RESOLUTION NO. 79-9

A RESOLUTION ADOPTING THE NOISE ELEMENT OF THE SAN JOAQUIN COUNTY COUNCIL OF GOVERNMENTS AS THE NOISE ELEMENT OF THE CITY OF LODI.

WHEREAS, Government Code Section 65302(g) requires that the General Plan of the City of Lodi shall consist, among other things, of a Noise Element; and

WHEREAS, the Planning Commission of the City of Lodi has recommended that the Noise Element adopted by the San Joaquin County Council of Governments on November 28, 1978 be used as the Noise Element of the City of Lodi; and

WHEREAS, pursuant to notice given, a public hearing was held by the Planning Commission of the City of Lodi on December 11, 1978 and at which public hearing the Planning Commission recommended to the City Council of the City of Lodi the adoption of said Noise Element of the San Joaquin County Council of Governments; and

WHEREAS, the City Council thereafter set a public hearing on January 17, 1979 to determine whether the City Council should adopt the aforesaid Noise Element; and

WHEREAS, after study of said Noise Element by the City Council and the hearing of public testimony at said hearing;

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Lodi that there be adopted as a Noise Element of the City of Lodi, the Noise Element heretofore adopted by the San Joaquin County Council of Governments on November 28, 1978 and that the contents of the document approving the Noise Element be adopted as the Noise Element of the City of Lodi, a copy of which document is attached hereto.

Dated: January 17, 1979

I hereby certify that Resolution No. 79-9 of the City Council of the City of Lodi was adopted in a regular meeting held January 17, 1979 by the following vote:

Ayes: Councilmen - Hughes, Katzakian and McCarty

Noes: Councilmen - None

Absent: Councilmen - Katnich and Pinkerton

Alice M. Reimche

ALICE M. REIMCHE
CITY CLERK

11/28/78

1978

noise element

SAN JOAQUIN COUNTY COUNCIL OF GOVERNMENTS

Resolution No. 79-9

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SAN JOAQUIN COUNTY COUNCIL OF GOVERNMENTS

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COUNCIL OF GOVERNMENTS

NOISE ELEMENT OF THE GENERAL PLAN

FALL, 1978

Noise Element Staff:

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Diane Bromley, Student Intern
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Alma Forenti, Illustrator
Myron Chan, Draftsman
Tom Campo, Draftsman

LIST OF CHARTS/TABLES/FIGURES

SECTION 1 - *INTRODUCTION*

WHY NOISE CONTROL IS IMPORTANT

This section describes the many harmful or disturbing effects noise can have on people. Such effects are what make it important for cities and counties to alleviate existing problem areas and to protect against creation of new noise-related problem areas.

EFFECTS OF NOISE ON PEOPLE

Hearing Loss. The function of the ear is to convert sound energy into nerve impulses. As sound waves enter through the outer ear and eardrum, the middle ear muscles contract or expand to increase or diminish sounds entering the delicate inner ear. However, this middle ear reflex is imperfect since it cannot adequately protect the inner ear against very loud, impulsive, or sustained noises.

When sounds are too intense and prolonged, the hearing receptor cells, or "hair cells" can be damaged. The inner ear (cochlea) is a coiled tube about 34 millimeters long, containing about 17,000 hair cells.

Hearing loss can occur along parts or all of the cochlea. Thus, the degree of hearing loss depends not only on the severity of injury at any one location, but upon the spread of hearing loss in the inner ear.

Hearing loss usually occurs above speaking ranges and spreads downward. Damage can, therefore, be substantial before hearing loss is noticed.

Most scientists believe noise levels of 70dB(A) or more contribute to loss of hearing over a lifetime. Clear evidence is available that noises above 80dB(A) can contribute to inner ear damage and eventually hearing loss if they are frequently and regularly encountered. Trucks, trains, sport cars, and motorcycles all exceed 80dB(A) at 50 feet. Amplified music at close range may reach 120dB(A). In industry, excessively loud machinery is often the norm.

The number of such loud noise sources has grown phenomenally in the last 20 years. Numbers of trucks and cars have more than doubled, commercial jets increased from 0 in 1995 to nearly 2,000 in 1970. Appliances, recreational vehicles, and power lawn mowers, all contribute to a noisier environment.

About twenty million people in the United States are presently estimated to have some degree of hearing loss, and the rate of hearing loss is increasing in part due to increased societal noise levels.

CHART I

DECIBEL REFERENCE CHART

Sound Source	Decibels	Noise Effects
Jet Plane (100 ft.)	130	
	120	Painfully loud, rapid hearing loss.
Amplified Rock Music	110	
Automatic Punch Press (3 ft.)		
Shout (6 inches)	100	Maddening sound
Jackhammers (50 ft.)		Evidence that noise can interfere with work performance.
Diesel Locomotive (50 ft.)		
Motorcycle (50 ft.)	90	Federal Industrial 8 hour exposure limit
Heavy truck (50 ft.)		Well established that noise levels this high contribute to hearing loss.
Power Lawn Mower (3 ft.)		
10-HP Outboard (50 ft.)	80	Noise very annoying.
Standard Passenger Car (50 ft.)		
Interior of Department Store	70	Noise level for potential hearing loss begins; hard to use phone. Stress reactions become obvious.
Dishwasher, clotheswasher, stove fan (operator's distance)	60	Noise intrudes on normal speech at distances greater than five feet.
	50	Some speech and sleep interference
Average business office		
Living Room (no T.V.)	40	
Bedroom		Sleep undisturbed
Whisper (15 ft.)	30	Very quiet
Broadcast Studio	20	
	10	Sound just audible
	0	Hearing limit

CHART 2

TYPICAL NOISE LEVELS FROM VARIOUS SOURCES IN dBA

Transportation & Recreational Vehicles	dBA Level
Passenger cars (50')	64-76
Sports Cars (50')	70-80
Light trucks (50')	70-85
Medium-heavy trucks (50')	75-95
Motorcycles-street (50')	65-95
Off Road Motorcycles (50')	80-105
Buses (50')	70-87
General aviation propeller aircraft (take-off @ 1000')	76-93
2-3 engine jet aircraft (take-off @ 1000')	90-100
4 engine jet aircraft (take-off @1000')	100-105
Light helicooter (500')	65-78
Medium - Heavy helicopters (500')	76-92
Diesel locomotive (50')	88-98
Freight cars (50')	80-94
Train horn (50')	90-114
Industrial Machinery, Equipment (User Distance)	
Pneumatic Power Tools (Grinders, Chippers)	90-116
Molding machines	102-106
Air blown devices (for paint, clean, etc.)	90-105
Blowers (forced, fan, induced, etc.)	80-100
Air compressors	92-100
Metal forming (Punch, Shearing)	82-97
Combustion (Furnaces, flare stacks @ 25')	82-97
Turbo generators (Steam @ 10')	88-92
Pumps (Water, hydraulic)	80-92
Transformers	83-84
Industrial	
Tractors (50')	75-95
Graders (50')	80-95
Pavers (50')	85-87
Concrete Mixers (50')	75-88
Movable Cranes (50')	75-85
Generators (50')	72-82
Jack Hammers & Rock drills (50')	80-98
Impact Pile drivers (peaks) (50')	95-105
Vibrator (50')	69-81
Saws (50')	72-82

Home Appliances	Level of Operator Exposure (dBA)
Group I: Quiet Major Equipment and Appliances	
Refrigerator	40
Freezer	41
Electric Heater	44
Humidifier	50
Floor Fan	51
Dehumidifier	52
Window Fan	54
Clothes Dryer	55
Air Conditioner	55
Group II: Quiet Equipment and Small Appliances	
Hair Clipper	60
Clothes Washer	60
Stove Hood Exhaust Fan	61
Electric Toothbrush	62
Water Closet	62
Dishwasher	64
Electric Can Opener	64
Food Mixer	65
Hair Dryer	66
Faucet	66
Vacuum Cleaner	67
Electric Knife	68
Group III: Noisy Small Appliances	
Electric Knife Sharpener	70
Sewing Machine	70
Oral Lavage	72
Food Blender	73
Electric Shaver	75
Electric Lawn Mower	75
Food Disposal (Grinder)	76
Group IV: Noisy Electric Tools	
Electric Edger and Trimmer	81
Hedge Clippers	84
Home Shop Tools	85

Even where daily exposure to community noises may not pose a distinct hazard in itself to hearing, it may increase individual hearing loss by making it impossible for a worker in a noisy factory to find enough off-job quiet to allow the ears to recover each evening.

Hearing loss can be eliminated if exposure to noise is held to sufficiently low levels, held to sufficiently short durations, and allowed to occur only rarely. But regulation of a person's total exposure to noise is impossible to achieve. Reducing noise levels of the noise source is a better approach. Clearly, quieting all noise sources to 70dB(A) or less is impossible at present. On the other hand, allowing loud noise sources to continue to proliferate without bound would lead to far greater problems in terms of hearing loss and other adverse effects of noise. As a goal from a hearing conservation standpoint, it is desirable to have as few noise sources as possible which expose people to sound levels in excess of 70dB(A).

Speech Interference. Another direct effect of noise is masking where unwanted sounds interfere with wanted signals, such as speech. Speech interference begins occurring at about 40-45dB(A) and becomes severe at 60dB(A) and above (see Chart 3). The relationship shown in the speech interference chart is for young adults with normal hearing speaking the same dialect. Children under about 13 years of age, the elderly, hard of hearing, and people with dialect differences are likely to require quieter conditions than those indicated on the chart.

In a highly intellectual technical society, speech communication plays an important role. Excessive background noise can reduce the amount and quality of verbal exchange and adversely affect education, family life styles, occupational efficiency and the quality of relaxation.

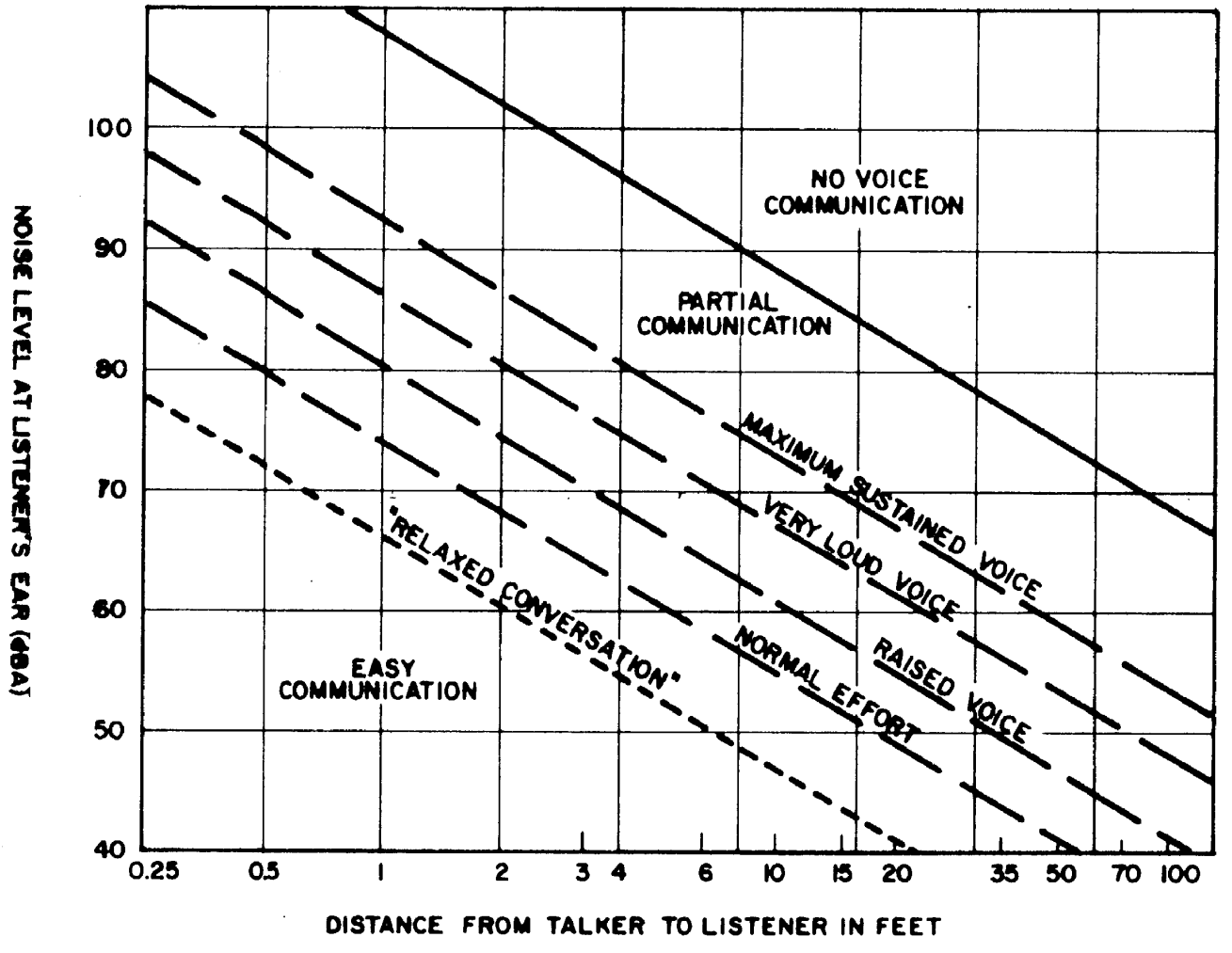
Sleep Interference. To protect a person from sleep interference, sound levels should not rise above 35-40dB(A). Whether a person is actually awakened by a particular noise will depend on noise levels, characteristics of the noise, stage of sleep, the person's motivation to awaken, age, sex, and so on. Elderly people and persons who are ill are particularly susceptible to sleep interference caused by noise.

Physical Reactions. Temporary physical reactions to passing noise include:

(at most levels)
- an orientation reflex;
- a startle reflex;

(at about 70dB(A) and above)
- construction of the peripheral blood vessels;
- acceleration or deceleration of the heart rate;
- dilation of pupils of the eye;

SPEECH INTERFERENCE

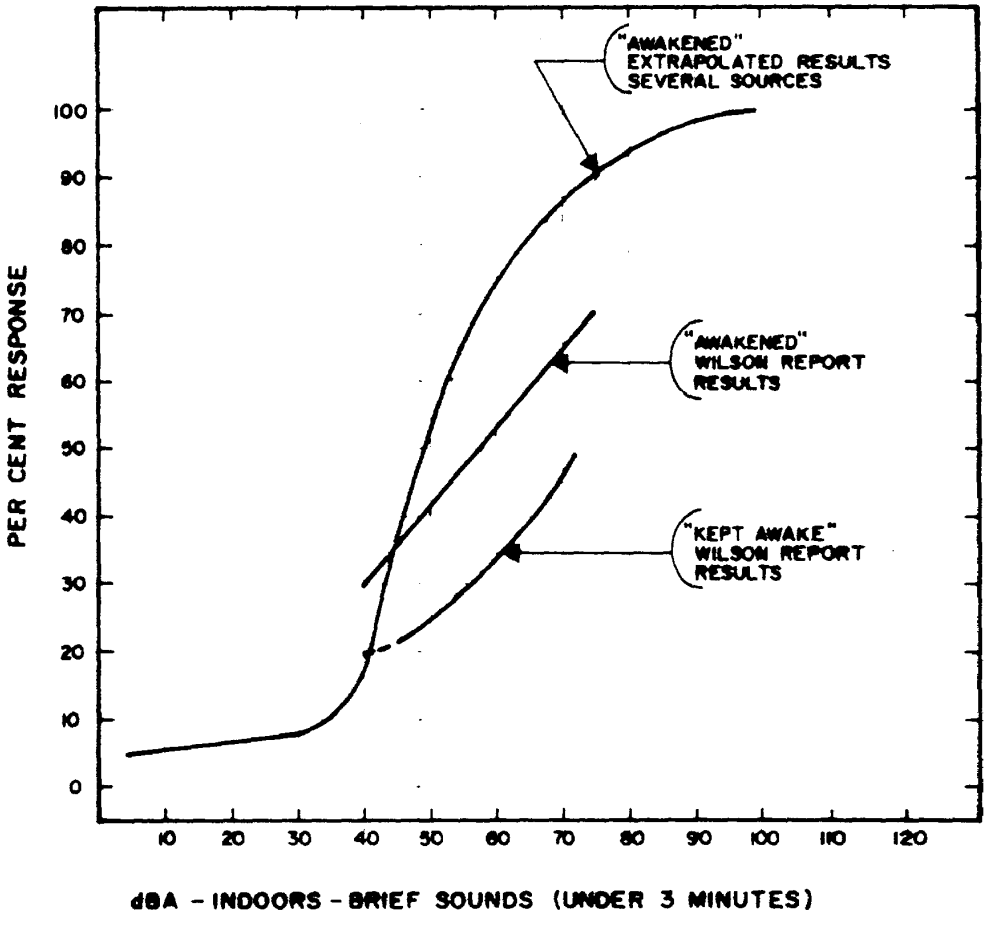


Distance at which ordinary speech can be understood outside. Indoors, levels may need to be lower because of the build-up of sound by reflections from walls of a room.

Source: Public Health & Welfare Criteria for Noise
U.S. Environmental Protection Agency, 1973

CHART 4

SLEEP INTERFERENCE



Source: Effects of Noise on People
U.S. Environmental Protection Agency, 1971

- changes in breathing patterns;
- changes in movement of the gastrointestinal tract;
- changes in secretion of saliva and gastric juices;
- chemical changes in the blood and urine;

(at higher levels)

- loss in visual acuity; and
- disturbance of equilibrium.

It is proposed, and evidence exists, that chronic arousal of such physical responses could aggravate the incidence of medical problems such as headaches, fatigue, digestive disorders, heart disease, blood circulatory disorders, and equilibrium disorders.

It is also proposed that noise as a source of stress is a likely contributor to what many medical authorities believe are stress-related diseases such as ulcers, high blood pressure, heart disease, and arthritis.

As a source of stress, noise may also be a contributing factor in mental illness, anxiety, and psychological distress.

Performance and Learning. Work performance can be adversely affected by noise through distraction and through the physical reactions previously described. While noise does not seem to have an effect on overall work productivity, it can reduce accuracy of work, particularly of complex tasks, and inhibit learning. Even if it does not do this, the price may be increased fatigue, distraction, and irritability on the part of the employee or student. Studies conducted in Europe recommend 55dB(A) as an upper limit for peak interfering noise in classrooms.

Privacy. As a result of a lack of acoustical privacy, people may experience annoyance, sleep interference, speech interference and all other detrimental effects of noise. Nearly everyone has experienced this effect at one time or another in apartments, hotels, or motels. In multi-unit structures, careful attention to building materials and construction techniques at separating walls and floor-ceilings is necessary to provide acceptable interior living environments.

Psychological. Facts clearly support the contention that noise can be a source of psychological distress through annoyance, speech, sleep interference, etc. This distress in turn can lead to instability, sexual impotency, headaches, nausea, general anxiety, and changes in general mood.

Annoyance. A large number of factors govern how annoyed people will be by noise. First, there are characteristics of the noise itself, i.e., its loudness and duration, whether it is impulsive or steady, contains speech or music, or piercing "pure tones." Second, background noise levels help in determining how "intrusive" and thus annoying a particular noise is.

Third, place, time of day, and seasonal variations can make a difference; people are more likely to be disturbed at home, at night, and during warm weather. Finally, a person's actual total exposure to the noise source, and his or her attitude toward it, may play a part.

The number of people disturbed by noise generally goes up as noise levels increase. Predicting annoyance response to noise in particular situations, however, is difficult. Individuals who complain are generally not unusually sensitive to noise. They do tend to have a higher socioeconomic status and a better education than those who do not complain, but there are few other guidelines. Communitywide annoyance response also depends on leadership within that community and a sense of community.

Complaints are not, then, very good criteria to apply in setting protective noise standards. As a result, criteria based on the harmful and disturbing effects of noise on persons have emerged as more objective, measurable, and protective approaches to the problem of setting noise standards.

SUGGESTED INTERIOR DESIGN NOISE LEVELS

The following levels for design of rooms are not required standards but are design objectives to prevent speech or sleep interference and other adverse noise effects previously described.

FIGURE 1
SUGGESTED DESIGN SOUND LEVELS FOR VARIOUS USES

Type of Use	dB(A) Level
Residential and hotels and motels:	
Interior living areas	25-40
Interior sleeping areas	20-35
Hospitals, convalescent homes, rest homes, housing for the elderly:	
Interior living areas	25-40
Interior sleeping areas	20-30
School classrooms, libraries	35-40
Concert halls, recital halls	21-30
Large auditoriums, large theaters and churches	20-30
Small auditoriums, small theaters and churches	Not Above 42
Large meeting and conference rooms	Not Above 42
Private or semiprivate offices	38-47
Large offices, reception areas, retail shops and stores, cafeterias..	42-52
Lobbies, laboratory work spaces, drafting and engineering rooms..	47-56
Light maintenance shops, office and computer rooms, laundries	52-61
Shops, garages, power plant control rooms..	56-66
Other commercial and industrial areas where speech interference is not a consideration	Less Than 70

Sources: Kryter, Karl, Effects of Noise on Man

Environmental Protection Agency, Effects of Noise on People

Environmental Protection Agency, Public Health and Welfare Criteria for Noise

L.L. Beranek, W.E. Blazier, and J.J. Figwer, "Preferred Noise Criterion Curves and their Application to Rooms," Journal of the Acoustical Society of America 50, 1971, pp. 1223-1228

LEGISLATIVE BACKGROUND

This Noise Element is an update of a 1974 Council of Governments Noise Element. In 1976, the State Office of Noise Control prepared guidelines to implement revised Noise Element Legislation. The new guidelines and legislation attempt to coordinate the noise measurement methodology being used throughout the state. They also set down more specifically what is required in a noise element.

This element has been prepared by COG to comply with the new guidelines. Major differences between the new and old elements are that noise level contours measured by the day-night average level (Ldn)* method have been calculated and plotted for the County's major noise sources; population contained within all of the Ldn noise contours have been estimated; a proposed countywide noise ordinance has been prepared along with the "equal noisiness" zones needed for noise ordinances; and a careful attempt has been made to specifically relate this element to new state noise laws and standards.

The 1974 COG Noise Element should be consulted for more detailed information on methods for noise reduction.

RELATIONSHIP WITH OTHER GENERAL PLAN AMENDMENTS

The noise element is most closely related to the land use, housing, circulation, and open space/recreation elements. A key objective of the noise element is to provide noise exposure information for use in the land use element. This land use element, when integrated with the noise element, will show acceptable land uses in relation to existing and projected noise contours. The housing element considers the provision of adequate sites for new housing and standards for the housing stock. Since residential land use is among the most noise sensitive, the noise exposure information provided in the noise element must be considered when planning the location and design of new housing. The circulation system is one of the major sources of noise. Noise exposure will thus be a factor in the location and design of new transportation routes and facilities and in the possible mitigation of noise from existing facilities. Finally, excessive noise can adversely affect the enjoyment of recreational pursuits. Recreation areas may also generate high noise levels. Thus, noise impacts must be considered when planning recreation uses. Also, open space can be used as a tool to buffer noise sources from sensitive land uses through wide setbacks.

*Refer to Ldn method description, page 18.

DEFINITIONS

Listed below are terms used in this element:

Ambient: The background noise level always present when isolated, identifiable sources are absent.

A-Weighted Sound Level: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise. Sounds measured with an "A" weighting are abbreviated dBA or dB(A).

Decibel (dB): A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).

Equal Noisiness Zones: Defined areas or regions of a community wherein the ambient noise levels are generally similar (within a range of 5dB). Typically, all sites within any given noise zone will be of comparable proximity to major noise sources.

Ldn or Day-Night Average Level: Average noise levels during a 24-hour day obtained after an addition of 10dB to sound levels occurring at night between 10:00 p.m. and 7:00 a.m. The daily levels of noise exposure are then averaged on an annual basis. Ldn's are approximately equal to CNEL or "Community Noise Equivalent Levels."

Noise Contour: A line passing through points where the same sound intensity level prevails. Contours form bands of varying width emanating from a noise source.

Residential: Places where people live and sleep. Includes but is not limited to single family dwellings, apartments, institutions, mobilehomes, group quarters, hotels and motels, convalescent hospitals, and rest homes.

Trucks: Includes all trucks with three axles or more, and two axle trucks with four rear wheels. This excludes light pickups and vans.

SECTION II - *NOISE ELEMENT GOALS, POLICIES and IMPLEMENTATION POLICIES*

GOALS

- To improve the overall environment by reducing physically harmful and annoying levels of noise.
- To prevent creation of new noise problems in developed and developing areas.
- To alleviate existing noise problems.
- To provide acceptable exterior and interior noise environments for residential and other noise sensitive land uses.

POLICIES

- To require acoustical studies for new residential projects within 60dB Ldn contours as required by State Noise Insulation Standards, using the contours provided in this element or updated contours where necessary.
- To apply State Noise Insulation Standards to new single family detached residential developments, hospitals, convalescent hospitals and rest homes, as well as to all new attached residential dwellings.
- To prohibit new residential land uses within present and future 65dB Ldn contours around all public access airports as required by California Airport Noise Standards.
- To avoid locating new homes within present and future 60dB Ldn contours around non-air carrier airports.
- To prohibit new residential land uses within present and future 75dB Ldn contours, unless effective shielding can be provided so that acceptable exterior and interior noise levels are met.
- To reduce exterior sound levels for new noise sensitive uses to less than 65dB Ldn where possible.
- To use 45dB Ldn as the interior sound level standard for all new dwelling units.
- To continue to identify noise generators and to calculate existing and future noise contours for such uses.
- To plan and design public projects and facilities to minimize noise impacts on neighboring noise sensitive areas.

