

# The Wall Journal™

Issue No.

28

THE INTERNATIONAL JOURNAL OF TRANSPORTATION-RELATED ENVIRONMENTAL ISSUES

Mar/Apr 1997

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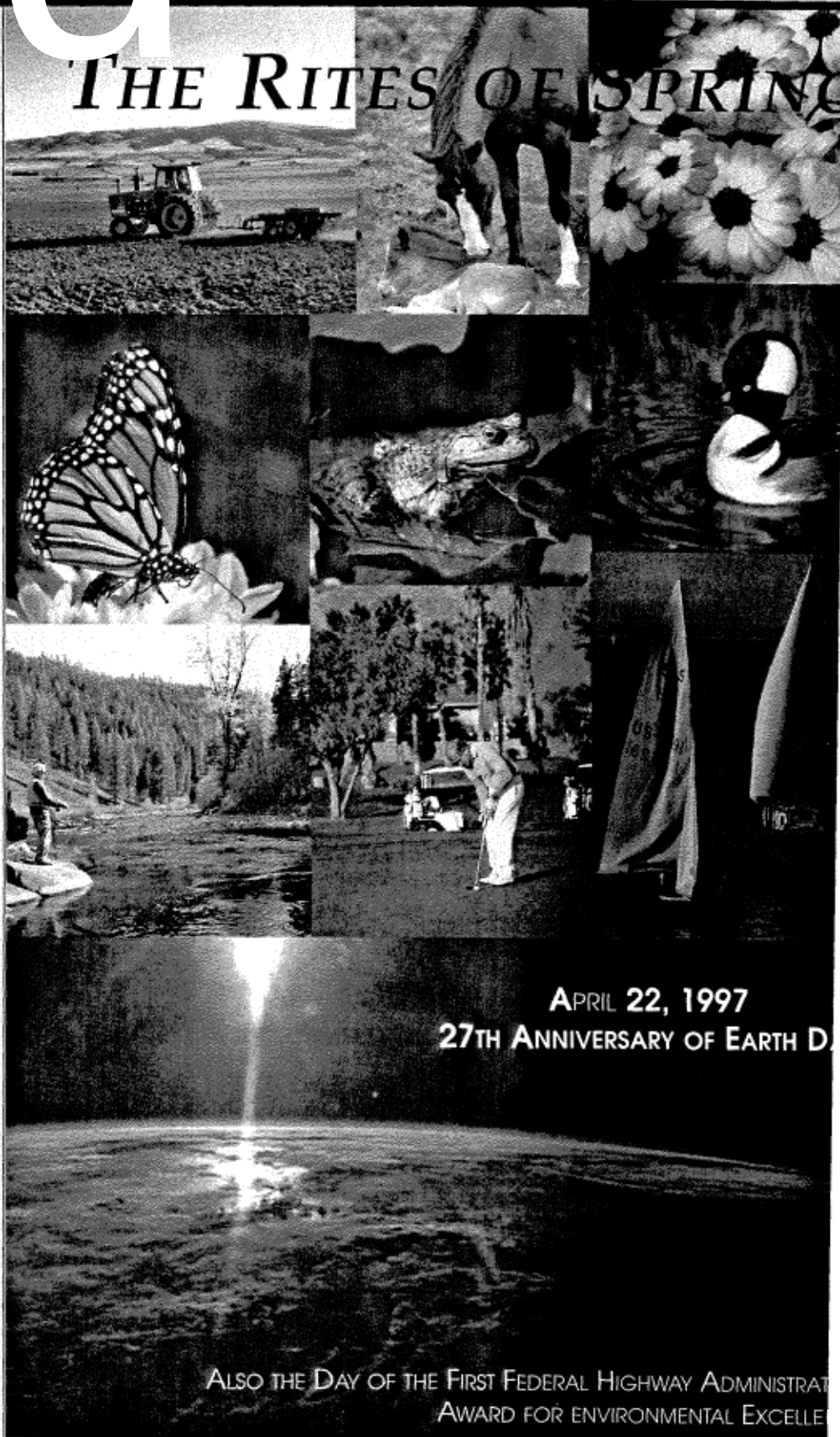
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### ATTENTION

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# The Wall Journal

The International Journal of Transportation-Related Environmental Issues

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## Editor

El Angove

## Director of Publications

John G. Piper

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Subscription and advertising information are shown on page 23.

\* \* \* \* \*

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## EDITOR'S CORNER

by El Angove

### Tennis, Anyone?

I always thought that invitation had a lot of class. It has that joie de vivre with a touch of savoir faire. Somehow, I feel that the English do it best — "I say there old chaps — tennis, anyone?"

It takes a certain type to make an invitation of this sort inviting, Take Mean Joe Green for example, or Mr. T.. If they wanted a tennis partner, they might pick you up by the collar and growl, "Tennis, chump?" It's all in the manner of asking.

Now, I'm about to extend an invitation to the readers, and my being mostly English of genealogy, I'll use the old tennis ploy:

### Editorial, Anyone?

I don't want to hog this space. And anyway I'm running out of things to write. I need some guest editorials to ease the burden of trying to fill up all the columns of every issue.

I know several of you who have threatened to write articles about technical matters, but they must have gotten lost in the mail. Maybe writing something which is of a technical nature could be dangerous, because one of your peers might challenge you on a technicality.

Fear not with editorials. These are your own private thoughts, and if someone says, "Not true," you can always say, "Is too!"

You see, you can get rid of a lot of steam and frustration (see The Off Ramp on page 23) and not be really accountable for it. Your opinions are entirely your own, and if someone doesn't like it, they can write an editorial of their own.

But, they cannot go to some technical manual and point out some grievous mistake in your calculations — it can't happen because your opinions are not (hopefully) printed in the scientific references.

I quite often consider getting rid of all the articles, reports, photos and other stuff we regularly publish. Then I could just print stuff that I write, and change the name to The El Journal.

But then, someone would send in a great story like the FHWA 1997 Environmental Excellence Award, and I

couldn't print it. See, this stuff gets in your blood and you need to find some outlet for some of it to leak out, or you will go crazy.

The nice thing about editorials is that you personally are not restricted by any rules or regulations, except maybe decency, spelling and lack of taste.

As you read what I have just written, you will not find too much intelligence or hard fact here. A lot of rambling discourse, a smile or two, the obvious need to fill this column so that I can put this issue to bed, and not much else.

But, the invitation is sincere. I would like some guest editorials. On any subject. Suggestions for The Journal are welcomed. Critiques of The Journal and its format will be considered by our review board (meetings every Tuesday afternoon at Grady's).

Where is Horace Greeley when you need him? ■



### NOTICE TO ADVERTISERS

From time to time, you surely have noticed that an advertiser's brochure has been inserted into an issue of The Journal. This is a service which is available to all.

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Sorry... We will not sell our databases. — Ed.

# ANNOUNCEMENT

Camp Hill Pennsylvania  
For Immediate Release

## Environmental Acoustics, Inc. Announces the hiring of Harvey S. Knauer, P.E., Senior Transportation Noise and Air Quality Engineer

Harvey joins Environmental Acoustics after a 30 year career with PennDOT that involved overall project management, environmental management, advanced technology, and acoustical design activities. His management of the acoustical design activities for major transportation projects in the Philadelphia metropolitan area resulted in the construction of over 25 miles of noise barriers.

He designed the first major noise barrier system in Pennsylvania (along I-95 in Philadelphia) and served four years as PennDOT's Statewide Noise and Air

Quality Engineer where he was responsible for the development of PennDOT's Noise and air quality guidelines and policies and The review, Guidance, And training activities for all of PennDOT's eleven engineering districts.

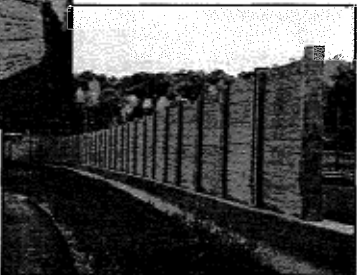
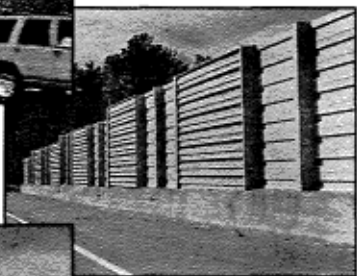
At Environmental Acoustics, Harvey provides noise and air quality services for our transportation clients, including:

- Noise monitoring
- Noise impact and mitigation analyses
- Construction noise and mitigation
- Noise barrier design
- Air quality analyses
- Training

Environmental Acoustics, Incorporated, located in Camp Hill, Pennsylvania, is a design-based acoustical firm specializing in Architectural Acoustics, Transportation and Environmental Noise Control and Engineered Audio System Design.

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| Transmission Loss at 125 Hz | 23                 | 36             | 16               |
| Std Panel Height, in. (mm)  | 24 (610)           | 48 (1219)      | 48 (1219)        |
| Std Post Spacing, ft (m)    | 16 (5)             | 32.8 (10)      | 16 (5)           |
|                             | REFLECTIVE SYSTEMS |                |                  |
|                             | NoiShield-R        | Soundcore      | AcoustaWood      |
| Sound Transmission Class    | 27                 | 51             | 38               |
| Transmission Loss at 125 Hz | 13                 | 36             | 16               |
| Std Panel Height, in. (mm)  | 16 (406)           | 48 (1219)      | 48 (1219)        |
| Std Post Spacing, ft (m)    | 10 (3)             | 32.8 (10)      | 16 (5)           |



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## ANNOUNCEMENTS

**The American Society of Highway Engineers (ASHE)** will be holding its Annual Meeting on May 14-17, 1997 at the Sheraton Valley Forge Hotel in King of Prussia, PA (suburban Philadelphia). One session of particular interest to noise professionals will be an entire afternoon session (on May 15) devoted to a detailed update on the upcoming FHWA Traffic Noise Model (TNM) by Bob Armstrong of FHWA, Grant Anderson of Harris Miller Miller & Hanson, Inc., and Cynthia Lee of the Volpe Center.

