The Wall Journal™

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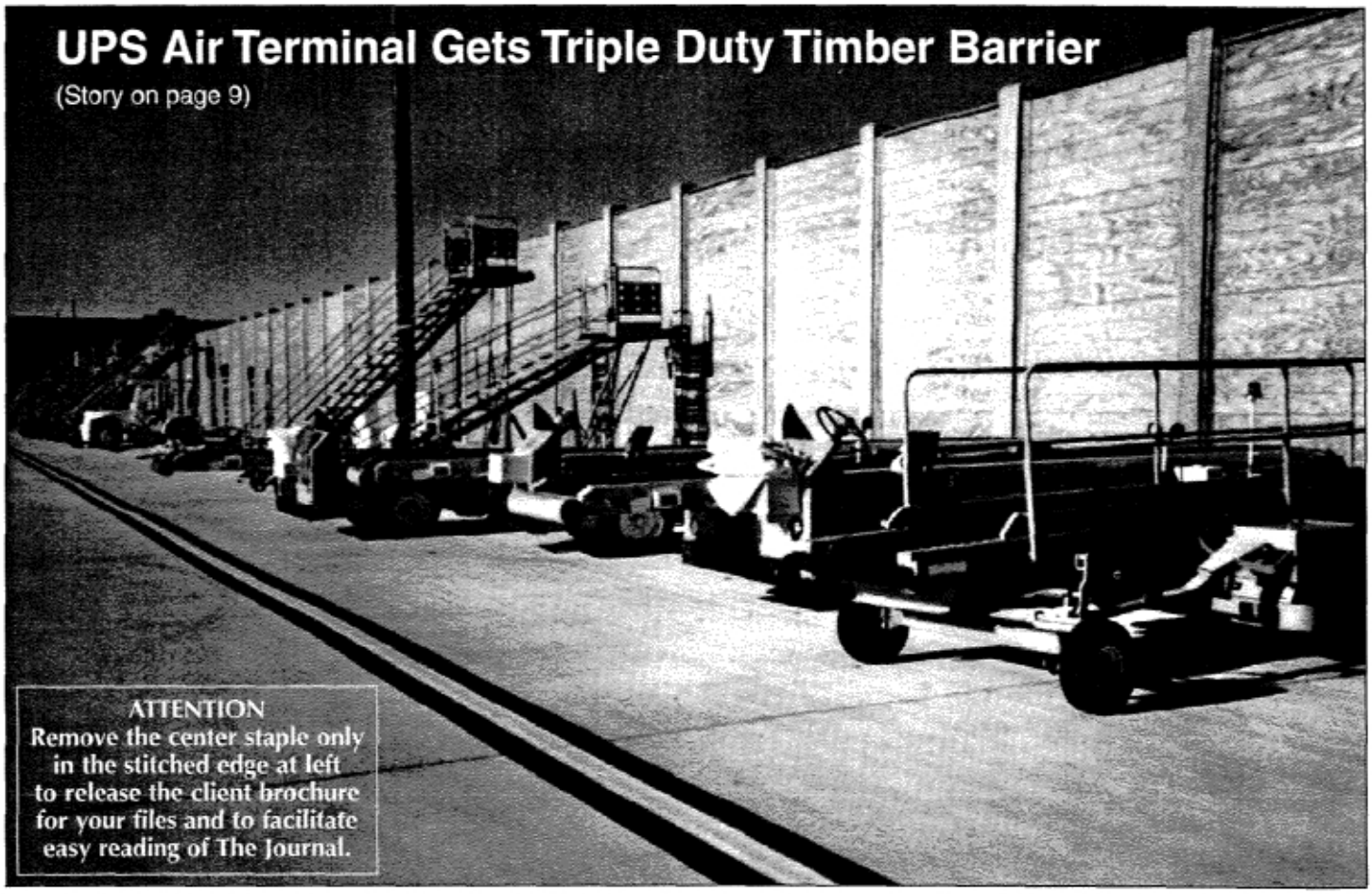
THE INTERNATIONAL JOURNAL OF TRANSPORTATION-RELATED ENVIRONMENTAL ISSUES



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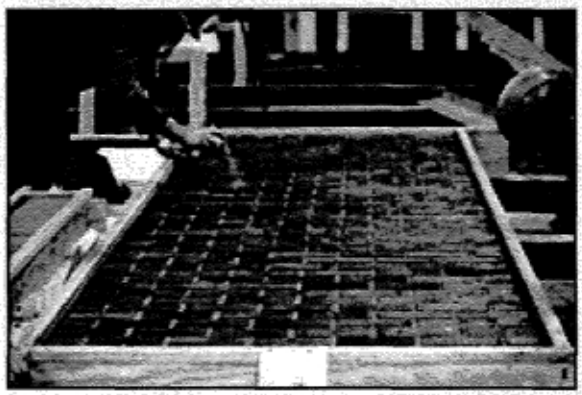

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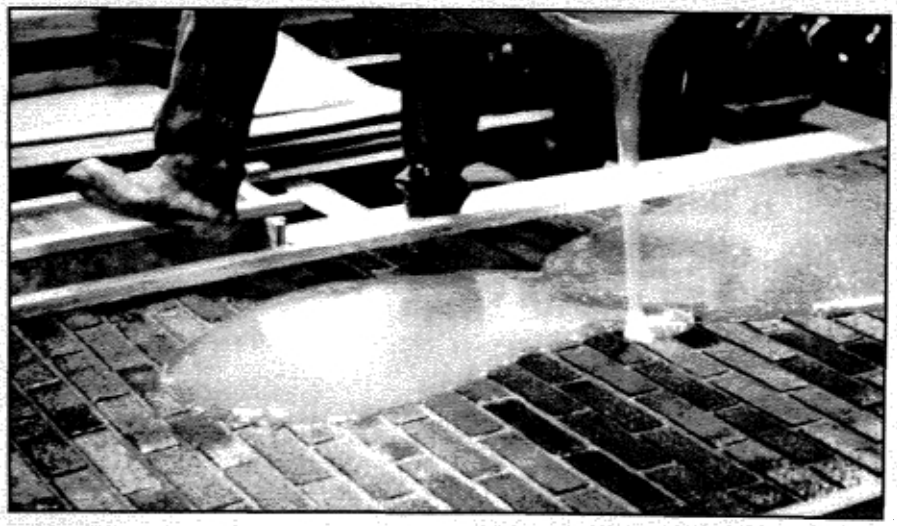

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The Wall Journal

The International Journal of Transportation-Related Environmental Issues

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Subscription and advertising information are shown on page 23.

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EDITOR'S CORNER by El Angove

You Want to Be There

Not "when the band starts playing" but when the A1F04 Committee holds their summer conference in mid-July in St. Petersburg, Florida. The conference of course will be of the now-getting-better-every-year class, the professional paper presentations will be outstanding, the technical tours I am sure will be informative and interesting (as always), and everyone will be glad they came.

BUT, the star of the show (not to demean the efforts of the attendees) will be the *location* of the conference. Many thanks to Win Lindeman of Florida DOT for arranging accommodations for the conference at the famed historical Renaissance Vinoy Resort in downtown St. Petersburg, Florida. The Vinoy glows in the warm sun on the very edge of Tampa Bay, as pictured below.

Here's what they say about Vinoy:

[The majestic facade of the restored Renaissance Vinoy Resort betrays little of the intriguing secrets held within. Nevertheless, its heritage is rich with celebrated characters, extravagant balls, and gala events.

Built by Pennsylvania oilman Aymer Vinoy Laughner, the Vinoy Park Hotel was the grandest of all the Boom Era hotels—an extraordinary fantasyland for the world's rich and famous. When it opened on New Year's Eve in 1925, its rooms were among the most lavish and expensive in the state.

Actual construction started on February 5, 1925, and the $3.5 million project was, at that time, the largest construction project in Florida's history. The contractor, Tampa's own George A. Miller, set a construction speed record for completing the 375-room hotel in just under 10 months, in time for its December 31 opening.

The feat was considered miraculous because a railroad embargo had been imposed to Florida, and all materials being brought in from out of state had to be shipped.

What resulted was one of the finest examples of Mediterranean Revival-style architecture in Florida. The hotel offered many exquisite details such as glazed quarry tile with colorful, hand painted decorative inserts in the lobby; massive, stenciled pecky cypress beams in the ballroom foyer and lobby; frescoed ceilings and walls of the dining room; and intricate ornamental plaster work on the observation tower, main entrance door and great arched dining room window.

In the early days, the hotel was only open for "the season", roughly December through March. Guests stayed for weeks, even months, at a time. The hotel featured a full American plan (breakfast, lunch and dinner included in the room rate), and guests would dine at two seatings each meal period in the Pompeii Room, the main dining room (now known as The Terrace Room and Marchand's Bar and Grill).

The hotel continued to prosper even during the Depression years, largely because of its elite clientele. Some of the country's wealthiest and most influential people frequented the hotel: Calvin Coolidge; Babe Ruth; Admiral Byrd; Herbert Hoover; Alf Landon; F. Scott Fitzgerald; The Pillsburys; the Fleischmanns; the Biddles of Philadelphia; and the Smiths, of Smith Corona].