- To plan and design public facilities to minimize noise interference from outside noise sources.

- To insure that new commercial and industrial projects are designed to minimize noise impacts on neighboring noise sensitive areas.

- To protect existing industrial and commercial uses from potential noise complaints from new residential development through enforcement of Noise Insulation Standards and through all other means possible.

- To alleviate existing community noise problems through use of a Comprehensive Noise Ordinance and any other means possible.

IMPLEMENTATION MEASURES FOR CITY AND COUNTY DEPARTMENTS

ALL:

- Assign, in all affected departments, at least one employee the responsibility of becoming knowledgeable about noise control, and consult that person where noise effects of a plan or project needs to be considered.

- Buy quieter replacement equipment when feasible; include noise specifications in requests for bids and equipment information.

- Encourage employees to wear hearing protection when working noise levels are above 70-80dBA.

PLANNING AND BUILDING DEPARTMENTS:

- Develop performance standards for noise buffer areas between residential and industrial/commercial uses.

- Incorporate Noise Insulation Standards into local building codes for new detached dwellings, hospitals, convalescent hospitals and rest homes.

- Consider the feasibility of making rest home conversions subject to a Use Permit to allow some control over their location and design in high noise areas.

- Prepare projected noise contours for transportation routes with noise contours that are likely to change by 1990, before or at the time projects are proposed along such routes.

- Continue to identify noise generators and prepare noise contours around them before or at the time projects are proposed near those generators.

- Use the methodology published by the Office of Noise Control included in the appendices to calculate new or updated Ldn noise contours.

- Incorporate noise information and acoustical studies required by State Noise Insulation Standards into city and county Environmental Impact Reviews and other review procedures, rezonings, and general plan amendments.

- Continue to promote compatibility between noise generating and noise sensitive land uses by the following methods: limitations on hours of operation, construction of sound barriers, relocation of noisy equipment, replacement of noisy equipment with quieter equipment, etc.

PLANNING AND RECREATION DEPARTMENTS:

- Locate suitable sites near cities for noisy recreation activities such as motorcycling.

- Locate quiet activity areas of parks away from major noise sources, or design them so that vehicular access is limited, or so that they are buffered from noise sources by earth berms, solid walls, etc.

PUBLIC WORKS DEPARTMENTS:

- Designate truck routes in cities where they are not existing to limit truck access through residential areas.

- Consider noise impacts on nearby residents of traffic control devices such as "slow down bumps," stop signs and lights, and decorative street treatments such as brick crosswalks.

- Confine city/county public works activities near residential areas to daytime hours (7 a.m. to 7 p.m.) except in emergencies.

- Specify hours of operation and/or decibel limits in garbage collection and public works projects contracts.

- Design new public works equipment such as pumps, wells, lift stations, etc. to minimize noise impacts on neighboring noise sensitive uses.

STOCKTON AIRPORT/AIRPORT LAND USE COMMISSION:

- Have an alternate set of future airport contours prepared assuming higher training flight levels, as recommend by the Airport Master Plan Consultant.

COG:

- Conduct workshops for building/planning personnel on Ldn noise contour preparation, and enforcement of building Noise Insulation Standards.

- Prepare present and future Ldn contours for all public access airports in San Joaquin County.

- Keep an ongoing record of all noise complaints received.

- Work with the State Office of Noise Control and/or lobby for State noise standards specifically applicable to hospitals, convalescent hospitals, rest homes, and schools.

LAW ENFORCEMENT DEPARTMENTS:

- Increase selective enforcement of State vehicle noise control laws, coupled with media publicity.

GOVERNMENT BUILDINGS DEPARTMENTS:

- Design city and county buildings to provide comfortable working environments regarding noise using the design sound levels for various uses listed in Figure 1.

LOCAL HEALTH DISTRICT:

- In coordination with the Council of Governments, the County and the cities, prepare and adopt a Countywide Noise Ordinance.

- Enforce a Countywide Noise Ordinance.

SECTION III - *DESCRIPTION OF COMMUNITY NOISE ENVIRONMENTS*

INTRODUCTION

One of the basic purposes of the Noise Element is to identify existing noise problem areas and high noise sources. This section identifies noise sources and noise sensitive uses by community with a series of maps. It describes average community noise levels. Through an estimate of the 1975 population residing within the various noise level contours, it assesses the relative importance of major sources of noise affecting a community. Finally, it discusses community noise problems as perceived by the population in response to a community noise survey. From these sources, analyses of noise problems and specific recommendations in each community are made.

Before describing each community, however, the noise surveys and the noise contours common to all communities are discussed. The surveys are two countywide noise surveys undertaken in late 1973. The noise contours delineate common high noise impact areas.

COUNTYWIDE NOISE SURVEYS

A countywide "ambient" or "background" noise level survey was first conducted. Background noise levels are important since the intrusiveness of a specific noise source is typically related to background levels. A 42dBA noise might blend into the background noise in a city but sound relatively loud in a rural area. As background levels drop off at night, noises become more noticeable and thus disturbing. For this reason, most comprehensive noise ordinances are based on measured background noise levels.

Day and night background noise levels were measured at 165 residential sites and many commercial and industrial sites throughout the County. Although the noise levels at each site were measured for an hour or less during a supposed typical day and night, and could vary with more extensive monitoring, the range of levels was not wide between similar residential areas.

Background noise levels in residential neighborhoods in San Joaquin County are usually a function of traffic noise, except for isolated instances where industry or transformer noise sets a high steady background level. Thus, neighborhoods closest to high volume freeways tend to have the highest levels; larger urban areas with many traffic arteries, the next highest levels; small urban centers with only one or two major roads, lower levels; and country areas, the lowest levels.

Background levels in residential neighborhoods near freeways in San Joaquin County centered around 44-47 decibels. In the incorporated cities, background levels, on the average, were 40-45dB(A), with fringe areas tending to have the lower levels. Small unincorporated urban centers away from freeways usually had background levels from 34-37dBA. County background levels ranged between 29-37dBA.

In commercial and industrial areas, background levels were higher, due to high traffic volumes from nearby major roads, parking lot activity, industrial blowers, fans, and heavy equipment. The daytime average background levels for commercial areas, 56dBA, and industrial areas, 55dBA, are not atypical for such land uses throughout the state. At night, around commercial uses which had closed, the average background levels dropped to 45dBA, only slightly higher than many residential areas. Industrial levels remained higher, 50 dBA.

From these readings, preliminary "equal noisiness zones" have been established for the entire County. The residential noise zones describe areas of similar noise levels through the County.

> Residential Noise Zone 1 describes rural residential areas away from major noise sources;
>
> Residential Noise Zone 2 encompasses quieter residential areas in the County's cities and some unincorporated communities;
>
> Residential Noise Zone 3 describes average urban residential areas; and
>
> Residential Noise Zone 4 includes residential areas within 800 feet of the County's major freeways (99, 580, 205 and part of 5), 300 feet of other freeways, and near some heavy industrial areas.

Equal noisiness zones are of primary use in the establishment and application of comprehensive community noise ordinances. The equal noisiness zones are mapped in Appendix B. The proposed noise ordinance, which includes these zones, is also included in that Appendix.

The second survey conducted by COG was a newspaper noise survey which ran in all County newspapers of general circulation. The survey attempted to identify a community's perceived noise problems. Over 300 persons clipped out and returned the questionnaire. About a third came from Stockton, a third from Lodi, and a third from the rest of the County.

Results were interesting. While complaints did come in about highways, freeways, railroads, and other specific noise sources, usually from persons living in very high noise contour areas,

the majority of complaints were about what people perceive to be unnecessary noise: motorcycles, speeding autos, cars with modified mufflers, barking dogs, and neighbors.

Thus, there are two types of noise "problems." One is planning-related such as the building of homes next to major transportation facilities or industries. The other noise problem is non-site specific and widespread.

NOISE CONTOURS AND POPULATION IMPACTED BY NOISE CONTOURS

The noise contours used throughout the County were calculated by the Day-Night Average Level (Ldn) method published by the State Office of Noise Control. The contour distances are listed and the methodology is described in more detail in Appendix A. The contours have also been mapped at a 1"=400' scale. The City and County Planning Departments have copies of these maps. An example is shown on page 19.

Basically, Ldn's are average noise levels during a 24-hour day obtained after an addition of 10dB to sound levels occurring at night between 10 p.m. and 7 a.m. The daily levels of noise exposure are then averaged on an annual basis. Ldn's are approximately equal to CNELs or "Community Noise Equivalent Levels" used in some State legislation.

Ldn's for roads are calculated based on Annual Daily Traffic volumes, percentage of day/night traffic, truck percentages, and traffic speed. Ldn's for railroad operations are based on an annual average of numbers of trains per day and per night over a 24-hour period. Railroad switchyard Ldn's are more complicated but data input includes hours and location of switching activities, location of engine pooling areas or refrigerator car storage areas, etc.

The noise contours are broken down into 5dB "steps" from 60 to 80 decibels for determination of land use compatibility. The State Office of Noise Control "Land Use Compatibility Chart for Community Noise Environments," page 61, describes noise contour levels within which various land uses are "acceptable;" "conditionally acceptable" if minor sound reduction measures are incorporated into the building or site design; "normally unacceptable" unless moderate to major sound reduction features are undertaken, and "clearly unacceptable."

For residential uses, these categories generally correspond to the following Ldn levels:

Less than 60dB = Acceptable
60-69dB = Conditionally Acceptable
70-74dB = Normally Unacceptable
75dB or greater = Clearly Unacceptable

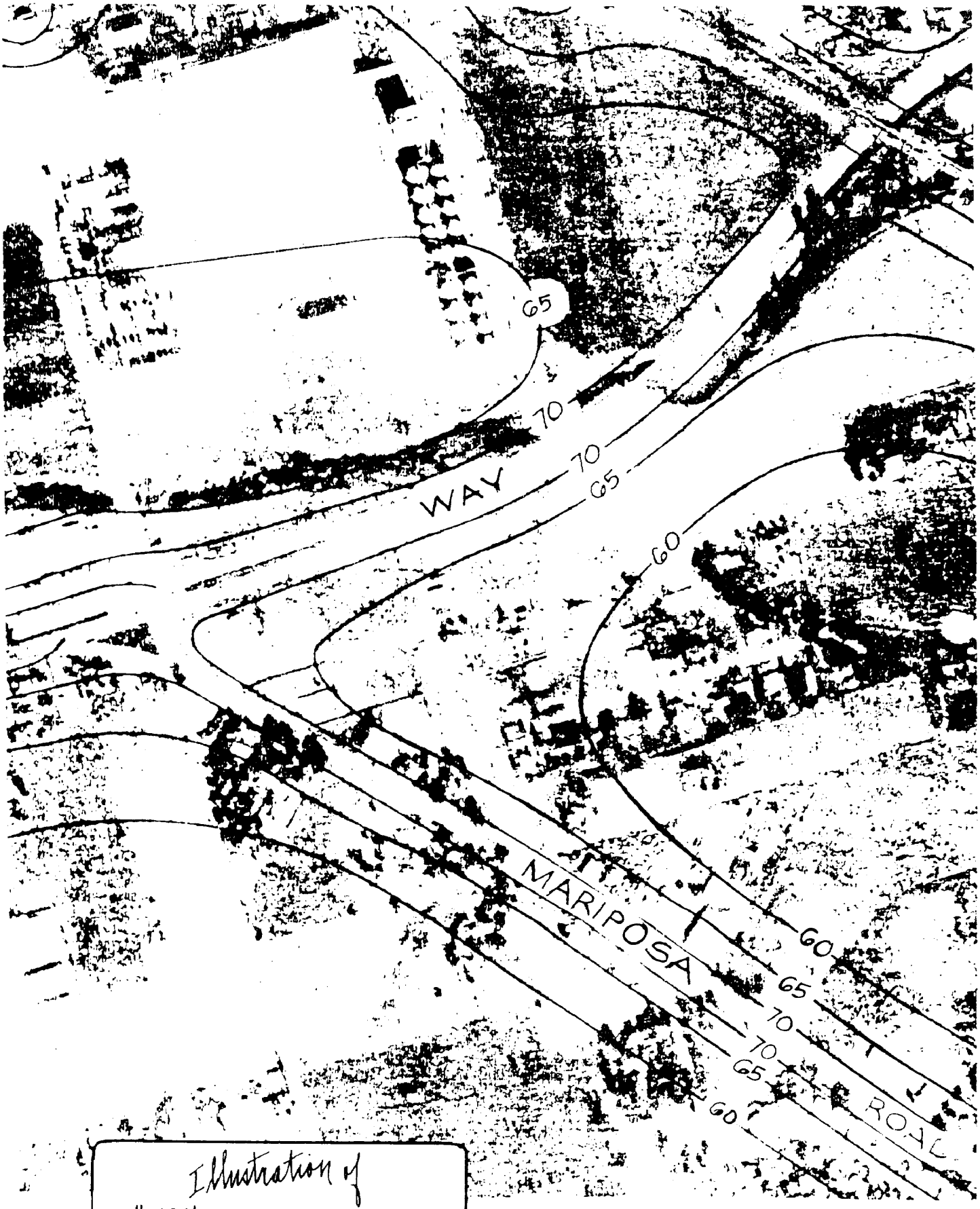
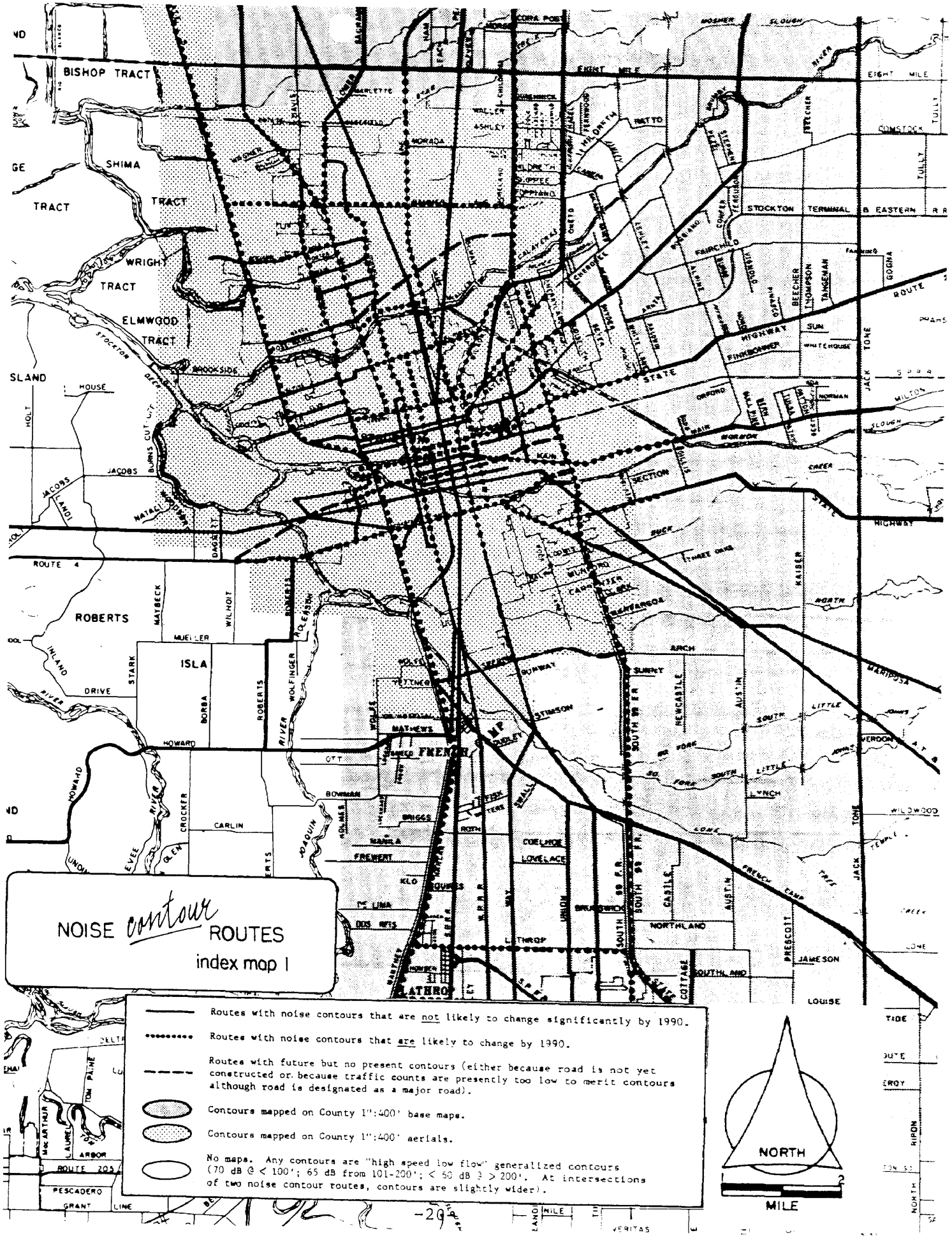
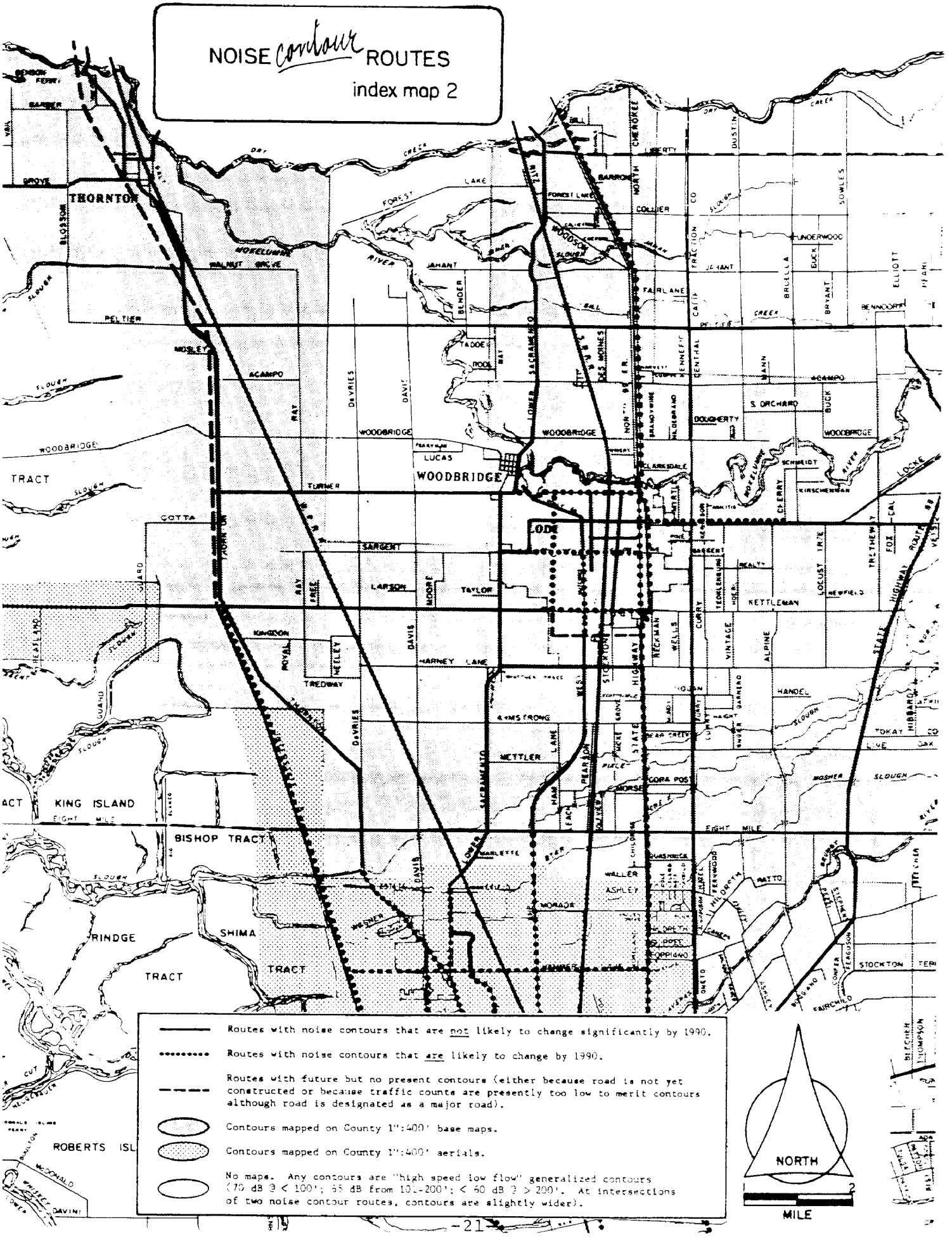
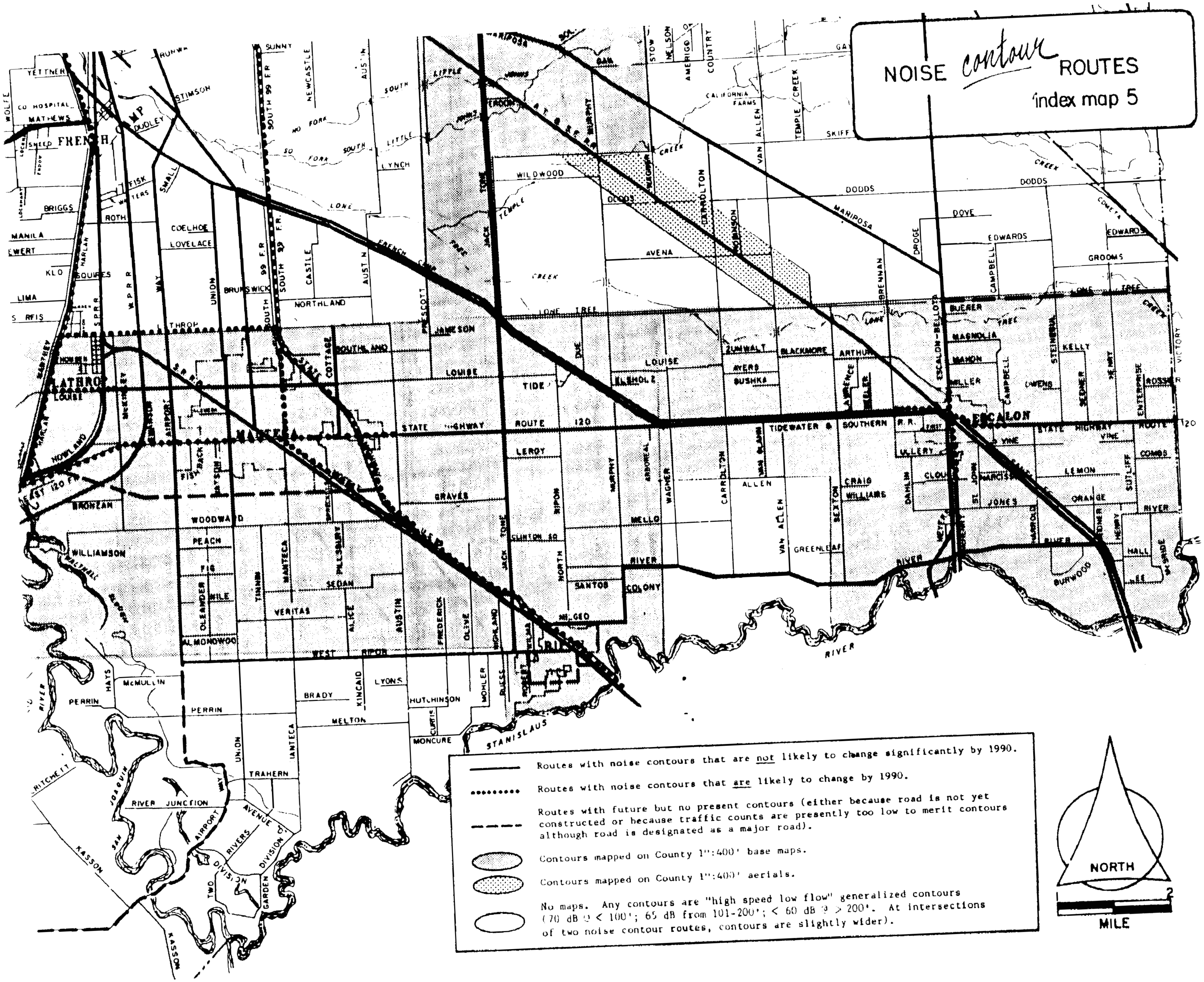
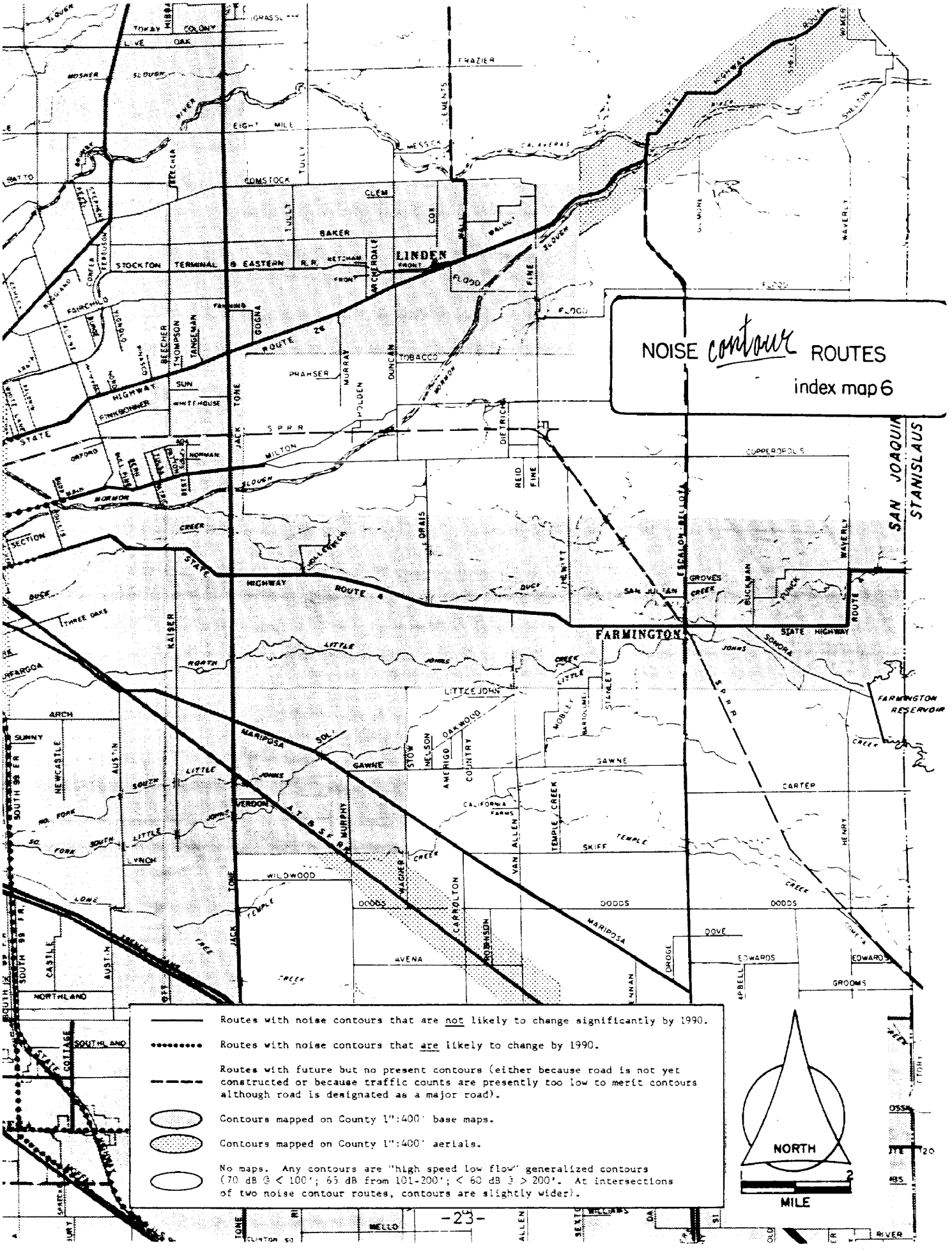


