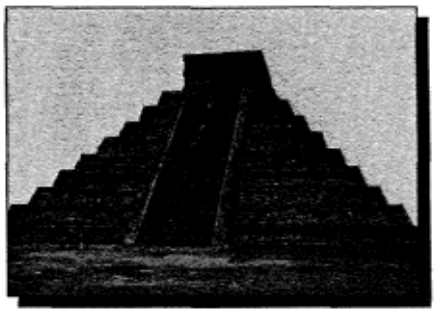
The Wall Journal™

Issue No. 19

THE INTERNATIONAL JOURNAL OF TRANSPORTATION-RELATED ENVIRONMENTAL ISSUES

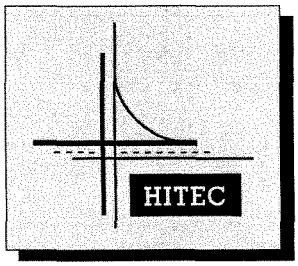
Sep/Oct 1995

In This Issue:



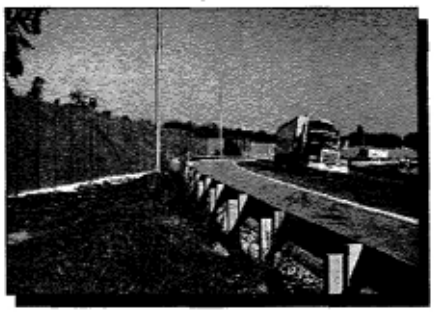
page 6

The Temples at Chichén Itzá Revisited — Surfing on the Internet in Search of People Who Have Encountered the Weird Acoustics There



page 8

HITEC Initiates 24 Different Technology Evaluations in 1994 for Innovations in Highway and Bridge Markets



page 12

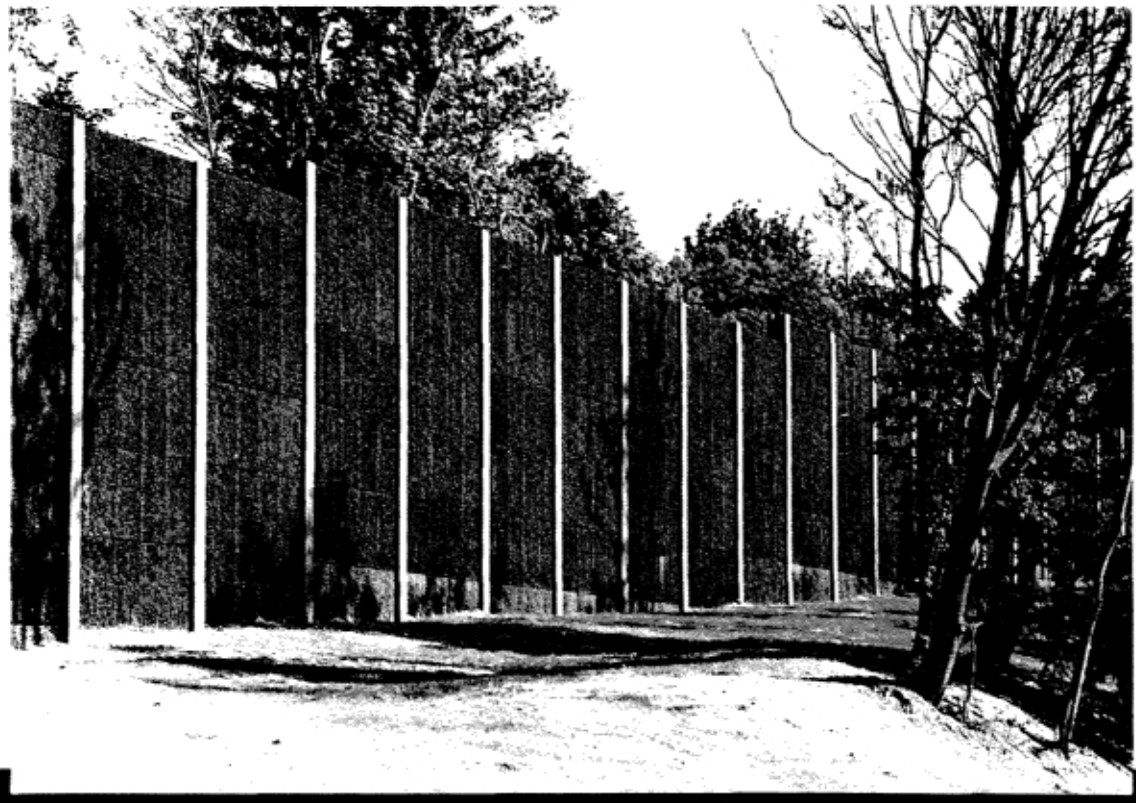
160,000 Pounds of Recycled Tires Utilized in New Illinois Toll Road Noise Barrier Project

page 14

New Jersey DOT Models New Concepts in Noise Barrier Design for Upcoming Project — A Report by Domenick Billera

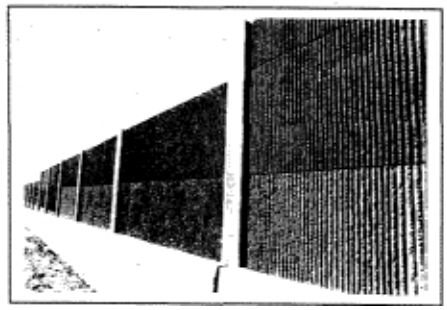
Also In This Issue:

When beautifying and protecting soundwall...



Specify Fosroc.

Sound absorptive highway noise barriers are becoming specified more and more. To significantly improve the appearance and durability of these structures, more specifiers are relying on **Fosroc** *for:*



- **Pigmented, VOC compliant acrylic stains** to provide an attractive, uniform color and water repellent protection. Aesthetically pleasing - anti graffiti properties.
  Specify Cementrate or Cementrate WB.
- Graffiti resistant, pigmented coatings protect soundwalls from vandalism.
  Specify Graffitiguard 2.

Also a wide range of sealers/coatings available:

- **EA-Sealer** high solids, non-yellowing "wet look" acrylic sealer. Solvent and VOC compliant. Also available in "low lustre" finish.
- **Exposed aggregate retarders** create uniform etch reveals on soundwall. **Preco** retarders are more economical, cleaner and less complicated than acid etching or sandblasting.

*The **Preco** Precast Division offers enhanced technical support to all of our customers. Free on-site seminars are also available on concrete coating technology. Call or write today for more information on how we can help you on your next soundwall project.*

FOSROC

Fosroc Inc.
Preco Precast Division

150 Carley Court
Georgetown, KY 40324
Tel 800-645-1258
Fax 502-863-4010

A BURMAH CASTROL COMPANY

The Wall Journal

The International Journal of Transportation-Related Environmental Issues

Volume IV, 1995
Issue No. 19

The Wall Journal is published six times a year. Issues are mailed bi-monthly on or about the end of the first month in the designated two-month issue date.

The Wall Journal is a publication of AcoustiCom Publishing Corporation. Editorial, subscription and advertising offices are located at 205 Danby Road, Lehigh Acres, FL 33936. Telephone us at 813 369-0178 or fax 813 369-0451.

Submissions of papers, articles, letters, and photographs for publication should be addressed to The Wall Journal, P.O. Box 1217, Lehigh Acres, FL 33970-1217.

Editor
El Angove

Director of Publications
John G. Piper

All material submitted becomes the property of The Wall Journal, and may be edited for length, clarity and accuracy. Material will not be returned without special arrangements prior to submission. The Wall Journal will not be responsible for lost or damaged materials.

Published articles, comments, letters, papers and advertisements do not necessarily represent the views and/or endorsements of The Wall Journal. The authors of submitted material are solely responsible for the truth and accuracy of their submissions, and The Wall Journal cannot be held liable for any damages suffered by our readers as a result of their use of published material.

Circulation is made to government agencies, consulting engineers, scientists, universities, contractors, vendors and others with an interest in transportation-related environmental issues.

Subscription and advertising information are shown on pages 27 and 28.

* * * * *

The Wall Journal is composed in its entirety on Apple Macintosh computers using Quark**XPress** electronic publishing software.

Printed in the U.S.A.

EDITOR'S CORNER by El Angove

Lorem ipsum

There's one bad thing I have discovered about being retired — it is very difficult to get yourself organized. Little things like what day of the week it is are totally irrelevant. Weekends and holidays are anomalous. They are only ordinary days in the unending parade of day after day. The only way I know what day it is, is when I look at my pill box in the morning which has little compartments marked S, M, T, W, T, F and S.

I guess the only really good thing about having a steady job, is that you are always aware of what day it is. The easiest day to remember is TGIF (I hope you all know what that is). The worst day in the week is OMGTIM (surely you know that means "oh my God, tomorrow is Monday").

Holidays are a cinch to remember for the gainfully employed. Somebody in the office always posts a schedule of company holidays on the bulletin board to give you a year's advance notice. Then, a few days before the holiday, there's another notice telling you whether you will have the intervening Monday or Friday off as well. Also, there are the office parties on holidays like Christmas and New Years, where it is obligatory to attend, even if you don't do any work, and you usually do something stupid so that you will never forget.

In addition to all these regulatory signposts, there is the workday ritual of getting out of bed at the crack of dawn, performing the requisite ablutions according to your gender, clothing yourself according to the workplace dress code, and then clawing your way through the morning traffic to your appointed work station.

As if this brutal and sadomasochistic awakening of your day were not enough, there follows the ignominy of eight to ten hours of labor in the belly of the beast. For dessert, you get to crawl your way home through the evening traffic, and what awaits you there I have no idea. In the winter, for you in the north, you also have to wake up in the dark and go home in the dark. You poor baby.

I, on the other hand, greet the new day quite differently.

Thank you very much...

First, when I retired, I took my alarm clock out into the garage , laid it on the concrete floor, and then smashed it to bits with a five-pound hammer. I really don't care if I don't get somewhere on time any more. Sue me.

Second, whatever I am doing on any particular evening has no time limit. If I'm having fun, let the games continue. I go to bed when the body cries for rest. That properly sets me up for the next morning.

At some point the next day, my eyes slowly open. If it is still dark, I turn over and catch a few more Zs. The day will arrive in its time.

When it does, I sit up and check out the body parts. If everything is working, I pull on a pair of shorts, walk out to the kitchen, turn on the coffee maker, and walk out to the driveway for the paper. Back in the house, I turn on the TV, tune in CNN, pour a cup of coffee, read the paper, watch CNN, and chill out. An hour passes.

Ho hum. Another cup of coffee. I go stand at the front window and watch the morning walkers in the neighborhood. Eventually, I take a shower and shave. I am at peace with the world. Maybe I will work on The Wall Journal today. Hopefully. It is to wonder. Maybe I will just go out and sit under the palm trees. Can I stand the pressure?

You bet. ■

In case you can't read Latin, Lorem ipsum is simulated text that graphics people use to flesh out a layout for appearance preview; it means nothing. Something like this column. A sample of Li is below:

> Lorem ipsum dolor sitamet,cosectetuer adipiscing elit, sed diam nonummnibh euismod tincidunt ut laoreet dolmagna aliquam erat volutpat. Ut wisi enimad minim veniam, quis nostrud exertation ullamcorper suscipit lobortis nisl ut

ANNOUNCEMENT

DURISOL BROADENS MARKET COVERAGE IN UNITED STATES

October 19, 1995
Hamilton, Ontario, Canada

Durisol Resource Inc. today announced that Agreements have been signed with Superior Precast, Inc. of Pottstown, Pennsylvania and with Smith-Midland Corporation of Midland, Virginia to manufacture and sell the Durisol® Acoustic and Durisol® Noise Barrier Systems.

Superior Precast, Inc. is positioned to service the North Atlantic region.

Smith-Midland Corporation will service the Mid Atlantic states.

Bob Rex, President of Superior Precast, Inc. and Rodney Smith, President of Smith-Midland Corporation have both endorsed Durisol as the material of choice for sound absorptive noise barriers for transportation and industrial noise abatement. They will market Durisol exclusively as their sole sound-absorptive noise barrier system. Both are well-known quality producers who have considerable experience in the precast concrete industry and have supplied products for noise abatement projects for many years.

The two companies will shortly be at full production capability and are now ready to accept orders for delivery of Durisol products within the coming months. In addition, they may be able to provide Durisol products outside their regions until new licensees are established in other parts of the United States.

