The Wall Journal™

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Sep/Oct1998

THE INTERNATIONAL JOURNAL OF TRANSPORTATION-RELATED ENVIRONMENTAL ISSUES

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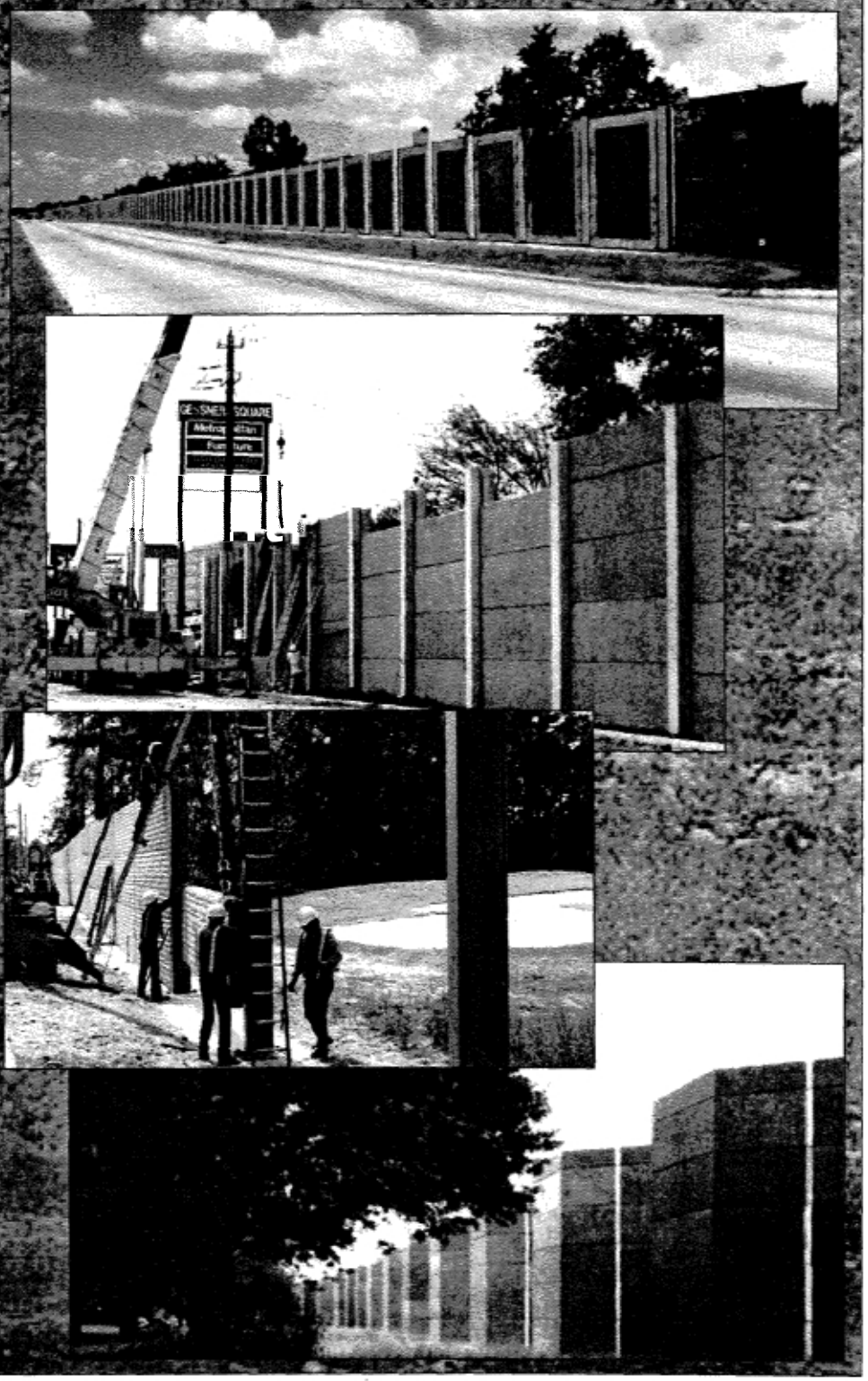

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"...and the days dwindle down, to a precious few, October, November, December..."

There. I'll bet that most of you thought that I had forgotten to make up the Sep/Oct issue, or that I had suffered a bout with Old Timer's disease (the kind that makes you forget what you went to the bathroom for), or that I had just chucked it all in and went fishin'—after all I'm supposed to be retired, and not busting my chops putting out newspapers, and pro bono at that.

But no, it was none of those. It was just one of those things (no, Frank, it's not your cue to sing). Actually, it was a lot of those things. First, the "clone" Apple Macintosh (which I acquired in July 1997 after my **real** Macintosh got zapped by rambling lightning which fried the logic board and wasted a lot of stuff on the hard drive) started acting weird. Suddenly, I had extension conflicts and numerous crashes, which slowed down my work. On top of that, the Apple "clone" makers went out of business. So much for clones of any kind.

I loaded the new Mac OS8 software into my untrusty clone—and found myself in a new and unfriendly neighborhood. I think the people who design these "upgrades" are just trying to show off how many neat tricks they can do, or they are trying to get a bigger market share, or to distract from the other rather substandard features their machine possesses.

How I long for my trusty old Mac II. It didn't have much memory or storage, but neither did it have superfluous bells and whistles. It was lean and mean. It was a working machine. It got me through the first 17 issues of The Journal without a snag. I should have loaded it up with memory and hard drive storage space, instead of letting myself be talked into a brand new Quadra Mac (which was the poor baby that got struck by lightning).

It seems like computer problems are my biggest nemesis, but a close second is my inability to gather good editorial material in sufficient volume for two or more issues at a time, to allow proper preparation and layout of the current issue on schedule.

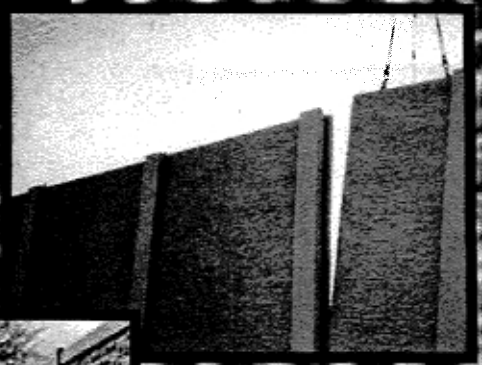
What material I get is usually barely enough for one issue, and it seems to arrive two or three weeks past the deadline, which means that I have to work very hard to get the issue to the printer and the mailer be fore it is time for the next issue to be scheduled.

This issue you are now reading, was tagged as the Sep/Oct issue. You may be having Thanksgiving dinner by now, because I was not able to create an issue to be in the printers' hands by the October 1 deadline. Today is Sunday, November 8, and I am typing in the last words for this issue, which will finally be finished. I will deliver my removable drive to the printer tomorrow, if all goes well.

The printer will probably take a week or a little more to print the issue. They will deliver the issues to the mailing facility, which can bag, tag and drop the entire U.S. readership in the Fort Myers Post Office, in one or two days. Wherever you are, have a happy Thanksgiving.

More news on page 9. ■

Coatings and Stains
Exposed Aggregate Retarders
Architectural Formliners



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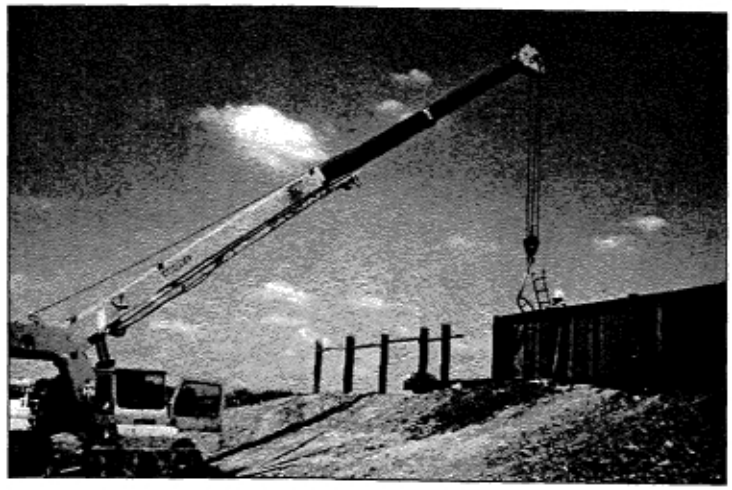
New noise walls protect Minnesota neighborhoods

Glued laminated Southern Pine panels are the key to a major highway noise wall barrier project on Highway 169 near Minneapolis. The specially designed noise abatement barrier system is the first of its kind in Minnesota.



Vertical glued laminated timber panels which vary from 6 to 18 feet in height are connected to laminated timber posts spaced at eight foot intervals on the new installation, which is between Bloomington and Eden Prairie, MN. The laminated panels range from 1-7/8" to 2 11/16" in thickness. About 9,700 lineal feet have been completed.

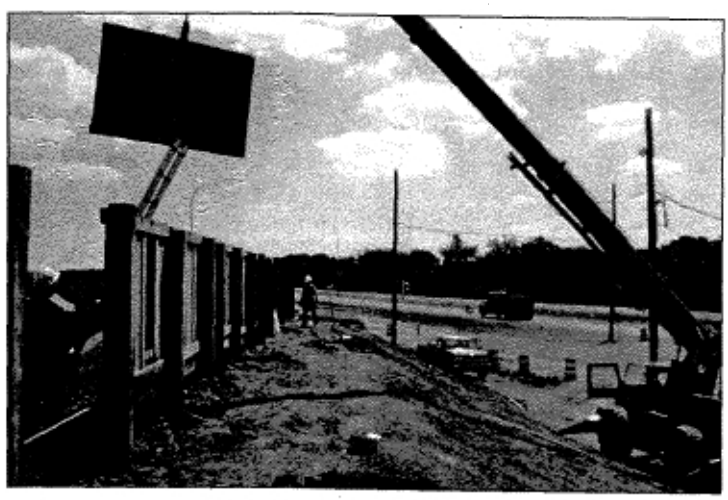
Minnesota Transportation Engineer Tom Ravn says his office is pleased with the wall system because of its attractive appearance, long-term durability, and competitive cost. Since the panels are preservatively pressure treated to maintain a chemical barrier against termites and decay, they have a life expectancy of 40 years or more. Ravn says the 6 3/4" x 11" glued laminated wood posts are a new departure for noise walls in this area.

