ISU-FHWA-ACPA Concrete Pavement Surface Characteristics Program Part 2: Preliminary Field Data Collection

National Concrete Pavement Technology Center

CP Tech Center

Final Report
August 2007

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16. Abstract

Highway noise is one of the most pressing of the surface characteristics issues facing the concrete paving industry. This is particularly true in urban areas, where not only is there a higher population density near major thoroughfares, but also a greater volume of commuter traffic.

In 2004 and 2005, the Federal Highway Administration, Iowa State University, and the American Concrete Pavement Association initiated a five-year, multi-million dollar Portland Cement Concrete Surface Characteristics Program. This program is administered through the National Concrete Pavement Technology Center located at Iowa State University. The purpose of the program is to determine the interrelationship among noise, friction, smoothness, and texture properties of concrete pavements.

This report addresses work conducted under Part 2 of the program. In Part 2, data were collected on 1,012 test sections totaling 240,000 ft., representing 395 unique pavement textures. This is the most comprehensive inventory of concrete pavement surface textures ever compiled. The inventory includes transverse and longitudinal tining, diamond grinding, various drag textures, grooving, exposed aggregate, shot peening, cold milling, and some asphalt pavements and surface treatments.

A preliminary analysis of the data has revealed a number of important findings. For example, relationships between texture and noise are beginning to emerge. These are not based on nominal texture dimensions, however, since a second finding is that nominal dimensions are rarely observed to be found in place. Friction and noise are also found to have no relationship, demonstrating that quieter concrete pavements can be achieved without compromising this important characteristic.

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ISU-FHWA-ACPA Concrete Pavement Surface Characteristics Program Part 2: Preliminary Field Data Collection

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August 2007

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and by the American Concrete Pavement Association
under Cooperative Agreement DTFH61-01-X-00042 (Project 15)
Part 2 of the ISU-FHWA-ACPA Concrete Pavement Surface Characteristics Project

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Special thanks are extended to Eric Mun and Robert Light of The Transtec Group for their tireless efforts in collecting the volumes of data on over 45 miles of pavement test sections. Also special thanks to Dale Harrington of Snyder & Associates who provided insight into this study through his background administering the Part I study and the development of the CP Road Map.

EXECUTIVE SUMMARY

This report addresses work conducted under Part 2 of the comprehensive ISU-FHWA-ACPA Concrete Pavement Surface Characteristics Program. This project is jointly funded by the three organizations.

Part 1 called for the development of four major deliverables. The first was the development and continuous update of a comprehensive Concrete Pavements Surface Characteristics Strategic Plan. The second deliverable was an analysis of current U.S. and international experiences with noise vis-à-vis concrete pavements. The remaining two consisted of an expanded discussion of pervious pavements, including an outline of an experimental plan for consideration in Part 3, as well as construction specifications for exposed aggregate concrete pavements. All work in Part 1 is complete.

Part 2 called for the collection and cataloging of noise, texture, friction, smoothness, and other pertinent characteristics from a wide distribution of pavements around North America.

Part 3 calls for a comprehensive analysis of these data and the construction of optimum surfaces using experimental specifications.

In Part 2, data were collected on 1,012 test sections totaling 240,000 ft., representing 395 unique pavement textures. This is the most comprehensive inventory of concrete pavement surface textures ever compiled. The inventory includes transverse and longitudinal tining, diamond grinding, various drag textures, grooving, exposed aggregate, shot peening, cold milling, and some asphalt pavements and surface treatments.

To allow for critical examination of construction factors that might affect noise and other surface characteristics, the data collection techniques included the following:

- Type 1: New construction, multiple texture configurations, with pre-traffic, post-traffic, and periodic in-service measurements collected until texture and noise measurements stabilize (possibly two to five years). Data include a full suite of noise, texture, friction, and smoothness measurements, along with concrete and construction properties.
- Type 2: In-service pavements, relatively new and/or significant projects with one or more texture configurations. Measurements will be performed until texture and noise values are seen to stabilize. Data here also include a full suite of noise, texture, friction, and smoothness measurements, along with concrete and construction properties as available.
- Type 3: In-service pavements, noise and texture measurements measured one time only.

Two breakthrough technologies for data collection used on this project included on-board sound intensity (OBSI) for noise measurements and “RoboTex,” a texture measurement device based on the LMI-Selcom RoLine line laser. On-board sound intensity measurements were very repeatable based on replicate sampling. RoboTex provided a texture resolution of

less than 0.5 mm laterally and 0.0l mm vertically. This first-in-world technology allows for comprehensive analysis of the noise to texture relationship to be possible.

The OBSI data collected at 60 mph using a Goodyear Aquatred III tire showed that the general population of concrete pavement textures range from a low end of approximately 100 A-weighted decibels ref 1 pW/m² (dBA) to a high end of 111 dBA. The differences were attributed to texture configuration and surface condition. It should be noted that 10 dBA can in some cases be perceived as a "doubling" of loudness.

While a more extensive analysis is planned under Part 3, some preliminary conclusions can be reached from an examination of the data during this phase of the work:

1. The data have been divided into three manageable zones: Zone 1 is for all test sections with values measured below approximately 100 dBA (OBSI), Zone 2 is for all values between about 100 dBA and 105 dBA, and Zone 3 is for all values above about 105 dBA. One should not focus on sharp border distinctions, however, since annoyance must also be considered along with the noise level. In fact, the borders between zones will overlap for this reason. Consider the zone boundaries as simple guides to further analyze the data.
    - Zone 1. Low or "Innovation" Zone. Measurements below ~99/100 dBA (OBSI). From the measurements that have been collected to date, it appears that conventional (dense) concrete paving has no known textures in this category.
    - Zone 2. Mid or "Quality" Zone. Roughly between 99/100 and 104/105 dBA (OBSI). Grinding and drag textures measure among the lowest dBA values in this zone. On the higher end of Zone 2—from 103 dBA and 105 dBA—there are many solutions, even some transverse tining. Zone 2 appears to capture the best balance of textured concrete pavements solutions that are cost effective for balancing noise, friction, and smoothness.
    - Zone 3. High or "Avoid" Zone. Measurements 104/105 dBA and higher (OBSI). This zone includes highly variable textured pavement, very aggressive transverse textures, and older pavements with serious joint deterioration.
2. From RoboTex measurements, the as-constructed width-depth spacing of the texture is much different from that which is specified (the nominal texture). In Part 3, the texture for each of the test sections will be redefined by actual configuration (as-constructed), as opposed to nominal. It appears that this can be done using a more intuitive texture metric such as that described in ISO Specification 13565-2.
3. There appears to be a relationship between some characteristics of texture and the corresponding tire–pavement noise. For example, it appears that more aggressive texturing of fresh concrete can lead to latent deposits of concrete on the surface that, in turn, increase noise. While some trends have emerged from this part of the study, it is also clear that more work is needed to better establish the link between texture and noise. For example, texture spectral components, along with skew (bias) indicators, were found to correlate with noise in a rational manner. It could also be concluded that nominal texture geometry—width, depth, and spacing—does not relate to the corresponding tire–pavement noise. As such, a more sophisticated characterization of texture is necessary if a predictable level of noise is desired. While the results of the

preliminary investigation of this type are provided herein, it should also be noted that this will be a primary emphasis of the analysis conducted in Part 3.

4. Analyses to date of OBSI variability show wide overlap between nominal texture types. Several transverse tined sections were found to be quieter than some longitudinally tined surfaces—particularly those with short spacings (e.g., 0.5 in.). Minor variations in texture geometry appear to have an appreciable influence on noise at the tire–pavement interface.
5. The texture and noise variability observed within section for longitudinal and transverse tining is generally much higher than the standard deviation for drag textures. There is a relationship between mix and texture that needs further examination.
6. Early texture and corresponding noise changes vary by mix and nominal texture. On the Type 1 project in Iowa on US 30, a 1 to 2 dBA change in tire–pavement noise was noted after several months of service. Snow plowing appears to be impacting the change, as well as wear due to traffic. As additional data are collected on the Type 1 project as well as other projects, more will be known about the rate of change.
7. To better control tire–pavement noise, and to reduce variability, new texture feedback systems during construction may need to be developed. This could eventually include depth or pressure sensors on the texture equipment that can sense the changes in texture. A line laser mounted on the equipment is a currently available option. Software can be developed that provides clear feedback to the texture operator, allowing manual corrections to be made. Eventually, equipment advances could automatically adjust for depth and/or pressure.
8. Recognizing the variability that is possible, guidelines for new texture specifications might focus on controlling the texture in a way that would not allow a certain percentage of tire–pavement noise values above a certain threshold.

I. BACKGROUND

Highway noise is one of the most pressing of the surface characteristics issues facing the concrete paving industry. This is particularly true in urban areas, where not only is there a higher population density near major thoroughfares, but also a greater volume of commuter traffic (Sandberg and Ejsmont 2002; van Keulen 2004).

In 2004 and 2005, the Federal Highway Administration, Iowa State University, and the American Concrete Pavement Association initiated a five-year, multi-million dollar Portland Cement Concrete Surface Characteristics Program. This program is administered through the National Concrete Pavement Technology Center located at Iowa State University. The purpose of the program is to determine the interrelationship among noise, friction, smoothness, and texture properties of concrete pavements. The program consists of the following parts:

- Part 1: Portland Cement Concrete Pavement Surface Characteristics (referred to as Project 15 of FHWA/ISU Cooperative Agreement No. DTFH61-01X-0042)
- Part 2: 2005-2006 Field Data Collection of Current Surface Characteristics Practices
- Part 3: 2006-2010 Data Analysis and Innovative Surface Characteristics Solutions

Part 1: *"Portland Cement Concrete Pavement Surface Characteristics" (Project 15)* was completed in September 2006. It included the development of a long-term Strategic Plan under Task 1. Task 2 called for the development of a comprehensive documentation on all concrete pavement noise reduction trials with a specific focus on European and U.S. methods. This investigation includes interviews with many of the innovators that have worked with these techniques firsthand. The report compiles information on design, bidding, construction, quality control, maintenance, and field evaluations. Finally, Task 3, referred to as "Strategic Plan Management," provided for continuous plan management that allows for tracking of the Strategic Plan activities for a 12-month period.

Part 2: *"Field Experiment Plan of Current Surface Characteristics Practices"* consists of the collection, measurement, presentation, and preliminary analysis of noise, skid, texture, and smoothness data for conventional texturing variations and grinding techniques on pavements. This work began in the summer of 2005 and concluded in the fall of 2006. However, monitoring of many of these sections will continue on an annual basis under Part 3.

Part 3: *"Innovative Surface Characteristics Solutions"* will develop innovative texturing techniques that have the potential to reduce noise below 100 dBA, while not degrading the other surface characteristics (smoothness, friction, drainage, etc.) of the pavement. It also includes a comprehensive analysis of Part 2 data that will in turn lead to building more successful texturing techniques using conventional methods. The second element of the Part 3 project is to continue the monitoring of the sites chosen in Part 2 through 2010. The interrelationship among the three parts of the program is summarized in Figure 1.1.

Part 1 (2004-2005)

- **Develop a Strategic Plan**
- **Evaluate European/U. S. methods**
- **Implement and monitor Strategic Plan**

Part 2 (2005-2006)

- **Quantify current best practices in noise, smoothness, and friction elements of texture on existing pavements**
- **Monitor current practices of texturing and grinding variations on new construction**
- **Establish the best conventional texture variations and grinding techniques with respect to noise, smoothness, and friction.**

Part 3 (2006-2010)

- **Conduct thorough analysis of Part 2 data**
- **Construct successful texturing techniques, using conventional methods as identified in Part 2**
- **Construct pavements with innovative techniques for texturing and grinding**
- **Monitor relationships between noise, smoothness, and**

Figure 1.1. Framework for ISU-FHWA-APCA Concrete Pavements Surface Characteristics Program

II. PART 2 STUDY FRAMEWORK

One of the primary goals of the overall SC Program is to determine the relationship between noise and texture by collecting, organizing, and interpreting surface characteristics data on new and existing concrete pavements around the country. The data collection includes noise in three locations, texture, friction, and smoothness measurements.

The Study Management Team included Paul Wiegand at the National CP Technology Center, Larry Scofield, and Jerry Voigt at ACPA, and Mark Swanlund at FHWA.

The Study Technical Team was led by Ted Ferragut of TDC Partners, Ltd. Dr. Robert Rasmussen with The Transtec Group, Inc. served as the chief engineer, and field engineering was provided by Eric Mun of Transtec. Other subcontractors and service providers include Dale Harrington from Snyder & Associates, Inc., Dr. Bob Bernhard from Purdue University, Steve Karamihas from UMTRI, Gary Fick from Trinity, Dan Howe from LMI-Selcom, Dr. Ulf Sandberg from VTI in Sweden; and Bob Prisby from the ACPA-PA Chapter.

A Technical Working Group (TWG) assisted the team in reviewing various aspects of the data collection and analysis process. They also offered recommendations for future analysis strategies and data processing techniques, many of which are proposed for Part 3 of this effort. Members of the TWG include Dr. John Ferris of Virginia Tech, Dr. Paul Donavan of Illingworth & Rodkin, Bruce Rymer of Caltrans, Chris Corbisier of FHWA, Dr. J.J. Henry (consultant), Ken Polcak of Maryland SHA, and Gijs-Jan van Blokland of M+P.

The technical objectives of the study were as follows:

- Determine the overall relationship between conventional texture configurations and noise at the tire–pavement interface, in-vehicle, and at wayside locations.
- Determine texture wear rates by relating pre-traffic, post-traffic, and in-service texture values to simultaneous noise measurements.
- Determine the sources of variability of texture (as it departs from nominal) based on current concrete paving practices.

Three types of data collection techniques for texture and grinding were identified:

- Type 1: New construction, multiple texture configurations, with pre-traffic, post-traffic, and periodic in-service measurements collected until texture and noise measurements stabilize (possibly 2 to 5 years). Data include a full suite of noise, texture, friction, and smoothness measurements along with concrete and construction properties.
- Type 2: In-service pavements, relatively new and/or significant projects with one or more texture configurations. In-service measurements performed until texture and noise measurements stabilize. Data include a full suite of noise, texture, friction, and smoothness measurements along with concrete and construction properties as available.

- Type 3: In-service pavements, noise and texture measurements are collected, one-time only.

The three types of studies work in harmony to provide the relationships discussed above.

Data Collected

The data collection completed under Part 2 included 1012 test sections totaling 240,000 ft. representing 395 unique pavement textures. They are broken down as follows:

- One Type 1 project, with 4 sets of measurements at different ages
- Eight Type 2 projects
- Eighteen Type 3 projects
- Sites visited include the states of CO, ND, MN, IA, KS, AL, GA, NC, VA, OH, IN, MI, NY, MO, WI, and the Canadian province of Quebec
- 395 unique nominal pavement textures, including the following:
    - 140 Transverse Tining (including 12 skewed and 2 cross-tined)
    - 104 Longitudinal Tining (including 2 sinusoidal)
    - 59 Drag (Burlap, Turf, Broom, Canvas Belt, and Carpet)
    - 39 Diamond Ground
    - 12 Transverse Grooved
    - 10 Shot Peened
    - 4 Longitudinal Grooved
    - 5 Exposed Aggregate
    - 2 Cold Milled
    - 20 HMA and other

Site Selection

Sites were selected based on several factors. These included texture type, age, material type, climatic region, and the ability to close to traffic. Sections were not randomly selected; instead, pavements were selected in order to capture the full range of concrete pavements and textures in use today.

III. MEASUREMENT TECHNIQUES

The study led to significant improvements in data measurements for both texture and noise. Heretofore, there was no way to measure texture with the relevance, accuracy, and precision that was needed.

Relevance is needed to ensure that the measurements meet the broader goals of obtaining quieter pavements. In other words, it is needed so that models can be developed that illustrate relationships between different characteristics or phenomena (e.g., texture vs. noise). If texture is not measured in a relevant manner, it will not be possible to relate it to noise.

Accuracy is needed to ensure that the study has technical credibility, and can subsequently be built upon under this study and/or by other researchers.

Finally, precision is important so that subtleties in the data can be identified and characterized. If a measurement has unnecessary variability, fewer conclusions can be drawn and the study becomes less efficient.

All of these components are needed to rationally promote the achievement of quieter roads without compromising safety.

This section describes these and the other measurement techniques that have been used on this project. Additional detail on specific techniques can be found in the testing plan included in Appendix A.

Noise

On-Board Sound Intensity (OBSI)

As a near-field (source) measurement technique (see Figure 3.1) that isolates and measures tire–pavement noise, the OBSI specification used on this project is based on procedures developed by Dr. Paul Donavan of Illingworth & Rodkin. Additional consideration has been given to procedures and guidance found in General Motors GMN7079TP, ISO (Draft) 11819-2, and the OBSI specification under development by the FHWA Noise ETG.

The team adopted environmental correction factors for OBSI. Previously, these were not routinely applied; however, given the wide range of testing conditions, environmental factors were found to be very significant in some cases. The correction includes the calculation of air density, which is used in the sound intensity calculation. This, in turn, is a complex function of ambient air temperature, relative humidity, barometric pressure (normally reported normalized to sea level), and altitude.

With these correction factors calculated and applied properly, valid comparisons could be made between different locations. As an example, measurements of an identical pavement in Colorado in the summer would appear to differ from measurements taken in Iowa in the winter by more than 2 dBA, unless the correction is made.

It should also be noted that all OBSI testing conducted in this project utilized a Goodyear Aquatred III tire. At the time of publication of this report, it appears that a new test tire has emerged as a leading candidate: the 16 in. Standard Reference Test Tire (SRTT) described in ASTM F 2493. One of the tasks in Part 3 of this program will be to relate all data collected in Part 2 with the Aquatred to future data collected with the SRTT.

Figure 3.1. On-board sound intensity microphones

In-Vehicle Noise

Using a specification based on ISO 5128 and SAE J1477, the in-vehicle noise test includes sound measurements inside the test vehicle at two microphone locations—one in the rear passenger position and another adjacent to the driver's head (as shown in Figure 3.2).

Figure 3.2. In-vehicle noise measurement jig

Controlled Pass-By (CPB)

Based on elements of ISO 11819-1 and the FHWA-PD-96-046 guidelines, this test measured wayside noise at 15 m (50 ft.) from the center of the test lane with contributions from all vehicular sources. The equipment is shown in Figure 3.3. The intent was to capture the specific event caused by only the test vehicle so that comparisons can be made to other noise measurements.

Figure 3.3. Controlled pass-by noise measurements

Megatexture and Macrotexture

Robotic Texture (RoboTex) Measurement System

This procedure involved the use of a new piece of equipment (see Figure 3.4) built around the LMI-Selcom RoLine Line Laser. Mounted on a robotic chassis that is remotely controlled as it travels down the road, RoboTex was capable of measuring a continuous three-dimensional texture profile with transverse sampling of 100 or more pts over a 100 mm line (~0.9 to 1.0 mm sample interval) and longitudinal sampling at 1000 Hz, which leads to a 0.5 mm sample interval when traveling at 0.5 m/s. The results of the RoboTex were used to calculate Mean Profile Depth per ASTM E 1845. However, since a three-dimensional profile, as shown in Figure 3.5, was measured by RoboTex, numerous other metrics were also calculated in both the transverse and longitudinal directions. This includes texture bias (skew), RMS and average rectified texture depths, and maximum texture depth via ASME B46.1, texture depth via ISO 13565-2, and texture spectra via ISO 13473-4.

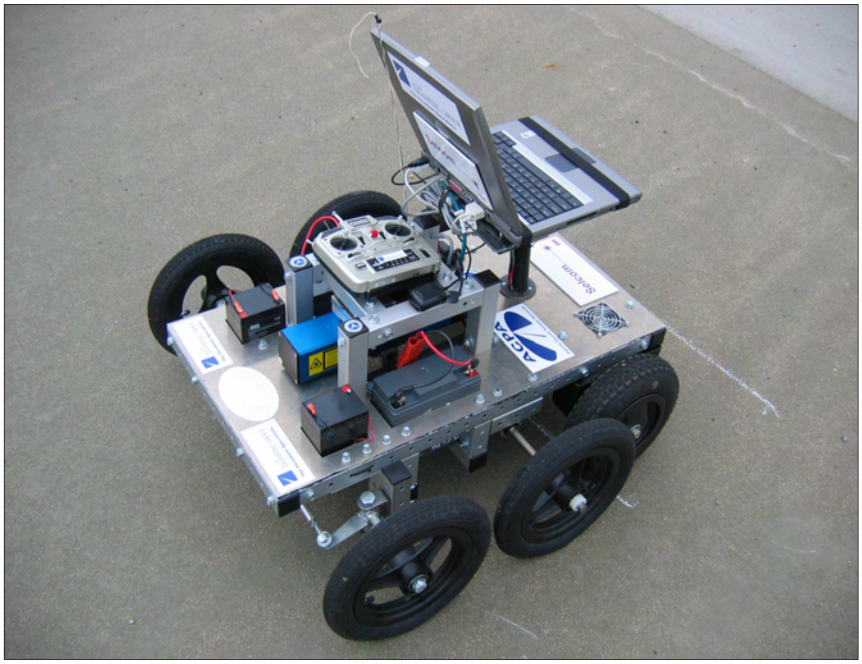

Figure 3.4. LMI-Selcom RoLine line laser as part of the RoboTex measurement system

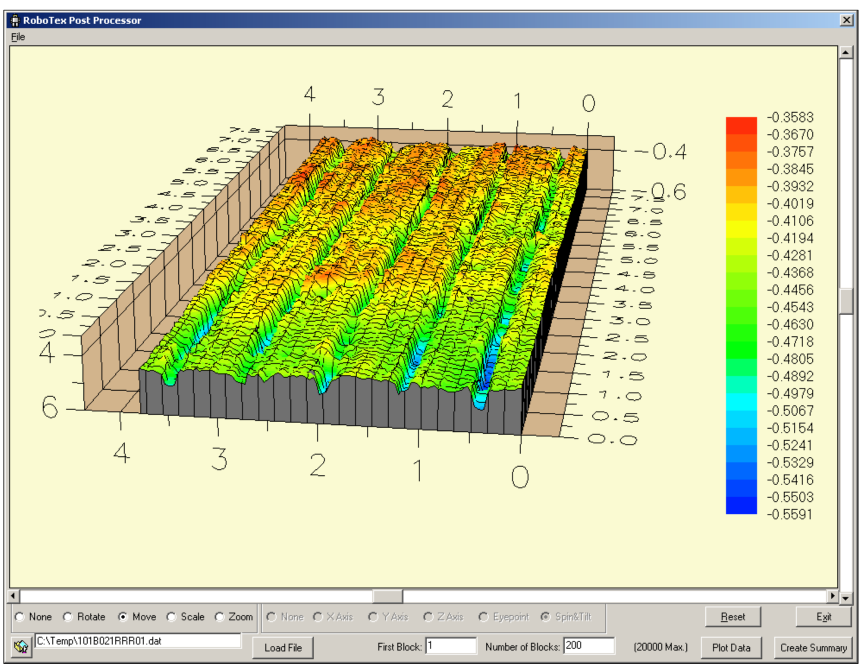

Figure 3.5. Example of RoboTex data presentation

Circular Track/Texture Meter (CTM)

Using equipment (see Figure 3.6) on loan from the FHWA for this project, Circular Texture Meter (CTM) measurements of texture were made at periodic locations along each test unit. Following ASTM E 2157, the CTM uses a spot laser mounted on a rotating arm of known length. The unit was placed on the pavement at the location(s) to measure. A computer was then triggered that rotates the arm and measures texture height for a complete revolution. The CTM was normally used at the same location(s) as the Direct Friction Tester (DFT—a friction measurement technique described below). Mean profile depth (ASTM E 1845) was reported by the CTM software.

Figure 3.6. Circular texture/track meter equipment

Sand Patch

Sand patch testing is the most commonly used technique for estimating pavement macrotexture. Following ASTM E 965, this technique, as shown in Figure 3.7, was used in this experiment for historical continuity.

Figure 3.7. Sand patch testing

Friction and Microtexture

Dynamic Friction Tester (DFT)

Following procedures described in ASTM E 1911, dynamic friction testing employed a device similar in size to the CTM. The DFT consists of a “fly wheel” with three small rubber pads that spins up to a given speed and is then lowered onto the pavement that has been covered with a regulated film of water. The CMT is shown in Figure 3.8. This technique results in an indirect measure of microtexture via friction and provides a full speed–friction relationship. This equipment, like the CTM, was on loan from FHWA.

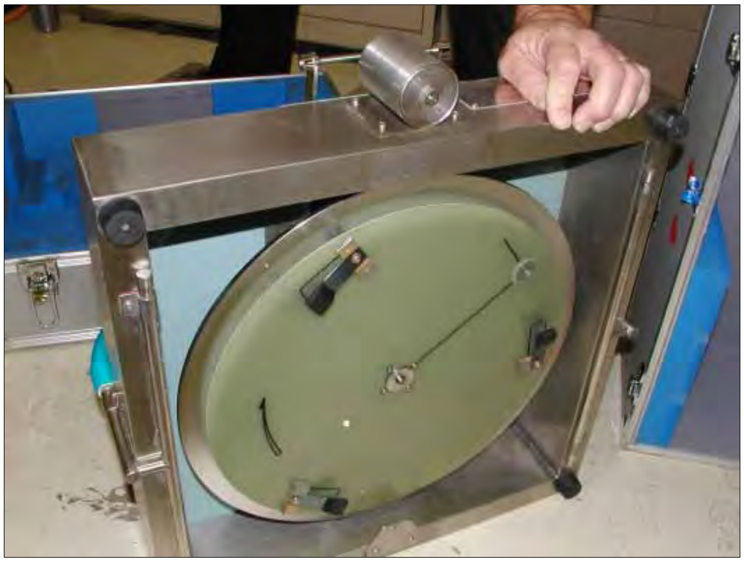

Figure 3.8. Dynamic friction tester

Locked Wheel Friction Trailer

Lock wheel friction testing is commonly used by the various state DOTs to measure pavement friction. This test is standardized under ASTM E 274, and when possible, a smooth test tire (ASTM E 524) is used to consider combined micro- and macrotexture effects. The trailer is shown in Figure 3.9.

Figure 3.9. Locked wheel friction trailer

IV. PRELIMINARY DATA ANALYSIS SUMMARY

The following sections discuss the data analysis and presentation techniques that were employed in this effort, including the various metrics that were calculated.

In Part 2, the intent is to provide data presentation. Given the voluminous nature of the database that has been generated, only representative examples of some of the data and trends are provided in Appendix B.

Noise

Sound levels were calculated for all acoustical measurements, including intensity for OBSI measurements and pressure levels for in-vehicle and wayside measurements. Total levels (A-weighted) and spectral content were also calculated and reported. Spatial referencing of noise data was of paramount importance to this study. With the more thorough understanding of the noise-to-texture relationship, being one of the more critical objectives of this study, measures were taken to ensure accuracy in data synchronization between noise and texture. Triggering at section limits was conducted, along with controls that minimized non-linear errors during data collection.

To the greatest degree reasonably possible, variability in noise due to equipment and operator were separated from that due to “natural” changes in texture and other material properties. Repeat measurements were therefore critical, which were analyzed with various statistical techniques, such as coherence and cross-correlation, in order to determine the degree of repeatability.

Measurements were also taken to investigate changes in noise from day and night. These differences were mostly attributable to joint behavior (opening and closing). Other phenomena were also believed to be in play though, and probably included environmental influences (e.g., changes in temperature or relative humidity). In all instances, multiple repeat measurements were collected and sufficient precision in spatial referencing made so that joint effects could be analyzed.

Texture of the pavement tends to wear the most in the wheel paths. While winter maintenance activities and environment-related wear may be a factor, the effect of wheel wear was isolated in the measurements to the greatest degree possible. Measurements of noise were made with the test vehicle “straddling” the wheel paths in addition to those measured with the test wheel within the wheel paths. A preliminary evaluation of these data has helped to better understand the texture wear effect and its effect on noise.

With synchronization of texture traces to noise traces, work was undertaken to relate noise to the effects of texture dimension (spacing, width, depth, isotropy, etc.) as well as texture variability. There has been a synchronized presentation and preliminary analysis between texture, OBSI, in-vehicle, and CPB noise measurements. In other words, each of the measurements can be plotted so that their values are known at any point along the pavement.

With repeat measurements of noise over a period of months and years necessary, accurate surveying and recording of the test sections was conducted. Numerous and redundant reference points were identified and tied into critical points on the project including the beginning and end of each test section.

Megatexture and Macrotexture

Like the noise measurements, it was important that the texture measurements be referenced along the test sections—both longitudinally and laterally. The technologies currently being used for texture measurement are the state of the art. Measurement of a three-dimensional macrotexture profile, for example, allows for comparisons of numerous texture metrics to noise—both spatial and spectral. Consideration of the isotropy of the texture was also considered as a factor. Coincidence of the texture measurements to the tire contact patch is critical, however, for the comparisons to be valid.

Because the scale of the texture being measured is approximately 1 to 200 mm, position control was critical. It is not reasonable to expect perfect coincidence of measurements. Therefore, repeat measurements have been conducted in order to determine variability due to operator and equipment.

In this experiment, multiple techniques were used to assess mega and macrotexture. RoboTex, for example, measures three-dimensional texture in a 100 mm wide continuous "swath" as it travels down the road. Comparisons of RoboTex-derived texture metrics with CTM-measured metrics are included in Appendix B. Additional validation is planned under Part 3 activities. The CTM and sand patch are stationary measurements that require discrete locations to be selected. Comparisons of all of these techniques required not only adequate numbers of samples to draw statistically significant conclusions, but also careful control that the various texture measurements were in fact being made on the same sections of the pavement surface.

Along with noise, the differences in the texture of the pavement both within and between the wheel paths were noted. Like the noise measurements, repeat measurements of texture were made which require a permanent record of the test sections.

Friction and Microtexture

Pavement friction measurements were made using two types of equipment. The first was the DFT. Careful referencing of this technique was required. It was commonly run at the same time/locations as the CTM since the two measures could be coupled to calculate the International Friction Index (IFI). The second measurement was the ASTM E 274 locked wheel skid trailer. Since this is a test done at speed, the results are representative of a length of pavement. Furthermore, since this test may accelerate wear of the texture along the section, it was not run until all of the other testing was complete.

In the same way that noise and texture were related in this study, so were friction and texture. Careful spatial referencing was required in order to ensure that calibration and/or validation of this relationship could be accomplished.

When using the smooth tire (ASTM E 524), the locked wheel trailer assessed the effects of both macrotexture and microtexture. The DFT, however, is primarily a measure of microtexture, which is why it is commonly coupled with CTM data to consider the effect of macrotexture as well. Comparisons using IFI, for example, were made between both skid trailer and DFT measurement techniques. In order to do so, a sampling of DFT data was compared to the skid testing which was more representative of an "average" of the section.

Finally, friction is also known to change over time along with the other surface characteristics. As previously mentioned, careful referencing was made of the test sections. However, consideration of the pavement surface condition during testing was relevant. For example, the time since the last rainfall event was noted where possible. Pavement surface temperatures were also noted along with other factors that might lead to variations in the friction measurements.

V. PRELIMINARY INTERPRETATION OF DATA

Ranking Texture by dBA

Early tire–pavement noise data ranked drag and grinding among the quieter textures and transverse tining among the loudest, based on averages for these nominal texture types.

However, there are many texture subsets within each class that will be analyzed in Part 3. This ranking does not always hold true, especially given the variability that is present.

Rank ordering in this case is based on sound levels in dBA as measured near the tire–pavement source. Rank ordering by sound level as received wayside will likely be similar, as work by Dr. Paul Donavan and Caltrans has demonstrated. However, the rank order can change, and at the very least be less significant (i.e., have more overlap) if other vehicles or tires are used. Furthermore, sound level in dBA is not the only descriptor of noise that can be used. Other psychoacoustic metrics, including loudness, may lead to different pavement rank orders due to differences in frequency and temporal characteristics. This issue will be explored further during Part 3.

OBSI Ranges

Average tire–pavement noise values ranged from 100 dBA on the low end to over 111 dBA on the high end. It should be noted that 10 dBA can represent a "doubling" of perceived sound for the same sound.

Based on the data collected in Part 2, we believe this is close to the range of noise values representing the total population of concrete pavements in the country. There may be others above the 111 dBA, but we also believe that 98–100 dBA will likely be close to the lowest that will be found for concrete pavements using conventional technology (i.e., dense concrete, not porous/pervious).

Within-Section Variability

The texture and noise variability observed within section for tining—particularly transverse tining—was generally higher than the standard deviation for drag or ground textures.

Between-Section Variability

Preliminary analyses of variability shows wide overlap between texture types, with even some transverse tining sections among the quietest of all sections tested in Part 2. A slight variation in texture geometry appears to have an appreciable influence on noise at the tire–pavement interface. Without the line laser–based RoboTex, measurement of this texture variability would not have been possible.

Texture Geometry

At first glance, there appears to be a relationship between texture depth and tire–pavement noise. However, this is an oversimplification and falls short of truly characterizing the relationship between texture and noise. In fact, this correlation appears to have more to do with the fact that a deeper (more aggressive) texture causes more disturbances of the concrete surface, and thus leads to random deposits of concrete on the surface that, in turn, increase noise.

It should also be noted that while trends are evident, there are often exceptions. It is clear that more work is needed to establish better indices for texture. For example, spectral analysis of the texture, coupled with the texture skew (bias), has revealed a lot more clarity in this relationship. More information on this can be found in Appendix M. Furthermore, at this time, it is not possible to relate nominal texture geometry—width, depth, and spacing—to tire pavement noise. This will be addressed in Part 3.

Wear Rate

A preliminary analysis has shown that early wear on textures in IA (Type 1) led to a 1 to 2 dBA change in tire–pavement noise after only months of service. With traffic volume as only one variable, snow plowing and other environmental effects appear to also be impacting the wear.

Construction Operations—Quality Control

One of the broad objectives of this program is to develop better practices for texturing. As part of the Type 1 project, data has been collected on the construction operations including weather data, batch tickets, etc. It was found during this process that few adjustments were possible using the current equipment. Adjustments were limited to forward speed, tine configuration, angles, and pressure.

As the acoustical data was reviewed, it was revealed that depth was, in fact, not a controlling factor—at least, not directly. Other variables (particularly texture wavebands) had much more of an influence on noise. Therefore, while depth may have been one source of these texture characteristics, other variables, such as equipment vibration, are also potential causes. Because of this new understanding, this task will carry over into Part 3. Only now can we monitor the possible sources of these texture characteristics on the job.

With texture and noise variability observed both within-section and between sections of "identical" nominal texture, only measurements of texture itself during construction remain as a means to consistently control the potential for noise.

Texture measurements during construction operations will probably have to go beyond sand patch if texture and noise variability is to be effectively controlled. Only with revised measures of texture will the concrete pavement industry be able to more adequately ensure that a "quieter pavement" is being constructed.

Construction Operations—Texture Equipment

Eventually, depth or pressure sensors may be needed on the texture equipment to provide process control feedback to the operator. A line laser mounted on the equipment is an option, with software that suggests any corrections to make or automatically adjusts the depth and/or pressure.

The team met with equipment manufacturers on February 1, 2006, and initiated a dialogue on just how texturing might be controlled. It was agreed that guidelines for new texture specifications might have to focus on controlling the texture configuration to not allow a certain percentage of tire–pavement noise values above a certain threshold. This would control the average and the variability.

In the future, for noise-sensitive projects, either direct noise measurements with OBSI, or indirect noise measurements via texture with a line laser, or similar technology will have to be developed and considered.

The direct measure of noise with an OBSI could be quite complicated when considering the state of the standard setting, the right time to conduct the test, the expense, and linkage to actual construction operations and corrective action. Since friction must also be balanced with noise, the owner may wish to seek out texture in lieu of noise directly.

The indirect measure of noise by controlling texture with a line laser might be more effective, but will take some trial and error along the way.

Friction vs. Noise

In the Type 1 and 2 sites, friction data were collected along with noise and texture. A worthwhile goal is to seek out relationships between noise and friction, as this is sometimes identified as a reason not to seek out quieter pavements. As the data in Appendix B illustrate, however, there is no clear relationship between the two. There are pavements of virtually every nominal texture configuration that are both loud and quiet, and have both high and low friction.

VI. ZONE CONCEPT

The team has divided the OBSI information into three distinct zones in order to evaluate findings and develop future action items. The data are presented in Figures 6.1 through 6.6. The team found this almost essential to help with decision making and interpretation. It is important to note that while the zones are distinct, the borders are not, and should not be debated as of yet. It should be recognized, for example, that these values are for tire–pavement noise measured with OBSI using a specific (single) tire.

The zone borders, while muted, helped to divide the data into manageable portions. This allows for discussion of data based on two approaches: traffic noise modeling and relative pavement performance.

The first approach is to look at tire–pavement noise as it relates to noise policy and the FHWA Traffic Noise Model (TNM). Currently, the TNM requires the use of an “average” pavement type in the analysis for potential noise abatement. It is estimated that the OBSI value that corresponds to the “average” pavement type lies within Zone 2. This means that under the current policy, those pavements that are louder than “average” are inherently benefited, while those that are quieter are penalized. Discussions are currently underway about the possibility of “unlocking” the pavement type within TNM. If this were to happen, there would be immediate demand for concrete pavement solutions that are consistently in the lower end of Zone 2 and in Zone 1. Furthermore, a comprehensive program to reduce the noise level of those existing pavements in Zone 3 might be required.

The second approach is to look at today’s concrete pavement operations and to determine what is feasible based on available technology and the state of the practice. What would it take to construct all future texturing and grinding operations (of dense pavements) in Zone 2? If friction is not compromised, future work could nestle in the lower portion of Zone 2, simply as good practice.

Eventually, we also need to consider other noise characteristics. Tonal content, for example, can be annoying to the public. Even if the total levels are reasonable, avoiding the more annoying pavements should be a complementary goal.

Zone 1, of course, is the future. Is it possible to develop a quieter pavement for ultra-quiet solutions in certain critical areas? What if society continues to demand even quieter pavements in the future? This is the long-term challenge to the industry.

Overall Interpretations of the Zones

Zone 1. Low or “Innovation” Zone. Less than 99/100 dBA (OBSI). The team did not find any pavements in this category. Research and innovation will be required if concrete is to have solutions in this zone.

Zone 2. Mid or “Quality” Zone. Roughly between 99/100 and 104/105 dBA (OBSI). It is feasible that future concrete pavement specifications would require solutions in this zone. With reasonable attention to process control, it may be possible to construct new pavements consistently below 103 dBA. Grinding and burlap/turf drags often resulted in the lowest dBA values. On the higher end of Zone 2—from 103 dBA and 105 dBA—there are many solutions, even some transverse tining. In conclusion, this zone more than likely captures the best balance of textured concrete pavements solutions that are cost effective and durable solutions for noise, friction, and smoothness.

Zone 3. High or "Avoid" Zone. Higher than 104/105 dBA (OBSI). This zone captures highly variable textured pavement, very aggressive transverse textures, and older pavements with serious joint deterioration. It is possible to eliminate future pavements from being build with values in this zone. Additionally, existing pavements in this zone could be eliminated with various concrete pavement restoration strategies such as joint repair, dowel bar retrofit, and diamond grinding.

In Part 3, an evaluation of the impact of tire–pavement noise on the Traffic Noise Model (TNM) will be conducted. With advanced modeling, a determination of the impact that 103–105 dBA OBSI will have on noise abatement for abutters will be made. The team will base the evaluation on typical traffic and roadway configurations. For now, the muted zone border at least establishes a way to narrow down the analysis range.

Expanded Discussion of the Zone Concept

Zone 1—Low or "Innovation" Zone

Zone 1 covers pavements that generally lie below 99/100 dBA (OBSI). With the exception of some experimental pervious concrete pavements, there are no viable concrete solutions in Zone 1 at this time. The practical lower limit for concrete pavement technology appears to be at the high end of this zone.

Innovative solutions will be needed to produce pavements in this zone. They will likely have to consider increasing porosity, minimizing adverse texture characteristics, and even modifying the mechanical properties of the pavement, including stiffness. Innovative solutions such as the use of inclusions, polymers, etc., in some combination must likely come online if concrete is to have solutions in Zone 1. Thin surfacing of concrete pavements using high quality aggregates is another possibility. In addition, with a premium expected in producing concrete of improved functional performance, the possibility of two-lift concrete paving becomes more likely for solutions in this zone.

Pervious concrete offers some hope for future product in this zone. There are two ways to advance this, as follows:

- For low traffic speeds, low load roadways: continuously improve on the storm water management approach, improving the surface course. Work is underway in this area.
- For high traffic speeds and/or heavy loads: determine the functional or performance requirements for a thin cement-based overlay that could be used either as a bonded overlay or in two-lift construction. Once the functional standards are developed, a cooperative program could be formed with industry to evaluate the actual mixes. These mixes will likely require polymers, fibers, and high quality aggregates to

perform in service. Functional requirements will include both conventional materials requirements (density, porosity, bond, tensile and compressive strength, modulus, etc.) as well as noise-related requirements (e.g., tortuosity, porosity, and absorption).[1]

It should be noted that asphalt solutions in Zone 1 include porous asphalt, asphalt crumb rubber, and a few SMA and dense-graded asphalt mixes. Using the same OBSI technology with the same tire, Dr. Paul Donavan has measured the lowest recorded pavement to date as approximately 93 dBA, from double-layer porous asphalt in Europe. In the United States, small aggregate open-graded friction courses have (at least initially) had values of 96 dBA. Again, these values were determined for relatively new pavements only, as it is known that they often increased dramatically over time.

Zone 2—Mid or "Quality" Zone

Zone 2 covers nearly all pavements between 99/100 and 104/105 dBA (OBSI). It has been found that any type of nominal texture can provide solutions in this range. This includes drag, grinding, longitudinal tining, and even some transverse tining. However, there appears to be a lot of variability within each of the nominal textures in this zone. If noise were to be a payment consideration (directly or indirectly through texture), there is too high a risk of missing specification targets for nominal dimensions of depth, for example. As such, a percent within limits (PWL) approach might be a consideration. The "trick" will then not be to select the quieter nominal texture, but to place it consistently. We will comprehensively address this in Part 3.

Other important considerations are as follows:

1. For noise sensitive solutions, joint effects should be included, especially to minimize the deterioration of noise over time. Thin (single) cut joints should be considered. If joint sealant is desired, it should be applied uniformly and without any protrusion above the pavement surface.
2. Field trials should be conducted that establish best practices for texturing quality control. One of the primary goals should be to reduce variability. While this was attempted on the IA Type 1 project, the workers were only asked to "pay more attention." To be successful, more advanced control of the operations will be needed via electronic sensing of as-constructed texture.

Grinding and drag are two solutions in the lower part of Zone 2. For grinding, a connection needs to be made between the blade spacing/width on the drum with the actual in-place texture.[2] The as-ground texture is simply not the same on all concretes, even for the same

[1] It should be noted that, resulting from the recent Long Life Concrete Scan, less than optimistic reports out of Germany and Belgium show that their first pervious concrete solutions for high-speed facilities were publicly reported as non-successful. Neither country plans on continuing research at this time. Details from that Scan may impact how the team approaches finding solutions in Zone 1 during Part 3 of this study.

[2] The data that exist on grinding are on friction, not noise. Furthermore, little is recorded on the specifics of the concrete, much less on the as-constructed texture geometry. As a result, this study must be a priority for the grinding industry.

drum. Data on as-ground texture vs. the drum configuration need to be analyzed, particularly how the texture relates to mix type, and how the texture wears over time. The interrelationships between noise, smoothness, and friction also need to be explored since it may be a long-term balancing act. All said and done, grinding should fall consistently within Zone 2, assuming there is diligence to detail.

For drag solutions, there should be a focus on texture and friction durability as a function of mix type. Determination of this relationship should be a goal in Part 3. One possible innovative solution is to consider two-lift construction with a thin lift on top using premium mixtures and a high-quality texturing control. This would allow a more widespread solution in the low part of Zone 2. It should be noted that both Mn/DOT and (until recently) Germany use drag/turf textures on high-speed facilities. Germany recently moved away from burlap drag due to the loss of texture issue on some of their pavements. However, this should not discourage examining this texture in the Part 3.

Zone 3—High or "Avoid" Zone

Zone 3 covers all pavements that have OBSI levels greater than 104/105 dBA. These are the loudest pavements in the inventory. It is believed that they may represent the vast majority of in-place concrete pavements. The first major conclusion one can draw from Zone 3 is not to build any new pavements with these values, especially if the project is noise sensitive. The second major conclusion is to eliminate existing pavements from the inventory, starting with the worst first. Lowering noise can be coupled with a restoration of smoothness and friction program.

The elimination of the worst first should include a consideration of the frequency issues as well, as opposed to just dBA. For example, eliminating "the whine" from pavements in this zone may be just as important as lowering the dBA. This approach requires an inventory of existing pavements.

Other important considerations are as follows:

1. For existing pavements, joint issues in this zone are probably playing a significant part in the psychoacoustics. An elimination of the loudest first should include joint repairs as well (e.g., DBR [Dowel Bar Retrofit] and grinding).
2. In Part 3, a guide specification will be developed that addresses the variability. The team will analyze these data to set the specification limits, attempting to keep a high percent of values below the 104 to 105 dBA "border" (thus migrating them back to Zone 2).

In any program to eliminate pavements in this zone, a balance of smoothness, friction, and noise will need to be examined. Friction will be evaluated as well to assure there is no significant loss in safety.

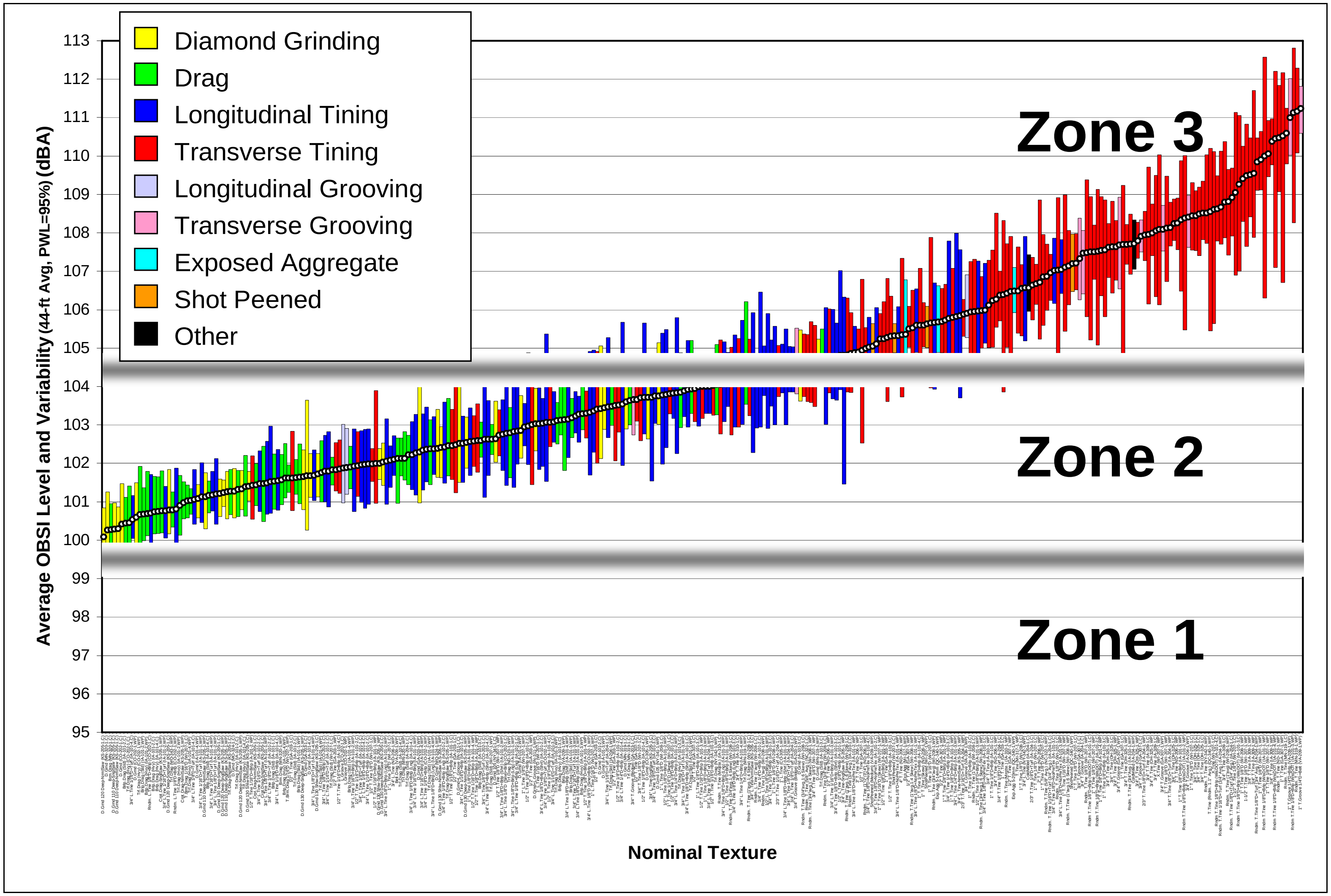

Figure 6.1. OBSI catalog of all concrete pavement textures including zone designations

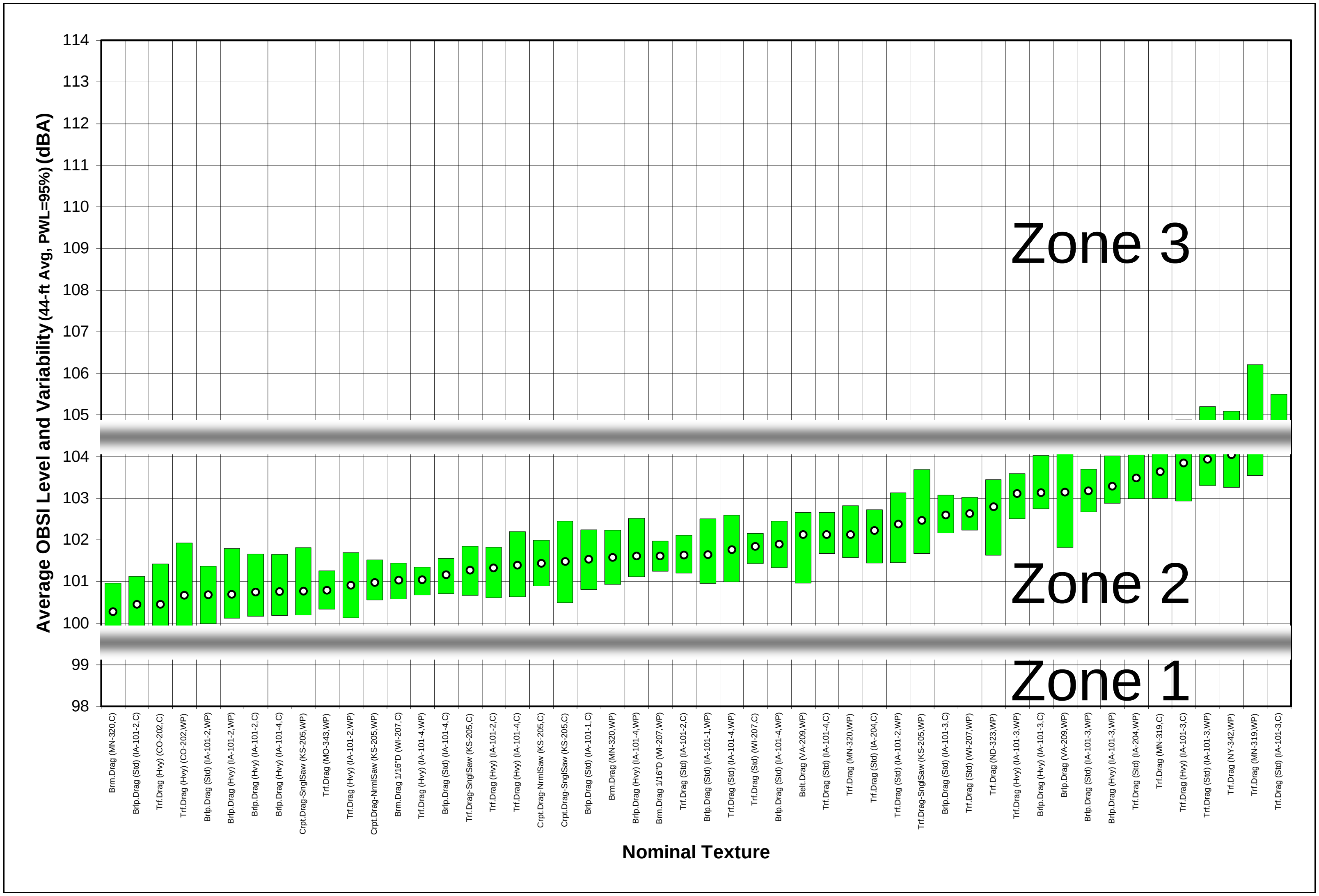

Figure 6.2. OBSI catalog of drag textures including zone designations

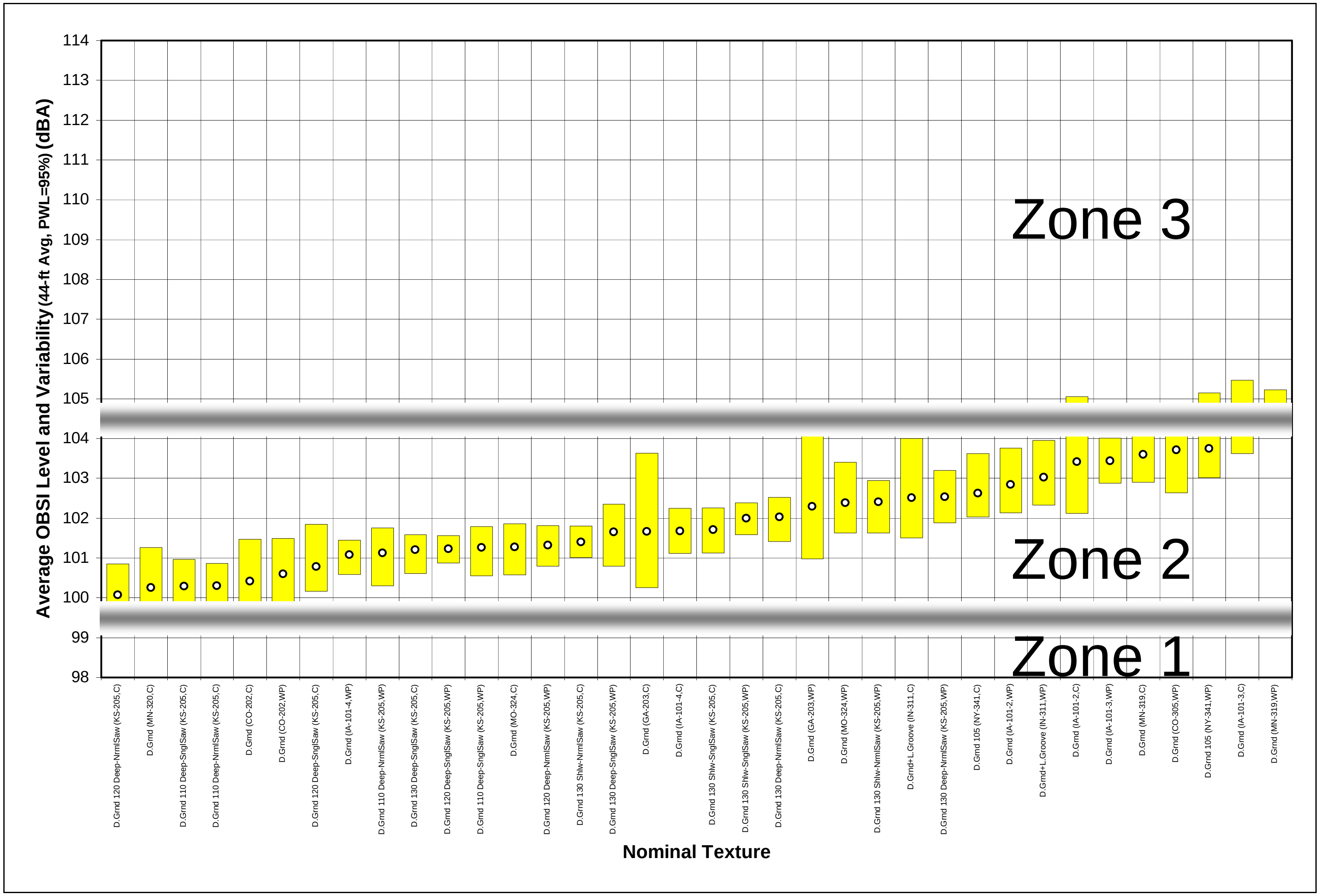

Figure 6.3. OBSI catalog of diamond ground textures including zone designations

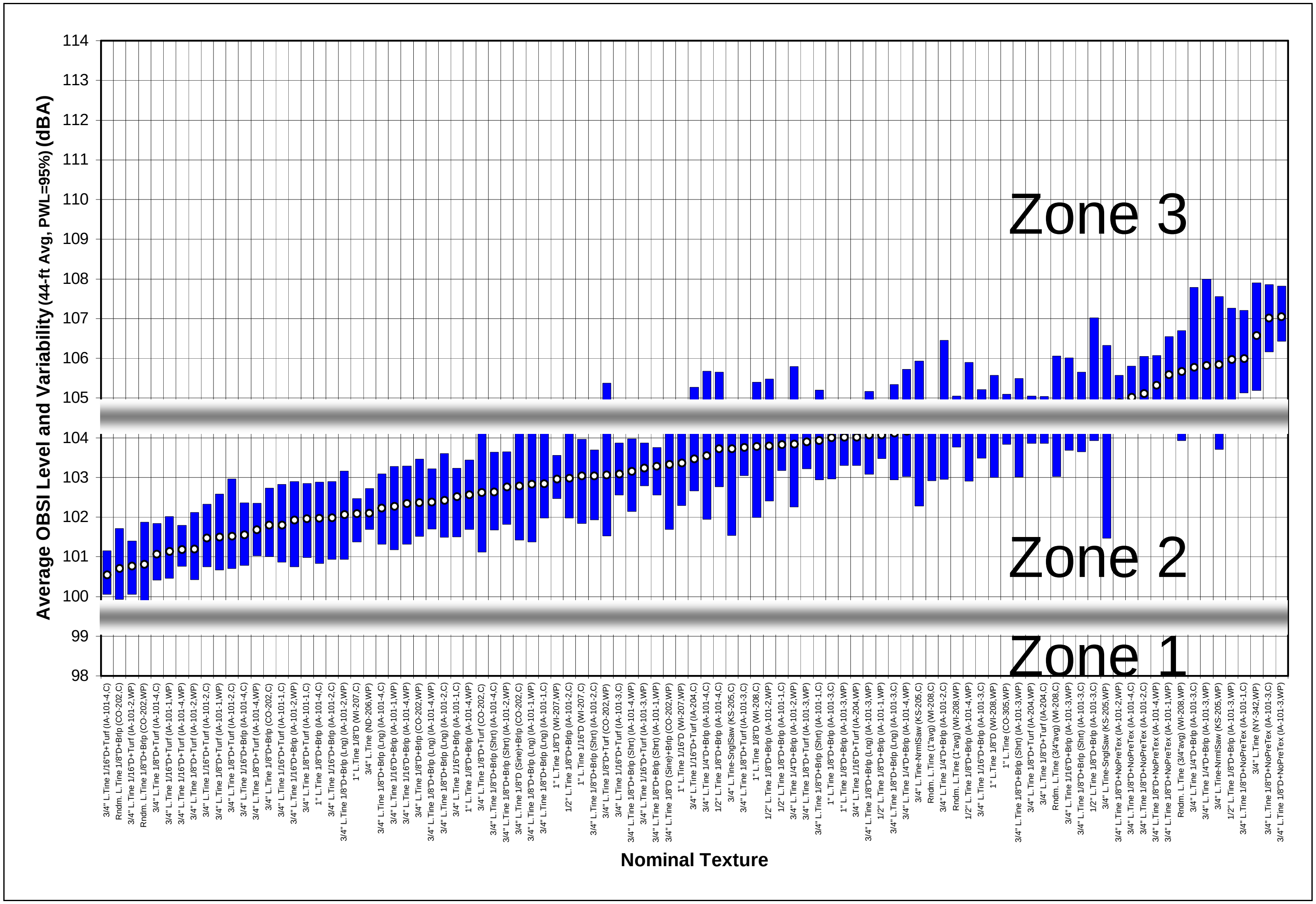

Figure 6.4. OBSI catalog of longitudinally tined textures including zone designations

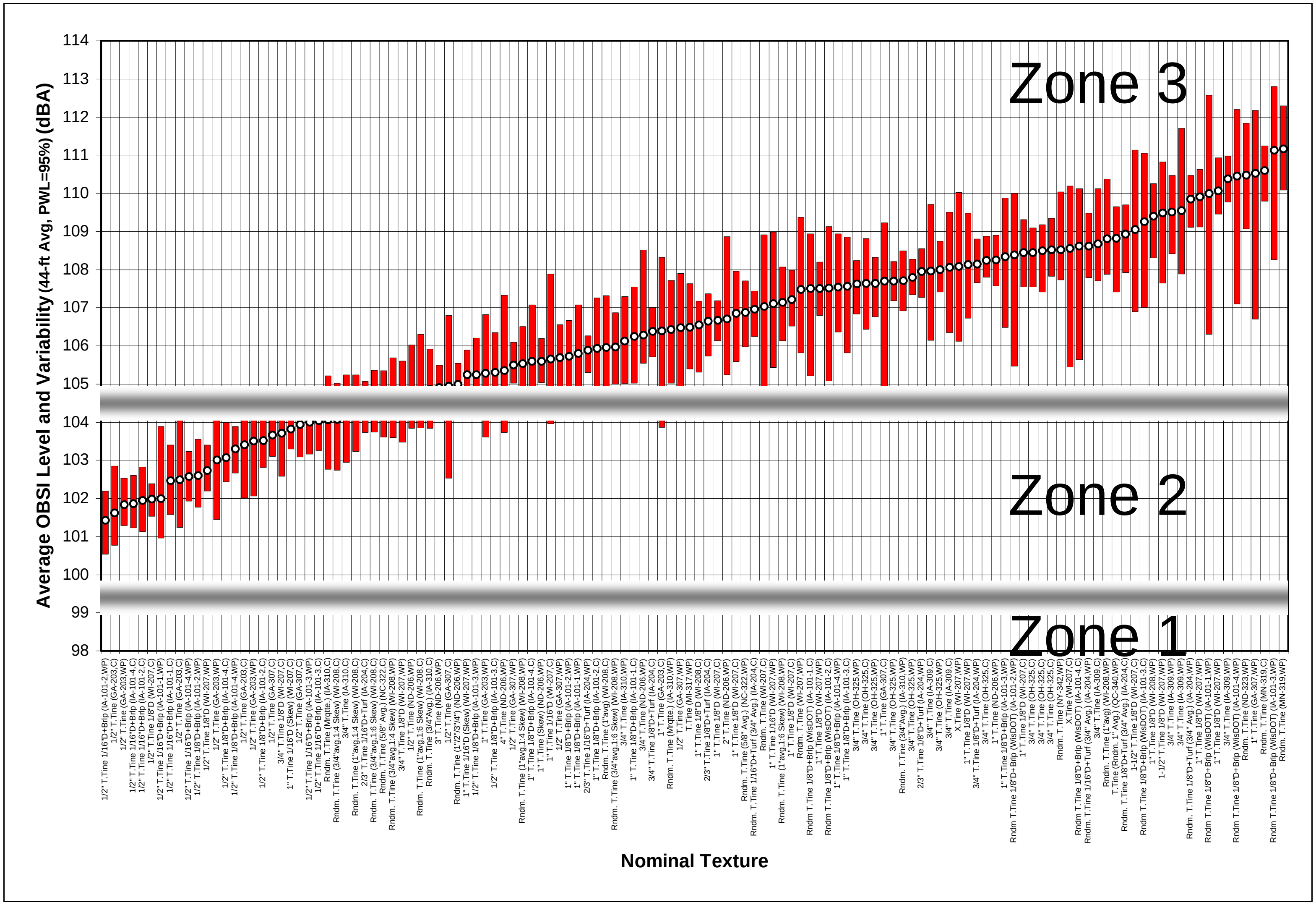

Figure 6.5. OBSI catalog of transverse tined textures including zone designations

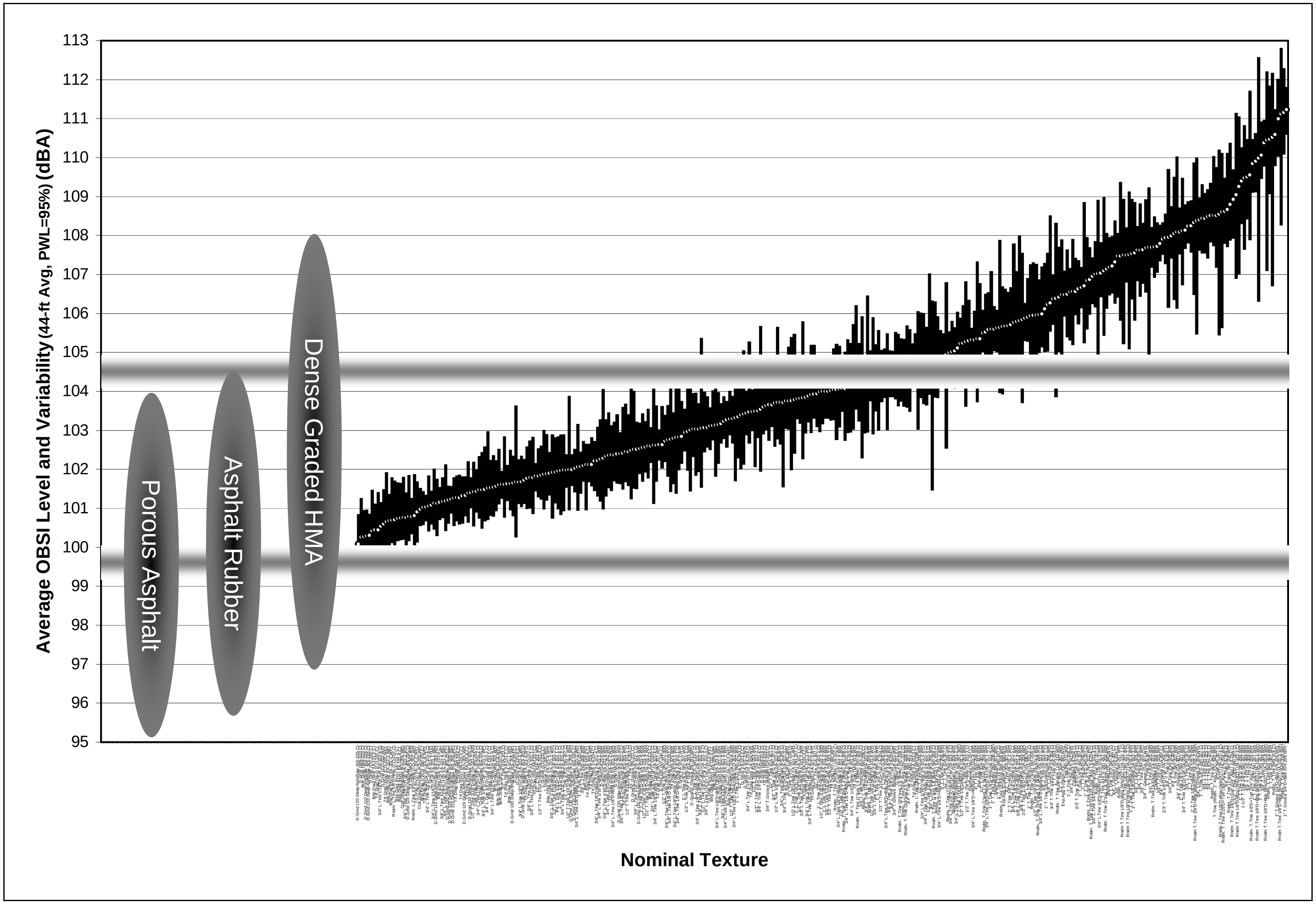

Figure 6.6. OBSI catalog of all concrete pavement textures including typical ranges of HMA alternatives

VII. LESSONS LEARNED AND THE NEXT STEPS

The technical objectives described for Part 2 of this program have been met.

- Objective 1: Determine the overall relationship between conventional texture configurations and noise at the tire–pavement interface, in-vehicle, and at wayside locations.

In short, it has been found that the overall relationship is not simple. Conventional texture configurations—described as nominally by spacings and depths—do not relate to the noise that results, no matter where it is measured/received. This is best illustrated in Figures 6.1 through 6.5—the "catalog"—where pavement sections of the same nominal characteristics are measured to have widely varied noise levels. Other examples can be found throughout the data presentation in Appendix B.

- Objective 2: Determine texture wear rates by relating pre-traffic, post-traffic, and in-service texture values to simultaneous noise measurements.

The second objective has been met via observations of the Type 1 project. Even more will be done in Part 3 in this regard as follow-up measurements are conducted on the Type 1 and 2 sites. As has been discussed previously, acoustical durability relationships can only be done properly if conducted on the same pavement section and tracked over time.

- Objective 3: Determine the sources of variability of texture (as it departs from nominal) based on current concrete paving practices.

This third objective has been met through characterization of texture variability, as well as observations of the construction practices during the Type 1 project. The texture features that have the most impact on noise were simply not known at the time that the Type 1 project was constructed. As a result, no observations of the practices leading to those features could have been made. Part 3 will pick up on these lessons learned, and seek out the practices that are most detrimental to noise.

In looking to the future, it is believed that the zone approach gives the ability to interpret the data and craft solutions that include both research and policy considerations. There may be some change in the data, but not in the approach to providing solutions in Part 3.

Analyses and other activities that will be included in Part 3 include the following:

- Conversion of OBSI data collected in Part 2 (using the Aquatred III tire) to be compatible with future test data collected in Part 3 and beyond.
- The use of nominal texture as a way to define a test section will be adjusted to quantify the actual texture. Texture width, depth, and even spacing varied appreciably from what was specified. We need to understand why, how, and what kind of impact this had on noise.

- The noise spectra will be analyzed to identify any irritating frequencies that may have been built into Zone 2 textures. Conversely, there may be specific noise frequencies included in Zone 3 that must be examined and targeted for elimination.
- Approximately 10 to 12 wayside studies were completed in Part 2. In Part 3 of the CPSCP, the analysis will link the pavement texture and OBSI data to the wayside measurement techniques that were actually used in the TNM to determine noise impacts on abutters.
- At each site, the team also collected in-vehicle data; it will be analyzed as well. Separating tire–pavement noise affecting the driver from the noise affecting the abutter will be included in the analysis.
- Wear rates (sometimes referred to as acoustic durability) will be estimated using Type 1 and 2 data. Type 3 data as well may help to link similar textures together to determine wear.
- Gaps in data and types of textures will be filled as well in Part 3 to round out the catalog.
- Part 3 will include testing and evaluation of the new pavements built with the new guide texture specifications and the apparently low noise textures.
- Planning and execution of a plan to deploy the database will be conducted during Part 3.

Construction operations will also be addressed comprehensively in Part 3, as follows:

- Quality measurements may include depth or pressure sensors on the texture equipment that can sense the texture variability that can lead to noise. A line laser mounted on the equipment is one option for this, with software that provides clear feedback to the texture operator on what corrections to make. It is clear from the data that the sand patch was not an effective control tool.
- Guidelines for new texture specifications will focus on controlling the texture configuration to not allow a certain percentage of tire–pavement noise values above a certain threshold.

See Appendix C for a more thorough explanation of the analyses expected.

All data generated by this study are available for scientific evaluation and analysis. The team will share data, coordinate studies, and publish works that are pertinent to the study goals.

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APPENDIX A. DETAILED TESTING PLAN

Overview of Testing Plan

Summary of Test Site Types

Type 1—New Construction/Grinding

- Measurements for noise, texture, profile, friction, and concrete/construction
- Will be evaluated during construction/grinding, and at subsequent ages to assess wear. Sections should be well marked for repeat visits. Both maintenance and accident records for the sites should be maintained to the greatest degree possible over the monitoring period.
- Ideally, 8–12 or more texture variables per project
- Minimum of 600 ft. sections for each test unit, which includes 100 ft. "transition zones"
- Single 2500 ft. (or more) section for variability assessment
- Flat and tangent sections where possible
- Outside (driving) lane
- Roadside features should be ideal for pass-by testing.
- Measurement frequency:
    - Conventional texturing (New construction)
        - Pre-traffic—immediately before opening to traffic
        - Post-traffic—after the first few days of traffic, at 3–6 months, then annually thereafter
    - Grinding
        - Pre-grind
        - Post-grind/pre-traffic
        - Post-grind/post-traffic—daily for first few days, at 3–6 months, then annually thereafter
    - Diurnal (day and night) measurements: noise, and possibly profile and/or friction
    - For the 3–6 month and annual measurements, the timing of intermediate winter maintenance operations should be noted as a variable.

Type 2—Existing Projects: Detailed Testing

- Measurements for noise, texture, profile, friction, and concrete (hardened)
- Will be assessed annually to assess wear. Sections should be well marked for repeat visits. Both maintenance and accident records for the sites should be maintained to the greatest degree possible over the monitoring period.
- Recently constructed/ground sections are preferred to track a more complete history of wear. Alternatively, existing sections with documented surface characteristics testing early in their life can be used.

- Should include previous experimental sites on record (e.g., Marquette, Kansas Grinding Experiment, California grinding/grooving experiment). Anecdotal outliers (i.e., good and bad noise) should also be included.
- Ideally, a minimum of 600-ft. sections; can and should include multiple textures on a given project
- Traffic control is a major consideration.

Type 3—Existing Projects: Inventory Testing

- Measurements for noise and texture only
- OBSI and In-Vehicle noise should be measured on all sites.
- Texture and CPB noise data collection will depend on the availability of traffic control and acoustical conditions at the site.
- No repeat visits will be scheduled, but a site can be identified for repeat testing if the results dictate.
- Sites include conventional texturing, grinding, and other PCC surfaces of interest.
- Sections should be "project" length, with ideally a minimum of 600 ft. for a given texture.
- Traffic control is a consideration for texture measurements.

Table A.1. Summary of proposed evaluation for each experiment type

Type	Pre-traffic measurements	Number of measurements	Testing				
			Noise	Texture	Profile	Friction	Concrete
1	Yes	3 +	Yes	Yes	Yes[3]	Yes	Yes
2	No	1 +	Yes	Yes[4]	Yes	Yes	Yes[5]
3	No	1	Yes	Yes	Optional	Optional	Optional[3,5]

Summary of Data Collection Methods and Procedures

Noise

- Near field (On-Board Sound Intensity – OBSI)
  - Specification based on procedures described by Dr. Paul Donavan (Illingworth & Rodkin), General Motors GMN7079TP, ISO (Draft) 11819-2, and the OBSI specification under development by the FHWA Noise ETG
- In-vehicle
  - Specification based on ISO 5128 and SAE J1477
- Wayside
  - Controlled Pass-By (CPB) and possibly time-averaged wayside

[3] If DOT can provide.
[4] Traffic control required.
[5] Tests on cores only.

    - Specification based on ISO 11819-1 and FHWA-PD-96-046 guidelines
    - Testing at 50 ft. from test lane, with additional testing at 25 ft., schedule permitting.
- All tests will be conducted using the same test vehicle and tires.
- Test variations for speed, lateral position, and time of day.

Macrotexture

- RoboTex (Robotic Texture) measurement system
    - Built around LMI-Selcom RoLine Line Laser
    - Transverse sampling: 100 to 118 pts over ~100 mm (~0.9 to 1.0 mm sample)
    - Longitudinal sampling: 1000 Hz, at 1 mph: ~0.45 mm interval
- Circular Track/Texture Meter (CTM)
    - On loan from FHWA for this project
    - Periodic locations along each test unit
    - Test at same locations as DFT testing (below), with additional testing as time permits
- Sand patch
    - Will be used for historical continuity
    - May be dropped from program if found to be accurately estimated using RoboTex data
- X-ray Computed Tomography (XCT)—optional
    - Donated services of FHWA Turner-Fairbank laboratory staff
    - Measured on "core tops" extracted from the projects at select locations
    - Three-dimensional structure can be reconstructed from images
- Projected Moiré Interferometry (PMI)—optional
    - Donated services of FHWA Turner-Fairbank laboratory staff
    - Measured on same "core tops" extracted from the project for XCT testing

Friction/Microtexture (Types 1 and 2 only)

- Dynamic Friction Tester (DFT)
    - Indirect measure of microtexture via friction (speed-friction relationship)
    - On loan from FHWA for this project
    - Test at same locations as CTM testing
- Locked wheel trailer (ASTM E 274)
    - Smooth test tire (ASTM E 524) to consider combined micro- and macrotexture effects
    - Local (DOT) devices will be requested for use

Profile/Megatexture (Types 1 and 2 only)

- Inertial profiler
    - Either a high-speed or a lightweight unit can be used.

  - Very high sampling and recording frequency should be used (to help assess macrotexture).
  - Concern has been raised about texture aliasing that will result from use of point (dot) laser, particularly on longitudinal textures. If the line laser unit becomes available on the profilers, it should be used. This sensor will help to characterize the longitudinal textures much better than a spot laser.
  - Local (DOT) devices will be requested for use.

Environment

- Portable weather station
  - Ambient temperatures, humidity, wind, barometric pressure, and solar radiation throughout the construction and data collection visits
- Pavement temperatures

Concrete (Types 1 and 2 only)

- Conventional lab testing
  - The ISU and/or FHWA mobile labs should be available.
  - Most of the materials testing (and environmental monitoring) can be conducted this way, with additional testing conducted by ISU laboratory facilities or local (DOT) labs.
  - Testing to include air, strength, modulus, and aggregate tests, at a minimum.
- Acoustical lab testing
  - Facility and budget permitting
  - Should include acoustical absorptivity, if possible
- Core samples should be taken from the pavement at select locations for macrotexture testing at FHWA facilities, and for in-situ strength and other properties.

Construction (Type 1 only)

- Field testing
  - Air content, temperature (maturity), and workability, at a minimum
- Timing
  - Batching, placement, curing, texturing, sawcutting
  - Grinding operations
- Geometry
  - Paving width and stationing
  - Joints—depth and width (monitored with Demecs)
- Variability
  - Conditions should be carefully monitored and adjusted to assure minimal variability. Where variances do occur, these should be carefully documented.

Summary of Data Analysis Methods

Noise

- Test methods
  - Near field (On-Board Sound Intensity—OBSI)
  - In-vehicle
  - Wayside (Controlled Pass-By—CPB)
  - Wayside (time-averaged)—optional
- Sound pressure/intensity analysis
  - Total levels (A-weighted)
  - Spectral analysis (both narrow band and fractional-octave)
  - Visualization of results by means of a "trace" by station (distance), showing within-section and between-section noise variability
  - Psychoacoustic parameter assessment (resources permitting)
- Repeatability assessment
- Diurnal effects
- Speed effects (resources permitting)
- Joint contribution
  - Joint effects will be assessed by digitally removing joints from measured signal, and considering joint geometry at the time(s) of testing
- Lateral position assessment
  - Pavement within and between wheel paths will be compared, collected as time and safety permit
- Relationships of texture to noise
  - Synchronization of texture traces to noise traces
  - Effects of texture dimension (spacing, width, depth, isotropy)
  - Effects of texture variability
- Synchronized analysis of OBSI, In-vehicle, and CPB
- Comparison of CPB and time-averaged wayside test results (resources permitting)
- Changes over time (for Type 1 and 2 sites, and possibly Type 3 sites by grouping "similar" sections of various ages)
- Comparison of time-averaged wayside measurements to predictions using the FHWA Traffic Noise Model (TNM) (resources permitting)
- Windscreen and microphone incidence corrections applied as appropriate

Macrotexture

- Test methods
  - RoboTex (Robotic Texture) measurement system
  - Circular Track/Texture Meter (CTM)
  - Sand patch
  - X-ray Computed Tomography (CT)—optional
  - Projected Moiré Interferometry (PMI)—optional
- Texture analysis

    - Simple geometry (e.g., as-measured spacing and depth)
    - Spectral analysis
    - Bias and skew
    - Isotropy
    - Advanced texture metrics
    - Visualization of results by means of a “trace” by station (distance), showing within-section and between-section texture variability, particularly the depth
- Repeatability assessment (within test methods)
- Reproducibility assessment (between different test methods)
- Changes over time (for Type 1 and 2 sites)

Profile/Megatexture

- Test method: inertial profiling—optional
- Profile analysis:
    - Smoothness, IRI and simulated Profilograph Index
    - Megatexture (resources permitting)
    - Macrotexture (resources permitting)
    - Slab curvature (resources permitting)
    - Visualization of results by means of a “trace” by station (distance), showing within-section and between-section profile and smoothness variability.
- Repeatability assessment
- Diurnal effects
- Changes over time (for Type 1 and 2 sites)

Friction/Microtexture

- Test methods:
    - Dynamic Friction Tester (DFT)
    - Locked wheel skid trailer (ASTM E 274) with smooth tire (ASTM E 524)—optional
- Friction analysis:
    - Speed-friction relationships
    - International Friction Index (IFI)
    - Visualization of results by means of a “trace” by station (distance), showing within-section and between-section friction variability
- Relationships of texture to friction
    - Synchronization of texture traces to friction traces
    - Effects of texture dimension (spacing, width, depth, isotropy)
    - Effects of texture variability
- Changes over time (for Type 1 and 2 sites)

Summary of Type 1 Experimental Variables

Recommended Textures—New Construction Conventional

A minimum of 10 conventional texture variations are recommended, with one repeated for assessing variability of texture under "reasonable" measures for control. Tables A.2 through A.4 include current thoughts for these textures. Table A.2 includes those textures that should be repeated from site to site, and are thus termed "required." Table A.3 identifies additional texture methods that could be included if additional test units are possible within a given project. Finally, Table A.4 lists textures that have been identified by others and have been or are being included in the Type 1 sites, along with the required textures.

Table A.2. Required test unit texture variables

Section ID	Primary texture type	Texture spacing (in.)	Texture depth (in.)	Pre-texturing	Minimum length (ft.)
001	Transverse tining	1/2	1/8	Burlap drag	600
002	Transverse tining	1	1/8	Burlap drag	600
003	Transverse tining	Random[6]	1/8	Burlap drag	600
004	Longitudinal tining	1/2	1/8	Burlap drag	600
005	Longitudinal tining	3/4	1/8	Burlap drag	600
006	Longitudinal tining	3/4	1/8	None	600
007	Longitudinal tining	3/4	1/4	Burlap drag	600
008	Longitudinal tining	1	1/8	Burlap drag	600
009	Burlap drag	n/a	(Standard weight)	None	600
010	Artificial turf drag	n/a	(Standard weight)	None	600
101	Longitudinal tining	3/4	1/8	Burlap drag	2500

[6] Recommended tine spacing for "Random" spacing is per Wisconsin DOT Construction & Materials Manual, Chapter 5, Section 35, Subject 100:

"…tine spacing for a 10 foot (3.022 m) rake,

Tine Spacing (Center to Center of Tines, mm):

34	*36*	*47*	*54*	*48*	*43*	*32*	*31*	*27*	*36*	*29*	*46*
21	*43*	*23*	*42*	*52*	*24*	*18*	*28*	*40*	*34*	*27*	*26*
25	*27*	*20*	*37*	*38*	*52*	*51*	*45*	*37*	*43*	*53*	*14*
27	*37*	*42*	*41*	*29*	*43*	*14*	*45*	*44*	*30*	*37*	*33*
40	*28*	*31*	*50*	*34*	*45*	*15*	*20*	*45*	*50*	*16*	*53*
51	*29*	*25*	*18*	*16*	*53*	*18*	*38*	*51*	*40*	*17*	*15*
49	*50*	*39*	*51*	*36*	*36*	*38*	*46*	*29*	*38*	*50*	*24*

33"

Table A.3. Optional (additional) test unit texture variables—in preferred order

Section ID	Primary texture type	Texture spacing (in.)	Texture depth (in.)	Pre-texturing	Minimum length (ft.)
201	Transverse tining	1/2	1/4	Burlap drag	600
202	Longitudinal tining	1/2	1/4	Burlap drag	600
203	Longitudinal tining	1	1/4	Burlap drag	600
204	Burlap drag	n/a	(Heavy weight)	None	600
205	Artificial turf drag	n/a	(Heavy weight)	None	600
206	Transverse tining	1	1/4	Burlap drag	600
207	Transverse tining	Random	1/4	Burlap drag	600
208	Transverse tining	1/2	1/8	None	600
209	Transverse tining	1	1/8	None	600
210	Longitudinal tining	1/2	1/8	None	600
211	Longitudinal tining	3/4	1/4	None	600
212	Longitudinal tining	1	1/8	None	600

Table A.4. Test unit texture variables planned or in use on Type 1 experiments

Section ID	Primary texture type	Texture spacing (in.)	Texture depth (in.)	Pre-texturing	Minimum length (ft.)	Location
301	Longitudinal tining	3/4	1/16	Burlap drag	600	Iowa
302	Longitudinal tining	3/4	1/16	Artificial turf drag	600	Iowa
303	Longitudinal tining	3/4	1/8	Artificial turf drag	600	Iowa
304	Transverse tining	1/2	1/16	Burlap drag	600	Iowa

The 10 nominal “required” textures identified in Table A.2 include three transverse tining, five longitudinal tining, and two drag textures. The intent in the selection of the various textures is to bridge the range of textures currently specified by state DOTs, exploring why some nominal textures appear louder, while others seem quieter. With depth and spacing of the texture being known variables for generating and attenuating noise, these are the key variables that are varied in this experiment.

The first two transverse textures (001, 002) cover the range of uniform transverse textures commonly specified: from 0.5 to 1 in. The 1/8” depth was selected for this (and most) of the texture variables, since not only is it commonly specified, but the majority conclusion of the anecdotal evidence is that the shallower textures at these spacings appear to be quieter. The so-called “random” spacing (003) is used as the third transverse tine pattern. For this experiment, it was specified to use the Wisconsin DOT pattern since this has been used on sections measured to be both quiet and loud (with texture depth and aggressiveness of those sections yet to be explored, and likely to be a factor).

The majority of the longitudinal textures were selected with 0.75” spacing, as this is the most common spacing (005), but sections are selected to range from 0.5” to 1” (004 and 008). The spacing of longitudinal tining has not been as closely considered in previous experiments, yet it may be worth exploring to help in optimization, especially since, so far, it has proven to be one of the quieter texture options. Within the 0.75” spacing, one variable that is altered is the nominal texture depth, using a 1/4” depth on one section (007). Additionally, the burlap “pretexture” is eliminated on one of the sections (006) in order to isolate the effect of the drag on the overall texture.

The burlap drag (009) is selected since it is currently the texture of choice in Germany and is used in the U.S. for lower volume, lower speed pavements. Artificial turf drag (010) is also used, since it has been used as texture in Minnesota and elsewhere.

The optional texture variables shown in Table A.3 continue to fill out the “factorial” of textures. Most look at the same variables in the “required” texture sections, but with a texture depth of 1/4” (201-203, 206-207). Heavier weights on the drag are also included (204-205), along with tined surfaces without pre-texturing in order to better understand the effect of the pre-texture drag on the final texture (208-212).

Recommended Textures—Grinding

Up to 12 variations of diamond grinding are currently recommended, but can be modified according to site-specific conditions. Furthermore, the results of acoustical laboratory testing of diamond ground specimens at Purdue University will be used to refine the final configurations used in the field. As of now, the following variables are being considered:

- Materials Properties
  - For a given site, select two projects in close proximity
    - One with hard aggregates, one with soft
  - Ideally, traffic should be same on both sections.
- Blade spacing variations
  - Uniform spacing, all with “texture grind” (8 configurations)
  - Soft aggregates: 0.110 in., 0.120 in., 0.130 in., 0.140 in.
  - Hard aggregates: 0.090 in., 0.100 in., 0.110 in., 0.120 in.
- Depth variations (4 configurations)
  - Vary 2 of the 4 above blade spacing variations to result in a deeper texture (“profile grinding”)
    - Use jacks or change grinding head pressure for depth variations
    - Soft aggregates: 0.110 in., 0.130 in.
    - Hard aggregates: 0.090 in., 0.110 in.
- Other considerations and variables
  - Fin condition (i.e., “knock down”)
  - Grinder type/geometry considerations (e.g., weight, bogie spacing)
  - Blade width/depth/type considerations

Texturing Specifications

The textures provided here for inclusion in the experiment are nominal, and it is recognized that the end result may be quite different. During construction of the test units, measures will need to be taken to ensure to the greatest degree possible that the texture that is constructed is reasonably close to the nominal dimensions. Guidelines for "better practices" of concrete pavement texturing should be developed prior to the field site, providing the contractor with some guidance on how to achieve this.

For the tined textures, automated texturing is an alternative that should be exercised to the greatest degree possible. Drag surfaces should include documentation of material properties and other properties as well as techniques that, if used, may affect the properties of the concrete surface.

While methods-based procedures will likely be used throughout this experiment, it is recognized that an end-result specification for texture will likely be implemented in the future. As a result, measures should be taken to understand the sensitivity of the various materials and practices in the field as they relate to changes in the texture.

Furthermore, for grinding, care should be taken to note the numerous mechanical and material variables that are present for a given grinding configuration so that the as-measured texture can be related back. Again, the ultimate goal is to understand these relationships better so that if an end-result texture specification were to be realized, a grinding contractor would have the information that they need to respond accordingly.

Summary of Type 1 Site Selection Considerations

Climate

In selecting the sites for this project, a number of variables are considered. Since texture change is being monitored along with initial (as-constructed) texture, variables that may affect this change are equally as important. This includes freeze-thaw conditions, rainfall, temperature ranges and extremes, and winter maintenance practices of the agency. Furthermore, during measurement of wayside noise, other climatic parameters may become critical, including humidity, wind, and temperature inversions in the atmosphere.

To best accommodate the highly-varied climatic conditions nationwide, it is recommended (if possible) that two sites be selected from the following regions:

1. Upper Midwestern (e.g., IA, MI, MN, or WI)
2. Southern/Western (e.g., southern CA, TX, GA, or FL)

Traffic Volume

Recommendations resulting from this project will likely be used on facilities with a range of traffic conditions. As such, both high and low traffic levels should be accounted for in the analysis. For purposes of this experiment, however, lower traffic levels will be important since there will be a periodic need to disrupt traffic for accurate measurements.

It is suggested that the team seek out four-lane, low-volume rural highway sections to minimize impacts to traffic. Furthermore, the team should avoid highways with "fast track" schedules that may lack incentives for the contractor to work with the project team in carefully controlling the experimental variables (texture, in particular).

Traffic Loading

Potentially conflicting with the need for a facility with lower traffic volumes is the desire for a facility with high traffic loading. Describing changes in texture and the associated pavement surface characteristics, is one of the more important aspects of this project. Texture changes are known to occur more rapidly on pavement surfaces with known "polish susceptible" materials and/or pavements subjected to high levels of loading.

As a result, it is recommended that facilities be selected that are expected to carry heavy agricultural and/or industrial truck loads (even if seasonal). The result will be the potential for accelerating surface wear on a facility that may still have a manageable level of traffic to facilitate the testing.

Materials and Mixtures

While the concrete mixture will likely be predetermined for the projects that are selected, care should be taken to note properties that may be a consideration in analysis. For example, the maximum size of the aggregate and (arguably more important) the gradation are variables that should be measured for the test units. Hardness of the aggregates should also be noted, as this will likely affect the wear rate and, for grinding, the effectiveness.

For the conventional texturing experiments, careful control should be exercised to minimize variability of the mixture over the experimental section. The "better practices" guidelines for concrete texturing being developed under this effort will contain guidance in this regard.

Because aggregate hardness is a known variable that affects the wear rates for diamond ground surfaces, it is one that should be carefully considered for the grinding site selection. Ideally, for each of the proposed experimental sites, two projects (pavements) constructed using different aggregate types should be located in close proximity to one another. To the greatest extent possible, age and traffic levels should be the same on the two sections.

Pavement Type

For this experiment, it is suggested that jointed concrete pavements be selected. Joints have been reported as a contributor to overall tire–pavement noise. Therefore, for all jointed pavements, the jointing techniques should be carefully controlled and evaluated. There should be uniformity in cut geometry and proper sealing procedures should be stressed. For this experiment, unsealed joints would be preferred since this might minimize variability. Furthermore, consideration should be given to evaluating various joint design techniques as part of this study—possibly on the Type 2 sites.

For the grinding experiment, it is suggested that sites with shallow existing textures be selected (at least in the wheel paths), so that there is a high degree of likelihood that it will be removed completely during the grinding process, removing this as a variable during the analysis.

Roadway Geometry

Flat and tangent sections are preferred to minimize the conflict that might occur with the wayside noise measurements. Furthermore, similar surface drainage characteristics (cross slopes) should be present on all test units to the greatest degree possible.

Site Selection and Routing Plan

Site Definition

In order to derive the various types of data that are of interest to the ISU-FHWA-ACPA CPSC Program, the various field sites have been divided into three types, as follows:

- **Type 1**—New construction/grinding
  - Measurements for noise, texture, profile, friction, and concrete/construction
    - Conventional texturing (New construction)
      - Pre-traffic measurements—immediately before opening to traffic
      - Post-traffic measurements—after first few days, at 3–6 months (or after the first winter), then annually thereafter
    - Grinding
      - Pre-grind measurements
      - Post-grind/pre-traffic measurements
      - Post-grind/post-traffic measurements—after first few days, at 3–6 months (or after the first winter), then annually thereafter
    - Diurnal (day and night) measurements: profile, noise, and possibly friction
  - Ideally, 8–12 or more texture variables per project
- **Type 2**—Existing projects: detailed testing
  - Measurements for noise, texture, and friction
  - Profile and concrete (hardened) also, if conditions permit
  - Will be assessed annually to assess wear
- **Type 3**—Existing projects: inventory testing
  - Measurements for noise and texture only
    - Ideally, OBSI and in-vehicle noise will be measured on all sites. Texture and CPB noise data collection will depend on the availability of traffic control and acoustical conditions at the site.
  - No repeat visits will be scheduled, but a site can be identified for repeat testing if the results dictate.

While budget and site access are important variables, the number of sites currently anticipated to be evaluated under this program can be found in Table A.5, along with the number and type of measurements that are anticipated.

Table A.5. Summary of proposed evaluation for each experiment type

Type	Number of sites	Pre-traffic measure-ments	Number of measure-ments	Testing				
				Noise	Texture	Profile	Friction	Concrete
1	Up to 4	Yes	3 +	Yes	Yes	Yes[7]	Yes	Yes
2	Up to 8	No	1 +	Yes	Yes[8]	Yes	Yes	Yes[9]
3	Up to 24	No	1	Yes	Yes	Optional	Optional	Optional[7,9]

Site Selection Methodology

A number of site selection criteria are identified elsewhere in this test plan. Type 1 sites require careful consideration in their selection given the investment in the quality and quantity of data being collected. Specific criteria include the following:

- Climate
- Traffic volume
- Traffic loading
- Materials and mixtures
- Pavement type
- Roadway geometry

Type 2 and 3 sites also require careful thought in their selection. It must first be recognized that they are existing sites that will be visited by the project team for post-construction/grinding evaluation, and, thus, the team will need to work within the constraints and conditions already present on the project. During the site selection process for Type 2 and 3 sites, the following variables were considered:

1) **Texture.** Sites should include a wide variety of conventional texture and grinding patterns that are in use today. This includes nominal patterns, as well as known variations due to construction practices and material variability.
2) **Geography.** There should be representation by regions that will inherently include differences in climate, typical materials, and possibly specifications.
3) **Historical data.** While this project is unique in its simultaneous measurement of multiple pavement surface characteristics, selecting sites with existing data from previous measurements provides value in better understanding texture wear over time.
4) **Age.** Since texture wear is a variable that is under investigation in this project, selecting sites with various degrees of wear will help to better understand the physical phenomena associated with wear, albeit qualitatively, if historical data are not available. For Type 2 sites, most projects should be selected that are

[7] If DOT can provide.
[8] Traffic control required.
[9] Tests on cores only.

relatively early in their life cycle allowing measurements in subsequent years to be connected in order to define texture wear more completely.

5) **Site access (traffic control).** The possibility of access to all of the sites via lane closure will not be known definitively until the project is underway. However, site selection must be made considering known contacts within the DOT that have either already committed to providing traffic control on the specific projects under consideration, or are known from similar endeavors to provide these services at no cost to pavement researchers.
6) **Parallel research activities.** Given the fact that a number of state DOTs and others have done or are in the process of doing related research activities, selecting sites that are common to these studies could be of benefit. This would allow the ISU-FHWA-ACPA research team to not only gauge repeatability or reproducibility of some data, but also supplement data that would otherwise not be collected, but could provide additional value in the analysis.

The identification of candidate Type 2 and 3 sites began with two parallel activities:

1) A survey conducted by the ACPA under the supervision of Dr. Mike Ayers
2) Information search including first-hand knowledge of the project team and sponsors

The survey was initiated in 2004 by the ACPA in direct response to their noise initiative. Conducted by email, the survey queried the various chapter-state executives, asking them to identify concrete paving projects of which they were aware and which would be worth evaluating based on their noise characteristics—both "quiet" and "noisy." Dr. Ayers developed a Microsoft Excel database that included the following:

- State
- Route designation
- Project location
- Urban/rural
- Texture type
- Quiet/noisy
- Distinguishing features of texture
- Traffic volume
- Pavement age
- Concrete properties
- Other available data
- Partnering opportunity with DOT

The database delivered to the ISU team on 9 February 2005 contained approximately 36 projects from nine states and Canadian provinces.

An information search was conducted in parallel to this survey, as part of the development of the report *Synthesis of Practice for the Control of Tire–pavement Noise Using Concrete Pavements*. Nearly 70 references are cited in the synthesis report, which represent only a fraction of the total information collected on this topic. Within many of these references is information related to specific concrete paving projects that included an evaluation of pavement surface characteristics. These projects were considered for evaluation under this study. Additional sites were similarly identified though various communications within the project team, the project sponsors, and others within the pavements and noise communities.

While not exhaustive, over 80 candidate projects were identified in the process, which included 170 nominally different concrete pavement textures. There are more textures than projects because many of the sites that were identified include “test units” of more than one texture.

With the master list of projects identified, the sorting and prioritization process proceeded, using the selection criteria previously identified.

Identification of Type 1 Sites

As of the date of this report, one project has been identified as a Type 1 site. The project is located on U.S. Highway 30 in Tama County in the state of Iowa. It was selected based on the various site selection criteria previously noted. The state of Iowa was selected because it expressed an interest early on in the program, and subsequently provided a generous contribution towards the research program. Details on this Type 1 project can be found in elsewhere in this appendix.

Additional Type 1 sites have yet to be specifically identified, but various inquiries have been made of the team by parties interested in participating in the coming months.

Identification of Type 2 and 3 Sites

Table A.6 identifies the Type 2 sites and surfaces and includes some characteristic information. Table A.7 similarly includes information about the Type 3 sites and surfaces. Table A.8 summarizes the various surfaces inherent in the Type 2 and 3 sites, demonstrating that a wide variety of surfaces have been evaluated.

Table A.6. Summary of Type 2 sites

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
202-A	3/4" L. Tine 1/8"D+Brlp	Berthoud, CO	US 287 SB	2	982
202-B	Trf. Drag (Hvy)	Berthoud, CO	US 287 SB	2	996
202-C	3/4" L. Tine 1/8"D+Turf	Berthoud, CO	US 287 SB	2	991
202-D	3/4" L.Tine 1/8"D (Sine)+Brlp	Berthoud, CO	US 287 SB	2	990
202-E	Rndm. L.Tine 1/8"D+Brlp	Berthoud, CO	US 287 SB	2	979
202-F	L. Groove	Berthoud, CO	US 287 NB	2	799
202-G	D. Grnd	Berthoud, CO	US 287 NB	2	1004
203-A	1/2" T. Tine	Commerce, GA	SR 15 / US 441 NB	2	397
203-B	1/2" T. Tine	Commerce, GA	SR 15 / US 441 NB	2	504
203-C	D. Grnd	Commerce, GA	SR 15 / US 441 NB	2	602
203-D	1/2" T. Tine	Commerce, GA	SR 15 / US 441 SB	2	489
203-E	3/4" T. Groove (Bridge)	Commerce, GA	SR 15 / US 441 SB	2	491
203-F	1" T. Tine	Commerce, GA	SR 15 / US 441 SB	2	507
204-A	2/3" T. Tine 1/8"D+Turf	Des Moines, IA	SR 163 WB	2	507
204-B	2/3" T. Tine 1/16"D+Turf	Des Moines, IA	SR 163 WB	2	505
204-C	3/4" L. Tine 1/16"D+Turf	Des Moines, IA	SR 163 WB	2	501
204-D	3/4" L. Tine 1/8"D+Turf	Des Moines, IA	SR 163 WB	2	502
204-E	Rndm. T.Tine 1/8"D+Turf (3/4" Avg.)	Des Moines, IA	SR 163 WB	2	510
204-F	Rndm. T.Tine 1/16"D+Turf (3/4" Avg.)	Des Moines, IA	SR 163 WB	2	500
204-G	Trf. Drag (Std)	Des Moines, IA	SR 163 WB	1	304
204-H	3/4" T. Tine 1/8"D+Turf	Des Moines, IA	SR 163 WB	2	504
204-I	3/4" T. Groove	Des Moines, IA	SR 163 WB	1	174
204-J	Cold Milled	Des Moines, IA	SR 163 WB	1	505
205-A	Trf.Drag-Sngl Saw	Louisburg, KS	US 69 NB	2	395
205-B	D. Grnd 110 Deep-Nrm lSaw	Louisburg, KS	US 69 NB	2	398
205-C	D. Grnd 110 Deep-Sngl Saw	Louisburg, KS	US 69 NB	2	399
205-D	D. Grnd 120 Deep-Nrm lSaw	Louisburg, KS	US 69 NB	2	397
205-E	D. Grnd 120 Deep-Sngl Saw	Louisburg, KS	US 69 NB	2	400
205-F	D. Grnd 130 Shlw-Nrml Saw	Louisburg, KS	US 69 NB	2	397
205-G	D .Grnd 130 Shlw-Sngl Saw	Louisburg, KS	US 69 NB	2	393
205-H	D. Grnd 130 Deep-Nrml Saw	Louisburg, KS	US 69 NB	2	393
205-I	D. Grnd 130 Deep-Sngl Saw	Louisburg, KS	US 69 NB	2	398

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
205-J	3/4" L. Tine-Nrml Saw	Louisburg, KS	US 69 NB	2	403
205-K	3/4" L. Tine-Sngl Saw	Louisburg, KS	US 69 NB	2	404
205-L	Crpt. Drag-Nrml Saw	Louisburg, KS	US 69 NB	2	403
205-M	Crpt. Drag-Sngl Saw	Louisburg, KS	US 69 NB	2	399
206-A	1" T. Tine (Skew)	Glen Ullin, ND	I-94 WB	2	497
206-B	3/4" T. Tine	Glen Ullin, ND	I-94 WB	2	495
206-C	2" T. Tine	Glen Ullin, ND	I-94 WB	2	501
206-D	3" T. Tine	Glen Ullin, ND	I-94 WB	2	503
206-E	4" T. Tine	Glen Ullin, ND	I-94 WB	2	502
206-F	Rndm. T. Tine (1"/2"/3"/4")	Glen Ullin, ND	I-94 WB	2	506
206-G	1/2" T. Tine	Glen Ullin, ND	I-94 WB	2	506
206-H	3/4" L. Tine	Glen Ullin, ND	I-94 WB	2	503
206-I	1" T. Tine	Glen Ullin, ND	I-94 WB	2	518
207-A	Trf. Drag (Std)	Thorp, WI	SR 29 WB	2	402
207-B	1" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	402
207-C	1-1/2" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	398
207-D	X. Tine	Thorp, WI	SR 29 WB	2	398
207-E	1" L. Tine 1/16"D	Thorp, WI	SR 29 WB	2	398
207-F	1" L. Tine 1/8"D	Thorp, WI	SR 29 WB	2	399
207-G	1" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	410
207-H	1" T. Tine 1/16"D (Skew)	Thorp, WI	SR 29 WB	2	396
207-I	1/2" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	397
207-J	3/4" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	399
207-K	Rndm. T. Tine	Thorp, WI	SR 29 WB	2	404
207-L	Brm. Drag 1/16"D	Thorp, WI	SR 29 WB	2	398
207-M	1" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	396
207-N	1" T. Tine 1/16"D	Thorp, WI	SR 29 WB	2	396
207-O	1" T. Tine 1/8"D	Thorp, WI	SR 29 WB	2	398
207-P	Shot Peened	Thorp, WI	SR 29 WB	2	399
208-A	1" L. Tine 1/8"D	Abbotsford, WI	SR 29 WB	2	404
208-B	Rndm. L. Tine (3/4"avg)	Abbotsford, WI	SR 29 WB	2	404
208-C	Rndm. L. Tine (1"avg)	Abbotsford, WI	SR 29 WB	2	404
208-D	Rndm. T. Tine (3/4"avg,1:4 Skew)	Abbotsford, WI	SR 29 WB	2	401
208-E	Rndm. T. Tine (1"avg,1:4 Skew)	Abbotsford, WI	SR 29 WB	2	404
208-F	Rndm. T. Tine (3/4"avg,1:6 Skew)	Abbotsford, WI	SR 29 WB	2	399
208-G	Rndm. T. Tine (1"avg,1:6 Skew)	Abbotsford, WI	SR 29 WB	2	402
208-H	Rndm. T. Tine (1"avg)	Abbotsford, WI	SR 29 WB	2	400
208-I	1" T. Tine 1/8"D	Abbotsford, WI	SR 29 WB	2	400

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
209-A	Belt. Drag	Wallops Island, VA	Runway 4/22 SB	1	352
209-B	1" T. Groove 1/4"D+Belt	Wallops Island, VA	Runway 4/22 SB	1	354
209-C	1" T. Groove 1/4"D+Brlp	Wallops Island, VA	Runway 4/22 SB	1	354
209-D	Brlp. Drag	Wallops Island, VA	Runway 4/22 SB	1	342
209-E	HMA (Small Agg)	Wallops Island, VA	Runway 4/22 SB	1	1005
209-F	HMA (Small Agg, 2" T. Groove)	Wallops Island, VA	Runway 4/22 SB	1	346
209-G	HMA (Small Agg, 1" T. Groove)	Wallops Island, VA	Runway 4/22 SB	1	353
209-H	Shot Peened	Wallops Island, VA	S-6	1	704
209-I	HMA (Med Agg)	Wallops Island, VA	Echo 1	1	280
209-J	HMA (Med Agg)	Wallops Island, VA	Echo 2	1	290
209-K	HMA (Med Agg)	Wallops Island, VA	Echo 3	1	273
209-L	HMA (Med Agg)	Wallops Island, VA	Echo 4	1	284
209-M	Surf. Treat (Polycon wo Sand)	Wallops Island, VA	EK 1	1	211
209-N	Surf. Treat (Polycon w Sand)	Wallops Island, VA	EK 2	1	186
209-O	Surf. Treat (Polycon w Med Grit)	Wallops Island, VA	EK 3	1	300
209-P	Surf. Treat (Polycon w Lrg Grit)	Wallops Island, VA	EK 4	1	285
209-Q	HMA (Med Agg, Sandblast/Rejuv)	Wallops Island, VA	RS 4	1	293
209-R	HMA (Med Agg, Rejuv)	Wallops Island, VA	R 5	1	296
209-S	HMA (Med Agg, Sandblast)	Wallops Island, VA	LS 1	1	299
209-T	Surf. Treat (Crafco)	Wallops Island, VA	M 1	1	290
209-U	Shot Peened	Wallops Island, VA	S-1	1	200

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
209-V	Shot Peened	Wallops Island, VA	S-5	1	900
209-W	Shot Peened	Wallops Island, VA	S-2	1	200
209-X	Shot Peened	Wallops Island, VA	S-3	1	200
209-Y	Shot Peened	Wallops Island, VA	S-4	1	300

Table A.7. Summary of Type 3 sites

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
305-A	1" L. Tine	Lakewood, CO	US 285 EB	5	1040
305-B	D. Grnd	Lakewood, CO	US 285 EB	5	1076
307-A	1" T. Tine	Clayton Co., GA	I-675 NB	2	997
307-B	1/2" T. Tine	Clayton Co., GA	I-675 NB	2	505
307-C	3/4" T. Groove	Clayton Co., GA	I-675 NB	1	203
307-D	1/2" T. Tine	Clayton Co., GA	I-675 NB	2	507
307-E	3/4" T. Groove	Clayton Co., GA	I-675 NB	2	476
307-F	1/2" T. Tine	Clayton Co., GA	I-675 NB	2	506
309-A	3/4" T. Tine	Des Moines, IA	US 65 NB	2	509
309-B	3/4" T. Tine	Des Moines, IA	US 65 NB	2	506
309-C	3/4" T. Tine	Des Moines, IA	US 65 NB	2	508
310-A	Rndm. T. Tine (Mrqtte.)	Cedar Rapids, IA	US 30 EB	4	1007
310-B	Rndm. T. Tine (3/4"Avg.)	Cedar Rapids, IA	US 30 EB	4	1010
310-C	3/4" T. Tine	Cedar Rapids, IA	US 30 EB	4	1016
311-A	D. Grnd	Marion, IN	SR 18 WB	10	2001
317-A	T. Tine	Detroit, MI	I-75 NB	1	1323
317-B	Exp. Agg	Detroit, MI	I-75 NB	1	1321
319-A	D. Grnd	Minneapolis, MN	I-694 WB	4	1005
319-B	Trf. Drag	Minneapolis, MN	I-694 WB	4	998
319-C	Rndm. T. Tine	Minneapolis, MN	I-694 WB	4	998
320-A	Trf. Drag	Bird Island, MN	US 212 WB	5	1005
320-B	D. Grnd	Bird Island, MN	US 212 WB	5	1005
320-C	Brm. Drag	Bird Island, MN	US 212 WB	5	1002
322-A	Rndm. T. Tine (5/8" Avg.)	Mt. Airy, NC	I-77 NB	6	1187
323-A	Trf. Drag	Valley City, ND	I-94 WB	5	1013
323-B	Rndm. T. Tine	Valley City, ND	I-94 WB	5	999
324-A	D. Grnd	Harrisonville, MO	US-71 SB	9	1804
325-A	3/4" T. Tine	Shadyside,OH	SR 7 SB	2	504
325-B	3/4" T. Tine	Shadyside, OH	SR 7 SB	2	506
325-C	3/4" T. Tine	Shadyside, OH	SR 7 SB	2	503

Number and surf. ID	Texture type	City, State	Route designation	Num. sections	Total section length (ft.)
325-D	3/4" T. Tine	Shadyside, OH	SR 7 SB	2	504
325-E	3/4" T. Tine	Shadyside, OH	SR 7 SB	2	511
336-A	3/4" L. Groove	Chesapeake, VA	I-64 EB	5	994
339-A	HMA (Thin AZ OGFC)	Opelika, AL	NCAT WB	1	191
339-B	HMA (Thick AZ OGFC)	Opelika,AL	NCAT WB	1	192
339-C	HMA (AZ OGFC on PEM)	Opelika, AL	NCAT WB	1	225
339-D	HMA (Thick PEM)	Opelika, AL	NCAT WB	1	203
339-E	HMA (Thin PEM)	Opelika,AL	NCAT WB	1	200
340-A	Exp. Agg 5-14mm	Montreal, QC	Hwy. 40 WB	3	609
340-B	T. Tine (Rndm. 1" Avg.)	Montreal, QC	Hwy. 40 WB	3	607
340-C	Exp. Agg 5-20mm	Montreal,QC	Hwy. 40 WB	3	611
340-D	Shot Peened	Montreal, QC	Hwy. 40 WB	3	606
341-A	D. Grnd 105	Lakeville, NY	I-390 SB	10	1983
342-A	Trf. Drag	Lowman,NY	I-86 EB	3	607
342-B	3/4" L. Tine	Lowman, NY	I-86 EB	3	603
342-C	Rndm. T. Tine	Lowman, NY	I-86 EB	3	604
343-A	Trf. Drag	Cuba, MO	I-44 WB	10	2017

Table A.8. Summary of texture types included on all sites

Texture type	Approx. number
Transverse tining	140
Longitudinal tining	104
Diamond grinding	39
Drag	59
Transverse grooving	12
Longitudinal grooving	4
Others	Shot peened (10)
	Exposed aggregate (5)
	Cold milled (2)
	HMA and misc. surfaces (20)
Total	**395**

Routing and Scheduling

When selecting the optimum route for the field testing, consideration was given to the following factors:

- **Efficiency.** Minimizing the amount of driving from location to location, as well as taking advantage of weekends for these mobilizations.
- **Weather.** While the weather is difficult to predict, climatic trends in snowfall and seasonal rains can be used to identify the best routes.
- **Temporary equipment storage.** Periodically, the evaluation team will return home to rest. Scheduling should consider locations where the test vehicles can be stored safely, including indoor storage of more valuable test equipment. Furthermore, easy access to airports serviced by low-cost airlines, such as Southwest Airlines, will be a consideration.

For Type 1 sites, the duration of the first site visit, including pre- and post-traffic measurements, is approximately 10 to 14 days. Details of the specific testing can be found elsewhere in this appendix for the Type 1 sites. Because it is of paramount importance that the timing of these visits coincides with the time of opening to traffic, the Type 1 sites take priority. In other words, while the team will strive to maintain a cohesive routing plan for Types 1, 2, and 3, if the date for a Type 1 opening to traffic were to change, the overall test schedule must change to accommodate this.

The routing for the Type 2 and 3 projects is currently anticipated to occur using circuitous patterns. This should maximize efficiency by minimizing travel time between sites.

Construction Test Plan for Iowa Type 1 Site

Objectives

Experimental Objective

This test site falls under the Type 1 classification within the ISU-FHWA-ACPA SC study. The objective is to evaluate the surface characteristics (SC) of various conventional (wet) texture variations, as well as the variability within these texture methods. Noise, texture, friction, and smoothness will all be measured on this project, with initial testing prior to opening to traffic. In the days, months, and years to follow, additional testing will be conducted to determine the rate of change of these properties.

Overall Test Objective

To evaluate and monitor the construction of texture test units on a PCC paving project in the state of Iowa, located on US Highway 30 in Tama County, near the town of Marshalltown.

Specific Test Objectives

1) To work with Iowa State University, Iowa DOT, and the contractor to finalize the nominal texture variations and the location of the test units on the project
2) To develop and encourage the use of "better practices" to minimize texture and joint geometry variability, documenting these practices for subsequent Type 1 sites, and serving as a product from this study
3) To continuously monitor the construction process and sequencing, noting all potential variables that may ultimately have any affect on pavement surface characteristics, including:
    A) Texture
    B) Smoothness, addressing variables that affect long-wavelength texture, or those that can affect slab shape over time, such as curling and warping
    C) Noise, addressing variations in texture, joint geometry, or mixture properties
    D) Friction
4) To install semi-permanent instrumentation for monitoring pavement temperatures and joint behavior
5) To collect fresh concrete samples and conduct materials testing
6) To collect concrete constituent and other materials samples for subsequent testing and evaluation
7) To collect on-site weather conditions during construction
8) To survey, benchmark, document, and record as-built test unit boundaries and locations of permanent instrumentation
9) To thoroughly document the as-constructed test units to serve as a historical reference

Summary of Experimental Data

Construction Data

The following information will be collected during the construction phase of this Type 1 project. Much of it will be used to identify sources of construction variability, believed to be a critical variable in the resulting surface characteristics. This project will result in a refined "better practices" guide for texture, and will thus require documentation of the impact to texture related to the various stages of construction. The following data will be collected:

1) Concrete constituent storage and supplier information (sources, delivery schedules, etc.)
2) Batching information, including equipment, charging sequence, batch time, and batch quantities (all individual batch tickets to be collected)
3) Transportation information, including equipment type, transit time, agitation, protection, and discharge methods
4) Placement information, including equipment type, production rate (esp. uniformity or lack thereof), placing/spreading technique, joint reinforcement details and techniques (tie bars and dowels), and grade control
5) Finishing information, including details of automated and manual methods—equipment, rate, and dimensions
6) Texturing information[10]
    A) Drag texture information
        i) Mounting equipment
        ii) Material (specifications or other production information, as available)
        iii) Moisture state (timing and estimated quantity of water application)
        iv) Cleanliness (approximate thickness of grout on surface)
        v) Weight added (incl. technique)
        vi) Dimensions (esp. length) of drag as applied
        vii) Length and condition of frayed trailing edge (if applicable)
        viii) Time since placement
    B) Tined texture information
        i) Equipment
        ii) Actual tine spacing, width, length
        iii) Automation
        iv) Application pressure
        v) Cleanliness
        vi) Angle (deviation from vertical)
        vii) Time since placement

[10] Of all of the information collected during construction, these observations are believed to be the most critical. It is important that an observer be present at the texture machine throughout the placement of the test units. This individual should be a passive observer, noting what practices are being employed to create the texture. As any deviation or change is made in the process, this should be noted along with the corresponding station.

7) Curing information—material, application method, timing (since placement), application rate, and uniformity
8) Sawing information[11]—equipment, methods, blade characteristics (type, dimensions, wear), timing (since placement), advance rate, overall production rate, and uniformity

Materials Data and Sampling

Throughout this project, material information will be collected via sampling and testing. This information is important if the various surface characteristics are to be tied to variables that are commonly under the control of the contractor and/or the agency, by either specifications or better practices. Data will be collected for the following:

1) Fresh concrete
    A) Air content and structure—pressure meter, unit weight, and AVA
    B) Slump (for consistency indicator)
    C) Water-cement ratio
2) Hardened concrete[12]
    A) Compressive strength—28 day (with 1, 3, and 7 day optional)
    B) Indirect tensile strength—28 day (with 1, 3, and 7 day optional)
    C) Modulus of elasticity—28 day (with 7 day optional)
    D) Drying shrinkage (optional)[13]—periodically for 56 days
    E) Coefficient of thermal expansion (optional)—28 day or later, saturated condition
    F) Heat evolution, calorimetry (optional)
    G) Acoustical absorption (optional)[14]
3) Concrete constituents[15]
    A) Gradation—fractions and combined
    B) Coarse aggregate samples
    C) Fine aggregate samples
    D) Intermediate aggregate samples, if applicable
    E) Cement samples
    F) SCM samples
4) Texture materials[16]
    A) Drag—representative sample of unused and used drag texture
    B) Tining—representative sample of unused (new) and used steel tine (if noted difference in wear)

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[11] Sawing information is being collected in order to understand the role that joint geometry will have on the resulting surface characteristics—in particular, noise from "joint slap."
[12] Materials testing of concrete from each test unit will allow for a better understanding of concrete variability, and can be a consideration when describing texture wear.
[13] These tests will allow for a better understanding of joint behavior over time and its effect on noise, smoothness, and possibly other surface characteristics.
[14] Acoustical testing of one or more cylinders or cores can be conducted later if deemed necessary.
[15] Collected for subsequent physical or chemical testing (e.g., hardness), if deemed necessary.
[16] Few if any specifications exist for the materials used in texturing. If deemed appropriate, subsequent evaluation of these materials can possibly be used to relate them back to the end-result texture.

5) Cores[17]
    A) Compressive strength
    B) Modulus of elasticity
    C) Texture assessment using FHWA lab techniques (CT scan, Interferometry)
    D) Indirect tensile strength (optional)
    E) Air voids (optional)
    F) Acoustical absorption (optional)

In-situ Pavement Data

During construction, various in-situ tests will be conducted to assess some of the variables that are believed to affect surface characteristics of interest, directly or indirectly. Instrumentation of the joints, for example, will allow for joint behavior (e.g., opening) to be related to temperature and ultimately to noise that is generated from "joint slap."

1) Pavement temperatures—min. 5 depths, including base—used for gradient, joint opening prediction, and maturity-based estimates of strength
2) Joint behavior (opening/closing)—Demec gauge studs to be installed on representative and consecutive joints
3) Silicone molds for texture[18]
4) Pavement profiles[19]—day/night for up to 10 days using an ICC rolling profiler
5) Curling and warping deflections—continuously for up to 7 days using LVDT sensors referenced to deep-ground elevation

Site Data

1) Weather[20]—portable weather station:
    A) Ambient temperature
    B) Ambient relative humidity
    C) Wind speed
    D) Wind direction
    E) Rainfall
2) Thorough stationing and referencing of all experimental variables
3) Thorough photographic documentation of entire project

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[17] The recommendations for core testing are given here for informational purposes only. Coring is not recommended during the construction period. Instead, cores should be obtained after the first round of surface characteristic testing, shortly after the time of opening to traffic. This allows the core locations to be selected to coincide with detailed texture evaluations conducted with the various instrumentation used under this research effort. Core testing will allow for material property evaluation in situ that can be compared to similar testing of cores extracted in future years.
[18] Conducted by Iowa DOT. May be postponed until later.
[19] These tests are being provided to this study as part of a parallel study being conducted by Iowa State University.
[20] Information on weather will be of paramount importance as it is widely recognized that changes in the behavior of concrete during placement can be linked to the weather. Temperature and wind, for example, will affect both the evaporation and set time of fresh concrete, leading to a surface with a varied depth of texture, all else being equal.

Preliminary Experimental Test Schedule

Pre-Paving Activities

1) Arrive on site, crosscheck supplies, and meet with local contact(s)
2) Conduct site reconnaissance
    A) Drive and walk site, noting features that may affect experiment
    B) Identify acoustically good and bad locations (for wayside noise testing)
    C) Delineate preliminary test unit boundaries (stations)
    D) Identify tentative locations for test units and instrumentation
3) Evaluation team meeting
    A) Identify team management structure, roles, and responsibilities
    B) Obtain/exchange cell numbers
    C) Confirm availability and condition of all requisite equipment
    D) Identify deviations from test plan, potential pitfalls, and solutions
4) Conduct pre-paving meeting with contractor and DOT
    A) Identify key personnel (evaluation team, contractor, DOT)
    B) Confirm understanding of research objectives
    C) Discuss planned activities of research team
    D) Confirm paving schedule and construction (esp. texturing) equipment availability and readiness
    E) Review "better practices" of texturing and refine based on project variables (materials, climate, equipment, labor availability)
    F) Discuss texture test unit sequencing and deviations from experimental plan
    G) Obtain/exchange cell numbers
5) Conduct detailed stationing survey
    A) Mark no more than every 50 m, if not already done
    B) Color code stakes using paint or flagging for quick identification by evaluation team
6) Conduct detailed checks of test equipment
7) Initialize temperature sensors

Paving Activities

1) Set up and initialize weather station
2) Confirm mobile laboratory readiness for PCC sampling and testing
3) Confirm evaluation team (observer and recorder) readiness
4) Prepare temperature sensors for morning installation
5) Tailgate meeting
    A) Confirm readiness of contractor and DOT for day's placement
    B) Review goals for day
    C) Identify paving schedule for day
6) Collect sample of unused (new) texture materials—drag and tines.
7) Install temperature "sensor tree" at approximately 4 to 5 ft from the pavement edge (half way between the anticipated right wheel path and center of noise test

vehicle). When paver approaches, shovel fresh concrete around sensors to protect from concrete head, and to ensure proper consolidation of concrete.

8) Begin paving using first texture method.
9) For first 10 to 20 m of paving, check texture depth from work bridge using "Tire Gauge" method. If adjustments to the texture are deemed necessary, make them accordingly, but in no case should adjustments be made after 50 m of section has been placed unless the test unit length is increased accordingly to ensure a total of 200 m of "uniform" texture.
10) All notations should be made of paving process by evaluation team, with particular emphasis on the finishing and texturing methods.
11) Repeat evaluation process, changing out texture methods as necessary.
12) Mobile laboratory activities:
    A) Fresh concrete sampling for slump and air should be conducted a minimum of once per test unit
    B) Sampling for lab specimen preparation should be conducted 3 times per paving day, or if a significant mix change is noted. Given the proposed tests, this will includes casting of six cylinders each time, with a single additional cylinder to be cast for CTE testing.
13) Prior to end of day's placement, a second temperature "sensor tree" should be installed using the same procedures.
14) Batch plant visit:
    A) Sample concrete constituents using 5-gallon buckets
    B) Note batching process parameters
15) Install Demec points on a minimum of five consecutive transverse joints at three locations along the project.
16) At end of day, collect samples of drag texture material prior to cleaning. Protect material for long-term storage to minimize moisture and material loss.

Post-Paving Activities

1) Conduct Demec readings twice daily—early morning, and mid-afternoon.
2) Download data from Temperature sensors and weather station periodically—minimum of once daily, preferably after the mid-afternoon Demec readings.
3) Conduct laboratory tests on concrete test specimens according to the elapsed time since casting.
4) Conduct silicone imprints of texture as materials and labor permit. Ideally, a minimum of one imprint per test unit.
5) Collect samples of worn tines. Note total length of pavement placed at this time.

Close-out Activities

1) Thoroughly document as-built stationing and site conditions.
2) Install permanent monuments for delineating test units, and document accordingly.
3) Install permanent hand-hole for temperature sensor lead protection.
4) Thoroughly conduct photographic documentation, still camera and video.
5) Cross check and pack equipment and leave site.

Proposed Test Unit Textures

Table A.9. Proposed texture configurations for Iowa Type 1

Day	Seq.	Sec. ID	Primary texture type	Texture spacing (in.)	Texture depth (in.)	Pre-texturing	Length (m)
1	1	008	Longitudinal tining	1	1/8	Burlap drag	200
1	2	101	Longitudinal tining	3/4	1/8	Burlap drag	750
2	1	004	Longitudinal tining	1/2	1/8	Burlap drag	200
2	2	009	Burlap drag	n/a	(Standard weight)	None	200
2	4	006	Longitudinal tining	3/4	1/8	None	200
2	3	005	Longitudinal tining	3/4	1/8	Burlap drag	200
2	5	007	Longitudinal tining	3/4	1/4	Burlap drag	200
Cross bridge							
3	4	204	Burlap drag	n/a	(Heavy weight)	None	200
3	2	001	Transverse tining	½	1/8	Burlap drag	200
3	3	304	Transverse tining	½	1/16	Burlap drag	200
3	1	002	Transverse tining	1	1/8	Burlap drag	200
3	5	003	Transverse tining	Random**	1/8	Burlap drag	200
4	1	010	Artificial turf drag	n/a	(Standard weight)	None	200
4	2	205	Artificial turf drag	n/a	(Heavy weight)	None	200
4	4	302	Longitudinal tining	3/4	1/16	Artificial turf drag	200
4	5	303	Longitudinal tining	3/4	1/8	Artificial turf drag	200
4	3	301	Longitudinal tining	3/4	1/16	Burlap drag	200

** Recommended tine spacing for "Random" spacing is per Wisconsin DOT Construction & Materials Manual, Chapter 5, Section 35, Subject 100:

"…tine spacing for a 10 foot (3.022 m) rake,

Tine Spacing (Center to Center of Tines, mm):

34	*36*	*47*	*54*	*48*	*43*	*32*	*31*	*27*	*36*	*29*	*46*
21	*43*	*23*	*42*	*52*	*24*	*18*	*28*	*40*	*34*	*27*	*26*
25	*27*	*20*	*37*	*38*	*52*	*51*	*45*	*37*	*43*	*53*	*14*
27	*37*	*42*	*41*	*29*	*43*	*14*	*45*	*44*	*30*	*37*	*33*
40	*28*	*31*	*50*	*34*	*45*	*15*	*20*	*45*	*50*	*16*	*53*
51	*29*	*25*	*18*	*16*	*53*	*18*	*38*	*51*	*40*	*17*	*15*
49	*50*	*39*	*51*	*36*	*36*	*38*	*46*	*29*	*38*	*50*	*24*

33"

Surface Characteristics Test Plan

Objective

The purpose of this section is to describe a test plan for surface characteristics and other related measurements. It includes identification of the specific test procedures, along with the recommended test frequency and schedule.

Overview

As part of the overall CPSC Program, sites termed Type 1, Type 2, and Type 3 have been identified for evaluation. The Type 1 and 2 sites include detailed testing for noise, texture, profile, friction, and (hardened) concrete properties. It is anticipated that each of the sites will be assessed annually to evaluate texture wear, and must therefore be well marked for repeat visits. Both maintenance and accident records for the sites should also be maintained to the greatest degree possible over the monitoring period. Type 3 sites are "inventory" type measurements where noise and texture will be evaluated, one time only.

Because of the need for detailed texture measurements, traffic control is a major consideration. All sites will require a closure of the test lane in order to conduct the required testing.

Data Collection Methods and Procedures

The following is a list of the data collection methods and procedures proposed for this effort. A brief description of the test and relevant standards and specifications is given here. Detailed test procedures are provided in other technical memoranda.

Noise

- **On-Board Sound Intensity (OBSI).** A near-field measurement technique that isolates and measures tire–pavement noise, the OBSI specification used on this project is based on procedures described by Dr. Paul Donavan (Illingworth & Rodkin). Additional consideration has been given to procedures and guidance found in General Motors GMN7079TP, ISO (Draft) 11819-2, and the OBSI specification under development by the FHWA Noise ETG.
- **In-vehicle noise.** Using a specification based on ISO 5128 and SAE J1477, this test includes sound measurements inside the test vehicle at two microphone locations—one in the rear passenger position, and another adjacent to the driver's head.
- **Time-averaged wayside noise.** Based on elements of ISO 11819-1 and the FHWA-PD-96-046 guidelines, this test measures noise wayside (at 50 ft. from the center of the test lane) with contributions from all vehicular sources. In this test, a continuous recording of the traffic stream will be made with simultaneous measures of vehicle classification, speed, and environmental conditions. The results are normalized for all of these factors.

- **Controlled Pass-By (CPB).** In this test, measurements of wayside noise will be made that isolate the noise generated by the test vehicle. The technique used for CPB will also adopt elements of the ISO 11819-1 and FHWA-PD-96-046 documents. However, unlike the time-averaged wayside testing, CPB will capture the specific event caused by only the test vehicle passing by.

Macrotexture

- **Robotic Texture (RoboTex) measurement system.** This procedure involves the use of a new piece of equipment built around the LMI-Selcom RoLine Line Laser. Mounted on a robotic chassis that is remotely controlled as it travels down the road, RoboTex is capable of measuring a continuous three-dimensional texture profile with transverse sampling of 100 to 118 pts over a ~100 mm line (~0.9 to 1.0 mm sample interval), and longitudinal sampling at 1000 Hz, which leads to a ~0.45 mm sample interval when traveling at ~ 1 mph. The results of the RoboTex can be used to calculate Mean Profile Depth per ASTM E 1845. However, since a three-dimensional profile is measured by RoboTex, numerous other metrics can be calculated.
- **Circular Track/Texture Meter (CTM).** Using equipment on loan from the FHWA for this project, CTM measurements of texture will be made at periodic locations along each test unit. Following ASTM E 2157, the CTM uses a spot laser mounted on a rotating arm of known length. The unit is placed on the pavement at the location(s) to measure. A computer is then triggered that rotates the arm and measures texture height for a complete revolution. The CTM is normally used at the same location(s) as the DFT testing (a friction measurement technique described herein). Mean Profile Depth (ASTM E 1845) is reported by the CTM software.
- **Sand patch.** This is the most commonly used technique for estimating pavement macrotexture. Following ASTM E 965, this technique will be used in this experiment for historical continuity. It may be dropped from the program, however, if the results are found to be accurately estimated using RoboTex data.
- **Laboratory texture measurements.** Where possible, cores should be extracted from the pavements under evaluation in order to run laboratory texture evaluations of the core tops. Using services donated by the FHWA Turner-Fairbank Highway Research Center laboratories, both X-ray Computed Tomography (XCT) and Projected Moiré Interferometry (PMI) will be used to assess a three-dimensional texture profile. Analysis techniques as described previously can then be used to characterize the texture.

Friction/Microtexture (Type 1 and 2 only)

- **Dynamic Friction Tester (DFT).** Following procedures described in ASTM E 1911, this technique employs a device similar in size to the CTM. The DFT consists of a “fly wheel” with three small rubber pads that spins up to a given speed, and is then lowered onto the pavement that has been covered with a regulated film of water. This technique is an indirect measure of microtexture via friction, and provides a full speed-friction relationship. This equipment, like the CTM, is on loan from FHWA.

- **Locked wheel friction trailer.** This technique is commonly used by the various State DOTs to measure pavement friction. This test is standardized under ASTM E 274. The project team will seek out donations of DOT services to measure friction using this device on the various test units. It will be further requested that a smooth test tire (ASTM E 524) be used to consider combined micro- and macrotexture effects. Finally, to better gauge speed effects on friction, it is recommended that testing be conducted during at least two unique speeds.

Profile/Megatexture (Type 1 and 2 only)

- **Inertial profiler.** Either a high-speed or a lightweight inertial profiler can be used on this project. However, it is preferred that a very high sampling and recording frequency be used to help assess megatexture and macrotexture. There is some concern that texture aliasing can occur as the result of using a point (spot) laser, particularly on longitudinal textures. If the line laser unit becomes available on the profilers, it should be used when possible. This will help to characterize the profile on pavements with longitudinal textures much better than a spot laser. The availability of inertial profilers is still under investigation.

Environment

- **Portable weather station.** On each project, numerous climatic variables will be monitored including ambient temperatures, humidity, wind (speed and duration), barometric pressure, and possibly solar radiation. These measurements will be used to correct noise measurements, and to estimate pavement behavior during testing.
- **Pavement temperature.** Temperatures of the concrete will be made to assess joint opening and to calibrate HIPERPAV, allowing for temperature gradient estimates for curling predictions. On some proposed sites, temperature gauges have already been installed, which can be read during the field visit. On others, small sensors (COMMAND Center iButton sensors) could be embedded into the surface of the concrete pavement and monitored during testing. Coupled with the ambient weather data and the FHWA HIPERPAV models, pavement temperature gradients can be accurately estimated.

Concrete (Type 1 and 2 only)

- **Conventional lab testing.** If cores of the concrete are made available to the project team, conventional concrete testing could be conducted using DOT or ISU laboratory facilities. This should include testing for strength, modulus, air, and/or aggregate tests.
- **Acoustical lab testing.** Facility and budget permitting, concrete samples could also be tested for acoustical absorptivity.

Sampling Objectives

Before a test plan can be detailed, it is important to review the objectives of the data analysis, which in turn reflect the overall objectives of the research program. Only through this process can the correct type and frequency of data be collected.

Categorized by surface characteristic type, the following sections identify the proposed data analysis techniques, including the various metrics that will be calculated. Accompanying this is the authors' commentary on how the data must be collected in order to accomplish these tasks.

Noise

- Sound pressure/intensity analysis
  - Total levels (A-weighted)
  - Spectral analysis (both narrow band and fractional-octave)
  - Presentation of results by means of a "trace" by station (distance), showing within-section and between-section noise variability
  - Psychoacoustic parameter assessment (as resources permit)

  Spatial referencing of noise data will be of paramount importance to this study. With the more thorough understanding of the noise-to-texture relationship being one of the more critical objectives of this study, measures must be taken to ensure accuracy in data synchronization between noise and texture. Triggering at section limits will therefore be critical, along with controls that minimize non-linear errors during data collection.

- Repeatability assessment

  To the greatest degree reasonably possible, variability in noise due to equipment and operator should be separated from that due to "natural" changes in texture and other material properties. Repeat measurements, which can be analyzed with various statistical techniques such as coherence and cross-correlation in order to determine the degree of repeatability, are therefore critical.

- Diurnal effects

  Changes in measured noise at various hours in the day and night have been previously noted. Differences may be attributable to joint behavior (opening and closing), environmental influences (e.g., changes in temperature or relative humidity), or other phenomena not yet identified or understood. In order to study these effects further, repeat measurements should be collected at various hours of the day and night.

- Speed effects

  Virtually all vehicle noise mechanisms are related to vehicle speed. As a result, some noise measurements should be collected at various vehicle speeds. Safety of the test operator(s) must be the highest priority when selecting test speeds for a given site.

- Joint contribution
  - Joint effects will be assessed by digitally removing joints from measured signal, and considering joint geometry at the time(s) of testing

  Measurements should be collected with sufficient precision so that joint effects can be analyzed. Furthermore, because joint behavior is dynamic as the pavement heats and cools, consideration should be given to seasonal effects as well as time of day (see "diurnal effects" above).

- Lateral position assessment
  - Pavement within and between wheel paths will be compared, collected as time and safety permit

  Texture of the pavement will tend to wear the most in the wheel paths. While winter maintenance activities and environmental-related wear may be a factor, the effect of wheel wear should be isolated to the greatest degree possible. Provided the evaluation can be done in a safe manner, measurements of noise should be made with the test vehicle "straddling" the wheel paths in addition to those measured with the test wheel within the wheel paths. Comparing these results may help better understand the texture wear effect and its effect on noise.

- Relationships of texture to noise
  - Synchronization of texture traces to noise traces.
  - Effects of texture dimension (spacing, width, depth, isotropy)
  - Effects of texture variability
- Synchronized analysis of OBSI, in-vehicle, and CPB noise measurements
- Comparison of CPB and time-averaged wayside test results (as resources permit)

  As previously noted, in order to conduct these various analyses, spatial referencing of the noise data must be ensured. Furthermore, a balance must be realized between the available resources for testing (including the availability of traffic control) with the number of repeat tests.

- Changes over time (Type 1 and 2 sites)

  Repeat measurements of noise over a period of months and years will require accurate surveying and recording of the test units. When feasible, numerous and redundant reference points should be identified and tied into critical points on the project, including the beginning and end of each test unit. If the permanency of *existing features as reference points appears in doubt, monuments should be constructed and documented.*

Macrotexture

- Texture analysis
  - Simple geometry (e.g., as-measured spacing and depth)
  - Spectral analysis
  - Bias and skew
  - Isotropy
  - Advanced texture metrics
  - Presentation of results by means of a “trace” by station (distance), showing within-section and between-section texture variability, particularly the depth.

  As with the noise measurements, it will be critical that texture measurements are carefully referenced along the test unit—both longitudinally and laterally. The technologies currently proposed for texture measurement are the state of the art. Measurement of a three-dimensional macrotexture profil,e as proposed here, will allow for comparisons of numerous texture metrics to noise. Consideration of the isotropy of the texture, for example, will be considered as a factor. Coincidence of the texture measurements to the tire contact patch is critical, however, for the comparisons to be valid.

- Repeatability assessment (within test methods)

  Because the scale of the texture being measured is approximately 1 to 20 mm, position control will be critical. It is not reasonable to expect perfect coincidence of measurements, though. Therefore, repeat measurements will be required in order to determine error due to operator and equipment.

- Reproducibility assessment (between different test methods)

  In this experiment, multiple techniques will be used to assess macrotexture. RoboTex, for example, will measure 3-D texture in a 4-inch wide continuous “swath” as it travels down the road. The CTM and sand patch are stationary measurements that require discrete locations to be selected. Testing of core tops in the laboratory will also require discrete samples to be identified for subsequent coring. Comparisons of all of these techniques will require not only adequate numbers of samples to draw statistically significant conclusions, but also careful control that the various texture measurements are in fact being made on the same sections of the pavement surface.

- Changes over time (Type 1 and 2 sites)

  Like the noise measurements, repeat measurements of texture will require a permanent record of the test units.

Profile/Megatexture (Type 1 and 2 only—resources permitting)

- Profile analysis:
  - Smoothness, IRI and simulated Profilograph Index
  - Megatexture
  - Macrotexture
  - Slab curvature
  - Presentation of results by means of a "trace" by station (distance), showing within-section and between-section profile and smoothness variability.

  In most cases, inertial profiling will provide a continuous trace of the pavement elevation. However, given the need for recognition of smaller texture wavelengths, a small sample and recording interval will be preferred. Furthermore, recognition of aliasing in the profile due to texture must be made. An improved tire-bridging filter should also be used as part of the data analysis. It is preferred, however, that this be done in post-processing, and not as an integral part of the data collection and filtering.

- Repeatability assessment

  Repeatability measures of pavement profiles will require multiple runs along the same nominal path. Triggering will also be critical, as will control of vehicle (lateral) position and speed in order to minimize non-linear errors. Cross-correlation techniques will be used to assess repeatability.

- Diurnal effects

  Concrete pavement slab shape will change from hour to hour. In order to assess this, measurements should be taken at various times of the day and night, if possible. Coupled with the environmental measurements, these diurnal effects will be better understood.

- Changes over time

  Pavement profiles are known to change with season due to a number of behavioral changes (joint opening, warping, swelling soils, frost heave, etc.). Changes in profile are also expected to occur under traffic. Measurements and comparison of profiles over time will require the same attention to section referencing as required of the other surface characteristics.

Friction/Microtexture (Type 1 and 2 only)

- Friction analysis:
  - Speed-friction relationships
  - International Friction Index (IFI)

- Presentation of results by means of a “trace” by station (distance), showing within-section and between-section friction variability

Pavement friction measurements will be made using two types of equipment. The first is the DFT, which is a discrete measurement technique that estimates the microtexture effect. Careful referencing of this technique will be required. It is commonly run at the same time/locations as the CTM, since the two measures can be coupled to calculate the IFI. The second type of measurement will be made with the ASTM E 274 locked wheel skid trailer. When possible, this equipment should be programmed to deliver the speed-friction relationship. Since this is a test done at speed, the results will be representative of a length of pavement. If possible, however, results should be reported that allow for an indication of friction within a given test unit. Furthermore, since this test may accelerate wear of the texture along the section, it should not be run until after all of the other testing is complete.

- Relationships of texture to friction.
  - Synchronization of texture traces to friction traces
  - Effects of texture dimension (e.g., spacing, width, depth, isotropy)
  - Effects of texture variability.

In the same way that noise and texture will be related in this study, so will friction and texture. Careful spatial referencing will be required in order to ensure that calibration and/or validation of this relationship can be accomplished.

- Reproducibility assessment (between different test methods)

When using the smooth tire (ASTM E 524), the locked wheel trailer will assess the effects of both macrotexture and microtexture. The DFT, however, is primarily a measure of microtexture, which is why it is commonly coupled with CTM data to consider the effect of macrotexture. Comparisons using IFI, for example, can be made between both skid trailer and DFT measurement techniques. In order to do so, however, adequate sampling of DFT data must be made to compare to the skid testing which is more representative of an “average” of the section.

- Changes over time

Friction is known to change over time along with the other surface characteristics. As previously mentioned, careful referencing must be made of the test units. However, consideration must also be made of the pavement surface condition during testing. For example, the time since the last rainfall event should be noted. Pavement surface temperature must also be noted along with other factors that may lead to variations in the friction measurements.

Test Frequency

The sites tentatively selected for Type 1, 2, and 3 testing can be found elsewhere in this plan. Type 2 sites include from 6 to 22 surface textures per project. Type 3 sites typically include one or two surface types, with some sites including up to 6 surfaces. Unless otherwise specified, all unique surface types on each project should be evaluated.

Table A.10 summarizes the testing proposed for the Type 1, 2, and 3 sites, including the traffic control requirements.

Table A.10. Test procedures and requirements for traffic control

Test procedure	Sample type	Type 1 and 2	Type 3	Traffic control[21]
Noise				
OBSI	Continuous	✓	✓	
In-vehicle	Continuous	✓	✓	
CPB[22]	Discrete	✓		
Texture				
RoboTex	Continuous	✓	✓	✓
CTM	Discrete	✓	✓	✓
Sand patch	Discrete	✓	✓	✓
Laboratory[23]	Discrete	✓		✓
Profile				
Inertial profiler	Continuous	✓		
Friction				
DFT	Discrete	✓		✓
Locked wheel trailer	Continuous[24]	✓		
Environmental				
Weather station	Continuous	✓	✓	
Pavement temperatures	Continuous	✓	✓	✓[25]
Laboratory				
Conventional	Discrete	✓		✓
Acoustical	Discrete	✓		✓

Since traffic control is being requested of the state DOT, it is important that the frequency of testing be held to the minimum necessary to accomplish the test objectives previously described. It is anticipated that one "day" of lane closure will be required for most sites with two to three textures that are no more than two miles in length.

[21] DOT donation for traffic control, profiling services, and locked wheel skid trailer testing.
[22] If traffic volumes are high and/or acoustical requirements cannot be met, CPB testing may not be possible.
[23] DOT donation of coring services.
[24] While continuous in recording, data are typically averaged over discrete lengths.
[25] Traffic control may be required if embedded sensors are installed.

Test Unit Definition

For each of the test sites, discrete test units will be defined based on the number of surface types. As the number of surface types on the site increases, a reduced number of test units per surface type are recommended. This is done in order to balance the resources available with the benefit gained from the additional data. A summary of these recommendations is given in Table A.11.

Table A.11. Number of test units

Number of surface types on the site	Number of test units per surface type	Number of test units on the site
1	10	10
2	5	10
3	4	12
4	3	12
5	2	10
6	2	12
7 +	2	2 × surface types

Guidelines for test unit length are also given herein in order to keep the testing practical while still allowing most sites to be evaluated within a single six-hour lane closure (two six-hour closures for most Type 1 and 2 sites). The length of each test unit will be determined based on the layout of the site including the length of each individual surface type.

For sites with six or fewer surface types, the length of any individual test unit should be no less than 200 ft. and no more than 300 ft. Furthermore, the total (combined) length of all test units on the site should be no more than 3000 ft. If the length of the test units is calculated to be less than the 200 ft. minimum, the number of test units shall be reduced to a number that would, when equally divided, be a minimum of 200 ft. For example, if the site has only a single surface type that is 900 ft. long, only four test units would be used, each with a length of 225 ft.

Recommended Testing Frequency

Table A.12 includes the testing frequency that is currently proposed per test unit for the Type 1, 2, and Type 3 sites. It should be noted that, while the number of test units subsequently defines the total number of discrete tests, those measurements that are “continuous” would be made over the entire length of all of the test units combined.

Table A.12. Test frequency per test unit

Test procedure	Type 1 and 2	Type 3
Noise		
OBSI	(4) runs, leading position, RWP, AM (1) run, leading position, LC[26], AM (4) run, trailing position, RWP, AM (1) run, trailing position, LC, AM (5) runs, leading position, RWP, PM (5) runs, trailing position, RWP, PM	(2) runs, leading position, RWP, AM (1) run, leading position, LC, AM (2) runs, trailing position, RWP, AM (1) run, trailing position, LC, AM (3) runs, leading position, RWP, PM (3) runs, trailing position, RWP, PM
In-vehicle	(5) runs, AM (5) runs, PM	(3) runs
CPB	(1) location per surface type, 50 ft. wayside, with (3) valid pass-bys	
Texture		
RoboTex	(4) runs, RWP (2) runs, LC	(3) runs, RWP (1) run, LC
CTM	(2) locations, RWP	(2) locations, RWP
Sand patch[27]	(1) location, RWP	(1) location, RWP
Profile		
Inertial profiler	(5) runs, RWP (5) runs, LC	
Friction		
DFT[28]	(2) locations, RWP	
Locked wheel trailer	(2) runs, RWP	
Environmental		
Weather station	Continuous	Continuous
Pavement temperatures	Continuous	Continuous
Concrete		
Core sample[29]	(1) intact core, RWP	

LC = Lane Center RWP = Right Wheel Path

[26] If LC cannot be tested safely, revert to a RWP for these test runs.
[27] Sand Patch testing should be done at the same location as CTM testing. If surface type has fewer than 4 test units, additional sand patch testing should be performed so that a minimum of 4 sand patch tests are conducted per surface type.
[28] Locations of DFT testing should coincide with CTM testing.
[29] Coring should be conducted at a separate time than the surface characteristics testing. However, the project team will mark the location as part of their visit. Core top will be removed (sawed) and used for texture measurements in the laboratory. Remaining concrete will be used for conventional and/or acoustical evaluation, depending on the laboratory availability.

Test Schedule

It is expected that every site on this project will be unique in its test schedule. Variables that will drive the schedule will include:

- Specific date and time of arrival and departure at the site—esp. with respect to weekend days and holidays
- Availability of traffic control with respect to overall test schedule at the site.
- Weather—esp. rain and snow that could contaminate the various surface characteristics measures
- Site layout—esp. number of test units, length of the test units, and proximity of test units to one another (i.e., adjacent or separated)

In order to understand the impact of the testing to both the project team and the DOT, however, “typical” test schedules are given herein.

Typical Type 1 and 2 Test Schedule

For Type 1 and 2 sites, testing by the project team during the site visits will include noise, texture, and friction measurements as described previously. In addition, donated services will be requested for locked wheel skid trailer testing, inertial profiling, and coring for samples used in subsequent laboratory services (which will be either requested of the DOT and/or conducted by the ISU laboratories).

Services not conducted by the project team can be performed simultaneously with the project team activities on the project, or preferably at a short time thereafter. The gap in time is recommended so that there is minimal interference of the project team with the DOT on the site. For example, the skid trailer testing will leave the surface wet, which can lead to erroneous texture and noise measurements. Coring can similarly lead to difficulties due to accumulation of the slurry.

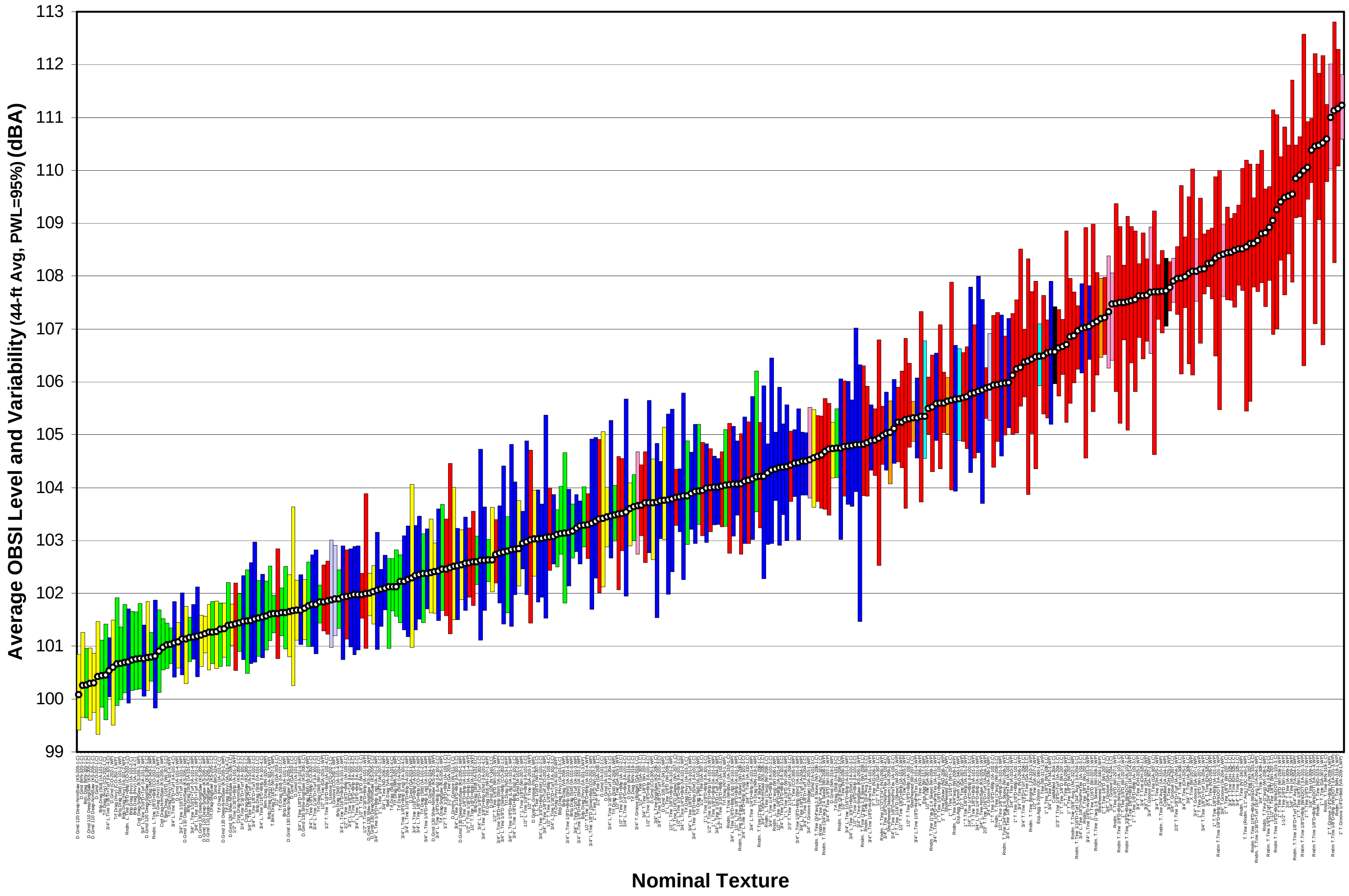
Typical Type 3 Test Schedule

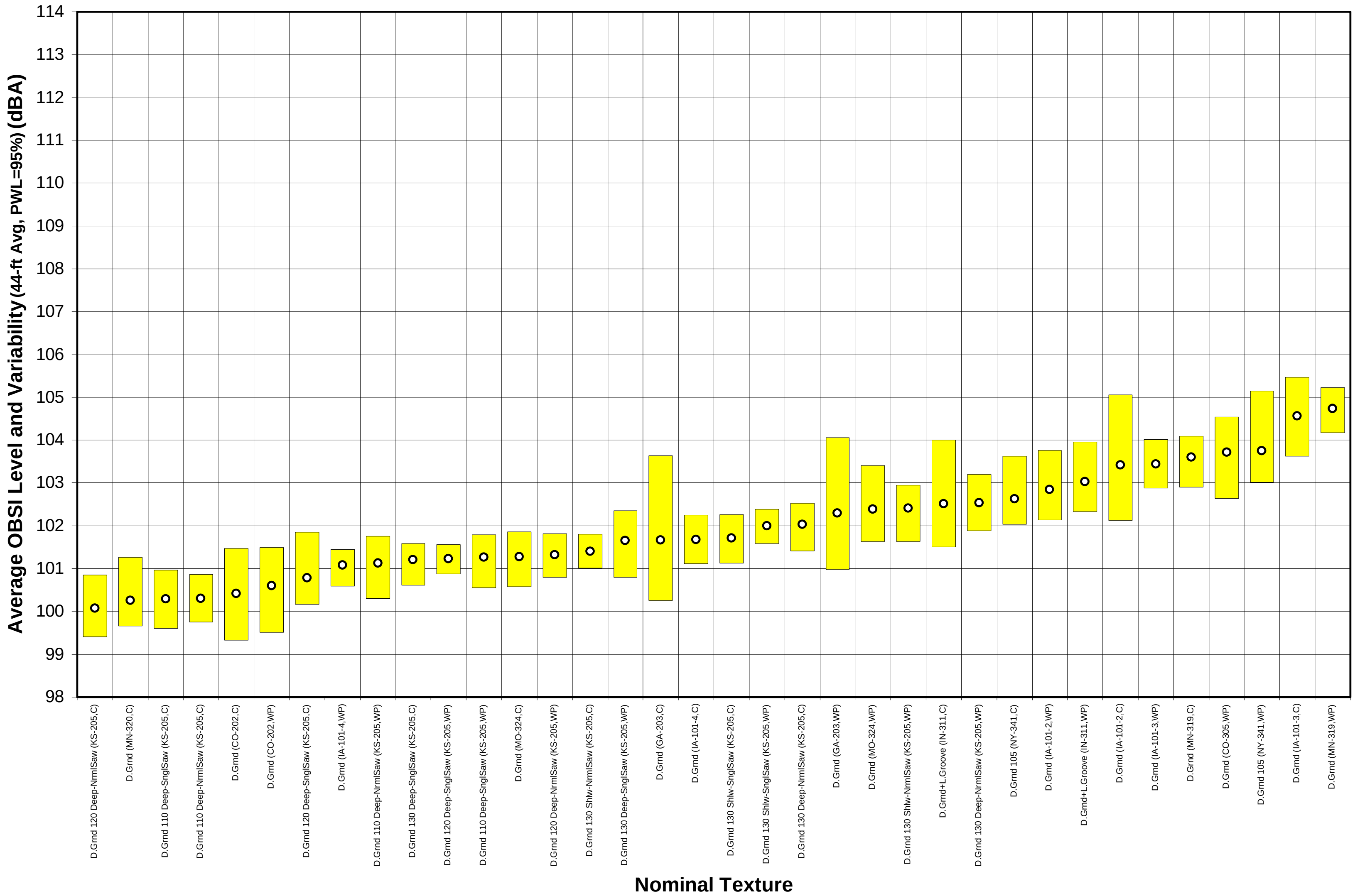
The Type 3 sites will include noise and texture measurements as described previously. Like the Type 1 and 2 sites, traffic control will be necessary in order to conduct the detailed test measurements. Furthermore, most of the Type 3 sites are one or two surface types, and a fewer number of test types will be run. The result is an accelerated schedule (compared to Type 2).

APPENDIX B. EXAMPLES OF DATA PRESENTATION

The extensive database collected during this project allows for a virtually infinite number of possible comparisons and analyses. In this appendix, select numbers and types of data are presented. The intent is to demonstrate the extent and diversity of the data that are available.

Data Presentation **Page**


Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
Nominal Texture



Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
114
113
112
111
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108
107
106
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104
103
102
101
100
99
98
D.Grnd 120 Deep-NrmlSaw (KS-205,C)
D.Grnd (MN-320,C)
D.Grnd 110 Deep-SnglSaw (KS-205,C)
D.Grnd 110 Deep-NrmlSaw (KS-205,C)
D.Grnd (CO-202,C)
D.Grnd (CO-202,WP)
D.Grnd 120 Deep-SnglSaw (KS-205,C)
D.Grnd (IA-101-4,WP)
D.Grnd 110 Deep-NrmlSaw (KS-205,WP)
D.Grnd 130 Deep-SnglSaw (KS-205,C)
D.Grnd 120 Deep-SnglSaw (KS-205,WP)
D.Grnd 110 Deep-SnglSaw (KS-205,WP)
D.Grnd (MO-324,C)
D.Grnd 120 Deep-NrmlSaw (KS-205,WP)
D.Grnd 130 Shlw-NrmlSaw (KS-205,C)
D.Grnd 130 Deep-SnglSaw (KS-205,WP)
D.Grnd (GA-203,C)
D.Grnd (IA-101-4,C)
D.Grnd 130 Shlw-SnglSaw (KS-205,C)
D.Grnd 130 Shlw-SnglSaw (KS-205,WP)
D.Grnd 130 Deep-NrmlSaw (KS-205,C)
D.Grnd (GA-203,WP)
D.Grnd (MO-324,WP)
D.Grnd 130 Shlw-NrmlSaw (KS-205,WP)
D.Grnd+L.Groove (IN-311,C)
D.Grnd 130 Deep-NrmlSaw (KS-205,WP)
D.Grnd 105 (NY-341,C)
D.Grnd (IA-101-2,WP)
D.Grnd+L.Groove (IN-311,WP)
D.Grnd (IA-101-2,C)
D.Grnd (IA-101-3,WP)
D.Grnd (MN-319,C)
D.Grnd (CO-305,WP)
D.Grnd 105 (NY-341,WP)
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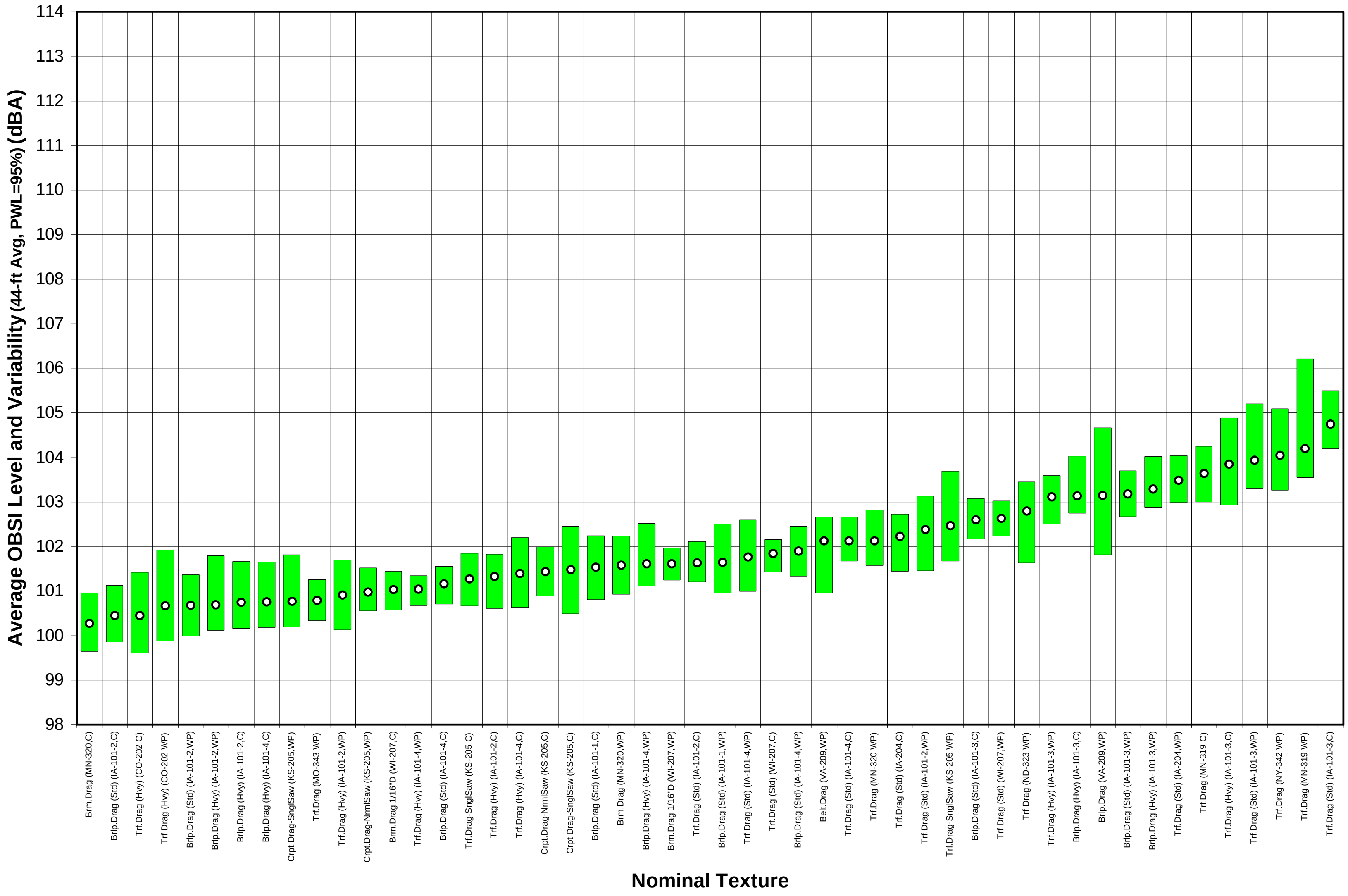
D.Grnd (MN-319,WP)
Nominal Texture


Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
114
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103
102
101
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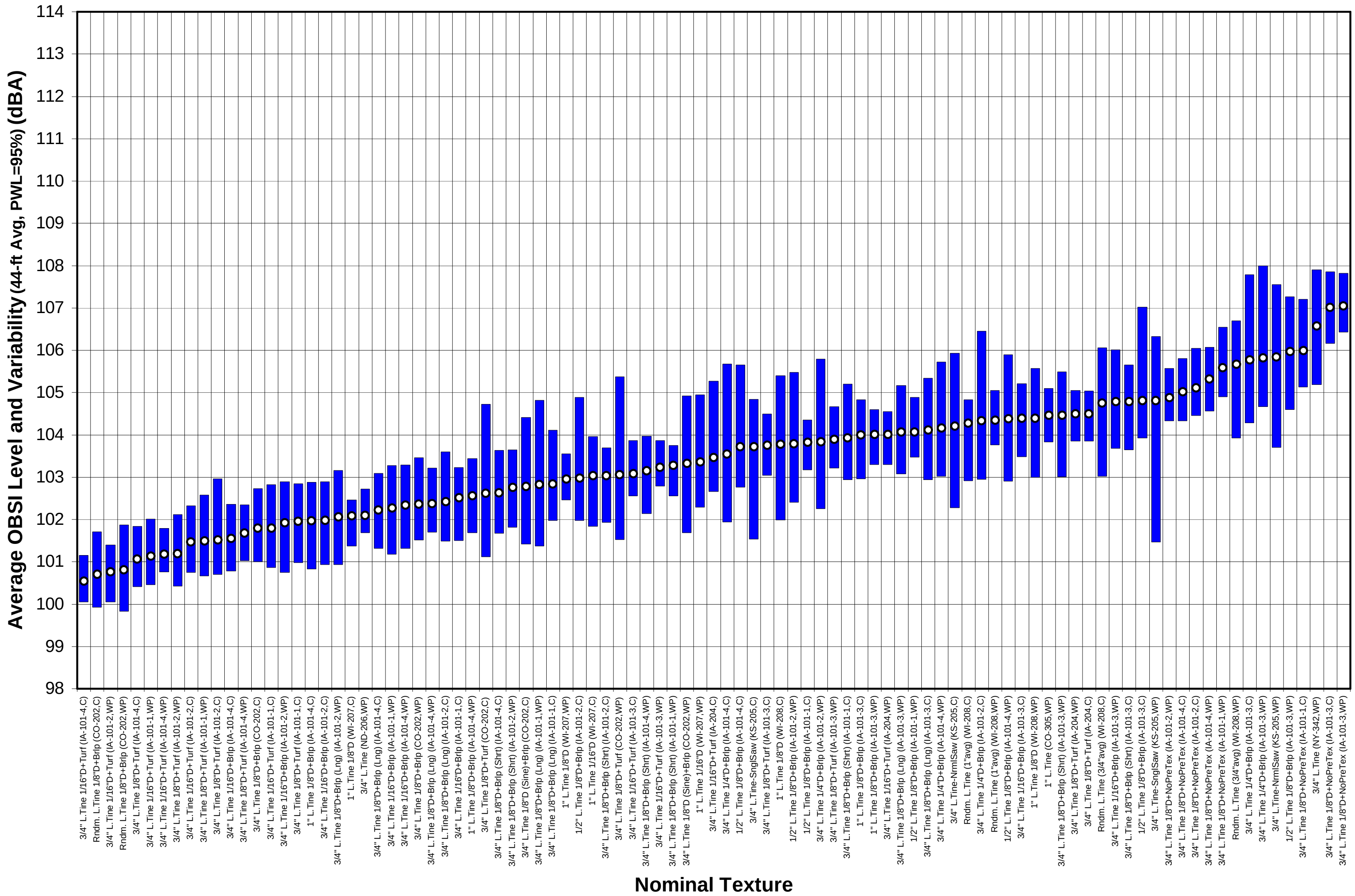
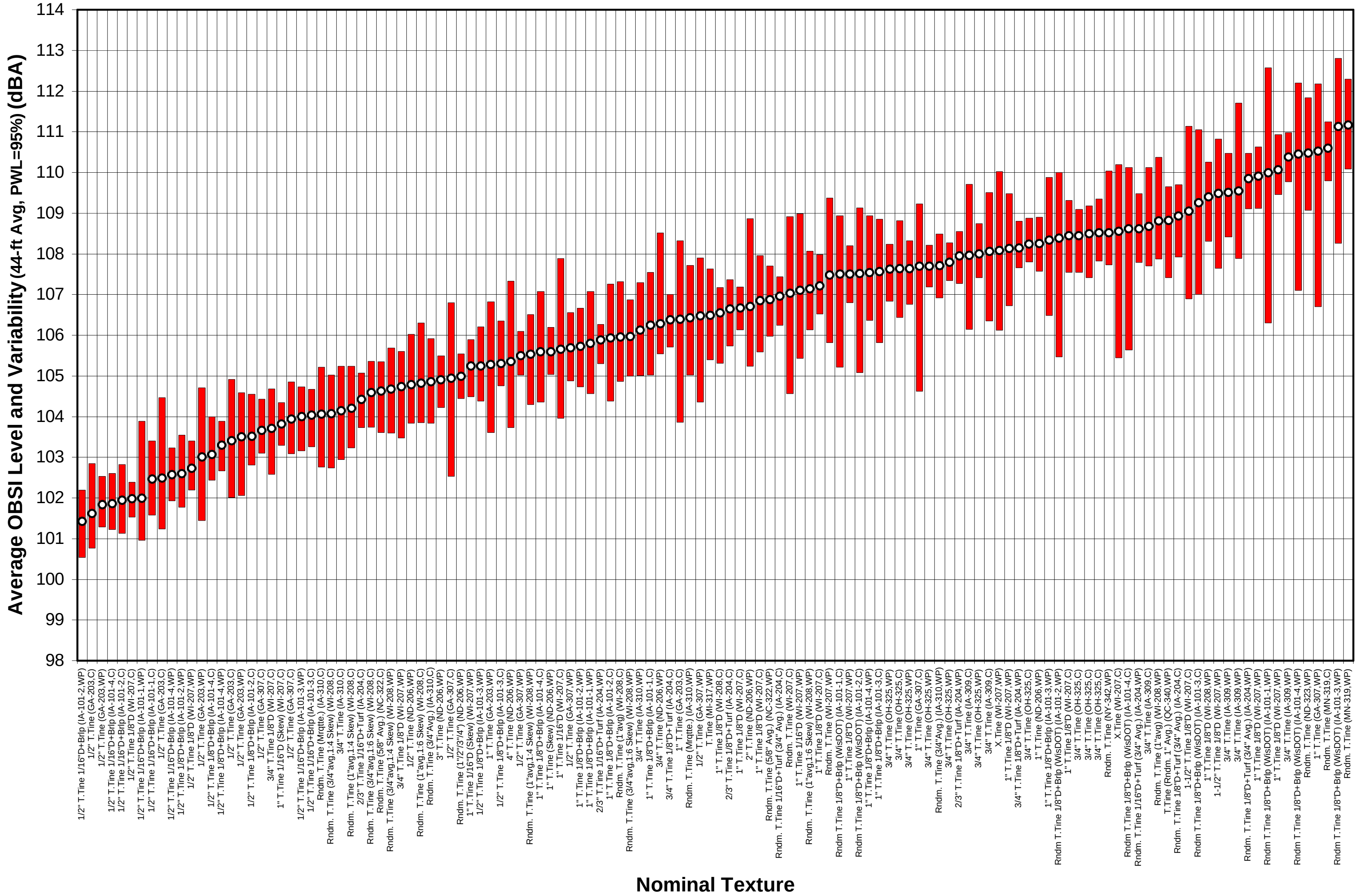
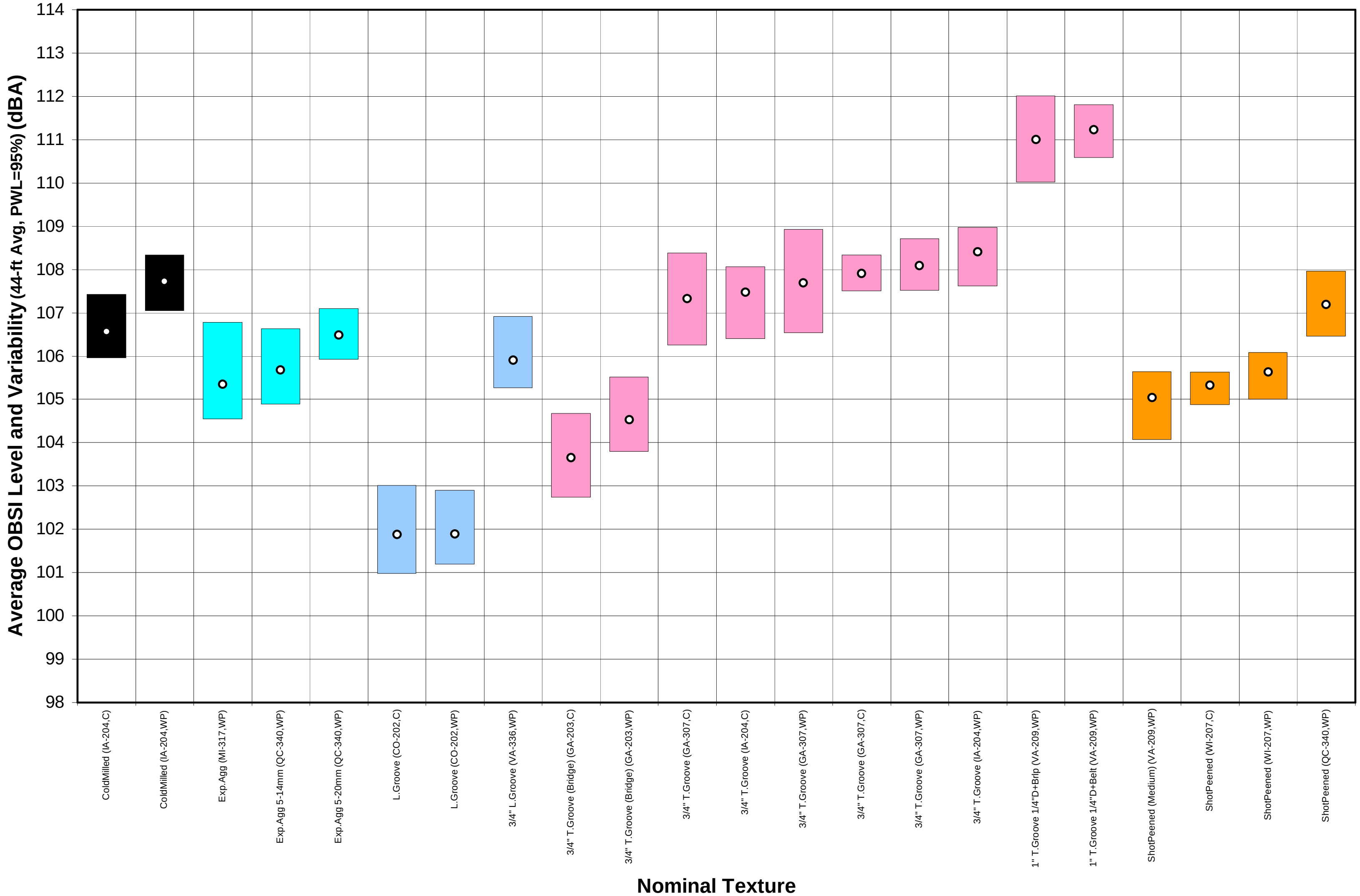
99
98
Brm.Drag (MN-320,C)
Brlp.Drag (Std) (IA-101-2,C)
Trf.Drag (Hvy) (CO-202,C)
Trf.Drag (Hvy) (CO-202,WP)
Brlp.Drag (Std) (IA-101-2,WP)
Brlp.Drag (Hvy) (IA-101-2,WP)
Brlp.Drag (Hvy) (IA-101-2,C)
Brlp.Drag (Hvy) (IA-101-4,C)
Crpt.Drag-SnglSaw (KS-205,WP)
Trf.Drag (MO-343,WP)
Trf.Drag (Hvy) (IA-101-2,WP)
Crpt.Drag-NrmlSaw (KS-205,WP)
Brm.Drag 1/16"D (WI-207,C)
Trf.Drag (Hvy) (IA-101-4,WP)
Brlp.Drag (Std) (IA-101-4,C)
Trf.Drag-SnglSaw (KS-205,C)
Trf.Drag (Hvy) (IA-101-2,C)
Trf.Drag (Hvy) (IA-101-4,C)
Crpt.Drag-NrmlSaw (KS-205,C)
Crpt.Drag-SnglSaw (KS-205,C)
Brlp.Drag (Std) (IA-101-1,C)
Brm.Drag (MN-320,WP)
Brlp.Drag (Hvy) (IA-101-4,WP)
Brm.Drag 1/16"D (WI-207,WP)
Trf.Drag (Std) (IA-101-2,C)
Brlp.Drag (Std) (IA-101-1,WP)
Trf.Drag (Std) (IA-101-4,WP)
Trf.Drag (Std) (WI-207,C)
Brlp.Drag (Std) (IA-101-4,WP)
Belt.Drag (VA-209,WP)
Trf.Drag (Std) (IA-101-4,C)
Trf.Drag (MN-320,WP)
Trf.Drag (Std) (IA-204,C)
Trf.Drag (Std) (IA-101-2,WP)
Trf.Drag-SnglSaw (KS-205,WP)
Brlp.Drag (Std) (IA-101-3,C)
Trf.Drag (Std) (WI-207,WP)
Trf.Drag (ND-323,WP)
Trf.Drag (Hvy) (IA-101-3,WP)
Brlp.Drag (Hvy) (IA-101-3,C)
Brlp.Drag (VA-209,WP)
Brlp.Drag (Std) (IA-101-3,WP)
Brlp.Drag (Hvy) (IA-101-3,WP)
Trf.Drag (Std) (IA-204,WP)
Trf.Drag (MN-319,C)
Trf.Drag (Hvy) (IA-101-3,C)
Trf.Drag (Std) (IA-101-3,WP)
Trf.Drag (NY-342,WP)
Trf.Drag (MN-319,WP)
Trf.Drag (Std) (IA-101-3,C)
Nominal Texture


Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
98
Nominal Texture


Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
98
Nominal Texture



Average OBSI Level and Variability (44-ft Avg, PWL=95%) (dBA)
114
113
112
111
110
109
108
107
106
105
104
103
102
101
100
99
98
ColdMilled (IA-204,C)
ColdMilled (IA-204,WP)
Exp.Agg (MI-317,WP)
Exp.Agg 5-14mm (QC-340,WP)
Exp.Agg 5-20mm (QC-340,WP)
L.Groove (CO-202,C)
L.Groove (CO-202,WP)
3/4" L.Groove (VA-336,WP)
3/4" T.Groove (Bridge) (GA-203,C)
3/4" T.Groove (Bridge) (GA-203,WP)
3/4" T.Groove (GA-307,C)
3/4" T.Groove (IA-204,C)
3/4" T.Groove (GA-307,WP)
3/4" T.Groove (GA-307,C)
3/4" T.Groove (GA-307,WP)
3/4" T.Groove (IA-204,WP)
1" T.Groove 1/4"D+Brlp (VA-209,WP)
1" T.Groove 1/4"D+Belt (VA-209,WP)
ShotPeened (Medium) (VA-209,WP)
ShotPeened (WI-207,C)
ShotPeened (WI-207,WP)
ShotPeened (QC-340,WP)
Nominal Texture

Site ID	Surf ID	ID	Primary Texture	Primary Texture Depth (Nominal) (in)	Primary Texture Spacing (Nominal) (in)	Primary Texture Width (Nominal) (in)	Secondary Texture	State	City	Route	Location	Dir.	Lane	Number of Sections	Total Test Section Length (ft)	Individual Test Section Lengths (ft)	Short Name	Texture Age at Testing (yr)	OBSI Date/Time AM	dBA Corr - AM	OBSI Date/Time PM	dBA Corr - PM
101-1	A	101-1A	Tining - Longitudinal	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	646	216,215,215	1" L.Tine 1/8"D+Brlp	0				
101-1	B	101-1B	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	5	1297	256,259,258,259,265	3/4" L.Tine 1/8"D+Brlp (Lng)	0	9/29/05 10:30 AM	0.08		
101-1	C	101-1C	Tining - Longitudinal	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	656	218,218,220	1/2" L.Tine 1/8"D+Brlp	0	9/29/05 10:30 AM	0.08		
101-1	D	101-1D	Drag - Burlap	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	221,220,211	Brlp.Drag (Std)	0	9/29/05 10:30 AM	0.08		
101-1	E	101-1E	Tining - Longitudinal	0.125	0.75	0.125	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	659	220,220,219	3/4" L.Tine 1/8"D+NoPreTex	0	9/29/05 10:30 AM	0.08		
101-1	F	101-1F	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	222,219,217	3/4" L.Tine 1/8"D+Brlp (Shrt)	0	9/29/05 10:30 AM	0.08		
101-1	G	101-1G	Tining - Longitudinal	0.25	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	221,220,217	3/4" L.Tine 1/4"D+Brlp	0				
101-1	H	101-1H	Drag - Burlap	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	657	222,222,213	Brlp.Drag (Hvy)	0				
101-1	I	101-1I	Tining - Transverse	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	674	222,222,230	1/2" T.Tine 1/8"D+Brlp	0				
101-1	J	101-1J	Tining - Transverse	0.0625	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	673	223,222,228	1/2" T.Tine 1/16"D+Brlp	0	9/29/05 12:15 PM	0.15		
101-1	K	101-1K	Tining - Transverse	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	218,217,217	1" T.Tine 1/8"D+Brlp	0	9/29/05 12:15 PM	0.15		
101-1	L	101-1L	Tining - Transverse	0.125	Random	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	660	218,219,223	Rndm T.Tine 1/8"D+Brlp (WisDOT)	0	9/29/05 12:15 PM	0.15		
101-1	M	101-1M	Drag - Turf	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	557	278,279	Trf.Drag (Std)	0				
101-1	N	101-1N	Diamond Grinding				n/a	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	1	169	169	D.Grnd	0				
101-1	O	101-1O	Drag - Turf	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	573	287,286	Trf.Drag (Hvy)	0				
101-1	P	101-1P	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	653	219,219,215	3/4" L.Tine 1/16"D+Turf	0	9/29/05 2:00 PM	0.20		
101-1	Q	101-1Q	Tining - Longitudinal	0.125	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	649	217,216,216	3/4" L.Tine 1/8"D+Turf	0	9/29/05 2:00 PM	0.20		
101-1	R	101-1R	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	654	218,219,217	3/4" L.Tine 1/16"D+Brlp	0	9/29/05 2:00 PM	0.20		
101-2	A	101-2A	Tining - Longitudinal	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	646	216,215,215	1" L.Tine 1/8"D+Brlp	0				
101-2	B	101-2B	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	5	1297	256,259,258,259,265	3/4" L.Tine 1/8"D+Brlp (Lng)	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	C	101-2C	Tining - Longitudinal	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	656	218,218,220	1/2" L.Tine 1/8"D+Brlp	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	D	101-2D	Drag - Burlap	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	221,220,211	Brlp.Drag (Std)	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	E	101-2E	Tining - Longitudinal	0.125	0.75	0.125	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	659	220,220,219	3/4" L.Tine 1/8"D+NoPreTex	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	F	101-2F	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	222,219,217	3/4" L.Tine 1/8"D+Brlp (Shrt)	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	G	101-2G	Tining - Longitudinal	0.25	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	221,220,217	3/4" L.Tine 1/4"D+Brlp	0	10/22/05 11:00 AM	0.05	10/22/05 2:45 PM	0.11
101-2	H	101-2H	Drag - Burlap	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	657	222,222,213	Brlp.Drag (Hvy)	0	11/8/05 8:45 AM	0.09	11/8/05 4:00 PM	0.32
101-2	I	101-2I	Tining - Transverse	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	674	222,222,230	1/2" T.Tine 1/8"D+Brlp	0	11/8/05 8:45 AM	0.09	11/8/05 4:00 PM	0.32
101-2	J	101-2J	Tining - Transverse	0.0625	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	673	223,222,228	1/2" T.Tine 1/16"D+Brlp	0	11/8/05 8:45 AM	0.09	11/8/05 4:00 PM	0.32
101-2	K	101-2K	Tining - Transverse	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	218,217,217	1" T.Tine 1/8"D+Brlp	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	L	101-2L	Tining - Transverse	0.125	Random	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	660	218,219,223	Rndm T.Tine 1/8"D+Brlp (WisDOT)	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	M	101-2M	Drag - Turf	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	557	278,279	Trf.Drag (Std)	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	N	101-2N	Diamond Grinding				n/a	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	1	169	169	D.Grnd	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	O	101-2O	Drag - Turf	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	573	287,286	Trf.Drag (Hvy)	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	P	101-2P	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	653	219,219,215	3/4" L.Tine 1/16"D+Turf	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	Q	101-2Q	Tining - Longitudinal	0.125	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	649	217,216,216	3/4" L.Tine 1/8"D+Turf	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-2	R	101-2R	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	654	218,219,217	3/4" L.Tine 1/16"D+Brlp	0	10/24/05 9:00 AM	-0.09	10/22/05 5:00 PM	0.10
101-3	A	101-3A	Tining - Longitudinal	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	646	216,215,215	1" L.Tine 1/8"D+Brlp	0	12/2/05 11:45 AM	-0.42		
101-3	B	101-3B	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	5	1297	256,259,258,259,265	3/4" L.Tine 1/8"D+Brlp (Lng)	0	12/2/05 11:45 AM	-0.42		
101-3	C	101-3C	Tining - Longitudinal	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	656	218,218,220	1/2" L.Tine 1/8"D+Brlp	0	12/2/05 11:45 AM	-0.42		
101-3	D	101-3D	Drag - Burlap	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	221,220,211	Brlp.Drag (Std)	0	12/2/05 11:45 AM	-0.42		
101-3	E	101-3E	Tining - Longitudinal	0.125	0.75	0.125	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	659	220,220,219	3/4" L.Tine 1/8"D+NoPreTex	0	12/2/05 11:45 AM	-0.42		
101-3	F	101-3F	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	222,219,217	3/4" L.Tine 1/8"D+Brlp (Shrt)	0	12/2/05 11:45 AM	-0.42		
101-3	G	101-3G	Tining - Longitudinal	0.25	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	221,220,217	3/4" L.Tine 1/4"D+Brlp	0	12/5/05 11:00 AM	-0.52		
101-3	H	101-3H	Drag - Burlap	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	657	222,222,213	Brlp.Drag (Hvy)	0	12/5/05 11:00 AM	-0.52		
101-3	I	101-3I	Tining - Transverse	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	674	222,222,230	1/2" T.Tine 1/8"D+Brlp	0	12/5/05 11:00 AM	-0.52		
101-3	J	101-3J	Tining - Transverse	0.0625	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	673	223,222,228	1/2" T.Tine 1/16"D+Brlp	0	12/5/05 11:00 AM	-0.52		
101-3	K	101-3K	Tining - Transverse	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	218,217,217	1" T.Tine 1/8"D+Brlp	0	12/5/05 11:00 AM	-0.52		
101-3	L	101-3L	Tining - Transverse	0.125	Random	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	660	218,219,223	Rndm T.Tine 1/8"D+Brlp (WisDOT)	0	12/5/05 11:00 AM	-0.52		
101-3	M	101-3M	Drag - Turf	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	557	278,279	Trf.Drag (Std)	0	12/5/05 2:15 PM	-0.46		
101-3	N	101-3N	Diamond Grinding				n/a	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	1	169	169	D.Grnd	0	12/5/05 2:15 PM	-0.46		
101-3	O	101-3O	Drag - Turf	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	573	287,286	Trf.Drag (Hvy)	0	12/5/05 2:15 PM	-0.46		
101-3	P	101-3P	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	653	219,219,215	3/4" L.Tine 1/16"D+Turf	0	12/5/05 2:15 PM	-0.46		
101-3	Q	101-3Q	Tining - Longitudinal	0.125	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	649	217,216,216	3/4" L.Tine 1/8"D+Turf	0	12/5/05 2:15 PM	-0.46		
101-3	R	101-3R	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	654	218,219,217	3/4" L.Tine 1/16"D+Brlp	0	12/5/05 2:15 PM	-0.46		
101-4	A	101-4A	Tining - Longitudinal	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	646	216,215,215	1" L.Tine 1/8"D+Brlp	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	B	101-4B	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	5	1297	256,259,258,259,265	3/4" L.Tine 1/8"D+Brlp (Lng)	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	C	101-4C	Tining - Longitudinal	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	656	218,218,220	1/2" L.Tine 1/8"D+Brlp	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	D	101-4D	Drag - Burlap	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	221,220,211	Brlp.Drag (Std)	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	E	101-4E	Tining - Longitudinal	0.125	0.75	0.125	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	659	220,220,219	3/4" L.Tine 1/8"D+NoPreTex	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	F	101-4F	Tining - Longitudinal	0.125	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	222,219,217	3/4" L.Tine 1/8"D+Brlp (Shrt)	0.4	4/19/06 12:30 PM	0.23	4/19/06 4:45 PM	0.32
101-4	G	101-4G	Tining - Longitudinal	0.25	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	658	221,220,217	3/4" L.Tine 1/4"D+Brlp	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	H	101-4H	Drag - Burlap	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	657	222,222,213	Brlp.Drag (Hvy)	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	I	101-4I	Tining - Transverse	0.125	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	674	222,222,230	1/2" T.Tine 1/8"D+Brlp	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	J	101-4J	Tining - Transverse	0.0625	0.5	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	673	223,222,228	1/2" T.Tine 1/16"D+Brlp	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	K	101-4K	Tining - Transverse	0.125	1	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	652	218,217,217	1" T.Tine 1/8"D+Brlp	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	L	101-4L	Tining - Transverse	0.125	Random	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	660	218,219,223	Rndm T.Tine 1/8"D+Brlp (WisDOT)	0.4	4/20/06 11:30 AM	0.19	4/20/06 2:30 PM	0.24
101-4	M	101-4M	Drag - Turf	Standard	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	557	278,279	Trf.Drag (Std)	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
101-4	N	101-4N	Diamond Grinding				n/a	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	1	169	169	D.Grnd	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
101-4	O	101-4O	Drag - Turf	Heavy	n/a	n/a	None	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	2	573	287,286	Trf.Drag (Hvy)	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
101-4	P	101-4P	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	653	219,219,215	3/4" L.Tine 1/16"D+Turf	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
101-4	Q	101-4Q	Tining - Longitudinal	0.125	0.75	0.125	Drag - Turf	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	649	217,216,216	3/4" L.Tine 1/8"D+Turf	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
101-4	R	101-4R	Tining - Longitudinal	0.0625	0.75	0.125	Drag - Burlap	IA	Le Grand	US 30	10 mi. East of Marshalltown	EB	Right	3	654	218,219,217	3/4" L.Tine 1/16"D+Brlp	0.4	4/21/06 10:15 AM	0.20	4/21/06 2:00 PM	0.29
202-1	A	202-1A	Tining - Longitudinal	0.125	0.75			CO	Berthoud	US 287	North of SH 56 T.I.	SB	Right	2	982	490,492	3/4" L.Tine 1/8"D+Brlp	0	8/29/05 9:45 AM	1.13	8/29/05 3:15 PM	1.37
202-1	B	202-1B	Drag - Turf	Heavy	n/a	n/a	None	CO	Berthoud	US 287	North of SH 56 T.I.	SB	Right	2	996	488,508	Trf.Drag (Hvy)	0	8/29/05 9:45 AM	1.13	8/29/05 3:15 PM	1.37
202-1	C	202-1C	Tining - Longitudinal	0.125	0.75		Drag - Turf	CO	Berthoud	US 287	North of SH 56 T.I.	SB	Right	2	991	492,499	3/4" L.Tine 1/8"D+Turf	0	8/29/05 9:45 AM	1.13	8/29/05 3:15 PM	1.37
202-1	D	202-1D	Tining - Longitudinal (Sinusoidal)	0.125	0.75			CO	Berthoud	US 287	North of SH 56 T.I.	SB	Right	2	990	498,492	3/4" L.Tine 1/8"D (Sine)+Brlp	0	8/29/05 9:45 AM	1.13	8/29/05 3:15 PM	1.37
202-1	E	202-1E	Tining - Longitudinal	0.125	Random			CO	Berthoud	US 287	North of SH 56 T.I.	SB	Right	2	979	480,499	Rndm. L.Tine 1/8"D+Brlp	0	8/29/05 9:45 AM	1.13	8/29/05 3:15 PM	1.37
202-1	F	202-1F	Grooving - Longitudinal		0.75			CO	Berthoud	US 287	North of CR 17 T.I.	NB	Right	2	799	401,398	L.Groove	0	8/29/05 11:15 AM	1.24	8/29/05 4:00 PM	1.37
202-1	G	202-1G	Diamond Grinding				n/a	CO	Berthoud	US 287	North of CR 17 T.I.	NB	Right	2	1004	503,501	D.Grnd	0	8/29/05 11:15 AM	1.24	8/29/05 4:00 PM	1.37
203-1	A	203-1A	Tining - Transverse		0.5			GA	Commerce	SR 15 / US 441	MP 4.2-9.2	NB	Right	2	397	198,199	1/2" T.Tine	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
203-1	B	203-1B	Tining - Transverse		0.5			GA	Commerce	SR 15 / US 441	MP 4.2-9.2	NB	Right	2	504	252,252	1/2" T.Tine	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
203-1	C	203-1C	Diamond Grinding				Tining - Transverse (1/2 in. spac.)	GA	Commerce	SR 15 / US 441	MP 4.2-9.2	NB	Right	2	602	251,351	D.Grnd	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
203-1	D	203-1D	Tining - Transverse		0.5			GA	Commerce	SR 15 / US 441	MP 4.2-9.2	SB	Right	2	489	244,245	1/2" T.Tine	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
203-1	E	203-1E	Grooving - Transverse		0.75			GA	Commerce	SR 15 / US 441	MP 4.2-9.2	SB	Right	2	491	245,246	3/4" T.Groove (Bridge)	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
203-1	F	203-1F	Tining - Transverse		1			GA	Commerce	SR 15 / US 441	MP 4.2-9.2	SB	Right	2	507	253,254	1" T.Tine	2	3/1/06 11:00 AM	0.27	3/1/06 4:30 PM	0.37
204-1	A	204-1A	Tining - Transverse	0.125	0.67			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	507	254,253	2/3" T.Tine 1/8"D+Turf	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	B	204-1B	Tining - Transverse	0.0625	0.67			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	505	253,252	2/3" T.Tine 1/16"D+Turf	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	C	204-1C	Tining - Longitudinal	0.0625	0.75			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	501	250,251	3/4" L.Tine 1/16"D+Turf	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	D	204-1D	Tining - Longitudinal	0.125	0.75			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	502	253,249	3/4" L.Tine 1/8"D+Turf	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	E	204-1E	Tining - Transverse	0.125	Random			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	510	254,256	Rndm. T.Tine 1/8"D+Turf (3/4" Avg.)	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	F	204-1F	Tining - Transverse	0.0625	Random			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	500	249,251	Rndm. T.Tine 1/16"D+Turf (3/4" Avg.)	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	G	204-1G	Drag - Turf	Standard	n/a	n/a	None	IA	Des Moines	SR 163	MP 14 to 12	WB	Right	1	304	304	Trf.Drag (Std)	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	H	204-1H	Tining - Transverse	0.125	0.75			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	2	504	252,252	3/4" T.Tine 1/8"D+Turf	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	I	204-1I	Grooving - Transverse		0.75			IA	Des Moines	SR 163	MP 14 to 12	WB	Right	1	174	174	3/4" T.Groove	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
204-1	J	204-1J	Cold Milling	Standard	n/a	n/a	n/a	IA	Des Moines	SR 163	MP 14 to 12	WB	Right	1	505	505	ColdMilled	12	10/7/05 11:30 AM	0.02	10/7/05 2:45 PM	0.07
205-1	A	205-1A	Drag - Turf	Standard	n/a	n/a	n/a	KS	Louisburg	US 69	Around MP 115 or 116	NB	Right	2	395	198,197	Trf.Drag-SnglSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	B	205-1B	Diamond Grinding	Deep (No Jacks)	0.11		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	398	199,199	D.Grnd 110 Deep-NrmlSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	C	205-1C	Diamond Grinding	Deep (No Jacks)	0.11		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	399	200,199	D.Grnd 110 Deep-SnglSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	D	205-1D	Diamond Grinding	Deep (No Jacks)	0.12		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	397	198,199	D.Grnd 120 Deep-NrmlSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	E	205-1E	Diamond Grinding	Deep (No Jacks)	0.12		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	400	200,200	D.Grnd 120 Deep-SnglSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	F	205-1F	Diamond Grinding	Shallow (Jacks)	0.13		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	397	199,198	D.Grnd 130 Shlw-NrmlSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	G	205-1G	Diamond Grinding	Shallow (Jacks)	0.13		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	393	197,196	D.Grnd 130 Shlw-SnglSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	H	205-1H	Diamond Grinding	Deep (No Jacks)	0.13		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	393	196,197	D.Grnd 130 Deep-NrmlSaw	1	11/3/05 12:30 PM	0.41	11/4/05 3:30 PM	0.44
205-1	I	205-1I	Diamond Grinding	Deep (No Jacks)	0.13		n/a	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	398	199,199	D.Grnd 130 Deep-SnglSaw	1	11/4/05 8:30 AM	0.21	11/3/05 3:30 PM	0.44
205-1	J	205-1J	Tining - Longitudinal		0.75			KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	403	202,201	3/4" L.Tine-NrmlSaw	1	11/4/05 8:30 AM	0.21	11/3/05 3:30 PM	0.44
205-1	K	205-1K	Tining - Longitudinal		0.75			KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	404	202,202	3/4" L.Tine-SnglSaw	1	11/4/05 8:30 AM	0.21	11/3/05 3:30 PM	0.44
205-1	L	205-1L	Drag - Carpet	Standard	n/a	n/a	None	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	403	202,201	Crpt.Drag-NrmlSaw	1	11/4/05 8:30 AM	0.21	11/3/05 3:30 PM	0.44
205-1	M	205-1M	Drag - Carpet	Standard	n/a	n/a	None	KS	Louisburg	US 69	Around MP 117 to 120	NB	Right	2	399	199,200	Crpt.Drag-SnglSaw	1	11/4/05 8:30 AM	0.21	11/3/05 3:30 PM	0.44