Hans J. Rerup, President of Durisol Materials Limited, Canada, and President of Durisol Resource Inc., the licensing arm of Durisol International Corp., is very enthusiastic about these new relationships. These two additions to the North American group of Durisol licensees share Durisol's commitment to insure that high quality, competitively priced and aesthetically appealing products reach their customers.

With more than 50 years of proven performance in manufacturing, designing and constructing Durisol products, the Durisol manufacturers around the world cooperate in materials research, process technologies, product and application development, design and engineering, and international marketing and sales.

There are active noise barrier projects in various countries in Europe, Canada, the United States and as far away as Hong Kong. Durisol has a proven performance record as a durable material in outdoor applications in all types of climates around the world. International development continues in the applications of Durisol in noise abatement for highway, rail, air, commercial and industrial uses.

OPPORTUNITY

Durisol Resource Inc. seeks to establish additional licensed manufacturers for Durisol products throughout the United States, Canada and the Pacific Rim countries. Interested parties are invited to contact:

Hans J. Rerup, President
Durisol Resource Inc.
phone (905) 521-0999 fax (905) 521-8658

PRESS RELEASE

FOR IMMEDIATE RELEASE
DATE: 1995 September 11
CLIENT: Scantek, Inc.
CONTACT: Debra Meyers (301) 495-7738

NEW CATALOG FEATURES PRECISION ACOUSTICAL INSTRUMENTATION

Silver Spring, MD -- Scantek, Inc. releases a new short-form catalog from Norsonic. The pocket sized two-color brochure features the company's many sound and vibration analyzers, noise generators, sound sources, DAT-Recorders, calibrators, and building acoustics instruments, including the Type 116 sound level meter/digital graphic level recorder, the Type SA-110, Real time Sound Analyzer, with capabilities for data logging, building acoustics, 1/3rd octave Real time and narrowband analysis, and vibration measurements, and the Norsonic Type 840 portable laboratory Real-time analyzer with narrowband, FFT, Intensity, and Maximum-Length Sequence measurement modes.

Scantek, Inc. recently celebrated its 10th year in supporting the acoustical community in the United States. Its hundreds of customers include national laboratories, the automotive, HVAC, and computer industries, and consultants specializing in industrial and community noise and vibration control.

For further information, contact Scantek, Inc.,
916 Gist Avenue, Silver Spring, Maryland 20910.
Telephone (301) 495-7738, fax -7739 .

TRB Committee A1F04 Chairman's Column

Domenick Billera

They're coming! New Noise Models! After years of hoping, waiting and tricking the old models into doing things you needed them to do, we are approaching the release of a new generation of noise models with features that up to now we have only dreamed about.

Already released is the Federal Transit Administration's Transit Noise and Vibration Impact Assessment, scheduled for the end of the year release is the Federal Highway Administration's Transportation Noise Model (TNM) and expected shortly is the Federal Aviation Administration's Integrated Noise Model Version 5.0 (INM 5.0).

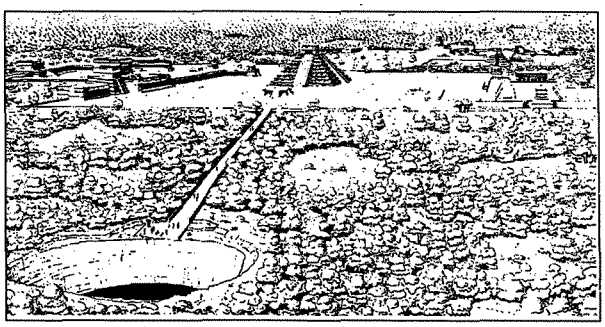
This year's TRB Annual Meeting, January 7-11, 1996 in Washington, D.C. will be the 75th gathering of transportation professionals. Committee A1F04 activities will include much discussion on the above mentioned new noise models in the respective Aircraft, Highway and Guided Transit Subcommittee meetings and our full committee meeting. As always, interested persons are welcome to attend committee meetings. We are planning a Super Session of two panels, the subjects covered are Developing a Written Noise Policy and Noise Criteria and their Relation to Human Response, as well as a paper session. Of course we always include our A1F04 Best Paper Award Dinner in there somewhere.

As someone involved in the development of the new TNM, I can clearly state that the new model is not just a warmed up version of STAMINA but a complete new model with incredible features and flexibility. I recommend that anyone involved in highway traffic noise prediction attend TRB and get a glimpse of the future.

Changing the subject, let me echo the call of The Wall Journal editor in asking for Technical articles. You transportation department readers out there - yes you! Pick up your pen, grab some photos and send El an article on what you're doing. That's what I did; you can see it in this issue, starting on page 14. ■

(Thank you for your support, and also for your contribution to this issue, Domenick. Your Gateways concept is a much-needed adjunct to noise barrier aesthetics. — El)

The Acoustic Phenomena of the Temples at Chichén Itzá — A Reader Looks for Answers in Cyberspace



Submitted by
Wayne Van Kirk

Musing About the Soundscape

Mayan Ruins and Unexplained Acoustics

Note: This discussion started on Alt.Sci.Physics. Acoustics Newsgroup and was forwarded to acoustic ecology discussison group. All notes are in sequence of posting.
Initial Topic as posted on the Internet and the first responses follow:

At least two structures at the Mayan ruins of Chichén Itzá in Mexico display unusual and unexplained acoustical properties.

The Great Ballcourt:

The Great Ballcourt is 545 feet long and 225 feet wide overall. It has no vault, no continuity between the walls and is totally open to the sky.

Each end has a raised "temple" area. A whisper from one end can be heard clearly at the other end 500 feet away and through the length and breath of the court. The sound waves are unaffected by wind direction or time of day/night. Archaeologists engaged in the reconstruction noted that the sound transmission became stronger and clearer as they proceeded. In 1931 Leopold Stokowski spent 4 days at the site to determine the acoustic principals that could be applied to an open-air concert theater he was designing. Stokowski failed to learn the secret.

The Castillo:

This structure is a temple that looks like a pyramid and is the one most commonly pictured on travel brochures for the Mexican Yucatan. Apparently if you stand facing the foot of the temple and shout, the echo comes back as a piercing shriek. Also, a person standing on the top step can speak in a normal voice and be heard by those at ground level for some distance. This quality is also shared by another Mayan pyramid at Tikal.

I believe a good case can be made that the Maya somehow engineered these acoustical phenomena. After months of research, I cannot locate any scientific discussion or investigations regarding any of this. Any information or comments appreciated. ■

Response

I was at Chichén Itzá two years ago. These acoustic phenomena are fascinating. The idea that they were intentionally engineered is not implausible, but it seems clear that it would have been different than our definition of 'engineering' in the modern world.

It is really cool though and I would enjoy knowing more about it if people can add to the discussion.

There are other "undocumented" acoustical properties of the ruins. When I was there several years ago the guide showed me a stack of what looked like stone artillery shells. He said that to this day no one has been able to determine what they were for. Then with a wink he picked up two sticks and proceded to play a tune on the "shells". Each one was precisely tuned. Perhaps the "ancients" knew more about acoustics than we give them credit for.

Response

From reposting on acoustic-ecology discussion.

A similar phenomenon to that reported at the Mayan ballpark structure can be experienced in Vancouver. At Science World two parabolic dishes have been set up across a large open noisy room. One can speak softly into one and the sound can be easily heard at the other end. I'm sure the two are not identical but the concept is the same and there is quite a bit of novelty appeal. The dishes are about 300 feet apart and have approx. a four foot radius. The effect only works when one speaks at or listens from the focal point of each dish which is not consistant with the report from Mexico, however, it might be a starting point into thinking about how it works.

I also heard a similar pheomenon during last year's Vancouver Folk Music Festival. I work at the Jericho Sailing Centre about 1/4 mile due west of the westernmost edge of the festival site. between the sailing centre and the site is a small hill, large enough to block out a good deal of the ruckus (except of course for the low frequencies). The west wall of the centre is about 35 feet high and about 60 feet long, it's surface is stucco and glass. Standing in front of it, I could hear perfectly the performances from one of the westernmost stages of the festival. My theory (and this is just plain speculation, no math involved here) is that the wall is high enough to reflect the sound that was being blocked by the hill. The stucco provided enough surfaces at the right angle to bounce the sound down. It coud have also been bent down around the hill, by a temperature inversion or some other atmospheric or geographical factor but that theory breaks down because the sound was quite clear only in front of the wall. Clarity also varied at different distances and positions in front of the wall.

Response

I think you are awfully lucky to be able to go to the wonderful Vancouver Folk Festival whenever you like.

Seriously, there's also Michelangelo's dome in St Peter's/Rome. A whisper from the dome can be heard in the church. I believe there are some humorous stories associated with this particular phenomenon.

Response

RE: The Castillo:

The 'piercing shriek' sounds like it

originates from some sort of periodic structure. Is the Castillo covered with stone steps? A similar effect occurs when you clap your hands near an iron fence or corrugated wall, and the impulse is returned from each corrugation. The echo then sounds like a 'twang.'

The acoustic ducting effect is something else again. Might a periodic structure on the building surface act to diffract the waves and make them follow the surface?

Response

I was in Northern Guatemala last year at some famous ruins that I have forgotten the name of (mostly to my brush with death from an intestinal parasite). Two pyramids stand face to face with a football field sized court between them, and low steps and wall on either side. One could easily hear a person talking in a normal voice at the opposite end of the grass covered courtyard. As we were working on a film and were trying to get wide shots, we used this phenomenon to our advantage, where yelling or radios would have been the normal practice. What was even more amazing, were that the stones of the pyramid were some type of resonant stone! Sat on one a foot square and when tapped it would produce clear short sustained sound.

A large part of the pyramid seemed to be made of this "limestone" as the locals called it, and the result was that as a person descended from the top of the pyramid, on the slightly over-sized steps, they would drop slightly and thus create a huge gonglike sound that would resonate across the courtyard and out into the surrouding area. It was amazing to hear the whole temple resound to a persons footsteps! Well worth the trip for you eartourists!

Response

A few months ago, someone from Houston sent me a copy of an article called "Parametric Amplification of Sound- Ancient Mayan Wall Provides Example for Design of Modern Acoustical Surfaces" written by Frank Hodgson in something called The Wall Journal (not to be confused with the Wall Street Journal) May/June 1994.

(continued on page 22)

Editor's Note:

I must admit to being fascinated by Frank Hodgson's first article on the Mayan walls at Chichén Itzá which exhibited unusual acoustic properties, which we published in Issue No. 11 (May/Jun 1994) and followed up in Issues 13 and 15.

I have had many conversations with Frank and we both were surprised at the apparent lack of interest from our readers. Until a couple of months ago, when Wayne Van Kirk called me to say that he had been to the ruins and experienced the same phenomenon. That led him to post this notice to the Internet bulletin board and he is getting a good response.

Also, I received a call today from Dr. Ed Karlow of La Sierra University in Riverside, California requesting back issues of The Journal. He has interest in starting a research project with his students on the Mayan wall acoustics.

We may be beginning a small network of advocates in search of a lost art. If you have interest, call:

Wayne Van Kirk, Arlington, Tx
817 640-0992
or
Frank Hodgson
Palo Alto, CA
415 493-5511

HITEC Begins Work on Numerous Projects

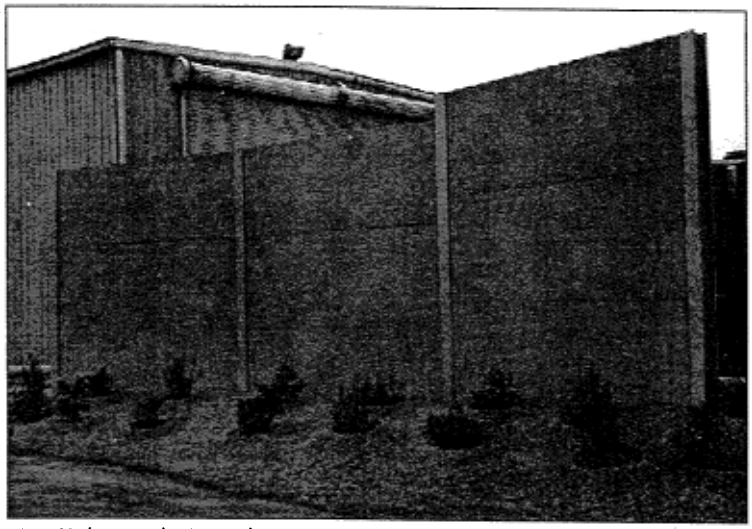
By Peter Kissinger, Becky Mattes and David Reynaud

Created through a four-year cooperative between the Civil Engineering Research Foundation (CERF), the research affiliate of the American Society of Civil Engineers (ASCE), and FHWA, the Highway Innovative Technology Evaluation Center (HITEC) was established in 1992 to expedite the introduction of innovative technologies into the highway and bridge markets. In January of 1994, HITEC opened for business and began accepting applications for innovative technologies. To date, HITEC has initiated 24 different technology evaluations, with one scheduled for completion this year and fifteen to be completed in 1996.

