The Wall Journal™ 6

The International Journal of Transportation–Related Environmental Noise Issues

In This Issue:

Coming Issues:

- "Big Blue" - Yes, we're still working on it...for Issue No. 8
- More of Soren Pedersen's Product Approval Process
- Dr. Roger Wayson's Classroom Series on Noise Fundamentals
- Feature Article on Design/Build Projects
- And Much, Much More

Announcements:

- **CALL for PAPERS!**

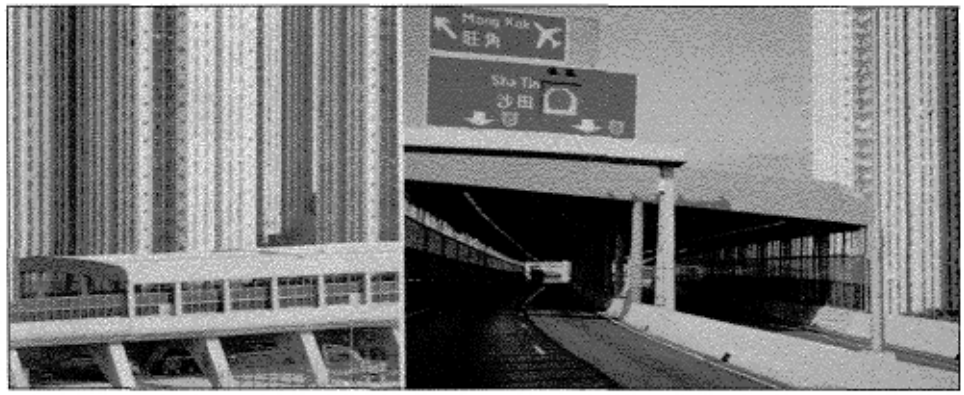
Acoustics Week in Canada
October 4-8, 1993

The Canadian Acoustical Association is holding its annual meeting at the Delta Chelsea Inn in Toronto. If you wish to submit a professional paper, abstracts must be received by April 30, 1993.

For further information, contact
Dr. Moustafa Osman
Ontario Hydro, Toronto
Tel. 416 592-4988

Hong Kong Government Puts a Lid on Noisy Highways

By Raymond CHAN, Principal Environmental Protection Officer



Covered Approaches to Tate's Cairn Tunnel at Richland Gardens Residential Complex
Glass Fiber Reinforced Concrete Construction with Transparent Acrylic Panels. 5.5m-high by 166m long.

Over the years, we have constructed a number of highway traffic noise barriers in Hong Kong, and will continue to do so for the road and rail projects associated with the new airport at Chek Lap Kok. This article illustrates some of our completed works which were required as a result of detailed noise assessments.

You will notice that we have used quite a lot of transparent wall panels to minimize the otherwise "walled-in" feeling about which some of your correspondents have written. Care must, however, be exercised in selecting the appropriate grade of panel material to minimize the loss of transparency due to UV attack.

Because of the compactness of Hong Kong (about 6 million population with 350,000 registered vehicles and approximately 1,500 Km of roads), we often find the most effective solution for highway noise abatement to be the complete covering up of roads or building over them.

*(See **Hong Kong**, page 10)*

Specifying Water-Based Acrylic Stains For Concrete Sound Walls

By Luis Calvo and Steve Geiger of Fosroc, Inc.

For many years, highway and Department of Transportation officials have been building concrete sound barriers along the nation's numerous highway systems. These cast concrete panels have provided noise protection to nearby residents from the ever-increasing vehicular traffic in the U.S.

To enhance and protect these important structures, polymeric stains have been used in the past. Recent VOC (Volatile Organic Content) regulations now in effect have limited the types of products which can protect concrete. Past knowledge acquired on this topic, coupled with new technologies now available, are allowing water-based acrylic stains to be front runners in protecting and enhancing the beauty of concrete sound walls.

The construction industry in North America is becoming increasingly more technically aware of its requirements. As a result, many DOT and highway authorities are becoming more specification conscious when requiring a concrete stain for their concrete sound walls.

