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16. ABSTRACT

As part of a national effort to gain information on the feasibility and effectiveness of noise insulation of private homes near freeways, four residences were insulated against freeway noise on an experimental basis. This report discusses the legal ramifications, the design, specifications, and the administration of contract for trial installations. It also includes an evaluation of before and after noise measurements and homeowner reactions. The cost effectiveness of using insulation as a noise mitigation strategy is compared with that of noise barriers. It is concluded that insulation can be a viable alternative if: (1) it is done on a small scale (isolated homes) and there is no concern for mitigating noise levels outside the residence, or (2) barriers are neither feasible due to topography, nor desirable because of interference with scenic views or general aesthetics.

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CONVERSION FACTORS

English to Metric System (SI) of Measurement

<u>Quality</u>	<u>English unit</u>	<u>Multiply by</u>	<u>To get metric equivalent</u>
Length	inches (in) or (")	25.40 .02540	millimetres (mm) metres (m)
	feet (ft) or (')	.3048	metres (m)
	miles (mi)	1.609	kilometres (km)
Area	square inches (in ²)	6.432 x 10 ⁻⁴	square metres (m ²)
	square feet (ft ²)	.09290	square metres (m ²)
	acres	.4047	hectares (ha)
Volume	gallons (gal)	3.785	litre (l)
	cubic feet (ft ³)	.02832	cubic metres (m ³)
	cubic yards (yd ³)	.7646	cubic metres (m ³)
Volume/Time (Flow)	cubic feet per second (ft ³ /s)	28.317	litres per second (l/s)
	gallons per minute (gal/min)	.06309	litres per second (l/s)
Mass	pounds (lb)	.4536	kilograms (kg)
Velocity	miles per hour (mph)	.4470	metres per second (m/s)
	feet per second (fps)	.3048	metres per second (m/s)
Acceleration	feet per second squared (ft/s ²)	.3048	metres per second squared (m/s ²)
	acceleration due to force of gravity (G) (ft/s ²)	9.807	metres per second squared (m/s ²)
Density	(lb/ft ³)	16.02	kilograms per cubic metre (kg/m ³)
Force	pounds (lbs)	4.448	newtons (N)
	(1000 lbs) kips	4448	newtons (N)
Thermal Energy	British thermal unit (BTU)	1055	joules (J)
Mechanical Energy	foot-pounds (ft-lb)	1.356	joules (J)
	foot-kips (ft-k)	1356	joules (J)
Bending Moment or Torque	inch-pounds (in-lbs)	.1130	newton-metres (Nm)
	foot-pounds (ft-lbs)	1.356	newton-metres (Nm)
Pressure	pounds per square inch (psi)	6895	pascals (Pa)
	pounds per square foot (psf)	47.88	pascals (Pa)
Stress Intensity	kips per square inch square root inch (ksi/√in)	1.0988	mega pascals/√metre (MPa√m)
	pounds per square inch square root inch (psi/√in)	1.0988	kilo pascals/√metre (KPa√m)
Plane Angle	degrees (°)	0.0175	radians (rad)
Temperature	degrees fahrenheit (F)	$\frac{+F - 32}{1.8} = +C$	degrees celsius (°C)

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I. INTRODUCTION

Mitigation of highway traffic noise by means such as construction of barriers, changes in highway geometrics and purchase of additional right-of-way are very expensive measures and not feasible in many cases. Private residences along the right-of-way are often spaced far apart or are in situations that make it difficult to mitigate traffic noise in a cost-effective manner.

This report covers an experimental project to insulate private residences rather than construct noise barriers. In January, 1977, The Federal Highway Administration (FHWA) issued Notice 5080.62, "National Experimental and Evaluation Program (NEEP) Project No. 21 - Noise Insulation for Private Dwellings" (Appendix A).

The FHWA requested the states to consider participation in Notice 5080.62 to gather information on the feasibility of noise insulation of private residences. After much discussion and a favorable legal opinion (Appendix B), the California Department of Transportation (Caltrans) agreed to participate.

This report covers the preliminary steps necessary to comply with Notice 5080.62, and the subsequent construction to noise insulate four residences. It also describes the evaluation of the noise mitigation measures and the reaction of the homeowners.

II. BACKGROUND

The Transportation Laboratory (TransLab) was to evaluate the feasibility and effectiveness of noise insulating privately owned residences. Initially, 7 of the 11 districts in Caltrans expressed an interest in this study. This was narrowed down to District 4 (San Francisco area) and District 7 (Los Angeles area) after some effort was made to find suitable residences.

Each District (4 and 7) was responsible for locating a qualified residence, designing the project, preparing bids and administering the contract. TransLab assisted in the process, measured noise before and after construction, conducted homeowner interviews and prepared this report.

In general, the NEEP guidelines stated that information was to be gathered on things such as:

1. Legal ramifications for all parties involved.
2. Development of design and specifications.
3. Administration of the contract.
4. Reporting the results.

Each of these is addressed in detail in this report.

Design of the insulation measures was done by the Caltrans Office of Structures personnel for District 4 and by a consultant for District 7. This included acoustical (window design) and mechanical (ventilation system design) engineering. Job specifications were prepared in the same manner as for other Caltrans construction contracts.

Administration of the Contract

Plans and specifications (Appendix E) were then prepared for advertising and awarded to a local building contractor based on low bid. The contractor was responsible for obtaining permits, materials and performing the work. Inspection and acceptance of the work was all performed by the District engineering staff.

Reporting of Results

Results are fully reported and include such items as noise measurement and analysis, homeowner interviews, cost, and overall feasibility.

III. DISCUSSION

Legal

Caltrans attorneys indicated that it was permissible to insulate private residences that were outside the right-of-way for this experimental project (Appendix B). Other authority would probably be needed if this were to be carried out as a Caltrans program.

Contact with the City of San Francisco indicated there would be no additional property taxes levied as a result of the proposed improvement (Appendix C).

Responsibility for the improvements would be assumed by Caltrans for one year. The homeowner would take over after one year. This was covered in the Homeowners Agreement (Appendix D).

Design and Specifications

The first step was to find potential candidate homes for the field evaluation. Comprehensive noise measurements were then made to provide guidelines for determining whether residences qualified from a noise standpoint. This information later provided the designers with goals for noise reductions for those residences selected.

District 4 Project - There were three residences that participated. These homes were initially part of a group of homes for which a noise barrier was being considered. However, all the other homeowners opted to keep their view and not have noise barriers. This left the three homes closest to the freeway without any noise mitigation.

The major modifications were using thicker glass or double pane windows and providing for a ventilation system. Air conditioners were not warranted because of the mild climate in San Francisco.

District 7 Project - A number of candidate residences were considered but rejected because, in most cases, the noise levels were not high enough. For these situations, adequate mitigation could be achieved by merely keeping all windows closed and installing a ventilation system. This did not appear to meet the intent of the NEEP.

The home selected was a farmhouse close to a freeway. It was an older home that required extensive work to seal all cracks, and install new windows and doors. In addition to this work, a central air conditioning and heating system was installed. This also required upgrading electrical service and wiring.

IV. CONCLUSIONS

Noise Attenuations

Noise attenuations achieved by insulating homes against freeway noise ranged from 1 to 8.5 dBA in freeway-facing rooms. The average noise attenuation for the four residences studied was 4.5 dBA. The average was computed from the mean attenuations of each of the four residences. These ranged from 3 to 6 dBA. The individual means were in turn calculated by averaging measured room attenuations.

Costs

The average construction cost of insulating each residence was \$11,950. The costs ranged from \$6,240 to \$19,000 per residence.

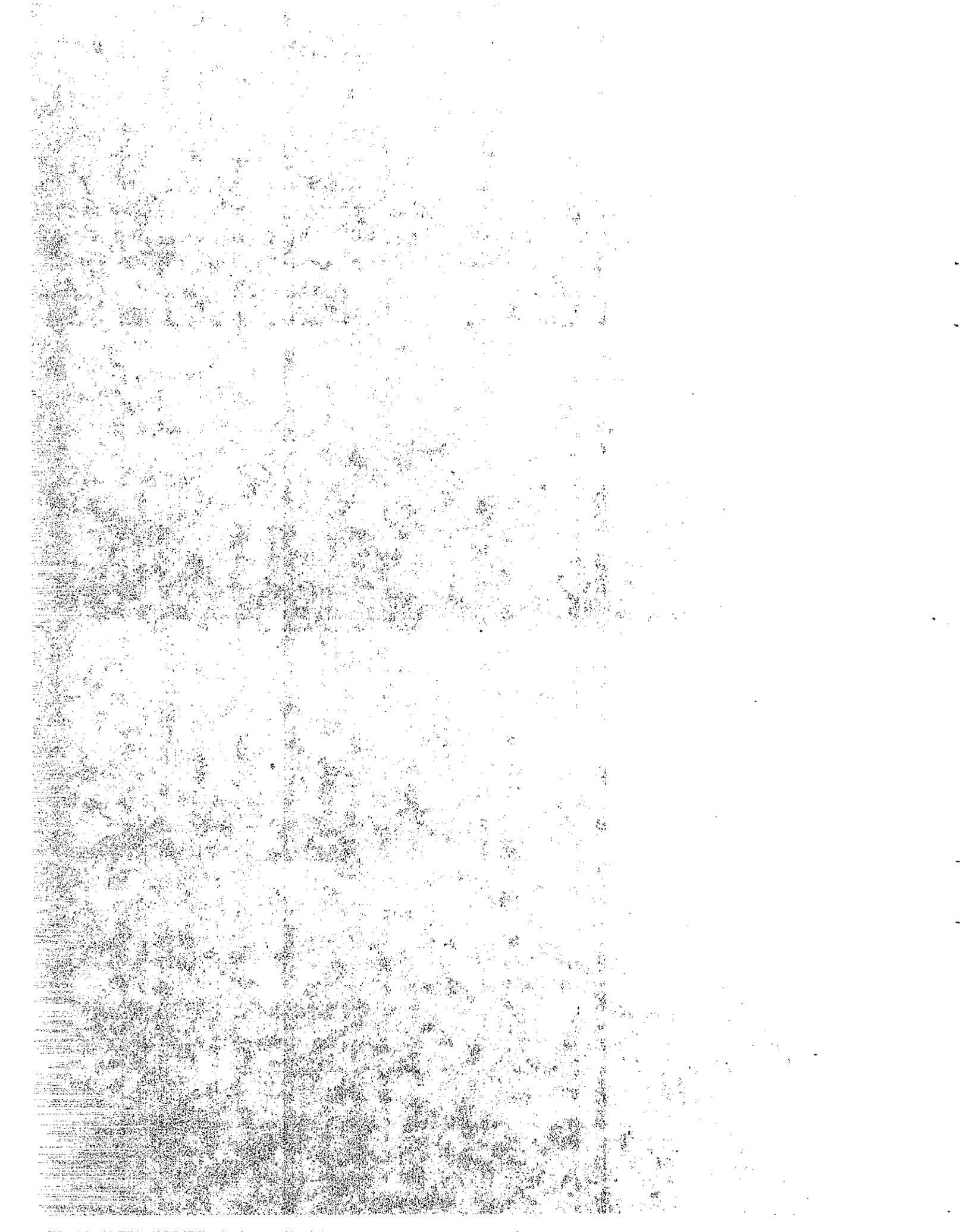
Cost-Effectiveness

Cost-effectiveness expressed in construction cost per dBA reduction per residence averaged \$2,880 (1981) and ranged from \$1,040 to \$4,160. This compares reasonably well with the average cost-effectiveness of \$2,600/dBA (1981) per residence for California masonry barriers, 6 to 10 feet high and 300 feet long, providing 5 to 7 dBA attenuation for two residences. Insulation generally becomes more cost-effective than a barrier when only one house needs to be protected. It becomes less cost-effective than a barrier when more than two residences need to be protected.

Feasibility

This study has shown that insulating private homes can be a viable highway noise mitigation measure if:

- ° it is done on a small scale (isolated homes),
and,
- ° there is no concern for mitigating noise levels outside the residence.
or,
- ° barriers are neither feasible, cost-effective, nor desirable.



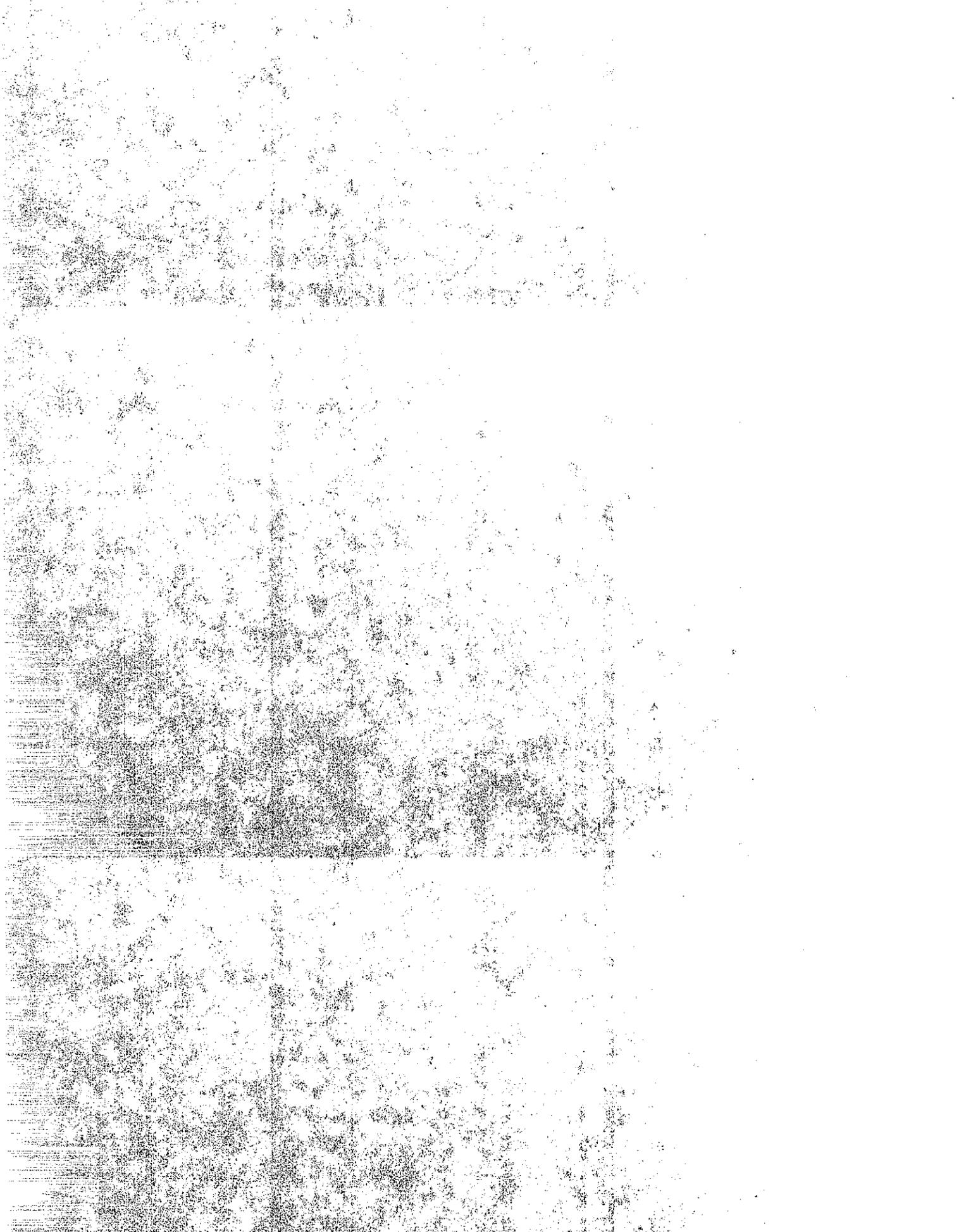
V. RECOMMENDATIONS

Insulating private residences from highway noise should be considered when:

- ° Noise barriers are not feasible or effective. Typical situations include multi-story residences, and adverse topography.
- ° Noise barriers are not cost-effective. This is usually the case when mitigating isolated homes from noise.
- ° Noise barriers are undesirable, such as when they block scenic views, or do not "fit in" with the aesthetics of a locale.

For reasons of cost-effectiveness, noise insulation should be done on a small scale. It may be particularly effective to mix insulation with conventional barrier designs when local anomalies in terrain prevent effective mitigation by barrier alone.

However, since this study dealt with noise insulation of private residences outside the highway right-of-way, it appears that a legislative act or policy is needed if such a program is undertaken.

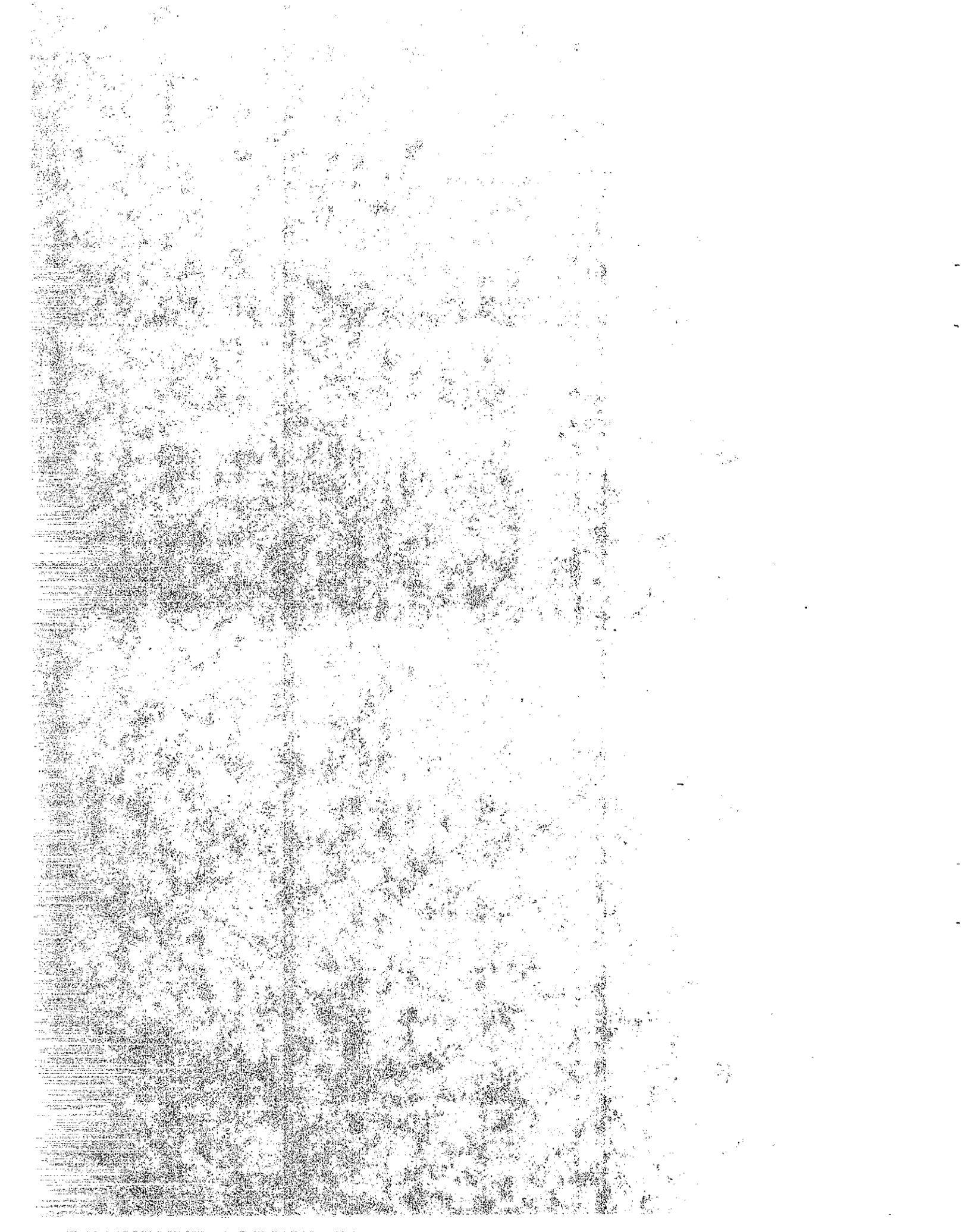


VI. BENEFITS

Information gathered in this study indicates that, in some cases, noise insulation is a feasible alternative to noise barriers and other cost-intensive noise mitigation measures such as realignment or cut-section design.

Insulation is an attractive alternative for mitigating noise impacts on isolated homes. It is estimated (using typical California construction costs) that noise mitigation of a single home through insulation can realize savings of up to \$18,000 over construction of an equivalent noise barrier (based on noise reduction of 5 dBA). Caltrans has a minimum noise barrier design requirement of breaking the line of sight between an 11.5 foot high truck stack and a 5 foot receiver. Even without this requirement, a savings of \$6,000 may be realized by insulating one home rather than providing protection with a noise barrier.

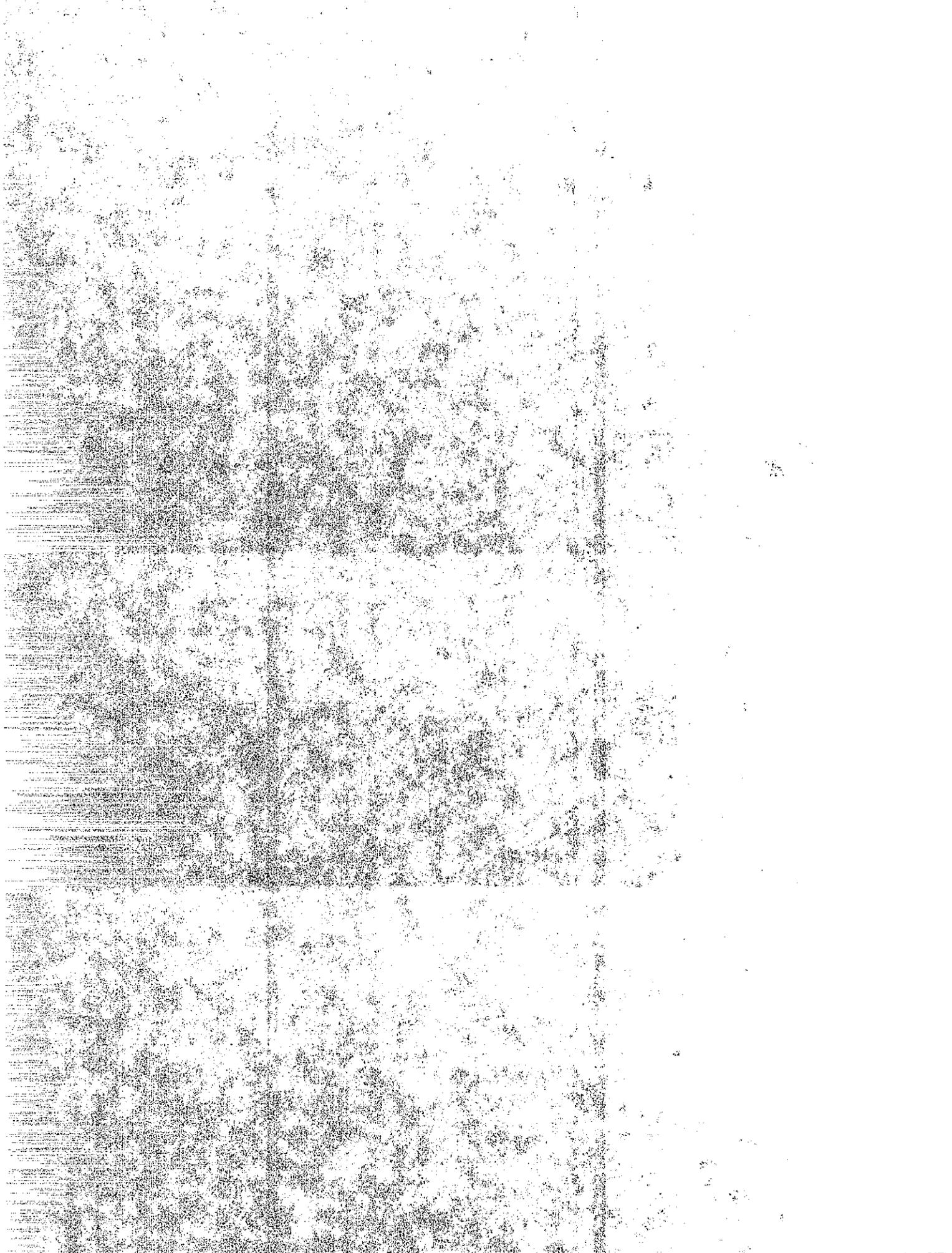
Other benefits and limitations of insulation are discussed in greater detail in the final chapter in this report.



VII. IMPLEMENTATION

This research report will be distributed statewide to Caltrans Districts and nationwide to FHWA and State Highway Agencies.

Caltrans should consider issuing a Policy and Procedure memorandum governing use of insulation based on criteria developed in this report.

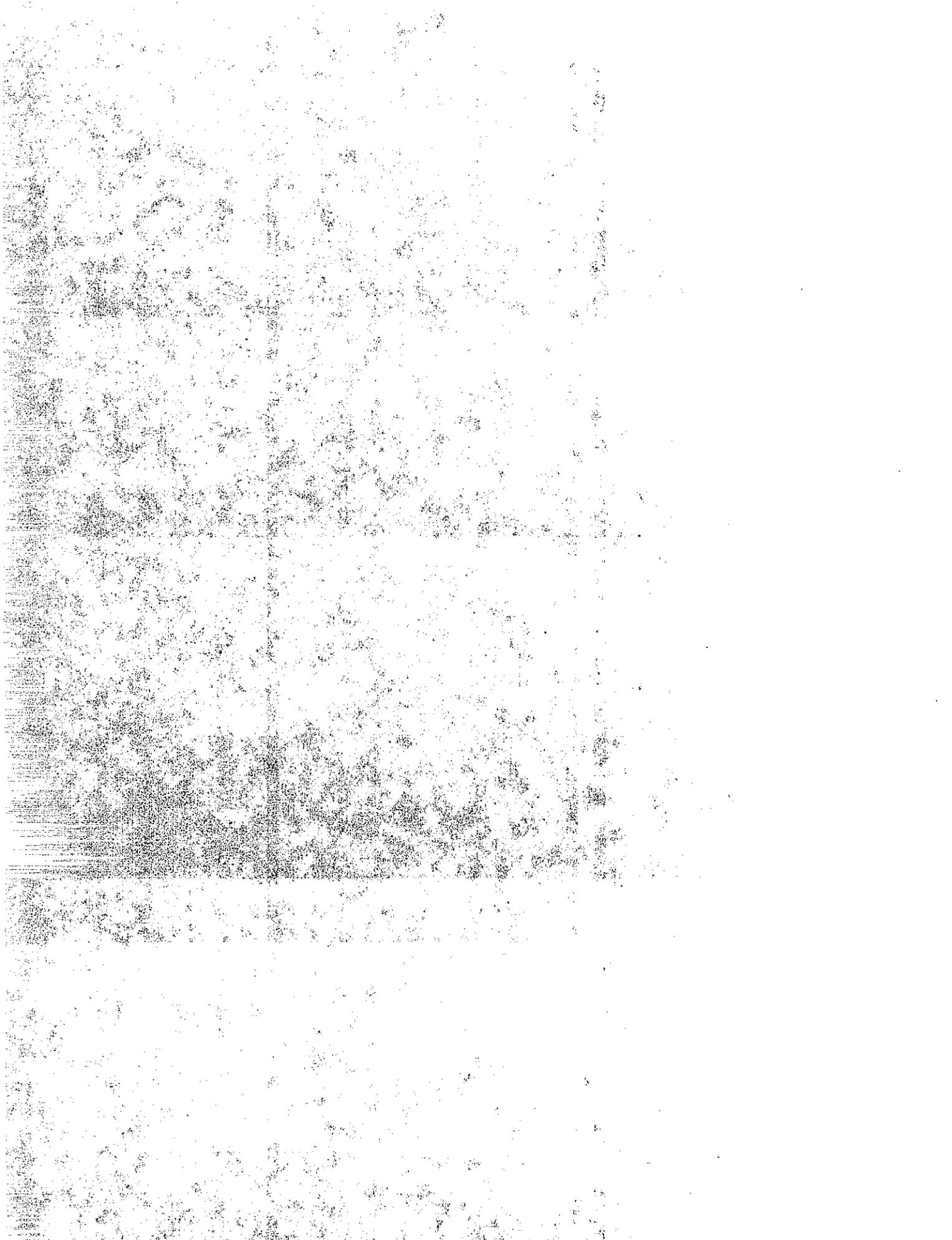


VIII. PROJECT DESCRIPTION

This report covers the evaluation of two noise insulation projects, one in District 4 (San Francisco) and one in District 7 (vicinity of Los Angeles).

In general, both insulation projects included modifications of, or additions to windows, doors, walls and ventilation systems. Because of variations in layout, window area and other pertinent conditions, no meaningful evaluation could be made of the effectiveness of one treatment over another.

Construction details are described in the Notice To Bidders and Special Provisions (District 4), Project Reports (District 4 and 7) and Proposal and Contract (District 7). These are shown in Appendix E.