HITEC's evaluation process is consensus-based in that it incorporates the ideas and expertise of various public and private sector individuals as well as the research community in an evaluation. To achieve this, a volunteer panel of experts is handpicked to design the evaluation plan for each individual technology or for a group of similar technologies. The panel's job is to design an evaluation plan which tests the product against everything the manufacturer claims the product can do.

Upon completion of the evaluation plan, the volunteer panel oversees and sometimes participates in the evaluation of the technology. Evaluation plans can call for independent analysis, laboratory testing, field demonstrations or some combination of evaluation criteria. Panelists and other members of the product "user" community can volunteer their jurisdictions to take part in the HITEC evaluation. For lab testing, the panel may select a site (public or private) or issue a Request for Proposals (RFP) to select the testing center.

After the evaluation is complete and the volunteer evaluation panel is notified of its outcome, the results are published in a comprehensive set of HITEC evaluation reports. An executive summary will be produced to give an overview of the testing incorporated in the evaluation plan and a synopsis of the results. Also, a larger report will be produced and contain all test results detailed for the more technical audience. The reports will be disseminated widely through the state DOTs, technology transfer centers, FHWA and other groups who make purchasing decisions. All reports will be available through the ASCE publications department.



One of HITEC's current efforts is an evaluation of United States Gypsum Company's Sight and Sound Screen (SSS—demonstrated in photo above). The SSS incorporates an inner core of polystyrene and outer panels of DUROCK™ cement wall board finished with a decorative coating. The SSS is a low-cost post and panel wall system which acts as a sight and sound barrier for highways and a privacy fencing system for residential or commercial property. Because the panels are lightweight, the system also is being marketed for bridge applications. Furthermore, the panels do not require heavy equipment for installation, maintenance or replacement making the system beneficial in congested areas. If special aesthetic effects are desired, the panels can even be modified to include decorative relief or artwork.

The HITEC panel met in April to begin the development of the evaluation plan. Consultants from the University of Louisville are now synthesizing and finalizing the panel's input into a comprehensive evaluation of the technology. Pending final approval of the plan by the manufacturer and the panelists, demonstrations should commence late this year or early 1996. Tentative sites for these demonstrations include California, Colorado, Georgia, Maryland, Ontario, Canada and Virginia.

In addition to the noise abatement wall project, HITEC has begun efforts to evaluate numerous proprietary retaining wall technologies. The group evaluation will be coordinated with AASHTO's T-15 technical committee on retaining walls and structures with the committee's chairman, Terry Shike, the bridge engineer for the Oregon DOT, acting as the chair for the HITEC panel. Current plans are to form the volunteer panel and conduct a meeting this fall to develop a preliminary evaluation plan. All known manufacturers of the technology are invited to participate in the group evaluation. After applications are received from the manufacturers interested in participating, the panel will meet again to develop the final evaluation plan.

In these cases as well as for the other HITEC evaluations, HITEC hopes to provide a value-added service to the community. The public sector can rely on HITEC's evaluations and reports when making purchasing decisions. For the private sector, HITEC can cut down the time it takes to introduce a new technology into the marketplace through its consensus-based process.

For more information regarding the various projects of HITEC, how to apply for an evaluation, and/or on how to become a HITEC volunteer panelist, consultant or testing site, contact:

HITEC
1015 15th Street, NW, Suite 600
Washington, DC 20005
phone (202) 842-0555
fax (202) 789-5345;
email hitec~cerf.asce.org.

INDUSTRIAL ACOUSTICS COMPANY and DiGERONIMO, P.A. ANNOUNCE ENGINEERING and ARCHITECTURAL NOISE CONTROL ASSOCIATION

This summer, a subcommittee (A1F04) of the Transportation Research Board (TRB), met in Boston to discuss transportation related noise and vibration issues for the mass transport, rail, highway, and aircraft transportation industries.

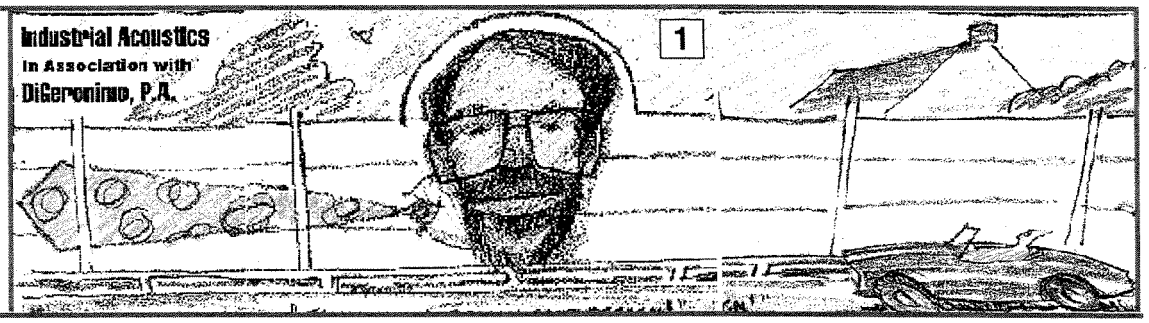
At that meeting of the A1F04, Gary Figallo of Industrial Acoustics Company (IAC), an international noise control engineering and manufacturing company introduced their team partner, DiGeronimo Associates, a 25 year old architectural firm in Paramus, New Jersey.

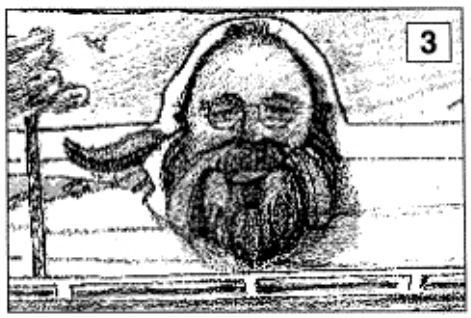
Industrial Acoustics Company and DiGeronimo are working as a team in the design of complementary decorative schemes of IAC's NOISHIELD) Barriers. DiGeronimo has been doing acoustical design work for historical structures and are contributing their expertise as part of the IAC team in the design of IAC's noise barrier projects.

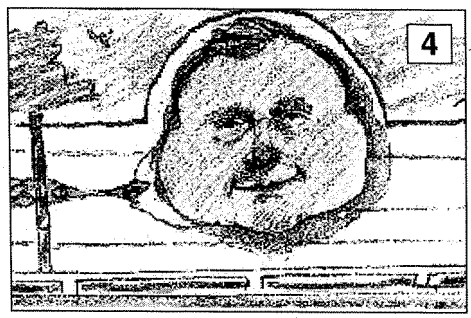
Principal Suzanne DiGeronimo notes, "We want to do wall design that is sensitive to the landscape", with IAC's Gary Figallo adding, "A common refrain is that highway noise barriers are ugly. With architects involved in the design of our NOISHIELD sound barrier projects, we can provide superior sound absorption while being sensitive to the aesthetic needs of communities and motorists."

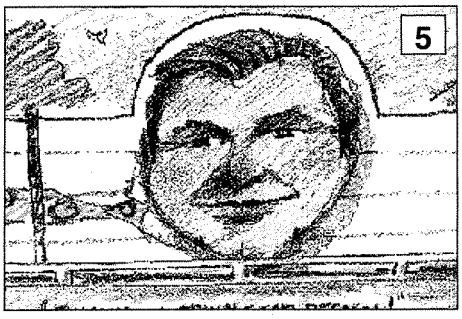
As a casual exercise, DiGeronimo's artist/designer George Marcincavage was encouraged to develop a "truly good noise wall design" in collaboration with the acoustics experts depicted below. The resultant design is shown in the first picture below. However, each of the experts insisted on certain modifications to the base design We present them here with tongue firmly in cheek.

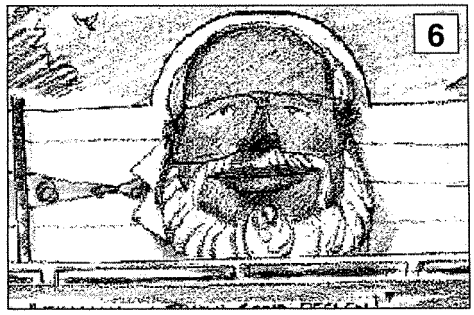
All the heads in the following 10 pictures are saying, **"Finally, a truly good design."** Try identifying these experts before you turn to page 26 for their amazing real-life identification.

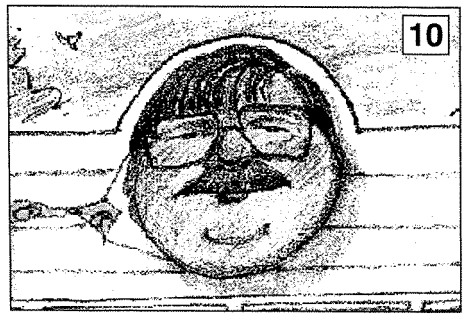












Consultant Prepares Noise Barrier Comparison Matrix for use in Design of Highway Noise Mitigation Projects

This matrix of the various noise wall materials manufactured by different companies across the United States resulted from my need to compare noise wall materials for noise mitigation design projects. Since I was not aware of an existing comparative listing, I decided to publish the results of my survey of noise wall materials in the hope that it may help others involved in noise wall design and engineering. I find this comparative analysis to be extremely useful especially for developing rough cost estimates and evaluating what materials are most suitable for particular applications.

My analysis of the different materials was conducted as part of an assessment of noise wall materials relative to two projects which my firm, Maguire Group Inc., is working on in Southwestern Pennsylvania - the Airport Busway/Wa bash HOV Project for the Port Authority of Allegheny County and the Mon-Fayette Expressway for the Pennsylvania Turnpike Commission. Both are large scale projects where proper selection of materials can have a significant effect on the overall cost of noise abatement.

In order to accurately assess the materials available, I first contacted noise wall manufacturers and requested catalog cut information as well as material samples. I tried to obtain samples of each of the materials included on the materials matrix, because often the literature that was available did not address adequately all of my questions, especially such variables concerning relative hardness, durability and aesthetics. Also, some of the available catalog cut information did not depict accurately the noise wall material. In some cases, the material is still being tested; therefore, critical information is lacking until testing is finalized.

This matrix is organized so that the name of the manufacturer, a contact person and a phone number is included, in case additional information is necessary. Listed are other physical characteristics of the noise wall materials determined from test results including: the Sound Transmission Class (STC); the Noise Reduction Coefficient (NRC) value, approximate weight of the material per sq. ft. (useful when assessing ease of constructability); and the relative cost for the noise wall material.

