



ESCSI

Expanded Shale
Clay & Slate
Institute

Information Sheet 5650.1

Asphalt Surface Treatment Testimonials

Lightweight Aggregate - the proven solution to a safe and economical road surface.



INTRODUCTION Lightweight aggregate asphalt surface treatment (chip seal, seal coat) is an advanced road surface made with expanded shale, clay or slate lightweight cover aggregate. Selectively mined shale, clay or slate is fired in excess of 2000° F in a rotary kiln. The result is a high quality ceramic lightweight aggregate that is inert, durable, and tough - ready to meet stringent specifications.

Highway safety is increased due to the superior skid resistance (wet or dry) of road surfaces made with lightweight aggregates. This high skid resistance is maintained throughout the road's service life because under wear, fresh interior cells with rough ceramic-like edges are continuously exposed. Lightweight aggregate does not polish as it wears.

The roadway service life is extended because of lightweight aggregate's unique and superior bonding capabilities with asphalt. When bonded to the asphalt lightweight aggregate presents a tough, durable pavement that holds up well under traffic and outlasts most pavements made with normal weight aggregate. Lightweight

aggregate has minimal dust, unlike normal weight aggregate that is often coated with dust that prevents uniform bonding and creates public complaints during application.

Lightweight aggregates consistently pass Los Angeles abrasion requirements as well as other quality tests. Lightweight aggregate also shows superior freeze/thaw resistance and durability to de-icing salt corrosion. When snowplow damage occurs, lightweight aggregate is far more resistant to being stripped out than normal weight aggregate.

Damage to windshields, headlights and paint caused by flying stones is practically eliminated with lightweight aggregate thus avoiding time consuming motorist complaints and costly insurance claims. The lightness of this aggregate, plus the higher wind resistance of the rough surface texture, lowers the speed at impact. The resulting striking force is too small to do damage. The clean rough surface texture also bonds to the asphalt better so there are fewer flying particles in the first place.

TESTIMONIALS

The following testimonials verify that lightweight aggregate asphalt surface treatment offer the engineer an economical, long lasting road surface that is safer to drive on and free of motorists complaints.

Oklahoma: Tulsa County chose lightweight aggregate based on the 1990 cost data of 102 miles of road paved with lightweight aggregate chip seal. Ray Jordan, Tulsa County Engineer, decided the County could no longer afford to use limestone chips. "In 1989 and 1990 lightweight aggregate was used instead of limestone to eliminate windshield and paint damage and to increase skid resistance. The county was very impressed with the lightweight aggregate performance and especially pleased with the overall cost as summarized below.

Year	Chips	Oil	Total Cost Installed (2)
1987	Limestone	CRS-2	\$.46/sq. yd.
1988	Limestone	CRS-2	\$.48/sq. yd.
1989	Light-weight (1)	CRS-2	\$.50/sq. yd.
1990	Light-weight (1)	CRS-2	\$.46/sq. yd.

- (1) The lightweight aggregate meets Oklahoma Grade 3 and Texas Grade 4 specifications.
- (2) These prices include labor, equipment and materials.

"Tulsa County computer analysis clearly shows lightweight is more effective to handle than limestone. The labor and equipment costs have dropped remarkably with lightweight. Also, the consumption of CRS-2 has dropped from 0.42 gallons per square yard to 0.34-0.36 gallons per square yard. These cost savings have more than off-set the higher unit cost for the lightweight aggregate which was approximately \$.08/sq. yd.

"The crew benefits by using lightweight as they are provided damp and dust-free chips. The emulsion bonds best to a dust-free, very irregular surface. Crew members say driving a full truck of lightweight is much easier than a load of limestone."

City of Phoenix, Street Transportation Department:

"In May 1992 we checked the two miles of lightweight aggregate chip seal we put down in 1988. Peoria Avenue from 35th Avenue to 43rd Avenue was chipped with expanded shale lightweight aggregate and conventional asphalt. Cactus Road between 43rd Avenue and 51st Avenue used rubberized asphalt as the binder with the lightweight aggregate. Peoria Avenue carries approximately 42,000 cars a day and Cactus Road carries about 29,000 cars a day.

"Neither street is showing any indication that the chip seal is wearing. There is the usual reflective cracking starting to come through but no stripping, raveling or polishing of the aggregate is evident. There are no signs of loose rock in the gutter and the chips appear to be embedded in the asphalt binder to about two-thirds of their length.

"We are quite happy with the results from these two experimental sections and would definitely consider specifying expanded shale lightweight aggregate in any future chip seal program."

James Matteson, P.E., Street Transportation Director
and Jeffrey Van Skike, P.E. Engineering Supervisor

Colorado: Frank F. Holman, Senior Highway

Maintenance Supervisor, State of CO, Dept. of Highways, Dist. 3, Section 6, has used lightweight expanded shale aggregate for cover coat on chip seal projects in Northwestern Colorado for the past four years. "The lightweight chips we have in place are performing very well.

