.00	15.40	REL	S	31-Mar-00	Waterborne	1999	3	125	39	Hot Mix	6569
	171	0.00	15.40	REL	S	24-Jun-01	Waterborne	2001	4	295	90	Hot Mix	5993
JASPER	171	15.10	17.90	LL	N	03-May-99	Waterborne	1998	3	155	43	Hot Mix	13760
	171	15.10	17.90	LL	N	16-Jul-99	Waterborne	1999	4	227	54	Hot Mix	13760
	171	15.10	17.90	LL	N	07-Nov-99	Waterborne	1999	0	223	60	Hot Mix	13760
	171	15.40	17.90	LL	N	31-Mar-00	Waterborne	1999	3	100	36	Hot Mix	16288
JASPER	171	15.10	17.90	LL	S	03-May-99	Waterborne	1998	3	164	48	Hot Mix	13760
	171	15.10	17.90	LL	S	16-Jul-99	Waterborne	1999	4	241	59	Hot Mix	13760
	171	15.10	17.90	LL	S	07-Nov-99	Waterborne	1999	3	222	61	Hot Mix	13760

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	171	15.10	17.90	REL	N	17-Jul-99	Waterborne	1999	4	244	60	Hot Mix	13760
	171	15.10	17.90	REL	N	07-Nov-99	Waterborne	1999	4	208	63	Hot Mix	13760
	171	15.40	17.90	REL	N	31-Mar-00	Waterborne	1999	3	106	33	Hot Mix	16288

JASPER	171	17.90	25.90	LEL	N	03-May-99	Waterborne	1998	3	153	51	Concrete	10101
	171	17.90	25.90	LEL	N	16-Jul-99	Waterborne	1999	4	229	45	Concrete	10101
	171	17.90	25.90	LEL	N	07-Nov-99	Waterborne	1999	0	233	57	Concrete	10101
	171	17.90	25.90	LEL	N	31-Mar-00	Waterborne	1999	2	122	44	Concrete	10448

JASPER	171	17.90	25.90	LEL	S	03-May-99	Waterborne	1998	3	161	54	Concrete	10101
	171	17.90	25.90	LEL	S	16-Jul-99	Waterborne	1999	4	222	41	Concrete	10101
	171	17.90	25.90	LEL	S	07-Nov-99	Waterborne	1999	0	229	54	Concrete	10101
	171	17.90	25.90	LEL	S	31-Mar-00	Waterborne	1999	2	131	45	Concrete	10448
	171	17.90	25.90	LEL	S	11-Nov-00	Waterborne	2000	2	166	50	Concrete	10448

JASPER	171	17.90	25.90	LL	N	03-May-99	Waterborne	1998	3	199	81	Concrete	10101
	171	17.90	25.90	LL	N	16-Jul-99	Waterborne	1999	4	261	71	Concrete	10101
	171	17.90	25.90	LL	N	07-Nov-99	Waterborne	1999	3	257	66	Concrete	10101
	171	17.90	25.90	LL	N	31-Mar-00	Waterborne	1999	3	125	41	Concrete	10448
	171	17.90	25.90	LL	N	11-Nov-00	Waterborne	2000	4	252	47	Concrete	10448

JASPER	171	17.90	25.90	LL	S	03-May-99	Waterborne	1998	3	200	78	Concrete	10101
	171	17.90	25.90	LL	S	16-Jul-99	Waterborne	1999	4	250	69	Concrete	10101
	171	17.90	25.90	LL	S	31-Mar-00	Waterborne	1999	3	128	42	Concrete	10448

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	171	17.90	25.90	REL	N	17-Jul-99	Waterborne	1999	4	276	58	Concrete	10101
	171	17.90	25.90	REL	N	07-Nov-99	Waterborne	1999	4	294	73	Concrete	10101
	171	17.90	25.90	REL	N	31-Mar-00	Waterborne	1999	3	125	49	Concrete	10448
JASPER	171	17.90	25.90	REL	S	17-Jul-99	Waterborne	1999	4	225	52	Concrete	10101
	171	17.90	25.90	REL	S	07-Nov-99	Waterborne	1999	4	299	61	Concrete	10101
	171	17.90	25.90	REL	S	31-Mar-00	Waterborne	1999	3	129	48	Concrete	10448
	171	17.90	25.90	REL	S	11-Nov-00	Waterborne	2000	4	232	67	Concrete	10448
JASPER	249	0.00	1.10	CL	N	11-Nov-00	HD21	2000	3	152	41	Concrete	6576
	249	0.00	1.07	CL	N	24-Jun-01	HD21	2000	3	219	62	Concrete	6610
	249	0.00	1.07	CL	N	27-Sep-01	HD21	2000	3	159	45	Concrete	6610
JASPER	37	0.00	21.70	CL	N	01-May-99	Waterborne	1998	0	142	44	Hot Mix	716
	37	0.00	21.70	CL	S	07-Nov-99	Waterborne	1999	3	175	29	Hot Mix	716
	37	0.00	21.70	CL	S	31-Mar-00	Waterborne	1999	3	171	58	Hot Mix	637
JASPER	43	0.00	11.10	REL	N	02-May-99	Waterborne	1998	0	158	46	Oil Aggregate	2366
	43	0.00	11.10	REL	N	07-Nov-99	Waterborne	1999	3	161	32	Oil Aggregate	2366
	43	0.00	11.10	REL	N	31-Mar-00	Waterborne	1999	3	158	43	Oil Aggregate	2666
JASPER	43	0.00	11.10	REL	S	02-May-99	Waterborne	1998	0	142	54	Oil Aggregate	2366
	43	0.00	11.10	REL	S	07-Nov-99	Waterborne	1999	3	164	30	Oil Aggregate	2366
	43	0.00	11.10	REL	S	31-Mar-00	Waterborne	1999	3	153	42	Oil Aggregate	2666

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	43	11.10	15.40	REL	N	02-May-99	Waterborne	1998	0	119	42	Hot Mix	5963
	43	11.10	15.40	REL	N	07-Nov-99	Waterborne	1999	3	180	35	Hot Mix	5963
	43	11.10	15.40	REL	N	31-Mar-00	Waterborne	1999	3	127	46	Hot Mix	6112

JASPER	43	15.40	18.50	CL	N	03-May-99	Waterborne	1998	1	102	29	Hot Mix	16589
	43	15.40	18.50	CL	N	08-Nov-99	Waterborne	1999	3	138	41	Hot Mix	16589
	43	15.40	18.50	CL	N	31-Mar-00	Waterborne	1999	1	106	37	Hot Mix	16507

JASPER	43	15.40	18.50	LL	N	02-May-99	Waterborne	1998	0	128	32	Hot Mix	16589
	43	15.40	18.50	LL	N	07-Nov-99	Waterborne	1999	3	218	50	Hot Mix	16589
	43	15.40	18.50	LL	N	31-Mar-00	Waterborne	1999	2	124	39	Hot Mix	16507
	43	15.40	18.50	LL	N	11-Nov-00	Waterborne	2000	2	194	43	Hot Mix	16507

JASPER	43	15.40	18.50	LL	S	02-May-99	Waterborne	1998	0	133	36	Hot Mix	16589
	43	15.40	18.50	LL	S	07-Nov-99	Waterborne	1999	3	260	51	Hot Mix	16589
	43	15.40	18.50	LL	S	31-Mar-00	Waterborne	1999	2	127	40	Hot Mix	16507
	43	15.40	18.50	LL	S	11-Nov-00	Waterborne	2000	2	192	36	Hot Mix	16507

JASPER	43	15.40	18.50	REL	N	02-May-99	Waterborne	1998	0	133	51	Hot Mix	16589
	43	15.40	18.50	REL	N	07-Nov-99	Waterborne	1999	3	198	45	Hot Mix	16589
	43	15.40	18.50	REL	N	31-Mar-00	Waterborne	1999	2	115	43	Hot Mix	16507
	43	15.40	18.50	REL	N	11-Nov-00	Waterborne	2000	4	215	64	Hot Mix	16507

JASPER	43	15.40	18.50	REL	S	02-May-99	Waterborne	1998	0	143	52	Hot Mix	16589
	43	15.40	18.50	REL	S	07-Nov-99	Waterborne	1999	3	199	45	Hot Mix	16589
	43	15.40	18.50	REL	S	31-Mar-00	Waterborne	1999	2	110	41	Hot Mix	16507
	43	15.40	18.50	REL	S	11-Nov-00	Waterborne	2000	4	221	66	Hot Mix	16507

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	44	0.00	2.10	LEL	E	07-May-01	Epoxy	2000	3	106	23	Hot Mix	27231
	44	0.00	2.10	LEL	E	28-Sep-01	Epoxy	2000	3	80	25	Hot Mix	27231
	44	0.00	2.10	LEL	E	22-May-02	Epoxy	2000	3	123	58	Hot Mix	Not Available

JASPER	44	0.00	2.10	LEL	W	07-May-01	Epoxy	2000	3	116	27	Hot Mix	27231
	44	0.00	2.10	LEL	W	28-Sep-01	Epoxy	2000	3	77	26	Hot Mix	27231
	44	0.00	2.10	LEL	W	22-May-02	Epoxy	2000	3	167	54	Hot Mix	Not Available

JASPER	44	0.00	2.10	LL	E	11-Nov-00	Epoxy	2000	4	436	50	Hot Mix	26860
	44	0.00	2.10	LL	E	07-May-01	Epoxy	2000	3	195	40	Hot Mix	27231
	44	0.00	2.10	LL	E	28-Sep-01	Epoxy	2000	3	189	40	Hot Mix	27231
	44	0.00	2.10	LL	E	20-May-02	Epoxy	2000	3	131	26	Hot Mix	Not Available

JASPER	44	0.00	2.10	LL	W	11-Nov-00	Epoxy	2000	4	448	23	Hot Mix	26860
	44	0.00	2.10	LL	W	07-May-01	Epoxy	2000	3	176	30	Hot Mix	27231
	44	0.00	2.10	LL	W	27-Sep-01	Epoxy	2000	3	200	48	Hot Mix	27231
	44	0.00	2.10	LL	W	20-May-02	Epoxy	2000	3	138	35	Hot Mix	Not Available

JASPER	44	0.00	2.10	REL	E	11-Nov-00	Epoxy	2000	4	320	81	Hot Mix	26860
	44	0.00	2.10	REL	E	07-May-01	Epoxy	2000	3	134	49	Hot Mix	27231
	44	0.00	2.10	REL	E	27-Sep-01	Epoxy	2000	3	126	49	Hot Mix	27231
	44	0.00	2.10	REL	E	20-May-02	Epoxy	2000	2	122	35	Hot Mix	Not Available

JASPER	44	0.00	2.10	REL	W	11-Nov-00	Epoxy	2000	4	308	74	Hot Mix	26860
	44	0.00	2.10	REL	W	07-May-01	Epoxy	2000	3	163	49	Hot Mix	27231
	44	0.00	2.10	REL	W	27-Sep-01	Epoxy	2000	3	165	45	Hot Mix	27231
	44	0.00	2.10	REL	W	20-May-02	Epoxy	2000	2	120	43	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	44	1.00	8.00	LEL	E	03-May-99	Waterborne	1998	4	104	39	Concrete	26943
	44	1.00	8.00	LEL	E	31-Jul-99	Waterborne	1998	2	100	38	Concrete	26943
	44	1.00	8.00	LEL	E	07-Nov-99	Waterborne	1999	0	232	40	Concrete	26943
	44	1.00	8.00	LEL	E	01-Apr-00	Waterborne	1999	2	123	66	Concrete	28716
JASPER	44	1.00	8.00	LEL	W	03-May-99	Waterborne	1998	4	124	41	Concrete	26943
	44	1.00	8.00	LEL	W	31-Jul-99	Waterborne	1998	3	83	28	Concrete	26943
	44	1.00	8.00	LEL	W	07-Nov-99	Waterborne	1999	0	238	36	Concrete	26943
	44	1.00	8.00	LEL	W	01-Apr-00	Waterborne	1999	2	129	77	Concrete	28716
JASPER	44	1.00	8.00	LL	E	03-May-99	Waterborne	1998	4	225	81	Concrete	26943
	44	1.00	8.00	LL	E	31-Jul-99	Waterborne	1998	3	213	75	Concrete	26943
	44	1.00	8.00	LL	E	07-Nov-99	Waterborne	1999	0	308	64	Concrete	26943
	44	1.00	8.00	LL	E	30-Mar-00	Waterborne	1999	3	206	44	Concrete	28716
JASPER	44	1.00	8.00	LL	W	03-May-99	Waterborne	1998	4	143	37	Concrete	26943
	44	1.00	8.00	LL	W	31-Jul-99	Waterborne	1998	4	108	27	Concrete	26943
	44	1.00	8.00	LL	W	07-Nov-99	Waterborne	1999	0	292	68	Concrete	26943
	44	1.00	8.00	LL	W	30-Mar-00	Waterborne	1999	3	201	49	Concrete	28716
JASPER	44	1.00	8.00	REL	E	03-May-99	Waterborne	1998	3	183	70	Concrete	26943
	44	1.00	8.00	REL	E	31-Jul-99	Waterborne	1998	3	167	58	Concrete	26943
	44	1.00	8.00	REL	E	07-Nov-99	Waterborne	1999	4	337	79	Concrete	26943
	44	1.00	8.00	REL	E	30-Mar-00	Waterborne	1999	3	151	48	Concrete	28716
	44	1.00	8.00	REL	E	01-Apr-00	Waterborne	1999	3	143	68	Concrete	28716

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	44	1.00	8.00	REL	W	03-May-99	Waterborne	1998	3	110	43	Concrete	26943
	44	1.00	8.00	REL	W	31-Jul-99	Waterborne	1998	2	97	45	Concrete	26943
	44	1.00	8.00	REL	W	07-Nov-99	Waterborne	1999	4	308	112	Concrete	26943
	44	1.00	8.00	REL	W	30-Mar-00	Waterborne	1999	3	170	65	Concrete	28716

JASPER	44	17.00	22.00	LEL	E	30-Apr-99	Thermo Extruded	1998	0	98	36	Hot Mix	25168
	44	17.00	22.00	LEL	E	31-Jul-99	Thermo Extruded	1998	2	88	37	Hot Mix	25168
	44	16.90	21.90	LEL	E	07-Nov-99	Thermo Extruded	1998	0	201	33	Hot Mix	25168
	44	17.30	21.85	LEL	E	08-May-00	Paint over thermo	2000	3	87	24	Hot Mix	25628
	44	17.30	21.85	LEL	E	10-Nov-00	Paint over thermo	2000	4	155	22	Hot Mix	25628
	44	17.30	21.85	LEL	E	28-Sep-01	Paint over thermo	2000	3	140	60	Hot Mix	26243

JASPER	44	17.00	22.00	LEL	W	30-Apr-99	Thermo Extruded	1998	0	91	15	Hot Mix	25168
	44	17.00	22.00	LEL	W	31-Jul-99	Thermo Extruded	1998	4	88	13	Hot Mix	25168
	44	16.90	21.90	LEL	W	07-Nov-99	Thermo Extruded	1998	0	76	12	Hot Mix	25168
	44	16.90	21.90	LEL	W	01-Apr-00	Thermo Extruded	1998	3	81	12	Hot Mix	25628
	44	17.30	21.85	LEL	W	10-Nov-00	Paint over thermo	2000	4	187	29	Hot Mix	25628
	44	17.30	21.85	LEL	W	08-May-01	Paint over thermo	2000	3	123	49	Hot Mix	26243
	44	17.30	21.85	LEL	W	28-Sep-01	Paint over thermo	2000	3	162	64	Hot Mix	26243

JASPER	44	17.00	22.00	LL	E	31-Jul-99	Thermo Extruded	1998	4	263	55	Hot Mix	25168
	44	16.90	21.90	LL	E	08-Nov-99	Thermo Extruded	1998	4	287	52	Hot Mix	25168
	44	16.90	21.90	LL	E	30-Mar-00	Thermo Extruded	1998	3	174	32	Hot Mix	25628
	44	17.30	21.90	LL	E	10-Nov-00	Paint over thermo	2000	4	168	43	Hot Mix	25628
	44	17.30	21.85	LL	E	08-May-01	Paint over thermo	2000	4	188	61	Hot Mix	26243
	44	17.30	21.85	LL	E	27-Sep-01	Paint over thermo	2000	3	193	51	Hot Mix	26243

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	44	17.00	22.00	LL	W	30-Apr-99	Thermo Extruded	1998	0	169	63	Hot Mix	25168
	44	17.00	22.00	LL	W	02-May-99	Thermo Extruded	1998	0	135	32	Hot Mix	25168
	44	17.00	22.00	LL	W	31-Jul-99	Thermo Extruded	1998	4	144	33	Hot Mix	25168
	44	16.90	21.90	LL	W	08-Nov-99	Thermo Extruded	1998	4	180	52	Hot Mix	25168
	44	17.30	21.90	LL	W	10-Nov-00	Paint over thermo	2000	4	212	43	Hot Mix	25628
	44	17.30	21.85	LL	W	08-May-01	Paint over thermo	2000	4	237	47	Hot Mix	26243
	44	17.30	21.85	LL	W	27-Sep-01	Paint over thermo	2000	3	219	38	Hot Mix	26243
JASPER	44	17.00	22.00	REL	E	30-Apr-99	Thermo Extruded	1998	0	125	60	Hot Mix	25168
	44	17.00	22.00	REL	E	31-Jul-99	Thermo Extruded	1998	4	110	44	Hot Mix	25168
	44	16.90	21.90	REL	E	07-Nov-99	Thermo Extruded	1998	4	285	34	Hot Mix	25168
	44	16.90	21.90	REL	E	30-Mar-00	Thermo Extruded	1998	3	120	41	Hot Mix	25628
JASPER	44	17.00	22.00	REL	W	30-Apr-99	Thermo Extruded	1998	0	143	30	Hot Mix	25168
	44	17.00	22.00	REL	W	31-Jul-99	Thermo Extruded	1998	4	104	21	Hot Mix	25168
	44	16.90	21.90	REL	W	07-Nov-99	Thermo Extruded	1998	4	134	21	Hot Mix	25168
	44	16.90	21.90	REL	W	30-Mar-00	Thermo Extruded	1998	3	101	17	Hot Mix	25628
	44	17.30	21.90	REL	W	10-Nov-00	Paint over thermo	2000	4	202	30	Hot Mix	25628
JASPER	571	1.60	2.70	CL	N	11-Nov-00	Waterborne	2000	3	190	46	Hot Mix	3417
	571	1.63	2.75	CL	N	24-Jun-01	Waterborne	2000	2	123	49	Hot Mix	3482
	571	1.63	2.75	CL	N	28-Sep-01	Waterborne	2000	1	61	28	Hot Mix	3482
JASPER	59	0.00	1.50	CL	N	01-May-99	Waterborne	1998	0	94	29	Hot Mix	10852
	59	0.00	1.50	CL	N	16-Jul-99	Waterborne	1999	4	227	53	Hot Mix	10852
	59	0.00	1.50	CL	N	31-Mar-00	Waterborne	1999	2	148	46	Hot Mix	10852

