53
1

LIBRARY COPY
Materials & Research Dept.

67-65

ClibPDF - www.fastio.com

ClibPDF - www.fastio.com

4653
C.1

State of California
Department of Public Works
Division of Highways
Materials and Research Department

February 1967

Lab W. O. 19605-762550-36409
District W. O. 04505-121514
04-SON-101-19.0/19.5 204.461

Mr. H. Ayanian
Deputy District Engineer
District 04
Division of Highways
San Francisco, California

Dear Sir:

Submitted in response to your letter of December 16, 1966, is a report of:

TRAFFIC NOISE STUDY

ADJACENT TO 04-SON-101 SANTA ROSA

NEAR HIGHWAY 12 INTERCHANGE

Study made by. . . . . Structural Materials Section
Under general direction of . . . . . E. F. Nordlin
Work Supervised by . . . . . J. E. Barton
Measurements and report by . . . . . Louis Bourget

Very truly yours,

JOHN L. BEATON
Materials and Research Engineer

JEB:LB:bk

67-65

ClibPDF - www.fastio.com

ClibPDF - www.fastio.com

INTRODUCTION

This study was made pursuant to a letter dated December 16, 1966, with attachment dated October 18, 1966, from Mr. H. Ayanian, Deputy District Engineer, District 04, to Mr. J. C. Womack, attention Mr. J. L. Beaton. The letter of October 18, 1966 mentions a complaint from Mr. Jack Zimmer of 230 Barnett Street, Santa Rosa, regarding freeway related noise adjacent to the southwest quadrant of Route 101 and Route 12 interchange in Santa Rosa. The District also requested that the Materials and Research Department look into the matter and make noise level measurements at the location.

ClibPDF - www.fastio.com

SUMMARY OF PROBLEM
AND
A POSSIBLE SOLUTION

The highway traffic noise that disturbs Mr. Jack Zimmer, is the result of a direct line of sight exposure to freeway vehicles including heavy diesel trucks, at a distance of slightly over 200 feet from the Zimmer residence. Other homes exist along the remaining portion of South Davis Street between Barnett Street and Barham Avenue and have a similar noise exposure. A map is presented as Exhibit 1 in the Appendix.

A photograph of the area between Highway 101 and the adjacent residences is presented as Exhibit 2. This was taken from an elevated position on the Pedestrian Separation stairway looking northward.

The highest noise peaks that are encountered in areas adjacent to highways are from diesel trucks, and these account for most of the complaints of excessive noise. The usual peak noise range in decibels A scale (DBA) that is developed by diesel trucks along California highways, at various distances

ClibPDF - www.fastio.com

over flat terrain, is shown as Exhibit 3. The reliability of this chart has been proven by comparison with the actual measurements of thousands of trucks traveling on various California highways. The usual peak noise range for trucks, at a distance of 200 feet, is 69 to 79 DBA. The measurements obtained at the exposed side of the Zimmer residence are almost identical and range from 70 to 79 DBA as shown on the noise recordings Exhibit 4. The amount of noise penetration to the interior of a residence 200 feet away through closed but exposed windows, can be approximated as follows:

Exterior noise peaks	70 to 79	DBA
Transmission loss (-)	-25	-25 DBA
Interior noise peaks	45 to 54	DBA

An acceptable range of noise levels for the interior of homes is about 35 to 45 DBA.[1] Therefore, a noise reduction of 10 to 14 DBA could bring the maximum interior noise peaks nearer to an acceptable range.

The most effective method of reducing the noise radiated from the highway is to employ a solid noise barrier along the right of way. A noise reduction of 10 to 16 decibles can be obtained from

ClibPDF - www.fastio.com

barriers that are tall enough to screen the vehicles from view (at the height of residence windows, in this case).[2] Some practical types of noise barriers are:

1. An earth mound, about 10 feet high.
2. A concrete curtain wall of the same height.

Either of these barrier types can produce a noise reduction of 10 to 14 DBA at the first floor levels of adjacent residences.