The New Jersey Department of Transportation, for example, is a clear leader in implementing specific new requirements for the use of water-based acrylic stains for their sound walls. Defining a specification assures the authority that its resources are going to be invested in a product which can perform to meet the requirements. Leaving a specification undefined or ambiguous opens the door for

*(See **Concrete Stain**, page 9)*

The Wall Journal

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Editor
El Angove

Director of Publications
John G. Piper

Subscription and advertising information are shown on the back cover page

★ ★ ★ ★ ★

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Editor's Corner

by El Angove

As I write this on Friday, March 12, I am about to deliver the disks and artwork for this issue to the printer. Hopefully, they will jump right on it and deliver The Journal to the mailing service in a timely fashion. After that, it is up to the famous U.S. Mule to get it into your hands.

I have no way of knowing how long it takes the Postal Service to deliver your copy. I do know of readers who have received their copy within three days of its being mailed, and I know of others who did not receive theirs for more than two weeks. And, the entire Canadian mailing of Issue No. 2 was lost somewhere between here and Canada. We had to re-mail it along with Issue No. 3.

I guess those are the breaks when you mail 2,000 copies by bulk rate third-class mail. However, bulk rate is less than half the cost of first class, which we certainly could not afford. So please bear with us.

For those reasons, I have decided to postpone for one month my moratorium on the deletion from our mailing list of unsubscribed or unregistered readers. Since I have received only a few new subscribers in the past two weeks, I have to believe that very few readers have received Issue No. 5, and therefore have not read my monologue in that issue.

Consequently, I will not begin to delete names of unregistered people and replace them with new names until April 12. That should allow sufficient time for the still undecided to renew us or lose us. I hate to do that, but it's a simple fact of economics.

Hello, Canadians!

We've got good news for you. We have established a "Canadian Connection" in an effort to improve our service to you and expand our readership in Canada and seek new authors. Our first step is a 'mail drop', where you can communicate with us without the current mail delays.

More important, we are beginning bulk shipment of The Wall Journal to Canada, where copies will be labeled and mailed first class to you from a Postal Outlet in Etobicoke. And, you may pay for your subscriptions in Canadian dollars (see page 12 for more details).

You will be hearing more about the new "Canadian Connection" as we develop more services and improvements.

Hello, Australians!

Yes, we have a friend in Australia with whom we are discussing an "Australian Connection". More about that soon.

Hello, Europe!

And anywhere else in the world troubled with transportation-related noise pollution. We're looking for a few good people.

AUTHORS WANTED!

You may have noticed that the only thing I am permitted to write in my own publication is the Editor's Corner. Being a natural-born writer from Missouri (home of Mark Twain), I suffer great frustration. Please help me.

I need more authors. Surely you have something of your own doing which you would like to share with others. This is the **only** forum I know of where you can reach an audience of your peers which will **really** read you with interest. Don't delay. **Send something now!** ■

Our Youngest Reader?

Five-months young, Kathryn Elizabeth Bowlby is without a doubt our youngest reader. Proud first-time parent Dr. William Bowlby and wife Patricia sent us this photo of Katy beginning her acoustical education by reading (really ?) her daddy's advertisement on the back cover of The Journal.
Congratulations, Pat and Bill. Katy's a girl to be proud of.

On the Florida Front

by Win Lindeman, Florida Department of Transportation

Ed. Note: We haven't been able to get a picture from Win, but we can show you where he lives.

In a report released January 1, 1993, the Florida Department of Transportation identifies the environmental research activities of the agency. Entitled "Environmental Research Implementation Notebook", the 100-page report serves as an annotated bibliography of environmental research activities conducted by and for the FDOT.

Covering areas such as noise, air, ecology, and cultural resources, the report illustrates the scope of the research project, the results, and any reports generated by the research. For a copy of this report, write me at FDOT, 605 Suwanee St., M.S. 37, Tallahassee, FL 32399-0450 or call me at 904 488-2914.

The Price is Up!

Along with everything else, the price of sound barrier walls in Florida has risen over the past year. Based on an evaluation of noise barriers constructed in 1992, the average noise barrier is now costing the Florida Department of Transportation approximately $16.50 per square foot installed. In a report issued January 1, 1993, Win Lindeman noted that the increase from $15.00 per square foot in 1991 to $16.50 will be used in future cost estimates until new data come in to support a change. For a copy of the report, "Florida Noise Barrier Status Report", contact me as noted in the previous item.

Approval Process Changed

The Florida Department of Transportation announced December 22, 1992 that it will modify the current New Product Approval process for sound barrier walls. Jerry L. Potter, State Structures Design Engineer, noted in a communication to all District Secretaries that, due to a proliferation of barrier wall systems seeking approval in Florida, the Structures Design Office would prepare standard design criteria for ground-supported barriers that will have to be met by all suitable alternatives.