IX. GENERAL APPROACH

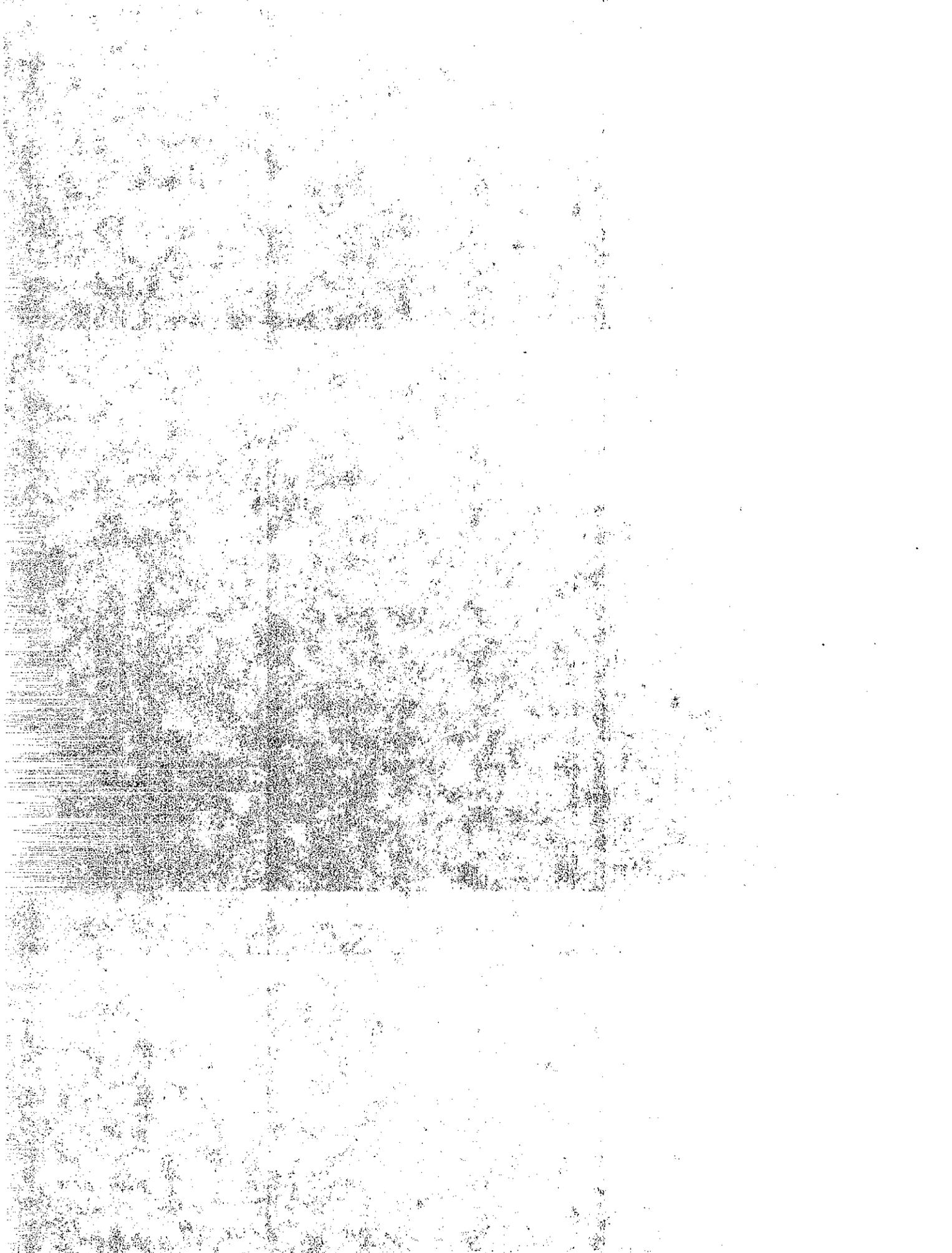
The effectiveness of the noise insulation of the residences was evaluated by objective "before-and-after" noise measurements and by subjective homeowner perceptions of noise level reductions.

Noise measurements were made inside and outside the residences, simultaneously, at the same locations and heights before and after insulation. The outside measurement served as a "control" to normalize before and after measurements for changes in traffic variables (volume, speed and vehicle type distribution). The differences between before and after outside-to-inside noise attenuations were attributed to the insulation added to the homes.

The measurements in District 7 also included a frequency analysis performed on ten prominent noise peaks obtained from simultaneous inside and outside tape recordings of the freeway noise.

In both Districts, the dominant noise source proved to be the freeway at each site. This was demonstrated by comparing measured outside noise levels to levels predicted by a traffic noise model (1). Local noise sources, such as street traffic and noisy neighbors, did not present contamination problems. The site in District 7 was in a rural area. The sites in District 4 were located in an urban neighborhood with very little local traffic or other-than-freeway activity. Inside noise measurements were carefully monitored to exclude contaminations from appliances, telephones, clocks, residents themselves and other potential sources not related to the freeway noise.

Homeowners were informally interviewed before and after insulation for their reactions to the project and perception of noise reduction. Questionnaires furnished by the Federal Highway Administration were used to record the data during personal interviews. No statistical correlation was attempted between objective measurements and subjective perceptions of noise reductions because of the small sample size (number of residents). Instead, a synopsis of the views expressed during the interviews and in the questionnaires is included in this report.



X. EVALUATION OF DISTRICT 4 PROJECT

Sites

Pre-insulation noise measurements were made inside and outside four connected two and three story residences at 575, 579, 585 and 599 San Bruno Avenue in San Francisco. Figures 1, 2, and 3 show the site layouts, cross sections and thirteen microphone (mic.) locations. The freeway (Route 101) is in a depressed section, averaging about 15 feet deep in front of the selected residences.

After the pre-insulation measurements, the owner of house No. 599 San Bruno Avenue decided to withdraw from the project. Consequently, the post-insulation measurements did not include locations No. 6 and 7. For convenience in correlating before-and-after measurements, mic. Nos. 8 through 13 were not renumbered after the elimination of Nos. 6 and 7. A list of instruments used is shown in Appendix F.

Noise Measurements

On October 15, 1980, before insulation, simultaneous noise measurements were made at the thirteen mic. locations. Three 20 minute Leq measurements (runs) were performed under several conditions. The Leq descriptor conforms to noise analyses requirements set forth by FHPM 7-7-3(2). It is the equivalent steady-state noise level which, in a stated period of time (in this case 20 minutes), contains the same acoustic energy as the time varying level during the same period. During run 1, windows and drapes were closed. Run 2 was measured with windows closed, drapes open. The windows and drapes were left open during run 3.

On February 3, 1984, after insulation, measurements were made in two setups (setups A and B). Conditions and duration of runs 1, 2 and 3, however, were the same as for the corresponding runs before insulation. Except for the elimination of mic. Nos. 6 and 7, all microphones occupied the same location as during the measurements before insulation.

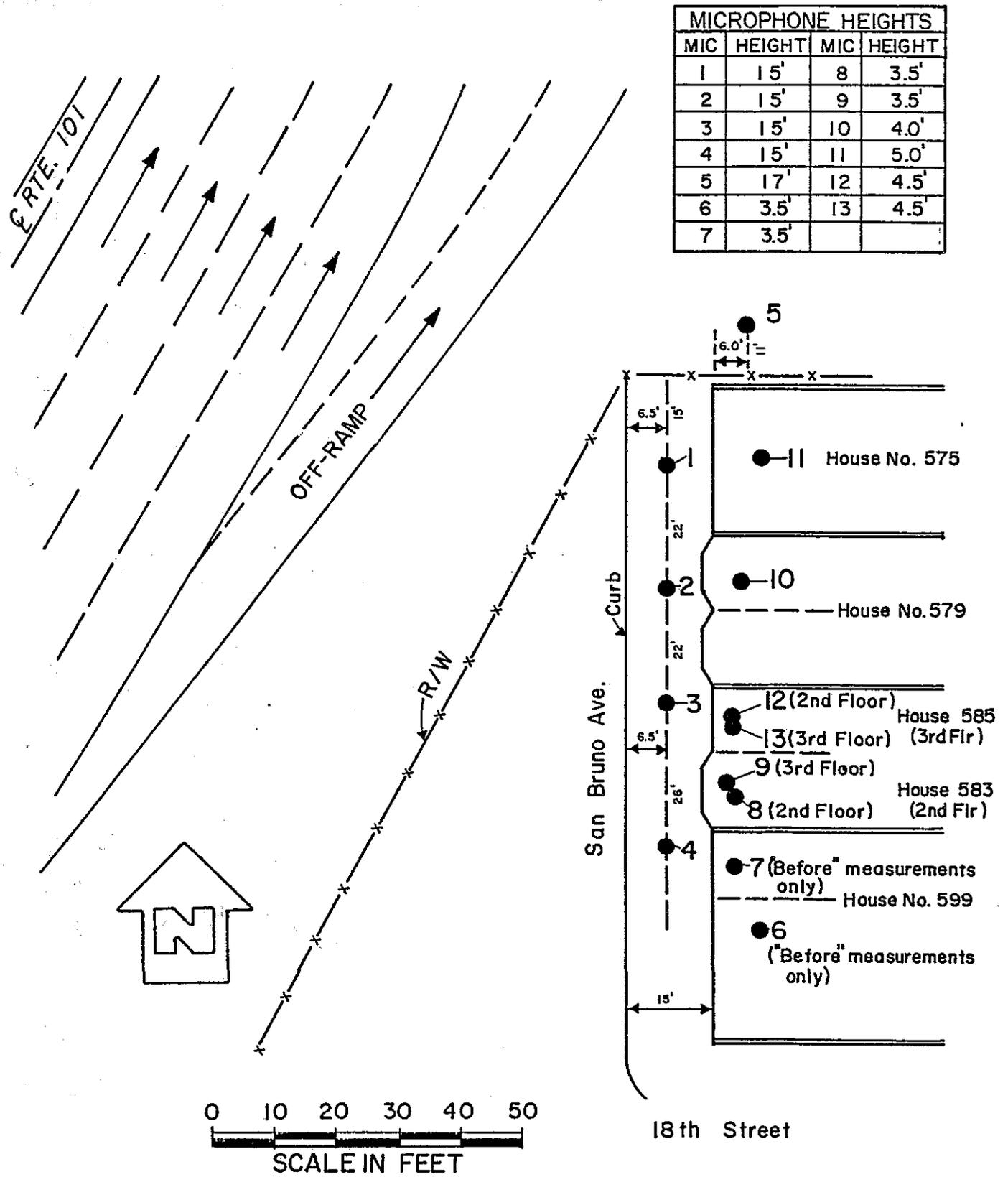


Figure 1 District 4 Sites-Layout

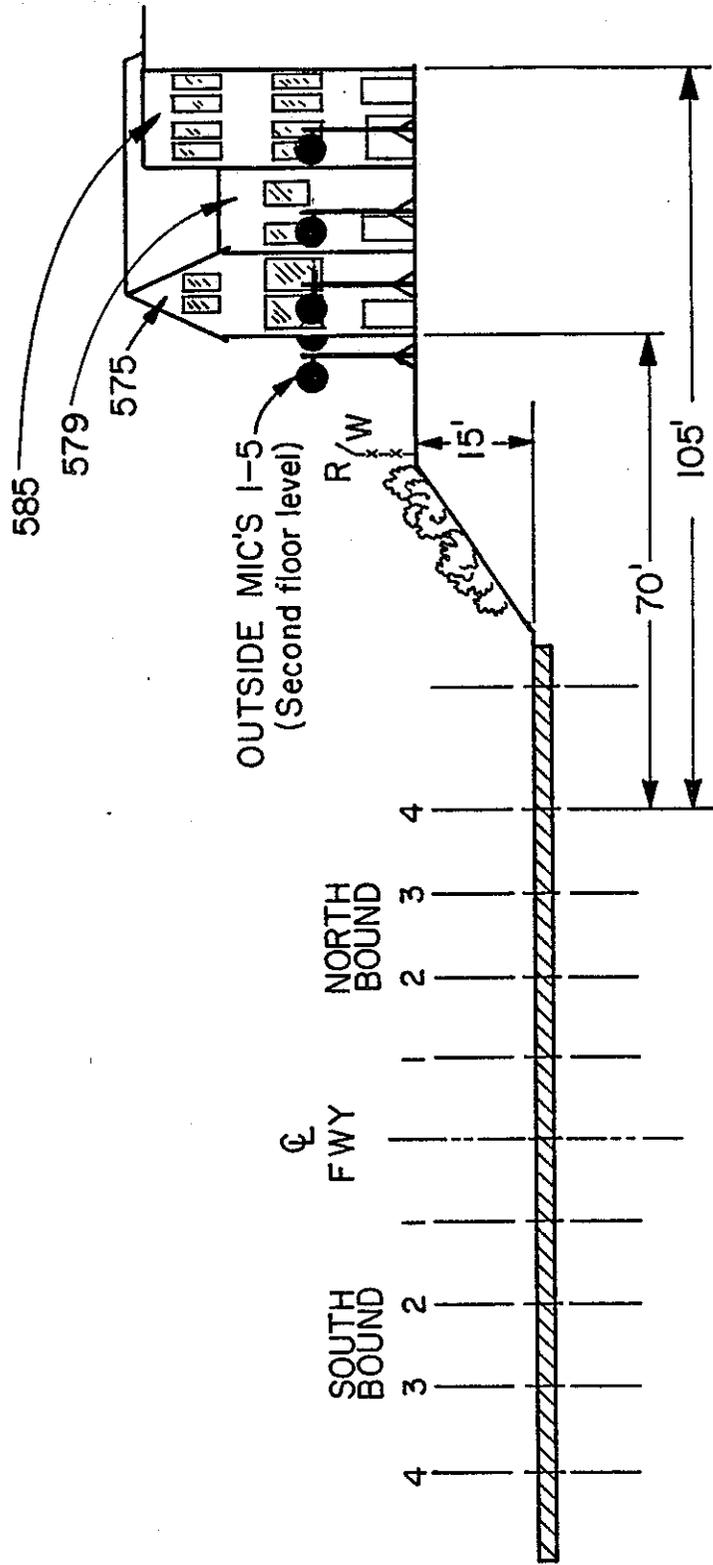


Figure 2 District 4 Sites-Cross Section

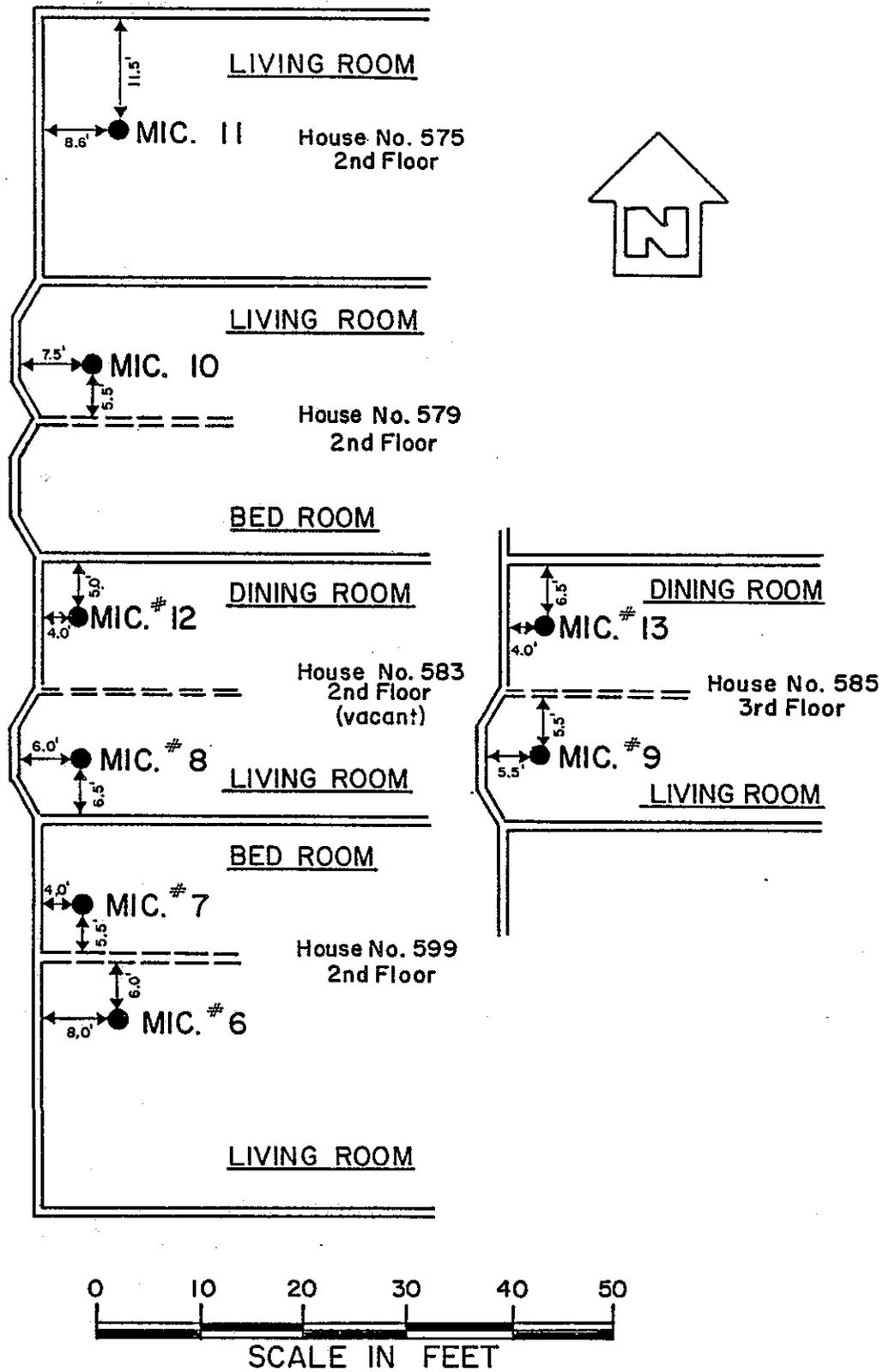


Figure 3 District 4 Sites-Inside Microphone Locations

Table 1 shows the measurement results

Freeway Traffic Volumes

Because of an observed lack of other noise sources in the site's vicinity, freeway traffic was considered the dominant noise source. This was later confirmed by comparing predicted with measured outside noise levels.

Lane-by-lane traffic counts were made simultaneously during the noise measurements (Table 2). These were expanded to hourly volumes averaged over runs 1, 2, and 3, before and after insulation (Table 3). The traffic counts were categorized by vehicle groups defined in FHWA-RD-77-108(1). Average speeds were obtained by radar.

Analyses and Results

The objective analysis of the effectiveness of the insulation procedures was based on a comparison of the before and after differences between outside and inside noise levels. These differences depend on (1) building attenuation (with and without insulation), (2) distances and topography between noise sources and receivers, and (3) location and nature of the noise sources. In order to measure the first variable, the other two variables must remain reasonably constant over the study period. Item No. 2 remained constant throughout the study, and therefore did not need further consideration. The stability of the location and nature of noise sources, however, needed to be confirmed.

Noise levels measured at outside mic. locations No. 1, 2, and 3 were compared with predictions using FHWA-RD-77-108(1) methodology with California Vehicle Noise (Calveno) Emission Levels(3). These comparisons were made for average before-and-after insulation traffic conditions. For convenience, noise and traffic measurements were averaged over runs 1, 2 and 3. The following tabulation summarizes the comparisons between measured and predicted.

Table 1

SUMMARY OF 20 MINUTE NOISE MEASUREMENTS
BEFORE AND AFTER INSULATION
DISTRICT 4 SITES

Mic. No.	BEFORE, Leq dBA						AFTER, Leq dBA					
	Run 1		Run 2		Run 3		Run 1		Run 2		Run 3	
	Windows, Drapes, Closed	Windows, Drapes, Open	Windows, Drapes, Closed	Windows, Drapes, Open	Windows, Drapes, Open	Same as "Before"						
1	79.6	79.6	79.6	79.7	79.7	80.8	80.9	80.6	-	-	-	-
2	78.4	78.6	78.6	78.5	78.5	79.7	79.8	79.8	-	-	-	-
3	76.2	76.3	76.3	76.3	76.3	-	-	-	77.3	77.2	77.4	77.4
4	73.3	73.8	73.8	74.0	74.0	-	-	-	75.6	75.7	76.1	76.1
5	79.2	79.0	79.0	79.2	79.2	80.8	80.7	80.6	-	-	-	-
6	48.4	48.5	48.5	67.4	67.4	-	-	-	-	-	-	-
7	47.6	50.2	50.2	68.5	68.5	-	-	-	-	-	-	-
8	50.5	52.0	52.0	67.0	67.0	-	-	-	50.1	49.6	67.0	67.0
9	51.5	52.3	52.3	67.8	67.8	-	-	-	50.5	49.9	66.7	66.7
10	53.1	54.2	54.2	67.7	67.7	48.3	49.2	68.6	-	-	-	-
11	52.6	51.1	51.1	59.7*	59.7*	49.0	49.3	68.0*	-	-	-	-
12	52.7	52.9	52.9	69.9	69.9	-	-	-	50.7	50.8	70.5	70.5
13	51.8	52.7	52.7	71.4	71.4	-	-	-	51.8	52.0	71.2	71.2

*The "after" condition included more open windows than the "before" condition.

Table 2

SUMMARY OF TRAFFIC COUNTS
 (Performed Simultaneously With Noise Measurements)
 District 4 - San Francisco Sites

	Avg. Speed	Southbound Lanes				Northbound Lanes				Ramp	
		4	3	2	1	1	2	3	4		
B E F O R E	Run 2 10:57- 11:17	Autos Med.Tr. Hvy.Tr.	366 24 25	499 29 24	529 16 20	510 7 2	486 7 0	633 24 19	525 19 34	213 11 7	98 14 3
	Run 2 12:00- 12:20	A MT HT	403 19 17	524 18 22	570 15 18	548 7 2	435 12 0	562 26 13	493 18 18	202 6 15	99 5 4
	Run 3 12:40- 13:00	A MT HT	360 22 18	484 20 16	507 14 18	466 10 2	489 5 0	544 30 13	514 25 19	209 17 11	73 1 2
S E T U P	Run 1 9:43- 10:03	Autos Med.Tr. Hvy.Tr.	421 23 14	497 22 22	548 21 18	569 1 1	662 5 1	750 29 17	607 33 23	291 12 9	134 7 3
	Run 2 10:10- 10:30	A MT HT	413 19 16	467 15 31	509 18 23	525 7 0	553 3 3	679 13 20	557 18 24	296 12 8	141 6 5
	Run 3 10:37- 10:57	A MT HT	445 18 11	496 28 16	501 14 21	539 6 1	643 8 1	754 21 19	570 19 27	301 12 4	131 7 2
A F T E R	Run 1 12:30- 12:50	A MT HT	439 14 7	522 14 10	548 14 15	634 8 0	585 2 0	697 19 18	567 14 17	271 8 11	137 3 1
	Run 2 13:07- 13:27	A MT HT	428 18 10	480 16 13	607 18 18	634 3 3	648 5 0	712 19 15	585 13 17	296 12 7	141 2 1
	Run 3 13:29- 13:49	A MT HT	450 10 8	524 12 12	592 10 24	596 8 2	596 6 2	756 12 10	590 10 22	286 10 8	128 2 2

Table 3

AVERAGE HOURLY TRAFFIC VOLUMES
District 4 - San Francisco Site

BEFORE INSULATION

	Southbound Lanes			Northbound Lanes				Ramp	
	4	3	2	1	1	2	3		4
Average Speeds	1129	1507	1606	1524	1410	1739	1532	624	270
Autos	65	67	45	24	24	80	62	34	20
Med. Trks	60	62	56	6	0	75	71	33	9

Average Speeds
52 mph
52 mph
52 mph

Autos
Med. Trks
Hvy. Trks

AFTER INSULATION

	Southbound Lanes			Northbound Lanes				Ramp	
	4	3	2	1	1	2	3		4
Average Speeds	1279	1460	1558	1633	1858	2183	1734	888	406
Autos	60	65	53	14	16	63	70	36	20
Med. Trks	41	69	62	2	5	49	74	21	10
Hvy. Trks									
Autos	1317	1526	1747	1864	1829	2165	1742	853	406
Med. Trks	42	42	42	19	13	50	37	30	7
Hvy. Trks	25	35	57	5	2	43	56	26	4

Average Speeds
55 mph
55 mph
50 mph

Autos
Med. Trks
Hvy. Trks

Autos
Med. Trks
Hvy. Trks

Mic. No.	San Francisco Sites			
	Before, Leq dBA		After, Leq dBA	
	Measured	Predicted	Measured	Predicted
1	80	78	81	78
2	78.5	77	80	77
3	76	76	77	76
4	74	74	75	74
5	79	78	81	78

The tendency for measurements to be 0 to 3 dBA higher than the predictions was probably caused in part by reflections off the buildings (reflections were not included in the predictions). The outside microphones were generally about 9 feet from the residences. These reflections did not introduce another variable in the insulation attenuation calculations, because they were present during both the before-and-after insulation measurements.

Considering the complexity of the site, the predicted values are in close agreement with measured values (i.e., the measured noise levels can be explained by the freeway traffic).

The noise attenuations due to insulation were calculated from measured noise levels using the following method:

$$\overline{\Delta L}_i = \frac{1}{nk} \sum_{o=1}^n \sum_{r=1}^k (\delta L'_{or} - \delta L_{or}) \quad [\text{Eq.1}]$$

where: $\overline{\Delta L}_i$ = the average attenuation due to insulation at inside mic. location i.

$\delta L'_{or}$ = the difference in measured or noise levels (Leq, dBA) between outside mic. location o and inside mic. location i, during run r, after insulation.

δL_{or} = same as above during pre-insulation measurements.

n = number of outside mic.'s

k = number of runs (measurements).

The above method focuses on differences between outside and inside mic.'s rather than actual noise levels. This has the same effect as normalizing before-and-after insulation measurements. Each inside noise level was paired with simultaneously measured outside noise levels at 2 or 3 locations (n=2 or 3) to generate the outside/inside differences for each run.

Two runs each (k=2) were made with windows closed during the before-and-after insulation noise measurements. For obvious reasons the third run with windows open - for obvious reasons was not included in the insulation attenuation calculations. Tables 4 and 5 summarized these calculations for runs 1 and 2. Table 6 shows the average insulation attenuation at each inside microphone location, the 95% confidence limits, standard deviations and the number of attenuations averaged ($N=nk$).

Cost-Effectiveness

Some time ago Caltrans derived two cost-effectiveness criteria for its Community Noise Abatement Program (mitigation of noise along existing free-ways)(Appendix G). These criteria are factors to be considered in determining eligibility of noise abatement projects for programming or inclusion in a priority list.

The cost-effectiveness criteria are:

1. Maximum of \$2,500 per dBA noise reduction for each residence.
2. Maximum of \$25,000 per residence.

These costs are based on 1981 costs and are adjusted according to a "Sound Wall Cost Construction Index" prepared by Caltrans' Office of Structures Design.

Table 4

DECREASE IN NOISE LEVELS DUE TO INSULATION
(District 4 Sites)

RUN NO. 1

BEFORE				AFTER				DECREASE	
OUTSIDE		INSIDE		OUTSIDE		INSIDE		DIFF. Leq, dBA	DIFF. Leq, dBA
Mic.No.	Leq, dBA								
1	79.6	10	53.1	1	80.8	10	48.3	32.5	6.0
2	78.4	10	53.1	2	79.7	10	48.3	31.4	6.1
5	79.2	10	53.1	5	80.8	10	48.3	32.5	6.4
1	79.6	11	52.6	1	80.8	11	49.0	31.8	4.8
2	78.4	11	52.6	2	79.7	11	49.0	30.7	4.9
5	79.2	11	52.6	5	80.8	11	49.0	31.8	5.2
3	76.2	8	50.5	3	77.3	8	50.1	27.2	1.5
4	73.3	8	50.5	4	75.6	8	50.1	25.5	2.7
3	76.2	9	51.5	3	77.3	9	50.5	26.8	2.1
4	73.3	9	51.5	4	75.6	9	50.5	25.1	3.3
3	76.2	12	52.7	3	77.3	12	50.7	26.6	3.1
4	73.3	12	52.7	4	75.6	12	50.7	24.9	4.3
3	76.2	13	51.8	3	77.3	13	51.8	25.5	1.1
4	73.3	13	51.8	4	75.6	13	51.8	23.8	2.3

Table 5

DECREASE IN NOISE LEVELS DUE TO INSULATION
(District 4 Sites)

RUN NO. 2

		BEFORE				AFTER				DECREASE	
		OUTSIDE		INSIDE		OUTSIDE		INSIDE		Diff. Minus	
Mic.No.	Leq,dBA	Diff. Before	Diff. After								
1	79.6	10	54.2	1	80.9	10	49.2	1	80.9	10	31.7
2	78.4	10	54.2	2	79.8	10	49.2	2	79.8	10	30.6
5	79.0	10	54.2	5	80.7	10	49.2	5	80.7	10	31.5
1	79.6	11	51.1	1	80.9	11	49.3	1	80.9	11	31.6
2	78.6	11	51.1	2	79.8	11	49.3	2	79.8	11	30.5
5	79.0	11	51.1	5	80.7	11	49.3	5	80.7	11	31.4
3	76.2	8	52.0	3	77.2	8	49.6	3	77.2	8	27.6
4	73.8	8	52.0	4	75.7	8	49.6	4	75.7	8	26.1
3	76.3	9	52.3	3	77.2	9	49.9	3	77.2	9	27.3
4	73.8	9	52.3	4	75.7	9	49.9	4	75.7	9	25.8
3	76.3	12	52.9	3	77.2	12	50.8	3	77.2	12	26.4
4	73.8	12	52.9	4	75.7	12	50.8	4	75.7	12	24.9
3	76.3	13	52.7	3	77.2	13	52.0	3	77.2	13	25.2
4	73.8	13	52.7	4	75.7	13	52.0	4	75.7	13	23.7

Table 6

AVERAGE DECREASE IN NOISE LEVELS
DUE TO INSULATION
(DISTRICT 4 SITES)

House No.	Mic. No.	Average Decrease Leq, dBA	95% Confidence Interval	Standard Deviation	N (nk)
575	11	4.1	3.3 - 4.9	1.0	6
579	10	6.3	6.1 - 6.5	0.2	6
585/587	8	3.0	1.6 - 4.4	1.2	4
	9	3.3	2.1 - 4.4	0.9	4
	12	3.6	2.9 - 4.3	0.6	4
	13	1.9	1.1 - 2.7	0.7	4

The following summarizes the 1981 cost of insulating each of the three residences in District 4, the average noise reduction achieved and a comparison of cost-effectiveness with the Caltrans criteria.

Cost-Effectiveness of Insulation - District 4

<u>House No.</u>	<u>Cost</u>	<u>Average Noise Reduction</u>	<u>Cost/dBA</u>	<u>Criterion Cost/dBA</u>
575	\$10,080	4 dBA	\$2,520/dBA	\$2,500/dBA
579	\$ 6,240	6 dBA	\$1,040/dBA	\$2,500/dBA
585/587	\$12,480	3 dBA	\$4,160/dBA	\$2,500/dBA

According to the above criteria insulating house No. 585/587 was not cost-effective. Insulating house No. 575 was only marginally cost-effective.