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	59	0.00	1.50	REL	N	01-May-99	Waterborne	1998	0	110	49	Hot Mix	10852
	59	0.00	1.50	REL	N	16-Jul-99	Waterborne	1999	4	297	57	Hot Mix	10852
	59	0.00	1.50	REL	N	07-Nov-99	Waterborne	1999	4	282	60	Hot Mix	10852
	59	0.00	1.50	REL	N	30-Mar-00	Waterborne	1999	1	118	47	Hot Mix	10852
JASPER	66	0.00	3.00	CL	E	18-Jul-99	Waterborne	1999	4	236	44	Concrete	10482
	66	0.00	3.19	CL	E	28-Sep-01	Waterborne	2001	3	119	29	Concrete	12267
	66	0.00	3.19	CL	W	28-Sep-01	Waterborne	2001	3	170	51	Concrete	12267
JASPER	66	0.00	3.00	LEL	E	03-May-99	Waterborne	1998	2	150	51	Concrete	10482
	66	0.00	3.20	LEL	E	07-Nov-99	Waterborne	1999	3	186	40	Concrete	10482
	66	0.00	3.20	LEL	E	01-Apr-00	Waterborne	1999	2	119	40	Concrete	12329
	66	0.00	3.19	LEL	E	07-May-01	Waterborne	2001	4	164	37	Concrete	12267
	66	0.00	3.19	LEL	E	22-May-02	Waterborne	2001	3	170	51	Concrete	Not Available
JASPER	66	0.00	3.20	LEL	W	03-May-99	Waterborne	1998	4	156	47	Concrete	10482
	66	0.00	3.00	LEL	W	18-Jul-99	Waterborne	1999	4	224	45	Concrete	10482
	66	0.00	3.20	LEL	W	07-Nov-99	Waterborne	1999	4	190	41	Concrete	10482
	66	0.00	3.20	LEL	W	01-Apr-00	Waterborne	1999	2	128	45	Concrete	12329
	66	0.00	3.19	LEL	W	07-May-01	Waterborne	2001	4	172	40	Concrete	12267
	66	0.00	3.19	LEL	W	22-May-02	Waterborne	2001	3	152	50	Concrete	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	66	0.00	3.20	LL	E	02-May-99	Waterborne	1998	0	208	49	Concrete	10482
	66	0.00	3.00	LL	E	17-Jul-99	Waterborne	1998	4	249	44	Concrete	10482
	66	0.00	3.20	LL	E	07-Nov-99	Waterborne	1998	3	221	43	Concrete	10482
	66	0.00	3.20	LL	E	01-Apr-00	Waterborne	1998	3	120	29	Concrete	12329
	66	0.00	3.19	LL	E	08-May-01	Waterborne	2001	4	258	64	Concrete	12267
	66	0.00	3.19	LL	E	28-Sep-01	Waterborne	2001	3	142	37	Concrete	12267
	66	0.00	3.19	LL	E	21-May-02	Waterborne	2001	3	206	59	Concrete	Not Available

JASPER	66	0.00	3.20	LL	W	02-May-99	Waterborne	1998	0	187	48	Concrete	10482
	66	0.00	3.20	LL	W	07-Nov-99	Waterborne	1998	0	185	40	Concrete	10482
	66	0.00	3.20	LL	W	01-Apr-00	Waterborne	1998	3	139	41	Concrete	12329
	66	0.00	3.19	LL	W	08-May-01	Waterborne	2001	4	253	68	Concrete	12267
	66	0.00	3.19	LL	W	28-Sep-01	Waterborne	2001	3	159	40	Concrete	12267
	66	0.00	3.19	LL	W	21-May-02	Waterborne	2001	3	200	69	Concrete	Not Available

JASPER	66	0.00	3.20	REL	E	02-May-99	Waterborne	1998	0	200	57	Concrete	10482
	66	0.00	3.20	REL	E	07-Nov-99	Waterborne	1998	0	164	34	Concrete	10482
	66	0.00	3.20	REL	E	01-Apr-00	Waterborne	1998	3	101	33	Concrete	12329
	66	0.00	3.19	REL	E	08-May-01	Waterborne	2001	4	262	65	Concrete	12267
	66	0.00	3.19	REL	E	27-Sep-01	Waterborne	2001	4	280	56	Concrete	12267
	66	0.00	3.19	REL	E	21-May-02	Waterborne	2001	3	226	64	Concrete	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	66	0.00	3.20	REL	W	02-May-99	Waterborne	1998	0	192	51	Concrete	10482
	66	0.00	3.20	REL	W	17-Jul-99	Waterborne	1999	4	217	52	Concrete	10482
	66	0.00	3.20	REL	W	07-Nov-99	Waterborne	1999	3	176	46	Concrete	10482
	66	0.00	3.20	REL	W	01-Apr-00	Waterborne	1999	3	139	40	Concrete	12329
	66	0.00	3.19	REL	W	08-May-01	Waterborne	2001	4	304	72	Concrete	12267
	66	0.00	3.19	REL	W	27-Sep-01	Waterborne	2001	4	321	61	Concrete	12267
	66	0.00	3.19	REL	W	21-May-02	Waterborne	2001	3	238	71	Concrete	Not Available
JASPER	66	3.20	7.90	LL	E	02-May-99	Waterborne	1998	0	115	40	Concrete	18065
	66	3.20	7.90	LL	E	07-Nov-99	Waterborne	1999	3	262	66	Concrete	18065
	66	3.20	7.90	LL	E	01-Apr-00	Waterborne	1999	2	135	64	Concrete	18085
JASPER	66	3.20	7.90	LL	W	03-May-99	Waterborne	1998	3	150	120	Concrete	18065
	66	3.20	7.90	LL	W	07-Nov-99	Waterborne	1999	3	271	64	Concrete	18065
	66	3.20	7.90	LL	W	01-Apr-00	Waterborne	1999	2	131	89	Concrete	18085
JASPER	66	6.50	7.90	CL	E	03-May-99	Waterborne	1998	1	132	34	Concrete	20338
	66	6.55	7.93	CL	E	28-Sep-01	DT400	2001	3	149	44	Concrete	20619
	66	6.55	7.93	CL	E	22-May-02	DT400	2001	2	113	37	Concrete	Not Available
JASPER	66	7.90	9.00	LL	E	02-May-99	Waterborne	1998	0	166	45	Hot Mix	12418
	66	7.90	9.00	LL	E	17-Jul-99	Waterborne	1999	4	293	87	Hot Mix	12418
	66	7.90	9.00	LL	E	07-Nov-99	Waterborne	1999	3	245	69	Hot Mix	12418
	66	7.90	9.00	LL	E	01-Apr-00	Waterborne	1999	2	198	62	Hot Mix	16283

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	66	7.90	9.00	LL	W	03-May-99	Waterborne	1998	3	150	69	Hot Mix	12418
	66	7.90	9.00	LL	W	17-Jul-99	Waterborne	1999	4	350	78	Hot Mix	12418
	66	7.90	9.00	LL	W	07-Nov-99	Waterborne	1999	3	283	63	Hot Mix	12418
	66	7.90	9.00	LL	W	01-Apr-00	Waterborne	1999	2	182	70	Hot Mix	16283
JASPER	66	9.00	14.10	CL	E	03-May-99	Waterborne	1998	3	161	41	Hot Mix	10239
	66	9.00	14.00	CL	E	18-Jul-99	Waterborne	1999	4	265	84	Hot Mix	10239
	66	9.00	14.10	CL	E	01-Apr-00	Waterborne	1999	2	161	52	Hot Mix	10941
JASPER	66	9.00	14.10	REL	E	02-May-99	Waterborne	1998	0	109	45	Hot Mix	10239
	66	9.00	14.10	REL	E	17-Jul-99	Waterborne	1999	3	195	64	Hot Mix	10239
	66	9.00	14.10	REL	E	07-Nov-99	Waterborne	1999	3	136	44	Hot Mix	10239
	66	9.00	14.10	REL	E	01-Apr-00	Waterborne	1999	2	112	49	Hot Mix	10941
JASPER	66	9.00	14.10	REL	W	02-May-99	Waterborne	1998	0	115	42	Hot Mix	10239
	66	9.00	14.10	REL	W	17-Jul-99	Waterborne	1999	4	314	88	Hot Mix	10239
	66	9.00	14.10	REL	W	07-Nov-99	Waterborne	1999	3	208	70	Hot Mix	10239
	66	9.00	14.10	REL	W	01-Apr-00	Waterborne	1999	2	121	51	Hot Mix	10941
JASPER	71	0.00	6.00	LEL	S	03-May-99	Waterborne	1998	2	160	52	Concrete	13245
	71	0.00	6.00	LEL	S	18-Jul-99	Waterborne	1998	3	166	51	Concrete	13245
	71	0.00	6.00	LEL	S	08-Nov-99	Waterborne	1999	4	258	29	Concrete	13245
JASPER	71	0.00	6.00	REL	S	03-May-99	Waterborne	1998	3	217	80	Concrete	13245
	71	0.00	6.00	REL	S	17-Jul-99	Waterborne	1998	4	252	90	Concrete	13245
	71	0.00	6.00	REL	S	08-Nov-99	Waterborne	1999	0	334	66	Concrete	13245

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	71	0.00	9.00	REL	N	03-May-99	Waterborne	1998	2	149	39	Concrete	13245
	71	0.00	9.00	REL	N	17-Jul-99	Waterborne	1998	2	176	45	Concrete	13245
	71	0.00	9.00	REL	N	08-Nov-99	Waterborne	1999	0	289	76	Concrete	13245
JASPER	71	0.00	9.00	REL	S	03-May-99	Waterborne	1998	2	130	42	Concrete	13245
	71	0.00	9.00	REL	S	17-Jul-99	Waterborne	1998	2	154	49	Concrete	13245
	71	0.00	9.00	REL	S	08-Nov-99	Waterborne	1999	4	289	94	Concrete	13245
JASPER	71	0.00	14.00	LEL	N	01-May-99	Waterborne	1998	0	193	62	Concrete	13757
	71	0.00	14.00	LEL	N	07-Nov-99	Waterborne	1999	0	173	57	Concrete	13757
	71	0.00	14.00	LEL	N	31-Mar-00	Waterborne	1999	2	167	58	Concrete	14694
JASPER	71	0.00	14.00	LEL	S	01-May-99	Waterborne	1998	0	130	40	Concrete	13757
	71	0.00	14.00	LEL	S	07-Nov-99	Waterborne	1999	0	155	66	Concrete	13757
	71	0.00	14.00	LEL	S	31-Mar-00	Waterborne	1999	2	133	52	Concrete	14694
JASPER	71	0.00	14.00	LL	N	01-May-99	Waterborne	1998	0	133	47	Concrete	13757
	71	0.00	14.00	LL	N	07-Nov-99	Waterborne	1999	3	177	93	Concrete	13757
	71	0.00	14.00	LL	N	30-Mar-00	Waterborne	1999	1	92	32	Concrete	14694
JASPER	71	0.00	14.00	LL	S	01-May-99	Waterborne	1998	0	137	57	Concrete	13757
	71	0.00	14.00	LL	S	07-Nov-99	Waterborne	1999	3	205	102	Concrete	13757
	71	0.00	14.00	LL	S	30-Mar-00	Waterborne	1999	1	88	39	Concrete	14694
JASPER	71	0.00	14.00	REL	S	01-May-99	Waterborne	1998	0	160	69	Concrete	13757
	71	0.00	14.00	REL	S	07-Nov-99	Waterborne	1999	4	191	83	Concrete	13757
	71	0.00	14.00	REL	S	30-Mar-00	Waterborne	1999	2	134	46	Concrete	14694

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	71	14.00	21.00	LEL	N	01-May-99	Waterborne	1998	0	140	64	Concrete	20287
	71	14.00	21.00	LEL	N	31-Jul-99	Waterborne	1998	2	125	55	Concrete	20287
	71	14.00	21.00	LEL	N	07-Nov-99	Waterborne	1999	0	184	64	Concrete	20287
	71	14.00	21.00	LEL	N	31-Mar-00	Waterborne	1999	2	139	56	Concrete	20027
JASPER	71	14.00	21.00	LEL	S	01-May-99	Waterborne	1998	0	101	35	Concrete	20287
	71	14.00	21.00	LEL	S	31-Jul-99	Waterborne	1998	3	102	38	Concrete	20287
	71	14.00	21.00	LEL	S	07-Nov-99	Waterborne	1999	0	160	65	Concrete	20287
JASPER	71	14.00	21.00	LL	N	01-May-99	Waterborne	1998	0	133	50	Concrete	20287
	71	14.00	21.00	LL	N	31-Jul-99	Waterborne	1998	3	133	50	Concrete	20287
	71	14.00	21.00	LL	N	07-Nov-99	Waterborne	1999	4	206	96	Concrete	20287
	71	14.00	21.00	LL	N	30-Mar-00	Waterborne	1999	1	108	40	Concrete	20027
JASPER	71	14.00	21.00	LL	S	01-May-99	Waterborne	1998	0	167	62	Concrete	20287
	71	14.00	21.00	LL	S	31-Jul-99	Waterborne	1998	3	157	61	Concrete	20287
	71	14.00	21.00	LL	S	07-Nov-99	Waterborne	1999	3	231	93	Concrete	20287
	71	14.00	21.00	LL	S	30-Mar-00	Waterborne	1999	1	89	41	Concrete	20027
JASPER	71	14.00	21.00	REL	N	01-May-99	Waterborne	1998	0	165	61	Concrete	20287
	71	14.00	21.00	REL	N	31-Jul-99	Waterborne	1998	2	122	41	Concrete	20287
	71	14.00	21.00	REL	N	07-Nov-99	Waterborne	1999	4	223	90	Concrete	20287
	71	14.00	21.00	REL	N	30-Mar-00	Waterborne	1999	1	132	49	Concrete	20027

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	71	14.00	21.00	REL	S	01-May-99	Waterborne	1998	0	152	61	Concrete	20287
	71	14.00	21.00	REL	S	31-Jul-99	Waterborne	1998	2	142	51	Concrete	20287
	71	14.00	21.00	REL	S	07-Nov-99	Waterborne	1999	4	253	72	Concrete	20287
	71	14.00	21.00	REL	S	30-Mar-00	Waterborne	1999	2	134	42	Concrete	20027
JASPER	71 Bus	8.80	14.70	CL	N	04-May-99	Waterborne	1998	2	107	30	Hot Mix	26690
	71 Bus	9.00	14.70	CL	N	16-Jul-99	Waterborne	1999	4	244	55	Hot Mix	26690
	71 Bus	8.80	14.70	CL	N	07-Nov-99	Waterborne	1999	4	216	55	Hot Mix	26690
	71 Bus	8.80	14.70	CL	N	01-Apr-00	Waterborne	1999	2	102	40	Hot Mix	30371
JASPER	71 Bus	8.80	14.70	CL	S	04-May-99	Waterborne	1998	2	104	29	Hot Mix	26690
	71 Bus	9.00	14.70	CL	S	16-Jul-99	Waterborne	1999	4	224	53	Hot Mix	26690
	71 Bus	8.80	14.70	CL	S	07-Nov-99	Waterborne	1999	4	221	59	Hot Mix	26690
	71 Bus	8.80	14.70	CL	S	01-Apr-00	Waterborne	1999	2	100	39	Hot Mix	30371
JASPER	71 Bus	8.80	14.70	LL	S	04-May-99	Waterborne	1998	1	125	33	Hot Mix	26690
	71 Bus	9.00	14.70	LL	S	16-Jul-99	Waterborne	1999	4	264	61	Hot Mix	26690
	71 Bus	8.80	14.70	LL	S	07-Nov-99	Waterborne	1999	3	268	48	Hot Mix	26690
	71 Bus	8.80	14.70	LL	S	02-Apr-00	Waterborne	1999	2	101	34	Hot Mix	30371
JASPER	71 Bus	9.20	14.70	LL	N	04-May-99	Waterborne	1998	1	124	39	Hot Mix	26690
	71 Bus	9.20	14.70	LL	N	16-Jul-99	Waterborne	1999	4	294	62	Hot Mix	26690
	71 Bus	9.20	14.70	LL	N	01-Apr-00	Waterborne	1999	2	101	56	Hot Mix	30371
JASPER	71 Bus	9.20	14.70	REL	N	04-May-99	Waterborne	1998	1	113	41	Hot Mix	26690
	71 Bus	9.20	14.70	REL	N	17-Jul-99	Waterborne	1999	4	237	75	Hot Mix	26690
	71 Bus	9.20	14.70	REL	N	01-Apr-00	Waterborne	1999	2	163	67	Hot Mix	30371

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	96	0.00	11.40	CL	W	01-May-99	Waterborne	1998	0	170	52	Hot Mix	2198
	96	0.00	11.40	CL	W	16-Jul-99	Waterborne	1998	4	177	58	Hot Mix	2198
	96	0.00	11.40	CL	E	07-Nov-99	Waterborne	1998	0	181	59	Hot Mix	2198
	96	0.00	11.40	CL	W	01-Apr-00	Waterborne	1998	2	138	45	Hot Mix	1980

JASPER	96	0.00	11.40	REL	E	02-May-99	Waterborne	1998	0	136	41	Hot Mix	2198
	96	0.00	11.40	REL	E	07-Nov-99	Waterborne	1998	3	131	39	Hot Mix	2198
	96	0.00	11.40	REL	E	31-Mar-00	Waterborne	1998	2	122	45	Hot Mix	1980