While the criteria are being developed, all companies seeking approval of their product will have their application held pending the completion of this process. The New Products Evaluation Engineer, Alan Lafferty, will notify all applicants of this change. For further information regarding this change, contact the New Products Evaluation section by writing to them at FDOT, 605 Suwanee St., M.S. 31, Tallahassee, FL 32399-0450 or call them at 904 488-4756.

AASHTO Makes Changes to Noise Barrier Design Specs

The American Association of State Highway and Transportation Officials (AASHTO) recently issued revisions to the Bridge Guide and Manual Interim Specifications - 1992. Within those revisions are many related to their Guide Specifications for Structutal Design of Sound Barriers, 1989. Some of the key sections involved are: 1-2.1.2 - **Wind Load**, 1-6.2 - **Notation**, 1-6.5.2 - **Working Stress Analysis**, 1-6.5.3 - **Reinforcement**, 1-8.1 - **Foundation Design - General**, 1-8.2 - **Spread Footings**, 1-8.3 - **Pile Foundation**, Appendix A - **Seismic Loads**, and Appendix C - **Foundations.**

Contact AASHTO at 444 N. Capitol St., N.W., Suite 249, Washington D.C. 20001

TRB A1F04 Committee

By Domenick Billera, Chairman

What's an A1F04?

This month, I'll discuss our A1F04 committee - about where it's been and where it's going. First, an explanation of the TRB designation A1F04:

A - Technical Activities

1 - Planning & Administrative Group Council

F - Environmental Section

04 - Transportation Noise

A1F04 started out in 1974 as a subcommittee, with a small group of highway noise researchers who were responsible for most of the work done in the 70's to develop a methodology for predicting highway traffic noise. Established as a full committee in 1975, the group held its first review of federal research and workshop on noise prediction in August/September of that year. This was the predecessor to our summer meetings. In addition to annual meetings in Washington, D.C., summer conferences were held in Connecticut in 1978, Minnesota in 1981, Boston in 1983 and in subsequent years in states all around the country.

As part of the growth of the committee, three subcommittees were established in 1979: Aircraft, Highway and Rail. Currently, there are over 100 subcommittee members on the roster as well as a large list of "friends".

The committee activities include: acting as a clearinghouse and meeting place for the exchange of information among professionals in the field (as best exemplified by our summer meetings); presentation of the results of research and the subsequent publication of papers from our Annual TRB (winter) meeting; and identifying research needs in our field of expertise (as was done in November 1991at the FHWA environmental research needs conference).

To honor authors of valuable papers, the committee has for the past 13 years, awarded a peer judged "**Best Transportation Noise Paper Award**". Through these activities, we hope to promote excellence in the field of transportation noise analysis, continually expand the state of the art, and educate those interested in this field.

Anyone who has an interest in committee membership should contact me at the Bureau of Environmental Analysis, New Jersey Department of Transportation, Trenton, New Jersey.

Rudy Hendriks of Caltrans Awarded "Best Paper"

Paul Benson Accepts Award for Rudy Hendriks

The TRB A1F04 Committee's "Best Paper of the Year Award" was presented in absentia to Rudy Hendriks at their Annual Awards Dinner at the TRB Conference on January 13, 1993. Rudy is Associate Transportation Engineer, Noise and Vibration Studies for Caltrans' Division of New Technology, Materials and Research at Sacramento, California.

Rudy's paper, presented at the TRB A1F04 Annual Meeting in 1992, was titled **"Field Evaluation of Acoustical Performance of Parallel Highway Noise Barriers Along Route 99 in Sacramento, California".**

This 155-page report details a field study of an existing highway carrying normal vehicular traffic before the erection of a sound barrier, after the barrier was in place, and after a second, parallel barrier had been erected.

The study was performed by Caltrans' Office of Research, Corrosion, Enviro-Chemical, and Graphics. The project manager was Paul Benson, Senior Materials and Research Engineer, who accepted the award for Rudy Hendriks, who was unable to attend.

If you wish further information on the report, contact Rudy Hendriks by plone at 916-739-2320. ■

ATTENTION!

Announcing an Open Competition...

