REPORT ON
EXPERIMENTAL NOISE BARRIER WALL
US-59 SOUTHWEST FREeway
RICE AVENUE TO CHIMNEY ROCK ROAD
LARCHMONT SUBDIVISION

February 1991
REPORT
ON
EXPERIMENTAL NOISE BARRIER WALL
US-59 SOUTHWEST FREEWAY
RICE AVENUE TO CHIMNEY ROCK ROAD
LARCHMONT SUBDIVISION

by

John B. Stokes, Jr., P.E.
Supervising Designing Engineer

Construction Project Manager
Lonnie B. Beckham, P.E.
Supervising Resident Engineer

Photographs by
Mark G. Anthony
Engineering Specialist

and

E. B. L., Inc.
General Contractor

FEBRUARY 1991
The Southwest Freeway, US 59 South, is located in the southwestern part of the City of Houston, Texas. This freeway was constructed in the early to middle sixties and consisted of four lanes inside IH 610 West Loop and three lanes outside of the West Loop.

With the construction of the Southwest Freeway, residential and commercial development accelerated in the southwestern portion of Houston and Harris County and in the eastern portion of adjoining Fort Bend County. With this development came increased traffic volumes and before long the freeway was operating at capacity. As the years passed, traffic demands became so great that the outside shoulders were converted into traffic lanes. Because of age and very high traffic volumes, the Southwest Freeway pavement began deteriorating and in the late seventies, the Texas State Department of Highways and Public Transportation (SDHPT) began planning for reconstructing the Southwest Freeway to add greater capacity and provide for mass transit.

The State legislature charged SDHPT with responsibility of coordinating with local public transportation agencies in order to enhance public transportation. The Harris County Metropolitan Transit Authority (Metro) is the local public transportation agency for Houston and Harris County. Therefore, SDHPT and Metro cooperated together in planning for, designing, and reconstructing the Southwest Freeway. The reconstructed freeway provides for four to seven lanes with a mass transit one way reversible lane in the median outside of IH 610 West Loop and provides for five and six lanes with a mass transit lane inside West Loop.
Planning and environmental studies were begun in August 1977 and completed and approved in October 1985. As a result of environmental studies, noise walls were considered for residential neighborhood noise mitigation and public meetings were held within each affected neighborhood to explain the purpose for and expected benefits from noise walls. The property owners adjacent to the right of way were then asked to choose whether or not they wanted a noise wall constructed along the right of way line, between their property and the freeway, in order to reduce noise impact on their homes. Several residential neighborhoods along the Southwest Freeway corridor chose to have noise walls constructed. The residential neighborhood known as Larchmont is one of the areas that requested a noise wall be constructed.

As part of the cooperative agreement between SDHPT and Metro, Metro and SDHPT chose a consulting engineering firm, 3D/Post, to prepare designs and plans for a portion of US 59 Southwest Freeway which included the Larchmont area. The Larchmont Noise Wall was included in the project, therefore, 3d/Post prepared designs, plans, and details for the noise wall and included these in the freeway project reconstruction plans. After the plans were submitted to SDHPT, there was a long delay because of difficulties in obtaining all right of way required for the project. However, the right of way in the Larchmont subdivision was acquired earlier than the rest of the project right of way; therefore, the noise wall portion of the plans was removed from the freeway project and made into an independent project. The decision was made by SDHPT's Houston District Office to permit commercial alternate noise barrier wall designs to be bid and constructed in lieu of the consultant's design. This decision required the consultant's plans to be revised by SDHPT. During the process of revising the plans, close coordination with the Federal Highway Administration (FHWA) was
maintained. As a result of coordination with the FHWA the noise barrier wall details prepared by SDHPT were included in the plans along with details prepared by "the fanwall corporation." Although "fanwall's" details were added to the plans, provisions were included to permit other commercial noise wall designs if those designs were acceptable to the project engineer.

The successful contractor, EBL, Inc., chose a commercial alternate design from First Technology, Inc., with structural design done by Macon Engineering, Inc. Shop drawings and calculations were submitted to SDHPT for review and approval. Because this was the Houston District's first commercial alternate noise wall project, close coordination with FHWA was maintained during the shop drawing review and approval process and also during project construction.

