Appendix H Noise Modeling Data

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LOCAL REGULATIONS AND STANDARDS

NOISE ELEMENT

LONG BEACH GENERAL PLAN
CITY OF LONG BEACH
PLANNING DEPARTMENT

March 25, 1975

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This document is one of many which together comprise the new comprehensive General Plan for the City of Long Beach, California. It not only complies with California legislation regulating the preparation of official planning documents, but also is expanded beyond the legislation to meet the special needs of Long Beach.

The General Plan is subdivided into a number of different subjects, entitled "elements." Some elements are mandated by State law, while others are optional. The Long Beach General Plan will contain the following elements:

Open Space*	Circulation*
Conservation*	Population
Seismic Safety*	Environmental Management
Noise*	Coastline
Scenic Highways*	Urban Design
Public Safety*	Others, as determined during the course of the program
Housing*	
Land Use*	

Elements identified by a star (*) are mandated by State law.

All of the elements are intimately interrelated and, therefore, none should be viewed entirely alone without reference to other elements.

The elements will be prepared and issued sequentially, on a schedule determined by mandated deadlines, manpower availability, informational needs, and other variables.

Inquiries regarding information contained in this document or related to the General Plan program should be directed to the

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FOREWORD

Urban noise is a phenomenon closely associated with human activity. Noise has many aspects ranging from a neighbor's party which has gone later than one might have liked, to a jet aircraft flying overhead. These being relatively common occurrences, city dwellers have become accustomed to a certain level of noise during the day and night. In most cases, this background noise (the "ambient") is generated by cars, trucks, buses, motorcycles, and aircraft. It is the absence of this noise that separates most distinctly the tranquility of the country from the rumble of the city. Current and future technology will probably not make it possible to significantly reduce the city's rumble. This is a fact which must be acknowledged at the outset of a study such as this.

Urban noise results from human activity. We who dwell in cities have acknowledged that we are trading country-like tranquility for some of the advantages of urban life, for example, better transportation opportunities. This is not to say that nothing can be done to improve the current situation: *the thrust of this report is that many things can be done to control noise.*

Enforcement measures suggested herein as possible methods for controlling noise must be viewed in the context of their dependence on citizen cooperation. Just as it is impossible to apprehend <u>all</u> speeders on all streets and freeways, so it is and will continue to be impossible to stop all adverse noise conditions. Objectionable noise intrusions will occur as long as there are individuals who, out of lack of concern for their neighbors or for the environment, will disregard present and future ordinances.

As the reader will see, large scale and repetitious noise intrusions (such as from freeways, aircraft, and industry) are subject to control and are easier to monitor than individual occurrences. It is toward control of these former noise sources that this document is directed.

The underlying philosophy of this element is that no significant increase in the ambient noise levels existing in Long Beach should be permitted; and that efforts should be continued to effect measures which will reduce or minimize existing noise levels. This, we believe, is the line of defense which must be held if we are to be spared the cacophony too often associated with modern technology and with our increasingly liberated and sensate lifestyle.

We recognize that the adoption of this element is only the beginning of an effort to control noise in Long Beach; constant attention must be directed to the problem to assure the level of control necessary for maintenance of a peaceful environment.

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I. INTRODUCTION

The Noise Element is part of the new General Plan for the City of Long Beach. The Element is comprehensive, generalized, and long range. Where State guidelines require it to be so and technical data were available or developed, it is detailed and site specific. It is closely related to other Elements of the General Plan, particularly Circulation, Land Use and Housing. It is, therefore, subject to amendment upon completion of these and other elements.

The preparation and adoption of the Noise Element is mandated by State law, and it has been completed in response to that mandate. The law (see Appendix A) requires that the Noise Element include analysis of noise generated by highways and freeways, rapid transit systems, airport ground facilities and air operations. This document has been expanded to include other obtrusive noise sources in Long Beach.

The Noise Element serves as a comprehensive program for noise control and abatement in Long Beach and includes an action program consisting of various measures which the City may implement in pursuing its noise control plan. It establishes noise control goals and policies, inventories existing noise sources and levels, identifies potential problem areas, and suggests the outlines of an ordinance for the control and abatement of noise. The element is intended to be an official guide to City agencies and concerned citizens in their efforts to achieve a more amiable environment for both residents of, and visitors to, Long Beach. The element also serves as a guide for the assessment of environmental impact reports (EIR's) prepared in association with proposed new projects. In order to understand the problems created by noise in the City, a categorization of primary noise sources was designed. Actions necessary in each case to control, abate and reduce noise were developed. The narrative discusses in depth each of four main categories: transportation, industrial, construction, and population noise.

Transportation noise is difficult to abate locally due to pre-emption of regulatory powers by higher levels of government. However, identification of major circulation patterns and their spatial inter-relationships will enable some re-arrangement of existing traffic flow and thus a reduction of noise.

Other control measures are also discussed. In the area of industry, Federal studies are being conducted to produce general regulations concerning noise.

Future regulations should consider the implications of technological advancement and development of equipment that will emit less noise. Although some industrial enclaves in the City are established, it is hoped that future site selection will result in realignment of land uses to help mitigate the problem of adjacent incompatible uses where industries exist individually rather than in enclaves.

Within the construction industry it will be necessary to balance the positive aspects of development against the noise resulting from its activities. Timetables can be developed to mitigate the effects of concentrated construction activity over a long period of time. The most modern equipment and sound barrier technology ought to be employed to reduce noise levels.

Population noise is a result of a variety of human activities. The high level of urbanization within the City and the lack of natural barriers (hills, etc.) to serve as buffers between incompatible land uses magnifies the problem. Affluence results in an accelerated ownership and use of noise appliances and recreational vehicles, perhaps the major sources of noise within this category. In this area, strict measures will be the most effective means for the reduction of noise.

The effectiveness of a noise control program is to a large extent based on the adoption and enforcement of a comprehensive noise ordinance and on citizen cooperation. In recognizing that fact, a model noise ordinance is included as Appendix E; likewise the effectiveness of a Noise Ordinance depends upon the work of a specialized team of technicians equipped with modern instruments and enforcement authority.

The Noise Element recommends a series of actions and policies for the control and reduction of noise. The narrative relating to each of these contains proposals for the abatement of noise and for the enhancement of the environment. These proposals are described in detail in the implementation strategies chapter of this element.

The City of Long Beach has a vital stake in preserving and improving conditions where possible. The goals and objectives related to noise control which currently reflect City policy and the citizen's desires indicate a strong thrust toward the preservation of quiet neighborhoods and the abatement and control of noise throughout the remainder of Long Beach.

It is recommended, therefore, that the Long Beach Planning Commission and the Long Beach City Council utilize the planning principles set forth in the Noise Element as guides and references for future decisions related to the preservation and improvement of quietness in the City.

II. GOALS PROGRAM

Citizen Participation Program

Introduction

Coinciding with the development of the Noise Element, a multi-phase citizen participation program was undertaken. Initial contact was made with City departments and public and private institutions considered to be noise generators or receivers of unwanted noise. A brief explanation of the element was mailed and a series of questions were asked of the participants in an attempt to determine their level of involvement in noise-related matters. The answers supplied showed a wide range of relevancy and involvement. They also helped to identify major problem areas and opportunities within the jurisdiction of the participant's organization. These opportunities and problem areas might not have otherwise been so readily identified.

Goals Program

A categorized draft of tentative goals and objectives was then mailed to the participants to obtain their responses and reactions in the form of additional goals. This step made the program more comprehensive, and afforded an added opportunity for a wide range of participation. Over 82 agencies and organizations were brought into the goals program in this manner.

Field Survey

The Long Beach City Planning Department conducted a survey of residents adjacent to a sound barrier wall erected by the California Department of Transportation between the Long Beach Freeway and White Avenue in Long Beach. The primary purpose of the field investigation was to determine noise conditions before and after the erection of the wall. A stamped, self-addressed questionnaire was mailed to a group of randomly selected residents (see Appendix B), and the results were computed and are shown in Tables 13, 14, and 15. The most significant result of the inquiry was that 87 per cent of the respondents noticed a significant reduction in freeway noise after the erection of the sound barrier wall.

Public Opinion Survey

A public opinion survey was made as a part of the General Plan Program and information was gathered from 602 "in home" interviews with a representative cross-section of adults residing in the City (See Goals Element of the General Plan). The interviewing was completed during the period January 12 to January 20, 1974.

The interviews were conducted by 35 OPINION RESEARCH OF CALIFORNIA Interviewers. The questionnaire administered included several noise-related questions (see Appendix C for details and results). The general subject of this survey was the attitudes of Long Beach residents toward the City's future development.

After analyzing and integrating most of the suggestions made during all the phases of the program, a copy of relevant sections of the first draft of the Noise Element was mailed to all previous participants; this gave every contributor the opportunity to preview the element and to suggest final changes. The conclusive step is public meetings where the general public at large has an opportunity to voice their reactions to the content of the element.

The Nature of Noise Goals

Ideally, public noise control policy should reflect the high regard that the citizenry has for quietness. This is difficult in practice because noise monitoring in Long Beach is done primarily in answer to specific complaints and because there is no comprehensive noise ordinance. City-wide noise problems are not easily recognized because what is noise to one person may very well be an acceptable sound to another. Further, acoustics is a highly technical subject which is difficult to describe to the layman and oftentimes subjective in nature. Basically, reactions to noise are physically, culturally, and emotionally generated group responses related to modes of behavior and life-styles. These group responses differentiate between what is considered acceptable sound and intolerable noise. The difference between these group responses evolves for each of the groups from actions relevant to their mores and sensitivities.

In addition, there are many competing institutions trying to achieve different goals in the context of the same environment. The community of older retired people is striving for a quiet, subdued lifestyle; the younger, active population seeks the excitement of boat racing, parties and indoor-outdoor socializing; yet another group, namely the industrialist, merchant, and developer, searches for an environment that facilitates production, trade, and growth. Noise control goals have, therefore, developed from a complex cross-section of the City and are often found to be in conflict with each other.

It seems rational, then, that a unifying, all inclusive set of goals should be developed that will be acceptable to the greater number of people and that would achieve improvement of the living environment and continued economic progress.

Noise Goals and Public Policy

One significant utility of a comprehensive set of goals is that it serves to structure public policy. The sets of goals contained in this document have been developed through the citizen participation program and reflect the desires and aspirations of a broad sampling of the population. Here, the goals have been categorized to obtain a more concrete dimension of the problem of noise pollution. These categorized sets of goals serve to narrow down the scope of recommendations and conclusions reached during the composition of this document. It should be noted that some of the noise control goals included represent extremely high levels of aspirations, in practice probably unattainable because population density and urbanization as they exist in Long Beach will deter their attainment.

Goals are frequently expressed here in terms of a desired direction *("to improve the quietness of the indoor noise level of homes and apartments")* instead of a particular result *("to soundproof every dwelling in Long Beach")*.

The next step is the achievement strategy which defines classifications of actions the City can take to progress toward the goals. In this element, the strategy is presented in a set of recommendations. Finally, there is the objective which selects a specific area of accomplishable City actions, such as the reduction of noise emanating from City-owned equipment.

Noise reduction actions designed to provide progress towards one goal often result in progress toward others: for example, enforcement of state vehicular noise limits laws can reduce the outdoor ambient noise level and in turn improve or preserve the indoor quietness of homes.

Unfortunately, other goals are negatively interrelated, so that movement towards one goal could delay, prevent or even reverse progress towards others: for instance, to reduce automobile generated noise, more intensive and extensive routes of buses may be introduced to encourage ridership and this in turn may have both a positive and a negative effect: positive because the overall number of vehicles would be reduced and thus the level of ambient noise; negative because each individual bus (unless electrically powered) will generate higher noise level peaks than a car, resulting in intermittent louder events separated by somewhat quieter periods. For these reasons, compromises in the achievement of all goals must often be made, and a careful weighting of priorities must be undertaken. A conflictive form of negative relationships is that between noise goals whose achievement require the expenditure of public funds, and goals that strive for lower taxes. A similar goal conflict has already been referred to above: the public's demand for a quiet environment and the need to continue economic development through noise-generating activities.

Source of Goals

A wide range of sources were used to develop the noise goals included in this document. The Citizen Participation Program section of this element explains in detail the chronology of noise goals development. These sources included Planning Department direct mail contacts; surveys related to the construction of sound barrier walls; a public opinion survey of the citizenry at large; other expressions of public noise goals; other adopted elements of the new General Plan (Open Space and Conservation); the Introduction to the New General Plan; the 1961 General Plan; the 1972 Mayor's Conference on Community Affairs; City Planning Task Force Report; the Long Beach Municipal Code; and comments received from citizens during the preparation of this element and during several public meetings held throughout Long Beach in 1974-1975.

General Noise Goals for Long Beach

These goals can be summarized in one statement: the *City desires to attain a healthier and quieter environment for all its citizens while maintaining a reasonable level of economic progress and development.* Other goals are:

1. To improve and preserve the unique and fine qualities of Long Beach and eliminate undesirable or harmful elements [General Plan, 1961].
2. To develop a well balanced community offering planned and protected residential districts . . . , well distributed commercial districts, planned and restricted industrial districts, and a coordinated circulation system for fast, safe, and efficient movement of people and commodities. [General Plan, 1961].
3. To improve the urban environment in order to make Long Beach a more pleasant place to live, work, play and raise a family. [Civic Beautification Program Application, 1967].
4. To establish noise policy quidelines and promote noise abatement action programs.
5. To develop specific neighborhood noise plans with the participation of resident citizen groups.

Goals Related to Land Use Planning

The broad goals which express the aspirations of the City under the above heading are *to protect and preserve* *both the property rights of owners and the right to quietness of the citizenry at large.* Some strategies to achieve this goal include:

1. Provide the City with limited maximum noise levels by judicious land use planning policies.
2. Develop standards for local fixed point[1] noise sources.
3. Set measurable goals for the reduction of noise in problem areas.
4. Propose land uses or activities that would act as buffer zones between incompatible land uses.
5. Consider existing ambient noise levels before establishing specific permitted levels of sound.
6. Locate and mitigate noise impacts from highways and freeways on residential land uses and institutional, recreational and school facilities.
7. Identify and anticipate existing or proposed land uses that cause (directly or indirectly) noise-generating activities.
8. Promote the health and well being of the people of Long Beach by adopting standards for the proper balance, relationship, and distribution of the various types of land uses . . . [General Plan, 1961].
9. Protect business and industrial areas against intrusions of non-business or non-industrial land uses which are highly sensitive to noise.

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[1]Stationary.

Goals Related to the Noise Environment

These can be summarized in one statement: *to make the City a quieter, more pleasant place in which to live.* The following are possible strategies for goal achievement:

1. To prevent the loss of relatively quiet areas of Long Beach by regulating potential noise sources.
2. To encourage citizen participation in the identification of noise sources and in the maintenance and preservation of relatively quiet areas of the City.
3. To foster and promote the cooperation of private organizations and public agencies to upgrade the level of community serenity.
4. To apply zoning, noise ordinance and other legislation to prevent an increase of noise levels and occurrences.
5. To enact a strong anti-noise ordinance [1972 Mayor's Conference Goal #13], including limits on transportation, industrial, construction and population noise.
6. To describe the noise problems areas which are within local control [1972 Mayor's Conference, p. 55].
7. To continue to take restorative measures to remedy and reduce high noise areas within the City.

Goals Related to Transportation Noise

The City's transportation noise reduction goal is to *diminish the transportation roar that impacts on the population.* Because of State and Federal pre-emption, no one single action that the City may take can accomplish this, but in moving toward that goal some improvements will occur by:

1. Recommending a plan for compatible land uses for those portions of Long Beach within transportation noise zones.
2. Discouraging within transportation noise zones the development of noise sensitive uses that cannot be sufficiently insulated against externally generated noise at reasonable cost.
3. Developing a long range re-allocation of noise sensitive land uses away from transportation noise impact areas.
4. Providing standards and criteria for noise emissions from transportation facilities.
5. Cooperating with the State and the Long Beach Unified School District in the reduction of traffic noise around school grounds.
6. Reducing the level of noise exposure to the population caused by railroad operations within the City and in problem areas not pre-empted by State and Federal law.
7. Reducing the level of noise exposure from boating activities to shoreline residents in problem areas not pre-empted by State or Federal law.
8. Reducing the level of noise exposure from surface transportation in problem areas not pre-empted by State or Federal law.

9. Reducing the level of noise exposure from air operations and aircraft ground maintenance in problem areas not pre-empted by State and Federal law.

Goals Related to Construction and Industrial Noise

These goals can be explained by stating what is already adopted City policy in the area of construction and industrial noise. The overall goal of the City is to *respond to demands for a reasonably quiet environment which is compatible with both existing ambient noise levels and continuing building and industrial development.* More categorized goals are:

1. To reduce the level of noise exposure to the population caused by demolition and construction activities.
2. To reduce the level of outdoor noise exposure to the population generated by industries.

Goals Related to Population and Housing Noise

The population noise goals of Long Beach can be summarized in one statement that delineates two problem areas. That statement is that the *City desires to reduce both noise exposure to the population and noise level outputs generated by the population.* Strategic proposals are:

1. To reduce the level of outdoor noise exposure the population is subjected to.
2. To achieve greater indoor quietness in multiple dwelling residential buildings.
3. To reduce the level of noise generated by the population into the environment of the City.

4. To reduce the level of noise generated by household appliances by advising the citizenry of reasonable appliance noise level outputs.

5. To stimulate the redevelopment or refurbishment of blighted housing to create quieter neighborhoods and better soundproofed dwellings.

6. To require better sound deadening design on new housing units where acoustical problems could develop.

7. To reduce the level of incoming and outgoing noise into and from residential dwellings within the City.

8. To provide criteria and standards for building construction materials intended to reduce noise levels inside homes.

9. To facilitate wherever feasible, noise standards that shall be employed in a manner consistent with proposed land uses, population densities and building types.

<u>Goals Related to Public Health and Safety</u>

An overall statement that expresses the City's concern with health can only be approximated. It is the *attainment of the lowest possible level of harmful effects of noise on the people by the implementation of information, monitoring and advisory programs.* More specific concerns are:

1. To inform citizens of real and potential noise hazards, both physical (to the hearing system) and psychological, (to the nervous system).

2. To regulate and control noise which is injurious to health or psychological well-being.
3. To continue to reduce excessive traffic noise in problem areas by the construction of sound barriers, further synchronization of traffic lights, and posting of "Quiet Zone" signs around hospitals and other highly noise sensitive land uses.
4. To establish special control areas to protect noise sensitive land uses such as hospitals, schools, recreational and institutional facilities from encroachment by noise-producing land uses.
5. To continue to adhere to the principles and policies of the Federal Occupational Safety and Health Act and the California - OSHA Act.
6. To monitor and answer complaints in noise-related problem area.
7. To advise citizens on noise-related problems, complaints and to suggest solutions on an individual basis.

Goals Related to Other General Plan Elements

The elements of the Long Beach General Plan are all, to some degree, related and interdependent, since together they provide the policy framework to direct development needed to serve the citizens and their activities within the City. The Noise Element is related most closely to the Circulation, Land Use and Housing Elements.

Because of the special nature of noise, it is important that the Noise Element be viewed in conjunction with other elements of the General Plan.

Noise is propagated at different intensities throughout the entire City. Noise is generated from certain land uses and can impact all other adjacent land uses. Noise can prohibit or blight certain land uses. Therefore, coordinating the goals of the Noise Element with goals from other elements of the General Plan is rational in order to develop a consistent plan which will provide guidelines and criteria for an environmentally sound and economically progressive future.

Elements which may impact on the Noise Element goals and programs are cited below, together with an example of the type of noise-related information which could result from each:

Seismic Safety Element. To recognize that *areas designated most suitable to remain open owing to some geologic hazard offer noise-attenuating potential.*

Public Safety Element. *To shield residential land uses from industries and transportation routes which may pose a safety or noise hazard.*

Scenic Highways Element. To consider *open areas designated to preserve vistas as linear open spaces that may potentially separate incompatible land uses.*

Conservation Element. The protection and conservation of natural resources as stated in that element afford an opportunity to mitigate noise at the macro scale. *The preservation of the Los Angeles and San Gabriel Rivers flood control channels will continue to provide east and west buffer zones against noise generated in and out of the City.*

Circulation Element. Achievement of the goals contained in the Circulation Element will no doubt have an impact of traffic-generated noise and on the achievement of Noise Element goals. *The potential for noise reduction of alternate transportation modes and circulation routes will be most complementary* to the goals stated in this document.

Open Space Element. Achievement of many goals of the Open Space Element may be significant to the Noise Element goals because *large open areas act as noise attenuators.*

Population Element. Some of the goals contained in the Population Element run parallel to Noise Element goals concerning population noise. More specifically, that *an unchecked population growth policy will have a detrimental effect on the noise environment simply because: "More people generate more noise."*

Environmental Management Element. The goals of this element will be very closely knitted to the Noise Element. The primary purpose of the Environmental Management Element is to serve as basis for the *conservation and management of the environment,* thus the goals outlined therein are in complete accord with the goals of this Noise Element.

Recreation Element. *The preservation of noise-sensitive recreational land uses* is a common goal of the two elements: Recreation and Noise.

Shoreline Element. An important goal within the Shoreline Element is to *de-emphasize the use of motor vehicles along the coastline.* The accomplishment of this goal will undoubtedly complement the transportation noise reduction goals stated in the Noise Element.

Housing Element. Focusing on the housing status of the City will explore *potential rehabilitative areas and better dwelling sound transmission control.*

<u>Land Use Element</u>. To *develop a conciliatory model of incompatible land utilizations.*

III. THE NATURE OF SOUND[1]

Introduction

This technical section summarizes the data collected during the course of conducting the research, analytical studies based on these data, and the resulting interpretations and recommendations.

Demands for an environment which is compatible with both acceptable living standards and for the assessment and control of noise in Long Beach continue to increase. A systematic method for evaluating the community noise environment is included in this discussion. The following items are the major components of this noise analysis:

- Categorization of major noise sources in Long Beach and description of the noise environment from noise measurement data.
- Verification of noise levels through measurements at selected locations.
- Assessment of the effect of Federal and State noise legislation on noise abatement and control in Long Beach.
- Provision of guidelines for noise criteria for various land uses and human activities in Long Beach.
- Development of noise legislation guidelines for the City.

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[1]Prepared by J. H. Wiggins Company. Edited and supplemented by City Planning Department Staff.

The traditional approach to community noise analysis relies most heavily on noise survey data. Some field measurement data is essential in any community noise evaluation. However, in order to arrive at useful planning procedures, it is not sufficient to only measure noise levels at representative stations throughout the community and assume that these levels represent limits for future legislation. A more analytical approach is required to establish factors such as statistical distribution through the day, long-term variability, potential for control through technological innovation, etc. This report summarizes the basic analytical approach.

The organization of methodology for deriving a technical basis for the Noise Element is described in the following sections. These items represent the salient issues which appear to be most directly related to effective planning in Long Beach. In the course of this presentation, descriptive terms related to the measurement and analysis of noise levels in the City will be employed. These terms are defined in the glossary section with references to appropriate technical documentation.

Policy Guidelines

The City wishes to limit the intrusion of noise into human activities in the community. Protecting the health and welfare of residents, workers and visitors with respect to high level noise exposure is, of course, a high priority issue.

Beyond this, the amenities of maintaining relatively quiet neighborhoods within the City have a wide appeal. Unfortunately, many communities have, in the past, subverted rational objectives of some vested interests in an attempt to achieve a maximum degree of noise control. This has brought about conflict between legitimate noise producing interests and those advocating immediate adoption of restrictive noise criteria. As a result, some form of transitional policy should be articulated as a bridge to longer range noise control regulations. (See Appendix D).

The concept of such transitional noise control policies embodies a phased reduction of noise sources characteristics within the limits of available technology and rational economic constraints. Virtually all noise producing activities in the City represent examples of the need for a transitional program for noise control. Roadways, industry and commercial activities have developed and expanded in Long Beach to the point that excessive land areas are currently subjected to undesirable noise exposures. Adoption of strict guidelines for noise environments applicable to new construction and redevelopment would produce an immediate and clear conflict in this area. Accordingly, it is recommended that the City adopt noise control legislation which attempts to reconcile the requirements for a noise environment acceptable to the general population and the need to maintain economic stability.

The Nature of Sound

Sound is a rapid, small-scale fluctuation of the instantaneous air pressure usually following a repetitive pattern. This disturbance may be initiated by a vibrating solid object, such as a loudspeaker diaphragm, or by turbulent airflow, such as that from a whistle or the wake of a jet engine. In every case, the sound wave radiates away from the source with a constant speed that depends mostly on the air temperature. Sound travels approximately 740 mph at sea level, in air having a temperature of 32°F.[2]

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[2]Encyclopedia Americana: New York, New York, Americana Corporation, 1974, Volume 25, p. 240.

Sound Level

The physical measure of sound corresponding to the subjective loudness heard by a listener is the sound level, measured in decibels (dB). It depends on the strength of the pressure fluctuations around the static pressure. It is measured with a sound-level meter, including a microphone, to convert the sound pressure into an electrical voltage, amplifiers and a meter to display the magnitude of the voltage. This device is calibrated so that a given voltage read on the meter always corresponds to the same sound level. The meter is marked to read the sound level directly in decibels.

Frequency

The physical measure corresponding to the subjective aspect of pitch is the frequency of the sound, that is, the rapidity of the repetitive pressure fluctuations, as expressed in the number of cycles completed per second. The recently adopted international standard unit of frequency, corresponding to cycles per second (cps), is the hertz, abbreviated Hz. A frequency of about 260 Hz corresponds to middle C on the piano keyboard. A healthy young ear can hear sounds with a range of frequencies from about 16 to 20,000 Hz. As people get older, however, the acuity, of hearing for higher frequencies gradually diminishes, so that it is not uncommon for a 50 year-old man to be unable to hear sound with frequencies above 8000 Hz.

Frequency Analysis

Most noises are made up of a mixture of components having different frequencies: the sound of a diesel tractor/trailer at high speed on the freeway combines the high-pitched whine of the tires and the low-pitched roar of the engine and exhaust, both of which the ear readily distinguishes. A landing jet aircraft has a clearly distinguishable whine from the compressor mixed with the roar of the engine exhaust. Depending on how the components of a noise are distributed in frequency, a subjective judgement of quality is obtained. Consequently, it is important to have an objective measure of the frequency distribution.

Such a frequency analysis is obtained by means of a set of filters, tuned to different parts of the frequency range; these are electrical circuits, each of which eliminates all the noise components except those in a more-or-less narrow band of frequencies, so that a meter reading of the sound level in only that one band can be made. Subsequently, readings are made for all the other frequency bands. The end result is that the frequency distribution of the noise is described in terms of a set of "partial" sound-levels in contiguous frequency-bands covering the entire audible range. Usually this set of numbers is plotted on a graph to show an analysis of the noise depending on the bandwidth of the filters.

In order to evaluate the response of human observers to noise, a specific method of frequency-intensity analysis is widely used. This is the so-called A-weighted Sound Pressure Level specified in A-weighted decibels (dBA). This is a single number direct measurement of sound pressure which is weighted or filtered to approximate the response of the human ear. These dBA values have been used extensively in the measurement of intrusive noise and in assessing noise acceptability criteria for a variety of human activities. It is this measure which is recommended to be used in noise elements by the Government Code of the State of California.

Public Health Significance of Noise[3]

This section contains basic data inputs contributed by the staff of the Environmental Health Division of the Long Beach City Health Department.

A multitude of adverse effects are caused by noise. There are however, only three categories of adverse relationships in which the cause/effect correlation are adequately known and can be justifiably used to identify maximum tolerable noise levels to protect the public's health and welfare. These are: 1) the effect of noise on hearing; 2) the effect of noise on the general mental state as evidenced by annoyance; and 3) the interference of noise with specific activities.[4]

Since a causal link between City noise and extra auditory disease has not been established, related Noise Element objectives are based on the assumption that protection against noise-induced hearing loss is sufficient for defense against extra-auditory effects.

The physiological changes in hearing acuity from excessive noise exposure are well known.[5] By an insidious process, the hair cells in the Organ of Corti[6] are damaged.

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[3]Health, defined by the United Nations, is not merely the absence of disease but also a measure of physical, emotional and social well-being. The First Ten Years of the World Health Organization, (Geneva, World Health Organization, 1958.

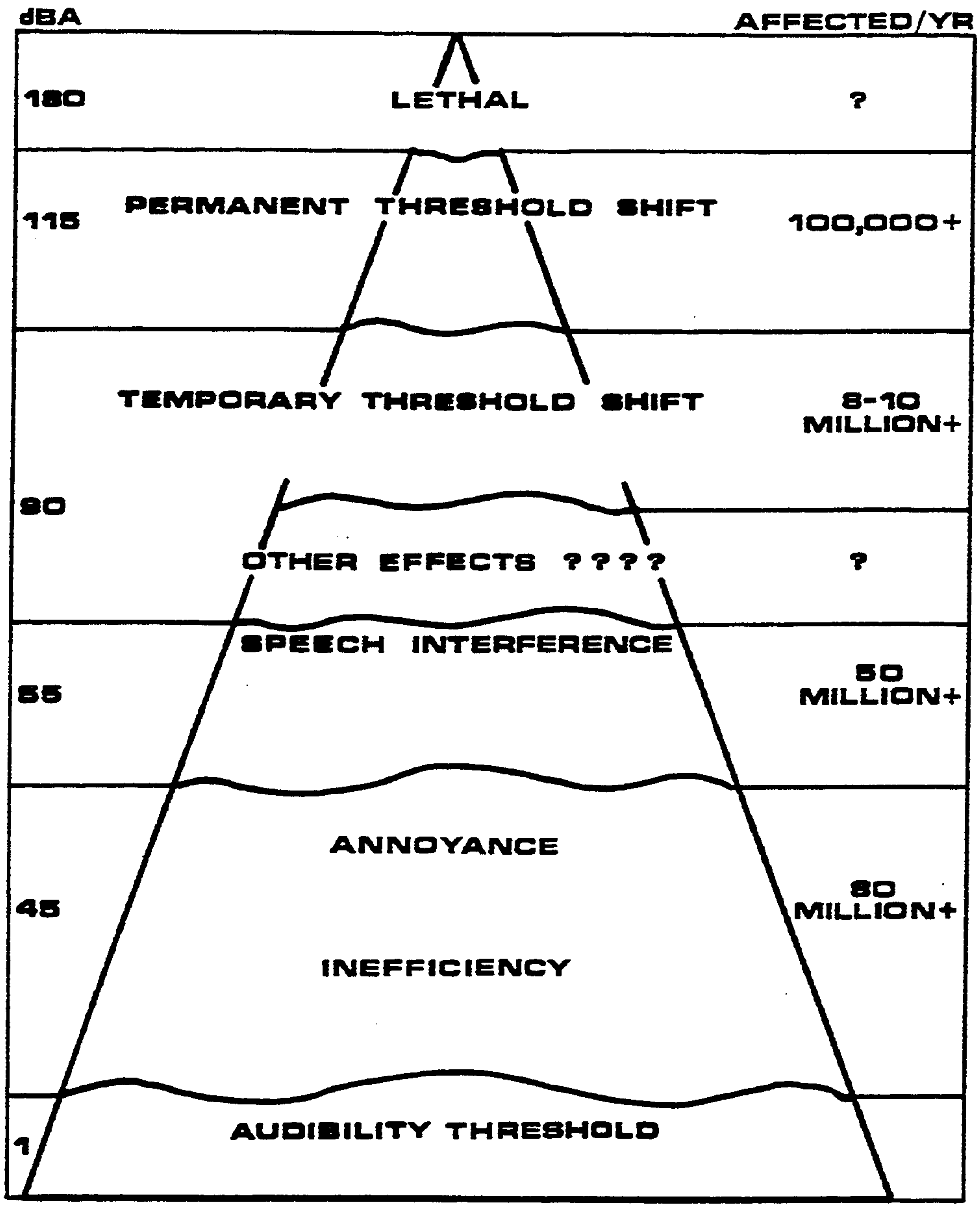
[4]U.S. Office of Noise Abatement and Control. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Arlington, Virginia, U.S. Environmental Protection Agency, March, 1974, pp. 3, 29.

[5](See figure 1), "Noise Levels and the Number of Americans Affected Per Year."

[6]See Glossary of Terms for a complete definition of all medical terms.

FIGURE 1

NOISE LEVELS[1]
AND NUMBER OF AMERICANS AFFECTED PER YEAR



1 A-WEIGHTED DECIBELS

Source: Sound and Vibration Magazine, May 1973, p. 10.

Note: Approximately 20,000,000 of us have a measurable hearing impairment.

Loud noises "shock" these hair cells causing temporary threshold shifts. Continued exposure can permanently damage these structures resulting in permanent hearing loss.

Noise-induced hearing loss is found mainly in the occupational environment.[7] The government has established allowable exposure limits, ranging from an 8-hour exposure to 90 dBA over a working lifetime, to 115 dBA for one-quarter of an hour exposure, to protect the American worker. The dBA weighting is specified because it is this setting on a sound level meter that most closely approximates the human ear's response to noise.

Recent research has revealed astounding neural-hormonal changes when people are exposed to sudden bursts of sound. In controlled experiments, sound levels from 75 dBA and above caused "stress reactions" among the patients, such as increases in epinephine levels, vasoconstriction of arterioles, alteration in salivation, increased heart rate and blood pressure, etc.[8] These physiological changes returned to "normal" pre-noise parameters when the subjects were moved from the noise source. The public health significance is that repetitive exposure to sudden, startling noises may lead to organic disease, such as cardiovascular and gastrointestinal disorders. The list of sound sources capable of triggering such "shock" reactions at a sound pressure level of 75 dBA is alarming; automobile horns; household and gardening appliances; ambulance sirens and many more.[9]

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[7] Glorig, Aram. Non-Auditory Health Effects, "Proceedings of the Sixth Congress on Environmental Health, Chicago (American Medical Association), April 1969, p. 4.

[8] See Figure 2, "How Noise Affects the Human Pulse Rate."

[9] See Table 1, "Automotive, Train and Aircraft Noise Levels."

HOW NOISE AFFECTS THE HUMAN PULSE AMPLITUDE

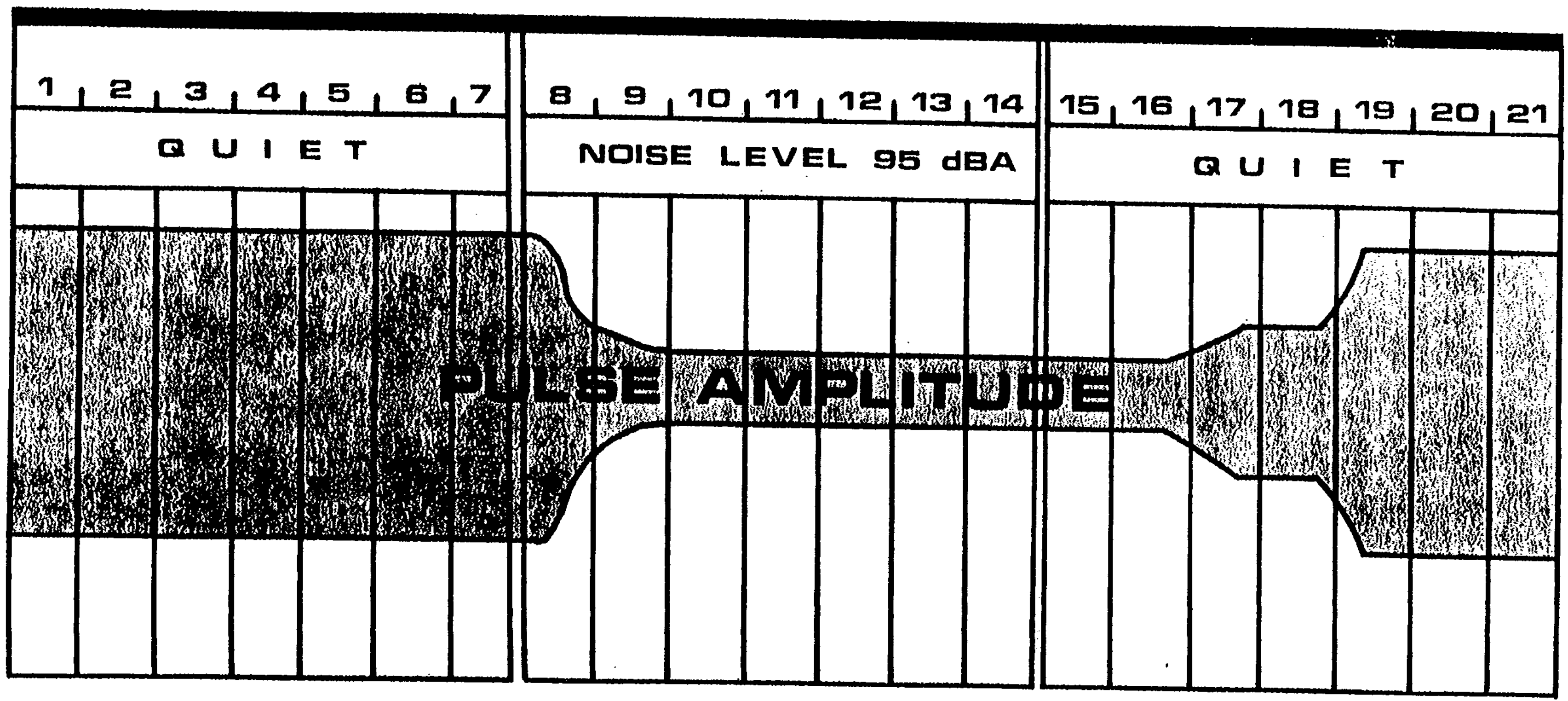

FIGURE 2

Pulse Amplitude - is a display of the strength of the human pulse. This chart shows the steadiness of the amplitude during the quiet period (1-7). Shortly after meaningless noise is introduced (8-10), the amplitude falls rapidly (10-14) illustrating constriction of small blood vessels and arterioles. After the noise ceases, there is a delay in the recovery of the pulse. Then stabilization of the amplitude returns to pre-noise levels (19-21).

Source: Jensen G. Noise Effects During Physical Work. C. Angew. International Journal of Physiology, Number 20, pp. 233-239, 1964.

TABLE 1

REPRESENTATIVE AUTOMOTIVE, TRAIN, AND AIRCRAFT NOISE LEVELS

Source	dBA
Light Automobile Traffic	55
Auto Horn (3 feet)	115
Heavy City Traffic	100
Freeway Traffic (50 feet)	70
Freight Train (50 feet)	90
Train Whistle (500 feet)	90
Jet Take-off (200 feet)	155
Jet Take-off (2000 feet)	120

Note: It is important to notice that these are representative levels. Varying conditions and type of equipment may cause deviations from these levels.

Source: Sperry Technology Magazine, Sperry Rand Corporation, Volume 1, Number 4, December 1973.

In addition to the physiological effects, there are psychological effects of noise on humans. Noise has been cited as contributing to familial conflicts, neighborhood feuds, sleepless nights, speech interference, and decreased work productivity and quality.[10] Because not all people respond the same to one type of noise, psychological effects depend largely on how sensitive people are. For example, it is documented that more than 45 dBA at night disturbs a significant proportion of the population (33%), either by interfering with dream patterns or altering the brainwave patterns. This figure represents a norm, because some individuals are adversely affected at lower sound levels. Noise, especially of a screeching nature such as a descending jetliner, may create a fear syndrome.[12] The sound of the jet engines projects into the minds of some people that the plane may crash. Noise interferes with rest and relaxation, either indoors or outdoors.

Noise poses a serious public health concern, and steps should be initiated to modify existing ambient noise levels for the health and welfare of all concerned.[13]

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[10] Ward, W. Dixon; Fricks, James E. (Editors), Noise As A Public Health Hazard, Proceedings of the Conference, June 13-14, 1968, Washington (American Speech and Hearing Association), February 1969.

[11] Lukas, Jerome S., The Effects of Simulated Sonic Booms and Jet Flyover Noise on Human Sleep, Proceedings of the Sixth Congress on Environmental Health, Chicago (American Medical Association), April 1969.

[12] Kryter, Karl D., Psychological Reactions to Aircraft Noise, Science, Vol. 151, 18 March 1966, pp. 1346-1356.

[13] Staff recommendation of the Long Beach City Health Department.

IV. EXISTING NOISE ENVIRONMENT IN LONG BEACH

Categories of Major Sources of Noise

The initial step in the community noise analysis is to identify major noise source categories and graphically display the mechanism of sound propagation away from these sources relative to land uses throughout the community. A systematic division of noise sources may then be used as a starting point for incorporating community planning data in the noise analysis procedure.

Transportation Noise. This category includes all land, sea, and air transportation systems. This is a particularly difficult noise source to control because of Federal and State pre-emption of regulatory powers. Also because existing roadway network represent the most extensive source of noise in Long Beach. See Table 2.

The most useful approach to control on a local level is to identify major transportation routes, compute noise exposure characteristics for current and projected conditions and introduce technical and legislative controls where indicated.

Aircraft noise may be specified in terms of both composite and single event values. The former is often required by Federal or State regulation and may utilize any one of several composite rating schemes. These composite ratings are an attempt to sum the effects of multiple flights during the day to obtain a value representing community response to the exposures. These composite descriptions provide general guidelines as to the extent of noise exposure from aircraft operations. The single event values are average noise exposure levels for specific aircraft types on an individual

TABLE 2

ROADWAY OWNERSHIP IN LONG BEACH

City	Local Streets	551.30
	Arterial Streets	187.60
	Other Roadways	59.40
	Total City Owned Roadways	798.30 Miles
State	Norwalk Boulevard	0.50
	Carson Street (East of Lakewood Boulevard)	3.00
	Lakewood Boulevard	6.50
	7th Street (East of Pacific Coast Highway)	1.50
	Pacific Coast Highway	9.00
	Total State Owned Highways	20.50 Miles
State Freeways	Long Beach Freeway (7)	8.75
	Artesia Freeway (91)	3.50
	Terminal Island Freeway	1.25
	Total State Owned Freeways	13.50 Miles
Inter State Freeways	San Diego Freeway (405)	9.00
	San Gabriel Freeway (605)	1.75
	Total Inter State Freeways	10.75 Miles
Total State Roadway Miles in Long Beach		44.75
Total City-Owned Roadway Miles		798.30
Total Roadway Miles in Long Beach (State and City)		843.05

Source: Long Beach City Traffic Engineering Department takeoff or landing. Single event values are useful in assessing the potential for speech interference or sleep arousal at specific locations.

Surface vehicle (automobile, truck, train or rapid transit system) noise levels are predicted from computer simulation models and verified through on-site measurement. A-weighted Sound Pressure Levels are employed as descriptive units with dBA values computed and evaluated with respect to land uses in Long Beach. Deviations from predicted noise levels attributable to local terrain or structure shielding can be incorporated in simulation models where such barriers have been identified. This also provides a method for estimating noise reduction which might be achieved through the introduction of barriers adjacent to surface transportation routes or through alternative route selection. This report does not make use of such a variation to these simulation models since projected noise levels were based on generalized roadway conditions and assumed no barriers to sound propagation. These models are more appropriately used in situations where specific localized, conditions are defined, i.e., noise exposures for a specific site.

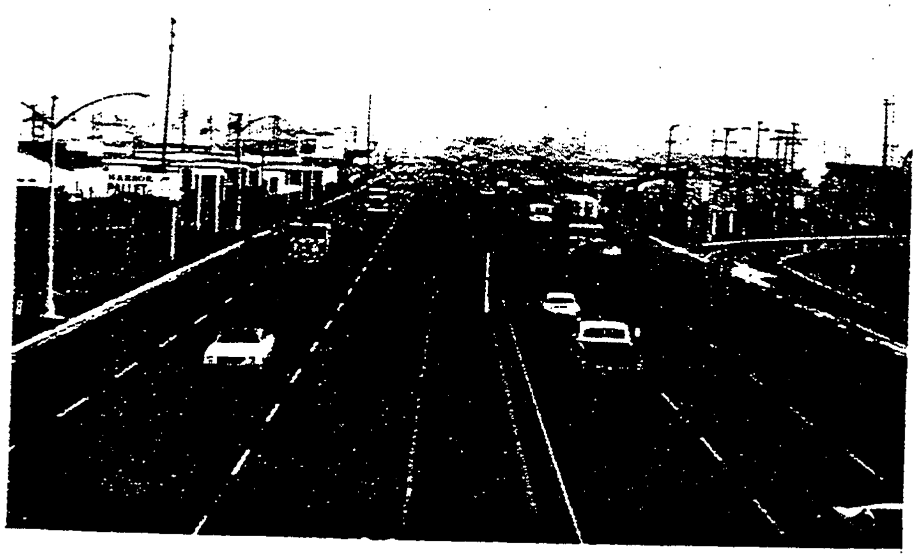
<u>Industrial Noise</u>. Established industrial sites in Long Beach may represent significant sources of intrusive noise. In addition, selection of locations for new industry must realistically incorporate noise characteristics among the factors relating to operation of the facility. Noise measurements were conducted to establish the prevailing ambient noise levels and to identify, where possible, the sources of noise intrusion into the community. Recommendations for the control of noise from future industrial sources have been proposed as part of the guidelines for recommended noise legislation.

Construction Noise. Construction activity in Long Beach associated with redevelopment or new construction may bring significant noise intrusion into the community. While construction projects are relatively short-lived, the quantity and phasing of this type of activity could well establish a near continuous noise source. Consequently, some realistic controls must be established which will limit the incursion of noise into the community, but at the same time will allow rational progress in the construction industry.

Planning for the control of construction noise may be included in regulatory legislation. Appropriate criteria for daily time limitations and consideration of the effects of concentrated construction activity on residential and commercial land use have been proposed.

Population Noise. This category represents the noises characteristic of human activity in the community. Noise sources associated with residences, e.g., air conditioners lawn mowers, radio/television, etc. and those related to commercial and entertainment activities would fall into this classification. This type of noise in the community is most amenable to control through rational legislation. This report develops guidelines establishing realistic and enforceable limits for noise associated with a variety of land uses and human activities. The abundance of recreational activities is of particular interest as a part of this noise category.

TRANSPORTATION NOISE



Transportation Noise

Surface motor vehicle traffic is the foremost noise pollutant throughout the City. Traffic noise levels were developed from simulation models and verified through on-site measurements. A-weighted Sound Pressure Levels were employed as descriptive units. The noise emanating from roadways or railways is modified as a result of natural terrain or structural barriers obstructing the propagation path. For this reason, it is not practical to depict roadway noise exposures as propagating uniformly from the source. An accurate description of all roadway noise exposures would require documentation on barrier conditions along every section of freeways, surface streets and railways in the City. Since this is clearly impractical, a more rational approach is to provide the methodology for analyzing noise exposures at specific problem locations. This approach to the description of surface vehicle noise is outlined in this section and should provide the basic analytical methods for use by City officials.

Automobile and truck noise is generated by vehicles operating on the Long Beach, Terminal Island, San Diego Artesia and San Gabriel River Freeways and the principal surface streets in Long Beach. Of these roadways, the San Diego Freeway carries the highest traffic volume, between 160,000 and 175,000 vehicles per day. Estimates of traffic volumes for the major roadways in Long Beach used in this study are shown in Tables 3 and 4.

TABLE 3

AVERAGE DAILY TRAFFIC (ADT) FOR FREEWAYS

Freeway	Two-Way Average Daily Traffic (ADT)	Posted Vehicle Speed (MPH)
San Diego Freeway (West of Lakewood)	174,000	55
San Diego Freeway (East of Lakewood)	178,000	55
San Gabriel River Freeway (North of San Diego Freeway)	91,000	55
Long Beach Freeway (South of San Diego Freeway)	88,000	55
Long Beach Freeway (North of San Diego Freeway)	128,000	55
Artesia Freeway (Cherry to Paramount)	130,000	55
Terminal Island Freeway (At Anaheim Street)	22,032	55

Source: 1972 State of California Division of Highways Annual Report.

TABLE 4

AVERAGE DAILY TRAFFFIC (ADT) FOR PRINCIPAL ROADWAYS

Roadway	Two-Way Annual Average Daily Traffic (ADT)	Posted Vehicle Speed (MPH)
Artesia at Orange	18,383	35
South at Atlantic	11,153	30
Wardlow at Clark	6,360	35
Atlantic at Pacific Cst. Hwy.	18,576	30
Willow at Woodruff	17,430	35
Anaheim at Atlantic	25,664	30
Santa Fe at Willow	16,173	35
Cherry at Carson	23,194	40-45
Redondo at Anaheim	19,340	30-35
Clark at Spring	17,947	40
Bellflower at Stearns	26,294	35
Studebaker at Anaheim	14,580	35
Pacific Cst. Hwy. - West of Lakewood	32,000	35
Pacific Cst. Hwy - East of Lakewood	28,000	35
Ocean at Cherry	26,000	35
Ocean at Molino	24,000	35
Seventh - West of Pacific Cst. Hwy.	35,000	35
Seventh - East of Bellflower	40,000	45
Carson at Cherry	20,000	35
Carson at Clark	39,000	40
Long Beach at Willow	26,000	30-35
Lakewood - No. & So. of San Diego Freeway	38,000	40-45
Del Amo at Long Beach Freeway	26,000	40
Spring St. at Cherry to San Gabriel River Freeway	20,000	40

Source: Long Beach City Traffic Counts, 1974.

These ADT figures cover a wide range of traffic volumes between 6,000 and 179,000 vehicles per day. Many of the remaining roadways in Long Beach will vary between 10,000 and 20,000 vehicles per day. Noise exposures for ADT volumes of 10,000 and 15,000 vehicles are shown in Figures 3 and 4 to provide a more complete representative analysis.

Noise generated by vehicles operating on the roadways in Long Beach may be specified either in terms of the noise emission from a single vehicle or as a time-averaged noise level expressed as a composite value. This latter method is also used to determine the noise levels exceeded 90%, 50% and 10% of time, i.e., L_{90}, L_{50}, and L_{10}. Both methods have been used to define surface vehicle noise in Long Beach. The single event noise levels are, of course, reasonably constant from one roadway to another with any variability in noise produced by speed changes or conditon of the road surface. In order to show an example of freeway noise exposure, the ADT on the freeway systems is broken down into day-hour and night-hour estimates utilizing 8% and 2%, respectively, of the ADT. Typically, 6-7 day-hours, 8 night-hours and 2-4 peak hours are considered. For the day-hour exposures, the volume in vehicles per hour is reduced to an equivalent traffic density assuming an average speed of 60 miles per hour.[1] This produces time averaged L_{50} noise exposures at a distance of 100 feet from the near traffic lane. The L_{50} value is the level exceeded 50% of the time. The night-hour volume is also estimated. Under these conditions (still assuming a 60 miles per hour speed) the time averaged L_{50} is reduced as a function of the decreased traffic volumes.

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[1]This analysis was prepared before reduction in the speed limit to 55 mph was made.

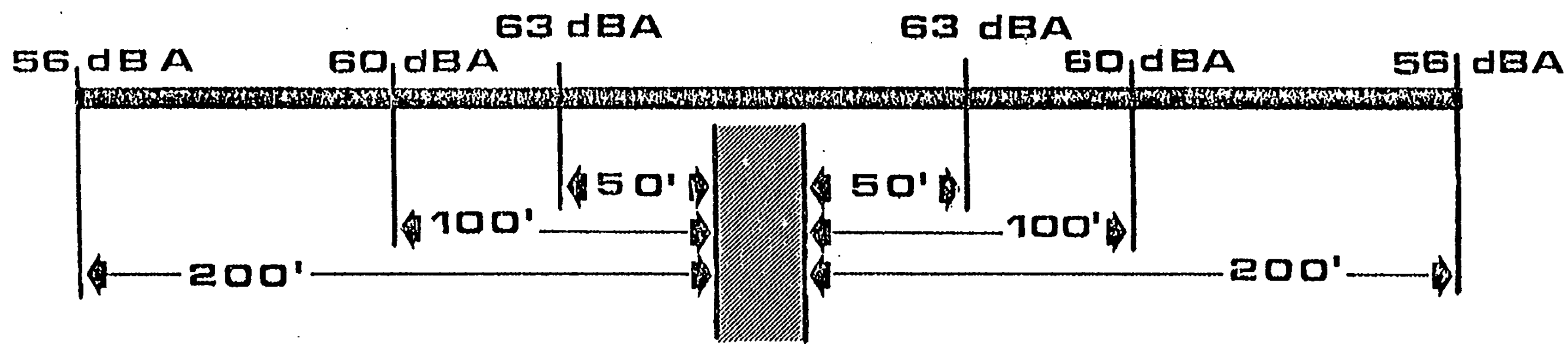


FIGURE 3

Composite Noise Exposure for Streets in Long Beach Carrying an Average Traffic Volume of 1,000 Vehicles During Peak Hours (ADT of 10,000 Vehicles). Noise Levels are Mean Levels Expected for Multiple Vehicle Flow

Source: J. H. Wiggins Company

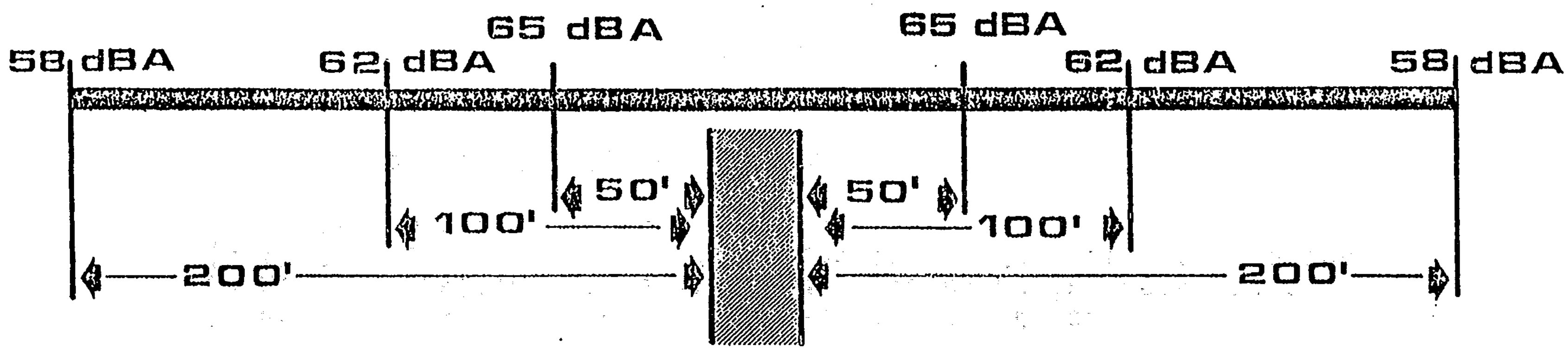


FIGURE 4

Composite Noise Exposure for Streets in Long Beach Carrying an Average Traffic Volume of 1500 Vehicles During Peak Hours (ADT of 15,000 Vehicles). Noise Levels are Mean Levels Expected for Multiple Vehicle Flow

Source: J. H. Wiggins Company

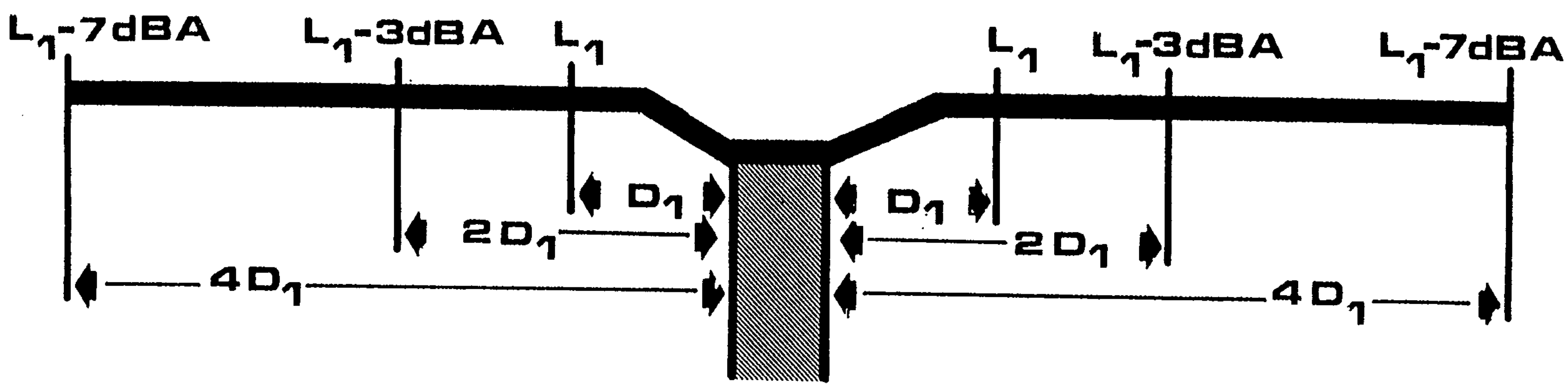


FIGURE 5

Noise Exposure as a Function of Distance from the Roadway. Distances (D) Are in Feet and Levels (L) in dBA. These Relationships are Representative for Values of D between 25 and 100 Feet and Traffic Volumes Above 2500 ADT.

Source: J. H. Wiggins Company

Under these assumptions, the noise exposure as a function of distance from the highway is shown in Figure 5. This exposure assumes a grade level roadway along the freeway routes with no significant barriers to sound propagation out to the distances shown. Since local topographic conditions present effective barriers which are continuously varying along the roadway, it is not practical to develop accurate noise exposure isoline contours for the entire length of the roadways in the area. Deviations from parallel isoline noise contours occur continuously with changes in the relative elevations of the roadway and the adjacent terrain. Consequently, it is only practical to illustrate the noise exposure for a general condition.

It is recognized that there is a requirement under the State Code to display the noise exposure from roadways for certain land uses (hospitals and convalescent homes). Without an extensive sound survey of each site, this can be done only if the assumption is made that an unimpeded propagation path exists. This was done, and figure 6 shows the noise contours around the freeways in Long Beach. In addition, a better approach to complying with this regulation is to display the noise levels around roadways assuming a completely flat, grade level terrain. This was done for a general street condition (10,000 to 15,000 ADT) in Long Beach in Figures 3 and 4. A general method for computing noise exposures from roadways with varying vehicle volumes, speeds and distances is shown in Figures 7 through 9. These data may be used to compute noise exposures at various distances from the roadway for a specific set of traffic conditons. This appears to be the only rational method for complying with the State Guidelines.

Additional information may be added to this general noise exposure computation by including the noise reduction from a general barrier condition. The conceptual basis for this procedure is illustrated in Figure 9 with a simplified graphic method for arriving at the dBA reduction for a given set of geometric parameters. This particular illustration represents the barrier as a wall or structure. It is also possible to apply this same methodology to a natural terrain barrier as in the case of an elevated or depressed roadway. This procedure is shown in Figure 10.

Measurements of noise levels were conducted along City streets in Long Beach. As noted previously, the noise from individual vehicles is uniform in different locations and any variability in noise exposure among various locations in the City is determined by local barrier conditions. Assuming effective exhaust muffling and consistent road conditions, data shown in Figure 5 may be used to assess noise exposure levels for various vehicle speeds. A subsequent section will present the ambient noise level measurements conducted throughout Long Beach. These data were obtained without identifiable noise sources (automobiles, trucks, etc.) visible from the measurement locations, i.e., while these vehicles were the sources of the ambient noise, they were shielded from view by structures or terrain and no individual vehicle was predominant in the ambient noise.

The intent in presenting the noise exposure data as individual components, i.e., contributions from various sources, is to allow City officials to realistically construct the noise environment for a specific site based on the prevailing conditions unique to that location. As discussed in an earlier section, it is not practical to generalize the noise exposure from transportation routes and make decisions on the compatibility of land uses without a specific definition of conditions at the land parcel.

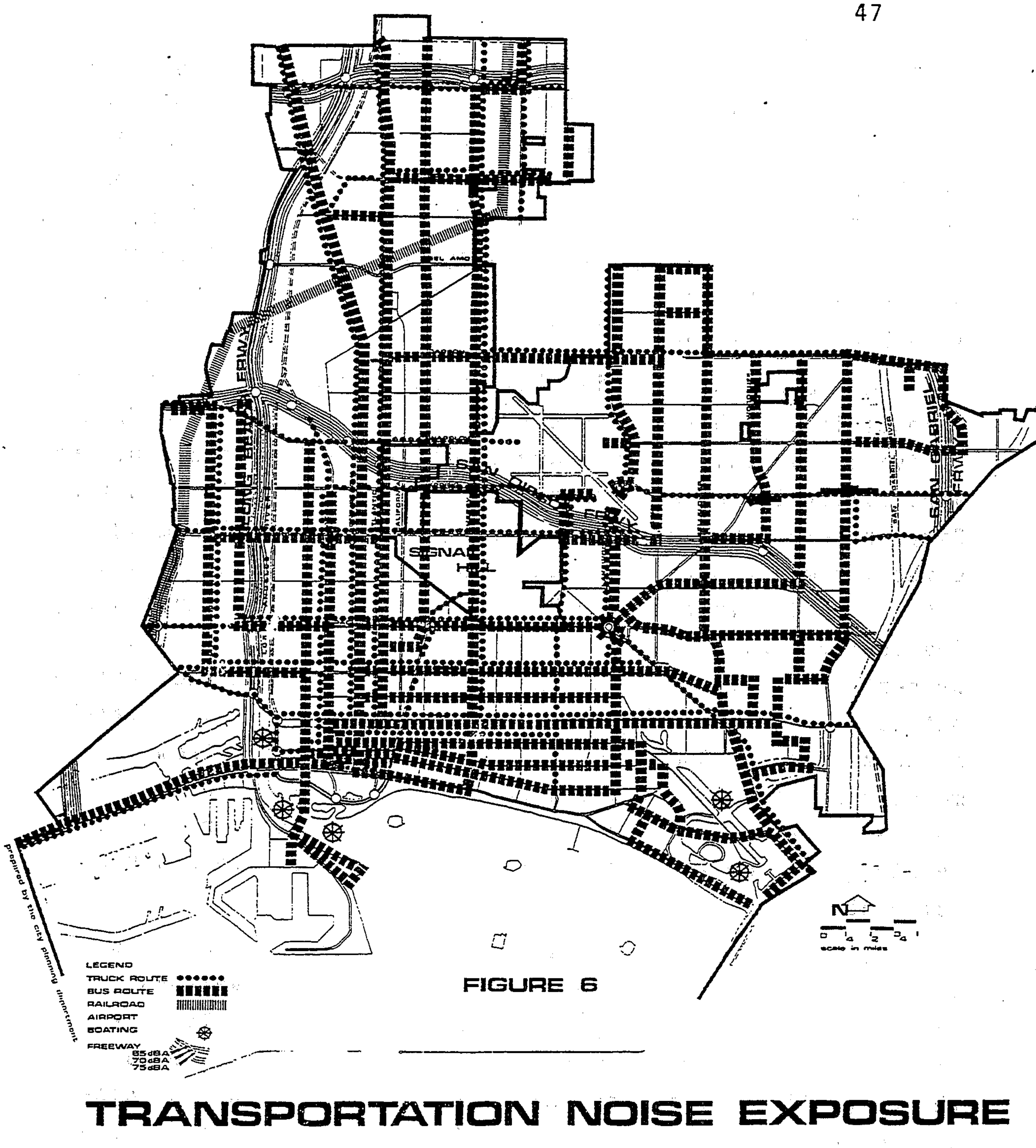


FIGURE 6

TRANSPORTATION NOISE EXPOSURE

Source: J. H. Wiggins Company and City Planning Department Staff.

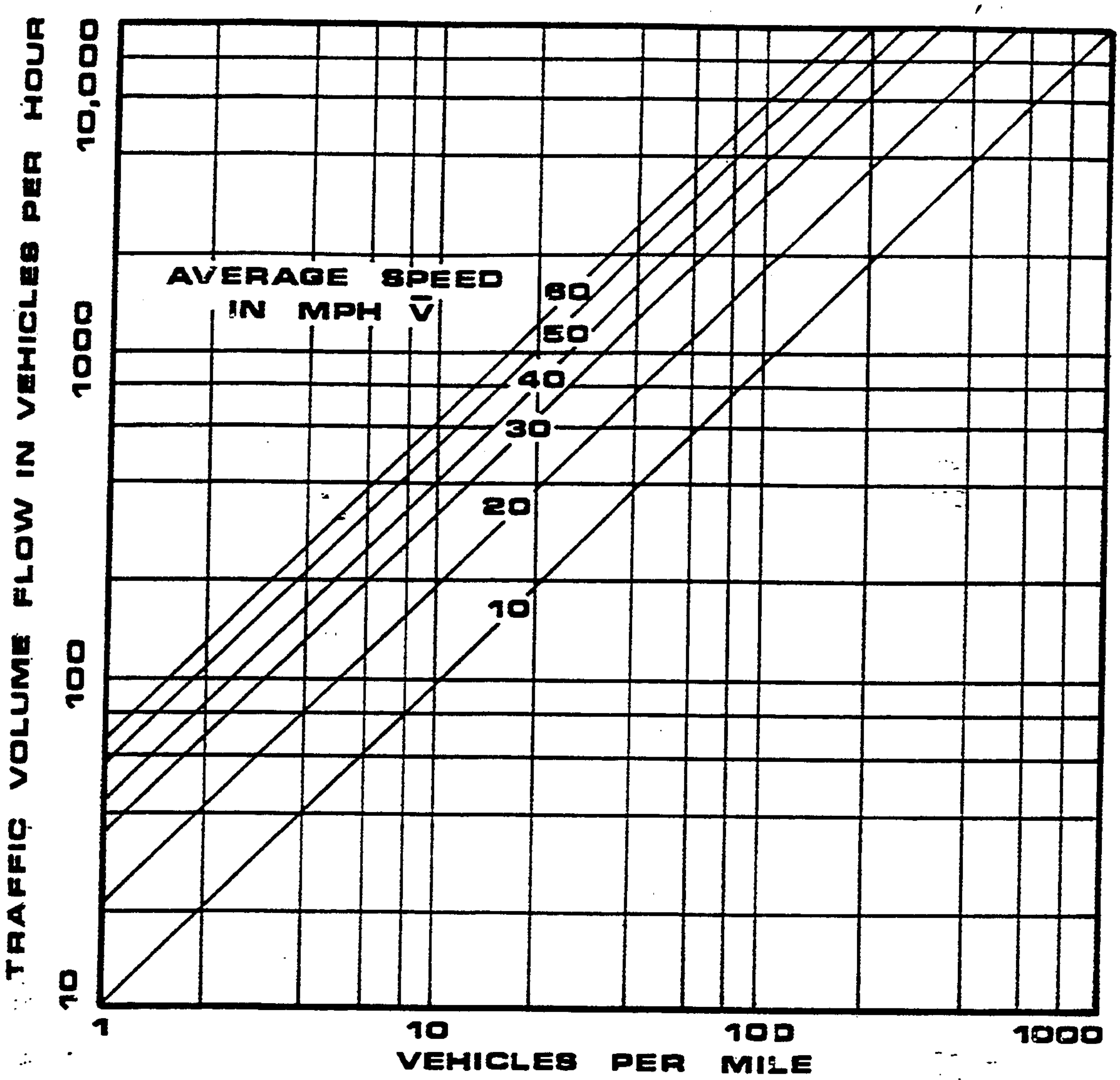


FIGURE 7

Relation between vehicle density, average speed, and traffic flow

Source: Highway Research Board Report No. 78.