Homeowners' Perception

Homeowners were generally satisfied with the modifications of their homes. The degree of satisfaction primarily followed the degree of achieved noise attenuation.

In one instance, quality of workmanship was criticized, but only to the extent that it degraded noise attenuation properties. A cross-check with measured attenuations revealed that a minimal 2 dBA attenuation was measured at the location (mic. #13), due to a poorly constructed sliding window.

XI. EVALUATION OF DISTRICT 7 PROJECT

Sites

Originally six potential residences were identified in District 7: two in Hollywood, three in San Clemente and one in Camarillo. Pre-insulation noise measurements were performed on October 27-29, 1981 at the six sites. After reviewing the measured data, only the Camarillo site at 505 North Wood Road, was deemed suitable for the project. Inside noise levels in the five rejected sites were too low. For this reason, only data from the Camarillo site is included in this report. Figures 4 and 5 show a layout and cross section of the site in relation to the freeway (route 101). Microphone locations are shown in Figure 6.

Noise Measurements

The site was instrumented with five microphones: two outside (mic.'s 1 and 2) and three inside (mic.'s 3, 4 and 5).

Mic.'s 1 and 2 were two feet from each other, 17 feet from the residence, 5 feet above inside floor level, and 8 feet above the ground. Mic. 1 was used to make a linear tape recording via a B&K type 2218 sound level meter and a Nagra tape recorder for subsequent frequency analysis. Mic. 2 measured A-weighted noise levels via a B&K type 2218 sound level meter. A similar arrangement was used inside at mic.'s 3 (linear) and 4 (A-weighted). Mic. 5 measured A-weighted only. A full list of instrumentation is included in Appendix F.

Pre-insulation noise measurements were performed on October 28, 1981. Post-insulation measurements were taken on December 12, 1984. Table 7 shows the results of the measurements in terms of 15 minute Leq's. The pre-insulation measurements included two runs: windows open and windows closed. The two post-insulation runs were performed with windows closed only: the first run without running the newly installed heat pump (air conditioner/heater), the

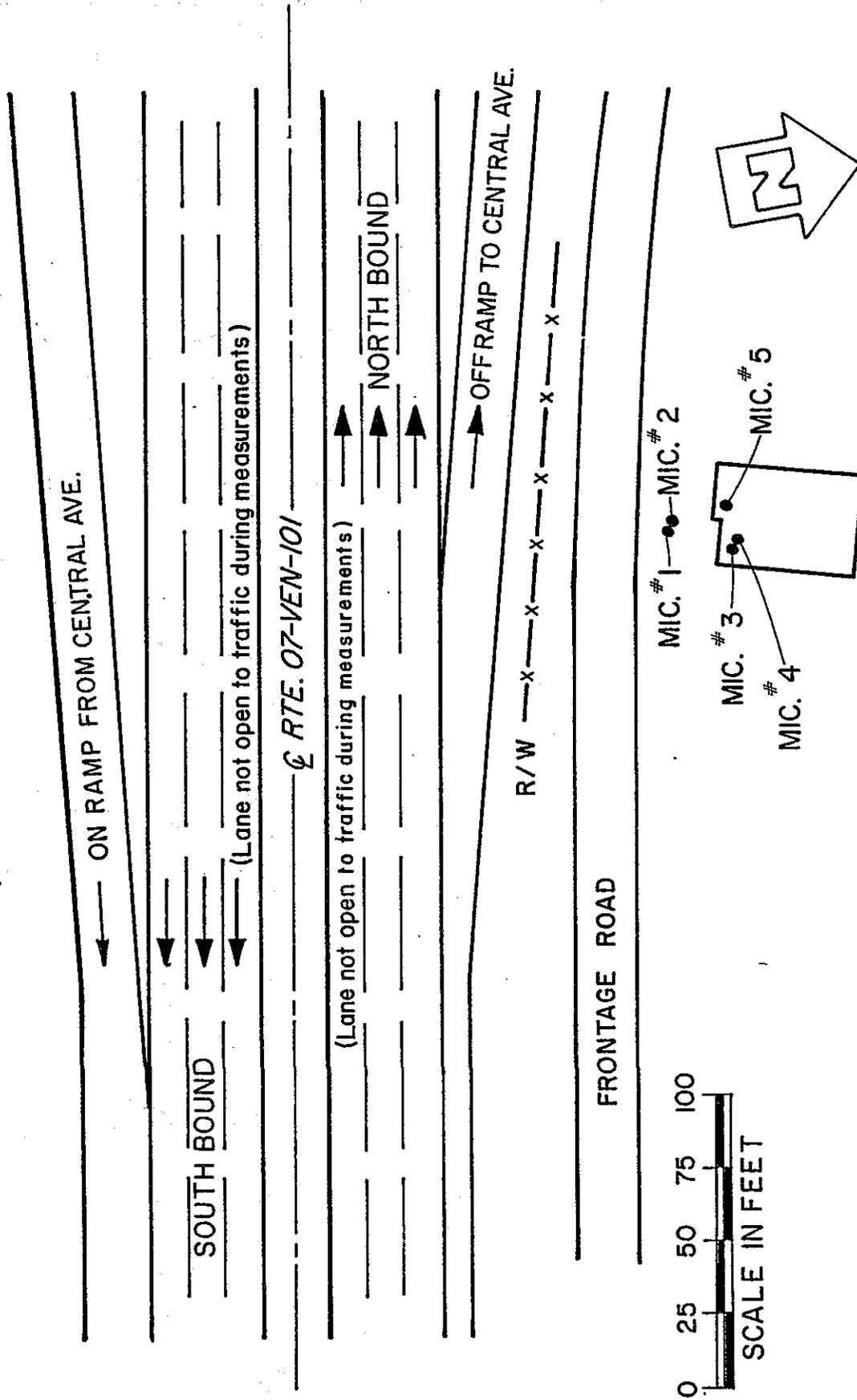


Figure 4 District 7 Site-Layout

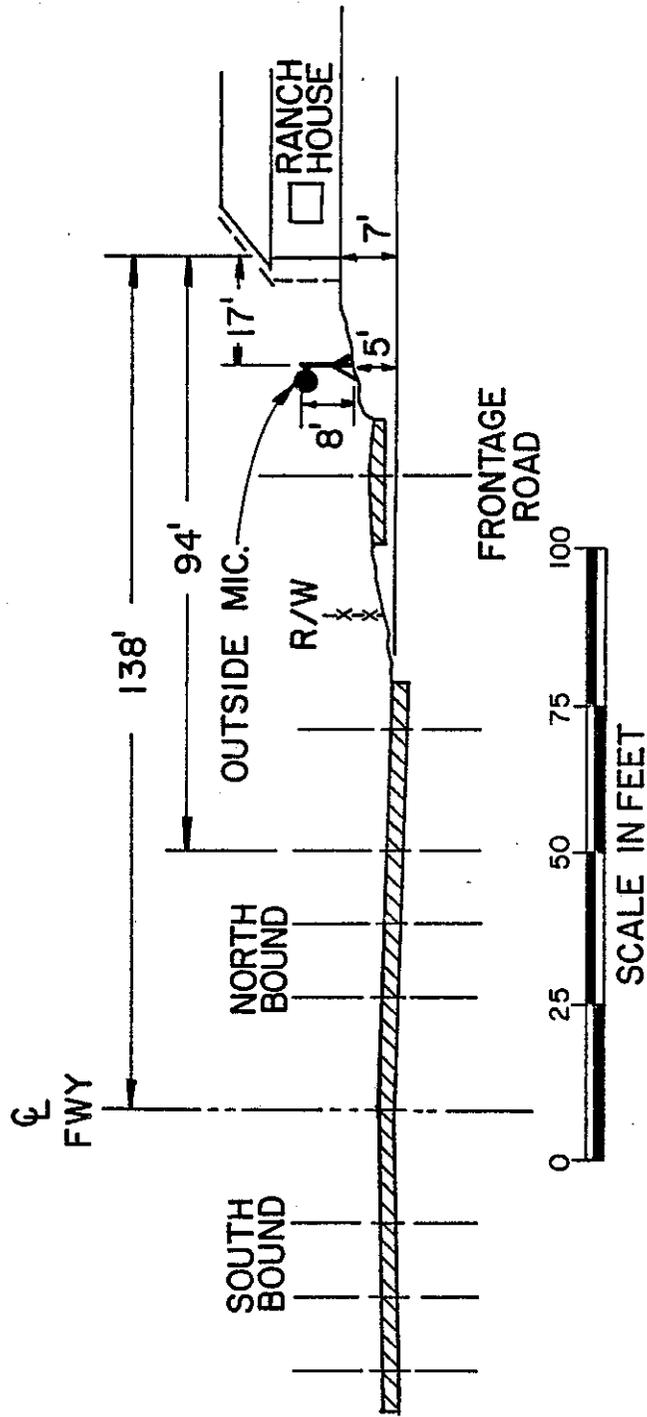
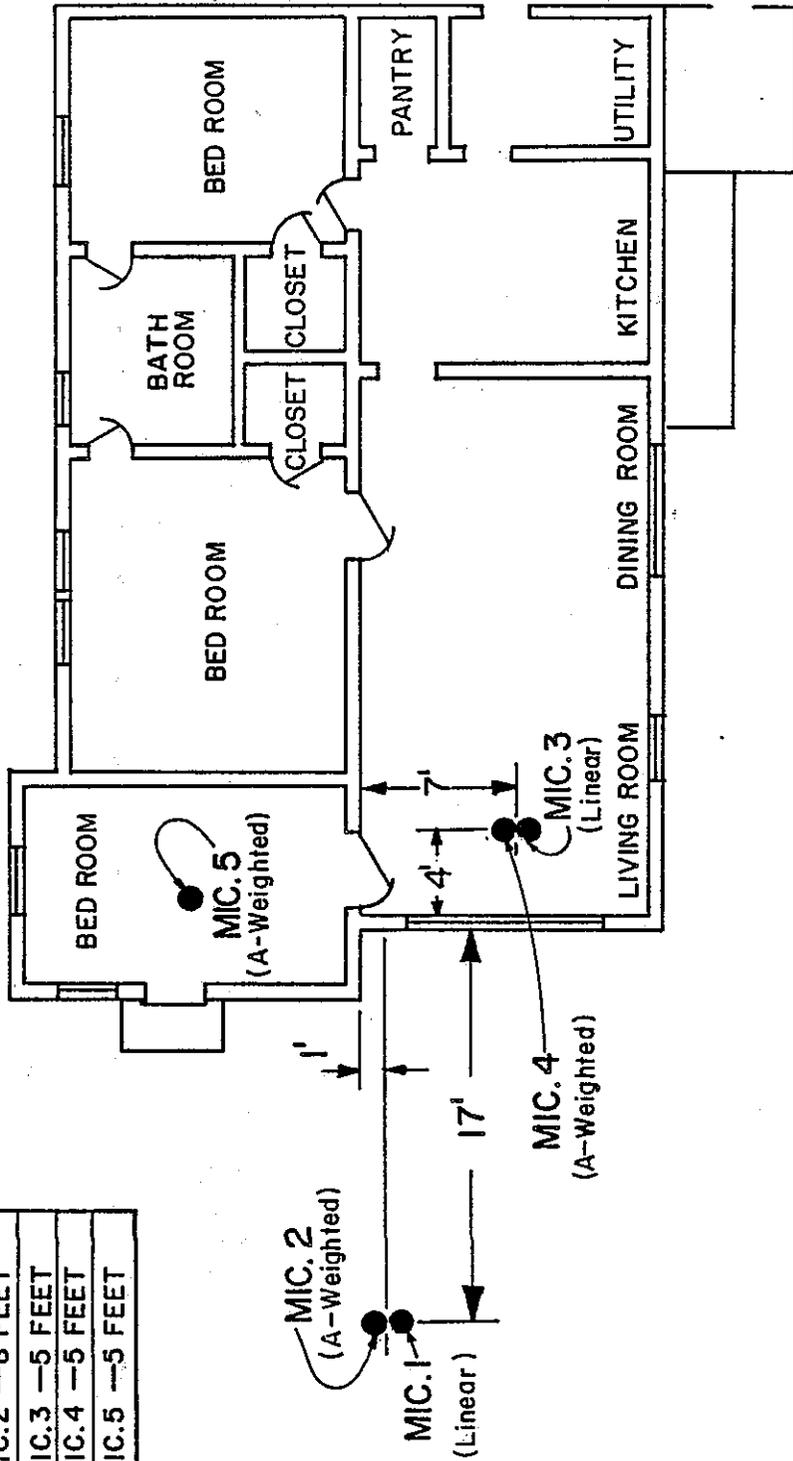


Figure 5 District 7 Site-Cross Section

MIC. HEIGHTS ABOVE FLOOR OR GROUND
MIC. 1 — 8 FEET
MIC. 2 — 8 FEET
MIC. 3 — 5 FEET
MIC. 4 — 5 FEET
MIC. 5 — 5 FEET



RTE 101 FWY.

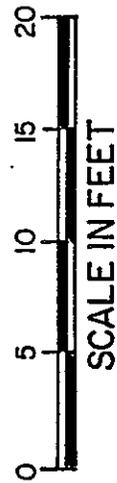


Figure 6 District 7-Microphone Locations

Table 7

SUMMARY OF 15 MINUTE NOISE MEASUREMENTS
BEFORE AND AFTER INSULATION
DISTRICT 7 SITE

Mic. No.	BEFORE, Leq		AFTER, Leq	
	Run A Windows Closed	Run C Windows Open	Run A Windows Closed W/o AC/HTR	Run B Windows Closed With AC/HTR
1	82.9 dBL*	81.5 dBL*	81.7 dBL*	83.1 dBL*
2	74.4 dBA	73.8 dBA	75.8 dBA	76.3 dBA
3	70.2 dBL*	71.8 dBL*	67.6 dBL*	68.3 dBL*
4	52.3 dBA	57.4 dBA	45.2 dBA	46.4 dBA
5	50.2 dBA	60.1 dBA	49.0 dBA	49.7 dBA

* dBL = dB Linear

second run with the heat pump on. For convenience, the runs were labeled A, B and C. Except for installing insulation, runs A before-and-after were made under the same conditions inside the residence. After normalizing for differences in traffic by using the concurrent outside measurements, these runs were compared to determine the attenuation provided by the insulation.

Freeway Traffic Volumes

Directional traffic was counted during each noise measurement run. As was the case with the District 4 San Francisco sites, freeway traffic was the dominant noise source. The 15 minute traffic counts were expanded to hourly volumes, averaged over runs A and C, before, and runs A and B after insulation. Table 8 shows the actual counts. Table 9 shows the volumes expanded to one hour. Traffic was grouped in vehicle categories defined in FHWA-RD-77-108(1). Average speeds were obtained by radar gun.

The traffic was used with the FHWA Highway Traffic Noise Prediction Model(1) for comparison with measured outside noise levels, to confirm that the measured noise levels were generated by the freeway.

Analyses and Results

Except for the addition of a frequency analysis, the analysis methods used in District 4 were applied to District 7 data.

A-weighted noise levels measured at mic. 2 were compared with predictions using FHWA-RD-77-108(1) methodology with Calveno emission levels. The following table summarizes the before-and-after comparisons of measured and predicted at mic. 2:

Mic. No.	District 7 Site			
	Before, Leq dBA		After, Leq dBA	
	Measured	Predicted	Measured	Predicted
2	74	74	76	75

Table 8

SUMMARY OF TRAFFIC COUNTS
 (Performed Simultaneously With Noise Measurements)

DISTRICT 7 SITE

Run and Time Periods	Vehicle Type	Average Speed	S/B Lanes	N/B Lanes	Average Speed	S/B Lanes	N/B Lanes
Run A 10:20-10:35 (Before)	Autos	55 mph	365	418	55 mph	431	498
	Med.Trks	55 mph	28	18	55 mph	20	17
	Hvy.Trks	55 mph	30	23	55 mph	29	35
10:10-10:25 (After)							
Run B 10:40-10:55	Autos	-	-	-	55 mph	462	476
	Med.Trks	-	-	-	55 mph	11	24
	Hwy.Trks	-	-	-	55 mph	29	27
Run C 10:45-11:00	Autos	55 mph	375	390	-	-	-
	Med.Trks	55 mph	19	25	-	-	-
	Hwy.Trks	55 mph	12	18	-	-	-

Table 9

AVERAGE HOURLY TRAFFIC VOLUMES
DISTRICT 7 - SITE

BEFORE INSULATION

	Average Speeds	S/B Lanes	N/B Lanes
Autos	55 mph	1480	1616
Med.Trks	55 mph	94	86
Hvy.Trks	55 mph	84	82

AFTER INSULATION

	Average Speeds	S/B Lanes	N/B Lanes
Autos	55 mph	1786	1948
Med.Trks	55 mph	62	82
Hvy.Trks	55 mph	116	124

The predicted values showed close agreement with the measured values. It is reasonable to infer that the measured noise levels both before and after insulation originated on the freeway.

Table 10 summarizes the calculated attenuations attributable to the insulation treatment. The comparison of run A, before-and-after, is most indicative of the attenuation provided by the insulation. A comparison of run B-after, with run A-before shows the slight degradation (insignificant) due to running the heat pump. The data suggest that noise levels from the heat pump at both inside mic. locations were approximately 38 dBA. For practical purposes, however, the degradation of insulation attenuations due to operation of the heat pump may be considered negligible.

With respect to the distinct attenuation differences shown between the two A-weighted mic. locations (mic.'s 4 and 5), the following explanation needs to be provided.

At the time of pre-insulation noise measurements, the windows near mic.'s 3 and 4 (living room) were in poor condition. One window was cracked and all windows generally provided many paths for noise to leak through. Because of the poor pre-insulation condition near mic.'s 3 and 4, the insulation treatment offered a greater-than-typical amount of attenuation. At the mic. 5 location (bedroom) the pre-insulation conditions were slightly better (from a noise leakage standpoint). The insulation treatment near mic. 5 included replacing windows and a nearby door. The post-insulation solid core door, however, did not seal off the noise properly, degrading the expected attenuation. The net result of these before-and-after conditions was the large difference in attenuations measured at mic. 4 and mic. 5. The lesser difference for mic. 3 can be understood by examining the frequency spectra. Figures 7 through 9 show simultaneous inside/outside 1/3 octave linear frequency spectra and mic.'s 1 and 3, for three conditions: (1) before insulation - windows closed (run A), (2) after insulation - windows closed, heat pump off, and (3) after insulation - windows closed, heat pump on.

Table 10

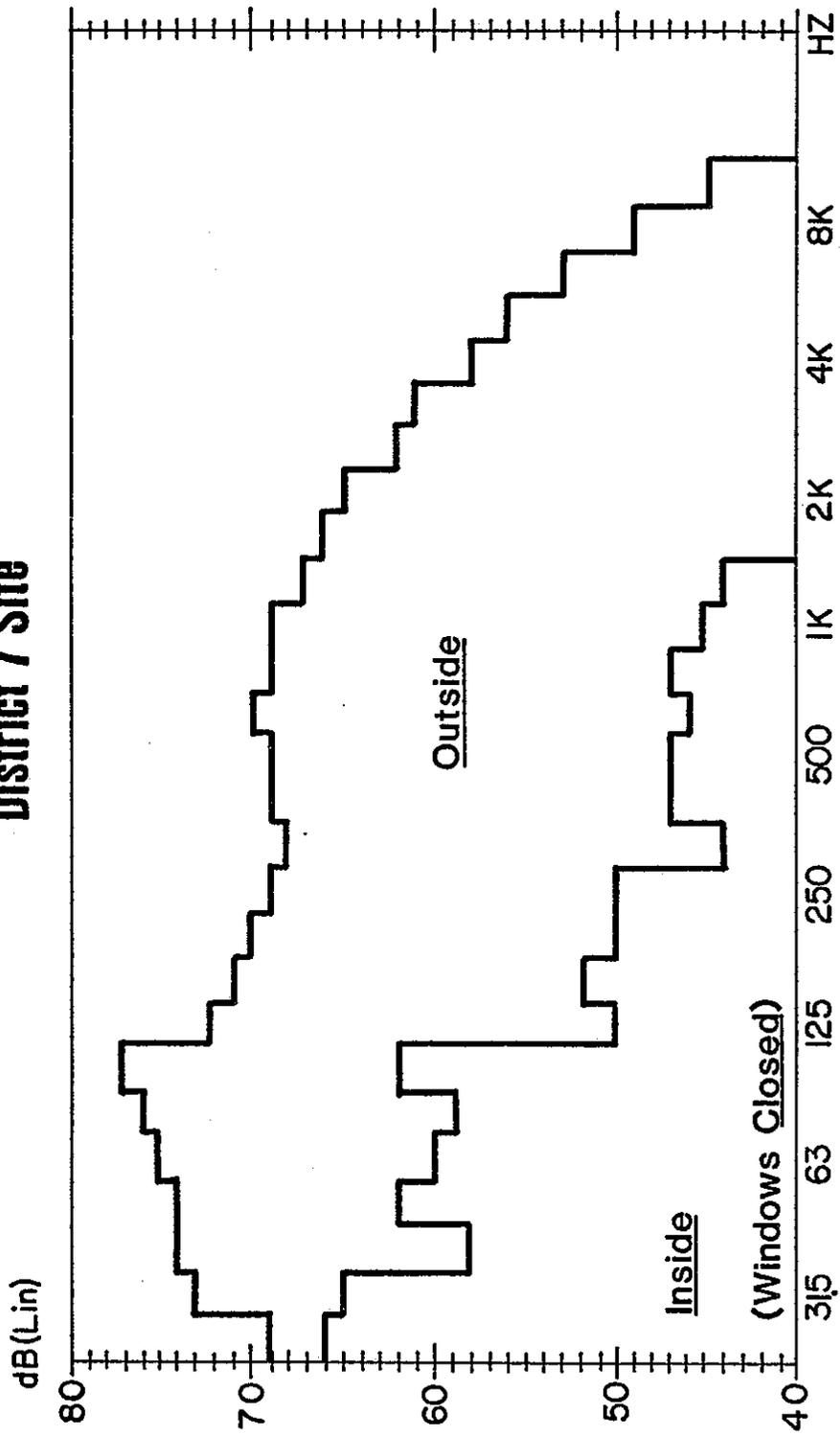
DECREASES IN NOISE LEVELS DUE TO INSULATION
DISTRICT 7 SITE

	Before				Diff.	After				Decrease (Diff.Aft.) Minus Diff.Bef.)	
	Outside		Inside			Outside		Inside			
	Mic. No.	Leq	Mic. No.	Leq		Mic. No.	Leq	Mic. No.	Leq		
Run A	1	82.0 dBL*	3	70.2 dBL*	11.8	1	82.7 dBL*	3	67.6 dBL*	15.1	3.3 dBL*
	2	74.4 dBA	4	52.3 dBA	22.1	2	75.8 dBA	4	45.2 dBA	30.6	8.5 dBA
	2	74.4 dBA	5	50.2 dBA	24.2	2	75.8 dBA	5	49.0 dBA	26.8	2.6 dBA
Run B						1	83.1 dBL*	3	63.3 dBL*	14.8	3.0 dBL*
						2	76.3 dBA	4	46.4 dBA	29.9	7.8 dBA
						2	76.3 dBA	5	49.7 dBA	26.6	2.4 dBA

* dBL = dB Linear

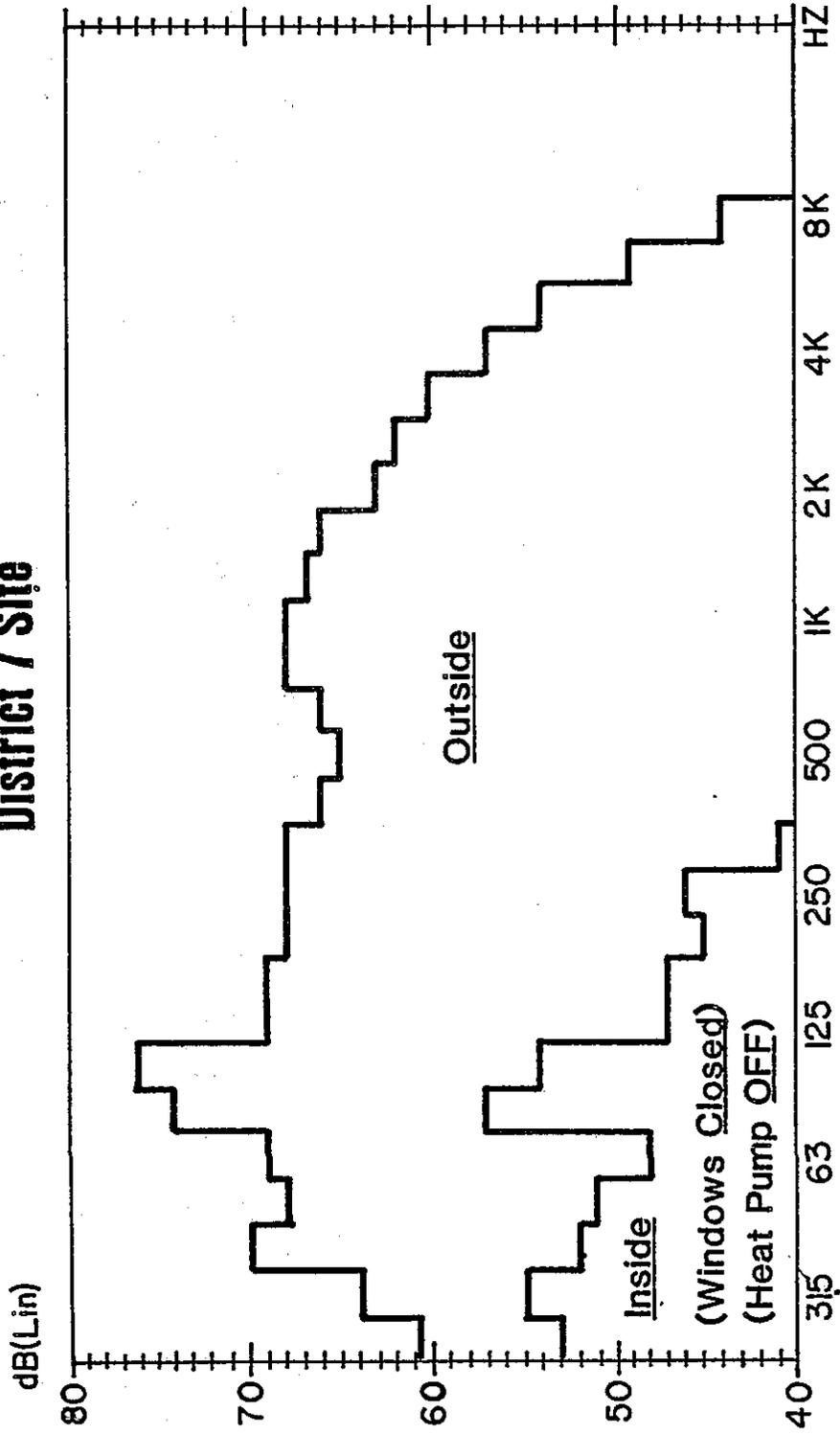
NOTE: Normalized differences in attenuations due to insulation, with and without Air Conditioner/Heater suggest that the AC/Htr contributions to Mic. 4 (after insulation) was approximately 38 dBA.

District 7 Site



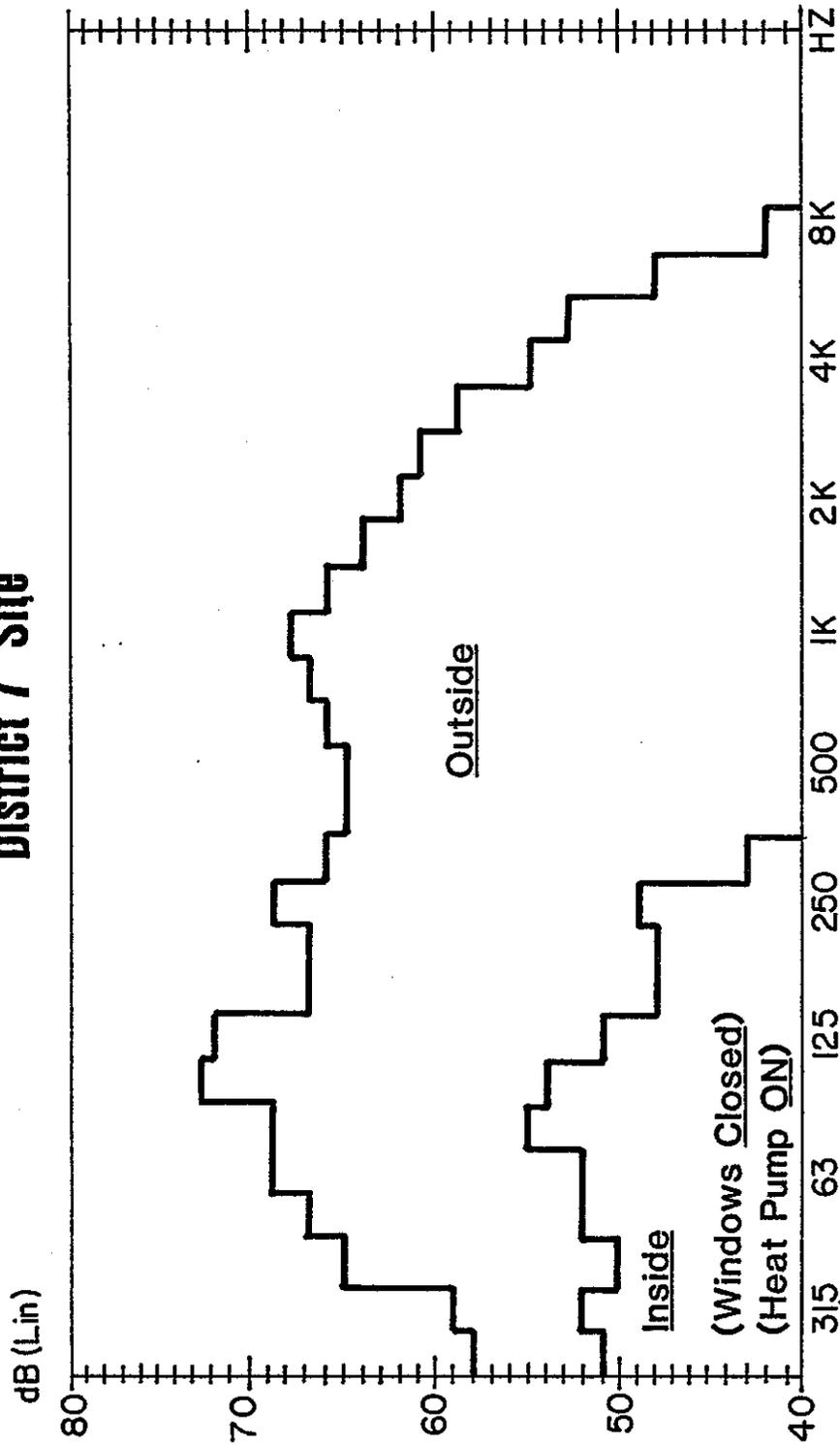
**Figure 7 Before Insulation Simultaneous Inside/Outside 1/3 Octave Frequency Spectra
(Averages of 10 Noise Peaks)**

District 7 Site



**Figure 8 After Insulation Simultaneous Inside/Outside 1/3 Octave Frequency Spectra
(Averages of 10 Noise Peaks)**

District 7 Site



**Figure 9 After Insulation Simultaneous Inside/Outside 1/3 Octave Frequency Spectra
[Averages of 10 Noise Peaks]**

These spectra were obtained by averaging simultaneous inside/outside frequency spectra of ten freeway noise peaks selected from the tape recordings of each measurement run.