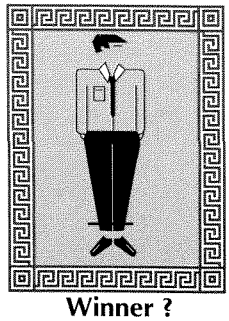
To name the new FHWA noise prediction program which will eventually replace the present STAMINA/OPTIMA. This competition was initiated during a recent FHWA-organized meeting in Washington, D.C. to discuss concepts for a new noise prediction methodology. It was decided that a new name was necessary to differentiate between the old and new programs. The TRB A1F04 Committee was selected to sponsor the competition.

Can you come up with an acronym (8 characters maximum) for this new traffic noise prediction and abatement program?

Entries must be submitted one per postcard, giving your name and address, the acronym you propose and the words from which it is derived. All are welcome to participate.

Your Chance to be FAMOUS... (Maybe)

Winner ?



Winner ?

Please send all entries to:
Bob Armstrong
Federal Highway Administration
HEP-41
400 Seventh St., S.W.
Washington, D.C. 20590

Mailed entries must be received at FHWA in Washington by Wednesday, July 7, 1993

Absolute deadline for entries is Monday, July 12, 1993 at the TRB A1F04 Summer Meeting in Berkeley, California. Entries will be judged by the FHWA's panel of experts and their decision will be final. The winner will receive a memento of appreciation in recognition of his/her efforts.

*(Not to mention the **FAME!**)*

Summaries of Professional Papers

Presented at the TRB A1F04 Summer Meeting at Milwaukee: July 21-24, 1991 - **Part III**

This concludes the 3-part series of the summaries of papers presented at the 1991 A1F04 Summer Meeting. See Issues 3 and 4 for preceding papers.

"USAF, NOISEMAP 6.0"

Presented by: Robert Lee
Armstrong Laboratory
Area B, Building 441
Wright Patterson Air Force Base
OH 45433-6573
(513) 255-3664

Summary: Air Force operations at airbases frequently produce excessive noise environments affecting hundreds of square miles and thousands of people. Adverse community reactions include annoyance, fear, sleep disruption, complaints, and claims regarding effects on health. These situations oftentimes lead to public hearings, litigation and Congressional inquiries....all of which can lead in turn to restrictions on operations. Such actions threaten flying mission capabilities....to acquire and control airspace, to bed-down and deploy new weapons systems, to meet training and operational readiness requirements. Numerous legislative and executive actions, along with DoD and Air Force directives and regulations, require that these environmental issues be properly addressed.

The NOISEMAP model forms the cornerstone of the DoD Air Installation Compatible Use Zone (AICUZ) program that is used to address these airbase noise concerns. Armstrong Laboratory research in this area have led to the developments of NOISEMAP 6.0 and BASEOPS 3.0. NOISEMAP 6.0 is the microcomputer (286, 386 or 486) based version of the Air Force NOISEMAP 5.0 program that previously resided on the CDC mainframe computer. It also now incorporates all the peripheral programs and databases required to run airbase noise analyses. This version incorporates the new lateral attenuation algorithm developed by the Noise Effects Branch and also interfaces directly with the new BASEOPS 3.0 programs which eliminate the need for the large paper database required to describe aircraft flight and runup operations.

BASEOPS provides the user with the capability to input and visually verify aircraft ground tracks and altitude/power/airspeed profiles and obtain summary information prior to running the noise analysis. These two programs will lead to major improvements in the quality and timeliness of AICUZ planning efforts. This will result in improved and stronger interface with local zoning commissions, which in turn will aid in protecting mission capability from encroachment.

"Background-Noise-Corrected Sound Level Measurements"

Presented by: Mike Staiano
Staiano Engineering, Inc.
1923 Stanley Avenue
Rockville, MD 20851
(301) 468-1074

Summary: In many sound measurement situations, a need arises to determine the magnitude of a specific sound source while persistent, although fluctuating, background sound exists due to other sound sources. Usually, the specific source can be tumed off, but no control for the background noise is possible. As a result, measurements can be obtained of the "total" (consisting of the source and background together) and of the background alone. Some recently reported experiments found that a sound level meter with statistical analysis capability can provide the means for obtaining useful estimates of source emissions when comparable magnitude (or even 10 dBA higher) background noise is present. Those experiments showed that the best results were obtained when the signal and background noise sound levels were of comparable magnitude, and when the sounds were more variable. However, the simple implementation of the procedure was limited by a relatively trivial detail of instrumentation design. Subsequent tests explore the extension of these procedures to overcome the instrumentation limitations. This paper will present the results of the follow-on experiments.