The noise wall panels are supplied by Sentinel Structures, Inc. in Peshtigo, Wisconsin and installed by Shafer Contracting Co. of Shafer, MN. Installed cost is estimated at about $19.00 per lineal foot for the wood posts, and $8.50 per square foot for the glued laminated panels. Sentinel Structures was actively involved in the design and engineering of the glued laminated timber noise walls.

Minnesota Transportation structural engineer Jim Hill says the in-place cost of the glued laminated timber noise walls is generally about 40% lower than concrete or steel panels. The laminated wood panels are also receiving positive response from the public. They help avoid problems such as the vibration and noise experienced when steel wall panels sometimes work loose in high winds, Hill adds.

The laminated wood walls do not experience the problems of the tongue and groove joint variations which sometimes open up small separations between solid wood plank panels, according to Minnesota officials.

Studies by the Southern Pine Council and the American Institute of Timber Construction indicate that wood panels are increasing their share of the noise wall market because consumers prefer the attractive aesthetic appearance of wood, and because of their competitive cost and durability against road salt damage.



Engineers report that another advantage of glued laminated timber noise walls is the flexibility they provide for slight adjustments in case a post is slightly off line.

More information on wood noise wall barriers is available from: Sentinel Structures, Inc., fax 715 582 4932 or Southern Pine Council, fax 504 443 6612, or American Institute of Timber Construction, fax 303 792 0669.

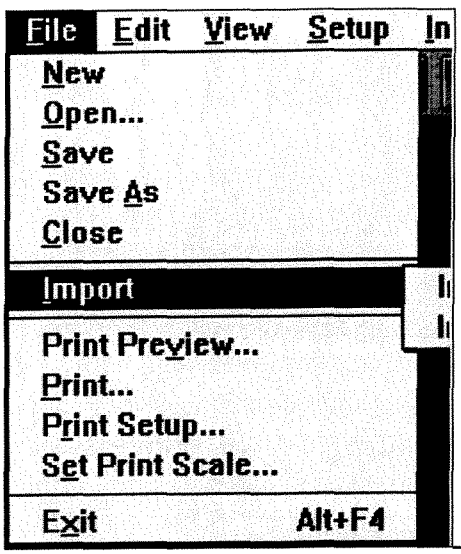
TNM Tips

by Bill Bowlby, President
Bowlby & Associates, Inc.

Welcome to TNM Tips, a new feature of The Wall Journal. With the release of the FHWA Traffic Noise Model© (TNM) Version 1.0 in March, we are in a transition period from STAMINA 2.0/OPT1MA to TNM. TNM Tips is aimed at easing that transition. Each issue, I'll address an important component of TNM. I'll also answer questions from users, seeking expert advice from others as needed. Also, Keep Those Tips Up! each issue will include a hot tip from a TNM user. So, keep those cards and letters coming! Send your questions and tips to TNM Tips, Bowlby &Associates, Inc Two Maryland Farms, Suite 130, Brentwood, TN 37027, Fax: 615-661-5918, e-mail: wbowlby@bowlbyassociates.com

"When is a door not a door? When it's ajar!" (When is a file not a file? When it's a run!)

Early on in TNM's development, it was decided to build TNM on a Windows© platform, using as many standard conventions as possible. Thus, the familiar File menu item on the left end of the menu bar, and the familiar submenu items.



Yet, as soon as you click on File and the submenu item "New" to begin an analysis, you get a dialog box titled *Save Run As* (italics added). Which raises two fundamental questions: why Save? And why Run? Let's try the latter first.

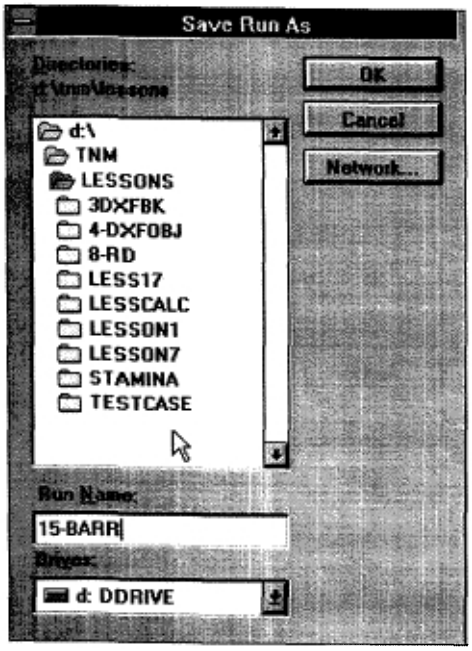
With STAMINA, you created an input data file of ASCII characters that the program would read. However, TNM populates a built-in data base as you enter data and information. These items are stored in memory until you save them to disk. When you do save them, they are written to two binary files: *objects.dat* and *objects.idx*. Calculated sound levels results and your barrier designs are also written to these two files. Always the same two files, always the same two names.

Being binary, these files cannot be simply read outside of TNM, another program design decision according to HMMH's Chris Menge, one of the lead developers of TNM. So, how do you distinguish these two files from one study to the next? That's where the concept of a "run"comes into play. A run at its simplest is a subdirectory that you create (and name) into which objects.dat and objects.idx are saved.

You create and name the run with the File, New command, which opens the Save Run As dialog box. So why Save (and why As)? Well, the first time through, you need to create the subdirectory into which TNM can place objects.dat and objects.idx. You choose the parent directory and then enter a name for the subdirectory (and hence the run). Being based around Windows 3.x, TNM limits the name to eight characters (plus a dot and three more characters if you are really creative) even if you running under Windows 9x on NT.

After you click the OK button to create the run, TNM displays a blank Plan View window with the run name in the window banner. You may then proceed with data entry. Periodically you will then save your entered data to the objects.dat and objects.idx files using the File, Save command.

But of course there's a twist. TNM is not like a word processing program or a



spreadsheet, where you may make changes to a saved file and then use a Save As command to save the changed file under a new name while preserving your original work under the old name. With TNM, as you make changes, you are changing your original work. When you then try to Save As a new run, TNM first requires you to save your current work, including the changes, under the old run name, leaving you without a copy of your original work. The only way to recover from this situation is to close the run immediately without saving the changes you have just made.

Furthermore, if you try to change virtually any of your input data after TNM has calculated the sound level results, the following appears with a giant yellow exclamation point:

"You have changed the input geometry which will cause the sound level results to be invalid. If you save this run, the sound level results will be lost."

Does the phrase, "Can I get back to you tomorrow with those results?" make your head ache? If you really do not want to lose those results, immediately close the run without saving your changes, reopen it, and immediately use the File Save As command to create a new run. Why is TNM set up this way? Well, it's necessary -- the developers had to protect against having changed set of input data stored together in the same run with a set of old results.

(continued next page)

So, think of "Run" when you see "File", and think of "Save Run As" as "Save My Upcoming Changes As." And, always remember to use "Save As" before you make changes to your input data when you wish to preserve your prior input data or results.

Finally, because a TNM run is a subdirectory of files, you may place a run anywhere, even as a subdirectory of another run. While this can be a convenient way of organizing related runs, it can get confusing because the files and thus the data in these runs are not linked or shared in any way by TNM. Placing a run within a run only means that the new run resides in the other run's subdirectory. If you wish to delete a run, you may delete the subdirectory from a file manager like Explorer. But, be sure you do not have runs saved as subdirectories of the run, or they will be deleted also.

Q Question du jour, from Line Gamache of the Quebec Ministry of Transportation: I am currently testing TNM and need your advice on a very simple case. In this case, there is one straight road (two TNM roadways in opposite directions with the same number of vehicles) and three receivers on each side of the road (at the same distance). Could you tell me why the calculated noise levels are not the same for both sides of the road?

A Line, a review of your run shows that the reason for the difference is that you only had traffic on the first segment of each roadway. TNM is different from STAMINA in that traffic must be assigned to each segment, a requirement that is very easy to overlook. Since these segments were of different lengths and since all of the receivers were slightly closer to Roadway 1's first segment, slightly different levels were computed. When I used the Copy All button for each roadway to assign traffic to all of the segments for that roadway, TNM computed identical answers for each receiver.

✪ Keep those tips up! This tip came up at a recent training course. I believe Mike Kelly of Wilson T. Ballard deserves the credit: You may copy and paste TNM tables directly into spreadsheets by highlighting the row selector buttons to the right of the table and using the familiar Ctrl+C to copy and Ctrl+V to paste into the spreadsheet. [Editor's note: Excel will correctly parse the data into columns, setting cells as values or character strings as appropriate. Quattro Pro will parse the data into columns, but all cells are set as character strings. To change a range of cells to values, you need to find and replace the apostrophe at the beginning of each string with <Nothing>.]

Bill Bowlby developed the TNM Trainer CD-ROM distributed with TNM by USDOT and co-teaches a TNM Training Course with Roger Wayson of the University of Central Florida. When not TNM-ing, he tunes into the sweet sounds of his lovely wife and two children.

How to build soundwalls that look like a million dollars, last forever, don't break, rust, rot or bust the budget...

By George Southworth, President, LEAP Associates International, Inc.

Urban population expansion and urban sprawl are taxing the capacity of our highway systems. Once "quiet lanes" through residential neighborhoods have become feeder arteries into and out of the cities as urban sprawl moves residential communities further from the central city business districts.

Increasing traffic levels and more stringent environmental standards regarding noise pollution are the driving force behind a rapidly expanding "soundwall" market. Federal guidelines now require environmental impact studies and frequently noise abatement.