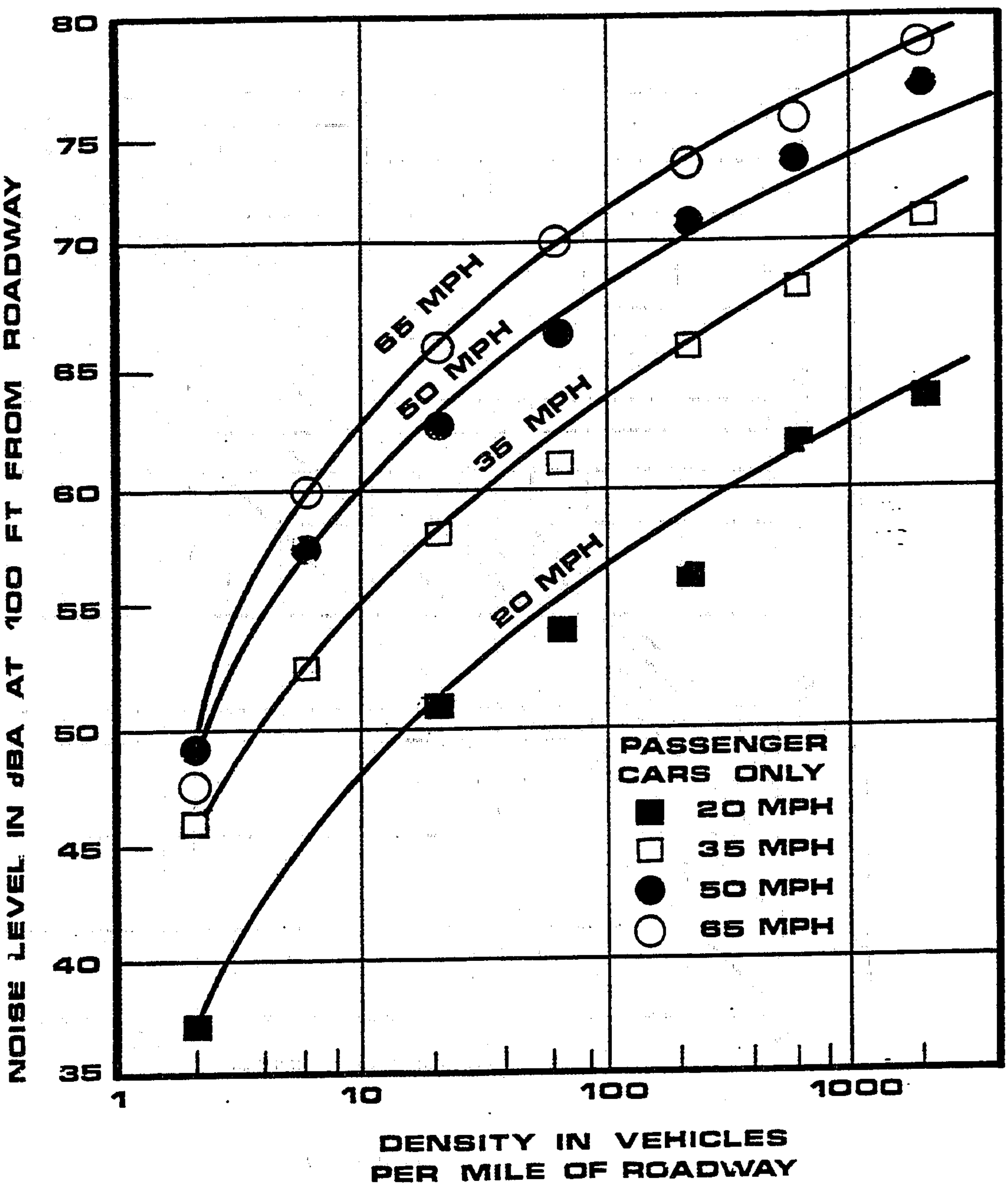


FIGURE 8

Curves for estimation of mean noise level in dBA at 100-ft distance from a lane (or single-lane-equivalent) of passenger car traffic, for four speeds.

Source: Highway Research Board Report No. 78

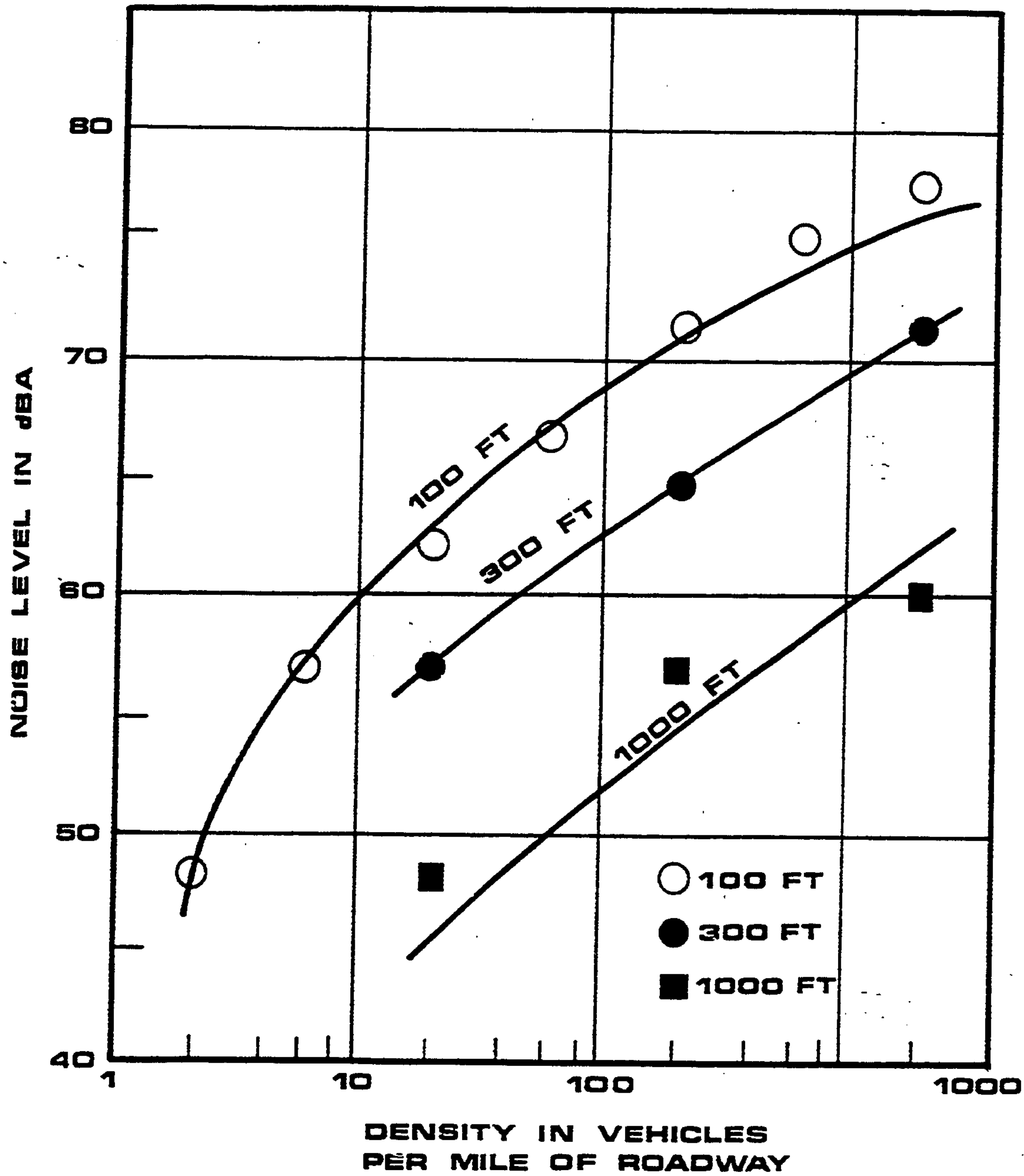


FIGURE 9

Curves for estimation of mean noise level in dBA at three distances from a near lane of passenger car traffic at 50 mph.

Source: Highway Research Board Report No. 78

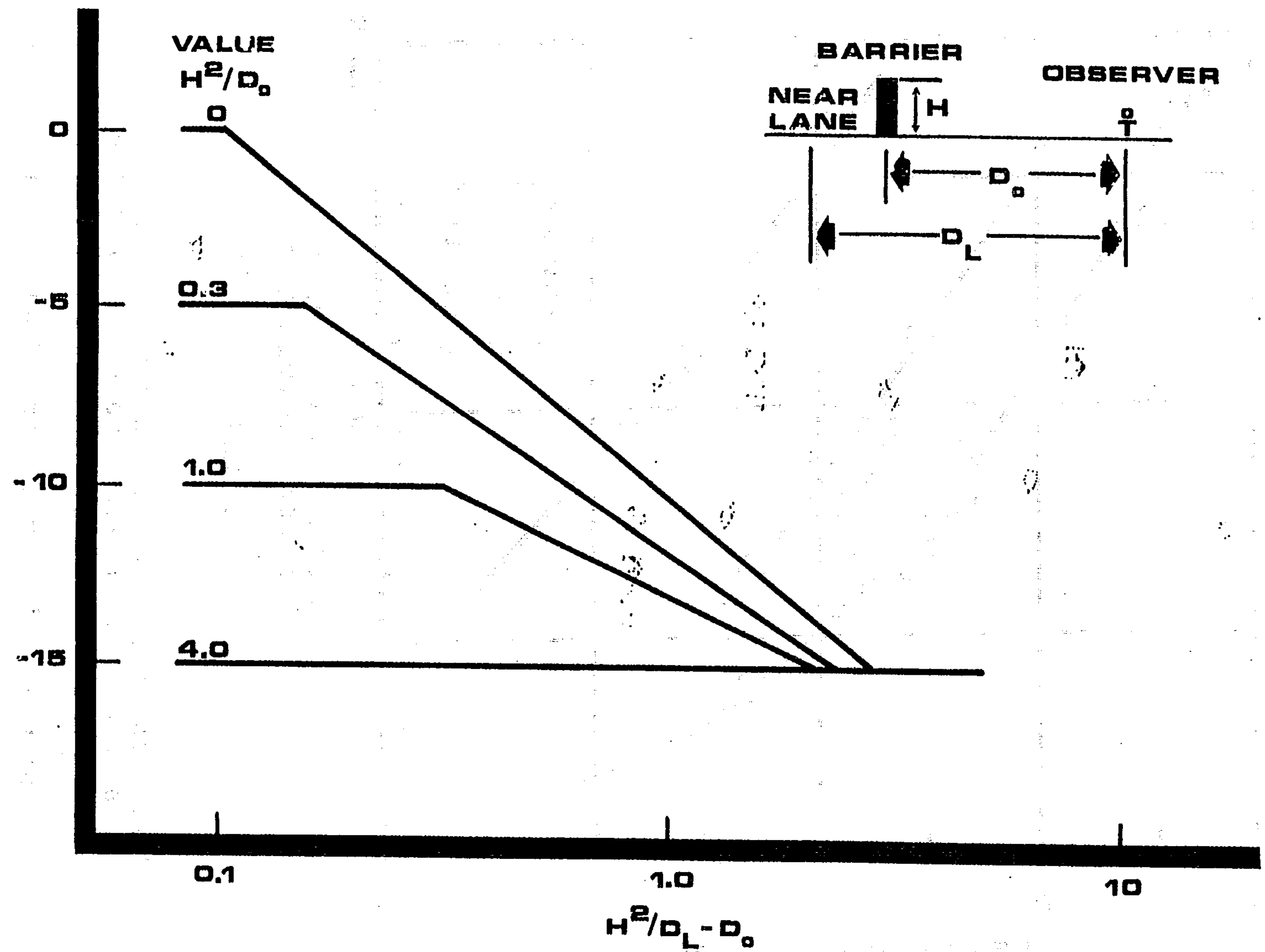


FIGURE 10

Effect or Roadside Barrier on Noise from Roadways. Appropriate Values for Barrier Height (H), Distance from Observer to Near Lane (D_2) and Distance from Observer to Barrier (D_o) are Used in the Two Expressions, H^2/D_o and H^2/D_L-D_o. The H^2/D_o Value is Interpolated Among the Four Curves and Followed Out to the H^2/D_L-D_o Value. The Corresponding Value on the Ordinate Gives the Noise Level Adjustm in dBA.

Source: J. H. Wiggins Company

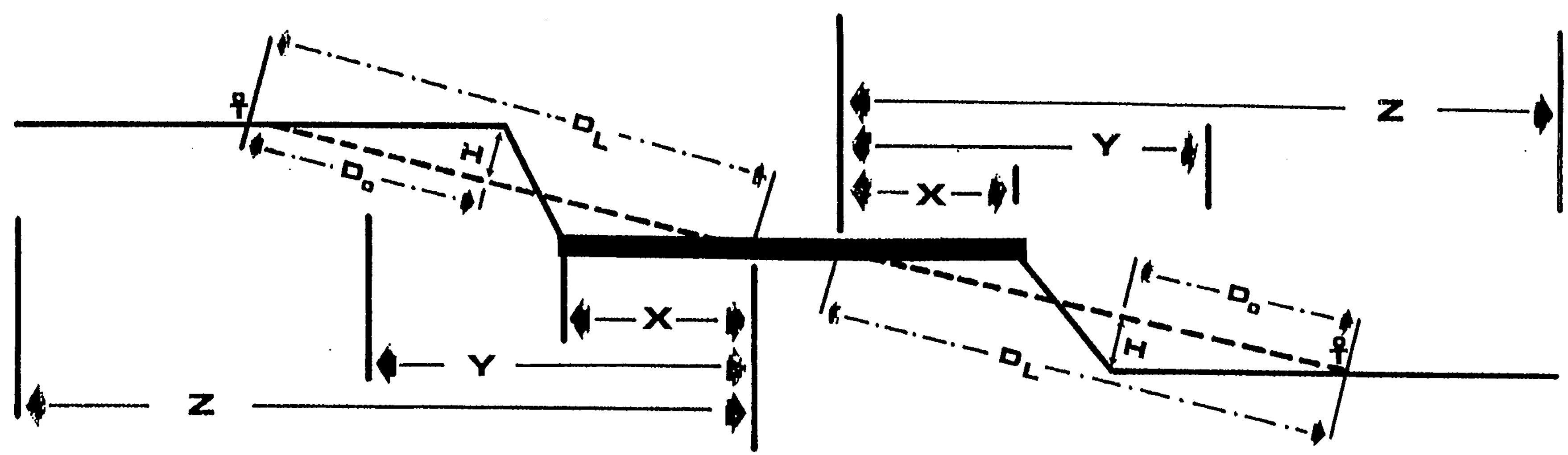


FIGURE 11

Barrier Effect Applied to Elevated or Depressed Roadway
Calculations are Conducted as in Figure 7.

Note: X equals uncorrected noise exposure value Y and Z equals corrected noise exposure value based on effective barrier height and distance.

Source: J. H. Wiggins Company

Any analysis of land use compatibility is conducted most effectively on a specific problem basis. In addition to normal growth and expansion in the City, any radical modification of city streets may introduce significant new noise exposures.

A discussion of the noise characteristics of single vehicles is included below to assist in the definition of roadway noise exposures. These observations relate, for the most part, to traffic moving at highway speeds. Noise exposures for streets in the City may be inferred from the data in Figure 12.

On most roadway systems, truck noise is the predominant noise source. In general, trucks generate noise levels 10 to 15 dBA greater than normal passenger traffic. Single trucks on a freeway produce an average level of about 82 dBA at a distance of 100 feet from the edge of the freeway. A substantial number of readings are in the 90 dBA range and maximum readings of approximately 95 dBA are not uncommon. For a freeway at a 100-foot measuring distance, passenger cars produce an average level of about 68 to 70 dBA with a maximum of about 72 dBA. These figures are for single vehicles. For heavy traffic flow at high speeds, this would be increased by 3-4 dBA.

Actual noise levels produced by roadway vehicles depend on a complicated array of factors such as road and tire conditions, speed and the type of muffler used on the vehicles. Some generalizations may be made. For passenger cars, tire noise is predominate over engine noise above about 50 miles per hour. Average noise levels measured for passenger cars at high speeds are greater than those for low speed traffic. Even at very high speeds, existing truck noise is still predominant by a considerable margin. The noise produced by truck traffic shows little dependence on the speed of the vehicle. Truck noise also depends on other road and traffic factors such as the presence of grades and curves and whether or not the vehicle is accelerating. Each of these factors may serve to increase noise levels over those measured in freely flowing level traffic.

Motorcycles also present a problem although they are not as frequent, in most cases, as trucks on the freeways. But on City streets, motorcycle noise is one of the most annoying manifestations of transportation noise. As previously mentioned, the California Motor Vehicle Code regulates the maximum level of noise output allowed to be generated by all motor vehicles in use in public streets and highways. The Long Beach authority can and does issue citations to violators of the code during normal patrolling. Enforcement of the code is somewhat difficult because loud motorcycles must be cited while operating on public streets. Police Department officers do respond to citizen's complaints regarding noisy motorcycles and actually dispatch a patrol car to the scene of alleged violations.

New motorcycles sold in California are certified by the State and the muffling system is sealed by the California Highway Patrol. Unfortunately, many seals are broken and muffling systems are illegally tampered with and modified, the result being the generation of excessive noise levels.

The mix of vehicle types on a roadway, in terms of both percentage and absolute volumes, should be closely analyzed in assessing roadway noise exposure. It is also recommended that, in any cases where there is reason to predict that trucks will comprise over 5 to 10 per cent of the total traffic flow on a roadway, noise produced by these vehicles should be used in the establishment of noise acceptability criteria for location and design of adjacent land uses.

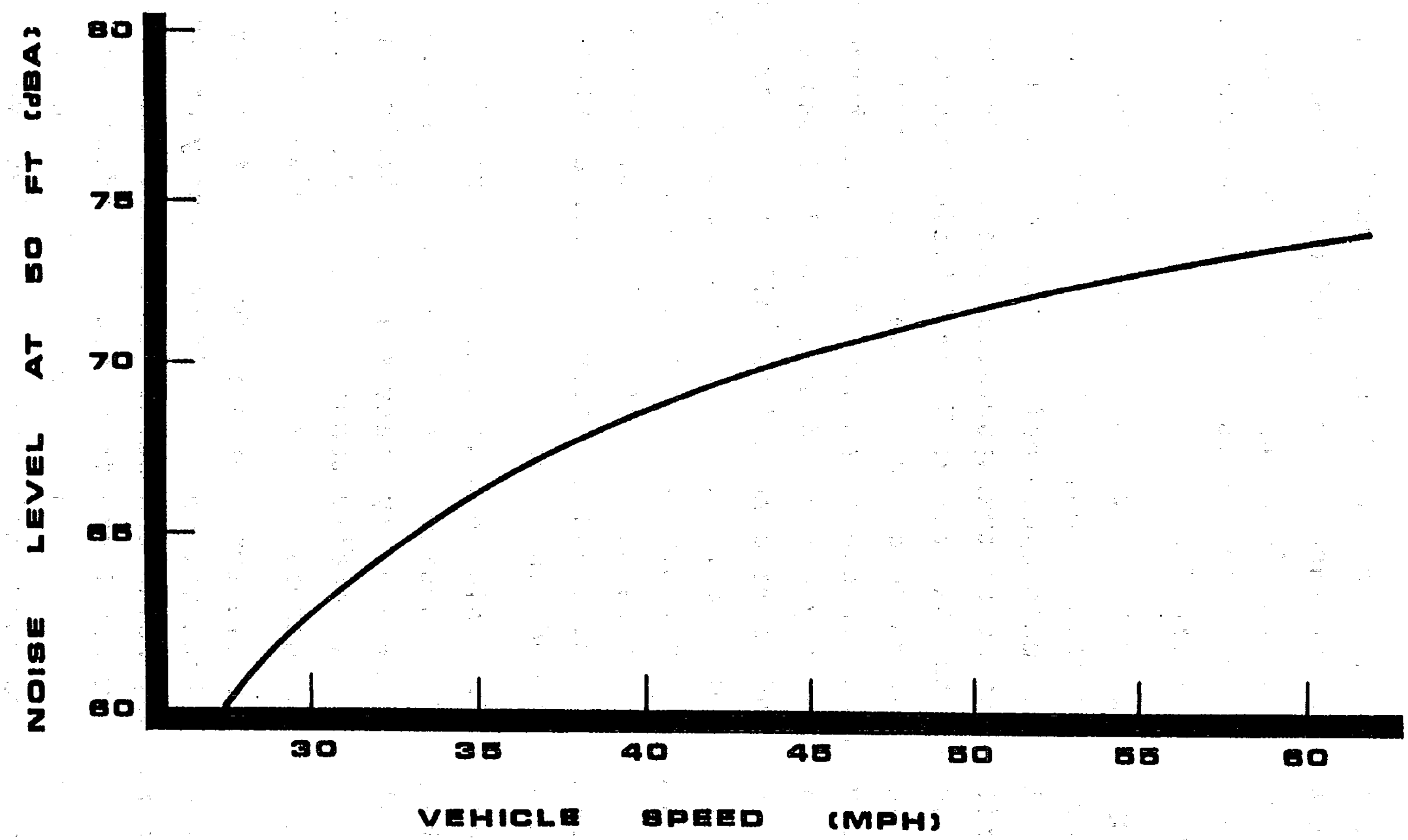


FIGURE 12

Noise Exposure from Automobiles on City Streets Operated at Various Speeds. Values May be Adjusted to 100 Feet by Subtracting 3 dBA

Source: U. S. Department of Transportation

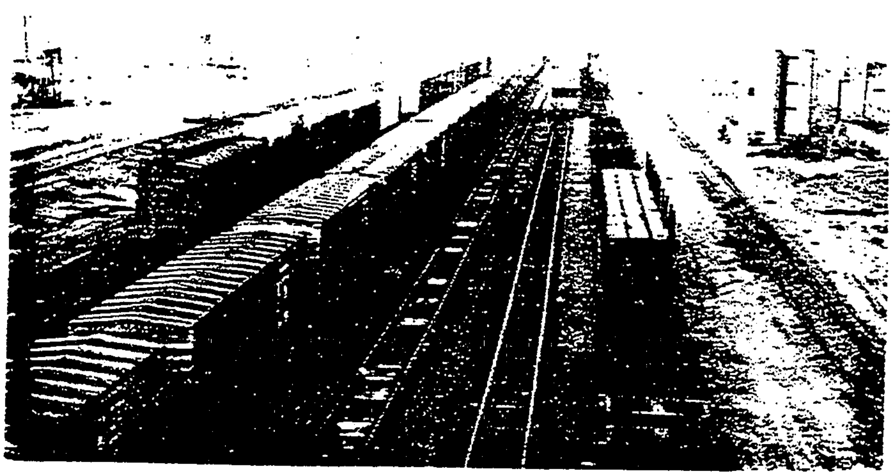
An assessment of the time-averaged noise exposures from freeways may be readily obtained from computer simulation models. These models require data on the operating characteristics of the vehicles, the roadway geometry and the observer locations. From these data, the program computes noise exposures on several measurement scales including L_{10}, L_{50}, and L_{90} as well as defining discrete octave band sound pressure levels for use in design of structures for noise control.

Sirens and Alarms on Motor Vehicles

One of the most intensive sources of noise in Long Beach is that of sirens, bells, and alarms mounted on motor vehicles. The control, certification and regulation of this type of equipment is pre-empted by State law.[2]

[2] California Motor Vehicle Code Sections 27000-27003.

RAILROAD NOISE



Railroad Noise

Railways in Long Beach serve the industrial sites located in the northwest and southwest sectors of the community. This section will outline the principal noise sources in a rail system and present characteristic noise levels for trains operating at 20-30 mph.

The major source of noise in trains operating in Long Beach is the diesel locomotive. The propulsion system includes a diesel engine driving an electrical generator which in turn provides power to the wheels. The water cooling system for the engine requires auxiliary equipment such as cooling fans which are an additional source of noise. The separate sources of noise are:

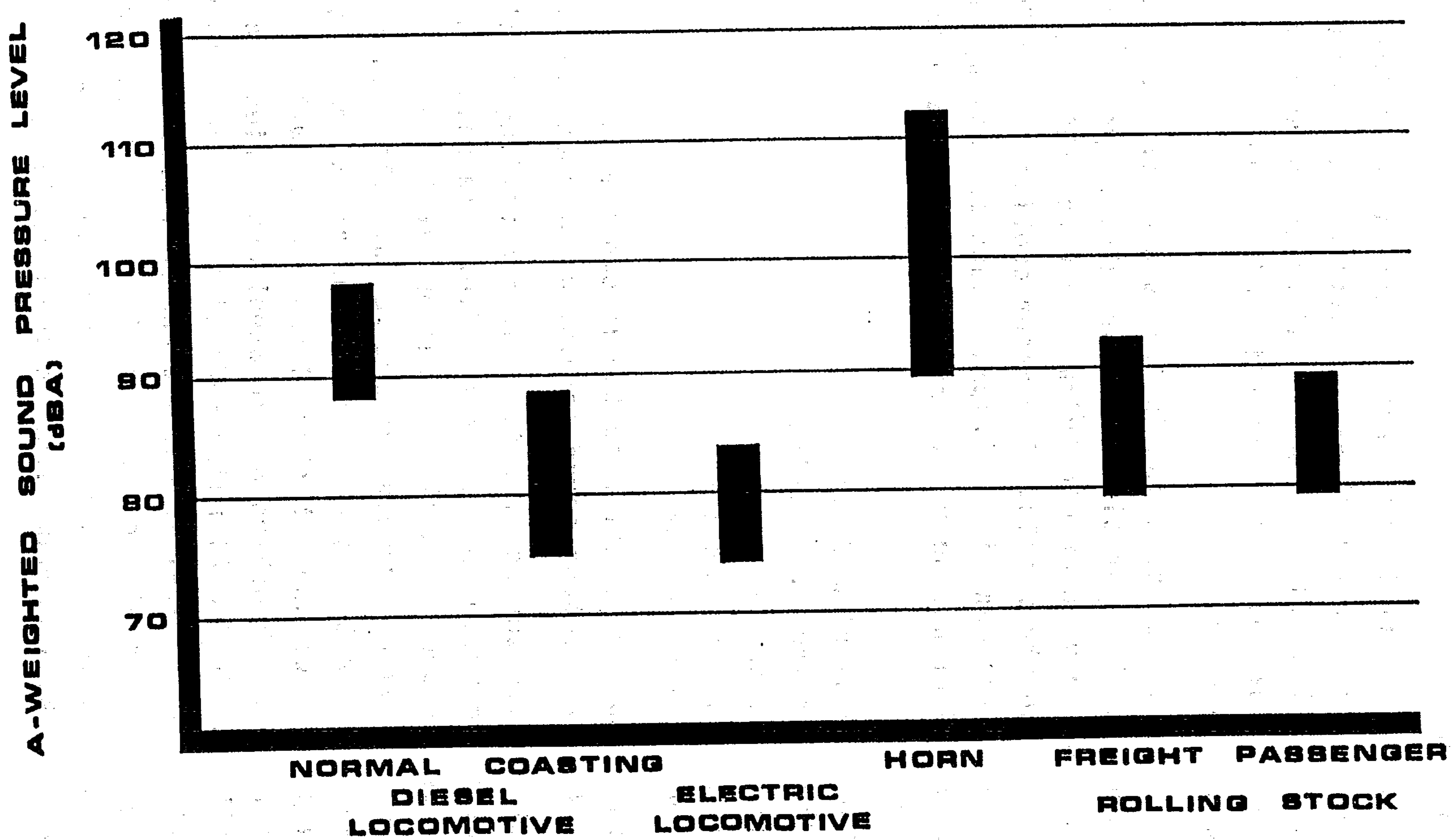
- diesel exhaust muffler
- diesel engine and housing
- cooling fans
- wheel-rail interaction
- electrical generator

A unique source of noise in the locomotive is the horn which produces the highest sound levels, up to about 115 dBA.

Another noise source in a train is the rolling stock or vehicles being pulled by the locomotive. The noise exposures produced by these vehicles is due primarily to the interaction between the wheels and the rails. This noise will be dependent on the type and condition of the railway and the suspension of the vehicle. Items such as welded track and hydraulic shock absorbers on the wheel assemblies can produce significant (5-10 dBA) noise reductions. Noise exposures representative of a diesel locomotive and rail cars passing at a distance of 50 feet are shown in Figure 13. Other types of surface tracked vehicles, such as those used for rapid transit systems, will produce lower noise emissions.

FIGURE 13

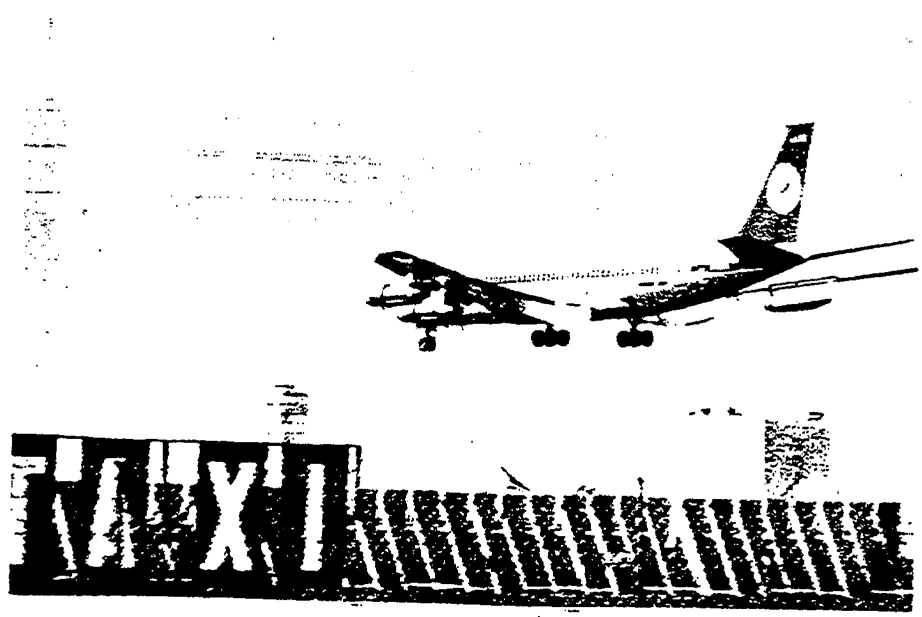
RAILROAD EQUIPMENT NOISE



Noise Exposure Levels in dBA for Train Operating at 20 - 30 MPH and Passing at a Distance of 50 Feet.

Source: Environmental Protection Agency Report PB 208-660

AIRCRAFT NOISE



Aircraft Noise

The City is subject to noise exposure from aircraft operations from Long Beach Airport located in the central section of the community. Both landing and takeoff operations overfly the City, producing noise exposures principally on a southeast to northwest track. Flights operating to and from the airport are under the jurisdiction of the Federal Aviation Administration while ground maintenance activity may be regulated by the City as the airport proprietor.

As discussed at the outset of this report, the Guidelines Document for State Code Section 65302(g) requires noise exposure contours for ground maintenance facilities associated with the airport. Such activities are, for the most part, associated with the McDonnell Douglas plant and various other lease-hold facilities at the airport. The principal noise sources encountered in ground maintenance are run-ups of jet engines for short time periods, McDonnell Douglas ground operations consist of final operational checks on DC9 and DC10 production aircraft. These ground run-ups are conducted in front of blast shields located at the west end of the production facilities. All ground testing is conducted between 6:30 a.m. and 10:00 p.m.[3] No testing is conducted on Sundays or Holidays. Other operators make pre-take-off and maintenance checks on general aviation aircraft engines, and the normal pre-flight engine checks are made by air carriers.

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[3]Some departures from this schedule have occasionally occurred owing to international trade and time constraint considerations.

Annual operations at Long Beach Airport are at a level of approximately 560,000. The majority of operations are general aviation aircraft with business jets and large jet operations constituting the remainder. These large jet operations are divided between commuter jets operated by PSA (Western Airlines initiated a three year suspension of operations in 1973) and test and delivery flights of McDonnell Douglas aircraft. The latter group includes mostly DC10 and DC9 aircraft.

There are a small number of itinerant military operations (less than 2%) including some jet aircraft. In addition to the fixed wing aircraft there are approximately 65,000 annual helicopter operations from the airport.

Of the commercial operations, there are currently 5 landings and 5 takeoffs daily of jet aircraft, all Boeing 727's. The remainder of the commercial operations are twin engine propellor aircraft operating to Catalina Island. There are five runways in operation at Long Beach Airport, with most general aviation operations on Runways 25L and 25R and virtually all jet activity on Runway 30. These operations are summarized in Table 5.

The operations and runway use shown in Table 5 are totals for the entire year. These vary with seasonal wind conditions and traffic demand so that certain runways or certain aircraft types may be used more intensively during different time periods. An example of this is the use of Runways 16L and R during afternoon periods in the summer.

Jet aircraft operations are the principal sources for noise exposures in the community surrounding the airport. As seen in Table 5, essentially all large jet operations are conducted on Runway 30. These aircraft execute a straight-in approach over the Alamitos Steam Plant location. On departure, the jets climb as rapidly as possible to an altitude of 1,500 feet prior to executing any turns over the community. This

TABLE 5

OPERATIONS AT LONG BEACH AIRPORT

Approximate Annual Operations: 560,000				
	General Aviation	Commercial Operations	Business Jets	McDonnell-Douglas Operations
	544,000	11,500	2,500	3,000
Runway				
25L	326,400			
25R	136,000			
30	27,200	1,500	2,500	3,000
12	(No data was given for this runway)			
16L	8,160			
16R	8,160			
34L	8,160			
34R	8,160			
7L	8,160			
7R	8,160			
Helicopter Operations: 65,000 Annual				

Source: Federal Aviation Administration Air Traffic Control Office, Long Beach Airport.

climb to 1,500 feet on departure is accomplished at a different rate by different aircraft. Consequently, the left turn to a heading of 250^{0} is accomplished above different points on the ground. Virtually all jet aircraft departing in Runway 30 leave the area on this 250^{0} heading, as the Los Angeles control zone boundary lies immediately to the north.

Aircraft noise exposures from flight operations may be specified either in terms of single events, i.e., the noise generated by a specific aircraft during a landing and takeoff, or as a composite measure of multiple operations. Since the advent of jet aircraft flight in the late 1950's, several composite methods have been devised for ostensibly assessing the impact of noise from multiple flight operations.

Composite Noise Rating (CNR), Noise Exposure Forecast (NEF) and Community Noise Equivalent Level (CNEL) are all methods used in this country for expressing weighted cumulative aircraft noise exposures. Each method incorporates a summation of a series of noises from aircraft flyovers using a frequency weighted sound pressure level as a physical index of the noise. These energy summations are then further weighted by adding penalties for night events. The original methods, CNR and NEF, utilize maximum Perceived Noise Level (PNL) and Effective Perceived Noise Level (EPNL), respectively, as the basic aircraft noise scale. Each method separates flyovers into day (7:00 a.m. to 10:00 p.m.) and night (10:00 p.m. to 7:00 a.m.) events.

Adopted Noise Regulations for California Airports

California Assembly Bill 645, passed in 1969, directed the Department of Aeronautics to develop and adopt noise standards for California airports. These standards would control aircraft engine noise at all airports operating under the aegis of the State Division of Aeronautics. A proposed noise standard was developed and subsequently adopted in November 1970 by the California Aeronautics Board.

This proposed noise standard developed for California airports incorporates a new concept for assessing community noise exposure, the Community Noise Equivalent Level (CNEL). This scheme utilizes a time-averaged A-weighted Sound Pressure Level as an index of cumulative noise exposure in the community. In effect, the total acoustic energy from all aircraft flyovers is summed and averaged over a 24-hour period, then added to the noise existing in the community (exclusive of aircraft noise) to give an equivalent or effective value for ambient noise in the area. Also inherent in this procedure is a weighting factor of 10 : 3 : 1 for daytime, evening and nighttime operations, respectively.

Given this procedure for measuring noise levels, the standard also specifies acceptability criteria. The principal component of these criteria for new airports dictates that residential land use shall be prohibited within areas exposed to aircraft noise exceeding CNEL=65 dB. This criterion was to become effective in 1985, but was postponed to 1987. Existing airports shall be subject to an interim criterion of CNEL=70 dB. In addition, there are provisions for yearly variances for existing airports. These variances are to be granted if the airport proprietor can demonstrate reasonable efforts toward achieving compliance with the standard as administered by the State Division of Aeronautics. Airports in California with 65 CNEL contours that impact 1,000 residential parcels or more are required to plan and implement a program of full-time noise monitoring and abatement. Fortunately, that is not the case at Long Beach Airport where approximately 188 parcels fall under the 65 CNEL impact zone. (See page 67).

It would appear that the prime objective in any composite noise rating scheme should be validity in terms of human response to aircraft noise. All of the existing procedures provide, at best, an approximation of human response. Estimates of the effect of increasing numbers of operations or the relative effect of night versus day operations are largely intuitive. Lacking any proven model of human behavior as a foundation for these factors, it becomes important to trade off simplicity for these approximations. In this respect, the CNEL scheme is desirable in terms of its use of A-weighted Sound Pressure Level as a magnitude scale. This provides a direct measure of the loudness level of aircraft noise and precludes the procedure of analyzing and calculating to derive the Perceived Noise Level (PNL). It does appear, however, that the CNEL concept of summing and averaging acoustic energy from aircraft flyovers over a 24-hour period has only face validity. Again, there are no experimental data available to support this as a model of human behavior.

Using the composite noise exposure method, the combined noise from current operations at Long Beach Airport is shown in Figure 14. CNEL noise exposure areas were computed on the basis of average annual operations, runway distributions and flight tracks. As specified in the State Division of Aeronautics Regulations, the limits on residential land use for existing airports will be the CNEL 70 contour boundary until 1985 (subsequently postponed to 1987) and CNEL 65 thereafter.

The CNEL 70 (and subsequently, CNEL 65) represent the recommended limits for residential land use around airports. Since the CNEL 65 will ultimately control these uses, this contour was chosen as shown in Figure 14. It is clear that some residential sites in Long Beach are, and will continue to be, included in these restricted areas. It is apparent from this that there will continue to be some significant conflicts between prevailing land uses and the State Regulations. This is occuring because no assessment

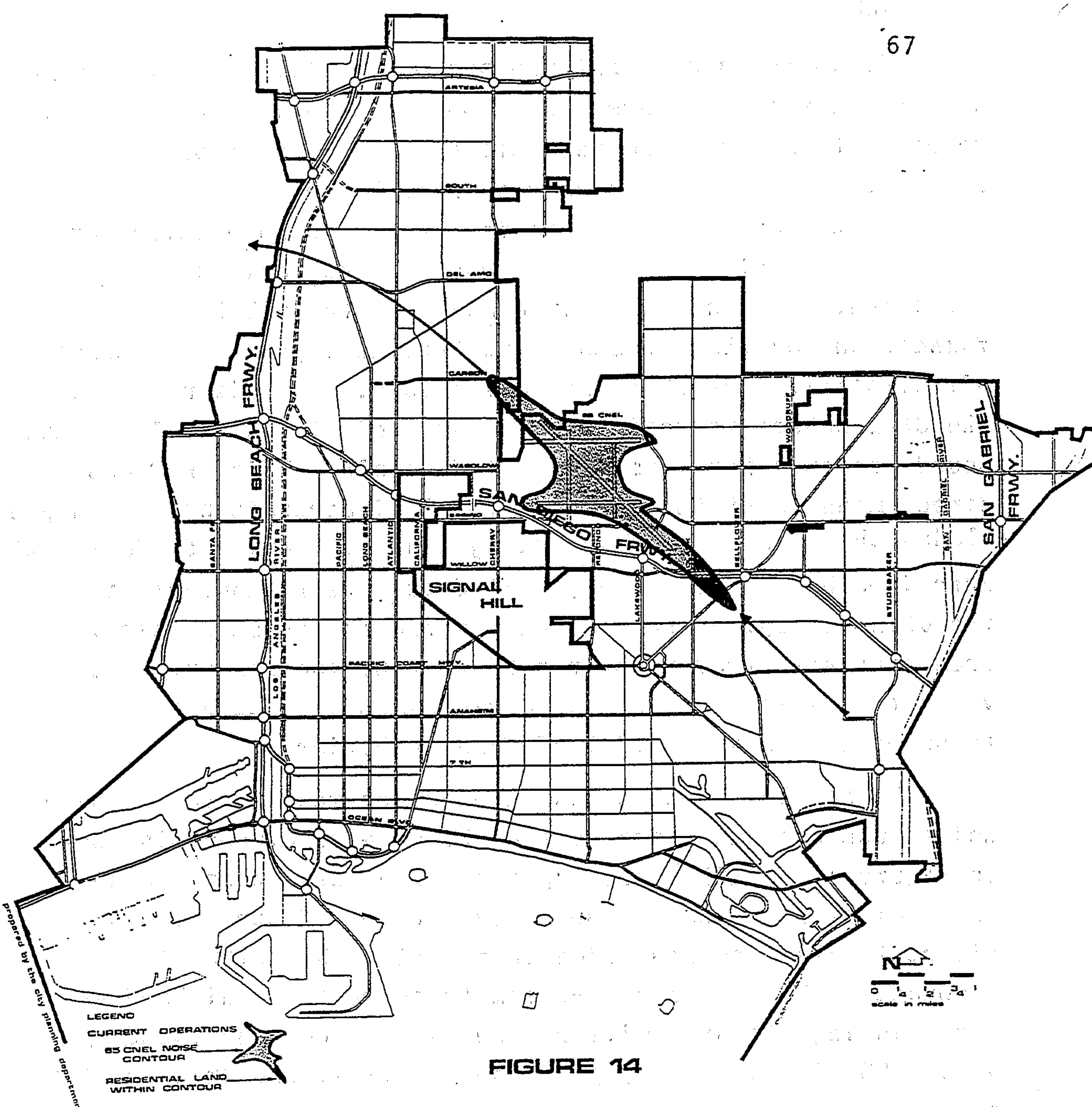


FIGURE 14

RESIDENTIAL LAND USES WITHIN THE 65 CNEL NOISE CONTOUR

Source: Noise Analysis City of Long Beach, J. H. Wiggins Company, October 29, 1973, p. 36.

of the extent of the impact of the Regulations or any transitional policies were included in development of the CNEL evaluation method.

A more direct method for evaluating the impact of aircraft noise is to assess the single event exposure levels. Operations at Long Beach Airport produce single event levels over residential areas of approximately 70-88 dBA. The higher values are in those areas lying closest to the airport. Strong objections to aircraft noise tend to appear in residential areas when the noise levels exceed about 77 dBA. This is an approximate criterion based on community surveys around airports in metropolitan locations. In referring to these single event levels, the dBA value represents the average maximum or peak level of the flyover noise. This maximum level persists only for a short time and drops in level before and after the maximum. One measure of intrusion is the speech interference caused by the noise. This may be inferred from Figure 15, noting at the same time that an individual flyover at the nearest residential sites may exceed 70 dBA for 15-20 seconds. With a total of about 12-15 jet operations each day, this amounts to approximately 3 minutes per day above 65 dBA.

Long Beach Airport Land Use Compatibility

The Long Beach Airport is surrounded with various land use types. These have been evaluated under the following headings: (See Figure 16).

- Residential
- Institutional
- Industrial
- Recreational
- Commercial
- Mixed Industrial-Commercial

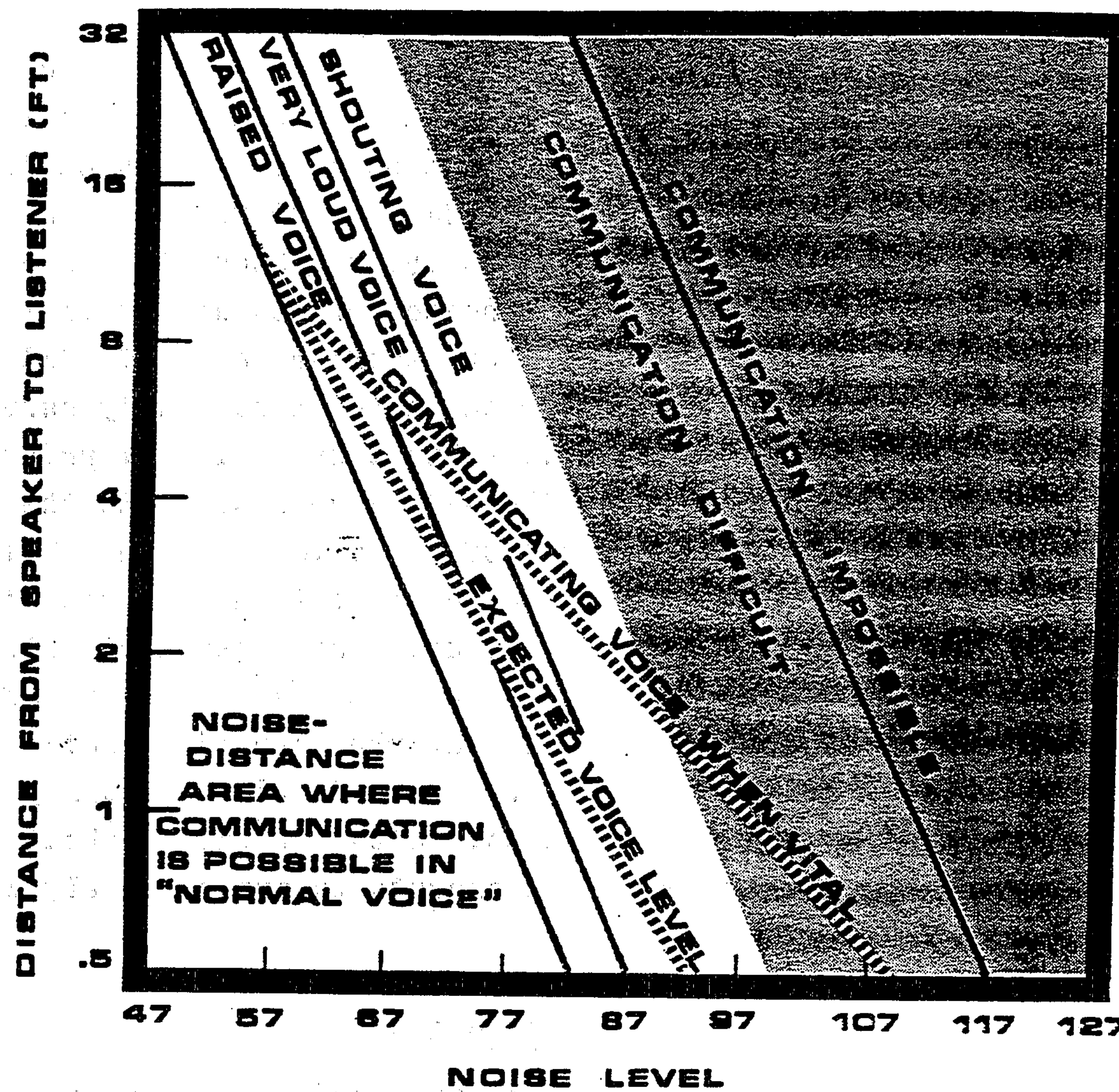


FIGURE 15

Distances for Effective Speech Communication for Various Noise Levels.

Source: J. C. Webster in Transportation Noises J. Chalupnik, ed. Washington University Press, 1970.

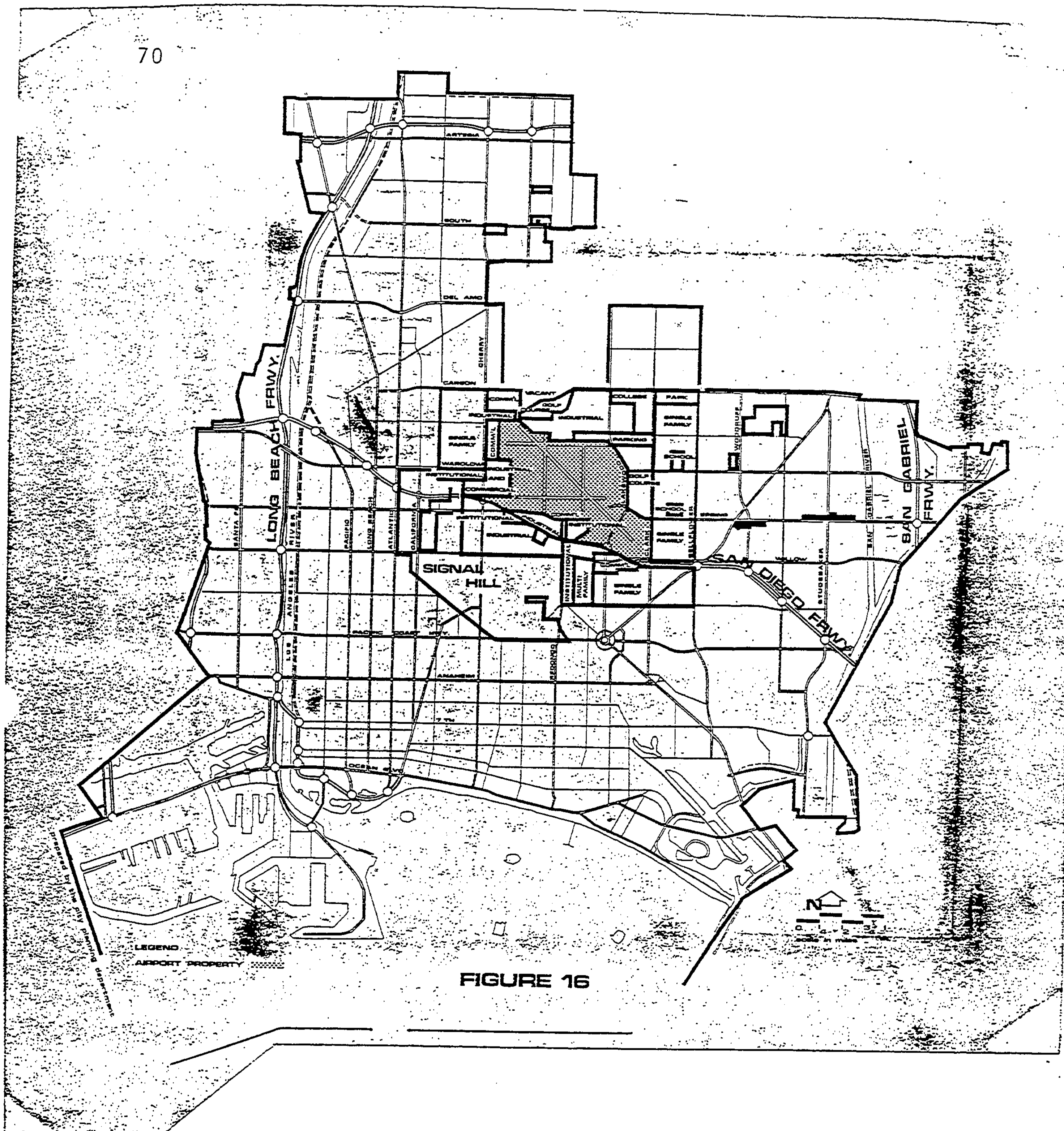


FIGURE 16

LONG BEACH AIRPORT ADJACENT LAND USE

The airport property includes various land use types. They have been analyzed under the following major headings: FAA, sales, services, manufacturing, industrial, commercial, military, and recreational.

All parcels leased or rented by the Department of Aeronautics are in land uses compatible with each other and with airport operations. The noise emanating from the Long Beach airport is generated by several activities, all related to air operations and aircraft ground maintenance and industries. The following are the main sources of noise:

1. Aircraft take-offs and landings, and operations in the traffic patterns;
2. Aircraft undergoing engine maintenance run-ups;
3. Engine test stands (for major overhaul);
4. Various ground power units, machinery, and people; and
5. Miscellaneous noise sources connected directly or indirectly with the operation of the airport.

Noise impact of air and ground operations at the Long Beach Airport is felt in residential land uses. Approximately 188 residential parcels fall under the 65 CNEL noise contour. (See Figure 14). The total residential land area affected is approximately forty-two acres.

For indoor noise abatement, housing can be made acceptable in most cases through adequate soundproofing. Outdoor living, however, engenders a critical noise problem because of the climate-determined outdoor living orientation of Long Beach.

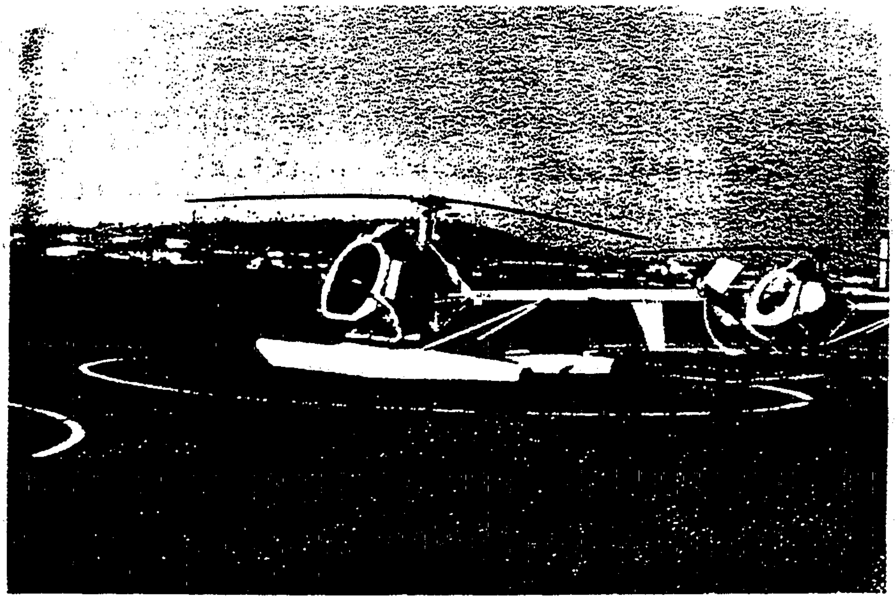
There is a need for continued city-wide land use planning including the Long Beach Airport. Coordination of city-wide airport land use planning can be mutually advantageous to airport tenants and airport-area residents. Land in and around the Long Beach Airport can be used to satisfy community requirements, and at the same time land uses can be regulated so that they are compatible with airport activities.

The land area surrounding the City's airport falls under the jurisdiction of several municipalities (the cities of Signal Hill and Lakewood) and the County of Los Angeles. It will be in the best interest of all concerned jurisdictions to plan and work together in all future development in and around the Long Beach Airport.

There is a need for the development of model housing and building codes that specify noise construction standards for structures around the Long Beach Airport. Such codes could be made part of the City zoning ordinance.

The regulation of land uses around the Long Beach Airport can be achieved with the least cost to the Community through zoning, and the use of housing and building codes. When it is not possible to use the above procedures, more compatible land uses should be considered, such as open spaces and recreational facilities. No additional housing units should be recommended in areas impacted by the CNEL - 65 contour. The possibility of technological advances in the form of quieter aircraft engines such as are being developed now will significantly affect airport noise problems. When it is not possible to use the above procedures, the City could consider the purchase of easements, or the conversion or redevelopment of property to compatible land uses. No additional housing units should be approved in areas impacted by the CNEL - 65 contour.

HELICOPTER NOISE

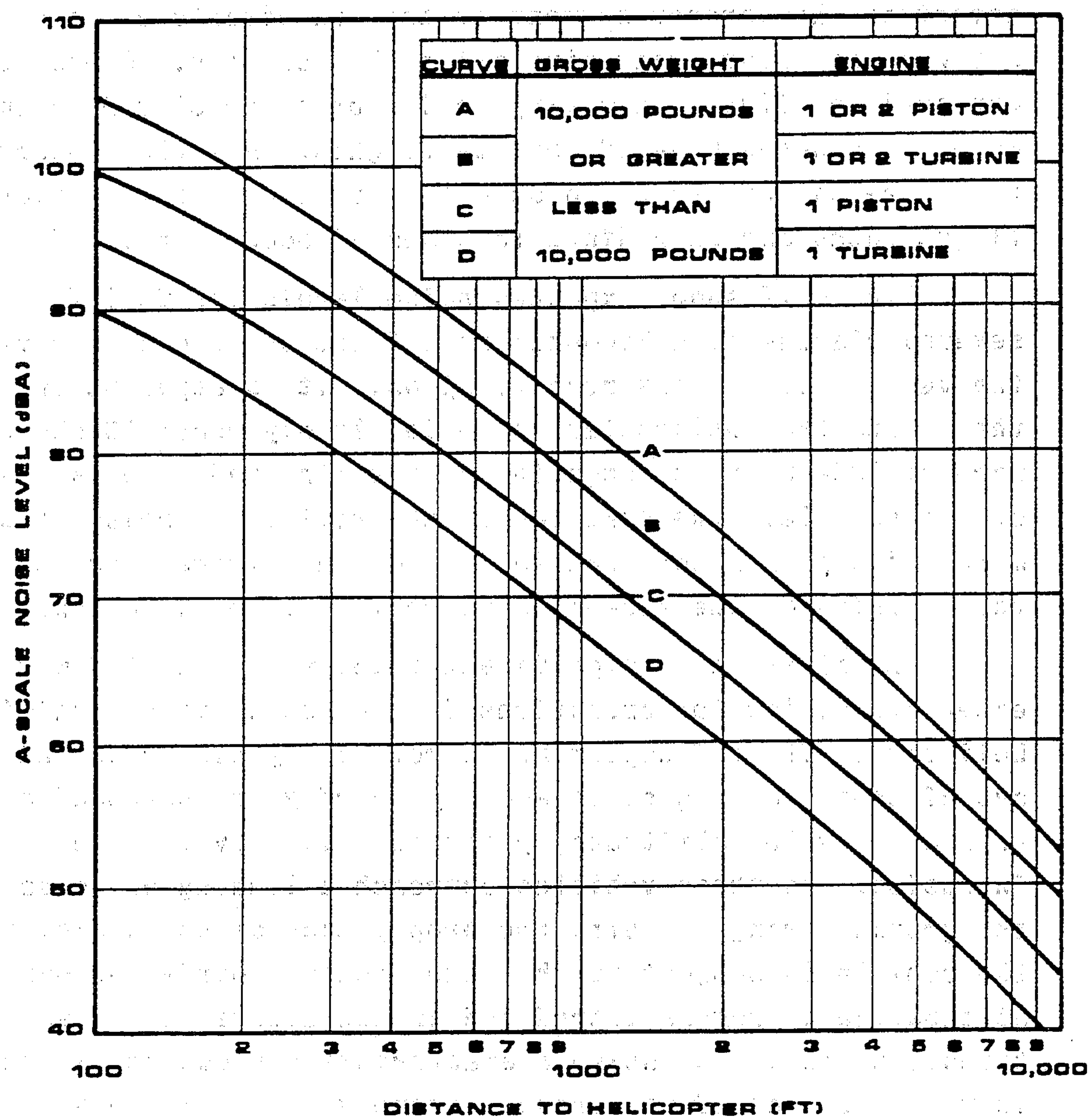


Helicopter Noise

The noise source in this category with a potential for affecting the largest segment of the inhabitants of Long Beach may well be rotary-wing aircraft or helicopters. Operations can include flights involving police or other City Departments as well as non-scheduled private flights. All these operations are not discussed in detail because of the irregular flight paths and unpredictable times of occurrence.

Figure 17 shows expected noise levels (in dBA) for several classes of helicopter as a function of distance from the vehicle to the observer location. It is apparent from these data that helicopter noise levels may reach 90 dBA or more at 100-500 feet depending on the size and power system of the vehicle. The duration of the helicopter noise is a more odius phenomenon than for fixed wing aircraft due to the capacity of the former to hover in a fixed location.

One of the most significant problems associated with extensive helicopter operations is the judicious siting of heliports. The helicopter moves relatively slowly in and out of these landing sites and may overfly the surrounding area at very low altitudes, producing high level noise intrusion. As these vehicles approach a landing or leave the ground during takeoff, the propagation of sound away from the vehicle is subject to the same excess ground-to-ground attenuation phenomena introduced in the discussion of surface transportation. The noise characteristics shown in Figure 18 may be corrected for these extremely low altitude noise exposures by adding the reductions plotted in Figure 18. Corrections for ground to ground propagation of helicopter noise mitigation of helicopter noise impact in Long Beach will depend most heavily on operational controls, e.g., controlling the number of daily flights along a particular route or the altitude of the overflights. These controls


CURVE
GROSS WEIGHT
ENGINE
A
10,000 POUNDS
1 OR 2 PISTON
B
OR GREATER
1 OR 2 TURBINE
C
LESS THAN
1 PISTON
D
10,000 POUNDS
1 TURBINE
A-SCALE NOISE LEVEL (dBA)
110
100
90
80
70
60
50
40
100
2
3
4
5
6
7
8
9
1000
2
3
4
5
6
7
8
9
10,000
DISTANCE TO HELICOPTER (FT)
A
B
C
D

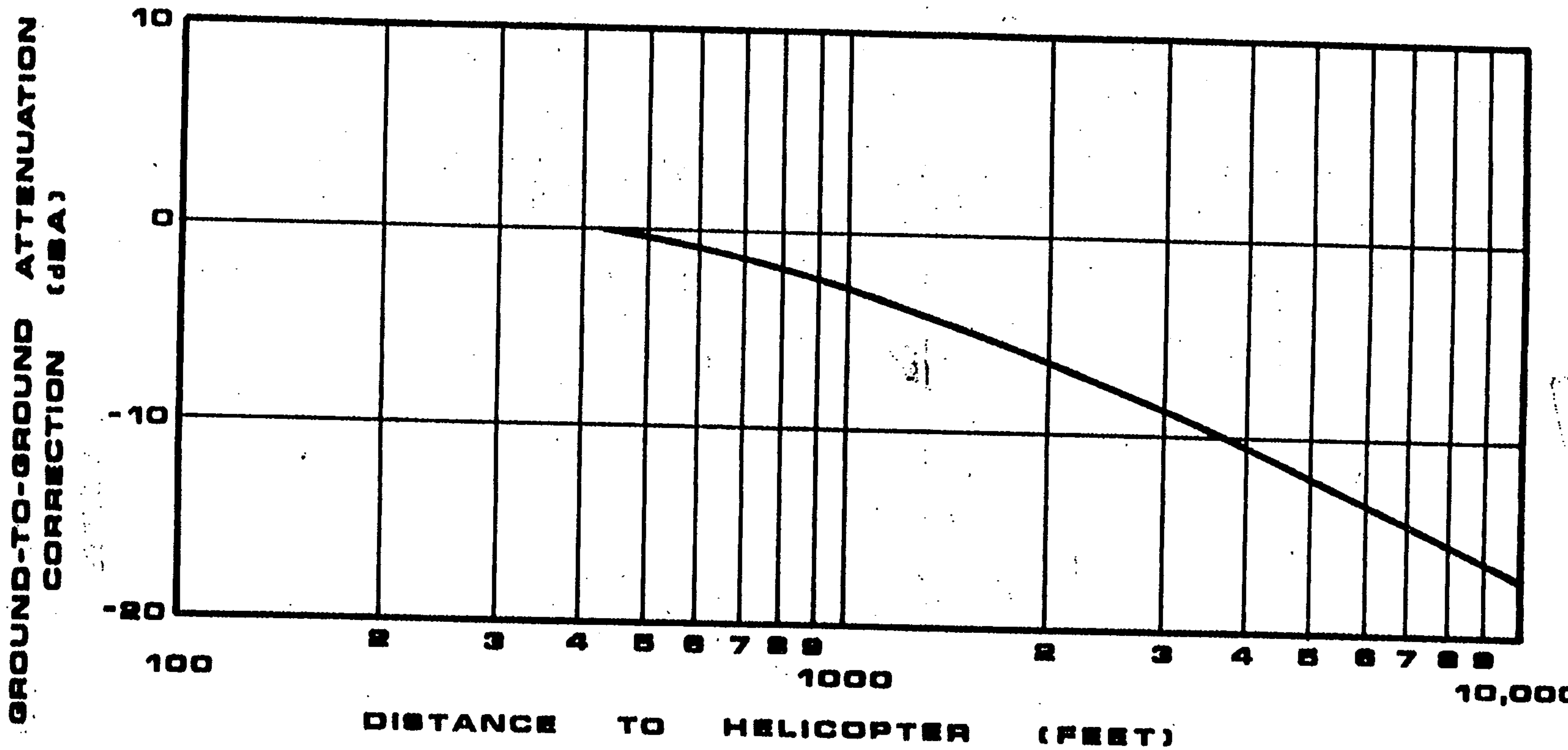


FIGURE 18

Corrections for Ground-to-Ground Propagation of Helicopter Noise.

Source: Federal Housing Administration Report "Literature Survey on Urban Noise," FH-954, Jan. 1967.

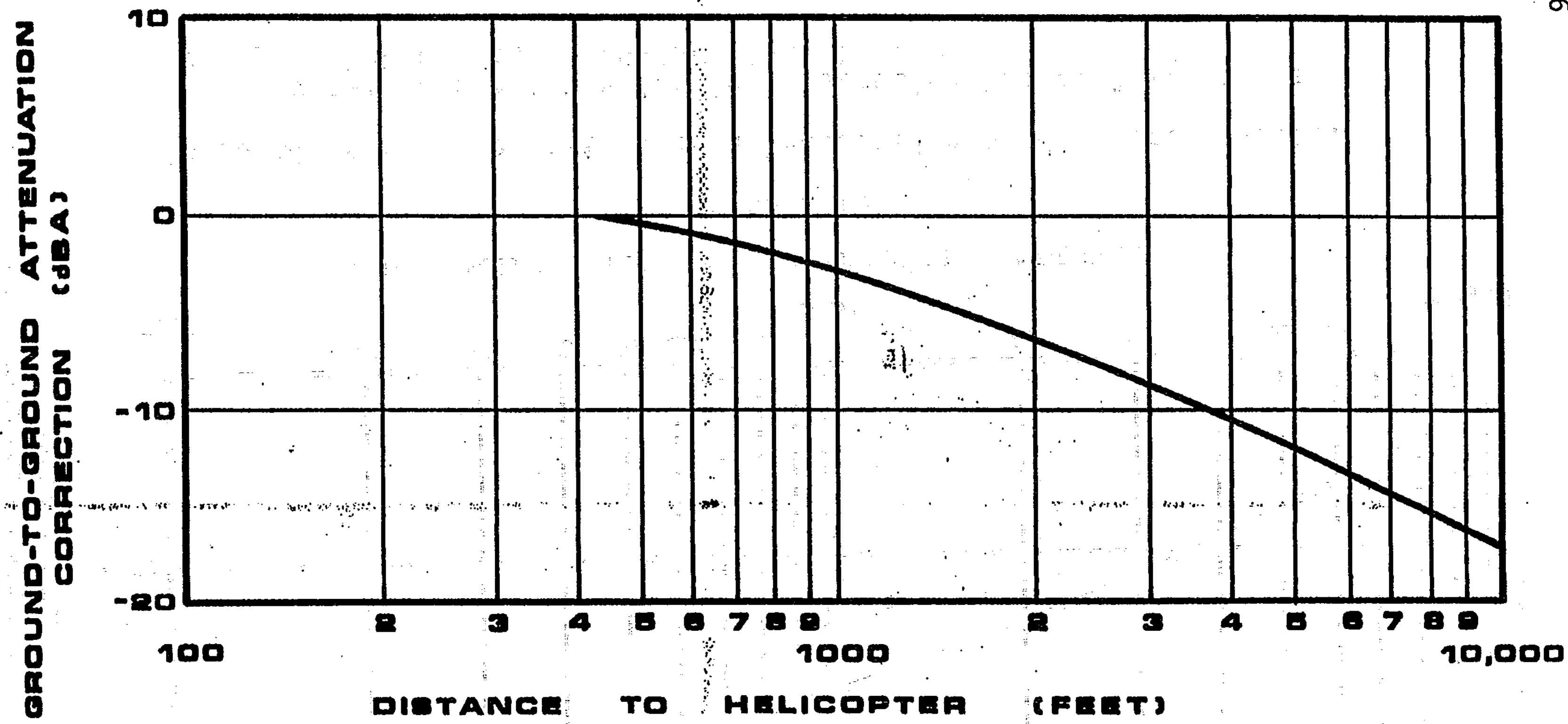


FIGURE 18

Corrections for Ground-to-Ground Propagation of Helicopter Noise.

Source: Federal Housing Administration Report "Literature Survey on Urban Noise," FH-954, Jan. 1967.

may be further enhanced through careful analyses of potential heliports relative to flight destinations, approach and departure routes and time of operation.

POLICE HELICOPTER NOISE

Police Helicopter Noise. The Long Beach Police Department operates two Bell 47G5-A helicopters over the City. It is an established police helicopter procedure to fly no lower than 500 feet unless it is a case of emergency, and, during the night time (depending upon the area), to fly no lower than 750 feet to reduce the possibility of sleep arousal. The two crafts fly an estimated 3600 hours per year along the beach, over main traffic arteries such as Long Beach Boulevard, Atlantic Avenue, Cherry Avenue, Anaheim Street, Pacific Coast Highway and the San Diego, Long Beach, Artesia and San Gabriel Freeways. Less often, flights follow the San Gabriel River and the Los Angeles River Flood Control Channels in order to cause as little noise pollution as possible. During the hours of preventative patrol, there are times when they do not use these previously designated channels of flight. When responding to emergency calls from ground units, the helicopters will fly the shortest route from their location to where they are needed. If they have to use the spotlight in order to assist the ground units in the identification of vehicles or suspects during the night time flights, it may be necessary for them to fly lower than the authorized height, depending upon the surrounding terrain. When this occurs, the pilots make the flight as short as possible. It is important to recognize that the level of helicopter noise output depends to a great extent on the maneuverability and attitude of the craft. Orbiting, for instance, causes much more noise than level flights at cruising speeds. Likewise, routine City-wide patrolling is less noisy than the pursuit of a suspect or spot surveillance missions.

