Noise Element

INTRODUCTION

The Noise Element of the General Plan provides a basis for comprehensive local programs to control and abate environmental noise and protect citizens from excessive exposure. The fundamental goals of the Noise Element are:

- To provide sufficient information concerning the community noise environment so that noise may be effectively considered in the land use planning process. In so doing the necessary groundwork will have been developed so that a community noise ordinance may be utilized to resolve noise complaints.

- To develop strategies for abating excessive noise exposure through cost-effective mitigating measures in combination with zoning, as appropriate, to avoid incompatible land uses.

- To protect those existing regions of the planning area whose no environments are deemed acceptable and also those locations throughout the community deemed "noise sensitive".

- To utilize the definition of the community noise environment, in the form of CNEL or Ldn noise contours as provided in the Noise Element for local compliance with State Noise Insulation Standards. These standards require specified levels of outdoor to indoor noise reduction for new multi-family residential constructions in areas where the outdoor noise exposure exceeds CNEL (or Ldn) 60 dB.

History

Since the time of the industrial revolution, the use of mechanical devices has increased dramatically. The technology has brought motor vehicles, jet aircraft, and literally thousands of labor saving implements into common usage and has, at the same time, increased both the magnitude and frequency of occurrence of man-made sound in the environment.

The need for increased attention to noise in the planning process is a consequence of this potential for continued elevation of ambient noise levels, the spread of noise producing activities into formerly quiet areas, and heightened awareness of the impact of noise on human health and amenity. Noise affects both physiological and psychological well-being. In addition to causing hearing loss, noise interferes with activities such as communication, sleep, and thought. Noise can be a source of great annoyance for many persons and may be a contributing factor in stress-related health disorders.

Noise Element

LEGISLATIVE REQUIREMENT

The requirement for Noise Element preparation was first codified in 1971. In 1976, the Department of Health Services issued Noise Element guidelines (Health and Safety Code Section 46050.1) followed shortly thereafter by model Noise Ordinance AB 2038's Chapter 1009, (statutes 1984). Revisions to the General Plan statutes made extensive changes to the Noise Element requirements. Generally, these revisions shortened the list of State required issues and encouraged local governments to design their own approaches to noise control. The underlying purpose of the noise element, to limit community exposure to excessive noise levels, remains unchanged.

In making city and county governments in California responsible for a Noise Element in their General Plans, the State Legislature has recognized the steady escalation of outdoor noise as a significant environmental hazard. Unlike other hazards faced by California residents, such as earthquakes or floods, noise is generated primarily by man's own activities. Considering noise in the planning process, then, is essential to controlling its impact on the community.

Specific authority for this Element of the General Plan is contained in government Code Section 65302(g), which was revised by Senate Bill 860 (Belenson, 1975). The amendment became effective January 1, 1976, and requires the following:

A noise element which shall recognize guidelines adopted by the Office of Noise Control pursuant to Section 39850.1 of the Health and Safety Code, and which quantifies the community noise environment in terms of noise exposure contours for both near and long-term levels of growth and traffic activity. Such noise exposure information shall become a guideline for achieving noise compatible land use and also to provide baseline levels and noise source identification for local noise ordinance enforcement.

The sources of environmental noise considered in this analysis shall include, but are not limited to, the following:

(1) Highways and freeways.

(2) Primary arterials and major local streets.

(3) Passenger and freight on-line railroad operations and ground rapid transit systems.

(4) Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.

(5) Local industrial plants, including, but not limited to, railroad classification yards.

(6) Other ground stationary noise sources identified by local agencies as contributory to the community noise environment.

Noise exposure information shall be presented in terms of noise contours expressed in community noise equivalent level (CNEL) or day-night average (Ldn). CNEL means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of five decibels to sound levels in the evening from 7 pm to 10 pm and after additions of 10 decibels to sound levels in the night before 7 am and after 10 pm. Ldn means the average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 10 decibels to sound levels in the night before 7 am and after 10 pm.

The contours shall be shown in minimum increments of 5 dB and shall continue down to 60 dB. For areas deemed noise sensitive, including, but not limited to, areas containing schools, hospitals, rest homes, long-term medical or mental care facilities, or any other local land use areas deemed noise sensitive by the local jurisdiction, the noise exposure shall be determined by monitoring.

A part of the noise element shall also include the preparation of a community noise exposure inventory, current and projected, which identifies the number of persons exposed to various levels of noise throughout the community.