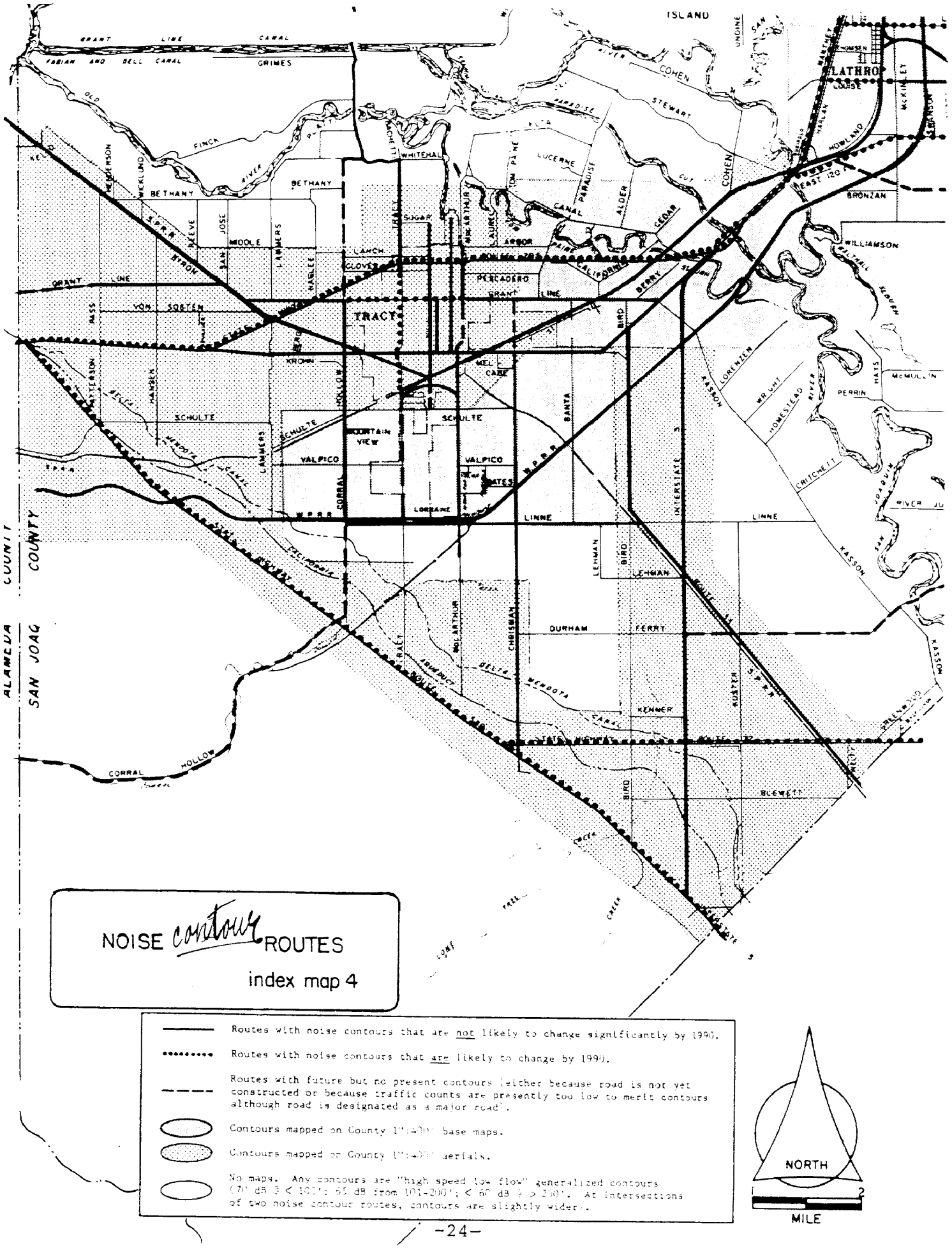
Illustration of
1": 400' NOISE CONTOUR MAP


BISHOP TRACT
SHIMA TRACT
WRIGHT TRACT
ELMWOOD TRACT
ROBERTS ISLA
NOISE contour ROUTES
index map 1
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB 3 > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
MILE


NOISE contour ROUTES
index map 2
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB @ > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
1
2
MILE
THORNTON
WOODBRIDGE
LODI
KETTLEMAN
KING ISLAND
BISHOP TRACT
ROBERTS ISL
TRACT
STOCKTON


NOISE contour ROUTES
index map 5
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB @ > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
MILE
FRENCH CAMP
LATHROP
MANTECA
ESCALON
RIPON
STATE HIGHWAY ROUTE 120
TIDEWATER & SOUTHERN R.R.
ESCALON-BELLOTA
MARIPOSA
JACK TONE
LONE TREE
FRENCH CAMP
SOUTH 99 F.R.
STANISLAUS
SAN JOAQUIN
RIVER


NOISE contour ROUTES
index map 6
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB @ > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
MILE
FARMINGTON
LINDEN
STOCKTON TERMINAL & EASTERN R.R.
COMSTOCK
BAKER
PHARSER
TOBACCO
MILTON
FRAZIER
EIGHT MILE
LITTLE JOHNS
SAN JOAQUIN
STANISLAUS
FARMINGTON RESERVOIR
CARTER
SKIFF
DODDS
GAWNE
MARIPOSA
WILDWOOD
AVENA
GROOMS
EDWARDS
DOVE
NORTHLAND
SOUTHLAND
-23-



NOISE *contours* ROUTES

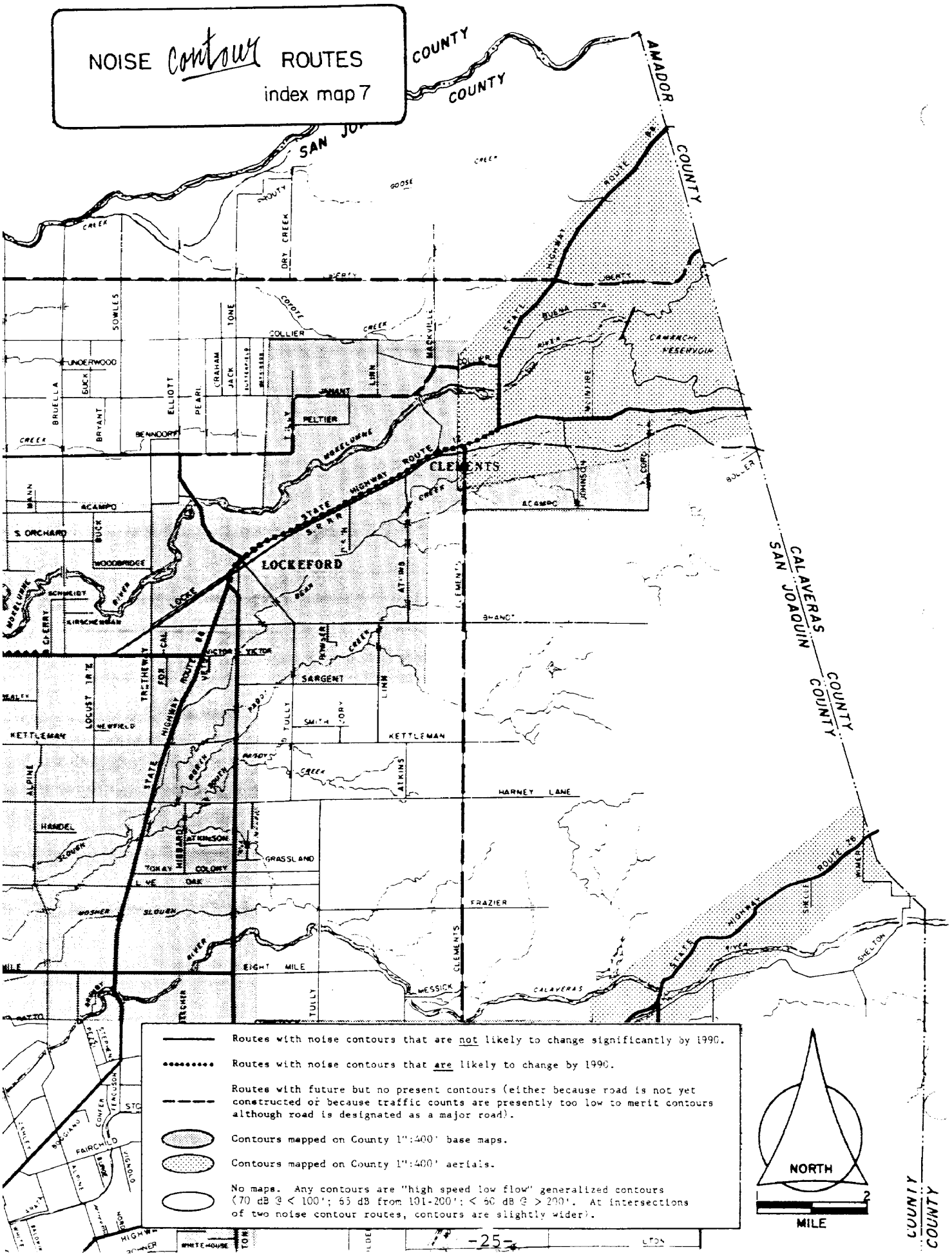
index map 4

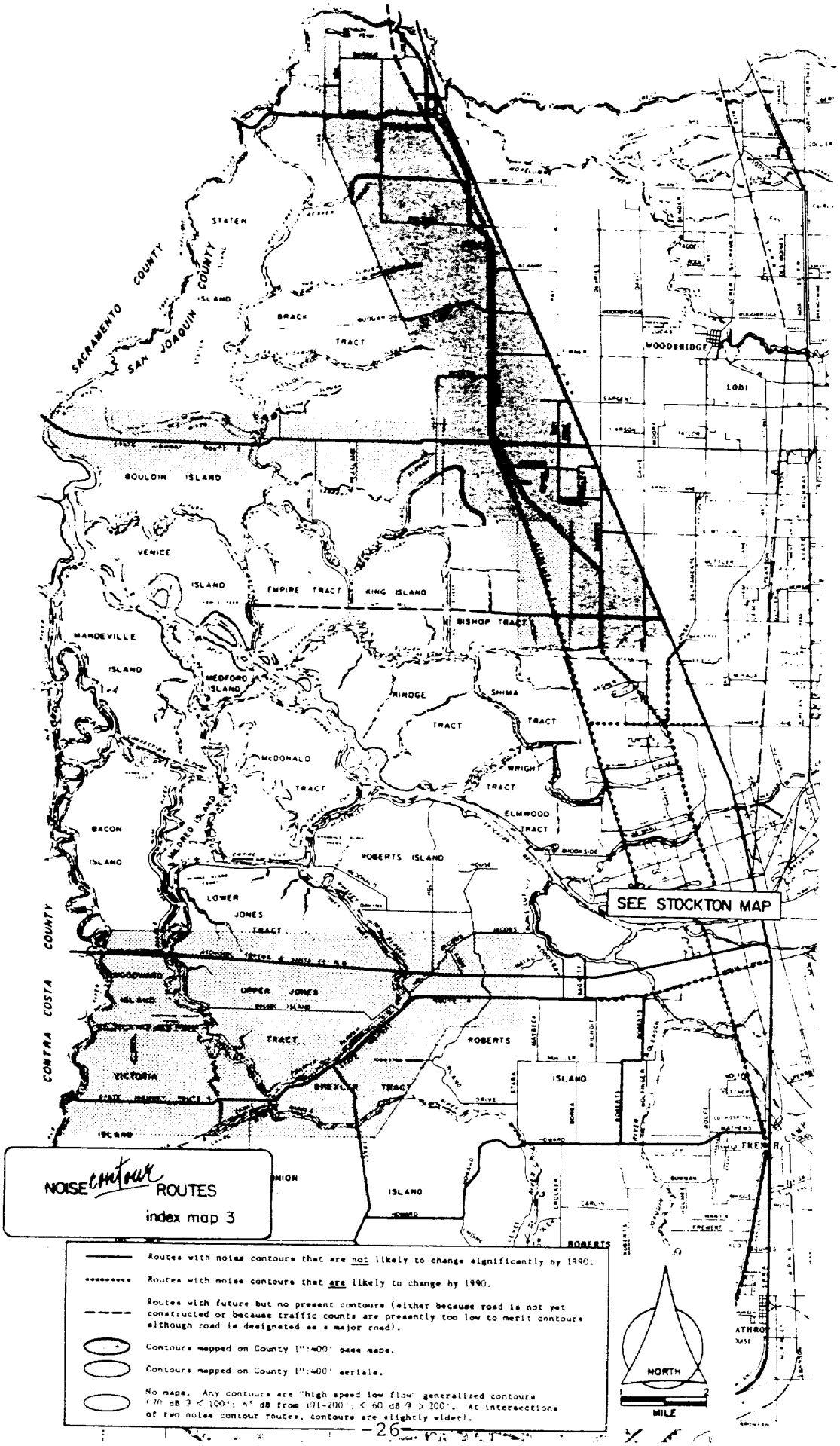
- Routes with noise contours that are not likely to change significantly by 1990.
- Routes with noise contours that are likely to change by 1990.
- Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
- Contours mapped on County 1"=400' base maps.
- Contours mapped on County 1"=400' aerials.
- No maps. Any contours are "high speed low flow" generalized contours (70 dB 3 < 100'; 65 dB from 101-200'; < 60 dB > 200'. At intersections of two noise contour routes, contours are slightly wider.

NORTH

1 2

MILE


NOISE Contours ROUTES
index map 7
AMADOR COUNTY
SAN JOAQUIN COUNTY
CALAVERAS COUNTY
LOCKEFORD
CLEMENTS
LINDEN
KETTLEMAN
HARNEY LANE
FRAZIER
EIGHT MILE
GRASSLAND
SARGENT
COLLIER
PELTIER
BENNDORF
WOODBRIDGE
S. ORCHARD
ACAMPO
WOODBRIDGE
WESSICK
SHELTON
WHITE HOUSE
FAIRCHILD
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB @ > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
MILE


NOISE contour ROUTES
index map 3
SEE STOCKTON MAP
Routes with noise contours that are not likely to change significantly by 1990.
Routes with noise contours that are likely to change by 1990.
Routes with future but no present contours (either because road is not yet constructed or because traffic counts are presently too low to merit contours although road is designated as a major road).
Contours mapped on County 1":400' base maps.
Contours mapped on County 1":400' aerials.
No maps. Any contours are "high speed low flow" generalized contours (70 dB @ < 100'; 65 dB from 101-200'; < 60 dB @ > 200'. At intersections of two noise contour routes, contours are slightly wider).
NORTH
MILE
SACRAMENTO COUNTY
SAN JOAQUIN COUNTY
CONTRA COSTA COUNTY
STATEN ISLAND
BRACK TRACT
WOODBRIDGE
LODI
BOULDIN ISLAND
VENICE ISLAND
EMPIRE TRACT
KING ISLAND
BISHOP TRACT
MANDEVILLE ISLAND
MEDFORD ISLAND
TRACT
McDONALD TRACT
WRIGHT TRACT
ELMWOOD TRACT
BACON ISLAND
ROBERTS ISLAND
LOWER JONES TRACT
UPPER JONES TRACT
VICTORIA ISLAND
BRENTWOOD
ROBERTS ISLAND
FRESNO

These categories correspond to State building Noise Insulation Standards. The only exception to these standards is around airport areas. Here, because of the difficulty in insulating buildings from airport noise, because outside yard areas cannot be shielded, and because airport noise is characterized by extremely high noise levels followed by periods of quite (and thus tends to be more bothersome than steady noise), Airport Noise Standards are more restrictive. New homes are prohibited within Ldn contours of 65dB or greater around airports.

The Ldn contours and State standards are the basis for many recommendations contained in this Section and Section IV.

CHART 5
STATE NOISE INSULATION REGULATIONS
APPLICABLE TO ALL CITIES AND COUNTIES

California Airport Noise Standards
Effective November 28, 1970
California Administrative Code
Title 4, Subchapter 6, Article 1, Section 5000

Content: Establishes method for predicting and monitoring noise exposure around state permit airports. Sets a numerical limit on the CNEL scale (approximately equal to the Ldn scale) above which the noise environment is not suited for residential use (CNEL or Ldn = 65dB). Requires measurement of noise levels around airports which have a noise problem. Requires reduction of noise at airports or sound insulation of existing residential dwellings and schools near airports so that the CNEL or Ldn = 65dB contour does not impact such uses by January 1, 1986.

California Noise Insulation Standards
Effective August 22, 1974
California Administrative Code
Title 25, Chapter 1, Subchapter 1, Article 4, Section 1092

Content: Sets minimum interior noise standards for sound insulation from exterior sources in high noise areas, and between units in all multi-unit dwellings and hotels and motels. Requires developers to submit an acoustical analysis report on projects proposed within CNEL or Ldn contours of 60 decibels or greater. The report, prepared under the supervision of an acoustical technician, shall include maps of the noise source(s) and project site, predicted noise levels, noise attenuation measures to be applied, and an analysis of their effectiveness.

The mapped contours are existing contours. Future 1995 contours were prepared only for airports and state highways and freeways. Future contours were not prepared for other sources because it was felt the limited data base available would be too unreliable to project accurate contours for specific areas.

The index maps on the following pages identify all roads and railroads with existing noise contours. The road segments marked ——— on the maps are not likely to have changed contours by 1990. Other mapped roads are likely to have changed contours. It is recommended that along the latter roads, specific future contours be used where already available, or be prepared where not available and used as the basis for building insulation requirements. Care must be taken to combine the contours with those of adjacent or intersecting roads and railroads. This can be done as part of a project's EIR or acoustical report. Major changes in railroad operations would also necessitate new contour preparation; no major changes were foreseen by railroad companies at the time of contour preparation.

The mapped noise contours which accompany the Noise Element do not show shielding effects as this would be virtually impossible to do. To estimate sound reductions obtained from buildings, barrier walls, and the minimal effects of plantings, see the Building and Site Design section, page 68.

The table on the following page summarizes the estimated population residing within various noise contours of different sources. These results are discussed individually by city and county.

COMMUNITY NOISE ENVIRONMENT DESCRIPTIONS

- STOCKTON

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29, for Summary)

In terms of numbers of persons affected and in terms of severity of noise impacts, railroads, and State Route 99 are the most important noise sources affecting the Stockton area. Approximately 330 persons live within 75dB Ldn contours of railroad lines in Stockton. That is, they live within 100 feet of Santa Fe's main line or 150' of Southern Pacific's main rail line. Another 225 persons live within 75dB Ldn's of Route 99. Other than switchyards, no other noise sources create levels of this magnitude.

The State Office of Noise Control Land Use Compatibility Chart (page 61) lists areas within 75dB Ldn contours as clearly unacceptable for residential development and would prohibit

TABLE 1

ESTIMATED POPULATION IMPACTED BY NOISE SOURCE: 1975

	LDN LEVEL					
Noise Source	60-64dB	65-69dB	70-74dB	75-79dB	Total all Levels	% Pop. Impacted
STOCKTON GENERAL PLAN AREA						
Railroads	4,573	4,217	2,005	338	11,133	
Rte. 99	1,637	1,028	508	227	3,400	
Interstate 5	1,878	1,102	33	0	3,013	
All Other Major Highways, Roads, and Streets	4,475	16,472	962	4	21,913	
Total all Sources	12,563	22,819	3,508	569	39,459	÷176,137= 22.4%
CITY OF LODI						
SPRR	1,911	1,690	751	180	4,522	
Rte. 99	545	415	293	246	1,499	
Rt. 12	309	341	236	0	898	
All Other Major Streets	509	3,157	204	0	3,870	
Total all Sources	3,274	5,603	1,484	413	10,774	÷ 32,065= 33.6%
CITY OF TRACY						
SPRR	672	170	3		845	
Eleventh Street	407	64			471	
I- 205	67	64			131	
All Other Major Streets	0	1,086	76		1,162	
Total all Sources	1,146	1,384	79		2,609	÷ 16,055= 16.3%
CITY OF MANTECA						
Railroads	1,066	936	336	60	2,398	
Rte. 99	847	362	113	267	1,589	
Rt. 120		324	0	0	811	
All Other Major Streets		887	126		1,013	
Total all Sources	2,400	2,509	575	327	5,811	÷ 17,489= 33.2%
CITY OF ESCALON						
SFRR & Main St.	210	302	186	18	716	
120 and TSRR	66	0	0	0	66	
All other Major Roads and RR's	78	147	3	0	228	
Total all Sources	354	449	189	18	1,010	÷ 2,336= 43.2%
CITY OF RIPON						
Rte. 99 & SPRR	395	244	107	0	746	
All Other Major Streets	29	123	3	0	155	
Total all Sources	424	367	110	0	901	÷ 2,891= 31.2%
UNINCORPORATED COUNTY AREA OUTSIDE STOCKTON GENERAL PLAN AREA						
Railroads	603	303	126	6	1,038	
Rte.99	360	318	384	144	1,206	
I-5	75	81	54		210	
Other State Routes	150	969	606		1,725	
Major County Roads	0	1,749	1,278	0	3,027	
Major Rds. & RR Where Parallel	135	150	222		507	
Total all Sources	1,323	3,570	2,670	150	7,713	÷ 52,858= 14.6%
TOTAL ALL SOURCES	21,484	36,701	8,615	1,477	68,277	÷299,831= 22.8%

new development within this contour band, unless effective exterior shielding of the noise source can be provided. Shielding is generally possible for at grade freeways, but is very difficult for railroad lines or switchyards since locomotives are 16 feet high and railroad tracks tend to be elevated. In addition, peak noise levels from trains are much higher than trucks and even proper shielding will not reduce peak noise levels enough to eliminate severe disturbance.

Stockton's General Plan shows two areas for future residential development within this contour. One is a triangular area surrounded by Mariposa Road, Route 99, and Charter Way. Santa Fe Railroad bisects the area. High noise levels from all of these sources would render part of this area unacceptable for residential development. The second area is north of the Calaveras River and west of the Southern Pacific Railroad. The eastern 150 feet of this entire strip would be unacceptable for residential development due to high noise levels.

The next most severe noise contour is a Ldn of 70-74dB. Within this contour, State Noise Insulation Standards require sound insulation of multiple family buildings or shielding from barriers to bring interior sounds to acceptable levels. Yard areas should be shielded if they are to be useful. Railroads are by far the largest generator of sound levels this high. More than 2000 persons in the Stockton General Plan area are presently impacted to this degree along the Southern Pacific, Santa Fe, and Western Pacific tracks. Additional development is planned along SP and WP tracks because of other qualities this land has for development purposes. Sound insulation of buildings will be necessary.