Site ID	Surf ID	ID	Primary Texture	Primary Texture Depth (Nominal) (in)	Primary Texture Spacing (Nominal) (in)	Primary Texture Width (Nominal) (in)	Secondary Texture	State	City	Route	Location	Dir.	Lane	Number of Sections	Total Test Section Length (ft)	Individual Test Section Lengths (ft)	Short Name	Texture Age at Testing (yr)	OBSI Date/Time AM	dBA Corr - AM	OBSI Date/Time PM	dBA Corr - PM
206-1	A	206-1A	Tining - Transverse (Skewed)		1			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	497	248,249	1" T.Tine (Skew)	11	9/4/05 12:00 PM	0.73	9/4/05 4:30 PM	0.72
206-1	B	206-1B	Tining - Transverse		0.75			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	495	251,244	3/4" T.Tine	11	9/4/05 12:00 PM	0.73	9/4/05 4:30 PM	0.72
206-1	C	206-1C	Tining - Transverse		2			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	501	250,251	2" T.Tine	11	9/4/05 12:00 PM	0.73	9/4/05 4:30 PM	0.72
206-1	D	206-1D	Tining - Transverse		3			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	503	252,251	3" T.Tine	11	9/4/05 12:00 PM	0.73	9/4/05 4:30 PM	0.72
206-1	E	206-1E	Tining - Transverse		4			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	502	253,249	4" T.Tine	11	9/4/05 12:00 PM	0.73	9/4/05 4:30 PM	0.72
206-1	F	206-1F	Tining - Transverse		Random			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	506	253,253	Rndm. T.Tine (1"/2"/3"/4")	11	9/8/05 10:30 AM	0.55	9/8/05 4:00 PM	0.83
206-1	G	206-1G	Tining - Transverse		0.5			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	506	252,254	1/2" T.Tine	11	9/8/05 10:30 AM	0.55	9/8/05 4:00 PM	0.83
206-1	H	206-1H	Tining - Longitudinal		0.75			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	503	252,251	3/4" L.Tine	11	9/8/05 10:30 AM	0.55	9/8/05 4:00 PM	0.83
206-1	I	206-1I	Tining - Transverse		1			ND	Glen Ullin	I-94	MP 107 to 111	WB	Right	2	518	257,261	1" T.Tine	11	9/8/05 10:30 AM	0.55	9/8/05 4:00 PM	0.83
207-1	A	207-1A	Drag - Turf	Standard	n/a	n/a	None	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	402	201,201	Trf.Drag (Std)	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	B	207-1B	Tining - Transverse	0.125	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	402	201,201	1" T.Tine 1/8"D	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	C	207-1C	Tining - Transverse	0.125	1.5		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	398	199,199	1-1/2" T.Tine 1/8"D	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	D	207-1D	Tining - Transverse & Longitudinal	0.125	6 (Tr) and 1 (Lg)		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	398	199,199	X.Tine	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	E	207-1E	Tining - Longitudinal	0.0625	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	398	199,199	1" L.Tine 1/16"D	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	F	207-1F	Tining - Longitudinal	0.125	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	399	200,199	1" L.Tine 1/8"D	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	G	207-1G	Tining - Transverse	0.125	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	410	204,206	1" T.Tine 1/8"D	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	H	207-1H	Tining - Transverse (Skewed)	0.0625	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	396	198,198	1" T.Tine 1/16"D (Skew)	12	5/10/06 10:45 AM	0.36	5/10/06 4:45 PM	0.39
207-1	I	207-1I	Tining - Transverse	0.125	0.5		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	397	198,199	1/2" T.Tine 1/8"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	J	207-1J	Tining - Transverse	0.125	0.75		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	399	200,199	3/4" T.Tine 1/8"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	K	207-1K	Tining - Transverse	0.125	Random		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	404	202,202	Rndm. T.Tine 1/8"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	L	207-1L	Drag - Plastic Broom (Transverse)	0.0625	n/a	0.125	Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	398	199,199	T.Brm.Drag 1/16"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	M	207-1M	Tining - Transverse	0.125	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	396	198,198	1" T.Tine 1/8"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	N	207-1N	Tining - Transverse	0.0625	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	396	198,198	1" T.Tine 1/16"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	O	207-1O	Tining - Transverse	0.125	1		Drag - Turf	WI	Thorp	SR 29	Between Thorp and Stanley	WB	Right	2	398	199,199	1" T.Tine 1/8"D	12	6/18/06 9:45 AM	0.52	6/18/06 2:45 PM	0.63
207-1	P	207-1P	Shot Peened	Standard	n/a	n/a	Drag - Turf	WI	Thorp	SR 29	3 mi. West of Stanley	WB	Right	2	399	200,199	ShotPeened	12	6/18/06 11:15 AM	0.56	6/18/06 4:00 PM	0.63
208-1	A	208-1A	Tining - Longitudinal	0.125	1		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	404	202,202	1" L.Tine 1/8"D	9	6/9/06 10:30 AM	0.25	6/9/06 4:15 PM	0.32
208-1	B	208-1B	Tining - Longitudinal	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	404	202,202	Rndm. L.Tine (3/4"avg)	9	6/9/06 10:30 AM	0.25	6/9/06 4:15 PM	0.32
208-1	C	208-1C	Tining - Longitudinal	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	404	202,202	Rndm. L.Tine (1"avg)	9	6/9/06 10:30 AM	0.25	6/9/06 4:15 PM	0.32
208-1	D	208-1D	Tining - Transverse (Skewed)	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	401	200,201	Rndm. T.Tine (3/4"avg,1:4 Skew)	9	6/9/06 10:30 AM	0.25	6/9/06 4:15 PM	0.32
208-1	E	208-1E	Tining - Transverse (Skewed)	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	404	202,202	Rndm. T.Tine (1"avg,1:4 Skew)	9	6/9/06 10:30 AM	0.25	6/9/06 4:15 PM	0.32
208-1	F	208-1F	Tining - Transverse (Skewed)	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	399	200,199	Rndm. T.Tine (3/4"avg,1:6 Skew)	9	6/11/06 10:30 AM	0.30	6/11/06 2:30 PM	0.34
208-1	G	208-1G	Tining - Transverse (Skewed)	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	402	201,201	Rndm. T.Tine (1"avg,1:6 Skew)	9	6/11/06 10:30 AM	0.30	6/11/06 2:30 PM	0.34
208-1	H	208-1H	Tining - Transverse	0.125	Random		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	400	200,200	Rndm. T.Tine (1"avg)	9	6/11/06 10:30 AM	0.30	6/11/06 2:30 PM	0.34
208-1	I	208-1I	Tining - Transverse	0.125	1		Drag - Turf	WI	Abbotsford	SR 29	West of Abbotsford	WB	Right	2	400	200,200	1" T.Tine 1/8"D	9	6/11/06 10:30 AM	0.30	6/11/06 2:30 PM	0.34
209-1	A	209-1A	Drag - Canvas Belt	Standard	n/a	n/a	None	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	352	352	Belt.Drag		5/25/06 2:45 PM	0.18		
209-1	B	209-1B	Grooving - Transverse	0.25	1	0.25	Drag - Canvas-Belt	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	354	354	1" T.Groove 1/4"D+Belt		5/25/06 2:45 PM	0.18		
209-1	C	209-1C	Grooving - Transverse	0.25	1	0.25	Drag - Burlap	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	354	354	1" T.Groove 1/4"D+Brlp		5/25/06 2:45 PM	0.18		
209-1	D	209-1D	Drag - Burlap	Standard	n/a	n/a	None	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	342	342	Brlp.Drag		5/25/06 2:45 PM	0.18		
209-1	E	209-1E	HMA - Small Agg	n/a		n/a	n/a	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	1005	1005	HMA (SmallAgg)		5/25/06 2:45 PM	0.18		
209-1	F	209-1F	HMA - Small Agg - Tr. Grooved	0.25	2	0.25	n/a	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	346	346	HMA (SmallAgg, 2" T.Groove)		5/25/06 2:45 PM	0.18		
209-1	G	209-1G	HMA - Small Agg - Tr. Grooved	0.25	1	0.25	n/a	VA	Wallops Island	R/W 4/22	Right of Center of Runway	SB	n/a	1	353	353	HMA (SmallAgg, 1" T.Groove)		5/25/06 2:45 PM	0.18		
209-1	H	209-1H	Shot Peened	Medium	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-6	SB	n/a	1	704	704	ShotPeened (Medium)	9	5/25/06 2:45 PM	0.18		
209-1	I	209-1I	HMA - Medium Agg?	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	Echo 1	SB	n/a	1	280	280	HMA (MedAgg)					
209-1	J	209-1J	HMA - Medium Agg?	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	Echo 2	SB	n/a	1	290	290	HMA (MedAgg)					
209-1	K	209-1K	HMA - Medium Agg?	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	Echo 3	SB	n/a	1	273	273	HMA (MedAgg)					
209-1	L	209-1L	HMA - Medium Agg?	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	Echo 4	SB	n/a	1	284	284	HMA (MedAgg)					
209-1	M	209-1M	Polycon Overlay w/o Sand	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	EK 1	SB	n/a	1	211	211	Surf.Treat (Polycon wo Sand)	3				
209-1	N	209-1N	Polycon Overlay w/ Sand	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	EK 2	SB	n/a	1	186	186	Surf.Treat (Polycon w Sand)	3				
209-1	O	209-1O	Polycon Overlay w/ Medium Grit	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	EK 3	SB	n/a	1	300	300	Surf.Treat (Polycon w MedGrit)	2				
209-1	P	209-1P	Polycon Overlay w/ Large Grit	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	EK 4	SB	n/a	1	285	285	Surf.Treat (Polycon w LrgGrit)	2				
209-1	Q	209-1Q	HMA - Medium Agg - Sandblasted/Rejuvasealed	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	RS 4	SB	n/a	1	293	293	HMA (MedAgg,Sandblast/Rejuv)					
209-1	R	209-1R	HMA - Medium Agg - Rejuvasealed	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	R 5	SB	n/a	1	296	296	HMA (MedAgg,Rejuv)					
209-1	S	209-1S	HMA - Medium Agg? - Sandblasted	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	LS 1	SB	n/a	1	299	299	HMA (MedAgg,Sandblast)					
209-1	T	209-1T	Crafco High Friction	n/a		n/a	n/a	VA	Wallops Island	T/W Echo	M 1	SB	n/a	1	290	290	Surf.Treat (Crafco HFS)					
209-1	U	209-1U	Shot Peened	Light	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-1	SB	n/a	1	200	200	ShotPeened (Light)	12				
209-1	V	209-1V	Shot Peened	Medium	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-5	SB	n/a	1	900	900	ShotPeened (Medium)	11				
209-1	W	209-1W	Shot Peened	Medium	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-2	SB	n/a	1	200	200	ShotPeened (Medium)	12				
209-1	X	209-1X	Shot Peened	High	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-3	SB	n/a	1	200	200	ShotPeened (High)	12				
209-1	Y	209-1Y	Shot Peened	Very High	n/a	n/a	n/a	VA	Wallops Island	R/W 4/22	S-4	SB	n/a	1	300	300	ShotPeened (Very High)	12				
305-1	A	305-1A	Tining - Longitudinal		1			CO	Lakewood	US 285	MP 243.4 to 246.2	EB	Right	5	1040	207,207,208,209,209	1" L.Tine	4	8/24/05 10:45 AM	1.57	8/24/05 2:45 PM	1.65
305-1	B	305-1B	Diamond Grinding				Tining - Transverse	CO	Lakewood	US 285	MP 243.4 to 246.2	EB	Right	5	1076	216,215,215,215,215	D.Grnd	3	8/24/05 10:45 AM	1.57	8/24/05 2:45 PM	1.65
307-1	A	307-1A	Tining - Transverse		1			GA	Lake City	I-675	Between MP 3.6-3.8	NB	Right	2	997	500,497	1" T.Tine	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
307-1	B	307-1B	Tining - Transverse		0.5			GA	Lake City	I-675	Between MP 3.8-4.1	NB	Right	2	505	252,253	1/2" T.Tine	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
307-1	C	307-1C	Grooving - Transverse		0.75			GA	Lake City	I-675	Between MP 4.1-4.2	NB	Right	1	203	203	3/4" T.Groove	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
307-1	D	307-1D	Tining - Transverse		0.5			GA	Lake City	I-675	Between MP 4.2-4.3	NB	Right	2	507	253,254	1/2" T.Tine	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
307-1	E	307-1E	Grooving - Transverse		0.75			GA	Lake City	I-675	Between MP 4.3-4.4	NB	Right	2	476	254,222	3/4" T.Groove	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
307-1	F	307-1F	Tining - Transverse		0.5			GA	Lake City	I-675	Between MP 4.4-6+	NB	Right	2	506	253,253	1/2" T.Tine	20	2/26/06 11:00 AM	-0.04	2/26/06 2:30 PM	0.04
309-1	A	309-1A	Tining - Transverse		0.75			IA	Des Moines	US 65	MP 82 to 83	NB	Right	2	509	254,255	3/4" T.Tine	11	10/7/05 8:30 AM	-0.11	10/6/05 4:15 PM	0.08
309-1	B	309-1B	Tining - Transverse		0.75			IA	Des Moines	US 65	MP 82 to 83	NB	Right	2	506	252,254	3/4" T.Tine	11	10/7/05 8:30 AM	-0.11	10/6/05 4:15 PM	0.08
309-1	C	309-1C	Tining - Transverse		0.75			IA	Des Moines	US 65	MP 82 to 83	NB	Right	2	508	254,254	3/4" T.Tine	11	10/7/05 8:30 AM	-0.11	10/6/05 4:15 PM	0.08
310-1	A	310-1A	Tining - Transverse		Random			IA	Cedar Rapids	US 30	MP 234 to 236	EB	Right	4	1007	253,252,251,251	Rndm. T.Tine (Mrqtte.)	6	10/9/05 10:30 AM	0.05	10/9/05 1:00 PM	0.10
310-1	B	310-1B	Tining - Transverse		Random			IA	Cedar Rapids	US 30	MP 234 to 236	EB	Right	4	1010	251,252,253,254	Rndm. T.Tine (3/4"Avg.)	6	10/9/05 10:30 AM	0.05	10/9/05 1:00 PM	0.10
310-1	C	310-1C	Tining - Transverse		0.75			IA	Cedar Rapids	US 30	MP 234 to 236	EB	Right	4	1016	254,254,254,254	3/4" T.Tine	6	10/9/05 10:30 AM	0.05	10/9/05 1:00 PM	0.10
311-1	A	311-1A	Diamond Grinding				Grooving - Longitudinal	IN	Marion	SR 18	I-69 to edge of Marion	WB	Right	10	2001	199,200,200,200,200,200,200,200,201,202	D.Grnd+L.Groove	2	3/23/06 9:45 AM	-0.10	3/23/06 2:30 PM	0.01
317-1	A	317-1A	Tining - Transverse		1			MI	Detroit	I-75	Warren Ave. Exit Ramp to Picquette Ave.	NB	Right	1	1323	1323	T.Tine	12	3/26/06 7:00 AM	-0.22		
317-1	B	317-1B	Exposed Aggregate		n/a	n/a	n/a	MI	Detroit	I-75	Warren Ave. Exit Ramp to Picquette Ave.	NB	Right	1	1321	1321	Exp.Agg	12	3/26/06 7:00 AM	-0.22		
319-1	A	319-1A	Diamond Grinding				n/a	MN	Minneapolis	I-694	MP 39 to 38	WB	Left	4	1005	251,251,251,252	D.Grnd	9	9/20/05 4:30 PM	0.52		
319-1	B	319-1B	Drag - Turf	Standard	n/a	n/a	n/a	MN	Minneapolis	I-694	MP 39 to 38	WB	Left	4	998	252,250,248,248	Trf.Drag	9	9/20/05 4:30 PM	0.52		
319-1	C	319-1C	Tining - Transverse		Random			MN	Minneapolis	I-694	MP 39 to 38	WB	Left	4	998	249,250,250,249	Rndm. T.Tine	9	9/20/05 4:30 PM	0.52		
320-1	A	320-1A	Drag - Turf	Standard	n/a	n/a	n/a	MN	Bird Island	US 212	Between MP 84 and 83	WB	Right	5	1005	202,201,201,201,200	Trf.Drag	3	9/23/05 9:30 AM	0.14	9/21/05 2:15 PM	0.66
320-1	B	320-1B	Diamond Grinding				n/a	MN	Bird Island	US 212	Between MP 84 and 83	WB	Right	5	1005	202,201,201,201,200	D.Grnd	3	9/23/05 9:30 AM	0.14	9/21/05 2:15 PM	0.66
320-1	C	320-1C	Drag - Broom	Standard	n/a	n/a	n/a	MN	Bird Island	US 212	Between MP 84 and 83	WB	Right	5	1002	200,200,200,201,201	Brm.Drag	3	9/23/05 9:30 AM	0.14	9/21/05 2:15 PM	0.66
322-1	A	322-1A	Tining - Transverse		Random			NC	Mt. Airy	I-77	MP 104.8	NB	Right	6	1187	198,198,197,197,198,199	Rndm. T.Tine (5/8" Avg.)	7	3/5/06 10:45 AM	0.11	3/5/06 2:45 PM	0.22
323-1	A	323-1A	Drag - Turf	Standard	n/a	n/a	n/a	ND	Valley City	I-94	Between MP 294 and 289	WB	Right	5	1013	201,202,203,203,204	Trf.Drag	5	9/12/05 9:30 AM	0.26	9/11/05 4:30 PM	0.63
323-1	B	323-1B	Tining - Transverse		Random			ND	Valley City	I-94	Between MP 294 and 289	WB	Right	5	999	200,200,199,200,200	Rndm. T.Tine	5	9/12/05 8:30 AM	0.22	9/11/05 6:45 PM	0.56
324-1	A	324-1A	Diamond Grinding					MO	Harrisonville	US-71	Between Rtes. 2 and 7	SB	Right	9	1804	199,198,199,199,201,202,202,202,202	D.Grnd	3	4/16/06 9:45 AM	0.42	4/16/06 2:30 PM	0.51
325-1	A	325-1A	Tining - Transverse		0.75			OH	Shadyside	SR 7	Begin MP 12.33	SB	Right	2	504	254,250	3/4" T.Tine	22	3/20/06 11:00 AM	-0.19	3/20/06 2:45 PM	-0.23
325-1	B	325-1B	Tining - Transverse		0.75			OH	Shadyside	SR 7	Begin MP 12.33	SB	Right	2	506	253,253	3/4" T.Tine	22	3/20/06 11:00 AM	-0.19	3/20/06 2:45 PM	-0.23
325-1	C	325-1C	Tining - Transverse		0.75			OH	Shadyside	SR 7	Begin MP 12.33	SB	Right	2	503	252,251	3/4" T.Tine	22	3/20/06 11:00 AM	-0.19	3/20/06 2:45 PM	-0.23
325-1	D	325-1D	Tining - Transverse		0.75			OH	Shadyside	SR 7	Begin MP 12.33	SB	Right	2	504	252,252	3/4" T.Tine	22	3/20/06 11:00 AM	-0.19	3/20/06 2:45 PM	-0.23
325-1	E	325-1E	Tining - Transverse		0.75			OH	Shadyside	SR 7	Begin MP 12.33	SB	Right	2	511	255,256	3/4" T.Tine	22	3/20/06 11:00 AM	-0.19	3/20/06 2:45 PM	-0.23
336-1	A	336-1A	Grooving - Longitudinal		0.75		Drag-Burlap	VA	Chesapeake	I-64	MP 295 to 299, High Rise Br. to Bowers Hill	EB	Right	5	994	200,200,198,198,198	3/4" L.Groove	14	3/9/06 11:00 AM	0.09	3/8/06 2:00 PM	-0.04
339-1	A	339-1A	HMA (AZ OGFC)	n/a		n/a	n/a	AL	Opelika	NCAT	Test Track, Section N-5	WB	Left	1	191	191	HMA (Thin AZ OGFC)	0.25	2/23/06 12:45 PM	0.19		
339-1	B	339-1B	HMA (AZ OGFC)	n/a		n/a	n/a	AL	Opelika	NCAT	Test Track, Section N-6	WB	Left	1	192	192	HMA (Thick AZ OGFC)	0.25	2/23/06 12:45 PM	0.19		
339-1	C	339-1C	HMA (AZ OGFC)	n/a		n/a	n/a	AL	Opelika	NCAT	Test Track, Section N-7	WB	Left	1	225	225	HMA (AZ OGFC on PEM)	0.25	2/23/06 12:45 PM	0.19		
339-1	D	339-1D	HMA (PEM)	n/a		n/a	n/a	AL	Opelika	NCAT	Test Track, Section N-8	WB	Left	1	203	203	HMA (Thick PEM)	0.25	2/23/06 12:45 PM	0.19		
339-1	E	339-1E	HMA (PEM)	n/a		n/a	n/a	AL	Opelika	NCAT	Test Track, Section N-9	WB	Left	1	200	200	HMA (Thin PEM)	0.25	2/23/06 12:45 PM	0.19		
340-1	A	340-1A	Exposed Aggregate	n/a	5-14 mm	n/a	n/a	QC	Montreal	Hwy. 40	E. of Blvd. Côte-Vertu	WB	Right	3	609	203,203,203	Exp.Agg 5-14mm	1.5	3/29/06 11:00 PM	-0.15		
340-1	B	340-1B	Tining - Transverse		Random		n/a	QC	Montreal	Hwy. 40	W. of Blvd. Côte-Vertu	WB	Right	2	403	202,201	T.Tine (Rndm. 1.1" Avg.)	1.5	3/29/06 11:00 PM	-0.15		
340-1	C	340-1C	Exposed Aggregate	n/a	5-20 mm	n/a	n/a	QC	Montreal	Hwy. 40	W. of Hwy 13 T.I.	WB	Right	3	611	204,204,203	Exp.Agg 5-20mm	1.5	3/29/06 11:00 PM	-0.15		
340-1	D	340-1D	Shot Peened	Standard	n/a	n/a	n/a	QC	Montreal	Hwy. 40	W. of Blvd. St. Charles	WB	Right	3	606	202,202,202	ShotPeened		3/30/06 1:00 AM	-0.18		
341-1	A	341-1A	Diamond Grinding		0.105			NY	Lakeville	I-390	3/4 mi. N of Lakeville Rd. (US 20A)	SB	Right	10	1983	199,198,199,199,198,198,199,198,197,198	D.Grnd 105	4	4/10/06 10:15 AM	0.00	4/10/06 2:30 PM	0.15
342-1	A	342-1A	Drag - Turf		n/a	n/a	n/a	NY	Lowman	I-86	0.35 mi. W. of Loman Xing	EB	Left	3	607	202,203,202	Trf.Drag		4/13/06 9:15 AM	0.20		
342-1	B	342-1B	Tining - Longitudinal	0.25	0.75			NY	Lowman	I-86	0.25 mi. W. of Loman Xing	EB	Left	3	603	201,201,201	3/4" L.Tine		4/13/06 9:15 AM	0.20		
342-1	C	342-1C	Tining - Transverse	0.1378	Random	0.1181		NY	Lowman	I-86	0.1 mi. E. of Loman Xing	EB	Left	3	604	201,201,202	Rndm. T.Tine		4/13/06 9:15 AM	0.20		
343-1	A	343-1A	Drag - Turf	Standard	n/a	n/a	n/a	MO	Cuba	I-44	1.3 mi. W. Hwy 19	WB	Right	10	2017	204,204,203,202,202,201,201,200,200,200	Trf.Drag	0.1	6/6/06 4:00 PM	0.52		

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		AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R	AM-R
		7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	44 ft. Avg
Site ID	Surf ID	Mean	StDev	Min	2.5%	5%	10%	90%	95%	97.5%	Max	Mean	StDev	Min	2.5%	5%	10%	90%	95%	97.5%	Max	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	95% PWL
101-1	A																																
101-1	B	102.82	1.11	99.76	100.73	101.05	101.31	103.88	104.26	104.65	111.60	102.84	0.78	101.27	101.38	101.49	101.58	103.55	104.23	104.82	105.04	88.07	88.85	96.05	98.29	93.69	94.76	90.29	85.41	81.33	78.18	75.00	3.44
101-1	C	104.06	0.95	101.86	102.14	102.42	102.72	105.21	105.55	105.91	106.34	104.07	0.43	103.36	103.48	103.50	103.54	104.73	104.83	104.89	104.95	89.72	90.82	98.25	99.61	95.28	94.36	89.39	84.98	81.96	79.42	76.16	1.41
101-1	D	101.63	0.98	99.54	100.04	100.20	100.45	102.74	103.20	103.69	106.60	101.60	0.40	100.85	100.95	101.08	101.16	102.36	102.44	102.51	102.60	87.58	86.60	94.30	97.05	91.26	94.75	89.92	84.45	80.91	77.87	75.08	1.55
101-1	E	105.59	0.91	102.02	103.44	103.98	104.32	106.47	106.78	107.06	110.07	105.64	0.36	104.62	104.90	105.11	105.20	106.04	106.32	106.54	106.63	90.96	91.72	98.74	101.23	96.50	97.13	93.18	87.72	83.74	80.85	77.63	1.65
101-1	F	103.27	0.86	100.65	101.46	101.66	102.07	104.20	104.50	104.77	106.91	103.27	0.34	102.45	102.56	102.61	102.75	103.64	103.71	103.75	103.82	89.10	89.78	97.16	98.99	94.14	93.79	89.11	84.71	81.73	78.98	75.89	1.19
101-1	G																																
101-1	H																																
101-1	I																																
101-1	J	101.99	1.13	99.65	99.96	100.20	100.62	103.16	103.67	104.16	110.28	101.98	0.67	100.91	100.96	101.02	101.10	102.50	103.77	103.89	104.07	88.29	88.88	95.46	97.15	94.37	92.64	88.37	83.74	79.94	76.86	75.09	2.93
101-1	K	105.79	1.05	102.91	103.61	103.97	104.32	107.02	107.45	107.76	109.32	105.78	0.69	104.39	104.56	104.69	104.76	106.73	106.97	107.08	107.17	87.77	88.70	96.28	103.76	96.07	94.58	90.54	84.97	80.47	77.53	74.99	2.51
101-1	L	109.99	2.55	102.49	104.01	104.65	105.79	112.69	113.56	113.93	115.64	110.16	1.48	105.14	106.31	106.96	107.83	111.32	112.16	112.58	112.77	95.38	96.54	103.85	105.54	102.36	100.16	95.10	88.44	82.34	78.96	76.60	6.27
101-1	M																																
101-1	N																																
101-1	O																																
101-1	P	101.13	0.74	99.28	99.78	99.94	100.16	102.05	102.43	102.66	103.64	101.15	0.31	100.39	100.46	100.69	100.83	101.49	101.90	102.01	102.12	86.59	87.17	94.75	96.87	92.19	92.09	87.38	82.43	79.31	76.92	74.00	1.56
101-1	Q	101.49	0.90	99.59	99.96	100.17	100.42	102.42	103.09	103.68	105.14	101.42	0.40	100.54	100.67	100.76	100.89	101.68	101.83	102.58	103.38	86.99	87.33	94.54	97.31	92.16	93.16	88.59	83.34	79.62	77.21	74.20	1.91
101-1	R	102.26	0.97	99.62	100.55	100.71	100.94	103.45	103.91	104.09	105.15	102.26	0.57	100.99	101.18	101.35	101.54	102.99	103.13	103.28	103.44	87.41	88.10	95.27	97.99	92.83	94.17	89.87	84.33	80.49	78.06	74.94	2.10
101-2	A																																
101-2	B	102.17	0.94	99.27	100.32	100.58	100.90	103.27	103.66	103.99	105.49	102.16	0.53	100.84	101.13	101.22	101.53	102.83	103.16	103.33	103.56	86.78	87.55	95.40	97.78	93.66	93.66	89.56	84.05	79.97	77.07	73.38	2.20
101-2	C	103.86	1.07	100.89	101.90	102.04	102.33	105.15	105.59	105.93	107.03	103.90	0.74	102.32	102.49	102.68	103.00	104.92	105.43	105.64	105.86	89.95	90.95	97.85	99.40	95.57	93.83	89.16	83.92	80.32	77.77	73.81	3.15
101-2	D	100.76	0.78	98.94	99.41	99.58	99.78	101.64	101.92	102.24	105.32	100.74	0.33	99.95	100.04	100.12	100.32	101.11	101.32	101.44	101.66	85.84	86.31	93.86	96.04	91.12	93.38	89.04	83.45	79.59	76.66	73.24	1.39
101-2	E	104.99	0.83	100.95	103.39	103.68	103.94	105.87	106.15	106.42	107.34	105.04	0.38	104.20	104.44	104.47	104.51	105.58	105.67	105.73	105.85	89.95	91.07	98.05	100.60	96.59	96.25	92.56	86.98	82.66	80.12	76.13	1.30
101-2	F	102.86	0.89	100.24	101.11	101.38	101.64	103.89	104.26	104.54	105.68	102.90	0.52	101.73	101.83	101.92	102.15	103.47	103.69	103.87	104.08	88.40	89.38	96.75	98.55	94.15	93.35	88.65	83.33	79.70	77.09	73.22	2.04
101-2	G	103.98	1.31	100.42	101.63	101.87	102.13	105.51	106.20	106.84	108.66	104.03	0.93	102.20	102.40	102.47	102.65	105.14	105.50	106.17	106.49	90.27	91.19	98.12	99.60	95.27	93.82	89.19	83.67	80.12	77.41	73.47	3.77
101-2	H	100.59	0.81	98.46	99.20	99.36	99.57	101.53	101.93	102.31	104.22	100.58	0.37	100.01	100.10	100.13	100.19	101.13	101.46	101.59	101.65	84.83	84.98	93.60	95.97	90.62	93.51	89.08	83.47	79.43	76.66	74.05	1.49
101-2	I	102.63	1.01	99.93	100.68	100.86	101.30	103.82	104.19	104.62	105.93	102.65	0.54	101.65	101.79	101.86	101.97	103.45	103.59	103.67	103.75	88.06	88.74	95.93	97.72	95.33	93.68	89.48	84.57	80.55	76.53	73.65	1.88
101-2	J	101.54	1.05	98.76	99.48	99.76	100.10	102.76	103.21	103.69	104.85	101.53	0.50	100.11	100.48	100.67	100.87	102.23	102.31	102.37	102.51	86.02	86.71	94.63	96.56	94.24	93.07	89.37	84.05	79.63	76.46	73.91	1.89
101-2	K	105.70	1.01	102.19	103.77	104.01	104.30	106.89	107.15	107.46	109.76	105.69	0.63	104.40	104.50	104.60	104.78	106.51	106.65	106.74	106.91	87.04	88.08	95.81	103.73	96.16	94.42	90.80	85.38	79.77	76.89	73.86	2.24
101-2	L	108.32	2.22	102.38	103.78	104.30	104.81	110.70	111.53	[illegible]	[illegible]	108.46	1.18	104.75	105.52	106.16	106.62	109.80	109.93	109.94	110.00	[illegible]	94.40	101.09	103.49	100.74	98.49	94.13	88.18	80.89	77.70	74.73	4.41
101-2	M	102.38	0.93	99.90	100.61	100.82	101.11	103.49	103.86	104.14	105.48	102.38	0.44	101.20	101.61	101.70	101.77	102.86	102.99	103.14	103.23	89.32	90.16	96.32	97.99	94.13	91.61	86.84	82.54	78.60	76.46	73.40	1.54
101-2	N	102.91	1.23	100.20	100.64	101.16	101.45	103.93	105.09	105.86	107.91	102.93	0.67	101.85	101.92	101.93	101.96	103.94	104.02	104.03	104.05	89.48	89.98	96.98	98.72	94.91	91.24	86.62	82.90	79.18	77.10	74.07	2.11
101-2	O	100.87	0.91	98.93	99.34	99.53	99.71	101.97	102.42	102.81	104.13	100.86	0.47	99.99	100.13	100.17	100.23	101.50	101.62	101.79	101.93	86.02	86.77	94.52	96.39	91.79	92.35	87.69	83.04	78.92	76.62	73.54	1.66
101-2	P	100.65	0.76	98.28	99.18	99.33	99.66	101.62	101.88	102.08	103.62	100.68	0.35	99.64	99.74	100.00	100.20	101.11	101.20	101.29	101.37	85.78	85.79	93.84	96.10	91.42	92.89	88.21	83.41	79.07	76.90	73.58	1.54
101-2	Q	101.04	0.93	98.90	99.38	99.60	99.83	102.06	102.65	103.37	104.65	100.98	0.38	99.72	100.26	100.42	100.58	101.30	101.53	101.99	102.87	85.69	86.41	93.89	96.57	91.54	93.58	88.99	84.00	79.47	77.18	74.07	1.73
101-2	R	101.74	0.97	99.31	99.90	100.17	100.44	102.98	103.30	103.55	104.35	101.74	0.60	100.41	100.57	100.73	100.86	102.43	102.49	102.58	102.73	86.47	87.22	94.95	97.18	92.36	93.90	89.87	84.59	79.75	77.39	74.21	2.01
101-3	A	104.00	0.73	101.90	102.65	102.82	103.03	104.93	105.28	105.59	106.10	103.99	0.40	103.19	103.30	103.34	103.37	104.49	104.56	104.60	104.73	87.22	89.72	96.95	98.88	95.48	96.11	93.62	88.93	82.91	79.78	74.95	1.30
101-3	B	104.06	0.91	101.70	102.43	102.60	102.82	105.11	105.55	105.97	107.06	104.03	0.54	102.87	103.08	103.16	103.32	104.63	104.85	105.16	106.02	87.12	89.67	96.58	98.85	95.52	96.51	94.09	89.45	83.42	80.09	75.27	2.08
101-3	C	105.96	1.01	103.17	103.95	104.16	104.48	107.16	107.45	107.64	108.22	105.98	0.67	104.52	104.60	104.71	104.94	106.66	107.14	107.27	107.45	89.95	92.78	99.17	100.99	98.17	97.05	94.55	89.67	83.50	80.36	75.24	2.67
101-3	D	103.18	0.73	101.12	101.84	102.04	102.20	103.96	104.29	104.51	106.93	103.14	0.27	102.60	102.67	102.71	102.82	103.57	103.63	103.69	103.78	85.90	88.55	96.14	97.76	93.52	96.16	93.36	88.68	82.70	79.49	75.21	1.03
101-3	E	107.04	0.92	103.22	105.14	105.48	105.84	108.06	108.35	108.76	111.14	107.09	0.43	106.23	106.42	106.45	106.53	107.64	107.69	107.82	108.10	90.08	93.36	99.41	102.13	98.86	98.67	96.96	92.31	85.78	82.58	77.66	1.40
101-3	F	104.46	0.98	101.35	102.46	102.71	103.05	105.60	105.87	106.13	107.00	104.48	0.70	102.92	103.01	103.08	103.37	105.24	105.40	105.49	105.58	87.76	90.66	97.31	99.67	95.90	96.28	93.68	88.69	82.85	79.75	75.09	2.49
101-3	G	105.82	1.17	103.22	103.87	104.05	104.33	107.23	108.02	108.43	109.51	105.86	0.81	104.54	104.66	104.74	104.79	106.67	107.44	107.99	108.37	89.70	92.66	99.25	100.66	97.26	97.55	94.81	89.75	83.24	80.83	75.66	3.33
101-3	H	103.29	0.70	101.12	102.05	102.29	102.47	104.10	104.46	104.86	106.69	103.27	0.25	102.69	102.87	102.91	102.98	103.52	103.60	104.01	104.06	86.02	87.81	96.77	97.49	93.09	96.83	93.30	88.52	82.31	80.11	75.50	1.14
101-3	I	105.23	0.90	103.13	103.65	103.77	103.98	106.43	106.77	107.06	107.86	105.24	0.46	104.26	104.38	104.50	104.62	105.84	106.03	106.21	106.28	89.06	91.15	97.64	99.56	97.74	97.66	94.93	90.50	84.44	80.96	76.14	1.83
101-3	J	104.00	0.85	101.70	102.61	102.77	102.91	105.05	105.48	106.02	106.84	103.99	0.36	102.97	103.16	103.28	103.49	104.35	104.59	104.74	104.91	86.95	89.13	96.71	97.92	96.45	96.61	94.23	89.79	82.98	80.44	76.00	1.57
101-3	K	108.33	1.39	105.12	105.55	105.82	106.23	109.79	110.25	110.61	112.58	108.34	1.12	106.42	106.49	106.56	106.67	109.46	109.64	109.88	109.94	88.06	90.22	97.86	106.34	98.20	97.58	95.21	90.87	83.46	80.51	75.86	3.39
101-3	L	111.12	2.16	104.70	106.32	106.90	107.60	113.55	114.07	114.43	115.39	111.26	1.23	107.69	108.26	108.59	109.10	112.45	112.69	112.81	113.00	95.17	97.17	103.48	106.69	103.81	102.05	99.16	95.02	85.59	81.71	76.61	4.55
101-3	M	103.93	0.99	101.33	102.11	102.35	102.56	105.27	105.53	105.83	106.38	103.88	0.44	103.21	103.30	103.34	103.44	104.35	105.07	105.20	105.29	86.60	89.56	97.03	98.62	95.44	96.26	93.48	88.84	82.69	80.08	75.56	1.89
101-3	N	103.45	0.69	101.74	101.94	102.16	102.46	104.22	104.50	104.67	104.97	103.38	0.31	102.84	102.88	102.89	102.97	103.79	103.95	104.01	104.05	84.80	88.78	96.23	98.18	96.32	95.25	92.36	87.94	82.15	80.25	76.27	1.13
101-3	O	103.11	0.69	101.01	101.90	102.03	102.26	103.90	104.27	104.60	105.57	103.10	0.28	102.33	102.50	102.65	102.77	103.45	103.55	103.58	103.63	85.22	87.98	96.06	97.57	94.44	96.08	92.93	88.24	82.33	79.76	75.37	1.08
101-3	P	103.23	0.70	101.61	102.09	102.18	102.35	104.14	104.46	104.82	106.12	103.25	0.28	102.74	102.79	102.83	102.89	103.66	103.73	103.87	103.99	84.80	87.73	95.94	97.88	94.31	96.33	93.21	88.52	82.40	79.94	75.55	1.08
101-3	Q	103.89	0.82	101.84	102.42	102.62	102.88	104.73	105.27	106.00	107.25	103.83	0.34	102.97	103.21	103.28	103.43	104.07	104.16	104.67	105.59	85.54	88.19	96.32	98.38	94.43	97.54	94.15	89.48	83.23	80.66	76.24	1.46
101-3	R	104.78	1.03	102.18	102.76	103.06	103.37	106.02	106.41	106.81	107.58	104.77	0.71	103.54	103.68	103.72	103.89	105.54	105.76	106.01	106.13	87.11	89.73	97.07	99.87	95.96	97.32	94.83	90.19	83.50	80.85	76.19	2.33
101-4	A	102.42	0.86	100.15	100.76	100.94	101.20	103.39	103.71	104.10	105.10	102.41	0.48	101.45	101.53	101.63	101.72	103.03	103.17	103.23	103.30	85.94	86.32	94.33	97.62	93.88	95.46	91.54	86.96	82.41	79.71	75.77	1.70
101-4	B	102.27	0.82	100.26	100.81	100.98	101.20	103.24	103.66	103.96	105.30	102.29	0.41	101.47	101.56	101.64	101.73	102.85	102.95	103.03	103.38	85.75	86.37	93.94	97.18	93.71	95.56	91.92	87.59	82.61	79.90	75.92	1.48
101-4	C	104.28	1.14	101.13	101.94	102.13	102.70	105.63	106.07	106.30	107.56	104.31	0.72	102.80	102.88	103.01	103.20	105.13	105.60	105.79	106.08	89.54	90.14	97.27	99.54	96.42	95.64	92.04	87.75	83.24	80.47	76.35	2.90
101-4	D	101.80	0.74	99.82	100.44	100.59	100.83	102.65	102.90	103.27	105.78	101.78	0.27	101.11	101.29	101.35	101.42	102.10	102.15	102.17	102.65	87.31	86.26	93.39	96.97	92.08	95.12	91.58	86.86	82.30	79.47	75.53	0.89
101-4	E	105.17	0.91	101.87	103.27	103.52	103.92	106.31	106.58	106.81	107.33	105.20	0.45	104.17	104.28	104.40	104.53	105.81	105.85	105.89	105.98	89.95	90.22	97.15	100.62	97.04	97.03	94.20	89.56	84.59	81.95	77.74	1.61
101-4	F	102.98	0.93	100.50	101.20	101.40	101.69	104.15	104.39	104.57	105.96	102.97	0.58	101.81	101.87	101.91	101.97	103.61	103.71	103.75	103.87	86.99	88.51	95.65	98.14	94.49	95.17	91.81	87.35	83.14	80.49	76.24	1.88
101-4	G	104.38	1.15	101.54	102.25	102.55	102.85	105.73	106.31	106.77	108.03	104.40	0.69	103.03	103.38	103.50	103.63	105.21	105.65	106.27	106.70	88.41	89.54	97.41	99.84	95.75	96.14	92.62	87.91	83.78	80.54	76.78	2.89
101-4	H	101.98	0.83	99.26	100.46	100.74	101.00	102.97	103.40	103.70	106.27	101.95	0.36	101.40	101.47	101.54	101.59	102.55	102.75	102.84	103.00	86.44	85.71	94.90	97.05	92.59	94.75	90.96	86.81	82.69	79.48	76.22	1.38
101-4	I	103.54	0.83	101.13	101.94	102.23	102.44	104.55	104.95	105.33	106.42	103.55	0.36	102.73	102.82	102.89	102.98	103.96	104.03	104.06	104.10	87.00	87.54	95.06	98.16	96.37	96.05	93.47	88.60	85.02	81.18	77.40	1.24
101-4	J	102.76	0.89	100.80	101.28	101.44	101.62	103.87	104.41	104.63	107.84	102.75	0.37	101.84	101.96	102.07	102.26	103.25	103.41	103.49	103.59	85.71	86.13	94.42	97.03	95.15	95.60	93.51	88.58	84.15	80.89	77.38	1.53
101-4	K	107.74	1.19	104.62	105.36	105.65	106.12	109.18	109.56	110.20	111.44	107.77	0.74	106.55	106.68	106.78	106.91	108.90	109.11	109.19	109.29	86.44	87.06	94.94	106.24	96.83	96.63	94.36	89.17	83.99	80.48	77.06	2.51
101-4	L	110.49	2.28	103.65	105.21	105.79	106.60	112.84	113.56	114.25	114.94	110.64	1.33	106.36	107.14	107.63	108.42	111.78	111.97	112.11	112.48	94.43	95.82	102.49	106.32	103.23	101.89	97.67	92.61	85.68	81.27	77.78	4.97
101-4	M	101.75	1.03	99.17	99.86	99.99	100.39	103.00	103.47	104.01	105.11	101.69	0.40	100.72	100.81	100.98	101.19	102.10	102.46	102.71	102.94	84.44	85.71	93.96	97.21	92.36	94.56	91.07	86.48	82.07	78.78	75.53	1.90
101-4	N	100.98	0.67	99.14	99.64	99.85	100.08	101.72	101.95	102.31	102.83	100.93	0.30	100.38	100.40	100.45	100.55	101.32	101.41	101.46	101.49	83.34	84.95	93.28	96.38	93.03	93.17	89.44	84.93	81.31	78.71	75.86	1.06
101-4	O	100.94	0.71	99.50	99.81	99.93	100.08	101.84	102.37	102.68	103.19	100.94	0.18	100.43	100.50	100.53	100.64	101.19	101.24	101.26	101.28	83.27	84.74	92.73	96.16	91.34	94.45	90.50	85.68	81.73	78.64	75.34	0.76
101-4	P	101.20	0.77	99.47	99.88	100.01	100.20	102.08	102.50	102.98	104.17	101.22	0.32	100.57	100.70	100.74	100.81	101.61	101.81	101.95	102.07	83.18	84.37	92.58	96.53	91.20	95.00	91.03	86.01	82.03	78.98	75.80	1.25
101-4	Q	101.63	0.84	99.53	100.15	100.32	100.60	102.57	103.10	103.52	104.71	101.58	0.34	100.74	100.91	100.98	101.18	101.98	102.21	102.33	102.99	83.86	84.99	93.17	96.78	91.83	95.36	91.60	86.70	82.37	79.37	76.17	1.42
101-4	R	102.32	0.98	99.74	100.40	100.70	100.96	103.54	103.90	104.23	105.09	102.32	0.63	101.11	101.23	101.27	101.39	103.04	103.11	103.19	103.26	84.66	86.12	93.96	97.58	93.23	95.42	92.27	87.42	82.93	79.65	76.40	1.96
202-1	A	102.99	1.09	99.87	100.89	101.19	101.51	104.29	104.71	105.05	107.30	102.99	0.68	101.65	101.95	102.00	102.10	103.81	104.01	104.44	104.60	88.98	90.00	97.55	98.84	93.80	91.87	87.24	82.92	79.34	75.83	72.34	2.49
202-1	B	101.29	0.95	98.89	99.60	99.84	100.05	102.29	102.80	103.33	107.14	101.30	0.51	100.38	100.51	100.58	100.66	101.99	102.36	102.67	102.97	86.86	87.59	95.52	97.11	92.16	91.14	86.70	82.20	78.62	75.30	71.98	2.16
202-1	C	103.75	1.32	100.62	101.28	101.65	101.99	105.25	105.83	106.41	108.35	103.76	0.90	102.03	102.20	102.32	102.60	104.84	105.22	105.92	106.15	89.16	90.91	98.27	99.56	94.59	93.00	88.21	83.46	79.56	76.03	72.40	3.72
202-1	D	104.28	1.28	100.25	101.72	102.09	102.51	105.72	106.27	106.58	108.19	104.30	0.86	102.18	102.48	102.65	103.00	105.20	105.38	106.00	106.38	90.22	91.69	98.87	100.11	95.54	92.55	87.65	83.15	79.20	75.67	71.99	3.52
202-1	E	101.43	0.98	98.38	99.60	99.79	100.11	102.63	102.94	103.36	104.99	101.45	0.56	100.14	100.29	100.46	100.73	102.12	102.29	102.45	102.76	86.65	87.08	95.34	97.04	92.36	92.46	88.07	83.12	79.38	76.06	72.73	2.15
202-1	F	102.16	0.87	99.26	100.41	100.71	101.04	103.16	103.46	103.87	105.62	102.17	0.39	101.25	101.50	101.54	101.65	102.60	102.89	103.08	103.41	88.00	88.76	96.74	98.23	92.67	90.76	86.24	81.77	78.35	75.28	71.45	1.59
202-1	G	100.85	0.91	98.39	99.10	99.25	99.55	101.90	102.29	102.65	104.08	100.84	0.55	99.59	99.72	99.79	100.02	101.49	101.65	101.72	101.88	87.28	87.66	95.00	96.85	92.01	89.38	85.54	81.80	78.34	75.15	72.05	2.00
203-1	A	101.47	1.19	98.80	99.61	99.77	100.00	103.11	103.73	104.08	105.52	101.51	0.38	100.67	100.94	101.00	101.06	102.06	102.10	102.13	102.17	84.72	84.37	92.04	96.48	93.73	94.42	91.70	86.89	82.80	79.59	76.66	1.19
203-1	B	102.61	1.54	99.63	99.99	100.27	100.50	104.63	105.02	105.36	107.41	102.63	1.02	101.00	101.13	101.20	101.32	103.91	104.33	104.51	104.62	86.70	86.71	93.91	97.66	95.27	95.01	92.17	87.39	83.04	79.68	76.38	3.38
203-1	C	101.98	1.68	98.67	99.17	99.38	99.62	104.04	104.63	105.02	105.94	102.01	0.98	100.39	100.63	100.78	100.91	103.26	103.42	103.84	104.05	87.26	86.34	93.33	97.20	94.52	94.20	90.99	86.31	82.65	79.99	76.80	3.21
203-1	D	103.35	1.26	100.37	100.76	101.05	101.50	104.80	105.21	105.54	106.75	103.31	0.81	101.59	101.65	101.72	101.80	104.13	104.51	104.58	104.70	85.99	87.54	94.93	98.12	96.68	95.57	92.60	87.85	83.98	80.46	76.90	2.92
203-1	E	104.15	1.09	101.87	102.62	102.75	102.98	104.85	105.37	107.12	110.56	104.19	0.51	103.38	103.43	103.51	103.55	104.92	105.05	105.15	105.29	84.72	86.15	94.23	97.79	96.13	100.17	90.89	87.16	84.26	79.54	76.39	1.72
203-1	F	105.29	1.67	100.79	101.77	102.18	102.73	107.02	107.75	108.02	111.16	105.32	1.03	102.87	103.32	103.59	103.92	106.58	106.74	106.87	106.98	86.88	87.39	95.34	102.35	97.01	95.72	93.54	88.68	84.04	81.04	77.81	3.55
204-1	A	107.82	0.89	105.63	106.02	106.26	106.57	108.88	109.18	109.57	110.01	107.85	0.36	107.11	107.16	107.21	107.29	108.33	108.42	108.44	108.54	89.27	91.59	100.88	102.59	100.26	101.00	94.69	90.29	86.10	82.55	79.49	1.28
204-1	B	105.81	0.73	103.36	104.30	104.59	104.84	106.72	106.91	107.09	108.11	105.84	0.32	105.10	105.14	105.18	105.28	106.16	106.20	106.23	106.27	87.35	89.23	98.40	100.06	97.10	100.34	93.65	89.25	85.32	82.46	79.44	1.08
204-1	C	103.81	0.93	101.66	102.27	102.33	102.59	104.88	105.52	105.92	106.86	103.78	0.41	102.93	102.99	103.08	103.28	104.32	104.38	104.40	104.44	87.12	88.14	96.45	98.98	94.38	97.07	92.34	87.42	84.07	81.26	78.15	1.41
204-1	D	104.43	0.91	102.15	102.76	103.02	103.29	105.59	105.96	106.36	108.08	104.44	0.32	103.58	103.65	103.73	104.00	104.80	104.89	104.93	105.14	87.82	89.61	97.58	99.77	95.06	97.01	92.45	87.60	84.31	81.41	77.79	1.28
204-1	E	109.61	0.88	106.63	107.61	107.89	108.38	110.57	110.80	111.04	111.92	109.61	0.30	108.91	108.95	109.04	109.16	109.95	110.08	110.11	110.31	94.69	95.11	103.36	104.45	101.95	101.31	96.36	91.43	86.17	82.56	79.38	1.16
204-1	F	108.43	0.86	105.72	106.53	106.91	107.24	109.35	109.73	110.00	111.02	108.42	0.40	107.40	107.61	107.73	107.93	108.92	109.09	109.15	109.19	91.14	92.94	102.05	103.36	100.23	100.84	95.88	91.42	86.38	82.69	79.83	1.54
204-1	G	103.25	0.82	101.58	101.86	102.06	102.29	104.21	104.72	105.32	106.30	103.26	0.26	102.60	102.69	102.85	102.92	103.66	103.76	103.79	103.84	85.94	87.15	94.82	98.29	93.18	97.17	93.09	88.00	84.52	81.75	78.73	1.10
204-1	H	107.92	0.70	105.45	106.58	106.81	107.01	108.76	109.02	109.18	109.97	107.94	0.29	107.24	107.47	107.54	107.61	108.33	108.36	108.42	108.46	89.34	92.16	100.38	102.30	102.16	99.90	95.39	90.86	85.97	82.54	79.58	0.95
204-1	I	108.11	0.92	105.65	105.80	106.47	106.89	109.14	109.31	109.44	109.56	108.24	0.39	107.12	107.22	107.28	107.68	108.63	108.65	108.67	108.70	91.50	91.86	100.45	102.59	101.87	100.34	96.09	91.78	87.01	83.28	80.35	1.45
204-1	J	107.45	0.99	105.26	105.76	105.87	106.14	108.65	109.32	109.64	111.02	107.47	0.34	106.65	106.74	106.89	107.00	107.87	107.99	108.10	108.23	93.95	94.73	101.07	102.45	99.12	98.58	94.37	89.73	85.97	82.86	79.74	1.36
205-1	A	102.39	1.29	99.11	99.97	100.30	100.69	104.17	104.58	104.90	105.92	102.45	0.59	101.37	101.47	101.52	101.79	103.40	103.62	103.67	103.76	86.23	87.26	94.70	98.26	94.59	93.81	90.04	84.49	80.04	77.36	74.39	2.20
205-1	B	101.12	1.38	98.94	99.16	99.30	99.51	102.97	103.85	104.46	106.74	101.09	0.40	100.26	100.29	100.32	100.41	101.58	101.66	101.71	101.84	82.87	84.84	94.23	96.80	93.52	92.17	88.16	84.16	80.63	78.29	75.44	1.42
205-1	C	101.04	1.26	98.51	98.89	99.07	99.50	102.61	103.37	104.28	105.85	101.01	0.39	100.22	100.28	100.34	100.43	101.49	101.53	101.58	101.79	82.99	84.45	93.79	96.70	93.65	92.17	88.50	84.17	80.48	78.47	75.52	1.30
205-1	D	101.22	0.67	99.50	99.94	100.13	100.25	102.03	102.26	102.45	103.47	101.24	0.26	100.68	100.77	100.78	100.91	101.62	101.65	101.67	101.73	83.69	85.14	93.53	96.84	94.24	92.36	88.60	84.39	80.79	78.72	75.73	0.91
205-1	E	101.16	0.62	99.55	99.94	100.13	100.37	101.96	102.15	102.35	103.06	101.19	0.24	100.59	100.73	100.81	100.86	101.49	101.53	101.55	101.59	84.05	85.34	93.21	96.91	94.22	92.11	88.45	84.37	80.82	78.76	75.72	0.82
205-1	F	102.31	1.12	100.21	100.59	100.76	101.00	103.78	104.50	105.00	106.51	102.29	0.33	101.67	101.73	101.75	101.79	102.69	102.76	102.82	103.13	85.77	87.12	95.12	98.16	95.44	92.04	88.46	84.60	81.00	78.80	75.82	1.09
205-1	G	101.97	0.62	100.14	100.68	100.91	101.10	102.67	102.93	103.14	103.91	101.94	0.18	101.56	101.62	101.64	101.69	102.19	102.24	102.28	102.37	85.48	86.88	94.48	97.64	95.38	92.01	88.61	84.82	81.05	78.95	75.92	0.66
205-1	H	102.62	1.06	100.14	100.83	101.08	101.29	103.99	104.61	105.00	106.44	102.60	0.38	101.87	101.90	102.01	102.14	103.22	103.27	103.31	103.50	85.48	87.14	95.98	98.30	95.80	92.17	88.41	84.73	80.74	78.53	75.65	1.41
205-1	I	101.79	0.87	99.73	100.06	100.17	100.45	102.89	103.11	103.23	104.13	101.77	0.49	100.67	100.83	100.89	101.02	102.33	102.60	102.62	102.67	87.08	86.91	94.83	97.41	94.15	92.43	88.28	84.74	81.07	79.31	76.43	1.79
205-1	J	105.82	1.54	101.56	102.65	102.96	103.49	107.60	107.88	108.16	108.63	105.84	1.25	103.51	103.65	103.74	103.85	107.43	107.48	107.52	107.61	91.97	92.60	99.91	101.35	97.82	95.42	90.55	86.18	82.55	79.98	76.21	3.87
205-1	K	104.85	1.66	100.23	100.68	101.22	101.86	106.33	106.78	107.12	108.05	104.89	1.27	101.37	101.44	101.64	102.40	105.96	106.33	106.38	106.50	91.09	91.58	98.48	100.51	96.49	95.04	90.72	85.98	82.39	79.76	76.08	4.94
205-1	L	100.64	1.02	98.50	99.02	99.20	99.42	102.12	102.56	102.93	104.09	100.62	0.25	100.19	100.26	100.28	100.31	100.85	101.07	101.34	101.50	85.80	84.84	92.65	96.35	91.13	93.38	89.14	84.16	80.20	77.72	75.26	1.08
205-1	M	100.64	1.05	98.32	99.12	99.35	99.54	101.69	102.29	103.49	105.91	100.67	0.40	100.07	100.14	100.17	100.20	101.32	101.58	101.71	101.91	85.30	84.64	93.05	96.34	91.27	93.09	89.13	83.89	80.34	78.00	75.42	1.58

Site ID	Surf ID	AM-R 7 ft. Avg. Mean	AM-R 7 ft. Avg. StDev	AM-R 7 ft. Avg. Min	AM-R 7 ft. Avg. 2.5%	AM-R 7 ft. Avg. 5%	AM-R 7 ft. Avg. 10%	AM-R 7 ft. Avg. 90%	AM-R 7 ft. Avg. 95%	AM-R 7 ft. Avg. 97.5%	AM-R 7 ft. Avg. Max	AM-R 44 ft. Avg. Mean	AM-R 44 ft. Avg. StDev	AM-R 44 ft. Avg. Min	AM-R 44 ft. Avg. 2.5%	AM-R 44 ft. Avg. 5%	AM-R 44 ft. Avg. 10%	AM-R 44 ft. Avg. 90%	AM-R 44 ft. Avg. 95%	AM-R 44 ft. Avg. 97.5%	AM-R 44 ft. Avg. Max	AM-R Avg Spec. 500	AM-R Avg Spec. 630	AM-R Avg Spec. 800	AM-R Avg Spec. 1000	AM-R Avg Spec. 1250	AM-R Avg Spec. 1600	AM-R Avg Spec. 2000	AM-R Avg Spec. 2500	AM-R Avg Spec. 3150	AM-R Avg Spec. 4000	AM-R Avg Spec. 5000	AM-R 44 ft. Avg 95% PWL
206-1	A	105.29	0.83	102.78	103.50	103.85	104.17	106.27	106.55	106.90	107.57	105.30	0.24	104.88	104.92	104.95	104.98	105.61	105.71	105.81	105.92	85.82	89.01	96.08	102.62	95.86	95.82	92.47	87.10	83.26	80.40	77.20	0.89
206-1	B	106.00	1.10	103.12	104.32	104.51	104.74	106.77	107.11	107.79	113.92	106.05	0.75	105.18	105.22	105.27	105.36	106.51	108.22	108.26	108.40	87.96	91.13	98.81	100.59	100.57	96.52	92.81	87.82	83.71	80.63	77.53	3.04
206-1	C	106.53	1.29	103.65	104.36	104.64	104.95	108.26	108.78	109.27	111.51	106.60	1.11	105.03	105.09	105.12	105.36	108.50	108.62	108.66	108.78	93.57	89.92	98.55	103.06	98.18	96.94	92.81	87.17	83.32	80.46	77.60	3.56
206-1	D	104.73	0.86	102.30	102.98	103.22	103.58	105.74	106.02	106.31	107.54	104.69	0.50	103.71	103.84	103.93	104.05	105.31	105.38	105.42	105.56	85.45	93.49	95.65	101.43	95.69	95.56	91.63	86.49	82.97	80.59	77.71	1.58
206-1	E	105.00	1.38	101.55	102.59	102.86	103.15	106.37	107.35	108.00	110.31	104.97	1.12	103.10	103.17	103.24	103.57	106.36	106.83	107.06	107.25	90.05	87.51	99.03	100.63	95.66	96.38	92.22	86.48	82.97	80.53	77.67	3.89
206-1	F	105.42	0.65	103.79	104.29	104.43	104.57	106.16	106.33	106.77	108.10	105.40	0.25	104.91	104.97	104.99	105.04	105.73	105.81	105.87	105.96	87.59	90.04	98.13	101.58	96.44	96.80	93.20	88.06	84.19	81.53	78.44	0.89
206-1	G	105.09	0.99	102.35	103.36	103.60	103.80	106.38	106.82	107.18	108.01	105.06	0.69	104.12	104.19	104.23	104.28	106.11	106.17	106.21	106.28	87.29	89.01	97.99	100.41	97.28	96.68	93.60	88.97	85.32	82.33	79.03	2.02
206-1	H	102.55	0.78	101.01	101.30	101.42	101.55	103.45	103.89	104.27	106.00	102.56	0.29	102.01	102.07	102.17	102.25	102.97	103.23	103.36	103.45	84.70	86.33	94.61	97.71	93.26	95.76	92.26	87.03	83.45	81.05	78.04	1.30
206-1	I	108.72	0.80	106.59	107.10	107.27	107.62	109.65	109.95	110.19	110.91	108.70	0.43	107.84	107.94	107.97	108.03	109.21	109.31	109.38	109.48	87.79	90.83	99.37	106.63	98.71	98.05	94.58	89.18	84.59	81.57	78.29	1.44
207-1	A	102.68	0.69	100.92	101.51	101.62	101.82	103.50	103.81	104.20	105.02	102.68	0.19	102.19	102.25	102.28	102.34	102.88	102.94	102.96	103.04	89.22	87.73	94.27	97.36	92.39	96.29	92.97	88.28	84.25	80.72	78.31	0.71
207-1	B	110.15	0.70	107.87	108.51	108.89	109.26	110.95	111.17	111.40	112.05	110.12	0.33	109.34	109.47	109.63	109.70	110.53	110.73	110.84	111.02	88.83	89.15	96.89	108.84	98.37	98.51	96.65	91.29	86.05	82.17	79.44	1.37
207-1	C	109.58	1.17	106.83	107.17	107.44	107.81	111.00	111.27	111.60	112.57	109.62	0.95	107.65	107.68	107.71	107.87	110.95	111.05	111.09	111.14	89.95	99.99	100.71	102.66	103.33	102.52	98.74	92.96	87.22	83.05	80.23	3.42
207-1	D	108.18	1.66	104.46	104.72	105.23	105.63	110.06	110.57	111.07	111.82	108.28	1.14	105.50	106.21	106.47	106.64	109.59	110.03	110.20	110.28	93.06	92.54	101.43	103.45	99.57	100.41	96.10	90.78	85.63	81.99	79.19	3.99
207-1	E	103.35	1.04	101.17	101.57	101.81	101.98	104.21	104.54	104.94	110.98	103.36	0.78	102.20	102.21	102.24	102.30	104.70	104.91	105.06	105.13	88.10	88.00	95.54	98.48	93.36	96.39	93.24	88.51	84.55	81.41	78.58	2.84
207-1	F	102.95	0.90	100.57	101.50	101.61	101.82	104.01	104.47	104.94	107.13	102.93	0.33	102.31	102.40	102.44	102.54	103.47	103.57	103.64	103.72	90.00	88.48	94.77	97.78	92.71	96.21	93.02	88.21	84.20	81.18	78.52	1.24
207-1	G	109.79	1.00	107.33	107.81	108.09	108.40	110.98	111.34	111.75	112.41	109.82	0.54	108.83	108.89	108.91	109.03	110.41	110.58	110.62	110.72	88.98	88.38	95.85	108.58	97.25	97.83	96.56	91.24	86.24	82.49	79.66	1.73
207-1	H	105.48	0.88	103.33	103.69	103.92	104.25	106.48	106.78	107.11	107.94	105.49	0.49	104.35	104.51	104.58	104.83	106.15	106.19	106.22	106.24	88.44	87.81	95.08	101.45	96.84	97.41	96.54	91.28	86.33	82.64	79.51	1.71
207-1	I	102.87	0.68	101.28	101.64	101.77	101.94	103.73	103.90	104.14	104.72	102.89	0.36	102.29	102.35	102.39	102.43	103.44	103.50	103.52	103.54	85.30	86.12	92.54	96.25	94.46	96.14	96.08	90.00	85.91	82.83	79.72	1.17
207-1	J	104.66	0.89	102.08	102.97	103.17	103.41	105.72	105.98	106.16	107.19	104.68	0.52	103.36	103.42	103.55	103.68	105.14	105.19	105.22	105.30	85.65	85.85	93.45	97.13	99.48	98.96	94.45	89.88	85.70	82.36	79.59	1.81
207-1	K	107.81	1.42	104.86	105.36	105.57	105.96	109.60	110.13	110.48	111.82	107.75	1.18	105.84	105.99	106.14	106.38	109.40	109.81	110.01	110.16	91.15	90.83	100.69	104.08	98.80	98.27	96.45	90.86	85.96	82.38	79.56	4.02
207-1	L	101.77	0.66	100.38	100.64	100.81	100.96	102.58	102.84	103.16	104.55	101.75	0.21	101.32	101.36	101.38	101.41	101.98	102.01	102.02	102.06	86.78	86.27	92.26	96.55	91.32	95.56	92.94	88.03	83.59	80.40	77.81	0.67
207-1	M	108.47	1.17	104.70	105.96	106.57	106.95	109.87	110.38	110.71	111.49	108.45	0.76	107.10	107.15	107.22	107.50	109.32	109.87	109.99	110.06	86.52	87.34	94.89	107.04	96.77	97.02	96.26	90.64	85.75	82.25	79.58	2.83
207-1	N	107.29	1.21	104.14	104.84	105.16	105.60	108.52	108.93	109.65	111.00	107.26	0.95	105.61	105.62	105.64	105.73	108.66	108.94	108.96	109.10	86.83	86.96	94.33	105.56	95.97	96.60	95.75	90.41	85.62	82.26	79.45	3.34
207-1	O	108.01	0.99	104.61	105.83	106.34	106.79	109.12	109.52	109.79	111.48	108.03	0.39	107.35	107.41	107.45	107.55	108.55	108.81	108.86	109.03	86.04	86.26	93.92	106.62	95.31	96.76	96.21	90.70	85.59	81.98	79.12	1.45
207-1	P	105.73	0.85	103.62	104.09	104.45	104.69	106.73	107.24	107.70	108.65	105.74	0.29	105.14	105.20	105.25	105.32	106.10	106.21	106.29	106.39	91.30	91.98	98.78	101.32	98.19	95.88	92.55	88.12	84.76	81.43	78.84	1.09
208-1	A	104.36	1.19	101.55	102.17	102.39	102.68	105.73	105.99	106.16	106.72	104.37	1.04	102.68	102.74	102.82	102.96	105.49	105.52	105.55	105.62	86.88	89.69	97.62	99.64	94.53	96.92	92.98	88.15	84.78	81.60	78.12	2.81
208-1	B	105.75	1.21	102.89	103.31	103.49	103.83	107.03	107.51	107.85	109.25	105.82	0.84	103.92	104.01	104.09	104.30	106.62	106.75	106.81	106.91	89.08	91.15	99.44	101.02	96.46	97.47	94.12	89.30	85.52	82.02	78.46	2.80
208-1	C	104.29	0.79	102.47	102.84	103.03	103.26	105.07	105.40	105.72	108.94	104.35	0.37	103.53	103.65	103.74	103.80	104.82	104.95	104.97	105.01	86.79	89.18	97.37	99.69	94.40	96.59	93.37	88.64	84.89	81.89	78.53	1.32
208-1	D	104.81	1.07	102.04	102.82	103.09	103.34	106.11	106.57	106.93	107.95	104.79	0.69	103.72	103.79	103.87	103.95	105.89	106.03	106.06	106.15	87.11	89.10	95.94	98.88	97.18	97.94	95.71	91.24	86.74	83.16	80.20	2.27
208-1	E	105.59	1.09	102.99	103.37	103.71	103.99	106.77	107.47	107.88	108.73	105.66	0.58	104.36	104.42	104.47	104.59	106.40	106.54	106.62	106.82	88.44	91.25	97.34	99.58	99.00	98.31	95.04	90.46	86.13	82.66	79.85	2.20
208-1	F	105.80	1.07	102.87	103.68	103.99	104.35	107.07	107.55	107.89	110.03	105.80	0.55	104.75	104.86	104.93	105.04	106.69	106.79	106.81	106.86	88.70	90.82	98.33	100.40	98.74	97.90	94.76	89.94	85.99	82.34	79.38	1.95
208-1	G	107.02	0.99	104.14	105.22	105.43	105.61	108.13	108.45	108.85	110.27	107.03	0.57	105.73	105.93	106.01	106.23	107.90	108.00	108.04	108.14	89.85	92.92	100.02	101.54	100.05	99.02	95.34	90.00	85.80	82.29	79.07	2.11
208-1	H	108.65	1.27	105.02	105.81	106.41	106.93	110.02	110.75	111.20	111.75	108.61	0.70	107.54	107.60	107.64	107.69	109.80	110.19	110.25	110.34	90.82	94.69	101.56	103.84	101.48	100.04	96.52	91.08	85.82	82.44	79.38	2.65
208-1	I	109.29	0.89	106.87	107.32	107.59	107.89	110.27	110.51	110.71	111.85	109.35	0.59	108.08	108.14	108.16	108.22	110.00	110.13	110.17	110.26	87.78	91.36	99.11	106.98	99.79	99.64	96.27	91.06	86.13	82.66	79.53	2.04
209-1	A	102.12	2.52	97.49	98.50	98.97	99.12	105.55	107.05	107.83	110.20	102.02	0.49	100.57	100.96	101.01	101.27	102.49	102.62	102.66	102.99	86.76	88.90	97.00	97.87	91.38	91.84	88.19	83.11	79.21	75.75	72.47	1.70
209-1	B	111.23	0.97	108.90	109.41	109.62	109.83	112.41	112.86	113.05	113.82	111.20	0.32	110.51	110.59	110.64	110.78	111.64	111.76	111.81	111.89	89.12	92.50	99.96	110.46	96.56	95.18	89.32	83.84	80.62	76.60	72.00	1.22
209-1	C	111.00	1.93	101.02	102.80	108.19	109.76	112.25	112.53	112.84	114.51	110.99	0.48	109.85	110.02	110.13	110.42	111.52	111.88	112.02	112.17	90.25	92.43	99.98	110.12	97.52	95.28	89.56	83.83	80.51	76.73	72.31	1.99
209-1	D	103.14	2.84	98.31	99.10	99.32	99.68	107.08	108.20	109.24	110.92	103.07	0.76	101.37	101.82	101.94	102.02	104.05	104.59	104.66	104.83	90.40	92.72	98.23	98.01	92.78	92.21	88.50	83.70	79.51	76.43	73.19	2.84
209-1	E	100.31	0.59	97.63	99.08	99.33	99.51	101.00	101.19	101.36	102.15	100.31	0.34	99.54	99.67	99.73	99.85	100.82	100.94	100.99	101.11	85.17	84.54	92.02	94.09	88.77	95.45	90.47	85.15	81.85	78.84	75.18	1.31
209-1	F	104.59	0.53	102.81	103.51	103.70	103.90	105.24	105.43	105.59	105.85	104.54	0.24	104.01	104.12	104.16	104.19	104.84	104.87	104.90	104.95	89.12	85.48	94.33	101.70	94.90	96.91	91.26	86.38	82.92	79.50	75.32	0.78
209-1	G	109.36	0.38	108.27	108.58	108.72	108.88	109.82	110.02	110.13	110.41	109.35	0.17	109.08	109.10	109.12	109.15	109.62	109.64	109.66	109.70	85.28	85.79	95.14	107.72	101.94	96.93	92.08	87.43	84.42	79.89	74.79	0.56
209-1	H	105.04	1.17	101.91	102.82	103.28	103.62	106.46	107.03	107.53	110.25	105.04	0.45	103.68	104.07	104.14	104.25	105.49	105.57	105.64	105.70	91.54	93.11	99.29	100.76	96.68	92.99	89.04	85.43	81.91	78.05	74.73	1.58
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305-1	A	104.02	0.74	101.96	102.63	102.83	103.05	104.91	105.22	105.63	106.88	104.02	0.29	103.36	103.45	103.52	103.60	104.37	104.46	104.54	104.81	87.92	89.02	96.30	99.81	95.36	95.65	92.85	87.48	83.77	80.77	77.80	1.08
305-1	B	103.21	1.23	99.80	100.83	101.14	101.51	104.68	105.30	105.86	107.38	103.22	0.50	102.14	102.26	102.33	102.43	103.80	103.88	103.94	104.19	88.53	88.17	95.51	98.96	94.22	94.90	92.04	86.86	83.33	80.58	77.88	1.68
307-1	A	110.43	1.77	103.69	105.53	106.96	107.99	112.11	112.61	113.03	114.04	110.42	1.29	105.49	106.49	107.72	108.75	111.62	111.78	111.86	112.76	87.82	89.16	96.25	108.96	100.27	98.88	96.95	92.46	86.62	83.84	80.39	5.37
307-1	B	106.41	1.38	102.70	103.56	103.80	104.19	107.81	108.20	108.58	110.72	106.49	0.93	104.24	104.29	104.68	105.04	107.37	107.59	107.81	108.00	89.32	91.75	97.73	101.38	99.88	98.10	95.23	91.55	86.44	84.00	80.56	3.51
307-1	C	108.28	1.00	105.89	106.44	106.68	106.94	109.45	109.83	110.24	111.32	108.29	0.29	107.64	107.75	107.80	107.84	108.65	108.72	108.73	108.81	88.87	89.16	95.80	100.78	104.99	100.48	96.66	92.21	87.08	83.69	80.18	0.98
307-1	D	105.38	0.91	102.97	103.71	103.98	104.22	106.37	107.00	107.52	109.45	105.41	0.28	104.52	104.84	104.90	105.00	105.72	105.87	105.90	105.96	88.80	90.11	96.03	99.81	98.97	97.67	95.17	91.45	86.47	83.67	80.15	1.06
307-1	E	107.46	1.16	104.42	105.48	105.69	105.96	108.90	109.47	109.83	110.76	107.48	0.59	106.27	106.48	106.54	106.67	108.19	108.27	108.34	108.51	88.61	89.65	96.57	100.59	103.77	98.89	96.03	92.17	86.59	83.70	80.33	1.86
307-1	F	105.68	0.89	103.68	104.21	104.31	104.53	106.64	107.21	107.76	109.29	105.70	0.38	104.75	104.91	105.03	105.13	106.16	106.30	106.34	106.48	88.90	90.52	96.73	100.31	99.27	97.65	95.22	91.29	86.30	83.75	80.19	1.43
309-1	A	110.56	0.86	108.40	108.85	109.08	109.34	111.63	111.92	112.12	114.19	110.58	0.34	109.80	109.87	109.93	110.07	110.95	110.99	111.23	111.28	92.49	95.90	104.36	105.38	103.35	101.91	97.64	93.63	88.40	84.38	81.20	1.36
309-1	B	109.55	1.00	106.72	107.55	107.99	108.25	110.78	111.10	111.52	112.78	109.59	0.58	108.25	108.33	108.40	108.76	110.24	110.39	110.47	110.64	92.16	95.11	102.91	104.19	102.14	101.57	97.42	93.54	87.86	84.37	81.18	2.13
309-1	C	109.51	1.38	106.10	107.08	107.43	107.79	111.42	111.99	112.32	113.96	109.43	1.12	107.87	107.93	108.00	108.22	111.48	111.81	111.89	111.95	92.44	95.96	103.53	104.35	102.09	100.60	95.84	91.68	87.29	83.90	80.57	3.97
310-1	A	106.44	1.04	103.85	104.49	104.70	104.98	107.68	108.13	108.45	109.86	106.49	0.77	104.96	105.05	105.12	105.36	107.34	107.44	107.63	107.80	91.07	91.79	100.29	101.63	97.22	98.50	93.90	88.98	84.59	81.55	78.61	2.59
310-1	B	107.79	0.94	105.12	105.82	106.12	106.42	108.87	109.22	109.53	110.46	107.80	0.44	106.77	106.92	107.02	107.22	108.39	108.53	108.65	108.74	88.91	93.39	102.32	103.28	98.48	98.79	94.38	89.75	85.20	82.16	79.04	1.73
310-1	C	106.06	0.93	103.76	104.26	104.50	104.79	107.21	107.64	107.92	108.71	106.02	0.59	104.77	105.04	105.13	105.29	106.95	107.13	107.27	107.77	88.45	89.82	98.47	100.64	99.66	98.31	94.07	89.91	85.38	82.27	79.02	2.23
311-1	A	103.16	0.88	100.78	101.46	101.72	102.04	104.13	104.64	105.11	107.49	103.15	0.36	102.15	102.37	102.52	102.69	103.55	103.67	103.95	104.29	85.47	87.37	96.86	98.32	93.83	95.67	90.97	86.47	83.67	81.12	75.84	1.58
317-1	A	106.49	1.47	102.74	104.18	104.46	104.75	108.12	109.34	110.34	113.93	106.49	0.63	105.19	105.39	105.47	105.68	107.34	107.48	107.64	108.26	89.72	92.53	99.34	101.68	98.93	97.57	94.90	90.63	86.18	83.55	79.10	2.25
317-1	B	105.35	1.30	102.39	103.44	103.60	103.83	107.07	107.72	108.28	114.01	105.34	0.47	104.33	104.55	104.65	104.77	105.87	106.10	106.78	107.14	87.84	91.31	98.18	100.32	97.95	96.68	93.73	90.02	85.88	83.69	79.71	2.23
319-1	A	104.73	0.63	102.78	103.55	103.74	103.92	105.52	105.85	105.98	106.46	104.74	0.26	103.86	104.18	104.30	104.41	105.09	105.16	105.23	105.32	87.95	91.04	98.31	100.25	95.58	96.09	92.31	87.72	84.36	81.98	79.35	1.05
319-1	B	104.19	1.14	101.87	102.56	102.67	102.87	105.39	106.06	106.64	113.35	104.21	0.51	103.40	103.54	103.60	103.70	104.53	104.89	106.20	106.38	86.55	89.07	97.36	99.38	94.66	96.67	93.07	88.71	84.79	82.05	79.47	2.66
319-1	C	111.16	0.88	108.53	109.46	109.65	109.96	112.23	112.56	112.88	113.55	111.14	0.63	110.04	110.08	110.12	110.24	111.93	112.10	112.29	112.48	91.31	97.62	104.16	107.29	103.05	101.86	97.61	92.21	87.05	83.44	80.42	2.21
320-1	A	102.89	0.95	100.85	101.24	101.50	101.71	104.04	104.62	105.17	106.69	102.88	0.42	102.11	102.25	102.29	102.36	103.45	103.60	103.74	103.96	85.51	87.37	95.77	98.03	92.51	96.41	91.63	86.29	83.30	80.29	76.87	1.49
320-1	B																																
320-1	C	102.37	0.82	100.12	100.81	101.08	101.34	103.35	103.78	104.14	105.74	102.36	0.30	101.64	101.77	101.82	101.94	102.72	102.82	102.91	103.05	85.04	86.72	95.34	97.68	91.75	95.71	90.95	85.68	82.81	80.07	76.70	1.14
322-1	A	106.94	0.91	104.08	105.03	105.32	105.74	107.96	108.41	108.80	110.15	106.95	0.44	105.70	105.97	106.04	106.26	107.43	107.67	107.71	107.88	89.73	91.22	98.09	101.95	100.08	99.01	96.44	92.06	87.59	84.21	80.59	1.74
323-1	A	103.17	0.87	100.70	101.44	101.70	102.01	104.14	104.61	105.04	107.02	103.18	0.49	101.88	102.00	102.05	102.27	103.60	103.85	103.91	104.03	85.22	86.77	95.38	98.45	93.59	96.34	92.71	87.69	83.88	81.27	78.34	1.91
323-1	B	110.54	1.43	106.42	107.59	107.98	108.44	112.19	112.57	112.80	114.25	110.55	0.66	109.18	109.34	109.48	109.66	111.41	111.67	111.84	111.97	93.19	95.83	103.84	106.44	103.39	100.84	95.53	90.32	85.65	81.81	78.86	2.50
324-1	A	102.35	0.87	99.84	100.92	101.10	101.31	103.28	103.69	104.17	111.21	102.32	0.38	101.34	101.67	101.78	101.89	102.72	102.96	103.39	103.94	84.97	85.86	93.62	97.59	93.64	95.48	92.14	87.77	83.33	80.98	77.72	1.72
325-1	A	107.62	0.91	105.62	105.98	106.16	106.39	108.76	109.18	109.43	111.67	107.64	0.25	106.96	107.12	107.17	107.28	107.96	108.05	108.09	108.20	88.38	91.19	98.35	101.44	100.89	101.86	96.60	92.74	87.91	84.36	80.69	0.97
325-1	B	107.88	1.17	105.70	106.25	106.35	106.50	109.37	110.29	110.97	112.64	107.89	0.34	106.98	107.31	107.33	107.43	108.32	108.42	108.48	108.50	89.05	92.96	99.63	101.37	100.87	101.99	96.70	92.93	88.04	84.25	80.64	1.17
325-1	C	107.64	0.97	105.19	105.77	105.96	106.38	108.82	109.26	109.57	111.90	107.65	0.33	106.79	106.99	107.07	107.14	108.11	108.19	108.23	108.26	88.54	91.48	98.27	101.26	100.70	102.09	96.86	93.22	88.01	84.38	80.81	1.24
325-1	D	107.63	0.99	105.28	105.91	106.10	106.37	108.71	109.37	109.84	112.19	107.61	0.23	107.15	107.26	107.27	107.34	107.96	108.02	108.10	108.19	87.98	90.47	98.23	101.16	100.80	102.27	96.63	92.97	88.03	84.23	80.58	0.85
325-1	E	107.57	0.96	105.00	105.86	106.11	106.35	108.68	109.20	109.85	110.85	107.57	0.29	106.69	106.84	106.98	107.14	107.89	107.95	108.03	108.14	88.37	91.79	98.50	101.19	100.61	102.11	96.20	92.68	87.71	84.25	80.67	1.20
336-1	A	105.73	0.79	103.77	104.20	104.47	104.77	106.55	106.96	107.26	110.36	105.73	0.36	104.99	105.12	105.20	105.27	106.17	106.34	106.62	106.71	88.15	90.04	97.67	101.20	97.19	97.87	95.26	90.77	86.64	84.12	79.95	1.50
339-1	A	96.09	0.79	94.22	94.67	94.80	95.01	97.00	97.44	97.65	97.90	96.12	0.44	95.55	95.59	95.60	95.63	96.82	96.89	96.94	96.97	86.21	88.72	90.37	87.41	84.66	87.44	83.15	79.95	78.80	75.77	72.47	1.35
339-1	B	99.13	1.07	95.14	96.23	96.90	97.65	100.15	100.37	100.48	100.68	99.38	0.35	98.21	98.43	98.67	98.87	99.72	99.75	99.75	99.76	85.79	89.95	95.28	92.30	88.72	87.70	82.37	80.14	79.35	76.38	72.89	1.33
339-1	C	95.44	0.45	94.47	94.55	94.67	94.84	95.98	96.21	96.30	96.55	95.42	0.15	95.18	95.19	95.20	95.21	95.64	95.70	95.72	95.77	85.04	84.89	88.19	88.37	87.21	87.35	82.62	81.34	79.89	75.81	72.42	0.52
339-1	D	99.84	1.07	96.90	97.55	98.04	98.24	101.03	101.34	101.80	102.19	100.03	0.50	99.04	99.14	99.18	99.27	100.57	100.64	100.66	100.69	90.62	95.14	93.18	91.33	87.85	87.70	84.29	81.94	80.26	76.03	72.39	1.53
339-1	E	103.17	0.93	100.65	100.97	101.18	101.77	104.06	104.37	104.66	105.06	102.98	0.56	102.16	102.20	102.24	102.32	103.69	103.81	103.85	103.87	89.79	96.22	99.06	96.62	92.97	86.67	82.59	81.53	80.45	76.07	72.00	1.65
340-1	A	105.67	0.81	103.27	103.98	104.21	104.63	106.52	106.78	107.01	109.80	105.65	0.41	104.79	104.89	104.96	105.14	106.31	106.49	106.63	106.73	89.59	91.09	97.99	101.42	98.02	96.61	93.63	89.03	84.94	82.24	78.79	1.74
340-1	B	108.81	0.95	105.68	106.99	107.29	107.52	109.84	110.14	110.49	110.98	108.86	0.62	107.40	107.42	107.54	107.95	109.52	109.59	109.65	109.73	88.18	91.36	101.25	104.49	101.44	100.13	97.60	92.59	86.63	83.33	80.15	2.23
340-1	C	106.48	0.68	104.49	105.09	105.31	105.52	107.35	107.60	107.76	108.17	106.48	0.29	105.87	105.93	106.03	106.11	106.87	107.04	107.10	107.21	91.17	92.63	98.94	102.28	99.36	96.48	93.17	89.10	85.57	82.85	79.37	1.17
340-1	D	107.19	0.70	105.36	105.80	105.98	106.24	108.04	108.30	108.57	109.11	107.21	0.36	106.39	106.46	106.51	106.69	107.65	107.77	107.96	108.04	90.73	93.22	99.48	102.60	100.30	97.93	94.99	90.56	87.04	84.13	80.16	1.50
341-1	A	104.14	0.94	101.83	102.62	102.80	103.04	105.07	105.51	105.99	112.57	104.14	0.41	103.32	103.43	103.49	103.61	104.51	104.64	105.43	105.79	86.47	87.50	95.65	99.67	95.13	96.68	93.99	89.65	85.39	83.01	80.04	2.00
342-1	A	104.04	1.53	101.23	101.62	101.86	102.18	105.89	106.77	107.53	111.53	104.06	0.53	103.21	103.26	103.29	103.35	104.89	105.01	105.10	105.20	85.72	88.61	96.74	99.12	94.50	96.59	94.08	89.65	84.96	81.62	77.98	1.83
342-1	B	106.56	1.10	102.24	104.06	104.45	105.13	107.85	108.20	108.42	109.22	106.62	0.61	104.93	105.19	105.58	105.88	107.30	107.59	107.90	108.22	89.31	91.27	98.69	101.94	98.57	98.31	96.09	91.22	86.53	83.35	79.23	2.71
342-1	C	108.51	1.07	105.83	106.44	106.80	107.06	109.98	110.30	110.63	111.67	108.54	0.70	107.59	107.73	107.76	107.85	109.64	109.93	110.04	110.20	89.14	91.56	97.91	105.04	101.43	99.30	97.46	92.59	87.45	83.55	79.94	2.30
343-1	A	100.79	0.67	98.64	99.57	99.73	99.92	101.61	101.89	102.13	103.42	100.79	0.25	100.15	100.34	100.38	100.45	101.13	101.20	101.26	101.48	84.10	86.20	93.03	96.02	91.70	93.62	90.25	84.58	80.81	76.91	73.31	0.92

		PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	PM-R	R
		7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	7 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	44 ft. Avg.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	Avg Spec.	44 ft. Avg	PM minus AM
Site ID	Surf ID	Mean	StDev	Min	2.5%	5%	10%	25%	95%	97.5%	Max	Mean	StDev	Min	2.5%	5%	10%	90%	95%	97.5%	Max	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	95% PWL	dBA
101-1	A																																	
101-1	B																																	
101-1	C																																	
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101-1	P																																	
101-1	Q																																	
101-1	R																																	
101-2	A																																	
101-2	B	101.95	0.95	99.26	100.06	100.33	100.63	101.15	103.47	103.68	104.85	101.92	0.54	100.51	100.74	100.91	101.27	102.57	102.82	102.99	103.30	86.18	87.34	94.89	97.43	93.98	93.57	89.44	84.20	79.75	76.84	73.56	2.24	-0.23
101-2	C	103.70	1.13	100.43	101.60	101.83	102.14	102.77	105.49	105.97	106.96	103.74	0.79	102.06	102.33	102.51	102.66	104.80	105.22	105.32	105.61	88.95	90.21	97.72	99.20	95.83	93.72	88.91	84.05	80.04	77.47	73.79	2.99	-0.16
101-2	D	100.59	0.87	98.77	99.10	99.24	99.43	99.88	101.96	102.19	105.59	100.57	0.35	99.87	99.93	100.00	100.07	101.01	101.17	101.30	101.37	85.19	85.66	93.29	96.09	91.53	92.99	88.90	83.50	79.29	76.41	73.51	1.37	-0.17
101-2	E	104.77	0.80	102.07	103.07	103.32	103.73	104.20	105.96	106.29	107.62	104.82	0.32	104.14	104.23	104.36	104.40	105.27	105.36	105.41	105.45	89.30	90.51	97.78	100.30	96.83	96.02	92.29	86.85	82.37	79.67	76.28	1.18	-0.22
101-2	F	102.65	0.79	100.33	101.11	101.39	101.65	102.04	103.98	104.30	105.05	102.67	0.47	101.67	101.81	101.88	102.02	103.29	103.37	103.43	103.55	87.24	88.84	96.34	98.47	94.41	92.84	88.52	83.30	79.49	76.80	73.30	1.62	-0.21
101-2	G	103.69	1.31	100.18	101.00	101.37	101.89	102.66	105.68	106.18	107.64	103.76	0.82	101.72	102.11	102.40	102.49	104.74	104.91	105.41	105.88	89.20	90.62	97.51	99.43	95.48	93.60	88.88	83.72	79.93	77.27	73.74	3.29	-0.28
101-2	H	100.79	0.84	98.38	99.42	99.57	99.80	100.18	102.16	102.47	105.84	100.75	0.43	100.07	100.14	100.19	100.35	101.21	101.52	102.00	102.48	86.41	85.58	93.43	95.88	91.16	93.86	89.65	84.65	80.58	77.59	74.05	1.86	0.20
101-2	I	102.55	0.96	99.82	100.83	101.07	101.27	101.73	104.18	104.54	105.34	102.57	0.46	101.61	101.75	101.90	102.00	103.19	103.35	103.43	103.61	88.74	88.97	95.24	97.36	95.53	94.06	90.22	85.37	81.70	77.29	73.93	1.68	-0.08
101-2	J	101.30	0.85	99.11	99.68	99.88	100.14	100.64	102.66	103.04	104.22	101.29	0.36	100.40	100.61	100.69	100.78	101.81	101.95	102.02	102.25	87.35	87.14	93.53	95.65	94.34	93.28	90.66	85.53	80.99	77.64	74.30	1.42	-0.24
101-2	K	105.73	0.95	102.81	103.73	104.04	104.47	104.99	107.24	107.53	109.56	105.74	0.45	104.68	104.97	105.06	105.12	106.40	106.48	106.59	106.78	86.66	87.55	95.54	103.80	96.06	94.71	91.15	85.55	80.24	76.67	74.07	1.62	0.03
101-2	L	108.44	2.26	102.47	103.50	104.25	105.07	106.27	111.82	112.26	114.42	108.59	1.20	104.47	105.42	106.13	106.77	109.79	109.93	110.07	110.29	93.69	94.34	101.08	104.51	100.80	98.92	94.77	88.42	81.62	77.77	74.82	4.65	0.13
101-2	M	102.35	0.88	100.09	100.61	100.82	101.11	101.69	103.72	104.18	105.38	102.37	0.48	101.10	101.29	101.47	101.71	103.03	103.09	103.12	103.20	88.97	89.68	96.31	97.95	94.20	91.68	87.19	82.78	79.19	76.23	73.45	1.83	-0.03
101-2	N	102.77	0.88	100.96	101.35	101.52	101.74	102.06	103.93	104.74	106.63	102.83	0.35	102.33	102.36	102.38	102.45	103.39	103.44	103.48	103.52	89.37	89.71	96.90	98.43	94.80	91.45	86.75	83.26	80.08	77.21	74.68	1.12	-0.14
101-2	O	100.93	0.82	99.04	99.40	99.59	99.80	100.29	102.27	102.64	103.20	100.90	0.40	100.02	100.13	100.27	100.42	101.46	101.55	101.59	101.83	86.17	86.64	94.38	96.32	92.42	92.48	88.10	83.16	79.33	76.33	73.46	1.46	0.06
101-2	P	100.87	0.71	99.01	99.61	99.75	99.94	100.33	102.05	102.35	104.05	100.89	0.27	100.31	100.37	100.49	100.59	101.24	101.38	101.51	101.58	86.24	86.40	93.73	96.39	92.04	92.96	88.49	83.52	79.65	76.77	73.70	1.14	0.22
101-2	Q	101.35	0.92	99.33	99.73	99.95	100.14	100.65	102.82	103.20	105.30	101.29	0.39	100.47	100.58	100.68	100.90	101.69	101.87	102.25	103.06	86.77	86.45	94.30	96.42	92.48	93.96	89.72	84.49	80.09	76.96	73.97	1.68	0.31
101-2	R	102.11	0.99	99.67	100.23	100.44	100.74	101.27	103.73	103.96	104.53	102.12	0.71	100.82	100.92	101.00	101.19	102.94	103.05	103.21	103.34	86.36	86.91	94.77	97.45	93.16	94.69	90.83	85.54	80.72	77.53	74.38	2.29	0.37
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101-4	A	102.70	0.82	100.38	101.06	101.32	101.61	102.06	104.00	104.27	105.44	102.69	0.45	101.77	101.83	101.89	102.10	103.25	103.51	103.64	103.76	85.12	86.06	94.80	97.71	94.81	95.48	92.00	87.28	82.62	79.73	76.15	1.81	0.28
101-4	B	102.47	0.82	100.14	101.03	101.22	101.41	101.79	103.88	104.20	105.42	102.48	0.41	101.70	101.85	101.89	101.93	102.95	103.26	103.40	103.51	85.52	85.95	94.06	97.30	94.30	95.68	92.27	87.77	82.77	79.98	76.36	1.55	0.19
101-4	C	104.47	1.17	101.15	102.12	102.50	102.80	103.49	106.31	106.60	107.74	104.52	0.78	102.78	102.93	103.02	103.15	105.41	105.65	106.01	106.32	88.78	89.91	97.31	99.75	96.97	95.76	92.36	88.06	83.51	80.63	76.93	3.09	0.19
101-4	D	101.98	0.78	99.88	100.58	100.76	100.99	101.40	103.12	103.57	106.51	101.96	0.37	101.33	101.39	101.41	101.50	102.57	102.66	102.72	102.77	86.70	86.08	93.94	96.98	92.90	95.03	91.79	87.28	82.52	79.64	76.05	1.33	0.18
101-4	E	105.47	0.83	102.86	103.90	104.16	104.39	104.77	106.76	107.04	108.12	105.51	0.41	104.78	104.83	104.89	104.96	106.05	106.11	106.25	106.56	88.97	90.39	97.52	100.88	97.80	97.12	94.34	90.01	85.05	82.05	78.01	1.42	0.29
101-4	F	103.30	0.85	101.13	101.61	101.89	102.21	102.62	104.68	104.95	105.81	103.31	0.50	102.34	102.41	102.45	102.52	103.87	104.01	104.19	104.31	86.88	88.02	95.64	98.78	95.34	95.10	91.84	87.37	83.07	80.35	76.56	1.77	0.32
101-4	G	103.93	1.10	100.74	101.71	102.11	102.45	103.08	105.69	105.90	107.06	103.98	0.61	102.38	102.66	102.97	103.25	104.84	104.98	105.18	105.67	87.69	88.98	96.52	99.52	95.72	95.59	92.30	87.32	83.02	79.95	76.41	2.52	-0.45
101-4	H	101.24	0.84	99.07	99.87	100.03	100.27	100.63	102.78	103.13	104.96	101.21	0.32	100.68	100.75	100.79	100.84	101.63	101.73	102.19	102.32	84.77	84.22	92.81	96.44	91.80	94.74	91.01	86.26	82.21	79.26	75.98	1.45	-0.74
101-4	I	103.06	0.75	100.34	101.72	101.85	102.07	102.49	104.25	104.63	106.41	103.05	0.31	102.39	102.50	102.60	102.67	103.51	103.63	103.71	103.78	85.84	86.76	94.22	97.52	95.99	95.65	93.66	88.05	84.74	81.03	77.15	1.21	-0.48
101-4	J	102.38	0.81	100.62	101.05	101.15	101.39	101.77	103.77	104.23	107.09	102.38	0.27	101.78	101.89	101.93	102.00	102.75	102.95	102.98	103.10	84.62	85.46	93.45	96.80	95.01	95.16	93.38	88.06	83.83	80.53	77.02	1.09	-0.38
101-4	K	107.33	1.23	103.14	104.78	105.29	105.66	106.39	109.21	109.71	110.69	107.35	0.82	105.68	106.05	106.22	106.27	108.37	108.61	108.69	108.78	84.85	85.76	94.11	105.81	96.54	96.46	94.14	88.83	83.86	80.24	76.77	2.64	-0.42
101-4	L	110.41	2.35	103.81	104.69	105.52	106.66	108.42	113.72	114.20	116.30	110.57	1.42	106.32	107.05	107.50	108.36	111.97	112.15	112.30	112.66	93.96	95.62	102.35	106.26	103.43	101.58	97.73	91.83	85.23	80.91	77.43	5.25	-0.08
101-4	M	101.77	0.96	99.50	100.16	100.34	100.56	100.94	103.41	103.76	106.18	101.73	0.31	101.01	101.17	101.27	101.40	102.17	102.32	102.46	102.84	83.75	85.22	93.76	97.10	92.72	94.69	91.48	86.62	82.15	78.82	75.81	1.29	0.02
101-4	N	101.19	0.70	99.57	99.94	100.03	100.22	100.66	102.48	102.75	103.16	101.10	0.20	100.74	100.77	100.78	100.82	101.36	101.40	101.43	101.45	83.41	84.57	93.25	96.56	93.62	93.42	89.50	85.24	81.76	78.88	76.35	0.66	0.21
101-4	O	101.13	0.72	99.54	99.86	100.01	100.26	100.57	102.42	102.83	104.05	101.12	0.15	100.78	100.85	100.88	100.93	101.32	101.37	101.44	101.51	82.89	83.95	92.87	96.45	92.00	94.41	90.67	86.00	81.75	78.49	75.61	0.59	0.19
101-4	P	101.15	0.66	99.47	99.93	100.08	100.34	100.68	102.32	102.65	103.46	101.16	0.21	100.76	100.81	100.85	100.89	101.44	101.53	101.62	101.74	82.25	83.83	92.27	96.33	91.86	94.92	91.15	86.16	82.03	78.98	76.01	0.82	-0.06
101-4	Q	101.73	0.81	99.98	100.33	100.53	100.71	101.11	103.24	103.68	104.68	101.69	0.31	101.12	101.15	101.19	101.26	102.06	102.30	102.38	102.87	83.62	84.69	92.76	96.92	92.34	95.46	91.88	86.88	82.42	79.24	76.44	1.22	0.10
101-4	R	102.35	0.93	99.84	100.53	100.78	101.06	101.55	103.83	104.02	105.36	102.32	0.57	101.23	101.39	101.44	101.56	102.99	103.14	103.37	103.41	84.49	85.70	93.42	97.59	93.45	95.59	92.63	87.84	82.93	79.74	76.80	1.99	0.03
202-1	A	101.72	0.88	99.35	100.12	100.27	100.55	101.00	103.19	103.62	105.05	101.72	0.40	101.01	101.09	101.13	101.18	102.25	102.40	102.49	102.66	87.11	88.22	95.77	97.77	93.53	90.07	86.25	81.36	77.57	74.33	70.97	1.40	-1.27
202-1	B	100.04	0.90	97.92	98.43	98.65	98.88	99.33	101.54	101.87	104.11	100.04	0.51	99.13	99.24	99.29	99.45	100.75	100.93	101.17	101.39	85.25	86.38	94.02	95.78	91.76	89.61	85.87	80.99	77.18	73.92	70.77	1.93	-1.25
202-1	C	102.37	1.39	99.29	99.88	100.22	100.58	101.13	104.77	105.24	107.38	102.40	1.02	100.53	100.86	101.01	101.15	103.68	103.99	104.82	105.11	87.15	88.62	96.36	98.36	94.15	91.42	87.56	82.39	78.13	74.89	71.30	3.96	-1.38
202-1	D	102.36	1.20	98.56	100.01	100.20	100.65	101.34	104.25	104.61	105.86	102.39	0.82	100.44	100.91	101.09	101.25	103.42	103.65	103.84	104.00	87.50	89.50	96.50	98.24	94.19	90.99	87.07	82.15	77.62	74.37	70.84	2.93	-1.92
202-1	E	100.18	0.96	97.65	98.62	98.74	98.93	99.39	101.78	102.21	103.83	100.18	0.48	99.25	99.37	99.43	99.57	100.81	101.19	101.30	101.52	85.13	85.88	93.54	95.97	92.07	90.58	86.99	81.82	77.73	74.71	71.34	1.93	-1.25
202-1	F	101.61	0.93	99.27	99.91	100.11	100.40	100.85	103.06	103.57	104.65	101.63	0.42	100.81	100.90	100.99	101.07	102.06	102.43	102.73	102.89	87.68	88.27	95.95	97.67	92.70	89.93	86.00	81.54	77.73	74.56	71.04	1.83	-0.55
202-1	G	100.35	0.92	97.55	98.51	98.82	99.11	99.54	101.80	102.01	103.12	100.33	0.51	99.01	99.30	99.48	99.69	101.00	101.21	101.26	101.33	86.53	87.22	94.36	96.34	91.94	88.45	85.34	81.34	77.64	74.46	71.49	1.96	-0.50
203-1	A	102.19	1.07	99.47	100.31	100.57	100.81	101.36	104.20	104.39	105.22	102.23	0.38	101.55	101.63	101.68	101.72	102.74	102.84	102.94	103.01	85.05	85.60	92.45	96.82	94.32	95.46	93.14	88.21	83.72	80.28	76.79	1.31	0.73
203-1	B	103.39	1.52	100.53	100.79	100.99	101.26	101.80	105.70	106.15	107.98	103.42	1.04	101.55	101.76	101.83	101.91	104.61	104.84	104.91	105.03	86.71	87.51	94.65	98.19	95.76	96.13	93.59	88.78	84.06	80.37	76.79	3.15	0.78
203-1	C	102.60	1.60	99.66	100.08	100.28	100.53	100.99	105.07	105.47	106.30	102.64	1.04	101.14	101.31	101.36	101.44	104.13	104.20	104.27	104.57	85.96	86.30	94.09	97.57	94.78	95.24	92.51	87.80	83.71	80.74	77.46	2.96	0.62
203-1	D	103.64	1.13	100.93	101.58	101.75	102.02	102.59	105.32	105.73	107.16	103.59	0.67	102.42	102.47	102.51	102.58	104.46	104.56	104.60	104.70	87.38	87.81	95.09	98.24	96.50	96.11	93.59	89.01	84.67	80.94	77.29	2.13	0.28
203-1	E	104.89	1.03	102.51	103.35	103.46	103.73	104.14	106.39	107.82	110.42	104.89	0.49	104.10	104.18	104.20	104.25	105.54	105.74	105.89	106.03	85.73	86.55	94.53	98.11	96.48	101.37	91.70	88.08	85.20	80.22	76.74	1.71	0.74
203-1	F	105.26	1.42	101.95	102.58	102.77	103.09	104.03	107.47	107.93	110.19	105.29	0.84	103.57	103.89	104.10	104.21	106.31	106.63	106.77	106.87	87.59	87.78	95.50	101.66	96.97	96.77	94.69	90.16	85.03	81.76	78.18	2.88	-0.04
204-1	A	108.07	0.82	105.93	106.55	106.71	106.94	107.36	109.39	109.62	110.41	108.09	0.36	107.31	107.39	107.46	107.55	108.54	108.62	108.67	108.70	89.51	91.96	100.87	103.03	100.69	101.05	94.82	90.62	86.14	82.82	79.25	1.28	0.24
204-1	B	105.95	0.73	104.07	104.61	104.85	105.00	105.33	107.20	107.57	108.45	105.97	0.27	105.41	105.46	105.47	105.52	106.23	106.28	106.30	106.35	87.11	89.09	98.03	100.22	97.55	100.60	93.89	89.44	85.40	82.91	79.27	0.84	0.13
204-1	C	104.20	0.93	102.08	102.50	102.69	103.02	103.47	105.84	106.11	107.71	104.18	0.34	103.56	103.61	103.66	103.73	104.61	104.67	104.70	104.82	87.47	88.89	96.92	99.45	95.58	96.71	92.73	87.80	84.23	81.75	78.02	1.09	0.40
204-1	D	104.55	0.91	101.67	103.02	103.23	103.41	103.80	106.11	106.57	107.81	104.59	0.29	103.99	104.07	104.08	104.19	104.97	105.03	105.17	105.24	88.10	89.41	97.32	100.04	95.84	96.79	92.57	87.94	84.27	81.66	77.92	1.10	0.12
204-1	E	110.08	1.01	105.82	107.70	108.34	108.78	109.36	111.51	111.81	112.49	110.08	0.44	109.11	109.26	109.28	109.35	110.66	110.77	110.83	110.90	94.02	95.68	103.94	105.09	102.53	101.39	96.78	91.85	86.31	83.09	79.50	1.58	0.48
204-1	F	108.80	0.82	106.32	107.24	107.47	107.72	108.14	110.20	110.41	110.80	108.79	0.46	107.86	107.98	108.03	108.12	109.38	109.77	109.81	109.86	91.23	93.58	102.28	103.85	100.91	100.91	96.29	91.80	86.42	83.36	79.65	1.83	0.38
204-1	G	103.71	0.97	101.86	102.19	102.25	102.47	102.95	105.38	105.91	107.54	103.73	0.26	103.16	103.28	103.30	103.38	104.13	104.23	104.30	104.32	85.58	88.01	95.59	98.77	94.06	97.27	93.51	88.34	84.66	82.31	78.67	1.02	0.46
204-1	H	108.35	0.75	106.53	106.93	107.14	107.37	107.80	109.60	109.82	110.87	108.37	0.38	107.81	107.85	107.87	107.91	108.87	109.03	109.19	109.28	89.83	93.20	100.80	102.95	102.69	99.85	95.46	90.98	85.97	82.89	79.33	1.34	0.43
204-1	I	108.70	0.90	106.26	106.44	106.80	107.30	108.14	109.83	110.03	110.23	108.84	0.36	107.88	108.02	108.08	108.33	109.23	109.25	109.28	109.33	91.16	92.94	100.53	103.33	102.86	100.83	96.27	92.03	87.17	83.69	80.03	1.26	0.59
204-1	J	108.00	1.00	105.57	106.37	106.51	106.73	107.20	109.80	110.29	111.18	107.99	0.29	107.26	107.37	107.45	107.57	108.34	108.41	108.58	108.65	94.00	95.66	101.21	103.23	99.88	98.99	94.98	90.28	86.23	83.40	79.79	1.21	0.55
205-1	A	102.52	1.16	100.37	100.57	100.74	101.06	101.52	104.48	104.97	106.69	102.56	0.53	101.79	101.88	101.91	101.96	103.41	103.61	103.70	103.80	86.74	87.37	95.24	98.35	94.67	93.79	89.49	84.41	80.12	77.17	74.52	1.82	0.12
205-1	B	101.14	1.28	98.80	99.29	99.41	99.60	99.99	103.22	103.90	106.58	101.06	0.41	100.10	100.31	100.43	100.49	101.62	101.76	101.80	101.90	83.70	85.00	94.42	96.82	93.45	91.94	88.05	84.12	80.54	78.47	75.88	1.50	0.01
205-1	C	101.48	1.25	99.13	99.58	99.72	99.96	100.45	103.76	104.33	105.79	101.48	0.28	100.67	100.82	101.05	101.12	101.83	101.92	102.00	102.15	84.82	85.21	94.55	97.22	94.39	91.71	87.95	84.01	80.49	78.35	75.83	1.18	0.45
205-1	D	101.43	0.68	99.39	100.22	100.35	100.52	100.92	102.55	102.80	103.52	101.44	0.32	100.79	100.82	100.85	101.10	101.91	101.95	101.96	102.01	85.46	84.93	94.14	96.96	94.56	92.15	88.23	84.42	80.71	78.67	76.18	1.14	0.20
205-1	E	101.30	0.62	99.70	100.22	100.33	100.53	100.81	102.31	102.57	103.76	101.31	0.14	100.99	101.01	101.02	101.10	101.47	101.52	101.58	101.67	85.12	85.26	93.66	97.06	94.12	92.18	88.44	84.38	80.70	78.67	76.22	0.57	0.14
205-1	F	102.50	1.15	99.93	100.72	100.95	101.12	101.52	104.76	105.36	106.71	102.48	0.40	101.46	101.52	101.68	101.91	102.93	103.01	103.08	103.25	86.36	87.48	95.78	98.34	95.32	91.97	88.26	84.66	80.99	78.85	76.37	1.56	0.19
205-1	G	102.02	0.61	100.70	100.86	101.05	101.27	101.51	103.07	103.23	103.66	102.02	0.27	101.48	101.54	101.64	101.68	102.40	102.46	102.49	102.53	85.77	86.67	94.65	97.59	95.49	92.11	88.48	85.00	81.05	79.03	76.40	0.95	0.05
205-1	H	102.46	1.09	99.77	100.58	100.82	101.20	101.62	104.50	105.07	106.06	102.43	0.32	101.81	101.86	101.93	102.07	102.85	103.00	103.09	103.31	86.02	87.22	95.76	98.13	95.70	91.96	88.23	84.49	80.51	78.55	76.07	1.23	-0.15
205-1	I	101.51	0.82	99.14	99.87	100.08	100.41	100.88	102.72	103.00	104.85	101.47	0.37	100.65	100.76	100.91	101.01	101.96	102.04	102.08	102.17	86.15	86.05	93.77	97.39	94.57	91.80	87.88	84.20	80.57	78.58	75.78	1.32	-0.28
205-1	J	105.86	1.42	101.84	103.05	103.39	103.76	104.57	108.01	108.27	108.93	105.90	1.14	103.54	103.75	103.81	104.15	107.39	107.53	107.59	107.68	91.58	92.42	99.46	101.81	98.00	95.02	90.62	86.08	82.62	79.60	75.67	3.84	0.03
205-1	K	104.77	1.63	99.83	100.86	101.26	101.85	103.69	106.61	106.94	107.73	104.82	1.31	101.36	101.48	101.65	102.32	105.96	106.17	106.26	106.29	90.61	91.17	98.14	100.55	97.18	94.33	90.46	85.62	82.07	79.31	75.27	4.78	-0.07
205-1	L	101.31	0.96	99.40	99.88	100.02	100.18	100.53	102.87	103.96	104.89	101.31	0.23	100.76	100.84	100.89	100.96	101.58	101.63	101.70	101.74	85.64	85.49	93.69	96.95	92.28	93.77	89.82	84.71	80.30	77.43	74.46	0.85	0.67
205-1	M	100.88	1.11	98.14	98.92	99.39	99.58	100.02	102.62	103.37	106.77	100.94	0.44	100.15	100.25	100.28	100.45	101.47	101.86	101.91	102.01	85.10	85.09	93.10	96.41	92.06	93.57	89.34	84.24	80.18	77.60	74.52	1.66	0.24

Site ID	Surf ID	PM-R 7 ft. Avg. Mean	PM-R 7 ft. Avg. StDev	PM-R 7 ft. Avg. Min	PM-R 7 ft. Avg. 2.5%	PM-R 7 ft. Avg. 5%	PM-R 7 ft. Avg. 10%	PM-R 7 ft. Avg. 25%	PM-R 7 ft. Avg. 95%	PM-R 7 ft. Avg. 97.5%	PM-R 7 ft. Avg. Max	PM-R 44 ft. Avg. Mean	PM-R 44 ft. Avg. StDev	PM-R 44 ft. Avg. Min	PM-R 44 ft. Avg. 2.5%	PM-R 44 ft. Avg. 5%	PM-R 44 ft. Avg. 10%	PM-R 44 ft. Avg. 90%	PM-R 44 ft. Avg. 95%	PM-R 44 ft. Avg. 97.5%	PM-R 44 ft. Avg. Max	PM-R Avg Spec. 500	PM-R Avg Spec. 630	PM-R Avg Spec. 800	PM-R Avg Spec. 1000	PM-R Avg Spec. 1250	PM-R Avg Spec. 1600	PM-R Avg Spec. 2000	PM-R Avg Spec. 2500	PM-R Avg Spec. 3150	PM-R Avg Spec. 4000	PM-R Avg Spec. 5000	PM-R 44 ft. Avg 95% PWL	R PM minus AM dBA
206-1	A	105.89	0.86	103.23	104.18	104.41	104.72	105.24	107.12	107.52	109.03	105.91	0.40	104.98	105.16	105.23	105.33	106.46	106.53	106.56	106.62	88.41	89.09	96.60	103.05	96.74	96.65	93.37	88.31	84.19	81.14	78.36	1.40	0.60
206-1	B	106.55	1.01	104.61	104.97	105.12	105.37	105.82	107.70	108.08	113.96	106.58	0.68	105.82	105.86	105.90	106.00	106.97	108.59	108.75	108.82	89.94	91.17	99.00	100.97	101.30	97.40	93.57	88.72	84.52	81.35	78.68	2.90	0.55
206-1	C	106.87	1.31	104.29	104.85	105.12	105.32	105.78	109.26	109.66	112.41	106.95	1.15	105.33	105.38	105.45	105.69	108.93	109.01	109.06	109.32	94.11	90.45	98.26	103.14	99.20	97.79	93.55	88.18	84.16	81.22	78.60	3.68	0.34
206-1	D	105.06	0.66	103.39	103.79	104.02	104.23	104.51	106.10	106.25	107.80	105.05	0.26	104.55	104.61	104.65	104.72	105.41	105.49	105.56	105.65	88.21	94.16	96.14	101.19	96.44	96.51	92.46	87.42	83.98	81.15	78.70	0.96	0.34
206-1	E	105.69	1.23	102.85	103.60	103.80	104.07	104.64	107.81	108.59	110.33	105.68	0.99	104.22	104.28	104.33	104.38	107.06	107.31	107.61	107.75	91.78	88.43	99.32	101.11	96.74	97.38	93.43	87.62	84.08	81.24	78.83	3.32	0.69
206-1	F	104.55	0.69	102.71	103.17	103.46	103.63	104.07	105.65	106.00	106.83	104.50	0.35	103.82	103.90	103.95	104.11	105.10	105.16	105.21	105.25	87.26	88.89	96.92	100.74	96.52	95.34	92.23	86.84	83.03	80.14	77.33	1.30	-0.88
206-1	G	104.46	1.02	101.87	102.53	102.82	103.11	103.59	106.21	106.42	107.31	104.44	0.76	103.30	103.48	103.51	103.55	105.50	105.75	105.83	105.93	85.81	88.11	96.80	99.82	97.43	95.83	93.27	87.80	84.12	81.02	78.04	2.34	-0.63
206-1	H	101.64	0.81	99.72	100.29	100.49	100.67	100.98	103.07	103.54	104.55	101.63	0.22	101.13	101.31	101.35	101.38	101.99	102.05	102.08	102.14	83.19	85.11	92.49	96.98	93.68	94.53	91.44	86.13	82.36	79.89	77.04	0.77	-0.91
206-1	I	107.77	0.71	105.62	106.46	106.60	106.78	107.19	108.80	109.08	110.21	107.77	0.38	107.12	107.19	107.23	107.28	108.29	108.40	108.43	108.56	86.16	89.79	98.31	105.32	99.50	97.19	94.06	88.07	83.69	80.56	77.70	1.24	-0.95
207-1	A	102.58	0.67	100.57	101.29	101.41	101.76	102.04	103.55	104.05	105.03	102.57	0.26	102.15	102.20	102.24	102.25	103.00	103.06	103.08	103.14	88.68	87.92	93.09	97.52	92.56	96.33	93.09	88.20	83.71	80.67	77.68	0.88	-0.10
207-1	B	109.96	0.78	107.26	108.35	108.61	108.90	109.43	111.01	111.36	112.43	109.94	0.36	109.38	109.44	109.47	109.54	110.42	110.85	111.01	111.08	90.31	89.82	96.39	108.60	98.65	98.22	96.58	90.83	85.75	82.17	78.94	1.57	-0.19
207-1	C	109.38	1.08	106.05	106.84	107.15	107.71	108.65	110.78	110.96	111.60	109.42	0.83	107.53	107.60	107.65	107.79	110.49	110.54	110.55	110.58	90.12	100.26	101.91	101.92	102.69	102.27	98.05	91.83	86.55	82.84	79.94	2.95	-0.20
207-1	D	107.99	1.57	103.84	104.62	105.13	105.61	106.50	110.23	110.64	112.18	108.08	1.04	105.35	106.05	106.24	106.44	109.18	109.56	109.86	110.03	93.04	92.50	100.74	103.29	99.86	100.28	96.07	90.23	85.27	81.84	78.93	3.81	-0.19
207-1	E	103.37	0.96	101.37	101.83	102.00	102.22	102.64	104.63	105.12	109.76	103.37	0.66	102.25	102.37	102.47	102.60	104.55	104.80	104.84	105.00	90.49	88.28	94.76	98.38	93.91	96.40	93.37	88.42	84.34	81.42	78.29	2.48	0.02
207-1	F	102.94	0.75	100.93	101.50	101.76	101.94	102.36	104.05	104.45	104.92	102.94	0.29	102.39	102.52	102.55	102.59	103.32	103.37	103.46	103.55	89.67	87.34	94.20	97.78	93.16	96.52	93.09	88.13	83.76	80.89	77.70	0.94	-0.01
207-1	G	110.02	0.76	107.35	108.27	108.63	109.00	109.45	111.10	111.33	111.85	110.05	0.37	109.28	109.35	109.40	109.45	110.41	110.59	110.64	110.72	89.01	88.85	95.68	108.94	97.42	97.42	96.31	90.15	85.71	82.38	79.20	1.29	0.23
207-1	H	104.99	0.67	103.04	103.68	103.84	104.14	104.50	106.13	106.26	107.59	105.04	0.27	104.40	104.46	104.49	104.64	105.37	105.52	105.57	105.68	88.84	87.91	95.29	100.20	96.88	97.15	96.59	90.72	85.90	82.55	79.30	1.11	-0.48
207-1	I	102.59	0.65	100.97	101.40	101.46	101.69	102.08	103.50	103.77	104.88	102.59	0.33	102.00	102.05	102.09	102.16	103.02	103.25	103.28	103.29	86.37	86.66	91.90	95.94	94.55	95.46	96.04	89.59	84.87	82.17	79.13	1.23	-0.28
207-1	J	104.80	0.96	102.36	102.96	103.18	103.42	103.98	106.24	106.62	107.27	104.88	0.65	103.43	103.54	103.67	103.84	105.59	105.89	105.97	106.03	87.69	86.94	92.74	96.76	100.58	98.41	94.53	89.73	84.94	81.49	78.99	2.43	0.15
207-1	K	107.15	1.29	104.46	104.88	105.13	105.43	105.96	109.36	109.60	110.05	107.05	1.02	105.51	105.65	105.69	105.80	108.44	108.62	108.73	108.91	90.84	90.08	99.66	103.27	98.88	97.56	96.17	90.12	85.28	81.89	78.86	3.08	-0.66
207-1	L	101.46	0.66	99.31	100.22	100.49	100.66	100.93	102.52	102.68	103.45	101.45	0.20	101.04	101.14	101.17	101.20	101.76	101.87	101.90	101.94	87.52	87.07	91.35	96.08	91.81	95.21	92.54	87.85	82.90	80.05	77.60	0.76	-0.31
207-1	M	107.78	1.19	104.28	105.30	105.71	106.05	106.76	109.55	109.78	110.45	107.74	0.86	106.13	106.30	106.45	106.55	108.89	108.94	108.97	109.03	88.70	88.26	93.82	106.23	96.63	96.36	95.71	89.87	85.16	81.75	79.26	2.67	-0.70
207-1	N	106.90	1.36	103.15	104.25	104.61	105.06	105.83	109.31	109.99	110.55	106.89	1.04	105.14	105.24	105.30	105.55	108.64	108.95	109.01	109.18	89.82	88.46	93.90	105.06	95.96	96.04	95.59	89.61	84.80	81.56	79.14	3.77	-0.39
207-1	O	106.99	0.89	104.45	105.36	105.56	105.78	106.30	108.41	108.74	109.90	107.01	0.35	106.06	106.18	106.26	106.56	107.41	107.48	107.55	107.64	86.98	86.39	92.89	105.35	95.39	95.89	96.04	90.09	84.56	81.33	78.63	1.37	-1.02
207-1	P	105.53	0.77	103.68	104.23	104.34	104.52	104.97	106.71	107.05	109.60	105.53	0.32	104.73	104.81	104.84	104.89	105.80	105.84	105.88	106.01	91.16	91.86	98.36	101.18	98.34	95.33	92.24	87.64	84.06	81.00	78.44	1.07	-0.21
208-1	A	104.42	1.07	102.13	102.53	102.65	102.92	103.36	105.96	106.27	106.85	104.46	0.86	103.23	103.25	103.27	103.32	105.42	105.53	105.58	105.66	87.17	88.97	97.21	99.88	95.14	96.86	93.14	88.37	84.94	82.16	78.56	2.33	0.06
208-1	B	105.58	1.19	102.38	103.06	103.35	103.76	104.60	107.09	107.43	109.91	105.62	0.85	103.79	103.84	103.88	103.94	106.35	106.49	106.58	106.64	88.50	91.07	98.92	101.01	96.72	97.21	93.73	89.36	85.38	82.04	78.66	2.74	-0.17
208-1	C	104.40	0.84	102.56	102.88	103.09	103.38	103.77	105.84	106.35	108.53	104.47	0.39	103.82	103.87	103.91	103.94	105.00	105.06	105.14	105.21	86.56	89.03	97.11	99.93	95.05	96.67	93.34	88.75	85.15	82.39	78.75	1.27	0.12
208-1	D	104.55	1.03	102.03	102.44	102.68	103.09	103.82	106.13	106.57	107.69	104.52	0.65	103.33	103.39	103.41	103.47	105.21	105.28	105.31	105.35	86.97	88.71	94.96	98.54	97.30	97.66	95.61	91.29	86.73	83.29	80.30	1.92	-0.26
208-1	E	105.46	1.11	102.59	103.23	103.51	103.85	104.65	107.29	107.78	108.69	105.53	0.57	104.08	104.17	104.23	104.43	106.15	106.29	106.39	106.51	88.51	90.95	96.89	99.32	99.04	98.03	95.42	90.61	86.35	83.06	80.17	2.21	-0.13
208-1	F	106.14	1.11	102.92	103.77	104.23	104.57	105.24	107.84	108.16	109.78	106.14	0.42	104.99	105.12	105.24	105.58	106.62	106.88	106.92	107.08	89.23	91.40	98.54	100.83	98.85	98.27	95.32	90.47	86.74	82.77	79.75	1.80	0.34
208-1	G	107.25	0.96	104.60	105.43	105.57	105.95	106.46	108.84	109.23	110.00	107.26	0.51	106.15	106.33	106.47	106.60	107.92	108.02	108.09	108.28	90.20	92.52	99.93	101.86	100.43	99.20	95.76	90.72	86.81	83.00	80.01	1.76	0.23
208-1	H	108.95	1.20	104.62	106.43	106.72	107.25	108.10	110.85	111.28	112.45	108.92	0.65	108.11	108.16	108.20	108.23	110.12	110.32	110.50	110.58	91.54	94.55	101.49	104.24	101.94	100.34	96.85	91.74	86.57	83.00	80.04	2.34	0.30
208-1	I	109.51	0.88	107.11	107.60	107.82	108.20	108.86	110.82	110.94	111.65	109.61	0.52	108.23	108.47	108.62	108.78	110.20	110.26	110.34	110.40	88.15	91.44	99.25	107.16	100.00	99.96	96.60	91.70	86.89	83.38	80.50	1.87	0.22
209-1	A																																	
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209-1	Y																																	
305-1	A	104.88	0.82	102.51	103.35	103.55	103.78	104.26	106.26	106.61	108.64	104.88	0.38	103.99	104.21	104.29	104.41	105.48	105.59	105.66	105.79	88.06	90.00	97.26	100.70	96.53	96.23	93.50	88.15	84.26	82.05	78.41	1.46	0.86
305-1	B	104.22	1.39	100.28	101.75	102.05	102.38	103.05	106.82	107.36	109.23	104.23	0.56	102.67	103.02	103.24	103.49	104.91	105.05	105.15	105.46	86.82	89.12	96.57	100.24	95.22	95.65	92.97	87.62	83.84	81.70	78.32	2.14	1.01
307-1	A	110.61	1.70	103.97	105.99	107.40	108.33	109.32	112.81	113.23	113.97	110.60	1.24	105.84	106.92	108.01	108.95	111.65	112.20	112.48	113.25	88.19	89.72	96.20	109.07	100.66	99.48	97.41	92.83	86.88	83.60	80.37	5.57	0.19
307-1	B	106.54	1.34	103.25	103.92	104.10	104.42	105.40	108.55	108.90	110.46	106.62	0.86	104.32	104.43	104.87	105.35	107.56	107.73	108.00	108.18	89.65	91.41	97.09	101.58	100.33	98.27	95.49	91.56	86.35	83.51	80.36	3.57	0.13
307-1	C	107.89	1.06	105.45	106.04	106.28	106.53	106.94	109.66	109.80	111.21	107.83	0.43	107.27	107.30	107.32	107.35	108.52	108.67	108.69	108.73	88.35	89.50	95.44	100.59	104.33	100.12	97.00	92.47	87.18	83.49	80.45	1.39	-0.38
307-1	D	105.61	0.74	103.73	104.33	104.51	104.71	105.03	106.82	107.09	109.69	105.64	0.31	105.07	105.20	105.23	105.27	106.15	106.26	106.29	106.34	88.56	89.44	96.14	99.82	99.40	97.95	95.90	91.73	86.72	83.56	80.08	1.09	0.23
307-1	E	107.92	1.22	104.37	105.71	105.88	106.19	106.84	109.78	110.20	111.06	107.99	0.87	106.50	106.59	106.62	106.74	109.17	109.36	109.51	109.78	88.46	89.75	96.68	100.69	104.45	99.52	96.48	92.52	86.87	83.40	80.14	2.92	0.46
307-1	F	105.70	0.93	103.99	104.24	104.35	104.47	104.86	107.48	107.78	108.99	105.74	0.52	104.70	104.84	104.87	105.00	106.40	106.67	106.77	106.82	88.33	89.89	96.12	100.34	99.51	97.92	95.32	91.28	86.35	83.38	80.27	1.93	0.02
309-1	A	110.20	0.78	107.69	108.63	108.85	109.12	109.59	111.37	111.54	112.35	110.21	0.30	109.54	109.67	109.73	109.82	110.62	110.67	110.72	110.76	92.25	95.53	103.70	105.15	103.33	101.30	97.33	92.78	87.84	83.85	80.68	1.04	-0.36
309-1	B	109.46	0.89	107.18	107.77	108.01	108.26	108.74	110.97	111.24	111.89	109.48	0.57	108.42	108.50	108.53	108.61	110.31	110.41	110.49	110.59	91.80	94.80	102.41	104.13	102.70	101.33	97.29	93.09	87.47	83.87	80.87	1.98	-0.09
309-1	C	109.58	1.40	106.42	107.13	107.48	107.88	108.32	112.06	112.58	113.76	109.51	1.10	107.71	107.85	108.18	108.31	111.40	111.49	111.52	111.57	92.83	96.16	103.62	104.54	102.38	100.09	95.60	91.23	87.00	83.36	80.09	3.67	0.07
310-1	A	106.41	1.04	103.27	104.37	104.69	104.94	105.59	108.14	108.42	110.02	106.45	0.77	104.86	104.99	105.14	105.29	107.28	107.57	107.79	107.98	90.92	92.70	99.81	101.60	97.79	98.32	93.95	89.24	84.58	81.60	78.17	2.81	-0.04
310-1	B	107.62	0.86	105.05	105.93	106.13	106.42	106.91	109.01	109.23	109.82	107.63	0.38	106.63	106.92	106.98	107.13	108.16	108.25	108.33	108.61	89.02	93.86	102.06	102.98	98.88	98.26	94.29	89.66	85.27	82.19	78.45	1.40	-0.18
310-1	C	106.17	0.97	103.63	104.35	104.53	104.83	105.32	107.71	107.95	108.80	106.13	0.67	104.87	104.98	105.05	105.17	107.08	107.20	107.31	107.93	89.22	90.10	98.28	100.50	100.35	98.21	94.18	90.00	85.39	82.29	78.56	2.33	0.11
311-1	A	102.89	0.96	100.56	101.30	101.48	101.71	102.12	104.51	105.12	108.14	102.89	0.37	102.02	102.28	102.36	102.45	103.30	103.61	103.95	104.31	85.36	86.86	96.52	98.15	93.88	95.16	90.36	86.30	83.58	81.16	75.69	1.67	-0.27
317-1	A																																	
317-1	B																																	
319-1	A																																	
319-1	B																																	
319-1	C																																	
320-1	A	101.36	1.00	99.31	99.77	99.92	100.16	100.52	103.14	103.48	104.85	101.35	0.27	100.72	100.89	100.94	100.99	101.70	101.79	101.90	102.10	84.24	85.75	93.92	96.87	92.59	93.54	90.32	84.78	81.35	78.64	75.51	1.02	-1.53
320-1	B																																	
320-1	C	100.78	0.92	98.60	99.24	99.41	99.61	100.05	102.46	102.90	104.39	100.77	0.35	99.88	100.08	100.15	100.30	101.19	101.39	101.56	101.75	83.56	84.82	93.17	96.36	91.64	93.19	89.85	84.51	81.15	78.56	75.41	1.48	-1.59
322-1	A	106.79	0.92	103.68	105.10	105.31	105.59	106.10	108.34	108.76	110.19	106.80	0.45	105.78	105.98	106.06	106.25	107.34	107.48	107.69	108.00	89.71	91.21	97.98	101.90	100.25	98.75	95.55	90.93	86.48	83.69	80.17	1.71	-0.15
323-1	A	102.42	0.94	99.47	100.59	100.80	101.10	101.68	103.99	104.33	105.59	102.43	0.52	101.06	101.26	101.33	101.46	102.88	102.94	103.00	103.09	84.18	86.04	94.05	97.92	93.88	95.18	91.80	86.52	82.62	80.07	77.63	1.74	-0.75
323-1	B	110.39	1.53	105.75	107.15	107.65	108.26	109.09	112.61	112.96	113.99	110.39	0.76	108.37	108.80	108.92	109.31	111.19	111.72	111.84	112.06	92.98	95.15	103.31	106.65	103.42	100.10	94.76	89.48	84.93	81.29	78.50	3.04	-0.15
324-1	A	102.42	0.91	99.79	100.82	101.03	101.31	101.71	103.74	104.37	109.38	102.41	0.47	101.36	101.59	101.70	101.77	102.99	103.21	103.42	103.82	83.43	84.51	93.23	97.66	94.48	95.66	92.08	87.44	83.33	80.27	77.52	1.82	0.07
325-1	A	107.77	0.98	105.46	106.13	106.40	106.59	106.93	109.55	109.86	111.42	107.79	0.29	107.06	107.24	107.32	107.40	108.23	108.32	108.33	108.38	88.27	90.94	97.75	101.43	100.83	102.52	97.05	92.86	88.67	84.40	80.83	1.10	0.15
325-1	B	108.10	1.22	105.67	106.35	106.47	106.77	107.12	110.72	111.30	112.83	108.12	0.38	107.36	107.50	107.53	107.70	108.67	108.96	109.01	109.06	88.91	92.85	99.20	101.25	100.65	103.01	97.27	93.23	88.77	84.44	80.97	1.51	0.22
325-1	C	107.60	0.94	105.21	105.75	106.10	106.37	106.82	109.28	109.52	110.49	107.61	0.43	106.55	106.68	106.71	106.77	108.07	108.19	108.25	108.33	88.14	90.22	97.58	100.64	100.35	102.75	97.40	93.50	88.65	84.55	81.03	1.56	-0.04
325-1	D	107.94	0.96	105.46	106.22	106.47	106.81	107.22	109.74	110.26	111.08	107.95	0.25	107.33	107.43	107.47	107.63	108.25	108.29	108.44	108.46	87.04	89.67	97.46	101.02	101.06	103.25	97.35	93.29	89.03	84.46	81.03	1.01	0.32
325-1	E	107.70	1.03	105.39	105.79	106.07	106.39	106.84	109.45	109.89	112.72	107.68	0.48	106.61	106.69	106.78	106.95	108.22	108.45	108.61	108.68	88.47	90.93	97.83	100.97	100.36	102.88	97.00	92.85	88.55	84.52	80.89	1.92	0.12
336-1	A	106.07	0.73	103.97	104.85	105.02	105.17	105.52	107.26	107.49	111.10	106.07	0.39	105.22	105.42	105.55	105.65	106.46	106.86	107.20	107.57	88.44	89.86	97.84	101.24	97.91	98.43	95.99	91.43	87.12	84.44	80.34	1.77	0.34
339-1	A																																	
339-1	B																																	
339-1	C																																	
339-1	D																																	
339-1	E																																	
340-1	A																																	
340-1	B																																	
340-1	C																																	
340-1	D																																	
341-1	A	103.37	1.03	100.73	101.74	101.92	102.17	102.59	105.03	105.60	112.13	103.37	0.51	102.36	102.61	102.66	102.76	103.93	104.19	104.86	105.16	86.99	86.83	94.35	98.96	94.99	95.89	92.83	88.47	84.20	82.01	78.97	2.25	-0.77
342-1	A																																	
342-1	B																																	
342-1	C																																	
343-1	A																																	

Site ID	Surf ID	AM-C 7 ft. Avg. Mean	AM-C 7 ft. Avg. StDev	AM-C 7 ft. Avg. Min	AM-C 7 ft. Avg. 2.5%	AM-C 7 ft. Avg. 5%	AM-C 7 ft. Avg. 10%	AM-C 7 ft. Avg. 90%	AM-C 7 ft. Avg. 95%	AM-C 7 ft. Avg. 97.5%	AM-C 7 ft. Avg. Max	AM-C 44 ft. Avg. Mean	AM-C 44 ft. Avg. StDev	AM-C 44 ft. Avg. Min	AM-C 44 ft. Avg. 2.5%	AM-C 44 ft. Avg. 5%	AM-C 44 ft. Avg. 10%	AM-C 44 ft. Avg. 90%	AM-C 44 ft. Avg. 95%	AM-C 44 ft. Avg. 97.5%	AM-C 44 ft. Avg. Max	AM-C Avg Spec. 500	AM-C Avg Spec. 630	AM-C Avg Spec. 800	AM-C Avg Spec. 1000	AM-C Avg Spec. 1250	AM-C Avg Spec. 1600	AM-C Avg Spec. 2000	AM-C Avg Spec. 2500	AM-C Avg Spec. 3150	AM-C Avg Spec. 4000	AM-C Avg Spec. 5000	AM-C 44 ft. Avg 95% PWL
101-1	A																																
101-1	B	102.83	0.99	99.83	100.94	101.07	101.38	103.87	104.23	104.49	108.92	102.84	0.57	101.85	101.98	102.01	102.08	103.58	103.74	104.11	104.42	88.18	88.76	96.45	98.37	93.91	94.02	89.91	84.93	81.22	78.11	75.02	2.13
101-1	C	103.82	0.97	100.73	101.90	102.18	102.45	104.96	105.32	105.59	106.00	103.83	0.31	103.07	103.17	103.21	103.34	104.22	104.31	104.35	104.42	89.11	90.48	98.03	99.43	95.16	93.83	89.19	84.76	81.49	78.86	76.05	1.18
101-1	D	101.53	0.80	99.19	100.00	100.18	100.46	102.50	102.84	103.21	104.39	101.53	0.36	100.74	100.81	100.84	100.90	101.92	102.12	102.24	102.30	87.54	87.02	94.57	96.97	91.32	94.20	89.54	84.16	80.47	77.12	74.16	1.43
101-1	E	105.99	0.91	102.57	104.12	104.53	104.89	107.07	107.36	107.81	109.23	106.04	0.47	105.02	105.13	105.32	105.48	106.59	106.96	107.20	107.32	91.48	92.08	99.47	101.54	97.18	97.21	93.22	87.75	83.38	80.22	76.97	2.08
101-1	F	103.92	0.94	101.34	102.40	102.58	102.79	104.92	105.50	106.14	108.26	103.92	0.50	102.73	102.94	103.17	103.34	104.39	104.95	105.20	105.31	90.07	91.08	97.85	99.57	94.93	94.22	89.50	85.03	81.88	78.91	76.26	2.26
101-1	G																																
101-1	H																																
101-1	I																																
101-1	J	102.46	0.97	99.32	100.50	100.84	101.14	103.59	104.08	104.37	105.00	102.44	0.44	101.47	101.58	101.63	101.85	102.96	103.13	103.41	103.59	88.15	89.25	96.11	97.80	94.97	92.60	88.02	83.80	80.03	76.68	74.32	1.83
101-1	K	106.24	1.07	103.35	104.01	104.34	104.76	107.55	107.85	108.18	109.69	106.24	0.64	104.72	105.03	105.27	105.53	107.07	107.30	107.55	107.77	88.36	89.28	96.92	104.30	96.40	94.44	90.13	84.98	80.80	77.70	75.27	2.52
101-1	L	107.50	1.77	102.20	103.63	104.24	104.77	109.45	110.19	110.84	111.91	107.62	0.94	104.30	105.21	105.64	106.24	108.52	108.73	108.94	109.13	93.35	94.77	100.87	103.18	99.74	97.79	92.70	86.83	81.59	78.41	75.88	3.72
101-1	M																																
101-1	N																																
101-1	O																																
101-1	P	101.79	0.90	99.27	100.20	100.42	100.68	102.77	103.10	103.77	105.82	101.83	0.49	100.65	100.86	101.13	101.26	102.50	102.75	102.83	103.01	87.56	88.69	95.62	97.43	92.75	92.31	87.78	83.61	80.36	78.25	75.54	1.97
101-1	Q	101.96	0.90	99.47	100.33	100.61	100.87	102.96	103.46	103.94	105.53	101.90	0.40	100.87	100.98	101.06	101.47	102.22	102.44	102.84	103.54	87.23	88.37	95.54	97.60	92.76	93.18	88.65	83.87	80.23	77.69	74.77	1.86
101-1	R	102.51	0.91	99.58	100.87	101.03	101.34	103.67	104.11	104.44	105.37	102.47	0.46	101.42	101.50	101.74	101.94	103.09	103.17	103.23	103.46	87.01	88.45	96.15	98.32	93.39	93.60	89.10	83.91	80.26	77.71	74.44	1.72
101-2	A																																
101-2	B	102.65	0.93	100.27	100.82	101.07	101.41	103.74	104.16	104.49	106.95	102.63	0.48	101.70	101.82	101.87	101.99	103.24	103.51	103.78	104.05	87.32	88.74	96.25	98.35	94.17	93.42	89.17	83.96	79.93	77.18	73.68	1.96
101-2	C	103.03	1.09	100.23	101.11	101.30	101.61	104.42	105.12	105.46	105.82	103.07	0.73	102.07	102.17	102.25	102.36	104.13	104.98	105.05	105.11	88.78	90.23	97.16	98.62	94.54	92.91	87.94	83.14	79.87	77.72	74.35	2.88
101-2	D	100.55	0.80	98.37	99.18	99.31	99.50	101.60	101.94	102.30	103.31	100.55	0.33	99.74	99.88	99.93	100.08	100.97	101.16	101.19	101.34	85.52	85.97	93.59	95.91	91.06	93.22	88.52	82.87	79.17	76.53	73.04	1.31
101-2	E	105.23	0.90	101.66	103.33	103.72	104.04	106.21	106.47	106.77	108.27	105.28	0.36	104.59	104.68	104.75	104.84	105.67	105.88	106.29	106.46	90.36	91.65	98.48	100.82	96.98	96.16	92.41	86.91	82.51	79.87	76.03	1.62
101-2	F	103.22	0.86	100.88	101.53	101.69	101.90	104.27	104.49	104.67	105.31	103.26	0.45	102.06	102.24	102.35	102.55	103.74	103.82	103.88	103.99	88.46	90.06	97.37	98.82	94.68	93.28	88.58	83.39	79.84	77.32	73.71	1.64
101-2	G	104.52	1.22	101.40	102.21	102.50	102.85	105.91	106.59	107.29	108.43	104.58	0.80	102.92	103.19	103.32	103.45	105.50	106.12	106.78	106.99	90.56	92.48	99.10	100.04	95.97	93.39	88.26	83.33	80.02	77.68	74.19	3.59
101-2	H	100.64	0.77	98.77	99.27	99.41	99.62	101.63	101.90	102.11	103.56	100.51	0.36	100.08	100.14	100.17	100.32	101.21	101.38	101.43	101.64	85.20	85.53	93.93	95.75	90.53	93.69	89.10	83.67	79.21	76.44	73.51	1.28
101-2	I	103.53	1.07	100.48	101.40	101.63	102.03	104.81	105.10	105.48	107.19	103.53	0.47	102.76	102.87	102.91	102.99	104.31	104.56	104.66	104.79	89.46	90.16	96.90	99.06	96.01	93.84	88.89	84.38	80.75	76.70	73.85	1.79
101-2	J	101.81	1.04	99.47	99.99	100.18	100.40	103.11	103.51	103.98	105.25	101.82	0.42	100.88	101.01	101.09	101.31	102.34	102.58	102.69	102.80	86.82	87.67	95.17	96.85	94.52	92.85	89.02	84.16	79.92	76.59	73.80	1.67
101-2	K	105.91	1.22	102.81	103.40	103.68	103.99	107.31	107.59	107.88	108.48	105.93	0.86	104.39	104.45	104.49	104.57	106.91	107.10	107.26	107.32	87.14	88.24	96.09	104.04	96.15	94.19	90.48	85.13	79.54	76.68	73.61	2.81
101-2	L	107.46	1.84	102.61	103.43	103.99	104.74	109.54	110.24	110.83	112.25	107.58	1.00	103.89	104.99	105.56	106.64	108.91	109.09	109.39	109.77	93.27	93.85	100.53	103.39	99.77	97.61	93.08	87.18	80.40	77.37	74.32	4.01
101-2	M	101.43	0.77	98.94	99.98	100.24	100.46	102.23	102.70	103.10	103.99	101.42	0.21	100.96	101.03	101.07	101.11	101.67	101.73	101.79	101.84	87.55	88.08	94.99	97.09	92.92	91.95	87.62	82.84	78.60	76.29	73.09	0.76
101-2	N	103.43	1.70	100.18	100.69	101.10	101.43	104.61	106.77	108.28	110.66	103.43	0.88	101.89	101.92	101.98	102.65	105.17	105.22	105.23	105.25	90.26	90.60	97.51	99.42	95.03	91.34	87.04	83.27	79.45	77.44	74.03	3.31
101-2	O	101.21	0.82	99.18	99.70	99.87	100.07	102.21	102.51	102.83	103.59	101.21	0.41	100.29	100.45	100.51	100.57	101.72	101.81	101.83	101.87	86.75	87.49	94.94	96.78	92.51	92.00	87.49	83.06	79.12	76.84	73.66	1.39
101-2	P	101.40	0.86	99.07	99.76	100.03	100.27	102.50	102.84	103.04	104.17	101.45	0.48	100.48	100.58	100.67	100.80	102.00	102.26	102.45	102.52	86.57	87.70	95.45	96.94	92.80	91.81	87.32	82.96	79.05	76.82	73.61	1.87
101-2	Q	101.35	1.02	98.57	99.66	99.86	100.10	102.41	103.12	103.80	105.34	101.25	0.51	100.39	100.52	100.63	100.72	101.79	102.31	102.81	103.60	86.43	87.06	94.92	97.00	92.45	92.56	88.13	83.27	79.24	76.91	73.51	2.30
101-2	R	101.88	1.02	99.46	100.01	100.26	100.51	103.09	103.60	104.03	105.34	101.84	0.61	100.47	100.71	101.00	101.12	102.66	102.82	102.86	103.01	86.59	87.42	95.40	97.47	92.74	93.46	89.17	84.13	79.51	77.12	73.61	2.15
101-3	A	103.99	0.77	101.88	102.49	102.69	102.91	104.87	105.32	105.56	106.29	103.98	0.47	102.85	102.96	103.09	103.21	104.61	104.75	104.83	104.97	87.09	90.06	96.85	98.97	95.79	95.76	93.43	88.72	82.85	79.71	74.87	1.87
101-3	B	104.11	0.98	101.50	102.20	102.43	102.69	105.24	105.58	105.95	107.45	104.09	0.63	102.81	102.94	103.02	103.15	104.82	105.04	105.34	105.53	87.02	89.82	96.61	99.22	95.88	96.04	93.77	88.96	83.12	79.80	74.96	2.40
101-3	C	104.81	1.06	102.34	102.90	103.07	103.40	106.19	106.85	107.10	107.90	104.84	0.75	103.72	103.92	104.00	104.09	105.88	106.80	107.02	107.07	88.72	91.78	97.85	99.91	96.94	95.97	93.48	88.40	82.74	79.50	74.61	3.10
101-3	D	102.59	0.69	100.70	101.41	101.58	101.78	103.46	103.70	104.01	105.78	102.59	0.24	102.09	102.16	102.21	102.26	102.88	102.95	103.08	103.27	85.73	88.24	95.08	97.23	93.14	95.79	92.71	87.87	82.47	79.20	74.93	0.91
101-3	E	107.01	0.77	104.31	105.35	105.64	105.99	107.92	108.16	108.31	108.41	107.05	0.35	105.91	106.16	106.47	106.68	107.44	107.58	107.86	107.94	91.00	93.33	99.30	102.19	98.79	98.54	96.82	92.14	85.64	82.37	77.36	1.69
101-3	F	104.79	0.89	102.00	102.93	103.25	103.62	105.91	106.20	106.38	107.09	104.81	0.52	103.40	103.65	103.89	104.15	105.48	105.57	105.65	105.75	88.52	91.23	97.92	99.90	96.81	96.02	93.55	88.62	82.87	79.69	74.85	2.00
101-3	G	105.77	1.16	102.69	103.54	103.85	104.13	107.15	107.76	108.17	110.31	105.83	0.75	104.19	104.29	104.53	104.67	106.43	107.16	107.79	108.18	89.76	93.10	99.50	100.61	97.51	97.01	94.18	88.97	82.70	80.36	75.30	3.50
101-3	H	103.12	0.72	101.40	101.89	102.09	102.30	103.94	104.29	104.50	107.67	103.14	0.27	102.56	102.74	102.81	102.87	103.43	103.75	104.02	104.10	87.24	88.79	96.55	97.53	93.32	96.01	93.10	88.13	81.99	79.66	75.09	1.28
101-3	I	105.30	0.94	102.85	103.48	103.73	104.02	106.48	106.84	107.14	108.06	105.29	0.41	104.70	104.76	104.80	104.83	105.82	106.23	106.35	106.46	89.66	91.80	98.00	99.89	97.87	97.37	94.03	89.61	83.94	80.50	75.65	1.59
101-3	J	104.03	0.86	101.59	102.55	102.77	102.96	105.15	105.53	105.74	107.68	104.02	0.33	103.18	103.26	103.45	103.57	104.38	104.52	104.68	104.81	87.81	90.14	96.83	98.37	96.54	96.16	93.42	89.06	82.70	80.02	75.37	1.42
101-3	K	107.56	1.24	104.48	105.07	105.28	105.74	108.96	109.27	109.46	110.34	107.56	0.98	105.68	105.82	105.94	106.07	108.67	108.79	108.86	108.94	87.42	90.38	97.80	105.28	97.99	97.01	94.66	89.97	82.88	80.08	75.37	3.04
101-3	L	109.25	1.88	103.67	105.68	105.90	106.44	111.35	111.96	112.86	114.15	109.37	1.03	105.91	107.01	107.54	107.86	110.31	110.81	111.05	111.34	94.12	95.71	101.89	104.85	101.49	99.98	97.40	92.93	84.01	80.73	75.90	4.04
101-3	M	104.74	0.88	101.63	103.13	103.41	103.60	105.76	106.19	106.60	107.39	104.69	0.36	104.03	104.19	104.25	104.28	105.29	105.43	105.49	105.56	88.77	91.58	97.93	99.81	97.28	95.53	92.80	88.35	82.60	80.12	75.64	1.30
101-3	N	104.56	1.11	102.21	102.58	102.74	103.03	105.74	106.32	106.51	107.94	104.63	0.64	103.61	103.62	103.63	103.68	105.37	105.44	105.47	105.51	87.63	90.63	97.32	99.69	97.76	95.34	92.47	88.39	82.26	80.19	76.10	1.85
101-3	O	103.84	0.89	101.57	102.12	102.30	102.59	104.86	105.30	105.58	106.81	103.83	0.50	102.71	102.93	102.99	103.07	104.47	104.61	104.88	105.06	86.59	89.44	97.00	98.53	95.86	95.95	92.92	88.42	82.60	80.05	75.56	1.95
101-3	P	103.08	0.74	101.15	101.63	101.78	102.06	103.97	104.24	104.48	106.31	103.10	0.34	102.44	102.56	102.61	102.67	103.53	103.69	103.87	104.02	85.40	87.96	95.78	97.53	94.70	96.09	92.75	88.33	82.53	80.07	75.81	1.31
101-3	Q	103.75	0.91	101.56	102.17	102.38	102.62	104.74	105.41	106.15	106.95	103.69	0.39	102.99	103.04	103.11	103.17	104.10	104.17	104.49	105.39	85.61	88.51	96.59	98.58	95.01	96.46	93.38	88.81	82.78	80.11	75.60	1.45
101-3	R	104.39	0.95	101.90	102.58	102.76	103.03	105.58	105.99	106.19	107.12	104.38	0.56	103.38	103.49	103.53	103.60	105.13	105.19	105.21	105.33	86.02	89.19	96.94	99.32	95.86	97.05	94.08	89.51	83.39	80.58	76.00	1.72
101-4	A	101.81	0.91	99.60	100.02	100.24	100.50	102.77	103.20	103.59	104.65	101.80	0.60	100.51	100.58	100.63	100.80	102.53	102.63	102.68	102.82	86.17	86.50	94.11	97.08	93.34	94.38	90.59	85.89	81.35	78.72	74.79	2.09
101-4	B	102.16	0.82	99.63	100.56	100.77	100.99	103.11	103.43	103.74	104.74	102.16	0.47	101.06	101.22	101.45	101.54	102.79	102.92	103.09	103.23	86.14	86.33	93.79	97.30	93.93	95.07	91.48	86.80	82.03	79.40	75.36	1.87
101-4	C	103.63	1.10	100.59	101.69	101.85	102.16	104.90	105.51	106.10	106.94	103.68	0.70	102.74	102.82	102.85	102.92	104.65	105.31	105.50	105.80	88.70	89.63	96.41	99.11	95.59	95.06	91.09	86.65	82.65	79.93	75.79	2.68
101-4	D	101.02	0.67	99.53	99.91	100.03	100.20	101.87	102.24	102.48	103.93	101.02	0.20	100.53	100.61	100.68	100.75	101.31	101.37	101.38	101.46	87.18	86.22	92.63	95.88	91.63	94.56	90.59	85.65	81.43	78.79	75.03	0.77
101-4	E	104.91	0.76	101.17	103.27	103.63	103.99	105.81	106.03	106.25	107.60	104.94	0.33	104.25	104.36	104.43	104.52	105.40	105.57	105.65	105.75	89.32	90.30	96.96	100.26	97.22	96.62	93.70	89.16	83.97	80.97	76.82	1.29
101-4	F	102.44	0.90	100.34	100.82	100.95	101.20	103.51	104.07	104.27	105.66	102.47	0.59	101.43	101.49	101.53	101.72	103.26	103.40	103.52	103.65	87.52	88.34	95.30	97.76	94.30	94.06	90.34	85.84	81.85	79.04	75.00	2.02
101-4	G	103.72	1.23	100.80	101.37	101.68	102.10	104.97	105.70	106.55	108.79	103.77	0.86	101.70	101.81	102.34	102.82	104.44	105.45	106.00	106.53	88.84	89.78	97.12	99.27	95.18	94.84	90.92	86.03	82.18	79.00	75.19	4.19
101-4	H	100.89	0.82	98.90	99.46	99.69	99.90	101.88	102.37	102.67	105.39	100.88	0.33	100.19	100.26	100.35	100.47	101.33	101.57	101.74	101.86	85.02	85.32	92.92	95.84	91.22	94.55	90.31	85.41	81.28	78.47	74.74	1.48
101-4	I	103.27	0.94	100.65	101.44	101.69	101.97	104.35	104.80	105.32	106.53	103.27	0.40	102.60	102.67	102.71	102.79	103.84	104.05	104.21	104.34	87.50	88.61	95.62	98.52	95.79	95.07	91.28	86.76	83.58	79.61	75.66	1.54
101-4	J	101.90	0.91	99.74	100.39	100.53	100.79	103.05	103.60	104.05	105.09	101.90	0.30	101.23	101.43	101.51	101.58	102.35	102.48	102.63	102.85	86.49	86.43	93.96	96.71	94.40	94.19	91.31	86.42	82.42	79.15	75.45	1.20
101-4	K	105.61	1.14	102.75	103.38	103.69	104.09	107.00	107.51	107.82	108.93	105.59	0.78	104.31	104.45	104.53	104.59	106.84	107.00	107.06	107.13	86.51	87.65	94.95	103.55	95.96	95.23	92.05	87.05	82.59	78.85	75.38	2.61
101-4	L	108.82	2.13	102.07	103.99	104.79	105.47	111.02	112.05	112.39	113.84	108.95	1.23	104.91	105.89	106.43	106.96	110.05	110.18	110.27	110.36	92.95	94.88	100.97	104.62	101.44	100.01	96.19	90.58	84.09	80.37	76.68	4.38
101-4	M	102.15	0.81	100.44	100.71	100.94	101.14	103.23	103.62	104.04	104.66	102.11	0.26	101.69	101.73	101.76	101.80	102.49	102.55	102.58	102.73	85.96	87.56	95.00	97.79	94.02	93.45	89.72	85.41	81.68	78.39	75.02	0.85
101-4	N	101.86	0.70	100.26	100.47	100.62	101.00	102.62	103.15	103.47	103.68	101.83	0.33	101.36	101.39	101.44	101.47	102.41	102.48	102.49	102.53	84.18	86.39	94.28	97.67	94.23	93.13	89.29	85.22	81.45	78.57	75.71	1.10
101-4	O	101.53	0.82	99.54	100.02	100.21	100.43	102.48	102.85	103.18	104.71	101.48	0.41	100.72	100.85	100.88	100.99	102.04	102.11	102.23	102.72	85.41	86.70	94.59	97.12	92.90	93.08	89.33	84.89	81.27	78.01	74.70	1.39
101-4	P	100.60	0.78	98.73	99.23	99.40	99.62	101.49	102.03	102.43	103.48	100.61	0.29	100.09	100.12	100.17	100.22	101.02	101.14	101.20	101.27	83.74	84.93	93.29	95.94	91.47	93.23	89.40	84.68	80.93	77.75	74.48	1.07
101-4	Q	101.19	0.93	98.94	99.62	99.77	100.02	102.27	102.68	103.18	104.81	101.15	0.36	100.32	100.50	100.57	100.66	101.58	101.77	101.91	102.45	83.86	85.06	93.59	96.61	92.00	94.00	90.27	85.54	81.28	78.15	74.82	1.41
101-4	R	101.60	0.87	99.15	100.08	100.30	100.51	102.73	103.08	103.41	104.08	101.60	0.48	100.82	100.91	100.95	101.04	102.28	102.38	102.45	102.52	84.39	85.52	93.59	96.92	92.50	94.65	91.05	86.21	81.63	78.31	74.94	1.54
202-1	A	102.30	0.97	99.82	100.51	100.71	100.99	103.47	103.93	104.36	105.60	102.28	0.47	101.15	101.47	101.60	101.71	102.97	103.21	103.31	103.53	87.91	88.73	96.59	98.17	93.42	91.73	87.12	82.41	78.93	75.45	71.88	1.84
202-1	B	100.92	0.85	98.92	99.33	99.49	99.77	101.95	102.39	102.77	103.66	100.91	0.35	99.96	100.15	100.25	100.43	101.34	101.45	101.52	101.70	86.41	87.06	95.04	96.63	91.80	91.27	86.89	82.13	78.65	75.21	71.90	1.37
202-1	C	102.90	1.20	99.34	100.69	100.98	101.27	104.29	104.78	105.22	107.22	102.89	0.69	101.61	101.69	101.76	101.91	103.76	104.04	104.40	104.92	88.47	88.99	97.09	98.73	93.94	92.80	88.26	83.27	79.43	75.98	72.36	2.71
202-1	D	103.15	1.12	99.47	100.86	101.44	101.76	104.51	105.07	105.55	106.50	103.16	0.68	101.80	101.98	102.07	102.22	103.98	104.41	104.63	105.27	88.76	89.96	97.46	98.93	94.48	92.44	87.90	83.07	79.21	75.68	72.04	2.66
202-1	E	101.32	0.87	98.20	99.74	99.96	100.24	102.32	102.79	103.14	105.08	101.31	0.40	100.35	100.57	100.73	100.82	101.87	102.05	102.19	102.39	86.92	87.02	95.29	96.95	92.23	92.04	87.81	82.97	79.24	75.91	72.59	1.62
202-1	F	102.32	1.04	99.64	100.52	100.67	100.87	103.48	104.18	104.51	106.78	102.34	0.38	101.18	101.33	101.61	101.83	102.70	102.86	103.19	103.37	88.55	88.96	96.74	98.37	92.82	91.25	86.82	82.19	78.77	75.76	72.38	1.86
202-1	G	100.57	1.16	97.18	98.47	98.67	99.04	101.77	102.32	102.92	107.29	100.59	0.69	98.92	99.25	99.33	99.52	101.36	101.70	101.90	102.11	86.66	87.11	94.73	96.58	91.65	89.26	85.55	81.69	78.25	75.26	72.27	2.66
203-1	A	101.35	1.45	98.69	99.08	99.21	99.46	103.19	103.92	104.58	105.06	101.41	0.60	100.12	100.31	100.38	100.54	102.22	102.67	102.85	102.98	85.18	85.81	92.94	96.29	93.98	93.82	90.87	85.65	81.60	77.99	74.48	2.54
203-1	B	101.86	1.53	98.46	99.30	99.64	99.90	103.81	104.52	105.03	106.23	101.89	0.95	100.51	100.59	100.66	100.76	103.16	103.63	103.93	104.10	85.72	86.53	93.57	96.81	94.33	94.56	91.10	85.88	81.53	77.93	74.59	3.34
203-1	C	101.16	1.68	97.54	98.53	98.70	98.95	103.17	103.68	104.31	106.44	101.21	1.13	99.66	99.82	99.89	99.95	102.83	102.96	103.01	103.14	85.09	84.87	92.79	96.48	93.61	93.44	90.18	84.99	81.28	78.53	74.95	3.19
203-1	D	102.98	1.36	99.82	100.35	100.74	100.98	104.37	104.75	105.38	108.54	102.93	0.82	101.49	101.63	101.67	101.82	103.89	104.47	104.79	104.82	87.45	87.94	95.20	97.76	96.21	94.90	91.59	86.40	82.33	78.20	74.36	3.16
203-1	E	103.16	1.16	100.83	101.34	101.58	101.92	103.99	104.68	106.44	108.94	103.16	0.61	102.18	102.29	102.32	102.38	104.05	104.14	104.18	104.36	84.99	86.84	94.19	97.45	95.47	98.24	89.51	85.50	82.74	77.81	74.29	1.89
203-1	F	105.74	1.63	101.25	102.13	102.46	103.25	107.41	107.86	108.32	109.62	105.70	1.08	103.63	103.89	103.98	104.15	106.82	106.94	107.00	107.22	87.42	87.48	95.03	103.43	97.01	95.20	92.85	87.80	82.98	79.96	76.42	3.10
204-1	A	107.13	0.79	104.66	105.42	105.76	105.98	108.05	108.40	108.60	109.15	107.15	0.42	106.08	106.13	106.15	106.43	107.58	107.69	107.74	107.83	89.55	91.22	99.79	102.21	99.78	99.99	93.64	89.30	85.57	81.65	78.64	1.61
204-1	B	104.82	0.79	102.75	103.23	103.57	103.81	105.60	106.05	106.47	108.48	104.85	0.38	104.01	104.05	104.09	104.24	105.36	105.41	105.45	105.56	87.09	88.41	97.15	99.35	96.64	98.97	92.36	88.14	84.31	81.35	78.38	1.41
204-1	C	103.61	0.99	101.67	102.16	102.27	102.48	104.74	105.35	105.92	108.92	103.58	0.47	102.87	102.92	102.97	103.01	104.28	104.69	104.71	104.75	86.97	88.51	96.49	98.90	94.42	96.37	91.85	86.79	83.50	80.82	77.59	1.79
204-1	D	104.40	0.78	102.27	103.06	103.21	103.38	105.40	105.74	105.91	106.75	104.38	0.32	103.54	103.61	103.78	103.99	104.75	104.81	104.86	105.08	88.92	90.58	98.10	99.60	95.05	96.42	91.82	87.04	83.71	80.90	77.31	1.26
204-1	E	109.24	0.88	106.48	107.36	107.72	108.08	110.28	110.64	110.90	111.43	109.26	0.36	108.32	108.40	108.47	108.72	109.57	109.91	109.98	110.17	94.02	94.66	103.01	104.16	101.61	100.94	95.81	90.69	85.58	82.05	78.99	1.59
204-1	F	107.55	0.77	105.43	105.88	106.25	106.48	108.50	108.72	108.92	109.40	107.53	0.28	106.69	106.79	106.92	107.17	107.84	107.93	107.97	108.01	90.36	91.28	101.15	102.47	99.65	99.86	95.07	90.27	85.09	81.61	78.73	1.18
204-1	G	102.51	1.14	100.18	100.82	101.00	101.22	104.10	104.80	105.28	106.27	102.53	0.31	101.47	101.61	101.81	102.06	102.87	102.96	102.99	103.03	85.37	86.16	94.20	97.43	92.94	96.54	91.87	86.96	83.65	80.87	78.07	1.38
204-1	H	107.01	0.74	105.20	105.67	105.79	106.00	107.91	108.23	108.65	109.44	107.02	0.29	106.52	106.59	106.63	106.68	107.50	107.56	107.62	107.78	89.20	91.34	99.50	101.74	101.31	98.30	94.05	89.28	84.90	81.53	78.58	1.03
204-1	I	107.49	0.82	104.91	105.79	105.99	106.21	108.44	108.54	108.85	109.41	107.56	0.38	106.69	106.72	106.74	107.00	107.97	108.01	108.01	108.03	91.17	91.41	100.13	102.12	101.34	99.31	94.81	90.08	85.91	81.77	78.95	1.30
204-1	J	106.88	1.05	104.55	105.27	105.43	105.61	108.11	108.94	109.44	110.85	106.88	0.31	106.17	106.36	106.43	106.47	107.22	107.33	107.68	107.82	93.80	94.22	100.35	102.17	98.53	97.68	93.16	88.83	85.04	81.94	79.01	1.33
205-1	A	101.05	1.07	98.62	99.39	99.55	99.80	102.51	103.01	103.56	104.58	101.06	0.29	100.42	100.53	100.60	100.66	101.44	101.48	101.52	101.62	84.57	85.94	93.71	96.87	93.06	92.61	88.30	82.87	78.75	76.10	72.89	0.99
205-1	B	100.07	1.11	97.65	98.24	98.44	98.71	101.64	102.15	102.46	104.27	100.09	0.32	99.43	99.46	99.51	99.71	100.54	100.66	100.72	100.80	82.38	83.87	92.41	95.87	92.99	90.96	87.34	82.89	79.17	76.76	73.78	1.26
205-1	C	100.18	1.20	97.76	98.27	98.56	98.79	101.86	102.51	102.99	103.97	100.17	0.27	99.43	99.54	99.59	99.85	100.52	100.61	100.65	100.75	82.23	83.47	92.79	95.96	92.77	91.37	87.53	83.11	79.37	77.05	74.08	1.11
205-1	D	100.04	0.89	98.04	98.57	98.74	98.99	100.92	101.31	102.10	104.86	100.03	0.35	99.44	99.48	99.50	99.53	100.48	100.53	100.56	100.68	82.73	83.71	92.50	95.60	93.00	91.26	87.57	82.84	79.22	77.06	74.25	1.09
205-1	E	100.63	1.17	98.56	98.94	99.09	99.35	101.38	102.23	104.41	107.49	100.60	0.44	99.85	99.93	99.97	100.05	101.32	101.57	101.60	101.66	83.59	84.98	93.21	96.46	93.58	91.02	87.53	83.37	79.61	77.27	74.31	1.66
205-1	F	101.44	0.98	99.51	99.97	100.12	100.33	102.75	103.49	103.84	104.69	101.43	0.20	101.00	101.06	101.12	101.15	101.70	101.77	101.83	101.96	84.48	86.51	94.45	97.40	94.40	90.91	87.30	83.60	79.73	77.29	74.15	0.77
205-1	G	101.76	0.75	99.82	100.33	100.55	100.80	102.58	102.90	103.52	104.72	101.72	0.38	100.98	101.10	101.12	101.22	102.23	102.34	102.38	102.42	85.58	86.57	94.76	97.65	95.02	90.89	87.32	83.91	79.84	77.47	74.24	1.28
205-1	H	102.02	1.04	99.51	100.25	100.44	100.72	103.34	103.87	104.27	106.36	101.98	0.27	101.37	101.49	101.57	101.67	102.39	102.49	102.51	102.68	85.20	86.75	95.11	97.88	95.33	91.26	87.52	83.84	79.85	77.71	74.72	1.02
205-1	I	101.12	0.74	98.82	99.77	99.98	100.23	101.93	102.29	102.63	104.55	101.11	0.22	100.53	100.58	100.71	100.81	101.42	101.47	101.51	101.54	87.35	86.47	94.31	96.48	93.93	91.48	87.33	83.65	80.02	78.17	75.23	0.93
205-1	J	104.17	1.64	100.01	101.05	101.32	101.84	106.14	106.56	106.82	107.71	104.26	1.25	101.89	102.19	102.28	102.55	105.79	105.87	105.91	106.00	90.04	90.50	98.21	99.92	95.80	93.90	89.11	84.99	80.73	78.01	73.82	3.72
205-1	K	103.90	1.54	100.18	100.82	101.05	101.66	105.37	105.90	106.90	110.24	103.88	0.92	101.77	101.82	101.88	102.10	104.80	104.89	105.05	105.20	89.75	90.12	97.56	99.84	95.40	93.89	89.36	84.63	80.40	77.81	74.12	3.23
205-1	L	101.57	0.82	99.75	100.14	100.33	100.58	102.57	102.87	103.13	104.63	101.57	0.20	101.17	101.24	101.26	101.31	101.85	101.91	101.94	102.05	85.77	86.27	94.32	97.18	92.17	94.05	89.70	85.19	80.32	77.24	74.36	0.70
205-1	M	101.61	1.32	98.74	99.15	99.52	99.99	102.60	103.31	104.43	109.61	101.67	0.58	100.57	100.62	100.67	100.81	102.39	102.52	102.61	102.71	86.26	86.73	95.17	97.21	92.43	93.12	89.11	84.28	79.82	76.83	73.73	1.99

Site ID	Surf ID	AM-C 7 ft. Avg. Mean	AM-C 7 ft. Avg. StDev	AM-C 7 ft. Avg. Min	AM-C 7 ft. Avg. 2.5%	AM-C 7 ft. Avg. 5%	AM-C 7 ft. Avg. 10%	AM-C 7 ft. Avg. 90%	AM-C 7 ft. Avg. 95%	AM-C 7 ft. Avg. 97.5%	AM-C 7 ft. Avg. Max	AM-C 44 ft. Avg. Mean	AM-C 44 ft. Avg. StDev	AM-C 44 ft. Avg. Min	AM-C 44 ft. Avg. 2.5%	AM-C 44 ft. Avg. 5%	AM-C 44 ft. Avg. 10%	AM-C 44 ft. Avg. 90%	AM-C 44 ft. Avg. 95%	AM-C 44 ft. Avg. 97.5%	AM-C 44 ft. Avg. Max	AM-C Avg Spec. 500	AM-C Avg Spec. 630	AM-C Avg Spec. 800	AM-C Avg Spec. 1000	AM-C Avg Spec. 1250	AM-C Avg Spec. 1600	AM-C Avg Spec. 2000	AM-C Avg Spec. 2500	AM-C Avg Spec. 3150	AM-C Avg Spec. 4000	AM-C Avg Spec. 5000	AM-C 44 ft. Avg 95% PWL
206-1	A																																
206-1	B																																
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206-1	F																																
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206-1	H																																
206-1	I																																
207-1	A	101.79	0.71	100.00	100.49	100.73	100.90	102.59	103.02	103.33	103.92	101.75	0.24	101.30	101.35	101.38	101.44	102.06	102.10	102.15	102.23	88.56	86.75	94.00	97.18	90.39	94.84	91.24	87.21	82.31	79.25	75.96	0.80
207-1	B	108.44	1.02	105.21	106.05	106.51	106.96	109.56	109.79	110.03	111.17	108.46	0.47	107.63	107.70	107.74	107.82	109.12	109.28	109.37	109.45	88.48	87.37	95.46	107.18	96.67	96.33	94.51	88.80	84.04	80.12	76.52	1.67
207-1	C	108.90	1.29	105.50	106.20	106.68	107.03	110.35	111.06	111.46	112.04	108.96	1.13	106.70	106.82	106.95	107.08	110.53	110.84	110.89	110.92	90.14	100.73	101.20	101.22	102.76	101.22	96.66	90.42	85.08	80.78	77.53	4.07
207-1	D	108.45	1.77	102.87	104.80	105.12	105.67	110.36	110.89	111.39	112.32	108.56	1.05	105.08	105.46	107.10	107.29	109.57	109.77	109.93	110.14	93.55	93.93	101.65	103.99	100.50	100.01	95.10	89.25	84.06	80.42	77.04	4.47
207-1	E	102.71	1.03	100.19	100.67	100.77	101.24	103.61	103.97	104.18	109.01	102.71	0.66	101.06	101.18	101.32	101.62	103.46	103.70	103.85	103.91	89.87	88.18	95.08	97.89	93.07	95.27	91.89	87.47	82.78	79.57	76.36	2.67
207-1	F	102.02	0.83	99.47	100.40	100.61	100.90	102.94	103.23	103.45	105.77	101.97	0.42	100.94	101.00	101.09	101.29	102.38	102.46	102.50	102.54	87.78	87.03	94.19	97.24	92.02	95.10	91.48	86.68	82.38	79.03	75.79	1.50
207-1	G	107.05	0.91	105.03	105.22	105.53	105.86	108.21	108.54	108.68	109.46	107.07	0.55	106.18	106.22	106.25	106.34	107.81	107.86	107.91	107.99	88.05	87.75	94.27	105.75	95.06	94.73	93.39	87.42	83.73	80.17	76.69	1.69
207-1	H	103.73	0.85	101.70	101.99	102.21	102.51	104.69	105.20	105.39	106.28	103.73	0.41	102.87	103.01	103.05	103.10	104.23	104.28	104.32	104.42	87.38	86.70	94.86	99.77	95.14	95.35	93.76	88.25	83.97	79.97	76.59	1.30
207-1	I	101.98	0.56	100.36	100.85	101.03	101.25	102.67	102.86	103.05	103.73	101.97	0.27	101.45	101.53	101.57	101.61	102.29	102.32	102.38	102.44	85.04	84.78	92.50	95.78	93.29	94.72	95.33	88.24	83.99	81.16	77.27	0.85
207-1	J	103.71	0.81	101.47	102.13	102.32	102.54	104.68	104.99	105.20	105.69	103.76	0.57	102.53	102.58	102.61	102.78	104.54	104.61	104.68	104.77	86.14	86.00	92.78	96.82	98.81	97.40	92.69	88.13	83.88	80.11	76.94	2.10
207-1	K	107.02	1.52	103.19	103.99	104.33	104.64	109.05	109.35	109.55	110.79	107.03	1.27	104.45	104.56	104.81	105.26	108.59	108.88	108.91	109.05	90.66	90.79	99.70	103.31	98.68	97.47	94.97	88.96	84.12	80.04	77.03	4.35
207-1	L	101.02	0.59	99.66	99.95	100.11	100.25	101.75	102.08	102.29	103.38	101.01	0.26	100.54	100.58	100.60	100.65	101.39	101.43	101.44	101.46	86.22	85.29	92.01	96.22	89.79	94.76	91.84	86.39	82.13	78.92	76.07	0.86
207-1	M	106.85	1.14	103.07	104.63	104.97	105.36	108.22	108.49	108.82	109.85	106.85	0.78	105.52	105.59	105.65	105.74	107.80	107.89	107.95	108.06	87.31	86.80	93.81	105.35	95.24	95.51	94.50	88.43	83.85	80.35	77.16	2.36
207-1	N	105.65	1.50	102.17	102.92	103.17	103.57	107.62	108.16	108.52	109.23	105.47	1.08	103.85	103.96	104.11	104.17	107.01	107.73	107.88	108.07	87.78	87.61	93.84	103.69	94.47	95.30	94.10	88.20	83.84	80.28	77.33	3.92
207-1	O	106.67	0.87	104.48	104.94	105.25	105.47	107.70	108.00	108.30	109.24	106.69	0.27	106.07	106.13	106.19	106.28	107.05	107.13	107.18	107.25	86.25	86.11	93.83	98.32	105.80	99.93	94.65	88.75	84.00	80.36	77.43	1.05
207-1	P	105.32	0.67	103.64	104.11	104.30	104.44	106.14	106.49	106.76	107.51	105.32	0.20	104.82	104.88	104.92	105.05	105.57	105.60	105.63	105.72	91.14	92.68	99.01	101.01	97.70	93.93	90.41	86.89	83.34	79.84	77.06	0.76
208-1	A	103.77	1.41	100.68	101.14	101.41	101.64	105.28	105.51	105.74	107.03	103.79	1.23	101.94	101.99	102.02	102.09	105.03	105.31	105.39	105.46	87.04	89.09	97.95	99.12	94.17	95.33	91.13	86.61	83.18	80.08	76.02	3.41
208-1	B	104.74	1.28	101.72	102.36	102.61	103.00	106.01	106.55	107.01	111.11	104.80	0.88	102.96	103.02	103.06	103.27	105.73	105.95	106.06	106.12	89.18	90.65	98.64	99.98	95.55	96.19	92.68	87.54	83.83	80.55	76.90	3.04
208-1	C	104.27	0.90	101.77	102.37	102.72	102.96	105.27	105.67	105.95	107.62	104.35	0.40	102.81	102.92	103.40	103.91	104.72	104.79	104.83	104.86	86.94	89.57	97.78	100.01	94.50	96.03	92.06	87.23	83.26	79.96	76.38	1.90
208-1	D	104.07	1.04	101.33	101.98	102.39	102.73	105.29	105.65	106.03	107.37	104.07	0.68	102.71	102.74	102.79	103.17	104.91	104.99	105.02	105.14	86.77	88.89	95.61	98.43	97.04	96.69	94.03	89.52	85.04	81.15	77.87	2.28
208-1	E	104.21	1.05	101.19	102.41	102.58	102.87	105.58	106.01	106.37	107.04	104.26	0.60	103.21	103.24	103.31	103.46	105.03	105.19	105.23	105.37	87.95	90.03	96.76	99.06	97.09	96.04	92.44	87.75	84.18	80.37	77.24	2.00
208-1	F	104.57	1.04	101.96	102.48	102.75	103.12	105.68	106.15	106.74	107.68	104.55	0.49	103.34	103.60	103.65	103.75	105.05	105.30	105.38	105.58	87.90	89.62	97.28	99.60	97.09	96.51	92.79	88.18	84.96	80.89	77.39	1.79
208-1	G	104.80	1.06	102.30	102.97	103.26	103.49	106.20	106.69	107.06	107.87	104.75	0.63	103.68	103.97	104.04	104.10	105.73	105.95	106.11	106.21	88.38	90.24	98.09	99.34	97.52	96.90	92.64	88.05	84.27	80.52	77.07	2.14
208-1	H	106.04	1.32	102.36	103.39	103.79	104.16	107.50	108.11	108.68	109.63	106.01	0.64	105.08	105.11	105.17	105.24	106.95	107.33	107.37	107.45	88.10	91.29	98.99	101.41	98.66	97.54	93.52	88.75	84.17	80.80	77.30	2.26
208-1	I	106.57	0.93	103.84	104.55	104.83	105.22	107.60	107.85	108.13	108.84	106.65	0.49	105.47	105.54	105.70	105.89	107.12	107.15	107.16	107.17	86.55	88.53	97.18	103.81	97.45	97.36	94.29	89.29	84.36	81.04	77.76	1.62
209-1	A																																
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305-1	B																																
307-1	A	107.63	1.55	101.98	103.90	104.80	105.49	109.28	109.83	110.12	111.17	107.62	1.18	103.81	104.46	105.06	106.12	108.98	109.19	109.33	109.66	86.64	88.27	95.18	105.89	98.25	96.53	93.58	89.00	84.18	81.17	77.56	4.87
307-1	B	104.78	1.59	101.15	101.88	102.05	102.41	106.66	106.92	107.33	108.02	104.90	1.38	102.38	102.48	102.60	102.86	106.50	106.59	106.65	106.70	88.88	90.38	96.60	99.77	98.44	96.11	92.63	88.87	84.83	81.84	78.43	4.17
307-1	C	107.92	0.79	104.90	106.40	106.69	106.85	108.73	109.05	109.54	110.14	107.94	0.32	107.23	107.30	107.35	107.42	108.41	108.45	108.46	108.48	85.72	86.12	94.30	98.32	105.80	99.93	93.94	89.10	84.84	80.41	77.06	1.16
307-1	D	103.65	0.79	101.56	102.17	102.33	102.60	104.59	104.92	105.21	106.65	103.69	0.39	103.01	103.04	103.09	103.13	104.27	104.37	104.43	104.54	87.23	88.10	95.39	97.60	97.28	96.14	93.30	88.78	84.43	80.99	77.48	1.38
307-1	E	107.14	1.02	103.95	104.93	105.21	105.58	108.24	108.52	109.01	109.62	107.20	0.60	105.56	105.92	106.02	106.42	107.89	108.13	108.22	108.28	86.73	87.86	95.20	98.25	104.62	99.11	93.60	88.92	84.78	80.80	77.47	2.30
307-1	F	103.91	0.92	101.26	102.30	102.53	102.75	105.06	105.54	105.83	106.88	103.94	0.51	102.84	102.98	103.16	103.21	104.39	104.75	104.98	105.04	87.59	88.49	95.86	98.15	97.59	96.06	92.93	88.61	84.39	81.28	77.72	2.00
309-1	A	108.67	1.05	106.10	106.54	106.88	107.22	109.77	110.17	110.73	112.31	108.73	0.56	107.68	107.71	107.76	108.02	109.26	109.86	110.07	110.24	91.53	94.50	102.25	103.54	101.88	99.75	95.12	90.78	86.00	82.21	78.80	2.36
309-1	B	108.03	1.20	105.02	105.44	105.79	106.29	109.40	109.77	110.03	110.92	108.10	0.76	106.28	106.36	106.60	106.90	109.06	109.13	109.16	109.33	90.79	93.88	101.44	102.65	101.42	99.59	94.71	90.57	85.50	82.05	78.65	2.80
309-1	C	108.03	1.27	104.87	105.53	105.85	106.22	109.53	110.17	110.49	112.16	108.01	0.99	106.01	106.22	106.47	106.85	109.64	109.73	109.80	109.98	90.43	93.55	102.26	102.74	101.32	98.75	93.13	89.19	85.33	81.53	77.87	3.57
310-1	A	104.08	1.05	101.30	102.00	102.20	102.55	105.31	105.83	106.20	107.06	104.11	0.75	102.63	102.81	102.87	102.98	104.96	105.15	105.27	105.42	89.17	90.00	97.83	99.17	95.45	96.04	91.01	86.33	82.22	79.01	75.77	2.46
310-1	B	104.97	0.97	102.55	103.14	103.36	103.63	106.15	106.52	106.89	107.86	104.96	0.49	103.87	103.98	104.07	104.31	105.65	105.73	105.79	105.98	87.59	90.82	99.12	100.18	96.37	96.27	92.04	87.30	82.88	79.45	76.05	1.81
310-1	C	103.93	0.94	101.55	102.04	102.43	102.67	105.04	105.57	105.88	106.86	103.89	0.59	102.56	102.73	103.01	103.13	104.64	104.99	105.19	105.66	88.15	88.83	96.90	98.54	97.42	95.69	91.05	87.03	82.83	79.02	75.54	2.45
311-1	A	102.76	1.03	99.64	100.85	101.14	101.45	104.01	104.52	104.87	107.41	102.78	0.68	101.68	101.84	101.88	101.96	103.75	104.11	104.26	104.45	85.54	88.14	96.83	97.98	93.99	94.31	89.52	85.79	82.83	80.35	74.91	2.42
317-1	A																																
317-1	B																																
319-1	A	103.60	0.71	101.49	102.20	102.41	102.64	104.46	104.74	105.00	106.32	103.60	0.34	102.73	102.90	102.96	103.10	103.95	104.01	104.09	104.32	86.82	90.02	97.26	98.97	94.61	95.10	90.73	86.49	83.44	81.17	78.71	1.19
319-1	B	103.63	0.98	101.47	101.99	102.17	102.45	104.90	105.52	105.81	107.33	103.64	0.30	102.83	103.00	103.14	103.25	104.03	104.11	104.24	104.43	85.97	88.20	96.56	98.70	94.15	96.57	92.60	88.08	84.21	81.53	79.08	1.24
319-1	C	110.59	0.71	108.13	109.22	109.40	109.62	111.44	111.67	111.88	113.23	110.58	0.40	109.60	109.79	109.87	109.99	111.09	111.20	111.24	111.33	90.79	97.07	103.92	106.94	102.26	100.74	95.77	90.42	85.94	82.37	79.58	1.45
320-1	A																																
320-1	B	100.80	1.15	98.48	98.99	99.15	99.35	102.35	102.91	103.21	104.79	100.78	0.40	100.15	100.23	100.27	100.34	101.22	101.47	101.93	102.27	83.10	84.96	94.38	96.15	90.96	93.49	88.50	83.79	80.88	78.39	75.07	1.70
320-1	C	100.66	0.88	98.73	99.09	99.28	99.51	101.77	102.23	102.57	103.80	100.67	0.40	99.91	100.02	100.04	100.11	101.19	101.39	101.47	101.61	83.45	85.49	94.09	95.71	90.10	94.10	88.71	83.68	80.70	77.98	74.47	1.45
322-1	A	104.58	0.90	101.71	102.82	103.17	103.47	105.60	106.18	106.57	108.50	104.59	0.42	103.41	103.59	103.70	104.00	105.12	105.24	105.33	105.45	88.36	89.81	96.13	99.70	97.36	96.81	93.34	88.59	84.95	81.47	77.87	1.74
323-1	A																																
323-1	B																																
324-1	A	101.27	0.86	99.18	99.83	100.01	100.22	102.32	102.73	103.30	104.96	101.26	0.37	100.44	100.58	100.66	100.75	101.68	101.79	101.86	102.56	83.80	84.70	92.16	96.44	92.72	94.68	91.08	86.32	82.33	80.21	76.92	1.28
325-1	A	108.21	0.91	106.00	106.45	106.71	107.02	109.24	109.60	109.89	111.05	108.25	0.32	107.60	107.73	107.76	107.80	108.70	108.82	108.94	109.05	90.31	92.51	98.90	102.94	101.26	102.41	94.97	90.87	87.21	82.19	78.18	1.22
325-1	B	108.48	1.36	105.56	106.34	106.48	106.77	110.25	111.02	111.53	113.22	108.49	0.38	107.45	107.78	107.90	107.99	108.95	109.24	109.38	109.43	90.97	94.00	101.01	103.33	101.31	101.31	95.43	91.27	87.29	82.58	78.44	1.60
325-1	C	107.53	1.19	104.40	105.31	105.53	105.84	108.90	109.37	109.67	111.49	107.54	0.61	106.32	106.44	106.53	106.72	108.28	108.69	108.78	108.89	89.62	91.77	98.64	101.92	100.84	101.30	95.60	91.44	86.73	82.58	78.61	2.35
325-1	D	108.40	1.13	105.02	106.36	106.64	106.87	109.70	110.22	110.60	111.98	108.42	0.52	106.98	107.10	107.17	107.62	108.92	109.06	109.17	109.27	90.56	92.54	99.63	103.47	101.25	101.98	95.49	91.42	87.67	82.84	78.50	2.06
325-1	E	108.33	1.07	105.55	106.27	106.55	106.87	109.42	110.06	110.68	112.31	108.31	0.36	107.36	107.55	107.67	107.76	108.66	108.86	109.00	109.06	90.12	92.31	99.27	102.77	101.22	102.85	95.25	91.15	87.45	82.58	78.44	1.45
336-1	A																																
339-1	A																																
339-1	B																																
339-1	C																																
339-1	D																																
339-1	E																																
340-1	A																																
340-1	B																																
340-1	C																																
340-1	D																																
341-1	A	102.63	1.04	100.53	101.02	101.25	101.47	103.87	104.55	105.33	107.80	102.62	0.39	101.86	102.03	102.10	102.16	103.08	103.36	103.62	104.06	83.95	85.69	94.56	97.85	93.58	95.85	91.94	87.62	84.19	82.02	78.68	1.60
342-1	A																																
342-1	B																																
342-1	C																																
343-1	A																																

Site ID	Surf ID	PM-C 7 ft. Avg. Mean	PM-C 7 ft. Avg. StDev	PM-C 7 ft. Avg. Min	PM-C 7 ft. Avg. 2.5%	PM-C 7 ft. Avg. 5%	PM-C 7 ft. Avg. 10%	PM-C 7 ft. Avg. 90%	PM-C 7 ft. Avg. 95%	PM-C 7 ft. Avg. 97.5%	PM-C 7 ft. Avg. Max	PM-C 44 ft. Avg. Mean	PM-C 44 ft. Avg. StDev	PM-C 44 ft. Avg. Min	PM-C 44 ft. Avg. 2.5%	PM-C 44 ft. Avg. 5%	PM-C 44 ft. Avg. 10%	PM-C 44 ft. Avg. 90%	PM-C 44 ft. Avg. 95%	PM-C 44 ft. Avg. 97.5%	PM-C 44 ft. Avg. Max	PM-C Avg Spec. 500	PM-C Avg Spec. 630	PM-C Avg Spec. 800	PM-C Avg Spec. 1000	PM-C Avg Spec. 1250	PM-C Avg Spec. 1600	PM-C Avg Spec. 2000	PM-C Avg Spec. 2500	PM-C Avg Spec. 3150	PM-C Avg Spec. 4000	PM-C Avg Spec. 5000	PM-C 44 ft. Avg 95% PWL	C PM minus AM dBA	C minus R AM dBA	C minus R PM dBA	R Avg dBA	R Avg 2.5%ile (44ft) dBA	R Avg Var 95% PWL (44ft) dBA	C Avg dBA	C Avg 2.5%ile (44ft) dBA	C Avg Var 95% PWL (44ft) dBA
101-1	A																																									
101-1	B																																	0.01		102.82	101.38	3.44	102.83	101.98	2.13
101-1	C																																	-0.24		104.06	103.48	1.41	103.82	103.17	1.18
101-1	D																																	-0.10		101.63	100.95	1.55	101.53	100.81	1.43
101-1	E																																	0.40		105.59	104.90	1.65	105.99	105.13	2.08
101-1	F																																	0.65		103.27	102.56	1.19	103.92	102.94	2.26
101-1	G																																									
101-1	H																																									
101-1	I																																									
101-1	J																																	0.47		101.99	100.96	2.93	102.46	101.58	1.83
101-1	K																																	0.45		105.79	104.56	2.51	106.24	105.03	2.52
101-1	L																																	-2.49		109.99	106.31	6.27	107.50	105.21	3.72
101-1	M																																									
101-1	N																																									
101-1	O																																									
101-1	P																																	0.66		101.13	100.46	1.56	101.79	100.86	1.97
101-1	Q																																	0.47		101.49	100.67	1.91	101.96	100.98	1.86
101-1	R																																	0.25		102.26	101.18	2.10	102.51	101.50	1.72
101-2	A																																									
101-2	B	102.19	1.01	99.53	100.38	100.59	100.86	103.13	103.69	104.00	111.37	102.10	0.55	101.01	101.15	101.27	101.42	102.67	103.21	103.42	104.71	86.51	87.86	95.19	97.88	94.26	93.32	89.04	84.04	79.83	77.09	73.81	2.27	-0.46	0.48	0.24	102.06	100.94	2.22	102.42	101.49	2.11
101-2	C	102.91	1.02	100.26	101.03	101.29	101.58	104.09	104.67	105.08	106.13	102.95	0.66	101.60	101.77	101.99	102.22	103.76	104.63	104.71	104.76	88.27	89.64	96.73	98.58	94.86	92.74	88.30	83.62	79.82	77.91	74.11	2.94	-0.12	-0.83	-0.80	103.78	102.74	3.07	102.97	101.97	2.91
101-2	D	100.33	0.77	98.25	98.96	99.14	99.32	101.30	101.66	102.03	103.19	100.34	0.27	99.77	99.82	99.87	100.00	100.63	100.80	101.05	101.09	84.80	85.23	93.09	95.76	91.35	92.91	88.34	83.11	79.16	76.73	73.37	1.23	-0.22	-0.21	-0.26	100.68	99.99	1.38	100.44	99.85	1.27
101-2	E	104.99	0.84	101.21	103.08	103.57	103.92	105.93	106.14	106.41	107.39	105.03	0.35	104.16	104.24	104.38	104.57	105.43	105.55	105.81	105.91	89.73	90.81	97.90	100.67	97.07	96.04	92.22	86.93	82.26	79.73	76.11	1.56	-0.24	0.24	0.22	104.88	104.33	1.24	105.11	104.46	1.59
101-2	F	102.85	0.90	100.13	100.96	101.27	101.58	103.91	104.21	104.43	105.04	102.89	0.50	101.37	101.62	101.75	102.22	103.41	103.46	103.49	103.70	87.94	89.32	96.57	98.58	94.69	93.05	88.47	83.57	79.73	77.69	73.79	1.88	-0.36	0.35	0.20	102.75	101.82	1.83	103.03	101.93	1.76
101-2	G	104.13	1.18	100.70	101.66	102.03	102.40	105.29	105.83	106.55	108.26	104.17	0.74	102.27	102.71	103.04	103.21	104.80	105.66	106.13	106.50	90.33	91.41	98.15	99.89	95.97	93.21	88.47	83.61	79.96	77.70	73.95	3.42	-0.39	0.55	0.44	103.84	102.26	3.53	104.33	102.95	3.51
101-2	H	100.83	0.81	98.71	99.39	99.64	99.86	101.87	102.26	102.59	103.68	100.82	0.39	100.13	100.18	100.25	100.42	101.27	101.79	101.89	102.09	86.66	86.28	93.59	95.77	91.69	93.64	89.71	84.76	80.49	77.43	73.96	1.71	0.20	0.05	0.05	100.69	100.12	1.67	100.73	100.16	1.50
101-2	I	103.49	0.99	100.80	101.63	101.90	102.20	104.73	105.24	105.42	106.85	103.49	0.48	102.65	102.74	102.78	102.85	104.19	104.31	104.44	104.50	89.64	90.48	96.77	98.80	96.01	94.19	89.33	85.10	81.87	77.51	74.24	1.70	-0.03	0.90	0.94	102.59	101.77	1.78	103.51	102.81	1.74
101-2	J	102.05	0.94	99.86	100.29	100.50	100.83	103.22	103.55	103.86	105.27	102.06	0.43	101.21	101.26	101.33	101.50	102.62	102.79	102.95	103.09	88.64	88.19	94.84	96.86	95.16	93.19	89.64	85.11	81.18	77.45	74.14	1.70	0.24	0.27	0.75	101.42	100.54	1.65	101.93	101.14	1.68
101-2	K	105.96	1.18	102.34	103.43	103.74	104.08	107.23	107.57	107.88	108.61	105.98	0.82	104.20	104.32	104.53	104.73	106.76	107.02	107.25	107.37	87.62	88.29	96.18	103.93	96.63	94.71	90.86	85.36	80.25	76.82	73.76	2.94	0.05	0.20	0.23	105.72	104.73	1.93	105.93	104.38	2.87
101-2	L	107.57	1.86	102.66	103.58	104.08	104.77	109.56	110.27	110.79	112.59	107.69	1.03	104.01	105.18	105.56	106.32	108.91	109.17	109.26	109.46	92.84	93.83	100.61	103.42	100.13	97.79	93.40	87.26	81.13	77.57	74.59	4.08	0.11	-0.86	-0.88	108.38	105.47	4.53	107.51	105.08	4.05
101-2	M	101.83	0.73	99.79	100.51	100.65	100.88	102.69	103.02	103.37	104.48	101.84	0.26	101.27	101.36	101.43	101.55	102.21	102.34	102.42	102.47	87.79	89.06	95.75	97.22	93.59	92.01	87.62	82.95	79.27	76.47	73.64	1.06	0.39	-0.95	-0.53	102.37	101.45	1.68	101.63	101.19	0.91
101-2	N	103.40	1.36	100.73	101.60	101.73	101.99	104.02	105.81	106.90	109.21	103.41	0.71	102.32	102.33	102.35	102.71	104.80	104.87	104.88	104.89	90.76	90.64	97.90	98.93	95.06	91.49	87.16	83.65	80.22	77.96	75.49	2.55	-0.03	0.52	0.63	102.84	102.14	1.62	103.42	102.12	2.93
101-2	O	101.43	0.73	99.28	99.90	100.26	100.51	102.36	102.59	102.95	103.74	101.41	0.29	100.66	100.78	100.89	100.96	101.75	101.78	101.81	101.96	87.29	88.25	95.25	96.87	93.11	92.88	87.64	83.06	79.59	76.69	73.96	1.03	0.23	0.33	0.50	100.90	100.13	1.56	101.32	100.61	1.21
101-2	P	101.54	0.77	99.22	100.02	100.19	100.52	102.49	102.83	103.07	103.74	101.55	0.38	100.76	100.91	100.98	101.05	102.08	102.16	102.21	102.27	86.97	87.57	95.28	97.08	93.26	92.02	87.85	83.48	79.69	76.92	74.02	1.30	0.14	0.75	0.66	100.76	100.06	1.34	101.47	100.75	1.58
101-2	Q	101.68	0.95	99.12	100.02	100.29	100.51	102.75	103.26	103.81	105.93	101.60	0.50	100.82	100.88	100.96	101.07	102.05	102.46	103.12	103.70	86.55	87.55	95.22	97.10	93.06	93.09	88.86	84.16	80.02	77.21	74.17	2.24	0.33	0.31	0.34	101.19	100.42	1.70	101.52	100.70	2.27
101-2	R	102.07	0.93	99.52	100.29	100.64	100.90	103.18	103.55	103.92	104.96	102.06	0.49	101.01	101.15	101.25	101.43	102.75	102.83	102.93	103.25	86.83	87.70	95.39	97.59	93.27	93.73	89.64	84.50	80.08	77.17	73.94	1.77	0.20	0.14	-0.03	101.92	100.75	2.15	101.98	100.93	1.96
101-3	A																																		-0.01		104.00	103.30	1.30	103.99	102.96	1.87
101-3	B																																		0.05		104.06	103.08	2.08	104.11	102.94	2.40
101-3	C																																		-1.16		105.96	104.60	2.67	104.81	103.92	3.10
101-3	D																																		-0.58		103.18	102.67	1.03	102.59	102.16	0.91
101-3	E																																		-0.03		107.04	106.42	1.40	107.01	106.16	1.69
101-3	F																																		0.32		104.46	103.01	2.49	104.79	103.65	2.00
101-3	G																																		-0.05		105.82	104.66	3.33	105.77	104.29	3.50
101-3	H																																		-0.16		103.29	102.87	1.14	103.12	102.74	1.28
101-3	I																																		0.07		105.23	104.38	1.83	105.30	104.76	1.59
101-3	J																																		0.03		104.00	103.16	1.57	104.03	103.26	1.42
101-3	K																																		-0.78		108.33	106.49	3.39	107.56	105.82	3.04
101-3	L																																		-1.87		111.12	108.26	4.55	109.25	107.01	4.04
101-3	M																																		0.81		103.93	103.30	1.89	104.74	104.19	1.30
101-3	N																																		1.12		103.45	102.88	1.13	104.56	103.62	1.85
101-3	O																																		0.73		103.11	102.50	1.08	103.84	102.93	1.95
101-3	P																																		-0.16		103.23	102.79	1.08	103.08	102.56	1.31
101-3	Q																																		-0.14		103.89	103.21	1.46	103.75	103.04	1.45
101-3	R																																		-0.39		104.78	103.68	2.33	104.39	103.49	1.72
101-4	A	102.13	0.86	99.57	100.37	100.61	100.95	103.06	103.52	103.74	104.69	102.11	0.53	101.02	101.08	101.13	101.20	102.77	102.93	103.09	103.22	85.30	86.08	94.43	97.31	94.14	94.66	90.93	86.20	81.59	78.89	75.37	2.01	0.31	-0.61	-0.57	102.56	101.68	1.76	101.97	100.83	2.05
101-4	B	102.29	0.87	99.57	100.63	100.84	101.08	103.34	103.67	103.89	104.76	102.31	0.51	101.31	101.40	101.46	101.55	102.91	103.04	103.09	103.22	85.85	86.52	94.00	97.32	94.32	95.15	91.57	87.10	82.19	79.61	75.94	1.69	0.13	-0.12	-0.18	102.37	101.70	1.51	102.22	101.31	1.78
101-4	C	103.79	1.06	100.94	101.83	102.09	102.34	105.15	105.68	105.98	106.93	103.84	0.74	102.63	102.72	102.87	102.99	104.85	105.71	105.80	105.90	88.46	89.39	96.59	99.23	96.17	95.03	91.22	86.91	82.60	79.95	76.15	3.08	0.16	-0.65	-0.68	104.38	102.90	3.00	103.71	102.77	2.88
101-4	D	101.29	0.79	99.45	99.94	100.11	100.34	102.06	102.55	103.00	105.50	101.25	0.29	100.69	100.81	100.86	100.91	101.58	101.66	101.71	102.38	86.65	85.62	93.34	96.14	92.33	94.48	90.96	85.94	81.51	78.91	75.31	0.90	0.27	-0.78	-0.69	101.89	101.34	1.11	101.16	100.71	0.84
101-4	E	105.13	0.78	101.93	103.58	103.79	104.07	106.11	106.38	106.63	107.14	105.17	0.40	104.22	104.29	104.52	104.71	105.74	105.85	105.95	106.06	89.35	90.40	96.94	100.55	97.76	96.70	93.85	89.16	84.09	81.07	77.03	1.66	0.22	-0.27	-0.34	105.32	104.56	1.52	105.02	104.33	1.47
101-4	F	102.80	0.86	100.02	101.25	101.48	101.69	103.83	104.28	104.73	105.87	102.83	0.55	101.80	101.87	101.97	102.13	103.59	103.69	103.75	103.84	87.13	88.43	95.62	98.16	95.01	94.25	90.61	86.15	82.06	79.19	75.27	1.88	0.36	-0.54	-0.50	103.14	102.14	1.83	102.62	101.68	1.95
101-4	G	103.36	1.23	100.29	101.11	101.36	101.64	104.88	105.38	105.90	106.80	103.39	0.82	102.00	102.07	102.11	102.21	104.35	104.91	105.36	105.73	87.67	89.23	96.36	98.99	95.18	94.56	90.72	86.08	81.97	78.53	75.04	3.28	-0.36	-0.66	-0.58	104.16	103.02	2.70	103.54	101.94	3.74
101-4	H	100.61	0.80	98.60	99.30	99.47	99.69	101.53	101.90	102.32	105.45	100.61	0.35	99.97	100.11	100.18	100.25	101.02	101.49	101.55	101.64	85.85	85.23	92.54	95.50	91.50	94.01	90.12	85.21	81.08	77.98	74.57	1.45	-0.28	-1.09	-0.63	101.61	101.11	1.41	100.75	100.18	1.46
101-4	I	102.86	0.98	100.22	100.96	101.19	101.53	104.02	104.46	104.72	105.97	102.86	0.44	102.00	102.20	102.25	102.34	103.54	103.70	103.77	103.92	87.80	88.24	95.06	97.98	95.54	94.72	91.16	86.41	83.25	79.18	75.43	1.57	-0.41	-0.27	-0.20	103.30	102.66	1.22	103.06	102.44	1.55
101-4	J	101.81	0.91	99.65	100.20	100.42	100.60	102.98	103.39	103.71	104.96	101.81	0.38	100.72	101.02	101.16	101.30	102.33	102.48	102.58	102.76	86.70	86.44	93.68	96.50	94.54	94.08	91.36	86.30	82.44	78.99	75.42	1.57	-0.09	-0.86	-0.57	102.57	101.92	1.31	101.85	101.22	1.38
101-4	K	105.57	1.11	102.89	103.36	103.68	104.02	106.79	107.38	107.95	108.71	105.54	0.67	104.11	104.26	104.56	104.87	106.68	106.99	107.09	107.31	86.19	86.57	94.22	103.61	95.90	95.08	92.32	87.01	82.36	78.80	75.10	2.84	-0.05	-2.13	-1.76	107.53	106.36	2.57	105.59	104.36	2.72
101-4	L	108.41	2.12	102.23	103.65	104.24	105.12	110.55	111.60	112.13	113.25	108.54	1.23	104.51	105.38	106.09	106.59	109.70	109.86	109.97	110.05	92.59	94.19	100.29	104.15	101.38	99.56	96.00	90.04	83.94	79.90	76.48	4.59	-0.41	-1.67	-2.01	110.45	107.10	5.11	108.61	105.63	4.49
101-4	M	102.09	0.85	100.23	100.69	100.77	101.02	103.14	103.66	103.87	105.09	102.05	0.31	101.52	101.62	101.66	101.71	102.58	102.71	102.74	102.80	86.02	87.13	94.69	97.84	94.18	93.24	89.81	85.09	81.55	78.34	75.24	1.12	-0.06	0.40	0.32	101.76	100.99	1.60	102.12	101.67	0.98
101-4	N	101.49	0.66	99.70	100.07	100.22	100.58	102.27	102.43	102.58	102.78	101.42	0.32	100.83	100.84	100.86	100.92	101.84	101.94	102.01	102.04	84.00	85.98	93.58	97.21	94.11	92.88	89.24	84.94	81.25	78.37	75.86	1.18	-0.37	0.88	0.30	101.08	100.59	0.86	101.68	101.11	1.14
101-4	O	101.25	0.85	99.05	99.76	99.88	100.14	102.32	102.75	102.91	103.71	101.23	0.49	100.33	100.41	100.45	100.62	101.85	102.09	102.17	102.26	84.46	85.75	93.56	96.72	92.98	93.59	89.65	84.86	81.20	78.05	74.90	1.76	-0.27	0.59	0.13	101.03	100.68	0.67	101.39	100.63	1.57
101-4	P	100.47	0.77	98.51	99.13	99.24	99.42	101.41	101.81	102.20	103.11	100.48	0.29	99.95	99.97	100.03	100.07	100.84	101.03	101.12	101.33	82.43	83.74	92.42	95.74	91.61	93.71	89.67	84.78	80.93	77.98	74.89	1.15	-0.13	-0.61	-0.67	101.17	100.75	1.03	100.53	100.05	1.11
101-4	Q	100.92	0.88	98.84	99.38	99.60	99.83	101.90	102.43	103.16	104.10	100.87	0.32	100.23	100.33	100.38	100.48	101.20	101.25	101.77	102.34	82.80	84.62	92.77	96.19	92.04	94.11	90.32	85.42	81.26	78.07	75.08	1.44	-0.27	-0.44	-0.81	101.68	101.03	1.32	101.06	100.41	1.43
101-4	R	101.49	0.82	98.90	99.76	100.11	100.38	102.48	102.83	103.00	104.02	101.48	0.52	100.51	100.65	100.71	100.80	102.03	102.16	102.27	102.37	83.56	84.93	92.91	96.83	92.63	94.71	91.23	86.14	81.54	78.42	75.27	1.62	-0.11	-0.72	-0.86	102.34	101.31	1.97	101.55	100.78	1.58
202-1	A	101.29	0.93	98.84	99.61	99.86	100.08	102.46	102.93	103.37	104.74	101.28	0.38	100.26	100.53	100.65	100.84	101.79	102.01	102.16	102.37	86.83	88.02	95.31	97.29	92.93	89.93	86.13	81.16	77.42	74.01	70.77	1.63	-1.01	-0.69	-0.43	102.36	101.52	1.94	101.79	101.00	1.74
202-1	B	99.98	0.99	97.44	98.26	98.46	98.70	100.99	101.54	102.01	107.61	99.99	0.57	98.90	99.07	99.23	99.32	100.81	101.16	101.31	101.52	85.38	86.18	93.79	95.82	91.78	89.45	85.96	80.87	77.13	73.93	70.76	2.24	-0.94	-0.37	-0.06	100.66	99.88	2.05	100.45	99.61	1.81
202-1	C	102.34	1.40	98.59	99.59	100.05	100.45	103.93	104.65	105.40	107.50	102.38	1.04	100.13	100.54	100.75	101.00	103.47	104.24	105.05	105.46	87.57	88.98	96.31	98.29	94.03	91.43	87.58	82.47	78.03	74.72	71.08	4.50	-0.55	-0.85	-0.02	103.06	101.53	3.84	102.62	101.12	3.61
202-1	D	102.40	1.33	98.60	99.91	100.20	100.55	103.99	104.43	104.91	107.19	102.42	0.91	100.67	100.87	100.93	101.10	103.47	103.91	104.19	104.59	87.62	89.21	96.48	98.20	94.58	91.04	87.05	82.09	77.70	74.39	70.84	3.32	-0.75	-1.13	0.03	103.32	101.69	3.22	102.77	101.42	2.99
202-1	E	100.09	0.89	97.79	98.47	98.67	98.89	101.13	101.61	102.11	103.33	100.10	0.48	99.17	99.27	99.37	99.50	100.78	101.01	101.22	101.45	85.53	85.96	93.46	95.82	92.02	90.36	86.91	81.82	77.79	74.64	71.46	1.95	-1.23	-0.12	-0.09	100.81	99.83	2.04	100.70	99.92	1.79
202-1	F	101.43	0.89	98.85	99.87	100.06	100.27	102.42	102.94	103.38	105.40	101.43	0.49	100.52	100.62	100.78	100.95	102.08	102.47	102.83	103.04	87.21	87.93	95.83	97.50	92.50	89.67	85.83	81.32	77.47	74.30	70.91	2.21	-0.89	0.16	-0.18	101.89	101.20	1.71	101.87	100.98	2.03
202-1	G	100.27	0.92	97.63	98.31	98.63	98.99	101.32	101.61	101.92	103.06	100.27	0.42	99.28	99.42	99.52	99.66	100.74	100.90	101.04	101.11	86.39	87.19	94.30	96.23	92.01	88.25	85.29	81.23	77.53	74.32	71.34	1.62	-0.30	-0.28	-0.08	100.60	99.51	1.98	100.42	99.33	2.14
203-1	A	101.88	1.26	99.49	99.96	100.09	100.27	103.57	103.91	104.55	105.52	101.93	0.48	101.03	101.22	101.27	101.32	102.53	102.73	102.83	102.98	85.27	85.49	92.92	96.53	94.09	95.16	92.27	87.01	82.47	78.63	75.08	1.61	0.53	-0.12	-0.31	101.83	101.29	1.25	101.62	100.77	2.08
203-1	B	103.11	1.38	100.22	100.82	100.97	101.25	104.87	105.47	105.81	106.70	103.14	0.89	101.72	101.88	101.99	102.07	104.41	104.76	104.99	105.10	86.15	87.88	95.55	97.92	94.69	95.84	92.96	87.61	83.09	79.25	75.25	3.11	1.25	-0.75	-0.28	103.00	101.44	3.27	102.49	101.24	3.22
203-1	C	102.18	1.82	98.63	99.31	99.48	99.73	104.30	104.88	105.50	107.80	102.23	1.18	100.49	100.69	100.76	100.89	103.70	103.92	104.27	104.47	85.76	86.50	94.08	97.40	94.14	94.65	91.53	86.57	82.37	79.31	75.69	3.58	1.02	-0.82	-0.42	102.29	100.97	3.09	101.67	100.26	3.38
203-1	D	103.82	1.29	100.99	101.39	101.64	101.94	105.27	105.73	106.32	107.39	103.78	0.73	102.33	102.39	102.46	102.66	104.72	104.80	105.03	105.18	87.19	89.04	96.14	98.67	96.71	95.75	92.78	88.08	83.76	79.52	75.39	2.64	0.85	-0.37	0.19	103.50	102.06	2.53	103.40	102.01	2.90
203-1	E	104.15	1.12	101.82	102.62	102.82	103.02	104.84	105.38	107.26	110.70	104.17	0.59	103.14	103.19	103.21	103.45	105.03	105.08	105.18	105.29	86.23	87.16	95.36	98.46	95.94	99.34	90.80	87.43	84.27	79.31	75.47	1.99	1.00	-1.00	-0.74	104.52	103.81	1.72	103.65	102.74	1.94
203-1	F	107.04	2.12	101.44	102.63	103.04	103.56	109.05	109.66	110.40	112.16	106.92	1.72	103.67	103.83	104.06	104.37	109.00	109.47	109.65	109.79	87.11	88.66	96.66	105.09	97.26	96.03	93.43	87.57	82.92	79.22	75.51	5.82	1.30	0.45	1.78	105.28	103.60	3.22	106.39	103.86	4.46
204-1	A	106.15	0.82	103.18	104.59	104.84	105.06	107.12	107.41	107.77	108.49	106.17	0.39	105.00	105.33	105.41	105.59	106.57	106.85	106.99	107.03	89.98	91.98	99.72	101.57	98.28	97.79	90.76	87.31	84.08	79.87	75.90	1.66	-0.98	-0.70	-1.92	107.95	107.27	1.28	106.64	105.73	1.63
204-1	B	104.01	0.86	102.10	102.49	102.72	102.88	105.03	105.43	105.75	108.09	104.03	0.34	103.37	103.42	103.49	103.59	104.50	104.59	104.68	104.76	87.20	89.10	97.36	98.98	96.25	96.52	90.06	86.71	82.95	79.83	76.04	1.26	-0.81	-0.99	-1.93	105.88	105.30	0.96	104.42	103.73	1.33
204-1	C	103.32	1.22	101.18	101.50	101.71	101.94	104.11	104.65	105.60	111.60	103.33	0.86	102.35	102.41	102.52	102.59	104.02	105.79	105.84	105.95	87.79	89.42	96.59	98.60	94.72	95.17	90.91	86.33	82.68	79.99	76.47	3.43	-0.28	-0.20	-0.88	104.00	103.30	1.25	103.46	102.67	2.61
204-1	D	104.59	0.79	102.60	103.02	103.24	103.55	105.55	105.96	106.12	106.73	104.58	0.29	103.97	104.10	104.19	104.25	105.01	105.17	105.21	105.30	89.38	91.21	98.36	100.05	96.24	95.34	90.90	86.48	82.89	80.18	76.18	1.10	0.20	-0.04	0.04	104.49	103.86	1.19	104.50	103.86	1.18
204-1	E	108.60	1.11	104.70	105.74	106.32	106.89	109.78	110.05	110.27	110.77	108.61	0.49	107.25	107.44	107.49	107.82	109.18	109.32	109.40	109.44	94.66	95.62	102.57	103.85	101.14	98.63	93.39	88.34	83.65	80.29	76.69	1.96	-0.64	-0.37	-1.49	109.85	109.10	1.37	108.92	107.92	1.77
204-1	F	106.36	0.85	103.84	104.55	104.92	105.20	107.34	107.60	107.77	109.97	106.33	0.31	105.52	105.70	105.81	105.91	106.68	106.73	106.91	107.11	90.50	91.43	100.07	101.21	98.67	98.16	93.76	88.81	83.50	80.35	76.81	1.21	-1.18	-0.88	-2.44	108.61	107.79	1.69	106.96	106.24	1.20
204-1	G	101.93	1.05	100.07	100.38	100.51	100.75	103.21	104.05	104.56	105.82	101.93	0.29	101.09	101.28	101.36	101.52	102.22	102.40	102.46	102.53	85.55	86.36	93.94	96.78	92.45	95.83	90.91	86.01	82.61	80.24	76.85	1.18	-0.59	-0.74	-1.78	103.48	102.99	1.06	102.22	101.45	1.28
204-1	H	105.73	1.00	103.26	103.70	103.90	104.26	106.87	107.20	107.54	108.97	105.71	0.42	104.73	104.83	104.88	105.06	106.17	106.29	106.38	106.44	89.18	91.83	98.58	100.71	99.67	96.47	91.63	87.62	83.74	79.99	76.42	1.55	-1.27	-0.91	-2.62	108.14	107.66	1.14	106.37	105.71	1.29
204-1	I	107.45	1.29	102.97	103.68	104.39	105.64	108.52	108.76	109.10	109.75	107.63	0.51	105.91	106.10	106.23	106.86	107.98	108.05	108.10	108.14	91.50	92.39	100.31	102.30	101.53	98.54	93.25	89.01	84.98	80.73	77.06	2.01	-0.04	-0.62	-1.25	108.41	107.62	1.36	107.47	106.41	1.65
204-1	J	106.25	1.17	103.52	104.24	104.52	104.85	107.46	108.29	109.21	111.30	106.26	0.37	105.29	105.57	105.73	105.81	106.78	106.95	107.17	107.26	93.48	94.67	100.12	101.43	97.90	96.12	91.97	87.76	84.14	81.16	77.61	1.60	-0.62	-0.57	-1.74	107.72	107.05	1.28	106.57	105.96	1.46
205-1	A	101.48	1.08	98.95	99.68	99.86	100.09	102.87	103.51	103.82	104.41	101.47	0.36	100.71	100.81	100.93	101.03	101.97	102.10	102.17	102.31	85.60	86.17	94.52	97.15	93.73	92.73	88.31	83.40	79.03	76.31	73.65	1.35	0.42	-1.34	-1.04	102.46	101.68	2.01	101.27	100.67	1.17
205-1	B	100.53	1.05	98.45	98.79	98.93	99.19	101.99	102.53	102.96	103.71	100.54	0.27	99.77	100.04	100.08	100.17	100.89	100.97	101.00	101.06	84.17	84.65	93.57	96.17	93.29	91.24	87.27	83.11	79.29	76.91	74.49	0.96	0.47	-1.06	-0.61	101.13	100.30	1.46	100.30	99.75	1.11
205-1	C	100.39	1.34	97.44	98.10	98.34	98.78	102.24	102.90	103.44	105.15	100.43	0.45	99.58	99.66	99.68	99.82	101.04	101.19	101.28	101.38	83.99	83.87	92.88	96.19	93.26	91.29	87.25	83.32	79.20	77.07	74.64	1.63	0.21	-0.85	-1.09	101.26	100.55	1.24	100.29	99.60	1.37
205-1	D	100.12	0.91	97.75	98.55	98.79	99.04	100.83	101.50	102.35	105.38	100.15	0.46	99.27	99.35	99.39	99.52	100.87	101.07	101.13	101.31	83.57	83.77	93.14	95.37	93.14	91.35	87.13	83.08	79.41	77.30	74.86	1.78	0.08	-1.19	-1.31	101.32	100.79	1.02	100.08	99.41	1.43
205-1	E	100.94	1.22	98.48	99.32	99.58	99.76	101.71	102.92	104.07	108.09	100.98	0.52	100.35	100.39	100.43	100.50	101.89	102.04	102.09	102.12	84.21	85.40	93.87	96.81	93.76	91.10	87.23	83.26	79.26	77.21	74.60	1.70	0.31	-0.53	-0.37	101.23	100.87	0.70	100.78	100.16	1.68
205-1	F	101.35	0.93	99.40	99.96	100.10	100.26	102.49	103.15	103.46	104.66	101.34	0.22	100.85	100.97	101.01	101.07	101.61	101.72	101.77	101.94	85.34	86.43	94.50	97.17	94.41	90.75	86.98	83.39	79.56	77.36	74.63	0.80	-0.09	-0.87	-1.15	102.41	101.63	1.33	101.40	101.02	0.78
205-1	G	101.67	0.69	99.97	100.44	100.59	100.80	102.45	102.77	103.08	104.67	101.65	0.28	101.09	101.15	101.20	101.24	102.02	102.09	102.14	102.18	86.02	86.82	94.92	97.42	94.91	90.69	87.04	83.76	79.75	77.36	74.71	1.00	-0.09	-0.21	-0.35	102.00	101.58	0.80	101.72	101.12	1.14
205-1	H	102.04	1.13	99.67	100.29	100.42	100.68	103.42	104.13	104.62	107.31	102.02	0.32	101.32	101.34	101.41	101.57	102.38	102.48	102.55	102.64	85.16	86.93	95.30	97.71	95.43	91.46	87.49	83.95	80.06	77.86	75.34	1.20	0.02	-0.59	-0.42	102.54	101.88	1.32	102.03	101.42	1.11
205-1	I	101.30	0.85	99.65	99.93	100.03	100.20	102.15	102.48	102.91	105.60	101.31	0.31	100.61	100.64	100.67	100.78	101.60	101.64	101.66	101.70	85.05	85.92	93.89	97.06	94.58	91.36	87.69	83.85	80.06	77.82	74.93	1.02	0.18	-0.67	-0.21	101.65	100.80	1.55	101.21	100.61	0.97
205-1	J	104.24	1.50	100.66	101.11	101.30	101.84	105.93	106.51	106.68	106.94	104.33	1.04	101.99	102.38	102.61	102.93	105.79	105.87	105.94	105.99	89.95	90.78	97.75	100.00	96.69	93.77	89.30	84.77	80.61	77.58	73.72	3.57	0.07	-1.65	-1.62	105.84	103.70	3.86	104.21	102.28	3.64
205-1	K	103.54	1.56	99.58	100.14	100.55	101.22	104.88	105.41	106.28	109.89	103.54	0.87	101.16	101.26	101.49	101.84	104.34	104.53	104.62	104.72	88.41	89.09	96.63	99.55	95.73	93.67	89.59	84.71	80.28	77.46	73.66	3.36	-0.36	-0.94	-1.23	104.81	101.46	4.86	103.72	101.54	3.30
205-1	L	101.30	0.96	99.04	99.64	99.82	100.06	102.41	103.07	103.43	104.04	101.26	0.41	100.45	100.55	100.66	100.80	101.79	101.93	102.03	102.11	84.59	85.22	93.69	96.92	92.52	93.79	89.77	84.75	79.99	77.18	74.25	1.48	-0.28	0.93	-0.01	100.97	100.55	0.96	101.43	100.90	1.09
205-1	M	101.34	1.29	98.58	99.17	99.37	99.69	102.61	103.26	104.23	107.92	101.39	0.52	100.17	100.35	100.46	100.63	102.01	102.11	102.29	102.40	85.70	85.66	94.30	96.95	92.80	93.16	89.32	83.94	79.62	76.59	73.77	1.93	-0.26	0.97	0.46	100.76	100.19	1.62	101.47	100.49	1.96