The noise element shall also recommend mitigating measures and possible solutions to existing and foreseeable noise problems.

The state, local, or private agency responsible for the construction, maintenance, or operation of those transportation, industrial or other commercial facilities specified in paragraph 2 of this subdivision shall provide to the local agency producing the general plan, specific data relating to current and projected levels of activity and a detailed methodology for the development of noise contours given this supplied data, or they shall provide noise contours as specified in the foregoing statements.

It shall be the responsibility of the local agency preparing the general plan to specify the manner in which the noise element will be integrated into the city or county's zoning plan and tied to the land use and circulation elements and to the local noise ordinance. The noise element, once adopted, shall also become the guideline for determining compliance with the State's Noise Insulation Standards, as contained in Section 1092 of Title 25 of the California Administrative Code.

As a mandated part of the General Plan, the Noise Element is intended to serve as the local governments guide to public and private development matters related to outdoor noise. The basic goal of the Element is to outline a comprehensive plan to achieve and maintain a noise environment that is compatible with a variety of human activities in different land uses. To achieve this goal, the element provides a quantitative estimate of noise exposures, land use noise standards, and policies and implementation for controlling noise. This information is intended for use in conjunction with other adopted policies of the General Plan, particularly those of the Circulation, Land Use, and Housing Elements.

RELATIONSHIP TO OTHER GENERAL PLAN ELEMENTS

The Noise Element is one of the more technical elements of the General Plan. However, the approach of this report is to present discussions of noise primarily in qualitative form for the lay-person to easily comprehend. Those wishing a more detailed technical explanation are referred to the Technical Report performed by Walker, Celano and Associates in Appendix B.

Circulation Element

The principle noise sources evaluated in the element are transportation noise sources, which are road, rail, and air traffic. Noise generated by these sources depends primarily on the number and type of vehicles in operation as planned for in the Circulation Element. The noise element affects the Circulation Element by suggesting that noise evaluation be included in the analysis of location and design alterations for new roadways.

Land Use

Inseparable from the circulation considerations in the General Plan are the locations, types and densities of land uses throughout the City. The locations of circulation routes in relation to different land uses can be a major determining factor of noise exposure. It is important that consideration be given in the Land Use Element to separating the most sensitive land uses from the sources of high noise levels. Land use noise standards are recommended as a part of this Element to assist in these considerations.

Housing Element

The Housing Element is related to the Noise Element in that both the location and insulation requirements of housing are, in part, determined by noise exposures. The Housing Element is concerned with the provision of adequate housing of acceptable quality, and noise exposure is an important factor affecting the quality of housing. The Noise Element recommends design standards for new housing in high noise impact areas. This will affect the cost and, in some instances, the location of new or rehabilitated housing.

Conservation Element

The Conservation Element identifies passive areas such as open space along creek beds, where low noise levels should be maintained.

GENERAL DEFINITIONS

The following is not intended as a comprehensive glossary of acoustic terminology, but will provide, in approximately logical order, information sufficient to allow a lay person to better understand the technical language in the document.

On a most fundamental level, sound is described by:

Sound Pressure Amplitude - the actual pressure or force per unit area of the sound. The amplitude of the faintest discernible sound is approximately 1/5,000,000,000 of a standard atmosphere (14.7 pounds per square inch). The standard reference pressure, which corresponds approximately to the minimum discernible sound pressure, is 20 micropascals. The amplitude of the highest reasonably tolerable sound is approximately 1 million times this minimum discernible value. The subjective manifestation of amplitude is loudness, but this is dependent upon other factors as well. The human ear acts as a signal compressor, with a factor of 3 in amplitude resulting in a factor of only 2 in perception of loudness.

Sound Frequency - the rate at which the sound pressure fluctuates between values above and below the static pressure, in cycles per second. The unit Hertz (Hz) is defined as one cycle per second. Subjectively, frequency defines pitch. One octave of pitch corresponds to a 2 to 1 ratio of frequencies, and "middle C" is approximately 256 Hz. The normal range of human hearing is nominally 20 Hz to 20,000 Hz, but, particularly at low frequencies, this is very dependent upon the amplitude of the sound.

