NOISE ELEMENT

NOISE ELEMENT

I. INTRODUCTION AND PURPOSE

The Noise Element is one of the seven mandatory General Plan elements. State Planning Law dictates which noise sources shall be analyzed in the Noise Element. Specifically, Government code Section 65302(F) states as follows:

"The General Plan shall include a Noise Element which shall identify and appraise noise problems in the community. The Noise Element shall recognize the guidelines adopted by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

A. Highways and freeways.

B. Primary arterials and major local streets.

C. Passenger and freight on-line railroad operations and ground rapid transit systems.

D. 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.

E. Local industrial plants, including, but not limited to, railroad classification yards.

F. Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

Noise contours shall be shown for all of these sources and stated in terms of community noise equivalent level (CNEL) or day-night average level (Ldn). The

noise contours shall be prepared on the basis of noise monitoring or following generally accepted noise modeling techniques for the various sources identified in paragraphs (1) to (6), inclusive.

The noise contours shall be used as a guide for establishing a pattern of land uses in the Land Use Element that minimizes the exposure of community residents to excessive noise.

The Noise Element shall include implementation measures and possible solutions that address existing and foreseeable noise problems, if any. The adopted Noise Element shall serve as a guideline for compliance with the State's Noise Insulation Standards."

The major purpose of the Noise Element is to limit Community exposure to excessive noise levels. This can be accomplished in several ways. The best method is to make adjustments to the Land Use Element to prevent noise sensitive uses (residences, schools, hospitals, etc.) from being located in areas with excessive noise levels. A secondary method would be to construct residences and other noise sensitive structures with construction materials and techniques that provide significant noise attenuation, thereby lessening the transmission of noise to the interior of the buildings. However, this secondary method still exposes citizens to excessive noise when they are outdoors. Another important consideration for the Noise Element is to determine the duration of the noise and the time of day that the noise is being generated. The longer the duration of noise from a particular source, the more disturbing it will be to surrounding uses. For example, an excessive noise that lasts only one hour per day and occurs from 1:00-2:00 in the afternoon will be far less disturbing than a noise that occurs continually from midnight to 6:00 in the morning. Late night noise generation can easily disturb the sleep of people in residences located close to the noise source. Noise buffers in the form of masonry walls and thick vegetation can provide some

lessening of noise impacts to surrounding uses, and are therefore appropriate mitigation measures in many instances.

The height of a noise source above the ground level affects the transmission of noise to surrounding properties. The higher the noise source above ground, the greater will be the distance the noise is transmitted. Therefore, every effort should be made to locate stationary noise generators at ground level or as close to ground level as possible.

Noise sources can basically be classified in two ways. Stationary noise sources remain in one place on a permanent basis, and are generally associated with mechanical equipment. Air conditioning units mounted on the roof of a building are an example of a stationary noise source.

Transitory noise sources are movable noise generators and are generally related to transportation equipment such as trucks, trains, cars and aircraft.

Major transitory noise generators in Imperial include aircraft operations noise, railroad noise, and vehicle noise along the State Highway and major City streets.

To the human ear, loudness of the noise is not only a function of sound intensity, but also of sound frequency. Higher frequency sounds tend to seem louder to people than lower frequency sounds. Therefore, sound level meters are often equipped with weighting networks which give more weight to higher frequency sounds. There are three (3) different weighting networks, designated as A, B, and C, which give varying degrees of weight to high frequency sounds. Highway generated noise, railroad noise and aircraft noise, are usually measured with the "A" weighted network. The readings taken on the meter are recorded in "A" weighted decibels (dba).

II. HARMFUL EFFECTS OF NOISE

Approximately 20 million people in the United States currently have some degree of hearing loss. In many of these cases, exposures to very loud, impulsive, or sustained noises caused damage to the inner ear which was substantial even before a hearing loss was actually noticed. To prevent the spread of hearing loss, a desirable goal would be to minimize the number of noise sources which expose people to sound levels above 70 decibels. But hearing impairment is only one of the harmful effects of noise on people.

Noise can also cause other temporary physical and psychological responses in humans. Temporary physical reactions to passing noises range from a startle reflex to constriction in the peripheral blood vessels, the secretion of saliva and gastric juices; and changes in heart rate, breathing patterns, the chemical composition of the blood and urine, the dilation of the pupils of the eye, visual acuity, and equilibrium. The chronic recurrence of these physical reactions has been shown to aggravate headaches, fatigue, digestive disorders, heart disease, and circulatory and equilibrium disorders. Moreover, as a source of stress, noise is a contributory factor in stress-related ailments such as ulcers, high blood pressure, and anxiety.

Two other harmful effects of noise which are commonly of concern involve speech interference and the prevention or interruption of sleep. Table N-2 illustrates how excessive background noises can reduce the amount and quantity of verbal exchange and thereby impact education, family lifestyles, occupational efficiency and the quality of recreation and leisure time. As shown therein, speech interference begins to occur at about 40 to 45 decibels and becomes severe at about 60 decibels. Background noise levels affect performance and learning processes through distraction, reduced accuracy, increased fatigue, annoyance and irritability, and the inability to concentrate (particularly when complex tasks are

involved or in schools where younger children exhibit imprecise speech patterns and short concentration spans).

Several factors determine whether or not a particular noise event will interfere with or prevent sleep. These factors include the noise level and characteristics, the stage of sleep, the individual's age, motivation to waken, and so forth. Ill or elderly people are particularly susceptible to noise-induced sleep interference, which can occur when intruding noise induced levels exceed the typical 35-45 decibel background noise level in bedrooms. Sleep prevention can occur when intruding noise levels exceed 50 dba.