JASPER	96	0.00	11.40	REL	W	02-May-99	Waterborne	1998	0	157	62	Hot Mix	2198
	96	0.00	11.40	REL	W	01-Aug-99	Waterborne	1998	3	140	51	Hot Mix	2198
	96	0.00	11.40	REL	W	07-Nov-99	Waterborne	1998	3	152	57	Hot Mix	2198
	96	0.00	11.40	REL	W	31-Mar-00	Waterborne	1998	2	136	61	Hot Mix	1980

JASPER	96	2.80	7.70	REL	E	11-Nov-00	Waterborne	2000	4	269	55	Hot Mix	1689
	96	2.79	7.75	REL	E	08-May-01	Waterborne	2000	3	193	79	Hot Mix	1680
	96	2.79	7.75	REL	E	27-Sep-01	Waterborne	2000	3	195	57	Hot Mix	1680
	96	2.79	7.75	REL	E	20-May-02	Waterborne	2001	3	244	71	Hot Mix	Not Available

JASPER	96	2.80	7.70	REL	W	11-Nov-00	Waterborne	2000	4	291	60	Hot Mix	1689
	96	2.79	7.75	REL	W	08-May-01	Waterborne	2000	3	143	66	Hot Mix	1680
	96	2.79	7.75	REL	W	27-Sep-01	Waterborne	2000	3	162	44	Hot Mix	1680
	96	2.79	7.75	REL	W	22-May-02	Waterborne	2001	3	226	63	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	96	12.50	26.40	CL	W	01-May-99	Waterborne	1998	0	102	37	Hot Mix	4939
	96	12.50	26.40	CL	W	16-Jul-99	Waterborne	1999	4	205	47	Hot Mix	4939
	96	12.52	26.42	CL	E	08-Nov-99	Waterborne	1999	4	190	36	Hot Mix	4939
	96	12.50	26.40	CL	E	31-Mar-00	Waterborne	1999	2	130	37	Hot Mix	4775
JASPER	96	12.50	26.40	REL	E	02-May-99	Waterborne	1998	0	103	44	Hot Mix	4939
	96	12.50	26.40	REL	E	17-Jul-99	Waterborne	1999	4	163	38	Hot Mix	4939
	96	12.50	26.40	REL	E	07-Nov-99	Waterborne	1999	3	146	32	Hot Mix	4939
	96	12.50	26.40	REL	E	31-Mar-00	Waterborne	1999	2	90	29	Hot Mix	4775
JASPER	96	12.50	26.40	REL	W	02-May-99	Waterborne	1998	0	110	48	Hot Mix	4939
	96	12.50	26.40	REL	W	17-Jul-99	Waterborne	1999	4	168	45	Hot Mix	4939
	96	12.50	26.40	REL	W	07-Nov-99	Waterborne	1999	3	149	38	Hot Mix	4939
	96	12.50	26.40	REL	W	31-Mar-00	Waterborne	1999	3	104	37	Hot Mix	4775
JASPER	AA	0.00	5.95	CL	N	08-May-01	Waterborne	2001	3	132	37	Hot Mix	861
	AA	0.00	5.95	CL	N	28-Sep-01	Waterborne	2001	3	153	55	Hot Mix	861
	AA	0.00	5.95	CL	N	22-May-02	Waterborne	2001	3	211	68	Hot Mix	Not Available
JASPER	AA	0.00	6.00	CL	N	03-May-99	Waterborne	1998	4	188	49	Hot Mix	861
	AA	0.00	6.00	CL	N	01-Aug-99	Waterborne	1998	4	167	43	Hot Mix	861
	AA	0.00	6.00	CL	N	07-Nov-99	Waterborne	1999	0	185	51	Hot Mix	861
	AA	0.00	6.00	CL	N	01-Apr-00	Waterborne	1999	3	142	43	Hot Mix	859

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	BB	0.00	6.60	CL	S	01-May-99	Waterborne	1998	0	157	32	Oil Aggregate	460
	BB	0.00	6.60	CL	N	16-Jul-99	Waterborne	1999	4	126	33	Oil Aggregate	460
	BB	0.00	6.60	CL	N	07-Nov-99	Waterborne	1999	0	126	24	Oil Aggregate	460
	BB	0.00	6.60	CL	S	31-Mar-00	Waterborne	1999	2	140	24	Oil Aggregate	424
JASPER	CC	0.00	0.90	CL	W	02-May-99	Waterborne	1997	0	197	52	Oil Aggregate	354
	CC	0.00	0.90	CL	W	17-Jul-99	Waterborne	1999	4	208	69	Oil Aggregate	354
	CC	0.00	0.90	CL	W	07-Nov-99	Waterborne	1999		212	43	Oil Aggregate	354
	CC	0.00	0.90	CL	W	01-Apr-00	Waterborne	1999	4	209	40	Oil Aggregate	352
JASPER	D	4.30	15.80	CL	E	11-Nov-00	Waterborne	2000	4	216	75	Hot Mix	438
	D	4.20	15.78	CL	E	07-May-01	Waterborne	2000	3	135	53	Hot Mix	435
	D	4.27	15.75	CL	E	28-Sep-01	Waterborne	2000	3	112	52	Hot Mix	435
	D	4.27	15.78	CL	E	20-May-02	Waterborne	2000	3	147	57	Hot Mix	Not Available
JASPER	E	0.00	8.90	CL	W	01-May-99	Waterborne	1998	0	113	33	Hot Mix	2350
	E	0.00	8.90	CL	E	16-Jul-99	Waterborne	1999	4	196	48	Hot Mix	2350
	E	0.00	8.90	CL	E	08-Nov-99	Waterborne	1999	3	176	33	Hot Mix	2350
	E	0.00	8.90	CL	W	31-Mar-00	Waterborne	1999	3	176	41	Hot Mix	2322
JASPER	E	0.00	8.90	REL	E	01-May-99	Waterborne	1998	0	149	46	Hot Mix	2350
	E	0.00	8.90	REL	E	17-Jul-99	Waterborne	1999	4	188	48	Hot Mix	2350
	E	0.00	8.90	REL	E	07-Nov-99	Waterborne	1999	3	143	32	Hot Mix	2350
	E	0.00	8.90	REL	E	31-Mar-00	Waterborne	1999	3	136	37	Hot Mix	2322

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	E	0.00	8.90	REL	W	01-May-99	Waterborne	1998	0	125	46	Hot Mix	2350
	E	0.00	8.90	REL	W	07-Nov-99	Waterborne	1998	3	149	37	Hot Mix	2350
	E	0.00	8.90	REL	W	31-Mar-00	Waterborne	1998	3	140	39	Hot Mix	2322
JASPER	F	0.00	4.80	CL	E	11-Nov-00	Waterborne	1999	3	127	32	Oil Aggregate	254
	F	0.00	4.84	CL	E	08-May-01	Waterborne	1999	3	111	29	Oil Aggregate	252
	F	0.00	4.84	CL	E	22-May-02	Waterborne	1999	2	114	25	Oil Aggregate	Not Available
JASPER	F	0.00	5.80	CL	W	01-May-99	Waterborne	1997	0	155	32	Oil Aggregate	276
	F	0.00	5.80	CL	E	16-Jul-99	Waterborne	1999	4	184	52	Oil Aggregate	276
	F	0.00	5.80	CL	E	08-Nov-99	Waterborne	1999	4	164	46	Oil Aggregate	276
	F	0.00	5.80	CL	W	31-Mar-00	Waterborne	1999	3	180	50	Oil Aggregate	247
JASPER	FF	0.00	2.00	CL	E	16-Jul-99	Waterborne	1999	4	304	62	Hot Mix	23007
	FF	0.00	2.00	CL	E	07-Nov-99	Waterborne	1999	4	240	63	Hot Mix	23007
	FF	0.00	2.00	CL	E	01-Apr-00	Waterborne	1999	2	110	43	Hot Mix	23077
JASPER	FF	0.00	2.00	CL	W	16-Jul-99	Waterborne	1999	4	281	67	Hot Mix	23007
	FF	0.00	2.00	CL	W	07-Nov-99	Waterborne	1999	4	230	70	Hot Mix	23007
	FF	0.00	2.00	CL	W	01-Apr-00	Waterborne	1999	2	121	46	Hot Mix	23077
JASPER	FF	0.00	2.00	LL	E	01-May-99	Waterborne	1998	4	281	67	Hot Mix	23007
	FF	0.00	2.00	LL	E	16-Jul-99	Waterborne	1999	4	297	53	Hot Mix	23007
	FF	0.00	2.00	LL	E	07-Nov-99	Waterborne	1999	4	269	46	Hot Mix	23007
	FF	0.00	2.00	LL	E	01-Apr-00	Waterborne	1999	2	169	46	Hot Mix	23077
	FF	0.00	2.00	LL	E	27-Sep-01	DT 400	2000	3	137	22	Hot Mix	24280
	FF	0.00	2.00	LL	E	21-May-02	DT 400	2000	2	102	28	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	FF	0.00	2.00	LL	W	01-May-99	Waterborne	1998	0	162	41	Hot Mix	23007
	FF	0.00	2.00	LL	W	16-Jul-99	Waterborne	1999	4	323	55	Hot Mix	23007
	FF	0.00	2.00	LL	W	07-Nov-99	Waterborne	1999	3	284	41	Hot Mix	23007
	FF	0.00	2.00	LL	W	01-Apr-00	Waterborne	1999	2	158	44	Hot Mix	23077
	FF	0.00	2.00	LL	W	27-Sep-01	DT 400	2000	3	141	28	Hot Mix	24280
	FF	0.00	2.00	LL	W	21-May-02	DT 400	2000	2	91	20	Hot Mix	Not Available
JASPER	FF	0.00	3.00	CL	E	11-Nov-00	DT 400	2000	3	177	41	Hot Mix	20432
	FF	0.00	3.03	CL	E	07-May-01	DT 400	2000	3	68	19	Hot Mix	21707
	FF	0.00	3.03	CL	E	27-Sep-01	DT 400	2000	3	76	27	Hot Mix	21707
	FF	0.00	3.03	CL	E	20-May-02	DT 400	2000	2	76	22	Hot Mix	Not Available
JASPER	FF	0.00	3.00	CL	W	11-Nov-00	DT 400	2000	3	180	46	Hot Mix	20432
	FF	0.00	3.03	CL	W	07-May-01	DT 400	2000	2	79	21	Hot Mix	21707
	FF	0.00	3.03	CL	W	27-Sep-01	DT 400	2000	3	84	36	Hot Mix	21707
	FF	0.00	3.03	CL	W	20-May-02	DT 400	2000	2	74	23	Hot Mix	Not Available
JASPER	FF	3.03	5.06	CL	E	07-May-01	HD 21	2000	3	90	27	Hot Mix	9698
	FF	3.03	5.06	CL	E	27-Sep-01	HD 21	2000	3	101	35	Hot Mix	9698
	FF	3.03	5.06	CL	E	21-May-02	HD 21	2000	3	133	53	Hot Mix	Not Available
JASPER	FF	3.03	5.06	CL	W	07-May-01	HD 21	2000	2	85	26	Hot Mix	9698
	FF	3.03	5.06	CL	W	27-Sep-01	HD 21	2000	3	98	37	Hot Mix	9698
	FF	3.03	5.06	CL	W	21-May-02	HD 21	2000	2	115	42	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	FF	3.03	5.06	LL	E	07-May-01	HD 21	2000	3	116	32	Hot Mix	9698
	FF	3.03	5.06	LL	E	27-Sep-01	HD 21	2000	3	155	48	Hot Mix	9698
	FF	3.03	5.06	LL	E	21-May-02	HD 21	2000	2	107	26	Hot Mix	Not Available
JASPER	FF	3.03	5.06	LL	W	07-May-01	DT 400	2000	3	100	25	Hot Mix	9698
	FF	3.03	5.06	LL	W	27-Sep-01	DT 400	2000	3	146	41	Hot Mix	9698
	FF	3.03	5.06	LL	W	21-May-02	DT 400	2000	2	101	31	Hot Mix	Not Available
JASPER	FF	3.03	5.06	REL	E	07-May-01	DT 400	2000	3	147	63	Hot Mix	9698
	FF	3.03	5.06	REL	E	27-Sep-01	DT 400	2000	3	139	38	Hot Mix	9698
	FF	3.03	5.06	REL	E	21-May-02	DT 400	2000	2	105	33	Hot Mix	Not Available
JASPER	FF	3.03	5.06	REL	W	07-May-01	HD 21	2000	2	114	42	Hot Mix	9698
	FF	3.03	5.06	REL	W	27-Sep-01	HD 21	2000	3	165	48	Hot Mix	9698
	FF	3.03	5.06	REL	W	21-May-02	HD 21	2000	2	116	36	Hot Mix	Not Available
JASPER	FF	5.00	11.20	REL	E	01-May-99	Waterborne	1998	0	169	54	Hot Mix	3781
	FF	5.00	11.20	REL	E	17-Jul-99	Waterborne	1999	4	265	59	Hot Mix	3781
	FF	5.00	11.20	REL	E	07-Nov-99	Waterborne	1999	4	249	47	Hot Mix	3781
JASPER	FF	5.06	6.90	CL	E	07-May-01	HD 21	2000	3	104	23	Hot Mix	10231
	FF	5.06	6.90	CL	E	27-Sep-01	HD 21	2000	3	104	34	Hot Mix	10231
	FF	5.06	6.90	CL	E	21-May-02	HD 21	2000	3	159	51	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	FF	5.10	6.90	CL	W	11-Nov-00	HD 21	2000	4	191	44	Hot Mix	10283
	FF	5.06	6.90	CL	W	07-May-01	HD 21	2000	3	104	34	Hot Mix	10231
	FF	5.06	6.90	CL	W	27-Sep-01	HD 21	2000	3	100	37	Hot Mix	10231
	FF	5.06	6.90	CL	W	20-May-02	HD 21	2000	3	153	45	Hot Mix	Not Available
JASPER	FF	5.10	6.90	REL	E	11-Nov-00	HD 21	2000	4	198	60	Hot Mix	10283
	FF	5.06	6.90	REL	E	07-May-01	HD 21	2000	3	122	44	Hot Mix	10231
	FF	5.06	6.90	REL	E	27-Sep-01	HD 21	2001	4	287	52	Hot Mix	10231
	FF	5.06	6.90	REL	E	20-May-02	HD 21	2001	3	247	80	Hot Mix	Not Available
JASPER	FF	5.10	6.90	REL	W	11-Nov-00	HD 21	2000	4	218	61	Hot Mix	10283
	FF	5.06	6.90	REL	W	07-May-01	HD 21	2000	3	108	33	Hot Mix	10231
	FF	5.06	6.90	REL	W	27-Sep-01	HD 21	2001	4	345	65	Hot Mix	10231
	FF	5.06	6.90	REL	W	20-May-02	HD 21	2001	3	238	77	Hot Mix	Not Available
JASPER	FF	6.90	11.20	CL	W	11-Nov-00	Waterborne	2000	4	208	44	Hot Mix	3208
	FF	6.90	11.15	CL	W	08-May-01	Waterborne	2000	3	144	45	Hot Mix	3192
	FF	6.90	11.15	CL	W	27-Sep-01	Waterborne	2000	3	123	44	Hot Mix	3192
	FF	6.90	11.15	CL	W	20-May-02	Waterborne	2000	3	167	61	Hot Mix	Not Available
JASPER	H	0.00	1.20	REL	E	02-May-99	Waterborne	1998	0	164	61	Hot Mix	896
	H	0.00	1.20	REL	E	17-Jul-99	Waterborne	1999	4	208	42	Hot Mix	896
	H	0.00	1.30	REL	E	18-Nov-00	Waterborne	1999	4	120	35	Hot Mix	892
	H	0.00	1.30	REL	E	04-May-01	Waterborne	1999	2	95	44	Hot Mix	888

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	H	0.00	1.20	REL	W	17-Jul-99	Waterborne	1999	4	244	44	Hot Mix	896
	H	0.00	1.30	REL	W	18-Nov-00	Waterborne	1999	4	127	39	Hot Mix	892
	H	0.00	1.30	REL	W	04-May-01	Waterborne	1999	3	95	34	Hot Mix	888

JASPER	H	0.00	7.30	CL	E	01-May-99	Waterborne	1998	0	154	35	Hot Mix	896
	H	0.00	7.10	CL	E	16-Jul-99	Waterborne	1999	4	212	53	Hot Mix	896
	H	0.00	7.30	CL	E	01-Apr-00	Waterborne	1999	4	203	40	Hot Mix	892
	H	0.00	7.30	CL	E	11-Nov-00	Waterborne	1999	4	156	40	Hot Mix	892
	H	0.00	7.30	CL	E	07-May-01	Waterborne	1999	3	96	27	Hot Mix	888

JASPER	H	8.30	18.10	CL	E	01-May-99	Waterborne	1998	0	168	44	Oil Aggregate	447
	H	8.30	18.10	CL	E	16-Jul-99	Waterborne	1999	4	204	56	Oil Aggregate	447
	H	8.30	18.10	CL	E	01-Apr-00	Waterborne	1999	4	189	48	Oil Aggregate	501

JASPER	JJ	0.00	4.00	REL	N	02-May-99	Waterborne	1998	0	132	42	Hot Mix	2067
	JJ	0.00	4.00	REL	N	01-Aug-99	Waterborne	1999	3	122	38	Hot Mix	2067
	JJ	0.00	4.00	REL	N	07-Nov-99	Waterborne	1999	3	172	43	Hot Mix	2067
	JJ	0.00	4.00	REL	N	22-May-02	Waterborne	2001	3	200	66	Hot Mix	Not Available

JASPER	JJ	0.00	4.00	REL	S	02-May-99	Waterborne	1998	0	129	39	Hot Mix	2067
	JJ	0.00	4.00	REL	S	01-Aug-99	Waterborne	1998	3	127	42	Hot Mix	2067
	JJ	0.00	4.00	REL	S	07-Nov-99	Waterborne	1999	3	182	38	Hot Mix	2067
	JJ	0.00	4.00	REL	S	22-May-02	Waterborne	2001	3	174	61	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	K	0.00	10.50	CL	E	01-May-99	Waterborne	1998	0	160	41	Hot Mix	661
	K	0.00	10.50	CL	E	16-Jul-99	Waterborne	1999	4	186	44	Hot Mix	661
	K	0.00	10.50	CL	W	01-Aug-99	Waterborne	1999	4	182	39	Hot Mix	661
	K	0.00	10.50	CL	E	07-Nov-99	Waterborne	1999	0	169	36	Hot Mix	661