Other technical sessions at the conference will deal with advanced technology, environmental design issues, construction management, and design/ build topics. Three separate technical tours will be held, including an environmental tour (wetlands mitigation sites, noise barriers, etc.), an advanced technology tour, and a tour featuring construction related topics, all within the Philadelphia metropolitan area. Social tours are also planned along with a golf tournament.

The registration fee is \$40 (no fee for guests) if paid before May 1, 1997 (\$60 thereafter) and includes many "extras".

More information on the technical program can be obtained from Harvey Knauer, ASHE Technical Program Chairman c/o Environmental Acoustics, Inc. at 717-763-4110.

For other conference information, please contact Dick Prentice c/o PennDOT at 610-768-3096. ■

### Fitzgerald Formliners™ Announces Availability of New Product Catalog

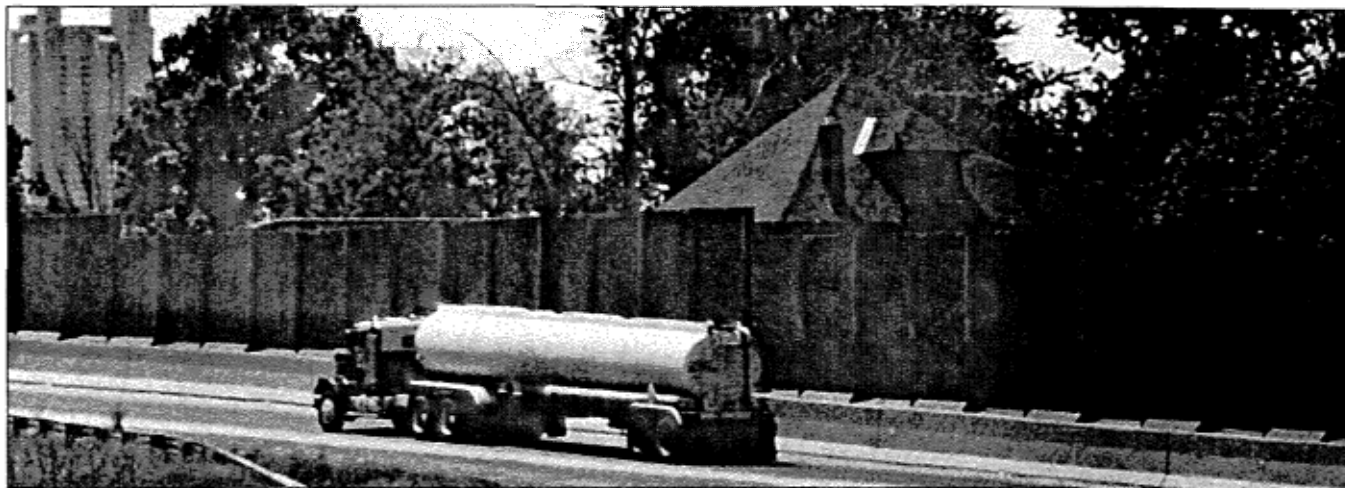
SANTA ANA, California, April 4, 1997 - Fitzgerald Formliners, a leading supplier of architectural concrete form liners for the precast, tilt-up and cast-in-place concrete markets, today announces the availability of its new comprehensive product catalog.

The new catalog provides a complete listing of Fitzgerald's standard form liner patterns, including reference charts, dimensional drawings and application photos of these patterns. Fitzgerald Formliners offers over one hundred standard patterns, including brick, wood, stone, sandblasted, fluted and fractured rib. The catalog also provides application photos demonstrating how form liners may be used to create custom art and special effects in concrete. The new catalogs may be ordered by calling the Fitzgerald Formliners Marketing Department at 1 (800) 547-7760 or by email at forming(a)ix.netcom.com.

Fitzgerald Formliners, a leading manufacturer of standard or custom patterned architectural form liners for precast, tilt-up or cast-in-place concrete applications, is recognized in the industry for launching innovative manufacturing methods, such as those used to produce Fitzgerald's single- or multi-use plastic liners, multi-use extruded plastic liners, extended-use urethane liners and extended-use fiberglass liners. The company's corporate headquarters and manufacturing facilities are located in Santa Ana, California. ■

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# ENVIRONMENTAL RESEARCH NEEDS IN TRANSPORTATION

## An Upcoming TRB Circular

Announcement by Jon Williams, Senior Programs Officer, Transportation Research Board

(Ed. Note: In the last issue of *The Wall Journal*, we published the opening announcement by Jon Williams of the upcoming TRB Circular with the title in the header above, along with the first highway noise research need, titled Investigation/Validation of Testing Procedures for Sound Absorbing Materials.

In this issue, we complete the list of highway noise research needs. In the next issue, you will find the research needs to be considered for aircraft and transit noise).

### Title: Atmospheric Effects on Highway Traffic Noise Propagation

**Problem Statement:** Recent studies by several research groups have shown that the atmospheric refraction and scattering effects that occur on the sound wave propagating from a highway traffic source is the greatest source of error during prediction and measurement. It is possible for noise levels to change by several decibels at a recep-

tor location due to these atmospheric effects. Existing prediction models for highway traffic noise do not account for atmospheric variations. Also, due to a lack of research, the new prediction model FHWA TNM (currently under development) does not include this feature.

**Proposed Research:** Research is proposed to better quantify the atmospheric effects on highway traffic noise propagation and incorporate them into the latest prediction model and measurement methodologies. The following tasks are proposed to accomplish the goals of this research:

- 1) perform measurements of noise levels at varying distances and heights from the vehicle path along with data of wind speed, wind direction, and temperature. Site geometry should be flat and open, such that only ground effects, geometric spreading and atmospheric effects would affect propagation. Normalization of ground effects and geo-

metric spreading can be accomplished, with the only remaining variable being atmospheric effects.

- 2) using the measurement data from Task 1, along with data from other relevant studies, a prediction scheme will be developed.

- 3) perform validation of the prediction scheme at two "real world" sites along existing highways, utilizing the same methodology and set-up as used in Task 1.

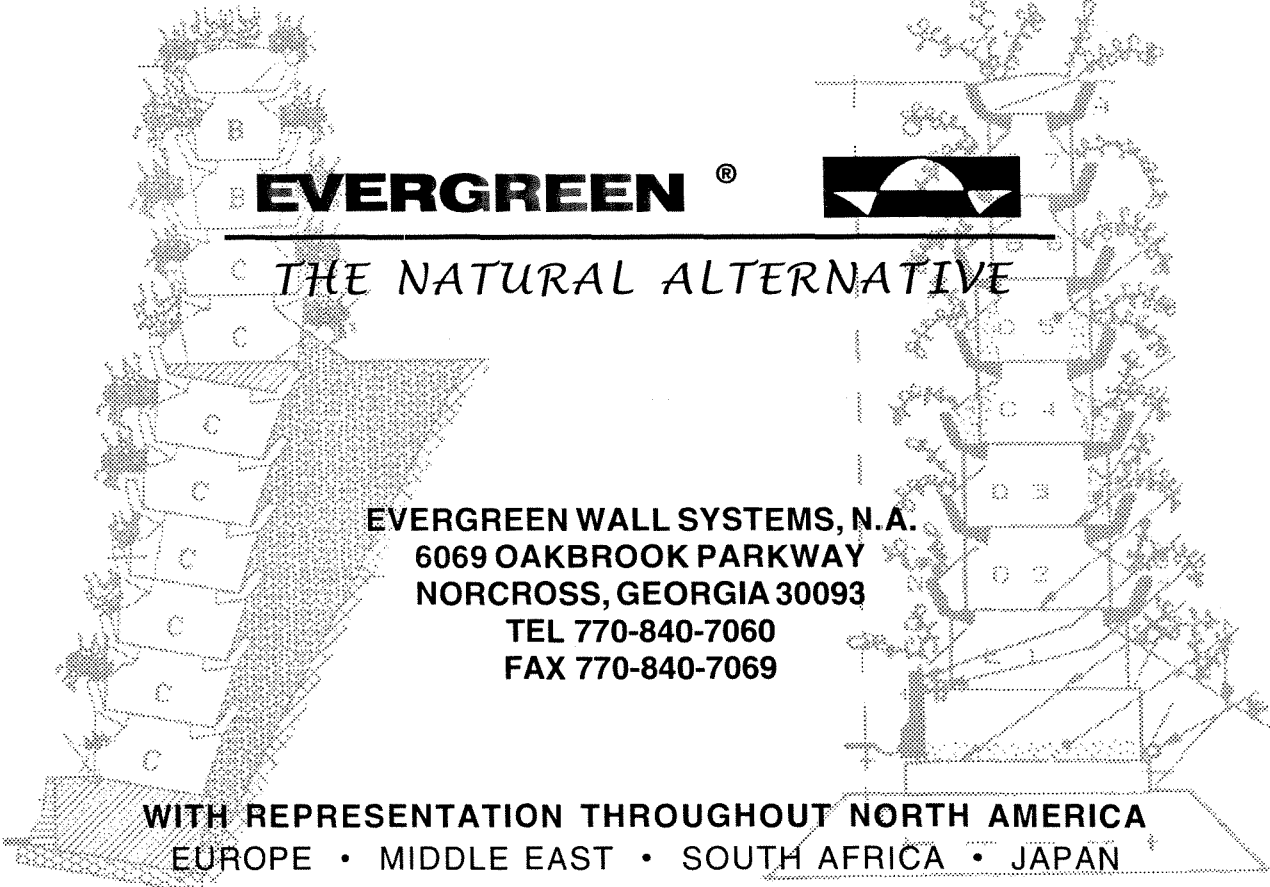
- 4) generate a final report documenting the measurement, prediction, and validation procedures analyses, and results.