These standards are hard to meet on most existing major roadways. New right-of-way acquisition in many instances is cost prohibitive, thereby forcing traffic planners to utilize virtually 100% of existing rights-of-way. This results not only in increased traffic as roadways are widened, but effectively moves the roadway noise source closer to adjacent residences. All of which combine to create a greater need for soundwalls.

Soundwalls, however, are not generally perceived as desirable structures by property owners residing near our highways. Often the reduction in noise levels is considered small compensation for being hemmed in by a permanent opaque barrier. Potential reductions in property values are also of real concern to impacted neighborhood groups.

Often, in order to compensate for perceived loss of property value and claustrophobia, elaborate and expensive soundwalls are built. This may alleviate the concerns of property owners and gain acceptance for the construction of structures mandated by environmental standards. However, elaborate and expensive soundwalls rarely add property value equal to their cost. Therefore, we are effectively "buying" approval of a relatively small group of homeowners rather than building based on rational economics. Aesthetics, however, do not have to come at the price of high budget soundwalls.

Precast soundwall systems have been developed in recent years which, when combined with certain production methods, can provide beautiful, durable and cost-effective solutions that make economic sense. The aesthetic basis of these wall systems is a textured finish on both sides of the wall. Soundwalls are unique in that, unlike industrial wall panels and retaining walls, both sides will be exposed to view forever. One side will be exposed to traffic and the other side to the neighborhood.

Soundwalls, with finishes on both sides, have a few parameters that greatly affect the life cycle cost. There are three "primary" parameters that, when understood by designers, allow significant reduction of the overall cost of the wall. These parameters are repairability, complexity of manufacturing set-up, and erection tolerances. The balance of this article will try to show how these three parameters affect cost.

Primary Parameters Effecting Cost

1. Repairability
2. Erection tolerances
3. The complexity of manufacturing

Understanding these few parameters and how they are affected by the choice of textures and finishes can help designers to reduce the overall cost of the wall.

Perhaps the most complex primary parameter is the repairability of the texture. Repairability will fall into three categories:

1. Graffiti
2. Texture repair of minor damage
3. Replacement of panels due to major damage

Graffiti damage to panels is essentially unavoidable, however, the general consensus is that a flat surface is a "paint me" invitation. Therefore, selection of rougher textures discourages the "artist" because it is much more difficult to create a discernable message on a rough texture. The trade off is that rougher textures usually require more concrete material and create a greater surface area for coatings (graffiti resistant or other).

The virtually unavoidable need to repair graffiti requires washing or repainting. Paint applied to an integral color concrete product to repair the graffiti almost never looks consistent with the original color. Therefore, choosing concrete finished with integral color is probably not cost-effective. Painting or application of color in the graffiti coating (essentially painting) makes dying the underlying concrete unnecessary. Painting or graffiti coating may initially appear to cost more than integral color, however, in most cases the wall will end up painted anyway when graffiti repairs are made. Utilizing medium rough textures and coated gray concrete products is the most effective, long-term solution to graffiti repair.

Texture and minor damage repair will occur on every project. If at no other time, panels will be damaged during construction. Minor chipping and spalling caused by rough handling during shipping and erection cannot be avoided. The first step toward repairing this type of damage is to properly cut out and remove the damaged material. This provides an end point for the patch material and, if possible, a negative bevel for mechanical interlock of the patch. The second step is to have a practical method for reapplying the texture. The choice of the texture will dramatically impact the cost of repair.

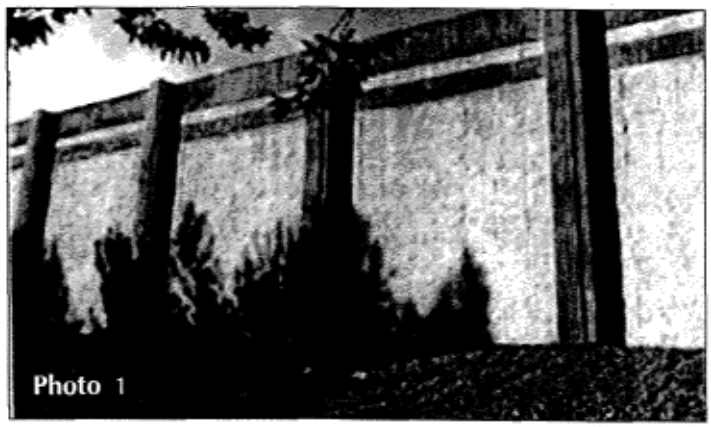


Photo 1

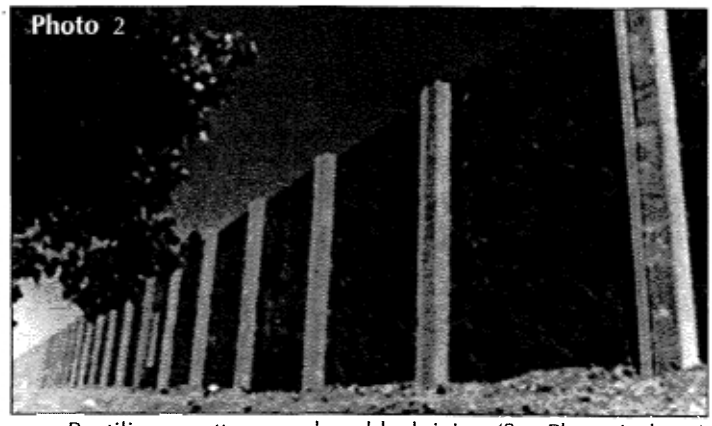


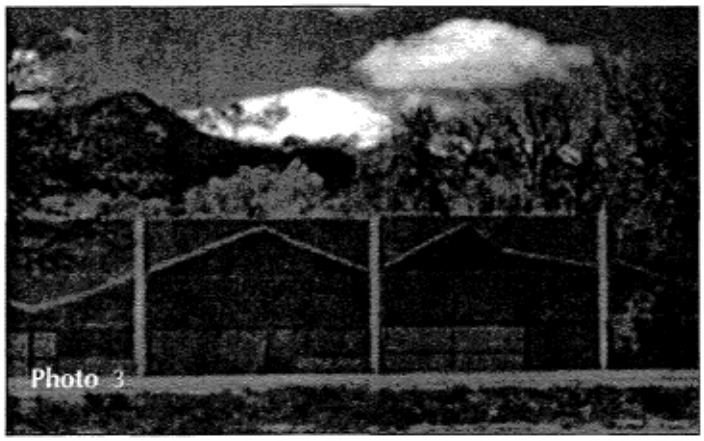
Photo 2

Rectilinear patterns such as block joints (See Photo 1 above) provide clean lines for sawcutting and natural end points for repair edges. Random patterns (See Photo 2 above) make patch edges more difficult to prepare and end points less natural. The texture reapplication can also be easier with rectilinear patterns. For instance, a damaged area of a split-faced block pattern can be cut along the mortar joints (a natural end point). The patch material can then be applied and an actual split-faced block used as a texturing tool to reapply the texture. With a random stone pattern with "jagged" non-uniform stones, cutting the patch edges will be difficult and tedious. It may be necessary to find the one spot on the original formliner that formed that particular stone, cut the formliner, and take that piece to the field to retexture the patch. Rectilinear or linear patterns will be easier and therefore less costly to repair, resulting in lower overall life cycle system cost.

Complete panel replacement due to major damage may very

(continued next page)

well have the largest impact on pattern selection. Assuming that the structural system allows the removal of a single panel without dismantling the entire wall, the fewer number of different patterns in a wall, the easier and less costly it is to acquire replacement panels. For example, if every wall panel in a long wall is identical, then it becomes feasible to stock replacement panels purchased at the time the wall is built and have them stored until needed. If the



wall has literally tens or hundreds of unique panels (See Photo 3), not only is purchasing or storing replacement panels expensive and perhaps impractical, but mobilization to produce the particular replacement panel required will be costly and inefficient. The fewer the number of unique panels in a project, the lower the panel replacement cost.

The next primary parameter to consider is the complexity of manufacturing set-up. Initial set-up costs for manufacturing greatly affect the cost of a soundwall project, particularly if the project is relatively small. Capital investment in set-up costs must be amortized over the number of panels or square feet of panel in a single project, unless the owner agency is willing to establish a standard and commit to that standard over a period of time or a series of projects. Therefore, the smaller the project, the higher the mobilization cost will be per square foot.

With two-sided finishes, the number of different patterns on each side of the wall and the repetition of those patterns will significantly impact set-up costs. For example, a recent Colorado project required a panel with a mountain scene on the roadway side and a textured pattern (fractured fin) on the residential side. In order to vary the appearance of the mountains, it was desirable to have multiple "mountain panels." After careful study, a panel system with two different mountain scenes and one lower panel with a fractured fin texture was selected (See Figure 4).

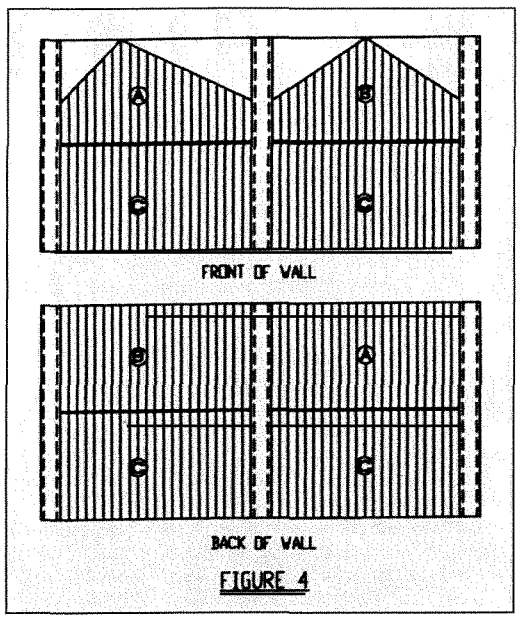


FIGURE 4

This created essentially three panel configurations for the project. The set-up of forms to produce the panels in the proper proportions for the project required any multiple of one type A, one type B and two type C panels. Since producing just four panels a day would not meet the schedule, it was decided to use eight forms and produce eight panels per day. Since the neighborhood (back) side of the panel only required a single texture, the "Impressor" method of manufacturing was selected as the entire project could be impressed with one stamp face using one piece of formliner, and casting the mountain scene face down.

