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Memorandum

Date:	September 10, 2010
To:	Mary DeLoretto
From:	Tom Herzog
Subject:	Trex® Barrier Acoustical Noise Monitoring Results
Cc:	Greg Thorpe, John Van Hoff

Attached are the results of the noise monitoring program conducted at the Trex® Barrier site behind 3153 South Pearce Street in West Valley City, UT on July 28, 2010.

Please contact me if you have any questions regarding these results.

1. Introduction

In response to the performance of the Trex® Barrier as a potential product to control transportation noise, noise measurements were conducted at a recently installed location to gauge the product's acoustical performance in the field.

2. Noise Monitoring Methodology

As shown in **Figures 1-2**, a noise-monitoring program was conducted at the Trex® Barrier site behind a residence located at 3153 South Pearce Street in West Valley City, UT. As shown in **Figure 3**, the noise monitoring equipment was set-up at two locations 20 feet apart to best gauge the acoustical benefits of the installed barrier:

- immediately behind the barrier approximately three feet above the ground; and,
- in line with the barrier five feet above the ground.

All measurements were conducted concurrently so as to capture the same noise source. Due to ongoing construction activities along Constitution Boulevard, only irregular traffic was observed.

The background noise level during the monitoring program ranged from 50-52 dBA (A-weighted decibels). The weather conditions were ideal including 92^{o}F, wind speed calm to 2 miles per hour, humidity approximately 34% and with clear skies (no cloud cover).

The sound-level meters that were used during the field measurements (such as Brüel & Kjær Model 2250 and the Larson Davis Model 812) meet or exceed the American National Standards Institute (ANSI) standards for Type I accuracy and quality. The sound-level meters were calibrated using a Brüel & Kjær Model 4231 before and after each measurement. All measurements were conducted according to ANSI Standard S1.13-2005, "Measurement of Sound Pressure Levels in Air". All noise levels were reported in A-weighted decibels (dBA), which best approximate the sensitivity of human hearing.

3. Noise Monitoring Results

The results of the noise-monitoring program are summarized in **Table 1** for each of the tests conducted to gauge the noise reduction benefits of the Trex® Barrier. As shown in **Table 1**, the estimated noise reduction of the Trex® Barrier ranges from 7 decibels (6.9 dBA) under Event No. 4 to 9 decibels (9.1 dBA) under Event No. 3. As a result, the average noise reduction of the installed Trex® at the monitoring site is approximately 8 decibels (8.2 dBA).

The measured results are somewhat conservative given the reflective surfaces in the area which would generally degrade the barrier performance. In general, most barrier materials are tested in accordance with ASTM E90-04 *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements* under ideal laboratory conditions to minimize interference from external sources in order to maximize the barrier's noise reduction properties.

Table 1: Results of the Trex® Barrier Noise Reduction Measurements (in dBA)

Event No.	Shielded Monitor	Unshielded Monitor	Net Change
1	55.8	62.8	-7.0
2	53.9	62.0	-8.1
3	55.5	64.6	-9.1
4	51.0	57.9	-6.9
5	49.6	58.5	-8.9
6	50.5	59.4	-8.9
Average, logarithmic			-8.2

NB: All noise levels reported as A-weighted decibels, which correspond best to human hearing.
Source: AECOM, September 2010.

Laboratory testing commissioned by the manufacturers of the Trex® Barrier indicate a sound transmission class (STC) of 17 indicating reasonably strong noise reduction properties. These noise reduction properties of the Trex® Barrier appear to be inherent in the overall density of the material (approximately 3.4 pounds per square foot, or lbs/sq.ft) and the design of the barrier itself. As shown in **Figure 4**, the overlapping panels and the tight tolerances provide higher weight densities per linear foot of installed material resulting in a material weight of approximately 4.2 lbs/sq.ft installed (based on an average overlap of 25 percent). Additionally, the absence of any gaps or openings due to the tight tolerances results in maximum noise reduction properties. Openings or gaps typically degrade the performance of a barrier providing a path for sound to travel through.

4. Conclusion

The results of the field noise monitoring and the independent laboratory product tests indicate that the Trex® Barrier would provide the necessary noise reduction benefits required of environmental noise barrier. Due to the density of the material and the design of the barrier product with overlapping panels, the overall density of the Trex® Barrier exceed the product density recommended by the Federal Transit Administration (FTA) in the *Transit Noise and Vibration Impact Assessment* guidelines.

Source: AECOM, September 2010.

Figure 1: Noise-Monitoring Location at the Trex® Barrier Site at 3153 South Pearce in West Valley City, UT

Source: AECOM, September 2010.

Figure 2: Trex® Barrier along Constitution Boulevard behind 3145 South Pearce Street in West Valley City, UT.

Source: AECOM, September 2010.

Figure 3: Noise-Monitoring Equipment Set-up at the Trex® Barrier behind 3145 South Pearce Street on July 28, 2010.

Source: AECOM, September 2010.

Figure 4: Close-up View of the Trex® Barrier with Overlapping Panels along Constitution Boulevard in West Valley City, UT.