James Roy Anderson, P.E.
Anderson Consulting
5817 Carolyn Drive
North Richland Hills, Texas 76180

April 16, 2016

Mr. Steven Merritt, C.O.O.
Roadbond Service Company
6413 Hill City Hwy
Tolar, TX 76476

Re: Dynamic Cone Penetrometer Testing-Turner Warnell Road, Arlington, TX-14Apr2016

Thank you for inviting me to witness the DCP testing on a Roadbond Stabilized subgrade placed in 2001 in Arlington, TX. As you know, the concern of all Professional Engineers involved in pavement design is "How long does it last?" We are particularly concerned with subgrades as that is the part of pavement system that fails first. I have witnessed the videos of this subgrade being treated in 2001 as diversionary pavement with only a 4" asphalt pavement to transmit the wheel loads to the sub-grade. I also noted that a portion of the treated subgrade was exposed to rain for an extended period of time but required no reworking prior to paving. A portion of that diversionary pavement remains in place and is now serving as primary pavement on the approaches to Matlock Road. It is subject to a fairly high volume of traffic including some heavy trucks. I was not able to review the original soil data but the videos of the machine processing suggest a moderate to highly plastic clay

I noted that you used a Kessler Dual Mass Dynamic Cone Penetrometer. That device is especially well suited to your type of testing in that it allows subgrades to be tested without causing extensive damage to the overlying pavement structure. The values recorded for penetration can be programed into a computer to generate California Bearing Ratio (CBR) values without the problems associated with conventional CBR testing.

Penetration of the asphalt pavement was accomplished with a one-inch diameter drill and was continued until the drill brought up subgrade material. The Device was fitted with its standard

60 degree cone and set to be driven with the 10.1 hammer dropped from a distance of 22.6 inches. Although the 10.1 hammer is often recommended for subgrades, it proved an unfortunate choice for this particular testing as the Roadbond EN1 subgrade had become so stiff and strong that normal penetration values could not be recorded. **This particular subgrade is in fact performing as Base Course** and the use of the 17.6 lb. hammer would have been more appropriate**. You may in fact need to increase the blow count to 10 or even 20 in order to achieve the minimum penetration of 25 mm between readings**. A series of five blows with the 10.1 lb. hammer typically produced penetration values of one millimeter or less in the six locations that were tested. These values are too small for accurate assessment of the CBR value of the subgrade by the computer program. **If the heavier hammer had been used as required to achieve the minimum penetration I am confident that CBR values well in excess of 200 would have been recorded.**

As you know, it has long been my contention that Roadbond EN1 treated subgrades gain strength over time as the natural alkalinity of the soil moves the silicates in the soil mass back toward neutral pH values thus returning them to their insoluble state in a tighter and more impermeable structure. This testing, although unsatisfactory from a technical point of view, confirms my view of the process that is taking place.

The condition of the overlying pavement material in the location tested suggest that the stress caused by heavy wheel loading is being carried by the treated subgrade material. I appreciate the opportunity to witness the testing of material that has been in place for 15 years. Hopefully you will seek other opportunities to test Roadbond EN1 subgrades that have been in-place for extended periods of time. Continue to use the Kessler Dual Mass Penetrometer but use the heavier hammer on future tests with an increased number of blows if necessary. I will send you under separate cover a technical report on the Kessler Dual Mass Dynamic Cone Penetrometer published by the Corp of Engineers. I'm sure you will find it interesting.

Sincerely,

James Roy Anderson

James Roy Anderson, P.E.
Principal