Introduction to Crack Sealing

Economical Maintenance Technique that Can Extend Pavement Life

Water is the most destructive element to our pavement. Water entering the roadway through cracks accelerates deterioration. In time, the water will undermine and weaken the roadway base material, creating cracks and potholes. Sealing pavement cracks to prevent water from entering the base and subbase will extend the pavement life from three to five years.

Pavements expand and contract with seasonal temperature changes. Consequently, cracks and joints expand and contract when the pavements move. Sealing the cracks with flexible rubberized asphalt that bonds to the crack walls and moves with the pavement will prevent water intrusion. As part of a pavement management system, crack sealing can reduce pavement deterioration by restricting water penetration into the underlying base and subbase layers. This restriction helps to maintain pavement structural capacity and limits future degradation. Simply stated, sealing cracks and joints in pavement extends the service life of the surface treatment and the pavement.

It should be noted that crack sealing will not improve the initial pavement rideability. The benefits are realized in three to five years when it becomes obvious that the pavement has not deteriorated as quickly. Roads and bridges that are crack sealed last longer than those that are not. Sealing prior to surface treatments and bituminous paving overlays enhances the treatment and further extends the pavement life. The overall successes of pavement maintenance systems that include crack sealing make crack sealing a desired maintenance program.

Sealants

Asphalt rubber was the first generation of flexible sealants to move with the pavement and maintain flexibility at warm and cold temperatures. Unlike fillers, asphalt rubber is flexible below 35°F and does not migrate or run when temperatures reach 85°F.

Selectively applying crack sealant can extend surface pavement life.
Region climates encouraged manufacturers to develop sealants that would outperform standard flexible sealants. Extreme high temperatures in the Southwest and severe cold temperatures in the northern Midwest prompted the development of sealants that have greater flexibility and better bonding to crack walls. A generation of sealants utilizing polymer technology was introduced. Polymers, when added to a liquid asphalt base, formulate a sealant that has a greater expansion capability than asphalt rubber sealants. Sealants are now manufactured with a performance range from 200°F to -30°F.

Louisiana’s climate is ideal for crack sealing almost all year round. Rubberized sealants will perform best in wet climates. Because the modified and proprietary products are typically more expensive, an agency should perform a cost effectiveness analysis before choosing a product. Manufacturers are a good source of information and know the performance of their products. Manufacturer’s claims should be carefully reviewed for applicability to the specific situation.

**Preparation and Application**

Preparation is key to successful use of crack sealants. In the same way that a dentist prepares a tooth before filling a cavity, crews must prepare cracks to receive sealants. The better the preparation, the better the chance that the sealant will last and perform. In Louisiana’s environment, it is extremely important to clean and dry the crack prior to sealing. Surface preparation can be accomplished with compressed air (100 psi minimum) and a simple blowpipe. This technique works well when the dirt is dry and not packed hard. If the cracks are filled with wet dirt, the dirt needs to be removed and the crack must be completely dried. An air compressor or a hot-air lance generating temperatures in excess of 2,000°F is the best tool. In simple terms, a heat lance uses hot compressed air that blows cracks clean while drying them out. Field studies and research are finding that heat lances are valuable tools for proper preparation.

Studies show that there is almost a 40 percent greater chance of sealant success if cracks are routed prior to sealing. Cutting a reservoir also ensures that the proper amount of sealant penetrates the crack. An operator passes the pavement cutter or router over the crack, through a series of star-shaped steel teeth, and cuts a reservoir into the crack. Modern routers can follow even the most random pavement cracks. Once the rout is complete, compressed air (hot or cold) can be used to remove the dust created by the router. Engine-powered steel wire brushes can also be used to clean routed and nonrouted cracks.

(Note: Older-aged asphalt pavements and thin asphalt pavements may not be suitable for routing.)

**Application Equipment**

The most visible piece of equipment is the melter. In years past (and still in use), the “tar pot” was simply a steel pot with a direct flame burner used to heat the material. Also in use today are indirect fire melters, which require a high temperature heat transfer medium such as oil. These kinds of melters are known as “oil jacketed” melters or “double boilers.” Special care must be taken to assure that the sealant temperature does not exceed the manufacturer’s recommendations; otherwise, the polymers may be destroyed therefore reducing the sealant perform-
Hot pour sealants are effectively applied through a delivery hose and wand. These materials are commonly applied at 375°F; however, the manufacturer’s recommended application temperature should be followed. To prevent sealant cooling, setup, and clogging, the hose is placed under constant pressure and the sealant circulates constantly back into the main tank. Crewmembers must therefore be trained not only in proper safety procedures but also proper operation of the melter. Melters with “on demand” pumping and thermostatically controlled delivery hoses reduce the chances of mistakes and improve productivity.

