

NOISE STUDY

PALMER TRINITY PRIVATE SCHOOL, INC.

VPB-14-001

SIEBEIN ASSOCIATES, INC.
Consultants in Architectural Acoustics
625 NW 60th Street, Suite C Gainesville, Florida 32607
Telephone - (352)-331-5111 Facsimile - (352)-331-0009

January 28, 2014

Mr. Jose Chao
CPA/CFO
Palmer Trinity School
7900 SW 176th Street
Palmetto Bay, Florida 33157

Dear Jose:

This letter summarizes the findings of an acoustical study of the current master plan conducted by our firm for Palmer Trinity School in Palmetto Bay, Florida. The study is based on observations of the existing facilities and acoustical measurements made during a visit to the site on January 16, 2014; a review of the current master plan for the school presented in drawings by MCHarry Associates dated January 13, 2014; meetings with MCHarry Associates and Palmer Trinity staff to discuss the master plan on January 22, 2014; a review of a *Community Noise Study* dated May 2, 2010 conducted by the Audio Bug for the school that documented sound levels in the adjoining neighborhoods; and acoustical analysis conducted in our office.

INTRODUCTION

1. Siebein Associates, Inc. staff visited the Palmer Trinity campus on January 16, 2014 and conducted acoustical measurements of typical school activities during the middle of a school day. These included sounds of students walking across campus and talking during a change of classes, sounds from air conditioning units operating in different buildings and sounds of students actively playing and socializing on play fields during lunch breaks.

ACOUSTICAL REVIEW OF *THE COMMUNITY NOISE STUDY* CONDUCTED BY THE AUDIO BUG in 2010

1. The conclusions of the *Community Noise Study* produced by the Audio Bug indicated that non-amplified human voices such as those at sporting events and other student activities are exempt from the provisions of the noise ordinance.
2. It was also concluded that all of the extensive acoustical measurements made by the Audio Bug of activities on campus including "*sporting events; football practice sessions, tennis classes and a baseball game . . . sounds of activities held on the school's campus never exceeded the Ordinance's limits at any time during our testing (Community Noise Study, 2010, p. 4).*"
3. It is further stated that "*Data gathered during our Study indicate that sound levels emanating from Palmer Trinity School currently do not exceed those levels or durations specified in the Village's Noise Ordinance. Based on personal observation and the measurements gathered, it is my*

professional opinion that, while sound from the school is at times audible at some listening positions, these sounds do not approach the 65 dBA sound level limit provided in the Ordinance” (ibid, p. 4).

4. Extensive measurements summarized in tables and graphs are included in the study to substantiate these conclusions.

ACOUSTICAL REVIEW OF THE CURRENT MASTER PLAN

1. The current master plan for the facility developed by MCHarry Associates is dated January 22, 2014.
2. The master plan shows the maintenance of the existing landscape buffer and noise attenuating walls that surround most of the campus perimeter.
3. Future plans call for future construction of several field houses located near existing and proposed athletic facilities, a new swimming pool, spectator seating and pool house, a new Gymnasium, Chapel, Auditorium, Dining Hall and Student Services Building, Class Room Buildings, Art Lab and Classrooms, Media Center, Administration Building, football field and running track with limited spectator seating areas, tennis courts, improved and/or relocated soccer and baseball fields, compactor area, chiller and main entrance.
4. Noise mitigation planning strategies are presented for those activities that may present acoustical issues in the future including the landscape buffers and setbacks, new swimming pool, public address systems for athletic events, the compactor area, the proposed central chiller plant (if used) and delivery trucks.

NOISE MITIGATION STRATEGIES TO BE CONSIDERED IN THE MASTER PLAN

1. Maintain the existing 50 ft setback, landscape buffer and noise attenuating walls already in place around the perimeter of much of the campus.
2. The main entry road will move to the center of the campus off SW 184th Street. The existing entry road is located off SW 176th Street. While the number of students will increase in the future (10 to 20 years), traffic will be diverted to SW 184th Street and will alleviate traffic on 176th Street in addition to other measures such as additional bus service routes and car-pooling. This will result in a reduction of trips and sounds propagated to the neighborhood during parent drop-off and pick-up times.
3. The main entry road with a setback of approximately 130 ft. from the property boundaries which is 21 times the existing setback, will reduce sounds by approximately 25 to 27 dB at the boundaries even with the increase in numbers of students on campus.
4. The barrier wall along the dumpster and the turn around area for delivery trucks should be approximately 13 to 15 ft. above the grade level of the road the trucks will drive on the block the acoustical line-of-sight between the top of the truck exhaust pipe which is one of the major noise sources on trucks and people standing in the adjoining yards to maximize the insertion loss or

sound reduction provided by the barrier wall. The barrier wall should be constructed of a material that has a sound absorbing facing so sounds from the truck and/or compactors are not reflected off near by buildings and propagated back to the residences. Perforated metal or pvc facings can be applied to prefabricated barrier wall products or prefabricated sound absorbing panels can be applied to the surface of a pre-cast concrete or concrete masonry unit wall would meet this requirement. Manufacturers' cut sheets of recommended barrier wall products and sound absorbing panels that can be used outdoors are included in Appendix A.

The barrier wall should be constructed of a material with a Sound Transmission Class (STC) rating > 20 to 25 to reduce the levels of sounds propagating through the wall assuming that an insertion loss of 10 to 12 dB is achieved by the barrier wall which would result in sounds on the other side of the barrier being heard as 1/2 as loud as they would be if the barrier were not constructed. This requirement would be met by walls made of sound barrier pvc, concrete masonry units or metal acoustical barrier materials. The bottom of the wall should be embedded in the earth adjacent to the wall so sounds do not flank or leak underneath the wall. Specific acoustical engineering analysis of the barriers can be conducted at the time of the design and construction of the barriers and other areas.

The wall should be elongated as shown in figure 1 to block lines-of-sight to adjoining properties. Similar walls should be considered at the new Kitchen loading area once the new Dining Building is constructed.