The insulation attenuations for each 1/3 octave band were calculated from the spectra for two conditions: (1) windows closed, heat pump off and (2) windows closed heat pump on. The attenuations, shown on Figures 10 and 11, were calculated in the same manner as the total A-weighted attenuations in noise levels. For each 1/3 octave band the differences of sound pressure levels between outside and inside, before insulation, were subtracted from those after insulation. This may be mathematically expressed as:

$$\Delta L_{if} = \delta L'_{of} - \delta L_{of} \quad [\text{Eq. 2}]$$

where: ΔL_{if} = the attenuation due to insulation at the inside mic. location (mic. #3) in the 1/3 octave band, f

$\delta L'_{of}$ = the difference in measured sound pressure levels (dB Linear) between outside mic. location 0 (mic. #1) and inside mic. location i (mic. #3) in the 1/3 octave band, f, after insulation.

δL_{of} = same as above during pre-insulation measurements.

On closer examination [Eq. 2] is a modification and simplification of [Eq. 1] discussed in the District 4 chapter of this report.

The frequency analyses indicate that most attenuations occurred in the higher frequencies, as was expected. Traffic noise, however, is composed of frequencies that are more predominant below 1 KHz than above 1 KHz, as supported by the measured outside and inside spectra. For these reasons, the mic. 3 location experienced only a 3.3 dB attenuation calculated from measurements on a linear scale (Table 10).

District 7 Site

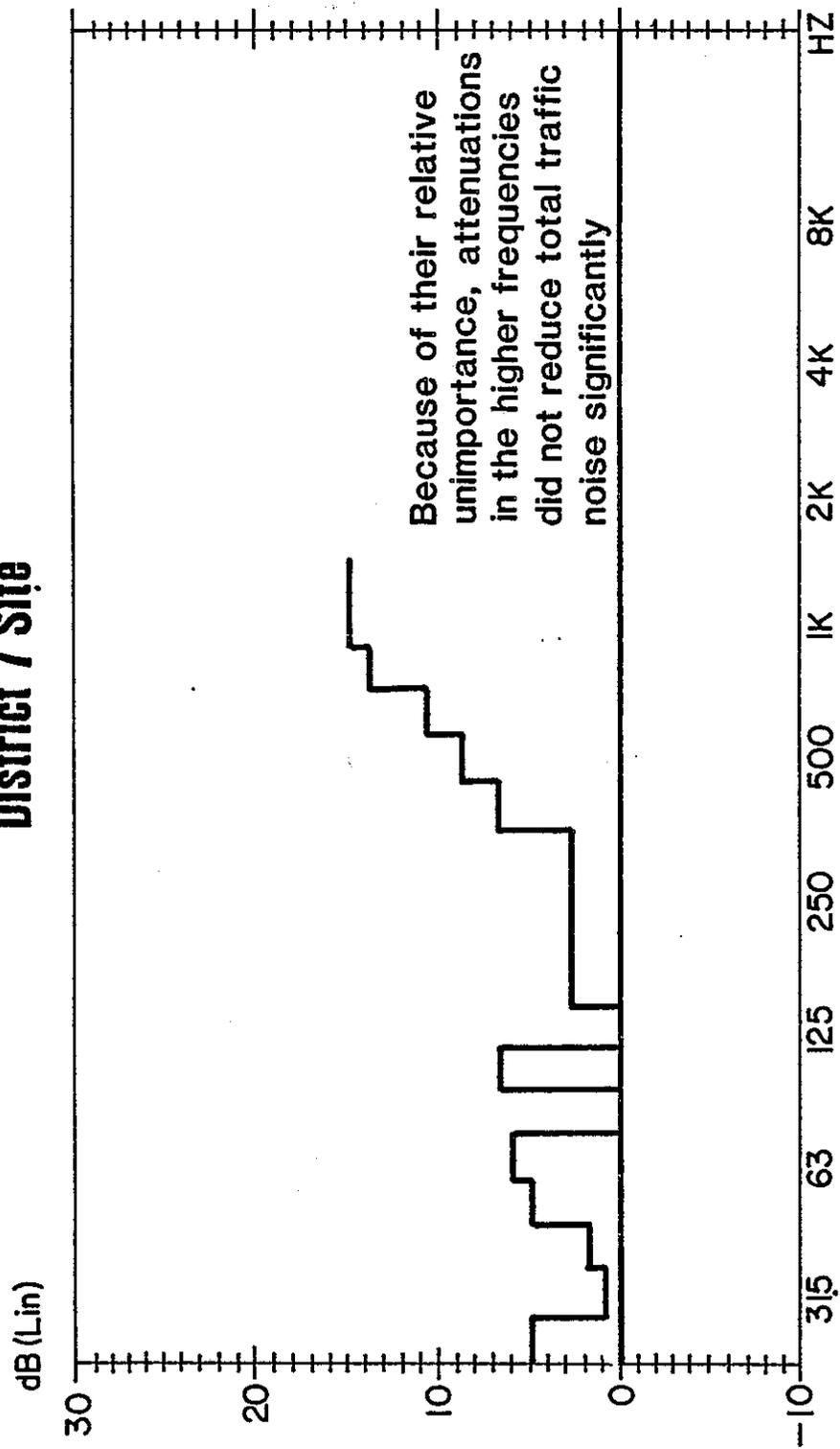


Figure 10 Insulation Attenuations by Frequency

(Heat Pump Off)

District 7 Site

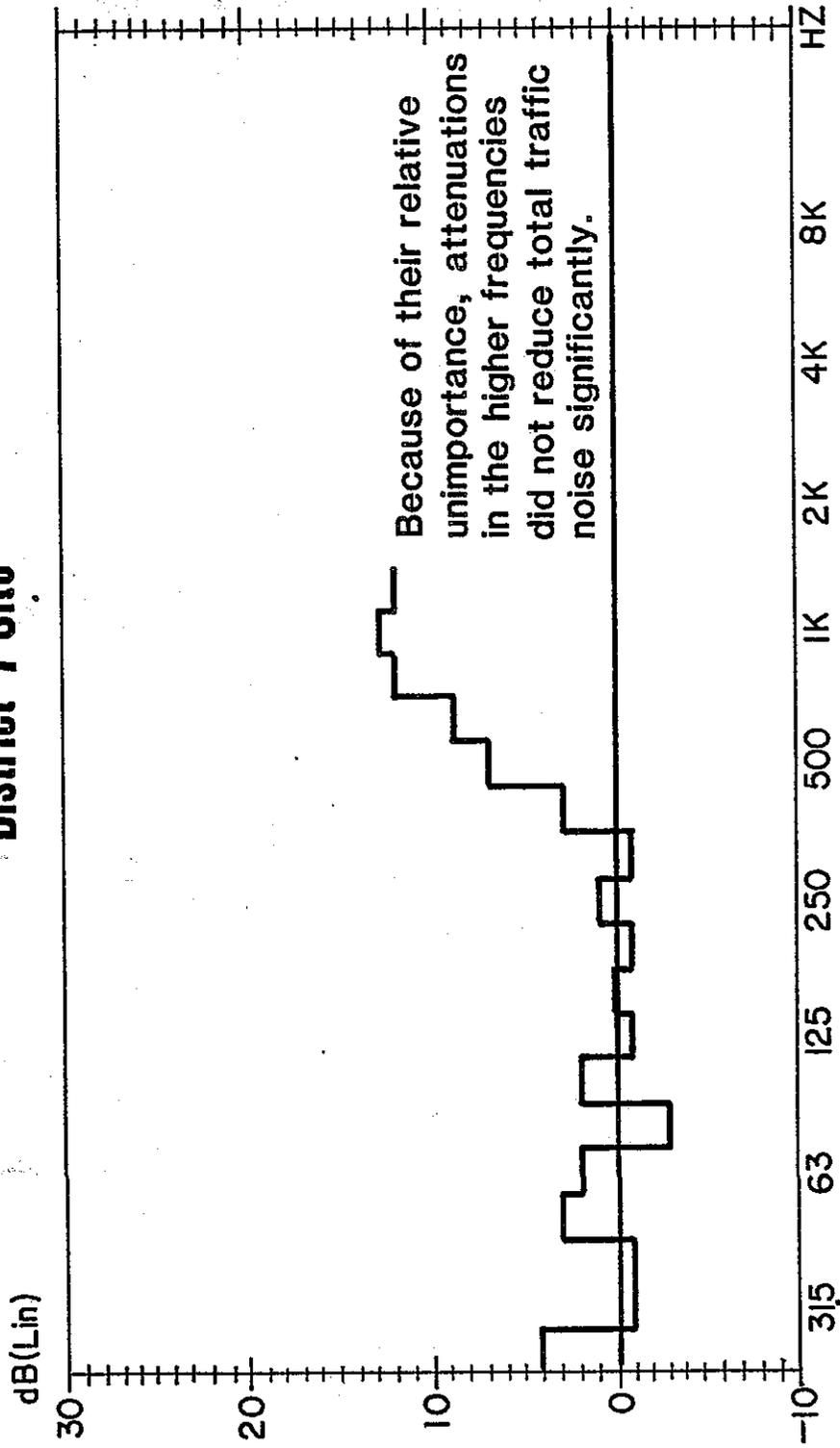


Figure 11 Insulation Attenuations by Frequency

(Heat Pump On)

On the A-weighted scale, however, attenuations in the middle frequencies (centering at 1 KHz) become more important resulting in an A-weighted attenuation of 8.5 dBA for mic. 4 (Table 10).

Cost-Effectiveness

The total cost of the District 7, Camarillo insulation project was \$18,150 - (contractor's bid) plus the \$850 which the homeowner agreed to pay for upgrading the electrical wiring and service panel.

The average noise reduction (bedroom and living room) was 5 dBA. The cost per dBA reduction was therefore \$3,800/dBA. According to the previously mentioned Caltrans cost effectiveness criterion of \$2,500/dBA for the Community Noise Abatement program, the Camarillo project was not cost-effective.

Home Owner's Perception

The homeowner was generally satisfied with the noise reduction provided by the insulation treatment, the quality of materials and workmanship.



XII. INSULATION AS A NOISE MITIGATION MEASURE

Limited Feasibility

Evaluation of the procedures and results covered in the previous chapters suggest that insulating homes from highway noise is a viable mitigation measure. There are several limitations, however, to this noise reduction strategy.

Data in this report suggest that noise attenuations of 3 to 6 dBA are typical and may be achieved at an average cost of \$2,880 (1981 base year) per dBA per house. Compared to the Caltrans 1981 base year cost-effectiveness criterion for the Community Noise Abatement program (\$2,500/dBA per residence with a maximum of \$25,000 per residence), insulation is not cost-effective, especially on a large scale. It further seems reasonable to assume that the cost per dBA increases for higher attenuations, reducing the cost-effectiveness even more when higher attenuations are required.

Feasibility of insulation as a noise abatement measure is also obviously limited to the inside of the home, and should therefore be considered mainly in areas without outside activities.

Other disadvantages of insulation include a possible increase in energy use in certain climates, and lack of natural ventilation. Cost-effectiveness may also be negatively influenced by maintenance and replacement costs of air conditioners and an insulation design process that is more labor intensive than the barrier design process. These were not included in the cost-effectiveness comparisons.

The above limitations point to noise barriers as a more desirable and cost-effective mitigation measure than insulation options. However, in spite of the drawbacks associated with insulation, there are several instances when it may be preferred over noise barriers or other mitigation measures such as roadway design features.

Advantages of Insulation

Insulation may provide noise mitigation when barriers or favorable roadway design features are not feasible, cost-effective or desirable.

When adverse topography or multi-story residences render noise barriers or other alternatives ineffective for noise abatement, noise insulation can still provide an adequate reduction of inside noise levels.

Insulation may also be more cost-effective than noise barriers or other mitigation alternatives when isolated homes need to be protected. Table 11 shows a comparison of cost per dBA per residence for a 6-ft and 10-ft masonry barrier protecting 1, 2, and 3 homes versus the cost per dBA per residence of insulation. Average at-grade sites are assumed.

A Caltrans noise barrier design bulletin (Appendix H) dictates a minimum barrier height of 6 feet and minimum noise reduction of 5 dBA. The bulletin also directs that the line-of-sight between an 11.5-ft truck stack and a 5-ft receiver must be intercepted by the top of the barrier. For average, at-grade site geometries, this is achieved with a 10-ft barrier. Under the same conditions a 10-ft barrier affords a 7 dBA noise reduction (insertion loss). The 6-ft, 5 dBA and 10-ft, 7 dBA barriers have therefore been chosen for the cost effectiveness comparisons in Table 11. Cost figures for these heights were derived from explicit 1981 base year masonry wall construction costs multiplied by a factor to include items such as landscaping and other associated costs. Barrier and landscape maintenance costs are not included, however, and these may very well put insulation in a more favorable light.

The table suggests that the "break-even" costs between masonry barrier and insulation choices are achieved when protecting approximately 2 homes. Given the stated assumptions, insulating one house would cost less than providing barrier protection; for more than two houses a masonry wall would be more cost-effective.

Table 11

COMPARISON OF COST-EFFECTIVENESS
MASONRY WALL VS. INSULATION

No. of Houses	MASONRY WALL, CALTRANS 1981						INSULATION (This Study) 1981	
	Minimum Length	Average Height	Cost per Lin. Ft.	Total Cost	Noise Reduction	1981 Cost/dBA Per House	Noise Reduction	1981 Cost/dBA Per House
1	250'	6'	\$ 80	\$20,000	5 dBA	\$4,000	4.5 dBA	\$2,880
2	300'	6'	\$ 80	\$24,000	5 dBA	\$2,400	4.5 dBA	\$2,880
3	350'	6'	\$ 80	\$28,000	5 dBA	\$1,900	4.5 dBA	\$2,880
1	250'	10'	\$130	\$32,500	7 dBA	\$4,600	4.5 dBA	\$2,880
2	300'	10'	\$130	\$39,000	7 dBA	\$2,800	4.5 dBA	\$2,880
3	350'	10'	\$130	\$45,500	7 dBA	\$2,200	4.5 dBA	\$2,880

In some cases noise barriers are undesirable because they block a scenic view or clash with the aesthetics of a locale. In such cases, insulation may be a preferred alternative. Since these decisions depend on value judgments, homeowner involvement and public hearings should be vital parts of the mitigation design process.

In summary, insulating homes from highway noise provides another mitigation option that is feasible and sometimes preferable when done on a limited scale. Insulation may also be incorporated effectively in conventional barrier designs by providing protection in isolated locations difficult to mitigate by barrier.

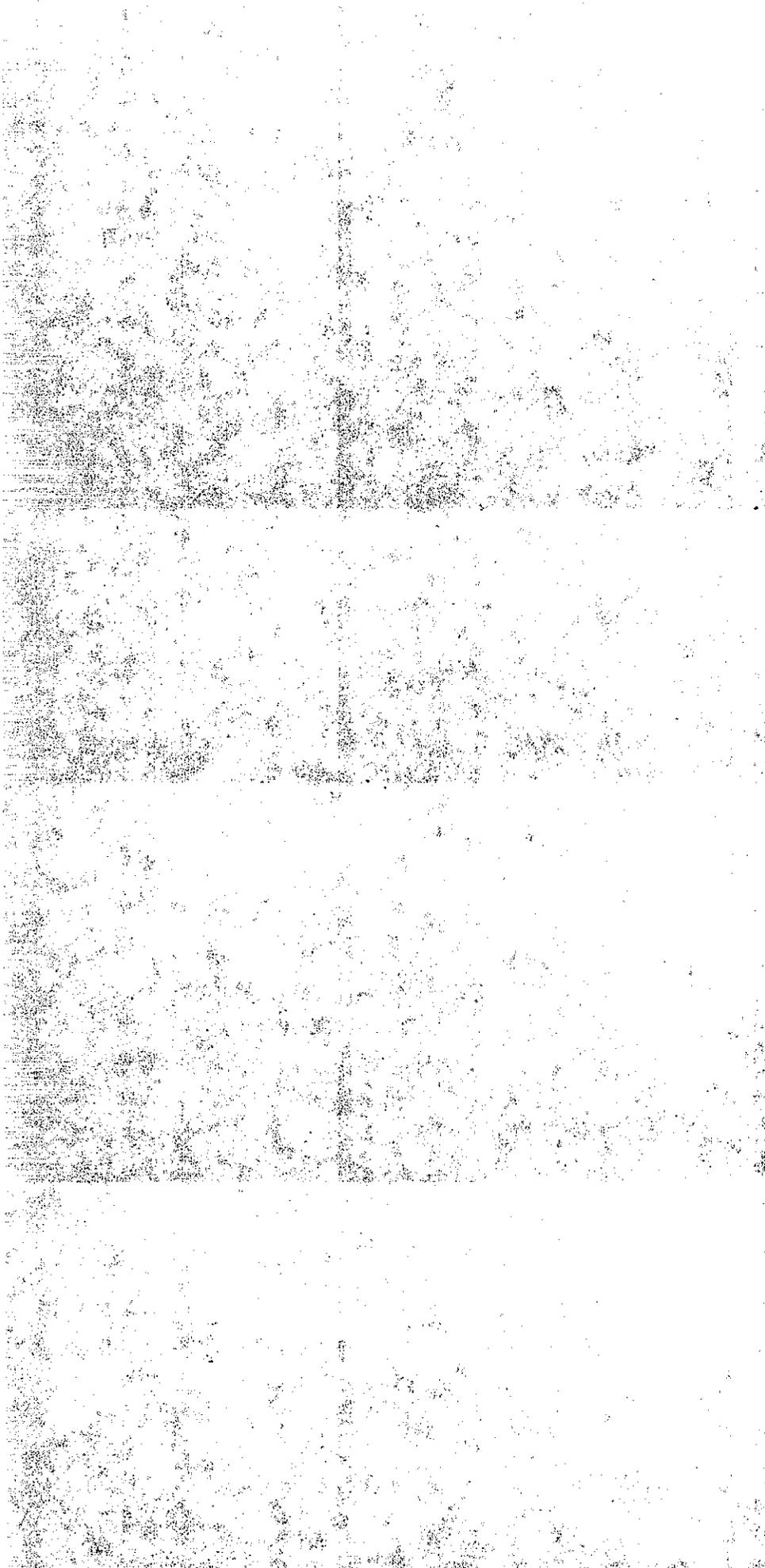
REFERENCES

1. B and Reagan, J. A., FHWA Highway Traffic Noise Prediction Model Highway Administration, FHWA-RD-77-108, December 1978.
2. Highway Program Manual, Vol. 7, Ch. 7, Sec. 3, Federal Highway Administration, August 9, 1982.
3. Hw., California Vehicle Noise Emission Levels, California Department of Transportation, Office of Transportation Laboratory, Interim Report 84.



APPENDIX A

FHWA Notice 5080.62





U. S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

SUBJECT National Experimental and
Evaluation Program (NEEP) Project No. 21 -
Noise Insulation for Private Dwellings

FHWA NOTICE
N 5080.62
January 17, 1977

1. PURPOSE. To provide guidance and encourage experimental projects, utilizing highway funds, designed to determine the feasibility of providing traffic noise insulation features in residences.
2. BACKGROUND
 - a. Prior to FHPM 7-7-3, Procedures for Abatement of Highway Traffic and Construction Noise, May 14, 1976, noise insulation of privately owned residences was not considered eligible for federal funding under Title 23. Federal funds may be approved for these experimental projects based on the criteria established in FHPM 7-7-3, paragraph 12a. The requirements of 12e need not be met, i.e., noise insulation may be implemented even if noise impact is not especially severe and other abatement measures are feasible.
 - b. A December 19, 1975, memorandum on the subject: Briefing on Highway Traffic Noise Abatement Measures, from the Associate Administrators for Right-of-Way and Environment and Engineering and Traffic Operations to the Regional Federal Highway Administrators and Division Administrators, solicited the interest of States in exploring the possibility of noise insulation projects involving privately owned noise sensitive dwellings. State responses indicated sufficient interest to justify the development of this National Experimental and Evaluation Program Project.
 - c. This NEEP has been established to obtain information in the following areas:

DISTRIBUTION:

Headquarters
Regions
Divisions

A-1

OPI:
HHO-31

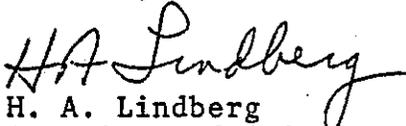
- (1) What are the legal rights, obligations, liabilities and responsibilities of each party, i.e., homeowner, (resident); State; Federal government; contractor; city; county; etc.?
- (2) What specifications are required for the work?
- (3) How detailed should the preliminary engineering study be to assess specific building insulation needs?
- (4) To what extent should noise insulation features be made available to other homeowners in the noise sensitive area, i.e., how far do we need to go with noise insulation of homes?
- (5) When noise insulation is incorporated in a home, a ventilation system may also have to be furnished. What kinds and types of equipment should funding be limited to, if any?
- (6) How much of the structure needs to be insulated against noise?
- (7) What are the impacts on legal obligations agreements, etc., when maintenance of equipment such as ventilating systems, air conditioners, etc., is required?
- (8) What are the costs for noise insulation treatments?

3. ACTION

- a. Encourage States to develop experimental projects to determine the feasibility of noise insulation of privately owned residences. Projects may be programmed as Type IA, IB, or II as defined in FHPM 7-7-3.
- b. The number of projects in any one State should be limited to five.
- c. Preliminary sound level measurements, analysis, etc., may be programmed for preliminary engineering funds. Sound level measurements and analysis necessary to determine the effectiveness of the special treatments, costs, etc., to answer those questions cited under paragraph 2 above and others as deemed necessary, may be programmed

for construction engineering funds. This would include the preparation of project construction and post-construction reports.

- d. All project proposals should be submitted to the Division Office preferably by August 1, 1977. Because of the specialized nature of these projects, they should be forwarded to the Office of Highway Operations, HHO-31, for review and comment prior to approval by the Division Administrator. Four copies of each proposal are requested. Washington Headquarters will make every effort to provide a response to each proposal in no more than 20 work days following receipt of each proposal.
- e. Attached are guidelines for preparation of work plans for use by the States in setting up and evaluating projects under this NEEP project.
- f. To assist the States in determining the necessary noise insulation requirements, a recently completed report titled, "Insulation of Buildings Against Highway Noise" has been prepared. A distribution of the report will be made to all FHWA field offices and State highway agencies in early 1977.
- g. To further assist the States in planning for projects under this program, a course of 2-day duration is being developed for presentation by the authors of the report cited under 3f above in March 1977. An indication of the number and identities of State and FHWA representatives interested in attending such a course is requested by February 28. This information should be sent to Mr. John Schultz, HDV-21, *202-426-9205* Implementation Division, Office of Development.


H. A. Lindberg
Associate Administrator for
Engineering and Traffic Operations

Attachment

Experimental Noise Insulation
Work Plan Guidelines

Scope: The purpose of this National Experimental and Evaluation Program (NEEP) is to determine and document the feasibility and effectiveness of noise insulation of privately owned dwellings. The evaluation of the projects will be based on personal interviews, noise measurements, and other analytical data taken before, during, and after construction.

Responsibility: The NEEP projects will be performed in accordance with FHPM 6-4-2, Construction Projects Incorporating Experimental Features.

Work Plan: A work plan will be prepared and submitted along with the project proposal. This work plan will be in sufficient detail to outline the methods and procedures that will be followed in implementing these experimental projects. The following items will be included in the work plan.

1. The legal ramifications that are involved in establishing and carrying out the projects--this will include the responsibilities, liabilities, and rights as they apply to the State, the homeowner, and the contractor.
2. The design steps that will be necessary in determining the needed modifications. (Note: These projects will be designed and implemented in accordance with a manual entitled "Insulation of Buildings Against Highway Noise" that will be distributed by FHWA.)
3. The proposed administration of the contract. This discussion will include the following:
 - a. Identification of the contracting authority and the basis for this determination.
 - b. How will the contract be managed?
 - c. Identification of the process of selecting contractors.
 - d. Identification of the work acceptance criteria.
4. The procedures to be followed for data collection and reporting.

Project Requirements and Procedures: The following tests, operations, and observations will be necessary in conducting the experimental projects.

Pre-Construction

1. Homeowner and resident interviews will be conducted prior to initiation of the projects. The purpose of the interview will be to ascertain the views and opinions of those persons directly affected by the noise impacts. Because of the need for unbiased responses, care should be taken in conducting the interviews. The interview questionnaire and instruction for its use will be supplied by FHWA.
2. Existing conditions for each structure involved in the project will be established. This will include the following data:
 - a. Exterior and interior noise levels.
 - b. Dwelling structural characteristics including present insulation, wall-and-roof characteristics and window-and-door construction.
 - c. Current fuel heating and electricity costs.
 - d. Climatic conditions (heating and cooling degree days corresponding with c. above) as defined by the National Weather Service.
3. Estimates of future conditions, based on increased traffic, should be established if applicable. The data necessary will include:
 - a. Exterior and interior noise predictions.
 - b. Use of an external noise source as detailed in the insulation manual supplied by FHWA if warranted for actual noise measurements.
4. The design process used in determining the necessary modifications will need to be well documented. This documentation will also include a discussion of how specifications and project related documents are prepared.
5. The administration of the contract will need to be addressed.

Construction - A methodology will be established by the State for determining the following information:

1. The availability of special acoustical and ventilation materials.
2. The incremental costs of materials and labor on a per unit and on an overall basis.
3. Quality control including the following:
 - a. The method by which material and installation control will be assured.
 - b. How specifications for materials will be satisfied.
 - c. Inspection requirements.

Post-Construction - A methodology will be established by the State to obtain the following information:

1. Final noise level measurements, both exterior and interior. These measurements are necessary for each structure measured initially for comparative purposes.
2. Final cost data both per unit and overall.
3. Post-construction interviews. (Questionnaires will be provided by FHWA.)
4. The effectiveness of insulation and ventilation.
5. Post-construction heating and electricity costs analysis considering climatic conditions. (Heating fuel and electricity costs due to noise insulation measures will be established using methodology provided by FHWA.)
6. A comparison between the proposed and completed work.

Reporting: An initial and a 2-year report will be submitted by the State.

Initial Report - The initial report should be prepared upon completion of each project. This report should document the operations, findings, and data collected. The initial report should provide the detailed information necessary for evaluation of the experimental noise insulation projects. The following information should be included in the initial report.

1. Any legal ramifications that resulted from prosecuting the work.
2. The results of the pre-construction and post-construction homeowner and resident interviews.
3. The existing noise levels, exterior and interior, and dwelling structural conditions.
4. The future conditions that were predicted or established using an artificial source.
5. The design steps that were taken to determine the necessary modifications. This discussion should include the usability of the "manual" and any additional information that was required in the design process beyond the scope of the insulation manual.
6. A discussion on the availability of noise insulation materials.
7. Cost figures on materials and labor on a per unit and overall basis.
8. Final contract time period to complete construction including extensions.
9. The effectiveness of the quality control of material and construction.
10. Post-construction noise level measurements and locations, both exterior and interior, for the affected dwellings.
11. Final costs for the completed project.
12. Post-construction heating and electricity costs. A cost comparison will be made between pre-construction and post-construction.
13. The comparison between the designed and completed-work in terms of noise reduction and heating and ventilation requirements.
14. An analysis comparing sound insulation to other feasible abatement strategies at the experimental site such as noise barriers.

Final Report - (2-year) The final report should be prepared 2 years after completion of the construction of each experimental project. The report is necessary to determine the effectiveness and acceptability of noise insulation of private dwellings. The report should include the following information:

1. The results of follow-up interviews conducted with participating homeowners and residents.
2. Exterior and interior noise level measurements taken to verify the validity of the prediction methods and to determine the condition of the noise insulation measures taken.
3. Updated cost data and the continued availability of materials for insulation and ventilation.
4. Costs associated with heating, ventilation and/or cooling.

APPENDIX B

Legal Opinions



Memorandum

To : HARRY L. KAGAN, Chief R/W Agent
Division of Right of Way

Date: May 25, 1979

File :

Attn: Otto Kihm

From : A. M. LYNCH
DEPARTMENT OF TRANSPORTATION

REC'D ENV. PLAN. JUN 21 1979

Subject:

Pursuant to our recent discussion concerning the "NEEP" (National Experimental and Evaluation Program) project, the following issues appear to be critical and worthy of review.

1. The legal foundation (as set forth in memorandum dated August 6, 1977 from Bruce A. Behrens, attorney) upon which the program is based is, according to Mr. Behrens, admittedly somewhat weak.
2. The purpose of this experimental project is to sound-insulate private dwellings as a method of mitigating freeway noise along existing freeways. Mr. Behren's memorandum indicates that "CEQA does not raise any retroactive duty to mitigate the environmental effects of an already constructed facility. Instead it is keyed to mitigate the effects of future projects. Thus, while CEQA could be used for mitigation of future noise impacts, a program to mitigate existing environmental noise effects from existing facilities would require new statutory authority independent of CEQA or an amendment to CEQA itself". Therefore, it would seem to follow that a demonstration research project would not be appropriate on a completed project because new statutory authority would be required to determine noise effects on existing facilities. Mr. Behren's also indicates that the ultimate purpose served under the NEEP program is a substantial public purpose. I do not see how a substantial public purpose is served by arbitrarily insulating selected dwellings unless the study results in the proof of noise damages to similar properties, which would result in payment of damages, either voluntary or through inverse condemnation, to innumerable properties.

