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STATE OF CALIFORNIA—TRANSPORTATION AGENCY

RONALD REAGAN, Governor

DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
MATERIALS AND RESEARCH DEPARTMENT
5900 FOLSOM BLVD., SACRAMENTO 95819

October 1969

File: M & R No. 36460

Your: 07-LA-2 2.3/11.5
Beverly Hills Freeway
Between San Diego Freeway
and Vermont Avenue
Dist. W.O. 07220-031101

Mr. Haig Ayanian
District Engineer
District 07

LIBRARY COPY
Materials & Research Dept.

Attention: Mr. A. A. Smith
Assistant District Engineer
Design D

Dear Sir:

Submitted in response to your letter of April 8, 1969, to Mr. K. E. McKean, Engineering Services, is a report of:

TRAFFIC NOISE STUDY - ROUTE 2

CITY OF BEVERLY HILLS AND

WEST LOS ANGELES AREAS

W. H. AMES
Principal Investigator

LOUIS BOURGET
Co-Principal Investigator

Very truly yours,

JOHN L. BEATON
Materials and Research Engineer

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This study was made pursuant to a letter dated April 8, 1969, from Mr. A. A. Smith, Assistant District Engineer, to Mr. K. E. McKean, Engineering Services, and directed to the attention of Mr. J. L. Beaton, Materials and Research Engineer.

OBJECTIVES

The request for this noise study was made by the district to permit a comparison of the existing traffic noise levels, at selected locations adjacent to Santa Monica Boulevard, with the noise levels that can be expected from several contemplated freeway plans. The plans follow the general route of Santa Monica Boulevard through the Beverly Hills and West Los Angeles areas.

The information should be helpful in identifying specific problem areas and in selecting an over-all plan that may minimize noise changes along the adjacent properties.

EQUIPMENT AND METHODS

All of the measurements cited in this report were made with a General Radio Sound Level Meter employing the A weighting network for a direct readout in decibels A scale (dBA). This is the current standard practice for evaluating motor vehicle noise and has been accepted by the Acoustical Society of America, the Society of Automotive Engineers, and the International Standards Organization.

The output of the sound level meter was coupled to a General Radio Graphic Level Recorder to furnish strip chart recordings of the noise measurements. Calibration of the complete system was performed prior to every recorded run.

FREEWAY NOISE PREDICTION

The prediction of noise levels at various distances from different freeway designs is a feasible practice as it is based on the experience of hundreds of field measurements obtained near freeways with traffic traveling at normal highway speeds. The freeway noise sources employed as a reference are diesel trucks, rather than automobiles, because trucks are the cause of most noise complaints near California highways. Figure 1 in the Appendix shows the usual range of truck noise at various distances over open flat terrain where the trucks are fully exposed to view. This chart also applies to any other highway design where the listener is directly exposed to a full view of the vehicles, as in the case of a listener at an upper apartment balcony or open window parallel to an elevated freeway, or for the same listener looking down on fully exposed vehicles in a depressed freeway.

Figure 2 shows the noise encountered at various distances from three basic highway designs with the microphone about 5 to 6 feet above the ground. The noise advantage of an elevated highway and a depressed highway are compared to a highway at grade in flat

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terrain. The elevated highway is about 3 decibels less noisy than the highway at grade, but only if the listener is at a lower elevation than the traveled lanes. The depressed highway is about 10 decibels quieter than the highway at grade, but only at distances great enough to shield the vehicles from view. Shielding is usually obtained beyond 100 feet for single level residences or beyond 150 feet for two storied residences.

SUMMARY

The present frontage buildings within 50 to 100 feet of Santa Monica Boulevard are now exposed to noise peaks from traffic that range from 75 to 87 dBA. There are some random 90 dBA peaks from especially loud trucks or sports cars and from a night train. The usual range of 75 to 87 dBA is similar to the peak noise range from freeway traffic at a visible exposure distance of 100 feet. Figure 1, in the Appendix, shows that the typical noise range of freeway trucks is 74 to 86 dBA at 100 feet. In effect, the nearest buildings along Santa Monica Boulevard are frequently exposed to the equivalent of freeway noise in proportion to their distance from the traffic but have none of the advantages of a free flowing thoroughfare that could relieve the frontage roads from a considerable amount of the present traffic burden. However, there are some differences that are not indicated by the numbers alone. The quantity of trucks encountered at night will probably be greater on a freeway than at present on Santa Monica Boulevard. A higher occurrence rate can increase the amount of annoyance and produce an effect similar to a rise in noise levels, even though the peak noise readings may be no higher than before. Other changes will take place where frontage buildings must be removed. Newly exposed residences can experience a rise in noise levels from the loss of noise shielding offered by the present frontage buildings.

The effects of these noise changes near residences can be reduced by two methods: by increasing the setback distance to a greater amount than now exists from present traffic, preferably to 150 feet or more, or by combining noise shielding with the maximum available setback distance, preferably 100 feet or more.

The noise reducing properties of a depressed plan may void the need for noise shielding except where an unusual amount of visual exposure to the vehicles develops. Where the need develops, the noise can be reduced by substituting a noise shield for the open chain link protective fencing near the edge of the cut.

A split level plan depends upon obtaining a maximum setback distance for noise control near residences. It is desirable that the setback be over 150 feet if unshielded or over 100 feet with noise shielding to minimize changes in the noise environment. The lower level of the structure will be partially shielded by the design. The noise radiation from the upper deck may be reduced by installing a noise shield above the concrete parapet of the bridge barrier rail on both sides of the structure. The optimum height for a noise shield would be about ten feet (above the parapet) to completely shield the trucks from view, but this would be difficult to achieve in a design with an acceptable appearance. A beneficial improvement may also be

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obtained from a noise shield extending six feet above the parapet. This compromise height could reduce the noise from all automobile sources and provide a significant reduction from truck engine, fan, and tire noise. Truck exhaust noise would be partly reduced but only at lower elevations.

An effective noise shield may be obtained from lightweight A-10 weatherproof panels in some appropriate color or design or by a concrete curtain wall. If the installation of noise shielding is regarded as excessively offensive in any form, there is a less obvious method that may deserve serious consideration. This is the planned replacement of residential frontage with attractive commercial frontage such as air conditioned office buildings and business establishments that are relatively immune to exterior noise and can serve as noise shielding to the residences behind them. The communities may be more amenable to this approach and willing to cooperate.

Comment follows on each of the plans submitted for review:

PLAN 6-F-1

According to these guidelines the least desirable arrangement is a fully elevated structure as shown in Plan 6-F-1. This plan cannot be recommended because it widens the noise source and reduces the setback distance to the remaining adjacent buildings. The noise levels would rise at virtually all locations and introduce problems for which there are no adequate solutions at the present time.

PLAN 6-D-3

The noise reducing properties of Plan 6-D-3 are exemplary between Wilshire Boulevard and Doheny Drive, where the highway is depressed and partially covered. However, these advantages may be offset by ventilation problems. Adequate ventilation equipment could radiate enough noise back into the community to cancel most of the benefits of the design. Maintenance problems would be excessive and a health hazard would exist during periods of electrical or mechanical trouble. Plan 6-D-3 would also be excessively noisy west of Wilshire Boulevard where it becomes a fully elevated structure of maximum width and has the same noise problems as elevated Plan 6-F-1.