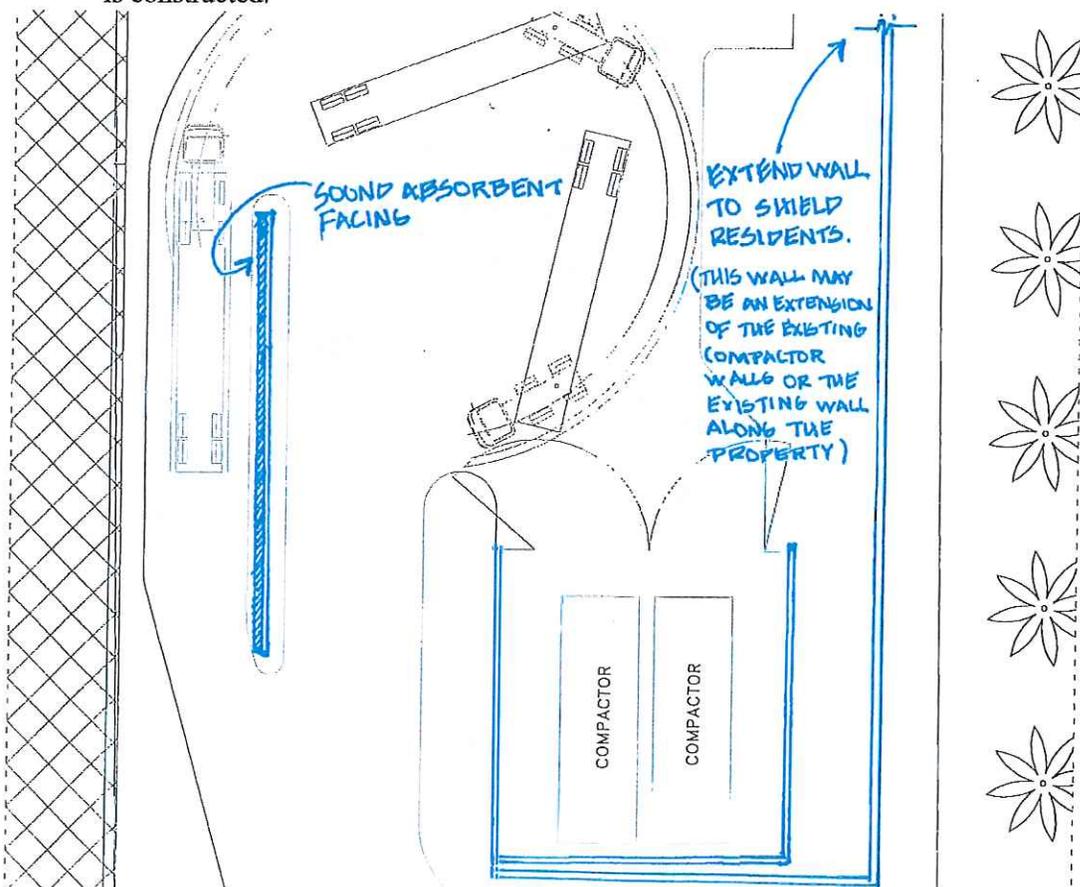


Figure 1. Concept sketch of noise mitigating wall at compactor.

5. The football field and running track are located in the center of the property which places them at the greatest possible distance from the property lines with distances of 190 ft or more to adjoining properties. Sounds at these distances would be heard as approximately 10 to 12 dB quieter than if the fields adjoined the 50 ft. setback buffer. This would be heard as half as loud.
6. There are small seating areas adjoining the football field and several of the baseball and soccer fields. It is suggested to construct these seating areas as partial acoustical enclosures to reduce the propagation of sounds from spectators propagating to the neighborhood as well as to restrict the sounds propagating off campus from loudspeakers used for announcements during sporting events.

The spectator seating areas would be designed similar to the prefabricated metal seating sections currently on site in shape. An insulated metal panel roof, side walls and rear walls would be added to enclose the seating on 4 sides. The side and rear walls of the enclosure and the underside of the roof/ceiling would be lined with sound absorbent finishes suitable for exterior environments. Narrow dispersion, controlled directivity loudspeakers would be mounted under the roof/ceiling structure pointed back at the spectators so sounds would travel short distances to the seated spectators so the volume of the loudspeakers could be controlled. The sound propagating from the loudspeakers to the spectators would strike the absorbent rear and side walls of the enclosure or the seated spectators and be absorbed greatly reducing off site noise propagation from the loudspeakers. A concept sketch of this solution is shown in figure 2.

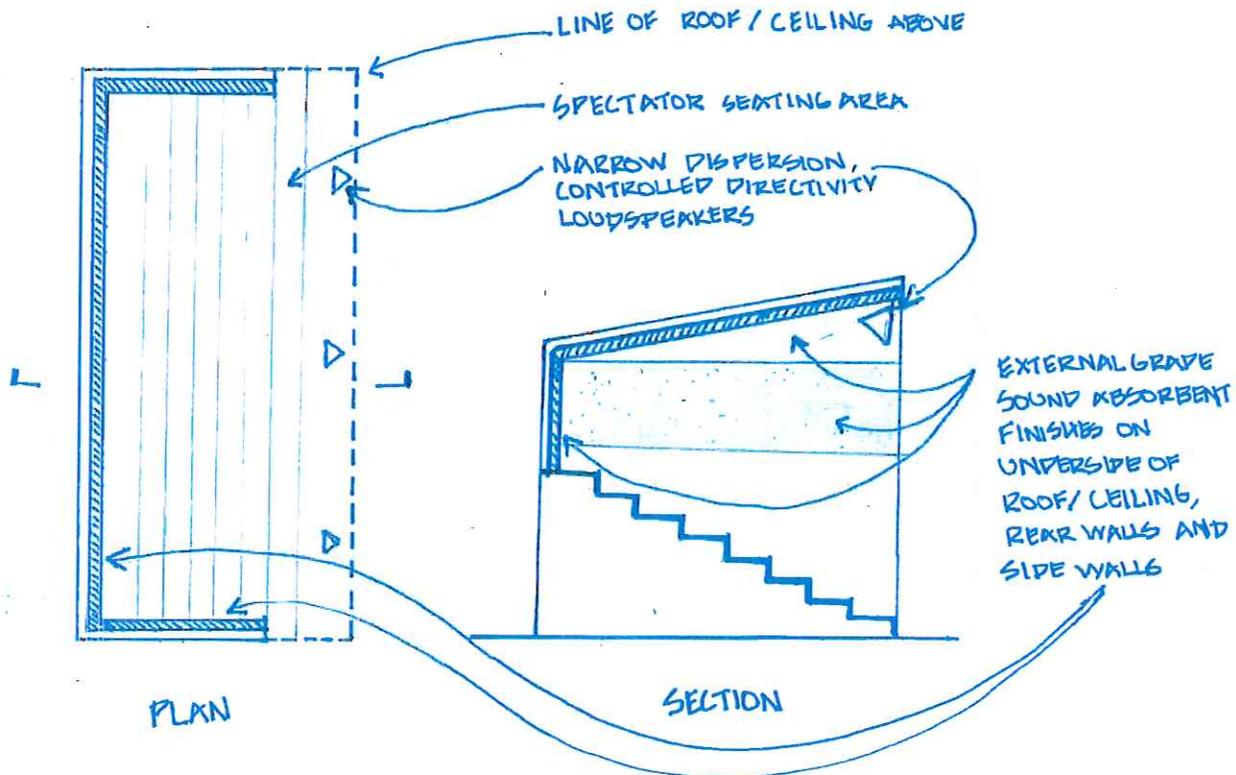


Figure 2. Concept sketch of sound absorbing enclosure for spectator seating areas.