Site ID	Surf ID	PM-C 7 ft. Avg. Mean	PM-C 7 ft. Avg. StDev	PM-C 7 ft. Avg. Min	PM-C 7 ft. Avg. 2.5%	PM-C 7 ft. Avg. 5%	PM-C 7 ft. Avg. 10%	PM-C 7 ft. Avg. 90%	PM-C 7 ft. Avg. 95%	PM-C 7 ft. Avg. 97.5%	PM-C 7 ft. Avg. Max	PM-C 44 ft. Avg. Mean	PM-C 44 ft. Avg. StDev	PM-C 44 ft. Avg. Min	PM-C 44 ft. Avg. 2.5%	PM-C 44 ft. Avg. 5%	PM-C 44 ft. Avg. 10%	PM-C 44 ft. Avg. 90%	PM-C 44 ft. Avg. 95%	PM-C 44 ft. Avg. 97.5%	PM-C 44 ft. Avg. Max	PM-C Avg Spec. 500	PM-C Avg Spec. 630	PM-C Avg Spec. 800	PM-C Avg Spec. 1000	PM-C Avg Spec. 1250	PM-C Avg Spec. 1600	PM-C Avg Spec. 2000	PM-C Avg Spec. 2500	PM-C Avg Spec. 3150	PM-C Avg Spec. 4000	PM-C Avg Spec. 5000	PM-C 44 ft. Avg 95% PWL	C PM minus AM dBA	C minus R AM dBA	C minus R PM dBA	R Avg dBA	R Avg 2.5%ile (44ft) dBA	R Avg Var 95% PWL (44ft) dBA	C Avg dBA	C Avg 2.5%ile (44ft) dBA	C Avg Var 95% PWL (44ft) dBA
206-1	A																																					105.59	105.04	1.15			
206-1	B																																					106.27	105.54	2.97			
206-1	C																																					106.70	105.24	3.62			
206-1	D																																					104.90	104.22	1.27			
206-1	E																																					105.34	103.73	3.60			
206-1	F																																					104.99	104.44	1.10			
206-1	G																																					104.78	103.84	2.18			
206-1	H																																					102.10	101.69	1.03			
206-1	I																																					108.25	107.57	1.34			
207-1	A	101.87	0.67	100.25	100.46	100.73	100.98	102.61	102.89	103.29	104.20	101.87	0.17	101.39	101.52	101.60	101.65	102.10	102.13	102.16	102.23	89.49	87.34	93.77	97.50	90.84	94.63	90.97	86.57	82.39	79.11	75.74	0.64	0.08	-0.89	-0.70	102.63	102.23	0.79	101.83	101.43	0.72
207-1	B	108.44	0.92	105.88	106.65	106.84	107.19	109.62	109.90	110.05	110.67	108.43	0.56	107.24	107.40	107.50	107.58	109.14	109.23	109.25	109.37	89.23	88.12	95.49	107.20	96.69	96.02	94.31	88.52	84.05	80.24	76.69	1.86	0.01	-1.71	-1.52	110.06	109.46	1.47	108.44	107.55	1.76
207-1	C	109.19	1.43	105.67	106.30	106.54	106.96	110.79	111.32	111.84	112.89	109.25	1.24	106.90	106.96	107.01	107.17	110.87	111.25	111.39	111.45	90.94	101.00	102.14	101.43	102.46	101.90	96.42	90.11	85.33	81.17	77.70	4.43	0.30	-0.69	-0.19	109.48	107.64	3.18	109.05	106.89	4.25
207-1	D	108.64	1.91	103.59	104.54	104.91	105.74	110.88	111.42	111.82	112.57	108.72	1.17	105.16	105.43	106.85	107.16	109.86	110.27	110.46	110.73	93.30	93.72	101.60	104.30	100.74	100.30	95.39	89.47	84.34	80.95	77.49	5.03	0.19	0.28	0.65	108.08	106.13	3.90	108.55	105.44	4.75
207-1	E	103.35	0.84	101.08	101.79	101.96	102.17	104.39	104.60	104.88	105.78	103.35	0.49	102.39	102.49	102.59	102.62	103.99	104.05	104.08	104.13	90.10	89.01	95.72	98.75	93.69	95.74	92.25	87.68	83.35	80.20	76.83	1.59	0.64	-0.63	-0.02	103.36	102.29	2.66	103.03	101.84	2.13
207-1	F	102.14	0.66	99.94	100.63	101.07	101.26	102.92	103.09	103.34	103.81	102.13	0.16	101.70	101.76	101.88	101.93	102.35	102.39	102.41	102.45	88.58	86.82	94.23	97.57	91.86	95.04	91.55	86.81	82.58	79.49	76.00	0.66	0.12	-0.93	-0.80	102.95	102.46	1.09	102.08	101.38	1.08
207-1	G	107.37	0.79	105.08	105.71	106.00	106.33	108.21	108.61	108.78	109.18	107.38	0.35	106.71	106.81	106.85	106.91	107.87	107.96	108.05	108.12	87.36	87.50	94.68	106.08	95.34	95.13	93.72	87.57	83.77	80.15	76.56	1.24	0.31	-2.74	-2.65	109.91	109.12	1.51	107.21	106.52	1.46
207-1	H	103.88	0.84	101.42	102.31	102.46	102.75	104.81	105.22	105.66	107.45	103.88	0.21	103.51	103.57	103.59	103.66	104.22	104.31	104.37	104.51	88.16	87.43	95.17	99.81	95.30	95.47	93.90	88.47	84.16	80.32	76.97	0.81	0.15	-1.74	-1.11	105.23	104.49	1.41	103.81	103.29	1.06
207-1	I																																			-0.89		102.73	102.20	1.20	101.98	101.53	0.85
207-1	J																																			-0.95		104.73	103.48	2.12	103.71	102.58	2.10
207-1	K																																			-0.78		107.48	105.82	3.55	107.02	104.56	4.35
207-1	L																																			-0.74		101.61	101.25	0.71	101.02	100.58	0.86
207-1	M																																			-1.62		108.12	106.73	2.75	106.85	105.59	2.36
207-1	N																																			-1.64		107.10	105.43	3.55	105.65	103.96	3.92
207-1	O																																			-1.34		107.50	106.80	1.41	106.67	106.13	1.05
207-1	P																																			-0.41		105.63	105.01	1.08	105.32	104.88	0.76
208-1	A																																			-0.59		104.39	103.00	2.57	103.77	101.99	3.41
208-1	B																																			-1.01		105.67	103.93	2.77	104.74	103.02	3.04
208-1	C																																			-0.02		104.34	103.76	1.30	104.27	102.92	1.90
208-1	D																																			-0.74		104.68	103.59	2.09	104.07	102.74	2.28
208-1	E																																			-1.38		105.52	104.30	2.21	104.21	103.24	2.00
208-1	F	104.60	1.05	101.53	102.50	102.73	103.15	105.69	106.26	106.77	108.32	104.59	0.41	103.75	103.89	103.99	104.05	105.07	105.24	105.34	105.51	88.21	89.69	97.37	99.58	97.17	96.49	92.71	88.29	85.11	81.00	77.78	1.46	0.03	-1.23	-1.54	105.97	104.99	1.87	104.58	103.74	1.62
208-1	G	104.83	1.19	102.40	102.63	102.91	103.17	106.27	106.81	107.43	108.10	104.74	0.76	103.62	103.73	103.82	103.92	105.89	106.24	106.50	106.61	88.07	90.48	97.98	99.56	97.49	96.77	92.73	88.15	84.68	80.81	77.35	2.76	0.03	-2.22	-2.42	107.14	106.13	1.94	104.82	103.85	2.45
208-1	H	105.85	1.24	102.76	103.44	103.70	104.14	107.25	108.00	108.38	110.15	105.83	0.70	104.58	104.63	104.71	104.92	106.55	107.21	107.25	107.34	88.14	91.21	98.86	101.16	98.50	97.15	93.62	88.83	84.37	81.00	77.66	2.62	-0.19	-2.61	-3.09	108.80	107.88	2.50	105.95	104.87	2.44
208-1	I	106.52	1.01	103.11	104.57	104.72	105.04	107.56	107.96	108.28	109.81	106.62	0.55	105.04	105.08	105.13	105.68	107.07	107.13	107.18	107.25	87.63	89.73	97.24	103.61	97.65	97.25	94.20	89.27	84.91	81.59	78.30	2.10	-0.05	-2.72	-2.98	109.40	108.30	1.95	106.55	105.31	1.86
209-1	A																																					102.12	100.96	1.70			
209-1	B																																					111.23	110.59	1.22			
209-1	C																																					111.00	110.02	1.99			
209-1	D																																					103.14	101.82	2.84			
209-1	E																																					100.31	99.67	1.31			
209-1	F																																					104.59	104.12	0.78			
209-1	G																																					109.36	109.10	0.56			
209-1	H																																					105.04	104.07	1.58			
209-1	I																																								
209-1	J																																								
209-1	K																																								
209-1	L																																								
209-1	M																																								
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209-1	V																																								
209-1	W																																								
209-1	X																																								
209-1	Y																																								
305-1	A																																					104.45	103.83	1.27			
305-1	B																																					103.71	102.64	1.91			
307-1	A	107.76	1.46	102.46	104.00	104.85	105.68	109.25	109.63	110.05	110.66	107.74	1.03	104.40	104.79	105.14	106.46	108.79	109.05	109.13	109.68	87.50	88.11	95.28	105.90	98.64	96.97	94.18	89.24	84.60	81.37	77.93	4.35	0.13	-2.79	-2.85	110.52	106.70	5.47	107.70	104.62	4.61
307-1	B	105.08	1.63	101.57	102.05	102.30	102.59	106.91	107.19	107.53	108.15	105.18	1.40	102.51	102.58	102.84	103.25	106.71	106.89	106.94	107.00	88.92	90.37	96.37	100.05	98.84	96.67	93.37	89.40	85.36	82.25	78.79	4.36	0.30	-1.63	-1.46	106.48	104.36	3.54	104.93	102.53	4.26
307-1	C	107.89	0.76	106.08	106.49	106.58	106.78	108.76	109.08	109.21	109.61	107.94	0.14	107.69	107.71	107.73	107.76	108.15	108.18	108.20	108.24	87.63	87.12	94.54	97.98	105.63	100.38	94.03	89.22	85.14	80.62	77.31	0.50	-0.03	-0.36	0.00	108.08	107.52	1.19	107.91	107.50	0.83
307-1	D	103.67	0.90	101.53	102.00	102.25	102.54	104.74	105.12	105.40	107.91	103.72	0.33	102.97	103.15	103.18	103.23	104.12	104.25	104.42	104.53	87.61	87.57	94.81	97.51	97.40	96.36	93.87	88.97	84.41	80.95	77.22	1.28	0.02	-1.73	-1.94	105.50	105.02	1.08	103.66	103.10	1.33
307-1	E	107.51	0.93	104.77	105.46	105.77	106.16	108.51	108.83	109.26	110.78	107.56	0.48	106.35	106.59	106.70	106.90	108.25	108.43	108.55	108.64	87.00	87.95	94.61	98.59	105.09	99.59	93.86	88.95	84.99	80.62	77.28	1.96	0.37	-0.32	-0.41	107.69	106.54	2.39	107.32	106.26	2.13
307-1	F	103.97	0.95	101.29	102.16	102.42	102.76	105.08	105.42	105.91	107.04	104.00	0.45	103.07	103.20	103.26	103.36	104.53	104.64	104.73	104.76	88.19	88.72	95.28	98.23	97.77	96.15	93.48	88.78	84.53	81.09	77.64	1.53	0.06	-1.78	-1.73	105.69	104.87	1.68	103.94	103.09	1.77
309-1	A	108.67	1.12	105.57	106.39	106.84	107.19	109.98	110.53	110.97	112.32	108.73	0.67	107.58	107.71	107.73	107.82	109.66	109.93	110.18	110.30	91.50	94.14	102.02	103.55	102.23	99.73	95.07	90.39	85.80	81.60	78.15	2.47	0.00	-1.89	-1.53	110.38	109.77	1.20	108.67	107.71	2.41
309-1	B	108.07	1.29	104.86	105.42	105.73	106.23	109.50	109.89	110.07	111.68	108.13	1.00	106.24	106.33	106.38	106.52	109.26	109.61	109.83	109.90	90.15	93.36	100.87	102.92	101.88	99.48	95.15	90.38	85.36	81.44	78.12	3.50	0.04	-1.52	-1.39	109.51	108.42	2.06	108.05	106.34	3.15
309-1	C	107.89	1.27	104.54	105.26	105.69	106.10	109.35	109.80	110.22	111.97	107.83	0.98	105.63	106.07	106.36	106.86	109.42	109.57	109.62	109.73	89.95	93.49	101.80	102.75	101.42	98.63	92.88	88.71	85.07	80.86	77.38	3.55	-0.14	-1.48	-1.69	109.55	107.89	3.82	107.96	106.15	3.56
310-1	A	104.02	1.03	101.57	102.02	102.25	102.60	105.28	105.70	105.98	107.45	104.04	0.72	102.52	102.71	102.81	102.95	104.94	105.08	105.16	105.29	89.60	90.34	97.28	99.15	95.95	95.83	91.04	86.44	82.20	79.05	75.49	2.44	-0.06	-2.36	-2.39	106.42	105.02	2.70	104.05	102.76	2.45
310-1	B	104.73	0.99	102.25	102.90	103.15	103.40	105.93	106.40	106.72	108.54	104.73	0.61	103.54	103.70	103.86	103.96	105.48	105.79	106.05	106.45	88.97	91.27	98.72	99.58	96.79	95.98	91.84	87.32	82.94	79.34	75.64	2.35	-0.23	-2.83	-2.88	107.70	106.92	1.57	104.85	103.84	2.08
310-1	C	104.34	0.92	101.64	102.42	102.72	103.09	105.41	105.83	106.12	107.37	104.31	0.56	102.80	103.15	103.28	103.43	105.01	105.15	105.30	105.80	87.84	89.15	96.70	98.84	98.36	96.19	91.72	87.61	83.25	79.77	75.88	2.15	0.41	-2.13	-1.83	106.12	105.01	2.28	104.14	102.94	2.30
311-1	A	102.26	1.05	99.40	100.46	100.64	100.91	103.43	104.00	104.61	107.79	102.27	0.67	101.00	101.17	101.34	101.43	103.12	103.49	103.76	103.93	85.73	87.31	96.11	97.58	93.78	93.70	88.78	85.21	82.41	79.96	74.41	2.59	-0.51	-0.40	-0.63	103.03	102.32	1.63	102.51	101.50	2.50
317-1	A																																					106.49	105.39	2.25			
317-1	B																																					105.35	104.55	2.23			
319-1	A																																			-1.14		104.73	104.18	1.05	103.60	102.90	1.19
319-1	B																																			-0.56		104.19	103.54	2.66	103.63	103.00	1.24
319-1	C																																			-0.57		111.16	110.08	2.21	110.59	109.79	1.45
320-1	A																																					102.12	101.57	1.25			
320-1	B	99.71	1.15	96.93	97.78	97.92	98.21	101.29	101.77	102.12	103.53	99.70	0.34	98.91	99.08	99.22	99.31	100.09	100.19	100.59	100.93	82.53	83.96	92.79	95.37	91.21	91.10	87.72	83.11	79.72	77.22	74.20	1.51	-1.10						100.25	99.66	1.61
320-1	C	99.88	0.90	97.55	98.28	98.50	98.69	100.93	101.47	101.96	103.30	99.88	0.31	99.00	99.27	99.33	99.40	100.25	100.36	100.44	100.61	83.05	84.29	92.94	95.46	90.80	91.89	88.22	83.01	79.61	76.79	73.56	1.17	-0.78	-1.71	-0.90	101.57	100.93	1.31	100.27	99.65	1.31
322-1	A	104.66	0.97	101.11	102.83	103.17	103.48	105.69	106.21	106.68	109.95	104.66	0.43	103.18	103.62	103.77	104.08	105.11	105.21	105.37	105.90	88.04	89.58	96.12	99.83	97.91	96.84	92.79	88.05	84.15	81.19	77.55	1.75	0.08	-2.37	-2.13	106.87	105.98	1.72	104.62	103.61	1.74
323-1	A																																					102.79	101.63	1.82			
323-1	B																																					110.47	109.07	2.77			
324-1	A																																			-1.08		102.39	101.63	1.77	101.27	100.58	1.28
325-1	A	108.27	0.92	105.88	106.66	106.80	106.97	109.45	109.72	110.01	110.68	108.31	0.24	107.63	107.88	107.92	108.01	108.59	108.76	108.80	108.98	89.69	91.77	98.28	102.68	101.31	102.99	95.82	91.24	87.71	82.77	78.58	0.93	0.06	0.59	0.50	107.70	107.18	1.03	108.24	107.80	1.07
325-1	B	108.54	1.22	105.72	106.47	106.68	107.03	109.92	110.73	111.24	112.58	108.54	0.40	107.55	107.87	107.93	108.01	109.18	109.29	109.31	109.41	90.07	93.06	100.37	103.15	101.28	102.26	96.31	91.73	87.95	83.02	78.94	1.44	0.06	0.61	0.44	107.99	107.41	1.34	108.51	107.83	1.52
325-1	C	107.73	1.09	105.07	105.65	105.89	106.15	108.97	109.39	109.86	111.26	107.74	0.62	106.32	106.44	106.58	106.95	108.50	108.83	108.86	108.94	88.69	91.21	98.12	101.97	101.00	101.91	96.45	91.96	87.66	82.91	79.13	2.42	0.19	-0.11	0.12	107.62	106.84	1.40	107.63	106.44	2.39
325-1	D	108.57	1.00	105.47	106.76	107.00	107.28	109.81	110.31	110.59	111.58	108.59	0.43	107.44	107.72	107.76	107.99	109.12	109.16	109.20	109.29	88.76	91.68	98.96	103.23	101.59	102.88	96.53	92.03	88.36	83.29	79.16	1.49	0.17	0.77	0.63	107.79	107.34	0.93	108.49	107.41	1.77
325-1	E	108.56	1.02	105.78	106.37	106.83	107.19	109.61	109.97	110.58	113.19	108.53	0.41	107.38	107.54	107.83	107.94	108.95	109.10	109.19	109.28	89.20	91.53	98.33	102.83	101.34	103.70	96.11	91.64	88.05	83.17	79.11	1.65	0.23	0.76	0.86	107.63	106.76	1.56	108.44	107.54	1.55
336-1	A																																					105.90	105.27	1.64			
339-1	A																																					96.09	95.59	1.35			
339-1	B																																					99.13	98.43	1.33			
339-1	C																																					95.44	95.19	0.52			
339-1	D																																					99.84	99.14	1.53			
339-1	E																																					103.17	102.20	1.65			
340-1	A																																					105.67	104.89	1.74			
340-1	B																																					108.81	107.42	2.23			
340-1	C																																					106.48	105.93	1.17			
340-1	D																																					107.19	106.46	1.50			
341-1	A																																			-1.51		103.75	103.02	2.12	102.63	102.03	1.60
342-1	A																																					104.04	103.26	1.83			
342-1	B																																					106.56	105.19	2.71			
342-1	C																																					108.51	107.73	2.30			
343-1	A																																					100.79	100.34	0.92			

Site ID	Surf ID	CPB Location	CPB Peak SPL Test 1	CPB Peak SPL Test 2	CPB Peak SPL Test 3	CPB Peak SPL Test 4	CPB Peak SPL Test 5	CPB Peak SPL Test 6	CPB Peak SPL Test 7	CPB Peak SPL Test 8	CPB Peak SPL Test 9	CPB Peak SPL Test 10	CPB Speed (mph) Test 1	CPB Speed (mph) Test 2	CPB Speed (mph) Test 3	CPB Speed (mph) Test 4	CPB Speed (mph) Test 5	CPB Speed (mph) Test 6	CPB Speed (mph) Test 7	CPB Speed (mph) Test 8	CPB Speed (mph) Test 9	CPB Speed (mph) Test 10	CPB Corr. Peak SPL Test 1	CPB Corr. Peak SPL Test 2	CPB Corr. Peak SPL Test 3	CPB Corr. Peak SPL Test 4	CPB Corr. Peak SPL Test 5	CPB Corr. Peak SPL Test 6	CPB Corr. Peak SPL Test 7	CPB Corr. Peak SPL Test 8	CPB Corr. Peak SPL Test 9	CPB Corr. Peak SPL Test 10	CPB Corr. Peak SPL Average	CPB Corr. Peak SPL Std. Dev.	Avg. OBSI	OBSI minus CPB SPL 29.48
101-2	B	675	73.85	74.10	73.22	73.35	73.40	73.17					60	60	60	60	60	61					73.85	74.10	73.22	73.35	73.40	72.90					73.47	0.44	102.06	28.59
101-2	D	371	72.34	72.25	72.28	72.18							59	59	59	59							72.62	72.53	72.56	72.46							72.54	0.07	100.68	28.14
101-2	E	440	75.07	74.77	74.71	74.97	75.19						59	59	59	59	59						75.35	75.05	74.99	75.25	75.47						75.22	0.20	104.88	29.66
101-2	F	150	72.88	73.29	73.07	73.36	72.79						58	58	58	59	58						73.44	73.85	73.63	73.64	73.35						73.58	0.19	102.75	29.17
101-2	G	441	74.50	74.22	72.91	73.60	74.02	73.15					58	58	58	56	59	58					75.06	74.78	73.47	74.74	74.30	73.71					74.34	0.64	103.84	29.49
101-2	H	372	72.57	72.46	71.92	71.88	72.56	72.56					60	59	59	59	59	59					72.57	72.74	72.20	72.16	72.84	72.84					72.56	0.31	100.69	28.13
101-2	I	272	73.64	73.11	73.61	73.44							58	59	59	59							74.20	73.39	73.89	73.72							73.80	0.34	102.59	28.79
101-2	J	273	72.13	72.09	71.83	72.02							59	59	58	59							72.41	72.37	72.39	72.30							72.37	0.05	101.42	29.06
101-2	K	150	75.47	76.14	76.08	76.21	76.75						54	60	59	59	59						77.21	76.14	76.36	76.49	77.03						76.64	0.45	105.72	29.07
101-2	L	150	79.58	80.87	78.69	80.74	79.63						61	59	59	59	59						79.31	81.15	78.97	81.02	79.91						80.07	0.99	108.38	28.31
101-2	P	150	71.73	71.78	71.88	71.67							59	59	59	59							72.01	72.06	72.16	71.95							72.04	0.09	100.76	28.72
101-2	Q	367	72.11	72.43	72.40	72.60	72.22						59	59	59	60	59						72.39	72.71	72.68	72.60	72.50						72.57	0.13	101.19	28.62
101-2	R	150	72.85	72.67	72.86	72.77	72.92						59	59	59	59	59						73.13	72.95	73.14	73.05	73.20						73.09	0.10	101.92	28.83
101-4	C	327	74.10	74.27	74.02	74.02	74.19						61	60	60	60	60						73.83	74.27	74.02	74.02	74.19						74.07	0.17	104.38	30.31
101-4	D	371	71.73	71.63	71.69	71.60							59	59	59	59							72.01	71.91	71.97	71.88							71.94	0.06	101.89	29.95
101-4	E	440	74.93	74.35	74.50	74.80	74.06						60	60	59	59	59						74.93	74.35	74.78	75.08	74.34						74.69	0.34	105.32	30.63
101-4	F	150	73.00	73.42	73.40	73.12	73.51						60	60	60	59	60						73.00	73.42	73.40	73.40	73.51						73.35	0.20	103.14	29.80
101-4	G	441	73.59	73.50	73.29	73.37							59	59	59	59							73.87	73.78	73.57	73.65							73.71	0.13	104.16	30.44
101-4	H	402	72.25	71.24	71.65	71.37							58	58	58	57							72.81	71.80	72.21	72.22							72.26	0.42	101.61	29.35
101-4	I	272	73.96	74.10	73.70	73.76							58	58	58	58							74.52	74.66	74.26	74.32							74.44	0.18	103.30	28.86
101-4	J	273	72.42	72.72	72.39	73.04							58	58	59	59							72.98	73.28	72.67	73.32							73.06	0.30	102.57	29.51
101-4	K	150	77.59	77.56	76.74	76.21	75.79						59	59	58	59	58						77.87	77.84	77.30	76.49	76.35						77.17	0.72	107.53	30.37
101-4	L	150	80.30	80.53	80.68	80.66							59	58	58	58							80.58	81.09	81.24	81.22							81.03	0.31	110.45	29.42
101-4	P	150	71.55	71.28	71.20	71.09	70.83						58	58	58	58	58						72.11	71.84	71.76	71.65	71.39						71.75	0.26	101.17	29.43
101-4	Q	431	72.58	72.79	72.57	72.05	72.82						59	59	59	59	59						72.86	73.07	72.85	72.33	73.10						72.84	0.31	101.68	28.84
101-4	R	150	72.54	73.37	72.57	73.12	72.95						59	59	58	59	58						72.82	73.65	73.13	73.40	73.51						73.30	0.33	102.34	29.04
202-1	B	500	71.36	71.03	71.01	71.24	68.23	68.27					64	63	63	63	54	54					70.29	70.22	70.20	70.43	69.97	70.01					70.19	0.18	100.66	30.47
202-1	C	400	71.09	71.91	70.82	71.60	71.82	69.13	69.59	68.23	69.53	69.35	65	65	64	64	65	56	56	55	55	55	69.77	70.59	69.75	70.53	70.50	70.27	70.73	69.67	70.97	70.79	70.36	0.47	103.06	32.70
202-1	D	500	72.24	71.09	71.45	72.07	69.12	68.95					64	63	63	63	54	54					71.17	70.28	70.64	71.26	70.86	70.69					70.82	0.36	103.32	32.50
202-1	E	500	70.72	71.02	70.94	68.52	68.11	68.77	68.17	68.52	68.33		64	64	64	56	55	56	55	56	56		69.65	69.95	69.87	69.66	69.55	69.91	69.61	69.66	69.47		69.70	0.17	100.81	31.10
202-1	F	550	73.17	71.74	71.61	71.53	71.39	70.28	70.26				65	60	59	59	59	54	54				71.85	71.74	71.89	71.81	71.67	72.02	72.00				71.85	0.13	101.89	30.03
202-1	G	653	71.88	69.28	69.30	68.99							64	55	55	54							70.81	70.72	70.74	70.73							70.75	0.04	100.60	29.85
203-1	A	250	71.06	71.37	71.65								59	59	59								71.34	71.65	71.93								71.64	0.30	101.83	30.19
203-1	D	250	72.84	72.59	72.95								60	60	60								72.84	72.59	72.95								72.79	0.18	103.50	30.70
204-1	A	100	75.67	76.48	76.17	75.41	76.58	76.09					59	59	59	59	59	59					75.95	76.76	76.45	75.69	76.86	76.37					76.34	0.45	107.95	31.60
204-1	B	403	74.13	74.55	74.24	75.02	74.40						59	59	59	59	59						74.41	74.83	74.52	75.30	74.68						74.75	0.35	105.88	31.13
204-1	C	85	74.51	74.44	74.41	74.13	74.22						59	59	59	59	59						74.79	74.72	74.69	74.41	74.50						74.62	0.16	104.00	29.39
204-1	D	403	73.37	72.71	72.59	73.15							59	59	59	59							73.65	72.99	72.87	73.43							73.23	0.37	104.49	31.26
204-1	E	304	78.63	78.45	78.16	78.16	78.67						57	58	57	57	57						79.48	79.01	79.01	79.01	79.52						79.20	0.27	109.85	30.64
204-1	F	299	76.54	77.00	77.09	76.76	76.23						59	59	59	59	59						76.82	77.28	77.37	77.04	76.51						77.00	0.35	108.61	31.61
204-1	H	302	75.87	76.43	76.25	76.22	75.61						58	59	59	59	59						76.43	76.71	76.53	76.50	75.89						76.41	0.31	108.14	31.73
204-1	J	300	75.86	75.52	76.03	75.56	75.58	75.82	75.88				58	58	59	58	58	58	58				76.42	76.08	76.31	76.12	76.14	76.38	76.44				76.27	0.15	107.72	31.45
205-1	A	50	73.49	72.63	72.63	72.51							60	59	59	59							73.49	72.91	72.91	72.79							73.02	0.32	102.46	29.43
205-1	B	50	71.83	72.12	72.25								59	58	58								72.11	72.68	72.81								72.53	0.37	101.13	28.60
205-1	E	50	72.63	71.93	72.41	72.01	72.31						59	59	59	59	59						72.91	72.21	72.69	72.29	72.59						72.54	0.29	101.23	28.70
205-1	J	0	76.07	76.49	77.13								59	59	59								76.35	76.77	77.41								76.84	0.53	105.84	29.00
205-1	K	404	73.46	73.44	73.50	74.97	74.86						58	58	58	58	58						74.02	74.00	74.06	75.53	75.42						74.61	0.79	104.81	30.20
206-1	A	100	74.91	75.01	74.76	75.00	74.92						60	61	60	61	60						74.91	74.74	74.76	74.73	74.92						74.81	0.10	105.59	30.78
206-1	B	-300	76.24	76.06	75.88	76.24	76.31	76.39	75.77				60	60	59	60	60	60	59				76.24	76.06	76.16	76.24	76.31	76.39	76.05				76.21	0.13	106.27	30.07
206-1	C	601	75.66	75.92	74.57	75.66							59	59	59	59							75.94	76.20	74.85	75.94							75.73	0.60	106.70	30.97
206-1	D	100	75.07	74.44	73.97	74.56	74.77	74.97	74.05				59	59	59	59	59	60	59				75.35	74.72	74.25	74.84	75.05	74.97	74.33				74.78	0.39	104.90	30.11
206-1	F	100	75.14	75.39	74.90	74.69							59	59	59	59							75.42	75.67	75.18	74.97							75.31	0.30	104.99	29.68
206-1	G	100	75.49	75.19	75.32	75.10	75.62	77.66	77.79	78.06	78.29		59	59	58	58	59	68	69	69	69		75.77	75.47	75.88	75.66	75.90	75.59	75.48	75.75	75.98		75.72	0.18	104.78	29.05
206-1	H	403	72.04	72.60	72.56	72.03	72.27	72.79					60	59	59	59	59	59					72.04	72.88	72.84	72.31	72.55	73.07					72.61	0.39	102.10	29.48
206-1	I	418	78.66	78.52	78.97								58	58	56								79.22	79.08	80.11								79.47	0.56	108.25	28.78
207-1	A	150	72.79	74.84	73.44	73.87	74.04						59	59	59	58	59						73.07	75.12	73.72	74.43	74.32						74.13	0.77	102.63	28.50
207-1	B	402	80.37	80.33	80.07	79.93							59	59	59	59							80.65	80.61	80.35	80.21							80.45	0.21	110.06	29.60
207-1	C	349	80.12	80.30	79.61								59	59	59								80.40	80.58	79.89								80.29	0.36	109.48	29.20
207-1	D	50	79.84	80.20	79.63	80.87	80.13						59	58	59	59	59						80.12	80.76	79.91	81.15	80.41						80.47	0.50	108.08	27.61
207-1	E	349	73.96	74.21	75.09	73.88	73.89						59	59	59	59	59						74.24	74.49	75.37	74.16	74.17						74.48	0.51	103.36	28.87
207-1	F	250	73.25	72.99	73.54	72.21	74.61						60	60	60	60	60						73.25	72.99	73.54	72.21	74.61						73.32	0.87	102.95	29.63
207-1	H	50	75.91	76.03	75.12	76.81							59	59	59	58							76.19	76.31	75.40	77.37							76.32	0.81	105.23	28.92
207-1	I	348	76.07	75.48	75.67								58	59	58								76.63	75.76	76.23								76.21	0.44	102.73	26.52
207-1	J	150	77.41	76.49	76.47	76.75							59	59	59	58							77.69	76.77	76.75	77.31							77.13	0.45	104.73	27.60
207-1	K	50	80.16	79.48	79.60	80.01	79.89						58	58	58	58	58						80.72	80.04	80.16	80.57	80.45						80.39	0.28	107.48	27.09
207-1	L	150	73.34	72.71	72.01	72.90							58	59	59	58							73.90	72.99	72.29	73.46							73.16	0.69	101.61	28.45
207-1	M	248	80.83	80.35	80.22	79.53	79.48						59	59	59	59	59						81.11	80.63	80.50	79.81	79.76						80.36	0.57	108.12	27.76
207-1	N	50	78.19	78.32	78.47	78.27							58	59	59	59							78.75	78.60	78.75	78.55							78.66	0.10	107.10	28.44
207-1	O	150	78.64	78.57	78.53	78.59							59	60	60	60							78.92	78.57	78.53	78.59							78.65	0.18	107.50	28.85
207-1	P	350	75.80	75.80	76.52	76.44	76.84						59	58	58	59	59						76.08	76.36	77.08	76.72	77.12						76.67	0.45	105.63	28.96
208-1	A	150	73.57	72.72	72.89	74.40	72.49	73.40					58	58	58	58	53	55					74.13	73.28	73.45	74.96	74.54	74.84					74.20	0.71	104.39	30.20
208-1	B	252	75.85	76.46	75.88	76.43	76.19						58	58	58	58	57						76.41	77.02	76.44	76.99	77.04						76.78	0.32	105.67	28.89
208-1	C	352	73.82	73.52	72.92								58	58	58								74.38	74.08	73.48								73.98	0.46	104.34	30.37
208-1	D	250	75.54	75.93	76.91	76.05							58	59	59	60							76.10	76.21	77.19	76.05							76.39	0.54	104.68	28.29
208-1	E	0	76.65	77.21	76.58	76.91							59	59	59	59							76.93	77.49	76.86	77.19							77.11	0.29	105.52	28.41
208-1	F	350	76.83	76.60	77.71	76.94	78.23						58	59	59	60	60						77.39	76.88	77.99	76.94	78.23						77.48	0.61	105.97	28.48
208-1	G	50	76.68	76.26	77.16	77.18							59	59	59	59							76.96	76.54	77.44	77.46							77.10	0.44	107.14	30.04
208-1	H	250	79.29	79.12	79.38	79.90							59	59	59	58							79.57	79.40	79.66	80.46							79.77	0.47	108.80	29.03
208-1	I	250	80.85	81.10	81.34	81.16							58	59	58	58							81.41	81.38	81.90	81.72							81.60	0.25	109.40	27.80

Site ID	Surf ID	CTM/DFT Locations	Sand Patch MTD (mm) Test 1	Sand Patch MTD (mm) Test 2	Sand Patch MTD (mm) Test 3	Sand Patch MTD (mm) Test 4	Sand Patch MTD (mm) Test 5	Sand Patch MTD (mm) Test 6	Sand Patch MTD (mm) Test 7	Sand Patch MTD (mm) Test 8	Sand Patch MTD (mm) Test 9	Sand Patch MTD (mm) Test 10	Sand Patch MTD (mm) Test 11	Sand Patch MTD (mm) Test 12	Sand Patch MTD (mm) Test 13	Sand Patch MTD (mm) Test 14	Sand Patch MTD (mm) Test 15	Sand Patch MTD (mm) Test 16	Sand Patch MTD (mm) Test 17	Sand Patch MTD (mm) Test 18	Sand Patch MTD (mm) Test 19	Sand Patch MTD (mm) Test 20	Sand Patch MTD (mm) Avg	Sand Patch MTD (mm) StDev	CTM MPD (mm) Test 1	CTM MPD (mm) Test 2	CTM MPD (mm) Test 3	CTM MPD (mm) Test 4	CTM MPD (mm) Test 5	CTM MPD (mm) Test 6	CTM MPD (mm) Test 7	CTM MPD (mm) Test 8	CTM MPD (mm) Test 9	CTM MPD (mm) Test 10	CTM MPD (mm) Test 11	CTM MPD (mm) Test 12	CTM MPD (mm) Test 13	CTM MPD (mm) Test 14	CTM MPD (mm) Test 15	CTM MPD (mm) Test 16	CTM MPD (mm) Test 17	CTM MPD (mm) Test 18	CTM MPD (mm) Test 19	CTM MPD (mm) Test 20	CTM MPD (mm) Avg	CTM MPD (mm) StDev
101-1	A	75,150,291,366,506,581																							0.606	0.688	0.689	0.686	0.639	0.549															0.643	0.057
101-1	B	75,150,331,406,590,665,848,923,1107,1182																							0.726	0.626	0.735	0.649	0.809	0.664	0.685	0.769	0.755	0.873											0.729	0.076
101-1	C	50,150,268,368,486,586																							0.940	1.160	1.430	1.166	0.920	1.165															1.130	0.186
101-1	D	50,150,271,371,491,591																							0.470	0.388	0.473	0.399	0.374	0.443															0.424	0.043
101-1	E	50,150,270,370,490,590																							0.794	0.809	0.678	0.686	0.799	0.734															0.750	0.059
101-1	F	50,150,272,372,491,591																							0.739	0.906	0.686	0.685	0.830	0.991															0.806	0.125
101-1	G	50,150,271,371,491,591																							0.999	1.111	0.821	1.064	1.021	0.941															0.993	0.102
101-1	H	50,150,272,372,494,594																							0.461	0.604	0.443	0.551	0.464	0.581															0.517	0.070
101-1	I	50,150,272,372,494,594																							1.164	0.991	1.370	1.338	1.021	1.121															1.168	0.158
101-1	J	50,150,273,373,495,595																							0.629	0.733	0.774	0.880	0.811	0.874															0.783	0.095
101-1	K	50,150,268,368,485,585																							0.590	0.646	0.733	0.585	0.576	0.661															0.632	0.060
101-1	L	50,150,268,368,487,587																							0.655	0.586	0.688	0.705	0.904	0.755															0.715	0.108
101-1	M	75,200,353,478																							0.825	0.995	0.946	0.980																	0.937	0.077
101-1	N	40,120																							1.089	1.179																			1.134	0.064
101-1	O	90,190,377,477																							0.854	0.866	0.661	0.630																	0.753	0.125
101-1	P	50,150,269,369,488,588																							0.629	0.776	0.639	0.648	0.759	0.635															0.681	0.068
101-1	Q	50,150,267,367,483,583																							0.525	0.388	0.606	0.576	0.734	0.810															0.606	0.150
101-1	R	50,150,268,368,487,587																							0.561	0.621	0.600	0.444	0.609	0.738															0.595	0.095
101-2	A	75,150,291,366,506,581	0.73	0.70	0.75	0.87	0.67	0.58															0.717	0.096	0.669	0.674	0.713	0.751	0.720	0.561															0.681	0.066
101-2	B	75,150,331,406,590,665,848,923,1107,1182	0.60	0.56	0.77	0.62	0.60	0.74	0.85	0.90	0.83	0.83											0.730	0.125	0.660	0.604	0.654	0.629	0.566	0.635	0.756	0.696	0.665	0.824											0.669	0.075
101-2	C	50,150,268,368,486,586	1.00	1.13	1.34	1.53	0.85	1.24															1.182	0.243	0.813	1.080	1.474	1.601	1.066	1.204															1.206	0.289
101-2	D	50,150,271,371,491,591	0.45	0.38	0.52	0.52	0.40	0.31															0.430	0.083	0.449	0.414	0.509	0.451	0.458	0.398															0.446	0.039
101-2	E	50,150,270,370,490,590	0.86	0.79	0.65	0.83	0.76	0.70															0.765	0.079	0.796	0.819	0.818	0.700	0.704	0.824															0.777	0.059
101-2	F	50,150,272,372,491,591	1.04	0.95	0.74	0.81	0.81	1.05															0.900	0.131	1.063	0.889	0.748	0.744	0.831	1.010															0.881	0.133
101-2	G	50,150,271,371,491,591	0.98	1.16	1.00	0.99	1.19	1.01															1.055	0.094	0.940	0.981	0.928	0.893	1.048	0.958															0.958	0.053
101-2	H	50,150,272,372,494,594	0.77	0.48	0.48	0.50	0.53	0.54															0.550	0.111	0.664	0.468	0.491	0.511	0.423	0.473															0.505	0.083
101-2	I	50,150,272,372,494,594	1.03	0.84	1.18	1.16	1.04	0.82															1.012	0.153	1.080	0.848	1.209	1.013	0.975	0.969															1.015	0.121
101-2	J	50,150,273,373,495,595	0.78	0.64	0.66	0.95	0.76	0.95															0.790	0.135	0.675	0.735	0.726	0.984	0.816	0.879															0.803	0.114
101-2	K	50,150,268,368,485,585	0.64	0.71	0.74	0.61	0.71	0.76															0.695	0.058	0.663	0.629	0.794	0.575	0.611	0.625															0.649	0.076
101-2	L	50,150,268,368,487,587	0.69	0.61	0.67	0.60	0.76	0.78															0.685	0.074	0.666	0.534	0.726	0.603	0.974	0.796															0.716	0.156
101-2	M	75,200,353,478	0.88	0.82	0.79	0.77																	0.815	0.048	0.786	1.018	0.619	0.668																	0.773	0.178
101-2	N	40,120	1.38	1.22																			1.300	0.113	1.235	1.171																			1.203	0.045
101-2	O	90,190,377,477	1.02	0.76	0.62	0.63																	0.758	0.186	0.686	0.761	0.583	0.666																	0.674	0.073
101-2	P	50,150,269,369,488,588	0.73	1.00	0.59	0.66	0.83	0.68															0.748	0.147	0.681	0.789	0.624	0.705	0.809	0.613															0.703	0.082
101-2	Q	50,150,267,367,483,583	0.59	0.50	0.67	0.62	0.75	0.95															0.680	0.156	0.525	0.419	0.630	0.528	0.625	0.828															0.592	0.139
101-2	R	50,150,268,368,487,587	0.65	0.54	0.55	0.44	0.52	0.67															0.562	0.086	0.606	0.459	0.521	0.458	0.571	0.600															0.536	0.067
101-3	A	75,150,291,366,506,581																							0.594	0.620	0.644	0.678	0.680	0.559															0.629	0.048
101-3	B	75,150,331,406,590,665,848,923,1107,1182																							0.591	0.520	0.663	0.615	0.441	0.588	0.613	0.673	0.618	0.769											0.609	0.088
101-3	C	50,150,268,368,486,586																							0.690	0.921	1.383	1.400	1.054	1.079															1.088	0.273
101-3	D	50,150,271,371,491,591																							0.339	0.345	0.361	0.400	0.411	0.376															0.372	0.029
101-3	E	50,150,270,370,490,590																							0.863	0.853	0.883	0.805	0.691	0.671															0.794	0.091
101-3	F	50,150,272,372,491,591																								0.730	0.704	0.686	0.710																0.708	0.018
101-3	G	50,150,271,371,491,591																							0.671	0.791	0.848	0.963	0.861	0.446															0.763	0.182
101-3	H	50,150,272,372,494,594																								0.401	0.391	0.343	0.401																0.384	0.028
101-3	I	50,150,272,372,494,594																								0.761	0.780	0.865	0.793																0.800	0.045
101-3	J	50,150,273,373,495,595																								0.488	0.571	0.808	0.600																0.617	0.136
101-3	K	50,150,268,368,485,585																								0.471	0.630	0.513	0.524																0.534	0.068
101-3	L	50,150,268,368,487,587																								0.486	0.650	0.486	0.943																0.641	0.215
101-4	A	75,150,291,366,506,581	0.65	0.74	0.73	0.79	0.73	0.66															0.717	0.053	0.513	0.664	0.618	0.554	0.583	0.563															0.582	0.053
101-4	B	75,150,331,406,590,665,848,923,1107,1182	0.79	0.57	0.69	0.62	0.62	0.69	0.54	0.63													0.644	0.079	0.658	0.466	0.575	0.468	0.525	0.533	0.448	0.583	0.510	0.778											0.554	0.101
101-4	C	50,150,268,368,486,586	0.95	0.90	1.30	1.22	1.04	1.16															1.095	0.157	0.780	0.868	1.231	1.039	1.070	1.126															1.019	0.167
101-4	D	50,150,271,371,491,591	0.47	0.48	0.50	0.56	0.60	0.50															0.518	0.051	0.336	0.330	0.341	0.350	0.358	0.311															0.338	0.016
101-4	E	50,150,270,370,490,590	0.72	0.71	0.89	0.86	0.80	0.77															0.792	0.073	0.633	0.641	0.766	0.736	0.753	0.665															0.699	0.059
101-4	F	50,150,272,372,491,591	0.79	0.81	0.78	0.74	0.79	0.83															0.790	0.030	0.691	0.743	0.596	0.615	0.631	0.815															0.682	0.085
101-4	G	50,150,271,371,491,591	0.85	0.79	0.76	0.88	0.90	0.95															0.855	0.071	0.644	0.833	0.689	0.790	0.781	0.814															0.758	0.075
101-4	H	50,150,272,372,494,594	0.47	0.52	0.50	0.46	0.51	0.54															0.500	0.030	0.360	0.373	0.319	0.248	0.363	0.375															0.339	0.049
101-4	I	50,150,272,372,494,594	0.86	0.77	0.95	0.93	0.90	0.84															0.875	0.066	0.814	0.724	0.894	0.926	0.828	0.709															0.816	0.088
101-4	J	50,150,273,373,495,595	0.58	0.69	0.60	0.74	0.71	0.72															0.673	0.067	0.518	0.619	0.488	0.779	0.554	0.599															0.593	0.104
101-4	K	50,150,268,368,485,585	0.58	0.55	0.64	0.59	0.67	0.67															0.617	0.050	0.400	0.369	0.500	0.454	0.480	0.516															0.453	0.058
101-4	L	50,150,268,368,487,587	0.55	0.56	0.55	0.57	0.65	0.79															0.612	0.095	0.499	0.523	0.433	0.433	0.884	0.549															0.553	0.169
101-4	M	75,200,353,478	0.52	0.60	0.64	0.60																	0.590	0.050	0.414	0.504	0.455	0.449																	0.455	0.037
101-4	N	40,120	0.82	0.87																			0.845	0.035	0.708	0.808																			0.758	0.071
101-4	O	90,190,377,477	0.59	0.59	0.60	0.50																	0.570	0.047	0.391	0.336	0.359	0.424																	0.378	0.038
101-4	P	50,150,269,369,488,588	0.69	0.72	0.63	0.60	0.70	0.63															0.662	0.048	0.458	0.601	0.446	0.386	0.500	0.486															0.480	0.072
101-4	Q	50,150,267,367,483,583	0.55	0.52	0.61	0.51	0.62	0.67															0.580	0.063	0.341	0.304	0.496	0.356	0.454	0.508															0.410	0.087
101-4	R	50,150,268,368,487,587	0.65	0.51	0.61	0.48	0.56	0.59															0.567	0.063	0.543	0.436	0.509	0.306	0.384	0.431															0.435	0.085
202-1	A	150,300,640,790	1.09	0.86	0.99	1.43																	1.093	0.244	0.969	0.913	0.966	0.895																	0.936	0.038
202-1	B	150,300,638,788	0.51	0.44	0.78	0.64																	0.593	0.150	0.776	0.709	0.928	0.703																	0.779	0.105
202-1	C	150,300,642,792	0.81	0.74	0.87	0.73																	0.788	0.066	0.891	0.896	1.016	1.164																	0.992	0.128
202-1	D	150,300,648,798	1.10	1.41	0.91	0.86																	1.070	0.249	1.183	1.496	1.211	1.026																	1.229	0.196
202-1	E	150,300,630,780	0.54	0.69	0.66	0.87																	0.690	0.136	0.536	0.635	0.679	0.771																	0.655	0.098
202-1	F	150,300,550,700	1.11	1.10	0.95	0.91																	1.018	0.102	0.773	0.970	0.838	0.946																	0.882	0.093
202-1	G	150,300,653,803	0.91	0.98	0.70	1.06																	0.913	0.154	0.935	1.080	0.738	0.818																	0.893	0.149
203-1	A	50,150,248,348	0.42	0.69	0.47	0.54																	0.530	0.117	0.253	0.371	0.386	0.339																	0.337	0.060
203-1	B	100,200,302,402	0.40	0.73	0.61	0.79																	0.633	0.172	0.291	0.611	0.484	0.555																	0.485	0.139
203-1	C	100,200,301,401,501	0.46	0.62	0.69	0.56																	0.583	0.097		0.299	0.601	0.558	0.358																0.454	0.148
203-1	D	100,200,294,394	0.63	0.81	1.04	0.80																	0.820	0.168	0.596	0.659	0.928	0.736																	0.730	0.144
203-1	E	100,200,295,395	1.65	1.30	1.31	1.24																	1.375	0.186	1.135	1.188	1.131	1.129																	1.146	0.028
203-1	F	100,200,303,403	0.78	0.97	0.58	0.69																	0.755	0.165	0.491	0.770	0.493	0.555																	0.577	0.132
204-1	A	100,200,304,404	0.58	0.71	0.89	0.78																	0.740	0.130	0.771	0.811	1.104	0.821																	0.877	0.153
204-1	B	100,200,303,403	0.53	0.75	0.62	0.74																	0.660	0.105	0.583	0.828	0.666	0.683																	0.690	0.102
204-1	C	100,200,300,400	0.59	0.70	0.43	0.56																	0.570	0.111	0.655	0.726	0.675	0.514																	0.643	0.091
204-1	D	100,200,303,403	0.67	0.78	0.81	0.65																	0.728	0.079	0.934	0.975	0.916	0.798																	0.906	0.076
204-1	E	100,200,304,404	0.52	0.45	0.41	0.56																	0.485	0.068	0.634	0.514	0.499	0.630																	0.569	0.073
204-1	F	100,200,299,399	0.49	0.57	0.58	0.47																	0.528	0.056	0.423	0.518	0.553	0.591																	0.521	0.072
204-1	G	100,200	0.36	0.35																			0.355	0.007	0.249	0.285																			0.267	0.026
204-1	H	100,200,302,402	0.61	0.52	0.54	0.58																	0.563	0.040	0.830	0.641	0.560	0.805																	0.709	0.130
204-1	I	50,100	0.58	0.65																			0.615	0.049	0.666	0.660																			0.663	0.004
204-1	J	100,200,300,400	0.63	0.65	0.69	0.61																	0.645	0.034	0.521	0.869	0.708	0.770																	0.717	0.146
205-1	A	50,150,248,348	0.42	0.42	0.46	0.50																	0.450	0.038	0.343	0.338	0.361	0.423																	0.366	0.039
205-1	B	50,150,249,349	0.92	0.95	0.75	0.90																	0.880	0.089	0.879	0.818	0.796	0.901																	0.848	0.050
205-1	C	50,150,250,350	0.97	0.83	0.89	0.92																	0.903	0.059	0.880	0.800	0.898	0.866																	0.861	0.043
205-1	D	50,150,248,348	0.69	0.87	0.81	0.84																	0.803	0.079	0.658	0.825	0.803	0.780																	0.766	0.075
205-1	E	50,150,250,350	0.86	0.95	0.95	0.80																	0.890	0.073	0.856	0.864	0.789	0.824																	0.833	0.034
205-1	F	50,150,249,349	0.82	0.73	0.97	0.87																	0.848	0.100	0.761	0.803	0.835	0.854																	0.813	0.041
205-1	G	50,150,247,347	1.11	1.08	1.06	0.96																	1.053	0.065	0.946	0.858	0.996	0.904																	0.926	0.059
205-1	H	50,150,246,346	1.12	0.99	1.10	0.99																	1.050	0.070	0.930	0.939	0.944	0.955																	0.942	0.010
205-1	I	62.5,162.5,261.5,361.5																							0.866	0.983	0.914	1.013																	0.944	0.066
205-1	J	50,150,252,352																							1.071	1.311	0.629	1.115																	1.032	0.288
205-1	K	50,150,252,352																							0.959	1.336	0.836	0.438																	0.892	0.370
205-1	L	50,150,252,352																							0.261	0.274	0.271	0.361																	0.292	0.047
205-1	M	50,150,249,349																							0.313	0.268	0.311	0.410																	0.325	0.060

Site ID	Surf ID	CTM/DFT Locations	Sand Patch MTD (mm) Test 1	Sand Patch MTD (mm) Test 2	Sand Patch MTD (mm) Test 3	Sand Patch MTD (mm) Test 4	Sand Patch MTD (mm) Test 5	Sand Patch MTD (mm) Test 6	Sand Patch MTD (mm) Test 7	Sand Patch MTD (mm) Test 8	Sand Patch MTD (mm) Test 9	Sand Patch MTD (mm) Test 10	Sand Patch MTD (mm) Test 11	Sand Patch MTD (mm) Test 12	Sand Patch MTD (mm) Test 13	Sand Patch MTD (mm) Test 14	Sand Patch MTD (mm) Test 15	Sand Patch MTD (mm) Test 16	Sand Patch MTD (mm) Test 17	Sand Patch MTD (mm) Test 18	Sand Patch MTD (mm) Test 19	Sand Patch MTD (mm) Test 20	Sand Patch MTD (mm) Avg	Sand Patch MTD (mm) StDev
206-1	A	100,200,348,448	0.56	0.57	0.47	0.45																	0.513	0.061
206-1	B	100,200,351,451	0.62	0.69	0.68	0.81																	0.700	0.080
206-1	C	100,200,350,450	0.69	0.62	0.58	0.60																	0.623	0.048
206-1	D	100,200,352,452	0.65	0.53	0.51	0.41																	0.525	0.098
206-1	E	100,200,353,453	0.42	0.43	0.43	0.44																	0.430	0.008
206-1	F	100,200,353,453	0.59	0.56	0.49	0.52																	0.540	0.044
206-1	G	100,200,352,452	0.86	0.67	0.71	0.72																	0.740	0.083
206-1	H	100,200,352,452	0.48	0.49	0.54	0.40																	0.478	0.058
206-1	I	100,200,357,457	0.64	0.59	0.59	0.63																	0.613	0.026
207-1	A	50,150,251,351	0.48	0.46	0.42	0.49																	0.463	0.031
207-1	B	50,150,251,351	0.76	0.68	0.70	0.64																	0.695	0.050
207-1	C	50,150,249,349	0.72	0.69	0.81	0.75																	0.743	0.051
207-1	D	50,150,249,349	0.67	0.57	0.57	0.54																	0.588	0.057
207-1	E	50,150,249,349	0.51	0.49	0.61	0.58																	0.548	0.057
207-1	F	50,150,250,350	0.49	0.51	0.51	0.46																	0.493	0.024
207-1	G	50,150,254,354	0.62	0.70	0.67	0.59																	0.645	0.049
207-1	H	50,150,248,348	0.63	0.44	0.60	0.77																	0.610	0.135
207-1	I	50,150,248,348	0.50	0.50	0.48	0.54																	0.505	0.025
207-1	J	50,150,250,350	0.51	0.55	0.67	0.50																	0.558	0.078
207-1	K	50,150,252,352	0.68	0.48	0.53	0.52																	0.553	0.088
207-1	L	50,150,249,349	0.38	0.36	0.36	0.39																	0.373	0.015
207-1	M	50,150,248,348	0.50	0.52	0.63	0.55																	0.550	0.057
207-1	N	50,150,248,348	0.57	0.55	0.51	0.67																	0.575	0.068
207-1	O	50,150,249,349	0.47	0.55	0.51	0.54																	0.518	0.036
207-1	P	45,150,250,350	0.88	0.90	1.12	1.04																	0.985	0.115
208-1	A	50,150,252,352	0.88	0.70	1.18	0.95																	0.928	0.199
208-1	B	50,150,252,352	0.82	1.65	1.11	0.91																	1.123	0.372
208-1	C	50,150,252,352	0.68	0.93	0.87	0.87																	0.838	0.109
208-1	D	50,150,250,350	0.53	0.51	0.55	0.57																	0.540	0.026
208-1	E	50,150,252,352	0.69	0.87	0.74	0.78																	0.770	0.076
208-1	F	50,150,250,350	0.76	0.88	0.60	0.87																	0.778	0.130
208-1	G	50,150,251,351	0.92	0.79	0.95	0.98																	0.910	0.084
208-1	H	50,150,250,350	0.60	0.81	0.79	0.97																	0.793	0.152
208-1	I	50,150,250,350	0.69	0.66	0.82	0.75																	0.730	0.071
209-1	A																							
209-1	B																							
209-1	C																							
209-1	D																							
209-1	E																							
209-1	F																							
209-1	G																							
209-1	H																							
209-1	I																							
209-1	J																							
209-1	K																							
209-1	L																							
209-1	M																							
209-1	N																							
209-1	O																							
209-1	P																							
209-1	Q																							
209-1	R																							
209-1	S																							
209-1	T																							
305-1	A	272,337,479,544,687,752,896,961	0.54	0.68	0.74	0.53	0.53	0.56	0.53	0.54													0.581	0.082
305-1	B	65,130,281,346,496,561,711,776,926,991	0.35	0.33	0.45	0.49	0.44	0.43	0.29	0.30	0.24	0.35											0.367	0.082
307-1	A	200,400,600,800	0.74	0.69	0.68	0.52																	0.658	0.095
307-1	B	100,200,302,402	0.55	0.88	0.95	0.84																	0.805	0.176
307-1	C	100,200	0.78	0.77																			0.775	0.007
307-1	D	100,200,303,403	0.61	0.77	0.74	0.73																	0.713	0.070
307-1	E	100,200,304,404	0.92	0.98	0.79	0.72																	0.853	0.119
307-1	F	100,200,303,403	0.62	0.74	0.72	0.52																	0.650	0.101
309-1	A	100,200,304,404	0.59	0.67	0.86	0.78																	0.725	0.119
309-1	B	100,200,302,402	0.69	0.43	0.37	0.60																	0.523	0.148
309-1	C	100,200,304,404	0.69	0.60	0.84	1.04																	0.793	0.192
310-1	A	75,200,328,453,580,705,831,956	0.40	0.48	0.50	0.44	0.56	0.48	0.47	0.52													0.481	0.049
310-1	B	75,200,326,451,578,703,831,956	0.69	0.57	0.62	0.90	0.61	0.69	0.64	0.68													0.675	0.100
310-1	C	75,200,329,454,583,708,837,962	0.66	0.93	0.53	0.77	0.70	0.71	0.69	0.53													0.690	0.129
311-1	A	50,150,250,350,450,550,650,750,850,950,1050,1150,1250,1350,1450,1550,1650,1750,1850,1950	1.34	1.22	1.35	1.18	1.13	1.46	1.21	1.35	1.38	1.37	1.37	1.28	1.22	1.24	1.33	1.09	1.03	1.33	0.98	1.22	1.254	0.126
319-1	A	100,200,351,451,602,702,853,953	0.55	0.57	0.61	0.55	0.69	0.61	0.65	0.68													0.614	0.056
319-1	B	100,200,352,452,602,702,850,950	0.38	0.34	0.40	0.37																	0.373	0.025
319-1	C	100,200,349,449,599,699,849,949	0.59	0.50	0.64	0.59																	0.580	0.058
320-1	A	75,150,277,352,478,553,679,754,880,955	0.44	0.55	0.44	0.51	0.52																0.492	0.050
320-1	B	75,150,277,352,478,553,679,754,880,955	0.60	0.69	0.66	0.73	0.68																0.672	0.048
320-1	C	75,150,275,350,475,550,675,750,876,951	0.52	0.56	0.70	0.55	0.56	0.61	0.56	0.57	0.63	0.54											0.580	0.053
322-1	A	50,150,248,348,446,546,643,743,840,940,1038,1138	0.57	0.59	0.65	0.63	0.74	0.79	0.67	0.88	0.70	0.71	0.74	0.68									0.696	0.086
323-1	A	60,120,261,321,463,523,666,726,869,929	0.44	0.38	0.41	0.44	0.48																0.430	0.037
323-1	B	60,120,260,320,460,520,659,719,859,919	0.43	0.41	0.45	0.42	0.38																0.418	0.026
324-1	A	50,150,249,349,447,547,646,746,845,945,1046,1146,1248,1348,1450,1550,1652,1752	0.51	0.49	0.48	0.48	0.52	0.50	0.49	0.49	0.49	0.51	0.52	0.52	0.52	0.54	0.52	0.50	0.49	0.52			0.505	0.017
325-1	A	100,200,304,404	1.01	0.70	0.78	0.96																	0.863	0.147
325-1	B	100,200,303,403	0.69	0.79	0.86	0.74																	0.770	0.073
325-1	C	100,200,302,402	0.52	0.69	0.82	0.71																	0.685	0.124
325-1	D	100,200,302,402	0.75	0.80	1.08	0.95																	0.895	0.150
325-1	E	100,200,305,405	0.49	0.64	0.60	0.87																	0.650	0.160
336-1	A	50,150,250,350,450,550,648,748,846,946	0.77	0.95	0.82	0.90	1.07	0.95	0.87	1.05	1.05	0.79											0.922	0.111
339-1	A	110,110																						
339-1	B	3,3,50,50,182,182																						
339-1	C	150,150																						
339-1	D	33,33,95,95,202,202																						
339-1	E	46,46,120,120																						
340-1	A	50,150,253,353,456,556	0.68	0.98	0.99																		0.883	0.176
340-1	B	50,150,254,354,456,556	0.70	0.47	0.60																		0.590	0.115
340-1	C	50,150,254,354,458,558	0.92	0.87	0.97																		0.920	0.050
340-1	D	50,150,252,352,454,554	0.79	0.98	0.98	0.96	0.90	1.05															0.943	0.089
341-1	A	50,150,250,350,450,550,650,750,850,950,1050,1150,1250,1350,1450,1550,1650,1750,1850,1950	0.46	0.57	0.57	0.48	0.42	0.58	0.51	0.48	0.54	0.63	0.52	0.42	0.43	0.54	0.48	0.41	0.43	0.55	0.44	0.58	0.502	0.066
342-1	A	50,150,250,350,450,550	0.45	0.47	0.52	0.48	0.51	0.52															0.492	0.029
342-1	B	50,150,250,350,450,550	0.77	0.82	0.89	0.70	0.77	0.70															0.775	0.073
342-1	C	50,150,250,350,450,550	0.87	0.67	0.76	0.48	0.54	0.84															0.693	0.159
343-1	A	50,150,250,350,450,550,650,750,850,950,1050,1150,1250,1350,1450,1550,1650,1750,1850,1950	0.72	0.66	0.67	0.55	0.64	0.68	0.70	0.64	0.68	0.74	0.71	0.69	0.74	0.68	0.73	0.73	0.73	0.68	0.74	0.71	0.691	0.046

Site ID	Surf ID	CTM MPD (mm) Test 1	CTM MPD (mm) Test 2	CTM MPD (mm) Test 3	CTM MPD (mm) Test 4	CTM MPD (mm) Test 5	CTM MPD (mm) Test 6	CTM MPD (mm) Test 7	CTM MPD (mm) Test 8	CTM MPD (mm) Test 9	CTM MPD (mm) Test 10	CTM MPD (mm) Test 11	CTM MPD (mm) Test 12	CTM MPD (mm) Test 13	CTM MPD (mm) Test 14	CTM MPD (mm) Test 15	CTM MPD (mm) Test 16	CTM MPD (mm) Test 17	CTM MPD (mm) Test 18	CTM MPD (mm) Test 19	CTM MPD (mm) Test 20	CTM MPD (mm) Avg	CTM MPD (mm) StDev
206-1	A	0.603	0.544	0.475	0.414																	0.509	0.082
206-1	B	0.614	0.713	0.725	1.011																	0.766	0.171
206-1	C	0.678	0.740	0.626	0.533																	0.644	0.088
206-1	D	0.701	0.599	0.708	0.381																	0.597	0.152
206-1	E	0.375	0.325	0.376	0.365																	0.360	0.024
206-1	F	0.521	0.725	0.475	0.464																	0.546	0.122
206-1	G	0.855	0.509	0.613	0.668																	0.661	0.145
206-1	H	0.453	0.396	0.448	0.395																	0.423	0.031
206-1	I	0.479	0.755	0.630	0.669																	0.633	0.115
207-1	A	0.370	0.250	0.320	0.560																	0.375	0.133
207-1	B	0.590	0.530	0.590	0.550																	0.565	0.030
207-1	C	0.760	0.620	0.900	0.710																	0.748	0.117
207-1	D	0.810	0.520	0.380	0.460																	0.543	0.187
207-1	E	0.380	0.330	0.520	0.520																	0.438	0.097
207-1	F	0.370	0.430	0.420	0.310																	0.383	0.055
207-1	G	0.610	0.610	0.560	0.490																	0.568	0.057
207-1	H	0.580	0.310	0.450	0.560																	0.475	0.124
207-1	I	0.330	0.280	0.270	0.350																	0.308	0.039
207-1	J	0.360	0.400	0.430	0.320																	0.378	0.048
207-1	K	0.680	0.350	0.380	0.370																	0.445	0.157
207-1	L	0.220	0.190	0.180	0.190																	0.195	0.017
207-1	M	0.430	0.430	0.490	0.440																	0.448	0.029
207-1	N	0.380	0.450	0.370	0.490																	0.423	0.057
207-1	O	0.300	0.350	0.460	0.350																	0.365	0.068
207-1	P	0.870	0.740	0.960	0.900																	0.868	0.093
208-1	A	0.820	0.500	1.340	0.900																	0.890	0.346
208-1	B	0.710	1.560	1.380	1.040																	1.173	0.376
208-1	C	0.510	0.620	0.780	0.710																	0.655	0.117
208-1	D	0.410	0.370	0.390	0.470																	0.410	0.043
208-1	E	0.730	0.870	0.640	0.750																	0.748	0.095
208-1	F	0.590	0.730	0.500	0.830																	0.663	0.146
208-1	G	0.720	0.830	0.840	0.960																	0.838	0.098
208-1	H	0.460	0.780	0.610	0.830																	0.670	0.169
208-1	I	0.600	0.570	0.680	0.680																	0.633	0.056
209-1	A	0.370	0.430	0.410	0.450	0.480																0.428	0.041
209-1	B	1.630	1.790	1.660	1.740	2.080																1.780	0.179
209-1	C	1.880	2.040	1.820	1.710	1.730																1.836	0.133
209-1	D	0.510	0.520	0.710																		0.580	0.113
209-1	E	0.490	0.380	0.380	0.370	0.360																0.396	0.053
209-1	F	1.010	0.780	0.860	0.930	1.220																0.960	0.168
209-1	G	1.870	1.760	2.510	2.150	2.060																2.070	0.290
209-1	H	0.690	1.330	0.980	1.390	0.970																1.072	0.288
209-1	I	0.180	0.170	0.210	0.160	0.240																0.192	0.033
209-1	J	0.530	0.520	0.400	0.510	0.440																0.480	0.057
209-1	K	0.590	0.420	0.640	0.600	0.570																0.564	0.084
209-1	L	0.370	0.490	0.460	0.290	0.400																0.402	0.079
209-1	M	0.640	0.590	0.630	0.750	0.640																0.650	0.060
209-1	N	0.740	0.520	0.540	0.600	0.540																0.588	0.090
209-1	O	0.780	0.650	0.670	0.640	0.590																0.666	0.070
209-1	P	0.690	0.730	0.640	0.740	0.570																0.674	0.070
209-1	Q	1.080	0.970	1.680	1.170	1.200																1.220	0.272
209-1	R	2.180	2.020	1.950	1.920	1.930																2.000	0.108
209-1	S	0.920	0.880	0.750	1.030	0.940																0.904	0.102
209-1	T	0.580	0.730	0.700	0.750	0.670																0.686	0.067
305-1	A	0.48	0.47	0.400	0.500	0.490	0.520	0.520	0.530													0.489	0.042
305-1	B	0.310	0.350	0.410	0.380	0.400	0.390	0.310	0.290	0.270	0.360											0.347	0.049
307-1	A	0.850	0.500	0.560	0.530																	0.610	0.162
307-1	B	0.550	0.760	0.850	0.810																	0.743	0.134
307-1	C	0.810	0.710																			0.760	0.071
307-1	D	0.570	0.650	0.630	0.760																	0.653	0.079
307-1	E	0.890	0.850	0.730	0.680																	0.788	0.099
307-1	F	0.510	0.590	0.730	0.520																	0.588	0.101
309-1	A	0.570	0.950	0.920	0.800																	0.810	0.173
309-1	B	0.800	0.370	0.400	0.710																	0.570	0.217
309-1	C	0.860	0.700	0.800	1.110																	0.868	0.175
310-1	A	0.490	0.660	0.700	0.520	0.600	0.520	0.490	0.540													0.565	0.080
310-1	B	0.700	0.770	0.650	1.070	0.620	0.800	0.640	0.780													0.754	0.145
310-1	C	0.570	0.990	0.640	0.600	0.720	0.590	0.680	0.570													0.670	0.140
311-1	A	1.380	1.250	1.720	1.250	1.260	1.390	1.180	1.430	1.390	1.570	1.370	1.450	1.380	1.540	1.370	1.370	1.460	1.670	1.390	1.300	1.406	0.137
319-1	A	0.540	0.490	0.580	0.540	0.700	0.600	0.560	0.690													0.588	0.074
319-1	B	0.330	0.370	0.300	0.370	0.340	0.310	0.300	0.340													0.333	0.028
319-1	C	0.490	0.620	0.550	0.590	0.710	0.690	0.780	0.750													0.648	0.102
320-1	A	0.370	0.480	0.490	0.380	0.340	0.320	0.440	0.360	0.390	0.410											0.398	0.057
320-1	B	0.580	0.610	0.640	0.430	0.630	0.300	0.710	0.690	0.680	0.610											0.588	0.128
320-1	C	0.470	0.510	0.680	0.560	0.480	0.550	0.530	0.530	0.610	0.570											0.549	0.062
322-1	A	0.520	0.460	0.510	0.600	0.750	0.790	0.600	0.860	0.660	0.600	0.600	0.680									0.636	0.119
323-1	A	0.480	0.450	0.350	0.320	0.440	0.360	0.370	0.460	0.420	0.310											0.396	0.061
323-1	B	0.810	0.870	0.850	0.850	1.140	1.110	0.990	1.100	0.940	0.980											0.964	0.121
324-1	A	0.410	0.420	0.410	0.390	0.380	0.420	0.380	0.440	0.430	0.490	0.430	0.480	0.470	0.440	0.390	0.420	0.410	0.380			0.422	0.033
325-1	A	0.990	0.670	0.650	0.860																	0.793	0.162
325-1	B	0.530	0.830	0.710	0.600																	0.668	0.131
325-1	C	0.450	0.560	0.690	0.480																	0.545	0.107
325-1	D	0.520	0.730	0.820	0.890																	0.740	0.161
325-1	E	0.340	0.570	0.510	0.820																	0.560	0.199
336-1	A	0.710	1.110	0.890	0.930	1.080	0.990	0.830	1.000	0.880	0.740											0.916	0.133
339-1	A	0.720	0.700																			0.710	0.014
339-1	B	0.970	0.940	0.810	0.830	0.710	0.710															0.828	0.110
339-1	C	0.960	0.950																			0.955	0.007
339-1	D	1.370	1.370	1.370	1.330	1.750	1.750															1.490	0.202
339-1	E	1.650	1.650	1.610	1.560																	1.618	0.043
340-1	A	0.510	1.030	0.840	0.560	0.640	0.460															0.673	0.220
340-1	B	0.700	0.690	0.360	0.630	0.420	0.460															0.543	0.148
340-1	C	0.720	0.770	0.760	0.950	1.020	1.270															0.915	0.210
340-1	D	0.610	0.860	0.900	0.760	0.750	0.780															0.777	0.101
341-1	A	0.360	0.380	0.400	0.340	0.440	0.370	0.490	0.370	0.430	0.580	0.440	0.390	0.410	0.400	0.390	0.400	0.490	0.380	0.360	0.550	0.419	0.064
342-1	A	0.380	0.420	0.380	0.350	0.350	0.390															0.378	0.026
342-1	B	0.770	1.010	0.870	0.680	0.710	0.640															0.780	0.138
342-1	C	0.950	0.610	0.840	0.510	0.440	0.820															0.695	0.204
343-1	A	0.560	0.480	0.440	0.450	0.500	0.550	0.490	0.570	0.450	0.530	0.500	0.430	0.470	0.430	0.520	0.570	0.550	0.440	0.470	0.490	0.495	0.048

Site ID	Surf ID	DFT mu 0 kph Test 1	DFT mu 0 kph Test 2	DFT mu 0 kph Test 3	DFT mu 0 kph Test 4	DFT mu 0 kph Test 5	DFT mu 0 kph Test 6	DFT mu 0 kph Test 7	DFT mu 0 kph Test 8	DFT mu 0 kph Test 9	DFT mu 0 kph Test 10	DFT mu 0 kph Avg	DFT mu 0 kph StDev
101-1	A	0.90	0.92	0.85	0.82	0.90	0.91					0.88	0.04
101-1	B	0.91	0.89	0.88	0.90	0.95	0.83	0.93	0.93	0.95	0.94	0.91	0.04
101-1	C	0.89	0.93	0.82	0.95	0.87	0.92					0.90	0.05
101-1	D	0.90	0.83	0.82	0.83	0.73	0.80					0.82	0.05
101-1	E	0.84	0.77	0.72	0.84	0.58	0.67					0.74	0.10
101-1	F	0.84	0.87	0.96	0.91	0.88	0.86					0.89	0.04
101-1	G	0.87	0.89	0.99	0.62	0.82	0.86					0.84	0.12
101-1	H	0.89	0.92	0.82	0.81	0.74	0.75					0.82	0.07
101-1	I	0.92	0.95	1.00	0.93	0.97	1.00					0.96	0.03
101-1	J	0.93	1.00	0.90	0.84	0.90	0.95					0.92	0.05
101-1	K	0.83	0.80	0.84	0.93	0.90	0.82					0.85	0.05
101-1	L	0.73	0.70	0.74	0.83	0.72	0.74					0.74	0.05
101-1	M	0.88	1.02	0.89	0.86							0.91	0.07
101-1	N	0.78	0.78									0.78	0.00
101-1	O	0.96	0.94	0.95	0.95							0.95	0.01
101-1	P	0.79	0.81	0.88	0.88	0.88	0.80					0.84	0.05
101-1	Q	0.94	0.89	0.90	0.90	0.93	0.90					0.91	0.02
101-1	R	0.79	0.79	0.84	0.86	0.85	0.91					0.84	0.05
101-2	A	0.93	0.93	0.79	0.89	0.88	0.85					0.88	0.05
101-2	B	0.81	0.86	0.86	0.82	0.79	0.86	0.92	0.86	0.92	0.82	0.85	0.04
101-2	C	0.88	0.92	0.92	0.95	0.91	0.93					0.92	0.02
101-2	D	0.91	0.88	0.90	0.87	0.76	0.82					0.86	0.06
101-2	E	0.75	0.85	0.60	0.72	0.79	0.75					0.74	0.08
101-2	F	0.88	0.95	0.93	0.96	0.63	0.84					0.87	0.12
101-2	G	0.98	0.92	0.96	0.78	0.83	0.86					0.89	0.08
101-2	H		0.89	0.94	0.95	0.86	0.90					0.91	0.04
101-2	I	0.88	0.86	0.98	0.99	0.88	0.93					0.92	0.06
101-2	J	0.99	1.01	0.96	0.95	0.80	0.93					0.94	0.08
101-2	K	0.79	0.81	0.79	0.96	0.83	0.77					0.83	0.07
101-2	L	0.68	0.73	0.70	0.88	0.77	0.81					0.76	0.07
101-2	M	0.83	0.98	0.88	0.93							0.91	0.06
101-2	N	0.82	0.82									0.82	0.00
101-2	O	0.94	0.95	0.86	0.95							0.92	0.04
101-2	P	0.74	0.95	0.98	0.93	0.96	0.94					0.92	0.09
101-2	Q	0.97	0.87	0.92	0.88	0.95	0.96					0.93	0.04
101-2	R	0.60	0.67	0.79	0.89	0.83	0.98					0.79	0.14
101-3	A	0.74	0.74	0.81	0.77	0.79	0.77					0.77	0.03
101-3	B	0.81	0.81	0.87	0.82	0.81	0.82	0.79	0.83	0.83	0.84	0.82	0.02
101-3	C	0.78	0.82	0.88	0.87	0.82	0.82					0.83	0.04
101-3	D	0.77	0.77	0.79	0.75	0.77	0.73					0.76	0.02
101-3	E		0.78	0.75	0.85	0.75	0.71					0.77	0.05
101-3	F		0.83	0.83	0.80	0.74						0.80	0.04
101-3	G		0.82	0.83	0.81	0.85						0.83	0.02
101-3	H		0.80	0.83	0.79	0.79						0.80	0.02
101-3	I		0.84	0.86	0.86	0.85						0.85	0.01
101-3	J		0.82	0.88	0.79	0.82						0.83	0.04
101-3	K		0.81	0.79	0.80	0.78						0.79	0.01
101-3	L		0.76	0.76	0.77	0.75						0.76	0.01
101-4	A	0.69	0.72	0.73	0.76	0.73	0.72					0.73	0.02
101-4	B	0.72	0.69	0.75	0.69	0.70	0.69	0.70				0.70	0.02
101-4	C	0.69	0.71	0.73	0.76	0.75	0.77					0.73	0.03
101-4	D	0.74	0.75	0.75	0.75	0.71	0.76					0.74	0.02
101-4	E	0.65	0.75	0.70	0.71	0.70	0.70					0.70	0.03
101-4	F	0.75	0.77	0.73	0.74	0.73	0.74					0.74	0.01
101-4	G	0.71	0.73	0.76	0.76	0.76	0.77					0.75	0.02
101-4	H	0.74	0.76	0.76	0.74	0.74	0.73					0.74	0.01
101-4	I	0.67	0.76	0.74	0.78	0.75	0.76					0.74	0.04
101-4	J	0.74	0.73	0.73	0.73	0.73	0.72					0.73	0.01
101-4	K	0.67	0.70	0.74	0.73	0.72	0.74					0.72	0.03
101-4	L	0.71	0.70	0.69	0.73	0.78	0.74					0.72	0.03
101-4	M	0.71	0.73	0.74	0.78							0.74	0.03
101-4	N	0.56	0.58									0.57	0.02
101-4	O	0.69	0.69	0.72	0.72							0.71	0.02
101-4	P	0.70	0.71	0.70	0.69	0.68	0.67					0.69	0.02
101-4	Q	0.67	0.61	0.67	0.66	0.68	0.69					0.66	0.03
101-4	R	0.64	0.65	0.67	0.66	0.67	0.68					0.66	0.01
202-1	A	0.88	0.89	0.86	0.88							0.88	0.02
202-1	B	0.82	0.84	0.95	0.88							0.87	0.06
202-1	C	0.91	0.93	0.86	0.92							0.91	0.03
202-1	D	0.94	0.99	0.92	0.91							0.94	0.04
202-1	E	0.87	0.86	0.89	0.90							0.88	0.02
202-1	F	0.82	0.82	0.81	0.85							0.83	0.02
202-1	G	0.92	0.87	0.92	0.92							0.91	0.02
203-1	A	0.84	0.91	0.92	0.93							0.90	0.04
203-1	B	0.84	0.90	0.88	0.87							0.87	0.02
203-1	C	0.83	0.85	0.85	0.90	0.87						0.86	0.03
203-1	D	0.88	0.84	0.92	0.89							0.88	0.03
203-1	E	0.79	0.79	0.75	0.80							0.78	0.03
203-1	F	0.86	0.83	0.84	0.84							0.84	0.01
204-1	A	0.80	0.75	0.78	0.73							0.76	0.03
204-1	B	0.72	0.73	0.74	0.77							0.74	0.02
204-1	C	0.66	0.67	0.70	0.68							0.68	0.02
204-1	D	0.77	0.68	0.68	0.66							0.70	0.05
204-1	E	0.64	0.64	0.69	0.67							0.66	0.02
204-1	F	0.67	0.67	0.66	0.70							0.68	0.02
204-1	G	0.63	0.63									0.63	0.01
204-1	H	0.73	0.73	0.75	0.78							0.75	0.02
204-1	I	0.66	0.68									0.67	0.01
204-1	J	0.63	0.56	0.58	0.60							0.59	0.03
205-1	A	0.68	0.72	0.70	0.69							0.70	0.02
205-1	B	0.66	0.68	0.59	0.61							0.63	0.04
205-1	C	0.61	0.57	0.54	0.62							0.58	0.04
205-1	D	0.64	0.57	0.58	0.61							0.60	0.03
205-1	E	0.58	0.57	0.55	0.55							0.56	0.02
205-1	F	0.59	0.60	0.55	0.60							0.58	0.02
205-1	G	0.65	0.60	0.63	0.62							0.63	0.02
205-1	H	0.62	0.69	0.67	0.64							0.66	0.03
205-1	I	0.60	0.67	0.70	0.62							0.65	0.05
205-1	J	0.72	0.75	0.67	0.66							0.70	0.04
205-1	K	0.66	0.73	0.68	0.65							0.68	0.04
205-1	L	0.64	0.72	0.73	0.68							0.69	0.04
205-1	M	0.64	0.69	0.63	0.63							0.65	0.03

Site ID	Surf ID	DFT mu 20 kph Test 1	DFT mu 20 kph Test 2	DFT mu 20 kph Test 3	DFT mu 20 kph Test 4	DFT mu 20 kph Test 5	DFT mu 20 kph Test 6	DFT mu 20 kph Test 7	DFT mu 20 kph Test 8	DFT mu 20 kph Test 9	DFT mu 20 kph Test 10	DFT mu 20 kph Avg	DFT mu 20 kph StDev
101-1	A	0.82	0.76	0.74	0.76	0.76	0.75					0.77	0.03
101-1	B	0.75	0.75	0.74	0.78	0.82	0.71	0.80	0.79	0.79	0.79	0.77	0.03
101-1	C	0.77	0.82	0.82	0.81	0.80	0.79					0.80	0.02
101-1	D	0.65	0.54	0.57	0.61	0.53	0.55					0.57	0.05
101-1	E	0.60	0.61	0.40	0.59	0.35	0.43					0.50	0.12
101-1	F	0.64	0.63	0.72	0.71	0.59	0.62					0.65	0.05
101-1	G	0.67	0.71	0.83	0.37	0.58	0.65					0.63	0.15
101-1	H	0.75	0.75	0.69	0.65	0.56	0.59					0.67	0.08
101-1	I	0.80	0.82	0.92	0.86	0.79	0.85					0.84	0.05
101-1	J	0.80	0.81	0.82	0.76	0.68	0.77					0.77	0.05
101-1	K	0.58	0.61	0.60	0.71	0.66	0.61					0.63	0.05
101-1	L	0.46	0.58	0.50	0.57	0.60	0.56					0.54	0.05
101-1	M	0.65	0.77	0.74	0.80							0.74	0.06
101-1	N	0.70	0.74									0.72	0.03
101-1	O	0.76	0.72	0.76	0.78							0.75	0.02
101-1	P	0.68	0.73	0.72	0.70	0.72	0.66					0.70	0.03
101-1	Q	0.79	0.74	0.72	0.73	0.76	0.77					0.75	0.03
101-1	R	0.49	0.51	0.61	0.62	0.62	0.75					0.60	0.09
101-2	A	0.80	0.80	0.74	0.74	0.79	0.75					0.77	0.03
101-2	B	0.68	0.71	0.74	0.73	0.71	0.75	0.79	0.74	0.77	0.71	0.73	0.03
101-2	C	0.79	0.85	0.84	0.85	0.80	0.82					0.82	0.03
101-2	D	0.71	0.69	0.69	0.66	0.54	0.54					0.64	0.08
101-2	E	0.51	0.62	0.40	0.44	0.52	0.47					0.49	0.08
101-2	F	0.62	0.71	0.73	0.74	0.48	0.57					0.64	0.10
101-2	G	0.79	0.75	0.85	0.51	0.57	0.65					0.69	0.13
101-2	H		0.74	0.80	0.79	0.74	0.70					0.75	0.04
101-2	I	0.80	0.81	0.84	0.85	0.81	0.80					0.82	0.02
101-2	J	0.81	0.81	0.79	0.81	0.52	0.73					0.74	0.11
101-2	K	0.56	0.53	0.57	0.75	0.62	0.57					0.60	0.08
101-2	L	0.54	0.58	0.50	0.68	0.51	0.65					0.58	0.07
101-2	M	0.70	0.83	0.71	0.79							0.76	0.06
101-2	N	0.73	0.78									0.75	0.04
101-2	O	0.76	0.74	0.70	0.69							0.72	0.03
101-2	P	0.54	0.77	0.76	0.75	0.79	0.71					0.72	0.09
101-2	Q	0.75	0.73	0.74	0.67	0.75	0.77					0.74	0.03
101-2	R	0.38	0.48	0.61	0.60	0.63	0.75					0.57	0.13
101-3	A	0.70	0.72	0.69	0.72	0.71	0.68					0.71	0.02
101-3	B	0.66	0.72	0.76	0.75	0.71	0.74	0.75	0.74	0.77	0.74	0.73	0.03
101-3	C	0.76	0.76	0.76	0.79	0.76	0.77					0.76	0.01
101-3	D	0.71	0.68	0.71	0.71	0.71	0.67					0.70	0.02
101-3	E		0.67	0.70	0.71	0.68	0.66					0.68	0.02
101-3	F		0.77	0.75	0.75	0.75						0.75	0.01
101-3	G		0.74	0.68	0.75	0.79						0.74	0.04
101-3	H		0.75	0.75	0.74	0.75						0.75	0.01
101-3	I		0.79	0.79	0.82	0.79						0.80	0.02
101-3	J		0.72	0.77	0.75	0.76						0.75	0.02
101-3	K		0.75	0.73	0.72	0.73						0.73	0.01
101-3	L		0.67	0.68	0.72	0.72						0.70	0.03
101-4	A	0.66	0.65	0.66	0.67	0.61	0.65					0.65	0.02
101-4	B	0.64	0.62	0.65	0.65	0.65	0.64	0.64				0.64	0.01
101-4	C	0.66	0.69	0.63	0.67	0.66	0.69					0.67	0.02
101-4	D	0.68	0.69	0.70	0.69	0.69	0.67					0.69	0.01
101-4	E	0.57	0.63	0.62	0.63	0.64	0.63					0.62	0.03
101-4	F	0.71	0.72	0.69	0.68	0.68	0.69					0.69	0.02
101-4	G	0.61	0.68	0.68	0.64	0.68	0.68					0.66	0.03
101-4	H	0.68	0.67	0.68	0.68	0.68	0.67					0.68	0.01
101-4	I	0.64	0.68	0.71	0.72	0.71	0.70					0.69	0.03
101-4	J	0.68	0.68	0.67	0.65	0.69	0.68					0.67	0.01
101-4	K	0.57	0.63	0.69	0.67	0.66	0.68					0.65	0.04
101-4	L	0.65	0.63	0.63	0.66	0.67	0.68					0.65	0.02
101-4	M	0.62	0.67	0.68	0.71							0.67	0.04
101-4	N	0.53	0.54									0.53	0.00
101-4	O	0.67	0.68	0.68	0.69							0.68	0.01
101-4	P	0.65	0.68	0.67	0.64	0.65	0.61					0.65	0.02
101-4	Q	0.62	0.54	0.59	0.59	0.63	0.64					0.60	0.04
101-4	R	0.54	0.56	0.62	0.58	0.62	0.61					0.59	0.03
202-1	A	0.81	0.87	0.81	0.85							0.83	0.03
202-1	B	0.75	0.79	0.88	0.85							0.82	0.06
202-1	C	0.84	0.84	0.89	0.92							0.87	0.04
202-1	D	0.90	0.95	0.88	0.85							0.90	0.04
202-1	E	0.77	0.79	0.80	0.83							0.80	0.03
202-1	F	0.74	0.76	0.75	0.77							0.76	0.01
202-1	G	0.85	0.82	0.86	0.85							0.84	0.02
203-1	A	0.77	0.86	0.87	0.88							0.84	0.05
203-1	B	0.77	0.84	0.84	0.85							0.83	0.04
203-1	C	0.78	0.83	0.82	0.84	0.82						0.82	0.02
203-1	D	0.84	0.84	0.89	0.87							0.86	0.02
203-1	E	0.77	0.75	0.70	0.76							0.74	0.03
203-1	F	0.79	0.80	0.77	0.77							0.78	0.02
204-1	A	0.64	0.68	0.69	0.65							0.67	0.02
204-1	B	0.64	0.66	0.62	0.69							0.65	0.03
204-1	C	0.63	0.62	0.65	0.61							0.63	0.01
204-1	D	0.64	0.60	0.62	0.58							0.61	0.03
204-1	E	0.56	0.59	0.59	0.59							0.58	0.02
204-1	F	0.60	0.61	0.61	0.60							0.60	0.01
204-1	G	0.57	0.57									0.57	0.00
204-1	H	0.68	0.64	0.68	0.68							0.67	0.02
204-1	I	0.60	0.58									0.59	0.02
204-1	J	0.54	0.56	0.55	0.53							0.54	0.01
205-1	A	0.61	0.66	0.66	0.66							0.65	0.02
205-1	B	0.52	0.59	0.52	0.55							0.55	0.03
205-1	C	0.54	0.52	0.53	0.57							0.54	0.02
205-1	D	0.60	0.56	0.57	0.57							0.57	0.02
205-1	E	0.56	0.56	0.56	0.54							0.54	0.03
205-1	F	0.58	0.57	0.53	0.58							0.56	0.02
205-1	G	0.60	0.55	0.63	0.57							0.59	0.03
205-1	H	0.60	0.61	0.67	0.59							0.62	0.03
205-1	I	0.55	0.64	0.69	0.58							0.61	0.06
205-1	J	0.68	0.67	0.63	0.68							0.67	0.02
205-1	K	0.66	0.66	0.66	0.63							0.65	0.01
205-1	L	0.57	0.62	0.63	0.63							0.61	0.03
205-1	M	0.60	0.59	0.62	0.61							0.60	0.01

Site ID	Surf ID	DFT mu 40 kph Test 1	DFT mu 40 kph Test 2	DFT mu 40 kph Test 3	DFT mu 40 kph Test 4	DFT mu 40 kph Test 5	DFT mu 40 kph Test 6	DFT mu 40 kph Test 7	DFT mu 40 kph Test 8	DFT mu 40 kph Test 9	DFT mu 40 kph Test 10	DFT mu 40 kph Avg	DFT mu 40 kph StDev
101-1	A	0.75	0.69	0.68	0.70	0.68	0.67					0.70	0.03
101-1	B	0.66	0.68	0.65	0.71	0.81	0.66	0.75	0.72	0.70	0.71	0.70	0.05
101-1	C	0.71	0.74	0.74	0.73	0.68	0.66					0.71	0.04
101-1	D	0.53	0.44	0.46	0.49	0.42	0.44					0.46	0.04
101-1	E	0.47	0.49	0.31	0.45	0.31	0.37					0.40	0.08
101-1	F	0.53	0.52	0.59	0.57	0.48	0.50					0.53	0.04
101-1	G	0.58	0.59	0.70	0.32	0.50	0.53					0.53	0.13
101-1	H	0.62	0.64	0.55	0.53	0.47	0.49					0.55	0.07
101-1	I	0.72	0.74	0.84	0.76	0.68	0.76					0.75	0.05
101-1	J	0.71	0.73	0.73	0.67	0.56	0.65					0.68	0.07
101-1	K	0.47	0.51	0.49	0.58	0.50	0.48					0.51	0.04
101-1	L	0.37	0.46	0.40	0.46	0.49	0.46					0.44	0.04
101-1	M	0.57	0.66	0.65	0.72							0.65	0.06
101-1	N	0.67	0.74									0.71	0.05
101-1	O	0.64	0.62	0.65	0.68							0.65	0.02
101-1	P	0.62	0.68	0.61	0.62	0.65	0.58					0.63	0.03
101-1	Q	0.70	0.66	0.62	0.64	0.67	0.69					0.66	0.03
101-1	R	0.39	0.42	0.49	0.50	0.52	0.63					0.49	0.08
101-2	A	0.73	0.72	0.67	0.67	0.73	0.69					0.70	0.03
101-2	B	0.61	0.65	0.67	0.68	0.64	0.69	0.73	0.67	0.66	0.62	0.66	0.04
101-2	C	0.74	0.78	0.76	0.75	0.73	0.72					0.75	0.02
101-2	D	0.64	0.61	0.60	0.57	0.45	0.45					0.55	0.08
101-2	E	0.39	0.48	0.33	0.34	0.43	0.38					0.39	0.06
101-2	F	0.50	0.58	0.60	0.61	0.42	0.48					0.53	0.07
101-2	G	0.64	0.60	0.75	0.40	0.46	0.52					0.56	0.13
101-2	H		0.62	0.69	0.69	0.65	0.61					0.65	0.04
101-2	I	0.75	0.75	0.78	0.76	0.75	0.75					0.76	0.01
101-2	J	0.67	0.70	0.69	0.70	0.45	0.61					0.64	0.10
101-2	K	0.46	0.45	0.46	0.62	0.51	0.45					0.49	0.07
101-2	L	0.46	0.47	0.43	0.56	0.44	0.52					0.48	0.05
101-2	M	0.60	0.72	0.61	0.70							0.66	0.06
101-2	N	0.70	0.76									0.73	0.04
101-2	O	0.66	0.63	0.59	0.58							0.62	0.04
101-2	P	0.47	0.65	0.65	0.63	0.68	0.59					0.61	0.07
101-2	Q	0.64	0.65	0.63	0.56	0.64	0.68					0.63	0.04
101-2	R	0.33	0.41	0.50	0.49	0.52	0.62					0.48	0.10
101-3	A	0.69	0.69	0.67	0.70	0.69	0.64					0.68	0.02
101-3	B	0.59	0.66	0.70	0.70	0.65	0.71	0.70	0.70	0.72	0.68	0.68	0.04
101-3	C	0.72	0.75	0.69	0.70	0.69	0.70					0.71	0.02
101-3	D	0.64	0.62	0.65	0.66	0.65	0.61					0.64	0.02
101-3	E		0.61	0.65	0.65	0.63	0.62					0.63	0.02
101-3	F		0.76	0.72	0.71	0.73						0.73	0.02
101-3	G		0.67	0.59	0.69	0.73						0.67	0.06
101-3	H		0.69	0.70	0.69	0.70						0.70	0.01
101-3	I		0.75	0.76	0.79	0.76						0.76	0.02
101-3	J		0.66	0.72	0.70	0.72						0.70	0.03
101-3	K		0.71	0.68	0.67	0.69						0.69	0.02
101-3	L		0.61	0.64	0.68	0.68						0.65	0.04
101-4	A	0.62	0.61	0.60	0.62	0.55	0.58					0.60	0.03
101-4	B	0.58	0.56	0.60	0.61	0.60	0.59	0.60				0.59	0.02
101-4	C	0.62	0.65	0.56	0.59	0.61	0.63					0.61	0.03
101-4	D	0.61	0.61	0.63	0.63	0.64	0.59					0.62	0.02
101-4	E	0.51	0.55	0.55	0.54	0.57	0.55					0.54	0.02
101-4	F	0.64	0.66	0.63	0.61	0.62	0.63					0.63	0.02
101-4	G	0.55	0.62	0.61	0.58	0.61	0.60					0.60	0.03
101-4	H	0.63	0.62	0.63	0.62	0.63	0.63					0.63	0.01
101-4	I	0.58	0.63	0.65	0.67	0.65	0.65					0.64	0.03
101-4	J	0.61	0.63	0.61	0.60	0.64	0.63					0.62	0.02
101-4	K	0.52	0.57	0.63	0.61	0.60	0.62					0.59	0.04
101-4	L	0.59	0.56	0.57	0.59	0.61	0.61					0.59	0.02
101-4	M	0.55	0.61	0.61	0.64							0.60	0.04
101-4	N	0.52	0.53									0.52	0.01
101-4	O	0.61	0.62	0.62	0.63							0.62	0.01
101-4	P	0.59	0.62	0.61	0.59	0.59	0.56					0.59	0.02
101-4	Q	0.57	0.48	0.53	0.53	0.56	0.57					0.54	0.04
101-4	R	0.47	0.50	0.55	0.52	0.56	0.56					0.53	0.04
202-1	A	0.78	0.85	0.80	0.80							0.81	0.03
202-1	B	0.74	0.77	0.85	0.83							0.80	0.05
202-1	C	0.83	0.74	0.83	0.88							0.82	0.06
202-1	D	0.87	0.90	0.83	0.83							0.86	0.03
202-1	E	0.75	0.76	0.78	0.82							0.78	0.03
202-1	F	0.64	0.69	0.68	0.70							0.68	0.02
202-1	G	0.79	0.77	0.79	0.81							0.79	0.02
203-1	A	0.72	0.80	0.80	0.81							0.78	0.04
203-1	B	0.72	0.79	0.79	0.80							0.77	0.04
203-1	C	0.68	0.75	0.78	0.75	0.75						0.74	0.04
203-1	D	0.78	0.77	0.83	0.82							0.80	0.03
203-1	E	0.75	0.73	0.66	0.72							0.71	0.04
203-1	F	0.68	0.71	0.67	0.68							0.68	0.02
204-1	A	0.58	0.61	0.63	0.58							0.60	0.03
204-1	B	0.59	0.62	0.55	0.62							0.59	0.03
204-1	C	0.56	0.56	0.58	0.55							0.56	0.01
204-1	D	0.58	0.53	0.54	0.52							0.54	0.03
204-1	E	0.49	0.52	0.52	0.52							0.51	0.01
204-1	F	0.53	0.54	0.54	0.53							0.54	0.00
204-1	G	0.50	0.51									0.51	0.00
204-1	H	0.60	0.56	0.61	0.61							0.60	0.02
204-1	I	0.54	0.52									0.53	0.01
204-1	J	0.48	0.49	0.50	0.48							0.49	0.01
205-1	A	0.56	0.60	0.59	0.61							0.59	0.02
205-1	B	0.47	0.55	0.50	0.53							0.51	0.03
205-1	C	0.51	0.52	0.53	0.58							0.53	0.03
205-1	D	0.58	0.55	0.57	0.57							0.57	0.01
205-1	E	0.50	0.56	0.55	0.54							0.54	0.03
205-1	F	0.57	0.56	0.53	0.57							0.56	0.02
205-1	G	0.59	0.55	0.62	0.56							0.58	0.03
205-1	H	0.59	0.59	0.65	0.58							0.60	0.03
205-1	I	0.52	0.59	0.64	0.56							0.58	0.05
205-1	J	0.63	0.62	0.57	0.64							0.62	0.03
205-1	K	0.62	0.62	0.61	0.58							0.61	0.02
205-1	L	0.52	0.56	0.57	0.57							0.55	0.03
205-1	M	0.57	0.55	0.56	0.57							0.56	0.01

Site ID	Surf ID	DFT mu 60 kph Test 1	DFT mu 60 kph Test 2	DFT mu 60 kph Test 3	DFT mu 60 kph Test 4	DFT mu 60 kph Test 5	DFT mu 60 kph Test 6	DFT mu 60 kph Test 7	DFT mu 60 kph Test 8	DFT mu 60 kph Test 9	DFT mu 60 kph Test 10	DFT mu 60 kph Avg	DFT mu 60 kph StDev
101-1	A	0.72	0.66	0.66	0.69	0.65	0.63					0.67	0.03
101-1	B	0.63	0.66	0.64	0.71	0.80	0.63	0.79	0.73	0.66	0.71	0.70	0.06
101-1	C	0.68	0.73	0.70	0.70	0.62	0.58					0.67	0.06
101-1	D	0.49	0.40	0.41	0.42	0.38	0.40					0.42	0.04
101-1	E	0.40	0.42	0.28	0.38	0.30	0.35					0.35	0.06
101-1	F	0.49	0.46	0.54	0.51	0.44	0.45					0.48	0.04
101-1	G	0.52	0.56	0.64	0.29	0.44	0.48					0.49	0.12
101-1	H	0.55	0.56	0.51	0.49	0.45	0.46					0.50	0.05
101-1	I	0.67	0.70	0.79	0.71	0.62	0.72					0.70	0.06
101-1	J	0.66	0.69	0.69	0.61	0.49	0.58					0.62	0.07
101-1	K	0.45	0.46	0.46	0.52	0.46	0.43					0.46	0.03
101-1	L	0.35	0.41	0.37	0.41	0.45	0.43					0.40	0.04
101-1	M	0.52	0.61	0.61	0.68							0.61	0.07
101-1	N	0.67	0.73									0.70	0.04
101-1	O	0.58	0.58	0.60	0.63							0.60	0.02
101-1	P	0.59	0.66	0.55	0.58	0.63	0.56					0.59	0.04
101-1	Q	0.67	0.60	0.57	0.59	0.64	0.66					0.62	0.04
101-1	R	0.35	0.38	0.45	0.44	0.46	0.58					0.44	0.08
101-2	A	0.68	0.67	0.64	0.65	0.70	0.65					0.67	0.03
101-2	B	0.59	0.63	0.65	0.64	0.63	0.67	0.72	0.64	0.57	0.60	0.63	0.04
101-2	C	0.70	0.76	0.71	0.71	0.68	0.67					0.70	0.03
101-2	D	0.59	0.56	0.54	0.52	0.40	0.41					0.50	0.08
101-2	E	0.36	0.43	0.32	0.32	0.38	0.37					0.37	0.04
101-2	F	0.47	0.51	0.56	0.54	0.40	0.43					0.48	0.06
101-2	G	0.57	0.58	0.70	0.34	0.45	0.48					0.52	0.12
101-2	H		0.55	0.62	0.63	0.59	0.56					0.59	0.04
101-2	I	0.71	0.73	0.77	0.72	0.70	0.72					0.73	0.02
101-2	J	0.58	0.63	0.64	0.64	0.41	0.56					0.57	0.09
101-2	K	0.44	0.43	0.44	0.55	0.47	0.43					0.46	0.05
101-2	L	0.43	0.44	0.41	0.51	0.42	0.50					0.45	0.04
101-2	M	0.56	0.64	0.57	0.65							0.60	0.04
101-2	N	0.70	0.77									0.74	0.05
101-2	O	0.61	0.58	0.54	0.53							0.57	0.04
101-2	P	0.45	0.60	0.60	0.57	0.62	0.55					0.57	0.06
101-2	Q	0.57	0.60	0.58	0.52	0.59	0.64					0.58	0.04
101-2	R	0.31	0.40	0.45	0.45	0.49	0.56					0.44	0.09
101-3	A	0.67	0.67	0.66	0.68	0.67	0.60					0.66	0.03
101-3	B	0.55	0.64	0.68	0.70	0.65	0.72	0.69	0.67	0.72	0.64	0.67	0.05
101-3	C	0.68	0.73	0.65	0.67	0.64	0.68					0.67	0.03
101-3	D	0.60	0.58	0.61	0.62	0.62	0.57					0.60	0.02
101-3	E		0.56	0.61	0.61	0.59	0.58					0.59	0.02
101-3	F		0.74	0.70	0.69	0.69						0.70	0.02
101-3	G		0.63	0.50	0.65	0.69						0.62	0.08
101-3	H		0.66	0.67	0.66	0.67						0.67	0.01
101-3	I		0.71	0.73	0.75	0.73						0.73	0.01
101-3	J		0.59	0.67	0.66	0.66						0.64	0.04
101-3	K		0.67	0.63	0.64	0.65						0.64	0.02
101-3	L		0.58	0.62	0.66	0.65						0.63	0.04
101-4	A	0.59	0.58	0.57	0.59	0.52	0.57					0.57	0.02
101-4	B	0.55	0.55	0.61	0.68	0.61	0.67	0.63				0.61	0.05
101-4	C	0.58	0.62	0.51	0.56	0.56	0.58					0.57	0.03
101-4	D	0.56	0.56	0.58	0.57	0.58	0.54					0.57	0.01
101-4	E	0.47	0.50	0.51	0.49	0.52	0.50					0.50	0.02
101-4	F	0.61	0.62	0.59	0.57	0.57	0.58					0.59	0.02
101-4	G	0.51	0.58	0.58	0.50	0.57	0.59					0.55	0.04
101-4	H	0.58	0.57	0.58	0.58	0.59	0.58					0.58	0.01
101-4	I	0.54	0.56	0.60	0.61	0.60	0.59					0.58	0.03
101-4	J	0.57	0.57	0.55	0.54	0.58	0.57					0.56	0.02
101-4	K	0.48	0.52	0.59	0.56	0.56	0.58					0.55	0.04
101-4	L	0.54	0.52	0.53	0.56	0.57	0.57					0.55	0.02
101-4	M	0.51	0.57	0.58	0.59							0.56	0.04
101-4	N	0.49	0.51									0.50	0.01
101-4	O	0.57	0.58	0.58	0.58							0.58	0.01
101-4	P	0.56	0.59	0.57	0.55	0.56	0.53					0.56	0.02
101-4	Q	0.53	0.45	0.50	0.50	0.53	0.56					0.51	0.04
101-4	R	0.44	0.47	0.52	0.49	0.52	0.53					0.49	0.04
202-1	A	0.76	0.84	0.76	0.77							0.78	0.04
202-1	B	0.73	0.76	0.83	0.83							0.79	0.05
202-1	C	0.80	0.67	0.81	0.84							0.78	0.08
202-1	D	0.85	0.87	0.81	0.81							0.84	0.03
202-1	E	0.74	0.76	0.78	0.82							0.77	0.03
202-1	F	0.61	0.64	0.62	0.65							0.63	0.02
202-1	G	0.78	0.76	0.75	0.78							0.77	0.01
203-1	A	0.66	0.74	0.76	0.76							0.73	0.05
203-1	B	0.67	0.73	0.74	0.74							0.72	0.03
203-1	C	0.59	0.68	0.74	0.70	0.69						0.68	0.05
203-1	D	0.71	0.70	0.78	0.77							0.74	0.04
203-1	E	0.69	0.69	0.58	0.67							0.66	0.05
203-1	F	0.61	0.64	0.61	0.61							0.62	0.02
204-1	A	0.52	0.55	0.56	0.52							0.53	0.02
204-1	B	0.52	0.55	0.49	0.56							0.53	0.03
204-1	C	0.50	0.51	0.52	0.49							0.50	0.01
204-1	D	0.53	0.48	0.50	0.47							0.49	0.02
204-1	E	0.44	0.48	0.48	0.47							0.47	0.01
204-1	F	0.48	0.49	0.48	0.47							0.48	0.01
204-1	G	0.46	0.47									0.47	0.01
204-1	H	0.55	0.51	0.55	0.55							0.54	0.02
204-1	I	0.48	0.46									0.47	0.01
204-1	J	0.43	0.45	0.45	0.43							0.44	0.01
205-1	A	0.52	0.57	0.57	0.57							0.56	0.03
205-1	B	0.45	0.53	0.49	0.53							0.50	0.04
205-1	C	0.49	0.51	0.52	0.55							0.52	0.03
205-1	D	0.55	0.53	0.55	0.55							0.54	0.01
205-1	E	0.48	0.53	0.54	0.54							0.52	0.03
205-1	F	0.55	0.55	0.53	0.57							0.55	0.02
205-1	G	0.58	0.53	0.59	0.55							0.56	0.03
205-1	H	0.58	0.58	0.64	0.56							0.59	0.03
205-1	I	0.49	0.57	0.63	0.53							0.56	0.06
205-1	J	0.58	0.59	0.54	0.59							0.58	0.03
205-1	K	0.59	0.56	0.57	0.54							0.57	0.02
205-1	L	0.49	0.54	0.55	0.55							0.53	0.03
205-1	M	0.59	0.53	0.57	0.55							0.56	0.03

		DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu
		0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph	0 kph
Site ID	Surf ID	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Avg	StDev
206-1	A	0.82	0.79	0.79								0.80	0.01
206-1	B	0.79	0.74	0.74	0.77							0.76	0.02
206-1	C	0.76	0.76	0.76	0.78							0.77	0.01
206-1	D	0.76	0.73	0.59	0.78							0.72	0.09
206-1	E	0.74	0.72	0.74	0.75							0.74	0.01
206-1	F	0.66	0.73	0.77	0.76							0.73	0.05
206-1	G	0.73	0.73	0.79	0.73							0.75	0.03
206-1	H	0.80	0.75	0.78	0.73							0.77	0.03
206-1	I	0.73	0.73	0.70	0.59							0.68	0.07
207-1	A	0.71	0.74	0.71	0.70							0.72	0.02
207-1	B	0.74	0.74	0.73	0.69							0.73	0.02
207-1	C	0.69	0.69	0.70	0.69							0.69	0.01
207-1	D	0.81	0.79	0.78	0.77							0.79	0.02
207-1	E	0.69	0.76	0.80	0.73							0.74	0.05
207-1	F	0.78	0.80	0.82	0.77							0.79	0.02
207-1	G	0.73	0.72	0.71	0.69							0.71	0.01
207-1	H	0.72	0.81	0.75	0.80							0.77	0.04
207-1	I	0.77	0.78	0.79	0.75							0.77	0.02
207-1	J	0.76	0.76	0.77	0.74							0.76	0.01
207-1	K	0.77	0.70	0.75	0.73							0.74	0.03
207-1	L	0.74	0.76	0.75	0.75							0.75	0.01
207-1	M	0.73	0.75	0.76	0.73							0.74	0.01
207-1	N	0.73	0.76	0.74	0.75							0.74	0.01
207-1	O	0.77	0.74	0.77	0.74							0.76	0.02
207-1	P	0.74	0.63	0.61	0.73							0.68	0.07
208-1	A	0.66	0.71	0.73	0.68							0.69	0.03
208-1	B	0.71	0.67	0.66	0.77							0.70	0.05
208-1	C	0.71	0.71	0.76	0.74							0.73	0.02
208-1	D	0.74	0.72	0.75	0.72							0.73	0.01
208-1	E	0.69	0.65	0.71	0.74							0.70	0.04
208-1	F	0.77	0.72	0.75	0.78							0.75	0.03
208-1	G	0.76	0.79	0.79	0.75							0.77	0.02
208-1	H	0.71	0.76	0.73	0.78							0.75	0.03
208-1	I	0.70	0.75	0.73	0.77							0.74	0.03
209-1	A	0.58	0.50	0.52	0.52	0.51						0.53	0.03
209-1	B	0.58	0.57	0.56	0.55							0.56	0.01
209-1	C	0.56	0.55	0.67	0.60	0.62						0.60	0.05
209-1	D	0.57	0.58	0.53	0.57	0.56						0.56	0.02
209-1	E	0.81	0.72	0.76	0.77	0.80						0.77	0.04
209-1	F	0.81	0.78	0.79	0.81	0.82						0.80	0.02
209-1	G	0.79	0.80	0.77	0.83	0.82						0.80	0.02
209-1	H	0.70	0.75	0.70	0.76	0.75						0.73	0.03
209-1	I	0.72	0.68	0.65	0.62	0.70						0.67	0.04
209-1	J	0.71	0.72	0.68	0.70	0.70						0.70	0.02
209-1	K	0.80	0.86	0.89	0.79	0.74						0.81	0.06
209-1	L	0.81	0.88	0.79	0.81	0.87						0.83	0.04
209-1	M	0.81	0.67	0.66	0.65	0.68						0.69	0.07
209-1	N	0.78	0.80	0.72	0.71	0.69						0.74	0.05
209-1	O	0.68	0.68	0.69	0.73	0.68						0.69	0.02
209-1	P	0.69	0.69	0.71	0.72	0.69						0.70	0.02
209-1	Q	0.87	0.85	0.88	0.87	0.83						0.86	0.02
209-1	R	1.02	1.16	1.04	1.15	1.17						1.11	0.07
209-1	S	1.09	1.01	0.86	1.09	1.15						1.04	0.11
209-1	T	1.11	1.16	1.12	0.68							1.02	0.23
305-1	A												
305-1	B												
307-1	A												
307-1	B												
307-1	C												
307-1	D												
307-1	E												
307-1	F												
309-1	A												
309-1	B												
309-1	C												
310-1	A												
310-1	B												
310-1	C												
311-1	A												
319-1	A												
319-1	B												
319-1	C												
320-1	A												
320-1	B												
320-1	C												
322-1	A												
323-1	A												
323-1	B												
324-1	A												
325-1	A												
325-1	B												
325-1	C												
325-1	D												
325-1	E												
336-1	A												
339-1	A												
339-1	B												
339-1	C												
339-1	D												
339-1	E												
340-1	A												
340-1	B												
340-1	C												
340-1	D												
341-1	A												
342-1	A												
342-1	B												
342-1	C												
343-1	A												

		DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu
		20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph	20 kph
Site ID	Surf ID	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Avg	StDev
206-1	A	0.70	0.70	0.70								0.70	0.00
206-1	B	0.69	0.66	0.67	0.66							0.67	0.01
206-1	C	0.64	0.69	0.69	0.71							0.68	0.03
206-1	D	0.68	0.67	0.54	0.65							0.63	0.07
206-1	E	0.67	0.67	0.66	0.67							0.67	0.01
206-1	F	0.65	0.67	0.69	0.69							0.68	0.02
206-1	G	0.67	0.63	0.68	0.66							0.66	0.02
206-1	H	0.69	0.66	0.68	0.67							0.67	0.01
206-1	I	0.65	0.66	0.65	0.54							0.62	0.05
207-1	A	0.69	0.68	0.66	0.66							0.67	0.01
207-1	B	0.63	0.64	0.67	0.67							0.65	0.02
207-1	C	0.63	0.64	0.64	0.63							0.63	0.00
207-1	D	0.72	0.72	0.73	0.72							0.72	0.01
207-1	E	0.65	0.71	0.69	0.67							0.68	0.03
207-1	F	0.74	0.72	0.74	0.72							0.73	0.01
207-1	G	0.68	0.67	0.66	0.68							0.67	0.01
207-1	H	0.67	0.74	0.72	0.71							0.71	0.03
207-1	I	0.72	0.74	0.74	0.71							0.73	0.01
207-1	J	0.72	0.72	0.72	0.72							0.72	0.00
207-1	K	0.68	0.62	0.67	0.70							0.67	0.03
207-1	L	0.70	0.70	0.70	0.73							0.71	0.01
207-1	M	0.70	0.72	0.68	0.71							0.70	0.02
207-1	N	0.68	0.65	0.66	0.70							0.67	0.02
207-1	O	0.71	0.70	0.69	0.71							0.70	0.01
207-1	P	0.65	0.65	0.66	0.65							0.65	0.00
208-1	A	0.63	0.63	0.66	0.61							0.63	0.02
208-1	B	0.64	0.62	0.63	0.61							0.62	0.02
208-1	C	0.62	0.66	0.63	0.66							0.64	0.02
208-1	D	0.67	0.66	0.66	0.64							0.66	0.01
208-1	E	0.61	0.62	0.64	0.66							0.63	0.02
208-1	F	0.69	0.69	0.66	0.67							0.68	0.02
208-1	G	0.67	0.71	0.70	0.67							0.69	0.02
208-1	H	0.59	0.65	0.63	0.68							0.64	0.04
208-1	I	0.65	0.70	0.66	0.69							0.67	0.02
209-1	A	0.55	0.50	0.49	0.49	0.50						0.51	0.02
209-1	B	0.64	0.60	0.57	0.59							0.60	0.03
209-1	C	0.57	0.54	0.64	0.55	0.60						0.58	0.04
209-1	D	0.56	0.57	0.56	0.56	0.54						0.56	0.01
209-1	E	0.73	0.68	0.72	0.72	0.72						0.71	0.02
209-1	F	0.76	0.74	0.72	0.77	0.77						0.75	0.03
209-1	G	0.78	0.77	0.75	0.79	0.76						0.77	0.02
209-1	H	0.72	0.72	0.69	0.74	0.72						0.72	0.02
209-1	I	0.38	0.35	0.37	0.36	0.37						0.37	0.01
209-1	J	0.68	0.70	0.65	0.69	0.69						0.68	0.02
209-1	K	0.54	0.52	0.56	0.56	0.53						0.54	0.02
209-1	L	0.53	0.48	0.39	0.47	0.46						0.46	0.05
209-1	M	0.72	0.66	0.65	0.65	0.66						0.67	0.03
209-1	N	0.70	0.72	0.70	0.69	0.63						0.69	0.03
209-1	O	0.64	0.63	0.63	0.66	0.63						0.64	0.01
209-1	P	0.65	0.66	0.69	0.69	0.67						0.67	0.02
209-1	Q	0.87	0.86	0.86	0.85	0.82						0.85	0.02
209-1	R	1.01	1.06	1.07	1.09	1.10						1.07	0.04
209-1	S	0.52	0.71	0.52	0.65	0.66						0.61	0.09
209-1	T	0.42	0.65	0.67	0.31							0.51	0.17
305-1	A												
305-1	B												
307-1	A												
307-1	B												
307-1	C												
307-1	D												
307-1	E												
307-1	F												
309-1	A												
309-1	B												
309-1	C												
310-1	A												
310-1	B												
310-1	C												
311-1	A												
319-1	A												
319-1	B												
319-1	C												
320-1	A												
320-1	B												
320-1	C												
322-1	A												
323-1	A												
323-1	B												
324-1	A												
325-1	A												
325-1	B												
325-1	C												
325-1	D												
325-1	E												
336-1	A												
339-1	A												
339-1	B												
339-1	C												
339-1	D												
339-1	E												
340-1	A												
340-1	B												
340-1	C												
340-1	D												
341-1	A												
342-1	A												
342-1	B												
342-1	C												
343-1	A												

		DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu
		40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph	40 kph
Site ID	Surf ID	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Avg	StDev
206-1	A	0.63	0.64	0.64								0.63	0.01
206-1	B	0.63	0.61	0.62	0.60							0.61	0.01
206-1	C	0.56	0.62	0.61	0.63							0.61	0.03
206-1	D	0.61	0.60	0.50	0.58							0.57	0.05
206-1	E	0.60	0.59	0.59	0.60							0.59	0.01
206-1	F	0.58	0.61	0.62	0.63							0.61	0.02
206-1	G	0.59	0.56	0.62	0.59							0.59	0.02
206-1	H	0.62	0.60	0.61	0.60							0.61	0.01
206-1	I	0.59	0.59	0.58	0.50							0.57	0.04
207-1	A	0.62	0.62	0.59	0.60							0.61	0.02
207-1	B	0.57	0.58	0.60	0.60							0.59	0.02
207-1	C	0.56	0.57	0.58	0.57							0.57	0.01
207-1	D	0.65	0.65	0.66	0.66							0.66	0.01
207-1	E	0.57	0.65	0.62	0.59							0.61	0.03
207-1	F	0.68	0.66	0.67	0.64							0.66	0.02
207-1	G	0.62	0.62	0.59	0.62							0.61	0.02
207-1	H	0.60	0.68	0.65	0.64							0.64	0.03
207-1	I	0.66	0.68	0.68	0.65							0.67	0.01
207-1	J	0.67	0.67	0.67	0.66							0.67	0.00
207-1	K	0.61	0.55	0.59	0.62							0.59	0.03
207-1	L	0.63	0.64	0.63	0.67							0.64	0.02
207-1	M	0.64	0.66	0.61	0.65							0.64	0.02
207-1	N	0.61	0.58	0.57	0.62							0.59	0.02
207-1	O	0.64	0.63	0.63	0.64							0.63	0.01
207-1	P	0.58	0.59	0.59	0.60							0.59	0.01
208-1	A	0.57	0.55	0.60	0.54							0.57	0.03
208-1	B	0.56	0.57	0.56	0.53							0.56	0.02
208-1	C	0.53	0.59	0.56	0.59							0.57	0.03
208-1	D	0.59	0.58	0.58	0.56							0.58	0.01
208-1	E	0.55	0.56	0.58	0.59							0.57	0.02
208-1	F	0.63	0.63	0.58	0.62							0.62	0.02
208-1	G	0.60	0.65	0.64	0.62							0.63	0.02
208-1	H	0.53	0.59	0.56	0.62							0.57	0.04
208-1	I	0.59	0.62	0.60	0.62							0.61	0.02
209-1	A	0.56	0.51	0.51	0.50	0.51						0.52	0.02
209-1	B	0.68	0.62	0.60	0.63							0.63	0.03
209-1	C	0.61	0.59	0.67	0.58	0.62						0.61	0.03
209-1	D	0.55	0.57	0.56	0.56	0.54						0.56	0.01
209-1	E	0.69	0.65	0.68	0.69	0.69						0.68	0.02
209-1	F	0.72	0.70	0.66	0.71	0.73						0.71	0.03
209-1	G	0.74	0.74	0.71	0.75	0.71						0.73	0.02
209-1	H	0.70	0.67	0.66	0.70	0.69						0.69	0.02
209-1	I	0.33	0.29	0.31	0.30	0.31						0.30	0.01
209-1	J	0.66	0.69	0.61	0.68	0.68						0.66	0.03
209-1	K	0.47	0.43	0.49	0.47	0.44						0.46	0.03
209-1	L	0.45	0.38	0.34	0.39	0.37						0.38	0.04
209-1	M	0.73	0.65	0.64	0.64	0.65						0.66	0.04
209-1	N	0.65	0.67	0.67	0.67	0.65						0.66	0.01
209-1	O	0.63	0.63	0.63	0.66	0.63						0.64	0.01
209-1	P	0.61	0.63	0.67	0.68	0.66						0.65	0.03
209-1	Q	0.84	0.84	0.85	0.83	0.82						0.83	0.01
209-1	R	1.01	1.07	1.06	1.09	1.09						1.07	0.03
209-1	S	0.38	0.40	0.38	0.38	0.37						0.38	0.01
209-1	T	0.32	0.35	0.35	0.31							0.33	0.02
305-1	A												
305-1	B												
307-1	A												
307-1	B												
307-1	C												
307-1	D												
307-1	E												
307-1	F												
309-1	A												
309-1	B												
309-1	C												
310-1	A												
310-1	B												
310-1	C												
311-1	A												
319-1	A												
319-1	B												
319-1	C												
320-1	A												
320-1	B												
320-1	C												
322-1	A												
323-1	A												
323-1	B												
324-1	A												
325-1	A												
325-1	B												
325-1	C												
325-1	D												
325-1	E												
336-1	A												
339-1	A												
339-1	B												
339-1	C												
339-1	D												
339-1	E												
340-1	A												
340-1	B												
340-1	C												
340-1	D												
341-1	A												
342-1	A												
342-1	B												
342-1	C												
343-1	A												

		DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu	DFT mu
		60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph	60 kph
Site ID	Surf ID	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6	Test 7	Test 8	Test 9	Test 10	Avg	StDev
206-1	A	0.57	0.58	0.59								0.58	0.01
206-1	B	0.59	0.56	0.57	0.55							0.57	0.02
206-1	C	0.51	0.57	0.55	0.58							0.55	0.03
206-1	D	0.56	0.54	0.46	0.53							0.52	0.04
206-1	E	0.54	0.54	0.54	0.56							0.55	0.01
206-1	F	0.52	0.56	0.57	0.57							0.55	0.02
206-1	G	0.53	0.50	0.56	0.53							0.53	0.03
206-1	H	0.57	0.55	0.56	0.55							0.56	0.01
206-1	I	0.56	0.54	0.54	0.47							0.53	0.04
207-1	A	0.58	0.57	0.56	0.55							0.56	0.01
207-1	B	0.53	0.54	0.57	0.57							0.55	0.02
207-1	C	0.50	0.53	0.53	0.51							0.52	0.01
207-1	D	0.60	0.59	0.60	0.59							0.59	0.01
207-1	E	0.53	0.60	0.58	0.54							0.56	0.03
207-1	F	0.63	0.60	0.63	0.59							0.61	0.02
207-1	G	0.57	0.58	0.55	0.57							0.57	0.01
207-1	H	0.56	0.63	0.61	0.60							0.60	0.03
207-1	I	0.58	0.61	0.60	0.58							0.59	0.01
207-1	J	0.61	0.62	0.62	0.61							0.62	0.01
207-1	K	0.56	0.50	0.53	0.56							0.54	0.03
207-1	L	0.56	0.57	0.55	0.58							0.56	0.02
207-1	M	0.59	0.61	0.55	0.59							0.59	0.02
207-1	N	0.56	0.53	0.52	0.59							0.55	0.03
207-1	O	0.59	0.58	0.57	0.58							0.58	0.01
207-1	P	0.54	0.55	0.54	0.54							0.54	0.01
208-1	A	0.53	0.51	0.55	0.50							0.52	0.02
208-1	B	0.52	0.51	0.51	0.49							0.51	0.01
208-1	C	0.49	0.55	0.52	0.55							0.53	0.03
208-1	D	0.54	0.52	0.54	0.52							0.53	0.01
208-1	E	0.51	0.53	0.53	0.55							0.53	0.02
208-1	F	0.57	0.56	0.54	0.58							0.56	0.02
208-1	G	0.54	0.60	0.58	0.58							0.58	0.02
208-1	H	0.48	0.56	0.51	0.57							0.53	0.04
208-1	I	0.56	0.58	0.56	0.59							0.57	0.01
209-1	A	0.58	0.53	0.52	0.51	0.53						0.54	0.03
209-1	B	0.69	0.63	0.63	0.63							0.65	0.03
209-1	C	0.63	0.60	0.69	0.60	0.66						0.64	0.04
209-1	D	0.56	0.57	0.57	0.58	0.55						0.56	0.01
209-1	E	0.65	0.60	0.64	0.66	0.64						0.64	0.02
209-1	F	0.69	0.67	0.62	0.67	0.68						0.66	0.03
209-1	G	0.75	0.75	0.72	0.75	0.72						0.74	0.02
209-1	H	0.68	0.63	0.64	0.67	0.66						0.66	0.02
209-1	I	0.31	0.28	0.29	0.28	0.29						0.29	0.01
209-1	J	0.66	0.70	0.62	0.69	0.70						0.67	0.03
209-1	K	0.43	0.41	0.45	0.44	0.42						0.43	0.02
209-1	L	0.42	0.37	0.32	0.36	0.35						0.36	0.04
209-1	M	0.77	0.63	0.61	0.63	0.64						0.65	0.07
209-1	N	0.61	0.65	0.64	0.64	0.68						0.64	0.03
209-1	O	0.61	0.63	0.63	0.67	0.63						0.63	0.02
209-1	P	0.59	0.61	0.66	0.66	0.64						0.63	0.03
209-1	Q	0.83	0.81	0.84	0.81	0.80						0.82	0.02
209-1	R	1.05	1.07	1.07	1.06	1.12						1.07	0.03
209-1	S	0.37	0.36	0.36	0.37	0.34						0.36	0.01
209-1	T	0.32	0.32	0.32	0.30							0.31	0.01
305-1	A												
305-1	B												
307-1	A												
307-1	B												
307-1	C												
307-1	D												
307-1	E												
307-1	F												
309-1	A												
309-1	B												
309-1	C												
310-1	A												
310-1	B												
310-1	C												
311-1	A												
319-1	A												
319-1	B												
319-1	C												
320-1	A												
320-1	B												
320-1	C												
322-1	A												
323-1	A												
323-1	B												
324-1	A												
325-1	A												
325-1	B												
325-1	C												
325-1	D												
325-1	E												
336-1	A												
339-1	A												
339-1	B												
339-1	C												
339-1	D												
339-1	E												
340-1	A												
340-1	B												
340-1	C												
340-1	D												
341-1	A												
342-1	A												
342-1	B												
342-1	C												
343-1	A												

Site ID	Surf ID	IFI Sp Test 1	IFI Sp Test 2	IFI Sp Test 3	IFI Sp Test 4	IFI Sp Test 5	IFI Sp Test 6	IFI Sp Test 7	IFI Sp Test 8	IFI Sp Test 9	IFI Sp Test 10	IFI Sp Avg	IFI Sp StDev	IFI F60 Test 1	IFI F60 Test 2	IFI F60 Test 3	IFI F60 Test 4	IFI F60 Test 5	IFI F60 Test 6	IFI F60 Test 7	IFI F60 Test 8	IFI F60 Test 9	IFI F60 Test 10	IFI F60 Avg	IFI F60 StDev
101-1	A	69	76	76	76	71	63					72	5	0.416	0.411	0.401	0.407	0.400	0.373					0.401	0.015
101-1	B	79	70	80	72	87	74	76	83	82	92	80	7	0.411	0.393	0.408	0.408	0.460	0.382	0.426	0.438	0.435	0.457	0.422	0.026
101-1	C	99	118	142	119	97	119					116	17	0.457	0.508	0.532	0.503	0.470	0.493					0.494	0.027
101-1	D	56	49	57	50	48	54					52	4	0.315	0.254	0.287	0.281	0.248	0.273					0.276	0.025
101-1	E	85	87	75	76	86	80					81	5	0.357	0.363	0.251	0.337	0.243	0.273					0.304	0.055
101-1	F	80	95	76	76	89	103					87	11	0.366	0.384	0.394	0.388	0.357	0.387					0.380	0.014
101-1	G	104	114	88	110	106	99					103	9	0.415	0.448	0.465	0.298	0.371	0.397					0.394	0.070
101-1	H	56	68	54	64	56	66					61	6	0.348	0.388	0.320	0.334	0.283	0.317					0.332	0.035
101-1	I	119	103	137	134	106	115					119	14	0.501	0.490	0.583	0.548	0.479	0.522					0.520	0.039
101-1	J	71	80	84	93	87	93					84	8	0.415	0.442	0.453	0.441	0.394	0.448					0.432	0.023
101-1	K	67	72	80	67	66	74					71	5	0.313	0.339	0.349	0.367	0.342	0.339					0.342	0.018
101-1	L	73	87	76	77	95	62					78	10	0.273	0.313	0.296	0.330	0.368	0.332					0.319	0.033
101-1	M	88	103	99	102							98	7	0.384	0.463	0.440	0.474							0.440	0.040
101-1	N	112	120									116	6	0.438	0.466									0.452	0.020
101-1	O	91	92	74	71							82	11	0.438	0.423	0.403	0.404							0.417	0.016
101-1	P	71	84	71	72	82	71					75	6	0.362	0.410	0.381	0.376	0.406	0.356					0.382	0.023
101-1	Q	81	49	69	66	80	87					69	13	0.382	0.319	0.374	0.372	0.419	0.437					0.384	0.041
101-1	R	65	70	68	54	69	80					68	9	0.276	0.290	0.329	0.297	0.336	0.416					0.324	0.051
101-2	A	74	75	78	82	79	65					75	6	0.421	0.421	0.406	0.412	0.429	0.378					0.412	0.018
101-2	B	73	68	73	71	65	71	82	77	74	88	74	7	0.369	0.372	0.392	0.383	0.360	0.395	0.436	0.402	0.408	0.410	0.393	0.023
101-2	C	87	111	146	158	110	122					122	26	0.445	0.516	0.547	0.563	0.489	0.511					0.512	0.042
101-2	D	54	51	60	55	55	50					54	3	0.329	0.312	0.341	0.312	0.271	0.257					0.304	0.033
101-2	E	86	88	88	77	77	88					84	5	0.315	0.367	0.264	0.274	0.310	0.300					0.305	0.036
101-2	F	110	94	81	87	89	105					93	12	0.397	0.421	0.407	0.411	0.305	0.363					0.384	0.043
101-2	G	99	102	97	94	108	100					100	5	0.465	0.451	0.495	0.324	0.368	0.400					0.417	0.065
101-2	H	74	56	58	60	52	57					59	7		0.345	0.376	0.376	0.333	0.334					0.353	0.022
101-2	I	111	90	123	105	109	111					108	11	0.490	0.459	0.525	0.506	0.493	0.475					0.490	0.023
101-2	J	75	80	79	102	87	93					86	10	0.428	0.440	0.431	0.480	0.322	0.426					0.421	0.052
101-2	K	74	71	85	66	89	70					76	9	0.319	0.302	0.340	0.378	0.336	0.315					0.332	0.026
101-2	L	74	62	79	68	102	86					78	14	0.311	0.302	0.304	0.358	0.332	0.379					0.331	0.032
101-2	M	85	105	70	74							83	16	0.402	0.496	0.374	0.417							0.423	0.053
101-2	N	125	119									122	4	0.466	0.488									0.477	0.015
101-2	O	76	82	66	74							75	7	0.409	0.415	0.363	0.378							0.391	0.025
101-2	P	75	85	70	77	87	69					77	7	0.314	0.431	0.393	0.409	0.446	0.373					0.394	0.047
101-2	Q	61	52	71	62	70	88					67	12	0.368	0.328	0.389	0.339	0.390	0.439					0.375	0.040
101-2	R	69	55	61	55	65	68					62	6	0.237	0.252	0.311	0.294	0.330	0.385					0.301	0.054
101-3	A	67	70	72	75	75	64					71	4	0.365	0.379	0.372	0.390	0.387	0.349					0.374	0.015
101-3	B	67	61	74	69	54	67	89	75	70	83	69	8	0.349	0.354	0.405	0.391	0.329	0.379	0.388	0.399	0.397	0.415	0.381	0.028
101-3	C	76	97	138	140	109	111					112	24	0.410	0.450	0.496	0.514	0.484	0.471					0.467	0.036
101-3	D	45	45	47	50	51	48					48	3	0.293	0.287	0.300	0.315	0.319	0.294					0.301	0.013
101-3	E	92	91	93	86	76	74					85	8		0.398	0.417	0.432	0.374	0.361					0.392	0.024
101-3	F		80	77	76	78						78	2		0.422	0.407	0.404	0.409						0.411	0.008
101-3	G	74	85	90	101	91	54					83	18		0.421	0.401	0.452	0.453						0.432	0.025
101-3	H		50	49	45	50						49	3		0.329	0.326	0.303	0.327						0.321	0.012
101-3	I		84	84	92	85						86	4		0.435	0.442	0.469	0.444						0.448	0.015
101-3	J		58	65	87	68						70	12		0.345	0.385	0.428	0.392						0.387	0.034
101-3	K		56	71	60	61						62	6		0.352	0.363	0.354	0.358						0.362	0.014
101-3	L		58	73	58	99						72	19		0.326	0.367	0.344	0.432						0.367	0.046
101-4	A	60	74	70	64	66	65					66	5	0.328	0.358	0.352	0.342	0.324	0.337					0.340	0.013
101-4	B	73	56	66	56	61	62	54	66	60	84	64	9	0.353	0.305	0.341	0.313	0.330	0.328	0.306				0.325	0.018
101-4	C	84	82	125	107	110	115					106	15	0.382	0.407	0.416	0.417	0.419	0.437					0.413	0.018
101-4	D	44	44	45	46	46	42					44	1	0.282	0.283	0.290	0.292	0.294	0.271					0.285	0.009
101-4	E	71	72	83	80	82	74					77	5	0.318	0.343	0.363	0.359	0.368	0.351					0.350	0.018
101-4	F	76	81	68	69	71	87					75	8	0.387	0.400	0.359	0.359	0.363	0.400					0.378	0.020
101-4	G	72	89	75	85	84	87					82	7	0.338	0.396	0.375	0.376	0.392	0.398					0.379	0.022
101-4	H	46	46	43	36	47	48					45	4	0.292	0.294	0.275	0.247	0.293	0.294					0.283	0.019
101-4	I	87	79	94	97	88	78					87	8	0.377	0.382	0.420	0.430	0.409	0.387					0.401	0.022
101-4	J	61	70	58	64	64	88					67	11	0.337	0.360	0.325	0.378	0.350	0.358					0.351	0.018
101-4	K	50	47	59	55	57	61					55	5	0.270	0.280	0.338	0.317	0.322	0.337					0.311	0.029
101-4	L	59	61	53	53	93	63					64	15	0.323	0.319	0.296	0.307	0.402	0.345					0.332	0.038
101-4	M	51	59	55	54							55	3	0.289	0.332	0.320	0.329							0.317	0.020
101-4	N	78	87									83	6	0.312	0.328									0.320	0.011
101-4	O	49	44	46	52							48	3	0.297	0.282	0.290	0.315							0.296	0.014
101-4	P	55	68	54	49	59	58					57	6	0.310	0.357	0.315	0.288	0.321	0.305					0.316	0.023
101-4	Q	45	41	59	46	55	60					51	8	0.266	0.231	0.300	0.263	0.302	0.320					0.280	0.033
101-4	R	63	53	60	42	49	53					53	8	0.289	0.275	0.312	0.244	0.280	0.292					0.282	0.022
202-1	A	101	96	101	94							98	3	0.479	0.501	0.480	0.488							0.487	0.010
202-1	B	84	78	97	77							84	9	0.422	0.428	0.510	0.449							0.452	0.040
202-1	C	94	95	105	119							103	12	0.485	0.486	0.527	0.560							0.514	0.036
202-1	D	120	148	123	106							124	18	0.554	0.612	0.545	0.510							0.555	0.043
202-1	E	62	71	75	83							73	9	0.377	0.409	0.426	0.458							0.417	0.034
202-1	F	83	101	89	99							93	8	0.416	0.457	0.433	0.458							0.441	0.020
202-1	G	98	111	80	88							94	13	0.495	0.499	0.461	0.474							0.482	0.018
203-1	A	37	48	49	45							44	5	0.272	0.352	0.361	0.342							0.332	0.041
203-1	B	40	69	58	64							58	13	0.291	0.426	0.389	0.413							0.380	0.061
203-1	C		41	68	84	46						55	13		0.309	0.418	0.411	0.334						0.367	0.054
203-1	D	68	73	97	80							80	13	0.423	0.439	0.512	0.468							0.460	0.039
203-1	E	116	121	116	115							117	3	0.480	0.475	0.442	0.475							0.468	0.018
203-1	F	58	63	58	64							66	12	0.372	0.445	0.363	0.384							0.391	0.037
204-1	A	83	87	113	88							93	14	0.373	0.397	0.437	0.385							0.398	0.028
204-1	B	86	88	74	75							76	9	0.339	0.387	0.343	0.376							0.361	0.024
204-1	C	73	79	75	60							72	8	0.347	0.354	0.358	0.312							0.343	0.021
204-1	D	98	102	96	86							95	7	0.393	0.376	0.381	0.347							0.375	0.020
204-1	E	71	60	58	71							65	7	0.312	0.302	0.300	0.327							0.310	0.012
204-1	F	52	61	64	67							61	6	0.283	0.313	0.319	0.323							0.310	0.018
204-1	G	37	40									39	2	0.219	0.233									0.226	0.010
204-1	H	89	72	64	86							78	12	0.396	0.349	0.349	0.395							0.372	0.027
204-1	I	74	73									74	0	0.338	0.327									0.332	0.008
204-1	J	61	82	78	63							71	10	0.286	0.346	0.320	0.322							0.319	0.024
205-1	A	45	44	47	52							47	4	0.264	0.278	0.284	0.305							0.283	0.017
205-1	B	93	88	86	95							90	4	0.328	0.355	0.319	0.346							0.337	0.016
205-1	C	93	86	95	96							91	4	0.338	0.322	0.337	0.352							0.337	0.012
205-1	D	73	88	86	84							83	7	0.335	0.340	0.342	0.342							0.340	0.003
205-1	E	91	92	85	88							89	3	0.319	0.347	0.339	0.332							0.334	0.012
205-1	F	82	86	89	91							87	4	0.341	0.342	0.328	0.352							0.341	0.010
205-1	G	99	91	104	95							97	5	0.372	0.341	0.392	0.357							0.365	0.022
205-1	H	98	88	99	100							99	1	0.374	0.379	0.406	0.370							0.383	0.016
205-1	I	92	102	96	105							99	6	0.341	0.398	0.412	0.372							0.381	0.031
205-1	J	110	132	71	114							107	26	0.425	0.444	0.344	0.433							0.412	0.046
205-1	K	100	134	89	53							94	33	0.404	0.441	0.389	0.300							0.383	0.060
205-1	L	38	39	39	47							40	4	0.226	0.243	0.243	0.276							0.247	0.021
205-1	M	42	38	42	51							43	5	0.252	0.234	0.256	0.283							0.256	0.020

Site ID	Surf ID	Est. SN40R Test 1	Est. SN40R Test 2	Est. SN40R Test 3	Est. SN40R Test 4	Est. SN40R Test 5	Est. SN40R Test 6	Est. SN40R Test 7	Est. SN40R Test 8	Est. SN40R Test 9	Est. SN40R Test 10	Est. SN40R Avg	Est. SN40R StDev	Est. SN40S Test 1	Est. SN40S Test 2	Est. SN40S Test 3	Est. SN40S Test 4	Est. SN40S Test 5	Est. SN40S Test 6	Est. SN40S Test 7	Est. SN40S Test 8	Est. SN40S Test 9	Est. SN40S Test 10	Est. SN40S Avg	Est. SN40S StDev
101-1	A	59	57	56	57	56	53					56	2	38	38	36	37	36	33					36	2
101-1	B	57	55	56	57	64	53	60	60	60	62	58	3	38	36	37	37	43	34	39	40	40	43	39	3
101-1	C	61	67	66	66	64	64					65	2	43	48	51	48	44	47					47	3
101-1	D	45	36	41	40	35	39					39	3	27	21	24	24	20	23					23	3
101-1	E	47	48	32	46	29	35					40	8	32	33	21	30	20	23					27	6
101-1	F	50	50	55	54	47	50					51	3	33	35	36	35	32	36					35	1
101-1	G	54	58	64	30	47	52					51	12	38	42	43	23	34	37					36	7
101-1	H	50	55	46	47	40	44					47	5	30	35	28	29	24	28					29	4
101-1	I	65	66	75	70	64	69					68	4	48	46	56	53	45	50					50	4
101-1	J	59	62	63	60	53	61					59	3	38	41	42	41	36	42					40	2
101-1	K	43	47	47	52	48	46					47	3	27	30	31	33	30	30					30	2
101-1	L	36	43	39	44	48	44					42	4	23	27	26	29	33	30					28	3
101-1	M	51	62	59	64							59	5	35	43	41	45							41	4
101-1	N	56	60									58	2	41	44									43	2
101-1	O	59	57	56	57							57	1	41	39	37	37							38	2
101-1	P	50	56	53	52	56	49					53	3	32	38	34	34	37	32					35	2
101-1	Q	55	46	53	53	58	60					54	5	34	27	34	33	38	40					35	5
101-1	R	38	39	45	42	47	58					45	7	23	25	29	25	30	38					28	5
101-2	A	59	59	56	57	60	54					57	2	39	39	37	38	39	34					38	2
101-2	B	51	52	55	54	51	55	60	56	57	55	55	3	33	33	36	35	32	36	40	37	37	38	36	2
101-2	C	61	69	68	69	65	66					66	3	41	49	53	55	46	49					49	5
101-2	D	47	45	48	44	38	37					43	5	29	27	30	27	23	21					26	3
101-2	E	41	49	33	36	41	38					40	6	28	33	23	24	27	26					27	4
101-2	F	50	56	56	57	39	46					51	7	37	39	37	38	27	33					35	4
101-2	G	63	60	68	41	46	52					55	10	44	42	47	29	34	37					39	7
101-2	H		49	54	54	48	48					51	3		30	33	33	29	29					31	2
101-2	I	65	63	69	68	65	64					65	2	46	43	50	48	46	45					46	3
101-2	J	60	61	60	64	42	57					57	8	39	41	40	45	29	39					39	5
101-2	K	43	41	45	53	46	43					45	4	28	26	30	34	30	28					29	3
101-2	L	42	42	40	50	41	51					44	5	27	26	27	32	30	34					29	3
101-2	M	55	67	52	58							58	6	37	47	34	38							39	6
101-2	N	59	63									61	3	44	46									45	2
101-2	O	57	57	51	52							54	3	37	38	32	34							35	3
101-2	P	42	59	55	57	61	52					54	7	28	40	36	37	41	33					36	5
101-2	Q	52	47	55	48	55	60					53	5	33	28	35	30	35	41					34	4
101-2	R	31	35	44	42	46	54					42	8	20	21	27	25	29	35					26	6
101-3	A	51	53	52	54	54	49					52	2	33	34	33	35	35	31					34	2
101-3	B	49	50	57	55	47	53	55	56	56	57	53	3	31	31	37	35	29	34	35	36	36	38	34	3
101-3	C	57	61	61	64	61	62					61	2	37	42	47	49	44	44					44	4
101-3	D	43	42	44	45	46	42					44	2	24	24	25	27	27	25					25	1
101-3	E		53	56	56	51	50					53	3		37	39	38	34	32					36	3
101-3	F		59	56	56	57						57	1		39	37	37	37						38	1
101-3	G		58	54	60	62						58	4		39	37	42	42						40	3
101-3	H		48	47	44	47						47	2		28	28	25	28						27	1
101-3	I		60	61	64	61						62	2		40	41	44	41						42	2
101-3	J		49	55	58	55						54	4		30	35	40	35						35	4
101-3	K		50	54	50	51						51	2		31	35	31	32						32	2
101-3	L		46	51	49	57						51	5		28	33	30	40						33	5
101-4	A	46	49	49	48	45	47					47	2	29	32	31	30	28	30					30	1
101-4	B	49	43	48	45	47	46	44				46	2	32	26	30	27	29	29	26				28	2
101-4	C	52	54	51	54	54	56					53	2	35	37	39	39	39	41					38	2
101-4	D	41	41	42	42	43	39					41	1	23	23	24	24	25	22					24	1
101-4	E	43	47	49	49	50	48					48	2	28	31	33	32	33	31					31	2
101-4	F	54	55	50	50	50	54					52	2	35	37	32	32	32	37					34	2
101-4	G	46	53	52	50	53	53					51	3	30	36	34	34	36	36					34	2
101-4	H	42	42	40	36	42	42					41	2	25	25	23	20	25	25					23	2
101-4	I	50	52	56	57	55	53					54	3	34	35	39	40	38	35					37	2
101-4	J	48	50	46	51	49	50					49	2	30	32	28	34	31	32					31	2
101-4	K	39	40	48	45	46	48					44	4	22	23	30	27	28	30					27	3
101-4	L	46	45	42	44	53	49					46	4	28	28	25	26	37	30					29	4
101-4	M	41	47	46	47							45	3	24	29	28	28							27	2
101-4	N	42	43									42	1	27	29									28	1
101-4	O	43	41	42	45							43	2	25	23	24	27							25	2
101-4	P	44	50	45	41	45	43					45	3	27	32	27	24	28	26					27	3
101-4	Q	39	34	42	38	43	45					40	4	22	18	26	22	26	28					24	4
101-4	R	40	39	44	36	40	42					40	3	25	23	27	20	23	25					24	2
202-1	A	64	69	65	67							66	2	45	47	45	46							46	1
202-1	B	58	60	70	63							63	5	39	39	48	42							42	4
202-1	C	66	66	71	75							70	4	46	46	50	54							49	4
202-1	D	73	78	72	69							73	4	53	60	52	48							53	5
202-1	E	54	58	60	64							59	4	34	37	39	43							38	4
202-1	F	57	61	59	61							60	2	38	43	40	43							41	2
202-1	G	67	66	65	66							66	1	47	47	43	44							45	2
203-1	A	40	51	53	50							48	6	22	31	32	29							28	4
203-1	B	43	60	56	59							55	8	24	39	35	37							34	7
203-1	C		45	59	59	49						53	7		26	38	37	29						32	6
203-1	D	60	62	70	66							64	4	38	40	48	43							43	4
203-1	E	62	61	56	62							60	3	45	45	41	45							44	2
203-1	F	53	62	52	55							55	4	33	41	32	34							35	4
204-1	A	50	54	56	52							53	3	34	36	41	35							37	3
204-1	B	47	52	47	52							50	3	30	35	31	34							32	3
204-1	C	48	48	49	44							47	2	31	32	32	27							30	2
204-1	D	51	48	50	46							49	2	36	34	35	31							34	2
204-1	E	43	42	42	45							43	1	27	26	26	29							27	1
204-1	F	40	44	45	45							43	2	24	27	28	28							27	2
204-1	G	32	34									33	1	17	18									18	1
204-1	H	53	48	49	53							51	3	36	31	31	36							34	3
204-1	I	46	44									45	1	30	29									29	1
204-1	J	40	45	43	42							42	2	24	31	28	29							28	3
205-1	A	38	40	41	44							41	2	22	23	24	26							24	2
205-1	B	42	47	42	44							44	3	29	32	28	31							30	2
205-1	C	43	42	43	46							43	2	30	29	30	32							30	1
205-1	D	46	44	45	45							45	1	30	30	31	31							30	0
205-1	E	41	45	45	43							43	2	28	31	30	30							30	1
205-1	F	45	45	42	46							45	2	30	31	29	32							31	1
205-1	G	48	44	50	46							47	3	34	31	36	32							33	2
205-1	H	48	49	53	47							50	3	34	35	38	34							35	2
205-1	I	44	52	55	47							49	5	31	37	38	34							35	3
205-1	J	54	54	48	55							53	4	40	42	31	41							38	5
205-1	K	53	53	52	43							50	5	37	42	36	26							35	7
205-1	L	33	36	36	40							36	3	18	19	19	23							20	2
205-1	M	37	34	37	40							37	3	20	18	21	24							21	2

Site ID	Surf ID	Corr.Est. SN40S Test 1	Corr.Est. SN40S Test 2	Corr.Est. SN40S Test 3	Corr.Est. SN40S Test 4	Corr.Est. SN40S Test 5	Corr.Est. SN40S Test 6	Corr.Est. SN40S Test 7	Corr.Est. SN40S Test 8	Corr.Est. SN40S Test 9	Corr.Est. SN40S Test 10	Corr.Est. SN40S Avg	Corr.Est. SN40S StDev	Actual SN40R Test 1	Actual SN40R Test 2	Actual SN40S Test 1	Actual SN40S Test 2
101-1	A	50	50	49	50	49	45					49	2				
101-1	B	50	48	50	50	57	46	52	54	53	56	51	3				
101-1	C	56	64	67	63	58	62					62	4				
101-1	D	37	29	34	33	28	32					32	3				
101-1	E	43	44	30	41	29	33					37	7				
101-1	F	44	47	48	47	44	48					46	2				
101-1	G	51	56	57	32	46	49					48	9				
101-1	H	41	47	38	40	33	38					39	5				
101-1	I	62	61	73	69	59	65					65	5				
101-1	J	50	54	56	54	48	55					53	3				
101-1	K	37	41	42	44	41	41					41	2				
101-1	L	33	37	35	40	45	40					38	4				
101-1	M	47	57	54	59							54	5				
101-1	N	54	58									56	3				
101-1	O	54	52	49	49							51	2				
101-1	P	44	50	46	46	50	43					46	3				
101-1	Q	46	37	45	45	51	54					46	6				
101-1	R	33	35	39	35	40	51					39	7				
101-2	A	51	52	49	50	52	45					50	2	55	56		
101-2	B	45	45	48	46	43	48	53	49	50	50	48	3	60	55		
101-2	C	55	64	69	71	61	64					64	6	62	60		
101-2	D	39	37	41	37	32	30					36	4	52	53		
101-2	E	38	45	32	33	37	36					37	5	55	48		
101-2	F	49	52	50	50	37	45					47	6	54	53		
101-2	G	58	56	61	39	45	49					51	8	56	48		
101-2	H		41	45	45	39	40					42	3	61	55		
101-2	I	61	57	66	63	60	59					61	3	66	61		
101-2	J	52	54	53	60	39	52					52	7	62	56		
101-2	K	38	36	41	45	40	38					40	3	54	54		
101-2	L	37	36	36	43	40	46					40	4	52	53		
101-2	M	49	62	45	51							52	7	52	55		
101-2	N	58	61									60	2	61			
101-2	O	50	51	44	46							47	3	49	44		
101-2	P	38	53	48	50	55	45					48	6	50	49		
101-2	Q	44	39	47	40	47	54					45	5	50	47		
101-2	R	28	29	37	34	39	46					36	7	43	46		
101-3	A	44	46	45	47	47	42					45	2				
101-3	B	42	42	49	47	39	46	47	49	48	51	46	4				
101-3	C	50	56	62	65	58	59					58	5				
101-3	D	34	33	35	37	37	34					35	2				
101-3	E		49	51	50	45	44					48	3				
101-3	F		52	50	49	50						50	1				
101-3	G		52	49	56	56						53	3				
101-3	H		39	38	35	38						38	2				
101-3	I		53	54	58	54						55	2				
101-3	J		41	46	52	47						47	5				
101-3	K		42	46	42	43						43	2				
101-3	L		39	44	41	53						44	6				
101-4	A	39	43	42	41	39	40					41	2	53	51	40	43
101-4	B	43	36	41	37	39	39	36				39	3	49	53	40	39
101-4	C	47	50	52	52	52	54					51	3	53	53	40	45
101-4	D	33	33	34	34	34	31					33	1	49	52	23	27
101-4	E	38	41	44	44	45	42					42	2	49	51	47	43
101-4	F	47	49	43	43	44	49					46	3	53	55	49	50
101-4	G	41	48	45	46	48	48					46	3	55	56	53	53
101-4	H	34	34	32	28	34	34					33	3	52	53	28	23
101-4	I	46	46	52	53	50	47					49	3	56	56	54	57
101-4	J	40	43	39	46	42	43					42	3	57	57	50	49
101-4	K	31	32	40	37	38	40					37	4	52	56	39	44
101-4	L	38	38	35	36	49	41					40	5	48	51	37	41
101-4	M	34	39	38	39							37	3	53	55	40	42
101-4	N	37	40									39	2	38		38	
101-4	O	35	32	34	37							34	2	49	49	25	28
101-4	P	37	43	37	34	38	36					37	3	50	51	36	39
101-4	Q	31	26	35	30	36	38					33	4	46	47	28	39
101-4	R	34	32	37	28	32	34					33	3	45	52	38	40
202-1	A	59	62	60	60							60	1				
202-1	B	52	52	63	55							56	5				
202-1	C	60	60	66	70							64	5				
202-1	D	69	77	68	63							70	6				
202-1	E	45	50	52	56							51	5				
202-1	F	51	57	53	57							54	3				
202-1	G	61	62	57	58							60	3				
203-1	A	31	41	43	40							39	5				
203-1	B	33	52	47	50							45	8				
203-1	C		36	50	50	39						44	7				
203-1	D	51	53	64	57							56	5				
203-1	E	60	59	55	59							58	2				
203-1	F	44	55	43	46							47	5				
204-1	A	45	49	54	47							49	4	61	62	45	43
204-1	B	41	47	41	46							44	3				
204-1	C	42	43	43	37							41	3	59	63	35	41
204-1	D	48	46	47	42							46	3				
204-1	E	37	36	35	39							37	2				
204-1	F	33	37	38	39							37	2				
204-1	G	24	26									25	1	47	48	14	14
204-1	H	48	42	42	48							45	4				
204-1	I	41	39									40	1	52	51	32	34
204-1	J	34	42	39	39							38	3				
205-1	A	30	32	33	36							33	2				
205-1	B	40	43	39	42							41	2				
205-1	C	41	39	41	43							41	2				
205-1	D	40	41	42	41							41	1				
205-1	E	39	42	41	40							41	2				
205-1	F	41	41	40	43							41	1				
205-1	G	46	41	48	44							45	3				
205-1	H	46	47	50	45							47	2				
205-1	I	41	49	51	46							47	4				
205-1	J	53	55	41	54							51	6				
205-1	K	50	55	48	35							47	8				
205-1	L	25	27	27	32							28	3				
205-1	M	29	26	29	33							29	3				

Site ID	Surf ID	IFI Sp Test 1	IFI Sp Test 2	IFI Sp Test 3	IFI Sp Test 4	IFI Sp Test 5	IFI Sp Test 6	IFI Sp Test 7	IFI Sp Test 8	IFI Sp Test 9	IFI Sp Test 10	IFI Sp Avg	IFI Sp StDev
206-1	A	68	63	57	51							60	7
206-1	B	69	78	79	105							83	15
206-1	C	75	81	70	62							72	8
206-1	D	77	68	78	48							68	14
206-1	E	48	43	48	47							47	2
206-1	F	61	79	57	56							63	11
206-1	G	91	60	69	74							73	13
206-1	H	55	50	54	50							52	3
206-1	I	57	82	71	74							71	10
207-1	A	47	37	43	64	14						41	18
207-1	B	67	62	67	64							65	3
207-1	C	82	70	95	78							81	10
207-1	D	87	61	48	55							63	17
207-1	E	48	44	61	61							53	9
207-1	F	47	53	52	42							49	5
207-1	G	69	69	64	58							65	5
207-1	H	66	42	55	64							57	11
207-1	I	44	39	38	46							42	3
207-1	J	46	50	53	43							48	4
207-1	K	75	46	48	47							54	14
207-1	L	34	31	30	31							32	2
207-1	M	53	53	58	54							54	3
207-1	N	48	55	47	58							52	5
207-1	O	41	46	55	46							47	6
207-1	P	92	81	100	95							92	8
208-1	A	88	59	134	95							94	31
208-1	B	78	154	138	107							119	34
208-1	C	60	70	84	78							73	10
208-1	D	51	47	49	56							51	4
208-1	E	80	92	72	81							81	8
208-1	F	67	80	59	89							74	13
208-1	G	79	89	90	100							89	9
208-1	H	55	84	69	89							74	15
208-1	I	68	65	75	75							71	5
209-1	A	47	53	51	55	57						53	4
209-1	B	160	175	163	170	201						174	16
209-1	C	183	197	177	168	169						179	12
209-1	D	60	61	78								66	10
209-1	E	58	48	48	47	46						50	5
209-1	F	105	84	91	98	124						100	15
209-1	G	182	172	239	207	199						200	26
209-1	H	76	134	102	139	101						110	26
209-1	I	30	29	33	29	36						31	3
209-1	J	62	61	50	60	54						57	5
209-1	K	67	52	72	68	65						65	8
209-1	L	47	58	55	40	50						50	7
209-1	M	72	67	71	81	72						73	5
209-1	N	81	61	63	68	63						67	8
209-1	O	84	73	74	72	67						74	6
209-1	P	76	80	72	81	65						75	6
209-1	Q	111	101	165	119	122						124	24
209-1	R	210	195	189	186	187						194	10
209-1	S	97	93	81	107	99						95	9
209-1	T	66	80	77	81	74						76	6
305-1	A	57	56	50	59	58	61	61	62			58	4
305-1	B	42	46	51	48	50	49	42	40	38	46	45	4
307-1	A	90	59	64	62							69	15
307-1	B	64	82	90	87							81	12
307-1	C	87	78									82	6
307-1	D	65	73	71	82							73	7
307-1	E	94	90	80	75							85	9
307-1	F	60	67	80	61							67	9
309-1	A	65	99	97	86							87	15
309-1	B	86	47	50	78							65	19
309-1	C	91	77	86	114							92	16
310-1	A	58	73	77	61	68	61	58	63			65	7
310-1	B	77	83	73	110	70	86	72	84			82	13
310-1	C	65	103	72	68	79	67	75	65			74	13
311-1	A	138	126	168	126	127	139	120	142	139	155	138	15
319-1	A	63	58	66	63	77	68	64	76			67	7
319-1	B	44	47	41	47	45	42	41	45			44	3
319-1	C	58	70	64	67	78	76	84	81			72	9
320-1	A	47	57	58	48	45	43	54	46	49	51	50	5
320-1	B	66	69	72	53	71	41	78	76	75	69	67	11
320-1	C	56	60	75	64	57	64	62	62	69	65	63	6
322-1	A	61	55	60	68	81	85	68	91	73	68	71	12
323-1	A	57	55	46	43	54	46	47	55	52	42	50	6
323-1	B	87	92	90	90	116	114	103	113	99	102	101	11
324-1	A	51	52	51	49	48	52	48	54	53	58	52	3
325-1	A	103	74	73	91							85	15
325-1	B	62	89	78	68							74	12
325-1	C	55	64	76	57							63	10
325-1	D	61	80	88	94							81	14
325-1	E	45	65	60	88							64	18
336-1	A	78	114	94	98	111	103	89	104	93	81	96	12
339-1	A	79	77									78	1
339-1	B	101	99	87	89	78	78					89	10
339-1	C	100	99									100	1
339-1	D	137	137	137	134	171	171					148	18
339-1	E	162	162	159	154							159	4
340-1	A	60	107	90	64	72	55					75	20
340-1	B	77	76	46	71	52	55					63	13
340-1	C	79	83	82	99	106	128					96	19
340-1	D	69	91	95	82	81	84					84	9
341-1	A	46	48	50	45	54	47	58	47	53	66	52	7
342-1	A	48	52	48	46	46	49					48	2
342-1	B	83	105	92	75	78	72					84	12
342-1	C	99	69	90	60	54	88					77	18
343-1	A	64	57	54	55	59	64	58	65	55	62	59	4

Site ID	Surf ID	IFI F60 Test 1	IFI F60 Test 2	IFI F60 Test 3	IFI F60 Test 4	IFI F60 Test 5	IFI F60 Test 6	IFI F60 Test 7	IFI F60 Test 8	IFI F60 Test 9	IFI F60 Test 10	IFI F60 Avg	IFI F60 StDev
206-1	A	0.365	0.352	0.334								0.350	0.016
206-1	B	0.365	0.370	0.377	0.411							0.381	0.021
206-1	C	0.354	0.388	0.366	0.352							0.365	0.016
206-1	D	0.376	0.354	0.316	0.290							0.334	0.038
206-1	E	0.293	0.275	0.289	0.291							0.287	0.008
206-1	F	0.329	0.378	0.329	0.329							0.341	0.025
206-1	G	0.396	0.319	0.361	0.364							0.360	0.032
206-1	H	0.325	0.298	0.318	0.299							0.310	0.014
206-1	I	0.316	0.375	0.350	0.313							0.339	0.030
207-1	A	0.297	0.249	0.271	0.342							0.290	0.040
207-1	B	0.335	0.328	0.349	0.340							0.338	0.009
207-1	C	0.364	0.344	0.386	0.358							0.363	0.017
207-1	D	0.412	0.352	0.314	0.339							0.354	0.042
207-1	E	0.287	0.291	0.343	0.334							0.314	0.029
207-1	F	0.315	0.328	0.331	0.283							0.314	0.022
207-1	G	0.361	0.356	0.339	0.329							0.346	0.015
207-1	H	0.349	0.291	0.333	0.360							0.333	0.030
207-1	I	0.293	0.277	0.272	0.298							0.285	0.012
207-1	J	0.305	0.318	0.328	0.289							0.310	0.017
207-1	K	0.374	0.269	0.295	0.301							0.310	0.045
207-1	L	0.238	0.224	0.218	0.229							0.227	0.009
207-1	M	0.321	0.326	0.330	0.327							0.326	0.004
207-1	N	0.297	0.309	0.287	0.337							0.308	0.021
207-1	O	0.277	0.295	0.328	0.296							0.299	0.021
207-1	P	0.391	0.368	0.398	0.394							0.388	0.013
208-1	A	0.375	0.315	0.438	0.374							0.376	0.050
208-1	B	0.362	0.429	0.424	0.386							0.400	0.032
208-1	C	0.312	0.355	0.368	0.371							0.351	0.027
208-1	D	0.304	0.289	0.297	0.310							0.300	0.009
208-1	E	0.352	0.375	0.348	0.377							0.363	0.015
208-1	F	0.361	0.388	0.325	0.394							0.367	0.032
208-1	G	0.374	0.411	0.408	0.412							0.401	0.018
208-1	H	0.291	0.376	0.341	0.400							0.352	0.047
208-1	I	0.345	0.358	0.367	0.377							0.362	0.014
209-1	A	0.254	0.251	0.245	0.254	0.263						0.253	0.006
209-1	B	0.445	0.427	0.409	0.424							0.426	0.015
209-1	C	0.418	0.406	0.453	0.398	0.426						0.420	0.021
209-1	D	0.291	0.297	0.327								0.305	0.019
209-1	E	0.351	0.298	0.310	0.307	0.304						0.314	0.021
209-1	F	0.460	0.416	0.419	0.457	0.490						0.449	0.031
209-1	G	0.538	0.528	0.546	0.557	0.534						0.541	0.011
209-1	H	0.392	0.469	0.422	0.486	0.435						0.441	0.038
209-1	I	0.156	0.147	0.161	0.145	0.170						0.156	0.010
209-1	J	0.341	0.346	0.295	0.341	0.320						0.329	0.021
209-1	K	0.297	0.257	0.317	0.307	0.291						0.294	0.023
209-1	L	0.247	0.257	0.219	0.208	0.232						0.232	0.020
209-1	M	0.382	0.349	0.350	0.370	0.357						0.362	0.014
209-1	N	0.392	0.353	0.350	0.363	0.324						0.356	0.024
209-1	O	0.371	0.348	0.352	0.359	0.335						0.353	0.013
209-1	P	0.362	0.373	0.370	0.390	0.348						0.369	0.015
209-1	Q	0.523	0.505	0.577	0.528	0.514						0.529	0.028
209-1	R	0.689	0.715	0.715	0.726	0.731						0.715	0.016
209-1	S	0.331	0.420	0.315	0.406	0.402						0.375	0.048
209-1	T	0.247	0.367	0.371	0.221							0.302	0.079

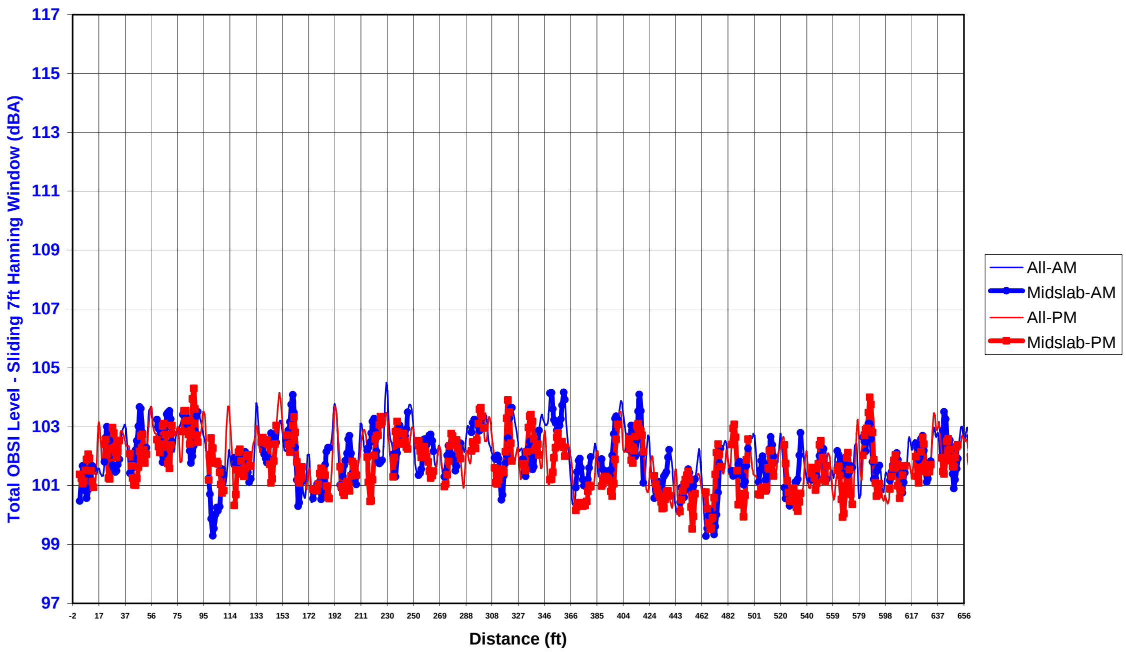
Site ID	Surf ID	Est. SN40R Test 1	Est. SN40R Test 2	Est. SN40R Test 3	Est. SN40R Test 4	Est. SN40R Test 5	Est. SN40R Test 6	Est. SN40R Test 7	Est. SN40R Test 8	Est. SN40R Test 9	Est. SN40R Test 10	Est. SN40R Avg	Est. SN40R StDev
206-1	A	51	50	48								50	2
206-1	B	51	51	52	53							52	1
206-1	C	49	53	51	50							51	2
206-1	D	52	49	42	42							46	5
206-1	E	42	40	42	42							42	1
206-1	F	46	52	47	47							48	2
206-1	G	53	45	50	50							50	3
206-1	H	47	43	45	43							44	2
206-1	I	45	51	49	42							47	4
207-1	A	43	37	39	48							42	5
207-1	B	47	46	49	48							47	1
207-1	C	49	48	51	49							49	1
207-1	D	56	50	45	49							50	4
207-1	E	41	42	49	47							45	4
207-1	F	46	47	48	41							45	3
207-1	G	50	50	48	47							49	2
207-1	H	49	43	48	51							47	4
207-1	I	43	41	40	43							42	2
207-1	J	44	46	47	42							45	2
207-1	K	52	39	43	44							44	5
207-1	L	35	33	32	34							34	1
207-1	M	46	47	47	47							47	0
207-1	N	43	44	42	48							44	3
207-1	O	40	43	47	43							43	3
207-1	P	52	50	52	52							51	1
208-1	A	50	44	53	49							49	3
208-1	B	49	48	50	49							49	1
208-1	C	44	49	49	51							48	1
208-1	D	44	42	43	44							43	1
208-1	E	48	49	48	51							49	2
208-1	F	51	53	46	53							51	3
208-1	G	51	55	55	54							54	2
208-1	H	41	51	47	54							48	5
208-1	I	48	50	50	52							50	2
209-1	A	36	35	35	36	37						36	1
209-1	B	50	44	43	44							45	3
209-1	C	41	37	48	41	45						42	4
209-1	D	41	41	44								42	2
209-1	E	50	43	45	44	44						45	3
209-1	F	61	57	56	62	63						60	3
209-1	G	61	61	52	60	57						58	4
209-1	H	54	58	55	60	57						57	2
209-1	I	23	22	24	22	25						23	1
209-1	J	48	49	42	48	46						47	3
209-1	K	41	36	43	42	40						40	3
209-1	L	35	36	30	30	33						33	3
209-1	M	53	49	49	50	49						50	2
209-1	N	54	50	49	51	45						50	3
209-1	O	50	48	48	50	47						48	1
209-1	P	50	51	52	53	49						51	2
209-1	Q	70	69	70	69	67						69	1
209-1	R	81	87	88	90	91						87	4
209-1	S	42	56	42	52	53						49	7
209-1	T	33	50	51	27							40	12

Site ID	Surf ID	Est. SN40S Test 1	Est. SN40S Test 2	Est. SN40S Test 3	Est. SN40S Test 4	Est. SN40S Test 5	Est. SN40S Test 6	Est. SN40S Test 7	Est. SN40S Test 8	Est. SN40S Test 9	Est. SN40S Test 10	Est. SN40S Avg	Est. SN40S StDev
206-1	A	33	31	29								31	2
206-1	B	33	33	34	36							35	2
206-1	C	32	35	33	31							33	2
206-1	D	34	31	28	24							29	4
206-1	E	25	23	24	24							24	1
206-1	F	29	34	29	29							30	3
206-1	G	36	28	32	33							32	4
206-1	H	28	25	27	25							27	1
206-1	I	27	34	31	27							30	3
207-1	A	25	20	22	30							24	4
207-1	B	30	29	31	30							30	1
207-1	C	33	31	35	32							33	2
207-1	D	38	31	27	30							31	5
207-1	E	24	24	30	29							27	3
207-1	F	27	28	29	23							27	2
207-1	G	32	32	30	29							31	2
207-1	H	31	24	29	32							29	3
207-1	I	25	23	22	25							24	1
207-1	J	26	27	28	24							26	2
207-1	K	34	22	25	25							27	5
207-1	L	19	17	16	18							17	1
207-1	M	28	28	29	28							28	0
207-1	N	25	27	24	29							26	2
207-1	O	23	25	28	25							25	2
207-1	P	36	33	37	36							35	2
208-1	A	34	27	41	34							34	6
208-1	B	33	40	40	36							37	4
208-1	C	27	32	33	33							31	3
208-1	D	26	24	25	27							25	1
208-1	E	32	34	31	34							33	1
208-1	F	32	35	28	36							33	4
208-1	G	34	38	38	38							37	2
208-1	H	25	34	30	37							31	5
208-1	I	31	32	33	34							32	1
209-1	A	21	21	20	21	22						21	1
209-1	B	42	40	38	40							40	2
209-1	C	39	38	43	37	40						40	2
209-1	D	25	25	29								26	2
209-1	E	31	25	26	26	26						27	2
209-1	F	43	38	39	43	47						42	3
209-1	G	52	51	53	54	52						53	1
209-1	H	36	44	39	46	41						41	4
209-1	I	11	10	11	9	12						11	1
209-1	J	30	30	25	30	28						29	2
209-1	K	26	21	28	27	25						25	2
209-1	L	20	21	18	16	19						19	2
209-1	M	34	31	33	33	32						32	1
209-1	N	34	31	31	32	28						32	2
209-1	O	34	31	31	32	30						32	1
209-1	P	33	34	33	36	31						33	2
209-1	Q	50	48	56	50	49						51	3
209-1	R	68	71	71	72	73						71	2
209-1	S	30	39	29	38	37						34	5
209-1	T	21	33	33	18							26	8

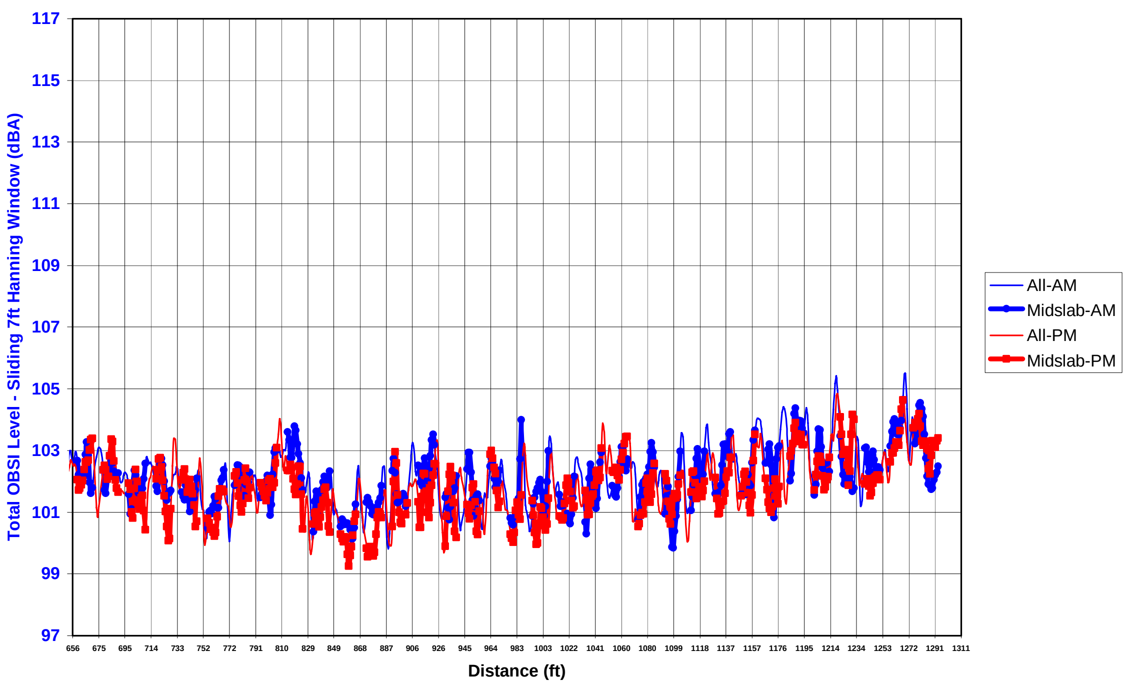
Site ID	Surf ID	Corr.Est. SN40S Test 1	Corr.Est. SN40S Test 2	Corr.Est. SN40S Test 3	Corr.Est. SN40S Test 4	Corr.Est. SN40S Test 5	Corr.Est. SN40S Test 6	Corr.Est. SN40S Test 7	Corr.Est. SN40S Test 8	Corr.Est. SN40S Test 9	Corr.Est. SN40S Test 10	Corr.Est. SN40S Avg	Corr.Est. SN40S StDev	Actual SN40R Test 1	Actual SN40R Test 2	Actual SN40S Test 1	Actual SN40S Test 2
206-1	A	44	42	40								42	2				
206-1	B	44	45	46	51							46	3				
206-1	C	43	47	44	42							44	2				
206-1	D	46	42	38	34							40	5				
206-1	E	34	32	34	34							33	1				
206-1	F	39	46	39	39							41	3				
206-1	G	48	38	43	44							43	4				
206-1	H	38	35	37	35							36	2				
206-1	I	37	46	42	38							41	4				
207-1	A	35	28	31	41							34	6				
207-1	B	40	39	42	41							40	1				
207-1	C	44	41	47	43							44	2				
207-1	D	50	42	37	40							42	6				
207-1	E	33	34	41	40							37	4				
207-1	F	37	39	39	33							37	3				
207-1	G	43	43	40	39							41	2				
207-1	H	42	34	39	43							39	4				
207-1	I	34	32	31	35							33	2				
207-1	J	36	37	39	33							36	2				
207-1	K	45	31	34	35							36	6				
207-1	L	27	25	24	25							25	1				
207-1	M	39	38	39	39							39	1				
207-1	N	35	36	33	40							36	3				
207-1	O	32	34	39	34							35	3				
207-1	P	48	45	49	48							47	2				
208-1	A	46	37	55	46							46	7				
208-1	B	44	54	53	48							49	5				
208-1	C	37	43	45	45							42	4				
208-1	D	35	34	35	37							35	1				
208-1	E	43	46	42	46							44	2				
208-1	F	43	47	39	48							44	4				
208-1	G	45	50	50	51							49	3				
208-1	H	34	46	41	49							42	6				
208-1	I	41	43	44	46							44	2				
209-1	A	29	29	28	30	31						29	1				
209-1	B	56	54	51	53							53	2				
209-1	C	52	51	57	50	53						53	3				
209-1	D	34	35	39								36	3				
209-1	E	42	35	36	36	35						37	3				
209-1	F	57	51	51	56	61						55	4				
209-1	G	68	67	70	71	68						69	2				
209-1	H	48	59	52	61	54						55	5				
209-1	I	17	15	17	15	18						17	1				
209-1	J	41	41	34	41	38						39	3				
209-1	K	35	30	38	37	34						35	3				
209-1	L	28	30	25	23	27						27	3				
209-1	M	46	42	42	45	43						44	2				
209-1	N	48	42	42	44	39						43	3				
209-1	O	45	42	42	43	40						43	2				
209-1	P	45	45	45	48	42						45	2				
209-1	Q	65	63	73	66	64						66	4				
209-1	R	88	91	91	93	93						91	2				
209-1	S	40	52	38	50	49						46	5				
209-1	T	29	45	45	26							36	10				