"The Use of a Sound Exposure Level Metric for the Design of Sound Insulation in Homes Around Commercial Airports - a Case Study"

Presented by: Eric Stusnick
Wyle Laboratories
2001 Jefferson Davis Highway
Arlington, VA 22202-3604
(703) 415-4550

Summary: This presentation will be a follow-on to the paper that I delivered at the TRB Annual Meeting in January 1991. (Summary not available).

"Parallel Barriers: A Ray-Tracing Program, RAYverb, for Completely General Cross Sections" - by Grant S. Anderson and Christopher J. Bajdek

Presented by: Grant Anderson
Harris Miller Miller & Hanson Inc.
429 Marrett Road
Lexington, MA 02173
(617) 863-1401

Summary: As is well known, STAMINA cannot predict increases in noise level due to multiple reflections between barriers that flank a roadway - often called parallel-barrier reverberation. Several "traffic-image" computer programs exist to predict parallel-barrier reverberation. Most of these programs are limited, however, to very simple cross-sectional shapes. To overcome this limitation, we developed a "ray-tracing" computer program, RAYverb, that computes parallel-barrier reverberation for completely general cross sections. In this talk, we will (l) review the parameters that affect parallel-barrier reverberation, (2) describe RAYverb, and (3) show some typical results. RAYverb was developed for the Pennsylvania Department of Transportation during detailed barrier design along the Mid-County Expressway (Blue Route) around Philadelphia. It is presently coded in the RSI language and will soon be converted to C.

"STAMINA Improvements: Ground Effects and Multiple Diffraction"

Presented by: Chris Blaney
Environmental Office
Ontario Ministry of Transportation
2nd Floor, West Building
1201 Wilson Avenue
Downsview, Ontario, M3M lJ8, Can.
(416) 235-5268

Summary: This presentation describes a project that incorporatesmajor modifications to the STAMINA 2.0 highway noise predictionmodel. Two major problems with the STAMINA program are its inability to properly account for soft ground over variable terrain, and its limitation to computing the shielding effects of only one barrier inthe source-receiver path.

To more precisely define the effects of soft ground propagation, the terrain is modelled with "ground lines", and the model computes the average sound path height above the ground to set an appropriate alpha factor. The results are consistent with Ontario's ORNAMENT model for simple geometries. The model also accounts for the additive diffraction effects of multiple barriers in the source-receiver path.

*(See **Papers** next page)*

(*Papers*, *from page 6)*

"An Investigation of the Psychoacoustic Effects of a Rapid Shift in Frequency and Intensity of the Noise Source for Adjacent Sections of Transverse-Grooved Concrete and Open-Graded Asphalt (Part 1, Measurement, Analysis and Calibration of Tire/Pavement Interface Noise Source Levels)"

Presented by: David Still
Gannett Fleming, Inc.
P.O. Box 1963
Harrisburg, PA 17105-1963
(717) 763-7211 Ext. 2428

Summary: Multiple data sets were collected representing simultaneous measurements of noise source levels for the two pavement types. The measured data were analyzed for variation or trends in source level attributable to the pavement types. Calibration of measured-versus-STAMINA 2.0-modeled-results, using a speed dependent shielding factor for T-grooved concrete pavement sections, was conducted to validate the pavement noise source offset suggested by the measured data. Annoyance, due to the presence of a temporal noise level increase throughout the target population as a result of the influence of T-grooved concrete pavement sections, was qualitatively compared against psychoacoustic studies conducted by Joan Sinnott, EPA and others.

"An Investigation of the Psychoacoustic Effects of a Rapid Shift in Frequency and Intensity of the Noise Source for Adjacent Sections of Transverse-Grooved Concrete and Open-Graded Asphalt (Part 2, Measurement and Analysis of the 1/1 Octave Band Frequency Spectrum of Individual Vehicle Passbys)"

Presented by: David Still
Gannett Fleming, Inc.
P.O. Box 1963
Harrisburg, PA 17105-1963
(717) 763-7211 Ext. 2428

Summary: A total of 41 individual vehicle passby events were recorded on magnetic tape for 1/1 octave band analysis. The passbys were analyzed for shifts in source level and frequency content at the pavement transition. The RTA analysis of level-versus-time was used to construct a speed dependent, average vehicle passby, profile at the pavement transition point. Regression analysis of the measured data was conducted to determine a log-averaged frequency content passby for each Lmax value on each pavement type. The results of the analysis were compared with FHWA LoE Emissions data. The effects of level/frequency shifts at pavement transitions were qualitatively evaluated relative to psychoacoustic studies by Joan Sinnott, EPA and others. ■

In Memoriam

Dr. Simon Slutsky
1919 - 1992

Enthusiasm for trying new research approaches -- *"let's give it a try"*, meticulous attention to detail, love of the annual forum provided by the TRB A1F04 Committee on Transportation-Related Noise and Vibration -- *"let's ask some intelligent questions and see if we can improve/simplify the formulation"*... these were just a few of the things that characterized the late Professor Simon Slutsky's devotion to advancing the state of the art of noise modeling.