Decibel (dB) - A unit division on a logarithmic scale whose base is the tenth root of ten, used to represent ratios of quantities proportional to power. In simple terms, if the power is multiplied by a factor of ten, then ten is added to the representation of the power on the decibel scale. If 0 dB represents 1 unit of power, 60 dB represents one million units, etc.

Level - Sound amplitudes are more conveniently described on a decibel scale. A pressure amplitude ratio of 10 corresponds to a level difference of 20 dB. By using 0 dB to represent a sound pressure amplitude of 28.3 micropascals or 20 micropascals rms, the range of normally dealt-with sound amplitudes covers the level range 0 to 120 dB.

Sound Pressure Level (SPL - dB) - The ratio, in decibels, of the mean squared sound pressure to the square of the reference pressure, 20 micropascals.

A-weighted Sound Level (FAL or SAL - dB) - Sound pressure level in decibels measured by use of the A frequency weighting and the fast or slow exponential time averaging. The A-weighting filter discriminates against low and very high frequencies in a manner similar to the human hearing mechanism at moderate sound levels. The fast exponential has an averaging time of 1/8 second. The slow exponential has an averaging time of one second.

Time Average Sound Level (L_{eqT} - dB) - The level, in decibels, of the mean squared sound pressure averaged over time period T. This is often referred to as "equivalent sound level" and hence the "eq" subscript. The "equivalence" is to a sound of constant level which has the same total acoustic energy content.

Sound Level Meter - An instrument consisting of a microphone, amplifiers, display device (meter or numerical) and frequency weighting networks, meeting appropriate performance specifications, for the purpose of determination of sound levels. For measurement of time-average sound levels (L_{eq}), an integrating sound level meter is required. This employs a special metering circuit which weights equally all sounds occurring within the measurement period. In a standard sound level meter, only events which occurred within the past approximately one second (or 1/8-second depending upon the meter setting) of the reading are included in the result. Some meters are capable of performing both functions simultaneously.

Ambient Noise - The noise which results from the combination of all sources, near and far. The ambient noise level is expressed as L_{eqT} or CNEL as judged appropriate to the situation.

Background Noise - The steady noise level which characterizes a given environment in the absence of transient sources. The background noise is usually expressed as L_{90}, the noise level which is exceeded 90% of the specified time period.

Intrusive Noise - Noise from an identifiable source which causes a discernible change in the existing acoustic environment. Noises can be intrusive by virtue of excessive overall level, or as the result of unusual spectral or temporal characteristics.

Noise Contour - A line on a map which indicates locations of constant ambient sound level near or around known sources of noise. In practice, noise contours are often shown as calculated for the dominant source of noise only.

NOISE EXPOSURE

EFFECTS OF NOISE

Noise may have a variety of consequences for physical, mental, or social well-being. For discussion, these effects are categorized as either auditory of non-auditory. Auditory effects of noise include hearing loss and interference with communication. Non-auditory effects include physiological reactions, interference with sleep, adverse affects on human performance, and annoyance.

Auditory Effects

Hearing Loss: Permanent hearing loss is, so far as is presently known, the most severe effect of noise upon health. While noise-induced hearing loss was once associated primarily with certain industrial situation, increasing numbers of people in urban areas are presently exposed to ambient noise levels which over long periods of exposure will cause significant hearing impairment. Even where daily exposure to general community noise does not in itself pose a distinct hazard to hearing, it may still contribute to hearing loss. Community noise may prevent the person who works in a high noise situation from receiving enough quiet while off the job to allow the ears to recuperate from temporary hearing loss experienced on the job.

Speech Communication: Interference with the ability to hear and understand speech communication is one of the more common experiences of noise intrusion. In a highly developed society, much value is placed on verbal exchange. Noise can reduce the amount and quality of this interaction. Normal conversation speech in the range of 60 to 65 dB and any noise in this range or louder may interfere with speech.

The impact of noise on speech communication can be evaluated in terms of speech intelligibility requirements. Speech intelligibility is measured in terms of the percentage of key word in a group of sentences that can be correctly understood. As noise level increases, the percentage of words understood will decrease, unless the people communicating move closer together or raise their voices. One hundred percent intelligibility is not necessary for satisfactory communication in all situations. Most people can correctly infer the content of a sentence even though one or more words may not have been heard. Once intelligibility drops below about 90 percent, however, conversation becomes strained.