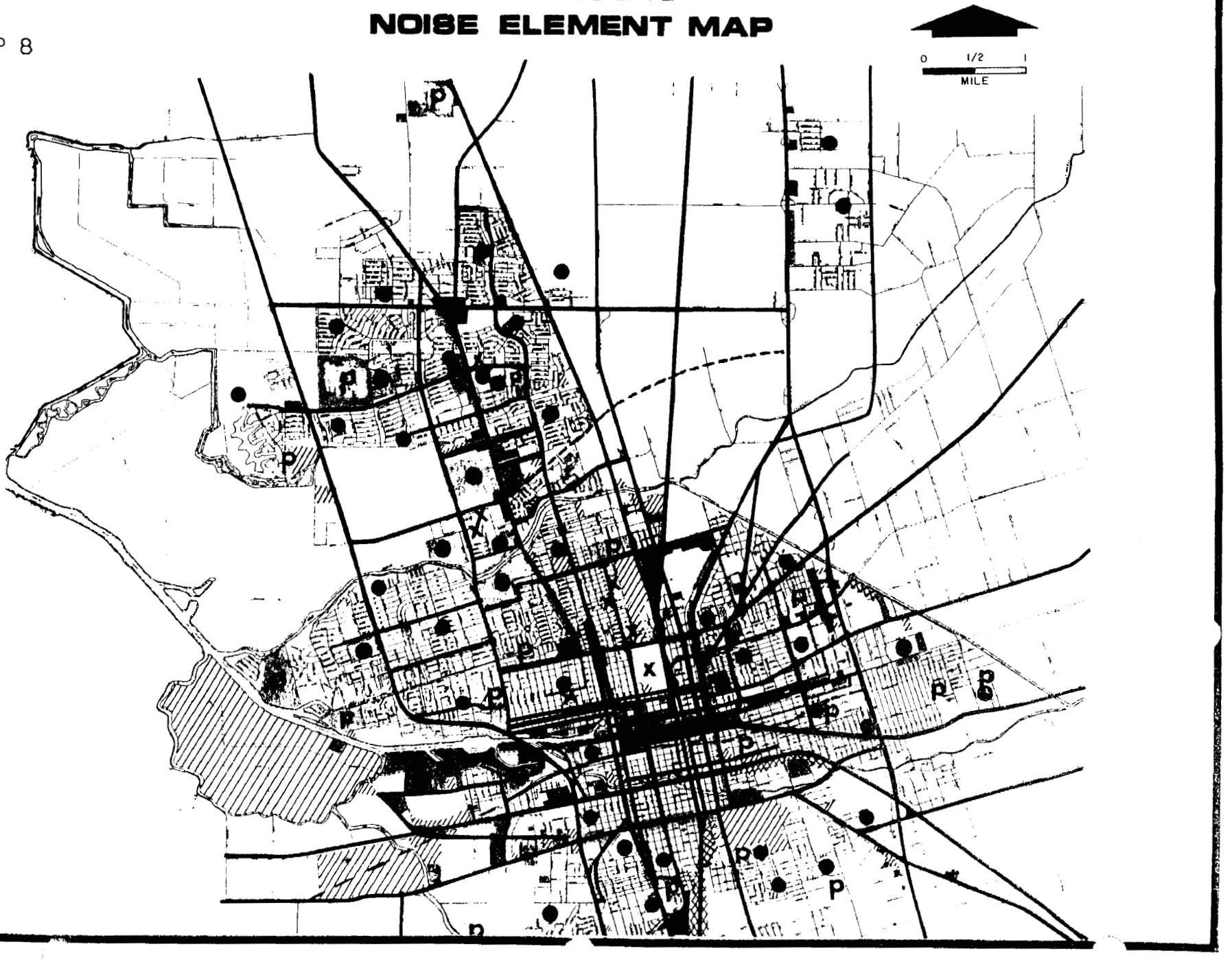
State Route 99 and several either very heavily travelled or high speed roads (Charter Way, I-5, the Crosstown Freeway, and parts of Center, El Dorado, Fremont, Fresno, Hammer, Harding, Lower Sacramento, Main, March Lane, Mariposa, Miner, Pacific, Pershing, Thornton, West Lane/Airport Way, and Wilson Way) impact another 1500 persons within a 70-74dB Ldn contour.

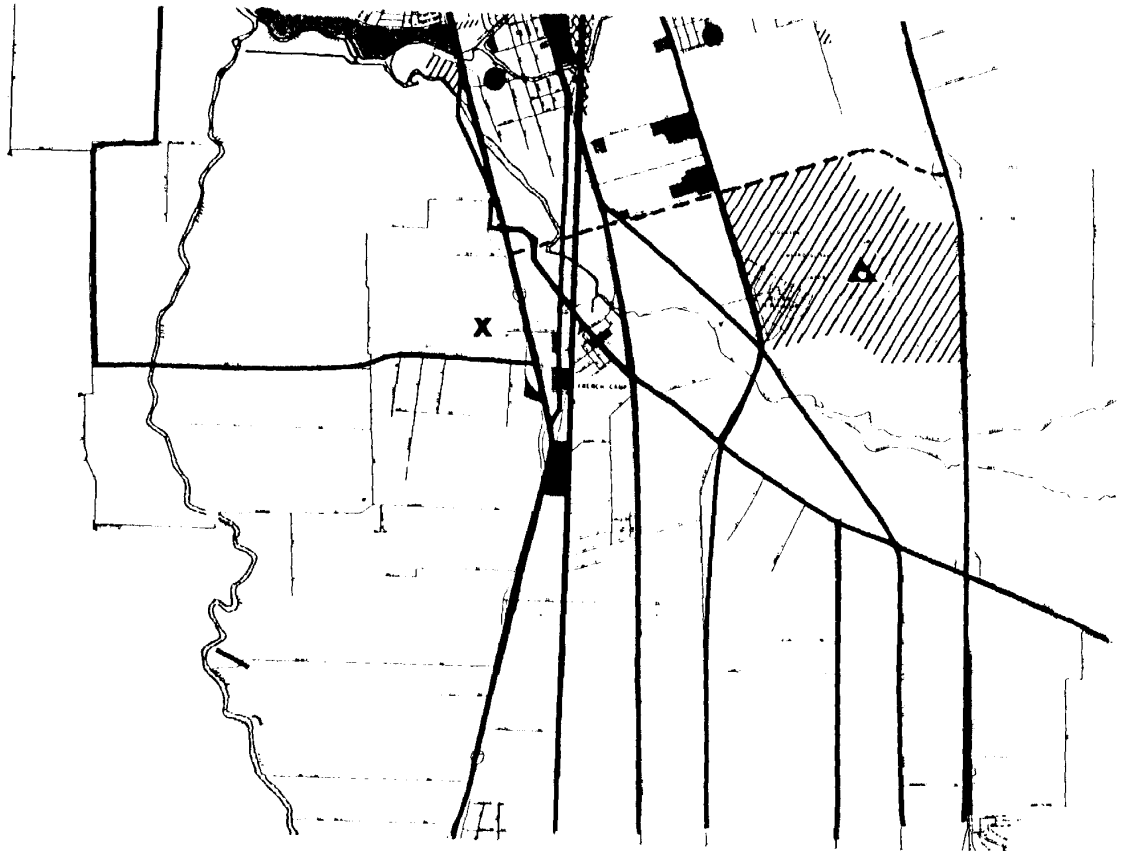
It is possible that along northern portions of Thornton, Lower Sacramento, and West Lanes, as development occurs and speeds decrease, the 70dB contours may shrink somewhat but this should be offset in the future by higher traffic volumes. Contours for all other roads, particularly I-5, are expected to increase in the future. Except for the freeways and other high speed roads, however, the 70dB contours will not generally extend past the first row of homes.

60-64 and 65-69dB Ldn contours are moderate to major noise impact areas. Normal residential construction with forced air ventilation will suffice within these contours to provide

STOCKTON
NOISE ELEMENT MAP

MAP 8





RESIDENTIAL
COMMERCIAL
INDUSTRIAL
SCHOOLS / LIBRARIES
HOSPITALS / CONVAL. & REST HOMES
PARKS / RECREATION
OTHER NON-RESIDENTIAL STRUCTURES
SWITCHYARDS
AIRPORTS - PUBLIC ACCESS
NOISE CONTOUR ROUTE
FUTURE NOISE CONTOUR ROUTES

MAP 8 (con't.)

acceptable interior environments according to State standards. Whether annoyance or sleep interference will occur, however, will depend in part on whether bedrooms are situated toward the street or at the back of the house. Also, careful attention to construction details so that windows and doors fit tightly, and no cracks exist for sound to leak through is necessary to insure that the house achieves its full insulation potential. Shielding of yard areas is recommended in all areas where exterior sound levels exceed an Ldn of 65dB.

Thirty-five thousand persons presently live within 60 or 65dB contours. These include residents living adjacent to many major streets (Oak, Park, Benjamin Holt, Swain, Alpine, Filbert, etc.); back a row or two from very busy roads such as Harding, Miner, Pacific, etc., or even further back from railroads, railroad switchyards, and freeways. In the latter group, estimates of actual populations impacted is difficult because the contours do not take shielding by buildings into account. Still, where I-5 or the railroads are elevated, shielding is not effective and the contours should be fairly accurate.

Obviously, future residential areas cannot be so isolated from noise sources that sound levels will always be less than 60dB. They can, however, be designed, constructed, and often shielded to eliminate potential annoyance from noise.

The Stockton Metropolitan Airport presently impacts only one residence within a 60-65dB Ldn contour. Maintaining this situation in the future depends upon whether airport operations grow at the rate assumed in the Airport Master Plan. If air cargo flights become a reality, or training flights increase significantly once Stockton Airport installs radar, the contours may encompass some planned residential areas (notably an undeveloped area east of Airport Way and north of Little Johns Creek). The General Plan would then need to be amended, since State Airport Noise Standards are clear that no homes may be impacted by Airport Ldn contours of 65dB or greater by the end of 1985.

Industrial noise contours for planning purposes have not yet been prepared. However, industries adjacent to planned residential areas which might create high noise levels have been identified by the Stockton Planning Department. Noise Impact Study Areas have been placed around these industries on noise contour maps. Before or at the time residential development within such areas is proposed, noise contours for these industries will be prepared. The city will also continue to identify potential industrial noise generators near developing residential areas for noise contour preparation.

Perceived Noise Problems from COG Noise Survey

Perceived noise problems in Stockton, according to the 1973 COG Survey, were in part land use related and in part not. Residents living near WPRR tracks, ST&E tracks, and the Santa Fe switch-yard complained of train noise. Complaints were also received from residents living near freeways and along major roads.

A small number of commercial and industrial uses near residential areas generated complaints due to pre-dawn delivery of garbage trucks, parking lot sweepers, truck traffic, amplified intercom systems, or plant noise itself.

In some of these cases, the residential and industrial uses should never have been allowed to develop so close. Other problems, however, are design-oriented and could have been eliminated in the initial construction of the homes or commercial/industrial/transportation use. In these cases, design compromises can still sometimes be worked out to alleviate existing problems. An adopted noise control ordinance provides a vehicle for objectively evaluating a noise problem situation.

It is the responsibility of the planning department to review new commercial and industrial construction for possible noise impacts and to explore mitigation measures. Figure 3 in Section IV lists suggested noise impact considerations for new commercial/industrial projects. Figure 2 describes some building and design techniques for noise reduction. Other mitigation measures are described in the 1974 COG Noise Element.

Stockton was similar to the rest of the County in that its major perceived noise problems were non-land use related. Fifty-six percent (56%) of people complained about motorcycles. Motorcycles were singled out because they are loud to start with and many have modified mufflers which create even higher sound levels. Motorcycles were also singled out because many regard tham as unnecessary noise. (They are unnecessary in an economic sense. Ninety percent (90%) are used for pleasure purposes only.) Also, many persons operate them in an unnecessarily noise manner.

Seventy-one percent (71%) of the respondents to the COG noise survey complained about vehicular noise other than motorcycles. Of this percentage, nearly half specified speeding cars, or cars with modified mufflers as causing the problem. Again, it is unnecessary or excessive noise to which people most object. (Noise from cars increases as speed increases.) Speeding cars also elicit complaints because of fears of safety.

The number and severity of complaints regarding motorcycles and excessively noisy or speeding cars indicates this is a problem of some importance in the Stockton area. It is one that can be dealt with under existing legislation if adequate

personnel and equipment are provided to police for on-street enforcement. In response to citizen complaints about off-road motorcycle riding along levees, etc., the Stockton City Council in 1975 adopted an ordinance restricting motorcycle use to city streets or on a resident's own property. It is enforced by trained motorcycle patrolmen.

Barking dog complaints were numerous and scattered throughout the city. Most problems with barking dogs occur at night when people are trying to sleep. In 1976, Stockton revised its "barking dog" ordinance so that "any person" disturbed by "continuous and incessant" barking can obtain relief. This ordinance will facilitate resolution of barking dog problems.

"Neighbor" complaints were also important in Stockton and involved unsupervised children or neighbors playing music too loudly, or warming up cars in winter. Most of these complaints could be eliminated with greater consideration on the part of the noisemakers, but noise ordinances can also be used as a tool to alleviate this type of problem.

Many of the "neighbor" complaints were from apartment dwellers, where problems stem from inadequate insulation between units. A 1973 state law responding to this situation is in effect providing minimum standards for between-unit insulation in new multi-family structures. It is enforced by local building departments.

In summary, planning and careful design and construction can eliminate most noise problems in Stockton's developing areas. Since major railroad lines and freeways create such severe noise impacts, particular care must be taken to insure homes are adequately protected near these sources or located further away from them. Where noise problems exist, a noise ordinance provides a useful tool to identify the severity of the noise problem situation and to work out compromises.

Special Problems

1. Schools: In 1973, 16 schools in Stockton were affected by high noise levels from nearby streets. In the past 5 years, 5 schools have been reconstructed and the new classrooms have been relocated, insulated, and/or air conditioned to eliminate noise disturbance. These schools include some of those most severely affected. Still, the following schools receive noise levels which will interfere with speech (and learning). Peak levels above 60dBA can be considered severe. If air conditioning were provided in affected classrooms, the worst problems could be eliminated.

CHART 6

NOISE LEVELS IN VARIOUS SCHOOLS IN STOCKTON

ESTIMATED TRUCK PEAK NOISE LEVELS (± 6dBA) FROM MAJOR ROAD

School	Number Classrooms Affected	dBA Level Outside Affected Classrooms	dBA Level Inside Classrooms With Windows Open	dBA Level Inside Classrooms With Windows Closed	Major Road Affecting
Apostolic	4	76	66	56	Cherokee
Edison	9	79	69	59	Center
	4	75-81	65-71	55-61	Charter
Harrison	2	74	64	54	Alpine
Oakhurst	2	70	60	50	I-5
St. Gertrude's	1 and Library	81-82	71-72	61-62	Main*
San Joaquin	4	82	72	62	Park
Webster		65-67	55-57	45-47	I-5

*St. Gertrude's is also affected by cannery noise in season.

2. Hospitals, Convalescent Hospitals and Rest Homes: In Stockton 5 rest homes were located within 60 dB Ldn contours; 7 within 65dB Ldn contours and 1 within a 70dB Ldn contour. Hospitals and convalescent hospitals tend to be located along major roads, thus many of these were also affected by noise. State licensing and construction standards governing hospitals, convalescent hospitals, and rest homes do not presently include noise criteria. Due to a lack of State standards, local actions described on page71 should be considered by the city. The sick and the elderly are far more susceptible to noise disturbance than the general population.

Community Background Noise Levels

For noise ordinance enactment, background noise levels were surveyed to determine "equal noisiness zones." Due to the pervasiveness of traffic noise and the number of major streets, background noise levels in Stockton are primarily in Noise Zone 3, that is, "urban area" levels. Along freeway corridors and near the Port of Stockton, residential levels are even higher and a higher background noise zone would be more appropriate (Zone 4). The northwest part of Stockton in 1973 had lower noise levels than the rest of the city, but this situation may change as the area develops and as I-5 is completed. Another small area north of Harding, east of Pershing, south of the Calaveras River, and west of the San Joaquin Cemetary also had quieter background sound levels once away from the major streets. These 2 areas better fit Noise Zone 2, "suburban" levels.

• TRACY

General

Tracy, thus far, is a relatively quiet community compared to other cities in San Joaquin County. Major freeways have by-passed it, although residential development needing sound reduction features is beginning to occur in North Tracy adjacent to I-205. The main Southern Pacific Railroad switchyard is outside the city in an industrial area and affects very few residents. A large "rim and rail" facility is located in town, but it elicited no COG noise survey complaints. An industrial corridor adjacent to residential development on the east side of town also brought no complaints, but the proximity to residential development would favor performance standards or at least careful consideration and mitigation of noise impacts for new industry locating in this area (refer to Figure 3 for commercial/industrial noise impact considerations, page 75).

Three schools in Tracy (9 classrooms) are affected by major roads. Noise levels from passing trucks would be disturbing with windows open; with windows closed, peak levels are in the 50's, high enough to cause some speech interference, but not high enough, according to Office of Noise Control personnel, to disrupt classrooms severely.

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29, for Comparison with Other Cities

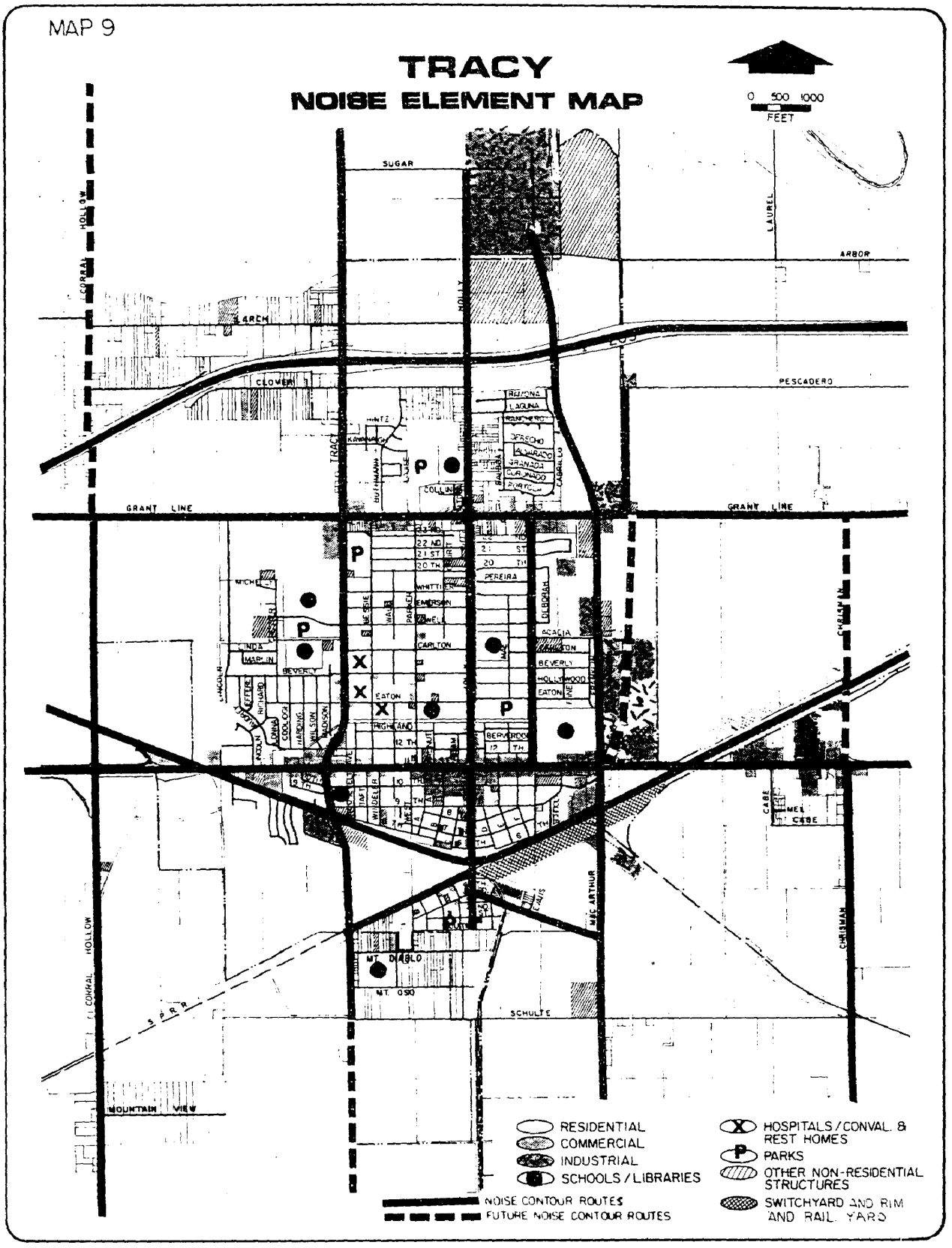
The estimated population falling within noise contour impact areas were as follows:

Ldn 60-64	(moderate)	1,146 persons
Ldn 65-69	(major)	1,384 persons
Ldn 70-74dB	(severe)	79 persons
TOTAL		2,609 persons

The severest noise impacts were from high speed roads (parts of MacArthur and Tracy Boulevards). Merely lowering speed limits would significantly reduce noise impacts from these roads. By noise source, the population affected breaks out as follows, listed in order of importance.

SPRR	845 persons
Eleventh Street	471 persons
Holly Drive	335 persons
Tracy Boulevard	271 persons
Grant Line Road	198 persons
East Street	173 persons
205	131 persons
MacArthur	98 persons
Central Avenue	42 persons
Third and Fourth Streets	45 persons
Tracy Municipal Airport	0 persons
TOTAL	2,609 persons

MAP 9


TRACY
NOISE ELEMENT MAP
0 500 1000
FEET
SUGAR
LAUREL
ARBOR
CORRAL HOLLOW
HOLLY
ARCH
CLOVER
PESCADERO
GRANT LINE
GRANT LINE
TRACY
LOUISE
CARLTON
EATON
BEVERLY
HIGHLAND
PEREIRA
ACACIA
MAC ARTHUR
CHRISMAN
MT. DIABLO
MT. OSO
SCHULTE
SPRR
MOUNTAIN VIEW
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
SCHOOLS / LIBRARIES
HOSPITALS / CONVAL. & REST HOMES
PARKS
OTHER NON-RESIDENTIAL STRUCTURES
SWITCHYARD AND RIM AND RAIL YARDS
NOISE CONTOUR ROUTES
FUTURE NOISE CONTOUR ROUTES

None of the sources in Tracy create or are likely to create noise impacts severe enough to prohibit residential development near them. However, Eleventh Street and 205 will require sound reduction features in new homes constructed adjacent to them.

The Tracy Airport creates no measurable noise problem at present. State Airport Noise Standards prohibit new residential development within a Ldn contour of 65dB or greater. The existing 65dB contour is contained primarily within the airport boundary and encompasses no residences. The future 65dB Ldn contour extends approximately 700 feet northwest of the junction of Linne and Corral Hollow Roads and 600 feet southeast of Tracy Boulevard into an industrial area. One existing home is contained within the future 65dB contour (See Map 18, page 65).

The future 60dB contour, within which noise could be a problem for residents and noise analyses must be undertaken before a new construction occurs, covers roughly 180 acres northwest and southeast of the airport in planned agricultural and industrial areas. These are compatible uses as long as construction of new residences in agricultural zones are prohibited within the 65dB Ldn contour and are avoided or insulated within 60dB Ldn contour areas. If airport operations change significantly in the future to accommodate larger planes, new contours should be prepared at that time.

Perceived Noise Problems from COG Noise Survey

The main perceived noise problems in Tracy were not specific sources per se. They were motorcycle, truck, and automobile noise. While individual standard automobiles cause little problem until their numbers are high, cars with modified or defective mufflers tend to be highly annoying. In a 1974 field survey by COG, noise levels of cars driving up and down East Street near the high school were measured. Thirty-one percent of the cars were in violation of State vehicle noise laws! Since the laws are generous for standard cars, it could be concluded that these cars either had muffler problems or were being driven in an excessively noisy manner. Part-time police attention to this problem, newspaper publicity about the fact that State noise laws will be enforced, and even classroom education could significantly reduce this situation citywide.

Trucks generate some complaints from residents near truck routes. Trucks are two to four times as loud as cars and make a great deal more noise upon acceleration/deceleration. The two major truck routes in town (Eleventh Street and Grant Line Road) are lined primarily with commercial uses. Any new residential uses along these roads will merit sound insulation. Other city truck routes might be studied for their necessity if noise complaints become numerous.

Motorcycles were found by the California Highway Patrol to be the most common offender of noise laws. This problem can best be handled in the same manner as loud automobiles.

Barking dogs were also perceived as problems by some, however, a reasonable city ordinance exists to remedy such situations.

- ESCALON

General

Escalon is a mixed use community located away from the County's freeways. Because of this, its background noise levels are lower than most other cities in San Joaquin County. It is, however, bisected by Highway 120 and Santa Fe Railroad, two sources which create high noise impacts. Other transportation noise sources include Tidewater Southern Railroad, Escalon Bellota/McHenry Road, and Main Street. The roads contribute to background noise levels typical of suburban or small urban communities. One fringe residential area on the northeach side is as quiet as many county rural residential areas.

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29, for Summary)

High noise impacts from transportation sources are reduced somewhat by the fact that the main roads and railroads are parallel through much of the city. Secondly, industrial and commercial uses buffer residential uses from the highest noise impacts along parts of Santa Fe Railroad and other sources. Still, major noise sources affect nearly half of Escalon's population.