Application

Sealant application can be accomplished in a variety of ways. No less than twelve methods are outlined in the Strategic Highway Research Program publication Materials and Procedures for Sealing and Filling Cracks in Asphalt-Surfaced Pavements (www.trb.org/publications/shrp/SHRP-H-348.pdf). The three most widely used material placement configurations are: simple band-aid (2 inch to 3 inch wide band); recessed band-aid; and shallow, recessed band-aid.

The success of each method was influenced by cleaning techniques and sealant selections. Sealant applied in routed cracks performed longer; each of the recessed band-aids had good results. A recessed configuration dispenses material into the confines of a routed crack. The sealant can be placed flush with the pavement, slightly overfilled on the surface, or slightly below the surface of the pavement. In an over-band configuration, the sealant is placed onto and over an unrouted crack. The sealant can be shaped into a band over the crack using a rubber blade squeegee or a sealing shoe that flattens the sealant over the crack.

Crack sealing is most appropriate for cracks between one-fourth to one inch wide. Cracks smaller than one-fourth inch will not retain sufficient sealer to flex in the cold. Cracks greater than one inch will sag and possibly prematurely fail without the installation of HMA or backer rod. Contracted crack sealing is typically bid by the following three methods: lineal feet of crack sealed, gallons of sealant applied, or pounds of sealant used.

Pavement Selection

Pavement selection is a critical element in determining the success or failure of a crack sealing program. If the road has alligator cracking, high density, multiple cracking, poor subbase drainage, or structural damage, then crack sealing will not solve the problem. In these cases the damage is too far-advanced. If attempting to save a pavement that has too much cracking, there will be disappointment with the efforts. The best candidates for crack sealing are newer pavements that are beginning to form cracks. Always begin a crack sealing program by sealing the best or newest roads first. A good rule of thumb is to

Overapplying sealant material can lead to problems when paving over with hot mix asphalt or bleeding up through the seal of paving application.

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Safety Improvement Projects

The Louisiana Local Road Safety Program (LRSP) is now entering its third year. The 2007 funding cycle received a fantastic response of over 80 applications. Each application was evaluated against criteria to determine the potential for the project to reduce the likelihood of crashes and the potential for serious injuries and fatalities. Thirty-nine projects were selected for funding. The same criteria will be used again in 2008.

Help for Intersections

The LRSP developed an intersection safety improvement action plan based on a systematic approach to data analysis and the implementation guidelines of the Louisiana Strategic Highway Safety Plan (SHSP). This includes addressing not only the highest crash intersections but also using standardized criteria to identify and select intersections to include in the program. (Note: a special workshop for areas with the greatest number of high crash intersections is scheduled for March 10–12, 2009.)

Using the statewide data, 59 intersections were selected for review based on the number, severity, and type of crashes occurring as well as the type of intersection. Consideration was also given to geographic location with a maximum of two intersections per jurisdiction being selected. These intersections were visited by LRSP engineers and local representatives to confirm that the low cost improvement packages would be appropriate.

The low cost package for stop controlled intersections includes a combination of oversize warning signs with solar flashing beacons, oversize stop and stop ahead signs with flashing solar beacons, and possible rumble strips or transverse markings on the stop approach to the intersections.

For the intersections with traffic signals, minor signal enhancements, where possible, would include twelve-inch light emitting diode (LED) lenses on all signal heads, back-plates on all signal heads, and a minimum of one traffic signal head per approach lane. Enhancements also include traffic signal amber and all red phase timing in accordance with ITE timing standards. Advance left and right signal ahead warning signs with solar flashing beacons could also be included.

Project Implementation Update

The Local Road Safety Program is working to implement the 46 projects from the 2006 application cycle and 39 from 2007. The funding for these projects comes from the Highway Safety Improvement Program (HSIP) and High Risk Rural Roads Program (HRRR), both of which are administered through the LADOTD. Since the LRSP is a new program and these funds have not been used on local projects of this type, a new process had to be developed to accommodate the requirements of the Federal Highway Administration (FHWA) and the LADOTD. This resulted in a longer than anticipated implementation period for the first year’s projects. The LRSP and LTAP staffs continue to work diligent-
ly to move all of these projects through the planning and administrative channels to the implementation stage. Please contact Marie Walsh at 225-767-9184 or Spencer Boatner at 225-767-9717 if you have any questions regarding the status of your project.

2006 Projects Update

The engineering consultants have been selected and have signed their retainer contracts for both the north and south parts of the state: Digital Engineering and Imaging, Inc. of Kenner and Aillet, Fenner, Jolly, and McClelland, Inc. of Shreveport. Meetings are being scheduled between the consultants and local sponsors of the approved projects.

2007 Projects Update

A Parish–City/State Agreement is being developed for each project as well as the environmental clearance requests. These are the final steps before the drafting of the Parish–City/State Agreement that must be signed by the project sponsor. Project sponsors should expect a local/state agreement by November 1, 2008. After the signing of these agreements, the engineering phase of the projects will be initiated.