JASPER	KK	0.00	0.80	CL	W	02-May-99	Waterborne	1998	0	153	46	Oil Aggregate	608
	KK	0.00	0.80	CL	W	17-Jul-99	Waterborne	1999	4	182	50	Oil Aggregate	608
	KK	0.00	0.80	CL	W	07-Nov-99	Waterborne	1999	0	198	39	Oil Aggregate	608
	KK	0.00	0.80	CL	W	11-Nov-00	Waterborne	2000	2	144	37	Oil Aggregate	604
	KK	0.00	0.84	CL	W	07-May-01	Waterborne	2000	3	117	39	Oil Aggregate	600
	KK	0.00	0.84	CL	W	28-Sep-01	Waterborne	2000	2	54	21	Oil Aggregate	600
	KK	0.00	0.84	CL	W	20-May-02	Waterborne	2000	2	123	36	Oil Aggregate	Not Available

JASPER	N	0.00	10.00	CL	W	01-May-99	Waterborne	1997	0	156	30	Oil Aggregate	563
	N	0.00	10.00	CL	E	01-Aug-99	Waterborne	1998	2	147	29	Oil Aggregate	563
	N	0.00	10.00	CL	E	07-Nov-99	Waterborne	1999	0	269	39	Oil Aggregate	563
	N	0.00	10.00	CL	E	11-Nov-00	Waterborne	2000	4	201	47	Oil Aggregate	649
	N	0.00	9.98	CL	E	07-May-01	Waterborne	2000	4	169	44	Oil Aggregate	646

JASPER	O	3.00	10.10	CL	S	11-Nov-00	Waterborne	2000	4	195	57	Hot Mix	546
	O	3.01	10.10	CL	S	07-May-01	Waterborne	2000	3	147	49	Hot Mix	489
	O	3.01	10.10	CL	S	28-Sep-01	Waterborne	2000	3	117	40	Hot Mix	489
	O	3.01	10.10	CL	S	20-May-02	Waterborne	2000	3	185	74	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	P	0.00	2.00	CL	E	03-May-99	Waterborne	1998	4	189	58	Oil Aggregate	544
	P	0.00	2.00	CL	E	01-Aug-99	Waterborne	1999	3	149	38	Oil Aggregate	544
	P	0.00	2.10	CL	E	07-Nov-99	Waterborne	1999	4	185	40	Oil Aggregate	544
	P	0.00	2.00	CL	E	01-Apr-00	Waterborne	1999	3	163	44	Oil Aggregate	542
JASPER	P	2.00	6.60	REL	E	02-May-99	Waterborne	1998	0	93	32	Hot Mix	2461
	P	2.00	6.60	REL	E	07-Nov-99	Waterborne	1999	3	168	37	Hot Mix	2461
	P	2.00	6.60	REL	E	01-Apr-00	Waterborne	1999	3	91	32	Hot Mix	2623
JASPER	P	2.00	6.60	REL	W	01-Aug-99	Waterborne	1999	4	162	37	Hot Mix	2461
	P	2.00	6.60	REL	W	07-Nov-99	Waterborne	1999	3	170	41	Hot Mix	2461
	P	2.00	6.60	REL	W	01-Apr-00	Waterborne	1999	2	97	44	Hot Mix	2623
JASPER	P	6.12	6.60	CL	W	07-May-01	Waterborne	2001	4	172	39	Hot Mix	8760
	P	6.12	6.60	CL	W	28-Sep-01	Waterborne	2001	4	168	42	Hot Mix	8760
	P	6.12	6.60	CL	W	22-May-02	Waterborne	2001	3	138	40	Hot Mix	Not Available
JASPER	P	6.12	6.60	REL	E	08-May-01	Waterborne	2001	4	282	74	Hot Mix	8760
	P	6.12	6.60	REL	E	27-Sep-01	Waterborne	2001	4	245	50	Hot Mix	8760
	P	6.12	6.60	REL	E	21-May-02	Waterborne	2001	2	165	56	Hot Mix	Not Available
JASPER	P	6.12	6.60	REL	W	08-May-01	Waterborne	2001	4	291	69	Hot Mix	8760
	P	6.12	6.60	REL	W	27-Sep-01	Waterborne	2001	4	270	58	Hot Mix	8760
	P	6.12	6.60	REL	W	21-May-02	Waterborne	2001	2	175	58	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	TT	0.00	1.00	CL	E	04-May-99	Thermo Extruded	1998	2	96	28	Hot Mix	10469
	TT	0.00	1.00	CL	E	01-Aug-99	Thermo Extruded	1998	3	102	28	Hot Mix	10469
	TT	0.00	1.00	CL	E	07-Nov-99	Thermo Extruded	1998	2	124	31	Hot Mix	10469
	TT	0.00	1.00	CL	E	01-Apr-00	Thermo Extruded	1998	3	89	22	Hot Mix	10501
JASPER	TT	0.00	1.00	CL	W	04-May-99	Thermo Extruded	1998	2	119	29	Hot Mix	10469
	TT	0.00	1.00	CL	W	01-Aug-99	Thermo Extruded	1998	3	95	28	Hot Mix	10469
	TT	0.00	1.00	CL	W	07-Nov-99	Waterborne	1999	2	108	34	Hot Mix	10469
	TT	0.00	1.00	CL	W	01-Apr-00	Waterborne	1999	3	83	23	Hot Mix	10501
JASPER	TT	0.00	1.00	LL	E	04-May-99	Thermo Extruded	1998	2	140	29	Hot Mix	10469
	TT	0.00	1.00	LL	E	01-Aug-99	Thermo Extruded	1998	3	131	24	Hot Mix	10469
	TT	0.00	1.00	LL	E	07-Nov-99	Waterborne	1999	2	164	34	Hot Mix	10469
	TT	0.00	1.00	LL	E	01-Apr-00	Waterborne	1999	3	114	27	Hot Mix	10501
JASPER	TT	0.00	1.00	LL	W	04-May-99	Thermo Extruded	1998	2	133	32	Hot Mix	10469
	TT	0.00	1.00	LL	W	01-Aug-99	Thermo Extruded	1998	3	129	28	Hot Mix	10469
	TT	0.00	1.00	LL	W	07-Nov-99	Waterborne	1999	2	163	34	Hot Mix	10469
	TT	0.00	1.00	LL	W	01-Apr-00	Waterborne	1999	3	128	35	Hot Mix	10501
JASPER	TT	0.00	1.00	REL	E	04-May-99	Waterborne	1998	2	101	34	Hot Mix	10469
	TT	0.00	1.00	REL	E	07-Nov-99	Waterborne	1999	4	295	47	Hot Mix	10469
	TT	0.00	1.00	REL	E	01-Apr-00	Waterborne	1999	3	113	37	Hot Mix	10501
JASPER	TT	0.00	1.00	REL	W	04-May-99	Waterborne	1998	2	81	31	Hot Mix	10469
	TT	0.00	1.00	REL	W	07-Nov-99	Waterborne	1999	3	303	49	Hot Mix	10469
	TT	0.00	1.00	REL	W	01-Apr-00	Waterborne	1999	3	91	36	Hot Mix	10501

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	U	0.00	4.10	CL	S	01-May-99	Waterborne	1998	0	114	28	Oil Aggregate	470
	U	0.00	4.10	CL	N	16-Jul-99	Waterborne	1999	4	197	46	Oil Aggregate	470
	U	0.00	4.10	CL	S	31-Mar-00	Waterborne	1999	3	176	35	Oil Aggregate	468
JASPER	U	4.10	9.70	CL	N	04-May-99	Waterborne	1998	2	168	54	Oil Aggregate	470
	U	4.10	9.70	CL	N	16-Jul-99	Waterborne	1999	4	208	50	Oil Aggregate	470
	U	4.10	9.70	CL	N	31-Mar-00	Waterborne	1999	3	175	35	Oil Aggregate	468
JASPER	V	0.00	2.20	CL	W	04-May-99	Waterborne	1998	2	145	38	Hot Mix	2144
	V	0.00	2.20	CL	W	07-Nov-99	Waterborne	1999	0	238	49	Hot Mix	2144
	V	0.00	2.20	CL	W	02-Apr-00	Waterborne	1999	2	133	46	Hot Mix	2982
JASPER	YY	0.00	4.00	REL	E	02-May-99	Waterborne	1998	0	188	38	Hot Mix	2061
	YY	0.00	4.00	REL	E	17-Jul-99	Waterborne	1999	4	221	71	Hot Mix	2061
	YY	0.00	4.00	REL	E	07-Nov-99	Waterborne	1999	3	215	43	Hot Mix	2061
	YY	0.00	4.00	REL	E	31-Mar-00	Waterborne	1999	4	178	43	Hot Mix	1721
	YY	0.00	4.00	REL	E	11-Nov-00	Waterborne	1999	4	134	39	Hot Mix	1721
	YY	0.00	4.01	REL	E	09-May-01	Waterborne	1999	4	129	49	Hot Mix	1713
JASPER	YY	2.00	4.00	REL	W	02-May-99	Waterborne	1998	0	174	48	Hot Mix	2061
	YY	0.00	4.00	REL	W	17-Jul-99	Waterborne	1999	4	205	54	Hot Mix	2061
	YY	0.00	4.00	REL	W	07-Nov-99	Waterborne	1999	3	180	42	Hot Mix	2061
	YY	0.00	4.00	REL	W	31-Mar-00	Waterborne	1999	4	157	48	Hot Mix	1721
	YY	0.00	4.00	REL	W	11-Nov-00	Waterborne	1999	4	110	27	Hot Mix	1721
	YY	0.00	4.01	REL	W	09-May-01	Waterborne	1999	4	122	40	Hot Mix	1713

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
JASPER	YY	0.00	4.00	CL	W	01-May-99	Waterborne	1998	0	193	41	Hot Mix	2061
	YY	0.00	4.00	CL	W	16-Jul-99	Waterborne	1999	4	206	50	Hot Mix	2061
	YY	0.00	4.10	CL	W	07-Nov-99	Waterborne	1999	0	246	51	Hot Mix	2061
	YY	0.00	4.00	CL	W	01-Apr-00	Waterborne	1999	4	194	45	Hot Mix	1721
	YY	0.00	4.00	CL	E	11-Nov-00	Waterborne	1999	3	155	41	Hot Mix	1721
	YY	0.00	4.01	CL	E	07-May-01	Waterborne	1999	4	120	44	Hot Mix	1713
	YY	0.00	4.01	CL	E	28-Sep-01	Waterborne	2001	3	124	45	Hot mix	1713
	YY	0.00	4.01	CL	E	20-May-02	Waterborne	2001	3	182	58	Hot Mix	Not Available
LAWRENCE	174	3.70	12.40	CL	E	10-Nov-00	Waterborne	2000	4	165	37	Concrete	3100
	174	3.74	12.41	CL	E	06-May-01	Waterborne	2000	3	139	51	Concrete	4545
	174	3.74	12.41	CL	E	28-Sep-01	Waterborne	2000	3	139	52	Concrete	4545
LAWRENCE	174	3.70	12.40	REL	E	10-Nov-00	Waterborne	2000	4	219	78	Concrete	3100
	174	3.74	12.41	REL	E	06-May-01	Waterborne	2000	2	132	37	Concrete	4545
	174	3.74	12.41	REL	E	27-Sep-01	Waterborne	2000	3	170	46	Concrete	4545
LAWRENCE	174	3.70	12.40	REL	W	10-Nov-00	Waterborne	2000	4	206	69	Concrete	3100
	174	3.74	12.41	REL	W	06-May-01	Waterborne	2000	2	119	40	Concrete	4545
	174	3.74	12.41	REL	W	27-Sep-01	Waterborne	2000	3	164	45	Concrete	4545
LAWRENCE	44	0.00	0.50	LEL	W	10-Nov-00	Paint over thermo	2000	4	196	30	Hot Mix	24806
	44	0.00	0.51	LEL	W	24-Jun-01	Paint over thermo	2000	2	115	54	Hot Mix	25402
	44	0.00	0.51	LEL	W	28-Sep-01	Paint over thermo	2000	3	187	72	Hot Mix	25402

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
LAWRENCE	44	0.00	0.50	LL	W	10-Nov-00	Paint over thermo	2000	4	197	38	Hot Mix	24806
	44	0.00	0.51	LL	W	06-May-01	Paint over thermo	2000	3	158	64	Hot Mix	25402
	44	0.00	0.51	LL	W	27-Sep-01	Paint over thermo	2000	3	200	33	Hot Mix	25402
LAWRENCE	44	0.00	0.50	REL	W	10-Nov-00	Paint over thermo	2000	4	198	41	Hot Mix	24806
	44	0.00	0.51	REL	W	06-May-01	Paint over thermo	2000	3	157	49	Hot Mix	25402
	44	0.00	0.51	REL	W	99-27-01	Paint over thermo	2000	3	182	23	Hot Mix	25402
LAWRENCE	44	11.80	17.20	LEL	E	10-Nov-00	Waterborne	2000	4	160	28	Concrete	22074
	44	11.79	17.19	LEL	E	06-May-01	Waterborne	2000	3	144	50	Concrete	23809
	44	11.79	17.19	LEL	E	28-Sep-01	Waterborne	2000	3	136	63	Concrete	23809
LAWRENCE	44	11.80	17.20	LL	E	10-Nov-00	Waterborne	2000	4	163	42	Concrete	22074
	44	11.79	17.19	LL	E	06-May-01	Waterborne	2000	3	166	48	Concrete	23809
	44	11.79	17.19	LL	E	27-Sep-01	Waterborne	2000	3	157	37	Concrete	23809
LAWRENCE	44	11.80	17.20	LL	W	10-Nov-00	Waterborne	2000	4	186	37	Concrete	22074
	44	11.79	17.19	LL	W	06-May-01	Waterborne	2000	3	170	67	Concrete	23809
	44	11.79	17.19	LL	W	27-Sep-01	Waterborne	2000	3	176	36	Concrete	23809
LAWRENCE	44	11.80	17.20	REL	E	10-Nov-00	Waterborne	2000	4	188	35	Concrete	22074
	44	11.79	17.19	REL	E	06-May-01	Waterborne	2000	2	146	60	Concrete	23809
	44	11.79	17.19	REL	E	27-Sep-01	Waterborne	2000	3	173	47	Concrete	23809
LAWRENCE	44	11.80	17.20	REL	W	10-Nov-00	Waterborne	2000	4	142	35	Concrete	22074
	44	11.79	17.19	REL	W	06-May-01	Waterborne	2000	2	191	80	Concrete	23809
	44	11.79	17.19	REL	W	27-Sep-01	Waterborne	2000	3	165	39	Concrete	23809

