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LAKEVIEW SCHOOL AND TRAFFIC NOISE IN THE VICINITY OF THE PLANNED MACARTHUR FREEWAY

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April 1961

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

April 1961

Your: W.O. 3456SC-49

Our: 100 - S - 6242

Mr. Anson Boyd
State Architect
Division of Architecture
Sacramento, California

Attention: Mr. Edwin M. Shomate

Dear Sir:

Submitted in accordance with your request of March 7, 1961, is a report of:

LAKEVIEW SCHOOL AND TRAFFIC NOISE

IN THE VICINITY OF

THE PLANNED MACARTHUR FREEWAY

Study made by . . . . . Structural Materials Section
Under general direction of . . . . . J. L. Beaton
Measurements by . . . . . L. Bourget and L. Kubel
Report prepared by . . . . . L. Bourget

Very truly yours,

F. N. Hveem
Materials and Research Engineer

By J. L. Beaton
Supervising Highway Engineer

LB:mw
cc: KWReeves
LRGillis
WLWarren
RHess
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INTRODUCTION

As requested by Division of Architecture memo dated March 7, 1961, a traffic noise study has been made at the Lakeview School, Oakland, California.

Mr. K. W. Reeves of the Division of Architecture directed that the purpose of this study was to determine:

1. Present exterior noise levels due to traffic on existing city streets.

2. The anticipated increase of exterior traffic noise when both MacArthur Freeway and the on-off structures become fully operational.

3. The related traffic noise increase within the school building if no protective measures are employed.

4. Reasonable means of preventing the increased external noise from penetrating to the occupied classrooms and offices within the building.

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I. EXISTING TRAFFIC NOISE FROM CITY STREETS

Present exterior traffic noise in the immediate vicinity of the school building is predominantly from the two nearest streets: Santa Clara Avenue on the northeast side and MacArthur Boulevard on the southwest border of the school site.

Sound pressure level recordings were made at three exterior locations, each within six feet of the building, to portray the situation. The test locations are shown on drawing, Exhibit 1, and photograph, Exhibit 2. Test results are presented on Exhibit 3.

The recordings shown on Exhibit 3 disclose that the highest levels of traffic noise now exist on the side of the building exposed to Santa Clara Avenue, Location A. This is due to:

1. The proximity of the source.
2. The street being on a grade.
3. The significant amount of truck traffic.

The highest noise peaks vary from 78 to 88 decibels and arise mainly from ascending trucks and occasionally from sports cars. The average noise level varies from 71 to 78 when passenger cars are the principle noise source.

Location B of Exhibit 3 shows that the lowest levels of exterior traffic noise now exist at the rear center of the building. This noise is a blended mixture of the noise complex from each side of the building and is naturally attenuated by the greater distance of travel.

The highest peak noise varies from 72 to 76 decibels, and the average is about 68 decibels.

Location C of Exhibit 3 shows intermediate noise values as compared to Locations A and B.

The highest noise peaks vary from 75 to 83 decibels. The long term average from passenger cars is from 70 to 75 decibels. This side of the building will be subject to the greatest change from the planned freeway structure.

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II. ANTICIPATED NOISE INCREASE

Location A nearest to Santa Clara Avenue

This side of the building will be subject to an estimated increase of from 4 to 8 decibels depending upon the character of the traffic during the time of measurement. This will be the least change of the three locations cited simply because we are dealing with the noisiest present location. The noise pattern may also become more persistent as the traffic becomes more continuous.

Location B at rear center of building

Noise at this location will still be the resultant of the noise arriving from the two side sources. We anticipate an increase of about 6 to 10 decibels; a value about midway between the changes expected at the two side locations.

Location C nearest to the planned MacArthur Freeway

The greatest increase of noise is expected on this side of the building because:

1. The distances to the nearest traffic lanes will be diminished.

2. Traffic density will increase and be resumed in both directions.

We anticipate an increase of from 10 to 16 decibels depending on the character of the traffic during the time of measurement. This estimate is based upon measurements taken near existing freeways that approximate the projected situation.