Non-Auditory Effects

Physiological Reactions: In addition to hearing loss, a number of other physiological responses to noise have been documented. Changes in cardiovascular blood pressure and blood volume, breathing rate, pulse rate, and endocrine gland secretions have all been observed to result from exposure to noise. These non-auditory effects distinguish physiologically from responses that occur in emotional states of fear or anger. They usually take place without conscious knowledge of their occurrence.

It is not yet clear whether these physiological responses are associated with the onset or prolongation of any disease in humans. Noise has been cited as a contributing factor to the development of peptic ulcers, hypertension, colitis, migraine headaches and other disorders; but a causal link between noise exposure and non-auditory disease has not been established with certainty.

Sleep Interference: From everyday experience as well as laboratory research, it is evident that noise interferes with sleep. In addition to awakening a person, or preventing the person from falling asleep, noise can shift the stage of sleep from a deep, restful stage to a lighter one. In laboratory tests this is observed as a change in brain-wave pattern of a sleeping subject. The significance of these shifts in stage of sleep to a person's long-term well-being has not been established.

Disruption of sleep can occur at sound levels as low as 35 dB, but there is a great deal of variability in response among individuals. Some people awaken consistently when exposed to rather low level noise while others practically never awaken, even at levels up to 75 dB. A number of factors influence the degree to which noise may interfere with sleep. Impulsive or fluctuating noise is more disruptive than steady-state noise. Familiarity with the noise may reduce its ability to awaken, but there is no clear evidence that the quality of sleep is unaffected.

Because of the number of variables involved, it has been difficult to establish a quantitative relationship between noise exposure and sleep interference. In light of present knowledge, however, researchers recommend that noise levels inside dwellings not exceed 35-40 dB for satisfactory sleeping conditions.

Physical and Mental Performance: Noise levels found in certain industrial situations are known to adversely affect the ability to perform physical tasks, even when the task requires little mental concentration. For a familiar, steady-state noise this is generally true only when the noise exceeds 90 dB. Irregular or unfamiliar bursts of noise can affect work efficiency at lower noise levels. Usually, the total quantity of work performed will not decrease, but the number of errors made will increase. Any task requiring the use of speech or other auditory signals will be subject to noise interference.

The ability to perform mental tasks such as reading, problem solving, or writing is also impaired by a noisy environment. As with sleep interference, there is a great deal of variability in individuals' responses. The degree of distraction, or interference with concentration, is related to the person's state of motivation, morale, stress, and fatigue, as well as characteristics of the noise such as intensity, pitch, impulsiveness, and information content. Complex or demanding tasks are more likely to be disrupted by noise than are simple assignments.

Annoyance: Annoyance is considered here to mean feelings of displeasure or resentment associated with the experience of noise, either because the noise is judged unpleasant or because the noise disrupts some ongoing activity. Annoyance is partly a psychological response to noise and partly a sociological response. Attitudes or values prevalent in a particular community can influence an individual's evaluation of noise.

Annoyance is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be unbearable to another of equal capability.

SEASONAL EFFECTS ON THE ACOUSTICAL ENVIRONMENT

Weather conditions affect sound generation, sound propagation and conditions at potential sound reception points. In the most obvious sense, wet weather causes a significant increase in tire noise from roadways, and indeed, full rain generates considerable noise as it strikes roofs and other surfaces. No effort has been made to quantify these effects, as they are so unpredictably variable with details of the local surroundings.

A more subtle effect would be the tendency of residents to keep windows open for ventilation in times of warm weather. This, again would be quite variable, as homes in warm areas are more commonly air conditioned, producing perhaps just the opposite effect.

Quantitatively, with "typical" sized windows and normal residential construction, the difference between outdoor noise levels and indoor noise levels is approximately 10 dB when windows are open and 20-25 dB when windows are closed. This was demonstrated by measurements taken at Whispering Oaks as part of the Technical Appendix. To allow windows to be kept open at residents' discretion without causing excessive indoor noise pollution, the Noise Element has recommended 55 dB exterior noise guideline.

The most commonly considered effect of weather on noise levels is the effect on sound propagation over long distances as specific atmospheric parameters vary. The important parameters are: wind profile and direction, temperature and temperature profile, humidity. These will be discussed in the following paragraphs.

SOUND PROPAGATION IN THE ATMOSPHERE

In an idealized atmosphere, sound travels at the same speed in all directions and loses no energy to the air. In this case, we say that sound levels decrease by 6 decibels (dB) for each doubling of the distance between the sound source element and the receiver. This is because for each doubling of distance, the radiated sound power is distributed over four times the area, and a power ratio of one-quarter is equal to -6 on the dB scale.