Dr. Slutsky was active in the field of acoustics, noise and vibration control for over 35 years, performing both theoretical and experimental work in boundary layer noise, jet noise, fan engine noise, sonic boom transmission, measurement and control of subway noise (for NYCTA and TSC), industrial plant noise control, measurement of airport noise (continuous monitoring program of Concorde operations at JFK) and vehicular noise (for FHWA and UMTA). He also worked and published in the field of supersonic ramjet aerodynamics with finite rate chemistry, conductivity and diffusion, and indoor air quality measurement.

After receiving his BCE from CCNY in 1941, he served in the Army in World War II before returning to Columbia University for a MS (Applied Mechanics) in 1947, and Polytechnic University of Brooklyn for a Ph.D. (Applied Mechanics) in 1953. He was a member of the faculty at New York University from 1968 on (with rank of Professor), and at Polytechnic Institute (after its merger with NYU). In addition to his teaching duties, Si was Director of the Acoustics Laboratory at NYU. He retired from full time teaching in 1987 with the title of Professor Emeritus, and continued to teach at least one course a semester and to work as an acoustical consultant. Prior to joining the faculty of NYU, he managed and conducted research at the General Applied Science Laboratories (then in Westbury, NY), holding positions of Manager and Assistant Director of Research.

When Si entered the hospital after Thanksgiving, he was working on a modular PC noise model accounting for the interaction between ground and barrier effects. Si planned to integrate this work along with his previous work on parallel and overlapping barriers and stop and go traffic into a revised STAMINA/OPTIMA model for free distribution to interested parties. Preliminary findings were presented at the Highway Subcommittee meeting by Dr. Van M. Lee, who will complete Si's work.

At the 72nd Committee Meeting, it was proposed that some way be found to permanently keep Si's spirit with us in the years to come. Some of the suggestions tabled at the meeting included establishing a scholarship and presenting a plaque in his honor at Polytechnic Institute, naming the annual banquet in his honor, and establishing an annual award for excellence in research.

(This tribute was written by Dr. Van M. Lee of Analysis and Computing, Inc. of Hicksville, New York, and Robert A. Michalove, Consultant.

Noise from Virginia

By Cary B. Adkins, Virginia Department of Transportation

The absence of articles from Virginia in the last three issues of The Wall Journal may have given the impression to some that (a) I had been fired or (b) that VDOT's noise abatement program had been shut down. I'm happy to say that neither is true. Both I and the program are alive and kicking.

In regard to the noise abatement program, the I-64 HOV barrier project in the cities of Norfolk and Virginia Beach and discussed in the first issue of The Journal is underway. VDOT's Sound Barrier Review Committee is completing its review of a barrier design which will utilize recycled rubber tires and, barring any last-minute complications, the design will be approved and used on the I-64 project.

We have reviewed Soren Pedersen's article in Issue No. 5 of The Journal, and have taken very seriously the concerns and also similar ones expressed by others regarding the use of recycled tires. However, this design contains only 5% rubber, and VDOT is confident that it will perform satisfactorily. Note: The sound barriers on this project will utilize rubber from more than 100,000 automobile tires.

Another sound barrier project on I-64 is scheduled to be advertised in August. Two sound-absorptive precast concrete barriers totaling 131,000 square feet will be constructed in conjunction with the widening of I-64 in the city of Newport News. These barriers are estimated to cost $2.1 million for materials and installation and will provide noise protection to 134 of 143 impacted residences and a school recreational area. As the widening of I-64 continues to move west toward Richmond, other sound barriers are likely to be required.

Also in August, another I-66 HOV project in northern Virginia is scheduled to be advertised. While no decisions have yet been made, it appears that sound barrier construction associated with the project will cost from $1.8 million to $3.2 million for materials and installation only. Unlike its sister project discussed in my article in Issue No. 2 of The Journal, this project is classified as Type I, and only those barriers meeting Virginia's cost-effectiveness criteria are likely to be constructed.