The appearance of an earth mound can be improved by planting ground cover or low lying shrubbery. The appearance of a wall can be improved by incorporation of coloring materials into the mix. The wall could eventually be hidden by vines or tall growing shrubs. The long term appearance would be similar to other well planted areas along existing routes in District 04.

It should be mentioned that plantings alone, without a noise barrier, are permeable to airborne sound and cannot produce a significant noise reduction within the right of way space that is generally available. Over 200 feet of dense jungle growth, thick enough to obscure the noise source, would be required to approach

ClibPDF - www.fastio.com

the noise reduction offered by a solid barrier.[3]

The reduction of vehicular noise radiation is important enough to the public to warrant serious consideration in the planning stage wherever it is technically and economically feasible and the need can be recognized in advance. Evidently the Aesthetics Committee recognizes the need, for their pamphlet, "Aesthetics - BE SPECIFIC", says on page 36: "Absence of irritating qualities would relate specifically to the effect on the community of fumes and noise." And then goes on to say, "Earth mounding might possibly be exploited more in the future for transitioning areas and as barriers between freeway and community."

ClibPDF - www.fastio.com

REFERENCES

1. Knudsen, V. O. and C. M. Harris, Acoustical Designing in Architecture, John Wiley & Sons, New York, 1950.

2. Rettinger, M., Noise Level Reductions of Barriers, Noise Control (per) Vol. 3, No. 5, September, 1957.

3. Eyring, C. F., Jungle Acoustics, Journal of the Acoustical Society of America, Vol. 18, No. 2, October, 1946.

ClibPDF - www.fastio.com

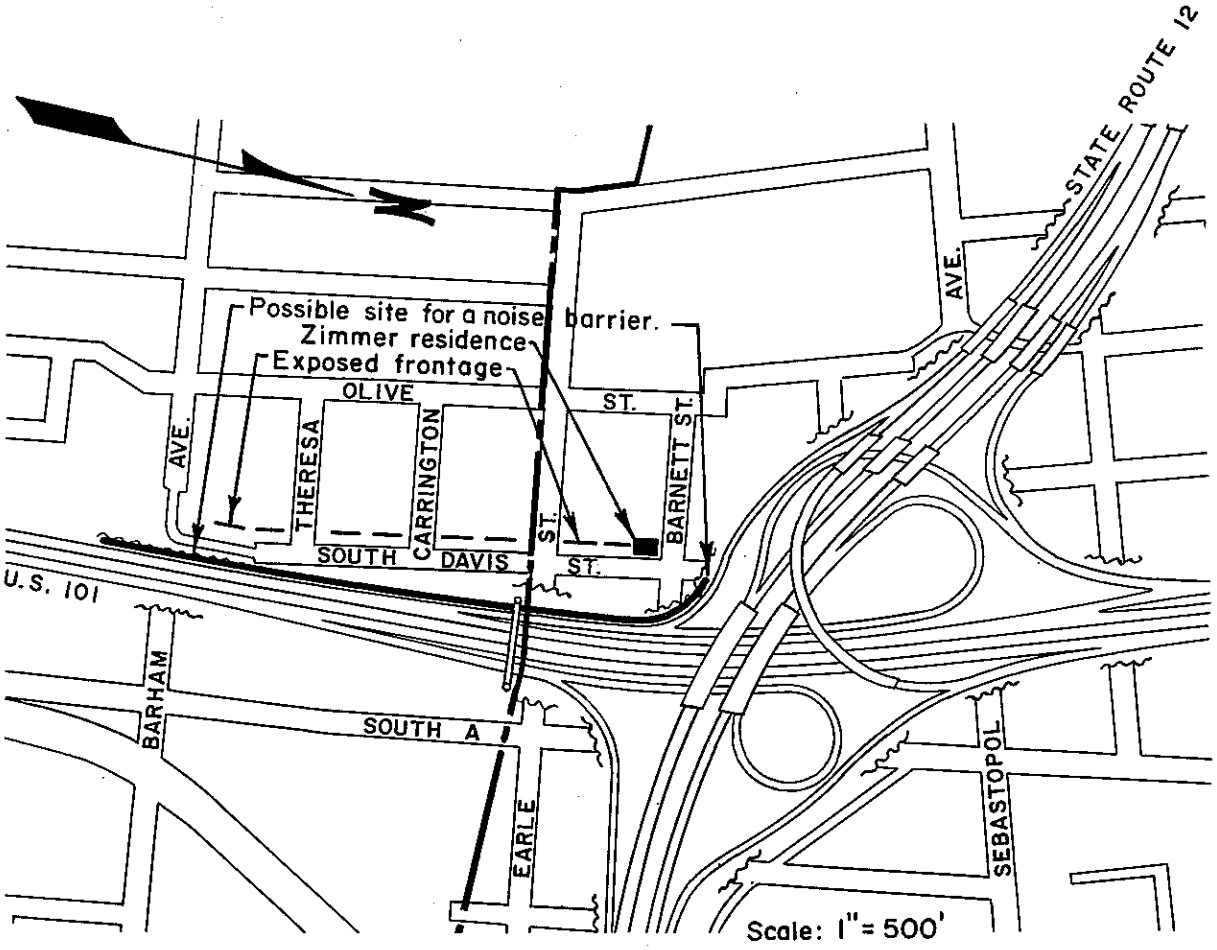


FIGURE 1

MAP OF EXPOSED FRONTAGE RESIDENCES ALONG SOUTH DAVIS STREET IN SW QUADRANT OF ROUTE 101/12 INTERCHANGE. A POSSIBLE SITE FOR A NOISE BARRIER IS SHOWN BUT IS CONTINGENT UPON TECHNICAL AND ECONOMIC FACTORS.

