

14 May 2020

Ms. Erin Abline, P.E.
Suburban Consulting Engineers
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Flanders, New Jersey 07836
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Re: Acoustical Evaluation of Proposed Trailer Parking Lot
Mars Incorporated
Hackettstown, New Jersey
LSG&A File: 2020016

Dear Ms. Abline:

As you requested, Lewis S. Goodfriend & Associates (LSG&A) has conducted an acoustical evaluation of the proposed trailer parking lot at the Mars Incorporated facility in Hackettstown, New Jersey. LSG&A understands that there are concerns regarding the potential acoustical impact on the adjacent residential properties to the west. This letter summarizes LSG&A's acoustical measurements, evaluation, and recommendations for the application. The results indicate that by implementing the recommended operational controls and constructing a sound barrier, the sound levels due to the proposed trailer parking lot activities are expected to meet the applicable limits of the NJDEP noise regulation at the nearest residential property lines.

1.0 SITE LAYOUT

The Mars facility is located at 700 High Street, in Hackettstown, New Jersey. The proposed trailer parking lot is to be located on the south side of the site, in place of the former wastewater treatment facility. The nearest residential properties are located approximately 400 feet to the west of the proposed parking lot. The site and adjacent areas are shown on Figure 1, at the end of this letter.

2.0 REQUIREMENTS OF THE APPLICABLE NOISE REGULATIONS

The New Jersey Department of Environmental Protection (NJDEP) maintains a statewide noise regulation, and the Town of Hackettstown also has regulations regarding sound.

2.1 NJDEP Noise Regulation

For continuous airborne sound, the NJDEP noise regulation limits the A-weighted¹ sound levels produced by a commercial or industrial facility, when measured at a residential property line, to the following sound levels:

Daytime	(7:00 A.M. -to- 10:00 P.M.)	–	65 dB(A)
Nighttime	(10:00 P.M. -to- 7:00 A.M.)	–	50 dB(A)

The NJDEP regulation also provides limits for sound pressure levels in the preferred octave bands with center frequencies between 31.5 and 8000 hertz during the daytime and nighttime hours, as summarized in Table 1.

Table 1 – Daytime and Nighttime Sound Pressure Level Limits [dB re: 20μPa] of the NJDEP Noise Regulation for Residential Property Receivers (NJAC 7:29)									
	Octave Band Center Frequency, Hz								
	31.5	63	125	250	500	1000	2000	4000	8000
Daytime Limits	96	82	74	67	63	60	57	55	53
Nighttime Limits	86	71	61	53	48	45	42	40	38

The NJDEP regulation also limits the sound pressure levels for commercial receiving property lines. These limits are equivalent to the daytime limits described above, but are imposed 24 hours a day.

For impulsive² sound, The NJDEP regulation limits the sound level to 80 dB(A), as measured by a sound level meter set to fast response. The limit for impulsive noise is in effect 24 hours per day. Impulsive sound that repeats more than four times in a nighttime hour is limited to 50 dB(A) when measured at a residential receiver.

¹A-Weighting, noted as dB(A), is a standardized sound level meter setting having a frequency characteristic similar to the human ear/brain frequency sensitivity and, therefore, provides an overall sound level measurement that correlates with how humans perceive sound.

² The impulsive noise section of the regulation is applied to noise that has a duration less than one second. Examples of impulsive noise would include gun shots and door slams.

2.2 Hackettstown Noise Regulation

The local noise regulation is set forth in the Code of the Town of Hackettstown. Section 9-70 (*Noise Prohibited*) provides language that subjectively prohibits “unnecessary or unusual noise.” In addition, Section 509-D of the Town of Hackettstown Land Development Ordinance defers to the regulations established by the NJDEP. As the local noise regulation does not provide any quantitative sound level limits, the sound emissions from the proposed operations were evaluated with respect to the NJDEP regulation.