Wind

In a real atmosphere, the air is moving at different speeds, at different elevations and locations. The effective speed of sound is higher in the direction of the wind and lower in the direction against the wind. As sound propagates from areas of lower to higher effective sound speed, the "direction" of propagation is bent or "refracted" toward the regions of lower speed. Thus, in a typical windy environment, where the wind speed is lower near the ground than aloft, noise levels are accentuated in the direction of the wind and greatly attenuated in the direction against the wind. This is not the result of the wind "pushing" the sound energy in its direction (a small effect, since sound travels 700 mph in still air!), but rather because sound which started propagating upwards is refracted down to add with sound which would have reached the receiver anyway. In the most extreme case, the spherical model used for analysis in the ideal atmosphere is transformed to a quasi-cylindrical model, in which levels drop at a -3 dB per distance doubling rate. In this case, the far-field noise level from a source which produces a 75 dB at 50 ft. would be increased by the wind gradient refraction from 35 dB to 55 dB at a distance of one mile. Effects of this magnitude are rare, since the structure of the wind gradient is seldom sufficiently stable over an extended enough region. Winds of sufficient strength to produce significant increases in propagation are usually sources of noise themselves.

In the up-wind direction, however, the so-called shadow zone created by upward refraction of sound (recall that in the upwind direction, the effective sound speed decreases with height) can result in noise levels many tens of dB lower than would occur in neutral conditions. This is an important consideration for noise surveys and enforcement measurements, particularly if the source is more than 100-200 ft.

from the reception point.

Temperature Profile

The speed of sound in air is proportional to the square root of the absolute temperature. Therefore, as for the wind profile, sound will be refracted from regions of high temperature toward those of lower temperature. On a sunny day, the temperature decreases with distance from the ground (a so-called lapse condition). This causes sound to be refracted upward, causing formation of shadow zones near the ground in all directions and potentially increasing noise levels at hillside or other elevated locations.

In the late evening following a warm day, conditions can reverse, forming an atmospheric layer (inversion) within a few hundred feet of ground where the temperature increases with elevation. In this case, acoustic energy is partially trapped near the ground and the rate of attenuation is significantly reduced, similar to the down-wind condition.

Temperature and Humidity

The air in the atmosphere converts a small percentage of acoustical energy into heat energy by three mechanisms: heat conduction, viscosity and molecular absorption. The first two effects are miniscule, and of no significance relative to community noise issues. The third effect can result in several dB per thousand feet excess attenuation at high frequencies. The degree of absorption depends upon the relationship of the sound frequency and the characteristic time constant for excitation of internal vibrations in nitrogen and (more importantly) oxygen molecules.

The time constant is strongly dependent upon the amount of water vapor in the atmosphere, and is secondarily dependent upon the temperature. Without reference to detail, it turns out that relatively dry air (20-35% relative humidity) has the greatest absorption. Very dry air and humid air have low absorption. Normally, these differences are of significance only for sounds of frequency 2 kHz or above, but at large distances (1000 ft. or more) they technically should not be ignored.

Overall Effect

In the built environment, the effect on sound propagation of structures, terrain and vegetation usually is greater than atmospheric irregularities. However, for hillside residences or other receivers which are located in remote areas at significant distances from major noise sources, noise levels can be expected to be higher than predicted from inverse square law propagation (6 dB per distance doubling) when atmospheric inversions and stable winds are present.

CATALOG OF NOISE SOURCES

This section contains a detailed description of the current noise environment within the City of Ojai. This information is from the Technical Report prepared by Walker, Celano and Associates which is included as Appendix B of this Noise Element.

The predominant land use in the City is residential. Residential land uses should therefore be considered the most noise sensitive in Ojai. Other noise sensitive land uses include schools, hospitals, museums, convalescent homes, libraries, and parks. Maintenance of a relatively quiet ambiance is important in maintaining the overall atmosphere of the area.

The rural environment and lack of either a railroad or airport in the vicinity create a considerably quiet noise environment. The primary source of noise affecting the City of Ojai is motor vehicle traffic. CNEL Contours were computed for all roadways carrying traffic flows of 2000 Average Daily Trips (ADT) or greater. Because it was observed that the day-evening-night distribution of traffic in Ojai is not typical per usual traffic models, the distributions from the November, 1989 count were used to determine CNEL weighting factors. FHWA RD77 and CALVENO noise emission models were used as a base line, but were modified to agree with measured data.