It should be remembered that traffic noise is subject to severe intensity fluctuations as shown on Exhibit 3; therefore, the changes anticipated should be interpreted as long term averages.

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III. EFFECTS WITHIN THE BUILDING

If no protective measures are taken, the noise penetration of the building will rise very nearly in proportion to the external noise increase, depending upon the exposure of any particular classroom to the noise sources.

At present, most of the noise access paths to the interior of the building are through the windows. In any room two or more of the windows are normally part way open to provide some ventilation because no other means of air exchange exists.

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IV. RECOMMENDATIONS FOR REDUCING NOISE PENETRATION

The most effective means of reducing noise penetration through window areas is to remove the window structures completely and then to fill in the apertures solidly.

It is suggested that glass block be used for this purpose as it is considered to be the most economic method to both furnish light and when properly installed offer a noise barrier of about 40 decibels. Glass block is about 8 decibels better than double glazed windows.

Of course, some other means of ventilation will be required if the windows are plugged.

It is suggested that the glass block treatment be considered for:

A. All window apertures to occupied rooms, offices, and auditorium on the upper two floors but not the windows facing the stairwells. The stairwell windows may be retained if adequately calked and sealed to prevent air leakage.

B. All window apertures on the basement (ground) level that are associated with classrooms or meeting rooms but not the equipment room. The existing metal wire grilles should be retained for reinstallation to protect the glass block at this level.

In addition it is also recommended that the following treatment be considered for reducing noise which may penetrate to the stairwells:

A. Install perforated metal over 1" absorptive padding material on at least one of every parallel surface within the stairwells, namely:

1. All overheads (underside of stair enclosures).

2. All flat surfaces opposing the windows.

3. At least one side wall above wainscot level alongside all stairs. If this partial coverage is regarded as detractive to the

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appearance, then consideration should be given to a more complete coverage of the side wall surfaces within the stairwells.

The protective measures suggested should reduce noise penetration to levels at least equal to (or slightly better than) existing conditions before activation of MacArthur Freeway.

V. EQUIPMENT EMPLOYED

1551-A General Radio Sound Level Meter

1521-A General Radio Graphic Level Recorder

REFERENCES

1. Acoustical Materials Association, Bulletin XXI, 1961. A. I. A. No. 39-B.
2. Pittsburgh Plate Glass Co. data, through Fuller Glass Co., Sacramento.
3. Acoustics, Leo L. Beranek, McGraw-Hill Book Co., 1954.
4. Sound Insulation and Room Acoustics, Per V. Bruel, Chapman & Hall, 1951.
5. Acoustical Engineering, Harry F. Olson, D. Van Nostrand Co., 1957.