The Long Beach Police Department heli-pad is located near Spring Street and Redondo Avenue in the Emergency Operating Center area (see Figure 19). This area is ideal for landings and takeoffs because there are neither businesses

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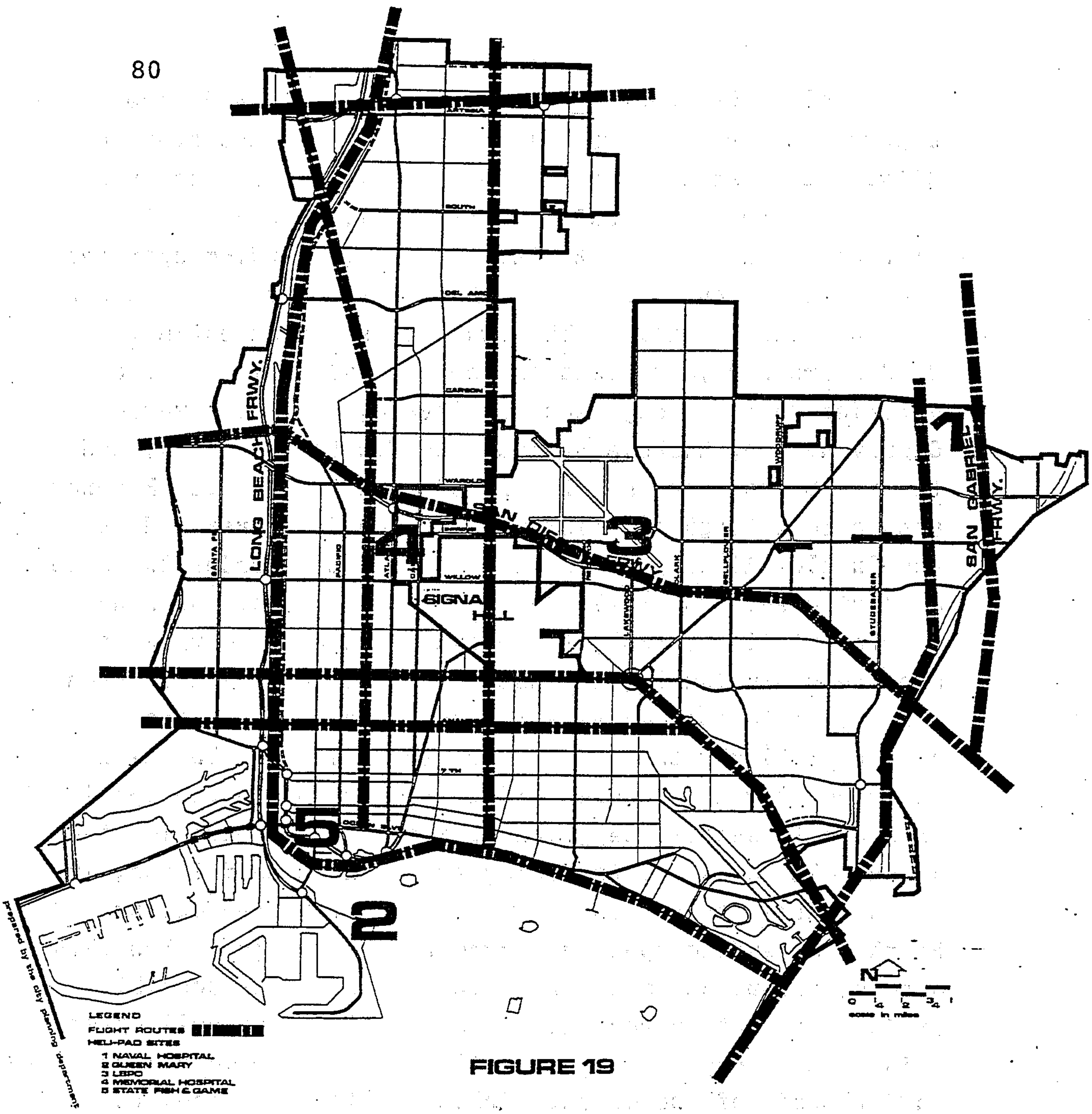


LONG BEACH POLICE HELICOPTER FLIGHT ROUTES

Source: Long Beach Police Department.

nor homes nearby. The aircraft are several hundred feet high before they are over a residential district.

The Police Department is well aware of the problem of noise pollution which might be attributed to the use of police helicopters and all helicopter pilots are continually advised not to fly low over residential areas of the City for extended periods of time because it might disturb people in the area.

The Police Department permits no personnel to perform any training exercises over residential areas. All of their practice is done over non-populated portions of the City.

In order to keep the noise pollution to a mimimum, the City recently purchased two new mufflers for their helicopters which are the latest in the state-of-the-art for this type of equipment. They have been installed at the cost of $2,600.

The helicopter has proven itself as being very effective assistance to ground units in apprehending criminals and in the prevention of crime. There are instances when it may be necessary to cause noise pollution. It then becomes necessary to decide whether it is more important to accomplish the police mission or pollute the air with noise for a short period of time.

Table 6 shows measured noise emission levels from Bell 47G5-A helicopters in use by the Long Beach Police Department before and after muffler system modifications.

TABLE 6

NOISE EMISSION LEVELS FROM LONG BEACH POLICE HELICOPTERS
(Before and After Muffler Modification)

Altitude Above Ground	Indicated Speed (MPH)	Maneuver or Attitude	Noise Levels in dBA: Before Modification	Noise Levels in dBA: After Modification	Noise Levels in dBA: Net Reduction	Perceived Loudness[2]
00 ft.	0[1]	Hover	80	76	4	(24%)
00 ft.	0[1]	Orbit	72	71	1	(6%)
600 ft.	60	Flyover	70	68	2	(14%)
700 ft.	60	Flyover	66	63	3	(19%)

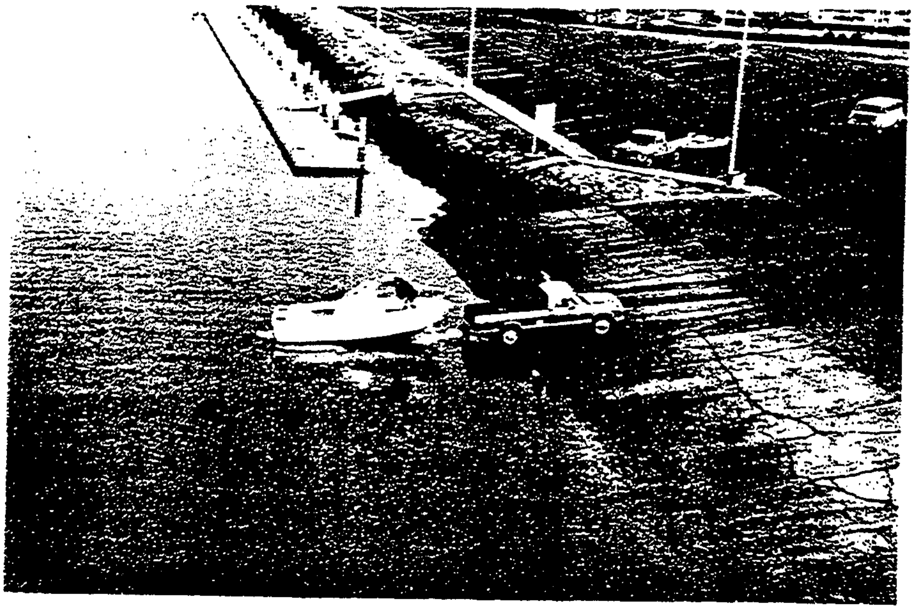
Note: Ambient level: 49-52 dBA. Wind direction and velocity: S.E., gusty 15-20 knots. Air temperature: 64° F.

[1] Orbit around and hover directly over the microphone.

[2] The noise output of two different aircrafts is unequal, therefore the reduction in perceived loudness cannot be assumed to be precise but rather an approximation.

Sources: Long Beach Transportation Division. Long Beach Building and Safety Department. J. H. Wiggins Company, Acoustical Consultants.

WATERCRAFT NOISE



Watercraft Noise

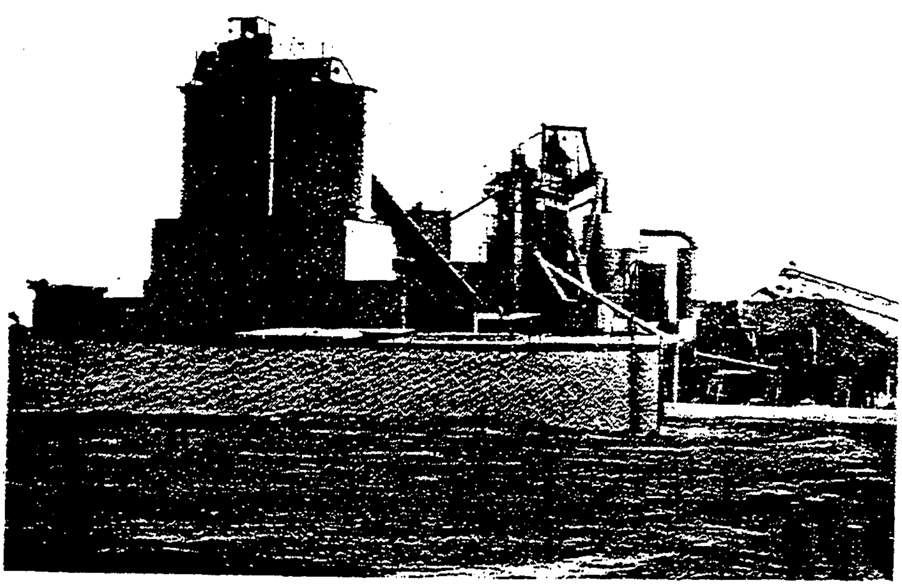
Watercraft noise is also a concern. The highest levels of noise in this category are produced by inboard-powered ski boats, with unmuffled exhausts. Lower levels are generated by small crafts (with 6 to 10 horsepower engines).

The Long Beach Marine Department has the responsibility of enforcing Section 654.05 of the California Harbors and Navigation Code. The Code regulates the maximum allowable noise level generated by motor boats operating in or upon the inland waters of the State. Boat-generated noise complaints are received occasionally by the Marine Department from waterfront homeowners along Los Cerritos Channel and the Golden Avenue launching ramp area. Watercraft noise is also annoying to those who want to enjoy the water in quiet ways such as sailing, canoeing or swimming. Most habitual infractions are by inboard motor and water-skiing boats. The most common cause of excessive boat noise in Long Beach is lack of proper muffling.

Motor boat-generated noise is not a widespread problem. The maximum boat speed limit allowed along highly developed waterfront lots is 15 mph. The length of existing water channels is too short to allow for sustained high speeds or long distance runs.

The problem of boat noise in Marine Stadium is the subject of a separate report prepared by the City Planning Department.

INDUSTRIAL NOISE



Industrial Noise

Industrial operations in the City cover a wide variety of noise producing functions. The principal noise sources in industry are impact, reciprocation or vibration, friction, and turbulence in air or gas streams. These sources appear in a variety of industries in Long Beach including oil production, metal forming, shipping and others. For the most part, the older industrial installations will prove to be the most significant noise producers. This derives from both the lack of technology for machine and building noise control at the time of installation and the absence of restrictive criteria for city planning. More recent industrial installations incorporate suitable noise control in the facility and modern planning criteria allow for rational site locations. The approach to the analysis and control of industrial noise in Long Beach will be to provide recommended methods which may be utilized for specific sites. Some examples of particular industrial noise areas in the City are cited at the end of this sub-section.

Two approaches to industrial noise problems are available. The City may implement a systematic sound survey of all industrial sites in the community to identify problem areas. (See Figure 20). This is a substantial undertaking and probably would not be justified in terms of expenditures. The second, and more pragmatic approach, is to assess each site on the basis of complaints. As the community becomes aware of the efforts on the part of the City Planning Department to identify and control noise problems, existing industrial noise intrusions in residential areas will be reported.

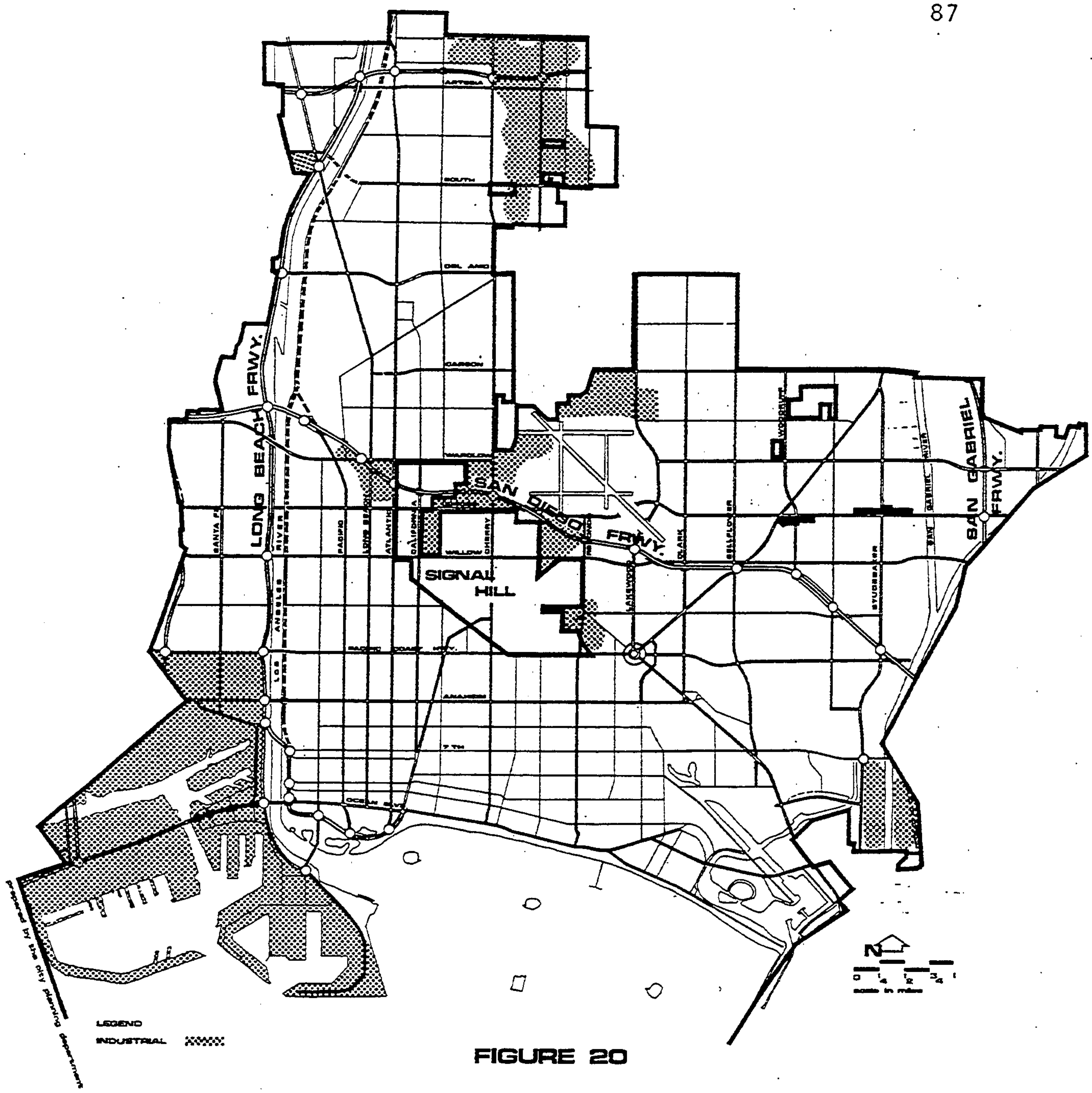


FIGURE 20

INDUSTRIAL LAND USE

Source: Long Beach Community Analysis Program, Gruen Associates. p. 1:8. Long Beach, 1972.

Annoyance from industrial noise is a subjective phenomenon affected by many factors such as background noise levels in the area. Also, whether the noise is continuous or only exists during a portion of the day. Other factors such as the presence of impulsive or irregular noises and the spectrum shape or frequency distribution of the noise enter into people's responses. Assessment of the physical attributes of the noise may be carried out through a straightforward series of measurements of the A-Weighted Sound Pressure Level conducted by City Personnel. These measurements should be conducted around the periphery of the facility and along adjacent residential property lines. Characterization of the time duration and subjective quality of the noise will be equally important. These data may then be evaluated against City noise regulations and prevailing Federal and State criteria.

One of the sources of noise in this category are the oil pumping stations located within the City. These installations are powered by either diesel or electric motors with the latter producing a quieter operation. A sampling of noise levels for these pumping stations (measured at 100') showed values ranging between 62 dBA for the electric motors with enclosures to 83 dBA for some older diesel units.

Other industrial areas in the City produced the following noise levels:

1. East of Henry Ford Avenue, 1 mile south of Pacific Coast Highway. Site adjacent to oil refinery showed levels between 56 and 58 dBA.

2. Oil well locations approximately 1/4 mile south of Colorado and west of Pacific Coast Highway. Levels in this area measured between 57 and 60 dBA.

3. Near the intersection of Desmond Bridge and Ocean, noise from oil wells ranged between 65 and 68 dBA.

4. East of intersection of Cherry Avenue and Hungerford. Traffic is principal noise source with levels between 54 and 59 dBA.

5. Near intersection of Paramount and Coolidge. Noise levels ranged between 52 and 60 dBA.

6. Near the intersection of Cherry Avenue and 65th Street, Industrial and oil operation, noise measured 48-56 dBA.

7. 60th Street and Walnut Avenue, a residential area one-fourth mile from Cherry Industrial Area 52-54 dBA. 46-49 dBA.

8. Near the intersection of 56th Street and Walnut Avenue, one-quarter mile from Cherry Industrial Area 55-56 dBA.

9. Atlantic Avenue and Wardlow Road north of warehousing and trucking area. Noise range 48-51 dBA.

10. Near intersection of 12th Street and Caspian Avenue. Noise level close to railroad storage yard 52-59 dBA.

11. Water Street and Ontario Avenue oil refinery, warehousing and trucking area noise level 56-66 dBA.

12. Panorama Drive and Pier A Avenue. Oil refinery, warehousing and trucking area. Noise level 50-54 dBA.

13. Intersection of Harbor Scenic Drive and Queen's Highway on fringe of port operations, noise level 50-54 dBA.

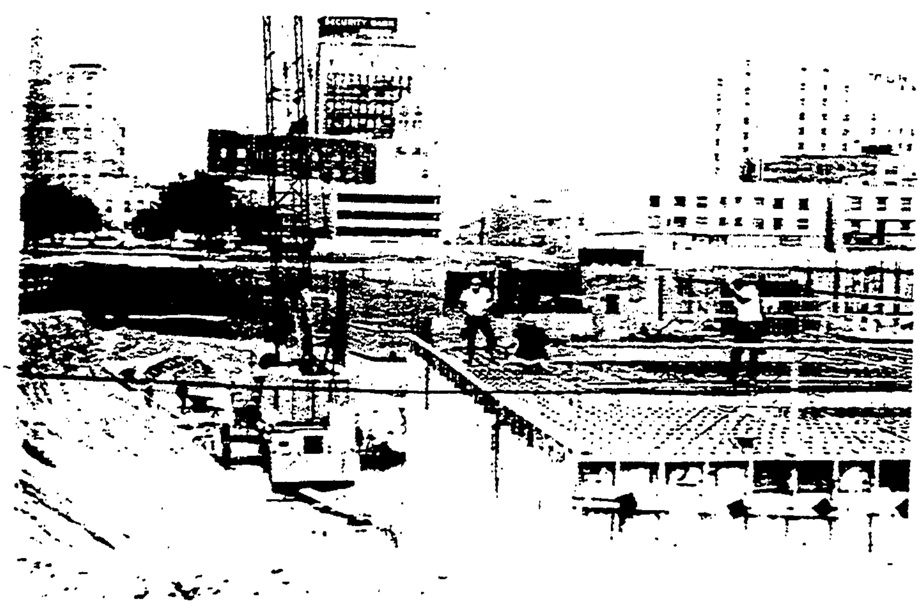
14. Wardlow Road and Rose Avenue residential area near to industrial and airport areas, noise level 54-56 dBA.

15. Intersection of Redondo Avenue and Stearns Street near to oil properties. Noise level 48-53 dBA.

16. Studebaker Road and 7th Street near Edison power generation facilities. Noise levels 45-49 dBA.

17. Near intersection of Hanbury Road and Greenbrier Street. Single family residential, one-half mile east of McDonald Douglas Aircraft. Noise level 49-52 dBA.

CONSTRUCTION NOISE



Construction Noise

As noted in a previous section, construction noise is an increasing by-product of new construction and urban redevelopment. This produces special problems of noise control compared with other industrial types. Work is conducted in unenclosed areas and is of a temporary nature. The frequency and intensity of the noise may vary greatly during different phases of the work. Finally, the noise cannot be controlled through land use restrictions as with industrial sites.

Most noise from construction and demolition sites is produced by machinery. The most prominent noise source is equipment fitted with diesel engines. Many of these, but not all, have exhaust silencers or mufflers. With unmuffled diesel equipment producing noise levels of 90 dBA at 100 feet, the introduction of silencers can result in significant noise reductions of the order of 15-18 dBA.

This will apply to graders, scrapers, other excavation equipment, motor generators and diesel trucks. If electrical power is available on a site, the use of electric motors rather than diesels is desirable whenever possible.

Air compressors and other machinery powered by internal combustion engines may be subject to the same muffling requirements and may further be controlled by ensuring that the manufacturer's enclosure is intact and by using enclosed housing where possible.

An overview of the range of noise levels produced by representative construction equipment is shown in Figure 21.

Some numerical criteria should be available by which local authorities and, perhaps, courts could judge whether noise from construction and demolition sites is reasonable or not.

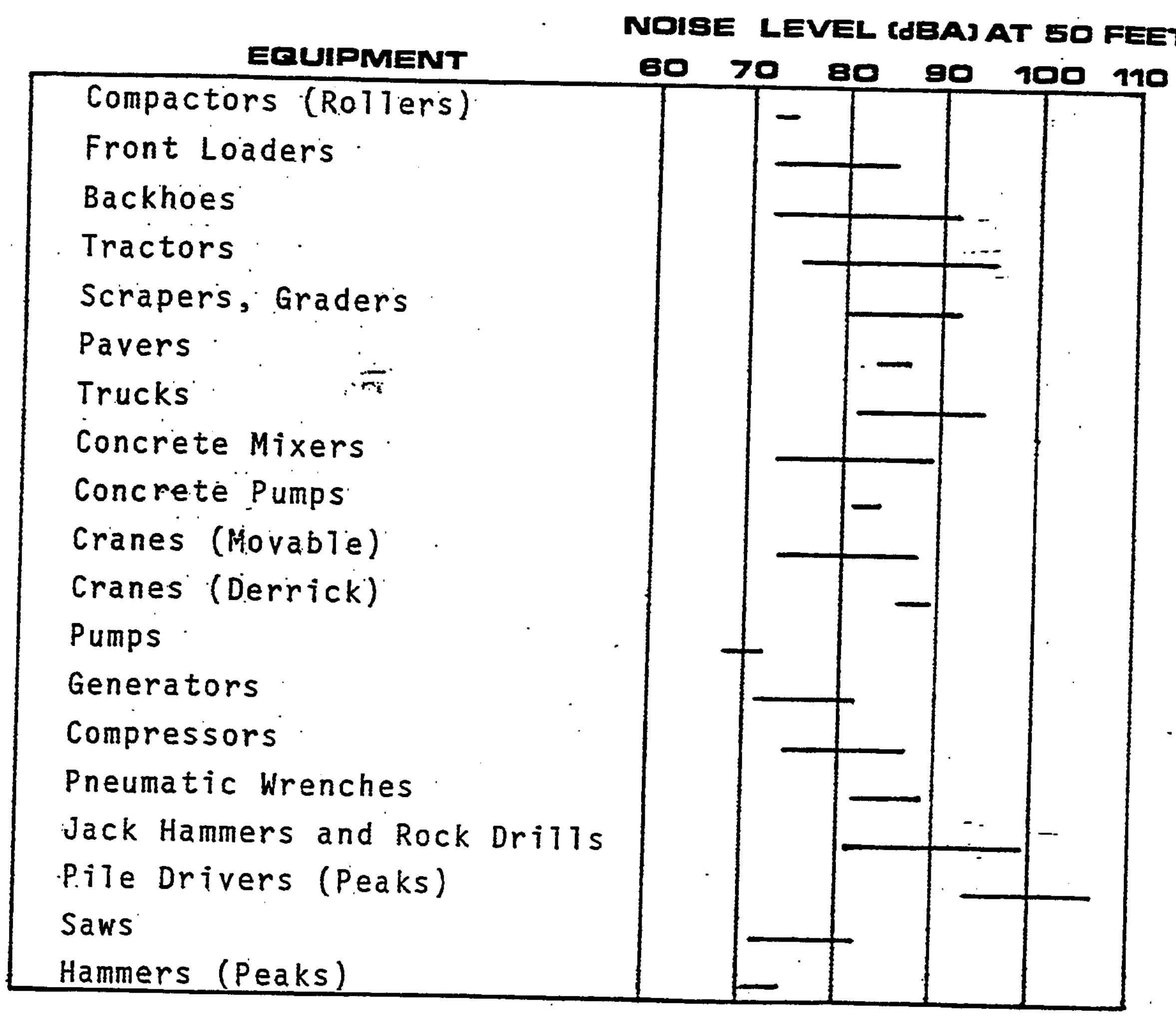


FIGURE 21

Noise Levels for Construction Equipment.

Source: "Engineering and Zoning Regulation of Outdoor Industrial Noise," NOISE Control, 3, 32-38, May 1959. "City Noise-Los Angeles," NOISE Control, 2, 14-19, July 1958.

In considering what criteria would be appropriate in the daytime, most weight is given to the following factors:

1. The noise should not interfere unduly with lives and the work of people in nearby buildings.
2. The work on most construction and demolition sites does not last very long, usually for some weeks or months at most.
3. A great deal of building is done in urban areas where there is noise from other sources, such as traffic.
4. The efficiency of the building industry depends upon the use of machines.
5. Any criterion must be economically and operationally practicable for contractors.

It is concluded that the simplest and most objective criterion is that the noise between 7 a.m. and 7 p.m. should not exceed the level at which conversation to the nearest building would be difficult with the windows shut. Most buildings have single windows which, if new and well fitting, can reduce outside noise levels by 15 dBA. The exterior walls of many existing buildings have ill-fitting windows and provide only about 5 dBA reduction. Moreover, the reduction at low frequencies is less than at high frequencies, thus emphasizing the low frequency components of the intruding noise and tending to make conditions for speech less acceptable. In these circumstances, with a noise level of about 50-55 dBA inside a building, a telephone could be used with some difficulty, and normal conversation carried out at a distance of several feet. This inside level corresponds to a level outside the building, with closed conventional single windows, of 65-70 dBA. To achieve this level of noise, would require the construction industry to restrict noise to a level which is below the level already produced at times by traffic alone, busy roadways of Long Beach, and below the level existing in some heavy industrial areas. These levels must be practicable and fair to the construction and demolition industries as well as to their neighbors. It is suggested that, at present, average maximum noise levels outside the nearest building at the window of the occupied room closest to the site boundary, should not exceed:

- 70 dBA in areas away from main roads and sources of industrial noise.
- 75 dBA in areas near main roads and heavy industries.

POPULATION NOISE

Population Noise

This category will encompass the most diverse noise sources in the City ranging from the noise of typical residential activities to such intrusive sounds as recreational vehicle activities. Many of these sounds are predictable, occur regularly and the source may be readily identified with the potential for mitigating the intrusive noise at a stationary location. (See Figure 22). Conversely, other noise sources tend to appear at random times and locations such that an alternative approach to noise control, i.e. reduction of the sound power levels at the source or limiting operations, is required. Since these population noise sources are so diverse (see Tables 7 and 8) this discussion will cite specific examples of noise sources, present typical sound levels associated with these sources and suggest methods for implementing some rational program of noise reduction.

Equipment Using Gasoline Engines. Another significant source of intrusive noise throughout the City is recreational and residential power equipment. The sounds of power lawnmowers, motorcycles and power boats in some areas of the City are sufficiently common to warrant continuous monitoring and control. Activities associated with these sources may occur virtually any time during the day and, in the case of recreation vehicles, may move past a relatively large number of people. Some typical noise levels associated with devices powered by gasoline engines are shown in Table 8.

These data have been supplied by manufacturers of the devices and probably reflect performance of units in good repair. Data for units operated at varying engine speeds are not available. The levels in Table 8 show improvements in noise levels over the past few years with projections for future noise reduction associated with each item. Average noise levels from household appliances are shown in Table 7. Mitigation procedures for the equipment described in this section are best carried out within the context of the nature of activities associated with each item. Motorcycles produce the greatest noise exposures when mufflers have been removed or are in poor condition. Most other power equipment cited also require exhaust mufflers in good condition to achieve the lowest possible noise emissions. Beyond this requirement, the best available noise control procedure is to limit the allowable hours of operation to those deemed rational by City officials in response to the interests of the general population. Also, some limit on continuous operation at a specific site might be considered. In this latter context, some particular attention might be directed to certain recreational activities such as model airplane or boat operations. These devices produce noise levels in the 70-90 dBA range depending on the distance from the observer. The model airplanes are operated at various heights above the ground, up to several hundred feet. At a distance of 100 feet, measurements showed levels of 80-85 dBA for these devices. The most practical mitigation procedure is to limit these activities to specified locations and hours of the day.

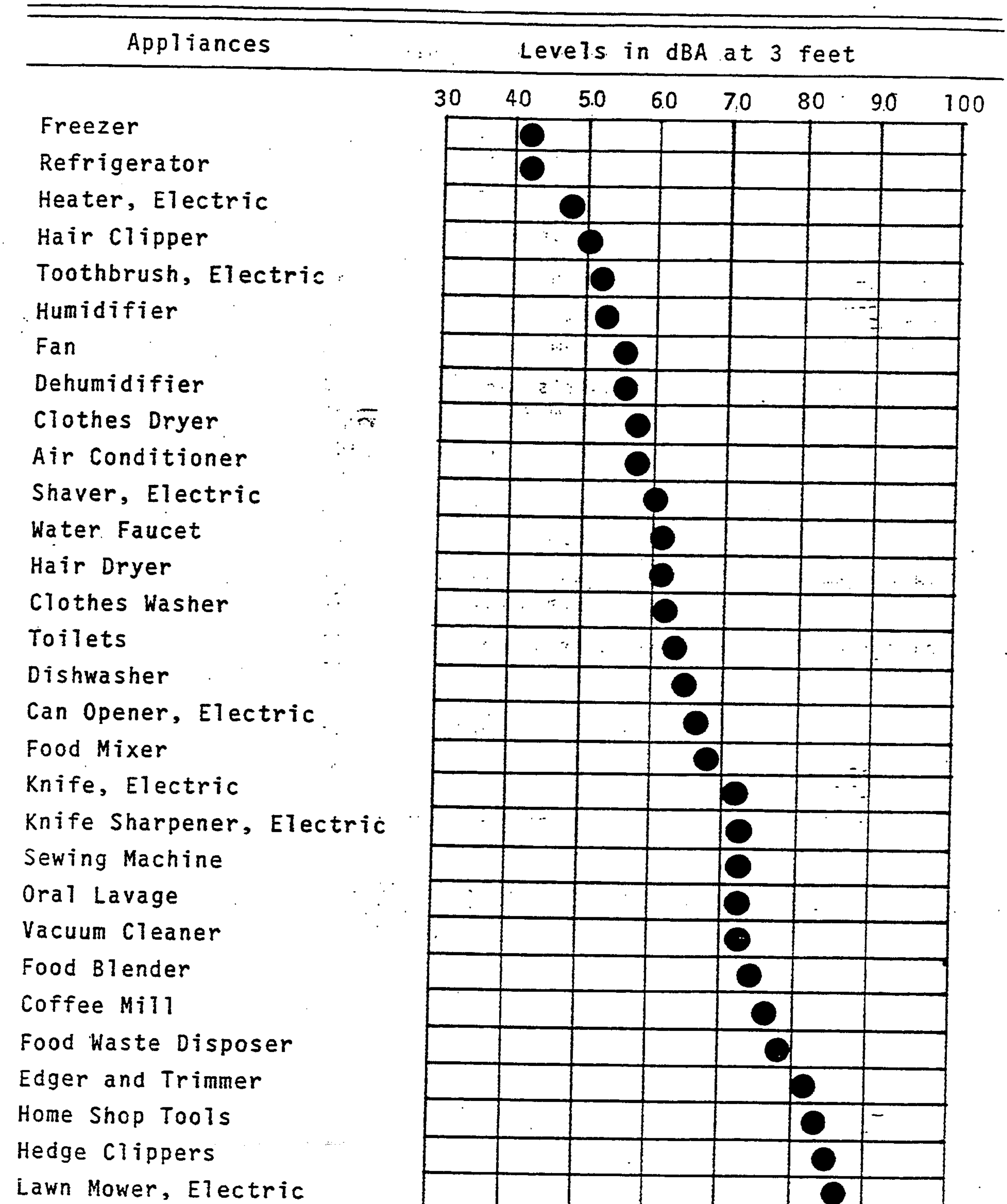
Categorization of Major Impact and Noise and Vibration Sources Introduction and Concepts

Because impact noise, and vibration are so closely related and because the phenomena are manifest in Long Beach, it is relevant to discuss impact noise and vibration within the scope of this Element.

Intensive impact noise (or vibration) can be as annoying or more annoying than noise. It is, in some cases, a more unmanageable phenomenon to control than noise, but in Long Beach, it occurs less frequently. Four primary categories

TABLE 7

AVERAGE NOISE LEVELS FOR HOME APPLIANCES



Source: Sound and Vibration Magazine, May 1973, p. 36.

TABLE 8

NOISE LEVELS IN DECIBELS FROM RESIDENTIAL AND RECREATIONAL POWER EQUIPMENT

Noise Source	Measurement Location	Feasible Goals* (Model Year) 1970	1973	1978	1983
Pleasure Boats					
Outboard	8' directly forward of engine center line	95	95	90	88
	50' from boat	80	78	74	70
Motorcycles					
Less than 240 cc	At user's ear	105	103	99	95
	50' from vehicle	89	87	83	76
More than 240 cc	At user's ear	112	110	105	100
	50' from vehicle	92	90	86	77
All Terrain Vehicles	At user's ear	105	100	95	90
	50' from vehicle	85	80	75	70
Rotary Power Mowers	At user's ear	92	88	85	82
	50' from mower	68	68	65	62
Riding Mowers	At user's ear	95	90	85	82
	50' from mower	78	73	68	65
Chain Saws	At user's ear	115	115	110	105
	50' from saw	86	86	84	76
Edgers	At user's ear	95	90	85	82
	50' from edger	78	72	68	65
Leaf Blowers	At user's ear	85	85	84	80
	50' from blower	76	76	72	68

*Industry Estimates

Source: National Industrial Pollution Control Council Sub-Council Report and Leisure Time Product Noise, May 1971.

of mayor sources will be discussed briefly; Transportation, industrial, construction, and population impact noise and vibration.

Transportation-generated impact noise and vibration in Long Beach is caused primarily by heavy surface vehicles (trucks, buses, trains) and low-flying heavy aircraft.

Heavy surface vehicles (trucks, buses, trains, locomotives, rapid transit systems) cause considerable vibration on adjacent land uses. This problem is most serious in residential areas that adjoin major roadways (and railways) at grade (see Figure 22), where dwellings sometimes rattle with the passing of tanker trucks, buses or trains. Equally annoying is the inter-car impact noise caused by coupling and uncoupling and by the stop-and-go movement of train components. Railway vibration in Long Beach is caused by trains moving over jointed rails and overpass bridgeworks. These railway impact noises and vibrations are less extensive than vehicular traffic because trains run slower, less frequent and are confined to some half a dozen interconnecting tracks in the City. (See Figure 6).

Low-flying heavy aircraft cause high levels of noise which in turn can make dwellings seem to "vibrate off the foundation." Again this phenomenon is confined to a few structures located under or very near the flight path of runway 30 at Long Beach Airport.

Impact noise and vibration caused by transportation systems are difficult to control and mitigate both technically and legally. It is difficult technically, because impact noise and vibration reduction measures sometimes require drastic steps to achieve results. Vibration is the most difficult of the two phenomena to mitigate because vibration waves radiate in all directions through ground surface and sub-surface. Furthermore, the noise barrier approach to reduce impact noise is not effective in controlling vibration.

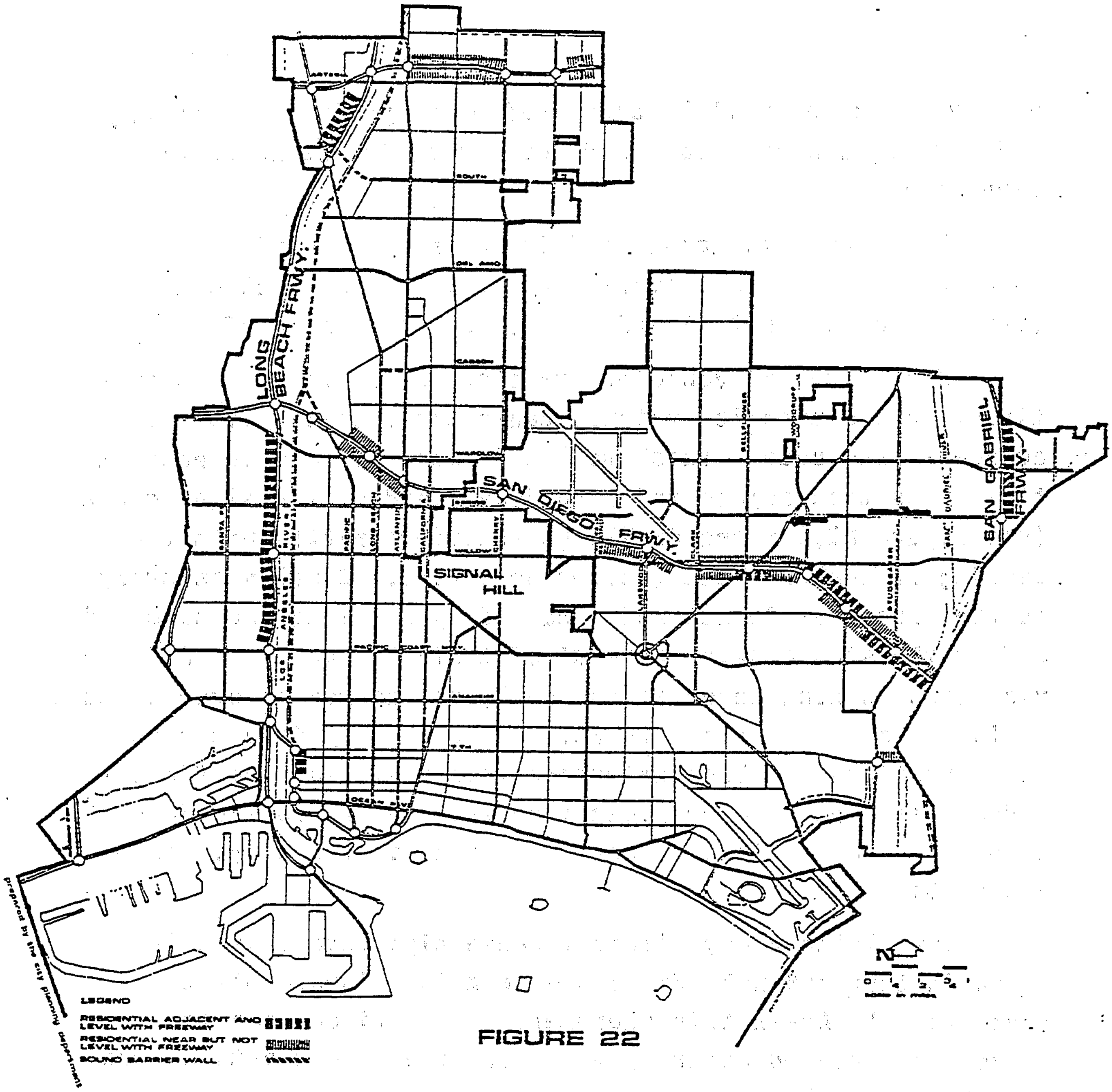


FIGURE 22

RESIDENTIAL LAND USES IMPACTED BY FREEWAYS

Legally, it is difficult to control impact noise and vibration because the operation of motor vehicles, railroads, and airports is regulated by Federal or State laws.

Industrial impact noises and vibrations are more serious phenomena because of their intensity. They include a wide range of machinery used in the extracting, manufacturing, and construction industries. Extracting-industry impact noises and vibrations in Long Beach are caused primarily by a large number of oil pumps and derricks located throughout the City.[4] Manufacturing activities that utilize heavy equipment, i.e. metal forming presses, sometimes cause "vibration waves" that radiate for several blocks affecting surrounding land uses. This problem is more likely to affect residential areas located adjacent to industrial zones. (See Figure 20). Some of the most intensive vibration and impact noise in the community is caused by heavy construction equipment.

Population Impact Noise and Vibration

In a building, impact noise is caused by footsteps, moving furniture, use of bathtubs,[5] and other similar sources. Because of the complex nature of impact noise, there is no nation-wide "official" impact noise criteria in this country. Practically every state adopts arbitrarily its sound transmission control rating.

Impact Sound Insulation and Transmission Control

The California Legislature has recognized the importance of impact sound insulation and transmission control in multiple dwelling units and has passed Title 25, Article 4, Section 1092 of the State Administrative Code (Noise

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[4]See Figure 23.

[5]See Figure 24.

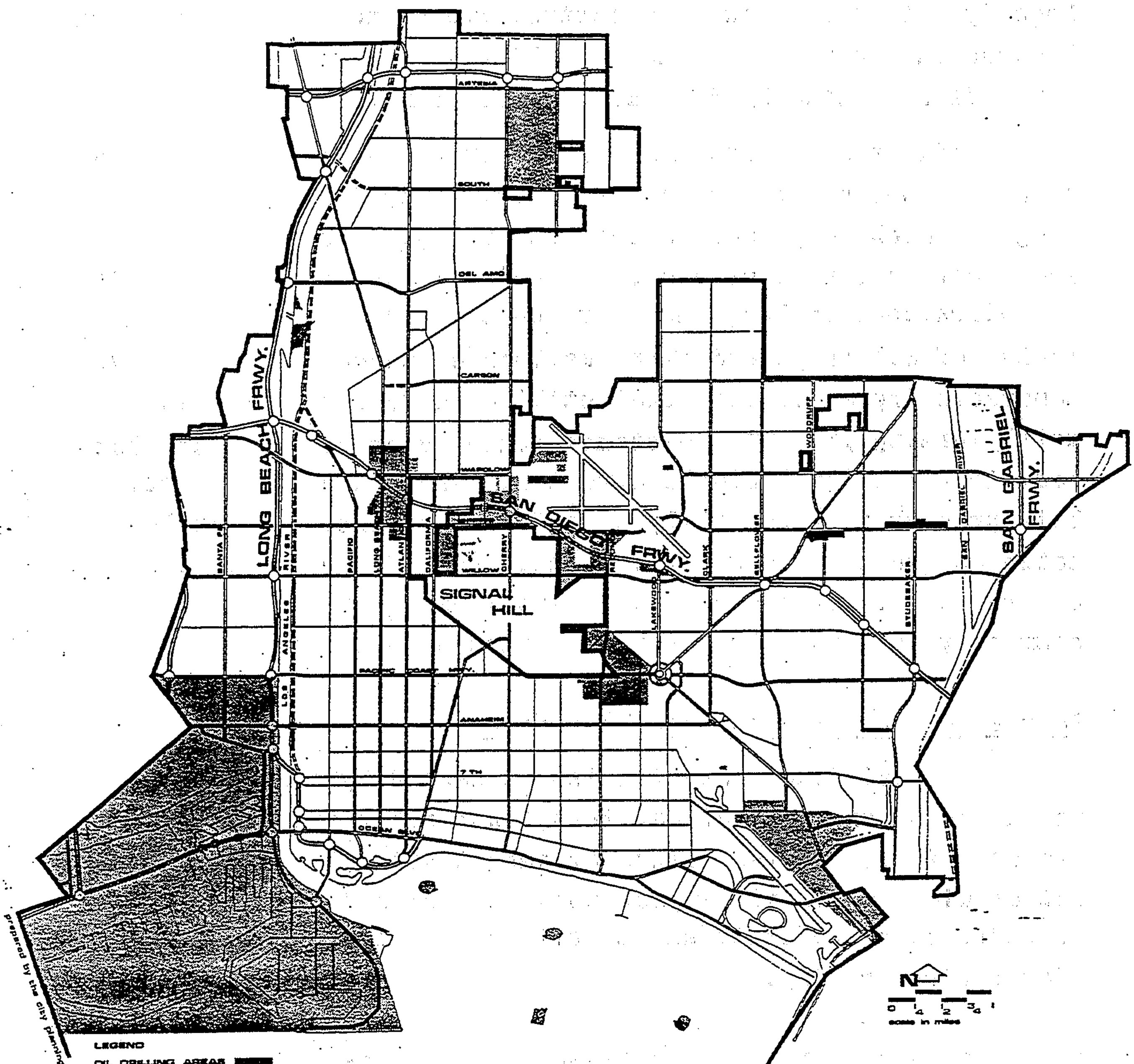

FIGURE 23

LONG BEACH OIL FIELDS

Source: Long Beach Department of Oil Properties.

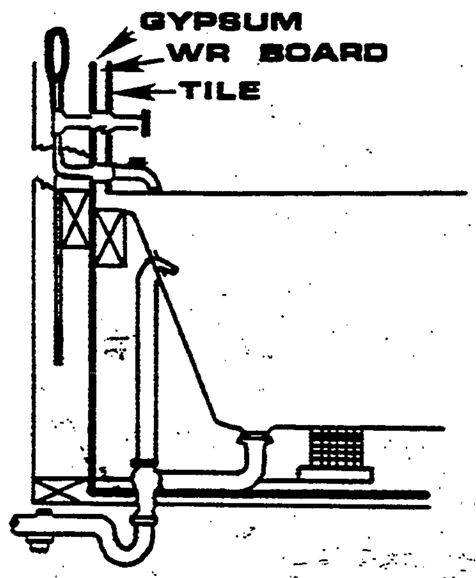

FIGURE 24

Soundproofing of Bathtubs. A source of noise in multi-apartment complexes is the bathtub. This sketch suggests some soundproofing measures to reduce noise transmission that may be applied, preferably during construction. Gypsum boards should be installed over all wall surfaces behind ends and sides of tubs, when on party walls. This is especially vital if tubs are back-to-back.

Source: Walter Pruter, "Sound Control to Increase Builders Cost," Western Building Design, November 1972, page 15.

Insulation Standards) which requires all new construction of hotels, motels, apartment houses and residential dwellings other than detached single family dwellings to have: 1) sound transmission control; 2) impact insulation control; 3) exterior intrusive noise control; 4) limited interior noise levels; and 5) acoustical analysis made if located within airports, freeways, highways, or industrial noise sources where the exterior exposure exceeds annual community noise equivalent level (CNEL) of 60 dBA. (See Appendix F for a more detailed summary of the law).

Population Vibration (including appliance vibration)

These vibrations are more acute in multi-story and apartment buildings than in single-family homes. Figure 25 shows the wide diversity of noise and vibration-generating equipment found in some multi-story buildings. In addition, apartment building residents have a concentration of noisy vibrating equipment and appliances that are used in the home daily. (See Table 9). Some of the worst apartment noise-generators are food waste disposers (78);[6] food blenders (75);[6] vacuum cleaners (72),[6] and can opener (65).[6] There is little that can be done to mitigate impact noise and vibration from manufactured appliances already in use in homes and apartments. The consumer has an opportunity, when purchasing a new appliance, to let manufacturers know of the increasing preference for lower noise level outputs by selecting quieter appliances.

This discussion of impact noise and vibration as manifested in Long Beach has been a brief attempt to identify the problem. Recommendations to mitigate impact noise and

[6]Typical sound levels in dBA. Different output levels are generated by other types and makes of appliances.

CROSS-SECTION OF A TYPICAL MULTISTORY STRUCTURE SHOWING BUILDING UTILITY EQUIPMENT

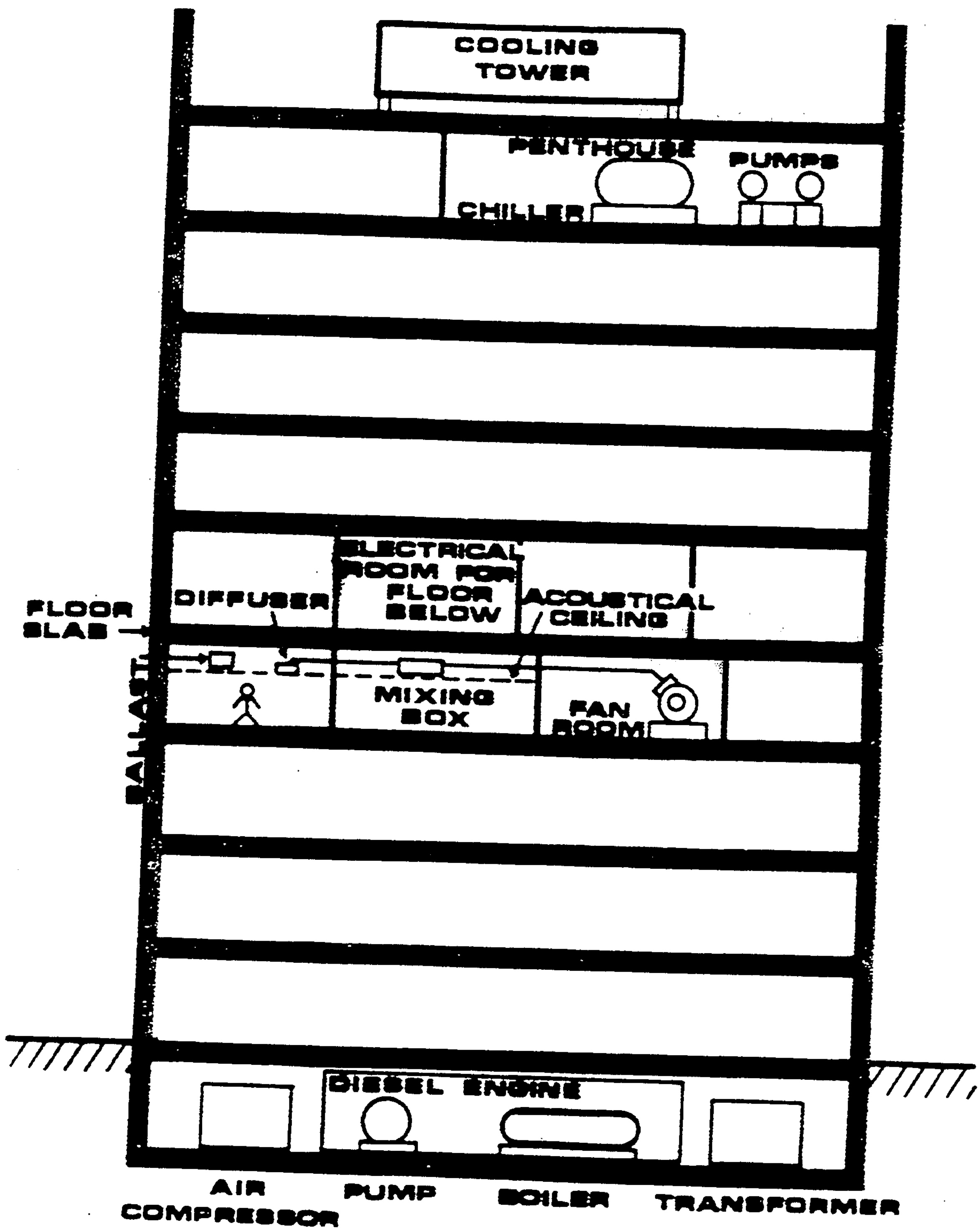

FIGURE 25

Source: Sound and Vibration Magazine, May 1973, p. 38.

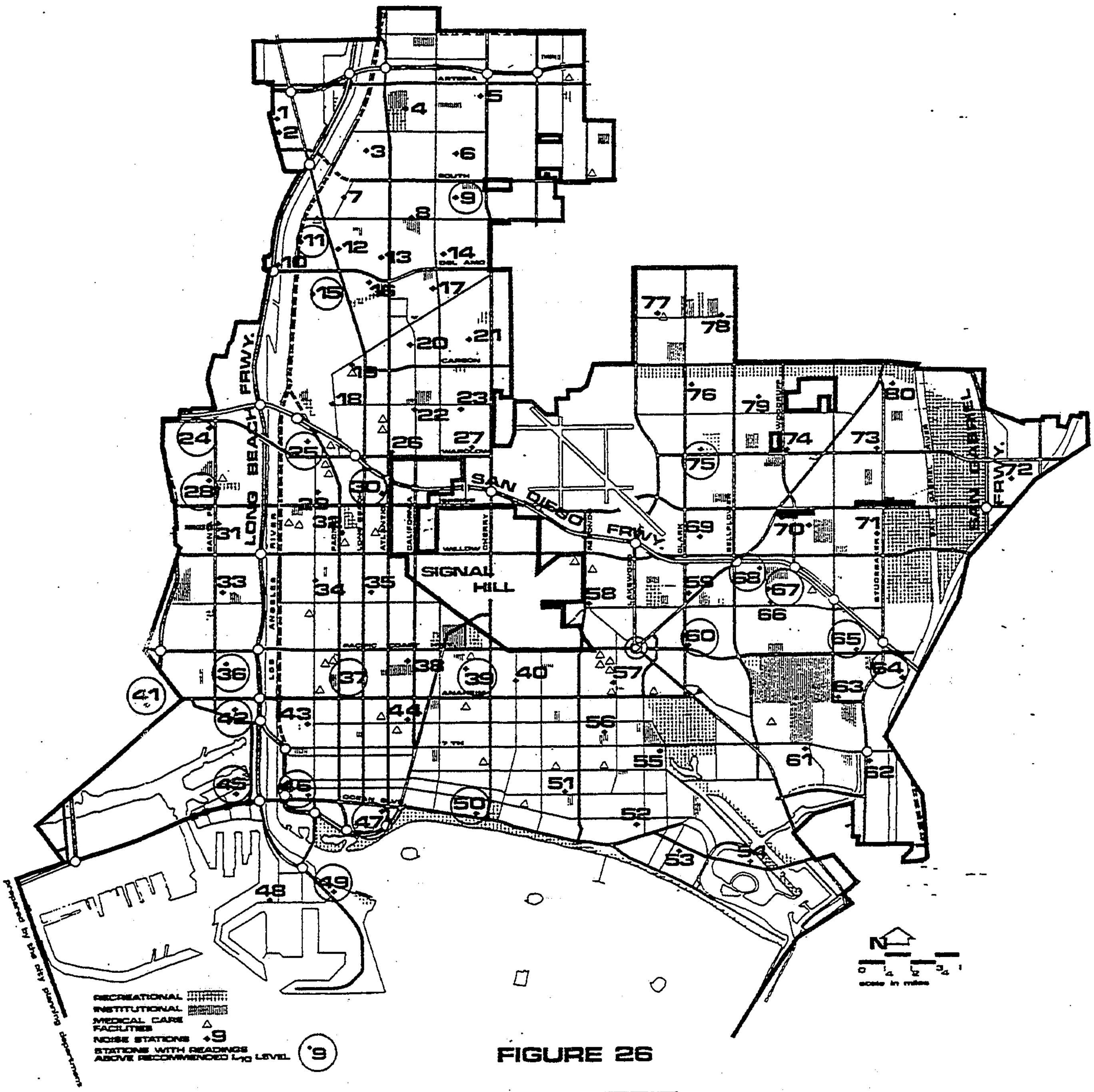

FIGURE 26

LOCATION OF NOISE MEASUREMENT STATIONS

Source: J. H. Wiggins Company.

vibration are much more difficult to draw than recommendations to mitigate noise. Furthermore, a comprehensive treatment of impact and vibration problems is beyond the scope of this element. To date, there are no nationally or internationally accepted standards adopted and enforced in any known municipality regarding impact and vibration in party walls and ceiling-floors in existing multiple dwelling units. Nevertheless, the problem of impact and vibration continues to adversely affect those who are closest to the source. Further research is needed in this area.

Field Measurements of Noise Levels in Long Beach

A series of sound measurements were carried out at selected locations in the City to provide a survey of the relative noise exposures existing through Long Beach. The measurement locations are shown in Figure 26 and described in this Section. All measurements were recorded as A-weighted Sound Pressure Levels. Each measurement location represents between 3 and 7 individual readings obtained within the surrounding few blocks. The range of maximum ambient noise levels for these locations are included with the descriptions of each site.

It is most important to recognize that these measurement data represent the sound levels existing at a specific location on a particular day. This is emphasized to convey the fact that readings obtained 50 feet apart may differ by 5 dBA or more, depending on the nature of the source and the propagation path. There was an attempt to exclude any unusual shielding conditions at each location.

The sound levels described in this section were obtained during daytime hours (9:00 a.m. to 4:00 p.m.), and during nighttime hours (8:00 p.m. to 12:00 a.m.). A check of several of the locations showed reductions of 4-10 dBA during night hours. This was attributable to the decrease in traffic volumes and, in some instances, to reduced commercial activity. Any attempt to characterize the noise at a particular location should incorporate 24-hour sound monitoring at a sufficient number of stations to accurately describe the noise environment.

TABLE 9

AVERAGE RANGE OF NOISE LEVELS FOR HOME APPLIANCES

Appliances	Level in dBA
Food Blender	68-85
Vacuum Cleaner	69-85
Electric Knife	65-75
Air Conditioner	50-68
Electric Fan	38-68
Food Mixer	48-78
Can Opener	54-75
Clothes Dryer	55-65
Hair Dryer	61-65
Electric Shaver	52-68
Electric Toothbrush	48-53
Hair Clipper	48-50
Refrigerator	38-52

Source: City Planning Department Staff Research

TABLE 10

FIELD MEASUREMENTS OF NOISE LEVELS

Map Location Number	Street Location	A-Weighted Sound Level Ranges in Decibels (dBA) Day	Night
1	Las Hermanas St. & Susana Rd.	52-56	48-50
2	Susana Rd. & Harcourt St.	49-53	50-52
3	Elm Ave. & Adair St.	52-57	49-52
4	64th St. & Myrtle Ave.	51-53	47-51
5	Cherry Ave. & 65th St.	48-56	49-52
6	60th St. & Walnut Ave.	52-54	46-49
7	56th St. & Daisy Ave.	53-56	50-52
8	Market St. & California Ave.	44-46	41-43
9	56th St. & Walnut Ave.	55-56	49-50
10	Del Amo Blvd. & Susana Rd.	46-49	47-48
11	52nd St. & De Forest Ave.	56-59	51-55
12	Cedar Ave. & Morningside St.	49-55	46-50
13	51st St. & Linden Ave.	44-48	42-47
14	Hardwick St. & Boyar Ave.	52-56	47-50
15	48th St. & Pacific Ave.	56-58	51-53
16	Elm Ave. & Arbor St.	46-48	44-47
17	Orange Ave. & 45th Way	51-54	47-49
18	Bixby Rd. & Pacific Ave.	46-48	44-45
19	Virginia Rd. & Claiborne Pl.	44-46	42-43
20	California Ave. & Tehachapi Dr.	43-48	41-44
21	Tehachapi Dr. & Keever Ave.	52-55	47-49
22	California Ave. & Bixby Rd.	46-50	43-47
23	Bixby Rd. & Walnut Ave.	53-57	49-51
24	Wardlow Rd. & Santa Fe Ave.	54-58	51-54

TABLE 10--Continued

Map Location Number	Street Location	A-Weighted Sound Level Ranges in Decibels (dBA) Day	Night
25	36th St. & Magnolia Ave.	57-60	55-59
26	Atlantic Ave. & Wardlow Rd.	48-51	46-49
27	Wardlow Rd. & Rose Ave.	54-56	50-52
28	Santa Fe Ave. & 32nd St.	55-57	53-56
29	31st St. & Eucalyptus Ave.	49-55	47-50
30	31st St. & Linden Ave.	56-60	52-54
31	Santa Fe Ave. & Columbia St.	49-56	46-50
32	28th St. & Pacific Ave.	48-53	45-49
33	23rd St. & Adriatic Ave.	46-49	44-46
34	Burnett St. & Magnolia Ave.	47-51	46-46
35	23rd St. & Elm Ave.	47-50	44-45
36	17th St. & Canal Ave.	54-59	51-53
37	15th St. & Cedar Ave.	53-59	50-52
38	17th St. & California	53-57	49-54
39	16th St. & Walnut Ave.	55-57	50-52
40	Spaulding & Junipero	48-53	46-49
41	Anaheim St. & Terminal Is. Fwy.	53-58	50-52
42	12th St. & Caspian Ave.	52-59	48-56
43	10th St. & Daisy Ave.	48-53	46-50
44	10th St. & California Ave.	50-54	47-51
45	Water St. & Broadway	56-66	55-59
46	1st St. & Daisy Ave.	53-59	50-54
47	Ocean Blvd. & Atlantic Ave.	55-62	51-56
48	Panorama Dr. & Pier A Ave.	50-54	50-53
49	Harbor Scenic Dr. & Queen's Hwy.	55-62	53-60
50	Ocean Blvd. & Hermosa Ave.	54-59	52-54
51	3rd St. & Obispo Ave.	47-53	46-47
52	Shaw St. & Bennett Ave.	49-55	46-50
53	2nd St. & Corona Ave.	51-54	47-49

TABLE 10--Continued

Map Location Number	Street Location	A-Weighted Sound Level Ranges in Decibels (dBA) Day	Night
54	2nd St. & Attica Dr.	49-53	44-46
55	7th St. & Roycroft Ave.	50-54	47-49
56	8th St. & Grand Ave.	47-51	44-48
57	14th St. & Termino Ave.	49-51	45-47
58	Redondo Ave. & Stearns St.	48-53	46-50
59	Clark Ave. & Los Coyotes Diagonal	52-55	50-53
60	Clark Ave. & Pac. Cst. Hwy.	52-59	50-54
61	7th St. & Margo Ave.	50-56	46-48
62	Studebaker Rd. & 7th St.	45-49	44-47
63	Anaheim Rd. & Hackett Ave.	48-53	44-46
64	Studebaker Rd. & Goldcrest St.	55-62	53-58
65	Atherton St. & Knoxville Ave.	56-60	53-56
66	Stearns St. & Radnor Ave.	49-54	47-49
67	Los Arcos Ave. & Albury St.	53-60	50-54
68	Ocana Ave. & Vernon St.	64-66	59-63
69	28th St. & Heather Rd.	51-54	49-52
70	Benmore St. & Vuelta Grande Ave.	47-50	43-47
71	Barrios St. & Petaluma	47-52	44-46
72	Lowe St. & Julian Ave.	46-49	44-45
73	Wardlow Rd. & Studebaker Rd.	46-48	42-45
74	Wardlow Rd. & Woodruff Ave.	45-49	43-45
75	Wardlow Rd. & Charlemagne	54-57	52-54
76	Hanbury Rd. & Greenbrier St.	49-52	47-48
77	Centralia St. & Graywood Ave.	48-53	46-47
78	Centralia St. & Stanbridge	47-51	45-47
79	Harco St. & San Anseline Ave.	46-48	45-47
80	Parkcrest St. & Karen Ave.	47-51	44-56

Summary of Field Measurements[7] of Noise Levels in Long Beach

The following detailed description is intended to explain the existing land use and major determinants of the noise environment at each measured station.

1. Las Hermanas Street and Susana Street - one-half mile west of the Long Beach Freeway. Industrial and manufacturing area. Heavy trucking and medium density traffic, 52-56 dBA. [48-50 dBA].

2. Las Hermanas Street and Trafford Street - one-half mile west of Long Beach Freeway. Industrial area with medium low traffic density, 49-53 dBA. [50-52 dBA].

3. Elm Avenue and Adair Street - one-half mile east of Long Beach Freeway. Older single family residential with low density traffic, 52-57 dBA. [49-52 dBA].

4. Myrtle Avenue and 64th Street - one-half mile east of Long Beach Freeway. Multi-family residential near Jordan High School and Houghton Park, 51-53 dBA. [47-51 dBA].

5. Cherry Avenue and 65th Street - oil extraction and industrial area. Heavy traffic on Cherry Avenue, 48-56 dBA. [49-52 dBA].

6. Walnut Avenue and 60th Street - Single family residential area, one-quarter mile west of Cherry Industrial area, 52-54 dBA. [46-49 dBA].

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[7] Nighttime measurements are shown in brackets.

7. Daisy Avenue and 56th Street - single family residential neighborhood, one-half mile east of Long Beach Freeway and Long Beach Boulevard, 53-56 dBA. [50-52 dBA].

8. Market Street and California Avenue - single and multiple family residential adjacent to Lindberg School and near to Carmelitos Housing Project, medium traffic, 44-46 dBA. [41-43 dBA].

9. Walnut Avenue and 56th Street - single family residential with light population density and light traffic, 55-56 dBA. [49-50 dBA].

10. Del Amo Boulevard and Susana Road - industrial area, near freeway on-ramp with heavy truck traffic, 46-49 dBA. [47-48 dBA].

11. De Forest Avenue and 52nd Street - single family residential near Los Angeles River Channel and one-quarter mile east of Long Beach Freeway, medium traffic, 56-59 dBA. [51-55 dBA].

12. Cedar Avenue and Morningside Avenue - single family residential, one block east of Long Beach Boulevard, light traffic, light density, 49-55 dBA. [46-50 dBA].

13. Linden Avenue and 51st Street - single family and multifamily residential with medium population density, adjacent to motorcycle shop, medium traffic, medium density, 44-48 dBA. [42-47 dBA].

14. Hardwick Street and Boyar Street - single family residential near to railroad tracks and Barton School, 52-56 dBA. [47-50 dBA].

15. Pacific Avenue and 48th Street - single family residential near Virginia Country Club and Long Beach Freeway, light density, light traffic, 56-58 dBA. [51-53 dBA].

16. Elm Avenue and Arbor Street - trailer home park near railroad tracks and Scherer Park. Medium population density, light traffic density, 46-48 dBA. [44-47 dBA].

17. Orange Avenue and 45th Street - single family residential with light population density, traffic medium to heavy on Orange Avenue, 43-48 dBA. [47-49 dBA].

18. Bixby Road and Pacific Avenue--single family residential, one-quarter mile north of San Diego Freeway, 46-48 dBA. [44-45 dBA].

19. Virginia Road and Claiborne Avenue - low density single family, one block west of Long Beach Boulevard, light traffic density, 44-46 dBA. [42-43 dBA].

20. California Avenue and Tehachapi Drive - single family residential with light traffic, 43-48 dBA. [41-44].

21. Tehachapi Drive and Keever Avenue - single family residential, one and one-quarter mile from end of Long Beach Airport runway, medium to light traffic, 52-55 dBA. [47-49 dBA].

22. California Avenue and Bixby Road - single family residential, near Hughes and Longfellow schools with light traffic, 46-50 dBA. [43-47].

23. Bixby Road and Walnut Avenue - single family residential, one mile west of Long Beach Airport runway, medium density, medium traffic, 53-57 dBA. [49-51 dBA].

24. Wardlow and Santa Fe Avenue - mixed commercial uses (gas station, construction equipment yard, drive-in theater) adjacent to San Diego Freeway. Heavy truck and auto traffic. Three-quarters mile west of intersection of Long Beach Freeway and San Diego Freeway near Wardlow on-ramp, 54-58 dBA. [51-54 dBA].

25. Magnolia Avenue and 36th Street - single family residential with low density population. Heavy background noise from San Diego Freeway, light traffic, 48-51 dBA. [46-49 dBA].

26. Atlantic Avenue and Wardlow Road - commercial use surrounded by single family residential 10-15 years old, medium to heavy density traffic, 48-51 dBA. [46-51 dBA].

27. Wardlow Avenue and Rose Avenue - multi-family residential, near Long Beach Water Department, medium to heavy background noise due to nearby Long Beach Airport and heavy traffic on Cherry Avenue, 54-56 dBA. [50-52 dBA].

28. Santa Fe Avenue and 32nd Street - strip commercial, single and multi-family residential, adjacent to Silverado Park and school. Medium traffic density, 55-57 dBA. [53-56 dBA).

29. Eucalyptus Avenue and 31st Street - single family and multi-family residential area with some residential use. Light to medium traffic, 49-55 dBA. [47-50 dBA].

30. Linden Avenue and 31st Street - single family and multi-family residential with some nearby commercial, light to medium traffic, 56-60 dBA. [52-54 dBA].