The wall system is a stacked panel, trapezoidal pattern attached to a spread footing by means of one half inch, epoxy coated, post-tensioned cables which are cast into the footing and anchored at the top of the wall. The wall is continuous with a total length of 2620 feet and consists of 940 feet of 20 foot high wall and 1680 feet of 22 foot high wall. Surface finish is exposed aggregate on both sides. The wall is designed to withstand a 40 pound per square foot wind loading and has a 1.5 factor of safety against overturning. The spread footing consisted of two sizes; one was four feet, six and one half inches wide by six and five eighths inches thick and the other is nine feet wide by two feet thick. Blockouts for the post-tensioned cable anchorage were cast into the footings and were later filled with concrete after the bottom panels were placed and plumbed. Photo numbers 1, 2, and 3 show foundation forms, poured footing, and post-tensioned cable blockouts respectively. Bearing capacity calculations, which a geotechnical consultant performed on soil data
1

FORMS FOR SPREAD FOOTING

2

SPREAD FOOTING FOR NOISE WALL
3
BLOCKOUT IN SPREAD FOOTING FOR
PRESTRESSING STRAND ANCHORAGE
provided by SDHPT, indicated that soil bearing capacity was at least 3300 pounds per square foot (psf) at each end of the project. No data were provided for the internal part of the project (see Appendix for Lone Star Geotechnical Services calculations). The minimum allowable soil bearing capacity required was 2500 psf.

The wall panels were cast off site in two and four foot heights, transported to the construction site and erected. During the casting process, the fabricator used vertical forms, and encountered several problems with this casting method. First, hand finishing was required for the top edge of the panel, and any high spots on the edge prevented the panels from seating properly when they were erected. Second, forming tolerances were critical because of the protruding trapezoidal wings (see shop drawings in Appendix A). If the form or wing headers were not plumb, or if the top and bottom of the panel were not parallel, the panels would not fit properly with adjacent panels when erected. The prime contractor did experience problems with wall erection because casting tolerances were not rigidly maintained. To solve those problems, the contractor used shims and grout to plumb the walls, and silicone seal was used to seal the horizontal and vertical joints.

The contractor threaded the epoxy coated cable through holes in each panel and after all the panels were in place, he placed a calibrated jack and gauge on top of the wall and applied the post tension required by the plans. Photo No. 4 shows an epoxy coated cable projecting through the end of a wall panel. Photo No. 5 shows a partially erected wall, and Photo No. 6 shows a completed wall section prior to post-tensioning operations.
4

PRESTRESSING STRAND PROJECTING THROUGH END (BULL NOSE) OF WALL PANEL

5

NOISE WALL SHOWING PARTIAL WALL ERECTION
NOISE WALL BEFORE POST-TENSIONING
Photo Numbers 4 and 5 show six inches wide by three inches high drainage slots through the wall. These slots were added in addition to the drainage system which the design consultant had provided. Designers and planners had no data relating to the effects these openings would have on noise mitigation; therefore, noise readings were obtained in order to evaluate the amount of noise that would pass through the openings. There is an insignificant difference in the noise levels behind panels with the openings when compared with panels which had the openings plugged. Refer to February 13, 1990, memorandum from Mr. William E. Neyland, P.E. to Mr. Donald R. Garrison, P.E. which is contained in the Appendix. As construction on the project progressed, several residents became concerned about drainage in one section where a street was blocked by the wall. After re-evaluating the situation the Department concurred with those concerns and provided eight large openings beneath the wall. Each opening is five feet wide by one foot eight inches high. Noise readings were obtained at those openings and the noisemeter readings indicate that the large openings conduct insignificant amounts of noise. Refer to Appendix to Mr. Neyland's October 9, 1990, memorandum to Mr. Garrison.

This project is the Houston District's first experience with commercial alternate noise wall designs and was therefore a new experience for designers and for the resident engineer's personnel. Because of this new experience and the lessons which have been learned, following are several items which designers should consider when commercial alternate noise walls are permitted by the project plans.

1. Design specifications that are to be used for commercial alternates should be clearly set out in the plans.
2. Design wind loading and exposure type should be shown in the plans. (See AASHTO Guide Specifications for Structural Design of Sound Barriers)

3. Include notes in the plans which require commercial alternates to meet plan alignments, color, and texture or state what exceptions to these requirements will be permitted.