3. The Streets and Highways Code does require a program of noise abatement for schools located adjacent to existing freeways, and specifically sets forth the noise decibel limitations. To my knowledge there are no statutes specifically establishing noise levels pertaining to dwellings adjacent to freeways. The District is being asked to be guided by criteria for noise levels arbitrarily established by FHWA design standards set forth in FHWA Notice N5080.62, January 17, 1977.
4. New income tax laws allow deductions for the addition of insulation and other energy saving devices. Is the State, in effect, giving tax benefits to individuals at the expense of all other taxpayers?

Generally the accepted appraisal approach to damage determination is either the "before and after" or the "cost-to-cure", whichever is less.

The environmental approach, as it pertains to the NEEP program, does not consider the "before and after" approach in determining damages in its procedures, but rather is limited only to the cost of curative work. This could lead to excessive and unjustifiable spending of tax monies and does not provide for offsetting special benefits.

To my knowledge there is no State law requiring us to forsake proven appraisal practices and adopt an environmental approach to mitigate damages. In fact, the Streets and Highways Code specifically defines damages and they are presently determined by approved appraisal procedures.

No provision is made in current instructions in the NEEP program for noise attenuation except for dwellings immediately adjacent to freeways. It would appear we could be establishing a basis for damage claims for noise in residences several blocks from the freeway if the State implements instructions included in FHWA Notice N5080.62, January 17, 1977, Experimental Noise Insulation Work Plan Guidelines, and the General Criteria for Selecting Projects issued December, 1977 by the Transportation Laboratory.

Also, the method of data collection relies on being able to maintain records supplied by the property owner, but fails to take into consideration some very probable real life situations which may drastically affect the data received. These would include, but not be limited to, vacations, sale or foreclosure of the property, burning wood or other combustibles in the fireplace, or change in occupancy from owner to tenant.

In summary, it appears to me that the District is being asked to approach a noise problem affecting dwellings on an environmental basis rather than the normal approach used for the appraisal of damages.

If damages of the type referred to in FHWA Notice N5080.62, January 17, 1977, in fact, are legally compensable, it is my suggestion that the Right of Way Division of FHWA concur in this experimental project before the District takes any further action. As further support of this noise insulation experimental project, I am attaching memorandum dated May 29, 1979 from Ellen D. Tiger, attorney, Legal Division, District 07.

Original signed by A. M. Lynch

A. M. LYNCH, Chief
R/W Acquisition Branch

AML:sh
Attachs.

cc: WJKenney
Larry Loudon, Env. Planning

Memorandum

To : Harry L. Kagan, Chief R/W Agent
Division of Right of Way

Date: May 29, 1979

File :
ATTORNEY-CLIENT CORRESPONDENCE
FOR USE OF DEPARTMENT ONLY

From : Department of Transportation—Legal Division
Los Angeles

Subject: "NEEP"
(Paul Bohem, et al. v. State, et al.
Los Angeles County SCC No. C 237140)

I have been asked to comment on Al Lynch's memorandum regarding the federal experimental program to insulate homes adjacent to freeways, known as NEEP (National Experimental and Evaluation Program). I agree with the contents of his memorandum, and I would also like to add the following comments.

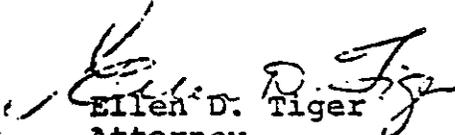
An important issue is whether this experimental project will be detrimental to the Department's legal position in Bohem v. State, Los Angeles Superior Court Case C 237140 filed on April 14, 1978.

In Bohem the plaintiffs are alleging a taking and damaging of their property (three separate residences) due to traffic noise from the adjacent freeway, Route 2, in the Eagle Rock area of Los Angeles County. There was no physical taking of plaintiffs' property before the freeway was completed in the mid 1970's.

Plaintiffs are attempting to set a precedent by extending the recent airport noise cases (e.g., Aaron v. City of Los Angeles (1974) 40 CA3d 471) to the operation of freeways.

If we proceed with the NEEP project, it may be used as an admission in the Bohem case. Plaintiffs could claim that the NEEP project is proof we have a duty to mitigate freeway traffic noise that adversely affects adjacent homes.

If we lose the Bohem case, it would set a precedent, and force the State to pay for noise pollution to residences adjacent to the State's freeways, even though there has been no physical taking.

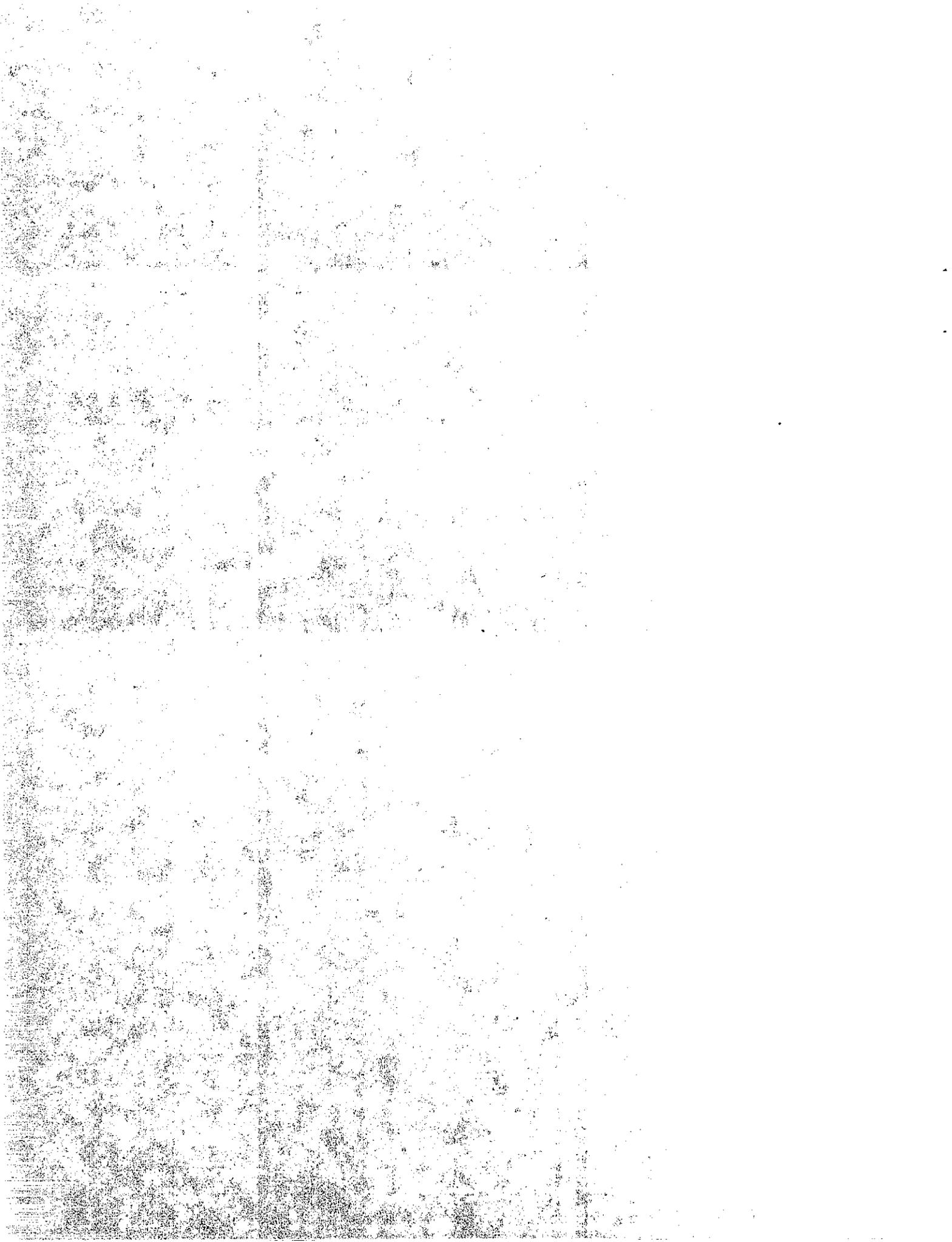

Ellen D. Tiger
Attorney

EDT:nm

B-4

APPENDIX C

Tax Assessment



March 18, 1980

04-SF-101 4.0
04226 - 100071

Mr. Robert Kennedy
Chief Appraiser
City and County of
San Francisco
400 Van Ness Avenue
San Francisco, CA 94102

Dear Mr. Kennedy:

Caltrans is participating in a Federal Highway Administration (FHWA) sponsored experimental project on noise insulation for private residences. The purpose of the project is to research the effectiveness of different noise insulation techniques relative to cost, interior noise reduction and energy conservation.

Four houses on San Bruno Avenue along the Route 101 freeway in San Francisco have been selected for this experimental project. (Please refer to the attached location maps.) We have contacted the four property owners and all have expressed a willingness to participate in the program.

Various types and combinations of insulation methods will be considered to reduce the interior noise to acceptable levels. These could include wall insulation, ceiling and floor insulation, caulking and window sealing and replacing existing windows with single or double glazed windows. In addition, a ventilation system may be required in the cases where the windows will be permanently sealed. It is estimated the insulation work will cost between \$5,000 to \$10,000 per house.

Mr. Robert Kennedy
Page 2
March 18, 1980

We would appreciate being informed if the insulation work proposed in this experimental project could result in a reassessment of the four properties involved, which may subsequently result in higher property taxes to the homeowners. This is a major concern of the homeowners and may influence their future participation in this program.

Should you require additional information or have any questions, please call Mr. L. V. Blackburn, Program Coordinator, at (415) 557-2685.

Sincerely yours,

T. R. LAMMERS
District Director

By ORIGINAL SIGNED BY
R. D. SAYRE
R. D. SAYRE, Chief
Project Development
C Branch

Attachment

EAS:dfc

cc: VJR, EAH, LVB-EAS, WWhitnack(HQ), MHatano(HQ-Trans Lab)

DEPARTMENT OF TRANSPORTATION
GENERAL PREVAILING WAGE RATES
DAS-OBM-1203 (1/82)

Contract No. 46559-MN	Sheet 4 of 32
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Pursuant to Section 1771 of the Labor Code, if this contract is for more than \$1,000, not less than the general prevailing rate of wages for work of a similar character in the county in which the work is to be performed shall be paid to all workers employed on this contract.

Pursuant to Section 1773 of the Labor Code, the general prevailing rate of wages in the county in which the work is to be done has been determined and the Department has listed these wage rates in the Department of Transportation publication entitled General Prevailing Wage Rates, dated September, 1982. Future effective wage rates which have been predetermined and are on file with the Department of Industrial Relations are referenced but not printed in said publication. The wage rates determined by the Director of Industrial Relations and published in the Department of Transportation publication entitled General Prevailing Wage Rates refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, said published rate of wage shall be in effect for the life of this contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the Department of Industrial Relations, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this contract, each successive predetermined wage rate shall apply to this contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this contract, such wage rate shall apply to the balance of the contract.

If this contract is more than \$1,000, the general prevailing wage rates set forth in the Department of Transportation publication entitled "General Prevailing Wage Rates", which establish minimum wages for this contract shall be posted by the Contractor in a prominent place at the site of the work.

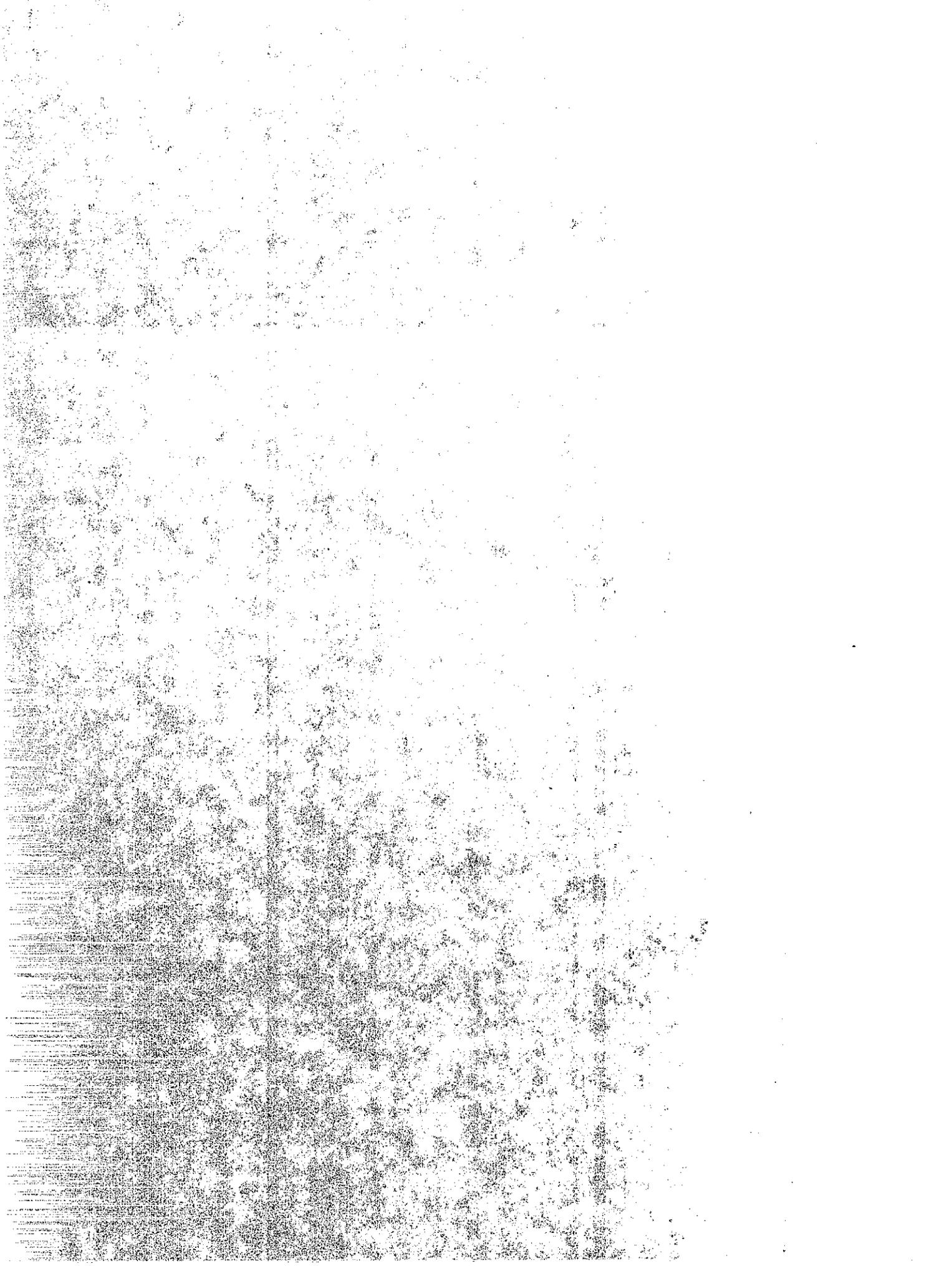
All copies of prevailing wage rates to be posted at the job site will be furnished by the Department.

E-29



APPENDIX D

Homeowner Agreements



DISTRICT 4

AGREEMENT

District Agreement No. 1

This Agreement, made and entered into on the 1st day of
July, 1980, by and between

Austin and Teresa Morris

Legal owner(s) of the property
known as 579 San Bruno

Avenue

SF

County in the State of California,
hereinafter referred to as
"HOMEOWNER".

And

STATE OF CALIFORNIA,
acting by and through the Business
and Transportation Agency,
Department of Transportation,
hereinafter referred to as "STATE".

AGREEMENT

District Agreement No. 2

This Agreement, made and entered into on the 1st day of
July, 1980, by and between

John De Nadai

Legal owner(s) of the property

known as 575 San Bruno

Avenue

SF

County in the State of California,
hereinafter referred to as
"HOMEOWNER".

And

STATE OF CALIFORNIA,
acting by and through the Business
and Transportation Agency,
Department of Transportation,
hereinafter referred to as "STATE".

AGREEMENT

District Agreement No. 3

This Agreement, made and entered into on the 7th day of
July, 1980, by and between

Donald Carnegie, Mabel Ehman

and Emil Ehman

Legal owner(s) of the property

known as 599 San Bruno

Avenue, San Francisco

, SF

County in the State of California,

hereinafter referred to as

"HOMEOWNER".

And

STATE OF CALIFORNIA,
acting by and through the Business
and Transportation Agency,
Department of Transportation,
hereinafter referred to as "STATE".

AGREEMENT

District Agreement No. 4

This Agreement, made and entered into on the 25 day of

August, 1980, by and between

Alfred B. Buen

Legal owner(s) of the property

known as 587 & 585

San Bruno Avenue
San Francisco, California

County in the State of California,

hereinafter referred to as

"HOMEOWNER".

And

STATE OF CALIFORNIA,
acting by and through the Business
and Transportation Agency,
Department of Transportation,
hereinafter referred to as "STATE".

Whereas, the U.S. Department of Transportation acting through its Federal Highway Administration, hereinafter referred to as "FHWA", on January 17, 1977, issued FHWA Notice N 5080.62 encouraging states to develop experimental projects to determine the feasibility of noise insulation of privately-owned residences; and

Whereas, STATE desires to conduct an experimental noise insulation project in the residence located on HOMEOWNER's property, hereinafter called RESIDENCE; and

Whereas, STATE desires and is willing to pay the cost of making modifications, alterations and reconstruction to RESIDENCE, hereinafter called ALTERATIONS and described herein and detailed on the plans and in the specifications to be prepared by STATE; and

Whereas, STATE desires to determine what changes in sound levels and energy use can be expected in RESIDENCE in which ALTERATIONS are made; and

Whereas, HOMEOWNER is willing and desirous to permit STATE to make ALTERATIONS to RESIDENCE with no design or construction costs accruing to HOMEOWNER; and

Whereas, HOMEOWNER, after approving ALTERATIONS as described hereinafter, is agreeable and willing to execute a "Memorandum of and Short Form of Agreement" (copy attached as Exhibit A and made a part of this agreement) and permit same to be duly recorded and become a covenant running with the land and condition on the title of HOMEOWNER's property; and

Whereas, HOMEOWNER and STATE do mutually desire to cooperate and desire to specify herein the terms and conditions under which ALTERATIONS shall be made;

NOW, THEREFORE, in consideration of the covenants and conditions herein contained, the parties hereto agree as follows:

Article I

STATE AGREES:

STATE, its contractor(s) or assignees shall do all of the following items of work in accordance with all applicable Federal, State, and local statutes, codes, ordinances, and regulations at STATE's expense without any monetary or material costs accruing to HOMEOWNER.

1. Make noise level recordings both inside and outside of RESIDENCE before and after construction determined by STATE to be necessary for the purpose of doing engineering and design work to prepare the plans and specifications for ALTERATIONS and to determine the effectiveness of ALTERATIONS in reducing noise levels. The times of the recordings shall be mutually agreed upon by both STATE and HOMEOWNER.

HOMEOWNER further agrees to notify STATE during the testing period of any and all changes to the home which the HOMEOWNER may undertake which would alter the test data.

2. Design ALTERATIONS deemed necessary by STATE to reduce interior noise levels from exterior sources.
3. Permit HOMEOWNER to review and approve proposed plans and specifications for ALTERATIONS. STATE shall discuss any objections HOMEOWNER may have to STATE's plans and specifications and make those changes thereto mutually agreed upon by STATE and HOMEOWNER. In the event STATE and HOMEOWNER do not mutually agree upon ALTERATIONS, this agreement shall be terminated by written notice and neither STATE or HOMEOWNER shall have any further obligation to the other. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-10.
4. All work done under this agreement shall conform to all applicable building, fire and sanitary statutes, codes, ordinances, and regulations relating to such work, and shall be done in a good and workmanlike manner. RESIDENCE shall be left in as good a condition as found.
5. Monitor energy usage for RESIDENCE covering the time period from two (2) years immediately preceding the construction of ALTERATIONS to two (2) years following the acceptance of ALTERATIONS by STATE. Energy usage shall include but not necessarily be limited to electricity and natural gas.
6. STATE shall compensate HOMEOWNER at the prevailing rate for the quantities of electricity and natural gas used during the construction period which are in excess of the quanti-

ties of these items used during the corresponding billing periods one year earlier. The construction period shall be the period from the date the construction contract is awarded to the date the work is accepted by STATE.

7. STATE, its contractor(s) or assignees shall provide all normal servicing, repair and maintenance, including filters, of any mechanical unit such as a ventilation system that is installed pursuant to this agreement during the period STATE monitors energy usage. At the close of said energy monitoring period the unit shall be serviced and inspected to be sure it is in a state of good repair at the time HOMEOWNER assumes servicing and maintenance responsibilities.
8. If, because of the construction activities by STATE, HOMEOWNER and his/her household or any member thereof are required to vacate RESIDENCE, STATE shall reimburse HOMEOWNER for actual expenses for lodging and meals incurred. The cost to STATE for this purpose shall not exceed 46.00 dollars per day per person. HOMEOWNER shall submit receipts for lodging and meals for reimbursement. STATE shall not be responsible for any items covered by HOMEOWNER's insurance.
9. STATE shall pay all engineering, design, materials, labor, equipment, permit and other costs and fees accrued under the

terms of this agreement. STATE shall make no payment to HOMEOWNER for rent, utility bills, inconvenience, use of subject property, or any other item except as specifically noted in Articles I-6, I-7 and I-8.

Article II

HOMEOWNER AGREES:

HOMEOWNER, his assignees or successors in interest shall:

1. Notify his assignees or successors in interest, and/or tenant occupant(s) of the terms of this agreement by written notice.
2. Notify STATE by written notice of any proposed changes in ownership or occupancy subsequent to executing this agreement and during the construction and monitoring period specified in Section I-5. Said written notice shall be mailed to STATE at the address specified in Article III-10.
3. Provide STATE and its contractor(s) access to various areas inside and outside of RESIDENCE as determined by STATE for the purpose of making noise recordings, design, and the construction and maintenance work described herein and detailed on the plans and in the specifications. Access will be required before, after and during construction.
4. On demand of STATE, make or cause to be made available for

review by STATE all bills and records for RESIDENCE showing quantities of energy used during the period from two (2) years immediately preceding the construction of ALTERATIONS to two (2) years following the acceptance of ALTERATIONS by STATE. Energy usage shall include but not necessarily be limited to electricity and natural gas.

5. Upon acceptance of ALTERATIONS by STATE, assume all responsibility for the operation and maintenance of ALTERATIONS except the maintenance responsibilities STATE has specifically obligated to itself as described in Article I-7. At the termination of energy-usage monitoring by STATE, the time period being described in Article I-5, HOMEOWNER understands and agrees that the servicing, repair and maintenance responsibilities STATE has specifically obligated to itself as described in Article I-7 shall pass to HOMEOWNER and STATE shall have no further obligation therefore.
6. HOMEOWNER understands and agrees that any damage to ALTERATIONS being maintained by STATE caused by HOMEOWNER, whether willfully or accidentally shall be repaired by HOMEOWNER at no expense to STATE as expeditiously as possible.
7. In consideration of ALTERATIONS to be performed in accordance with this agreement, execute a "Memorandum of and Short Form of Agreement", attached as Exhibit A, upon approving and signing the plans and specifications for the work proposed by STATE.

8. Participate in an interview by STATE within twelve (12) months of acceptance of ALTERATIONS by STATE.

Article III

IT IS MUTUALLY UNDERSTOOD AND AGREED:

1. HOMEOWNER is not responsible for any damage or liability occurring by reason of anything done or omitted to be done by STATE under or in connection with any work, authority or jurisdiction not delegated to HOMEOWNER under this agreement.
2. That neither STATE nor any officer or employee thereof shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by HOMEOWNER in connection with any work, authority or jurisdiction not delegated to STATE under this agreement.
3. That obligations of STATE to make ALTERATIONS approved by HOMEOWNER under the terms of this agreement are contingent upon the allocation of funds by the California Transportation Commission.
4. That construction of ALTERATIONS referred to herein may require alterations, deviations, additions to or omissions from STATE's plans and specifications, including increase or decrease of quantities in items of work. Any such changes as referred to herein will be accomplished in compliance with all local codes, laws, ordinances and regulations and

in accordance with STATE's Standard Specifications and Special Provisions in STATE's construction contract.

5. That upon the date of completion of all work under this agreement and acceptance of ALTERATIONS by STATE, ownership and title to all materials, equipment and appurtenances installed will automatically be vested in HOMEOWNER and no further action will be necessary to transfer ownership to HOMEOWNER. All materials, equipment and appurtenances installed are further to be classified as realty, and shall remain with the dwelling in the event of sale or foreclosure during the test period.
6. That all data, reports, recommendations, plan estimates, specifications, and documentation prepared or obtained pursuant to the terms of this agreement shall be the property of STATE. STATE shall furnish to HOMEOWNER at no cost to HOMEOWNER one copy of all final plans and specifications and as-built plans concerning RESIDENCE. STATE shall have unrestricted use of all data obtained pursuant to this agreement.
7. That this agreement shall terminate two (2) years following the acceptance by STATE of ALTERATIONS performed under the terms of this agreement except this agreement may be terminated by written notice by either HOMEOWNER or STATE at any time prior to start of construction of ALTERATIONS and neither will have any further obligation to the other or as

provided in Article I-3. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-10.

8. That construction of ALTERATIONS shall be considered to have started when STATE awards the contract to make such ALTERATIONS.
9. That this agreement may be amended in writing upon the mutual agreement of all parties, hereto.
10. That STATE's mailing address shall be:

Mr. Leland V. Blackburn
California Department of Transportation
Project Development C Branch
P. O. Box 3366, Rincon Annex
San Francisco, CA 94119

and that HOMEOWNER's address shall be:

Mr. & Mrs. Austin Morris

579 San Bruno Avenue

San Francisco, CA 94107

STATE and HOMEOWNER may change their respective mailing address by written notice mailed to the other.

11. It is estimated that the total cost to the STATE of payments to HOMEOWNER pursuant to Article I-6 and I-8 shall not exceed \$3,500.00.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, duly authorized, the provisions of which Agreement are effective as of the day, month and year first hereinabove written.

HOMEOWNER

Louise Morris
~~*[Signature]*~~

RECOMMENDED FOR APPROVAL:

BY *Barbara M. Sundry*
Right of Way Agent

BY *Russell Sayre*
Chief, Pro. Dev. C Branch
RUSSELL SAYRE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY *Richard J. Murphy*
RICHARD J. MURPHY, Chief
Acquisition and Appraisal
Branch

provided in Article I-3. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-10.

8. That construction of ALTERATIONS shall be considered to have started when STATE awards the contract to make such ALTERATIONS.
9. That this agreement may be amended in writing upon the mutual agreement of all parties, hereto.
10. That STATE's mailing address shall be:

Mr. Leland V. Blackburn
California Department of Transportation
Project Development C Branch
P. O. Box 3366, Rincon Annex
San Francisco, CA 94119

and that HOMEOWNER's address shall be:

Mr. John De Nadai

575 San Bruno Avenue

San Francisco, CA 94107

STATE and HOMEOWNER may change their respective mailing address by written notice mailed to the other.

11. It is estimated that the total cost to the STATE of payments to HOMEOWNER pursuant to Article I-6 and I-8 shall not exceed \$3,500.00.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, duly authorized, the provisions of which Agreement are effective as of the day, month and year first hereinabove written.

HOMEOWNER John DeLadai

RECOMMENDED FOR APPROVAL:

BY BARBARA M. SUNDY
Right of Way Agent

BY Russell Sayre
Chief, Pro. Dev. C Branch
RUSSELL SAYRE

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY Richard J. Murphy
RICHARD J. MURPHY, Chief
Acquisition and Appraisal
Branch

provided in Article I-3. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-10.

8. That construction of ALTERATIONS shall be considered to have started when STATE awards the contract to make such ALTERATIONS.
9. That this agreement may be amended in writing upon the mutual agreement of all parties, hereto.
10. That STATE's mailing address shall be:

Mr. Leland V. Blackburn
California Department of Transportation
Project Development C Branch
P. O. Box 3366, Rincon Annex
San Francisco, CA 94119

and that HOMEOWNER's address shall be:

Alfred B. Breen
587 San Bruno Avenue
San Francisco, Ca 94107

STATE and HOMEOWNER may change their respective mailing address by written notice mailed to the other.

11. It is estimated that the total cost to the STATE of payments to HOMEOWNER pursuant to Article I-6 and I-8 shall not exceed \$3,500.00.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, duly authorized, the provisions of which Agreement are effective as of the day, month and year first hereinabove written.

HOMEOWNER

Alfred B. [unclear]
Gene [unclear]

RECOMMENDED FOR APPROVAL:

BY *Barbara M. Sudy*
Right of Way Agent

BY *[Signature]*
Chief, Pro. Dev. C Branch

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY *Richard J. Murphy*
RICHARD J. MURPHY, Chief
R/W Appraisals-Acquisition Branch

provided in Article I-3. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-10.

8. That construction of ALTERATIONS shall be considered to have started when STATE awards the contract to make such ALTERATIONS.

9. That this agreement may be amended in writing upon the mutual agreement of all parties, hereto.

10. That STATE's mailing address shall be:

Mr. Leland V. Blackburn
California Department of Transportation
Project Development C Branch
P. O. Box 3366, Rincon Annex
San Francisco, CA 94119

and that HOMEOWNER's address shall be:

Mr. Donald Carnegie
513 Rhode Island Street
San Francisco, CA 94107

STATE and HOMEOWNER may change their respective mailing address by written notice mailed to the other.

11. It is estimated that the total cost to the STATE of payments to HOMEOWNER pursuant to Article I-6 and I-8 shall not exceed \$3,500.00.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, duly authorized, the provisions of which Agreement are effective as of the day, month and year first hereinabove written.

HOMEOWNER *Donald P. Carson*
Malik H. Edwards
Ernest G. G. ...