The second source of noise is the industrial area on Bryant Street and Bryant Circle. At the present time, the main source is a precipitator atop the roof of the ITI facility near the northerly end of South Bryant Street. The Bryant Circle Industrial area is located at the east end of the City. The existing land uses in this industrial park are currently not significant noise generating sources. However, the future buildout of the Bryant Street area, which abuts a quiet residential area to the south and west, could pose potential noise impact conflicts.

Additional noise sources identified by the City as sources of community complaints were:

- Gasoline powered leaf blowers. Measurements were obtained for one of these devices being operated in the Ojai Valley Hospital parking lot.

- Street sweepers, Jackhammers, Chain Saws, representative of transitory mechanical sources. Street sweepers and trash pickup trucks are represented in some of the measurement data.

- o Air Conditioners, Ventilation equipment noise was measured at OjaiValley Hospital and at the Acacias.

- o Crowing Roosters and Peacocks.

- o Barking Dogs.

- o Recreational Activities at Sarzotti Park and Nordoff High School Athletic Field.

- o "Boom-Box" motor vehicle sound systems. Concerts and other entertainment functions at Libbey Park Bowl.

CATALOG OF NOISE SENSITIVE RECEPTORS

Ojai is primarily a residential community. Except for the main commercial corridor along Ojai Avenue and the industrial area on Bryant Street, essentially all roadways affect residential uses to some extent. Specific Noise Sensitive Receptors are as follows:

- o Residences on the west side of Highway 150/33 south of the Maricopa Highway/Ojai Avenue Intersection. This area was judged to have the highest noise impact potential in the City, due to the high traffic flow and proximity to the roadway.

- o Ojai Valley Hospital, located on the north side of Maricopa Highway.

- o Nordoff High School, located on the south side of Maricopa Highway.

- o Matilija Junior High School and Ojai Valley (private) School, located adjacent to one another on the north side of Ojai Avenue west of Country Club Drive.

- o Topa Topa Kindergarten, located on the east side of Montgomery Street at Aliso Street.

- o Whispering Oaks Senior housing, located on the south side of Ojai Avenue east of downtown.

- Acacias convalescent hospital, located on the southwest corner of Grand Avenue and Montgomery Street.
- Libbey Park, on the south side of Ojai Avenue opposite the central commercial area.
- Sarzotti Park, located across from residences on Park Road, south of Grand Avenue.
- Ojai Library, located on the southeast corner of Ojai Avenue and Ventura Street.
- Ojai Museum, located on the west side of South Montgomery Street.
- Ojai Art Center, located directly south of the museum on Montgomery Street.
- Clausen's Funeral Home, located on the northwest corner of North Montgomery and East Matilija.
- Mim's Manor Convalescent Hospital, located on the north side of Eucalyptus Street.
- Mountain Vista Manor Convalescent Hospital, located on the north side of east Oak Street.
- Grey Gables residential care facility, located on the northwest corner of North Montgomery and Grand Avenue.

FUTURE AND EXISTING ACOUSTICAL ENVIRONMENT

The California Environmental Quality Act (CEQA) requires that noise contours be drawn on a City map for all significant noise sources in the community. However, noise contours as calculated from available modeling programs have meaning only in areas where essentially unobstructed sound transmission is possible. In Ojai, there are few locations where this situation exists, most notably along the Maricopa Highway between Nordoff High School and El Roblar Drive. In most other areas, roadways are flanked by existing structures. Reflections from the structures cause noise levels between them and roads to be higher than predicted, generally by 1 to 3 dB. Shielding by the structures causes noise levels behind them to be lower than predicted by 3 to 10 dB.

Noise Element

For this Element, graphical noise contours were calculated based on the actual roadway geometry presented on a 600 ft. per inch map provided by Public Works. The two or four lanes of each road were divided into 25 ft. long segments. Each segment was treated as a point source of sound, the strength of which was determined based on the ADT, speed, temporal distribution and truck mixture traffic. FHWA RD-77 and CALVENO models were used to represent individual vehicle noise emissions. Sound from all roadway segments affecting a given contouring area were combined in a computer model which logically traces the noise contour around the roadway grid. Propagation is based on spherical wave spreading (-6 dB per distance doubling) plus 1.5 dB per 1000 ft. atmospheric and ground absorption. The contour points were then stored on magnetic disk files for subsequent plotting in CAD (computer aided drawing) program.