4. Require contractor to submit design calculations and detailed shop drawings for approval prior to fabrication.

5. Designer must provide soil data or he must tell contractor to obtain soil data needed for any commercial alternate foundation design.

6. Drainage must be provided through, under, or around the wall.

7. Utilities must be considered, and adjusted if necessary.

8. If foundation types (e.g. drilled shaft, spread footing, piling, etc.) are restricted, state which type is acceptable.

9. If form liners are to be used, determine if seams where liner sections are joined together are acceptable, or state if a one-piece (without seams) form liner is required.

10. Require reproducible tracing of approved commercial alternate shop drawings for inclusion in final plans.

11. If wall must be designed to withstand a vehicle impact, state those requirements in the plans.
APPENDICES
APPENDIX A

A-1 Vicinity map showing project location

APPENDIX B

B-1 Lone Star Geotechnical Services letter to Macon Engineering, Inc.

APPENDIX C

C-1 3D/Post Noise wall details
C-5 Fanwall Noise wall details
C-6 SDHPT Noise wall details
C-7 Approved shop drawings for commercial alternate noise wall

APPENDIX D

D-1 Memoranda from William E. Neyland, P.E. to Donald R. Garrison, P.E.

APPENDIX E

E-1 E.B.L., Inc. letter to Mr. Lonnie B. Beckham, P.E.

APPENDIX F

F-1 Work Plan for evaluating experimental wall
APPENDIX A
APPENDIX B
July 26, 1989

Macon Engineering, Inc.
15422 El Padre
Houston, Texas 77083

Attn: Mr. James D. Maberry, P.E.

Re: Sound Barrier Wall
T.S.D.H.P.T. Project No. F 514(90)

Dear James:

In compliance with your request, the writer has studied the documents presented to determine the frictional shear resistance of the soil for the project referred to above.

Four (4) logs of borings furnished by the Texas State Department of Highways & Public Transportation (TSDPHT) were examined for soil characteristics in the surface or surficial stratum to use for determining the friction resistance or shear strength of the soil to overcome the wind loads on the sound barrier wall. Logs of borings 101 & 102 were labeled CHIMNEY ROCK OVERPASS - HIGHWAY U. S. 59, and dated 3/23/59 and 3/24/59, respectively. Logs of borings 103 & 104 were labeled RICE AVENUE OVERPASS - HIGHWAY U. S. 59 and dated 7/13/59 and 8/14/59, respectively. The following is a summary of information used from the logs.

<table>
<thead>
<tr>
<th>LOG #</th>
<th>DESCRIPTION</th>
<th>ELEVATION, FT.</th>
<th>COHESION, P.S.I.</th>
<th>FRICTION ANGLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Med. Stiff</td>
<td>68.0</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Dark Gray</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silty Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>102</td>
<td>Stiff Dk.</td>
<td>69.0</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Gray Silty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>103</td>
<td>Stiff Dk.</td>
<td>68.0</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Gray Silty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>104</td>
<td>Med. Stiff</td>
<td>68.0</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Lt. Gray Tan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silty Clay</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To determine the soil resistance to the wind load, the cohesion and angle of internal friction have to be taken into account as the founding soil is a "mixed" soil and not a pure silt or a pure clay.

Coulomb's Law is applicable in this situation. It is expressed as follows:

\[ s = c + p \tan \phi \]

in which:
- \( s \) = unit shear strength
- \( c \) = unit cohesion
- \( p \) = normal stress on surface of sliding
- \( \phi \) = angle of internal friction

Using the lowest values provided (Log of Boring 101), the soil resistance is calculated as follows:

\[
\begin{align*}
\text{a} & = \text{area of footing} = 4.54' \times 56.56' = 257 \text{ S.F.} \\
c & = 432 \text{ PSF (3 P.S.I.)} \\
p & = 93329\#(\text{Wall Wt.}) + 19259\#(\text{Footing Wt.}) = 438.1 \text{ PSF} \\
\phi & = 8' \\
\tan \phi & = .140541 \\
n & = 432 + 438.1(0.140541) = 493.57 \text{ PSF} \\
r & = \text{resistance} = s \times a = 493.57 \text{ PSF} \times 257 \text{ SF} = 126,847 \# \\
\text{W.L.} & = \text{Wind Load} = 26 \text{ PSF} \times 22' \times 48.28' = 27,616 \# \quad ** \\
\text{S.F.} & = \text{safety factor} = r \div \text{W.L.} = 126,847 \div 27,616 = 4.6
\end{align*}
\]

A value of 0.4 for the coefficient of friction for concrete on concrete appears to be a very reasonable value. The value for concrete masonry units is 0.5 to 0.7, as noted on p. 147, paragraph preceding equation (H.5), Structural Masonry by Sven Sahlin, 1971, Prentis-Hall, Inc.