Site ID	Surf ID	BrdgElev3D	LgMPD	LgMaxPeak	LgMaxValley	LgMaxHeight	LgMean	LgMedian	LgBrdgElev	LgRoughAvg	LgRMS	LgRpk	LgRk	LgRvk	LgRkTotal	LgSkew	160	125	100	80	63	50	40	31.5	25	20	16	12.5	L80	L63	L31.5	TrMPD	TrMaxPeak	TrMaxValley	TrMaxHeight	TrMean	TrMedian	TrBrdgElev	TrRoughAvg	TrRMS	TrRpk	TrRk	TrRvk	TrRkTotal	TrSkew
101-1	A	56.95	0.49	0.56	-0.60	1.16	56.87	56.86	56.86	0.19	0.24	0.21	0.54	0.24	1.02	-0.07	39.63	46.32	47.84	42.13	37.84	33.90	31.01	25.44	14.44	23.15	24.00	13.81	49.46	44.08	32.13	0.69	0.76	-1.49	2.25	56.98	56.88	56.95	0.34	0.47	0.27	0.69	1.17	2.14	-1.31
101-1	B	55.96	0.52	0.60	-0.64	1.24	55.87	55.85	55.86	0.20	0.25	0.23	0.57	0.25	1.08	-0.05	40.48	47.57	48.67	42.87	38.44	34.99	32.34	26.71	15.98	25.20	25.76	15.79	50.33	44.79	33.45	0.71	0.80	-1.60	2.41	55.99	55.87	55.95	0.37	0.51	0.28	0.67	1.32	2.29	-1.36
101-1	C	55.51	0.77	0.89	-0.97	1.86	55.38	55.36	55.37	0.31	0.39	0.36	0.87	0.38	1.68	-0.01	41.40	47.58	50.23	45.62	43.22	40.04	37.06	31.58	21.00	29.69	30.21	19.64	52.24	48.48	38.25	1.04	1.15	-1.94	3.10	55.60	55.40	55.51	0.58	0.73	0.36	1.14	1.48	3.03	-0.87
101-1	D	55.11	0.43	0.49	-0.52	1.01	55.10	55.08	55.09	0.17	0.21	0.17	0.49	0.20	0.90	-0.11	40.07	48.62	49.76	42.09	40.00	33.73	30.49	22.91	11.31	19.81	20.71	11.12	50.95	44.74	31.14	0.45	0.50	-0.68	1.18	55.11	55.09	55.10	0.18	0.23	0.19	0.51	0.30	1.01	-0.34
101-1	E	56.09	0.57	0.66	-0.68	1.34	55.97	55.96	55.96	0.24	0.30	0.28	0.67	0.28	1.25	-0.02	41.01	48.16	49.93	45.09	42.31	39.24	36.85	30.83	19.33	28.38	28.46	17.74	51.84	47.83	37.94	0.79	0.89	-2.20	3.10	56.20	55.98	56.08	0.53	0.73	0.27	0.71	2.15	3.14	-1.58
101-1	F	56.59	0.67	0.78	-0.74	1.51	56.51	56.50	56.49	0.24	0.30	0.31	0.68	0.28	1.32	0.05	40.05	46.67	49.12	44.53	41.52	37.71	34.89	29.45	19.19	28.25	28.80	18.81	51.10	47.06	36.17	0.92	1.04	-1.93	2.98	56.66	56.51	56.59	0.46	0.64	0.38	0.83	1.69	2.90	-1.31
101-1	I	56.93	1.09	1.20	-1.83	3.03	56.98	56.82	56.92	0.54	0.68	0.36	1.11	1.33	2.84	-0.84	40.30	46.77	47.97	45.10	41.96	39.16	36.95	31.90	24.45	33.85	37.08	38.14	50.69	47.82	38.39	0.87	1.02	-0.93	1.96	56.98	56.98	56.97	0.31	0.39	0.48	0.86	0.40	1.75	0.14
101-1	J	56.85	0.81	0.90	-1.38	2.28	56.87	56.75	56.84	0.39	0.50	0.27	0.81	0.98	2.10	-0.87	39.02	45.74	47.84	42.91	40.54	36.41	33.56	29.06	20.61	31.23	34.69	36.37	49.74	45.45	34.99	0.67	0.78	-0.74	1.52	56.87	56.87	56.86	0.23	0.29	0.36	0.63	0.32	1.31	0.10
101-1	K	56.50	0.67	0.76	-1.70	2.47	56.51	56.41	56.48	0.34	0.49	0.23	0.64	1.24	2.17	-1.57	39.50	46.30	47.87	44.57	40.69	37.07	34.74	31.20	31.57	32.67	34.25	34.21	50.40	46.81	37.81	0.60	0.69	-0.71	1.41	56.52	56.51	56.51	0.21	0.27	0.31	0.57	0.31	1.20	-0.04
101-1	L	56.90	0.64	0.73	-1.90	2.63	56.92	56.80	56.87	0.35	0.51	0.20	0.66	1.25	2.18	-1.82	43.83	47.41	49.10	48.05	49.60	49.10	49.07	41.86	33.70	43.53	44.30	34.76	53.83	53.90	50.06	0.55	0.64	-0.67	1.32	56.92	56.91	56.91	0.20	0.25	0.29	0.53	0.30	1.13	-0.08
101-1	M	56.73	0.80	0.94	-0.82	1.76	56.74	56.74	56.73	0.28	0.35	0.39	0.76	0.32	1.53	0.13	41.28	45.63	48.03	46.85	43.12	37.93	35.60	30.32	19.65	28.33	29.37	19.11	51.51	48.98	36.82	1.00	1.17	-1.09	2.27	56.75	56.75	56.73	0.34	0.44	0.54	0.94	0.51	1.99	0.04
101-1	N	58.16	0.60	0.75	-0.64	1.39	58.21	58.27	58.20	0.19	0.25	0.31	0.45	0.24	1.13	0.11	40.37	46.41	47.82	45.90	41.90	35.80	31.81	27.16	17.09	26.59	27.55	16.89	50.87	48.14	33.26	1.43	1.64	-0.91	2.57	58.17	58.26	58.13	0.46	0.57	0.92	1.01	0.26	2.25	0.75
101-1	O	56.17	0.65	0.75	-0.84	1.59	56.18	56.15	56.16	0.25	0.32	0.27	0.69	0.36	1.39	-0.21	39.04	46.13	47.98	43.89	40.98	37.13	34.37	28.85	18.50	27.34	28.09	18.03	50.27	46.41	35.58	0.80	0.93	-1.13	2.08	56.18	56.15	56.17	0.30	0.39	0.38	0.80	0.56	1.76	-0.38
101-1	P	55.95	0.58	0.66	-0.69	1.36	55.89	55.87	55.88	0.21	0.27	0.25	0.59	0.28	1.16	-0.06	38.81	46.53	47.98	43.52	39.71	35.25	32.16	26.84	16.45	25.59	26.44	16.47	49.88	45.67	33.29	0.73	0.84	-1.23	2.07	55.95	55.89	55.94	0.31	0.41	0.32	0.71	0.80	1.85	-0.83
101-1	Q	56.03	0.51	0.59	-0.66	1.25	55.97	55.95	55.96	0.20	0.25	0.23	0.54	0.26	1.07	-0.09	38.69	47.58	48.46	42.64	38.64	34.79	31.84	26.06	15.64	24.48	25.24	15.35	50.04	44.78	32.94	0.63	0.73	-1.18	1.91	56.04	55.96	56.03	0.29	0.38	0.26	0.59	0.81	1.68	-1.03
101-1	R	55.82	0.44	0.51	-0.51	1.03	55.74	55.73	55.73	0.17	0.21	0.20	0.48	0.20	0.89	-0.01	39.17	46.45	48.56	43.42	39.85	35.50	32.09	25.62	15.02	23.78	23.87	14.54	50.45	45.66	33.03	0.59	0.67	-1.33	2.02	55.84	55.73	55.82	0.30	0.42	0.23	0.50	1.10	1.86	-1.42
101-2	A	59.16	0.43	0.49	-0.54	1.03	59.08	59.06	59.07	0.16	0.20	0.18	0.46	0.22	0.89	-0.11	37.09	39.93	43.25	43.12	38.77	34.00	30.73	25.09	14.19	23.44	23.61	13.89	47.16	45.16	31.89	0.66	0.73	-1.54	2.28	59.20	59.07	59.15	0.35	0.48	0.24	0.67	1.25	2.16	-1.45
101-2	B	58.57	0.46	0.53	-0.59	1.13	58.48	58.46	58.47	0.17	0.22	0.20	0.49	0.24	0.95	-0.10	39.36	40.92	43.69	42.73	38.74	34.48	31.02	25.60	15.59	24.26	24.94	15.20	47.11	44.85	32.33	0.70	0.78	-1.67	2.46	58.62	58.48	58.57	0.38	0.53	0.26	0.67	1.42	2.36	-1.45
101-2	C	58.80	0.71	0.82	-0.92	1.74	58.65	58.63	58.64	0.28	0.35	0.32	0.78	0.36	1.52	-0.07	39.51	40.82	43.90	44.92	43.31	39.52	36.55	31.07	20.38	29.19	29.31	19.02	49.24	48.15	37.91	1.07	1.18	-2.17	3.35	58.91	58.67	58.79	0.65	0.81	0.34	1.08	1.92	3.36	-1.02
101-2	D	58.05	0.39	0.44	-0.47	0.91	58.05	58.04	58.05	0.14	0.18	0.16	0.40	0.19	0.77	-0.12	39.47	39.46	41.40	41.25	40.83	34.41	28.71	21.51	9.96	18.58	19.45	9.96	46.11	44.58	29.47	0.47	0.53	-0.65	1.18	58.06	58.05	58.05	0.18	0.23	0.22	0.51	0.28	1.00	-0.21
101-2	E	58.03	0.51	0.60	-0.62	1.22	57.90	57.89	57.90	0.21	0.26	0.25	0.59	0.26	1.11	-0.05	40.55	41.70	44.53	45.03	42.60	39.03	35.79	30.00	18.42	26.92	27.03	16.58	49.18	47.82	36.92	0.78	0.88	-2.32	3.20	58.15	57.92	58.03	0.54	0.75	0.25	0.70	2.24	3.21	-1.66
101-2	F	58.36	0.58	0.67	-0.67	1.34	58.25	58.24	58.24	0.21	0.26	0.26	0.60	0.26	1.15	-0.01	39.23	40.45	43.08	44.02	42.22	37.60	33.87	28.51	17.87	26.87	26.70	17.24	48.06	46.85	35.14	0.87	0.97	-2.13	3.09	58.44	58.26	58.36	0.49	0.68	0.32	0.81	1.92	3.05	-1.52
101-2	G	58.62	0.63	0.74	-0.74	1.49	58.53	58.51	58.52	0.24	0.30	0.30	0.66	0.29	1.29	0.00	40.06	41.78	43.95	45.74	43.28	38.87	36.17	30.90	19.94	28.88	29.14	19.03	49.60	48.70	37.40	0.95	1.06	-2.29	3.37	58.73	58.52	58.62	0.54	0.75	0.36	0.86	2.11	3.35	-1.47
101-2	H	58.60	0.39	0.44	-0.48	0.92	58.58	58.56	58.57	0.14	0.18	0.16	0.40	0.20	0.79	-0.15	37.45	39.25	43.68	41.60	36.80	32.25	29.01	23.87	12.87	21.85	22.45	12.50	46.46	43.26	30.28	0.49	0.55	-0.81	1.39	58.61	58.57	58.60	0.20	0.27	0.21	0.54	0.41	1.19	-0.53
101-2	I	58.97	0.97	1.07	-1.75	2.83	59.01	58.84	58.96	0.51	0.64	0.30	1.00	1.26	2.62	-0.87	39.40	40.18	43.93	44.41	41.88	38.57	35.89	31.04	23.33	33.59	36.41	38.01	48.45	46.96	37.42	0.79	0.91	-0.93	1.83	59.01	59.01	59.00	0.29	0.36	0.41	0.80	0.41	1.62	0.02
101-2	J	59.27	0.71	0.78	-1.25	2.03	59.29	59.16	59.26	0.35	0.44	0.23	0.69	0.90	1.86	-0.92	37.65	38.88	42.76	42.73	39.42	35.38	32.02	27.98	19.79	30.55	33.99	36.06	46.94	45.07	33.62	0.61	0.70	-0.71	1.41	59.28	59.28	59.28	0.21	0.27	0.33	0.59	0.31	1.22	0.04
101-2	K	59.21	0.64	0.72	-1.73	2.47	59.23	59.11	59.19	0.34	0.49	0.21	0.56	1.31	2.14	-1.75	38.22	38.42	42.39	43.34	39.81	36.32	33.53	30.70	32.35	32.53	34.40	34.63	47.06	45.56	37.21	0.58	0.66	-0.73	1.40	59.24	59.23	59.23	0.21	0.26	0.30	0.57	0.32	1.20	-0.07
101-2	L	58.91	0.63	0.71	-1.87	2.59	58.93	58.81	58.88	0.35	0.51	0.19	0.64	1.26	2.15	-1.86	44.36	45.00	45.87	48.21	49.35	49.44	49.32	42.03	34.01	43.62	44.65	34.72	53.08	53.95	50.39	0.54	0.63	-0.69	1.32	58.93	58.92	58.92	0.20	0.25	0.28	0.54	0.31	1.13	-0.15
101-2	M	57.83	0.51	0.58	-0.60	1.18	57.83	57.81	57.82	0.18	0.23	0.22	0.51	0.25	1.02	-0.09	38.00	41.65	44.62	43.43	39.50	34.44	30.94	25.27	14.43	23.62	24.25	14.40	48.01	45.54	32.14	0.59	0.67	-0.95	1.64	57.84	57.81	57.83	0.24	0.31	0.26	0.63	0.47	1.38	-0.54
101-2	N	59.12	0.31	0.39	-0.52	0.91	59.18	59.19	59.17	0.12	0.16	0.14	0.30	0.20	0.71	-0.22	37.18	40.19	43.86	43.94	39.81	34.56	28.70	23.59	12.46	22.99	23.79	13.27	47.69	45.88	30.01	1.03	1.10	-0.75	1.87	59.12	59.23	59.11	0.38	0.45	0.67	0.87	0.21	1.76	0.54
101-2	O	57.80	0.45	0.51	-0.63	1.14	57.79	57.76	57.78	0.18	0.23	0.18	0.51	0.27	0.99	-0.28	36.51	39.36	43.09	42.79	39.40	35.38	31.10	25.58	15.53	24.43	25.02	15.14	46.87	44.99	32.40	0.52	0.57	-0.90	1.47	57.81	57.78	57.79	0.22	0.28	0.21	0.60	0.43	1.25	-0.60
101-2	P	58.15	0.43	0.49	-0.62	1.11	58.07	58.05	58.06	0.17	0.22	0.18	0.48	0.26	0.94	-0.26	35.54	40.77	43.11	41.12	37.14	33.60	29.87	24.58	14.07	22.96	23.52	14.08	46.11	43.24	31.11	0.57	0.63	-1.26	1.89	58.17	58.07	58.15	0.30	0.39	0.19	0.63	0.82	1.65	-1.12
101-2	Q	58.53	0.45	0.51	-0.60	1.12	58.46	58.43	58.45	0.16	0.21	0.20	0.45	0.25	0.92	-0.18	36.90	41.08	43.41	42.14	38.09	34.45	30.70	25.05	15.15	23.86	24.59	14.64	46.67	44.10	32.03	0.58	0.65	-1.19	1.85	58.55	58.45	58.53	0.28	0.37	0.23	0.56	0.82	1.63	-1.15
101-2	R	58.32	0.39	0.46	-0.46	0.92	58.22	58.21	58.21	0.14	0.18	0.18	0.40	0.19	0.76	-0.03	37.90	40.19	43.17	42.61	39.49	35.59	30.95	24.78	13.44	21.92	22.79	12.81	46.97	44.96	32.04	0.57	0.64	-1.35	1.99	58.34	58.22	58.32	0.30	0.42	0.21	0.49	1.13	1.84	-1.46
101-3	A	57.47	0.52	0.60	-0.66	1.26	57.40	57.38	57.39	0.18	0.23	0.25	0.47	0.28	1.03	-0.12	37.79	42.01	44.84	42.12	38.45	35.13	32.44	27.16	17.14	26.14	27.19	18.01	47.35	44.27	33.69	0.69	0.79	-1.52	2.32	57.50	57.39	57.46	0.33	0.47	0.28	0.64	1.19	2.11	-1.44
101-3	B	56.67	0.49	0.57	-0.73	1.30	56.58	56.55	56.57	0.18	0.24	0.24	0.48	0.30	1.04	-0.21	39.24	43.88	45.58	41.32	36.84	34.22	31.38	26.32	16.03	25.24	26.31	17.53	47.57	43.42	32.72	0.69	0.78	-1.67	2.46	56.71	56.57	56.66	0.38	0.52	0.25	0.64	1.39	2.30	-1.46
101-3	C	57.07	0.92	1.07	-1.41	2.47	57.01	56.91	56.95	0.36	0.48	0.41	0.89	0.57	2.10	-0.30	39.16	43.19	45.82	43.87	41.86	39.65	37.19	33.01	23.03	32.47	33.66	25.23	49.18	47.02	38.83	1.08	1.24	-2.23	3.48	57.21	56.96	57.08	0.62	0.80	0.41	1.07	1.85	3.34	-1.05
101-3	D	56.87	0.39	0.45	-0.48	0.94	56.87	56.87	56.87	0.14	0.18	0.18	0.38	0.20	0.79	-0.11	38.57	41.83	44.49	40.85	36.97	33.14	28.08	21.40	10.03	18.95	19.71	9.66	46.81	43.04	28.97	0.46	0.52	-0.64	1.17	56.88	56.87	56.87	0.17	0.22	0.22	0.47	0.27	0.97	-0.24
101-4	A	54.92	0.54	0.61	-0.69	1.31	54.83	54.82	54.82	0.23	0.28	0.22	0.65	0.27	1.17	-0.12	40.22	51.59	51.49	41.43	40.22	35.53	33.04	26.06	15.51	24.09	24.32	14.16	52.32	44.56	34.00	0.62	0.68	-1.63	2.32	54.97	54.83	54.92	0.36	0.50	0.20	0.64	1.32	2.18	-1.59
101-4	B	54.61	0.47	0.54	-0.65	1.19	54.50	54.48	54.49	0.20	0.24	0.19	0.57	0.26	1.03	-0.16	39.42	49.55	49.72	41.42	40.30	34.34	32.21	25.29	14.58	23.12	23.81	13.97	50.89	44.60	33.09	0.58	0.64	-1.56	2.20	54.64	54.49	54.60	0.36	0.49	0.18	0.57	1.33	2.09	-1.51
101-4	C	54.19	0.62	0.71	-1.12	1.84	53.99	53.92	53.97	0.28	0.37	0.24	0.75	0.45	1.57	-0.34	38.96	47.69	48.84	44.03	43.60	38.56	36.39	30.01	20.23	28.35	28.91	19.22	51.10	47.73	37.49	0.90	0.99	-2.21	3.20	54.31	53.97	54.19	0.66	0.81	0.18	0.93	1.91	3.05	-1.04
101-4	D	53.68	0.38	0.43	-0.50	0.93	53.66	53.65	53.66	0.16	0.20	0.14	0.47	0.19	0.82	-0.16	39.14	49.54	49.28	41.54	39.61	32.59	30.96	21.10	9.91	18.39	19.21	9.29	50.50	44.20	31.51	0.29	0.33	-0.60	0.94	53.68	53.66	53.68	0.13	0.17	0.11	0.34	0.27	0.74	-0.81
101-4	E	53.11	0.52	0.61	-0.73	1.34	52.95	52.92	52.94	0.24	0.29	0.23	0.65	0.32	1.19	-0.18	41.81	49.97	50.97	45.51	42.77	38.25	35.69	28.62	17.94	26.17	26.24	16.48	52.72	48.07	36.53	0.75	0.83	-2.45	3.30	53.25	52.95	53.11	0.59	0.80	0.17	0.66	2.34	3.19	-1.62
101-4	F	53.60	0.54	0.61	-0.76	1.38	53.44	53.42	53.43	0.23	0.28	0.22	0.65	0.31	1.19	-0.19	39.91	49.28	50.09	44.83	41.76	36.78	34.52	26.95	16.40	25.16	25.77	15.60	51.78	47.13	35.26	0.72	0.79	-2.16	2.96	53.68	53.44	53.59	0.51	0.69	0.18	0.70	1.94	2.84	-1.57
101-4	G	53.86	0.57	0.65	-0.84	1.51	53.71	53.68	53.69	0.25	0.31	0.24	0.69	0.36	1.30	-0.22	40.21	48.71	50.37	45.15	42.46	38.20	36.07	29.05	19.15	27.81	28.04	17.91	52.12	47.66	37.00	0.84	0.92	-2.57	3.49	54.01	53.69	53.85	0.61	0.82	0.21	0.80	2.31	3.33	-1.56
101-4	H	53.24	0.47	0.53	-0.64	1.17	53.23	53.21	53.22	0.19	0.24	0.18	0.56	0.25	1.02	-0.21	39.99	50.28	50.31	42.58	38.82	33.55	31.42	24.44	13.82	22.52	23.19	13.35	51.42	44.64	32.39	0.38	0.43	-0.79	1.24	53.24	53.21	53.23	0.17	0.22	0.15	0.44	0.37	0.98	-0.87
101-4	I	53.98	0.96	1.05	-2.04	3.09	54.04	53.82	53.96	0.59	0.74	0.22	1.07	1.53	2.86	-0.96	40.63	50.19	50.64	43.26	40.99	37.84	36.26	31.90	26.16	35.95	38.74	41.12	51.90	46.06	37.97	0.64	0.73	-1.00	1.73	54.05	54.01	54.03	0.27	0.34	0.30	0.74	0.47	1.51	-0.45
101-4	J	53.43	0.69	0.76	-1.35	2.11	53.43	53.33	53.41	0.38	0.48	0.18	0.83	0.87	1.92	-0.87	39.64	50.15	50.79	42.40	39.76	35.94	33.76	28.86	20.46	31.74	35.19	37.87	51.77	44.86	35.11	0.46	0.52	-0.75	1.28	53.44	53.41	53.44	0.19	0.24	0.21	0.52	0.34	1.07	-0.52
101-4	K	53.97	0.62	0.68	-1.84	2.53	53.99	53.86	53.94	0.37	0.53	0.17	0.66	1.38	2.22	-1.66	39.08	49.03	49.90	42.55	39.87	35.95	34.91	31.07	33.66	34.47	36.55	36.99	51.16	44.99	38.60	0.43	0.49	-0.76	1.25	54.00	53.97	54.00	0.18	0.24	0.19	0.49	0.35	1.04	-0.68
101-4	L	52.99	0.59	0.67	-1.83	2.51	53.00	52.87	52.95	0.35	0.51	0.17	0.66	1.22	2.10	-1.75	43.32	49.02	50.45	48.26	49.36	49.53	49.50	42.20	33.88	43.96	44.41	35.01	54.37	54.11	50.46	0.42	0.47	-0.68	1.16	53.01	52.99	53.01	0.17	0.22	0.19	0.47	0.31	0.98	-0.54
101-4	M	53.85	0.47	0.54	-0.66	1.20	53.84	53.81	53.83	0.19	0.24	0.19	0.53	0.26	1.02	-0.20	38.88	47.85	48.85	42.71	38.69	33.87	31.53	24.39	12.72	21.91	22.76	12.84	50.37	44.65	32.30	0.51	0.57	-1.12	1.68	53.86	53.82	53.85	0.25	0.32	0.19	0.59	0.59	1.37	-1.02
101-4	N	54.07	0.31	0.37	-0.55	0.92	54.09	54.11	54.08	0.13	0.17	0.13	0.35	0.22	0.75	-0.31	37.06	45.69	46.94	42.07	39.28	32.80	30.86	23.59	11.96	22.14	22.45	13.31	48.82	44.18	31.84	0.77	0.82	-0.75	1.56	54.09	54.14	54.08	0.32	0.38	0.46	0.81	0.26	1.52	0.29
101-4	O	54.03	0.49	0.55	-0.66	1.22	54.03	54.01	54.02	0.20	0.25	0.19	0.57	0.27	1.07	-0.22	38.52	48.73	49.54	41.43	38.21	33.59	31.50	25.76	14.61	23.36	24.08	14.29	50.57	43.71	32.62	0.47	0.53	-0.87	1.41	54.04	54.01	54.03	0.20	0.26	0.20	0.55	0.41	1.16	-0.67
101-4	P	54.28	0.47	0.54	-0.65	1.19	54.23	54.21	54.22	0.20	0.24	0.19	0.56	0.26	1.04	-0.18	38.24	49.29	49.49	40.24	36.97	32.89	30.51	23.99	13.47	22.46	22.97	13.22	50.34	42.46	31.43	0.50	0.55	-1.03	1.58	54.28	54.22	54.27	0.25	0.33	0.17	0.57	0.65	1.40	-1.01
101-4	Q	54.00	0.45	0.51	-0.65	1.17	53.94	53.92	53.93	0.19	0.23	0.18	0.54	0.26	1.00	-0.22	39.10	49.71	49.66	40.11	37.22	33.95	30.78	24.57	13.51	22.46	23.10	13.39	50.50	42.64	31.70	0.45	0.50	-1.10	1.59	54.01	53.93	54.00	0.24	0.32	0.15	0.50	0.69	1.35	-1.26
101-4	R	54.40	0.44	0.51	-0.57	1.09	54.35	54.33	54.34	0.19	0.23	0.19	0.54	0.23	0.96	-0.12	40.30	49.84	50.16	41.11	38.04	34.23	31.82	25.25	14.09	22.35	22.93	13.05	50.97	43.44	32.76	0.49	0.55	-1.31	1.86	54.42	54.34	54.40	0.29	0.39	0.16	0.48	1.00	1.66	-1.46
202-1	A	59.88	0.77	0.88	-1.03	1.90	59.80	59.77	59.78	0.31	0.38	0.33	0.86	0.44	1.67	-0.16	42.03	43.64	47.48	45.38	42.35	40.03	37.32	32.45	21.80	30.47	30.81	20.45	50.53	47.94	38.74	1.01	1.13	-2.53	3.65	59.99	59.80	59.87	0.56	0.75	0.37	1.12	1.70	3.19	-1.34
202-1	B	60.34	0.67	0.77	-0.81	1.59	60.34	60.33	60.33	0.24	0.31	0.30	0.67	0.33	1.36	-0.06	42.00	43.71	46.74	43.63	38.58	35.82	33.47	28.31	18.08	27.40	28.19	18.29	49.02	45.53	34.78	0.86	1.00	-1.16	2.17	60.36	60.33	60.34	0.31	0.40	0.45	0.85	0.53	1.84	-0.17
202-1	C	60.47	0.80	0.93	-1.12	2.06	60.34	60.31	60.32	0.31	0.40	0.37	0.87	0.44	1.76	-0.14	42.79	43.70	46.90	45.99	42.69	39.96	37.28	32.35	21.75	31.12	31.18	20.78	50.64	48.57	38.69	1.14	1.29	-3.12	4.41	60.65	60.36	60.46	0.70	0.97	0.41	1.05	2.70	4.20	-1.59
202-1	D	60.79	0.95	1.13	-1.38	2.50	60.74	60.68	60.71	0.39	0.49	0.44	1.05	0.55	2.16	-0.14	44.25	44.76	47.57	46.51	43.75	41.48	39.14	34.07	23.57	32.06	32.17	21.70	51.25	49.51	40.50	1.28	1.44	-3.53	4.95	61.03	60.70	60.79	0.78	1.09	0.47	1.19	3.05	4.70	-1.59
202-1	E	60.26	0.55	0.63	-0.72	1.35	60.19	60.18	60.19	0.21	0.27	0.23	0.60	0.29	1.17	-0.14	40.88	41.47	45.10	43.42	40.39	35.58	32.62	26.99	15.85	24.93	25.57	15.32	48.44	45.83	33.74	0.73	0.81	-1.57	2.39	60.29	60.19	60.25	0.36	0.49	0.27	0.81	1.11	2.21	-1.22
202-1	F	59.28	0.60	0.70	-0.55	1.26	59.04	59.04	59.03	0.19	0.25	0.28	0.52	0.20	1.07	0.16	40.60	42.07	46.49	44.77	42.03	38.77	35.71	30.46	19.29	27.53	27.62	17.04	49.70	47.31	37.01	1.19	1.32	-2.21	3.54	59.54	59.09	59.27	0.84	1.03	0.37	0.83	3.05	4.32	-1.08
202-1	G	59.64	0.25	0.31	-0.48	0.79	59.74	59.74	59.73	0.10	0.14	0.12	0.28	0.16	0.59	-0.11	38.64	40.66	45.16	43.25	39.51	34.04	28.69	22.32	11.84	21.42	22.02	12.36	48.27	45.33	29.75	0.99	1.09	-0.61	1.71	59.65	59.78	59.64	0.30	0.37	0.76	0.49	0.20	1.46	0.96
203-1	A	56.61	0.51	0.57	-0.97	1.55	56.62	56.56	56.60	0.24	0.32	0.18	0.57	0.60	1.37	-0.91	39.78	47.20	49.17	42.69	44.11	37.38	34.22	27.61	19.21	32.20	35.39	32.92	51.11	46.92	35.19	0.37	0.43	-0.49	0.93	56.62	56.60	56.62	0.14	0.18	0.18	0.40	0.22	0.81	-0.16
203-1	B	56.79	0.54	0.60	-1.28	1.88	56.80	56.70	56.77	0.29	0.39	0.17	0.56	0.89	1.63	-1.29	39.02	45.51	47.68	41.80	40.65	37.57	35.69	30.33	23.11	36.11	38.80	35.43	49.46	45.20	37.27	0.41	0.47	-0.57	1.05	56.81	56.77	56.81	0.16	0.21	0.20	0.45	0.27	0.92	-0.21
203-1	C	56.80	0.32	0.37	-0.46	0.84	56.82	56.75	56.80	0.15	0.18	0.13	0.39	0.18	0.74	-0.31	38.44	46.03	47.61	41.36	37.91	34.97	32.92	28.34	22.27	34.24	36.78	33.06	49.02	43.58	35.22	0.57	0.63	-0.61	1.27	56.82	56.83	56.82	0.25	0.30	0.28	0.70	0.19	1.20	0.05
203-1	D	57.26	0.81	0.90	-1.83	2.73	57.31	57.14	57.25	0.45	0.59	0.24	0.77	1.41	2.49	-1.16	40.69	45.03	46.33	43.59	40.49	39.18	38.04	33.33	26.55	38.74	41.84	38.18	49.16	46.41	39.58	0.57	0.67	-0.79	1.46	57.31	57.29	57.30	0.24	0.30	0.29	0.65	0.37	1.32	-0.19
203-1	E	56.63	0.87	0.96	-2.48	3.45	56.84	56.44	56.62	0.73	0.95	0.17	0.45	3.16	3.89	-1.51	38.16	42.58	44.93	40.34	40.47	36.03	33.10	29.50	25.33	51.95	40.46	29.20	47.31	44.12	35.35	0.69	0.78	-0.71	1.49	56.83	56.86	56.81	0.25	0.30	0.39	0.64	0.28	1.31	0.26
203-1	F	56.98	0.64	0.74	-1.74	2.48	57.02	56.90	56.97	0.31	0.46	0.25	0.55	1.23	2.08	-1.80	40.75	46.56	48.17	43.54	41.01	37.79	35.68	32.52	31.53	36.02	38.62	35.90	50.24	46.11	38.32	0.47	0.55	-0.65	1.20	57.01	57.00	57.01	0.19	0.24	0.24	0.51	0.30	1.05	-0.19
204-1	A	56.96	0.89	0.98	-2.22	3.22	57.02	56.77	56.92	0.59	0.75	0.19	1.04	1.59	2.89	-1.17	42.65	47.77	49.35	46.08	44.14	45.83	45.40	42.35	34.70	47.35	51.41	38.40	52.14	50.38	47.67	0.61	0.70	-1.13	1.83	57.04	56.96	57.02	0.30	0.38	0.26	0.75	0.60	1.61	-0.75
204-1	B	57.05	0.63	0.70	-1.55	2.25	57.07	56.93	57.03	0.36	0.47	0.17	0.73	0.96	1.91	-1.18	38.53	45.80	48.29	42.94	40.87	40.92	40.08	36.83	27.74	41.96	46.67	33.49	50.11	46.53	42.13	0.55	0.63	-1.13	1.77	57.07	57.01	57.06	0.27	0.35	0.22	0.69	0.58	1.50	-0.86
204-1	C	55.99	0.41	0.47	-0.80	1.27	55.90	55.85	55.89	0.18	0.23	0.16	0.47	0.34	1.01	-0.48	37.14	43.90	46.31	41.46	38.20	35.52	33.54	28.55	17.85	26.16	26.56	16.46	48.39	43.92	34.89	0.60	0.67	-1.87	2.55	56.04	55.85	55.98	0.43	0.57	0.15	0.63	1.38	2.18	-1.52
204-1	D	55.98	0.49	0.58	-1.06	1.64	55.83	55.78	55.82	0.24	0.31	0.19	0.60	0.45	1.32	-0.47	38.52	46.36	48.64	43.19	40.35	38.53	36.23	31.08	21.18	27.67	27.37	17.58	50.48	46.00	37.64	0.88	0.98	-2.78	3.77	56.14	55.79	55.97	0.70	0.91	0.16	0.94	2.23	3.35	-1.46
204-1	E	56.12	0.70	0.78	-2.02	2.80	56.15	55.98	56.09	0.45	0.59	0.16	0.82	1.30	2.35	-1.35	44.25	46.91	49.50	46.98	44.64	50.23	45.61	44.08	32.65	45.37	45.79	36.41	52.55	52.68	48.20	0.49	0.57	-0.90	1.48	56.16	56.10	56.15	0.23	0.30	0.22	0.59	0.46	1.29	-0.74
204-1	F	56.89	0.57	0.64	-1.46	2.12	56.89	56.76	56.86	0.35	0.46	0.14	0.68	0.93	1.81	-1.20	41.29	45.98	48.21	44.76	42.89	47.46	43.38	41.49	30.13	43.20	43.36	33.11	50.94	50.41	45.93	0.43	0.50	-0.89	1.40	56.91	56.84	56.90	0.21	0.27	0.19	0.52	0.44	1.16	-0.88
204-1	G	56.36	0.34	0.38	-0.50	0.89	56.37	56.36	56.37	0.14	0.17	0.13	0.37	0.20	0.74	-0.31	38.29	45.13	47.90	40.54	37.21	33.70	30.46	24.53	13.63	22.35	22.79	12.52	49.23	43.00	31.57	0.31	0.35	-0.60	0.96	56.37	56.36	56.36	0.12	0.17	0.14	0.33	0.27	0.75	-0.75
204-1	H	55.66	0.74	0.82	-2.25	3.07	55.73	55.47	55.63	0.52	0.69	0.16	0.76	1.70	2.67	-1.49	41.88	46.51	48.67	45.90	46.19	46.00	46.23	42.29	34.43	49.38	47.09	37.82	52.07	50.95	48.09	0.53	0.62	-0.96	1.59	55.74	55.66	55.72	0.25	0.32	0.24	0.65	0.49	1.39	-0.76
204-1	I	56.75	0.76	0.83	-1.43	2.28	56.77	56.61	56.73	0.47	0.57	0.16	0.97	1.01	2.21	-0.79	40.81	45.53	48.02	45.33	43.54	44.26	39.90	37.05	28.76	50.03	40.74	29.02	51.05	49.51	42.05	0.46	0.53	-0.79	1.32	56.77	56.73	56.76	0.21	0.27	0.21	0.54	0.39	1.16	-0.53
204-1	J	57.11	0.76	0.89	-1.52	2.41	57.14	57.03	57.10	0.38	0.49	0.30	0.90	0.80	2.08	-0.74	46.68	47.98	50.80	49.82	47.16	46.24	42.66	37.45	28.35	33.93	33.30	24.28	54.47	52.85	43.96	0.78	0.93	-1.66	2.61	57.16	57.04	57.11	0.40	0.53	0.38	0.91	1.01	2.32	-0.81
205-1	A	60.11	0.42	0.47	-0.50	0.98	60.12	60.10	60.10	0.15	0.19	0.18	0.42	0.20	0.82	-0.08	39.88	41.33	43.53	43.18	39.92	36.97	34.13	28.02	16.84	25.20	25.07	16.36	47.35	45.54	35.14	0.43	0.49	-0.54	1.03	60.12	60.12	60.12	0.15	0.19	0.21	0.43	0.23	0.86	-0.11
205-1	B	59.57	0.32	0.38	-0.89	1.26	59.61	59.55	59.58	0.14	0.20	0.11	0.33	0.36	0.87	-0.92	40.56	39.90	43.51	41.02	37.35	35.52	33.25	29.24	20.05	27.92	28.61	18.68	46.06	43.36	35.22	0.98	1.07	-1.75	2.83	59.63	59.56	59.58	0.42	0.55	0.40	1.18	0.90	2.50	-0.58
205-1	C	59.60	0.28	0.33	-0.71	1.05	59.62	59.58	59.60	0.12	0.17	0.10	0.30	0.28	0.76	-0.86	41.62	39.67	43.38	41.36	38.71	34.14	32.06	27.46	18.94	26.84	26.95	17.89	46.26	43.82	33.93	0.95	1.03	-1.19	2.22	59.63	59.60	59.60	0.37	0.46	0.42	1.13	0.49	2.04	-0.09
205-1	D	59.00	0.26	0.31	-0.70	1.01	59.07	59.05	59.06	0.11	0.17	0.10	0.26	0.27	0.72	-0.96	36.20	38.66	42.75	40.95	37.17	32.35	29.36	24.54	14.44	23.05	23.64	14.29	45.81	43.05	30.92	0.80	0.86	-0.97	1.81	59.02	59.07	59.00	0.28	0.35	0.56	0.53	0.48	1.57	0.23
205-1	E	59.54	0.23	0.28	-0.56	0.85	59.61	59.61	59.61	0.10	0.14	0.09	0.25	0.21	0.62	-0.63	35.93	38.93	43.21	41.53	35.98	30.79	27.29	21.67	11.37	20.43	21.65	11.76	46.02	42.94	28.30	0.85	0.93	-0.74	1.67	59.54	59.64	59.53	0.29	0.36	0.61	0.57	0.29	1.47	0.57
205-1	F	59.19	0.30	0.35	-0.69	1.05	59.26	59.23	59.24	0.13	0.18	0.11	0.30	0.27	0.78	-0.70	36.23	38.40	42.09	42.89	40.67	35.43	31.68	26.45	16.64	24.37	25.06	15.89	46.74	45.56	33.24	0.93	0.99	-0.93	1.93	59.21	59.28	59.19	0.37	0.44	0.62	0.83	0.41	1.88	0.33
205-1	G	59.41	0.32	0.39	-0.80	1.20	59.48	59.48	59.47	0.14	0.21	0.12	0.32	0.32	0.90	-0.77	34.71	38.11	43.13	42.67	38.91	33.17	30.23	24.76	14.10	23.25	24.03	14.71	46.80	44.62	31.43	1.03	1.11	-1.04	2.16	59.42	59.52	59.41	0.40	0.48	0.73	0.82	0.49	2.05	0.35
205-1	H	58.67	0.29	0.36	-0.68	1.04	58.75	58.75	58.74	0.13	0.18	0.11	0.30	0.26	0.79	-0.57	37.45	38.83	42.68	43.85	40.25	33.84	30.09	24.63	14.75	23.88	24.25	15.44	47.37	45.88	31.18	0.99	1.07	-0.94	2.02	58.69	58.78	58.68	0.38	0.46	0.71	0.78	0.41	1.91	0.41
205-1	I	59.21	0.31	0.36	-0.72	1.08	59.28	59.26	59.27	0.13	0.18	0.11	0.32	0.28	0.80	-0.68	35.78	38.51	42.21	41.84	39.15	33.83	30.52	25.35	15.02	23.76	24.86	15.58	46.21	44.53	31.86	1.00	1.08	-1.08	2.16	59.22	59.30	59.21	0.38	0.47	0.65	0.82	0.53	2.01	0.24
205-1	J	60.28	0.85	1.00	-1.36	2.37	60.21	60.16	60.18	0.37	0.47	0.38	0.99	0.56	2.04	-0.23	42.38	44.36	46.39	47.81	45.52	43.35	40.82	35.53	25.61	33.07	32.78	22.66	51.89	50.91	42.45	1.28	1.44	-3.86	5.31	60.53	60.18	60.28	0.86	1.17	0.39	1.37	2.98	4.79	-1.53
205-1	K	60.48	0.73	0.86	-1.06	1.92	60.38	60.36	60.36	0.31	0.39	0.32	0.85	0.44	1.67	-0.22	41.50	42.74	46.02	46.95	44.71	42.28	39.42	34.10	23.46	31.30	30.81	20.31	50.95	49.99	40.76	1.12	1.26	-3.40	4.65	60.69	60.37	60.47	0.76	1.03	0.32	1.18	2.63	4.18	-1.56
205-1	L	60.21	0.33	0.37	-0.44	0.81	60.19	60.18	60.18	0.12	0.15	0.13	0.35	0.17	0.67	-0.19	38.82	40.30	43.39	41.95	38.45	33.92	29.95	24.26	12.44	20.27	20.48	11.04	46.42	43.98	31.08	0.33	0.37	-0.46	0.84	60.22	60.20	60.21	0.12	0.16	0.15	0.34	0.20	0.70	-0.27
205-1	M	59.89	0.36	0.40	-0.48	0.88	59.87	59.86	59.87	0.13	0.17	0.15	0.38	0.19	0.73	-0.21	39.45	41.15	43.29	41.55	37.37	33.03	29.64	23.84	12.56	21.28	20.81	10.89	46.15	43.35	30.73	0.36	0.41	-0.51	0.92	59.89	59.88	59.88	0.13	0.17	0.17	0.38	0.22	0.77	-0.28
206-1	A	57.31	0.61	0.69	-1.57	2.26	57.33	57.24	57.29	0.31	0.42	0.20	0.70	0.89	1.83	-1.35	41.89	49.21	51.23	43.49	42.17	40.58	39.37	36.10	27.82	30.53	30.86	23.59	52.69	47.07	41.44	0.55	0.64	-1.20	1.84	57.33	57.24	57.30	0.27	0.36	0.23	0.64	0.69	1.57	-0.94
206-1	B	56.59	0.80	0.90	-2.31	3.21	56.66	56.46	56.56	0.49	0.66	0.21	0.90	1.51	2.68	-1.45	40.65	48.77	50.47	43.16	42.98	42.63	41.93	38.60	32.45	49.98	43.58	35.49	52.03	47.69	44.07	0.61	0.70	-1.18	1.88	56.67	56.60	56.64	0.29	0.37	0.26	0.75	0.59	1.60	-0.75
206-1	C	56.74	0.69	0.79	-2.53	3.32	56.78	56.63	56.70	0.40	0.60	0.22	0.74	1.51	2.52	-2.06	40.78	48.72	50.28	43.68	44.67	53.39	42.63	38.76	34.90	44.82	46.00	36.21	52.17	54.55	44.79	0.57	0.65	-1.10	1.77	56.79	56.73	56.76	0.26	0.34	0.24	0.68	0.56	1.50	-0.75
206-1	D	58.19	0.54	0.62	-2.14	2.77	58.22	58.11	58.17	0.30	0.47	0.18	0.55	1.17	1.94	-2.42	39.95	46.46	48.63	51.78	41.24	40.92	46.93	34.70	32.02	43.06	43.51	34.79	53.86	52.67	47.41	0.46	0.53	-1.02	1.56	58.23	58.18	58.21	0.21	0.28	0.20	0.54	0.49	1.23	-0.91
206-1	E	57.79	0.47	0.54	-1.41	1.94	57.80	57.74	57.77	0.23	0.33	0.17	0.52	0.72	1.42	-1.80	39.03	46.81	51.89	42.52	41.58	47.03	40.60	38.45	28.89	39.53	40.76	30.55	52.96	49.42	43.05	0.38	0.44	-0.86	1.31	57.80	57.77	57.79	0.17	0.23	0.16	0.43	0.40	1.00	-0.95
206-1	F	57.57	0.56	0.64	-1.48	2.12	57.58	57.50	57.54	0.26	0.37	0.21	0.60	0.76	1.63	-1.30	40.68	45.79	47.69	42.60	42.58	43.31	41.47	37.99	30.05	39.50	40.11	30.06	50.43	48.24	43.50	0.55	0.63	-1.14	1.77	57.60	57.54	57.58	0.25	0.33	0.24	0.64	0.56	1.45	-0.82
206-1	G	57.24	0.76	0.85	-1.74	2.60	57.28	57.13	57.23	0.43	0.55	0.21	0.92	1.04	2.21	-1.03	40.30	47.29	49.45	44.21	43.12	42.52	41.44	38.56	30.74	41.19	44.10	39.05	51.64	48.21	43.65	0.61	0.71	-1.19	1.90	57.29	57.23	57.27	0.28	0.36	0.28	0.71	0.59	1.58	-0.78
206-1	H	58.05	0.45	0.51	-0.72	1.23	58.02	57.99	58.01	0.18	0.23	0.18	0.50	0.30	1.01	-0.38	39.18	46.61	49.20	41.41	39.67	36.90	34.58	29.01	18.73	26.67	26.81	16.39	50.56	44.48	35.67	0.46	0.52	-1.09	1.61	58.07	58.01	58.06	0.22	0.30	0.17	0.51	0.60	1.29	-1.16
206-1	I	57.10	0.66	0.75	-1.97	2.72	57.13	56.98	57.08	0.39	0.55	0.18	0.73	1.29	2.23	-1.59	40.55	45.95	48.25	44.92	44.04	44.91	44.12	42.27	37.05	43.70	44.95	36.41	51.02	49.36	46.86	0.56	0.64	-1.14	1.78	57.15	57.08	57.12	0.26	0.34	0.23	0.68	0.57	1.48	-0.84
207-1	A	53.36	0.46	0.52	-0.72	1.25	53.39	53.36	53.37	0.20	0.24	0.18	0.54	0.30	1.05	-0.40	40.38	48.91	49.51	44.20	42.58	37.26	34.74	27.66	16.54	24.80	25.20	15.21	51.43	47.09	35.52	0.40	0.45	-0.88	1.33	53.37	53.34	53.36	0.19	0.24	0.15	0.48	0.42	1.05	-0.95
207-1	B	53.39	0.79	0.88	-2.16	3.05	53.44	53.26	53.36	0.48	0.64	0.21	0.89	1.50	2.64	-1.43	40.66	48.55	49.92	45.42	44.71	40.19	39.03	36.48	37.02	36.87	38.35	39.37	52.29	48.88	42.54	0.56	0.65	-1.04	1.69	53.44	53.39	53.42	0.26	0.33	0.25	0.67	0.51	1.44	-0.71
207-1	C	53.71	0.89	0.99	-3.20	4.19	53.79	53.54	53.64	0.59	0.86	0.22	0.87	2.27	3.43	-1.96	41.23	49.08	50.04	45.50	44.32	43.17	55.08	37.40	32.94	51.30	42.26	40.25	52.22	49.27	55.25	0.59	0.69	-1.14	1.83	53.81	53.75	53.79	0.27	0.35	0.27	0.68	0.56	1.52	-0.80
207-1	D	53.06	0.54	0.63	-1.51	2.16	53.00	52.92	52.96	0.28	0.39	0.20	0.62	0.77	1.66	-1.32	48.80	48.78	48.84	51.70	45.82	47.98	44.39	37.77	30.41	40.31	41.43	30.94	54.58	54.22	45.69	0.50	0.57	-1.35	1.93	53.10	52.98	53.07	0.30	0.40	0.16	0.53	0.96	1.68	-1.44
207-1	E	53.11	0.44	0.51	-0.68	1.19	53.02	53.00	53.01	0.19	0.24	0.18	0.53	0.27	0.99	-0.26	41.09	49.54	49.86	44.22	42.49	36.59	34.95	27.19	16.75	24.42	24.50	14.89	51.60	47.08	35.84	0.49	0.56	-1.56	2.11	53.16	53.01	53.11	0.32	0.44	0.15	0.49	1.17	1.84	-1.66
207-1	F	52.93	0.41	0.48	-0.55	1.03	52.88	52.86	52.88	0.18	0.22	0.16	0.49	0.21	0.89	-0.15	40.76	49.81	50.18	43.97	41.52	35.97	33.46	24.59	14.21	21.17	20.63	10.79	51.72	46.51	34.12	0.42	0.48	-0.94	1.41	52.94	52.87	52.92	0.23	0.29	0.14	0.49	0.60	1.24	-1.12
207-1	G	53.67	0.73	0.81	-1.97	2.78	53.69	53.53	53.63	0.41	0.56	0.21	0.75	1.34	2.32	-1.48	39.56	47.97	48.80	43.90	41.92	38.26	37.10	34.37	34.93	34.99	36.41	37.50	50.78	46.66	40.47	0.48	0.56	-0.97	1.54	53.70	53.66	53.69	0.20	0.27	0.23	0.50	0.46	1.19	-0.91
207-1	H	53.44	0.60	0.68	-1.97	2.64	53.48	53.31	53.42	0.39	0.54	0.15	0.62	1.45	2.25	-1.69	40.19	47.28	48.23	44.03	43.55	39.61	39.02	37.41	33.63	34.57	34.71	30.61	50.78	47.49	42.20	0.52	0.63	-1.18	1.81	53.49	53.33	53.47	0.29	0.37	0.23	0.63	0.69	1.55	-0.89
207-1	I	54.09	0.51	0.56	-1.00	1.56	54.09	54.04	54.08	0.25	0.32	0.15	0.62	0.55	1.34	-0.87	38.47	49.07	49.25	42.32	39.67	34.94	32.50	27.24	17.77	27.88	31.15	33.09	50.50	44.76	33.76	0.34	0.39	-0.60	0.99	54.09	54.07	54.08	0.14	0.18	0.15	0.38	0.27	0.80	-0.60
207-1	J	53.92	0.56	0.62	-1.36	1.99	53.93	53.82	53.90	0.32	0.42	0.15	0.63	0.92	1.74	-1.20	38.18	46.20	47.77	43.42	40.99	36.45	34.60	29.03	22.80	47.21	35.52	24.77	50.04	46.11	36.02	0.39	0.44	-0.75	1.19	53.94	53.91	53.93	0.16	0.21	0.17	0.43	0.34	0.94	-0.82
207-1	K	54.18	0.57	0.65	-1.82	2.48	54.20	54.05	54.15	0.36	0.51	0.15	0.60	1.31	2.10	-1.66	38.84	46.21	48.55	43.96	47.16	48.59	44.23	43.24	32.65	43.80	41.87	36.24	51.77	51.89	46.90	0.40	0.46	-0.73	1.20	54.21	54.18	54.20	0.17	0.22	0.18	0.46	0.33	0.97	-0.65
207-1	L	53.69	0.33	0.38	-0.41	0.79	53.70	53.68	53.69	0.13	0.16	0.13	0.38	0.15	0.67	-0.11	39.00	48.12	47.50	42.13	40.37	34.24	31.77	23.13	10.86	18.38	18.80	8.52	49.41	44.86	32.53	0.25	0.28	-0.36	0.65	53.71	53.69	53.70	0.09	0.12	0.11	0.25	0.15	0.52	-0.31
207-1	M	53.88	0.59	0.65	-1.87	2.52	53.90	53.77	53.85	0.36	0.50	0.15	0.62	1.28	2.10	-1.72	39.63	50.46	45.75	42.05	40.15	36.56	35.54	34.78	35.06	33.27	36.37	37.46	48.29	45.11	40.27	0.41	0.47	-0.81	1.28	53.91	53.87	53.90	0.18	0.24	0.18	0.47	0.38	1.03	-0.81
207-1	N	53.39	0.53	0.60	-1.59	2.18	53.41	53.31	53.37	0.31	0.43	0.15	0.58	1.06	1.82	-1.65	40.13	48.02	48.66	44.93	44.30	37.96	35.80	31.79	32.57	32.11	33.66	34.36	51.22	48.09	38.63	0.36	0.42	-0.65	1.07	53.42	53.38	53.41	0.15	0.20	0.16	0.41	0.30	0.87	-0.61
207-1	O	53.67	0.51	0.57	-1.50	2.07	53.67	53.59	53.65	0.28	0.40	0.15	0.56	0.95	1.69	-1.63	39.38	47.94	49.11	43.29	41.77	36.90	34.85	31.49	31.75	30.36	31.83	32.34	50.90	46.33	37.83	0.35	0.40	-0.63	1.03	53.68	53.65	53.68	0.15	0.19	0.15	0.39	0.28	0.84	-0.64
207-1	P	54.10	0.91	1.05	-1.31	2.36	54.11	54.07	54.08	0.38	0.48	0.42	1.04	0.58	2.10	-0.27	43.06	49.99	50.32	47.45	45.23	42.93	40.87	35.91	25.64	34.36	34.88	24.95	53.13	50.34	42.19	0.88	1.03	-1.45	2.49	54.14	54.08	54.10	0.38	0.49	0.46	0.99	0.73	2.19	-0.40
305-1	A	59.20	0.57	0.67	-1.10	1.77	59.20	59.16	59.18	0.27	0.34	0.25	0.68	0.48	1.47	-0.56	42.87	50.31	52.60	43.91	43.81	40.68	38.24	32.96	21.40	29.34	29.38	19.05	53.84	48.02	39.45	0.52	0.61	-1.26	1.87	59.21	59.17	59.20	0.25	0.34	0.26	0.59	0.63	1.49	-0.97
305-1	B	58.98	0.48	0.56	-0.80	1.36	59.00	58.97	58.98	0.22	0.28	0.20	0.58	0.34	1.18	-0.38	43.07	49.63	53.14	43.63	43.24	40.26	37.30	31.77	22.32	29.83	29.43	21.26	54.17	47.32	38.55	0.41	0.49	-0.90	1.40	58.99	58.97	58.98	0.19	0.26	0.22	0.45	0.45	1.14	-0.79
307-1	A	56.85	0.65	0.73	-1.59	2.32	56.87	56.77	56.83	0.32	0.43	0.22	0.70	0.92	1.89	-1.30	41.31	46.88	48.30	42.84	40.56	38.36	36.53	32.93	33.23	33.94	35.63	34.17	50.09	45.81	39.29	0.55	0.64	-0.83	1.48	56.87	56.85	56.86	0.22	0.28	0.28	0.58	0.38	1.25	-0.27
307-1	B	56.96	0.73	0.83	-0.99	1.82	56.97	56.95	56.95	0.29	0.37	0.34	0.82	0.40	1.61	-0.15	41.69	47.89	49.08	44.30	43.02	40.93	38.62	33.46	24.37	33.07	33.78	26.28	51.43	47.85	40.33	0.68	0.79	-1.02	1.82	56.99	56.98	56.97	0.28	0.36	0.38	0.75	0.44	1.59	-0.22
307-1	C	57.12	0.77	0.84	-1.53	2.38	57.14	56.97	57.11	0.45	0.56	0.21	0.84	1.12	2.22	-0.94	39.65	44.94	46.41	43.39	40.14	37.70	36.11	32.28	26.53	50.97	37.73	25.11	48.78	45.83	38.05	0.53	0.61	-0.85	1.48	57.15	57.12	57.14	0.21	0.27	0.26	0.58	0.37	1.22	-0.34
307-1	D	56.10	0.80	0.90	-1.57	2.49	56.13	56.04	56.09	0.36	0.47	0.29	0.89	0.80	2.03	-0.82	42.09	49.21	50.23	43.63	43.36	40.43	38.32	33.30	25.70	35.40	37.52	36.50	51.89	47.48	39.77	0.60	0.73	-0.99	1.74	56.13	56.09	56.12	0.23	0.31	0.34	0.59	0.47	1.40	-0.40
307-1	E	56.95	0.65	0.72	-1.08	1.80	56.98	56.91	56.96	0.29	0.37	0.23	0.75	0.54	1.58	-0.60	40.20	48.80	49.92	43.24	42.58	38.34	36.12	30.81	22.46	46.15	33.58	21.03	51.47	46.58	37.38	0.50	0.57	-0.82	1.40	56.96	56.97	56.95	0.20	0.26	0.25	0.52	0.36	1.15	-0.37
307-1	F	57.28	0.70	0.78	-1.33	2.12	57.31	57.22	57.28	0.33	0.42	0.24	0.84	0.68	1.80	-0.77	40.45	48.09	49.36	43.79	42.95	39.57	37.68	32.08	23.80	33.67	36.33	36.33	51.19	47.29	39.17	0.60	0.68	-0.96	1.65	57.30	57.28	57.28	0.25	0.32	0.29	0.66	0.44	1.41	-0.42
309-1	A	55.84	1.00	1.14	-2.98	4.17	55.95	55.71	55.82	0.61	0.83	0.31	1.03	1.87	3.33	-1.43	43.50	50.26	52.66	47.68	46.70	47.66	47.70	43.63	36.63	50.66	48.42	39.75	54.72	52.32	49.52	0.56	0.70	-1.13	1.83	55.95	55.89	55.93	0.25	0.34	0.31	0.58	0.57	1.47	-0.81
309-1	B	55.22	0.69	0.78	-1.76	2.54	55.25	55.13	55.20	0.40	0.53	0.21	0.82	1.09	2.15	-1.19	42.51	52.25	49.90	46.20	44.65	45.28	45.00	40.84	33.56	47.27	44.87	35.70	52.48	50.27	46.71	0.44	0.51	-0.96	1.47	55.26	55.21	55.24	0.20	0.27	0.20	0.49	0.47	1.17	-0.94
309-1	C	55.60	1.02	1.15	-2.64	3.81	55.71	55.44	55.55	0.62	0.81	0.27	1.20	1.69	3.25	-1.18	44.20	49.73	51.84	48.25	47.17	48.00	47.69	43.72	36.49	50.39	47.91	39.32	54.64	52.70	49.52	0.72	0.84	-1.46	2.31	55.72	55.62	55.68	0.35	0.46	0.33	0.86	0.79	1.98	-0.83
310-1	A	55.69	0.70	0.80	-2.35	3.16	55.73	55.59	55.66	0.39	0.58	0.23	0.75	1.41	2.44	-1.88	40.91	50.43	51.70	47.33	47.47	46.14	46.53	42.07	34.63	44.91	46.35	36.47	54.27	51.90	48.12	0.56	0.67	-1.25	1.96	55.75	55.69	55.72	0.25	0.34	0.24	0.62	0.55	1.43	-0.89
310-1	B	55.79	0.82	0.92	-2.44	3.38	55.85	55.63	55.75	0.54	0.73	0.20	0.88	1.76	2.91	-1.47	46.23	48.41	51.52	47.75	45.90	44.53	46.95	45.20	36.46	45.71	49.55	39.66	54.06	51.14	49.51	0.59	0.68	-1.14	1.83	55.87	55.81	55.85	0.28	0.36	0.25	0.72	0.56	1.54	-0.82
310-1	C	56.45	0.83	0.92	-2.63	3.56	56.55	56.26	56.42	0.58	0.77	0.17	0.86	1.89	2.98	-1.45	38.97	47.24	49.18	43.26	43.39	43.73	42.06	39.55	33.01	51.61	46.00	37.56	51.21	48.49	44.56	0.60	0.69	-1.19	1.89	56.56	56.49	56.53	0.29	0.37	0.25	0.73	0.59	1.59	-0.82
311-1	A	55.12	0.95	1.15	-1.69	2.88	55.37	55.02	55.01	0.38	0.53	0.47	0.82	0.75	2.27	-0.56	45.24	51.76	52.32	47.03	46.90	46.12	45.11	41.16	33.79	41.36	42.94	36.06	54.29	51.60	46.90	1.96	2.44	-5.00	7.75	55.71	55.22	55.29	1.09	1.58	0.89	1.62	4.63	7.20	-1.57
319-1	A	57.07	0.58	0.68	-0.96	1.67	57.10	57.07	57.08	0.21	0.29	0.26	0.54	0.38	1.29	-0.45	40.47	45.47	46.54	44.37	41.67	39.56	38.80	32.38	22.43	32.18	32.68	24.53	49.51	47.25	39.82	0.75	0.88	-1.05	1.95	57.10	57.10	57.08	0.27	0.35	0.40	0.71	0.46	1.57	-0.11
319-1	B	57.04	0.43	0.49	-0.68	1.17	57.03	57.01	57.02	0.16	0.21	0.17	0.45	0.29	0.93	-0.49	41.22	44.72	46.46	43.28	40.91	37.50	34.95	29.05	19.49	26.54	26.57	16.58	48.90	45.79	36.11	0.41	0.48	-0.84	1.31	57.05	57.01	57.03	0.17	0.23	0.18	0.43	0.40	1.01	-0.88
319-1	C	57.60	0.85	0.96	-2.89	3.86	57.67	57.40	57.55	0.56	0.78	0.21	0.85	1.92	3.05	-1.71	43.33	46.67	49.54	54.69	50.36	48.28	53.15	43.07	35.81	47.38	46.24	39.93	57.15	56.91	53.68	0.59	0.70	-1.05	1.75	57.68	57.62	57.66	0.25	0.33	0.28	0.65	0.52	1.46	-0.66
320-1	A	56.39	0.44	0.49	-0.61	1.11	56.37	56.33	56.36	0.18	0.22	0.17	0.51	0.25	0.96	-0.28	40.65	46.87	48.39	43.27	41.73	38.13	34.99	28.77	22.14	29.22	29.33	23.10	50.35	46.21	36.41	0.44	0.49	-0.85	1.35	56.40	56.34	56.39	0.22	0.28	0.15	0.58	0.41	1.17	-0.71
320-1	B	56.78	0.28	0.33	-0.43	0.76	56.79	56.79	56.78	0.12	0.15	0.12	0.33	0.16	0.63	-0.19	39.17	45.03	47.00	41.19	39.20	33.51	28.88	21.72	13.43	20.98	20.89	13.90	48.61	43.53	29.88	0.66	0.70	-0.71	1.43	56.78	56.82	56.77	0.32	0.36	0.29	0.86	0.23	1.42	0.11
320-1	C	57.43	0.44	0.50	-0.63	1.13	57.39	57.35	57.38	0.18	0.22	0.17	0.49	0.25	0.97	-0.26	39.66	45.73	48.14	41.62	40.43	36.21	32.56	26.47	16.07	24.69	25.15	15.00	49.70	44.56	33.63	0.56	0.61	-1.26	1.86	57.44	57.36	57.43	0.30	0.38	0.15	0.74	0.68	1.58	-0.97
322-1	A	56.22	0.92	1.06	-1.78	2.87	56.27	56.18	56.23	0.40	0.54	0.39	0.98	0.92	2.35	-0.81	42.83	48.12	49.09	44.91	44.04	45.61	41.86	37.44	30.42	39.44	46.74	33.20	51.50	49.88	43.47	0.60	0.82	-0.98	1.81	56.25	56.22	56.23	0.23	0.31	0.40	0.48	0.49	1.38	-0.35
323-1	A	56.09	0.48	0.55	-0.79	1.34	56.10	56.06	56.08	0.20	0.26	0.19	0.56	0.33	1.11	-0.44	40.90	48.96	50.66	41.85	41.19	38.35	34.67	28.35	18.81	26.91	27.18	17.26	51.91	45.30	35.67	0.43	0.49	-0.94	1.43	56.10	56.06	56.09	0.20	0.26	0.18	0.51	0.46	1.14	-0.93
323-1	B	55.46	1.04	1.20	-4.02	5.26	55.57	55.26	55.36	0.67	0.99	0.30	1.14	2.38	3.92	-2.03	48.76	52.52	55.70	55.93	53.79	53.08	50.94	45.25	40.95	48.83	50.56	41.82	60.29	59.38	52.36	0.75	0.87	-1.48	2.35	55.58	55.50	55.55	0.37	0.47	0.32	0.93	0.78	2.03	-0.81
324-1	A	54.09	0.35	0.41	-0.52	0.93	54.08	54.07	54.08	0.16	0.20	0.14	0.46	0.20	0.82	-0.21	37.89	49.92	50.33	41.29	39.98	33.85	31.75	23.09	12.36	21.04	21.51	11.88	51.36	44.29	32.43	0.42	0.46	-0.63	1.10	54.10	54.09	54.09	0.18	0.23	0.15	0.57	0.24	0.97	-0.29
325-1	A	54.86	0.91	1.02	-1.50	2.53	54.90	54.79	54.85	0.45	0.56	0.32	1.06	0.84	2.28	-0.59	45.61	51.32	51.90	45.46	43.35	39.94	37.76	32.72	25.82	49.90	44.76	27.09	53.37	48.27	39.18	0.51	0.63	-0.82	1.45	54.89	54.87	54.87	0.18	0.24	0.28	0.44	0.37	1.10	-0.39
325-1	B	54.76	0.88	0.98	-1.48	2.47	54.79	54.67	54.74	0.44	0.55	0.30	1.02	0.88	2.24	-0.65	46.32	50.60	51.86	45.64	43.59	39.92	37.82	32.79	26.41	50.92	45.90	27.51	53.29	48.12	39.23	0.47	0.58	-0.77	1.35	54.79	54.77	54.77	0.17	0.22	0.26	0.40	0.34	1.01	-0.42
325-1	C	54.21	0.77	0.87	-1.26	2.12	54.23	54.16	54.21	0.35	0.44	0.29	0.88	0.67	1.86	-0.58	46.91	51.04	51.30	45.19	43.38	39.52	37.38	32.06	24.68	47.54	42.60	25.13	52.88	48.17	38.85	0.45	0.56	-0.75	1.31	54.24	54.22	54.22	0.16	0.21	0.25	0.37	0.33	0.96	-0.44
325-1	D	54.63	0.88	0.98	-1.52	2.51	54.68	54.56	54.64	0.45	0.56	0.30	0.99	0.94	2.28	-0.71	46.54	50.13	50.88	44.97	44.01	40.98	38.51	33.84	26.08	50.58	45.49	28.10	52.54	48.20	39.87	0.47	0.60	-0.76	1.36	54.66	54.65	54.65	0.16	0.22	0.27	0.37	0.34	0.98	-0.40
325-1	E	55.00	0.86	0.97	-1.44	2.41	55.03	54.93	55.00	0.42	0.52	0.32	0.99	0.82	2.16	-0.64	45.95	50.39	51.37	45.20	42.83	40.38	38.47	33.20	25.76	49.40	44.24	27.55	52.84	48.07	39.71	0.49	0.62	-0.78	1.41	55.02	55.01	55.01	0.17	0.23	0.28	0.41	0.35	1.05	-0.35
336-1	A	55.28	0.84	1.03	-1.73	2.80	55.34	55.10	55.15	0.35	0.49	0.41	0.78	0.75	2.13	-0.61	45.64	50.90	51.93	47.76	47.76	46.20	44.53	40.32	32.19	40.00	41.67	33.97	54.26	51.91	46.20	1.40	1.81	-3.70	5.71	55.59	55.27	55.37	0.73	1.07	0.62	1.11	2.93	4.75	-1.42
340-1	A	54.82	0.98	1.16	-1.07	2.26	54.86	54.86	54.84	0.34	0.44	0.54	0.89	0.44	1.95	0.10	46.69	53.56	53.46	46.69	45.81	43.39	42.12	37.30	27.67	37.81	39.06	29.86	54.87	50.23	43.71	0.66	0.96	-0.90	1.88	54.84	54.83	54.82	0.20	0.29	0.50	0.42	0.40	1.33	0.10
340-1	B	54.91	0.81	0.92	-1.77	2.72	54.98	54.84	54.93	0.41	0.54	0.31	0.85	1.05	2.26	-1.07	43.19	49.85	50.63	44.87	46.51	44.24	44.64	45.02	34.72	40.12	40.80	32.43	53.00	50.31	48.07	0.44	0.59	-0.78	1.37	54.96	54.90	54.95	0.19	0.25	0.28	0.39	0.43	1.10	-0.49
340-1	C	53.76	1.36	1.62	-1.41	3.11	53.77	53.79	53.73	0.43	0.57	0.83	1.05	0.60	2.56	0.29	45.15	53.06	53.36	48.57	47.86	46.79	45.38	40.90	32.14	41.99	43.41	34.25	55.49	52.65	47.03	0.62	1.02	-0.90	1.94	53.78	53.68	53.76	0.21	0.30	0.69	0.39	0.42	1.51	0.37
340-1	D	53.37	1.03	1.19	-1.20	2.39	53.49	53.49	53.47	0.38	0.48	0.53	1.04	0.49	2.09	0.02	43.15	51.95	52.39	45.92	44.84	42.68	40.86	36.74	26.52	36.14	37.39	27.82	53.95	49.63	42.41	0.75	0.95	-1.07	2.03	53.42	53.43	53.38	0.30	0.38	0.46	0.72	0.54	1.73	-0.23
341-1	A	55.83	0.38	0.44	-0.74	1.18	55.84	55.81	55.82	0.17	0.22	0.15	0.45	0.32	0.95	-0.67	38.62	46.23	47.74	42.92	42.81	37.40	34.24	28.45	18.25	27.38	27.15	17.28	49.98	46.46	35.48	0.44	0.51	-1.03	1.54	55.85	55.81	55.83	0.17	0.25	0.22	0.40	0.50	1.14	-0.96
342-1	A	54.30	0.42	0.49	-0.63	1.11	54.29	54.26	54.28	0.19	0.23	0.16	0.51	0.26	0.98	-0.27	39.36	48.55	48.84	44.38	40.60	35.96	33.01	25.82	15.08	23.59	23.82	13.78	50.62	46.33	33.87	0.43	0.48	-0.86	1.34	54.30	54.26	54.29	0.21	0.26	0.16	0.52	0.44	1.13	-0.81
342-1	B	54.52	0.55	0.65	-0.77	1.42	54.38	54.36	54.37	0.26	0.31	0.25	0.70	0.35	1.30	-0.19	40.66	49.51	49.78	45.19	41.47	38.97	36.51	31.02	20.71	28.72	28.53	18.12	51.71	47.59	37.78	0.81	0.91	-2.44	3.35	54.66	54.39	54.52	0.58	0.78	0.22	0.82	2.07	3.14	-1.51
342-1	C	54.07	0.73	0.83	-2.27	3.10	54.12	53.94	54.03	0.45	0.63	0.21	0.77	1.57	2.60	-1.63	41.59	49.42	49.97	46.76	45.54	43.88	43.63	39.96	37.99	44.07	44.02	37.59	52.92	50.27	46.09	0.54	0.63	-0.85	1.48	54.13	54.08	54.11	0.25	0.31	0.25	0.66	0.42	1.33	-0.37

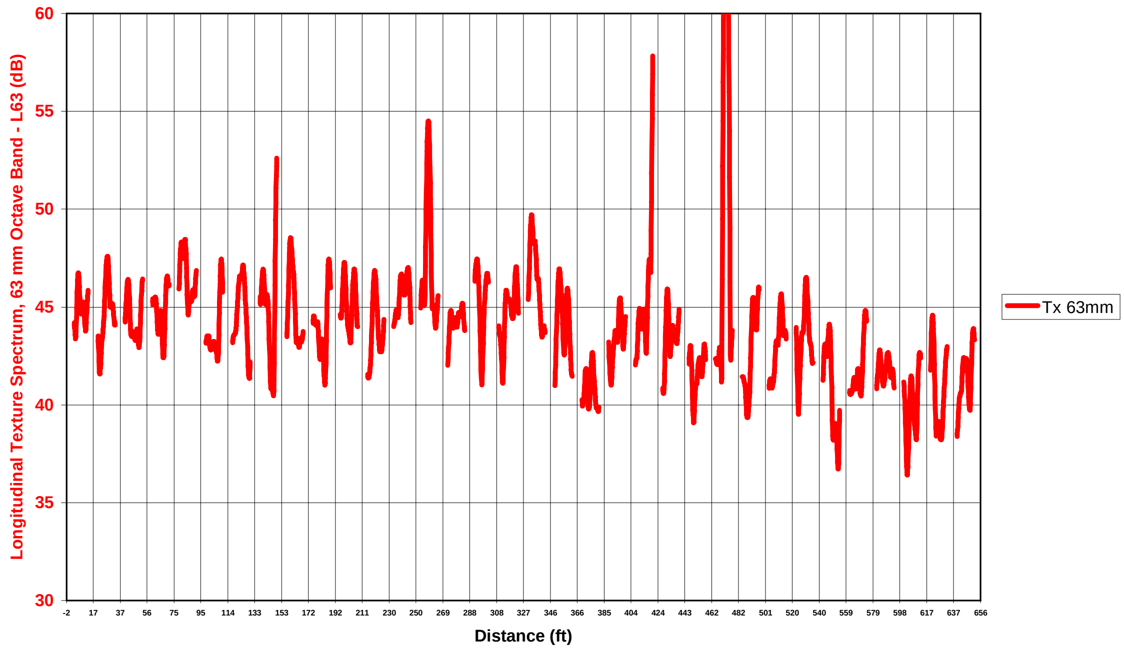
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



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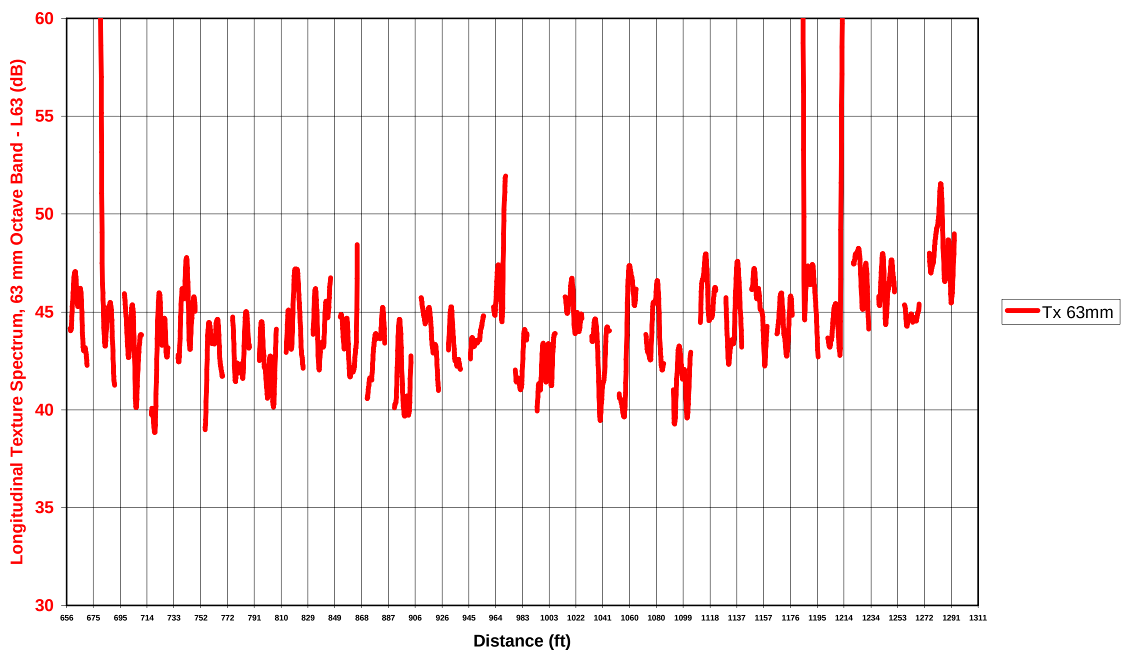
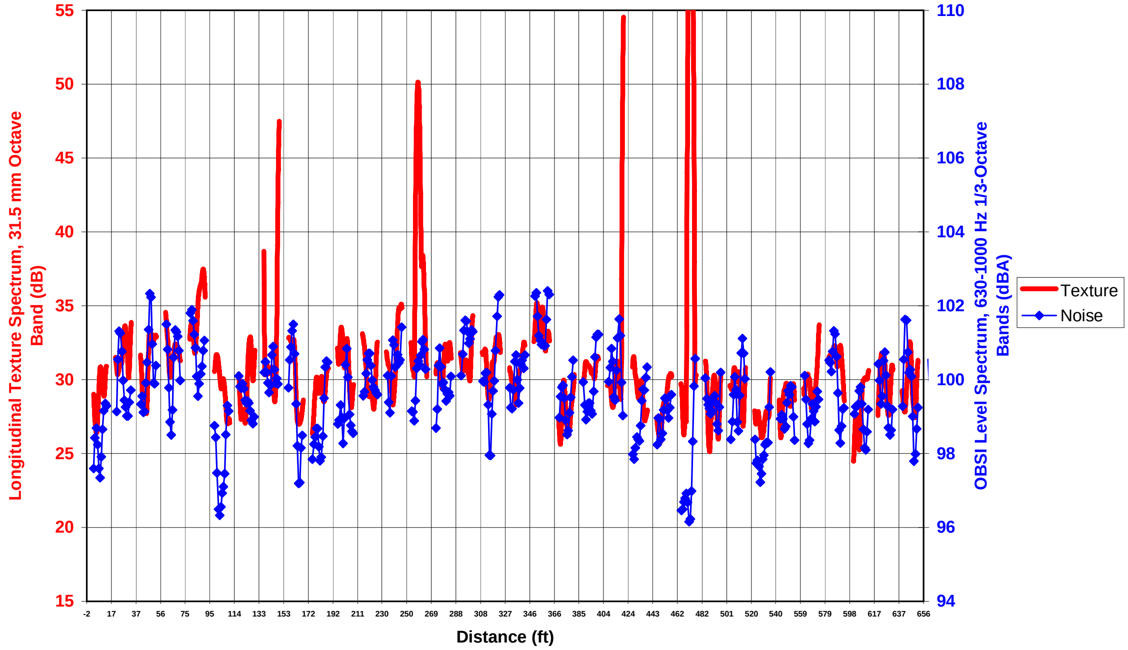
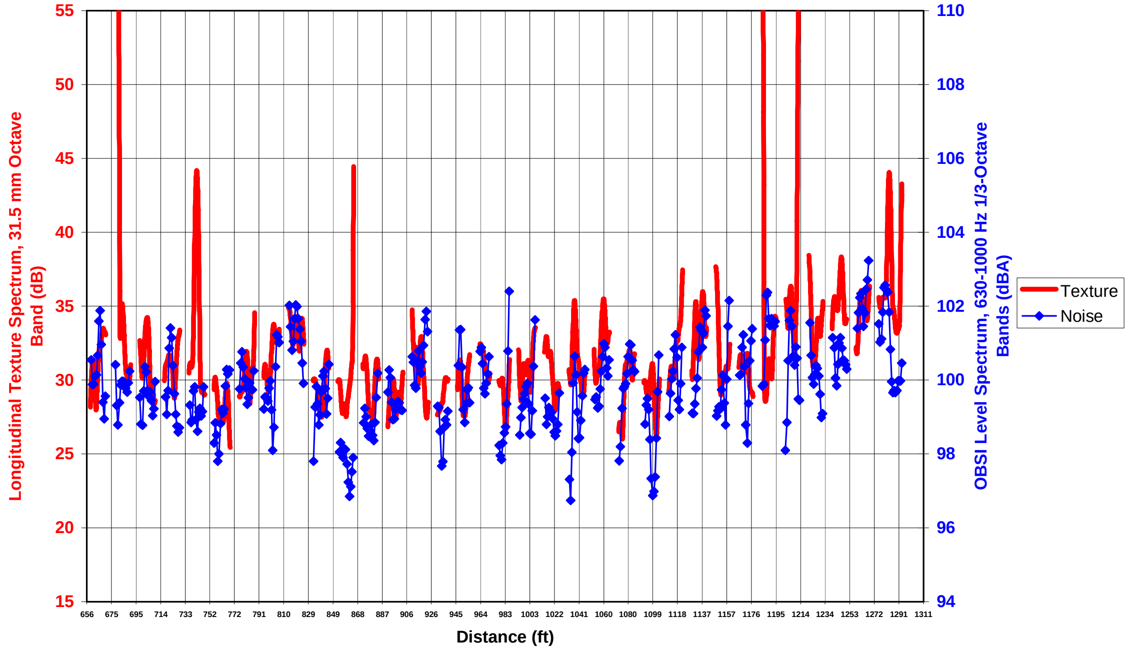


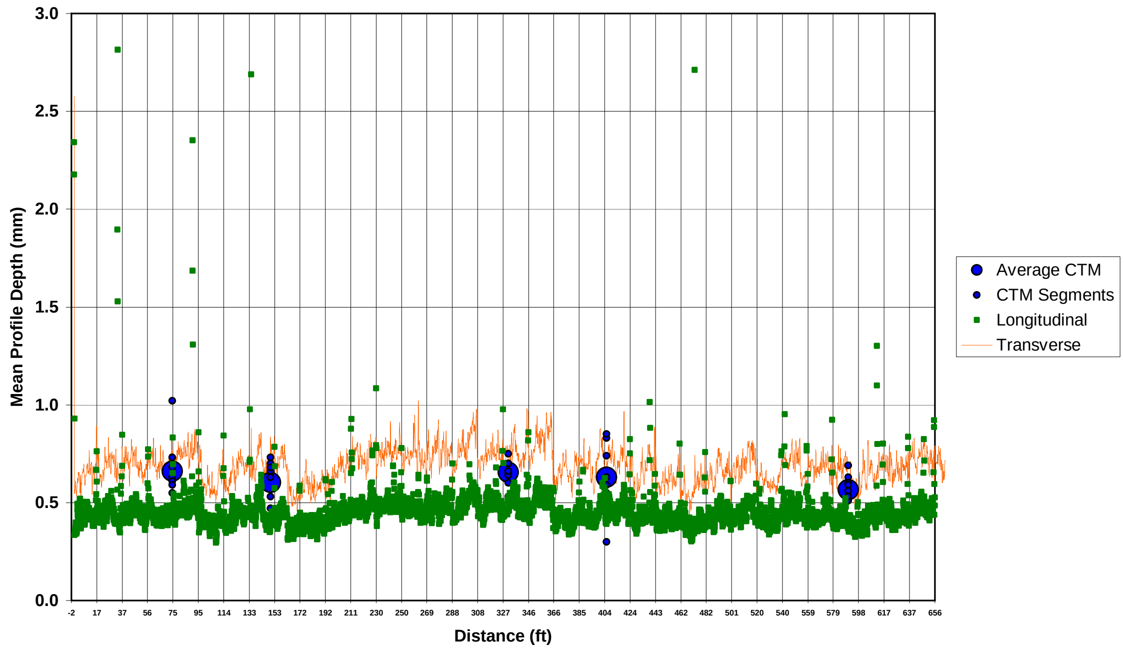
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



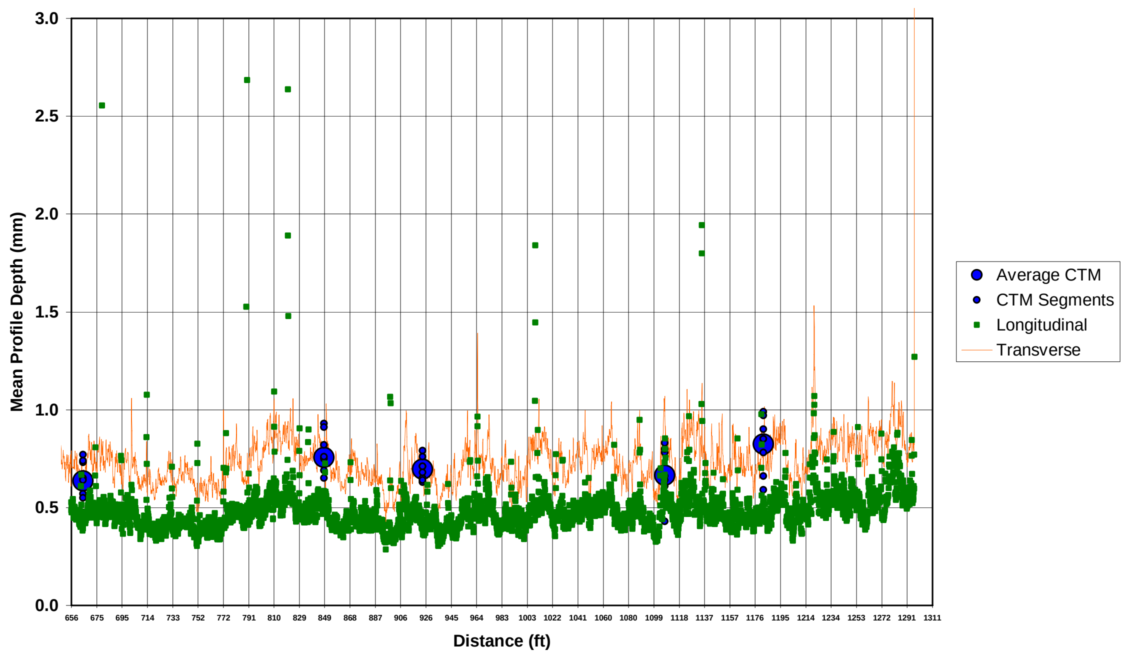
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



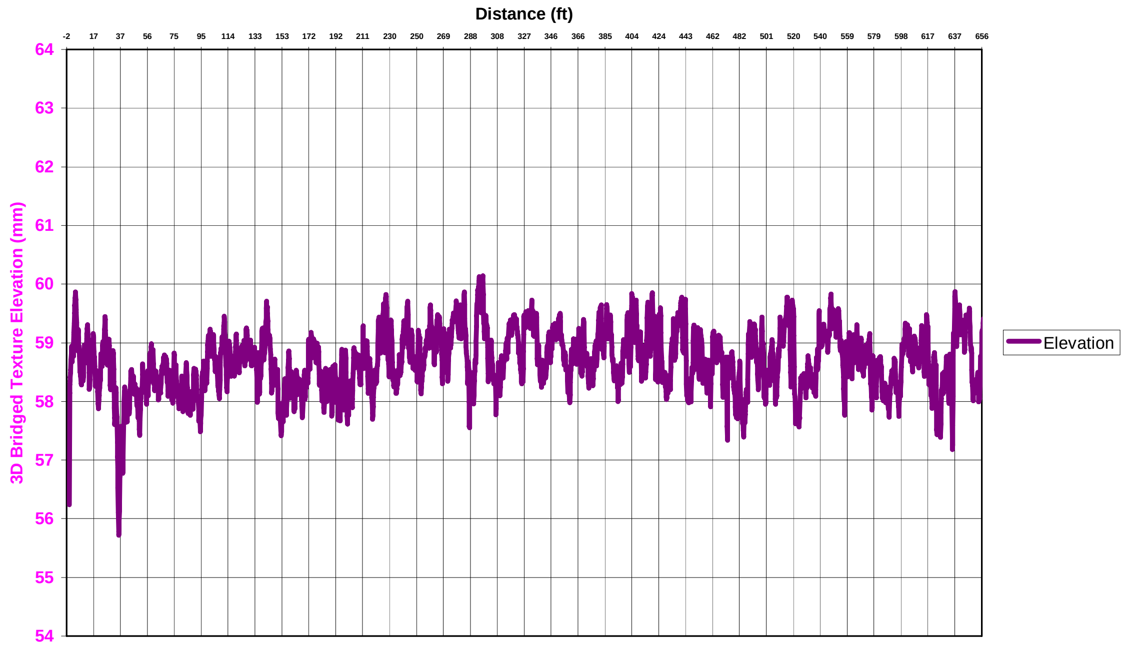
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



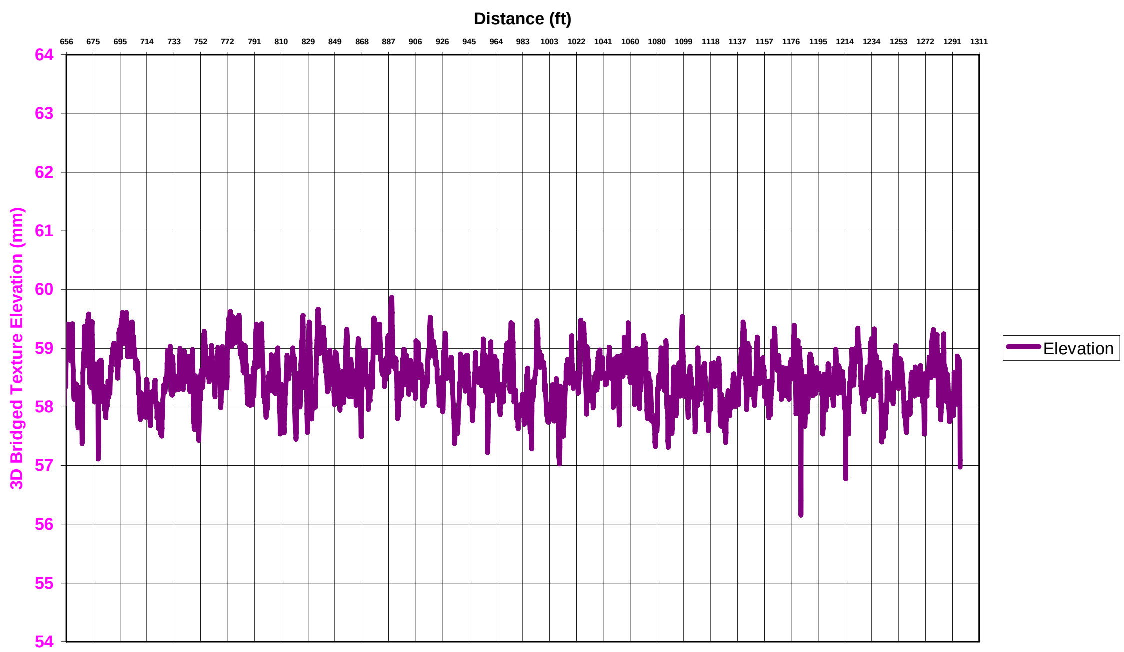
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



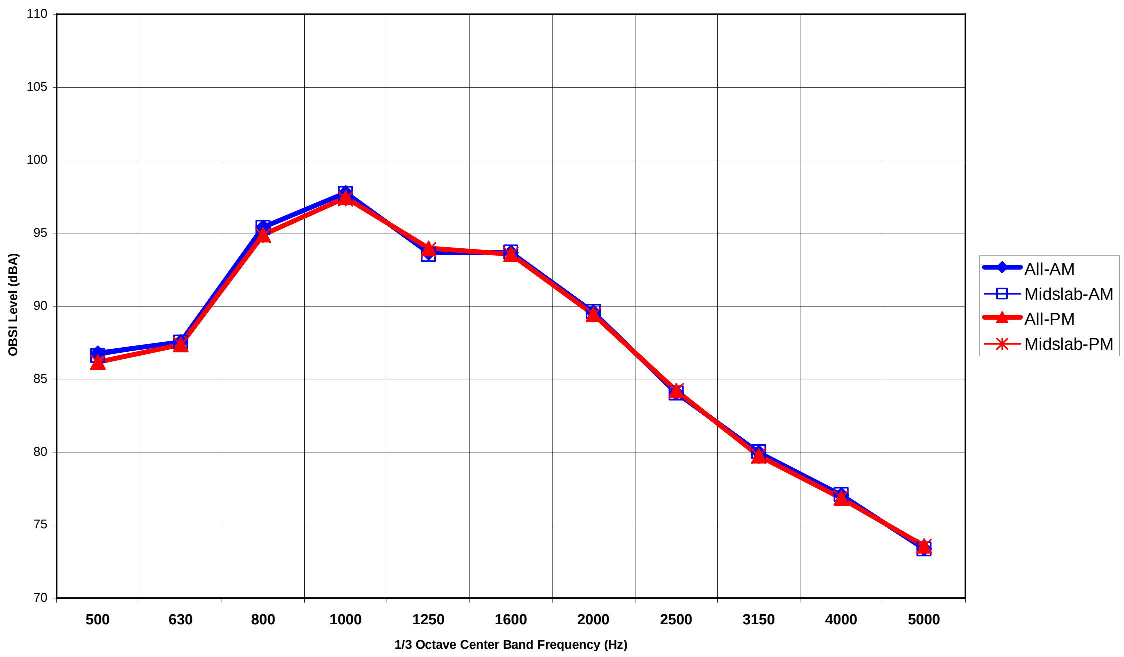
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



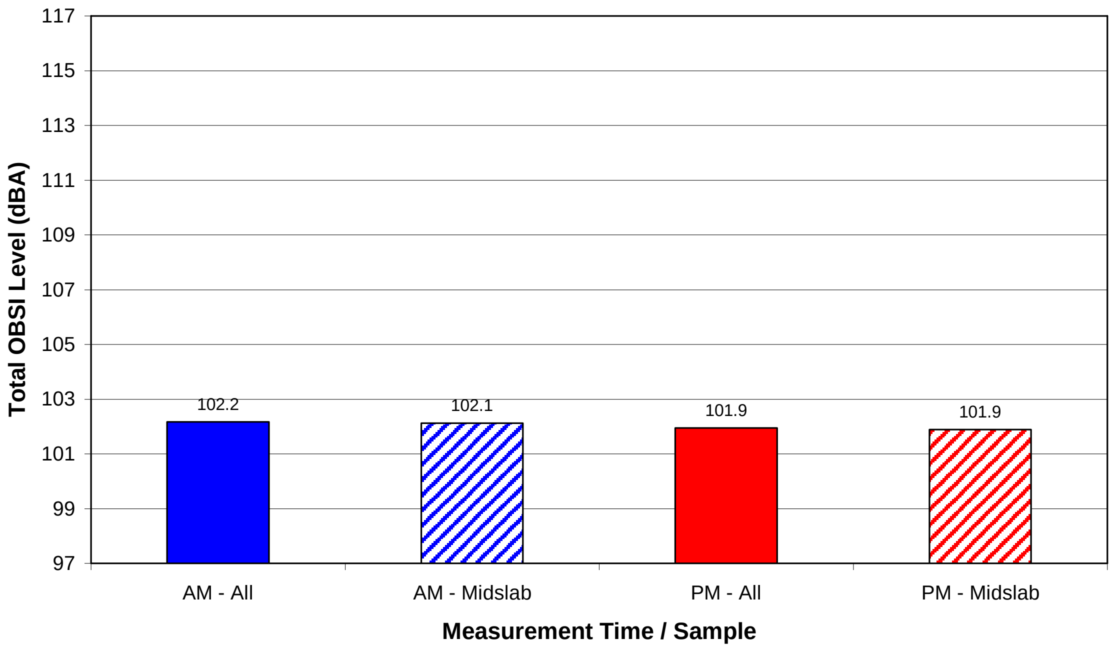
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



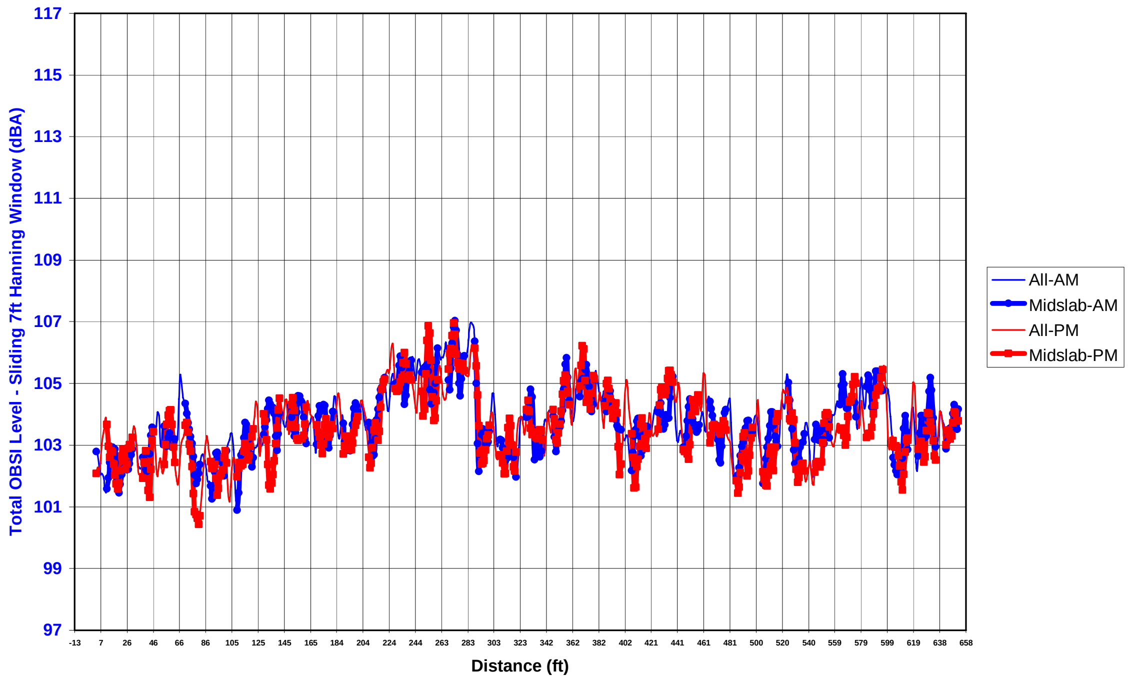
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



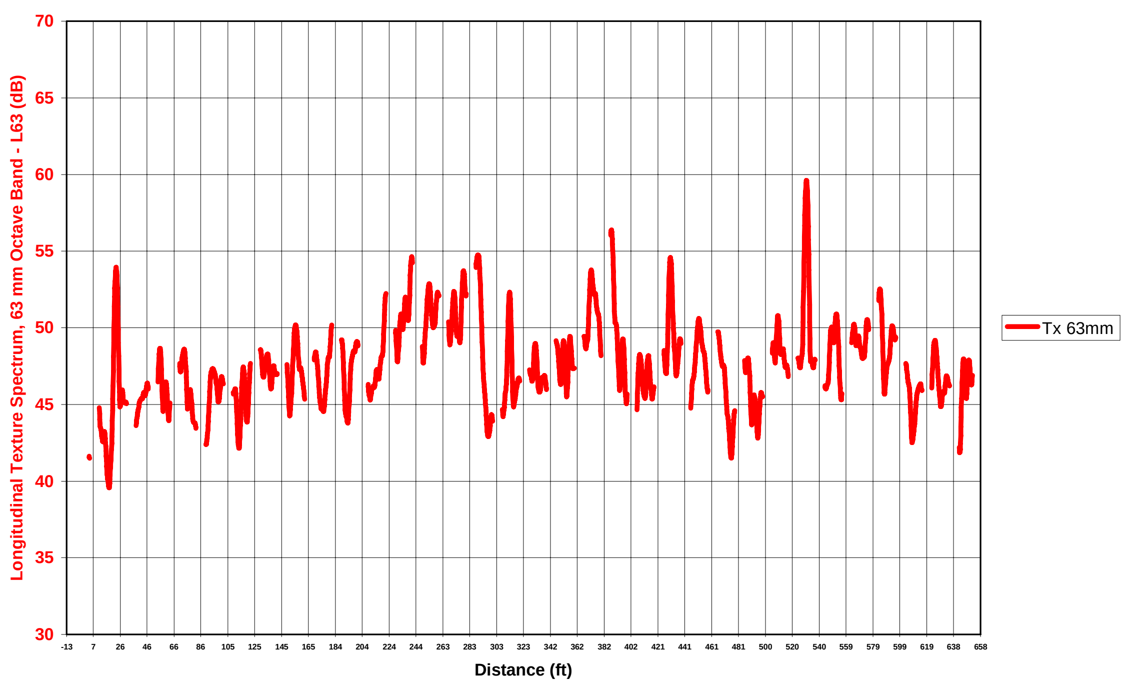
Site 101-2 (IA), Section B (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Long Section)



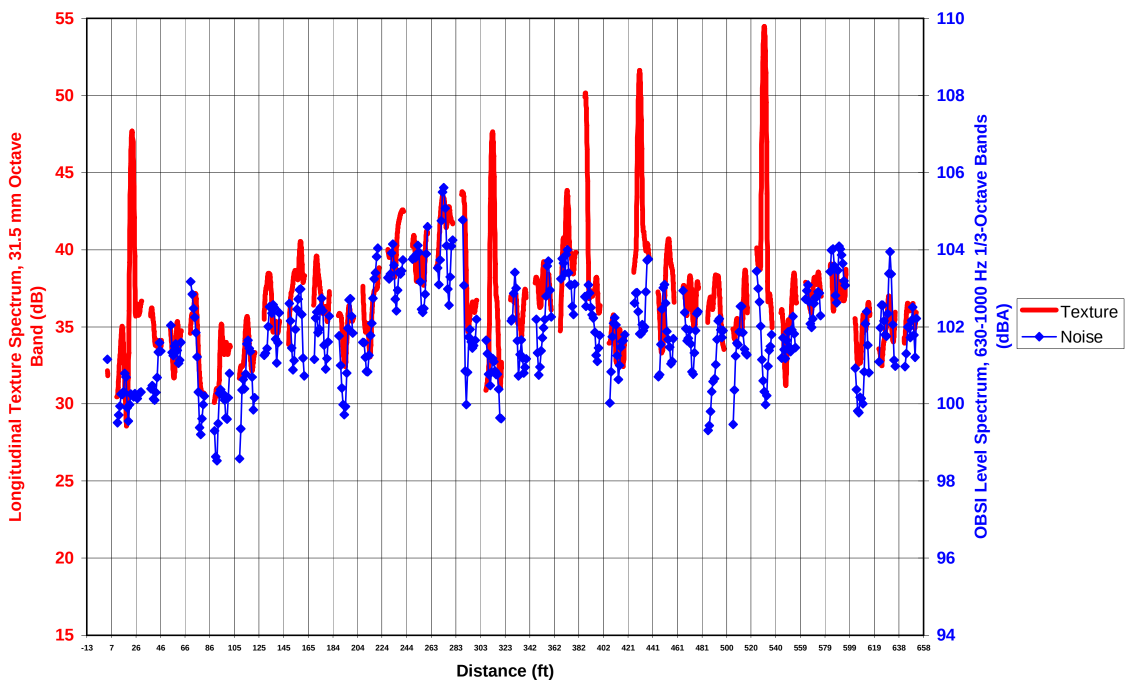
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



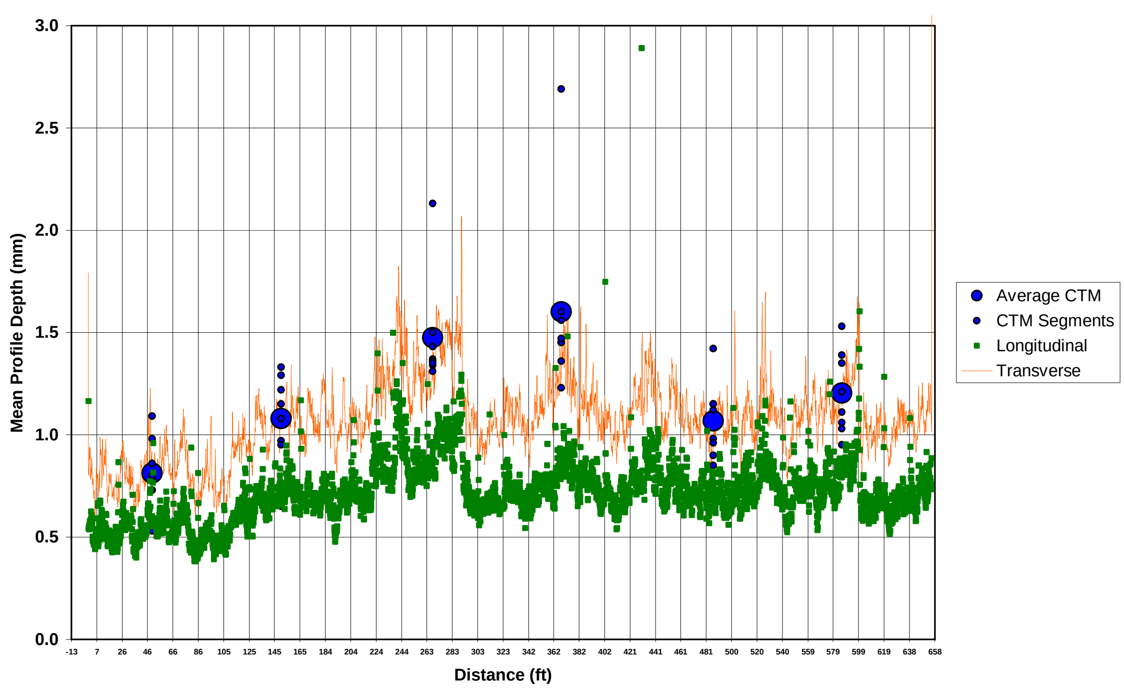
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



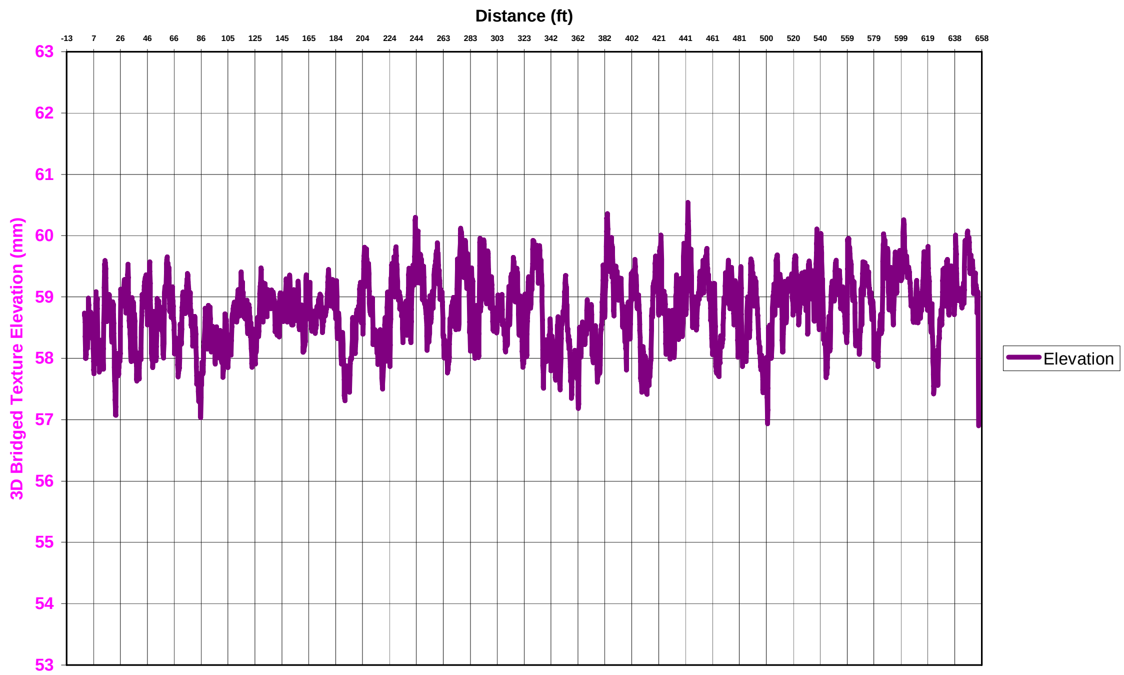
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



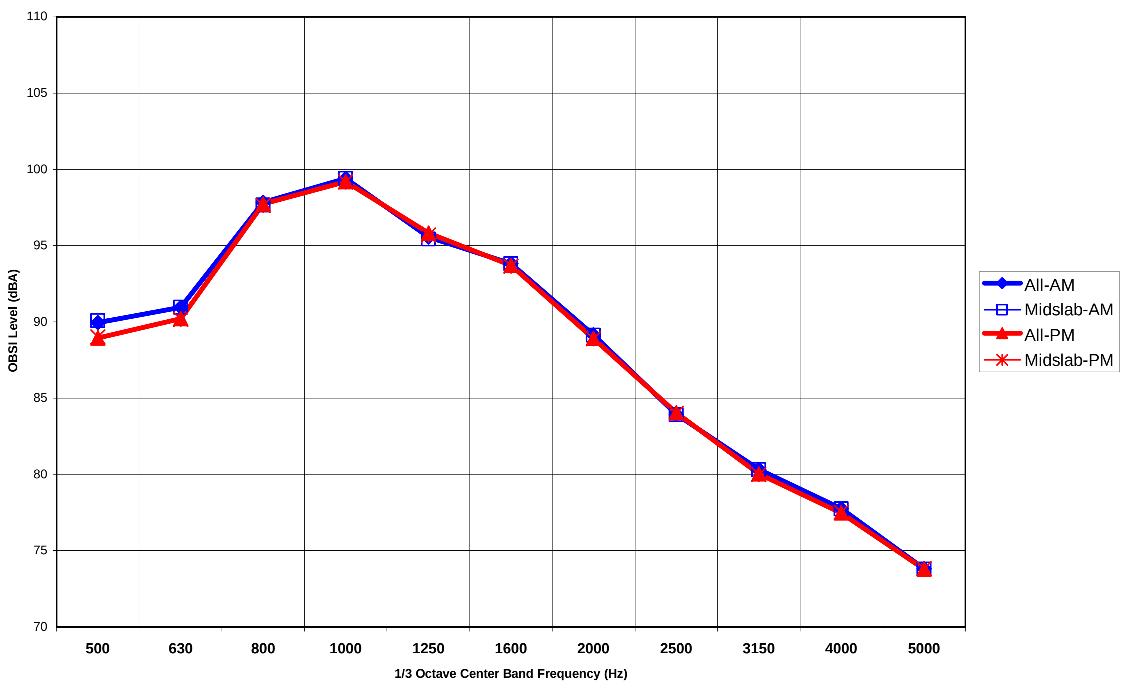
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



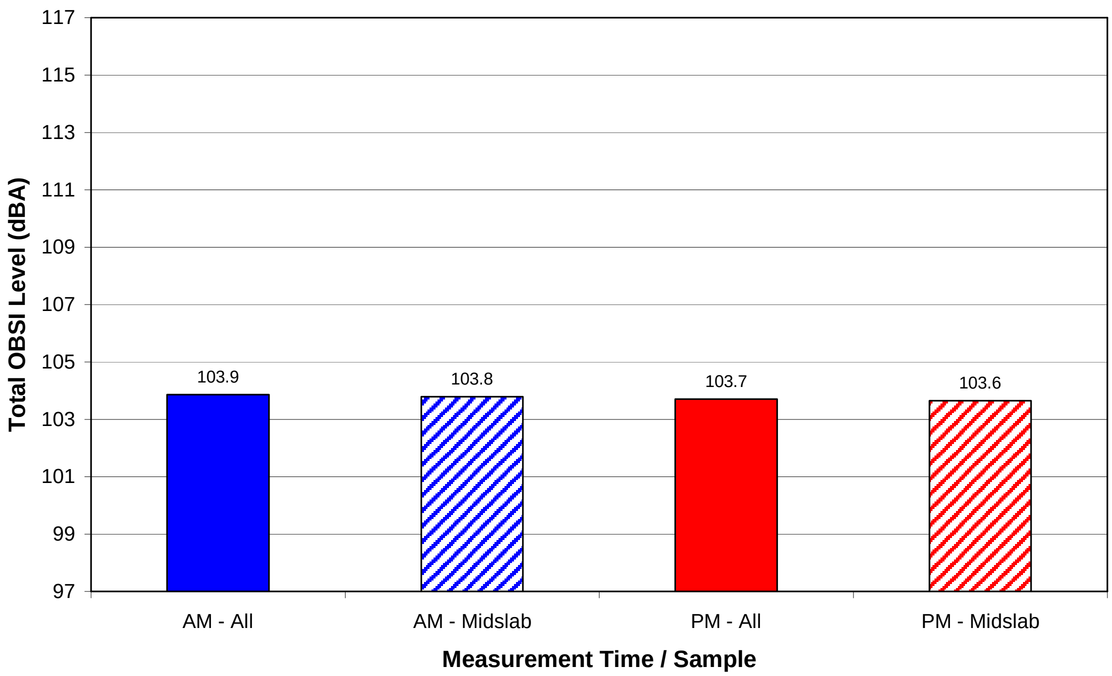
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



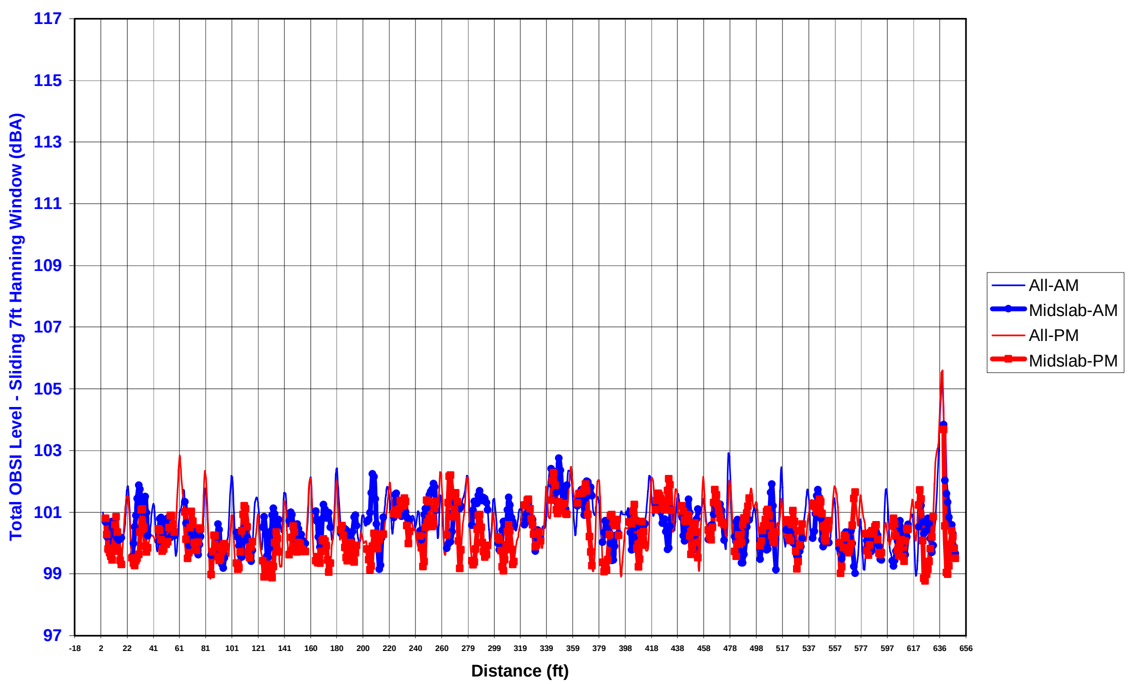
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)

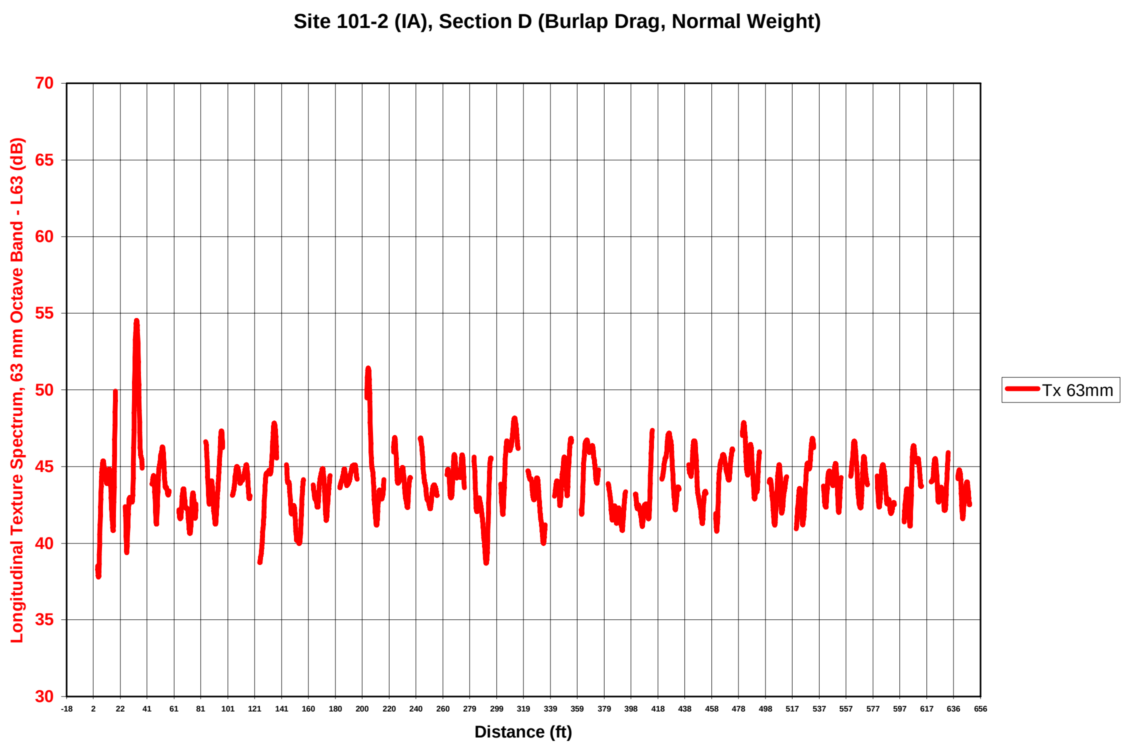


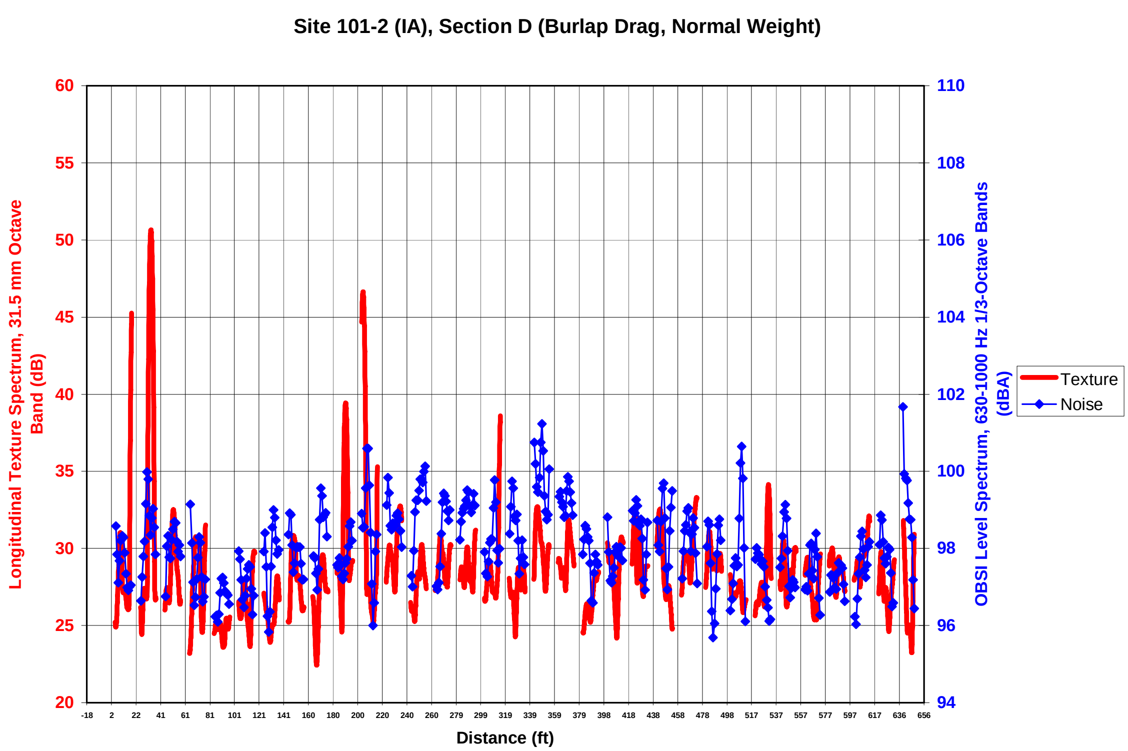
Site 101-2 (IA), Section C (Long. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



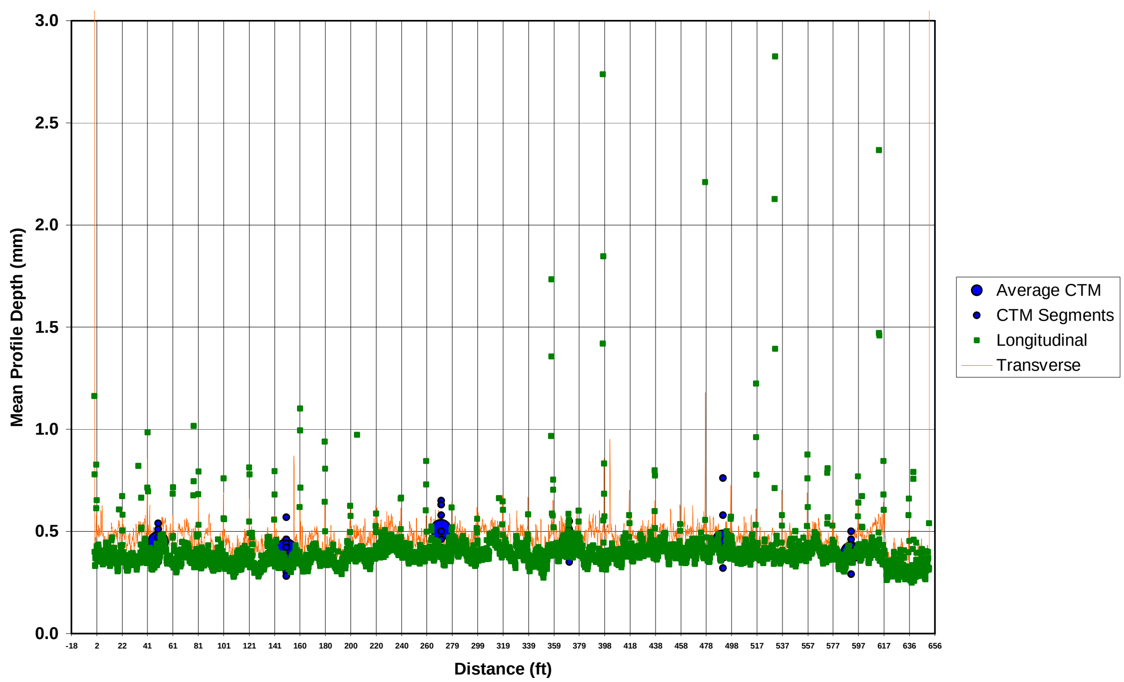
Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)



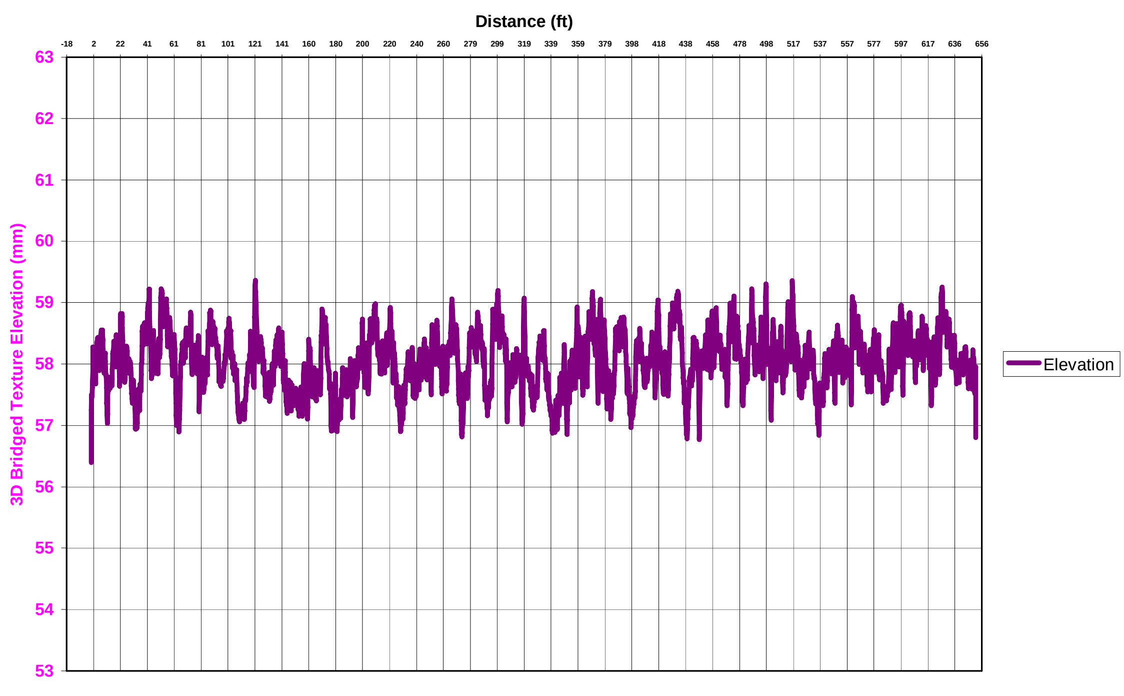

Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
Distance (ft)
Tx 63mm


Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise

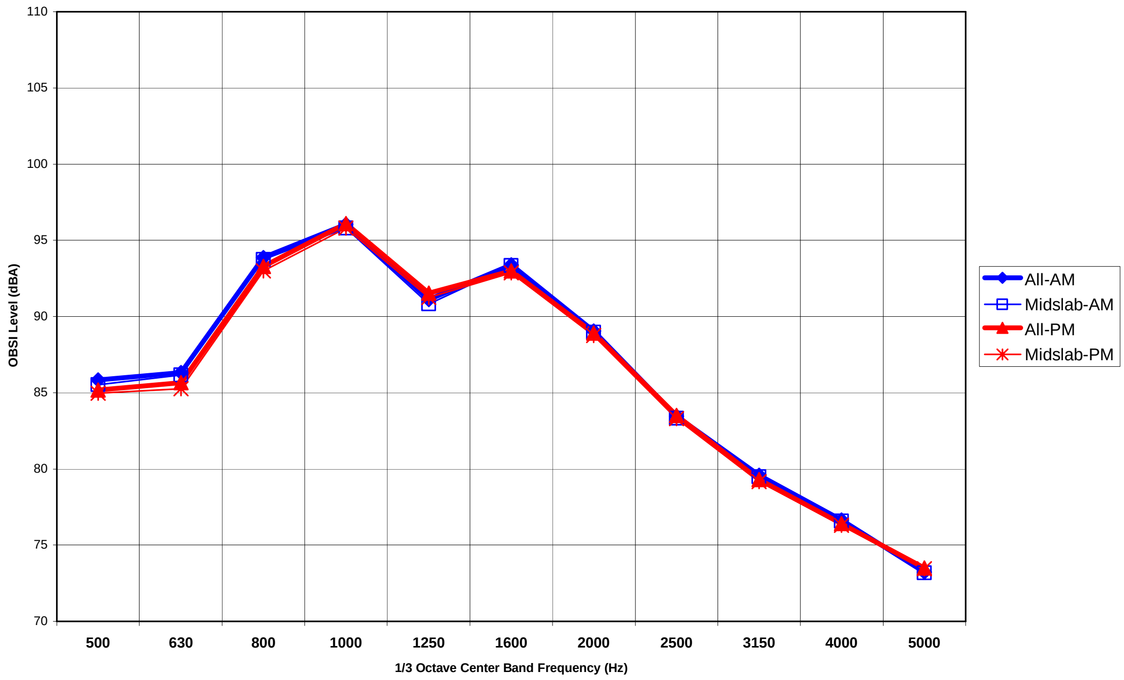
Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)



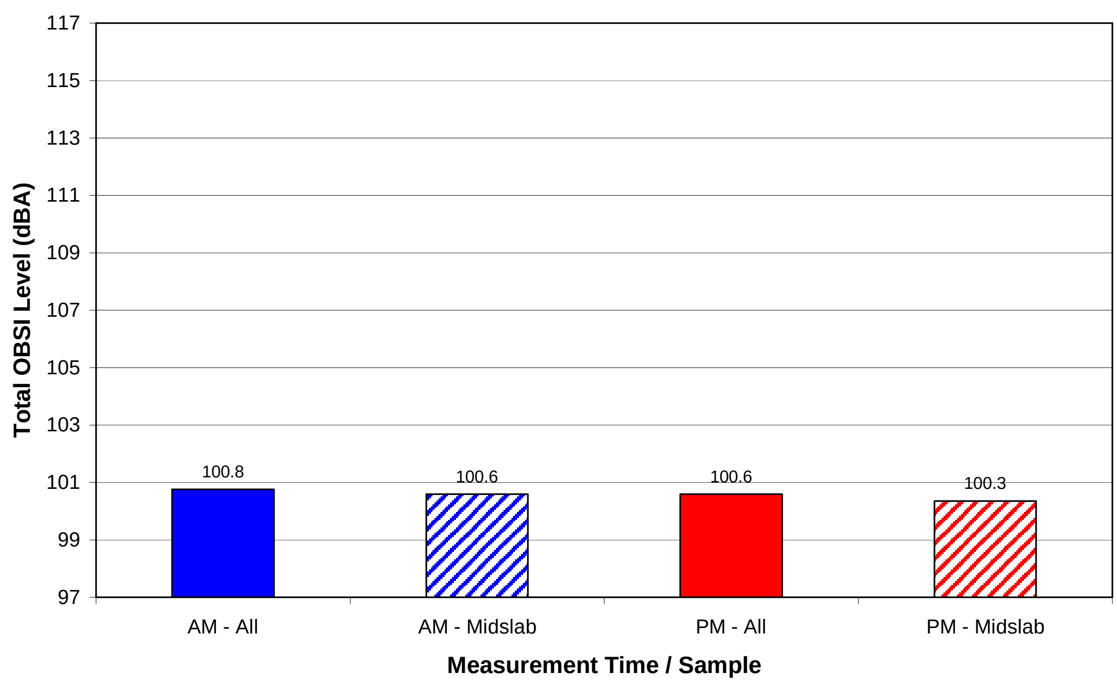
Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)

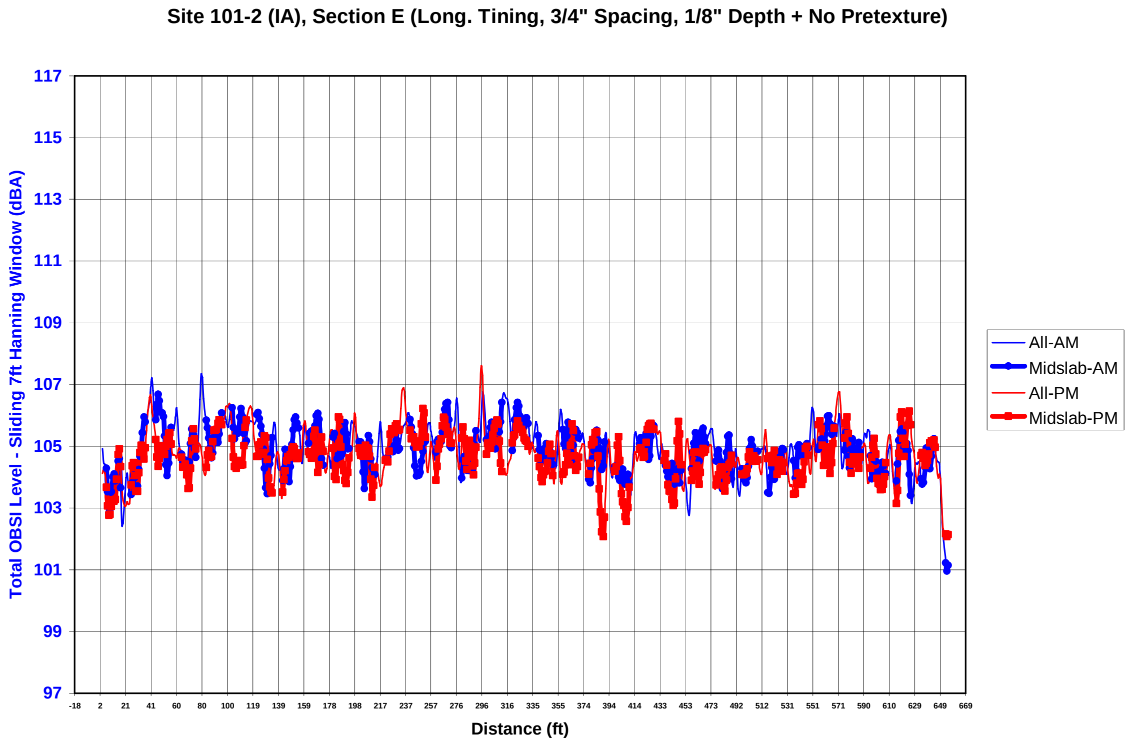


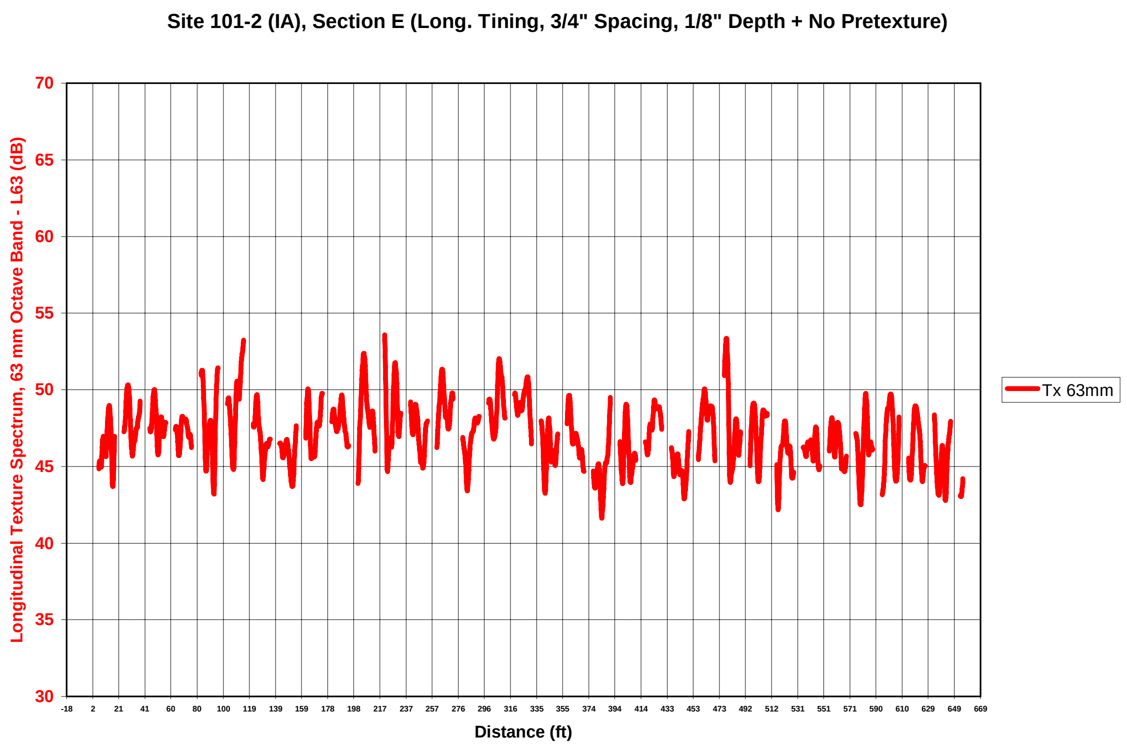
Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)

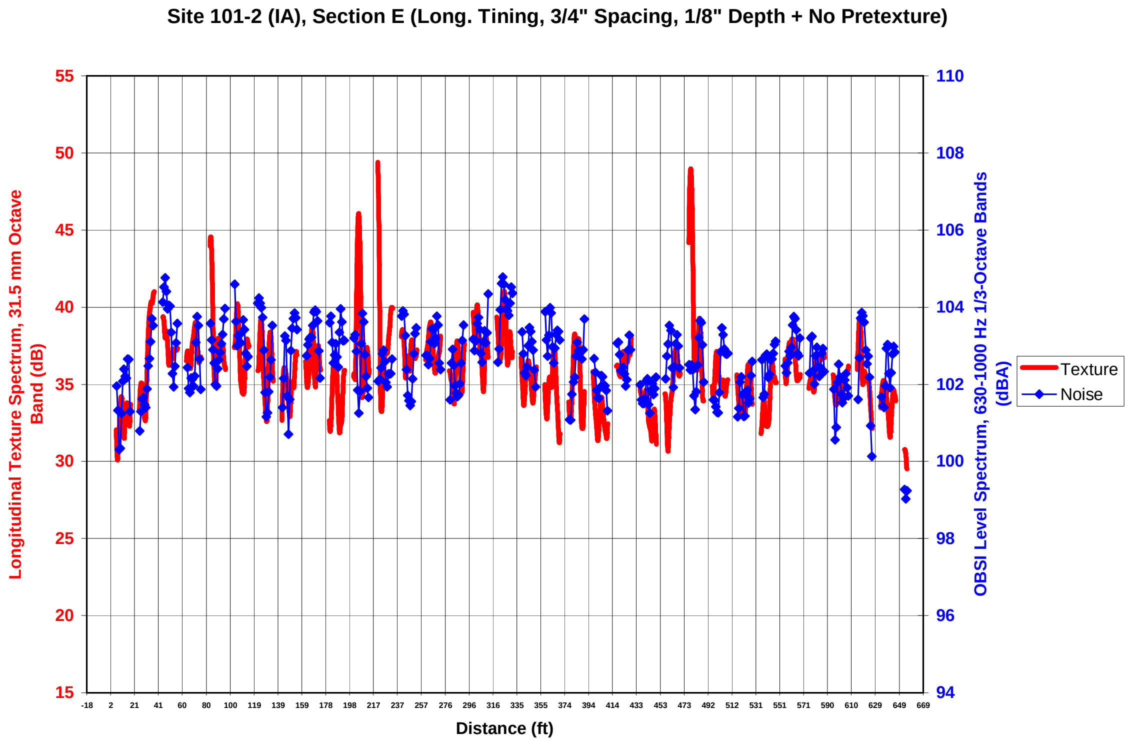


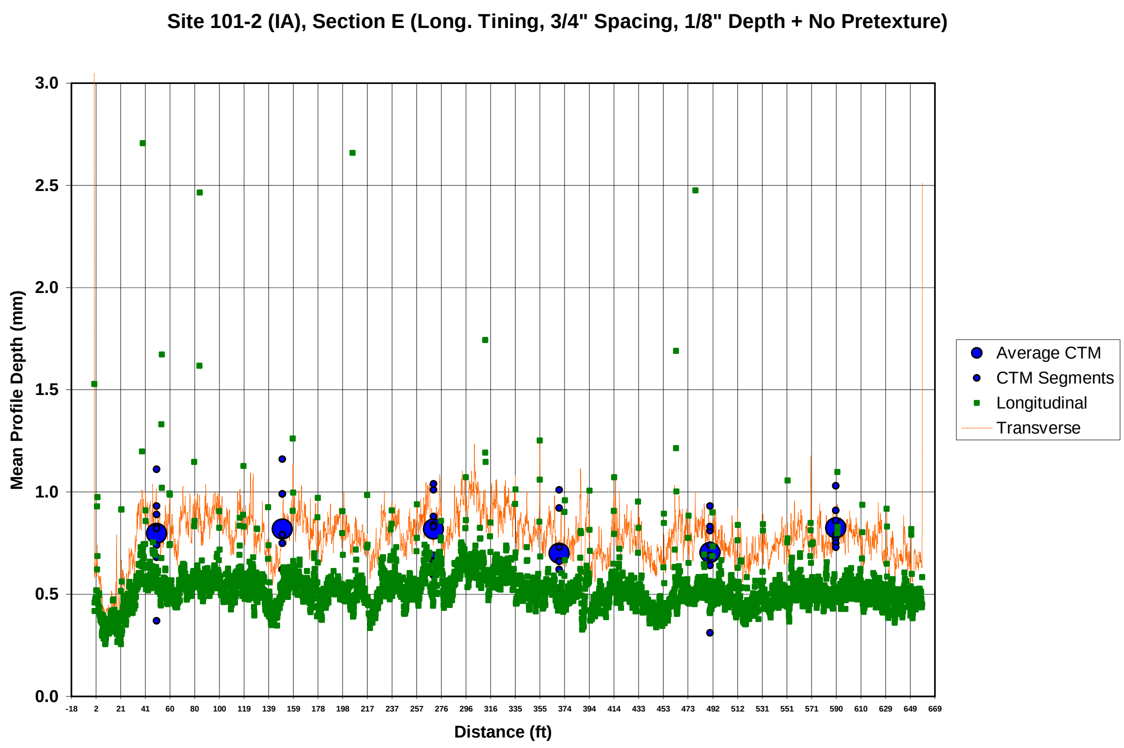
Site 101-2 (IA), Section D (Burlap Drag, Normal Weight)



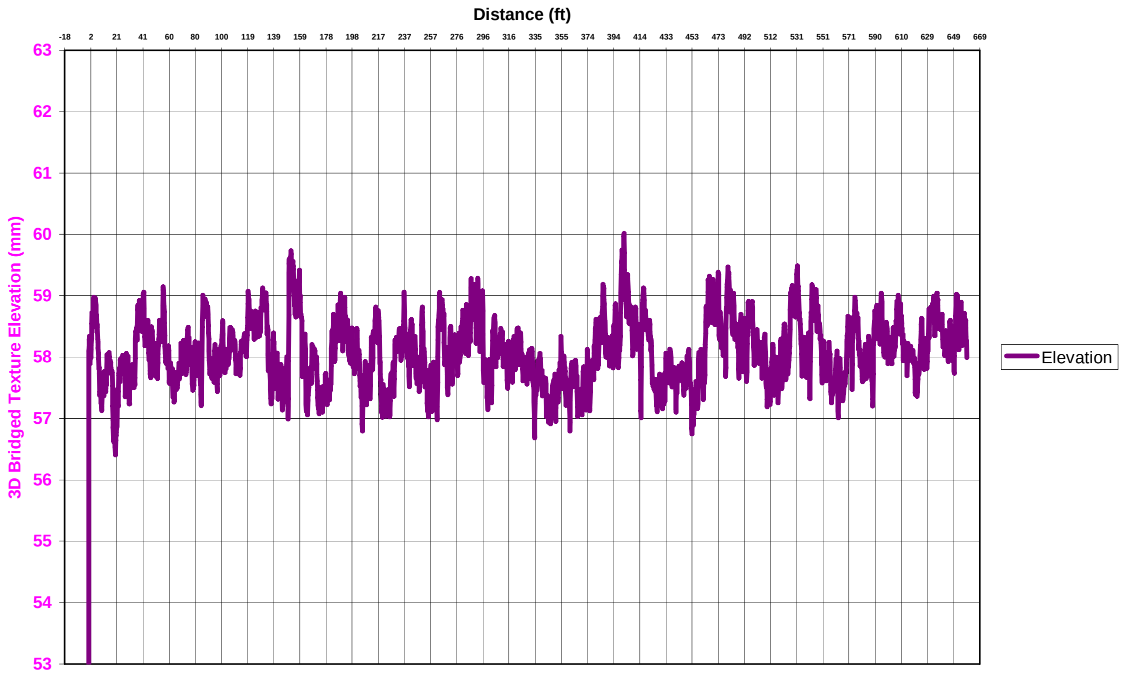

Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
Distance (ft)
Tx 63mm

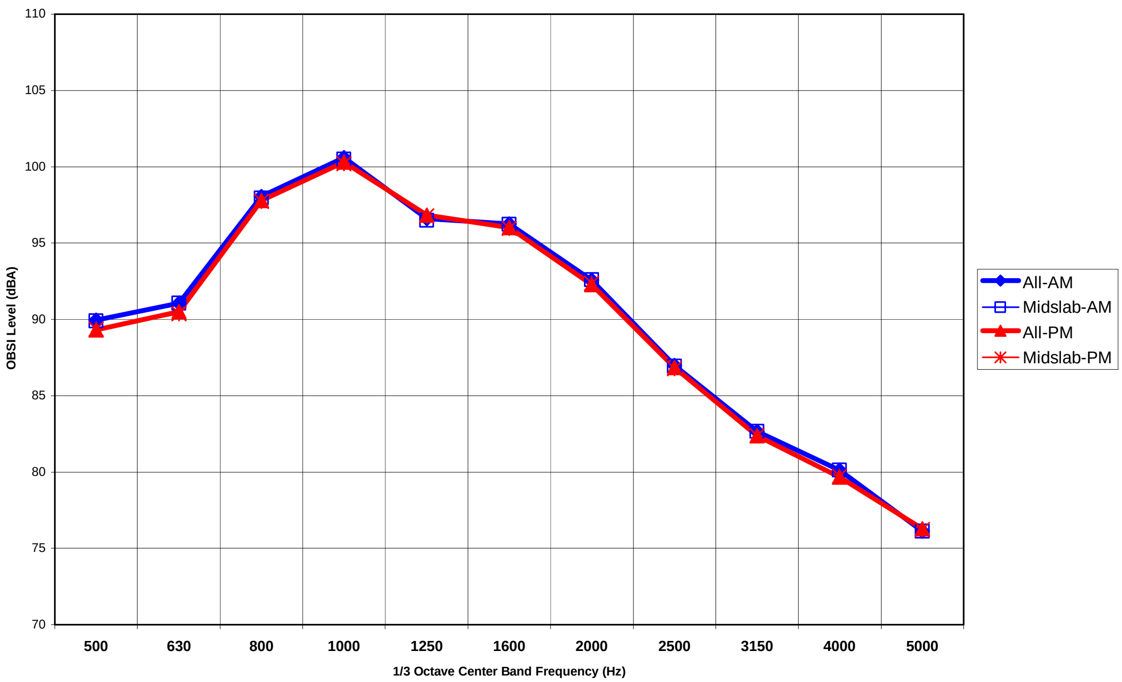

Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise

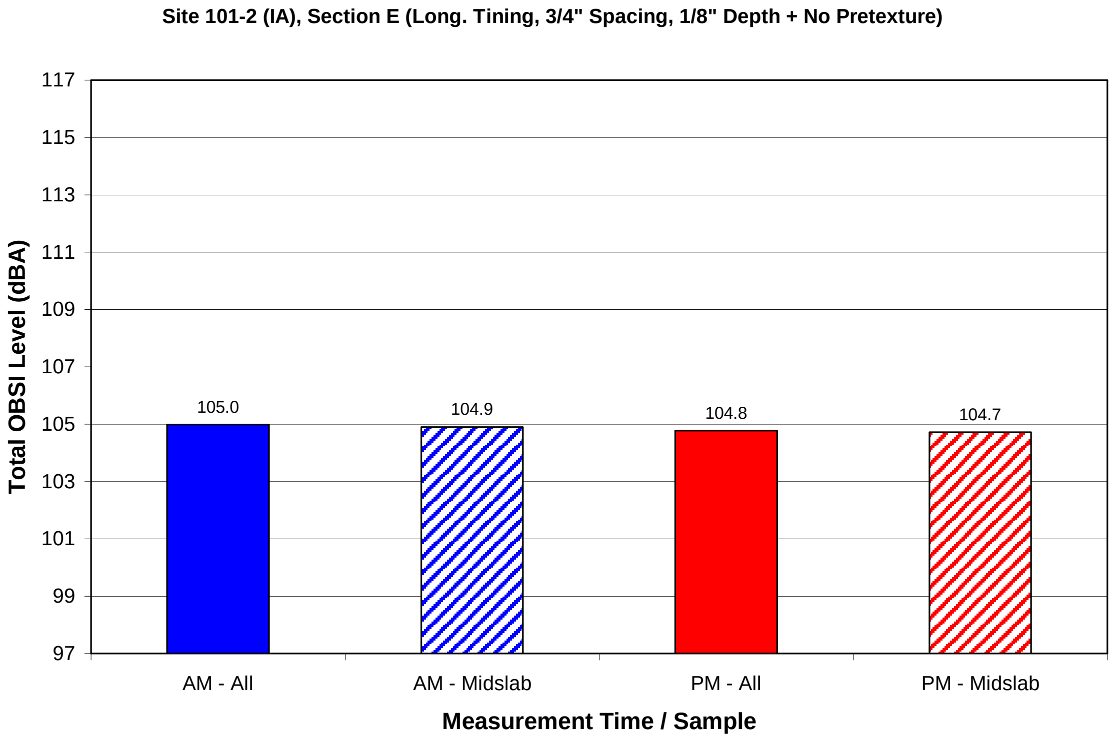

Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

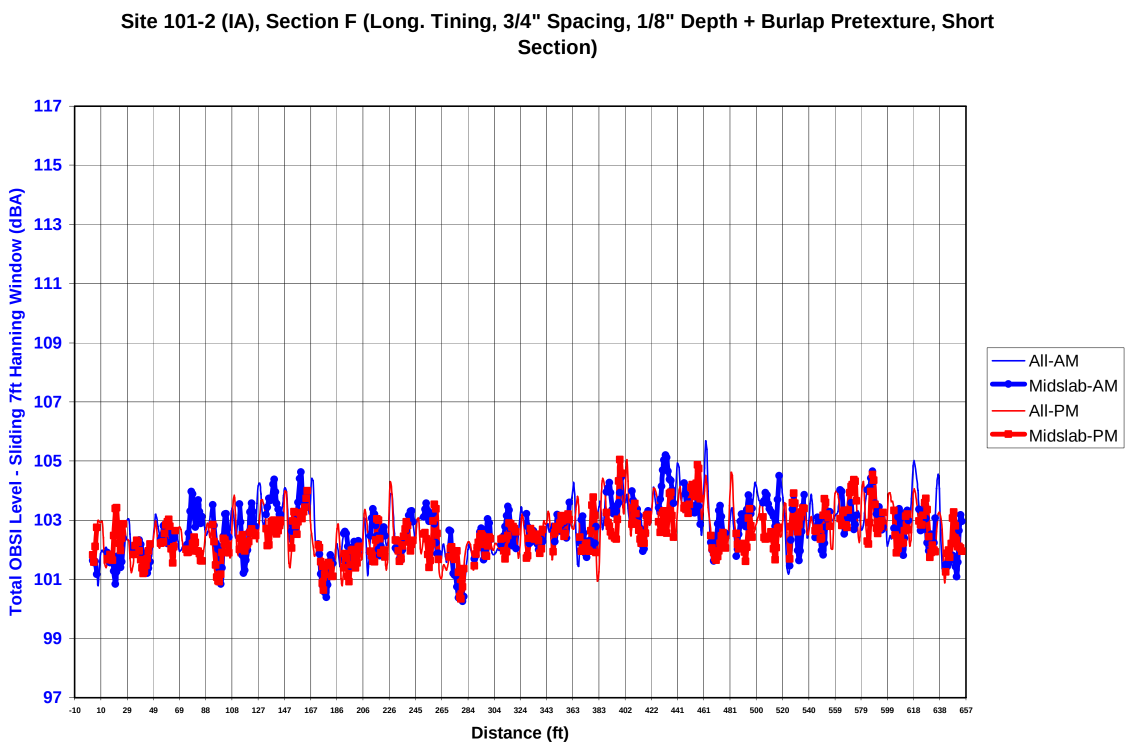
Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)



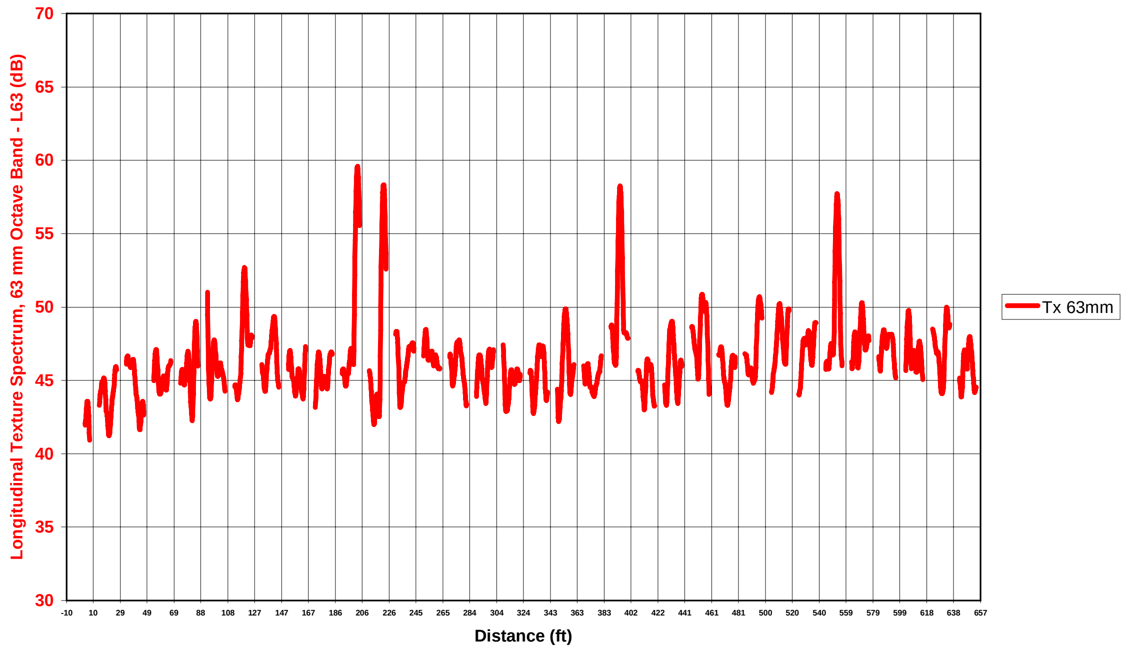
Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)



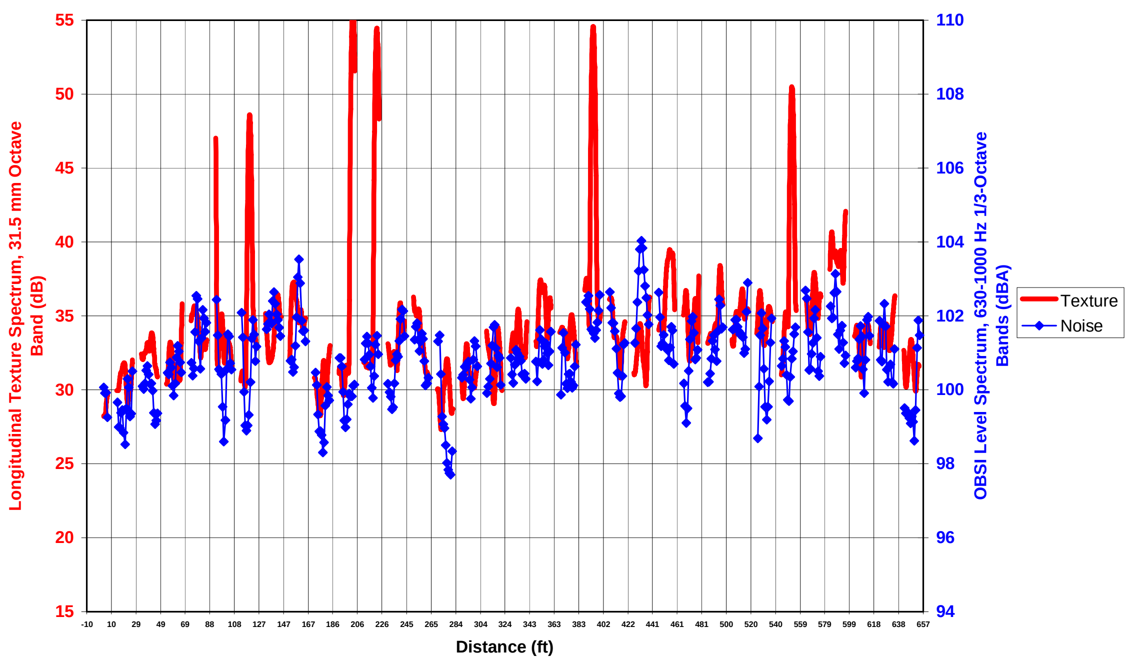

Site 101-2 (IA), Section E (Long. Tining, 3/4" Spacing, 1/8" Depth + No Pretexture)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
105.0
104.9
104.8
104.7
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample


Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-10
10
29
49
69
88
108
127
147
167
186
206
226
245
265
284
304
324
343
363
383
402
422
441
461
481
500
520
540
559
579
599
618
638
657
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM

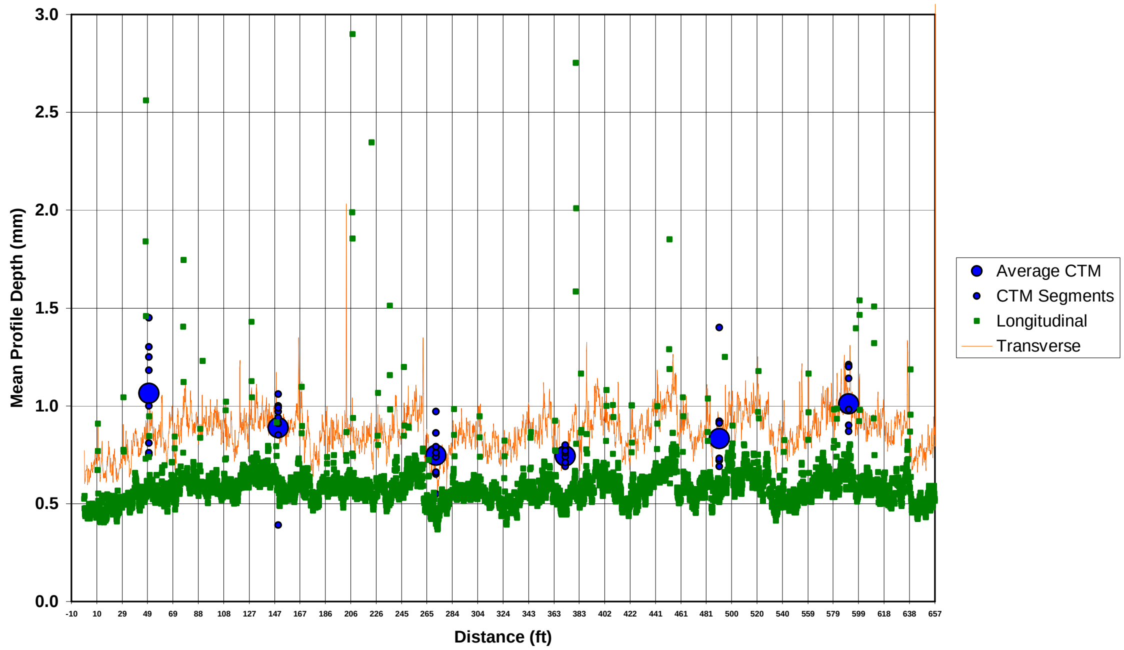
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



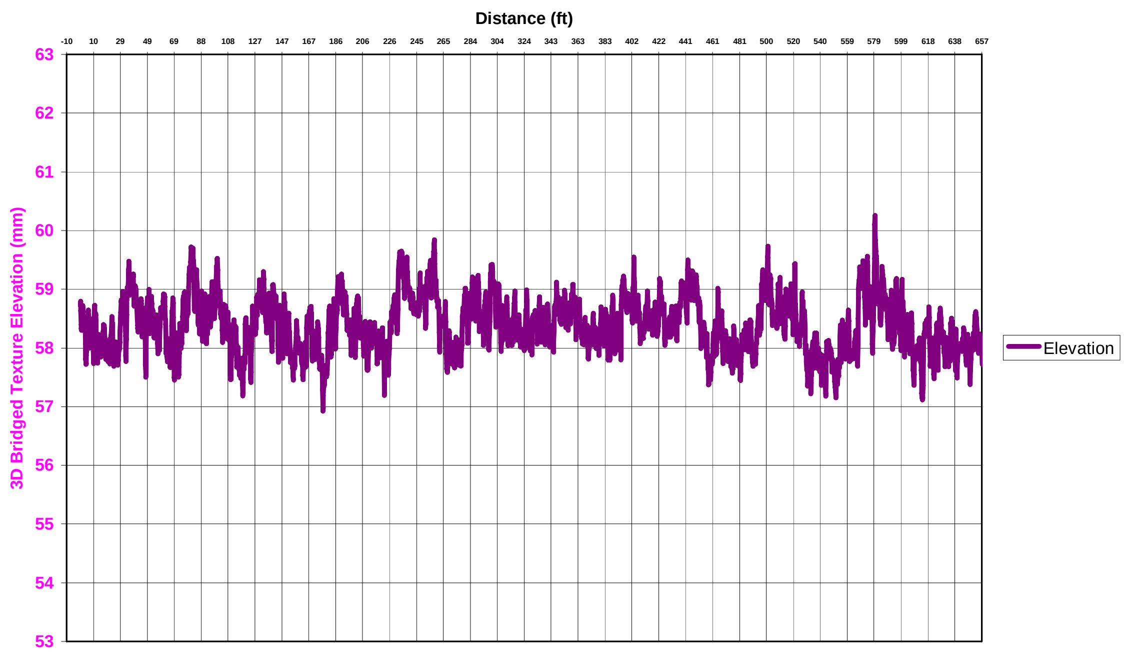
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



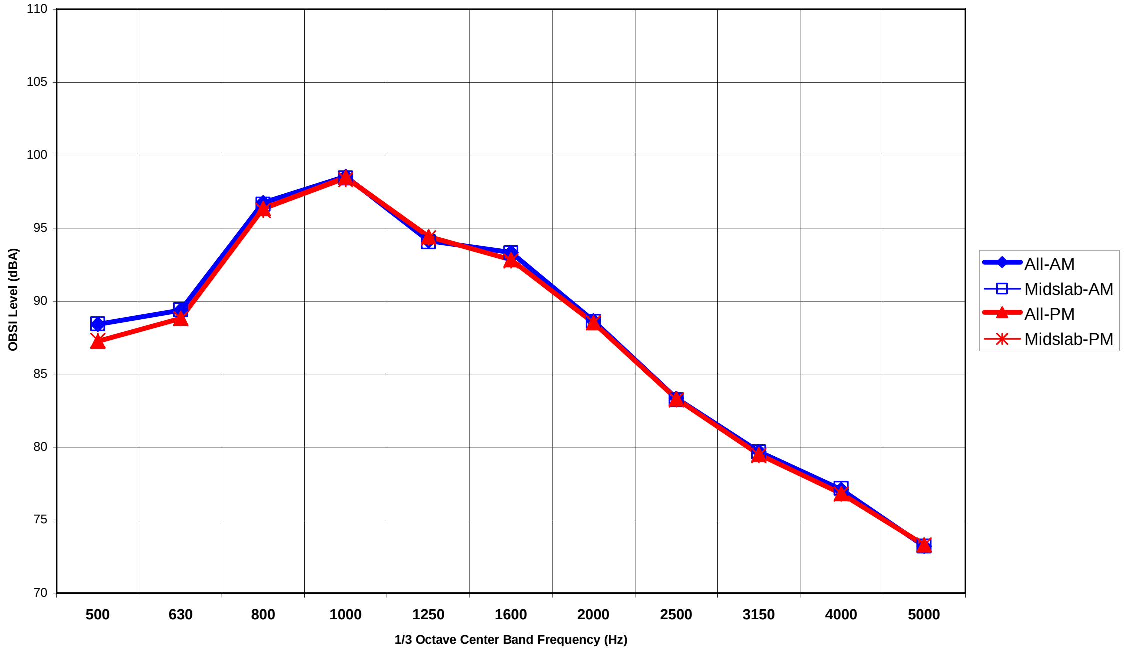
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



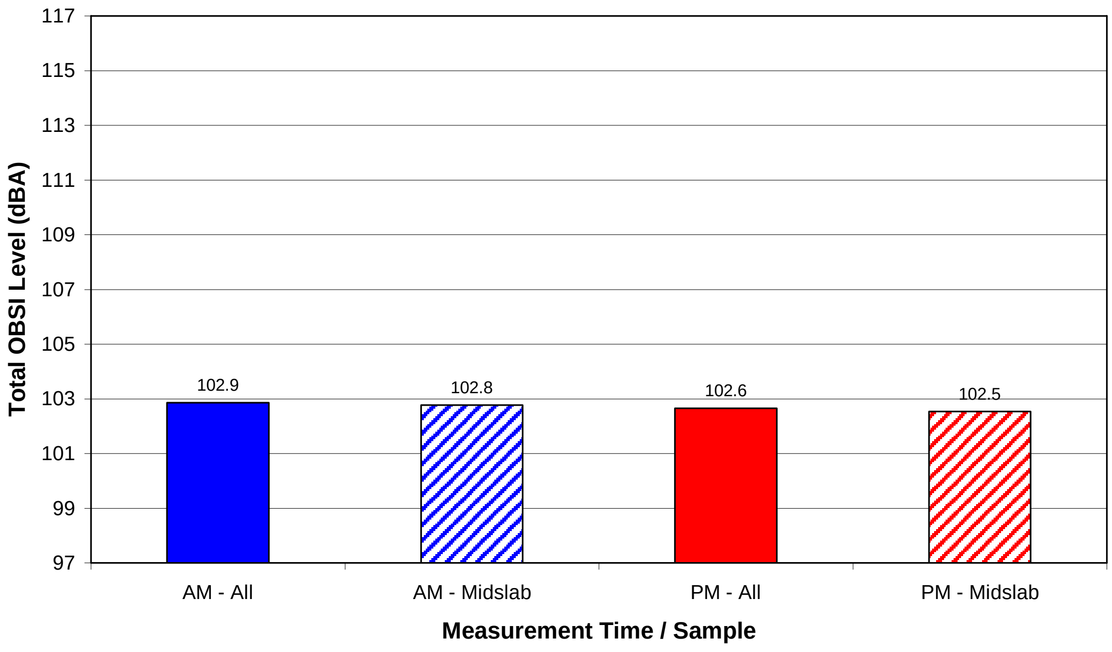
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



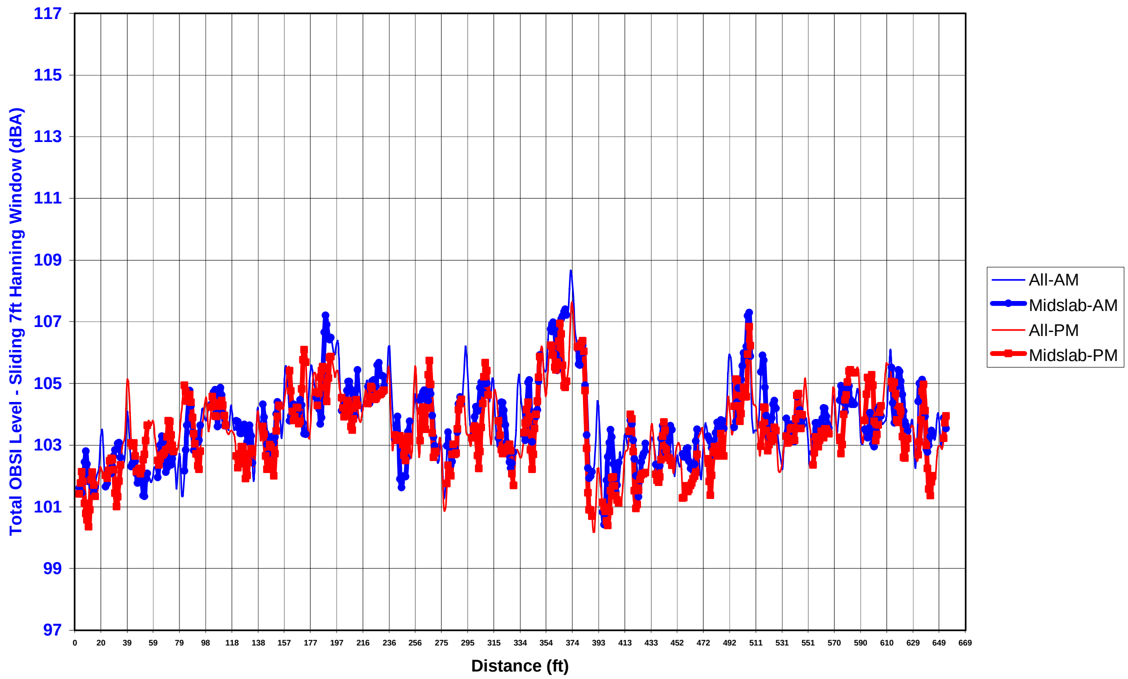
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



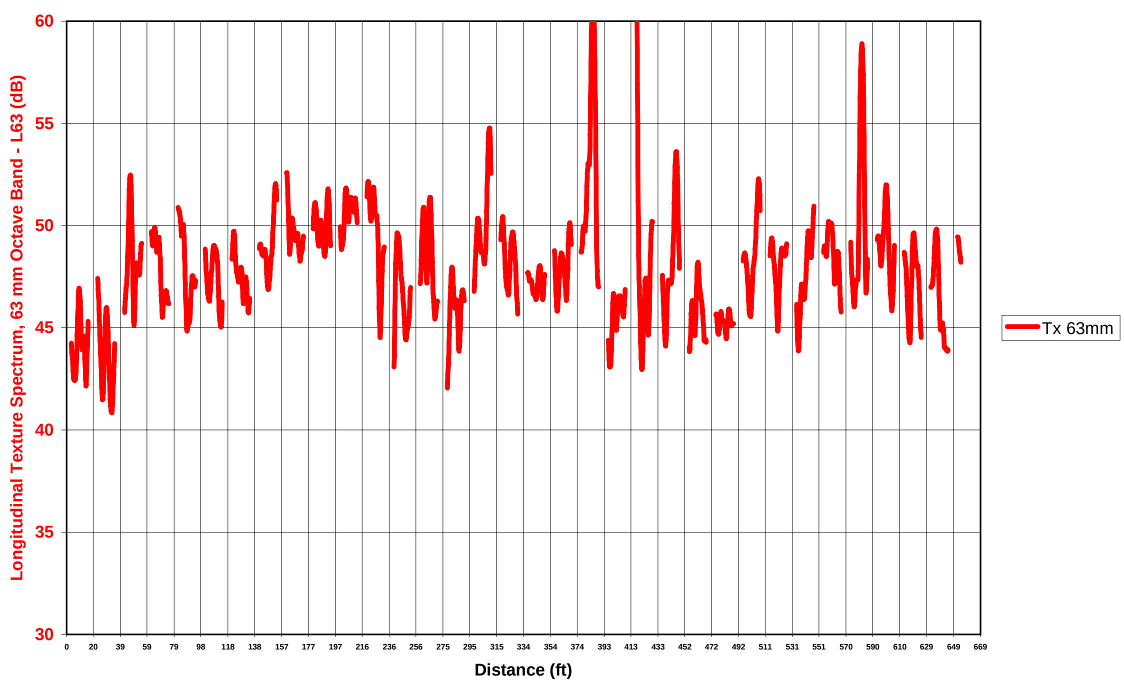
Site 101-2 (IA), Section F (Long. Tining, 3/4" Spacing, 1/8" Depth + Burlap Pretexture, Short Section)



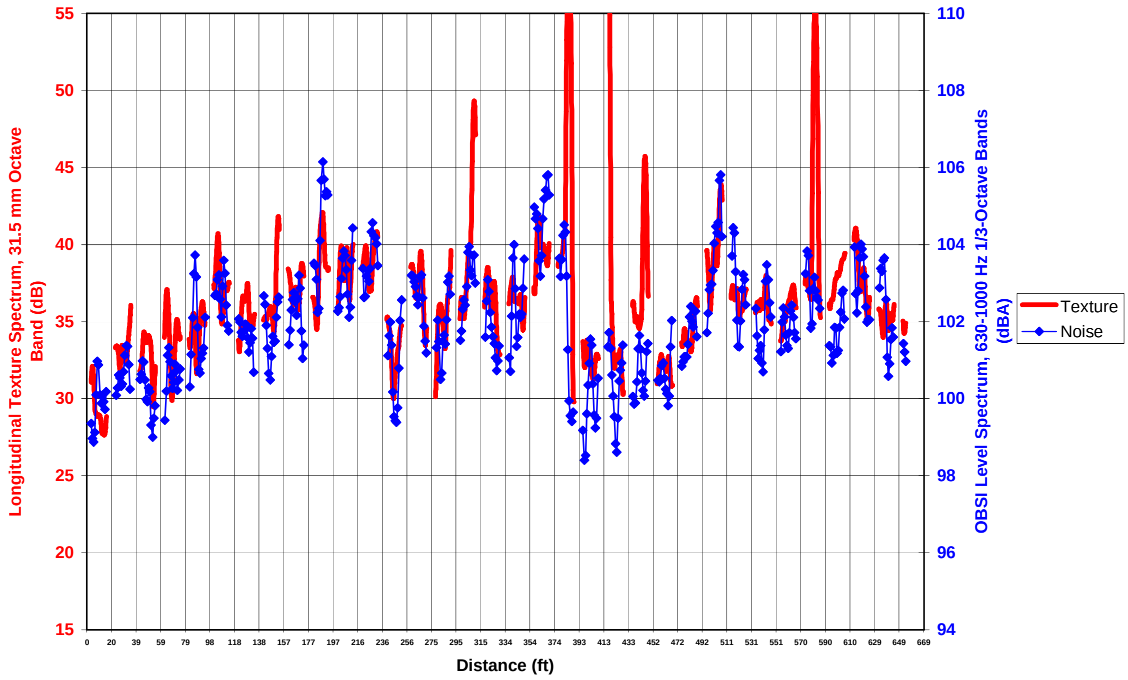
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



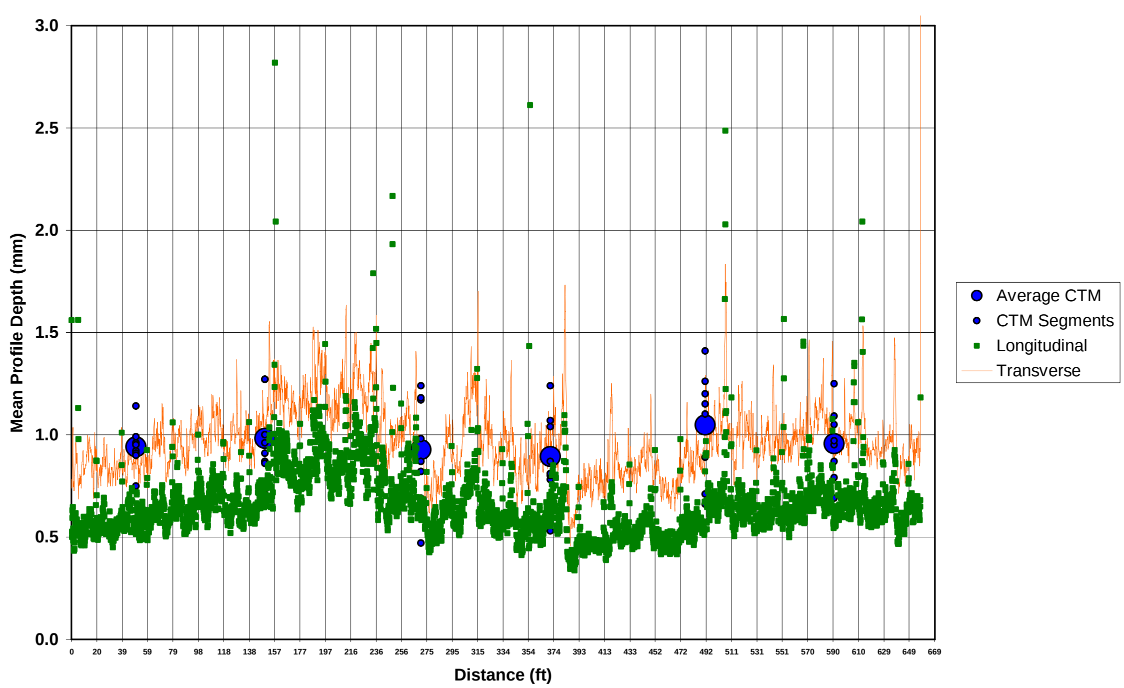
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



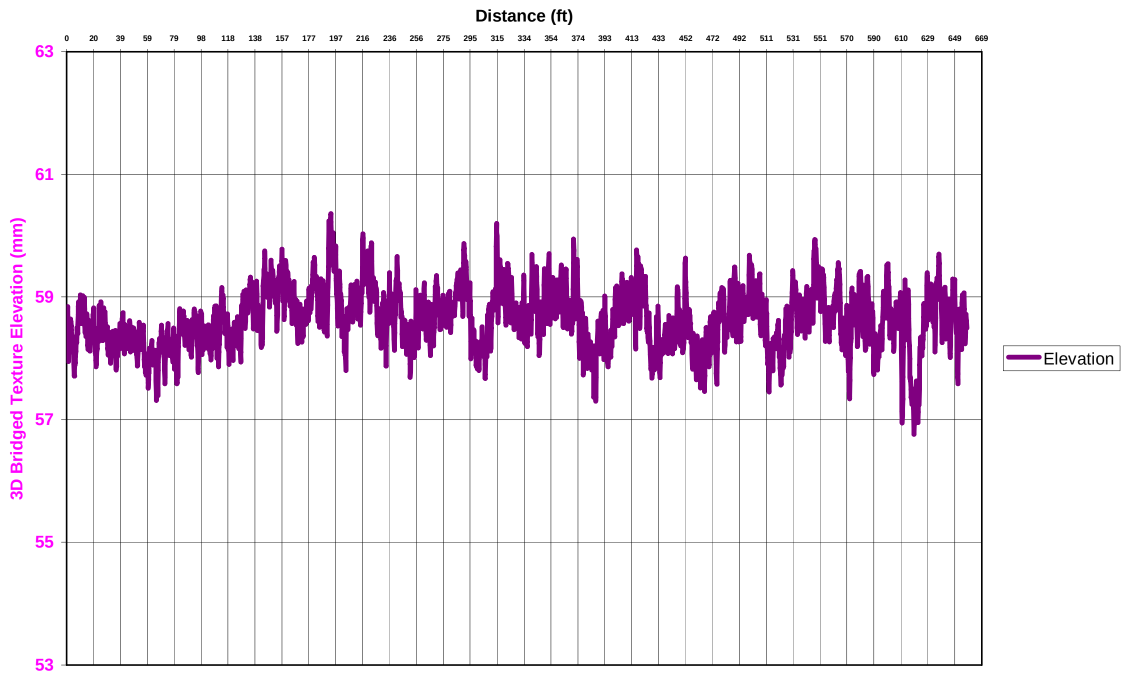
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



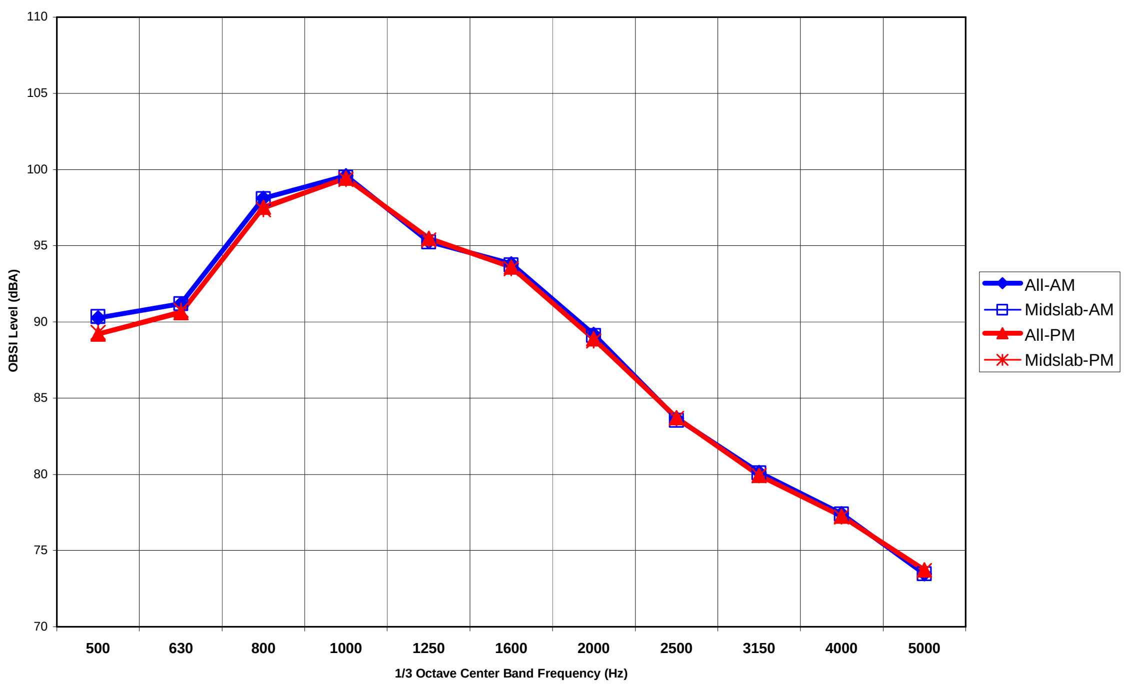
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



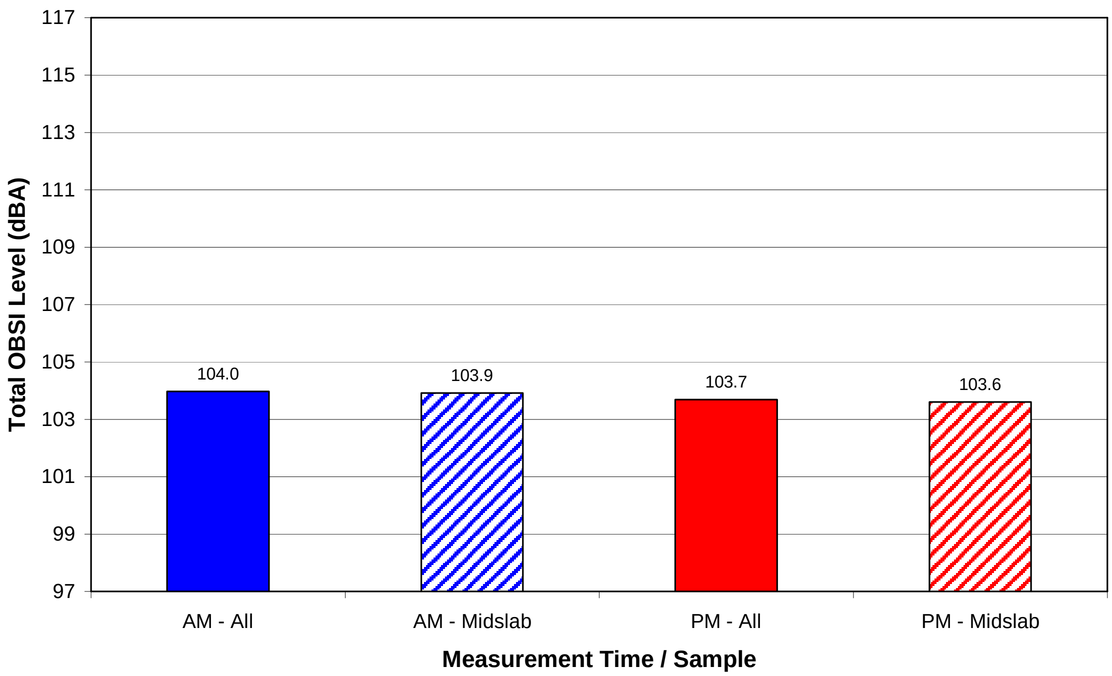
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



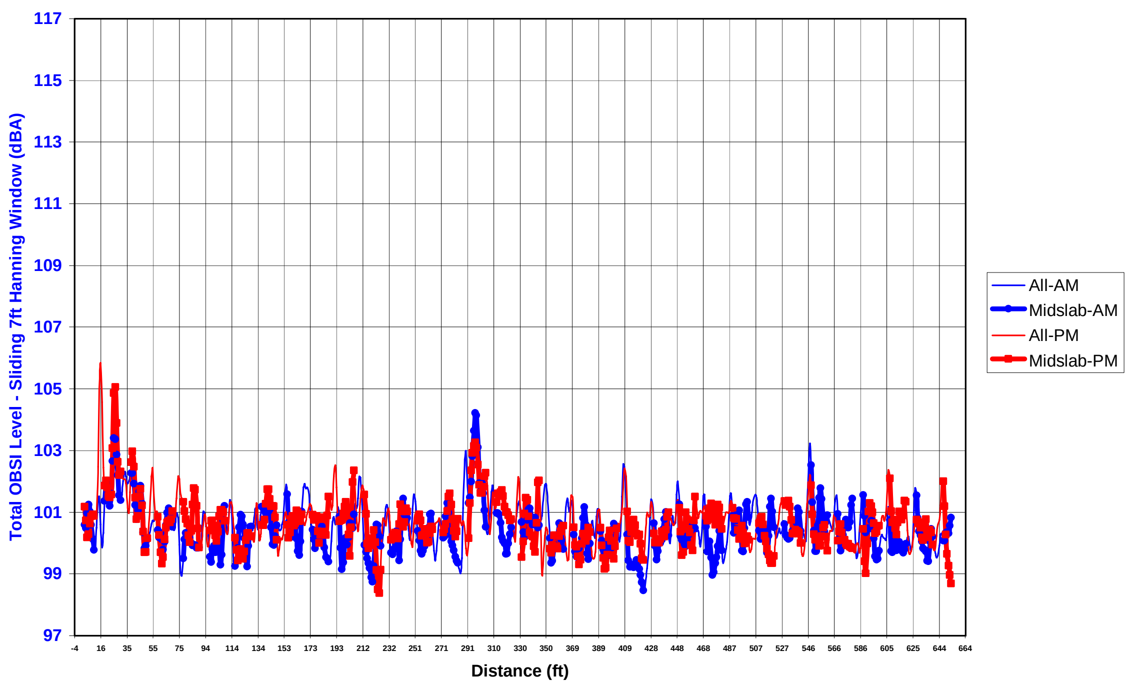
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



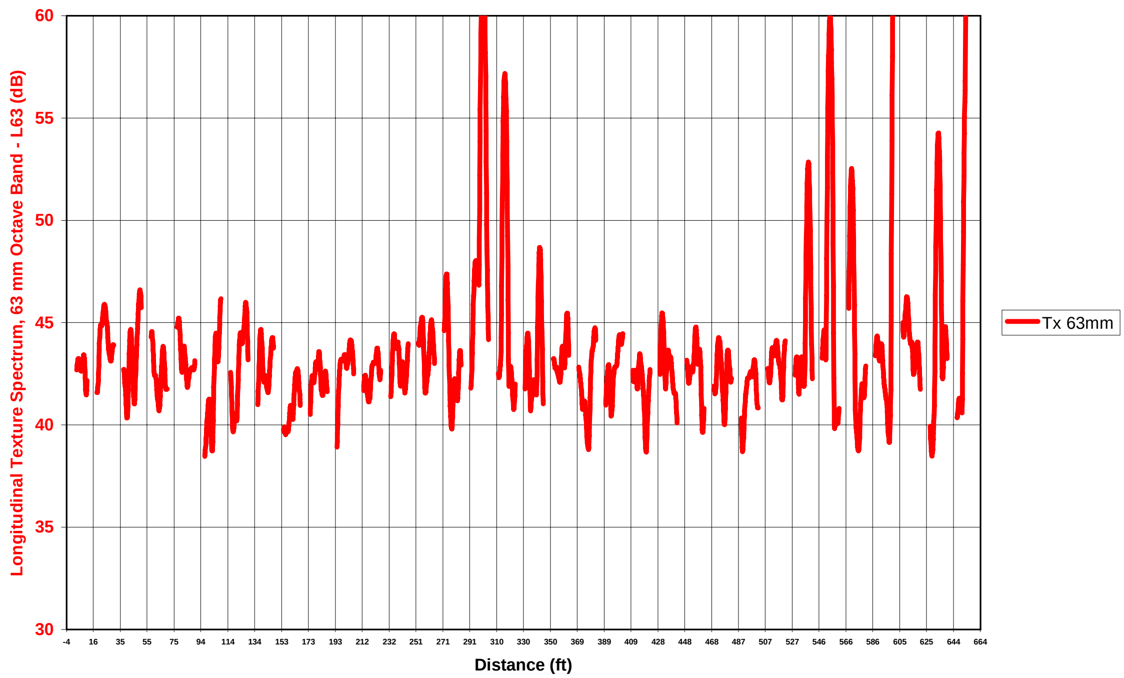
Site 101-2 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



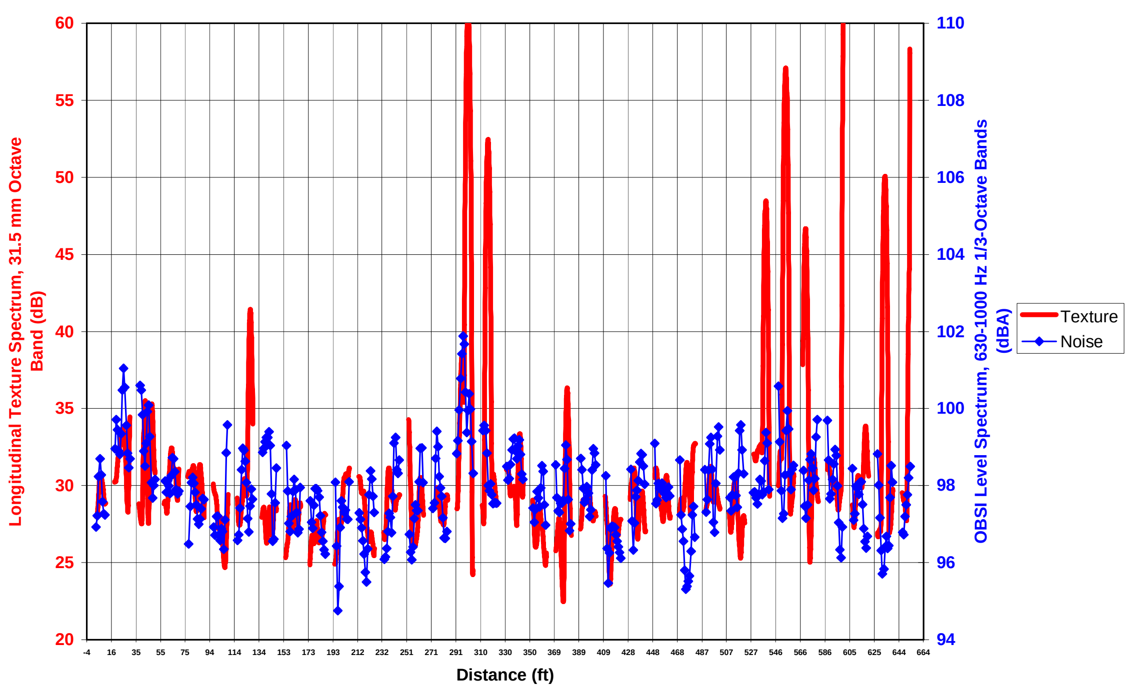
Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)



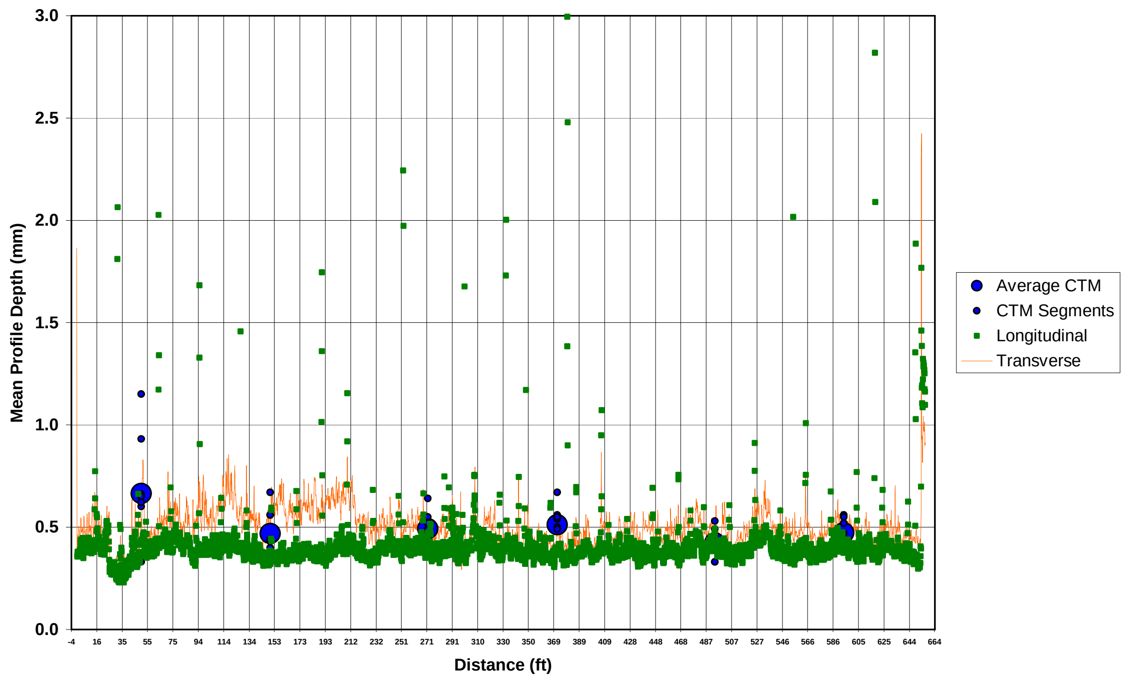
Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)



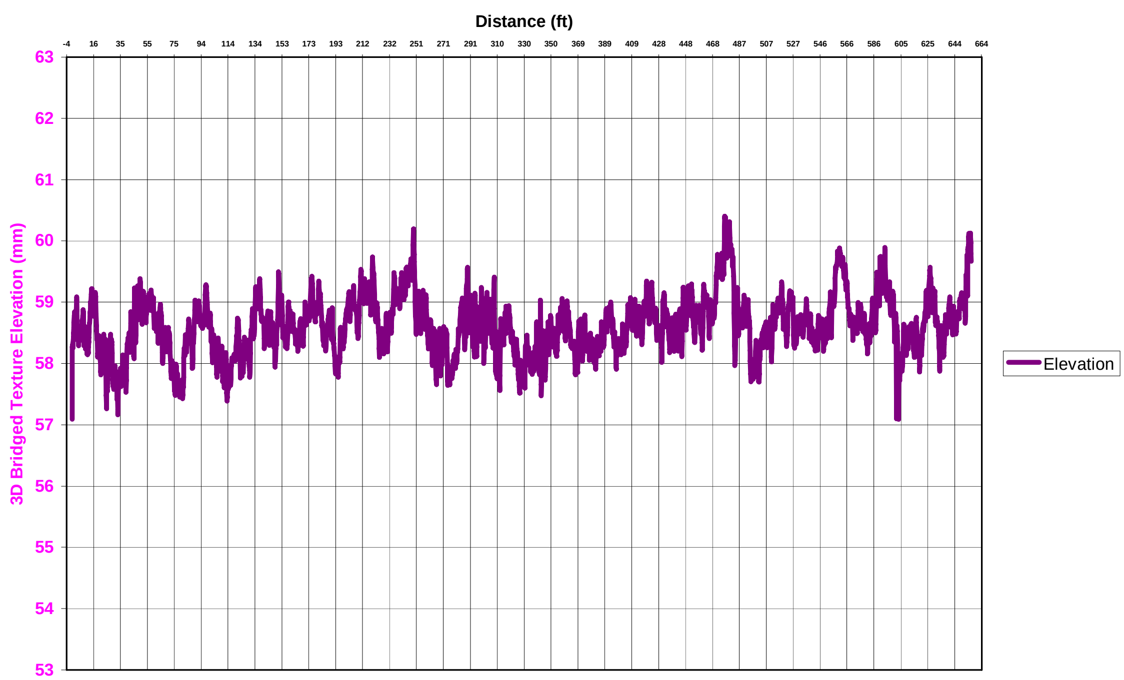
Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)



Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)

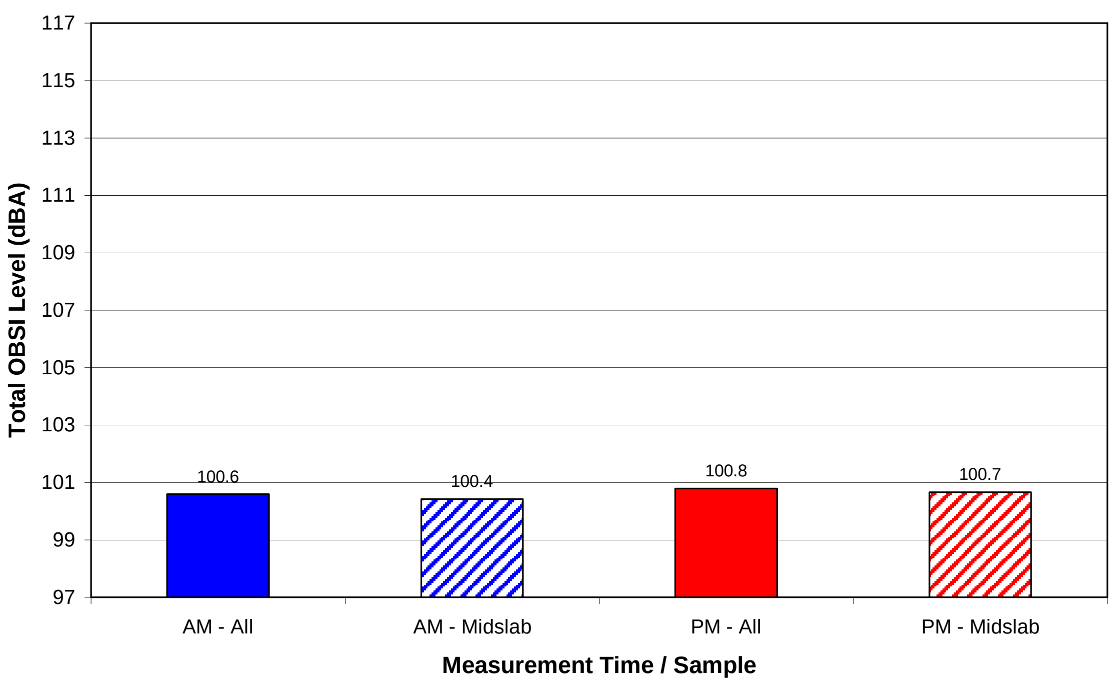


Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)

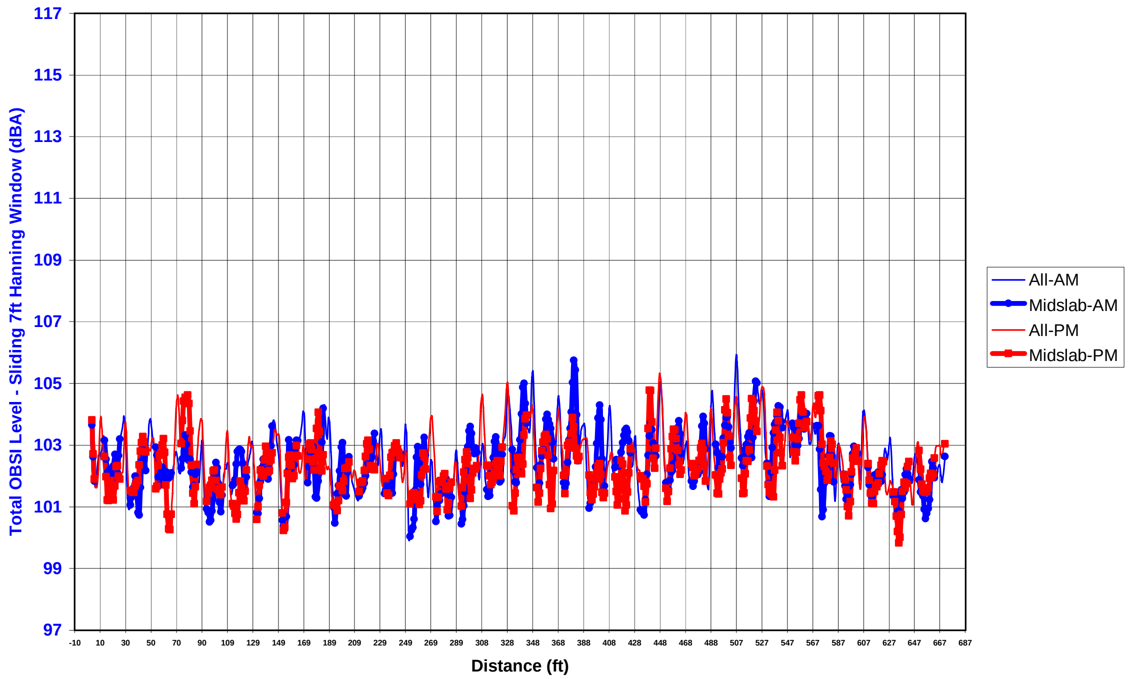


Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)

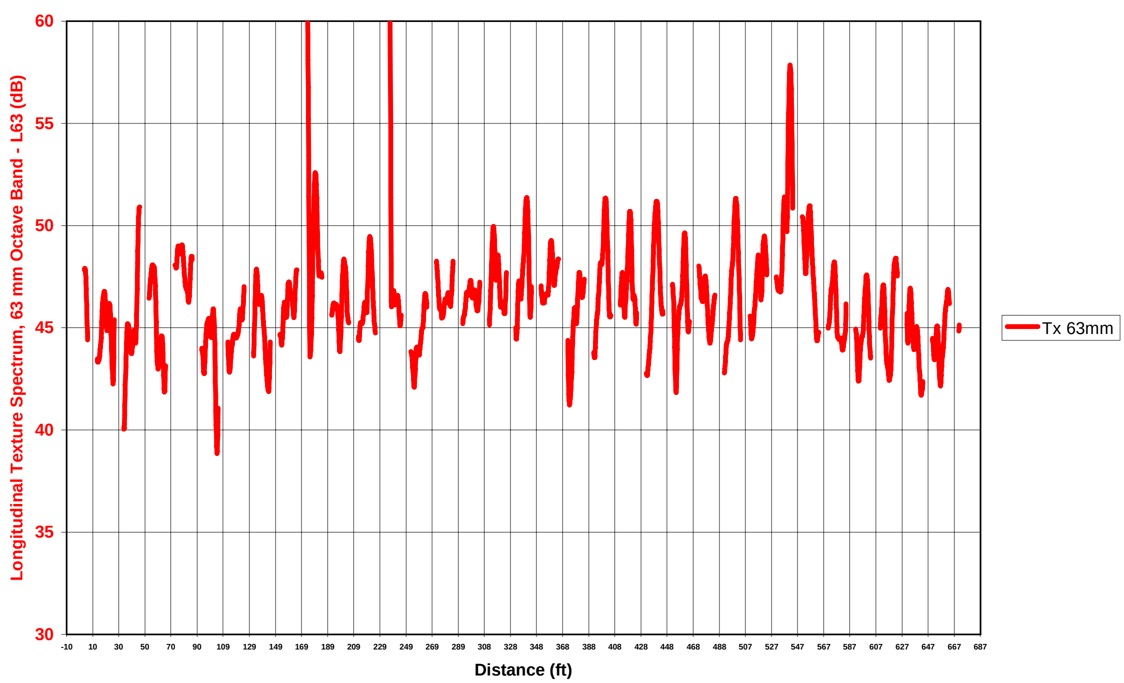
Site 101-2 (IA), Section H (Burlap Drag, Heavy Weight)



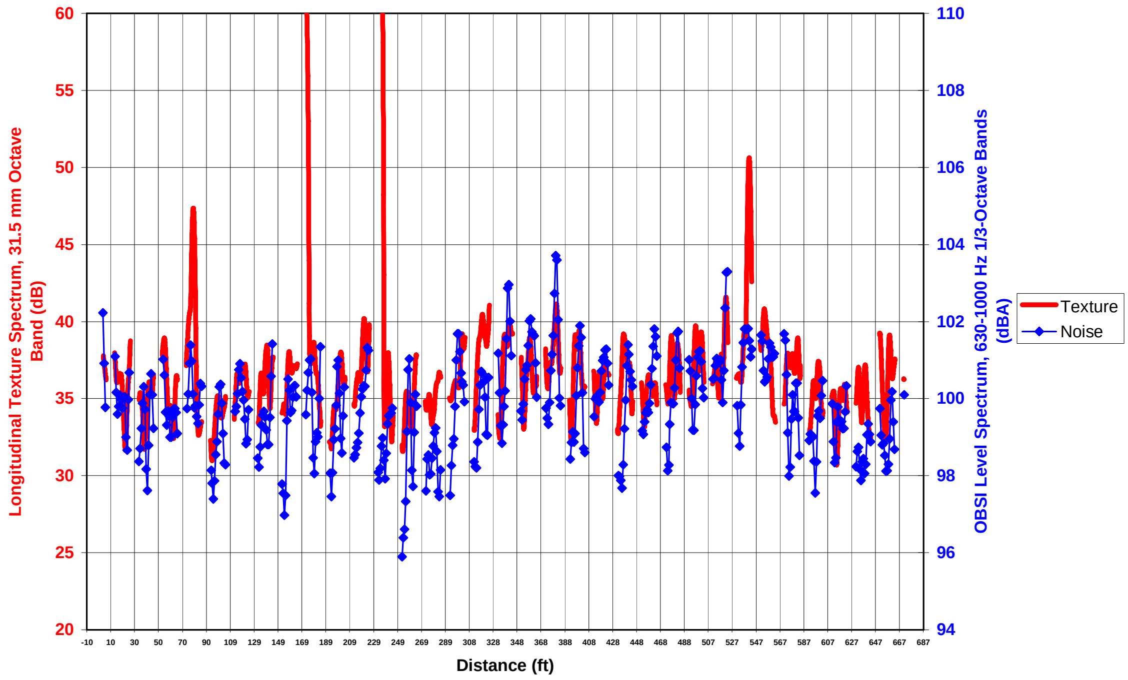
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



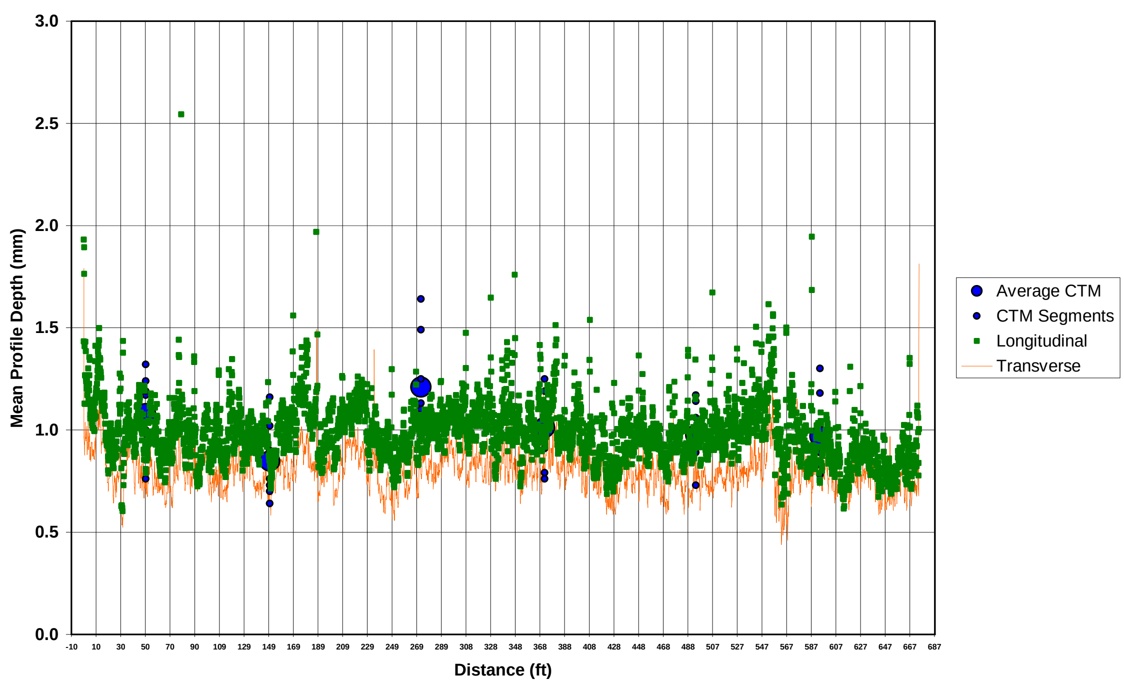
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



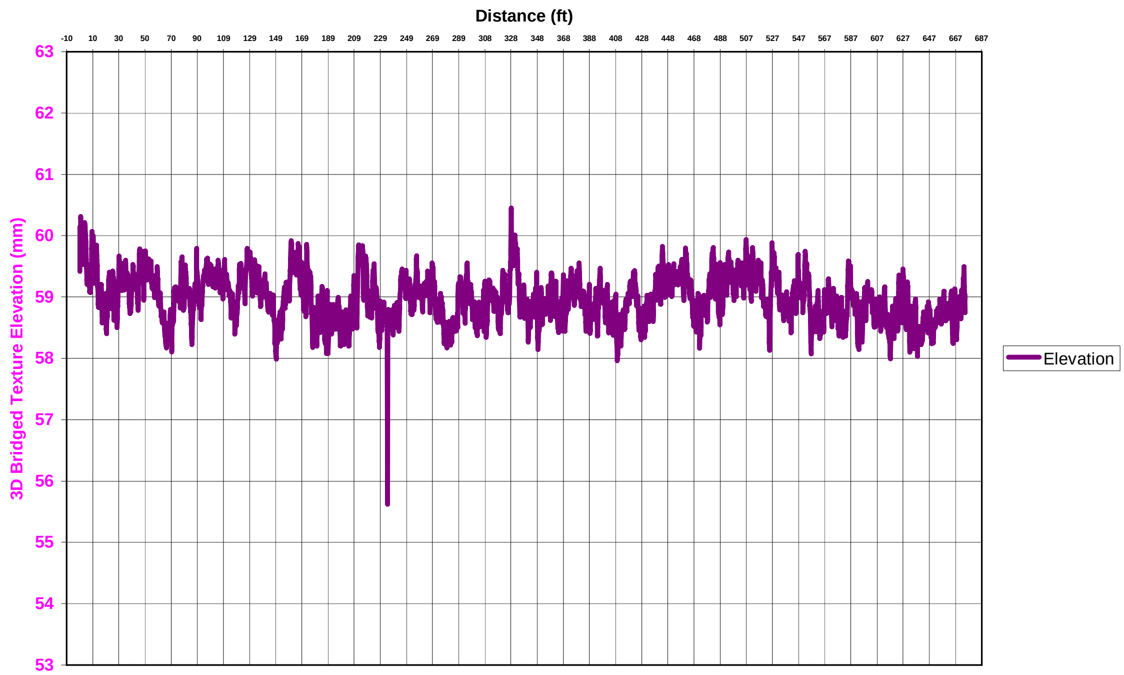
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



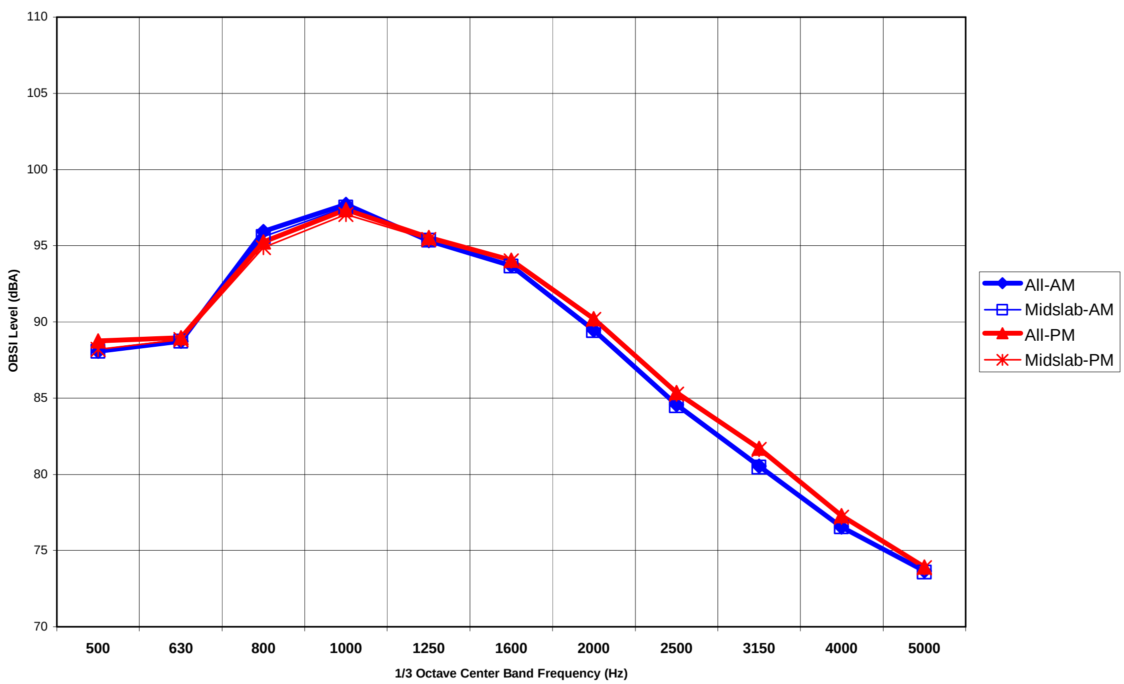
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



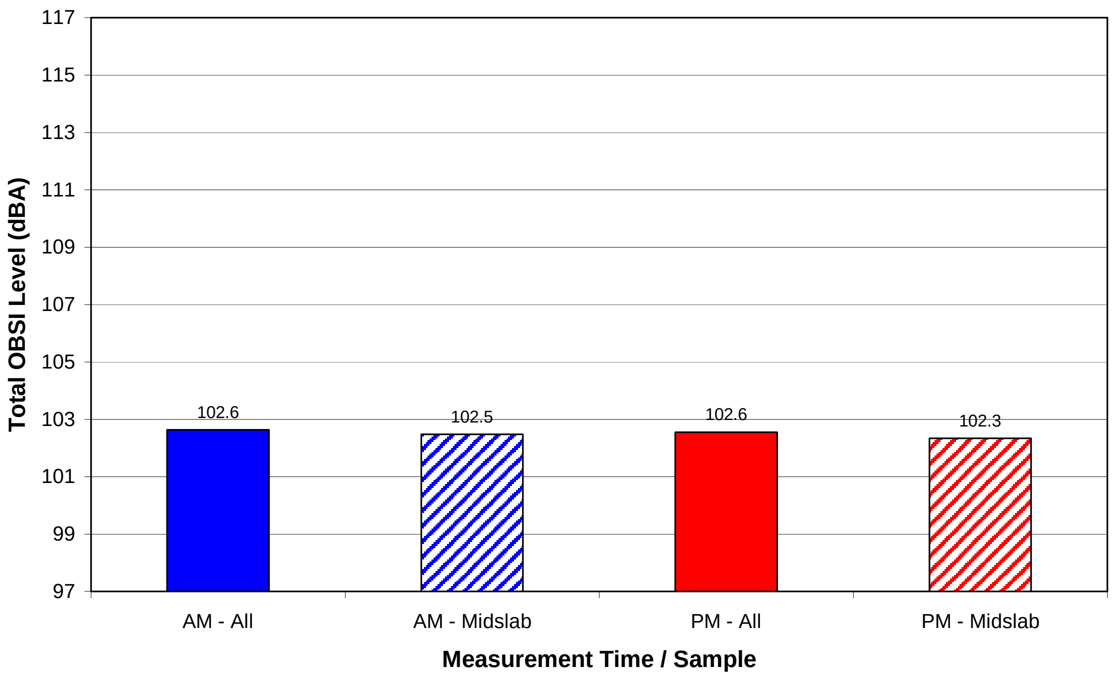
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



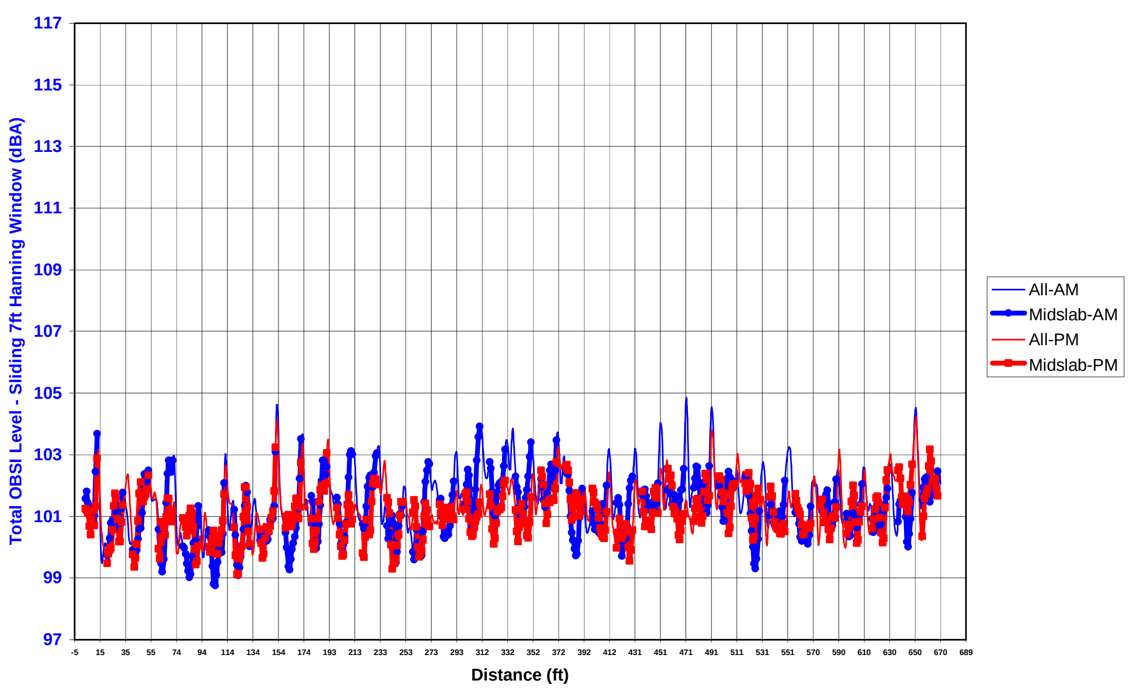
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



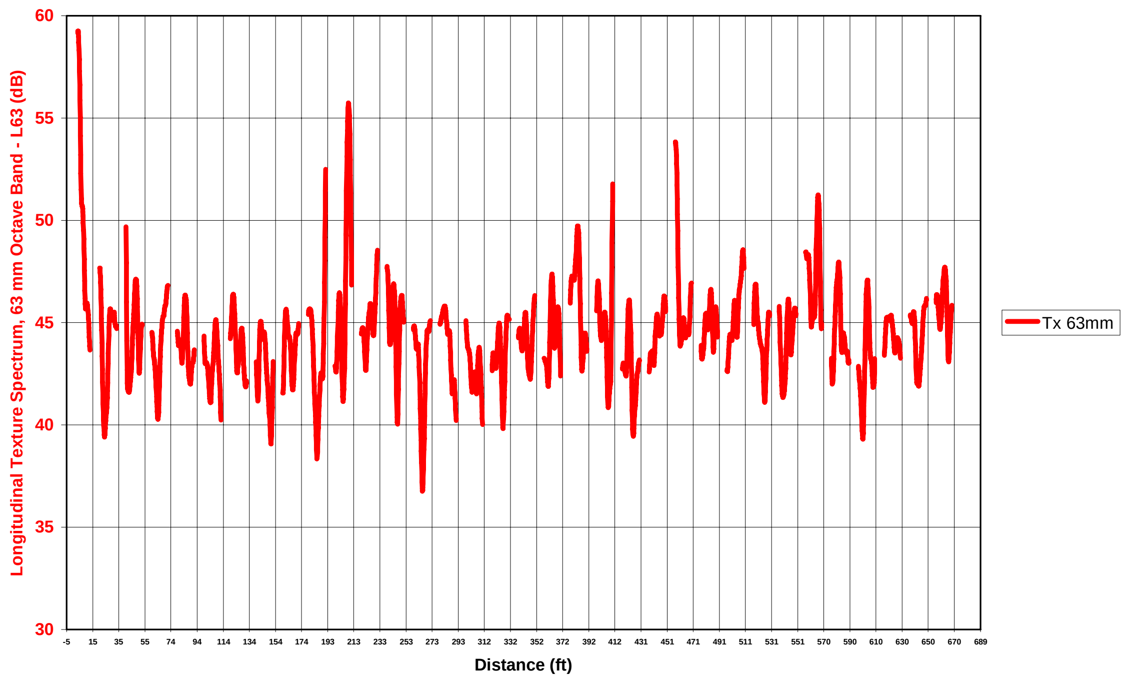
Site 101-2 (IA), Section I (Trans. Tining, 1/2" Spacing, 1/8" Depth + Burlap Pretexture)