2008/2009 Funding Cycle

The application deadline was extended to November 1, 2008 because of the recent storms. The application and additional documents have been posted to the LTAP Web site. Please read all of the supporting documentation before filling out an application. In addition, a concept development form can be completed and sent to the LTAP office to judge the safety impact of the project prior to filling out the entire application. The LRSP staff can provide immediate feedback regarding the evaluation rating criteria to the particular projects. This may help applicants improve their application and save time for projects that do not meet the criteria for funding.

Please visit the LTAP Web site at www.ltrc.lsu.edu/ltap for the application and other resources on the Local Road Safety Program.

TIMED Program Coming up Short

The funding problem stems from a series of 16 projects approved by voters in 1989 and known as TIMED, which stands for Transportation Infrastructure Model for Economic Development. In 1990, officials estimated that finishing the 16 projects would cost $1.2 billion. However, primarily post-Katrina re-construction has driven those costs to approximately $5.2 billion.

For each gallon of gas purchased, Louisiana motorists pay 38.4 cents in state and federal taxes, which include 16 cents in state taxes to finance rank-and-file road and bridge projects and four cents to finance TIMED improvements. However, four cents will not be enough to pay off the debt for the 16 projects – there will be a shortfall. TIMED problems could strip as much as $66 million per year from the fund that is supposed to pay for other road improvements.

Although the seven percent drop in state gasoline tax revenue covers a period from July 2007 through February 2008, gasoline prices have gone even higher since that time, meaning that the revenue drop may exceed seven percent. The setback in the state road picture comes on the heels of the Legislature’s approval of a plan to trim the state’s $14 billion backlog of road/bridge needs.

A bill approved in March will gradually boost state aid to roads/bridges by $255 million per year in five years. The increase is set to be $42 million in the financial year beginning July 1.
Governor Bobby Jindal announced the appointment of Louisiana State Police Lt. Colonel John LeBlanc as the Executive Director of the Louisiana Highway Safety Commission (LHSC).

Colonel Mike Edmonson, Deputy Secretary of Public Safety, said, “I am looking forward to working with Lt. Colonel LeBlanc as he continues to serve the citizens of Louisiana in his new role as Executive Director of the Louisiana Highway Safety Commission.” Edmonson also points out the importance of Executive Director Lt. Colonel LeBlanc, Motor Vehicle Commissioner Kay Hodges, and Fire Marshal Butch Browning, along with his position as State Police Superintendent as being essential to the Crime and Safety Package of Governor Jindal.

Lt. Colonel LeBlanc has over 30 years of law enforcement experience, including more than 26 years with the Louisiana State Police. He has completed numerous law enforcement schools, including the 207th Session of the FBI National Academy. Additionally, he has completed coursework at the University of Virginia and the University of Louisiana at Lafayette.

Lt. Colonel LeBlanc has also served as a patrolman, a uniform officer, a detective, and a protective services commander. He is a member of the International Association of Chiefs of Police, the Governor’s DWI Task Force, and the FBI National Academy Associates. LeBlanc has also served as a past chairman of the Region II Law Enforcement Committee of the American Association of Motor Vehicle Professionals, and he is a past member of the Louisiana Property and Casualty Insurance Commission. During both Hurricanes Katrina and Rita, he served as the State Police Forward Operational Commander.

Lt. Colonel LeBlanc has served as the Deputy Superintendent of Patrol at the Louisiana State Police since 2000, where he directs and coordinates the nine state police troops, comprised of nearly 600 uniformed officers and more than 100 non-commissioned personnel. LeBlanc has received many awards and honors for his years of service in the law enforcement community. He has also received numerous commendations for outstanding performance of duty.

Highway Safety Commission’s Programs

The Louisiana Highway Safety Commission sponsors many programs to meet its goal of “developing and implementing a comprehensive strategy aimed at saving lives and preventing injuries on our highways.” This includes a strong emphasis on enforcement in the key areas of impaired driving, speeding, seat belt usage.

For more information on the Louisiana Highway Safety Commission and their programs, please visit their Web site at www.dps.state.la.us/hwswww.nsf.
Drunk driving is a persistent problem in Louisiana and across the nation that contributed to the loss of nearly 450 lives in our state last year and more than 17,000 across the nation. Louisiana authorities arrested more than 17,000 drivers on DWI charges in 2006. John LeBlanc, Governor’s Representative of High Safety, supports new approaches to addressing impaired driving issues.

Because this problem is so pervasive, highway safety experts constantly search for new initiatives to reduce the number of deaths that are caused by persons who insist on driving while impaired. “Judicial and prosecutorial partnerships are a critical component to the overall success of ridding our roadways of impaired drivers,” said LeBlanc. Judges, district attorneys, and prosecutors from across Louisiana met September 29 and 30 in Baton Rouge to confront the overwhelming problem of people drinking and driving.

