V.
NOISE
ELEMENT

V. NOISE ELEMENT

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1.0 INTRODUCTION

When sounds become unwanted irritants, they become noise. As an environmental pollutant, noise is a waste product of our high technology, fast-paced way of life. Noise is also recognized as a potential hazard, not only detracting from the quality of life but having the potential to cause psychological and physical harm. However, noise is a subjective experience - sound which is desirable to one listener may be considered as noise to another.

1.1 Sources of Noise

While motorized vehicles are the most prevalent noise source, industrial operations, construction work, sirens, radios and other generators can transform a quiet scene into a chaos of unwanted sounds. Home, office and factory interiors may provide refuge, but they also are hosts to noise-producing machines, appliances and communication devices. Among the noisier interior places, the kitchen is filled with so many devices that, combined with hard-surfaced walls, cabinets and floors, it can become an unhealthy noise environment.

Among exterior noise sources, transportation vehicles dominate. Automobiles, trucks and buses create a constant stream of sounds, varying by time of day and by a variety of site conditions. Transportation noise is made up of three source components: the engine (primarily the cooling fan), exhaust gases and tires. Also affecting the noise level are vehicle speed and acceleration, and road grade and surface condition. Other contributors to transportation-generated noise are trains and airplanes; however, these are not substantial sources of noise within the City.

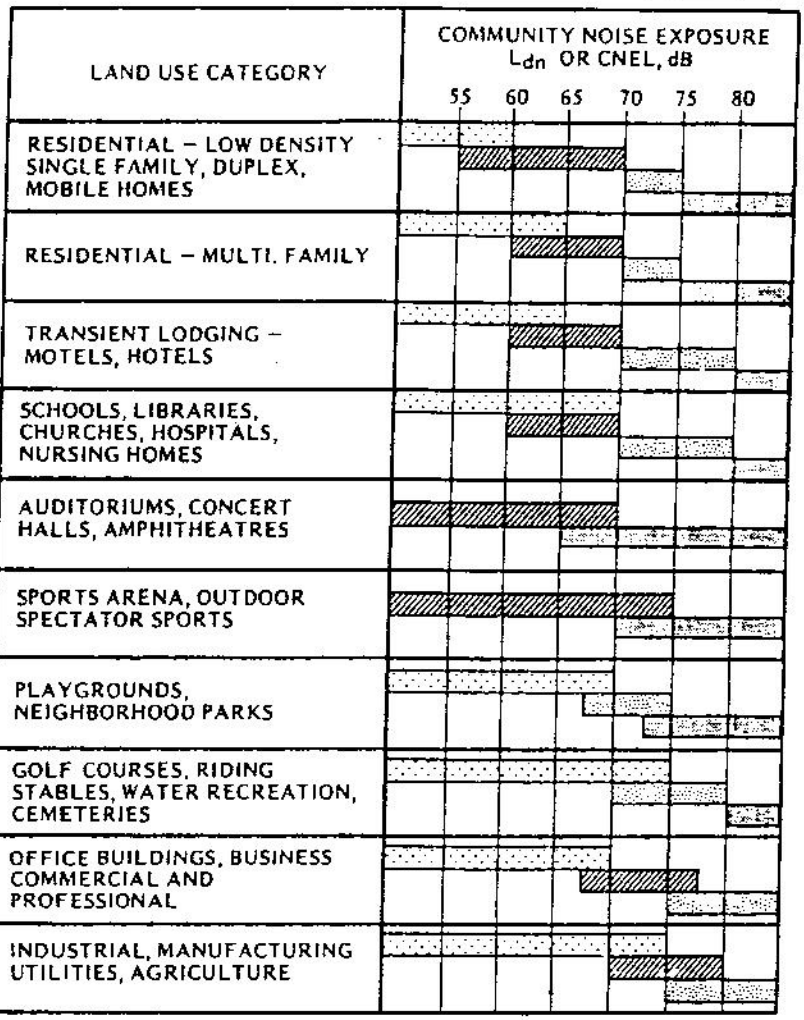
1.2 Effects of Noise (Figure V-1)

Sound levels are determined by the noise generating characteristics and distribution of noise sources within a given regional or local area. The effects of ambient sound levels on offsite receptors depend largely on the characteristics of the receptors and the intensity, frequency, duration, and spatial and temporal distribution of the noise source. The direct effect of noise on people range from annoyance to inconvenience to hearing damage. Environmental noise guidelines (Figure V-1) specify levels of sound consistent with the protection of the public health and welfare, including the prevention of annoyance or discomfort caused by noise. These State-established guidelines indicate that the highest recommended

FIGURE V-1

LAND USE NOISE SENSITIVITY

General Plan



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.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

CONSIDERATIONS IN DETERMINATION OF NOISE-COMPATIBLE LAND USE

A. NORMALIZED NOISE EXPOSURE INFORMATION DESIRED

Where sufficient data exists, evaluate land use suitability with respect to a "normalized" value of CNEL or L_{dn}. Normalized values are obtained by adding or subtracting the constants described in Table 1 to the measured or calculated value of CNEL or L_{dn}.