The relative material cost listed represents a standard range for typical

Manufacturer	Product Name	Material Type	Wall Type
CARSONITE INTL	SBS Sound BarrierSystem	Composite Shell, Recycled Tires Inside	Reflective
Conc Placement System	DuBrook Sound Wall	Recycled Tires in a Concrete Masonry Matrix — Free Draining	Absorptive
COR TEC COMPANY	SOUND OFF	Fiberglass Reinforced Panel Laminate with Polyester Inside	Reflective
CSI (Concrete Solutions)	SOUNDTRAP	Open Cell, Free-Draining Panels of Cementitious Material	Absorptive
CYRO INDUSTRIES	ACRYLITE 237	Acrylic Sheet	Reflective
Faddis Concrete Prod	FENCE-CRETE	Precast Concrete	Reflective
Hoover Treated Wood	PLYWALL	Wood Exterior, Insulation Inside	Reflective
Industrial Acoustics	NOISHIELD	Steel or Aluminum Skin with Absorptive Material Inside	Absorptive
Pickett Wall System	MonoWall	Precast Concrete Panels with Integral Precast Concrete Posts	Reflective
Sound Fighter Systems	LSE 1000/2000	Slotted Polyethylene Shell with Mineral Wool Absorber Inside	Absorptive
SOUNDZERO SOUNDZERO	SOUNDZERO SOUNDZERO NR	Concrete Shell, Insulation Inside Polymer-Bound Recycled Tires Affixed to Precast Panel or to Steel Core	Reflective Absorptive
Durisol International	DURISOL	Concrete Composite Panels of Wood Fibers and Portland Cement	Absorptive
Timber Holdings Ltd	Timbatech Noise Barrier	Wood Exterior with Mineral Wool Absorber Inside	Absorptive or Reflective

By David Freudenrich
Maguire Group Inc. — Architects/Engineers/Planners
1212 Manor Building, 564 Forbes Avenue, Pittsburgh, Pennsylvania 15219

walls with average wall heights. In other words, this information is to be used cautiously when comparisons are drawn between different materials. Variables such as quantity of material, the height of the noise wall, wind loads for a particular locale, geographic location of the project, complex engineering, soil conditions. location of the supplier or an approved contractor and others dictate the true, total cost of the noise wall. Also, the more complex the noise wall design and the more difficult the terrain, the higher the cost of the noise wall.

Additional subjective information was obtained including: is the material resistant to graffiti; if the material has been PennDOT approved; and if the material is fire resistant. Whole noise walls have been known to be set ablaze due to minor brush fires, so this aspect is very important, especially in those areas where the proposed noise wall is to be placed adjacent to residences.

My analysis represents a starting point which I plan to expand as more information becomes available, new materials are developed and existing ones are refined. Therefore, I am asking both manufacturers and noise wall design professionals to help me. If you are aware of a material which is not included in this survey or if the information included herein is inaccurate, please notify me at : (412) 281-6393 or E-mail me at 72411.2673 @ Compuserve.com. ■

Editor's Note:

I accepted this article with a little trepidation. All of the manufacturers in the matrix are my very good advertisers, and I would not want to have them upset by seeing their products so displayed.

However, they all seem to coexist compatibly throughout the pages of The Journal. Further, it is my understanding that Mr. Freudenrich spoke personally to each of the contact persons, advising them of his intentions for using their data.

I did, however, eliminate from David's matrix the cost information you all provided to him, since the installed cost of a noise barrier depends on many factors and not simply materials cost alone.

Also, this article alerts all of you advertisers to two new large-scale projects to which you may direct your attention.

If any of you feel there has been a misrepresentation of your product in any way, I shall reserve space in the next issue for printing your corrections. ■

Freeze/Thaw	NRC	STC	Wt/Sf	Fire Resist	Graffiti Resist	Contact Person	Phone No
Resistant	0.15	36	8 lbs	Yes	Yes	Paul Schubring	916 725-1373
Resistant	0.80	42	78 lbs	Under Test	Somewhat	Steven Lane	804 545-5215
Resistant	—	32	5 lbs		Yes	John Wohlford	708 598-5200
Resistant	0.95	51/40	32 lbs	Yes	Somewhat	Wendi Bucher	512 327-3481
Resistant	—	34	5 lbs	Some	Yes	Cathy Shashock	203 795-6081
Resistant	—	31	45.25 lbs	Yes	When Coated	John Morris	800 777-7973
Resistant	—	38	5.5 lbs	Somewhat	Somewhat	Glenn Wilson	800 832-9663
Resistant	1.0	31/38	5.4-9.8 lbs	Yes	Yes	Gary Figallo	718 931-8000
Resistant	—	36	50	Yes	When Coated	William Pickett	305 927-1529
Resistant	1.0	31	9.9 lbs	Somewhat	Yes	Guy Legendre	318 861-6640
Resistant		33	8-14 lbs	Yes	When Coated	Mark Murphy	800 321-6275
Resistant	0.80	—	5.25 lbs	Not Class 1	Somewhat	Mark Murphy	800 321-6275
Resistant	0.75-0.85	—	47 lbs	Yes	Somewhat	Hans Rerup	905 521-0999
Resistant	0.85-0.95	32 - 42	10-15 lbs	Class A	Somewhat	Richard Walker	414 445-8989

Illinois Toll Road Utilizes Recycled Tires in New Sound Barrier Project

Each year, over 250 million tires are dumped into our nation's landfills. This puts a strain on already overburdened waste sites. Fortunately, there is now a solution for getting those exhausted tires out of the landfill and back on the road.

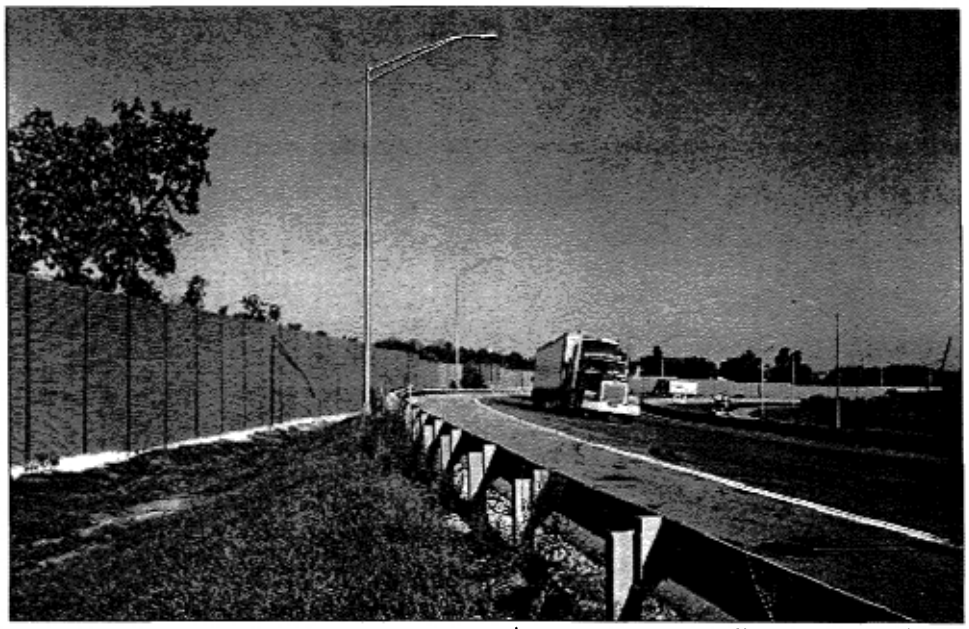
The Illinois State Toll Highway Authority (ISTHA) relieved their landfill of over 160,000 pounds of old tires in a unique and useful way. The old tires were reground and used in a sound barrier structure. This reduced noise pollution along the Illinois Toll Way System as well as easing the load on one of our nation's landfills.

The product used in this application was the Carsonite Sound Barrier System (SBS). This unique system is composed of space age reinforced composite building members, filled with post consumer scrap rubber (recycled tires). This combination offers durability and a high degree of graffiti-resistance; as well as the welcomed ecological benefits of recycling old tires. The Carsonite SBS is the only sound barrier containing recycled materials currently approved by ten Departments of Transportation including Caltrans.

Reducing noise pollution is the prime purpose of the Carsonite SBS. This is achieved through the scrap rubber core, which carries a Sound Transmission Class of 36, well above national and state maintained minimums.

The Carsonite Sound Barrier System was installed on the Illinois Toll Road at the I-294 exit southbound to I-55 westbound. This area is heavily traveled by commercial traffic day and night creating noise pollution to the adjoining upscale residential neighborhood.

This portion of the ISTHA contract for the Carsonite SBS covers approximately 45,000 square feet. The project was handled by Lorig Construction of Chicago, Illinois. After approval of product design, materials and location by ISTHA, the Carsonite SBS was delivered during August and September for immediate installation. Shipments consisted of approximately 4,000 square feet of material per truck. Because the

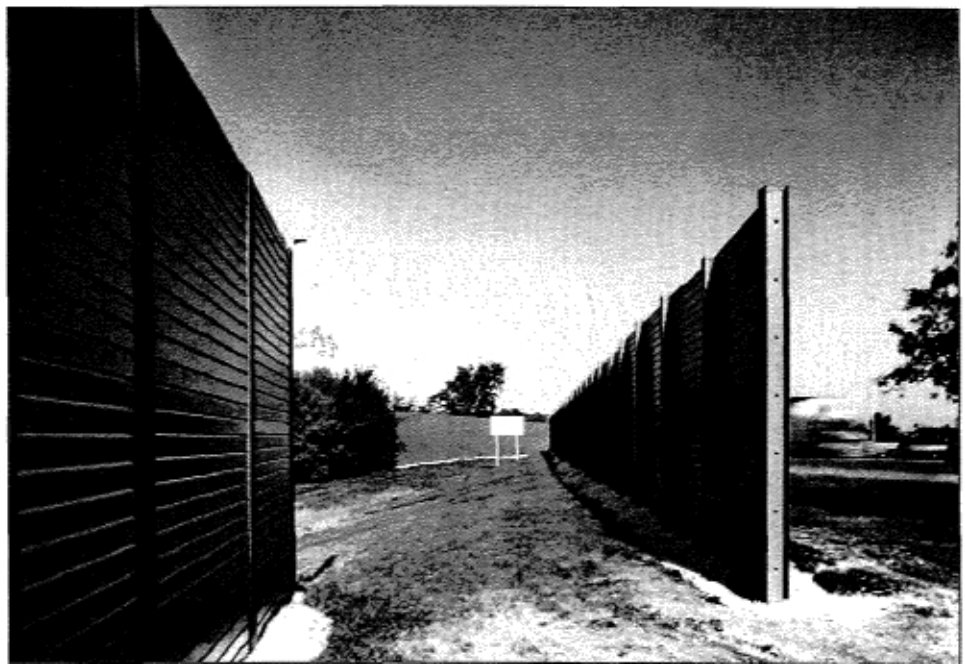


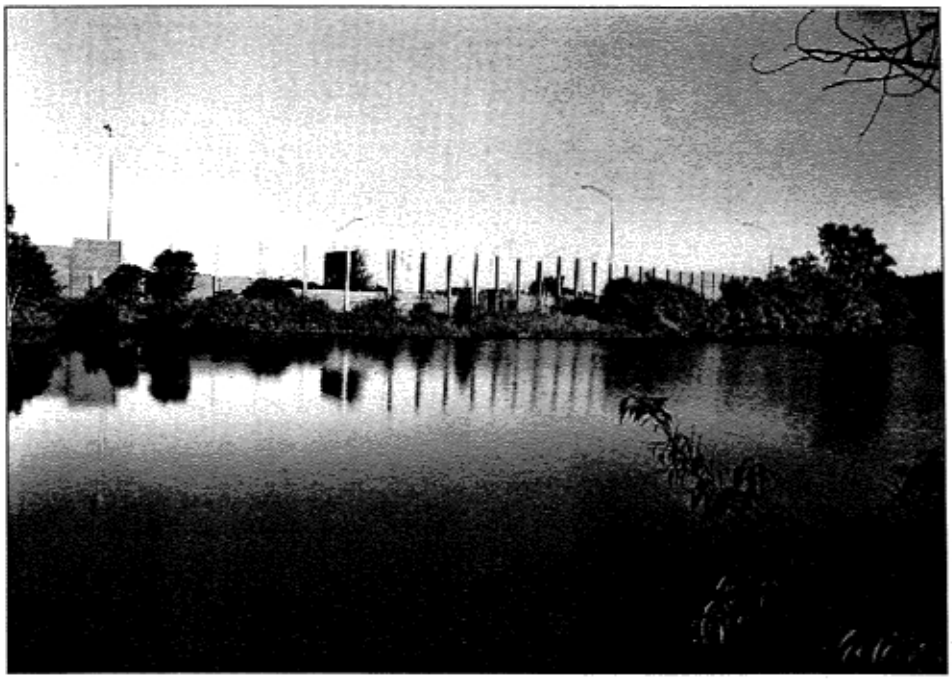
Carsonite SBS weighed under eight pounds per square foot, the material could be delivered and stored on pallets at the jobsites, prior to the crews moving in for construction. Coordination of shipment from the factory with the crews in the field allowed the material to arrive when crews and equipment were available.

The Carsonite SBS arrived in preassembled panel sections, ready to be placed into the sound wall uprights. Each panel was numbered for wall location and order of installation. The panels were placed directly in front of the appropriate wall section, ready to be dropped between the uprights. All panels had previously been capped and sized for fit in the factory, so once the panel was lowered into place, the wall section was complete and the crew could quickly move on to the next section.