The above is from one of the pieces which the Concierge will hand you when you register. The Vinoy is beautiful Old Florida architecture and gracious living. I am amazed that Win was able to procure such elegant quarters for the conference. In addition to the creature comforts, the Vinoy is in walking distance to a park and pier with little shops, plenty of places to eat and things to see, one of which is the ship *BOUNTY* of Mutiny on the Bounty, tied up alongside the pier. Of course, this is not the real ship, but it is the one built for the movie, and you can go aboard.

The Vinoy also has a golf course, tennis courts, swimming pool, and all the other usual accoutrements you find at spas and resorts. But to me it's a grand marble palace in exquisite taste in construction and decor, great food and impeccable service. If you want more information on this, you may call Win Lindeman at FDOT, 904 488-2914. I promise you'll be sorry if you don't come to the A1F04 Conference.■

NEWS RELEASE

NEWS RELEASE
Wednesday, December 24, 1997
New Brunswick, New Jersey

NATIONAL TRANSIT INSTITUTE ANNOUNCES SESSION OF NATIONAL EDUCATIONAL PROGRAM ON TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT

The National Transit Institute announces an additional offering of its course on assessment of noise and vibration impacts of federally funded transit projects. This session is to be held April 13-15, 1998, in the Chicago area. It is the last scheduled delivery of the three-day course, entitled *Noise and Vibration Impact Assessment.* Training is free of charge to employees of federal, state and local government, and private, non-profit transit operators. Tuition is $450.00 for all others, including contractors and consultants to transit operators.

BACKGROUND & EDUCATIONAL NEED

Noise and vibration assessments are key elements of the environmental impact assessment process for mass transit projects. To promote quality and uniformity in those assessments, the FTA has published a guidance manual, *Transit Noise and Vibration Impact Assessment* (April 1995) to be used by project sponsors and consultants in performing noise and vibration analyses. It covers the methods and procedures for estimating the level of noise and vibration impacts resulting from most federally funded transit projects, and for determining what can be done to mitigate such impacts.

The NTI training program has been designed and developed in close cooperation with the FTA Office of Planning. The course is intended to:

- Enhance the understanding of the noise and vibration assessment approach and of the analytical methods presented in the guidance manual;
- Show how noise and vibration assessment relates to the NEPA process, the Major Investment Study Process, and other related activities;
- Present information on available noise and vibration mitigation measures and considerations for determining the need for mitigation,
- Illustrate how to exercise professional judgment to extend the basic methods of the guidance manual to situations not covered explicitly in it.

COURSE INSTRUCTORS

The program will be presented by Mr. Carl Hanson of Harris, Miller, Miller & Hanson Inc., a firm specializing in noise and vibration analysis, and by Mr. Abbe Marner of the Federal Transit Administration. Mr. Hanson is a principal of HMMH. He has extensive experience in noise and vibration analysis and was principal author of the guidance manual. Mr. Marner works in the FTA's Office of Planning, where he directed the development of the guidance manual.

WHO SHOULD ATTEND

The course is aimed at users of the new FTA guidance manual. It is designed for those conducting noise and vibration studies, (e.g. specialists from acoustics consulting firms engaged in federal-aid transit work) as well as management personnel of project sponsors who need a more complete understanding of the methods used by consultants in such studies. In addition, it is expected to be of interest to others in more general fields, such as environmental planners and transit project planners from local and state transit agencies.

CONTENT and OBJECTIVES

Each participant will receive a copy of the FTA guidance manual, which will serve as the course text. Substantial classroom time will be devoted to exercises which apply the procedures and methods described in the guidance manual, or which were developed by extending the basic techniques to address conditions not explicitly covered in the manual. Personal computers will be provided for use by groups of participants in a spreadsheet demonstration. Upon completion of the course, participants will:

1. Understand the basic concepts of noise and vibration and the requirements of the FTA,
2. Be able to determine when a noise or vibration assessment is required, and what level of impact assessment is appropriate,
3. Have sufficient knowledge to evaluate qualifications for producing a noise or vibration assessment for a transit project; and
4. Understand the procedures and major analytical steps of reviewing the noise or vibration report of a transit project.

To register, please contact:
Susan Greenstone, Registrar
National Transit Institute
Rutgers, The State University of New Jersey
120 Albany Street, Suite 705
New Brunswick, NJ 08901-2163
(908) 932-1700 ext. 19
FAX (908) 932-1707 ■

News Release
January 8, 1998

Coordinating Transportation and Land Use A New Three Day Intensive Course on Tools and Techniques

The National Transit Institute is pleased to announce the offering of a new training course on Coordinating Transportation and Land Use. The purpose of this three-day training is to identify and disseminate the most useful information, evidence, tools, and techniques for integrating transportation and land use planning that are now available.

Planners must also be able to measure the implications of urban form and site design for transportation, as well as the implications of transportation for urban form and site design. The practical instruction for this course has two parts: first to provide training specifically related to issues at the regional level in development of metropolitan transportation plans, at the corridor level in development of major investment studies, and at the project level in completion of NEPA studies, and second, to provide guidance on how to address transportation in site development and neighborhood, municipal, and regional plans. The course is designed for both transportation and land use planners and identifies best practices.

TARGET AUDIENCE

The target audience is transportation and land use professionals in the spectrum of agencies who work in the area of transportation and land use coordination. These include comprehensive, land use, and transportation planners who work in state departments of transportation, metropolitan planning organizations, transit agencies, state/county/local planning agencies, and consulting firms. Portions of the course are specifically targeted to include local civic activists, modelers, and elected officials as participants.

COURSE INSTRUCTORS

There are three instructors for this course. Dr. Robert Cervero of the Department of City and Regional Planning, University of California at Berkeley, is a recognized expert on the subject of the relationship between land use and transportation. Dr. Reid Ewing of the College of Engineering and Design at Florida Atlantic University, is an authority on transportation, land use, and growth management. Mr. Uri Avin, AICP, of LDR International, Inc., has an extensive background in land use planning in both the private and public sectors.

Fee and Schedule

The $450 tuition fee includes all course materials. Enrollment is limited to 30 per course. The course schedule is:

Atlanta, GA	March 4-6, 1998
Chicago, IL	April 1-3, 1998
Seattle, WA	April 29-May 1, 1998
Dallas, TX	June 3-5, 1998

For further program information, please contact:
Amy Van Doren
Telephone: 732 932-1700, ext. 21
e-mail: avd@rci.rutgers.edu
To reserve a seat in a class, contact:
Susan Greenstone, Registrar
National Transit Institute
Telephone: 732 932-1700 ■

NEWS RELEASE

INSTITUTE OF TRANSPORTATION ENGINEERS

Contact: Loraine Coleman
Release: December 1997

How Can Today's Transportation Professionals Meet the Needs of the Communities They Serve?

Washington D.C.—Elected officials and the public are demanding that transportation facilities be shaped by the needs and desires of the community, rather than the other way around. How can today's transportation professional "harmonize" the safe and efficient movement of people and goods with the broader community objectives involving livability, aesthetics, design, security, commerce, and the environment? The Institute of Transportation Engineers' 1998 International Conference will help professionals address these issues.

"Harmonizing Transportation and Community Goals: The Challenge for Today's Transportation Professional" is the theme for ITE's 1998 International Conference, March 1-4, 1998 in Monterey, California, USA.

This is the 14th in a series of annual ITE conferences to provide transportation professionals with information on what is being done to meet current and future challenges and to take advantage of opportunities. The information generated at this conference will be critical to transportation professionals employed by federal, state/provincial, regional and local government agencies, consulting firms, universities, and industry.

The program includes many preeminent transportation professionals and leaders in allied disciplines in the field, and participants will have opportunities for informal discussions with both the speakers and meeting attendees. The conference also includes exhibits of transportation products and services. Topics include:

Meeting Neighborhood Objectives

- Neighborhood Management Programs
- Walkable Neighborhoods
- Traffic Calming State-of-the-Art
- Experiences with Traffic Calming
- Liability/Safety Issues in Traffic Calming
- Mitigating Traffic in the Neighborhood
- Neighborhood Street Design Issues
- Traffic Calming Devices

Meeting Community Objectives

- Knitting Communities Together
- Transit Friendly Communities
- TDM in Post-Regulatory Environment
- Arterials or Main Streets?
- Harmonizing Goods Movement
- Parking
- Pedestrian & Bike Friendly Communities
- Transit Oriented Developments
- Telework Strategies

Addressing Implementation Issues

- New Planning & Design Philosophies
- ITS: Beyond Mobility & Safety?
- Managing Land Use & Growth
- Street Design Standards Revisited
- Harmonizing Major Projects
- Working with the Public
- Improving Transportation Aesthetics
- Evaluating the Trade-offs

For conference information, contact:
Loraine Coleman
Tel: 202/554 8050 ext. 149
Fax:202/863-5486
e-mail: lcoleman@vax.ite.org

For registration information, contact
Donna Ford
Tel: 202/554-8050 ext. 140
Fax:202/863-5486,
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INSTITUTE OF TRANSPORTATION ENGINEERS
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FHWA Traffic Noise Model Update

By Cynthia Lee
Acoustics Facility, Volpe National Transportation Systems Center, Cambridge, MA

The Federal Highway Administration (FHWA), in cooperation with the Volpe National Transportation Systems Center (Volpe Center) Acoustics Facility, Harris Miller Miller & Hanson Inc., Foliage Software Systems Inc., and various other organizations, is developing the FHWA Traffic Noise Model (FHWA TNM®). Currently, the model is undergoing final testing and debugging. That is, the acoustics have been "frozen" and TNM is essentially in its final form with reproduction, release, and distribution of Version 1.0 to occur in early 1998. This transmittal addresses several issues surrounding the Version 1.0 release: run-time, accuracy and program cost savings, TNM look-up tables, the TNM "package," distribution, and training and phase-in of TNM.