31. Santa Fe Street and Columbia Street - mixed residential and commercial uses near to Stephen School. Traffic medium density, 49-56 dBA. [46-50 dBA].

32. Pacific Avenue and 28th Street - single family and multi-family residential use, near Veteran's Memorial Park and Long Beach School District Maintenance Yard. Medium density, medium traffic.

33. 23rd Street and Adriatic Avenue - single family and multi-family residential use near Garfield and Elizabeth Hudson Schools. One-half mile west of Long Beach Freeway and one-half mile east of Terminal Island Freeway. Medium to heavy traffic, 46-49 dBA. [44-46 dBA].

34. Magnolia Avenue and Burnett Avenue - single family and multi-family residential with some commercial uses. Light traffic density, 47-51 dBA. [46-46 dBA].

35. Elm Avenue and 23rd Street - single family residential, near fire station and one block east of heavy traffic on Long Beach Boulevard, 47-50 dBA. [44-45 dBA].

36. 17th Street and Canal Avenue - residential use one-half mile west of Long Beach Freeway, light traffic, 51-53 dBA. [48-50 dBA].

37. 15th Street and Cedar Avenue - multi-family and single family use near to Washington School, medium density traffic, 53-59 dBA. [50-52 dBA].

38. 17th Street and California Avenue - Poly High School, residential area, medium density, medium traffic, 53-57 dBA. [49-54 dBA].

39. 16th Street and Walnut Avenue - multi-family and single family residential near Whittier School, 55-57 dBA. [50-52 dBA].

40. Spaulding Street and Junipero Avenue - single and multi-family residential, medium to heavy traffic, medium density, 48-53 dBA, [46-49 dBA].

41. Anaheim Street and Terminal Island Freeway - oil, industrial, warehouse area, truck traffic, 53-58 dBA. [50-52 dBA].

42. 12th Street and Caspian Avenue - residential area one-eighth mile from railroad storage yard, 52-59 dBA. [48-56 dBA].

43. Daisy Avenue and 10th Street - strip commercial, single family, and multi-family near Drake Park, light traffic, light density, 48-53 dBA. [46-50 dBA].

44. 10th Street and California Avenue - single family residential, one-quarter mile east of St. Mary's Hospital, 50-54 dBA. [47-57 dBA].

45. Water Street and Ontario Avenue - oil refinery area, truck traffic area, 56-66 dBA. [55-59 dBA].

46. 1st Street and Daisy Avenue - multi-family and commercial uses, 53-59 dBA. [50-54 dBA].

47. Ocean Boulevard and Atlantic Avenue commercial and highrise residential - heavy traffic, 55-62 dBA. [51-56 dBA].

48. Panorama Drive and Pier A Avenue - industrial area and oil equipment, truck traffic, 50-54 dBA. [50-53 dBA].

49. Harbor Scenic Drive and Queen's Highway - commercial area near site of Queen Mary, 55-62 dBA. [53-60 dBA].

50. Ocean Boulevard and Hermosa Avenue - multi-family residential, medium traffic, 54-59 dBA. [52-54 dBA].

51. 3rd Street and Obispo Avenue, multi-family and single family dwellings near Harvey Mann School, light traffic, 47-53 dBA. [46-47 dBA].

52. Shaw Street and Bennett Avenue - single family and multi-family uses, medium traffic 49-55 dBA. [46-50 dBA].

53. 2nd Street and Corona Avenue - commercial use with single family and multi-family dwellings adjacent, 51-54 dBA. [47-49 dBA].

54. 2nd and Attica Drive - commercial with adjacent single family uses, 49-53 dBA. [44-46 dBA].

55. 7th Street and Roycroft Avenue - strip commercial and single family and multi-family residential, near to Wilson High School and Recreation Park, medium to heavy traffic, 50-54 dBA. [47-49 dBA].

56. 8th Street and Grand Avenue - single family residential across from Jefferson School, light traffic, 47-51 dBA. [44-48 dBA].

57. 14th Street and Termino Avenue - single family and multi-family use, medium traffic 49-51 dBA. [45-47 dba].

58. Redondo Avenue and Stearns Street - Industrial use and oil property, near Army Reserve Station, 48-53 dBA. [46-50 dBA].

59. Clark Avenue and Los Coyotes Diagonal - residential use near Stearns Park. Fire Department training facilities 52-54 dBA. [50-53 dBA].

60. Clark and Pacific Coast Highway - strip commercial and multi-family residential use, heavy traffic on Pacific Coast Highway, moderate traffic on Clark Avenue, 52-59 dBA. [50-54 dBA].

61. 7th Street and Margo Avenue - institutional use, Veterans Hospital and California State University at Long Beach, heavy traffic on 7th Street, 50-56 dBA. [46-48 dBA].

62. Studebaker Road and 7th Street near Edison Power Plant and Los Cerritos Channel, some single family residential, heavy traffic on Studebaker and 7th Street, one-half mile from San Diego and San Gabriel freeways, 45-49 dBA. [44-47 dBA].

63. Anaheim Road and Hackett Avenue - single family residential near Walter Hill School. Medium traffic, 48-53 dBA. [44-46 dBA].

64. Studebaker Road and Goldcrest Street - single family residential across from California State University at Long Beach, medium traffic, 55-62 dBA. [53-58 dBA].

65. Atherton Street and Knoxville Avenue - single family residential near Eugene Tincher School, one-half mile from intersection of San Diego and San Gabriel freeways, 56-60 dBA. [53-56 dBA].

66. Stearns Street and Radnor Avenue - single family residential, with medium density population, medium to heavy traffic density, 49-54 dBA. [47-49 dBA].

67. Los Arcos Avenue and Albury Street near Stanford and Prisk Schools, one-quarter mile south of San Diego Freeway, 53-60 dBA. [53-58 dBA].

68. Ocana Avenue and Vernon Street - single family residential adjacent to Stanford School and San Diego Freeway 64-66 dBA. [59-63 dBA].

69. 28th Street and Heather Road - single family residential, one-quarter mile north of San Diego Freeway, 51-54 dBA. [49-52 dBA].

70. Benmore Street and Vuelta Grande - residential, across from Millikan High School, medium traffic, 47-50 dBA. [43-47 dBA].

71. Barrios Street and Petaluma - single family residential, across from Eldorado Park, 47-52 dBA. [44-46 dBA].

72. Lowe Street and Julian Avenue - single family residential, near Newcomb School, and one-quarter mile east of San Gabriel Freeway 46-49 dBA. [44-45 dBA].

73. Wardlow Road and Studebaker Road - residential and some commercial use, 46-48 dBA. [42-45 dBA].

74. Wardlow Road and Woodruff Avenue - single family residential, light population density. Heavy automobile traffic, 45-49 dBA. [43-45 dBA].

75. Wardlow Road and Charlemagne - single family residential, near Wardlow Park, one-half mile east of Long Beach Airprot, 54-57 dBA. [52-54 dBA].

76. Hanbury Road and Greenbrier Street - single family residential, near Heartwell Park and Veteran's Memorial Stadium, 49-52 dBA. [47-48 dBA].

77. Centralia Street and Graywood Avenue - single family residential, near Long Beach City College, 48-43 dBA. [46-47 dBA].

78. Centralia Street and Stanbridge Avenue - single family residential, near Bancroft School, light traffic, 47-51 dBA. [45-47 dBA].

79. Harco Street and San Anseline Avenue - single family residential, low density population. Low traffic, low density, 46-48 dBA. [45-47 dBA].

80. Parkcrest Street and Karen Avenue - single family residential, adjacent to school. Light traffic density, 47-51 dBA. [44-46 dBA].

Display of Relation Between Noise Exposure and Land Use

The analysis of noise sources in Long Beach and the resultant noise intrusion into the community are presented in graphic display. (See Figures 6, 14, 20). The California State Code requires that noise exposure be displayed in a series of contours decreasing in level from the noise source down to certain criterion levels, e.g., 65 or 45 dBA depending on the land use in question. This has been done in response to these requirements.[8] This approach presumes a more predictable propagation of noise away from the source than is actually encountered in a typical environment. The propagation of noise from a source such as a roadway is usually affected by intervening terrain or structural barriers, atmospheric conditions or other factors influencing sound pathways. For this reason, it is mandatory to qualify any noise contour with this caveat and to rely on specific site analyses utilizing field measurement data to establish a realistic noise exposure environment.

This documentation and display of noise exposure was employed as the procedure for establishing the nature and extent of existing and potential noise problems in Long Beach. It is most important to note that only general inferences may be drawn from any community-wide evaluation of noise exposure conditions. Regions of possible incompatible land use may be identified, but caution should always be exercised in making judgements concerning specific land parcels with respect to compatibility with the noise environment. Experience with analyses of community noise exposure has consistently shown that specific sites must be evaluated in terms of a variety of relevant factors in addition to the basic exposure level. The type of land use, the condition of the structure, noise acceptability criteria as a function of time of day and relative priorities for the land use and the noise source are examples of the contingencies which must be considered for a particular location.

It is concluded, therefore, that any determination of land use incompatibility resulting from noise exposure must be made on a site-by-site basis rather than being presented

[8] Noise contours around major traffic routes were not carried down to 45 dBA owing to the fact that the ambient noise levels for the City as a whole are higher than this at most measurement stations.

as a conclusion of this report. On many occasions, community agencies have been advised that certain land uses within the City are unacceptable as a result of adverse noise conditions. Such conclusions and ensuing recommendations may then be judged untenable by City officials because of overriding considerations such as vested economic or social interests, future development plans or available resources within the community. The point to be made is that the range of factors affecting land use are known only by City officials responsible for this function and they are unique for each site.

Given these considerations, the intent of this document, with respect to existing noise exposure conditions, is to present:

- ° General noise exposure patterns from established transportation routes.
- ° Examples of specific noise level measurements within the City.
- ° Methodology, information sources and interpretations which will allow the City to assess noise impact conditions for specific sites.

Current Actions to Control Noise

Monitoring

The City presently operates two separate systems for monitoring the noise environment. One system is conducted by the Long Beach Building and Safety Department and consists of two staff members working part-time on noise problems. Their effectiveness is somewhat lessened by the absence of a noise ordinance. The only noise regulation that authorizes enforcement at the present time is Section 3300.78 of the Oil Regulations of the Long Beach Municipal Code. (See Appendix F).

On occasions, the Department receives complaints regarding noise from machinery and equipment used in connection with an oil well. These complaints are investigated and noise level readings are taken by the Building Inspector assigned the responsibility of enforcement of the Oil Regulations to determine compliance with the above section. The equipment used by the Department to take these readings consists of two meters--a noise level meter and an impact noise analyzer.

Procedures

The Department only becomes involved when a complaint is received. These inspections generally require two site visits to establish the ambient noise level which in many cases must be at night; and day monitoring during the peak hours. Due to the lack of an ordinance and limited personnel, the Department's activities are very restricted. Upon completion of the inspection those persons found to be responsible are generally contacted to seek their cooperation. The Department has monitored noise of City vehicles for other City departments: trucks operated by Public Service; siren noise of the Fire Department; and Police Department monitoring of noise from aircraft for the Planning Department; helicopter noise for the Budget and Research Division of the Department of Administrative Management, etc.

The second monitoring system is conducted by the Environmental Health Division of the Long Beach Health and Sanitation Department and consists of two Occupational Health Sanitarians equipped with a General Radio, type 1565-A, Sound Level Meter with A, B, and C sound level weightings.

The General Sanitarians enforce Municipal Code Section 5620.5,[9] Crowing Fowl Prohibited. Other than this noise source, the Sanitarians investigate citizen's complaints and make suggestions where appropriate on a consultative level of techniques to alleviate problems.

Current activities deal mainly in occupational health noise problems. Under Cal-OSHA, the City Health Department may provide consultative and technical assistance upon request by the State Division of Industrial Safety. Both systems monitor noise levels and sources which have resulted in citizen complaints.

Enforcement

Statutes currently in effect which may be invoked to help solve a noise problem that causes complaints or causes the noise standards to be exceeded are as follows:

Truck Route Ordinance. Section 3410.125 of the Long Beach Municipal Code specifies which routes trucks must use within the City.

City Equipment Specifications. Wherever possible purchase of equipment for City use will contain specifications for the maximum allowable noise emissions. Acceptance testing and periodic testing is used to assure compliance with these specifications.

Conditional Use Permits. Where appropriate and warranted, conditional use permits granted by the City contain noise restrictions.

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[9]Section 5620.5-Crowing Fowl Prohibited. No person shall keep or maintain, or cause to be kept or maintained, any crowing fowl. Long Beach Municipal Code, Article V, Section 5620.5, June 23, 1961.

<u>Motor Vehicle Code</u>. The California Motor Vehicle Code specifies the maximum noise that may be created by vehicles on the highway. These Codes are enforced by the Long Beach Police Department to the extent of their authority.

The two noise monitoring systems and other current City actions are inadequate to control and reduce noise. The lack of a comprehensive noise ordinance and a team of specialized technical monitors to implement it makes it virtually impossible to carry out a rational, effective noise control program.

Noise Control through Purchasing

The Long Beach City Department of Finance through its Purchasing Division has long since recognized the fact that noise pollution is a vital and important factor affecting the health and environmental quality of the City. The Division has been actively involved on a national, state and local level for the last three years in the improvement of safety, health and general quality of living. Through membership of the Purchasing Agent in the President's Advisory Panel, Long Beach has been able to implement through the Federal Supply Services and General Services Administration specifications to reduce the environmental impact of a wide variety of products and equipment. It has been nationally recognized that through procurement officers of governmental agencies, there exists a tremendous force to improve the ecology and environment of our cities. As a result of these and other similar involvements, Long Beach has been regarded a leader in the equipment procurement area. All the City specifications for equipment make provisions for compliance with the Occupational Safety and Health Act (OSHA) of 1970 and the Cal-OSHA Act. The City Purchasing Agent recognizes procurement as a forceful tool to achieve new equipment noise output reduction, as well as a vehicle to improve environmental quality by stimulating manufacturers to develop new, quieter products which contribute thereto.

Environmental Impact Studies

Pursuant to Section 21151 of the California Public Resources Code, the City has adopted a policy of requiring Environmental Impact Studies to be conducted for all City projects. The policy also includes private projects for which a building permit or other entitlement for use is required. Public hearings are held wherever a project may have a significant effect on the environment.

Advocacy

As discussed in other sections, much of the authority to control Long Beach's noise environment is pre-empted by higher level government. Therefore, the City maintains a program of advocacy briefly described below:

Local and Regional. Through the Los Angeles Division of the League of California Cities and through the Southern California Association of Governments (SCAG), Long Beach works with other agencies in the region to develop solutions to mutual noise problems.

Statewide. Through its elected representative to the California State Government the City works to improve or add new laws to help reduce noise pollution. The City staff maintains liason with State agencies which have the power to affect Long Beach's noise environment.

National. Long Beach fully uses a multitude of avenues to affect Federal legislation, regulations, and policies. Some of these are: elected representatives, the National League of Cities, and direct staff contact with Federal agencies.

V. PROPOSED NOISE ENVIRONMENT IN LONG BEACH

Recommended Criteria for Maximum Acceptable Noise Levels by Major Land Use Categories

Introduction and Concepts

The noise criteria recommended below was developed to reach three basic objectives. These objectives are prioritized as follows: 1) where the existing level of noise threatens the health and or welfare of the public, the objective of the criteria is to recommend the reduction of noise to a harmless level; 2) where the existing noise degrades the environment, the criteria's objective is to recommend the elimination (or at least the reduction) of that environmental degradation; and 3) where the existing ambient level is low, the objective of the criteria is to serve as a guideline in preserving the quietness of the environment.

Acceptable noise limits are dictated by human tolerance,[1] preference levels, and economic pressures. The quasi-random development of land use patterns prior to the adoption of strong planning policies has created established economic interests throughout Long Beach. Some of these investments represent significant noise sources, e.g., transportation corridors, industry and commercial sites. It is essential to recognize the urgent necessity of reaching

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[1]Any outdoor level exceeding 65-70 dBA is likely to generate vigorous public complaints. Peterson, Arnold P.G. and Gross, Ervin E. Jr., Handbook of Noise Measurement, Seventh Edition, Concord Mass., General Radio Company, 1972, p. 47.

a compromise for the co-existence of noise-sensitive land uses with noise generators. In addition to creating an acceptable noise environment that all vested interests can live with, some decision is required as to the relative priorities to be set for future development in the City. The extent to which an acceptable noise environment is sought MUST be balanced against the optimum economic development in Long Beach. The recommended noise criteria can be instrumental in the decision making process and in reaching a more rational balance.

Parameters of the Recommended Criteria

The criteria are based on three different parameters as follows:

Existing Ambient Levels. As indicated in a previous section, a City-wide survey of noise levels was made in Long Beach and measurements were taken at eighty different locations both during daytime and nighttime hours. The readings taken ranged from a low of 41 dBA to a high of 66 dBA. This is not, however, to be construed as absolute minimum and maximum levels in Long Beach. There may be small sections not surveyed with levels lower or higher than the ones monitored during the study. In addition, noise limits recommended may be lower or higher than those recorded during the field test for the land use type in question.

Existing Land Use Patterns. Industrial, Commercial, and residential land uses in Long Beach are oftentimes mixed and widespread. In developing compromising noise limits that could be recommended rationally, the standards and ratios of of the United States Environmental Protection Agency were used.[2] This was done to allow reasonable limits to noise-generating economic activities adjacent to noise sensitive land uses, while protecting the citizenry from harmful noise exposure with an adequate margin of safety.

Existing Health, Communication, and Physical Setting Needs. As mentioned in the "Public Health Significance of Noise" section, the health-related considerations within this document are based on the assumption that protection against the direct effect of noise-induced hearing loss is sufficient for defense against extra-auditory effects.[3] This direct effect of noise has been one major consideration in the identification of recommended maximum noise limits.

In addition, interference by noise with various human activities, (sleep, speech, and thought) can lead to annoyance and indirect effects on well-being. This indirect effect has been a secondary consideration. Finally, there is the consideration that deals with the physical setting in which noise exposure takes place. The Long Beach climate determines much of the City's lifestyle. The population here is more outdoor oriented than in communities with severe climates. Air conditioners in summer and heaters in winter are minimally used. Open windows prevail in houses as well as in apartments throughout the City. Consequently, the exposure to outdoor noise is longer in duration and

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[2] U.S. Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety, Arlington, Va., U.S. Environmental Protection Agency, March 1974, pp. 3, 29.

[3] At this time there is insufficient scientific evidence that non-auditory diseases are caused by noise levels lower than those that cause noise-induced hearing loss. In the event that future research proves otherwise, this Element must be revised accordingly.

significant reduction of indoor noise is more difficult in Long Beach than in other cities. Although small amounts of outdoor speech interference is not detrimental to public health and welfare, the same is not true for most indoor environments. For these reasons, the difference between the recommended maximums for prolonged indoor and outdoor noise limits has to be less in Long Beach because the noise reduction afforded by structures is less effective due to the tendency of residents to keep windows open. Based on this reasoning, adequate recommendations to protect the citizenry against involuntary exposure to environmental noise required the special considerations cited above.

Explanation of Table 11

The table on page 137 classifies three major land use types in Long Beach according to the primary activity most likely to occur in each. The following is a brief description of each classification:

Residential Land Uses. (Day and night). These are areas of human habitation. They include single and multiple family homes, apartments, seasonal residences, hotels and mobile homes. The lowest recommended noise limits are within this category. They are necessarily low in order to prevent sleep arousal, activity interference, annoyance, and to permit the hearing mechanism to recuperate if it is exposed to higher levels of noise at anytime elsewhere. The noise levels recommended are restrictive enough to protect every type of noise-sensitive land use, such as schools, hospitals, libraries, etc., which are also included in this category.

Commercial Land Uses. Included in the commercial categories are shopping centers and shopping areas, Downtown Long Beach, and all strip commercial zones of the City.

TABLE 11

RECOMMENDED CRITERIA FOR MAXIMUM ACCEPTABLE NOISE LEVELS[1] IN A-WEIGHTED DECIBELS (dba)
(decibels levels for noise monitoring purposes only, for frequency and band restrictions see Section 100.02 (c) of Proposed Model Noise Ordinance, Appendix E)

Major Land Use Type	Outdoor			Indoor
	Maximum Single Hourly Peak	L_{10} (2)	L_{50} (3)	L_{dn} (4)
Residential[5] 7 a.m.-10 p.m.	70	55	45	45
Residential[5] 10 p.m.-7 a.m.	60	45	35	35
Commercial (anytime)	75	65	55	(6)
Industrial (anytime)	85	70	60	(6)

(1) Based on existing ambient level ranges in Long Beach and recommended U.S. Environmental Protection Agency ratios and standards for interference and annoyance.

(2) Noise levels exceeded ten per cent of the time.

(3) Noise levels exceeded fifty-per cent of the time.

(4) Day-night average sound level. The 24-hour A-weighted equivalent sound level with a 10 decibel penalty applied to nighttime levels.

(5) Includes all residential categories and all noise sensitive land uses such as hospitals, schools, etc.

(6) Since different types of commercial and industrial activities appear to be associated with different noise levels, identification of a maximum indoor level for activity interference is unfeasible.

Source: U.S. Office of Noise Abatement and Control: Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Arlington, Virginia; U.S. Environmental Protection Agency, March, 1974, pp. 3, 29.

Excluded are commercial living accommodations such as hotels, inns, etc. These facilities are included in the residential category since they are places where people sleep and sometimes spend long periods of time. New hotels in Long Beach are now required by State Law to comply with very strict indoor noise reduction and sound transmission control standards.

Industrial Land Uses. Include such facilities as factories, warehouses, storage and distribution areas, oil fields and riggs, the Long Beach Harbor, the Long Beach Airport, the West Side Industrial Park, the South-East Industrial lands, and other smaller but similar areas.

Recommended Indoor-Outdoor Levels. The decibel noise levels (L_{10}, L_{50}, L_{dn}) were chosen to statistically describe the noise environment. L_{10} is the recommended noise level to be exceeded only ten per cent of the time, L_{50} is the limit recommended to be exceeded no more than fifty per cent of the time, and L_{dn} is the recommended day-night average sound level not to be exceeded in a 24-hour period. Using these three parameters as well as an absolute maximum limit for noise peaks, it is possible to control the background noise, extended duration of noise, frequency of repetition of peaks and exceptionally high noise peaks. Different standards for the different land use types, for daytime and nighttime, in residential areas and for indoor and outdoor environments, account for the variation in sensitivity of people with type of activity and time of day.

Uses of the Recommended Noise Criteria. A major purpose of this criteria is to recommend a numerical basis to protect public health and well-being. It is also intended to reconcile the continuation of economic activity with the desire to maintain an acceptable noise environment. The information and maximum limits recommended in the criteria MUST be utitized along with other relevant data. These data include knowledge of the balance between costs and benefits associated with chosen noise limits, the existing ambient level, the neighborhood aspirations, and current state-of-the-art means available to control and abate noise. The levels recommended were identified irrespective of the nature of any one individual noise source. The utility of this criteria is to provide a basis by which noise regulations, exposure levels, land use planning, and zoning and building codes may be assessed. These criteria and the explanations that complement them attempt to avoid misinterpretations regarding the meaning of "desired maximum noise levels by land use categories" called for by the State guidelines. The City Planning Department Staff interpreted this subsection of the guidelines to be a requirement for a scientific recitation of available knowledge, rather than a compulsory prescription of recommended levels for noise exposure limitations. Likewise, an attempt is hereby made to avoid the misunderstanding that this document would be prescriptive of maximum levels of noise that could not be exceeded on a legal basis, but rather that it would state, as called for in the guidelines, data as to the kind and extent of all identifiable effects on the public health and welfare, which might be expected from different quantities and qualities of noise. Likewise, it is extremely important to point out that the limits recommended are not designed to deal with land use incompatibility. Finally, the City should evaluate the recommended limits more extensively prior to using them as a basis for the development of a noise ordinance. Due to the dynamic nature of the noise environment, the recommended maximum limits should be reviewed on a regular basis to determine their validity.

Implementation Strategies

The ultimate intent of the Noise Element is the implementation of the recommendations set forth in the document. Even the most innovative and comprehensive plan cannot succeed unless appropriate actions are taken to reduce or at least prevent the increase of noise in the community. Additionally, it is paramount that flexible and enforceable methods of noise control and monitoring be employed. The latter is especially true in an urbanized area such as Long Beach where the population continues to grow and large tracts of unoccupied land are almost non-existent.

If achieving a quieter environment were based upon a Noise Control Ordinance or other regulations passed by our governing bodies, or if it were determined by the number of public pronouncements, public hearings and associated rhetoric, then the ultimate objective of a quieter environment would be at hand. Unfortunately it is not, for a variety of reasons, including the difficulties associated with implementation and enforcement of noise programs and noise control laws. One of the most disabling factors in effective local noise control is the pre-empting of City regulations by State and Federal laws. The California Motor Vehicle Noise Standards and the Federal Aviation Agency Noise Standards are typical examples.

Identification and Ranking of Priorities

The noise problem areas identified in the Noise Element have been defined as the sectors that are of principal significance in Long Beach. These major areas are:

- Transportation noise (including all land, water, and air transportation).

- Industrial Noise
- Construction Noise
- Population Noise
- Impact Noise and Vibration

The recommendations contained in this Noise Element are concerned primarily with preventing increases in the level of noise, reducing noise where possible, and outlining the opportunities and problems in so doing. However, because State laws and Federal regulations pre-empt local ordinances in airports, freeways, and motor vehicles operation, immediate implementation of each of the recommendations in these areas is readily acknowledged to be unfeasible. Furthermore, the enforcement of the proposed noise ordinance depends entirely on its being approved and officially adopted by the Long Beach City Planning Commission and City Council. Therefore, primary consideration must be given to preventing further increases in noise and recommending control measures that can be readily taken to alleviate the situation in the most critical problem areas.

The Action Plan

To achieve the goals and objectives of the General Plan Noise Element the following implementation measures are proposed. They comprise a comprehensive program of noise control and abatement procedures embodying the following principles:

Noise Criteria. The recommended noise criteria given in the preceding section cover the entire spectrum of problems areas and noise sources. These noise criteria should be established and maintained for all areas of the City. They are set at those levels required to adequately protect the public's health and welfare, and to preserve and enhance the lifestyles of Long Beach.

Monitoring. Monitoring of the Noise environment is being conducted in Long Beach by several City departments. With the advent of this element, increased coordination will be achieved and additional monitoring will take place to assure that progress is made toward meeting the noise criteria.

Code Enforcement and Revision. Where monitoring shows that the noise criteria are being exceeded or where complaints indicate that a noise problem exists, enforcement action should be taken. City ordinance and regulations currently in effect as well as specific sections of the proposed Noise Ordinance should be invoked to assure that the objectives and noise standards contained herein are met.

Environmental Impact Studies. The City should continue to require environmental impact studies as dictated by State law, on all projects (private and public) which may have a significant effect on the environment.

Advocacy. Much of the noise impact on Long Beach results from action of agencies outside the control of City government. In particular, the regulation of aircraft noise is largely pre-empted by the Federal Government and the regulation of traffic noise is largely pre-empted by the State Government. Therefore, the City should use all of its influence to change the policies of other levels of government so as to improve the noise environment in Long Beach.

Legal Actions. The City should initiate legal proceedings wherever appropriate and necessary to protect and enhance the Noise Environment.

TABLE 12

ACTION PLAN SUMMARY TABLE

Problem Noise Area	Potential Solution(s)
Surface Transportation	Muffling, sound barrier walls, depressed roadways, speed limit and motor vehicle code enforcement.
Air Transportation	Routing, activity level, and time of day restrictions.
Water Transportation	Engine muffling, harbors and navigation code and speed limit enforcement.
Industrial Sites	Buffer zones, operating hours restrictions, soundproofing, barrier walls.
Construction Sites	Equipment noise limitations, operating hours restrictions, soundproofing, temporary barrier walls.
Commercial Sites	Buffer zones, operating hours restrictions, soundproofing.
Recreational Sites	Buffer zones, operating hours and date restrictions, soundproofing.
Residential Sites	Setbacks, soundproofing, building, sound transmission control, and municipal codes enforcement.
Multi-dwelling Sites	Setbacks, open space allocation, walls and floors soundproofing, sound transmission control.
Ambient Noise	All of the above.

Source: Long Beach Planning Department Staff.

Categorical Recommendations

Introduction to Recommendations. Adherence to the principles and guidelines contained in this category should assure that progress is made, within the limit of existing laws and economic capabilities of the City, toward achieving a quieter environment.

During the preparation of the Noise Element a set of goals and objectives was developed in an effort to categorize different problem areas and then better recommend corrective measures. The following categorical recommendations were made to achieve the goal and objectives previously set.

1. Recommendations Related to Overall Goals of the City

   1.1. That the Long Beach Planning Commission and the Long Beach City Council continue to take affirmative action to preserve the City's quietness and to reduce and control noise.

   1.2. That the Long Beach City Council adopt this Noise Element and the policies and action programs outlined herein.

2. Recommendations Related to Zoning Changes

   2.1. Where appropriate, that zone changes be effected to create land uses compatible with the noise environment.

3. Recommendations Related to Redevelopment

   3.1. Where appropriate, that the City redevelopment process be used to improve the noise environment in Long Beach.

4. Recommendations Related to Development Policies

That any development, present or future, be considered incompatible with its noise environment if any of the standards or criteria listed in this document are exceeded. The following policies shall guide development action:

4.1. Where incompatibility exists at present, action shall first be taken to change the noise environment.

4.2. Where incompatibility exists at present and future projections indicate that the noise environment cannot be reduced to create compatibility, every effort shall be made to change the development to achieve compatibility.

4.3. No future development shall be allowed which is incompatible with the existing or future noise environment unless the developer can show:

a. The development can reasonably be expected to be compatible at some time in the near future; and

b. Other factors favoring the development (social, environmental, for example) outweigh factors against the development.

4.4. No future development shall be allowed which causes other developments to become incompatible with their noise environments.

5. Recommendations Related to Noise Reduction and Control

That noise be controlled and reduced more effecrively through the adoption of abatement policies by various City departments. And that City residents be encouraged to adopt "more serene" lifestyles through an informative campaign geared to expose the harmful effects of noise. The following noise control recommendations are also made:

5.1. Increase community awareness of ambient and noise level exposures throughout the City and their consequences for zoning, subdivision, environmental and land use planning decisions.

5.2. Provide a technical noise assessment manual and supplemental guidance on noise measurement.

5.3. Continue the present cooperation with Federal, State, and local regulatory agencies when adopting noise standards; and make all such standards consistent with Federal and State statutory requirements and pre-emptions as well as Municipal and County ordinances.

5.4. Urge the City to deny a building permit if the adverse environmental impact of noise to be generated by a proposed project or received from a noise source outweighs its anticipated benefits. (Long Beach Municipal Ordinance Number C-5119, "Denial of Building Permits on Environmental Grounds").

5.5. Adopt and enforce a comprehensive noise ordinance.

5.6. Urge the City to review the feasibility of developing a noise control team equipped with all the necessary instruments and entrusted with the responsibility of monitoring noise complaints, advising and recommending corrective measures, and enforcing all existing noise laws and regulations.

5.7. Urge the City to create a noise variance board to review cases involving non-compliance with the noise control ordinance.

5.8. Urge the City to enforce more strictly existing Motor Vehicle and Municipal Code sections related to noise.

5.9. Urge the City to encourage consumers to demand quieter and less vibrating appliances from manufacturers.

6. <u>Recommendations Related to Transportation Noise</u>

That the City Departments connected with transportation-related matters will make full use of the standards and criteria outlined in this element and that the City, as well as the Long Beach Unified School District, will continue to undertake noise studies and carry out corrective measures such as the Sound Barrier Wall Program.

That the Circulation and Transportation studies of the General Plan pay particular attention to the possibility of restructuring truck routes and diverting through traffic away from residential streets.

It is hoped that a combination of several actions and events will be taken to mitigate noise in Long Beach. The following enumeration outlines some specific solutions:

6.1. Encourage privately and federally funded research in progress which is intended to reduce jet aircraft engine noise emissions. (As previously mentioned, jet engine modifications are being carried out in an effort to quiet down several types of aircrafts already in use. The prospect of quieter engines to be built in the future is much more promising now than ever before.)

6.2. Support a permanent 55 m.p.h. speed limit on major travel routes. (Because lower speeds result in less noise impact on land-uses adjacent to freeways.)

The following set of recommendations is made to suggest new measures or in the case of existing policies to encourage their continuation.

6.3. It is urged that a number of on going studies and programs related to circulation, traffic and transportation (such as the Parking

Management Plan) be completed since they will undoubtedly improve the vehicular flow throughout the City and thus reduce vehicular noise.

6.4. Keep the number of painted pedestrian crosswalks down to an essential minimum due to their tendency to increase stop-and-go traffic, and thereby increase noise.

6.5. Continue to synchronize traffic lights to improve vehicular flow and reduce unnecessary stop-and-go traffic.

6.6. Evaluate and analyze all bus and truck routes, their spatial relationships and proximity to noise sensitive land uses.

6.7. Lower or raise existing speed limits to better fit neighborhood driving conditions and improve circulation and safety.

6.8. Limit by ordinance the use of horns, bells, or sirens, used by private and city vehicles, to emergency situations to eliminate particularly annoying noises.

6.9. Require that residential projects near freeways be built with adequate soundproofing considerations.

6.10. Encourage the Long Beach Transportation Company to purchase quieter buses and thus gradually reduce the noise generated by that particular type of vehicle, when such equipment is available.

6.11. Encourage the City to enter into additional cooperative agreements with the Califronia Transportation Department (CALTRANS) for the erection of sound barrier walls to protect freeway-adjacent residential land uses.

6.12. Urge the City to assess all new residential projects which could be impacted by freeway noise, taking under consideration the high noise potential of that environment.

6.13. Require that new residential construction adjacent to railroad tracks be soundproofed, with additional consideration being given to groundborne vibrations that are transmitted from railroad tracks to houses.

6.14. Urge the City in future purchases of police helicopters to take aircraft noise output level into consideration.

6.15. Urge that police helicopter training flight paths continue to be directed away from noise-sensitive areas. (To minimize disturbance over the City).

6.16. Urge that cruising helicopters operate without "blade slap"[4] over noise-sensitive areas, even though this might result in decreased speed or operating efficience (except in emergency situations).

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[4] A major source of helicopter disturbance caused when rotor tips exceed the speed of sound and produce localized sonic booms.

6.17. Require that new buildings near the airport be made more adequately soundproofed by the use of noise absorbent materials, special construction techniques such as double windows, and air conditioning.

6.18. Reserve near-airport sites for warehouses, factories, light industries and other noise insensitive land uses that would confine and absorb aircraft noise.

6.19. Assess carefully all new residential projects within the Long Beach Airport Noise Impact Zone, taking under consideration the high noise potential of that environment.

6.20. Recommend that the Long Beach Police Department continue to strictly enforce Section 3410.125 "Designated Truck Routes" of the Long Beach Municipal Code to confine through-truck traffic noise to those designated routes.

6.21. Encourage residents to use alternate modes of transportation, such as bicycling and mass transit, which will reduce traffic generated noise throughout the City.

7. <u>Recommendations Related to Industrial Noise</u>

It is recommended that all industrial related activities in the City comply with existing sections of the Municipal Code and that recent studies be consulted before establishing standards for noise regulation. In cases where noise cannot be effectively contained, muffled or directed away from schools, hospitals and housing, it is recommended that land use planning make a more advantageous use of existing sound barriers. It is recommended that new industrial equipment designed to emit less noise be chosen whenever possible. More detailed recommendations are:

7.1. Require that engines used in connection with the drilling of any oil well be equipped with an effective exhaust muffler [Long Beach Municipal Code Section No. 3300.78] to suppress their noise level.

7.2. Confine the noise level output of automotive repairs to within buildings intended, constructed, or arranged for that purpose. [Long Beach Municipal Code Section No. 9120.10 (c-1)].

7.3. Determine appropriate schedule control for industrial operations whose noise level outputs are greater than those recommended herein (see table 11).

7.4. Require that industrial plants' walls be constructed of sound absorbent materials, providing a sound barrier for the community; and that all wall openings be either muffled or directed away from adjacent residents.[5]

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[5] Long Beach Municipal Code Section 9120.10 (c-1) requires blank walls or stationary windows on commercial or manufacturing building sides that adjoin residential lots.

7.5. Require that industrial noise sources that cannot be kept indoors be placed so as to take advantage of existing sound barriers, or directed toward non-sensitive uses.

7.6. Establish local codes and pass zoning laws to prohibit the operation of excessively noise plants on sites that are adjacent to Long Beach schools, hospitals, and housing.

7.7. Require adequate exhaust and intake mufflers and soundproofed enclosures to restrict the noise level output and the duration of noise exposures generated by heavy construction equipment.

7.8. Recommend that vibration-driven piles be used where impact pile drivers may cause an unusual nuisance.

7.9. Require the erection of temporary sound barriers to reduce the level of noise exposure generated by small construction projects.

7.10. Establish noise codes setting forth permissible noise levels for construction equipment and insuring means for enforcing these codes.

7.11. Recommend the replacement of noise diesel powered oil pumps with quieter electric ones as the former become worn out.

7.12. Consider the establishment of buffer zones around industrial areas in order to minimize the noise impact on other adjacent land uses.

7.13. Grant variances in the form of time extensions on individual cases where existing industrial and construction operations exceed maximum recommended noise levels set forth in this element but where the excessive noise is justified.

7.14. Encourage the demolition of structures, and the excavation and channelization of projects by use of implosive techniques[6] rather than by conventional heavy equipment.

7.15. Warn the City to use OSHA industrial noise standards with caution since the standards (indoor) may induce excessive outdoor noise levels.

8. Recommendations Related to Public Health

The section dealing with the significance of noise and the public's health has brought into focus the urgency of noise related matters to the physical

[6] The use of highly directional explosives applied to structural foundations or to ground areas which causes a building to collapse or the ground to be easily dug out without delay and with minimum-duration noise disturbance.

and psychological well-being of Long Beach residents. The Environmental Health Division of the Long Beach City Health Department is currently conducting a program of monitoring and corrective, advisory service. It is most urgently advised that the program be continued and/or be expanded to fully respond to the threat that noise poses to the public at large. It is further hoped that the information, standards and graphics included herein will serve to alert both citizens and City officials to this fact. More defined recommendations follow:

8.1. That the City continue to regulate and control noise which is injurious to the public's health or well-being through the Environmental Health Division of the Long Beach City Health Department.

8.2. That the City authorize the Environmental Health Division of the City's Health Department to issue citations in health related noise cases which are found to be in clear violation of existing ordinances, regulations and laws.

9. Recommendations Related to Population and Housing Noise

9.1. It is strongly recommended that a population growth policy be adopted by the City as suggested in the Population and Growth Policy document of the General Plan. (Any increase in population can potentially increase the level of Noise). Table 7 and 9 show the average noise levels generated by a variety of equipment and appliances used in modern homes. It is hoped that this chart will further contribute to increase a public awareness regarding noise exposures in homes. Apartment home builders around the country are paying more attention and investing more money to control sound transmission in their projects. The Long Beach Building Code and the California Administrative Code[7] had adopted legislation that affects multiple unit dwellings. The portion of the implementation strategies that deals with structural modifications already identifies the necessary alteration to floors, walls, ceilings, windows, and doors. In addition, a cost estimate is given to carry out such modifications. To control and reduce noise in housing, the Long Beach Community Development Department is urged to take advantage of urban renewal projects as said projects afford an excellent opportunity to develop and rehabilitate structures, thus creating better soundproofed dwellings. More specific recommendations are:

9.2. Require some form of damping treatment in quieting noise from multi-story apartment building equipment.

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[7]Long Beach Municipal Code, Article 8, Section 8100. 101, to 8100.4621, March 1973. California Administrative Code, Title 25, Article 4, Section 1092 (Noise Insulation Standards).

9.3. Require stationary noise generating equipment to be enclosed with sound-absorbing materials.

9.4. Place curfew rules on noisy airconditioning units and noisy mechanical appliances such as washing and drying machines when such measures will not constitute an infringement upon individual freedom.

9.5. Continue on-site supervision of party walls and floor-ceiling construction in multi-dwelling structures.

9.6. Encourage the utilization of noise control measures in residential projects such as resilient-structured walls, increased mass in walls and floors, and inclusion of damping materials, such as fiber glass, in partitions.

9.7. Help reduce the impact noise from "the apartment above" by encouraging the use of padding, carpeting, and suspended ceilings.

9.8. Amend the Long Beach Building Code to include standards for airborne and impact noise and vibration control.

9.9. Using the Noise Element as a guide, advise homeowners and apartment dwellers on reasonable ranges of noise level outputs generated by household appliances.

9.10. Through an information campaign, encourage the improvement of quietness of homes and apartments.

9.11. That the City adopt Chapter 35, "Sound Transmission Control" of the 1973 Uniform Building Code.

9.12. Identify physical soundproofing alterations to structures in order to reduce noise levels in problem areas.

9.13. Enforce soundproofing standards applicable to all apartment buildings.

9.14. Encourage consumers to choose and buy new appliances that make the least noise thus letting manufacturers know that this is an important factor in purchasing habits.

9.15. Urge residents, whenever possible, to avoid using noisy appliances during periods of sleep or television viewing.

10. Recommendations Related to Land Use

Vacant land use planning offers an opportunity for noise control. Unfortunately, because Long Beach is almost entirely built up, land use planning for noise control is feasible primarily when land is recycled through demolition and redevelopment.

The recommended noise criteria for the various land uses shown in Table 11 serve as ready reference regarding noise exposure and land use questions. The following additional recommendations are also made:

10.1. Require that all new industrial buildings be constructed with outside wall materials that absorb rather than reflect noise.

10.2. Update the Zoning Ordinance to provide proper spacing of buildings and thus lessen the propagation of noise to adjacent properties.

10.3. Increase yard area requirements in certain zones and introduce yard area requirements in others with the intent of reducing the propagation of noise.

10.4. Establish ample yard area requirements in R-4 zones to provide adequate light, ventilation, emergency access and noise buffering between adjacent properties.

10.5. Require through the Zoning Ordinance the provision of essential open space per dwelling unit ratios in multiple residential developments.

10.6. Create mutually exclusive zones wherein only compatible land uses would be permitted.

10.7. Utilize redevelopment projects to realign the zoning and reduce land use incompatibility.

10.8. Study land owned by the City or other agencies which is considered surplus for its open space and buffering potential.

11. Recommendations Related to Other Elements of the General Plan

The development of other General Plan Elements afford an additional opportunity for the drafting of recommendations related to noise control and abatement. The following discussion suggests dual recommendations that ought to be considered within the context of the subject element.

11.1. Circulation Element. It is recommended that the transportation portion of this element analyze in detail existing truck routes and heavily travelled streets, and that it develop alternative routes away from noise-sensitive land uses. It is also suggested that the Transportation Element encourage the creation of alternate modes of travel, such as people movers, mass transit, and bicycle paths.

11.2. Land Use Element. It is strongly recommended that the Land Use Element recognize noise level/land use relationships as proposed in the land use acceptability criteria and the Long Beach Airport Land Use Compatibility sections of the Noise Element.

11.3. <u>Housing Element.</u> Since this element deals with the characteristics of the housing stock, it is recommended that the housing goals and recommendations stated in the Noise Element serve as inputs in such areas as soundproofing, and housing density and location. It is urged that the City of Long Beach recognize and take advantage of the opportunity for improving the noise environment that renewal and rehabilitation work have to offer.

11.4. <u>Public and Seismic Safety Elements</u>. Recognizing these two elements as key inputs to the Land Use and Transportation Elements because they define suitable areas for density and urbanization, it is recommended that the City adopt the Public Safety Element proposals regarding the physical separation of incompatible land uses. This separation oftentimes help in the attenuation of noise. It is also recommended that the City adhere to suitability indicators drafted in the Seismic Safety Element which identify potential areas to remain open owing to some geologic hazard. These areas, depending on their location, could act as noise attenuators.

11.5. <u>Open Space Element.</u> It is recommended that the areas proposed in the Open Space Element be recognized as having significant noise abatement potential and that implementation should reflect the beneficial duality of open areas.

11.6. Population Element. The City is urged to follow the recommendations made in the Population and Growth document regarding a moderate rate of growth.

11.7. Scenic Highways. The creation of scenic highways and the preservation and enhancement of the existing view corridors offers potential for creating a psychological effect of calmness and tranquility. It is, therefore, recommended that the City landscape and beautify as many areas as possible to create this positive psychological effect of serenity.

11.8. Recreation Element. It is recommended that recreational facilities and programs continue to afford a wider opportunity to all citizens for a pleasureable escape from noise environments.

11.9. Environmental Management Element. It is recommended that this element, to which noise is a basic input, emphasize noise reduction as an essential consideration in improving the environment.

11.10. Conservation Element. Some recommendations made in the Conservation Element are complementary to the proposals of the Noise Element. It is recommended that the proposal be implemented that urges the preservation of inland water areas will insure that those zones will continue to act as noise buffers in their locations.

Transportation Noise Reduction Measures

Introduction and Concepts. This section will examine briefly some major noise reduction measures. The emphasis is placed on problems and solutions as they relate primarily to surface transportation noise since it is from this source that most urban noise emanates.

Noise generated by vehicles travelling on major roadways in Long Beach has a considerable effect on adjacent land uses. The effect varies with the type and volume of vehicles, the distance from the highway to inhabited areas, the type of land use, and the amount of noise originating in the area[8] as compared to that originating on the highway. Combinations of these factors can be quite disagreeable and often intolerable when noise sensitive land uses are located immediately adjacent to a heavily travelled roadway.

Noise Control Measures

The first and most rational step in noise control is the recognition and numerical identification of the problem. This can be done by comparing the measured noise levels with the acceptable or recommended levels, which often can be estimated by using one of the criteria given in Table 11. The next step is to find out how this reduction can be achieved most satisfactorily. A more comprehensive discussion of this problem is not feasible within this element because: 1) the alternate methods are innumerable, and

[8] Existing ambient noise.

2) technological developments continually afford new methods. However, a few introductory statements on the subject are well justified and will be made herein.

Alternate Measures. Several alternative methods of surface transportation noise control are available, each of which by itself provides only a partial solution to the total problem. Consequently, a combination of several methods may be required to achieve effective noise control. The general approach to most noise control measures can be classified in three basic approaches: 1) Noise reduction at the source; 2) Noise reduction in the transmission path; and 3) noise reduction at the receiver.

Noise Reduction at the Source. The most effective noise reduction measure is one applied at the source. In surface transportation vehicles, a different type of motor or more efficient intake and exhaust mufflers afford great reductions. In other words when modification of a source is attempted, a decrease in the radiated power is usually the most important change that can be made. One of the most common complaints against highway-generated noise is caused by diesel trucks. In many cases, the complaints continue to flow even after the erection of a costly and otherwise effective ten-foot high sound barrier wall. This negative effect is sometimes caused by the design of the muffling system which in many trucks is located vertically to a height of eleven or more feet, with the tailpipe exhaust opening at that height. Obviously, these trucks can render a ten-foot high sound barrier wall ineffective. When streams of exhaust gases come out of the top of the vertical tailpipes, they radiate sound that may be highly directional at high frequencies. Changing the direction of flow (or in this case lowering the height of the muffling system) can shift this pattern.

It may be possible to direct the exhaust pipe in such a way that noise in certain directions (towards the median divider, for instance) is considerably reduced.

The most direct approach to minimizing road-generated noise is to reduce the legally allowable noise emission from motor vehicles. Enforcement of the 1973 California Motor Vehicle Code, Section 23130 shown in Appendix F is an example.

In addition to the statutory approach mentioned above, techniques can be applied in the location and design of highways to mitigate noise effects on surrounding areas. A previous section, ("Noise Control for Transporation Systems"), explores the acoustical potential of road design, suggests that highways may be depressed to alter the propagation of noise and outlines some of the avenues available to the City in reducing roadway noise.

Noise Reduction in the Transmission Path. The available means of controlling the transmission path of noise are innumerable. In addition to the discussion on sound reduction in previous sections, a more specific treatment will be made here of the sound barrier wall approach.

The sound attenuation due to a noise barrier depends on its distance from both the source of sound and the receiver, the height of the barrier above a straight line joining the sound source and the receiver, and on the frequency spectrum of the sound: the higher the frequency of the sound the greater the sound attenuation due to a barrier.[9]

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[9] Milton D. Harmelink and Jerry J. Hajek; "Highway Noise Control. Traffic Engineering Magazine, September, 1973, Page 48.

For new freeway construction, the California Department of Transportation (Caltrans) has outlined its basic criteria and policies in site location of sound barrier walls in Circular Letter 72-33 as follows:

Initial Construction. "Except for separate criteria stated for outside widening on existing freeways, erection of noise attenuating appurtenances should be considered in situations where all of the following conditions usually exist:

1. New freeway construction.
2. Development existing at time of route adoption. (Examples: dwellings, churches, schools, libraries, and hospitals.)
3. Ambient noise level is 65 dBA or less.
4. Depressed section is not feasible.
5. Anticipated noise radiation would be a problem (based on maximum noise level source of 86 dBA at 50 feet) if corrective measures are not taken.

"Purchase of additional right-of-way to provide a buffer zone may be considered when it is the most economical solution to a particular noise problem. Join use of a buffer zone by compatible noise tolerant developments should be investigated."[10]

For existing roads, "Caltrans" is constructing sound barrier walls between freeways and adjacent schools as mandated by Section 216 of the California Highway Code.[11] Such a project has been undertaken at the Newcomb School

[10] State of California Department of Transportation, Project Development Design No. 173, Circular Letter 72-33 May 31, 1972, p.2.

[11] Section 216 stipulates that if the noise level, after the freeway is completed, exceeds 51 dBA, the State is required to accomplish a reduction down to that level.

on the San Gabriel Freeway (605) at Wardlow Road. The sound barrier wall is scheduled to be completed in early 1975.

"Caltrans" has completed a sound barrier wall between the Long Beach Freeway and White Avenue in Long Beach, north of Long Beach Boulevard, the project resulted from the widening of the Freeway at that location. The reduction in distance between the roadway and adjacent homes in the west end caused the noise to increase to the level of 78 dBA. After the erection of the wall the noise decreased to 66 dBA, a total reduction of 12 dBA.

Prompted by the construction of the sound barrier wall between Long Beach Freeway and White Avenue, the City Planning Department conducted a field survey early in 1974. The project was included in the Citizen Participation Program of this element and was explained therein. The field survey and the numerical noise reduction clearly indicate the effectiveness of the sound barrier wall at that location.

Noise Reduction Measures at the Receiver

Of the three noise reduction approaches outlined above, sound reduction measures applied at the receiver are the least desirable. In cases where structural modifications are being applied, the actual noise reduction achieved is conditioned to having windows and doors closed. These acoustical modifications are less effective in Long Beach because the City enjoys a very favorable year-round climate and weather conditions which encourage outdoor living and activities and de-emphasize the need for artificially controlled environments.

In another section of this report, cost estimates of acoustical modifications for noise reduction clearly show the high cost of soundproofing. In addition to the disadvantages listed therein, soundproofing sometimes requires some structural modifications which can be very expensive also.

The three noise reduction measures discussed above afford both advantages and disadvantages. In most cases, application of one or two of the approaches explained will mitigate noise levels. In more serious cases, application of all three approaches may be the only solution. Noise control at the source is most desirable while soundproofing is less costly and more feasible during initial construction than acoustical modifications done to old structures.

Vehicular Noise Reduction Measures

As noted previously, limits on noise emission levels from individual surface vehicles are prescribed in the State Motor Vehicle Code and this preempts any local control legislation. The State requirements are directed to noise limits for new vehicles. The worst vehicle noise exposures come from older cars and trucks with poor muffling. In terms of controlling the sources of motor vehicle noise, some method of controlling the muffling condition, along with vehicle speed limits are the avenues available to the City.

Another potential source of local control of motor vehicle noise is enforcement of vehicle speed limits past noise sensitive areas. The relationship between vehicle speeds and noise levels on surface streets and freeways was shown in a previous section. From the data presented, it is seen that a speed increase from 35 to 50 mph may add 5 dBA to the noise exposure. Conversely, reducing speeds to 25 mph past noise sensitive areas could only reduce noise exposures by 8-10 dBA.

In the matter of controlling aircraft noise, the City has jurisdiction over ground maintenance activities where there should be a requirement for use of jet engine ground noise suppressors in those locations where there is noise intrusion into the community beyond established limits.

The City has exercised one avenue for controlling noise from aircraft overflights by limiting the hours of commercial operations at Long Beach Airport. This has the important effect of eliminating any heavily weighted night operations from the composite noise exposure. Beyond this measure, the City can work with the FAA Air Traffic Controllers and the airlines to possibly alter operations when a significant noise problem is identified.

Other surface transportation noise sources may be treated in much the same way, analytically, as motor vehicles. Trains and rapid transit systems will encounter similar routing and sound propagation considerations.

Potential For Noise Control Through Structural Modifications

This section will present an assessment of the costs of introducing noise reduction treatment into a variety of structures in areas subject to excessive noise exposure. Four major structural categories are considered:

- Single-Family residential
- Multiple-Family residential
- Office structures
- Educational facilities

Estimates for costs of structural treatment in multiple-family residential structures and office buildings were developed following an appraisal of noise reduction requirements in various noise exposure environments and the architectural and construction constraints imposed by these requirements.

It is appropriate to preface a discussion of noise control in residential structures by noting that there are costs other than economic, i.e., social costs, which must be considered when contemplating structural modifications in a high noise impact residential area. These social costs reflect the fact that structural noise control treatment will accomplish very little toward alleviating outdoor noise exposure conditions.

Three studies deemed pertinent to the determination of these costs will be considered. The first study was completed about seven years ago for NASA. This study estimated the costs of soundproofing existing single-family residences to be about one per cent of building cost per dB of additional noise reduction required up to about 10 dB additional NR. No discussion of spectral weighting, i.e., type of dB units, was provided. Storm windows were estimated so to be an additional two per cent of the basic costs. It was noted that additional noise reductions greater than 10 dB involved major structural changes and would cost more than one per cent per additional dB. For new homes, soundproofing would again cost about one per cent of basic cost per dB additional NR. The addition of central air-conditioning, where required, would add another ten per cent to basic building cost, whereas a minimal air circulation system would cost approximately one per cent. Utilizing these estimates, an approximate cost of $6,000 is required to provide an additional NR of 10 dB for a $30,000 residence where air-conditioning is required.

The second study was performed for the Federal Housing Administration. Three major stages of soundproofing were discussed; 5-10 PNdB, 10-15 PNdB, and 15-20 PNdB additional NR figures. Modifications to achieve 5-10 PNdB additional NR include: storm windows with 1/4" panes, weatherstripping on all doors, and, in some cases installing new ceilings and caulking and sealing of any air gaps. The 10-15 PNdB modifications included installation of double windows, separate storm doors with heavy weatherstripping in addition to the other steps as noted above. The 15-20 PNdB modifications were extensive, including double windows, storm doors with weatherstripping or heavy solid core doors, installation of new ceilings or gypsum board on ceiling joists, and brick or concrete veneer on exterior walls as well as the usual caulking and sealing of any air gaps in the structure. Their costs were somewhat conservative: $260-$820 for the 5-10 PNdB group, $1,600-$2,400 for the 10-15 PNdB group, and $3,000-$4,500 for the 15-20 PNdB group, assuming a small residence of 1,000 square feet floor area. Costs of air-conditioning were extra; the costs estimated to be from $0.50-$0.60 per square foot of floor area for room units to $1.20-$1.60 per square foot for central air-conditioning installations where new duct work had to be installed.

The final study was performed for the Los Angeles Department of Airports. This report also considers three stages of soundproofing, with noise reductions expressed as reductions in the speech interference levels inside the structure. The exact relationship between NR expressed in dBA units and NR expressed in dB (SIL)[12] units depends on the incident noise spectrum and the transmission loss characteristics of the structure. However, for transportation noise and typical residential construction, a working relationship is that NR in PNdB units = NR in SIL units, to a first approximation and with uncertainty of several dB. This report considered three stages of modifications: those that produced a minimum total of 25 dB (SIL) NR, 35 dB (SIL) NR, and 45 dB (SIL) or greater NR. For the first stage, windows and doors were modified and forced air ventilation installed if not already in the house. For the second stage, major changes to windows and doors were implemented as well as modification of beam ceilings in some cases. Stage 3 required modification of the external walls, ceilings, and floors, forced air ventilation and modification of windows and exterior doors. These modifications were actually carried out on a selected number of existing homes.

The average costs for these modifications were the following:

	Average Cost Per House	Average Cost/Square Foot Floor Area
Stage 1 (25 dB SIL)	$ 3,210	$ 2.10
Stage 2 (35 dB SIL)	4,820	3.15
Stage 3 (45 dB SIL)	12,500	8.20

[12]SIL-Speech Interference Level. This is the arithmetic average of the frequency octave bands centered at 500, 1000 and 2000 Hz. It is used as a single number measure of the difficulty in communicating in a noisy environment.

Noise reduction costs per house were compiled on the basis of a normalized 1,500-square foot residence. It should be noted that these costs are considerably higher than those estimated in the FHA report. For the most part, one might express more confidence in the estimates provided in the Los Angeles Department of Airports Study, since house modifications were carried out under this program and actual costs incurred were reported. However, an examination of the report reveals that, under certain of the Stage 1 residence modification programs, construction work beyond that required for noise control was performed. Thus, the average costs reported for these Stage 1 modifications are probably inflated. In a large-scale noise-proofing project, as noted in the report, it should be possible to reduce all the above costs by 10-20 per cent.

Very little work has been done to assess the costs involved in the soundproofing of apartments. Consequently, it was necessary to develop some estimates for these costs based on experience with noise control requirements. The greatest factor limiting structural noise reduction (for NR values up to about 35 dBA) is the combination of inadequate doors and windows. In some cases, wall construction will also limit NR, especially stucco construction with poor low frequency attenuation. For any area where from 35-40 dBA NR is required, it will be necessary to sound-treat exposed exterior walls. A final factor is the type of ventilation. Since doors and windows must be closed at all times if maximum NR values are to be achieved, at least a minimal ventilation system will be required. Any air intake for either this minimal system or for a more elaborate air-conditioning system should also be sound treated.

Extra costs to be added to normal new construction figures are estimated below, assuming that we wish to achieve from 35-40 dBA total NR:

° Acoustical window systems (double glazing or commercial system)	$4 per square foot
° Sound-retardant (non-sliding) doors	$150-200 per opening
° External wall treatment	$2 per square foot for for exposed exterior wall
° Air-conditioning inlet duct	$150 per square foot opening

Normal sliding glass doors, such as are often found in apartments, must be eliminated entirely or replaced by a double sliding glass door. The estimated cost of this is from $250-$300 per door.

Normal construction for modern multi-story office buildings will yield slightly better noise reduction figures than single or multi-family residential structures. Normal window construction will again, however, limit the maximum NR to between 25 and 30 dBA. Maximum NR can be increased to between 35 and 40 dBA by installation of a suitable commercial window system. Again, an estimate of the additional new construction costs is $4.00 per square foot of external glass area. Other noise reduction steps may have to be taken in some instances (such as sound treatment of ventilation openings) with costs equivalent to those previously indicated. Depending upon the building size and configuration, including the extent to which the external portion of the building is glass, an estimate of the cost to be added to new construction figures is from $1.25 to $2.10 per square foot of floor space.

It is estimated that soundproofing can be provided for schoolrooms so that adequate speech communication can be carried out in areas where external noise levels approach and in some cases, exceed 85 dBA. Soundproofing for these structures must be performed very carefully, however, since the ability to understand speech is quite important. Estimates indicate the costs of noise control to be an average of $8,000 per treated room. These costs are for modification of existing structures. The costs of providing this amount of noise reduction in new structures will be less.

Updating the Noise Element

The Advanced Planning Division of the City Planning Department will prepare an annual report, to be completed by October 1st of each year. The report will update the Noise Element by stating progress which has taken place towards controlling and abating noise. The report will contain at least, the following:

1) Code enforcement actions which have taken place during the year.

2) Code revisions which have taken place during the year.

3) A list of Environmental Impact Reports containing noise related statements and the action taken.

4) The results of advocacy at all levels of government in terms of new laws, regulations, ordinances, or policies which were adopted during the year, and affect the City environment. The report will also contain, where applicable, proposals for changing the following:

    a. Numerical noise standards.
    b. Monitoring procedures
    c. Any of the codes related to noise control.

d. Noise enforcement procedures.

e. Environmental Impact Studies.

f. Advocacy programs.

g. Specific action program.

h. Other relevant policies

APPENDIX A

Noise Element Guidelines[1]

State guidelines for the preparation of General Plan Noise Elements are presented below, verbatim:

1. AUTHORITY

Government Code Section 65302(g) requires a noise element of all city and county general plans, as follows:

A noise element in quantitative, numerical terms, showing contours of present and projected noise levels associated with all existing and proposed major transportation elements. These include but are not limited to the following:

(1) Highways and freeways

(2) Ground rapid transit systems

(3) Ground facilities associated with all airports operating under a permit from the State Department of Aeronautics.

These noise contours may be expressed in any standard acoustical scale which includes both the magnitude to noise and frequency of its occurrence. The recommended scale is sound level A, as measured with A-weighting network of a standard sound level meter, with corrections added for the time duration per event and the total number of events per 24-hour period.

Noise contours shall be shown in minimum increments of five decibels and shall be continued down to 65 db(A). For regions involving hospitals, rest homes, long-term medical or mental care, or outdoor recreational areas, the contours shall be continued down to 45 ~~db(A)~~.

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[1] Council on Intergovernmental Relations: Guidelines for Local General Plans. Sacramento, California, State of California, September 20, 1973, pp. IV, 29, 30, 31, and 32.

Conclusions regarding appropriate site or route selection alternatives or noise impact upon compatible land uses shall be included in the general plan.

The state, local, or private agency responsible for the construction or maintenance of such transportation facilities shall provide to the local agency producing the general plan, a statement of the present and projected noise levels of the facility, and any information that was used in the development of such levels.

2. THE SCOPE AND NATURE OF THE NOISE ELEMENT

A. A statement of general policy indicating the local jurisdiction's general intentions regarding noise and noise sources in the community.

B. Desired maximum noise levels by land use categories.

C. Standards and criteria for noise emissions from transportation facilities. (It should be noted that control of some noise sources has been pre-empted by State and Federal governments).

D. Standards and criteria for compatible noise levels for local 'fixed-point' noise sources.

E. Guide to implementation.

F. Appendix describing methodology of preparation and sources of data.

3. METHODOLOGY

A. Preliminary identification of problem noise areas.

B. Collect data on existing and proposed transportation noise sources. Such transportation noise data is to be provided by the agency constructing and operating the facilities. Such data may be expressed in the acoustical scale recommended in Section 65302(g), or any professionally acceptable acoustical scale used consistently throughout the preparation of the noise element.

C. Collect data on general noise levels throughout the community related to types of use. In collecting data, the differences among kinds of noises should be recognized. The impact of noise on the individual varies with its frequency, pitch, duration and cyclic consistency; the presence of masking noises in the environment; and the sound's familiarity.

D. Review information from published sources regarding effects of noise on people's activities, health and well being.

E. Establish committees or other procedures for developing citizen input and awareness of problems, issues and opportunities.

F. Survey noise control regulations from other jurisdictions giving special attention to regulations from jurisdictions with chacteristics similar to the local community.

G. Formulate general policy statements responsive to local issues and problems.

H. Prepare standards and criteria relating noise levels to types of use and environmental factors.

I. Set measureable goals for the reduction of noise in problem areas.

4. DEFINITION OF TERMS

Sound intensity: A measure of the loudness of sound.

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

Decibel: A unit for measuring the relative loudness of sounds detectable by the human ear.

5. RELATIONSHIP OF THE NOISE ELEMENT

A. To other elements:

The noise element is related most clearly to the circulation, land use and housing elements, since it provides noise level standards related to the compatibility of land use, of which residential use will be a highly important component. Noise level standards thus can be the decisive factor in locating transportation facilities (or their design) in relation to existing or planned land use. Consideration should be given to the adverse effects of noise on activities taking place both in the out-of-doors and in structures not insulated against sound. The noise element is also closely related to the open space element since noise can adversely affect the enjoyment of quiet pursuits in open space. Conversely, open space can be employed to buffer noise sources from sensitive uses through distance and extensive tree planting.

B. To environmental impact questions:

Social: Excessive noise is socially disruptive, and may be physically and psychologically damaging.

Economic: Excessive noise adversely affects property values and levels of productivity. In the past the costs of excessive noise from transportation facilities have been passed on to those in the vicinity rather than being borne by the producer of the noise.

C. To other agencies:

The law requires state, local or private agencies responsible for the construction and maintenance of major transportation facilities, provide present and projected noise levels for their facilities. This includes (but is not limited to):

State Department of Transportation
Regional Transit Authorities
Local Public Works Departments
Rapid Transit Districts
Airport Ground Facilities
Private Air Carriers
Private Freight Carriers
Railroad Companies.

6. IMPLEMENTATION

A. Noise ordinances and regulations. The zoning ordinance may be utilized since it can vary levels of permissable noise by zoning district-relating noise level to type of use and situation.

B. Maintain liason with transportation agencies regarding reduction in noise from existing facilities and control of noise through design and location and new facilities.

C. Revise other elements of general plan as appropriate to give recognition to noise level/land use relationships and other relevant matters. Revise circulation element to divert through traffic from residential streets.

D. Revise building code to reduce noise transmission in or from building and provide for additional sound insulating in high noise areas.

E. Liaison with health departments in the preparation of standards and ordinances and for assistance in on-site measurements of noise level.

F. Construct sound barriers, particularly surrounding noise intolerant areas such as between residential areas and freeways.

APPENDIX B

NOISE REDUCTION SURVEY - PERCENTAGES

- A noise barrier between your neighborhood and the Long Beach Freeway has just been erected by the State Department of Transportation. Your answers to the following questions will help the City measure the effectiveness of the barrier.

- Length of residence?______years. Age bracket? Less than 21 years ☐ 21-29 yrs. ☐ 8% 30-39 yrs. ☐8% 40-49 yrs. ☐20% More than 50 yrs. ☐66%

- Would you please indicate how the freeway noise prior to construction of the sound barrier affected your life style? (Please choose as many of the following that pertain to your situation.)

Interfered with speech	☐ 29%	Interfered with relaxation	☐52%
Made sleeping difficult	☐ 60%	Interfered with television, etc.	☐45%
Interfered with sense of privacy	☐ 29%	Curtailed outdoor enjoyment	☐45%
Made tense, irritable	☐ 25%	No adverse effect	☐25%

Other (Please explain)______________________________

- If adversely affected by the noise: Was the noise worse during the night or day hours? Night ☐ 32% Day ☐ 16% No Difference ☐ 41%

- During which season or seasons were you disturbed the most? (Please choose as many of the following that pertain to your situation.)

  Winter ☐ 8% Spring ☐29% Summer ☐ 50% Fall ☐20% No Difference ☐ 45%

- Did any special weather conditions make the noise more noticeable? Yes ☐ 16% No ☐ 32%

- Were you disturbed more by:

  Low, roaring sounds ☐66% High, screeching sounds ☐ 16% No Difference ☐12%

- What measures, if any, did you take to reduce freeway noise interference prior to the erection of the sound barrier? (Please choose as many of the following that pertain to your situation?)

Complained to government agencies	☐8%	Keep windows closed	☐79%
Soundproofed home	☐	Stayed indoors most of the time	☐41%
Air conditioned home	☐29%	Other (please explain)__________	
None	☐16%		

- If complained to government agencies, which one or ones did you contact?

  ____

- Have you noticed any reduction in freeway noise after the completion of the sound barrier? Yes ☐ 87% No ☐ 12%

- If yes, would you indicate what effect the reduction of noise has had in/on your home life style?

Sleep better	☐ 58%	Enjoy television more	☐32%
Speech is easier	☐ 29%	Keep air conditioner off, windows open	☐29%
More relaxed	☐ 41%	Enjoy outdoors more	☐50%
More sense of privacy	☐ 32%	Other (please explain)__________	
None	☐ 12%		

- Which type of noise from vehicles disturbs you the most?

Tire tread noise	☐ 70%	Blowing horns	☐ 8%
Exhaust noise from vehicle mufflers	☐ 50%	Other, (please explain)__________	

- Which type of vehicle disturbs you the most? Motorcycle ☐ 25% Bus ☐ 4% Automobile ☐ 16% Diesel Truck ☐87% Emergency ☐ 16%

- What other noises if any, still continue to annoy you at the present time?