Traffic control was not necessary during the installation. Since the materials were palletized and previously delivered to the jobsite, only one lane was blocked, for the safety of the crew.

Because the panels are lightweight and easy to handle, two crews worked





closely together, and heavy cranes were not necessary. These factors, combined with the ease of construction, resulted in high daily production rates for panel installation. The Lorig Construction crews accomplished the installation in record times using relatively small crews and minimal equipment.

In this project alone, over 160,000 pounds of exhausted innertubes, retreads and radial tires were reclaimed from dumpsites and put to beneficial use. The Carsonite SBS has also been installed in Oregon, Nevada, and Virginia. With installations to begin in California and Colorado, the Carsonite Sound Barrier System is on its way to being the single largest consumer of discarded tires in the United States.

Carsonite was featured on the national program Today's Environment. The program illustrated the Carsonite Sound Barrier product, its waste material, the limitless supply of old tires, and the importance of reducing these massive stock piles which are putting a chokehold on America's dwindling acres of waste sites. Free video copies of the Carsonite segment on Today's Environment are available by contacting Carsonite's Marketing Department at 1 800 648-7974. ■

A Sense of Place

By Domenick Billera, New Jersey Department of Transportation

The most common complaint that we receive at the NJDOT about noise barriers is that they eliminate the highway users view from the roadway and create a "tunnel". NJDOT, using a team approach of architects, roadway and bridge engineers and noise experts along with community input, have developed a barrier concept to create a sense of place in the barrier corridor instead of a tunnel.

The majority of the barrier is a well designed standard concrete post and panel with carefully selected enhancements. The wall is tinted a taupe color which will not clash with the galvanized guiderail immediately in front of it. The wall is banded with a rough texture at the base, a good anti-graffiti surface. The rough surface reflects less light and registers as a darker shade .

A sandblast finish middle segment which registers as a lighter color and a smooth overhanging cap at top which registers as the lightest color completes the wall. The bottom to top transition of dark to light makes sense as it "reads" as heavy at the bottom, light at top. Also, the dark color corresponds to earth tones and the light color to sky tones.

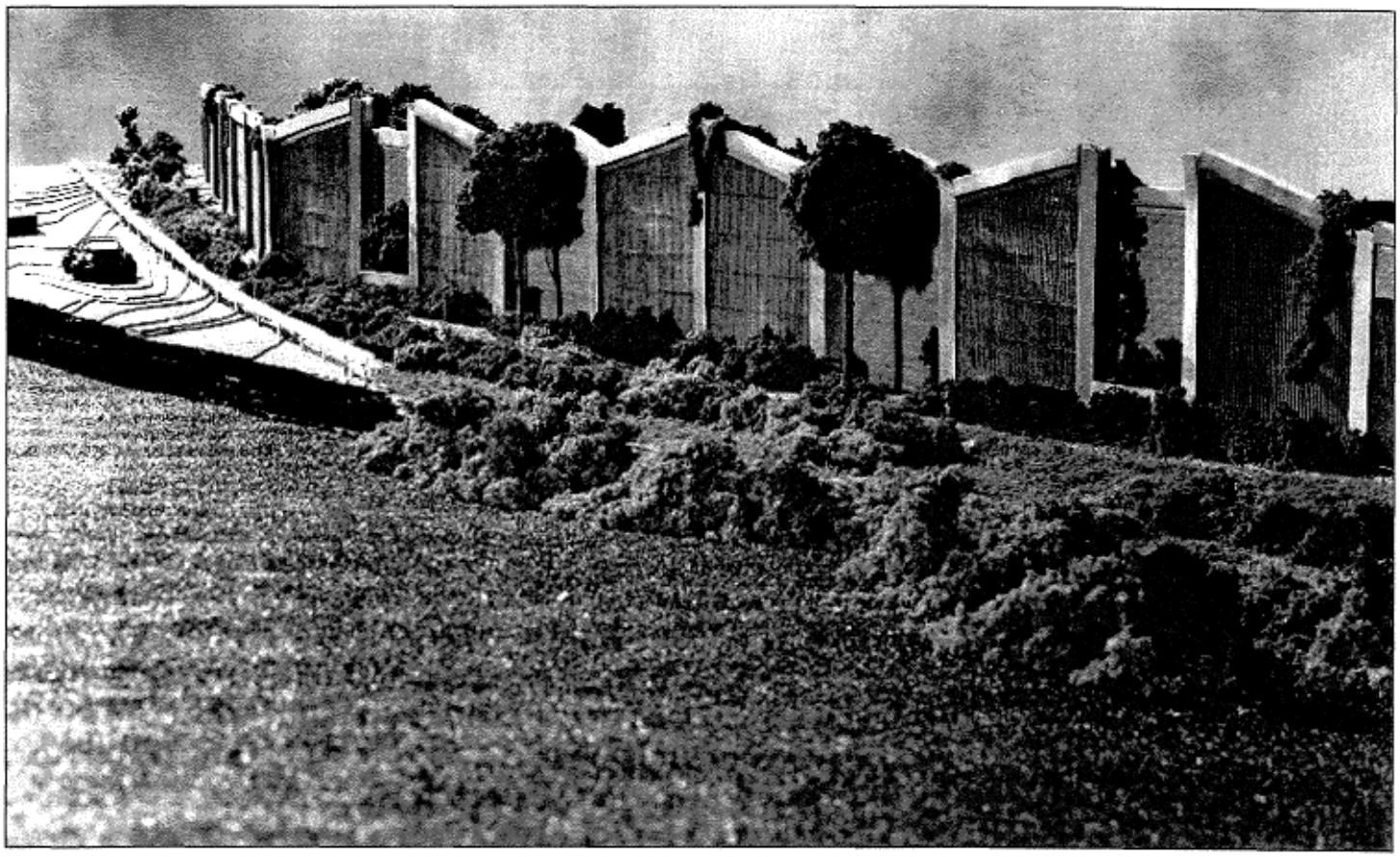
To create the sense of place, we replicated building roof lines in what we call "Gateways" at select locations of the barrier alignment. These Gateway locations would be natural focal points for highway users as they traverse the corridor.

The Gateways also solved another problem we have when crossing structures with noise barriers. Many times we use a lighter weight material on the structure. This material looks different from the rest of the wall, almost like a mistake. By creating Gateways at the ends of the structure, we highlight the change and create an additional point of visual interest. Construction of the wall will start in 1996 and everyone involved with the project feels this will be the best wall NJDOT has ever constructed. Cost estimates project that the Gateways will add only 5% to the project cost!

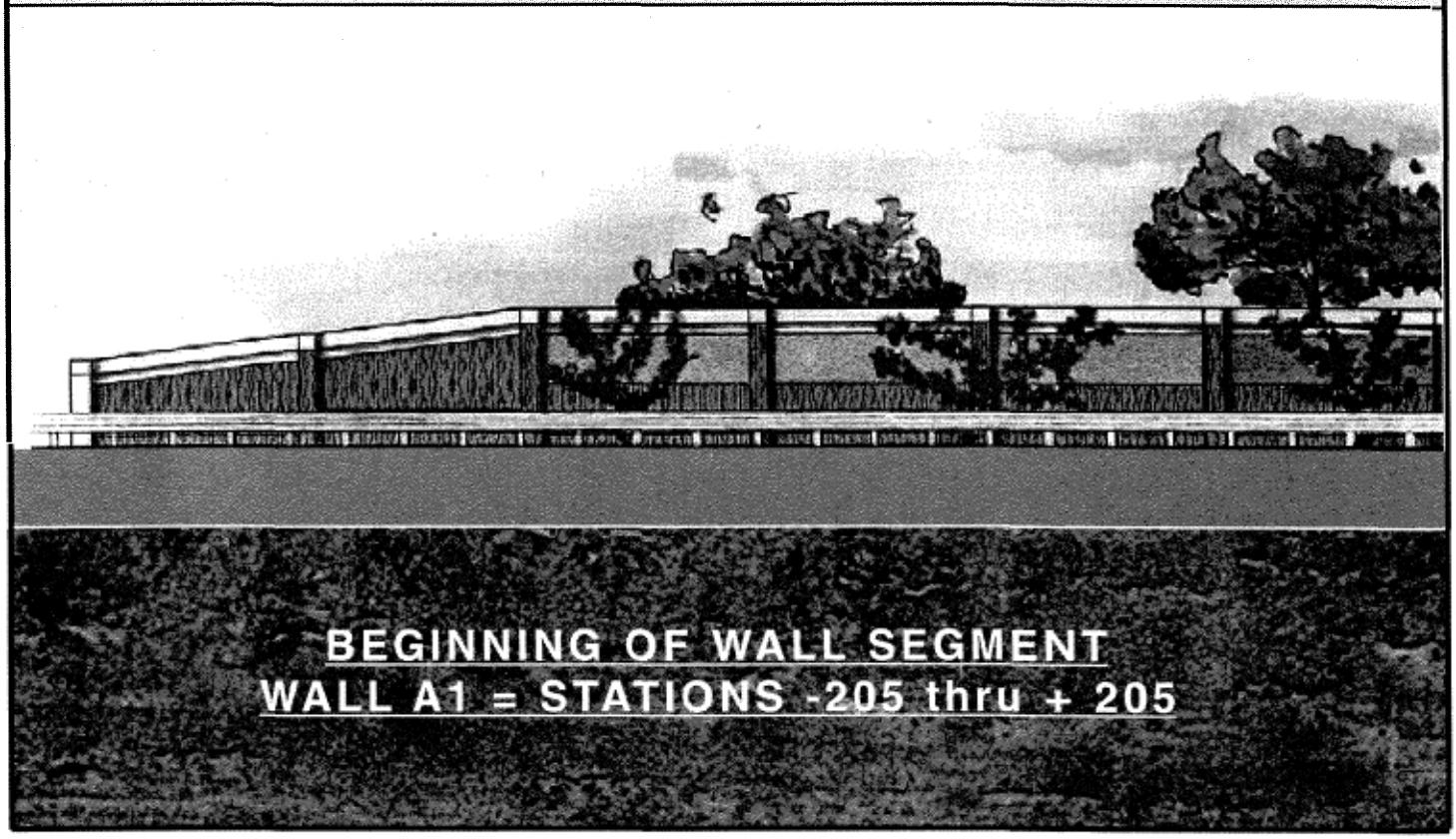
For your information, I have provided three photographs of scale model mock-ups and five design concept sketches of these walls. They begin at the bottom of this page and continue along the top half of the next seven pages.

I will be happy to discuss with you any of the aspects of design and construction of these walls.