PLAN 7-C-5

This plan, or a reasonable equivalent offering wider setback distances, may be the best practical solution available. It provides a depressed freeway without ventilation problems between Wilshire Boulevard and Doheny Drive. It also provides a narrower split level structure, west of Wilshire Boulevard, where insufficient width may exist for a depressed plan. The split level portion can (and should) be arranged to offer a maximum setback distance to all remaining properties. If the setback distance is less than 150 feet, a significant improvement is possible if noise shielding can be installed along both sides of the upper level. Full noise shielding

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may be considered offensive, but a six foot noise shield may offer a significant noise reduction without seriously degrading the appearance of the structure.

PLAN 6-B-1

This plan indicates a split level structure throughout most of its length. It can offer favorable noise control where its narrower width requirement is properly exploited to yield a greater setback distance from adjacent properties. It is desirable that this distance be 150 feet or more. If this is not possible, a significant noise reduction can be obtained by installing six feet of noise shielding along both sides of the upper level. The split level structure is not equal to a depressed highway in appearance or noise control but can be a suitable alternative where space requirements are critical.

RESULTS OF NOISE MEASUREMENTS

Separate noise recordings were obtained at twenty-two locations in the vicinity of the proposed freeway routes. The peak noise ranges are presented along with the estimated noise levels that will be produced by three typical freeway designs at the same locations. Allowance has been made for the degree of visibility as well as for distance. Where future noise is indicated as less than the existing noise, the existing noise may continue to be dominant. Where future noise is higher than the existing noise, the higher figure alone applies. Where future noise and existing noise are equal, a slight rise in noise will result. The effects of the various freeway plans are discussed in the summary.

Location 1. Mormon Temple grounds at crest of terraced lawn. The present noise peaks range from 60 to 70 dBA from vehicles on Santa Monica Boulevard. Noise from birds and from local vehicles passing near the parking area ranged from 60 to 73 dBA. The estimated future peak noise ranges from freeway proposals are:

Fully elevated plan	63 to 74 dBA	Not advised
Split level plan	62 to 72 dBA	
Depressed plan	60 to 70 dBA	May not be feasible

There should be no significant noise change with a split level plan due to the excellent setback distance from the traveled lanes.

Location 2. Manning Avenue one-half block south of Santa Monica Boulevard. The present noise peaks range from 65 to 77 dBA for aircraft and 63 to 73 dBA from motor vehicles. Future noise levels will be higher as a result of the loss of setback distance and the removal of frontage buildings that now offer noise shielding. The estimated peak noise ranges from freeway proposals are:

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Fully elevated plan	74 to 86 dBA	Not recommended
Split level plan	71 to 81 dBA	
Depressed plan	73 to 83 dBA	May not be feasible

Some degree of noise adaption will be required at the nearest residences. A depressed plan may not be technically feasible because the freeway must rise above ground level in this general vicinity to prepare for the interchange with the San Diego Freeway. The split level plan permits obtaining the greatest setback distance and the least rise in noise levels. A six foot noise shield, above the barrier rail of the upper deck, is suggested for your consideration wherever the setback is less than 150 feet to residences on either side.

Location 3. Manning Avenue at Missouri Avenue, one block south of Santa Monica Boulevard. The present noise peaks range from 68 to 78 dBA and are produced by the nearest local vehicles. The estimated future peak noise levels from various freeway proposals are:

Fully elevated plan	63 to 73 dBA	Not advised
Split level plan	61 to 71 dBA	
Depressed plan	55 to 65 dBA	

There should be no significant noise change from any of the proposed plans due to the wide setback distance from the traveled lanes and the shielding effect of intervening buildings.

Location 4. Eastborne Avenue at Fairburn Avenue, one block north of Santa Monica Boulevard. Present noise peaks range from 68 to 78 dBA from the combined effects of local vehicles and Santa Monica Boulevard traffic.

Estimated future peak noise levels from various freeway proposals are:

Fully elevated plan	72 to 82 dBA	Not recommended
Split level plan	68 to 78 dBA	
Depressed plan	62 to 72 dBA	

Either a split level or depressed plan is suggested.

Location 5. Eastborne Avenue at Beverly Glen Boulevard. Present noise peaks from local traffic on Beverly Glen Boulevard range from 75 to 85 dBA. The estimated future peak noise levels from freeway proposals are:

Fully elevated plan	72 to 82 dBA	Not advised
Split level plan	70 to 80 dBA	
Depressed plan	62 to 72 dBA	

Either a split level or depressed plan is suggested.

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Location 6. Hospital on south side of Santa Monica Blvd. at Beverly Glen Boulevard. Present noise peaks range from 75 to 89 dBA at this busy intersection. This is an undesirable noise environment for a hospital, but it is a condition that already exists. The hospital needs sealed double windows and a central air exchange system or air conditioning system for noise protection in the existing environment.

The estimated future peak noise range from freeway proposals are:

Fully elevated plan	82 to 92 dBA	Not recommended
Split level plan	75 to 85 dBA	
Depressed plan	73 to 83 dBA	

Either a split level or depressed plan is suggested. Noise shielding is desirable but neither plan can relieve the need for better noise protection in the present environment by the methods already described. Noise shielding of the highway will not reduce the level from the local traffic. Noise shielding at the hospital can reduce the noise penetration from all external sources and is regarded as essential.

Location 7. Beverly Glen Boulevard 300 feet south of Santa Monica Boulevard. Present noise peaks range from 71 to 81 dBA from local traffic.

The estimated future peak noise range from freeway proposals are:

Fully elevated plan	66 to 76 dBA	Not advised
Split level plan	64 to 74 dBA	
Depressed plan	60 to 68 dBA	

Either a split level or depressed plan is suggested.

Location 8. Southeast corner, Wilshire at Santa Monica Boulevard. Present noise peaks range from 78 to 90 dBA. The estimated future peak noise range from freeway proposals are:

Fully elevated plan	78 to 92 dBA	Not recommended
Split level plan	76 to 86 dBA	
Depressed plan	74 to 84 dBA	

A depressed plan is suggested from Wilshire to Doheny Drive.

Location 9. Park Circle, Wilshire at Santa Monica Boulevard northeast corner. Present noise peaks range from 76 to 87 dBA. The estimated future peak noise range from freeway proposals are:

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Fully elevated plan	82 to 90 dBA	Not advised
Split level plan	76 to 86 dBA	Retains park
Depressed plan	74 to 84 dBA	Eliminates park

A depressed plan is suggested from Wilshire to Doheny Drive.

Location 10. Walden Drive at 175 feet north of Santa Monica Boulevard. Present noise peaks range from 65 to 75 dBA. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	70 to 80 dBA	Not advised
Split level plan	67 to 77 dBA	
Depressed plan	63 to 73 dBA	

The depressed plan is suggested.

Location 11. Walden Drive at 275 feet north of Santa Monica Boulevard. Present noise peaks range from 67 to 77 dBA. The estimated noise peaks from freeway proposals are:

Fully elevated plan	67 to 77 dBA	Not advised
Split level plan	63 to 73 dBA	
Depressed plan	58 to 68 dBA	

The depressed plan is suggested.