TABLE 13

NOISE BARRIER WALL SURVEY RESPONSES
(Before Construction)

Question and Multiple Choices	Yes	No	Comments
1. Does Any Special Weather Condition Make the Noise More Noticeable?	4	9	11-Not Noticed
2. Did You Take Any Measures to Reduce or Eliminate Noise?			
a) Complained to Government Agency	2	22	
b) Soundproofed Home	--	--	
c) Air-Conditioned Home	7	17	
d) Kept Windows Closed	19	5	
e) Stayed Indoors	10	14	
(After Construction)			
1. Have You Noted Any Reduction in Noise Since the Sound Barrier Completion?	21	3	See Figure 27
2. If Yes, What Effect has the Noise Reduction had on your Home Lifestyle?(1)			
a) Speech is Easier	7		
b) Sleep is Better	14		
c) More Sense of Privacy	9		
d) More Relaxed	10		
e) More Enjoyment of Television	9		
f) Keep Air-Conditioner Off, Windows Open	7		
g) More Outdoors Enjoyment	12		

(1)This distribution does not total twenty-four because several respondents either chose not to check all the multiple choices offered or checked more than one choice.

Source: Long Beach City Planning Department, Research at Long Beach Freeway and Long Beach Boulevard, February 1974.

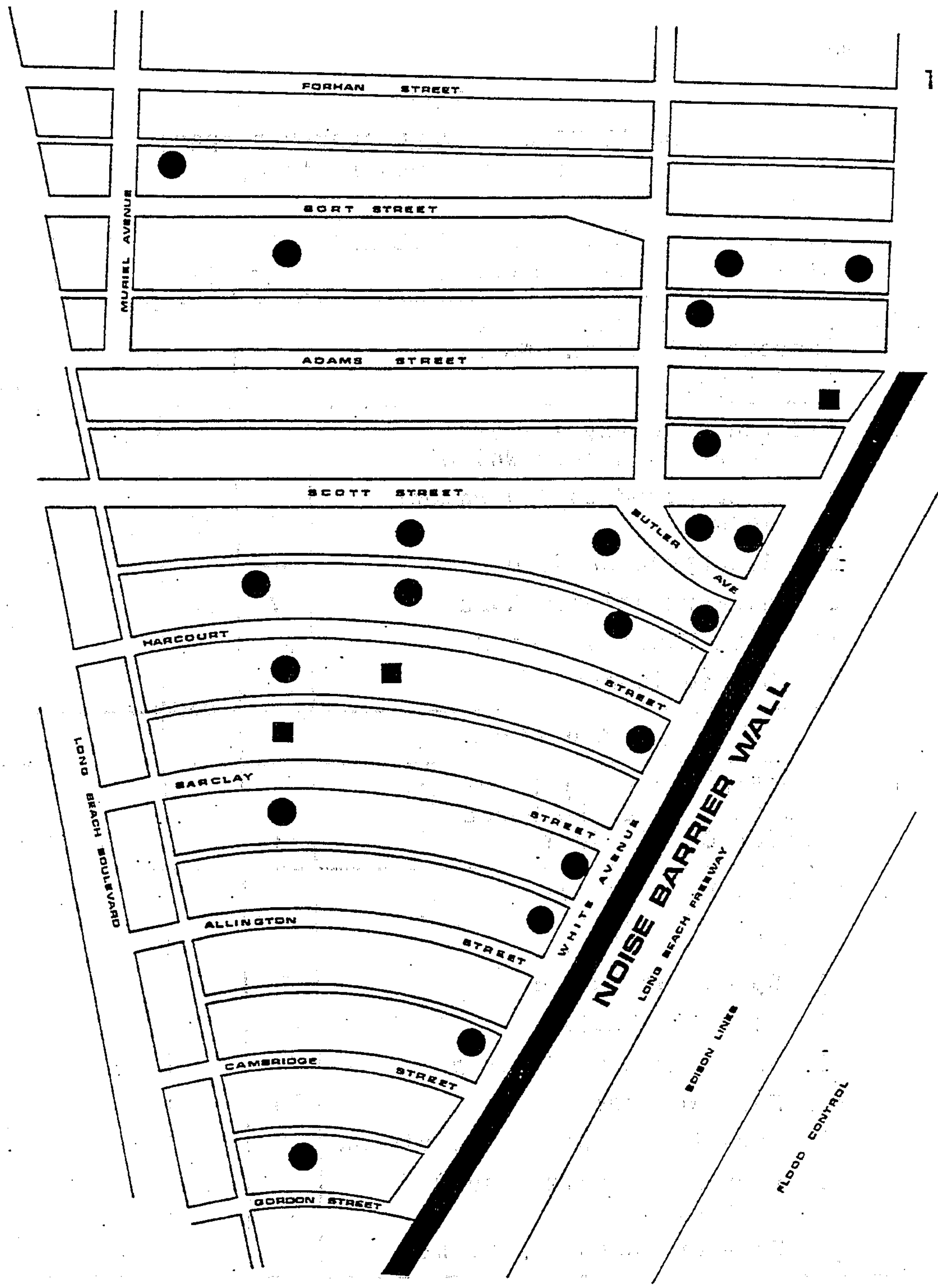

FIGURE 27

NOISE BARRIER WALL SURVEY

Source: Long Beach Planning Department Staff field research, February 1974.

TABLE 14

NOISE BARRIER WALL SURVEY

(Comparison of 24 Responses[1] Before and After Sound Barrier Erection)

Question and Multiple Choices	Before Yes	Before No	After Yes	After No	Other Explanation
1. How Does Freeway Noise Affect You?					
A. Interfered with Speech?	7			7	
B. Made Sleeping Difficult?	17			14	
C. Interfered with Sense of Privacy?	7			9	
D. Made Tense, Irritable?	6			10	
E. Interfered with Relaxation?	13			10	
F. Interfered with Television?	11			9	
G. Curtailed Outdoor Enjoyment?	11			12	
H. No Adverse Effect?	6			21	No Response (3)
I. Keep Air Conditioner Off, Windows Open?		14	7		No Response (3)
2. Which Vehicle Type Noise Disturbs You Most?					
A. Tire Tread?	17		1		
B. Exhaust from Mufflers?	12		1		
C. Blowing Horns?	2		1		
D. Automobile?	4				
E. Diesel Truck?	21		3		
F. Motorcycle?	6		1		
G. Emergency Vehicle?	4				
H. Bus?	1				
3. Considered Moving Due to Noise?	9	11	4	9	N/A=5

(1) This distribution does not total twenty-four because several respondents either chose not to check all the multiple choices offered or checked more than one choice.

Source: Long Beach City Planning Department, Research at Long Beach Freeway and Long Beach Boulevard, February 1974.

TABLE 15

NOISE BARRIER WALL SURVEY
(Sensitivity to Types of Noise)

Question and Multiple Choices	Responses
5. What Type of Noise Disturbs You Most?	
A. Low Roaring Sounds	16
B. High Screeching Sounds	4
C. No Difference	4

Source: Long Beach City Planning Department, Research at Long Beach Freeway and Long Beach Boulevard, February 1974.

PUBLIC OPINION SURVEY RELATED QUESTIONS AND RESPONSES

Q.23- WHAT DO YOU THINK THE MOST PRESSING ENVIRONMENTAL PROBLEMS FACING THE CITY OF LONG BEACH ARE?

	TOTAL	AGE: UNDER 30	AGE: 30-59	AGE: 60 & OVER	INCOME: LESS THAN 7,500	INCOME: 7,500 TO 15000	INCOME: 15,000 & OVER
BASE = TOTAL SAMPLE	602	153	271	166	176	206	187
	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SMOG	214	64	104	46	48	73	86
	35.5	39.3	38.4	27.7	27.3	35.4	46.0
OCEAN POLLUTION	59	31	22	6	9	22	26
	9.8	19.0	8.1	3.6	5.1	10.7	13.9
OVERPOPULATION	43	19	21	3	13	14	12
	7.1	11.7	7.7	1.8	7.4	6.8	6.4
CRIME	34	6	17	11	12	9	11
	5.6	3.7	6.3	6.6	6.8	4.4	5.9
DETERIORATION OF DOWNTOWN	34	4	17	12	12	11	10
	5.6	2.5	6.3	7.2	6.8	5.3	5.3
OVER BUILDING	33	12	15	6	9	13	11
	5.5	7.4	5.5	3.6	5.1	6.3	5.9
TOO MANY VEHICLES	32	11	9	12	10	8	13
	5.3	6.7	3.3	7.2	5.7	3.9	7.0
OIL REFINERIES	29	7	18	4	2	9	16
	4.8	4.3	6.6	2.4	1.1	4.4	8.6
NOISE POLLUTION	16	6	9	1	3	4	8
	2.7	3.7	3.3	.6	1.7	1.9	4.3
STREET LITTERING	16	4	4	8	3	7	4
	2.7	2.5	1.5	4.8	1.7	3.4	2.1
DIRTY BEACHES	16	7	5	4	5	4	6
	2.7	4.3	1.9	2.4	2.8	1.9	3.2
OFF SHORE DRILLING	13	5	5	3	2	4	6
	2.2	3.1	1.9	1.8	1.1	1.9	3.2
LACK OF GREEN AREAS/ OPEN SPACES	13	4	5	4	4	4	4
	2.2	2.5	1.8	2.4	2.3	1.9	2.1
PUBLIC TRANSPORTATION LACK	11	4	2	5	3	6	2
	1.8	2.5	.7	3.0	1.7	2.9	1.1

	OWN/RENT HOME: OWN	OWN/RENT HOME: RENT	RACE: CAUCA-SIAN	RACE: BLACK	RACE: MEXICAN AMER.	RACE: OTHER
BASE = TOTAL SAMPLE	412	189	535	39	15	13
	100.0	100.0	100.0	100.0	100.0	100.0
SMOG	152	62	189	11	9	5
	36.9	32.8	35.3	28.2	60.0	38.5
OCEAN POLLUTION	39	20	54	3	1	1
	9.5	10.6	10.1	7.7	6.7	7.7
OVERPOPULATION	26	17	39	2	2	
	6.3	9.0	7.3	5.1	13.3	
CRIME	24	10	24	6	2	2
	5.8	5.3	4.5	15.4	13.3	15.4
DETERIORATION OF DOWNTOWN	26	8	32	2		
	6.3	4.2	6.0	5.1		
OVER BUILDING	22	11	32	1		
	5.3	5.8	6.0	2.6		
TOO MANY VEHICLES	22	10	31			1
	5.3	5.3	5.8			7.7
OIL REFINERIES	24	5	27	1		1
	5.8	2.6	5.0	2.6		7.7
NOISE POLLUTION	11	5	14	2		
	2.7	2.6	2.6	5.1		
STREET LITTERING	10	6	14	1		1
	2.4	3.2	2.6	2.6		7.7
DIRTY BEACHES	12	4	16			
	2.9	2.1	3.0			
OFF SHORE DRILLING	9	4	12	1		
	2.2	2.1	2.2	2.6		
LACK OF GREEN AREAS/ OPEN SPACES	11	2	12	1		
	2.7	1.1	2.2	2.6		
PUBLIC TRANSPORTATION LACK	7	4	10	1		
	1.7	2.1	1.9	2.6		

APPENDIX C -- Cont.

C.27A- REGULATIONS TO REDUCE NOISE ARE NEEDED IN LONG BEACH

		AGE			INCOME			OWN/RENT HOME		RACE			
	TOTAL	UNDER 30	30-59	60 & OVER	LESS THAN 7,500	7,500 TO 15000	15,000 & OVER	OWN	RENT	CAUCA-SIAN	BLACK	MEXICAN AMER.	OTHER
BASE = TOTAL SAMPLE	602 100.0	163 100.0	271 100.0	166 100.0	176 100.0	206 100.0	107 100.0	412 100.0	185 100.0	535 100.0	39 100.0	15 100.0	13 100.0
STRONGLY AGREE -1-	249 41.4	62 38.0	102 37.6	84 50.6	90 51.1	67 32.5	77 41.2	165 40.0	84 44.4	222 41.5	16 41.0	7 46.7	4 30.8
TEND TO AGREE -2-	202 33.6	49 30.1	106 39.1	46 27.7	40 22.7	80 38.8	73 39.0	146 35.4	55 29.1	184 34.4	10 25.6	4 26.7	4 30.8
TEND TO DISAGREE -3-	108 17.9	38 23.3	44 16.2	26 15.7	31 17.6	46 22.3	25 13.4	76 18.4	32 16.9	93 17.4	9 23.1	2 13.3	4 30.8
STRONGLY DISAGREE -4-	29 4.8	11 6.7	12 4.4	6 3.6	11 6.3	9 4.4	9 4.8	15 3.6	14 7.4	24 4.5	2 5.1	2 13.3	1 7.7
DON'T KNOW/REFUSED	14 2.3	3 1.8	7 2.6	4 2.4	4 2.3	4 1.9	3 1.6	10 2.4	4 2.1	12 2.2	2 5.1		
MEAN BASE	1.86 588	1.99 160	1.87 264	1.72 162	1.78 172	1.99 202	1.82 184	1.85 402	1.87 185	1.85 523	1.92 37	1.93 15	2.15 13

APPENDIX C -- Cont.

APPENDIX C
TABLE 16

PUBLIC OPINION SURVEY RELATED QUESTIONS AND RESPONSES

Q.23- WHAT DO YOU THINK THE MOST PRESSING ENVIRONMENTAL PROBLEMS FACING THE CITY OF LONG BEACH ARE?

		AGE			INCOME			OWN/RENT HOME		RACE			
	TOTAL	UNDER 30	30-59	60 & OVER	LESS THAN 7,500	7,500 TO 15000	15,000 & OVER	OWN	RENT	CAUCA-SIAN	BLACK	MEXICAN AMER.	OTHER
ENERGY CRISIS	10	3	3	4	2	4	3	9	1	8		1	1
	1.7	1.8	1.1	2.4	1.1	1.9	1.6	2.2	.5	1.5		6.7	7.7
GHETTO/SLUM AREAS	10	4	4	2	3	2	5	6	3	8	1	1	
	1.7	2.5	1.5	1.2	1.7	1.0	2.7	1.5	1.6	1.5	2.6	6.7	
MINORITY INFLUX	7	1	4	2	3	1	3	5	2	7			
	1.2	.6	1.5	1.2	1.7	.5	1.6	1.2	1.1	1.3			
AIRPORT NOISE	5		3	2	1	1	2	4	1	5			
	.8		1.1	1.2	.6	.5	1.1	1.0	.5	.9			
POWER PLANTS	5	1	4			3	2	4	1	5			
	.8	.6	1.5			1.5	1.1	1.0	.5	.9			
INDIVIDUAL PROPERTY UPKEEP	4		2	2	1	1		3	1	4			
	.7		.7	1.2	.6	.5		.7	.5	.7			
MISCELLANEOUS	83	23	38	22	24	32	23	50	33	72	6	1	4
	13.8	14.1	14.0	13.3	13.6	15.5	12.3	12.1	17.5	13.5	15.4	6.7	30.8
DON'T KNOW	111	20	44	46	48	35	19	71	40	93	12	2	4
	18.4	12.3	16.2	27.7	27.3	17.0	10.2	17.2	21.2	17.4	30.8	13.3	30.8

APPENDIX C - Cont.

Q.27?- REGULATIONS TO REDUCE NOISE ARE NEEDED IN LONG BEACH

		TOTAL	GEOGRAPHIC AREA: NORTH WEST	SOUTH WEST	NORTH EAST	SOUTH EAST	LENGTH OF RESIDENCE: LESS THAN 2 YR	3-5 YEARS	6-20 YEARS	MORE THAN 20	ANTICIPATED LENGTH OF RESIDENCE: LESS THAN 2 YR	3-10 YEARS	ANTI-CIPATE MOVING
BASE = TOTAL SAMPLE		602 100.0	129 100.0	199 100.0	174 100.0	101 100.0	87 100.0	74 100.0	205 100.0	234 100.0	97 100.0	99 100.0	398 100.0
STRONGLY AGREE	-1-	249 41.4	49 38.0	87 43.9	77 44.3	36 35.6	34 39.1	31 41.9	87 42.4	95 40.6	41 42.3	43 43.4	159 39.9
TEND TO AGREE	-2-	202 33.6	49 38.0	59 29.8	54 31.0	40 39.6	31 35.6	22 29.7	72 35.1	77 32.9	31 32.0	29 29.3	141 35.4
TEND TO DISAGREE	-3-	108 17.9	21 16.3	37 18.7	31 17.8	19 18.8	17 19.5	14 18.9	33 16.1	44 18.8	21 21.6	20 20.2	67 16.8
STRONGLY DISAGREE	-4-	29 4.8	7 5.4	8 4.0	9 5.2	5 5.0	3 3.4	6 8.1	9 4.4	11 4.7	2 2.1	7 7.1	20 5.0
DON'T KNOW/REFUSED		14 2.3	3 2.3	7 3.5	3 1.7	1 1.0	2 2.3	1 1.4	4 2.0	7 3.0	2 2.1		11 2.8
MEAN BASE		1.86 588	1.89 126	1.82 191	1.84 171	1.93 100	1.87 85	1.93 73	1.82 201	1.87 227	1.83 95	1.91 99	1.87 387

APPENDIX C - Cont.

APPENDIX D

Proposed Noise Legislation

Policy Guidelines

The City of Long Beach wishes to limit the intrusion of noise into human activities in the community. Protecting the health and welfare of residents, workers and visitors with respect to high level noise exposures in the City is, of course, a high priority issue.

Beyond this, the amenities of maintaining relatively quiet neighborhoods within the City have a wide appeal. Unfortunately, many communities have, in the past, subverted rational objectives of some vested interests in an attempt to achieve a maximum degree of noise control. This has brought about conflict between legitimate noise producing interests and those advocating immediate adoption of restrictive noise criteria. As a result, some form of transitional policy should be articulated as a bridge to longer range noise control regulations.

The concept of such transitional noise control policies embodies a phased reduction of noise source characteristics within the limits of available technology and rational economic constraints. Virtually all noise producing activities in the City represent examples of the need for a transitional program for noise control. Roadways, industry and commercial activities have developed and expanded in Long Beach to the point that extensive land areas are currently subject to undesirable noise exposures. Adoption of contemporary guidelines for noise environments applicable to new construction and redevelopment shows an immediate and clear conflict in this area. Accordingly, it is recommended that the City adopt noise control legislation which attempts to reconcile the requirements for a noise environment acceptable to the general population and the need to maintain the economic stability of Long Beach.

Preparation of legislative guidelines for the identification and control of noise in communities has emerged as a high priority item as a result of expanding mechanization in contemporary society. Historically, noise intrusion has been covered by legislation in the areas of "disturbing the peace" or "public nuisance." Neither of these categories has proved to be particularly useful in controlling the increase in noise levels in municipalities in the United States. In reviewing the lack of success in arresting the increase in noise intrusion in urban areas, it appears that the implementation and enforcement phases of noise control legislation are the weak links in the process. Accordingly, increased effort should be devoted to these functions in the course of drafting meaningful legislation.

It is possible to set approximate limits of acceptability on noise in the community. Experience with the tolerance limits for noise for a variety of land uses and contextual conditions has led to the identification of desirable criteria in this area. However, it is important to note that any such criteria must also be implemented and enforced if they are to be effective. In order to be implemented, they must be acceptable to a variety of special interest groups. In order to be enforced, the legislation must be based on accurate technical data which will be supportable in the courts.

The most effective approach to establishing regulatory limits on noise is to separate land use noise criteria from limits on noise emission from manufactured products. The concept of noise criteria for land use, i.e., residential, commercial or industrial, has proved more effective than attempting to zone an urban area for noise.

Most noise producing manufactured products are inherently portable and may best be regulated by setting limits on the noise output of the device as manufactured. Such regulation by the Federal government is an immediate possibility. Local legislation should employ compatible criteria where in terms of acceptable noise levels for the wide range of land uses extant in the community.

For those land development or redevelopment projects requiring Federal financing, at least two specific guidelines have been formulated. First, the U. S. Department of Housing and Urban Development has issued noise standards for projects involving DHUD funds. A second Federal control is imposed by the Federal Highway Act of 1970 which requires compatibility between highways and different land uses. In addition to these specific standards, the National Environmental Policy Act requires the preparation of environmental impact statements on proposals for legislation and Federal projects affecting the quality of the human environment.

As noted previously, there is a useful distinction to be drawn between land use noise criteria and limits on noise emission from manufactured products. The Federal Noise Control Act of 1972 defines noise standards for equipment manufactured after 1 July 1973. Any ordinance governing equipment noise which may be adopted by the City should be in agreement with these proposed Federal Standards. Recognizing the practical time limitations associated with the promulgation of a noise ordinance level at the local level, some interim model ordinance for noise abatement and control is presented in the following section.

APPENDIX E

Proposed Model Noise Ordinance

The model noise ordinance prepared by the Quiet City Committee, Los Angeles County Division of the League of California Cities is presented below, verbatim.

Sec. 100.00 Declaration of Policy

This section should contain a declared intent to achieve a noise environment conducive to residential and recreational activities in accordance with the regulatory powers of the City. While the health and welfare of the community should form a basis for the legislation, existing industrial and commercial interests must be considered concurrently.

Sec. 100.01 Definition of Legal and Technical Terminology

(a) Ambient Noise. "Ambient noise" is the all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far. For the purpose of this ordinance, ambient noise level is the level obtained when the noise level is averaged over a period of at least 15 minutes without inclusion of noise from occasional or occasional and transient sources, at the location and time of day near that at which a comparison is to be made.

(b) Decibel. (dB) shall mean a unit of level which denotes the ratio between two (2) quantities which are proportional to pressure; the number of decibels corresponding to the ratio of two (2) pressures is twenty (20) times the logarithm to the base (10) of this ratio.

(c) Emergency Work. "Emergency Work" shall mean work made necessary to restore property to a safe condition following a public calamity or work required to protect persons or property from an imminent exposure to danger or work by private or public utilities when restoring utility service.

(d) Motor Vehicles. "Motor vehicles" shall include, but not be limited to, automobiles, trucks, motorcycles, minibikes and go-carts.

(e) Person. "Person" shall mean a person, firm, association, co-partnership, joint venture, corporation, or any entity, private or public in nature.

(f) Octave Band Noise Analyzer. "Octave band noise analyzer" shall mean an instrument for measurement of sound levels in octave frequency bands which satisfies the pertinent requirements for Class II Octave Band Analyzers of the American National Standard Specifications for Octave, Half-Octave, and Third-Octave Band Filters, S1.11-1966 or the most recent revision thereof.

(g) <u>Commercial Purpose</u>. "Commercial Purpose" shall mean and include the use, operation, or maintenance of any sound amplifying equipment for the purpose of advertising any business, or any goods, or any services, or for the purpose of attracting the attention of the public to, or advertising for, or soliciting patronage or customers to or for any performance, show, entertainment, exhibition, or event, or for the purpose of demonstrating such sound equipment.

(h) <u>Noncommercial Purpose</u>. "Noncommercial purpose" shall mean the use, operation, or maintenance of any sound equipment for other than a "commercial purpose." "Non-commercial purpose" shall mean and include, but shall not be limited to, philanthropic, political, patriotic, and charitable purposes.

(i) <u>Sound Amplifying Equipment</u>. "Sound amplifying equipment" shall mean any machine or device for the amplification of the human voice, music or any other sound, but shall not include:

1. Automobile radios, stereo players or television receivers when used and heard only by the occupants of the vehicle in which the same is installed.

2. Radio, stereo, phonograph and television receiving sets used in any house or apartment within any residential zone or within 500 feet thereof;

3. Warning devices on emergency vehicles;

4. Horns or other warning devices authorized by law on any vehicle when used for traffic purposes.

(j) Sound Level. "Sound Level" (noise level), in decibels (dB) is the sound measured with the "A" weighting and slow response by a sound level meter, except for impulsive or rapidly varying sounds, the fast response shall be used.

(k) Sound Level Meter. "Sound level meter" shall mean an instrument including a microphone, an amplifier, an output meter, and "A" frequency weighting network for the measurement of sound levels which satisfies the pertinent requirements for Type S2A meters in American Standard Specifications for sound level meters S1.4-1971 or the most recent revision thereof.

(l) Sound Truck. "Sound truck" shall mean any motor vehicle, or any other vehicle regardless of motive power, whether in motion or stationary, which carries, is equipped with, or which has mounted thereon, or attached thereto any sound amplifying equipment.

(m) Supplementary Definitions of Technical Terms
Definitions of technical terms not defined herein shall be obtained from American Standard Acoustical Terminology S1-1-1971 or any revised version thereof.

Sec. 100.02 Specifications for Conducting Sound Measurements.

(a) Any sound level measurement made pursuant to the provisions of this chapter shall be measured with a sound level meter using the "A" weighting and response as indicated in Sec. 100.01 (j) of this article.

(b) Where the sound alleged to be offending is of a type of character set forth below, the following values shall be added to the sound level measurement of the offending noise.

1.	Except for noise emanating from any electrical transformer or gas metering and pressure control equipment existing and installed prior to the effective date of this ordinance, any steady tone with audible fundamental or overtones above 200 Hz.	+5
2.	Repeated impulsive noise.	+5
3.	Noise occurring more than 5 but less than 15 minutes per hour.	-5
4.	Noise occurring more than 1 but less than 5 minutes per hour.	-10
5.	Noise occuring less than 1 minute per hour.	-20

(c) For those cases where an objectionable noise is clearly audible, but where the level of ambient noise does not permit direct quantitive sound level "A" measurements of the objectionable noise, sound measurements may be performed utilizing an

Octave Band Sound Analyzer to determine sound level "A" limits as indicated in the table below. This table is used to convert the sound pressure level meter readings in dB for each band to SPL in dB (A) for each band.

OCTAVE BAND NOISE VALUES CORRESPONDING TO SOUND LEVEL "A" VALUES

Sound Level "A"	Octave Band Sound Pressure Level, dB re .0002 dyne/cm^2 — Octave Band Center Frequency in Hz: 31.5	63	125	250	500	1000	2000	4000	8000
35	58	50	42	35	32	29	26	23	20
40	61	54	46	40	37	34	31	28	25
45	64	58	51	45	42	39	36	33	30
50	67	61	55	50	47	44	41	38	35
55	70	65	60	55	52	49	46	43	40
60	73	68	64	60	57	54	51	48	45
65	76	72	68	65	62	59	56	53	50
70	79	76	73	70	67	64	61	58	55
75	84	81	78	75	72	69	66	63	60

Sec. 100.03 Reference Ambient Noise Level

Where the ambient noise level is less than designated in this section the respective presumed ambient noise level in this section shall be deemed to be the minimum ambient noise level for purposes of this chapter.

At the boundary line between two zones, the presumed ambient noise level of the quieter zone shall be used.

Sec. 100.04 Violations: Misdemeanors.

Any person violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor and upon conviction thereof, shall be fined in an amount not exceeding ______________________________ or be imprisioned in the City or County Jail for a period not exceeding ____________________, or by both such fine and imprisionment.

Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such.

Sec. 100.05 Violations: Additional Remedies.

As an additional remedy, the operation or maintenance of any device, instrument, vehicle or machinery in violation of any provision of this chapter, which operation or maintenance cause discomfort or annoyance to reasonable persons of normal sensitiveness or which endangers the comfort, repose, health, or peace of residents in the area, shall be deemed and is declared to be, a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

Sec. 100.06. Severability of Ordinance Provisions

If any provision, clause, sentence, or paragraph of this chapter or the application thereof to any person or circumstances, shall be held invalid, such invalidity shall not effect the other provisions or applications of the provisions of this chapter which can be given without the invalid provisions or application and, to this end, the provisions of this chapter are hereby declared to be severable.

SPECIFIC NOISE SOURCES

Sec. 101.01 Radios, Television Sets, and Similar Devices

(a) It shall be unlawful for any person within any residential zone of the City or within 500 feet thereof, to use or operate any radio receiving set, musical instrument, phonograph, television set, or other machine or device for the producing or reproducing of sound, between the hours of 10:00 p.m. of one day and 7:00 a.m. of the following day in such a manner as to disturb the peace, quiet, and comfort of neighboring residents or any reasonable person of normal sensitiveness residing in the area.

(b) Any noise level exceeding the ambient base level at the property line of any property or, if a condominium or apartment house, within any adjoining apartment, by more than five (5) decibels shall be a violation of the provisions of this section.

Sec. 101.02 Air Conditioning, Refrigeration, Heating Pumping, Filtering Equipment

(a) It shall be unlawful for any person, within any residential zone of the City, or within 500 feet thereof, to operate any air conditioning, refrigeration or heating equipment for any residence or other structure, or to operate any pumping, filtering or heating equipment for any pool or reservoir in such a manner as to create any noise which could cause the noise level at the property line of any residential property or if a condominium or apartment house, within any adjoining apartment to exceed the ambient noise level by more than five (5) decibels.

(b) The noise level created by equipment installed prior to the effective date of this ordinance may exceed the presumed ambient noise levels by eight (8) decibels for a period not exceeding two years from the effective date of this ordinance.

(c) This section shall not be applicable to emergency work, as defined in Sec. 100.01 (c) of this chapter, or to periodic maintenance or testing of such equipment reasonably necessary to maintain such equipment in good working order.

Sec. 101.03. Construction Noise

(a) Between the hours of 9:00 p.m. and 7:00 a.m. of the following day, noise due to construction or repair work of any kind upon, or excavation for any building or structure shall be regulated or prohibited as provided by Sections of this code.

(b) Between 7:00 p.m. and 9:00 a.m. of any day, in any residence of the City or within 500 feet thereof, no person shall perform any construction or repair work on any building or structure, or perform any excavation work, which work entails the use of any power driven hoist, scraper or shovel, pneumatic hammer, pile driver or other construction type device in such manner that the noise created thereby is loud, unnecessary and unusual and substantially exceeds the noise customarily and necessarily exceeds the noise customarily and necessarily attendant to the reasonable and efficient performance of such work.

Sec. 101.04 Other Machinery, Equipment, Devices

Except as to the equipment and operations specifically mentioned and regulated elsewhere in this chapter, and except as to aircraft, tow tractors, aircraft auxiliary power units, trains and motor vehicles in their respective operations governed by state or federal regulations, no person shall operate or cause to be operated any machinery, equipment or other mechanical or electrical device in such manner as to create any noise which would cause the noise level at the property line, of any occupied residential property, or if a condominium or apartment house, within any adjoining apartment to exceed the ambient noise level by more than five (5) decibels.

Transitional Policies for Noise Legislation

The immediate adoption of rigorous noise limits within the City, via a Community Noise Ordinance, will place numerous commercial and industrial activities in a position of being in violation of the statute. Compliance with a restrictive ordinance would place these businesses in an untenable economic posture. In order to arrive at a rational position on this issue, the City should recognize the inherent conflicts and develop policies which would reduce noise levels but would allow this to be done within the technological and economic constraints imposed upon any particular operation.

It is apparent that any such policies must be flexible and subject to individual interpretations. Some possibilities for accomplishing these objectives are outlined below.

- Any control the City has in the form of land use permits or leases may carry a stipulation for noise control modifications as a requisite for renewal.

° The normal longevity of industrial or commercial structures may be determined to establish a time requirement for construction of new noise controlled structures. This would allow the original capital investment to be amortized over the expected life of the building(s) and not place a disproportionate economic burden on the business.

° Noise reduction requirements should be keyed to technological innovations applicable to each land use. As new noise control procedures become available, acceptable noise limits could be reduced.

° The optimum method for dealing with commercial and industrial noise sources is through identification as noise problems. Two identical sources may produce the same noise levels but one may be a problem because of more noise sensitive land uses in the immediate vicinity.

APPENDIX F

Legal Framework

Introduction

Demands for an environment which is compatible with both acceptable living standards and continuing urban development have increased the City's concern about the ever growing problem of noise pollution. Over the past twenty-five years noise levels in the United States have grown at a rate of one decibel per year. Indeed the noise level for the country has doubled in the last fifteen years! The requirement that a Noise Element be made a part of the General Plan emphasizes the commitment on the part of the California Legislature to deal with the problems created by the increased levels of noise.

The Noise Element, as prepared, conforms to California Government Code, Article 5, Section 65302 (g). (See Appendix A). This legislation requires all cities and counties to prepare a noise element as part of the General Plan, to include: noise levels around major ground and air transportation systems; maximum noise levels for land use categories; noise emission standards for transportation systems (where not pre-empted by other agencies); and standards and criteria for compatible noise levels for local "fixed point" noise sources.

Local, State, and Federal Jurisdictions

Before considering local noise planning within Long Beach, it is essential to note the impact of Federal and State pre-emptory legislation. Even through most noise in Long Beach is generated locally, much of this noise is associated with regional transportation systems. State and

Federal legislation regulate and control these noise sources at different levels. In addition, residential construction utilizing Federal funds carries certain restrictions as to noise generation. A review of both State and Federal Law is necessary in order to point out areas of conflict or omission with local noise regulations as well as to identify areas needing revision.

Local Regulations

This Noise Element has been developed on the premise that soon after its completion, a comprehensive Noise Ordinance will be adopted by the Long Beach City Council. The importance of such an adoption cannot be overemphasized here. The existing sections of the Long Beach Municipal Code that relate to noise control are inadequate at the present time in that they fail to encompass all the different manifestations of noise now present in the community. A brief survey of these regulations appears herein.

The sound monitoring and the handling of complaints related to noise in Long Beach is conducted primarily by two City departments: Public Health; and Building and Safety. In addition, the Long Beach Police Department responds to complaints related to City ordinances dealing with disturbing the peace sections. Other ordinances related to noise are:

Section 3410.125 (Truck Routes Designated) - Regulates the flow of truck traffic throughout the City.

Section 9120.25 (Special Permits for Nonconforming Uses) - Deals with the issuance of special permits which in some cases include noise level emission limitations.

Section 8100.314 (Building Permits--Denial on Environmental Grounds). Is an official tool to control projects which may be detrimental to the environment. This control can apply to new projects with excessive noise emissions in relatively quiet neighborhoods.

Section 4611.7 (Certain Acts Declared a Public Nuisance). Anything that is injurious to health, offensive to the senses, or interferes with the comfortable enjoyment of life by a neighborhood or by any considerable number of persons may be declared to be a public nuisance and unlawful.

Section 5610.3 (Dogs Barking or Howling). No person shall permit any dog under his control to bark, howl, or whine so as to annoy the neighborhood or persons residing immediately surrounding the habitation of the same.

Section 5610.24. No persons shall tie up or confine a dog as to cause the dog to make noise.

Section 6254.2 (Noisy Advertising). Prohibits use of megaphones, electrical amplifiers, horns, drums, and bells for the purpose of advertising.

Section 9120.2. Defines trailer park as an area designed, used, or intended to be used for living purposes by two or more trailer coaches.

Section 9120.11 (Trailer and House Car District). Prohibits the location of trailers for residential purposes in any zone other than trailer or house car district.

Section 3300.78. Muffling Exhausts -- Permissible Noise Levels--The engines used in connection with the drilling of any oil well and/or any production equipment shall be equipped with an exhaust muffler, or mufflers, or an exhaust muffler box, sufficient to suppress noise and to prevent the escape of obnoxious gases, fumes or sparks or ignited carbon or soot. The type and design of any muffler box shall be approved by the Building Inspector and by the Bureau of Fire Prevention.

Section 3410.119 (Sound Cars Prohibited) excludes any advertising vehicle equipped with sound amplifying or loud speaker device within the Central Traffic District.

Section 4620.2 (Operating Vehicles on Private Property). Prohibits driving motorcycle, trail bike, minibike, dune buggy, motor scooter, jeep, or other motor vehicles on public land or private property without written consent of the owner.

Section 7534.06 (Railroad Equipment). Prohibits use of bells, or blowing of whistles when not in motion or necessary for safety.

Long Beach City Council Resolution C-21599. Established procedural guidelines for the evaluation of projects and the preparation of environmental impact reports. Section 9 B (6) of this Resolution outlines the content of the environmental impact report as it relates to noise.

Long Beach City Council Resolution No. C-20024. Requested the League of California Cities to undertake an in-depth study of the excessive noise problem. In so doing, the Council recognized the problem of excessive noise in the community as well as in the State and hoped that the League of California Cities would develop a model noise ordinance which is included herein as Appendix E.

State Regulations

Aside from the requirement for a General Plan-Noise Element, the State monitors other areas affected by noise. Motor vehicles operating on the streets and freeways in Long Beach are governed by the State of California Motor Vehicle Code. The State Motor Vehicle Laws include muffling requirements and associated specific noise emission limits in decibels for all motor vehicles.

AB 1803 ch. 741-1957 (Mufflers Required). Motor vehicles registered in California must be equipped with a muffler system.

SB 59 ch. 1097. Authorized State Highway Commission to consider noise impact when locating State highways and freeways.

	Speed Limit of 35 mph or less	Speed Limit of more than 35 mph
1. Any motor vehicle with a manufacturer's gross vehicle weight rating of 6,000 pounds or more and any combination of vehicles towed by such motor vehicle:		
(A) Before January 1, 1973	88 dBA	90 dBA
(B) On and after January 1, 1973	86 dBA	90 dBA
2. Any motorcycle other than a motor-driven cycle	82 dBA	86 dBA
3. Any other motor vehicle and any combination of vehicle towed by such motor vehicle	76 dBA	82 dBA

Motor Vehicle Code Section 27150.1. No person shall offer for sale, sell, or install, a motor vehicle exhaust system, or part thereof, including, but not limited to, a muffler, unless it meets state standards.

Motor Vehicle Code

Section 27150. (a) Every motor vehicle subject to registration shall at all times be equipped with an adequate muffler in constant operation and properly maintained to prevent any excessive or unusual noise, and no muffler or exhaust system shall be equipped with a cutout, bypass, or similar device.

(b) Subdivision (a) shall also apply to motorcycles operated off the highways, except motorcycles being operated in an organized racing or competitive event conducted on a closed course. For the purposes of this subdivision, "closed course" means a permanent motor racing facility which has one or more of the following:

(1) Safety crash walls.

(2) Grandstands which seat 500 persons or more.

(3) Sanitation facilities for persons attending events.

(4) A business license or permit from a local authority to conduct motor racing or competition events.

Motor Vehicle Code Section 27160.

Section 27160. (a) No person shall sell or offer for sale a new motor vehicle which produces a maximum noise exceeding the following noise limit at a distance of 50 feet from the centerline of travel under test procedures established by the department:

(1) Any motorcycle manufactured before 1970-----92 dBA

(2) Any motorcycle, other than a motor-driven cycle, manufactured after 1969, and before 1973---88 dBA

(3) Any motorcycle, other than a motor-driven cycle, manufactured after 1972, and before 1975---------------------------------------86 dBA

(4) Any motorcycle, other than a motor-driven cycle, manufactured after 1974, and before 1978---------------------------------------80 dBA

(5) Any motorcycle, other than a motor-driven cycle, manufactured after 1977, and before 1988---------------------------------------75 dBA

(6) Any motorcycle, other than a motor-driven cycle, manufactured after 1987-------------70 dBA

(7) Any snowmobile manufactured on or after January 1, 1973, and before January 1, 1975---------------------------------------82 dBA

(8) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1967 and before 1973----88 dBA

(9) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1972, and before 1975---86 dBA

(10) Any motor vehicle with a gross weight rating of 6,000 pounds or more manufactured after 1974, and before 1978----------83 dBA

(11) Any motor vehicle with a gross weight rating of 6,000 pounds or more manufactured after 1977, and before 1988-----------80 dBA

(12) Any motor vehicle with a gross vehicle weight rating of 6,000 pounds or more manufactured after 1987-------------------70 dBA

(13) Any other motor vehicle manufactured after 1967, and before 1973---------------------------86 dBA

(14) Any other motor vehicle manufactured after 1972, and before 1975---------------------------84 dBA

(15) Any other motor vehicle manufactured after 1974, and before 1978---------------------------80 dBA

(16) Any other motor vehicle manufactured after 1977 and before 1988---------------------------75 dBA

(17) Any other motor vehicle manufactured after 1987--70 dBA

Motor Vehicle Code 38275. Requires off the road vehicles to comply to noise standards and muffler requirements, except when participating in organized racing events.

Motor Vehicle Code 27503. Provides for testing and public hearings to adopt regulations setting noise standards for pneumatic tires.

Harbors and Navigation Code Section 654. Requires exhaust from internal combustion engines used in motorboats to be muffled except for those participating in organized racing.

Harbors and Navigation Code Section 654.05 (Maximum Noise Levels)

(a) For engines manufactured on or after January 1, 1974, and before January 1, 1976, a noise level of 86 dBA measured at a distance of 50 feet from the motorboat.

(b) For engines manufactured on or after January 1, 1976, and before January 1, 1978, a noise level of 84 dBA measured at a distance of 50 feet from the motorboat.

(c) For engines manufactured on or after January 1, 1978, a noise level of 82 dBA measured at a distance of 50 feet from the motorboat.

SB 268 ch. 658. Authorized the Department of Public Works to undertake specific action to protect schools, libraries, and multi-purpose rooms constructed prior to freeway route adoption when noise levels within closed rooms exceed 50 dBA.

SB 1220 (California Noise Control Act 1973) creates Office of Noise Control in State Department of Health. The policy of the state will be to provide an environment free from noise that jeopardizes the health and welfare of Californians. Requires the office to maintain a program of noise control, make recommendations for future noise control legislation, coordinate federal, state, and local noise control programs, and assist in acquisition of federal funds.

SB 1249 ch. 1424. Required Commission of Housing and Community Development to adopt noise performance standards for new hotels, motels, and apartment houses.

California Administrative Code, Title 25 Housing Law and Earthquake Protection. Article 4, Section 1092. (Noise Insulation Standards) applies to all new construction of hotels, motels, apartment houses and dwellings other than detached single family dwellings.

- Requires sound transmission control between dwelling units equal to that required to meet a Sound Transmission Class (STC) of 50 (45 if field tested) as defined in Unified Building Code Standards No. 35-1.

- Recommends use of insulation for walls, floors, and ceilings. Recommends sealing of penetrations and openings necessary for plumbing and electrical devices to maintain required ratings. Entrance doors from interior corridors are required to maintain a STC rating not less than 30.
- Requires all separating floor-ceiling assemblies between separate units to have insulation equal to that required to meet Impact Insulation Class (IIC) of 50 (45 if field tested) as defined in Uniform Building Code Standard No. 35-2. Permits the use of laboratory or field tested wall or floor-ceiling designs having an STC or IIC of 50 or more as determined by Unified Building Code Standard 35-1, 35-2, and 35-3.
- Requires noise insulation from exterior sources for residential structures located in noise critical areas such as proximity to major transportation routes, industrial areas and airports.
- Specific interior community noise equivalent levels (CNEL) with windows closed shall not exceed an annual CNEL of 45 dB in any habitable room.
- Requires an acoustical analysis for new residential structures located within airport's annual CNEL contour 60 or for new structures located near to freeways, highways or industrial noise sources where the exterior exposure exceeds annual community noise equivalent level of 60 dB.

An acoustical analysis report, prepared by a person experienced in the field of acoustical engineering is required for compliance with these regulations.

Uniform Building Code Standard No. 35-1 (Airborne Sound Transmission Class) Laboratory measurement of airborne sound transmission loss of building partitions such as walls, floor-ceiling assemblies, door and other space dividing elements.

Uniform Building Code Standard No. 35-2 (Noise Control in Multi-family dwellings) Method for measurement of impact sound transmission through floor-ceiling assemblies, and establishes a method of determining an impact Insulation Class (IIC) as a single figure rating.

Uniform Building Code Standard No. 35-3 (Airborne Sound Insulation Field Test) Procedure for determination of the extent of airborne sound insulation provided by partitions in existing buildings.

AB 645 - 1969 Authorizes Department of Aeronautics to adopt noise standards.

California Administrative Code, Title Four, Noise Standards for California Department of Aeronautics) Requires counties to determine airports with significant noise problems, and specifies criteria and standards for implementation of noise monitoring programs.

- Requires airport proprietor to maintain a continuing statistical sampling plan and submit to the county;

1) Impact Area Map - boundaries are based on existing evidence of community noise reaction, interference with speech and sleep and noise induced hearing loss. The noise level acceptable to a reasonable person residing in the vicinity of an airport is established as a Community Noise Equivalent Level (CNEL) value of 65 for the regulations.

2) CNEL daily measurement records - airports with one thousand or more homes in the noise impact area must maintain a continuous monitoring program (48 weeks per year).

3) Monthly list of Single Event Noise Exposure Level (SENEL) violations together with identification of aircraft operator. Violations are punishable as prescribed in Public Utilities Code Section 21669.4.

° Defines and specifies measurement method for Single Event Noise Exposure Levels (SENEL). Requires the airport proprietor to recommend appropriate SENEL for his airport.

° Specifies use of A-weighted noise level for easy monitoring.

Federal Regulations

The Federal government has shown slightly more interest in noise control. The Environmental Protection Agency (E.P.A.), under provisions of the Noise Control Act of 1972, moved to curb noise levels coming from inter-state trucks and buses. The Act also allowed E.P.A. to outline proposed remedies for aircraft noise around airports by means of changed take-off and landing procedures and modified, quieter engines. Such regulations would have to be approved by the Federal Aviation Agency (F.A.A.)

Presently, limits on aircraft noise exposures [relating to take-offs and landings] are published in Federal Aircraft Regulations, (F.A.R.) Part 36. Authority to set standards for noise emissions from aircraft and aircraft engines is published in FAR volume III, Appendix III, Section 611.

On May 20, 1969, new Federal standards for industrial noise, known as the Walsh-Healy Health and Safety Regulations, became effective. These standards, which are enforced by the Department of Labor, apply only to firms which have Federal contracts of $10,000 or more during the course of one year. The regulations establish a maximum allowable sound pressure level of 90 dBA for a continuous eight hour per day exposure, with shorter permissable times for higher sound pressure level exposures.

William-Steiger Occupational Safety and Health Act of 1970 (OSHA Industrial Noise Exposure Limits) Requires that no worker be subject to 115 dBA for more than 15 minutes or to 90 dBA for more than 8 hours.

The Federal government, through the Department of Housing and Urban Development, has developed guidelines for residential developments involving FHA loan guarantees. The acceptable noise environment for residential construction involving federal financing is specified in U. S. Department of Housing and Urban Development Advisory Circular 1390.2

Federal Housing Administration Advisory Circular No. 2600, August 1964. (Quasi-law for building construction) recommendation for builders who apply for FHA mortgages.

Federal Highway Act 1970 (Noise Standards) Guidelines of the Federal Highway Adminīstration for noise control along roadways.

Environmental Noise Control Act of 1972 (Federal Noise Laws) General statement recognizing noise pollution as a serious national problem responsible for psychic and physiological effects on the human body that range from deafness to enhanced risk of cardio-vascular disease. Noise has a significant impact on eighty million Americans. The severity of which depends on intensity and character of noise, the total exposure time, and the activity (such as conversation or rest) affected.

- Requires the Administrator of the Environmental Protection Agency to establish noise emission standards for newly manufactured products. Control of noise at the source is considered the most effective Federal action, in that major noise sources such as construction and transportation equipment move so commonly in interstate commerce.
- Standards to regulate all new manufactured products except airplanes. Provides for extensive research and investigation of products noise and its effect on humans.
- Aircraft noise research and standards will be determined in cooperation with the Federal Aviation Administration.
- Promotes the concept of an Audiological Data Bank to use as a research tool.
- Requires the Administrator to formulate and issue criteria for public health and standards for manufactured products.

Any areas of conflict between local noise regulations and those covered by State or Federal law must be identified together with the need for changes in those statutes. Proposed Federal and State legislation affecting noise sources in the community should be incorporated in local planning procedures. The question of Federal control over aircraft noise regulations will be decided in the courts. There is an obvious requirement for consistent regulation in this area since varying local controls would be impractical.

However, the issues of residential construction and U.S. Department of Housing and Urban Development noise requirements is an immediate concern. Since many residential developments involve FHA loan guarantees, these guidelines must be compatible with local ordinances.

Another area of concern is regulation of noise from motor vehicles. Noise generated by vehicles operating on streets and highways is currently covered in the State Motor Vehicle Code. Consequently, local control is typically confined to vehicles operating on private property. This latter consideration has become increasingly important with the advent of off-road vehicle use. New Federal regulations governing noise exposure are currently being developed by the Environmental Protection Agency (EPA). These regulations are directed primarily at controlling noise emission from manufactured products and will have the effect of reducing noise at the source.

GLOSSARY OF TERMS[1]

Acoustics

(1) Acoustics is the science of sound, including its production, transmission, and effects.

(2) The acoustics of a room are those qualities that together determine its character with respect to distinct hearing.

Acoustic, Acoustical

The qualifying adjectives "acoustic" and "acoustical" mean containing, producing, arising from, actuated by, related to, or associated with sound. Acoustic is used when the term being qualified designates something that has the properties, dimensions, or physical characteristics associated with sound waves; acoustical is used when the term being qualified does not designate explicitly something that has such properties, dimensions, or physical characteristics.

Ambient Noise

Ambient noise is the all encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far.

Absorption Loss

Absorption loss is that part of the transmission loss due to the dissipation or conversion of sound energy into other forms of energy (e.g., heat), either within the medium or attendant upon a reflection.

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[1]Sources: American Standards Association, "Acoustical Terminology," May, 1960; and, Taber, Clarence W., Taber's Cyclopedic Medical Dictionary, 11th Edition, Philadelphia, Pennsylvania, F.A. Davis Company, 1970.

Amplitude

The strength or magnitude of a sound wave.

Arterioles

Smallest blood vessels in the circulatory system.

Audible Spectrum

The frequency range normally associated with human hearing. For noise control purposes, this range is usually taken to include frequencies between 20 Hz and 10,000 Hz.

Audio Frequency

An audio frequency is any frequency corresponding to a normally audible sound wave.

Background Noise

Background noise is the total of all sources of interference in a system used for the production, detection, measurement, or recording of a signal, independent of the presence of the signal.

Bel

The bel is a unit of level when the base of the logarithm is 10. Use of the bell is restricted to levels of quantities proportional to power.

Band Pressure Level

The band pressure level of a sound for a specified frequency band is the sound pressure level for the sound contained within the restricted band. The reference pressure must be specified.

Cardio-Vascular Disorders

Disorders of the cardiac and blood system.

Cycle

A cycle is the complete sequence of values of a periodic quantity that occur during a period.

Damping

Damping is the dissipation of energy with time or distance.

dB

One-tenth of a Bel

dBA

The sound pressure levels in decibels measured with a frequency weighting network corresponding to the A-scale on a standard sound level meter. The A-scale tends to suppress frequencies, above and below 1000 Hz.

Echo

An echo is a wave that has been reflected or otherwise returned with sufficient magnitude and delay to be detected as a wave distinct from that directly transmitted.

Epinephine Levels

Adrenaline levels, stress-producing chemical which causes vasoconstriction of arterioles and cardiac stimulation.

Frequency

The rate of change of a variable such as sound pressure with unit time. The unit of frequency is called the Hertz, abbreviated as Hz, or the cycle per second.

Harmonic

A harmonic is a partial whose frequency is an integral multiple of the fundamental frequency.

Hearing Loss (Hearing Level) (Hearing-Threshold Level)

The hearing loss of an ear at a specified frequency is the amount, in decibels, by which the threshold of audibility for that ear exceeds a standard audiometric threshold.

Hz

The abbreviation for frequency in Hertz.

Impact

An impact is a single collision of one mass in motion with a second mass which may be either in motion or at rest.

Impact Noise

The noise created by an impact and resulting in impulse sound.

Impulse Sound

When the overall sound pressure level changes at least 15 decibels during any one-half second interval of time at a rate of 40 or more decibels per half-second, the sound during the interval is called impulsive.

Inverse First Power

The diminution of sound amplitude due to geometric effects as the observation point increases in distance from an infinite line or cylindrical source. The sound pressure level SPL_1 at distance r_1 is related to the sound pressure level SPL_2 at distance r_2 by the equation:

$$SPL_1 - SPL_2 = 10 \log_{10} \frac{r_2}{r_1}$$

which indicates cylindrical divergence.

Inverse Square

The diminution of sound amplitude due to geometric effects as the observation point increases in distance from a point source. The sound pressure level SPL_1 at one distance is related to the sound pressure level SPL_2 at a second distance r_2 by the equation:

$$SPL_1 - SPL_2 = 10 \log_{10} \frac{r_2^{\,2}}{r_1^{\,2}}$$

which indicates spherical divergence.

L

See Level

Level

An adjective used to indicate that the quantity referred to is in the logarithmic notation of decibels, with a standardized reference quantity used as the denominator in the decibel ratio expression.

Loudness

The intensive attribute of an auditory sensation, measured in units of sones. By definition, a pure tone of 1000 Hz. 40 db above a normal listener's threshold, produces a loudness of 1 sone.

Loudness Level

The loudness level of any sound is defined as the sound pressure level of a 1000 Hz tone that sounds as loud to a listener as the sound in question. Described in units of phons.

Maximum Sound Pressure

The maximum sound pressure for any given cycle of a periodic wave is the maximum absolute value of the instantaneous sound pressure occuring during that cycle.

Neural-hormonal changes

Changes which are conveyed from the central nervous system through the blood to other parts of the body, stimulating an increase in functional activity and hormonal secretion.

Noise

(1) Noise is any undesired sound. By extension, noise is any unwanted disturbance within a useful frequency band, such as undesired electric waves in a transmission channel or device.

(2) Noise is an erratic, intermittent, or statistically random oscillation.

Noise Level

Noise level is the level of noise, the type of which must be indicated by further modifier or context.

Noise Sensitive Land Uses

Dwellings, schools, hospitals, hotels, and health institutions.

Noisiness

Analogous to loudness, but referred to a frequency weighting function in which observers judge the unwantedness or unacceptability of the sound as compared to a reference standard consisting of an octave band of random noise centered at 1000 Hz.

Octave

(1) An octave is the interval between two sounds having a basic frequency ratio of two.

(2) An octave is the pitch interval between two tones such that one may be regarded as duplicating the basic musical import of the other tone at the nearest possible higher pitch.

One-third Octave

A frequency ratio of 1:1-1/3. Three contiguous one-third bands cover the same frequency range as one octave band.

Organ of Corti

An elongated spiral structure running the entire length of the cochlea in the floor of the cochlear duct and resting on the basilarmembrane. The end organ of hearing containing hair cells, supporting cells and neuroephithelial receptors which are stimulated by sound waves.

Peak Sound Pressure

The peak sound pressure for any specified time interval is the maximum absolute value of the instantaneous sound pressure in that interval.

Per cent Impairment of Hearing (Per cent Hearing Loss)

Per cent impairment of hearing is an estimate of a person's ability to hear correctly. It is usually based, by means of an arbitrary rule, on the pure-tone audiogram. The specific rule for calculating this quantity from the audiogram now varies from state to state according to a rule or law.

Physical Measure of Sound

Any quantity describing a sound which can be read directly or an electrical instrument, e.g., sound pressure level.

Psychological Measure of Sound

Any quantity describing a sound which can be compared by subjective judgements of the sound. Usually computed from some empirically derived rule which uses sound pressure level in frequency bands as input data. Examples are loudness, perceived noise level, etc.

Response

The response of a device or system is the motion (or other output) resulting from an excitation (stimulus) under specified conditions.

Rate of Decay

The rate of decay is the time rate at which the sound pressure level (or other stated characteristic) decreases at a given point and at a given time. A commonly used unit is the decibel per second.

Reverberation

(1) Reverberation is the persistence of sound in an enclosed space, as a result of multiple reflections after the sound source has stopped.

(2) Reverberation is the sound that persists in an enclosed space, as a result of repeated reflection or scattering, after the source has stopped.

Sound

(1) Sound is an oscillation in pressure, stress, particle displacement, particle velocity, etc., in a medium with internal forces (e.g., elastic, viscous), or the superposition of such propagated oscillations.

(2) Sound is an auditory sensation evoked by the oscillation described above.

Sound Pressure

The sound pressure at a point is the total instantaneous pressure at that point in the presence of a sound wave minus the static pressure at that point.

Signal

A signal is (1) a disturbance used to convey information; (2) the information to be conveyed over a communication system.

Sound Intensity (Sound-Energy Flux Density) (Sound-Power Density)

The sound intensity in a specified direction at a point is the average rate of sound energy transmitted in the specified direction through a unit area normal to this direction at the point considered.

Sound Absorption

Sound absorption is the change of sound energy into some other form, usually heat, in passing through a medium or on striking a surface.

Sound Pressure Level

The sound pressure level, in decibels, of a sound is 20 times the logarithm to the base 10 of the ratio of the pressure of this sound to the reference pressure. The reference pressure shall be explicitly stated.

Sound Analyzer

A sound analyzer is a device for measuring the band-pressure level or pressure-spectrum level of a sound as a function of frequency.

Sound Level Meter

A sound-level meter is an instrument including a microphone, an amplifier, an output meter, and frequency weightings networks for the measurement of noise and sound levels in a specified manner.

Tectorial Membrane

Corti's membrane, roof or covering of the Organ of Corti.

Transmission Loss

Transmission loss is the reduction in the magnitude of some characteristic of a signal, between two stated points in a transmission system.

Threshold of Pain

The threshold of pain for a specified signal is the minimum effective sound pressure level of that signal which, in a specified fraction of the trials, will stimulate the ear to a point at which the discomfort gives way to definite pain that is distinct from mere non-noxious feeling of discomfort.

Vaso-constriction of Arterioles

Reduction in the diameter of the smallest blood vessels.

Vibration

Vibration is an oscillation wherein the quantity is a parameter that defines the motion of a mechanical system.

List of Abbreviations

ADT
Average Daily Traffic.

ANSI
American National Standards Institute

ASA
American Standards Association

ASDS
Aircraft and Sound Description System

C-2
Commercial Zoning

CNEL
Community Noise Equivalent Level

CNR
Composite Noise Rating

CPS
Cycles Per Second

CVC
California Vehicle Code

dB
Decibel

dBA
Decibels in the "A" Scale

DHUD
Department of Housing and Urban Development

EIR

Environmental Impact Report

EPA

Environmental Protection Agency

EPNdB

Equivalent Perceived Noise in Decibels

EPNL

Effective Perceived Noise Level

FAA

Federal Aviation Agency

FAR

Federal Aircraft Regulation

FHA

Federal Housing Act

HNEL

Hourly Noise Equivalent Level

Hz

Hertz, Unit of Cycles Per Second

IIC

Impact Insulation Class

L_{EA}

Mean Sound Level

L_{EQ}

Equivalent Sound Level

L_{DN}

Day-Night Exposure Level

L_{10}

Level of Noise exceeded ten per cent of the time.

L_{50}

Level of Noise exceeded fifty per cent of the time.

L_{90}

Level of Noise exceeded ninety per cent of the time.

MPH

Miles Per Hour

NASA

National Aeronautics and Space Administration

NEF

Noise Exposure Forecast

NHRB

National Highway Research Board

NNI

Noise and Number Index

NR

Noise Reduction

OSHA

Occupational Safety and Health Act

PNdB

Perceived Noise in Decibels

PNL

Perceived Noise Levels

PSA

Pacific Southwestern Airlines

RTD

Rapid Transit District

SAE

Society of Automotive Engineers

<u>SCAG</u>

Southern California Association of Governments

<u>SENEL</u>

Single Event Noise Equivalent Level

<u>SI</u>

Situation Index

<u>SIL</u>

Speech Interference Level

<u>UBC</u>

Uniform Building Code

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Southern California Edison Company

NOISE element

City of Long Beach General Plan

DRAFT December 2019

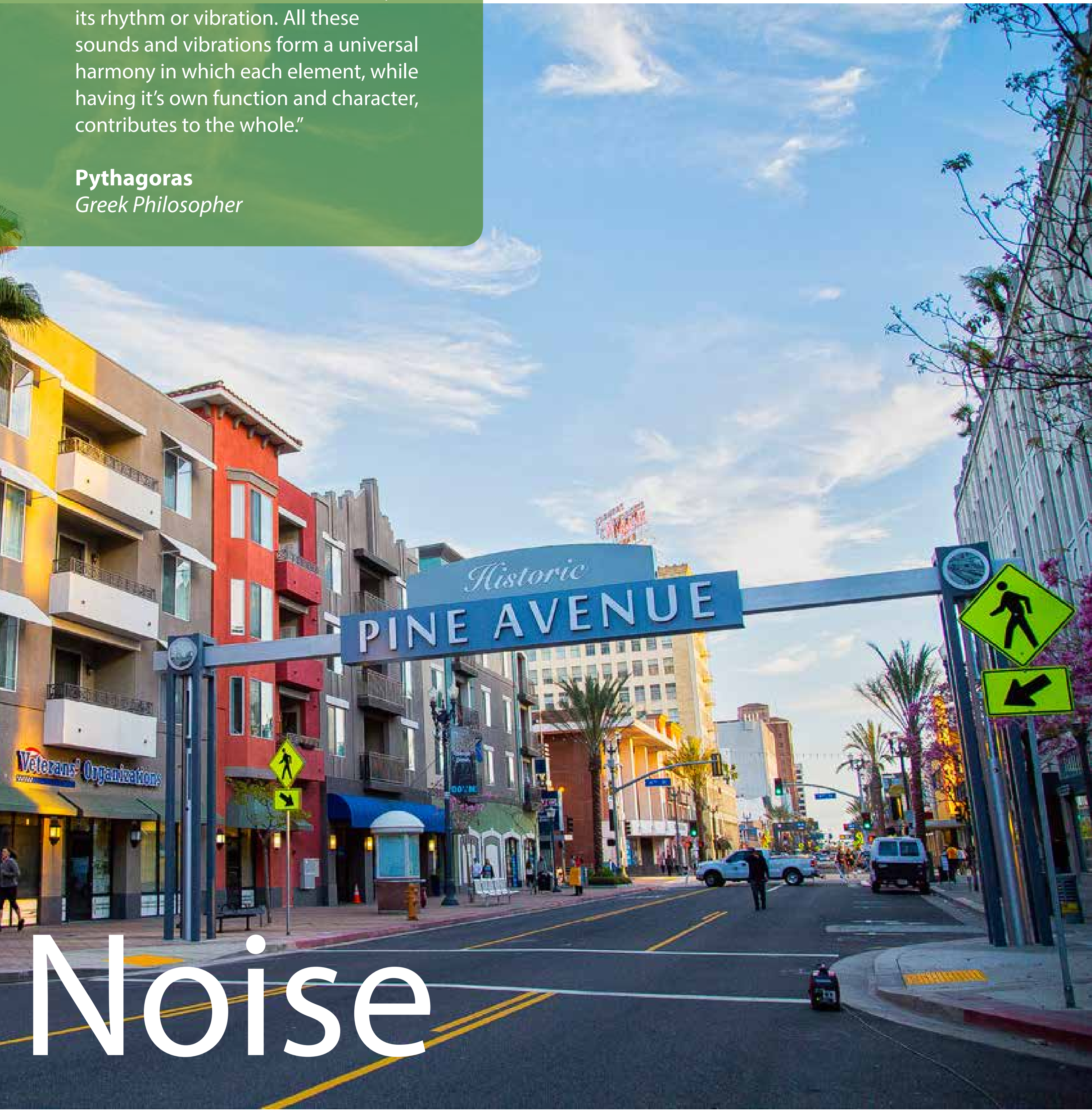
creating livable environments

LONGBEACH DEVELOPMENT SERVICES

CITY OF LONGBEACH

"Each celestial body, in fact each and every atom, produces a particular sound on account of its movement, its rhythm or vibration. All these sounds and vibrations form a universal harmony in which each element, while having it's own function and character, contributes to the whole."

Pythagoras
Greek Philosopher



Noise

NOISE element

City of Long Beach General Plan

DRAFT December 2019

Adopted by the Long Beach City Council on (xx.xx.xxxx)

Processed by Long Beach Development Services

Assisted by RRM Design Group and LSA Associates.

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Vision

A City That Thrives

"Just as we share the air we breathe, we are submerged in a sea of shared sound. We are all connected by the vibrations we make as we use energy in daily life."

Bruce Odland and Sam Auinger
Reflections on the Sonic Commons, a Special Section of the Leonardo Music Journal

1

Vision

A City That Thrives

INTRODUCTION

The City of Long Beach has evolved into a vibrant urban community, a home for residents and enterprise alike. Long Beach has become a metropolitan community by its own right—a home to a thriving port, international airport, and transit lines. Additionally, Long Beach is a destination for nightlife, festivals, and concerts. As Long Beach transitions from a Los Angeles suburb to a young, spirited stand-alone city, the soundscape will inevitably also transition.

Our vision for Long Beach includes an urban environment with all the amenities of life in a city while maintaining healthy, livable neighborhoods for all residents. Balancing the needs of transit, industry, entertainment, and business with the livelihood of all residents, is essential for a growing city. These aspects are part of the daily lives of residents and visitors in Long Beach. An ambient level of noise is to be expected as part of life in an urban environment; the key will be minimizing noise events and striving for equality throughout all neighborhoods of Long Beach. Desired goals of the Noise Element include: A healthy, livable community, equitable distribution of noise, minimizing exposures to excessive noise, and allowances for elements necessary for a dynamic, growing city.

A Healthy, Livable Community

A base level of noise as part of life in an urban environment can be normal and healthy. Noise events that disturb the peace of residents can lead to negative health outcomes; therefore, this Noise Element should prioritize the health and well-being of City residents and visitors.

Long Beach: A vibrant, growing community

Equitable Distribution of Noise

Urban noise may be more likely to occur in some parts of Long Beach than others. An equitable distribution of noise is a pillar of environmental justice, and as such, this Noise Element should prioritize the well being of all residents by ensuring equitable spatial distribution of potential noise impacts.

Minimizing Exposures to Excessive Noise

Though an ambient level of noise is to be expected as part of daily life in Long Beach, excessive noise events can be disruptive and unwelcomed. Frequent occurrences of excessive noise events can lead to negative health outcomes, and should be minimized to the extent feasible. A main purpose of the Noise Element is to limit exposure of the community to excessive noise levels in noise-sensitive areas and at noise-sensitive times of day.

Allowances for Elements Necessary for a Dynamic, Growing City

Many of the elements that make Long Beach such an exciting place to live also contribute to urban noise. Long Beach is a desirable place to live due to its many amenities including availability of transportation and wide-range of entertainment. Buses, cars, airplanes, ships, and light rail as well as nightlife, concerts, and festivals are all part of the urban fabric of Long Beach. Allowing for these elements while minimizing their impact is a priority of the Noise Element.

Downtown Long Beach at night

Introduction

2

What is a Noise Element?

"Sound is the vocabulary of nature."

Pierre Schaeffer
French Composer

2

Introduction

What is a Noise Element?

INTRODUCTION

Noise surrounds us; it is a constant presence in urban life. A certain level of noise in a community can be indicative of a healthy, active neighborhood. Noise from busy shops and restaurants, children playing, and public transportation are all signs of a thriving environment. While technical in nature, noise is often interpreted subjectively. Certain types of noise are commonly perceived as negative, such as busy transportation corridors, construction zones, and landscaping activities. However, in the context of a dynamic neighborhood, these noises may be perceived as less obtrusive. In addition, some development goals, such as infill, may create acceptably higher levels of noise.

The overall objective of the Noise Element is to create and maintain a healthy noise environment in Long Beach. Specific goals of the Noise Element include: striving for a more equitable distribution of noise, limiting the exposure of the community to excessive noise levels in noise-sensitive areas and at noise-sensitive times of day, and creating allowances for Long Beach to thrive as a dynamic, growing city.

WHAT IS A NOISE ELEMENT?

Due to potential impacts associated with elevated noise and vibration impacts and the effects on citizens within its cities, the California legislature in 1972 mandated that a noise element be included as part of city and county general plans. The current State of California General Plan Guidelines provides the specific requirements for a noise element (2017).

The Noise Element is a mandatory element of the City of Long Beach General Plan, and sets forth policies regarding noise and land use throughout the City. The Noise Element was last updated in 1975, and was implemented through a 1977 noise ordinance. Since that time, the City's physical makeup, population, regional context, and the regulatory guidance around noise have changed significantly.