7. This has been done at the new swimming facility at Ransom Everglades School in Coconut Grove and has enhanced the compatibility of their facility with neighbors.
8. The mechanical equipment used in future buildings located near property lines should have noise mitigation analysis conducted at the time of design to determine appropriate systems to maintain compatibility with the neighborhood.
9. If a central chiller plant is constructed in the future noise analysis should be considered. Generally water cooled chillers are quieter than air-cooled chillers. A water cooled chiller usually has a chiller and chilled water and condenser water pumps located in an enclosed building with a cooling tower located outside. Cooling towers can be selected with various noise mitigating systems such as low speed fans, water silencers and other options manufacturers can provide so the cooling tower can meet the sound level limits in the noise ordinance once loads are determined. The sounds produced by a cooling tower have components including fans and water falling over a matrix inside the tower. These sounds are usually broad band sounds that are often masked by winds and other environmental sounds. Water chiller systems tend to be more expensive than air-cooled systems for the same thermal load.

An air cooled system consists of a compressor, condenser coils and condenser fans located in one unit that is located out doors. Some types of air cooled chillers especially those with screw compressors tend to produce narrow band tones that are often disturbing to people living near the chillers. Noise mitigation analysis and design would have to be undertaken if air-cooled chillers are used for the project. Possible noise mitigation strategies that can be employed include using the manufacturer's low noise options, sound attenuation wraps for the compressor, associated equipment and piping and barrier walls. Specific strategies can not be determined until thermal loads and location of the unit are determined.

10. The new pool complex should be located so that the spectator seating area and the new pool building along with a noise mitigating wall enclose the pool to reduce off site propagation of sounds from swimming events. The spectator seating area would be designed similar to that described in item 6 for the sports fields. The loudspeakers for the facility would also be located as shown in figure 2.

CONCLUSIONS

1. The items described above and noted on figure 3 should maintain and enhance current acoustical compatibility levels between Palmer Trinity School as its educational mission is realized and the surrounding neighborhoods.

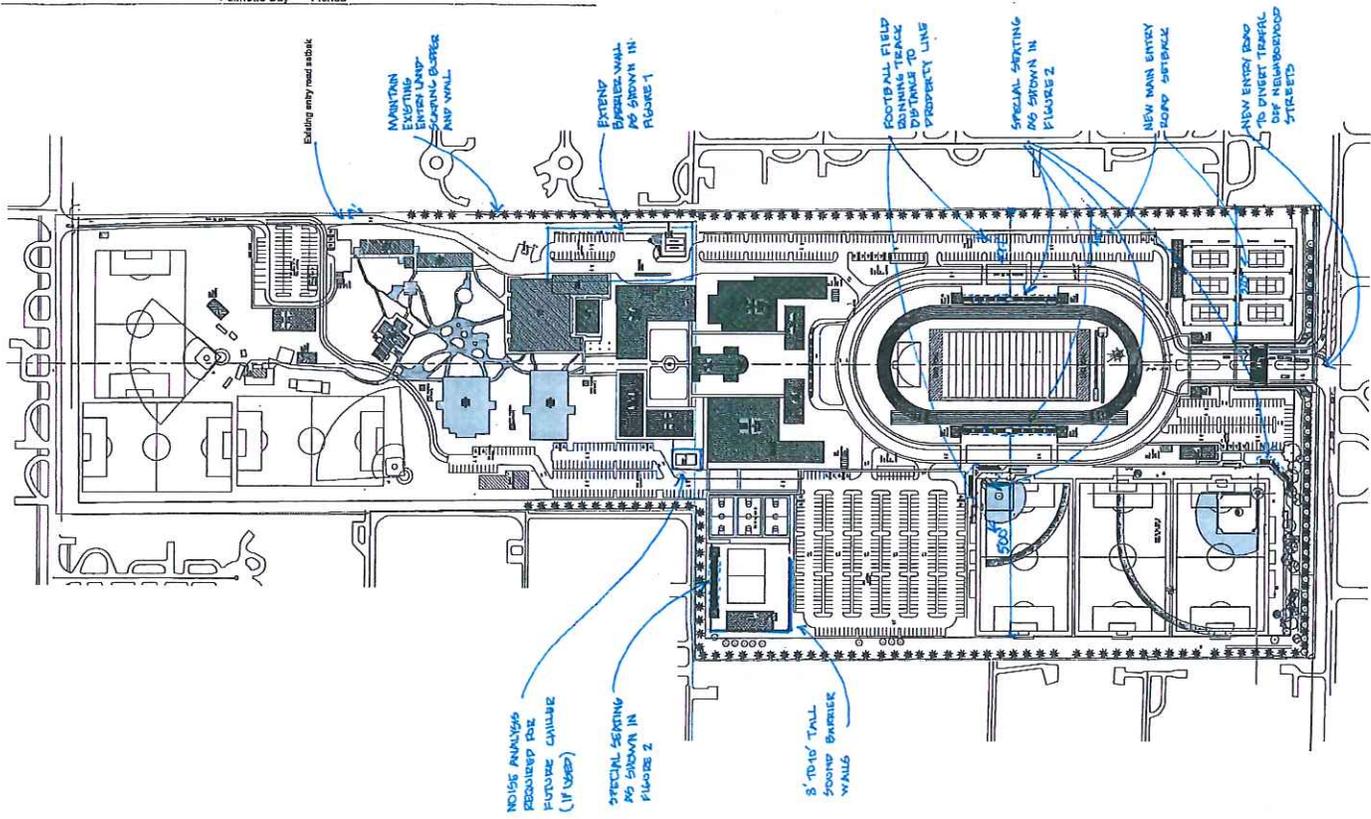
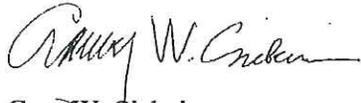


Figure 3. Current master plan for Palmer Trinity School with acoustical features identified.

Please let me know if we can be of additional assistance in this regard.