VDOT will advertise in December the Route 17/Warrenton Bypass project. A four-lane divided facility will be constructed on new location and will include a noise abatement package consisting of a depressed roadway alignment, earthen berms, and sound-absorptive precast concrete barriers. This abatement package will provide noise protection to 151 of 161 impacted residential units and a school playground. The barriers will total approximately 60,000 square feet and are estimated to cost just under $1 million for materials and installation.

In future issues of The Wall Journal, I will discuss some of our completed projects in detail, covering barrier types, specifications and construction methods, including project photos. ■

(Cary Adkins is an Environmental Program Planner for the Virginia Department of Transportation and manager of VDOT's noise program. He may be contacted by phone at 804 371-6765, or by fax at 804 786-7401.)

lower grade products to be used without regard for durability, quality and performance.

From the solvent-based era, we have learned that acrylic stain specifications should include a series of basic criteria to become completely functional for concrete sound walls. These same criteria also apply to water-based stains. A well-formulated water-based product should provide the following functions: • Aesthetically pleasing; • Early water resistance; • Protection for the concrete; • Weather resistance; •Good adhesion to concrete; • VOC Compliance.

Aesthetic Effect. The water-based stain should enhance the beauty of the concrete sound wall by coating uniformly without showing different color tones due to varying porosity of the concrete. This ability in a stain is controlled by manipulating the rheology of the stain. When deciding which thixotrope works best in a stain, we must keep in mind that we want to minimize color float, eliminate settling and maintain stable viscosity over time. Organically modified clays, non-ionic urethane thicknesses and non-urethane associate thickeners accomplish this very well, assuring good aesthetics.

Solid concentration and desired viscosity of the stain are the two most important built-in characteristics one must consider when choosing the right thixotrope. For example, simply because a certain thickener works well at high solids and low viscosity, the same thickener might show extreme settlement at low solids and the same viscosity, hampering the aesthetic value of the stain once applied.

It is of the utmost importance that the water-based stain has enough hiding power to cover concrete imperfections created during manufacture. This is accomplished by using high-solid water-based stains. This becomes a critical function of the stain in order to produce a uniform, aesthetically pleasing concrete sound wall.

Early Water Resistance. This a unique and valuable property found only in very modern acrylic emulsions. Even though the product is water borne to meet VOC regulations, it must have the ability to resist water after it has dried. This has obvious importance if the product is being applied and rain occurs with little or no warning.

Protection for Concrete Sound Wall. A very important function of the water-based acrylic stain is its ability to protect the concrete and steel rebar from the ingress of damaging chemicals or agents such as water and chloride ions. The damage to rebar caused by unwanted chloride ion ingress is a phenomenon understood and well documented. The stain prevents this ingress by its acrylic polymer content, which acts as a barrier preventing chloride ions from entering the concrete sound wall. The same barrier protection mechanism applies for water ingress. Preventing ingress of these destructive agents results in protection against rebar corrosion and concrete deterioration. The protective power of a stain is gauged by its acrylic content. Up to a limit, the higher the acrylic content, the more difficult it is for water and chloride ions to penetrate into the concrete substrate. Other factors such as polymer types and application rates can also affect the stain's protective ability.

Weather Resistance. For obvious reasons, the appearance of the stained concrete panel must be kept and preserved, thus maintaining the aesthetic improvement of the stained concrete. This is accomplished by using acrylic polymers in the stain which are weather resistant. Thorough outdoor testing as well as accelerated weathering are key factors in producing a water-based stain that produces a product with longevity.

Good Adhesion to Concrete. For obvious reasons, the stain must show tenacious bond to the concrete substrate as it is produced by the precaster.

VOC Compliance. The trend worldwide is for products of high performance coupled with environmental safety. VOC compliance should never be a reason to supply a technically inferior product to the market. Advances in emulsion chemistry and polymer science are making waterborne acrylic stains the choice for protecting and enhancing the appearance of concrete sound walls.