** James D. Maberry, P.E. #13842 notes dated July 1, 1989 on Sound Barrier Wall, 10' Offset, S.D.H.P.T. Project F 514(90).
The bearing capacity of the soil is determined from the general bearing capacity equation derived by Dr. Karl Terzaghi, taking into account local shear in loose soil. This equation using bearing capacity factors has been modified by several soil engineers. Heyerhof, Bell, Peck, Hanson, & Thornburg to name a few. We are inclined to use the curves derived by W.A. Taylor as shown on page 337, Figure 9-12, Basic Soils Engineering, B. K. Hough, 1969.

The equation is as follows:

\[ q(ult) = cNc + q'Nq + 0.5\pi BNx \]

where

- \( q(ult) \) = bearing capacity, psf
- \( c \) = cohesion, psf
- \( Nc \) = cohesion factor
- \( q' \) = surcharge (density X depth), psf
- \( Nq \) = surcharge factor
- \( \pi \) = wet unit weight, pcf
- \( B \) = width of footing, feet
- \( Nx \) = solid friction factor

From Log of Boring 101: Dry Unit Weight = 107 pcf
Moisture Content = 20.0
So, \( \pi \), Wet Unit Weight = 128.4 pcf

From Curves:
- \( Nc = 7 \)
- \( Nq = 2 \)
- \( Nx = 1 \)

Since depth of footing is 1 foot, \( q' = 128.4 \) psf
Width of footing, \( B = 4.54 \) feet
Cohesion, \( c = 432 \) psf

\[ q(ult) = 432(7) \times (128.4 \times 1)(2) + 0.5(128.4)(1) \]
\[ q(ult) = 3345 \] psf
Load capacity = \( q(ult) \times \) Area
= 3345 psf \times 257 sf
= 859665 lbs.
Safety Factor = Load Capacity \div Load (Dead Load Only)
= 859665 \div 112583 = 7.6

For overturning moments, use 150 pcf for the unit weight of the concrete and 3345 psf passive resistance for the soil.

It has been a pleasure serving you on this project, if we may be of further service on this or other projects, please call.

Sincerely,

James L. Hickey, P.E.
Senior Engineer

JLH/ohr

LONE STAR GEOTECHNICAL SERVICES
APPENDIX C
**FANWALL NOISE BARRIER (OPTION)**

This is the registered trademark of the Fanwall Corporation. The Fanwall Corporation is a subsidiary of the Fanwall Corporation, and is being formed to sell the Fanwall product line.

FANWALL CORPORATION

The Fanwall Corporation is a subsidiary of the Fanwall Corporation, and is being formed to sell the Fanwall product line.

FANWALL is covered by U.S. Patent Numbers 3,172,453 - 3,124,905, 3,206,547, and 3,206,548, and foreign patent applications.
PRECAST PANEL DETAILS

**PLAN**

- Top of top panel and portion of bottom panel to be smooth, all others to be concrete.
- Torque 4-Grade stud. See detail "F".

**4 FT. PANEL ELEVATION**

- 2 FT TOP PANEL ELEVATION
  - PRECAST PANEL DETAILS
  - Base mesh may be used in lieu of deformed bars. If deformed bars are used, widths will not be permitted.

**TYPICAL SECTION**

**JOIN DETAIL**

- Reinforcement in required to avoid sheering beneath wall.

**TYPICAL ELEVATION**

Notes:
- Columns, CS 1-2, base plates, anchor bolts and washers shall be galvanized in accordance with ASTM A6. All steel not specified to be coated shall be painted in accordance with Item 446.
- Anchor bolts and base plates shall be painted after erection of fence.
- All concrete shall be class C-6 concrete.
- In determining which pipe heights (C-4) to use, the contractor shall select only 6 panels unless a 2nd panel is required to establish the wall height. Two panels shall be placed atop the top of the wall.