Table N-3 summarizes the noise sensitivity of various land uses.

Section 1092 of Title 25 of the California Administrative Code includes noise insulation standards which detail specific requirements for new multi-family structures (motels, apartments, condominiums, and other attached dwellings) located within the 60 CNEL contour adjacent to roads, rapid transit lines, or manufacturing areas.

An acoustical analysis is required showing that the multi-family units have been designed to limit interior noise levels with doors and windows closed to 45 db CNEL in any habitable room. Title 21 of the California Administrative Code (Subchapter 6, Article 2, Section 5014) also specifies that multi-family attached units incorporate noise reduction features sufficient to assure that interior noise levels in all habitable rooms do not exceed 45 db CNEL.

Section 65302(f) of the Government Code specifies that it is the responsibility of the City of Imperial to specify the manner in which the Noise Element, once adopted, also becomes the guideline for determining compliance with the State noise insulation standards discussed above. The State Office of Noise Control has

developed criteria and guidelines for local agencies to use in setting standards for human exposure to noise and preparing noise elements.

III. LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches, and residences are more sensitive to noise intrusion than commercial or manufacturing activities. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design of new developments. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop, and work.

The City of Imperial must make a determination regarding how much noise is too much. Guidelines for land use compatibility with noise have been developed by the U.S. Department of Housing and Urban Development and the California State Office of Noise Control, and these are shown in Figures N-1 and N-2.

Of particular concern in the City of Imperial is the impact of aircraft noise on surrounding uses from operations at the Imperial County Airport.

The County of Imperial completed a noise contour analysis for future aircraft operations at the County Airport and this noise contour analysis is included herein. Residential uses should not be allowed in areas with a noise exposure level of 65 db CNEL or greater as indicated on the noise exposure map.

IV. STATE AND FEDERAL NOISE STANDARDS

The Federal Highway Administration (FHWA) has developed a series of maximum

design noise levels for various activity categories which are expressed in terms of equivalent sound levels (Leq) and L10 values. The FHWA design noise levels represent maximum values and incorporate trade-offs between desirable and feasible noise levels.

The California Department of Health has established guidelines for assessing the compatibility of community noise environments and land uses in terms of community noise equivalent level (CNEL). These guidelines rank noise and land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. These guidelines are summarized in Figure N-1. 60 and 65 dba CNEL are the highest threshold noise levels considered normally acceptable for the most noise-sensitive land uses, which are single family and multiple family residences.

The State of California Department of Health Services model noise ordinance standards, contained in Table N-1 establishes exterior noise standards. The ordinance is designed to protect residential areas from stationary noise sources on private properties. The model noise ordinance requirements cannot be applied to mobile noise sources, such as when traveling on public roadways. Control of the mobile noise sources on public roads is preempted by federal and state laws. The noise ordinance also does not apply to motor vehicles on private property.

TABLE N-1
MODEL NOISE ORDINANCE STANDARDS

Maximum Time of Exposure	Noise Metric*	Noise Level Not to Be Exceeded	
		7 A.M.-10 P.M.	10 P.M.-7 A.M.
30 minutes/hour	L50	50 dBA	45 dBA
15 minutes/hour	L25	55 dBA	50 dBA
5 minutes/hour	L8.3	60 dBA	55 dBA
1 minute/hour	L1.7	65 dBA	60 dBA

*L(*x*) = noise level exceeded *x* percent of the time.

V. EXISTING NOISE EXPOSURE AND NOISE SOURCES

As a prerequisite to the formation of an effective noise control program, the City must be cognizant of the location and extent of local noise problems, namely major noise source locations, the number of persons exposed, and what levels of exposure exist. A community noise exposure inventory should be developed delineating the current number of people in the community exposed to various noise sources in terms of the population impacted. This data can then be utilized to focus noise control and abatement efforts to achieve the most good. In some cases, the control of offending noise sources will be beyond the City's jurisdiction; however, by recognizing these limitations more effective land use planning strategies can be developed.

Railroad Noise

The Southern Pacific railroad has a branch line that passes through the eastern section of the City of Imperial, east of "M" Street. According to the Southern Pacific representative, a minimum of two (2) freight trains pass through the City every day except Sunday. The time of day when the trains operate varies. A maximum of six (6) trains could pass through the City in any given 24 hour period. This branch line connects with the Southern Pacific main line at Niland and extends south to El Centro. Railroad noise is therefore transmitted to surrounding land uses in Imperial on an almost daily basis.

Railroad noise is measured in terms of CNEL (dBA). Railroad noise levels can be determined by computer modeling according to the distance in feet from the railroad tracks as outlined below. These projections do not include influences of topography or structures and barriers which might reduce the noise levels.

EXISTING RAILROAD NOISE LEVELS

Distance (feet)	100	200	300	400	500	700	1,000	2,000	5,000
CNEL (dBA)	74	70	67	64	62	60	57	51	44

As depicted above, existing train movements on the Southern Pacific rail line can reach high maximum noise levels (greater than 75 dBA) at a distance of 50 feet. Existing residential uses within roughly 350 feet of the railroad are currently exposed to noise levels greater than 65 dBA CNEL. It is therefore necessary to restrict residential land uses adjacent to the railroad tracks and to designate these areas for commercial and industrial uses which are not noise sensitive uses.

Airport Noise

Aircraft noise can be divided into two (2) basic categories. Aircraft on the ground waiting to take off, and aircraft in a taxi mode operating on the surface of the airport is one category. Another is the noise generated by aircraft in flight during either the takeoff, landing, or cruising phase of flight.