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
LAWRENCE	96	10.80	12.10	CL	E	10-Nov-00	Waterborne	2000	4	177	38	Concrete	3643
	96	10.78	12.15	CL	E	06-May-01	Waterborne	2000	3	108	38	Concrete	3911
	96	10.78	12.15	CL	E	28-Sep-01	Waterborne	2000	3	159	50	Concrete	3911
LAWRENCE	96	10.80	12.10	REL	E	10-Nov-00	Waterborne	2000	4	219	74	Concrete	3643
	96	10.78	12.15	REL	E	06-May-01	Waterborne	2000	3	100	33	Concrete	3911
	96	10.78	12.15	REL	E	27-Sep-01	Waterborne	2000	3	159	44	Concrete	3911
LAWRENCE	96	10.80	12.10	REL	W	10-Nov-00	Waterborne	2000	4	210	65	Concrete	3643
	96	10.78	12.15	REL	W	06-May-01	Waterborne	2000	3	101	34	Concrete	3911
	96	10.78	12.15	REL	W	27-Sep-01	Waterborne	2000	3	192	48	Concrete	3911
LAWRENCE	96	12.10	16.10	CL	W	10-Nov-00	Waterborne	2000	4	157	33	Hot Mix	4050
	96	12.15	16.10	CL	W	06-May-01	Waterborne	2000	3	120	48	Hot Mix	4350
	96	12.15	16.10	CL	W	28-Sep-01	Waterborne	2000	3	125	55	Hot Mix	4350
LAWRENCE	96	12.20	16.10	REL	W	10-Nov-00	Waterborne	2000	3	114	22	Hot Mix	4050
	96	12.15	16.10	REL	W	06-May-01	Waterborne	2000	3	118	43	Hot Mix	4350
	96	12.15	16.10	REL	W	27-Sep-01	Waterborne	2000	3	165	41	Hot Mix	4350
LAWRENCE	97	7.00	14.90	CL	N	10-Nov-00	Waterborne	2000	4	171	35	Hot Mix	1247
	97	6.98	14.87	CL	N	06-May-01	Waterborne	2000	3	113	32	Hot Mix	1156
	97	6.98	14.87	CL	N	28-Sep-01	Waterborne	2000	3	151	40	Hot Mix	1156
	97	6.98	14.87	CL	N	20-May-02	Waterborne	2000	2	129	39	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
LAWRENCE	F	0.00	7.20	CL	W	01-May-99	Waterborne	1998	0	143	35	Oil Aggregate	231
	F	0.00	7.00	CL	E	16-Jul-99	Waterborne	1999	4	209	58	Oil Aggregate	231
	F	0.00	7.20	CL	E	08-Nov-99	Waterborne	1999	4	197	42	Oil Aggregate	231
	F	0.00	7.20	CL	E	31-Mar-00	Waterborne	1999	3	173	36	Oil Aggregate	229
MCDONALD	71	6.33	7.33	LEL	N	07-May-01	Thermo Extruded	2001	3	124	31	Hot Mix	12000
	71	6.33	7.33	LEL	N	27-Sep-01	Thermo Extruded	2001	3	101	45	Hot Mix	12000
	71	6.33	7.33	LEL	N	21-May-02	Thermo Extruded	2001	3	78	13	Hot Mix	Not Available
MCDONALD	71	6.33	7.33	LEL	S	07-May-01	Thermo Extruded	2001	2	76	27	Hot Mix	12000
	71	6.33	7.33	LEL	S	27-Sep-01	Thermo Extruded	2001	3	119	56	Hot Mix	12000
	71	6.33	7.33	LEL	S	21-May-02	Thermo Extruded	2001	3	84	17	Hot Mix	Not Available
MCDONALD	71	6.33	7.33	REL	N	07-May-01	Thermo Extruded	2001	5	291	59	Hot Mix	12000
	71	6.33	7.33	REL	N	27-Sep-01	Thermo Extruded	2001	4	233	57	Hot Mix	12000
	71	6.33	7.33	REL	N	21-May-02	Thermo Extruded	2001	3	140	41	Hot Mix	Not Available
MCDONALD	71	6.33	7.33	REL	S	07-May-01	Thermo Extruded	2001	5	282	66	Hot Mix	12000
	71	6.33	7.33	REL	S	27-Sep-01	Thermo Extruded	2001	4	304	53	Hot Mix	12000
	71	6.33	7.33	REL	S	21-May-02	Thermo Extruded	2001	3	166	33	Hot Mix	Not Available
MCDONALD	B	8.70	12.20	CL	W	10-Nov-00	Waterborne	1999	3	134	43	Oil Aggregate	968
	B	8.70	12.23	CL	W	07-May-01	Waterborne	1999	3	110	31	Oil Aggregate	964
	B	8.70	12.23	CL	W	27-Sep-01	Waterborne	1999	3	95	24	Oil Aggregate	964
	B	8.70	12.23	CL	E	20-May-02	Waterborne	1999	2	120	29	Oil Aggregate	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
MCDONALD	JJ	0.00	4.50	CL	S	10-Nov-00	Waterborne	2000	3	148	46	Oil Aggregate	348
	JJ	0.00	4.54	CL	S	07-May-01	Waterborne	2000	3	120	35	Oil Aggregate	346
	JJ	0.00	4.54	CL	S	27-Sep-01	Waterborne	2001	3	100	29	Oil Aggregate	346
	JJ	0.00	4.54	CL	S	20-May-02	Waterborne	2001	2	124	28	Oil Aggregate	Not Available
NEWTON	44	0.00	8.00	REL	E	11-Nov-00	Waterborne	1999	4	176	62	Hot Mix	28691
	44	0.00	8.00	REL	E	07-May-01	Waterborne	1999	2	111	52	Hot Mix	28877
	44	0.00	8.00	REL	E	27-Sep-01	Waterborne	2001	3	134	46	Hot Mix	28877
NEWTON	44	0.00	8.00	REL	W	11-Nov-00	Waterborne	1999	4	173	79	Hot Mix	28691
	44	0.00	8.00	REL	W	07-May-01	Waterborne	1999	2	99	40	Hot Mix	28877
	44	0.00	8.00	REL	W	27-Sep-01	Waterborne	2001	3	147	44	Hot Mix	28877
NEWTON	44	8.80	10.70	LEL	E	11-Nov-00	Epoxy	2000	4	257	78	Hot Mix	34182
	44	8.76	10.67	LEL	E	24-Jun-01	Epoxy	2000	3	157	49	Hot Mix	34114
	44	8.76	10.67	LEL	E	28-Sep-01	Epoxy	2000	3	88	34	Hot Mix	34114
	44	8.76	10.67	LEL	E	20-May-02	Epoxy	2000	2	135	47	Hot Mix	Not Available
NEWTON	44	8.80	10.70	LEL	W	11-Nov-00	Epoxy	2000	4	230	45	Hot Mix	34182
	44	8.76	10.67	LEL	W	24-Jun-01	Epoxy	2000	3	158	38	Hot Mix	34114
	44	8.76	10.67	LEL	W	28-Sep-01	Epoxy	2000	3	90	32	Hot Mix	34114
	44	8.76	10.67	LEL	W	20-May-02	Epoxy	2000	2	139	45	Hot Mix	Not Available
NEWTON	44	8.80	10.70	LL	E	11-Nov-00	Epoxy	2000	5	367	62	Hot Mix	34182
	44	8.76	10.67	LL	E	24-Jun-01	Epoxy	2000	4	296	71	Hot Mix	34114
	44	8.76	10.67	LL	E	27-Sep-01	Epoxy	2000	3	193	33	Hot Mix	34114
	44	8.76	10.67	LL	E	20-May-02	Epoxy	2000	3	123	26	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
NEWTON	44	8.80	10.70	LL	W	11-Nov-00	Epoxy	2000	5	327	45	Hot Mix	34182
	44	8.76	10.67	LL	W	24-Jun-01	Epoxy	2000	4	294	36	Hot Mix	34114
	44	8.76	10.67	LL	W	27-Sep-01	Epoxy	2000	3	216	54	Hot Mix	34114
	44	8.76	10.67	LL	W	20-May-02	Epoxy	2000	3	136	34	Hot Mix	Not Available
NEWTON	44	8.80	10.70	REL	E	11-Nov-00	Epoxy	2000	4	325	67	Hot Mix	34182
	44	8.76	10.67	REL	E	07-May-01	Epoxy	2000	3	162	62	Hot Mix	34114
	44	8.76	10.67	REL	E	27-Sep-01	Epoxy	2000	3	155	38	Hot Mix	34114
	44	8.76	10.67	REL	E	20-May-02	Epoxy	2000	2	92	25	Hot Mix	Not Available
NEWTON	44	8.80	10.67	REL	W	11-Nov-00	Epoxy	2000	4	322	72	Hot Mix	34182
	44	8.76	10.67	REL	W	07-May-01	Epoxy	2000	3	156	43	Hot Mix	34114
	44	8.76	10.67	REL	W	27-Sep-01	Epoxy	2000	3	185	57	Hot Mix	34114
	44	8.76	10.67	REL	W	20-May-02	Epoxy	2000	2	128	42	Hot Mix	Not Available
NEWTON	71	0.00	2.90	REL	S	11-Nov-00	30 Mil (HD21)	1998	4	217	73	Concrete	13955
	71	0.00	2.87	REL	S	05-May-01	30 Mil (HD21)	1998	3	132	48	Concrete	14206
	71	0.00	2.87	REL	S	27-Sep-01	30 Mil (HD21)	1998	3	150	43	Concrete	14206
NEWTON	71	0.00	4.00	LEL	S	11-Nov-00	DT 400	2000	3	140	34	Concrete	13955
	71	0.00	4.00	LEL	S	05-May-01	DT 400	2000	3	147	59	Concrete	14206
	71	0.00	4.00	LEL	S	27-Sep-01	DT 400	2000	3	101	44	Concrete	14206
NEWTON	71	0.00	6.00	LL	S	01-Apr-00	30 Mil (HD21)	1998	3	230	60	Concrete	13508
	71	0.00	6.00	LL	S	11-Nov-00	30 Mil (HD21)	1998	3	201	60	Concrete	13508
	71	0.00	6.00	LL	S	05-May-01	30 Mil (HD21)	1998	3	193	74	Concrete	13751
	71	0.00	6.00	LL	S	27-Sep-01	30 Mil (HD21)	1998	3	170	46	Concrete	13751

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
NEWTON	71	0.00	6.00	REL	N	01-Apr-00	30 Mil (HD21)	1998	3	204	68	Concrete	13508
	71	0.00	6.00	REL	N	11-Nov-00	30 Mil (HD21)	1998	4	160	52	Concrete	13508
	71	0.00	6.00	REL	N	05-May-01	30 Mil (HD21)	1998	3	148	56	Concrete	13751
	71	0.00	6.00	REL	N	27-Sep-01	30 Mil (HD21)	1998	3	151	47	Concrete	13751
NEWTON	71	2.90	8.00	REL	S	11-Nov-00	HD 21	2000	4	178	54	Concrete	13745
	71	2.87	8.00	REL	S	05-May-01	HD 21	2000	3	137	54	Concrete	13992
	71	2.87	8.00	REL	S	27-Sep-01	HD 21	2000	3	133	42	Concrete	13992
NEWTON	86	19.20	19.70	CL	E	11-Nov-00	Waterborne	2000	2	167	47	Hot Mix	10688
	86	19.20	19.70	CL	E	24-Jun-01	Waterborne	2000	3	198	62	Hot Mix	10892
	86	19.20	19.70	CL	E	28-Sep-01	Waterborne	2000	3	67	24	Hot Mix	10892
	86	19.20	19.70	CL	E	22-May-02	Waterborne	2000	2	93	29	Hot Mix	Not Available
NEWTON	86	19.20	19.70	CL	W	11-Nov-00	Waterborne	2000	2	153	45	Hot Mix	10688
	86	19.20	19.70	CL	W	24-Jun-01	Waterborne	2000	3	203	48	Hot Mix	10892
	86	19.20	19.70	CL	W	28-Sep-01	Waterborne	2000	3	123	51	Hot Mix	10892
	86	19.20	19.70	CL	W	20-May-02	Waterborne	2000	2	90	32	Hot Mix	Not Available
NEWTON	E	2.00	7.30	CL	S	11-Nov-00	Waterborne	1999	2	139	45	Hot Mix	1614
	E	2.00	7.27	CL	S	07-May-01	Waterborne	1999	3	80	23	Hot Mix	1606
	E	2.00	7.27	CL	S	28-Sep-01	Waterborne	1999	3	75	20	Hot Mix	1606
	E	2.00	7.27	CL	S	20-May-02	Waterborne	1999	2	80	23	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
NEWTON	EE	0.00	4.70	CL	E	11-Nov-00	Waterborne	2000	4	202	47	Oil Aggregate	364
	EE	0.00	4.73	CL	E	07-May-01	Waterborne	2000	3	133	36	Oil Aggregate	362
	EE	0.00	4.73	CL	E	28-Sep-01	Waterborne	2000	3	130	29	Oil Aggregate	362
	EE	0.00	4.73	CL	E	20-May-02	Waterborne	2000	3	139	35	Oil Aggregate	Not Available
NEWTON	O	0.00	3.20	CL	N	11-Nov-00	Waterborne	2000	3	113	31	Hot Mix	614
	O	0.00	3.18	CL	N	07-May-01	Waterborne	2000	3	126	35	Hot Mix	610
	O	0.00	3.18	CL	N	28-Sep-01	Waterborne	2000	2	71	23	Hot Mix	610
	O	0.00	3.18	CL	N	20-May-02	Waterborne	2000	2	72	18	Hot Mix	Not Available
NEWTON	W	0.00	7.20	CL	W	11-Nov-00	Waterborne	1999	4	190	46	Oil Aggregate	188
	W	0.00	7.19	CL	W	07-May-01	Waterborne	1999	2	87	31	Oil Aggregate	188
	W	0.00	7.19	CL	W	28-Sep-01	Waterborne	1999	4	132	31	Oil Aggregate	188
	W	0.00	7.19	CL	W	20-May-02	Waterborne	1999	3	128	34	Oil Aggregate	Not Available
NEWTON	Y	0.00	4.85	CL	N	10-Nov-00	Waterborne	2000	4	181	43	Oil Aggregate	622
	Y	0.00	4.85	CL	N	07-May-01	Waterborne	2000	3	146	40	Oil Aggregate	619
	Y	0.00	4.85	CL	N	27-Sep-01	Waterborne	2000	3	131	31	Oil Aggregate	619
	Y	0.00	4.85	CL	N	20-May-02	Waterborne	2000	2	148	38	Oil Aggregate	Not Available
ST. CLAIR	13	18.20	27.30	REL	N	18-Nov-00	HD 21	2000	4	254	53	Hot Mix	7914
	13	18.16	27.26	REL	N	05-May-01	HD 21	2000	3	170	52	Hot Mix	8682
	13	18.16	27.26	REL	N	27-Sep-01	HD 21	2000	3	200	76	Hot Mix	8682
	13	18.16	27.26	REL	N	20-May-02	HD 21	2001	3	219	97	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
ST. CLAIR	13	18.20	27.30	REL	S	18-Nov-00	DT 400	2000	4	292	77	Hot mix	7914
	13	18.16	27.26	REL	S	05-May-01	DT 400	2000	3	157	54	Hot Mix	8682
	13	18.16	27.26	REL	S	27-Sep-01	DT 400	2000	3	251	102	Hot Mix	8682
	13	18.16	27.26	REL	S	20-May-02	DT 400	2001	3	212	78	Hot Mix	Not Available
ST. CLAIR	13	23.40	24.00	CL	N	18-Nov-00	HD 21	2000	4	218	46	Hot Mix	8310
	13	23.40	24.03	CL	N	23-Jun-01	HD 21	2000	3	262	26	Hot Mix	9258
	13	23.40	24.03	CL	N	28-Sep-01	HD 21	2000	3	105	42	Hot Mix	9258
ST. CLAIR	13	23.40	24.00	CL	S	18-Nov-00	DT 400	2000	4	194	43	Hot Mix	8310
	13	23.40	24.03	CL	S	23-Jun-01	DT 400	2000	3	181	71	Hot Mix	9258
	13	23.40	24.03	CL	S	28-Sep-01	DT 400	2000	3	101	48	Hot Mix	9258
ST. CLAIR	13	24.00	27.30	CL	S	18-Nov-00	DT 400	2000	4	180	40	Hot Mix	8135
	13	24.03	27.26	CL	S	08-May-01	DT 400	2000	3	176	44	Hot Mix	8705
	13	24.03	27.26	CL	S	28-Sep-01	DT 400	2000	3	163	52	Hot Mix	8705
	13	24.03	27.26	CL	S	20-May-02	DT 400	2000	3	225	87	Hot Mix	Not Available
ST. CLAIR	54	0.00	4.20	REL	W	18-Nov-00	Thermo Spray	1999	4	179	45	Hot Mix	1750
	54	0.00	4.23	REL	W	05-May-01	Thermo Spray	1999	2	134	40	Hot Mix	1680
	54	0.00	4.23	REL	W	27-Sep-01	Thermo Spray	1999	3	190	56	Hot Mix	1680
	54	0.00	4.23	REL	W	20-May-02	Thermo Spray	1999	2	206	60	Hot Mix	Not Available
ST. CLAIR	54	4.20	10.90	CL	W	18-Nov-00	Thermo Spray	1999	4	113	25	Hot Mix	2210
	54	4.23	10.92	CL	W	23-Jun-01	Thermo Spray	1999	2	86	16	Hot Mix	2117
	54	4.23	10.92	CL	W	28-Sep-01	Thermo Spray	1999	3	74	17	Hot Mix	2117
	54	4.23	10.92	CL	W	20-May-02	Thermo Spray	1999	2	81	14	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
ST. CLAIR	54	4.20	10.90	REL	E	18-Nov-00	Thermo Spray	1999	4	138	30	Hot Mix	2210
	54	4.23	10.92	REL	E	05-May-01	Thermo Spray	1999	3	118	29	Hot Mix	2117
	54	4.23	10.92	REL	E	22-May-02	Thermo Spray	1999	2	166	43	Hot Mix	Not Available

ST. CLAIR	82	0.00	11.20	CL	W	18-Nov-00	Waterborne	2000	4	225	56	Hot Mix	784
	82	0.07	11.19	CL	W	04-May-01	Waterborne	2000	3	159	58	Hot Mix	857
	82	0.07	11.19	CL	W	28-Sep-01	Waterborne	2000	3	120	56	Hot Mix	857
	82	0.07	11.19	CL	W	20-May-02	Waterborne	2000	3	138	57	Hot Mix	Not Available

ST. CLAIR	82	11.20	23.00	REL	E	18-Nov-00	Waterborne	2000	4	309	78	Hot Mix	775
	82	11.19	23.04	REL	E	05-May-01	Waterborne	2000	2	127	39	Hot Mix	974
	82	11.19	23.04	REL	E	27-Sep-01	Waterborne	2000	3	210	75	Hot Mix	974
	82	11.19	23.04	REL	E	20-May-02	Waterborne	2000	3	154	54	Hot Mix	Not Available

ST. CLAIR	82	23.00	32.80	CL	W	18-Nov-00	Waterborne	2000	4	220	48	Hot Mix	936
	82	23.04	32.75	CL	W	08-May-01	Waterborne	2000	2	141	42	Hot Mix	1044
	82	23.04	32.75	CL	W	28-Sep-01	Waterborne	2000	3	132	51	Hot Mix	1044
	82	23.04	32.75	CL	W	20-May-02	Waterborne	2000	2	143	50	Hot Mix	Not Available

ST. CLAIR	82	23.00	32.70	REL	W	18-Nov-00	Waterborne	2000	4	226	51	Hot Mix	936
	82	23.04	32.75	REL	W	05-May-01	Waterborne	2000	1	103	34	Hot Mix	1044
	82	23.04	32.75	REL	W	27-Sep-01	Waterborne	2000	3	173	66	Hot Mix	1044
	82	23.04	32.75	REL	W	20-May-02	Waterborne	2000	2	137	49	Hot Mix	Not Available

County	Route	Beg LP	End LP	Line	D	Date Reading	Paint Material	Year Stripe	Sub Rate	Avg MCD	Std Dev	Surface	Weighted AADT for the appropriate year
VERNON	54	21.80	31.20	CL	E	19-Nov-00	Waterborne	2000	4	167	36	Hot Mix	8676
	54	21.79	31.20	CL	E	04-May-01	Waterborne	2000	3	157	57	Hot Mix	8835
	54	21.79	31.20	CL	E	28-Sep-01	Waterborne	2000	3	158	72	Hot Mix	8835
	54	21.79	31.20	CL	E	20-May-02	Waterborne	2000	2	106	23	Hot Mix	Not Available
VERNON	54	21.80	31.20	REL	E	18-Nov-00	Waterborne	2000	4	252	75	Hot Mix	8676
	54	21.79	31.20	REL	E	05-May-01	Waterborne	2000	2	128	56	Hot Mix	8835
	54	21.79	31.20	REL	E	26-Sep-01	Waterborne	2000	2	196	107	Hot Mix	8835
VERNON	54	21.80	31.20	REL	W	18-Nov-00	Waterborne	2000	4	194	51	Hot Mix	8676
	54	21.79	31.20	REL	W	05-May-01	Waterborne	2000	2	129	47	Hot Mix	8835
	54	21.79	31.20	REL	W	26-Sep-01	Waterborne	2000	2	179	76	Hot Mix	8835
VERNON	EE	7.00	10.20	CL	E	19-Nov-00	Waterborne	2000	3	119	21	Hot Mix	386
	EE	6.98	10.18	CL	E	04-May-01	Waterborne	2000	4	215	54	Hot Mix	384
	EE	6.98	10.18	CL	E	28-Sep-01	Waterborne	2000	4	193	52	Hot Mix	384
	EE	6.98	10.18	CL	E	20-May-02	Waterborne	2000	3	182	45	Hot Mix	Not Available
VERNON	F	7.80	12.40	CL	E	19-Nov-00	Waterborne	2000	3	137	24	Oil Aggregate	356
	F	7.80	12.43	CL	E	07-May-01	Waterborne	2000	4	199	48	Oil Aggregate	354
	F	7.80	12.43	CL	E	28-Aug-01	Waterborne	2000	3	124	34	Oil Aggregate	354

APPENDIX H – 30 MIL WATERBORNE PAINT

MEMO TO FILE

**Date:** July 15, 1998

**SUBJECT:** Rohm Haas 30 mil Latex Paint Stripe application

**Prepared By:** Vince Imhoff, RDT Division

On July 13 and 14, 1998 Rohm Haas representatives John R. Gingrich and Thomas R. Winterberg met with myself, David Musser of the Traffic Division and District 7 personnel, Randy Branham, Dave Taylor and John Brust to demonstrate the subject product. According to the manufacturer representatives the 30 mil paint is long term latex paint that will resist snowplowing better than the MoDOT waterborne paint and provide a serviceable life in the range of three years to compete with thermoplastic applications.