ClibPDF - www.fastio.com

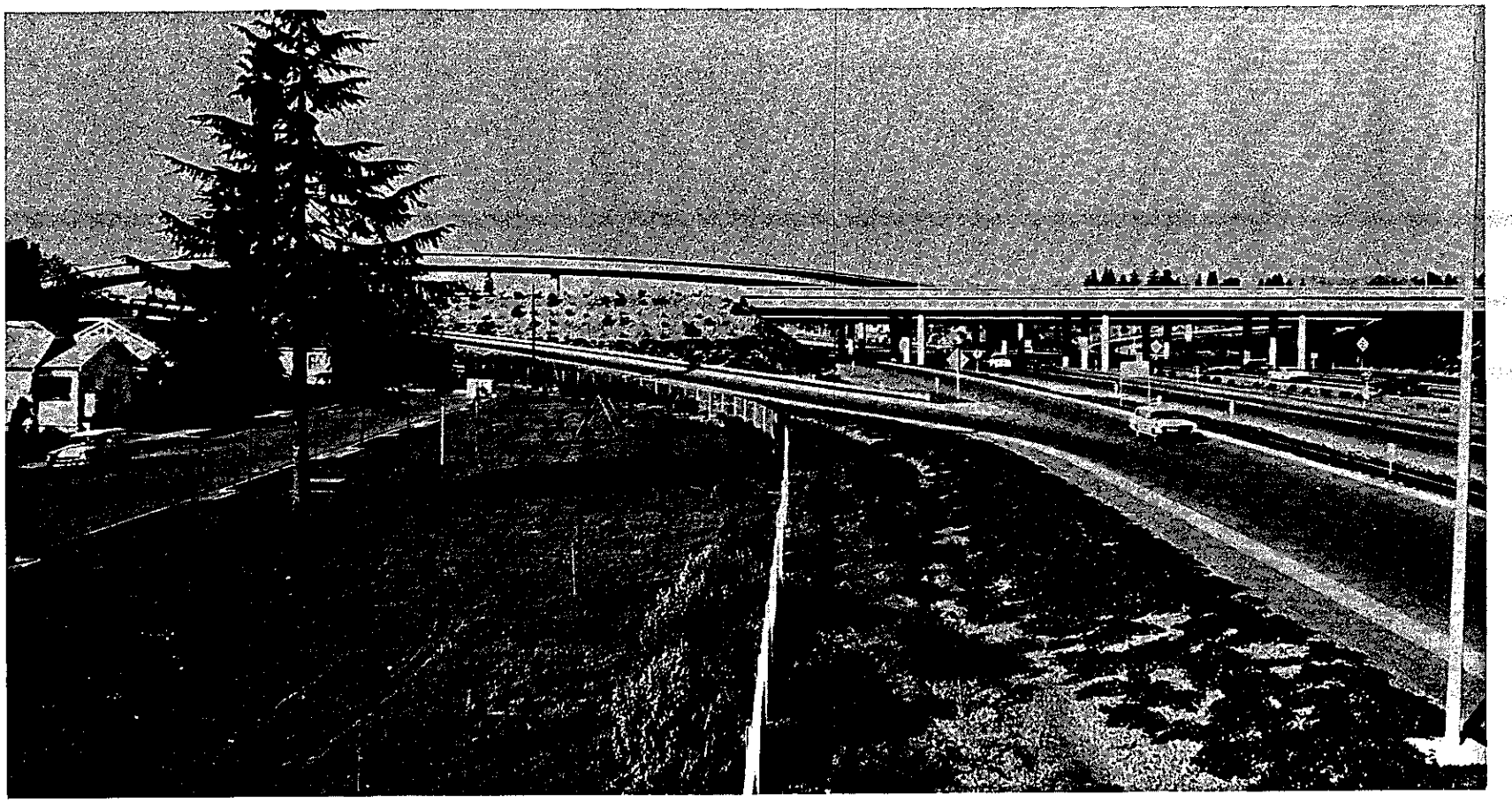


FIGURE 2

AREA BETWEEN HIGHWAY 101 AND SOME RESIDENCES ON SO. DAVIS STREET
(FROM AN ELEVATED STAIRWAY ON THE PEDESTRIAN SEPARATION, LOOKING NORTHWARD)