The County of Imperial, as a part of its revised Airport Land Use Plan, measured and analyzed the noise impacts associated with the Imperial County Airport. A noise contour map was developed which shows which areas of the City are exposed to various noise levels. The 55, 60, and 65 db CNEL contours are depicted. Table N-5 includes a comparison of aircraft noise for turbine (jet) aircraft with other common noise sources.

One method of reducing the sound transmission from outdoors to the interior of a building or residence is to use noise attenuation building

techniques. The noise level reduction afforded by ordinary building construction is outlined in Table N-6. Additional insulation in walls and ceilings, exterior solid core doors, smaller window areas, larger roof overhangs, wall to wall carpeting, and building orientation can all increase the amount of noise level reduction in a residential or commercial building. Keeping the windows closed at all times will also prevent transmission of noise from the exterior to the interior.

Among the basic characteristics of sound which are of particular interest in the discussion of aircraft-generated noise is its attenuation or reduction over distance. Part of the reduction occurs because the sound energy is spread over a geometrically increasing area as the distance from the source increases. At sufficient distances from the source, this geometric spreading results in a 6 dB loss per doubling of distance. Additional attenuation results from absorption of the sound by the air and by the ground, structures, and other objects.

Sound propagation through the air is affected by meteorological conditions including air temperature, temperature inversions, humidity, wind speed, and air turbulence. Sounds traveling along a hard ground surface are attenuated by an additional 2.5 dB in 1,000 feet (compared to the attenuation in air alone) and tall grasses or shrubs can double this figure. Structures, terrain, or other barriers can provide significant attenuation for ground-to-ground noise as well. Ground cover and objects on the ground, however, have little effect on air-to-ground noise, such as that from aircraft.

The attenuation of sound from the exterior to the interior of a building is fairly consistent among structures of similar construction type.

Noise is often perceived to be the most significant of the adverse impacts associated with airport activity. To better understand airport noise impacts, it is important to recognize the variables involved with regard to different types of aircraft, the location where the noise occurs, and other factors such as pilot techniques.

Types of Aircraft

The noise emitted by different types of aircraft has distinctly different properties. Although there are also differences among specific makes and models of aircraft within each broad group, these distinctions are generally less pronounced.

Jet Aircraft

Both the character and the intensity of jet airplane noise has changed over time as new engine technologies have been developed and introduced into the airline and business jet aircraft fleets. The older, turbojet engines produce noise that is both very loud and at the high end of the frequency spectrum. Newer generation, fan-jet engines -- in which a substantial volume of the air entering the engine bypasses the combustion chamber -- create noise that is comparatively lower both in intensity and frequency. The extent to which future technology can continue to reduce jet-engine noise is uncertain. Most of the overall noise level improvements at airports having jet activity are expected to result from the retirement of the older, louder jet aircraft.

Propeller Aircraft

The dominant noise from most propeller airplanes, whether they be driven by piston or turbojet engines, is from the propeller itself. Propeller airplane noise varies depending upon the number of engines, the rotational speed of the propellers, the number of blades on each propeller, and the pitch of the blades, as well as, to some extent, the type of engine.

Compared to jets, the majority of propeller airplanes emit significantly less noise when measured at equal distances from the aircraft. The size of the aircraft is a major factor in this distinction, however, most propeller airplanes flying today are substantially smaller and lighter than jet airplanes are. For aircraft of similar weight, the noise levels of aircraft that are propeller driven and those that have new-technology, fan-jet engines are not vastly different. Another factor affecting the relative noise levels generated by the two aircraft types is the takeoff climb profile. Because jets climb much more rapidly than typical propeller airplanes, the noise levels measured on the ground diminish rapidly with increased distance from the runway. Consequently, at points sufficiently far from the runway end, the higher altitude attained by jets may make them effectively quieter than propeller airplanes.

Other Variables

The noise levels experienced on the ground as an aircraft flies over are primarily dependent upon the inherent loudness of the aircraft,

the aircraft's altitude, and the horizontal distance between the measuring site and the aircraft flight track. Other variables are also important , however. These other variables are outlined below.

Pilot Technique

An important variable in aircraft noise is the pilot. Depending upon the techniques that the pilot employs, the same aircraft can generate significantly different noise levels. Conditions which produce some of the greatest noise variations include: the angle of climb while on takeoff (also affected by air temperature); the pitch setting on variable pitch propeller airplanes, especially at high takeoff power settings; power adjustment during takeoff by jet aircraft; and the airspeed and descent rate relationships that determine the extent of helicopter blade slap during landing operations. Pilot awareness of the aircraft configurations that create abnormally high noise levels can be a significant factor in helping to reduce airport noise impacts.

Air Temperature

On hot days aircraft cannot climb as rapidly as when temperatures are cooler. Takeoff noise impacts consequently are stretched out over a greater distance from the runway end.

Sound Wave Reflections

The presence of nearby structures or steep terrain can cause sound wave reflections which may increase noise levels. Certain meteorological conditions, particularly a solid, low cloud cover, also can reflect sound back to the ground, resulting in higher noise levels.

Noise, especially aircraft noise, affects people and their activities in varied and complex ways. Three principal types of effects can be identified: physiological, behavioral, and subjective.

Physiological Effects

Physiological effects can be either temporary or permanent. Among the temporary effects are startle reactions and the effects of sustained sleep interference. Hearing loss is the most obvious permanent effect of noise. Research indicates that off-airport aircraft noise, even from the loudest aircraft, is generally not severe enough to produce permanent or even sustained (after the noise ceases) physiological effects.