**Cost: \$300,000**

**Duration: 2 years**

**Urgency and Payoff Potential:** Funding this research would provide valuable information for the new Trans-

(continued next page)



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portation Noise Model under development, allowing increased prediction accuracy at greater distances from a highway than currently possible. This would increase the credibility of the analysis to the public and provide a more complete picture of noise impact.

**Title: Upgrade the Federal Highway Administration's Traffic Noise Model (TNM)**

**Problem Statement:** The TNM is a totally new highway traffic noise prediction model that incorporates state-of-the-art acoustical algorithms in a program with a Microsoft Windows environment and internal Computer-Aided Design Drawing capabilities. After the TNM is released and users have gained training and experience in its use (a minimum period of one year), there will be a need to respond to user comments on the validity and adequacy of the model. The model must perform accurately and efficiently.

**Proposed Research:** Develop an upgrade of the TNM that corrects user-

identified deficiencies in the model. This upgrade will require extensive communication and coordination with users after TNM's release. The upgraded release of TNM will revise program elements which are functioning incorrectly and adjust the accuracy of model algorithms, where necessary.

**Cost: \$150,000**

**Duration: 1 year**

**Urgency and Payoff Potential:** This is a necessary component of new model development. Completion of the upgrade will allow the full benefits of the substantial cost or the new model to be realized.

**Title: Reduction of Tire/Pavement Noise**

**Problem Statement:** The tire/pavement interface is a primary cause of highway traffic noise. Variations in pavement types may have a pronounced effect on the noise source lev-

els. Little research has been done within continental United States to evaluate a reduced noise pavement.

**Proposed Research:** Tire/pavement noise is the subject of a current NCHRP synthesis study. Based on the conclusions and recommendations of this study, further research will be pursued to address the seeming conflict of maintaining safety and durability in pavement design with designing a reduced-noise pavement. This could include field testing of both domestic and foreign pavement designs.

**\$300,000**

**Duration: 2 years**

**Urgency and Payoff Potential:** The public is becoming increasingly sensitive to the high level OT noise from current standard pavement designs. The development of a reduced-noise pavement can reduce the area of potential noise impacts adjacent to highways and may reduce public annoyance with the tire/pavement

(continued on page 17)

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## FHWA — WHAT'S HAPPENING...

By Robert Armstrong, Office of Environment and Planning, Federal Highway Administration



Robert Armstrong

**ATTENTION!! ATTENTION!!** The Federal Highway Administration (FHWA) will announce its Environmental Excellence Awards on April 22 in conjunction with the 27th anniversary celebration of Earth Day. The awards reflect the true spirit of Earth Day - a commitment to enhance an awareness of the environment and what can be done to improve it. FHWA developed the biennial awards program to honor those partners, projects, and processes that excel in meeting growing transportation demands, while protecting and enhancing the environment.

FHWA received 154 nominations from 34 states. Awards will be presented to sixteen winners in ten categories including: non-motorized transportation; habitat, water quality, and wetland preservation; historic and archeological preservation; roadside vegetation management; noise abatement; air quality improvement; community cohesion; environmental leadership; environmental process, and environmental research. The winners were selected by an independent panel consisting of a Junior High School science and pre-algebra teacher, a professor at The George Washington University, a staff biologist with the U.S. Department of the Interior, and a manager of urban and metropolitan programs at The Chesapeake Bay Foundation.

The award for Excellence in Noise Abatement will read as follows:

**FEDERAL HIGHWAY ADMINISTRATION  
1997 ENVIRONMENTAL EXCELLENCE AWARD  
For Excellence in Noise Abatement**

**S.R. 581 (I-81 Connector) Cumberland County, Pennsylvania  
Gannett Fleming, Inc.**

**This highway is an example of integrating noise abatement features into a project while enhancing the natural environment. The designer was able to incorporate the best features of noise control while retaining architectural enhancements that help promote a sense of community. Gannett Fleming's engineers interacted with the community and incorporated public concerns and comments into the project. The project minimizes the impact of highway traffic noise to the community. This award acknowledges the designer's ability to promote, support, and create excellent designs and plans that provide innovative noise abatement features in the highway environment.**

**Gannett Fleming, Inc.    Wayne Willey  
                                 Dave Still  
                                 Art Thomas  
                                 Rod Miller**

Since many of you may be just hearing about FHWA's Environmental Excellence Awards for the first time, I thought you all might like to know how they came into being.

Three years ago, FHWA wanted to do something to highlight and promote successful environmental mitigation activities. The idea of having a competition, presenting awards, and generating lots of positive publicity was born; the awards program was planned to be a biennial event.

The first awards were presented on Earth Day in 1995 and included the categories of bicycle/pedestrian safety; congestion mitigation and air quality improvement; public involvement; recycling; wetland and water quality management; and transportation enhancements. Eight awards were given.

The awards program for 1997 was expanded to include additional categories, and noise abatement was added to the list. However, due to limited publicity, many of you probably never "got the word" that FHWA was looking for nominations (we promise to increase the publicity next time).

On the next page is this year's nomination that was judged the best by the independent panel of judges. We have received the permission of the author to reprint the nomination. Hopefully, this will give readers an idea of what the judges may be looking for when the FHWA presents its next Environmental Excellence Awards in two years. ■

*(Ed. Note: Following the nomination letters on the next page are excerpts from a display board prepared by the people at Gannett Fleming for use at a consulting engineers conference. We print them here because they tell the story of the project better than we could, and Gannett Fleming was kind enough to let us borrow the photos).*

## The Volunteer

Industrial Acoustics Company  
1160 Commerce Avenue  
Bronx, New York 10462

November 5, 1996

Bob Armstrong  
U.S. Department of Transportation  
Federal Highway Administration  
Office of Environment and Planning  
Noise Team  
HEP-40, Room 3240  
Washington, D.C. 20590

Subject: Environmental Excellence  
Award — Noise Abatement

Dear Bob,

Thank you for the opportunity to nominate a project for an Environmental Excellence Award in the Noise Abatement category. I have thought about the many projects that I have been involved in over the years, and considering the criteria, have chosen a project that is worthy of note.

The recipient of the award would be the designer, who has shown an ability to incorporate the best features of noise control with architecture, a sense of community, and the production of good plans for use by the owner and contractor.

The most recent work by this designer may be the next project worthy of nomination; the Gateways concept in New Jersey. I elected to nominate the design firm rather than the owner because I am aware that the designer fought long and hard to incorporate the particular features of the project that satisfied the award criteria.

Whether or not this project is selected by the judges, it remains a monument to our efforts to do not just the right thing, but to do it with excellence. Very truly yours,

Industrial Acoustics Company  
Gary S. Figallo  
Product Manager

## The Winning Letter

ENVIRONMENTAL EXCELLENCE  
AWARD NOMINATION  
FOR NOISE ABATEMENT

GANNETT FLEMING, INC.  
FOR THE 581 CONNECTOR  
MECHANICSBURG, PENNSYLVANIA

The group nominated for the award is Gannett Fleming, Inc. for the 581 Connector in Mechanicsburg, Pennsylvania. Gannett Fleming has a long history of designing noise abatement projects. The 581 Project is but one example of their work; a project that I can describe from my own personal experience.

SR 581 is a new highway constructed through existing communities, crossing rivers and massive rock cuts. The designer's role in the noise abatement portion of the project was to minimize the impact of highway traffic noise on the community. The process involved Gannett Fleming (GF) engineers in interpreting the mandates of the environmental impact statement into a concept that could be presented at community meetings and accepted by the local citizens, the owner who is the Pennsylvania Department of Transportation (PennDOT), and the FHWA in order to gain approval of the project plans.

There were historical references within the community that could be mirrored in the texture and color of the project structures. There was an excess of excavated rock on the project that could be used on site. Bridges over rivers required barriers that were parallel resulting in the potential for reverberant noise. Compliance with clean air regulations would be necessary during performance of the work. The development of the project specifications and drawings to provide clear direction to the contractor and jobsite engineers and inspectors was to be the final product of Gannett Fleming's efforts.

The actions that inspire this writer to nominate Gannett Fleming for the 581 Project are:

Seeking proactive public involvement: GF interacted with the community through the course of meetings which involved the citizens in the project development. The concerns and comments of the people were incorporated into the project design as it was feasible and cost effective to do so. GF had to fight for the architectural enhancements in the design phase, and did so successfully. The architectural concept for the barriers was presented to and accepted by the community.

Integrating the noise abatement into the project and enhancing the natural environment: GF chose to use an undulating concrete sound barrier that would be supported on shallow foundations perched upon earthen berms. The berms were built of the excess rock from the cuts on the project. The top edge of the serpentine wall was sloped where elevations changed, creating a flowing edge to the silhouette of the wall.

The finish selected for use on the community side of the undulating barrier was a 3/4" deep contoured wood grain board texture. The highway side finish of the barrier was an inexpensive, attractive raked finish. A warm brown color was selected to provide a natural earth tone to the barrier, blending it into the color of the tree trunks of the forest, and of the fallen leaves. The bridge mounted concrete barriers were to receive a horizontal barn board finish, reflecting the historical context of some of the old local structures. The color of the bridge barriers matched the ground mounted barriers.

Meeting environmental challenges creatively: The specifications of the 581 project were the first in my experience to have an architectural section for the noise abatement walls. Color and texture requirements were clearly defined. Color was achieved in the concrete panels through the use of integral pigment and through the jobsite application of acrylic stains. The formulation of the acrylic stains was to be in accordance with requirements of the clean air act. The

(Continued next page)

(AWARD, continued from page 9)

application of stains was limited on a daily basis by requirements for compliance with the clean air act.