Location 12. All Saints Episcopal Church, Santa Monica Boulevard between Camden and Rodeo Drives. Present noise peaks range from 75 to 87 dBA from Santa Monica Boulevard traffic. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	80 to 90 dBA	Not advised
Split level plan	75 to 85 dBA	Not advised
Depressed with partial shield	70 to 80 dBA	

The depressed plan is suggested.

Location 13. Rexford Drive at 380 feet north of Santa Monica Boulevard. The present noise peaks range from 68 to 78 dBA and are produced by local vehicles on Rexford Drive. The estimated future noise levels from freeway proposals are:

Fully elevated plan	66 to 76 dBA	Not advised
Split level plan	63 to 73 dBA	
Depressed plan	58 to 68 dBA	

The depressed plan is suggested.

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Location 14. Rexford Drive at 280 feet north of Santa Monica Boulevard. Present noise peaks are from vehicles on Rexford Drive and range from 70 to 80 dBA. The estimated peak noise range from freeway proposals are:

Fully elevated plan	70 to 80 dBA	Not advised
Split level plan	66 to 76 dBA	
Depressed plan	62 to 72 dBA	

The depressed plan is suggested.

Location 15. Rexford Drive 180 feet north of Santa Monica Boulevard. Present noise peaks range from 70 to 80 dBA. The recording missed some vehicles between 75 and 80 dBA but shows a fire truck (no siren) at 90 dBA. The estimated future noise peaks from freeway proposals are based on removal of buildings north of Santa Monica Boulevard to the nearest alley. At the alley the estimated noise peaks are:

Fully elevated plan	70 to 80 dBA	Not advised
Split level plan	66 to 76 dBA	
Depressed plan	62 to 72 dBA	

The depressed plan with a wide residential setback on the north side of Santa Monica Boulevard, between Rexford and Carmelita, offers good noise control, but the slope angle should not be so gentle as to permit a view of the freeway vehicles from the residences north of the alley.

Location 16. City Hall corner at 20 feet from Rexford Drive. Present noise peaks range from 75 to 84 dBA at this busy intersection. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	80 to 90 dBA	Not advised
Split level plan	72 to 82 dBA	
Depressed plan	70 to 80 dBA	

The depressed plan is suggested.

Location 17. Rexford Drive near Police Department. The present noise peaks range from 70 to 80 dBA with an occasional siren to 86 dBA. This is not a particularly noise sensitive environment. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	70 to 80 dBA
Split level plan	64 to 74 dBA
Depressed plan	60 to 70 dBA

The depressed plan is suggested.

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Location 18. Near Wonder Bread building on Santa Monica Boulevard and Alpine. Present noise peaks range from 71 to 86 dBA. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	80 to 90 dBA	Not advised
Split level plan	76 to 86 dBA	
Depressed plan	70 to 80 dBA	

More sensitive structures east of this location will need the protection offered by a depressed plan.

Location 19. Doheny Drive opposite Rangely Avenue. Present noise peaks range from 70 to 80 dBA. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	70 to 76 dBA
Split level plan	63 to 73 dBA
Depressed plan	58 to 68 dBA

The depressed plan is suggested.

Location 20. Doheny Drive at Santa Monica Boulevard southwest corner. Present noise peaks range from 75 to 88 dBA at this busy intersection. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	76 to 86 dBA	Not advised
Split level plan	75 to 85 dBA	
Depressed plan	70 to 80 dBA	

The depressed plan is suggested.

Location 21. Doheny Drive near Carmelita Place. Present noise peaks range from 72 to 83 dBA. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	74 to 84 dBA	Not advised
Split level plan	70 to 80 dBA	
Depressed plan	70 to 80 dBA	

The depressed plan is suggested.

Location 22. Doheny Drive near Nemo Street. Present noise peaks range from 73 to 83 dBA from local traffic on Doheny Drive. The estimated future noise peaks from freeway proposals are:

Fully elevated plan	70 to 80 dBA	Not advised
Split level plan	66 to 76 dBA	
Depressed plan	68 to 78 dBA	

The depressed plan is suggested for compatibility elsewhere.