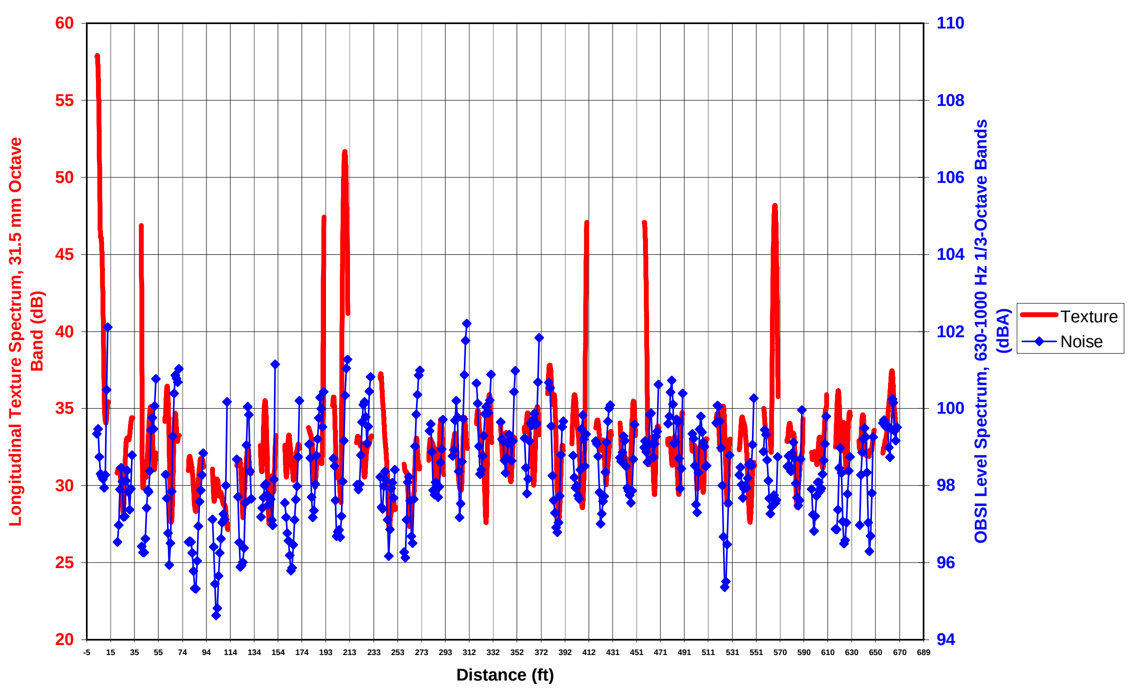
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



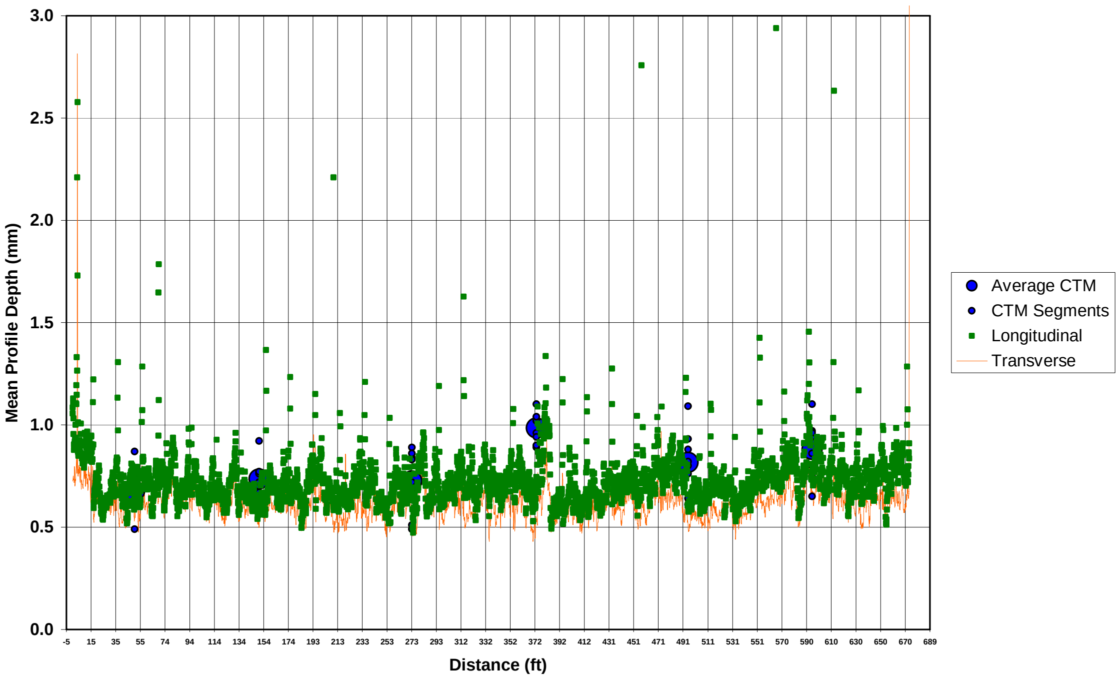
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



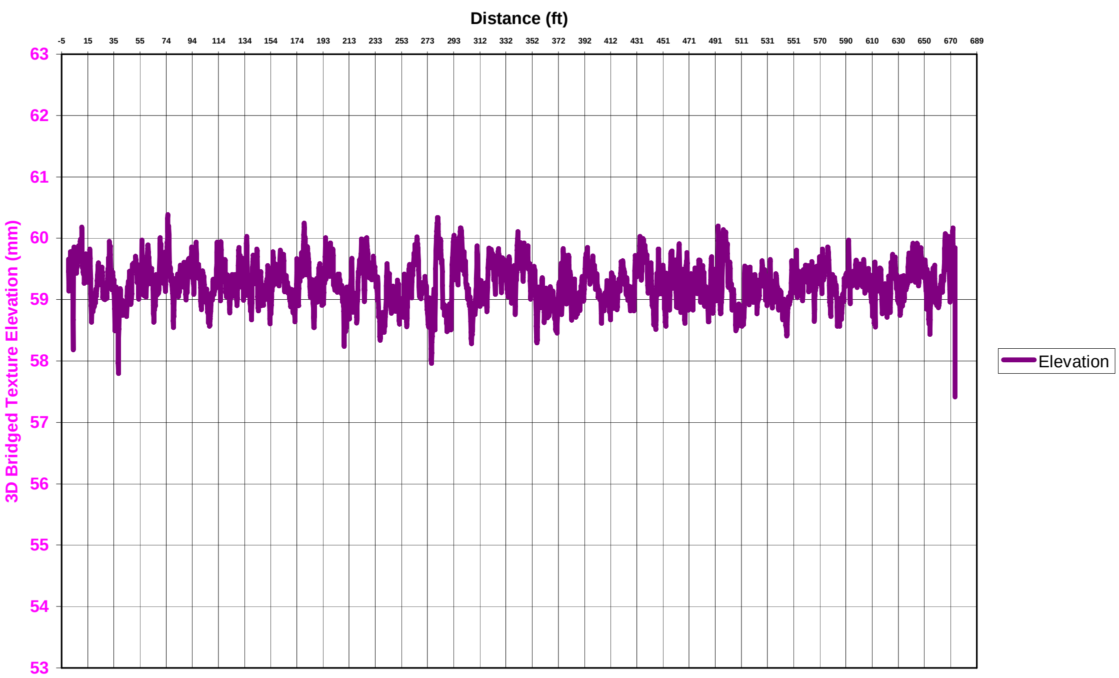
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



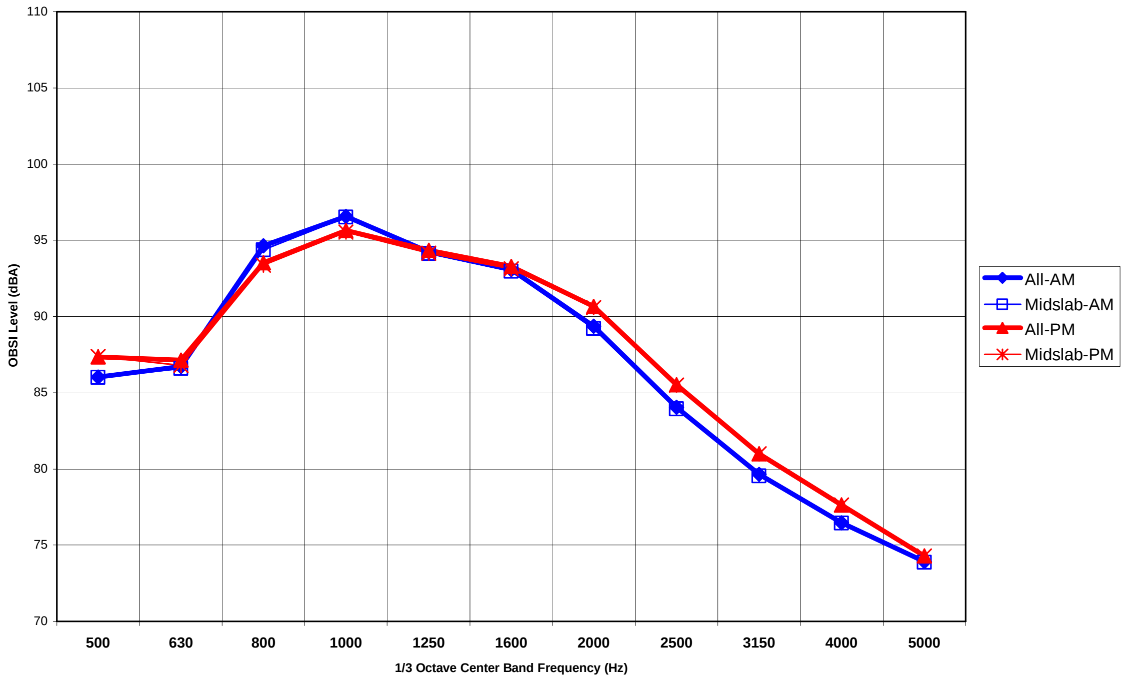
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



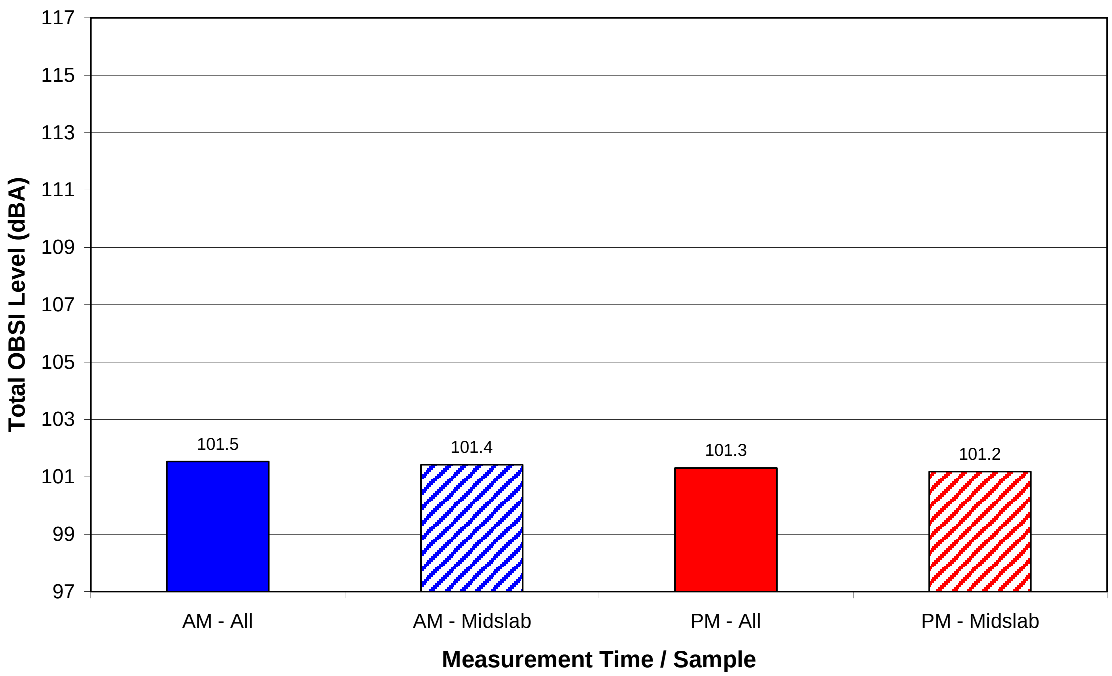
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



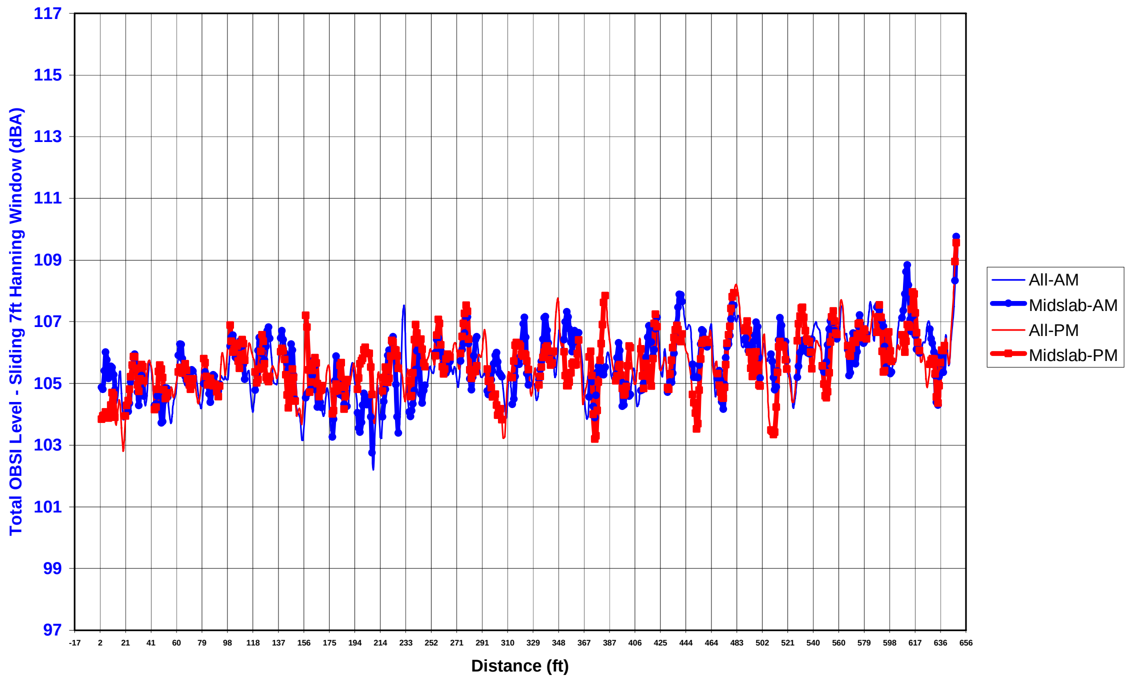
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



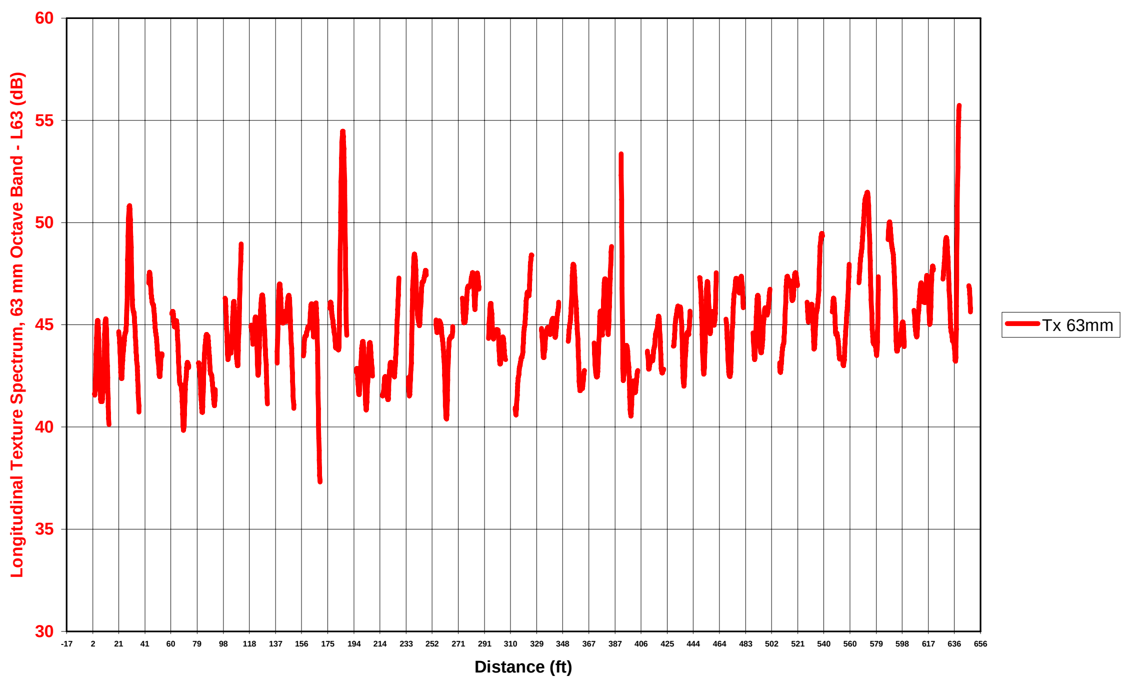
Site 101-2 (IA), Section J (Trans. Tining, 1/2" Spacing, 1/16" Depth + Burlap Pretexture)



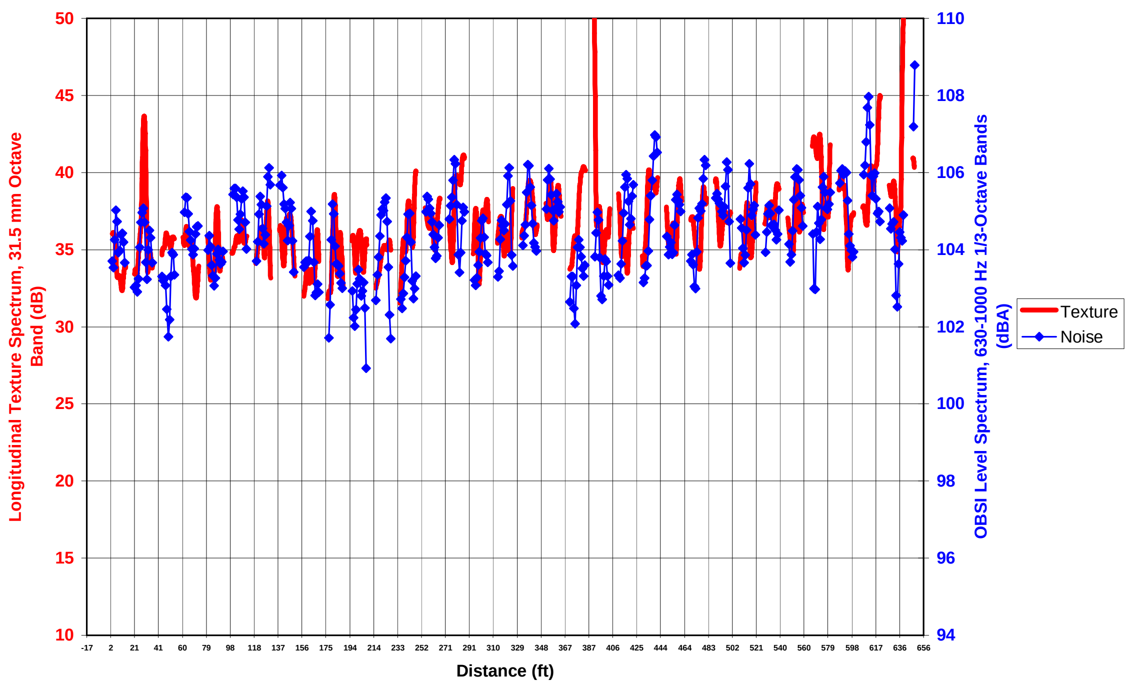
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



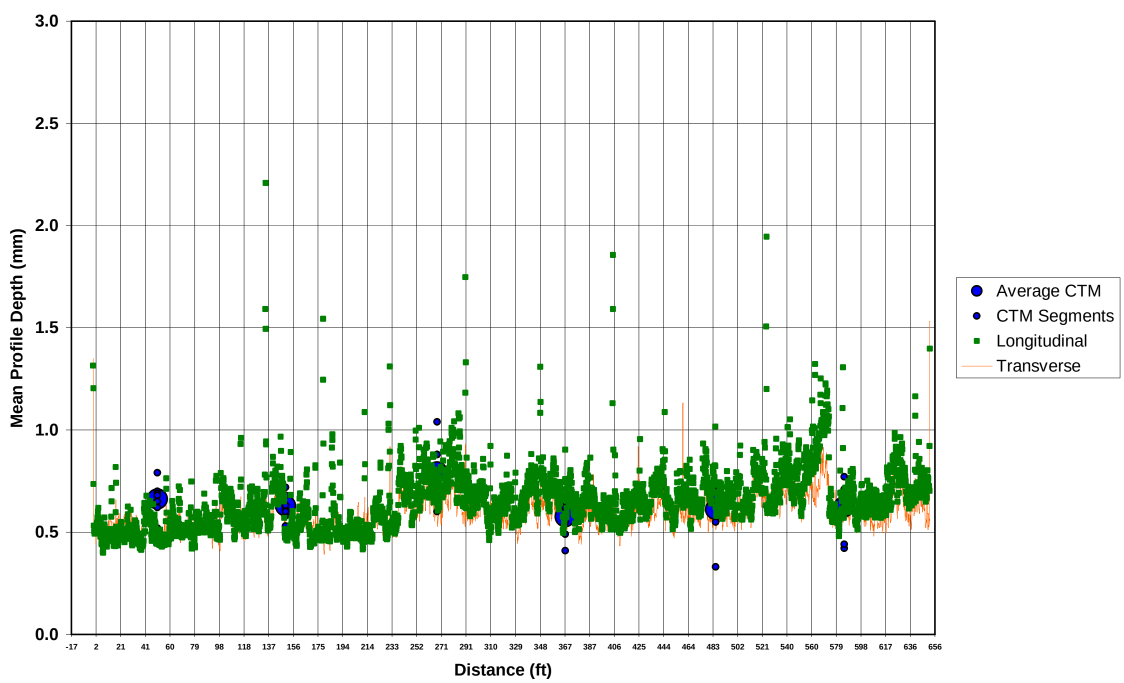
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



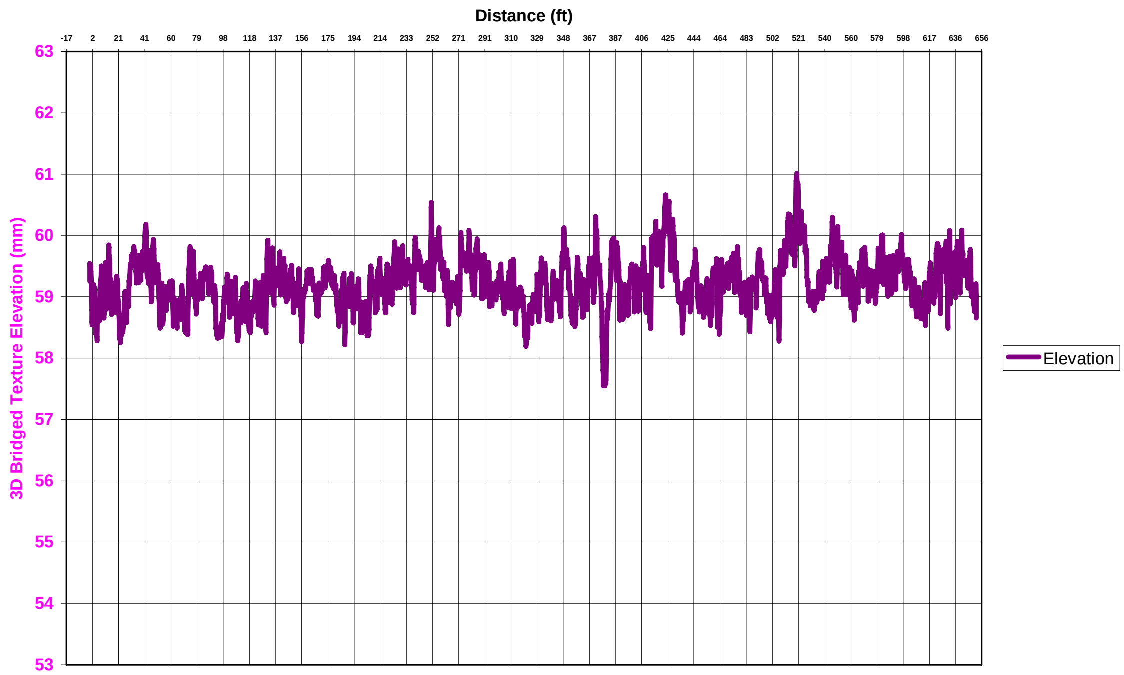
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



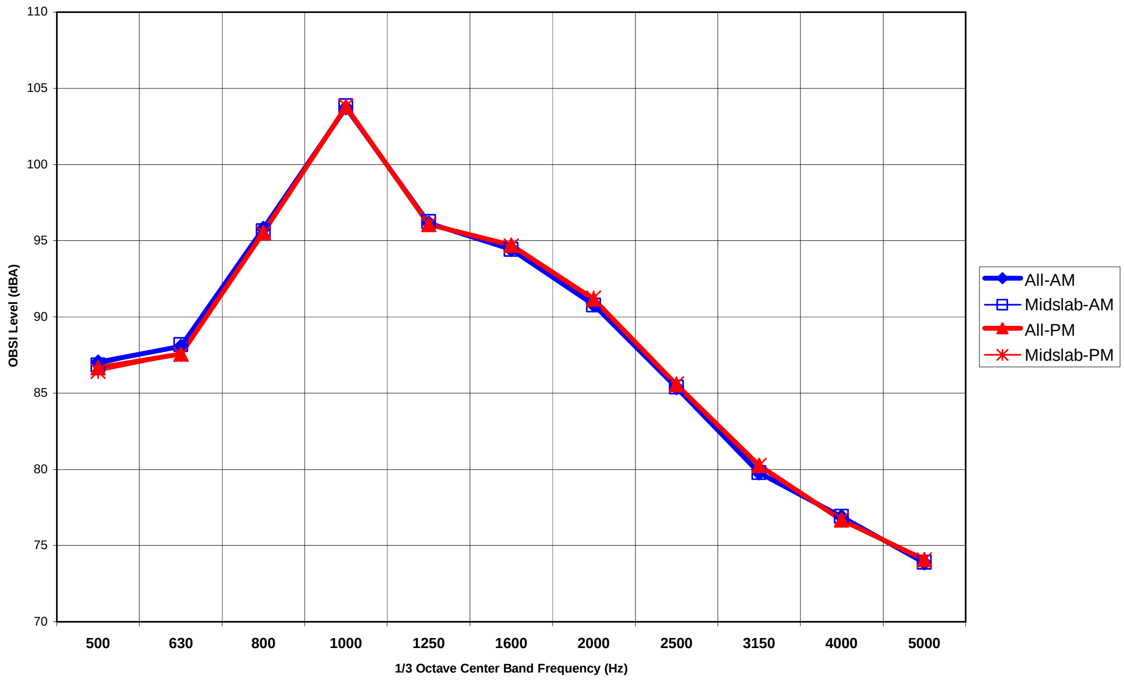
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



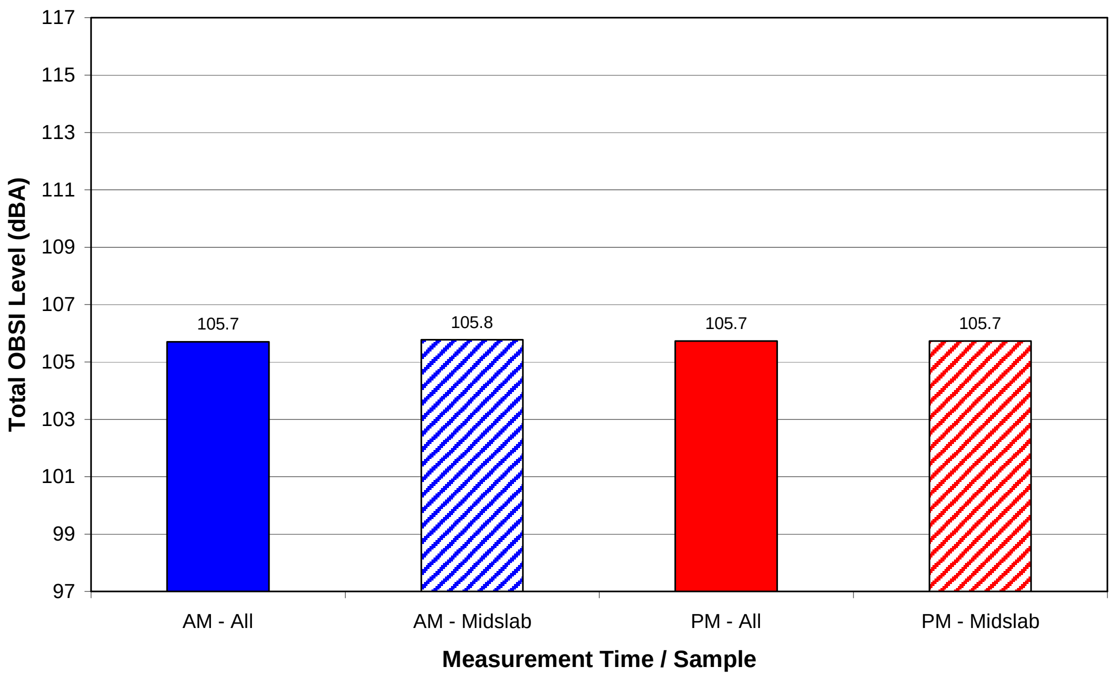
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



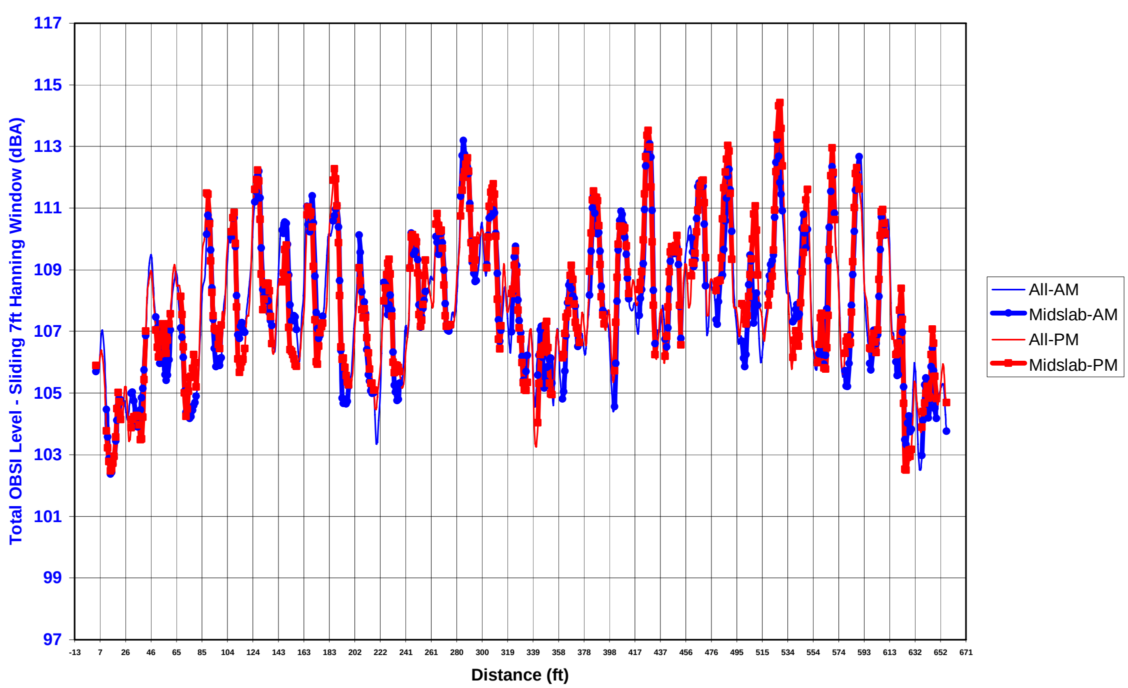
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



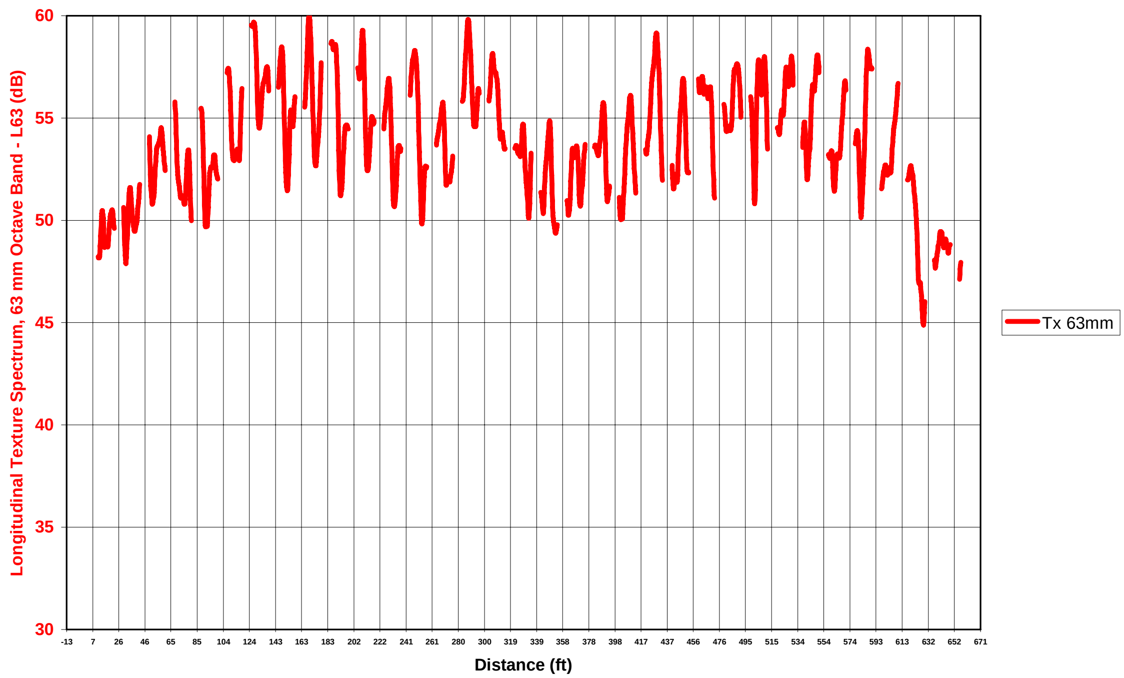
Site 101-2 (IA), Section K (Trans. Tining, 1" Spacing, 1/8" Depth + Burlap Pretexture)



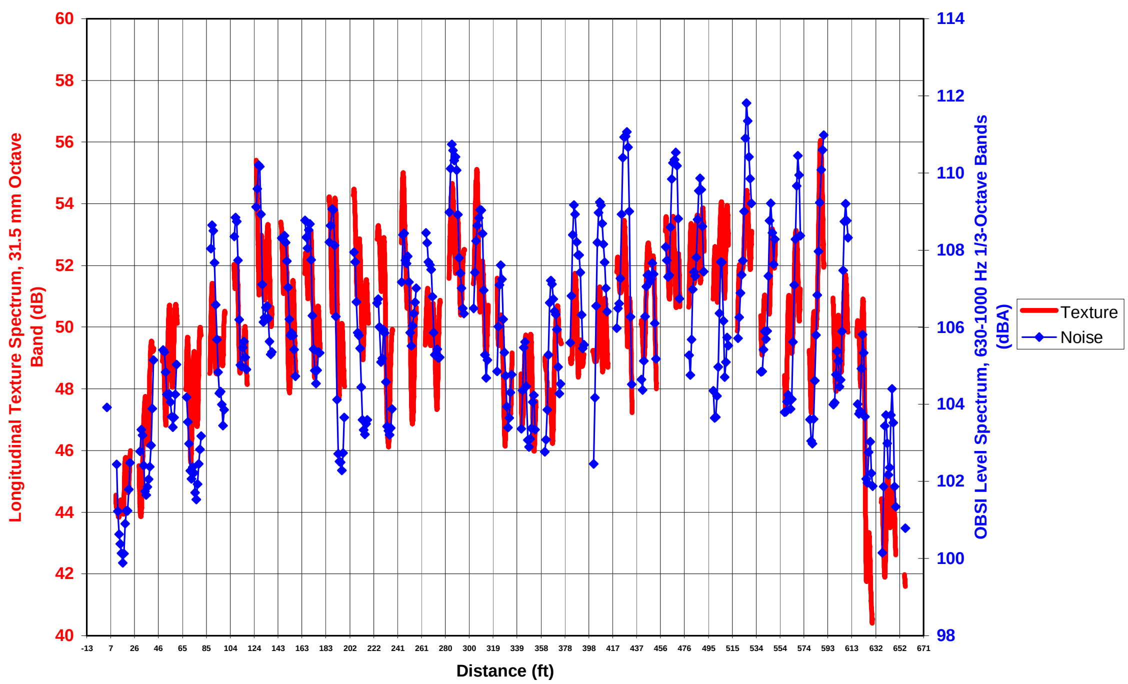
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



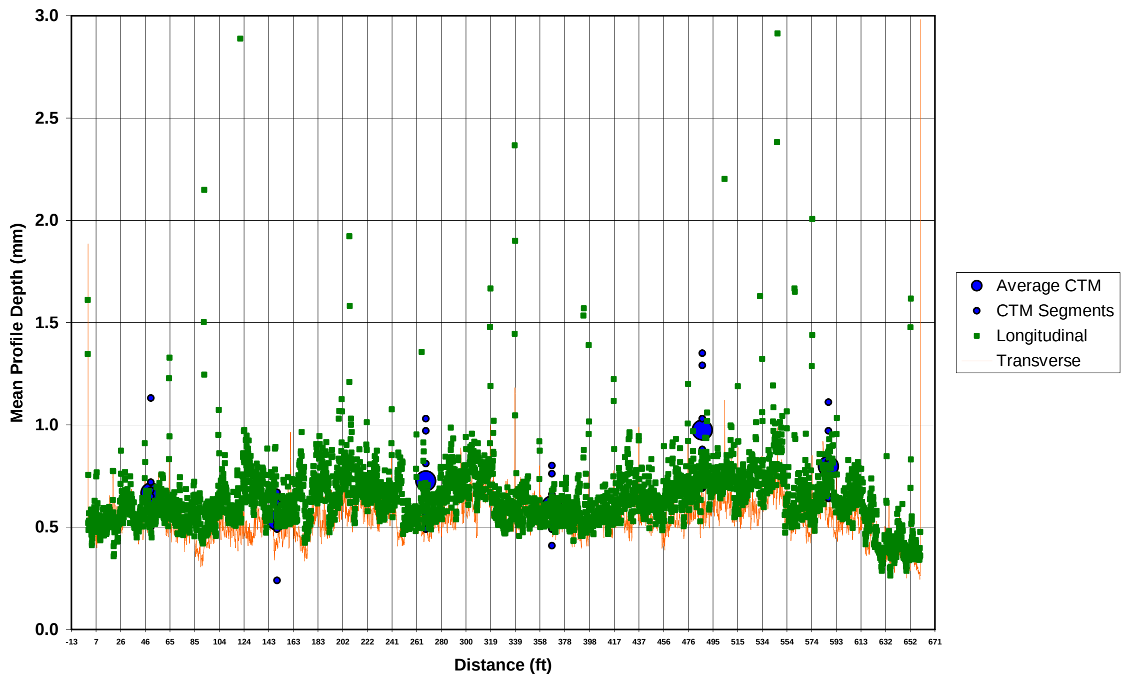
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



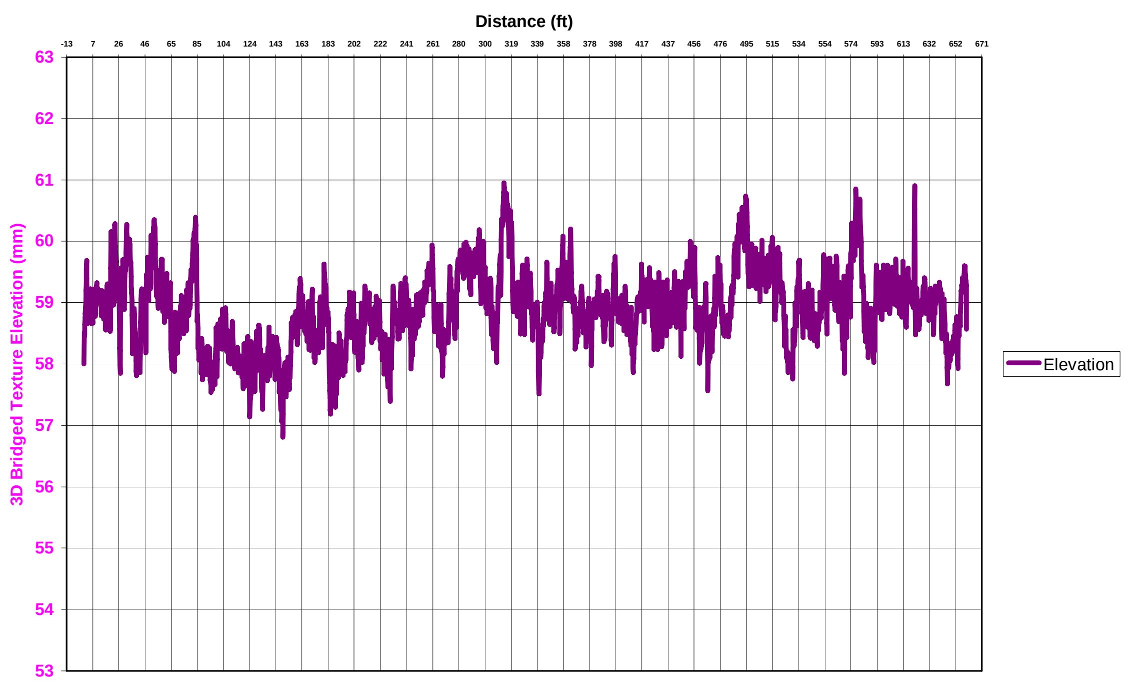
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



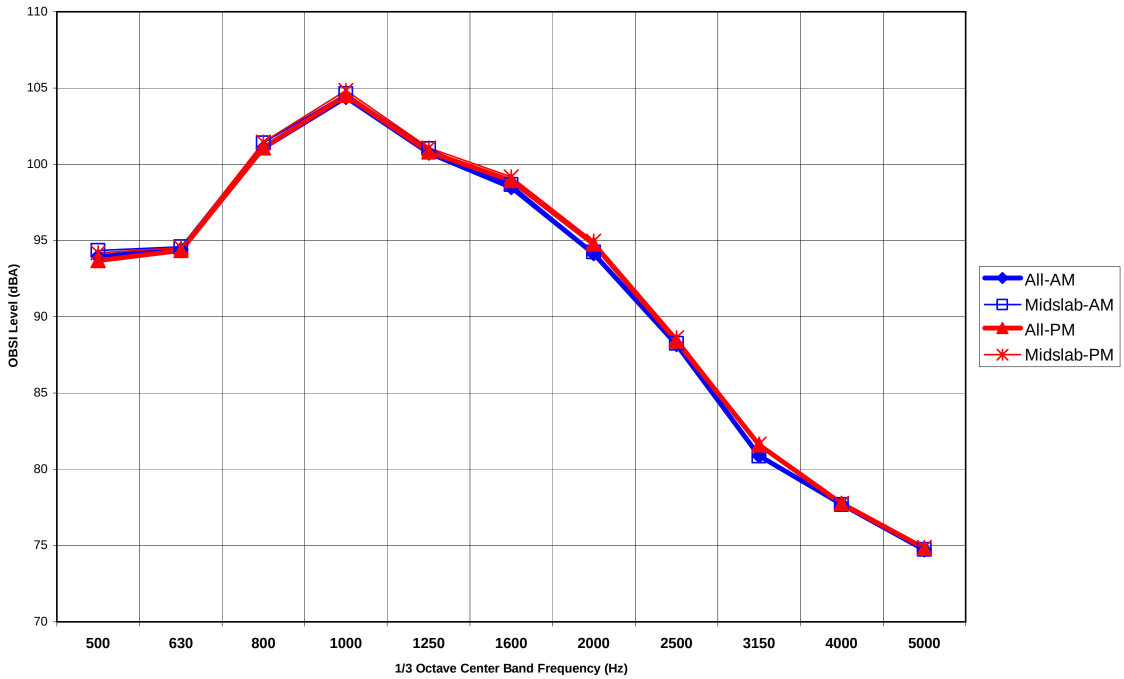
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



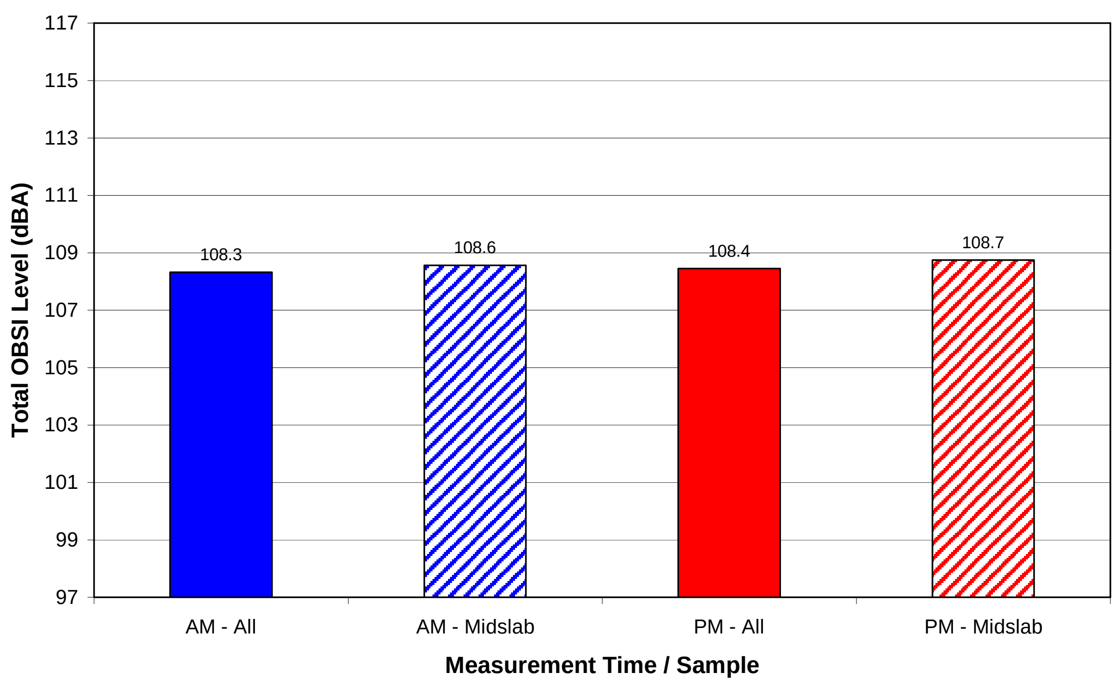
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



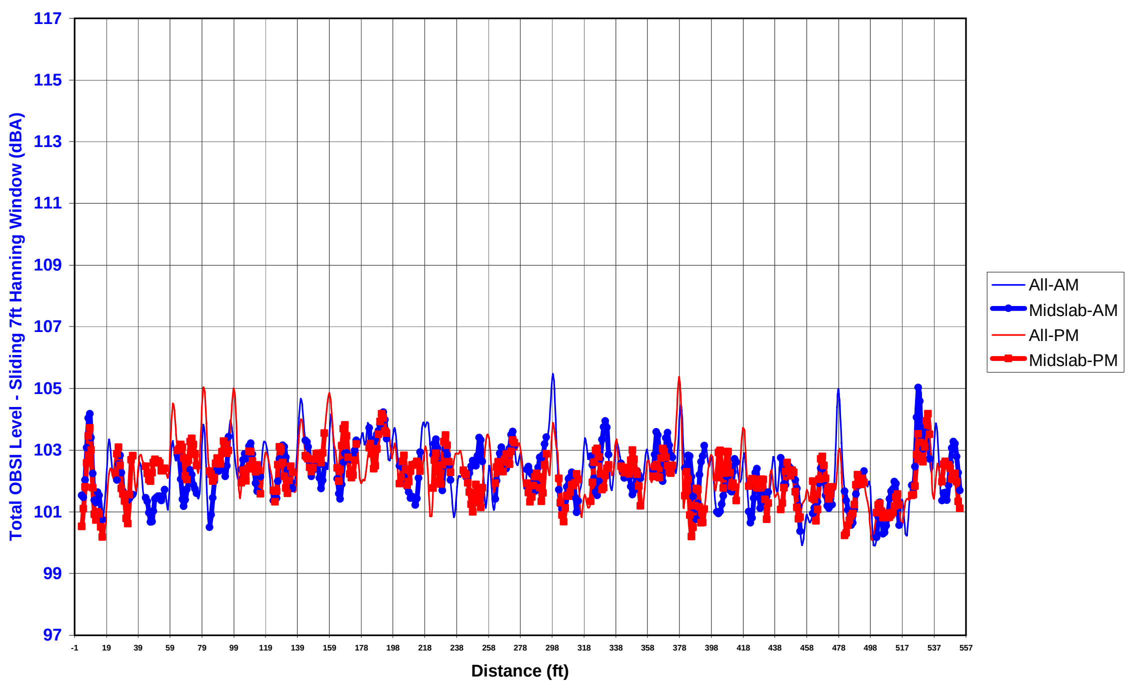
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)



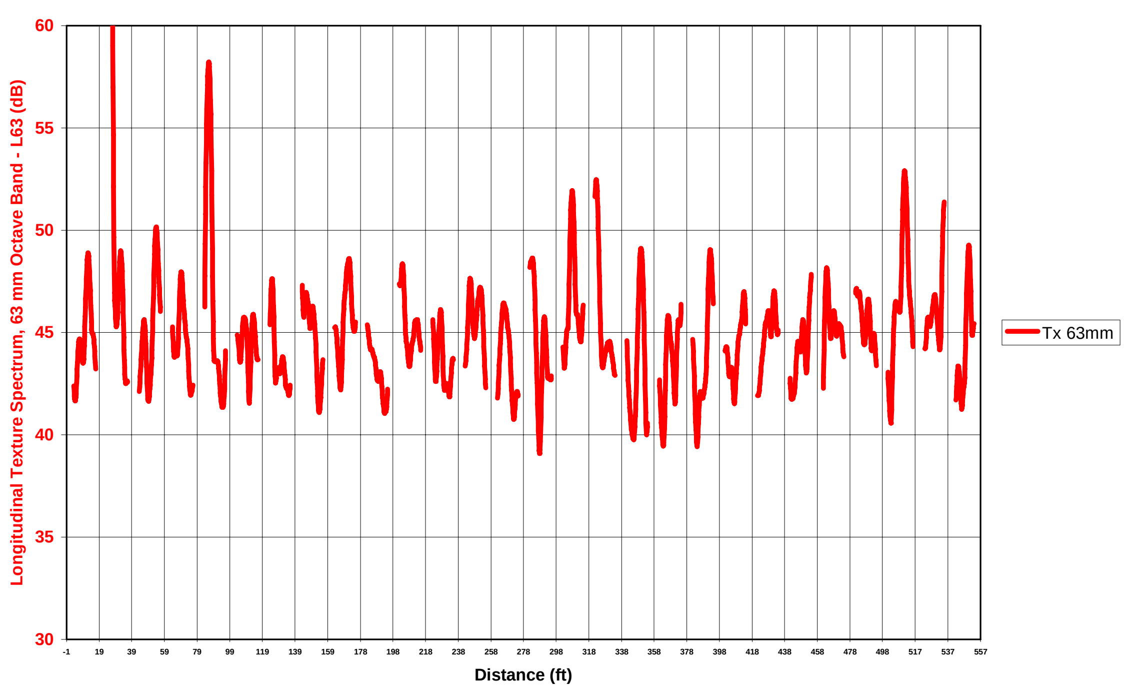
Site 101-2 (IA), Section L (Trans. Tining, Random Spacing, 1/8" Depth + Burlap Pretexture)

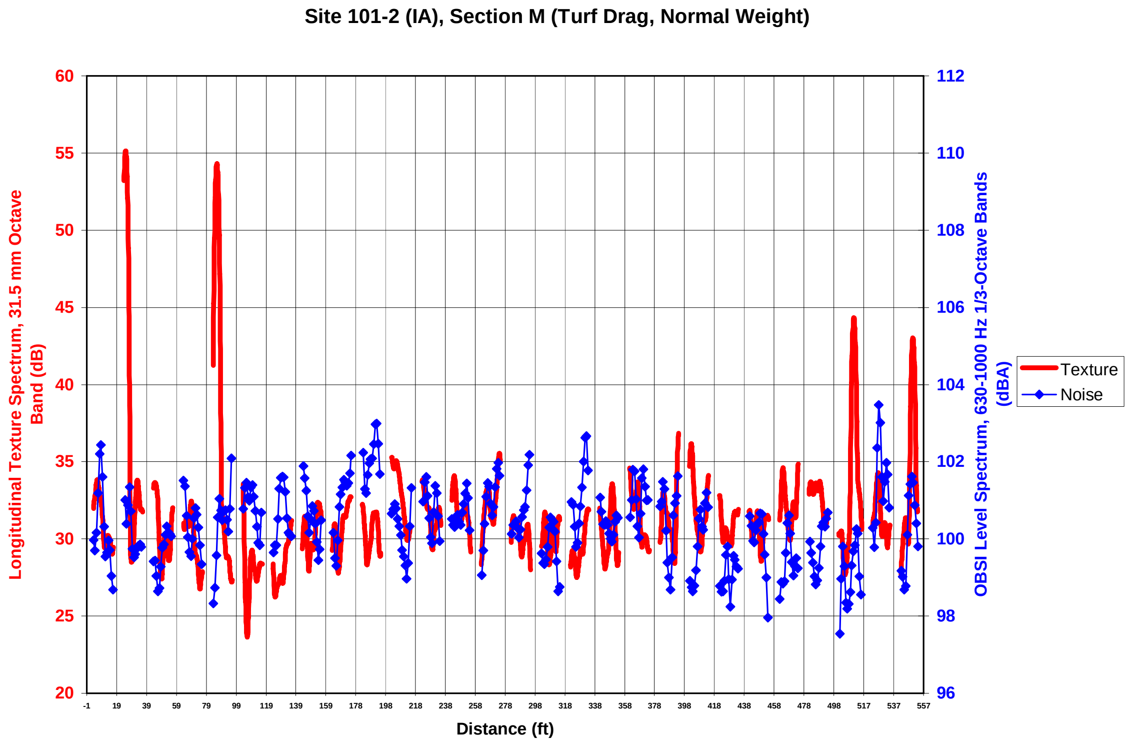


Site 101-2 (IA), Section M (Turf Drag, Normal Weight)

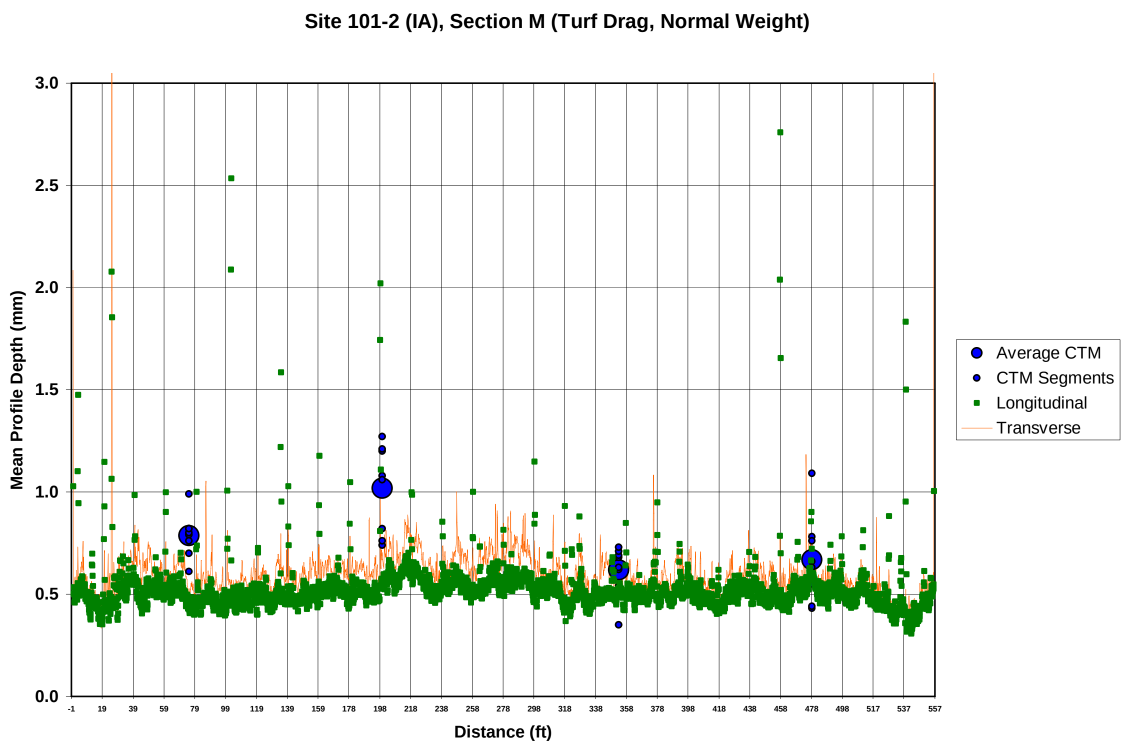


Site 101-2 (IA), Section M (Turf Drag, Normal Weight)



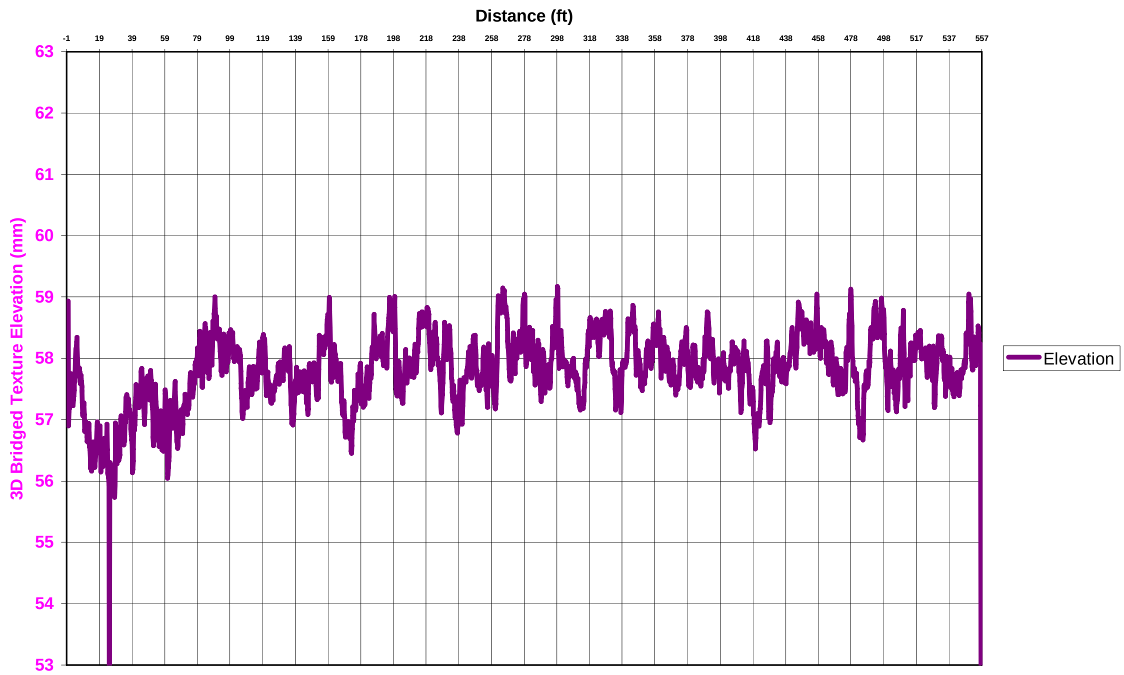


Site 101-2 (IA), Section M (Turf Drag, Normal Weight)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise

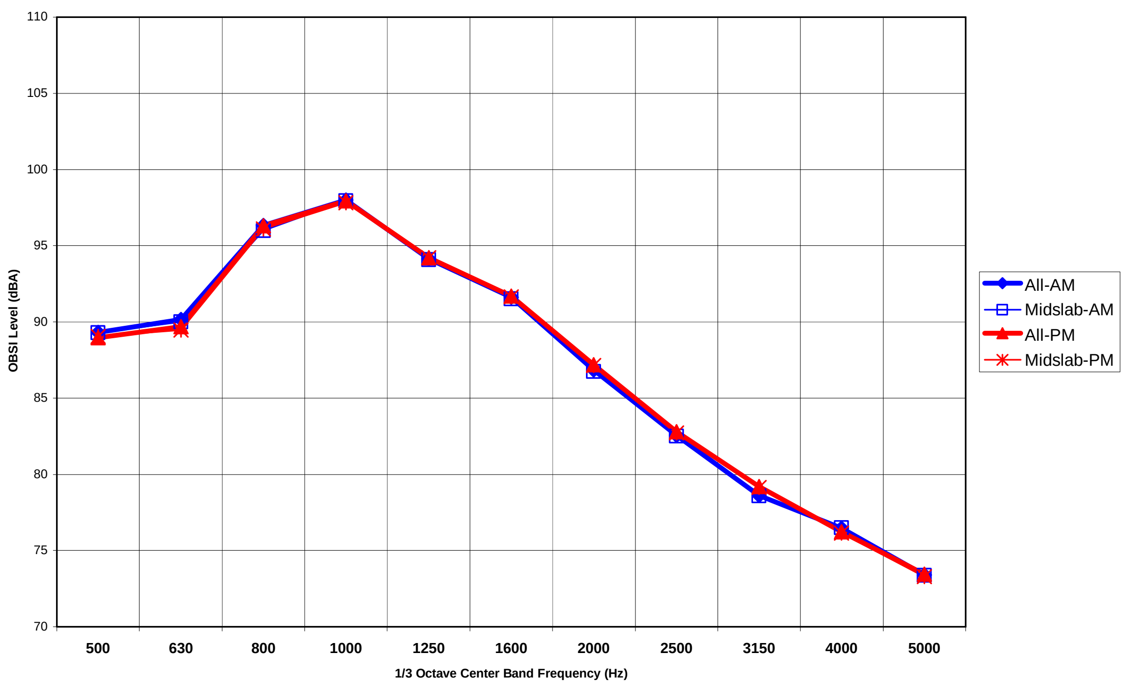


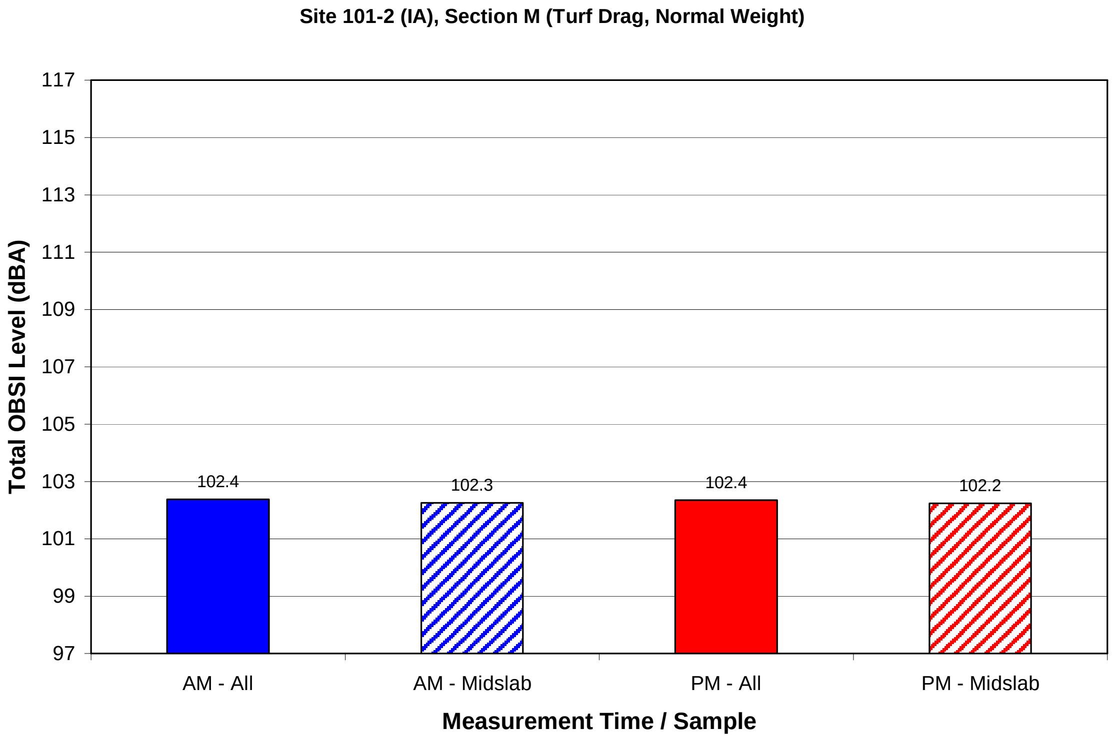
Site 101-2 (IA), Section M (Turf Drag, Normal Weight)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

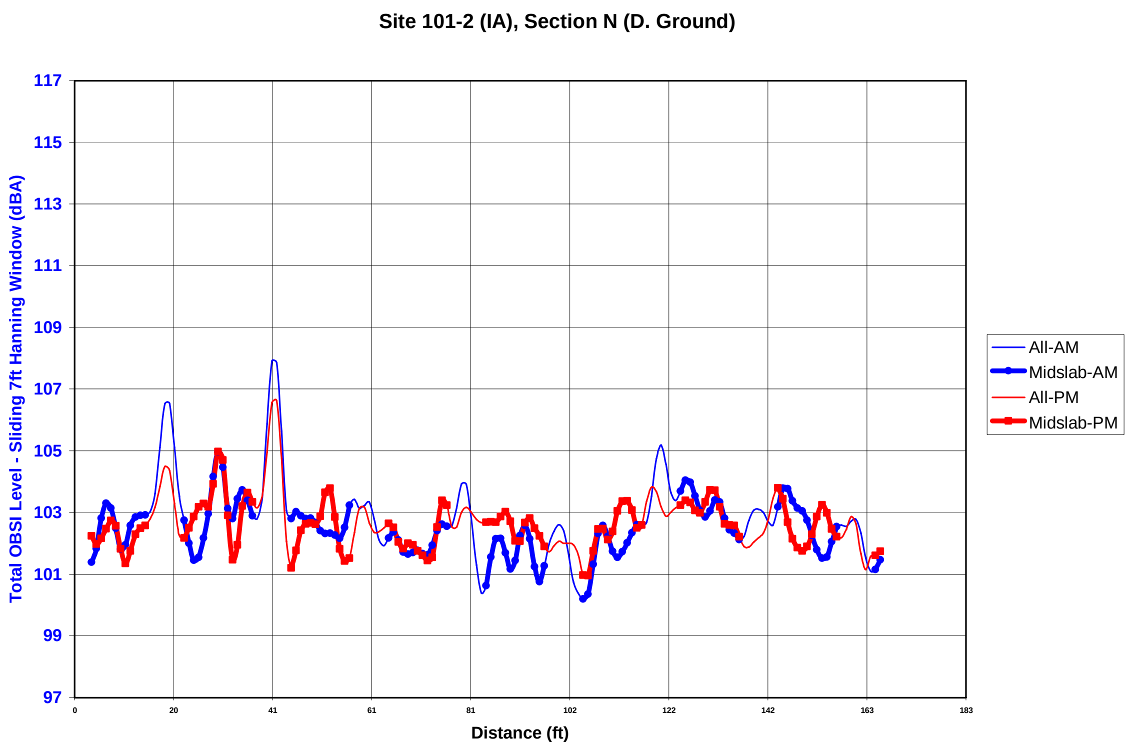
Site 101-2 (IA), Section M (Turf Drag, Normal Weight)

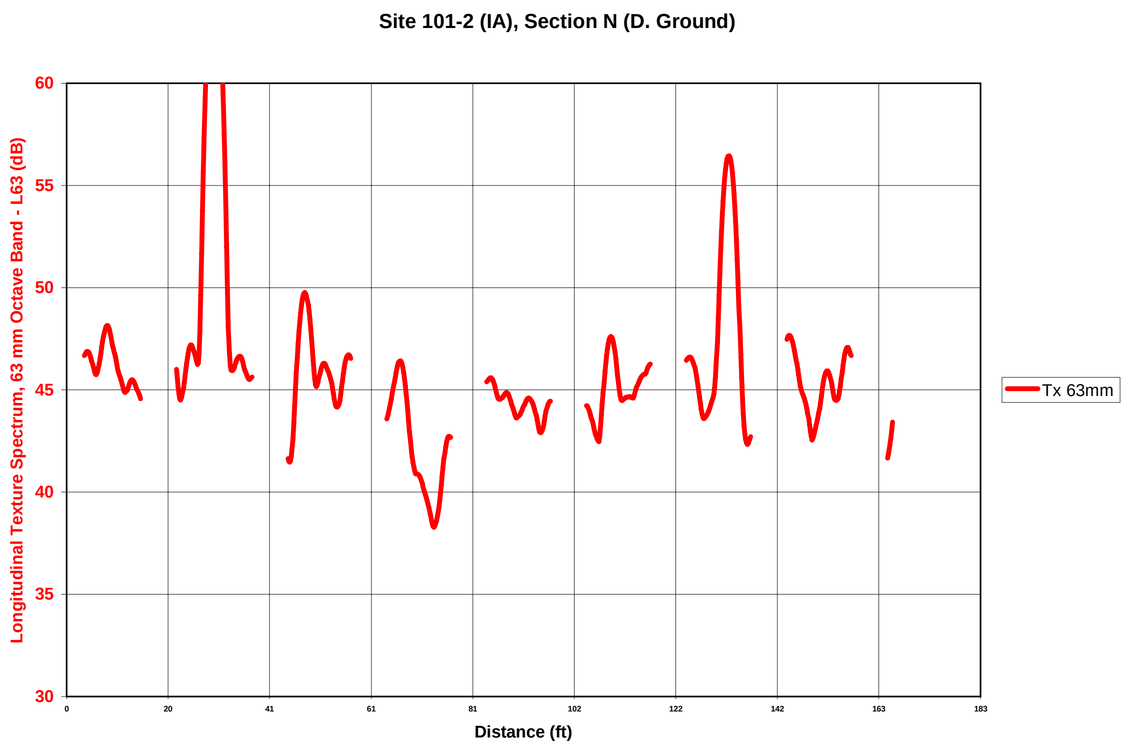


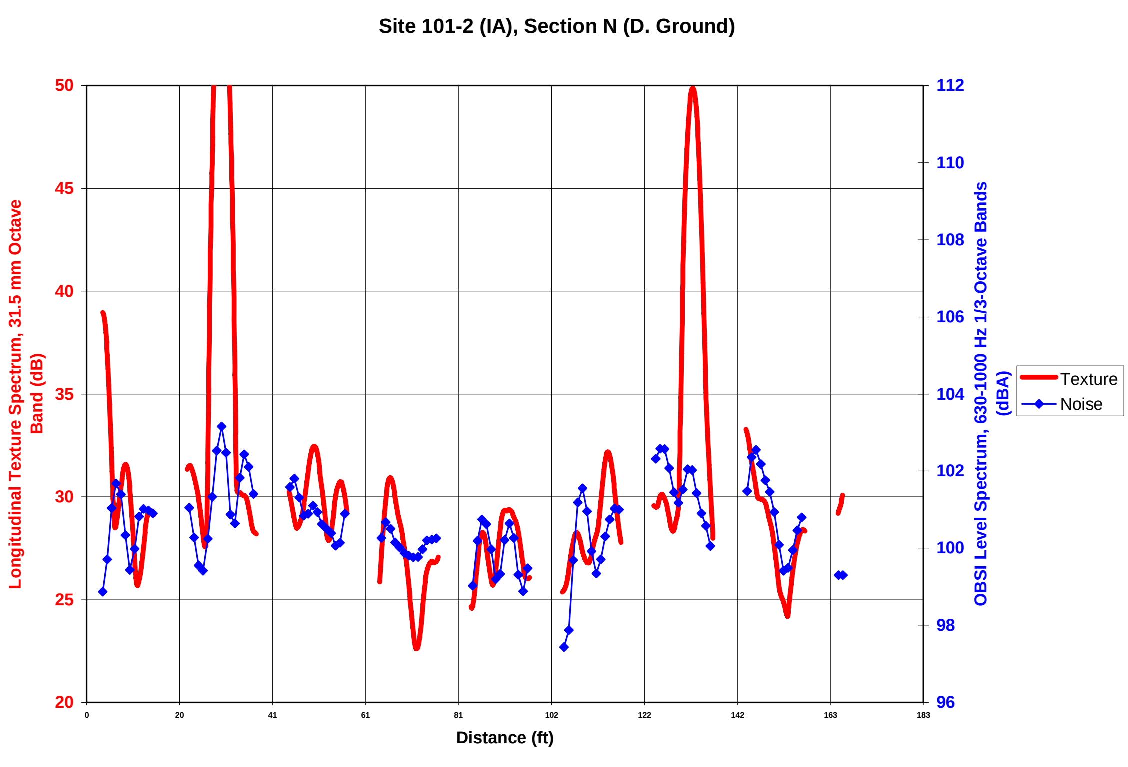
Site 101-2 (IA), Section M (Turf Drag, Normal Weight)

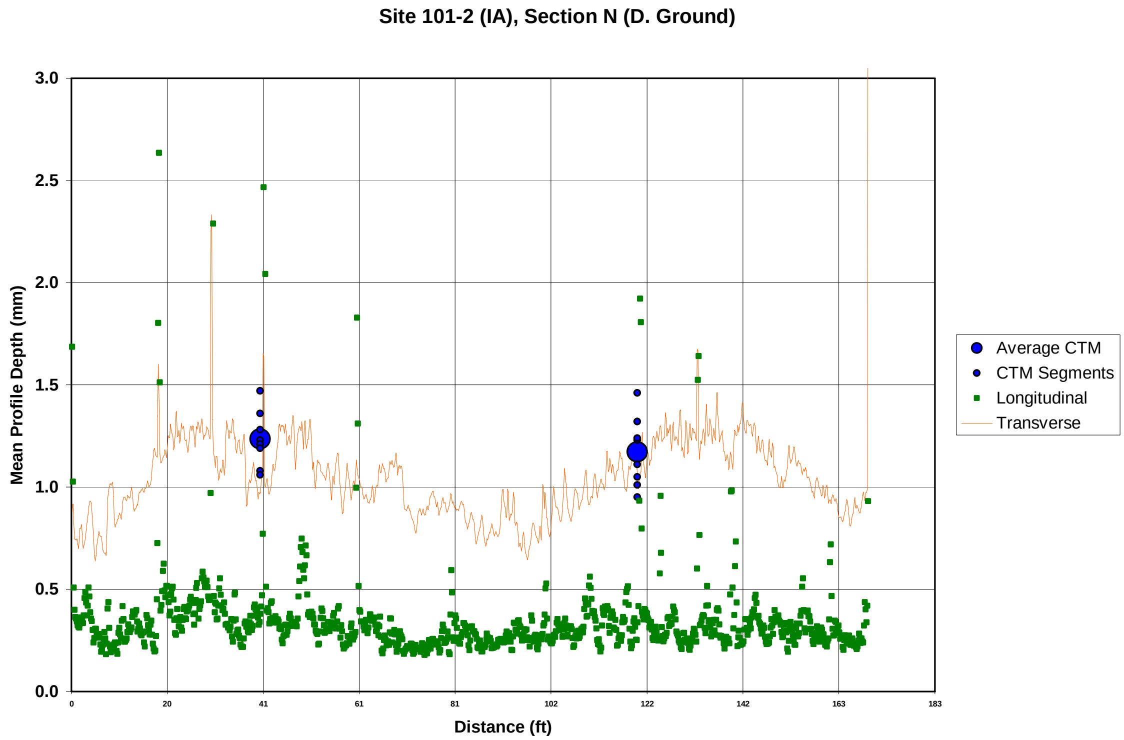



Site 101-2 (IA), Section M (Turf Drag, Normal Weight)
117
115
113
111
109
107
105
103
101
99
97
Total OBSI Level (dBA)
102.4
102.3
102.4
102.2
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample

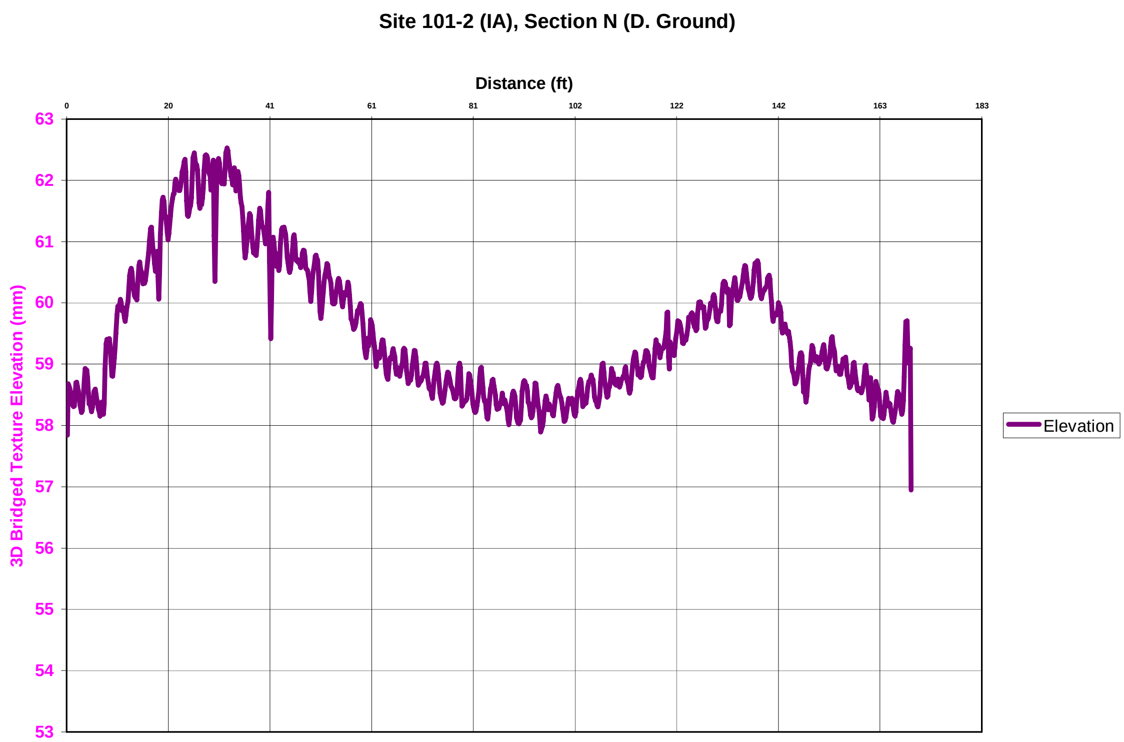

Site 101-2 (IA), Section N (D. Ground)
117
115
113
111
109
107
105
103
101
99
97
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
0
20
41
61
81
102
122
142
163
183
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 101-2 (IA), Section N (D. Ground)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
0
20
41
61
81
102
122
142
163
183
Distance (ft)
Tx 63mm


Site 101-2 (IA), Section N (D. Ground)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
50
45
40
35
30
25
20
0
20
41
61
81
102
122
142
163
183
Distance (ft)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
112
110
108
106
104
102
100
98
96
Texture
Noise

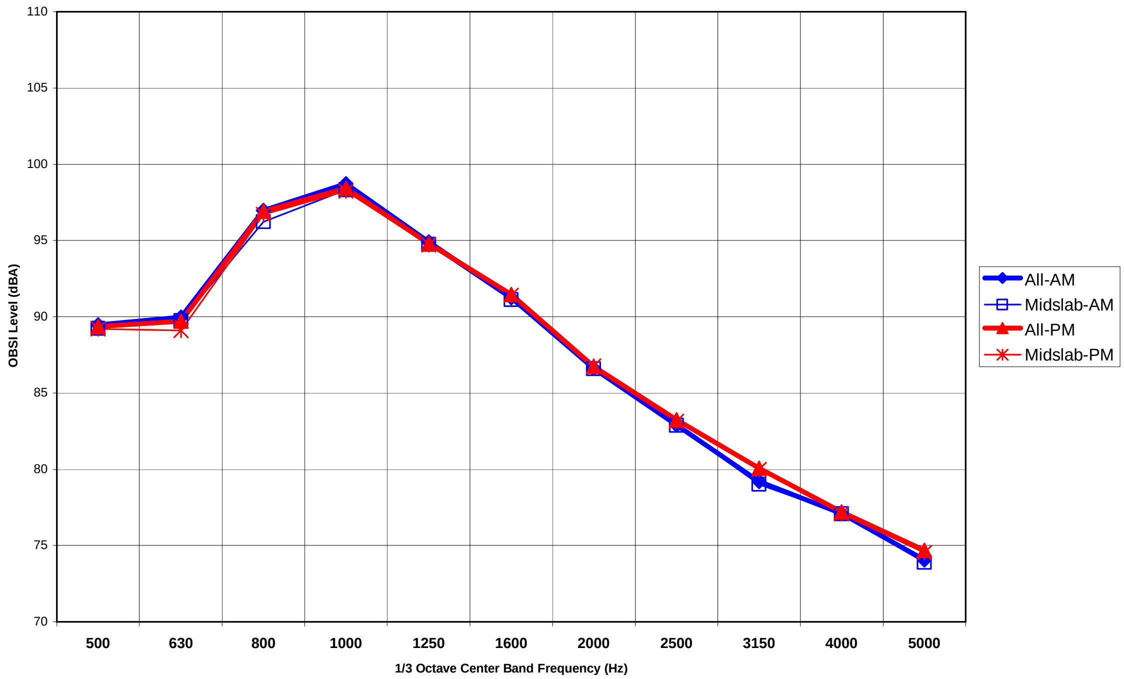


Site 101-2 (IA), Section N (D. Ground)
Mean Profile Depth (mm)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
20
41
61
81
102
122
142
163
183
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

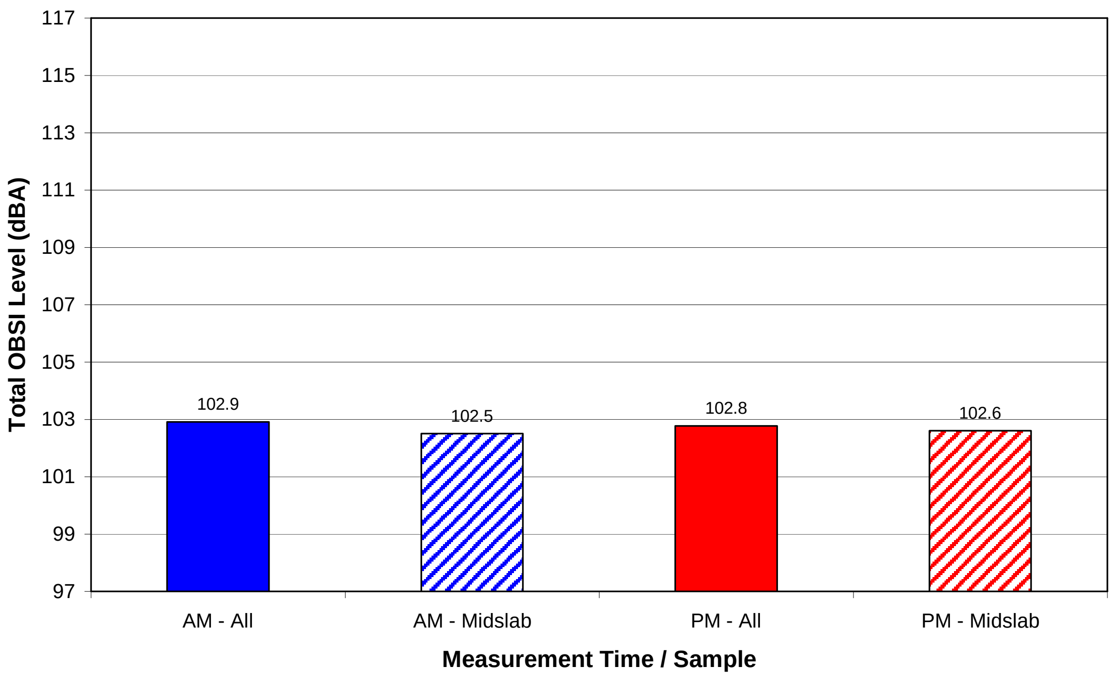


Site 101-2 (IA), Section N (D. Ground)
Distance (ft)
0
20
41
61
81
102
122
142
163
183
3D Bridged Texture Elevation (mm)
63
62
61
60
59
58
57
56
55
54
53
Elevation

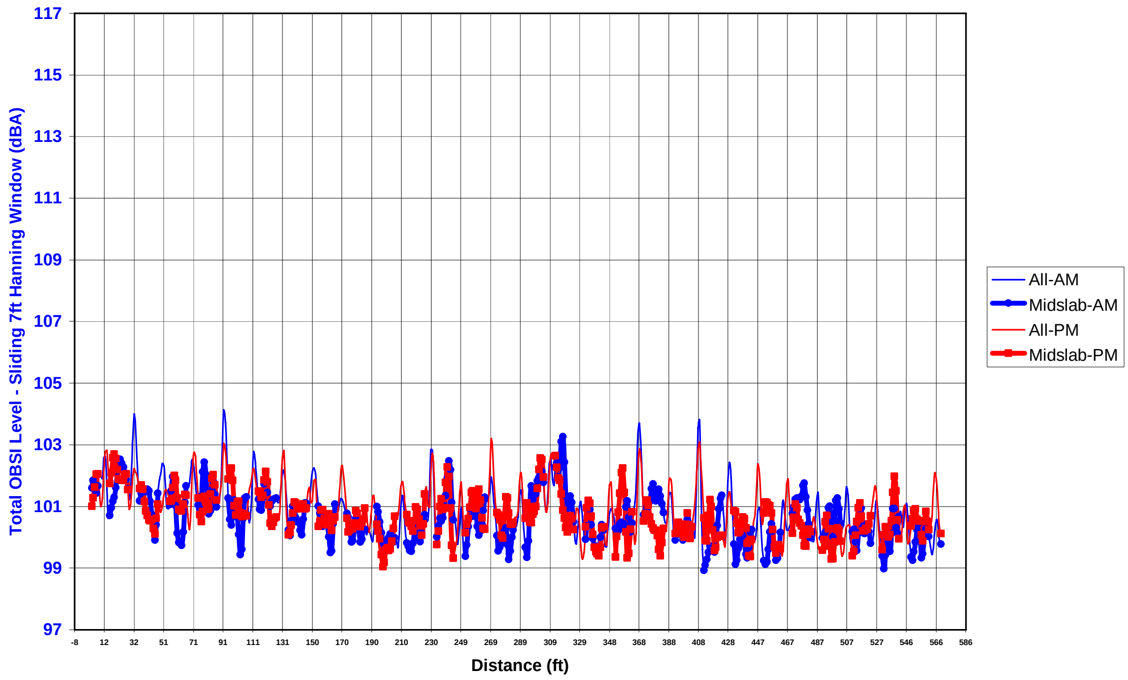
Site 101-2 (IA), Section N (D. Ground)



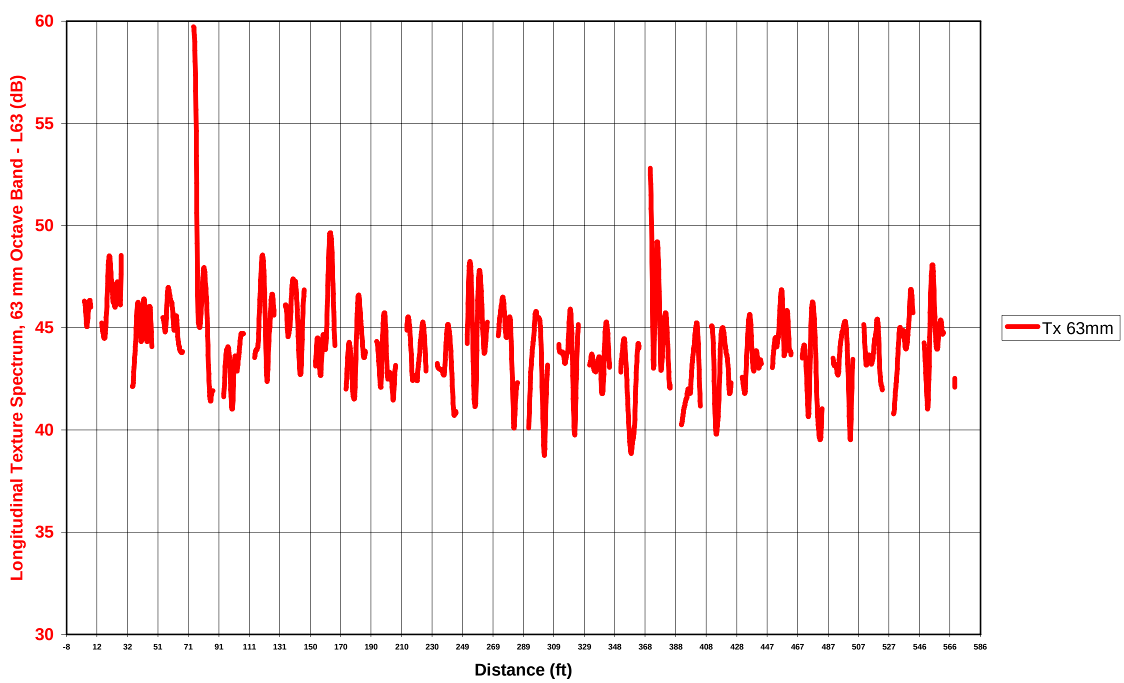
Site 101-2 (IA), Section N (D. Ground)



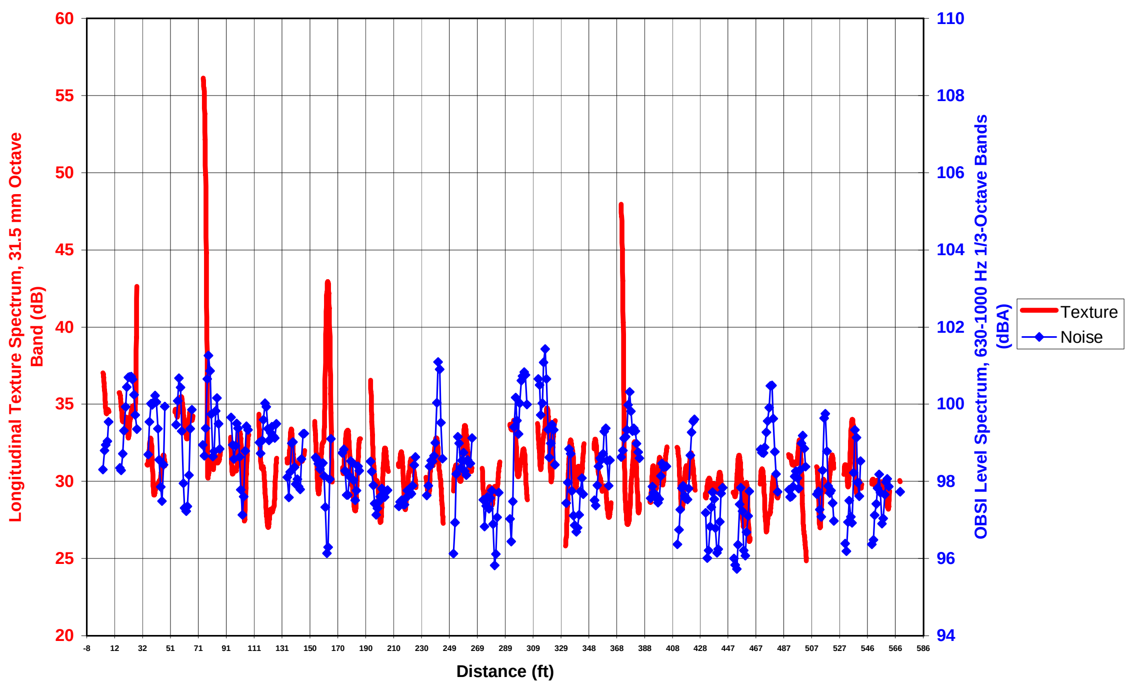
Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)



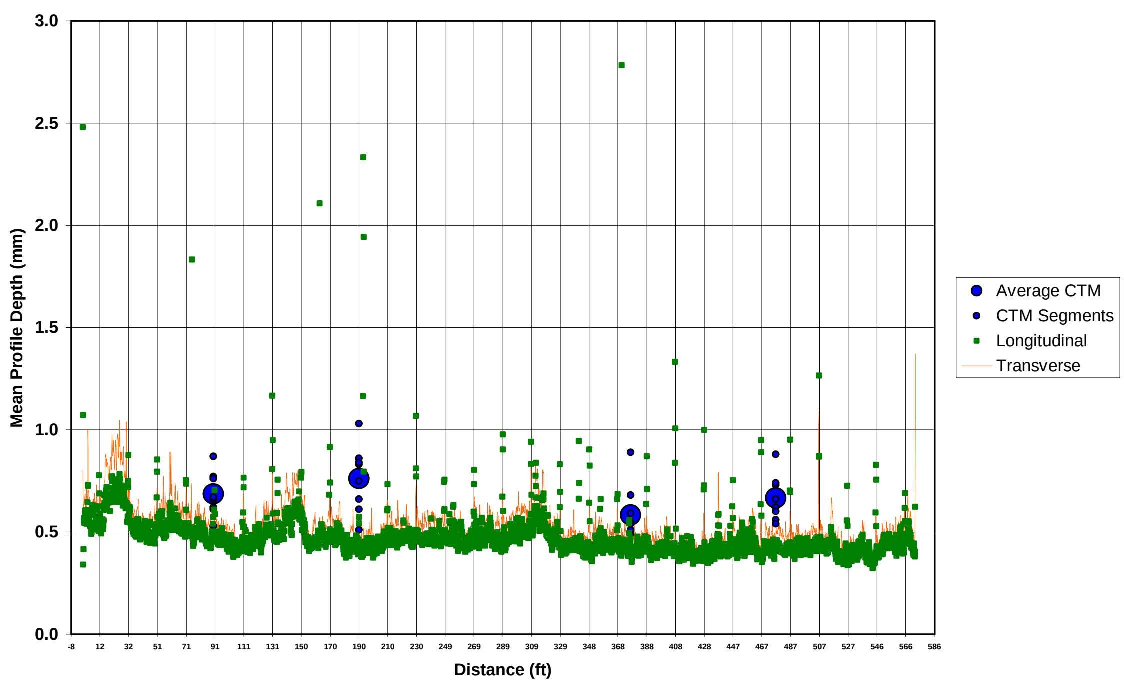
Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)

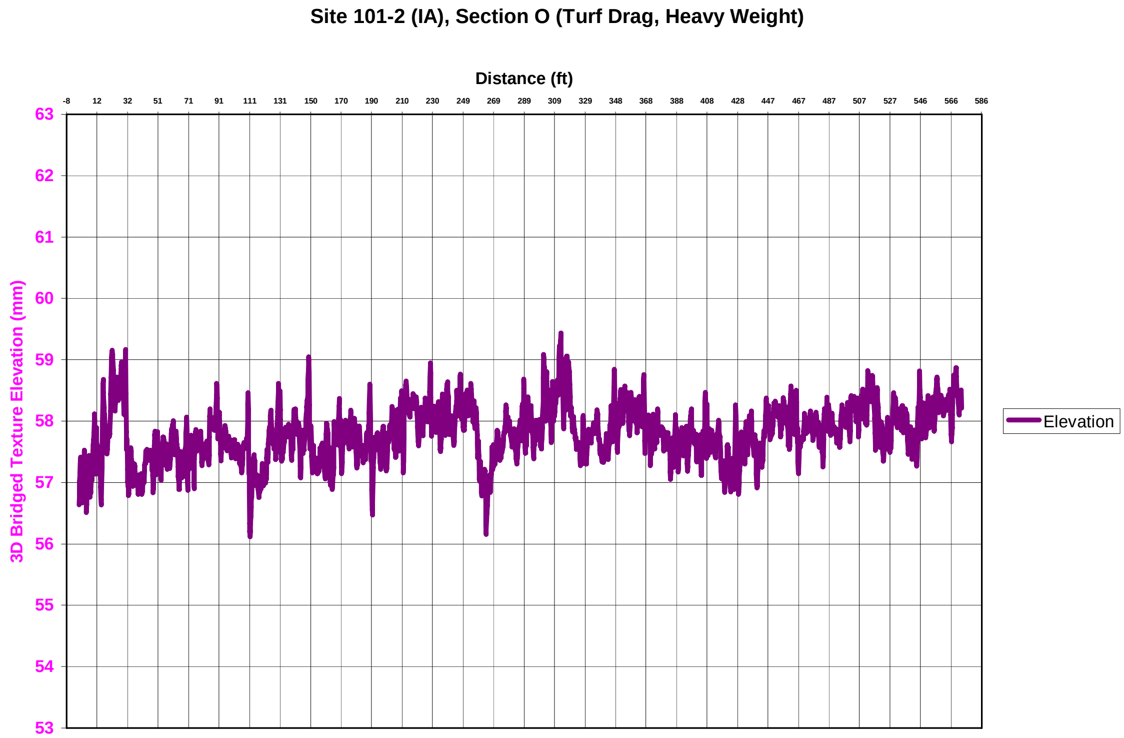


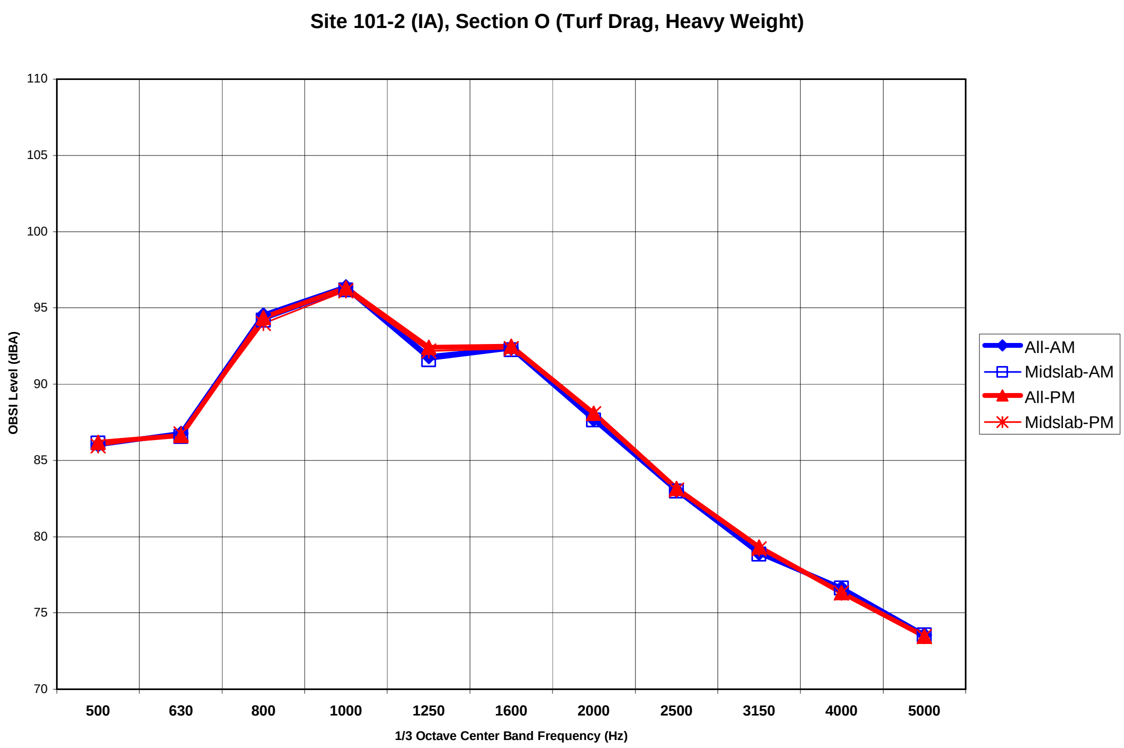
Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)

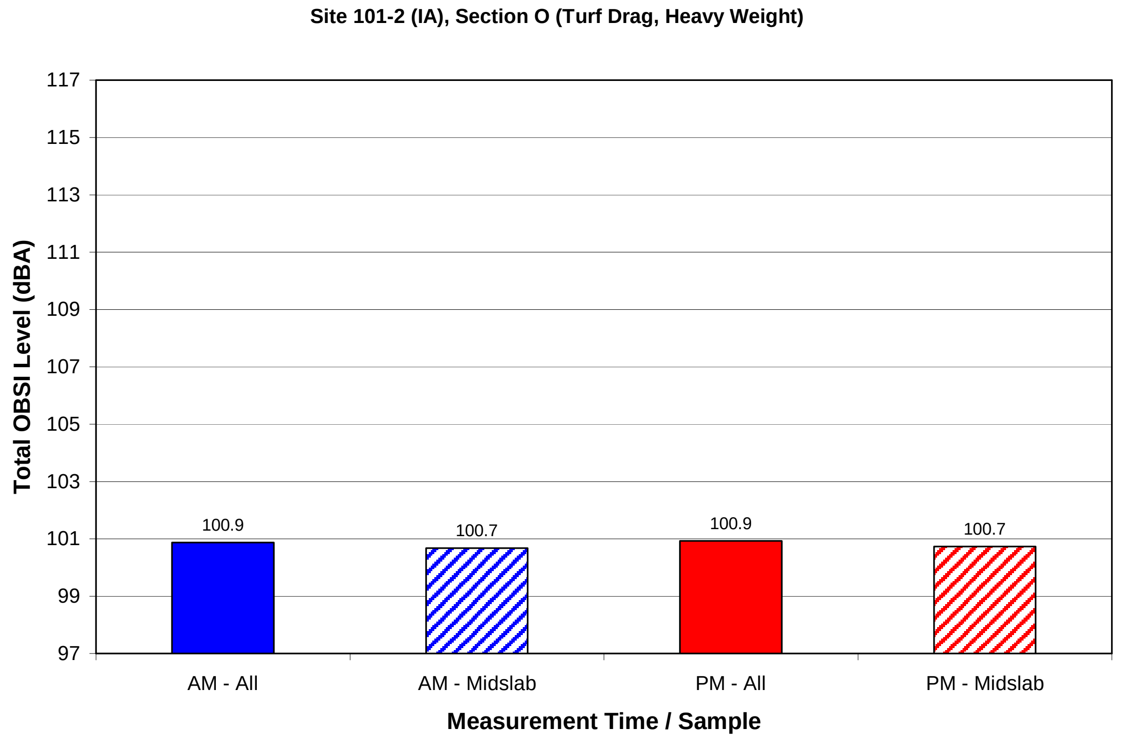


Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)

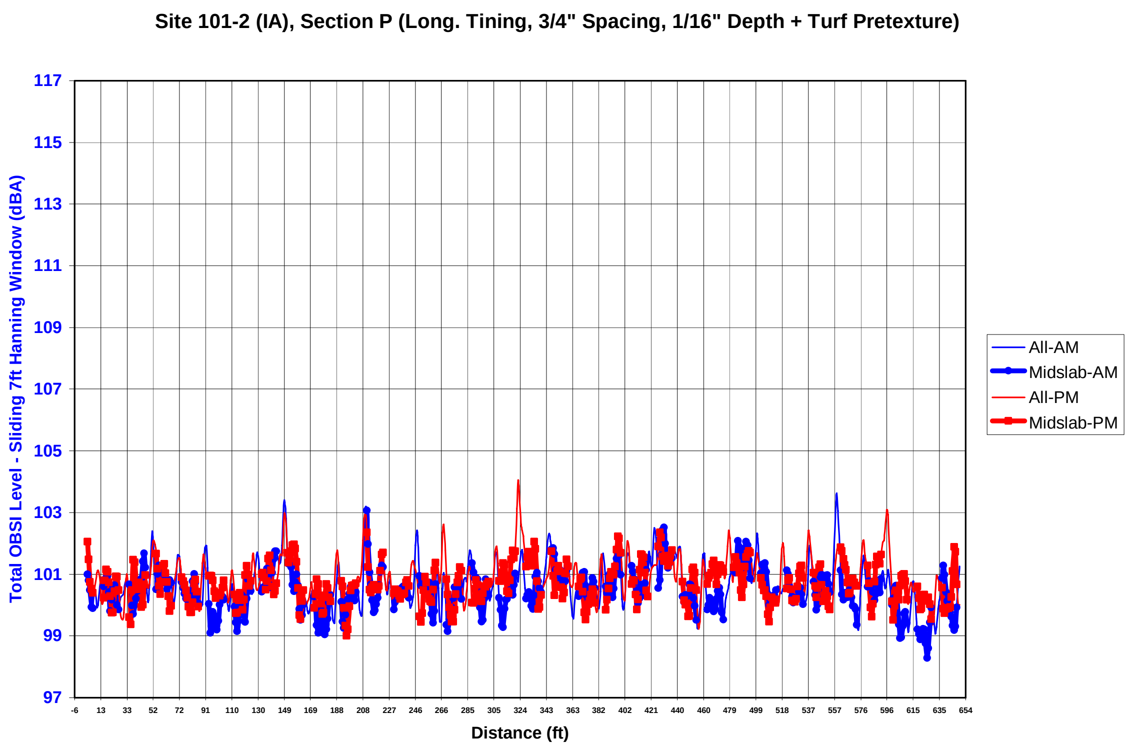



Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)
Distance (ft)
3D Bridged Texture Elevation (mm)
Elevation


Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)
OBSI Level (dBA)
1/3 Octave Center Band Frequency (Hz)
All-AM
Midslab-AM
All-PM
Midslab-PM

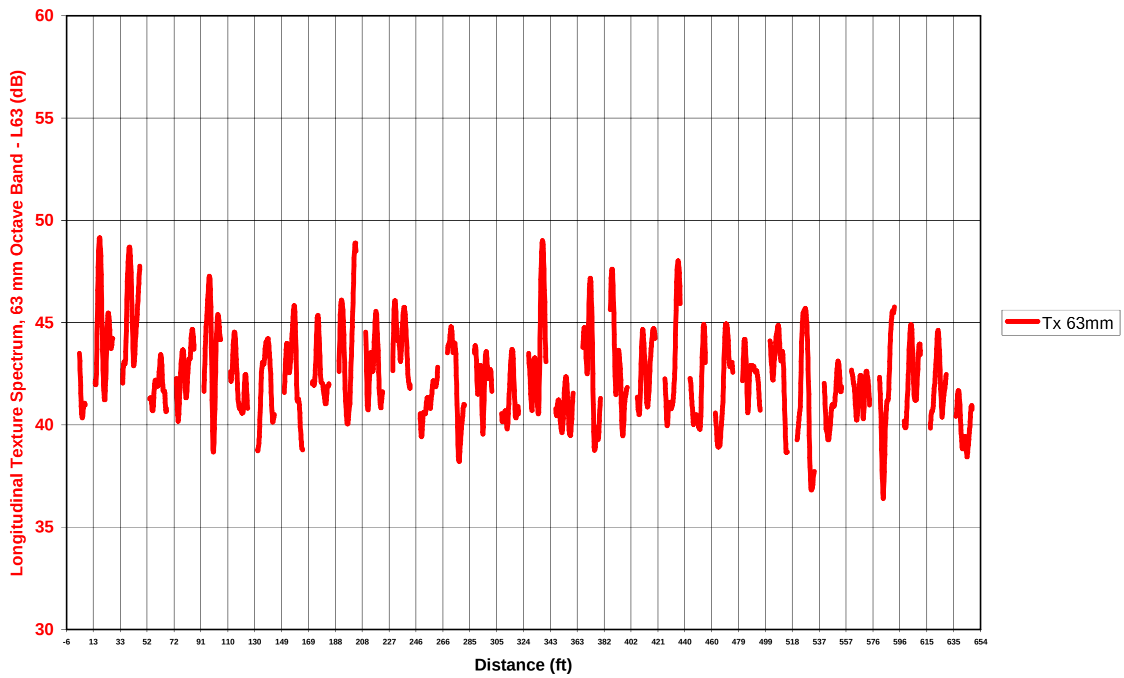


Site 101-2 (IA), Section O (Turf Drag, Heavy Weight)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
100.9
100.7
100.9
100.7
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample

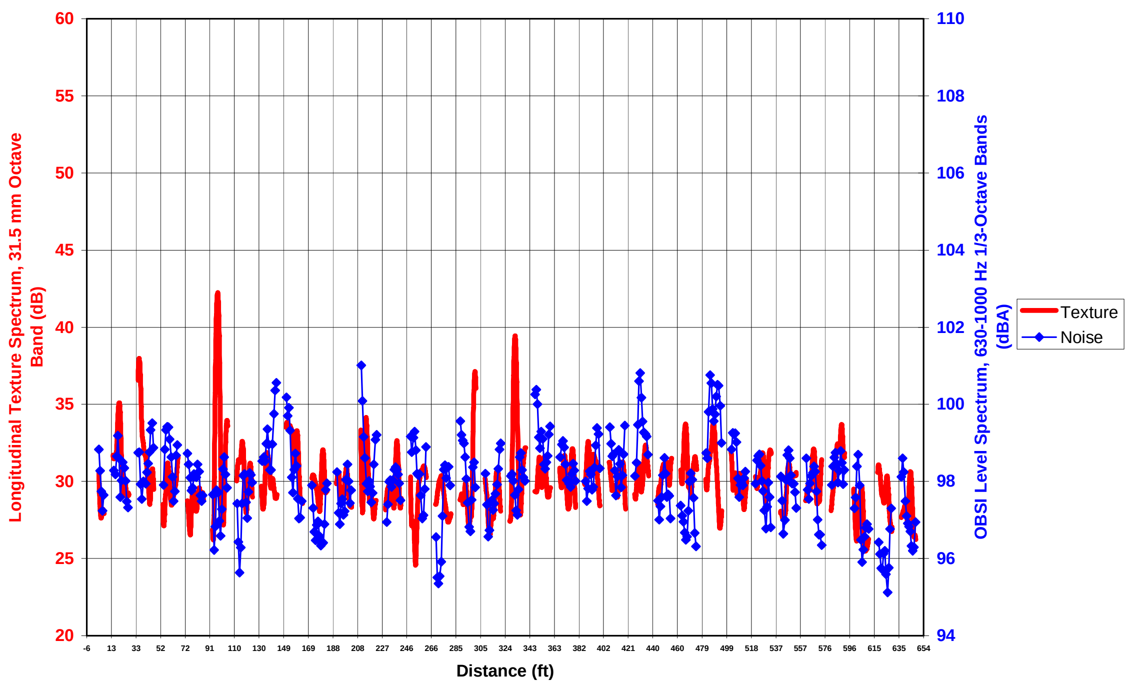


Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-6
13
33
52
72
91
110
130
149
169
188
208
227
246
266
285
305
324
343
363
382
402
421
440
460
479
499
518
537
557
576
596
615
635
654
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM

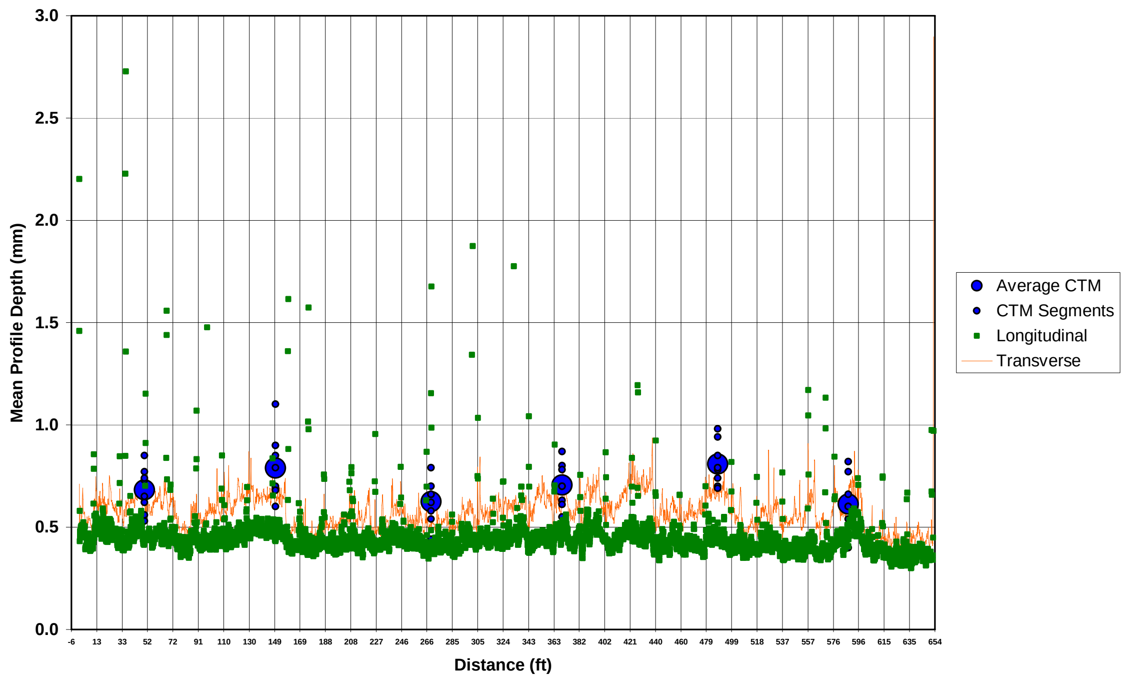
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



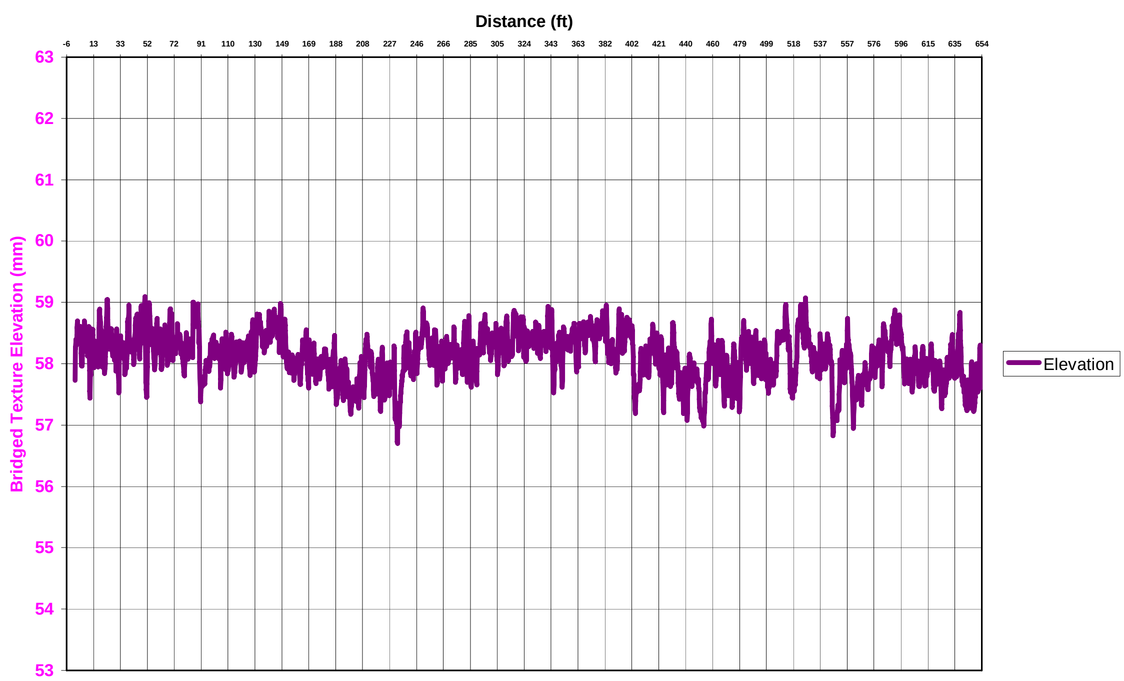
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



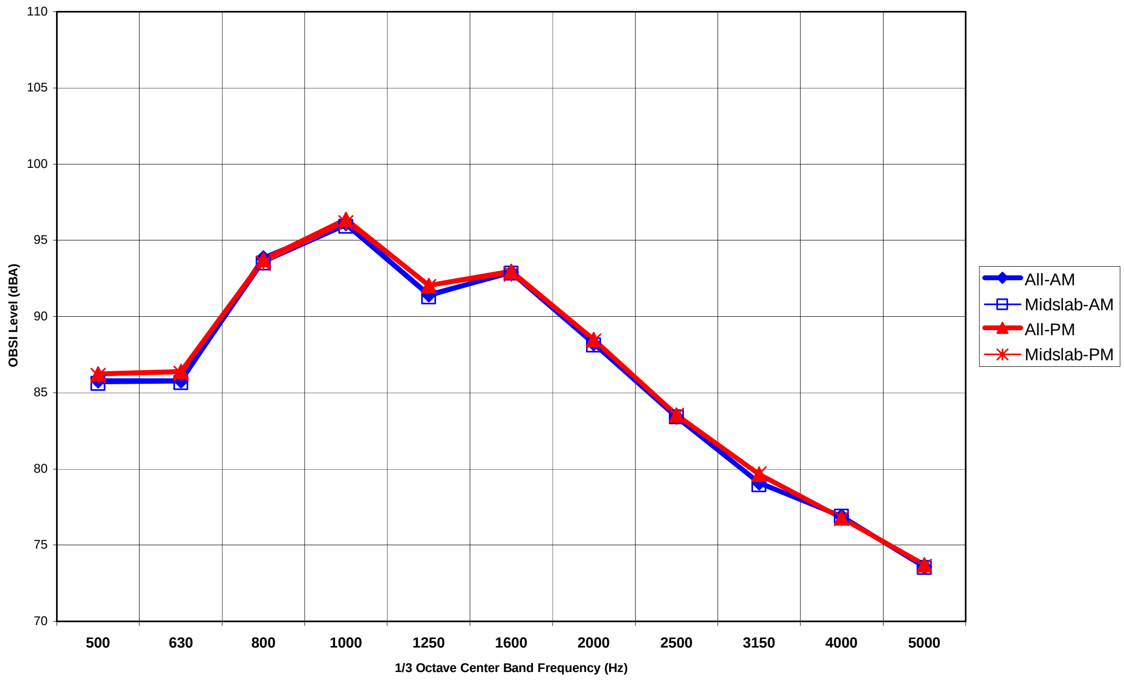
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



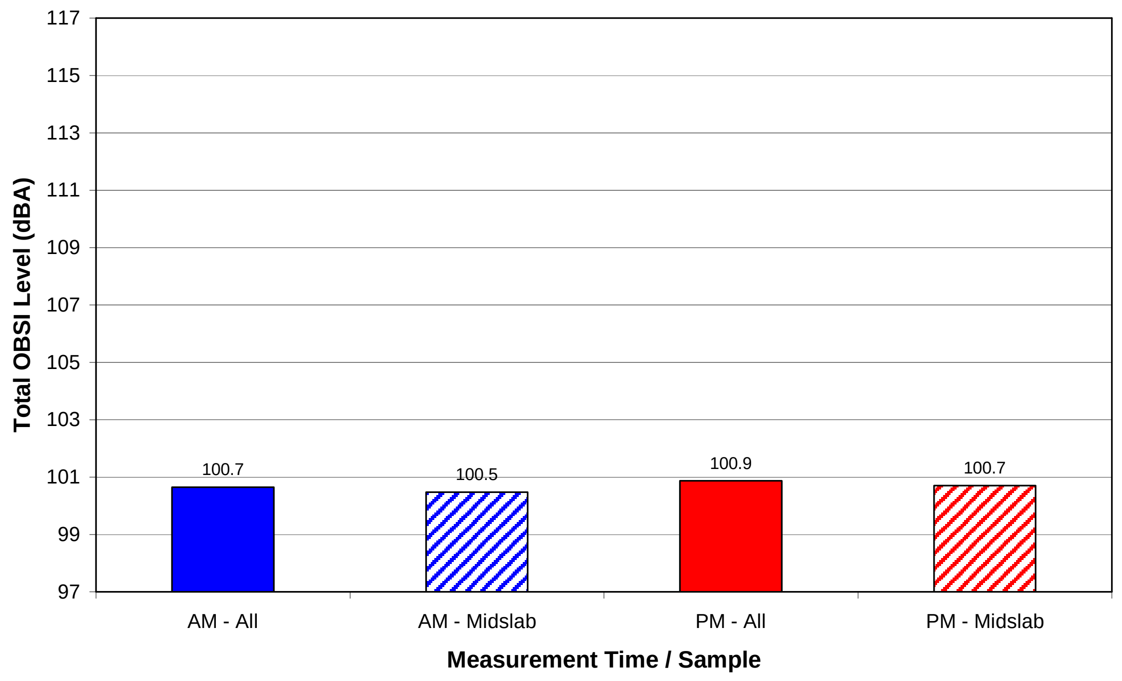
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



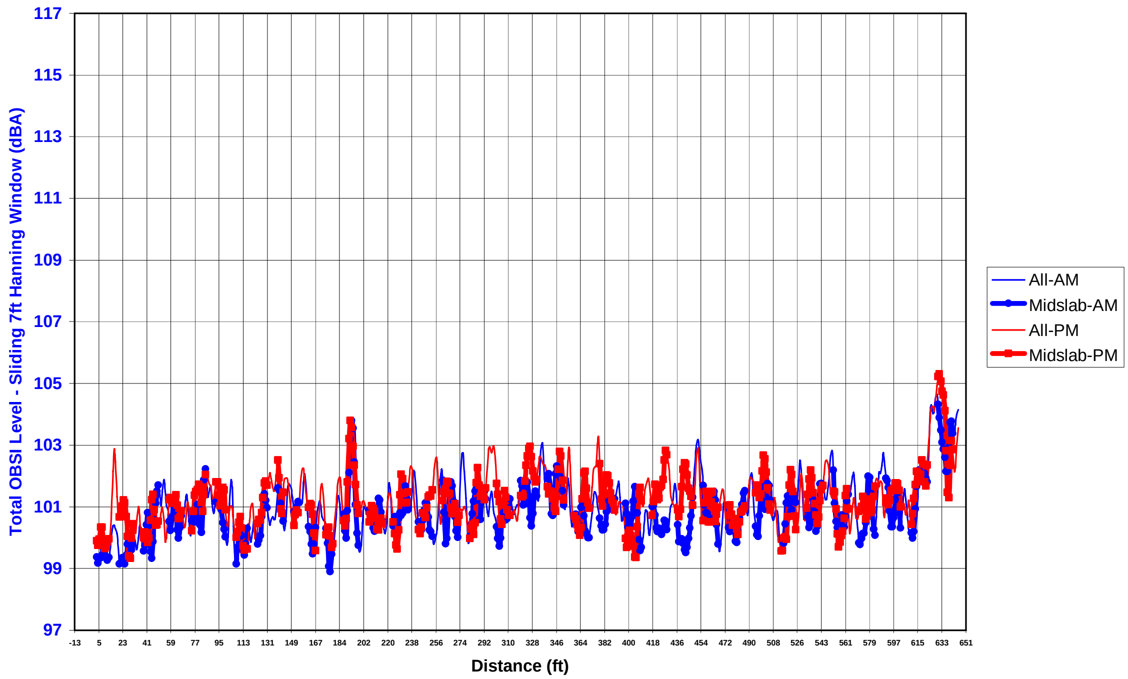
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



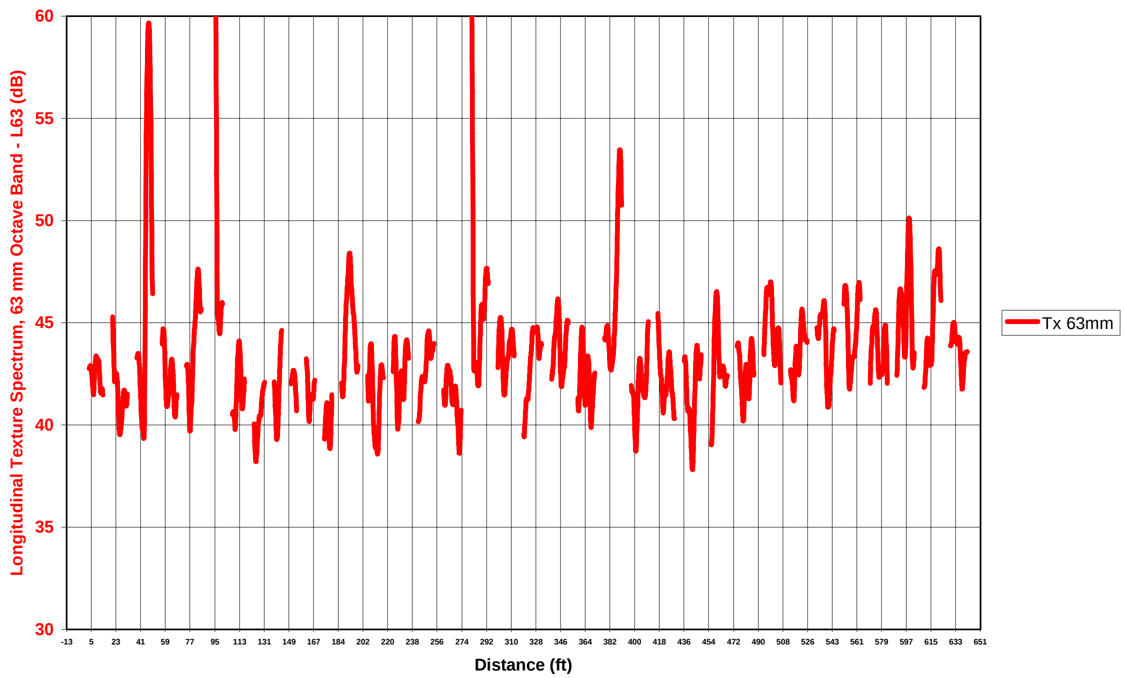
Site 101-2 (IA), Section P (Long. Tining, 3/4" Spacing, 1/16" Depth + Turf Pretexture)



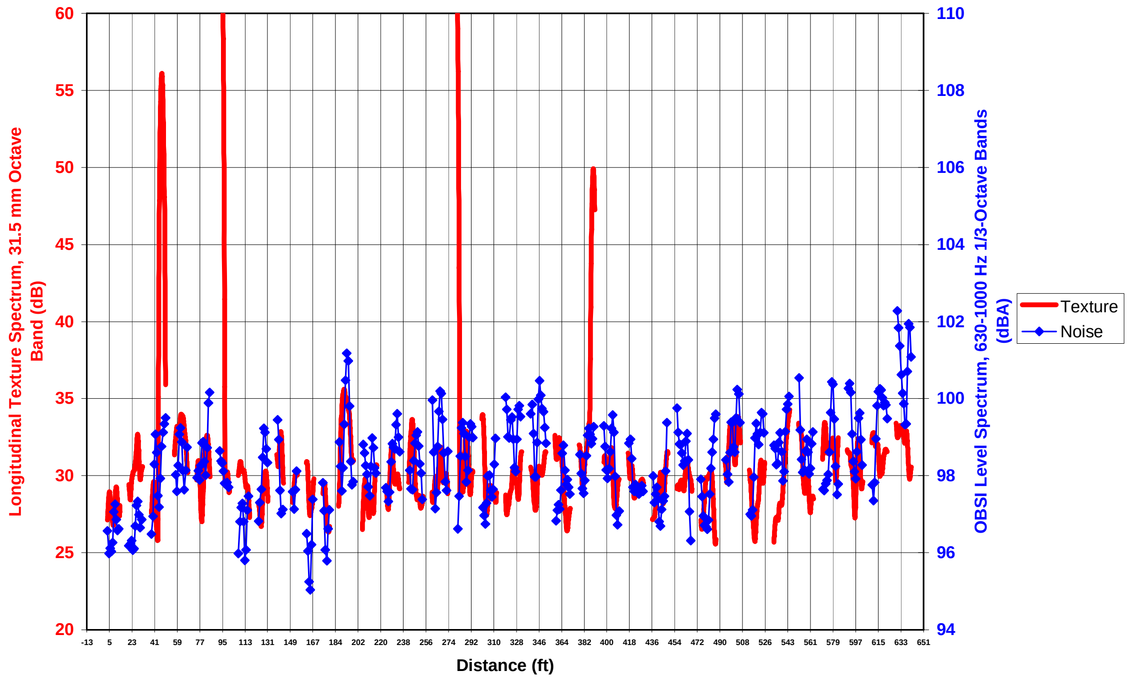
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



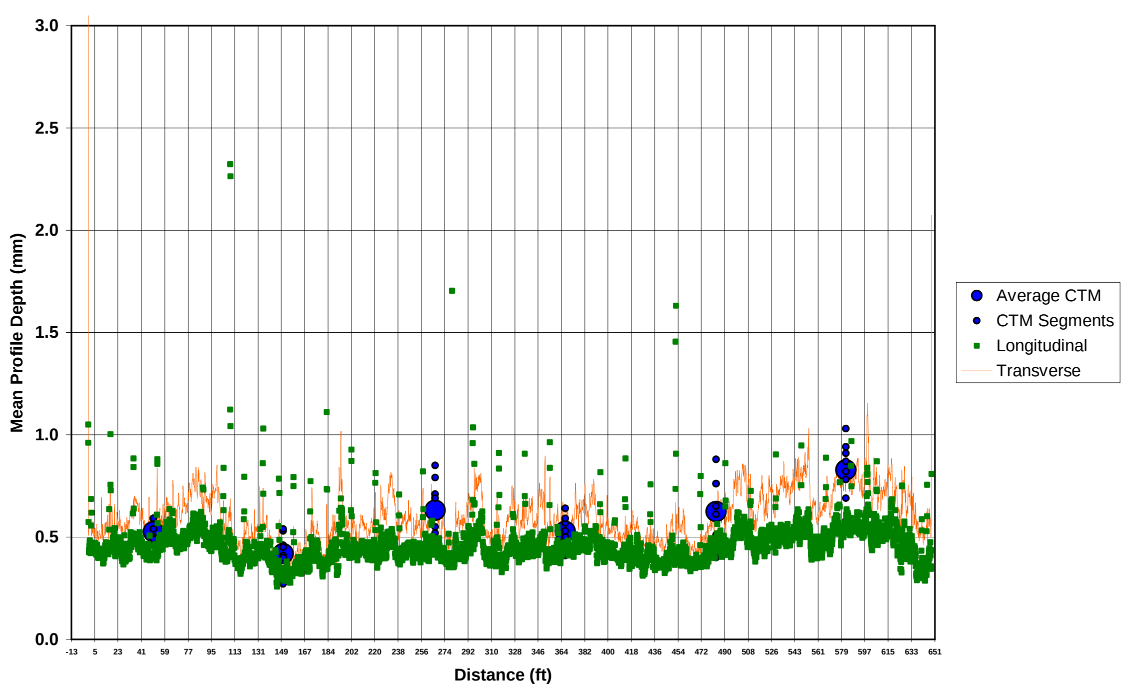
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



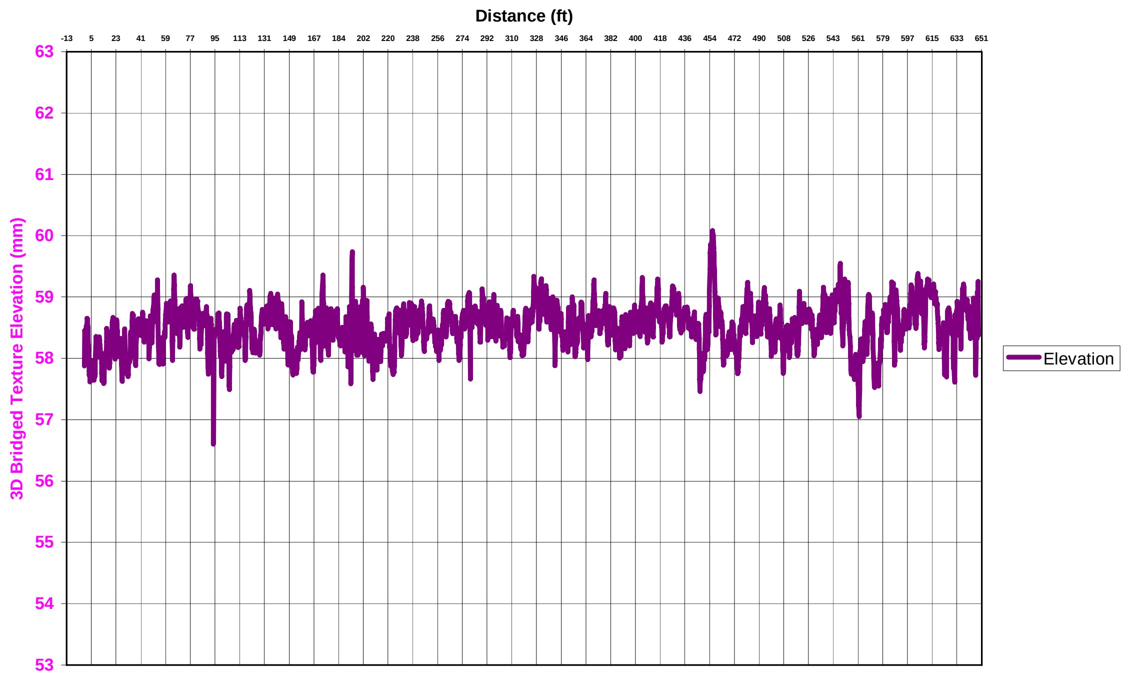
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



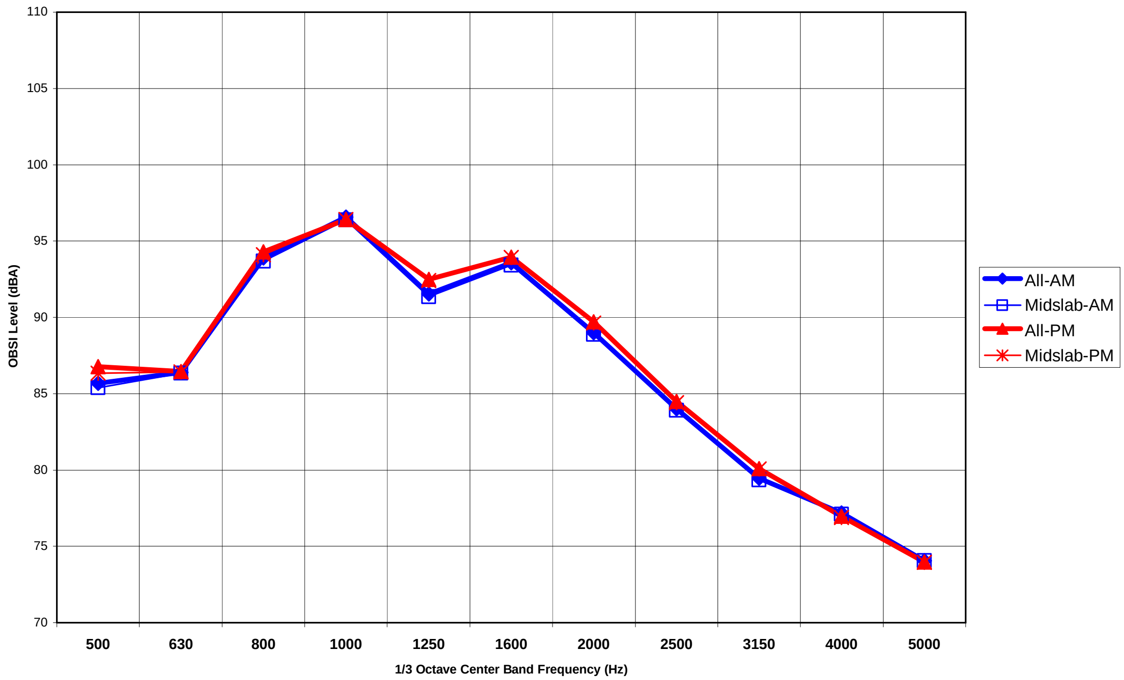
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



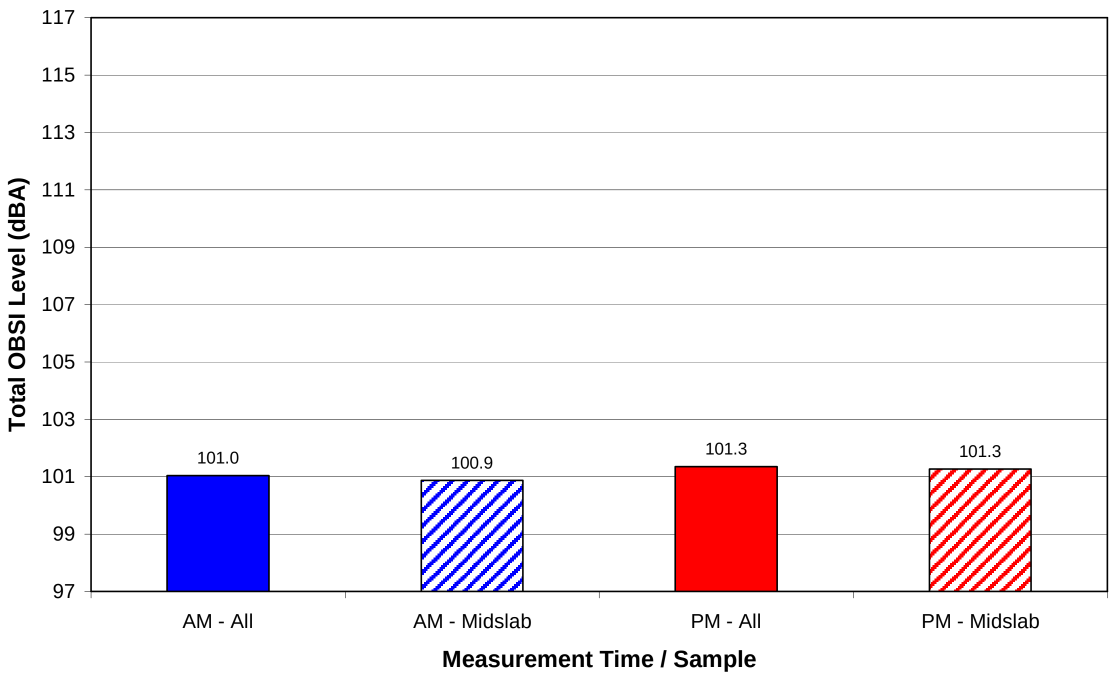
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



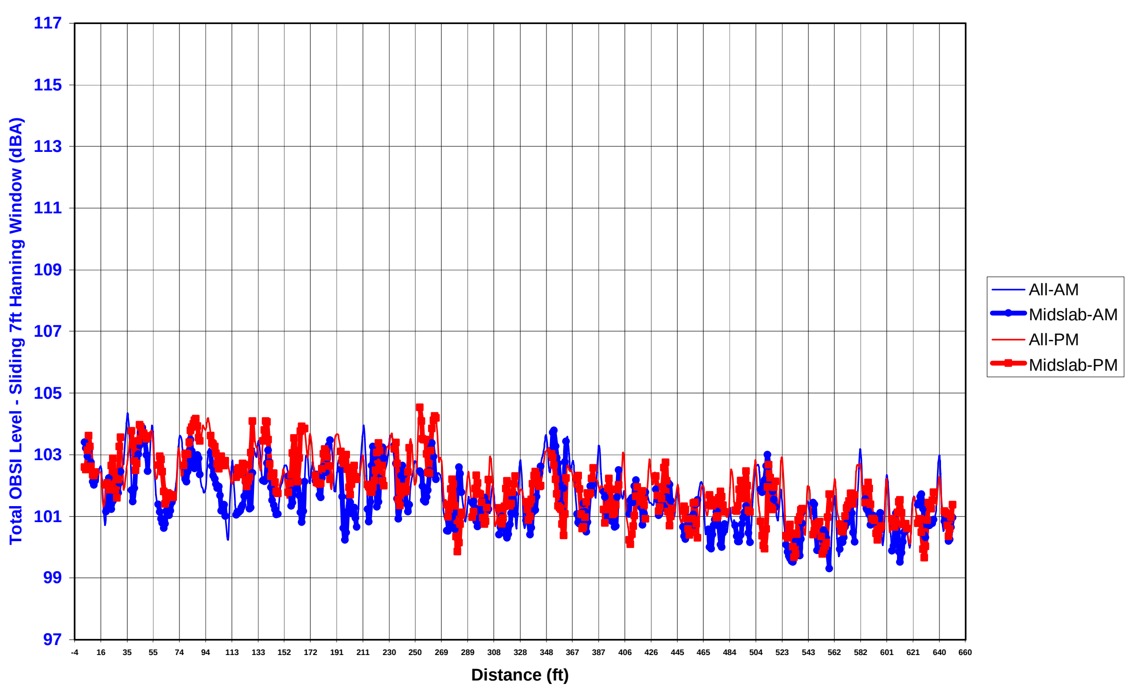
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)

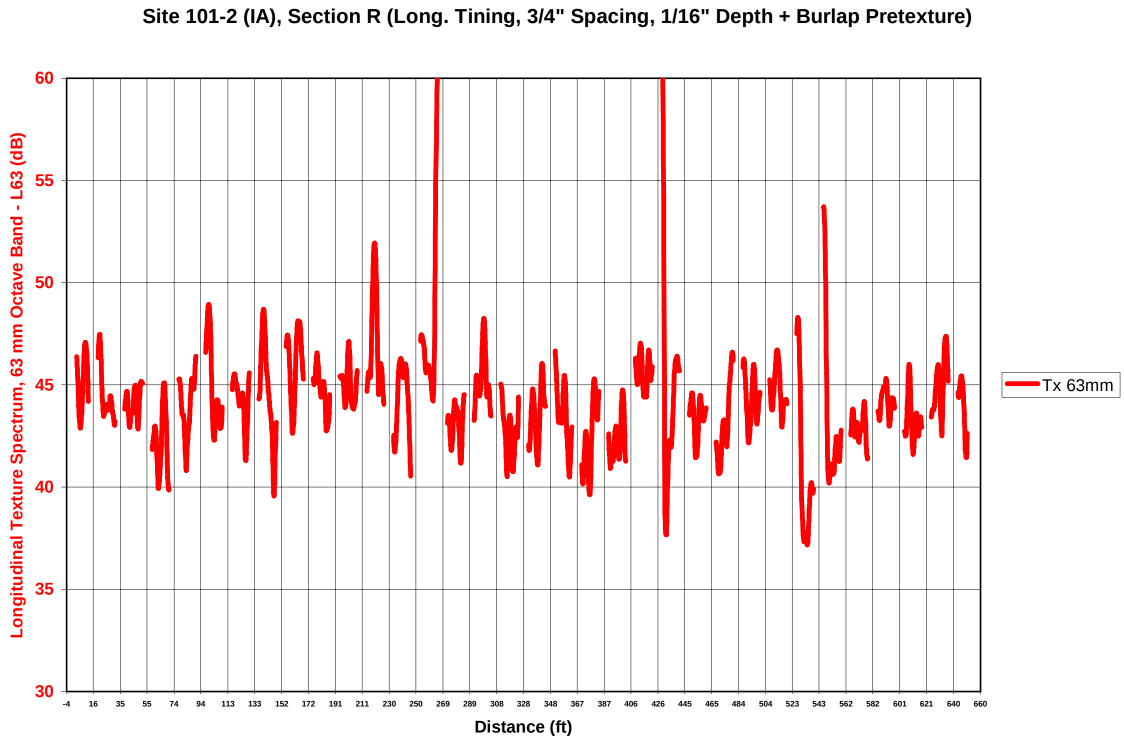


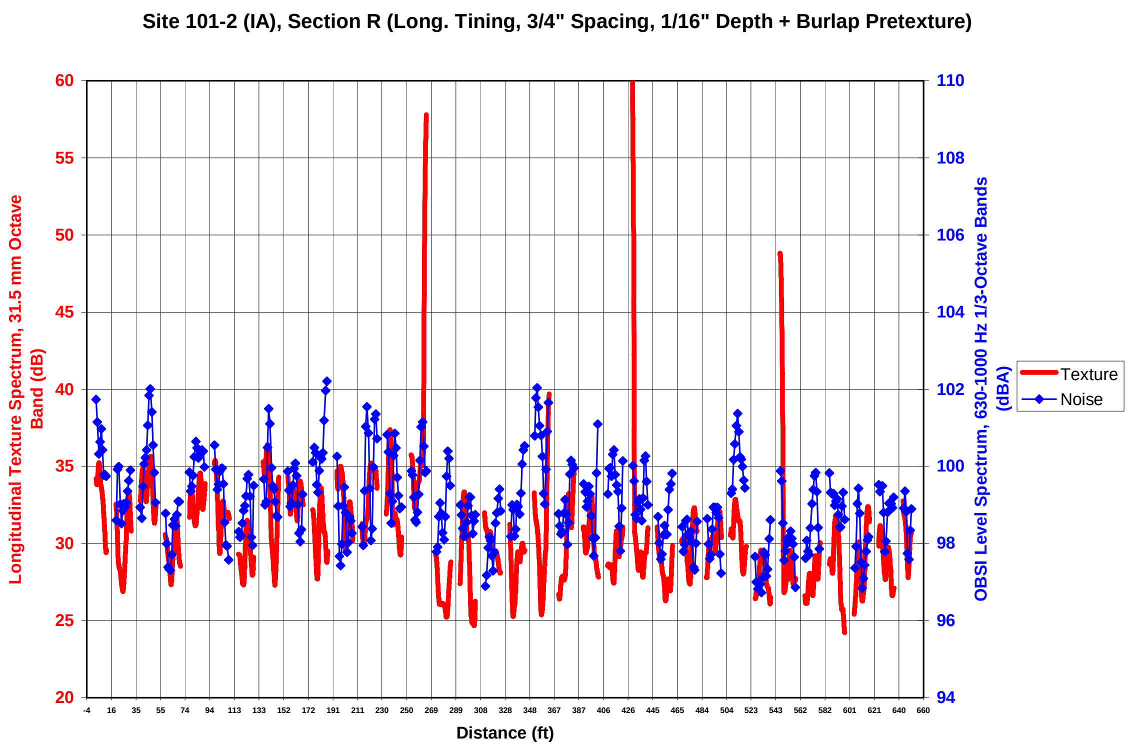
Site 101-2 (IA), Section Q (Long. Tining, 3/4" Spacing, 1/8" Depth + Turf Pretexture)



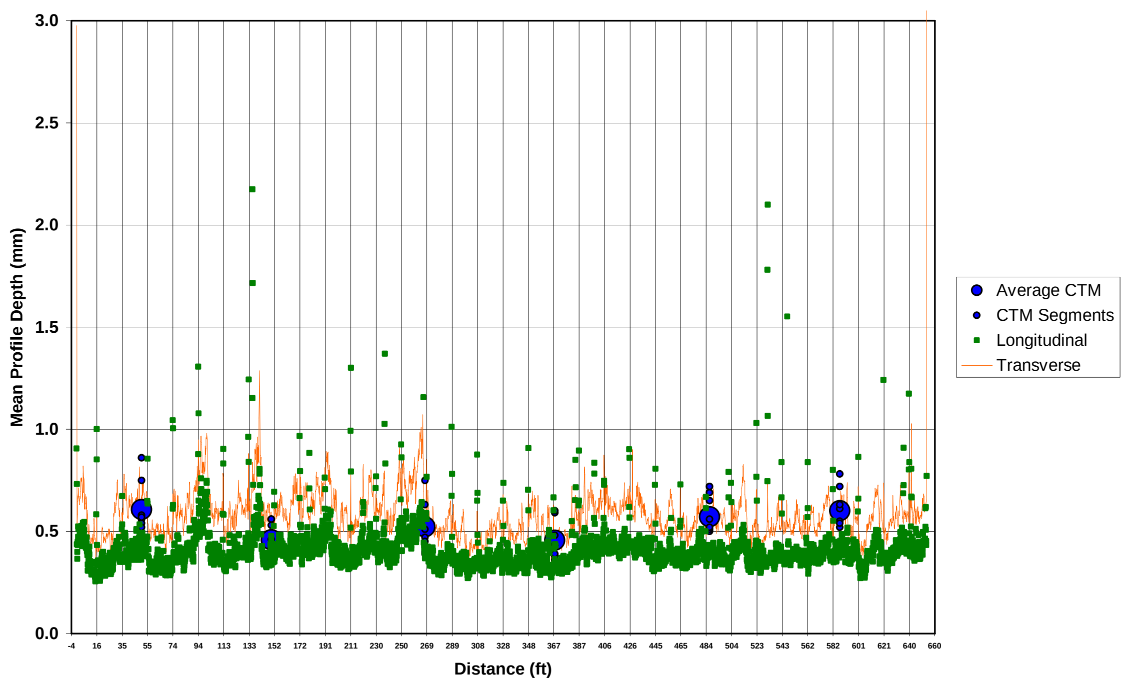
Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)



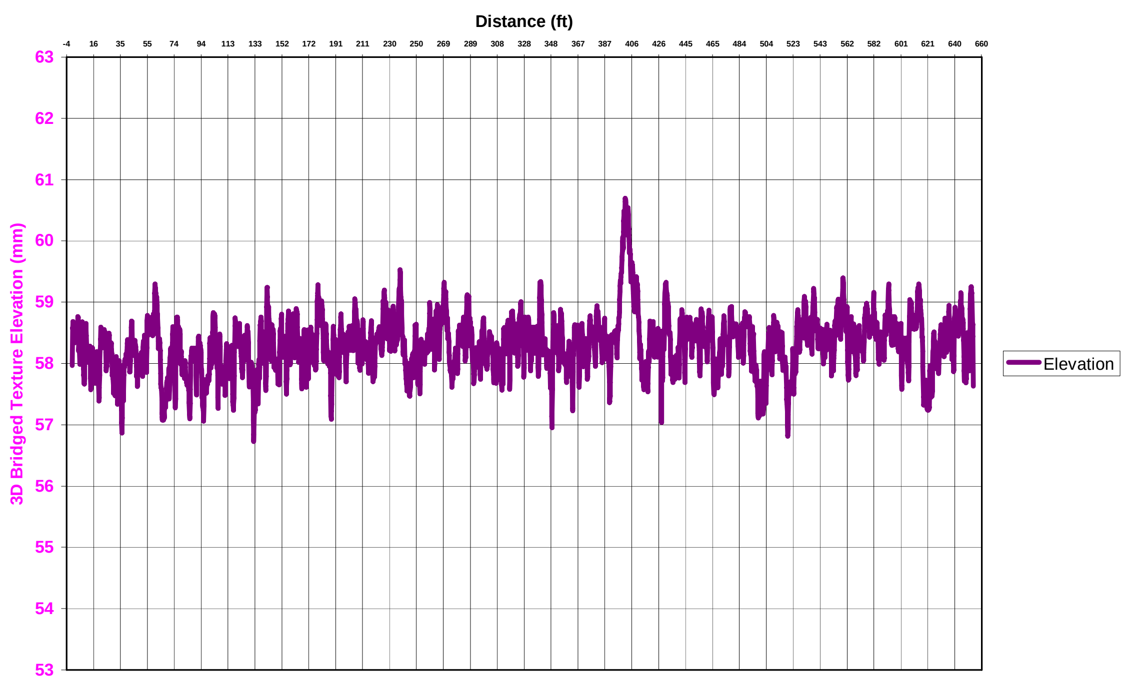

Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
Distance (ft)
Tx 63mm


Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise

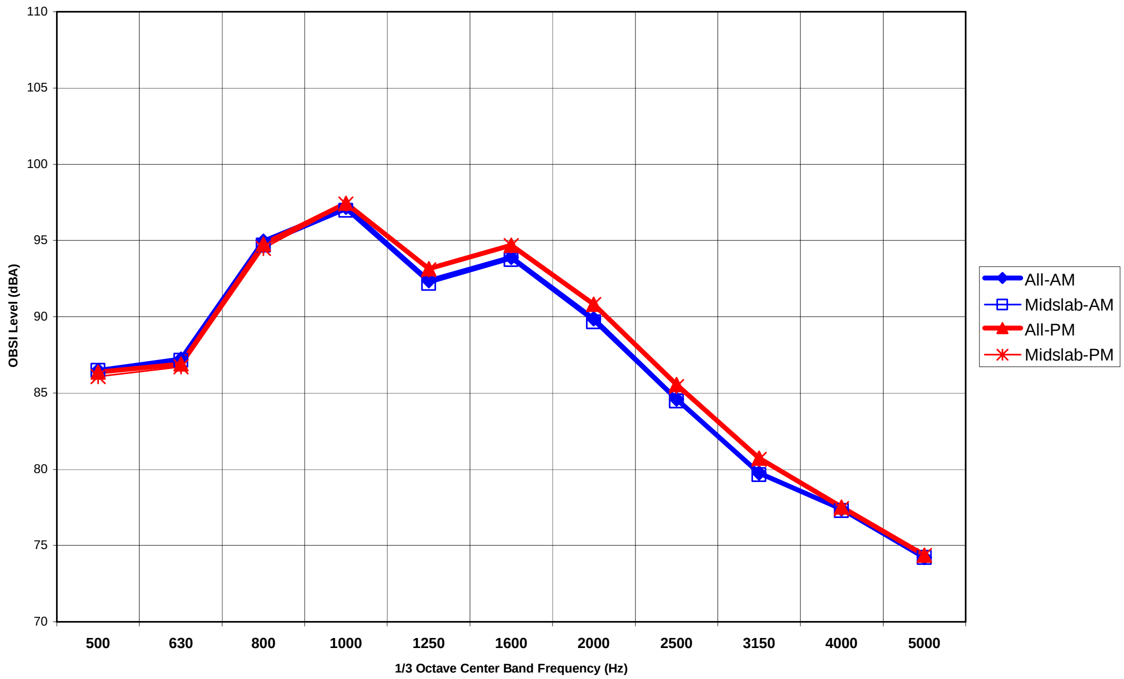
Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)



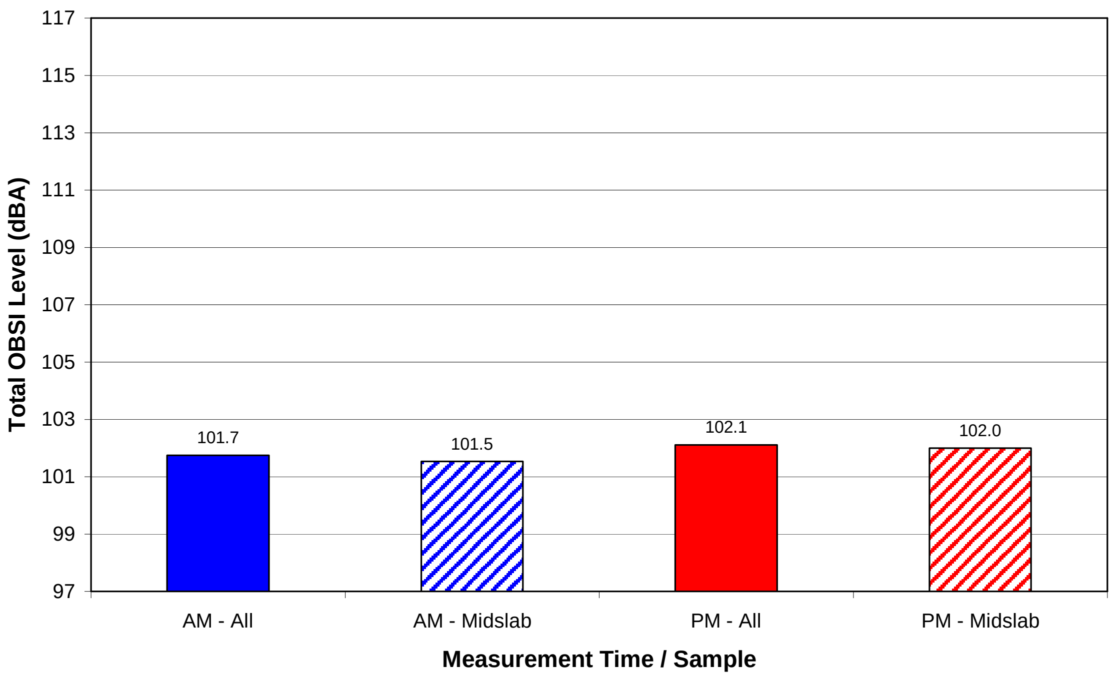
Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)

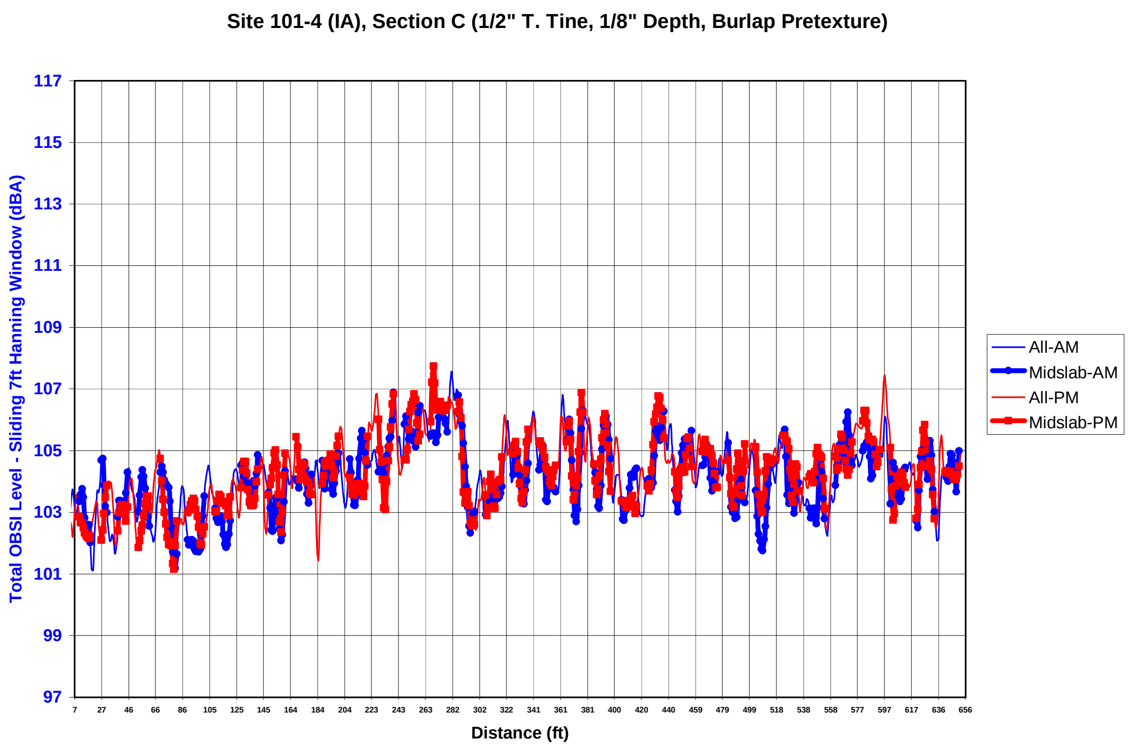


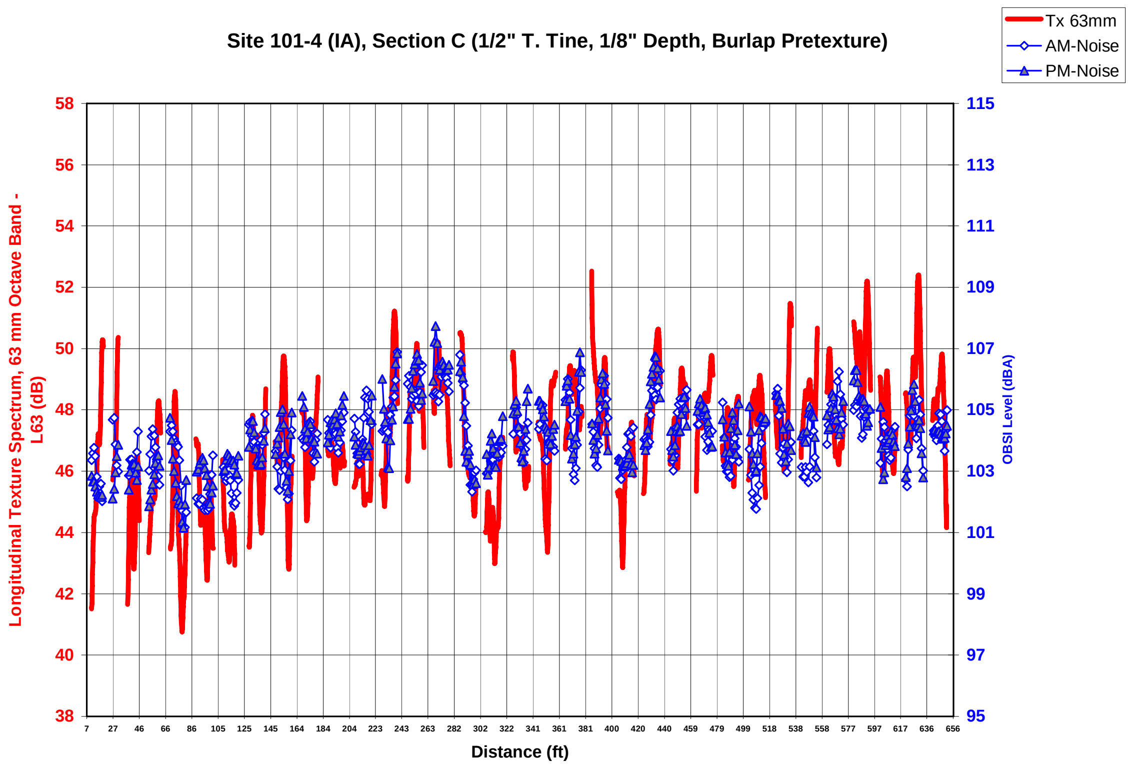
Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)



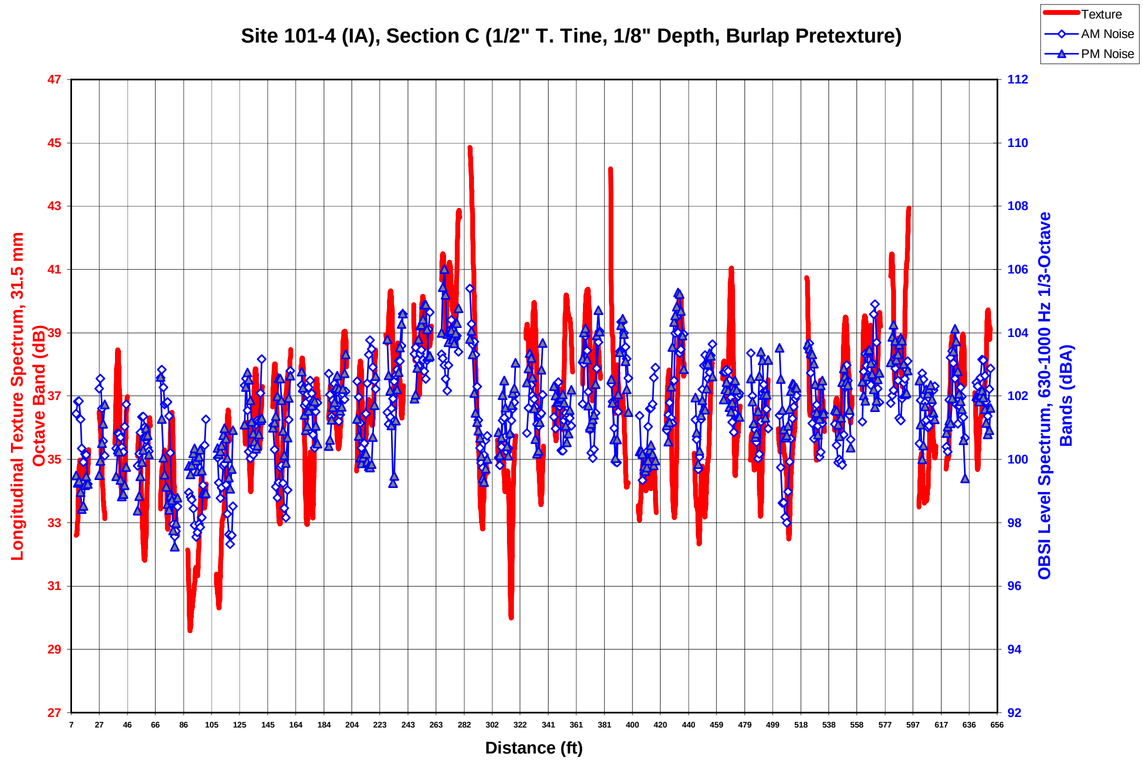
Site 101-2 (IA), Section R (Long. Tining, 3/4" Spacing, 1/16" Depth + Burlap Pretexture)



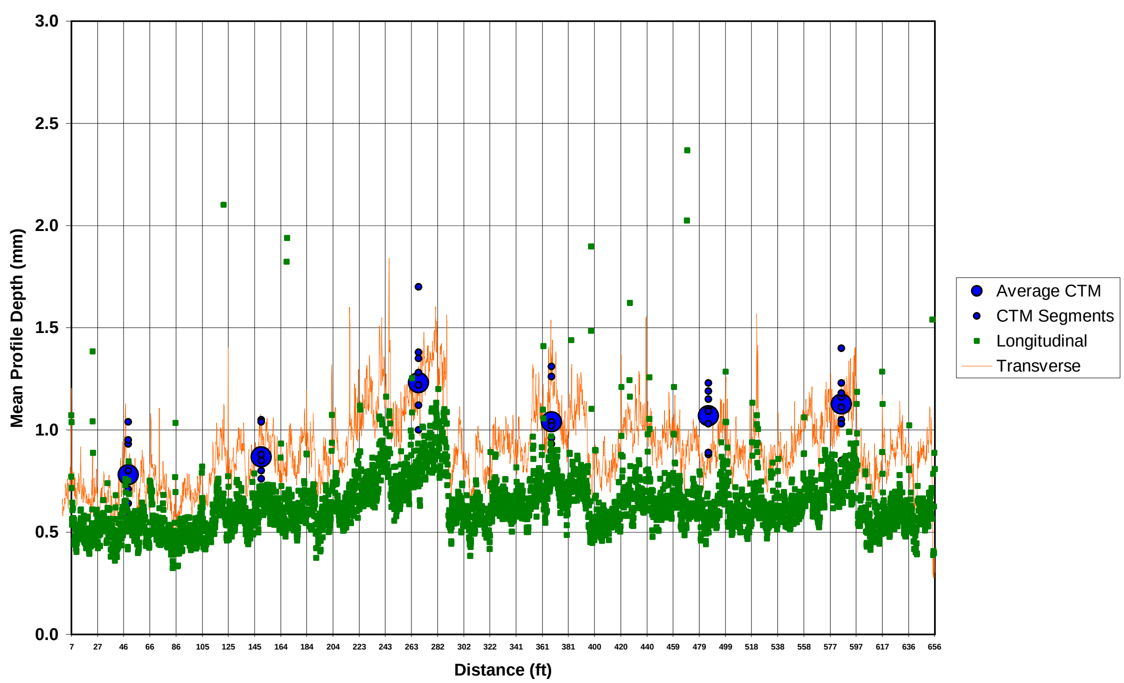

Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)
Tx 63mm
AM-Noise
PM-Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)

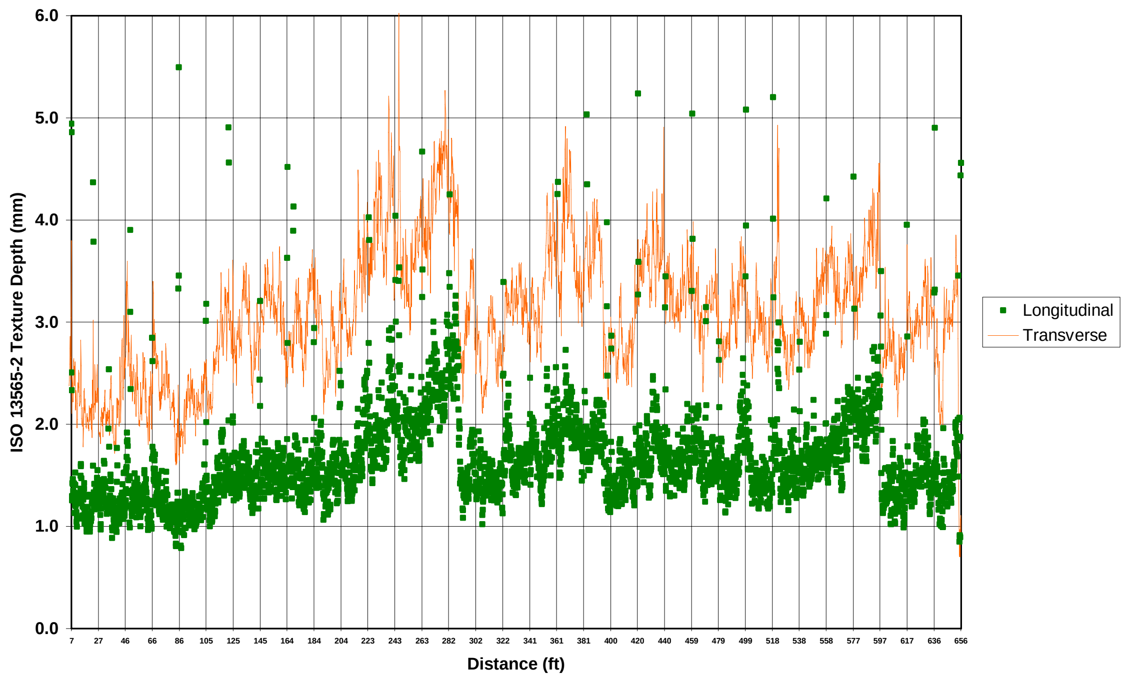
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)



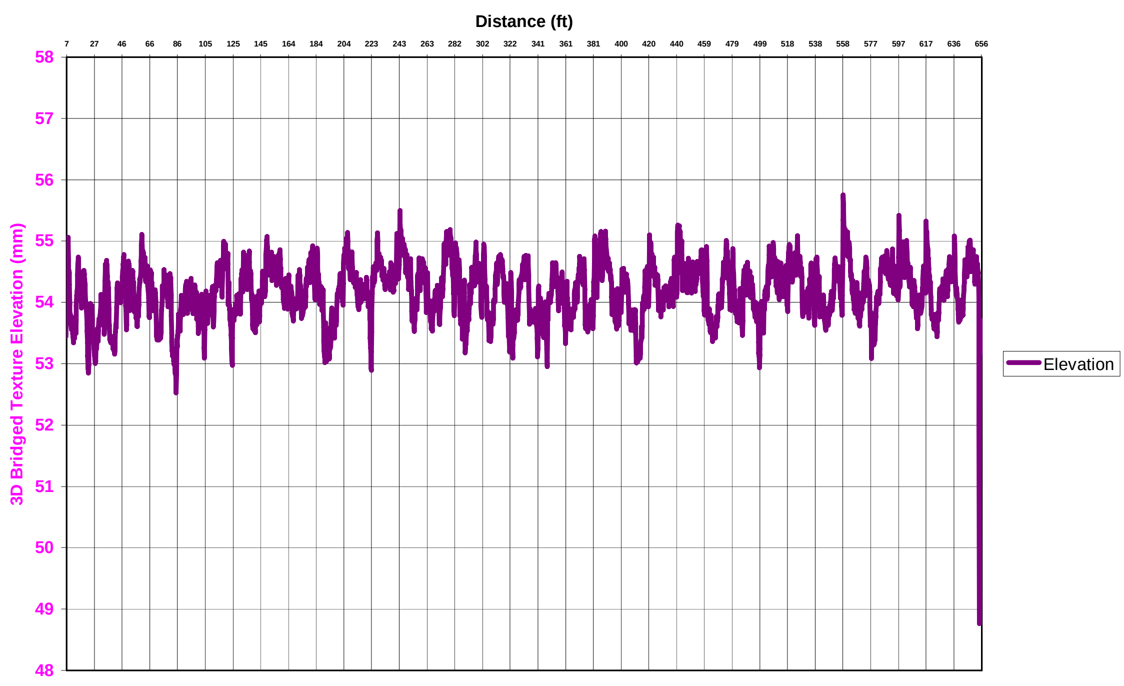
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)



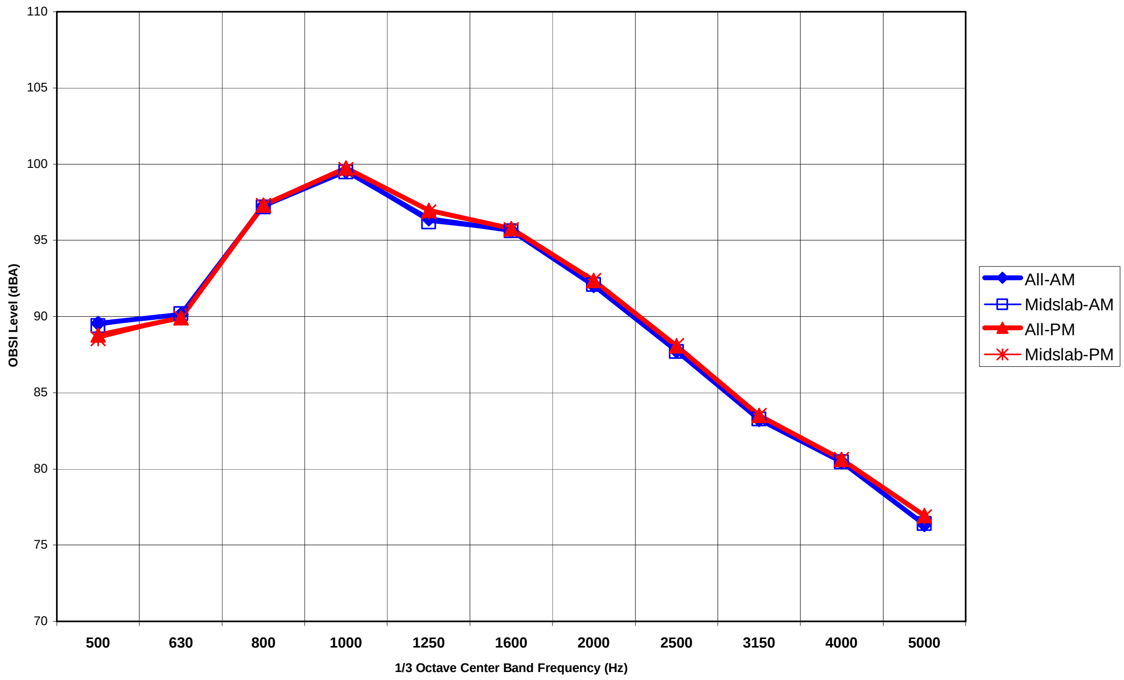
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)



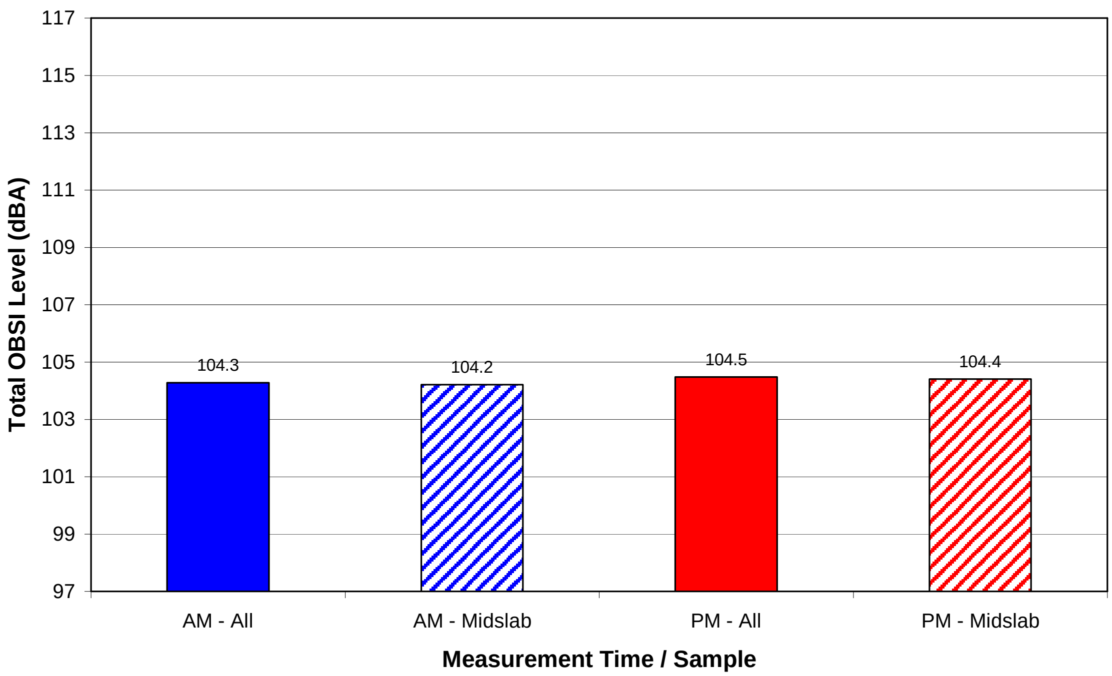
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)

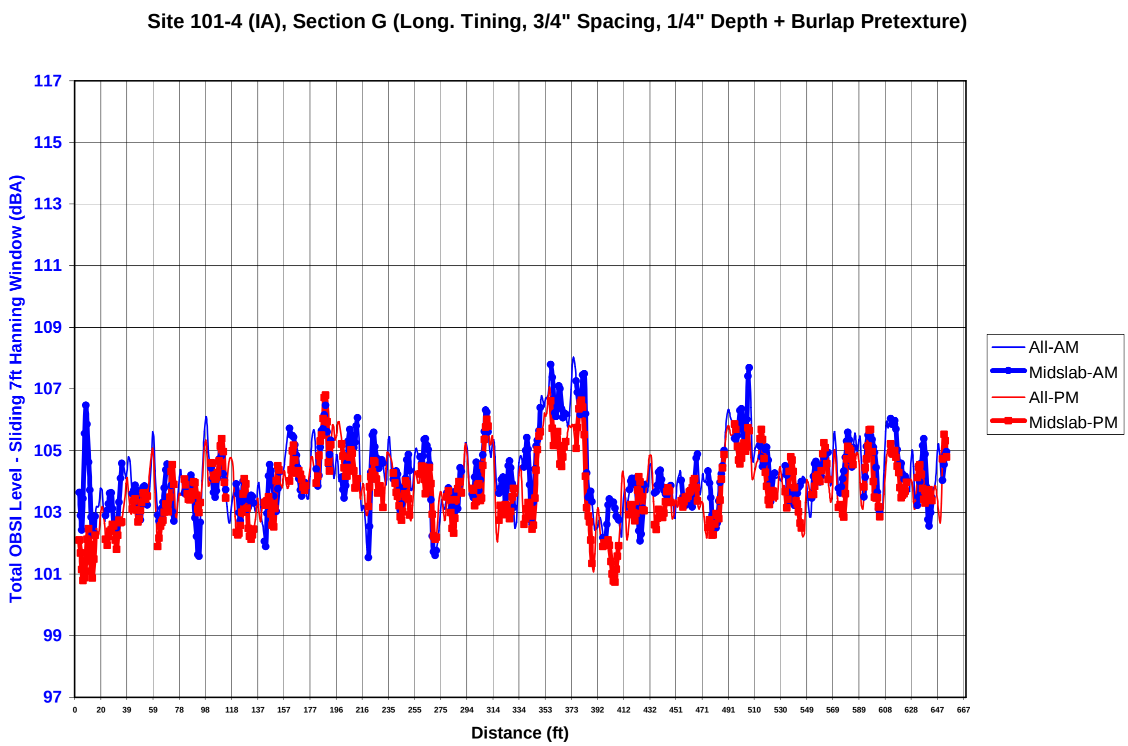


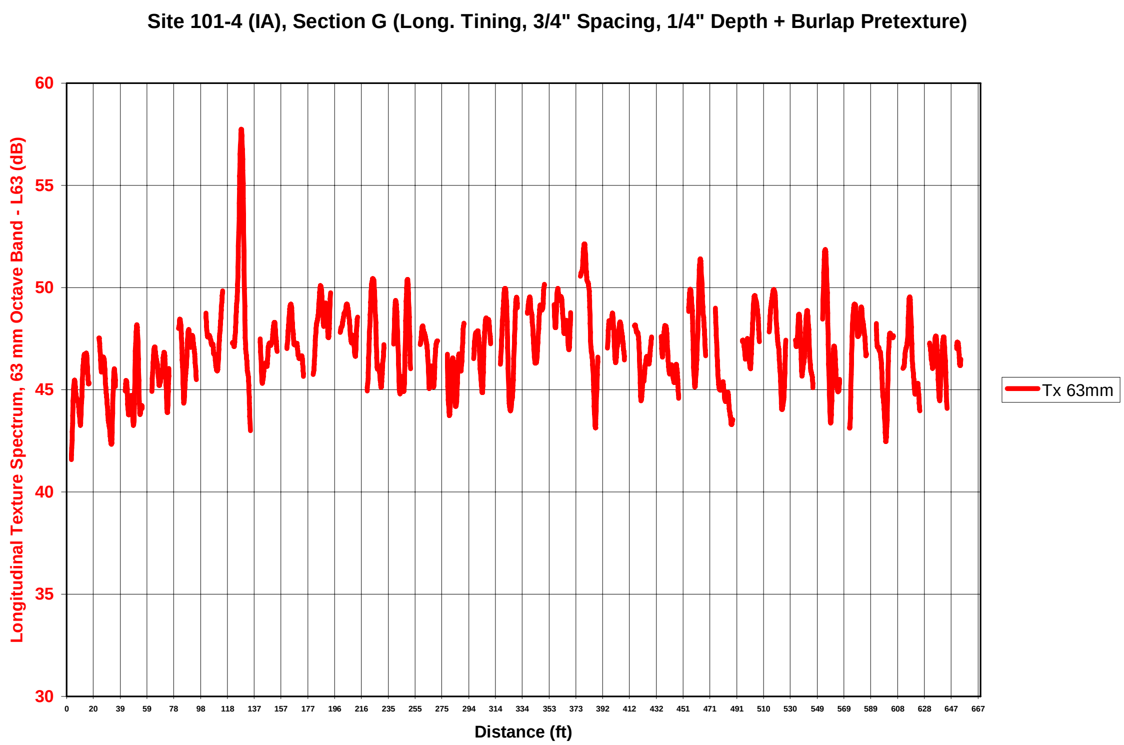
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)



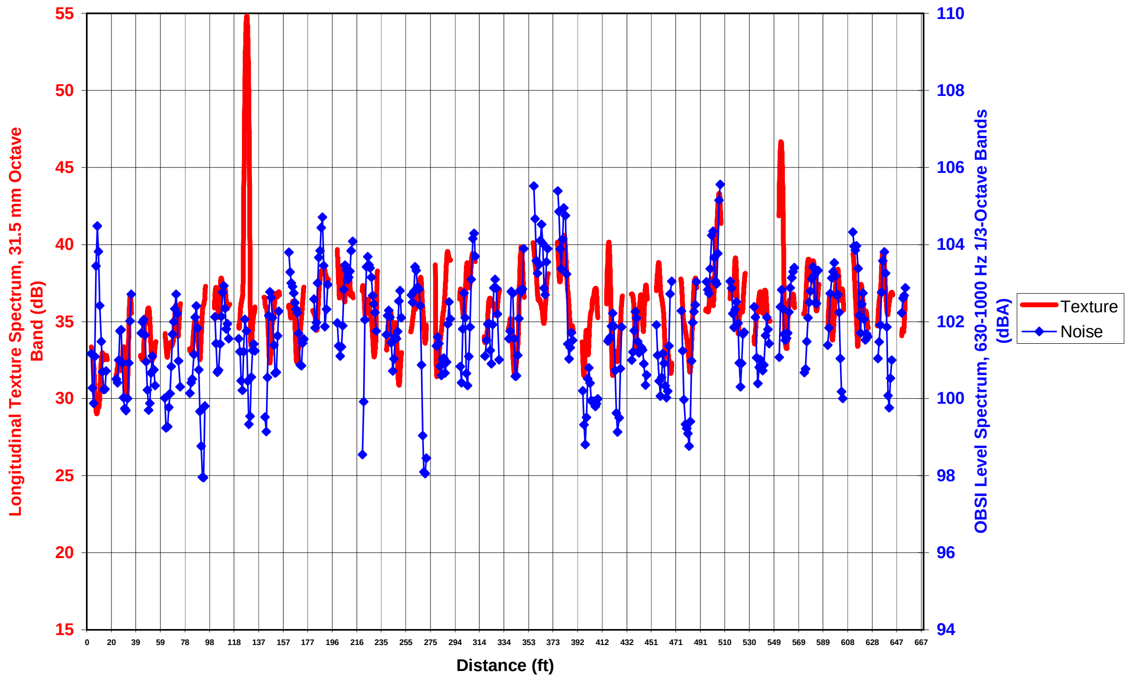
Site 101-4 (IA), Section C (1/2" T. Tine, 1/8" Depth, Burlap Pretexture)



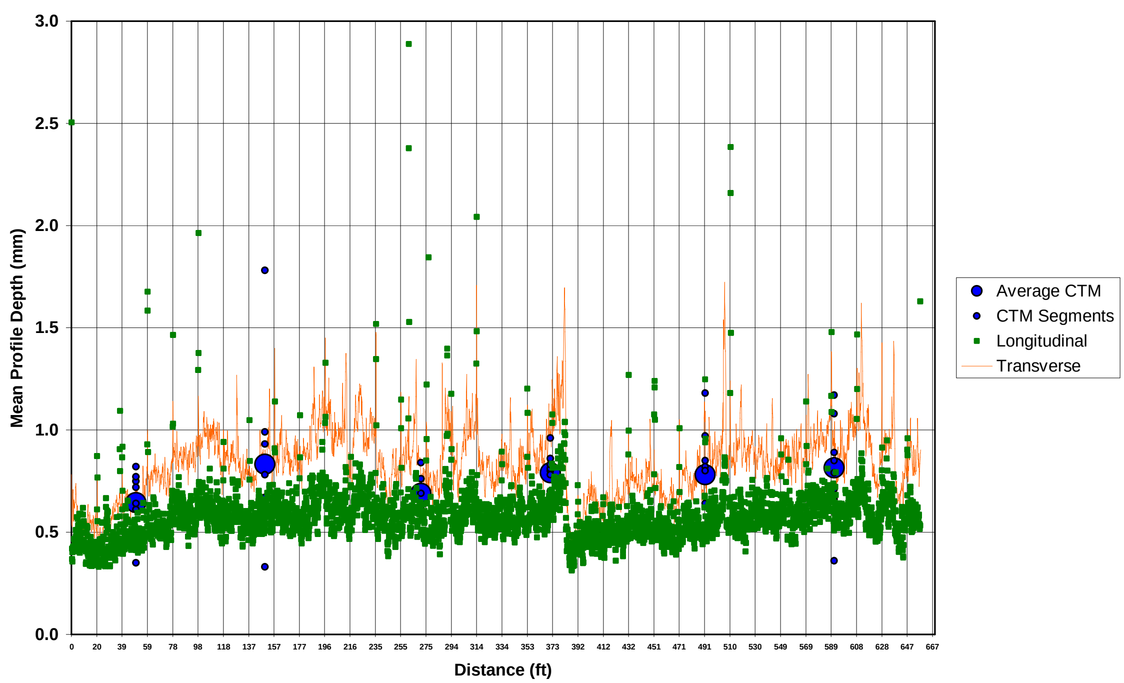

Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
0
20
39
59
78
98
118
137
157
177
196
216
235
255
275
294
314
334
353
373
392
412
432
451
471
491
510
530
549
569
589
608
628
647
667
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
0
20
39
59
78
98
118
137
157
177
196
216
235
255
275
294
314
334
353
373
392
412
432
451
471
491
510
530
549
569
589
608
628
647
667
Distance (ft)
Tx 63mm

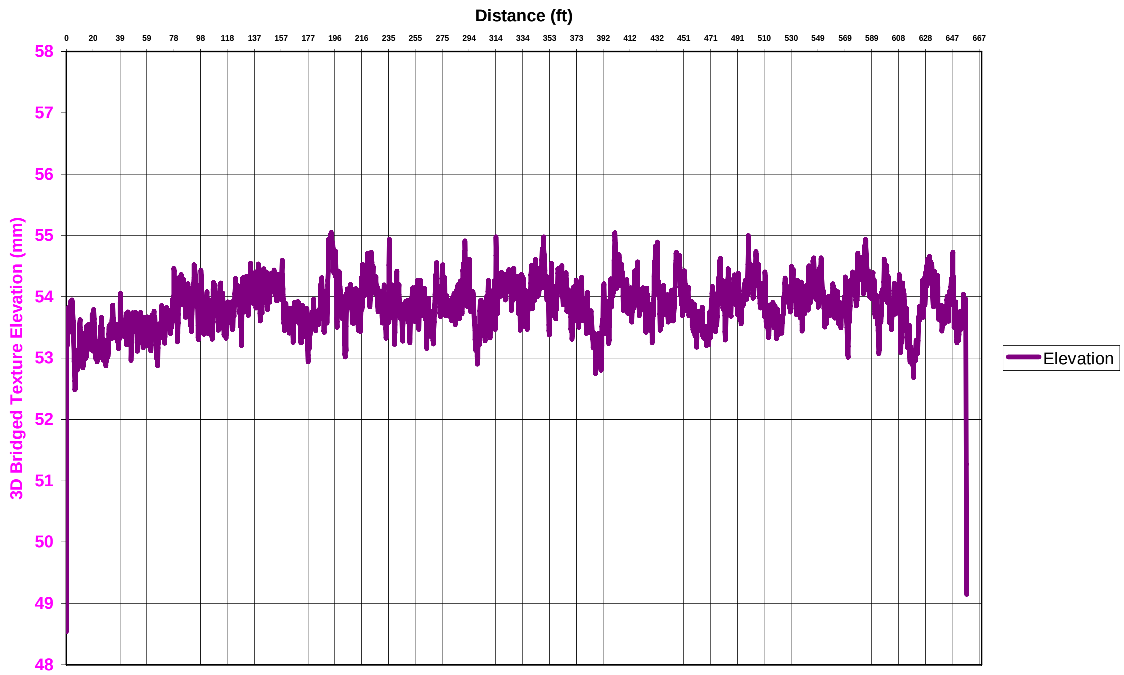
Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



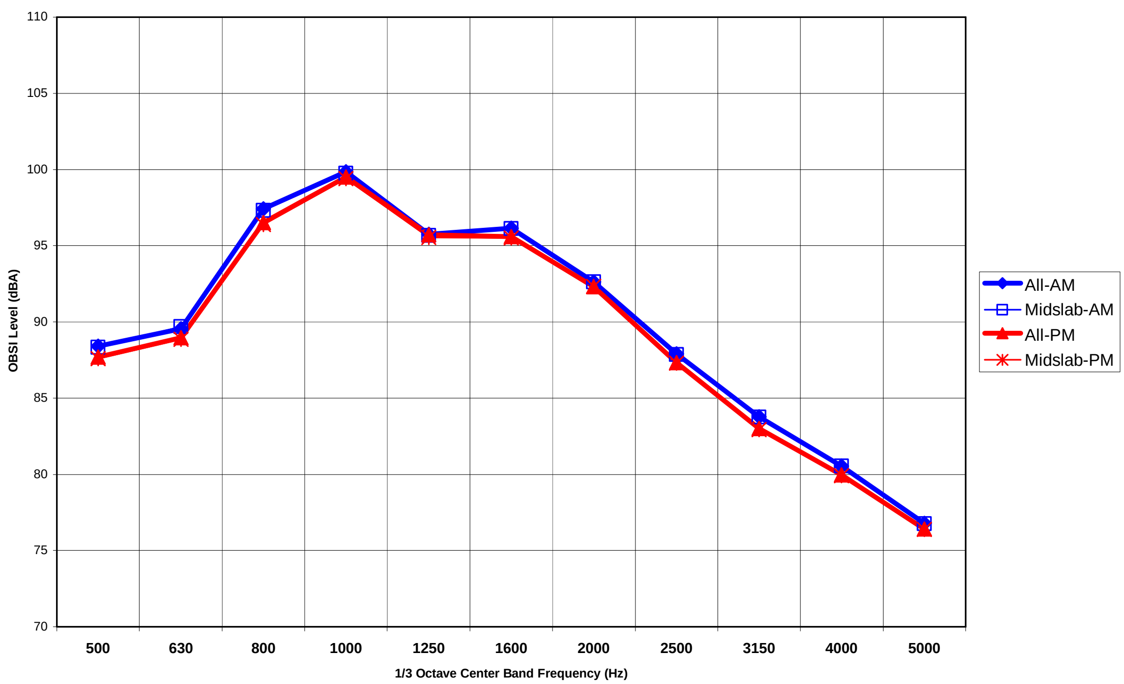
Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



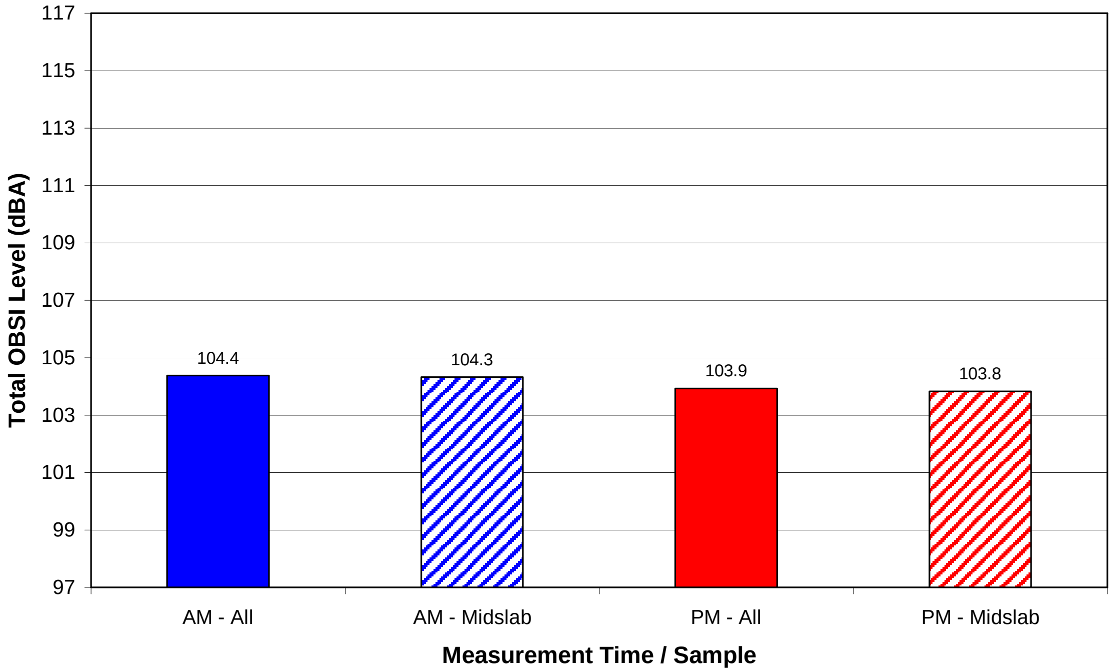
Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)



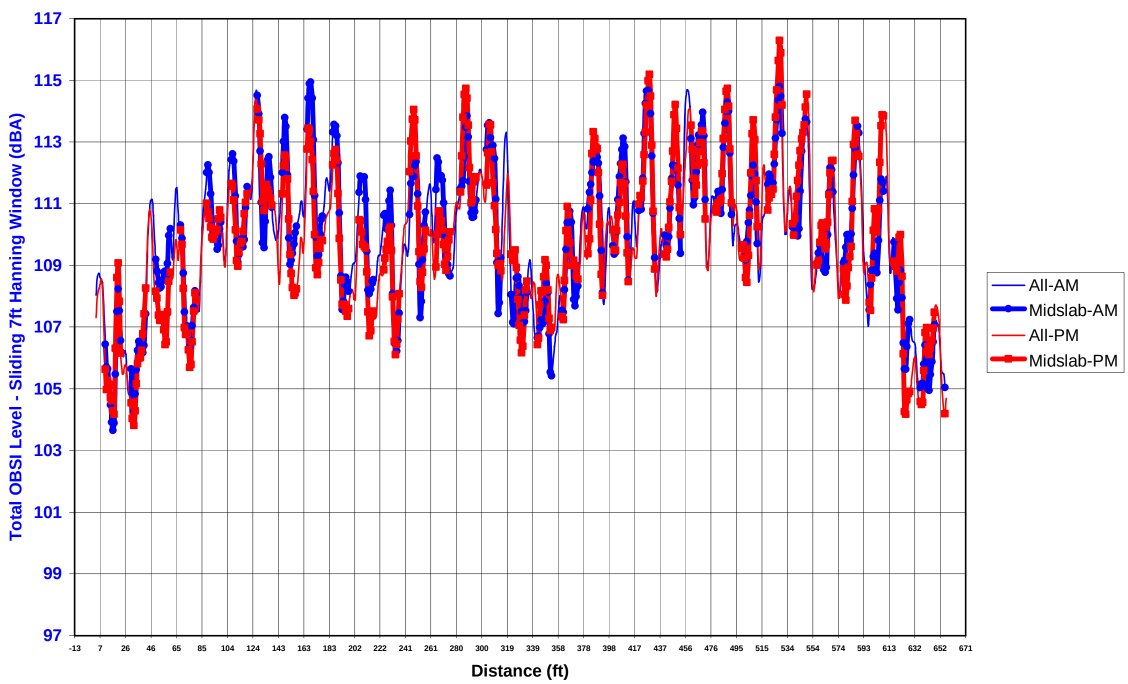
Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)

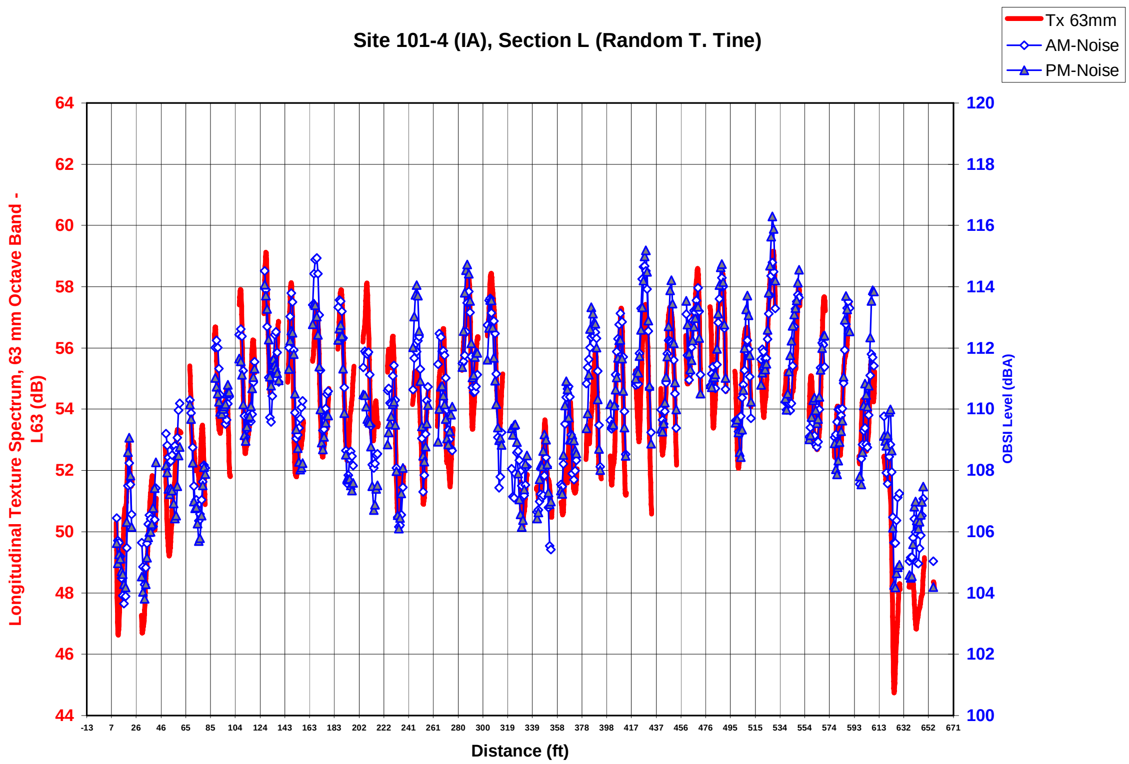


Site 101-4 (IA), Section G (Long. Tining, 3/4" Spacing, 1/4" Depth + Burlap Pretexture)

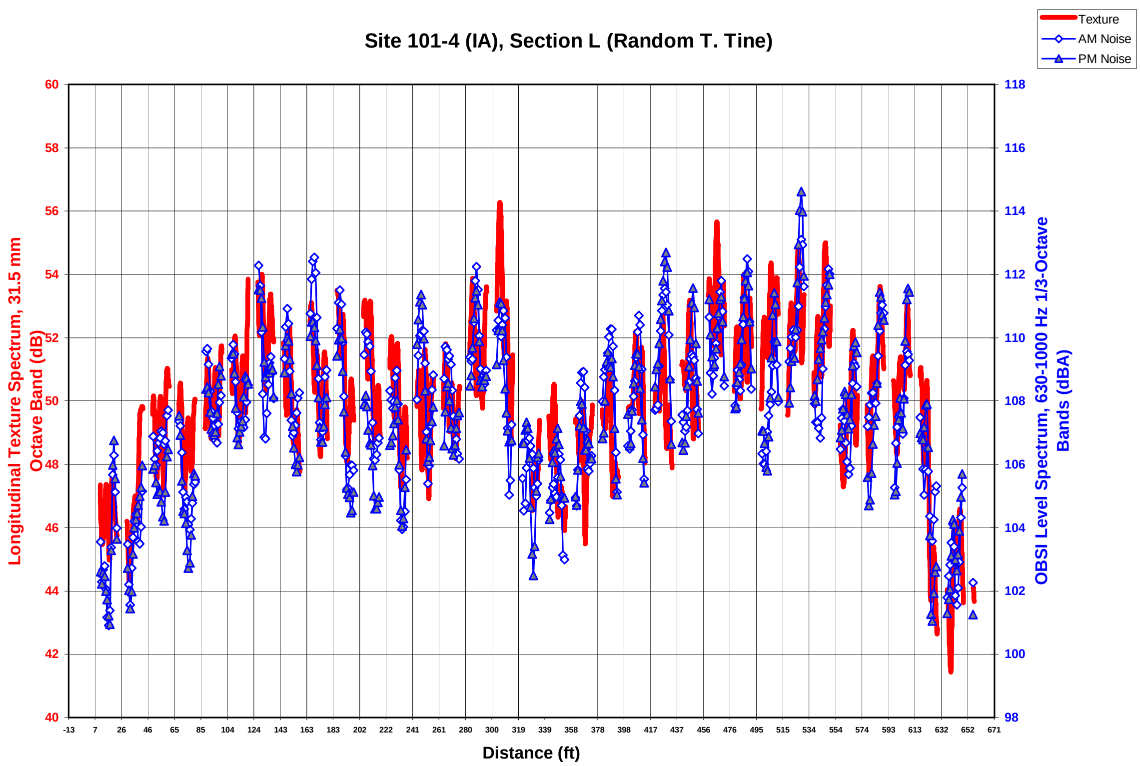

Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
104.4
104.3
103.9
103.8
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample

Site 101-4 (IA), Section L (Random T. Tine)


Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-13
7
26
46
65
85
104
124
143
163
183
202
222
241
261
280
300
319
339
358
378
398
417
437
456
476
495
515
534
554
574
593
613
632
652
671
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM

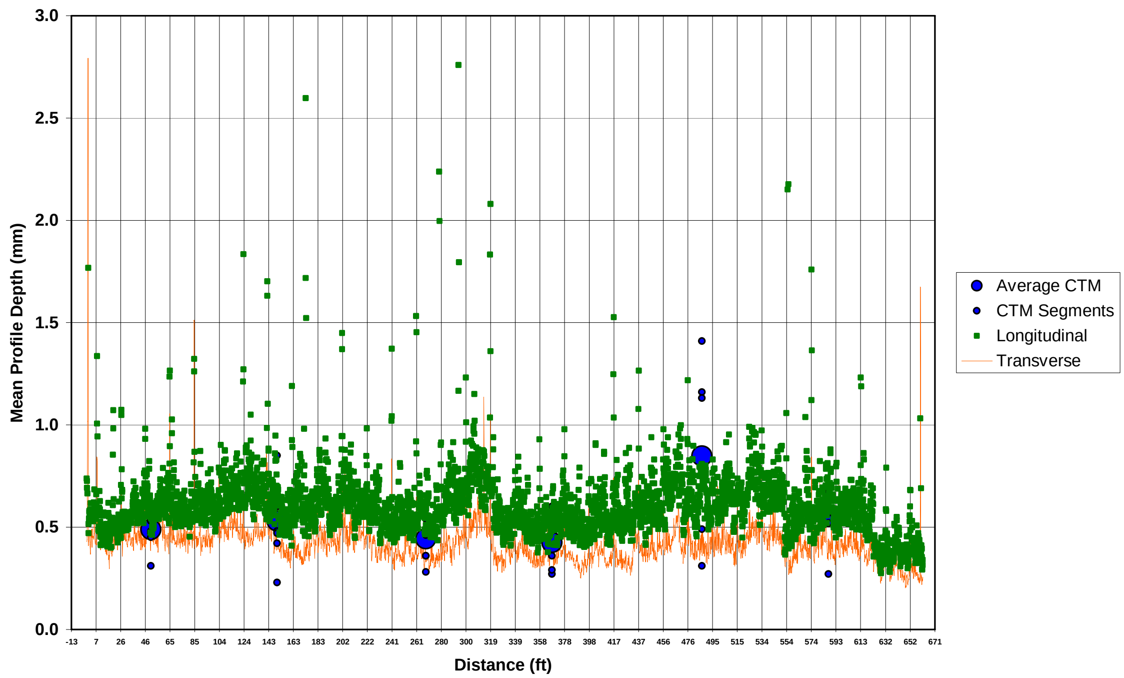


Site 101-4 (IA), Section L (Random T. Tine)
Tx 63mm
AM-Noise
PM-Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)

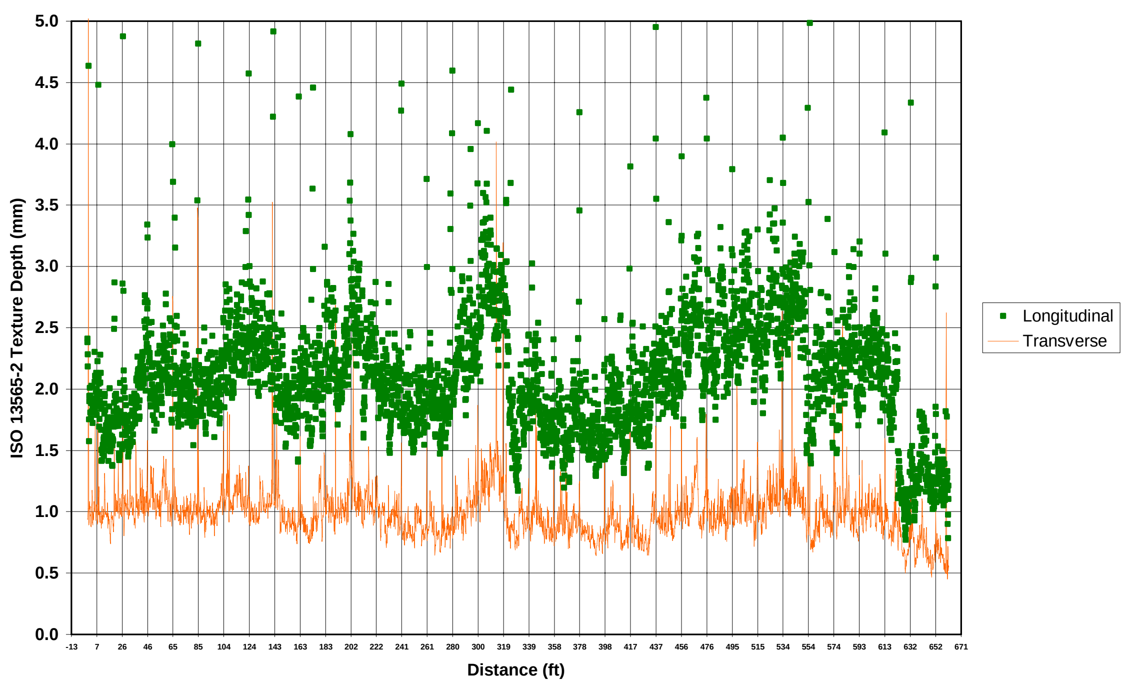


Site 101-4 (IA), Section L (Random T. Tine)
Texture
AM Noise
PM Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)

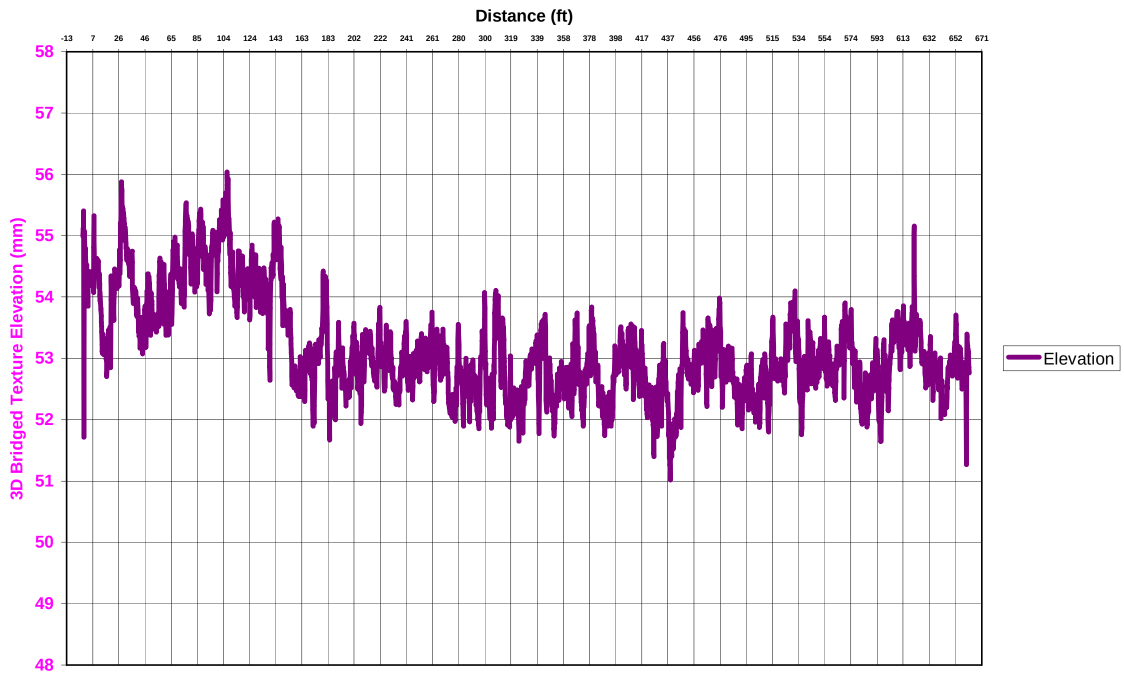
Site 101-4 (IA), Section L (Random T. Tine)



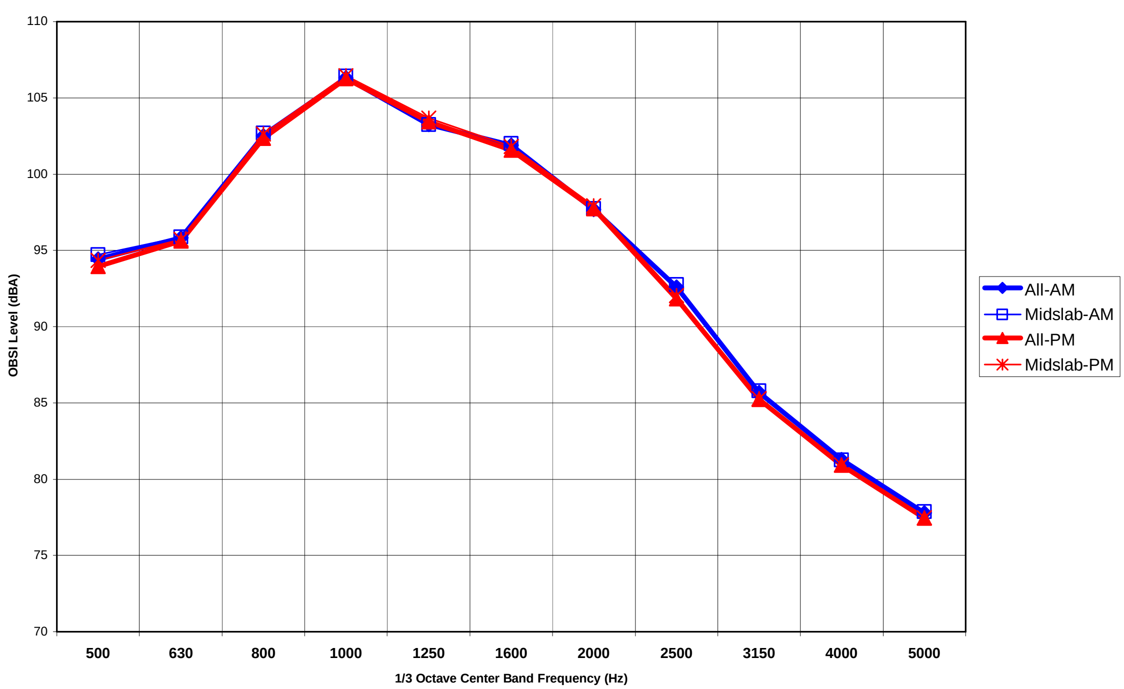
Site 101-4 (IA), Section L (Random T. Tine)



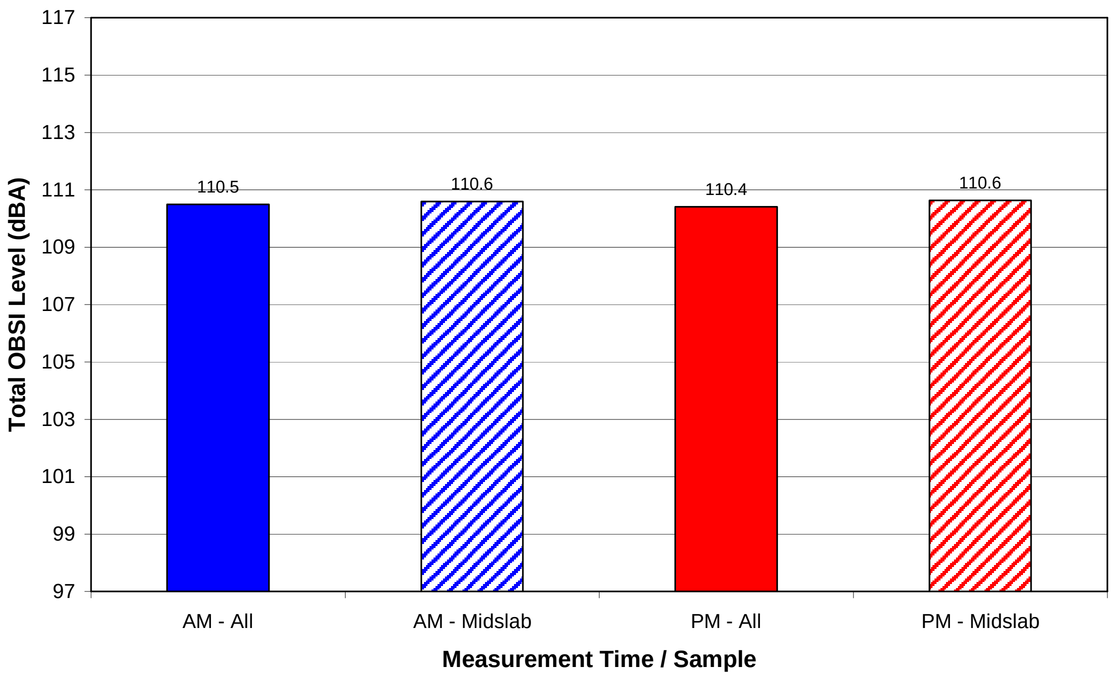
Site 101-4 (IA), Section L (Random T. Tine)



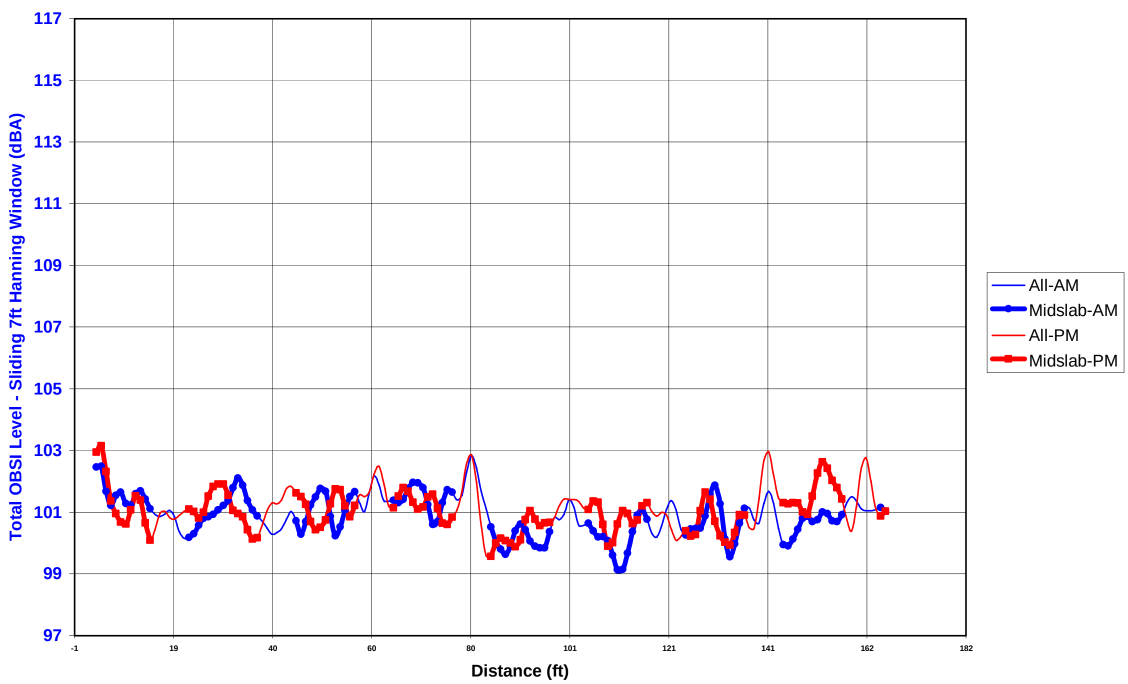
Site 101-4 (IA), Section L (Random T. Tine)

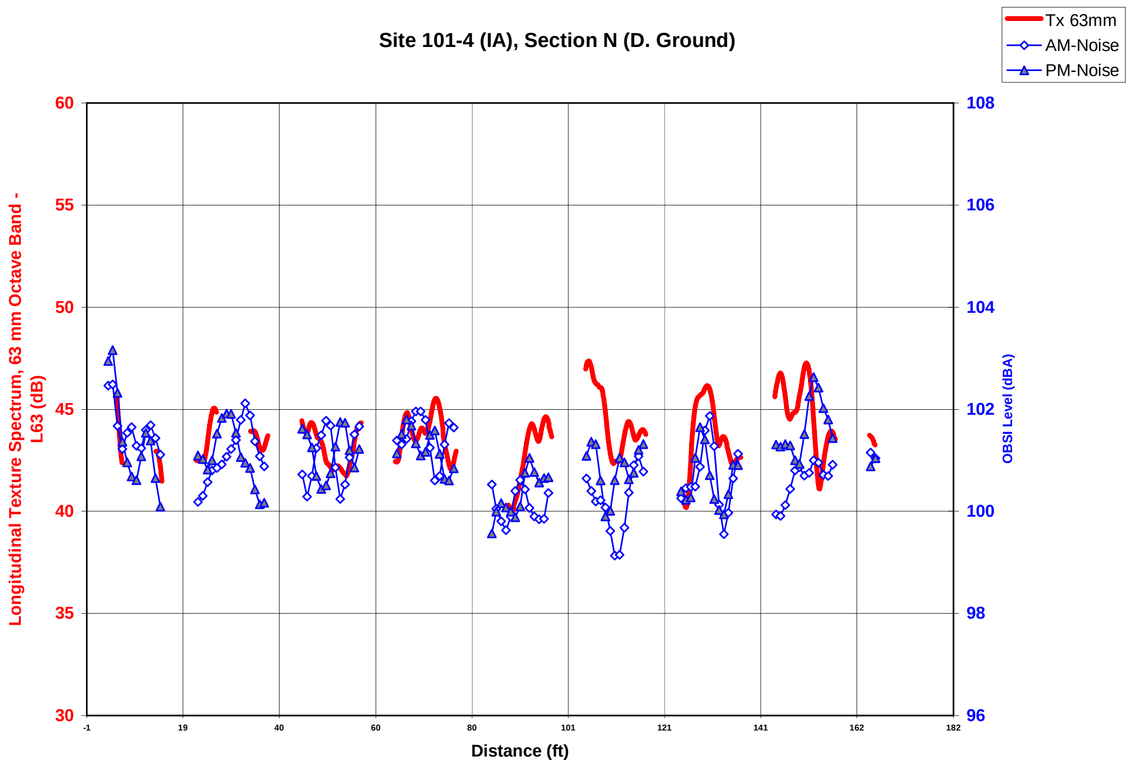


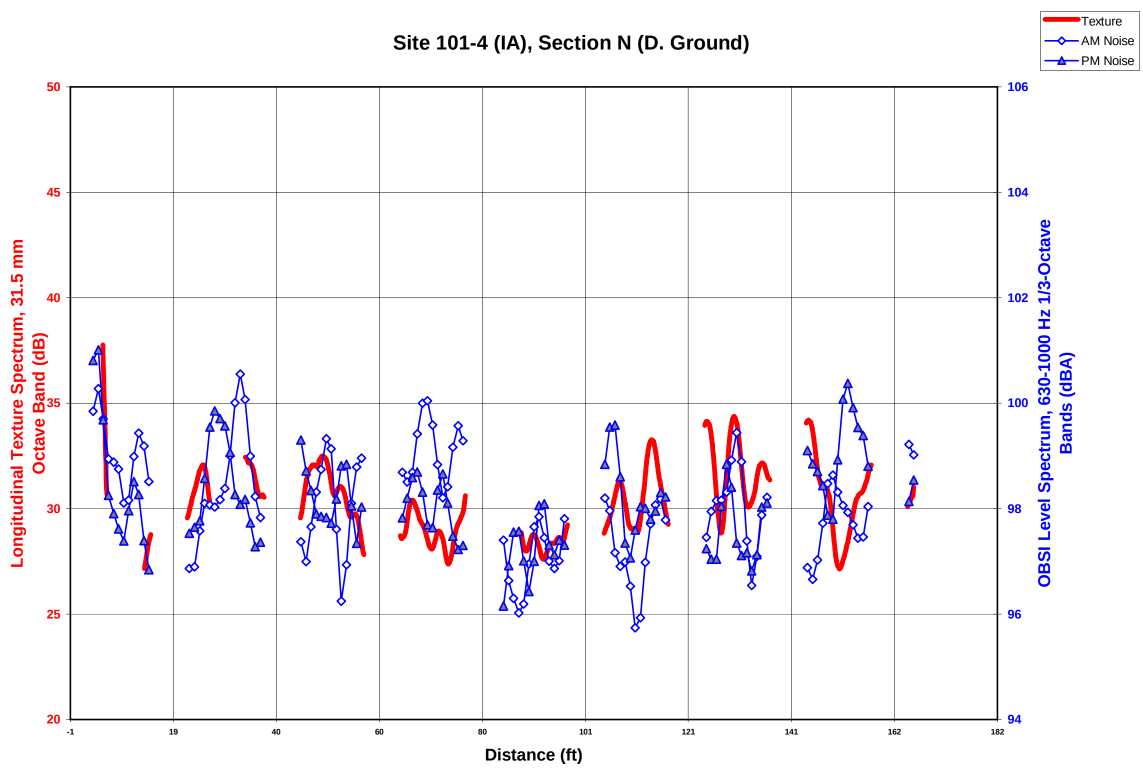
Site 101-4 (IA), Section L (Random T. Tine)

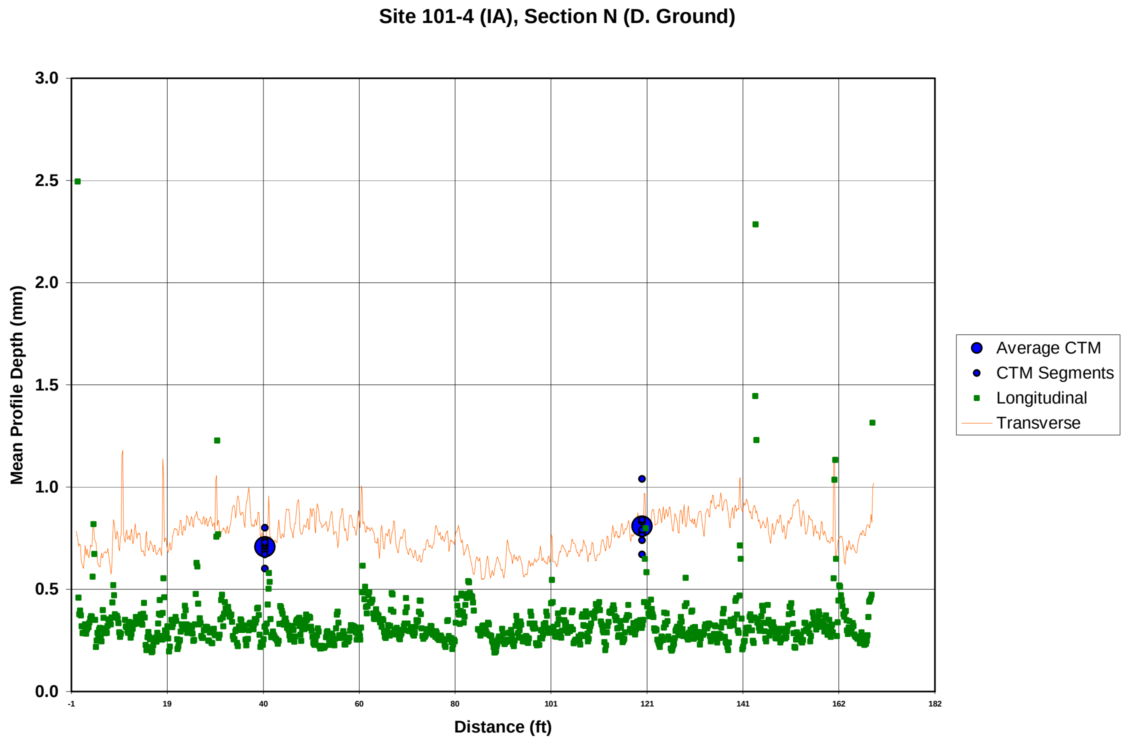


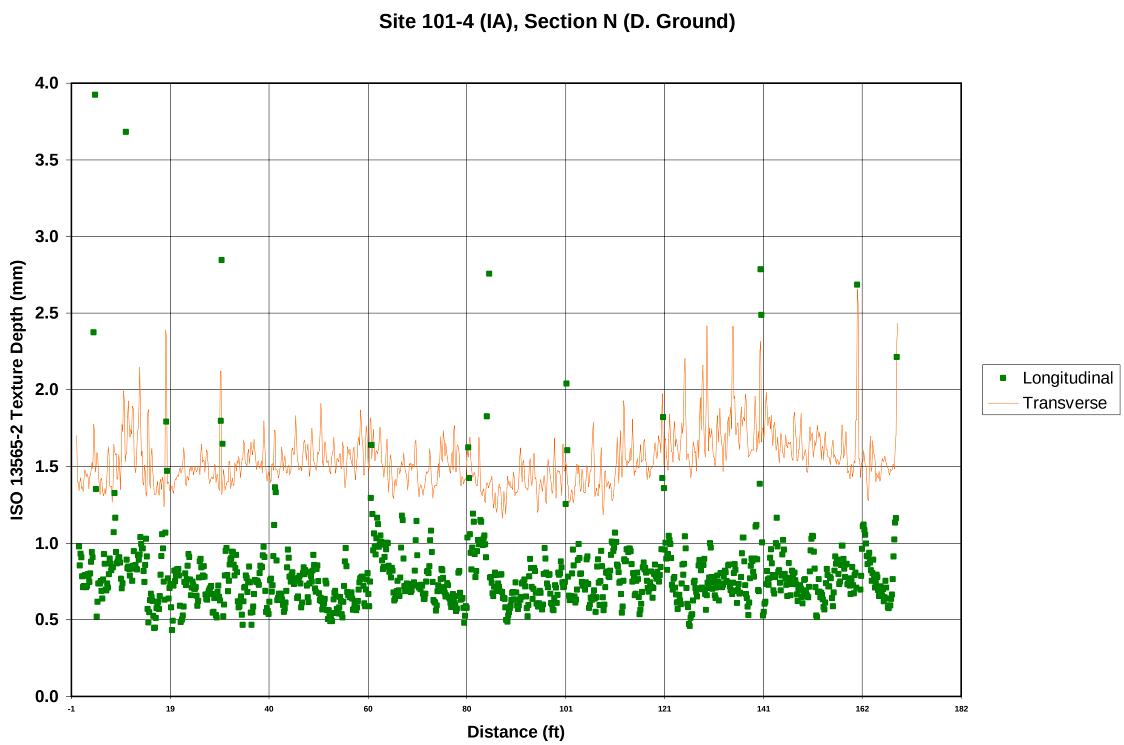
Site 101-4 (IA), Section N (D. Ground)

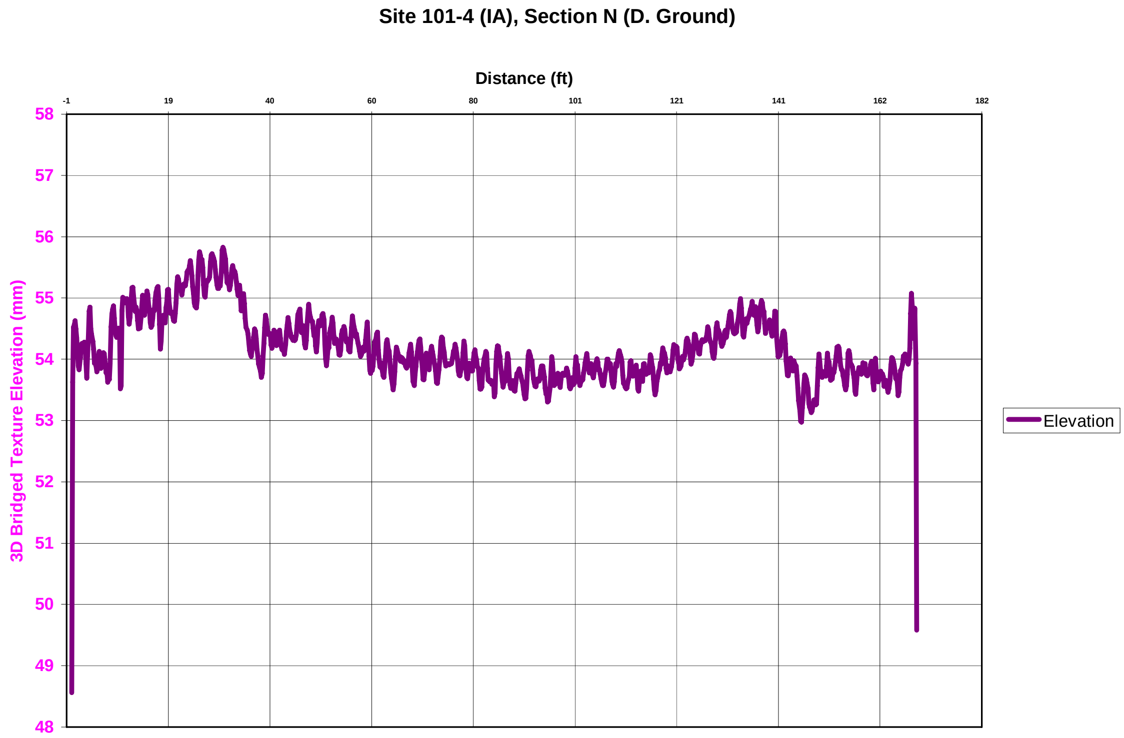


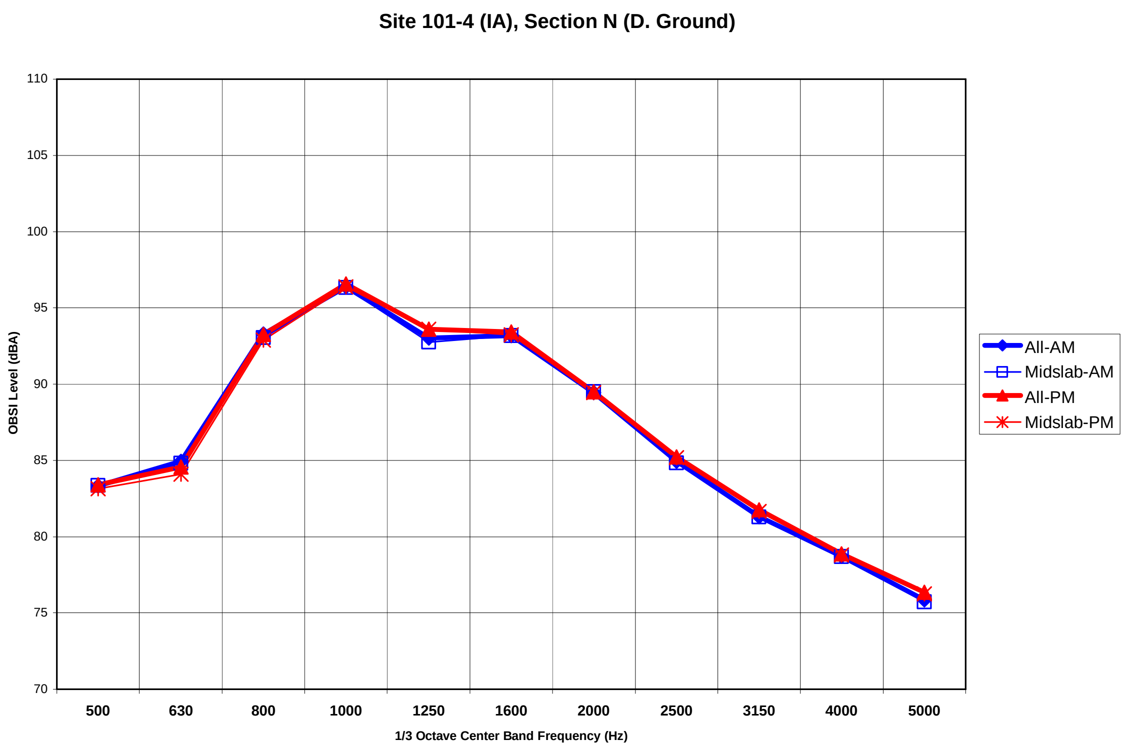

Site 101-4 (IA), Section N (D. Ground)
Tx 63mm
AM-Noise
PM-Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)
60
55
50
45
40
35
30
108
106
104
102
100
98
96
-1
19
40
60
80
101
121
141
162
182

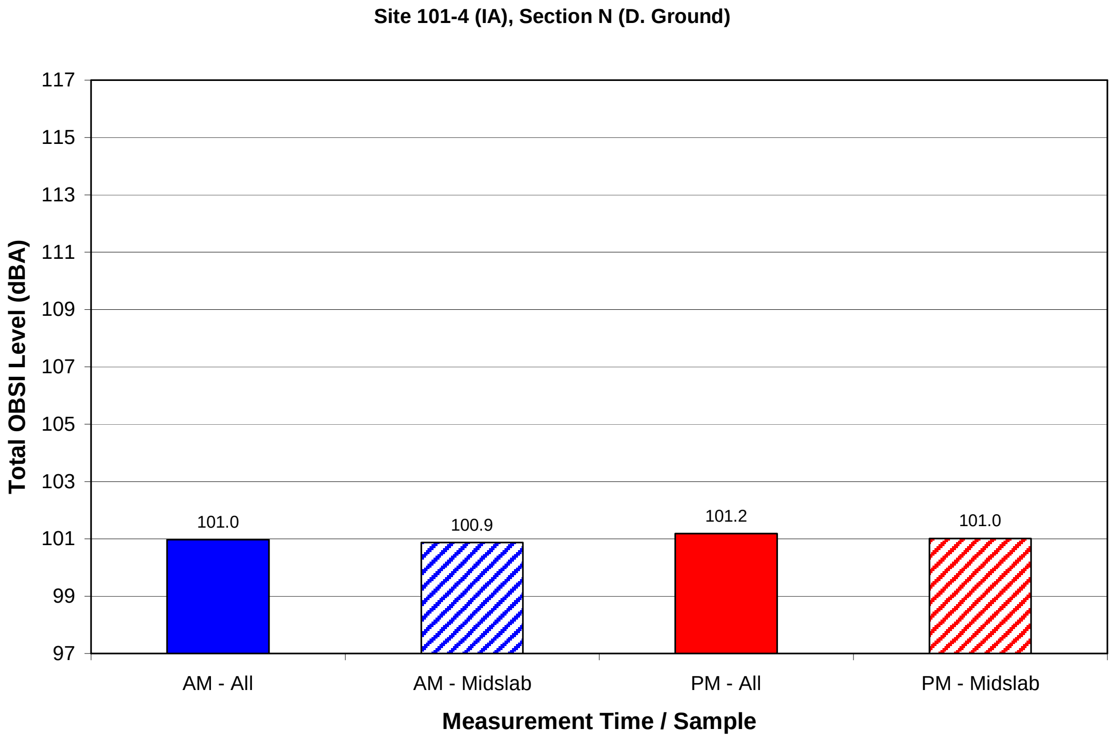

Site 101-4 (IA), Section N (D. Ground)
Texture
AM Noise
PM Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
50
45
40
35
30
25
20
106
104
102
100
98
96
94
-1
19
40
60
80
101
121
141
162
182


Site 101-4 (IA), Section N (D. Ground)
Mean Profile Depth (mm)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-1
19
40
60
80
101
121
141
162
182
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse


Site 101-4 (IA), Section N (D. Ground)
ISO 13565-2 Texture Depth (mm)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-1
19
40
60
80
101
121
141
162
182
Distance (ft)
Longitudinal
Transverse

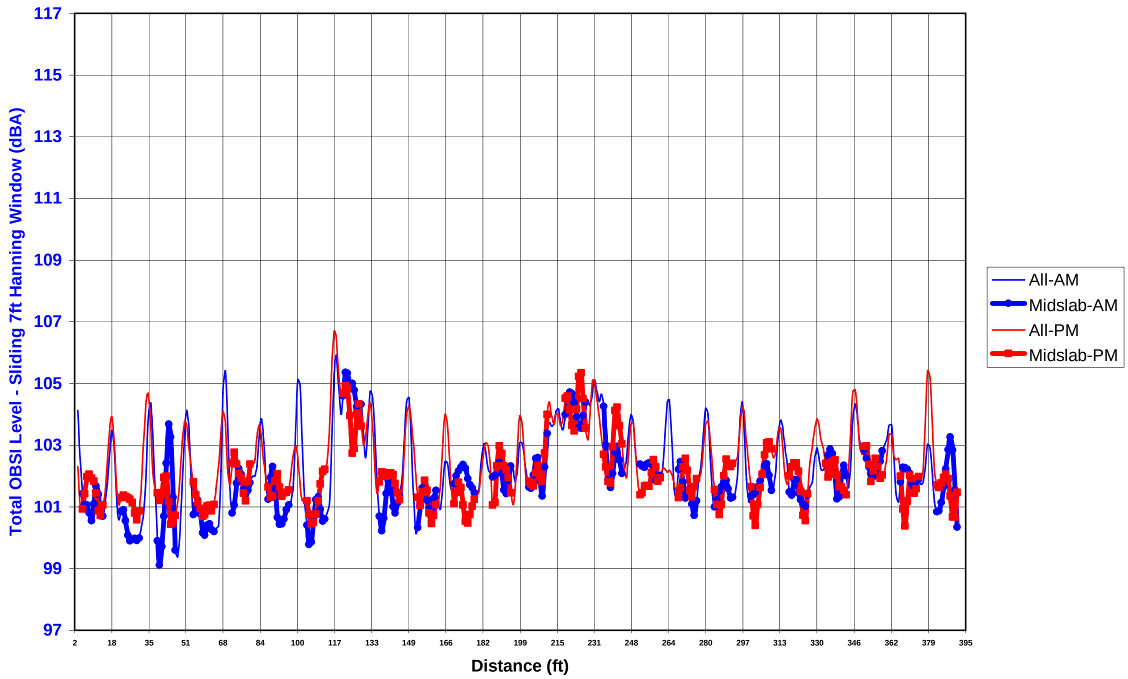

Site 101-4 (IA), Section N (D. Ground)
Distance (ft)
-1
19
40
60
80
101
121
141
162
182
3D Bridged Texture Elevation (mm)
58
57
56
55
54
53
52
51
50
49
48
Elevation


Site 101-4 (IA), Section N (D. Ground)
OBSI Level (dBA)
110
105
100
95
90
85
80
75
70
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
1/3 Octave Center Band Frequency (Hz)
All-AM
Midslab-AM
All-PM
Midslab-PM

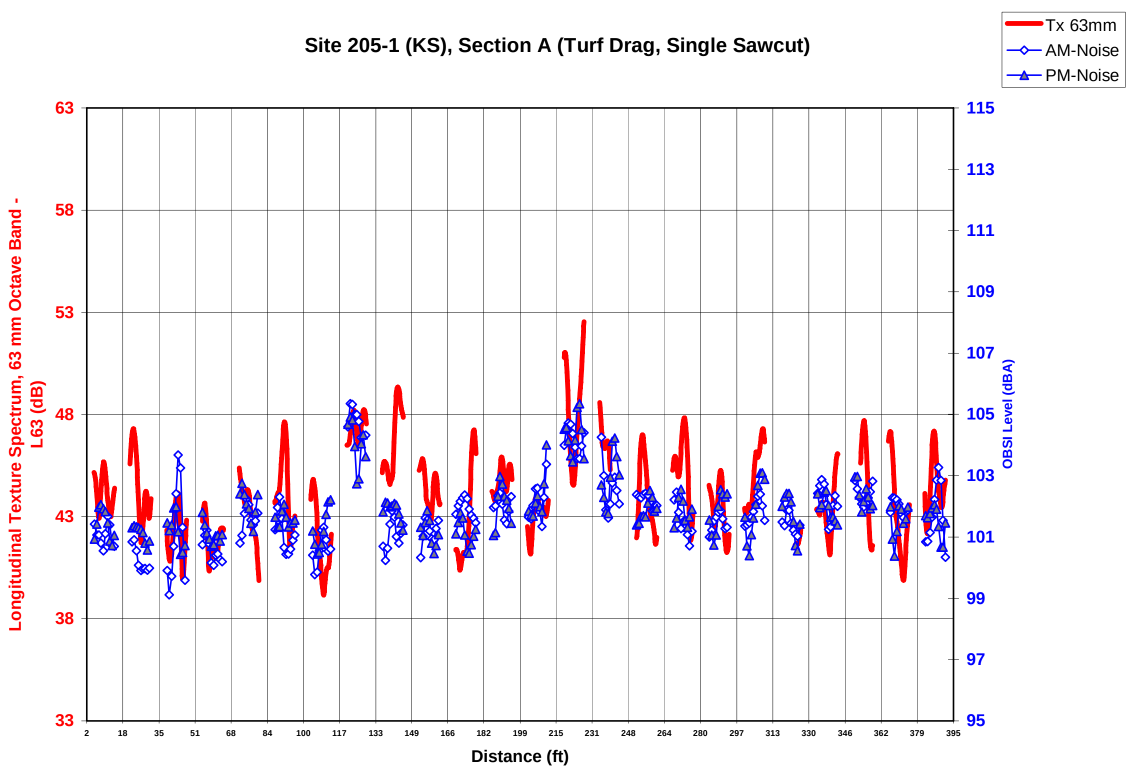


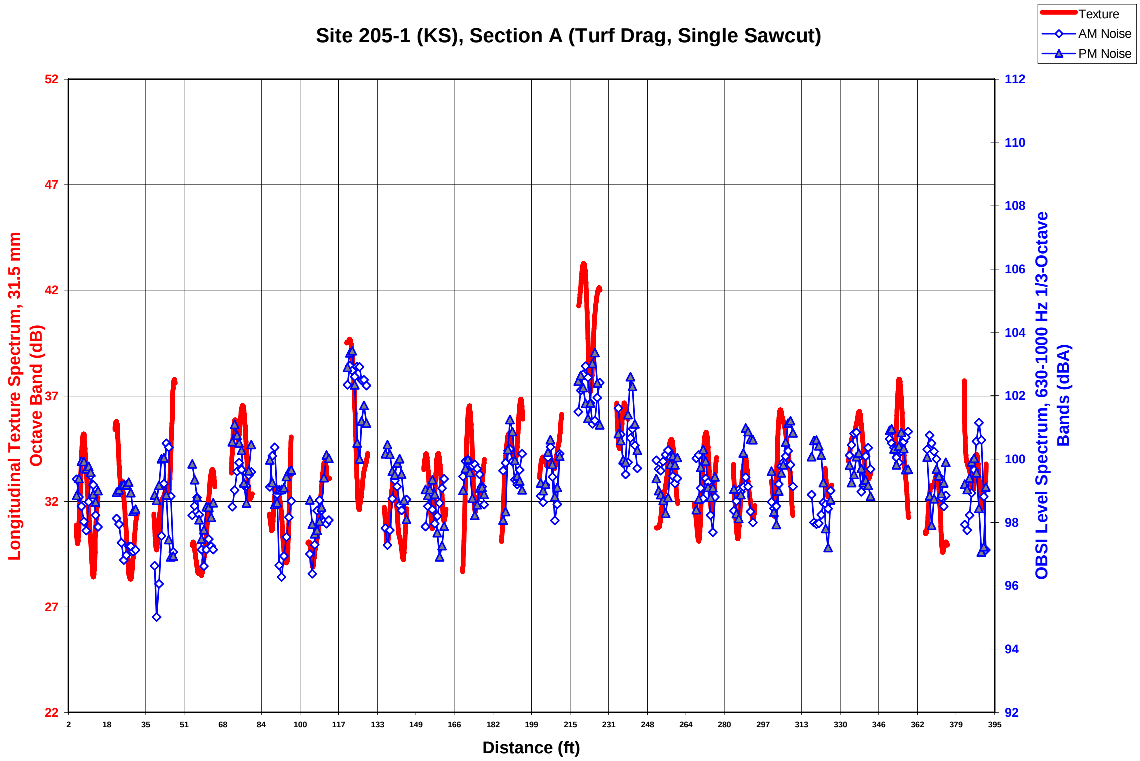
Site 101-4 (IA), Section N (D. Ground)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
101.0
100.9
101.2
101.0
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample

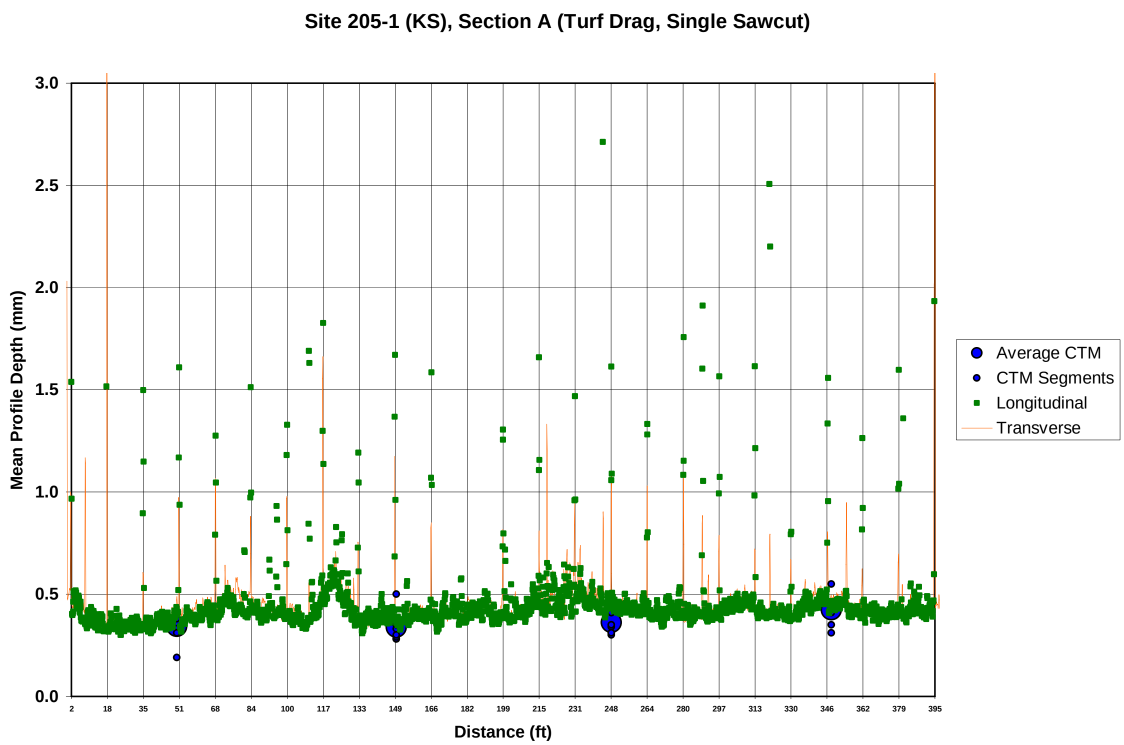
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)



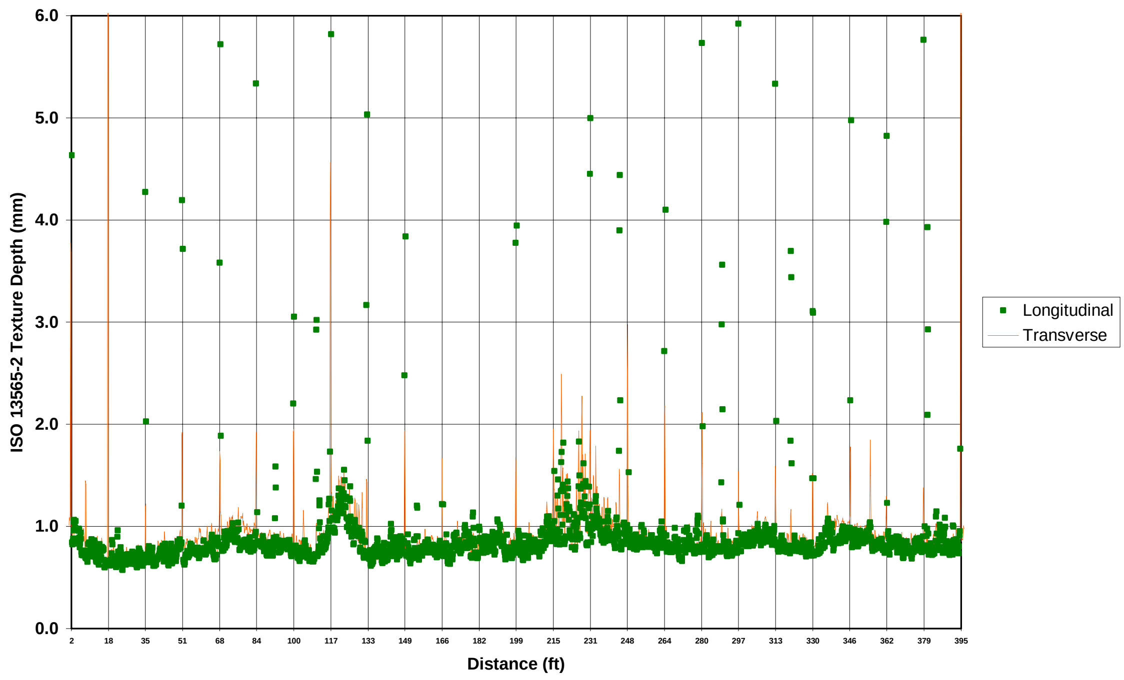
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)



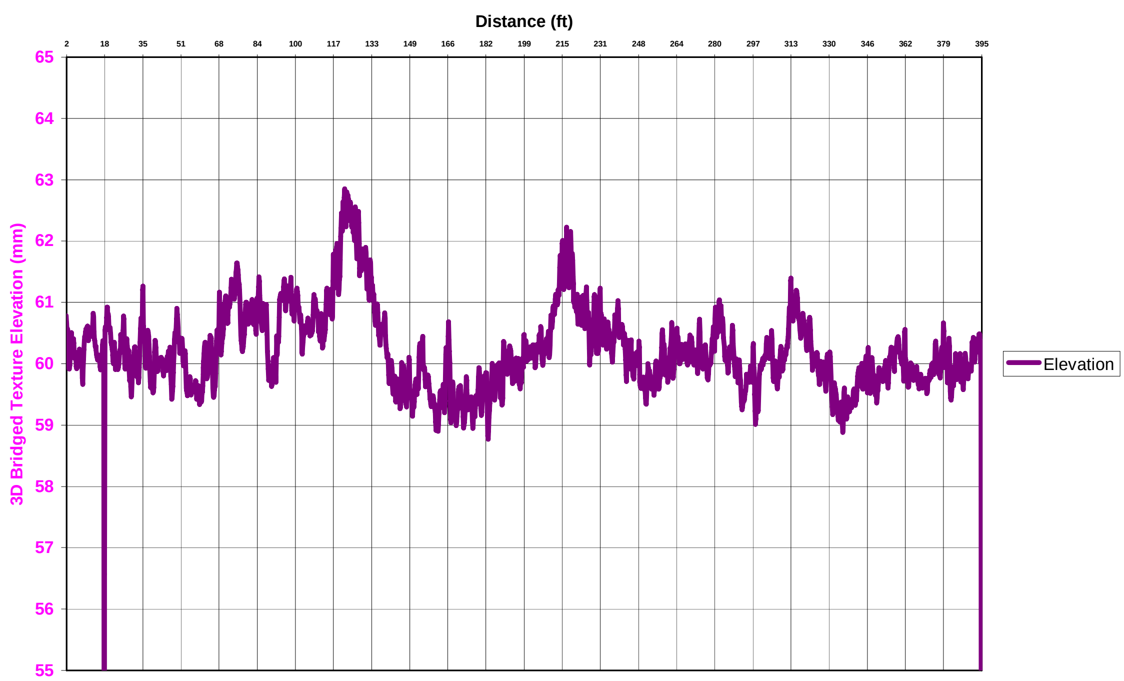

Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)
Texture
AM Noise
PM Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)


Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)
Average CTM
CTM Segments
Longitudinal
Transverse
Mean Profile Depth (mm)
Distance (ft)

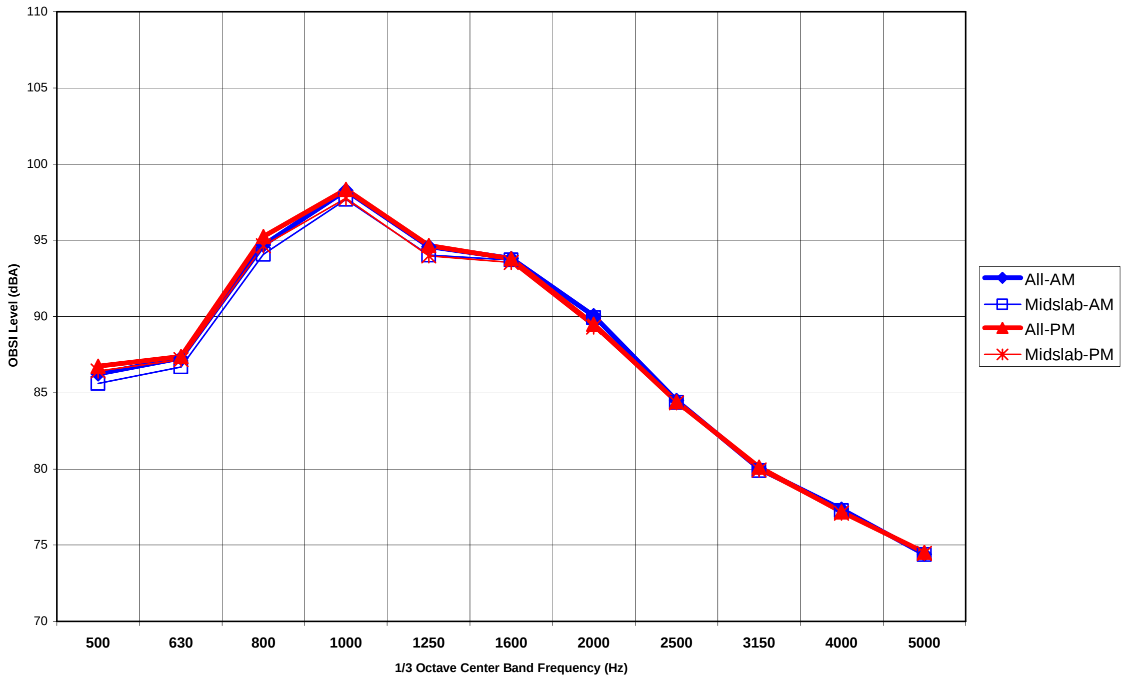
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)



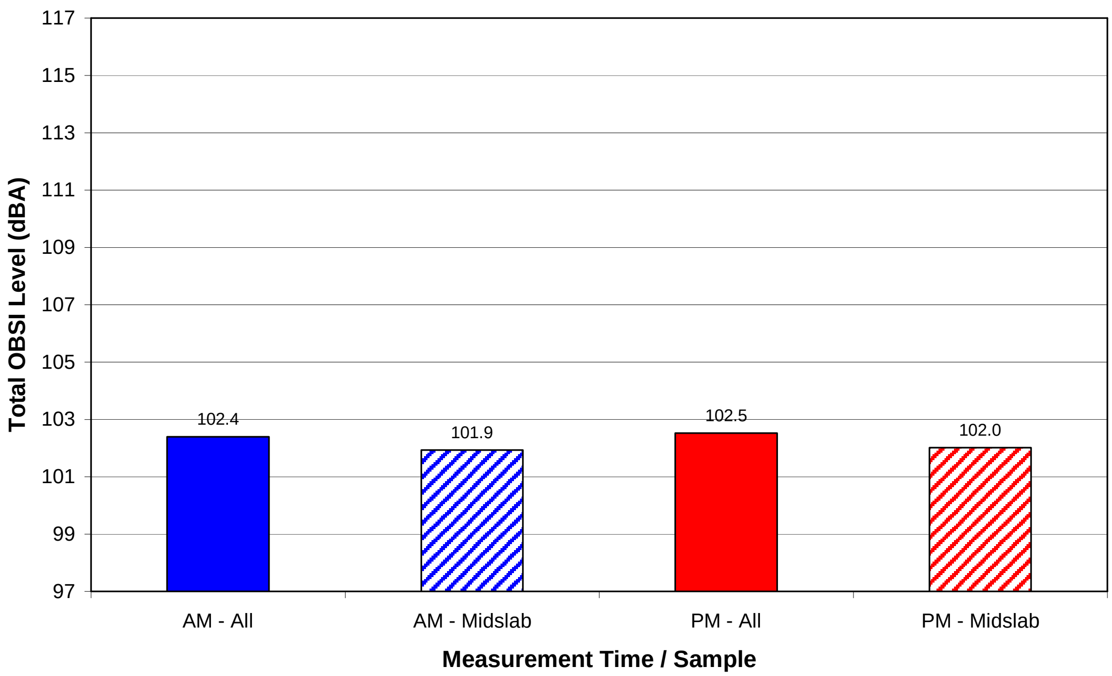
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)

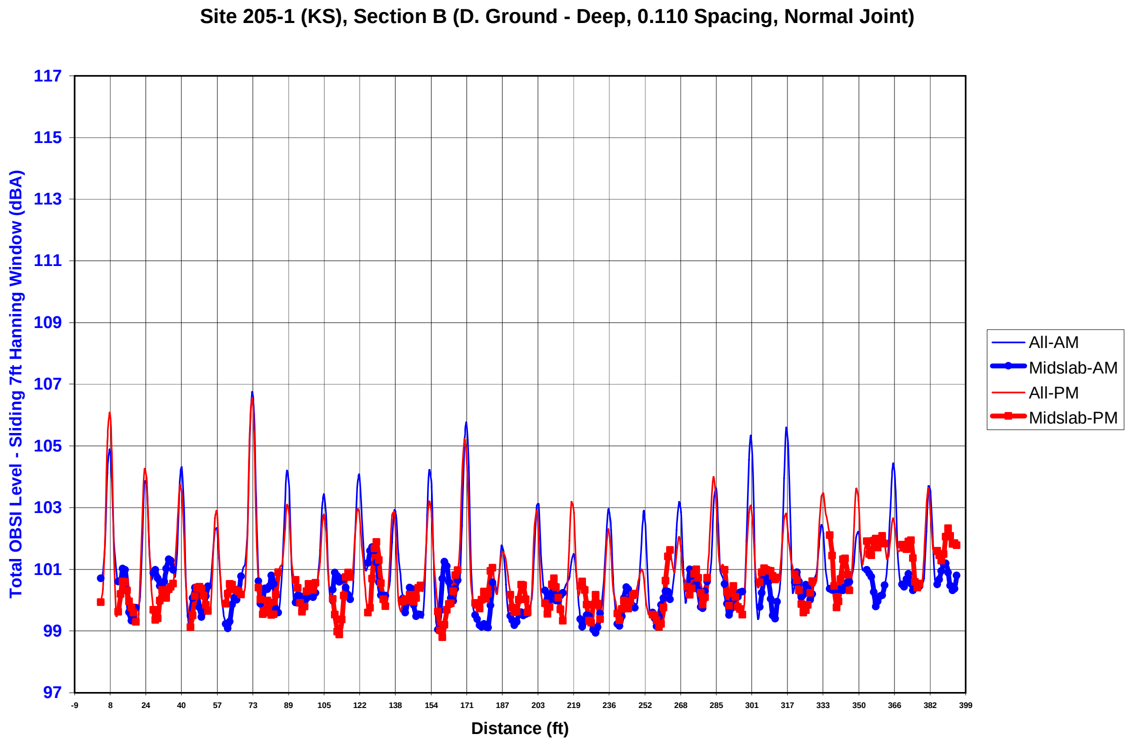


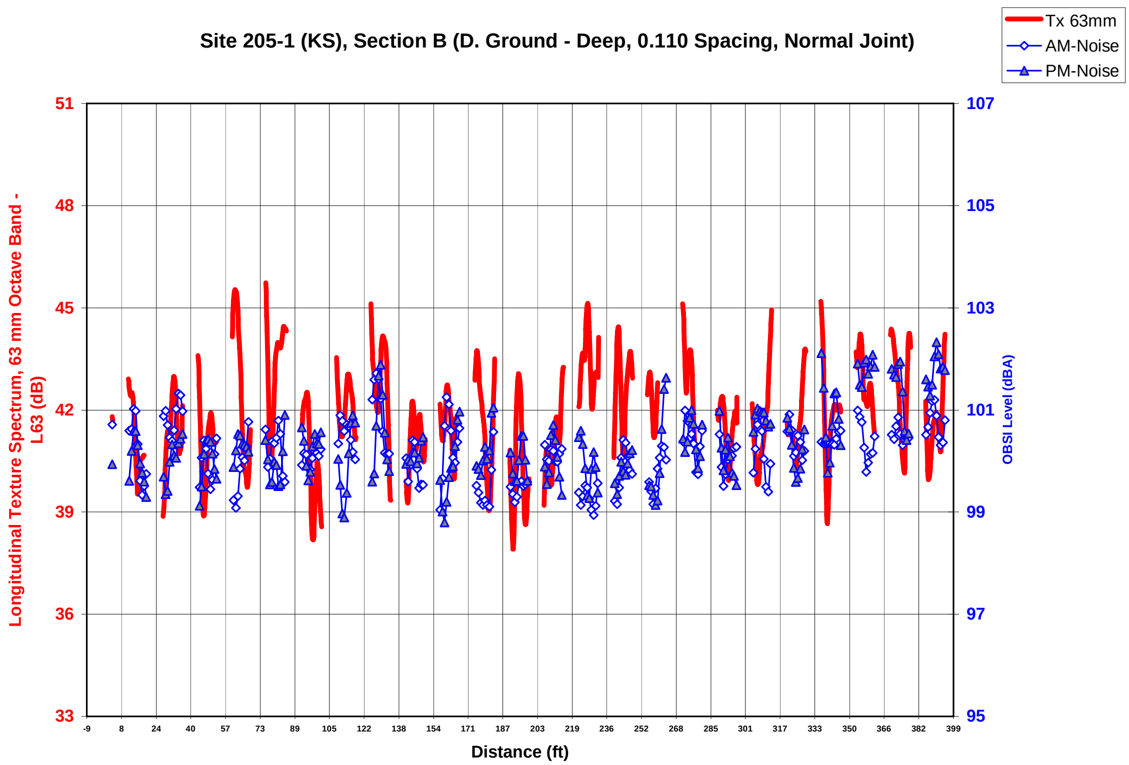
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)

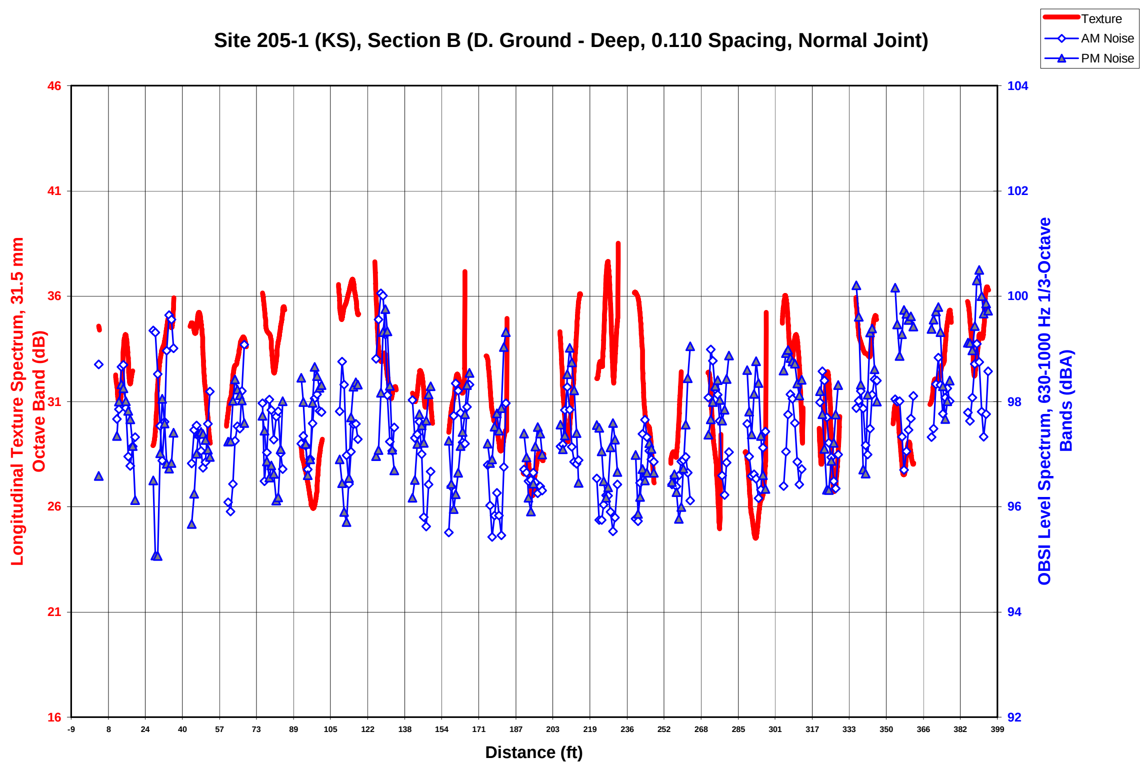


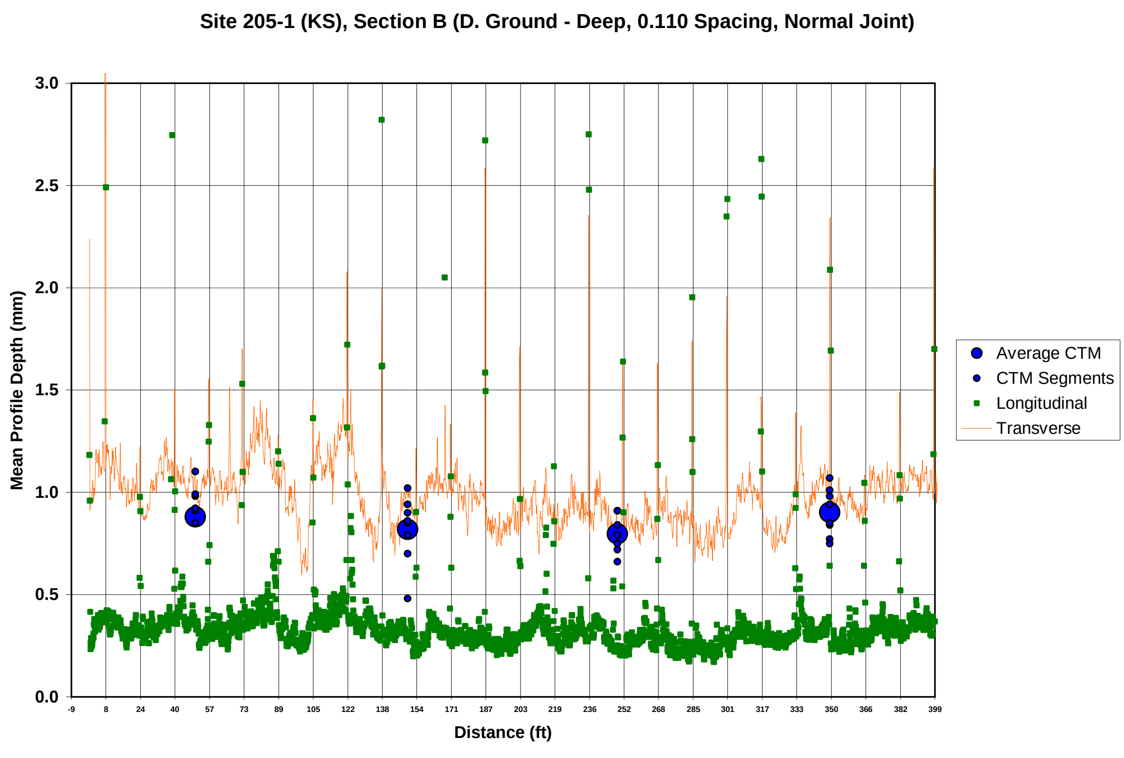
Site 205-1 (KS), Section A (Turf Drag, Single Sawcut)



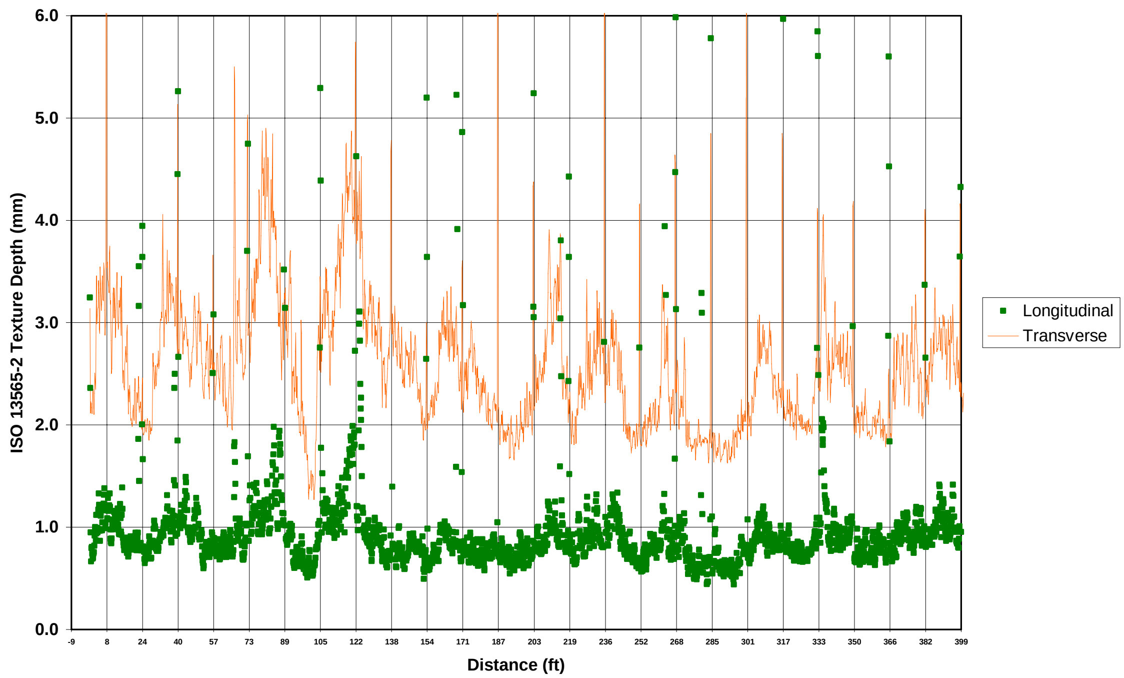

Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-9
8
24
40
57
73
89
105
122
138
154
171
187
203
219
236
252
268
285
301
317
333
350
366
382
399
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Tx 63mm
AM-Noise
PM-Noise
Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
51
48
45
42
39
36
33
OBSI Level (dBA)
107
105
103
101
99
97
95
-9
8
24
40
57
73
89
105
122
138
154
171
187
203
219
236
252
268
285
301
317
333
350
366
382
399
Distance (ft)

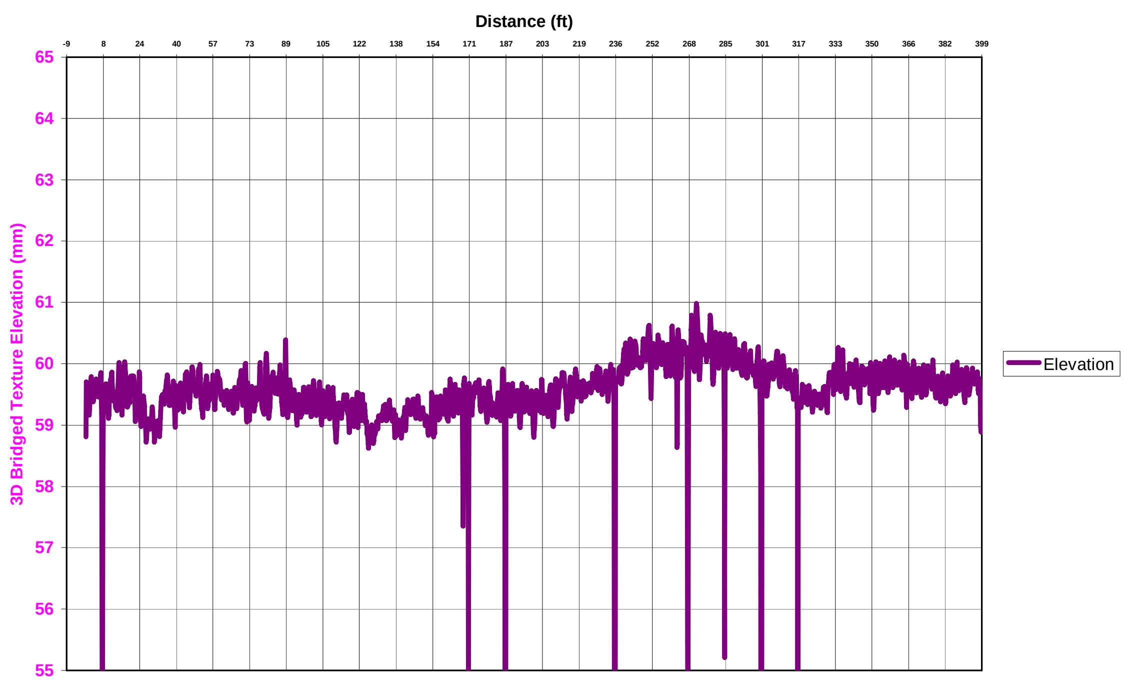

Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)
Texture
AM Noise
PM Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)


Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

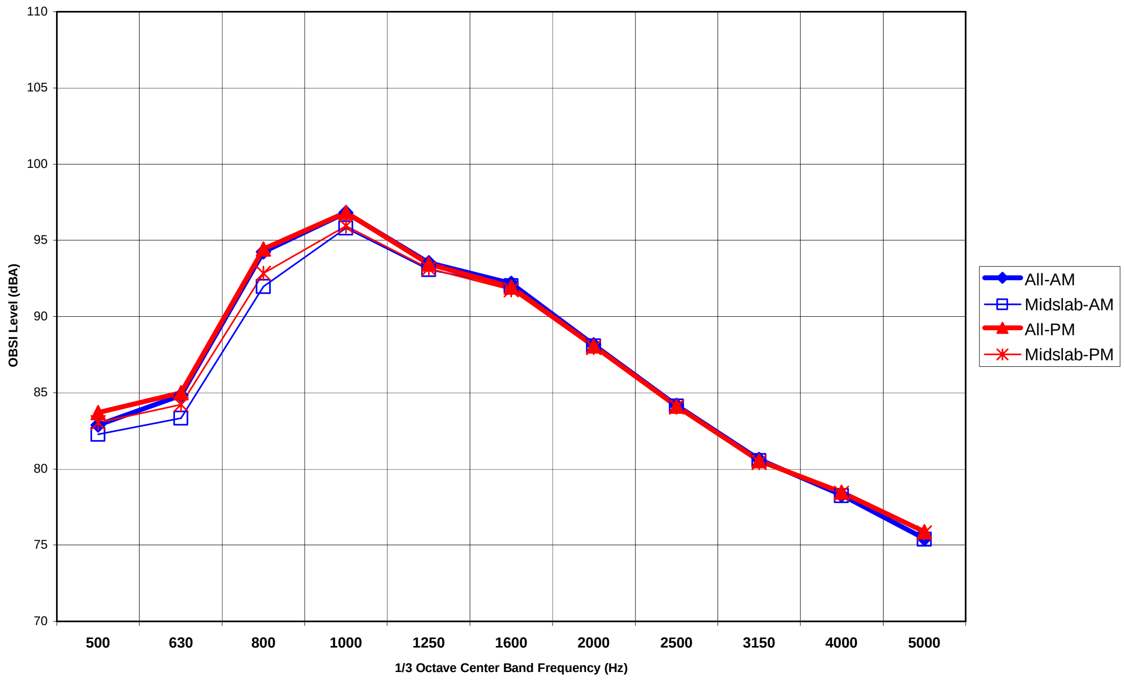
Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)



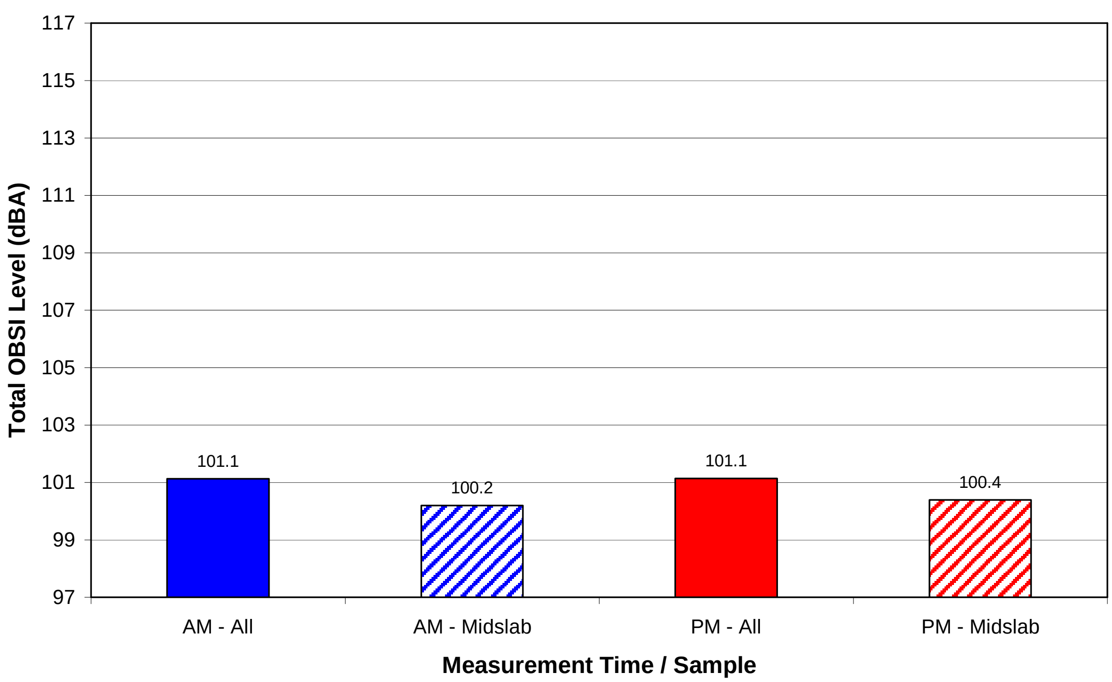
Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)



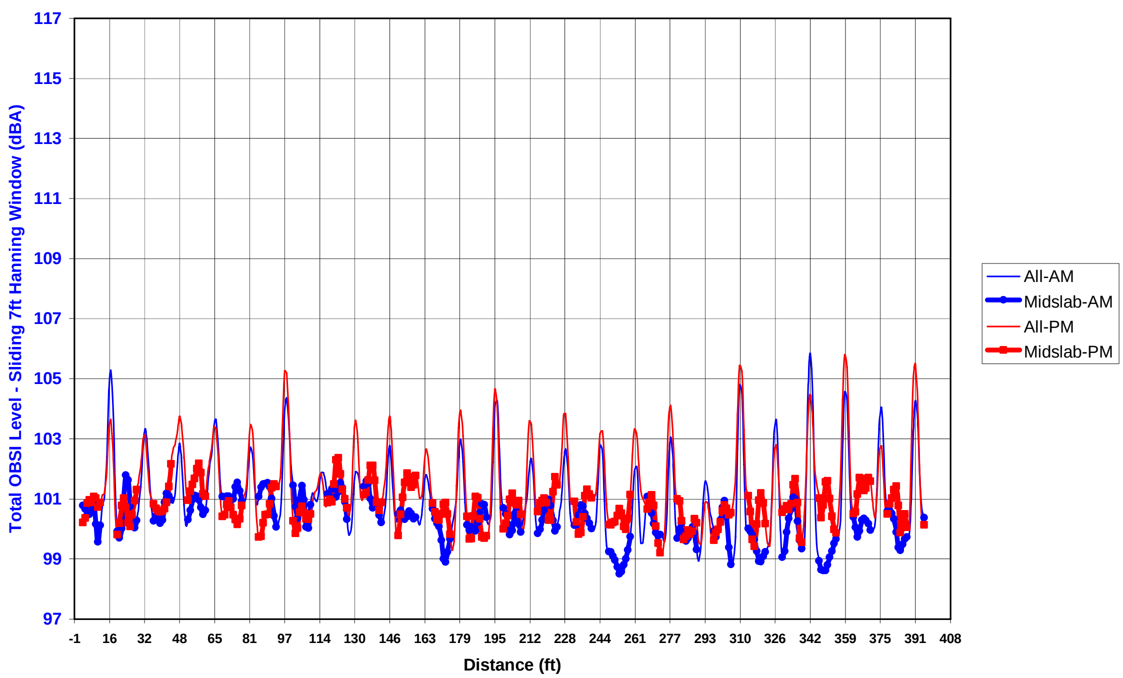
Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)



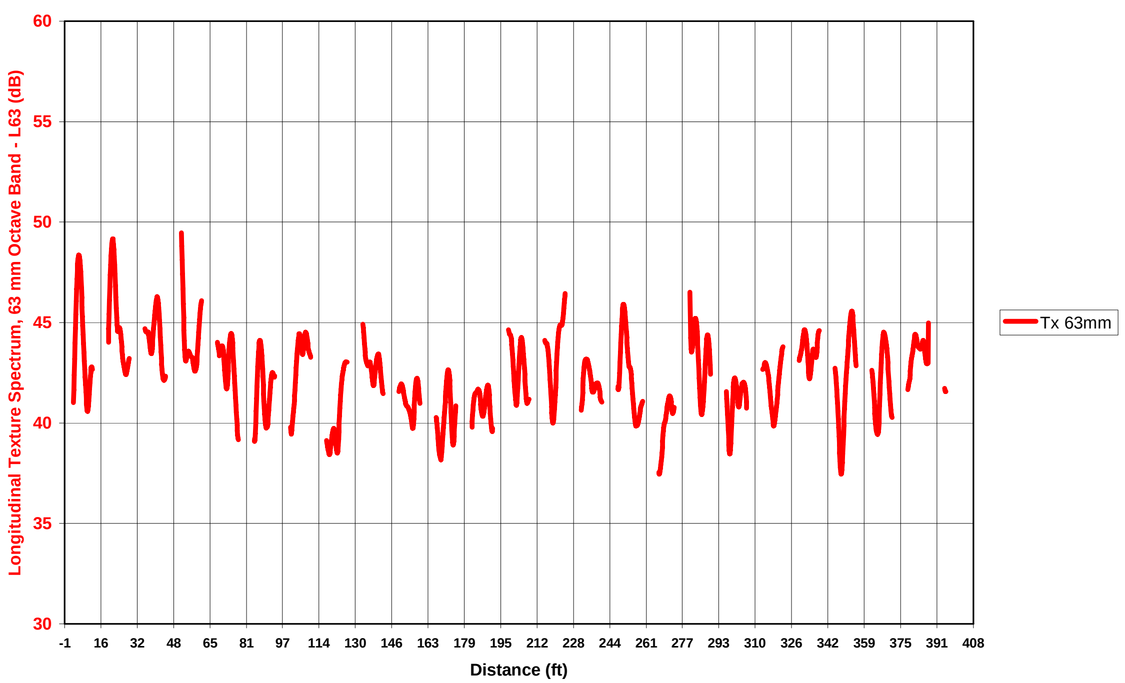
Site 205-1 (KS), Section B (D. Ground - Deep, 0.110 Spacing, Normal Joint)



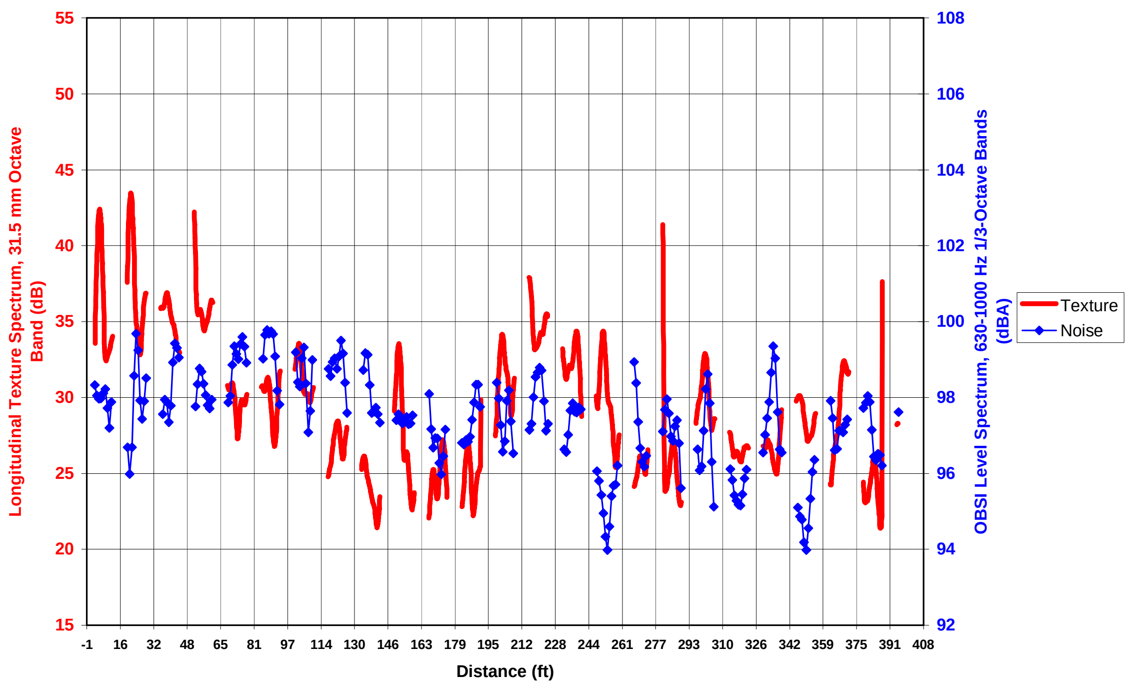
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)



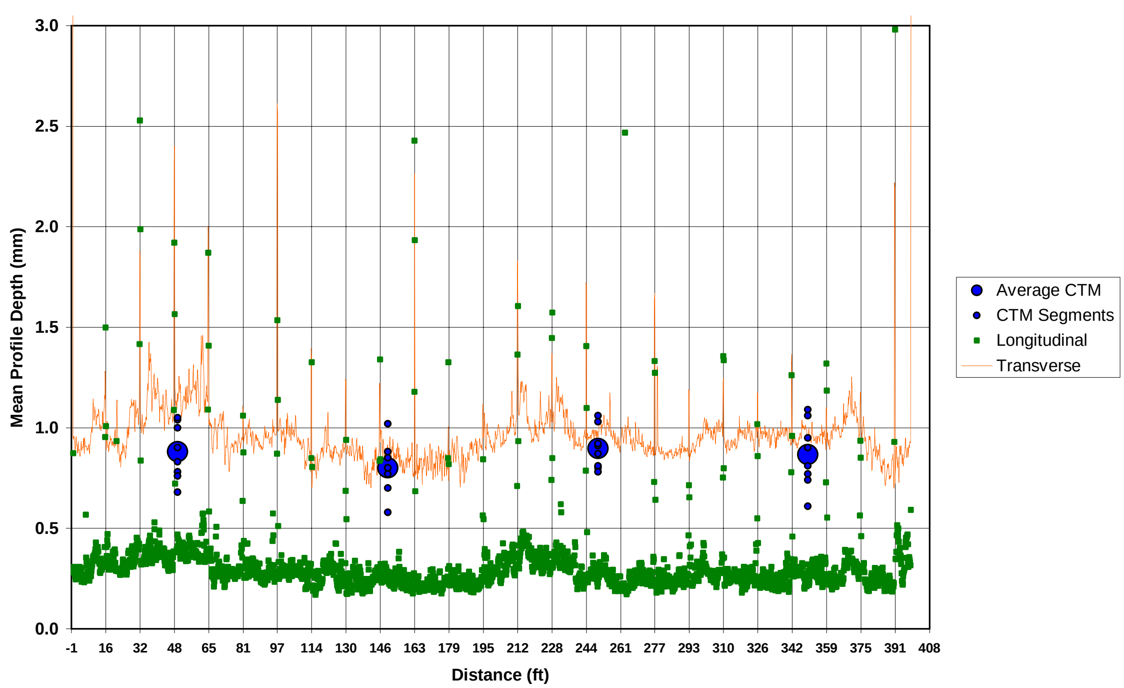
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)



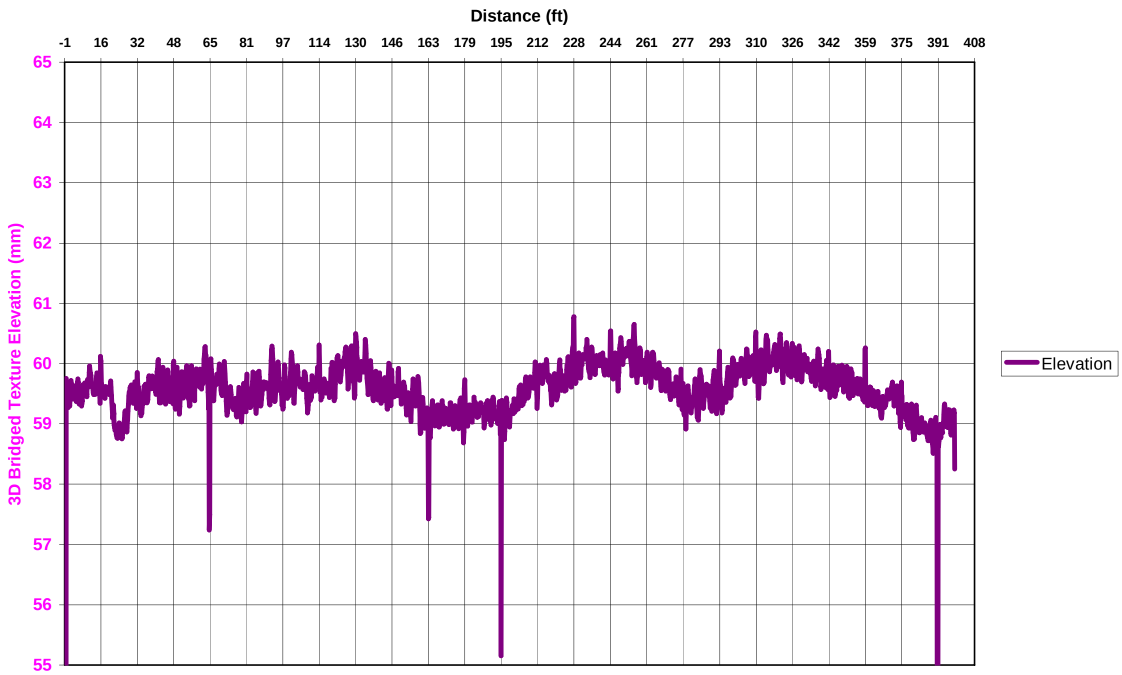
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)



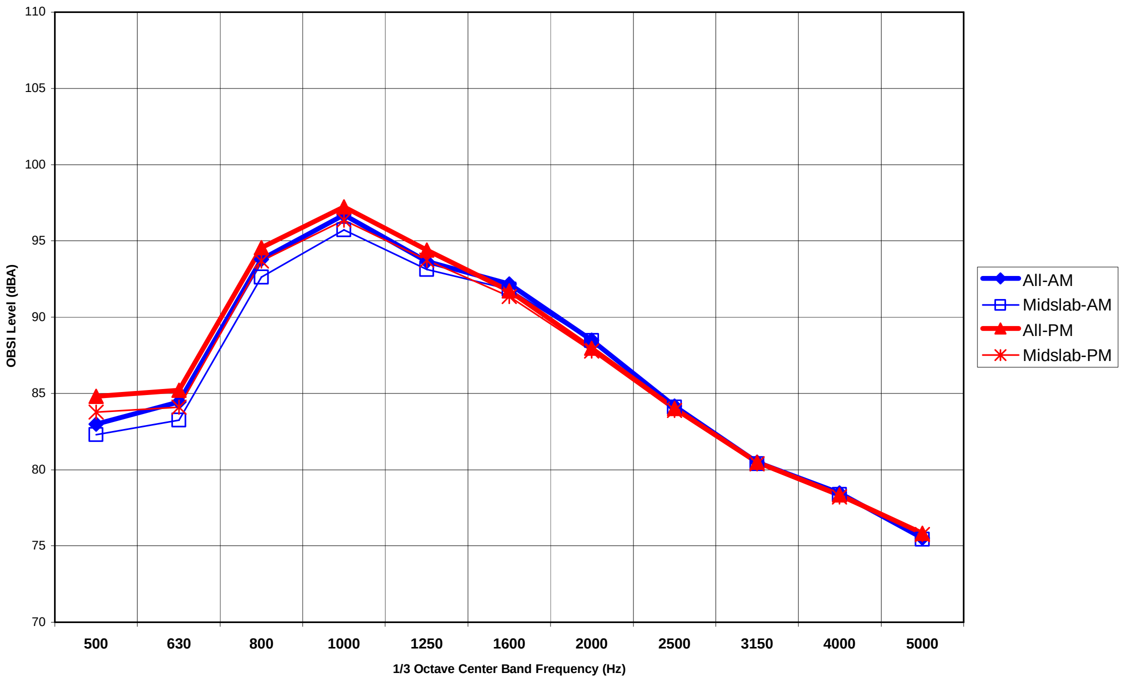
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)



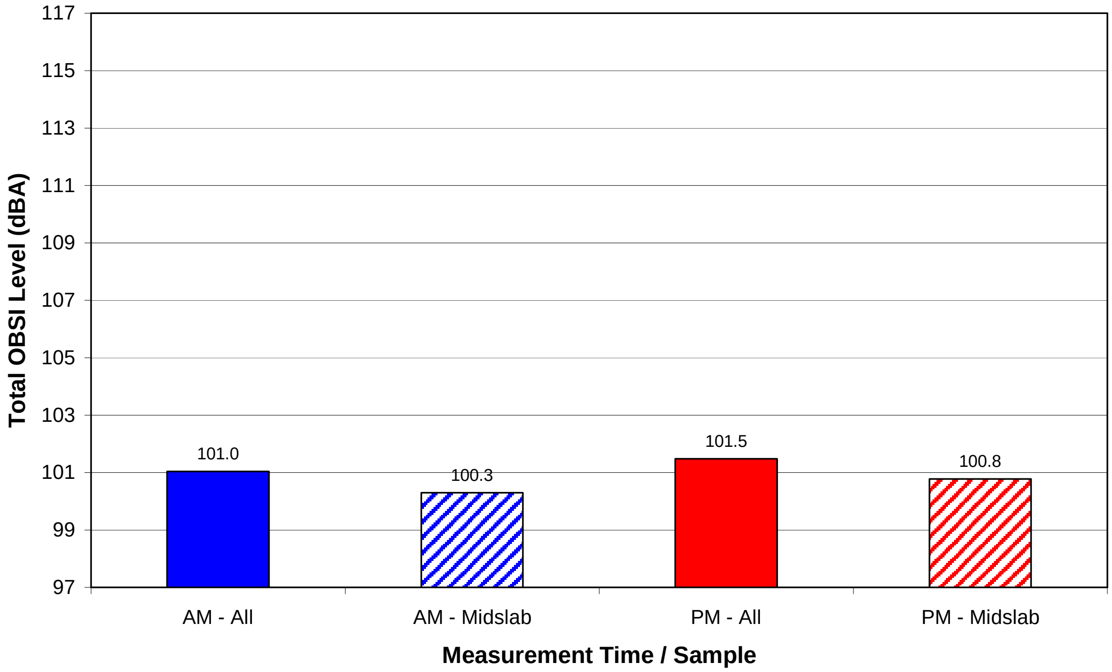
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)



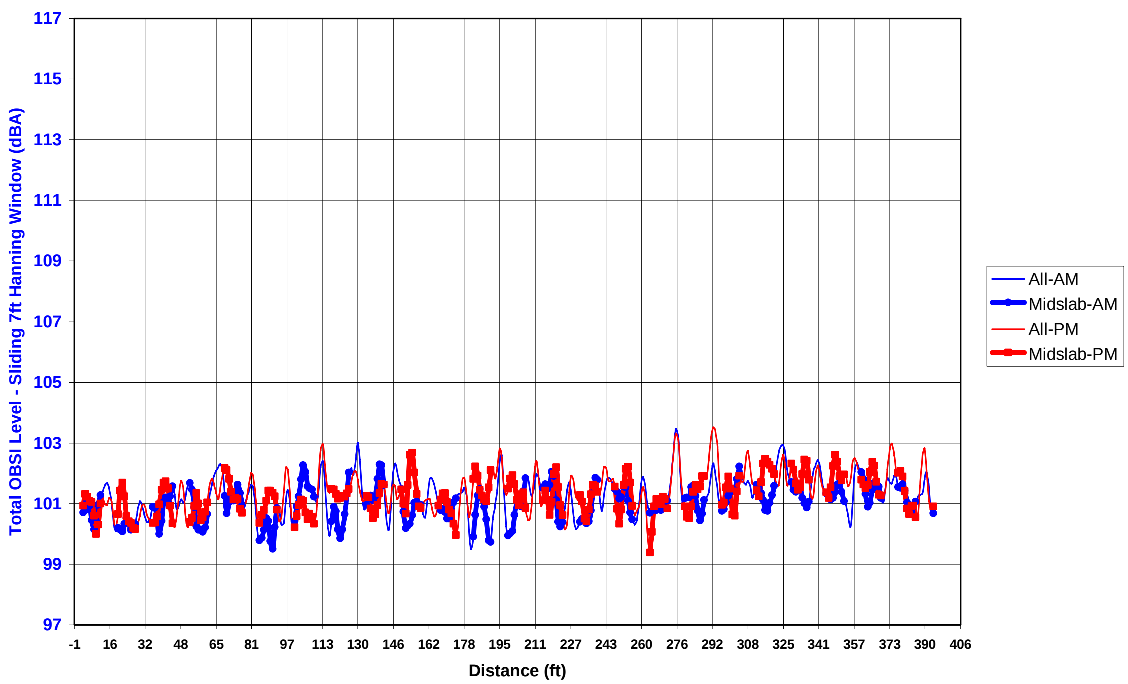
Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)

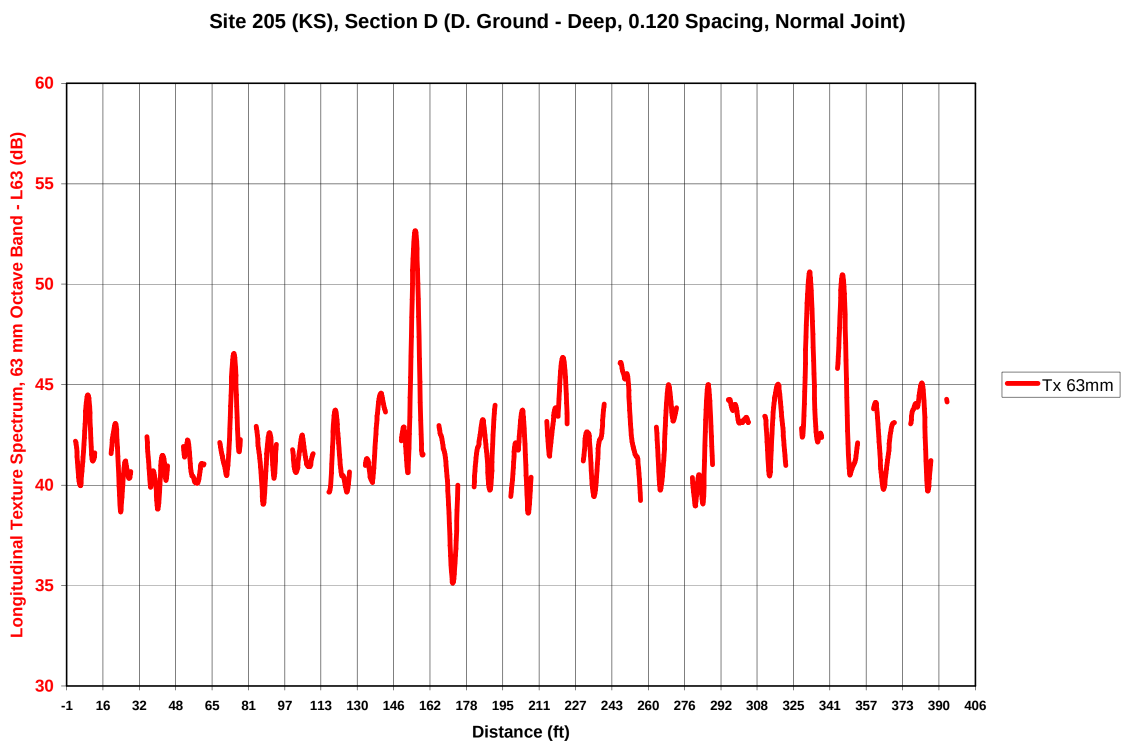


Site 205 (KS), Section C (D. Ground - Deep, 0.110 Spacing, Narrow Joint)

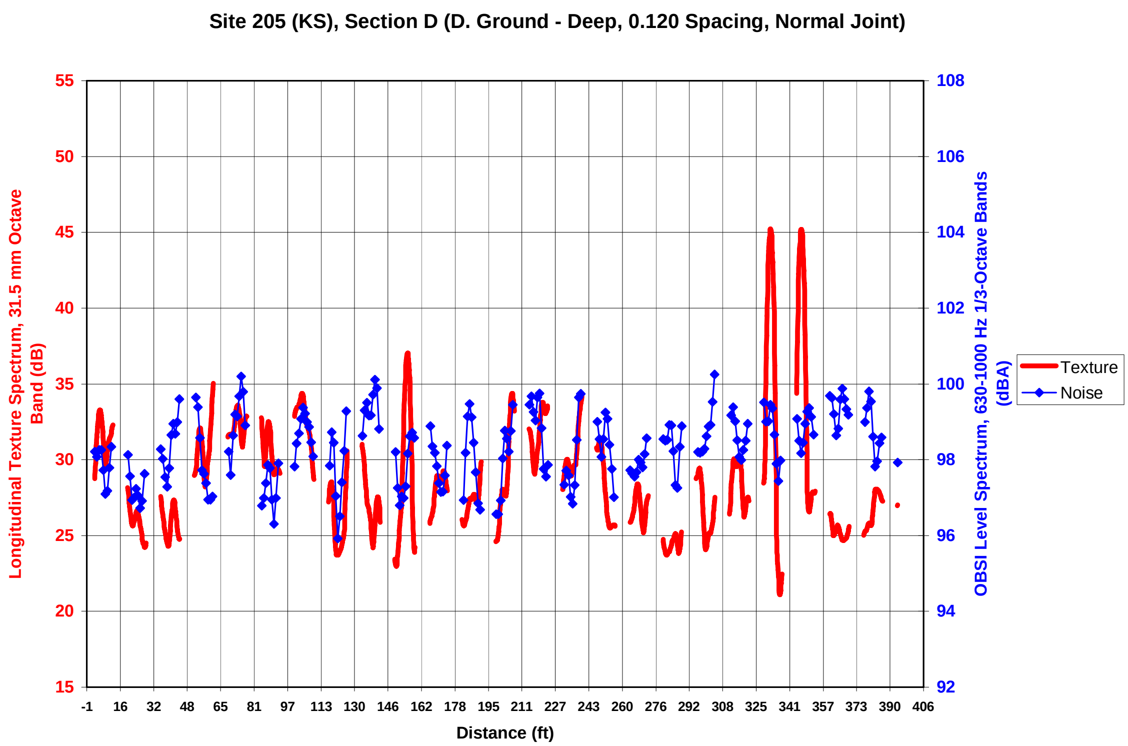


Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)



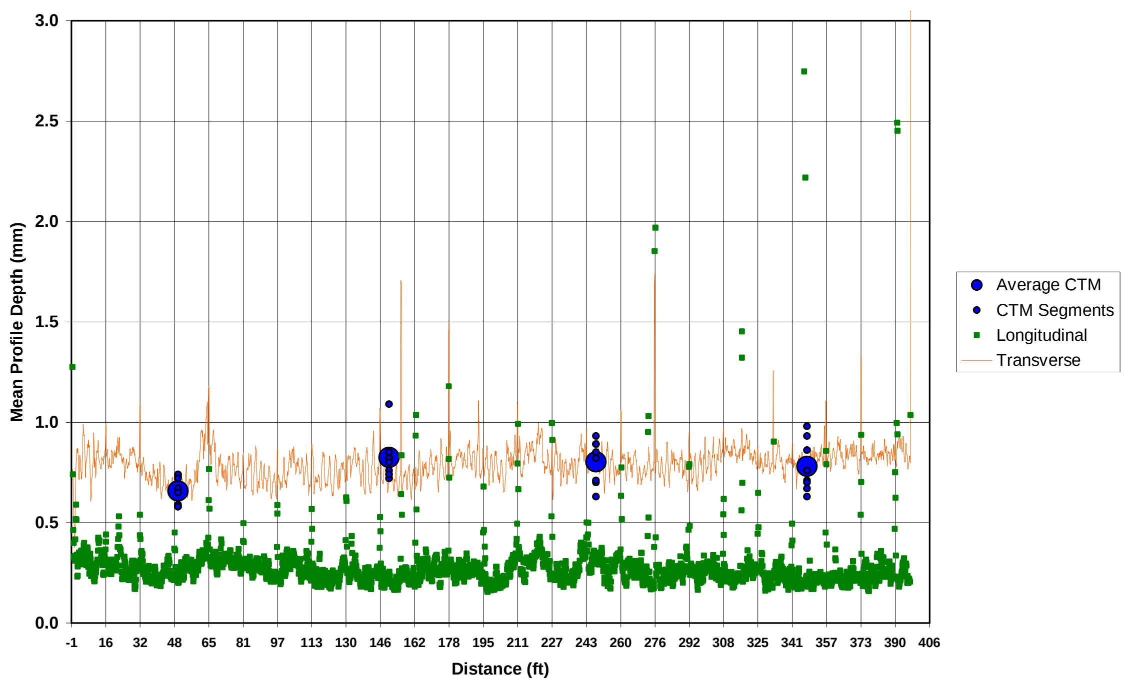


Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-1
16
32
48
65
81
97
113
130
146
162
178
195
211
227
243
260
276
292
308
325
341
357
373
390
406
Distance (ft)
Tx 63mm

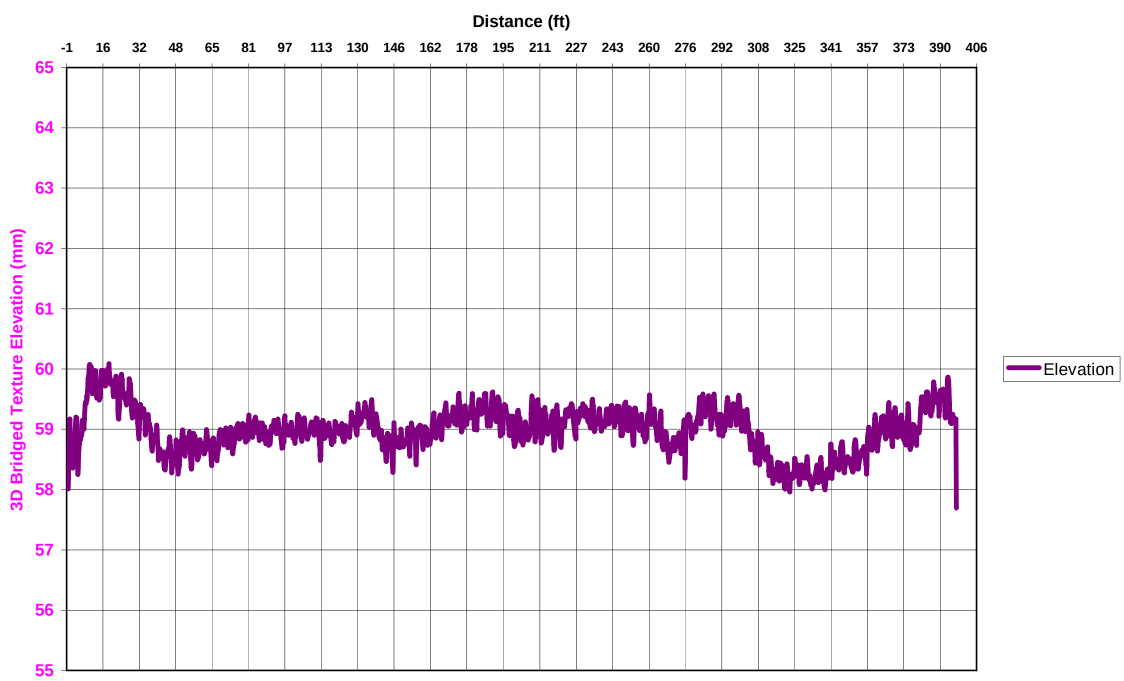


Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
55
50
45
40
35
30
25
20
15
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
108
106
104
102
100
98
96
94
92
-1
16
32
48
65
81
97
113
130
146
162
178
195
211
227
243
260
276
292
308
325
341
357
373
390
406
Distance (ft)
Texture
Noise

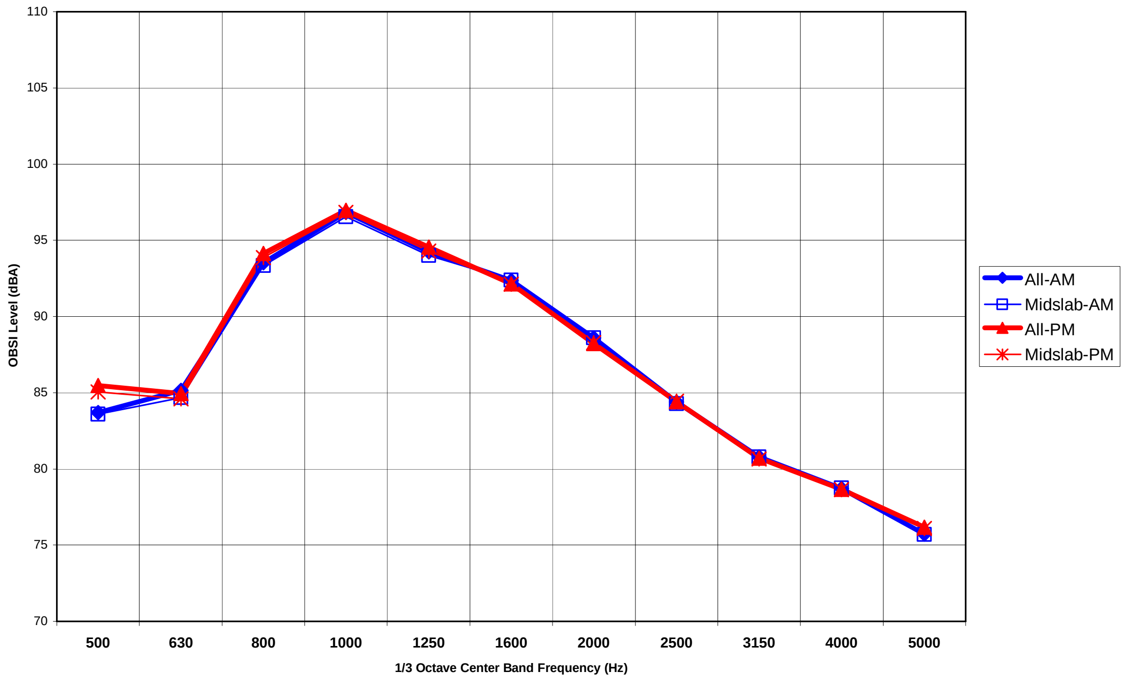
Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)



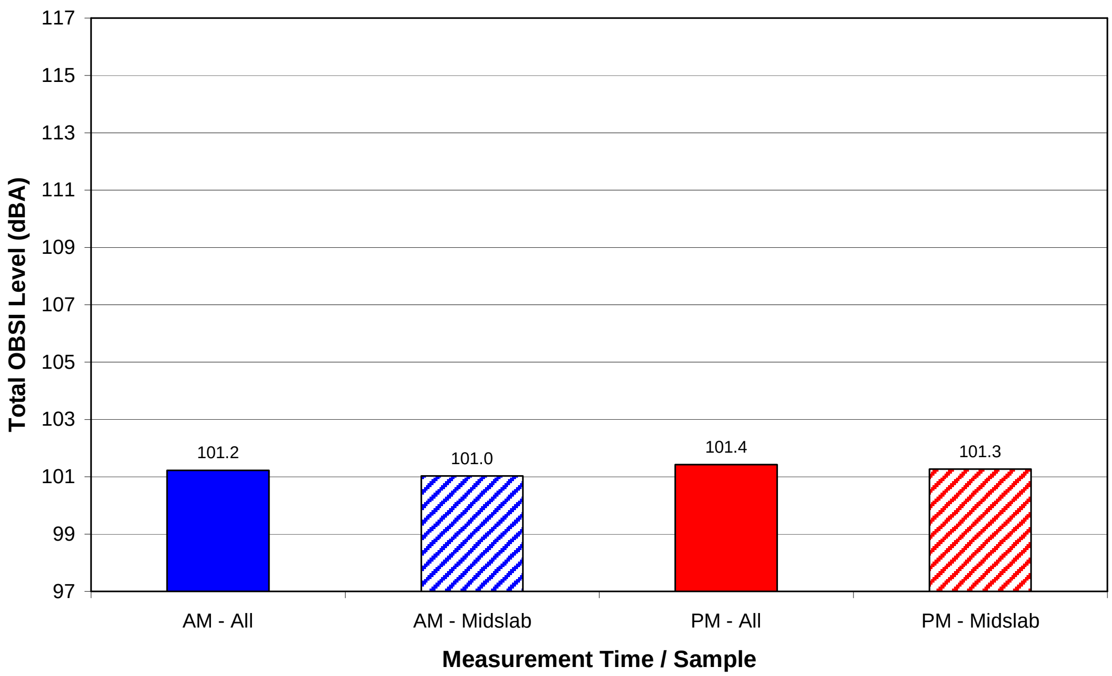
Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)



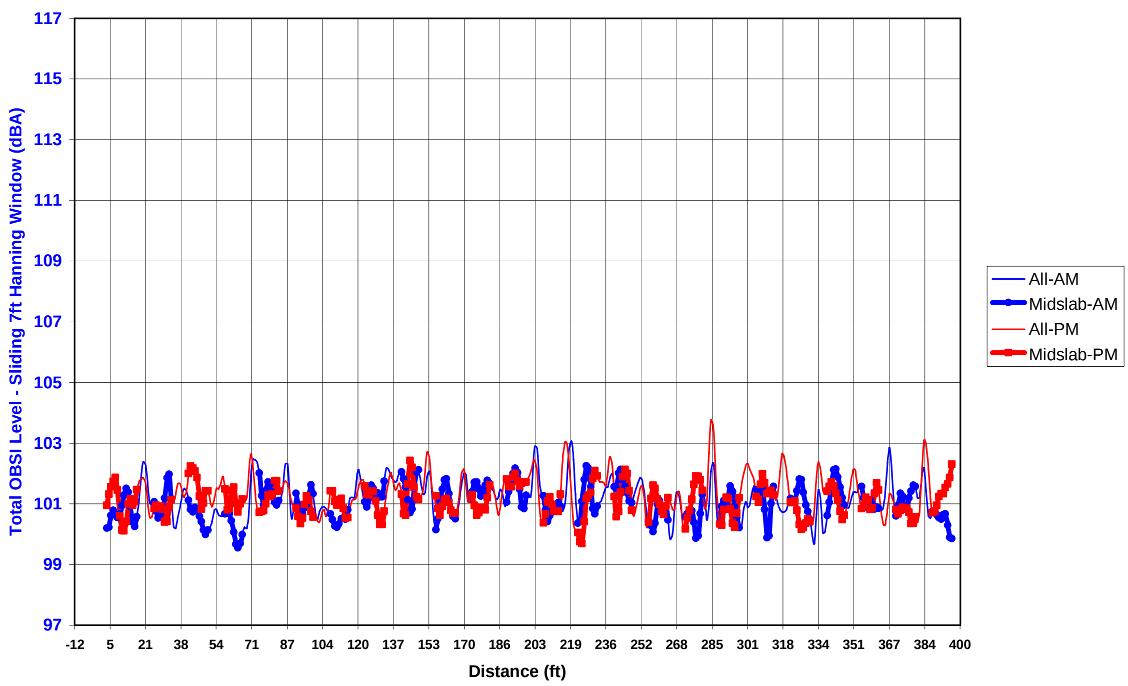
Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)



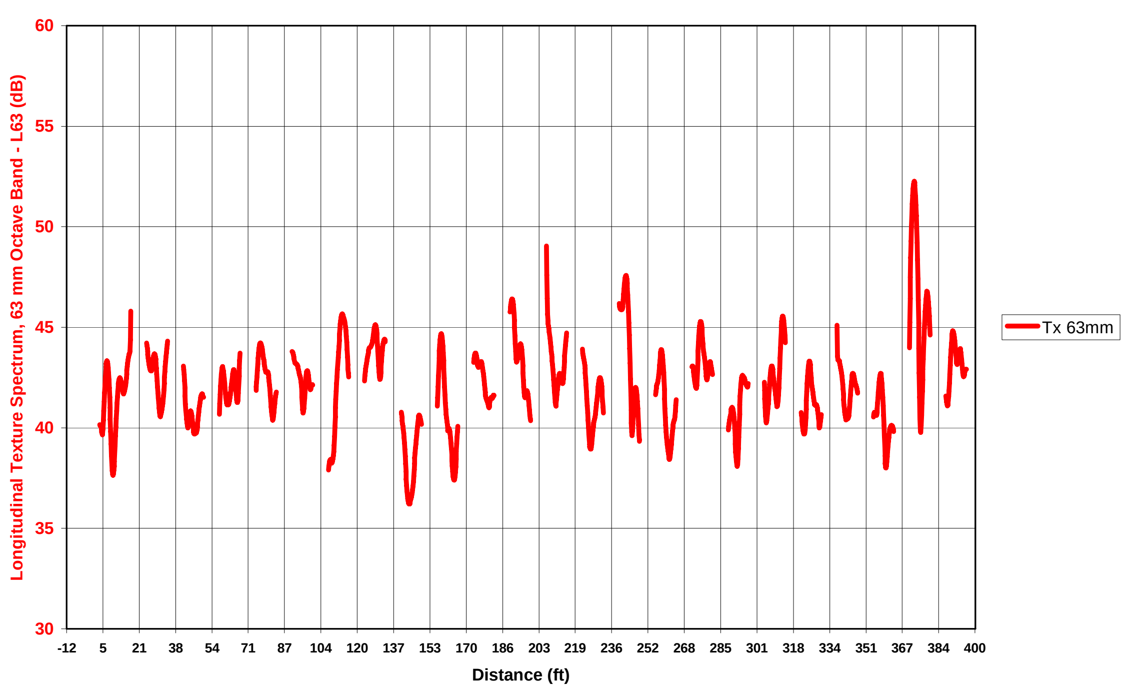
Site 205 (KS), Section D (D. Ground - Deep, 0.120 Spacing, Normal Joint)

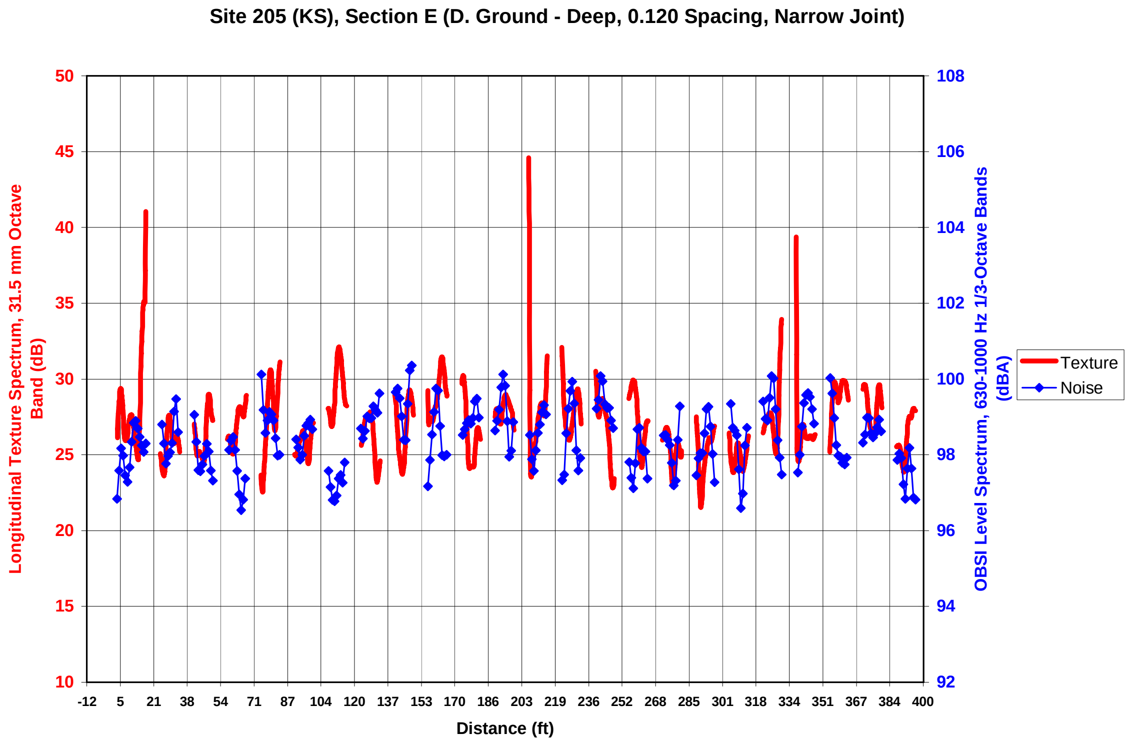


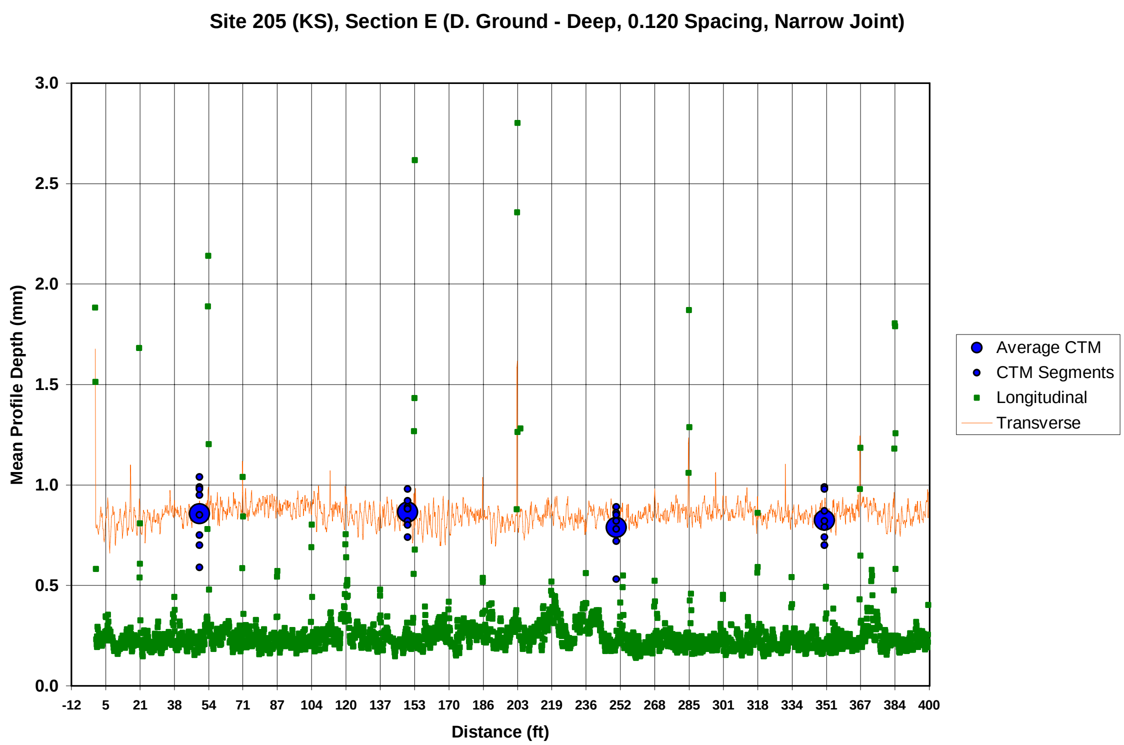
Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)



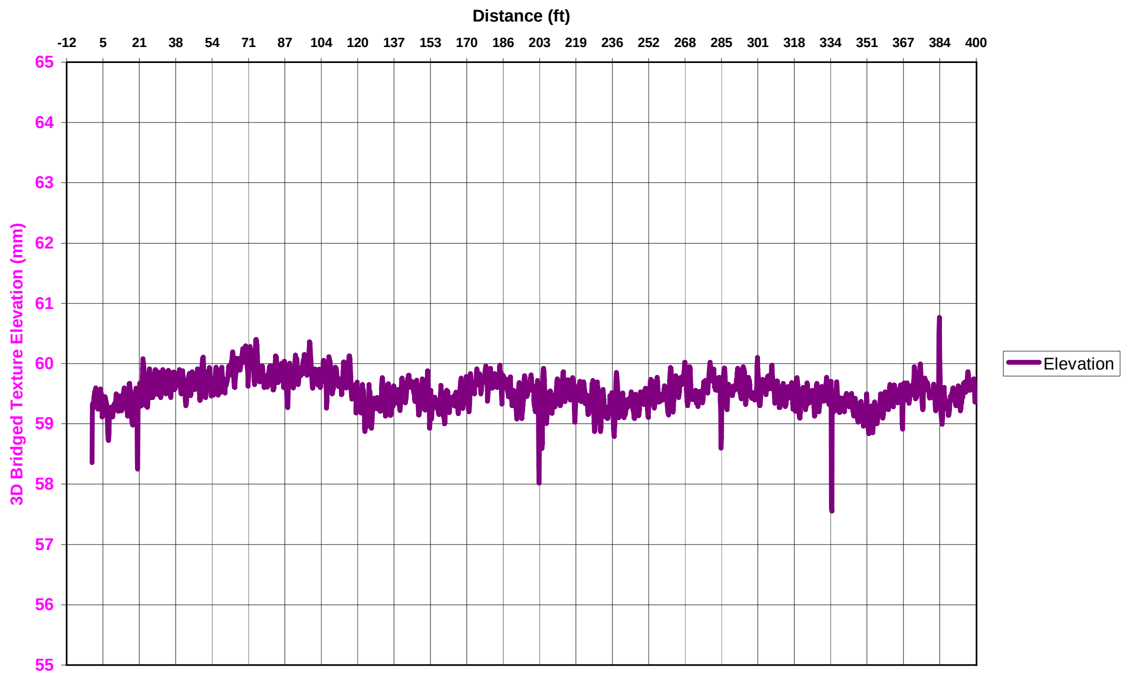
Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)



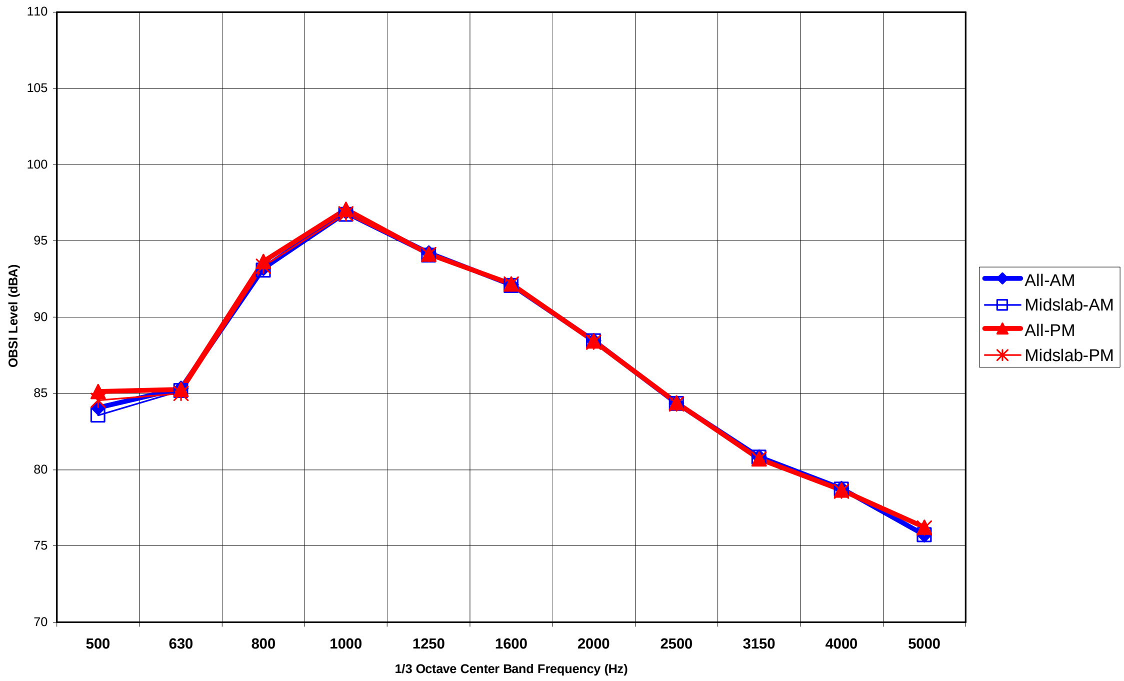

Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise
50
45
40
35
30
25
20
15
10
108
106
104
102
100
98
96
94
92
-12 5 21 38 54 71 87 104 120 137 153 170 186 203 219 236 252 268 285 301 318 334 351 367 384 400


Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-12 5 21 38 54 71 87 104 120 137 153 170 186 203 219 236 252 268 285 301 318 334 351 367 384 400

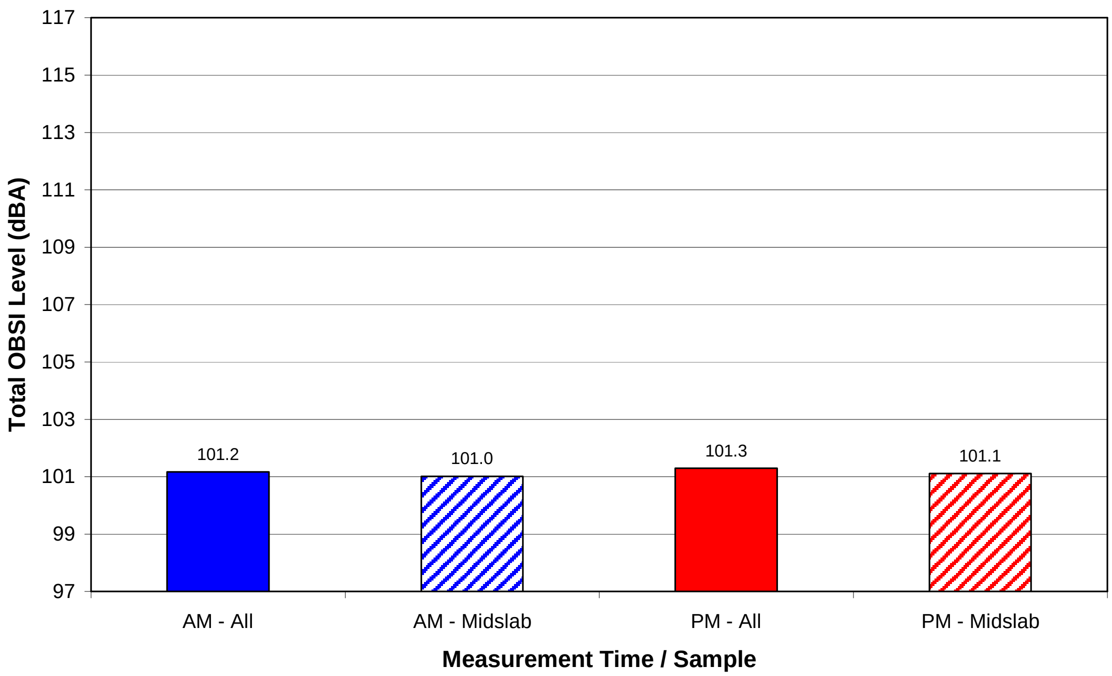
Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)



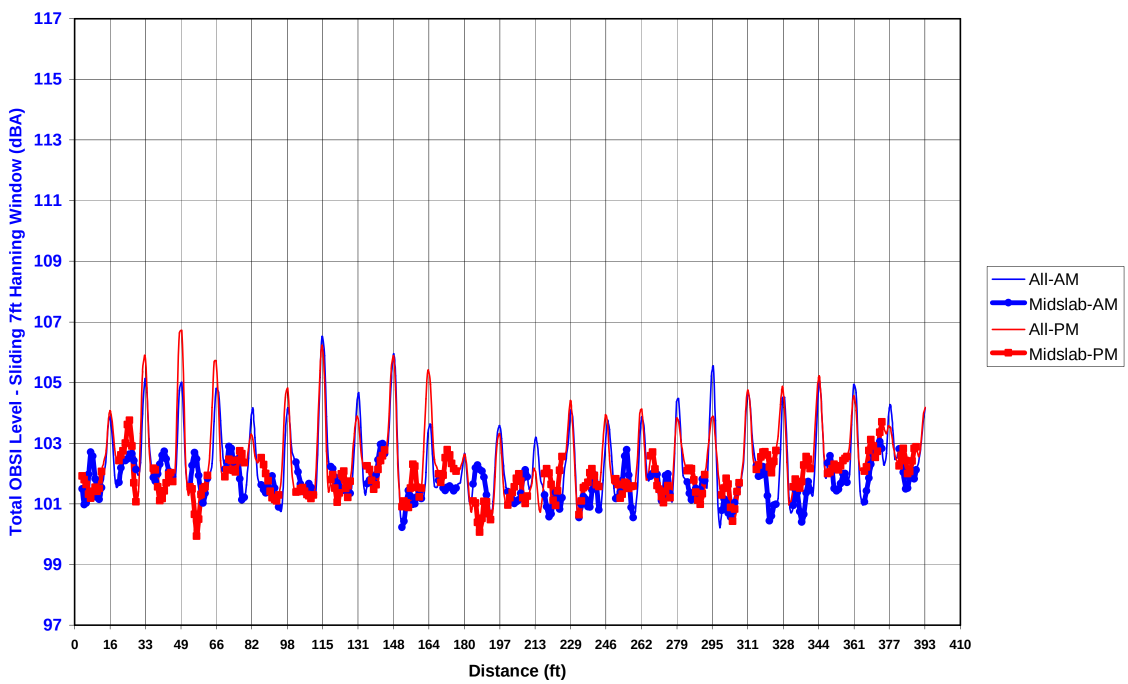
Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)



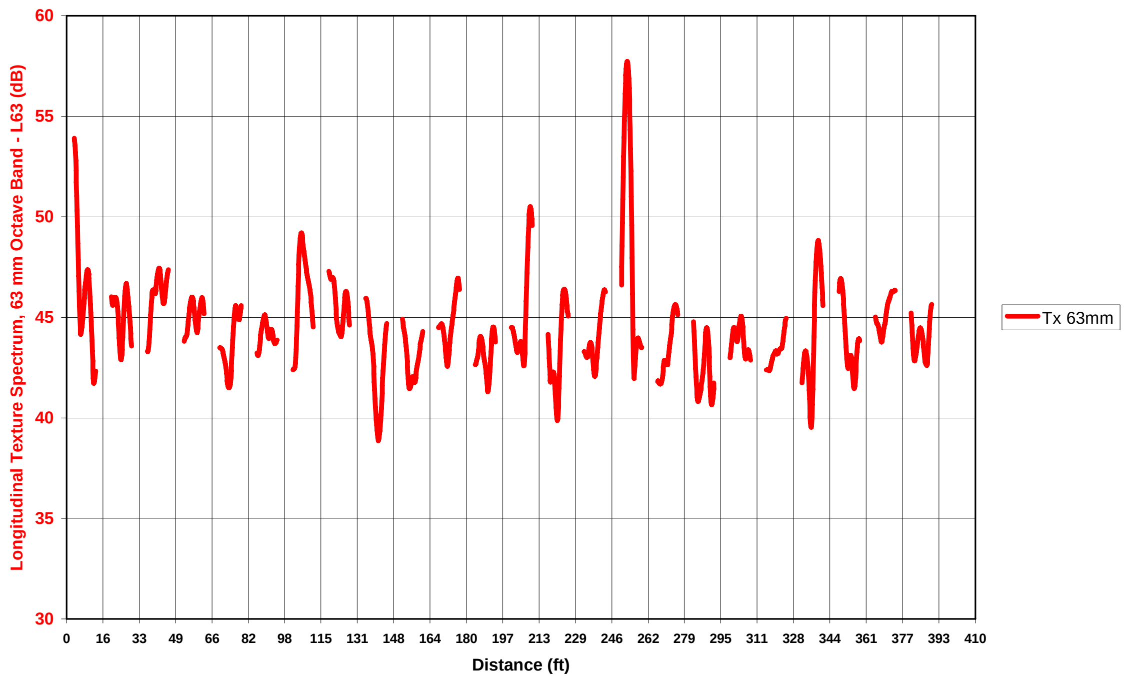
Site 205 (KS), Section E (D. Ground - Deep, 0.120 Spacing, Narrow Joint)



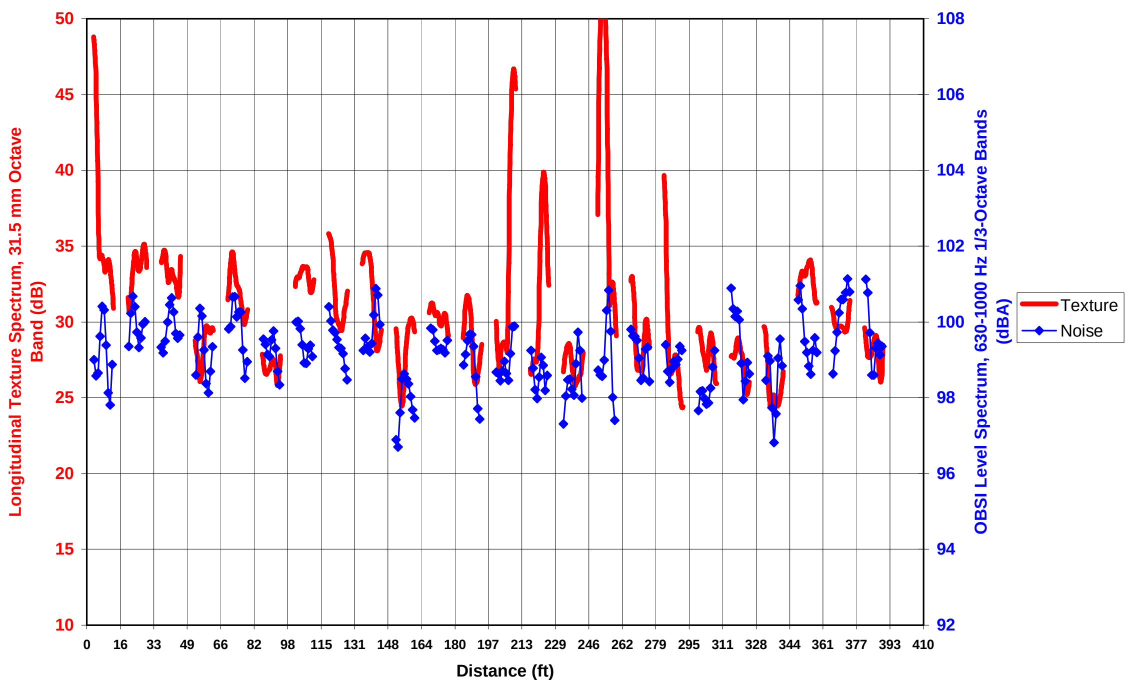
Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)

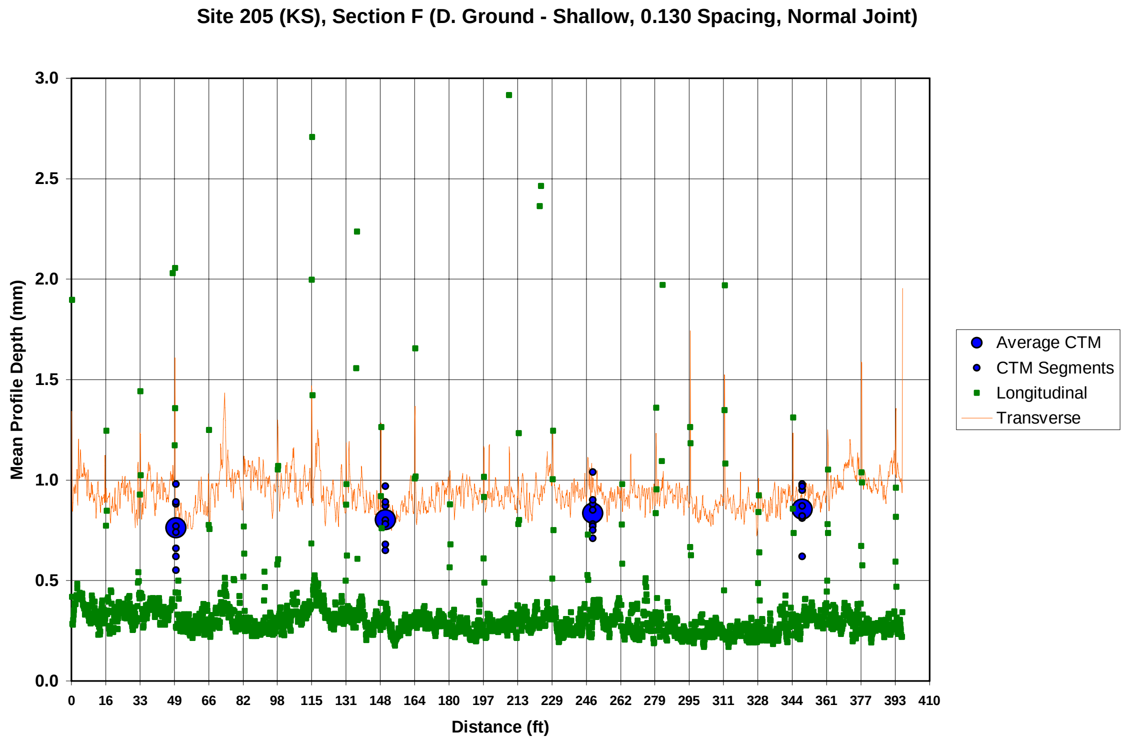


Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)

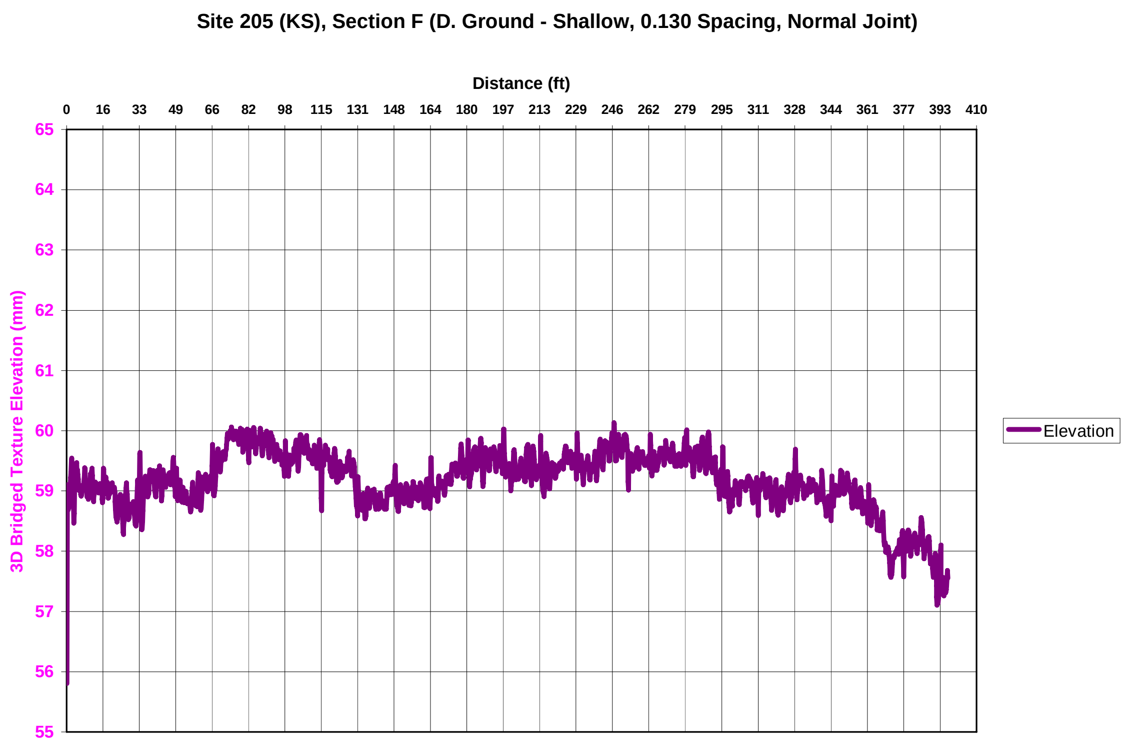


Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)



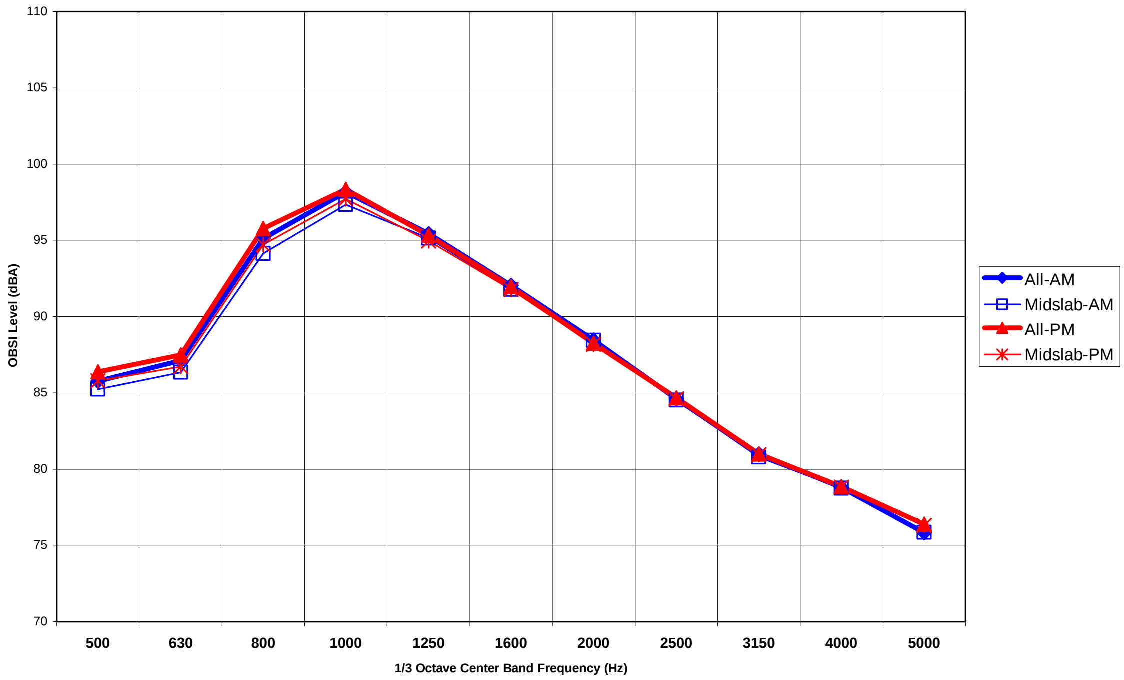


Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)
Mean Profile Depth (mm)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0 16 33 49 66 82 98 115 131 148 164 180 197 213 229 246 262 279 295 311 328 344 361 377 393 410
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

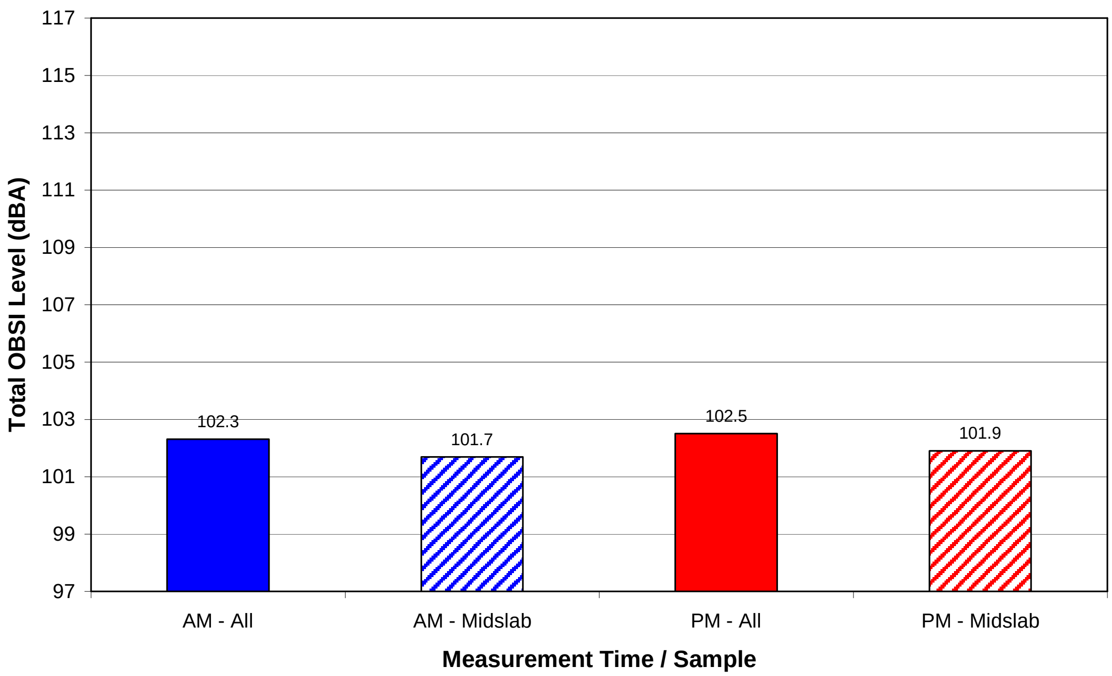


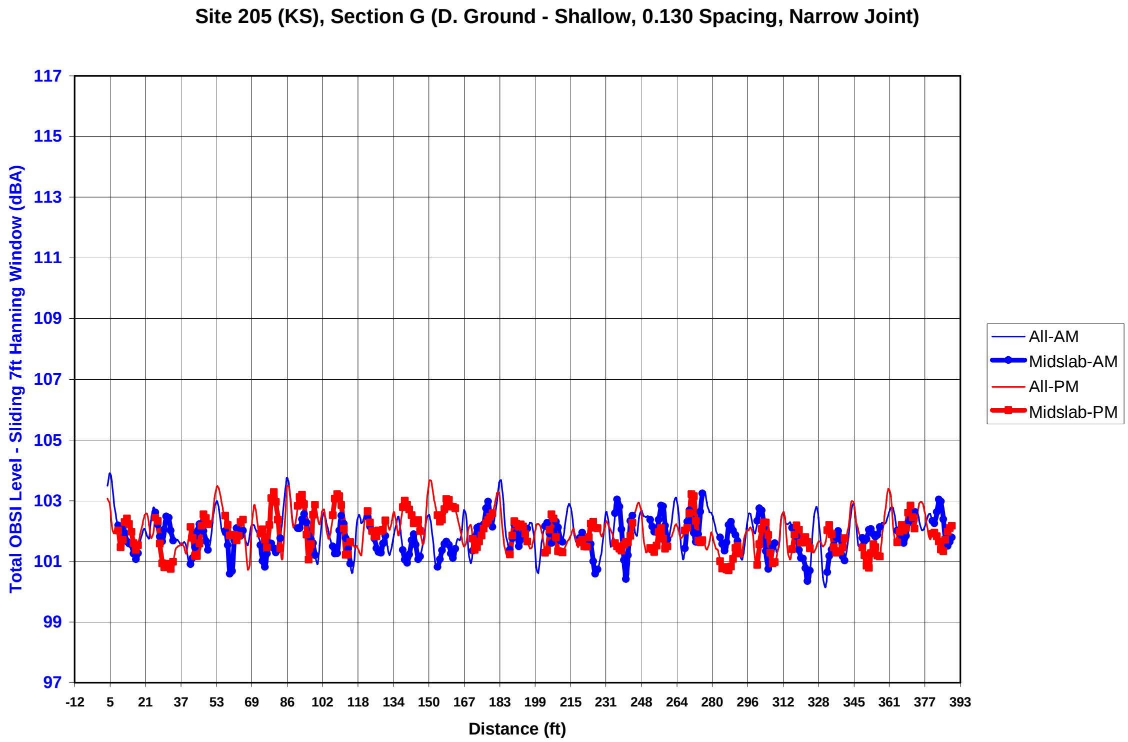
Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)
Distance (ft)
0 16 33 49 66 82 98 115 131 148 164 180 197 213 229 246 262 279 295 311 328 344 361 377 393 410
3D Bridged Texture Elevation (mm)
65
64
63
62
61
60
59
58
57
56
55
Elevation

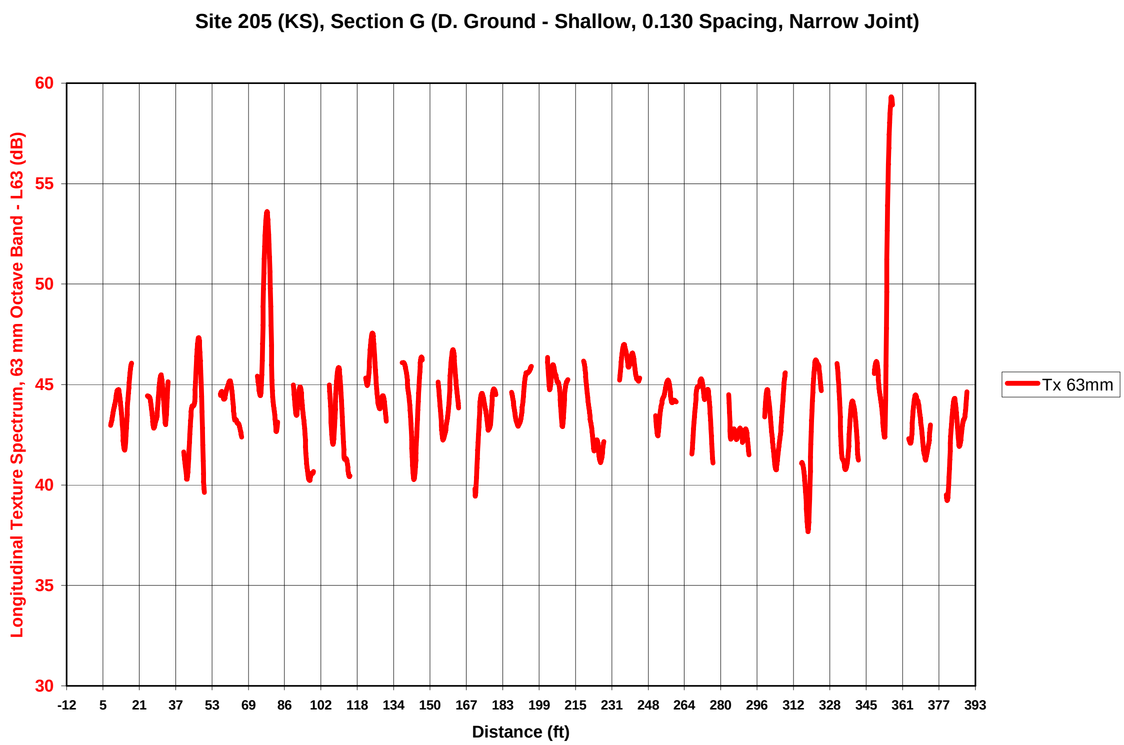
Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)

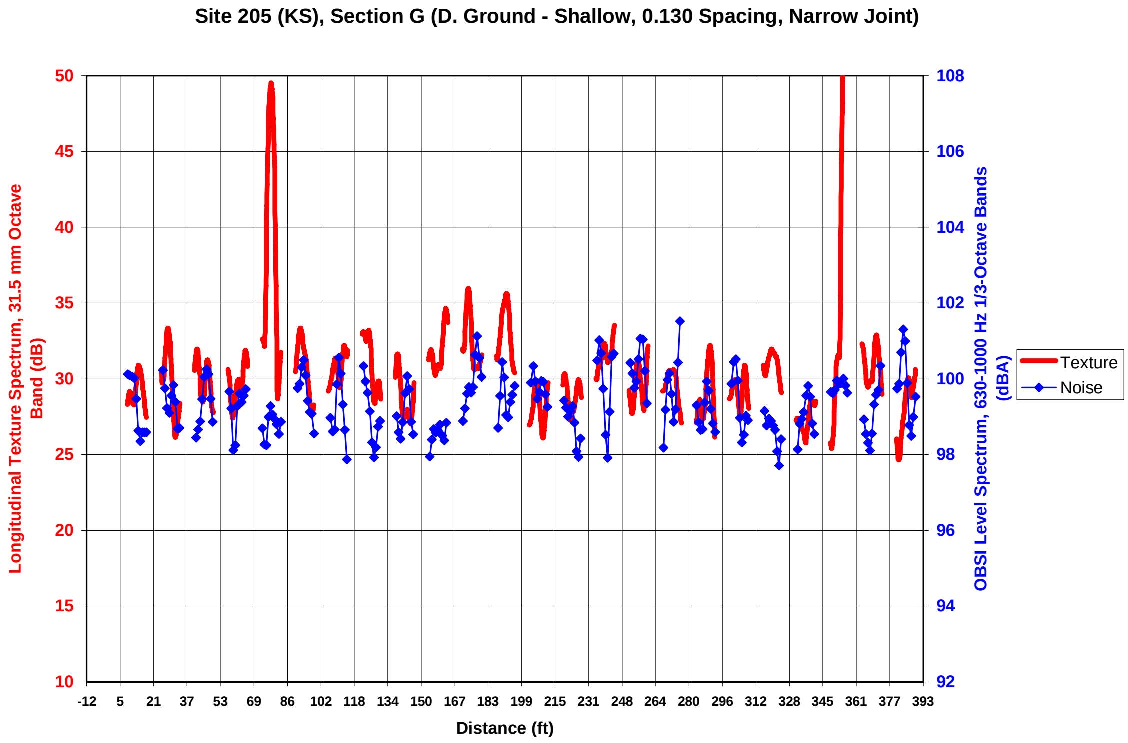


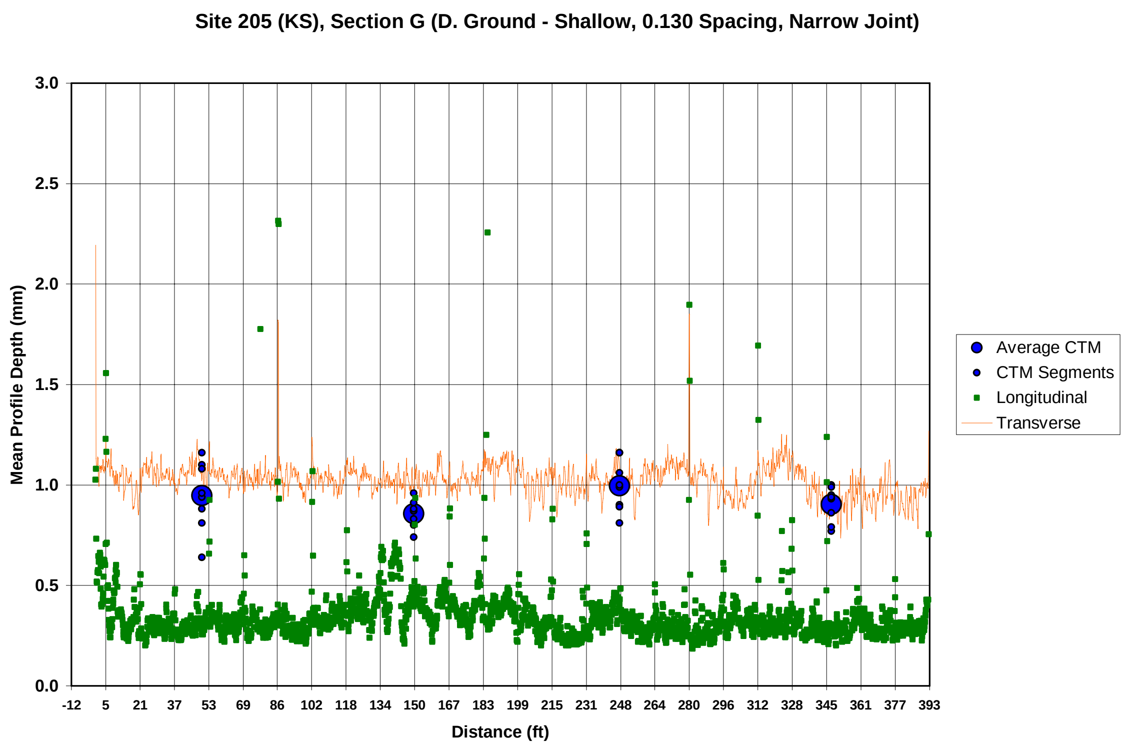
Site 205 (KS), Section F (D. Ground - Shallow, 0.130 Spacing, Normal Joint)



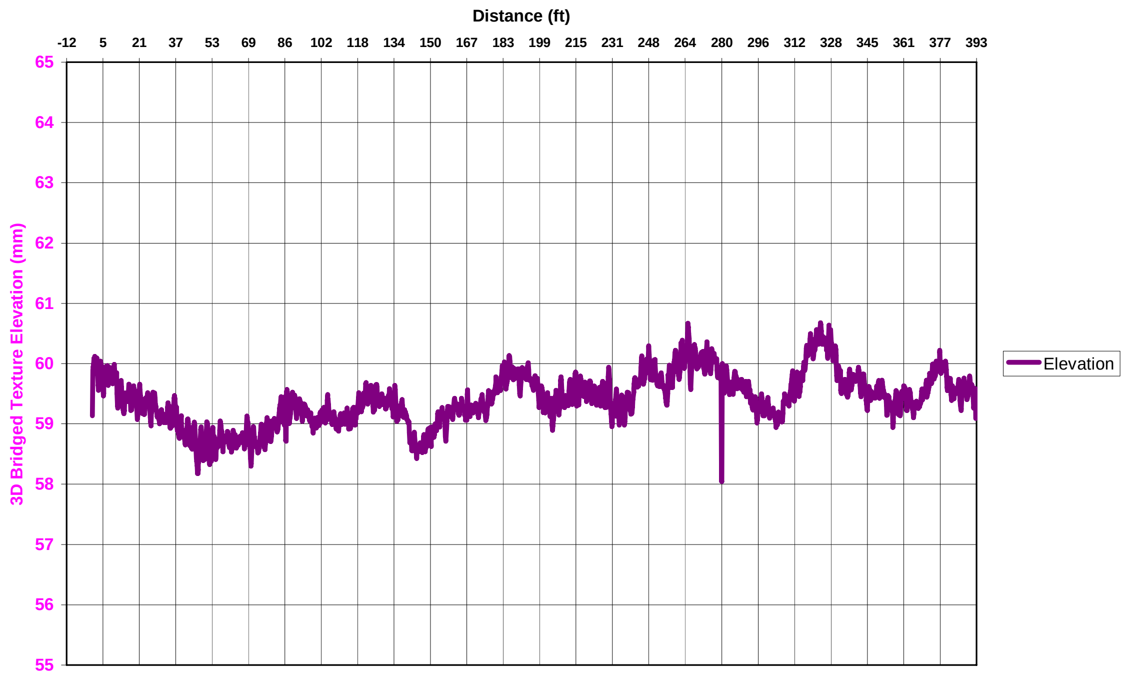

Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-12 5 21 37 53 69 86 102 118 134 150 167 183 199 215 231 248 264 280 296 312 328 345 361 377 393
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-12 5 21 37 53 69 86 102 118 134 150 167 183 199 215 231 248 264 280 296 312 328 345 361 377 393
Distance (ft)
Tx 63mm

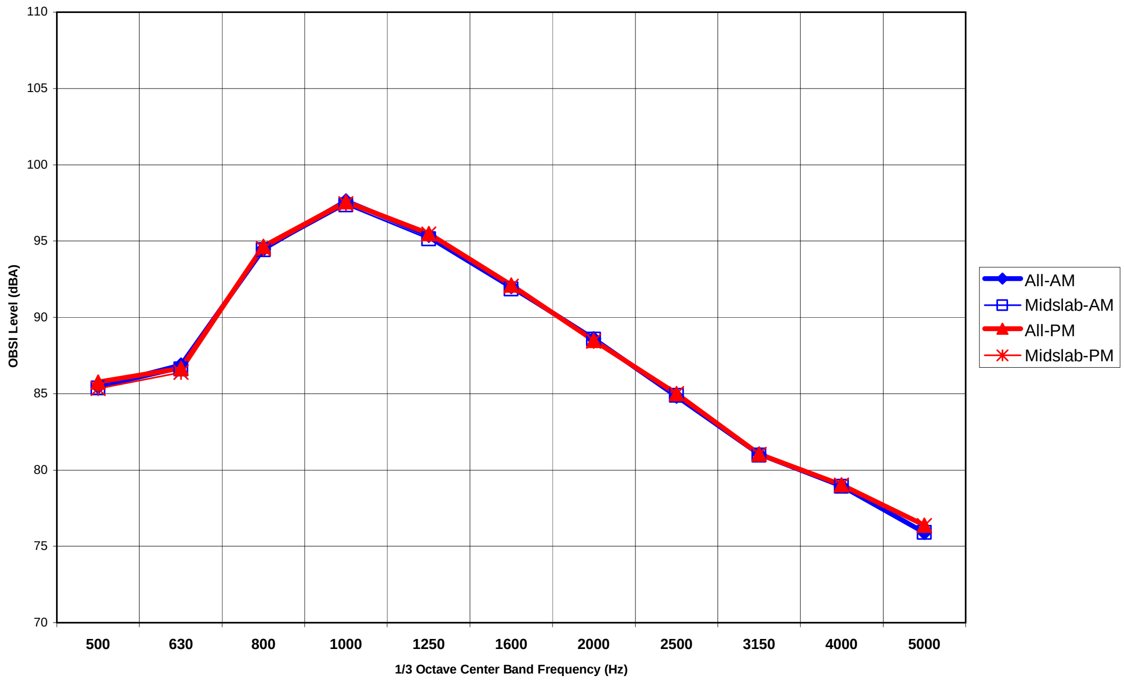

Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise


Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

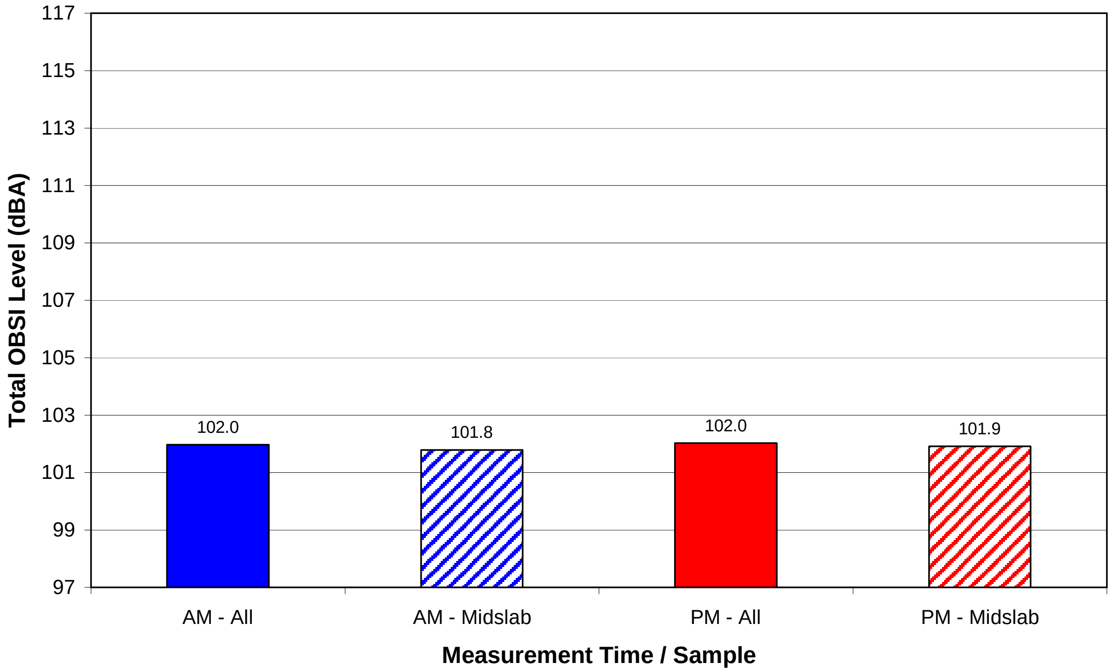
Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)



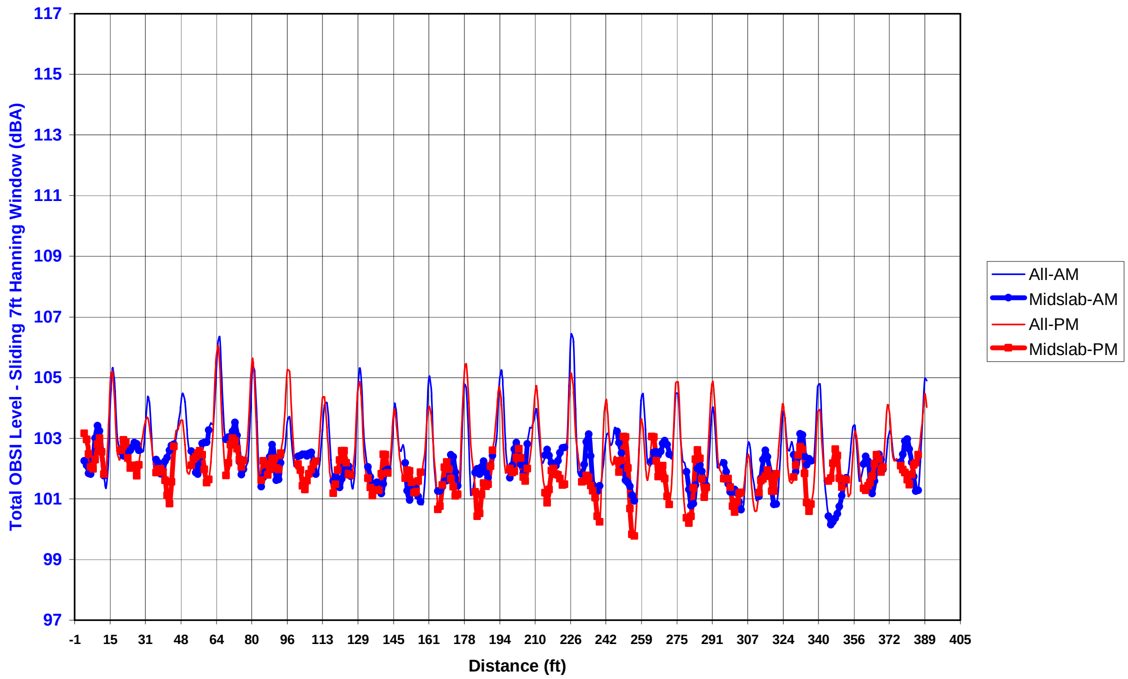
Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)

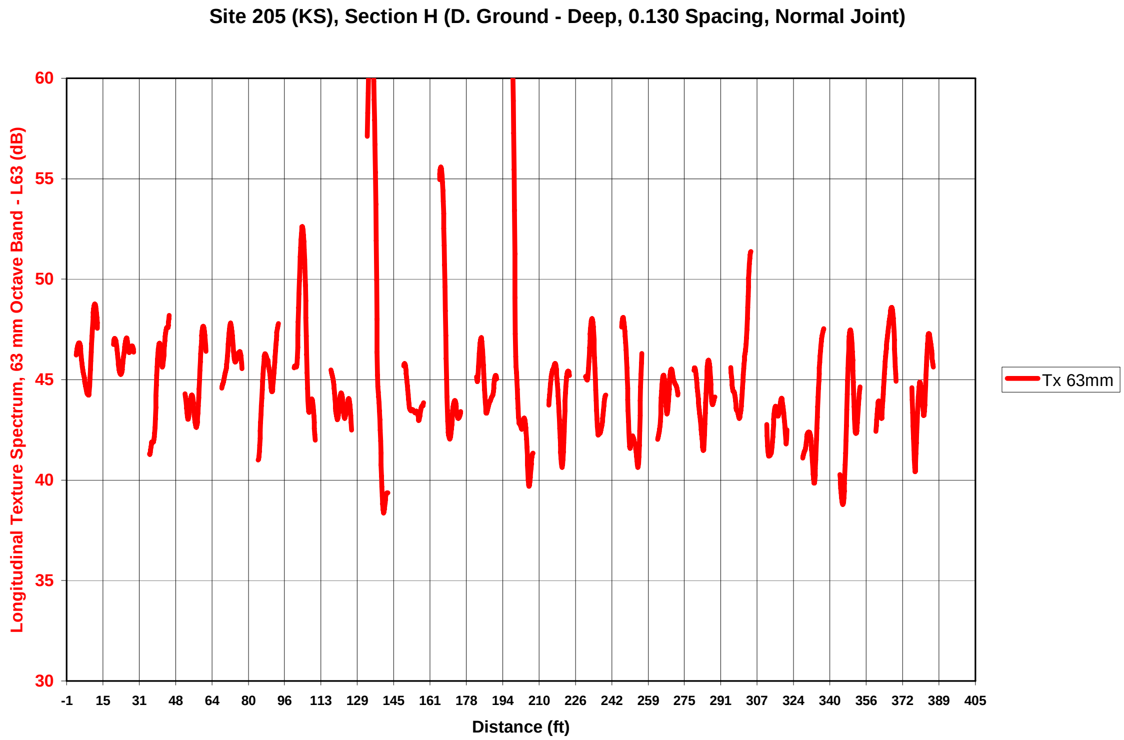


Site 205 (KS), Section G (D. Ground - Shallow, 0.130 Spacing, Narrow Joint)

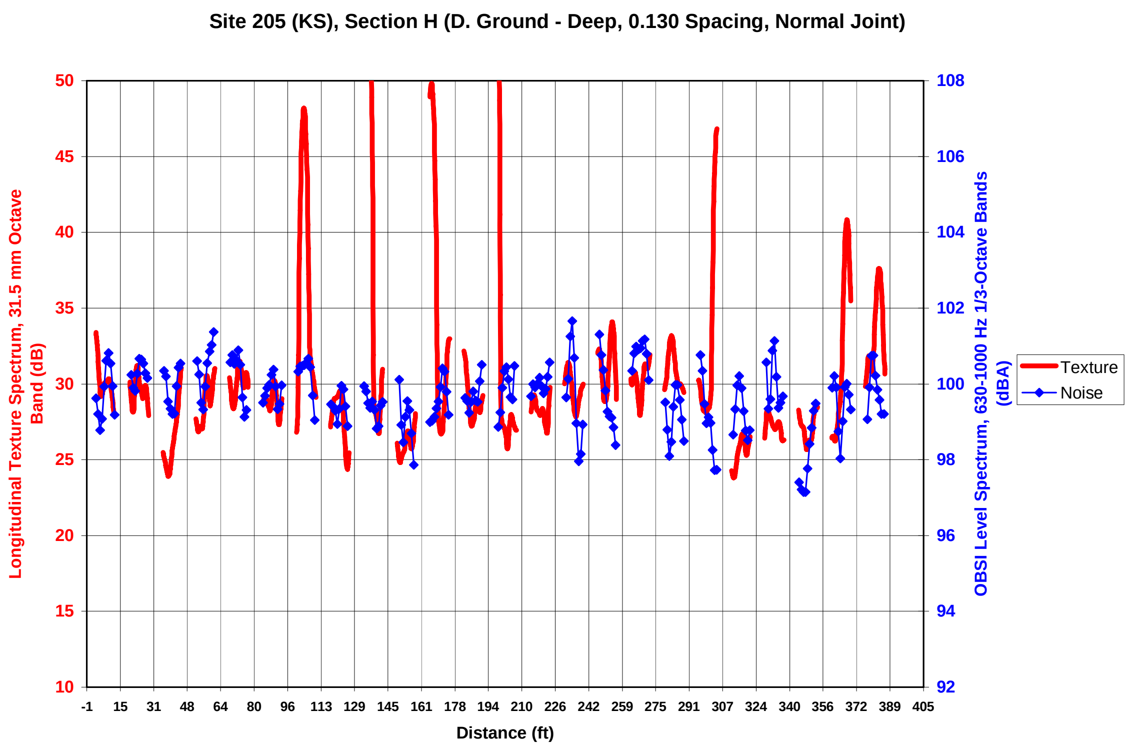


Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)



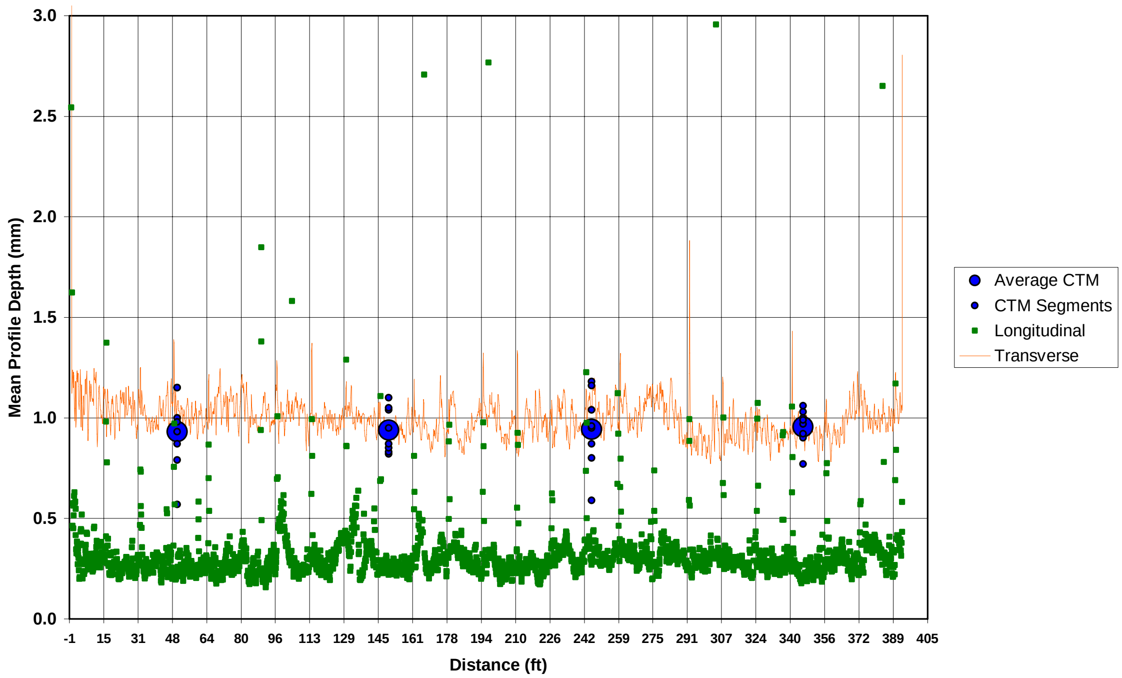


Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-1
15
31
48
64
80
96
113
129
145
161
178
194
210
226
242
259
275
291
307
324
340
356
372
389
405
Distance (ft)
Tx 63mm

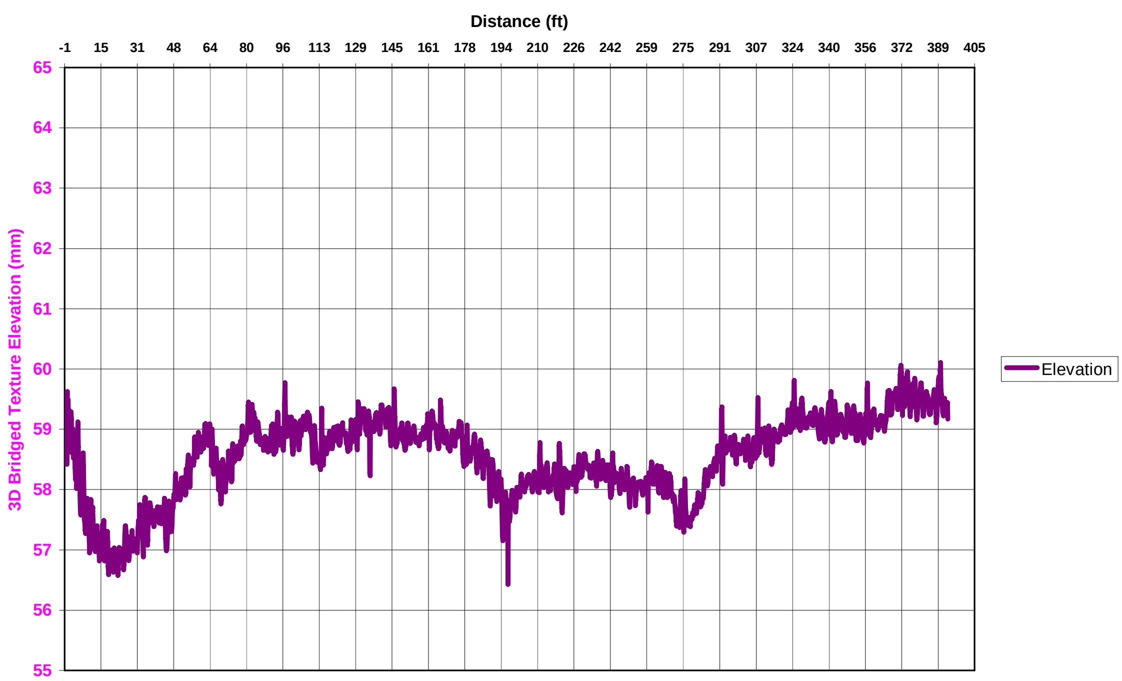


Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
50
45
40
35
30
25
20
15
10
108
106
104
102
100
98
96
94
92
-1
15
31
48
64
80
96
113
129
145
161
178
194
210
226
242
259
275
291
307
324
340
356
372
389
405
Distance (ft)
Texture
Noise

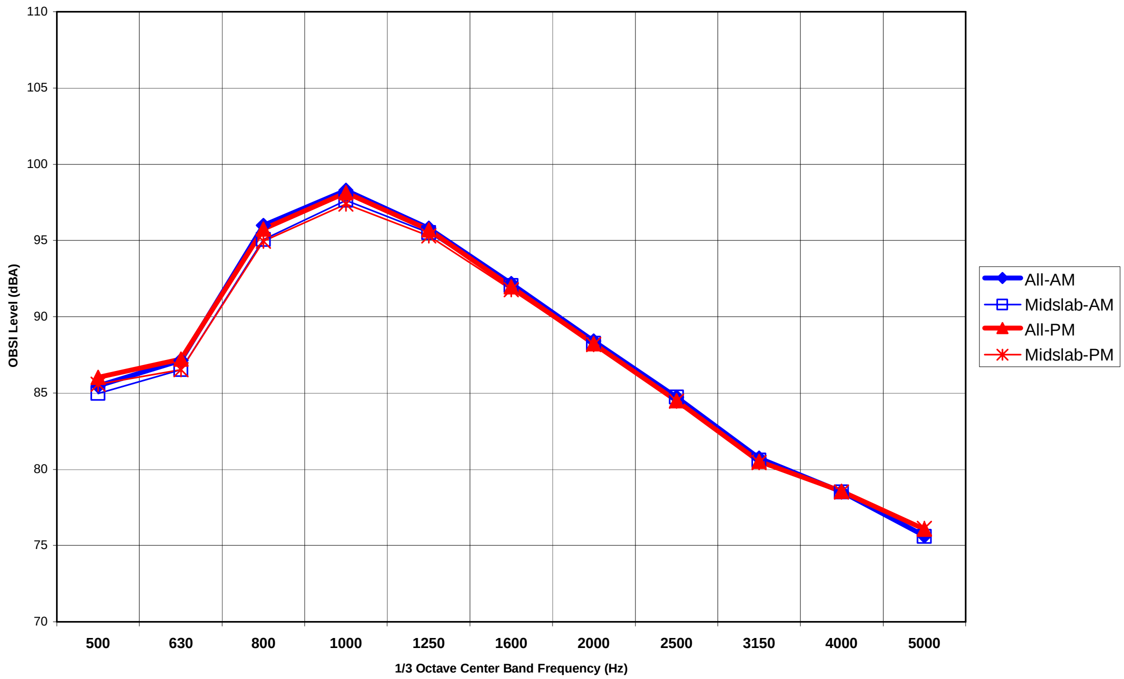
Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)



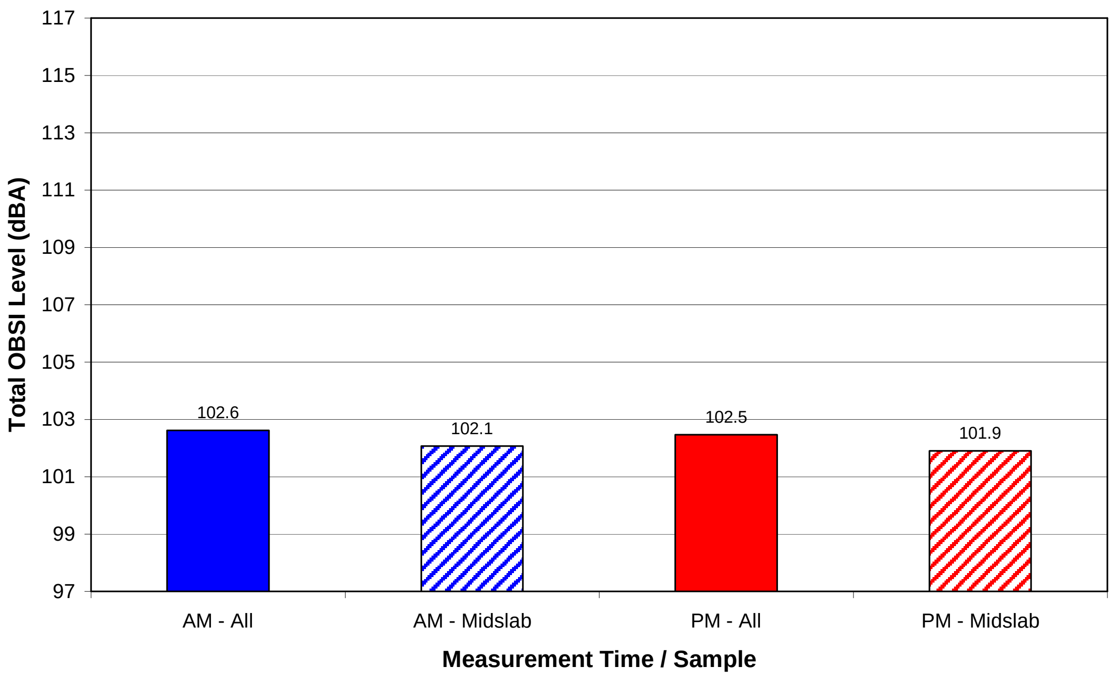
Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)

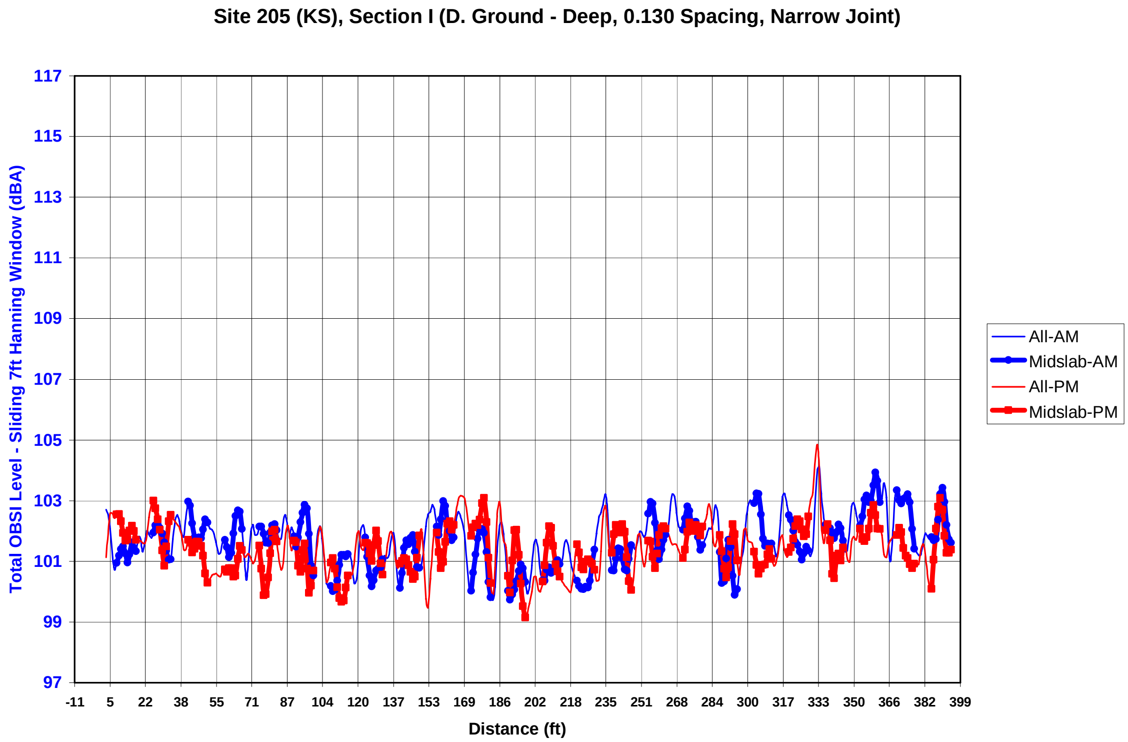


Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)

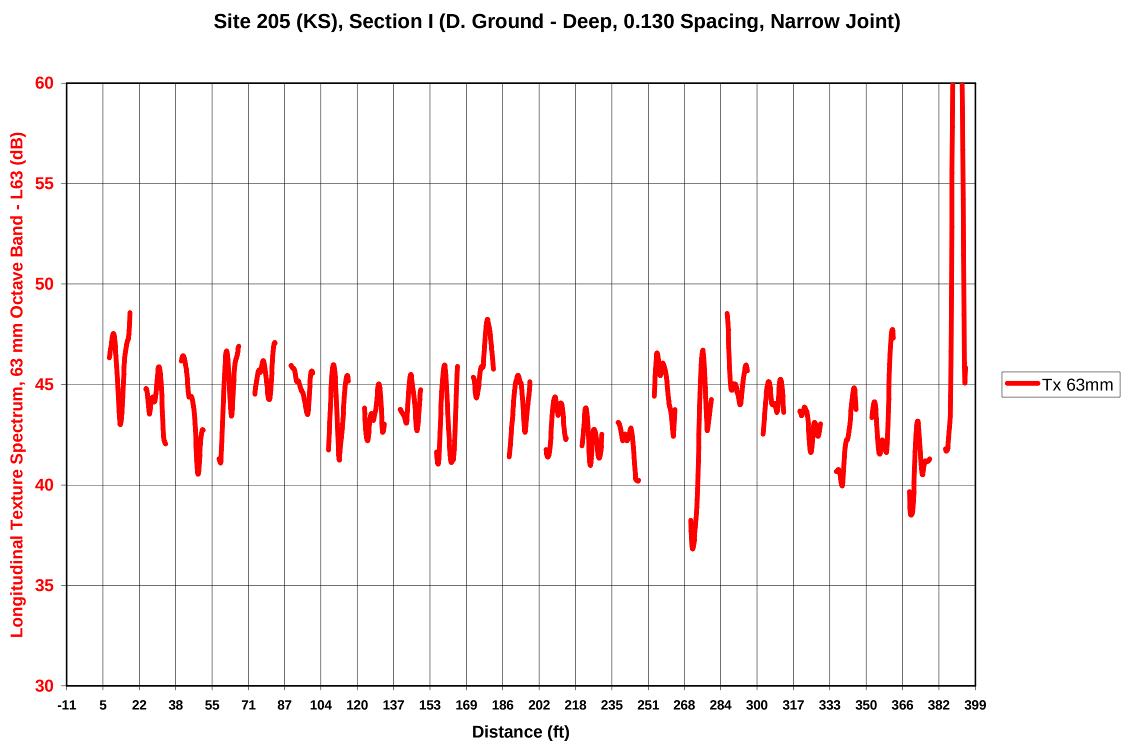


Site 205 (KS), Section H (D. Ground - Deep, 0.130 Spacing, Normal Joint)

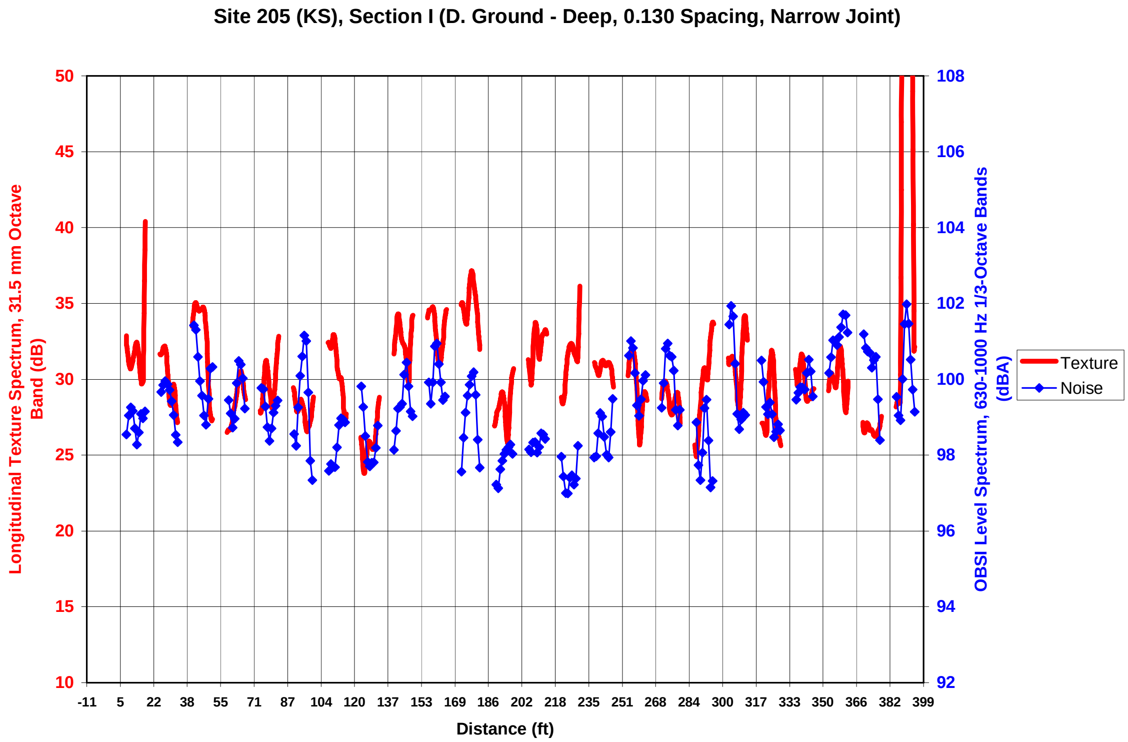




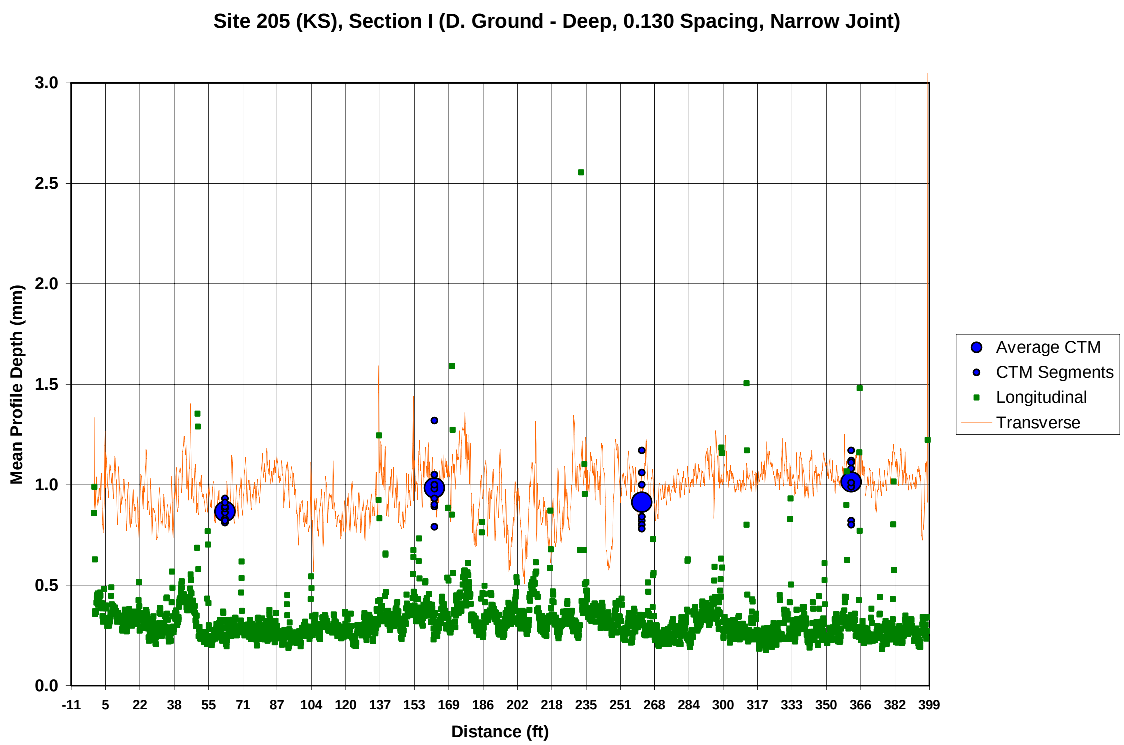
Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-11 5 22 38 55 71 87 104 120 137 153 169 186 202 218 235 251 268 284 300 317 333 350 366 382 399
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM



Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-11 5 22 38 55 71 87 104 120 137 153 169 186 202 218 235 251 268 284 300 317 333 350 366 382 399
Distance (ft)
Tx 63mm

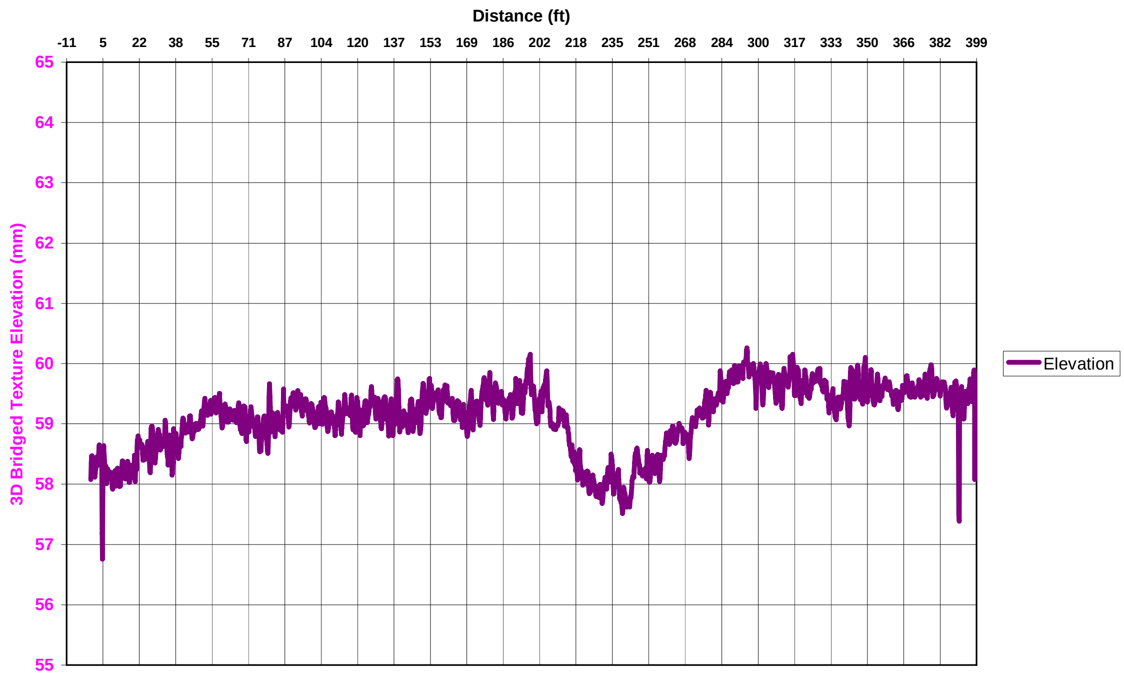


Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise

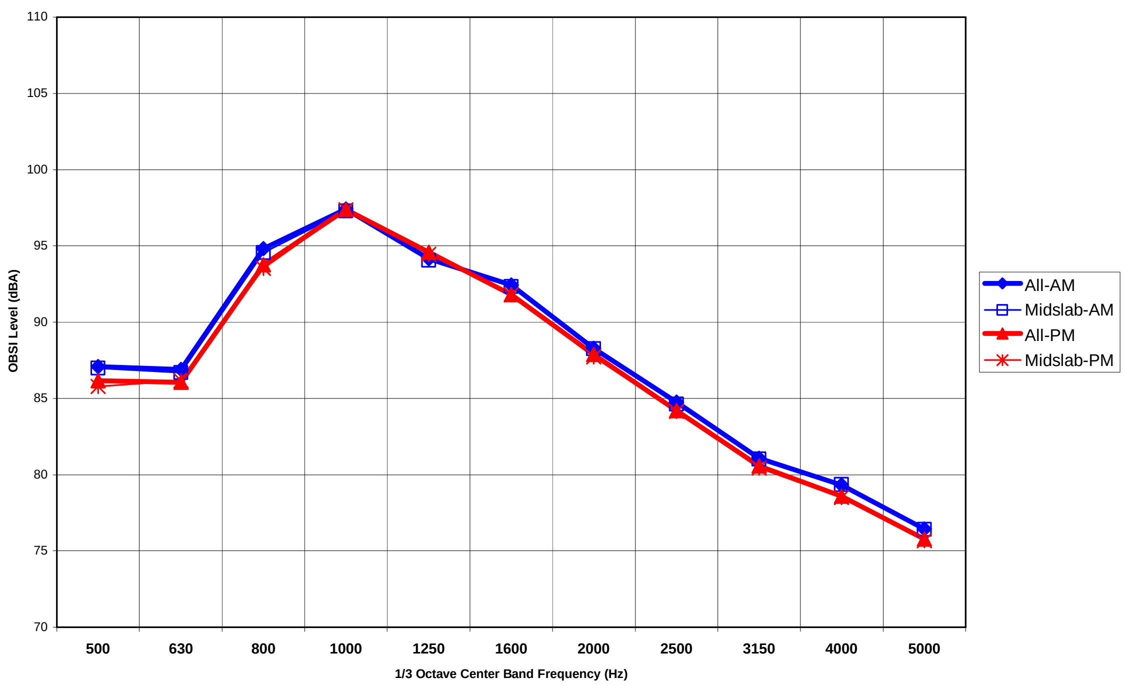


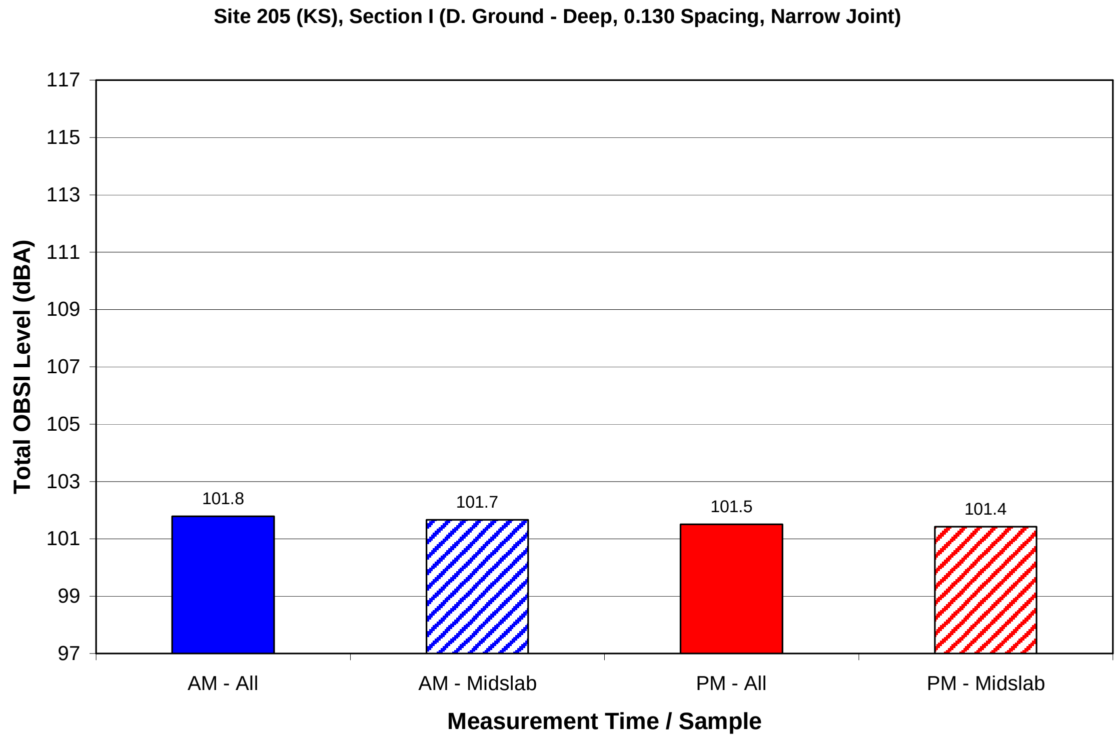
Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)