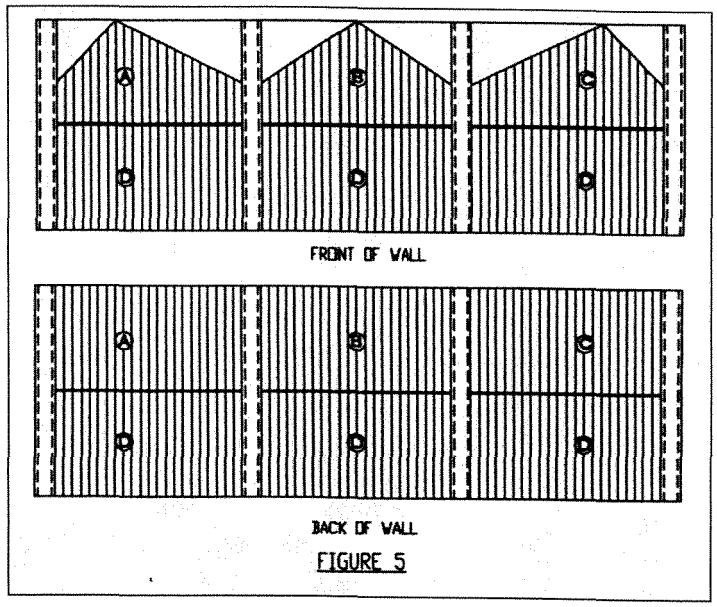


FIGURE 5

If one additional mountain scene had been added (See Figure 5 above), the proper proportions would have been any multiple of one type A, one type B, one type C and three type D for a total of six forms. In order to produce efficiently and meet the schedule, six panels per day was not adequate, therefore twelve forms would have been required, resulting in additional set-up cost of approximately $100,000.00. Additionally, if two patterns had been selected for the back side (one upper and one lower) two stamp faces would have been required, adding an additional $20,000.00 to the mobilization cost.

The size of the project also changes the impact of set-up costs. For instance, $120,000.00 over 120,000 square feet translates into $1 per square foot. However over a 40,000 square foot project the cost escalates to $3 per square foot. Assuming an in-place wall cost of $20 per square foot, the impact ranges from 5% on a large project to 15% on a small project. Obviously, all projects will benefit from fewer different patterns, however, simplicity will have a bigger impact on smaller projects.

The last primary parameter is the effect of production and erection tolerances. Production and erection tolerances are often dictated by the choice of the structural system of the soundwall, a topic beyond the scope of this article. There is, however, one key point related to the selection of a pattern that impacts production and erection tolerances and thereby cost. When choosing finishes for two-sided panels, systems with horizontal joints (i.e., walls more than one panel high - see Figure 6 on next page), the vertical alignment of vertical ribs on both sides of the panel simultaneously is very difficult. Since soundwall products are not match cast and by the very nature of some patterns eliminate the ability to cast the individual panels to be stacked in the same exact form, vertical ribs will not align perfectly on both sides of a wall across a horizontal joint.

There are three acceptable solutions to this problem:

1. Increase alignment tolerances to a practical dimension. (See Figure 7 on next page)
2. Do not use a vertical pattern on both sides of a wall without a smooth band to break the visual alignment. (See Figure 8 on next page)
3. Use a horizontal or running bond pattern on at least one side of the wall. (See Figure 9 on next page)

It is fairly easy to align vertical ribs on one side of a panel. However, if alignment such as that in stack band block patterns or fractured fin or smooth vertical ribs occur on both sides, substantial amounts of erection time can be wasted shifting the panels back and forth trying to align both sides.

To summarize, it is safe to say that the choice of pattern and

texture can have many effects on the ultimate life cycle cost of the soundwall system. Obviously, simple single pattern solutions will always cost the least. However, with a little insight of how designers' choices affect cost, substantial variations can be achieved with only a small premium over other, more plain patterns and textures and even fairly elaborate precast systems will be less expensive than similar masonry and cast-in-place alternatives.

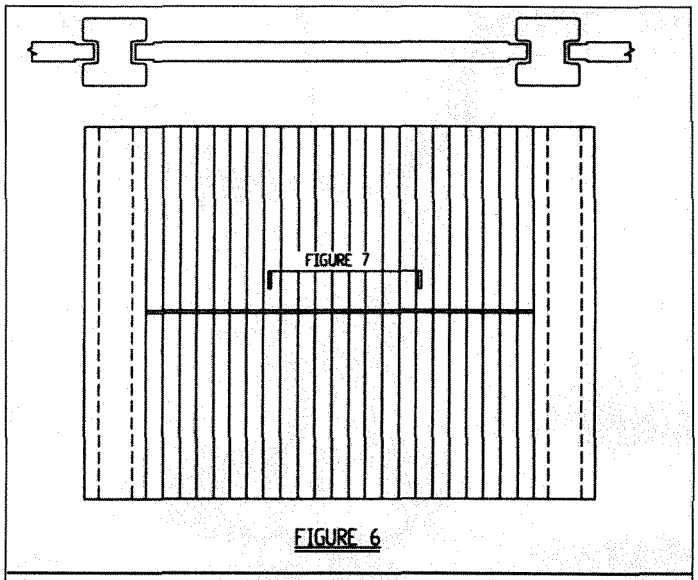


FIGURE 6

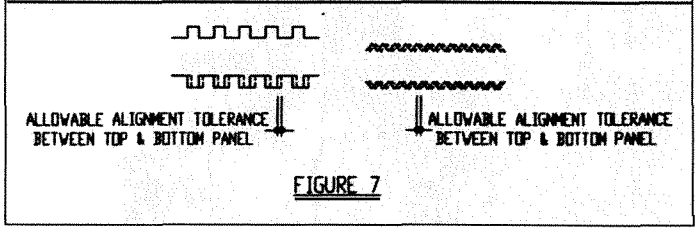


FIGURE 7

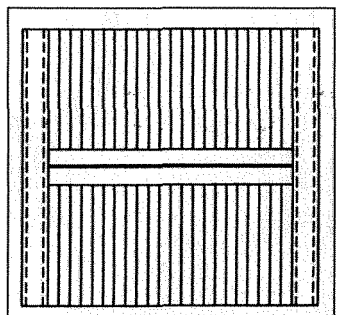


FIGURE 8

NOTE:
SMOOTH BAND BREAKS ALIGNMENT OF VERTICAL TEXTURE

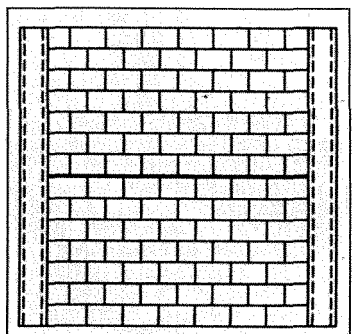


FIGURE 9

NOTE:
RUNNING BOND BREAKS VISUAL ALIGNMENT OF VERTICAL TEXTURE

CALL OUTS

Elaborate and expensive soundwalls rarely add property value equal to their cost.

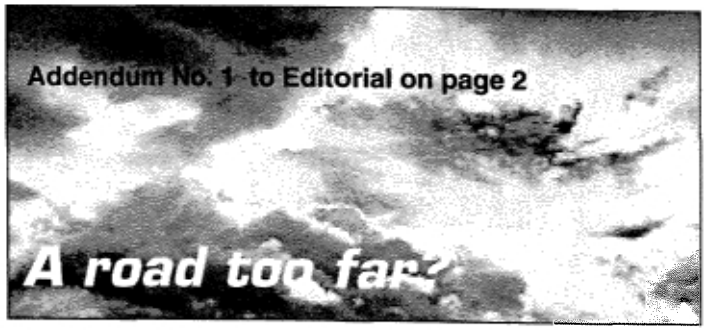
Utilizing medium rough textures and coated gray concrete products is the most effective long term solution to graffiti repair.

Rectilinear or linear patterns will be easier and therefore less costly to repair, resulting in lower overall life cycle system cost.

The fewer the number of unique panels in a project, the lower the panel replacement cost.

Soundwalls are unique in that, unlike industrial wall panels and retaining walls, both sides will be exposed to view forever with one side to traffic and the other to the neighborhood. ■

(For further information, refer to Concrete Impressions ad on p.19)



Hello again. I apologize for breaking in on you again, but my editorial was sort of an expositorial introduction to what I really wanted to talk about. I did not want to mix this discussion with the kind of loose talk in my editorials up front; back here with my professional people, I want to be quite serious about things of great consequence to me and, I trust, of more than reasonable interest to my readers and advertisers.

Frankly, the publication of The Wall Journal has become a burden to me. Not because of the simple *publishing* of it, but because of the effort and frustration of trying to acquire interesting articles and stories; good photos with captions; maintaining computers, printers, scanners, software, etc.; taking care of 1,600 readers around the world, answering questions from people who want to know how to contact the right people to buy their noise barriers; who want me to send them what they need to make up business plans; and trying to find time to do some of the administrative work, like sending out subscription renewal notices — a million things to do, and I've got a computer that crashes a lot. And all this from a one-man show in a one-horse town in Florida, which some call God's Waiting Room.

One thing I cannot do—quit. There are too many loose ends dangling just to walk away. That's no answer.

And, I don't want to sell it. The Journal has such a good reputation around the world, I'd like to stick around and watch it grow. It has a fantastic potential for growth.

After a lot of brain-wracking, I believe that what I really want and need—is a partner. The Journal is just too much for a one-man gang. And a "partner" is not just another body. That would only exacerbate the situation—we'd probably be at each other's throats. No soap.

The partner I am looking for would be a medium-sized publisher in the highway construction field, with a large readership database in the general contracting sector. The Journal would provide the "partner" with a 'close-fit' publication to its leader, while The Journal provides growth in its own 'close-fit' structures.