B. NOISE SOURCE CHARACTERISTICS

The land use-noise compatibility recommendations should be viewed in relation to the specific source of the noise. For example, aircraft and railroad noise is normally made up of higher single noise events than auto traffic but occurs less frequently. Therefore, different sources yielding the same composite noise exposure do not necessarily create the same noise environment. The State Aeronautics Act uses 65 dB CNEL as the criterion which airports must eventually meet to protect existing residential communities from unacceptable exposure to aircraft noise. In order to facilitate the purposes of the Act, one of which is to encourage land uses compatible with the 65 dB CNEL criterion wherever possible, and in order to facilitate the ability of airports to comply with the Act, residential uses located in Community Noise Exposure Areas greater than 65 dB should be discouraged and considered located within normally unacceptable areas.

C. SUITABLE INTERIOR ENVIRONMENTS

One objective of locating residential units relative to a known noise source is to maintain a suitable interior noise environment at no greater than 45 dB CNEL of L_{dn}. This requirement, coupled with the measured or calculated noise reduction performance of the type of structure under consideration, should govern the minimum acceptable distance to a noise source.

D. ACCEPTABLE OUTDOOR ENVIRONMENTS

Another consideration, which in some communities is an overriding factor, is the desire for an acceptable outdoor noise environment. When this is the case, more restrictive standards for land use compatibility, typically below the maximum considered "normally acceptable" for that land use category, may be appropriate.

SOURCE: CALIFORNIA DEPARTMENT OF HEALTH,
OFFICE OF NOISE CONTROL

exterior noise level for single-family and multi-family residential land uses is 60 and 65 dB(A), respectively; the highest recommended noise level for most commercial land uses is 70 dB(A); and the highest recommended noise level for institutional uses, such as schools, parks, hospitals, etc., is 70 dB(A) Ldn.

1.3 Noise Measurement

Loudness, duration, frequency and tone describe the characteristics of noise and help identify whether a noise source is likely to be harmful. Common noises range from a distracting whisper to a thunderous locomotive train. To begin to accurately measure the range of sounds, a loudness scale has been developed called the decibel (dB) scale.

Beginning with 0 dB, representing the weakest sound detectable by the human ear, the scale increases in logarithmic fashion to approximately 150 dB (equivalent to a jet carrier deck operation). At a logarithmic scale, the measured loudness increases geometrically; thus, an increase from 30 dB to 60 dB is not a doubling but an eight-fold increase in relative loudness.

The decibel scale has been modified to adjust for the sensitivity of the human ear with regard to tone. We tend to be more sensitive to high-pitch sounds than to low-pitch, and the scale is thus weighted to account for this bias. This adjustment is called the A-weighted decibel scale, and is notated as dB(A). The dB(A) scale is the commonly accepted scale for measuring noise sources.

To develop an indicator of sound levels occurring over a 24-hour day, it is necessary to average the sound occurring throughout the day. This averaging procedure yields a single-number index called the day-night noise level, or Ldn. The Ldn is based on the equivalent sound level (Leq), which is a constant sound level that is equivalent to the same amount of acoustic energy as the actual time-varying sound over the same time period. Appropriately weighted Leqs are combined for a 24-hour period to result in the day-night average level, or Ldn. The procedure includes a weighting of noise that occurs at night to account for the increased sensitivity people have to noise after dark.

Using the weighted decibel scale and the day-night noise level, quantitative estimates of noise exposure in the City can be determined. These estimates are shown graphically as noise contours. Contour lines show areas having higher noise levels and are typically

located around major roads, airports and certain industrial activities. Miscellaneous sources, such as a fire station siren or backyard rock and roll band, are not included in the contour areas. It should be remembered that the noise contours are general indicators of noise exposure and not precise levels. Estimating and smoothing limit the exactness of the contour map; precise estimates require a more detailed site analysis.

The State Office of Noise Control has issued guidelines for the preparation of a local Noise Element which detail a local jurisdiction's responsibility for identifying a) noise sources, b) an inventory of noise-sensitive areas and c) measures addressing existing and foreseeable noise problems. This Element is prepared in accordance with these guidelines.