Sincerely,

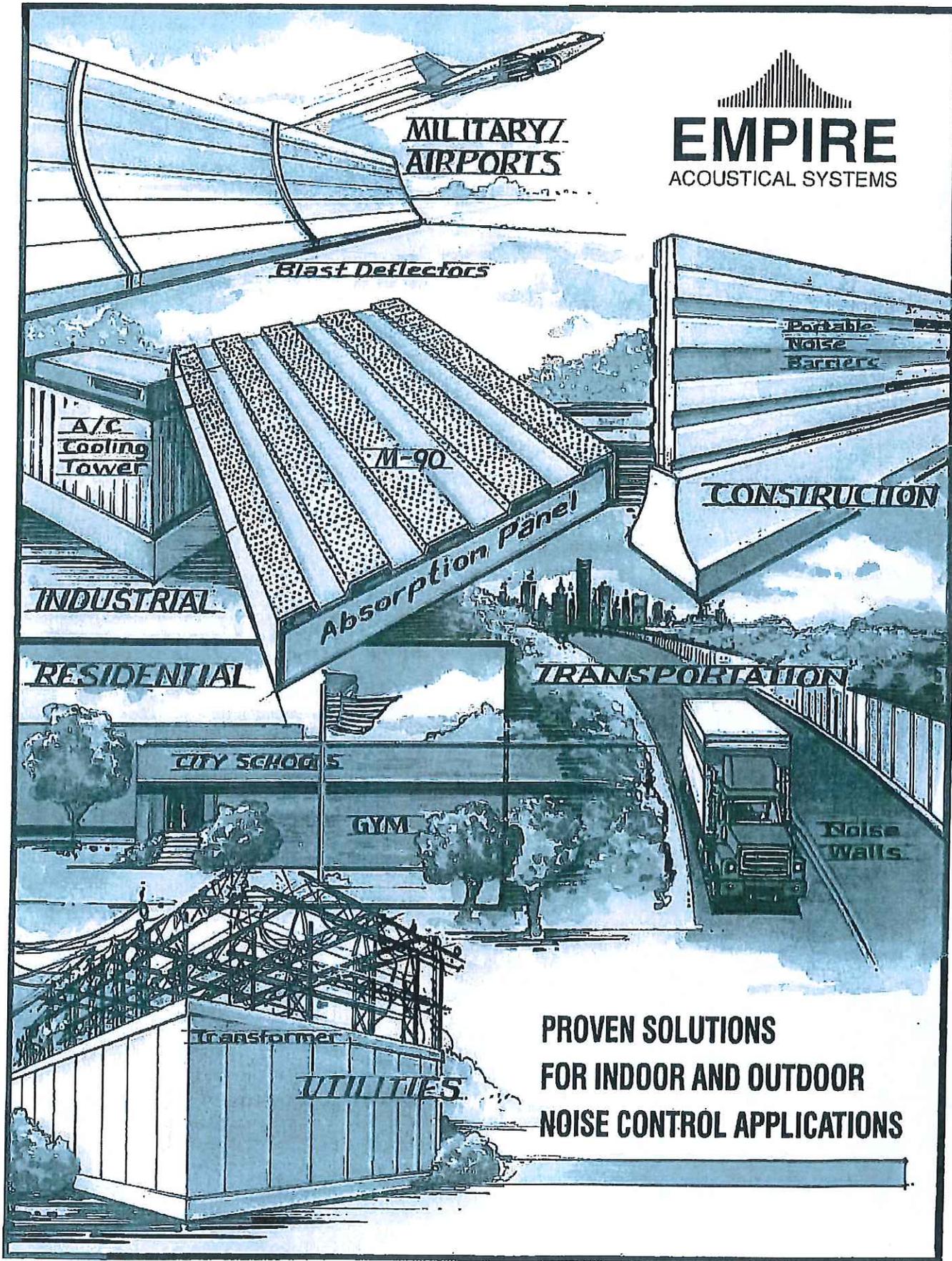
SIEBEIN ASSOCIATES, INC.



Gary W. Siebein, FASA, FAIA
Senior Principal Consultant
GWS/lsc

APPENDIX A

MANUFACTURERS' CUT SHEETS OF RECOMMENDED PRODUCTS



**MILITARY/
AIRPORTS**

EMPIRE
ACOUSTICAL SYSTEMS

Blast Deflectors

*Portable
Noise
Barriers*

*A/C
Cooling
Tower*

M-90

Absorption Panel

CONSTRUCTION

INDUSTRIAL

RESIDENTIAL

TRANSPORTATION

CITY SCHOOLS

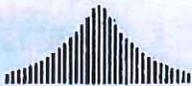
GYM

*Noise
Walls*

Transformer

UTILITIES

**PROVEN SOLUTIONS
FOR INDOOR AND OUTDOOR
NOISE CONTROL APPLICATIONS**



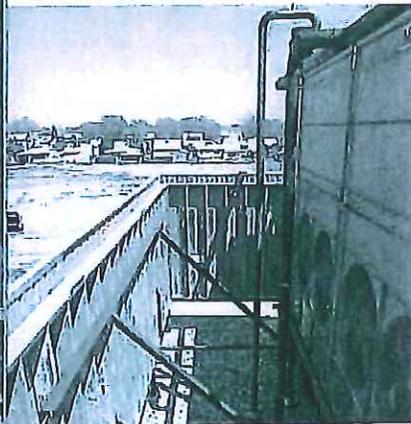
EMPIRE

ACOUSTICAL SYSTEMS

The need for more efficient noise control products has never been greater. In this regard Empire Acoustical Systems (EAS) is committed to provide architects, builders, engineers, equipment manufacturers and owners with problem-solving products and technical assistance to maximize noise control in working and living environments.

Our cost-effective, light-weight, metal panels (reflective and absorptive) are designed to meet your specific noise control problems. Maintaining the highest acoustical properties available, our systems are engineered for easy installation and no maintenance.

A/C Unit



Cooling Tower



Reflective Barrier

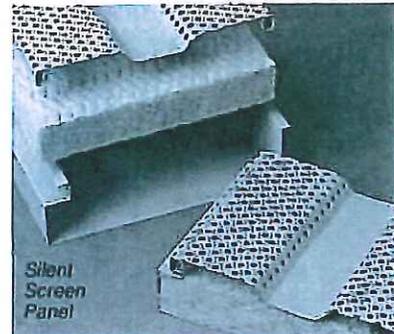
Environmental Acoustical Panels

The Empire Acoustical Panel provides a cost-effective solution to virtually any noise control problem. These noise control systems can be utilized in a wide variety of indoor and outdoor applications, including...