On the afternoon of July 13 a meeting to explain application and calibration procedures was held at the district striping office. On the afternoon of the 13<sup>th</sup>, attempts were made at the District 7 maintenance lot to calibrate the MoDOT striper to apply the recommended bead rate and paint thickness and consistency. Several attempts to find a paint gun tip that would provide a uniform 30mil thickness with a four inch wide line and no overspray were tried. We had no success in finding a tip that would provide desired results. Attempts were made to “Overnite” additional tips in from the Rohm Haas home office. These tips did arrive on the morning of the 14<sup>th</sup>.

On the morning of the 14<sup>th</sup> continued attempts were made to find a tip that would produce a uniform, consistent paint application. Finally a 163-471 tip was found to produce the desired mil thickness in the range of 30-32 wet mils. The dry thickness of the paint should be in the 19 mil thickness range. The width of the test stripe was approximately 4.5 inches instead of the normal 4.0 inch width. The calibration speed to attain these results was 5 miles per hour. Normal striping speed for MoDOT waterborne paint is approximately 8.5 to 9.0 miles per hour, so the striping operation will take approximately twice as long as conventional 15 mil waterborne striping. The high pressure paint pump pressure used to calibrate the 30 mil paint was 1500 pounds per square inch. The beads used during the calibration and striping were Type 3 Visibeads. They were calibrated at 12 pounds per gallon of paint. The bead distribution during the calibration was uniform. During the calibration the no track time of the paint was checked. The no track time observed during the calibration was approximately 3 to 3.5 minutes. The striper was calibrated on an asphalt section in the maintenance lot.

It appears that the Rohm Haas representatives were not well prepared to calibrate the set up the airless type of striper that MoDOT utilizes.

With the calibration of the striper completed, the actual evaluation application was performed during the afternoon of July 14, 1998. The evaluation location was an approximately six mile long section of US Route 71 from Route FF (Jasper County Line) to the Route 175 interchange in Newton County. White edge line and intermittent skips on the southbound lane were striped and the white edge line on the northbound lane were striped. Striping started at approximately 1:30 p.m.

The weather conditions at the time of application was as follows:

Air Temperature--2 F (obviously temperature is incorrect)  
Relative Humidity--9%  
Heat Index--97F  
Wind--5 M.P.H. N.W.

No pavement surface temperature was available.

Because of the no-track time required (3-3.5 minutes) the traffic control consisted of 3 TMA's instead of 2 to keep traffic from crossing the paint. Even with the 4 TMA's spaced out to control tracking some tracking was observed. The stripe applied on the pavement was checked by the Rohm Haas representatives and was in the 30-34 mil thickness range.

The paint application produced a good deal of overspray on the pavement. This was evidenced by photos taken of the tires on the TMA directly behind the striper. The tread of the tires were white with the overspray. Overspray on vehicles could be a problem because my car was parked on the shoulder and overspray was noticed on the rear window and trunk deck as shown by photos taken.

The color of the paint stripe appears to be a well defined white and uniform in appearance.

The approximate volume of paint applied was 350 gallons with 4200 pounds of Type 3 glass beads. The length of stripe applied was 47183 linear feet. This figure was obtained from the striper foot counters, which related to 8.938 miles of stripe applied. The rate of application was 38.88 gallons per mile. Bead application rate was 12 pounds per gallon of paint.

It appears that unless the overspray problem can be resolved the only application for this paint might be on limited access, four lane concrete pavement section. The overspray problem would not allow its use on asphalt pavements or in towns or cities where vehicles would be parked along the striping route.

Test plates were laid in the striper path and the bead guns were turned off as the striper

passed over the plates. The test plates will be sent to the Chemical Lab, Paint Section to determine the paint thickness applied.

**Initial retroreflectivity measurements, taken with the MiroLux 30 Reflectometer, will be taken within two weeks of application. Additional measurements will be taken on approximately 60-day intervals, i.e., October 1, 1998, December 1, 1998, etc. District 7 personnel will document and inform RDT of snow and ice incidents and snowplow runs made by district personnel. Retroreflectivity measurements will be provided to Rohm Haas representative. Evaluation will continue for at least two winters or until the paints fails.**

## APPENDIX I- HD21 AND DT400 RESINS

### UPDATE ON DISTRICT 7's TESTING OF STRIPING PAINT WITH HD21 AND DT400 RESINS

District 7 has for several years been trying to improve the waterborne stripe being placed by District 7 strippers. The district, with the assistance of Traffic Engineering and Research, has placed a number of stripes with different types of experimental material. One of these is a waterborne stripe with the 4th generation of resins (HD21 and DT400). Currently MoDOT uses second-generation resins in our waterborne paint. The district is also participating in a research project to develop a Pavement Marking Management System with BC Traffic Engineering. Most of the test sites using this experimental paint are included in this project. This research contract includes taking retroreflectivity readings on a substantial amount of striping in District 7 with a Laserlux unit.

In July 1998, a test was placed using HD21 resin on concrete pavement on new US71. The material was supplied by Rohma-Haas and shipped in barrels from one of their plants in the eastern United States. This material did not meet MODOT striping specifications. The material was placed with a 30-mil thickness over a one-time thinly applied waterborne stripe. The existing stripe was tight. Information on this application of the 30-mil was collected and has been previously distributed. The company representatives were in charge of the operation with District 7 employees performing the work. We did experience some difficulty in applying the material. Our personnel felt they could remedy those problems with minimum effort. The information on retroreflectivity for this test is included in Attachment 1. This 30-mil stripe has never been restriped during the 3-year test.

In October 2000, the testing of these new resins was expanded with additional stripe being placed with paint using experimental resins HD21 from Rohm-Haas and DT400 from Dow. This material was supplied to us by each of the vendors and we were in charge of the operation to apply it. The performance of this material during the striping operation was comparable to our existing waterborne material. This material was placed with a mil thickness of 20 to 23 with approximately 13 lbs of beads per gallon of paint. BC Traffic Engineering took retroreflectivity readings on some of these locations in November 2000 and again in May 2001. See Attachment 2 for locations of stripe, where the material was placed, and their retroreflectivity readings.

Pavement Marking Management System Phase 1 (RDT 00-008) found that the normal deterioration during the mild winter of 1999-2000 for yellow striping was relatively consistent and had a deterioration rate of approximately 30% of the retroreflectivity and the white stripe, even though not as consistent, had a deterioration rate of approximately 50%. At one time FHWA has discussed using minimum levels of retained retroreflectivity as 80mcd/m<sup>2</sup>/lux for yellow and 100 mcd/m<sup>2</sup>/lux for white. District 7

considers a Laserlux retroreflectivity reading of 225 for yellow and 275 for white to be good on a new stripe with our existing paint using Visibeads.

BC Traffic Engineering read new epoxy stripe placed on I-435 in District 4 during their November readings. White ranged from 302 to 383 and yellow from 233 to 241. Attachment 3 contains readings on epoxy stripe on I-44 in District 7 that were striped in 2000. BC Traffic Engineering read a range of 308 to 448 on the white stripe in November 2000. After one winter the readings on the white stripe ranged from 134 to 195 and yellow ranged from 106 to 116.

The estimated quantities for District 7 2001 striping program are 80,000 gallons of yellow and 60,000 gallons of white at a cost of \$4.19/ gal for yellow and \$3.45/gal for white. The estimated increase cost of HD21 is approximately 45% per gallon. However with our present paint, we are using 20 gal per mile (17-mil) on high volume roads (roads with edge lines, in cities and new stripes) and 17 gals (15-mils) on other roads. The vendors supplying HD21 and DT400 are recommending 20 to 22 mils. When considering the entire striping operation, labor cost, equipment cost, and availability of equipment to complete the program are more critical than material costs. The cost of paint is not quite 20% of the total cost of the stripe. Material costs should not be the controlling factor.

The performance of the 30-mil HD21 placed in 1998 has been excellent especially when it is considered that this was on concrete. This was placed over an existing one waterborne stripe. The existing stripe is still tight and has not failed. Generally the performance of our existing paint on concrete is poor. The initial review of the performance of the HD21 and DT400 placed in 2000 was not as good. At locations where this material was placed over several old waterborne stripes, the bond between the old stripe and the pavement failed (especially on old concrete) which caused the new stripe to fail. Locations where this experimental material was placed on a new surface, the daytime presence of the stripe is good. HD21 and DT400 had the highest retained retroreflectivity on stripe placed in 2000 on new asphalt surface compared with our existing paint and epoxy. Attachment 4 contains this information.

In the Pavement Marking Management System Phase 1 Report, BC Traffic Engineering recommended consideration is given in using more of the higher build latex products such as the HD21 and DT400. These resins are presently being used by several state DOT's in waterborne striping operations and appears quickly to be coming the "standard" in resins for waterborne paint.

During these Pavement Marking Management System research projects, we identified one cause of snowplow damage to striping and developed a procedure to reduce yearly striping on selected routes to striping once every two years. The snow plow damage was caused by the plow cutting action on the taller stripe created by the build-up of stripes over several years especially on major routes that are striped twice or three times per year. Several years ago we were able to go to one stripe per year on I-44. It was determined that reducing this build-up will reduces the damage caused by snowplows.

Also during 2000 we identified 300 to 400 centerline miles of striping that could be delayed until the following year. Appendix F is the test criteria we established for roads in 2000 that could be done once every two years. A district wide increase in preventive maintenance work during the fall of 2000 decreased the amount of stripe we could delay striping. Even with the past severe winter, we are still seeing the potential to being able to apply these criteria. Even though the quality of our white stripe does not follow the national standard of being substantially better than yellow, we plan on including white stripe for 2001. Even with the second-generation resin, the quality of the striping in these situations has been adequate but with the 4<sup>th</sup> generation resin the quality of the striping should go to good.

We believe our results and success to this point justifies expanding the testing of these resins. Our experience shows that the 4<sup>th</sup> generation will improve the quality of our paint but the testing has been limited and what effects it will have on operations are difficult to determine. An expanded test would clarify these issues. District 7 striping operations are at the point that with an improved paint we can reduce striping and still maintain a good stripe in certain situations. We are proposing that District 7 striping operations convert to waterborne paint with the new resins for the remainder of the 2001 season. This would give Missouri experience in using these materials, especially within our routine operation.

(06/19/01)  
Daryl Weinkein

## Retroreflectivity Key

R <sub>L</sub>	Retroreflectivity
LEL	Left Edge Line of a four lane divided or undivided highway or street (yellow marking)
REL	Right Edge Line of a four or two-lane highway (white marking).
LL	Lane Line (skips) of a four lane divided or undivided highway or street (white marking)
CL	Centerline of a two-way two lane or three lanes with continuous left turn lane roadway (yellow marking)
mcd	Units retroreflectivity are measured in (metric units mcd/m <sup>2</sup> /lux).
Subjective Rating	Visual rating of pavement marking, from 1-5 (1 failure – 5 excellent), based on daytime appearance of the in place marking
PL	Material type: PL = paint latex
TH	Material type: TH = thermoplastic
T	Material type: T= tape
E	Material type: E=epoxy

ATTACHMENT 1

Retroreflectivity Readings on 30-mil HD21 white waterborne paint

Date of Readings	Southbound Right Edge Line				Southbound Lane Line				Northbound Right Edge Line			
	mcd	Diff	Sub Rate	Log	mcd	Diff	Sub rate	Log	mcd	Diff	Sub Rate	Log
5-3-99	217		3	0-6	239		5	.9-6	242		4	6-0
4-1-00	154	40.9%	2	0-6	230	3.9%	3	0-6	204	18.6%	3	6-0
11-11-00	-		-	-	201	14.4%	3	0-6	160	27.5%	4	6-0
5-7-01	132	16.7%	3	0-2.9	193	4.1%	3	0-6	148	8.1%	3	6-0

Striped on 7-15-98, 30 mil HD21, US 71, Newton County on new concrete over one waterborne stripe

ATTACHMENT 2  
Locations and Retroreflectivity Readings on 4<sup>th</sup> Generation Resins

Route 66, Jasper County, 20-21 mils															
Date of Reading	HD21 Resin						DT400 Resin						Log	Pavement Surface	Over Old Stripe
	Westbound Lane Line (white)			Westbound Centerline (yellow)			Eastbound Lane Line (white)			Eastbound Centerline (yellow)					
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	348		4	214		3	351		4	202		3	6.6-9	Hot Mix	yes
5/5/2001	148	135.1%	2	138	55.1%	3	132	165.9%	2	129	56.6%	3			

Route FF, Jasper County, DT400 Resin 20-21 mils															
Date of Reading	Eastbound Lane Line (white)			Westbound Lane Line (white)			Eastbound Centerline (yellow)			Westbound Centerline (yellow)			Log	Pavement Surface	Over Old Stripe
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	351		4	351		4	177		3	180		3	0-3	0-2 Hot Mix; 2-5.6 Concrete	yes
5/5/2001	122	187.7%	2	113	210.6%	2	68	160.3%	3	79	127.8%	2			

Route FF, Jasper County 20-21 mils															
Date of Reading	HD21 Resin						DT400 Resin						Log	Pavement Surface	Over Old Stripe
	Eastbound Lane Line (white)			Westbound Lane Line (white)			Eastbound Lane Line (white)			Westbound Lane Line (white)					
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	336		4	383		4							3-5	Concrete	Yes
5/5/2001	116	189.7%	3	100	283%	3									

Route FF, Jasper County 20-21 mils															
Date of Reading	HD21 Resin						DT400 Resin						Log	Pavement Surface	Over Old Stripe
	Westbound Right Edge Line (white)			Eastbound Centerline (yellow)			Eastbound Right Edge Line (white)			Westbound Centerline (yellow)					
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	210		4	169		3	166		4	178		3	3-5.1	Concrete	yes
5/5/2001	114	84.2%	2	90	87.8%	3	147	12.9%	3	85	109.4%	2			

Route FF, Jasper County, HD21 Resin 20-21 mils												
Date of Reading	Eastbound Right Edge Line (white)			Westbound Right Edge Line (white)			Westbound Centerline (yellow)			Log	Pavement Surface	Over Old Stripe
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	198		4	218		4	191		4	5.1-6.9	Hot Mix	yes
5/5/2001	122	43.5%	3	108	101.9%	3	104	83.7%	3			

US 71, Jasper County 20-21 mils															
Date of Reading	HD-21 Resin						DT400 Resin						Log	Pavement Surface	Over Old Stripe
	Northbound Lane Line (white)			Northbound Left Edge Line (yellow)			Southbound Lane Line (white)			Southbound Right Edge Line (white)					
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	259		4	185		4	244		4	431		4	21-	Concrete	yes
5/5/2001	198	30.8%	2	90	105.6%	2	164	48.8%	2				21.5		

US 71, Newton County 20-21 mls									
Date of Reading	HD21 Resin			DT400 Resin			Log	Pavement Surface	Over Old Stripe
	Southbound Right Edge Line (white)			Southbound Left Edge Line (yellow)					
	mcd	diff	Sub Rate	mcd	diff	Sub Rate			
11/11/2000	178		4	140		3	HD21 2.9-8	Concrete	Yes
5/5/2001	137	29.9%	3	147		3	DT400 0-4		

Route 13, St. Clair County HD21 Resin 20-21 mls														
Date of Reading	Northbound Centerline (yellow)				Southbound Centerline (yellow)				Northbound Right Edge Line (white)				Pavement Surface	Over Old Stripe
	mcd	diff	Sub Rate	Log	mcd	diff	Sub Rate	Log	mcd	diff	Sub Rate	Log		
11/18/2000	218		4	23.4-	216		4	18.2-	254		4	18.2-	Hot mix	no
5/5/2001				24				23.4	170	49.4%	3	27.3		

Route 13, St. Clair County DT400 Resin 20-21 mls														
Date of Reading	Southbound Centerline (yellow)				Southbound Centerline (yellow)				Southbound Right Edge Line (white)				Pavement Surface	Over Old Stripe
	mcd	diff	Sub Rate	Log	mcd	diff	Sub Rate	Log	mcd	diff	Sub Rate	Log		
11/18/2000	180		4	24-	194		4	23.4-	292		4	18.2-	Hot mix	no
5/5/2001	176	2.3%	3	27.3				24	157	86%	3	27.3		

Route 249, Jasper County 0 to 1.07 and 1.07 to 1.51 also has 4<sup>th</sup> generation resin on it but retroreflectivity readings were not obtained

ATTACHMENT 3

Retroreflectivity readings on I-44, Jasper County Epoxy stripe, Concrete Surface (log 0 to 2.1)

Date of Reading	Eastbound Right Edge Line (white)			Westbound Right Edge Line (white)			Eastbound Lane Line (white)			Westbound Lane Line (white)		
	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate	mcd	diff	Sub Rate
11/11/2000	320		4	308		4	436		4	448		4
5/7/2001	134	138.8%	3	163	89%	3	195	123.6%	3	176	154.5%	3