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Figure I

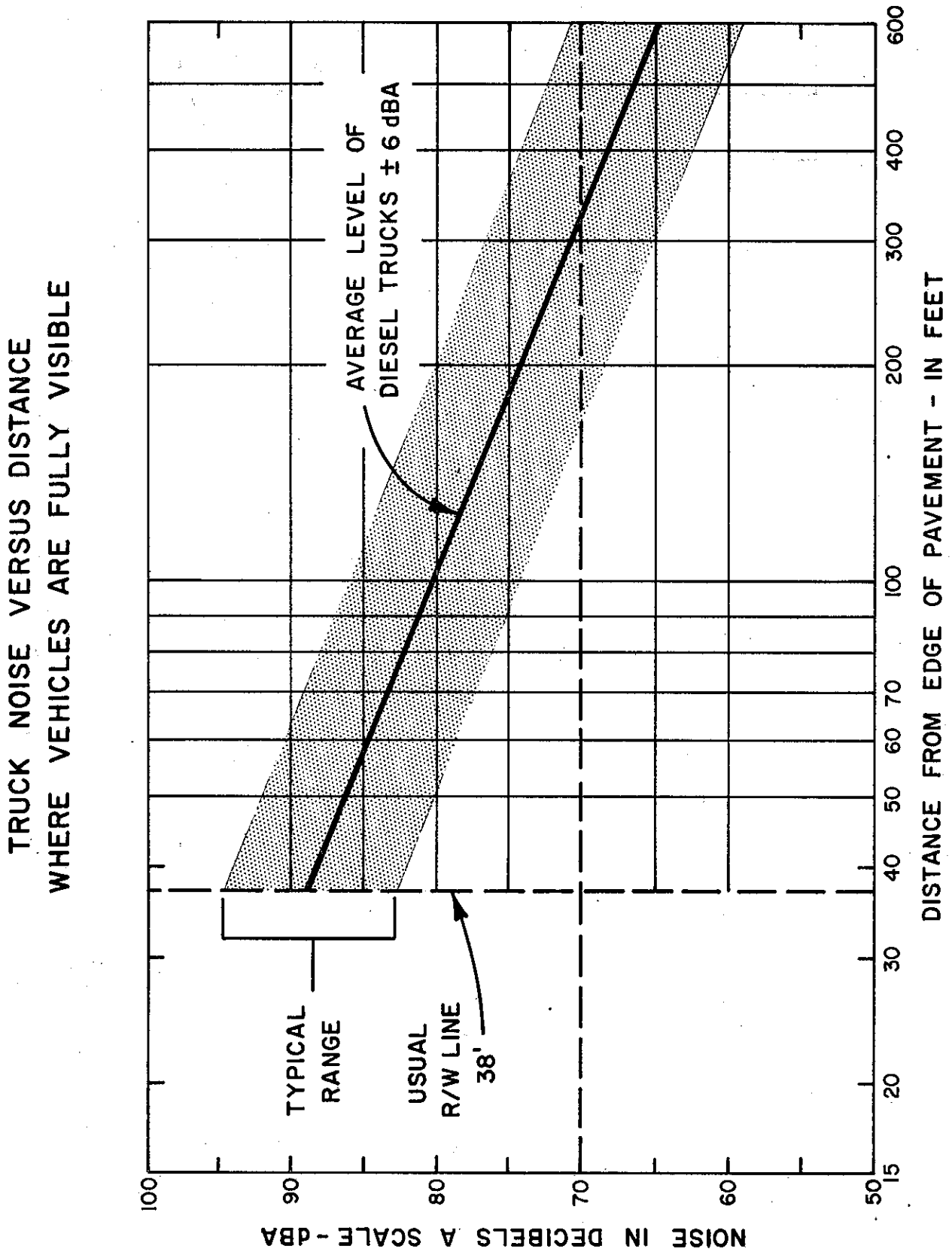

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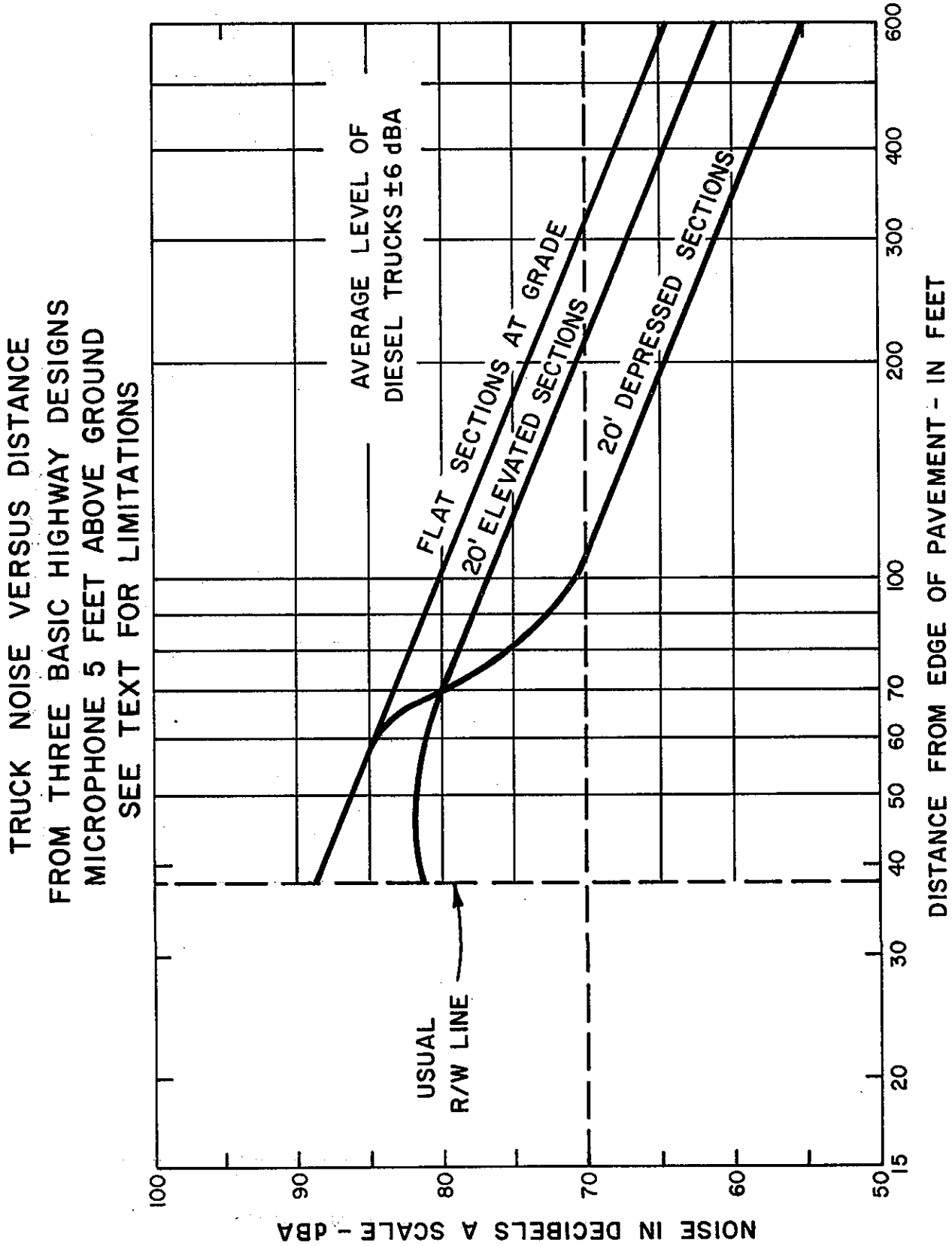
Figure 2



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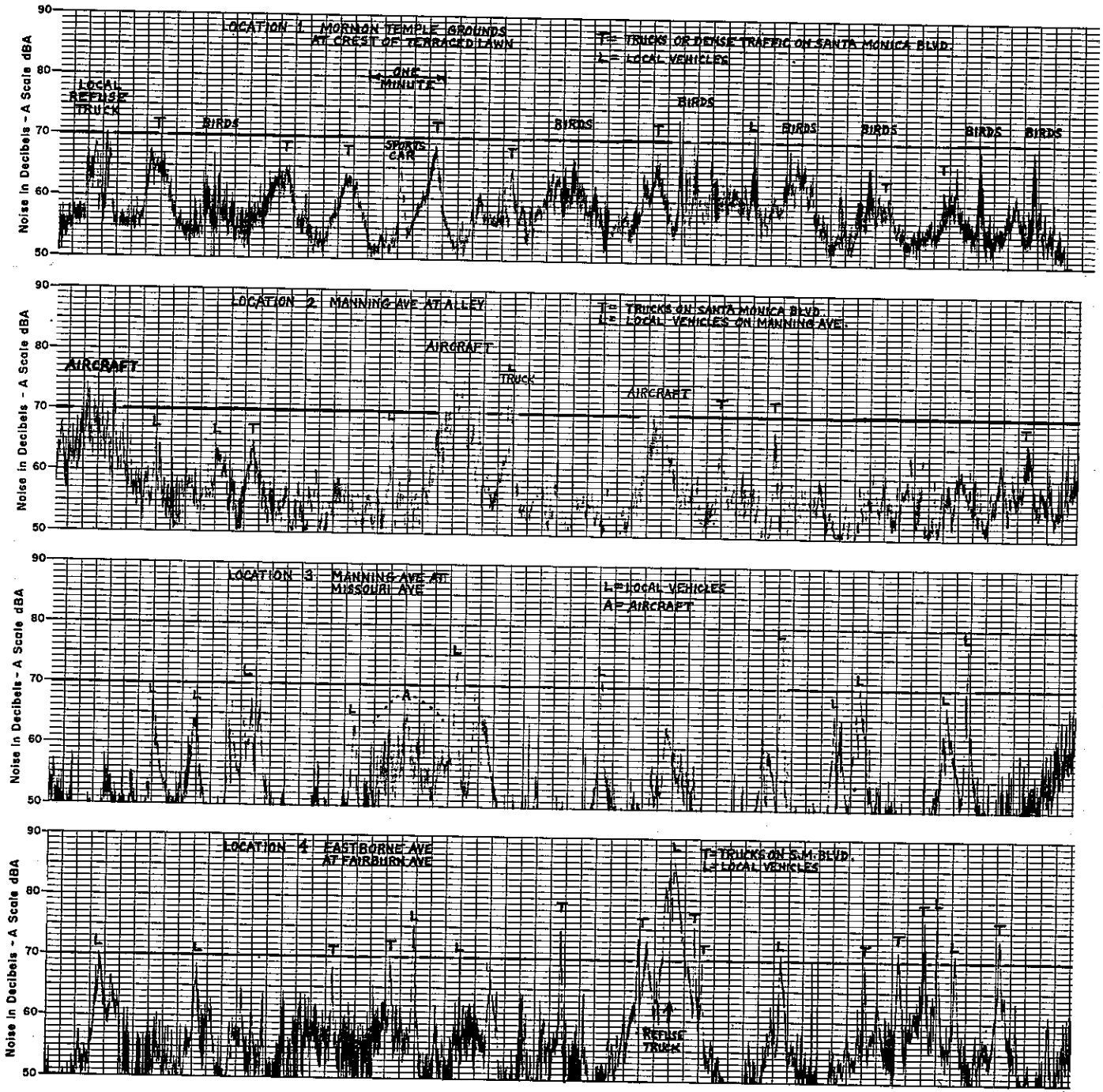