While I try to find this partnership, I will continue to try to get The Journal out on schedule. Gregg Fleming, Chair of the A1F04 Committee, has promised me that he will press the subcommittee chairs to send me articles and papers on the activities in their committees. Also, I expect to get some more articles from the state DOTs, so we will keep rolling along.

Happy Thanksgiving! See you next issue! ■

TEXAS DOT HAS 42 NOISE BARRIERS IN THE HOUSTON DISTRICT, AND MORE IN THE WORKS

(Editor's Note: I recently received this letter, along with a stack of photographs, some noise wall charts, specs and other information. I was really happy to get this stuff, because I have been wondering why we had not heard sooner from Texas.

I think we might be hearing more from the Lone Star State, now that Mark has got the ball rolling).

Dear Mr. Angove:

After reading the June/July issue of The Wall Journal, I thought it was about time the great State of TEXAS spoke up.

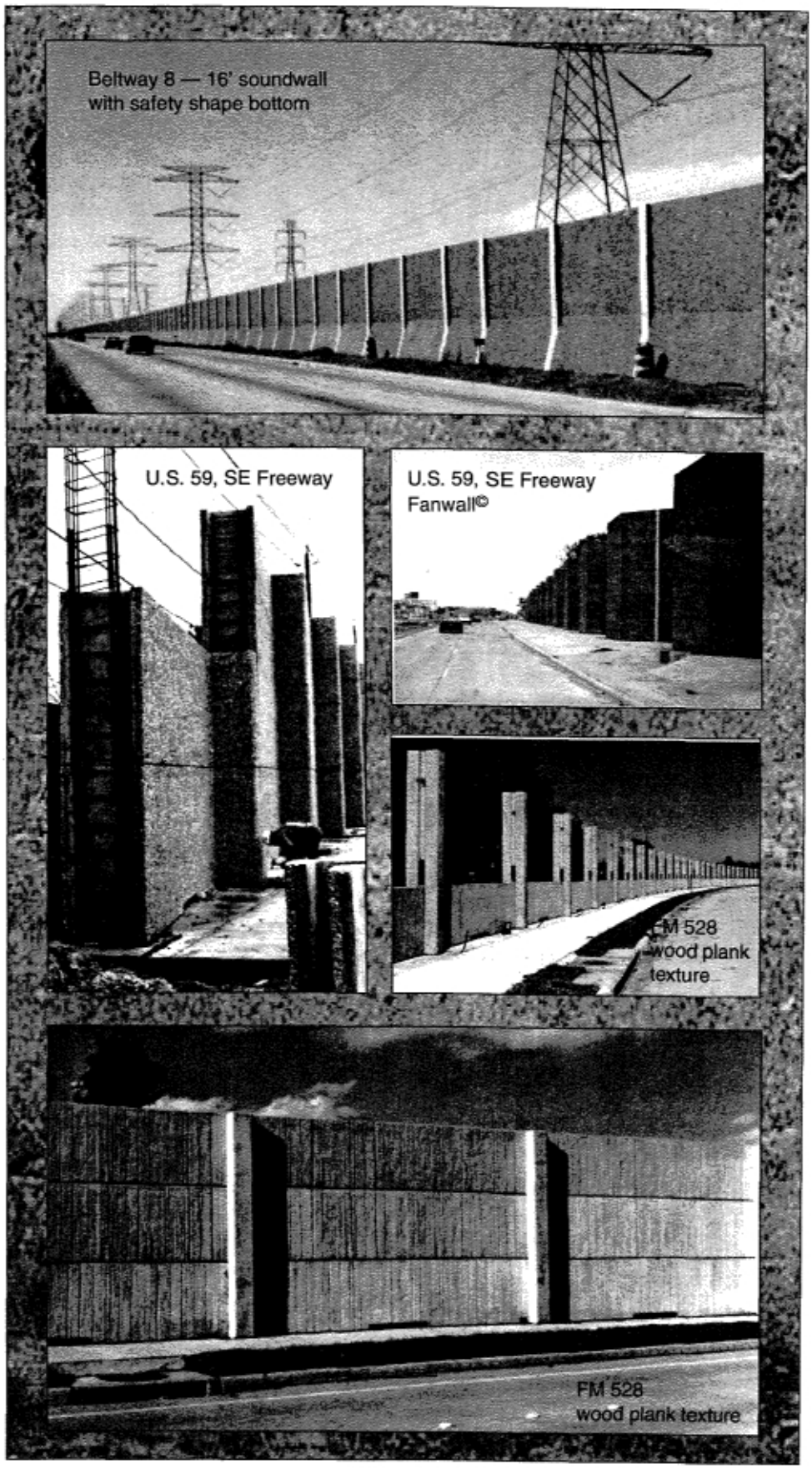
Upon reading your article about "The 1998 Summer Conference of the TRB Committee on Transportation-Related Noise and Vibration" and seeing all the small, diminutive sound walls pictured in the article, I thought it was about time we sent pictures of some real Texas size walls. There's no need in telling you that the BIGGEST sound walls come from Texas.

Everything is big in Texas and here at TxDOT there's no exception. We have constructed walls up to 22 feet in height with our average height being about 14 feet. The walls constructed in the Houston District are made of precast concrete and are not only tall but are considerably strong. Considering our proximity to the Gulf of Mexico (50 miles), we have to design our walls to withstand wind speeds of 100 mph or greater and even though it's not a prerequisite, we also incorporate an AASHTO requirement that the bottom 4 feet withstand the same load as that for bridge railing. We include not only strength in our walls but we also use varying degrees of color admixtures and formliner designs.

Sincerely,

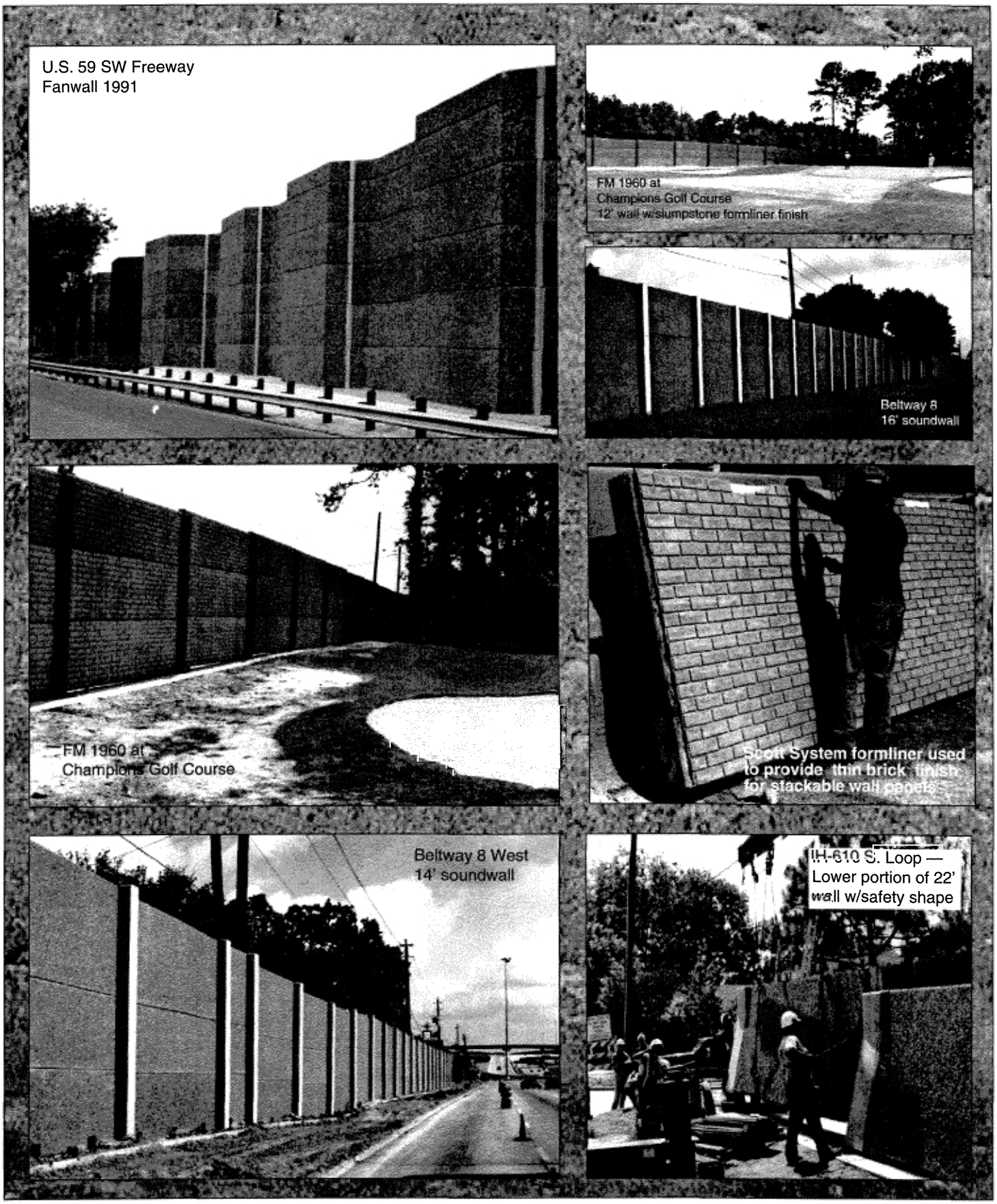
Mark G. Anthony
Design Manager
Houston District

(Ed. Note: I think Mark might be hearing from some of the other DOTs that have built some pretty high walls, and who may want to challenge Mark on that "no need in telling you that the BIGGEST sound walls come from Texas." Some of them on the East Coast are 35 feet high).



"Texas improves sound walls with precast concrete"— This was the headline of the article in the ***Better Roads*** issue of August 1993, which was written by Mark G. Anthony, our reader who has furnished this material for your edification. Mark's 1993 article opened with the following three paragraphs: "Near Houston, the Texas DOT has been building sound walls of wood construction with sleel columns mounted on drilled shafts since the 1970s.