- Transportation noise control (highway, rail and airport)
- Indoor and outdoor equipment enclosures
- Reverberant noise control (wall and ceiling panels)
- Work station/worker isolation
- Commercial office partitions
- Schools and recreational facilities (gymnasiums, pistol ranges, outdoor theatres)
- Cooling towers
- Shopping malls

Silent Screen Panels

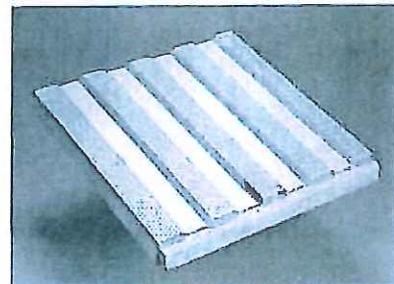
Silent Screen absorption panels are designed to provide both sound absorption and sound transmission loss. These panels consist of individual sections, 12-inches wide, mounted horizontally on top of one another, or vertically, side by side. Each section consists of a 2- to 4-inch deep, 16- to 22-gauge tray. Typically, the tray is filled with six-pound density mineral wool, and covered with a perforated 22-gauge face panel. Some of the incident sound striking the perforated side will pass through the perforations and be absorbed by the acoustical



material, and some will be reflected back in the direction of the noise source. The "remaining" sound, which is transmitted through the barrier, will be substantially reduced. The standard silent screen panel has a sound absorption value of NRC 1.05 and an STC of 35.

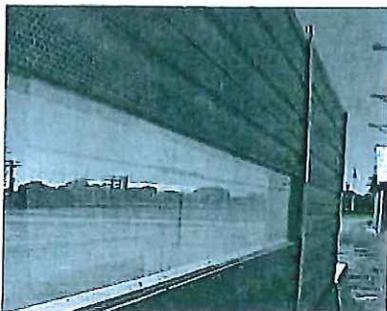
M-90 Absorptive Panel

The M-90 panel is designed for wall-mounting indoor and outdoor applications. The panel widths are 24-inches wide. The panel thickness is 2- to 4-inches and lengths vary up to 12 feet. The absorptive material is a six-pound density mineral rock wool. The M-90 panel has a sound absorption value of NRC 1.1.



VISTA Panels

When some degree of visibility is required for safety or monitoring purposes, EAS Acoustical Panels can incorporate a high strength Lexan-type material which has a clarity rivaling glass, but is much stronger. VISTA panels also are abrasion and ultraviolet resistant.

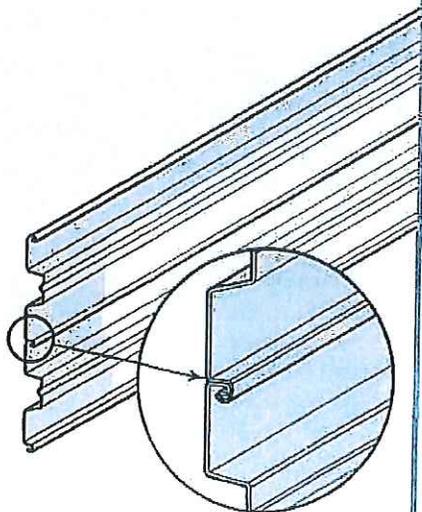


Vista Panels

VISTA panels are easily combined with mineral wool filled panels or double wall panels to solve a wide variety of sight and sound problems.

Reflective Panels

ANGLE-LOK Reflective Panels are designed to provide sound transmission loss only. The panels consist of interlocking sections, typically 12 inches wide, and can be mounted horizontally or vertically. Reflective panels provide a lightweight, aesthetically pleasing noise wall and acoustical barrier.



Acoustical Performance

There are two properties which are used to measure the performance of acoustical panels. *Sound absorption* is the ability of a noise panel to internally dissipate (as heat) incident acoustical energy. This property is measured in terms of a *sound absorption coefficient*. The higher the value of the coefficient, the more sound will be "absorbed," leaving less to be transmitted or reflected. Theoretically, a coefficient value of 1.0 indicates that all incident energy is absorbed.

Sound transmission loss is a measure of the amount by which a noise level is reduced as the noise "passes through" a panel or barrier. Transmission loss is measured in decibels, and a high transmission loss indicates that a panel will be able to block substantial amounts of noise.

EAS panels have been tested in an *independent* acoustical laboratory.* The results of these tests are available on request. Typical performance data for standard panels is as follows:

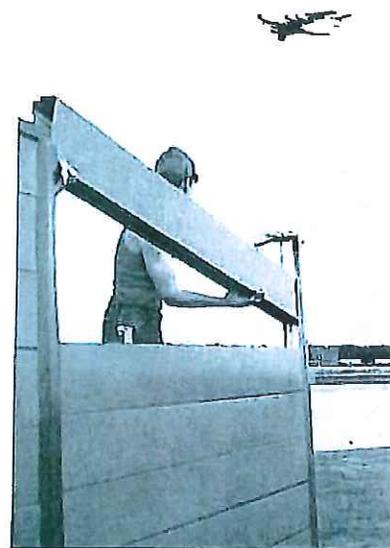
TEST	PANEL TYPE	ACOUSTICAL RATING
SOUND TRANSMISSION LOSS		
RAL-TL90-352	Composite Panel with perforated metal facing	STC 39
SOUND ABSORPTION		
RAL-A87-370	Composite Panel with perforated metal facing	NRC 1.0

Sound transmission loss tests were performed in accordance with ASTM-E90 and ASTM-E413. Sound absorption tests were performed in accordance with ASTM-C423 and ASTM-E795.

*Riverbank Acoustical Laboratories

Installation

One of the major advantages of the EAS Silent Screen panels is their ease of handling and installation. In contrast to many other acoustical panels, which are fabricated in heavy 2-foot or 4-foot widths, Silent Screen panels come in 12-inch widths. These lightweight sections can be easily handled and installed by one or two people without special tools.



Installation

Many installations do not require fasteners between panel sections!

All necessary trim pieces and hardware are included. When required, structural supports, framing and girts can also be designed and supplied, resulting in a complete turnkey installation.

Durability and Maintenance

All Empire Acoustical Panels are fabricated using galvanized G-90 Steel. EAS panels are designed to be virtually maintenance-free over the expected lifetime of a typical installation. Spray painted graffiti can be easily removed with common solvents when using the Kynar® paint system.

Color Coating

Panels can be supplied either galvanized (G-90) or color coated after galvanizing with one of the following systems:

- Acoustical panels may be supplied in a galvanized finish, primed for field paint, or factory powder coated.
- Various paint systems can be applied on larger orders; siliconized polyester, or Kynar. For smaller orders, baked on powder coatings or air dry paint coatings are available.



