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...
National Work Zone Awareness Week 2009

April 6-10 marks the 10th anniversary of National Work Zone Awareness Week. The national campaign is conducted every year at the start of the construction season to attract national attention to drive carefully through highway construction and repair sites. Each year, approximately 1,000 people are killed in roadway work zones and, with the recent enactment of the President’s economic recovery package which supports a good deal of highway repair and construction funding, 2009 could be one of the most active highway repair seasons in recent memory.

National Public Works Week

May 17-23, 2009

Use this week to educate the public on the importance of the contribution of public works to their daily lives: planning, building, managing and operating the heart of our local communities and building the quality of life.

The theme chosen by APWA for the 2009 celebration is “Revitalize, Reinvest, Renew”

- **Reinvesting** our infrastructure will ensure safety, longevity and a positive quality of life.
- **Renewing** our infrastructure means replacing and reinvigorating the systems

For more information and a sample proclamation that can be used in your town, please visit: www.apwa.net/About/NPWW/
In these difficult economic times, it is even more critical that you can successfully sell your public works budget to the elected officials of your local agency and to the public.

Here are a few tips from Hank Lambert, former Director of the Vermont Local Roads Program, who developed a training program on Budgeting for Public Works Professionals.

**DEVELOP A CONCISE SUMMARY OF THE BUDGET**

A concise summary and guide for informing the Board and involving the public is valuable. There is no set format. It may include a transmittal letter, a budget message, an executive summary, a budget-in-brief. At a minimum, a summary should do the following:

1. **Summarize the major changes in priorities or service levels from the current year and the factors leading to those changes.**
2. **Articulate the priorities and key issues for the new budget period.**
3. **Identify and summarize major financial factors and trends affecting the budget, such as economic factors; long-range outlook; significant changes in revenue collections, tax rates, or other changes; current and future debt obligations; and significant use of or increase in fund balance or retained earnings.**
4. **Provide financial summary data on revenues, other resources, and expenditures for at least a three-year period, including prior year actual, current year budget and/or estimated current year actual and proposed budget.**

**TIPS FOR PRESENTING THE BUDGET TO YOUR BOARD AND TO THE PUBLIC**

**Ask First:** “Have I fully involved my staff in developing the department’s budget?”

1. **Tailor your presentation to the situation, and what you want the Board (and the public) to decide.** Begin with an overview of the presentation.
2. **Revenue section**
   - Show anticipated revenues by source
3. **Expenditure section**
   - Show expenditures by program
   - Project changes in salaries and fringe benefits
4. **Program Section**
   - Briefly explain new requirements
   - Give status reports on programs and success of new initiatives
   - Explain proposed new program initiatives and justification: pay for itself, will improve efficiency; will improve performance/safety/liability. Stress benefits to be achieved.
5. **Focus on what interests members of the audience (support existing programs, new programs, effect on property taxes, and staffing)**
6. **Discuss implications of the budget (facilities, taxes, debt); show benefits if passed; explain the consequences if the budget is cut.**

The Technology Transfer Center looks forward to bringing this valuable training to Connecticut in the future as a part of our Road Scholar program or our new Transportation Leadership Academy.
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.

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. 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.

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

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

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 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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Some resources for information on the
American Recovery and Reinvestment
Act of 2009 (ARRA).
www.recovery.gov
www.fhwa.dot.gov/economicrecovery
220x496
6 www.t2center.uconn.edu
A spring supervisory/leadership seminar was held March 17-18 at the Community College of Rhode Island in Warwick. This class is usually given twice a year, so watch the Chapter’s website (newengland.apwa.net) for date and location of the class this fall.

The Chapter’s regular spring meeting will be held April 8th at the Warwick, RI Crown Plaza Hotel. In addition to breakout sessions on Public Works topics of significance, there will be vendor displays at this meeting.

The National Public Works Week luncheon will be held at Anthony’s Pier 4 restaurant on the Boston waterfront on May 20, 2009. This is a celebration of the public works industry in New England and also raises money for the Chapter’s two Timothy J. O’Leary scholarships. The National APWA President generally attends this luncheon which usually has 500 attendees.

The Chapter’s joint student membership is growing. We now have 14 students. With one membership fee of $30/yr these students are members of the New England Chapters of the American Public Works Association, the Water Works Association and the Water Environment Federation. This is a great way for students to get the mailings from all 3 associations while they plan their careers. Contact the Chapter’s Secretary-Treasurer Lon Hultgren (HultgrenLR@MansfieldCT.org) for details.

The Chapter’s winter newsletter, the “Chapter Chatter” is out. For this and other news please visit the Chapter’s website at newengland.apwa.net.

Reaching Tomorrow’s Engineers

With proud parents and teachers looking on, The 2008 Transportation Design Challenge for Connecticut High School & Middle School Students winning teams were announced this past October 19th at the 2008 American Association of State Highway Transportation Officials (AASHTO) Annual Meeting held at the Connecticut Convention Center in Hartford. This statewide contest was open to all Connecticut secondary students to provide a realistic and engaging introduction to engineering and transportation systems. The students displayed and presented their models to a panel of judges and the competition culminated with an Awards breakfast where each student received a savings bond, academic medal, and school trophies for first, second and third place. The “Challenge” for the students were to research, analyze and design a model of a transit-oriented development project that might someday work in their community.

THE WINNERS WERE:

Middle School:

1st Place: Irving A. Robbins Middle School, Farmington
2nd Place: East Lyme Middle School, East Lyme
3rd Place: Cromwell Middle School, Cromwell

High School:

1st Place: Somers High School, Somers
2nd Place: Sacred Heart Academy, Hamden
3rd Place: Academy of Information Technology and Engineering, Stamford

To see more pictures from the competition, visit the Department website at www.ct.gov/dot/trac.
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