Run-Time:

Unlike its predecessor, STAMINA, TNM is a Windows-based program with increased capabilites and scientifically-founded acoustic algorithms, which have undergone some field validation. TNM's expanded capabilities include the ability to model constant- and interrupted-flow traffic, attenuation over/through building rows and vegetation, multiple diffractions, parallel barrier analysis, and contour analysis. However, the model's increased capabilities and theoretical basis result in fairly extensive run-times. TNM will currently run typical studies in between 1 and 2 hours on state-of-the-art PCs; and the more complex studies (previously unachievable with STAMINA) are expected to take no longer than an overnight run. These run-times are substantially longer than those of STAMINA. However, the notable improvements in accuracy, flexibility, and ease of use should more than compensate. Additionally, the sound theoretical base upon which TNM has been structured will allow for easy incorporation of other acoustical effects, e.g., atmospherics, as future studies are completed, and TNM run-times will be greatly reduced as computer hardware technology continues to advance.

A run-time comparison of a moderately complex, STAMINA test case, imported into TNM, is shown below for several computer platforms (it should be noted that TNM is most efficient running under the Windows NT operating system). The test case consists of the following: 9 roadways, 1 barrier (with 3 perturbations up and down), 2 terrain lines, and 32 receivers.

Accuracy and Program Cost Savings:

As discussed above, TNM contains several components which are not accounted for in STAMINA, and for which only limited field-measured data exist, e.g. berms, terrain lines, building rows, vegetation, and multiple diffractions. For both berms and multiple diffractions under certain tested geometries, the model is showing small (generally less than 2 dB) discontinuities. The source of these apparent anomalies is currently unclear, but they have only been found in rare instances. Further, it is believed that these anomalies are not coding bugs, but rather weaknesses in the acoustic algorithms. Examination of these algorithms has already begun. Ultimately, high-quality field-measurements will be necessary to effectively assess these apparent anomalies and correct them if necessary.

Although measurements to validate and refine all components within TNM, once it is released, are essential to ensure results are and continue to be reliable for all geometries, comparisons between STAMINA and TNM for two recent studies show unprecedented predictive accuracy in the case of TNM. It should be pointed out that these two studies exercise the majority of the most commonly used components within TNM, including barriers, propagation over acoustically soft ground, and moderately-changing terrain elevation. The comparisons are summarized below:

(1) Rt. 99 in Sacramento, California (2 minute run-time on a Pentium 166 in Windows NT Version 4: The study included sound-level measurements performed BEFORE and AFTER barrier construction, and the resultant INSERTION LOSS associated with the barrier. It consisted of 4 roadways, 1 barrier of interest in the AFTER case, 3 terrain lines, and 10 receivers. The receivers were located as follows: 1 reference microphone at 5 ft directly above the position of the barrier, 3 receivers placed at a 15-ft offset position behind the position of the barrier at 5-ft, 15-ft, 23-ft elevations, 3 receivers placed at a 75-ft offset position at the same elevations, and 3 receivers placed at a 200-ft offset position, also at the same elevations. The three microphone elevations will be referred to as low, middle, and high hereafter. The results shown below reflect sound levels adjusted for the reference microphone in accordance with ANSI S12.8-1987 ("Methods for Determination of Insertion Loss of Outdoor Noise Barriers." American National Standard. ANSI S12.8-1987. New York: American National Standards Institute, 1987).

(2) I-495 in Montgomery County,Maryland (1 minute run-time on a Pentium 166 in Windows NT Version 4)

The study only included sound-level measurements performed AFTER barrier construction. It consisted of 2 roadways, 1 barrier, and 10 receivers. The receivers were located as follows: 1 reference microphone at 5 ft directly above the position of the barrier, 3 receivers placed at a 16-ft offset position behind the position of the barrier at 7.9-ft, 18.3-ft, 28.9-ft elevations, 3 receivers placed at a 65.5-ft offset position at the same elevations, and 3 receivers placed at a 131-ft offset position, also at the same elevations. The three elevations will be referred to as low, middle, and high hereafter. The results shown below reflect sound levels adjusted for the reference microphone in accordance with ANSI S12.8-1987.

In the first study (Rt. 99, California), STAMINA averaged a delta insertion loss (measured minus predicted) of 1.57 dB, while TNM averaged a delta insertion loss of 0.73 dB, i.e., 0.84 dB lower than STAMINA. In other words, both STAMINA and TNM would lead users to build taller barriers than necessary at this site. Using the commonly-accepted rule-of-thumb, "1 dB insertion loss per 2 ft of barrier height (above line-of-sight)," STAMINA would have resulted in barriers built 3.14 ft higher on average than necessary, and TNM 1.46 ft higher. The 1.68-ft difference between STAMINA and TNM would result in an overly-conservative design on the part of STAMINA. This over-design on the part of STAMINA can be easily translated into a cost-savings associated with TNM. At this site, the barrier was about 2000 ft in length and about 12 ft in height. Since noise barrier costs are commonly estimated at about $1 million per linear mile (based on an average barrier height of about 12 ft), this 1.68-ft difference translates into a cost savings of a little over $50,000 if TNM were used to design this barrier as compared with

Run-Time (hrs) Versus Computer Platform*

Windows Operating System	Pentium 90	Pentium Pro 200	Pentium 166	Pentium 200	Pentium II 300
3.1	19	11	10	8	5
95	20	18	11	9	6
NT 4.0/3.51	12	8	7	6	4

*Note: The fastest, tested computer platform for TNM is currently a Pentium II 300 running Windows NT Version 4 or 3.51.

STAMINA.

Further, if the above example of TNM performance can be considered typical, and if we assume barrier construction trends in the U.S. over the next five years will be similar to those of the past five years (approximately 500 linear miles of noise barriers constructed in the next five years), then use of TNM (as compared with STAMINA) will translate into a cost savings of about $14 million per year. Probably more importantly, the public will embrace the model because of its excellent agreement with field measurements.

BEFORE (No Barrier) Levels

Receiver	Measured Levels	STAMINA	Predicted Levels		
			Delta (Measured-STAMINA)	TNM	Delta (Measured-TNM)
200'-high	70.9	74.5	-3.6	70.2	0.7
200'-middle	71.0	74.5	-3.5	69.3	1.7
200'-low	64.7	74.5	-9.8	67.7	-3.0
75'-high	75.2	77.7	-2.5	75.5	-0.3
75'-middle	75.4	77.8	-2.4	74.2	1.2
75'-low	71.9	74.7	-2.8	72.4	-0.5
15'-high	79.5	80.5	-1.0	79.2	0.3
15'-middle	79.3	80.6	-1.3	78.6	0.7
15'low	75.8	79.0	-3.2	76.8	-1.0
Average Delta			-3.34		-0.02

AFTER (Barrier) Levels

Receiver	Measured Levels	STAMINA	Predicted Levels		
			Delta (Measured-STAMINA)	TNM	Delta (Measured-TNM)
200'-high	65.0	70.2	-5.2	66.3	-1.3
200'-middle	63.4	69.4	-6.0	64.7	-1.3
200'-low	60.6	68.5	-7.9	62.5	-1.9
75'-high	72.0	75.8	-3.8	73.3	-1.3
75'-middle	66.9	72.6	-5.7	68.1	-1.2
75'-low	63.4	69.8	-6.4	63.9	-0.5
15'-high	80.4	80.9	-0.5	79.3	0.7
15'-middle	71.8	75.9	-4.1	71.6	0.2
15'low	63.0	67.6	-4.6	63.2	-0.2
Average Delta			-4.91		-0.76

TNM Look-Up Tables:

Immediately following TNM release, the FHWA, in cooperation with the Volpe Center, will finalize development and publication of a set of printed tables of pre-calculated TNM results. These "look-up" tables will be a useful reference for those individuals who desire a quick screening tool for simple highway geometries. The tables will be accompanied by a complementary MS-DOS computer program. The tables and program will allow the user to consider the following types and ranges of input parameters:

- Five vehicle types (automobiles, medium trucks, heavy trucks, buses, and motorcycles) at speeds 0-130 km/h in 10 km/h increments;
- Acoustically soft or hard terrain (flow resistivity of 300 cgs rayls for lawn, flow resistivity of 20,000 cgs rayls for pavement or water);
- No barrier or a single barrier (2, 3, 4, 5, or 6 m in height, located 10 m or 30 m from the centerline of the roadway); and
- Receiver distances from 10 m to 100 m in 10 m increments from the centerline of the roadway.

All noise levels included in the tables, or derived from the accompanying program, will be representative of propagation from an infinitely-long straight roadway over flat ground to a receiver(s) at the user-selected/input distance(s). All receivers will be at a height of 1.5 m above ground level. If the barrier parameter is selected/input, the barrier will also be infinitely long and parallel to the roadway. The "look-up" tables and complementary program will be made available shortly after TNM Version 1.0 is released.