The sound barriers on the bridges were parallel with each other. The ratio of the width between the barriers and the height of the barriers was less than 10:1. GF engineers knew that barriers in this configuration create reverberant noise, degrading barrier performance. They solved the problem by specifying a sound absorptive cladding system to be fastened to the inside face of the panels. They specified the acoustical performance of the sound absorption system with absorption coefficients defined at center one third octave band frequencies. This was the first time a specification was written with the acoustic definition necessary to guarantee optimum performance. Weight limit of the cladding was 2.5 pounds per square foot due to structural limitations of the bridge. This was the first time that mechanical fasteners were required to bolt the cladding to the concrete panels, recognizing the vibration that bridge structures experience constantly. The cladding system provided was a perforated metal system with fiberglass fill. Cladding panels were coated with zinc rich epoxy and a top color coat of polyester, all applied in a VOC (volatile organic compound) compliant powder coating system. The cladding panels were color matched to the concrete panels.

Provides economic opportunities and builds partnerships: A clearly drawn set of plans, and clearly worded specifications create opportunities for contractors to bid on projects, with minimal error. The undulating barrier system was extremely well defined on the drawings, providing clear direction for the take-off, bidding, and construction of the wall. The specifications provided for partnering between the contractor and the owner, allowing differences in interpretation of the specifications to be discussed between parties, and resolved quickly and in an amicable fashion, wherever possible. The pro-

ject mission statement, signed by all parties to the contract, included a goal to complete the noise abatement efforts without complaint from the community, which was achieved. In fact, the sub-contractor for the noise barrier project donated rejected wall panels to the community and erected a sound barrier at a local sports field, all at no cost to the community. The attached article from the Wall Journal describes the donation. (Ed. Note: see Issue No. 21, Jan/Feb 1996).

Why I chose Gannett Fleming: In the years since 1982 when I first became involved with noise barriers, I have worked for noise barrier suppliers. From 1982 to 1994 with the Reinforced Earth Company supplying Fanwall® and Durisol®. From 1995 through today with Industrial Acoustics Company. During that time, I have worked on supplying millions of square feet of sound barriers in over 28 States. I was the Project Manager for the supply of Fanwall to the 581 project until joining Industrial Acoustics Company in 1995 where I was the Product Manager for the supply of the NoiShield® cladding for the bridge. Therefore, I could personally attest to the above and to the exemplary nature of GF's work.

My personal point of contact with Gannett Fleming has been David Still. Mr. Still was the first to design with software that used STAMINA (Standard Method for Noise Analysis) computer files to create graphical depictions of the barriers. This feature has now become a standard in the new FHWA Transportation Noise Model. He has, through the years, recommended the use of absorptive materials in a considered manner, where appropriate. He was the point man in the 581 project with the community and PennDOT for GF, and was the key man for the wall concept and specification writing on the job. He fought for the community's interests.

I recently met another GF employee, Richard Parsons, who was the architect for the Gateways concept being built by the New Jersey

Department of Transportation. While this concept has not yet been completed, it demonstrates the skill and ability of the firm to provide publicly pleasing designs for noise barriers. The attached illustrations from a Wall Journal article show the Gateways concept. (Ed. Note: see Issue No. 19, Sep/Oct 1995).

This nomination could well have been for PennDOT for the 581 Project, or to Domenick Billera of the New Jersey Department of Transportation for the Gateways project (now under construction and not ripe for nomination). I found a common element to these excellent projects. That element was Gannett Fleming. Although I have mentioned the two employees that I personally know, the nomination and award, if granted, goes to all the people in the Company of Gannett Fleming who contributed to the good works exemplified by the 581 Connector project. ■

*(Editor — On the next three pages, we are pleased to publish descriptive material on the award-winning project. This was furnished to us by David Still, Gary Figallo and Bob Armstrong. If you wish to contact these people, here are the details:*

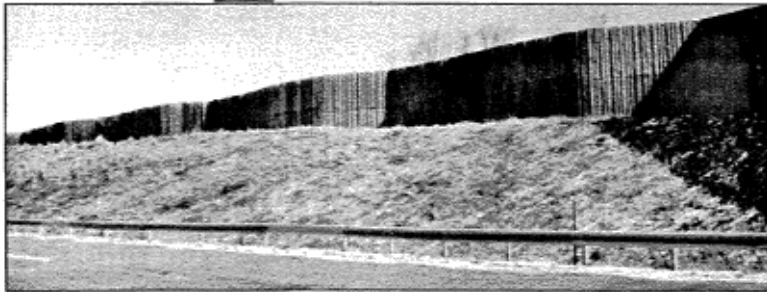
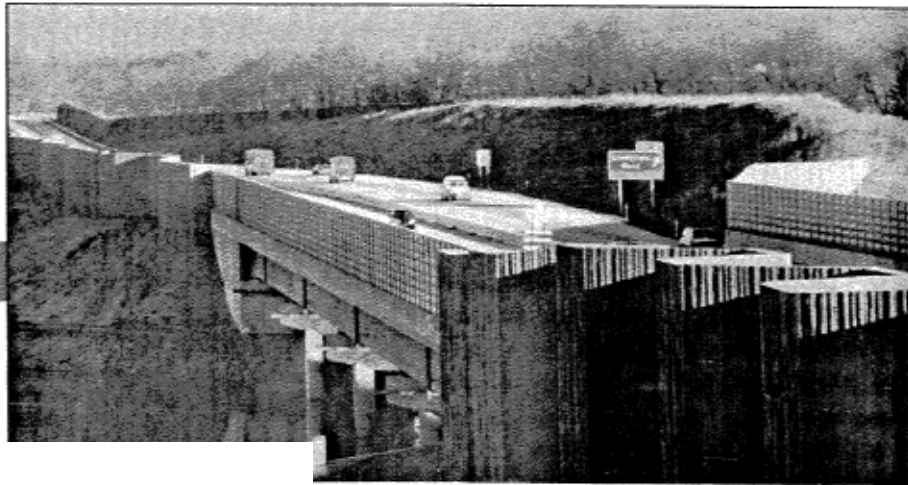
David Still  
Gannett Fleming, Inc.  
207 Senate Avenue  
Camp Hill, PA 17011  
Tel 717 763-7211 Fax 717 763-8150

Gary Figallo  
Industrial Acoustics Company, Inc.  
1160 Commerce Avenue  
Bronx, NY 10462  
Tel 718 430-4515 Fax 718 863-1138

Robert Armstrong  
Federal Highway Administration  
HEP-40  
400 Seventh St., SW  
Washington, D.C. 20590  
Tel 202 366-2073 Fax 202 366-3409).

# A SOUND DESIGN MITIGATES NOISE ON RT. 581

The Route 581 Connector completed the final link in the beltway around Pennsylvania's capital, the city of Harrisburg. This project resulted in the most comprehensive and extensive noise mitigation design ever undertaken within central Pennsylvania. The analysis and conceptual design of noise barriers was conducted totally within the digital CADD environment — *the first such design in Pennsylvania*. This approach reduced noise, noise barrier panel height, and cost.

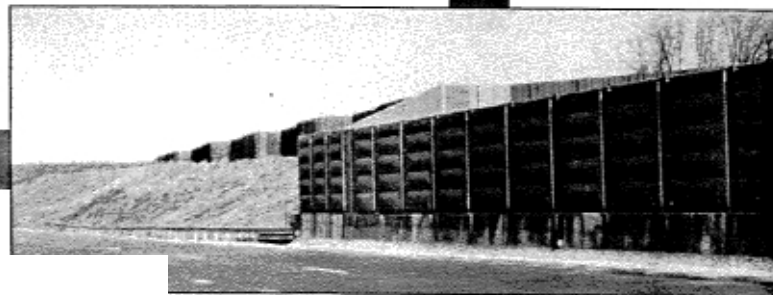


The Connector roadway passes through well established residential communities that include farms, historic properties and wetlands. Noise mitigation systems included:

- Carefully designed cuts and fills
- Earth berms
- Linear posts and panels
- Structure mounted barrier
- Triple wall design at bifurcated roadway
- Absorptive panel treatment
- Free standing Fanwalls®

Key design features included:

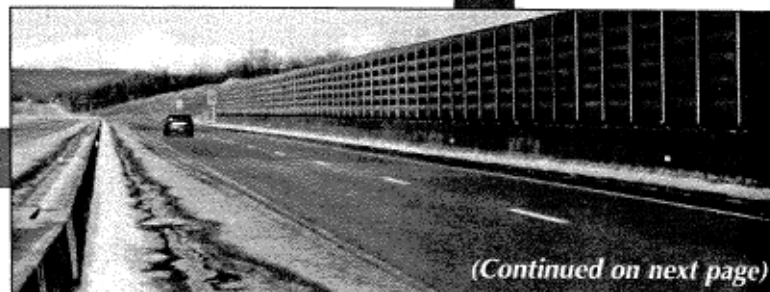
- Extensive use of earth berms as they are less costly than other types of noise barrier
- Elimination of visual "stepping" of the noise walls
- For exterior of bridges, a panel surface that resembled earlier wooden bridges in central Pennsylvania was used



Final design for the Connector was accelerated and completed in five months instead of 14 months, on time and within budget. Construction was completed at a cost of \$45 million.