(Story *continued on page 16)*



BARRIER GRIEF

By Bruce Feit, President, Graffiti Abatement Institute, and Thomas W. Smoot, PhD., Visual Pollution Technologies

The new highways bill has in it provisions to include sound barriers to separate populated areas from highways. These sound barriers have been very successful in reducing or at least dampening sound noise pollution in the peopled areas.. Unfortunately, more, in some places they have been the canvas for vandalism including colors panels, special designs and reliefs. For example, on my drive to the office from home, I pass on the Pima Freeway, which is being embossed with art typical of the inheritance of the area, the symbols of the desert and the Indian culture. The colors and the art make the barriers a lot more acceptable and I do prefer them to the back yards and malls which they protect, in some cases.

They, like many other sound walls, will also be found to serve as excellent "canvases" for graffiti taggers---- and these vandalized panels become the great barrier grief.

The sound barriers are prized by taggers who want to have their tags seen by many people and who hunger for a large unobstructed continuous surface to deface.

A study group has recently been impaneled by the FHWA to study the problem of graffiti along our highways with the aim to discourage this vandalism but also to find ways to protect this considerable investment against the graffiti which seems inevitable to accompany their construction. (Indeed, some of the panels become tagged between the time they are cast and the time they are put in place)!

Observations by people who have studied the social aspects of graffiti, reported at conferences sponsored by GAIN indicate that taggers want their work to be displayed for long times in prominent places. These studies have concluded that some effective means of controlling this vandalism includes swift and conclusive prosecution of the crime and swift and effective removal of the tags. The later aspect has be the impetus for the enactment of regulations in many municipalities whereby graffiti must be removed in 24 to 48 hours! Such quick removal of taggers "art" at least drives them to other areas where their efforts will stand longer times.

Removal includes paint-over which accomplishes only the removal of the graffiti---it does not restore the original, architectural beauty of the barrier.

The nature of graffiti tags is such that spray paint is the choice of destruction. Other instruments are used including markers, crayons and simple ink but spray paint seems much prized because it is available in a variety of colors, is, (unfortunately), very accessible and has good coverage with ease of application. It also has the highest coloration for the surface even when the surfaces are porous such as cast concrete, block of masonry.

All of the instruments used have more or less penetration on the surfaces which they are applied to. With markers and pens, the penetration is deep and thus, the color does not stand out on the surface as does paint where the penetration is less deep and the coating is meant to bridge micropores to keep the color, the pigments, on the surface for great color "density". It is this penetration which really causes grief when removal is attempted. It is this penetration which remains as a "shadow" of the graffiti when the major part of the visual pollution has been removed by cleaning or traditional paint-removal methods. Some of these use chemicals which can be hazardous to the environment and, indeed, to the workers who use them.

Other removal methods are at least in part destructive to the architecture. Thus, sand blasting, which removes the material as well as the graffiti, may actually harm and weaken the surface competency of the structure.

As mentioned above, paint-over, although the most common remedy used to date, is hardly ever completely satisfactory and really only accomplishes the obstruction of the graffiti depiction, message or signage. The paint never matches the color, texture and reflectivity of the architectural surface and is as visible as a paint blob as the graffiti which is under it. More, the paint over-area may invite new graffiti as it presents a fresh, new surface to be vandalized. (I have seen many areas throughout the United States which have been painted over so many times that the paint is now peeling off in layers by its own weight and the lack of surface bonding which results from the painted surfaces being difficult to penetrate to form a bond to the substrate.

Failing prevention of the marking in the first place, the best protection against graffiti so far has been the use of surface preparation which can deter or eliminate the penetration of the graffiti medium. Several protective coatings have been studied and many are being used. These coatings have run the range which spans on the one end a "TEFLON" - type coating which is difficult to mark to a sacrificial coating which accepts the graffiti but comes off easily taking the graffiti with it. These coatings all have in common the following characteristics to be successful, I) transparency, 2) colorless, or capable of being tinted to order, 3) prevents or greatly reduces penetration of the substrate, 4) have a useful life time span as a protectant, 5) preserve the surface characteristics of the substrate material including drying characteristics, reflectivity, both visual and auditory reflection or absorption, and 6) must be cost effective: which must be evaluated in respect to the value of the surface being protected. For example, protecting miles of sound barrier along the Long Island Expressway may have a much different set of cost criteria than protecting ancient statuary in front of the Basilica of St. Peter Basilica in Rome.

The coatings offered include three general types, according to my experience; permanent, semi-permanent and sacrificial. The variations between the various products in the market are very wide and the generalization presented below is for the products which have been observed in more or less successful applications, especially on cast concrete, block and masonry surfaces. Each has its place and each have very different performance depending on the job to be done. Table below shows some of the characteristics of each in relation to the 6 criteria outlined above.

Coating Type	Permanent	Semi Permanent	Sacrificial
Transparency	.....excellent.....		
Color	clear	clear	clear for a period
Protection against penetration	excellent	excellent to good	excellent to fair
Life span	many years	years	few years to months
Preserves surface characteristics	with special substrates	most substrates	most substrates
Cost:			
a) application	very expensive	expen. to inexp.	inexpensive
b) per coverage	" "	" "	exp. to inexp.

What makes up the cost effectiveness for each job has a lot to do with the particular purpose for the job. In the case of sound barriers for highway use, criteria to be used include such things as climate, ease of access and, of course, cost of labor. For sound barriers, it is a rare situation which would justify use of the permanent coatings. Some of these coatings are urethane-based or other complex plastics and rubber compounds which may have multiple components which must be mixed at job site and need special surface preparation. All of them substantially seal the surface completely; water and air permeability substantially becomes zero.

All of the permanent coatings studied are very expensive in bulk and difficult to apply, often achieving only tens of square feet coverage

(continued on page 13)

after elaborate surface preparation and stringent application requirements. With some, personnel must be specially trained before they can apply. In some places, though, they may be justified. In an underpass in Los Angeles which has a long history of being vandalized, permanent coating is used as the graffiti removal is a weekly or almost daily task and is easily accomplished, like removing paint from a glass surface. Even here though, permanent means that the coating will withstand perhaps several removals without losing its protective and aesthetic value.

Some of the semi-permanent coatings are two component mixes which need to be prepared at job site with limited pot life. Others are ready to apply. Conditions for acceptable application vary from restricted temperature ranges of the surface to be covered to the air temperature or curing/ drying conditions. Also, however, there are available a variation which can be applied over a wide temperature range and range in humidity so long as the surface being covered is thoroughly dry. Some of these may be applied as any paint. Coverage ranges, on cast concrete surfaces range from low-hundred to several hundred square feet per gallon. Curing takes from hours to days. There is a range of surface characteristics of those on the market. Some alter the surface noticeably in that reflectivity and therefore color, changes. Thus, to have homogeneity, the entire surface must be coated. The more the material need to protect the surface, the more the surface is altered in appearance. Semi-permanent coatings, according to this classification, will withstand approximately five graffiti removal operations using the modern non-chlorinated, solvent-type removers before having to be replaced. In short seasons, such as in the northern, northeastern areas, it is important that a coating which has acceptable application ranges which cover a wide range of air and surface temperatures and drying or curing times. Air and moisture permeability may be an important aspect, depending on the job. Under conditions where the panels are thoroughly dried before being shipped to the job site, application of these barriers can be done at the casting yard or at the storage area. This is an advantage in that some graffiti finds its way to panel surfaces even before they are erected at the site.

The sacrificial coatings, many of which are water-based, cannot be applied when the surface to be coated is colder than 32F and, for reasons of practical, should not be applied below about 40F and when the temperature of the surface, too, is above freezing as evaporation will act to cool the surface. Some of these coatings, polymer-based, are air permeable and thus, can be applied to even damp surfaces because the moisture, as steam can pass through to the air with no damage to the coating.

These coatings will accept the graffiti but, in substantially all cases, will not allow the liquid carrier to penetrate the coated surface. These coatings, once graffitied can be removed by various means, chemically or even with steam or heat. As they are removed, the graffiti on the surface is removed, too. Thus, with no physical damage to the surface, it can be restored to original character and then, quickly, recoated for protection. One of the great advantages of the sacrificial coatings are that only the affected area need s to be removed and then recoated,. So, if only a square foot of a panel has been tagged, that is the only area that must be removed then replaced. Replacement can be achieved with the same personnel that is used to remove the graffiti and, in many cases, at substantially the same time as the removal takes. ■

About the authors:

Bruce Feit has been President GAIN, Graffiti Abatement Institute of North America for two years. His background includes 15 years in the construction chemical industry.

Dr. Thomas W. Smoot has been a consultant to the chemical industry for over 30 years.

For more information please call GAIN at 602-438-8257.

Open Letter to the Editor for Reader Response

May 6,1998

Mr. El Angove, Editor
The Wall Journal

Subject: Article title "FHWA Traffic Noise Model Update" Issue #33

I am writing this letter in response to reading the article that Ms. Cnythia Lee from the Volpe National Transportation Systems Center had written on the TNM model. As a noise/air/traffic consultant, I am questioning certain aspects of the existing TNM Version 1.0 model and anticipated cost savings.

First, from a consultant's standpoint, the most immediate concern aside from the expense of the TNM model ($699 from McTrans) is the significant increase in expected run times over the existing STAMINA2.0/OPTIMA noise prediction model. I thought that the reason that TNM's release was held back an entire year was to improve the run time problem. As stated in Ms. Lee's article, there are significant "run-times" associated with the new model using newer computer equipment and operating systems (NT and Windows '95) I question the development of a new noise model using 16 bit technology when most consultants are at least using Windows '95 which allows both 16 and 32 bit applications to be run in this operating system, although 32 bit applications will run faster. I realize the argument that there may be some public agencies that cannot afford newer computers/equipment - all the more reason the run times should be reduced. Those that can afford the newer computers and operating systems recognize the fact that Windows '95197198 is here to stay, but at least we should be given an option to select a slower 16 bit version compared to faster (hopefully) 32 bit version based on our needs. Perhaps the run times could be significantly reduced if the TNM program were to have some "toggles" which the user would set which could either enabled/disabled certain program features which slow down the program, i.e parallel barrier analysis, etc.? There may be other programming languages that are more efficient than what was used in this instance?