3.0 BASELINE MEASUREMENTS

3.1 Measurements

On Saturday, 8 February 2020, Jack Zybura, P.E., of LSG&A visited the site to set up a 24-hour monitor to measure the baseline sound pressure levels. Figure 1, at the end of this letter, shows an aerial view of the site with the acoustical measurement location identified. The results of these measurements indicated average hourly sound levels of 49 to 65 dB(A) on the west side of the site. The L_{eq} ³, L_{10} ⁴, and L_{90} ⁵ results of the monitoring period are shown in Figure 2, at the end of this letter.

The hourly A-weighted sound pressure levels were measured over a period of 24 hours, beginning at 11:00 A.M. on 8 February 2020. Sound sources that contributed to the ambient sound pressure levels during the measurement included traffic, HVAC equipment, wildlife, wind, and aircraft. The meteorological conditions during the measurement period included a temperature range of approximately 17-24 degrees Fahrenheit, a relative humidity range of 40-75 percent, and variable wind with speeds of 0 to 10 mph. All surfaces were dry throughout the duration of the measurement.

³ The L_{eq} represents the energy-averaged sound pressure level during the measurement period.

⁴ The L_{10} is the sound pressure level exceeded 10 percent of the time, and represents the transient sound pressure levels during the measurement period.

⁵ The L_{90} is the sound pressure level exceeded 90 percent of the time, and represents the background sound pressure levels during the measurement period.

Mr. Zybura returned to the site on Wednesday, 12 February 2020, to perform close-proximity sound level measurements of trailer jockey operations, trailer hitching/unhitching operations, and trailer refrigeration unit operations. The results of these measurements were used in LSG&A's acoustical model to determine the impact of the proposed operations in the new parking lot.

3.2 Data Acquisition and Analysis

Measurements of the airborne sound pressure levels were performed using one of LSG&A's Rion Type NL-52 precision sound level meters, equipped with a Rion Type UC-59 microphone. The analyzer automatically records statistical A-weighted and one-third octave band sound pressure levels and stores the results in memory for later retrieval. The analyzer was mounted on a tripod at a height of approximately 5 feet above grade, and a windscreen was placed over the microphone for all measurements. The system calibration was verified in the field before and after the measurements using a Brüel & Kjær Type 4231 acoustical calibrator. The stored data was later downloaded and transferred to a spreadsheet for evaluation. Copies of the NIST traceable calibration certificates for the sound level measurement equipment are available upon request.

4.0 ACOUSTICAL EVALUATION

LSG&A completed an acoustical evaluation in order to determine the expected sound generated by trailer operations in the proposed lot. LSG&A utilized operational sound emissions data for the trailers based on measurements of operation at the facility. The following sound emission data were incorporated into the analysis.

- Trailer Jockey Movement
- Trailer Jockey Hitching to Trailer
- Trailer Jockey Raising Trailer
- 33 Trailer Refrigeration Units Running Simultaneously

LSG&A used the above data to prepare an acoustical model using SoundPLAN software. Calculation of the expected sound pressure levels was based on the distances between operations and the residential receivers across High Street, reflections and shielding from buildings and trailers, and the topographical features of the site and surrounding areas.

LSG&A understands that only one jockey will operate at time within the lot. Therefore, the acoustical model was configured to calculate the maximum sound level expected from a single jockey operation at any point within the lot, and the maximum sound levels expected from a single trailer hitching and raising event occurring at any of the delineated parking spaces.

5.0 RECOMMENDATIONS

The results of the evaluation indicated that the proposed operations would comply with the daytime limits of the noise regulation. However, additional noise control measures would be necessary in order to comply with the nighttime limits of the noise regulation. In order to meet the nighttime limits, LSG&A developed the following recommendations:

- Silence the jockey backup alarm while in the lot during nighttime hours (10 P.M. – 7 A.M.). LSG&A understands that this can be accommodated by the use of a “kill switch” which would deactivate the alarm for a short time period.
- Limit refrigeration unit use to the eastern-most spots. LSG&A understands that this can be accommodated by the use of signage within the lot and employee training.
- Install an 18 foot tall sound barrier along the western edge of the proposed lot. The sound barrier should start from southern-most edge of the proposed lot, extend north, and angle towards the east once near the driveway. Figure 3, at the end of this letter, shows the proposed placement of the sound barrier. Appropriate barrier construction includes a prefabricated modular panel system, such as the following:
 - **Tuf-Barrier, by AIL Sound Walls (PVC construction)**
AIL Sound Walls (<http://ailsoundwalls.com/>)
Craig Cook
AIL Sound Walls
(678) 260-8687
ccook@ailsoundwalls.com

LSG&A's sound barrier recommendation is based upon acoustical performance only. All other aspects of the final design, construction, and implementation of the recommended sound barriers must be provided by a licensed structural or civil engineer for correct support, loading, and code compliance.

6.0 RESULTS AND DISCUSSION

Table 2, below, shows the expected sound levels at the west residential property line during various activities in the proposed trailer parking lot. These results include the effect of the recommended operational controls and sound barrier, and are compared to the nighttime limit of the NJDEP noise regulation.

Table 2 – Expected Sound Levels at the West Residential Property Line due to Various Trailer Parking Lot Activities, Mars Incorporated, Hackettstown, New Jersey.		
Activity in Proposed Lot	Type of Sound	Sound Level, dB(A)
33 Trailer Refrigeration Units Running Simultaneously	Continuous	46
Trailer Jockey Movement, plus 33 Refrigeration Units	Continuous	49
Trailer Jockey Raising Trailer, plus 33 Refrigeration Units	Continuous	50
Trailer Jockey Hitching to Trailer	Impulsive	46
NJDEP Limits (Day/Night)		65/50

For the events that are characterized as continuous sound, the octave band sound pressure level results are provided in Figure 4, at the end of this letter. The results indicate that by implementing the recommended operational controls and sound barrier, the sound levels due to the proposed trailer parking lot activities are expected to meet the applicable daytime and nighttime limits of the NJDEP noise regulation.

Please note that all recommendations included in this report are acoustical in nature and should be reviewed by the appropriate licensed design professionals. Alternative products should be submitted to LSG&A for review. I trust that this information is sufficient for your present needs. Please call if you have any questions regarding this report.

Very truly yours,

LEWIS S. GOODFRIEND & ASSOCIATES



Jack A. Zybur, P.E., INCE Bd. Cert.
Project Manager

JAZ:jaz
Enclosures

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Figure 1 – Aerial View showing the Acoustical Measurement Location, Proposed Trailer Parking Lot Area, and Nearest Residential Property Line, Mars Incorporated, Hackettstown, New Jersey.



All Locations Approximate
Not to Scale

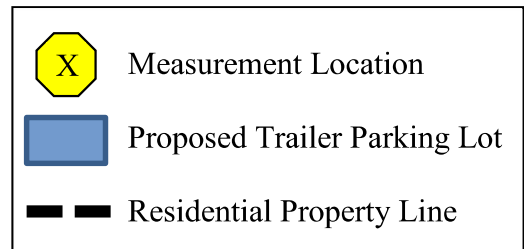


Figure 2 – Baseline Sound Levels at the West Property Line Measured During a 24-Hour Period, Mars Incorporated, Hackettstown, New Jersey, 8-9 February 2020.