The results of these contour calculations are shown at 1" = 2000' on the contour map on the following page. They have also been plotted at 1" = 600' on a City Street and Parcel Map and at a 1" = 400' on the City Zoning Map. It must be noted that the contours presented on the maps are approximate, and are intended to provide an overview of the acoustical environment. Detailed assessments of noise at specific locations will vary, based on local topographical conditions, existing structures, roadway conditions, driver habits, etc.

Results of noise measurements and computations indicate the following general characteristics of the Ojai acoustical environment:

- Daytime noise in most areas of the City is dominated by automobile traffic.
- Nighttime noise is very low, due to the near disappearance of traffic from local streets after around 10 p.m. Along Ventura Avenue, noise continue to be dominated by traffic. At other locations, crickets and other insects are the significant nighttime noise source.
- Overall, the characteristic noise levels are approximately:
  - 50-55 dB daytime, 35-40 dB nighttime in side-street areas
  - 58-62 dB daytime, 40-50 dB nighttime along Ojai Avenue, south of the "Y", and Maricopa Highway
  - 67-69 dB daytime, 53-60 dB nighttime along Ventura Avenue
- Background noise levels late at night are 20-25 dB in absence of insect noise,

35-45 dB in close proximity to active crickets.

- o Individual noise sources which intrude on the general acoustical environment were observed to be:
  - o Trash pickup trucks
  - o Barking dogs
- o Ventilation and other electrical and mechanical equipment
- o Street sweeper
- o Individual automobiles and pickup trucks with excessively noisy exhaust systems, loud "boom-box" sound systems and/or unnecessarily noisy "off-road" type tires
- o Mechanical equipment from the industrial facility on Bryant Street

NOISE CONTROL

A common approach to mitigating noise impacts is through the use of setbacks. This approach may be more desirable for the City of Ojai due to its low volume roadways and the desire to avoid a "walled in" look. The setback approach simply requires that the homes or noise sensitive uses be setback away from the roadway at a distance great enough so that they are outside the noise impact zone. The setback area is landscaped. The landscaping actually provides very little noise reduction, however, residents seem to become less aware of the noise probably because they can not see or have an obstructed view of the road.

As previously discussed, the sources of noise in Ojai can be divided into two basic categories, transportation sources (primary traffic) and non-transportation sources. Local agencies have the responsibility to control the noise from the source, such as vehicle noise emission levels and enforcing the speed regulations to reduce vehicle noise.

The most effective method the City has to mitigate transportation noise is through reducing the impact of the noise onto the community (i.e., noise barriers and site design review). Mitigation through the design and construction of a noise barrier (wall, berm, or combination wall/berm) is the most common way of alleviating traffic noise impacts. The effect of a noise barrier is critically dependent on the geometry between the noise source and the receiver. A noise barrier effect occurs when the "line of sight" between the source and receiver is penetrated by the barrier. The greater the penetration, the greater the noise reduction. Barriers should be required for residences where outdoor noise exceeds 60 or 65 dB. Another noise reduction method would be for the City to provide retrofit incentives for residences that provide ventilation and better windows to reduce noise impacts.

For existing residences, the following mitigation measures are possible: For outdoors, barriers (walls and berms), re-routing traffic, enhance speed limit enforcement, and maintaining auto exhausts in proper condition are methods to control noise. For indoors, ventilation modification (summer switch) to allow some windows to be kept closed, improvement of seals on doors and windows, and relocation of vent openings to shielded sides of structures are some methods to control noise.

NOISE REGULATIONS

The responsibility for the control of noise is divided among various levels of government and in turn divided among various agencies and departments at each governmental level. Local agencies have several alternatives for the control of various noise generators. These include: enforcement of existing state and local laws, creation of local ordinances and policies, adoption of Federal and State Noise Standards, and the implementation of various land uses and site planning techniques based on state and Federal planning guidelines. Some State and local laws may include: Noise limits for on-highway motor vehicles for the state of California, Noise limits for motorboats in or upon Inland Waters, Sound Transmission Class (STC) and Impact Insulation Class (IIC) for non-single family buildings for human occupancy, noise limits for off-highway motor vehicles in the State of California. These state laws can be immediately enforced by local and building departments. In addition to state laws, local nuisance ordinances relating to disturbing the peace and animal control can be enforced by local law enforcement agencies and the County Department of Animal Control.