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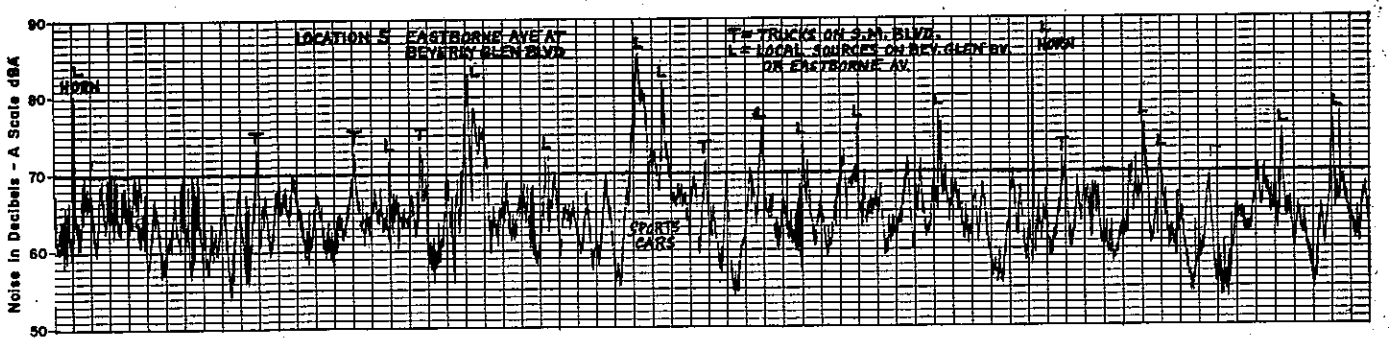