"We've found the cost of the lightweight chips to be comparable to rock chips with a number of advantages. The advantages are: we can haul more cubic yards per truck allowing us to reduce the equipment and man-power required to do the job. With the lighter weights the chipper has less strain on the belts and drive-train. The porous aggregate adheres to the liquid asphalt very well and provides a driving surface with excellent skid resistance. Brooming is much simpler because of the lighter weight and traffic blows much of the loose material off before we sweep. On some projects we haven't had to sweep at all. Last, and perhaps one of the most important advantages, damage to motorists' windshields has been eliminated."

Utah: "During my thirty-years of experience with materials and testing for the Utah Department of Transportation, I have encountered many problems with natural stone chip seal projects. When lightweight expanded shale aggregate was proposed as a chip seal cover aggregate I was intrigued. My previous use of expanded shale aggregate was with de-slicking grit used for sanding roadways after a rejuvenation oil was put down. It worked remarkably well, reducing the skid factor and bonding where we had a chip loss.

"After much discussion and testing we put down a lightweight chip seal test section for four miles over a mountain pass using the Utelite expanded shale chip. The cost was comparable to a good 100% crushed chip of natural stone. We put one side in lightweight expanded shale and the opposite side in 100% natural crushed stone. We evaluated this project for four years looking for chip loss and also the skid factor of the roadway. After evaluating both products we found the lightweight expanded shale had no chip loss but the 100% crushed natural stone was losing some percentage of chips. The roadway skid factor for the lightweight aggregate remained in the 60's where the natural stone was polishing out, dropping into the 40's. Some of the natural chips were taken out by snowplows, however, the lightweight expanded shale did not move. The plows would cut the lightweight but did not pull it off the roadway. This is due to the excellent bond between the lightweight and the oil making it impossible to remove from the roadway.

"I am now retired from the Utah Department of Transportation and working as a free-lance consultant for Neste Oil Company. Neste Oil Co. and Utelite Corp. are working on a plant mix seal design that will be ready to put down in 1993 on some test sections for the Utah Department of Transportation. Some of these test areas will include bridge decks. We feel the lightweight expanded shale design will prove to be an excellent product that will outlast any natural stone plant mix seal design by at least four to five years with a much higher skid factor." John M. DeGrazio, Consultant

Kansas: "Haydite - Give it a try! If more engineers, city and county officials would just try Haydite aggregate as cover material for chip and seal street surface, I think they would be surprised and amazed at the quality and longevity they would receive from this material.

"Haydite can be used with either cutback or emulsified asphalts. It is a non-polishing material approved by the FHWA and state highway agencies.

"I have been in the asphalt and chip and seal business for thirty-three years. My experience with Haydite as a cover material started twenty years ago. We have had tremendous success with this product and recommend it on almost all chip

and seal jobs." Bob Harbour, Sr., Harbour Construction, Inc., Kansas City, KS.

Haydite is the original trade name used for expanded shale, clay and slate lightweight aggregate manufactured by the rotary kiln method and some lightweight manufacturers continue to use the term, Haydite.

Virginia: "Whitehurst Paving Co., Inc. has supplied lightweight aggregate surface treatments for more than ten years working under contract for the Virginia Department of Transportation. We have developed considerable experience in the application, field performance and construction effectiveness of this material. This material provides superior bonding to asphalt emulsions and its workability is easier than normal granite stone.

"The lighter, more efficient material is applied with all our conventional equipment such as chip spreader, asphalt distributors and rubber-tired rollers. This allows us to meet all VDOT specifications calling for both lightweight and normal weight stone."

S. Wilson Whitehurst

Texas - A Typical Experience

"The Texas State Highway Department, Brownwood District, used the following aggregate and oil application rates in 1989 and 1990:

Year	LWA (1) sq. yd./yd. ³	CRS-2 gal./sq. yd.
1989	128	0.38
1990	126	0.41

(1) Texas lightweight aggregate (LWA) Grade 4 (waste not included)."

Wes Heald, Brownstone District Engineer, (915/646-2591) has used lightweight aggregate seal coat for many years with excellent success. "The District has used LWA on Interstates, State and Federal highways and farm-to-market roads. Each section of road is evaluated prior to paving to determine the optimum application of both emulsion and aggregate. A systematic evaluation of each section to be paved will insure maximum longevity and minimum cost to the taxpayer."

A Limitation To Consider: Quoting R. P. Haun, Jr., P.E., a highway consulting engineer from Eastland, Texas, with over 25 years of LWA asphalt experience.

"Synthetic expanded shale, clay or slate lightweight aggregates (LWA) has a micro surface texture that is highly resistant to skidding even when wet. This quickly creates a very high frictional force build up between the tire and the road surface. This reaches a maximum during a turning or braking action. The same thing that makes lightweight aggregate excellent to

prevent loss of control skidding when wet can also make it roll out of the asphalt under constant turning or braking. This situation occurs at busy intersections and on a hot summer day - no asphalt membrane is strong enough to overcome this force and hold it. To eliminate these isolated trouble spots the lightweight aggregate chip seal application is stopped slightly short of busy intersections. The intersections are then treated differently: hot mix, concrete, crack sealing or just do nothing. In other words--you can't have your cake and eat it too."