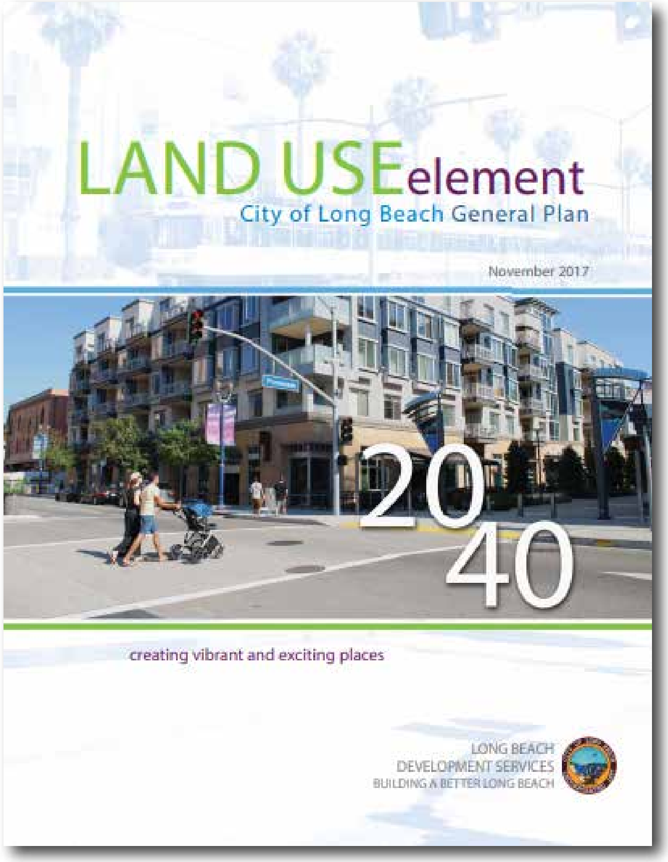
Downtown Long Beach skyline

Relationship to Other Elements

Additionally, state law mandates that the Noise Element be consistent with all other General Plan Elements. Policies and strategies in the Noise Element are intended to provide protection for land uses, as identified in the Land Use Element, from excessive noise. The Noise Element identifies potential and anticipated noise sources and establishes programs to avoid or mitigate noise impacts. All policies and strategies established in the Noise Element are designed to support the vision established in Chapter 1.

The Noise Element is related to other mandated elements, including Land Use, Housing, Circulation, and Open Space. Recognition of the interrelationship of noise and these four other mandated elements is necessary in order to prepare an integrated general plan. In addition, the Noise Element is related to policies in the Urban Design Element, an optional element under state law. The relationship between noise and these elements is briefly discussed below.

Long Beach General Plan 2040 Land Use Element



» **Land Use**—A key objective of the Noise Element is to provide noise exposure information for use in the land use element. When integrated with the Noise Element, the Land Use Element will show acceptable land uses in relation to existing and projected noise contours. Section 65302(f) states that: "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."

» **Housing**—The Housing Element considers the provision of adequate sites for new housing and standards for housing stock. Since residential land use is among the most noise sensitive, the noise exposure information provided in the Noise Element must be considered when planning the location of new housing. Also, state law requires special noise insulation of new multifamily dwellings constructed within the 60 dB (CNEL or Ldn) noise exposure contour. This requirement may influence the location and cost of this housing type. In some cases, the noise environment may be a constraint on housing opportunities.

» **Mobility**—The circulation system must be correlated with the Land use Element and is one of the major sources of noise. Noise exposure will thus be a decisive factor in the location and design of new transportation facilities and the possible mitigation of noise from existing facilities in relation to existing and planned land uses. The local planning agency may wish to review the circulation and land use elements simultaneously to assess their compatibility with the noise element.

» **Open Space**—Excessive noise can adversely affect the enjoyment of recreational pursuits in designated open space. Thus, noise exposure levels should be considered when planning for this kind of open space use. Conversely, open space can be used to buffer sensitive land uses from noise sources through the use of setbacks and landscaping. Open space designation can also effectively exclude other land uses from excessively noisy areas.

» **Urban Design**—Urban design techniques can be employed to mitigate noise impacts. Strategies such as creative incorporation of noise attenuation methods can be effective in accomplishing both urban design goals as well as noise mitigation goals. Additionally, the Urban Design Element utilizes a differentiated approach for neighborhoods of Long Beach, complementing that of this element.

State Requirements for Noise Elements

The State of California's Governor's Office of Planning and Research (OPR), under California Government Code 65303, allows a city or county to adopt "any other elements or address any other subjects, which, in the judgement of the legislative body, relate to the physical development of the county or city." Once adopted, this Noise Element will carry the same legal weight as any of the seven mandatory elements and will be consistent to all the other elements, as required by §65300.5.

OPR also states: "The noise element of the general plan provides a basis for comprehensive local programs to control and abate environmental noise and to protect residents 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 noise 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 the State Noise Insulation Standards. These standards require specified levels of outdoor to indoor noise reduction for new multifamily residential constructions in areas where the outdoor noise exposure exceeds CNEL (or Ldn) 60 dB."

Document Organization

The chapters of the Noise Element are organized by topic as follows:

1. **Vision**
   » This chapter discusses the overall vision of the Noise Element.
2. **Introduction: What is a Noise Element?**
   » This chapter discusses the function of a noise element and its role within other planning and regulatory frameworks and the community engagement involved in shaping this element. It concludes with a discussion of concepts important for implementing the vision of the element.
3. **Context: Understanding the Noise Environment**
   » This chapter discusses the context and sources of noise and vibration in the City of Long Beach.
4. **Noise Fundamentals: Characteristics of Sound**
   » This chapter details the technical aspects of how noise is measured and its impact on human health.
5. **Noise Plan: Creating Livable Environments**
   » This chapter contains the strategies and policies that implement the vision of the Noise Element. Topics include land use compatibility, mobility, construction, special events, environmental justice and noise management.
6. **Administration + Implementation: Maintaining the Noise Environment**
   » This chapter describes the tools for administering and implementing the Noise Element.

A. **Appendix**
   » Detailed information on modeled future traffic noise contours (2040) may be found here.

The upcoming sections discuss the many ways noise is regulated and planned for within the City of Long Beach. The primary tools for regulation are this Noise Element and the Long Beach Municipal Code Noise Ordinance. Beyond the local level, different types of noise are regulated by several federal and state organizations and policy frameworks.

REGULATORY SETTING

Federal Regulations

Long Beach does not typically rely on any specific federal noise regulations given that the State level requirements, specifically the California Environmental Quality Act (CEQA), and the City's Noise Element and Municipal Code Noise Ordinance provide more specific and restrictive regulations related to noise and vibration impacts. However, the following information is provided for reference and may be used when local criteria are not established.

Federal Railroad and Federal Transit Administrations

The guidelines in the Federal Transit Administrations (FTA) *Transit Noise and Vibration Impact Assessment* (2006) general assessment establishes thresholds for construction noise identified as a 1-hour noise level of 90 dBA L_{eq} for residential uses during daytime hours and a 1-hour noise level of 100 dBA L_{eq} for commercial and industrial uses. This provides reasonable criteria for assessing construction noise impacts based on the potential for adverse community reaction when the noise thresholds are exceeded.

In addition to the vibration standards included in the FTA *Transit Noise and Vibration Impact Assessment* for ground-borne vibration impacts on human annoyance are shown below, the criteria for potential damage from ground-borne vibration and noise are based on the maximum levels for a single event. Table N-1 lists the potential vibration building damage criteria associated with construction activities, as suggested in the *Transit Noise and Vibration Impact Assessment*. FTA guidelines show that a vibration level of up to 102 VdB (equivalent to 0.5 in/sec in PPV) is considered safe for buildings consisting of reinforced concrete, steel, or timber (no plaster), and would not result in any construction vibration damage. For a nonengineered (those not designed by an engineer or architect) timber and masonry building, the construction building vibration damage criterion is 94 VdB (0.2 in/sec in PPV).

Human Response to Different Levels of Ground-Borne Noise and Vibration

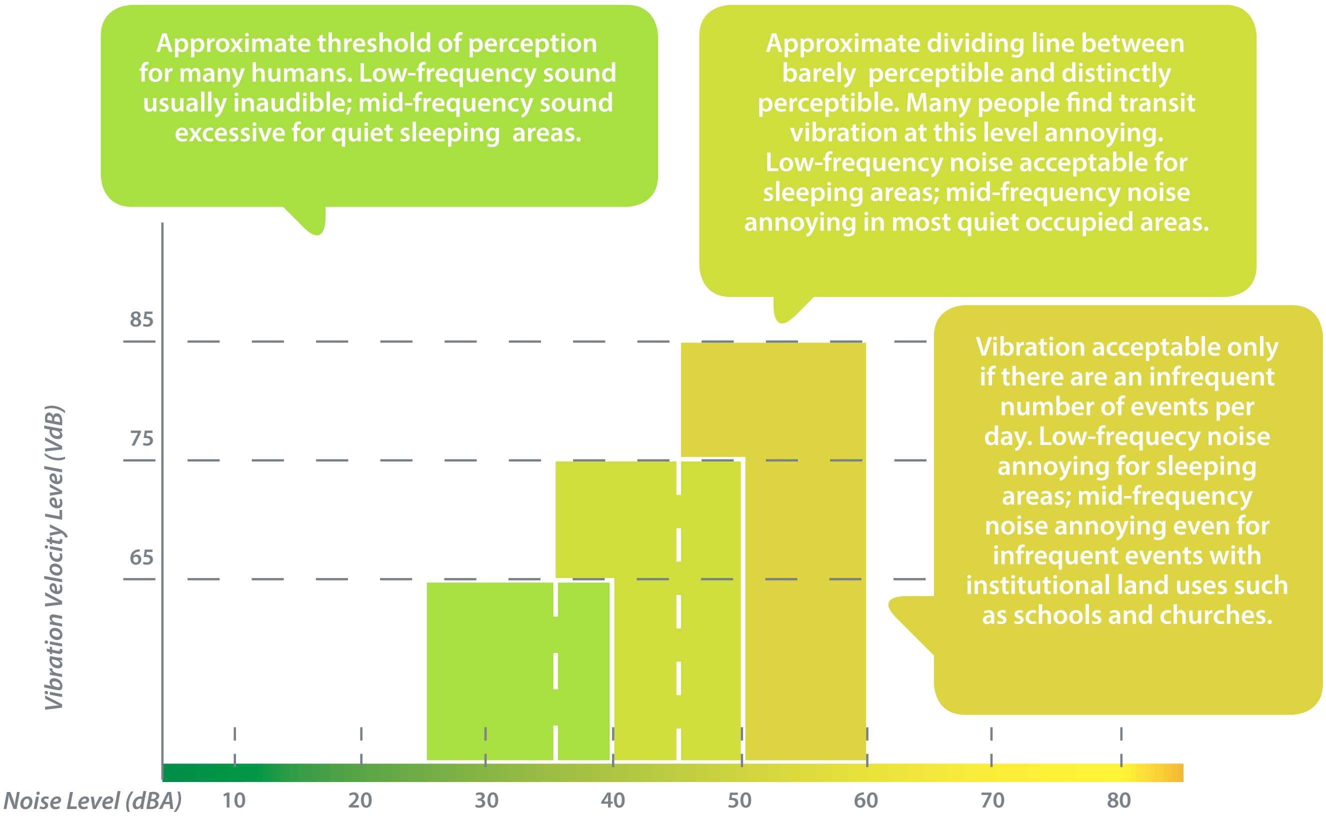


Table N-1: Construction Vibration Damage Criteria

Building Category	PPV (in/sec)	Approximate L_V (VdB)[1]
Reinforced concrete, steel, or timber (no plaster)	0.50	102
Engineered concrete and masonry (no plaster)	0.30	98
Non-engineered timber and masonry	0.20	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: Table 12-3, Transit Noise and Vibration Impact Assessment (FTA 2006).

1 RMS VdB re 1 µin/sec.

µin/sec = microinches per second

FTA = Federal Transit Administration

in/sec = inches per second

LV = velocity in decibels

PPV = peak particle velocity

RMS = root-mean-square

VdB = vibration velocity in decibels

Environmental Protection Agency

In 1972 Congress enacted the Noise Control Act. This act authorized the Environmental Protection Agency (EPA) to publish descriptive data on the effects of noise and establish appropriate levels of sound. The document *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety* (EPA 1974) established that noise levels less than or equal to 45 dBA would not interfere with indoor activities or cause annoyance. Thus, an interior noise level of 45 dBA CNEL or less is often used to assure exterior façades will provide adequate noise reduction.

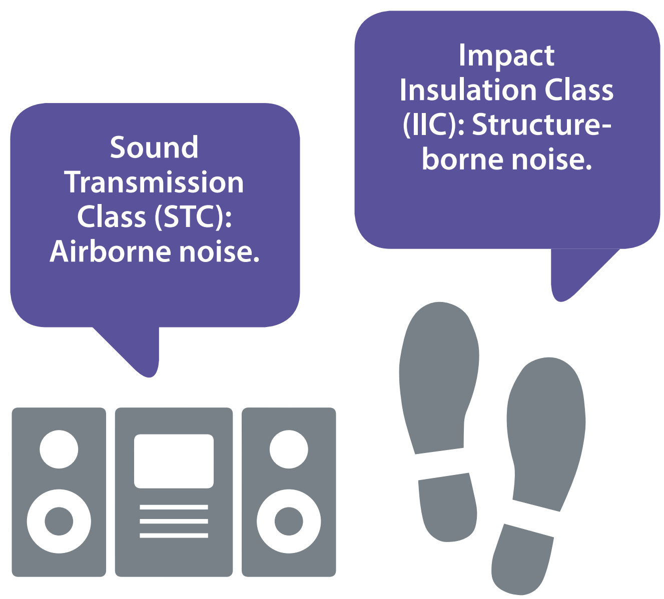
International Building Code

The International Building Code (IBC) (ICC 2015) has been adopted and used as a standard code throughout most of the United States. Within the IBC, standards for both reference or laboratory ratings as well as field measured rating requirements are identified to assure interior noise environment thresholds are met. There are two specific class ratings: (1) STC or Sound Transmission Class and (2) IIC or Impact Insulation Class. The STC rating is often used for room-to-room assemblies and focuses more on airborne noise impacts such as radio, television, and human speech. The IIC rating is often used for floor/ceiling assemblies to focus on structure-borne noise such as footfall or objects being dropped. The IBC specifies that a minimum STC or IIC rating of 50 is desired to provide a comfortable living environment.

State Regulations

State of California Noise Control Act

In 1975, the State of California established its own Noise Control Act located in Division 28 of the State's Health and Safety Code. Chapter 6, Assistance to Local Agencies, provides direction on how the state will assist each local agency in establishing local ordinances and policies, as expected below.



Two class ratings help to measure interior noise thresholds.

Chapter 6. Assistance to Local Agencies

46060. *It is the purpose of this chapter to encourage the enactment and enforcement of local ordinances in those areas which are most properly the responsibility of local government. It is further the purpose to insure that the state is of maximum assistance to local agencies in the discharge of those responsibilities, furnishing technical and legal expertise to assist local agencies in the enactment and enforcement of meaningful and technically sufficient noise abatement measures.*

46061. *The office shall provide technical assistance to local agencies in combating noise pollution. Such assistance shall include but not be limited to:*

G. *Advice concerning methods of noise abatement and control.*

H. *Advice on training of noise control personnel.*

I. *Advice on selection and operation of noise abatement equipment.*

46062. *The office shall provide assistance to local agencies in the preparation of model ordinances to control and abate noise. Such ordinances shall be developed in consultation with the Attorney General and with representatives of local agencies, including the County Supervisors Association of California and the League of California Cities. Any local agency which adopts any noise control ordinance shall promptly furnish a copy to the office.*

State of California Building Code

The State of California's noise insulation standards are codified in the California Code of Regulations (CCR), Title 24, Building Standards Administrative Code, Part 2, California Building Code. These noise standards are applied to new construction in California for the purpose of ensuring that the level of exterior noise transmitted to and received within the interior living spaces of buildings is compatible with their comfortable use. For new residential dwellings, hotels, motels, dormitories, and school classrooms, the acceptable interior noise limit for habitable rooms in new construction is 45 dBA CNEL or Ldn. Title 24 requires acoustical studies for residential development in areas exposed to more than 60 dBA CNEL to demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. Where exterior noise levels are projected to exceed 60 dBA CNEL or Ldn at the facade of a building, a report must be submitted with the building plans that describe the noise control measures that have been incorporated into the design of the project to meet the 45 dBA CNEL or Ldn noise limit.

California Green Building Code

The California Green Building Code, also referred to as CalGreen (ICC 2017), provides requirements under Environmental Comfort related to noise, including acoustical control, exterior noise transmission prescriptive method, noise exposure where noise contours are not readily available, performance method, site features, and interior sound transmission.

State of California Land Use Compatibility Criteria

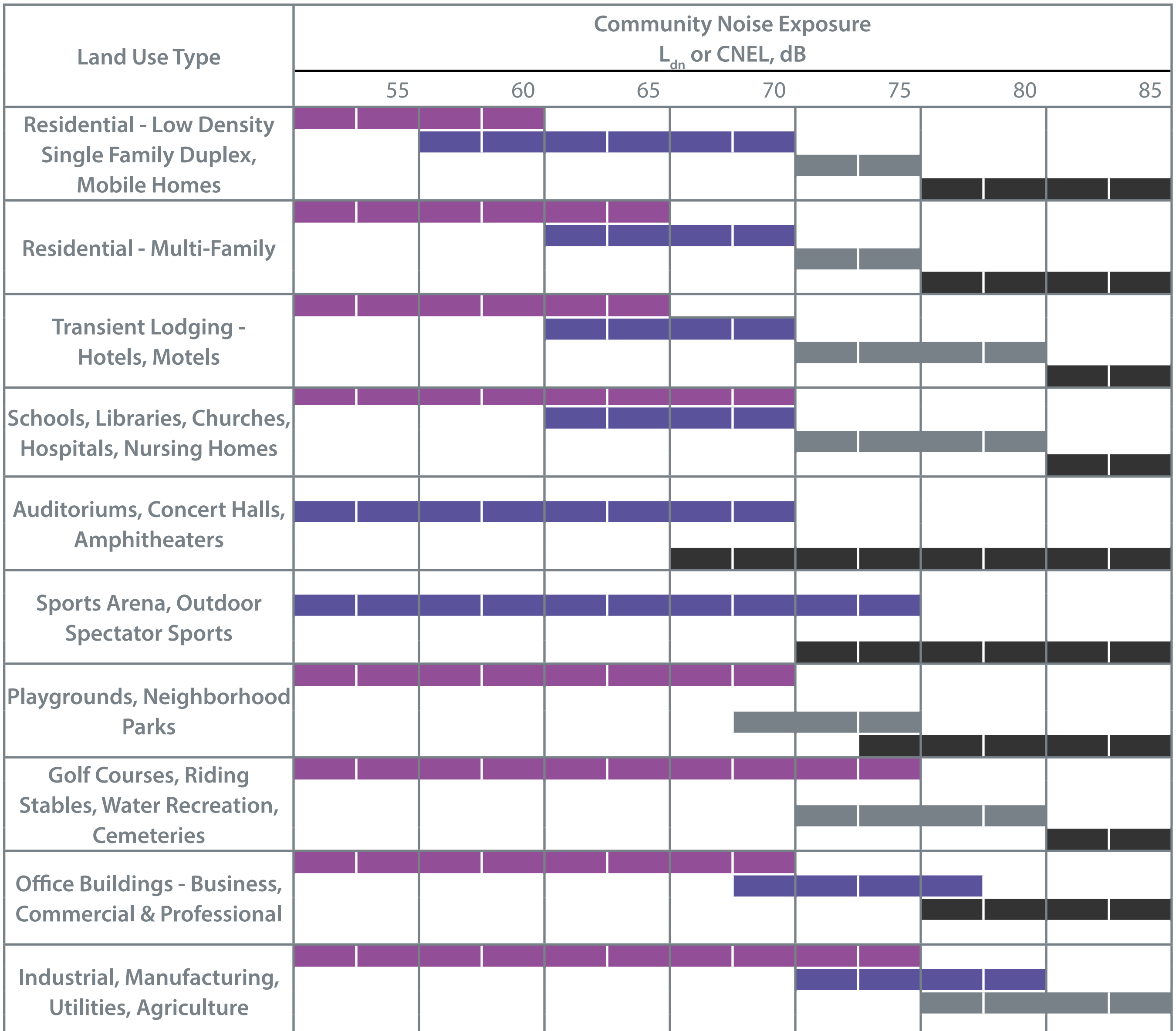
The State of California adopts suggested land use noise compatibility levels as part of its General Plan Guidelines. These suggested guidelines provide urban planners with an integral tool to gauge the compatibility of land uses relative to existing and future noise levels. The guidelines identify normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable noise levels for various land uses. A conditionally acceptable designation implies new construction or development should be undertaken only after a detailed analysis of the noise reduction requirements for each land use is made and needed noise insulation features are incorporated into the design. By comparison, a normally acceptable designation indicates that standard construction can occur with no special noise reduction requirements. The land use compatibility guidelines are intended to be an advisory resource when considering changes in land use and policies, such as zoning modifications. The Land Use Compatibility Guidelines are shown in Table N-2.

There are four categories of noise levels for various land uses that help planners gauge the compatibility of land uses relative to existing and future noise levels:

- **Normally acceptable**
- **Conditionally acceptable**
- **Normally unacceptable**
- **Clearly unacceptable**

State of California Land Use Compatibility Criteria.

Table N-2: Land Use Compatibility Guidelines for Noise Exposure



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.*

Source: California Office of Planning and Research, General Plan Guidelines (2017), Appendix D.

State of California Vehicle Code

Division 12, Equipment of Vehicles, Chapter 5, Other Equipment, Article 2, Exhaust Systems, and Article 2.5, Noise Limits, provide regulations related to noise levels associated with motor vehicles, including exhaust systems and noise limits.

Long Beach Airport

State of California Airport Land Use Requirements

The State of California has multiple regulations and standards that apply to airports. These are briefly summarized below:

- The Aeronautics Division of the California State Department of Transportation (Caltrans)
- Enforces the California Airport Noise Regulations. These regulations establish 65 dB CNEL as the noise impact boundary within which there shall be no incompatible land uses. Airports are responsible for achieving compliance with these regulations. Compliance can be achieved through noise abatement alternatives, land acquisition, land use conversion, land use restrictions, or sound insulation of structures. Airports not in compliance can operate under variance procedures established within the regulations.
- California Noise Insulation Standards apply to all multi-family dwellings built in the State. Single-family residences are exempt from these regulations. The regulations require that all multi-family dwellings with exterior noise exposures greater that 60 dB CNEL must be sound insulated such that the interior noise level will not exceed 45 dB CNEL. These requirements apply to all roadway, rail, and airport noise sources.
- The State of California requires that all municipal General Plans contain a Noise Element. The requirements for the Noise Element of the General Plan include describing the noise environment quantitatively using a cumulative noise metric such as CNEL or DNL, establishing noise/land use compatibility criteria, and establishing programs for achieving and/or maintaining compatibility. Noise elements shall address all major noise sources in the community including mobile and stationary sources.
- Airport Land Use Commissions were created by State Law for the purpose of establishing a regional level of land use compatibility between
- Airports and their surrounding environs. The Los Angeles County Airport Land Use Commission has adopted an Airport Environs Land Use Plan (AELUP) for Los Angeles County airports including Long Beach Airport. The AELUP criteria for sensitive land uses at 65 dB CNEL for outdoor areas and 45 dB CNEL for indoor areas of residential land uses.

State of California Motorized Watercraft Requirements

The State of California has established requirements and limits as it relates to noise associated with watercraft. Any motorized vessel operated on the inland waters of California or on ocean waters within one mile of the coastline must be muffled or otherwise prevented from exceeding the following noise levels:

- » As measured using a stationary sound level test as defined by SAE J-2005:
  - 90 decibels if the engine was manufactured before January 1, 1993
  - 88 decibels if the engine was manufactured on or after January 1, 1993, or
- » 75 decibels measured as defined by SAE J-1970 for all engines. However, such measurement shall not preclude a stationary sound level test as prescribed by SAE J-2005.

Exceptions to the above restrictions are made for vessels participating in permitted regattas, boat races or speed trials. Authorities generally agree that unbaffled exhaust pipes (stacks) and most water-injected pipes do not meet the above noise level requirements. Unmodified outboards usually meet legal requirements.

Municipal Code

The Long Beach Municipal Code (LBMC) contains the City's Noise Ordinance in Chapter 8.80. In addition to this section, many chapters and sections of the Municipal Code contain regulations related to noise within Long Beach. The LBMC implements Long Beach General Plan policies and strategies.

COMMUNITY ENGAGEMENT

To inform the Noise Element update and identify potential issues, a variety of community engagement strategies were employed. A City of Long Beach project webpage was established as well as a Facebook and Twitter account for the Noise Element at #ListenUpLB. Project background was furnished and the community was invited to use an online engagement tool linked on the sites. The online tool provided a map-based ability to provide comments on a range of topics linked to specific locations throughout the city. Awareness of this opportunity for participation was provided through the City's website, emails, Facebook and Twitter advertising, and counter cards placed throughout city hall and other locations. Materials were provided in both English and Spanish.

#ListenUpLB materials

In addition, a series of meetings were conducted with internal and external stakeholders. Initial meetings were held with City departments and local agencies including the Police Department, Noise Control Office, Animal Care Services, Public Works, Port, Airport and Long Beach Unified School District. Meetings with focus groups included public health professionals/academics, environmental justice, bar and restaurant operators, and the construction industry, as well as the Environmental Health Working Group and various local school students in their classrooms. Further, a Planning Commission study session was conducted on April 20, 2017 to introduce the Noise Element work effort and solicit comments from commissioners and members of the public.

Feedback provided through these various platforms covered an array of topics and key themes are summarized below:

- Develop regulations that respond to the evolution of neighborhoods
- Needed coordination with other regulatory agencies (rail, on-road vehicles, aircraft)
- Common annoyances: Leaf blowers, rail line operations, motorcycles, helicopters, loud music, construction, dogs, park/beach activities, bars/restaurants, autos/freeway, industrial and commercial uses
- Noise impacted communities in West Long Beach
- Effectiveness of good communication, relationship-building, proactive noticing
- Technology trending toward quieter equipment

Received comments and input informed collection of noise data and the preparation of the Noise Element.

NEXT BOLD MOVES: VISION IN MOTION

Long Beach is committed to innovative and meaningful policies to advance the vision of the community and this Noise Element. In order to create a healthy, more equitable noise environment, the City will work to pave the way in several aspects of noise management. Communication of noise policy, creative and thoughtful urban design, and advanced technology will help foster a balanced noise environment in Long Beach.

Communication

Communication is a central aspect of noise management. Ensuring clear communication between the various City departments that manage noise, residents, business owners, and special event managers will serve as a strong foundation for noise management and minimizing noise impacts. Noise policy and the noise ordinance should be clear and enforced, as well as continue to evolve over time based on feedback and better information. Reminders of the noise ordinance should be strategically provided throughout the City.

Design

Land use compatibility and urban design can prevent noise impacts before they begin. Thoughtfully sited and oriented uses, along with creative placemaking can focus noise sources and buffer sensitive receptors from noise impacts.

Technology

Long Beach will seek the latest technology regarding noise mitigation. This includes building materials, freeway noise buffering, public transit, and even technology such as silent fireworks. Noise monitoring equipment used within the City will also be as advanced as possible.

3

Context

Understanding the Noise Environment

"But a city is more than a place in space, it is a drama in time."

Patrick Geddes
Scottish Scientist

3

Context

Understanding the Noise Environment

OUR REGION. OUR CITY.

Long Beach is committed to creating a healthy noise environment throughout the metropolitan City. The Long Beach Noise Ordinance (Chapter 8.80 of the Long Beach Municipal Code) is intended to protect people from non-transportation noise sources such as construction activities, commercial operations, machinery, and nightlife. Enforcement of the noise ordinance requires new developments to show compliance with the ordinance, including operating in accordance with noise levels recommended in this element. The ordinance also provides general standards for prohibited noises and identifies specific activities that are prohibited because of their capability to create unreasonable noise. As an example, the City requires construction activity to comply with established work schedule limits (see Section 8.80.202, Construction Activity-Noise Regulations).

Long Beach is an urban, developed City. As with any developed environment, it is subject to numerous noise sources. Major sources of noise include traffic, rail, aircraft, and stationary sources. Many freeways and corridors throughout Long Beach contribute to traffic noise within the City, including I-405, I-605, I-710, SR-22, SR-91, Pacific Coast Highway or State Route 1 (SR-1), and Long Beach Boulevard. In addition to the automobile and truck traffic along these corridors, the City is currently served by Long Beach Transit, a public transit agency with bus service along major roadways in the City through various routes (i.e., Routes 1, 21, 22, 81, and 192). The Los Angeles County Metropolitan Transportation Authority (Metro) operates a limited number of local and express buses. The Long Beach Transit Gallery serves as the southern terminus of the Metro Blue Line and is the main transit hub for bus connections to various Metro, Long Beach Transit, Los Angeles Department of Transportation Commuter Express, and Torrance Transit bus routes. Rail noise is due to the three freight rail lines and one public transit line, the Metro Blue Line, that pass through the City. Aircraft noise is from the Long Beach Airport, located within City limits.

Anaheim Street and Long Beach Boulevard

NOISE SOURCES

Land Use Patterns

Noise is a key element for consideration in the arrangement of land uses throughout Long Beach. Thoughtfully designed land use patterns can be the first step in avoiding potential noise impacts on a neighborhood or group of people. Additionally, priority should be given to reduction of noise in severely impacted areas through rehabilitative improvements.

The overall noise environment is a conglomeration of noise from several sources. Mobility sources, including vehicular traffic, rail, aircraft and watercraft, contribute to the daily transportation-related noise in Long Beach. Another noise source is special events, which occur on a periodic basis. The last category of noise sources is construction and nuisance noises, which include machinery, heating ventilation and air conditioning systems, compressors, and landscape maintenance equipment among others.

Though Long Beach is unique in that the Port of Long Beach is so active, operation noise levels are generally limited to areas within the perimeter of the Port. Noise associated with the Port includes cranes, forklifts, and truck activities. Due to the distance from daily operations, which are located close to the coast, to the nearest sensitive uses, noise impacts are rarely audible at such a large distance. Heavy truck traffic associated with the transport of cargo along the I-710 corridor is the primary source of noise associated with the Port. Impacts associated with the Port of Long Beach, including noise, were assessed in the Port of Long Beach Community Impact Study in July 2016.

Commercial, commercial-industrial, light-industrial, and to a lesser extent residential land uses in the City have the potential to generate high noise levels and impact surrounding land uses with their equipment operation. Noise sources from these land uses include air conditioning or refrigeration units, power tools, lawn equipment, generators, and other powered mechanical equipment. Additionally, activities that are not necessarily "stationary" include parking lot activities, truck deliveries, and events are oftentimes classified in the same categories.

The highest priority for protection from noise are "sensitive receptors," or groups which are particularly vulnerable to the impacts of noise. Examples of sensitive receptors include residential neighborhoods, schools, hospitals, religious facilities, libraries, offices and parks. Areas of Long Beach with sensitive receptors should be protected through proper land use planning.

Pine Avenue

Mobility

Traffic Noise

Automobiles, buses, trucks, motorcycles and trains dominate transportation noise in the City. Traffic moving along streets and freeways produces a sound level that remains relatively constant and is part of the City's minimum ambient noise level. Vehicular noise varies depending on the volume, speed and type of traffic. Slower traffic produces less noise than fast moving traffic. Trucks typically generate more noise than cars. Infrequent or intermittent noise is also associated with vehicles, including sirens, vehicle alarms, slamming of doors, garbage and construction vehicle activity and honking of horns. These noises add to urban noise and are regulated by a variety of agencies. Often times, noise from motorcycle activities are specifically noticed over general traffic noise impacts due acceleration, exposed motor and, in some cases, lack of or modified mufflers.

Bus service is provided on major streets, collectors, and local streets within the City's circulation system. For the purpose of assessing vehicular noise, three generic weight classifications are considered (light, medium, and heavy). At 35 mph, 1 medium duty truck is as loud as 10 cars, 1 bus is as loud as 20 cars, and 1 heavy truck is as loud as 30 cars. In addition, noise from traffic sources may be worsened by grade (inclined roadway) or by the condition of the pavement.

Major transportation noise sources in the City include traffic on I-405, I-605, I-710, SR-22, SR-91, SR-103, Terminal Island Freeway, Pacific Coast Highway, and Long Beach Boulevard.

In addition to typical automobiles and medium and heavy trucks, the City is currently served by Long Beach Transit, a public transit agency, with bus service along major roadways in the City through various routes (i.e., Routes 1, 21, 22, 81, and 192). The Los Angeles County Metropolitan Transportation Authority (Metro) operates a limited number of local and express buses. The Long Beach Transit Gallery serves as the southern terminus of the Metro Blue Line light rail and is the main transit hub for bus connections to various Metro, Long Beach Transit, Los Angeles Department of Transportation Commuter Express, and Torrance Transit bus routes.

Rail Noise

The noise impacts associated with rail activities depend heavily on a number of factors, including the type of train, the length of train, the physical track conditions, the geometry and intervening structures between the rail line and its receptor, the number of trains operating during the daytime, the number of trains operating during the night time, and the speed of the train. Additionally, when a horn is required to sound a warning, which is typical for at-grade crossings, the noise impact would be greatest at the land uses closest to the intersection.

Currently, three freight rail lines pass through the City which are operated by Burlington Northern Santa Fe Corporation (BNSF) Railway, Union Pacific Railroad Company (UPRR), and Pacific Harbor Line Incorporated (PHL). The rail lines run north-south through the west side of the City, through the northwest corner of the City, around the neighborhood of North Long Beach.

Interstate 405

Metro Light Rail

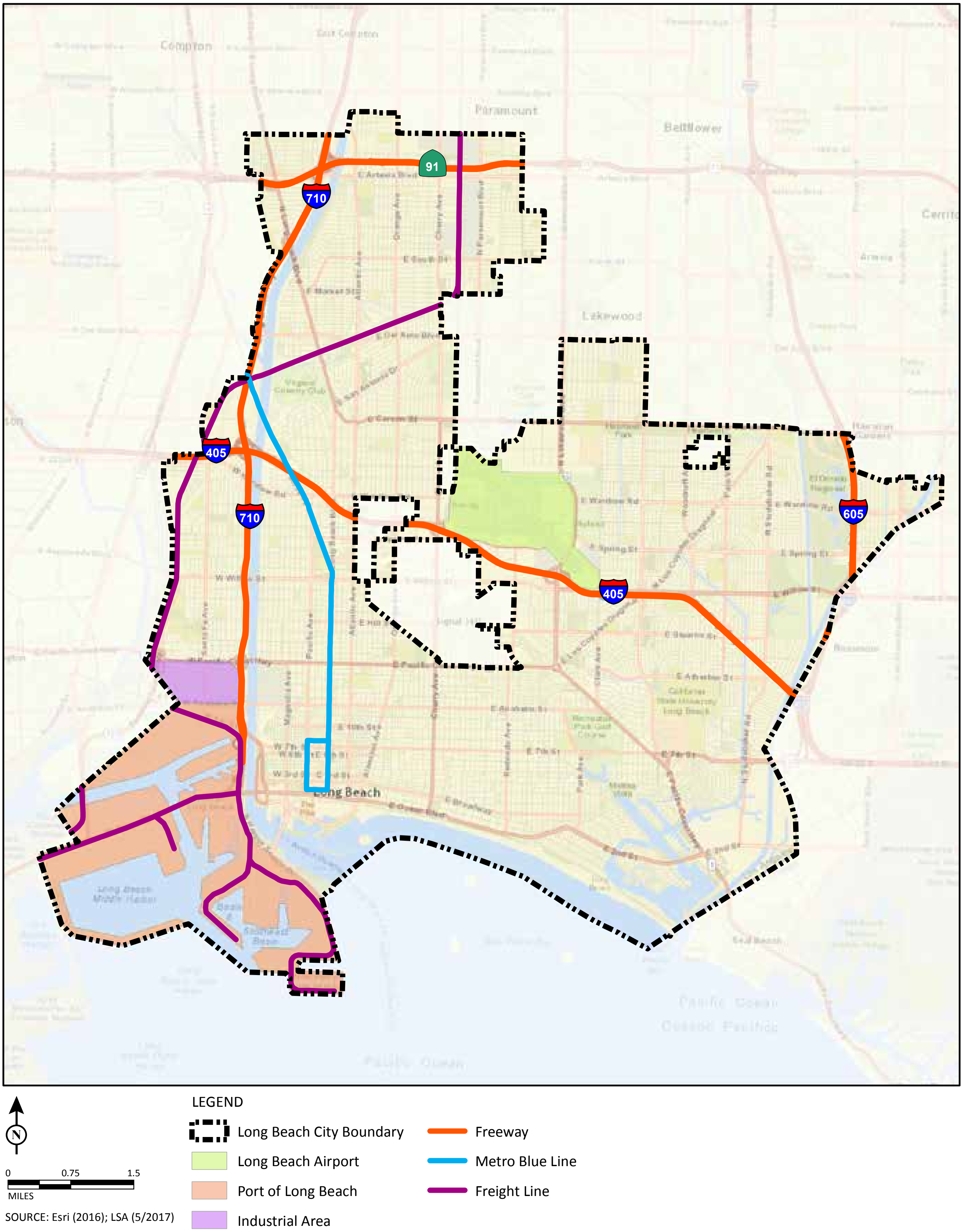


Figure N-1, Existing Major Noise Sources

In addition to freight activities, the Metro Blue Line which serves as public transit, is part of the Metro Rail System that runs north-south from Los Angeles to Long Beach, traveling south via Long Beach Avenue, Willowbrook Avenue, and Long Beach Boulevard to its final destination at the Long Beach Transit Gallery. The Metro Blue Line operates daily, including all major holidays.

Based on the Federal Railroad Administration crossing inventories completed between January 1, 2000 and September 17, 2017 conducted at various crossings in the City, typical operations along the main rail line included up to 74 trains per day ranging in speed from 5 to 25 mph.

Aircraft Noise

Aircraft noise within the City is predominately influenced by operations at the Long Beach Airport located within the City limits. Operations at the Long Beach Airport include commercial air carriers, commuter flights, industrial planes, charter flights, and other general aviation. Operations at the Long Beach Airport typically occur within the daytime hours of 7:00 a.m. to 10:00 p.m., with the exception of occasional unscheduled landings that occur after 10:00 p.m., and emergency and police helicopter activities. *The Long Beach Airport Community Guide to Aircraft Noise* presents factual information on the City of Long Beach Airport Noise Compatibility Ordinance (Long Beach Municipal Code Chapter 16.43) and Long Beach Airport's efforts to minimize aircraft noise over nearby neighborhoods. While the City is not able to control the flight paths, typical operations include approaches from the southeast of the airport and departures taking off in a northwest direction.

Apart from the restrictions on hours of day, noise budgets are utilized to limit aircraft activities. Noise budgets do not directly restrict the operation of a particular aircraft, in contrast to night time restrictions, but they restrict access by the fleet as a whole. Noise budgets restrict the overall noise during a certain period of time, which could be seasonally related or annual.

Currently, the City has implemented a Helicopter Noise Reduction Study Group that provides members of the public the opportunity to meet with both City and Airport staff to discuss issues and concerns regarding helicopter noise including rotor or "chop" noise, hovering, and inconsistent flight paths. While the City cannot directly control the majority of the operations associated with helicopters, specifically those related to emergency and police, the City maintains an interest in helping resolve noise issues where possible. Members of the communities

Long Beach Airport

are currently participating as a part of the Los Angeles Area Helicopter Coalition (LAAHNC) and regularly meet with Federal Aviation Administration (FAA) representatives, helicopter operators, and Long Beach Airport staff in an effort to reduce noise exposure from helicopter operations.

Watercraft Noise

Watercraft noise along the southern portion of the City varies greatly depending on watercraft type, distance from mainland, and overall control and use of equipment. While the City does not currently have any specific criteria related to noise associated with watercraft, the State of California Department of Motor Vehicles, as part of its requirements for watercraft operations, does have regulations that would also be applicable in the City of Long Beach.

Special Events

Long Beach is a vibrant coastal city with attractions serving residents, businesses, and visitors. As such, the City has experienced an increased interest in holding special events in Long Beach, especially outdoor special events along the waterfront in the downtown area. These events include, but are not limited to, community festivals, runs/walks, citywide holiday celebrations, Long Beach Grand Prix, Long Beach Marathon, Long Beach Lesbian and Gay Pride Parade and Celebration, Jazz Festival, film production, and events hosted at the Queen Mary. These activities help build a foundation that fosters sustainable community development, economic development, and tourism. However, with residents living in close proximity to these events, ensuring managed frequency and intensity of the noise from these events is a priority for the City. Long Beach is seeking an informed, balanced approach to managing the needs of these events while continuing to prioritize the well-being of residents.

Construction and Nuisance Noises

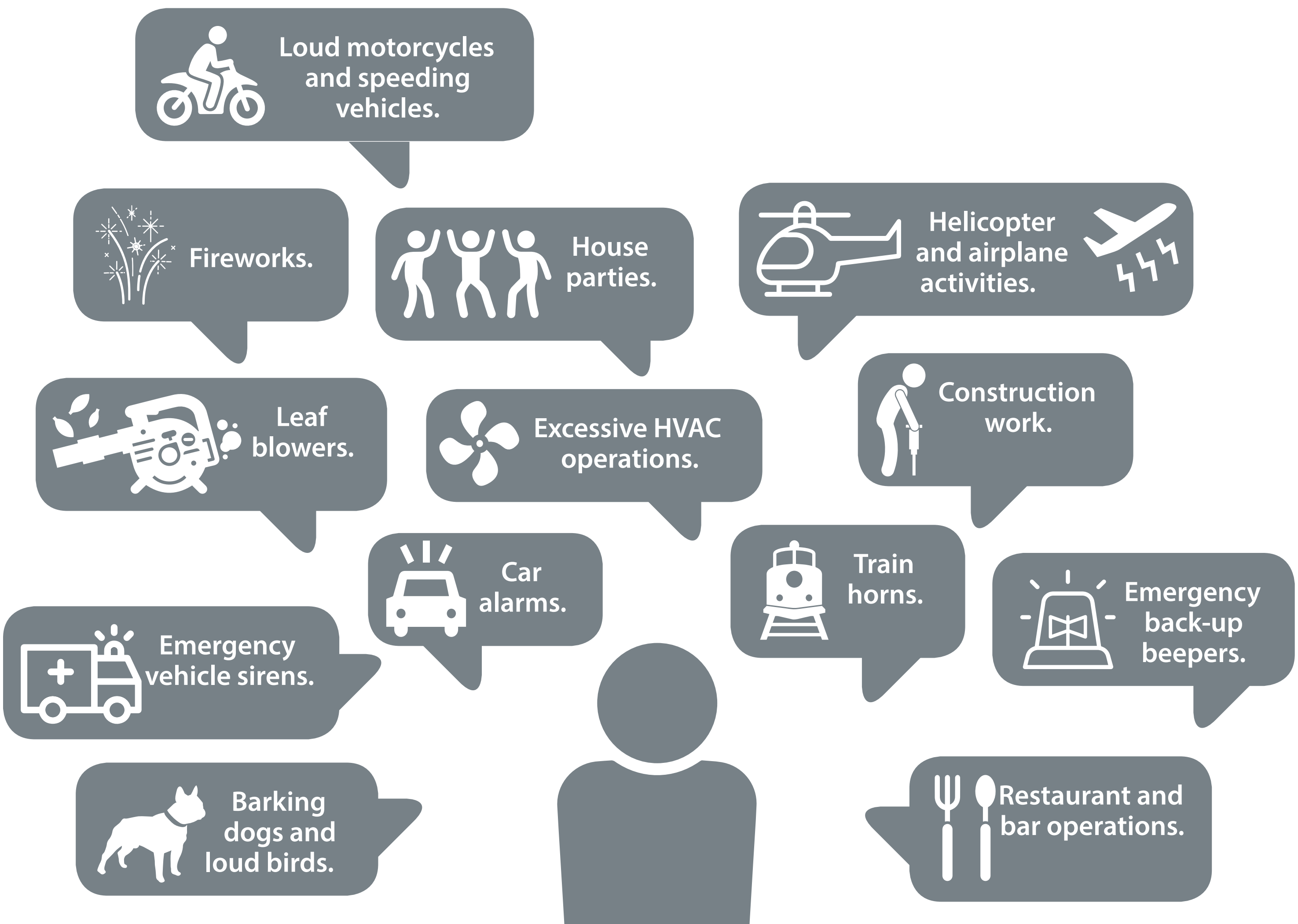
Construction noise, though temporary in nature, can cause noise disruptions on an on-going basis. Long Beach is a growing metropolitan City, therefore construction noise is an expected part of the noise environment. Restrictions on noise from construction are especially important for sensitive receptors. The primary method of restricting noise from construction is through limiting the hours in which construction activity is permitted.

Beach Streets Concert

The City of Long Beach has a wide variety of land use types. Within the commercial and downtown area, certain uses including restaurants, bars, and clubs have the potential to generate noise which may be perceived as annoying or disturbing. Additionally, sources of noise that are permissible under existing laws and regulations still have the potential to disrupt the peace, cause sleep interference, and can create an undesirable setting for residents. The following graphic lists some of the potential sources of noise that have been noted to occur with regularity in the City limits:

VIBRATION SOURCES

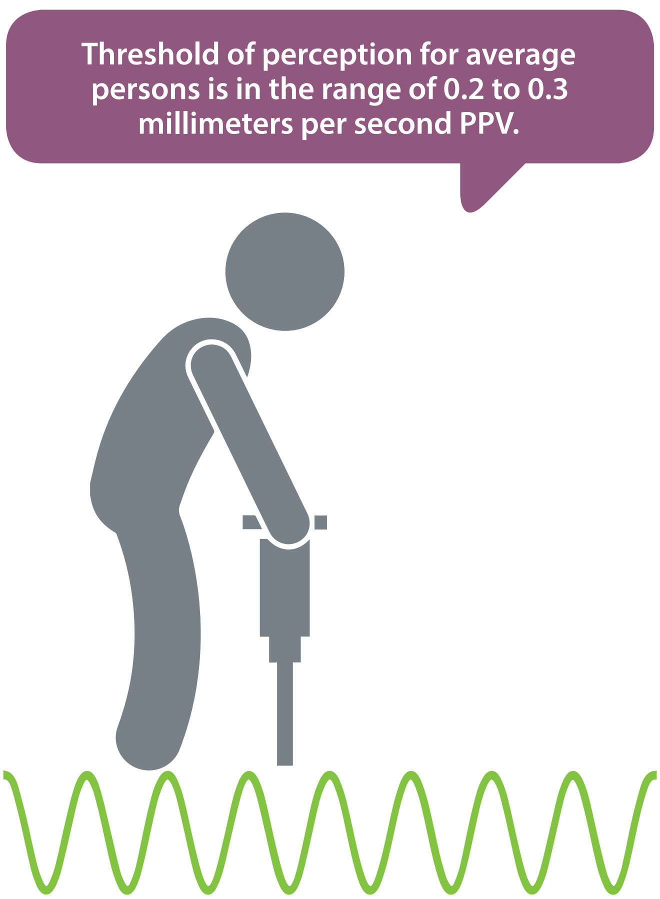
Major vibration sources in the City include construction activities, rail operations, heavy vehicle traffic, and vehicle loading and delivery operations. Other sources which have the potential to cause vibration impacts are aircraft operations, low-frequency music and some stationary sources. Similar to noise standards, cities can adopt vibration exposure standards regarding the sensitivity of land uses which may be affected. In relation to vibration impacts, there are two factors that are considered to assessing the level of impact expected: the potential for damage to a building or structure and the potential of annoyance to people. Also similar to potential noise impacts, the most efficient actions to help reduce vibration impacts occur during the planning and permitting phases of any project or development.



Other potential noise sources

Construction

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related ground-borne vibration levels. Because of the impulsive nature of such activities, the use of the peak particle velocity (PPV) descriptor has been routinely used to measure and assess ground-borne vibration and almost exclusively to assess the potential of vibration to induce structural damage and the degree of annoyance for humans. The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Studies have shown that the threshold of perception for average persons is in the range of 0.2 to 0.3 millimeters per second (0.008 to 0.012 inches per second), PPV. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels (e.g., people in an urban environment) may tolerate a higher vibration level. Structural damage can be classified as cosmetic only (e.g., minor cracking of building elements) or may threaten the integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher and there is no general consensus as to what amount of vibration may pose a threat for structural damage to the building. Construction-induced vibration that can be detrimental to a building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity (e.g., impact pile driving) occurs immediately adjacent to the structure.



Construction-induced vibration may interfere with the enjoyment of life.

Two factors help measure the impact of noise to humans and buildings.

Rail Activity

Rail operations are potential sources of substantial ground-borne vibration depending on distance, the type and the speed of trains, and the type of railroad track. People's response to ground-borne vibration has been correlated best with how quickly sounds moves through the ground. The velocity of the ground is expressed on the decibel scale. The reference velocity is 1 x 10-6 inches per second. RMS, which equals 0 vibration velocity decibels (VdB), and 1 inch per second equals 120 VdB. Although not a universally accepted notation, the abbreviation "VdB" is used in this document for vibration decibels to reduce the potential for confusion with sound decibels.

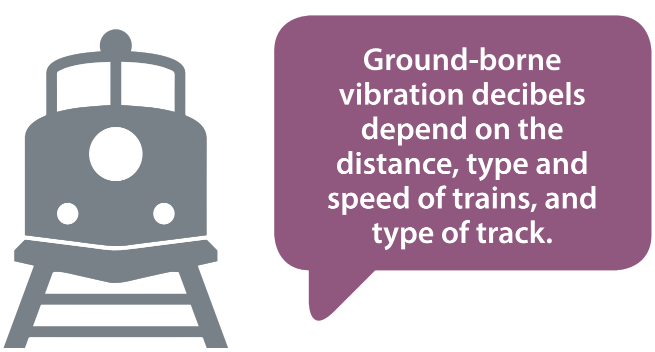
One of the challenges with developing suitable criteria for ground-borne vibration is the limited research into human response to vibration and, more importantly, human annoyance inside buildings. The United States Department of Transportation, Federal Transit Administration has developed rational vibration limits that can be used to evaluate human annoyance to ground-borne vibration. These criteria are primarily based on experience with passenger train operations (e.g., rapid transit and commuter rail systems). The main difference between passenger and freight operations is the time duration of individual events. For example, a passenger train lasts a few seconds whereas a long freight train may last several minutes, depending on speed and length.

Heavy Vehicles and Buses

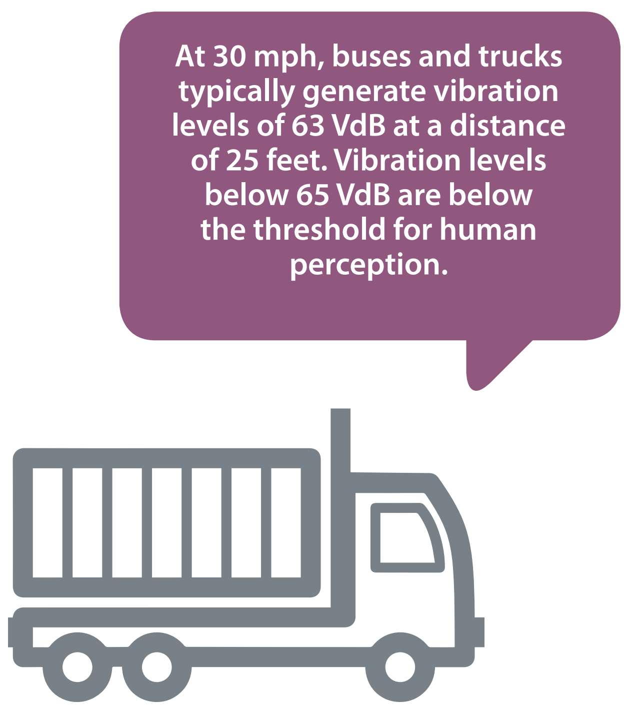
Ground-borne vibration levels from heavy trucks and buses are not normally perceptible, especially if roadway surfaces are smooth. Buses and trucks typically generate ground-borne vibration levels of about 63 VdB at a distance of 25 feet when traveling at a speed of 30 miles per hour (mph). Higher vibration levels can occur when buses or trucks travel at higher rates of speed or when the pavement is in poor condition. Vibration levels below 65 VdB are below the threshold for human perception.

Other

In addition to activities that have vibration impacts which translate through the ground surface between source and receptor, sources which generate high levels of low-frequency noise may generate vibration through air. These sources may include aircraft and helicopter operations, low-frequency music and other large stationary sources. When the vibration effects of these sources are felt or experienced by a receptor, to determine the level of impact, low-frequency noise measurements are the best method to determine the impact.



Many factors affect ground-borne vibration.



How loud are busses and trucks?

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Noise Fundamentals

Characteristics of Sound

4

"The City is what it is because our citizens are what they are."

Plato
Classical Greek Philosopher

4

Noise Fundamentals

Characteristics of Sound

CHARACTERISTICS OF SOUND

Sound is increasing in the environment and can affect quality of life. Noise is usually defined as unwanted sound. Noise consists of any sound that may produce physiological or psychological damage and/or interfere with communication, work, rest, recreation, and sleep.

To the human ear, sound has two significant characteristics: pitch and loudness. Pitch is generally an annoyance, while loudness can affect the ability to hear. Pitch is the number of complete vibrations (or cycles per second) of a wave, resulting in the tone's range from high to low. Loudness is the strength of a sound and describes a noisy or quiet environment; it is measured by the amplitude of the sound wave. Loudness is determined by the intensity of the sound waves combined with the reception characteristics of the human ear. Sound intensity refers to how hard the sound wave strikes an object, which in turn produces the sound's effect. This characteristic of sound can be precisely measured with instruments. Typically, a noise analysis defines the noise environment within a specific area in terms of sound intensity and the effect on adjacent sensitive land uses.

Measurement of Sound

Sound intensity is measured through the A-weighted scale to correct for the relative frequency response of the human ear. That is, an A-weighted noise level de-emphasizes low and very high frequencies of sound similar to the human ear's de-emphasis of these frequencies. Unlike linear units, such as inches or pounds, decibels are measured on a logarithmic scale representing points on a sharply rising curve.

For example, 10 decibels (dB) is 10 times more intense than 1 dB, 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense. Thirty decibels (30 dB) represent 1,000 times as much acoustic energy as 1 dB. The decibel scale increases as the square of the change, representing the sound-pressure energy. A sound as soft as human breathing is about 10 times greater than 0 dB. The decibel system of measuring sound gives a rough connection between the physical intensity of sound and its perceived loudness to the human ear. A 10 dB increase in sound level is perceived by the human ear as only a doubling of the loudness of the sound. Ambient sounds generally range from 30 A-weighted decibels (dBA) (very quiet) to 100 dBA (very loud).

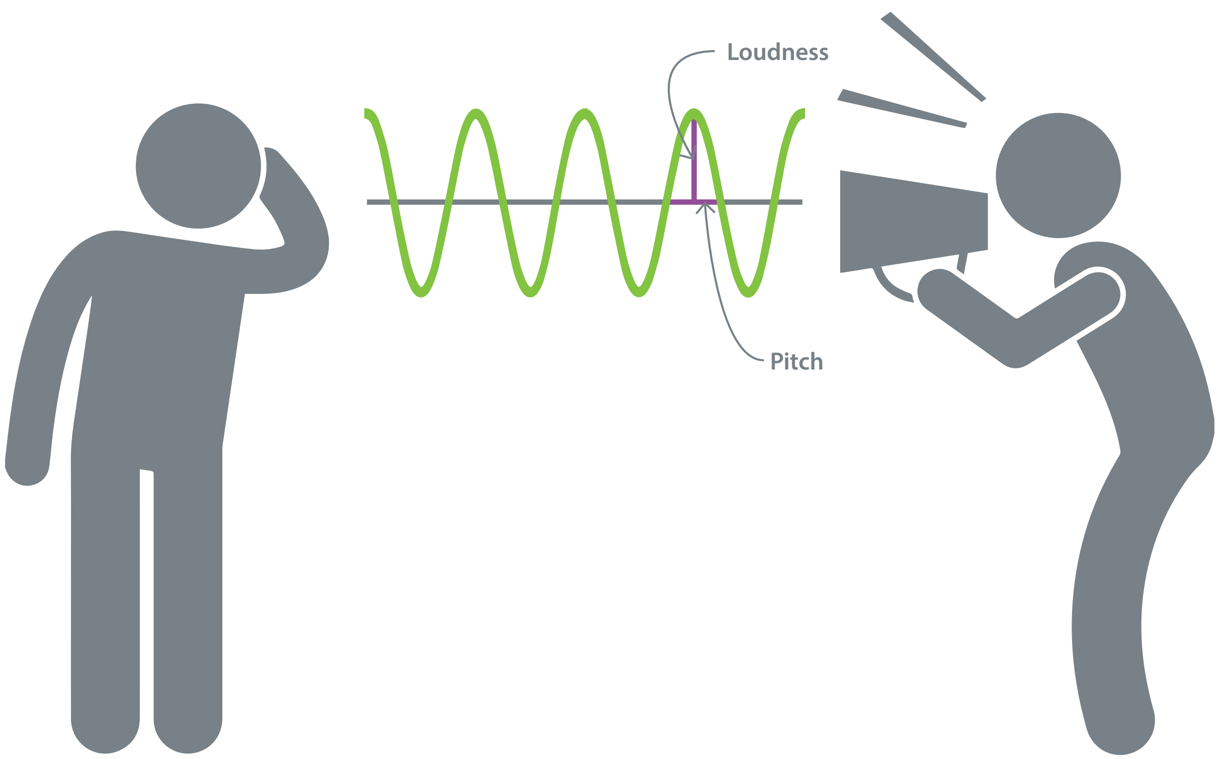


Table N-3: Definitions of Acoustical Terms

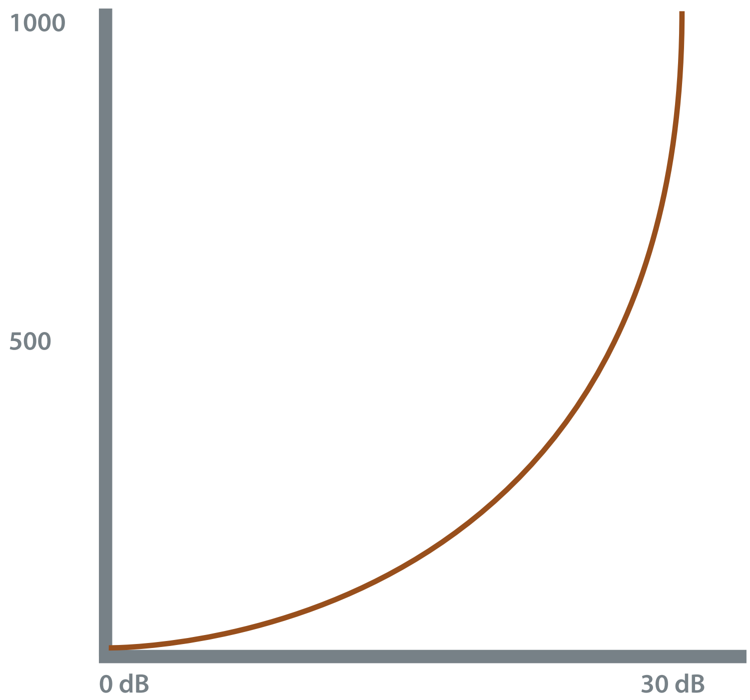
Term	Definition
Decibel, dB	A unit of noise level that denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm (to the base 10) of this ratio.
Frequency, Hz	Of a function periodic in time; the number of times that the quantity repeats itself in one second (i.e., number of cycles per second).
A-Weighted Sound Level, dBA	The sound level obtained by use of A-weighting. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. (All sound levels in this report are A-weighted, unless reported otherwise.)
L_{02}, L_{08}, L_{50}, L_{90}	The fast A-weighted noise levels that are equaled or exceeded by a fluctuating sound level 2 percent, 8 percent, 50 percent, and 90 percent of a stated time period.
Equivalent Continuous Noise Level, L_{eq}	The level of a steady sound that, in a stated time period and at a stated location, has the same A-weighted sound energy as the time-varying sound.
Community Noise Equivalent Level, CNEL	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 5 dB to sound levels occurring in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The 24-hour A-weighted average sound level from midnight to midnight, obtained after the addition of 10 dB to sound levels occurring in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted sound levels measured on a sound level meter during a designated time interval using fast-time averaging.
Ambient Noise Level	The all-encompassing noise associated with a given environment at a specified time; usually a composite of sound from many sources from many directions, near and far; no particular sound is dominant.
Intrusive	The noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal or informational content, and the prevailing ambient noise level.
Sound Exposure Level (SEL)	A measure of the total noise within an event which accounts for duration.
Single Event Noise Equivalent Level (SENEL)	The sound exposure level for a defined noise threshold level.

Source: Handbook of Acoustical Measurement and Noise Control (Harris 1991).

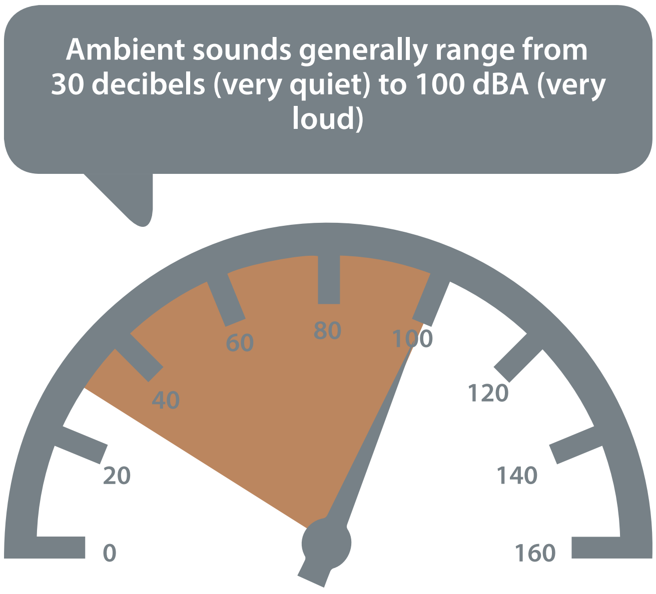
Sound levels are generated from a source, and their decibel level decreases as the distance from that source increases. Sound dissipates exponentially with distance from the noise source. For a single-point source, sound levels decrease approximately 6 dB for each doubling of distance from the source. This drop-off rate is appropriate for noise generated by stationary equipment. If noise is produced by a line source (e.g., highway traffic or railroad operations) the sound decreases 3 dB for each doubling of distance in a hard site environment. Line source noise in a relatively flat environment with absorptive vegetation decreases 4.5 dB for each doubling of distance.

There are many ways to rate noise for various time periods, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant rating scales for human communities in the State of California are the L_{eq} and the Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on A-weighted decibels. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within 1 dBA of each other and are normally interchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance, when assessing the annoyance factor, include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of Lmax for short-term noise impacts. L_{max} reflects peak-operating conditions and addresses the annoying aspects of intermittent noise.

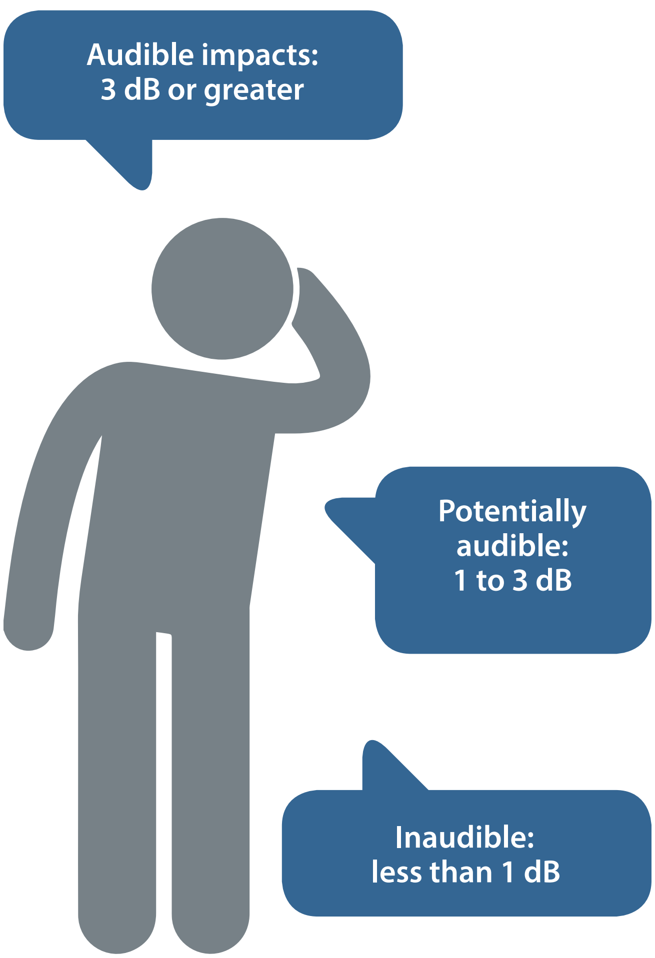


Exponential intensity of decibels



A-weighted decibels (dBA) of ambient sounds

Another noise scale often used together with the L_{max} in noise ordinances for enforcement purposes is noise standards in terms of percentile noise levels. For example, the L_{10} noise level represents the noise level exceeded 10 percent of the time during a stated period. The L_{50} noise level represents the median noise level. Half of the time the noise level exceeds this level, and half of the time it is less than this level. The L_{90} noise level represents the noise level exceeded 90 percent of the time and is considered the background noise level during a monitoring period. For a relatively constant noise source, the L_{eq} and L_{50} are approximately the same.



What noise level changes are audible?

Noise impacts can be described in three categories. The first includes audible impacts, which refer to increases in noise levels noticeable to humans. Audible increases in noise levels generally refer to a change of 3 dB or greater, because this level has been found to be barely perceptible in exterior environments. The second category, potentially audible, refers to a change in the noise level between 1 and 3 dB. This range of noise levels has been found to be noticeable only in laboratory environments. The last category includes changes in noise level of less than 1 dB, which are inaudible to the human ear. Only audible changes in existing ambient or background noise levels are considered potentially significant.

Physiological Effects of Noise

Physical damage to human hearing begins at prolonged exposure to noise levels higher than 85 dBA. Exposure to high noise levels affects the entire system, with prolonged noise exposure in excess of 75 dBA increasing body tensions and thereby affecting blood pressure and functions of the heart and the nervous system. In comparison, extended periods of noise exposure above 90 dBA would result in permanent cell damage. When the noise level reaches 120 dBA, a tickling sensation occurs in the human ear, even with short-term exposure. This level of noise is called the threshold of feeling. As the sound reaches 140 dBA, the tickling sensation is replaced by the feeling of pain in the ear. This is called the threshold of pain. A sound level of 160 dBA to 165 dBA will potentially result in dizziness or loss of equilibrium. The ambient or background noise problem is common and generally more concentrated in urban areas than in outlying, less-developed areas.

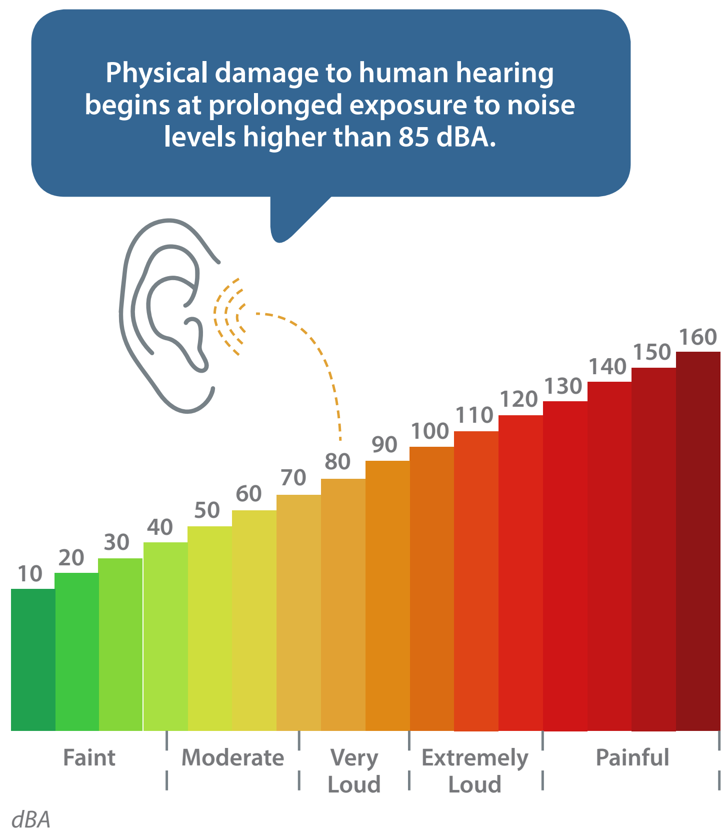
In addition to the audible effects of noise, research has shown that prolonged exposure to elevated noise levels may have other negative health effects. As presented in Wolfgang Babisch's *Cardiovascular Effects of Noise*, sleep disturbance is considered a major environmental effect. It is estimated that 80 to 90 percent of the reported cases of sleep disturbance in noisy environments are for reasons other than noise originating outdoors. Examples of sleep disturbance causes include restroom trips; indoor noises from other occupants; worries; illness; and climate. Field studies conducted with people in their normal living situations are scarce.