*"This was one of Pennsylvania's most important highway openings in the last 10 years. I am quite proud of this grand and successful team effort. We produced the most comprehensive noise mitigation design ever undertaken within central Pennsylvania. The result is a safe and quiet environment for all residents along the corridor."*

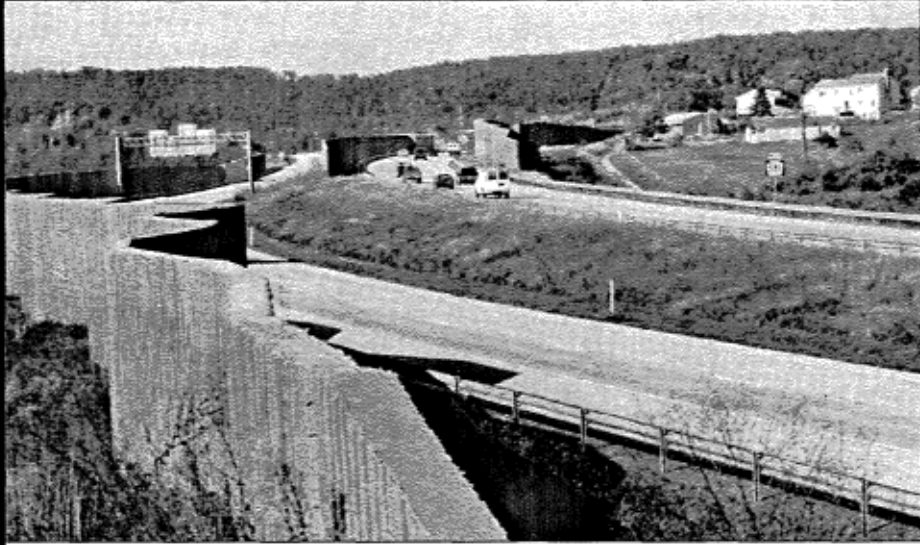
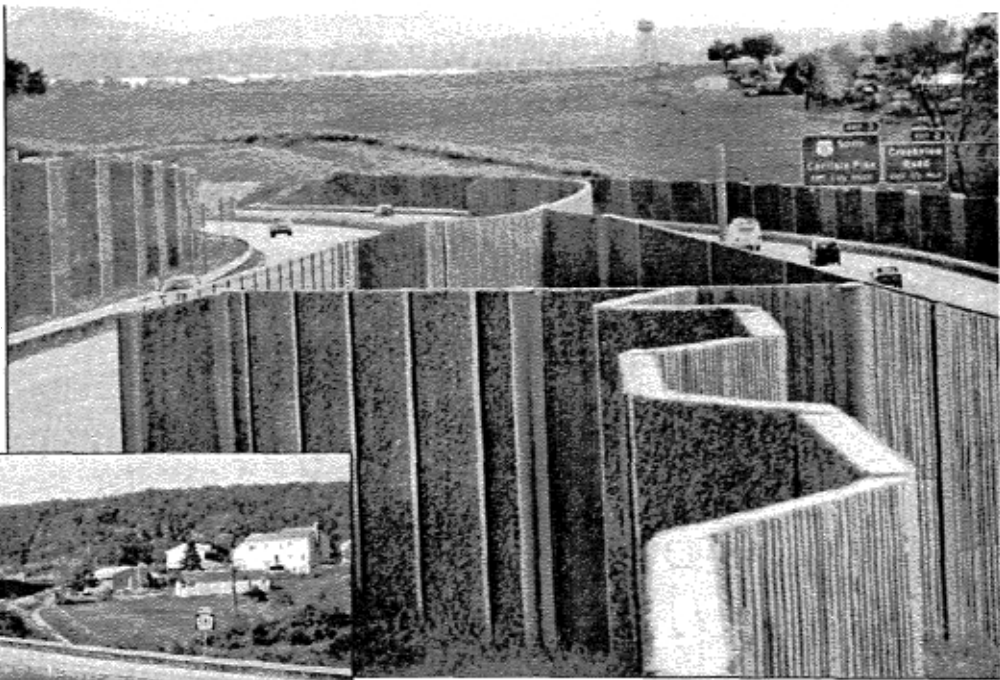
Bradley I. Mallory,  
Pennsylvania Secretary of Transportation



(Continued on next page)

AWARD, continued from page 11)

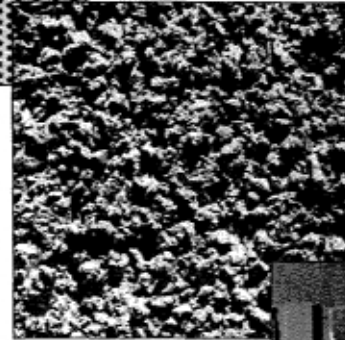
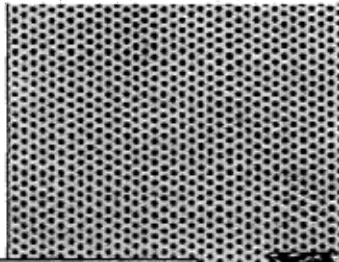
The median noise barrier system functions in a bi-directional mode to maximize noise reductions while minimizing panel height and cost.



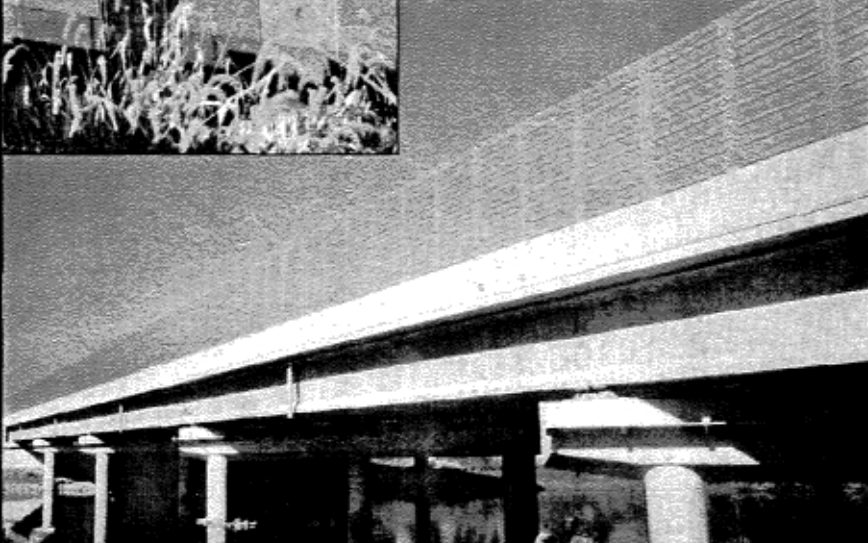
**FEDERAL HIGHWAY  
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For Excellence**

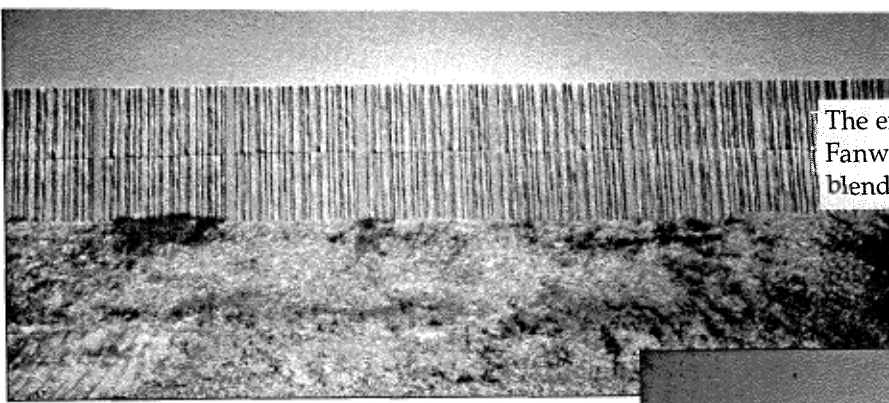
**S. R. 581 (I-76)  
Cumberland County  
Gannett**

A variety of surfaces and textures were used for sound barriers (reading down): perforated aluminum panel; raked fuzzy finish; and rustic plank to resemble earlier wooden bridges. Exaggerated grapestake finish was used on the Fanwall systems. The perforated aluminum panels were anchored to bridges with a mechanical fastener system — *the first ever use of the system and panels in Pennsylvania.*



Hampden  
to the C  
project p





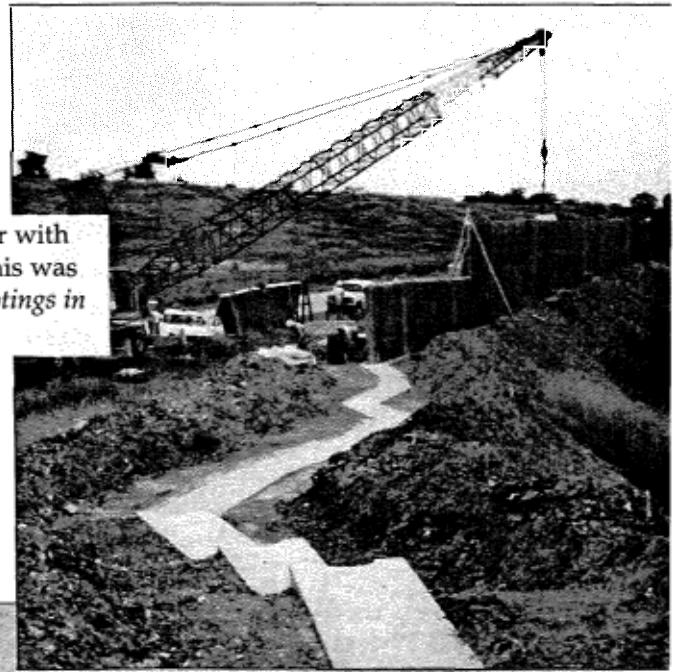
The exaggerated grapestake finish used on the Fanwall free-standing wall systems did much to blend the walls into the rural environment.

The sound barriers make for a quiet evening in the Bunker Hills neighborhood (a former encampment for Union soldiers during the Civil War).



ADMINISTRATION  
L EXCELLENCE AWARD  
Noise Abatement  
(1 Connector)  
nty, Pennsylvania  
eming, Inc.