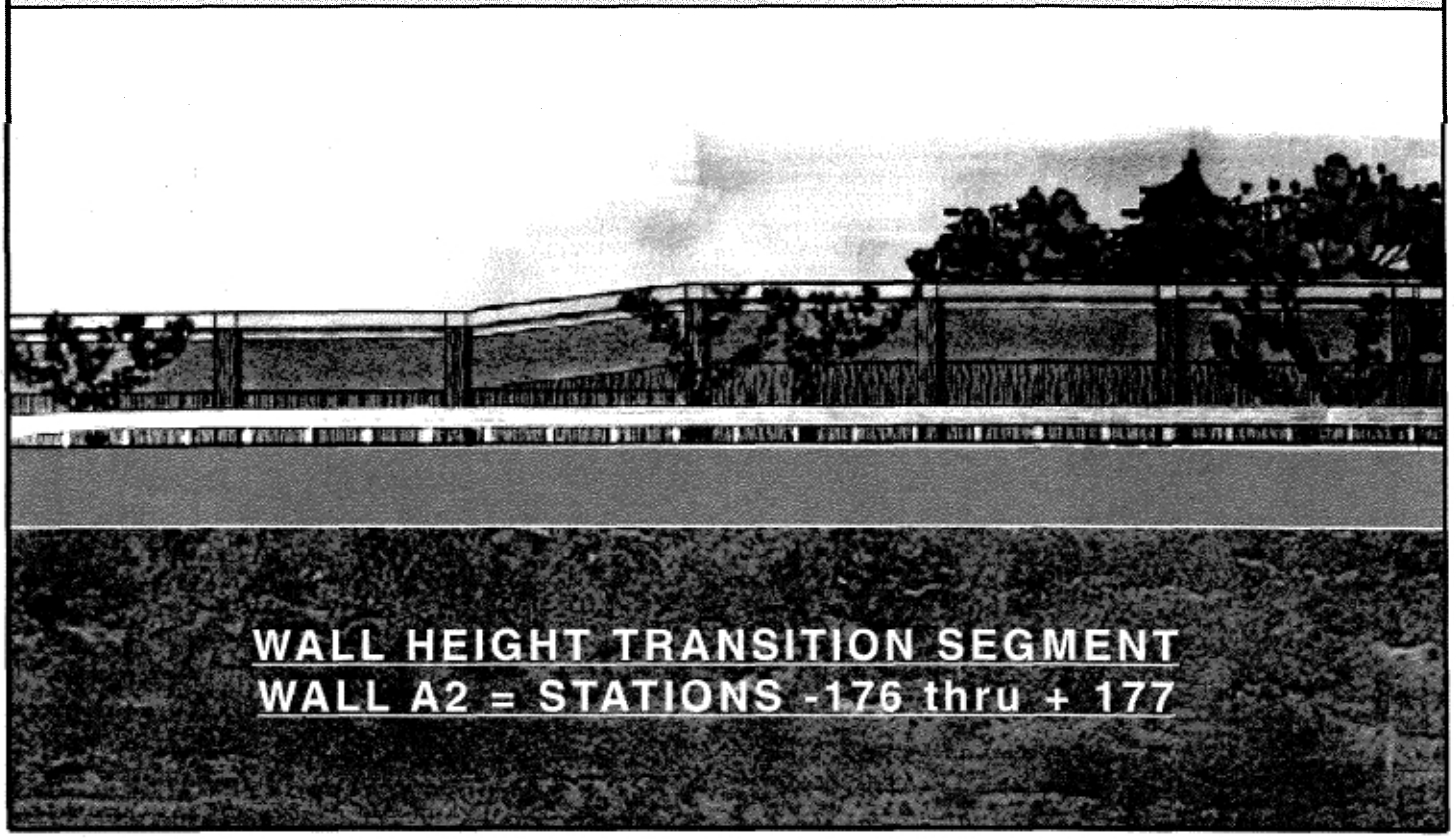
Domenick Billera
New Jersey Dept. of Transportation
1035 Parkway Avenue CN 600
Trenton, NJ 08625
Phone 609 530-2834
Fax 609 530-3893



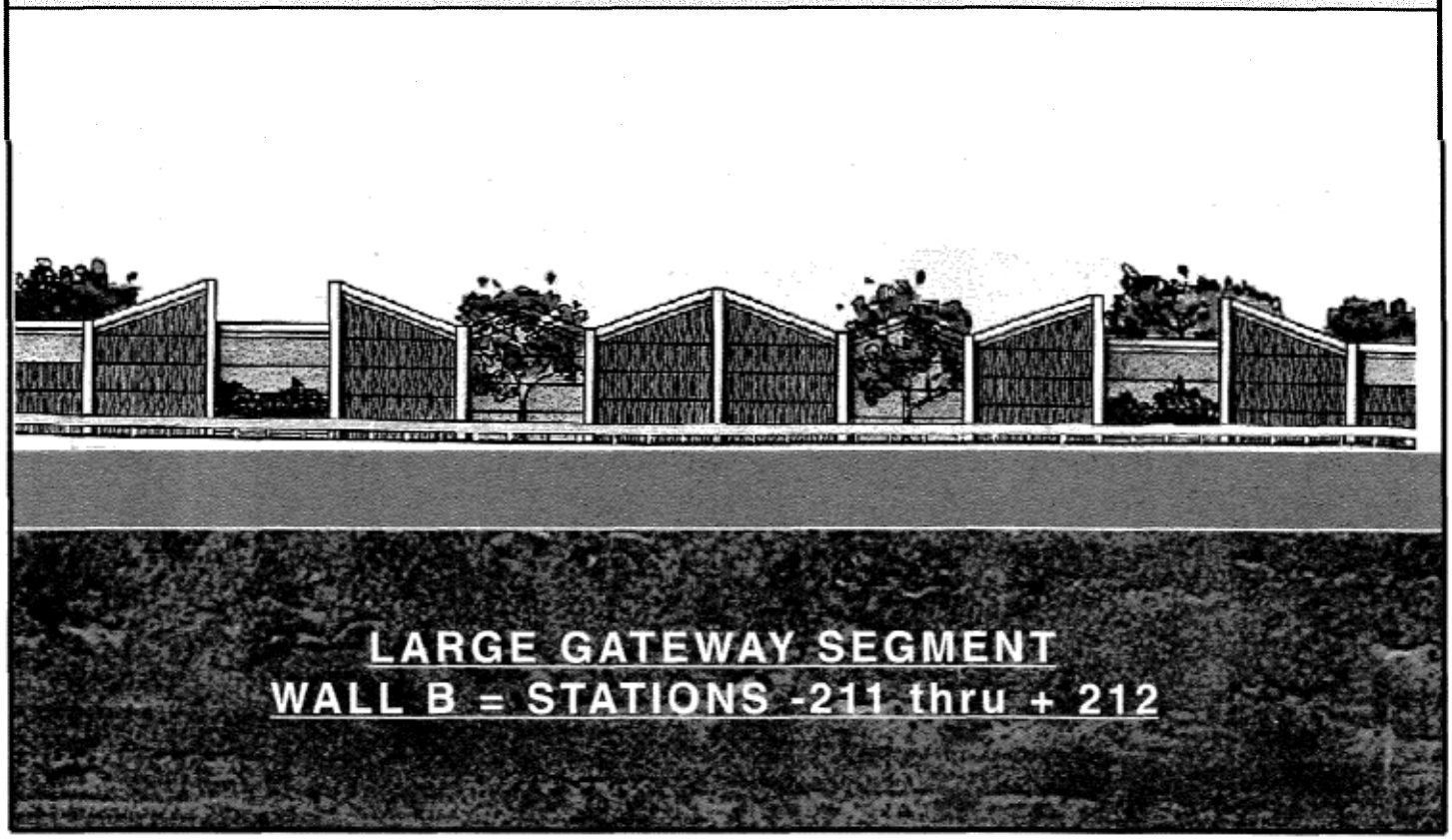
A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



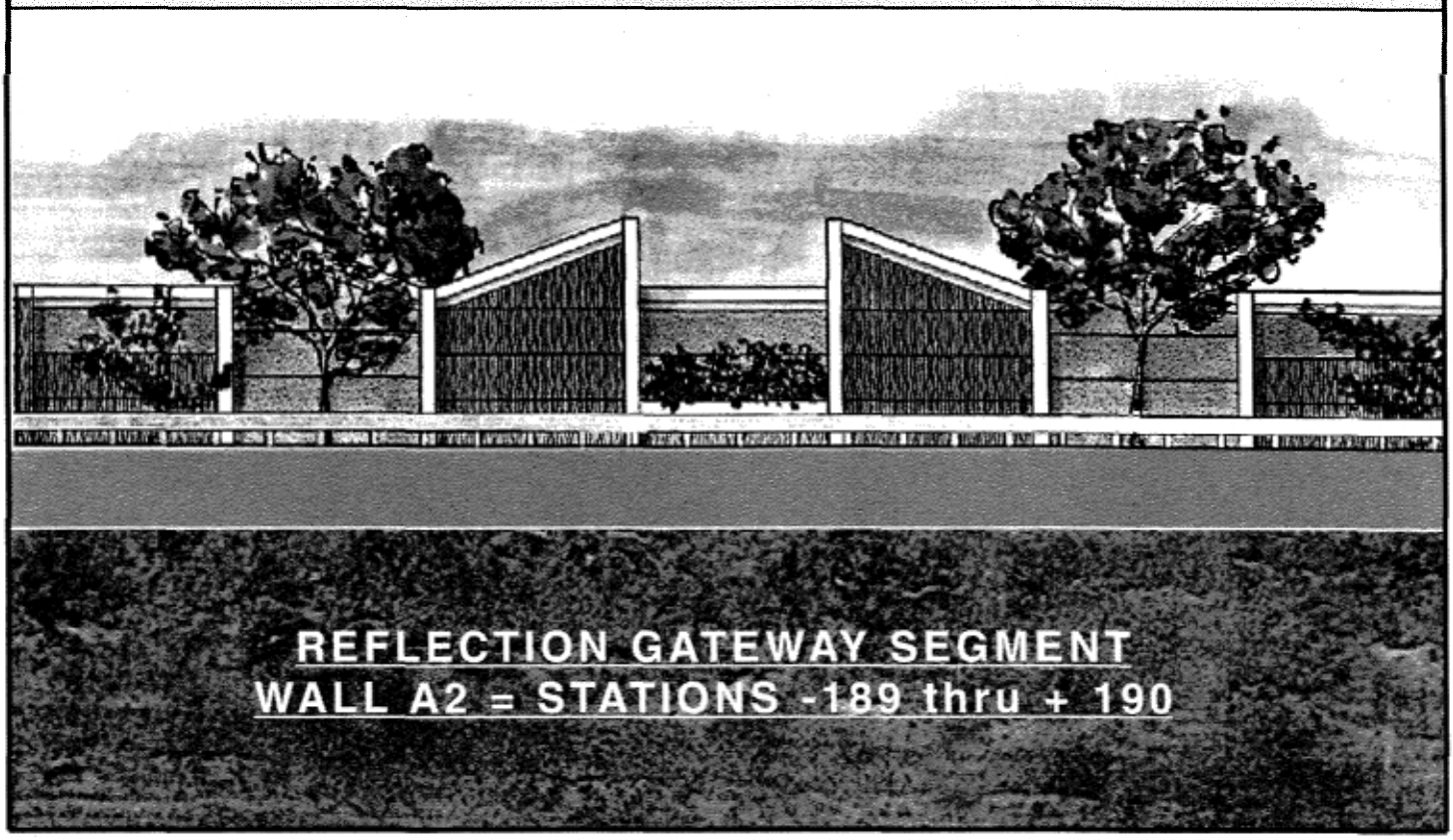
A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



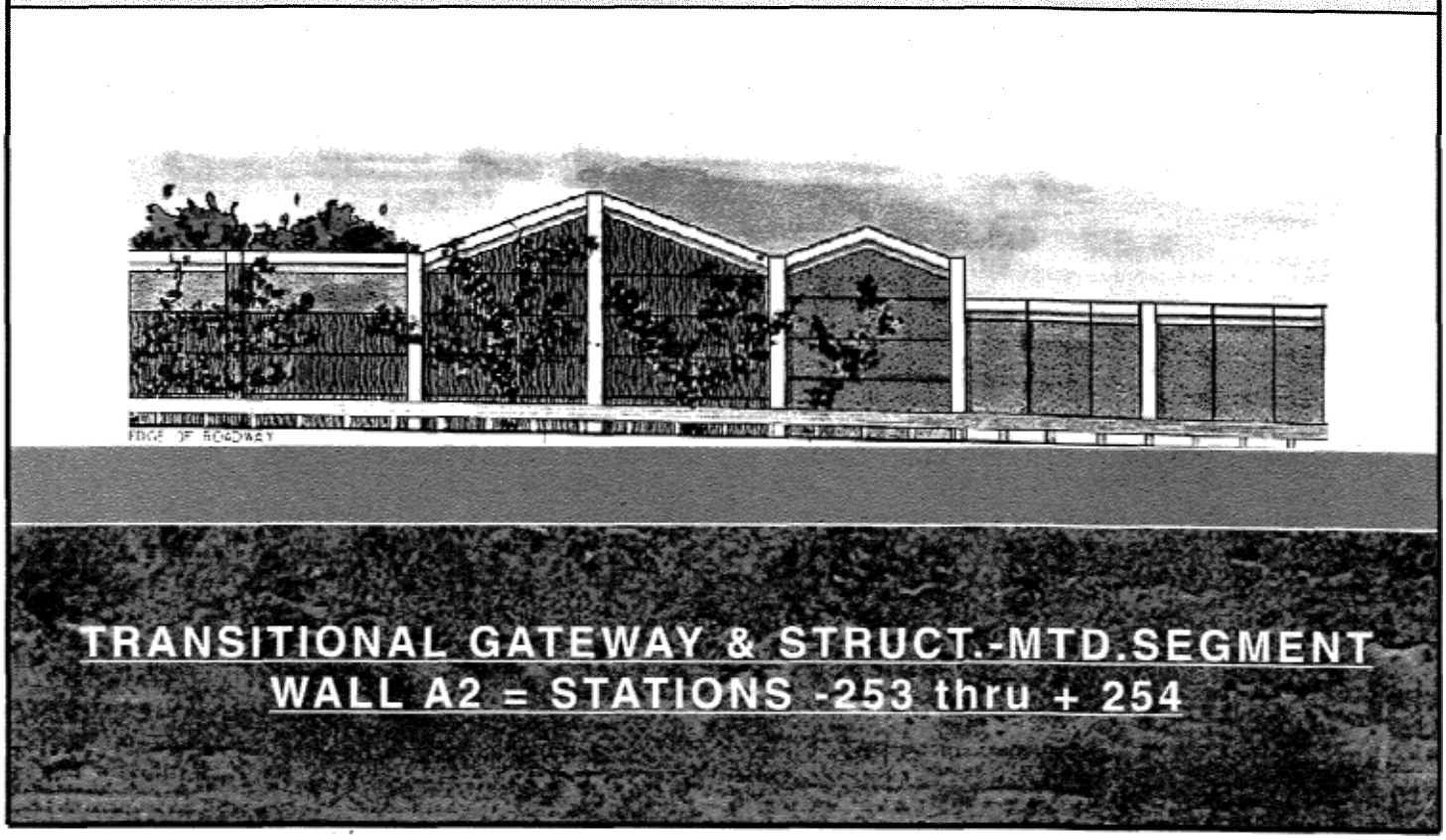
A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