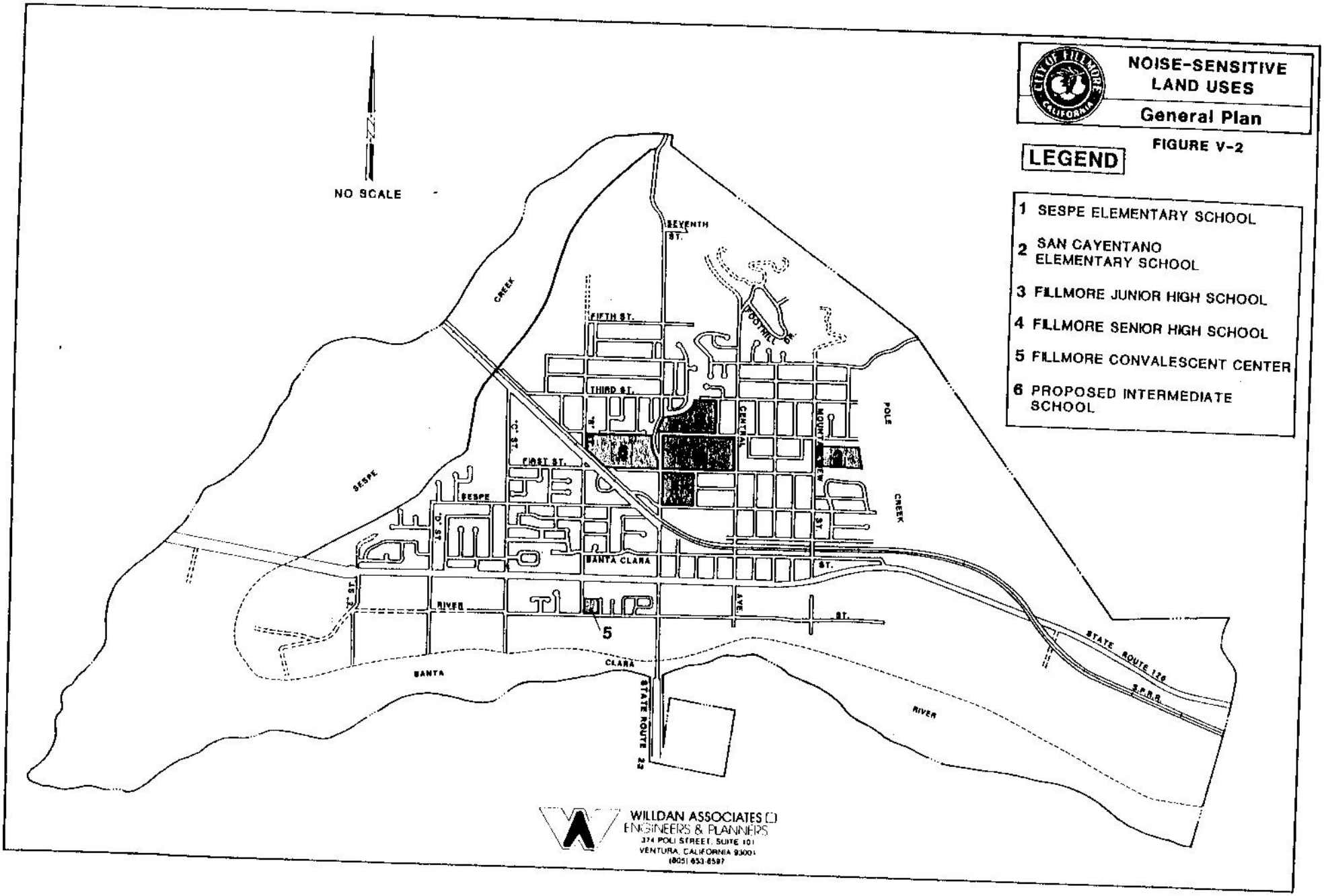
2.0 NOISE AND LAND USE COMPATIBILITIES (Figure V-2)

The relationship between noise and the General Plan is most commonly expressed in terms of compatibility of land uses. When noise-sensitive uses are kept distant from noise sources, the result is a higher quality living environment.

Within the City, land uses considered sensitive to noise include residential areas, schools, hospitals, etc. The schools and hospitals are identified in Figure V-2. The ways noise sensitive land uses can be adversely affected by noise include (a) increasing vehicular traffic on adjacent roadways; and (b) locating high noise generating land uses directly adjacent to noise sensitive uses. Where a land use is denoted as "normally acceptable" in Figure V-1 for the given Ldn noise environment, the highest noise level in that range should be considered the maximum desirable for conventional construction which does not incorporate any special acoustical treatment. Not all activities occur indoors, however, and so another consideration affecting land use compatibility is the anticipated amount of time which will normally be spent outside the structure.

3.0 EXISTING NOISE CONDITIONS (Figures V-3, V-4, V-5)

The existing noise environment in the City is largely determined by three primary noise sources which include vehicular traffic on local roadways, activity associated with local industrial development, and general human activity associated with local residential and commercial land uses. Secondary noise sources in the City include railroad activity associated with the local rail line and occasional overflights of aircraft. These secondary sources are not investigated in this document because the railroad only makes one run through the City a day and future