The TNM "Package

The TNM Version 1.0 "package" will include the TNM program, the User's Guide, the Technical Manual, and a TNM-tutorial CD-rom. The CD-rom is an interactive tutorial being developed by the Volpe Center, in cooperation with Bowlby and Associates, Inc., and Serac Technology Group, Inc. It will serve as the primary introductory training mechanism for TNM users. The CD-rom will have sound, scanned photography, narration, animation, and simulation to fully interact with the user. It will be structured into the following major navigation sections:

- Introduction: It will provide an overview of TNM and guide the user on how to use the training CD-rom;
- Virtual Reference: It will allow the

(continued next page)

(**Traffic Noise Model.** *from page 7*)

user to access help on TNM's graphical user interface (menus, tool bar, and status bar). All menu and submenu items will be available for selection, each with a brief discussion and links to other areas of the CD-rom;

- Lessons: They will demonstrate the use of TNM via "movies" and example tutorials. The lessons will emphasize the "smart use" of the model, as well as provide available keyboard and mouse shortcuts, relevant hints, and pertinent FHWA policies. The lessons will also include a simple and a complex TNM workflow example, both based on actual highway noise studies. The simple example will take the user through file creation and setup, object input, sound-level calculations, and a short barrier analysis. The complex example will include everything within the simple example, as well as a brief contour analysis and a parallel barrier analysis;
- Search Engine: It will allow the user to search for help on TNM topics, keywords, and concepts;
- Notepad: It will establish a link to the standard Windows Notepad application to allow the user to input notes and memos at any point during the use of the CD-rom;
- TNM Installation: It is expected that TNM may be installed directly from the CD-rom, itself (note that the CD-rom does not run the TNM program). Because the results used in the lessons will be pre-calculated, the user will have rapid interaction with the CD-rom and will also be able to run TNM separately upon installation.

Distribution:

The FHWA will distribute TNM Version 1.0 free of cost to every State Department of Transportation (DOT). All State DOTs may make sufficient copies of the TNM "package" for internal use. For all other users, TNM will be distributed by the McTrans Center at the University of Florida (at an anticipated cost of approximately $500). McTrans' website (wwwmctrans.ce.ufl.edu) will announce TNM's release and will have a demonstration version available for viewing. "The Wall Journal" (telephone (941) 369-0178) will also announce TNM's release and will contain an order form for its purchase.

Training and Phase-In of TNM:

It is important to note that while the CD-rom will provide the most immediate training of TNM users, comprehensive training programs are being developed and will be provided by several universities and various consulting firms. Because TNM will eventually replace STAMINA, training programs will be essential in ensuring users become proficient in its operation. FHWA will issue appropriate notice for discontinuance of the use of STAMINA. Currently, a two-year phase-in period is anticipated. At this point, only the use of TNM will be accepted for Federal-aid highway projects.

If you have any questions, please do not hesitate to contact me at (617) 494-2372. ■

BARRIER INSERTION LOSS

Receiver	Measured Levels	STAMINA	Predicted Levels		
			Delta (Measured-STAMINA)	TNM	Delta (Measured-TNM)
200'-high	6.4	4.8	1.6	4.4	2.0
200'-middle	8.1	5.6	2.5	5.1	3.0
200'-low	4.6	6.5	-1.9	5.7	-1.1
75'-high	3.7	2.4	1.3	2.7	1.0
75'-middle	9.0	5.7	3.3	6.6	2.4
75'-low	9.0	5.4	3.6	9.0	0.0
15'-high	-0.4	0.1	-0.5	0.0	-0.4
15'-middle	8.0	5.2	2.4	7.5	0.5
15'-low	13.3	11.9	1.4	14.1	-0.8
Average Delta			1.57		0.73

AFTER (Barrier) Levels

Receiver	Measured Levels	STAMINA	Predicted Levels		
			Delta (Measured-STAMINA)	TNM	Delta (Measured-TNM)
131'-high	67.9	71.2	-3.3	67.3	0.6
131'-middle	65.25	70.1	-4.85	65.2	0.05
131'-low	62.8	69.3	-6.5	63.9	-1.1
65.5'-high	72.15	73.95	-0.2	72.75	-0.6
65.5'-middle	67.9	71.25	-1.85	66.45	1.45
65.5'-low	64.75	68.75	-4.3	63.45	1.3
16'-high	80.3	80.4	-0.1	80.6	-0.3
16'-middle	73.15	67.7	-1.25	72.8	0.35
16'-low	66.45	67.7	-1.25	62.8	3.65
Average Delta			-3.07		

Early Timber Noise Barriers Spur Innovation

The PLYWALL noise barrier system, while entirely different from so-called "timber" noise barriers, is a direct outgrowth of the early timber barriers pioneered by Minnesota and other states.

Minnesota was the first state to utilize large amounts of 2x8 tongue and groove treated lumber for barriers, beginning in the early- to mid-1970's. Treated lumber proved econornical, but the barriers experienced shrinkage and cracks between the planks.

Hoover supplied some of the treated lumber for these early timber barriers and quickly learned how difficult it is to force lumber planking to perform satisfactorily as noise barrier sheathing. It's a square peg in a round hole. Significantly, lumber shrinkage has also affected timber barriers built to tighter lumber grade and moisture content specs, as well as barriers built of tropical hardwoods. *Experience shows it's not feasible to out-specify lumber's natural tendency to shrink and warp when it's baked by the sun.*

Other Timber Barrier Experiences

Glue-laminated wood was also used in the 70's and 80's in several configurations, often with heavy steel hardware and bolted waler-to-post connections. The glue-lam wood was treated with pentachlorophenol preservative in heavy oil. "Penta" was a good preservative and the heavy oil carrier reduced the wood's tendency to shrink, but penta's use was restricted in the mid-1980's by the EPA. Glue-lam barriers proved to be elegant, but expensive.

This noise barrier at United Parcel Service Cargo Terminal at Greater Rockford (IL) Airport, also serves as a blast fence for UPS planes maneuvering on the ground. The Hoover PLYWALL is 16 feet high, panels are 8 feet wide, and Parallam The PSL engineered posts are 11 in. x 14 in. x 31 ft. Design wind load is 50 psf

This bottling plant had been in operation for some time and had been receiving complaints from residential neighbors about truck noise and headlights.The owners decided to erect this PLYWALL as a screening/noise wall along the back of the plant, which included the loading dock area. Response from the neighbors was positive.

Solving the Shrinkage Problem

Disturbed by planking's performance as noise barrier sheathing, and convinced that glue-lam was too costly, Hoover set out in 1980 to develop an acoustically effective, economical, and long-lived wooden noise barrier that would be free of the shrinkage and warpage typical of treated lumber.

The answer was treated exterior plywood, which was already used for wood foundations and other permanent structures exposed to the ground or the weather. Plywood consists of veneers that are cross banded (cris-crossed) at layup. This creates dimensional stability (resistance to shrinking and warping), even with fluctuating moisture content in outdoor use.

An 8-foot wide prefabricated noise barrier panel assembly was developed, with internal framing of treated 2x4 lumber and sheathing of airtight 5/8" thick Texture 1-11 exterior plywood siding on both faces. Acoustical testing was performed per ASTM E-90. The Sound Transmission Class rating was 38, compared to the STC of about 25 for 2x8 planks. Weight was about 6 lb/sf, light enough that several thousand square feet could be shipped on a single truck yet heavy enough to assure noise reduction comparable to that of free-standing concrete barriers.

Postless Prototypes

Early PLYWALL prototypes eliminated posts and concrete foundations by utilizing power-installed screw anchors as concealed tie-downs. The panels were offset in a zig-zag or shadowbox configuration, similar to the Fanwall system (see photo next page) but relying on tie-downs instead of mass to resist overturn. This post-less design was abandoned, however, due to ground space requirements and engineering limitations on barrier height and panel width. A post and panel design was adopted, utilizing treated sawn timber posts, but height was limited to about 15 feet because of limits on the size and length of sawn timber posts.

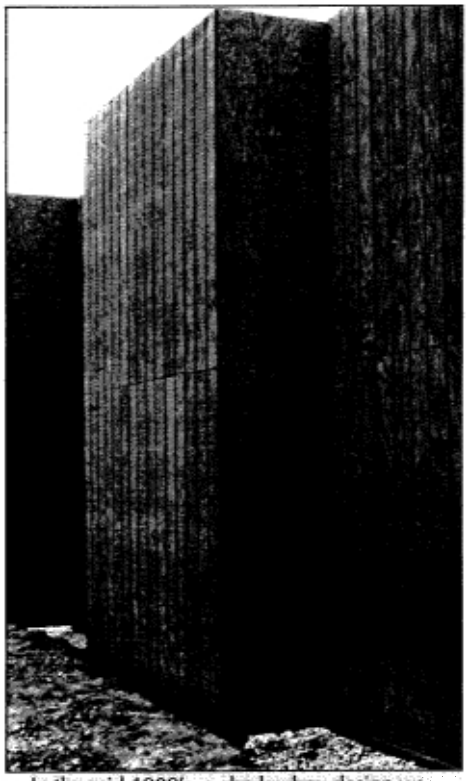
Engineered Timber Posts to the Rescue

The size and length limitations of sawn timber were overcome, however, by treated Parallam PSL® Parallel Strand Lumber, an engineered wood product which is available in much greater size and length, and with much

(continued next page)

(**TIMBER**, *continued from page 9*)

higher design stresses, makng possible the construction of barriers up to 25 feet high. Parallam PSL® also accepts treatment extremely well. Parallam's higher design stresses help offset its higher cost per board foot. For example, a 7x12 Parallam engineered timber is as strong as a 12x12 solid sawn timber.