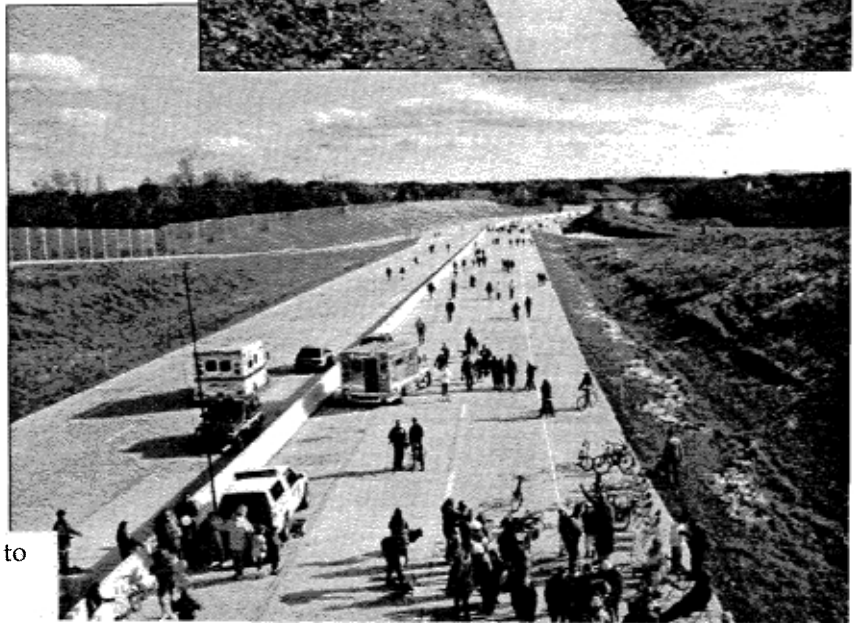
Construction of a sound barrier with stepped footing in progress. This was the first application of stepped footings in Pennsylvania.



Elementary School, located adjacent  
ector, was the setting for a special  
sentation to the student body.



"Community Day on the Connector" was held prior to the roadway opening — the first such event in central Pennsylvania.



## TRB COMMITTEE A1F04 ON TRANSPORTATION RELATED NOISE AND VIBRATION

GREGG G. FLEMING, CHAIRMAN

### Transportation Research Board Committee A1F04 Conference on Transportation Related Noise and Vibration 1997 Summer Meeting

You are cordially invited to attend and participate in the activities of the TRB A1F04 Committee Summer Conference on Transportation Related Noise and Vibration, to be held between July 20 to 23, 1997 in Toronto, Ontario, Canada.

The meeting will focus on current topics relating to rail/transit noise and vibration, aircraft noise, and highway traffic noise. Also featured at this conference will be over 15 exhibits and three field trips and tours.

This year's conference will be held at the Delta Chelsea Inn (1-800-268-1133) in the heart of downtown Toronto. A block of rooms has been reserved for conference participants at the special rate of \$124.00 (approximately \$95.00 US) for both single and double accommodations, per night. The rate and room availability is guaranteed up to June 20, 1997, so please make your hotel reservations early and be sure to mention that you are attending the Transportation Research Board (TRB) summer conference.

The following pages cover conference registration and preliminary agenda. Please submit the completed conference registration form and fee by July 1, 1997. If you have any questions, please contact Soren Pedersen at (905) 704-2291 or Marty Fitzgerald (905) 704-2293.

We look forward to seeing you in Toronto.

Transportation Research Board  
Committee A1F04  
Transportation Related Noise  
and Vibration  
Gregg G. Fleming, Chairman

## ANNOUNCEMENT

Summer Meeting  
Toronto, Ontario, Canada  
July 20-23, 1997  
Hosted by  
Ministry of Transportation, Ontario  
and  
Hatch Mott MacDonald

### CALL FOR PRESENTATIONS

Titles and Subject Matter  
Due As Soon As Possible

Abstracts or Short Summary  
Due June 15, 1997

### Conference Information:



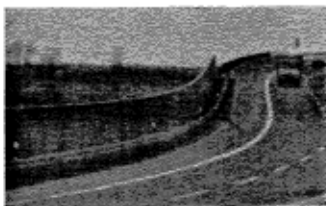
Soren Pedersen  
Ministry of Transportation, Ontario  
Surveys and Design Office  
301 St. Paul St., 2nd Floor  
St. Catharines, Ontario, L2R 7R4  
Canada  
Phone: (905) 704-2291  
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**1997 SUMMER CONFERENCE**  
**Sunday, July 20 to Wednesday, July 23, 1997**  
**Delta Chelsea Inn, Toronto, Ontario**

**AGENDA**

|                           |                                                         |
|---------------------------|---------------------------------------------------------|
| <b>Sunday, July 20</b>    | Registration open from 7:00 pm to 9:00 pm               |
| 7:00 pm - 9:00 pm         | Welcome Reception                                       |
| <b>Monday, July 21</b>    | Registration open from 7:00 am to 12:00 pm              |
| 7:00 am - 8:00 am         | Coffee                                                  |
| 8:00 am - 8:30 am         | Welcome, Opening Remarks and Announcements              |
| 8:30 am - 10:00 am        | Presentations on Highway Noise                          |
| 10:00 am - 10:30 am       | Morning break                                           |
| 10:30 am - 11:30 am       | Presentations on Highway Noise                          |
| 11:30 am - 1:00 pm        | Lunch                                                   |
| 1:00 pm - 4:30 pm         | Tour of noise barrier sites in the Greater Toronto Area |
| <b>Tuesday, July 22</b>   | Registration open from 7:00 am to 12:00 pm              |
| 7:00 am - 8:00 am         | Coffee                                                  |
| 8:00 am - 9:00 am         | Presentations on highway noise                          |
| 9:00 am - 10:30 am        | Presentations on aircraft noise                         |
| 10:05 am - 10:30 am       | Morning break                                           |
| 10:30 am - 12:00 pm       | Presentations on aircraft noise                         |
| 12:00 pm - 1:30 pm        | Lunch                                                   |
| 1:00 pm - 5:00 pm         | Tour of Bombardier Aircraft Co.                         |
| <b>Wednesday, July 23</b> | Registration open from 7:00 am to 10:00 am              |
| 7:00 am - 8:00 am         | Coffee                                                  |
| 8:00 am - 9:00 am         | Presentations on highway noise                          |
| 9:00 am - 10:00 am        | Presentations on rail/transit noise and vibration       |
| 10:00 am - 10:30 am       | Morning break                                           |
| 10:30 am - 12:00 pm       | Presentations on rail/transit noise and vibration       |
| 12:00 pm - 1:30 pm        | Lunch                                                   |
| 1:30 pm - 5:00 pm         | Tour of Toronto Transit noise abatement sites           |

**Note: Official Registration Form is on page 16**

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**Transportation Research Board  
A1F04 Conference on  
Transportation Related Noise and Vibration  
1997 Summer Conference**

**REGISTRATION FORM**

**Date and Location**

The Transportation Research Board's A1F04 Summer Conference on Transportation Related Noise and Vibration, to be held from July 20 to 23, 1997 in Toronto, Ontario, Canada at the Delta Chelsea Inn (1-800-268-1133).

**Accommodations**

Accommodations are the responsibility of the program participants. A block of rooms has been reserved for conference participants at the special rate of \$124.00 (approximately \$95.00 US) for both single and double accommodations, per night. The rate and room availability is guaranteed up to June 20, 1997 so please make your hotel reservations early and be sure to mention that you are attending the Transportation Research Board (TRB) summer conference.

**Registration Fee**

The registration fee for the conference is \$175.00 US (\$230.00 CDN) per person. The fee includes access to all presentations, handout materials, and technical field trips and transportation. Details of the optional activities and the spouses program, which are at an additional cost, will be announced at a later date or during the conference.

**Registration Information:**

**First Name:** \_\_\_\_\_ **Last Name:** \_\_\_\_\_

**Organization:** \_\_\_\_\_

**Mailing Address:** \_\_\_\_\_

\_\_\_\_\_

**Phone Number:** (    ) \_\_\_\_\_ **Fax:** (    ) \_\_\_\_\_

Please make cheque payable to the **TRB Summer Conference** and mail it along with your completed conference registration form by July 1, 1997 to:

Soren Pedersen  
Ministry of Transportation Ontario  
Surveys and Design Office  
301 St. Paul St., 2nd Floor  
St. Catharines, Ontario, Canada. L2R 7R4

Phone (905) 704-2291  
Fax (905) 704-2050

NOTE: You may copy this page to submit as your registration.

We look forward to seeing you in Toronto

(Research Needs, from page 7)

component of highway traffic noise.

**Title: Development of Outreach Materials to Aid in Noise Compatible Land Use Planning**

**Problem Statement:** As the growth of urban and suburban residential development continues, instances of development that is incompatible with existing noise conditions along highways continue to occur. As a result highway agencies are continuously faced with requests for noise abatement from newly developed residential areas located in high noise environments. Little new information has been generated or compiled on successful efforts made by local jurisdictions to control and guide development. Similarly, there are no tools available that utilize state-of-the-art methods to enable highway agencies to be more proactive in encouraging local jurisdictions to consider highway noise in the land use planning process.

**Proposed Research:** Develop outreach materials (pamphlets, manuals,

videotapes, etc.) which present concepts methods, and procedures that may be used to incorporate noise compatible land use planning in the local growth and development process.

The outreach materials should, as a minimum, address the concepts and measures contained in the existing FHWA report "The Audible Landscape" and should contain specific examples of communities with noise compatible growth and development programs. The existing FHWA slide-tape presentation titled "Sound Planning" and the interagency report titled "Guidelines for Land Use Planning and Control" should also be used as guides in development of the materials. The outreach materials should be developed specifically for use by those directly involved with land use planning- local officials, planning staffs, private developers, and the general public.

**Cost: \$250,000**

**Duration: 1 Year**

**Urgency and Payoff Potential:** The

lack of guidance and information on successful examples of noise compatible land use planning in local growth and development programs can help foster incompatible development along highways. As State Departments of Transportation implement highway improvements, vast amounts of noise abatement measures must be included in areas of incompatible development. This research will provide the partners directly involved in local growth and development programs with tools to effectively plan for new development adjacent to highways. This will lessen the need for costly noise abatement as part of highway improvement projects, saving millions of dollars annually.