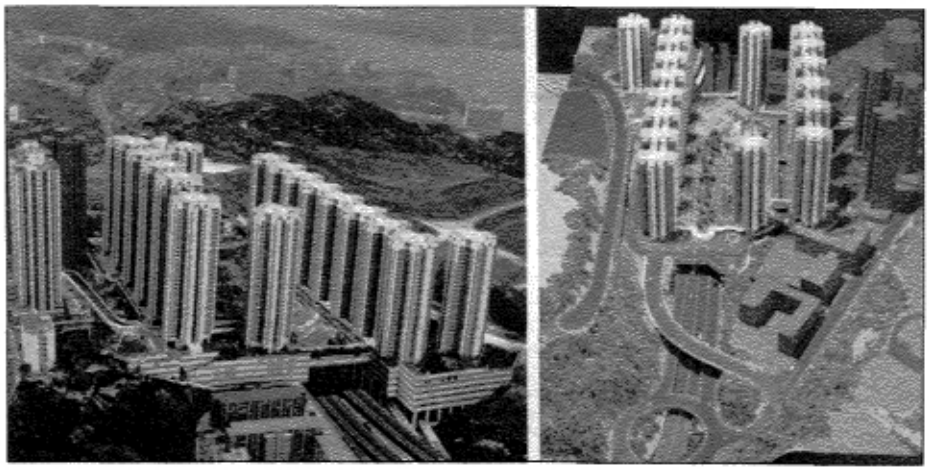
Conclusion. Volatile Organic Content laws in the U.S. have started an awareness of product performance in harmony with environmental concerns. To meet the performance and VOC requirement demands placed on water-based acrylic stains, it is necessary to identify important parameters which later must be clearly defined in a specification to ensure that product performance matches expectations.

Water-based acrylic stains offer high performance when specifiers are aware of the requirements necessary to assure that performance. With recent advances in polymer science, water-based acrylic stains are becoming the performance choice of engineers and architects. ■

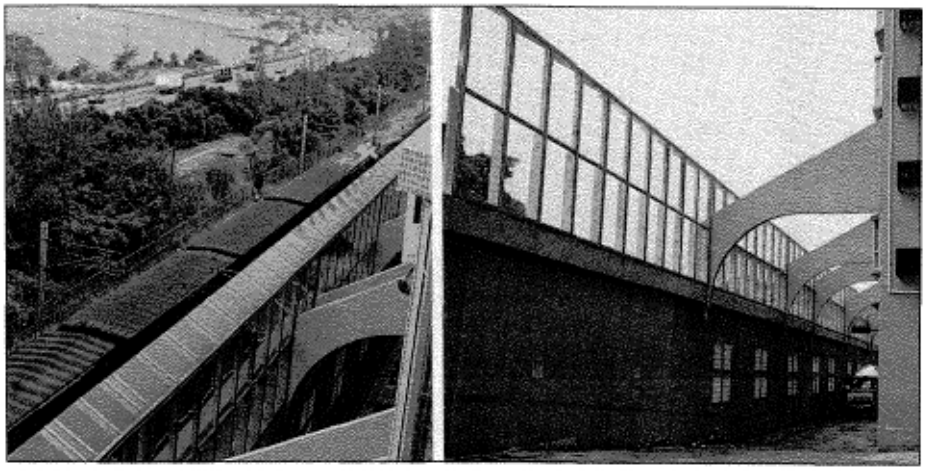
(Hong Kong *Noise Barriers, from page 1*)

Illustrated here are a few of the projects which required the covering of the road in order to achieve the desired noise abatement. For further detailed technical information, readers may contact me by fax at 852 802-4511, or by mail at the address at the bottom of this coumn.

Project:
Landscaped Deck Over Lei Yue Mun Road
Deck Length: 261m, Deck Width: 45.5m
Noise Source:
Vehicular Traffic
Impacted Area:
High-Rise Residential Complex
Noise Reduction:
16 - 17 dBA



Project:
Barrier Wall with Cantilevered Transparent Panels. Length: 186m. Height: 10.75m.
Noise Source:
Vehicular Traffic and Railway
Impacted Area:
KCRC Staff Quarters at Tai Po Kau
Noise Reduction:
6 - 20 dBA



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Sound Bites... (for real)

California -- A municipal judge in San Luis Obispo resolved a neighborhood noise dispute by ruling that the three basset hounds belonging to two of the residents may bark only once an hour, and the dogs may bark for no more than two minutes at a time and must remain silent from 8 p.m. until 8 a.m.

London -- A French inventor has come up with a $150 dog collar that quiets dogs by emitting a spray of perfume whenever they start barking. About 40,000 French dog owners have purchased the device, which so confuses the dog with scent that it stops yapping.

As recently reported in The Washington Post.

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