NOISE-SENSITIVE LAND USES
General Plan
FIGURE V-2
LEGEND
1 SESPE ELEMENTARY SCHOOL
2 SAN CAYENTANO ELEMENTARY SCHOOL
3 FILLMORE JUNIOR HIGH SCHOOL
4 FILLMORE SENIOR HIGH SCHOOL
5 FILLMORE CONVALESCENT CENTER
6 PROPOSED INTERMEDIATE SCHOOL
NO SCALE
SEVENTH ST.
FIFTH ST.
THIRD ST.
FIRST ST.
SESPE CREEK
POTRERO CREEK
SANTA CLARA RIVER
STATE ROUTE 23
STATE ROUTE 126
SP R.R.
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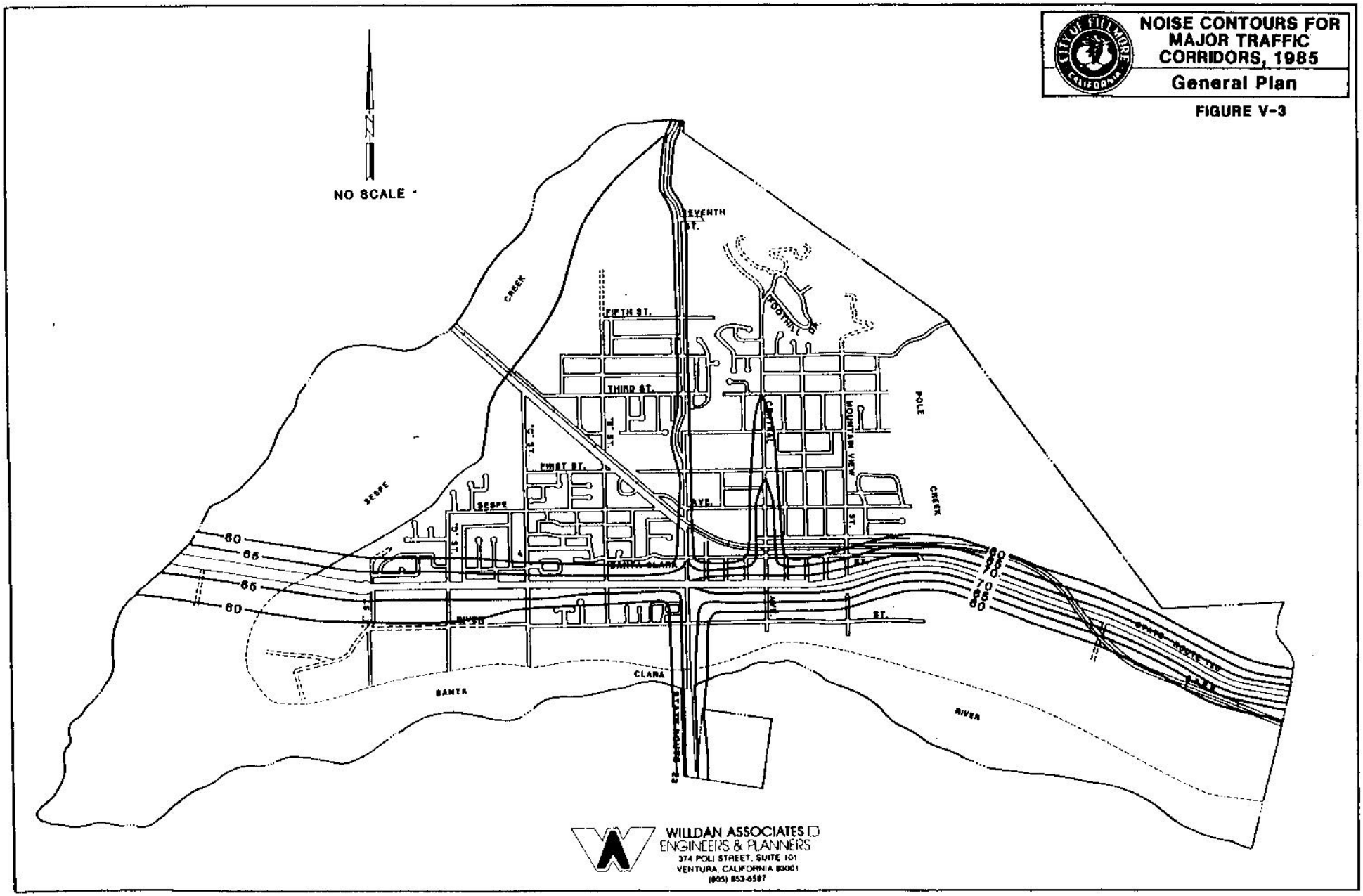
NOISE CONTOURS FOR MAJOR TRAFFIC CORRIDORS, 1985