Secondly, I understand after speaking with the Mr. Bob Armstrong at the FHWA that the TNM model will accept *.dat file format input from the older STAMINA2.0 program but these files must be in the "official file format" (as shown on page 2-42, Figure 11 of FHWA-DP-58-1 titled "Noise Barrier Cost Reduction Procedure STAMINA2.0/OPTIMA User's Manual." It is questionable whether the TNM model will accept any other STAMINA2.0 file format other than "the official file format," which is a fixed field FORTRAN file. Various consultants and others have developed other *.dat FORTRAN file formats, i.e. free field FORMATS. Can these

(continued next page)

other files be readily read/imported into the TNM model? If they cannot, are there any plans to enhance the TNM model to include these other file formats or include in the TNM program a means to translate other file formats into the I~M *.dat file format?

Thirdly, the cost savings presented in the Wall Journal article aren't all that significant when you also consider that noise wall designs are based on a peak hour traffic volumeslcounts which can fluctuate daily.. Traffic fluctuations coupled with other factors which affect outdoor vehicular noise transmission such as weather, seasonal variation in vegetation, etc. are not really accounted for in this cost savings analysis which makes some inaccurate assumptions. When all of these factors are considered, I question the validity of anticipated cost savings of TNM over STAMINA.

Finally, apologize if I inaccurately depicted some attributes of the TNM model since I have not been able to acquire the program manual. Unlike most software programs available from McTrans, you cannot purchase just the TNM manual to find out about the details of the program before actually purchasing the program. The software and the manuals are sold as one package by McTrans. My comments are derived from conversations with those at FHWA and others who have had a hand in developing the TNM Version 1.0 model.

The bottom line is, I think that there much room for improvement and that most will probably wait until all of the bugs have been worked out of the program - hopefully this includes reducing the excessive run times. As for me, I most likely use the older STAMrNA2.0/OPTIMA model for preliminary analysis and will use TNM when it is necessary for final design or as mandated.

Respectfully submitted,

David R. Freudenrich
Senior Engineer
MAGUIRE GROUP INC.

(Editor"s note: From the date of Mr. Freudenrich's letter, it is plain to see that your editor has been shuffling this one around. When you are up to your fantail in trying to catch up with what's already on your desk, it is easy to keep shoving that hot potato ever closer to the waste basket and oblivion.

Well, I did talk wiith Cynthia a couple of times after I received David's letter, and she talked with Bob Armstrong, but everybody seemed to be moving around a lot and missing connections, and I was in my usual swamp with the alligators. Time flowed away.

When I have a situation like this, I prefer to publish the inquirer's letter in the same issue that the recipient publishes their response. So I told Cynthia that I was going to publish the letter, as David had requested, and ask our readers enter the debate, by sending their comments directly to The Wall Journal, P.O. Box 1389, Lehigh Acres FL, 33970-1389, or E-mail eangove@aol.com)

(**Texas Noise Barriers**, *cont'd from p. 11*)
During this era, the tallest walls built were 12 fL

Now the demand for sound walls is much greater. Increased traffic volumes have pushed walls to heights of 22 ft. Due to the warping of wood, the DOT no longer uses it in the construction of sound walls. Everything is concrete and steel.

Wood is out, specifically in areas with high humidity. From the maintenance, safety, and appearance viewpoint concrete sound walls are the only way to go.

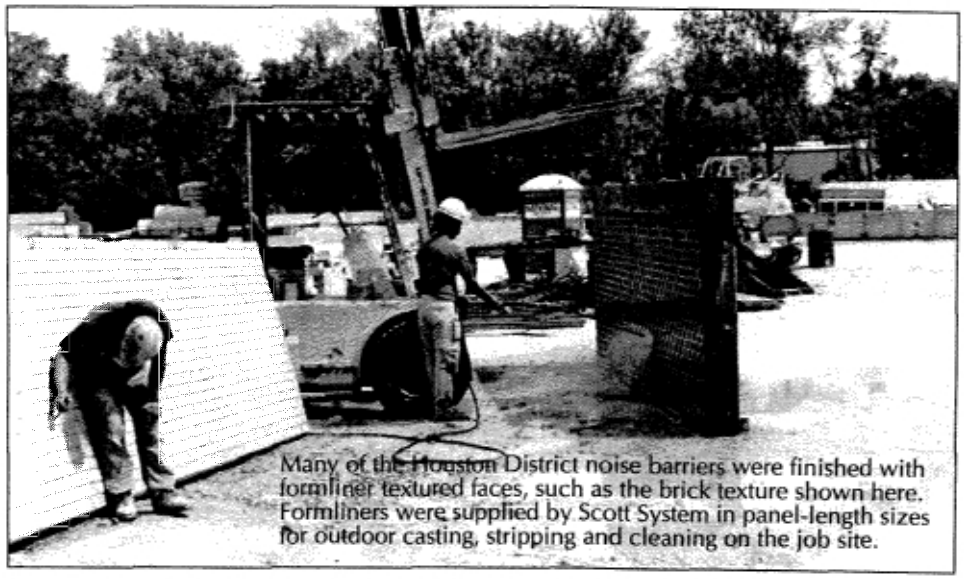
Current designs provide for a stack panel system consisting of precast con crete panels which are 5-in. thick with an additional 0.75 inch allowed on each side for textured finish such as fractured rib, wood plank, brick, exposed aggregate, and so on. These panels are formed in 2-ft. and 4-ft. heights to provide a finished wall height of 8 to 22 ft. The panels are then supported by steel wide flanges attached to drilled shafts spaced at 20-ft. center to center."

(Ed. Note: Thanks to Ruth Stidger, Editor -in-Chief of Better Roads, for our borrowing some of some of Mark's words from your great publication. Hope you don't mind).

On the next two pages are a tabulation of the 42 noise barriers which have been constructed in the Houston area as of January 1, 1997. The tables provide you with general information on the location, physical dimensions, year built and cost. I have printed the tables just as they were provided by Mark, and if you have questions about them, you will have to talk with Mark.

All noise barriers are precast concrete. Barrier make-up by height:

2.4 m (8') = 1.7%;
3.1 m (10') = 8.7%;
3.7 m (12') = 16.6%;
4.3 m (14') = 15.0%;
4.9 m (16') = 34.8%;
5.5 m (18') = 11.0%;
6.1 m (20') = 6.0%;
6.7 m (22') = 5.7%



Many of the Houston District noise barriers were finished with formliner textured faces, such as the brick texture shown here. Formliners were supplied by Scott System in panel-length sizes for outdoor casting, stripping and cleaning on the job site.

(**Texas Noise Barriers**, *continued on next page*)

TEXAS DOT — HOUSTON DISTRICT — EXISTING NOISE BARRIERS — AS OF 1/1/97						
No.	FACILITY	SUBDIVISION/SITE City/County (# walls)	H x L (meters)	H x L (feet)	YEAR BUILT	COST ($000)
1	SH3/FM517	Church, Dickinson/Galveston	2.4 x 82.6	8 x271	1994	28.7
2	SH 6	Fleetwood S/tD (1) & Mission Leona (2) Houston/Harris	3.7 x 835.3	12 x 2740	1992	692.1
3	SH 6	Ridgeview Park, Missouri City/ Ft. Bend	2.4 x 320	8 x 1050	1994	67.2
4	BW 8(W)	Memorial Plaza (2), Houston/Harris	4.3 x 406.3	14 x 1333	1992	927 4
5	BW 8(W)	Briargrove Park, Houston/Harris	4.3 x 859.5	14 x 2820	1988	721.4
6	BW 8(W)	Briar Court, Houston/Harris	4.3 x 588.3	14 x 1930	1991	552.7
7	BW 8(W)	Windfern Forest, Jersey V'lge/Harris (2)	4.9 x 2194.6	16 x 7200	1991	1,461.0
8	BW 8(S)	Sagemont Park, Houston/Harris	3.7 x 274.3	12 x 900	1992	274.4
9	BW 8(S)	Sagemont Park, Houston/Harris	4.9 x 152.4	16 x 500	1992	
10	BW 8(S)	Kirkmont, Houston/Harris (3)	4.3 x 560.8	14 x 1840	1992	360.6
11	+BW8(S)	Glenshire S/D, Houston/Harris (2)	4.3 x 2332	14x7651	4Q96	1,161..2
12	BW 8(N)	Lincoln Green, N'west Green, Woodgate S/Ds, /Harris (6)	4.9 x 2365.2	16 x 7760	1995	1,913.7
13	BW 8(N)	Briarcreek S/D, tHarris	4.9 x 704.1	16 x 2310	1995	
14	IH 45(S)	@ Dixie Drive, Houston/Harris (2)	2.4 x 121.9	8 x 400	1983	25.6
15	IH 45(S)	Church @ des Jardine,Houston/Harris**	2.4 x 45.0	8 x 148	1979	12.8
16	IH 45(S)	W'swept T"home @ Nyack Dr, Houston/Harris	4.3 x 104	14 x 340	1996	113.9
17	US 59(S)	SharpstownNorth, Houston/Harris	4.9 x 609.6	16 x 2000	1988	
18	US 59(S)	Country Club Est., Houston/Harris (3)	6.1 x 1091.8	20 x 3582	1988	3,020.0
19	US 59(S)	Sharpstown South, Houston/ Harris (2)	4.9 x 1280.1	16 x 4200	1989	
20	US 59(S)	Braeburn Glen, Houston/Harris	4.3 x 762.0	14 x 2500	1989	490.0
21	US 59(S)	Larchmont, Houston/ Harris	6.7 x 792.5	22 x 2600	1989	943.1

(**Texas Noise Barriers**, *continued on page 18*)

