

## Technology Transfer Brief

### Roadwork: What To Look For As It Happens

Roadwork projects continue to take a big bite out of local government budgets. The more local officials understand good construction practices, the better they can protect this significant community investment in road pavements. Local officials in charge of new road or resurfacing projects should coordinate details with the contractor prior to the start of construction, including who is responsible for which aspects of the project. Do not overlook agreeing on how to manage project quality control and quality assurance. This article offers some basic guidance in the form of simple checklists for both chip seal and hot-mix asphalt projects that local officials can use during discussions with the contractor and on field visits. Some communities find it useful to retain an engineering and materials consultant to provide inspection services, particularly on more complex projects.

**See the job done right** - Local officials are responsible for maintenance of resurfaced roads once the contractor leaves. Therefore, a good quality management program is essential. The high cost of materials and construction now makes every road project a bigger investment for local governments. Developing and using a basic knowledge of materials and the application process helps in seeing a job is done right. Another aspect of planning ahead is to address quality in the bid process. The Arkansas State Highway and Construction, Edition of 2003 is a

good guide for Design and Quality Control of Asphalt Mixtures. Local officials do well to work closely with the contractor during a project. Being on site is part of that commitment.

**Pre-paving meetings** - Local officials should request pre-paving meetings with contractors, typically held within days prior to the planned work. The job owner and contractor should go over the process, talk about what's going to take place, what's going to be achieved and pinpoint any issues that concern them. Material suppliers should be encouraged to attend the meeting as well.

**Many reasons to be on the job site** - Local officials serve as a contact point for members of the public who have questions about the project. They can use first-hand knowledge of project progress to update staff members, elected officials and residents about the status of the project. Finally, having a visible presence at the job site is good public relations. It reassures residents to see their local officials on the job, making sure that public funds are spent wisely.

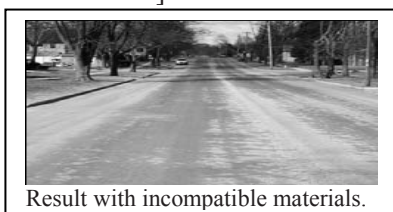
**Basic checklists helpful** - Most local officials are not expert at every detail of a chip seal or hot-mix asphalt project. Checklists like the ones provided on the checklists below and on the following page make it easier to identify potential quality issues evident on site and discuss them with the contractor.

Based on recommendations gathered from various sources, the article narrowed its checklists to the basics. Critical in a chip seal job, for example, is compatibility between emulsion and chips. Do not switch specified aggregate material without notifying the contractor; the mix balance is important to materials bonding. The materials should be confirmed to meet specifications and a chip seal design should be performed. The chip seal design will determine the median sized aggregate and the liquid asphalt application rates. Rolling and sweeping of the new surface are other points in the chip seal process to monitor closely in an on-site inspection.

Equipment settings and material temperature matter on an asphalt resurfacing job. Spray bar position affects coverage of the tack coat layer. Issues of air temperature and weather conditions also belong on the agenda, along with producing a consistent blend of asphalt to aggregate. Bids should be based on quantity instead of square yards. This ensures the contractor's incentive is for quality of work rather than cutting costs. Work should be performed within seasonal limitations as set forth in the specifications. As a general rule, chip seal work in Arkansas should not be performed before April 15 and should be completed by September 30. Arkansas Specifications allow hot-mix asphalt application at a minimum air temperature of 40° F and rising.

### Chip Seal Inspection Checklist

Are asphalt and chip materials compatible? The contractor usually checks and needs to know the source of chips if the contracting agency provides the aggregate material. An incompatible chip/emulsion combination can separate within months. [See picture below.]



Result with incompatible materials.

Is the chip material of a uniform size? Is it clean and free of excess dust?

Is the road surface clean and dry?

Have localized surface distresses been repaired and cracks sealed?

Is the asphalt distributor truck spray bar set at a height that allows fans of asphalt to overlap and produce consistent double or triple coverage of the surface?

Are all spray bar nozzles set at an angle of 15 to 30 degrees from parallel with the spray bar?

Are all nozzles free of clogs? Does the spray pattern appear uniform or is there visible streaking? If not uniform, the distributor should be stopped immediately, nozzles cleaned, and gaps sprayed by hand prior to restarting.