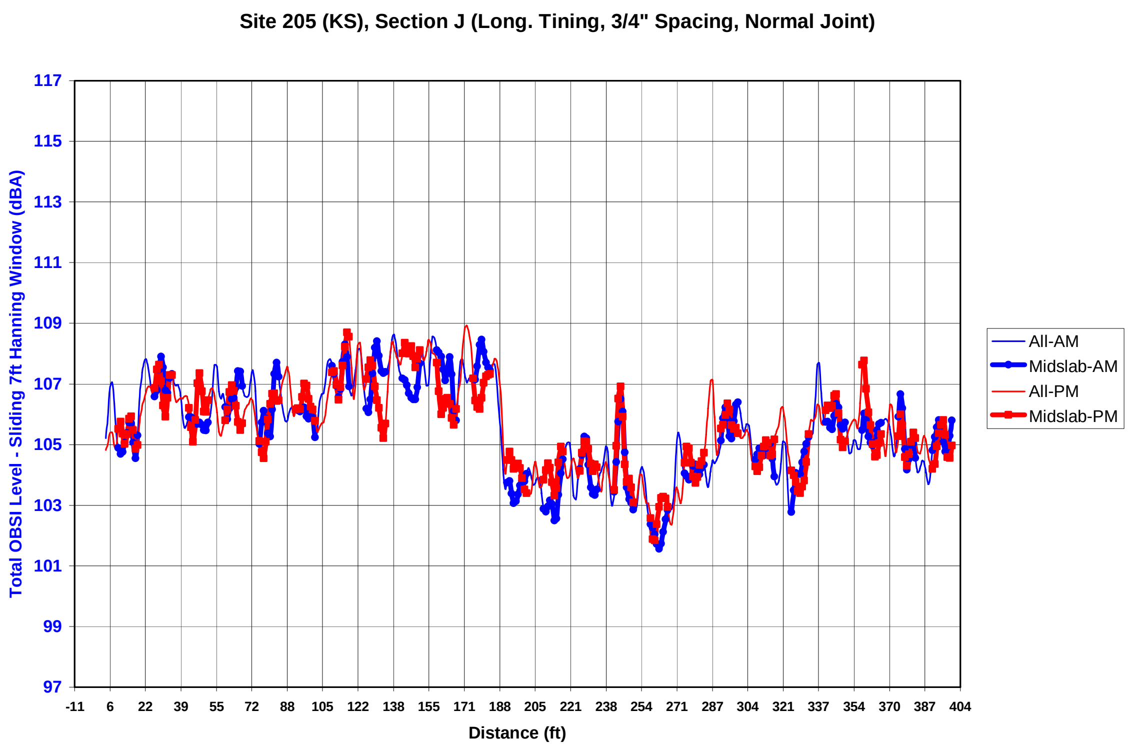


Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)

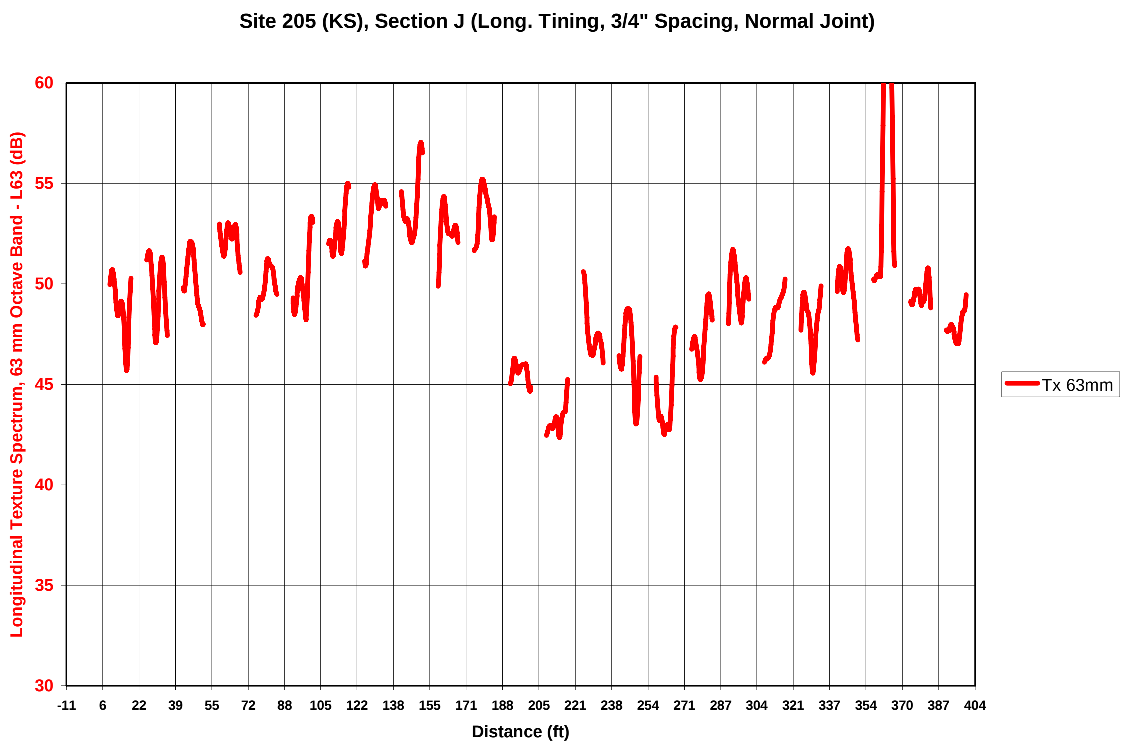


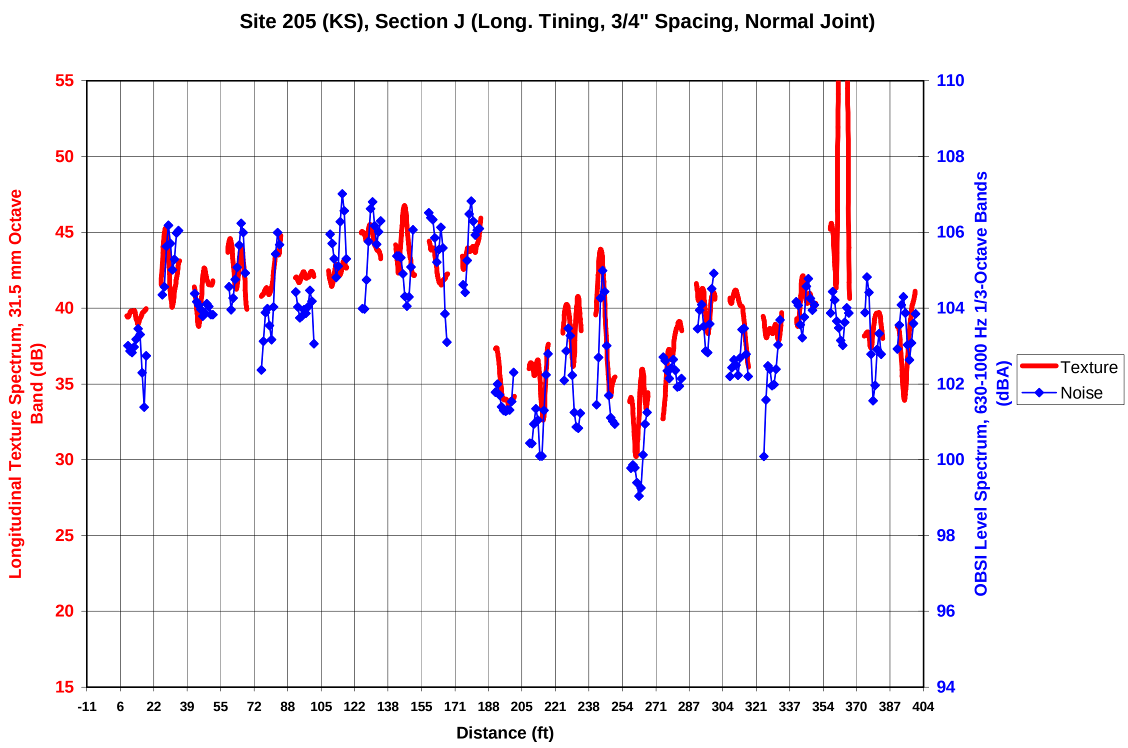


Site 205 (KS), Section I (D. Ground - Deep, 0.130 Spacing, Narrow Joint)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
101.8
101.7
101.5
101.4
AM - All
AM - Midslab
PM - All
PM - Midslab
Measurement Time / Sample

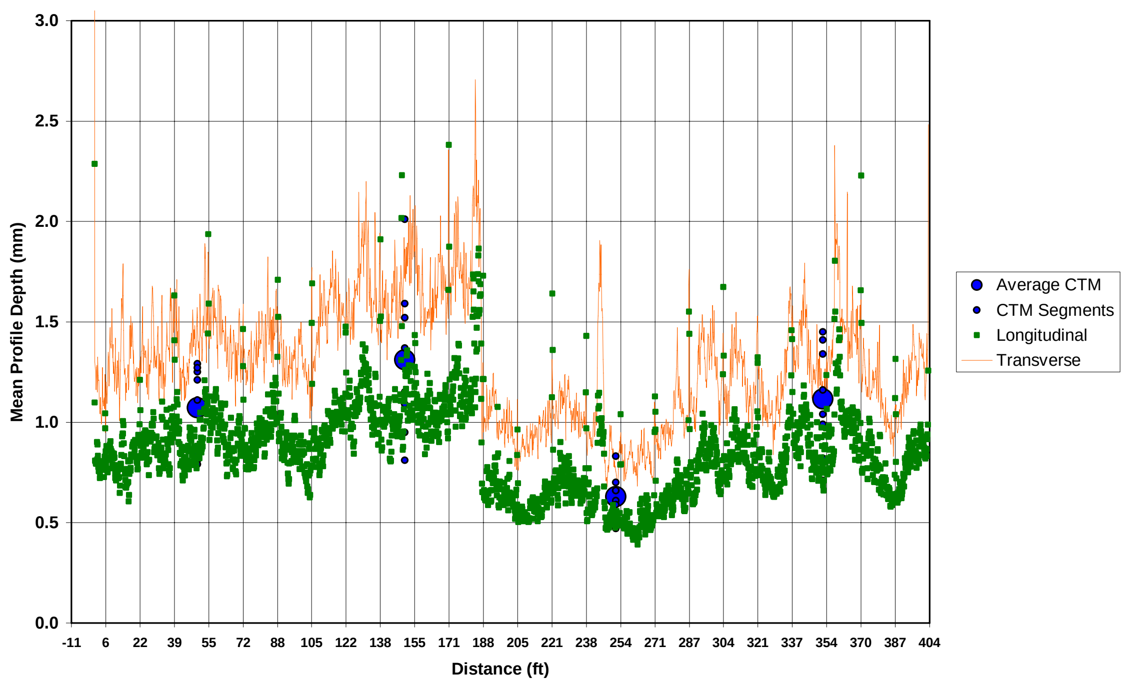


Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM

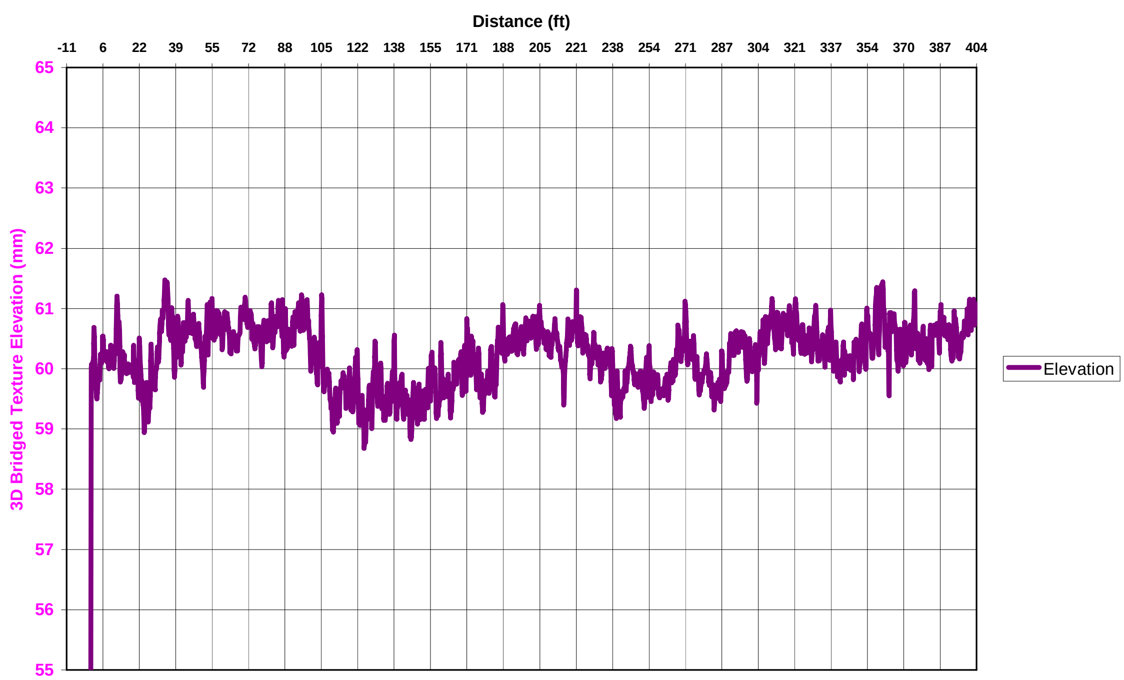

Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
Tx 63mm


Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
55
50
45
40
35
30
25
20
15
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
110
108
106
104
102
100
98
96
94
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
Texture
Noise

Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)

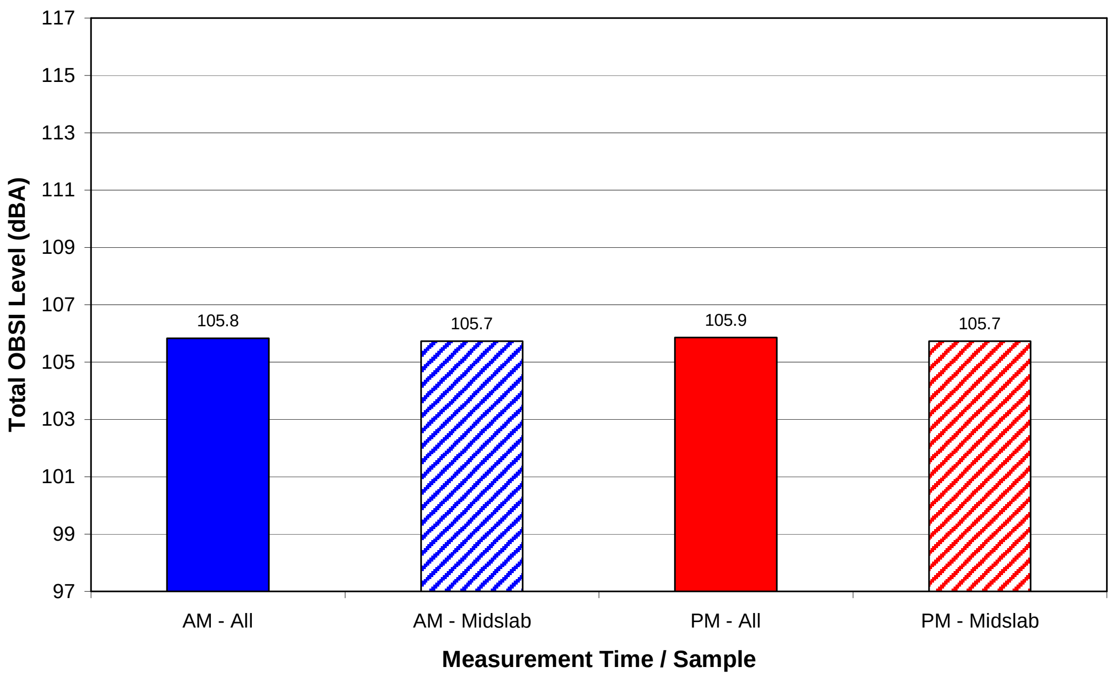


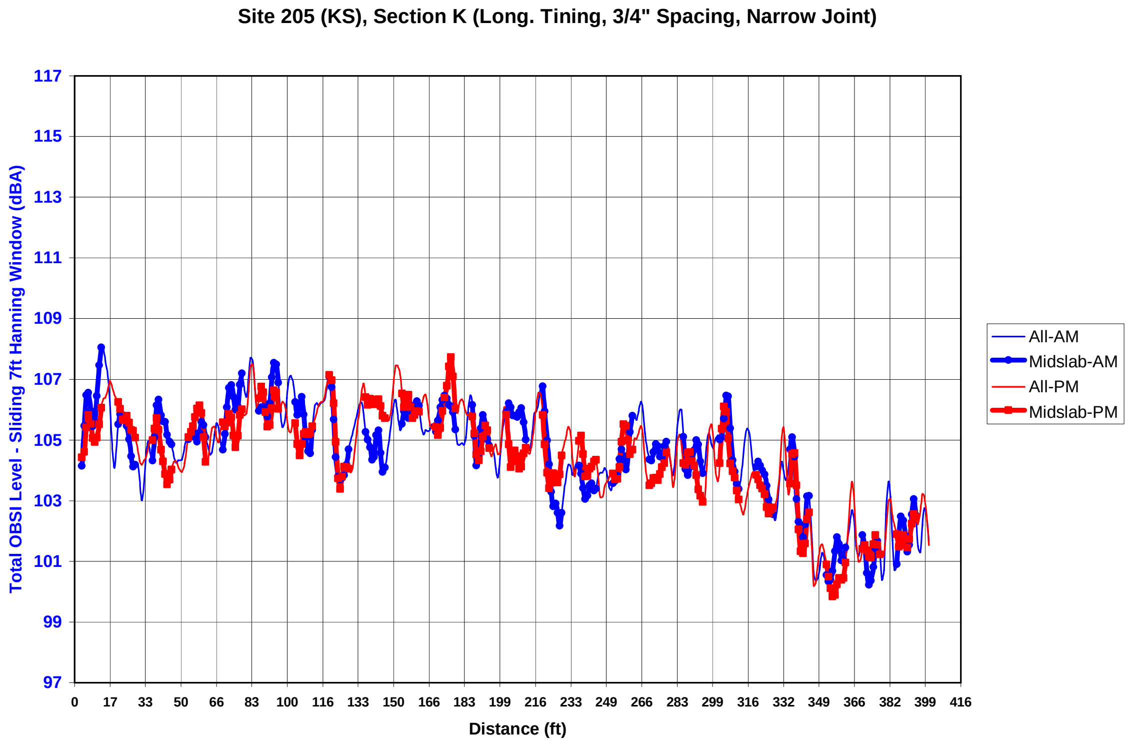
Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)



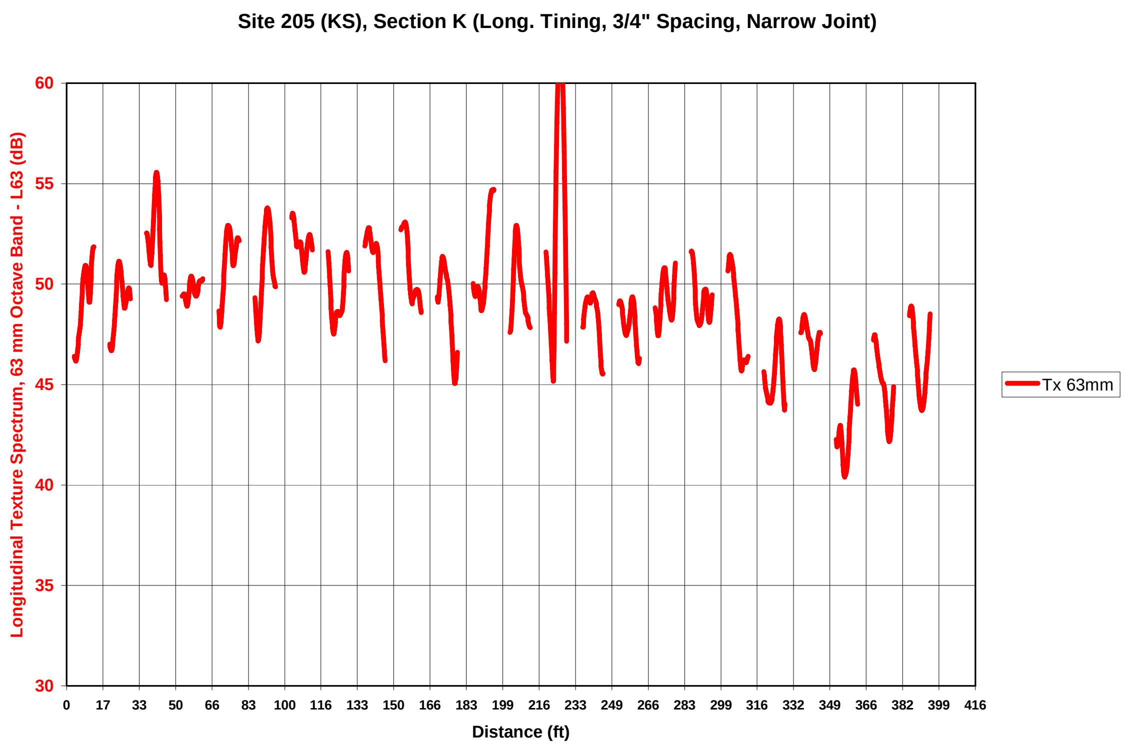
Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)

Site 205 (KS), Section J (Long. Tining, 3/4" Spacing, Normal Joint)

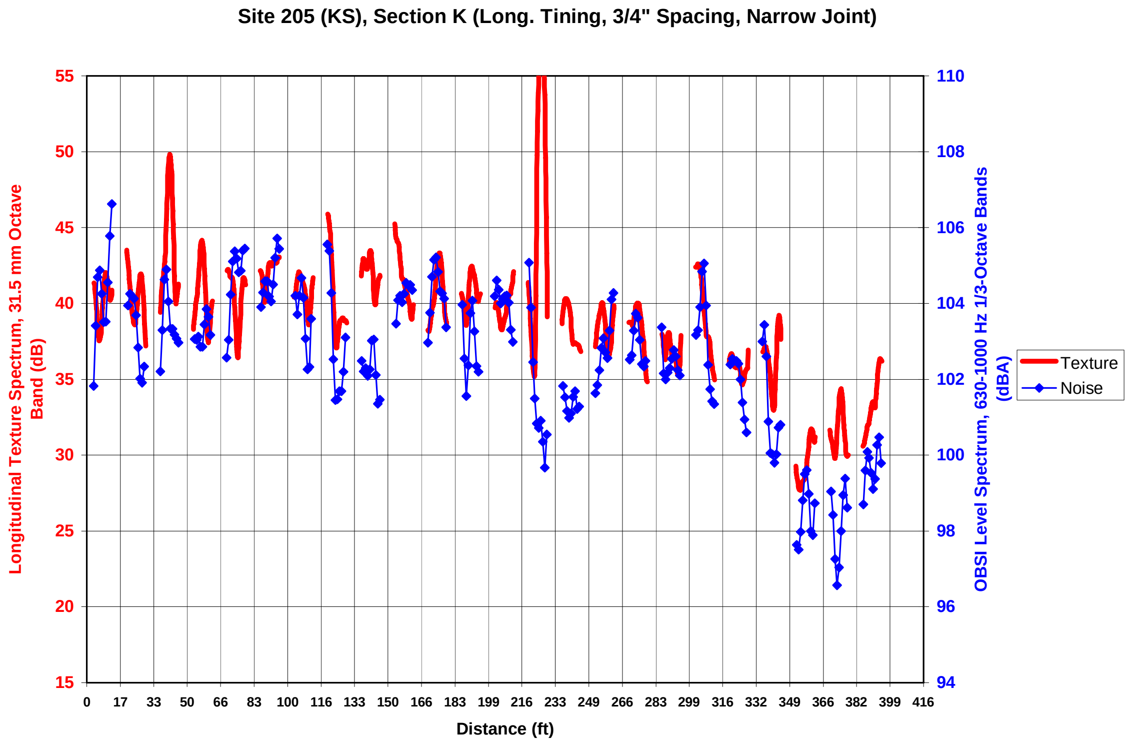


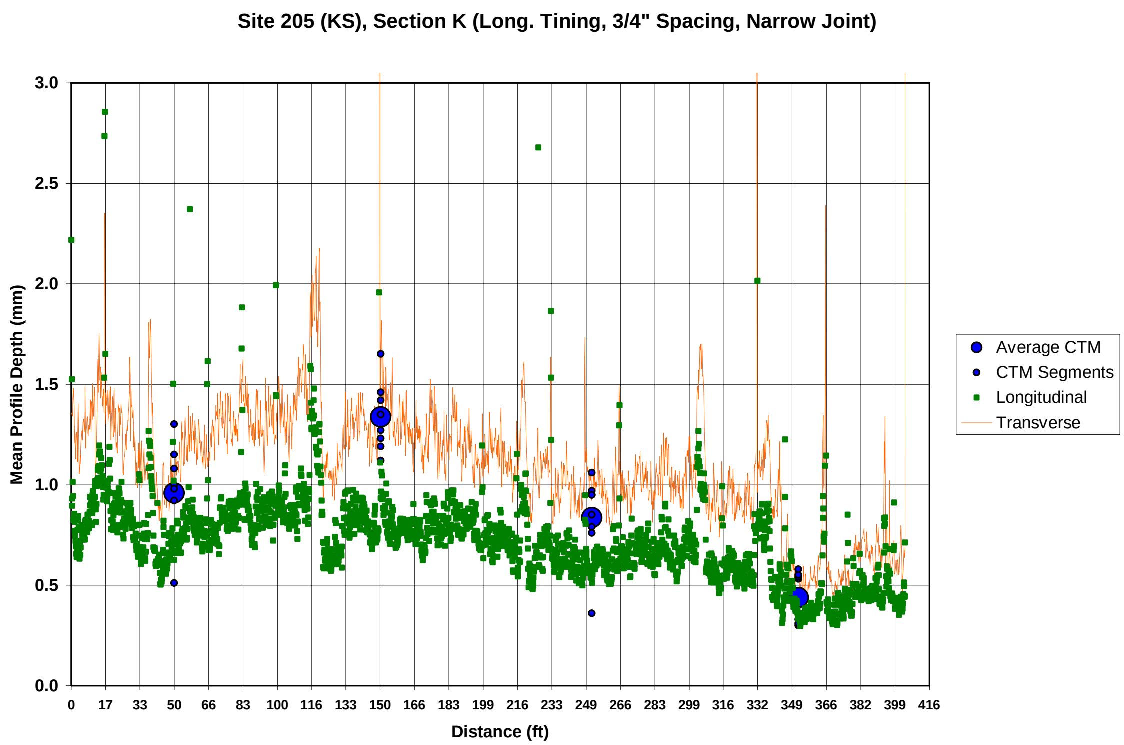


Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
0 17 33 50 66 83 100 116 133 150 166 183 199 216 233 249 266 283 299 316 332 349 366 382 399 416
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM

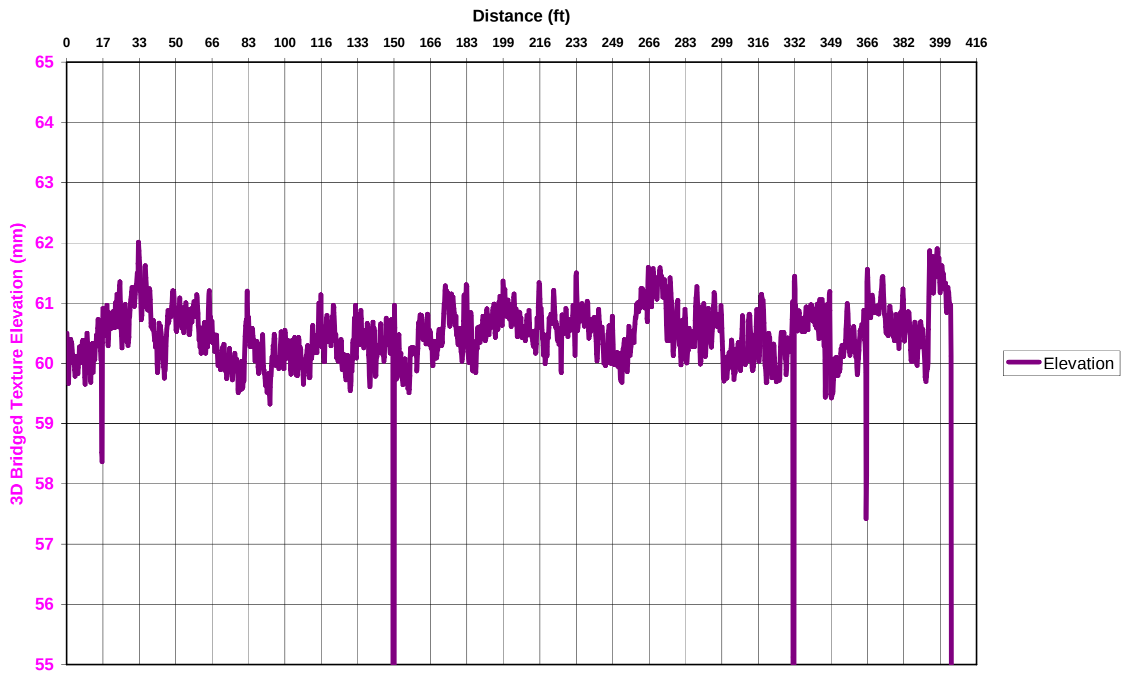


Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
0 17 33 50 66 83 100 116 133 150 166 183 199 216 233 249 266 283 299 316 332 349 366 382 399 416
Distance (ft)
Tx 63mm

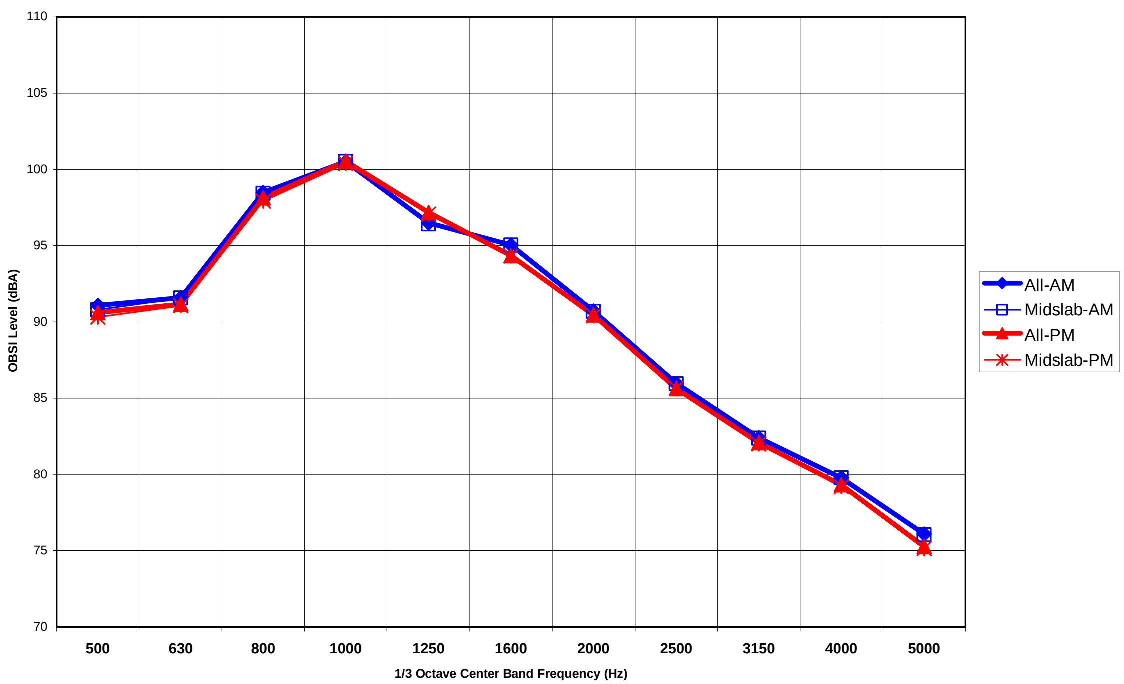

Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)
Texture
Noise
0 17 33 50 66 83 100 116 133 150 166 183 199 216 233 249 266 283 299 316 332 349 366 382 399 416
15 20 25 30 35 40 45 50 55
94 96 98 100 102 104 106 108 110


Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)
Mean Profile Depth (mm)
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse
0.0 0.5 1.0 1.5 2.0 2.5 3.0
0 17 33 50 66 83 100 116 133 150 166 183 199 216 233 249 266 283 299 316 332 349 366 382 399 416

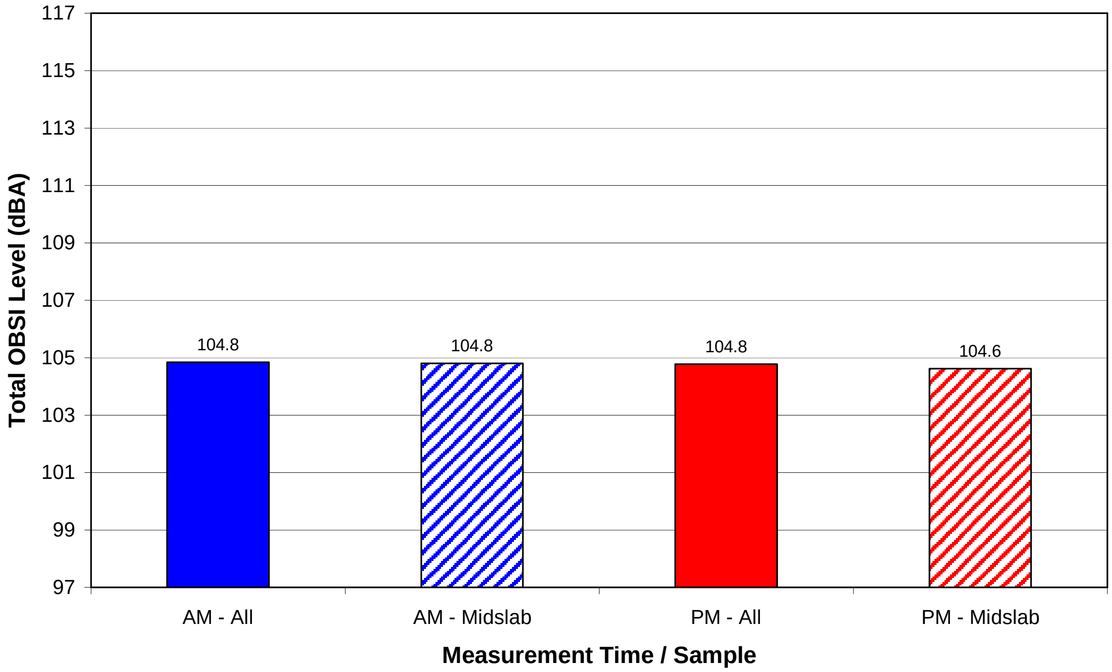
Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)



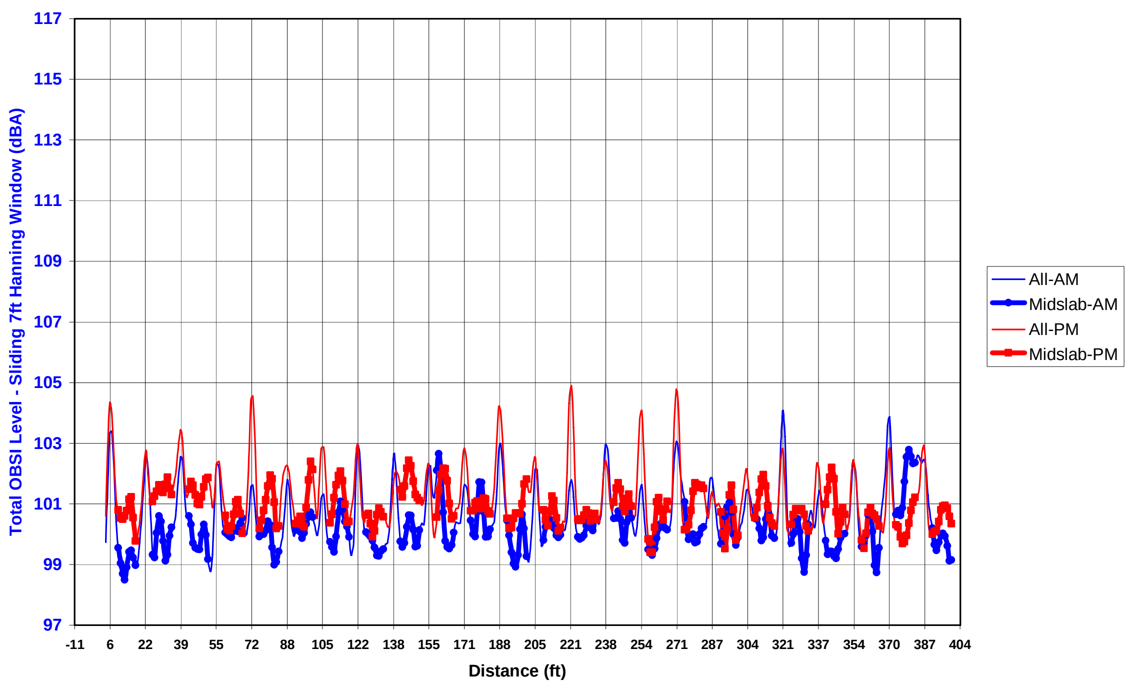
Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)

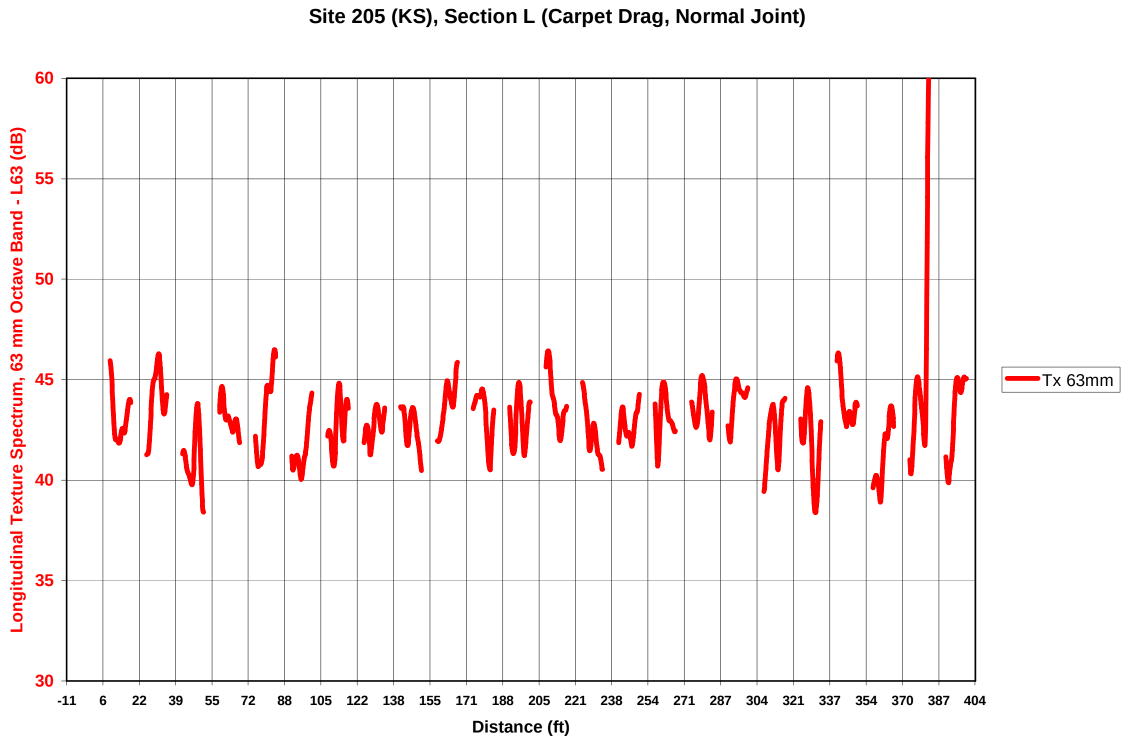


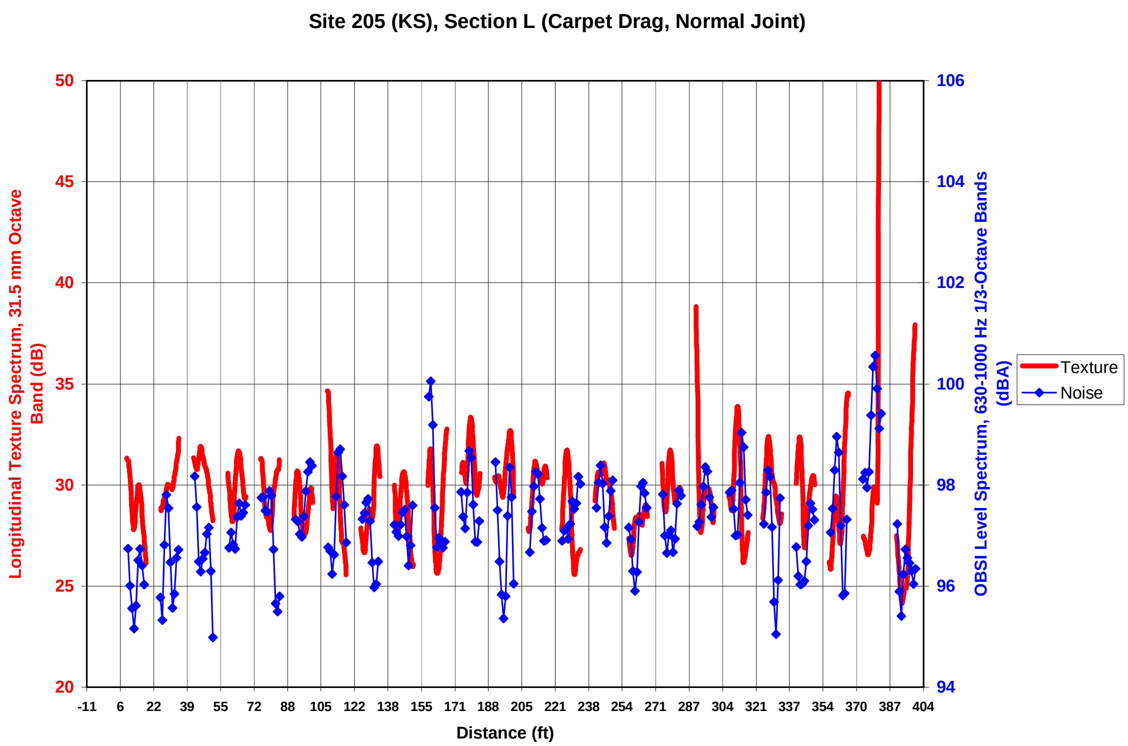
Site 205 (KS), Section K (Long. Tining, 3/4" Spacing, Narrow Joint)

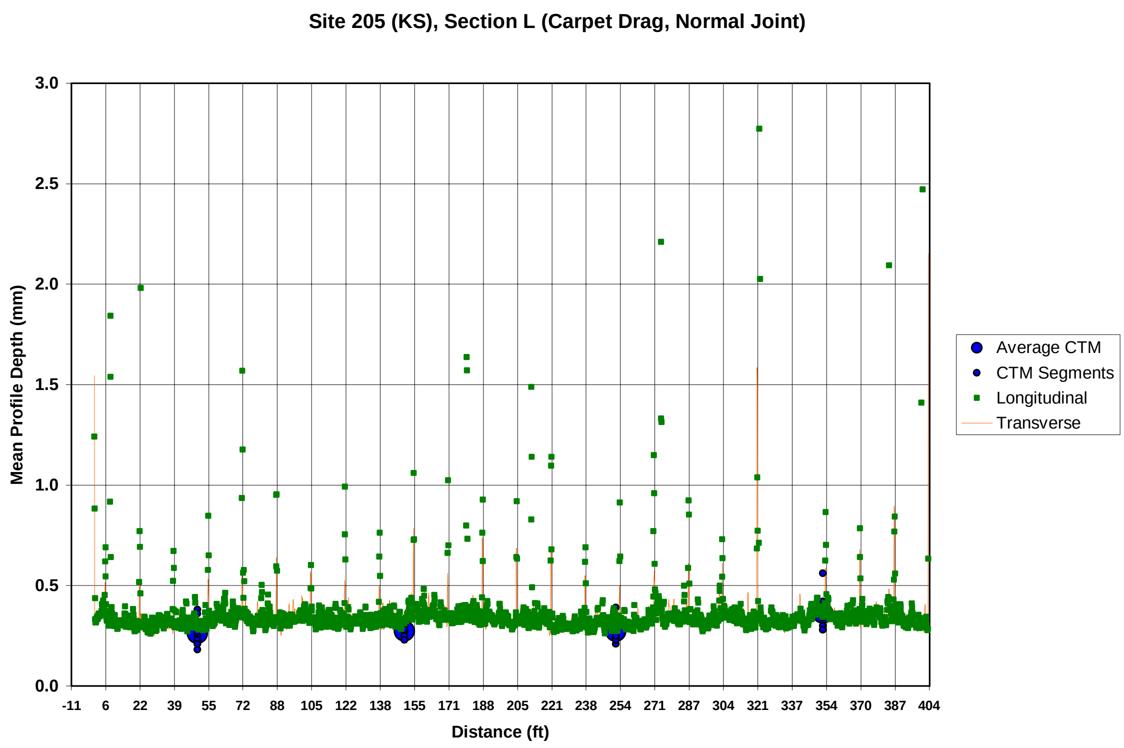


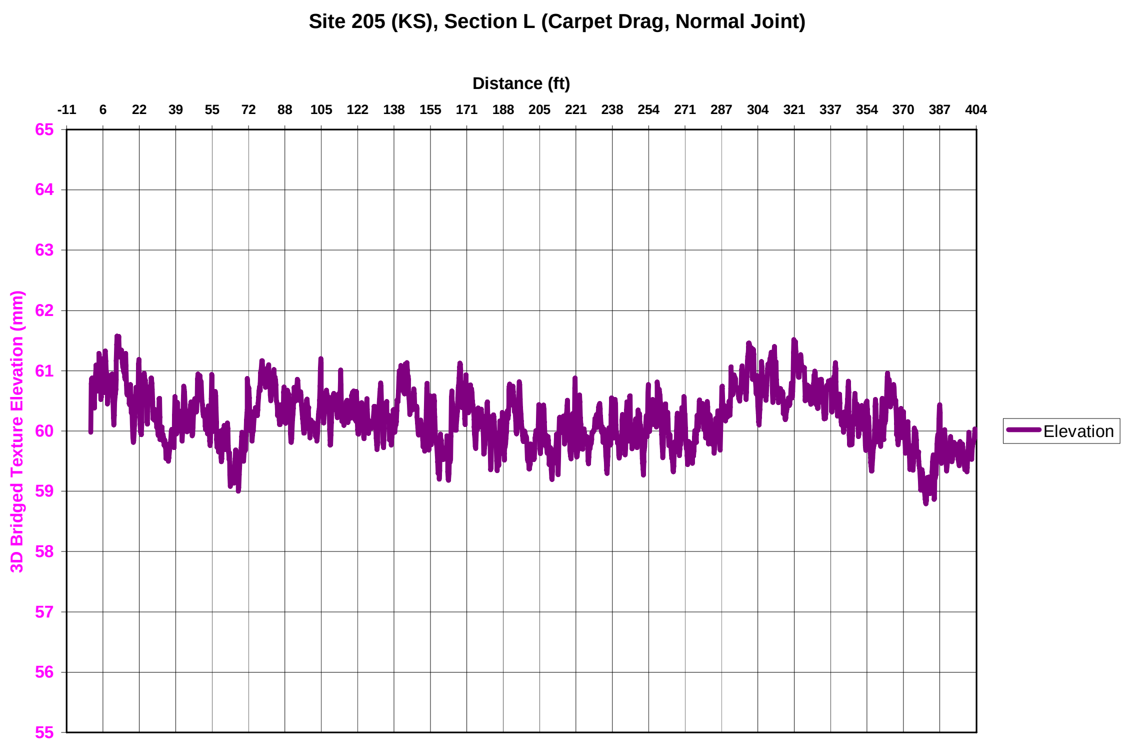
Site 205 (KS), Section L (Carpet Drag, Normal Joint)



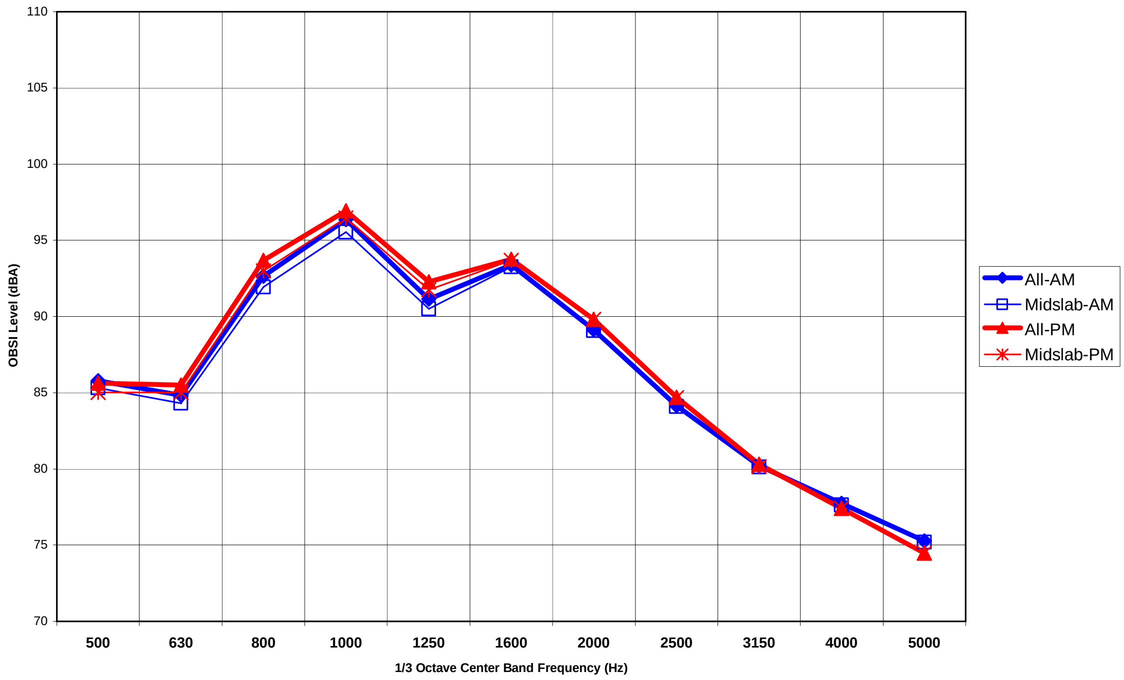

Site 205 (KS), Section L (Carpet Drag, Normal Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
Tx 63mm


Site 205 (KS), Section L (Carpet Drag, Normal Joint)
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
50
45
40
35
30
25
20
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
106
104
102
100
98
96
94
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
Texture
Noise

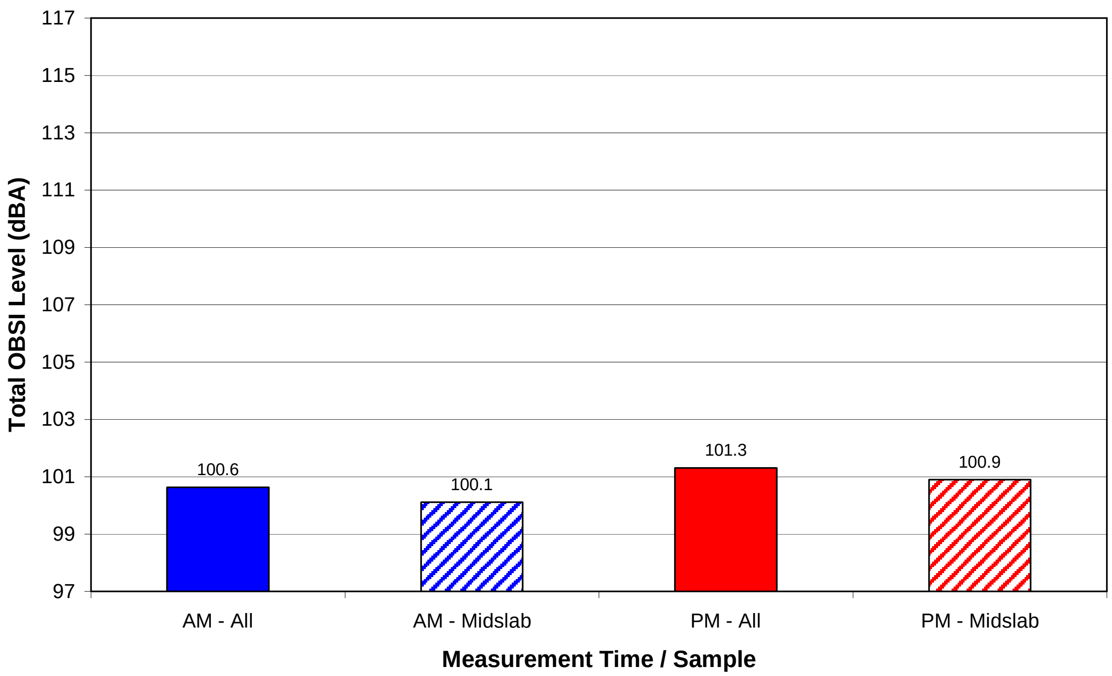

Site 205 (KS), Section L (Carpet Drag, Normal Joint)
Mean Profile Depth (mm)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
Distance (ft)
Average CTM
CTM Segments
Longitudinal
Transverse

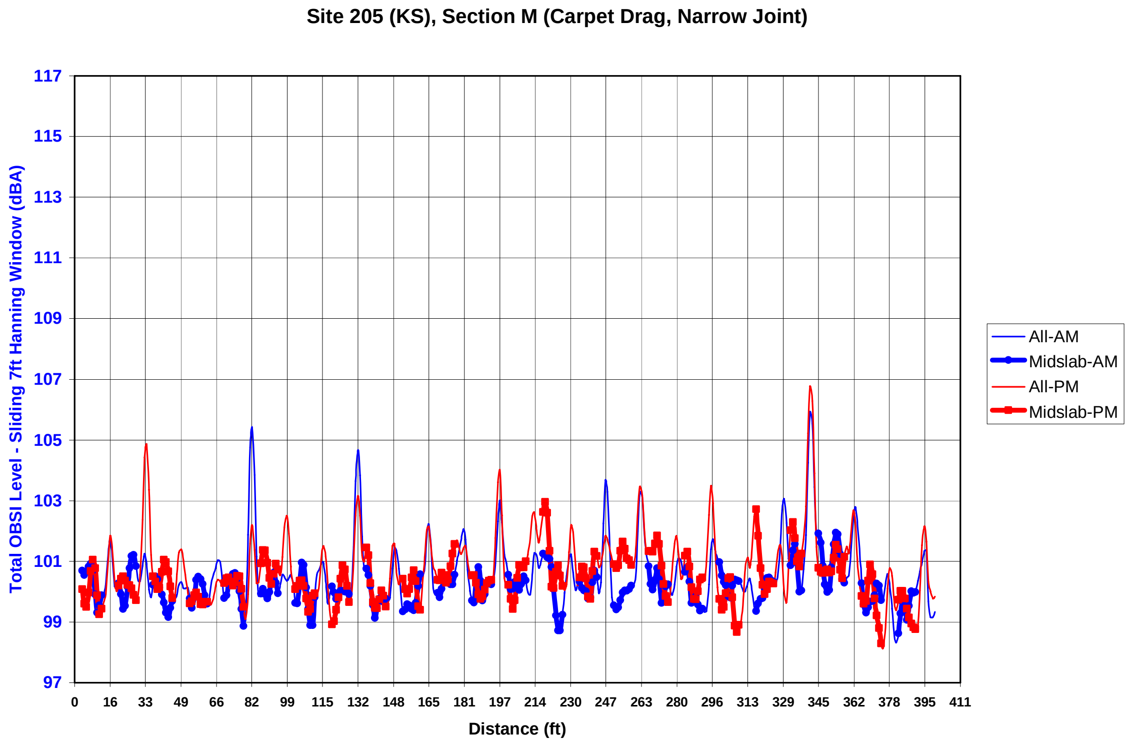

Site 205 (KS), Section L (Carpet Drag, Normal Joint)
Distance (ft)
-11
6
22
39
55
72
88
105
122
138
155
171
188
205
221
238
254
271
287
304
321
337
354
370
387
404
3D Bridged Texture Elevation (mm)
65
64
63
62
61
60
59
58
57
56
55
Elevation

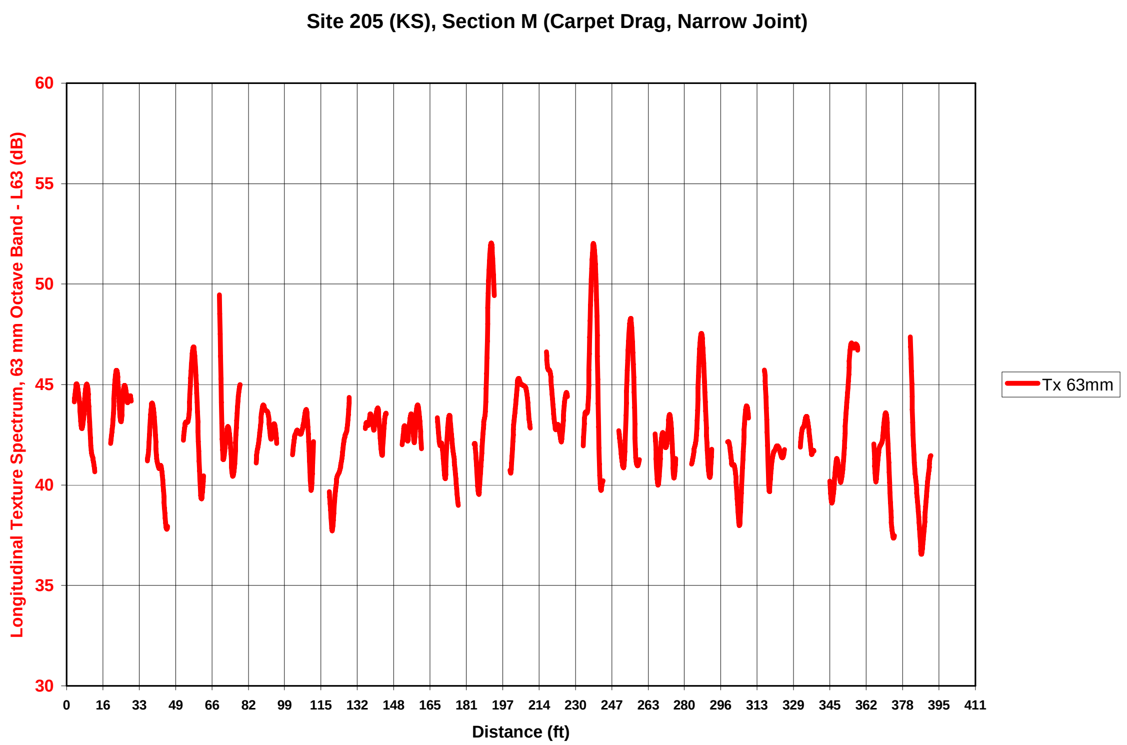
Site 205 (KS), Section L (Carpet Drag, Normal Joint)



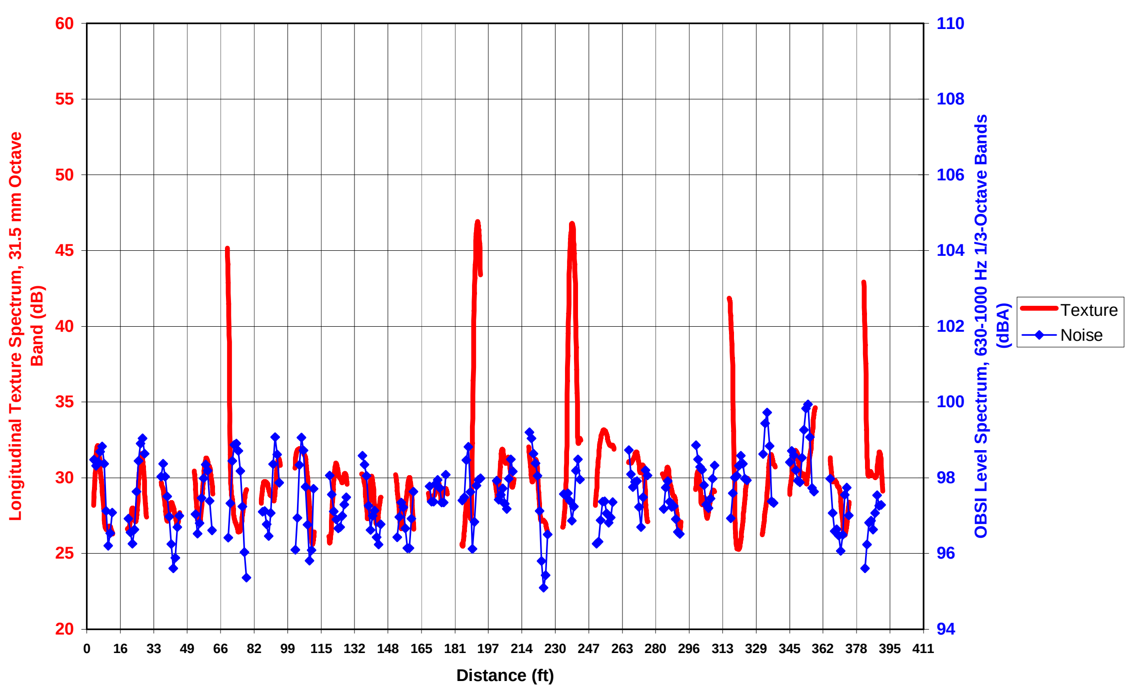
Site 205 (KS), Section L (Carpet Drag, Normal Joint)



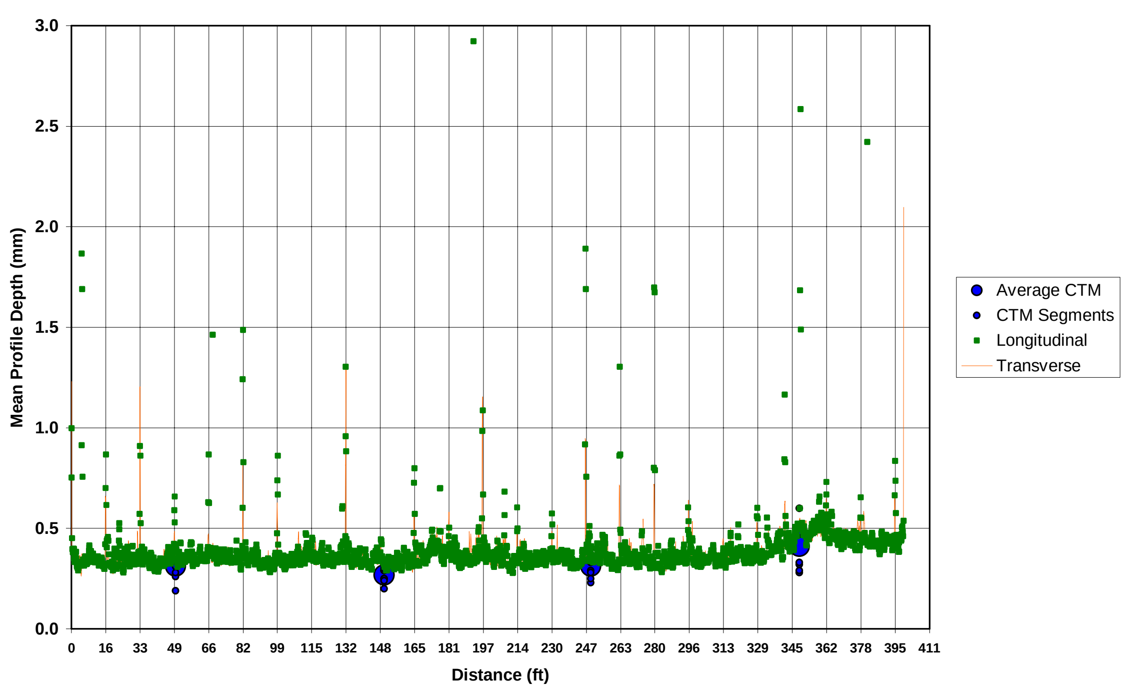

Site 205 (KS), Section M (Carpet Drag, Narrow Joint)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
0
16
33
49
66
82
99
115
132
148
165
181
197
214
230
247
263
280
296
313
329
345
362
378
395
411
Distance (ft)
All-AM
Midslab-AM
All-PM
Midslab-PM


Site 205 (KS), Section M (Carpet Drag, Narrow Joint)
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
60
55
50
45
40
35
30
0
16
33
49
66
82
99
115
132
148
165
181
197
214
230
247
263
280
296
313
329
345
362
378
395
411
Distance (ft)
Tx 63mm

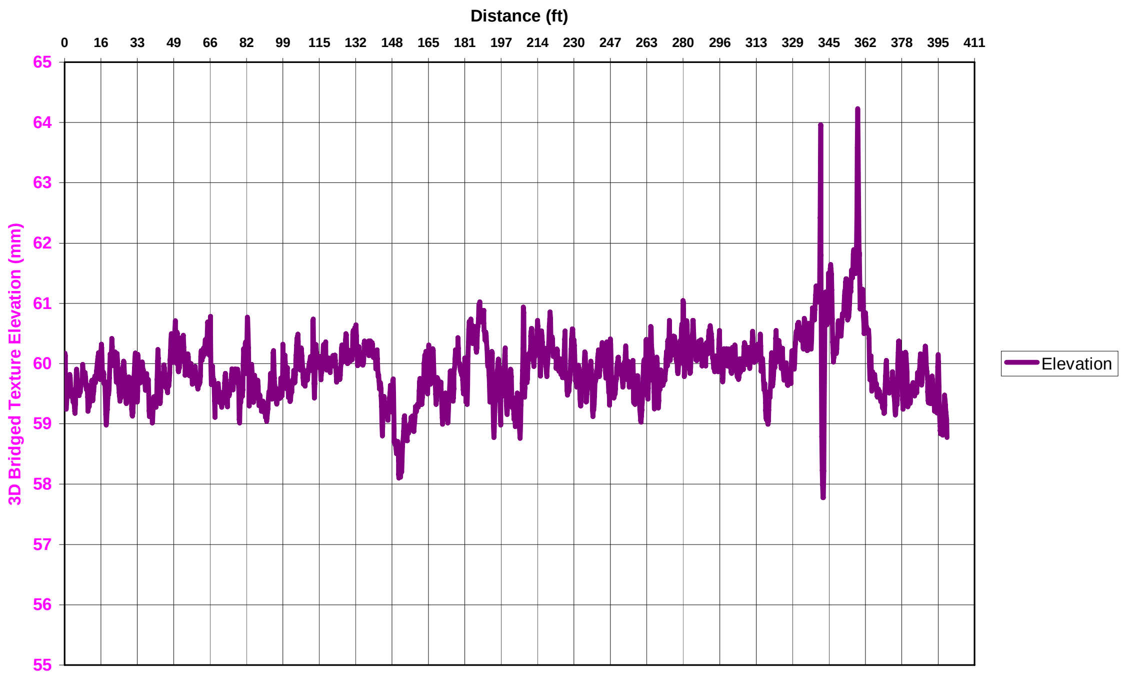
Site 205 (KS), Section M (Carpet Drag, Narrow Joint)



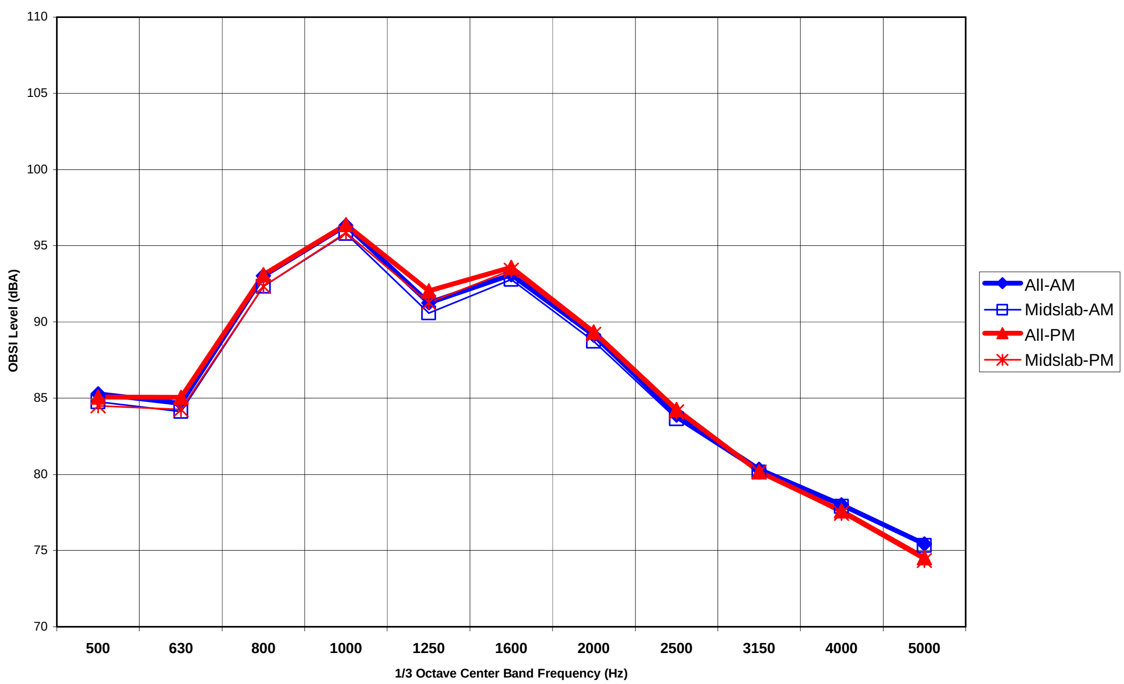
Site 205 (KS), Section M (Carpet Drag, Narrow Joint)



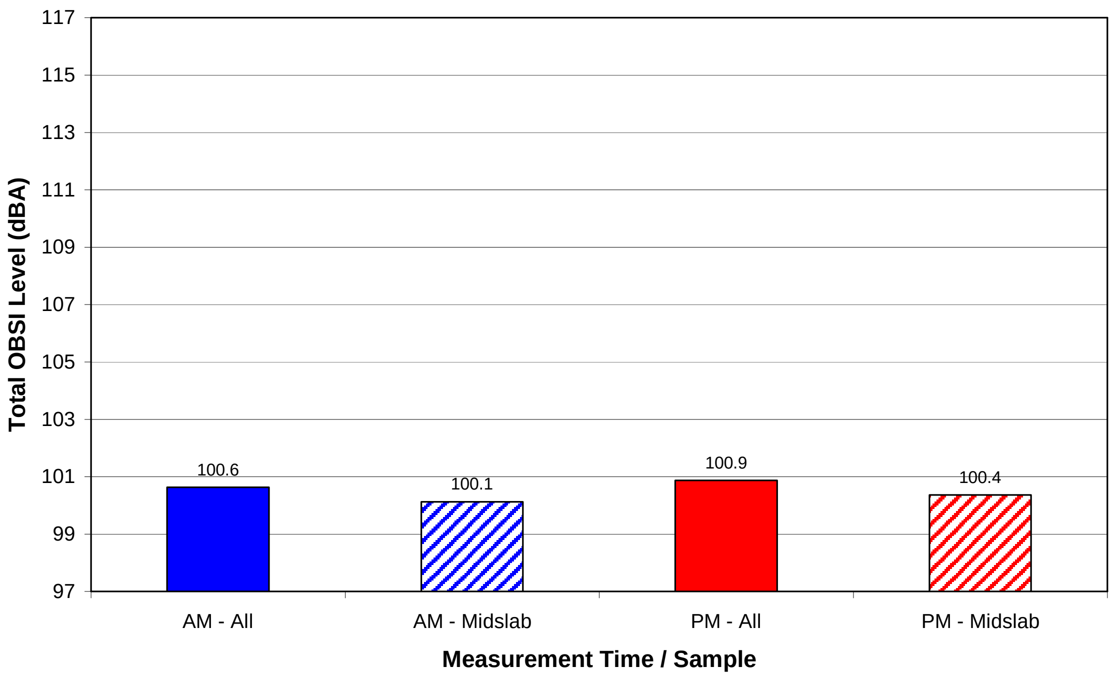
Site 205 (KS), Section M (Carpet Drag, Narrow Joint)



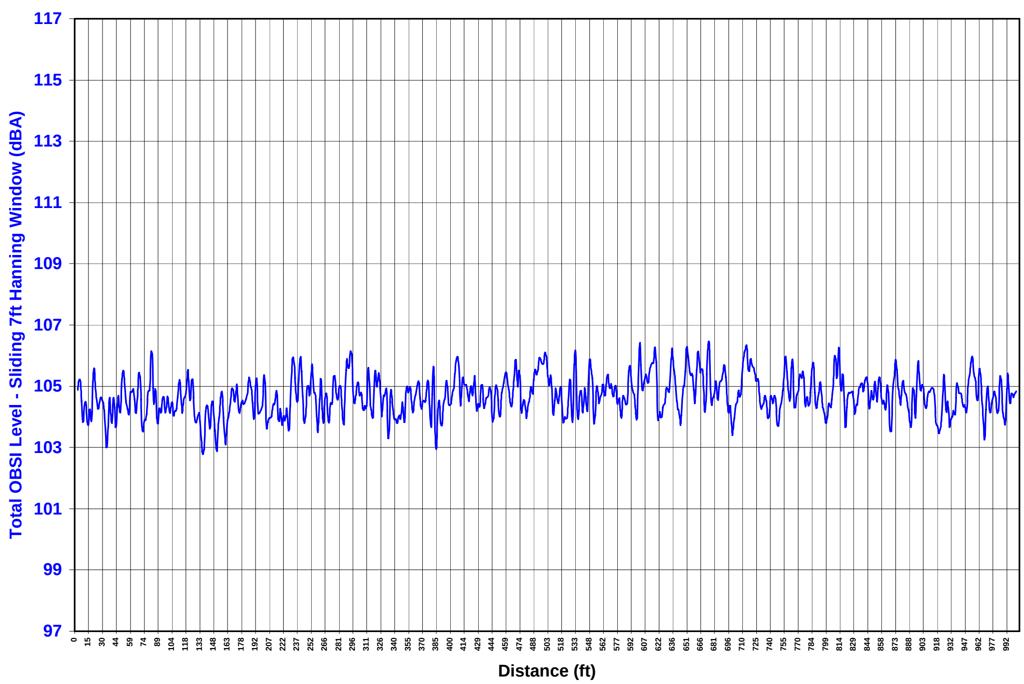
Site 205 (KS), Section M (Carpet Drag, Narrow Joint)

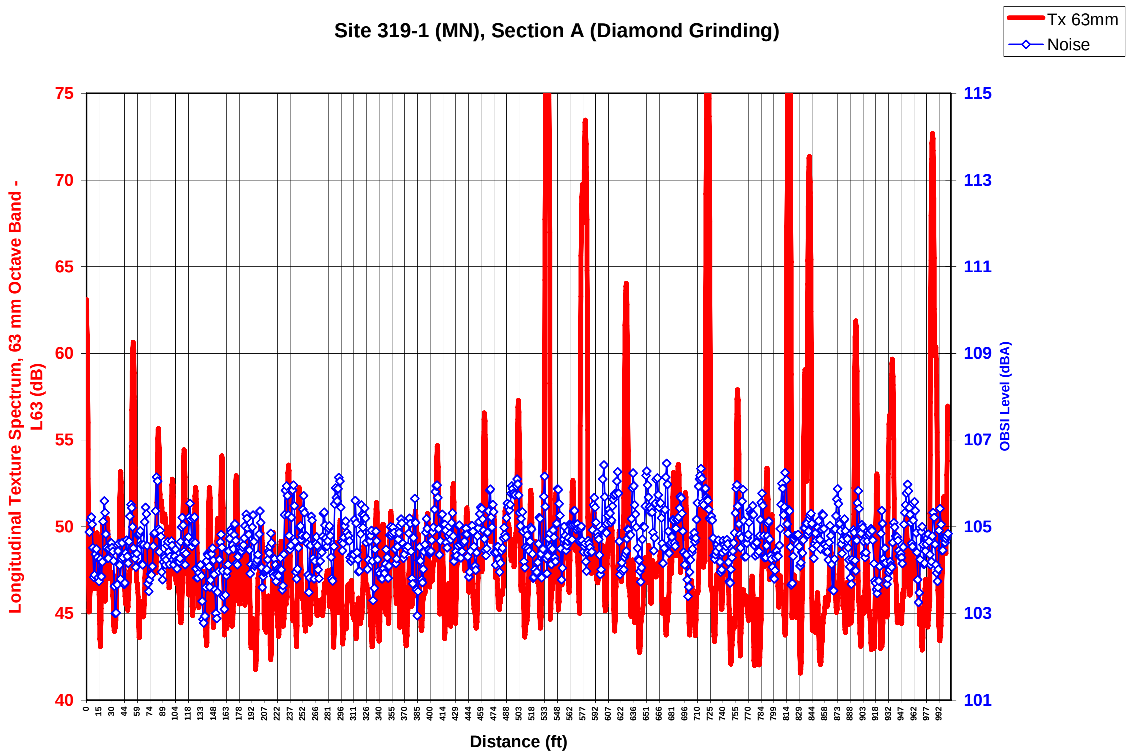


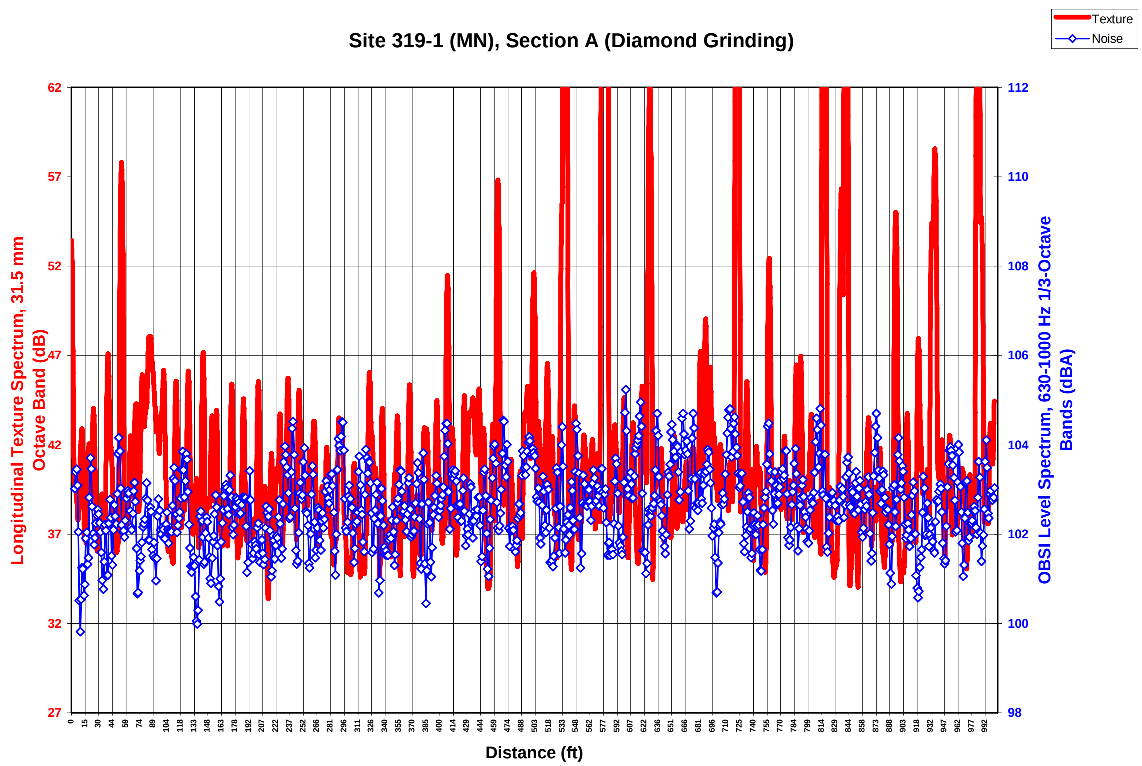
Site 205 (KS), Section M (Carpet Drag, Narrow Joint)

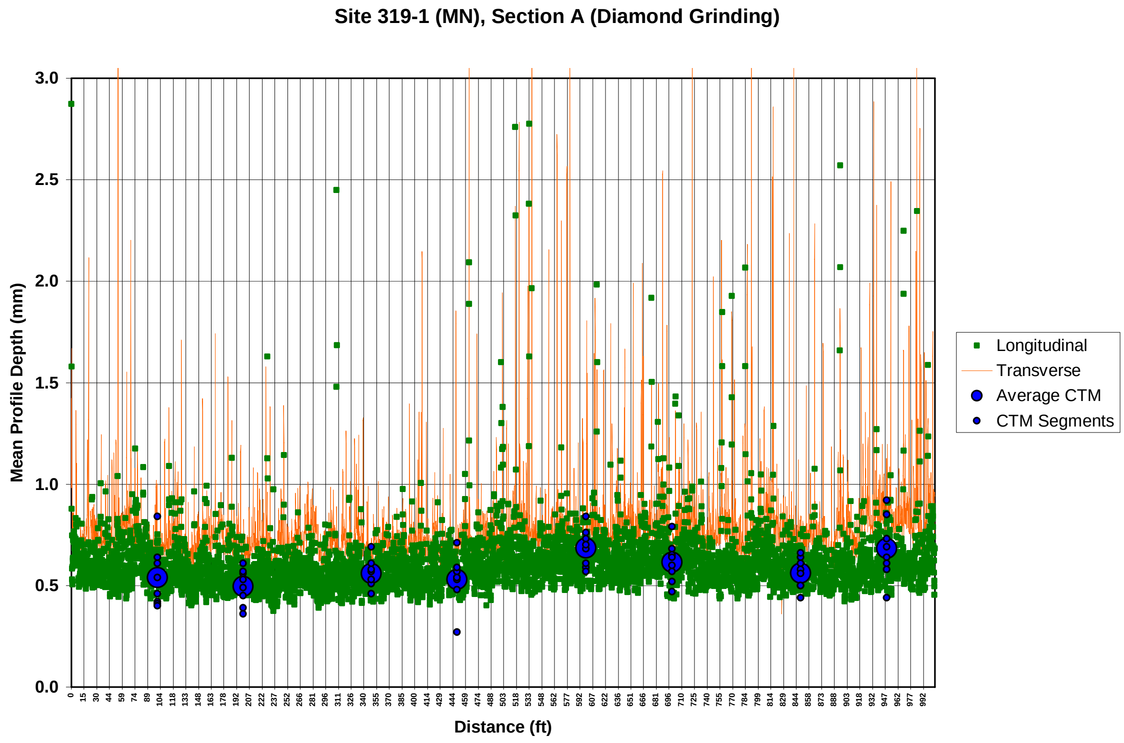


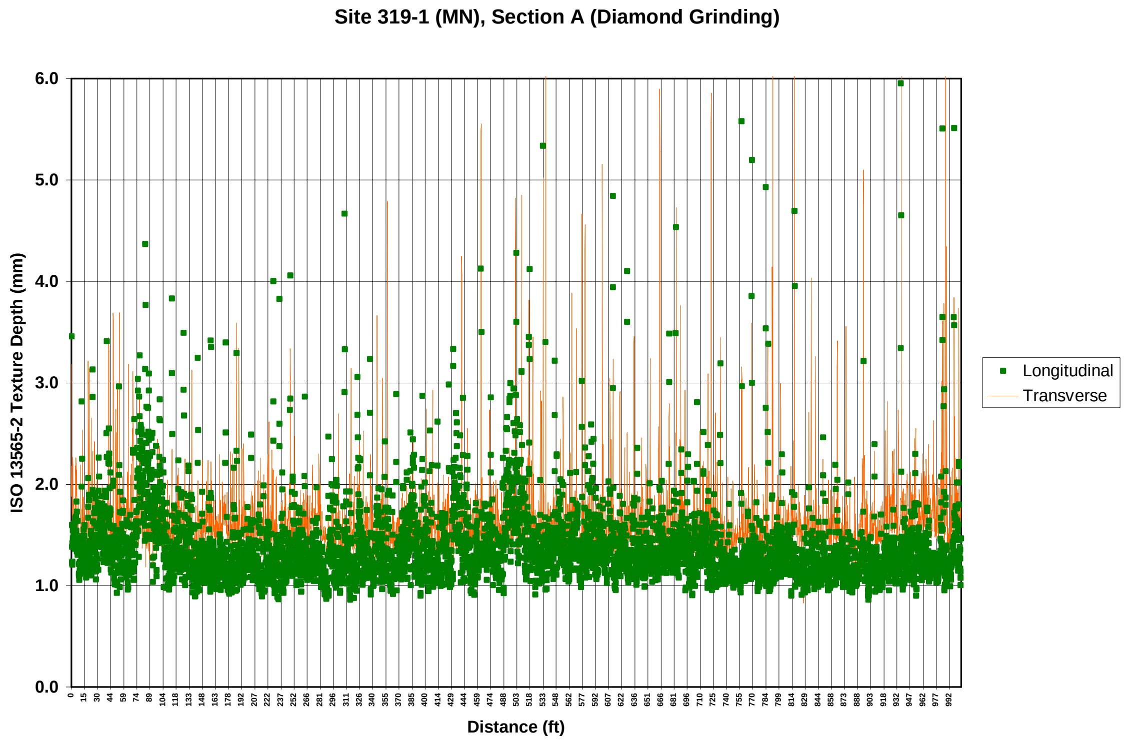
Site 319-1 (MN), Section A (Diamond Grinding)



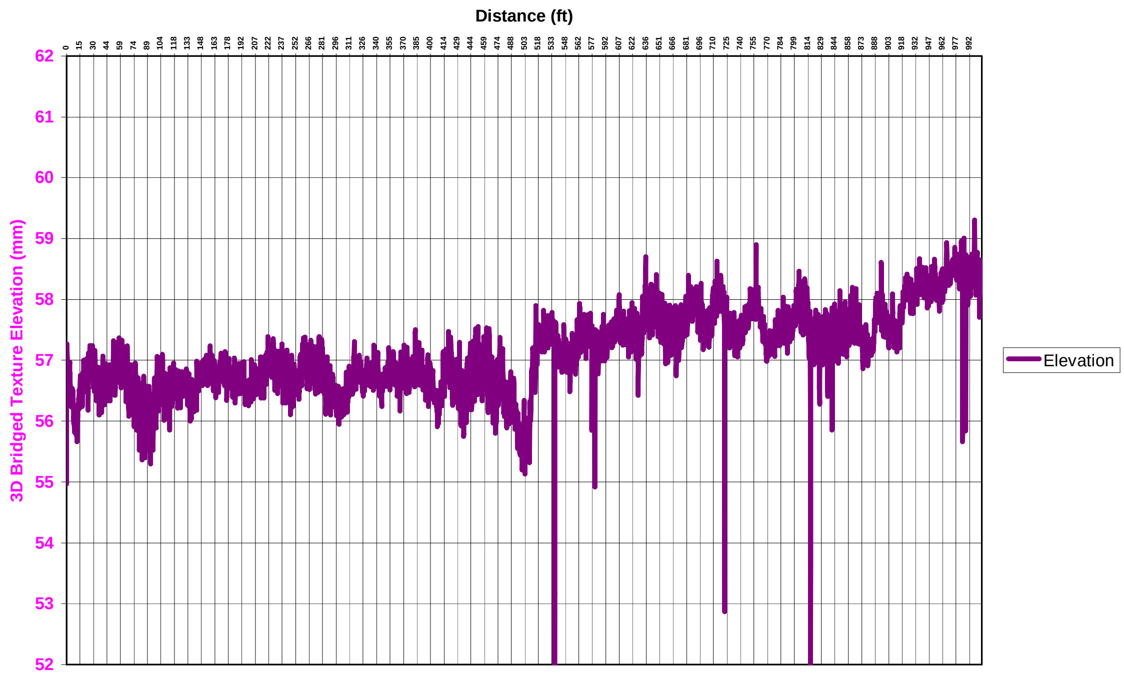

Site 319-1 (MN), Section A (Diamond Grinding)
Tx 63mm
Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)


Site 319-1 (MN), Section A (Diamond Grinding)
Texture
Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)

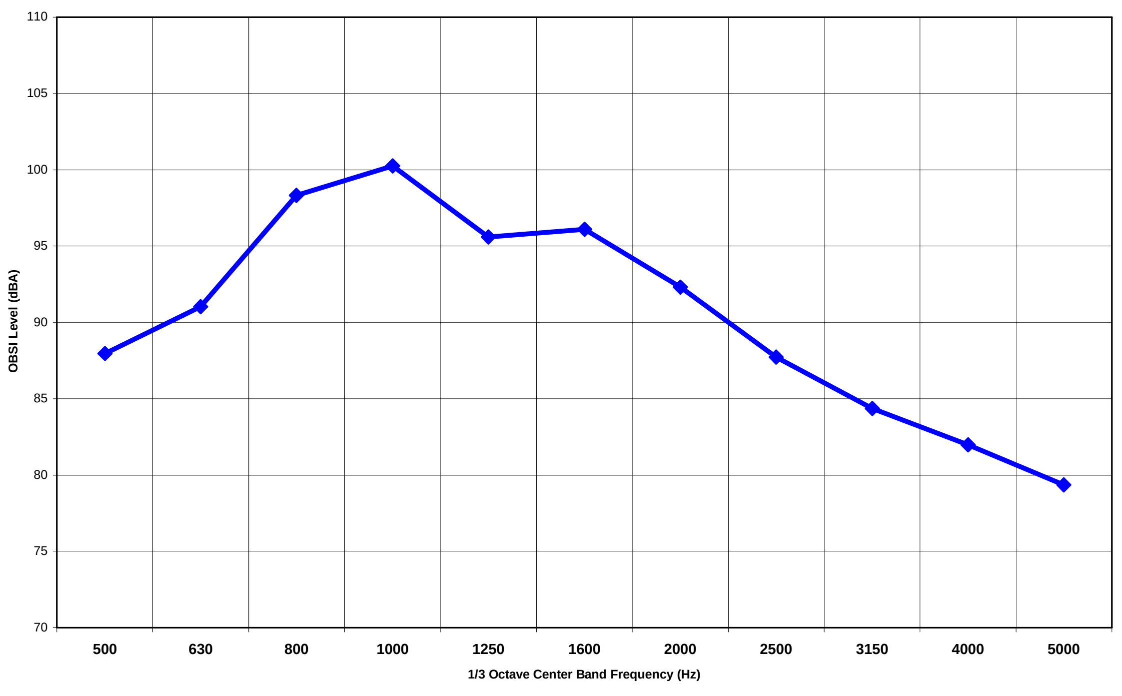

Site 319-1 (MN), Section A (Diamond Grinding)
Mean Profile Depth (mm)
Distance (ft)
Longitudinal
Transverse
Average CTM
CTM Segments

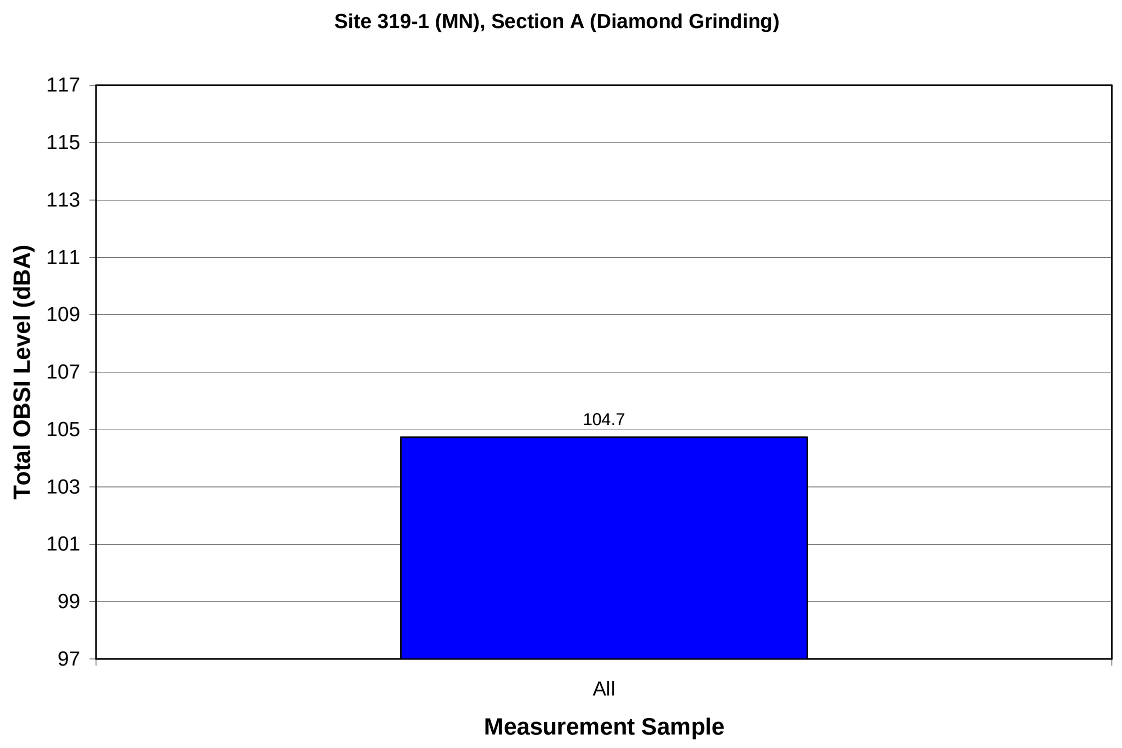

Site 319-1 (MN), Section A (Diamond Grinding)
ISO 13565-2 Texture Depth (mm)
Distance (ft)
Longitudinal
Transverse

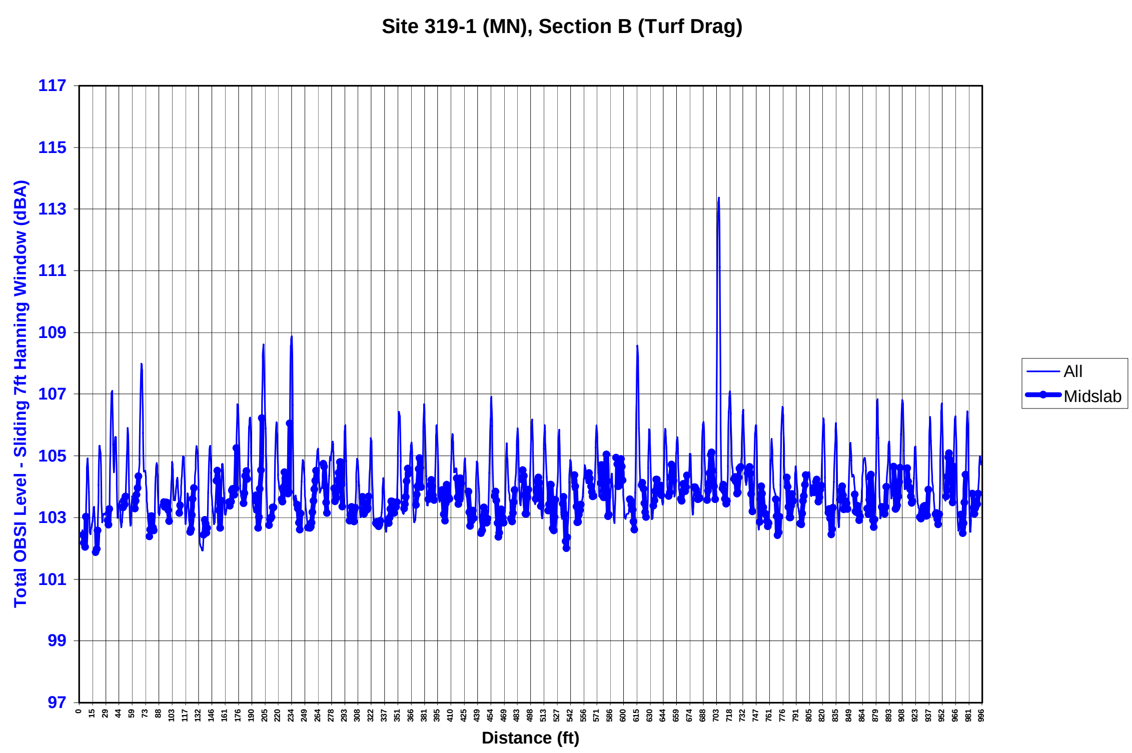
Site 319-1 (MN), Section A (Diamond Grinding)

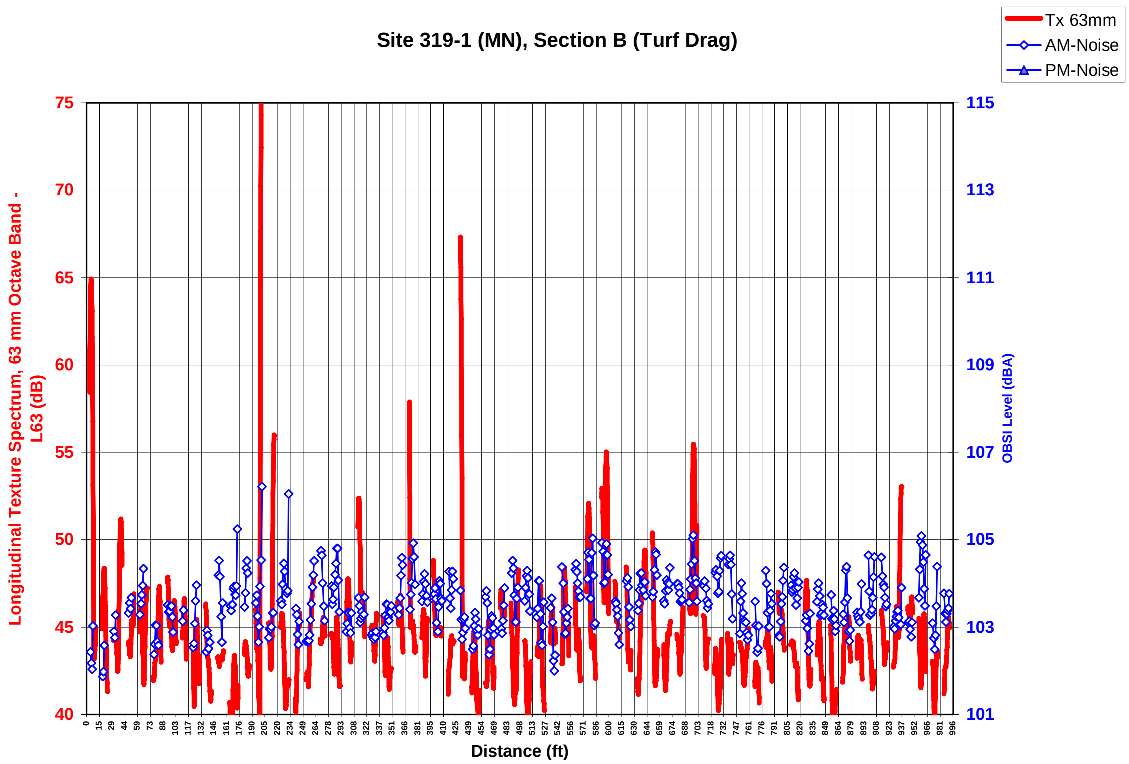


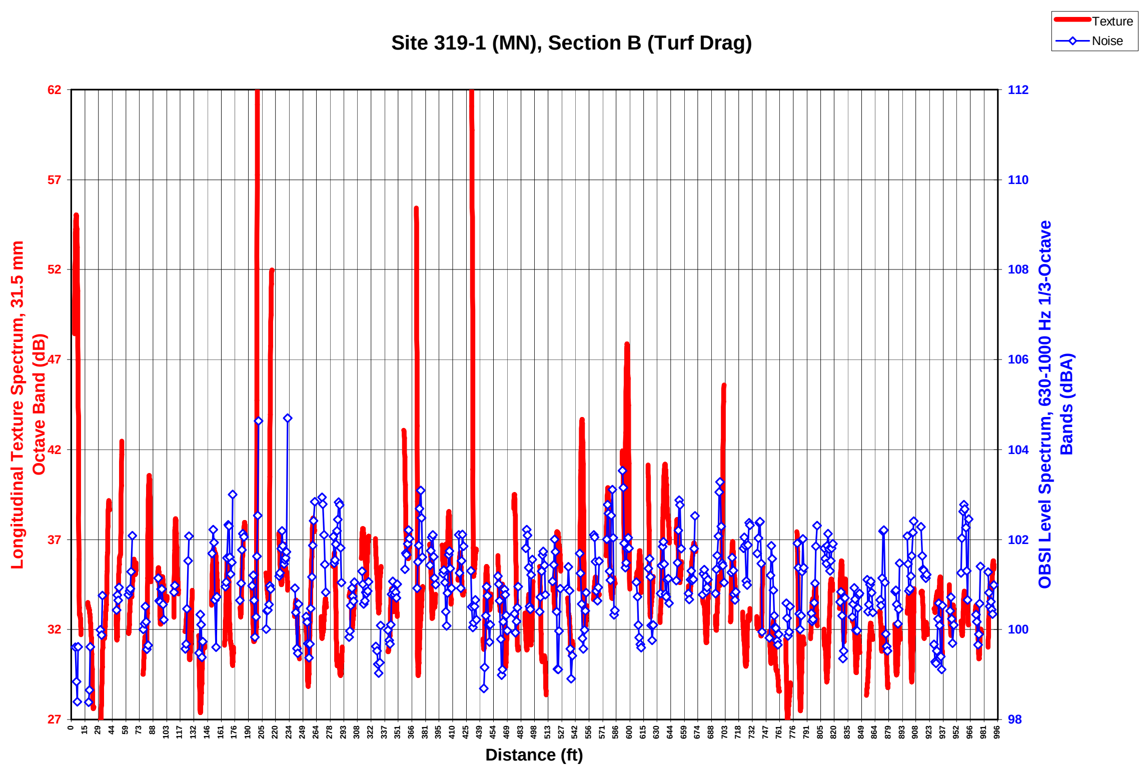
Site 319-1 (MN), Section A (Diamond Grinding)



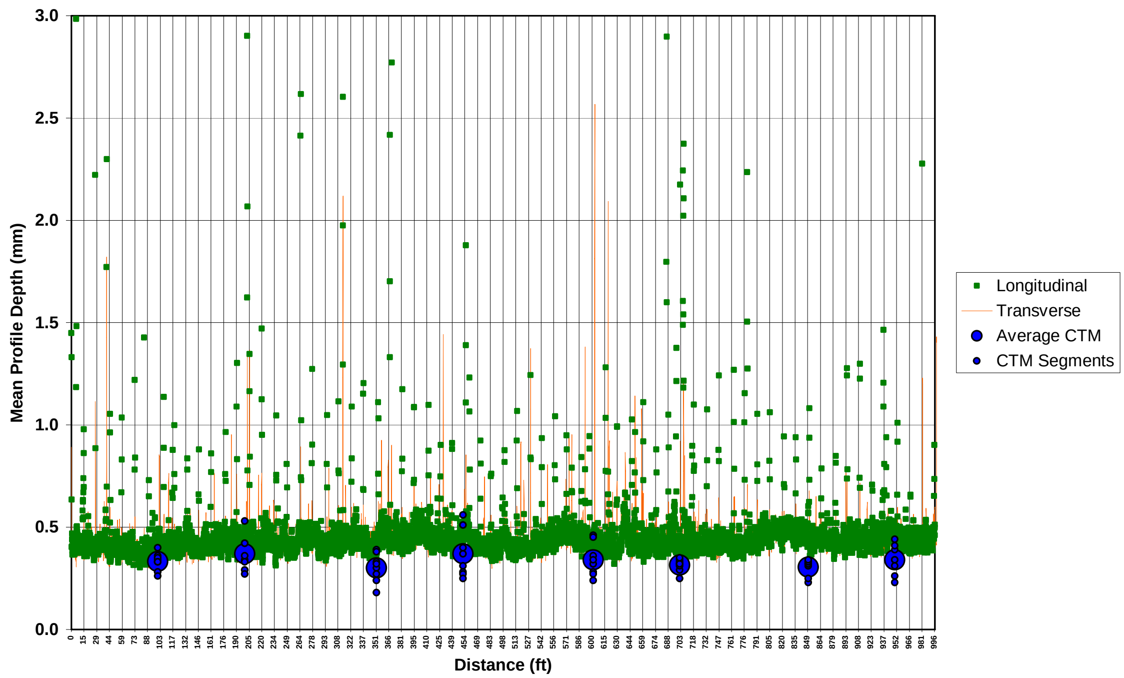

Site 319-1 (MN), Section A (Diamond Grinding)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
104.7
All
Measurement Sample


Site 319-1 (MN), Section B (Turf Drag)
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
117
115
113
111
109
107
105
103
101
99
97
Distance (ft)
All
Midslab

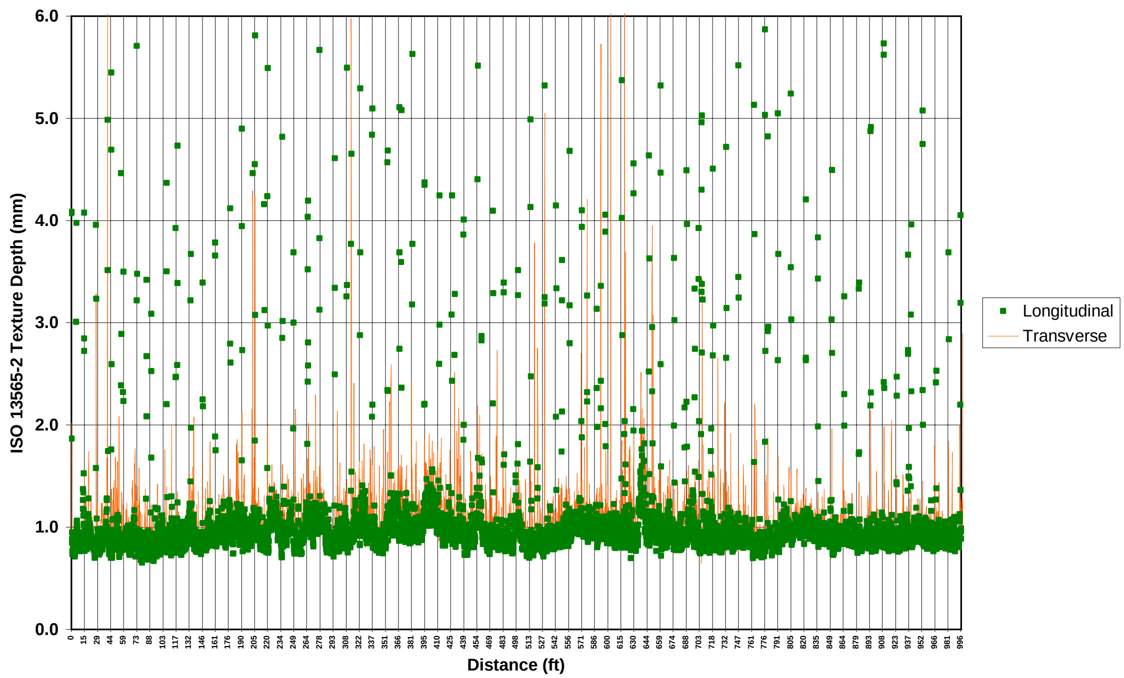

Site 319-1 (MN), Section B (Turf Drag)
Tx 63mm
AM-Noise
PM-Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)


Site 319-1 (MN), Section B (Turf Drag)
Texture
Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)

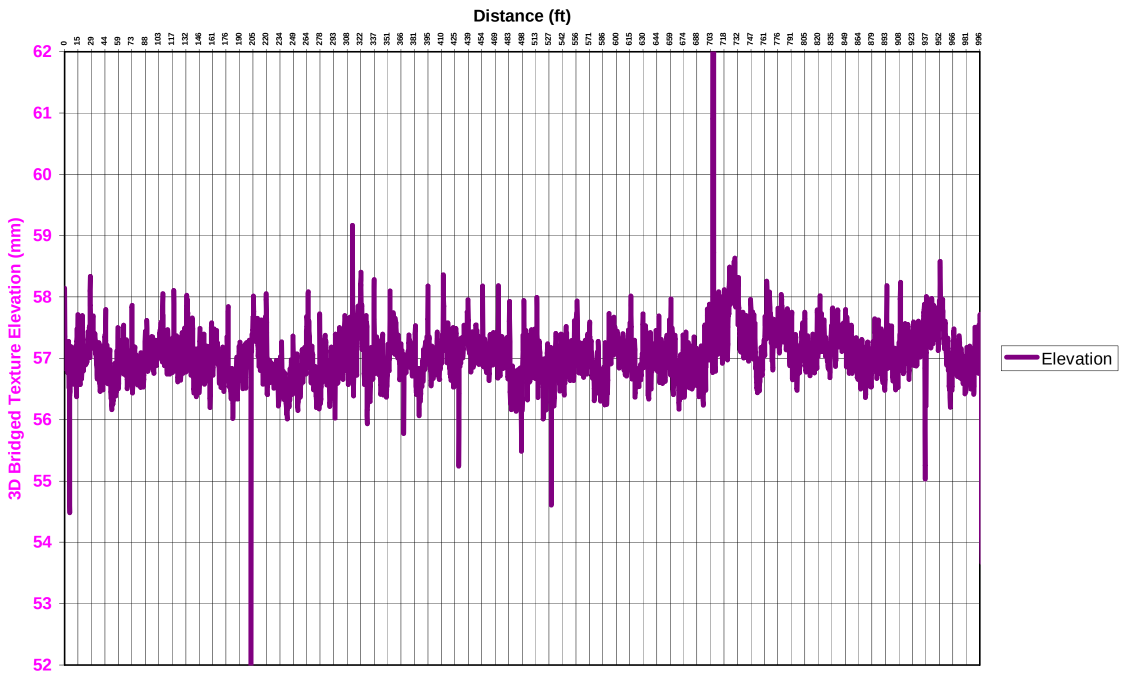
Site 319-1 (MN), Section B (Turf Drag)



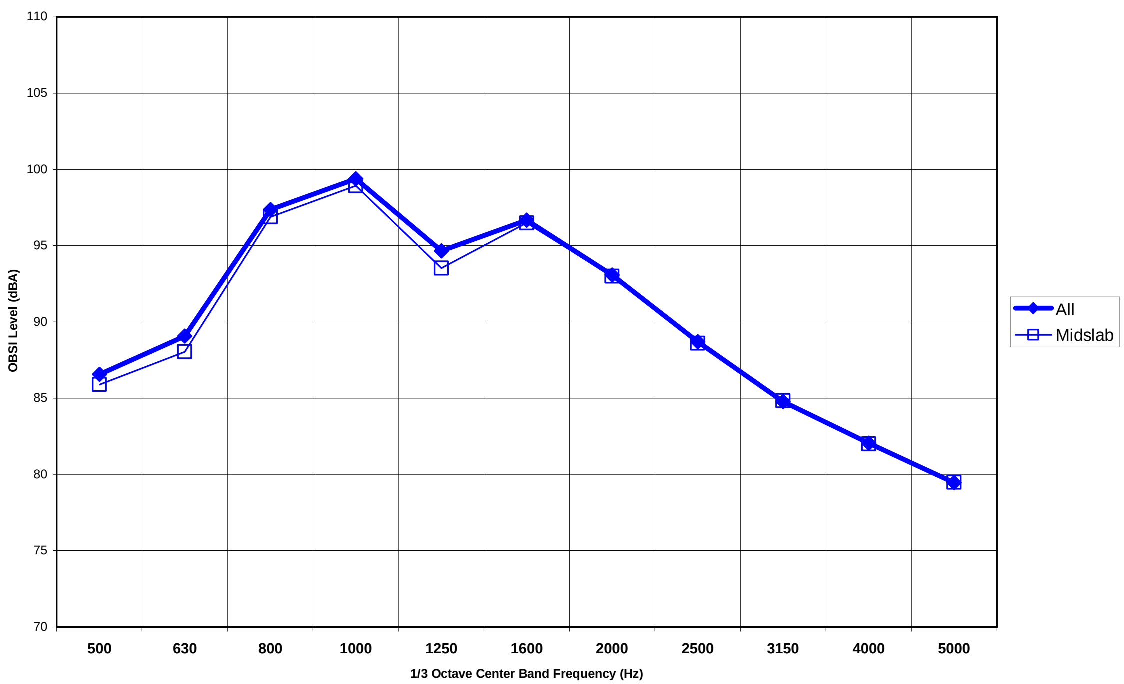
Site 319-1 (MN), Section B (Turf Drag)

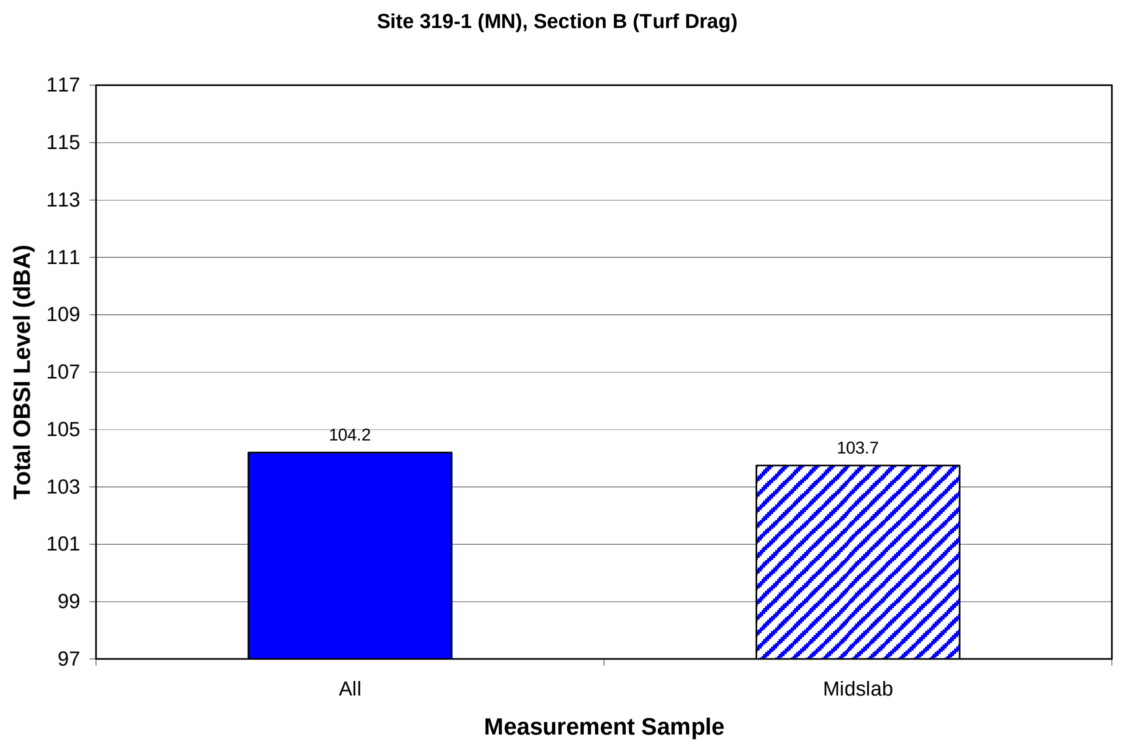


Site 319-1 (MN), Section B (Turf Drag)

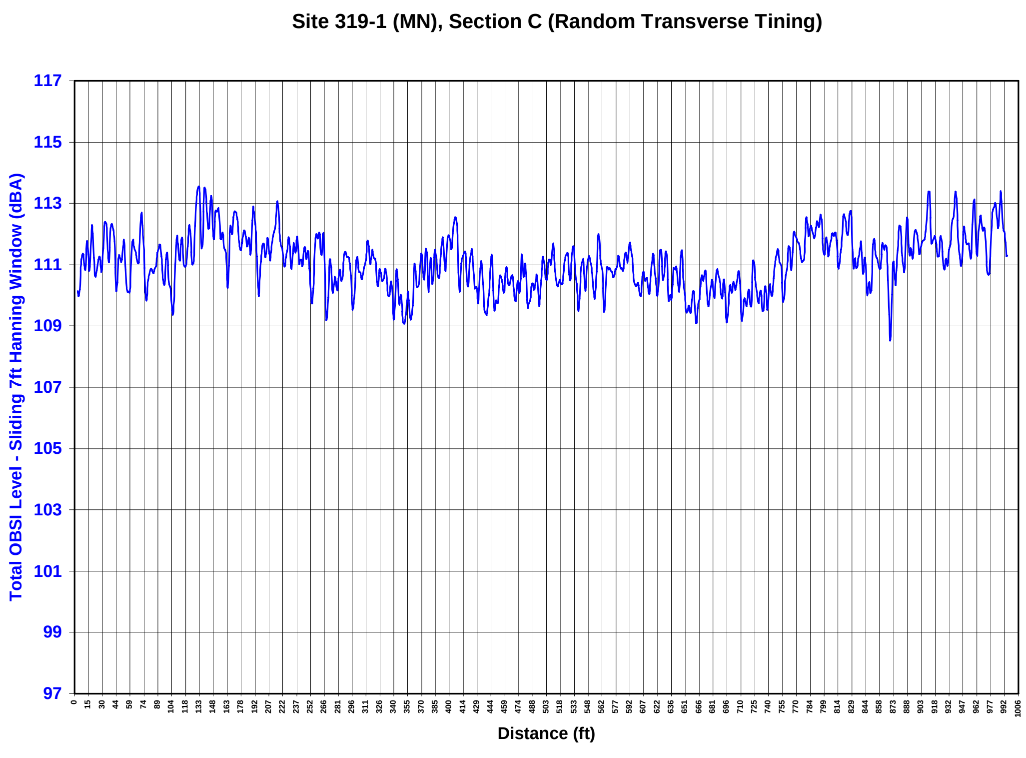


Site 319-1 (MN), Section B (Turf Drag)

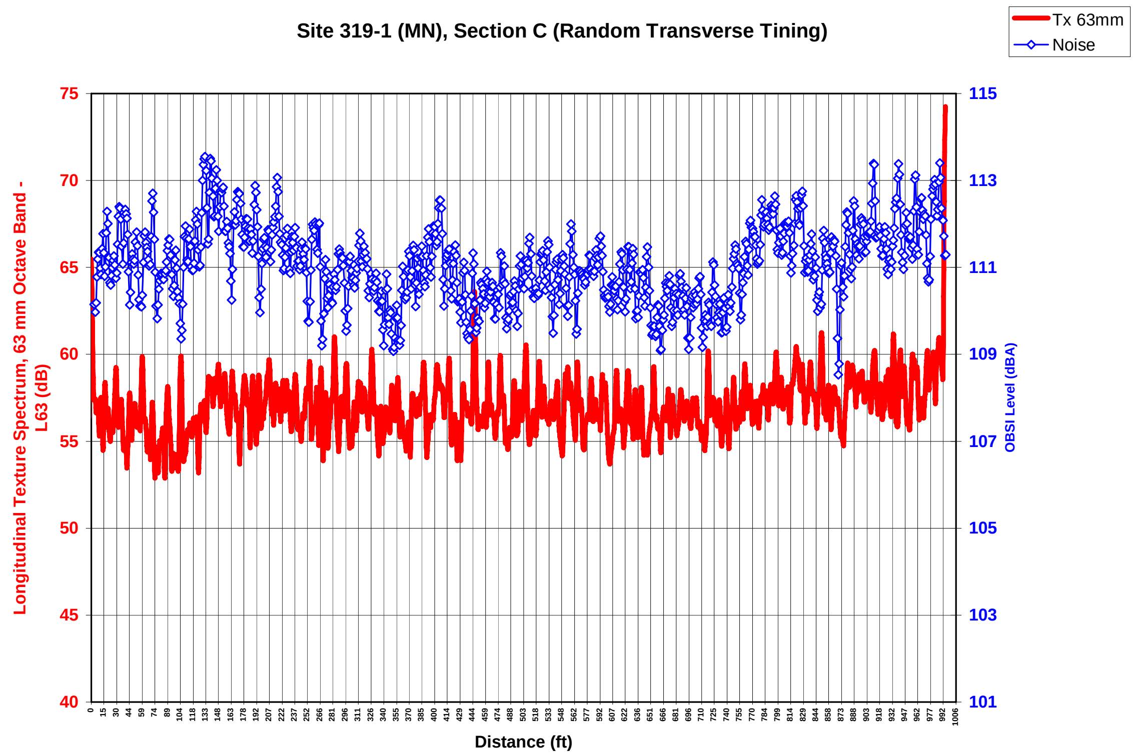




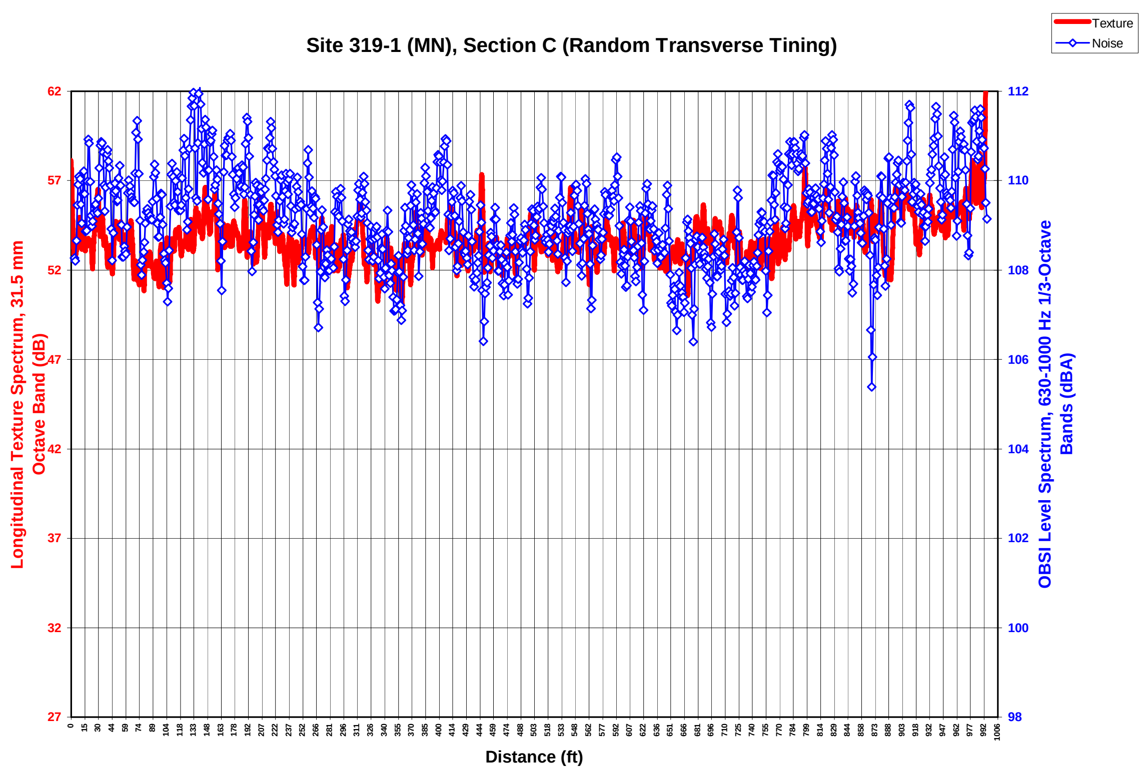
Site 319-1 (MN), Section B (Turf Drag)
117
115
113
111
109
107
105
103
101
99
97
Total OBSI Level (dBA)
104.2
103.7
All
Midslab
Measurement Sample



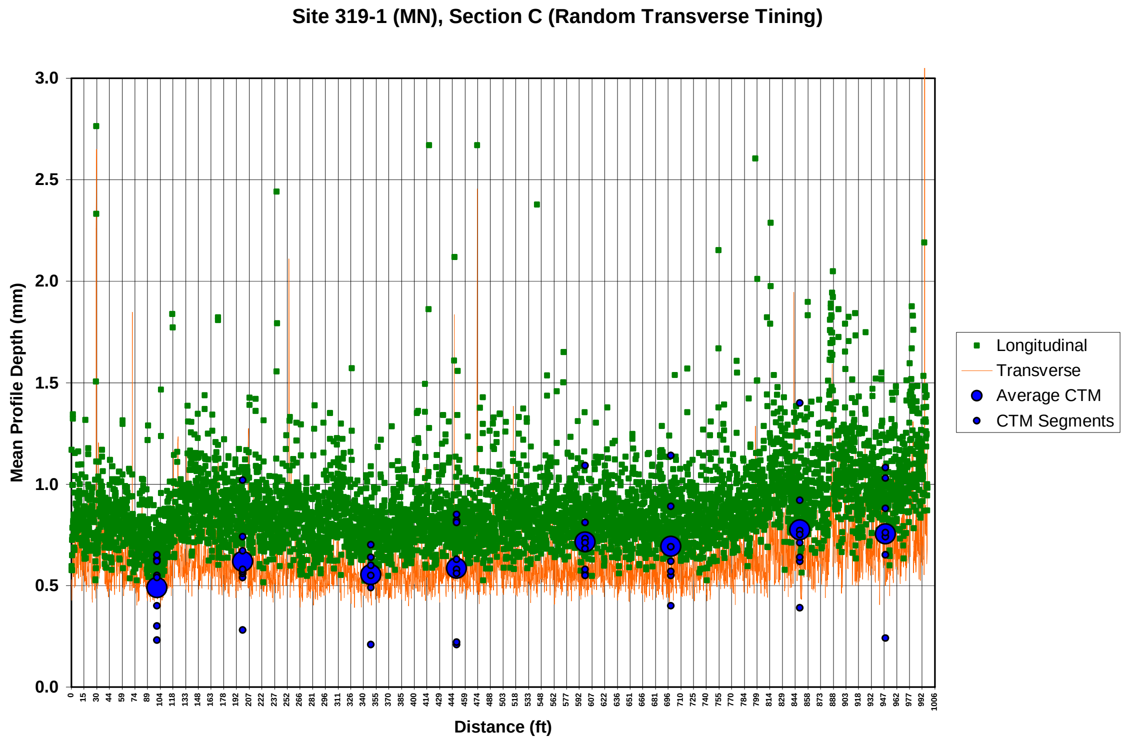
Site 319-1 (MN), Section C (Random Transverse Tining)
117
115
113
111
109
107
105
103
101
99
97
Total OBSI Level - Sliding 7ft Hanning Window (dBA)
Distance (ft)

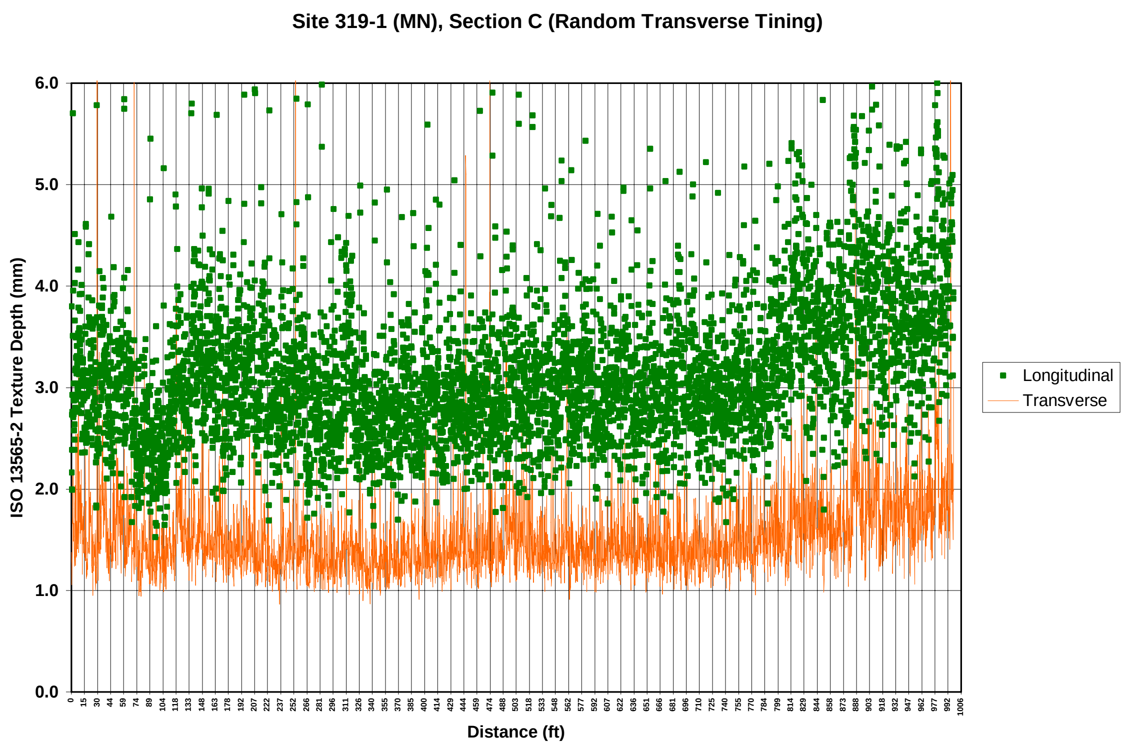


Site 319-1 (MN), Section C (Random Transverse Tining)
Tx 63mm
Noise
Longitudinal Texture Spectrum, 63 mm Octave Band - L63 (dB)
OBSI Level (dBA)
Distance (ft)

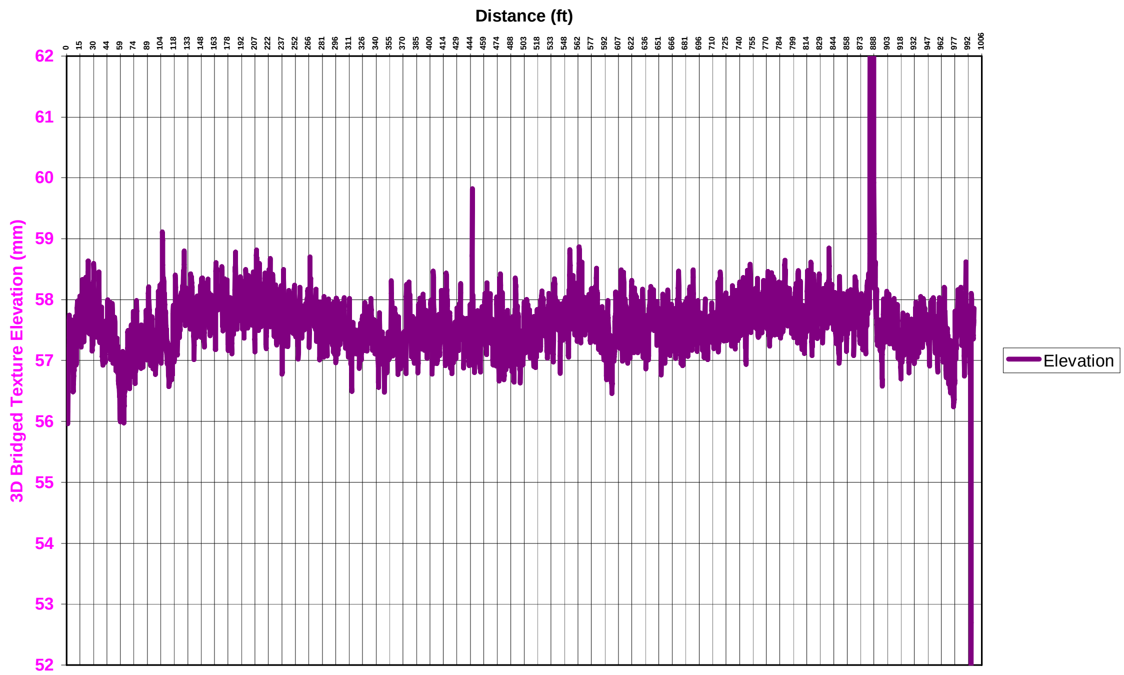


Site 319-1 (MN), Section C (Random Transverse Tining)
Texture
Noise
Longitudinal Texture Spectrum, 31.5 mm Octave Band (dB)
OBSI Level Spectrum, 630-1000 Hz 1/3-Octave Bands (dBA)
Distance (ft)

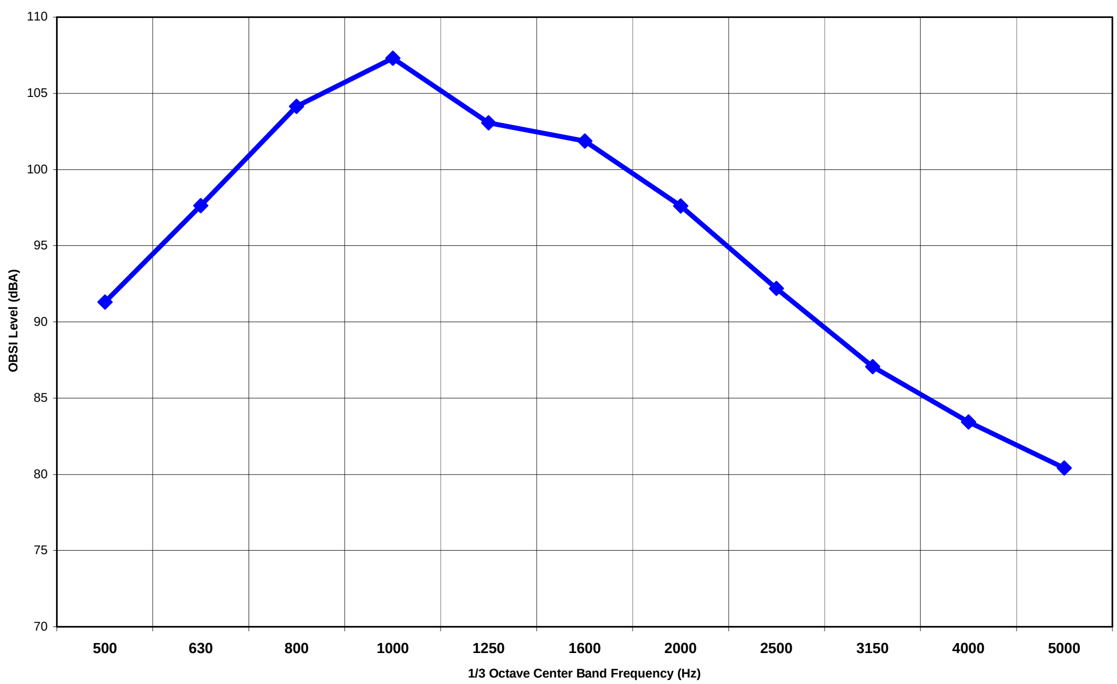

Site 319-1 (MN), Section C (Random Transverse Tining)
Mean Profile Depth (mm)
Distance (ft)
Longitudinal
Transverse
Average CTM
CTM Segments

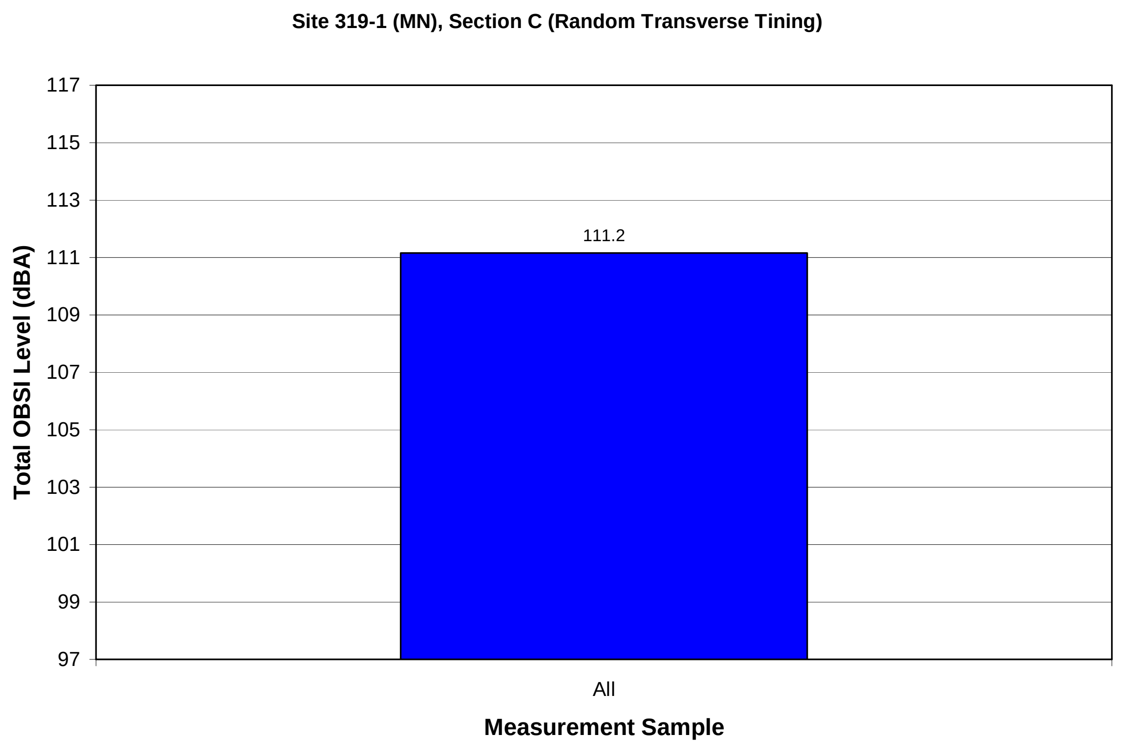

Site 319-1 (MN), Section C (Random Transverse Tining)
ISO 13565-2 Texture Depth (mm)
Distance (ft)
Longitudinal
Transverse

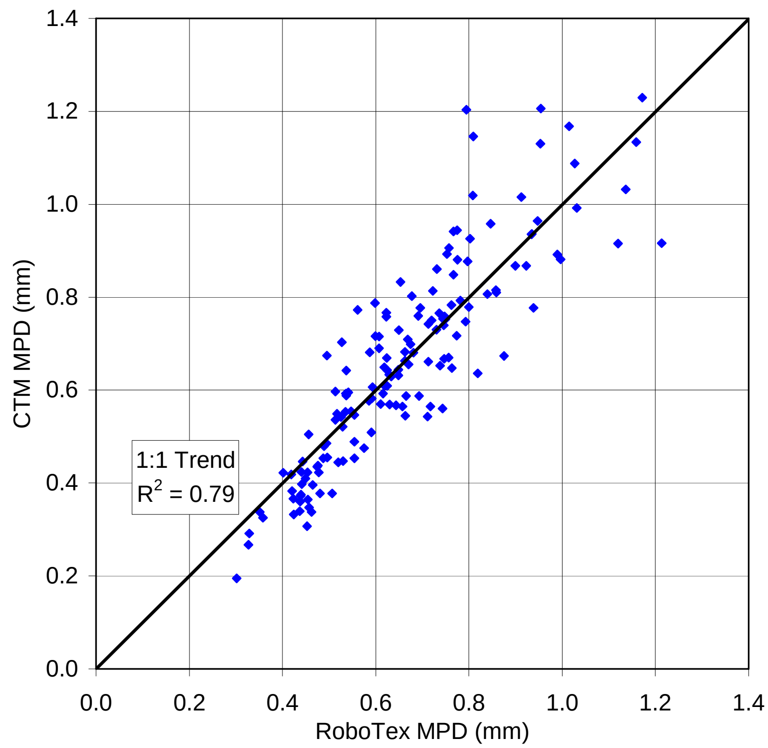
Site 319-1 (MN), Section C (Random Transverse Tining)

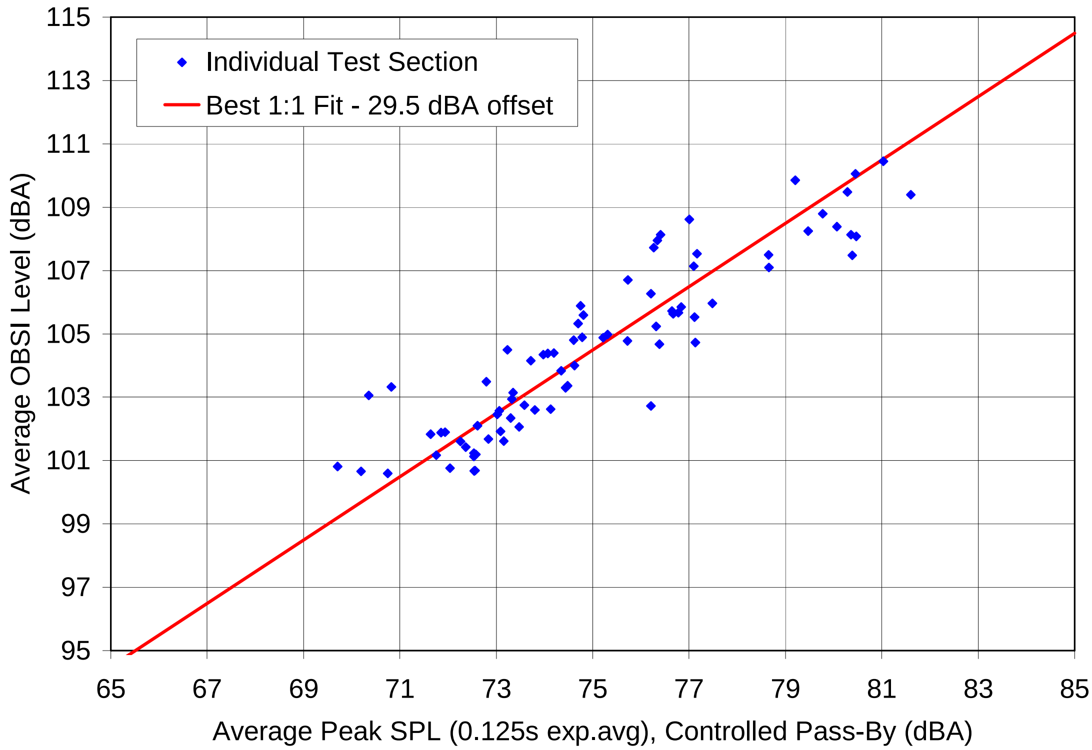


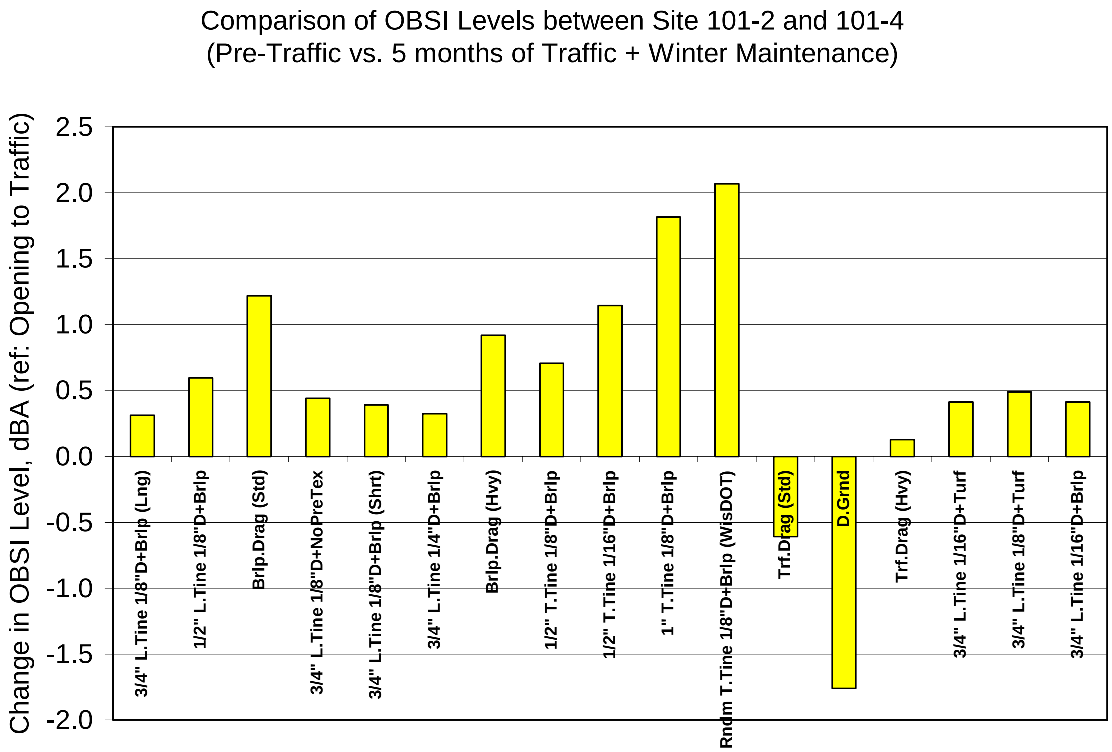
Site 319-1 (MN), Section C (Random Transverse Tining)



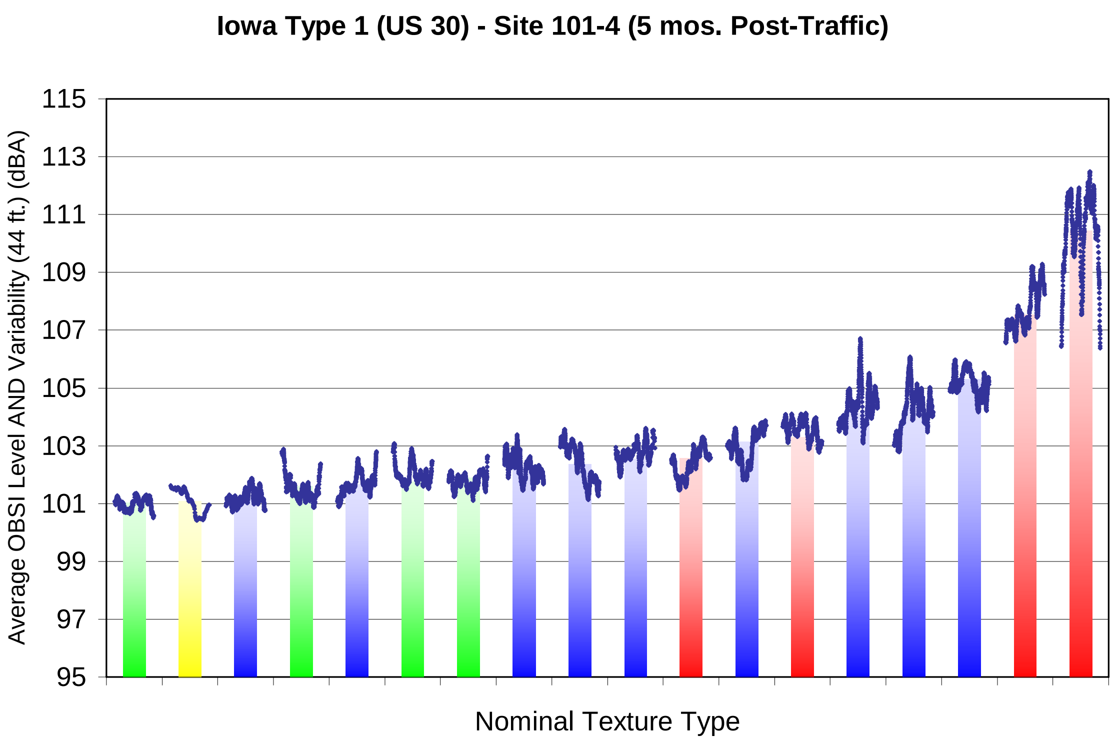

Site 319-1 (MN), Section C (Random Transverse Tining)
Total OBSI Level (dBA)
117
115
113
111
109
107
105
103
101
99
97
111.2
All
Measurement Sample


1:1 Trend
R2 = 0.79
CTM MPD (mm)
RoboTex MPD (mm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4

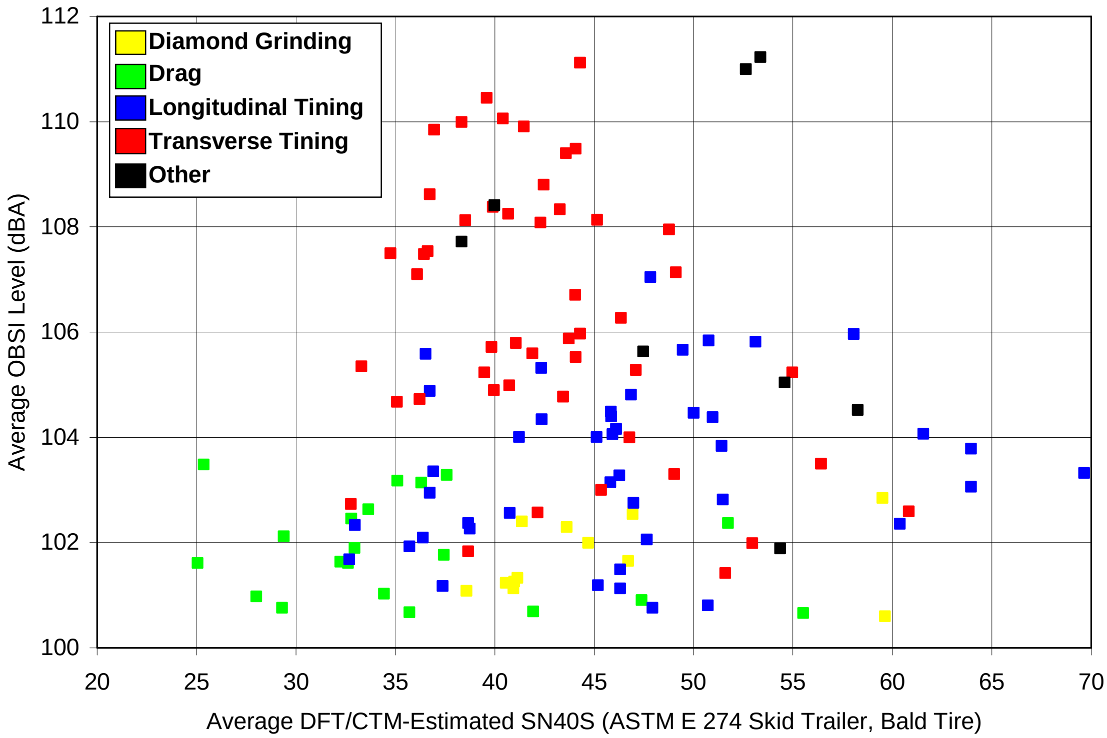

Individual Test Section
Best 1:1 Fit - 29.5 dBA offset
Average OBSI Level (dBA)
Average Peak SPL (0.125s exp.avg), Controlled Pass-By (dBA)
95
97
99
101
103
105
107
109
111
113
115
65
67
69
71
73
75
77
79
81
83
85

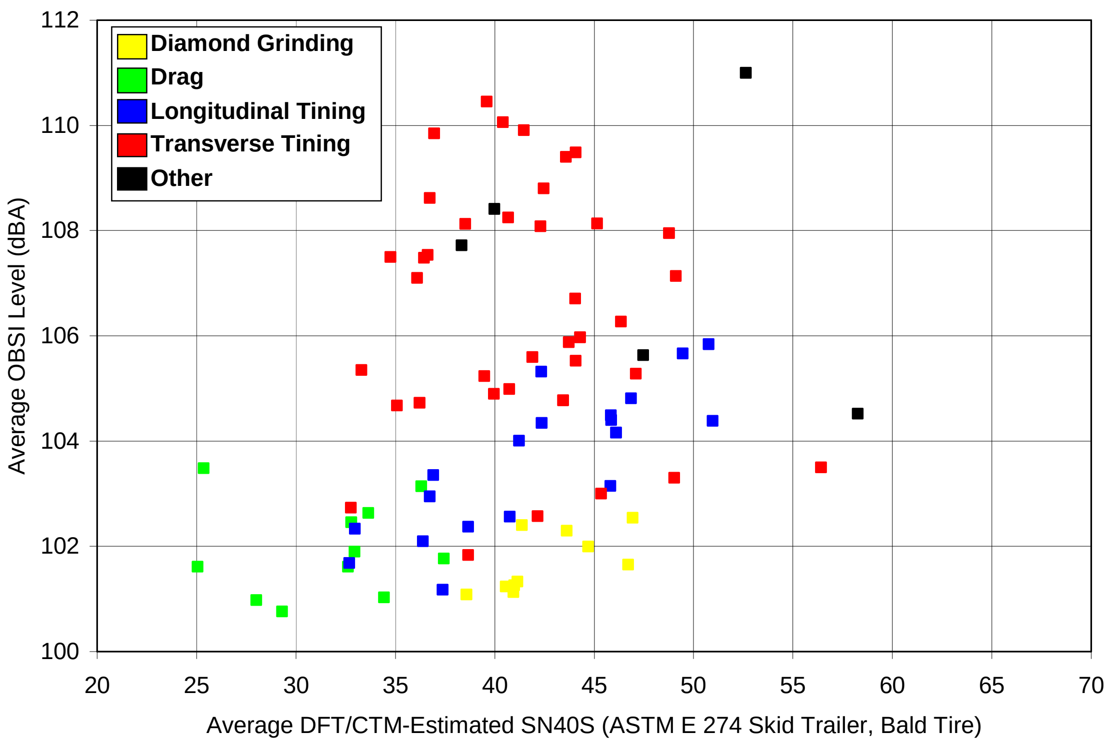


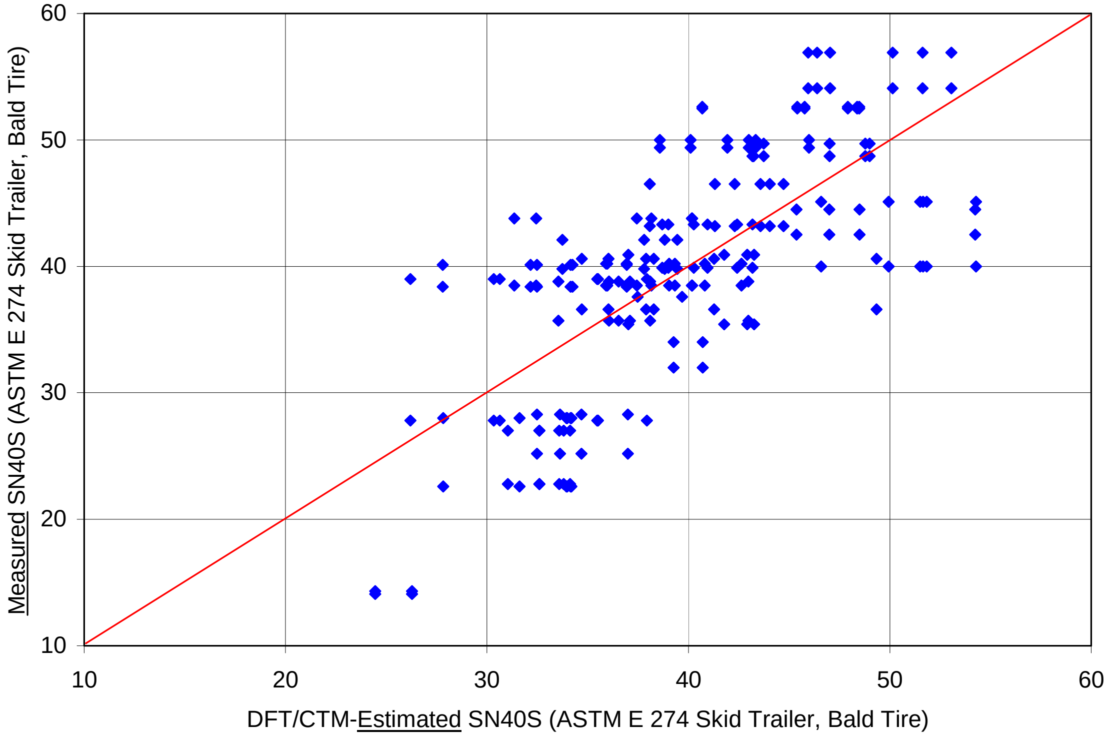
Comparison of OBSI Levels between Site 101-2 and 101-4
(Pre-Traffic vs. 5 months of Traffic + Winter Maintenance)
Change in OBSI Level, dBA (ref: Opening to Traffic)
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
3/4" L.Tine 1/8"D+Brlp (Lng)
1/2" L.Tine 1/8"D+Brlp
Brlp.Drag (Std)
3/4" L.Tine 1/8"D+NoPreTex
3/4" L.Tine 1/8"D+Brlp (Shrt)
3/4" L.Tine 1/4"D+Brlp
Brlp.Drag (Hvy)
1/2" T.Tine 1/8"D+Brlp
1/2" T.Tine 1/16"D+Brlp
1" T.Tine 1/8"D+Brlp
Rndm T.Tine 1/8"D+Brlp (WisDOT)
Trf.Drag (Std)
D.Grnd
Trf.Drag (Hvy)
3/4" L.Tine 1/16"D+Turf
3/4" L.Tine 1/8"D+Turf
3/4" L.Tine 1/16"D+Brlp

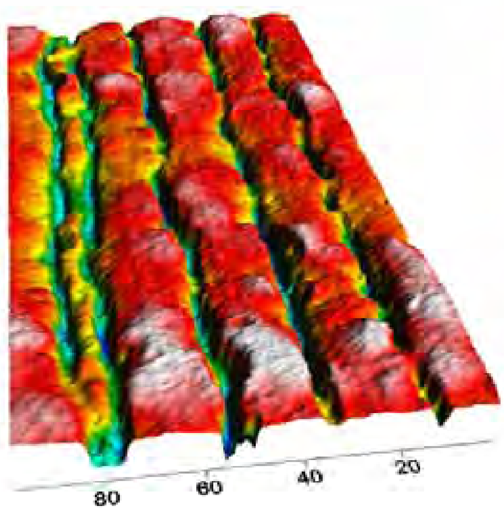


Iowa Type 1 (US 30) - Site 101-4 (5 mos. Post-Traffic)
Average OBSI Level AND Variability (44 ft.) (dBA)
115
113
111
109
107
105
103
101
99
97
95
Nominal Texture Type

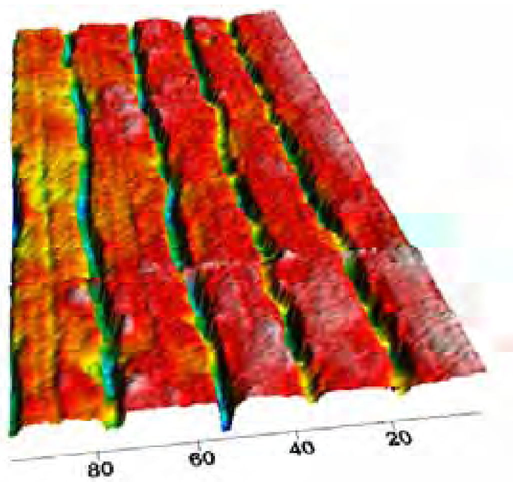

Diamond Grinding
Drag
Longitudinal Tining
Transverse Tining
Other
Average OBSI Level (dBA)
100
102
104
106
108
110
112
20
25
30
35
40
45
50
55
60
65
70
Average DFT/CTM-Estimated SN40S (ASTM E 274 Skid Trailer, Bald Tire)


Diamond Grinding
Drag
Longitudinal Tining
Transverse Tining
Other
Average OBSI Level (dBA)
100
102
104
106
108
110
112
20
25
30
35
40
45
50
55
60
65
70
Average DFT/CTM-Estimated SN40S (ASTM E 274 Skid Trailer, Bald Tire)

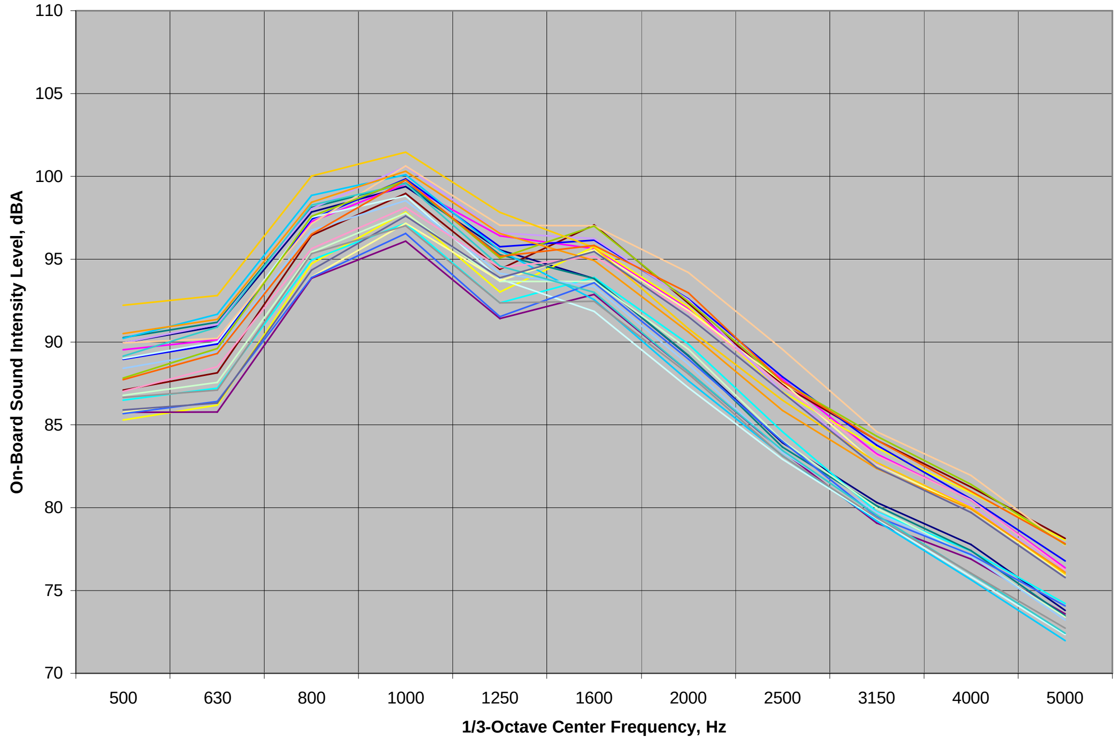


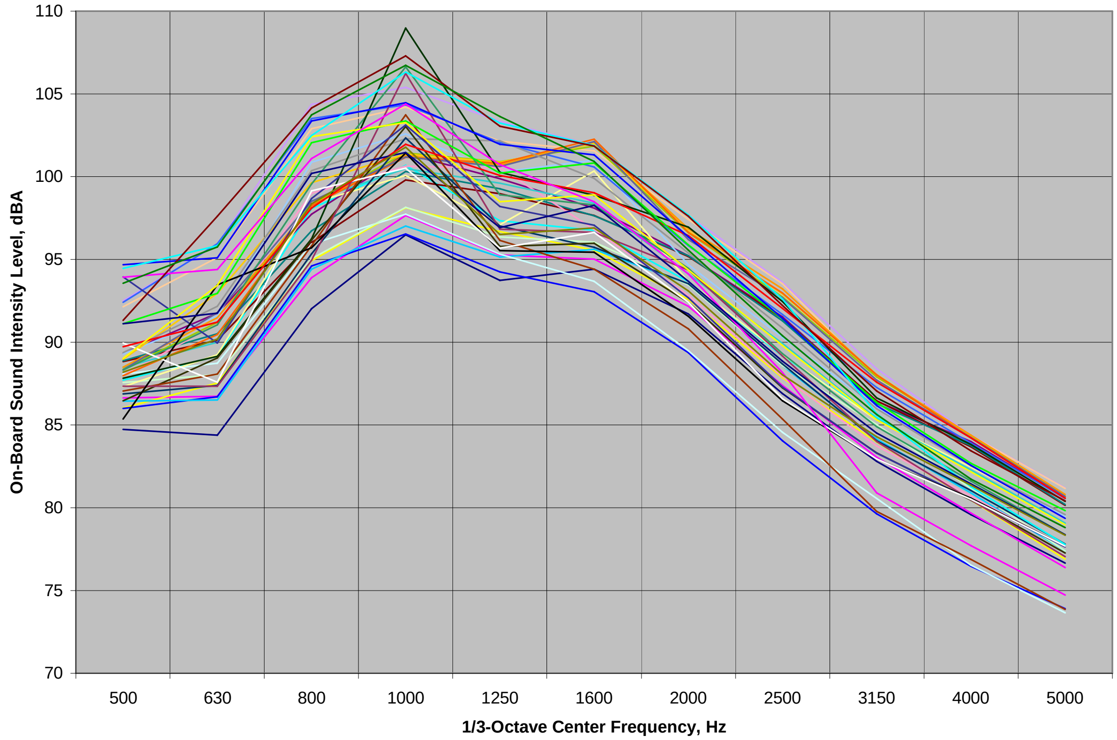


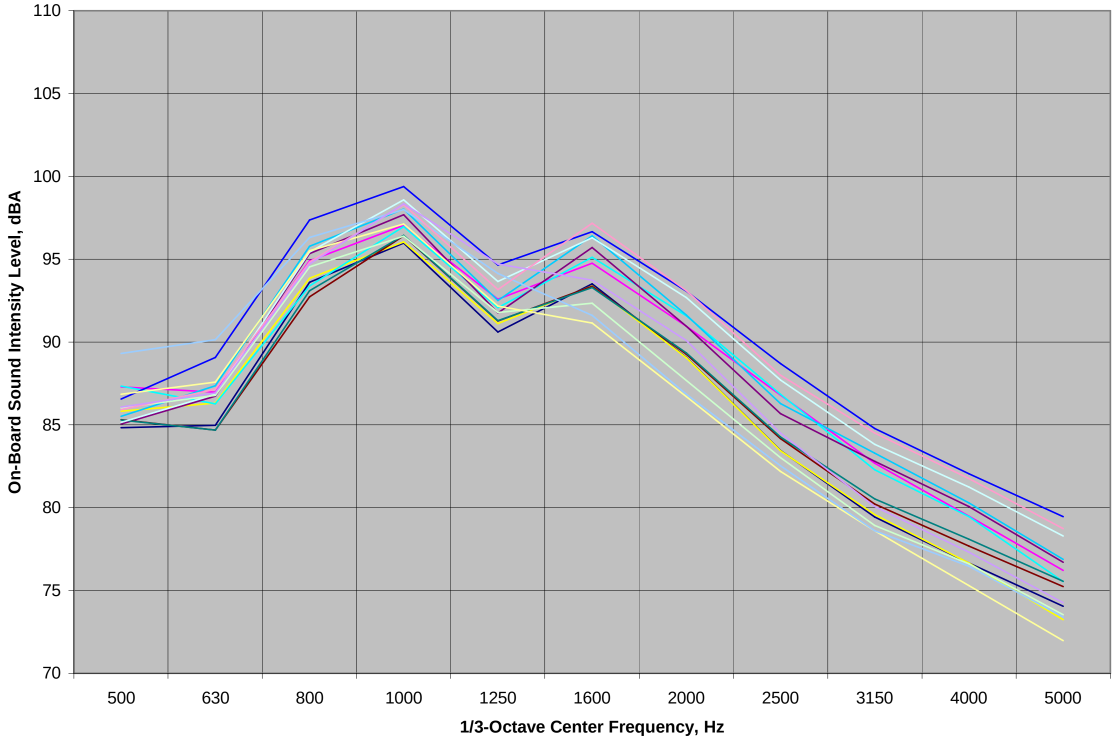
Distance ~ 147 ft.
OBSI Level ~ 107 dBA



Distance ~ 259 ft.
OBSI Level ~ 102 dBA


110
105
100
95
90
85
80
75
70
On-Board Sound Intensity Level, dBA
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
1/3-Octave Center Frequency, Hz


110
105
100
95
90
85
80
75
70
On-Board Sound Intensity Level, dBA
500
630
800
1000
1250
1600
2000
2500
3150
4000
5000
1/3-Octave Center Frequency, Hz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105
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On-Board Sound Intensity Level, dBA
500
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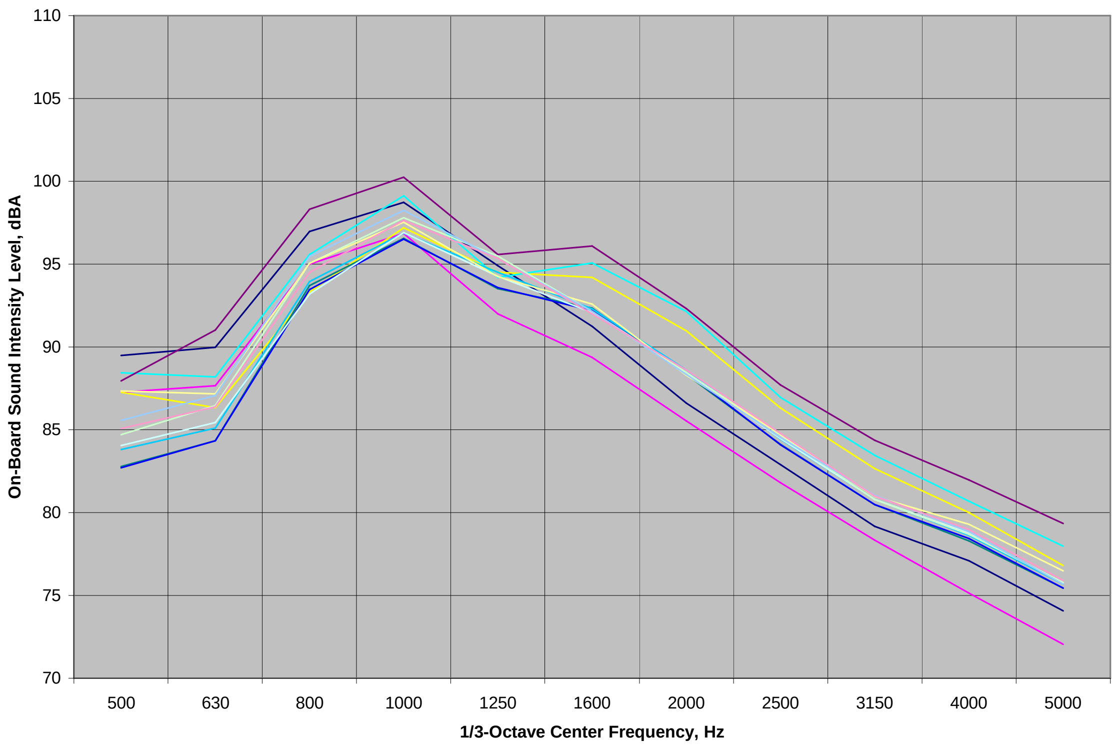
2500
3150
4000
5000
1/3-Octave Center Frequency, Hz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On-Board Sound Intensity Level, dBA
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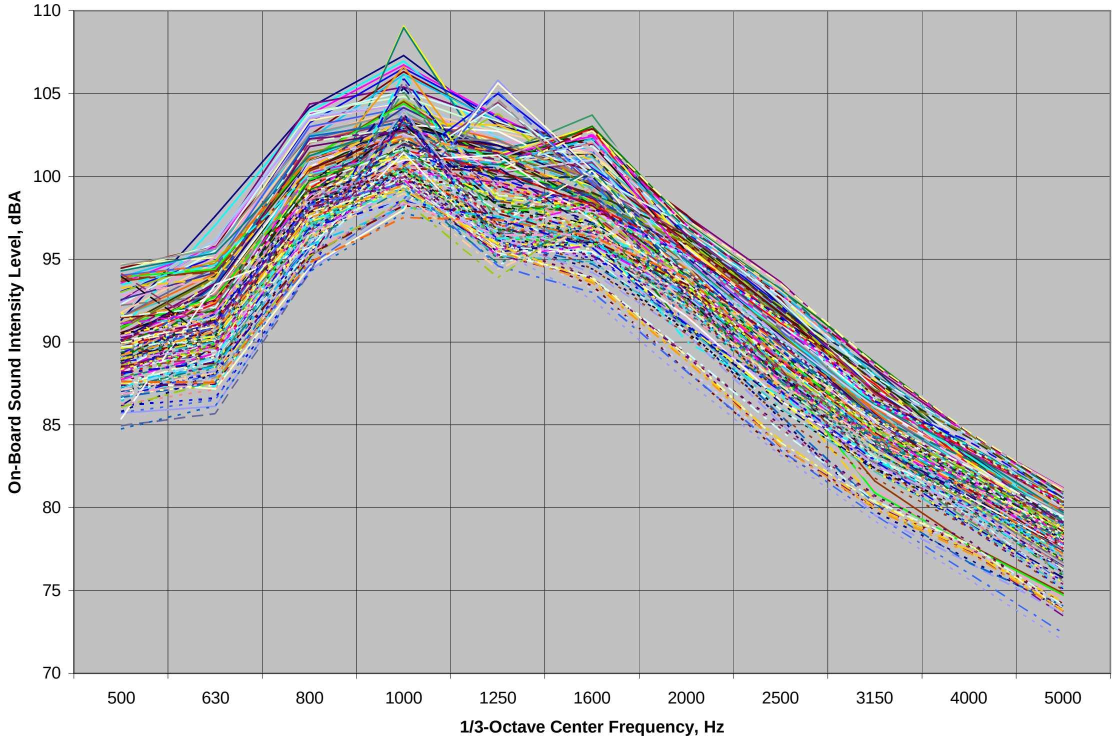
1/3-Octave Center Frequency, Hz



On-Board Sound Intensity Level, dBA
1/3-Octave Center Frequency, Hz
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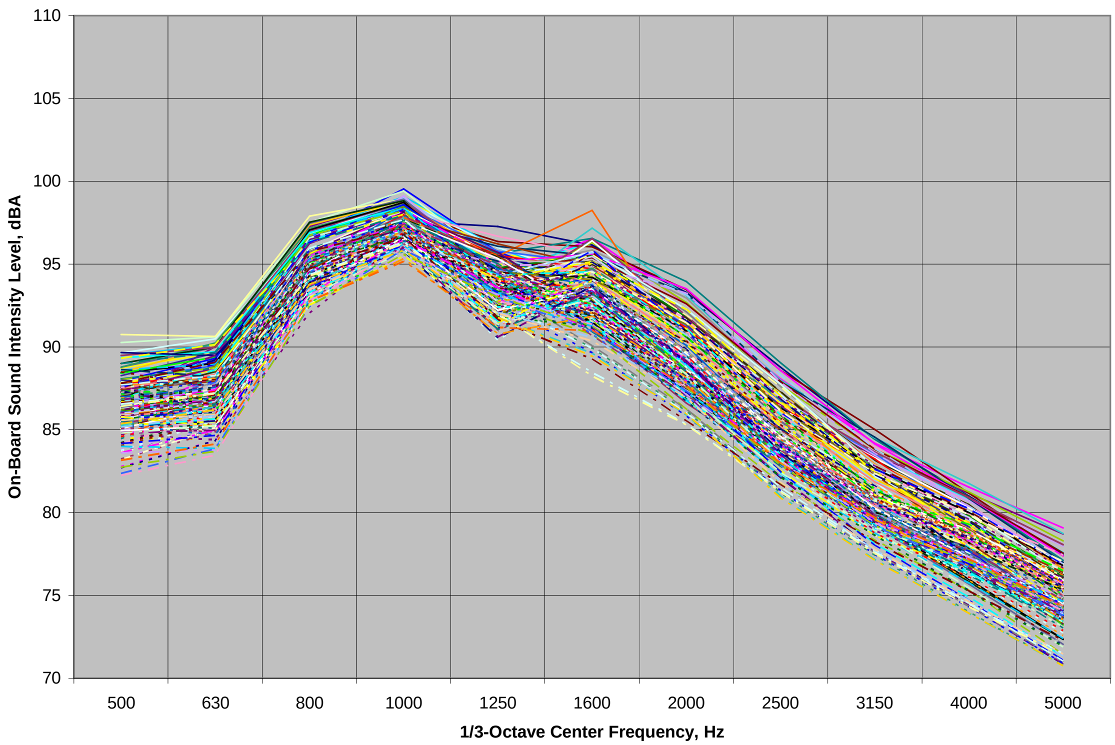

On-Board Sound Intensity Level, dBA
1/3-Octave Center Frequency, Hz
110
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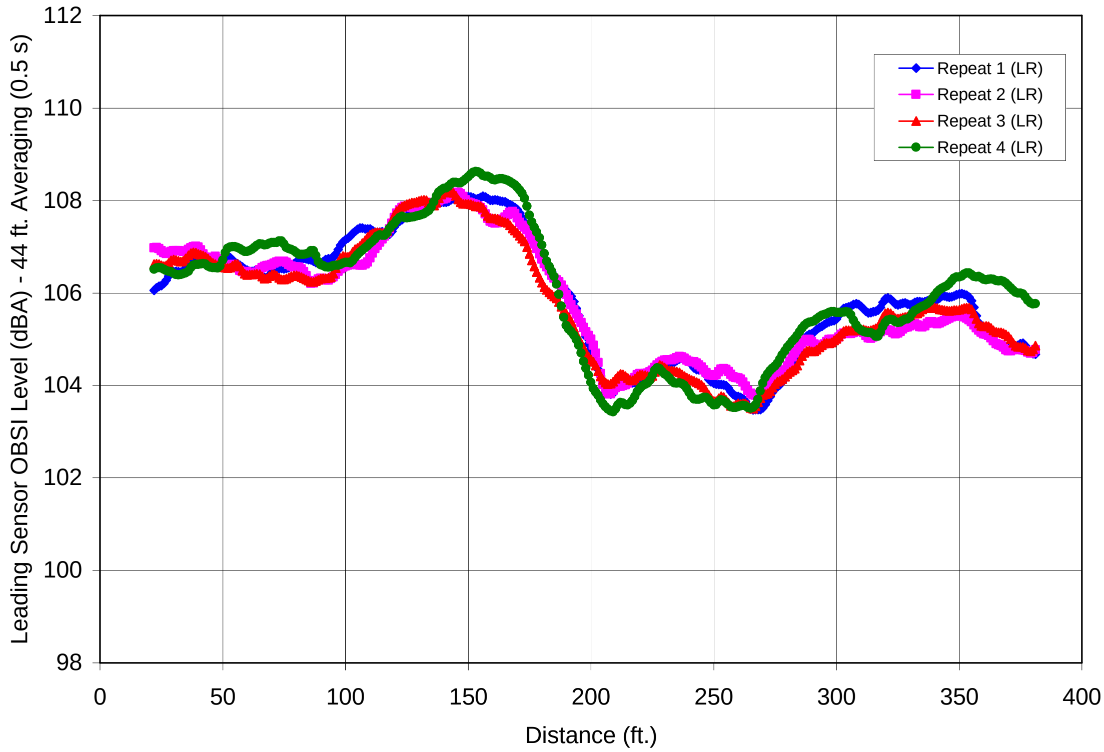
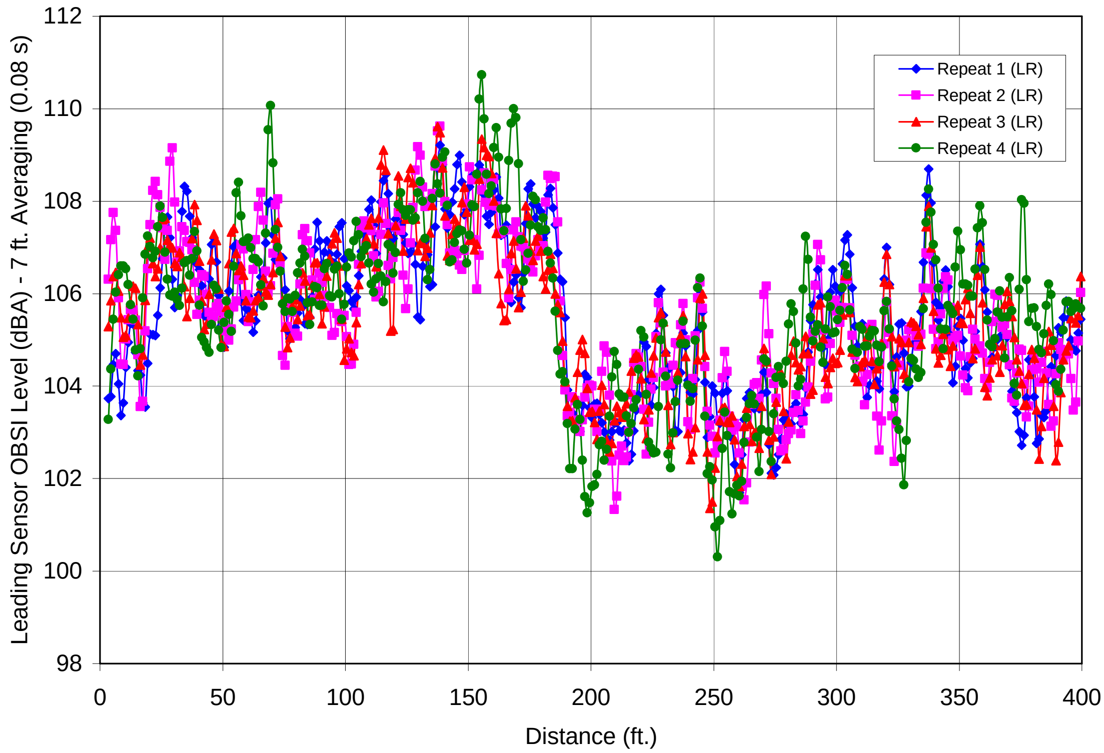
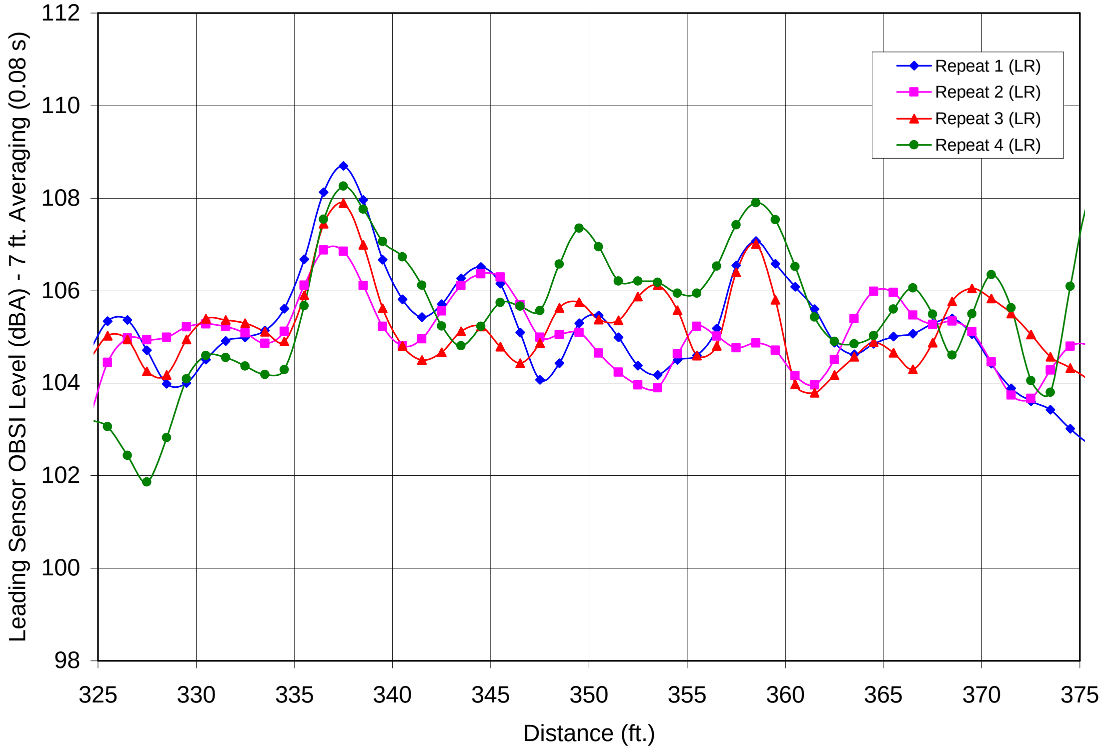


Leading Sensor OBSI Level (dBA) - 44 ft. Averaging (0.5 s)
Distance (ft.)
Repeat 1 (LR)
Repeat 2 (LR)
Repeat 3 (LR)
Repeat 4 (LR)



Leading Sensor OBSI Level (dBA) - 7 ft. Averaging (0.08 s)
Distance (ft.)
Repeat 1 (LR)
Repeat 2 (LR)
Repeat 3 (LR)
Repeat 4 (LR)



112
110
108
106
104
102
100
98
325
330
335
340
345
350
355
360
365
370
375
Leading Sensor OBSI Level (dBA) - 7 ft. Averaging (0.08 s)
Distance (ft.)
Repeat 1 (LR)
Repeat 2 (LR)
Repeat 3 (LR)
Repeat 4 (LR)

APPENDIX C. PROPOSED ANALYSIS TASKS FOR PART 3

Project ID: 01

Title: 3D Tire Envelopment Filter Development

Description: In order to proceed with more advanced analysis of a texture-to-noise relationship, the texture data collected using the RoboTex device must be processed using a three-dimensional tire envelopment filter. Ideally, such a filter would simulate the OBSI test tire to the degree that is as relevant as practical to relate to the various noise generation and amplification mechanisms. The envelopment filter must be sensitive to excitation from texture wavelengths from 10 to 200 mm, with a particular emphasis to those wavelengths from 20 to 40 mm. Furthermore, while use of the envelopment model that is under development for pavement smoothness calculations would be ideal, an investigation must be made of its relevance to noise, possibly making modifications to it in order to accomplish both objectives simultaneously. At the very least, the data being collected during controlled laboratory testing as part of the smoothness study may be beneficial in this effort.

Output: This effort will result in a mathematical filter that can be used to process the RoboTex data. The filter will be developed in Fortran, and will be fully documented for subsequent peer review. This model will serve as a critical input in texture-to-noise modeling.

Project ID: 02

Title: Spectral and Temporal Decomposition of Noise and Psychoacoustic Evaluation

Description: In order to proceed with some of the more advanced analysis methods, a more thorough understanding of the nature of the noise is required, particularly the OBSI. While the various OBSI data have been reported in Part 2 to include their spectral content in third-octave bands, additional characteristics of the spectral content (such as critical band content) and transient events (such as joint slap) need to be characterized and reported more robustly. Combining these and other noise characteristics are measures such as unbiased annoyance. All of these metrics will be calculated for the noise data collected in Part 2.

Output: A set of models will be developed in this effort that can be used to process noise data. This will include the reporting of spectral and temporal metrics and various psychoacoustic parameters for the Part 2 data. These models will be developed in Fortran, and will be fully documented for subsequent peer review. They will serve as critical inputs in the texture-to-noise modeling.

Project ID: 03

Title: Identification of Relevant Texture Metrics for Noise

Description: Finding the relationship between pavement texture and tire–pavement noise is one of the principal objectives of the overall study. With a better understanding of this relationship in place, the possibility will exist to use texture as a quality control metric, since it would relate back to the functional characteristic of noise. Furthermore, pavement surfaces can only then be "optimized" for noise. Using the 3D tire envelopment filter as well as other data processing techniques, numerous metrics that describe pavement texture can be generated. These include a variety of spectral and geometric metrics. The intent of this analysis will be to identify those metrics that are most relevant to the noise as measured using OBSI. To accomplish this, the noise will be decomposed into both spectral and temporal components and compared to the various texture metrics. The final models will likely be derived from empirical correlations based on a robust statistical analysis of the data; however, every reasonable effort will be made to employ fundamental modeling of the tire–pavement noise generation and amplification mechanisms. The latter would allow the model to be more readily extrapolated to tires and/or pavements that are not included in the data.

Output: All of the texture metrics that are evaluated will be documented, including the various formulae and algorithms. The most relevant metrics will be identified, along with their correlation to various characteristics of OBSI noise. Plots of the relevant texture metrics vs. noise will be provided for select test sections from the Part 2 data.

Project ID: 04

Title: Relating OBSI and Wayside Noise

Description: Current noise policy in the U.S. is based on wayside measurements. Tire–pavement noise is only part of the overall vehicle noise source, and the relationship between tire–pavement and wayside noise is not straightforward. This is particularly true when it is considered that only a single tire/vehicle is used in OBSI, while wayside is often reported as an aggregate of many different vehicles. The analysis in this effort will draw from similar endeavors to relate various wayside noise measurements to those collected using OBSI. The Part 2 data collection yielded both Controlled Pass-By (CPB) and some Statistical Pass-By and Time-Averaged Wayside noise data. A strong relationship between OBSI and CPB has been previously reported, but this relationship using other wayside data is still under investigation. In this analysis, the OBSI-CPB relationship previously developed will be validated for the variety of textures that have been measured. Where variances from this trend are noted, an investigation will be conducted for the reasons. Furthermore, fundamental modeling may be employed for the propagation effects, particularly as they relate to frequency. This may allow for an approximate separation of tire–pavement noise from other noise sources (e.g., powertrain).

Output: Existing relationships between OBSI and wayside noise will be validated in this effort. Where deviations from existing models are noted, these will be investigated. Some fundamental modeling may also be conducted to include propagation effects, and allowing for a possible separation of tire–pavement and other vehicle noise sources. All of the validated models will be documented for subsequent peer review. Subsequent tasks may include adaptations of these models in the form of modified policy tools and/or construction quality tools that demonstrate the relevance of the tire–pavement noise characteristics to abutters.

Project ID: 05

Title: Texture and Noise Artifacts due to Pavement Design and Construction

Description: With the Europeans already beginning to gauge the quality of as-constructed pavements using texture and noise, the possibility exists that a similar undertaking may happen in the U.S. To prepare for this, a better understanding must be gained of the impacts that the numerous design and construction variables have on texture and noise. As part of the Part 2 study, a significant emphasis was placed on the Type 1 projects to collect this type of data. Furthermore, many of the Type 2 and some of the Type 3 projects have this data available to varying degrees. This analysis would synchronize the design and construction characteristics to the as-constructed texture and noise. With this information, a better understanding of what practices should be avoided in order to reduce noise can be derived.

Output: With a “Texture Best Practices” guide expected under Part 2, this task would result in further development of these guidelines by validating or modifying the various “rules of thumb” that will likely be present in the first version. Subsequent tasks can include trial projects where the guidelines are adhered to, and a validation showing that marked improvements to noise resulted.

Project ID: 06

Title: Pavement Joint Effects on Noise

Description: It is known from the analysis of Part 2 data that the effect joint noise can have on the overall noise level can be significant. The differences in the joint contribution from one project to another can be tied to numerous variables including the joint geometry (width, depth), joint condition (presence of spalling), sealant type and quality, and environmental variables including slab temperature (and thus joint opening). In this analysis, the effect of the joints will be thoroughly investigated using the Part 2 data. If additional data is or becomes available on CRC pavements, this may also prove helpful in validating these relationships. Furthermore, the effects of having a periodic noise impulse due to joint slap will also be explored from a psychoacoustic perspective. Particular benefit will be gained from those sites that have detailed joint measurements, including some of the LTPP SPS sites.

Output: A report will be developed on the potential role that joints have in the overall noise level in concrete pavements. Where possible, relationships will be drawn between joint characteristics and the noise at the joint. This information can be used to possibly improve joint design and construction, and thus lower the overall noise level on the pavement as a result. The effect of joint maintenance (especially resealing) will also be reported as a variable to the greatest degree possible.

Project ID: 07

Title: Impact of Changing the OBSI Test Tire

Description: The tire–pavement noise community appears to be moving towards a standard that will include the new ASTM Standard Reference Test Tire (SRTT). Throughout the Part 2 testing, the Goodyear Aquatred tire was used since at the time that the testing began, it was the de-facto standard (based on the recommendations of Dr. Paul Donavan). At the end of Part 2, some sections will be measured using both tire types. The resulting data, however, must be analyzed so that a transfer function (or functions) can be developed between OBSI data collected using both tires. This will better assure historical continuity of the data.

Output: A transfer function (model) will be developed that will allow for OBSI data collected using the Aquatred tire to be related to that collected with the SRTT, and vice versa. This transfer function will then be applied for all data collected during the Part 2 program to assure historical continuity with subsequent revisits of Type 1 and 2 sites using the new tire.

Project ID: 08

Title: Acoustical Durability

Description: Acoustic durability is a critical characteristic of the function of a pavement. It describes the ability of the pavement to maintain a noise level over time and under traffic. It allows for a differentiation between pavements that may change rank-order in noise over time. In Part 2, both Type 1 and Type 2 studies have been designated for repeat visits. This data can be used to help build these acoustical durability relationships. However, with significant variability expected in this relationship, other methods will need to be developed in order to identify these trends in a shorter period of time. For example, data has been collected between wheel paths and in the right wheel path of most of the sections. While both alignments will experience environmental impacts and winter maintenance activities, only the wheel path will experience the effects of traffic loading.

It may be possible to use both sets of data to draw some relationships. In some cases, the Part 2 sites were previously measured under other projects. Using those measures can also possibly allow for constriction of these trends.

Output: Initially, a framework will be developed describing the best way to develop acoustical durability relationships using the data that is available. Following this, the data that has been collected to date, which can begin to constitute these curves, will be reported in this fashion.

Project ID: 09

Title: Relating OBSI and In-Vehicle Noise

Description: In-vehicle noise is important as it will be the measure that dictates the quality of the pavement on many roadways – particularly those that carry a lot of traffic, but do not necessarily have many abutters. Noise sensed inside the passenger car is inherently different than that measured using OBSI – even for the same vehicle. The vehicle mechanically attenuates some noise characteristics, and amplifies others. In this analysis, a transfer function will be developed that will allow for an approximation of the in-vehicle noise from that measured using OBSI. While the transfer function will only be relevant for the test vehicle, it will demonstrate the possibilities of defining a metric that is relevant to the driver's perception of a pavement using only OBSI data. The transfer function will be on a spectral basis, and not a mere offset in the total noise level.

Output: A model will result from this analysis that can be used to crudely approximate the potential noise impacts to a driver using only the OBSI data. While further validation will likely be needed before widespread adoption of this model, it will serve as an important framework for subsequent study in this area.

Project ID: 10

Title: Validating the Texture – Friction Relationship

Description: Friction and safety of the pavement are often used interchangeably. Wet weather friction has been reported to be a function of the macrotexture content of a pavement, and numerous models have been developed to describe this. In this task, the sheer variety of pavement surfaces that have been evaluated with high-resolution texture data lends itself to a significant opportunity to validate these models.

Output: The result of this effort will be a report of the validity of the texture-friction models to the large number of surfaces that have been measured under the Part 2 effort. If deviations from the model are found to exist, these will be flagged for additional investigation.

APPENDIX D. DATA COLLECTION PROCEDURES

Setup and Reconnaissance

1. Locate site.
2. Measure and mark test sections.
3. Setup up weather station at test site.

On Board Sound Intensity

1. Set out optical triggers at boundaries of each test section.
2. Inspect test vehicle to ensure that it is in good mechanical condition and that there are no noise sources that may influence the test results.
3. Inspect test tire for inflation, tread wear, foreign objects in the tread, and overall mechanical condition.
4. Install the test tire in the rear passenger side location.
5. Install the microphone bracket ensuring that the bracket is aligned vertically.
6. Mount microphone probe and microphones in the trailing edge position.
7. Setup the instrumentation including the DAT backup, and double check the settings on both the computer and DAT.
8. Turn on triggering system.
9. Plug in the microphones, turn on the microphone power supply, and allow the system to warm up.
10. Calibrate the microphones.
11. Install the nose cones and windscreens and double check that all fasteners are tight and that the microphones are in the correct position.
12. Line the test vehicle up with the test section and bring it up to the test speed (usually 60 mph).
13. As the test vehicle approaches the beginning of the test section beginning recording data.
14. As the test vehicle enters the test section, ensure that the triggering system is working correctly and that the data being recorded passes "sanity" checks.
15. After the test vehicle leaves the test section, stop the recording and save the file in the appropriate folder.
16. Repeat the data collection procedure until the number of repeats prescribed in the data collection plan is complete.
17. Reposition the microphones so that they are in the leading edge position and repeat the data collection procedure until the number of repeats prescribed in the data collection plan is complete.
18. Remove the windscreens and nose cones.
19. Calibrate the microphones.
20. Turn off and pack the instrumentation, microphones, and bracket.

In-Vehicle Testing

1. Set out optical triggers at boundaries of each test section.
2. Inspect test vehicle to ensure that it is in good mechanical condition and that there are no noise sources that may influence the test results.
3. Inspect tires for inflation, tread wear, foreign objects in the tread, and overall mechanical condition.
4. Install the microphone brackets.
5. Mount microphones.
6. Setup the instrumentation including the DAT backup, and double check the settings on both the computer and DAT.
7. Turn on triggering system.
8. Plug in the microphones, turn on the microphone power supply, and allow the system to warm up.
9. Calibrate the microphones.
10. Before beginning the test turn off the air conditioner and any other sources of noise inside the vehicle that may influence the test results.
11. Line the test vehicle up with the test section and bring it up to the test speed (usually 60 mph).
12. As the test vehicle approaches the beginning of the test section begin recording data and stay as quiet as possible once the vehicle enters the test section.
13. After the test vehicle leaves the test section, stop the recording and save the file in the appropriate folder.
14. Repeat the data collection procedure until the number of repeats prescribed in the data collection plan is complete.
15. Calibrate the microphones.
16. Turn off and pack the instrumentation, microphones, and brackets.

Controlled Pass-By

1. Inspect test vehicle to ensure that it is in good mechanical condition and that there are no noise sources that may influence the test results.
2. Inspect tires for inflation, tread wear, foreign objects in the tread, and overall mechanical condition.
3. Position microphone at a location within the test section that is as straight and level as possible and free of any large obstructions that might influence the test results.
4. Position the microphone 50ft. from the center of the test lane and 5ft. above the test lane.
5. Setup the instrumentation including the DAT backup, and double check the settings on both the computer and DAT.
6. Plug in the microphone, turn on the microphone power supply, and allow the system to warm up.
7. Calibrate the microphone.
8. Line up the test vehicle and, during a break in traffic, bring the vehicle up to the test speed (usually 60 mph).
9. As the test vehicle approaches the microphone begin recording data.

10. As the test vehicle passes the microphone, if it is the only vehicle passing near the microphone and there are no other noise sources that will influence the test results save the file in the appropriate folder.
11. Repeat the data collection procedure until the number of repeats prescribed in the data collection plan is complete.
12. Calibrate the microphones.
13. Turn off and pack the instrumentation and the microphone.

RoboTex

1. Unload RoboTex.
2. Plug in batteries.
3. Secure the laptop to RoboTex and plug in the DAQ, GPS, and Laser.
4. Turn on the laptop and laser.
5. Mount and set the guide bars so that the robot will follow the right wheel path of the lane.
6. Mark the beginning and end of the test section.
7. Line up the robot and calibrate the DMI.
8. Set out the calibration bar.
9. Line up the robot with the calibration bar and collect three calibration runs.
10. Line up the robot with test section and proceed to collect data making sure the robot is traveling at 1 mph.
11. After passing the end of the test section save the file in the appropriate folder.
12. Repeat the data collection procedure until the number of repeats prescribed in the data collection plan is complete.
13. Turn off the robot and pack the batteries and laptop.

CTM

1. Unpack the CTM.
2. Plug in the battery the laptop to the CTM.
3. Unpack the calibration surface.
4. Calibrate the CTM.
5. Place the CTM on the test surface.
6. Collect the data and mark the location of the CTM so that the DFT can be placed in the same location.
7. Continue to the next test location and repeat until all the locations are complete.
8. Unplug and pack the CTM.

DFT

1. Unpack the DFT and DFT Controller.
2. Connect the power, laptop and water supply to the DFT and DFT Controller.
3. Check the rubber pad and replace as needed.
4. Place the DFT at the location that was marked after the CTM test.
5. Collect the data and check the results for obvious anomalies.
6. Continue to the next test location and repeat until all the location are complete.
7. Unplug, dry, and pack the DFT.

APPENDIX E. ON-BOARD SOUND INTENSITY TEST PROCEDURE

Equipment list

- Test Vehicle – 2003 Buick Century, VIN: 2G4WS52J631121174
- Test Tire – Goodyear Aquatred 3, size P205/70/R15
- Microphones – G.R.A.S. Type 40IA Phase Matched Intensity (TGSI-1420, Microphone 1 [left]: S/N: 37314, Microphone 2 [right]: S/N: 37307)
- Preamps – G.R.A.S. Type 26AK (Preamp 1 [left]: S/N: 38330, Preamp 2 [right]: S/N: 32792)
- Power Module – G.R.A.S. 12AA (TGSI–1000 - S/N: 40241)
- Recording Instrument (DAT/Computer) – Sony TCDD100 (S/N: 541146), Dell Laptop (ISU-056) w/Docking Station (ISU-056-02) and M-Audio Delta 1010LT sound card (S/N: 110159)
- Instrumentation Board – Transtec custom made.
- Batteries – 2 Interstate Model 1055
- Inverter – Samlex 600W Pure Sine Wave Inverter (ISU-1140)
- RTA – Larson Davis 3000+ (S/N: 0165), Transtec Sound Analysis Software
- Calibration Tone – Larson Davis CAL200 (S/N: 3692)
- Microphone Simulator
- Cables: 2 LEMO Cables (already attached to preamps and inside the vehicle)
- Weather Station – Transtec Cure-All Weather Station and Software
- Tape Measure
- Hand Level
- Vehicle Speed Detection Unit (radar gun/record from car)
- Tire Tread Depth Guage

- Optical Triggering System – Culter-Hammer Optical Sensor (P/N: 14150AL17), ELK-960 Delay Timer, Reflective Targets

- Microphone Bracket:
    - Bracket Assembly
    - 5/16-8 Threaded Rod
    - 2 Small C-Clamps
    - Plexiglass Bracket
    - Microphone Probe

1. Equipment Specs

1.1. Test Vehicle

1.1.1. The test vehicle should be in good mechanical condition. Any foreign objects fixed to the outside of the car should be removed.