General Plan

FIGURE V-3



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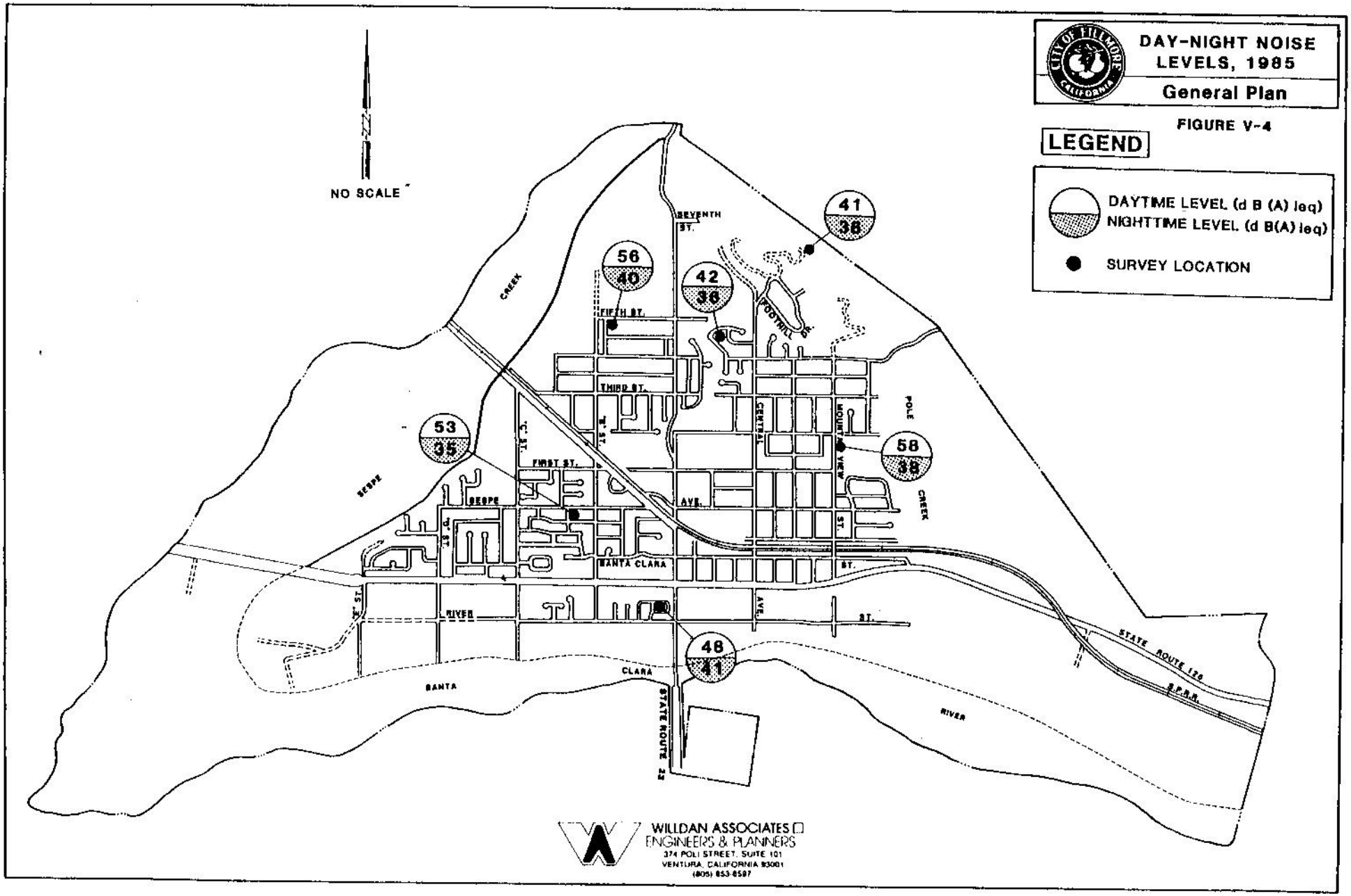
DAY-NIGHT NOISE LEVELS, 1985
General Plan
FIGURE V-4
LEGEND
DAYTIME LEVEL (d B (A) leq)
NIGHTTIME LEVEL (d B(A) leq)
SURVEY LOCATION
NO SCALE
41
36
56
40
42
36
53
35
58
38
48
41
SEVENTH ST.
FIFTH ST.
FOOTHILL DR.
THIRD ST.
FIRST ST.
SESPE
SESPE AVE.
SANTA CLARA
RIVER
CLARA
SANTA
STATE ROUTE 23
STATE ROUTE 126
S.P.R.R.
RIVER
POLE
CREEK
MOUNTAIN VIEW
CENTRAL
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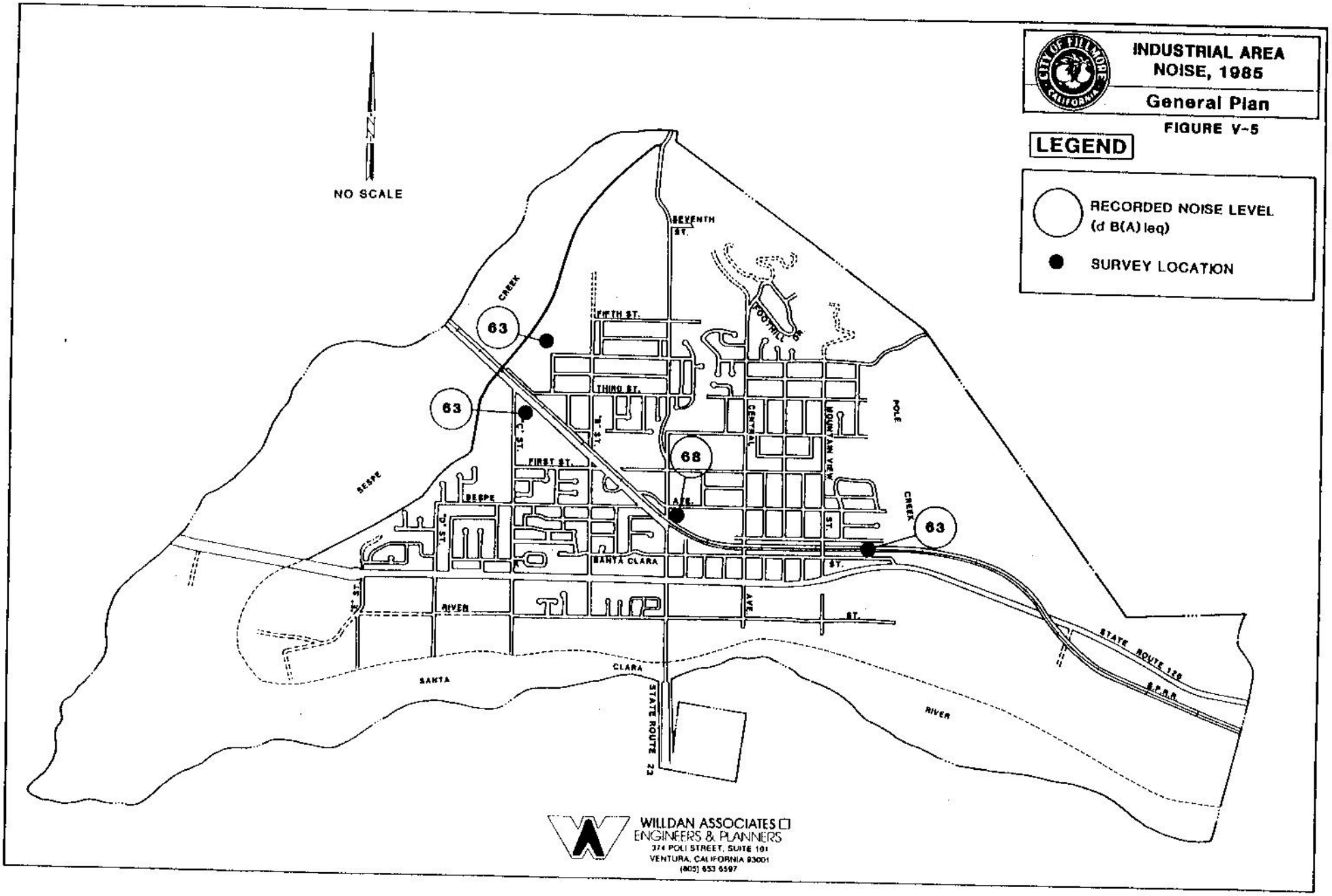
INDUSTRIAL AREA
NOISE, 1985
General Plan
FIGURE V-5
LEGEND
RECORDED NOISE LEVEL
(d B(A) leq)
SURVEY LOCATION
NO SCALE
63
63
68
63
SEVENTH ST.
FIFTH ST.
THIRD ST.
FIRST ST.
SANTA CLARA
RIVER
SESPE
MOLE
CREEK
STATE ROUTE 23
STATE ROUTE 126
S.P.R.R.
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increases in activity is not anticipated. Existing noise levels are graphically depicted for major traffic corridors, (Figure V-3), and industrial areas (Figure V-5). Figure V-4 depicts 1985 day and night noise levels (Leqs) throughout the City.