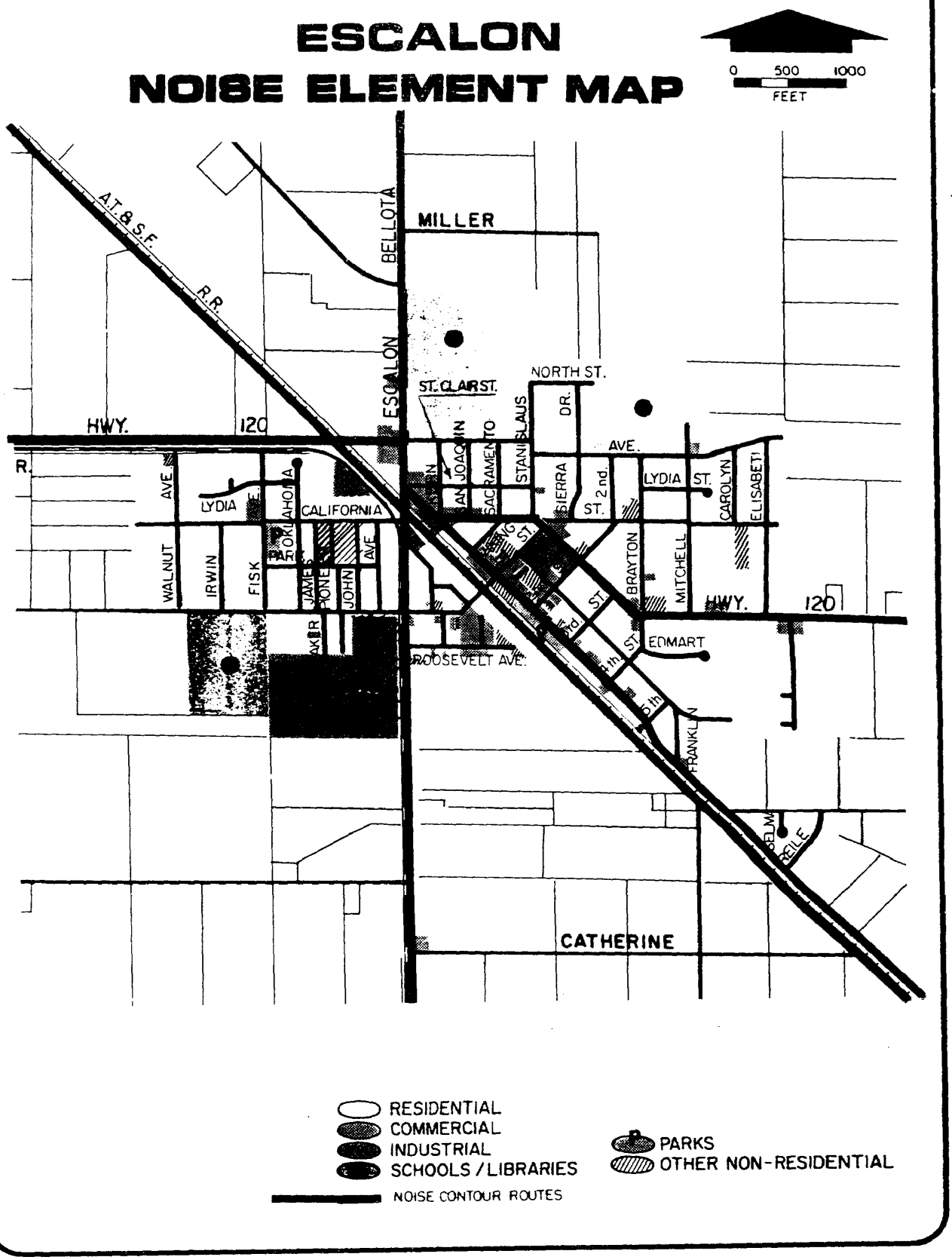
The State Noise Compatibility Chart defines an Ldn contour of 75dB or greater as clearly incompatible with residential uses. Santa Fe Railroad creates an Ldn of 75dB or greater within 100 feet on each side of the tracks. This contour presently affects only 2 single family homes and 1 apartment, or approximately 15 persons. However, the City's General Plan shows additional undeveloped residential land along the railroad track.

Another 185 persons live within 70-74 dB contours (approximately 240 feet either side of the rail line) of Santa Fe Railroad. State Noise Insulation Standards currently require building sound insulation in new multiple family construction in this contour to reduce interior noise to acceptable levels.

Santa Fe Railroad is by far the dominant noise source in Escalon, affecting 714 persons total within all noise contours. Route 120 and Tidewater Southern affect another 251 persons; McHenry Avenue and Tidewater, 177 persons; and Escalon Bellota, 51 persons. But in addition to affecting fewer persons, these latter roads and railroads create less severe noise impacts than Santa Fe.

MAP 10

ESCALON
NOISE ELEMENT MAP



Perceived Noise Problems from COG Noise Survey

Contrasting with the noise contour information are complaint data from the 1973 noise survey. The complaints received from Escalon residents cited only motorcycles, cars, trucks, and barking dogs. Since the survey, industrial noise complaints have been received by COG. Complaint data are not generally a very good indicator of problem situations. Research has found complaints may represent only 2-20% of the highly annoyed people in a community. Still, it was surprising that no train complaints were registered.

The City has responded to citizen complaints by adopting both a dog noise control ordinance and an ordinance which allows the prosecution of those who operate vehicles which emit excessive or unnecessary noise.

Thus, possible future noise problems are likely to be planning-related. In its General Plan, the City has mitigated many possible problems by buffering most residential areas from transportation noise sources with commercial or industrial development. Single family residential uses are buffered further from some commercial areas by multiple family areas. However, some residential land is shown for development adjacent to the Santa Fe tracks as before mentioned. Further, there is one section where residential uses adjoin industrial land. The recommendations in Section 4 would apply to these areas.

- RIPON (SEE RIPON NOISE ELEMENT FOR FURTHER INFORMATION)

Community Background Noise Levels and Perceived Noise Problems

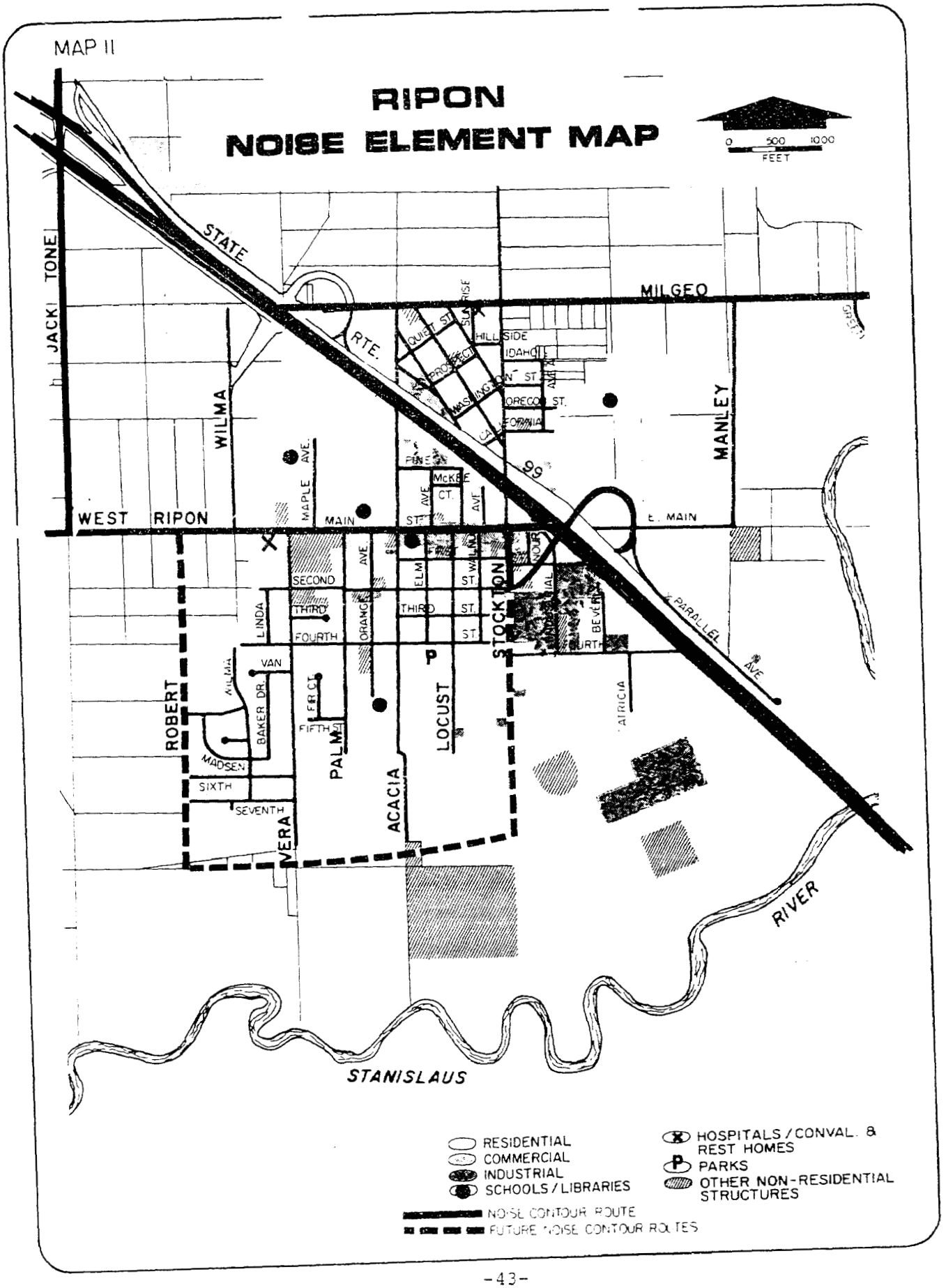
In Ripon, as in the rest of the County, transportation noise is the source which affects the most people. Highway 99 raises background noise levels throughout the city. Levels, when measured, ranged from 44-54dBA during the day and 40-45dBA at night. These levels are relatively high compared to other cities in the County.

Ironically, the relatively high background noise levels tend to make intruding sounds such as cars, motorcycles, etc. less noticeable. Because of this, or effective police enforcement, or other reasons, only 1 noise complaint, citing cars and trucks, was received from Ripon. Thus, perceived noise problems in Ripon are low, and planning for noise compatible land uses take precedence.

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29, for Summary)

Highway 99 and the SPRR main line affect residents the most severely in terms of high noise impacts and in terms of numbers of persons affected. Approximately 110 residents live within

MAP II


RIPON
NOISE ELEMENT MAP
0 500 1000
FEET
STATE
RTE.
99
MILGEO
JACKSON
WILMA
MANLEY
WEST RIPON
MAIN
E. MAIN
MAPLE AVE.
McKEE
CT.
PINE
QUIET ST.
SUNRISE
HILLSIDE
IDAHO
WASHINGTON ST.
OREGON ST.
CALIFORNIA
SECOND
THIRD
FOURTH
FIFTH
SIXTH
SEVENTH
ELM
WILLOW
ORANGE
LINDA
VAN
BAKER DR.
MADSEN
ROBERT
PALM
LOCUST
ACACIA
VERA
STOCKTON
PARALLEL
AVE
PATRICIA
RIVER
STANISLAUS
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
SCHOOLS / LIBRARIES
HOSPITALS / CONVAL. & REST HOMES
PARKS
OTHER NON-RESIDENTIAL STRUCTURES
NOISE CONTOUR ROUTE
FUTURE NOISE CONTOUR ROUTES

an Ldn contour of 70-74dB from these sources. Noise Insulation Standards require sound insulation of new multiple family structures (or shielding by barriers) within this contour to bring interior sound to acceptable levels. Barriers must be high and long enough to block the sound source from sight. They must also contain no cracks for sound to leak through. Since the railroad is elevated and locomotives are 16 feet high, exterior shielding is difficult.

Ripon's General Plan shows most future residential growth occurring away from the freeway/railroad corridor. However, there is one residential growth area in the northwest between Jack Tone Road and Wilma which is affected by these sources. State Land Use Compatibility Standards identify residential uses as clearly incompatible within 75dB Ldn contours. (No persons presently live in areas with levels this high.) The 75dB Ldn contour encompasses a strip 150 feet either side of the SPRR tracks. The 70dB contour extends another 150 feet out or 300 feet away from the tracks.

Six hundred and thirty-five persons live within 60-64 and 65-69dB Ldn contours of the freeway and railroad. Main Street and Milgeo in town affect 140 residents with levels of 60-64dB. These are moderate to major noise levels. While ordinary construction with forced air ventilation will suffice for acceptable interior levels, shielding of yard areas would be necessary to make outside sound levels comfortable.

Ripon has planned industry next to residential areas in two places. Possible noise problems are mitigated in part by designating much of the industrial area as "light industry." Still, in both the planned industrial areas and existing industrial areas adjacent to existing residential areas, the noise impacts listed on page 74 should be considered to insure that potential noise problems are averted.

Special Problems

Noise levels from trucks on Main Street are disturbing at times in 4 classrooms at Ripon Grammar School. This problem is worst during warm weather when doors need to be opened for air circulation and harvest season is underway. Noise levels inside reach 65dBA every time a truck passes by. Speech (and learning) interference is likely when noise levels rise above 60dBA. Air conditioning would improve this situation significantly by reducing interior levels by 10 decibels or one-half as loud.

The elderly and ill are particularly susceptible to disturbance by noise. In Ripon, a convalescent hospital and housing for the elderly front on Main Street. To protect against noise disturbance, it would be better to locate such uses off major roads, although sound insulation can provide acceptable interior environments. The discussion on page 71 describes how local governments may provide interior noise standards for such uses.

- MANTECA

Estimated Population Affected by Various Noise Sources

As indicated on the land use map, Manteca residential areas are separated from many of its major transportation routes by open space, industry, or commercial development. There are two sources which do severely impact residents, however. One is Highway 99 and one is SPRR's main line.

Sixty residents along SPRR and 267 persons along Highway 99 are exposed to the highest average sound levels found anywhere in the County; 75-80dB. The State Land Use Compatibility Chart recommends that no new homes be built within areas with sound levels this high unless effective exterior shielding of homes by barriers is possible. To achieve effective shielding, barrier walls must be high and long enough to block vehicles from sight and contain no cracks or sound leaks. Cracks will just about negate the effects of the barrier. Trees and shrubs also have little effect on sound levels. Shielding is generally possible along 99; it is more difficult along railroad tracks because of the 16 foot height of the engines and the elevation of many tracks.

Highway 99 and SPRR are by far the most prominant noise sources affecting Manteca in terms of numbers affected also. Two thousand nine hundred and eighty-two persons live within noise contours of these two sources. State Route 120 affects another 811 persons. Noise from this road, however, is likely to decrease in the future due to the 120 Bypass. Tidewater Southern Railroad impacts another 1,000 residents although presently its operations per day are limited and noise impacts are not severe.

Other major roads (Main, Union, Louise, and Cottage) affect 1,012 residents with moderate to major noise impacts. Totals by noise levels are contained in Table 1, page 29.

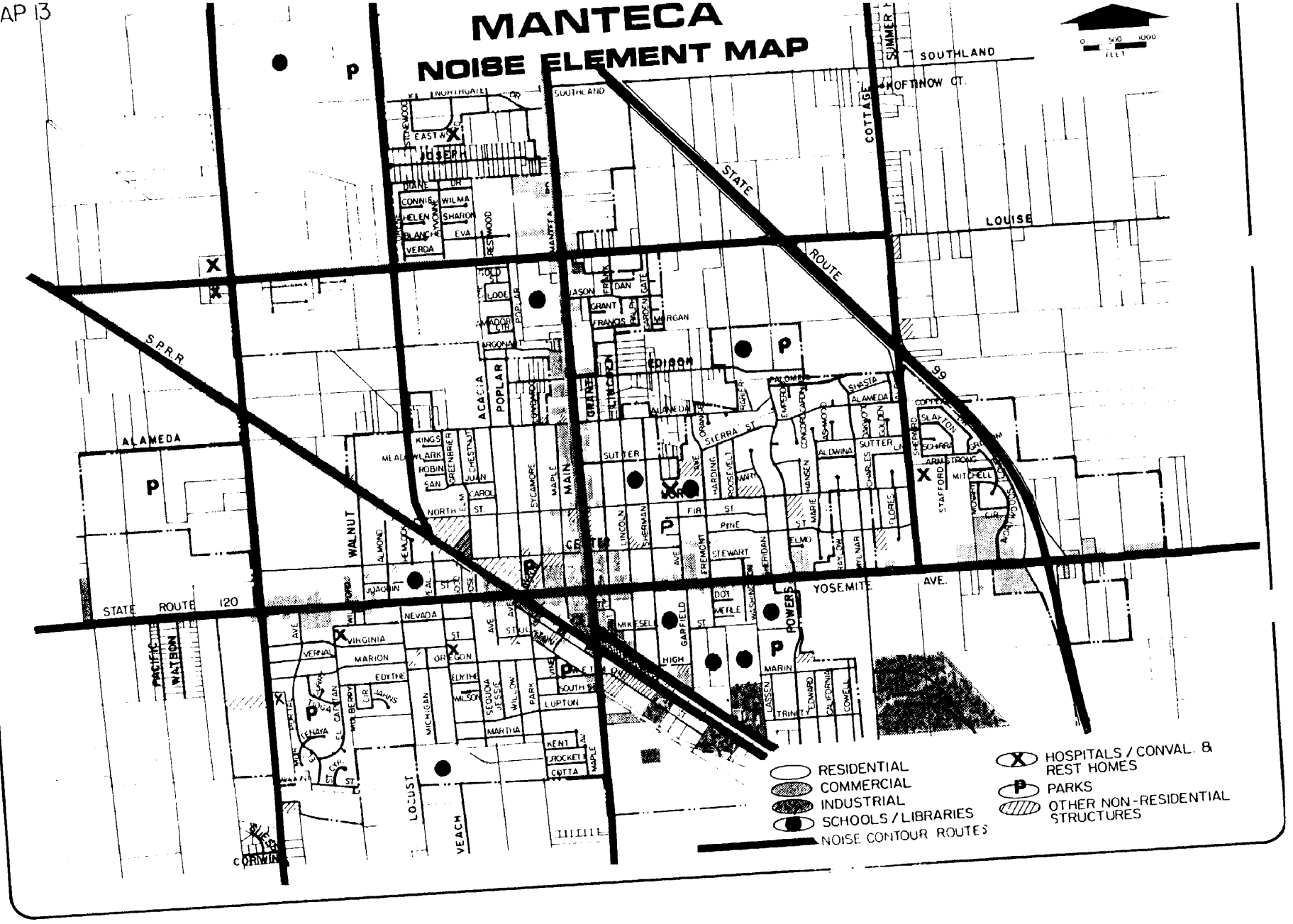
Five thousand eight hundred and eleven persons are affected by all noise sources, approximately one-third of Manteca's population. Of course, these totals do not take into account shielding by other buildings, so unless the noise source is elevated, numbers of persons in the lesser noise contours are likely to be less. The population estimates do point out, however, the severity of some sources, and the pervasiveness of relatively high sound levels throughout Manteca.

Traffic noise raises background sound levels in all areas of Manteca. The quietest area is also the most isolated; the southwest corner.

Perceived Noise Problems from COG Noise Survey

As might be expected, persons living near 99 and SPRR did complain about these sources in response to the COG noise survey.

MAP 13


MANTECA
NOISE ELEMENT MAP
SOUTHLAND
LOUISE
STATE ROUTE 99
S.P.R.R.
ALAMEDA
STATE ROUTE 120
YOSEMITE AVE.
SUTTER
MAIN
WALNUT
POPLAR
ACACIA
GRANT
EDISON
POWERS
LOCUST
VEACH
CORWIN
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
SCHOOLS / LIBRARIES
NOISE CONTOUR ROUTES
HOSPITALS / CONVAL. & REST HOMES
PARKS
OTHER NON-RESIDENTIAL STRUCTURES

Traffic noise in general was also seen to be a problem. These types of complaints are directly land use related and in most cases can be mitigated in new construction by proper design and shielding of residential buildings. In a few undeveloped areas, however, (within 150 feet either side of SPRR and approximately 100 feet of the freeway right-of-way) new residential construction is clearly unacceptable unless effective barrier walls can be constructed. This is probably possible only along 99 where it is at grade.

As elsewhere in the County, motorcycles, cars with modified mufflers, and barking dogs were also important perceived noise problems in Manteca. These are best dealt with through noise ordinances and vehicle noise abatement programs (see mitigation section). No local noise ordinances have yet been adopted.

- LODI

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29, for Summary)

In terms of severity and numbers of persons affected in Lodi, Southern Pacific Railroad and Highway 99 create the highest noise impacts. Four hundred and thirteen persons presently live within the highest noise contours found in the County (Ldn contours of 75-79dB) along Highway 99 and SP's main line. This number would be larger except industry buffers many existing residential areas from the severest SPRR noise impacts. The State Office of Noise Control Land Use Compatibility Chart identifies Ldn contour areas of 75dB or greater as clearly unacceptable for new residential development.

There are two undeveloped residential areas in Lodi's General Plan area within 75dB Ldn contours. Both are adjacent to SPRR. One is north of Century Boulevard and south of Lowe's Village. The other is north of Turner Road on the east side. It is recommended that any new residences be set back at least 105 feet (to the 75dB contour line) in accordance with State Standards.

Fifteen hundred persons presently live within Ldn contours of 70-74dB. According to State Noise Insulation regulations, exterior levels this high necessitate building sound insulation or shielding in order to bring interior sound to acceptable levels. Normal construction will not suffice. Half of the total 1,500 persons are affected by SPRR. Highway 99 and Kettleman Lane account for another 540 persons out of the total. The other 200 persons live adjacent to Cherokee Lane or high speed sections of South Hutchins, Lower Sacramento, and Harney Roads.

60-64dB and 65-69dB Ldn contours are considered moderate to major noise impact areas. Eight thousand eight hundred and eighty persons presently live within such contours in Lodi.

These residents either live adjacent to busy low speed city streets (Ham Lane, Lodi Avenue, Lockeford, Turner, Hutchins); a row or two back from the major roads listed in the preceding paragraph, or even further away from SPRR or Highway 99. Actual population estimates of persons impacted at these levels from 99 and SPRR is difficult since the contours do not take shielding by buildings into account. Still, where the railroad or freeway is elevated, shielding is not effective and the contours should be fairly accurate.

Normal residential construction with forced air ventilation is adequate within 60-69dB contours to meet State standards. Whether annoyance or sleep interference will occur, however, will depend in part on whether bedrooms are situated towards the street or at the back of the house. It will also depend on whether careful attention has been paid to construction details to insure that the house achieves its full insulation potential. Ill-fitting window or door seals can negate the effects of an insulated wall.

Exterior noise levels greater than 65dB will not be comfortable for most residential leisure activities. Thus, shielding of yard areas is recommended where possible when exterior sound levels exceed an Ldn of 65dB. Shielding has the advantage of reducing the need for careful attention to construction details.

Perceived Noise Problems from COG Noise Survey

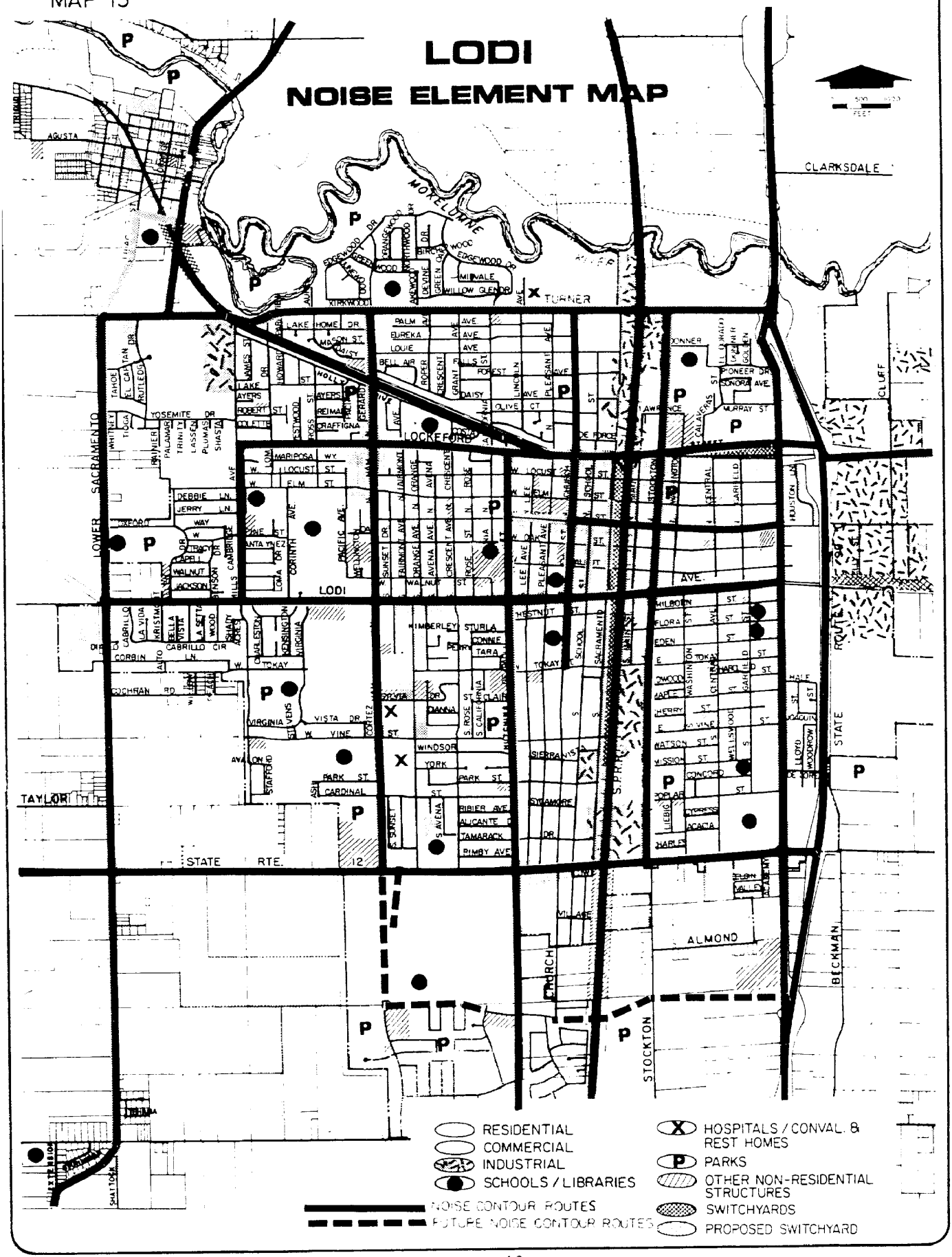
In Lodi, as in the rest of the County, transportation noise was the major perceived noise problem. In the 1973 COG noise survey, 65% cited motorcycle noise as bothering them, 55% cited other vehicular noise and 20% cited trains.