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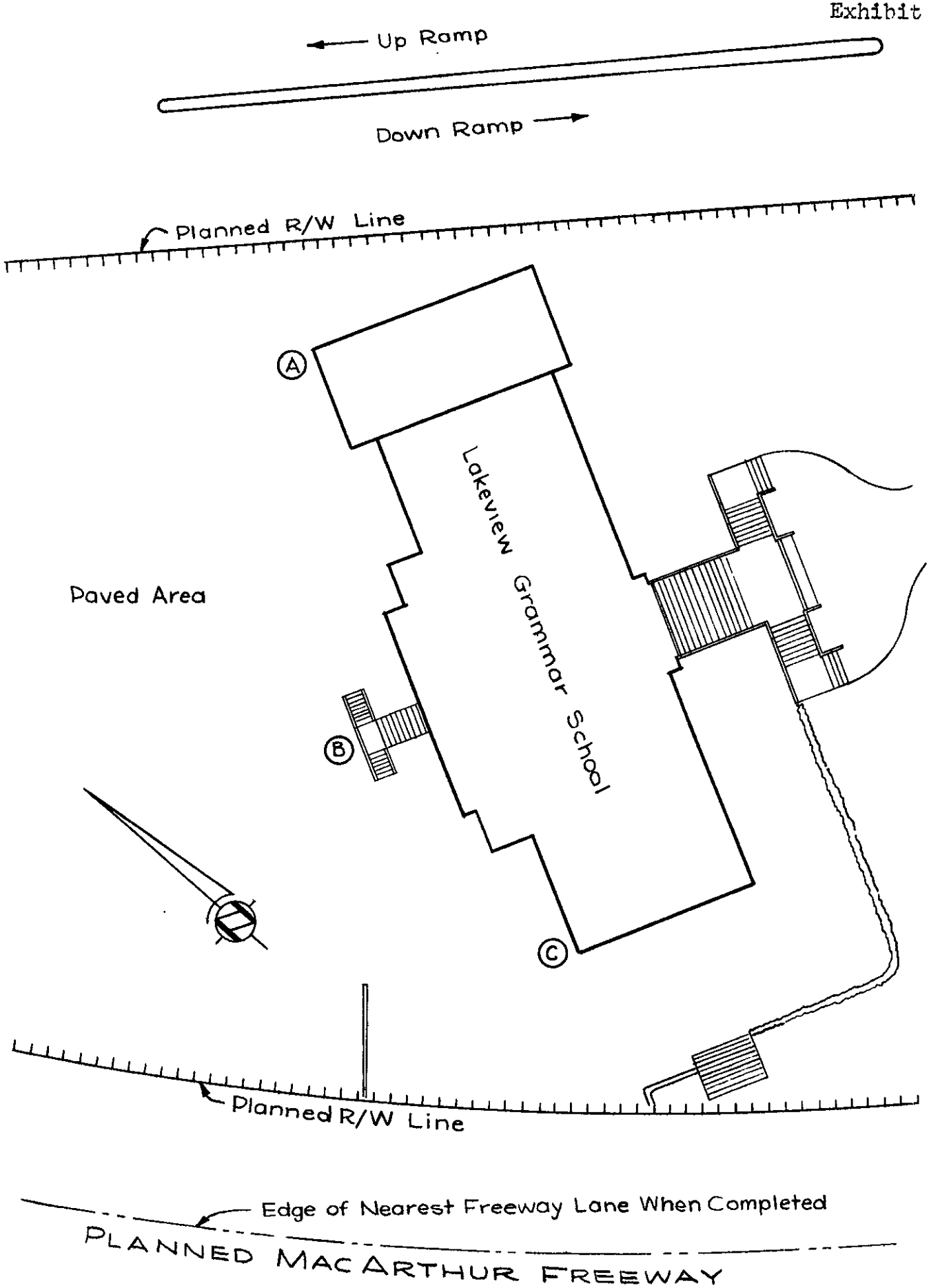
Exhibit 1