With funding from the LHSC, the Louisiana District Attorneys Association put together a dynamic two-day event, titled Innovative Approaches to DWI Prosecution and Adjudication. Louisiana judges, district attorneys, and prosecutors from across Louisiana met September 29 and 30 in Baton Rouge to confront the overwhelming problem of people drinking and driving.

A lively panel discussion on how to implement a DWI court was an integral part of the event. Officials of the Terrebonne Parish DWI court, including District Attorney Joe Waitz, Court Administrator Danny Smith, DWI Court Liaison Sgt. Jody Blanchard, and Judge John R. Walker, conducted the energetic panel discussion on DWI courts.

LeBlanc further states, “DWI courts have been designed to reduce recidivism, hold offenders accountable, prevent alcohol abuse, and protect the public.” DWI court programs continue to expand throughout Louisiana with programs in Terrebonne, St. Mary, New Iberia, and Monroe.

As the problem of drunk driving in our state persists, innovative approaches to DWI prosecution and adjudication must take place. In 2007, 49 percent of all traffic fatalities statewide were due to drunk driving, and this percent has risen steadily. In 2006 46 percent of all traffic fatalities were the result of drunk driving, and in 2005, 42 percent were the result of drunk driving.

Partnerships between the Louisiana Highway Safety Commission, the Louisiana District Attorney’s Association, and various enforcement and education programs throughout the state must step up to the continuing challenges of impaired driving.

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monitor roadways that have been resurfaced, and consider crack sealing within three to five years following the resurfacing. Keep in mind that more sealant is not always better. Over applying sealant material can lead to problems when paving over with HMA or bleeding up through the seal or paving application. These new sealants are not designed to be “road glue.” Yes, they are very sticky and have tremendous bonding power. However, they were not made to “hold the road together.” Crack sealing has one objective: to prevent water from further damaging our roads. Sealing “buys time” and saves money by delaying the expense of major reconstructive pavement work.

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Upcoming Events

**LRSP Intersection Safety Workshop**
Rescheduled for March 10–12, 2009
TTEC Building, Baton Rouge, LA

**Temporary Traffic Control for Local Agencies: MUTCD Part 6**
October 14 – Bossier City
October 15 – Monroe
October 22 – Alexandria
October 23 – Lake Charles
October 29 – Rayne
October 30 – Baton Rouge
November 5 – Madisonville
November 6 – Metairie

**Operational Safety in and Around Heavy Equipment**
November 12 – Bossier City
November 13 – Monroe
November 17 – Baton Rouge
November 18 – Alexandria
November 19 – Lake Charles
November 20 – Metairie

**Louisiana Transportation Conference**
February 8–11, 2009
Baton Rouge River Center

Due to Hurricane Gustav, a number of LTAP’s courses have been postponed. Please visit the LTAP Web site at www.ltrc.lsu.edu/ltap for the new dates of the rescheduled courses.

**Traffic Signal Power Outages — Four Way Stops**

Hurricanes Gustav and Ike wrecked havoc on a majority of south Louisiana’s traffic signals. When approaching an intersection without power to the traffic signal, motorists must treat it as a four-way stop controlled intersection. If two vehicles stop at the same time, the driver of the vehicle on the left shall yield the right of way to the vehicle on the right.

**Need Technical Help? Contact LTAP**

225-767-9117
800-595-4722 (in state)
225-767-9156 (fax)
www.ltrc.lsu.edu/ltap/cu.html

Dr. Marie B. Walsh
Director

David McFarland
Teaching Associate

Robert Breaux
Office Manager

Dean Tekell, P.E., P.T.O.E.
Tom Buckley, P.E.
Rick Holm
Local Road Safety (contractor)
Spencer Boatner
Graduate Student
T.J. Dunlevy
Student Worker

LTAP Center
4099 Gourrier Ave.
Baton Rouge, Louisiana 70808

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**Newsletter Staff**

Jenny Speights, Public Information Director
Jenny Gilbert, Editor
T.J. Dunlevy, Publisher

The Louisiana Local Technical Assistance Program was established at the Louisiana Transportation Research Center on the LSU campus in 1986. The purpose of the center is to provide technical materials, information, and training to help local government agencies in Louisiana maintain and improve their roads and bridges in a cost effective manner. To accomplish this purpose, we publish a quarterly newsletter; conduct seminars, workshops, and mini-workshops covering various aspects of road and transportation issues; provide a lending library service of audio/visual programs; provide technical assistance through phone and mail-in requests relating to transportation technology; and undertake special projects of interest to municipalities in Louisiana. LTAP also coordinates the Louisiana Local Road Safety Program.