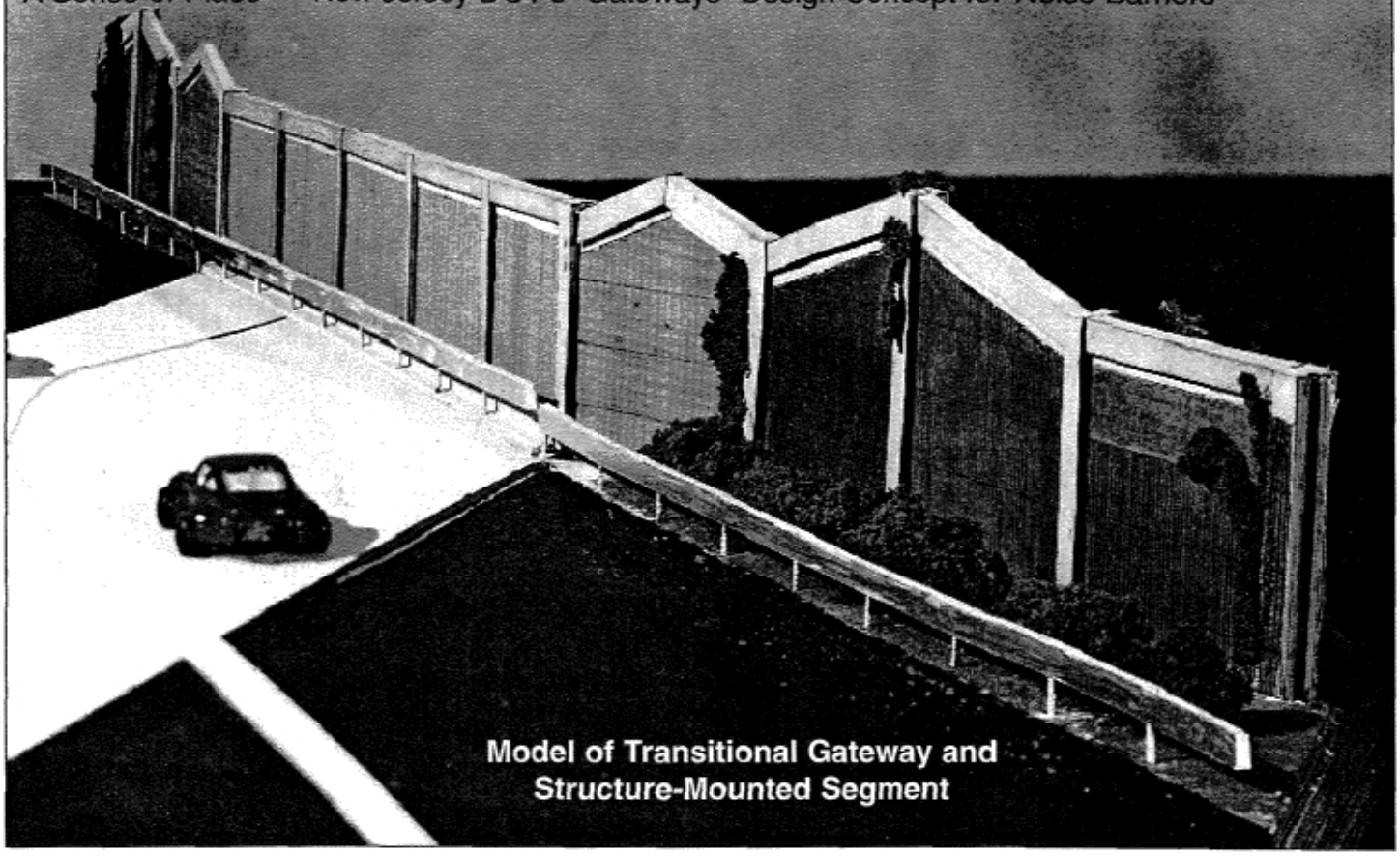
A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers

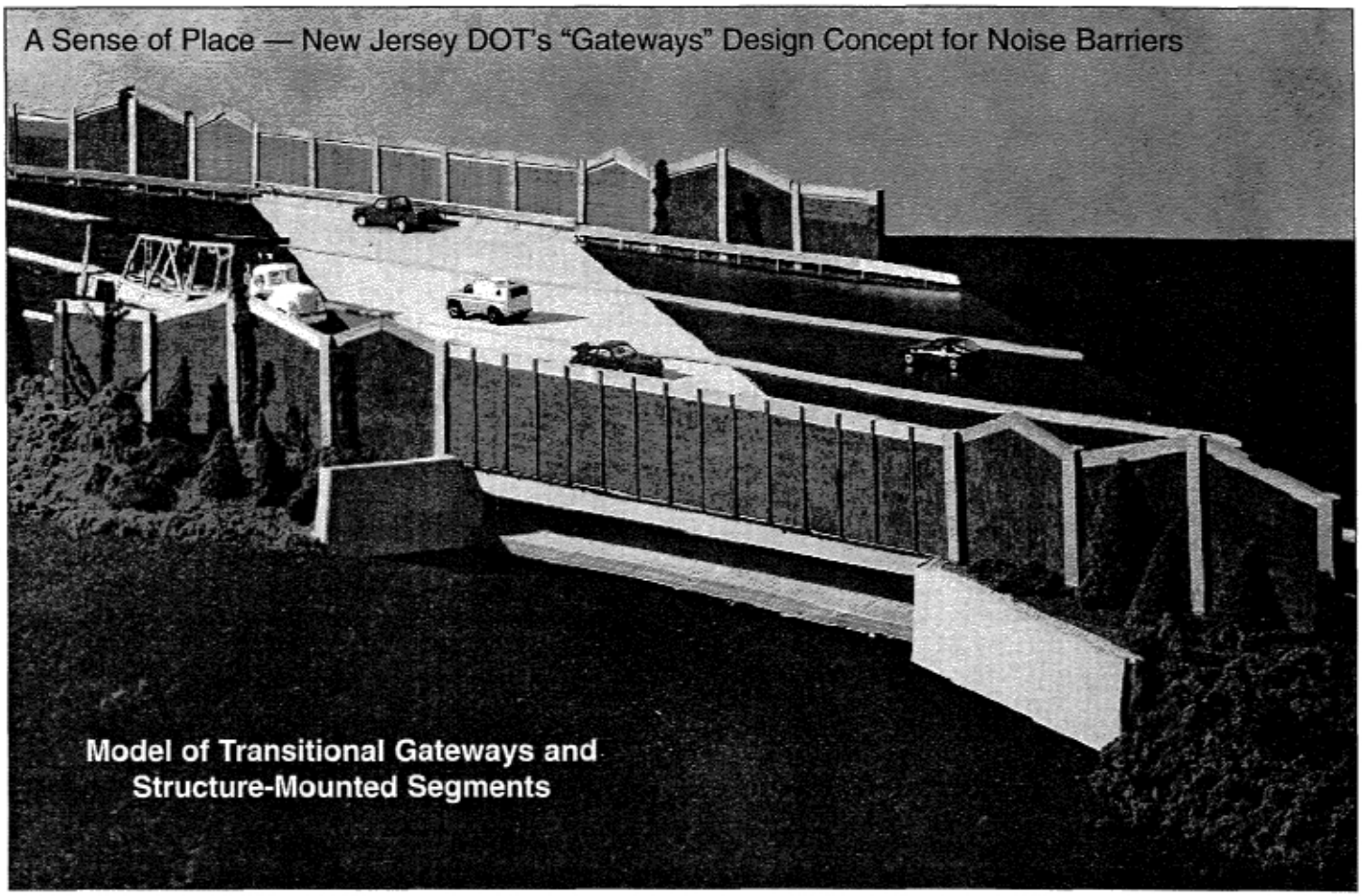


A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



Model of Transitional Gateway and Structure-Mounted Segment

A Sense of Place — New Jersey DOT's "Gateways" Design Concept for Noise Barriers



Model of Transitional Gateways and Structure-Mounted Segments

(**Temples**, *continued from page 7)*

It's a bit over my head, but he seems to be saying the unusual acoustics at Chichen Itza are due, in part, to the gaps which are part of the surface of the temple's exterior walls. The fellow in Houston says a researcher from Central Florida University was doing an acoustical survey there in late '94. I'll let you know if I hear anything more specific.

One other thought on this subject - back in 1988 or thereabouts, acoustician Steve Garrett (then at the Naval Postgraduate School in Monetery, CA) did some work on ancient Peruvian Whistling pottery vessels. They made a sound when you poured water from them. Garrett was convinced there was more to the vessels than that. He got a couple of them and found they were tuned fairly precisely, if you blew into them. Two vessels blown simultaneously produced different tones. He hypothesized this was intentional and a clue to the Vessel's real purpose. There's a paper on this somewhere in the annals of the Acoustical Society.

Response

I'm very interested in this type of phenomenon, and I've been mounting a research program at my institution to evaluate the absorptive and reflective properties of surfaces _in situ_. No doubt the gaps in these Mayan temple walls create a favorable interference pattern for the range of frequencies involved in the sounds of their ceremonies.

Response

Yes the building has 4 stairways of stone which represent the number of days in the year 91 steps per side and a upper platform for a total of 365. Also the Maya had an 18 base for math and 18 months in a year. The pyramid has nine levels divided by the staircases or 18. During the spring and autumn equinoxes a series of shadow triangles are projected on the north stair case which has serpent heads at the base. The triangles undulate in assent in March and descent in September. Add this to the nonlinear echo, and the sound projection from them, you get one tricky pyramid..

The Question is was all this accidental or by design. If by design How? The Mayas were stone age people

---

Response

In December 1994 I travelled to Belize, and visited a ceremonial site on the Guatemalan border which is still being excavated, called Xunantunich. When we had climbed the tall pyramid and looked down into the courtyard where people assembled to be addressed, we noticed a strange illusion. The people walking across the courtyard appeared to be smaller and more distant than one would have expected, since when in the courtyard the pyramid seems to loom quite close above. We could also observe that the people in the courtyard were talking, apparently quite loudly, but that their voices sounded muted and distant. Yet as we spoke to one another, our voices seemed amplified. A large recess in the wall of the pyramid behind us functioned as a resonator, and gave our sounds back to us with a bright, ringing quality. We could be heard quite clearly in the

courtyard below. Our host suggested that this enabled one to sound larger than life and that such designs helped to maintain the mystique of the mayan class structure. He also pointed out that the stone used in building the pyramid had resonant qualities, although the structures as we see them now are not in their finished form -- they are missing the polished stucco surfaces and wood additions they were designed for.

Response

There's a considerable history to Mayan architecture, and although the pyramid we ascended was a work added to periodically, with each generation of ruler, there is a strong sense of overall design. Remember that the Mayan calendar is much more accurate than the Roman, and that their mathematical skills are as yet not fully accounted for. Perhaps their sense of sound in general is worth study?