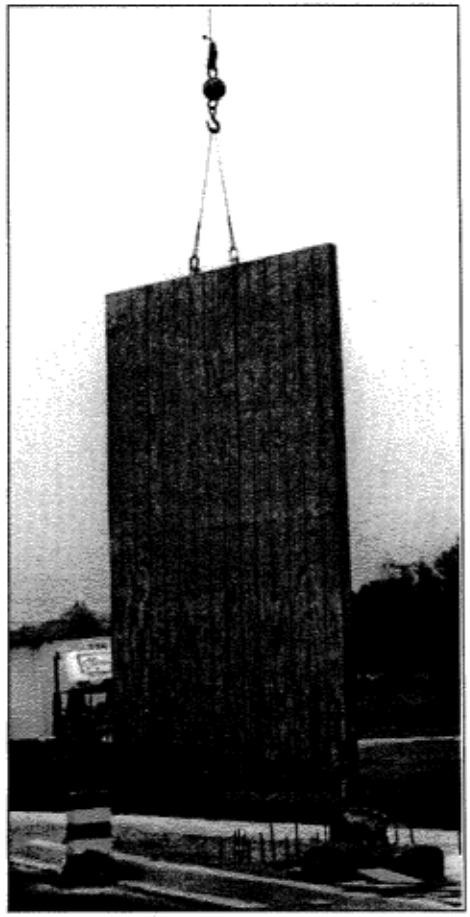


In the mid-1980's, a shadowbox design was used. A large steel screw anchor was driven into the earth at each corner for wall stability and wind resistance.

Wider Panels Speed Up Installation Most recently, the standard 8-foot panel width has been supplemented by 12-foot and 16-foot widths. These wider panels are thicker and utilize heavier internal framing. The panels are fabricated in maximum module heights of 8 feet and are stacked at installation to achieve the desired barrier height. Wood cost is similar to 8-foot wide panels and posts, but installed cost is less due to fewer post foundations.

Conclusion:

PLYWALL's roots are over 20 years deep. It was developed after observing the inherent shrinkage problems of plank sheathing and the inherent high cost of glue-laminated timber barriers.



Good acoustical performance, labor-efficient modular construction, and economical transportability has been achieved. Field experience is over 15 years. The design has been refined to provide an effective, maintenance free, aesthetically pleasing barrier system that has been used in a variety of circumstances. ■

For further information, contact:
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TRB Committee A1F04 on Transportation Related Noise and Vibration

Gregg G. Fleming, Chairman

It was another excellent showing at this years Annual Meeting in Washington, D.C., held from January 11-15. We had an extremely full schedule this year with the Highway and Aircraft Subcommittees meeting Monday Morning and Monday afternoon. On Tuesday, both the Rail Subcommittee and Main Committee met in the morning, followed by three paper sessions which began in the afternoon and lasted well into the evening. Abstracts of all the professional papers which were presented are printed on this and following pages.. As I mentioned at the meeting, I would encourage feedback (positive or negative) on this year's condensed meeting schedule (2 days versus 3 days for the past several years).

A few notable highlights from this year's meetings:

Williams of TRB announced a newly-created membership status for long~time contributors to TRB committees. It is anticipated that members with 18 years or more of dedicated service will he eligible for *Emeritus Status.* More detail to come.

The following TRB-related noise publications were made available in 1997/1998:

(1) Aircraft Noise Modeling: This publication presents a set of research needs related to aircraft noise modelling. The needs were compiled by a group of experts who participated in a jointly-sponsored FAA/TRB meeting which took place in Woods Hole, MA in May of 1996. (Contact Cyndy Lee at (617) 494-2372 if you would like a copy of this publication).

(2) *Summary of Transportation-Related Noise Papers from 1997 Annual Meeting*: This publication presents the complete set of papers recommended for publication in 1997 by Committee A1F04. Due to TRB funding limitations, not all papers could be included in an official TRB Research Record. (Contact Cyndy Lee if if you would like a copy of this publication).

(3) Environmental Research Needs in Transportation: This publication presents a compilation of environmental rcesearch needs in transportation, including needs in the area of noise. The needs were compiled by a group ofexperts who participated in a TRB-sponsored meeting which took place in Washing,ton D.C. in November of 1996. (Contact Jon Williams at (202) 334-2938 if you would like a copy).

Congratulations to Roger Wayson, John MacDonald and Win Lindeman for winning the 1998 Harter Rupert Award for best paper. Their paper was entitled: "Method to Determine the Reasonableness and Feasibility of Noise Abatement at Special Use Locations." The Award was presented at the A1F04 Annual Awards Dinner on Monday Evening.

On the TNM front, I can happily say we're very close to public releass. The acoustics have been "frozen" and the program is currently in final test and debug with distribution slated for the March/April time frame. Distribution to the state transportation agencies will be performed by the Volpe Center at no cost to the individual states. All other individuals must obtain copies from the University of Florida McTrans Group. Anticipated cost will be approximately $700.00. McTrans may be contacted via telephone at (352) 392-0378, or via the world wide web at http://www-mctrans.ce.ufl.edu. See the status memorandurn on Page 6 of this issue for more information on TNM, including details on its runtime and accuracy.

Looking forward, Win Lindemnn has assembled a small army of individuals (too numerous to mention) to assist him in what promises to be a memorable Summer Meeting in the St Petersburg, FL area. We're anticipating three full days of meetings, with the last day, Wednesday, taking on a bit of a non-traditional format. Namely, we've scheduled two presentation/discussion sessions which will focus on: (1) tire/pavement noise; and (2) public involvement in noise.

Due to the success of last years First Annual A1F04 Scholarship program established to increase attendance at the summer meeting, we're planning an expanded, Second Annual Program (See Page 19 for details). Beginning this year, the program is eligile to all individuals who are active in transportation-related noise.

The Summer Meeting is scheduled to take place from July 12-15, 1998 - Look for more information in upcomtng issues of The Wall Journal, or in the soon to be distributed A1FO4 Newsletter.

Hope to see you all in St. Pete! ! !

Session 231: Transportation-Related Noise Issues, Part 1
Kenneth D. Polcak, Maryland State Highway Administration, presiding

Aircraft Community Noise Impact Model, 981362

Eric Stusnick (Tel. 703 415-4550) and Richard L. Thompson, Wyle laboratories, Inc.; Terence R. Thompson, Bryan A. Evans, and John DiFelici, Metron, Inc.

The Aircraft Community Noise Impact Model (ACNIM) is a computer software system being developed by Wyle Laboratories and Metron, Inc., for the NASA-Langley Research Center. It is intended to provide a user-friendly tool for the analysis of the impact of the noise from aircrait operations on communities near airports. This paper briefly outlines the history of the development of ACNIM and some of its unique features and discusses in some detail the optimization algorithms that are used by ACNIM to produce minimally impacting night trajectories.

This work was carried out under NASA Contract NAS1-20103.

Measurement of Road Traffic Noise and Perceptions of Residents in Kuwait, 980221

Parvitz A. Koushki (Tel.Kuwait 965-481-7240), Omas Al-Saleh, and Salch Yaseen Ali, Kuwait University

Measurements of traffic noise at,the.edge of traffic lanes and at distances equivalent to residence locations, and traffic flow variables for nine roadway locations in Kuwait are presented. The perceived annoyance impact of traffic noise on 1182 sample exposed residents is described. Principal factor analysis,

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correlation analysis, and stepwise linear/non-linear regressions are employed to investigate how well perceptions, and noise levels, correlate. The mean equivalent noise level was strongly and positively correlated with the total traffic volume, the mean travel speed and roadway class. The mean traffic equivalent noise levels, measured at distances equivalent to where the residents live, also demonstrated positive and significant correlations with sleeping, reading, resting, telephone conversation and watching TV - the main predictors of residents' annoyance. Investigations mainly focus on likely relationships between exposed residents' annoyance and measured traffic noise levels. Results indicate that exposure to higher traffic noise levels was naturally associated with increasing annoyance.

Comparative Field Measurements of Tire Pavement Noise of Selected Texas Pavements, 981220

B.J. Landsberger (Tel. 512 232-3138), Michael T. McNerney, Tracy Turen, and Albert Pandelides, University of Texas, Austin

The effects of traffic noise are a serious concern in the United States and the world. One significant component of traffic noise is tire pavement interaction. If tire pavement noise can be reduced at the source rather than using traffic noise barriers to protect individual receivers, potential savings exist. This research conducted field testing on 15 different pavement types found in Texas, in coordination with six pavement types in South Africa. A test procedure was developed using roadside microphones and microphones mounted on a test trailer to record and analyze the differences in tire pavement noise. The test procedure was designed to develop comparisons of pavements while keeping other variables constant. The results, measured on the standard A-weighted scale, indicated for the 15 test pavements in Texas a difference of roadside noise levels of up to 7 dBA. Additionally, a roadside noise level of one pavement measured in South Africa was 3 dBA quieter than any Texas pavement.