- Are chips spread uniformly across the entire road surface or street?
- Is the contractor using rubber-tire pneumatic rollers? Do roller weight, tire size and pressure comply with manufacturer specifications? Are all tires inflated to the same pressure?
- Does the chip spreader follow closely behind the asphalt distributor? When using an emulsion, 100 feet or less is the recommended distance.
- Does sweeping begin after there is sufficient bond between chip and binder? Test-sweep a spot by hand using a whiskbroom. If you do not dislodge chips, the surface is ready to sweep.
- Does traffic on the fresh chip seal move at 25 mph or less? Avoid opening road to normal traffic until sweeping is completed.

## Hot-mix Asphalt Overlay Inspection Checklist

- Is pavement surface clean, dry, and free of dust and debris? Are manhole covers and water valves raised to prevent awkward dips in the newly surfaced pavement?
- Is tack coat asphalt applied properly? Is distributor spray bar set at proper height to provide double coverage of tackcoat, applied uniformly at the specified rate?
- Are approved asphalt release agents used on trucks and rollers? Diesel fuel should not be used. Be sure trucks and equipment do not leak hydraulic fluids, oil or fuel on the road surface; leaks can cause a poor bond or strip asphalt from newly placed mix.
- How does contractor manage weather conditions? Do they delay or stop paving if rain is forecast early, or if it occurs during the paving process?
- Did the hot-mix asphalt arrive at paving site within specified temperature range? Check with instant-read thermometer. Cover all loads during inclement weather or when air temperature falls below 65°F.
- How are the trucks unloaded? Is care taken to avoid bumping the paver when backing up? Driver should raise truck bed slightly to break the load from the dump body before unloading into hopper and discharge material without spilling onto the pavement. End of load should not be cleaned out on pavement.
- Is the mix placed at proper grade and cross-slope and specified thickness? Overlays help correct existing cross-slope problems and road surface drainage.
- Does the placed surface texture appear uniform, free of segregation, tearing or scuffing? Does the paver screed adequately control thickness, provide a smooth surface and initial compaction of the mixture? Are manual adjustments kept to a minimum? Fold paver wings over every load or not at all to avoid placing cold segregated material.
- Are there sufficient trucks to keep paver moving at a uniform speed, balancing production and delivery of material? Is the paver kept fairly constant to help produce an amount of hot-mix asphalt material in the smooth surface?

*Adapted from an article in "Crossroads," September 2008, Wisconsin LTAP.*



## Dozer Safety



Since the beginning of 2008, six accidents have occurred nationwide involving bulldozers, five of which resulted in fatal injuries. The following is an overview of these accidents:

- On February 1, 2008, a dozer mechanic was killed when high pressure fluid from the dozer's diesel engine was ejected directly into the mechanic's eye as the dozer was cranked.
- On March 12, 2008, a dozer mechanic was killed when the dozer belly pan guard fell on the victim while he was underneath the dozer.
- On September 19, 2008, a dozer operator was fatally injured when the dozer he was operating traveled over the high wall and fell for approximately 190 feet to a pit below. (See Figure 1.)
- On September 19, 2008, a dozer operator was killed when the dozer he was operating flipped over and rolled approximately 180 feet down a slope. (See Figure 2.)
- On October 17, 2008, a dozer operator was seriously injured as the result of another machinery accident. While traveling to refuel the dozer, the operator lost control and traveled over an embankment for a distance of approximately 45 feet. (See Figure 3.)
- On October 22, 2008, a dozer operator was fatally injured when the dozer he was operating slipped and rolled sideways down a steep 80 foot incline coming to rest on its left side. (See Figure 4.) This was the fourth accident in five weeks where a dozer operator was either fatally injured or suffered serious life threatening injuries.

### Best Practices

- Routinely monitor work habits and examine work areas to ensure that safe work procedures are followed.
- Ensure equipment operators receive proper task training.
- Ensure work areas are properly illuminated at night.
- Conduct pre-operational checks of equipment before utilizing the equipment.
- Use seat belts when operating equipment.
- Assure the dozer blade is kept between you and the edge when operating close to high walls.
- Implement safety precautions for adverse weather, lighting, and visibility conditions.
- Maintain equipment braking and systems in good repair.
- Train all employees on proper work procedures, as well as hazard recognition and avoidance.