Shopping Mall

Aesthetics

Our superior coating system is available in a variety of colors to suit virtually any decor requirement. Colors can be specified to blend into or contrast with the surroundings. Panels are supplied with all ancillary items in matching colors.



Highway Barrier

Absorptive panels can be specified with a flat finish, to reduce unwanted glare and reflections, or a gloss finish, to enhance the color and brighten the decor. Alternatively, if a coating is not required, panels can be furnished with a standard galvanized finish.

For Engineering Assistance
Call or Write


EMPIRE
ACOUSTICAL SYSTEMS
the quiet solution

36744 Constitution Dr.
Trinidad, CO 81082
(719) 846-2300
(719) 846-7466-fax
email: empmlco@rmi.net

Specifications

A complete set of suggested product specifications for EAS Silent Screen panels is available on request.

Technical Assistance

EAS Acoustical Systems has structural designers and engineers available, and can provide a turnkey project, including installation, when requested.

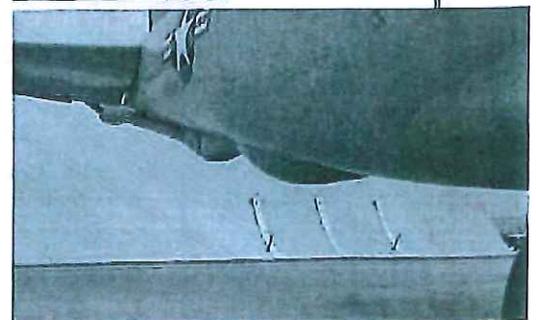
We also have the resources to provide acoustical testing and evaluation. A preliminary acoustical analysis may be necessary to determine the appropriate type of treatment. Pre- and post-project acoustical measurements can help determine the effectiveness of an installation.

Our technical staff is ready and willing to assist you on your next project.

EAS
acoustical
test at
Mansfield Lahm
Airport.



Field testing



EAS can also provide sound solutions where noise isn't the only problem. EAS Blast Deflector at Grissom AFB.



LSE NOISE BARRIER WALL SYSTEM



The Highway and Interstate Absorptive Noise Barrier Wall with Over 30 Years of Proven Performance!



The Sound Fighter® LSE Noise Barrier Wall System is the perfect solution to virtually any highway or interstate noise application. The noise absorptive panels are easy to install and maintenance free. Since the LSE System has such a high absorptive value, the possibility of reflected noise is eliminated. Sound Fighters has been manufacturing and shipping the LSE Sound Wall System throughout the world for over 30 years.

Outstanding Features:

- Fully Absorptive
- Lightweight
- Modular Design
- Choose Any Color
- Easy to Assemble and Disassemble
- Non-Corrosive
- Non-Conductive
- Water/Moisture Resistant
- Will Not Rust, Rot or Stain
- Fast Delivery



THE ULTIMATE IN NOISE CONTROL

The LSE Noise Barrier Wall System is a great way to reduce unwanted noise from cars and trucks. The sound absorption panels eliminate virtually all irritable noise caused by highways and interstates. With the Sound Fighter® System you get the most dBA reduction for least money spent.

Applications:

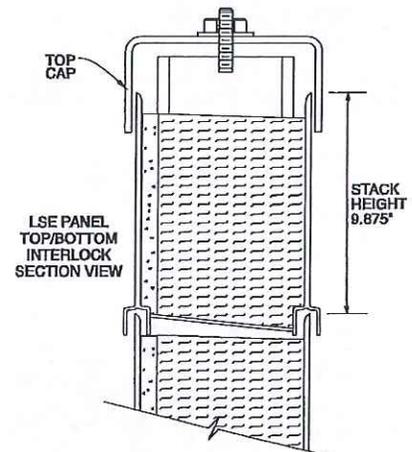
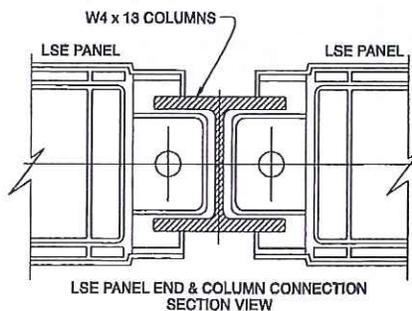
- Highways
- Interstates
- Bridges
- Elevated Roadways
- Highway Approaches
- Neighborhood Sites
- Truck Turn Arouds
- Commercial Sites
- Industrial Sites
- Shopping Centers
- Racetracks
- Residential Developments



The Sound Fighter® LSE Noise Barrier Wall System is designed for easy installation. Because the panels are lightweight and modular, the LSE sound wall can be installed much cheaper than other noise barriers. **Any construction company can easily erect the LSE wall system in just a few days without any special equipment.**

Dimensions:

	LSE 1000	LSE 2000
Length	38.75"	73.00"
Depth	6.00"	6.00"
Height	10.50"	10.50"
Stack Height	9.875"	9.875"
Area	2.50 Sq.ft	5.00 Sq.ft
Panel Weight	11.75 lbs.	23.25 lbs.
Weight/Sq.ft	5 lbs.	5 lbs.
Col. Center Dist.	39.50"	74.00"



Certified Laboratory Acoustic Test and Results:

Noise Absorption Test

Test Result

Noise Reduction Coefficient

1.05

Test Method

ASTM C 423-90a
ASTM E 795-92

Sound Transmission Loss Test

Test Result

Sound Transmission Loss

33

Test Method

ASTM E 90-90
ASTM C 423-90a
ASTM E 1332-90



6135 Linwood Avenue
Shreveport, Louisiana 71106

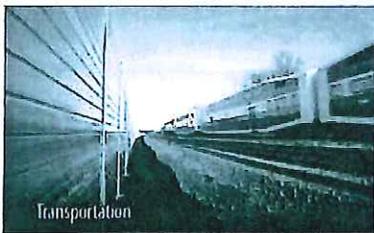
Tel: 318.861.6640

Fax: 318.865.7373

www.soundfighter.com

AIL SOUND WALLS

- ▶ PVC Sound Barrier Wall Systems
- ▶ Lightweight and easy-to-install
- ▶ Lower installed costs



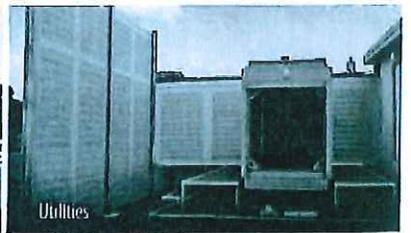
Transportation



Industrial



Commercial



Utilities

ENGINEERED SOUND MITIGATION SOLUTIONS

ailsoundwalls.com

1-866-231-7867



An industry leader in sound mitigation.