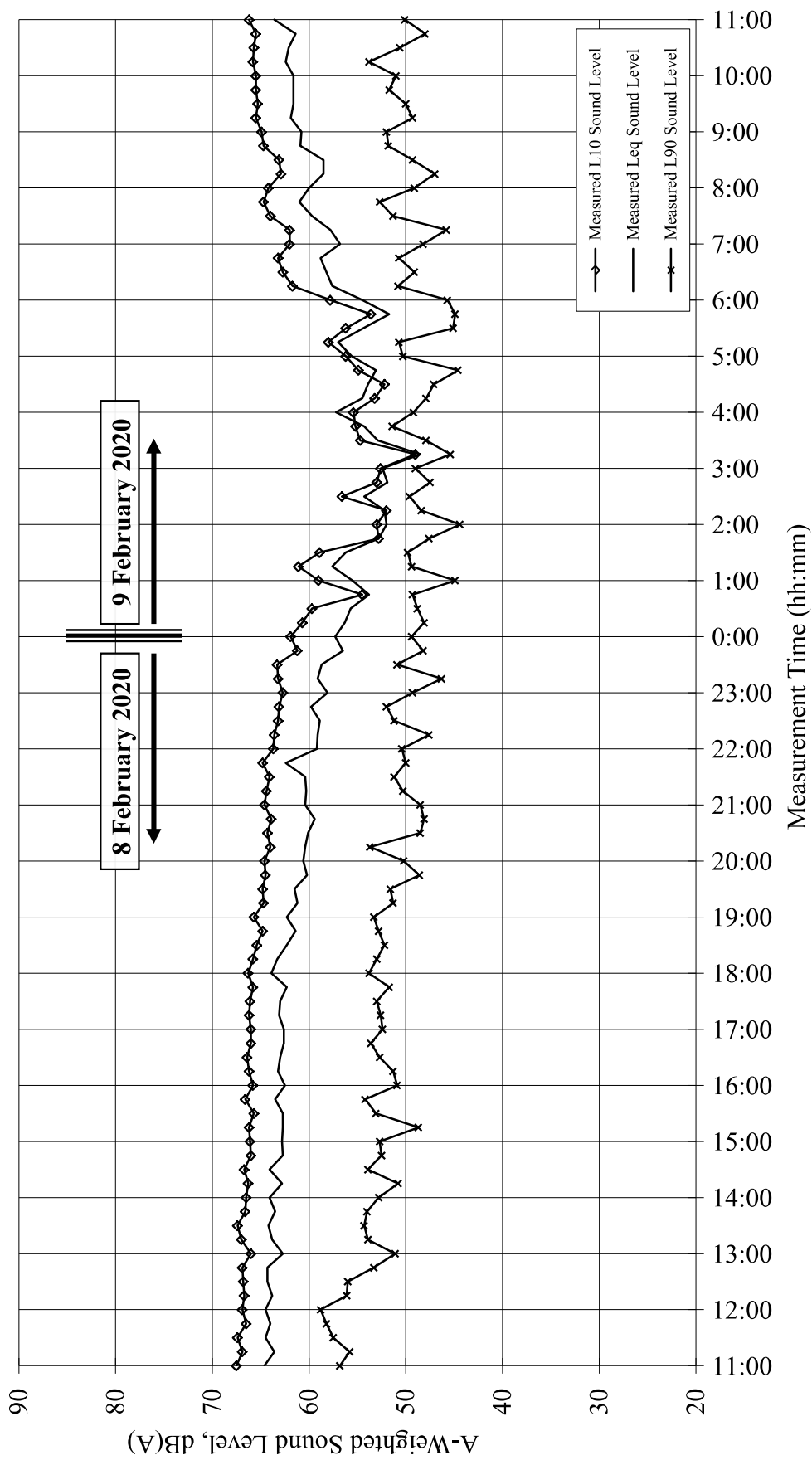


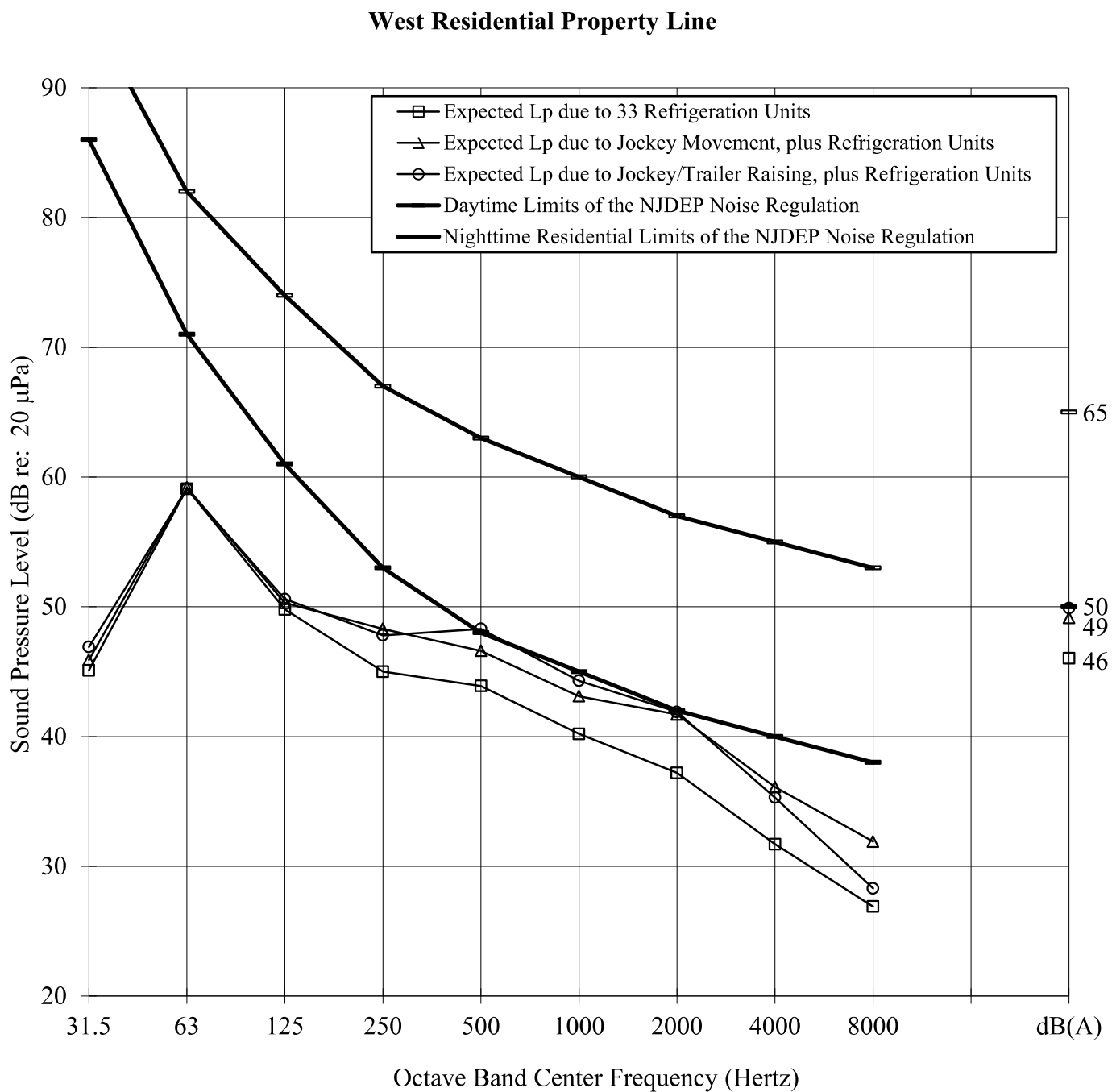
Figure 3 – Existing Aerial View showing the Recommended Placement of the Sound Barrier, Mars Incorporated, Hackettstown, New Jersey.



All Locations Approximate
Not to Scale
Not for Construction

 Proposed Sound Barrier

Figure 4 – Expected Sound Pressure Levels (Lp) at the West Residential Property Line due to Various Trailer Parking Lot Activities, Mars Incorporated, Hackettstown, New Jersey.



Tuf-Barrier (Reflective) Sound Barrier Walls

Smooth PVC panels engineered for strength and versatility in a wide variety of sound wall applications.