Truck traffic generated specific complaints on the following Lodi streets: Turner Road (spring to fall); Lockeford; Kettleman Lane; Woodrow (freeway noise); Golden (freeway noise); East Elm; East Tokay, East Vine (summer and fall); and Corbin Lane (grape gondolas).

Lodi has no established truck routes and prohibits them only on East Tokay and Holly Drive. A 5 week survey in August and September, 1975 found trucks using Pine, Elm, Lodi, Lockeford, Turner, Vine, Tokay, and Kettleman to get from downtown or the industrial sector east to the freeway.

Establishment of truck routes would contain truck noise to a smaller area of the city. It would alleviate the annoyance of truck noise on several residential streets, although it would also increase somewhat the truck load on designated truck routes. Another benefit of truck routes is that they enable more informed decision-making. Potential homebuyers know what to expect. New hospitals and schools can be located off truck routes. Subdivisions can be designed and constructed to insulate against truck noise.

MAP 13


LODI
NOISE ELEMENT MAP
CLARKSDALE
MOKELUMNE
TURNER
LOCKEFORD
LODI
LOWER SACRAMENTO
TAYLOR
STATE RTE. 12
STATE
ALMOND
STOCKTON
BECKMAN
RESIDENTIAL
COMMERCIAL
INDUSTRIAL
SCHOOLS / LIBRARIES
NOISE CONTOUR ROUTES
FUTURE NOISE CONTOUR ROUTES
HOSPITALS / CONVAL. & REST HOMES
PARKS
OTHER NON-RESIDENTIAL STRUCTURES
SWITCHYARDS
PROPOSED SWITCHYARD

In addition to truck noise and noise contour routes, some streets, due to location or design, encourage speeding, "dragging," or socializing. There are also on all streets in Lodi noise problems created by cars and motorcycles with modified mufflers. More than half of the persons complaining about motorcycle noise said they should be better muffled. Also, one-third of persons complaining about vehicle noise stated specifically that cars with modified mufflers were the cause of annoyance. These are basically police problems which are best alleviated by selective and increased patrols. Since lack of manpower is always a problem, noise enforcement on weekends or in known vehicle congregating areas, coupled with publicity that State vehicle noise laws will be enforced, could yield the highest results. Such enforcement would go far towards relieving the situation all over the city.

The percentage of residents complaining about train noise was higher in Lodi than any other city--due in part to the railroad's central switchyard locations.

Lodi is a busy switching center where regular switching activities occur on the approximate schedule shown below:

a. Main Switchyard (from Tokay Street to north of Lockeford Street):

   6:00 a.m. to 11:30 a.m. - Lodi switch engine begins work on Lodi trains.

   11:30 a.m. to 2:00 p.m. - Two other switchers begin work on trains bound for Ione and Valley Springs.

   2:30 p.m. to 4:30 p.m. - Lodi switch engine finishes up and picks up full cars from Lodi industries.

   5:00 p.m. - Roseville train sets out cars in north yard area.

   8:00 p.m. - The Ione and Valley Springs switchers return and set out full cars.

   All day and night. Mainline trains set out and pick up cars as they pass through.

b. Lockeford Street Switchyard (from Washington Street to Cherokee Lane):

   1:00 a.m. to 5:00 a.m. - General Mills switcher makes up train for General Mills

c. Woodbridge Switching Area (from Turner Road to Lower Sacramento Road):

   6:30 a.m. to 7:45 a.m. - General Mills switching.

Most residential areas affected by the main switchyard are partially buffered from it by commercial or industrial buildings. This reduces noise levels to these residential areas. However, the noise still carries large distances down straight streets. In addition, the sounds produced by switching operations are impulsive and irregular--a type most likely to disturb or awaken.

The Lockeford Street switchyard unfortunately has no buffer zone between it and residences to the south. Further, switching occurs late at night. Several persons complained that these late night switching operations keep them awake or wake them up.

The Woodbridge area switching operations are limited and noise impacts are reduced slightly by open space. Still, early morning trains and switching activities in this area have generated some noise complaints from residents.

There is little which feasibly can be done to reduce noise levels from switching activities once a problem situation exists. Physical measures are expensive and difficult. For example, barriers must be very high and long. Too, the nature of switching activities does not lend itself to curfews or other operational solutions. The best solutions are initial land use controls which separate railroad and residential uses.

Future railroad development is primarily up to the railroad companies and the Public Utilities Commission. One previous railroad proposal was to move the main Lodi switchyard south of Kettleman Lane. This plan was dropped indefinitely because of costs. Now, with recent unbuffered residential development in the vicinity of the proposed switchyard, such a move would not improve the situation.

Industry in Lodi generated complaints in a few instances. A noise ordinance is the most objective tool the city can utilize to help work out compromises in existing problem situations. In the future the city plans to separate industrial uses from residential uses where possible. Where not possible, a "light industrial designation has been utilized. Only certain types of industry are permitted within light industry zones so they act as buffer areas. Performance standards which set time and/or decibel limits might also be employed in light industrial zones.

Environmental Impact Reports and other city review procedures are other ways to identify and correct potential adverse noise impacts before any new industrial proposal is far along. Noise considerations for review are contained in Figure 3, page 75.

"Neighbor" and "barking dog" complaints were scattered throughout the city. Problems with barking dogs usually occur at night when people are trying to sleep. Many persons also reported that barking dogs interfered with them being able to use their yard as much as they would like. The City has an adequate

"barking dog" ordinance to deal with such situations. "Neighbor" problems are somewhat more difficult. These are now handled under nuisance provisions of general law. There are no existing laws which set objective limits on neighbor noise levels, as a comprehensive noise ordinance could.

Community Background Noise Levels

Background noise levels are important since the bothersomeness of a specific noise source is typically related to background levels. Most noise ordinances are therefore based on measured background noise levels. Background residential noise levels in Lodi tend to be relatively low compared to similar areas in the county's cities. Most of the city is contained in Zone 2 "suburban levels"; the southeast section has somewhat higher levels and would better fit in Zone 3 "urban area levels". Along the Route 99 freeway corridor, of course, background levels are even higher.

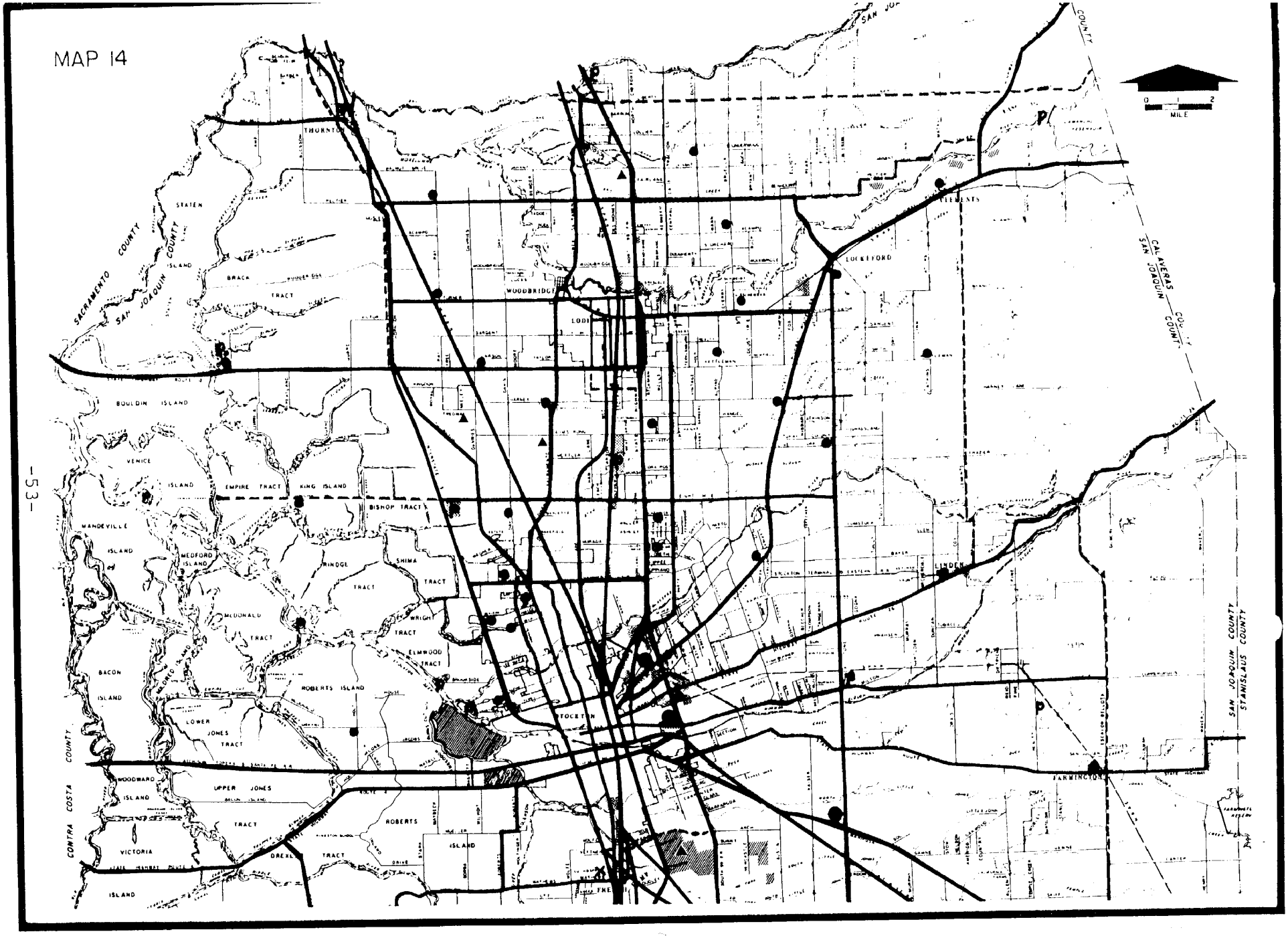
- SAN JOAQUIN COUNTY

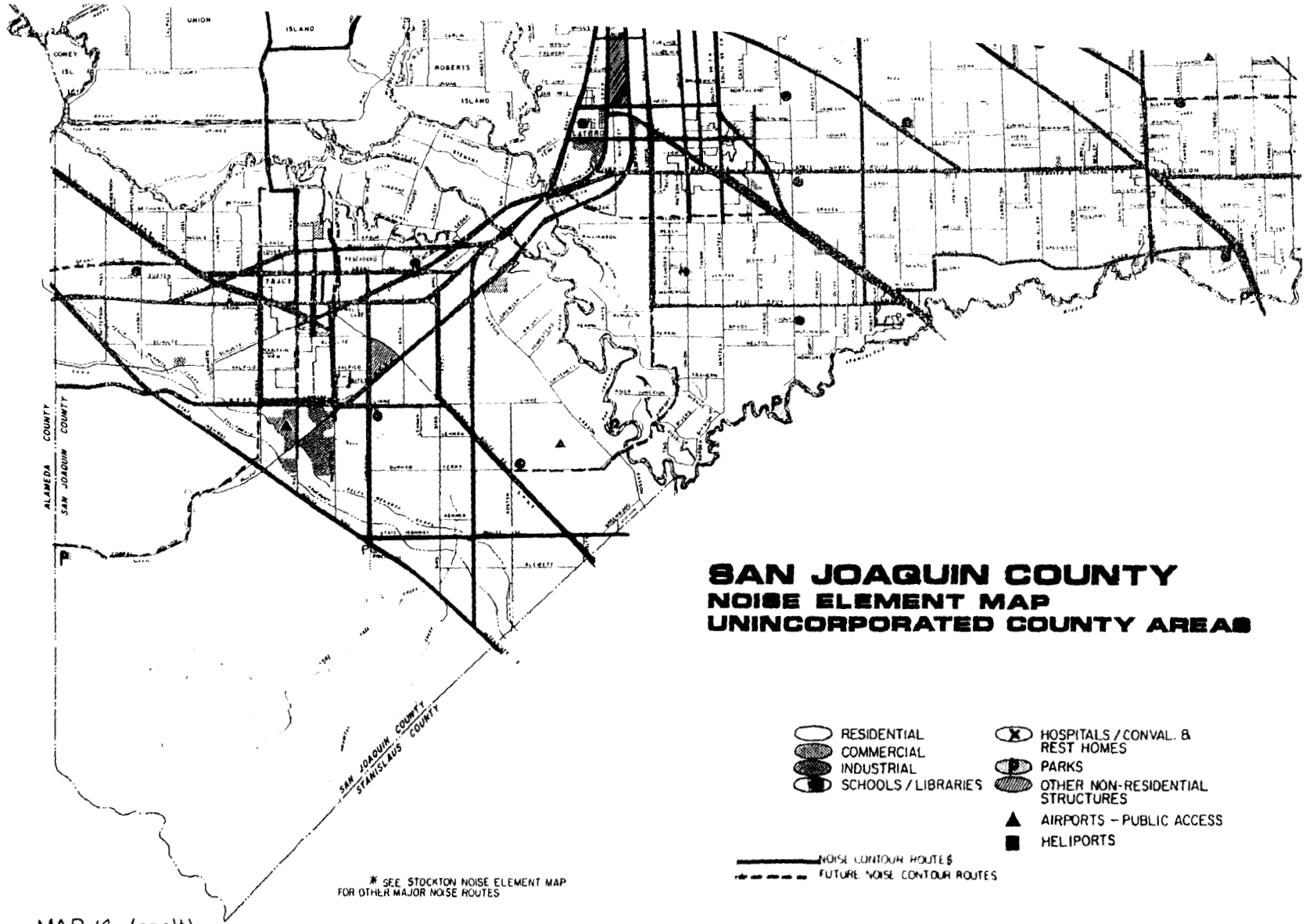
Perceived Noise Problems from COG Noise Survey and Background Levels

Outside of the Stockton urban area, very few complaints were received from county residents in the COG noise survey. In the area around Escalon, motorcycles were a problem; in Linden along Highway 26 and along a few other very busy roads (Highway 12, Thornton Road, Highway 99, I-5), cars and trucks elicited complaints. Barking dogs were a problem only in unincorporated communities. It would appear that, when people move to small unincorporated communities or onto agricultural parcels, they do not find noise to be a major problem.

This is easy to justify. Large lots in rural areas mitigate neighbor and barking dog complaints. If homes are set back from the road, traffic noise is also reduced. People in small communities tend to know each other and may be more apt to talk over noise problems and work out solutions. Traffic volumes on county roads are generally low, although they may carry high numbers of trucks. Still, these tend to be agricultural trucks, part of living in the country, and may not be seen as an intrusion. Noise from agricultural operations may also be recognized as part of country living and thus be generally accepted.

Since traffic noise determines background levels in most areas, lower traffic volumes mean quieter background levels--correspondingly, levels outside of freeway corridors in the County were quite low. Rural residential areas and some small communities have the lowest levels. Lockeford and Clements have slightly higher levels due to busy State Route 88. Morada, French Camp and Lathrop are affected by freeway noise in varying degrees, as Thornton will be. Unincorporated East Stockton for the most part had urban background noise levels.


MAP 14
0 1 2
MILE
SACRAMENTO COUNTY
SAN JOAQUIN COUNTY
CONTRA COSTA COUNTY
CALAVERAS COUNTY
SAN JOAQUIN COUNTY
STANISLAUS COUNTY
THORNTON
STATEN ISLAND
BRACK TRACT
WOODBRIDGE
LODI
LOCKEFORD
ELLIS
BOULDIN ISLAND
VENICE ISLAND
EMPIRE TRACT
KING ISLAND
BISHOP TRACT
MANDEVILLE ISLAND
MEDFORD ISLAND
RINDGE TRACT
SHIMA TRACT
McDONALD TRACT
WRIGHT TRACT
ELMWOOD TRACT
BACON ISLAND
ROBERTS ISLAND
LOWER JONES TRACT
STOCKTON
LINDEN
FARMINGTON
WOODWARD ISLAND
UPPER JONES TRACT
ROBERTS ISLAND
VICTORIA ISLAND
DREXLER TRACT



SAN JOAQUIN COUNTY
NOISE ELEMENT MAP
UNINCORPORATED COUNTY AREAS

- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- SCHOOLS / LIBRARIES
- HOSPITALS / CONVAL. & REST HOMES
- PARKS
- OTHER NON-RESIDENTIAL STRUCTURES
- AIRPORTS – PUBLIC ACCESS
- HELIPORTS
- NOISE CONTOUR ROUTES
- FUTURE NOISE CONTOUR ROUTES

MAP 14 (con't)

Since the noise survey in 1973, COG has maintained an ongoing noise complaint file. As in city areas, conflicts between proximate industrial and residential uses have generated some severe complaints. Solutions are not easily reached, for these problems are often land use comflicts. Although not many in number, these instances point out the importance of keeping such uses separate in the county as well as in city areas, and considering effects of truck and rail access to the industry. Precisely because background noise levels are low, industrial noise becomes more prominent and intrusive. It is the responsibility of the Planning Department to insure that industrial projects receive at least an initial noise review. Some potential problems may be design related, and if so can be eliminated by site planning, buffers, or other means. Figure 3 on page 75 describes noise impacts in industrial development which are important to consider.

Special Problems

1. Recreation Areas: Noise considerations in recreation are important. The county more than the cities has the opportunity to provide specific recreation areas for quiet uses such as fishing and bicycling, and other areas for high noise level activities such as motorcycle riding and speedboating. Restricting motorized access to some parts of parks and waterways would help provide a few quiet environments where people could unwind and relax close to home. Conversely, areas need to be sited for those wishing to engage in noisy recreational pursuits where others will not be disturbed. Noisy recreational activities can be especially bothersome because, unlike traffic on most roadways and most business operations, the noisiest periods tend to be after work and on weekends, when people are home. The recreation noise principles on page 73 particularly apply to recreation areas.

2. Schools: Truck noise affects several county schools, as indicated in the chart below. Few cities are faced with high speed truck noise levels to insulate against as county schools are.

CHART 7
NOISE LEVELS IN VARIOUS SCHOOLS IN SAN JOAQUIN COUNTY
ESTIMATED TRUCK PEAK NOISE LEVELS (± 6dBA) FROM MAJOR ROAD

School	Number Classrooms Affected	dBA Level Outside Affected Classrooms	dBA Level Inside Classrooms with Windows Open	dBA Level Inside Classrooms with Windows Closed	Major Road Affecting
Linden Elem.	5	80-87	70-77	60-67	State Rt. 26[1]
Bruella	?	80-86	70-76	60-66	Acampo Rd.[1,3]
Calla	3 Portables	81	Air Conditioning	61	State Rt. 120
	1 Corner Rm.	81	71	61	State Rt. 120
Collegeville	1	80-82	70-72	60-62	Jack Tone Rd.
Van Allen	4	77	No Windows Open to 120	57	State Rt. 120
Chartville	?	80	70	60	Jack Tone Rd.
Houston[4]	Room 5	65-76	55-65	48-51	State Rt. 99
	Room 4	65-76	54-61	52-57	State Rt. 99
	2 Classrooms	83	73	63	Acampo[2]
	Library	63-75	53-65	46-55	State Rt. 99

[1]Highway 26 was being widened. Noise levels have increased.
[2]Seasonal.
[3]Bruella also has noise problems from crop dusters.
[4]Freeway noise in classrooms has been reduced below 50dBA by Caltrans through air conditioning and other measures.

Where peak levels exceed 60dBA, speech interference is severe. Teachers often need to stop teaching until the truck is past. Even air conditioning will not completely eliminate the problem in some of the classrooms, but it certainly alleviates the open window situation. Reduced window size and sealed or double windows are measures which would reduce interior levels further. In most new school construction, classrooms are set further back off the street, and windows are minimized facing the street to alleviate potential problems.

3. Airports: All airports in San Joaquin County essentially meet State Airport Noise Standards. That is, no homes (except one across from Stockton Airport and one adjacent to Tracy Airport) are located within existing or projected 65dB Ldn contours (see further discussion and maps beginning on page 66). This standard was established for all airports in California as the maximum level acceptable for residential living near airports. However, complaints may occur where average noise levels are less than 65dB. Heliports, small public access airports, and agricultural dusting strips can create seasonal or sporadic noise problems. Since small airports tend to be located in quiet agricultural areas, airplane overflights stand out and are thus bothersome. The high peak levels become more important to residents than annual averages. Many public agencies establish land use limits for new construction around non-air carrier airports at the Ldn=60dB contour, having had severe complaint problems around small airports at these levels.

   It is recommended that new home construction be discouraged within 60dB Ldn contours around Tracy, Linds, and the other non-air carrier airports. Except for Tracy Airport, this involves very little land outside airport boundaries. Around Tracy Airport, roughly 180 acres outside airport boundaries are involved.

Estimated Population Affected by Various Noise Sources (See Table 1, Page 29 for Summary)

The largest and most severe single noise source affecting unincorporated County residents outside of the Stockton General Plan area is State Route 99. One thousand two hundred and six persons are affected. Also, 144 of them are affected by 75dB Ldn contours, the most severe in the County. The State Land Use Compatibility Chart (page 61) recommends prohibiting new homes within Ldn's of 75dB or greater unless effective shielding can be provided to reduce exterior sound levels. Only 6 persons are located within a contour this high from any other noise source.

The next most severe noise contours are Ldn's of 70-74dB. State Noise Insulation Standards require sound insulation or shielding of all new multiple family dwellings within 70-74dB Ldn contours. Two thousand six hundred and seventy County residents presently live within 70-74dB Ldn contours; 1,278 along major County roads.

A word needs to be said at this point about methodology. All County roads are "high speed, low volume" or "low speed, low volume" roads. The Office of Noise Control methodology does not provide for calculated contours when traffic volumes are low (5,000-10,000 vehicles per day depending on speed). Instead, a generalized contour is used. For low speed roads, the contour is 65dB at greater than 100 feet. The generalization was designed to protect against low speed roads with low truck volumes. The high speed generalization uses a 70dB contour within 100 feet of the roadway; a 65dB contour from 101-200 feet; and a less than 60dB level beyond 200 feet. This generalization was designed to protect homes adjacent to high speed roads with 10% or more trucks, since truck peak noise levels are twice as high as cars.

Thus, the 1,278 persons affected by 70-74dB contours from County roads live within 100 feet of them. Every time a truck passes by, peak noise levels outside will be 80dBA or greater, and many County roads average more than 300 trucks a day. Setbacks greater than 100 feet, a possibility on most County lots, puts homes in a lower noise contour and significantly reduces truck noise levels.

Another 1,044 persons live within calculated 70-74dB contours of highways and freeways. Only 348 persons live within 70-74dB contour of railroads, or railroads and roads where they are parallel and create a combined noise contour. The relatively few persons living near major railroads is in sharp contrast to the high numbers of urbanites severely affected by railroad noise.

60-69dB Ldn contours indicate areas where noise is of concern, but where normal home construction with forced air ventilation will suffice to reduce noise to acceptable standards. Outside levels will still be high, and shielding of yard access is recommended where Ldn's exceed 65dB.

Four thousand five hundred and ninety-three County residents live within 60-69dB contours. This would be within 101-200 feet of "high speed, low flow" roads; within 100 feet of "low speed, low flow" roads, or at somewhat greater distances from sources with calculated contours.

SECTION IV.-*GOVERNMENT ROLES IN NOISE COMPATIBLE LAND USE PLANNING*

INTRODUCTION

Government plays significant roles in keeping existing areas quiet and in planning noise compatible land uses. It locates and designs transportation routes and facilities, government buildings, and parks. It reviews private projects for noise impacts. It is responsible for changes in land uses and zoning, as well as changes in zoning regulations governing a use. These measures are discussed. For new development, the State's Land Use Compatibility Chart is given describing noise contour levels within which various land uses are acceptable. Based on this chart and the State Noise Insulation Standards and State Noise Standards, described on page 27, land use recommendations are made. These recommendations include prohibiting new residential construction in certain areas, shielding or insulating residences in other areas, and mitigation of noise impacts through site design, construction precautions, and other measures. Some noise-related problems by specific land use are also covered.

PUBLIC PROJECT NOISE EFFECTS

Government plays a role in noise-related land use decisions in several ways. Directly, it is responsible for location, construction, maintenance, and improvement of many transportation routes and facilities which have become our most pervasive noise generators. Although the 1960's freeway building boom has busted and new air carrier airport construction has nearly halted, public works projects do continue, though on a smaller scale.