RECOMMENDED FOR

- ▶ Commercial ▶ Industrial ▶ Institutional ▶ Military
- ▶ Utilities ▶ Transformers ▶ Roof Top Mechanical Systems
- ▶ HVAC ▶ Highways ▶ Railways ▶ Bridges ▶ Oil & Gas

AIL Sound Walls is a division of AIL and the manufacturer of the Silent Protector® and Tuf-Barrier® sound barrier wall systems for absorptive or reflective applications.

Build in success with AIL.

For over 40 years Atlantic Industries Limited (AIL) has been adding value to the world's most successful infrastructure projects.

AIL is a world leader in developing innovative engineered solutions in sound barrier wall systems, structural plate, MSE retaining walls, corrugated steel pipe and prefabricated steel bridges.

Choose an AIL infrastructure solution and get the value, experience, innovation, sustainability and support that will ensure your project's success.

For more information on
AIL Sound Wall solutions,
call 1-866-231-7867 or visit
ailsoundwalls.com

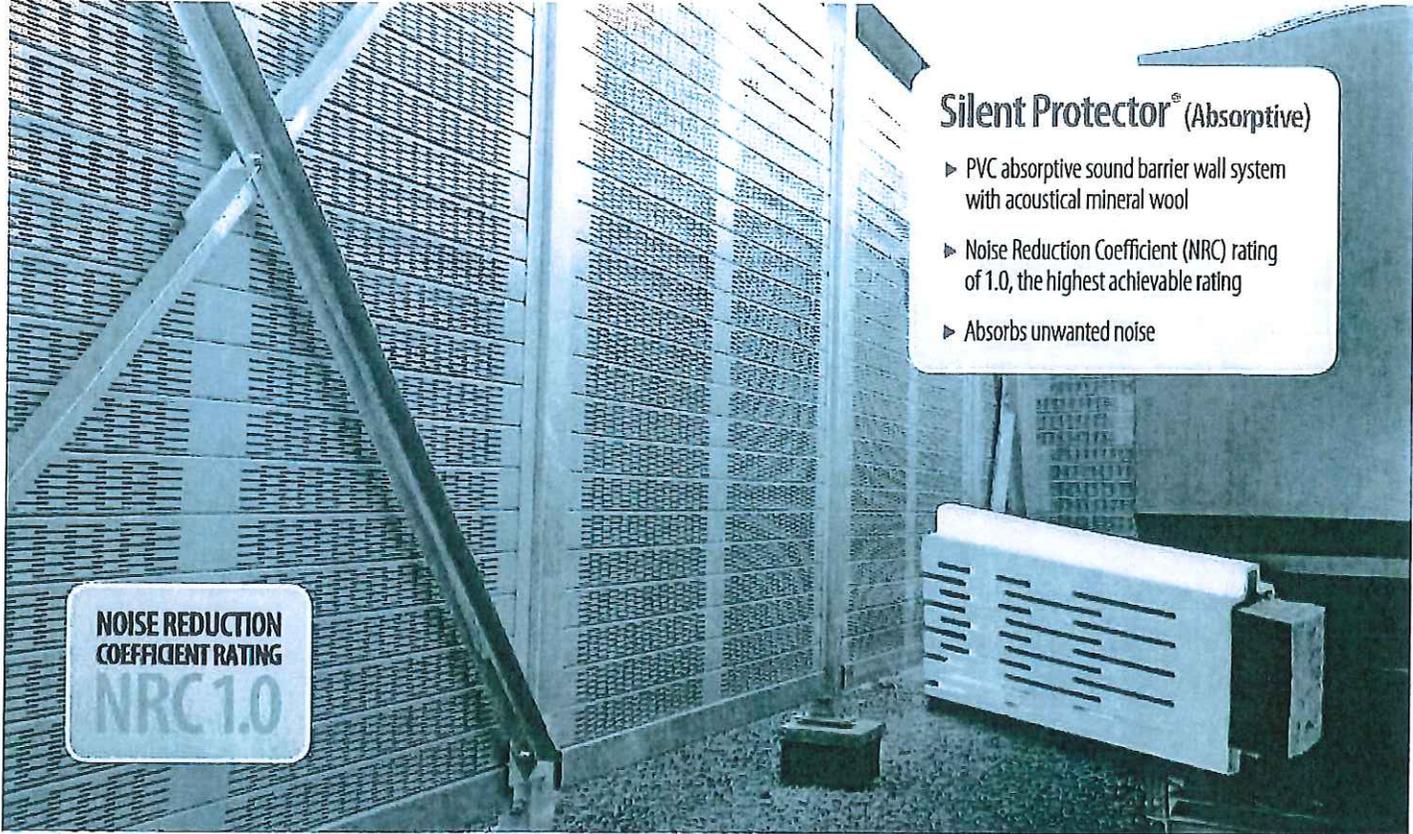
Lightweight, easy-to-install,
durable and cost-effective.

Lightweight and easy-to-install, AIL Sound Walls are engineered for maximum sound reduction of environmental or ambient noise such as traffic, manufacturing, industrial or commercial noise.

Our turn-key solutions, include: engineering, manufacturing, project management and site assistance.

- ▶ Meets accelerated test requirements for durability
- ▶ Impervious to rain, snow, ice and sleet
- ▶ Will not rust, rot, or stain
- ▶ Maintenance-free
- ▶ Designed to meet AASHTO, CSA and EN noise wall guidelines
- ▶ Wind load tested up to +140 mph (+225 kph)