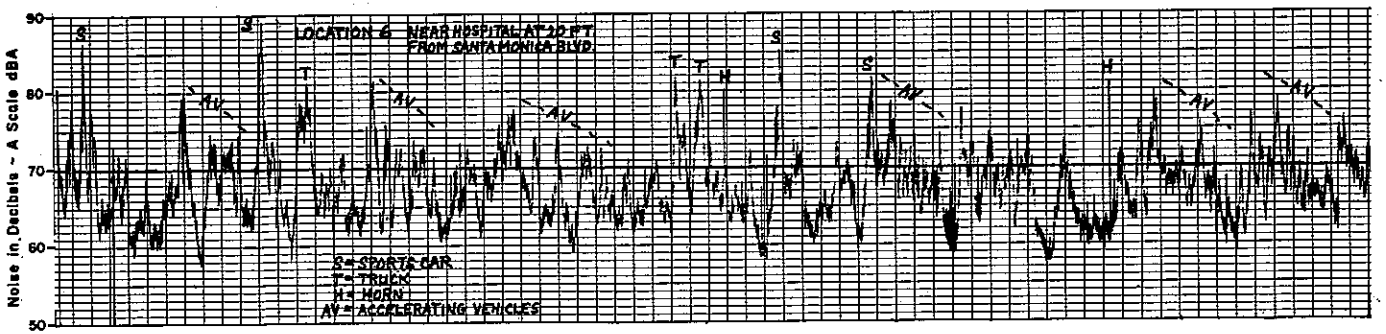

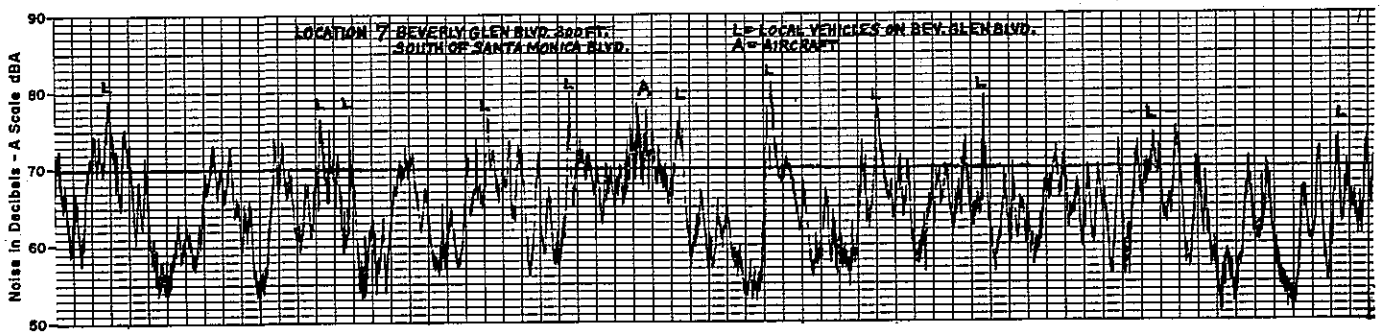

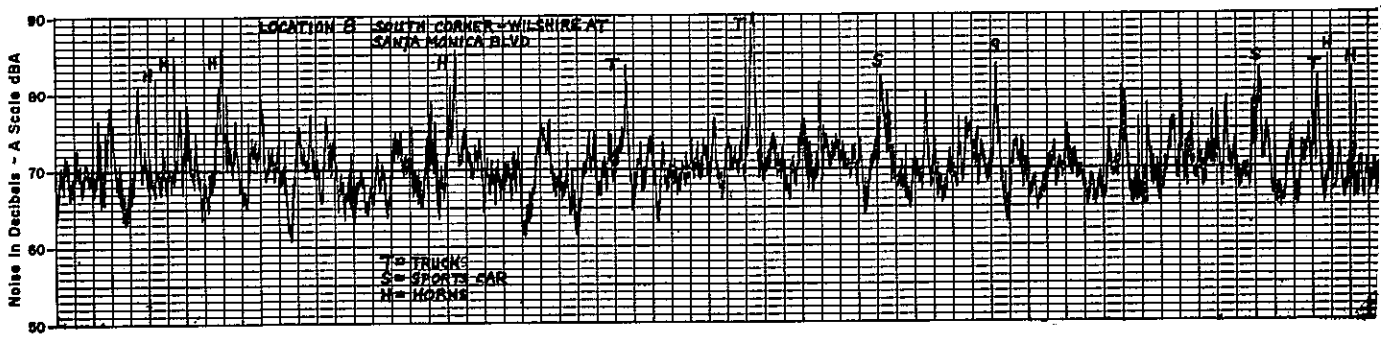

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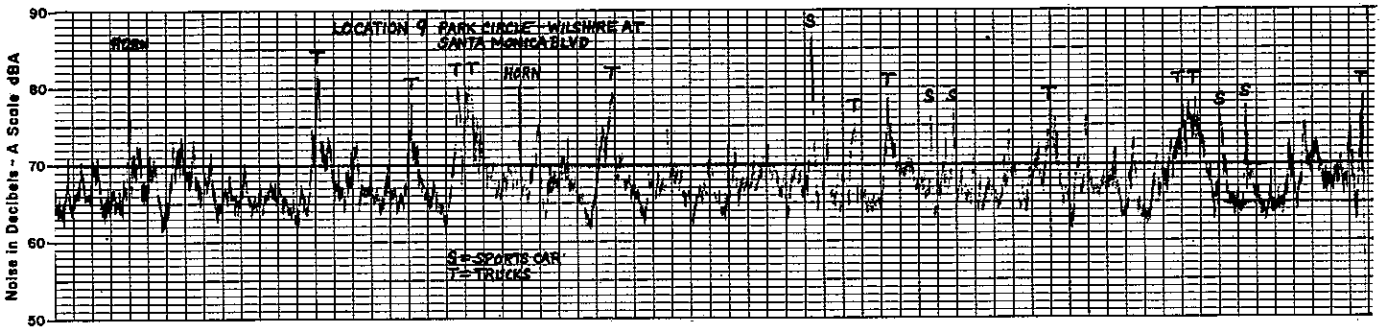

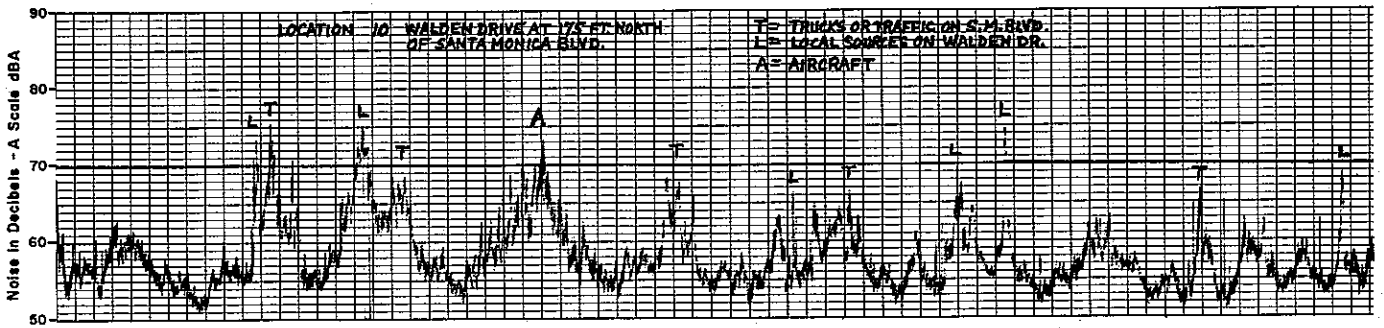

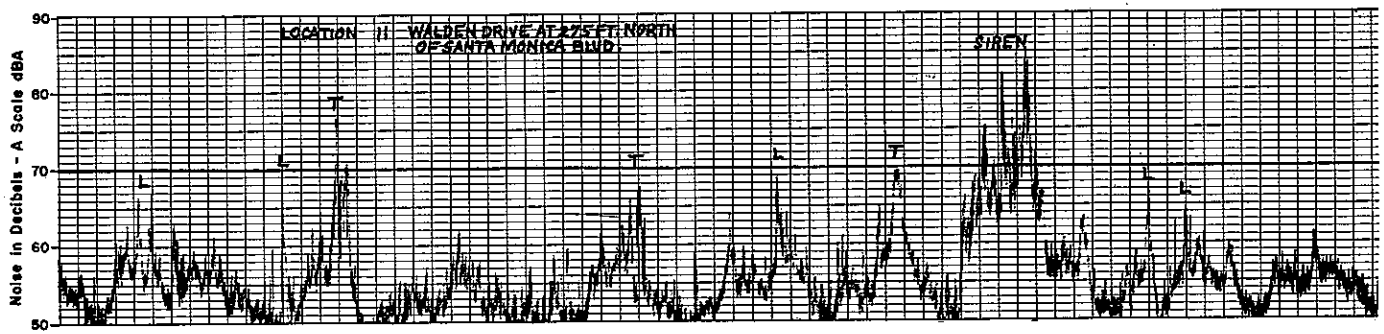

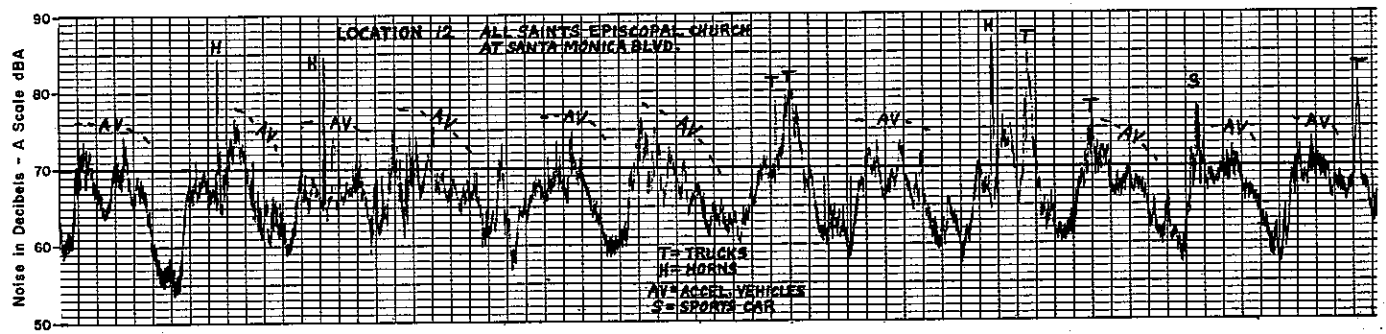

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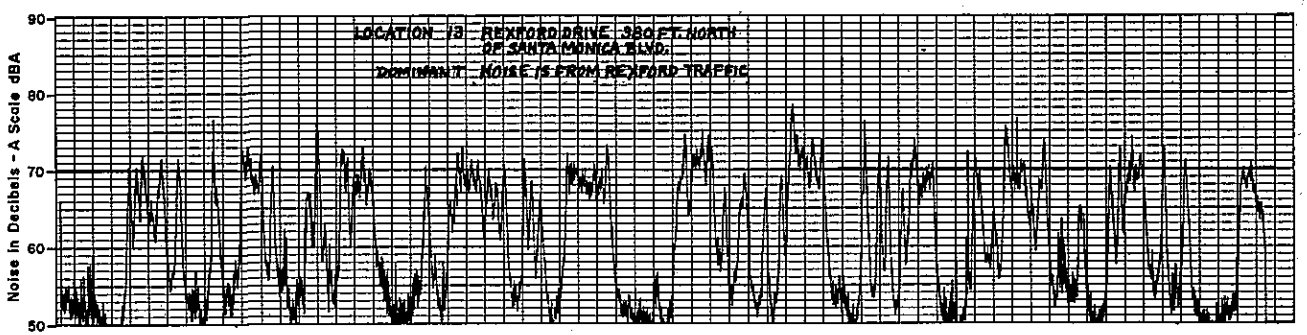