The primary sleep disturbance effects of noise are: difficulty in falling asleep (increased sleep latency time); awakenings; and alterations of sleep stages or depth, especially a reduction in the proportion of REM-sleep. Other physiological effects can be induced by noise during sleep, including increased blood pressure; increased heart rate; increased finger pulse amplitude; vasoconstriction; changes in respiration; cardiac arrhythmia; and an increase in body movements. For each of these physiological effects, both the noise threshold and the noise-response relationships may be different. Different noises may also have different information content and this also could affect physiological threshold and noise-response relationships.

Exposure to night time noise also induces secondary effects, or so-called after effects. These are effects that can be measured the day following the night time exposure, while the individual is awake. The secondary effects include reduced perceived sleep quality, increased fatigue, depressed mood or well-being, and decreased performance.

Long-term effects on psychosocial well-being have also been related to noise exposure during the night. Noise annoyance during the night time increased the total noise annoyance expressed by people in the following day. Various studies have also shown that people living in areas exposed to night time noise have an increased use of sedatives or sleeping pills. Other frequently reported behavioral effects of night time noise include closed bedroom windows and use of personal hearing protection. Sensitive groups include the elderly, shift workers, persons especially vulnerable to physical or mental disorders and other individuals with sleeping difficulties.

Table N-3 lists definitions of acoustical terms and Table N-4 shows common sound levels and their noise sources.



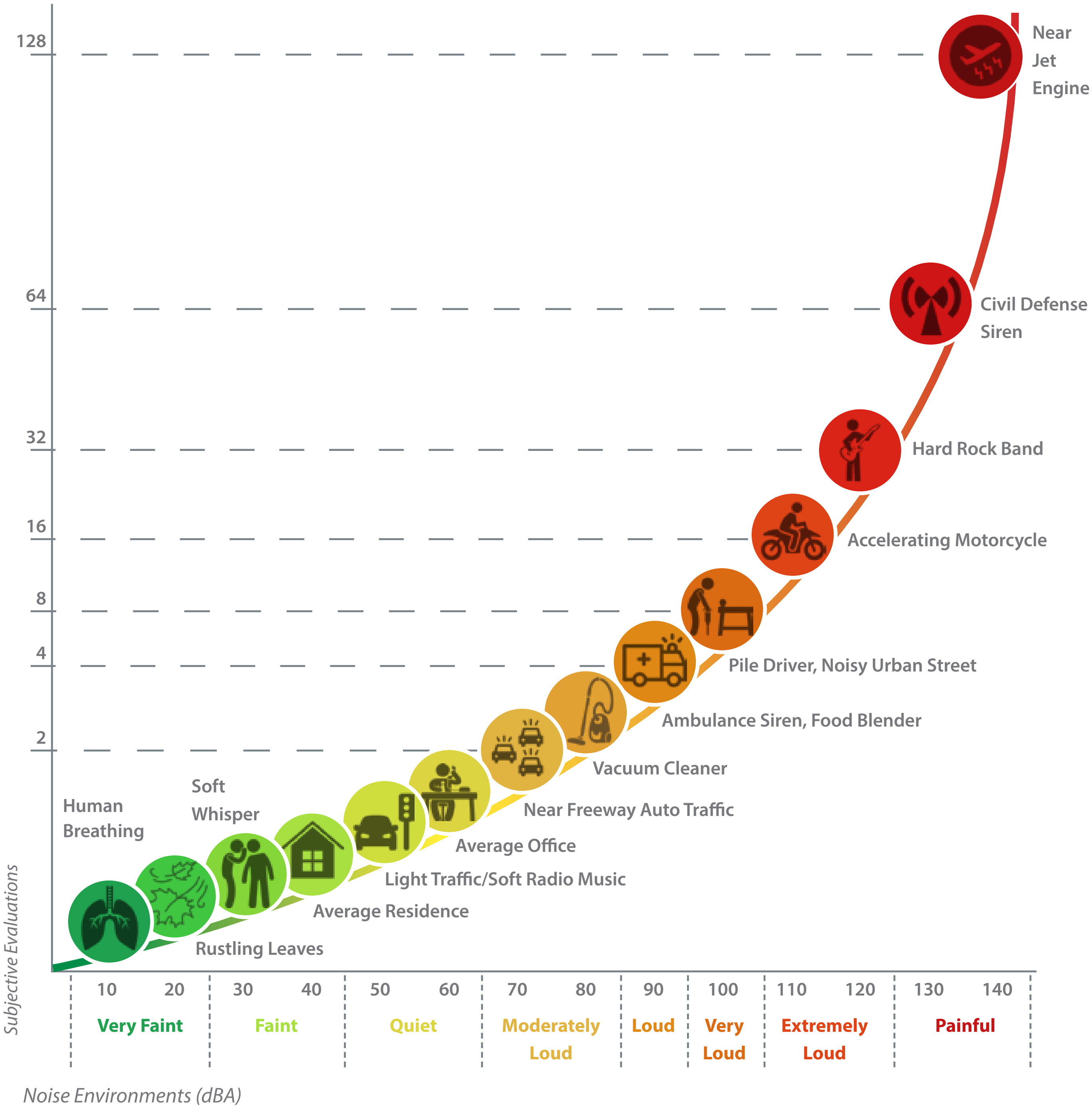


Table N-4: Common Sound Levels and Their Noise Sources

Noise Plan

5

Creating Livable Environments

"Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody."

Jane Jacobs
Urbanist, Author - The Death and Life of Great American Cities

5

Noise Plan

Creating Livable Environments

This Noise Element identifies strategies and policies to implement the vision of a healthy, livable noise environment in Long Beach. The strategies and policies outlined in this chapter identify specific ways the City is working toward that vision. Long Beach is constantly pursuing innovative policies to lead the way in planning for noise in an evolving urban environment.

PLACETYPE CHARACTERISTICS AND LAND USE COMPATIBILITY

Long Beach values the health and wellness of its residents. PlaceTypes identified within the Land Use Element establish neighborhood form, character and community-scaled districts structured around development patterns, streetscape design, and urban form. These areas range in development intensity and activity. Land use compatibility and project design strategies and policies are established to protect more sensitive PlaceTypes such as Founding and Contemporary Neighborhoods and Multifamily Residential—Low and Moderate. Additional policies are provided for more active areas such as Transit-Oriented Development – Low and Moderate, Downtown, and Waterfront PlaceTypes to promote harmony within entertainment and visitor-serving areas. Finally, policies are provided for business and employment center PlaceTypes including Community Commercial, Industrial, Neo-Industrial, Regional-Serving Facility, as well as the Port of Long Beach, to address noise generated from operations and service. Development of buildings, neighborhoods, streets, and outdoor spaces within any PlaceType should be designed to identify and reduce or eliminate unnecessary noise near noise sensitive areas. In summary, noise policies are largely organized to correspond to established PlaceTypes that reflect differentiated area characteristics. A map of Long Beach PlaceTypes is brought forward from the Land Use Element for ease of reference.

Recognizing that much of Long Beach is currently developed and in proximity to existing roadways, land use decisions must be made in context considering ambient noise levels. For example, adaptive reuse of an existing building may be in a location with high ambient noise, however, measures to the degree practical should be applied to minimize noise impacts.

Strategy No. 1 Apply site planning and other design strategies to reduce noise impacts, especially within the Founding and Contemporary Neighborhoods, Multifamily Residential—Low and Moderate, and Neighborhood-Serving Centers and Corridors – Low and Moderate PlaceTypes.

- **Policy N 1-1:** Integrate noise considerations into the land use planning process in order to prevent new land use noise conflicts.
- **Policy N 1-2:** Require noise attenuation measures to be incorporated into all development and redevelopment of sensitive receptor uses, including residential, health care facilities, schools, libraries, senior facilities, and churches in close proximity to existing or known planned rail lines.
- **Policy N 1-3:** Ensure development and redevelopment is considerate of the natural shape and contours of a site in order to reduce noise impacts.
- **Policy N 1-4:** Encourage developers or landowners to incorporate noise reduction features in the site planning process.
- **Policy N 1-5:** Incorporate urban design strategies such as courtyards, paseos, alleys, plazas and open space areas to provide a buffer to noise sensitive uses.
- **Policy N 1-6:** Ensure that project site design and function minimize the potential adverse impacts of noise.
- **Policy N 1-7:** Encourage educational facilities to locate playgrounds, sports fields, and other outdoor activity areas away from residential areas.
- **Policy N 1-8:** Require new development to provide facilities which support the use of multimodal transportation, including, walking, bicycling, carpooling and, transit.
- **Policy N 1-9:** Utilize noise barriers after all practical design-related noise measures have been integrated into the project. In instances where sound walls are necessary, they should be incorporated into the architectural and site character of the development and pedestrian access should be integrated.

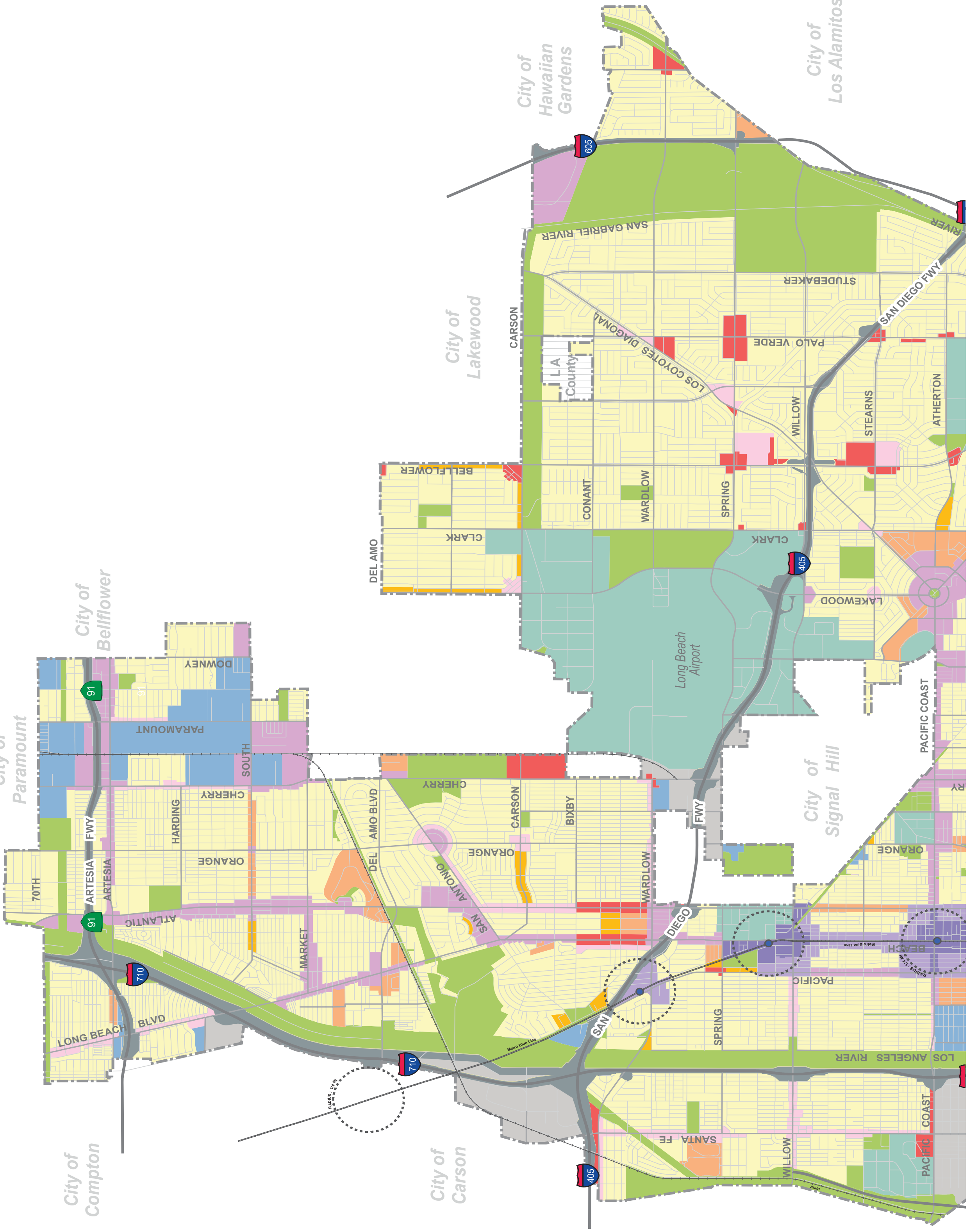


Figure N-2, Long Beach PlaceTypes-Northern (Land Use Element)

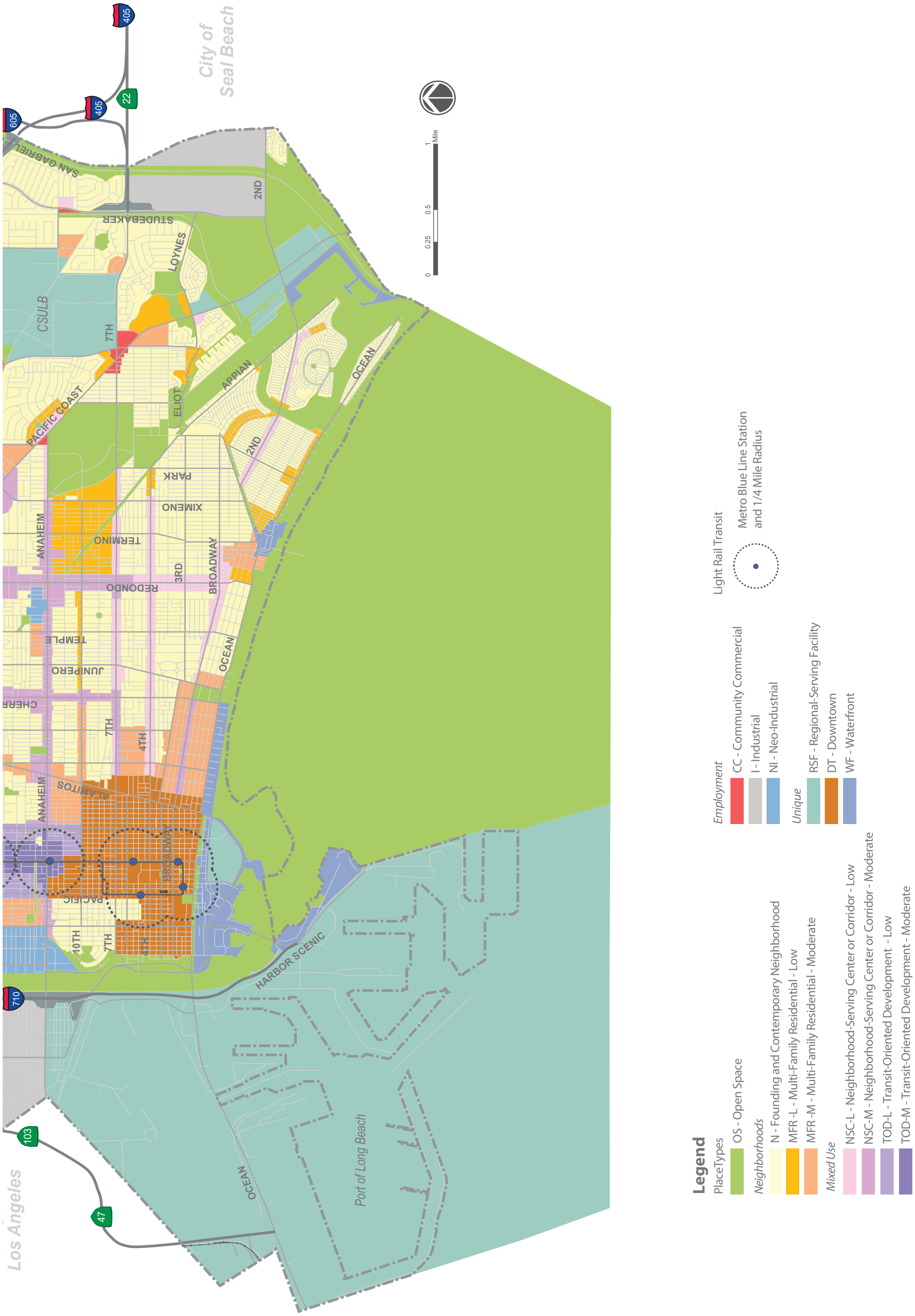


Figure N-3, Long Beach PlaceTypes-Southern (Land Use Element)

Strategy No. 2 Create a balance of business practices within dynamic, active, and engaging areas such as the Transit-Oriented Development – Low and Moderate, Downtown, and Waterfront PlaceType areas to promote activity while respecting adjacent sensitive uses.

» **Policy N 2-1:** Ensure that developments located in commercial or entertainment areas do not exceed stationary-source noise standards at the property line of proximate residential or commercial uses.

» **Policy N 2-2:** Require mitigation measures for new high-generating uses adjacent to sensitive receptors.

» **Policy N 2-3:** Require that high-generating uses engage in responsible management and operation to control the activities of their patrons on-site and within reasonable and legally justifiable proximity to minimize noise impacts on adjacent residences.

» **Policy N 2-4:** Develop, update and apply best practices for restaurants, bars and retail establishments with evening activities to ensure compatibility such as limitations on hours, location of trash/recycling, policies for rooftop activities, and communications with neighboring residents and businesses.

Strategy No. 3 Capitalize on urban design techniques and business operation strategies within business and employment center PlaceTypes (Community Commercial, Industrial, Neo-Industrial, Regional-Serving Facility, Port of Long Beach) to minimize noise impacts on surrounding adjacent uses.

» **Policy N 3-1:** Provide sufficient spatial separation between industrial uses and sensitive receptors. Utilize mitigation measures where feasible to reduce the noise source, such as noise attenuation methods, interrupting the noise path, or insulating the receptor to minimize the exposure of noise-sensitive uses to excessive industrial-related noise.

» **Policy N 3-2:** Ensure new industrial uses are in compliance with the City's Noise Ordinance.

» **Policy N 3-3:** Encourage industrial and commercial activities to restrict their receiving operations to daytime periods.

» **Policy N 3-4:** Enforce established hours and routes for delivery trucks and truck traffic.

» **Policy N 3-5:** Where sensitive receptors are located adjacent to industrial uses, reduce noise impacts through the use of noise barriers, restriction of operating hours, and investment in noise cancelling technology.

» **Policy N 3-6:** Mitigate off-site impacts from port operations and consider development of grant programs for off-site port-related noise mitigations.

Strategy No. 4 Protect and buffer noise sensitive areas and uses through effective building design and material selection.

» **Policy N 4-1:** Encourage developers to utilize noise absorbing building materials.

» **Policy N 4-2:** In mixed-use developments, locate and orient residential units away from noise sources associated with other uses on the site.

» **Policy N 4-3:** In mixed-use developments, locate residential balconies and windows away from the primary street and from other uses on the site.

» **Policy N 4-4:** In mixed-use developments, require techniques to prevent the transfer of noise and vibration to the residential uses on the site.

» **Policy N 4-5:** Encourage building design that incorporates varying and/or angled wall articulation to disperse noise.

Outdoor dining

- **Policy N 4-6:** Promote building design best practices such as staggering wall studs to minimize transmission of noise between rooms.
- **Policy N 4-7:** Consider use of decorative walls and/or dense landscaping to further buffer noise between uses.

Strategy No. 5 Implement best practices to reduce impacts of noise from industrial sources.

- **Policy N 5-1:** In observance of requirements imposed by the California Air Resources Board (CARB), limit the idling of heavy trucks during night time hours to less than five minutes.
- **Policy N 5-2:** Where feasible, require equipment enclosures for pumps and compressors that exceed Municipal Code noise standards.
- **Policy N 5-3:** Encourage conduction of high-noise or high-vibration activities in a set window or time during the day.
- **Policy N 5-4:** Industrial facility owners and/or operators should use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment.
- **Policy N 5-5:** Commercial delivery truck traffic should avoid residential areas whenever feasible.

Streets opened for biking for Beach Streets celebration

- **Policy N 5-6:** Site design should consider sensitive receptor locations and place noise sources away from these uses when feasible.
- **Policy N 5-7:** Encourage industrial operations to utilize on-site electrical sources to power equipment rather than diesel generators where feasible.

MOBILITY

Vehicle Noise

Long Beach has a multitude of sources of vehicle-related noise including automobiles, trucks, motorcycles, and buses.

Automobiles, Buses, and Trucks

Automobiles, buses, trucks, motorcycles and trains dominate transportation noise in the City. In addition to the ambient noise level created by freeway and corridor traffic, cars and trucks may also produce intermittent noise like honking and car alarms. Intermittent noise is also produced by public bus routes.

Vehicle Emissions

Vehicle noise emission standards are promulgated by the federal Environmental Protection Agency (Title 49, Code of Federal Regulations Parts 190 et seq.). The Federal Highway Administration (FHA) of the Department of Transportation has authority to enforce noise standards pertaining to licensed interstate vehicles with a gross weight of over 10,000 pounds, providing the enforcement authority has been authorized "curbing" (i.e., police) authority. State and local jurisdictions may adopt the Environmental Protection Agency regulations with-out amendment in order to enforce the regulations. However many cities, including Los Angeles, have not done so because noise emissions, as described previously and below, can be enforced locally as nuisance noise under other authorities.

The California Department of Motor Vehicles has jurisdiction over vehicle noise emissions within California. California Motor Vehicle Code Section 23130 establishes vehicle noise limits for moving vehicles, including interstate trucks that operate on streets, highways and freeways within the state, and regulates noise impacts on adjacent land uses. The provisions are enforced by the California Highway Patrol and local law enforcement agencies, such as city police.

Trucks tend to generate greater noise than cars. Certain types of trucks are prohibited by the State from traveling on certain State highways due to safety considerations. Freeways serve as the primary truck freight haul routes. Within the City, trucks are allowed to travel on streets except where prohibited by State regulations or by weight or height limits, such as on bridges, in tunnels and on some substandard streets. Because trucks can travel on most streets and highways in Long Beach, truck noise can impact all areas of the city. Areas especially impacted tend to be those that are located adjacent to industrial and warehouse sites. Truck traffic impacts, including noise, are such a problem near the Port of Long Beach and along the SR-91, I-605, I-710 and I-405 Freeways.

Freeway Noise

By the late 1960s, freeways were a major source of noise throughout the State. Entire communities were impacted, especially at night, by the steady hum or roar generated by fast moving traffic. In 1973-74 state and federal agencies, in response to the 1969 National Environmental Policy Act, adopted formal policies and criteria for construction of noise barriers to mitigate impacts. In California, the responsibility for freeway and highway noise management was assumed by the California Department of Transportation (Caltrans). As a part of the nationwide highway noise abatement effort, Caltrans instituted a noise management program to reduce impacts from existing and new freeways on residential, school and other noise sensitive uses.

The program utilized noise barriers (sound walls) and/or building modification methods. Where sound walls alone cannot reduce interior sound to acceptable levels, buildings sometimes are modified by adding or improving air conditioning, acoustical glass and/or other noise insulation features.

Future traffic noise contours, consistent with Land Use Element and Mobility Element assumptions, have been modeled and are shown in Figure 4. Detailed traffic noise contour maps are provided in the appendix.

Strategy No. 6 Minimize vehicular traffic noise in residential areas and near noise-sensitive land uses.

» **Policy N 6-1:** Ensure noise-compatible land uses along existing and future roadways, highways, and freeways.

» **Policy N 6-2:** Use the "Land Use Compatibility Guidelines" and established Noise Standards or other measures that are acceptable to the City, to guide land use and zoning reclassification, subdivision, conditional use and use variance determinations and environmental assessment considerations, especially relative to sensitive uses, as defined by this chapter within a line-of-sight of freeways, major highways, or truck haul routes.

» **Policy N 6-3:** Continue to work with the California Department of Transportation (Caltrans) to install, maintain, and update freeway and highway rights-of-way buffers and sound walls.

» **Policy N 6-4:** Work toward understanding and reducing traffic noise in residential neighborhoods with a focus on analyzing the effects of traffic noise exposure throughout the City.

» **Policy N 6-5:** Establish and enforce designated truck routes on specified arterial streets to minimize the negative impacts to noise sensitive uses throughout the City.

» **Policy N 6-6:** For future noise sensitive land uses proposed within the 65 dBA Ldn noise contours, a qualified acoustical consultant shall conduct a noise analysis to determine appropriate measures are implemented to meet the necessary exterior and interior noise standards.

» **Policy N 6-7:** Enforce regulations that address noise generated by motorcycles and support education efforts to create awareness and encourage compliance (such as posting signs along Ocean Boulevard).

» **Policy N 6-8:** Work with transit providers to evaluate and update fleet vehicle characteristics and operations to minimize noise.

» **Policy N 6-9:** Encourage site planning and building design measures that minimize the effects of traffic noise in residential zones.

» **Policy N 6-10:** Evaluate the tone and pitch of emergency vehicle sirens and truck backup sounds to promote the least impactful approach.

» **Policy N 6-11:** Supoprt and promote the Air Quality Management District's (AQMD) program for retirement of older vehicles, as they tend to generate more noise than newer, more fuel-efficient vehicles.

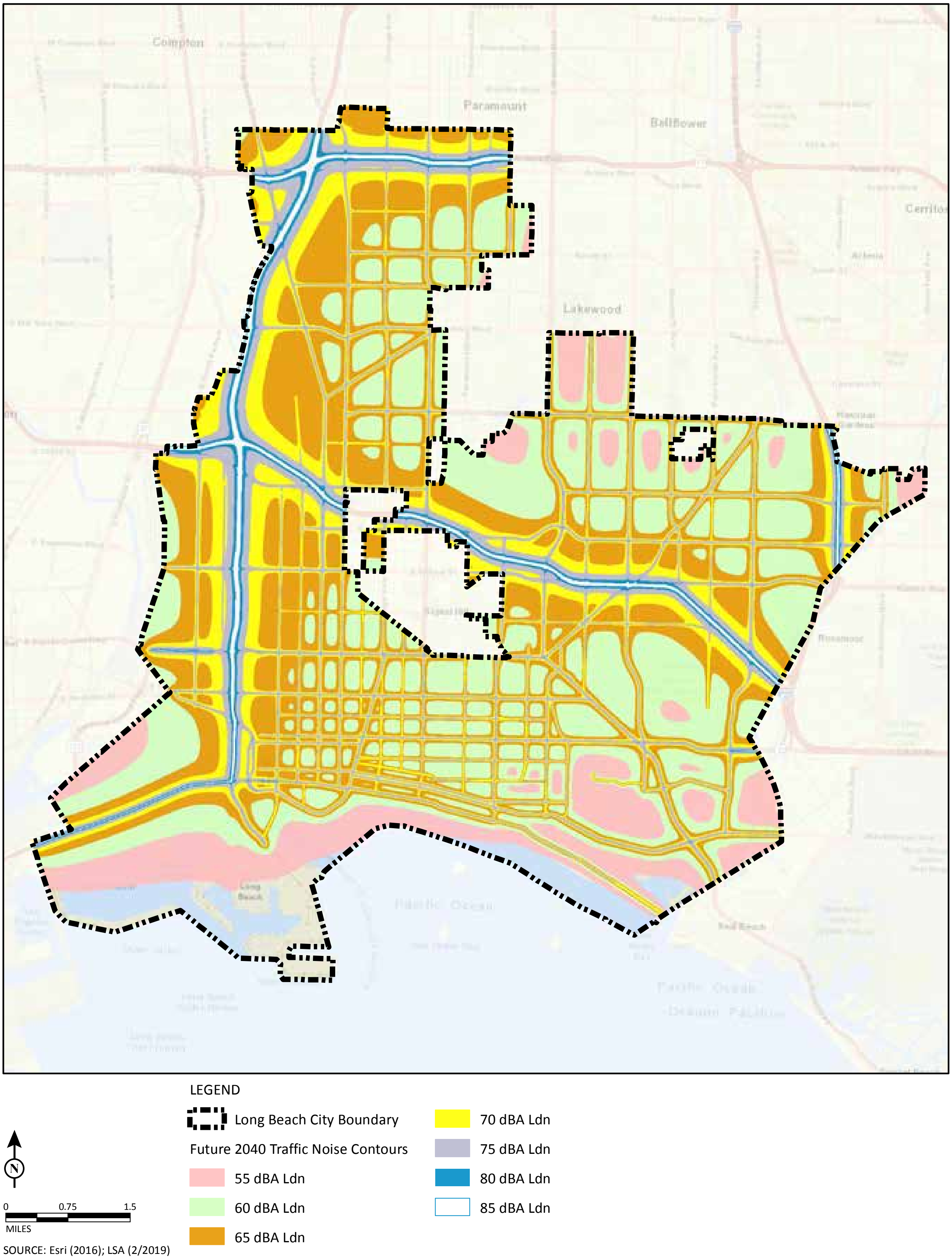


Figure N-4, Future Traffic Noise Contours (2040) Overview (Detailed maps available in Appendix)

Table N-5: Allowable Noise Exposure from Transportation Sources

Allowable noise exposure levels from transportation sources provided in Table N-5 are intended to be used as a guide to establish a pattern of land uses that minimizes exposure of residents to excessive noise. In areas where transportation noise is not the dominant noise source, refer to stationary and operational standards in the Noise Ordinance of the Long Beach Municipal Code.

Land Use		Ldn (dBA)	
PlaceType	**Uses**	**Interior[1,2]**	**Exterior[3]**
Open Space Open Space (OS)	Playgrounds, neighborhood parks	N/A	70
	Golf Courses, riding stables, water recreation, cemeteries	N/A	N/A
Neighborhoods Founding and Contemporary Neighborhood (N) Multi-Family Residential-Low (MRF-L) Multi-Family Residential-Moderate (MRF-M)	Single-family, duplex and multiple-family	45	65
	Mobile home park	N/A	65
Mixed-Use Neighborhood-Serving Center or Corridor – Low (NC-L) Neighborhood-Serving Center or Corridor – Low (NC-M) Transit-Oriented Development – Low (TOD-L) Transit-Oriented Development – Moderate (TOD-M)	Single-family	45	65
	Mobile home park	N/A	65
	Multiple-family, mixed-use	45	65[4]
	Transient lodging-motels, hotels	45	65
	Sports arenas, outdoor spectator sports	N/A	N/A
	Auditoriums, concert halls, amphitheaters	45	N/A
	Office buildings, business, commercial and professional	50	N/A
Employment Community Commercial (CC) Industrial (I) Neo-Industrial (NI)	Manufacturing, utilities, agriculture	N/A	N/A
	Office buildings, business, commercial and professional	50	N/A
Unique Regional Serving Facility RSF) Downtown (DT) Waterfront (WF)	Schools, nursing homes, day care facilities, hospitals, convalescent facilities, dormitories	45	65
	Government Facilities – offices, fire stations, community buildings	45	N/A
	Places of Worship, churches	45	N/A
	Libraries	45	N/A
	Multiple-family, mixed-use	45	65[4]
	Utilities	N/A	N/A
	Cemeteries	N/A	N/A

[1] Interior habitable environment excludes bathrooms, closets, and corridors.

[2] Interior noise standards shall be satisfied with windows in the closed position. Mechanical ventilation shall be provided per Uniform Building Code requirements.

[3] Exterior noise level standard to be applied at outdoor activity areas (e.g., private yards, private patio, or balcony of a multifamily residence). Where the location of an outdoor activity area is unknown or not applicable, the noise standard shall be applied inside the property line of the receiving land use.

[4] Within the NC-M, TOD-L, TOD-M, DT and WF PlaceType designations, exterior space standards apply only to common outdoor recreational areas.

Ldn = Day-Night Average Level

dBA = A-weighted decibels

N/A = Not Applicable

Strategy No. 7 Promote multimodal mobility to reduce noise generated from vehicular traffic.

» **Policy N 7-1:** Encourage the use of active transportation modes (walking, bicycling), micro-mobility (electric vehicles) and transit as stipulated in the Mobility Element to minimize traffic noise in the City.

» **Policy N 7-2:** Work with local and regional transit agencies and businesses to provide transportation services that reduce traffic and associated noise as stipulated in the Mobility Element.

» **Policy N 7-3:** Evaluate private development proposals to ensure provisions for multimodal mobility where feasible.

» **Policy N 7-4:** Factor multimodal mobility as part of decisions affecting use and priority of public rights-of-way.

Strategy No. 8 Implement street design and maintenance practices to minimize vehicular noise impacts.

» **Policy N 8-1:** Employ noise mitigation practices, as necessary, when designing future streets and highways, and when improvements occur along existing road segments. Mitigation measures should emphasize the establishment of buffers or setbacks between the arterial roadways and adjoining noise-sensitive areas.

Freeway interchange in Long Beach

» **Policy N 8-2:** Consider traffic calming design, such as "road diets," traffic control measures, and low-noise pavement surfaces that minimize motor vehicle traffic noise.

» **Policy N 8-3:** Consider the noise impacts on adjacent residential uses associated with establishing stop signs or other traffic control or traffic calming devices.

» **Policy N 8-4:** Maintain roadways so that the paving is in good condition to reduce noise-generating cracks, bumps, and potholes and ensure steel plates are properly installed where needed.

» **Policy N 8-5:** Consider using roadway sound attenuation techniques for resurfacing projects that use "quiet" pavement or noise-reducing rubberized asphalt.

Rail

Noise from rail systems is localized, impacting immediately adjacent communities. This section addresses noise management relative to rail systems within the City. Currently, three main freight rail lines pass through the City that are operated by Burlington Northern Santa Fe Corporation (BNSF) Railway, Union Pacific Railroad Company (UPRR), and Pacific Harbor Line Incorporated (PHL). The rail lines run north-south through the west side of the City, through the northwest corner of the City, around the neighborhood of North Long Beach.

In addition to freight activities, the Metro Blue Line which serves as public transit, is part of the Metro Rail System that runs north-south from Los Angeles to Long Beach, traveling south via Long Beach Avenue, Willowbrook Avenue, and Long Beach Boulevard to its final destination at the Long Beach Transit Gallery. The Metro Blue Line operates daily, including all major holidays.

Railways in Long Beach serve the industrial sites located in the northwest and southwest sectors of the community and typically operate at 20-30 mph. The major source of noise in trains operating in Long Beach is the diesel locomotive. The propulsion system includes a diesel engine driving an electrical generator which in turn provides power to the wheels. The water-cooling system for the engine requires auxiliary equipment such as cooling fans which are an additional source of noise. The separate sources of noise are: the exhaust, engine, fans, and wheel-to-rail noise.

A unique source of noise in the locomotive is the horn which produces the highest sound levels, up to about 115 dBA. Another noise source in a train is the rolling stock or vehicles being pulled by the locomotive. The noise exposures produced by these vehicles is due primarily to the interaction between the wheels and the rails. This noise will be dependent on the type and condition of the railway and the suspension of the vehicle. Items such as welded track and hydraulic shock absorbers on the wheel assemblies can produce significant (5-10 dBA) noise reductions. Other types of surface tracked vehicles, such as those used for rapid transit system, will produce lower noise emissions. Some residential neighborhoods near active rail lines are impacted by noise from intermittent passing trains and associated rail and truck activities.

Strategy No. 9 Minimize train noise in residential areas and near noise-sensitive land uses.

- **Policy N 9-1:** Encourage noise-compatible land uses and incorporate noise-reducing design features within transit-oriented, mixed-use development near rail corridors.
- **Policy N 9-2:** Encourage all active railroads within the City to schedule trains during daylight hours when possible.
- **Policy N 9-3:** Encourage the rail operators, both freight and passenger, to minimize the level of noise produced by train movements and horn noise within the City by reducing the number of night time operations, improving vehicle system technology, and developing improved sound barriers where residences exist next to the track.
- **Policy N 9-4:** Work with rail operators to install and maintain noise mitigation features where operations adversely impact existing or planned residential and other noise-sensitive land uses.
- **Policy N 9-5:** Require future rail projects under the City's control to analyze noise impacts and to identify and incorporate noise and vibration reducing features in the project design.
- **Policy N 9-6:** Work with Metro to provide that the design and operation of the Blue Line tracks, crossings, and station area use approaches that will minimize noise impacts associated with train operations on the community.
- **Policy N 9-7:** Coordinate with affected agencies including California Public Utilities Commission, rail operators, and Federal Railroad Administration to evaluate potential locations for Quiet Zone improvements (reduced train horn areas) and implement recommended safety improvements to result in reduced need and frequency of train horn use.
- **Policy N 9-8:** Explore Port to Alameda Corridor "Quiet Zone" implementation.
- **Policy N 9-9:** Continue to assess new methods and apply appropriate technologies to reduce rail-related noise such as application of sound-deadening matting (as opposed to wood) leading to, from and between the rails where public roads cross tracks in residential areas.

Aircraft

The primary source of aircraft noise in Long Beach is from the Long Beach Airport, though other neighboring airports, including Los Angeles International, may also impact Long Beach residents. Operations at the Long Beach Airport include commercial air carriers, commuter flights, industrial planes, charter flights, and other general aviation as well as emergency and police helicopter activities. Management of aircraft and airport related noise impacts are within federal, state and/or local authority jurisdiction.

Federal regulations are through the Federal Aviation Administration (FAA). The Caltrans Aeronautics Program (CAP) administers the enforcement of federal airport regulations in the state of California. CAP sets noise guidelines for local airports. In addition, the state provides noise level guidelines for land uses surrounding airport and those within the airport land use plan with the main focus being interior noise level standards.

In addition to the CAP, State law (Public Utilities Code Section 21670 et seq.) requires creation of county Airport Land Use Commissions (ALUCs). The ALUCs advise local jurisdictions concerning coordination of airport and land use planning for adjacent geographic areas in order to achieve orderly expansion of airports, reduction of community exposure to excessive noise and elimination of safety hazards associated with airport operations. The ALUCs prepare and adopt Comprehensive Airport Land Use Plans (CLUPs). Local methods for regulation of noise impacts is through proactive land use planning. The primary regulating tool for airport compatibility is the City of Long Beach compatibility ordinance. Chapter 16.43 of the City of Long Beach Municipal Code was established in 1995 giving the City one of the strictest noise-controlled airports in the United States. In 1990, out of concern over the proliferation of local airport noise control regulations, Congress passed the Airport Noise and Capacity Act, giving noise control to the federal government and Federal Aviation Administration (FAA). However, the City was able to work with the federal government and the FAA to retain the Ordinance, as "grandfathered" under the legislation. The Ordinance includes many details including, but not limited to, number of flights restrictions, maximum allowed noise exposure levels, a monetary violation process, incentives for quieter operations, and pilot education programs.

Long Beach Airport runway

Federal Aviation Regulations, Part 150, "Airport Noise Compatibility Planning"

As a means of implementing the Aviation Safety and Noise Abatement Act, the FAA adopted Regulations on Airport Noise Compatibility Planning Programs. The FAA published noise and land use compatibility charts to be used for land use planning with respect to aircraft noise. An expanded version of this chart appears in Aviation Circular 150/5020-1 (dated August 5, 1983). These guidelines represent recommendations to local authorities for determining acceptability and permissibility of land uses. The guidelines recommend a maximum amount of noise exposure (in terms of the cumulative noise metric DNL) that might be considered acceptable or compatible to people in living and working areas. Residential land use is deemed acceptable for noise exposures up to 65 dB DNL. The FAA permits substitution of CNEL for DNL in California.

Helicopter Operations

Helicopter noise, unlike that of fixed-wing aircraft, is associated with the sound generated by rotor blades slapping against wind currents, not by the aircraft engine. Improvements in rotor systems is the primary means of reducing noise generated by helicopters. Even with noise suppression improvements, helicopter flight at 500 feet creates an audible sound that is especially noticeable at night. National "Fly Neighborly" guidelines are implemented voluntarily by most pilots, thereby reducing noise impacts, especially in the vicinity of residential neighborhoods and noise sensitive uses.

Strategy No. 10 While the operations of airports and airport related uses are noisy by nature, the adverse effects of aircraft-related noise should be minimized.

» **Policy N 10-1:** Ensure that new development can be made compatible with the noise environment by using noise/land use compatibility standards and the airport noise contour maps as guides to future planning and development decisions.

» **Policy N 10-2:** When making land use decisions, give careful consideration to the type and density of land use and its cumulative impacts so that appropriate decisions are made for the airport, its context, and its environment. Specific consideration should be given for all development within two miles of an airport.

» **Policy N 10-3:** Support efforts of the Federal Aviation Administration (FAA) and other responsible agencies to require the development of quieter aircraft.

» **Policy N 10-4:** Utilize information provided by the Long Beach Airport Quarterly Environmental Reports, specifically noise contours, to advise land owners of special noise considerations associated with their development.

» **Policy N 10-5:** Continue to work with the FAA, airport staff and aircraft operators to ensure that future operations are in compliance with the City's noise goals, where possible.

» **Policy N 10-6:** Require private heliports/helistops to comply with the City noise ordinances and Federal Aviation Administration standards.

» **Policy N 10-7:** Work with interest groups to reduce helicopter noise impacts and direct helicopter operators to perform any training exercises over non-populated portions of the City, not over residential areas.

» **Policy N 10-8:** Continue open communications with citizens through continued outreach. Continued use of WebTrak or a similar system will allow the ability for residents to give feedback to the City on noise impacts experienced such that further meaningful communication can continue with Federal and airport staff.

» **Policy N 10-9:** Continue to evaluate potential noise impacts and compatibility through analysis and mitigation required by the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA).

Watercraft

Watercraft operation noise is a concern for noise sensitive receivers located near the City's coast and waterways. Watercraft noise levels vary greatly depending on the size of the engines and noise levels are magnified when improper muffling occurs. The Long Beach Marine Department has the responsibility to regulate noise levels on the City's coast and waterways. Typically, watercraft are divided into two general categories: personal watercraft and boats. Personal watercraft typically refer to non-motorized vessels such as kayaks and paddle boats as well as motorized vessels such as sea-doos and jet skis. Boats are typically divided into three sub-categories: man-powered boats such as gondolas; sailboats which are wind-propelled; and motor boats. The motor boat category ranges from small fishing and ski boats to cruise liners and tug boats. In areas of low speed, boat noise is generally not a concern, with the use of proper mufflers.

Strategy No. 11 Minimize watercraft noise level impacts to residential areas and in other locations near noise-sensitive uses, where possible.

» **Policy N 11-1:** Continue to require the Long Beach Parks, Recreation and Marine Department to enforce the noise requirements within the California Harbors and Navigation Code.

Watercraft in Rainbow Harbor

- **Policy N 11-2:** Enforce speed limits near the coastline and on the existing water channels.
- **Policy N 11-3:** Continue communications with the Marine Department on responding to and documenting noise complaints.
- **Policy N 11-4:** Ensure that boat owners receive information on proper noise management practices, especially those leasing City slips or with City-registered docks. Strategies include informational signage and education.

CONSTRUCTION

Construction activities are a necessary and on-going source of noise throughout all parts of the City. The duration of construction noise ranges from a few hours to multiple months. Construction activities are regulated by the City's Municipal Code, which limits typical construction activities to the daytime hours, except under special circumstances. The type of construction equipment and duration of activities greatly affect the amount of noise and vibration created. Activities include hauling materials, site preparation, grading, building erection, and other specialized construction activities.

Construction of city hall

Strategy No. 12 Minimize construction noise and vibration levels in residential areas and in other locations near noise-sensitive uses where possible.

- **Policy N 12-1:** Reduce construction, maintenance, and nuisance noise at the source, when possible, to reduce noise conflicts.
- **Policy N 12-2:** Limit the allowable hours for construction activities and maintenance operations near sensitive uses.
- **Policy N 12-3:** As part of the City's Municipal Code, establish noise levels standards based on PlaceType and time of day, to which construction noise shall conform.
- **Policy N 12-4:** Encourage off-site fabrication to reduce needed onsite construction activities and corresponding noise levels and duration.
- **Policy N 12-5:** Encourage the following construction best practices:
  - Schedule high-noise and vibration-producing activities to a shorter window of time during the day outside early morning hours to minimize disruption to sensitive uses.
  - Grading and construction contractors should use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment.
  - Construction haul truck and materials delivery traffic should avoid residential areas whenever feasible.
  - The construction contractor should place noise- and vibration-generating construction equipment and locate construction staging areas away from sensitive uses whenever feasible.
  - The construction contractor should use on-site electrical sources to power equipment rather than diesel generators where feasible.

- All residential units located within 500 ft of a construction site shall be sent a notice regarding the construction schedule. A sign legible at a distance of 50 ft shall also be posted at the construction site. All notices and the signs shall indicate the dates and durations of construction activities, as well as provide a telephone number for a "noise disturbance coordinator."
- A "noise disturbance coordinator" shall be established. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler) and shall be required to implement reasonable measures to reduce noise levels.

» **Policy N 12-6:** Continue to provide information bulletins dispersing information on municipal code requirements and recommended best practices.

» **Policy N 12-7:** Work together with the AQMD to encourage the retirement of older construction equipment in favor of newer, quieter, and less polluting equipment.

SPECIAL EVENTS

Long Beach provides a desirable setting for special events of many forms. These events include, but are not limited to, community festivals, runs/walks, citywide holiday celebrations, Long Beach Grand Prix, Long Beach Marathon, Long Beach Lesbian and Gay Pride Parade and Celebration, Jazz Festival, film production, and events hosted at the Queen Mary. Special events provide economic development and tourism, however, with residents living in close proximity to these events, ensuring managed frequency and intensity of the noise from these events is a priority for the City. Long Beach strives for an informed, balanced approach to managing the needs of these events while continuing to prioritize the wellbeing of residents.

Special event in Long Beach

Strategy No. 13 Balance the needs of special events while prioritizing the well-being of residents.

- **Policy N 13-1:** Ensure consistency and clear communication between the various City departments involved in noise. Strategies may include posting an online calendar of special events and providing information bulletins.
- **Policy N 13-2:** Provide a efficient and standardized process for Special Events permitting in order to increase predictability for residents and applicants.
- **Policy N 13-3:** Implement and enforce procedures related to noise level requirements for large special events.
- **Policy N 13-4:** Communicate regularly with residents about the Special Events that may impact them through appropriate channels to increase transparency and timely information.
- **Policy N 13-5:** Consider geographic distribution of special events throughout the City by managing frequency and intensity of events.
- **Policy N 13-6:** Stay up-to-date with sound mitigation technology for Special Events.

ENVIRONMENTAL JUSTICE AND SOCIAL EQUITY

Environmental justice and social equity, as they relate to sound, are important aspects of planning for a healthy noise environment for all residents of Long Beach. Creating a more equitable distribution of noise is one of the four primary goals of this Noise Element. Environmental justice entails equitable treatment and enforcement of environmental laws, regulations, and policies as they may disproportionately affect marginalized groups. It also emphasizes meaningful participation from affected groups.

Strategy No. 14 Ensure meaningful participation in the public process by all members of the community, especially historically excluded or marginalized groups.

- **Policy N 14-1:** Ensure that affected residents have the opportunity to participate in decisions that impact their health.
- **Policy N 14-2:** Facilitate the involvement of residents, businesses, and organizations in all aspects of the planning process.
- **Policy N 14-3:** Utilize culturally appropriate approaches to public participation and involvement.

Sound wall to protect residential neighborhood from noise

- **Policy N 14-4:** Identify those areas of the City most vulnerable to environmental hazards through CalEnviroScreen, the Environmental Justice Screening Model (EJSM) or other model.

Strategy No. 15 Reduce the disproportionate environmental noise burdens affecting low-income and minority populations.

- **Policy N 15-1:** Require that proposals for new sensitive land uses are located adequate distances from freeways and major roadways based on an analysis of physical and meteorological conditions at the project site.
- **Policy N 15-2:** Require that proposals for new sensitive land uses incorporate adequate setbacks, barriers, landscaping, or other measures as necessary to minimize noise impacts.
- **Policy N 15-3:** Provide adequate buffers between schools and industrial facilities and transportation corridors.
- **Policy N 15-4:** Require that zoning regulations provide adequate separation and buffering of residential and industrial uses.
- **Policy N 15-5:** Ensure that low-income and minority populations understand the effect of projects with noise impacts.
- **Policy N 15-6:** Initiate outreach efforts as early as possible in the decision-making process before significant resources have been invested in a particular outcome.
- **Policy N 15-7:** Support traffic and highway techniques and technologies that reduce noise impacts of vehicular traffic through traffic calming, noise barriers, pavement design and other measures.

NOISE MANAGEMENT

Long Beach makes a continual effort to regulate noise and create buffers from sources of noise to surrounding sensitive receptors and land uses. Enforcement of regulations is ongoing, and efforts are made to inform the public through a variety of means, such as through information bulletins.

One method of imposing noise regulations is through the enforcement of the California Environmental Quality Act (CEQA). Through the review of projects in compliance with CEQA, noise mitigation measures are prescribed through approved Mitigation and Monitoring Programs to limit excessive noise. The CEQA process provides a tailored environmental analysis to address project-specific impacts and individual context.

Noise mitigations are typically divided into measures addressing construction activities and measures addressing project design and operation. For construction noise, potential mitigation measures include equipment mufflers, quieter models of air compressors, locating stationary noise-generating equipment farther from sensitive receptors, no unnecessary idling of internal combustion equipment, routing construction-related traffic away from sensitive receptors, hours of loading/unloading, 150-foot radius noticing for construction activities, establishing a construction liaison to respond to noise complaints and provide corrections, provision of temporary noise barriers or blankets, and site-specific vibration mitigation.

For project design and operation noise mitigation, potential mitigation measures include appropriate site planning (for example, locating shared residential spaces behind buildings to reduce noise exposure), mechanical ventilation in residential areas in higher noise areas to allow for closed windows if desired, installation of sound-rated windows and construction methods, strategic placement of loading/unloading areas, placement of HVAC in mechanical rooms whenever possible, and provision of localized noise barriers or rooftop parapets around mechanical equipment.

Strategy No. 16 Continue to actively enhance the regulation and management of noise to improve procedures and minimize noise impacts.

- **Policy N 16-1:** Create a one-stop shop for noise concerns of all types to streamline processes, obtain information and report complaints.

» **Policy N 16-2:** Explore implementation of a noise reporting app in collaboration with existing platforms such as Go Long Beach.

» **Policy N 16-3:** Develop a framework for improved inter-agency coordination such as with the Federal Rail Administration, Federal Highway Administration, Federal Aviation Administration, and California Department of Motor Vehicles.

» **Policy N 16-4:** Compile best noise mitigation practices for key industries (such as special events, bars/entertainment, industrial and commercial uses, and construction practices).

» **Policy N 16-5:** Update the Noise Ordinance to carry out the Noise Element and periodically update based on community input and updates in technology and best practices.

» **Policy N 16-6:** Regularly evaluate and update strategies for management of nuisance noise such as:

- Updating leaf blower requirements to encourage use of electric leaf blowers versus gas-powered machines.
- Enhancing methods for managing animal noise (such as from dogs and birds).
- Improving communications and enforcement for house parties and other neighborhood disturbances.
- Support business owners by providing information on useful tools and best practices and clarifying requirements.

» **Policy N 16-7:** Evaluate the development of a mitigation program to provide sound-attenuating improvements (such as updated windows) to older buildings and residences using funds from noise fines, grants or other sources.

» **Policy N 16-8:** Ensure adequate resources are provided for enforcement of City noise regulations.

» **Policy N 16-9:** Improve communications regarding noise regulations and processes through City website features, information bulletins, and reporting procedures.

Noise from delivery trucks can be classified as a nuisance noise

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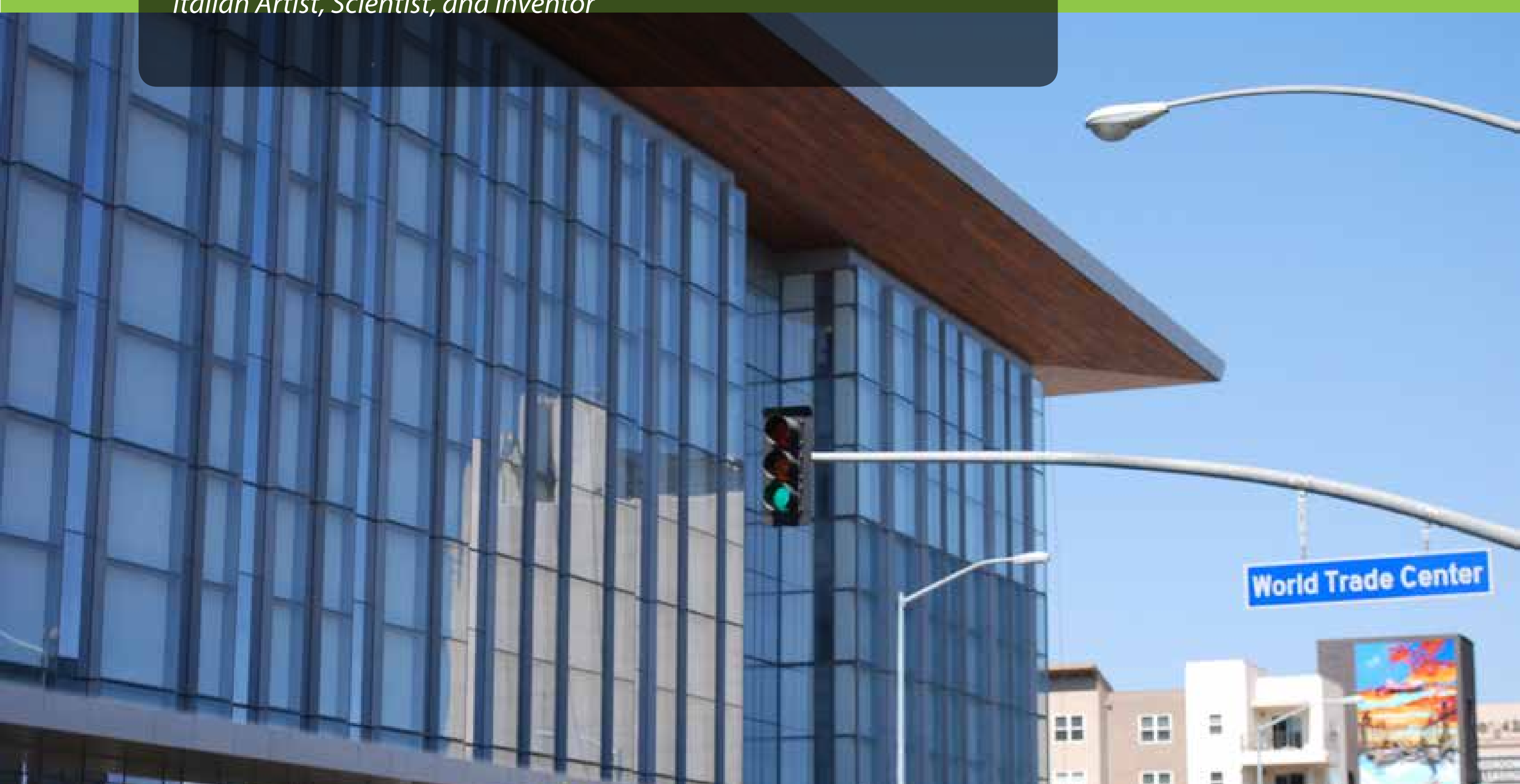
Administration + Implementation

6

Maintaining the Noise Element

"I have been impressed with the urgency of doing. Knowing is not enough; we must apply. Being willing is not enough; we must do."

Leonardo da Vinci
Italian Artist, Scientist, and Inventor



6

Administration + Implementation

Maintaining the Noise Element

ADMINISTRATION

The Noise Element provides the highest level of noise guidance on a citywide basis. It provides guidance that will be implemented through the Municipal Code, zoning, public project consistency, development review process and interagency coordination. The Noise Element further implements the PlaceType approach established in the Land Use Element and interrelates with policies with the broader Long Beach General Plan, especially those established in the Mobility Element, Housing Element, Urban Design Element and Open Space Element.

State law allows amendments to the Noise Element. Amendments may be periodically initiated by staff, the Planning Commission, City Council or a property owner. State mandated elements, including the Noise Element, can only be amended four times per calendar year. However, more than one change may be considered at each of these four opportunities. General Plan Amendments are adopted by resolution and approved immediately upon adoption of the resolution.

IMPLEMENTATION

To effectively implement the goals, strategies and policies of the Noise Element, implementing measures must be reflective of local needs and carried out as an integrated program of complementary and mutually reinforcing actions. Measures should be specific enough to implement the goals of the General Plan, while maintaining adaptability to allow flexibility in implementation throughout the timeline of the General Plan.

The City is committed to regularly reviewing progress toward implementing the goals, policies and implementation measures of the Noise Element. Since many of the factors and issues that the Element addresses change from time to time, a review and progress report that is prepared every two to three years will help ensure the City is moving forward to achieve the Noise Plan's vision and bold moves. This review will describe the status of each specific implementation strategy outlined. The review will also take into account the availability of new implementation tools and feedback from monitoring activities.

Noise Element policies are implemented through a variety of implementation tools including:

- Zoning (location of land uses, especially near sensitive receptors)
- Noise Ordinance
- Development Review (project design)
- Building and Housing Codes
- California Environmental Quality Act/National Environmental Protection Act
- Consistency in Implementation (General Plan findings for zoning, subdivisions, specific plans, capital improvement projects)
- City Noise Procedures/Management
- Interagency Coordination
- Enforcement and Remedies
- Periodic Progress Reports

Table N-6 summarizes Noise Element strategies and related policies from Chapter 5 (Noise Plan) and identifies responsible departments and the time frames to complete implementation strategies.

- Responsible Department(s). The lead City department which has primary responsibility for completion of a program will be listed. If any additional departments or external agencies are involved in a critical or supporting role, they are also listed.
- Time Frame. A time frame for existing and proposed (new) strategies and programs will be identified. Many strategies operate on an ongoing basis and are indicated as such. The timelines presented are only an estimate and may not occur as indicated due to unforeseen events, changes in funding, or City operations. Time frames are defined generally as follows:
  - Short-term = 0-5 years
  - Mid-term = 5-10 years
  - Long-term = 10-20 years
  - Ongoing = May require short-, mid-, and long-term actions

Table N-6: Implementation Matrix

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
Strategy No. 1: Apply site planning and other design strategies to reduce noise impacts, especially within the Founding and Contemporary Neighborhoods, Multifamily Residential—Low and Moderate, and Neighborhood-Serving Centers and Corridors – Low and Moderate PlaceTypes.					
N 1-1	Integrate noise considerations into the land use planning process in order to prevent new land use noise conflicts. **Responsible Department**: Development Services				●
N 1-2	Require noise attenuation measures to be incorporated into all development and redevelopment of sensitive receptor uses, including residential, health care facilities, schools, libraries, senior facilities, and churches in close proximity to existing or known planned rail lines. **Responsible Department**: Development Services				●
N 1-3	Ensure development and redevelopment is considerate of the natural shape and contours of a site in order to reduce noise impacts. **Responsible Department**: Development Services				●
N 1-4	Encourage developers or landowners to incorporate noise reduction features in the site planning process. **Responsible Department**: Development Services				●
N 1-5	Incorporate urban design strategies such as courtyards, paseos, alleys, plazas and open space areas to provide a buffer to noise sensitive uses. **Responsible Department**: Development Services				●
N 1-6	Ensure that project site design and function minimize the potential adverse impacts of noise. **Responsible Department**: Development Services				●
N 1-7	Encourage educational facilities to locate playgrounds, sports fields, and other outdoor activity areas away from residential areas. **Responsible Department**: Development Services				●
N 1-8	Require new development to provide facilities which support the use of alternative transportation modes, including, walking, bicycling, carpooling and, transit. **Responsible Department**: Development Services				●
N 1-9	Utilize noise barriers after all practical design-related noise measures have been integrated into the project. In instances where sound walls are necessary, they should be incorporated into the architectural and site character of the development and pedestrian access should be integrated. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
Strategy No. 2: Create a balance of business practices within dynamic, active, and engaging areas such as the Transit-Oriented Development – Low and Moderate, Downtown, and Waterfront PlaceType areas to promote activity while respecting adjacent sensitive uses.					
N 2-1	Ensure that developments located in commercial or entertainment areas do not exceed stationary-source noise standards at the property line of proximate residential or commercial uses. **Responsible Department**: Development Services				●
N 2-2	Require mitigation measures for new high-generating uses adjacent to sensitive receptors. **Responsible Department**: Development Services				●
N 2-3	Require that high-generating uses engage in responsible management and operation to control the activities of their patrons on-site and within reasonable and legally justifiable proximity to minimize noise impacts on adjacent residences. **Responsible Department**: Development Services **Supporting Departments**: Police, Health and Human Services				●

Policy Number	Implementation Strategies	Time Frames: Short-term	Time Frames: Mid-term	Time Frames: Long-term	Time Frames: Ongoing
N 2-4	Develop, update and apply best practices for restaurants, bars and retail establishments with evening activities to ensure compatibility such as limitations on hours, location of trash/recycling, policies for rooftop activities, and communications with neighboring residents and businesses. **Responsible Department**: Development Services **Supporting Departments**: Police, Health and Human Services	●			●
Strategy No. 3: Capitalize on urban design techniques and business operation strategies within business and employment center PlaceTypes (Community Commercial, Industrial, Neo-Industrial, Regional-Serving Facility, Port of Long Beach) to minimize noise impacts on surrounding adjacent uses.					
N 3-1	Provide sufficient spatial separation between industrial uses and sensitive receptors. Utilize mitigation measures where feasible to reduce the noise source, such as noise attenuation methods, interrupting the noise path, or insulating the receptor to minimize the exposure of noise-sensitive uses to excessive industrial-related noise. **Responsible Department**: Development Services				●
N 3-2	Ensure new industrial uses are in compliance with the City's Noise Ordinance. **Responsible Department**: Development Services				●
N 3-3	Encourage industrial and commercial activities to restrict their receiving operations to daytime periods. **Responsible Department**: Development Services				●
N 3-4	Enforce established hours and routes for delivery trucks and truck traffic. **Responsible Department**: Police				●
N 3-5	Where sensitive receptors are located adjacent to industrial uses, reduce noise impacts through the use of noise barriers, restriction of operating hours, and investment in noise cancelling technology. **Responsible Department**: Development Services				●
N 3-6	Mitigate off-site impacts from port operations and consider development of grant programs for off-site port-related noise mitigations. **Responsible Department**: Development Services **Supporting Department**: Harbor Department				●
Strategy No. 4: Protext and buffer noise sensitive areas and uses through effective building design and material selection.					
N 4-1	Encourage developers to utilize noise absorbing building materials. **Responsible Department**: Development Services				●
N 4-2	In mixed-use developments, locate and orient residential units away from noise sources associated with other uses on the site. **Responsible Department**: Development Services				●
N 4-3	In mixed-use developments, locate residential balconies and windows away from the primary street and from other uses on the site. **Responsible Department**: Development Services				●
N 4-4	In mixed-use developments, require techniques to prevent the transfer of noise and vibration to the residential uses on the site. **Responsible Department**: Development Services				●
N 4-5	Encourage building design that incorporates varying and/or angled wall articulation to disperse noise. **Responsible Department**: Development Services				●
N 4-6	Promote building design best practices such as staggering wall studs to minimize transmission of noise between rooms. **Responsible Department**: Development Services				●
N 4-7	Consider use of decorative walls and/or dense landscaping to further buffer noise between uses. **Responsible Department**: Development Services				●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
Strategy No. 5: Implement best practices to reduce impacts of noise from industrial sources					
N 5-1	In observance of requirements imposed by the California Air Resources Board (CARB), limit the idling of heavy trucks during night time hours to less than five minutes. **Responsible Department**: Development Services				●
N 5-2	Where feasible, require equipment enclosures for pumps and compressors that exceed Municipal Code noise standards. **Responsible Department**: Development Services				●
N 5-3	Encourage conduction of high-noise or high-vibration activities in a set window or time during the day. **Responsible Department**: Development Services				●
N 5-4	Industrial facility owners and/or operators should use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment. **Responsible Department**: Development Services				●
N 5-5	Commercial delivery truck traffic should avoid residential areas whenever feasible. **Responsible Department**: Development Services				●
N 5-6	Site design should consider sensitive receptor locations and place noise sources away from these uses when feasible. **Responsible Department**: Development Services				●
N 5-7	Encourage industrial operations to utilize on-site electrical sources to power equipment rather than diesel generators where feasible. **Responsible Department**: Development Services				●
Strategy No. 6: Minimize vehicular traffic noise in residential areas and near noise-sensitive land uses.					
N 6-1	Ensure noise-compatible land uses along existing and future roadways, highways, and freeways. **Responsible Department**: Development Services				●
N 6-2	Use the "Land Use Compatibility Guidelines" and established Noise Standards or other measures that are acceptable to the City, to guide land use and zoning reclassification, subdivision, conditional use and use variance determinations and environmental assessment considerations, especially relative to sensitive uses, as defined by this chapter within a line-of-sight of freeways, major highways, or truck haul routes. **Responsible Department**: Development Services				●
N 6-3	Continue to work with the California Department of Transportation (Caltrans) to install, maintain, and update freeway and highway rights-of-way buffers and sound walls. **Responsible Department**: Public Works **Outside Agency**: Caltrans				●
N 6-4	Work toward understanding and reducing traffic noise in residential neighborhoods with a focus on analyzing the effects of traffic noise exposure throughout the City. **Responsible Department**: Public Works				●
N 6-5	Establish and enforce designated truck routes on specified arterial streets to minimize the negative impacts to noise sensitive uses throughout the City. **Responsible Department**: Development Services **Supporting Departments**: Public Works, Police		●		●
N 6-6	For future noise sensitive land uses proposed within the 65 dBA CNEL noise contours, a qualified acoustical consultant shall conduct a noise analysis to determine appropriate measures are implemented to meet the necessary exterior and interior noise standards. **Responsible Department**: Development Services				●
N 6-7	Enforce regulations that address noise generated by motorcycles and support education efforts to create awareness and encourage compliance (such as posting signs along Ocean Boulevard). **Responsible Department**: Police **Supporting Department**: City Manager				●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
N 6-8	Work with transit providers to evaluate and update fleet vehicle characteristics and operations to minimize noise. **Responsible Department**: Public Works **Supporting Department**: Long Beach Transit				●
N 6-9	Encourage site planning and building design measures that minimize the effects of traffic noise in residential zones. **Responsible Department**: Development Services				●
N 6-10	Evaluate the tone and pitch of emergency vehicle sirens and truck backup sounds to promote the least impactful approach. **Responsible Department**: Development Services **Supporting Departments**: Police, Fire	●			●
N 6-11	Supoprt and promote the Air Quality Management District's (AQMD) program for retirement of older vehicles, as they tend to generate more noise than newer, more fuel-efficient vehicles. **Responsible Department**: City Manager	●			●
Strategy No. 7: Promote alternative forms of mobility to reduce noise generated from vehicular traffic.					
N 7-1	Encourage the use of alternative transportation modes as stipulated in the Mobility Element (walking, bicycling, transit use, electric vehicles) to minimize traffic noise in the City. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
N 7-2	Work with local and regional transit agencies and businesses to provide transportation services that reduce traffic and associated noise as stipulated in the Mobility Element. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
N 7-3	Evaluate private development proposals to ensure provisions for alternative modes of mobility where feasible. **Responsible Department**: Development Services				●
N 7-4	Factor alternatives modes of mobility as part of decisions affecting use and priority of public rights-of-way. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
Strategy No. 8: Implement street design and maintenance practices to minimize vehicular noise impacts.					
N 8-1	Employ noise mitigation practices, as necessary, when designing future streets and highways, and when improvements occur along existing road segments. Mitigation measures should emphasize the establishment of buffers or setbacks between the arterial roadways and adjoining noise-sensitive areas. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
N 8-2	Consider traffic calming design, such as "road diets," traffic control measures, and low-noise pavement surfaces that minimize motor vehicle traffic noise. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
N 8-3	Consider the noise impacts on adjacent residential uses associated with establishing stop signs or other traffic control or traffic calming devices. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
N 8-4	Maintain roadways so that the paving is in good condition to reduce noise-generating cracks, bumps, and potholes and ensure steel plates are properly installed where needed. **Responsible Department**: Public Works **Supporting Department**: Development Services				●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
N 8-5	Consider using roadway sound attenuation techniques for resurfacing projects that use "quiet" pavement or noise-reducing rubberized asphalt. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
Strategy No. 9: Minimize train noise in residential areas and near noise-sensitive land uses.					
N 9-1	Encourage noise-compatible land uses and incorporate noise-reducing design features within transit-oriented, mixed-use development near rail corridors. **Responsible Department**: Development Services				●
N 9-2	Encourage all active railroads within the City to schedule trains during daylight hours when possible. **Responsible Department**: Public Works				●
N 9-3	Encourage the rail operators, both freight and passenger, to minimize the level of noise produced by train movements and horn noise within the City by reducing the number of night time operations, improving vehicle system technology, and developing improved sound barriers where residences exist next to the track. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
N 9-4	Work with rail operators to install and maintain noise mitigation features where operations adversely impact existing or planned residential and other noise-sensitive land uses. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
N 9-5	Require future rail projects under the City's control to analyze noise impacts and to identify and incorporate noise and vibration reducing features in the project design. **Responsible Department**: Public Works				●
N 9-6	Work with Metro to provide that the design and operation of the Blue Line tracks, crossings, and station area use approaches that will minimize noise impacts associated with train operations on the community. **Responsible Department**: Public Works **Supporting Department**: Development Services	●			●
N 9-7	Coordinate with affected agencies including California Public Utilities Commission, rail operators, and Federal Railroad Administration to evaluate potential locations for Quiet Zone improvements (reduced train horn areas) and implement recommended safety improvements to result in reduced need and frequency of train horn use. **Responsible Department**: Public Works		●		
N 9-8	Explore Port to Alameda Corridor "Quiet Zone" implementation. **Responsible Department**: Public Works **Supporting Department**: Harbor		●		
N 9-9	Continue to assess new methods and apply appropriate technologies to reduce rail-related noise such as application of sound-deadening matting (as opposed to wood) leading to, from and between the rails where public roads cross tracks in residential areas. **Responsible Department**: Public Works		●		
Strategy No. 10: While the operations of airports and airport related uses are noisy by nature, the adverse effects of aircraft-related noise should be minimized.					
N 10-1	Ensure that new development can be made compatible with the noise environment by using noise/land use compatibility standards and the airport noise contour maps as guides to future planning and development decisions. **Responsible Department**: Development Services **Supporting Department**: Long Beach Airport				●