Reference: U.S. Department of Labor at <http://www.dol.gov>

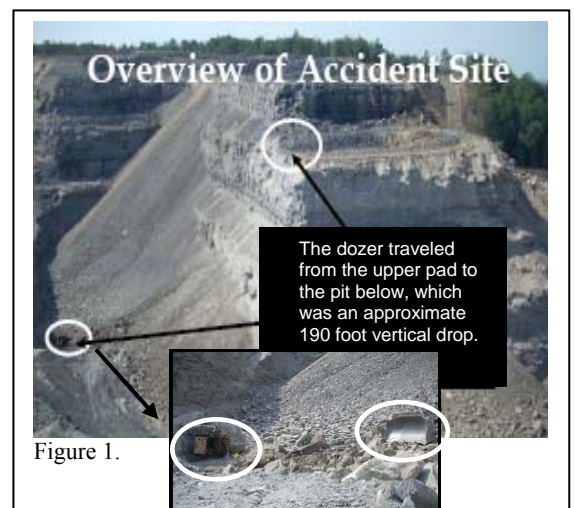


Figure 1.



Figure 2.



Figure 4.

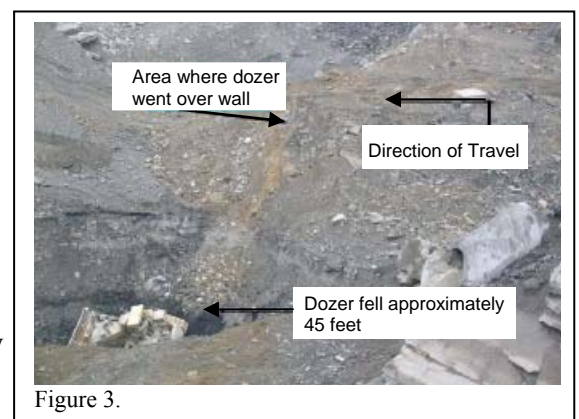


Figure 3.

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# TRAINING

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P.O. Box 13740  
Maumelle, AR 72113



Pat Genty  
President  
501-851-8001

## Utility Training – Grant

**Course Code:** 14488

**Course Date:** 9/23/2009

**Course Location:** Little Rock Wastewater Utility  
5300 S. Shackelford Road  
Little Rock, AR 72204

Sign up for this course at [www.aratssa.com](http://www.aratssa.com)

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## THE SIMPLIFIED LOW-VOLUME ROAD ANALYSIS PROCEDURE FOR WEIGHT RESTRICTION POSTING STUDY HAS BEEN COMPLETED.

A study was conducted by the Department of Civil Engineering at the University of Arkansas, with assistance from the Planning and Research Division of the Arkansas State Highway and Transportation Department (AHTD), to assist Arkansas counties with posting weight restrictions on low volume county roads.

Most low volume rural roads are not designed to carry repetitive loads from heavy vehicles. However, with strong stable soil, good drainage, strong base, and a waterproof surface, the road can carry heavy traffic beyond its design life.

A method to evaluate low volume roads that are able to withstand heavy traffic loads was developed. This procedure can be used to evaluate the possible need for posting a weight restriction on a low volume road. The procedure involves the use of low volume road design principles presented in the AASHTO Pavement Design Guide as well as pavement analysis principles utilized in the research effort. The following information is needed to conduct this evaluation procedure: pavement condition evaluation, drainage survey, asphalt and base thickness, soil resilient modulus ( $M_R$ ) estimated from a soil map, and ESAL estimate from a traffic study.

The University developed A SIMPLIFIED MECHANISTIC-EMPIRICAL (M-E) PROCEDURE FOR WEIGHT RESTRICTION POSTING FOR LOW-VOLUME FLEXIBLE ROADS, a Visual Basic Applications (VBA) within Microsoft Excel. The enclosed compact disc includes the nine page user's manual in companion with this application. This product evaluates the roadway in two separate methods: evaluating cumulative pavement damage and allowable load cycles. The following information is needed for both types of evaluation: thickness of asphalt and base course, magnitude of traffic loads and number of load cycles and axles, average daytime temperature, extent of pavement cracking, rutting depth, and Atterberg Limits. The output for each method is straight forward and easy to decipher. It is recommended that a testing firm be employed to conduct the soil tests and a Professional Engineer manage the work and conduct the analysis.

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*DISCLAIMER: Arkansas Roads & Streets is a publication of the Local Transportation Assistance Program and is financed jointly by the Federal Highway Administration (FHWA) and the Arkansas State Highway and Transportation Department (AHTD). Its purpose is to translate into straight forward, understandable terms the latest technologies in the areas of roads, bridges, and public transportation to local highway personnel. The views, opinions, and recommendations contained in this publication are those of the authors and do not necessarily reflect the views of the FHWA or AHTD.*

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