Behavioral Effects

Behavioral effects are usually measured in terms of interference with human activities. Speech interference and interference with the enjoyment of radio or television are the most often cited effects. Interference with concentration on mental

activities and disruption of sleep are two others. Most of the readily identifiable aircraft noise effects fall into this category.

Subjective Effects

Subjective effects are by their very nature unique to each individual and, therefore, difficult to quantify. Subjective effects of noise are commonly described in terms of "annoyance" or other similar terms.

It is the intent of the City of Imperial to minimize the public's exposure to aircraft generated noise by not allowing noise sensitive uses to be located in areas with 65 db CNEL or above noise exposure levels, and to require noise attenuation building techniques for all noise sensitive uses constructed in the vicinity of the airport within the depicted noise contours.

Highway Noise

Highway generated noise occurs as a result of the operation and movement of cars, trucks, and other vehicles on highways and roadways within the City. State Highway 86 passes through the central portion of the City in a north/south direction and this roadway carries a significant amount of heavy truck traffic, which generates a considerable amount of noise. Aten Road is a 4 lane roadway which carries traffic in an east/west direction near the south city limits of Imperial. This roadway also carries a considerable amount of heavy truck traffic; and therefore has a significant noise impact on adjacent land uses. Table N-4 outlines the approximate distances in feet

from the various roadway centerlines for the 60, 65, 70 and 75 db CNEL noise contours. These contours assume the roadway is operating at design capacity.

Noise impacts from traffic to adjacent sensitive noise receptors, such as residences, can be minimized by the construction of noise barrier walls, one story dwellings, and by the planting of significant numbers of trees or other vegetation between the roadway and the noise sensitive use. These measures, in conjunction with noise attenuation building techniques, will help assure that the interior noise levels of residences, churches, and other sensitive uses does not exceed 45 dba. However, noise sensitive uses should be located as far as possible from major roadways such as Highway 86, Aten Road, and Barioni Boulevard (Worthington Road), in order to lessen noise impacts. The City should restrict heavy truck traffic (more than two axles) to major arterials and selected secondary arterials which are not bordered by large numbers of noise sensitive uses. The City should pass an ordinance prohibiting the use of "Jake Brakes" by heavy diesel trucks as these devices increase the noise generated by trucks when they are stopping or slowing down.

Stationary Noise Sources

Stationary significant noise sources would include noise generators such as large air conditioning units and other mechanical equipment such as an auto body crusher or rock crusher. These types of noise sources have not been identified in the City of Imperial as being a problem. Therefore, at the present time there are no identified stationary noise sources that are disturbing residential neighborhoods and other noise sensitive uses. In

order to mitigate the establishment of significant stationary noise sources in the future, the City will require appropriate noise buffers and screening to ensure that noise levels greater than 55 dBA CNEL are not transmitted offsite to noise sensitive land uses. According to City Hall personnel, no noise complaints from stationary noise sources have been received. Police Department noise complaints are generally for such disturbances as late night loud parties and barking dogs. These disturbances can be controlled by Police Department enforcement of disturbing the peace ordinances.

VI. FUTURE NOISE EXPOSURE

Growth in and near the City of Imperial will generate increased traffic volumes. As traffic levels rise, existing residences will be exposed to higher noise levels. A 26 percent increase in daily traffic will generate a 1.0 dba noise increase. Doubling the traffic volume will increase the need for controlling the noise source whenever feasible and protecting the noise receptors when noise source control measures are inadequate.

Acoustic architectural design involves the incorporation of noise reducing strategies in the design and layout of individual structures. Building heights, room arrangements, window size and placement, balcony and courtyard design, and the provision of air conditioning all play an important role in shielding noise sensitive activities from intrusive noise levels.

Acoustic construction is the treatment of various parts of a building to reduce interior noise levels. Acoustic wall design, doors, ceilings and floors, as well as dense building materials, the use of acoustic windows (double glazed, double paned, thick, nonoperable, or small with air-tight seals) and the inclusion of

maximum air spaces in attics and walls are all available options.

Noise barriers are relatively easy to design and inexpensive. Consequently, they are often used indiscriminantly in place of the techniques discussed above. Residential developments where each road is bordered by six-foot block walls behind which residences are "protected" from excessive noise levels are an effective mitigation technique. Ideally, noise barriers incorporate the placement of berms, walls, or a combination of the two in conjunction with appropriate landscaping to effect an aesthetically desirable environment. Where space is available, a meandering earth berm is both effective and desirable. Where space is restricted, a wall is effective. In either case, however, thick landscaping (utilizing evergreen plants) should be specified to reduce the visual impact of the barrier and retain the rural ambience.

Noise Goal

Maintain the quiet rural residential nature of the community through the use of sensitive land use planning practices and appropriate noise mitigation measures.

Acceptable Noise Levels

The City should establish maximum noise levels for various noise-sensitive uses.

Objective 1

The City should establish maximum noise levels for various

noise-sensitive uses.

Policy 1

A. 60 dba CNEL is established as the acceptable outdoor noise exposure level for rural and single family residential areas.

B. 65 dba CNEL is established as the acceptable outdoor noise exposure level for multiple-family residential areas.

C. In the event that acceptable outdoor noise exposure levels cannot be attained by various noise attenuation mitigation measures, indoor noise levels shall not exceed 45 dba CNEL.

D. 70 dba CNEL is established as the maximum outdoor noise exposure level for schools (public and private), libraries, churches, hospitals, nursing homes, parks and recreation areas. Interior noise levels for the uses in this section shall not exceed 40 db and building construction shall include appropriate noise attenuation techniques to ensure this goal can be achieved.