3.1 Traffic Corridors (Figure V-3)

3.1.1 Primary Noise Corridors

As mentioned previously, noise levels in the City are primarily generated by vehicular traffic, notably from State Highway 126, "A" Street and Central Avenue. The main entrance into the City, and a prominent truck route between U.S. Highway 101 and Interstate 5, Highway 126 accommodates average daily traffic flows of 16,000 vehicles. Approximately 2,200 trucks (14 percent of daily volume) are included in this flow.

As shown on the traffic-generated noise map (Figure V-3), Highway 126 traffic produces exterior noise levels in excess of 70 dB(A) within 35 feet of the roadside, east of Central Avenue. Given an uninterrupted line of site and a noise reduction of 4.5 dB(A) per doubling of distance (typical of traffic-generated noise) the 65 and 60 dB(A) noise contours would extend approximately 150 and 500 feet from the roadway edge, respectively. Lower traffic levels west of Central Avenue generate lower noise levels, exceeding 65 and 60 dB(A) within 125 and 400 feet of the roadway edge, respectively. As estimates of noise levels, these contours would vary depending on local site conditions.

Existing development along the Highway includes residential uses which are incompatible with high noise levels. Homes built on Ventura Street prior to its designation as a State highway are located within the 70 to 74 dB(A) contour. The Land Use Map identifies land uses along the Highway for Commercial uses to encourage conversion of these areas to more noise-tolerant uses.

3.1.2 Secondary Noise Corridors

Secondary noise corridors include "A" Street and Central Avenue. Residential uses along these corridors are exposed to noise levels exceeding 60 dB(A), although many homes have noise attenuation barriers (especially walls) which effectively lower first-floor noise levels below 60 dB(A). Residences which do not have such barriers are located in the following areas:

- o on Central Avenue between First and Fourth Streets
- o on "A" Street between
  - Highway 126 and Old Telegraph Road
  - Third and Fifth Streets, and
- o on the north side of State Highway 126 between
  - "D" and "C" Streets
  - "A" and Palm Streets, and
  - Saratoga and Mountain View Streets.

