

## CONSULTANT ENGINEER

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Lithtec™ US  
218 Camino La Tierra  
Santa Fe, NM. 87506

Attn: Joshua D. Cantrell, President & CEO

Summary of observations and analysis of Lithtec™

### **Greetings Joshua,**

This is the summary of the evaluation of Lithtec™ performance expectations to date. When comparing the key laboratory results the resilient modulus ( $M_R$ ) test (ASTM D7369) is used in studies to measure the stiffness of many types of asphalt mixtures and various specimen types. Therefore, this will be a primary factor for the basis of our comparison of the expected performance of Lithtec™ treated soils to be used as the main structural element in a standard pavement structural section.

The process is ongoing to construct and document the use of Lithtec™ treated soils within a wide range of conditions and soil types for various roadways. The treatment of clay soils as well as sandy soils has been found to be very effective. Full depth reclamation (FDR) of roadways with thinner lifts of existing asphaltic concrete (AC) is performed by completely incorporating the pulverized AC with the existing base layer for a stronger and more crack resistant pavement structural section with no "memory" of locations of the preexisting cracks. The ability to re-use all of the in-situ material is a substantial benefit in all of the installations that have been reviewed. The monitoring of the current and future installations will be continued to gather a full range of empirical data.

Designers and users can expect the Lithtec™ treated material to exhibit the characteristics of a relatively stiff AC layer without the increased risk of cracking. The mix does not exhibit the brittleness that may normally be associated with stiffer pavements. The Lithtec™ mixtures compare favorably with AC pavement materials and can be cut and patched with all of the same methods, tools and materials used when cutting and replacing a trench cut, for instance,



in an AC or a concrete roadway, runway or other impervious wearing course or cover layer that may be designed for long periods of service.

The performance of this material is comparable to a primary pavement layer rather than any subgrade layer materials and in my professional opinion can be used in design applications with a structural number of 0.44 with a minimum thickness of 4 inches due to its semi-rigid performance characteristics. Some mining haul roads may be expected be over 15 inches in thickness depending on the maximum size of the vehicles, which weigh several hundred tons. Anticipated use in airfield runways should be similar for the heaviest applications although smaller commuter fields will have the same minimums as shown here for highway pavements.

The testing for unconfined compressive strengths shows good results (examples attached) and with high  $M_R$  of greater than 500,000 psi (3,447 Mpa) this will be a durable and effective pavement layer. Even higher  $M_R$  can be achieved by increasing the dosage. The associated calculations for subgrade support are identical to the process used for a flexible pavement design. This is compatible with the design approach and assumptions mentioned above.

The durability is expected to be equal or greater than found in most flexible pavements since it will not bleed or rut. The Lithtec™ treated material should be protected from severe abrasion such as using tire chains directly on the exposed surface. Many of the Lithtec™ applications are installed with a chip seal on the top surface for improved friction characteristics. This has proven more than adequate for abrasion protection even in winter conditions where the roadways are plowed to clear the snow in the winter season.

Please refer questions or additional observations to us for analysis and response.

Greg Gentsch, P.E.  
Civil Engineer  
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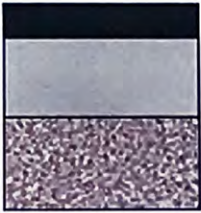


1/2" Chip 3 1/2" LT-DX  
3 1/2" S/G difference



2 1/2" AC 5" AB

### COMPARE 7 1/2" SECTIONS LOW VOLUME ROADWAY



2" AC 4" LT-DX 4" AB



4" AC 6" AB

### COMPARE 10" SECTIONS SECONDARY ROADWAY



2" AC 6" LT-DX 4" AB



6 1/2" AC 9"  
AB

3 1/2" S/G difference

### COMPARE 15 1/2" SECTIONS (like Valencia) PRIMARY ARTERIAL ROADWAY