Response

I posted the original Chichen Itza: unexplained acoustics in sci.archaeology.mesoamerican newsgroup. and got some interesting responses including one on Tulum on 07/18 or 19 and another regading Chichen Itza's "Musical Phalluses" These were public posting and should be discussed in WFAE.

Response

Article 1:

"You could also mention Chichen Itza's "musical phalluses". These are a series of cones that produse musical tones when tapped with a wooden mallet. Supposedly, back in the '20s members of Morley's team had some of them set out in rows like a xylophone and played Xmas carols on them. I've never read of any musicologist studying them to determine their pitches and compare them with Western scales and notation (has anyone else seen something of this sort?) About 20 years ago, the cones were laying stacked in piles behind old park entrance near the Castillo. Someone put up a saying "Do not hit with stones", so of course various tourists who otherwise wouldn't have given the cones a second look banged away at the cones with rocks, breaking many of them.

Article 2:

Another example: When I was at Tulum on the Yucatan coast, I seem to remember that there was a temple which gave a clear and long-range whistle or howl when the wind velocity and direction were correct. The guide, for what it's worth, stated that this was used as a signal to warn of incoming hurricanes and big storms. I heard it that day, and I don't think it was an accident that the sound was generated in this way.

Looks like a pattern here. The Maya may have had a particular propensity for acoustic engineering. Why not, they were great at engineering for specificality? It would be interesting research problem. ■

Transportation Research Board, Committee A1F04, Transportation Related Noise and Vibration
Directory of TRB A1F04 Officials, Chairpersons and State Representatives of A1F04

Committee Officials

Domenick Billera, Chairman
New Jersey Dept. of Transportation
1035 Pakrway Avenue CN 600
Trenton, New Jersey 08625
Phone 609-530-2834 Fax 609-530-3893

Wayne Kober, A1F100 Chairman
Pennsylvania Dept. of Transportation
Room 1009, Transportation & Safety Bldg.
Commonwealth & Forster Street
Harrisburg, Pennsylvania 17120
Phone 717-787-1024 Fax 717-783-8217

Win Lindeman, A1F04 Secretary
Florida Dept. of Transportation
605 Suwannee St., MS-37
Tallahassee, Florida 32399-0450
Phone 904-488-2914 Fax 904-922-721 7

Jon Williams, A1F04 Committee Liaison
National Academy of Sciences
2101 Constitution Avenue, N.W.
Washington, D.C. 20418
Phone 202-334-2966

Chairmen Emeritus

Dr. Louis F. Cohn
Universlty of Loulsvllle
Department of Civil Engineering
Louisville, Kentucky 40292
Phone 502-588-6276
Fax 502-588-7033

John Wesler
Wyle Laboratorles
2001 Jefferson Davis Highway
Suite 701
Arlington, Virginia 22202-3604
Phone 703-415-4550
Fax 703-415-4556

Mas Hatano
64 Manley Court
Sacramento, California 95820
Phone 916-451-5000

Subcommittee Chairmen

Aircraft Noise
Dr. Eric Stusnick
Wyle Laboratories
2001 Jefferson Davis Highway
Suite 701
Arlington, Virginia 22202-3604
Phone 703-415-4550
Fax 703-415-4556

Highway Noise
Ken Polcak
Maryland State Hlghway Admin.
Office of Environmental Design
707 N. Calvert Street
Baltimore, Maryland 21202
Phone 410-333-8072
Fax 410-333-4126

Rail/Mass Transit Noise
James Nelson
Wilson, Ihrig & Associates
5776 Broadway
Oakland, California 94618
Phone 510-658-6719
Fax 510-652-4441

State Representatives to the A1F04 Committee

ALBAMA State Rep.
Bill G. Carwile
Phone 334-242-6142
Fax 334-269-0826

ALASKA State Rep.
Davld Esch
Phone 907-479-2471
Fax 907-586-8365

ARIZONA State Rep.
William P. Belt
Phone 602-255-7767
Fax 602-255-8117

ARKANSAS State Rep.
Mlke Webb
Phone 501-569-2281
Fax 501-568-1565

CALIFORNIA State Rep.
Rudy Hendriks
Phone 916-263-3383
Fax 916-263-3384

COLORADO STtate ReP.
L. R. 'Randy" Flodine
Phone 303-757-9793
Fax 303-757-9149

CONNECTICUT State Rep.
Carmine Trotta
Phone 203-566-4272
Fax 203- 566-8943

DELAWARE State Rep.
Rlchard K. Vetter
Phone 302-739-3828
Fax 302-739-6119

FLORIDA State Rep .
Win Lindeman
Phone 904-488-2914
Fax 904-922-7217

GEORGIA State Rep.
Blll Johnson
Phone 4()9-699-4427
Fax 404-699-4440

HAWAII
Pat Hironaga
Phone 808-841-2876
Fax 808-847-5857

IDAHO State Rep.
Charles M. Rountree
Phone 208-334-8484
Fax 208-334-3858

ILLINOIS State Rep.
Mike Bruns
Phone 217-782-7077
Fax 217-782-1927

INDIANA State Rep.
Steve Cecil
Phone 317-232-5468
Fax 317-232-0238

IOWA State Rep.
Ron Ridnour
Phone 515-239-1613
Fax 515-239-1639

KANSAS State Rep.
Scott P. Vogel
Phone 913-296-3521
Fax 913-296-6946

KENTUCKY State Rep.
Barry Adkins
Phone 502-564-7250
Fax 502-564-5655

LOUISIANA State Rep.
Ron Rebouche
Phone 509-929-9142
Fax 504-929-9i87

MAINE State Rep.
Arlo N. White
Fhone 207-287-3361
Fax 207-289-2896

MARYLAND State Rep.
Ken Polcak
Phone 410-333-8072
Fax 410-333-4126

MASSACHUSETTS State Rep.
Tim Roache
Phone 617-973-8071
Fax 617-973-8035

MICHIGAN State Rep.
Leo DeFrain
Phone 517-322-1032
Fax 517-322-5664

MINNESOTA State Rep.
Melvin Roseen
Phone 612-296-3260
Fax 612-296-3160

MISSISSIPPI State Rep.
Elton D. Holloway
Phone 601-944-9142
Fax (601) 944-9009

MISSOURI State Rep.
Robert L. Hudson
Phone 314-751-4659
Fax 314-751-655 5

MONTANA State Rep.
Gordon J. Stockstad
Phone 406-444-7223
Fax 406-444-7245

NEBRASKA State Rep.
Mark Ottemann
Phone 402-479-4684
Fax 402-479-4325

NEVADA State Rep.
Jim Crawford
Phone 702-885-5680
Fax 702-687-4846

NEW HAMPSHIRE State Rep.
Charles Hood
Phone 603-271-3226
Fax 603-271-3914

NEW JERSEY State Rep.
Domenick Billera
Phone 609-530-2834
Fax 609-530-3893

NEW MEXICO State Rep.
Greg Rawlings
Phone 505-827-0339
Fax 505-827-3214

NEW YORK State Rep.
William McColl
Phone 518-457-2385
Fax 518-457-6887

NORTH CAROLINA State Rep.
Stephen Walker
Phone 919-733-9770
Fax 919-733-9794

NORTH DAKOTA State Rep.
Ingvald Okland
Phone 701-224-2507
Fax 701-224-4545

OHIO State Rep.
Elvin W. Pinckney
Phone 614-466-5154
Fax 614-752-4718

OKLAHOMA State Rep.
Roger Saunders
Phone 405-521-3050
Fax 405-521-2524

OREGON State Rep.
David Goodwin
Phone 503-378-8486
Fax 503-373-7376

PENNSYLVANIA State Rep.
Roy Osborne
Phone 717-772-0832
Fax 717-772-0834

PUERTO RICO State Rep.
Jorge Rivera Jimenez
Phone 809-728-6290
Fax 809-727-5503

RHODE ISLAND State Rep.
Richard Gottlieb
Phone 401-277-2694
Fax 401-277-6038

SOUTH CAROLINA State Rep.
Paul Embler
Phone 803-737-139
Fax 803-737-6385

SOUTH DAKOTA State Rep.
James D. Nelson
Phone 605-773-3309
Fax 605-773-3921

TENNESSEE State Rep.
Raymond Brisson
Phone 615-741-2612
Fax 615-741-2508

TEXAS State Rep.
Michael Shearer
Phone 512-416-2622
Fax 512-416-2643

UTAH State Rep.
John D.A. Neil
801-965-4227
Fax 801-965-4338

VERMONT State Rep.
Jeff Squires
Phone 802-828-3441
Fax 802-828-3983

VIRGINIA State Rep.
Cary Adkins
Phone 804-371-6765
Fax 804-786-7401

WASHINGTON State Rep.
Tim Coats
Phone 206-753-1866
Fax 206-586-8613

IDENTIFICATION OF THE ACOUSTICS EXPERTS IN THE "TRULY GOOD NOISE BARRIER DESIGN" ON PAGE 9

1. Domenick Billera
   New Jersey Dept. of Transportation
2. William Bowlby
   Bowlby & Associates, Inc.
3. Ken Polcak
   Maryland State Highway Administration
4. David Zawada
   H.W. Lochner, Inc.
5. Win Lindeman
   Florida Dept. of Transportation
6. Grant S. Anderson
   Harris Miller Miller & Hanson Inc.
7. Soren Pedersen
   Ontario Ministry of Transportation
8. James L. Sowell
   Los Angeles Metro Transp Authority
9. James Nelson
   Wilson, Ihrig & Associates
10. Jay Waldschmidt
    Wisconsin Dept. of Transportation

INDEX OF ADVERTISERS

IMPORTANT

Reader Registration

For Federal, State and Local Government Officials, Government Associations, Universities and Libraries

Only you are entitled to a **free** subscription to The Wall Journal.
Just provide us with a subscription request on your letterhead and mail it to:

The Wall Journal, P.O. Box 1217, Lehigh Acres, FL 33970-1217

Please don't telephone it to us. If you have already registered, just ignore this — you are safely in our database and will continue to receive The Journal..

Reader Subscription

For U.S. Consultants, Contractors, Manufacturers, Equipment Vendors and Others in the Private Sector

Please ❑ begin/ ❑ renew my subscription to The Wall Journal.

Subscriptions are for a one-year period (six bi-monthly issues)

Single Copy Subscription (USA) ❑ 1 Year, $17.95

Corporate Subscription (5 copies each issue, one address) ❑ 1 Year, $56.00

Please order your subscription on your letterhead, enclose your check for the appropriate amount, and mail to:

The Wall Journal, P.O. Box 1217, Lehigh Acres, FL 33970-1217

BACK ISSUES

Issues # 1 thru # 17 are available at a cost of $3.00 each to cover postage and handling — this applies to both public and private sectors

Keep your files up to date for a unique chronology of the events and workings of other professionals in the field of transportation related environmental issues.

Subscriptions

Subscriptions to The Wall Journal are free of charge to federal, state and local government agencies and their officials, to government associations, and to universities, provided they have registered in writing by sending name, department and complete mailing address. We would also like to have telephone and fax numbers for our referral records.

Subscriptions for the private sector (e.g.,consulting engineers, contractors, equipment manufacturers and vendors) are available at the costs per year (6 issues) shown below. Please include your check with your subscription order.

U.S. Subscribers: $17.95. Please send checks and subscription orders to The Wall Journal, P.O. Box 1217, Lehigh Acres, FL 33970-1217.

Canadian Subscribers: $26.00 (CDN, including GST). Please make checks and subscription orders payable to Catseye Services, Postal Outlet Box 27001, Etobicoke, Ontario M9W 6L0.

All Others: $30.00 (U.S.). Please send subscription orders and drafts payable in U.S. funds through U.S. banks to The Wall Journal, P.O. Box 1217,Lehigh Acres, FL 33970-1217.

Advertising

Display advertising rates and sizes are contained in our Advertising Rate Schedule, a copy of which is available on request sent to The Wall Journal, P.O. Box 1217, Lehigh Acres FL 33970-1217.

The Wall Journal
P.O. Box 1217
Lehigh Acres, FL 33970-1217

BULK RATE
U.S. POSTAGE
PAID
PERMIT NO. 198
FORT MYERS FL

ADDRESS CORRECTION REQUESTED

PRINTED WITH SOY INK

Printed on Recycled Paper