RECOMMENDED FOR APPROVAL:

BY *BARBARA M. Sundry*
Right of Way Agent

BY _____
Chief, Pro. Dev. C Branch

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

BY *Richard J. Murphy*
RICHARD J. MURPHY, Chief
Acquisition and Appraisal
Branch

EXHIBIT A

MEMORANDUM OF AND SHORT FORM OF AGREEMENT

This Memorandum of and Short Form of Agreement is made by and between the State of California, acting by and through the Business and Transportation Agency, Department of Transportation, hereinafter referred to as the "State" and _____ hereinafter referred to as the "Homeowners".

State's Agreement with Homeowners, concerns the real property located at _____ and legally described as:

Lot _____ of Tract No. _____, in the City of _____ County of _____, State of California, as per map recorded in Book _____ Pages _____ of Maps, in the Office of the County Recorder of the County of _____.

The term of this Agreement shall be for a period not to exceed 4 years following the execution of this "Memorandum of an Short Form of Agreement".

This Agreement is subject to the terms and conditions of that certain unrecorded agreement between the parties entitled

"Agreement Between the State of California and _____
_____ covering a single family residence and
dated, for reference purposes only, _____ and,
identified as Agreement No. _____ in the
official files of the Department of Transportation.

It is understood that the only purpose of this instrument is
to give notice of the existence of the Agreement as described
above. All rights and obligations of Homeowner and the State
hereunder are governed by the terms, covenants, conditions,
limitations and restrictions contained in said agreement entitled
"Agreement Between the State of California and _____
_____."

Executed at _____ California on _____ 1980.

HOMEOWNERS

BY _____

BY _____

STATE

BY _____

ACKNOWLEDGEMENT

STATE OF CALIFORNIA)ss.
County of San Francisco)

On _____, before the undersigned, a Notary
Public for the State of California, personally appeared _____
_____, known to me to be the person(s) whose names(s)
is/are subscribed to the within instrument, and acknowledged that
he executed same.

July 27, 1981

04-SF-101 4.0
04226 - 100071

Mr. Donald Carnegie
513 Rhode Island Street
San Francisco, CA 94107

Dear Mr. Carnegie:

This letter will confirm the desire of you and your partners, Emil and Mabel Egan, not to proceed with the noise insulation work as proposed in our June 30, 1981 letter.

We are therefore terminating the agreement in accordance with Article III-7 of said document. Thank you for your past cooperation and we regret your decision not to continue with the project.

Sincerely yours,

JOHN WEST
District Director

By ORIGINAL SIGNED BY

MILTON LOUIE, Chief
Project Development
C Branch

RI:dfc

cc: RJM,ML-RI,MHatano (Trans Lab) ,DThompson (HQ)

D-23

Recording Request
DEPARTMENT OF TRANSPORTATION
When Recorded Mail to
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
Box 2304 Terminal Annex
Los Angeles, California 90051

75819
VERIFIED-5

RECORDED IN NATIONAL BUREAU
OF RECORDS
JUL 10 1984 AT 8:30 AM
RICHARD D. DEAN, COUNTY RECORDER

COMM.

DISTRICT 7

MEMORANDUM OF AND SHORT FORM OF AGREEMENT

FREE - 3

This Memorandum of and Short Form of Agreement is made by and between the State of California, acting by and through the Business and Transportation Agency, Department of Transportation, hereinafter referred to as the "STATE" and WILLIAM McGRATH hereinafter referred to as the "Homeowners".

State's Agreement with Homeowners, concerns the real property located at 505 North Wood Road, Camarillo, California, and legally described as:

Lot 1, Section 29, T 2 N, R 21 W, SBB&M in Camarillo, County of Ventura, State of California, as per map recorded in Book 4193 Page 303 of Maps in the Office of the County Recorder of said County.

The term of this Agreement shall be for a period not to exceed 4 years following the execution of this "Memorandum of and Short Form of Agreement".

This Agreement is subject to the terms and conditions of that certain unrecorded agreement between the parties entitled "Agreement Between the State of California and WILLIAM McGRATH covering a single family residence and dated, for reference purposes only, May 9, 1984 and, identified as Agreement No. 168-A in the official files of the Department of Transportation.

Free Recording Requested
Essential to Acquisition by
Department of Transportation
(See 6103 Gov. Code)

Ronald A. Costello
Sr. R/W Agent

D-25

Memorandum

To : MR. C. G. BORK
Construction Branch

Date: June 25, 1984

File : 7-Ven-101 17.7
Noise attenuation for
Private Dwelling at
505 North Wood Road
Camarillo
07203 - 001171 - 5952101
Category: 452

From : MR. R. V. WALLIN
Project Development Branch C
DEPARTMENT OF TRANSPORTATION

Subject:

Attached, for your information, is a fully executed agreement covering noise attenuation in a private residence located at 505 North Wood Road, Camarillo.

The proposed work, which includes air conditioning and mechanical work, and replacing doors and windows, is discussed in the State's acoustical consultant report which is attached to the agreement as EXHIBIT B.

The homeowner, Mr. William McGrath, invited and opened bid proposals on May 30, 1984. The District will approve the homeowner to award the contract to the low bidder in 7 to 10 days and the preconstruction conference follows. Your Resident Engineer will monitor this project about the same way as they do in the School Noise Abatement projects.

As indicated in the agreement, the homeowner will administer the contract. There is no PS&E prepared for this project. The successful low bidder will prepare plans according to the State's consultant report and apply for a building permit from the city before construction starts. The homeowner will receive the payment for construction of all the work upon completion of the contract.

We will let you know of the date and place of the preconstruction conference as soon as it is arranged. You could call Eddy Chow at 3481 if you have any questions about this project.



R. V. WALLIN
Senior Transportation Engineer
Project Development Branch C

cc: WA Whitnack, HQ OPPD

EC:gm

7-VEN-101 17.7
07203-001171-595210104

District Agreement No. 168-A
Contract No. 07A894

THIS AGREEMENT, ENTERED INTO ON May 9, 1984, is
between the STATE OF CALIFORNIA, acting by and through its
Department of Transportation, referred to herein as STATE, and

WILLIAM McGRATH
Legal owner(s) of the property
known as 505 North Wood Road
Camarillo, Ventura County in
the State of California,
hereinafter referred to as
"HOMEOWNER"

This Agreement supersedes the STATE-HOMEOWNER District Agreement No. 166-A dated November 29, 1982 entirely.

The U.S. Department of Transportation acting through its Federal Highway Administration, hereinafter referred to as "FHWA", on January 17, 1977 issued FHWA Notice N 5080.62 encouraging states to develop experimental projects to determine the feasibility of noise insulation of privately-owned residences; and

STATE desires to conduct an experimental noise insulation project in the residence located on HOMEOWNER's property, hereinafter called RESIDENCE; and

STATE desires and is willing to pay the cost of making modifications, alterations and reconstruction to RESIDENCE, hereinafter called ALTERATIONS and described herein; and

STATE desires to determine what changes in sound levels and energy use can be expected in RESIDENCE in which ALTERATIONS are made; and

HOMEOWNER is willing and desirous to permit STATE to make ALTERATIONS to RESIDENCE with no design or construction costs accruing to HOMEOWNER; and

HOMEOWNER, after approving ALTERATIONS as described hereinafter, is agreeable and willing to execute a "Memorandum of and Short Form of Agreement" (copy attached as Exhibit A and made a part of this agreement) and permit same to be duly recorded and become a covenant running with the land and a condition on the title of HOMEOWNER's property; and

HOMEOWNER and STATE do mutually desire to cooperate and desire to specify herein the terms and conditions under which ALTERATIONS shall be made;

NOW, THEREFORE, in consideration of the covenants and conditions herein contained, the parties hereto agree as follows:

ARTICLE I

STATE AGREES:

STATE, contractor(s) or assignees shall do all of the following items of work in accordance with all applicable Federal, State, and local statutes, codes, ordinances, and regulations at STATE's expense without any monetary or material costs accruing to HOMEOWNER.

1. Make noise level recordings both inside and outside of RESIDENCE before and after construction determined by STATE to be necessary for the purpose of determining the effectiveness of

ALTERATIONS in reducing noise levels. The times of the recordings shall be mutually agreed upon by both STATE and HOMEOWNER.

HOMEOWNER further agrees to notify STATE during the testing period of any and all changes to the home which the HOMEOWNER may undertake which would alter the test data.

2. To bear the costs of ALTERATIONS plan check fee and building permit as approved by STATE.

3. To make payment to HOMEOWNER after contract completion as approved by HOMEOWNER and STATE, and upon receipt of billing therefor. The total contribution to be borne by the STATE will not exceed \$25,000.00 unless provided for in a supplement to this agreement. Such supplement will be executed and approved prior to the obligation of the additional funds.

4. All work done under this agreement shall conform to all applicable building, fire and sanitary statutes, codes, ordinances, and regulations relating to such work, and shall be done in a good and workmanlike manner. RESIDENCE shall be left in as good a condition as found.

5. Monitor energy usage for RESIDENCE covering the time period from two (2) years immediately preceding the construction of ALTERATIONS to two (2) years following the acceptance of ALTERATIONS by STATE. Energy usage shall include but not necessarily be limited to electricity and natural gas.

6. STATE shall compensate HOMEOWNER at the prevailing rate for the quantities of electricity and natural gas used during the construction period which are in excess of the quantities of these items used during the corresponding billing periods one year earlier. The construction period shall be the period from the date the construction contract is awarded to the date the work is accepted by HOMEOWNER.

7. STATE, contractor(s) or assignees shall provide all normal servicing, repair and maintenance, including filters, of any mechanical unit such as an air conditioning or ventilation system that is installed pursuant to this agreement during the period STATE monitors energy usage. At the close of said energy monitoring period the unit shall be serviced and inspected to be sure it is in a state of good repair at the time HOMEOWNER assumes servicing and maintenance responsibilities.

8. If, because of the construction activities by STATE, HOMEOWNER and his/her household or any member thereof are required to vacate RESIDENCE, STATE shall reimburse HOMEOWNER for actual expenses for lodging and meals incurred. The cost to STATE for this purpose shall not exceed 62.00 dollars per day per person. HOMEOWNER shall submit receipts for lodging and meals for reimbursement. STATE shall not be responsible for any items covered by HOMEOWNER's insurance.

9. STATE shall pay all materials, labor, equipment, permit and other costs and fees accrued under the terms of this agreement.

STATE shall make no payment to HOMEOWNER for rent, utility bills, inconvenience, use of subject property, or any other item except as specifically noted in Articles I-6, I-7, and I-8.

ARTICLE II

HOMEOWNER AGREES:

HOMEOWNER, his assignees or successors in interest shall:

1. Construct ALTERATIONS by contracts with licensed construction contractors; such contracts to be completed in conformity with the report prepared by Purcell & Noppe & Associates, Inc., a STATE acoustical consultant, and dated November 9, 1982, attached hereto as Exhibit "B".

2. HOMEOWNER shall obtain sealed bids indicating the contract amount for each item of work required for ALTERATIONS from at least 3 licensed construction contractors, and submit for STATE's review, a summary of proposals submitted by the respective bidders. The STATE shall approve the award of the contract to the lowest responsible bidder for the construction of ALTERATIONS.

3. HOMEOWNER shall submit the contract proposed between HOMEOWNER and the contractor for STATE's review prior to award authorization being issued.

4. HOMEOWNER shall execute and administer the contract, and provide supervision and inspection of the contractor's operations.

5. STATE shall monitor and exercise general supervision over ALTERATIONS and may assume full or direct control over the project whenever STATE, at its sole discretion, determines that its responsibility so requires. In that event, STATE will act in the capacity of the designated agent of HOMEOWNER.

6. Upon completion of the ALTERATIONS, HOMEOWNER shall accept full responsibility for the proposed work and make no claim against STATE for further noise abatement measures.

7. Within 60 days after completion of ALTERATIONS, HOMEOWNER shall furnish STATE with a detailed statement of construction cost and related costs required to complete ALTERATIONS and refund to STATE any remaining amount of STATE's payment.

8. HOMEOWNER shall retain all records and accounts relating to construction of ALTERATIONS for audit for STATE and other government auditors for a period of three (3) years from date of completion of ALTERATIONS.

9. Notify his assignees or successors in interest, and/or tenant occupant(s) of the terms of this agreement by written notice.

10. Notify STATE by written notice of any proposed changes in ownership or occupancy subsequent to executing this agreement and during the construction and monitoring period specified in Article I-5. Said written notice shall be mailed to STATE at the address specified in Article III-9.

11. Provide STATE and its contractor(s) access to various areas inside and outside of RESIDENCE as determined by STATE for the purpose of making noise recordings, the construction and maintenance work described herein. Access will be required before, after and during construction.

12. On demand of STATE, make or cause to be made available for review by STATE all bills and records for RESIDENCE showing quantities of energy used during the period from two (2) years immediately preceding the construction of ALTERATIONS to two (2) years following the acceptance of ALTERATIONS by HOMEOWNER. Energy usage shall include but not necessarily be limited to electricity and natural gas.

13. Upon acceptance of ALTERATIONS, assume all responsibility for the operation and maintenance of ALTERATIONS except the maintenance responsibilities STATE has specifically obligated to itself as described in Article I-7. At the termination of energy-usage monitoring by STATE, the time period being described in Article I-5, HOMEOWNER understands and agrees that the servicing, repair and maintenance responsibilities STATE has specifically obligated to

itself as described in Article I-7 shall pass to HOMEOWNER and STATE shall have no further obligation therefore.

14. HOMEOWNER understands and agrees that any damage to ALTERATIONS being maintained by STATE caused by HOMEOWNER, whether willfully or accidentally shall be repaired by HOMEOWNER at no expense to STATE as expeditiously as possible.

15. In consideration of ALTERATIONS to be performed in accordance with this agreement, execute a "Memorandum of and Short Form of Agreement", attached as Exhibit A, prior to the award of the contract for the construction of ALTERATIONS.

16. Participate in an interview by STATE within twelve (12) months of acceptance of ALTERATIONS.

ARTICLE III

IT IS MUTUALLY UNDERSTOOD AND AGREED:

1. HOMEOWNER is not responsible for any damage or liability occurring by reason of anything done or omitted to be done by STATE under or in connection with any work, authority or jurisdiction not delegated to HOMEOWNER under this agreement.

2. That neither STATE nor any officer or employee thereof shall be responsible for any damage or liability occurring by reason of anything done or omitted to be done by HOMEOWNER in connection

with any work, authority or jurisdiction not delegated to STATE under this agreement.

3. That obligations of STATE to make ALTERATIONS approved by HOMEOWNER under the terms of this agreement are contingent upon the allocation of funds by the California Transportation Commission.

4. That upon the date of completion of all work under this agreement and acceptance of ALTERATIONS by HOMEOWNER, ownership and title to all materials, equipment and appurtenances installed will automatically be vested in HOMEOWNER and no further action will be necessary to transfer ownership to HOMEOWNER.

All materials, equipment and appurtenances installed are further to be classified as realty, and shall remain with the dwelling in the event of sale or foreclosure during the test period.

5. That all data, reports, recommendations, and documentation prepared or obtained pursuant to the terms of this agreement shall be the property of STATE. STATE shall have unrestricted use of all data obtained pursuant to this agreement.

6. That this agreement shall terminate two (2) years following the acceptance of ALTERATIONS performed under the terms of this agreement, but no later than December 31, 1986, except this agreement may be terminated by written notice by either HOMEOWNER or STATE at any time prior to start of construction of ALTERATIONS and

obligation to the other. Said written notice shall be mailed to HOMEOWNER by STATE or to STATE by HOMEOWNER at the address specified in Article III-9.

7. That construction of ALTERATIONS shall be considered to have started when HOMEOWNER awards the contract to make such ALTERATIONS.

8. That this agreement may be amended in writing upon the mutual agreement of all parties, hereto.

9. The STATE's mailing address shall be:

Mr. Satish Chander
California Department of Transportation
Environmental Planning Branch
P. O. Box 2304, Terminal Annex
Los Angeles, CA 90051

and that HOMEOWNER's address shall be:

Mr. William McGrath
505 North Wood Road
Camarillo, CA 93010

STATE and HOMEOWNER may change their respective mailing address by written notice mailed to the other.

10. It is estimated that the total cost to STATE of payments to HOMEOWNER pursuant to Articles I-6 and I-8 shall not exceed \$4,000.00.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their respective officers, duly authorized, the provisions of which Agreement are effective as of the day, month and year first hereinabove written.

STATE OF CALIFORNIA
Department of Transportation

HOMEOWNER

BY *Henry Weiler*
District Director

William H. McGrath Ranch
By *William H. McGrath*
PARTNER

RECOMMENDED FOR APPROVAL

BY *[Signature]*
Right of Way Agent

[Signature]

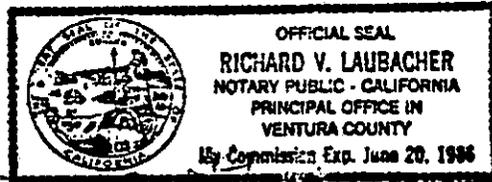
STATE OF CALIFORNIA)
COUNTY OF Ventura)^{SS}

On APRIL 13th 1984, 1984 before me RICHARD V. LAUBACHER
a Notary Public in and for said County and State, personally appeared _____

William H. McGrath, known to me to be the person whose name is
subscribed to the within instrument, and acknowledged to me that they executed
the same.

WITNESS my hand and official seal.

D-39



Richard V. Laubacher

EXHIBIT A
MEMORANDUM OF AND SHORT FORM OF AGREEMENT

This Memorandum of and Short Form of Agreement is made by and between the State of California, acting by and through the Business and Transportation Agency, Department of Transportation, hereinafter referred to as the "STATE" and _____ hereinafter referred to as the "Homeowners".

State's Agreement with Homeowners, concerns the real property located at _____ and legally described as:

Lot _____ of Tract No. _____ in the
City of _____ County of _____,
State of California, as per map recorded in
Book _____ Pages _____ of Maps in the
Office of the County Recorder of the County of
_____.

The term of this Agreement shall be for a period not to exceed 4 years following the execution of this "Memorandum of and Short Form of Agreement".

This Agreement is subject to the terms and conditions of that certain unrecorded agreement between the parties entitled "Agreement Between the State of California and _____ covering a single family residence and dated, for reference purposes only, _____ and, identified as Agreement No. _____ in the official files of the Department of Transportation.

It is understood that the only purpose of this instrument is to give notice of the existence of the Agreement as described above. All rights and obligations of Homeowner and the State hereunder are governed by the terms, covenants, conditions, limitations and restrictions contained in said agreement entitled "Agreement Between the State of California and _____

Executed at _____ California on _____ 1984.

HOMEOWNERS

By: _____

By: _____

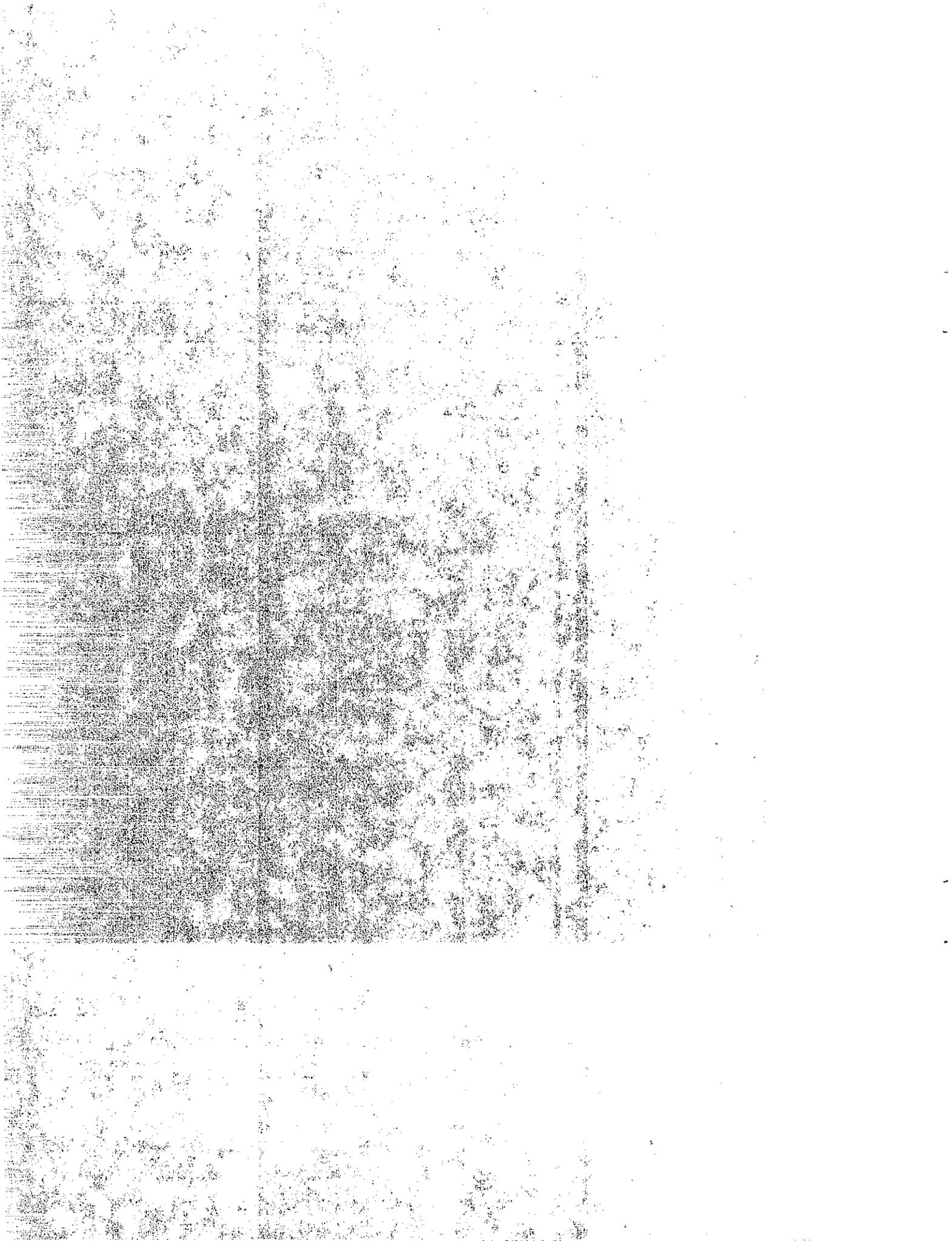
STATE

By: _____

ACKNOWLEDGEMENT

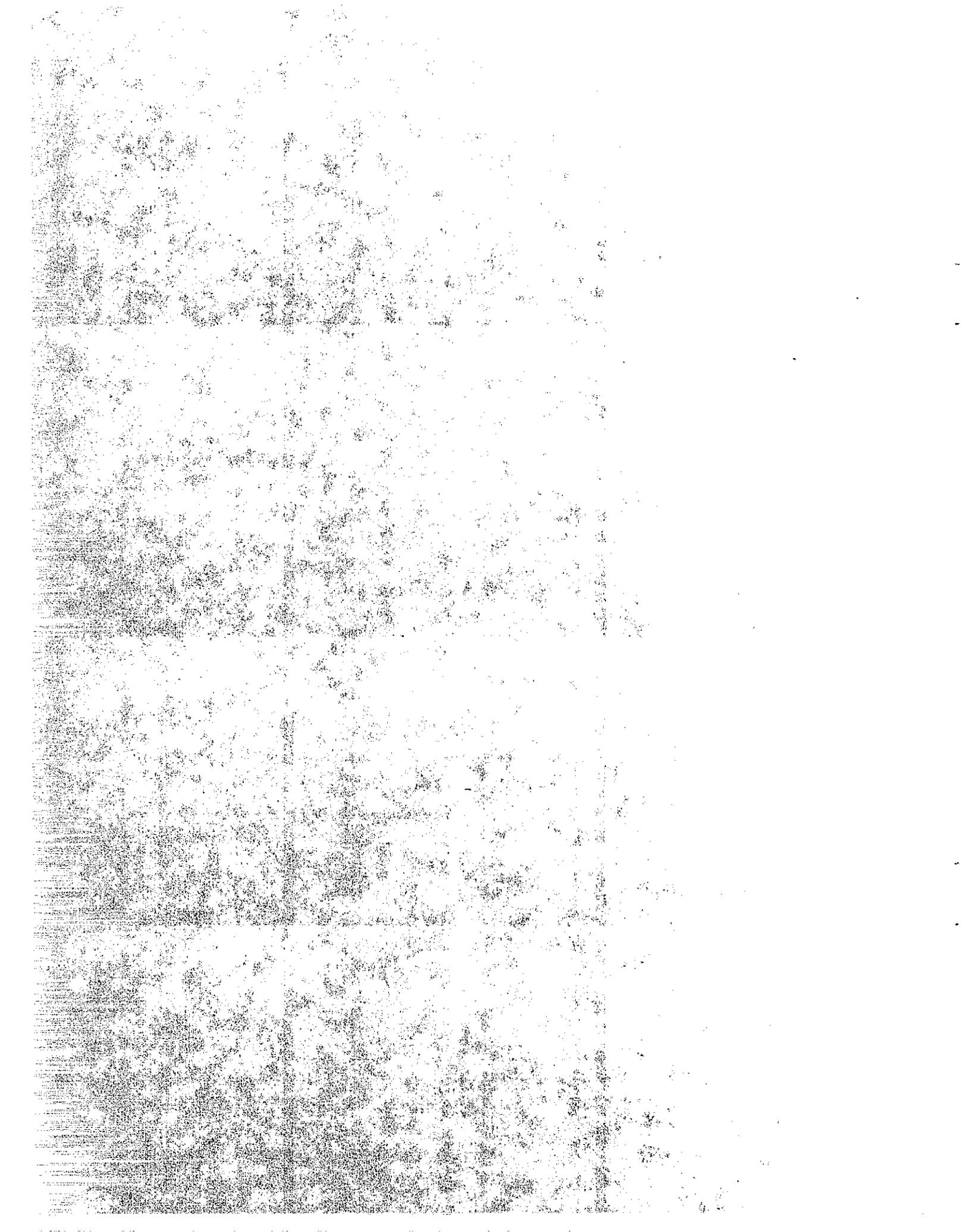
STATE OF CALIFORNIA)
) ss.
County of Los Angeles)

On _____, before the undersigned a Notary Public for the State of California, personally appeared _____, known to me to be the person(s) whose name(s) is/are subscribed to the within instrument, and acknowledged that he executed same.



APPENDIX E

**Plans, Specifications, Bids
and Contracts**



DEPARTMENT OF TRANSPORTATION

P. O. BOX 3366, RINCON ANNEX
SAN FRANCISCO 94119
(415) 557-1840

DISTRICT 4



June 14, 1982

04-SF-101 4.0
04226 - 100071

Mr. John DeNadai
575 San Bruno Avenue
San Francisco, CA 94107

Dear Mr. DeNadai:

Final plans are enclosed for your review and approval. Changes from the preliminary plans include:

1. The new wall (existing garage door) has been stiffened with an extra 3/8" plywood sheathing. The new windows will consist of a single pane, 5/16" laminated glass without muntins.
2. The northerly windows in your dining room will be a single pane, 5/16" laminated glass without muntins.
3. All of the windows in your living room will be double pane with the outer glass being tinted.
4. The operable windows (E, F and G) will all have double panes with new frames similar to the existing.
5. The existing raised platform adjacent to the garage door will be removed.
6. Exterior painting will be restricted to the new wall and trim at the front of your house.
7. The location for the switch to the fan motor has been moved to the interior of the living room closet.

Please let us know at your earliest convenience if the proposed alterations are satisfactory by calling Mr. Ryu Inoue at 557-2561 between the hours of 7:30 a.m. and 4:00 p.m. If they are satisfactory, he will make arrangements with you to sign the original tracing of the Title Sheet of the plans and the exhibit that was attached to the Homeowners Agreement.

The next step involves finalizing the construction contract and advertizing for bids. We anticipate that the contract will be advertized in late July or early August. Work at your home should begin around early October and be completed by early November.

E-1

Mr. John DeNadai
Page 2
June 14, 1982

Thanks again for your continuing cooperation and do not hesitate to call if you have any questions.

Sincerely yours,

~~CONFIDENTIAL~~

J. C. BRADFIELD
Senior Engineer
Project Development
C Branch

Attachment

RI:dfc

cc: MEH, JCB-RI, MHatano(HO), DThomson(HO)

DEPARTMENT OF TRANSPORTATION

P. O. BOX 3366, RINCON ANNEX
SAN FRANCISCO 94119
(415) 557-1840



June 14, 1982

04-SF-101 4.0
04226 - 100071

Mr. & Mrs. Austin Morris
579 San Bruno Avenue
San Francisco, CA 94107

Dear Mr. & Mrs. Morris:

Final plans are enclosed for your review and approval. Changes from the preliminary plans include:

1. The window framing has been simplified to match your existing frames.
2. Exterior painting has been reduced due to the elimination of trim work at each window.
3. The position of the new in-line cabinet fan shown on Sheet ME-1 has been revised to reflect its proper relation to the furnace.

Please let us know at your earliest convenience if the proposed alterations are satisfactory by calling Mr. Ryu Inoue at 557-2561 between the hours of 7:30 a.m. and 4:00 p.m. If they are satisfactory, he will make arrangements with you to sign the original tracing of the Title Sheet of the plans and the exhibit that was attached to the Homeowners Agreement.

The next step involves finalizing the construction contract and advertizing for bids. We anticipate that the contract will be advertized in late July or early August. Work at your home should begin around early October and be completed by early November.

Thanks again for your continuing cooperation and do not hesitate to call if you have any questions.

Sincerely yours,

ORIGINAL SIGNED BY

J. C. BRADFIELD
Senior Engineer
Project Development
C Branch

Attachment

RI:dfc

E-3

cc: MEH, JCB-RI, MHatano(HO), DThomson(HO)

DEPARTMENT OF TRANSPORTATION

P. O. BOX 3366, RINCON ANNEX
SAN FRANCISCO 94119
(415) 557-1840.



June 14, 1982

04-SF-101 4.0
04226 - 100071

Mr. Gino Biradelli
Ms. Alexis O'Brien
587 San Bruno Avenue
San Francisco, CA 94107

Dear Ms. O'Brien and Mr. Biradelli:

Final plans are enclosed for your review and approval. The only change from the previous preliminary plans is the clarification of work involving the ventilation system.