SLIT: An Improved Noise-Prediction Model for Parallel Noise Barriers, 980201

Seishi Meiarashi (Japan Tel. 81-298-64-2871), Public Works Research Institute; Howard Jongedyk, Robert Armstrong, and Steve Ronning, FHWA; Masaki Hasebe, Hokkaido University

This paper describes a new noise prediction model for parallel noise barriers (called SLIT) based on the FHWA prediction models STAMINA and IMAGE-3. It compares the noise levels calculated using STAMINA, IMAGE-3, and SLIT against field measurement data and discusses the accuracy of the STAMINA, IMAGE-3, and SLIT. The results indicate that SLIT is a better model than STAMINA and IMAGE-3 for predicting noise from parallel noise barriers because it mitigates irregular reflection caused by real surfaces.

Session 260: Transportation-Related Noise Issues, Part 2

Jay Waldschmidt, Wisconsin Departrnent of Transportation, presiding

Investigation of the Relationship Between the Traffic Condition and the Worst-Case Noise Hour on the Freeway

Alex C. Chen (973 678-1960), URS Greiner, Inc.

Federal Highway Administration noise monitoring and prediction procedures do not specify when is the worst-case noise hour and how to determine the traffic condition during which the worst-case noise is emitted. As we know, the noise level fluctuates from time to time as the traffic goes by. Since the existing and future traffic volume and operating speed during the worst-noise hour are used to predict the existing and future worst-case noise levels, the worst-case noise period needs to be specified so as to determine the existing and future noise levels accurately.

It is recommended that, in normal situations, the worst-noise hour occurs at the worst-traffic hour (AM or PM peak). However, this is no longer true when the traffic congestion develops during the peak traffic hours and/or when the vehicle composition is changed greatly in non-peak traffic periods. The noise emitted from the pass-by vehicles depends on volume, vehicle composition, and speed. The vehicle and decrease during the congestion period, so does the noise level during the period. Therefore, it is necessary to investigate the relationship between the noise level and the traffic volume/flow speed to determine the traffic condition for the worst-case noise hour.

The results of the field monitoring, as well as calculation, indicated that the worst-case noise hour fluctuates with traffic conditions (vehicle volume, speed, vehicle composition). The worst-case noise hour is a hypothetical concept with certain hidden assumptions and needs to be better defined in terms of the traffic condition.

Tire-Pavement Noise: An Investigation of Its Importance in Mitigating Highway Noise Impacts, 980927

Philip J. Grealy(914 347-7500), John Collins Engineers, P.C.; William R. McShane, Polytechnic University

Highway traffic noise is a complex phenomenon which is the result of the combined effects of the various emission sources present on a moving vehicle. With changes in the nature and strength of these individual sources, the prediction of noise levels at a wayside receiver is made significantly more complex. Existing noise emission models do not specifically account for the effect of the changes in each of these individual sources. It is hypothesized that discrepancies between predicted and observed levels are experienced in certain cases due to the lack of sensitivity to individual source strengths. The new FHWA Traffic Noise Model(TNM) which is being finalized will address variations in specific sources including different pavements.

The purpose of this paper is to review the "tire noise" component of highway noise and to develop a methodology and an accompanying procedure for evaluating the effects of changes in individual source characteristics on resulting wayside noise levels. The paper discusses existing prediction models, describes some of the tire and pavement combinations investigated and presents a procedure for tire-pavement noise assessment. Although the procedure is developed to be sensitive to all sources, the major emphasis is on tire noise and the completion of sensitivity analysis with respect to changes in such aspects as tire type, pavement type, and vehicle mix and speed. The procedure is not as complex as the forthcoming TNM, however, it does provide some direction on the consideration of the tire-pavement noise component. A series of possible applications is presented to show the potential usefulness of the procedure.

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Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations, 981131

Roger L. Wayson (407 823-2480) and John MacDonald, University of Central Florida; Win Lindeman, Florida Department of Transportation

Most states have policies in place that determine whether noise abatement is necessary and reasonable/feasible for Type I projects. These policies mirror federal guidance and apply to various land uses near the proposed project. Special land use facilities such as parks, churches and schools are included in the policy as far as when abatement may be necessary (i.e. the Federal Highway Administration Noise Abatement Criteria), but the determination of whether the abatement is reasonable and/or feasible may not be adequately addressed. A survey of state Departments of Transportation (DOT) indicated that states are dealing with this need for reasonable/feasible determination for special land uses, but do not have formal policy in place to address the issue. A systematic procedure would eliminate arbitrary decisions.

This paper contains a methodology developed for the Florida Department of Transportation (FDOT) to aid the FDOT in the development of a procedure for special land use cases. This methodology includes a Feasibility Flowchart that leads an individual through the process of determining whether abatement at a special land use site is feasible. The Feasibility Flowchart directs the individual to cease analysis because abatement is not feasible or to continue onto a Reasonableness Worksheet that determines whether abatement at the site is reasonable. The Reasonableness Worksheet is a simple worksheet that leads the individual through site specific calculations to derive an "abatement cost factor" used to determine reasonableness of abatement at the site.

Sound BarrierApplications of Recycled Plastics, 980378

Mohamad A. Saadeghvaziri(Tel. 973-596-5813) and Keith MacBain, New Jersey Institute of Technology

An innovativc noise wall design that uses recycled plastic and takes advantage of multi-layering to increase stiffness and sound effectiveness is proposed and analyzed. Prototypes of the proposcd design were constructed and tested for sound transmission to determine their effectiveness and show the desirability of a multi-layered approach. The results show that acoustically, the transmission loss of the proposed design is as effecdve as traditional designs. Furthermore, finite element analyses as well as an analytical mode developed specifically for recycled plastics indicate that structurally, the proposed design can increase spans between posts resulting in a design that is potentially more economical than current designs. The paper also discusses results of material tests conducted in support of the analytical mode and noise wall development.

This research and development study is sponsored by the New Jersey Department of Transportation (NJDOT) and the Federal Highway Administration (FHWA). It is coordinated by NJDOT's office of Quality Assurance, Improvements and Research. The results and conclusions are those of the authors and do not necessarily reflect the views of the sponsors.

NDADS: A System Employing User-Enhanced Automation Procedures with Radar Tracking Data for Noise Prediction Models, 981427

Juliet A. Page (703 415-4550), Wyle Laboratories

The Noise Data Acquisition and Display System (NDADS) is an interactive tool for the user-enhanced automation and creation of flight tracks and profiles for noise analysis based on radar tracking data. The NDADS system features graphical methods for the rapid creation of vectored flight tracks with statistical guidance via gate penetrations and visual references based on background maps. Profiles, including altitude, velocity, and power, critical for the evaluation of noise contours, may also be generated easily. The NDADS system contains a suite of pre-processors for the evaluation of velocity and power profiles based on radar data. Reports and statistical analysis features provide operational summaries and airfleld utilization information as well as statistical track modeling capabilities. This paper describes the NDADS system and some of the unique radar analysis features that are used within NDADS for the development of aircraft flight tracks and profiles.

This work was primarily funded by USAF HQ ACC/CEVA and AL/OEBN under Purchase Orders D7175 and K3203.

Session 290: Transportation-Related Noise Issues, Part 3

Cynthia S.Y. Lee, U.S. Departrnent of Transportation, Volpe Center, presiding

State of the Art on the Prevision and Control of the Road Traffic Noise in France, 980691

Michel C. Berengier(Tel. France 33-240845903) and Fabienne Anfosso-Ledee, Laboratoire Central des Ponts et Chaussees, France

Because traffic noise is considered by the French population as the first environmental nuisance, the prediction of road traffic noise and the development of efficient noise control techniques is very important. The first step is to analyse the source, the main part of which is due to the contact between tires and the road pavement. Many efforts have been devoted to the assessment of a reliable measurement method, and a classification of road pavements in relation with noise has been established for some years. In order to abate road traffic noise, special attention has been paid on low noise pavements. Thus, the modeling of the absorption properties of porous asphalts has been particularly studied in the last ten years. The second step is to understand the physics of sound propagation outdoor, especially the meteorological effects on the propagation of road traffic noise. Both theoretical and experimental approaches have been undertaken. Finally, the effect of road noise barriers of any shape on the propagation and their interaction with porous road suraces have been investigated using numerical models.

A Case Study in Public Perception of Noise Barrier Effectiveness, 981446

Kenneth D. Polcak (Tel. 410 545-8601), Maryland State Highway Administration; Andrew B. Smith, McCormick, Taylor & Associates, Inc.

US Route 50 and I-97 are the two major limited-access highways that connect Washington D.C. and Baltirnore to

(continued next page)

(Paper Abstracts, *from page 15*)

Annapolis (Maryland's state capital). Three communities situated along US 50 and at the interchange with I-97 were considered for Type I noise barriers as the result of proposed widening and ramp additions to the highway network. Ultimately, pre-cast concrete noise barriers were constructed in five sections on both sides of the highway in the area.

Located just west ofthe US 50/I-97 interchange is the retirerment community of Heritage Harbour. During the development and construction of the community in the early and mid 1980's, the developer constructed two non-contiguous earth berms adjacent to, but outside the highway right-of-way line. The noise barrier design concept developed for this project incorporated these existing earth berms into the overall US 50/I-97 barrier system. Barrier wall sections were designed to tie into both ends ofthe berms to mitigate flanking noise, and to ultimately provide a "closed system" for the adjacent communities. STAMINA 2.0/OPTIMA modeling identified that the noise barrier construction would provide an additional 3-7 dBA insertion loss for homes situated near the berms.