ClibPDF - www.fastio.com

ClibPDF - www.fastio.com

FLAT SECTION

TRUCK PEAK NOISE RANGE OF MOST FREQUENT OCCURRENCE

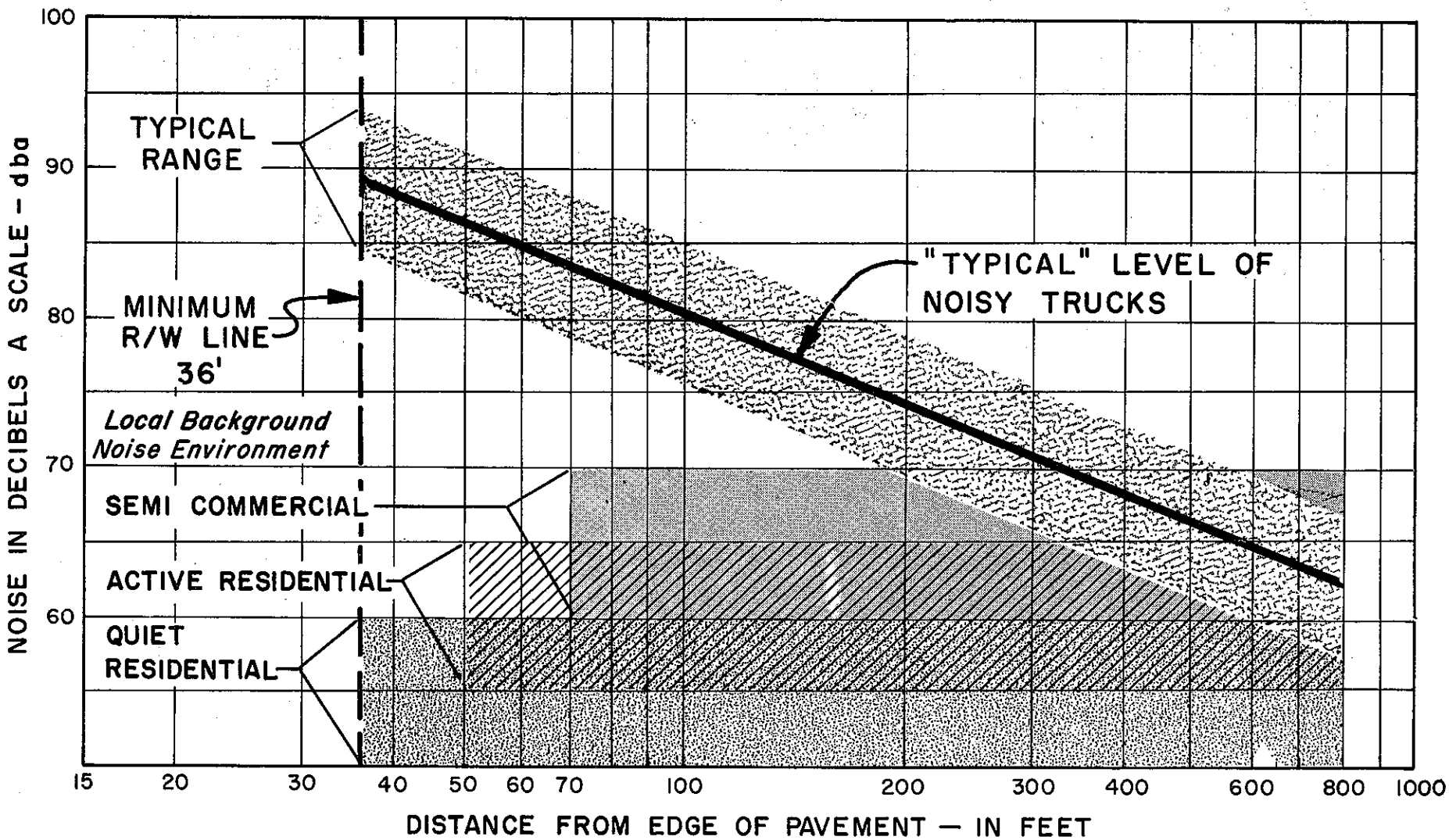
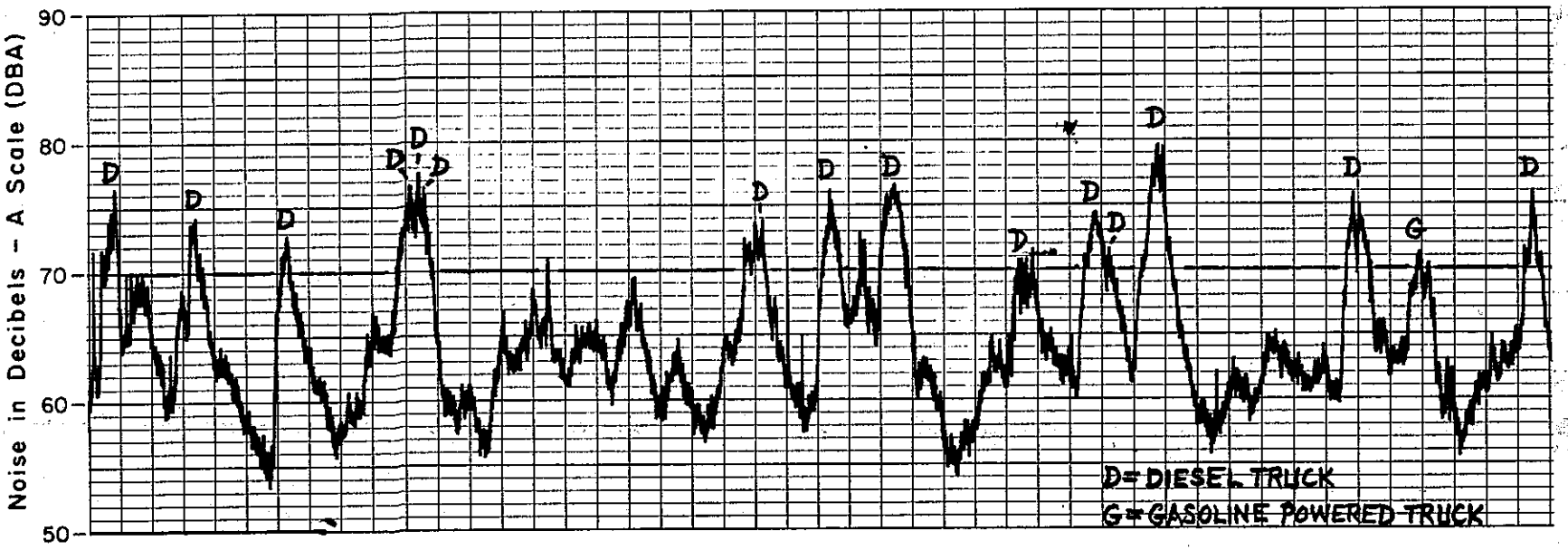