**SOUND BARRIER FENCE DETAILS (OPTION)**

**COLUMN CONNECTION TO DRILLED SHAFT**
APPENDIX D
MEMORANDUM

TO: Mr. Donald R. Garrison, P.E.  Date: February 13, 1990

FROM: William E. Neyland, P.E.

SUBJECT: Investigation of Effect of Noise through Drainage Holes in Existing Noise Barrier US 59: SW Freeway @ Chimney Rock, At Larchmont Subdivision CSJ 0027-13-149

Originating Office DDE-SD

On February 9, 1990, the above investigation was made. Drainage holes in one bay of the fan wall were closed by means of stuffing them with rags and placing wooden boards behind them. Drainage holes in the adjacent bay were left open. Noisemeters were placed on wooden blocks in the locations shown in the enclosed sketch. The portion of the barrier chosen was located far enough from Chimney Rock and Barrington to preclude cross street noise as a factor in the investigation. The following readings were observed:

<table>
<thead>
<tr>
<th>TIME</th>
<th>READING METER #2525</th>
<th>READING METER #2537</th>
</tr>
</thead>
<tbody>
<tr>
<td>4:00-4:15 PM</td>
<td>55.7 dBA</td>
<td>56.0 dBA</td>
</tr>
<tr>
<td>4:15-4:30 PM</td>
<td>57.6 dBA</td>
<td>56.8 dBA</td>
</tr>
<tr>
<td>4:30-4:45 PM</td>
<td>56.7 dBA</td>
<td>57.3 dBA</td>
</tr>
<tr>
<td>4:45-5:00 PM</td>
<td>59.2 dBA</td>
<td>58.8 dBA</td>
</tr>
<tr>
<td>5:00-5:15 PM</td>
<td>57.9 dBA</td>
<td>58.3 dBA</td>
</tr>
<tr>
<td>5:15-5:30 PM</td>
<td>56.6 dBA</td>
<td>57.3 dBA</td>
</tr>
<tr>
<td>5:30-5:45 PM</td>
<td>57.4 dBA</td>
<td>57.7 dBA</td>
</tr>
<tr>
<td>5:45-6:00 PM</td>
<td>56.6 dBA</td>
<td>57.9 dBA</td>
</tr>
</tbody>
</table>

AVERAGE 57.2 dBA  57.5 dBA

Based on the above, the conclusion is made that the open drainage holes conduct insignificant noise.

WEN:jcl
Attachment
MEMORANDUM

TO: Mr. Donald R. Garrison, P.E.  
FROM: William E. Neyland, P.E.  
SUBJECT: Investigation of Effect of Noise through Drainage Apertures in Existing Noise Barrier US 59: SW Freeway at Larchmont Subdivision (Near Chimney Rock) 
CSJ 0027-13-149

Date: October 9, 1990

On Monday, October 8, 1990, the above investigation was made. Noisemeters were placed on tripods (meter about 5' above ground) at the locations shown in the sketch. The following readings were observed:

<table>
<thead>
<tr>
<th>TIME</th>
<th>READING (Leq) METER # 2525</th>
<th>READING (Leq) METER # 2542</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 - 9:15 AM</td>
<td>59.1 dBA</td>
<td>58.7 dBA</td>
</tr>
<tr>
<td>9:15 - 9:30</td>
<td>59.0</td>
<td>57.6</td>
</tr>
<tr>
<td>9:30 - 9:45</td>
<td>59.0</td>
<td>57.2</td>
</tr>
<tr>
<td>9:45 - 10:00</td>
<td>58.6</td>
<td>57.8</td>
</tr>
<tr>
<td>10:00 - 10:15</td>
<td>58.4</td>
<td>57.3</td>
</tr>
<tr>
<td>10:15 - 10:30</td>
<td>58.9</td>
<td>57.6</td>
</tr>
<tr>
<td>10:30 - 10:45</td>
<td>58.3</td>
<td>57.4</td>
</tr>
<tr>
<td>10:45 - 11:00</td>
<td>57.9</td>
<td>57.2</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>58.7 dBA</td>
<td>57.6 dBA</td>
</tr>
</tbody>
</table>

Based on the above, the conclusion is made that the drainage apertures conduct insignificant noise.
LARCHMONT SUBDIVISION
NOISE BARRIER
INVESTIGATION OF DRAINAGE APERTURES

SCALE: 1" = 20'
SECTION OF DRAINAGE APERTURE
LARCHMONT SUBDIVISION NOISE BARRIER
9/21/90

State Department Of Highways
And Public Transportation
P.O. Box 1386
Houston, Texas 77251-1386

Attention: Mr. Lonnie B. Beckham P.E.