Following construction of the US 50/I-97 noise barrier system, community members living directly behind the berms clairned that the new barrier walls were now 'funneling" noise over top of the berms and causing the noise to be louder than it was prior to the barrier construction. The MD State Highway Administration monitored post-barrier noise levels in response to the community's request. The monitored levels confirmed OPTIMA predicted noise levels and did not support claims that noise levels had become worse following barrier construction.

Under "pre-barrier" conditions, it was hypothesized that noise particularly from heavy vehicles unshielded by the existing berms was substantial enough that vehicle noise passing over the berms was being masked, so that the source direction was not always discernible. Once the "flanking noise" was abated by the barrier walls, vehicle noise passing over the berms dominated. The results of the noise monitoring and an explanation of identified phenomenon were successfully presented to the comrnunity.

The case study presents the US 50/I-97 berm/barrier public perception issues, discusses the project's applicability to previous "public noise perception" research and, suggests public involvement techniques that could prepare communities for unique acoustic situations.

Traffic Noise Barrier Overlap Gap Model

Lloyd Herman (Tel. 614 593-1472), Ohio University

Oral Presentation Only — No Abstract Available

Texturing of Cement Concrete Pavements to Reduce Traffic Noise Emission, 981069

Ulf S. Sandberg (Sweden Tel. 011-46-13204131), Swedish National Road and Transport Research Institute, Jerzy Ejsmont,Technical University of Gdansk, Poland

INTRODUCTION

Cement concrete pavements, in USA mostly referred to as Portland Cement Concrete (PCC), are frequently used on high-volume streets and highways, in particular on high-speed motorways. High volumes of traffic traveling at high speeds often result in road traffc noise nuisance for people living close or fairly close to the road. At the same time, for reasons of safety in wet weather, high speeds require an appropriate surface texture on the pavement which can provide suffcient drainage of water from the tire/road interface. PCC pavements often require special surface treatments during construction or afterwards to obtain a sufficient texture and if this is made in the "wrong way", such texture may cause excessive noise. In Europe, unsuitable textures are generally avoided in noise-sensitive areas, but many states in the U.S. have experienced problems with traffic noise on PCC pavements in recent years. In some cases, resurfacing has been necessary because of noise problems, resulting in expenditures which could have been avoided had existing knowledge been utilized from the beginning. Even cement concrete pavements with no special texturing applied, often having rather polished surfaces, may be relatively "noisy". This paper presents results from experiments made in Sweden in order to create suitable textures on cement concrete pavements, both in used and in new condition.

BRIEF REVIEW OF NOISE GENERATION AND TEXTURE INFLUENCE

It is necessary to have a basic understanding of how tire/road noise is generated. Research on generation mechanisms has been conducted since the mid 70's and resulted in an extremely complicated menu of mechanisms and related phenomena, all of which have been demonstrated to have some influence. However, the most influential mechanisms are as follows:

1.Radial vibration mechanism	1A Impact of tire tread blocks or other pattern elements on road surfaces
	1B Impact of road surface texture on the tire tread
2.Airresonant mechanism	2A Pipe resonance
	2B Helmholz resonance
	2C Pocket air-pumping (this may also be a special case of 2B)
3.Adhesion mechanism	3A Stick/slip motions causing tangen tial tire vibrations (might give exci tation to 2A and/or 2B)
	3B Rubber-to-road stick/release (adhe sive effect)

Furthermore, there are some phenomena closely related to the mechanisms and which influence the amplitude, but which cannot be regarded as pure "generation mechanisms. ■

Evaluation of Low Cost Noise Barriers

By James Byers III, Environmental Analysis Division
Pennsylvania Department of Transportation

Traffic noise has long been regarded by the general public as one of the most significant environmental impacts associated with both existing and new highways. Communities along busy interstate highways are most impacted by traffic noise. These communities often seek relief by requesting the construction of noise abatement devices such as noise barriers. These noise barriers are generally expensive to produce and erect (e.g. approximately $1.4 million per mile when they are part of a new highway and up to $3.5 million per mile when retrofitted) and the cost of construction often falls on the authorized transportation agency. The Pennsylvania Department of Transportation (PennDOT) has been actively looking for solutions that will effectively lower the cost associated with building noise bar riers. Sponsored by PennDOT, and co-sponsored by Mid-Atlantic University Transportation Center (MAUTC) and the Department of Civil and Environmental Engineering of West Virginia University (WVU-CEE), a research project has been carried out at WVU-CEE to evaluate the performances and costs of various highway noise barriers, including proprietary and non-proprietary barriers.

This study evaluated cost-effective alternatives for highway noise bar rier construction, developed a methodology for the comprehensive evaluation of noise barrier performances and associated costs, and developed field testing procedures for new noise barrier evaluation. Utilization of recycled materials in noise barrier manufacturing also was evaluated. The following four tasks were carried out in this study:

Task 1: Literature Review on Noise Abatement

Task 2: Measurement of Effectiveness and Criteria for Noise Abatement Alternatives

Task 3: Identification of Materials and Products for Noise Barriers

Task 4: Design of Testing Program for Field-Scale Evaluation

An extensive literature review was carried out in this study. The feder al and state legislation and regulations related to highway noise pollu tion control and abatement were studied. Information on the basic principles of sound transport and noise measurement has been gath ered. Design specifications, testing results and cost information were collected from manufacturers, vendors, and constructors for various proprietary noise barrier. Construction information and cost of non proprietary noise barriers were obtained from several state DOTs. Seven parameters were identified for noise barrier evaluations. These parameters are: noise abatement efficiency, cost, structural integrity, safety, constructability, aesthetics, and utilization of recycled materi als. A survey of highway noise pollution control experts was carried out to obtain experts' opinions on ranking the seven parameters iden tified.

Material and installation costs for 22 proprietary and 5 non-propri etary noise barriers were analyzed. Costs associated with using differ ent construction materials and different engineering designs were compared. The cost analysis were performed separately for propri etary reflective barriers, proprietary absorptive barriers, and non-pro prietary barriers. Cost of different barriers varies with construction materials, surface treatment and finishing, and foundation requirement.

The results of these analysis showed that average costs of proprietary reflective and absorptive barriers were $15.27/ft2 and $17.96/ft2, respectively. Because the cost of absorptive barriers (not including maintenance cost) is approximately 18% higher than reflec tive barriers, using absorptive barriers should be avoided unless the situations require parallel barriers. Utilization of recycled materials increased the total cost by 17 to 27%, based on the data collected. In general,the costs of non-proprietary noise barriers were comparable. Utilization of earth berms provides the most cost-effective alternative for highway noise abatement when barrier height of 12 ft was used. However, earth berms requires large area of land to construct. Since both cost and right-of-way requirement increase as the height of earth berms increase, a low cost noise barrier may be constructed by com bining an earth berm with other types of noise barriers.

To take all the noise barrier performance parameters and cost into consideration, a comprehensive analysis of proprietary noise barriers was carried out. Performance information and testing results were obtained from noise barrier manufacturers. Since performance infor mation was not available for non-proprietary barriers, these barriers were not included in this study. The selected parameters were priori tized through quantification and synthesis. A weighting factor was assigned to each parameter based upon the opinions of experts in the area of highway noise abatement. The sound barriers were assigned a score for each parameter based on either (1) the barrier's ability to meet the established goals for the parameter or (2) the barrier's per formance in relationship to the other sound barriers. An overall per formance score for each barrier was computed by first multiplying each parameter score by the parameter's weighting factor to obtain a weighted parameter score. Secondly, the weighted parameter scores for each barrier were totaled to obtain an overall performance score for the barrier.

Results of the survey showed that most experts considered structural integrity to be the most important parameter for noise barrier evalua tions, and aesthetics came in second. The experts felt that cost, safety, constructability, and utilization of recycled material parameter fol lowed in importance respectively.

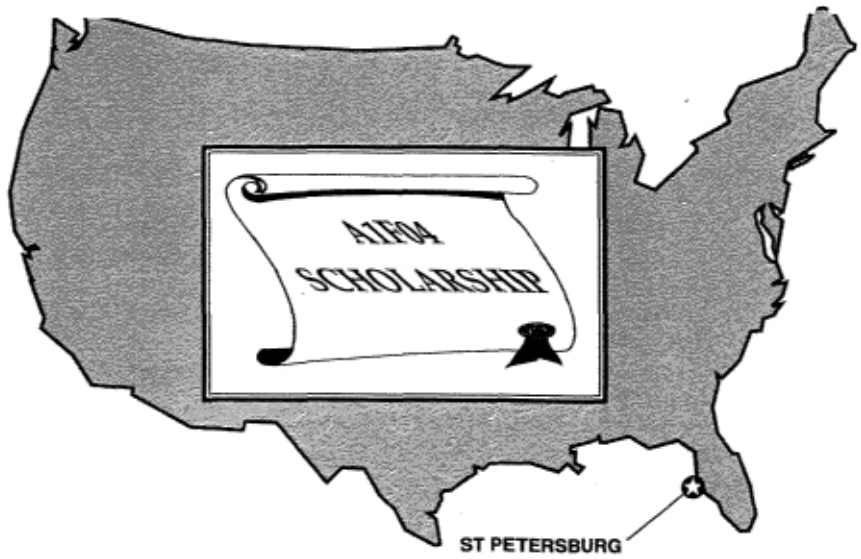
The proprietary sound barriers investigated were separated into reflective and absorptive barriers and evaluated twice. The first evalu ation took the utilization of recycled materials into consideration while the second evaluation did not. This was due to the varying importance of this parameter from project to project and from state DOT to state DOT. The reflective barrier with the highest overall performance score when both considering the utilization of recycled materials and when not was the concrete Midland Sound Panels barrier. The absorptive barrier with the highest overall performance score when both considering the utilization of recycled material and when not was the concrete DuBrook barrier. The final product of this research was not only the evaluation of reflective and absorptive sound barriers based upon the prioritized parameters but was also the establishment of an evaluation method that can be utilized by PennDOT for future highway projects to select a functional, cost effective sound barrier.