Tuf-Barrier noise barrier walls reflect unwanted noise back to its source and beyond

PVC Reflective Sound Barrier Wall System

Lightweight and easy-to-install, our Tuf-Barrier Sound Walls are engineered for the maximum reflection of ambient or environmental noise such as industrial, manufacturing, traffic or commercial noise. Our walls not only block and reflect unwanted noise, they're also built in a way that makes it easy for graffiti and tagging to be removed.

Tuf-Barrier's smooth surface is designed to reflect unwanted noise in railway or highway noise barrier walls and many other applications. With an overall density of more than four pounds per square foot, and the ability to withstand a considerable wind live load, AIL's Tuf-Barrier reflective sound wall system is known for its strength and sound reduction performance.



Tuf-Barrier Features

- ▶ Blocks and reflects unwanted noise
- ▶ Easy-off graffiti and tagging
- ▶ Textured finishes available
- ▶ Lightweight and durable PVC construction
- ▶ Interlocking tongue and groove connection
- ▶ Quick and easy to install

Reflective sound mitigation for highway noise barriers and other applications

With their perforated absorptive panels and construction versatility in narrow job sites, Tuf-Barrier is the go-to sound barrier solution for demanding sound mitigation jobs like railway or highway noise barriers and other applications. [See product specifications >>](#)



Easy to install with local crews and reduced need for lifting equipment

AIL Sound Walls are constructed with tongue and groove PVC panels. Panels are stacked and placed within standard steel posts to the required height and capped with a top panel. A standard panel is 10 ft. (3.0 m) in length and weighs only 21 lbs. (9.5 kg). See how easy AIL Sound Walls install on a variety of footing types in our [Installation Video >>](#).

- ▶ Lower installed costs
- ▶ Sustainable and maintenance-free
- ▶ Will not rust, rot or stain
- ▶ Impervious to rain, snow, ice and sleet
- ▶ Wind load tested for hurricane-force winds
- ▶ Meets accelerated test requirements for durability
- ▶ Designed to meet applicable design codes (AASHTO, IBC, CSA)
- ▶ Variety of colours, textures and options
- ▶ Adaptable to different footing systems
- ▶ Also available as Tuf-Barrier XL for lengths of up to 16'

[Product Specifications >>](#)



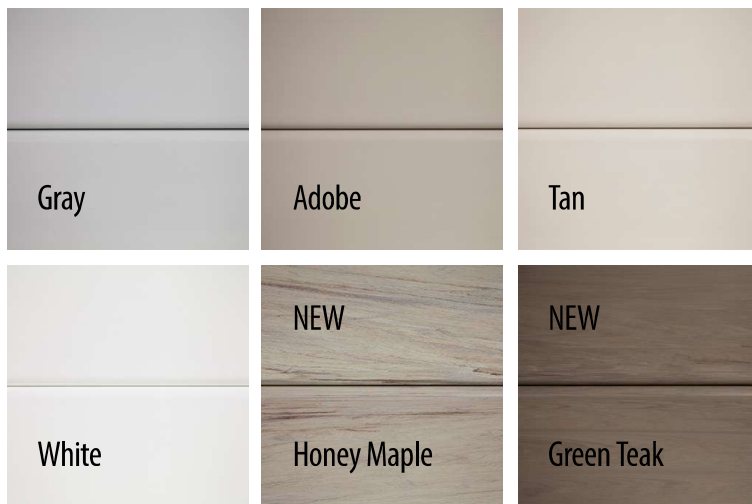
Introducing Tuf-Barrier *XL* — going the distance for better value

Tuf-Barrier *XL* can now reach lengths of 14' or 16' between posts which means fewer posts and foundations for even lower installed costs. With this *XL* product innovation, we can now design our sound barrier walls with longer spans for all types of wind conditions — even hurricane zones. Ask your AIL Sound Walls Representative about putting this latest product innovation to work for your better bottom line.

A variety of colors and textures

AIL Sound Walls are available in a variety of attractive colors and woodgrain textured finishes.

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Add an optional embossed woodgrain texture to any flat colour.