Date of Reading	Eastbound Left Edge Line (yellow)			Westbound Left Edge Line (yellow)		
	mcd	diff	Sub Rate	mcd	diff	Sub Rate
5/7/2001	106		3	116		3

ATTACHMENT 4

**AVERAGE MCD READING ON STRIPE PLACED IN 2000  
ON NEW ASPHALT SURFACES**

Material	Line Type	2000 mcd Reading	2001 mcd Reading
DT400 White Resin	REL	292	157
HD21 White Resin	REL	254	170
Epoxy	REL	319	154
Waterborne	REL	231	147
DT400 Yellow Resin	CL	187	176
HD21 Yellow Resin	CL	217	
Waterborne	CL	200	164
Epoxy	LEL	244	111
Waterborne	LEL	146	129
Epoxy	LL	395	186
Waterborne	LL	300	192

APPENDIX J - PAINT TESTS IN DISTRICT SEVEN

**On October 04, 2000, District Seven Striping Crews started the first phase of testing of two traffic paint resins - Rohm Haas HD21 and Dow DT400. We received 440 gallons of each color(yellow & white) from each resin manufacturer. This material was shipped to us in 55 gallon drums. Our crews pulled 4 1-quart samples from each color from each manufacturer, which totaled 16 quarts. District Material Staff sent samples to Division Lab for testing.**

**The first phase of testing was done in St. Clair County on Route 13. This section of roadway to be painted was a new construction hot mix overlay. Paint mil checks were done on maintenance lot at Collins. Crews also calibrated all bead dispensers. Both resins went onto pavement with no problems. Crews made few adjustments to get correct amounts of material down and lines applied look sharp and crisp. It was an overcast day and we had concerns of the dry times. I feel because this was the first stripe to be installed, it allowed paint to settle into pavement with little tracking. We applied 14 pounds of glass Visibeads that allowed traffic to drive on glass and not in paint. Test went well, but crews left at 5:00 A.M that morning and got back home at 8:00 P.M. that evening. Most of the extra time needed to do this test was because Route 13 is 110 miles from Joplin. The other factor for the extra time was doing a clean out to change over paints. Results of this first phase were forwarded to both resin manufacturers, paint manufacturer and all interested parties within MoDOT.**

**The second phase of testing was done on October 18, 2000 in the Joplin area. Routes selected to get test materials are: Jasper County - Route 66, Route 249, Route FF ; Newton County - Route 71. Representatives from Rohm Haas and Ennis Paint were present for this test. Dow representative was contacted but was not able to attend. This test also went with little or no problems. All parties involved and present seemed to agree testing well. Weather was outstanding for October. This was the first time in 15 to 20 years that Route 66 and Route FF were striped during daylight hours. Under normal restripes, our crews would have striped these routes during night hours. We do this to reduce tracking of paint. I had concerns of tracking in this test in these areas. Everyone present agreed that we were impressed that both resins had such good dry times. Again, we had little to no tracking. We applied paint at 20 to 21 mils in Joplin area testing, while we applied 23 mils on the Route 13 test. In both tests, I think the application of 13 to 14 pounds of glass**

**Visibeads helped reduce tracking. The extra mil thickness also allowed more beads to be embedded in the line. From the test plates we set out, we could see that ¼ to 1/3 of Visibeads settled into paint. The remainders of beads were sitting up with good embedment. This will allow us to have beads in line longer with extra beads in extra paint.**

**The striping crew had little problems applying these extra amounts of material. They shot lines as if they put this amount down daily. Striper speed was at 10 MPH and minor paint pump pressures were needed. Our bead dispensers had no problems getting extra beads out. We used Visiguns and they had plenty of extra adjustment left. This test went better than the 30 mil test applied 2 years ago. This 20 to 23 mil paint was simple to get down on pavement. The disadvantage of the 30 mil tests was that the crew had to try to get the striper to stripe at 5 MPH. This was difficult to do. Also, this 20 to 23 mil test went well because we got our paint from Ennis Paint with our specs. The viscosity of the 20 to 23 mil test paint was thicker than the 30 mil test paint. The 30 mil test paint was supplied from an eastern state manufacturer. The 30 mil test is still proving out great with great retro readings. I have test sites established to get retro readings and will forward these reading to all interested parties.**

**Branham**

**Randy  
Signing & Striping  
Supervisor**

APPENDIX K – INFORMATION COLLECTION DATA SHEET AND PMMS REPORTS

# DAILY STRIPING OPERATION LOG

MISSOURI DEPARTMENT OF TRANSPORTATION  
DISTRICT 7 – JOPLIN, MO

STRIPER NUMBER: \_\_\_\_\_

DATE: \_\_\_\_\_

EMPLOYEE NAME	FUNCT CODE	REG. HRS	OT HRS	BENEFIT TYPE	BENEFIT TIME	EQUIP TYPE	VEHICLE I.D.	END MILEAGE													
COUNTY	ROUTE	RTE CLASS	BEGIN LOG MILE	END LOG MILE	DIR. ST. N,S, E,W	LINE MILES INSTALLED				GAL./LINE(S) INSTALLED				BEAD USAGE	TRAVEL TIME	WEATHER DELAY	EQUIP DELAY	PVMT TEMP	AIR TEMP	HUMID %	
						YELLOW LT	YELLOW CL	WHITE LL	WHITE RT	YELLOW LT	YELLOW CL	WHITE LL	WHITE RT								
<b>MATERIAL TOTALS</b>						0	0	0	0	0	0	0	0	NOTES:							

## Equipment Information 08/22/2002

<b>Equipment Description:</b> 1985 GMC Truck-TMA				<b>Equipment #:</b> 2854			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
0.79	0.00	56.00	56.00	0	159,165	159,165		0.00	0
<b>Equipment Description:</b> 1986 International Truck-TMA				<b>Equipment #:</b> 3208			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
0.79	0.00	0.00	0.00	0	221,096	221,096		0.00	9,999,999
<b>Equipment Description:</b> 1988 Ford Truck-TMA				<b>Equipment #:</b> 3635			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
0.79	0.00	0.00	0.00	0	188,718	188,718		0.00	9,999,999
<b>Equipment Description:</b> 1988 GMC Truck-TMA				<b>Equipment #:</b> 3813			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
0.79	0.00	0.00	0.00	0	109,778	109,778		0.00	9,999,999
<b>Equipment Description:</b> 1990 Ford Truck-TMA				<b>Equipment #:</b> 4237			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
0.79	0.00	18.00	18.00	0	144,625	144,625		0.00	9,999,999
0.79	0.00	86.00	86.00	0	110,267	110,267		0.00	9,999,999
<b>Equipment Description:</b> 1990 M-B Center Striper				<b>Equipment #:</b> G7475			<b>Serial #:</b>		
<b>Rate</b>	<b>Begin Hours</b>	<b>Current Hours</b>	<b>Total Hours</b>	<b>Begin Miles</b>	<b>Current Miles</b>	<b>Total Miles</b>	<b>Next Maint Date</b>	<b>Next Maint Hours</b>	<b>Next Maint Miles</b>
4.21	0.00	0.00	0.00	0	144,616	144,616		0.00	999,999

## Daily Product Used by Crew Report For 01/01/2001 to 12/31/2001

**Install Date: 03/30/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	515	0	8,350
<hr/>			
Date Totals:	515	0	8,350

**Install Date: 04/26/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	310	530	11,700
<hr/>			
Date Totals:	310	530	11,700

**Install Date: 04/04/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	325	0	5,800
<hr/>			
Date Totals:	325	0	5,800

**Install Date: 04/30/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	215	80	4,100
<hr/>			
Date Totals:	215	80	4,100

**Install Date: 04/12/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	265	85	4,300
<hr/>			
Date Totals:	265	85	4,300

**Install Date: 05/01/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	230	120	6,100
<hr/>			
Date Totals:	230	120	6,100

**Install Date: 04/17/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	290	480	11,900
<hr/>			
Date Totals:	290	480	11,900

**Install Date: 05/02/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	730	385	6,700
<hr/>			
Date Totals:	730	385	6,700

**Install Date: 04/18/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	275	220	6,950
<hr/>			
Date Totals:	275	220	6,950

**Install Date: 05/03/2001**

CrewID	Gallons of YellowPaint	Gallons of White Paint	Lbs of Beads
Striper2	495	0	6,600
<hr/>			
Date Totals:	495	0	6,600

## Inventory Usage Report

### For 01/01/2001 to 12/31/2001

**Material: Beads paint price per pound contract 2000**

Day	Transaction Description	Units Used	Units Recv	CrewID	Location
March					
30	Maintenance Installation	4,500	0	Striper2	Joplin
30	Maintenance Installation	650	0	Striper2	Joplin
30	Maintenance Installation	2,200	0	Striper2	Joplin
30	Maintenance Installation	1,000	0	Striper2	Joplin
April					
4	Maintenance Installation	3,500	0	Striper2	Joplin
4	Maintenance Installation	1,800	0	Striper2	Joplin
4	Maintenance Installation	500	0	Striper2	Joplin
12	Maintenance Installation	650	0	Striper2	Joplin
12	Maintenance Installation	250	0	Striper2	Joplin
12	Maintenance Installation	500	0	Striper2	Joplin
12	Maintenance Installation	250	0	Striper2	Joplin
12	Maintenance Installation	2,400	0	Striper2	Joplin
17	Maintenance Installation	5,500	0	Striper2	Joplin
17	Maintenance Installation	2,600	0	Striper2	Joplin
17	Maintenance Installation	1,900	0	Striper2	Joplin
17	Maintenance Installation	1,900	0	Striper2	Joplin
18	Maintenance Installation	3,850	0	Striper2	Joplin
18	Maintenance Installation	1,550	0	Striper2	Joplin
18	Maintenance Installation	1,550	0	Striper2	Joplin
19	Beads used on j, S, 06	4,680	0	Unknown	Joplin
19	Beads used on o, N, 06	3,270	0	Unknown	Joplin
19	Maintenance Installation	2,900	0	Striper2	Joplin
24	Maintenance Installation	1,100	0	Striper2	Joplin
24	Maintenance Installation	500	0	Striper2	Joplin
24	Maintenance Installation	100	0	Striper2	Joplin
25	Beads used on 71, S, 49	2,400	0	Unknown	Joplin
25	Maintenance Installation	950	0	Striper2	Joplin
25	Maintenance Installation	1,900	0	Striper2	Joplin
25	Maintenance Installation	7,000	0	Striper2	Joplin
26	Maintenance Installation	7,900	0	Striper2	Joplin

## Monthly Striping Progress Report For 01/01/2001 to 12/31/2001

DATE	COUNTY	DIR	RTE	SEC	BEGIN LOG MILES	END LOG MILES	MILES				MATERIAL			TOTAL \$\$\$
							LEFT EDGE MILES	CENTER LANE MILES	LANE LINE MILES	RIGHT EDGE MILES	GLASS BE ADS \$ 0.50	YELLOW PAINT \$ 4.03	WHITE PAINT \$ 3.79	
							<b>Striper1</b>							
04/19/2001	Barton	N	o	S	0.00	6.93	0.00	5.68	0.00	0.00	3270	180	0	
											\$ 1,635.00	\$ 725.40	\$ 0.00	\$ 2,360.40
04/25/2001	Jasper	S	71	S	15.80	21.00	0.00	0.00	0.00	5.20	2400	0	150	
											\$ 1,200.00	\$ 0.00	\$ 568.50	\$ 1,768.50
06/12/2001	Jasper		K	COLC	0.00	10.54	0.00	10.12	0.00	0.00	5000	310	0	
											\$ 2,500.00	\$ 1,249.30	\$ 0.00	\$ 3,749.30
06/12/2001	Jasper		BB	COLC	0.00	6.64	0.00	6.37	0.00	0.00	2400	150	0	
											\$ 1,200.00	\$ 604.50	\$ 0.00	\$ 1,804.50
06/27/2001	Barton		E	COLC	0.00	1.19	0.00	0.98	0.00	0.00	400	30	0	
											\$ 200.00	\$ 120.90	\$ 0.00	\$ 320.90
06/27/2001	Dade		W	COLC	0.00	3.77	0.00	4.56	0.00	0.00	1400	100	0	
											\$ 700.00	\$ 403.00	\$ 0.00	\$ 1,103.00
06/27/2001	Dade		U	COLC	0.00	3.54	0.00	4.28	0.00	0.00	1000	70	0	
											\$ 500.00	\$ 282.10	\$ 0.00	\$ 782.10
06/27/2001	Dade		H	COLC	0.00	9.21	0.00	11.14	0.00	0.00	2100	300	0	
											\$ 1,050.00	\$ 1,209.00	\$ 0.00	\$ 2,259.00
06/27/2001	Dade		E	COLC	0.00	12.41	0.00	15.02	0.00	0.00	2100	300	0	
											\$ 1,050.00	\$ 1,209.00	\$ 0.00	\$ 2,259.00
07/11/2001	Lawrence	N	39	ARTL	6.90	13.80	6.90	0.00	0.00	0.00	5040	360	0	
											\$ 2,520.00	\$ 1,450.80	\$ 0.00	\$ 3,970.80
07/20/2001	McDonald		C	COLC	0.00	6.80	0.00	10.81	0.00	6.80	4500	300	20	
											\$ 2,250.00	\$ 1,209.00	\$ 75.80	\$ 3,534.80
07/20/2001	McDonald		U	COLC	0.00	7.20	0.00	11.45	0.00	0.00	5900	420	0	
											\$ 2,950.00	\$ 1,692.60	\$ 0.00	\$ 4,642.60
07/20/2001	McDonald		JJ	COLC	0.00	4.50	0.00	7.16	0.00	0.00	2800	200	0	
											\$ 1,400.00	\$ 806.00	\$ 0.00	\$ 2,206.00
07/20/2001	McDonald		V	COLC	0.00	4.00	0.00	6.36	0.00	0.00	2900	210	0	
											\$ 1,450.00	\$ 846.30	\$ 0.00	\$ 2,296.30

## Striping Progress Summary Report For 01/01/2001 to 12/31/2001

MONTH STRIPED	MILES					MATERIAL				DOWNTIME			
	LEFT EDGE MILES	CENTER LANE MILES	LANE LINE MILES	RIGHT EDGE MILES	LINE MILE SEG	GLASS BE ADS \$ 0.50	YELLOW PAINT \$ 4.03	WHITE PAINT \$ 3.79	TOTAL \$\$\$	WEATHER DELAY	EQUIP DELAY	MISC DELAY	TOTAL DELAY
March	0.00	20.89	0.00	0.00	17.78	8,350 \$ 4,175.00	515 \$ 2,075.45	0 \$ 0.00	\$ 6,250.45	0.00	0.00	0.00	0.00
April	9.60	82.57	2.61	89.34	134.82	64,870 \$ 32,435.00	2,260 \$ 9,107.80	2,060 \$ 7,807.40	\$ 49,350.20	1.50	8.00	0.00	9.50
May	0.00	202.26	1.60	81.96	167.60	86,300 \$ 43,150.00	4,675 \$ 18,840.25	2,355 \$ 8,925.45	\$ 70,915.70	3.00	4.50	0.00	7.50
June	0.00	274.02	0.00	238.24	315.04	163,450 \$ 81,725.00	5,585 \$ 22,507.55	5,670 \$ 21,489.30	\$ 125,721.85	3.00	6.00	0.00	9.00
July	216.10	255.18	39.95	324.09	526.49	264,140 \$132,070.00	11,930 \$ 48,077.90	7,170 \$ 27,174.30	\$ 207,322.20	2.00	18.50	0.00	20.50
August	8.00	394.77	3.53	281.58	540.96	252,000 \$126,000.00	10,145 \$ 40,884.35	7,080 \$ 26,833.20	\$ 193,717.55	2.00	22.00	0.00	24.00
September	0.00	407.67	2.32	163.63	494.08	203,800 \$101,900.00	9,760 \$ 39,332.80	4,045 \$ 15,330.55	\$ 156,563.35	2.00	8.00	0.00	10.00
October	41.73	285.63	10.58	420.61	572.07	208,400 \$104,200.00	7,625 \$ 30,728.75	9,055 \$ 34,318.45	\$ 169,247.20	4.00	13.00	0.00	17.00
November	88.34	30.94	18.69	134.55	214.02	77,000 \$ 38,500.00	2,755 \$ 11,102.65	2,782 \$ 10,543.78	\$ 60,146.43	6.00	1.00	0.00	7.00
December	0.00	156.03	0.00	6.52	130.00	55,650 \$ 27,825.00	3,910 \$ 15,757.30	225 \$ 852.75	\$ 44,435.05	0.00	1.00	0.00	1.00
<b>TOTAL</b>	<b>363.77</b>	<b>2,109.94</b>	<b>79.27</b>	<b>1,740.52</b>	<b>3,112.86</b>	<b>1,383,960</b> <b>\$ 691,980.00</b>	<b>59,160</b> <b>\$ 238,414.80</b>	<b>40,442</b> <b>\$ 153,275.18</b>	<b>\$ 1,083,669.98</b>	<b>23.50</b>	<b>82.00</b>	<b>0.00</b>	<b>105.50</b>