Land Use Compatibility

Objective 2

Land use plans shall take into consideration the noise generation characteristics of various uses.

Policy 2

A. The location and distribution of land uses throughout the City shall take into account the compatibility of different uses with the various levels of noise.

B. Any new development within the Airport Land Use Planning Area (see Technical Appendix) shall be limited to those uses defined as sensitive, moderately sensitive, and insensitive (see Table N-3).

C. The City shall encourage the Airport Management to maximize the use of the east/west runway and minimize the use of the north/south runway. Touch and go takeoffs and landings should be restricted to the east/west runway 8-26.

D. The review of development applications shall

consider the impact of the use on the noise environment of existing or planned contiguous uses.

E. Where necessary because of incompatibilities, noise attenuation measures shall be required by the City to achieve the acceptable noise exposure levels.

Circulation Compatibility

Objective 3

Traffic generated by major and secondary arterial streets shall be considered when planning improvements to the City's circulation system.

Policy 3

A. The potential for increasing the general neighborhood noise levels shall be considered when planning improvements to the City's circulation system.

B. In the event that it is determined that increased noise levels will result from an improvement to the circulation system, mitigation measures shall be required which reduce the noise levels to

those determined acceptable.

C. Traffic speeds shall be regularly monitored to determine the feasibility of lowering the speeds and thus lowering the traffic noise generated.

D. The City should examine areas where truck traffic should be restricted in residential areas to reduce adverse noise and vibration levels.

E. The City shall maintain appropriate ordinances to restrict illegal or faulty exhaust systems on motor vehicles.

F. The City shall establish truck routes for trucks with more than two axles and the truck routes shall be located on arterial streets where noise impacts to residential neighborhoods can be minimized.

Noise Attenuation Measures

Objective 4

Noise attenuation measures should be required to reduce noise to an acceptable level.

Policy 4

A. Where feasible, setbacks beyond the acceptable noise exposure level should be used to mitigate adverse noise conditions.

B. Parcels affected by adverse noise levels should be properly site planned to reduce noise through the following measures:

1. Uses that are compatible with higher noise levels should be located adjacent to noise generators to buffer noise from noise sensitive uses.
2. Clustering of commercial, office, or multiple family uses can reduce interior open space noise levels.

C. Architectural design in adverse noise areas should shield noise-sensitive uses through:

1. Appropriate entrance and window location;
2. Appropriate patio and balcony location;
3. Building projections and heights;
4. Internal arrangement of rooms; and
5. Location of air conditioning equipment at ground level.

D. Construction techniques should consider the following methods of noise reduction:

1. Acoustical wall design;
2. Use of dense building materials;
3. Acoustical windows (double glazed, double paned, thick and nonoperable windows); and noise-tight doors, ceilings, and floors.

E. Noise barrier walls and berms shall be required where other noise attenuation measures fail to reduce the adverse noise levels.

Noise Ordinance

Objective 5

A community noise ordinance should be adopted and enforced to implement the Noise Element.

Policy 5

A. The City shall maintain a community noise ordinance to resolve noise complaints; the ordinance should address the following as a minimum:

1. Prohibition of construction activities

between the hours of 8:00 p.m. and 7:00 a.m.; however, the following zones will have the opportunity to obtain an exemption:

- General Industrial
- Rail-Served Industrial
- Public
- Agriculture

2. Noise associated with the keeping of domestic and farm animals;

3. Regulation of tire squealing or excessive exhaust noise; including the use of truck "Jake Brakes";

4. Restriction of truck traffic on local residential collector streets.

TABLE N-2

HARMFUL EFFECTS OF NOISE

Effect	Noise Levels at Which Harmful Effects Occur
Prevention or Interruption of Sleep	35 - 45 db(A)
Speech Interference	50 - 60 db(A)
Extra Auditory Physiological Effects	65 - 70 db(A)
Hearing Loss	75 - 85 db(A)

Source: California Department of Public Health Report to 1971 Legislature

TABLE N-3

NOISE SENSITIVITY OF VARIOUS LAND USES

Land Use	Sensitivity
Educational Facilities	
Hospitals	
Convalescent Homes	
Theaters	Very Sensitive
Wildlife Sanctuaries	
Churches	
Mobile Homes and Mobile Home Parks	
Single-Family (detached) Dwellings	
Single-Family (attached) Dwellings	
Multi-Family (low-rise) Dwellings	
Multi-Family (mid-rise) Dwellings	
Multi-Family (high-rise) Dwellings	Sensitive
Dormitories	
Resort Hotels	
Outpatient Clinics	
Preschools	
Cemeteries	
Country Clubs	
Scientific Testing	
Professional Research	
Government Services	Moderately Sensitive
Restaurants and Bars	
Motor Inns	
General Merchandising	
Professional Offices	
Recreational Vehicle Parks	
Agriculture	
Mining and Extraction	
Water Areas	
Natural Open Space	Insensitive
Undeveloped Land	
Motor Vehicles Transport	
Auto Parking	
Raceways and Drag Strips	

Source: Environmental Impact Analysis Handbook, Rau and Wooten, McGraw Hill, 1980