Noise barriers can be made with a wide range of materials, providing different noise reduction efficiencies and are available in a wide range of prices. Knowing the acoustical characteristics of a barrier, its field performance, and its structural integrity and safety features is critical in noise barrier evaluation and selection.

If you would like more information on this topic, including a copy of the final report, contact James Byers at 717-783-9147. ■

TRB COMMITTEE A1F04 SECOND ANNUAL SCHOLARSHIP PROGRAM

Purpose: To increase attendance at committee A1F04 summer meetings.
Eligibility: All A11F04 committee members active in transportation-related noise issues.
Details: Between 3 and 5 scholarships will be awarded for the upcoming summer meeting in St. Petersburg, Florida, scheduled for July 12-15, 1998. The scholarship will include conference registration, 4-night hotel accomodations, and up to $500.00 toward airfare. Scholarships will be awarded based on past contributions to the committee and budgetary constraints. Willingness to make a presentation at the meeting will also be considered in the award process.
How do I apply?: By April 30, 1998, send a brief letter describing your past contributions to the committee, your budgetary constraints, and a paper abstract for presentation (if applicable)



TO:

Cynthia Lee
Volpe Center, DTS-34
55 Broadway
Cambridge, MA 02142

Submissions will be evaluated and announcement of award will be made by May 32, 1998. Note: Awardees will be required to submit an expense report prior to reimbursement.

LETTERS TO THE EDITOR

Jan. 6, 1998
To The Editor
Ref: Editors Corner Nov/Dec '97

Not "WHOA!! Back the train up!" But GETTIE UP!! Full steam ahead! Full steam ahead with your excellent Editor's Corner and the entire publication as written in the past.

While I'm not delighted when anyone is offended, evidently it is going to happen more often as we have become a multi-gender, multi-ethnic society. Contrary to suggesting sensitivity training, I suggest "desensitivity training" for those of us who wear our feelings on our cuff and get them crushed with each slight slip of the tongue or variance from orchestrated behavior.

The last group needing such desensitizing would be the Vietnam veteran I would think. However in this case I am proven wrong. They have endured some of the worst.

Consider me among the non-offended, for if you are fired (as Jimmy the Greek) from your self-employed non-paid job, I am fearful the offended will justly reimburse you for your $30,000 plus, and I don't have that in my budget.

GETTIE UP, EL!! Looking forward to your next issue with the same classy professional journalism of the past.

Charles A. Lewter
P. O. Box 198927
Nashville, TN 37219

Maryland Department of Transportation
State HighwayAdministration
Office of Environmental Design

November 3, 1997

Mr. El Angove, Editor
The Wall Journal

Dear El:

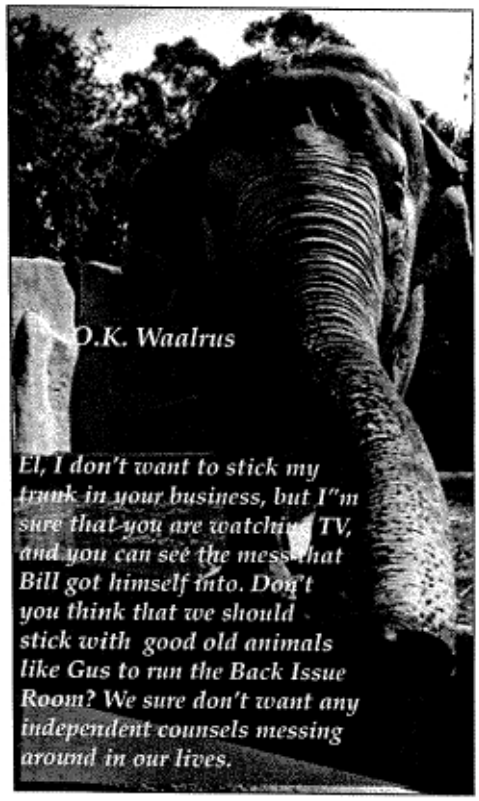
Now that I am back in the hallowed halls of the Office of Environmental Design, the noise abatement syndrome seems to be creeping once again into my system. Having been asked to review some correspondence relative to noise impact concerns, it dawned on me that, perhaps, our interaction with the public may be somewhat misguided. My "other life" dealing with things psychological, philosophical and theological, led me to consider the possibility that our citizens might be grieving due to real or perceived losses in their lives. Hence, the motivation and reason for the enclosed article. Hopefully, you will consider publishing it.

I trust it meets the needs of your constituency and begins a dialogue on the psychological aspects in the realm of noise abatement we all hold so dear. If you have any questions or comments regarding my submittal, please do not hesitate to contact me.

Cordially,

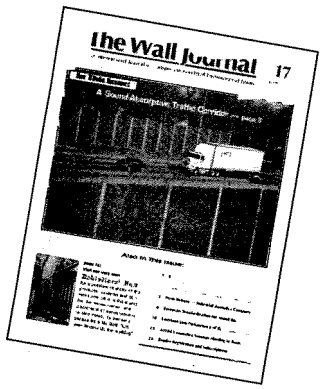
Eugene J. Miller
Acting Deputy Director

In the Back Issue Room with Walrus and Shotgun Willy



In the Back Issues:

- Noise Barrier Construction Forecast
- Summaries of Professional Papers
- Noise Barrier Project Reports
- Fundamentals of Sound
- New Product Press Releases
- TRB A1F04 Committee Meetings
- State DOT Noise Barrier Programs
- FHWA Noise Model Updates
- Noise Abatement in Other Countries
- Airport Noise Control
- Construction Trends in Noise Barriers
- Product Approval Process
- FHWA History of Barrier Construction
- Materials Test Standards
- Rail Transit Noise Control
- And a Bunch More



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ANNOUNCEMENT

Dr. Bill Bowlby has announced that he has left Vanderbilt University after 16 years to assume full time duties as President of Bowlby & Associates, Inc. He has acted in a part-time capacity over the last six years while building the business. This is an exciting career change for him that will allow him to serve his clients in the best possible manner. Bill's career spans 24 years, including positions with Vanderbilt, the Federal Highway Administration and the New York State Department of Transportation, specializing in transportation noise analysis, abatement and training, as well as transportation air quality analysis.

Bill has also announced two staff actions. Dr. Darlene D. Reiter, P.E., who has done part-time work with the firm, will be playing a much more active role as Senior Project Engineer now that she has received her doctorate from Vanderbilt. Darlene is a specialist in transportation air quality and noise analysis, with extensive prior experience in transportation planning and traffic engineering. Also joining the firm as a part-time Project Engineer is Rennie L. Williamson, who recently received his M. S. degree in transportation engineering. Rennie gained extensive experience in the use of the new FHWA Traffic Noise Model (TNM) as part of a testing and evaluation team for USDOT. TNM training will be an immediate focus of the firm in the coming year.

Bill also related that Clay Patton, Project Engineer with the firm for five years, has completed the National Transit Institute course on Transit Noise and Vibration Analysis. ■

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NEWS RELEASE

The National Transit Institute announces that it will offer its training program on *Financial Planning and Programming for Metropolitan Planning Organizations* two additional times. The program has been offered since October 1994 and the upcoming sessions will be given on the east and west coasts. This three-day training course was developed by the National Transit Institute for theFederal Transit Administration with assistance from the Federal Highway Administration and the National Association of Regional Councils.

This training course addresses the financial planning requirements of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the new metropolitan and statewide transportation planning regulations. At both the metropolitan and state levels, Transportation Improvement Programs (TIPs) must be constrained to the reasonably expected financial resources. Transportation Plans at the metropolitan level must be similarly constrained.

These requirements place new responsibilities on transportation planning professionals, especially for those involved at the Metropolitan Planning Organization (MPO) level, either as MPO staff or member agency staff working with the MPO. Planners at the state Department of Transportation level are similarly affected. In order to respond to these requirements, transportation planning professionals require enhanced knowledge and skills related to revenue and cost estimates andforecasts.

This course is designed for professional staff of MPOs and member agencies such as transit operators as well as state Department of Transportation staff engaged in developing the financial components of Transportation Improvement Programs and Transportation Plans. Federal Transit Administration and Federal Highway Administration personnel from Regional, Divisional, or Headquarters offices will be present, to give an overview of federal regulations and to participate in discussion sessions. The course is geared to those who work at the program and planning levels in both highway and transit modes.

Course Dates and Locations:

The course will be offered at the following locations on the following dates:

San Francisco, CA April 6-8, 1998
New York, NY September 14-16, 1998

For further course information, contact the program manager, Neal Denno, Assistant Director at 732/932-1700 ext. 50.

Subscriptions

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