ASK ABOUT RENTING
AIL SOUND WALLS



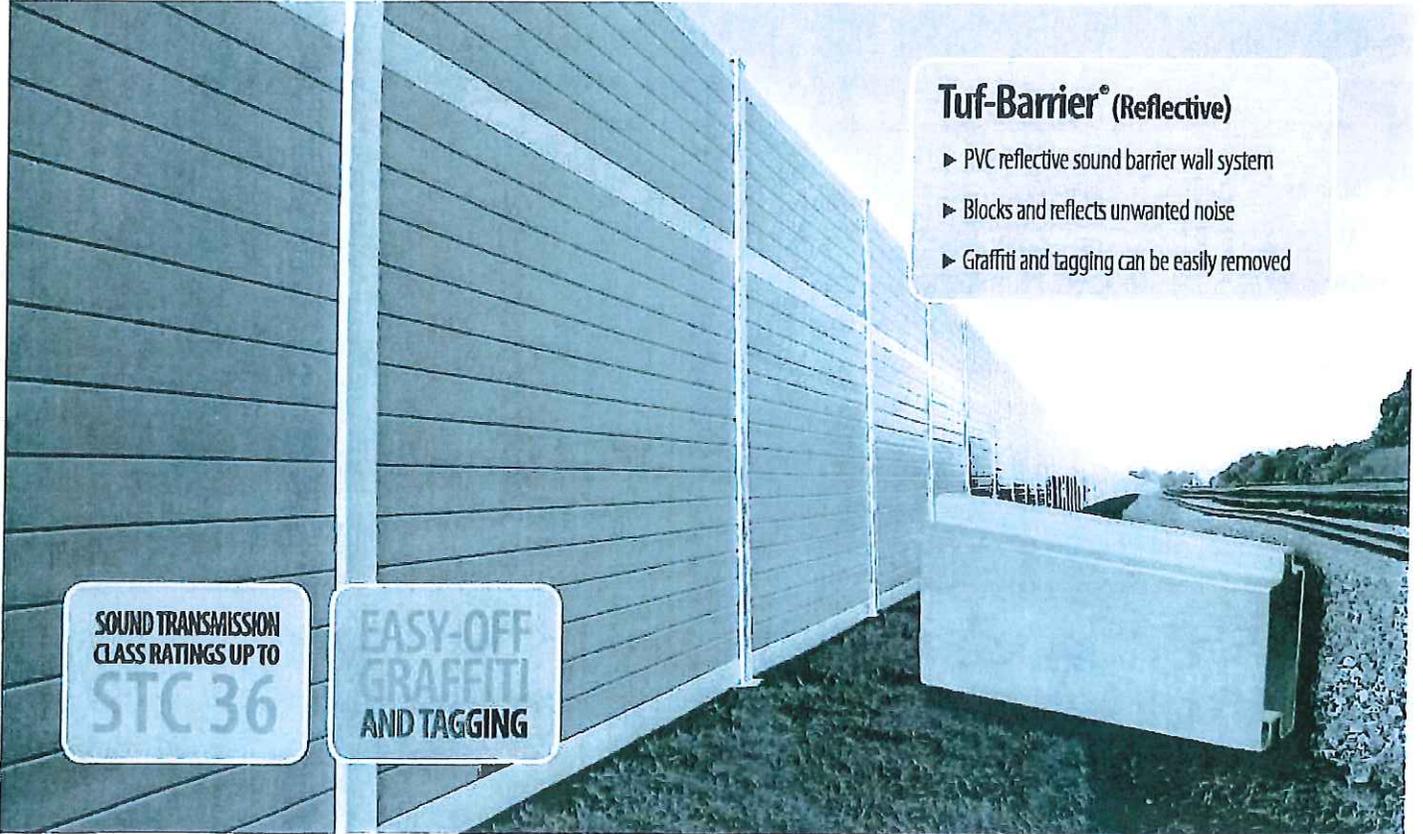
Silent Protector® (Absorptive)

- ▶ PVC absorptive sound barrier wall system with acoustical mineral wool
- ▶ Noise Reduction Coefficient (NRC) rating of 1.0, the highest achievable rating
- ▶ Absorbs unwanted noise

NOISE REDUCTION
COEFFICIENT RATING

NRC 1.0

Made from recycled and recyclable PVC, All Sound Walls provide unmatched value and performance benefits.



Tuf-Barrier® (Reflective)

- ▶ PVC reflective sound barrier wall system
- ▶ Blocks and reflects unwanted noise
- ▶ Graffiti and tagging can be easily removed

SOUND TRANSMISSION
CLASS RATINGS UP TO

STC 36

EASY-OFF
GRAFFITI
AND TAGGING

Transportation, Industrial, Commercial and Utilities

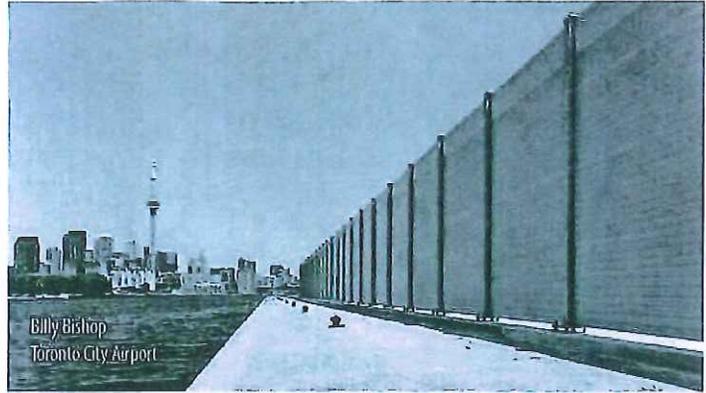
RECOMMENDED FOR

- ▶ Shopping Centers
- ▶ Big Box Stores
- ▶ Drive-Thru Lanes
- ▶ Loading Docks
- ▶ Commercial Development
- ▶ Industrial Sites
- ▶ Mines/Quarries

Noise from large commercial or industrial developments and their associated traffic is one of the most contentious environmental problems for surrounding communities.

Residents are demanding better noise abatement solutions from facilities like shopping centers, manufacturing plants, distribution hubs and utility stations.

AIL Sound Walls provide superior noise abatement solutions for all noise sensitive projects.



Lightweight AIL Sound Walls are perfect for roof top applications. Man-doors and access ports are easily integrated.

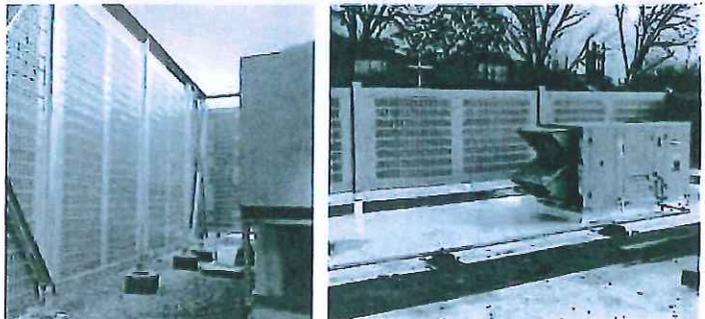
Roof Top Enclosures

RECOMMENDED FOR

- ▶ HVAC Units
- ▶ Utilities
- ▶ Generators

Most of today's urban buildings have their utility and HVAC systems mounted to their roofs. However, sound barrier protection is still needed for best results and to deal with unwanted noise between buildings at upper levels.

The lighter weight of AIL Sound Walls make them ideal for roof top applications. The enclosure support system integrates easily with roof structures of both existing and new buildings to deliver effective sound mitigation.



ASK ABOUT RENTING
AIL SOUND WALLS