TABLE N-4

CNEL DISTANCES FOR ROADS

Link	Arterial	Segment	Master Planned Classification	Approx. Distance to CNEL Contour (from centerline) At Operating Capacity[1] 75	70	65	60
1.	State Highway 86	N City limits to S City limits	Freeway	70'	115'	230'	500'
2.	Worthington Road	W City limits to "B"Street	Major Arterial				
3.	Worthington Road	"P"Street to E City limits	Major Arterial				
4.	Barioni Blvd. (Main Street)	"B"Street to "P"Street	Major Arterial	39'	69'	141'	300'
5.	Aten Road	W City limits to E City limits	Major Arterial				
6.	2nd Street	Airport to Clark Road	Secondary Arterial				
7.	Austin Road	N City limits to S City limits	Secondary Arterial				
8.	Neckel Road	W City limits to E City limits	Secondary Arterial				
9.	Imperial Avenue	Highway 86 N to Highway 86 S	Secondary Arterial	26'	44'	88'	101'
10.	Clark Road	1st Street to S City limits	Major Arterial				
11.	"P"Street	Worthington Road to 1st Street	Secondary Arterial				
12.	Murphy Road	W City limits to "B"Street	Secondary Arterial				
13.	15th Street	Highway 86 to "M"Street	Secondary Arterial				
14.	"M"Street	15th Street to 1st Street	Industrial Collector				
15.	"N"Street	14th Street to 1st Street	Industrial Collector				
16.	4th Street	"N"Street to "P"Street	Industrial Collector	Not analyzed at this time			
17.	14th Street	"M"Street to "P"Street	Industrial Collector				
18.	4th Street	"B"Street to "M"Street	Residential Collector				
19.	10th Street	Frank Wright School to "K"St.	Residential Collector				
20.	12th Street	"B"Street to "K"Street	Residential Collector	13'	26'	55'	118'
21.	20th Street	"B"Street to Imperial Avenue	Residential Collector				
22.	"B"Street	4th Street to 20th Street	Residential Collector				
23.	Belford Road	W City limits to "B"Street	Residential Collector				
		PROPOSED (FUTURE)					
24.	15th Street	"B"Street to Imperial Avenue	Secondary Arterial				
25.	15th Street	"M"Street to "P"Street	Secondary Arterial	26'	44'	88'	188'
26.	"P"Street	N City limits to Worthington Rd.	Secondary Arterial				
27.	"M"Street	1st Street to Aten Road	Industrial Collector	Not analyzed			
28.	"B"Street	N City limits to 20th Street	Residential Collector	13'	26'	55'	118'
29.	Bonta Street	Austin Road to "B"Street	Residential Collector				

[1]Chart assumes level of Service "C"

See text for description of LOS "C"