Please let us know at your earliest convenience if the proposed alterations are satisfactory by calling Mr. Ryu Inoue at 557-2561 between the hours of 7:30 a.m. and 4:00 p.m. If they are satisfactory, he will make arrangements with you to sign the original tracing of the Title Sheet of the plans and the exhibit that was attached to the Homeowners Agreement.

The next step involves finalizing the construction contract and advertizing for bids. We anticipate that the contract will be advertized in late July or early August. Work at your home should begin around early October and be completed by early November.

Thanks again for your continuing cooperation and do not hesitate to call if you have any questions.

Sincerely yours,

J. C. BRADFIELD
Senior Engineer
Project Development
C Branch

Attachment

RI:dfc

E-4

cc: MEH, JCB-RI, MHatano (HC), DThomson (HO)

Memorandum

To : R. H. Jahrling, Chief
Project Development A Branch

Attention R. M. Schroll

Date: July 8, 1982

File : 04-SF-101 4.0
04226 - 100071

From : DEPARTMENT OF TRANSPORTATION
Project Development C Branch

Subject:

As discussed, enclosed is the original PS&E for the Noise Insulation of Private Dwellings project adjacent to SF-101 near the 18th Street Pedestrian Overcrossing. Please process and advertise as a Minor B, State-only funds, contract.

This is a FHWA Experimental Project administered through our Transportation Laboratory. FHWA approved the Project Report on January 6, 1982 and right of way was certified on January 5, 1982. Agreements with the homeowners have been executed for doing all of the necessary work.

We have contacted the Construction Branch and they indicate that they will be administering the contract. We will prepare and transmit a Resident Engineer's file to the Construction Branch prior to advertisement.

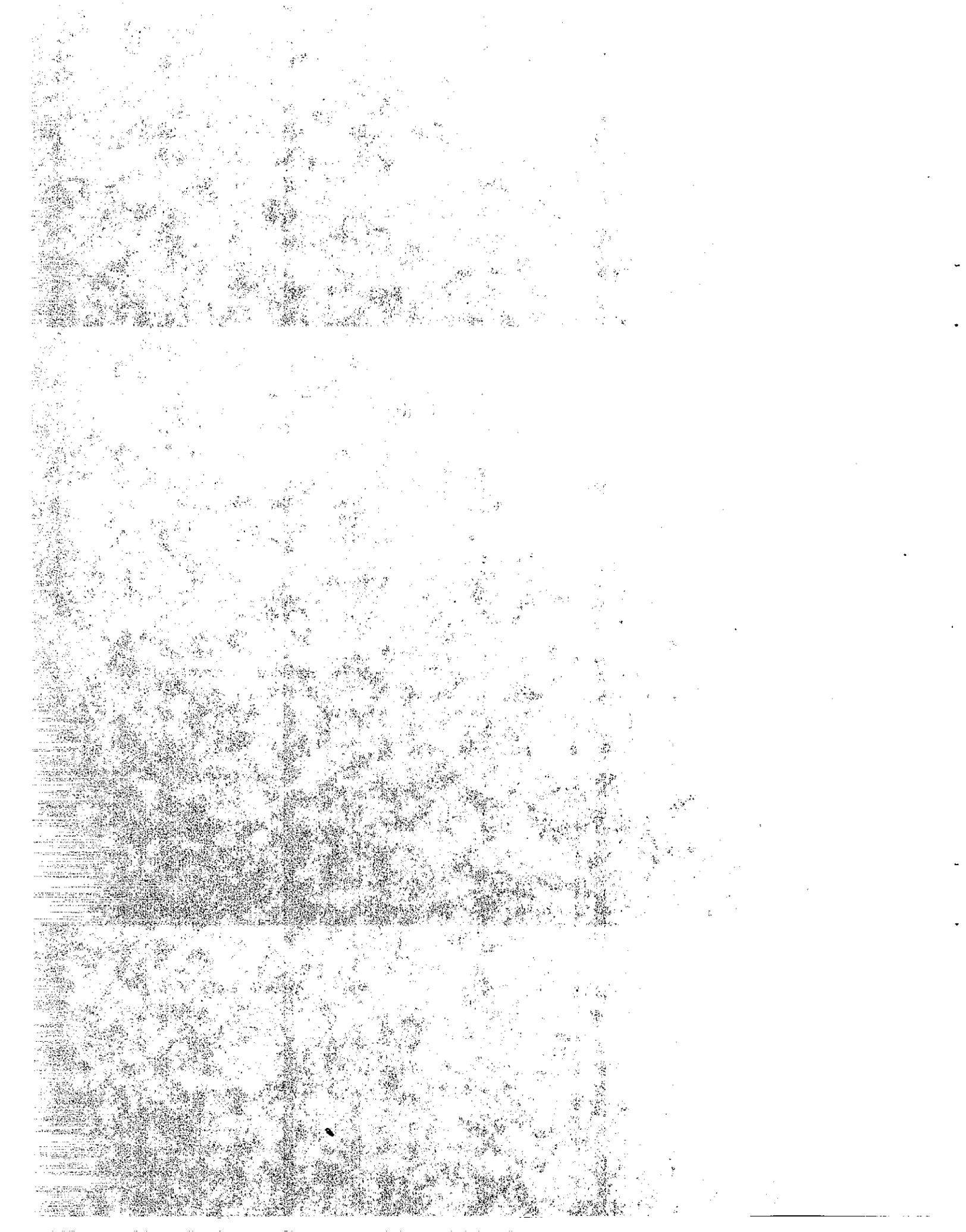
Please expedite in order to advertise the contract in August and to complete the work before the holiday and rainy season. Keep us informed in order that we may continue to coordinate the on-going studies with Transportation Lab. Contact Duane Thomson, the Project Architect, at 8-454-1975 if you have specific questions on the plans and specifications.

J. C. BRADFIELD
Senior Engineer
Project Development C Branch

Attachment

RI:dfc

cc: MEH,RAS-RJM,RWS,LC,EBD,JCM,JCB-RI,WWhitnack(HQ),MHatano(Trans Lab),
DThomson(HQ-Struct. Arch.)



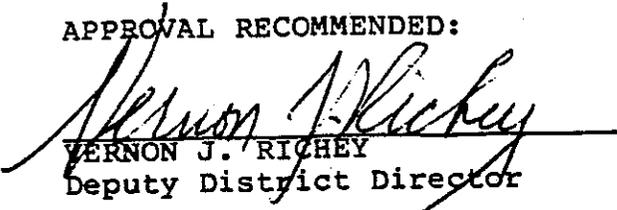
STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF TRANSPORTATION
DISTRICT 4

September 1981
04-SF-101 PM 4.0
04226 - 100071

TO: J. T. KASSEL
Chief, Office of Planning and Design

PROJECT REPORT
FOR THE PROPOSED
INSULATION OF PRIVATE DWELLINGS
ON
ROUTE 101
IN
SAN FRANCISCO COUNTY
NEAR THE
18TH STREET PEDESTRIAN OVERCROSSING

APPROVAL RECOMMENDED:


VERNON J. RICHEY
Deputy District Director

E-7

I. PROJECT DEVELOPMENT CATEGORY

This is a Category 5 project because of its minimal social, economic, and environmental significance.

II. PROJECT LIMITS AND DESCRIPTION

The proposed project is located in the Potrero Hill District of San Francisco, adjacent to Route 101 near the 18th Street Pedestrian Overcrossing. (See Exhibits A and B.)

This is an experimental project for noise insulation of three private dwellings located adjacent to the freeway. The purpose of the project is to test the effectiveness of various noise insulation techniques relative to cost, interior noise reduction and energy conservation. The project will be designed and administered in accordance with the National Experimental and Evaluation Program (NEEP) Project No. 21 - Noise Insulation for Private Dwellings.

III. BACKGROUND INFORMATION

The project was initiated in January 1978 in response to a request from the Department's Transportation Laboratory for a list of potential sites that could be used in the Program. Three sites (in Oakland, San Jose and San Francisco) were submitted with the San Francisco site having the top priority based on its location, structure and site characteristics, noise level, and other criteria used in the selection process. A sound wall had been proposed along SF-101, between 17th and 19th Streets, but was rejected by a majority of the residents at the September 1977 public meeting. Preliminary interior readings taken at one of the residences indicated a noise level of 61 dBA (L10), which is a 6 dBA over the Federal Standard.

IV. EXISTING FACILITIES

The site consists of four residences, closely spaced along the easterly side of San Bruno Avenue. (See Exhibit C.) The project originally included all four residences. It was reduced to the three residences closest to the freeway when a mutual agreement could not be reached on the proposed work with the owners of the fourth residence.

The remaining three residences are 2 and 3 story structures. The house closest to the freeway (#575) is a 3-story structure with living quarters on all 3 floors. The second house from the freeway (#579) is 2 stories with living quarters on the second floor. The first level consists of a garage and a

small room used as a work area by the owner. The third house (#585/587) is a 3-story structure with living quarters (separate apartments) on the second and third floors. The ground level is used as a garage and storage area.

The homes are typical of this area in that the sides of each house touch the adjoining houses, thereby creating a continuous structure (See Exhibit C). They were constructed between 1910 and 1941.

The Route 101 freeway is a major north-south freeway. It links the metropolitan area of San Jose to the south, downtown San Francisco, the Golden Gate Bridge and Marin County to the north and Interstate 80 and the San Francisco-Oakland Bay Bridge to the east. Route adoption was in April 1948.

V. TRAFFIC DATA

The freeway in the project area is an 8-lane facility that carried an annual ADT of 216,000 vehicles in 1979. The freeway is depressed approximately 15 feet in front of the houses. However, from the second and third levels of the houses, there is an uninterrupted line of sight to both the northbound and southbound freeway lanes.

Vehicle classification counts were taken during the measurement of baseline noise levels on October 15, 1980. See Exhibit D.

VI. ULTIMATE DEVELOPMENT

No new freeway construction is scheduled in this area in the six-year program. A 12-foot high sound wall was recently constructed on the opposite (westerly) side of the freeway under Contract No. 04-102064. A proposed wall on the easterly side between 17th and 19th Street was rejected by the residents in September 1977.

VII. PROJECT JUSTIFICATION

This is a FHWA Experimental Project covered by FHWA Notice N5080.62, dated January 17, 1977. It indicates that noise insulation for private residences may be implemented even if noise impact is not especially severe and other abatement measures are feasible. These projects are encouraged by FHWA and will qualify for Federal funds.

VIII. PHASING-SECTION 188.8 STUDY

Minor A projects are not currently listed in the State Highway Inventory.

IX. DESCRIPTION OF PROPOSAL

<u>BUILDING</u>	<u>PROPOSED WORK</u>	<u>COST</u>	
#585/587	See Exh. F Architectural Mech./Elec.	\$3,400 <u>7,000</u>	\$10,400
#579	See Exh. G Architectural Mech./Elec.	2,200 <u>3,000</u>	5,200
#575	See Exh. H Architectural Mech./Elec.	6,900 <u>1,500</u>	<u>8,400</u>
	Sub Total		\$24,000
	20% Contingency		<u>4,800</u>
	Total		<u>\$28,800</u>

The proposed work at each resident was approved by the property owners in July 1981.

X. ENGINEERING AND RIGHT-OF-WAY DATA

Project is to be financed from the HB-311, Minor Category A Program in the 1981-82 fiscal year. Project is eligible for Federal participation.

The estimated construction cost is \$28,800 including 20% contingencies. No right-of-way is required.

Certification

I have reviewed the right of way data contained in this Project Report and find it to be complete, current and accurate.



R. A. SPECK
Deputy District Director
Right of Way

9-18-81

Date

XI. COOPERATIVE FEATURES

A State/Homeowners Agreement specifying the duties, responsibilities, and obligations of both parties has been executed with the owners of the three residences.

The Agreement generally includes the following provisions:

State Agrees:

- To conduct before and after noise studies.
- To design and construct alterations to the buildings.
- To monitor energy use for two years preceding and following construction. *This was eliminated on 6/10/80*
- To provide normal maintenance of any mechanical unit installed as part of the alteration during the monitoring period of energy use.
- To pay all engineering, construction, permit and other costs accrued under the terms of the agreement including any excess utility costs during construction and per diem allowances for temporary relocations.

Homeowners Agrees:

- To notify his assignees of the terms of the agreement.
- To give State written notice of change in property ownership.
- To provide access to residence.
- To provide energy use records during monitoring period.
- To assume all responsibility for operation and maintenance of alterations upon termination of the monitoring period.
- To participate in an "after" study interview.

XII. ENVIRONMENTAL ASPECTS

This action is a Categorical Exemption under Article 10 of the Caltrans regulations for the implementation of the California Environmental Quality Act (CEQA).

It has been further determined by FHWA that this action is a Categorical Exclusion under 7-7-2 of the Federal-aid Highway Program Manual.

The Categorical Exemption/Categorical Exclusion Determination is attached. (See Exhibit E.)


ETHLYN ANN HANSEN, Chief
Environmental Planning Branch

XIII. COMMUNITY INTERACTION AND CONTACTS

The following meetings and contacts have been made with the property owners:

1. July 20, 1979. Letters to property owners inviting them to participate in the Experimental Project.
2. August 8, 1979. First meeting with property owners to explain program scope and to obtain initial input.
3. March 25, 1980. Second meeting with property owners to provide update of project and for completing a pre-project questionnaire provided by FHWA.

XIV. PROJECT REVIEWS

This draft Project Report was reviewed by the Headquarters Coordinator on August 25, 1981. A copy of the draft Project Report was also sent to FHWA for their review. Approval is pending. A-95 review is not required for Category 5 projects.

A Work Plan was approved by FHWA on December 20, 1979.

XV. RECOMMENDATION

It is recommended that this Project Report be approved and authorization given to prepare PS&E.

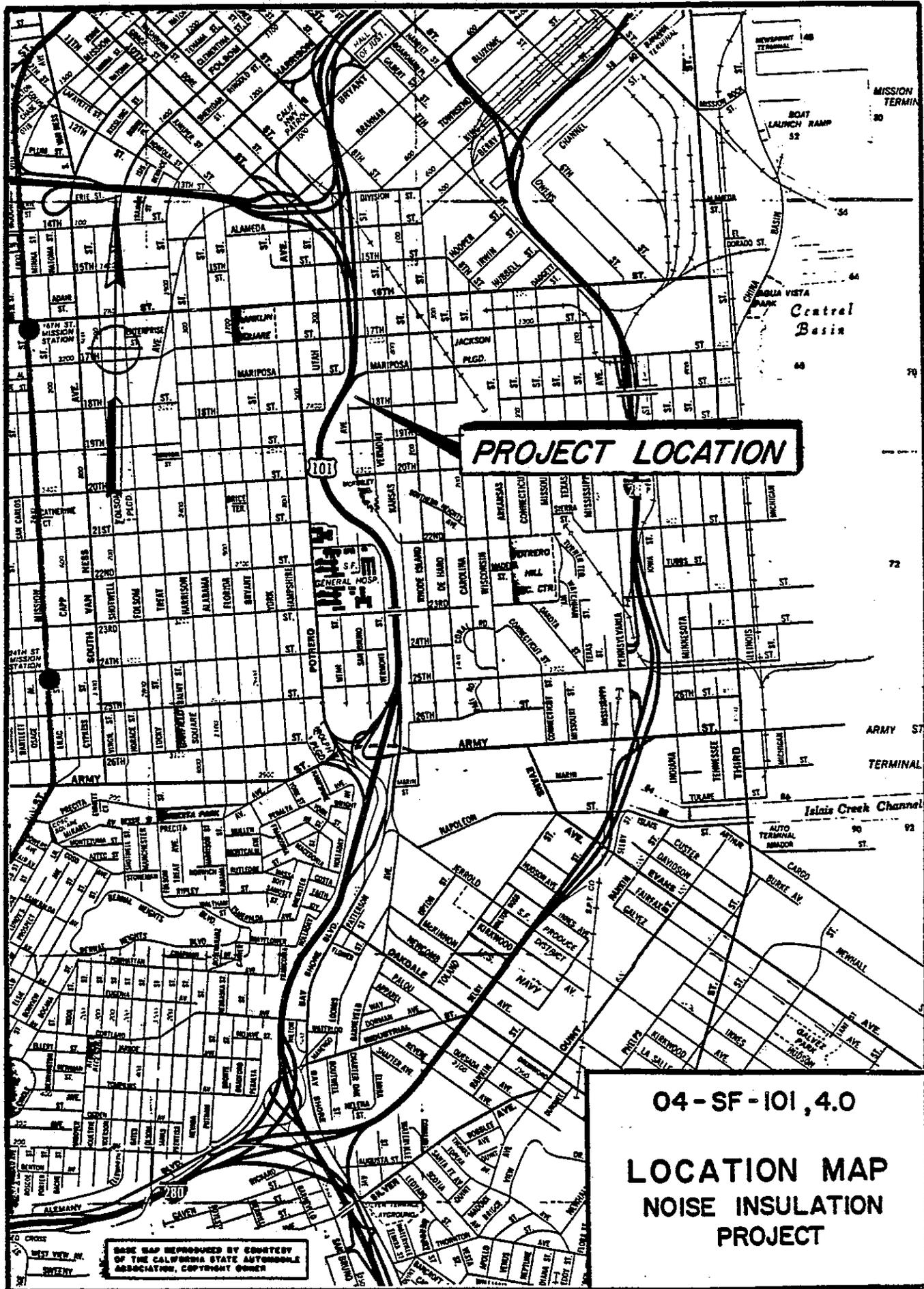
XVI. ATTACHMENTS

1. Exhibit A - Location Map
2. Exhibit B - Aerial Plan View
3. Exhibit C - Photographs

4. Exhibit D - Baseline Noise Level Measurements
5. Exhibit E - Environmental Evaluation Document
6. Exhibit F - Proposed Work at #585/587
7. Exhibit G - Proposed Work at #579
8. Exhibit H - Proposed Work at #575

PREPARED BY:

Milton Louie, Chief, P/D-C Branch	7-3274
J. C. Bradfield, Sr. Trans. Engr.	7-2685
R. Inoue, Project Engr.	7-2561

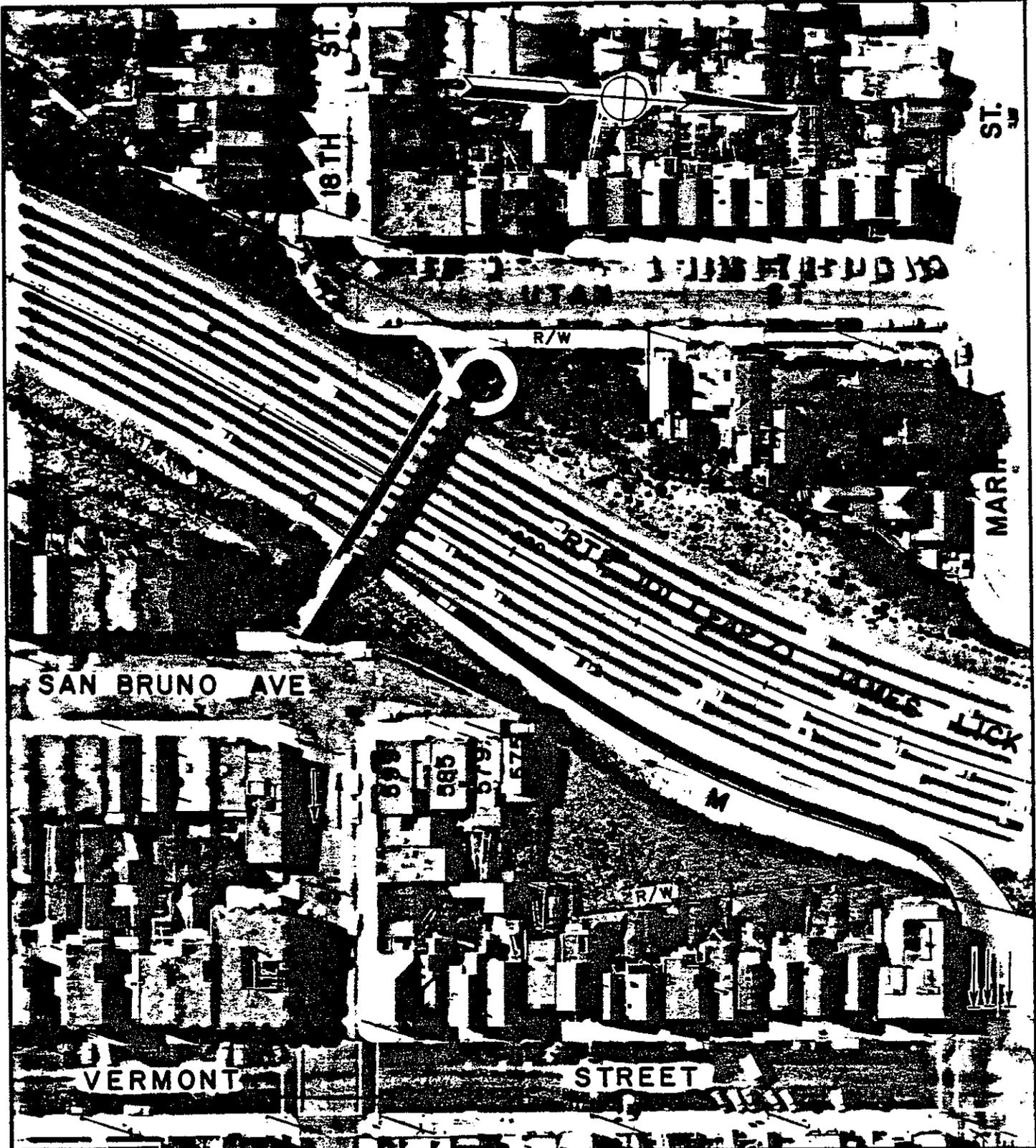


PROJECT LOCATION

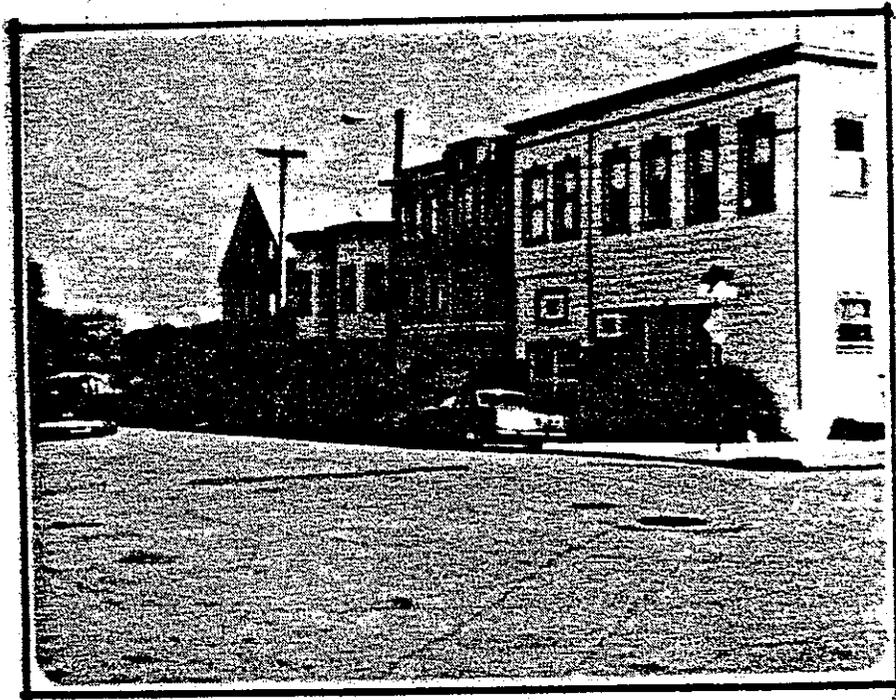
04-SF-101, 4.0

**LOCATION MAP
NOISE INSULATION
PROJECT**

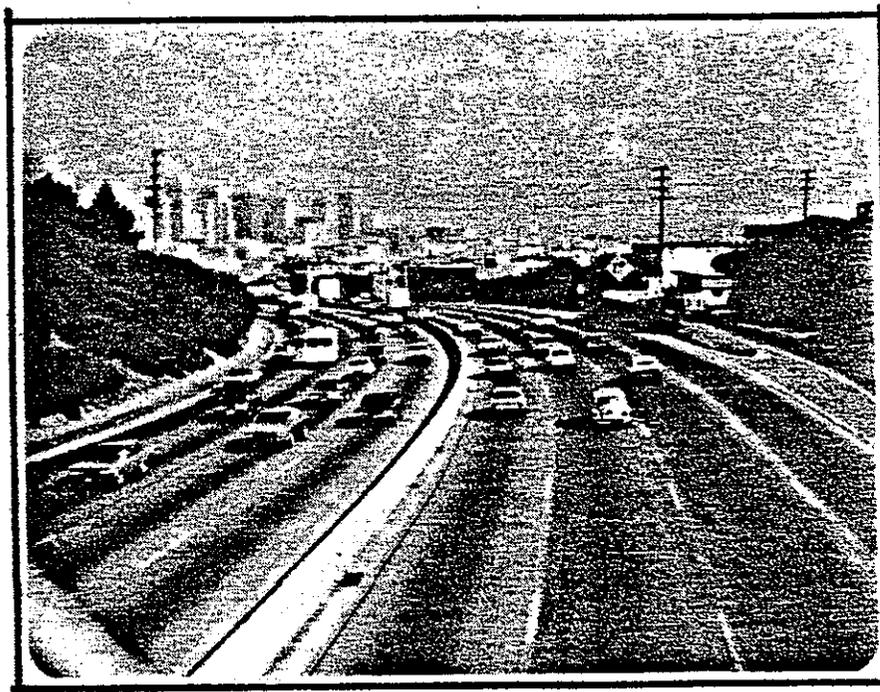
BASE MAP REPRODUCED BY COURTESY OF THE CALIFORNIA STATE AUTOMOBILE ASSOCIATION, COPYRIGHT OWNER



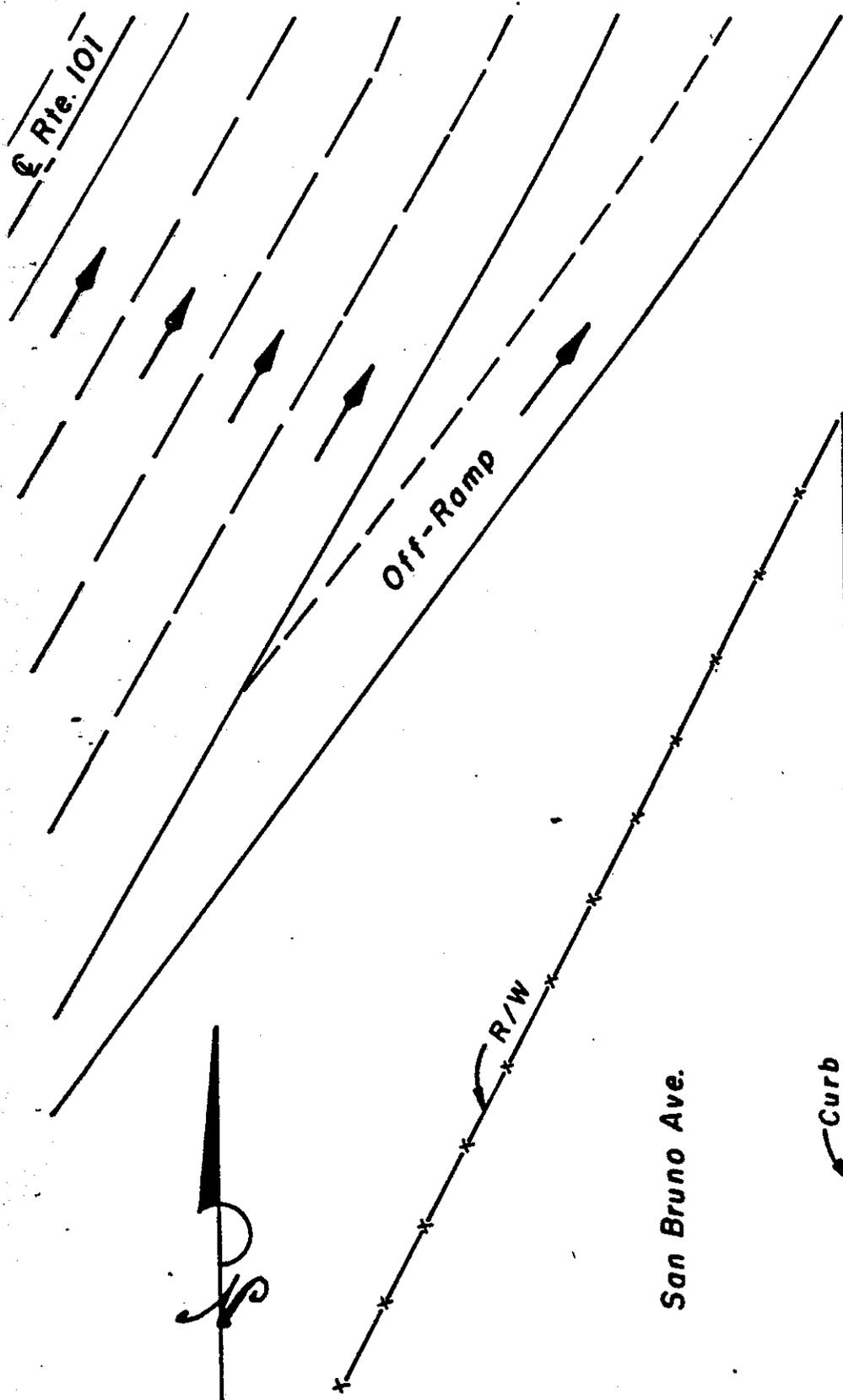
04-SF-101
PROPOSED FHWA EXPERIMENTAL
NOISE INSULATION PROJECT
SCALE: 1" = 100' E-15 NOV. 1979



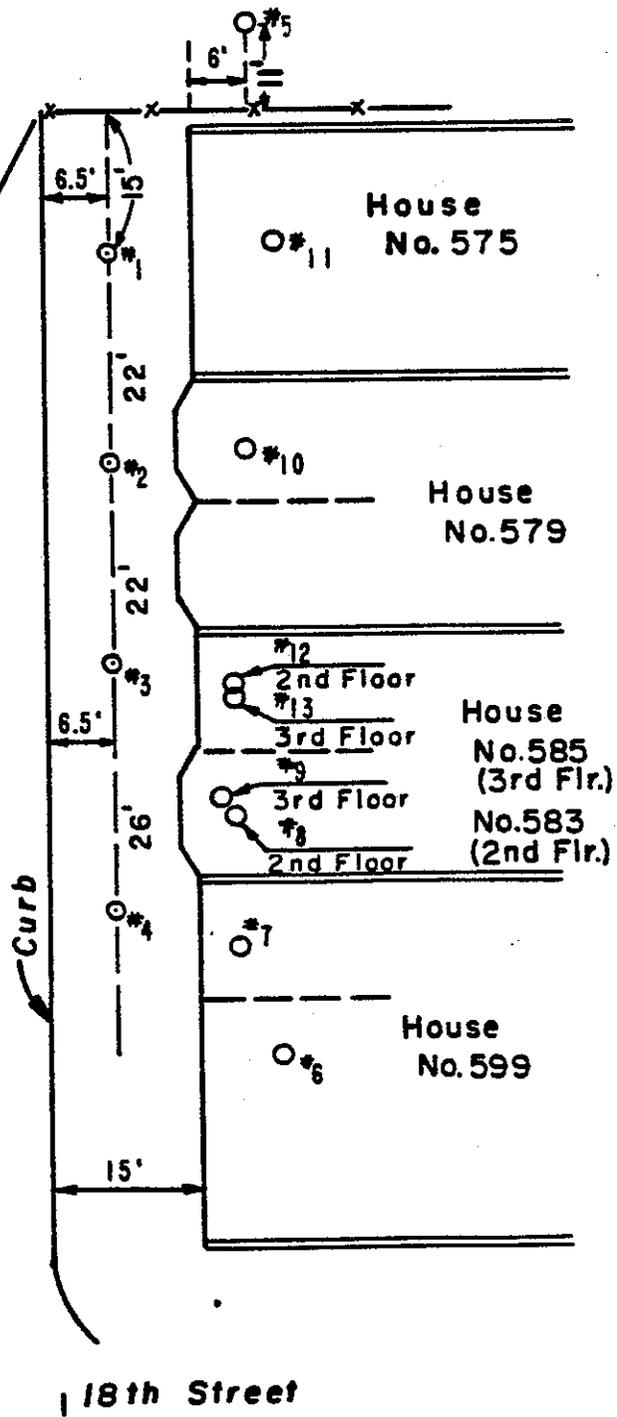
Close-up view of four houses. Route 101 freeway is on the left, behind landscaping.