Noise effects have generally played only a peripheral role in public works decision-making. Analysis of noise effects and mitigation measures still need to be included in project conception and design. This might best be done by assigning one person in a department responsibility for becoming familiar with sound and noise control. That person can then be informally consulted about noise effects of possible projects. (The person would have other responsibilities; sound control would simply be an area of specialized knowledge.) Too few departments have persons knowledgeable about sound and its control. Thus, noise control in projects is often largely ignored or treated superfically.

Besides transportation and other public works projects, government locates and builds public facilities such as parks, libraries and government buildings which generate traffic and may create other noise impacts. It is the responsibility of the implementing government agency to insure that projects are planned and designed to reduce noise since other public agencies may not carefully review the project for noise impacts.

In quiet areas, even small increases in noise levels from new projects will be noticeable. There are many mitigating measures which can easily reduce possible noise impacts from public projects. Berms or walls around equipment or noisy play areas can halve noise levels to nearby neighbors. Garbage bins can be placed near the street rather than next to a residential back fence. Access to the facility can often be designed to bypass quiet areas. Where more than one access route is possible, the one which would direct traffic onto a quiet street might be blocked off. Parking lots can be located on the site away from residences. Many other similar measures are common sense, yet they are often overlooked.

REVIEWS OF PRIVATE PROJECTS

Through Environmental Impact Reports, Use Permit reviews, Subdivision and Development Plan reviews, public agencies also suggest measures or revise measures included in acoustical reports to reduce a private project's noise impacts. How well this is done depends on how familiar the reviewer is with noise control. At least one employee in affected departments should be familiar with noise reduction techniques.

GENERAL PLACEMENT OF LAND USES THROUGH PLANNING AND ZONING

Government is also involved in overall placement of land uses through land use planning and zoning. In these capacities, it plays major roles in planning noise compatible development and in keeping quiet areas quiet. Rezonings, and General Plan development and amendments are times that it is necessary to look at the noise compatibility of adjacent land uses.

Traditional land use planning and zoning goals have long attempted to segregate residential uses from industrial and commercial land uses. For noise control purposes, this is generally good although it means more and longer commuting and thus more vehicles on city streets and freeways. Such separation does, however, mean truck routes are primarily located in industrial areas rather than purely residential streets. Garbage collection or deliveries at odd hours will not disturb residents. Noise from the industry or commercial establishment itself will not affect residents. Of course, there will be areas where the uses must meet. In such transition areas, performance standards are now often used to protect residents, and to protect business and industry from future complaints. These standards set decibel and time limits on noise emissions from new industrial or commercial uses. At the maximum, performance standards should conform to reasonable noise ordinance limits so that problem situations are not created.

Older developed residential areas are where zoning is not as effective a noise control tool. It is frequent practice to zone older, large home areas for multiple family development. As more homes are split into flats or torn down for new apartments, the traffic gradually increases, noise caused simply by more families living in the area increases, and the desirability of the neighborhood for single family use goes down. "Quiet" is a desirable feature in a neighborhood, and noisier neighborhoods are generally seen to be of poorer quality.

Spot zoning for commercial or industrial uses in primarily residential neighborhoods also tends to occur in older neighborhoods but is to be avoided in planning theory. Avoidance makes sense in terms of noise control. Such zones may contain uses which are not now noisy but which could become so in the future. Spot zoning also allows replacement by another noisier use allowable in the zone.

A typical zoning plan will locate higher density residential zones along noisy transportation corridors to protect single family uses which demand quieter environments. At first, it would appear this action exposes a lot more people to high noise environments. Yet it makes sense in some ways from a noise standpoint. Multiple family buildings can be more economically sound insulated than single family homes. In apartments, the relatively small common outside yard and pool areas can be shielded from roadways by the large building complex. This benefit does not apply to duplex development with small individual yards.

Thus, the traditional zoning tenets of separation of uses; enforcement of such separation; and avoidance of spot zoning will help keep quiet areas quiet. Adding industrial and commercial performance standards where such uses are adjacent to residential uses would further reduce possible noise conflicts. Higher noise levels can be considered a detrimental factor in increasing the densities of older residential neighborhoods. There are pros and cons to lining transportation corridors with multiple family uses as far as noise considerations go. In this case, proper building design, shielding, and building insulation are probably more important than whether the zone is multiple or single family.

SPECIFIC RECOMMENDATIONS FOR NOISE COMPATIBLE LAND USE PLANNING IN SAN JOAQUIN COUNTY

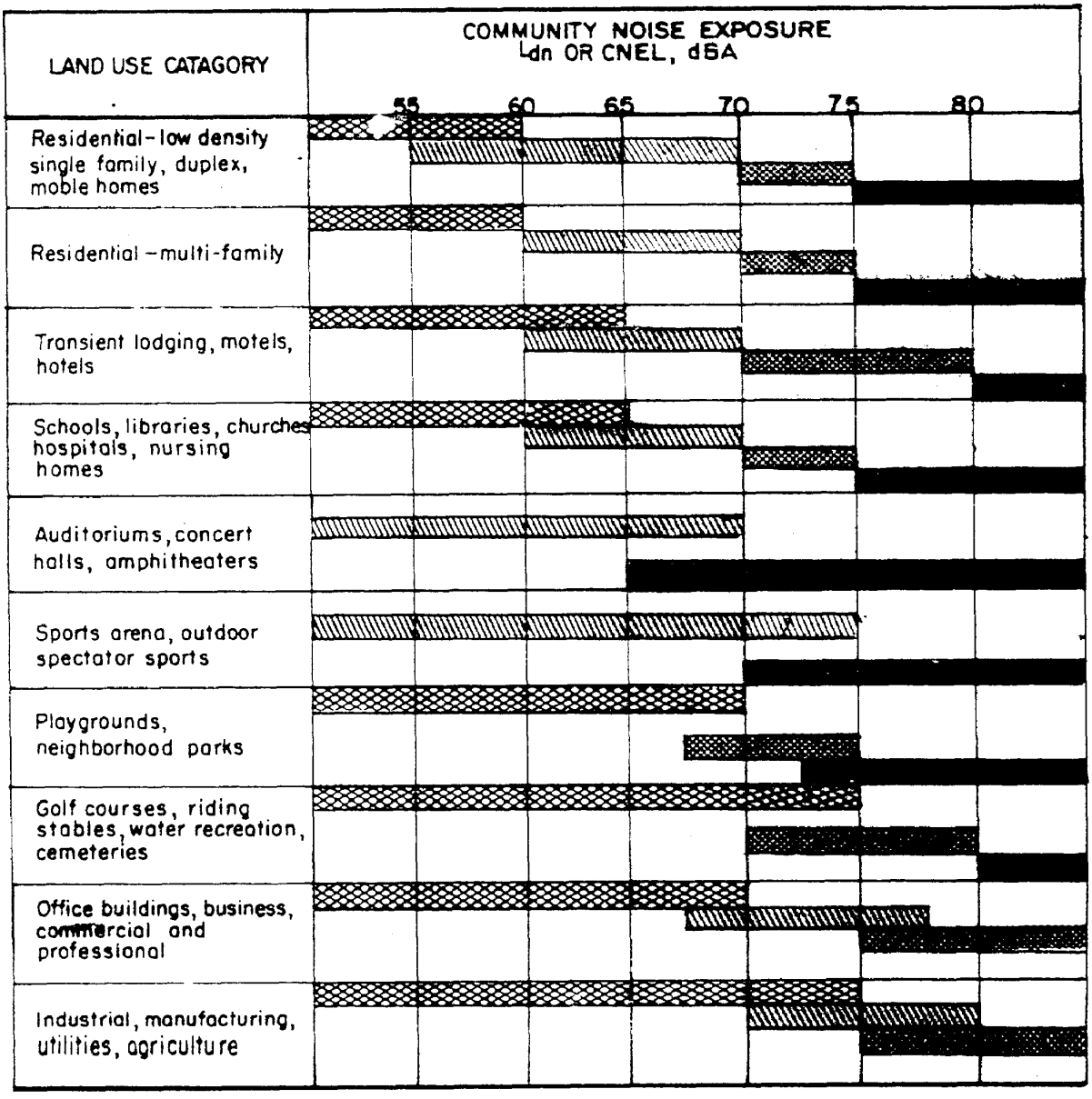
LOCATION OF LAND USES NEAR HIGH NOISE SOURCES

Chart 8 is the Land Use Compatibility Chart for Community Noise Environments prepared by the State Office of Noise Control. With noise levels given in day-night average levels (Ldn's),

CHART 8

LAND USE COMPATIBILITY for COMMUNITY NOISE ENVIRONMENTS

(Except Around Airports) California Office of Noise Control



INTERPRETATION:

Normally acceptable

Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction, without any special noise insulation requirements.

Conditionally acceptable

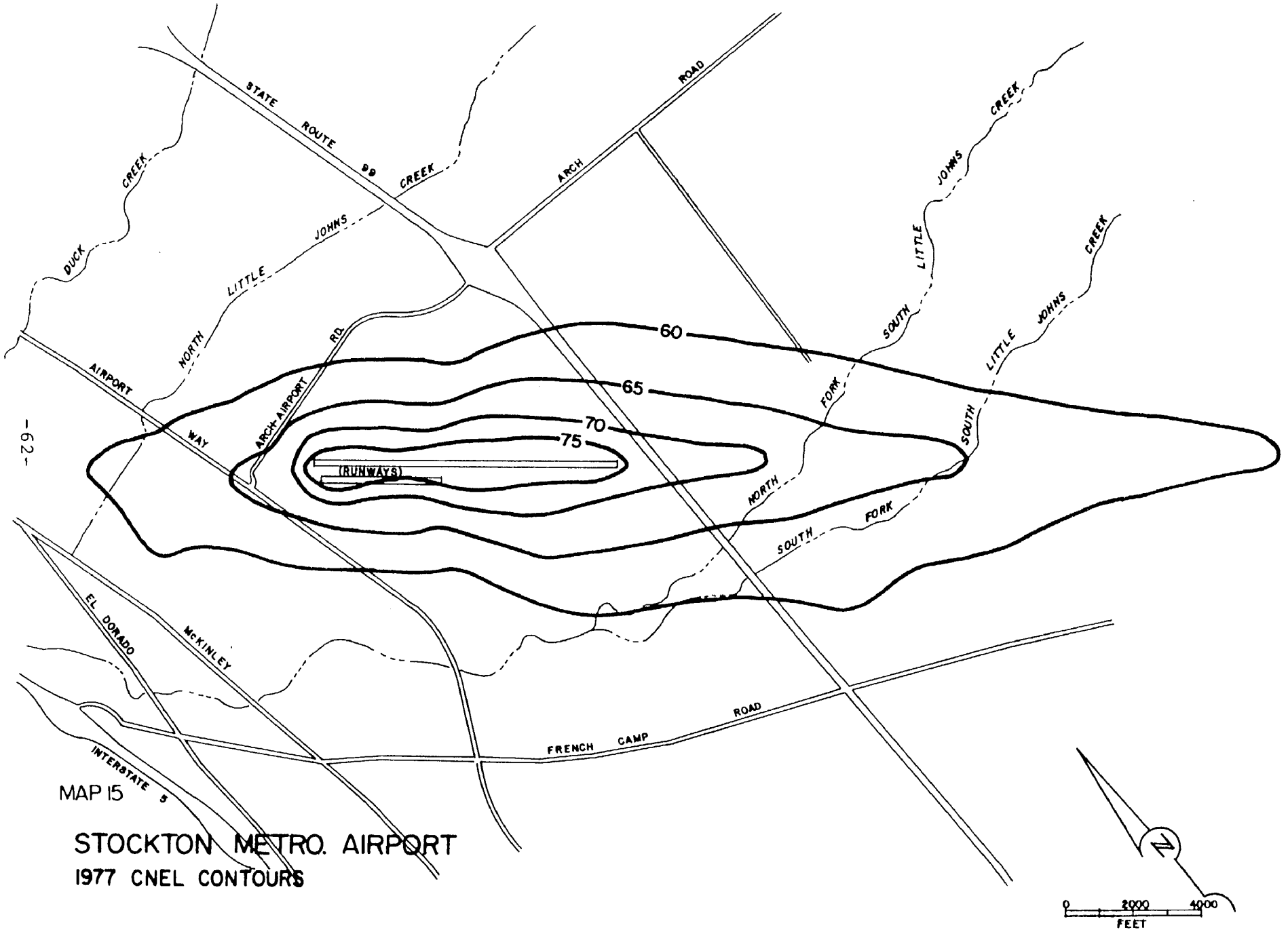
New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally unacceptable

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design. Residential Areas: Barriers are recommended to make the outdoor environment tolerable.

Clearly unacceptable

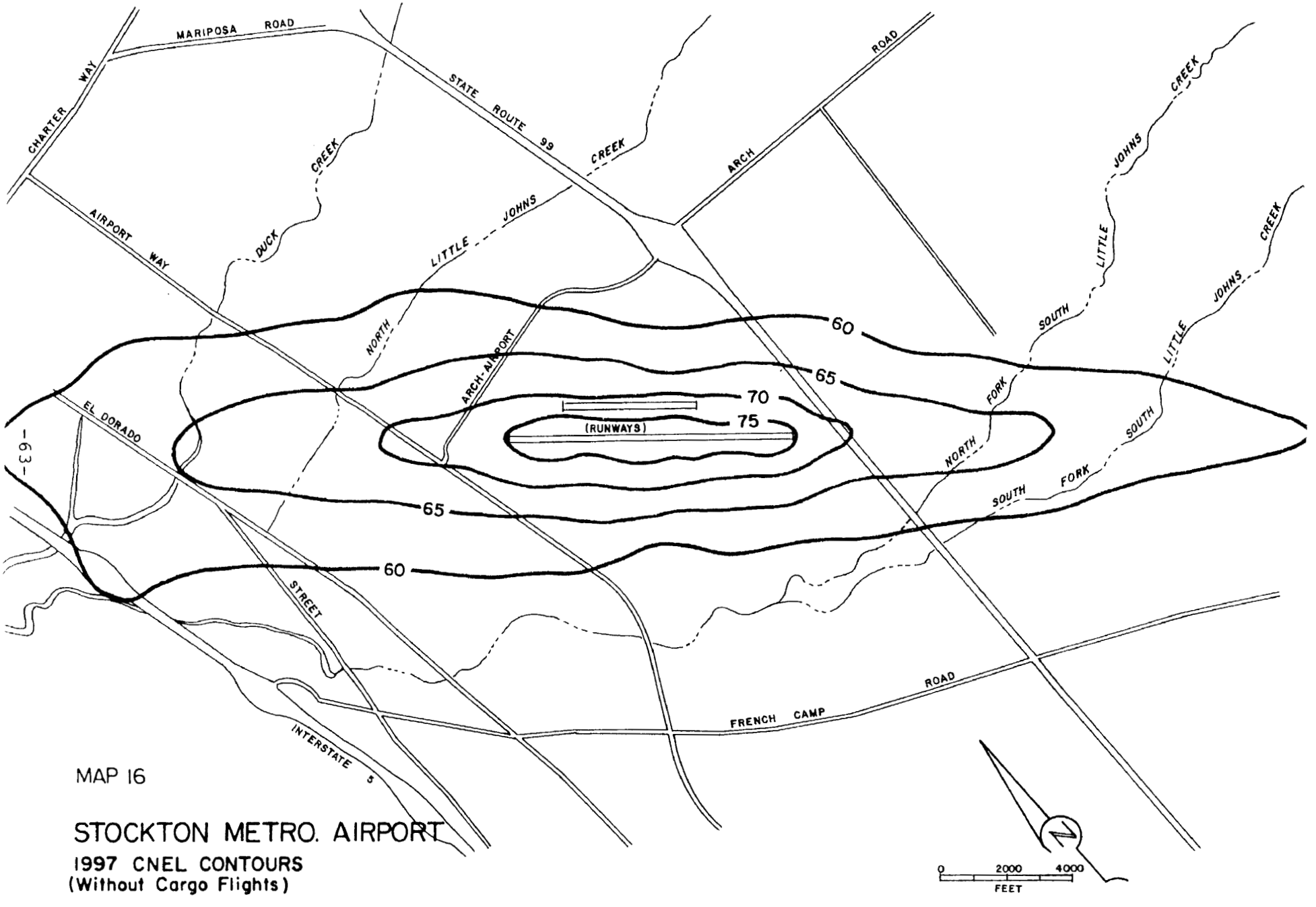
New construction or development should generally not be undertaken. Residential Areas: The outdoor environment will be intolerable for normal residential use.



MAP 15

STOCKTON METRO. AIRPORT

1977 CNEL CONTOURS

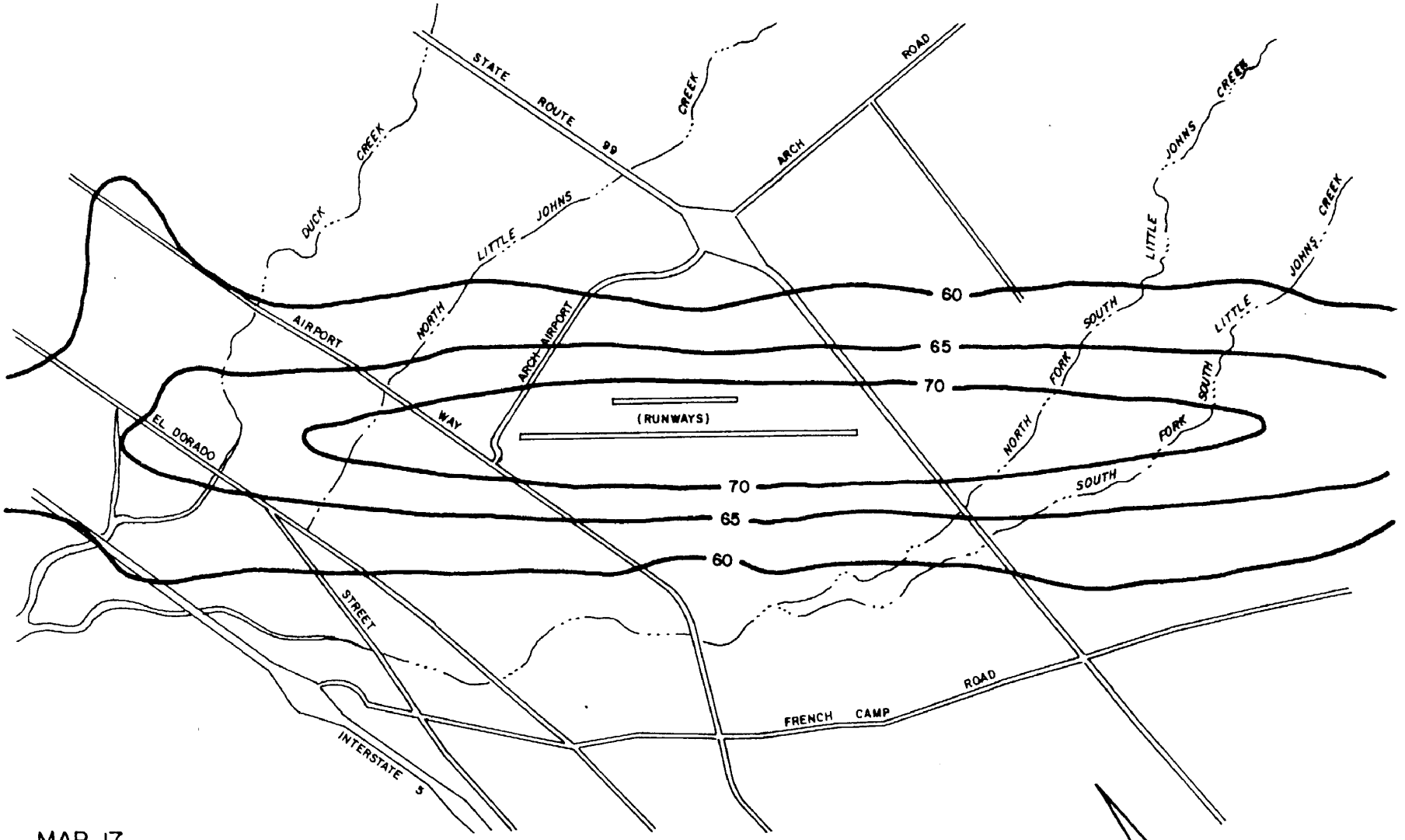


-63-

MAP 16

STOCKTON METRO. AIRPORT

1997 CNEL CONTOURS
(Without Cargo Flights)

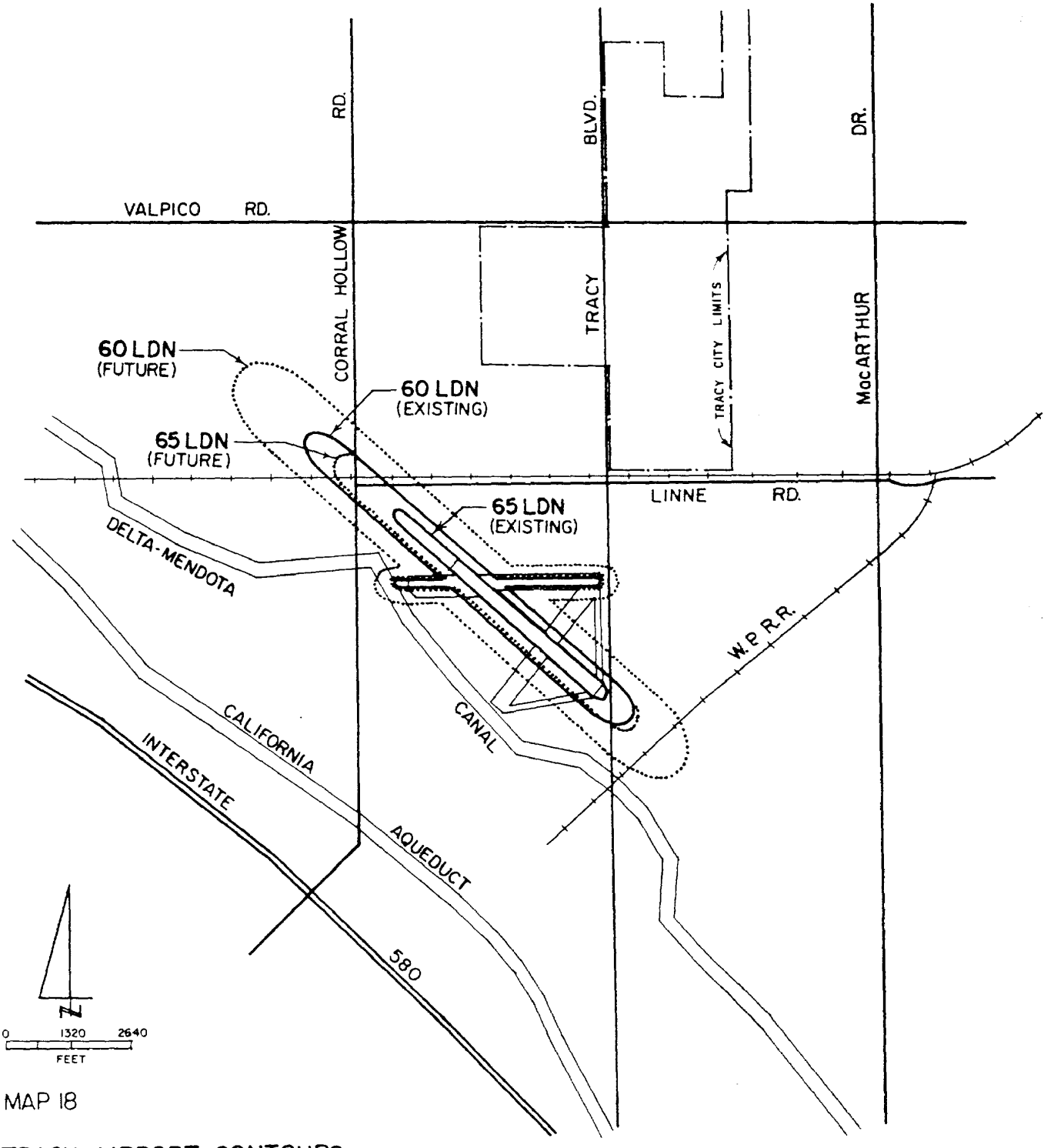


MAP 17

STOCKTON METRO. AIRPORT

1997 CNEL CONTOURS

(With Two Cargo Flights)



MAP 18

TRACY AIRPORT CONTOURS

1973 AND 1993
LDN NOISE CONTOURS

SOURCE: LAMPMAN & ASSOCIATES, TRACY MUNICIPAL AIRPORT LAND USE PLAN

the chart provides a guide for noise compatible land use. It corresponds with existing State Building Noise Insulation Standards, except Airport Noise Standards which are a special case. The chart describes Ldn noise contours greater than 75dB as "Clearly Unacceptable" for new residential construction. Around airports, new homes are prohibited within Ldn contours greater than 65dB because of the difficulty in insulating or shielding against airport noise.

In accordance with the above standards, two specific land use recommendations are made with regard to noise in San Joaquin County.

The first recommendation is that no residential land use areas be planned or constructed within present and future 65dB Ldn contours of County airports. This is required by State Airport Noise Standards. Both Stockton and Tracy airports generate 65dB contours. Neither presently contains residential areas within future 65dB Ldn contours. However, County policy could permit the construction of a house on an existing agricultural parcel. Also, future contours could change to encompass more land based on changes in airport operations (see maps). One operational change which would cause such a situation is the success of air cargo flights out of Stockton. The alternate set of future airport contours which include two nightly air cargo jets show that 63 acres of existing residential land northwest of the airport, and some residential acreage northeast of the airport would be impacted by 65dB Ldn contours. Another situation which would increase the predicted 1997 noise contours would be a significant increase in jet training flights once radar is installed at Stockton Airport.