TABLE N-5

APPROXIMATE DECIBEL LEVEL OF COMMON SOUND SOURCES

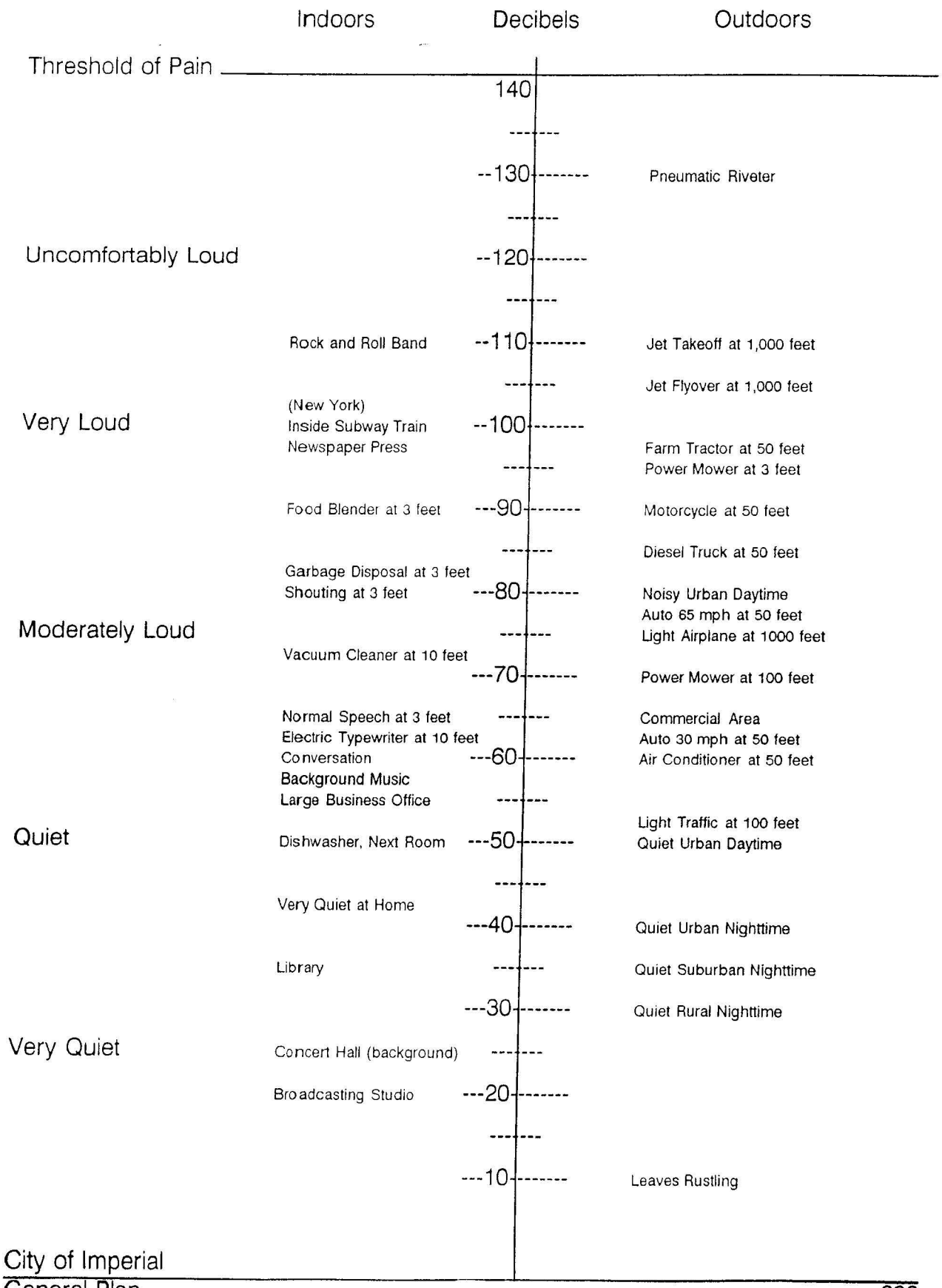


TABLE N-6

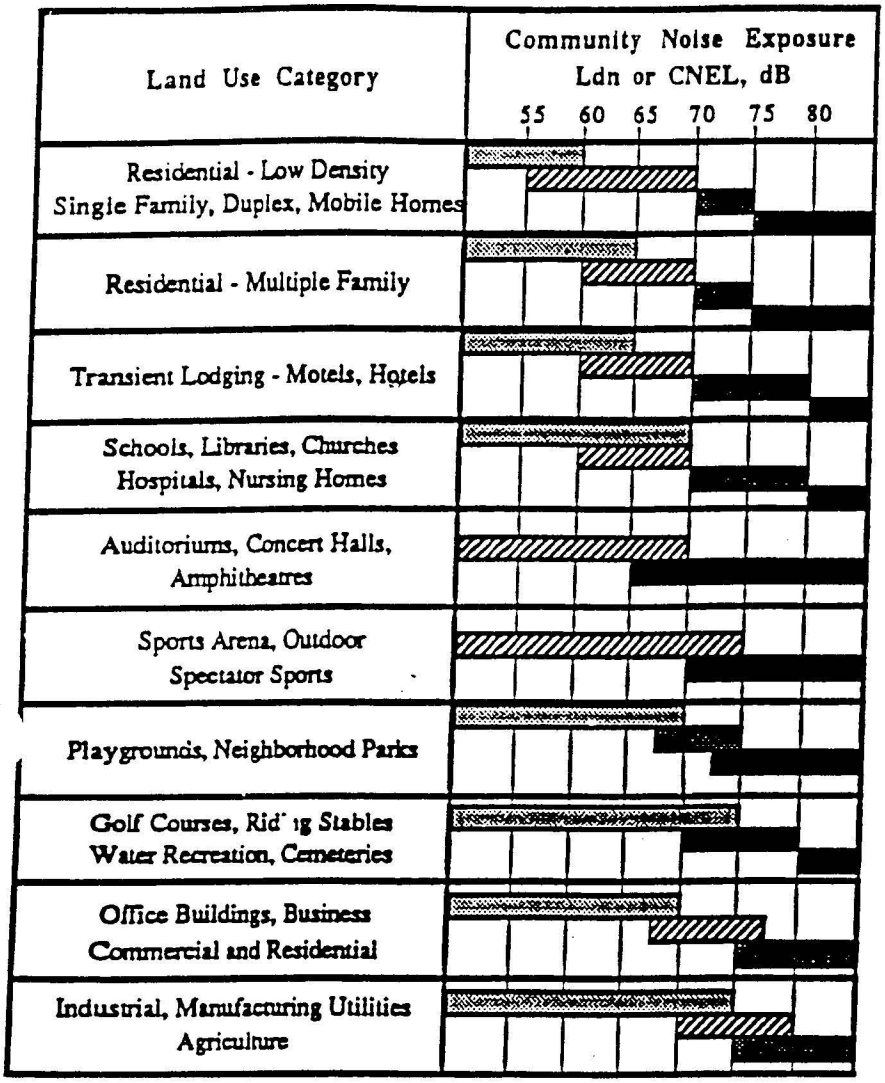
NOISE REDUCTION BY COMMON BUILDING CONSTRUCTION

Construction Type	Typical Occupancy	General Description	Noise Level Reduction (NLR) in dBA
1	Residential, Commercial, Schools	Wood framing. Exterior stucco or wood sheathing. Interior drywall of plaster. Sliding glass windows. Windows partially open.	15-20
2	Same as 1 above	Same as 1 above, but windows closed.	25-30
3	Commercial, Schools	Same as 1 above, but windows are fixed 1/4 inch plate glass.	30-35
4	Commercial	Steel or concrete framing. Curtain wall or masonry exterior wall. Fixed 1/4 inch plate glass windows.	30-40

Notes: Construction methods assume no special noise control provisions.

The NLR range depends upon the openness of the windows, the degree of seal, and the window area involved.

Source: Paul S. Veneklasen & Associates (1973), "Noise Insulation Problems in Buildings".