**Title: Transportation Noise Prediction Model**

**Problem Statement:** To address noise concerns and issues in areas with inter-modal transportation activity, there is a need to develop a multi-modal trans-

*(continued next page)*

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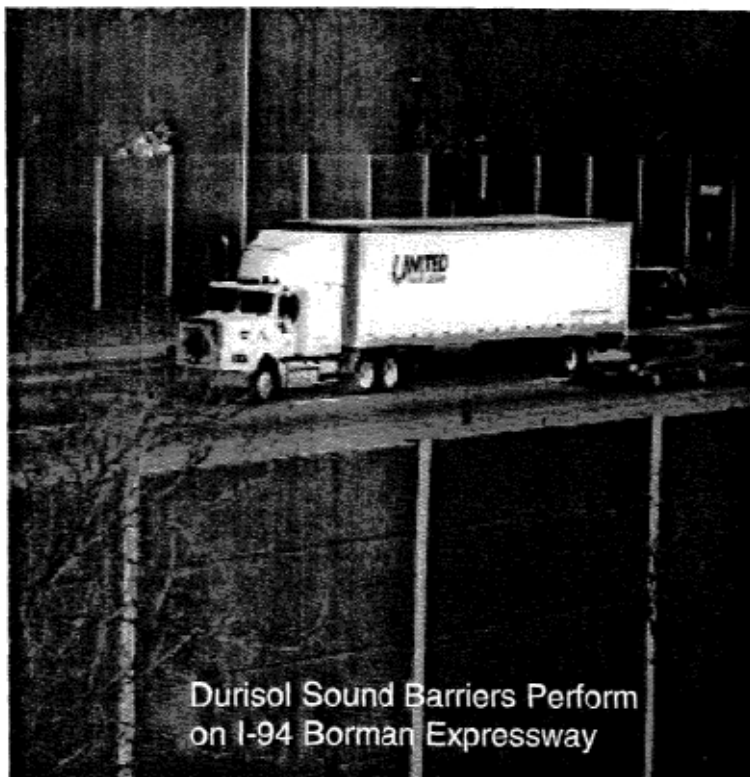
8614 Westwood Center Drive, Suite 1100

Vienna, Virginia 22182

Tel 703 821-1175 Fax 703 821-1815



Write, fax or phone for further project information  
or to receive literature or design details



ATLANTA BOSTON CHICAGO DALLAS DENVER LOS ANGELES ORLANDO SEATTLE

(Research Needs, from page 17)

portation noise prediction model.

**Proposed Research:** An interface linkage between existing aviation noise prediction and highway traffic noise prediction models and future rail/transit noise prediction models will be developed to produce a comprehensive prediction model that will be fully multi-modal in scope and output. Model functionality and appropriateness of noise metrics in transportation noise analysis will be assured.

**Cost: \$150,000**

**Duration: 1 Year**

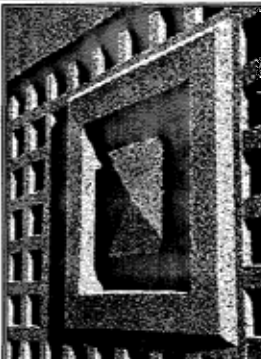
**Urgency and Payoff Potential:** This research will not be undertaken until noise prediction models for individual transportation modes have been released and put into use. A multi-modal transportation noise prediction model will allow for more informed decisions on analyses and abatement implementation in areas of intermodal transportation activity.

### **Title: Investigation of Sound Propagation Over Irregular Terrain**

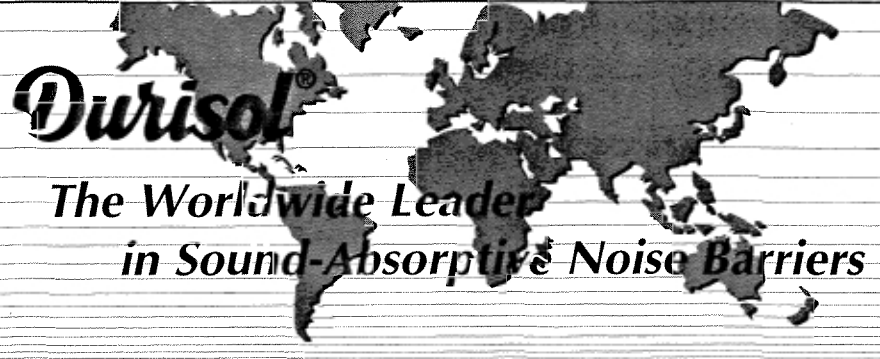
**Problem Statement:** Most propagation routines neglect the effects of small scale roughness. Recent studies have indicated that small scale roughness, where the characteristic length of the roughness is smaller than the acoustic wavelength, can have a dramatic effect on propagation and grazing and near grazing angles of incidence. Such conditions are common in highway noise applications. These same studies have further indicated that rough surfaces can be acoustically modeled as though they were smooth with a modified surface impedance. In principle, the newly developed Traffic Noise Model (TNM) could incorporate surface roughness by including many terrain lines at slightly different elevations but this procedure would be computationally prohibitive and may not properly model the physics of the problem. Finding an analytic solution to the problem would speed computations and possibly improve accuracy.

**Proposed Research:** Research is proposed to better understand the effects of irregular terrain on highway noise propagation at distances of up to a kilometer. This research would seek to incorporate these effects into the latest propagation models and measurement methodologies. The following tasks are proposed to accomplish the goals of this research.

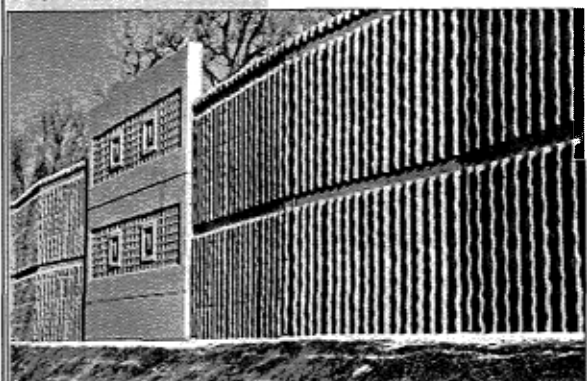
- 1) Perform measurements of noise levels at varying distances and heights from the vehicle path along with data of surface height profiles and impedance parameters (flow resistivity, etc.). The site geometry should be nominally level and open such that only the ground effect and geometrical spreading affect the propagation. The atmosphere should be still and data on wind speed, wind direction and temperature will be recorded so that atmospheric effects can be discounted. Removing atmospheric effects and geometric spreading from the analysis will leave the ground effect, including roughness, as the only remaining variable in the problem.
- 2) Using the measured data from task



Close-up detail of one of many architectural patterns available for highlighting long walls and accents as shown in photo below.



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#1, along with data from other relevant studies, a prediction scheme will be developed which can be incorporated into an updated version of the TN~1.

3) Perform validation at 2 "real world" sites along existing highways utilizing the same method and setup as used in task #1.

4) Using the prediction scheme developed in task #2, identify if surface roughness could be intentionally included in construction as a new mitigation technique.

5) Generate a final report documenting the measurement, prediction, validation procedures analysis and results.

**Cost: \$250,000**

**Duration: 2 years**

**Urgency and Payoff Potential:** Funding this research would provide information for the new TN~1 which would improve prediction accuracy at greater distances from a highway than is currently possible. This refinement to the model would increase the credibility of the analysis to the public and provide a

more complete picture of noise impact. Including surface roughness in an analytic manner, rather than through the use of terrain lines would improve the computational speed of the TNM. The research may also yield insight into a new mitigation technique, that is, including surface roughness in highway designs as a means of decreasing sound levels.

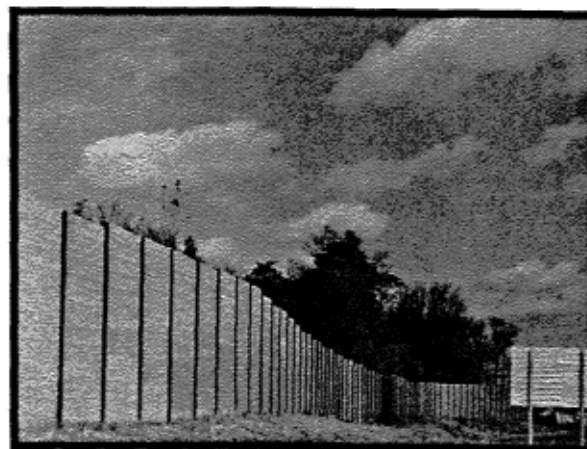
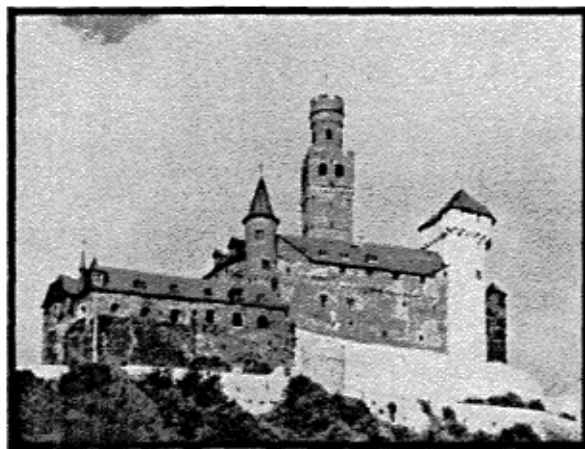
**Title: Field Evaluation of Reflected Noise for Sensitive Receptors Across from a Non-Absorptive Noise Barrier Surface**

**Problem Statement:** Residents on the opposite side of a highway from a reflective noise barrier often complain that construction of the barrier has increased noise levels in their area. Conventional wisdom suggests this is a social phenomenon not associated with the physical sciences. However, the consistency and repetition of complaints suggest that physical theory may not be consistent with reality. Comprehensive studies of noise level magni-

tude, annoyance image events (L10 - L90), 1/3 octave-band frequency analysis of the noise source spectrum opposite a reflective noise barrier is recommended. These quantitative analyses will then be used to determine if the magnitude and/or composition of the noise level actually changes, or whether the complaints are triggered by the psychological phenomenon of "barrier envy" (nearby residents are not receiving a noise barrier when their neighbors do).