(**Texas Noise Barriers**, *continued from page 17*) ■

No.	FACILITY	SUBDIVISION/SITE City/County (# walls)	H x L (meters)	H x L (feet)	YEAR BUILT	COST ($000)
22	US 59(S)	Afton Oaks, Houston/Harris	4.9 x 944.9	16 x 3100	1989	793 6
23	SH 249	Hidden Valley, Houston/Harris (5)	3.7 x 1094.2	12 x 3590	1991	461.5
24	SH 288	Lake Jackson/Brazoria	4.3 x 975.4	14 x 3200	1991	627.2
25	US 290	@FM 1960, Houston/Harris	3.1 x 413.6	14 x 1357	1994	374.6
26	FM 518	C'tryside Dr., League City/Galveston	3.1 x 726.9	10 x 2385	1994	698.4
27	FM 518	Leisure Ln., Friendswood/Galveston	4.9 x 115.8	16 x 380	1993	410.2
28	FM 525	Imperial V'ly, Houston, Harris (6)	3.7 x 1154.6	12 x 3788	1995	639.4
29	FM 528	Falcon Ridge., Fr'ndsw'd/Galveston (2)	3.1 x 170.7	10 x 560	1995	64.4
30	FM 528	The Park S/D (2), Forest Bend Community Pk., Friendswood/Galveston	3.7 x 859.5	12 x 2820	1995	361.0
31	FM 528	Keystone, Friendswood/Galveston (4)	3.7 x 502.0	12 x 1647	1996	229 0
32	IH 610(S)	Willowmeadows, Houston/Harris (8)	5.5 x 1356.1	18 x 4449	1995	
33	IH 610(S)	Westwood S/D, Houston/Harris (2)	6.7 x 301.8	22 x 990	1995	1,862.1
34	IH 610(S)	Woodside S/D, Houston/Harris (4)	4.9 x 327.7	16 x 3390	1995	
35	IH 610(N)	Lindale Pk., Houston/Harris (3)	5.5 x 978.4	18 x 3210	1996	560.6
36	FM 1093	Forestview/Wingate, Houston/Harris (3)	3.1 x 804.7	10 x 2640	1991	365.5
37	FM 1960	Champions Forest, Houston/Harris (3)	3.7 x 774.2	12 x 2540	1990	471.2
38	FM 1960	Inverness Forest, Houston/Harris (2)	4.9 x 409.7	16 x 1344	1994	580.0
39	FM 1960	Inverness Forest, Houston/Harris	5.5 x 221.9	18 x 728	1994	
40	FM 2351 -	Randolph Park, Cherry Tree Ln., Friendswood/Galveston	3.7 x 259.1	12 x 850	1993	74.3
41	FM 3345	Quail Valley, Missouri City/Ft. Bend (5)	3.1 x 1917.2	10 x 6290	1992	629.0
42	+s. Post Oak	Meyerland, Houston/Harris (2)	2.4 x 350.5	8 x 1150	1984	73.6
		TOTALS	31.913 km (114,401 m^2)	104,700 lf 19,830 mi		$22,041.or $192,67

LETTERS THAT HELP MAKE AN EDITOR'S DAY

Presidentt: Bernard DUCONGE

Subject: Adress change

Dear Sir,

Should you notice that our address is not any more in NEUILLY SUR SEINE. Should you be kind enough to send your next issues of The Wall Journal to the here-under address:

APREA c/o B. DUCONGE
775, CHEMIN DE LA BLAQUE
13080 LUYNES, FRANCE

As it happens for you in Florida, life is much nicer in southern France than in the northern part, especially Paris region !

I always read your magazine with great pleasure and interest.

Yours sincerely.

Bernard DUCONGE

Dear Sir:

I really enjoy reading your journal. Please extend my subscription for another year.

George Penesis
Konheim & Ketcham, Inc.
Brooklyn, New York

Dear Sir:

Thank you very much for your time and effort in sending me the enclosed report for my use. The report will be very helpful to me. The Wall Journal is a great source of information to me and I enjoy reading every issue.

Dale L. Steib
Gulf Engineers and Consultants
Baton Rouge, Louisiana

Dear Sir:

I really enjoy reading your journal. Please extend my subscription for another year.

George Penesis
Konheim & Ketcham, Inc.
Brooklyn, New York

Dear Sir:
Thanks for another entertaining year — sign me up for another.
Bruce R. Thompson
KCI Technologies, Inc.
Newark, Delaware

Big Gus is back in town and he is mad, Mad, MAD, MAADD!!!

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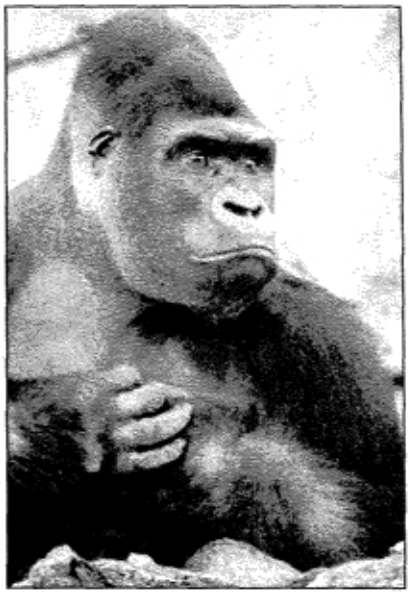
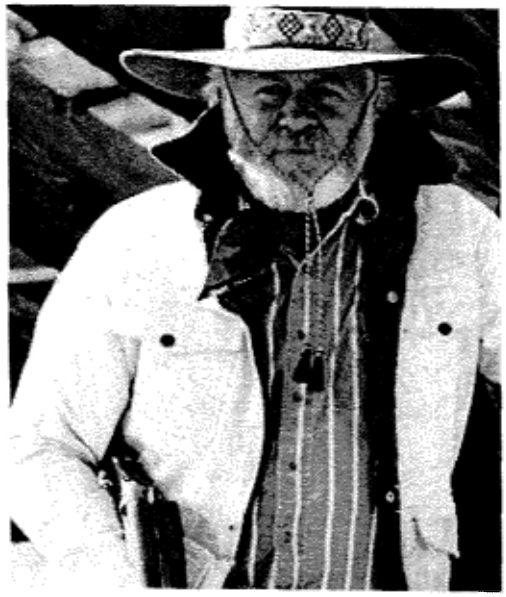
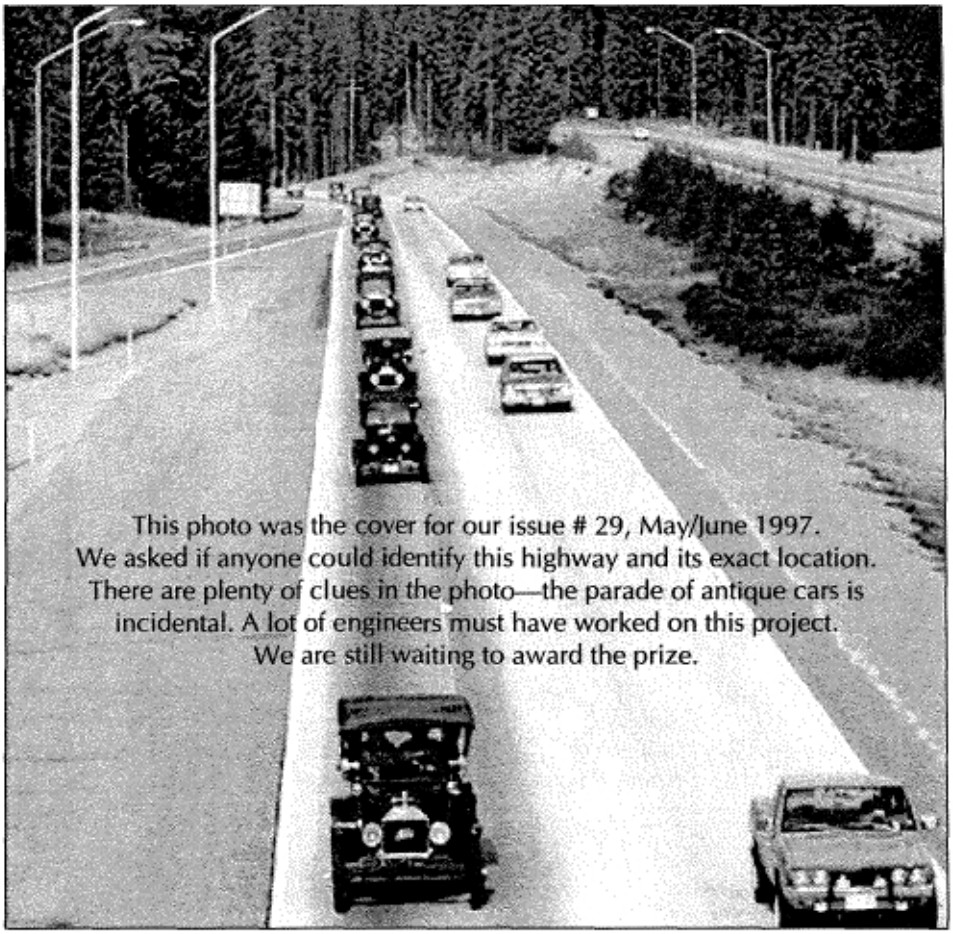


Ned, what the hell's been goin; on around here! I take off a little tine to go down south and swing around in the big trees, and the place falls apart! Where is that lazy stupid wal rus and those crazy chimps? Hov do you tolks tigure me to get my pension if you won't work. I can see I've got some hig butt-kickin' to do.



Doggone it, Gus, I tried to call you a bunch of times, even though you told me not to do that. But I really needed some help. These animals they've got workin' in the back order room aren't worth the gas to run 'em out of town. I was tempted to shoot them all, but remembered that some of them might be your relatives. I shore am glad that you're back home. It's gonna be O.K. now.



This photo was the cover for our issue # 29, May/June 1997.
We asked if anyone could identify this highway and its exact location.
There are plenty of clues in the photo—the parade of antique cars is incidental. A lot of engineers must have worked on this project.
We are still waiting to award the prize.

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