3.2 Industrial Parks (Figure V-5)

Existing noise levels at local industrial sites (Figure V-5) are at or below 68 dB(A) as required by the Fillmore Zoning Ordinance performance standards for industry. Residential areas have noise levels consistent with those typical of rural areas and small towns. With the exception of the highway and major street corridors, Fillmore residents enjoy a relatively quiet noise environment.

4.0 EXPECTED NOISE CONDITIONS

In planning for the City's future noise environment, estimates of noise levels must be based on full build-out under the City's General Plan, including consequential traffic volumes. In general, the expected noise environment will be contingent upon three factors:

- o expected changes (increases) in the number of noise sources, specifically traffic volumes;
- o application of noise-control measures to reduce noise at the source; and
- o noise mitigation measures applied to decrease exterior and interior noise levels.

4.1 Noise Corridors (Figure V-6)

4.1.1 Primary Noise Corridors

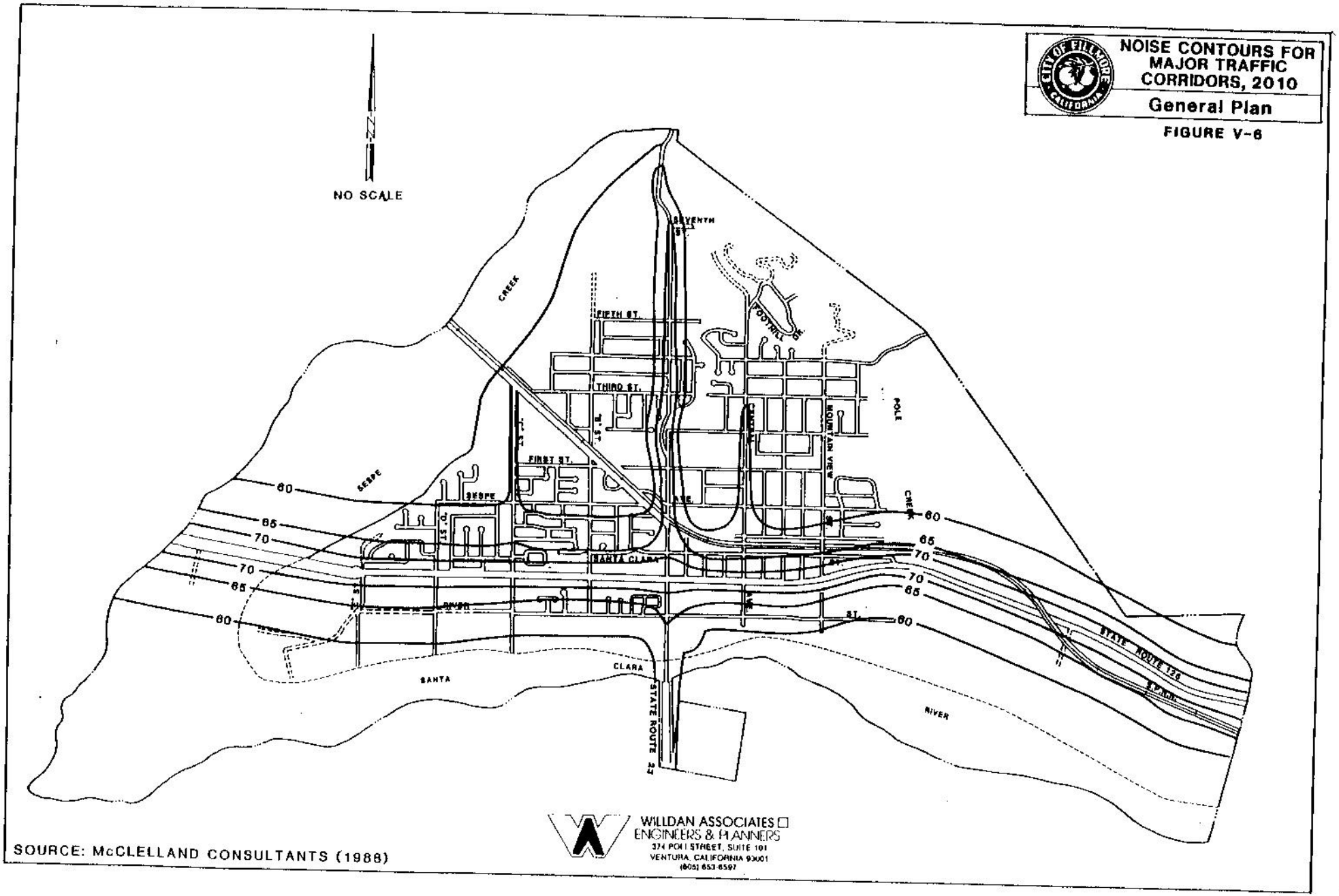
Noise exposure contours were developed for full buildout under the City's General Plan, based on an updated version of the Federal Highway Noise Prediction Model (STAMINA 2.0, FHWA, 1982). The noise contours were based on the traffic volumes assumed in the Circulation Element. Posted speed limits were assumed to remain unchanged.

The 2010 Noise Contour Map (Figure V-6) indicates the locations of noise level contours resulting from projected traffic volumes. Those road segments experiencing the largest percentage increases in traffic are expected to produce the greatest noise level increases. State Highway 126 and "A" Street north of the State Highway are expected to have the greatest noise level increases.