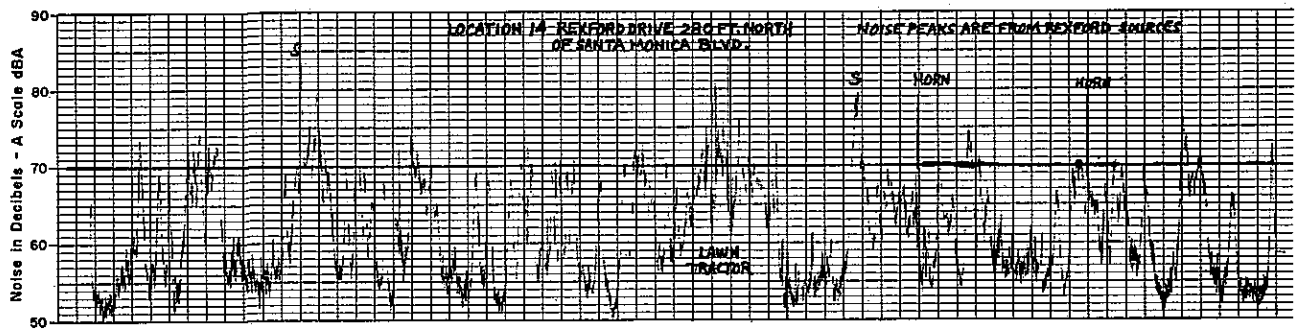

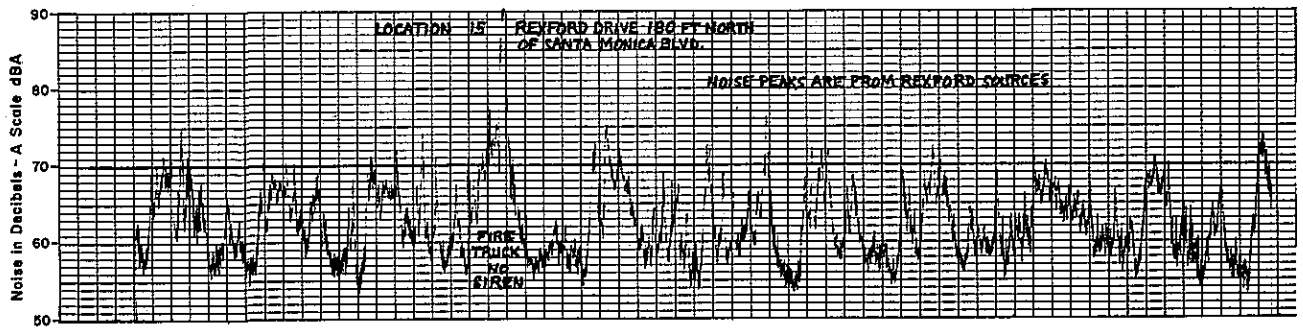

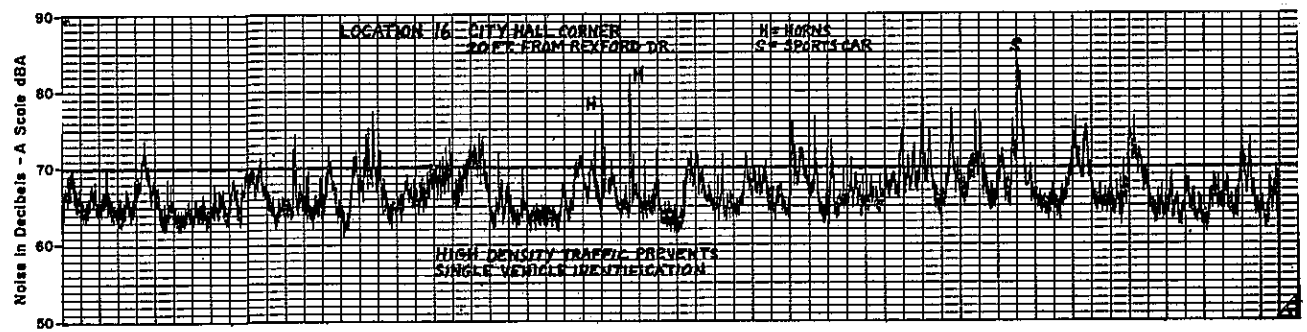

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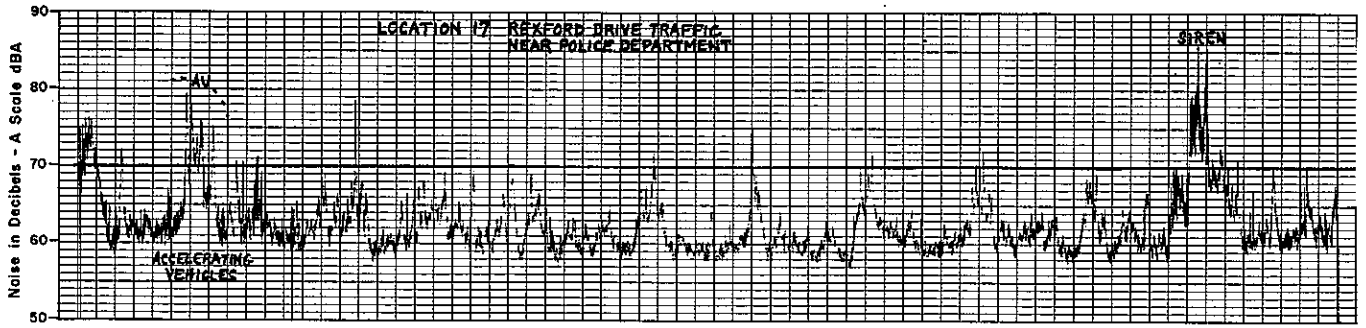