**Total Miles Striped: 4293**

**Material Cost per Yellow Mile Striped: \$ 257.54**

**Material Cost per White Mile Striped: \$ 245.39**

## Striping Progress by County, Route Report For 01/01/2001 to 12/31/2001

DATE	COUNTY	DIR	RTE	SEC	BEGIN LOG MILES	END LOG MILES	MILES				MATERIAL			TOTAL \$\$\$
							LEFT EDGE MILES	CENTER LANE MILES	LANE LINE MILES	RIGHT EDGE MILES	GLASS BEADS \$ 0.50	YELLOW PAINT \$ 4.03	WHITE PAINT \$ 3.79	
							<b>Striper2</b>							
10/31/2001	Lawrence	E	144	IS	0.00	14.40	14.40	0.00	3.60	0.00	6700	485	70	
											\$ 3,350.00	\$ 1,954.55	\$ 265.30	\$ 5,569.85
11/01/2001	Lawrence	E	144	IS	14.40	27.37	12.97	0.00	3.24	0.00	3800	280	60	
											\$ 1,900.00	\$ 1,128.40	\$ 227.40	\$ 3,255.80
11/01/2001	Lawrence	W	144	IS	25.80	27.37	1.57	0.00	0.00	0.00	1300	40	0	
											\$ 650.00	\$ 161.20	\$ 0.00	\$ 811.20
11/05/2001	Lawrence	W	144	IS	0.00	25.80	25.80	0.00	6.45	0.00	12800	700	225	
											\$ 6,400.00	\$ 2,821.00	\$ 852.75	\$ 10,073.75
11/07/2001	Lawrence	E	144	IS	0.00	27.37	0.00	0.00	0.00	27.37	7200	0	525	
											\$ 3,600.00	\$ 0.00	\$ 1,989.75	\$ 5,589.75
11/08/2001	Lawrence	W	144	IS	5.98	27.37	0.00	0.00	0.00	21.39	5000	0	370	
											\$ 2,500.00	\$ 0.00	\$ 1,402.30	\$ 3,902.30
							Striper2							
							54.74	0.00	13.29	48.76	36800	1505	1250	
											\$ 18,400.00	\$ 6,065.15	\$ 4,737.50	\$ 29,202.65

## Striping Progress by Crew Report For 01/01/2001 to 12/31/2001

MONTH STRIPED	MILES					MATERIAL				DOWNTIME			
	LEFT EDGE MILES	CENTER LANE MILES	LANE LINE MILES	RIGHT EDGE MILES	LINE MILE SEG	GLASS BEADS \$ 0.50	YELLOW PAINT \$ 4.03	WHITE PAINT \$ 3.79	TOTAL \$\$\$	WEATHER DELAY	EQUIP DELAY	MISC DELAY	TOTAL DELAY
<b>Striper1</b>													
April	0.00	5.68	0.00	5.20	12.13	5,670	180	150		0.00	4.00	0.00	
						\$ 2,835.00	\$ 725.40	\$ 568.50	\$ 4,128.90				4.00
June	0.00	52.47	0.00	0.00	47.30	14,400	1,260	0		0.00	2.00	0.00	
						\$ 7,200.00	\$ 5,077.80	\$ 0.00	\$ 12,277.80				2.00
July	6.90	35.78	0.00	73.17	95.77	42,440	1,490	1,540		0.00	12.00	0.00	
						\$ 21,220.00	\$ 6,004.70	\$ 5,836.60	\$ 33,061.30				12.00
August	0.00	150.50	0.00	196.58	320.50	115,700	3,850	4,390		2.00	15.00	0.00	
						\$ 57,850.00	\$ 15,515.50	\$ 16,638.10	\$ 90,003.60				17.00
September	0.00	20.17	0.00	146.66	165.16	67,500	450	3,815		0.00	3.00	0.00	
						\$ 33,750.00	\$ 1,813.50	\$ 14,458.85	\$ 50,022.35				3.00
October	0.00	0.00	0.00	285.99	285.99	77,400	0	5,990		2.00	7.00	0.00	
						\$ 38,700.00	\$ 0.00	\$ 22,702.10	\$ 61,402.10				9.00
<b>TOTAL</b>	<b>6.90</b>	<b>264.59</b>	<b>0.00</b>	<b>707.60</b>	<b>926.85</b>	<b>323,110</b>	<b>7,230</b>	<b>15,885</b>		<b>4.00</b>	<b>43.00</b>	<b>0.00</b>	
Striper1						<b>\$ 161,555.00</b>	<b>\$ 29,136.90</b>	<b>\$ 60,204.15</b>	<b>\$ 250,896.05</b>				<b>47.00</b>

## Striping Time Chargeout Report For 01/01/2001 to 12/31/2001

CREW	INSTALL DATE	TOTAL HOURS	HOURS STRIPED	TRAVEL TIME	EQUIPMENT DELAY	WEATHER DELAY	MISC DELAY
<b>Striper1</b>							
	04/19/2001	1.50	1.50	1.50	1.00	0.00	0.00
	04/25/2001	1.00	1.00	1.00	3.00	0.00	0.00
	06/12/2001	1.00	1.00	1.00	0.50	0.00	0.00
	06/12/2001	0.00	0.00	0.00	0.00	0.00	0.00
	06/27/2001	1.50	1.50	1.50	1.00	0.00	0.00
	06/27/2001	0.00	0.00	0.00	0.50	0.00	0.00
	06/27/2001	0.00	0.00	0.00	0.00	0.00	0.00
	06/27/2001	0.00	0.00	0.00	0.00	0.00	0.00
	06/27/2001	1.50	1.50	1.50	0.00	0.00	0.00
	07/11/2001	1.00	1.00	1.00	0.00	0.00	0.00
	07/20/2001	1.00	1.00	1.00	0.00	0.00	0.00
	07/20/2001	0.50	0.50	0.50	0.00	0.00	0.00
	07/20/2001	0.50	0.50	0.50	0.00	0.00	0.00
	07/20/2001	1.50	1.50	1.50	0.50	0.00	0.00
	07/23/2001	1.00	1.00	1.00	4.50	0.00	0.00
	07/23/2001	1.00	1.00	1.00	0.00	0.00	0.00
	07/24/2001	2.00	2.00	2.00	5.00	0.00	0.00
	07/31/2001	2.00	2.00	2.00	0.00	0.00	0.00
	07/31/2001	2.00	2.00	2.00	2.00	0.00	0.00
	08/01/2001	2.00	2.00	2.00	1.00	0.00	0.00
	08/01/2001	2.50	2.50	2.50	0.00	0.00	0.00
	08/02/2001	2.00	2.00	2.00	0.00	0.00	0.00
	08/02/2001	0.50	0.50	0.50	0.00	0.00	0.00
	08/02/2001	0.50	0.50	0.50	0.00	0.00	0.00
	08/02/2001	2.00	2.00	2.00	0.00	0.00	0.00
	08/03/2001	1.50	1.50	1.50	0.00	0.00	0.00
	08/03/2001	1.00	1.00	1.00	0.00	0.00	0.00
	08/06/2001	2.00	2.00	2.00	0.00	0.00	0.00
	08/06/2001	2.00	2.00	2.00	4.00	0.00	0.00

# TimeSheet

Week #: 47
District/Region: 07
Organization #: 781

Name	Date	Reg Hours	OT Hours	Comp Hours	Vacation Hours	Sick Hours	Holiday Hours	Other Hours	Total Hours
	11/20/2001	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	<b>Totals:</b>	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	11/20/2001	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	<b>Totals:</b>	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	11/20/2001	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	<b>Totals:</b>	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	11/20/2001	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	<b>Totals:</b>	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	11/20/2001	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
	<b>Totals:</b>	8.00	0.00	0.00	0.00	0.00	0.00	0.00	8.00
<b>Totals:</b>		40.00	0.00	0.00	0.00	0.00	0.00	0.00	40.00

## Equipment Transaction Report For 01/01/2001 to 12/31/2001

Crew ID:

Equipment: 3208 - 1986 International Truck-TMA

Rate: 0.79  
 Current Hours: 0.00  
 Current Miles: 221,096.0

Date	Hours	Beg Miles	End Miles
03/30/2001	0.00	0.0	210,005.0
04/04/2001	0.00	0.0	210,135.0
04/12/2001	0.00	0.0	210,608.0
04/24/2001	0.00	0.0	210,705.0
04/25/2001	0.00	0.0	210,768.0
04/30/2001	0.00	0.0	210,931.0
05/01/2001	0.00	0.0	211,020.0
06/07/2001	0.00	0.0	212,050.0
06/14/2001	0.00	0.0	212,067.0
06/18/2001	0.00	0.0	212,185.0
06/19/2001	0.00	0.0	212,334.0
06/20/2001	0.00	0.0	212,508.0
06/22/2001	0.00	0.0	212,675.0
06/25/2001	0.00	0.0	212,847.0
07/09/2001	0.00	0.0	213,094.0
07/11/2001	0.00	0.0	213,224.0
07/13/2001	0.00	0.0	213,350.0
07/17/2001	0.00	0.0	213,514.0
07/18/2001	0.00	0.0	213,685.0
07/19/2001	0.00	0.0	213,845.0
07/24/2001	0.00	0.0	213,948.0
07/25/2001	0.00	0.0	214,112.0
08/07/2001	0.00	0.0	214,152.0
08/16/2001	0.00	0.0	214,200.0
08/17/2001	0.00	0.0	214,250.0
08/20/2001	0.00	0.0	214,300.0

## Maintenance Installations Report For 01/01/2001 to 12/31/2001

Date	Location	County	Crew	Dir	Route	Section	Beg Mile	End Mile	Left Edge Miles	Center Lane Miles	Lane Line Miles	Right Edge Miles	Trav Time	Equip Delay	Weather Delay	Misc Delay	LT Gal	CL Gal	LL Gal	RT Gal	LT Bear
04/19/2001	Joplin	Barton	Stripert	N	o	S	0.00	6.93	0.00	5.68	0.00	0.00	1.50	1.00	0.00	0.00	0	180	0	0	327
04/25/2001	Joplin	Jasper	Stripert	S	71	S	15.80	21.00	0.00	0.00	0.00	5.20	1.00	3.00	0.00	0.00	0	0	0	150	240
05/12/2001	Joplin	Jasper	Stripert		K	COLC	0.00	10.54	0.00	10.12	0.00	0.00	1.00	0.50	0.00	0.00	0	310	0	0	500
05/12/2001	Joplin	Jasper	Stripert		BB	COLC	0.00	6.64	0.00	6.37	0.00	0.00	0.00	0.00	0.00	0.00	0	150	0	0	240
05/27/2001	Joplin	Dade	Stripert	W		COLC	0.00	3.77	0.00	4.55	0.00	0.00	1.50	1.00	0.00	0.00	0	100	0	0	140
05/27/2001	Joplin	Dade	Stripert	U		COLC	0.00	3.54	0.00	4.28	0.00	0.00	0.00	0.50	0.00	0.00	0	70	0	0	100
05/27/2001	Joplin	Dade	Stripert	H		COLC	0.00	9.21	0.00	11.14	0.00	0.00	0.00	0.00	0.00	0.00	0	300	0	0	210
05/27/2001	Joplin	Dade	Stripert	E		COLC	0.00	12.41	0.00	15.02	0.00	0.00	0.00	0.00	0.00	0.00	0	300	0	0	210
05/27/2001	Joplin	Barton	Stripert	E		COLC	0.00	1.19	0.00	0.98	0.00	0.00	1.50	0.00	0.00	0.00	0	30	0	0	40
07/11/2001	Joplin	Lawrence	Stripert	N	39	ARTL	6.90	13.80	6.90	0.00	0.00	0.00	1.00	0.00	0.00	0.00	360	0	0	0	504
07/20/2001	Joplin	McDonaid	Stripert	C		COLC	0.00	6.80	0.00	10.81	0.00	6.80	1.00	0.00	0.00	0.00	0	300	0	20	450
07/20/2001	Joplin	McDonaid	Stripert	U		COLC	0.00	7.20	0.00	11.45	0.00	0.00	0.50	0.00	0.00	0.00	0	420	0	0	590
07/20/2001	Joplin	McDonaid	Stripert	JJ		COLC	0.00	4.50	0.00	7.16	0.00	0.00	0.50	0.00	0.00	0.00	0	200	0	0	280
07/20/2001	Joplin	McDonaid	Stripert	V		COLC	0.00	4.00	0.00	6.36	0.00	0.00	1.50	0.50	0.00	0.00	0	210	0	0	290
07/23/2001	Joplin	Jasper	Stripert	N	71	NHS	0.00	20.98	0.00	0.00	0.00	20.98	1.00	4.50	0.00	0.00	0	0	0	450	640
07/23/2001	Joplin	Barton	Stripert	N	71	NHS	15.27	20.38	0.00	0.00	0.00	5.11	1.00	0.00	0.00	0.00	0	0	0	120	170
07/24/2001	Joplin	Barton	Stripert		71	NHS	4.21	10.93	0.00	0.00	0.00	6.72	2.00	5.00	0.00	0.00	0	0	0	200	280
07/31/2001	Joplin	Barton	Stripert	N	71	NHS	0.00	4.20	0.00	0.00	0.00	4.20	2.00	0.00	0.00	0.00	0	0	0	90	130
07/31/2001	Joplin	Vernon	Stripert	N	71	NHS	0.60	29.96	0.00	0.00	0.00	29.36	2.00	2.00	0.00	0.00	0	0	0	650	910
08/01/2001	Joplin	Bates	Stripert	N	71	NHS	0.00	29.32	0.00	0.00	0.00	29.32	2.00	1.00	0.00	0.00	0	0	0	650	920
08/01/2001	Joplin	Bates	Stripert	S	71	NHS	0.00	5.39	0.00	0.00	0.00	5.39	2.50	0.00	0.00	0.00	0	0	0	135	190
08/02/2001	Joplin	Bates	Stripert	S	71	NHS	5.39	20.76	0.00	0.00	0.00	15.37	2.00	0.00	0.00	0.00	0	0	0	325	450
08/02/2001	Joplin	Bates	Stripert	S	71	NHS	28.70	29.36	0.00	0.00	0.00	0.66	0.50	0.00	0.00	0.00	0	0	0	15	20
08/02/2001	Joplin	Vernon	Stripert	S	71	NHS	7.38	14.23	0.00	0.00	0.00	6.85	0.50	0.00	0.00	0.00	0	0	0	145	200
08/02/2001	Joplin	Vernon	Stripert	S	71	NHS	16.56	28.95	0.00	0.00	0.00	12.39	2.00	0.00	0.00	0.00	0	0	0	250	370
08/03/2001	Joplin	Barton	Stripert	S	71	NHS	0.00	20.38	0.00	0.00	0.00	20.38	1.50	0.00	0.00	0.00	0	0	0	430	600
08/03/2001	Joplin	Jasper	Stripert	S	71	NHS	0.00	20.98	0.00	0.00	0.00	20.98	1.00	0.00	0.00	0.00	0	0	0	450	650
08/06/2001	Joplin	Bates	Stripert		W0R7	COLC	0.00	1.00	0.00	1.12	0.00	0.00	2.00	0.00	0.00	0.00	0	20	0	0	30
08/06/2001	Joplin	St. Clair	Stripert	KK		COLC	0.00	1.60	0.00	2.19	0.00	0.00	2.00	4.00	0.00	0.00	0	60	0	0	80
08/07/2001	Joplin	St. Clair	Stripert	P		COLC	0.00	4.50	0.00	6.17	0.00	0.00	2.50	0.50	0.00	0.00	0	95	0	0	130
08/07/2001	Joplin	Bates	Stripert	P		COLC	0.00	4.50	0.00	5.04	0.00	0.00	1.00	0.00	0.00	0.00	0	95	0	0	130
08/07/2001	Joplin	St. Clair	Stripert	B		COLC	0.00	1.60	0.00	2.19	0.00	0.00	0.50	2.00	0.00	0.00	0	40	0	0	60
08/07/2001	Joplin	Bates	Stripert	B		COLC	0.00	4.40	0.00	4.93	0.00	0.00	2.00	0.00	0.00	0.00	0	140	0	0	200
08/08/2001	Joplin	Jasper	Stripert	HH		ARTL	0.50	5.13	0.00	0.00	0.00	4.63	1.00	2.00	0.00	0.00	0	0	0	135	190
08/08/2001	Joplin	Jasper	Stripert	P		ARTL	1.04	4.27	0.00	0.00	0.00	3.23	0.00	0.00	0.00	0.00	0	0	0	60	80
08/08/2001	Joplin	Jasper	Stripert	JJ		ARTL	0.00	4.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00	0	0	0	60	80
08/08/2001	Joplin	Jasper	Stripert	P		ARTL	2.17	6.50	0.00	0.00	0.00	4.43	1.00	0.00	0.00	0.00	0	0	0	60	80
08/09/2001	Joplin	Vernon	Stripert	M		COLC	0.00	21.95	0.00	23.93	0.00	0.00	2.00	0.00	0.00	0.00	0	470	0	0	660
08/09/2001	Joplin	Bates	Stripert	M		2.5	0.00	2.50	0.00	2.80	0.00	0.00	2.00	1.00	0.00	0.00	0	170	0	0	240
08/13/2001	Joplin	Bates	Stripert	A		COLC	0.00	16.34	0.00	18.30	0.00	0.00	2.00	1.50	0.00	0.00	0	365	0	0	510
08/13/2001	Joplin	Vernon	Stripert	D		COLC	0.00	4.00	0.00	4.36	0.00	0.00	1.00	0.00	0.00	0.00	0	150	0	0	210
08/13/2001	Joplin	Bates	Stripert	PP		COLC	0.00	4.00	0.00	4.48	0.00	0.00	2.00	0.00	0.00	0.00	0	200	0	0	280
08/14/2001	Joplin	Bates	Stripert	U		COLC	0.00	14.96	0.00	16.76	0.00	0.00	2.50	0.00	0.00	0.00	0	460	0	0	670
08/14/2001	Joplin	Bates	Stripert	Y		COLC	0.00	12.21	0.00	13.68	0.00	0.00	2.50	0.00	0.00	0.00	0	375	0	0	520

## Materials Listing 08/22/2002

**Product**      3

Description	Location	Units	Unit Price	Reorder	
				Level	Lead Time
Beads paint price per pound contract 2000	Joplin	Lbs	0.50	1000	1 week
Beads price per pound contract 2001	Joplin	Lbs	0.50	50000	1 week
Beads price per pound contract 2002	Joplin	Lbs	0.48	1000	1 week

**Product**      1

Description	Location	Units	Unit Price	Reorder	
				Level	Lead Time
White paint price per gallon contract 2000	Joplin	Gal	3.30	1000	1 week
White paint price per gallon contract 2001	Joplin	Gal	3.45	5000	1 week
White paint price per gallon contract 2002	Joplin	Gal	3.79	5000	1 week

**Product**      2

Description	Location	Units	Unit Price	Reorder	
				Level	Lead Time
Yellowpaint price per gallon contract 2000	Joplin	Gal	4.54	1000	1 week
Yellowpaint price per gallon contract 2001	Joplin	Gal	4.19	5000	1 week
Yellowpaint price per gallon contract 2002	Joplin	Gal	4.03	5000	1 week