Thus, any major change in airport operations above and beyond predicted air carrier and training flight increased used in preparation of the 1997 Stockton Airport Contours would necessitate resolving incompatible land use and zoning around Stockton Airport. No such problems are foreseen around Tracy Airport.

It should be noted that Stockton's prepared contours already take into account many airport operational noise reduction features. When wind conditions permit, many airplanes avoid existing residential areas by landing and taking off toward the south. One airline uses a high fast climbout technique. A curfew on night operations is in effect. Thus, most of the sound reduction which can be achieved through aircraft operational techniques have been effected, and these features have been included in the prepared noise contours. Changes in air traffic and land use controls play the critical roles in maintaining compliance with State standards.

The second noise-related land use recommendation is that residential development not be allowed in areas around railroads where the Ldn contour equals 75dB or greater. The 75dB Ldn is

considered "Clearly Incompatible" with residential uses, and effective shielding by barriers to reduce exterior noise levels next to heavily used railroad tracks is generally not possible. This is because railroad tracks tend to be elevated and train engines are 16 feet high. Additionally, trains generate noise levels twice as high as trucks. Even with shielding, peak noise levels at near distances would cause severe disturbance. Such a restriction would not affect much land. The 75dB Ldn contours fall about 150 feet either side of Southern Pacific Railroad's main line track extending from Ripon through Manteca, Lathrop, French Camp, Stockton, and Lodi. They also affect a 100 foot strip either side of Santa Fe Railroad.

These 75dB Ldn contour strips include approximately 138 acres of undeveloped land shown for residential development in City and County General Plans. If all this land were developed, another 2,000 residents would be exposed to unacceptably high noise levels (800 along SPRR in North Stockton alone). Up to 1975, only 602 persons lived within 75dB Ldn contours near railroads throughout the County. An increase in complaints and possible class actions would be a likely result.

It should be noted that train noise was the third largest perceived noise problem in San Joaquin County in COG's Noise Survey. Complaints were concentrated near all rail lines and yards in Lodi, along the main Western Pacific and Stockton Terminal and Eastern lines and the Santa Fe switchyard in Stockton, and along Manteca's main Southern Pacific line. Switching noise carries greatly; while most complaints came from within 900 feet of mainline tracks and less along branch lines, persons complained up to 2,000 feet away around switchyards. Train noise is also one perceived noise problem for which there are no ready non-land use solutions.

Local governments are pre-empted from regulating railroad operations to reduce noise, for example, by placing limits on speed, noise levels, or curfews on operations. The State and Federal Public Utilities Commissions contend they have final authority over all phases of railroad operations. Thus, for railroads particularly, planning compatible land uses around rail lines and utilizing building restrictions on nearby noise sensitive land uses are the most important tools local governments have. Solving existing problems is very difficult.

There are a few other areas in the County where Ldn levels are 75dB or greater: around railroad switchyards, along freeways, and at the junction of two major noise sources. If effective exterior shielding cannot be provided in such areas, it is recommended that new residential development be prohibited within these 75dB contours also. This is not likely to affect much residential land. The 75dB railroad switchyard contours are nearly always contained within the switchyard itself. Along I-5, the only major elevated freeway in the County where shielding by a developer would be difficult, the future 75dB contours are generally within the freeway right-of-way.

BUILDING AND SITE DESIGN

In all other areas it is expected that building and site design restrictions can create compatible, if not ideal, situations.

Within Ldn contour levels of 60dB and greater, State Building Noise Insulation Standards* apply to new multiple family residential construction. It is recommended that these minimum standards apply to detached single family development hospitals, convalescent homes, and rest homes. The standards relate to the noise contour levels as follows:

Conventional residential construction with forced air ventilation is usually adequate where Ldn's are 60-69dB. However, careful attention to construction details is necessary to insure that a house achieves its full insulation potential. Ill-fitting doors and windows can negate the sound insulation effects of an otherwise well-built home. Locating bedrooms away from the noise source will also be important in reducing potential problems. Further, policy-makers should consider the importance of exterior noise impacts to a project within Ldn contours of 65-75dB. Exterior sound levels will be high in such areas if yards are not shielded.

Where exterior sound levels exceed an Ldn of 70dB, additional building sound insulation or shielding is necessary in order to reduce sounds to acceptable interior levels according to Noise Insulation Standards.

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*California Administrative Code, Title 25, Chapter 1, Subchapter 1, Article 4, Section 1092.
(The Noise Insulation Standards require: that specified residential structures, located within an Ldn or CNEL of 60dB, have an acoustical analysis prepared showing that the structure has been designed to limit intruding noise to an interior Ldn level of 45dB. The report shall be prepared under the supervision of a person experienced in the field of acoustical engineering and be submitted with the application for a building permit--if not sooner. It may be included in earlier Planning Department reviews to minimize inconvenience to developers.

The acoustical report must show topographical relationships of noise sources and dwelling sites, identification of noise sources and their characteristics, predicted noise levels at the exterior of the proposed dwelling unit considering present and future land usage, basis for the prediction (measured or obtained from published data) noise attenuation measured to be applied, and an analysis of the noise insulation effectiveness of the proposed construction showing that the prescribed interior noise level requirements are met. If interior allowable noise levels are met by requiring that windows cannot be opened, the design for the structure must also specify the means that will be employed to provide ventilation and cooling so as to provide a habitable interior environment. See Appendix C for complete text.)

Shielding is often a good answer. Many surface noise sources can be shielded from residential areas by barrier walls, reducing Ldn noise levels about 10dB. This would reduce a 70dB Ldn contour area down to an Ldn of 60dB, making it much more acceptable for residential construction. Barriers are a good mitigating measure to employ where possible, for they reduce building insulation costs and make outside areas usable. However, this alternative is not always possible.

To be effective, barriers must be solid and contain no cracks or holes for sound to leak through. Airborne sound travels readily through any opening. For example, wood slatted chain link fences are virtually useless as a sound barrier. Barriers may be constructed of concrete blocks and slabs, one-half inch thick plywood panels, or earth. All will provide about equal amounts of reduction since the leakage over the top and sides of the barrier will determine the net result.

To be effective, barriers must also be high and long enough to block the noise sources from sight. What can be seen, can be heard. Thus, at grade or depressed roadways can usually be shielded. It is much more difficult to shield railroads. They tend to have elevated tracks in San Joaquin County and locomotives are 16 feet high. Elevated roadways are also difficult to shield unless the barrier is on the road level. An Office of Noise Control publication entitled "Evaluation of Outdoor to Indoor Noise Reduction of Building Facades and Outdoor Noise Barriers" provides a method for evaluating a proposed barrier's effectiveness (see Appendix D).

To estimate shielding sound reductions from buildings, barrier walls, and the minimal shielding effects of plantings for specific projects, the following general rules apply:

1. To estimate shielding from buildings:

    . Subtract 3 decibels per row of buildings when buildings occupy 50% of area;

    . Subtract 5 decibels per row of buildings when buildings occupy 60-70% of row area;

    . Subtract 7 decibels per row of buildings where buildings occupy 80% of row area;

    . Subtract 10 decibels where buildings occupy 90% of row area; and

    . Subtract 10-15 decibels where a solid row of continuous buildings completely blocks vehicles from sight.

    Sound penetration studies indicate shielding is effective for the first two to three rows of buildings and remains

constant thereafter. Reductions (except for continuous buildings) should not exceed a maximum of 10 decibels. The average height of the first row of buildings must equal or exceed the average height of the second row for a sound reduction to be realized. Where roadways are elevated, shielding by buildings is very difficult. No direct line of sight to the roadway should exist. Where only scattered buildings exist, each building might produce a small localized shielding effect, but the combined effect is negligible.

2. To estimate shielding from barrier walls, subtract 10 decibels where a wall barrier, or earth berm, completely blocks vehicles from sight. Larger reductions up to 15 decibels are very difficult to achieve and are about the maximum attainable.

3. To estimate shielding from plantings:

   . Subtract up to 1 decibel for every 4 feet of depth of very dense plantings which block vehicles from view; and

   . Subtract 5 decibels per 100 feet of depth of mature trees which block sight of vehicles. This should not exceed 10 decibels at a maximum.

   As can be seen, plantings have little effect on noise levels, although they may provide a psychological feeling of isolation.

Sound insulation of buildings is the other primary method used to reduce interior noise levels. The Office of Noise Control publication* also describes more effective window/wall combinations to use in high noise areas. It describes measures such as reducing window size, using double windows or staggered stud walls to increase sound insulation. Solid plywood roof construction may also be needed. The following paragraphs delineate other building and site design and construction techniques to reduce interior noise levels.

One helpful sound reduction measure is to put as much distance as possible between residential buildings and the noise source. In apartment projects, parking areas can be located toward the road. In subdivisions, frontage roads add distance. On country lots, 100 feet setbacks are often possible. Distance is not as effective a method as barrier walls, but a 3-4.5dB reduction will generally occur per doubling of distance from the noise source.

Another useful measure is to design each dwelling unit so that bedrooms and quiet living areas face away from the noise source,

*"Evaluation of Outdoor to Indoor Noise Reduction of Building Facades," Appendix D.

while kitchens, garages, bathrooms, and playrooms face the source. In this way, some shielding and additional distance is obtained from the building itself.

In a subdivision or apartment complex, units can often be laid out to reduce noise impacts by minimizing the number nearest the noise source, or by using some units (or commercial or community buildings) to shield other residential units behind them.

That construction details are extremely important in achieving and maintaining a building's full noise reduction potential has already been mentioned. Most residential buildings will reduce outside sound levels only 15 to 20 decibels. This is because sound will leak through poorly placed attic or dryer vents, or improperly sealed windows and doors. The following tips, published by Owens-Corning Fiberglas Corporation pertains primarily to multi-family construction, but many apply to single family construction as well. (Figure 2)

NOISE CONSIDERATIONS FOR SPECIFIC LAND USES

There are, of course, noise considerations for other land uses than residential. What follows are brief discussions of noise considerations for schools; hospitals, convalescent hospitals and rest homes; and recreation areas. Lastly, noise concerns with commercial and industrial uses are covered.

Hospitals, Convalescent Hospitals, Rest Homes. The sick and the elderly are particularly susceptible to noise disturbance. The elderly are much more easily awakened by noise than younger groups, and once awakened, find it more difficult to return to sleep. Due to a loss of hearing acuity, the aged also need lower background noise levels to understand speech. For these reasons, convalescent hospitals, hospitals, and rest homes need protection from noise sources even more than residences in general.

Surprisingly, however, there are no specific existing noise standards (for protection from external noise sources) governing any of these uses! State Noise Insulation Standards applicable to new construction of "dwellings other than detached single family" may be applied to new construction of rest homes or convalescent hospitals. It is unlikely they could be construed to apply to hospitals. Rest homes converted from existing single family homes also receive no noise review. Further, unless a building permit is needed, the Building or Planning Department is unlikely to be aware of the conversion.

Rest homes, licensed through the Department of Public Assistance and the State, are subject to all applicable State and local building codes and regulations at the time they are licensed (California Administrative Code, Title 22, Article 6, Section 80801). Thus, making residential conversions subject to a use

FIGURE 2

NOISE CONTROL PRECAUTIONS FOR BUILDERS

Maintaining Full Reduction Potential of Walls and Floor-Ceilings:

- Avoid unnecessary perforation of walls or ceilings. Optimum sound isolation requires that holes not be cut for vents or grilles or for recessing cabinets, light fixtures, etc. Where holes are necessary, avoid placing them back to back and immediately next to each other. Electrical boxes should be staggered at least one stud space.
- Seal all openings in walls and floor-ceilings. A non-hardening, resilient caulking material should be used to seal all cutouts, such as around electrical, telephone and piping outlets. Caulk at all intersections with the adjoining structure, such as where the wall assembly meets the floor-ceiling. Cracks are excellent conductors of airborne sound.
- Seal all cracks in subfloors with an airtight caulk or install a layer of underlayment over the entire surface.
- Close all open spaces between joists over party walls with flocking to prevent sound travelling over walls. Under party walls, close the open space between the joists under floors and install gypsum board or plywood at least 4 feet wide to the bottom of joists.
- Cover all party wall and ceiling surfaces behind ducts and piping, behind bathtubs, behind soffits, and under stairs with gypsum board.
- Use resilient floor coverings such as carpeting to isolate structure-borne vibrations and sound.

Ducts and Conduits:

- Do not pierce common floors or walls with duct systems.
- Avoid construction such as ducts, rigid conduits or corridors which act as speaking tubes to transmit sound from one area to another.
- Line ducts with insulation to absorb noise and seal conduits.
- Ducts, pipes, and conduits should be broken with resilient non-rigid boots or flexible couplings where they leave vibrating equipment.

Doors:

- Stagger doors across hallways.
- Avoid sliding doors where control of noise is desired.
- Use solid wood core doors or mineral core doors where privacy is demanded. Hollow core doors will lower sound insulation and should never be used when a high performance is desired.
- Seal doors at top and sides with soft type weather stripping and use automatic threshold.

Windows:

- Minimize window sizes facing noisy areas. Solid insulated walls would tend to provide better sound reduction.
- Arrange casement windows so sound is not reflected into adjoining units.
- Movable windows should close tightly and be weatherstripped.
- Thick glass, insulating glass, double glazing and double windows with air space between all help reduce noise transmission through windows.

Equipment Noise:

- Locate heating and cooling equipment far from bedrooms.
- Inquire about equipment noise levels before buying and insist on quiet units.
- Isolate equipment in room with door to outside or use a solid core door, gasketed, when access is from building interior.
- Mount equipment on fiberglass board or other resilient mountings to isolate vibrations from structure.

Plumbing:

- Design pipe runs with swing arm so expansion and contraction can occur without binding and thus eliminate noise.
- Isolate piping from structure with resilient gasketing and caulking where they pass through walls, floors, or other building surfaces.
- Develop a well-planned layout to minimize the noise of water flowing. Over-sized pipes and reduced pressure will slow the speed of flowing water and reduce noise.
- Provide air chambers at each outlet to eliminate water hammer due to abrupt stop of flowing water.
- Use quiet action water closets and isolate from structure on a floating floor.

Electrical:

- Wire each apartment as a unit--avoid penetration of walls or floors between apartments.
- Caulk holes made by wiring which penetrates connecting structures with plastic caulk or dry packing.
- Connect vibrating equipment with flexible wiring.

Source: "Quiet Comfort" and "Solutions to Noise Control Problems", Owens-Corning Fiberglas Corporation, Toledo, Ohio 43601

permit could allow local governments some control over their location and design in high noise areas. New construction of any of these uses can be made subject to the Noise Insulation Standards governing residences by adopting these standards into local building codes.

In lieu of State Noise Standards specifically applicable to hospitals, convalescent hospitals, and rest homes, these actions at the local level would remedy a lack of noise input.

Schools. Noise affects schools primarily in terms of speech and learning interference. Speech interference becomes severe above 55-60dBA and acousticians recommend average levels in the range of 35-40dBA to insure good communication. As was noted in Section III, these levels are exceeded in many classrooms throughout the County. Air conditioned rooms will alleviate many existing problems by enabling teachers to keep windows closed. Proper location and design of new classrooms can eliminate future noise problems. Again, however, there are no State standards governing new construction of classrooms. New school construction must meet local building regulations, thus, local interior standards could be developed and adopted in lieu of State action. Such standards might combine the interior design levels on page 9 with an interior peak level maximum of 60dBA. Also, the State Office of Noise Control Land Use Compatibility Chart applies as a general location and design guideline.

Recreation Areas. Noise considerations in recreation areas deserve specific mention. Quiet is a scarce commodity in San Joaquin County. Restricting motorized access to some parts of the County's parks and waterways would help provide a few environments close to home where people could pursue quiet activities such as fishing or bicycling. Conversely, there is a lack of designated suitable sites near cities for persons wishing to engage in noisy recreational pursuits such as motorcycle riding. Multi-use parks may not satisfy either need. It is recommended that planning and recreation departments add the following noise principles to their recreation area's site selection and design criteria:

1. Noise levels intruding in recreational areas and structures should not hinder the enjoyment of the featured recreational activities. Thus, where a recreational area is designed for quiet activities, it should not be placed near major noise sources unless it can be shielded, and motorized access should be limited.

2. Design of recreation areas involving noisy activities should protect surrounding sensitive land uses from disturbance. Industrial areas might be explored as possible sites for such uses. Where there are noisy sections of a multi-use park, they should be buffered from more sensitive park uses as well as land uses outside the park.

Commercial and Industrial Uses. Commercial and industrial land uses are commonly noise generators. Noise-related land use compatibility problems may occur where these uses are adjacent to noise sensitive uses. Some cities have developed general performance standards spelling out noise levels, curfews on operations, or building design measures which new commercial or industrial projects must meet on fringe areas of zones. This is a recommended option.

Another approach is, on an individual basis during Environmental Impact Reports or Use Permit reviews, etc., to look at possible noise impacts and propose specific measures to minimize noise emissions. The accompanying chart describes noise considerations for new commercial or industrial development. These considerations would also be valid where residential uses are proposed near existing commercial and industrial uses. (Figure 3)

For the latter case, Noise Element legislation provides a third option. Cities and counties develop Ldn noise contours around selected industries. New residential construction must then meet the Noise Insulation Standards which apply to the identified Ldn noise contours.

No industrial noise contours have yet been prepared. However, planning agencies have identified several industries which may create high noise levels. Eight hundred foot "Industrial Noise Study Areas" have been placed around these industries on the noise contour maps. Before or at the time development projects are proposed near these industries, noise contours will be prepared.

Also, planning departments will continue to identify noisy industries near where new residential development is likely to occur. This can be undeveloped residential land or older residential areas that are experiencing new development at the same or increased densities.

FIGURE 3
NOISE CONSIDERATIONS FOR
COMMERCIAL/INDUSTRIAL DEVELOPMENT

Land separation of residential from industrial or noisy commercial areas will avoid creation of potential noise-related land use conflicts. However, in those areas where residential zones are adjacent to industrial or commercial areas, performance standards to control noise are advisable, as are residential insulation standards.

Whether a new industry or commercial enterprise is locating near existing residences, or vice versa, noise considerations should include:

1. Business Hours and Number of Persons Employed

   Are there or will there be 24-hour operations which mean shift changes and large numbers of cars starting up late at night? What roads will they use? Does the establishment stay open late? When are the busiest hours of operation?

2. Maintenance Activities

   What kind of plant or office maintenance activities occur or will occur and at what time of day? (Daily garbage pickups or noisy parking lot sweeping may occur in the very early morning.)

3. Deliveries and Pickups

   Will trucks need to make deliveries or pickups? At what time and how often will they come? On what roads do or will the trucks travel? Does the industry use rail service? How often are train car pickups? Will the industry be using refrigerator cars?

4. Machinery

   What machinery on the premises may be bothersome to nearby residents, and what are the noise levels of these machines? Do they contain piercing tones? How often and at what time of day do or will they run? Will fans or other steady noises provide a higher than desirable background noise level for a residential area?

5. Plant or Office Expansion Plans

6. Sound Level Measurements to determine existing noise conditions.

Both industry and commercial activities generate truck and automobile traffic. Thus, they should be located in areas where truck access is possible without having to pass through residential areas.

SECTION V- *NON LAND USE MITIGATION MEASURES FOR NOISE CONTROL*

INTRODUCTION

There are many non-land use oriented measures for community noise control. This section will cover methods to reduce some major perceived noise problems in San Joaquin County, and other government-related noise reduction measures.

POLICE ENFORCEMENT OF VEHICLE NOISE LAWS

As was discussed in Section II, motorcycles and excessively noisy (i.e., with modified mufflers) or speeding or speeding cars stood out as the major perceived noise problem in the County.

CHART 9
MAJOR PERCEIVED NOISE PROBLEMS IN SAN JOAQUIN COUNTY
BY COMPLAINTS RECEIVED IN THE COG NOISE SURVEY

Percent Complaining	Noise Source
61	Motorcycles
59	Other Vehicular Traffic
22	Barking Dogs
16	Trains
13	Neighbors
9	Industry
3	Planes
3	Practicing Bands
15	Miscellaneous

(Percentages do not add up to 100 since many persons cited more than one noise source.)

These results came from a late 1973 noise survey prepared by the Council of Governments. What is ironic is that excessively noisy motorcycles and cars are one type of complaint which can be strictly dealt with under existing laws. State legislation already prohibits faulty or modified mufflers on vehicles. This can be visually checked by a police officer. Other State laws set decibel limits for all vehicles. Trained officers take vehicle passby noise readings to determine if the vehicle exceeds limits established. Since noise limits are generous for standard vehicles, it can be concluded that vehicles exceeding them have faulty mufflers, no muffler, or are being driven in an excessively noisy manner.

The main reasons police give for not enforcing these sections of the Vehicle Code are their lack of manpower and that there are other more important things they must attend to. Yet they still must spend time responding to noise-related vehicle complaints, and these incidents could be reduced with a regular noise enforcement program.

Vehicle noise enforcement programs in other cities have found that unless officers are given sole responsibility for enforcing vehicle noise, other responsibilities take priority. To have an effective noise reduction program, the officer must have noise abatement as a sole responsibility, at least for certain hours of duty.

In San Francisco, four officers work full time on noise abatement. While San Joaquin County and its cities could not afford releasing such manpower, a possible alternative would be to use additional officers only on Friday and Saturday nights, when the problem is likely to be most severe. Increased selective enforcement, coupled with media publicity, could yield good results.

San Francisco has found their operation to be completely self-supporting through the issuance of fines. Modification of mufflers result in a mandatory fine while defective mufflers are treated more leniently. Start up costs for such programs are minimal--mainly the purchase of a reliable sound level meter.

Vehicle noise enforcement may have the added benefit of reducing overall urban noise levels, as well as peak level annoyance. San Francisco found dB reductions in nearly all parts of the City in two years when comparing noise contour maps prepared in 1974 with those prepared in 1976 after start up of the program.

COMMUNITY NOISE ORDINANCES

The second greatest noise complaint which came out in the survey were "barking dogs." Twenty-two percent of persons replying to the COG survey were disturbed by barking dogs. This complaint is best dealt with by ordinance--either as part of a comprehensive noise ordinance or as a separate ordinance. The cities and County have responded to the need for ordinances to control barking dogs. In 1973, only Tracy, Lodi, and Stockton had dog noise control ordinances. Since then, Stockton has revised its ordinance to make it easier for persons to obtain relief, and the County and all cities except Manteca have adopted barking dog ordinances. Most ordinances declare it unlawful to keep any animal which disturbs any person by continuous or incessant barking. In its ordinances, Stockton and the County specify "incessant barking" as that occurring for 10 minutes or more in duration.

Enforcement of barking dog ordinances is usually handled carefully--the complaint is investigated to see if there is a true problem, and contact with the dog owner is made. Records are then filed with the District Attorney or City Attorney who will write a warning letter, etc. before any drastic action such as fines or removing the dog is taken. The ordinances merely provide aveneus for legal resolution of such problems.

"Neighbors" were another widespread urban areas noise problem. Such complaints primarily involved amplified music, loud children, or home tool and garden equipment use. Many of the complainants were apartment dwellers, pointing out the need for adequate sound insulation between units. (A State law to provide better insulation between units has been in effect since 1974. It is enforced by local building departments.) Noise ordinances are the most effective measure local governments can employ to alleviate "neighbor" complaints. They establish time and/or decibel limits on noisy activities, making complaints relatively easy to define quantitatively.

The noise ordinance is also the most effective tool for resolving noise problems existing between industrial/commercial areas, and residential uses. It provides an objective guide for a mediator to use to define the problem and to work out solutions. There were few industries which generated complaints throughout the County. As a perceived noise problem it ranked low.

OTHER

Construction and maintenance activities are a further potential problem which should be mentioned here. Although construction and public works activities are generally temporary situations and have not been a real source of complaint in San Joaquin County, such problems could occur. Several methods can be used to reduce noise impacts from construction sites where construction is ongoing, or is occurring, for example, near hospitals or schools.

Curfews on operations are the primary method used to mitigate noise impacts from private construction activities. Some public agencies have also established decibel limits on the amount of noise a construction site may generate. (These could be included in a commercial noise ordinance.)

Specific measures used to control construction site noise includeoperating only certain equipment at one time; moving some of the noisiest equipment items further into the construction site; using temporary walls or complete enclosures around certain equipment; modifying the equipment to make less noise through muffling; buying quieter replacement equipment, or substituting quieter processes when possible.

City and County maintenance and public works activities are other sources of temporary noise which are reduced by the same methods listed above. A city or county may also put noise specifications into city or county contracts such as garbage collection contracts or public construction contracts.

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15. Supplementary Notes

16. Abstracts

This is a planning document. It updates an earlier 1974 Council of Governments Noise Element to conform with new State noise legislation. It describes noise and its effects on people. It identifies noise problem areas in San Joaquin County and how many residents are affected in these areas. It provides noise contours of high noise impact areas. The noise contour areas, along with State noise standards, were used to develop noise design and location guidelines for new construction projects. Goals and policies to prevent land use related noise conflicts closely follow State standards, and in some cases carry them further. Specific methods for reducing noise (i.e., noise barriers, building orientation, and insulation, etc.) are given.

17. Key Words and Document Analysis. 17a. Descriptors

Noise Reduction, Noise (sound), Aircraft Noise, Noise Generators, Urban Planning, Highway Planning, Acoustic Insulation.

17b. Identifiers/Open-Ended Terms

Noise Reduction Planning
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17c. COSATI Field/Group 05E, 13B, 09D, 06F, 06J, 06S, 20A

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