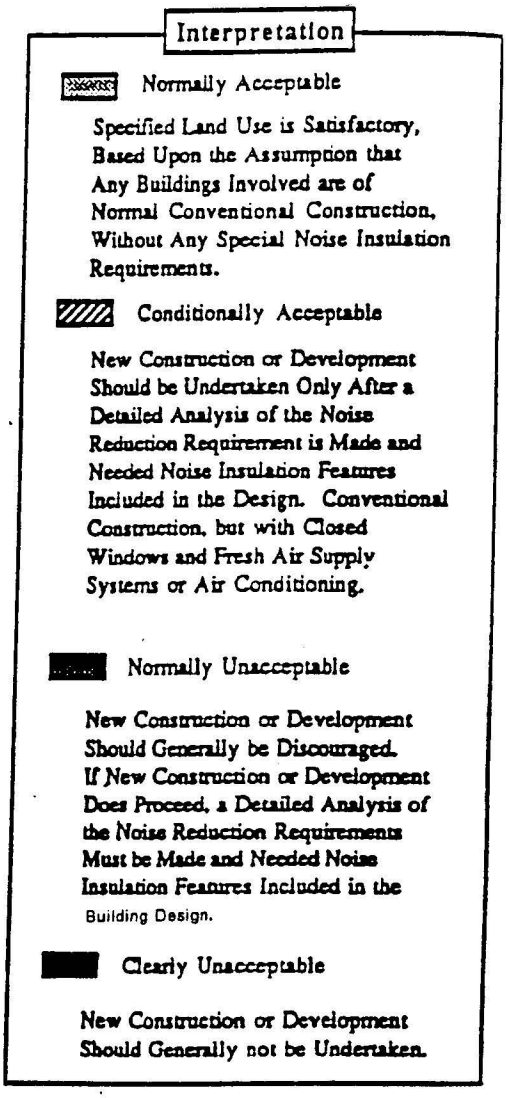
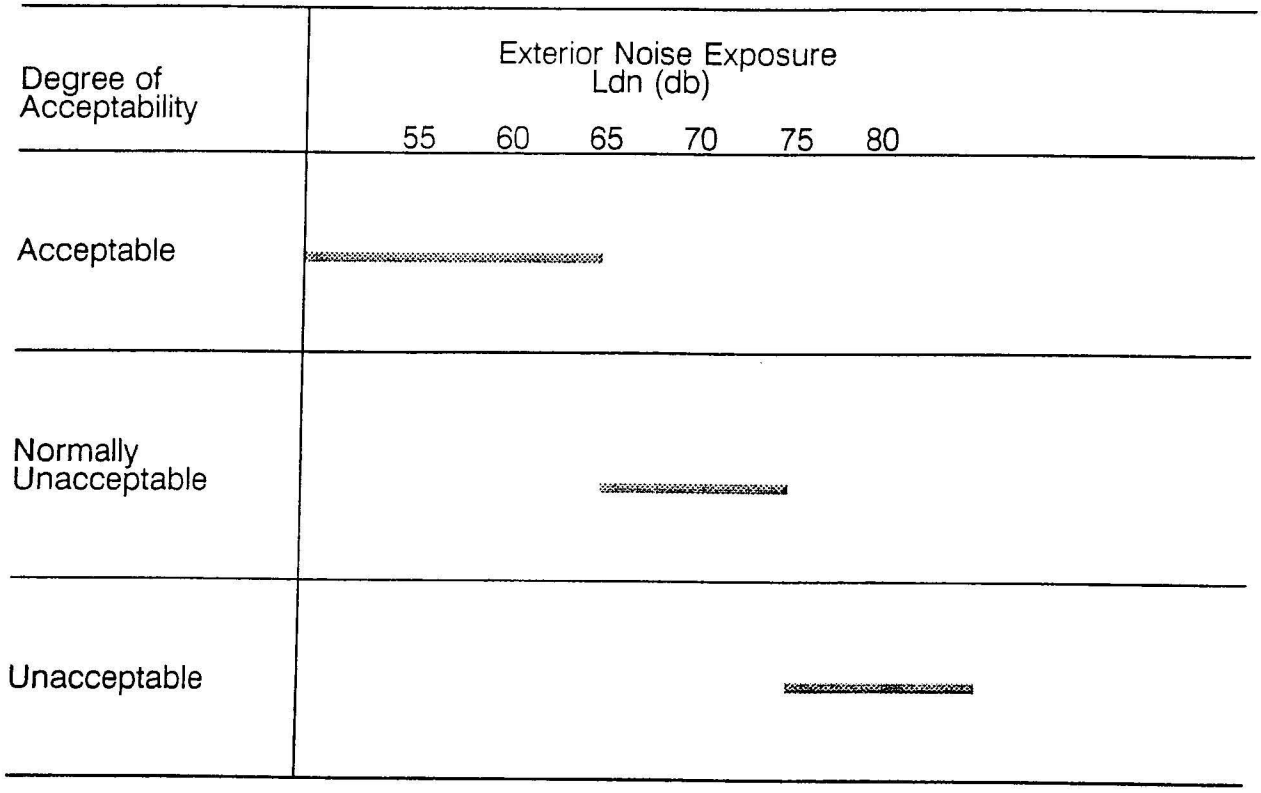


FIGURE N-1 CALIFORNIA LAND USE COMPATIBILITY STUDIES

FIGURE N-2

FEDERAL EXTERIOR NOISE

ACCEPTABILITY CRITERIA FOR HOUSING



Source: "Interim Noise Assessment Guidelines," U.S. Dept. Housing and Urban Development, 1980.

INTERPRETATION

Acceptable

The noise exposure may be of some concern but common building construction will make the indoor environment acceptable and the outdoor environment will be reasonably pleasant for recreation and play.

Normally Unacceptable

The noise exposure is significantly more severe; barriers may be necessary between the site and prominent noise sources to make the outdoor environment acceptable; special building construction may be necessary to ensure that people indoors are sufficiently protected from outdoor noise.

Unacceptable

The noise exposure at the site is so severe that the construction cost to make the indoor noise environment acceptable may be prohibitive and the outdoor environment would still be unacceptable.