FIGURE 3

ClibPDF - www.fastio.com



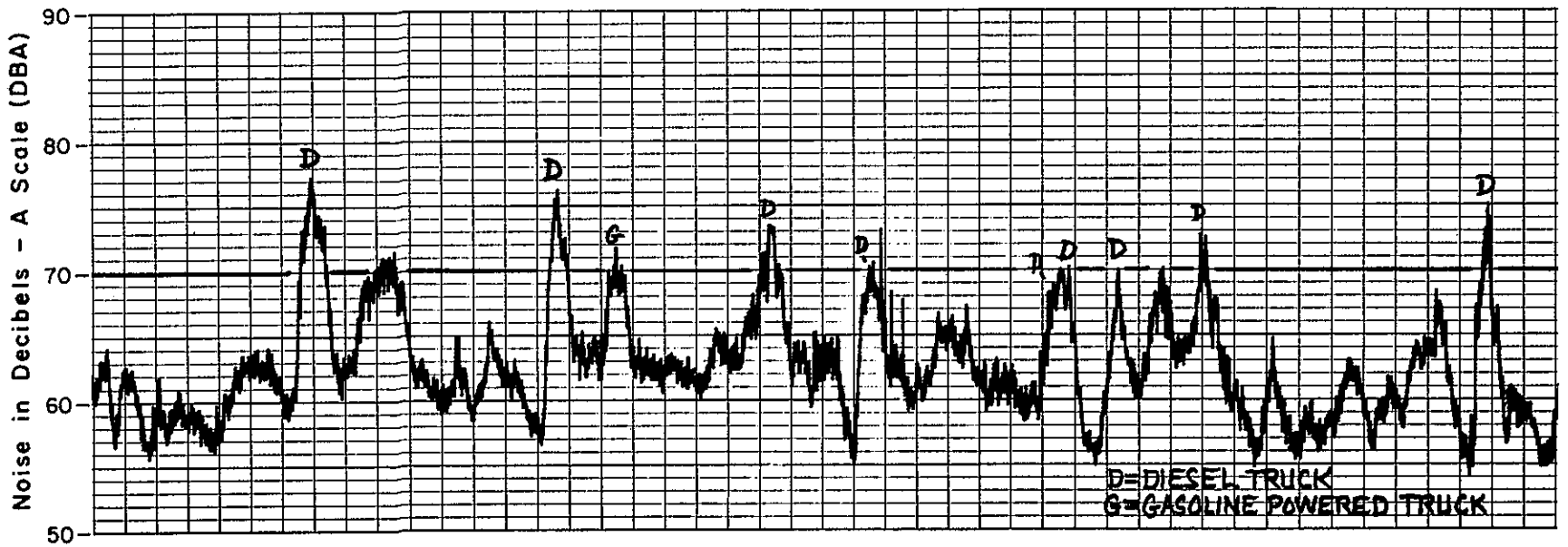


FIGURE 4

NOISE RECORDED NEAR ZIMMER RESIDENCE FROM VEHICLES ON HIGHWAY 101.
TRUCK NOISE PEAKS RANGE FROM 70 TO 79 DBA.
NEARLY ALL AUTOMOBILES ARE BELOW 70 DBA.