Reference: Contract No. 0027-13-149
Project MA-F 514(90)
Name US 59
County Harris

Gentlemen;

Per the request of Mr. John Stokes and yourself, below you will find the report on the precasting and erection of our alternate design on the above referenced project.

The Sound Attenuating Barrier Fence was built with a trapezoidal pattern that used both a ten foot and three and one half foot offset. The wall was post-tensioned to a cast-in-place footing with one half inch epoxy coated strand. The panels were cast by Brookshire Concrete Products (BCP) in four and two foot heights. The panels had a 14.14 foot flat side and two wings projecting 7.07 feet or 2.47 feet depending on the offset. The panels were cast in the vertical position. BCP used a form release agent, a concrete kill and water blasting to achieve the exposed aggregate finish. The appearance of the panels was acceptable and improved with experience and when Mr. Beckham modified the mix design of the concrete.

We encountered several problems with the vertical casting of the panels. First since the top edge had to be finished by hand any high spot kept the next panels from seating properly. Secondly, the forming tolerances were very important because of the two protruding wings. If the form was not plumb, if the wing header was not plumb, or if the bottom and top of the panel were not parallel the panels would not properly line-up with the adjacent panels. At times BCP found it difficult to keep all the tolerances perfect and this resulted in some erection problems. The erection problems were solved with a joint seal, shims or grouting the horizontal joints. In the vertical joints we used a silicone sealer to match-up the ball and socket. Knowing what we know now, I doubt BCP or ourselves would cast the panels vertically with the two wings.
The footing was poured with block-outs in the strand locations. We provided the block-outs to ensure the proper location of the post tension strand. The block-outs were filled in after the first couple panels were set. This proved to be helpful as the wall grew as it was set.

The setting of the panels was slower than anticipated due to trying to get the panels both horizontal and vertical, while at the same time trying to get the ball and socket to look acceptable.

The threading of the epoxy coated strand and the tensioning went extremely smooth. Using a calibrated jack and gauge we were assured of a positive connection with the proper tension.

In conclusion, in spite of the initial design problems, a new precaster and other challenges inherent in a new product, we are confident that the State Department of Highways and Public Transportation and the public received an structurally sound and an aesthetically pleasing Sound Attenuating Barrier Fence.

We would like to take this opportunity to make a few comments on Commercial Alternate Designs. The building of the first commercial alternate sound wall has been a learning experience for us. Since bidding and building the sound wall many more jobs have been let, with suppliers proposing many new sound wall systems. These systems are approved "in concept only" and it is our actual experience that the details of a system are often incomplete even with approved designs. It is these incomplete details that leave field personnel (both SD&PT and Contractor) without proper information to finish the project. We would recommend that the SD&PT would pre-approve the sound wall systems with complete details so the contractor and the SD&PT knows what is expected of the finished product.

If additional information is required please contact us.

Sincerely,

David E. Boehm
Vice President.
E.B.L., Inc.

CC: Mr. John Stokes P.E.
PROJECT:   MA-F514(90)
CONTROL:   0027-13-149
HIGHWAY:   US 59
COUNTY:    Harris

Experimental Feature: Trapezoidal (zig-zag) noise wall installed on spread footing.

Construction Report: A report will be transmitted at completion of construction detailing the construction procedure and identifying any specific problems.

Annual Report: A report will be transmitted annually for three years after construction is completed detailing wall and foundation conditions. The report will include information on wall deviation from the vertical condition, exterior finish condition, and foundation cracking and settlement.

Mr. John Stokes, P.E. in Central Design "A" will coordinate with the Resident Engineer, Mr. Lonnie Beckham, P.E., in preparing the post construction report. Mr. Stokes will also prepare the annual follow-up reports.