PLAN SHOWING SOUND LEVEL RECORDING LOCATIONS

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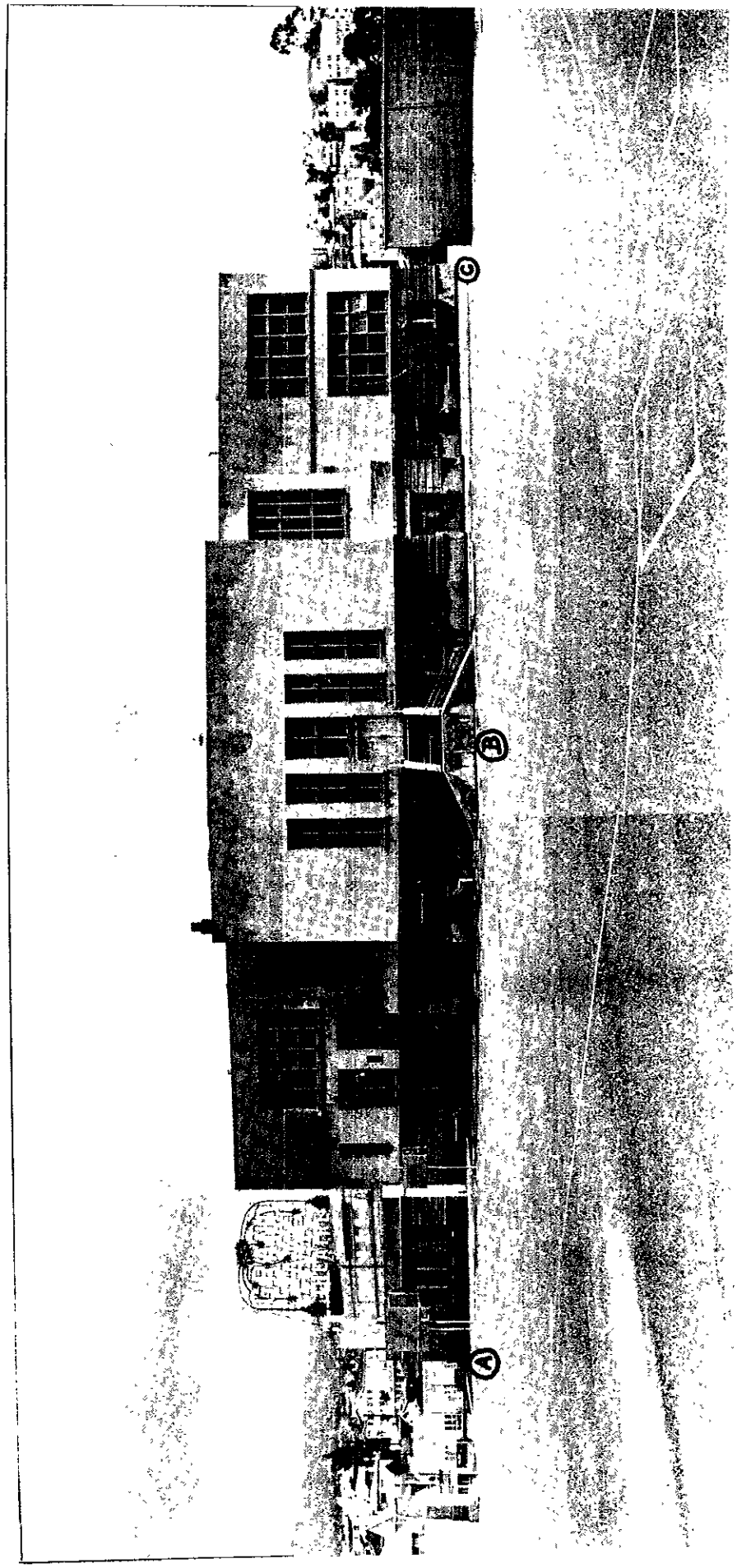
Exhibit 2