The second alternative mentioned is the creation of noise ordinances. Generally, this includes the passage of new ordinances. In contrast to nuisance ordinances, a noise ordinance attempts to provide noise level standards for reoccurring noise generators or land use types. An ordinance should contain a well defined, objective noise standard for various land uses, based on an easy to calculate noise evaluation scheme, maximum noise levels, consideration for impulse and pure tone sounds, appropriate reference pressure, and reference to a measurement procedure.

A local ordinance could also extend to the enforcement of Federal and State product standards, to those products once purchased. According to the Noise Control Act of 1972, the United States Environmental Protection Agency must establish noise levels on new products including construction, transportation, electric/electronic equipment and any motor or engine. These product noise levels could be adopted as a part of a noise ordinance by local entities to insure control over specific noise sources which might otherwise be difficult to control.

Local jurisdictions could also adopt Federal and State regulations and guidelines for local development. Three Federal and State regulations which are of particular importance are: The Department of Transportation Design Noise Standards; The Department of Housing and Urban Development (H.U.D.) Noise Standards; and State Noise level Standards for various land uses. The H.U.D. noise guidelines are used to help determine whether projects applying for H.U.D. or F.H.A. loans are qualified on the basis of noise. The Department of Transportation has established noise standards and procedures to determine if particular roadways can qualify for federally assisted noise abatement projects. State laws also establish standards estimating adverse impacts of noise on various land uses. These standards could be adopted as policy or ordinance by local entities locating the appropriate land uses near noise sources. The advantage of using these standards, particularly the

H.U.D. standards, is that they may have greater acceptability due to greater resources available to State and Federal agencies. The disadvantage of these noise standards is that they are inconsistent, individually they do not adequately measure the noise conditions, and they may be too high to accurately reflect community desires.

Noise Element

GOALS, POLICIES AND PROGRAMS

This section of the Noise Element sets forth the Goals, Policies and Implementing Programs. They evolve out of the discussion issues and needs discussed in the previous section of the document (Noise Exposure and Noise Control).

GOALS

(1) A City that maintains a quiet acoustical environment

(2) A City whose residents are protected from unhealthful levels of noise

(3) A City that is planned to minimize noise conflicts

POLICIES

(1) The City shall enforce the State Uniform Building Code which specifies that the indoor noise levels for residential living spaces not exceed 45 dB dn/CNEL due to the combined effect of all noise sources. The state requires implementation of this standard when the outdoor noise levels exceed 60 dB Ldn/CNEL. However, the City should implement a 55 dB outdoor noise standard.

(2) The City should establish standards that specify acceptable limits and hours of occurrence of noise for various land uses throughout the City.

(3) The City shall incorporate noise reduction features during site planning to mitigate anticipated noise impacts on affected noise sensitive land uses. New development should be permitted only if appropriate mitigation measures are included such that the standards contained in this Element or adopted ordinances are met.

(4) The City should encourage the use of walls, berms or "inward orientation" in the design of residential or other noise sensitive land uses that are adjacent to major roads, commercial or industrial areas.

(5) The City should enhance efforts to enforce vehicle noise emission regulations and speed limits.

(6) The City should discourage nighttime traffic, particularly truck traffic, on streets in residential areas and schedule trash pickups between 7 a.m. and 5 p.m. in residential areas.

(7) The City should adopt a new comprehensive community noise ordinance to

ensure city residents are not exposed to excessive noise levels from existing and new stationary noise sources.

PROGRAMS

(1) Investigate and, if possible, implement mitigation programs for existing residences when traffic noise exceeds 55 dB CNEL.

(2) Strengthen enforcement of vehicle noise emissions regulations and vehicle speeds.

(3) Restrict the hours of operation of street sweeper and private parking lot sweepers.

(4) Restrict hours of operation of leaf blowers and other power gardening activities.

(5) Restrict hours of operation and days of the week of construction activities.

(6) Adopt a noise ordinance to control noise levels and hours of occurrence for various land uses throughout the City.

(7) The City should develop an educational program to inform residents of the negative effects of noise on human health.