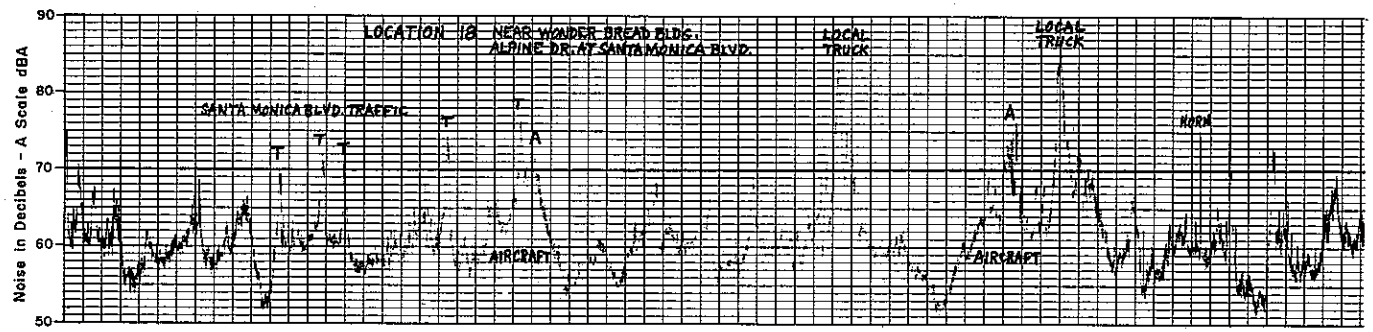

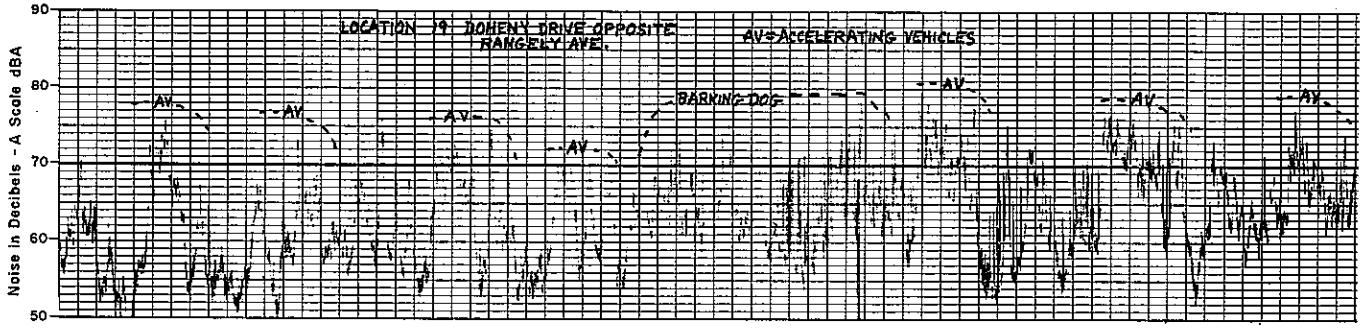

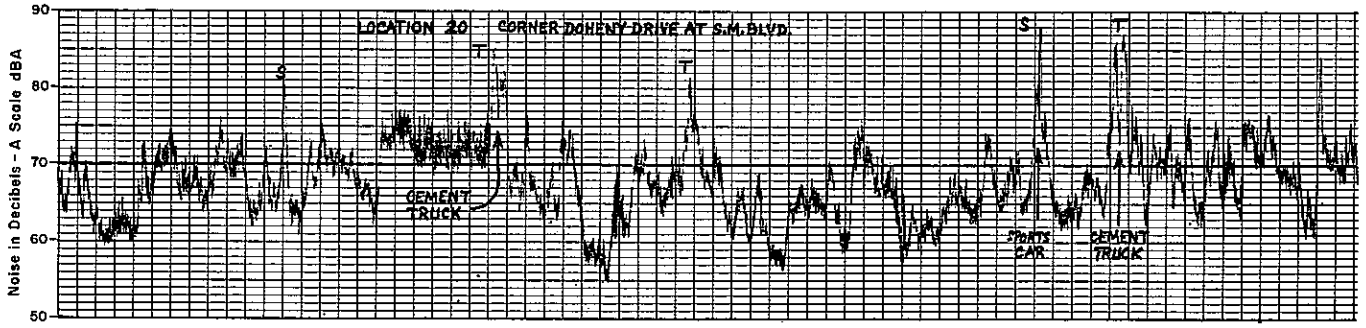

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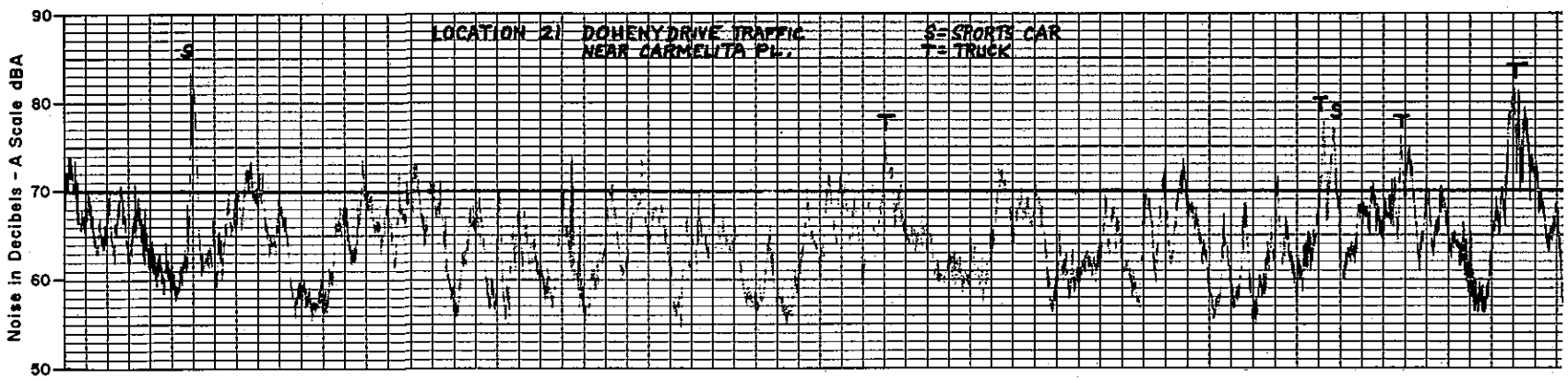

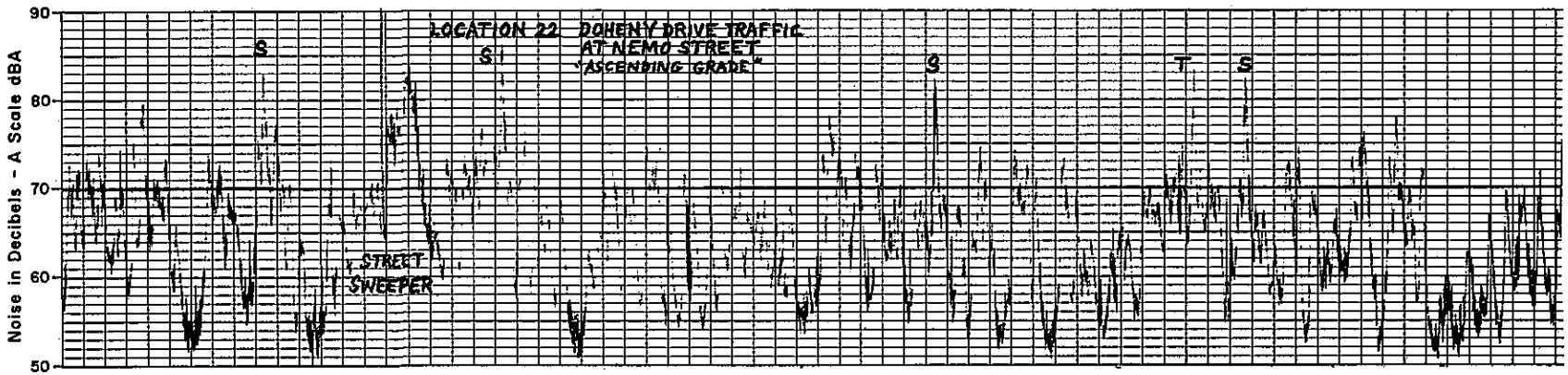

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