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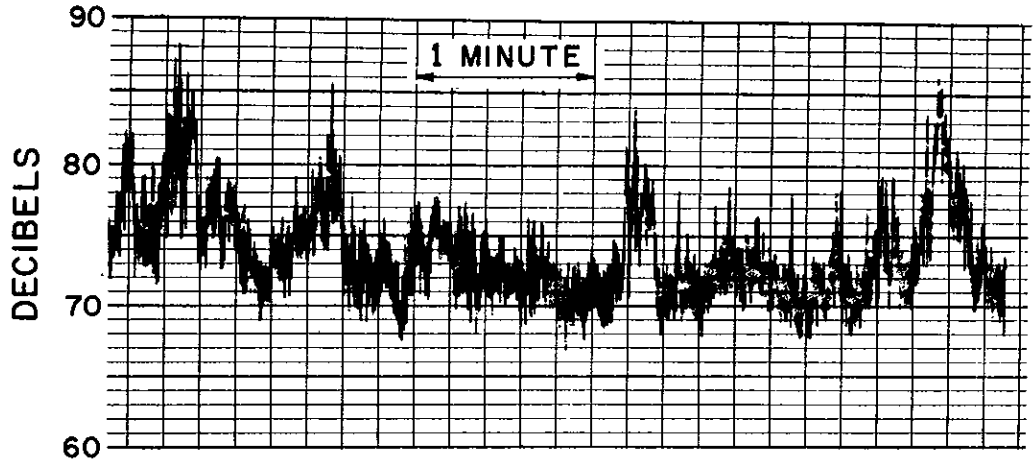
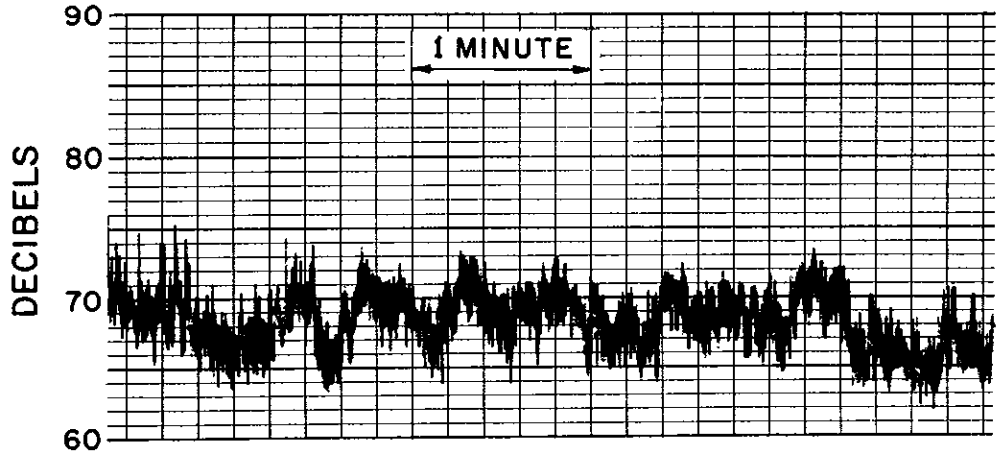
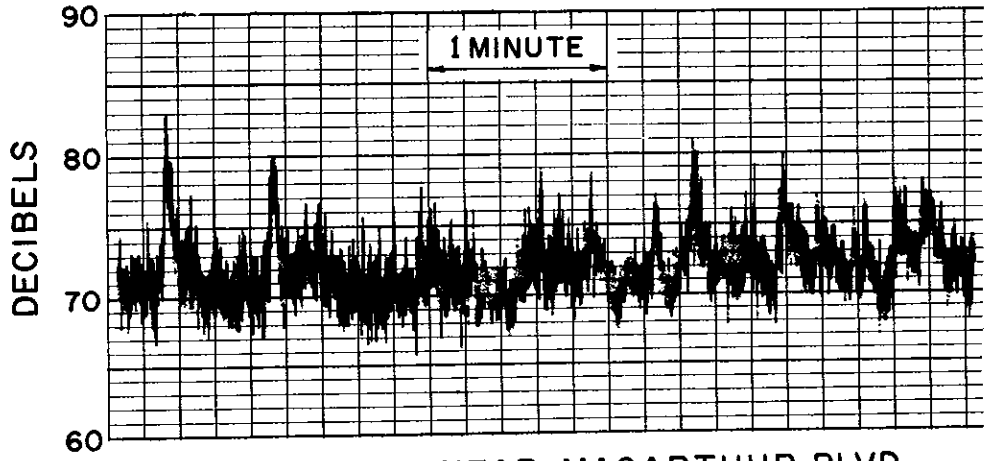


LOCATION A NEAR SANTA CLARA AVE.



LOCATION B CENTER REAR OF BLDG.



LOCATION C NEAR MACARTHUR BLVD.

EXISTING SOUND PRESSURE LEVELS AT LAKEVIEW SCHOOL EXTERIOR

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