**Proposed Research:** Several State Departments of Transportation should be canvassed where residents have complained about an increase in noise due to the presence of a recently constructed noise barrier across the highway. Using information about specific sites provided by the DOT's, study sites should be selected which provide equivalent cross-sectional topography and traffic operations for both target (across the highway from the reflective barrier) and reference (no barrier) locations. Data for comparative analyses should be simultaneously collected at

*(Concluded on page 22)*



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## LETTERS TO THE EDITOR

OFFICE OF THE ENVIRONMENT  
PROTECTION AUTHORITY  
Adelaide, South Australia

March 10, 1997

Dear El,

Congratulations on a wonderful publication. It is much appreciated down here in the antipodes.

Could I please make a request for your contributors to include a complete set of details including telephone, fax and in particular E-mail addresses, as it would make it much easier for us to contact them.

Thank you.

Marco Ciccozzi  
Noise Control Engineer  
ciccozm@ephp.dep.sa.gov.au

*Ed. — Readers, please take note.*

Kimley-Horn and Associates, Inc.  
Raleigh, North Carolina

Thanks for your hard work. I greatly enjoy The Wall Journal —It's one-of-a-kind!

Mark E. Atkinson, P.E.

KCI TECHNOLOGIES, INC.  
Newark, Delaware

Dear El,

Please continue my subscription for another year.

I'm glad you're around to keep us in tune with the latest in noise research and technology. Keep up the good work!

Bruce R. Thompson

TEXAS DEPARTMENT OF  
TRANSPORTATION  
Austin, Texas

February 26, 1997

Dear Gus:

In an effort to help you keep your database up to date, please make the following modification to your mailing list:

Was Thomas E. Word Jr., P.E.  
Director, Transp Planning

Now: Sharon A. Barta, P.E.  
Adv Proj Dev Engr

Your publication is very interesting and informative. Keep up the good work.

Sharon A. Barta

*Ed. — Sharon, your letter is the first one that Gus has ever received. He is a changed gorilla. Gus has a few words for you in his column on the next page.*

# JTE<sub>INC</sub>

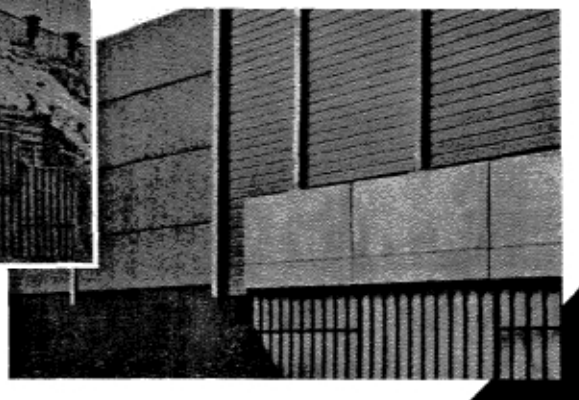
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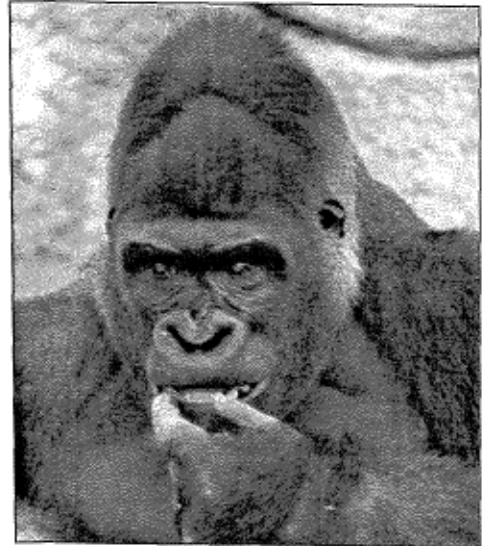
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*"Well, Gus, you think you're pretty hot stuff now that you got a personal letter from one of our readers. Do you for a New York second think that the lady has any interest in a 400-pound pile of dirty fur, bow legs, a brain the size of a pea and a face that would scare Frankenstein's monster? In your dreams, Godzilla. Case closed."*



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Noise Barrier Construction Forecast  
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New Product Press Releases  
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*"Sharon, don't pay any attention to that misanthrope. He's just jealous because nobody writes to him (or her, or it, or whatever). I want you to know that I appreciate that you recognize that there are those of us here who really care about our readers. And, I will personally make the changes you requested. To show you how happy I am, I am trying to make a big grin for you, but gorillas don't grin much."*

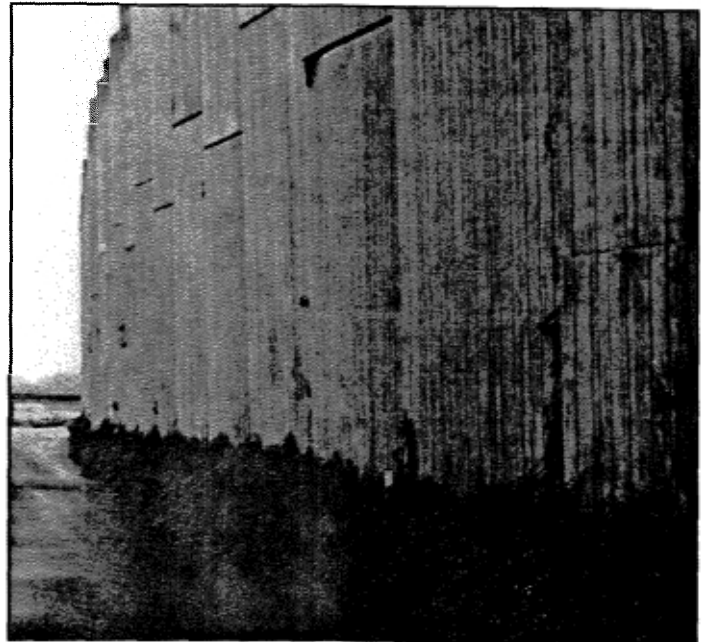
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(Research Needs, from page 19)

various setback distances up to 1000 feet from the roadway. Data should be collected for target locations near the center of the barrier, and near the end of the barrier. Simultaneous data should be collected for reference locations under the same traffic conditions. A detailed record of meteorological conditions, e.g. wind speed, atmospheric stability, should be maintained during data collection. Using annoyance metrics to identify image events and 1/3 octave-band frequency analysis and meteorological data, traffic noise source and reflected spectra should be analyzed for the presence of an anomaly in actual conditions other than those currently predicted by the methodology. The analysis should identify whether or not a measured shift in noise level and/or frequency content occurs for a given set of traffic operations. Evaluations should consider if the presence of a phenomenon varies with distance, or is influenced by geometric or physical parameters such as barrier height, surface roughness, and vehicle

type. A technical report should be prepared to present the findings.

**Cost: \$200,000**

**Duration: 1 year**

**Urgency and Payoff Potential:** Community acceptance of noise barrier construction and State Department of Transportation credibility are seriously eroded by media reports of noise barrier reflected noise issues. The ability to logically and rationally explain the "reflected noise phenomena" will greatly enhance State DOTs' credibility with the general public and help dispel community fears about noise reflected from barriers. ■

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## The Off Ramp

I just got OFF the Fort Myers OFF ramp on I-75 South, and I am teed OFF at the OFFful way people drive the Interstate. There are a lot of idiots I would like to get OFF of my back, OFF of the highway, and OFF of this planet.

I think the Interstate system in Florida is great! The roadways are in good shape (they are out in the warm sunshine all the time and they never, never get snow, sleet and ice on them. Being from the northern climes, I've dodged a lot of potholes, gaping cracks and road heaves in the springtime up there.

When I moved to Florida, I figured I was going to have some smooth motor-ing. But it's worse down here, You have to play dodge 'em with the nutcases who tailgate you at 65, weave in and out of lanes at 75, and zoom past you at 85 or more.

The horrible thing is that many of them are doing these things while they are fixing their hair (men, too), phoning their friends and reading the paper or looking at a map. The scariest is the guy who is trying to empty his beer can into his mouth with his eyes on the ceiling of the car and a hand with a cigarette holding the wheel.

I used to sell highway noise barriers before I retired. I allowed as how I was doing something good for the environment and the quality of life for my fellow persons. Well, I see that now as just a step in the calling to a higher purpose in life.

For a while, I promoted the Fanwall system as a security wall for foreign embassies. The panels were loaded with electronic sensing devices, communications wiring, electrical power, gun ports, armor plate and explosive devices. It was a killer wall.

Now, the noise barrier programs seem to be moving right along. I should be moving up the ladder to the next big menace to the environment — Raiders of the Roadway.

I can't reveal my secret plans yet, but I can tell you they revolve around another kind of barrier — I call it The Bonehead Barricade. It involves border police, a high wall, and severe punishment.

Stay tuned. They are coming. ■

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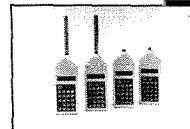
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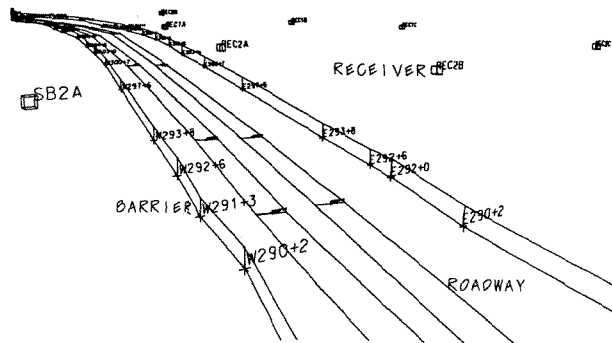
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