NOISE CONTOURS FOR MAJOR TRAFFIC CORRIDORS, 2010

General Plan

FIGURE V-6



SOURCE: McCLELLAND CONSULTANTS (1988)

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The increase in existing noise levels along "A" Street north of Highway 126 is expected to be up to 6 dB(A), with much of the increase in noise levels due to the proposed industrial expansion in the northwest corner of the city. Access to this industrial area is limited to truck traffic that is projected to use "A" Street and to a minor extent, "C" Street, with subsequent significant increases in traffic noise along both routes. The expected increase in traffic noise along "A" Street would not cause noise levels at the school sites located adjacent to "A" Street to exceed the 70 dB(A) compatability limit, because the buildings are all located away from the street.

Regional and local travel along Highway 126 is expected to increase noise along the highway by up to 3 dB(A) over existing levels, which would be just perceptible to existing residents living in the area. Noise levels would substantially exceed the 60 dB(A) Ldn guideline for existing residences located adjacent to the highway. Those residences that are currently shielded by noise barriers are not expected to experience noise levels exceeding 65 dB(A) Ldn, but unshielded residences would experience noise levels in excess of both interior and exterior standards.

However, complete build-out of the Plan includes the conversion of the north frontage of the State Highway east of "A" Street to noise-tolerant highway commercial uses, eliminating unprotected sensitive residential uses from the highway corridor.

Other future noise impacts within the City involve noise related to construction activity, specifically, transportation of construction equipment. Short-term in nature, these impacts would result along primary transportation corridors.

Reduction of noise at the source can be accomplished through the implementation of a local noise control ordinance. For vehicle-generated noise, the City's power to set noise standards is pre-empted by the Environmental Protection Agency (EPA) which has set standards for new vehicles that will incrementally decrease noise emissions from individual vehicles; however, these reductions will be compromised by increased traffic volumes.

4.1.2 Secondary Noise Corridors

It is expected that traffic-generated noise levels adjacent to other roadways in the City would increase as well. However, because other roadways would not

support the same high traffic volumes as would Highway 126, "A" Street, and Central Avenue, noise guidelines at locations adjacent to other City roadways would not be exceeded.

4.2 Industrial Plants

Review of the proposed land use map in the Land Use Element indicates that there is a potential for the creation of noise generating land uses adjacent to noise sensitive land uses. As shown in the northwestern and southwestern portions of the City, industrial uses which are considered relatively high noise generators are proposed to be located directly adjacent to single-family and multi-family residential land uses. This situation creates a land use incompatibility problem as industrial uses would be a cause of nuisance noise near residential land uses. As a result, the potential for significant impact could be created.

5.0 NOISE CONTROL MEASURES

Control of noise is considered a local government responsibility due to the close relationship between noise and land use. Several potential control measures, however, are not available to local jurisdictions. State and Federal governments pre-empt cities and counties with regard to vehicle, rail and aviation noise standards. Thus, local agencies are prevented from directly addressing the most prevalent noise generators.

Zoning provides some protection by keeping factories out of residential areas; however, as shown by the contours in Figure V-3, land uses such as freeways or major roads are not separated from sensitive areas by zoning. Combined with effective programs, the contour map itself can be an effective tool for developing policy for reducing noise-related land use conflicts. Noise contour areas can operate as overlays, defining areas that should be limited to uses which are compatible with noisier environments.

Cities must use other measures to control noise pollution. Zoning, mentioned earlier, has the potential for controlling noise. The existing Fillmore Zoning Ordinance requires all industrial buildings to be constructed and occupied in such a way as to limit exterior noise levels to 68 dB(A). Specific proposals may have conditions imposed which restrict times of operations which tend to limit nighttime noise levels. Finally, many jurisdictions adopt noise ordinances which set maximum noise levels allowed for activities such as construction, commercial loading/unloading, powered motor vehicles and residential air conditioners.

Another approach to noise control is found in project-design review. Orienting structures away from noise or setting them back from noise sources are site-specific measures that can reduce interior noise pollution. Separating noise-sensitive uses and the noise source with other structures can help attenuate noise as can natural topography, such as low mounds or hills. Building construction techniques commonly used to reduce interior noise include:

- o increasing wall mass or thickness,
- o using wall cavity partitions,
- o enlarging the airspace around the noise sensitive uses,
- o adding acoustical blankets,
- o increasing window glass thickness,
- o using double-glazed window.

Outside the structure, noise barriers can effectively reduce noise if properly designed and constructed. Barriers such as walls, berms or embankments can reduce noise 5 to 10 dB(A) depending on their placement relative to the noise source and how well they prevent the passage of noise. Finally, it should be noted that landscaping with trees and shrubs is not an effective noise barrier.

6.0 REFERENCES

Westland Geological Services, Inc. 1986. Draft Initial Study: City of Fillmore General Plan.

McClelland Consultants (November 1988). Final Environmental Impact Report - City of Fillmore General Plan Update, 1988-2010. (Ventura, California).