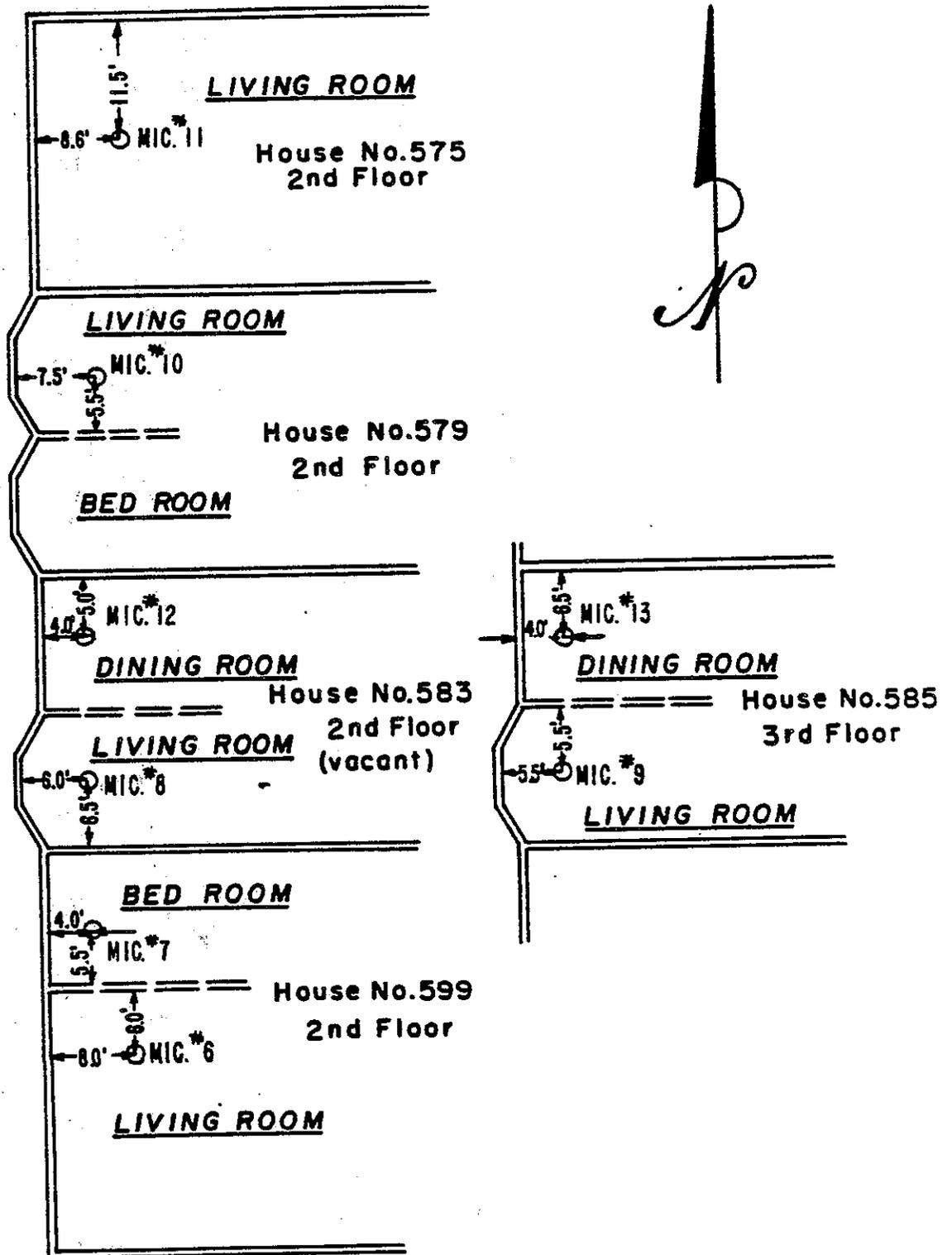
View of freeway, looking north, adjacent to the four houses. Houses are located on the right side, outside the photograph. Downtown San Francisco is in the background.



MICROPHONE HEIGHTS			
MIC.	HEIGHT	MIC	HEIGHT
1	15'	8	3.5'
2	15'	9	3.5'
3	15'	10	4'
4	15'	11	5'
5	17'	12	4.5'
6	3.5'	13	4.5'
7	3.5'		



MICROPHONE LOCATIONS
Scale: 1" = 20"



INSIDE MICROPHONE LOCATIONS
 Scale: 1" = 15'

NOISE MEASUREMENTS, 20-MINUTE L(eq)dB

TAKEN ON 10/15/80, ALONG SAN BRUNO AVE., AT RTE 101

Microphone Location Number	House Number	Inside or Outside	Floor	Room	Run #1 Windows, Drapes, Shutters* Closed	Run #2 Windows Closed, Drapes, Shutters** Open	Run #3 Windows, Drapes, Shutters Open	Remarks
1	575	out	2nd	Living	80	80	80	
2	579	out	2nd	Living	78	79	79	
3	583 & 585	out	2nd	Dining	76	76	76	
4	599	out	2nd	Bed	73	74	74	
5	575	out	2nd	Living	79	79	79	
6	599	in	2nd	Living	48	49	68	
7	599	in	2nd	Bed	48*	50**	69	Shutter on inside
8	583	in	2nd	Living (vacant)	51	52	67	Rug on floor - no furniture
9	585	in	3rd	Living	52	52	68	
10	579	in	2nd	Living	53	54	68	
11	575	in	2nd	Living	53	52	60	Run 3, only 2 end windows open Could not open other windows
12	583	in	2nd	Dining (vacant)	53	53	70	Rug on floor - no furniture
13	585	in	3rd	Dining	52	53	71	

Attachment 3

TRAFFIC COUNTS

Date: 10/15/80

RUN	TIMES START/END	VEHICLE TYPE*	4	S. BOUND				LANES**			N. BOUND		4	RAMP
				3	2	1	1	2	3	2	3			
1	10:57/11:17	Autos	366	499	529	510	486	633	525	213	98			
		Med.Tr.	24	29	16	7	7	24	19	11	14			
		H.Trucks	25	24	20	2	0	19	34	7	3			
2	12:00/12:20	Autos	403	524	570	548	435	562	493	202	99			
		Med.Tr.	19	18	15	7	12	26	18	6	5			
		H.Trucks	17	22	18	2	0	13	18	15	4			
3	12:35/12:55	Autos	360	484	507	466	489	544	514	209	73			
		Med.Tr.	22	20	14	10	5	30	25	17	1			
		H.Trucks	18	16	18	2	0	13	19	11	2			

* Vehicle types per FHWA RD-77-108

** Lane 1 is inside, or fast lane, lane 4 is slow lane

Average speed of the vehicles in the S. Bound and N. Bound lanes was 52 mph during runs 1, 2, and 3.

Attachment 4

EXH. D-4

E-20

Date Requested May 21, 1981

CATEGORICAL EXEMPTION/CATEGORICAL EXCLUSION
DETERMINATION

PROJECT DESCRIPTION

Experimental project for noise insulation of private dwellings involving sealing windows, installing single or double-glazed windows and providing ventilation systems for air circulation.

DETERMINATION

Based on an examination of the proposal, it is

1. concluded that this project is a categorically exempt action under CALTRANS' Environmental Regulations for the implementation of CEQA.
 - (a) Class 1, Section 1510.1 _____, or
 - (b) General rule exemption applies N/A
2. recommended that this project be determined to be a Categorical Exclusion in accordance with Volume 7, Chapter 7, Section 2 (7-7-2) of the Federal-Aid Highway Program Manual.

Ethel Ann Hansen 5/29/81
Chief, Environmental Planning Branch Date

Milton Laine 6/2/81
Chief, Originating Branch Date

Reviewed by and approve Categorical Exclusion recommendation.

J. M. Lamb 8-13-81
FHWA Representative Date

ENVIRONMENTAL SETTING

Urban setting; work to be performed within private dwellings.

STATE (CEQA)

Categorical Exemption:

- 1. Will there be a significant cumulative impact by this project and successive projects of the same type in the same place? No
- 2. Does this project fall within exempt Class 1, 3, 4, 5, 6, or 11, and might it impact on an environmental resource or hazard designated in the Environmental Goals and Policy Report issued by the Governor, or an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law? No
- 3. If a Class 1 (c) project, will it result in significant damage to or removal of a scenic resource? No
- 4. If for a conveyance of Excess Land, does the conveyance comply with the provisions of Section 1510.9 of the Caltrans Guidelines for the Implementation of CEQA? N/A

General Rule Exemption (if applicable):

This project does not fall within an exempt class but it can be seen with certainty that there is no possibility that the activity may have a significant effect on the environment. N/A

FEDERAL (NEPA)

Categorical Exclusion (if applicable):

- 1. Is this project likely to precipitate significant foreseeable alterations in land use, planned growth, development patterns, traffic volumes, traffic patterns, transportation service, or resources? No
- 2. Will the project affect property protected by Section 4(f) of the Department of Transportation Act? No
- 3. Will the project affect property protected by Section 106 of the National Historic Preservation Act? No
- 4. Will the project affect wetlands as defined in Executive Order 11990? No
- 5. Will the project affect habitats under the Endangered Species Act? No
- 6. Will the project affect lands subject to the Coastal Zone Management Act? No

Are other Federal agencies involved? No

If yes, specify _____

INTERDISCIPLINARY REVIEW

Air by _____

Russ Weeks

Date: 5-28-81

Noise by _____

Russ Weeks

Date: 5-28-81

Energy by _____

Russ Weeks

Date: 5-28-81

Water by _____

James P. Rosa

Date: 5-28-81

Natural Environment by _____

Jeffrey C. Bingham

Date: 5/29/81

Heritage Resources by _____

Jeffrey C. Bingham

Date: 5/28/81

Socio-Economic by _____

Ellie M. Ballerell

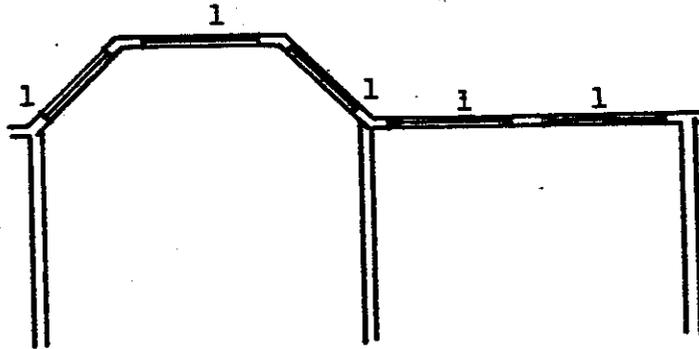
Date: 5/25/81

RyW

Yes _____ No X

Comments

SAN BRUNO AVENUE



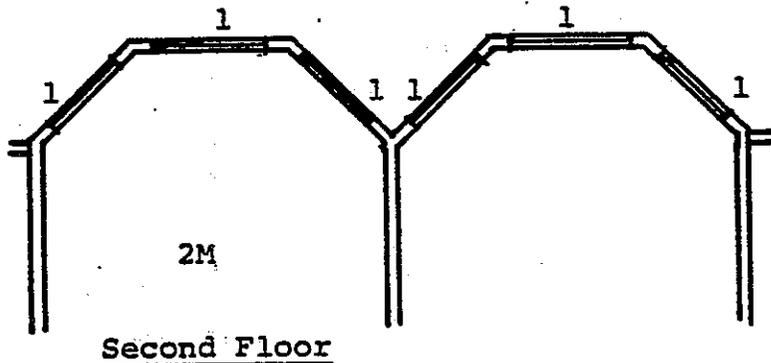
Second Floor 2M
Third Floor 3M

585/587

- *1. Replace existing single pane glass lites with new laminated glass in existing metal frames. Repair and/or replace weatherstripping and caulk as necessary for maximum air tightness.
- 2M. Existing extended dual baseboard register for living and dining areas offer sufficient airway section to accommodate a booster fan for forced air circulation from existing return air duct. A branch circuit will be provided from the existing panel with a remote on-off switch in the living area.
- 3M. Existing air duct risers in stud wall spaces provide for only limited air flow. Accordingly a floor-standing or ceiling fan may be considered for air movements.

*Operable Windows.

SAN BRUNO AVENUE



579

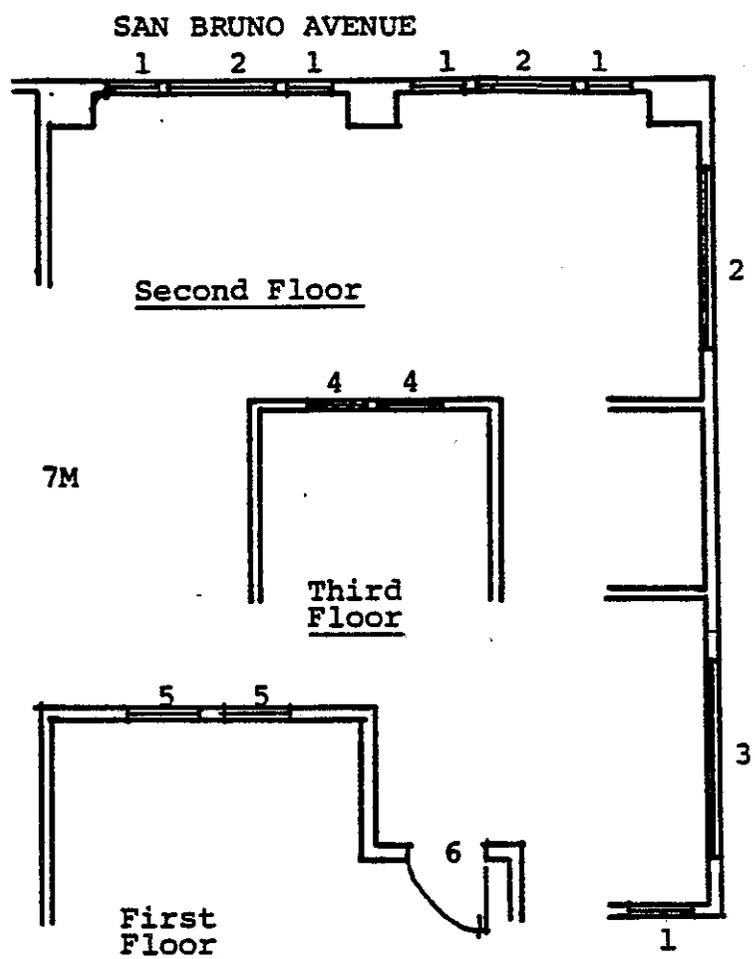
*1. Replace existing vertical hung wood window with new double glazed wood framed window to match existing appearance. Outer lite to be float glass and inner lite to be laminated glass. Caulk for continuous seal before installing window.

2M. Existing extended baseboard register for front bedroom offers sufficient airway section to accommodate a booster fan for forced air circulation from existing return air duct.

An alternate selection would be replacing existing ceiling light fixture with a combination paddle fan with light.

A branch circuit will be provided as necessary with an on/off switch in the bedroom.

*Operable Windows.



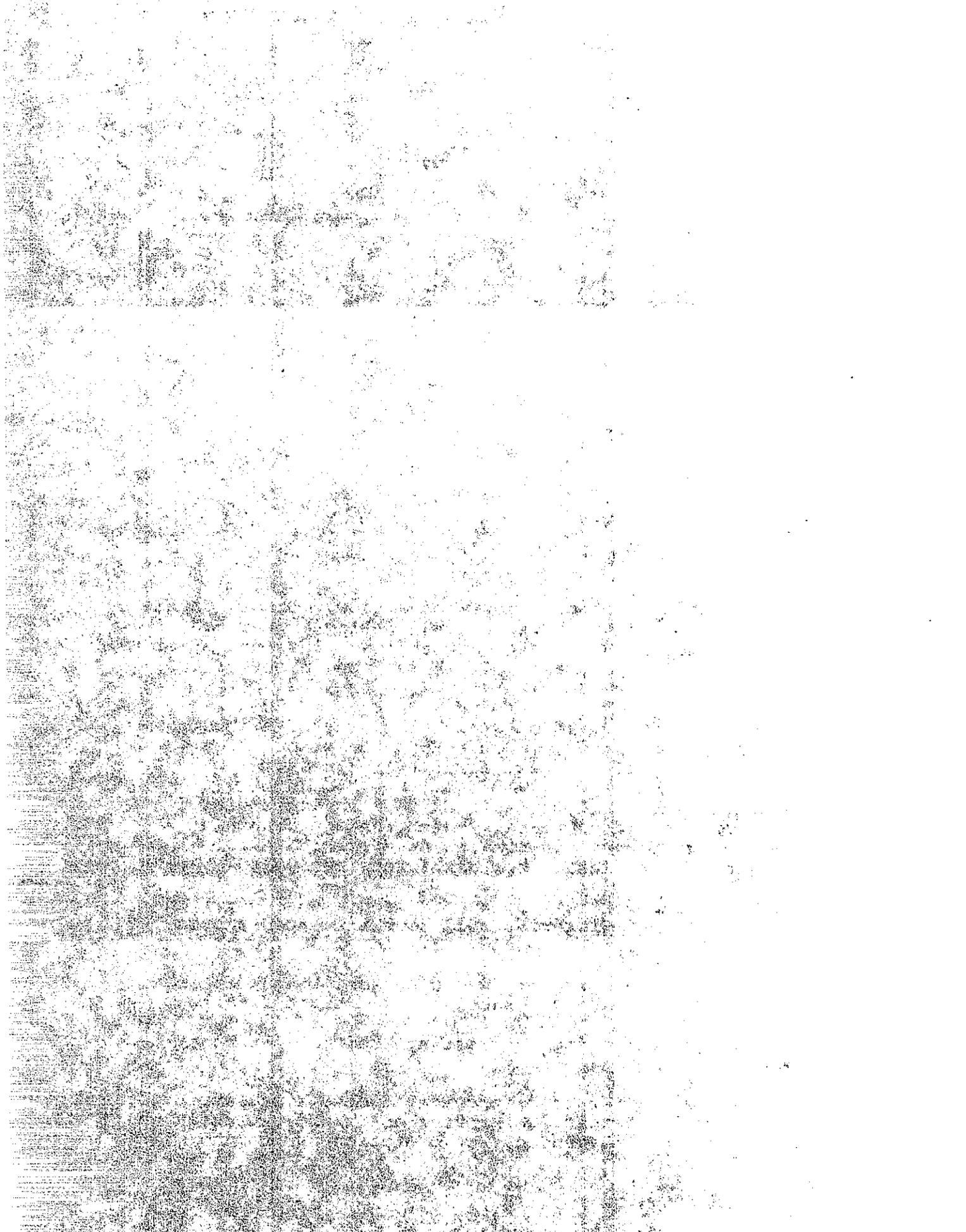
575

- *1. Replace existing vertical hung wood window with new double glazed wood framed window to match existing appearance (mullions, etc.). Outer lite to be float glass and inner lite to be laminated glass. Caulk for continuous seal before installing window.
2. Add inner lite of laminated glass to inside of existing fixed glass wood framed window. Separate glass lites by approximately 1" and seal for air tightness.
3. Replace existing metal framed window with single glazed fixed laminated glass window. Match the appearance of the large living room window with no operable vents. Caulk before installation for continuous seal.
- *4. Replace existing vertical hung wood windows as described in Note No. 1. Add interior roll down insulated fabric shutters with continuous edge guides to window opening.
5. Add fixed laminated glass to inside of existing wood framed windows with 1" air space. Seal for air tight fitting.
6. Add new weatherstripping to existing wood door at head, jambs and sill.
- 7M. Existing forced air furnace provides ducted air distribution throughout this residence. Provide an on/off switch at the second floor for independent fan operation during the warmer months.

*Operable Windows.

E-25

EXHIBIT H



Contract Sheet 2 of 32
SF 101 4.0
Co. Route P.M.

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DISTRICT 04

No. 46559-MN
(04-100075)

NOTICE TO BIDDERS AND SPECIAL PROVISIONS

Sealed proposals will be received by the Department of Transportation, at the office of the District Director, 150 Oak Street, San Francisco, California, in the Sealed Bid Box, First Floor Lobby, until 10:00 A.M., November 29, 1982 at which time they will be publicly opened and read, in Room 266, for the performance of work as follows:

IN THE CITY AND COUNTY OF SAN FRANCISCO ON SAN BRUNO AVENUE ADJACENT TO ROUTE 101 NEAR THE 18TH STREET PEDESTRIAN OVERCROSSING; BUILDING MODIFICATIONS TO PROVIDE THREE EXISTING PRIVATE RESIDENCES WITH NOISE INSULATION.

IT IS ESTIMATED THAT THE WORK WILL INCLUDE:

- 1 - LUMP SUM BUILDING WORK

BIDS ARE TO BE SUBMITTED IN A LUMP SUM AMOUNT.

The foregoing is a general description of the work to be performed and the Department of Transportation does not expressly or by implication agree that the actual items or amount of work will correspond therewith.

Further inquiries concerning the proposed work may be directed to the Department of Transportation. Resident Engineer E. Coble, 100 Rickard Street, San Francisco, Telephone (415) 557-2303.

The Department of Transportation reserves the right to reject any or all bids.
E-27 BID INFORMATION WILL BE AVAILABLE AFTER 1:00 P.M. **E-27** Phone No. (557-2101)

MINOR CONTRACT SPECIAL PROVISIONS

CONTRACT NO.

46559-MN

SHEET

3 OF 32

The work embraced herein constitutes a "Minor Contract". It shall be done in accordance with the General Specifications for Service Contracts of the Department of Transportation, dated 1981,* hereinafter referred to as General Specifications, and in accordance with the following special provisions and proposal, the proposed "Form of Contract" (Form OE-1284PW (Rev. 5/80)), the attached project plans and applicable "Standard Plan" sheets.

*and "Instructions to Bidders and General Conditions for Building Construction dated March 1980".

Project Plans consist of:

General Plan	Sheet A-1
Building No. 575	Sheet A-2, A-3, A-4
Building No. 579	Sheet A-5
Building Nos. 585/587	Sheet A-6
Mechanical, Electrical Details	Sheet ME-1, ME-2

AWARD OF CONTRACT PROPOSAL REQUIREMENTS AND CONDITIONS

A proposal guaranty is not required.

If the bidder is awarded the contract and refuses to execute the prescribed forms presented to him for signature within the time and manner required of him, he will be liable to the Department of Transportation for damages resulting to the Department therefrom, but said damages will be limited to either the actual damages or 10% of the amount bid, whichever is less.

The bid of any contractor who is currently in default with Caltrans on a contract already awarded may be regarded as nonresponsive and may be rejected. Default is defined as being within a period of liquidated damages on uncompleted work or under notice to begin or complete a contract where work has not commenced or was suspended without cause.

TIME OF COMPLETION AND LIQUIDATED DAMAGES

The Contractor shall begin work by the date specified in the Engineer's letter informing him that the contract has been approved and shall diligently prosecute the work so that all work shall be completed before the expiration of 65 consecutive working days including the specified starting date.

The Contractor shall notify Resident Engineer, E. Coble

(name and position)

100 Rickard Street, San Francisco

(address and telephone number)

(415) 557-2303

at least 24 hours in advance of starting work.

The Contractor shall pay the State of California the sum of \$100.00 per day for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

In addition to any penalties prescribed herein, should the Contractor fail to commence work within five (5) working days after notification of the starting date, or suspend work for a period of five (5) continuous working days after work has begun, the State may provide three (3) days written notice, posted at the job site or mailed to the Contractor, to timely prosecute and complete the work or the contract may be terminated and penalties of \$900.00 assessed for administrative costs for rebidding the work.

In addition, the Contractor shall be liable to the State for the difference between the Contractor's bid price and the actual cost of performing the work by the second low bidder or by another contractor.

DEPARTMENT OF TRANSPORTATION
GENERAL PREVAILING WAGE RATES
DAS-OBM-1203 (1/82)

Contract No. 46559-MN	Sheet 4 of 32
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Pursuant to Section 1771 of the Labor Code, if this contract is for more than \$1,000, not less than the general prevailing rate of wages for work of a similar character in the county in which the work is to be performed shall be paid to all workers employed on this contract.

Pursuant to Section 1773 of the Labor Code, the general prevailing rate of wages in the county in which the work is to be done has been determined and the Department has listed these wage rates in the Department of Transportation publication entitled General Prevailing Wage Rates, dated September, 1982. Future effective wage rates which have been predetermined and are on file with the Department of Industrial Relations are referenced but not printed in said publication. The wage rates determined by the Director of Industrial Relations and published in the Department of Transportation publication entitled General Prevailing Wage Rates refer to expiration dates. If the published wage rate does not refer to a predetermined wage rate to be paid after the expiration date, said published rate of wage shall be in effect for the life of this contract. If the published wage rate refers to a predetermined wage rate to become effective upon expiration of the published wage rate and the predetermined wage rate is on file with the Department of Industrial Relations, such predetermined wage rate shall become effective on the date following the expiration date and shall apply to this contract in the same manner as if it had been published in said publication. If the predetermined wage rate refers to one or more additional expiration dates with additional predetermined wage rates, which expiration dates occur during the life of this contract, each successive predetermined wage rate shall apply to this contract on the date following the expiration date of the previous wage rate. If the last of such predetermined wage rates expires during the life of this contract, such wage rate shall apply to the balance of the contract.

If this contract is more than \$1,000, the general prevailing wage rates set forth in the Department of Transportation publication entitled "General Prevailing Wage Rates", which establish minimum wages for this contract shall be posted by the Contractor in a prominent place at the site of the work.

All copies of prevailing wage rates to be posted at the job site will be furnished by the Department.

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PAYROLL RECORDS

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If this contract is for more than \$1,000, and involves the employment of people, the contractor and each subcontractor shall comply with the following provisions. The contractor shall be responsible for compliance with these provisions by his subcontractors.

"(a)" Each contractor and subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work.

"(b)" The payroll records enumerated under subdivision (a) shall be certified and shall be available for inspection at all reasonable hours at the principal office of the contractor on the following basis:

(1) A certified copy of an employee's payroll record shall be made available for inspection or furnished to such employee or his or her authorized representative on request.

(2) A certified copy of all payroll records enumerated in subdivision (a) shall be made available for inspection or furnished upon request to a representative of the body awarding the contract, the Division of Labor Standards Enforcement and the Division of Apprenticeship Standards of the Department of Industrial Relations

(3) A certified copy of all payroll records enumerated in subdivision (a) shall be made available upon request to the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through either the body awarding the contract, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. The public shall not be given access to such records at the principal office of the contractor

"(c)" Each contractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested such records within 10 days after receipt of a written request.

"(d)" Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address and social security number. The name and address of the contractor awarded the contract or performing the contract shall not be marked or obliterated.

"(e)" The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a change of location and address.

"(f)" In the event of noncompliance with the requirements of this section, the contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects such contractor must comply with this section. Should noncompliance still be evident after such 10-day period, the contractor shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars (\$25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due."

The penalties specified in subdivision (f) of Labor Code Section 1776 for noncompliance with the provisions of said Section 1776 may be deducted from any moneys due or which may become due to the Contractor.

A copy of all payrolls shall be submitted to the Engineer within 10 days, not including Saturdays, Sundays or legal holidays, following completion of the work.

Payrolls shall contain the full name, address and social security number of each employee, his correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made and actual wages paid. They shall also indicate apprentices and ratio of apprentices to journeymen. The employee's address and social security number need only appear on the first payroll on which his name appears. The payroll shall be accompanied by a "Statement of Compliance" signed by the employer or his agent indicating that the payrolls are correct and complete and that the wage rates contained therein are not less than those required by the contract. The "Statement of Compliance" shall be on forms furnished by the department or on any form with identical wording. The Contractor shall be responsible for the submission of copies of payrolls of all subcontractors.

The Contractor and each subcontractor shall preserve their payroll records for a period of 3 years from the date of completion of the contract.

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