1.1.2. The interior of the test vehicle should be empty except for the equipment necessary to complete the test.

1.1.3. The test vehicle's tires should be in good condition and have at least 50% of their tread remaining. The tread should be free of any loose rocks, screws, nails, or other protrusions.

1.1.4. Speedometer should be calibrated to ± 1mph @60mph.

1.2. Sound Recording Equipment

1.2.1. Condenser type microphones should be used.

1.2.2. Preamplifiers should be compatible with the microphone and ideally selected as part of a vendor recommended microphone - preamplifier system.

1.2.3. Recording devices used must meet IEC 1265 and ANSI S1.13-1971 for frequency response and sound-to-noise ratio. The dynamic range or "hard overload point" must be 10 to 20 dB greater than the maximum sound pressure level that is expected to be measured.

1.2.4. Calibration tone shall meet Type 1L performance requirements of IEC 942.

1.2.5. Overall system specs:

- Minimum frequency range between 500 and 5000 Hz.

- A-weighted frequency weighting should be applied to the sound pressure level.

- Input gain should be set to provide maximum dynamic range while avoiding overload.

- A fast exponential time-averaging should be used with a time constant of 0.125s.

1.3. Weather Station

1.3.1. For general purpose measurements, the wind measuring device that is of the wind-cup type is acceptable.

1.3.2. The temperature sensor used should have an accuracy of at least ± 2 °F and be fully shielded from direct solar radiation.

2. Test Site

2.1. Site Description

2.1.1. The site should have no large reflecting surfaces within 100 ft. of vehicle path.

2.1.2. Pavement should be dry and reasonably free of debris or gravel.

2.1.3. The average measured wind speed should not be more than 12 mph.

2.2. Site Setup

2.2.1. Identify the test section and verify that it meets the requirements described in Section 3.1.

2.2.2. Mark off the beginning and end of the test section with the traffic cones such that the reflective tape on the cones is facing the vehicle path.

2.2.3. Setup the weather station at a height of 5 ft. in a safe area near the test section such that it will not affect the noise measurements that will be taken, and such that the measurements are reasonably representative of the conditions along the site.

2.2.4. Begin recording weather data in 1 minute intervals until all testing is complete.

2.2.5. Take photographs of the test section from various perspectives to allow for subsequent understanding of site conditions.

3. Procedure

3.1. Vehicle Setup

3.1.1. Place the vehicle in park on a flat surface.

3.1.2. Remove the jack, test tire, and wrench from the trunk.

3.1.3. Inspect the test tire for any damage and remove any foreign objects from the tread.

3.1.4. Measure and record the tread depth of the three vehicle tires and the test tire. This should be done for all four tread grooves and at the front and rear of the tire.

3.1.5. If any section of the vehicle tire's tread is worn beyond 50% of the tread depth, the tire must be changed before proceeding. If any section of the test tire is worn beyond 75% of the tread depth, the test tire must be changed.

3.1.6. Check that the cold tire pressure of all four tires is within 2 psi of the vehicle manufacturer's recommended tire pressure.

3.1.7. Loosen the lug nuts of the passenger side rear tire.

3.1.8. Position the jack in front of the tire as shown in Figure E.1.

Figure E.1. Jack position

3.1.9. Jack the car up so that the tire is in the air.

3.1.10. Remove the lug nuts and tire.

3.1.11. Mount the test tire.

3.1.12. Replace three of the regular lug nuts with three special lug nuts (lug nuts 1, 2, and 5 in Figure E.1) as shown.

Figure E.2. Test tire lug nut configuration

3.1.13. Tighten the lug nuts so that the tire is flush with the wheel hub.

3.1.14. Slowly lower the car.

3.1.15. Tighten the lug nuts to 65 ft-lbs, following the pattern shown in Figure E.3.

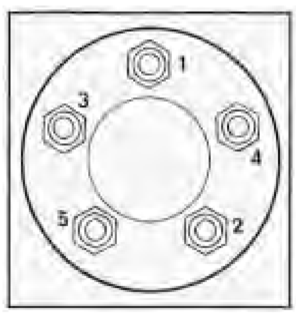


Figure E.3. Order for tightening lug nuts

3.2. Microphone Bracket Setup

3.2.1. Line up the three holes with the 3 special lug nuts and use the socket head cap screws to tighten the bracket as shown in Figure E.4.

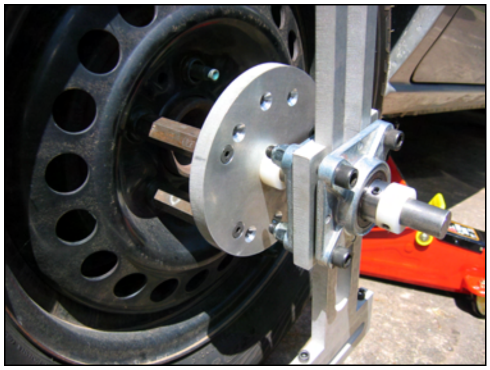


Figure E.4. Bracket secured to wheel

3.2.2. Screw in the threaded rod on to the top of the microphone bracket and tighten with a crescent wrench as shown in Figure E.5.

Figure E.5. Threaded rod connected to bracket

3.2.3. Apply duct tape to the rear quarter panel where the C-clamps are to be placed.

3.2.4. Place a level on the horizontal beam of the mounting bracket.

3.2.5. Attach the plexiglass bracket to the rear quarter panel with two C-clamps making sure the threaded rod fits through the slot in the bracket and that the bracket is level. The completed assembly is shown in Figure E.6.

Figure E.6. Completed microphone bracket

3.3. Triggering System Setup

3.3.1. Attach the optical sensor to the bottom of the front bumper on the passenger side.

3.3.2. Plug in the sensor under the hood right above the battery as shown in Figure E.7.

Figure E.7. Optical sensor wiring connection

3.4. Instrumentation Setup

3.4.1. Place the instrumentation board on the passenger seat.

3.4.2. Verify that the Gain settings for Channel A and B are set to *0* on the front panel of the power module. Place the power module on the instrumentation board with the Velcro strips facing up and secure it with the Velcro straps.

3.4.3. Verify that the settings on the rear of the DAT are for recording at *48kHz (SP), Manual* gain setting, *Line In*, and *0dB* Mic Att, and that the Rec Level on top is set at *10*. Place the DAT on top of the power module such that it is secured with the Velcro strips on the power module and back of the DAT.

3.4.4. Place two 12V batteries on the instrumentation board, plug them in, and secure them with the Velcro straps.

3.4.5. Connect the BNC cables on the instrumentation board labeled 1 and 2 to the power module connections labeled Out A and Out B, respectively.

3.4.6. Connect the 1/8" stereo jack on the instrumentation board to the *Mic/Line In* plug of the DAT.

3.4.7. Plug in the power cables on the instrumentation board into the power module and DAT making sure that the power switch on the power module is in the *off* position. The complete instrumentation board is shown in Figure E.8.

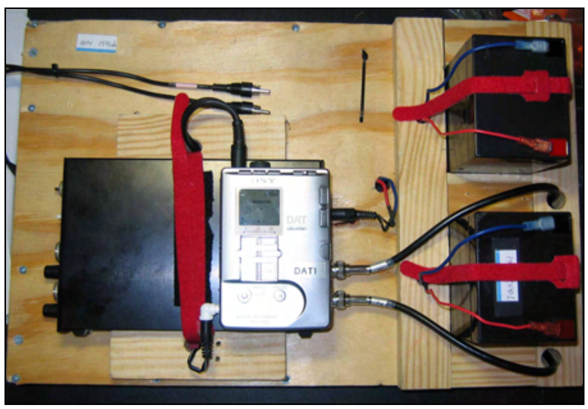


Figure E.8. Assembled instrumentation board

3.4.8. Insert a blank DDS tape into the DAT.

3.4.9. Set the time and date on the DAT by pressing and holding down the *Clock/Set* button on the DAT till the date begins to flash. Then use the +, -, and *Clock/Set* buttons to adjust the time and date. The time should be in local time and synchronized as close as possible to atomic time.

3.4.10. Place the laptop and docking station on the floor and plug the docking station into the inverter.

3.4.11. Plug a keyboard into the docking station and place it on the armrest.

3.4.12. Turn on the vehicle, the inverter, and then the computer.

3.4.13. Plug the two RCA cables from the instrumentation board into the RCA jacks labeled IN3 and IN4 on the sound card. The RCA cable on the instrumentation board with the pink sticker on it is channel 2 and should be plugged into the red RCA jack labeled IN4 and the remaining RCA jack should be plugged in to the white RCA jack labeled IN3.

3.5. Microphone Setup and Pre-Calibration

3.5.1. Take the microphone probe from the trunk and bring it to the instrumentation board.

3.5.2. Remove the windscreen from the microphone probe.

3.5.3. Remove the yellow cap from preamp 1 and carefully blow out the connector with compressed air. Carefully screw microphone 1 (s/n: 37314) onto preamp 1.

3.5.4. Remove the yellow cap from preamp 2 and carefully blow out the connector with compressed air. Carefully screw microphone 2 (s/n: 37307) onto preamp 2.

3.5.5. Plug in LEMO connectors from preamps 1 and 2 into power module Channel A and B, respectively, and turn the power module on.

3.5.6. Wait one minute and then attach the calibration tone onto microphone 1.

3.5.7. Open Audacity on the laptop and press *pause* and then the *record* button on the DAT.

3.5.8. Set the calibration tone to 94dB and press the *on* button.

3.5.9. While the calibration tone is being played into microphone 1 press the *pause* button on the DAT and press the *R* key on the keyboard simultaneously. Make sure to note the start time on the DAT.

3.5.10. After 30 seconds of data has been recorded press the *stop* button on the DAT and press the “S” key on the keyboard. Make sure to note the end time on the DAT.

3.5.11. In Audacity, click on File–>Export As Wav. Name the file XXXXsiprecal1.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

3.5.12. Close the sound file in Audacity by clicking on the “x” next to where it says “Audio Track.”

3.5.13. Advance the DDS tape on the DAT at least 10 seconds and then press *pause* and then *record* on the DAT.

3.5.14. Carefully place the calibration tone onto microphone 2.

3.5.15. Set the calibration tone to 94dB and press the *on* button.

3.5.16. While the calibration tone is being played into microphone 2 press the *pause* button on the DAT and press the "R" key on the keyboard simultaneously. Make sure to note the start time on the DAT.

3.5.17. After 30 seconds of data has been recorded press the *stop* button on the DAT and press the "S" key on the keyboard. Make sure to note the end time on the DAT.

3.5.18. In Audacity, click on File–>Export As Wav. Name the file XXXXsiprecal2.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

3.5.19. Remove the calibration tone from microphone 2.

3.5.20. Carefully remove the microphone cap from microphone 1 and replace it with nose cone 1.

3.5.21. Carefully remove the microphone cap from microphone 2 and replace it with nose cone 2.

3.5.22. Place the windscreen on the microphone array.

3.5.23. Slide the probe into the probe bracket making sure to line up the grooves on the probe with the two pairs of screws on each side of the bracket and that microphone 1 is closest to the tire.

3.5.24. Align the microphones such that they are positioned in the leading edge position as shown in Figure E.9. The microphones should be parallel to the road surface, 3 in. above the road surface, and centered 4 in. away from the tire/pavement contact area on the leading edge of the tire.

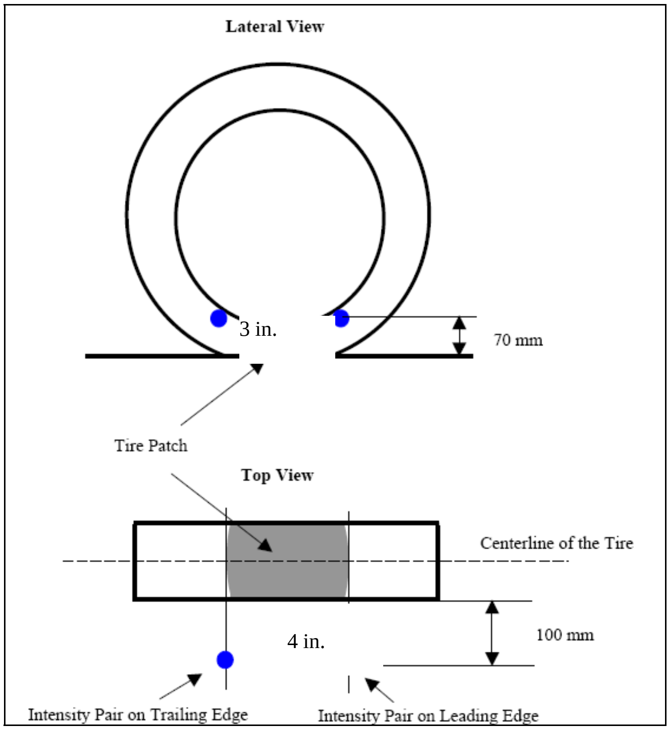


Figure E.9. Microphone positions

3.5.25. Tighten the four screws on the microphone probe bracket. Figure E.10 shows the microphone probe positioned in the trailing edge position.

Figure E.10. Microphones in the trailing edge position

3.5.26. The vehicle speed measuring device should also be calibrated (procedures depend on type of measurement).

3.6. Test Measurements

3.6.1. Turn on the sensor by opening the ashtray inside the vehicle and moving the red toggle switch to the forward position as shown in Figure E.11.

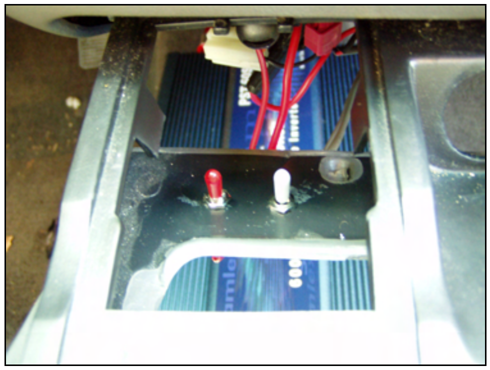


Figure E.11. Triggering system switches

3.6.2. Switch the white toggle switch to the forward position to turn on the exterior trigger speaker.

3.6.3. Before accelerating and reaching the beginning of the test section, begin recording data by pressing the “R” key on the keyboard and by pressing the *record* and *play* buttons on the DAT. Be sure to note the time on the DAT.

3.6.4. Bring the test vehicle up a test speed of 60 mph and set the cruise control.

3.6.5. As you pass the start of the test section, check that the LED on the dash has flashed once. If the LED has not flashed once, abort the test run and adjust the triggering system.

3.6.6. If the speaker has been triggered, maintain the test speed and keep the vehicle riding in the center of the lane.

3.6.7. If during the test you cannot maintain the test speed because of traffic abort the test run and begin again.

3.6.8. As you pass the end of the test section, check that the LED on the dash has flashed once. If the LED has not flashed once, abort the test run and adjust the triggering system.

3.6.9. If the speaker has been triggered, stop the data recordings by pressing the “S” key on the keyboard and by pressing the stop button on the DAT. Be sure to note the time on the DAT.

3.6.10. In Audacity, click on File–>Export As Wav. Name the file XXXXsi##.wav (where XXXX is the Test ID and ## is the test number) and save the file in the appropriate folder.

3.6.11. Advance the DSS tape by pressing play and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

3.6.12. Repeat steps 3.6.3 - 3.6.11 until you have two acceptable runs with the microphones in the leading edge position, unless otherwise stated in the test plan.

3.6.13. Loosen the microphone probe bracket and reposition it so that the microphones are positioned in the trailing edge position as shown in Figure E.9. The microphones should be parallel to the road surface, 3 in. above the road surface, and centered 4 in. away from the tire/pavement contact area on the trailing edge of the tire.

3.6.14. Repeat steps 3.6.3 - 3.6.11 until you have a total of 2 acceptable data recordings for the trailing edge, unless otherwise stated in the test plan.

3.6.15. Once all tests have been run, download the weather data from the weather station and verify that the environmental conditions have been within the allowed limits as defined by this procedure.

3.7. Post Calibration

3.7.1. Loosen the microphone probe from the bracket and carefully take it to the passenger seat.

3.7.2. Remove the windscreen from the microphone array.

3.7.3. Carefully unscrew nose cone 1 from microphone 1 and replace it with microphone cap 1.

3.7.4. Attach the calibration tone onto microphone 1.

3.7.5. Press *pause* and then *record* on the DAT.

3.7.6. Set the calibration tone to 94dB and press the on button.

3.7.7. While the calibration tone is being played into microphone 1 press the *pause* button on the DAT and press the “R” key on the keyboard simultaneously. Make sure to note the start time on the DAT.

3.7.8. After 30 seconds of data has been recorded press the *stop* button on the DAT and press the “S” key on the keyboard. Make sure to note the end time on the DAT.

3.7.9. In Audacity, click on File–>Export As Wav. Name the file XXXXsipostcal1.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

3.7.10. Close the sound file in Audacity by clicking on the “x” next to where it says “Audio Track.”

3.7.11. Advance the DSS tape on the DAT at least 10 seconds and then press *pause* and then *record* on the DAT.

3.7.12. Carefully unscrew nose cone 2 from microphone 2 and replace it with microphone cap 2.

3.7.13. Carefully place the calibration tone onto microphone 2.

3.7.14. Set the calibration tone to 94dB and press the *on* button.

3.7.15. While the calibration tone is being played into microphone 2 press the *pause* button on the DAT and press the "R" key on the keyboard simultaneously. Make sure to note the start time on the DAT.

3.7.16. After 30 seconds of data has been recorded press the *stop* button on the DAT and press the "S" key on the keyboard. Make sure to note the end time on the DAT.

3.7.17. In Audacity, click on File–>Export As Wav. Name the file XXXXsipostcal2.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

3.7.18. Remove the calibration tone from microphone 2.

4. Data Reporting

This section is incomplete; I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Vehicle operator
- Sound equipment operator
- Vehicle type (make, model, year, engine and transmission type)
- Tire type and tread level for all tires
- Tire pressure for all tires
- Vehicle speed
- Vehicle gear during testing
- Vehicle rpm during testing
- Any other notable vehicle conditions
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Sound equipment used (deviations from Section 1)
- Location of microphones
- Calibration data
- Noise floor data

APPENDIX F. IN-VEHICLE NOISE TEST PROCEDURE

1. Equipment list

- Test Vehicle – 2003 Buick Century, VIN: 2G4WS52J631121174
- Test Tires – Goodyear Aquatred 3, size P205/70/R15
- Microphones – G.R.A.S. Type 40AQ (ISU Microphone 1 - S/N: 41470 – front, ISU Microphone 2 - S/N: 38164 – rear)
- Preamps – G.R.A.S. Type 26AK (ISU Preamp 1 - S/N: 50860 – front, ISU Preamp 2 - S/N: 50859 – rear)
- Power Module – G.R.A.S. 12AA (ISU–1090 - S/N: 53571)
- Recording Instrument (DAT/Computer) – Sony TCDD100 (S/N: 541146), Dell Laptop (ISU-056) w/Docking Station (ISU-056-02) and M-Audio Delta 1010LT sound card (S/N: 110159), Audacity Software, OBD II ScanTool.
- Instrumentation Board – Transtec custom made
- Batteries – 2 Interstate Model 1055
- Inverter – Samlex 600W Pure Sine Wave Inverter (ISU-1140)
- RTA – Larson Davis 3000+ (S/N: 0165), Transtec Sound Analysis Software
- Calibration Tone – Larson Davis CAL200 (S/N: 3692)
- Microphone Simulator
- Cables: 2 LEMO Cables (ISU-1120 and ISU-1121)
- Weather Station – Transtec Cure-All Weather Station and Software
- Tape Measure
- Hand Level
- Vehicle Speed Detection Unit (radar gun/record from car)
- Tire Tread Depth Gauge

- Optical Triggering System – Culter-Hammer Optical Sensor (P/N: 14150AL17), ELK-960 Delay Timer, Reflective Targets

2. Equipment Specs

2.1. Test Vehicle

2.1.1. The test vehicle should be in good mechanical condition. Any foreign objects fixed to the outside of the car should be removed.

2.1.2. The interior of the test vehicle should be empty except for the equipment necessary to complete the test.

2.1.3. During testing, the air vents should be closed and the air conditioning in the vehicle should not be operating nor should any other nonessential device.

2.1.4. The test vehicle's tires should be in good condition and have at least 50% of their tread remaining. The tread should be free of any loose rocks, screws, nails, or other protrusions.

2.1.5. Speedometer should be calibrated to ± 1mph @60mph.

2.2. Sound Recording Equipment

2.2.1. Condenser type microphones should be used.

2.2.2. Preamplifiers should be compatible with the microphone and ideally selected as part of a vendor recommended microphone - preamplifier system.

2.2.3. Recording devices used must meet IEC 1265 and ANSI S1.13-1971 for frequency response and sound-to-noise ratio. The dynamic range or "hard overload point" must be 10 to 20 dB greater than the maximum sound pressure level that is expected to be measured.

2.2.4. If a sound level meter is to be used, it should perform a true numeric integration and averaging in accordance with ANSI S1.4-1983. Type 1 sound level meters are recommended. (Type 0 sound level meters are laboratory grade sound level meters and Type 1 are precision field grade)

2.2.5. In order for a 1/3 octave band analysis to be consistent with historical data, the filter used must comply with a type 1-D Butterworth filter as defined by ANSI S1.11-1986.

2.2.6. Calibration tone shall meet Type 1L performance requirements of IEC 942.

2.2.7. Overall system specs:

- Frequency range between 45 and 11200 Hz.

- A-weighted frequency weighting should be applied to the sound pressure level measurements.

- Input gain should be set to provide maximum dynamic range while avoiding overload.

- A fast exponential time-averaging should be used with a time constant of 0.125s.

2.3. Weather Station

2.3.1. For general purpose measurements, the wind measuring device that is of the wind-cup type is acceptable.

2.3.2. The temperature sensor used should have an accuracy of at least ± 2 °F and be fully shielded from direct solar radiation.

3. Test Site

3.1. Site Description

3.1.1. The site should have no large reflecting surfaces within 100 ft. of vehicle path.

3.1.2. Pavement should be dry and reasonably free of debris or gravel.

3.1.3. Ambient conditions should be at least 10 dB below the lowest anticipated measured maximum A-weighted sound pressure level measured inside the test vehicle.

3.1.4. The average measured wind speed should not be more than 12 mph.

3.2. Site Setup

3.2.1. Identify the test section and verify that it meets the requirements described in Section 3.1.

3.2.2. Mark off the beginning and end of the test section with the triggering targets such that the reflective tape is facing the vehicle path.

3.2.3. Setup the weather station at a height of 5 ft. in a safe area near the test section such that it will not affect the noise measurements that will be taken, and so that the measurements are reasonably representative of the conditions along the site.

3.2.4. Begin recording weather data in 1 minute intervals until all testing is complete.

3.2.5. Take photographs of the test section from various perspectives to allow for subsequent understanding of site conditions.

4. Procedure

4.1. Equipment Setup

4.1.1. Measure and record the tread depth of all four tires. This should be done for all four tread grooves and at the front and rear of the tire.

4.1.2. If any section of the tread is worn beyond 50% of the tread depth, the tire must be changed before proceeding.

4.1.3. Check that the cold tire pressure of all four tires is within 2 psi of the vehicle manufacturer's recommended tire pressure.

4.1.4. Attach the optical sensor to the bottom of the front bumper on the passenger side.

4.1.5. Plug in the sensor under the hood right above the battery.

4.1.6. Turn on the sensor by opening the ashtray inside the vehicle and moving the red toggle switch to the forward position.

4.1.7. Switch the white toggle switch to the backward position to turn on the in-vehicle trigger speaker.

4.1.8. Place the instrumentation board on the passenger seat.

4.1.9. Verify that the Gain settings for Channel A and B are set to *0* on the front panel of the power module. Place the power module that is set to work with prepolarized microphones, on the instrumentation board with the Velcro strips facing up and secure it with the Velcro straps.

4.1.10. Verify that the settings on the rear of the DAT are for recording at *48kHz (SP)*, *Manual* gain setting, *Line In*, and *0dB* Mic Att, and that the Rec Level on top is set at *10*. Place the DAT on top of the power module such that it is secured with the Velcro strips on the power module and back of the DAT.

4.1.11. Place two 12V batteries on the instrumentation board, plug them in, and secure them with the Velcro straps.

4.1.12. Connect the BNC cables on the instrumentation board labeled 1 and 2 to the power module connections labeled Out A and Out B, respectively.

4.1.13. Connect the 1/8" stereo jack on the instrumentation board to the *Mic/Line In* plug of the DAT.

4.1.14. Plug in the power cables on the instrumentation board into the power module and DAT making sure that the power switch on the power module is in the *off* position.

4.1.15. Insert a blank DSS tape into the DAT.

4.1.16. Set the time and date on the DAT by pressing and holding down the *Clock/Set* button on the DAT till the date begins to flash. Then use the +, -, and *Clock/Set* buttons to adjust the time and date. The time should be in local time and synchronized as close as possible to atomic time.

4.1.17. Place the laptop and docking station on the floor and plug the docking station into the inverter.

4.1.18. Plug a keyboard into the docking station and place it on the armrest.

4.1.19. Turn on the vehicle, the inverter, and then the computer.

4.1.20. Plug the two RCA cables from the instrumentation board into the RCA jacks labeled IN3 and IN4 on the sound card. The RCA cable on the instrumentation board with the pink sticker on it is channel 2 and should be plugged into the red RCA jack labeled IN4 and the remaining RCA jack should be plugged in to the white RCA jack labeled IN3.

4.1.21. Plug one end of the OBD II ScanTool into the laptop's serial port and the other end into the vehicle's OBD II port below the steering column.

4.1.22. Adjust the driver's seat such that the back rest is fully upright, the head rest is in its middle position, and the seat itself is in the middle position of the horizontal range of adjustment.

4.1.23. Attach the front microphone clamp to the right head rest support on the driver's seat as shown in Figure F.1.

Figure F.1. Front microphone clamp

4.1.24. Attach the rear microphone clamp to the support post located behind the rear passenger side seat as shown in Figure F.2.

Figure F.2. Rear microphone clamp

4.1.25. Place ISU Preamplifier 1 into the front microphone clamp and secure it with the setscrew.

4.1.26. Connect the LEMO cable, ISU-1120, to the back of ISU Preamplifier 1 and connect the other end to the *In A* connection on the power module.

4.1.27. Place ISU Preamplifier 2 into the rear microphone clamp and secure it with the setscrew.

4.1.28. Connect the LEMO cable, ISU-1121, to the back of ISU Preamplifier 2 and connect the other end to the *In B* connection on the power module.

4.1.29. Remove the yellow cap on ISU Preamplifier 1 and replace it with ISU Microphone 1.

4.1.30. Adjust the microphone clamp on the driver's side so that the microphone will be pointing in the direction of travel and parallel to the road surface. Use the hand level to verify that the microphone is level to the road surface. Also adjust the clamp such that the microphone is positioned vertically 28 in. ± 2 in. above the intersection of the seat, and horizontally 8 in ± 1 in. to the right from the middle plane of the seat as shown in Figure F.3.

4.1.31. Remove the yellow cap on ISU Preamplifier 2 and replace it with ISU Microphone 2.

4.1.32. Adjust the microphone clamp located behind the rear passenger seat so that the microphone will be pointing in the direction of travel and parallel to the road surface. Use the hand level to verify that the microphone is level to the road surface. Also adjust the clamp such that the microphone is positioned vertically 28 in. ± 2 in. above the intersection of the seat, and horizontally in line with the middle plane of the seat ± 1 in. as shown in Figure F.3.

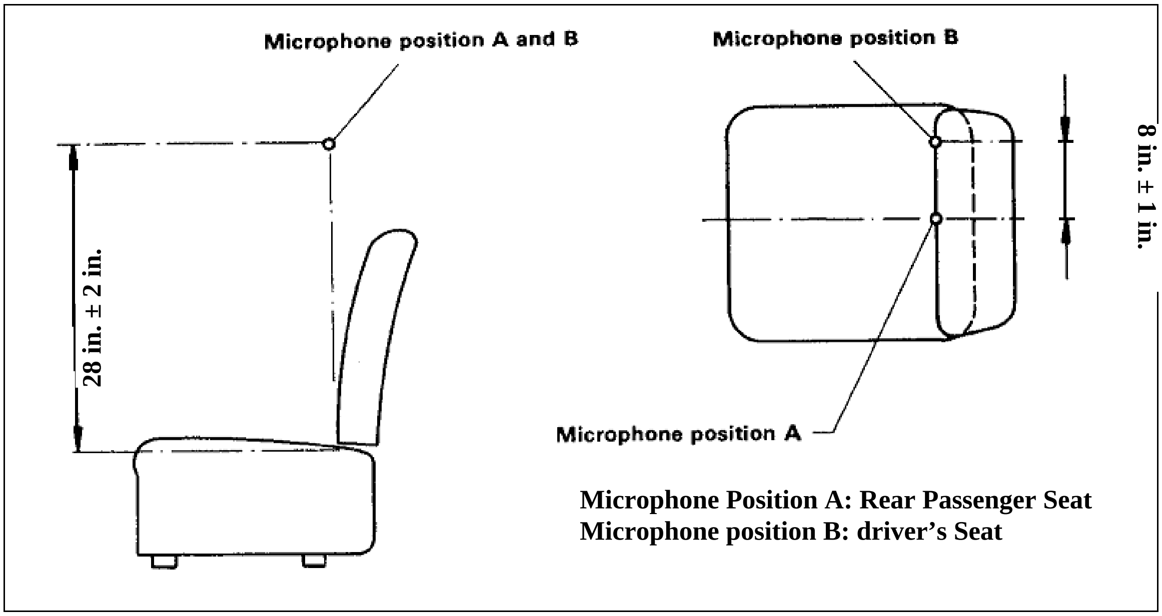


Figure F.3. Microphone positions

4.2. Pre-Calibration

4.2.1. Turn on the power module and wait one minute for it to warm up.

4.2.2. Attach the calibration tone to ISU Microphone 1, driver's seat location.

4.2.3. Open Audacity on the laptop computer.

4.2.4. Press the *paus*e and then the *record* button on the DAT.

4.2.5. Set the calibration tone to 94dB and press the *On* button.

4.2.6. While the calibration tone is being played into microphone 1, press the *pause button* on the DAT and press the *R* key on the keyboard simultaneously. Make sure to note the start time on the DAT. While recording, keep all background noise levels to a minimum.

4.2.7. After 30 seconds of data has been recorded, press the *stop* button on the DAT and press the "S" key on the keyboard. Make sure to note the end time on the DAT.

4.2.8. In Audacity, click on File–>Export As Wav. Name the file XXXXintprecal1.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.2.9. Close the sound file in Audacity by clicking on the "x" next to where it says "Audio Track."

4.2.10. Advance the DSS tape by pressing *play* and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.2.11. Remove the calibration tone from ISU Microphone 1 and attach it to ISU Microphone 2, rear seat position.

4.2.12. Set the calibration tone to 94dB and press the *On* button.

4.2.13. While the calibration tone is being played into microphone 2, press the *record* and *play* buttons on the DAT and press the *R* key on the keyboard simultaneously. Make sure to note the start time on the DAT. While recording keep all noise levels to a minimum.

4.2.14. After 30 seconds of data has been recorded, press the *stop* button on the DAT and press the *S* key on the keyboard. Make sure to note the end time on the DAT.

4.2.15. In Audacity, click on File–>Export As Wav. Name the file XXXXintprecal2.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.2.16. Advance the DSS tape by pressing *play* and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.2.17. Remove the calibration tone from microphone 2.

4.2.18. The electronic noise floor of the system should be established at the beginning of each test session. This is done by grounding the microphone leads with a capacitor of the same capacitance as that of the microphone, and recording and listening to the signal for at least 30 seconds. Any noise detected that is not at least 40dB below the expected maximum level of the noise source being measured shall be noted and corrected. Any such noise can usually be eliminated by checking the instrumentation connections and/or by re-orienting the instrumentation.

4.2.19. With the vehicle idling and with no passing traffic, record the ambient noise levels by pressing the *R* key on the keyboard and the *record* and *play* buttons on the DAT. Be sure to note the time on the DAT. Once the data recording have started make sure that you are as quiet as possible and that all unnecessary noise sources are turned off. This includes but is not limited to the air conditioning, radio, and inverter.

4.2.20. After 10 seconds of ambient noise has been recorded, stop recording data by pressing the *S* key on the keyboard and the *stop* button on the DAT. Be sure to note the time on the DAT.

4.2.21. In Audacity, click on File–>Export As Wav. Name the file XXXXintBN.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.2.22. Advance the DSS tape by pressing *play* and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.2.23. The vehicle speed measuring device should also be calibrated (procedures depend on type of measurement).

4.3. Test Measurements

4.3.1. During testing, only the driver should be present inside the vehicle.

4.3.2. Immediately before running a test warm up the test vehicle by driving it for at least 5 miles at 55 mph.

4.3.3. Immediately before beginning a test run open the OBD II Logger program.

4.3.4. Before accelerating and reaching the beginning of the test section, begin recording data by pressing the *R* key on the keyboard and by pressing the *record* and *play* buttons on the DAT. Be sure to note the time on the DAT. Once the data recordings have started make sure that you are as quiet as possible and that all unnecessary noise sources are turned off. This includes but is not limited to the air conditioning, radio, and inverter.

4.3.5. Bring the test vehicle up a test speed of 60 mph and set the cruise control.

4.3.6. As you pass the start of the test section, check that the LED on the dash has flashed. If the LED has not flashed, abort the test run and adjust the triggering system.

4.3.7. Maintain the test speed and keep the vehicle riding in the center of the lane.

4.3.8. If during the test you cannot maintain the test speed because of traffic, large amounts of passing traffic, or unusually loud passing traffic, abort the test run and begin again.

4.3.9. As you pass the end of the test section, check that the LED on the dash has flashed. If the LED has not flashed, abort the test run and adjust the triggering system.

4.3.10. If the speaker has been triggered, stop the data recordings by pressing the *S* key on the keyboard and by pressing the stop button on the DAT. Be sure to note the time on the DAT.

4.3.11. In Audacity, click on File–>Export As Wav. Name the file XXXXint##.wav (where XXXX is the Test ID and ## is the test number) and save the file in the appropriate folder.

4.3.12. Advance the DSS tape by pressing play and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.3.13. Repeat steps 4.3.5 - 4.3.12 as specified in the test plan.

4.3.14. Once you have three acceptable test runs completed, check the overall (L_{eq}) for both measurement. If the measurements are not within 3 dB of each other continue making runs until you are able to record three consecutive runs that fall within a 3 dB range of each other.

4.3.15. Once all tests have been run, download the weather data from the weather station and verify that the environmental conditions have been within specification throughout the test period.

4.4. Post Calibration

4.4.1. Attach the calibration tone to ISU Microphone 1, driver's seat location.

4.4.2. Open Audacity on the laptop computer and press pause and then record on the DAT.

4.4.3. Set the calibration tone to 94dB and press the on button.

4.4.4. While the calibration tone is being played into microphone 1 press the pause button on the DAT and click on the record button in Audacity (or press the "R" key on the keyboard) simultaneously. Make sure to note the start time on the DAT. While recording keep all noise levels to a minimum.

4.4.5. After 30 seconds of data has been recorded press the stop button on the DAT and click on the stop button in Audacity (or press the "S" key on the keyboard). Make sure to note the end time on the DAT.

4.4.6. In Audacity, click on File–>Export As Wav. Name the file XXXXintpostcal1.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.4.7. Close the sound file in Audacity by clicking on the "x" next to where it says "Audio Track"

4.4.8. Remove the calibration tone from ISU Microphone 1 and attach it to ISU Microphone 2, rear seat.

4.4.9. Set the calibration tone to 94dB and press the on button.

4.4.10. While the calibration tone is being played into microphone 2 press the pause button on the DAT and click on the record button in Audacity (or press the "R" key on the keyboard) simultaneously. Make sure to note the start time on the DAT. While recording keep all noise levels to a minimum.

4.4.11. After 30 seconds of data has been recorded press the stop button on the DAT and click on the stop button in Audacity (or press the "S" key on the keyboard). Make sure to note the end time on the DAT.

4.4.12. In Audacity, click on File–>Export As Wav. Name the file XXXXintpostcal2.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.4.13. Remove calibration tone from ISU Microphone 2.

5. Data Reporting

This section is incomplete; I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Vehicle operator
- Sound equipment operator
- Vehicle type (make, model, year, engine and transmission type)
- Tire type and tread level for all tires
- Tire pressure for all tires
- Vehicle speed
- Vehicle gear during testing
- Vehicle rpm during testing
- Any other notable vehicle conditions
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Sound equipment used (deviations from Section 1)
- Location of microphones
- Calibration data
- Noise floor data
- Ambient noise level
- Frequency response
- Any other notable events or special conditions
- Maximum, A-weighted sound-pressure level with fast exponential time-averaging (L_{max}). Reporting of spectral data is also recommended.

APPENDIX G. CONTROLLED PASS-BY TEST PROCEDURE

1. Equipment list

- Test Vehicle – 2003 Buick Century, VIN: 2G4WS52J631121174
- Test Tires – Goodyear Aquatred 3, size P205/70/R15
- Microphones – G.R.A.S. Type 40AQ (ISU Microphone 3 - S/N: 48233)
- Preamps – G.R.A.S. Type 26AK (ISU Preamp 3 - S/N: 50861)
- Power Module – G.R.A.S. 12AA (ISU–1090 - S/N: 53571)
- Windscreen
- Recording Instrument (DAT/Computer) – Sony TCDD100 (S/N: 541146), Dell Laptop (ISU-056) w/Docking Station (ISU-056-02) and M-Audio Delta 1010LT sound card (S/N: 110159), Audacity Software, OBD II ScanTool.
- Instrumentation Board – Transtec custom made.
- Batteries – 2 Interstate Model 1055
- RTA – Larson Davis 3000+ (S/N: 0165), Transtec Sound Analysis Software
- Calibration Tone – Larson Davis CAL200 (S/N: 3692)
- Microphone simulator
- Cable: 1 LEMO Cable (ISU-1122)
- Weather Station – Transtec Cure-All Weather Station and Software
- Tripod with microphone adapter bracket
- Leveling rod
- Monocular optical level
- Tape measure
- Hand level
- Radar gun

- 2-Way radios
- Traffic cones
- Folding table

2. Equipment Specs

2.1. Test Vehicle

2.1.1. The test vehicle should be in good mechanical condition. Any foreign objects fixed to the outside of the car should be removed.

2.1.2. During testing the air conditioning in the vehicle should not be operating nor should any other nonessential device.

2.1.3. The test vehicle tires should be in good condition and have at least 50% of tread remaining. The tread should be free of any loose rocks, screws, nails, or other protrusions.

2.1.4. Speedometer should be calibrated to +/- 1mph @60mph.

2.2. Sound Recording Equipment

2.2.1. Condenser type microphones should be used. If the microphones flattest frequency response characteristics are in the normal incidence position the manufactures published correction factors should be applied for a grazing incidence position. If none exist, testing must be done in accordance with ANSI S1.10-1986.

2.2.2. Preamplifiers should be compatible with the microphone and ideally selected as part of vendor recommended microphone/preamplifier system.

2.2.3. Recording devices used must meet IEC 1265 and ANSI S1.13-1971 for frequency response and sound-to-noise ratio. The dynamic range or “hard overload point” must be 10 to 20dB greater than the maximum sound pressure level that is expected to be measured.

2.2.4. If a sound level meter is to be used, it should perform a true numeric integration and averaging in accordance with ANSI S1.4-1983. Type 1 and 2 sound level meters are acceptable for Federal-aid highway projects. (Type 0 sound level meters are laboratory grade sound level meters and Type 1 are precision field grade)

2.2.5. In order for a 1/3 octave band analysis to be consistent with historical data, the filter used must comply with a type 1-D Butterworth filter as defined by ANSI S1.11-1986.

2.2.6. Calibration tone shall meet Type 1L performance requirements of IEC 942.

2.2.7. Windscreens should be clean, dry, and in good condition.

2.2.8. Overall System specs:

- Frequency range between 50Hz and 10kHz.
- A-weighted frequency weighting should be applied to the microphone signal.
- A fast exponential time-averaging should be used with a time constant of 0.125s.

2.3. Weather Station

2.3.1. For general purpose measurements, the wind measuring device that is of the wind-cup type is acceptable. For high precision or at measuring distances greater than 100 ft, a 3D type anemometer with a data logger should be used.

2.3.2. The temperature sensor used should have an accuracy of at least ±1°F and be fully shielded from direct solar radiation.

3. Test Site

3.1. Site Description

3.1.1. The site should have no large reflecting surfaces within 100 ft. of vehicle or recording instrumentation.

3.1.2. There should be an unobstructed arc of 150° from the microphones to the pavement.

3.1.3. Pavement should be dry and reasonably free of debris or gravel.

3.1.4. Ambient conditions should be at least 10dB below the lowest anticipated measured maximum A-weighted sound pressure level measured from the test vehicle.

3.1.5. The average measured wind speed should not be more than 12 mph.

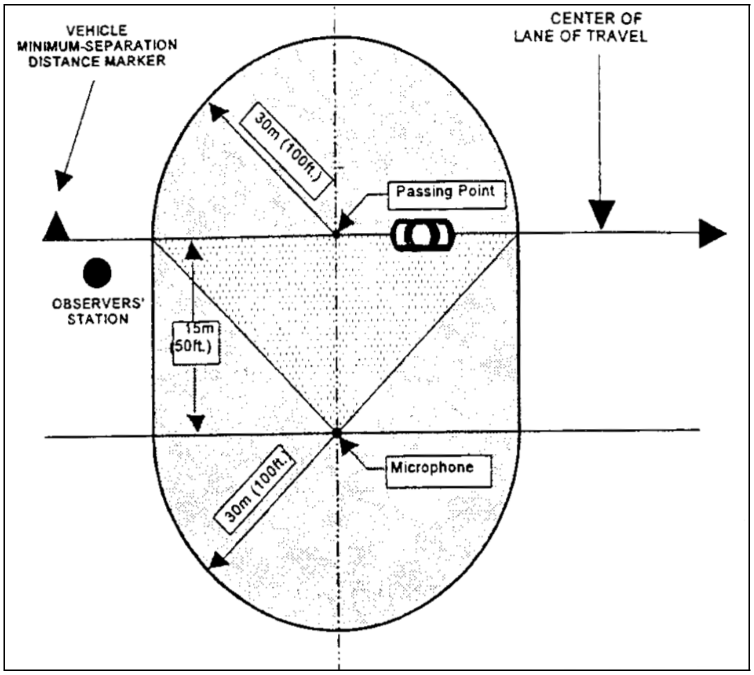


Figure G.1. Ideal site layout

3.2. Site Setup

3.2.1. Identify the test section and verify that it meets the requirements described in Section 3.1.

3.2.2. Mark the beginning of the test section, 400 ft. before the microphone, with a traffic cone.

3.2.3. Setup the weather station at a height of 5 ft. in a safe area that is representative of the ambient conditions of the test section such that it will not affect the noise measurements that will be taken.

3.2.4. Begin taking weather data in 1 minute intervals until all testing is complete.

3.2.5. Take pictures of the test section.

4. Procedure

4.1. Equipment Setup

4.1.1. Measure and record the tread depth of all four tires by placing a straight edge of known thickness across the width of the tire and then measuring the depth from the surface of the straight edge to the bottom of the tread. This should be done for all four tread grooves and at the front and rear of the tire.

4.1.2. If any section of the tread is worn beyond 50% of the tread depth, the tire must be changed before proceeding.

4.1.3. Check that the cold tire pressure of all four tires is within 2 psi of the vehicle manufacturer's recommend tire pressure.

4.1.4. Place the instrumentation board on top of the folding table.

4.1.5. Verify that the Gain setting for Channel A is set to *0* on the front panel of the power module. Place the power module on the instrumentation board with the Velcro strips facing up and secure it with the Velcro straps.

4.1.6. Verify that the settings on the rear of the DAT are for recording at *48kHz (SP)*, *Manual* gain setting, *Line In*, and *0dB* Mic Att, and that the Rec Level on top is set at *10*. Place the DAT on top of the power module such that it is secured with the Velcro strips on the power module and back of the DAT.

4.1.7. Place two 12V batteries (model 1055) on the instrumentation board, plug them in, and secure them with the Velcro straps.

4.1.8. Connect the BNC cables on the instrumentation board labeled 1 to the power module labeled Out A.

4.1.9. Connect the 1/8" stereo jack on the instrumentation board to the Mic/Line In plug of the DAT.

4.1.10. Plug in the power cables on the instrumentation board into the power module and DAT making sure that the power switch on the power module is in the off position.

4.1.11. Insert a blank DDS tape into the DAT.

4.1.12. Set the time and date on the DAT by pressing and holding down the *Clock/Set* button on the DAT till the date begins to flash. Then use the +, -, and *Clock/Set* buttons to adjust the time and date. The time should be in local time and synchronized as close as possible to atomic time.

4.1.13. Take the laptop and docking station to the car and plug the docking station into the inverter.

4.1.14. Turn on the vehicle, the inverter, and then the computer.

4.1.15. Once the laptop has booted up, unplug the docking station from the inverter and carefully take the laptop and docking station to the folding table. Note: you will only have about 2 hours of battery life once you unplug the docking station from the inverter. If you need to replace the battery you will have to shut the computer down, change the battery, and then plug the docking station back into the inverter to start it up again.

4.1.16. Set the time on the computer to match the DAT.

4.1.17. Plug the RCA cable on the instrumentation board without the pink sticker on it to the RCA cable labeled IN3 on the soundcard.

4.1.18. Connect the LEMO cable to the preamp.

4.1.19. Carefully secure the preamp the microphone pole with the small piece of aluminum angle and two U-bolts. Make sure that the top of the preamp extend past the top of the pole as shown in Figure G.2.

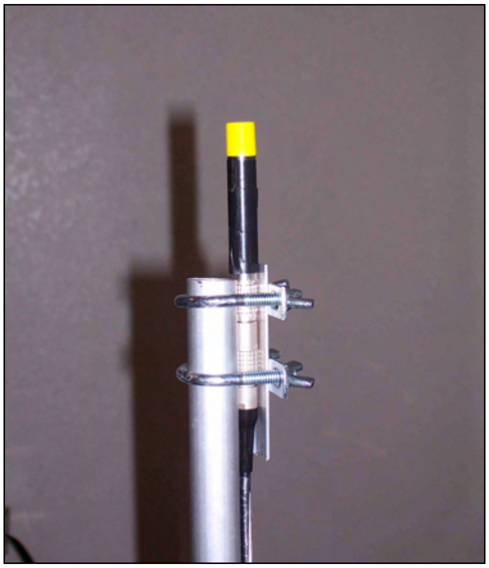


Figure G.2. Preamp attached to microphone pole

4.1.20. Remove the yellow cap from the preamp, carefully screw on the microphone, and place the windscreen over the microphone.

4.1.21. Place the base of the microphone pole on the tripod and use the mounting screw on the tripod to secure it as seen in Figure G.3.

Figure G.3. Complete tripod assembly

4.1.22. Locate the tripod assembly 50 ft. from the center of the near travel lane and use the hand level to adjust the microphone so that it is pointing perpendicular to the source, pointing upwards.

4.1.23. Adjust the height of the microphone such that it is 5 ft. above the pavement surface as seen in Figure G.4. This can be done by having someone standing on the pavement surface use a monocular optical level set at 5 ft. to see how much the microphone needs to be raised of lowered. The microphone should also be positioned such that it is behind the tripod (farthest from the noise source) and it should be isolated from the tripod by encapsulating it in a nonconductive material.

4.1.24. The operator and folding table should be located at least 25 ft. from the microphone(s) to ensure the operator does not introduce any noise into the measurement.

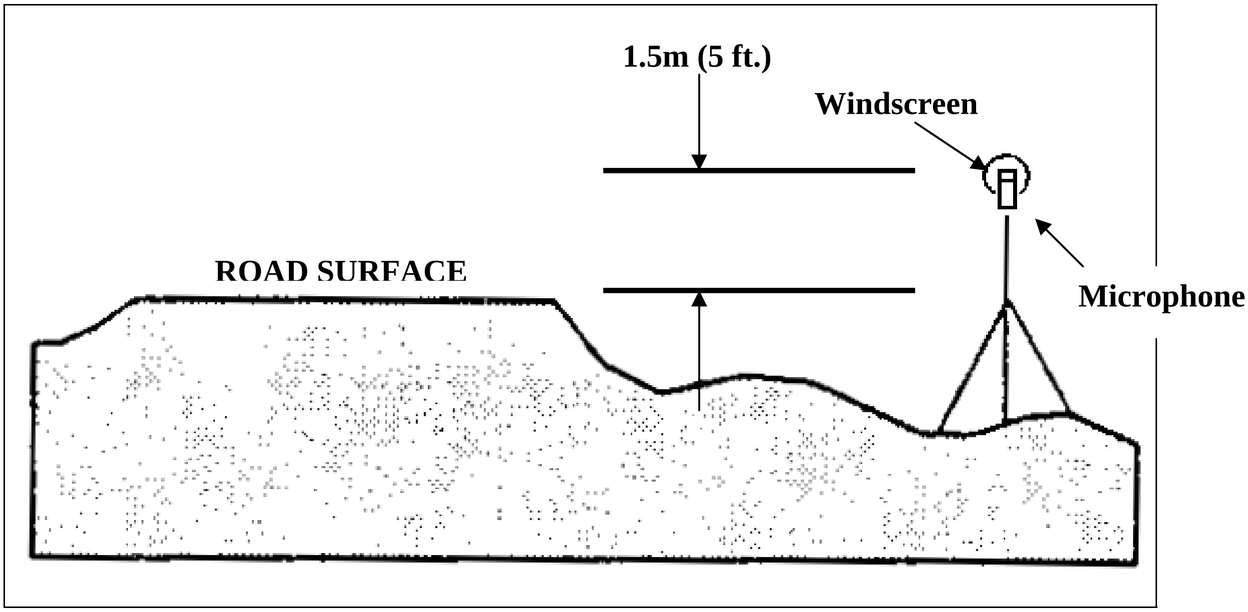


Figure G.4. Microphone position

4.2. Pre-Calibration

4.2.1. Turn on the power module and wait one minute for it to warm up.

4.2.2. Attach the calibration tone to the microphone.

4.2.3. Open Audacity on the laptop computer.

4.2.4. Press the *Pause* and then the *Record* button on the DAT.

4.2.5. Set the calibration tone to 94dB and press the *On* button.

4.2.6. While the calibration tone is being played into the microphone, press the *Pause* button on the DAT and press the *R* key on the keyboard simultaneously. Make sure to note the start time on the DAT. While recording, keep all noise levels to a minimum.

4.2.7. After 30 seconds of data has been recorded, press the stop button on the DAT and press the “S” key on the keyboard. Make sure to note the end time on the DAT.

4.2.8. In Audacity, click on File–>Export As Wav. Name the file XXXXcpbprecal1.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.2.9. Close the sound file in Audacity by clicking on the “x” next to where it says “Audio Track.”

4.2.10. Advance the DDS tape by pressing *Play* and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.2.11. The electronic noise floor of the system should be established at the beginning of each test session. This is done by grounding the microphone leads with a capacitor with the same capacitance as that of the microphone and recording and listening to the signal for at least 30 seconds. Any noise detected that is not at least 40dB below the expected maximum level of the noise source being measured shall be noted and corrected. Any such noise can usually be eliminated by checking the instrumentation connections and/or by re-orienting the instrumentation.

4.2.12. With no passing traffic, record the ambient noise levels by pressing the *R* key on the keyboard and the *Record* and *Play* buttons on the DAT. Be sure to note the time on the DAT.

4.2.13. After 10 seconds of ambient noise has been recorded, stop recording data by pressing the *S* key on the keyboard and the *Stop* button on the DAT. Be sure to note the time on the DAT.

4.2.14. In Audacity, click on File–>Export As Wav. Name the file XXXXcpbBN.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

4.2.15. Advance the DDS tape by pressing play and letting the DAT play for 10 or more seconds so that there is a distinct break in between each data recording.

4.2.16. The vehicle speed measuring device should also be calibrated (procedures depend on type of measurement).

4.3. Test Measurements

4.3.1. Vehicle operator should bring the vehicle to the test speed (60 mph +/-2 mph) and should maintain a distance of at least 400 ft. from the any other vehicles.

4.3.2. When approaching the test area, the vehicle operator will signal the data collector through a 2-way radio.

4.3.3. The data collector will begin recording data by pressing the *Record* and *Play* buttons on the DAT and by pressing the *R* key on the keyboard, when the test vehicle is 400 ft. from the microphone and no other vehicle is in the test section.

4.3.4. The data collector should stop the recording by pressing the *Stop* button on the DAT and by pressing the *S* key on the keyboard, after the vehicle has passed the microphone but before the next vehicle enters the test section.

4.3.5. In Audacity, click on File–>Export As Wav. Name the file XXXXcpb##.wav (where XXXX is the Test ID and ## is the test number) and save the file in the appropriate folder.

4.3.6. Repeat steps 4.3.1-4.3.5 until there are 3 acceptable runs.

4.4. Post Calibration

4.4.1. Attach the calibration tone to the microphone.

4.4.2. Press the *Pause* and then the *Record* button on the DAT.

4.4.3. Set the calibration tone to 94dB and press the *On* button.

4.4.4. While the calibration tone is being played into the microphone, press the *Pause* button on the DAT and press the "*R*" key on the keyboard simultaneously. Make sure to note the start time on the DAT. While re-cording, keep all noise levels to a minimum.

4.4.5. After 30 seconds of data has been recorded, press the *Stop* button on the DAT and press the "*S*" key on the keyboard. Make sure to note the end time on the DAT.

4.4.6. In Audacity, click on File–>Export As Wav. Name the file XXXXcpbpostcal.wav (where XXXX is the Test ID) and save the file in the appropriate folder.

5. Data Analysis

The beginning and ending calibrations should be within 1dB. If the calibration measurements differ by more than 1dB, the previously collected data is not to be used. However if the calibration measurements are within 1dB of each other, a calibration adjustment factor calculated with the equation below is to be added to the collected data.

$$Cal_{Adj} = REF - \frac{(Cal_{\text{int}} - Cal_{final})}{2}$$

If calibrations differ by more than 1dB, the data is no good.

Correct the measured data for the type of windscreens used, grazing incidence factors, and the Cal_{Adj} factor.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Vehicle operator
- Sound equipment operator
- Vehicle type (make, model, year, engine and transmission type)
- Tire type and tread level for all tires
- Tire pressure for all tires
- Vehicle speed
- Vehicle gear during testing
- Vehicle rpm during testing

- Any other notable vehicle conditions
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Sound equipment used (Section 1 above)
- Calibration data
- Noise floor data
- Ambient noise level
- Frequency response
- Any other notable events or special conditions
- Max, A-weighted sound-pressure level with fast exponential time-averaging (L_{AFmax}). Reporting of spectral data is also recommended.

APPENDIX H. ROBOTEX TEST PROCEDURE

1. Equipment list

- LMI Selcom line laser
- RoboTex chassis
- Robot remote control
- Transtec RoboTex Laptop

2. Site Description

2.1. Site should be dry, clean, and reasonably free of loose debris and other contaminants.

3. Procedure

3.1. Equipment Setup

3.1.1. Carefully place the laser into the laser bracket on the robot making sure that the end of the laser with the cable connectors is flush with the rear most mounting post, as shown in Figure H.1.

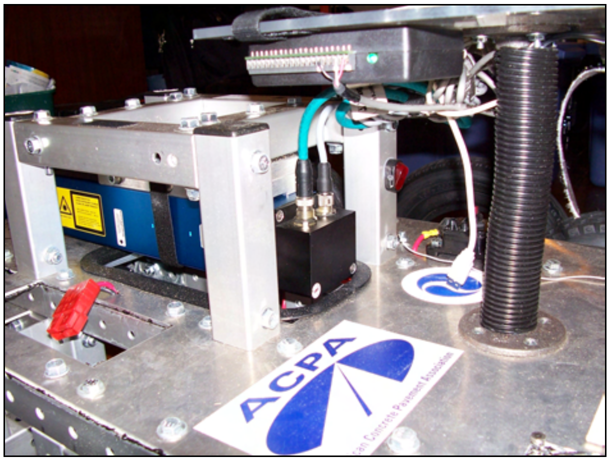


Figure H.1. Laser mounted on robot

3.1.2. To secure the laser to the bracket tighten the center socket head cap screw shown in Figure H.2. As an added measure secure the laser to the bracket with a velcro strap.

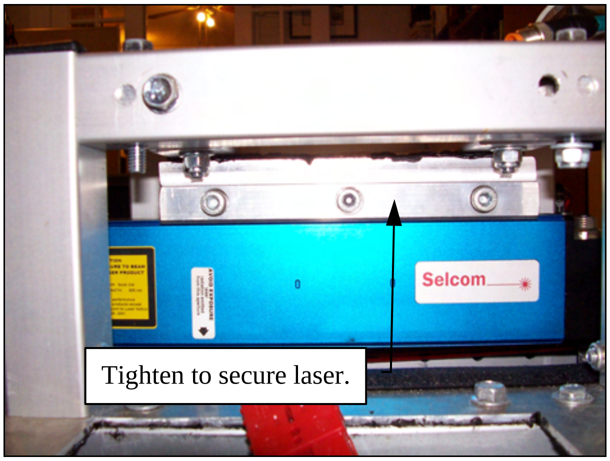


Figure H.2. Laser mounting bracket

3.1.3. Carefully attach the power cable (grey) and the data cable (green) from the robot to the laser.

3.1.4. Place the GPS unit on the robot with the velcro strap located next to the laser mounting bracket.

3.1.5. Verify that the wiring on the DAQ is as follows: Ch. 15 = black, Ch. 18 = white, and Ch. 2 = Red.

3.1.6. Place the Transtec laptop on the robot and secure it with two velcro straps.

3.1.7. Make the following connections to the laptop: the USB cable (white) from the DAQ, the USB cable (black) from the GPS unit, the white serial cable from the robot, the power cord from the robot, and the ethernet cable from the laser. The finished connections should look like those in Figure H.3.

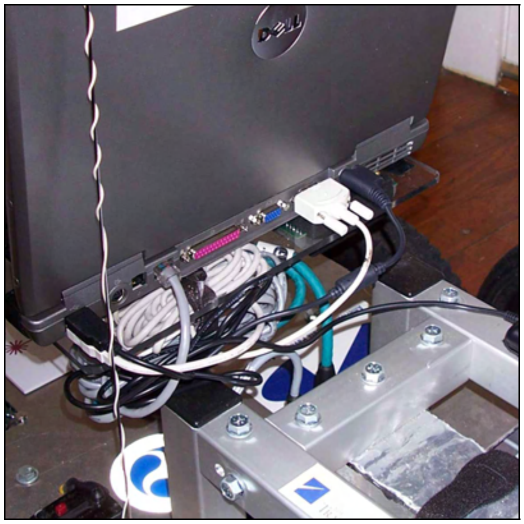


Figure H.3. Laptop connections

3.1.8. Turn on the laptop and verify that the network settings on the laptop are as follows: IP address: 192.168.1.199, Subnet: 255.255.255.0, Gateway: 192.168.0.1, and DSN: 192.168.0.1.

3.2. Pre-Calibration

3.2.1. Place the calibration surface on the pavement surface.

3.2.2. Place the four thickest feeler gauges (.026”, .025”, .024”, and .023”) on the calibration surface making sure that they lie completely flat on the surface.

3.2.3. Line up RoboTex with the calibration surface.

3.2.4. Turn on the controller and then turn on the robot with the large switch mounted horizontally on the robot and the laser with the small switch mounted vertically on the robot as shown in Figure H.4.

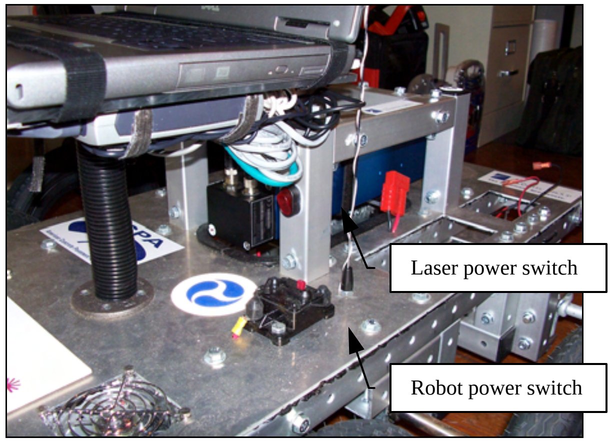


Figure H.4. Power switch locations

3.2.5. Start the RoboTex software and set the parameters as follows. Under the "Plot" tab, the *Autoscale* feature should be selected. Under the "Laser" tab, the settings should match those seen in Figure H.5. Under the "Other" tab, the Output folder should be C:\RoboTex Data\XXXX, where XXXX is the site ID, and the Laser, DMI, and GPS should all be enabled.

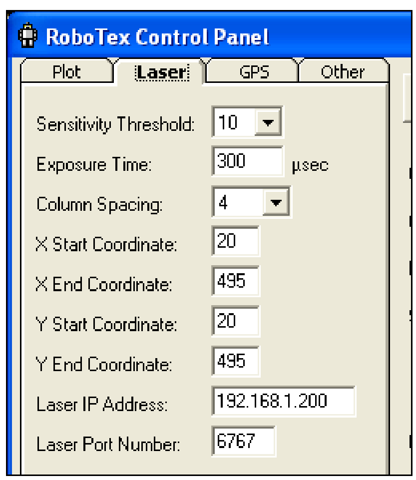


Figure H.5. Laser settings

3.2.6. Press the “Start” button in the RoboTex software to begin taking data. Be sure to note the filename for the calibration data.

3.2.7. Drive RoboTex over the calibration surface, making sure that the measurement taken includes the whole test section.

3.2.8. Once the RoboTex has passed the end of the calibration surface, stop RoboTex and Press the “Stop” button in the RoboTex software.

3.3. Test Measurements

3.3.1. Identify the beginning and end of the test section and mark it with a black strip.

3.3.2. Line up RoboTex three or more feet behind the test section of interest to allow it to reach full speed by the beginning of the test section.

3.3.3. Press the “Start” button in the RoboTex software to begin taking data. Be sure to note the filename.

3.3.4. Drive RoboTex over the test surface at full speed, making sure to follow the test path as closely as possible.

3.3.5. Once the end of the test section has been reached, stop RoboTex and press the “Stop” button in the RoboTex software.

3.4. Data Reporting

This section is incomplete; I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Equipment operator
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Calibration data

APPENDIX I. CIRCULAR TRACK/TEXTURE METER TEST PROCEDURE

1. Equipment list

- CTMeter and accessories (power cable and serial cable)
- CTMeter Calibration Surface
- Dell Laptop (ISU-056)
- Power Supply (vehicle or 12V Battery)

2. Site Description

2.1. The test surface shall be free of any loose particles.

2.2. Test surface should be representative of the test section and should not include any unique or localized features such as cracks or joints.

2.3. The test surface should be as horizontal as possible but leveling of the instrument can be done in cases where no horizontal surfaces are of interest.

3. Procedure

3.1. Equipment Setup

3.1.1. Unpack the CTM from its carrying case.

3.1.2. Connect the power cable to the CTM.

3.1.3. Connect the computer cable to the CTM.

3.1.4. Connect the battery/power source to the power cable from the CTM.

3.1.5. Connect the computer cable from the CTM to the Laptop.

3.2. Pre-Calibration

3.2.1. Unpack the calibration surface.

3.2.2. Place the CTM on top of the calibration surface making sure that the green and red dots on the CTM line up with the green and red dots on the calibration surface as shown in Figure I.1.

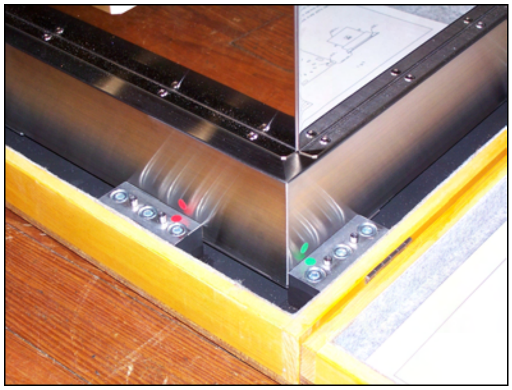


Figure I.1. CTM alignment on calibration surface

3.2.3. Turn the CTM power switch on.

3.2.4. Turn the M.SW switch on.

3.2.5. Open the CTM Software on the Laptop.

3.2.6. Click on the *CTMeter* button.

3.2.7. Click on the *Data View (F6)* button and make sure the Analysis Points is set to 1024.

3.2.8. Click on the *Menu* button.

3.2.9. Click on the *Measurement (F1)* button.

3.2.10. Click on the *(F2)* button.

3.2.11. Create a new file named XXXXCTMcal were XXXX is the test site ID.

3.2.12. Click on the *Measure (F3)* button to start receiving data from the CTM.

3.2.13. Push the green *Start* button on the CTM.

3.2.14. When the measurement is finished click on the *OK* button.

3.2.15. Click on the *Close* button to close the graph.

3.2.16. Click on *Save (F5)* button.

3.2.17. Click *OK* when it is done saving.

3.2.18. Repeat steps 3.2.12 thru 3.2.17 seven times or until there are 8 complete runs saved.

3.2.19. Click on the *Menu* button.

3.2.20. Click on the *Data View (F6)* button.

3.2.21. Click on the *Graph (F7)* button.

3.2.22. Compare the averages shown below the graph and make sure that each individual average is within ±0.05mm of the overall average and that the overall average is within the 5.68-5.78mm range. Figure I.2 shows which numbers to compare. If any of the two conditions are not met rerun the calibration. If after rerunning the calibration, both conditions are still not met, the CTMeter must be sent to the manufacture for re-calibration.

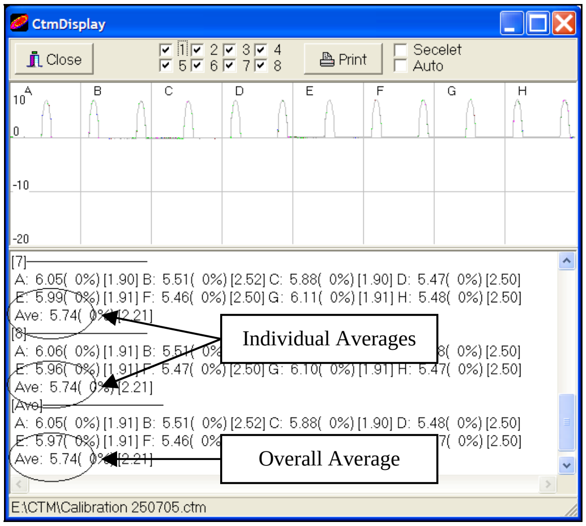


Figure I.2. Data to be compared

3.2.23. Click the *Close* button.

3.2.24. Click on the *Menu* button to return to the main menu.

3.2.25. Remove the CTM from the calibration surface.

3.2.26. Carefully pack up the calibration surface.

3.3. Test Measurements

3.3.1. Clean test surface so that any loose particles or contaminates are removed.

3.3.2. In the CTM Software click on the *Measurement (F1)* button.

3.3.3. Click on the *(F2)* button.

3.3.4. Create a new file named XXXXCTM## were XXXX is the test site ID and ## is the test number.

3.3.5. Click on the *Measure (F3)* button to start receiving data from the CTM.

3.3.6. Place the CTM on the test surface so that segments C and G are perpendicular to the direction of travel as shown in Figure I.3.

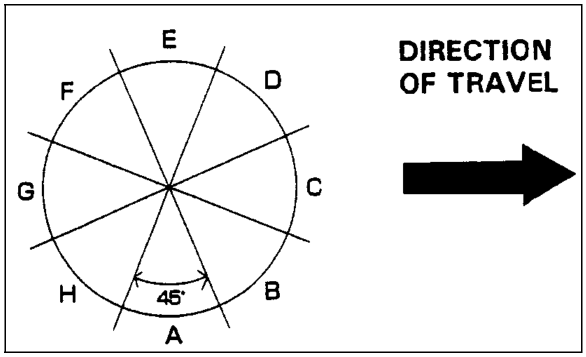


Figure I.3. Orientation of CTM

3.3.7. Press the green *Start* button to begin the test.

3.3.8. Once the test is complete, place the position marking guide on the ground flush against the front surface of the CTM and mark the pavement around it with chalk. Also mark the back surface of the CTM as shown in Figure I.4.

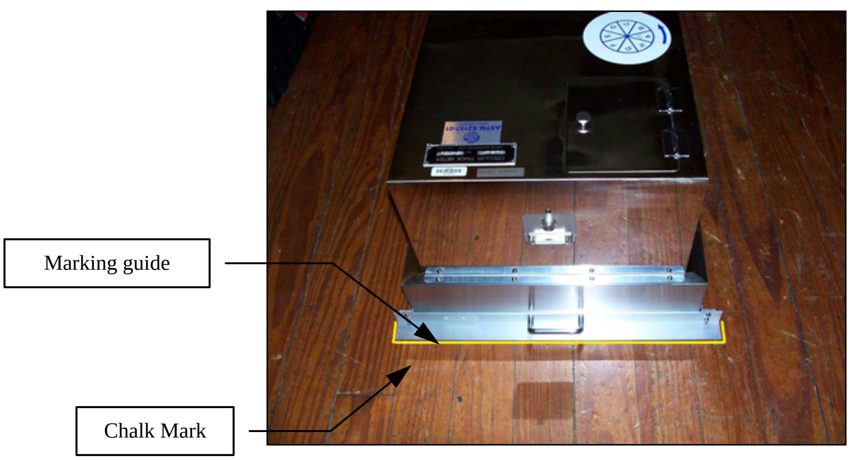


Figure I.4. Marking guide

3.3.9. Press *OK* in the laptop and then press the *Save (F5)* button.

3.3.10. Press the *Menu* button to return to the Main Menu.

3.3.11. Repeat steps 3.3.1 to 3.3.10 until all sections have been tested.

4. Data Reporting

This section is incomplete, I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Equipment operator
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Calibration data
- Values of MPD and RMS
- Plot of profile

APPENDIX J. SAND PATCH TEST PROCEDURE

1. Equipment list

- Glass beads – size shall be such that 90 % by weight passes a No.60 sieve and retained on a No. 80 sieve
- Plastic graduated cylinder with an internal volume of 1.90 in^3
- Hard rubber ice hockey puck
- Custom made wooden windscreen
- Standard 12 in. scale with 0.1 in. division
- 2 brushes – one stiff wire and one soft bristle

2. Site Description

2.1. The test surface shall be free of any loose particles.

2.2. Test surface should be representative of the test section of interest and should not include any unique or localized features such as cracks or joints.

3. Procedure

3.1. Site Setup

3.1.1. Inspect the surface to ensure that it meets the requirements stated in Section 2.

3.1.2. Clean the test surface with the stiff **wire** brush and subsequently the soft bristle brush to remove any loose contaminants.

3.1.3. Place the wind screen over the test section.

3.1.4. Fill the graduated cylinder to the top with glass beads and gently tap the bottom on a hard surface. Add more beads until the cylinder is completely full and level with a straight edge.

3.1.5. Carefully pour the glass beads onto the test surface.

3.1.6. Using the hockey puck, slowly spread the beads into a circular shape, filling in the surface voids flush with the particle tips.

3.1.7. Measure and record the diameter of the resulting circle at four equally spaced intervals. Note: for smooth surfaces where the diameter of the circle is greater than 12 in., use half the usual amount of beads.

3.1.8. Repeat steps 3.1.1 to 3.1.7 at least three times such that there are four measurements of the test sections at four randomly chosen sites, or as many times as required in the test plan.

3.2. Data Analysis

3.2.1. The average pavement macrotexture shall be calculated using the following formula:

$$MTD = \frac{4V}{\pi D^2}$$

where:

MTD	=	mean texture depth of pavement macrotexture, in.
V	=	sample volume, $in.^3$
D	=	average diameter of the area covered by the beads, in.

4. Data Reporting

This section is incomplete, I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Equipment operator
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Calibration data
- Value of MTD

APPENDIX K. DYNAMIC FRICTION TESTER TEST PROCEDURE

1. Equipment list

- Dynamic Friction Tester (DFT) and accessories (2-pronged power supply cable, 5-pronged data cable, 3-pronged power cable, serial cable, friction pads)
- DFT Controller
- Dell Laptop (ISU-056)
- Power Supply (vehicle or 12V Battery)

2. Site Description

2.1. The test surface shall be free of any loose particles.

2.2. Test surface should be representative of the test section and should not include any unique or localized features such as cracks or joints.

2.3. The test surface should be as horizontal as possible, but leveling of the instrument can be done in cases where no horizontal surfaces are of interest.

3. Procedure

3.1. Equipment Setup

3.1.1. Fill the water tank and place it 24 in. above the test surface.

3.1.2. Unpack DFT.

3.1.3. Check the pads on the DFT to ensure that they are in good condition. If the pads are worn replace them.

3.1.4. Connect water hose to tank and open the valve so that the tube becomes full of water and then close the valve. Connect the loose end of the hose to the DFT.

3.1.5. Connect the power (3-pronged) and data (5-pronged) cables to the Controller and the DFT.

3.1.6. Connect the serial cable to the Controller and the laptop.

3.1.7. Connect the power (2-pronged) cable to the Controller and the power source (vehicle or battery).

3.1.8. Turn the motor switch (M.SW.) on the DFT on.

3.1.9. Turn the Controller power on.

3.1.10. Open the valve on the water tank.

3.2. Test Measurements

3.2.1. Clean test surface so that any loose particles or contaminants are removed.

3.2.2. Start the DFT.exe program on the laptop.

3.2.3. Click on the *Measurement (F1)* button.

3.2.4. Click on the *(F2)* button.

3.2.5. Create a new file named XXXXDFT## were XXXX is the test site ID and ## is the test number.

3.2.6. Set the "Average run" to *1 run*.

3.2.7. Click on the *Start Measurement (F1)*

3.2.8. Make sure that the "Measurement mode" is set to *Automatic* and that the "Speed to start measurement" is set to *80 km/h*.

3.2.9. Click on the *Connection* button and within ten seconds push the *4.Remote Connection* button on the Controller.

3.2.10. Place the DFT on the test section. If CTM measurements were made on the same test surface, make sure to line up the DFT with the location marks from the CTM.

3.2.11. Click on the *Start* button in the software which should bring up a small window that displays the current speed of the DFT.

3.2.12. Press down on the *black lever* on the DFT and make sure that the water valve on the tank is open.

3.2.13. Once the measurement is complete, click on the *Confirm* button to save the data or press the *Re-Measurement* button to re-run the test.

3.2.14. Once the data has been confirmed press the *exit* button followed by the *previous screen* button.

3.2.15. Repeat steps 3.2.5 to 3.2.14 until all the test sections for the site are complete.

4. Data Reporting

This section is incomplete, I plan to make run sheets that will have spaces to fill in all the information listed below, but I also need to add what to do with the weather data and how to analyze the data and stuff like that.

Report the pertinent information:

- Test location (city, highway designation, MP or station, direction, lane)
- Test date and time (start and end)
- Equipment operator
- Ambient conditions (temp, wind speed, wind direction, relative humidity, barometric pressure)
- Calibration data
- Values of MPD and RMS
- Plot of profile

APPENDIX L. LOCATIONS OF TEST SECTIONS

Figure L.1. Test layout for site 101, IA (surfaces A through G)

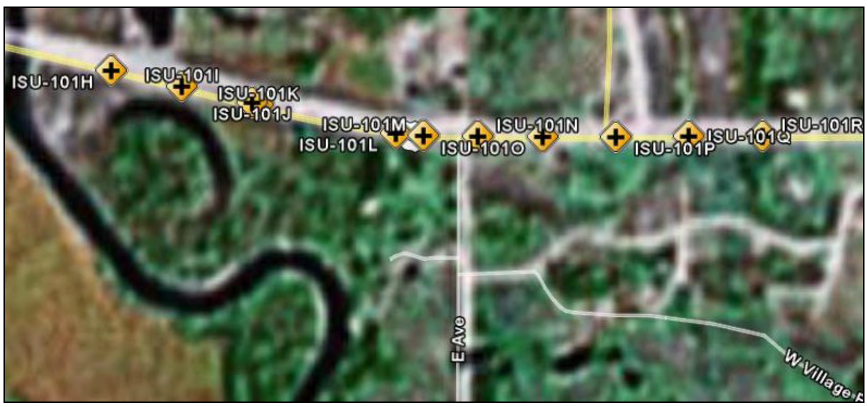


Figure L.2. Test layout for site 101, IA (surfaces H through R).

Figure L.3. Test layout for site 202, CO

Figure L.4. Test layout for site 203, GA

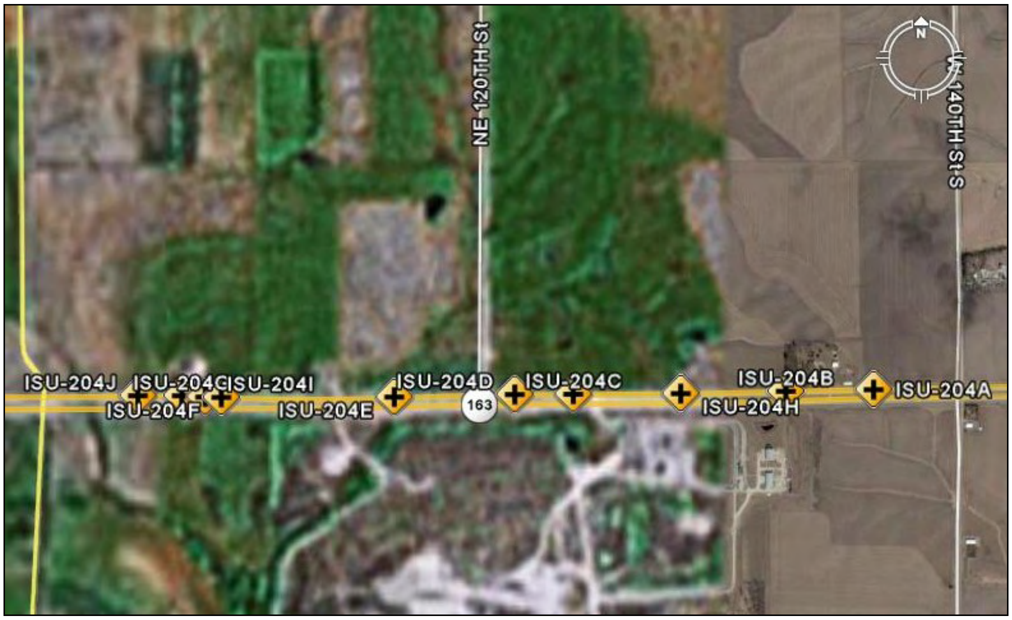


Figure L.5. Test layout for site 204, IA

Figure L.6. Test layout for site 205, KS

Figure L.7. Test layout for site 206, ND

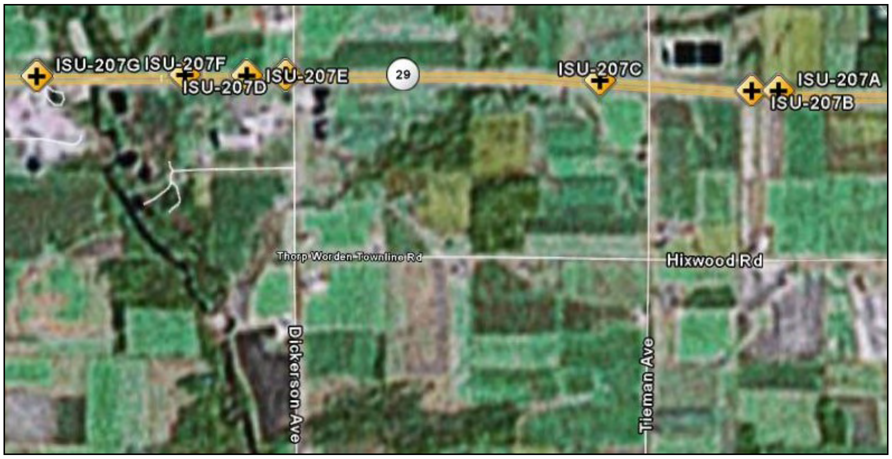


Figure L.8. Test layout for site 207, WI (surfaces A through G)

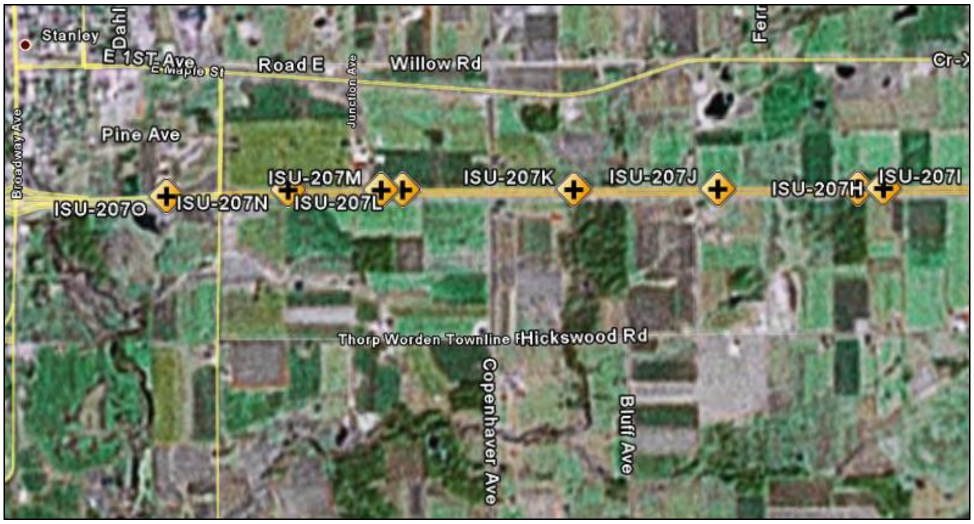


Figure L.9. Test layout for site 207, WI (surfaces H through O)

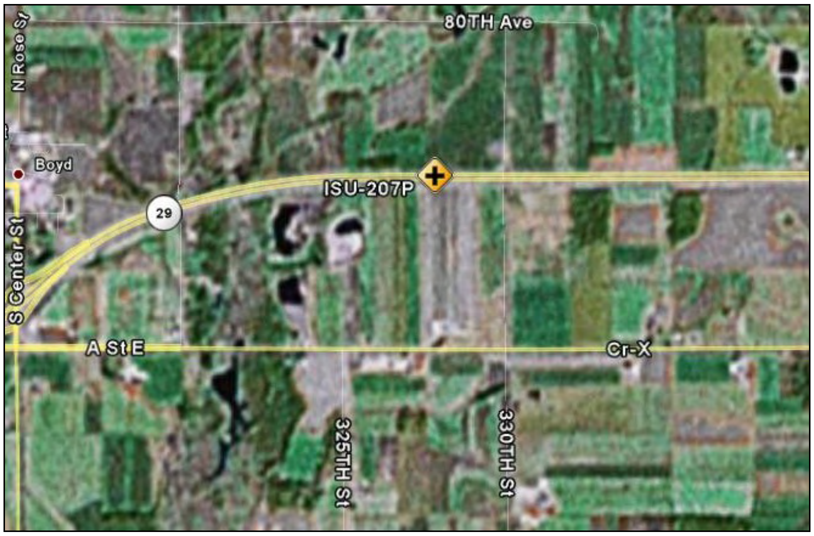


Figure L.10. Test layout for site 207, WI (surface P)

Figure L.11. Test layout for site 208, WI

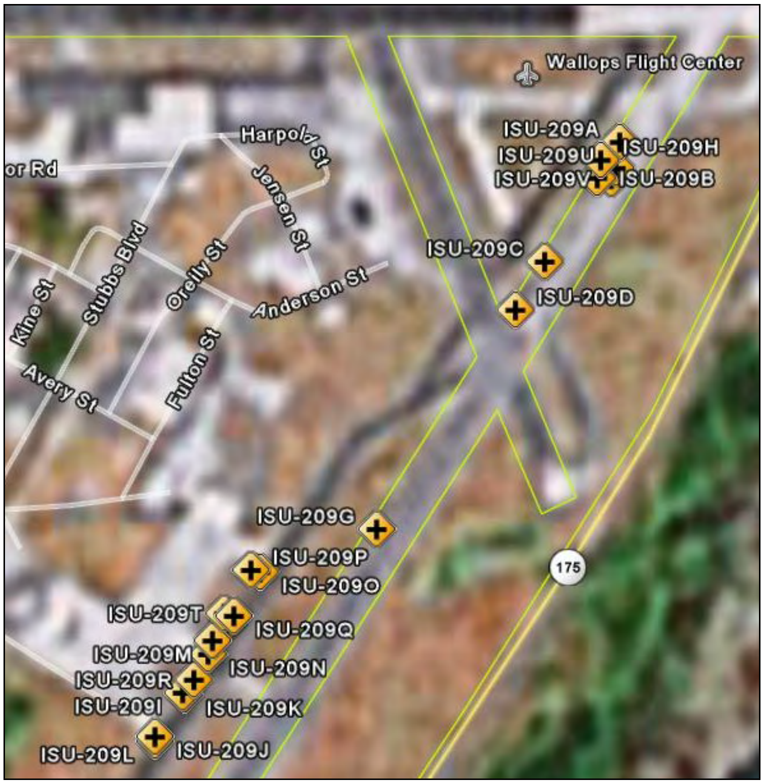


Figure L.12. Test layout for site 209, VA.

Figure L.13. Test layout for site 305, CO

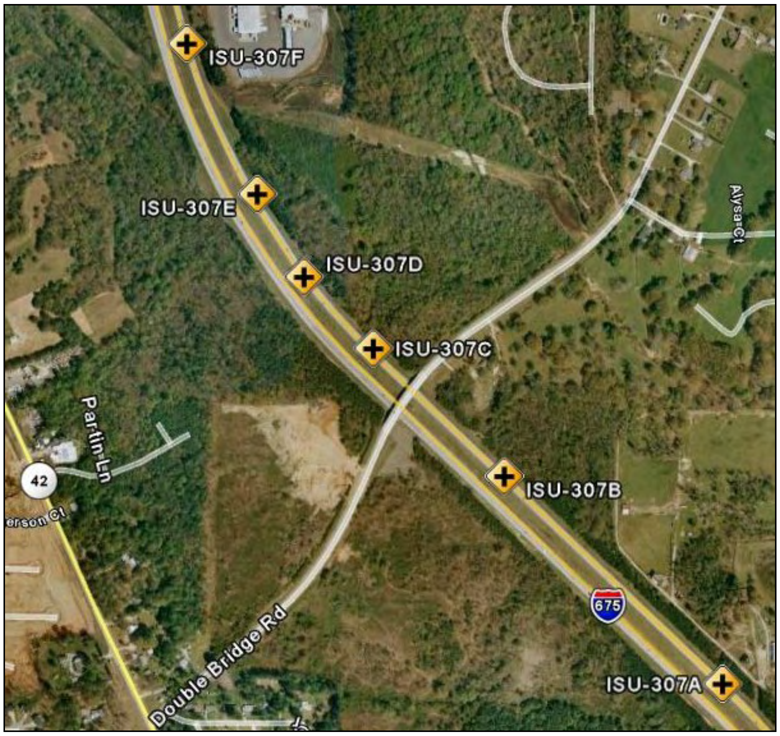


Figure L.14. Test lLayout for site 307, GA

Figure L.15. Test layout for site 309, IA

Figure L.16. Test layout for site 310, IA

Figure L.17. Test layout for site 311, IN

Figure L.18. Test layout for sSite 317, MI

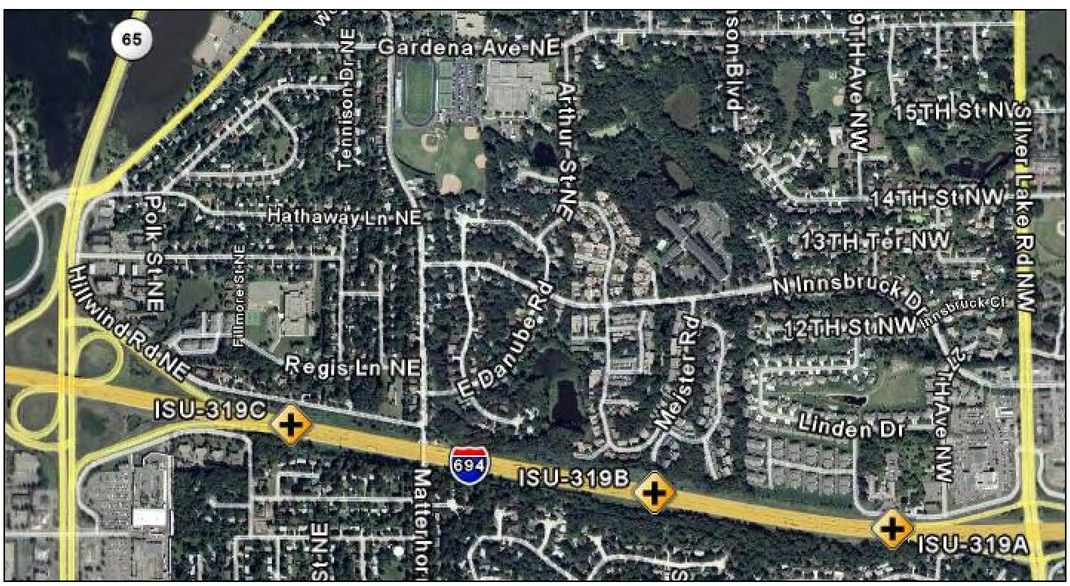


Figure L.19. Test layout for site 319, MN

Figure L.20. Test layout for site 320, MN

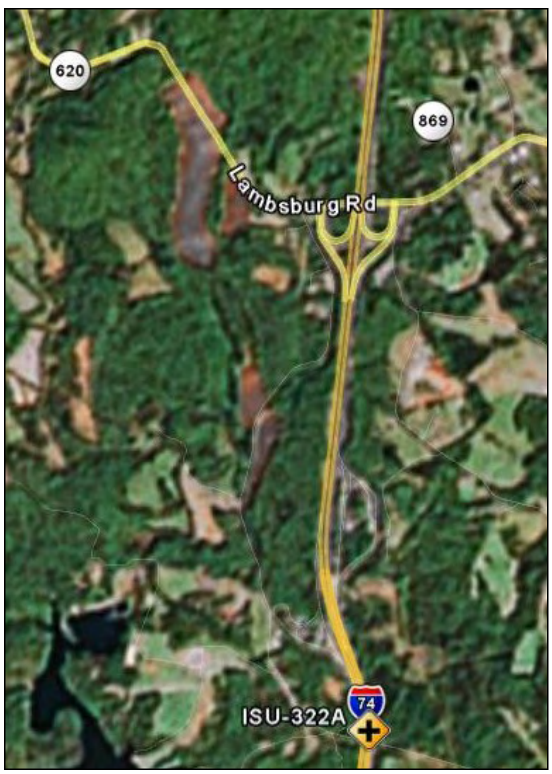


Figure L.21. Test layout for site 322, NC

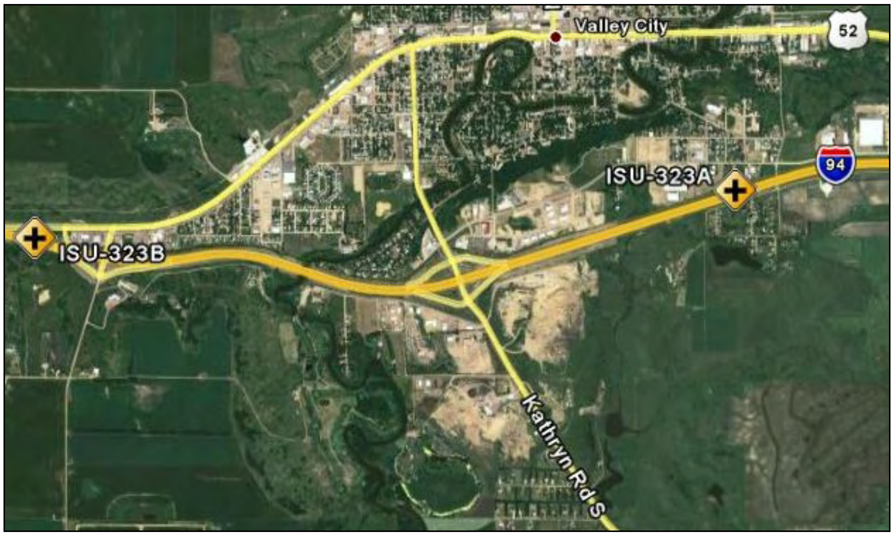


Figure L.22. Test layout for site 323, ND

Figure L.23. Test layout for site 324, MO

Figure L.24. Test layout for site 325, OH

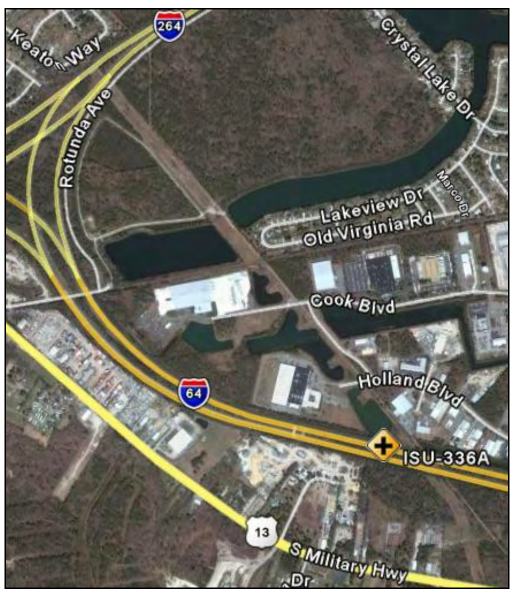


Figure L.25. Test layout for site 336, VA

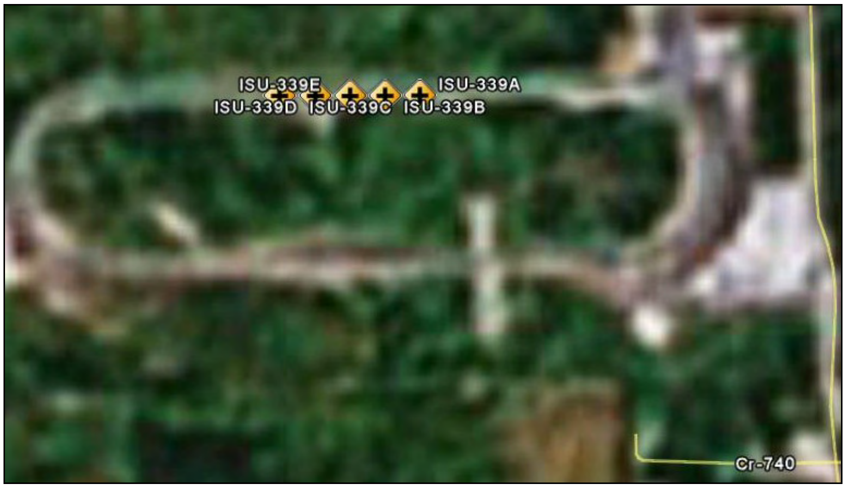


Figure L.26. Test layout for site 339, AL

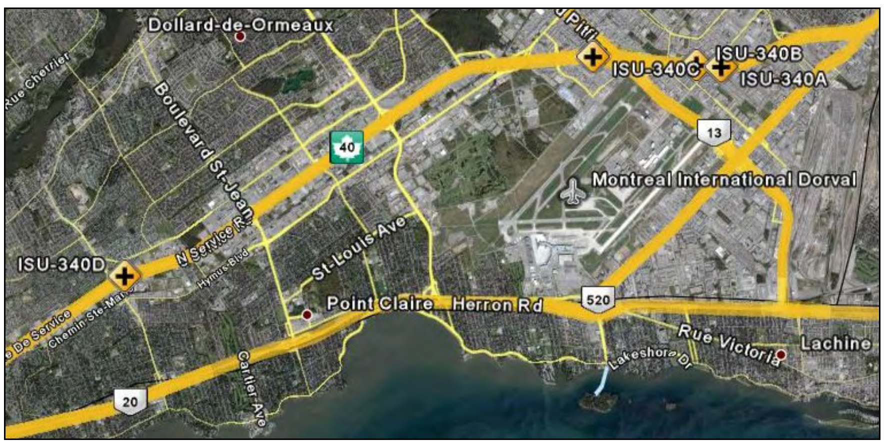


Figure L.27. Test layout for site 340, Quebec

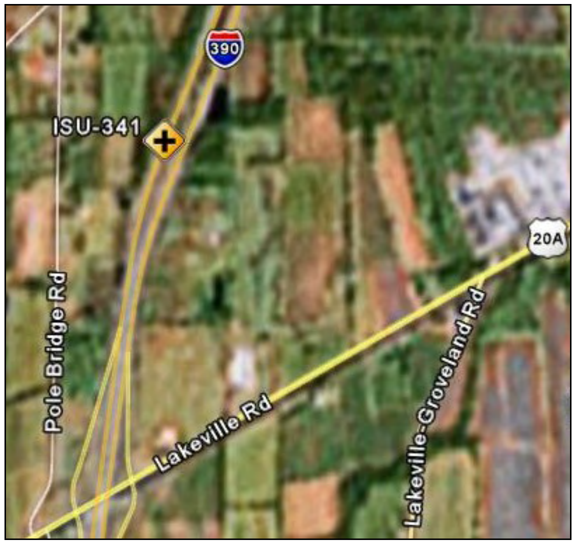


Figure L.28. Test layout for site 341, NY

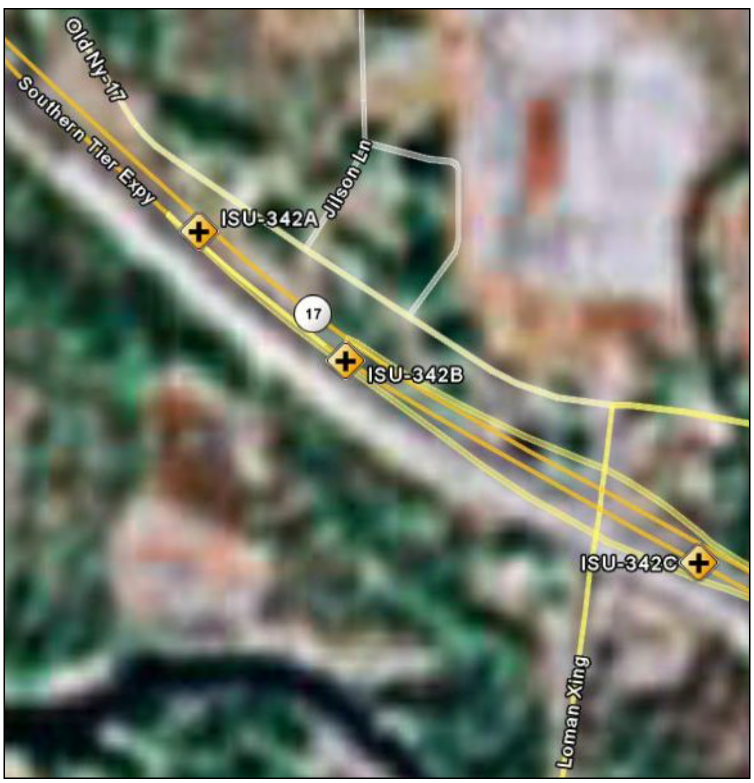


Figure L.29. Test layout for site 342, NY

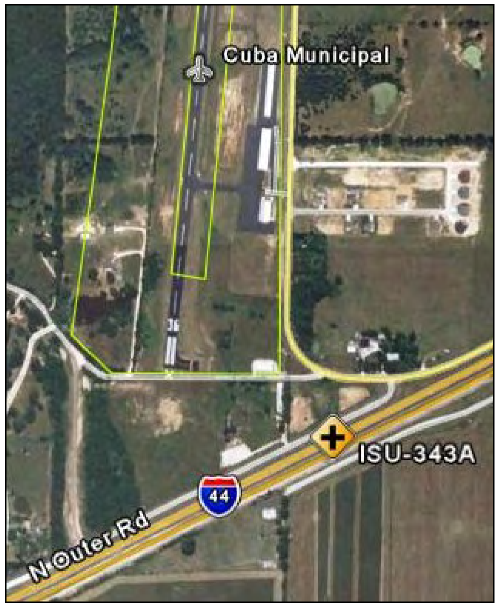


Figure L.30. Test layout for site 343, MO

APPENDIX M. PRELIMINARY DATA ANALYSIS TECHNIQUES

In this appendix, information is provided on some of the techniques used to process and conduct preliminary analyses of the data collected in Part 2. The following is described herein:

- ✓ Reducing and processing OBSI and in-vehicle noise data
- ✓ Reducing and processing RoboTex texture data
- ✓ Preliminary analysis of texture-noise relationship
- ✓ Preliminary analysis of joint effects

Reducing and Processing OBSI and In-Vehicle Noise Data

Step 1: Calculate calibration tone scaling factors

Calibration tone sound files are captured of at numerous times during testing. At a minimum, this is done before and after the end of testing on any given day. Quite often, additional calibration is conducted during the day if there is any significant time gap in the testing, or if there is any indication that a change may have occurred that could affect the equipment.

A standard acoustical calibrator is used, and files are saved that correspond to each microphone used in the testing. In this step of the analysis, a scaling factor for each of these files is determined by first visually inspecting the files for anomalies, cropping as necessary, and then calculating the RMS value of the remaining signal. This RMS value is then divided into the pressure corresponding to the calibration tone (94 dB ref 20 μPa). The resulting scale is in Pa/scale ("scale" is unitless since the signals are floating point with a range from -1.0 to 1.0). The scaling factors are compared "pre" and "post" testing. If in any case, a difference of greater than 0.5 dB is noted, the data collected between these tests would be considered highly suspect and would likely be discarded. In nearly all cases, however, this difference is on the order of 0.1 dB or less. An average of the scaling factors for each independent channel from pre- and post-calibration is used for all subsequent analysis.

Step 2: Locate sound file sample numbers for "spikes" at each trigger (start/end points of test sections)

The OBSI and In-Vehicle sound files contain an additional track that contains a transient "spike" corresponding to the moment that the vehicle's optical transceiver is triggered. In this step, the sample number of the file corresponding to each spike is noted. The distance between spikes for each repeat run is compared, and distances of longer sections are calculated from the average time between spikes multiplied by the known vehicle speed. Note that the distance between the transceiver and the microphones within the vehicle is corrected for in subsequent analyses.

Step 3: Temporal averaging for SPL and SIL

The analysis of the data proceeds with the scaling factors and spike locations as inputs. For each channel of data, temporal averaging is conducted in order to calculate sound pressure levels. For OBSI, sound intensity levels are similarly calculated in the temporal domain using matched channels of data corresponding to the microphones on any given probe. While it is a readily adjusted parameter, for OBSI and In-Vehicle, linear averaging is used over a 7 ft. interval (~79.5 msec). Calculated values of SPL and SIL are reported every 1 ft., however, meaning that there is an approximate 85% overlap.

Step 4: Spectral averaging for SPL and SIL including 1/N-octave calculation

Sound analysis is also conducted in the spectral domain for narrow-band frequency diagnostic information. A 7 ft. (~79.5 msec) interval is typically used, with a Hanning window function applied to minimize leakage. Discrete Fourier transformations are performed on each signal to calculate SPL frequency content. For matched microphone pairs, a cross-spectrum analysis is conducted in order to calculate the frequency content of the SIL. As before, the results are reported in 1 ft. increments. Frequency information is subsequently sorted into 1/N octave bins, with user-defined options of 1/1, 1/3, 1/12, and 1/24. An example of the analysis results for Steps 3 and 4 is shown in Figure M.1.

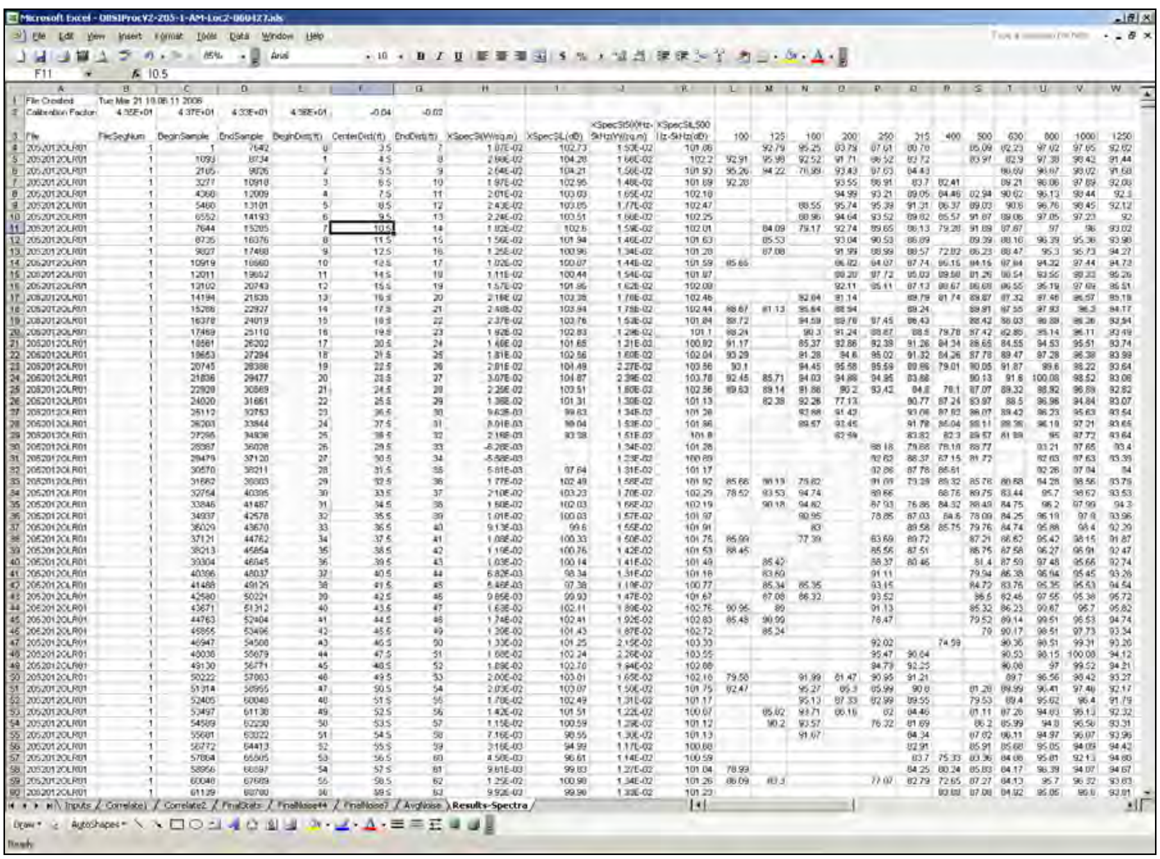


Figure M.1. Screen capture of Excel output of noise analysis

Step 5: Repeat run comparisons

Repeat runs are conducted over the same test sections—typically no less than three repeat runs and sometimes up to seven repeats. The analysis above is conducted for each segment (bounded by spikes), and the resulting SPL and/or SIL are compared for each repeat run. The objective is to identify data that are representative so that averaging of the leading and trailing edge sensor positions can be done accordingly. Both (minimum) standard error and (maximum) correlation coefficients are used for this purpose, in addition to comparisons of the overall pressure or intensity levels.

Step 6: Reporting

Variability is present in all signals. To reduce the effect of test and analysis variability, thus focusing on more accurate and relevant metrics for pavement variability, a 44 ft (0.5 sec) average is calculated and reported for each calculated metric. To do this, each of the 7 ft. averages (offset at 1 ft. intervals) are energy-averaged and reported as a 44 ft. average with 1 ft. offsets (~98% overlap).

Reducing and Processing RoboTex Texture Data

The RoboTex texture measurement system collects data from a number of different sources. This includes the line laser sensor from LMI-Selcom, a GPS receiver, time/date information from the laptop, and distance information from a DAQ fed by an optical encoder. This is illustrated in Figure M.2. When operating, a binary file is generated that interlaces data from each of these sources.

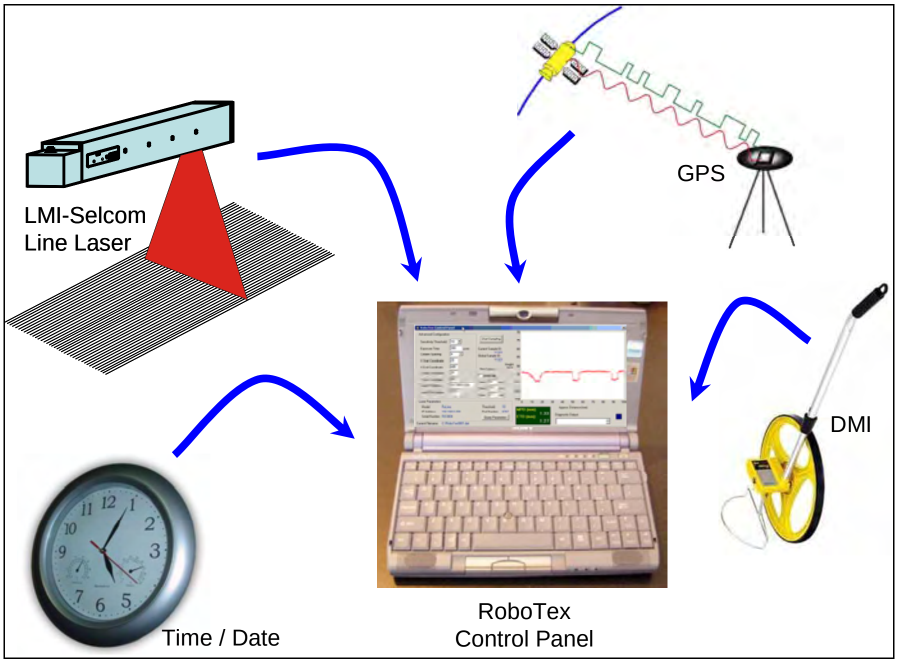


Figure M.2. Illustration of RoboTex data sources

The following steps illustrate the process of reducing and analyzing the RoboTex data.

Step 1: Convert RoboTex Binary File to ASCII (text)

The RoboTex data processing begins with a conversion of the binary data (Figure M.3) to an ASCII (text) file (Figure M.4). Elevation data from each line laser “scan” is reported, along with the corresponding coordinate in the forward direction, calculated from the DMI data. Locations with significant number of dropouts (joints, section delineators) are noted in a separate file (Figure M.5).

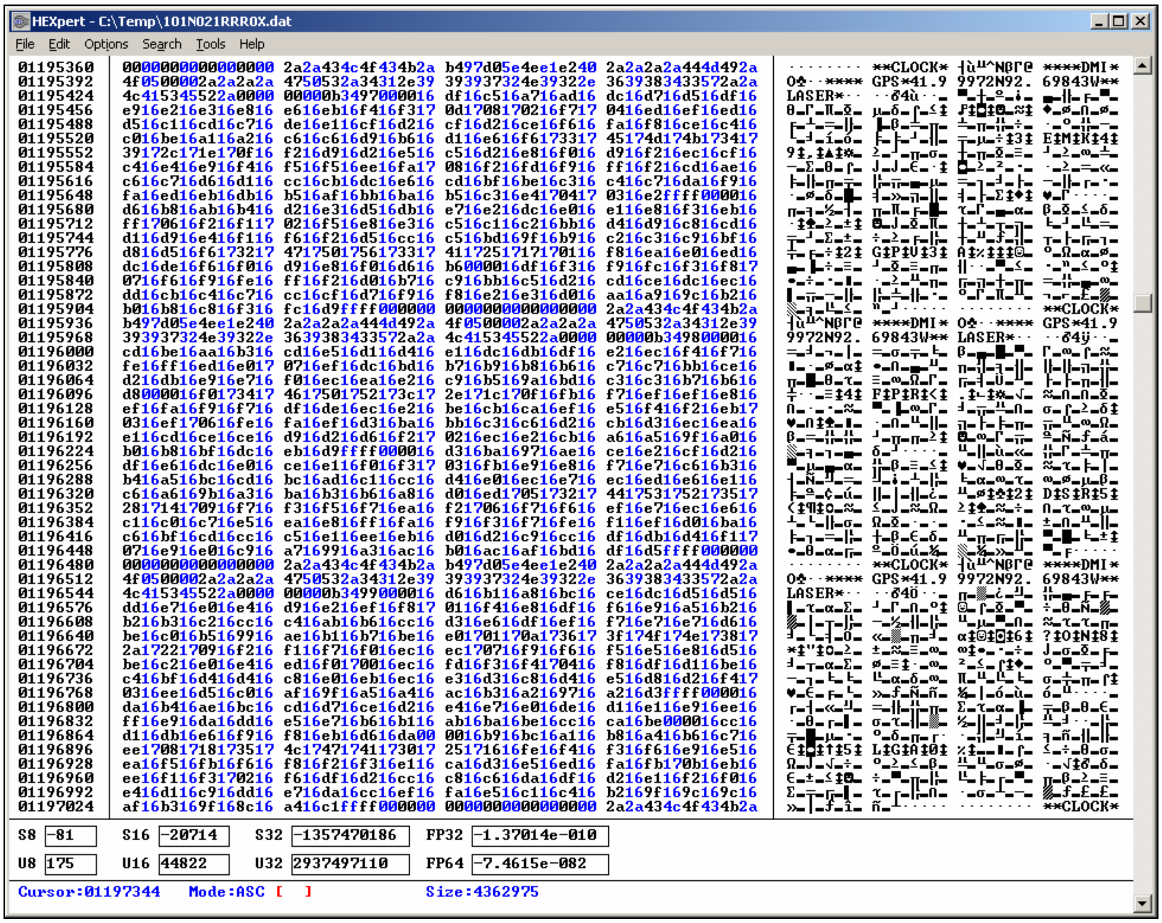
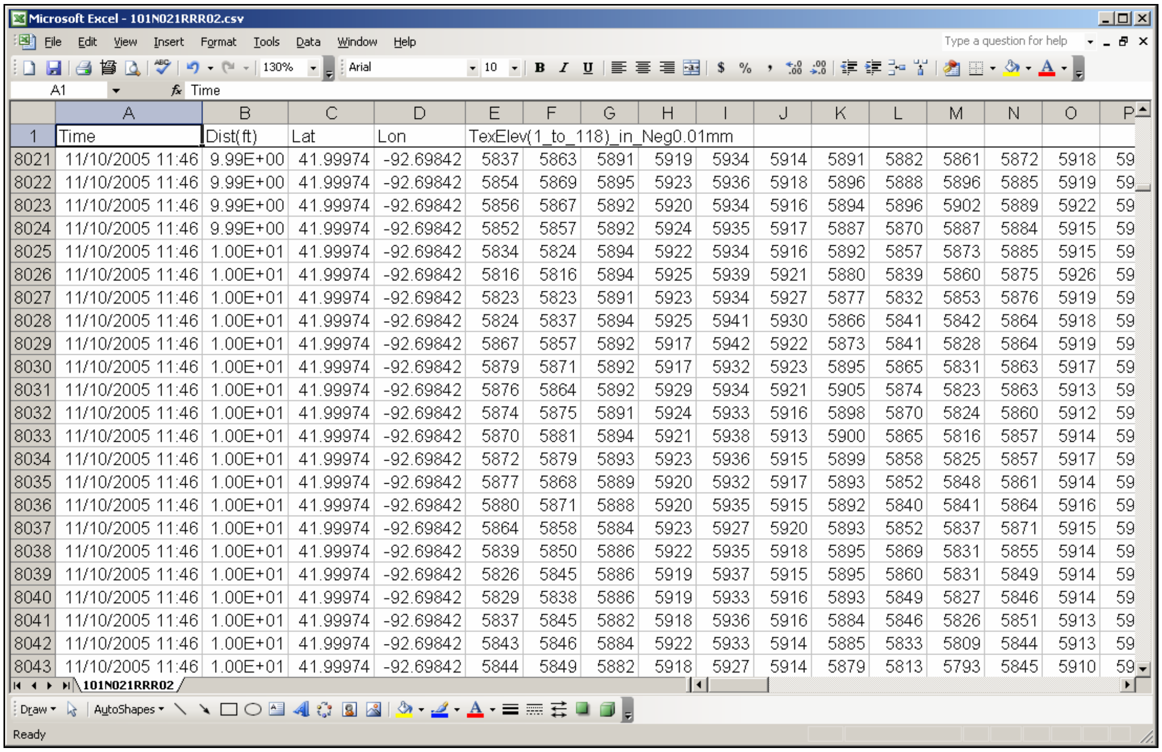
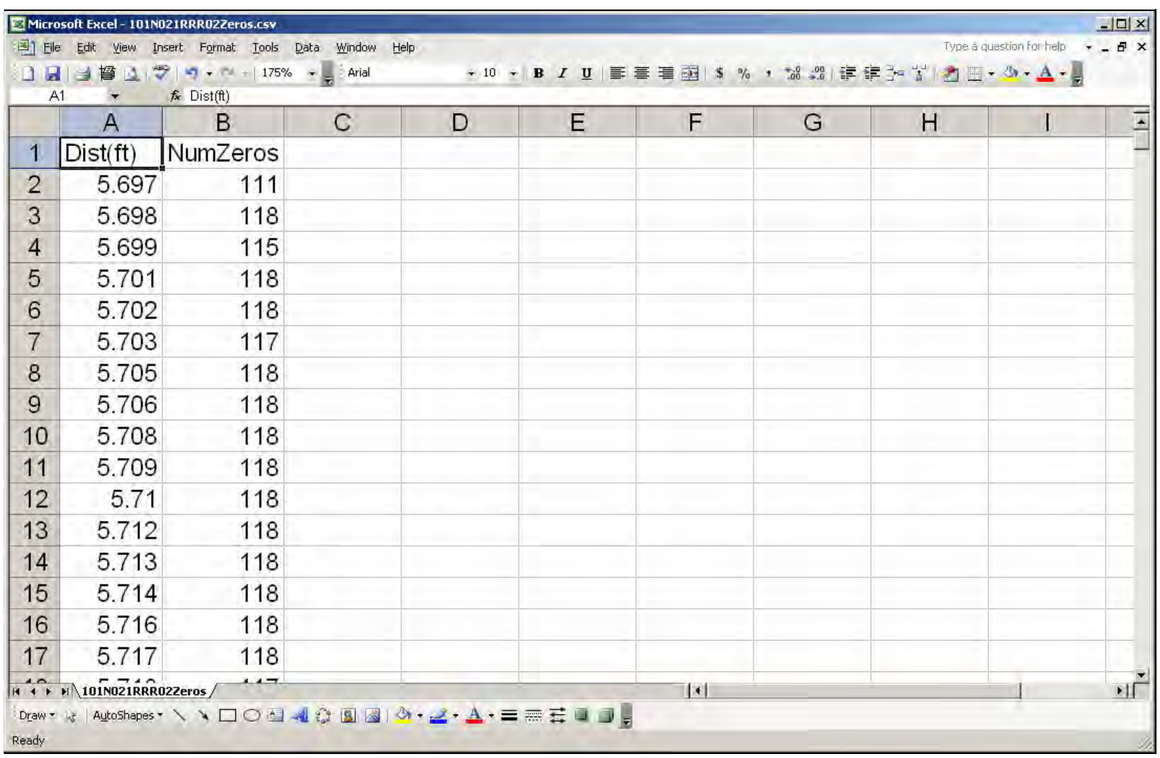


Figure M.3. Screen capture of binary RoboTex data file



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	Time	Dist(ft)	Lat	Lon	TexElev(1_to_118)_in_Neg0.01mm											
8021	11/10/2005 11:46	9.99E+00	41.99974	-92.69842	5837	5863	5891	5919	5934	5914	5891	5882	5861	5872	5918	59
8022	11/10/2005 11:46	9.99E+00	41.99974	-92.69842	5854	5869	5895	5923	5936	5918	5896	5888	5896	5885	5919	59
8023	11/10/2005 11:46	9.99E+00	41.99974	-92.69842	5856	5867	5892	5920	5934	5916	5894	5896	5902	5889	5922	59
8024	11/10/2005 11:46	9.99E+00	41.99974	-92.69842	5852	5857	5892	5924	5935	5917	5887	5870	5887	5884	5915	59
8025	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5834	5824	5894	5922	5934	5916	5892	5857	5873	5885	5915	59
8026	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5816	5816	5894	5925	5939	5921	5880	5839	5860	5875	5926	59
8027	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5823	5823	5891	5923	5934	5927	5877	5832	5853	5876	5919	59
8028	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5824	5837	5894	5925	5941	5930	5866	5841	5842	5864	5918	59
8029	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5867	5857	5892	5917	5942	5922	5873	5841	5828	5864	5919	59
8030	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5879	5871	5892	5917	5932	5923	5895	5865	5831	5863	5917	59
8031	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5876	5864	5892	5929	5934	5921	5905	5874	5823	5863	5913	59
8032	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5874	5875	5891	5924	5933	5916	5898	5870	5824	5860	5912	59
8033	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5870	5881	5894	5921	5938	5913	5900	5865	5816	5857	5914	59
8034	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5872	5879	5893	5923	5936	5915	5899	5858	5825	5857	5917	59
8035	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5877	5868	5889	5920	5932	5917	5893	5852	5848	5861	5914	59
8036	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5880	5871	5888	5920	5935	5915	5892	5840	5841	5864	5916	59
8037	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5864	5858	5884	5923	5927	5920	5893	5852	5837	5871	5915	59
8038	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5839	5850	5886	5922	5935	5918	5895	5869	5831	5855	5914	59
8039	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5826	5845	5886	5919	5937	5915	5895	5860	5831	5849	5914	59
8040	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5829	5838	5886	5919	5933	5916	5893	5849	5827	5846	5914	59
8041	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5837	5845	5882	5918	5936	5916	5884	5846	5826	5851	5913	59
8042	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5843	5846	5884	5922	5933	5914	5885	5833	5809	5844	5913	59
8043	11/10/2005 11:46	1.00E+01	41.99974	-92.69842	5844	5849	5882	5918	5927	5914	5879	5813	5793	5845	5910	59

Figure M.4. Screen capture of ASCII elevation data file

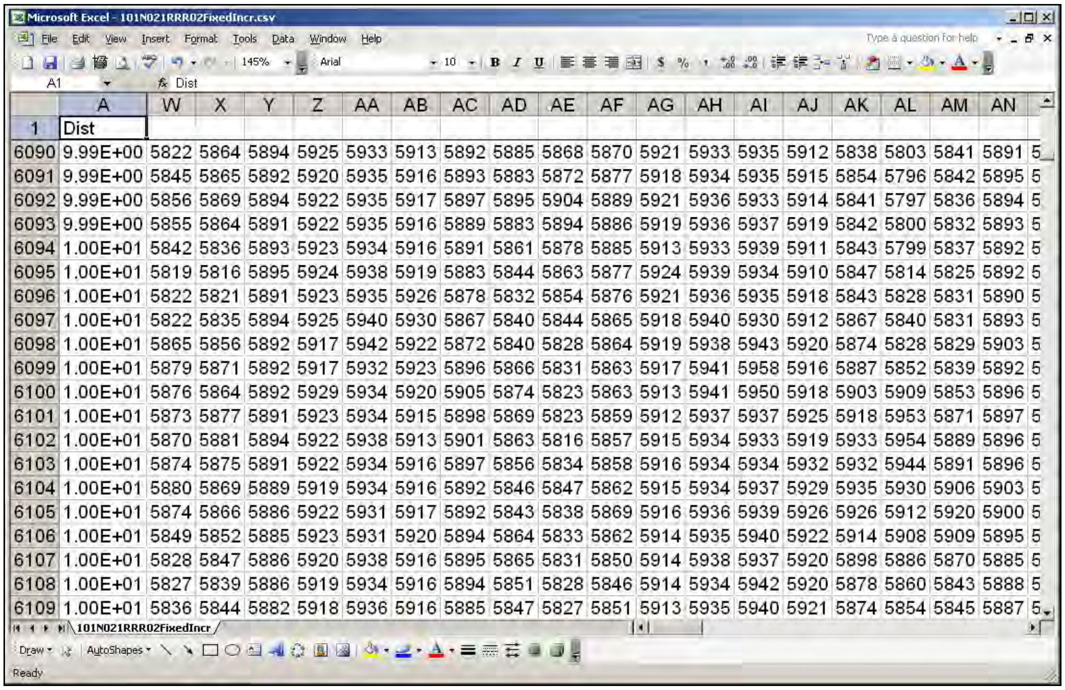


	A	B
1	Dist(ft)	NumZeros
2	5.697	111
3	5.698	118
4	5.699	115
5	5.701	118
6	5.702	118
7	5.703	117
8	5.705	118
9	5.706	118
10	5.708	118
11	5.709	118
12	5.71	118
13	5.712	118
14	5.713	118
15	5.714	118
16	5.716	118
17	5.717	118

Figure M.5. Screen capture of dropout listing file

Step 2: Convert data from a constant time to constant distance interval

To facilitate calculation of spectral content, a constant distance interval is necessary. The processed data is converted from "rows" with a constant time interval (0.001 sec) shown in Figure M.4 to a constant distance interval (0.5 mm), illustrated in Figure M.6. Spline interpolation of each "column" of data is conducted over ~ 200 ft. (120,000 pts.).



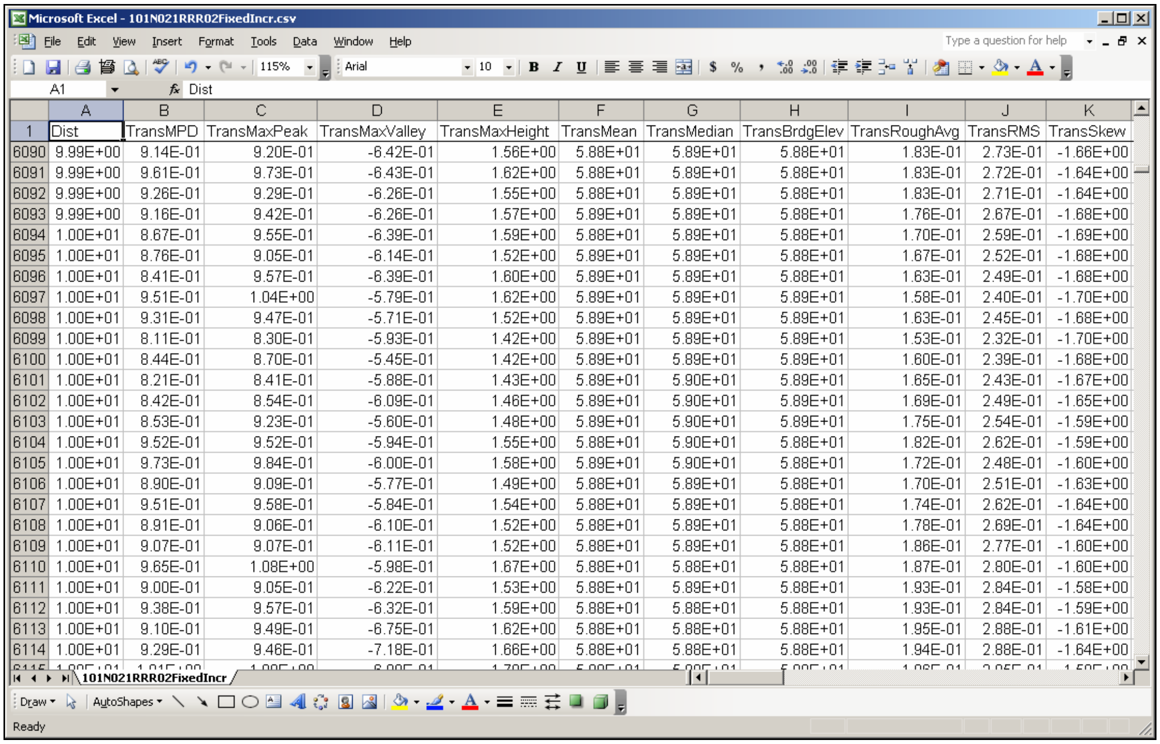
	A	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	Dist																		
6090	9.99E+00	5822	5864	5894	5925	5933	5913	5892	5885	5868	5870	5921	5933	5935	5912	5838	5803	5841	5891
6091	9.99E+00	5845	5865	5892	5920	5935	5916	5893	5883	5872	5877	5918	5934	5935	5915	5854	5796	5842	5895
6092	9.99E+00	5856	5869	5894	5922	5935	5917	5897	5895	5904	5889	5921	5936	5933	5914	5841	5797	5836	5894
6093	9.99E+00	5855	5864	5891	5922	5935	5916	5889	5883	5894	5886	5919	5936	5937	5919	5842	5800	5832	5893
6094	1.00E+01	5842	5836	5893	5923	5934	5916	5891	5861	5878	5885	5913	5933	5939	5911	5843	5799	5837	5892
6095	1.00E+01	5819	5816	5895	5924	5938	5919	5883	5844	5863	5877	5924	5939	5934	5910	5847	5814	5825	5892
6096	1.00E+01	5822	5821	5891	5923	5935	5926	5878	5832	5854	5876	5921	5936	5935	5918	5843	5828	5831	5890
6097	1.00E+01	5822	5835	5894	5925	5940	5930	5867	5840	5844	5865	5918	5940	5930	5912	5867	5840	5831	5893
6098	1.00E+01	5865	5856	5892	5917	5942	5922	5872	5840	5828	5864	5919	5938	5943	5920	5874	5828	5829	5903
6099	1.00E+01	5879	5871	5892	5917	5932	5923	5896	5866	5831	5863	5917	5941	5958	5916	5887	5852	5839	5892
6100	1.00E+01	5876	5864	5892	5929	5934	5920	5905	5874	5823	5863	5913	5941	5950	5918	5903	5909	5853	5896
6101	1.00E+01	5873	5877	5891	5923	5934	5915	5898	5869	5823	5859	5912	5937	5937	5925	5918	5953	5871	5897
6102	1.00E+01	5870	5881	5894	5922	5938	5913	5901	5863	5816	5857	5915	5934	5933	5919	5933	5954	5889	5896
6103	1.00E+01	5874	5875	5891	5922	5934	5916	5897	5856	5834	5858	5916	5934	5934	5932	5932	5944	5891	5896
6104	1.00E+01	5880	5869	5889	5919	5934	5916	5892	5846	5847	5862	5915	5934	5937	5929	5935	5930	5906	5903
6105	1.00E+01	5874	5866	5886	5922	5931	5917	5892	5843	5838	5869	5916	5936	5939	5926	5926	5912	5920	5900
6106	1.00E+01	5849	5852	5885	5923	5931	5920	5894	5864	5833	5862	5914	5935	5940	5922	5914	5908	5909	5895
6107	1.00E+01	5828	5847	5886	5920	5938	5916	5895	5865	5831	5850	5914	5938	5937	5920	5898	5886	5870	5885
6108	1.00E+01	5827	5839	5886	5919	5934	5916	5894	5851	5828	5846	5914	5934	5942	5920	5878	5860	5843	5888
6109	1.00E+01	5836	5844	5882	5918	5936	5916	5885	5847	5827	5851	5913	5935	5940	5921	5874	5854	5845	5887

Figure M.6. Screen capture of elevation data file at constant spacing

Step 3: Calculate texture metrics

For the LMI-Selcom RoLine sensor used in most of the project, the resulting 100 mm line scans were discretized into 118 points (columns). Each line (row) is spaced each 0.5 mm (from Step 2). Texture metrics are then calculated both across the row (transverse) and along each of the 118 columns in the longitudinal direction. This is shown in Figure M.7. The metrics calculated include:

- ✓ Mean Profile Depth per ASTM E 1845
- ✓ Maximum Elevation Peak per ASME B46.1
- ✓ Minimum Elevation (Valley) per ASME B46.1
- ✓ Maximum Texture Height per ASME B46.1
- ✓ Mean Elevation per ASME B46.1
- ✓ Median Elevation per ASME B46.1
- ✓ Bridged Elevation using Karamihas algorithm
- ✓ Average Roughness per ASME B46.1
- ✓ Root Mean Squared (RMS) Roughness
- ✓ ISO 13565-2 Texture Depth Metrics
- ✓ Skew per ASME B46.1



	A	B	C	D	E	F	G	H	I	J	K
1	Dist	TransMPD	TransMaxPeak	TransMaxValley	TransMaxHeight	TransMean	TransMedian	TransBrdgElev	TransRoughAvg	TransRMS	TransSkew
6090	9.99E+00	9.14E-01	9.20E-01	-6.42E-01	1.56E+00	5.88E+01	5.89E+01	5.88E+01	1.83E-01	2.73E-01	-1.66E+00
6091	9.99E+00	9.61E-01	9.73E-01	-6.43E-01	1.62E+00	5.88E+01	5.89E+01	5.88E+01	1.83E-01	2.72E-01	-1.64E+00
6092	9.99E+00	9.26E-01	9.29E-01	-6.26E-01	1.55E+00	5.88E+01	5.89E+01	5.88E+01	1.83E-01	2.71E-01	-1.64E+00
6093	9.99E+00	9.16E-01	9.42E-01	-6.26E-01	1.57E+00	5.89E+01	5.89E+01	5.88E+01	1.76E-01	2.67E-01	-1.68E+00
6094	1.00E+01	8.67E-01	9.55E-01	-6.39E-01	1.59E+00	5.88E+01	5.89E+01	5.88E+01	1.70E-01	2.59E-01	-1.69E+00
6095	1.00E+01	8.76E-01	9.05E-01	-6.14E-01	1.52E+00	5.89E+01	5.89E+01	5.88E+01	1.67E-01	2.52E-01	-1.68E+00
6096	1.00E+01	8.41E-01	9.57E-01	-6.39E-01	1.60E+00	5.89E+01	5.89E+01	5.88E+01	1.63E-01	2.49E-01	-1.68E+00
6097	1.00E+01	9.51E-01	1.04E+00	-5.79E-01	1.62E+00	5.89E+01	5.89E+01	5.89E+01	1.58E-01	2.40E-01	-1.70E+00
6098	1.00E+01	9.31E-01	9.47E-01	-5.71E-01	1.52E+00	5.89E+01	5.89E+01	5.89E+01	1.63E-01	2.45E-01	-1.68E+00
6099	1.00E+01	8.11E-01	8.30E-01	-5.93E-01	1.42E+00	5.89E+01	5.89E+01	5.89E+01	1.53E-01	2.32E-01	-1.70E+00
6100	1.00E+01	8.44E-01	8.70E-01	-5.45E-01	1.42E+00	5.89E+01	5.89E+01	5.89E+01	1.60E-01	2.39E-01	-1.68E+00
6101	1.00E+01	8.21E-01	8.41E-01	-5.88E-01	1.43E+00	5.89E+01	5.90E+01	5.89E+01	1.65E-01	2.43E-01	-1.67E+00
6102	1.00E+01	8.42E-01	8.54E-01	-6.09E-01	1.46E+00	5.89E+01	5.90E+01	5.89E+01	1.69E-01	2.49E-01	-1.65E+00
6103	1.00E+01	8.53E-01	9.23E-01	-5.60E-01	1.48E+00	5.89E+01	5.90E+01	5.89E+01	1.75E-01	2.54E-01	-1.59E+00
6104	1.00E+01	9.52E-01	9.52E-01	-5.94E-01	1.55E+00	5.88E+01	5.90E+01	5.88E+01	1.82E-01	2.62E-01	-1.59E+00
6105	1.00E+01	9.73E-01	9.84E-01	-6.00E-01	1.58E+00	5.89E+01	5.90E+01	5.88E+01	1.72E-01	2.48E-01	-1.60E+00
6106	1.00E+01	8.90E-01	9.09E-01	-5.77E-01	1.49E+00	5.88E+01	5.89E+01	5.88E+01	1.70E-01	2.51E-01	-1.63E+00
6107	1.00E+01	9.51E-01	9.58E-01	-5.84E-01	1.54E+00	5.88E+01	5.89E+01	5.88E+01	1.74E-01	2.62E-01	-1.64E+00
6108	1.00E+01	8.91E-01	9.06E-01	-6.10E-01	1.52E+00	5.88E+01	5.89E+01	5.88E+01	1.78E-01	2.69E-01	-1.64E+00
6109	1.00E+01	9.07E-01	9.07E-01	-6.11E-01	1.52E+00	5.88E+01	5.89E+01	5.88E+01	1.86E-01	2.77E-01	-1.60E+00
6110	1.00E+01	9.65E-01	1.08E+00	-5.98E-01	1.67E+00	5.88E+01	5.88E+01	5.88E+01	1.87E-01	2.80E-01	-1.60E+00
6111	1.00E+01	9.00E-01	9.05E-01	-6.22E-01	1.53E+00	5.88E+01	5.89E+01	5.88E+01	1.93E-01	2.84E-01	-1.58E+00
6112	1.00E+01	9.38E-01	9.57E-01	-6.32E-01	1.59E+00	5.88E+01	5.88E+01	5.88E+01	1.93E-01	2.84E-01	-1.59E+00
6113	1.00E+01	9.10E-01	9.49E-01	-6.75E-01	1.62E+00	5.88E+01	5.88E+01	5.88E+01	1.95E-01	2.88E-01	-1.61E+00
6114	1.00E+01	9.29E-01	9.46E-01	-7.18E-01	1.66E+00	5.88E+01	5.88E+01	5.88E+01	1.94E-01	2.88E-01	-1.64E+00

Figure M.7. Screen capture of calculated texture metrics

Step 4: Dump visualization files

In this step, the elevations are dumped into files with the intent of facilitating post-process visualization. ERD files of three discrete column elevations and bridged elevations are generated, along with (X,Y,Z) data of 100 mm x 200 mm patches every 22 ft. These are shown in Figures M.8 and M.9, respectively.

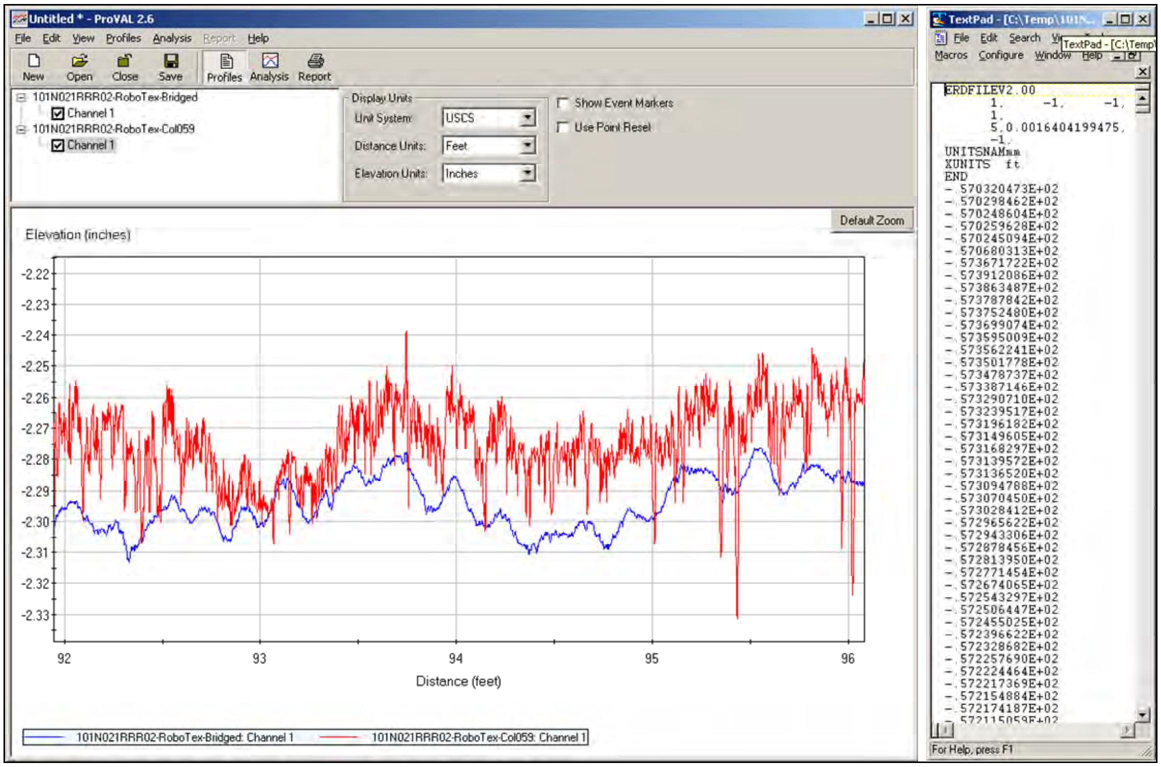


Figure M.8. Screen capture of FHWA ProVAL showing ERD file

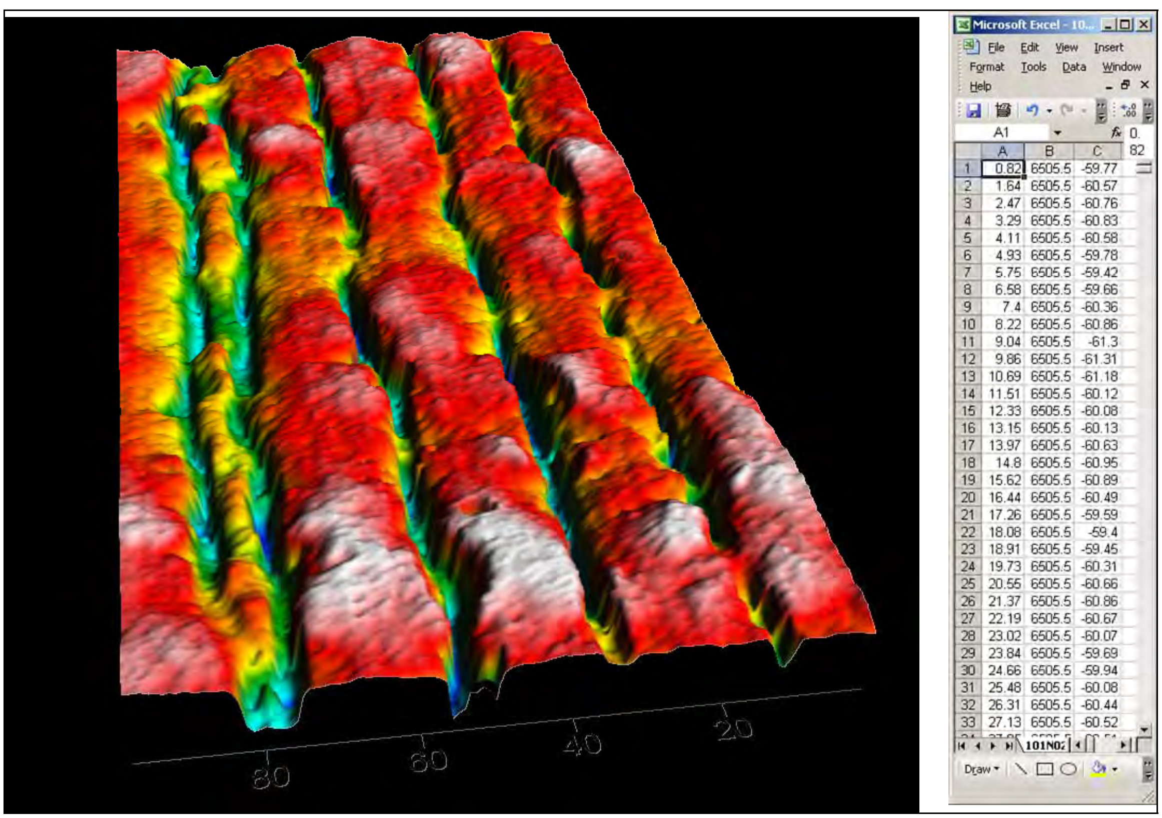
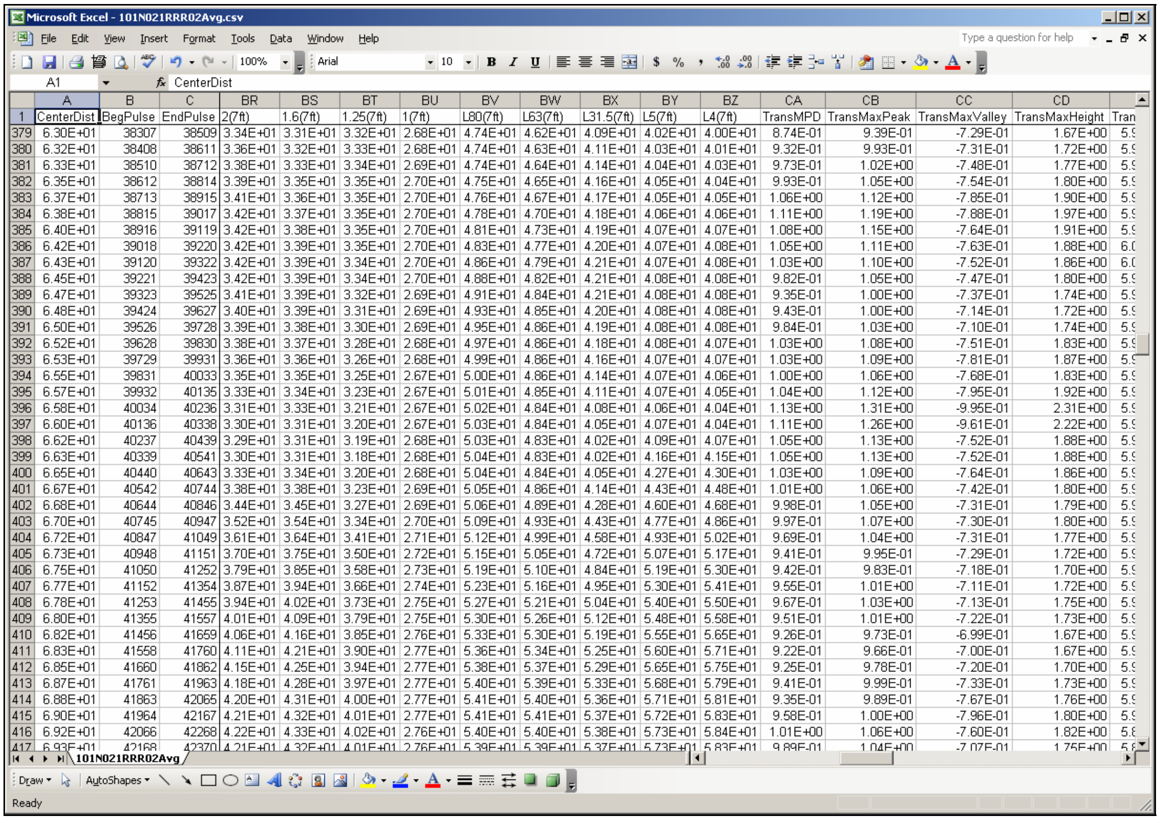


Figure M.9. Screen capture of Surfer visualization of (X,Y,Z) data

Step 5: Develop summary texture metrics

To minimize the effect of test and processing variability, average texture metrics in the longitudinal and transverse direction are calculated every 2 inches. In this step, a spectral analysis of texture using 7 and 44 ft. sliding windows is also conducted using the draft standard ISO/CD 13473-4. The results are illustrated in Figure M.10.



Microsoft Excel - 101N021RRR02Avg.csv

	A	B	C	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	
1	CenterDist	BegPulse	EndPulse	2(7ft)	1.6(7ft)	1.25(7ft)	1(7ft)	L80(7ft)	L63(7ft)	L31.5(7ft)	L5(7ft)	L4(7ft)	TransMPD	TransMaxPeak	TransMaxValley	TransMaxHeight	Tran
379	6.30E+01	38307	38509	3.34E+01	3.31E+01	3.32E+01	2.68E+01	4.74E+01	4.62E+01	4.09E+01	4.02E+01	4.00E+01	8.74E-01	9.39E-01	-7.29E-01	1.67E+00	5.9
380	6.32E+01	38408	38611	3.36E+01	3.32E+01	3.33E+01	2.68E+01	4.74E+01	4.63E+01	4.11E+01	4.03E+01	4.01E+01	9.32E-01	9.93E-01	-7.31E-01	1.72E+00	5.9
381	6.33E+01	38510	38712	3.38E+01	3.33E+01	3.34E+01	2.69E+01	4.74E+01	4.64E+01	4.14E+01	4.04E+01	4.03E+01	9.73E-01	1.02E+00	-7.48E-01	1.77E+00	5.9
382	6.35E+01	38612	38814	3.39E+01	3.35E+01	3.35E+01	2.70E+01	4.75E+01	4.65E+01	4.16E+01	4.05E+01	4.04E+01	9.93E-01	1.05E+00	-7.54E-01	1.80E+00	5.9
383	6.37E+01	38713	38915	3.41E+01	3.36E+01	3.35E+01	2.70E+01	4.76E+01	4.67E+01	4.17E+01	4.05E+01	4.05E+01	1.06E+00	1.12E+00	-7.85E-01	1.90E+00	5.9
384	6.38E+01	38815	39017	3.42E+01	3.37E+01	3.35E+01	2.70E+01	4.78E+01	4.70E+01	4.18E+01	4.06E+01	4.06E+01	1.11E+00	1.19E+00	-7.88E-01	1.97E+00	5.9
385	6.40E+01	38916	39119	3.42E+01	3.38E+01	3.35E+01	2.70E+01	4.81E+01	4.73E+01	4.19E+01	4.07E+01	4.07E+01	1.08E+00	1.15E+00	-7.64E-01	1.91E+00	5.9
386	6.42E+01	39018	39220	3.42E+01	3.39E+01	3.35E+01	2.70E+01	4.83E+01	4.77E+01	4.20E+01	4.07E+01	4.08E+01	1.05E+00	1.11E+00	-7.63E-01	1.88E+00	6.0
387	6.43E+01	39120	39322	3.42E+01	3.39E+01	3.34E+01	2.70E+01	4.86E+01	4.79E+01	4.21E+01	4.07E+01	4.08E+01	1.03E+00	1.10E+00	-7.52E-01	1.86E+00	6.0
388	6.45E+01	39221	39423	3.42E+01	3.39E+01	3.34E+01	2.70E+01	4.88E+01	4.82E+01	4.21E+01	4.08E+01	4.08E+01	9.82E-01	1.05E+00	-7.47E-01	1.80E+00	5.9
389	6.47E+01	39323	39525	3.41E+01	3.39E+01	3.32E+01	2.69E+01	4.91E+01	4.84E+01	4.21E+01	4.08E+01	4.08E+01	9.35E-01	1.00E+00	-7.37E-01	1.74E+00	5.9
390	6.48E+01	39424	39627	3.40E+01	3.39E+01	3.31E+01	2.69E+01	4.93E+01	4.85E+01	4.20E+01	4.08E+01	4.08E+01	9.43E-01	1.00E+00	-7.14E-01	1.72E+00	5.9
391	6.50E+01	39526	39728	3.39E+01	3.38E+01	3.30E+01	2.69E+01	4.95E+01	4.86E+01	4.19E+01	4.08E+01	4.08E+01	9.84E-01	1.03E+00	-7.10E-01	1.74E+00	5.9
392	6.52E+01	39628	39830	3.38E+01	3.37E+01	3.28E+01	2.68E+01	4.97E+01	4.86E+01	4.18E+01	4.08E+01	4.07E+01	1.03E+00	1.08E+00	-7.51E-01	1.83E+00	5.9
393	6.53E+01	39729	39931	3.36E+01	3.36E+01	3.26E+01	2.68E+01	4.99E+01	4.86E+01	4.16E+01	4.07E+01	4.07E+01	1.03E+00	1.09E+00	-7.81E-01	1.87E+00	5.9
394	6.55E+01	39831	40033	3.35E+01	3.35E+01	3.25E+01	2.67E+01	5.00E+01	4.86E+01	4.14E+01	4.07E+01	4.06E+01	1.00E+00	1.06E+00	-7.68E-01	1.83E+00	5.9
395	6.57E+01	39932	40135	3.33E+01	3.34E+01	3.23E+01	2.67E+01	5.01E+01	4.85E+01	4.11E+01	4.07E+01	4.05E+01	1.04E+00	1.12E+00	-7.95E-01	1.92E+00	5.9
396	6.58E+01	40034	40236	3.31E+01	3.33E+01	3.21E+01	2.67E+01	5.02E+01	4.84E+01	4.08E+01	4.06E+01	4.04E+01	1.13E+00	1.31E+00	-9.95E-01	2.31E+00	5.9
397	6.60E+01	40136	40338	3.30E+01	3.31E+01	3.20E+01	2.67E+01	5.03E+01	4.84E+01	4.05E+01	4.07E+01	4.04E+01	1.11E+00	1.26E+00	-9.61E-01	2.22E+00	5.9
398	6.62E+01	40237	40439	3.29E+01	3.31E+01	3.19E+01	2.68E+01	5.03E+01	4.83E+01	4.02E+01	4.09E+01	4.07E+01	1.05E+00	1.13E+00	-7.52E-01	1.88E+00	5.9
399	6.63E+01	40339	40541	3.30E+01	3.31E+01	3.18E+01	2.68E+01	5.04E+01	4.83E+01	4.02E+01	4.16E+01	4.15E+01	1.05E+00	1.13E+00	-7.52E-01	1.88E+00	5.9
400	6.65E+01	40440	40643	3.33E+01	3.34E+01	3.20E+01	2.68E+01	5.04E+01	4.84E+01	4.05E+01	4.27E+01	4.30E+01	1.03E+00	1.09E+00	-7.64E-01	1.86E+00	5.9
401	6.67E+01	40542	40744	3.38E+01	3.38E+01	3.23E+01	2.69E+01	5.05E+01	4.86E+01	4.14E+01	4.43E+01	4.48E+01	1.01E+00	1.06E+00	-7.42E-01	1.80E+00	5.9
402	6.68E+01	40644	40846	3.44E+01	3.45E+01	3.27E+01	2.69E+01	5.06E+01	4.89E+01	4.28E+01	4.60E+01	4.68E+01	9.98E-01	1.05E+00	-7.31E-01	1.79E+00	5.9
403	6.70E+01	40745	40947	3.52E+01	3.54E+01	3.34E+01	2.70E+01	5.09E+01	4.93E+01	4.43E+01	4.77E+01	4.86E+01	9.97E-01	1.07E+00	-7.30E-01	1.80E+00	5.9
404	6.72E+01	40847	41049	3.61E+01	3.64E+01	3.41E+01	2.71E+01	5.12E+01	4.99E+01	4.58E+01	4.93E+01	5.02E+01	9.69E-01	1.04E+00	-7.31E-01	1.77E+00	5.9
405	6.73E+01	40948	41151	3.70E+01	3.75E+01	3.50E+01	2.72E+01	5.15E+01	5.05E+01	4.72E+01	5.07E+01	5.17E+01	9.41E-01	9.95E-01	-7.29E-01	1.72E+00	5.9
406	6.75E+01	41050	41252	3.79E+01	3.85E+01	3.58E+01	2.73E+01	5.19E+01	5.10E+01	4.84E+01	5.19E+01	5.30E+01	9.42E-01	9.83E-01	-7.18E-01	1.70E+00	5.9
407	6.77E+01	41152	41354	3.87E+01	3.94E+01	3.66E+01	2.74E+01	5.23E+01	5.16E+01	4.95E+01	5.30E+01	5.41E+01	9.55E-01	1.01E+00	-7.11E-01	1.72E+00	5.9
408	6.78E+01	41253	41455	3.94E+01	4.02E+01	3.73E+01	2.75E+01	5.27E+01	5.21E+01	5.04E+01	5.40E+01	5.50E+01	9.67E-01	1.03E+00	-7.13E-01	1.75E+00	5.9
409	6.80E+01	41355	41557	4.01E+01	4.09E+01	3.79E+01	2.75E+01	5.30E+01	5.26E+01	5.12E+01	5.48E+01	5.58E+01	9.51E-01	1.01E+00	-7.22E-01	1.73E+00	5.9
410	6.82E+01	41456	41659	4.06E+01	4.16E+01	3.85E+01	2.76E+01	5.33E+01	5.30E+01	5.19E+01	5.55E+01	5.65E+01	9.26E-01	9.73E-01	-6.99E-01	1.67E+00	5.9
411	6.83E+01	41558	41760	4.11E+01	4.21E+01	3.90E+01	2.77E+01	5.36E+01	5.34E+01	5.25E+01	5.60E+01	5.71E+01	9.22E-01	9.66E-01	-7.00E-01	1.67E+00	5.9
412	6.85E+01	41660	41862	4.15E+01	4.25E+01	3.94E+01	2.77E+01	5.38E+01	5.37E+01	5.29E+01	5.65E+01	5.75E+01	9.25E-01	9.78E-01	-7.20E-01	1.70E+00	5.9
413	6.87E+01	41761	41963	4.18E+01	4.28E+01	3.97E+01	2.77E+01	5.40E+01	5.39E+01	5.33E+01	5.68E+01	5.79E+01	9.41E-01	9.99E-01	-7.33E-01	1.73E+00	5.9
414	6.88E+01	41863	42065	4.20E+01	4.31E+01	4.00E+01	2.77E+01	5.41E+01	5.40E+01	5.36E+01	5.71E+01	5.81E+01	9.35E-01	9.89E-01	-7.67E-01	1.76E+00	5.9
415	6.90E+01	41964	42167	4.21E+01	4.32E+01	4.01E+01	2.77E+01	5.41E+01	5.41E+01	5.37E+01	5.72E+01	5.83E+01	9.58E-01	1.00E+00	-7.96E-01	1.80E+00	5.9
416	6.92E+01	42066	42268	4.22E+01	4.33E+01	4.02E+01	2.76E+01	5.40E+01	5.40E+01	5.38E+01	5.73E+01	5.84E+01	1.01E+00	1.06E+00	-7.60E-01	1.82E+00	5.8
417	6.93E+01	42168	42370	4.21E+01	4.32E+01	4.01E+01	2.76E+01	5.39E+01	5.39E+01	5.37E+01	5.73E+01	5.83E+01	9.89E-01	1.04E+00	-7.07E-01	1.75E+00	5.8

Figure M.10. Screen capture of summary texture metrics and spectral analysis

Step 6: Locate start/end and joint locations, rescale data, and plot trends

In this final step, the start/end locations of the test section are identified from the test block or tape that was used. Locations of joint and other major anomalies in the data are also noted. Plots of the resulting metrics and texture spectra can be found in Appendix B.

Preliminary Analysis of Texture-Noise Relationship

In this section, the results are provided of a preliminary investigation of the link between texture, measured using RoboTex, and noise, measured using OBSI. This begins with description of a texture bridging filter, followed by an empirical evaluation of the resulting texture metrics with OBSI levels.

3D Texture Bridging Filter

With respect to the relevance to noise, spectral analyses of the texture data are necessary. In the post-processing software developed for RoboTex, spectral analysis is conducted per the draft ISO standard ISO/CD 13473-4 (*1*). As mentioned in the last section, an FFT of Hanning-windowed texture profile data is conducted on 7 ft. segments. However, since the FFT requires a two-dimensional profile trace, an additional step is necessary to reduce the 3D texture profile to this format.

Tire bridging (or envelopment) filters have been used by previous researchers in an attempt to capture profile characteristics more realistically—as the tire would "see" them (*2, 3, 4*). The basic premise is to ignore (or attenuate) texture features that would lie below the bottom of what would likely be the bottom of a tire, and to give particular relevance to (amplify) those features that project above the pavement surface.

RoboTex measures texture in three dimensions; thus, the bridging model is more complex than the 2D models that are traditionally used (*4*). To illustrate this process, refer to Figure M.11. In Figure M.11, a 3D texture profile of a transversely tined pavement, measured using RoboTex, is shown. The intent of the bridging algorithm is to mathematically envelop a portion of this texture profile with a relevant footprint. In the case of noise, a geometry on the scale of a tire tread block is relevant. As a result, the model used to date has a footprint with a width equal to the RoboTex measurement (100 mm), and a length of 25 mm, corresponding to the approximate size of a tread block.

All of the texture profile points below the footprint enter into the mathematical filter, which results in the calculation of a single elevation point that is representative of all of the enveloped texture data. Once this calculation is made, the footprint is advanced forward – in our case by 2.5 mm (10% of the length) – and the process is repeated. The accumulation of each of the bridged elevations allows for the construction of a two-dimensional profile that can then be processed with the FFT.

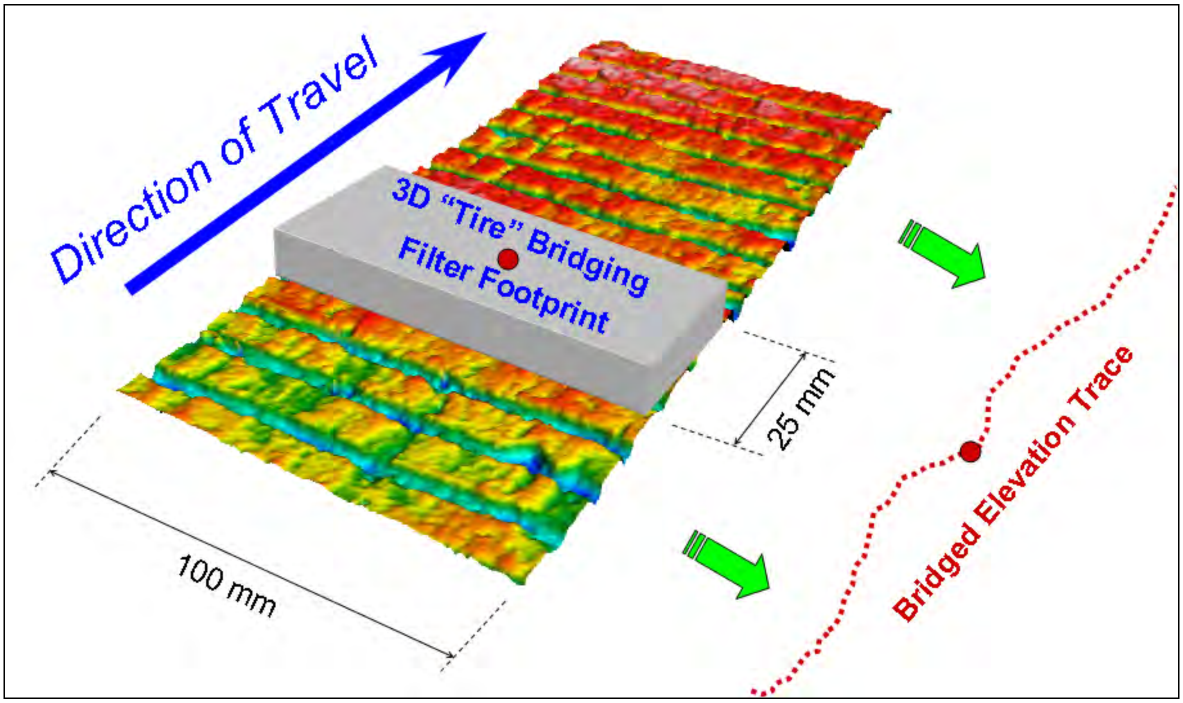


Figure M.11. Schematic of 3D tire bridging filter on an actual 3D texture profile measured with RoboTex

The bridging model that is used to date is based on work recently conducted by Mr. Steven Karamihas with respect to pavement smoothness (*4*). The basis of the model, as illustrated in Figure M.12, is to find an elevation of the bottom of a virtual tire that results in a displaced tire volume equal to that of a uniform displacement of a fixed amount (a model parameter). This value was reported as 1 mm based on observations of work conducted by others. While this figure illustrates the model in only two dimensions, the same logic is extrapolated to 3D when processing the RoboTex data. It can be seen in the figure that the elevation at the bottom of the tire may leave voids that, while deep, do not influence the tire position, and should thus be considered irrelevant to any forced dynamics of the tire. This model may be physically described as that of a dense liquid with tensionless springs.

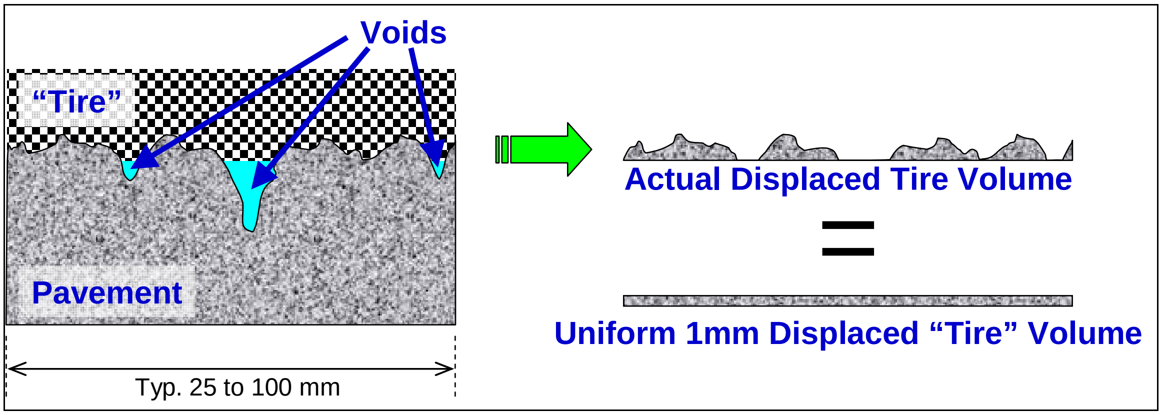


Figure M.12. Determining the tire penetration by an equivalent displacement volume

The mathematical process of calculating the bridged elevation can be efficiently accomplished by working with an array of sorted profile elevations. Figure M.13 illustrates this process, which again is extrapolated to three dimensions when working with RoboTex data. The volume displaced by the sorted values is numerically integrated beginning with the highest elevations, and continuing until an equivalent reference volume of displaced tire is found. For shallow textures, the model will predict all of the texture to be "filled" with the tire, and will therefore report an average of texture profile as the bridged elevation. The derivation for this model can be found in Karamihas' report, with the physical parameters illustrated in Figure M.13.

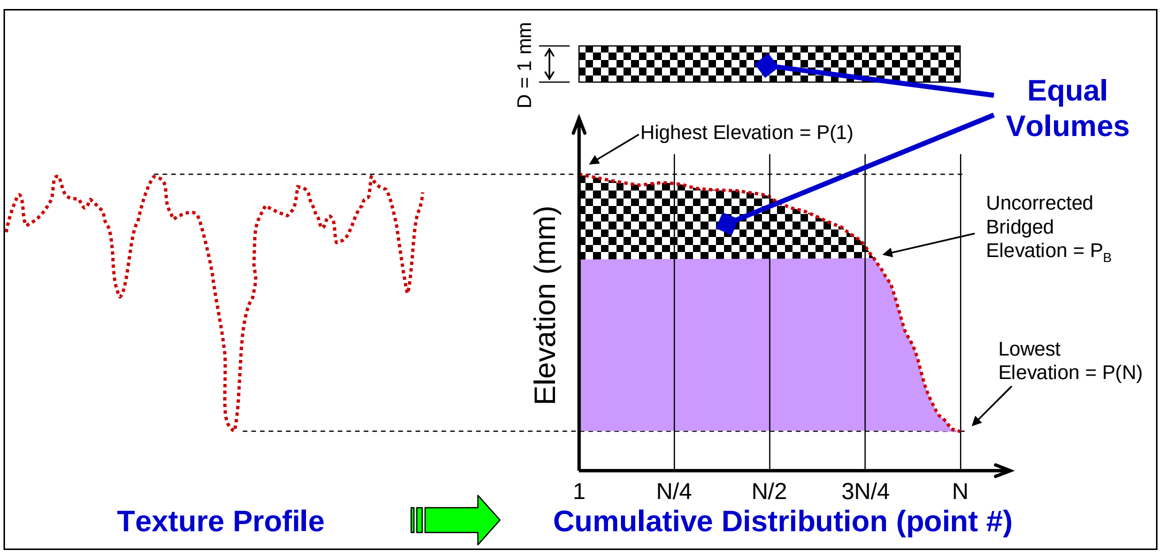


Figure M.13. Using sorted profile elevations to efficiently determining the bridged elevation

Relating Texture to Tire–pavement Noise

With the texture and noise data reduced to a relevant and synchronized form, attention can be turned to seeking a relationship between them. The ideal approach would be to begin with a fundamental (mechanistic) model, and to then seek out validation of this model using this data. While this is the ultimate objective of this overall program, it is outside of the scope of Part 2 due to limitations of available resources.

An empirical approach has been adopted for now, and given the diligence given to reducing the texture data to a relevant form, a number of strong correlations have been realized. Previous research has approached this relationship by investigating components of the spectral content of both the noise and texture data (*2*, *3*).

Figure M.14 illustrates typical spectral distributions for both OBSI and texture data – in this case, for a transverse tined pavement with random spacing. For the OBSI, note the characteristic peak of 1000 Hz (sometimes found to be at 800 Hz). Also note the low-pass attenuation of the shorter texture wavelengths as the filter dimension of 25 mm is approached.

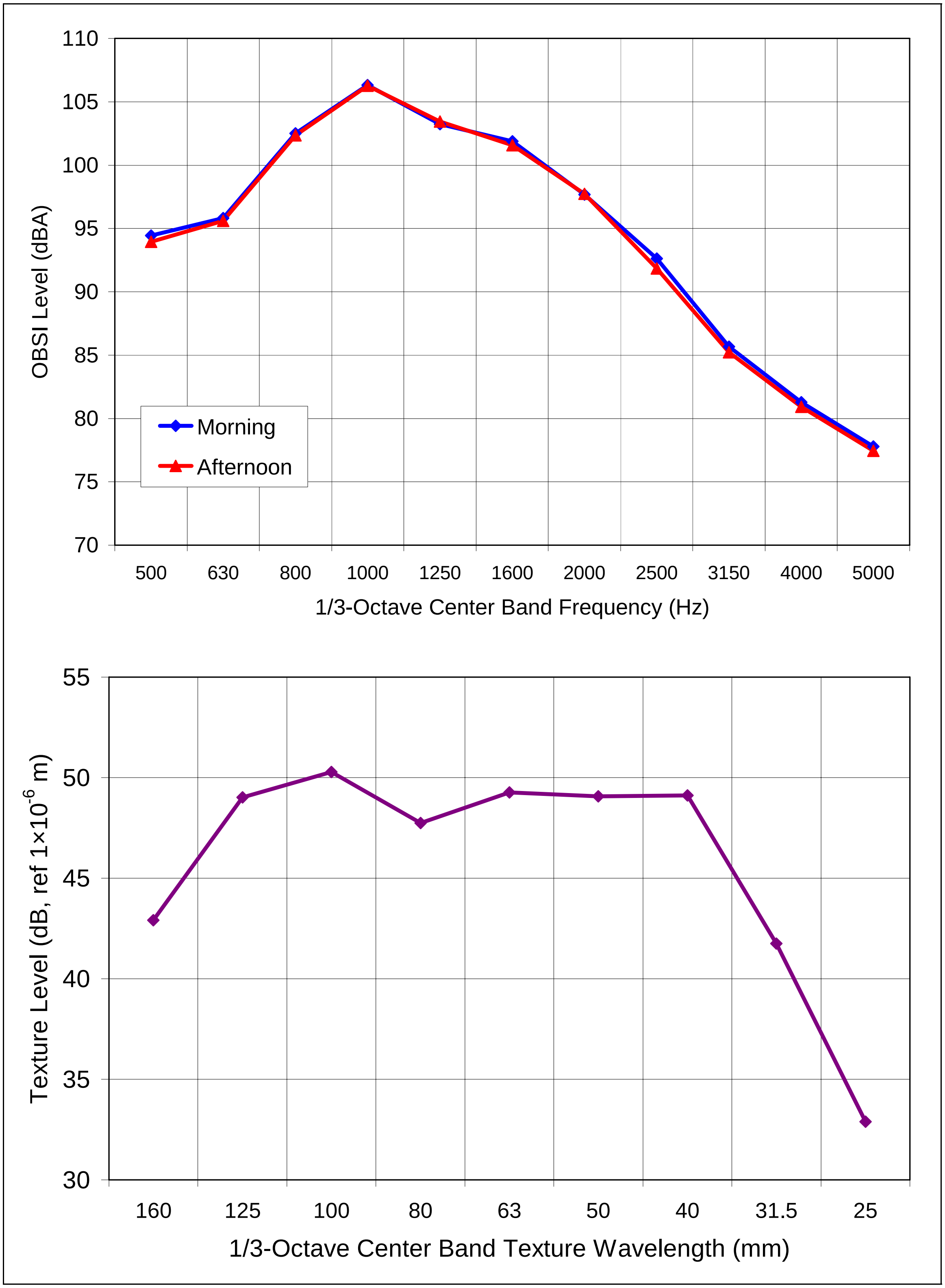


Figure M.14. OBSI and texture spectra for a random transverse tined section

For this example, the OBSI energy that falls within the 630, 800, and 1000 Hz bands were summed, and plotted against the texture spectrum octave band that includes the energy in the 25, 31.5, and 40 mm 1/3-octave bands. These ranges were selected as not only are they complementary at 60 mph, but also capture the greatest proportion of OBSI content at the "peak" of the spectral curve. The result for the random transverse tined section is shown in Figure M.15. As can be seen in this figure, while there is a wide range of OBSI level along the section (in fact, one of the largest variabilities of all of the sections tested), there is a corresponding change in the texture spectral content. Figure M.16 illustrates a shorter segment within this profile, again illustrating the close relationship. The gaps at the gridlines correspond to data at the pavement joints. While the OBSI levels at these locations reveal the contribution of noise to joint slap, as has been reported previously by Donavan (*5*), the texture spectra at these locations are contaminated due to the large transient.

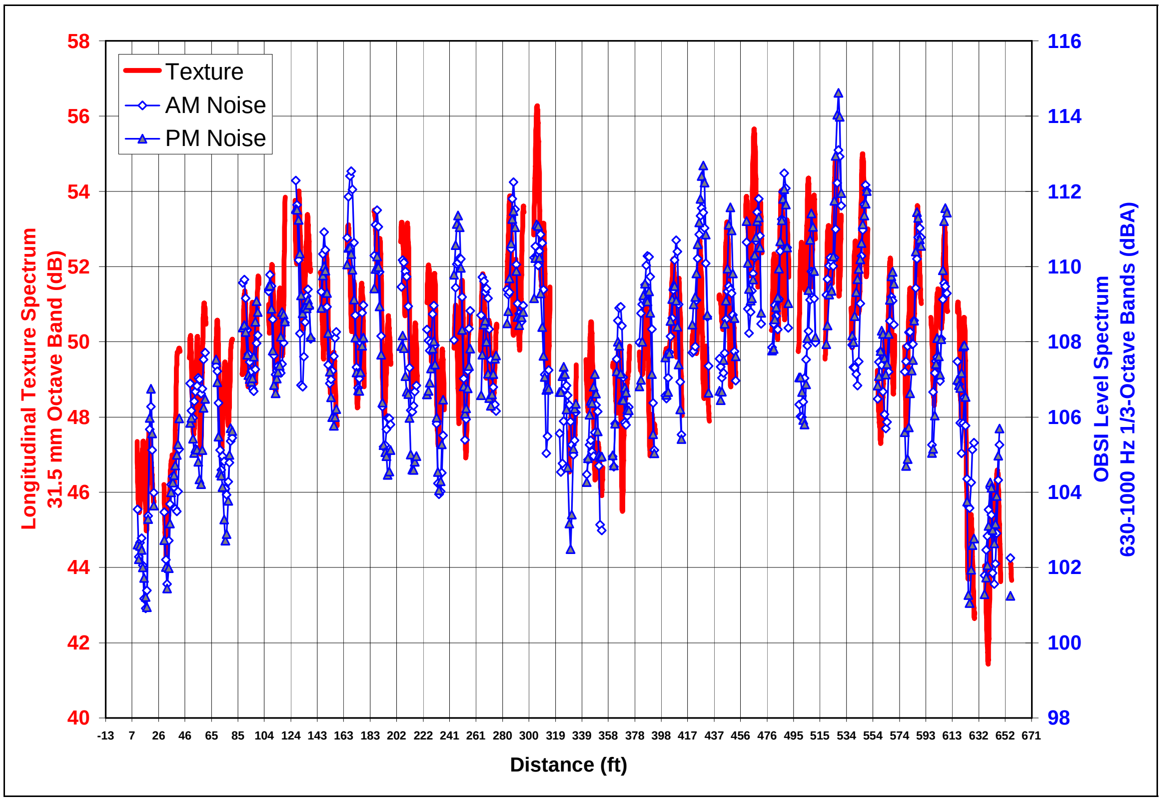


Figure M.15. OBSI and texture spectra for a random transverse tined section

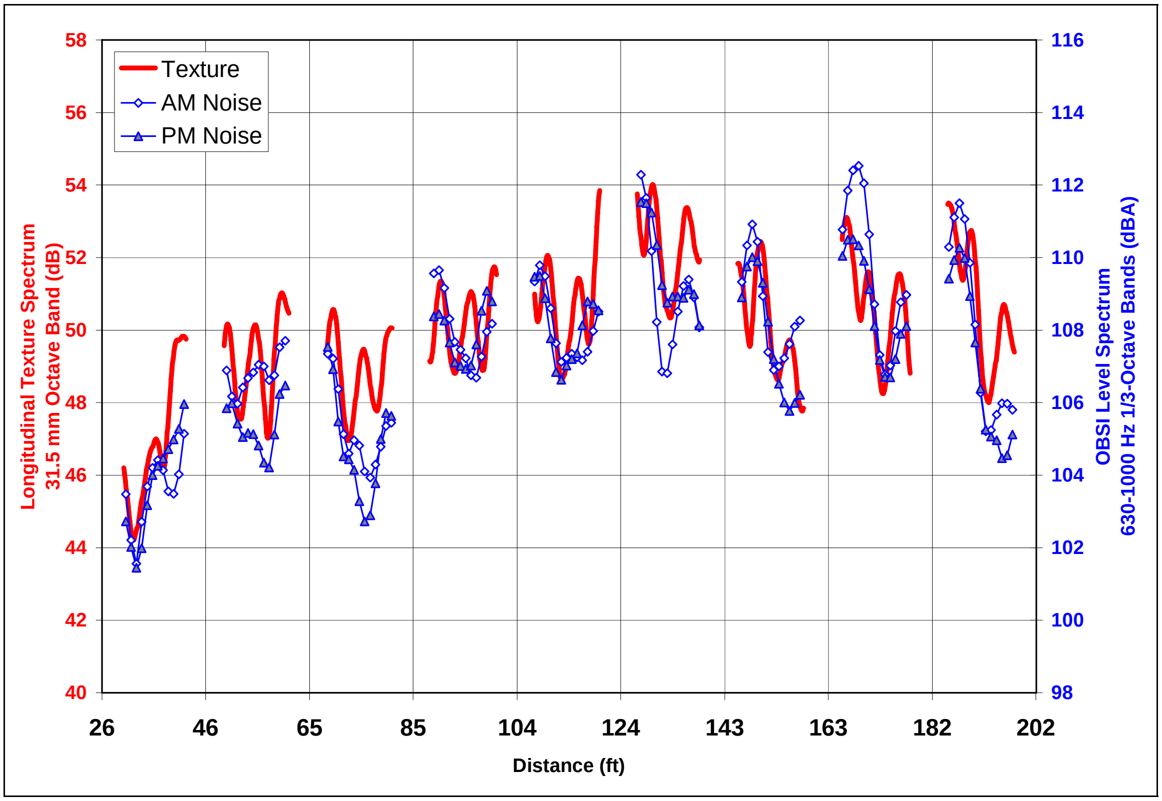


Figure M.16. OBSI and texture spectra for a shorter section of the random transverse tined section

Figure M.17 illustrates how a relationship between texture and noise can be found on concrete pavement textures that are fundamentally different. In this case, a burlap drag section is illustrated.

As shown in these examples, there appears to be a strong relationship between texture and noise, particularly in those spectra that contribute most to the overall noise level. While validation of a mechanistic model would be preferred, the trends shown here show promise that a model may be within reach. The database that has been developed under Part 2 is not only extensive, but care has been taken to ensure that the quality and type of data is such that future endeavors can seek to derive the ideal models. The result will be the ability to optimize pavement surfaces for noise, and ultimately, lower highway noise without compromise.

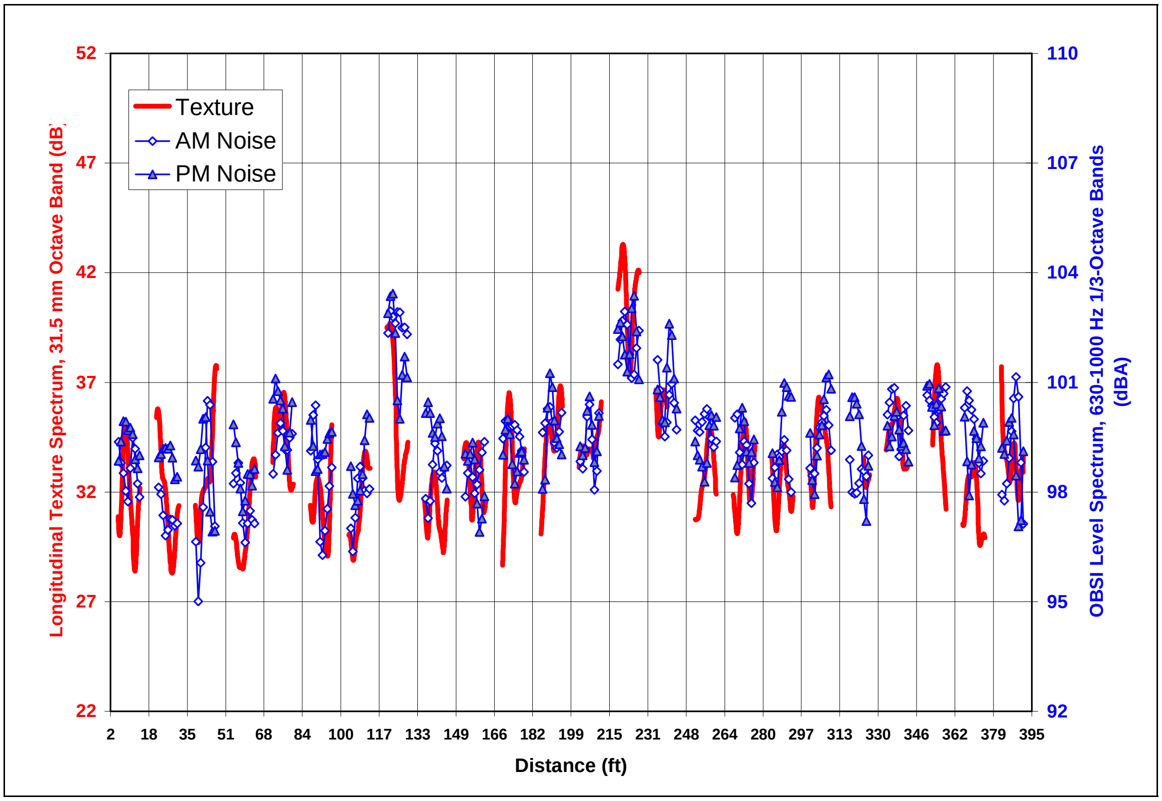


Figure M.17. OBSI and texture spectra for a burlap drag section

References

1) ISO, "Characterization of pavement texture by use of surface profiles – Part 4: Spectral analysis of surface profiles," ISO TC 43 / SC 1, ISO/CD 13473-4 (2006).
2) U. Sandberg and J. Ejsmont, *Tyre/Road Noise Reference Book* (Informex, Handelsbolag, Sweden, 2002).
3) *Guidance manual for the implementation of low-noise road surfaces*, FEHRL Report 2006/02, Ed. by Phil Morgan, TRL (2006).
4) S. Karamihas, "Critical Profiler Accuracy Requirements," University of Michigan research report UMTRI-2005-24 (2005).
5) P. Donavan, "Influence of PCC Surface Texture and Joint Slap on Tire/Pavement Noise Generation," Proceedings of NOISE-CON 2004, Baltimore, MD (2004).

Preliminary Analysis of Joint Effects

On jointed concrete pavements, the design and condition of the joint will affect the level of noise that is created as the tire interacts with it. This effect is often termed “joint slap” and while it occurs for a short duration, the sometimes large transient impulse can contribute to the overall noise level as measured using OBSI.

To quantify the potential effect that joints might have on the overall OBSI level, signal processing techniques must be employed that isolate the acoustical energy in the vicinity of the joint. In theory, if this energy is removed, then the resulting level would be indicative of the pavement without joints. Comparing the “before” and “after” allows for the effect of the joints to be quantified in a relevant manner.

In this project, a preliminary analysis of this effect has been conducted. As discussed in this appendix, short-window FFT methods are used to determine both SPL and SIL. The locations of the joints within the sound files is often readily apparent, as the audible “slap” similarly appears as a transient even in either the raw “pressure” data or the calculated levels when using short windows. These are shown in Figures M.18 and M.19, respectively.

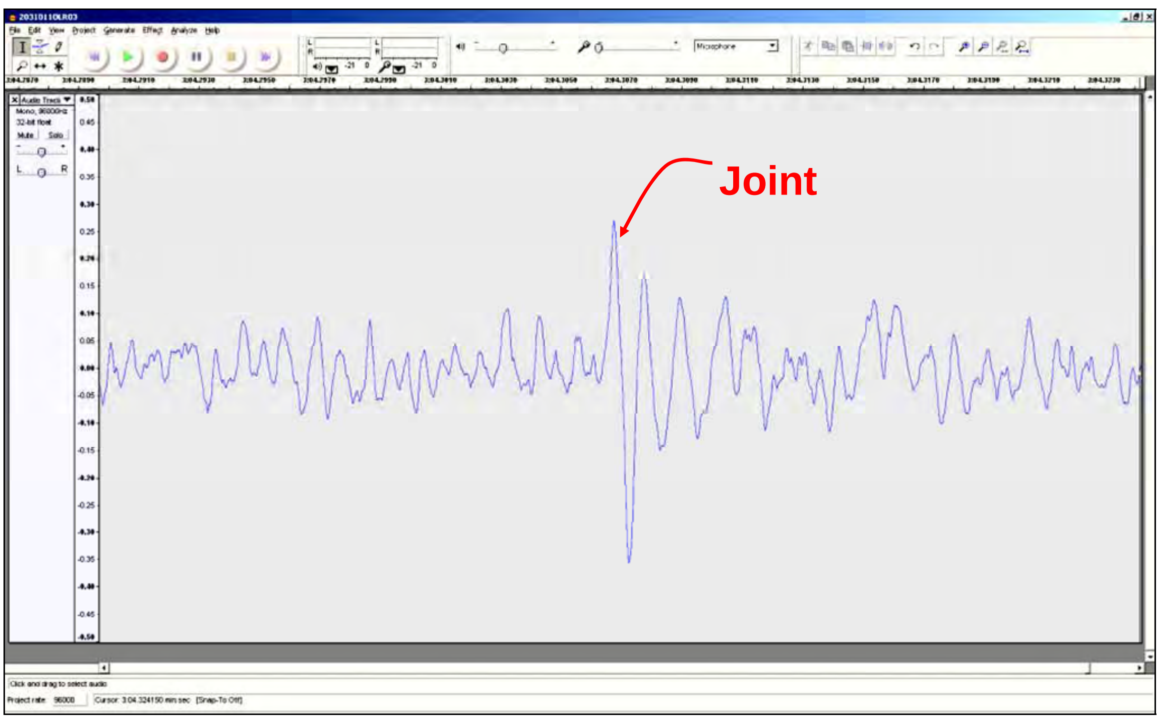


Figure M.18. Screen capture of sound pressure transient corresponding to “joint slap”

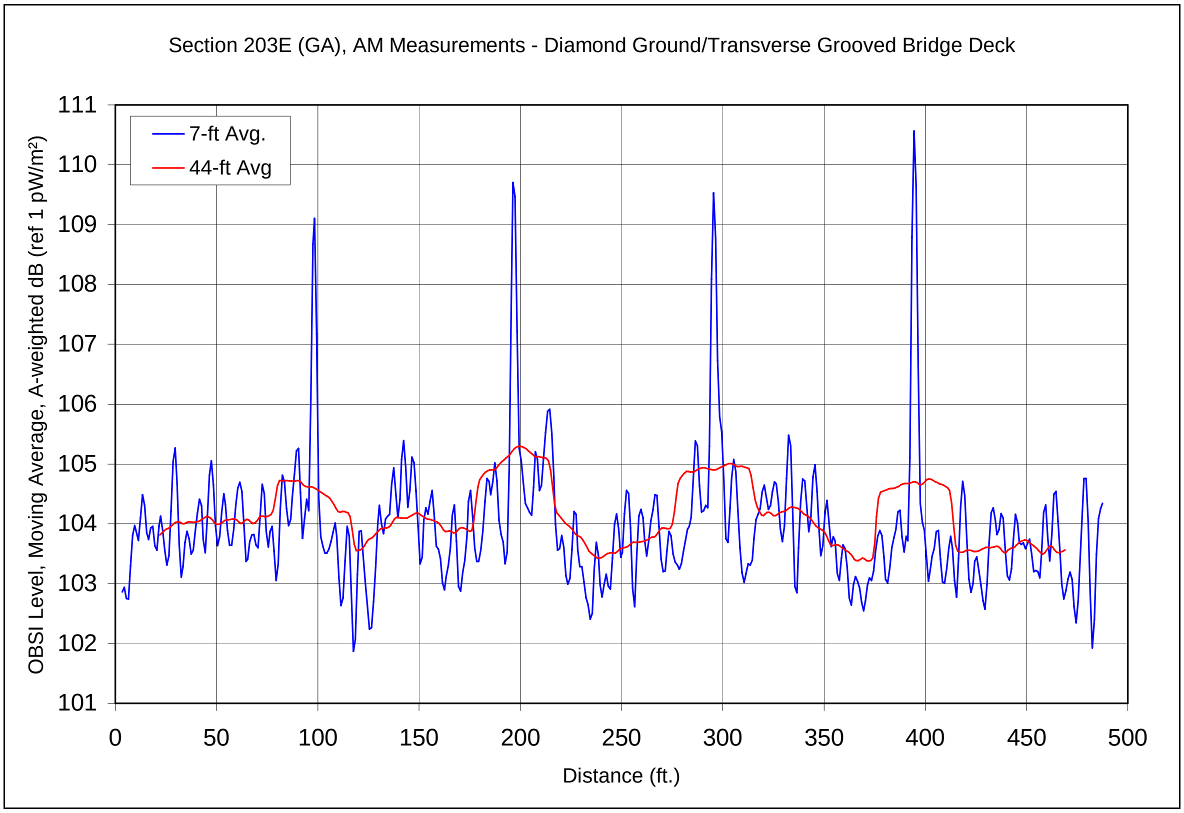


Figure M.19. Sound intensity levels corresponding to "joint slap" transients on a bridge deck.

To better understand how such a small duration the event is, but yet how large the level is in comparison to the background level, a cumulative distribution plot of the sound intensity levels is sometimes helpful. An example of this, corresponding to the same test section, is given in Figure M.20. Photographs of this section are also given in Figures M.21 through M.23.

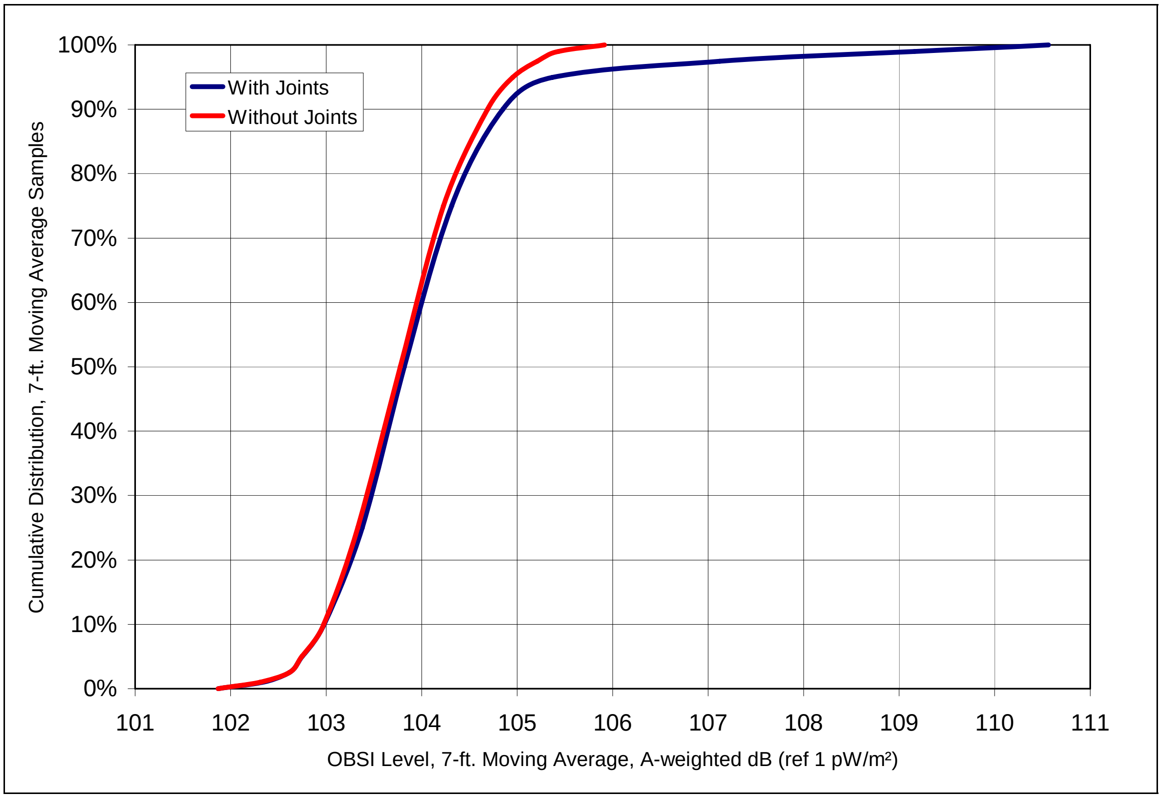


Figure M.20. Cumulative distribution of short window sound intensity levels with and without the effect of joints

Figure M.21. Photograph of example test section—a concrete bridge deck in Georgia

Figure M.22. Close-up of texture on the concrete bridge deck

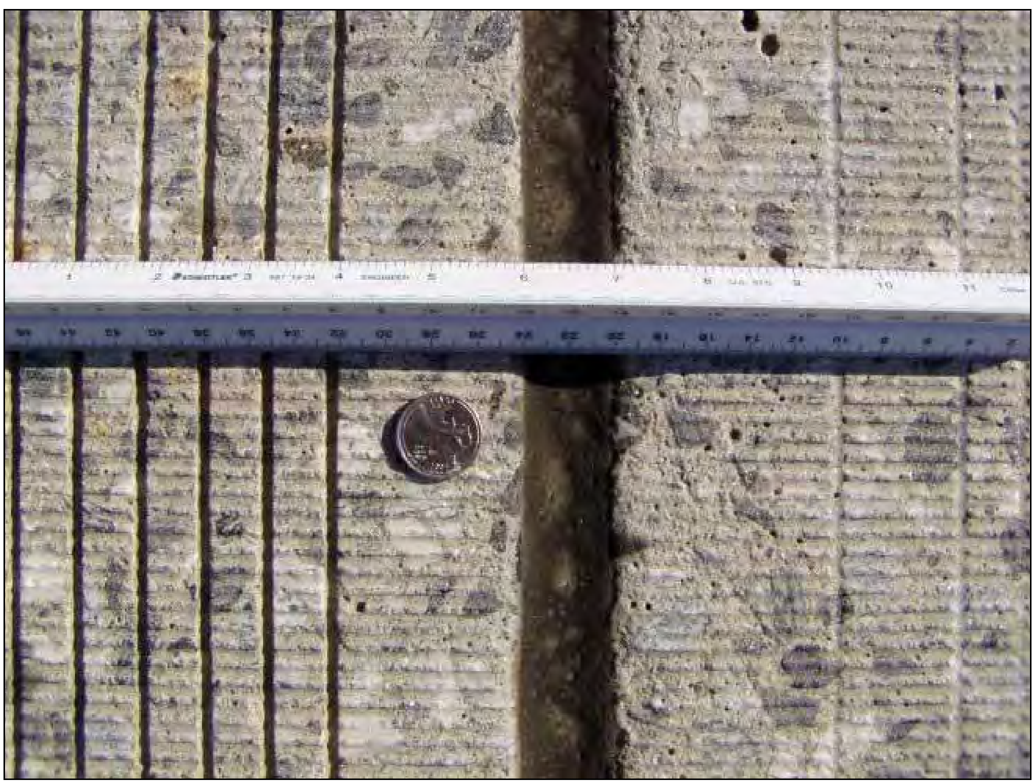


Figure M.23. Close-up of a typical joint on the concrete bridge deck

By digitally cropping the joint transients, an overall sound intensity level and corresponding 1/3-Octave spectra can be calculated before and after. For this example, these are given in Figures M.24 and M.25, respectively.

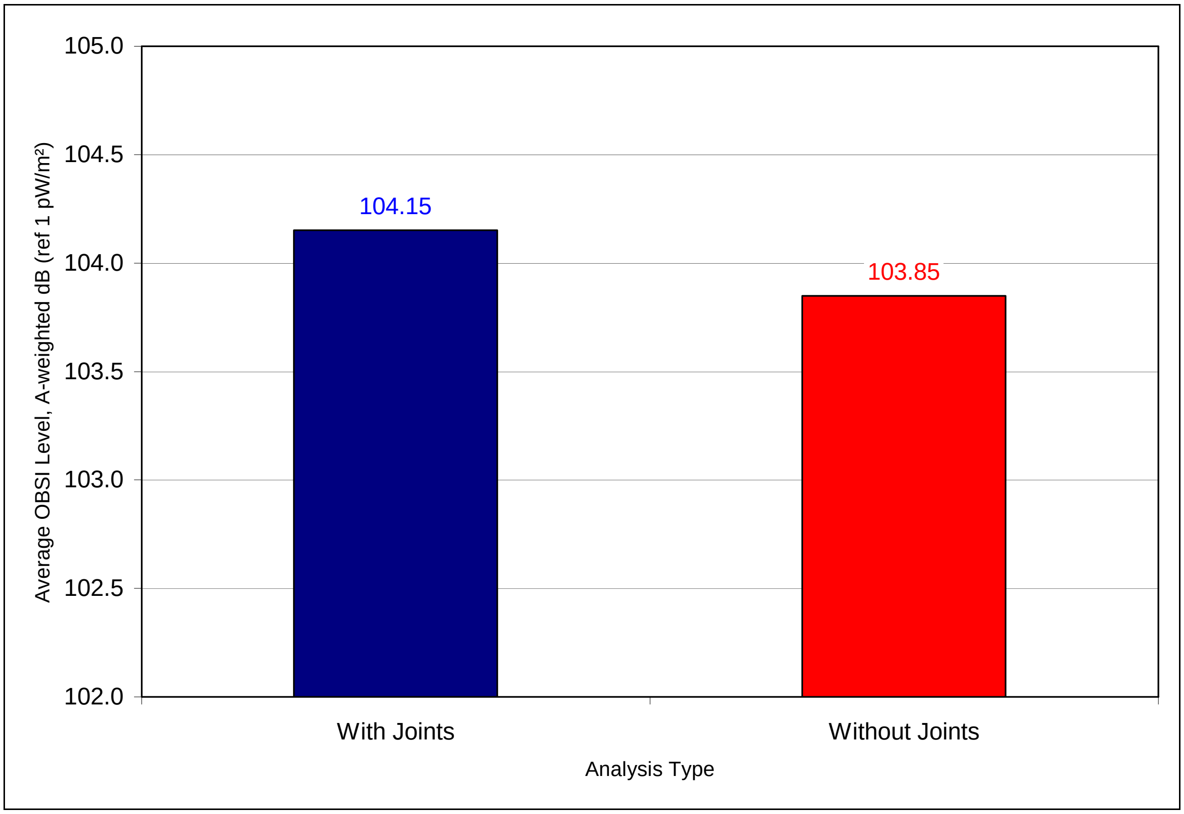


Figure M.24. Overall sound intensity levels with and without the effect of joints

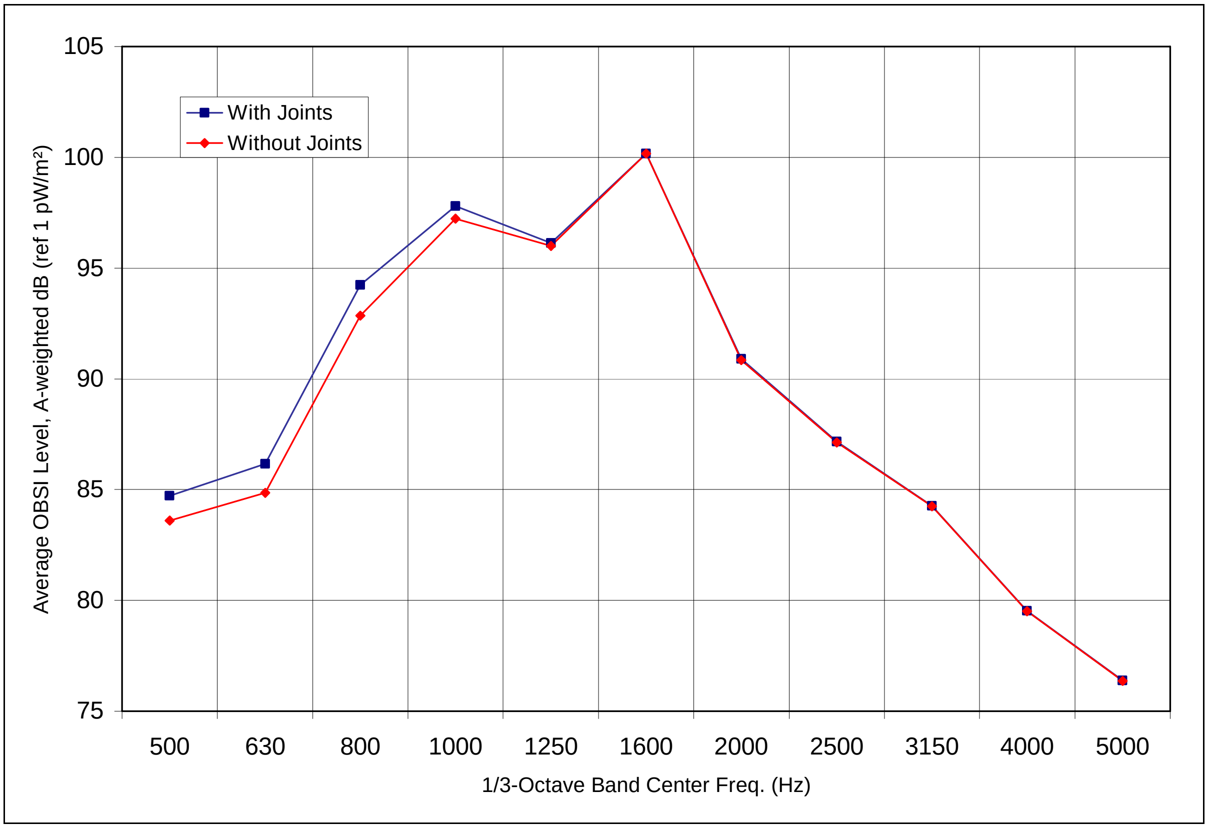


Figure M.25. Overall sound intensity level spectra with and without the effect of joints