Policy Number	Implementation Strategies	Time Frames: Short-term	Time Frames: Mid-term	Time Frames: Long-term	Time Frames: Ongoing
N 10-2	When making land use decisions, give careful consideration to the type and density of land use and its cumulative impacts so that appropriate decisions are made for the airport, its context, and its environment. Specific consideration should be given for all development within two miles of an airport. **Responsible Department**: Development Services				●
N 10-3	Support efforts of the Federal Aviation Administration (FAA) and other responsible agencies to require the development of quieter aircraft. **Responsible Department**: Long Beach Airport				●
N 10-4	Utilize information provided by the Long Beach Airport Quarterly Environmental Reports, specifically noise contours, to advise land owners of special noise considerations associated with their development. **Responsible Department**: Long Beach Airport				●
N 10-5	Continue to work with the FAA, airport staff and aircraft operators to ensure that future operations are in compliance with the City's noise goals, where possible. **Responsible Department**: Long Beach Airport				●
N 10-6	Require private heliports/helistops to comply with the City noise ordinances and Federal Aviation Administration standards. **Responsible Department**: Long Beach Airport **Supporting Department**: Police				●
N 10-7	Work with interest groups to reduce helicopter noise impacts and direct helicopter operators to perform any training exercises over non-populated portions of the City, not over residential areas. **Responsible Department**: Long Beach Airport **Supporting Department**: City Manager				●
N 10-8	Continue open communications with citizens through continued outreach. Continued use of WebTrak or a similar system will allow the ability for residents to give feedback to the City on noise impacts experienced such that further meaningful communication can continue with Federal and airport staff. **Supporting Department**: Long Beach Airport				●
N 10-9	Continue to evaluate potential noise impacts and compatibility through analysis and mitigation required by the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA). **Responsible Department**: Development Services				●
Strategy No. 11: Minimize watercraft noise level impacts to residential areas and in other locations near noise-sensitive uses, where possible.					
N 11-1	Continue to require the Long Beach Marine Department to enforce the noise requirements within the California Harbors and Navigation Code. **Responsible Department**: Parks, Recreation and Marine **Supporting Department**: Harbor				●
N 11-2	Enforce speed limits near the coastline and on the existing water channels. **Responsible Department**: Parks, Recreation and Marine **Supporting Department**: Harbor				●
N 11-3	Continue communications with the Marine Department on responding to and documenting noise complaints. **Responsible Department**: Health and Human Services **Supporting Departments**: Parks, Recreation and Marine, Harbor				●
N 11-4	Ensure that boat owners receive information on proper noise management practices, especially those leasing City slips or with City-registered docks. Strategies include informational signage and education. **Responsible Department**: Parks, Recreation and Marine	●			●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
Strategy No. 12: Minimize construction noise and vibration levels in residential areas and in other locations near noise-sensitive uses where possible.					
N 12-1	Reduce construction, maintenance, and nuisance noise at the source, when possible, to reduce noise conflicts. **Responsible Department**: Development Services				●
N 12-2	Limit the allowable hours for construction activities and maintenance operations near sensitive uses. **Responsible Department**: Development Services				●
N 12-3	As part of the City's Municipal Code, establish noise levels standards based on PlaceType and time of day, to which construction noise shall conform. **Responsible Department**: Development Services	●			●
N 12-4	Encourage off-site fabrication to reduce needed onsite construction activities and corresponding noise levels and duration. **Responsible Department**: Development Services				●
N 12-5	Require that all construction activities incorporate the following best business practices: • Schedule high-noise and vibration-producing activities to a shorter window of time during the day outside early morning hours to minimize disruption to sensitive uses. • Grading and construction contractors shall use equipment that generates lower noise and vibration levels, such as rubber-tired equipment rather than metal-tracked equipment. • Construction haul truck and materials delivery traffic shall avoid residential areas whenever feasible. • The construction contractor shall place noise- and vibration-generating construction equipment and locate construction staging areas away from sensitive uses whenever feasible. • All residential units located within 500 ft of a construction site shall be sent a notice regarding the construction schedule. A sign legible at a distance of 50 ft shall also be posted at the construction site. All notices and the signs shall indicate the dates and durations of construction activities, as well as provide a telephone number for a "noise disturbance coordinator." • A "noise disturbance coordinator" shall be established. The disturbance coordinator shall be responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of the noise complaint (e.g., starting too early, bad muffler) and shall be required to implement reasonable measures to reduce noise levels. **Responsible Department**: Development Services				●
N 12-6	Continue to provide information bulletins dispersing information on municipal code requirements and recommended best practices. **Responsible Department**: Health and Human Services **Supporting Departments**: Development Services, City Manager				●
N 12-7	Work together with the AQMD to encourage the retirement of older construction equipment in favor of newer, quieter, and less polluting equipment. **Responsible Department**: City Manager **Supporting Department**: Development Services	●			●
Strategy No. 13: Balance the needs of special events while prioritizing the well-being of residents.					
N 13-1	Ensure consistency and clear communication between the various City departments involved in noise. Strategies may include posting an online calendar of special events and providing information bulletins. **Responsible Department**: City Manager **Supporting Department**: Health and Human Services	●			●
N 13-2	Provide a efficient and standardized process for special events permitting in order to increase predictability for residents and applicants. **Responsible Department**: City Manager				●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
N 13-3	Implement and enforce procedures related to noise level requirements for large special events. **Responsible Department**: City Manager **Supporting Departments**: Health and Human Services, Police				●
N 13-4	Communicate regularly with residents about the special events that may impact them through appropriate channels to increase transparency and timely information. **Responsible Department**: City Manager				●
N 13-5	Communicate regularly with residents about the special events that may impact them through appropriate channels to increase transparency and timely information. **Responsible Department**: City Manager				●
N 13-6	Stay up-to-date with sound mitigation technology for special events. **Responsible Department**: City Manager **Supporting Department**: Health and Human Services				●
Strategy No. 14: Ensure meaningful participation in the public process by all members of the community, especially historically excluded or marginalized groups.					
N 14-1	Ensure that affected residents have the opportunity to participate in decisions that impact their health. **Responsible Department**: Development Services **Supporting Departments**: City Manager, Health and Human Services				●
N 14-2	Facilitate the involvement of residents, businesses, and organizations in all aspects of the planning process. **Responsible Department**: Development Services **Supporting Departments**: City Manager, Health and Human Services				●
N 14-3	Utilize culturally appropriate approaches to public participation and involvement. **Responsible Department**: Development Services **Supporting Departments**: City Manager, Health and Human Services				●
N 14-4	Identify those areas of the City most vulnerable to environmental hazards through CalEnviroScreen, the Environmental Justice Screening Model (EJSM) or other model. **Responsible Department**: Development Services **Supporting Department**: Health and Human Services				●
Strategy No. 15: Reduce the disproportionate environmental noise burdens affecting low-income and minority populations.					
N 15-1	Require that proposals for new sensitive land uses are located adequate distances from freeways and major roadways based on an analysis of physical and meteorological conditions at the project site. **Responsible Department**: Development Services				●
N 15-2	Require that proposals for new sensitive land uses incorporate adequate setbacks, barriers, landscaping, or other measures as necessary to minimize noise impacts. **Responsible Department**: Development Services				●
N 15-3	Provide adequate buffers between schools and industrial facilities and transportation corridors. **Responsible Department**: Development Services				●
N 15-4	Require that zoning regulations provide adequate separation and buffering of residential and industrial uses. **Responsible Department**: Development Services				●
N 15-5	Ensure that low-income and minority populations understand the effect of projects with noise impacts. **Responsible Department**: Development Services **Supporting Department**: Public Works				●
N 15-6	Initiate outreach efforts as early as possible in the decision-making process before significant resources have been invested in a particular outcome. **Responsible Department**: Development Services **Supporting Department**: Public Works				●

Policy Number	Implementation Strategies	Time Frames			
		Short-term	Mid-term	Long-term	Ongoing
N 15-7	Support traffic and highway techniques and technologies that reduce noise impacts of vehicular traffic through traffic calming, noise barriers, pavement design and other measures. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
Strategy No. 16: Continue to actively enhance the regulation and management of noise to improve procedures and minimize noise impacts.					
N 16-1	Create a one-stop shop for noise concerns of all types to streamline processes, obtain information and report complaints. **Responsible Department**: Health and Human Services **Supporting Departments**: City Manager, Police, Development Services				●
N 16-2	Explore implementation of a noise reporting app in collaboration with existing platforms such as Go Long Beach. **Responsible Department**: Health and Human Services **Supporting Departments**: City Manager				●
N 16-3	Develop a framework for improved inter-agency coordination such as with the Federal Rail Administration, Federal Highway Administration, Federal Aviation Administration, and California Department of Motor Vehicles. **Responsible Department**: Public Works **Supporting Department**: Development Services				●
N 16-4	Compile best noise mitigation practices for key industries (such as special events, bars/entertainment, industrial and commercial uses, and construction practices). **Responsible Department**: City Manager **Supporting Department**: Development Services	●			
N 16-5	Update the Noise Ordinance to carry out the Noise Element and periodically update based on community input and updates in technology and best practices. **Responsible Department**: Development Services	●			●
N 16-6	Regularly evaluate and update strategies for management of nuisance noise such as: • Updating leaf blower requirements to encourage use of electric leaf blowers versus gas-powered machines. • Enhancing methods for managing animal noise (such as from dogs and birds). • Improving communications and enforcement for house parties and other neighborhood disturbances. • Support business owners by providing information on useful tools and best practices and clarifying requirements. **Responsible Department**: Development Services **Supporting Departments**: Health and Human Services, Police				●
N 16-7	Evaluate the development of a mitigation program to provide sound-attenuating improvements (such as updated windows) to older buildings and residences using funds from noise fines, grants or other sources. **Responsible Department**: Development Services **Supporting Department**: Health and Human Services		●		
N 16-8	Ensure adequate resources are provided for enforcement of City noise regulations. **Responsible Department**: Health and Human Services **Supporting Department**: Police				●
N 16-9	Improve communications regarding noise regulations and processes through City website features, information bulletins, and reporting procedures. **Responsible Department**: Health and Human Services **Supporting Departments**: City Manager, Development Services	●			●

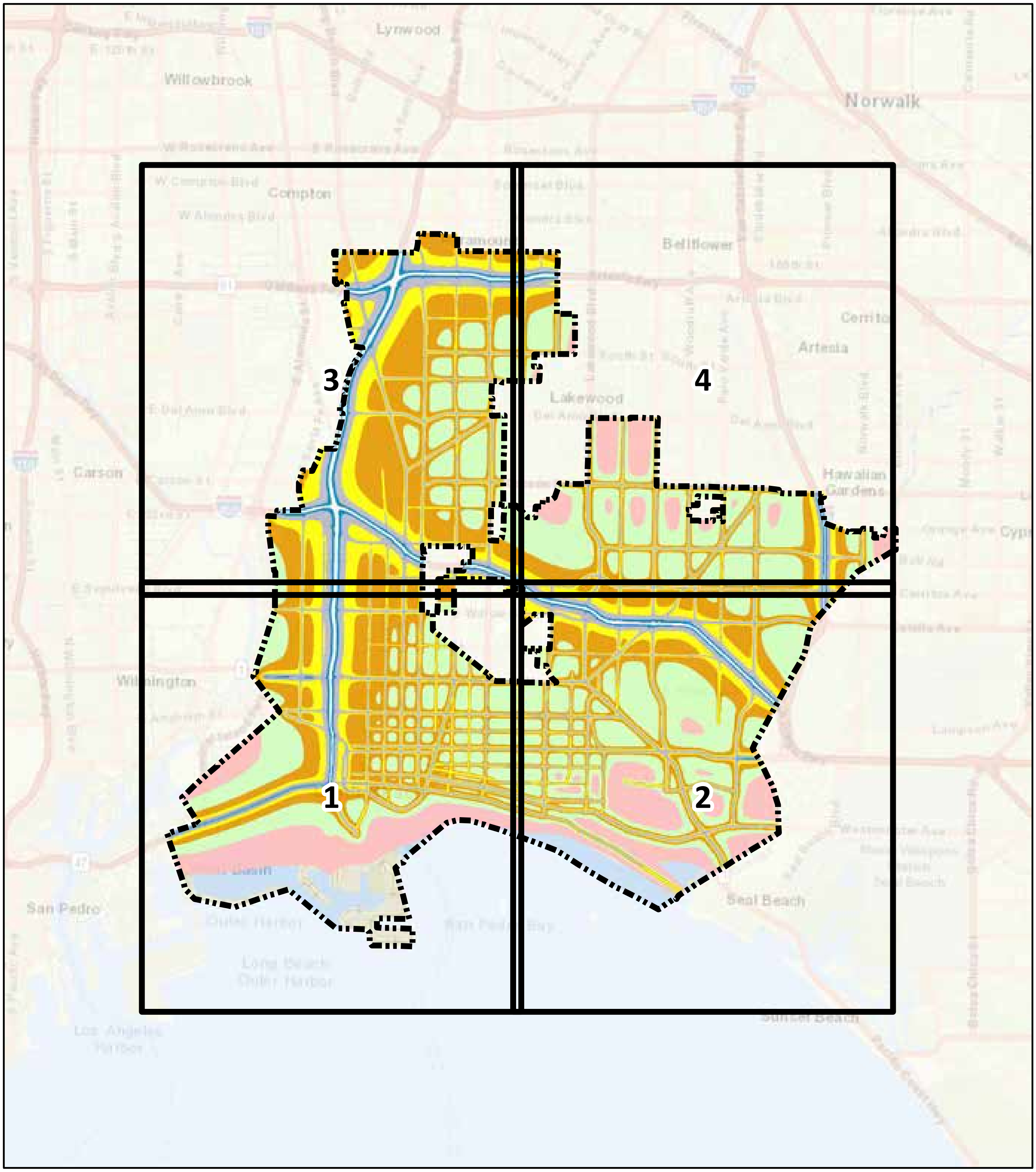
Appendix

7

"Cities have the capability of providing something for everybody, only because, and only when, they are created by everybody."

Jane Jacobs
Urbanist, Author - The Death and Life of Great American Cities

7 Appendix



LEGEND

Long Beach City Boundary

Future 2040 Traffic Noise Contours

55 dBA Ldn

60 dBA Ldn

65 dBA Ldn

70 dBA Ldn

75 dBA Ldn

80 dBA Ldn

85 dBA Ldn

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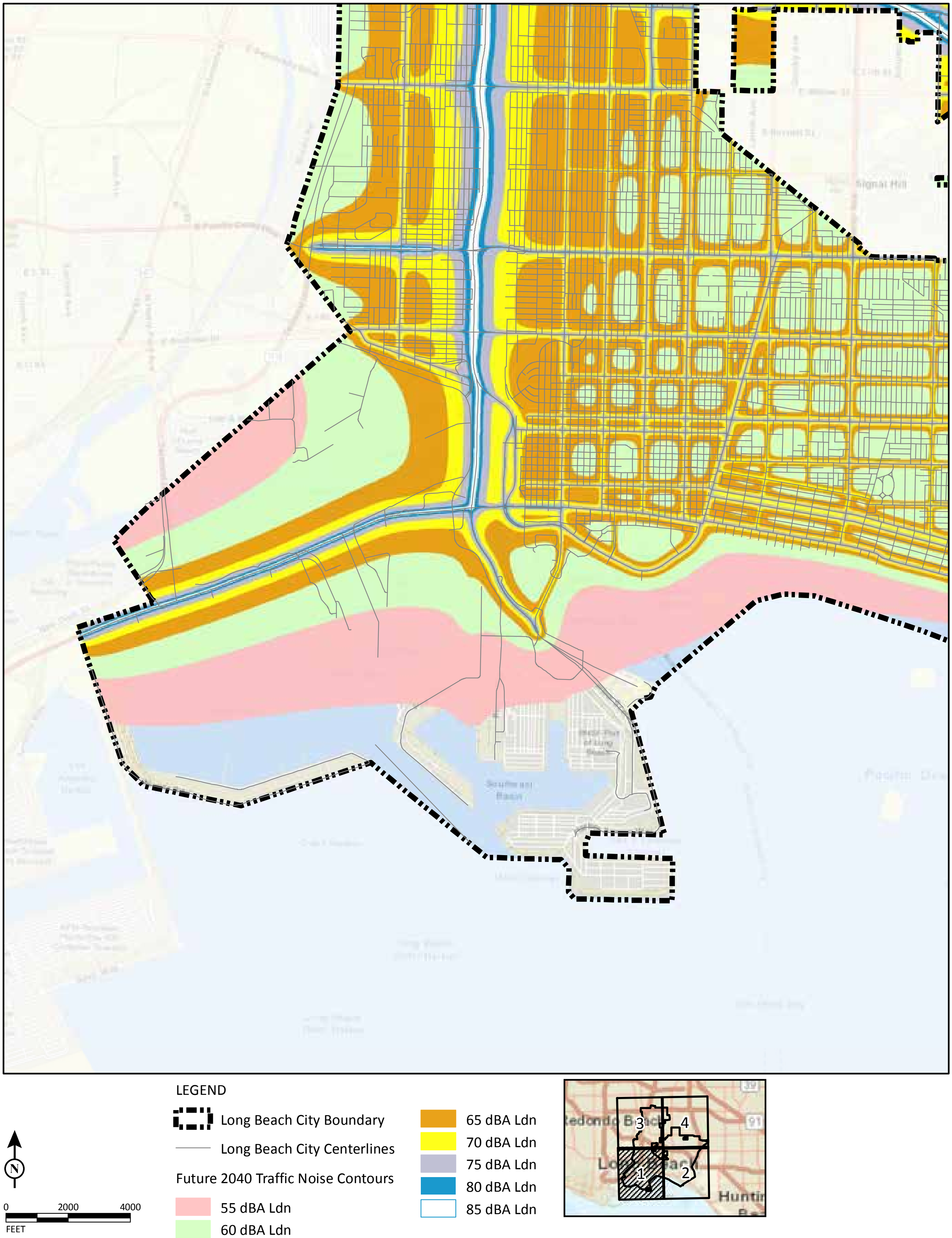
SOURCE: Esri (2016); LSA (2/2019)



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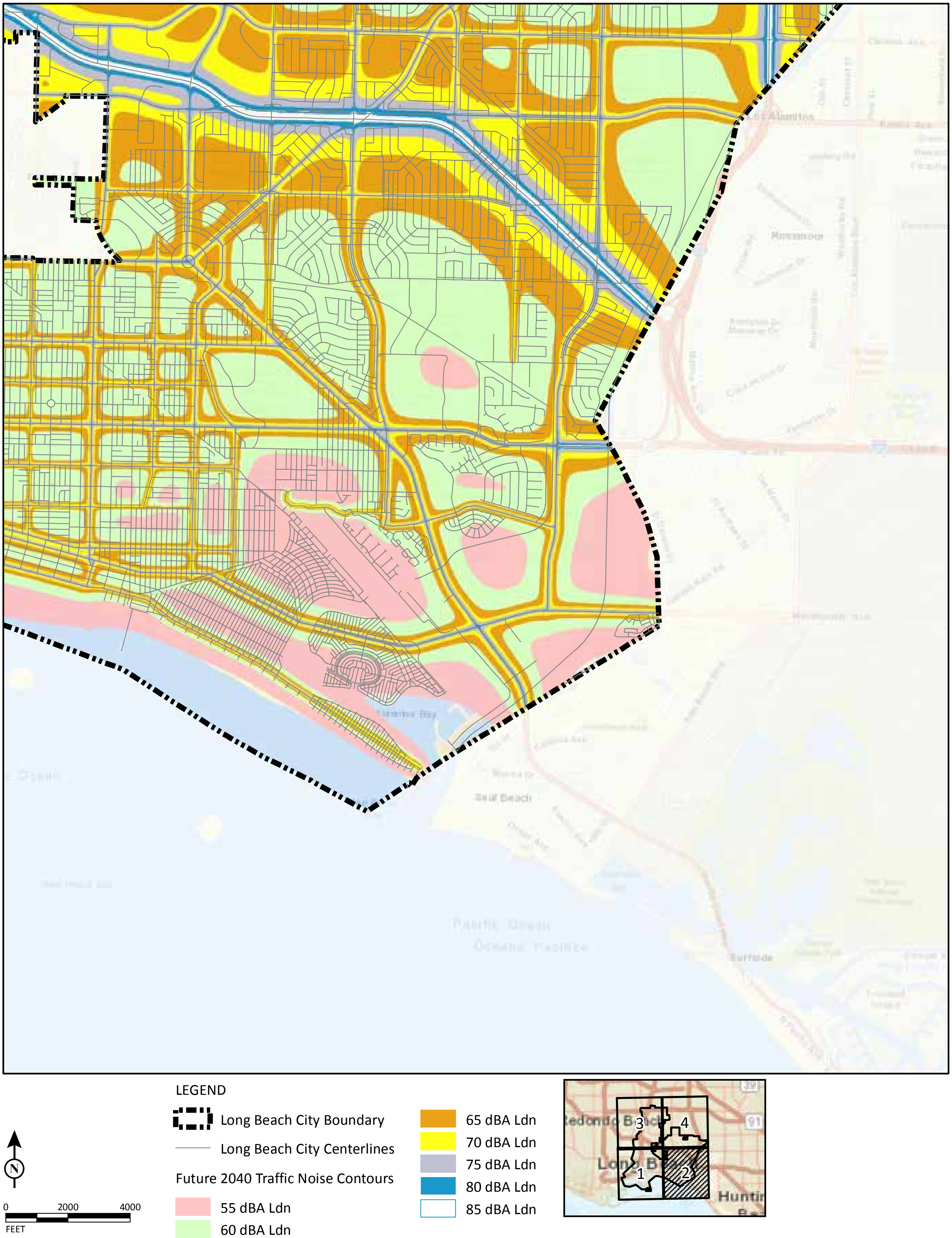

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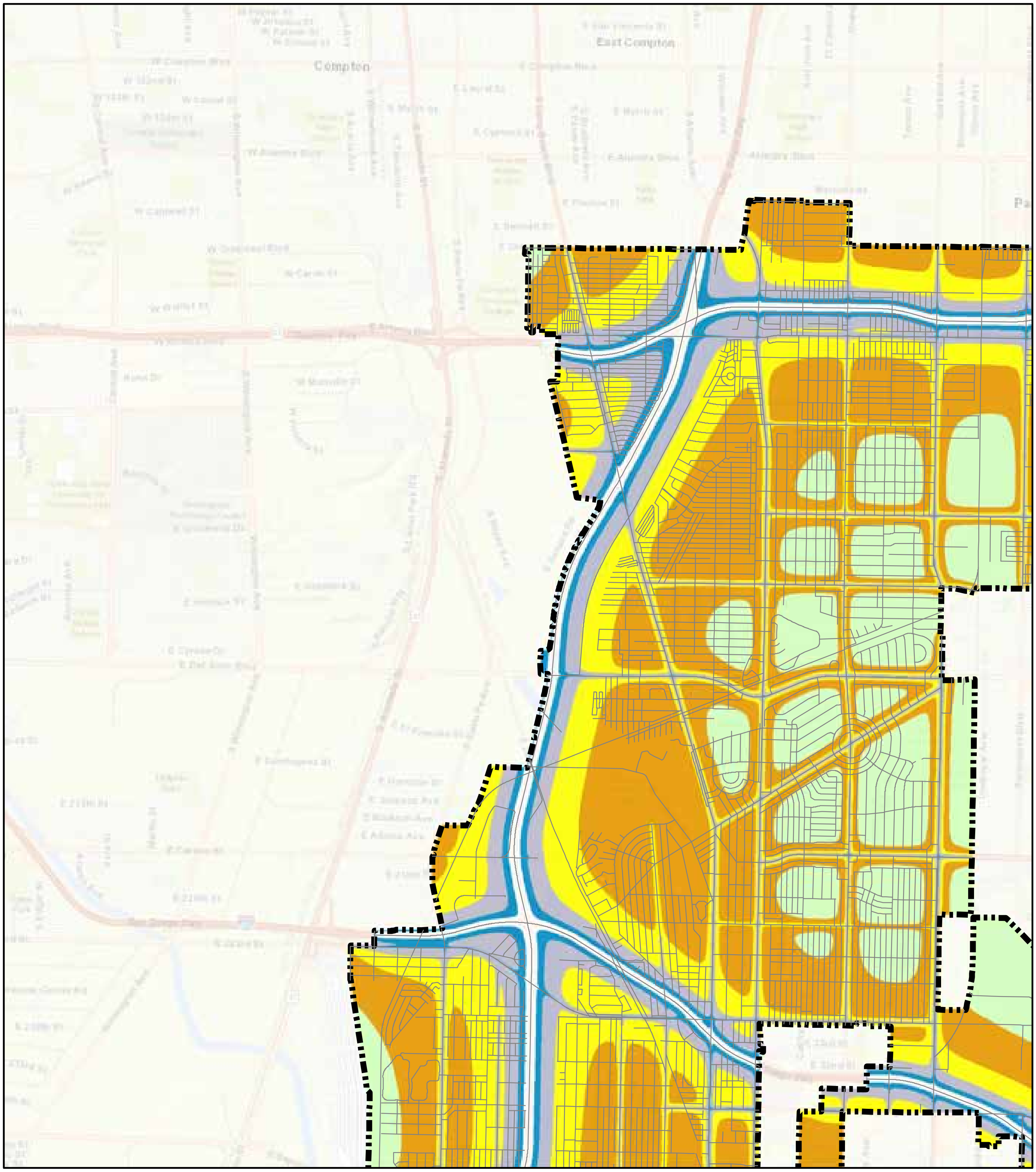

LEGEND

Long Beach City Boundary

Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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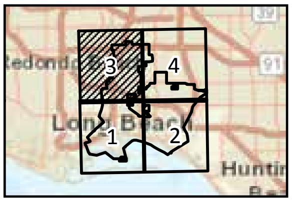

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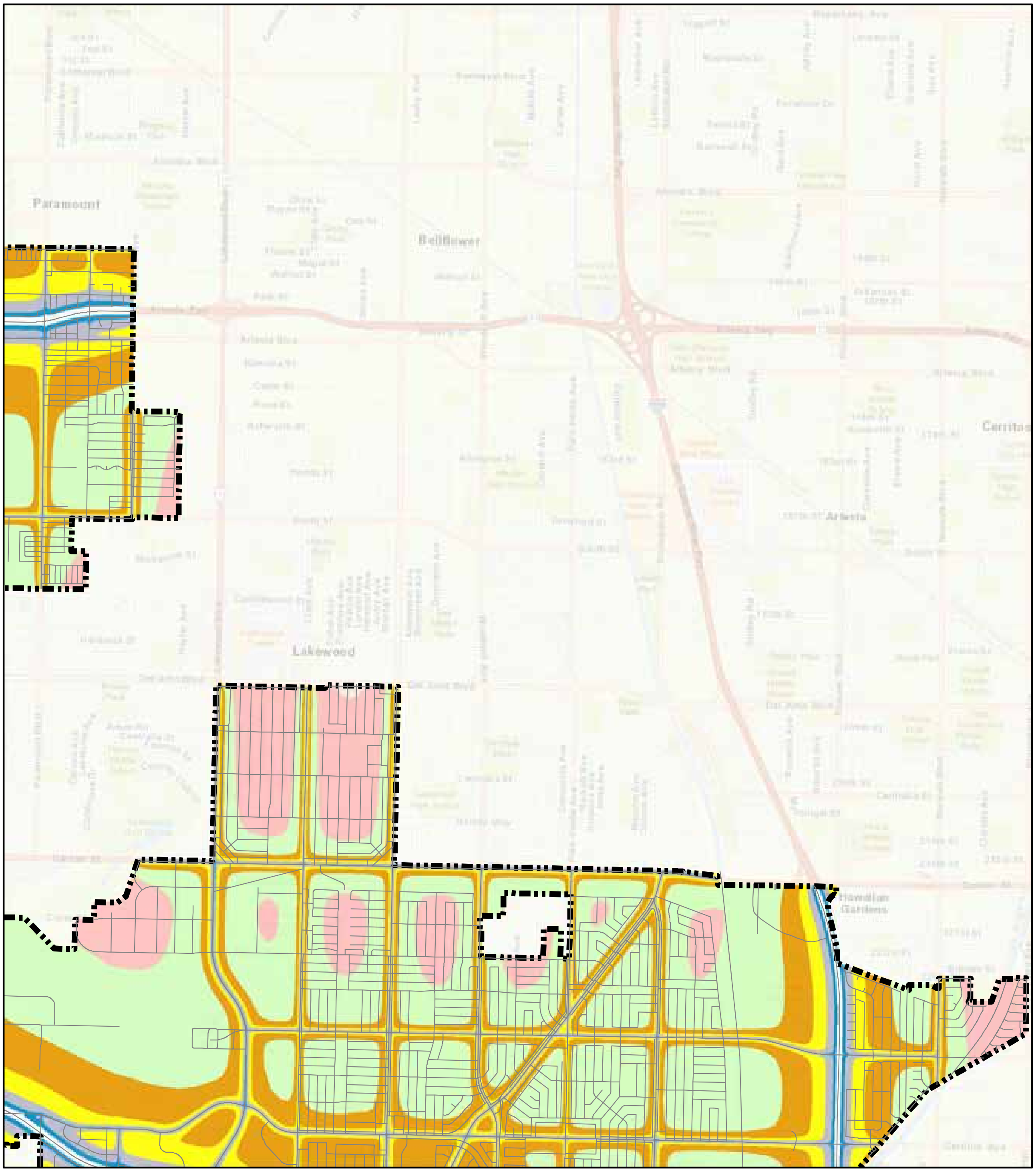

LEGEND

Long Beach City Boundary

Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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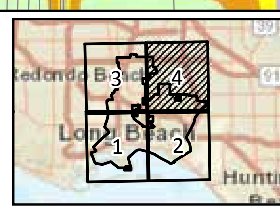

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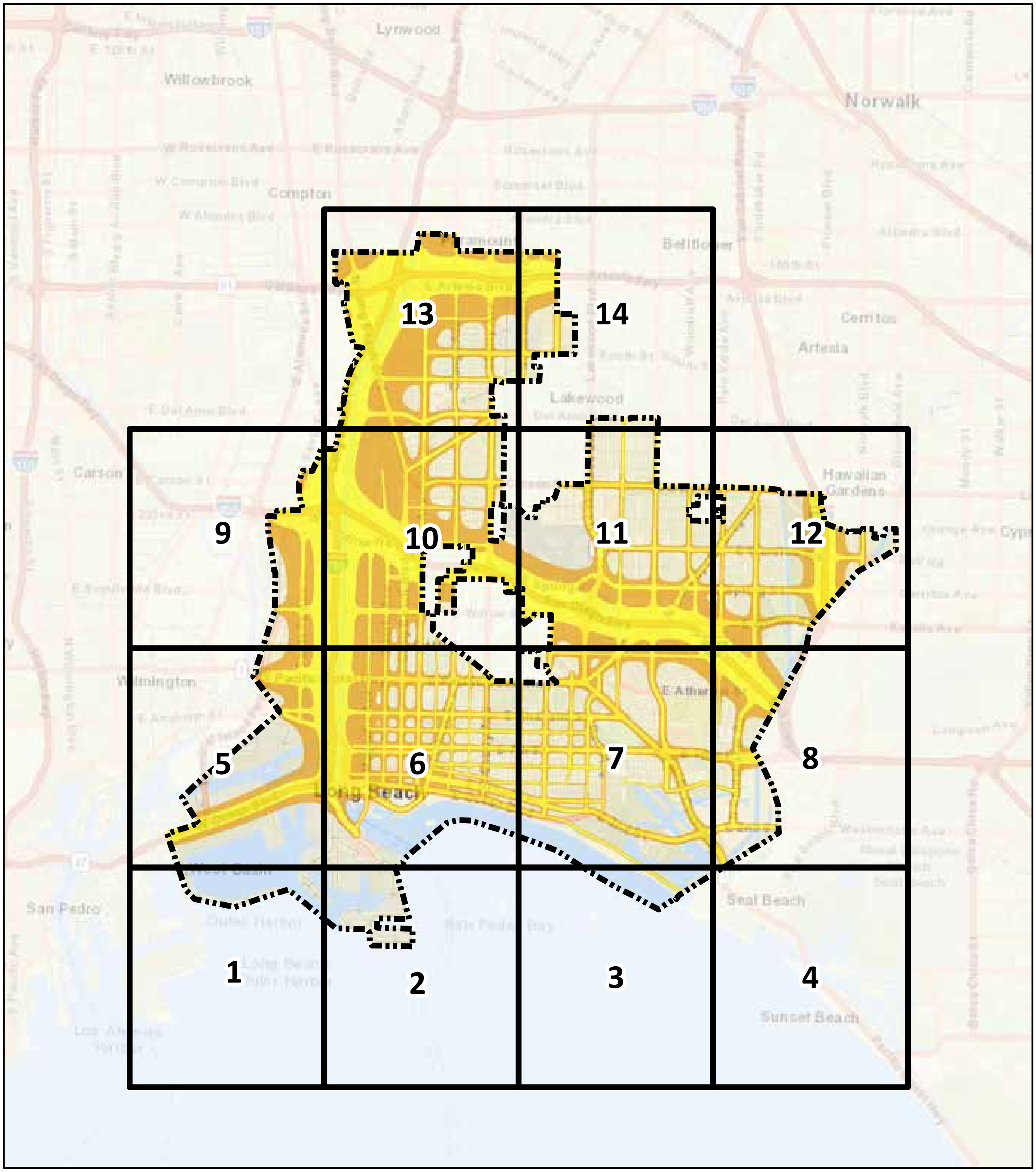

LEGEND

Long Beach City Boundary

Future 2040 Traffic Noise Contours

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MILES

SOURCE: Esri (2016); LSA (5/2017, 2/2019)

LEGEND

Long Beach City Boundary

Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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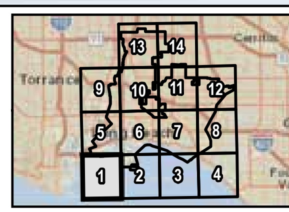

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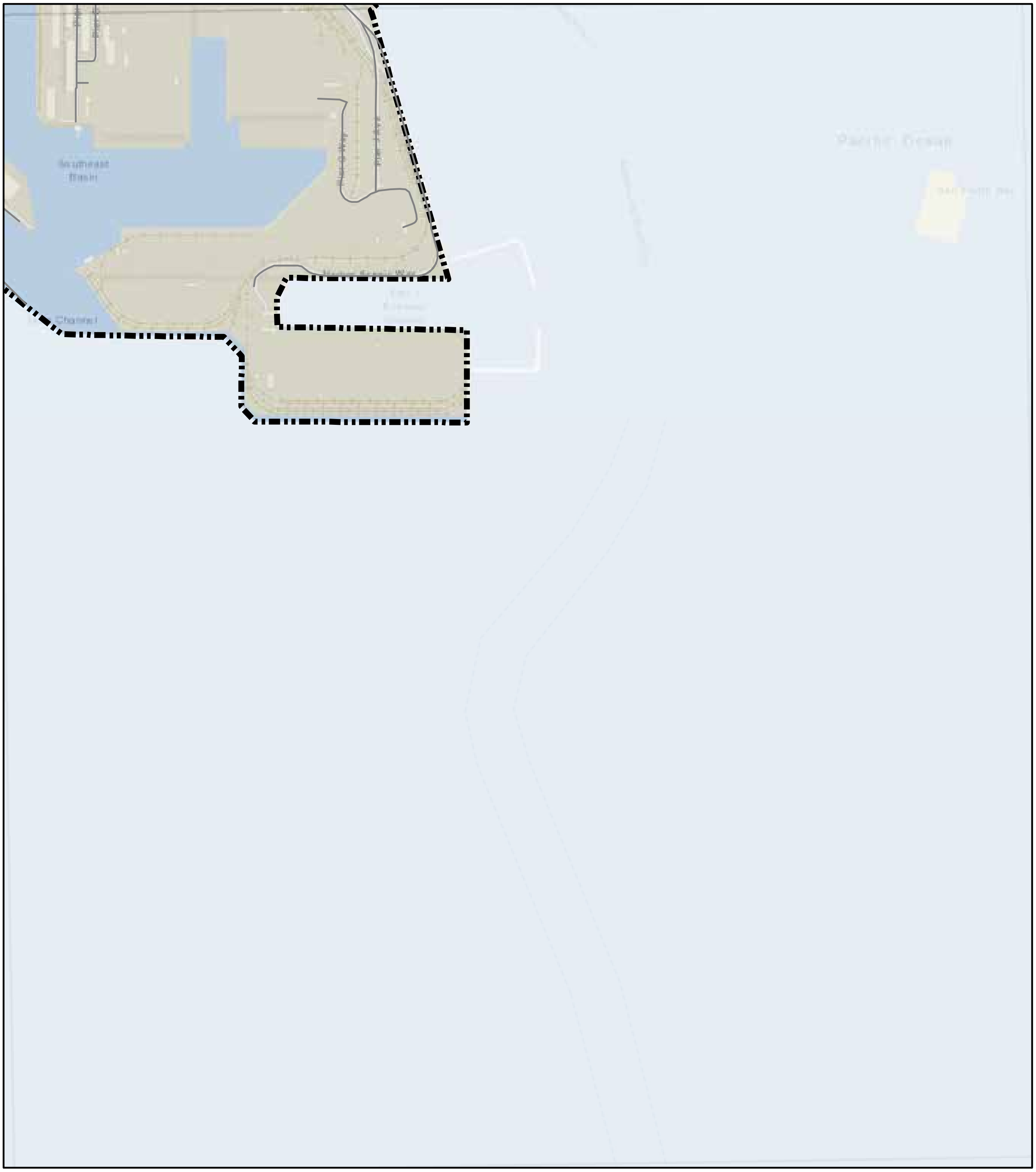

LEGEND

Long Beach City Boundary

Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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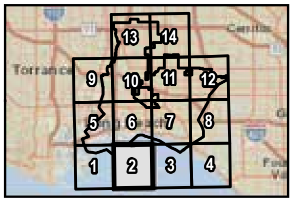

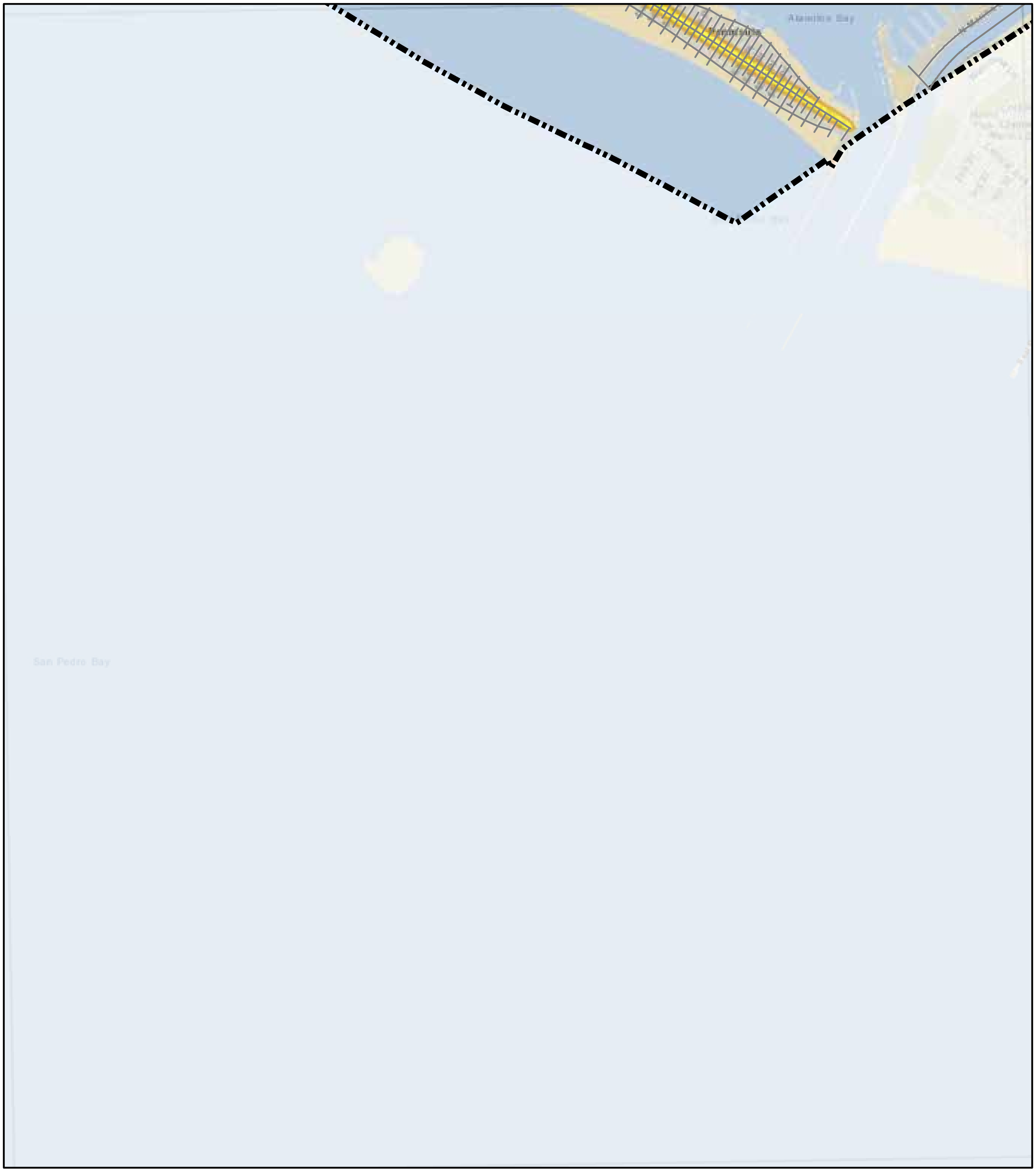

LEGEND

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Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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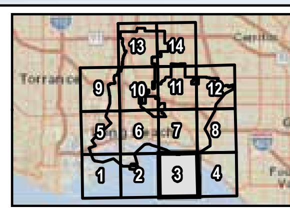

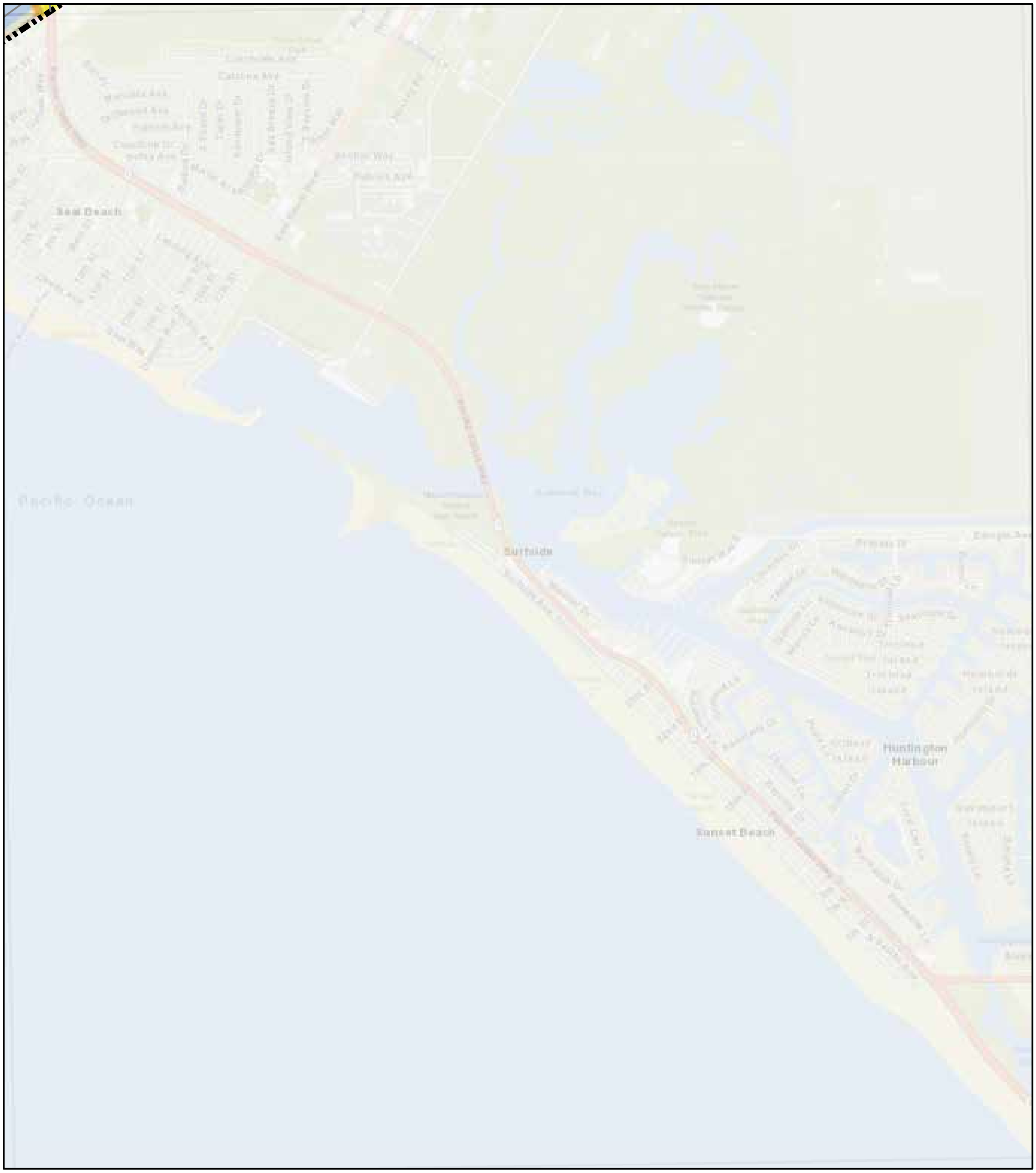

LEGEND

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Future 2040 Traffic Noise Contours

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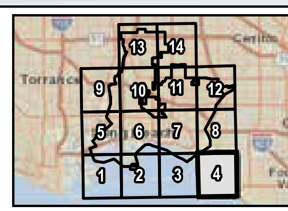

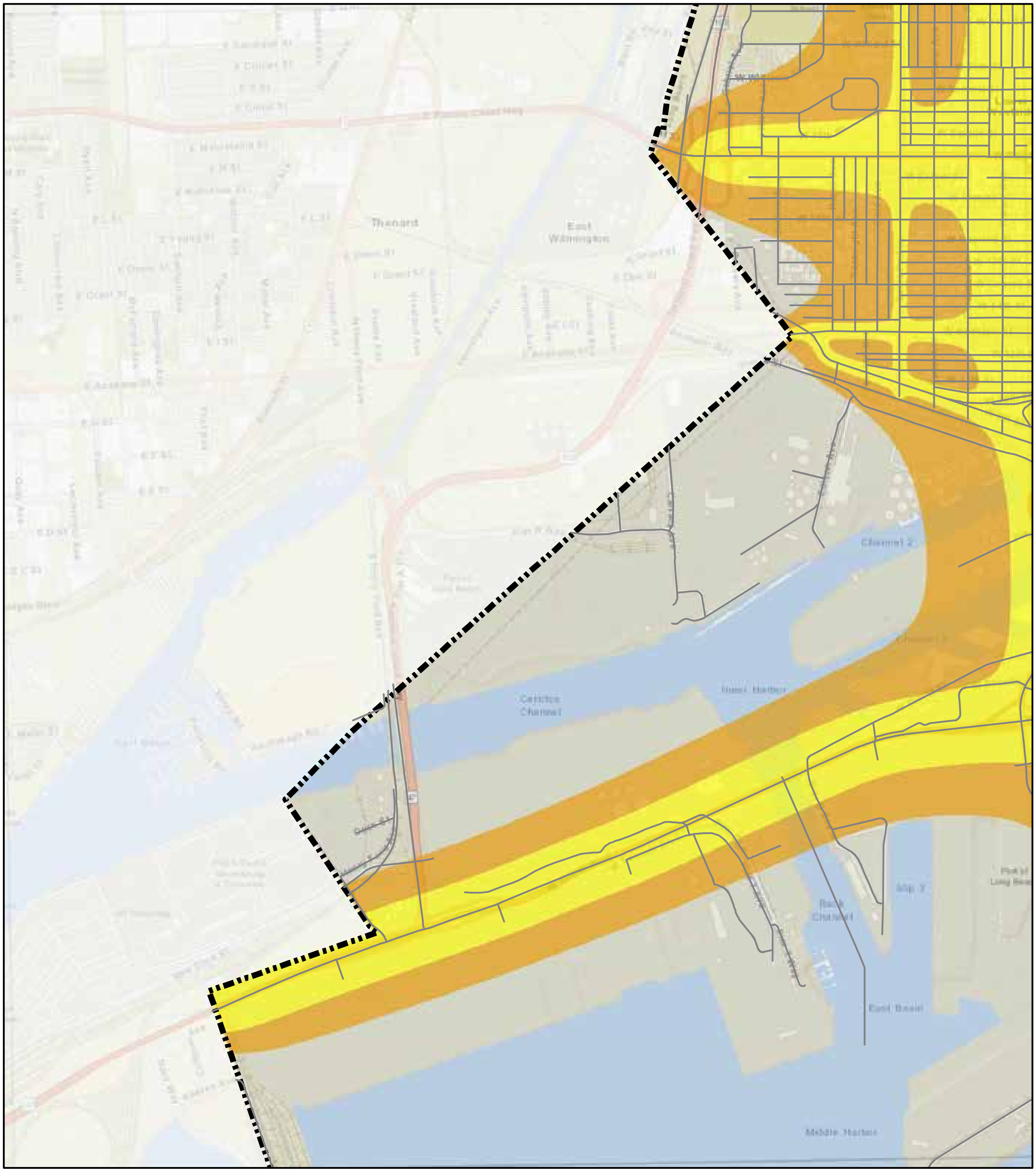

LEGEND

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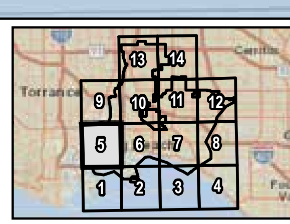

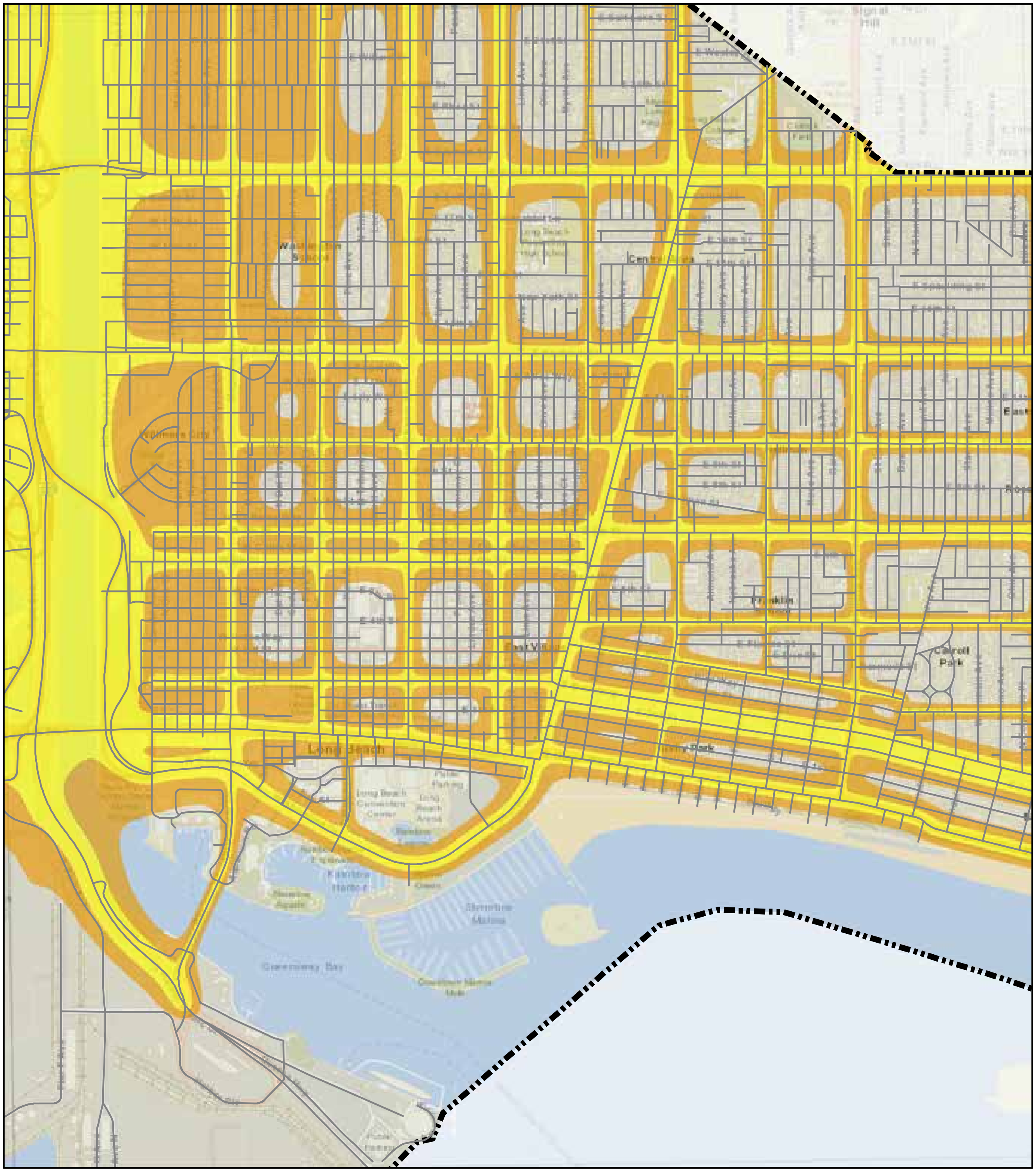

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Future 2040 Traffic Noise Contours

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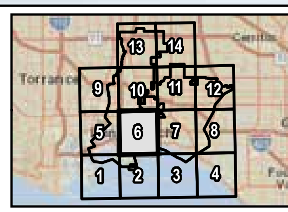

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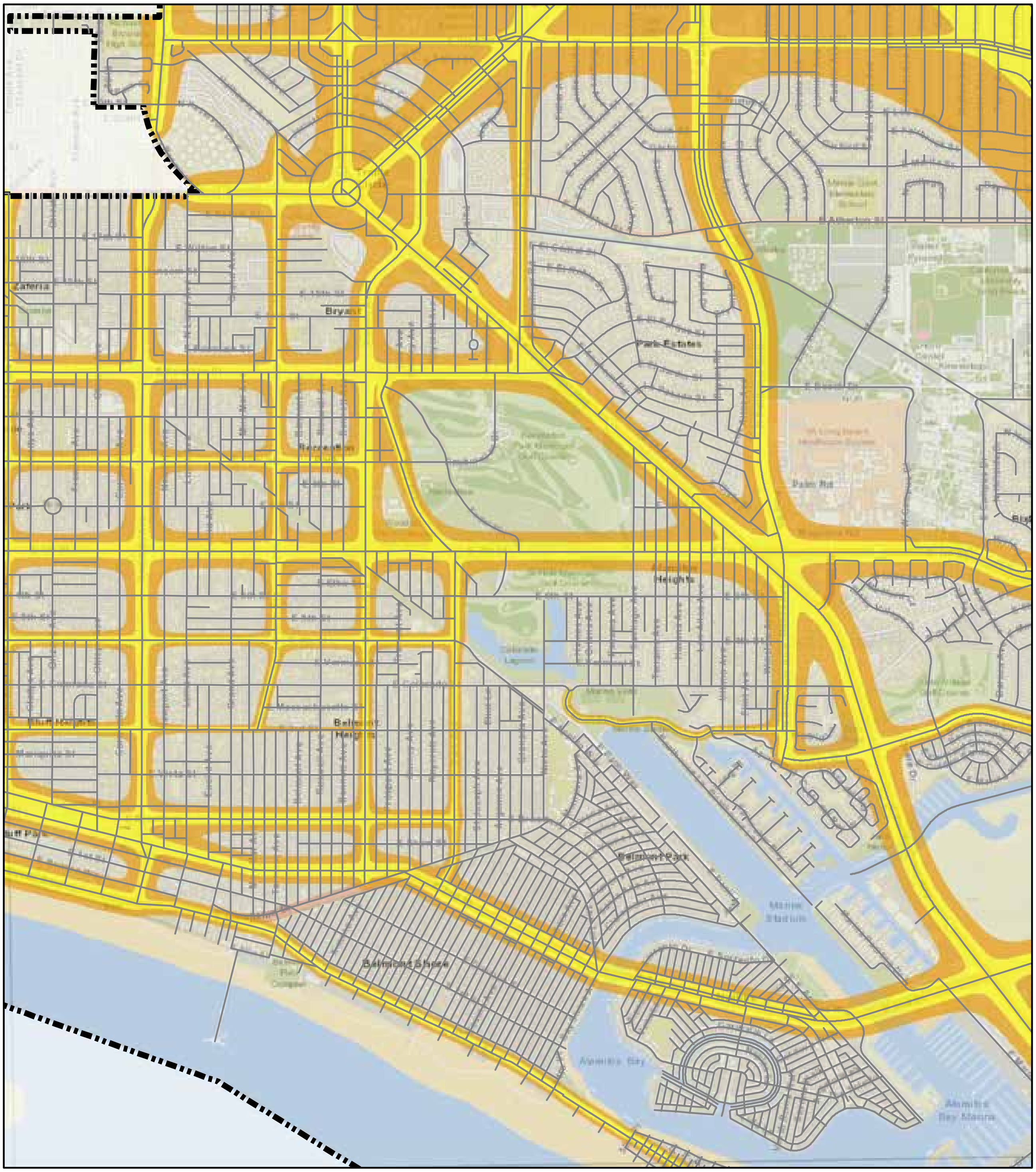

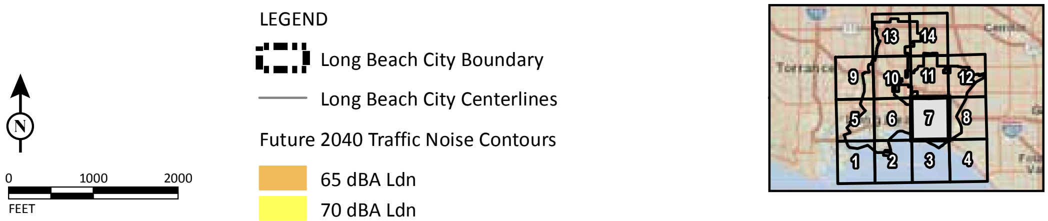

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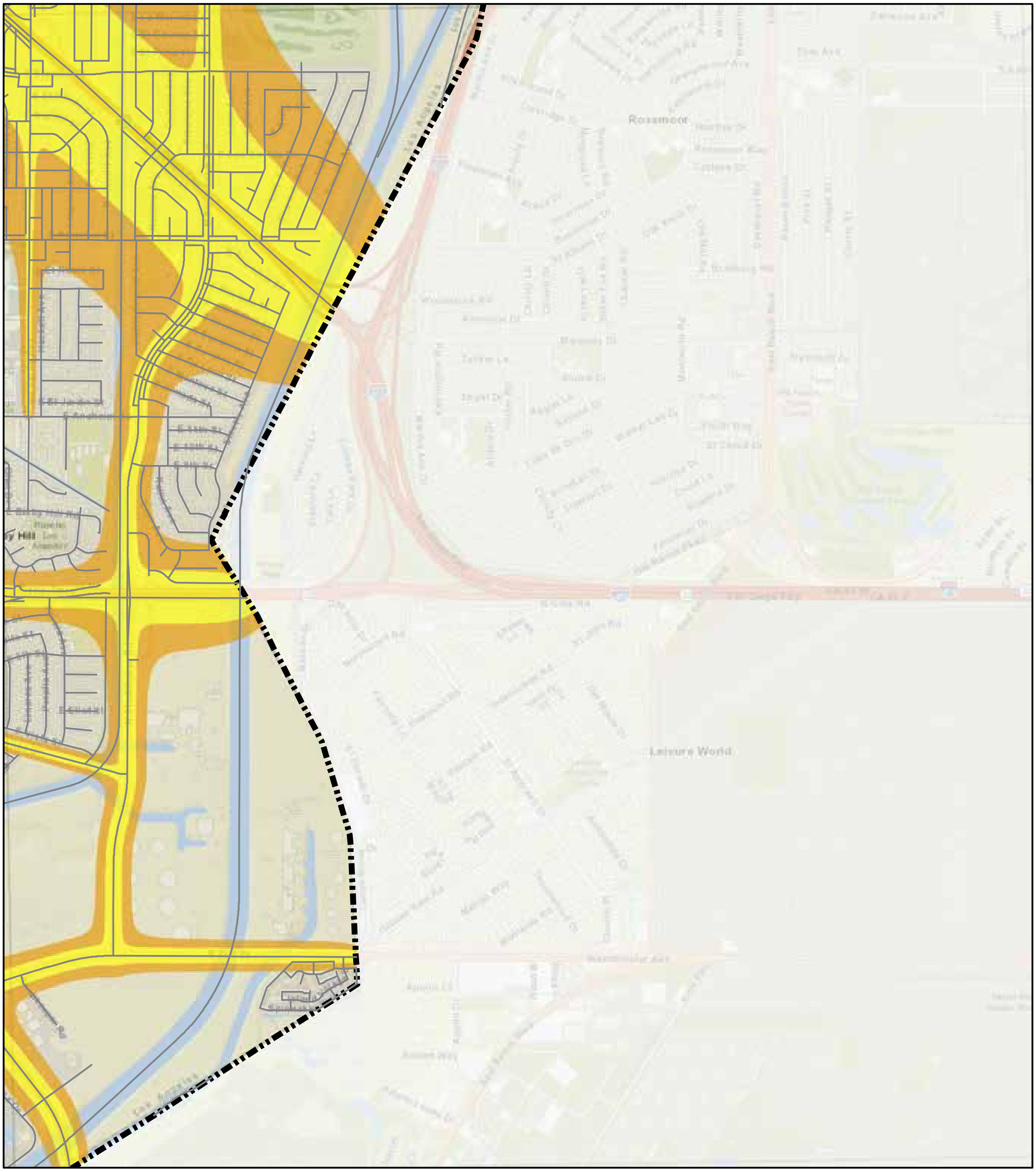

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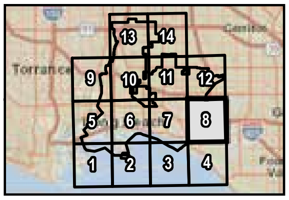

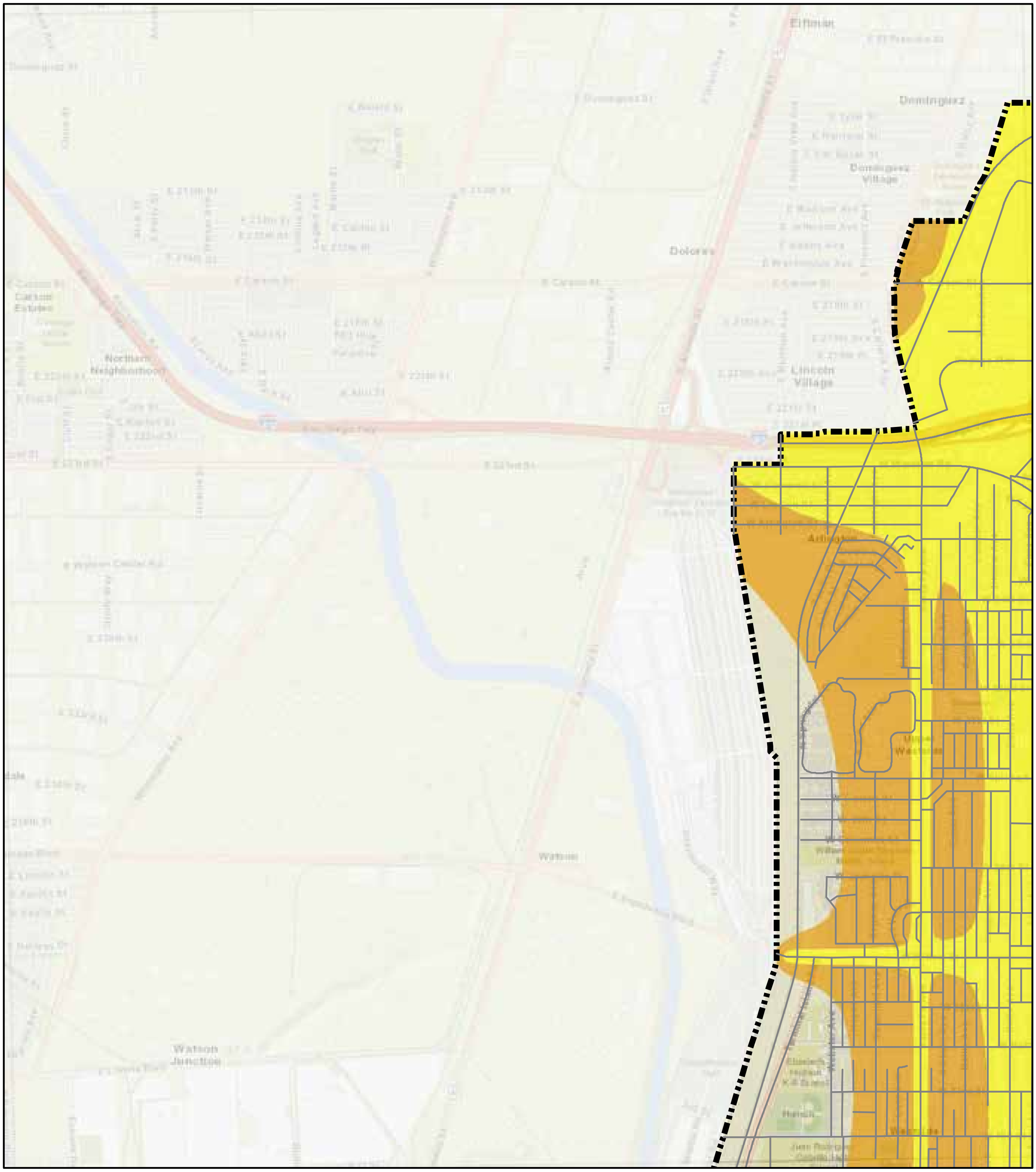

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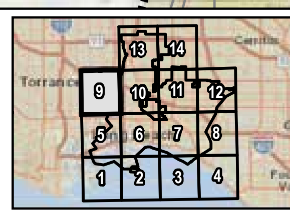

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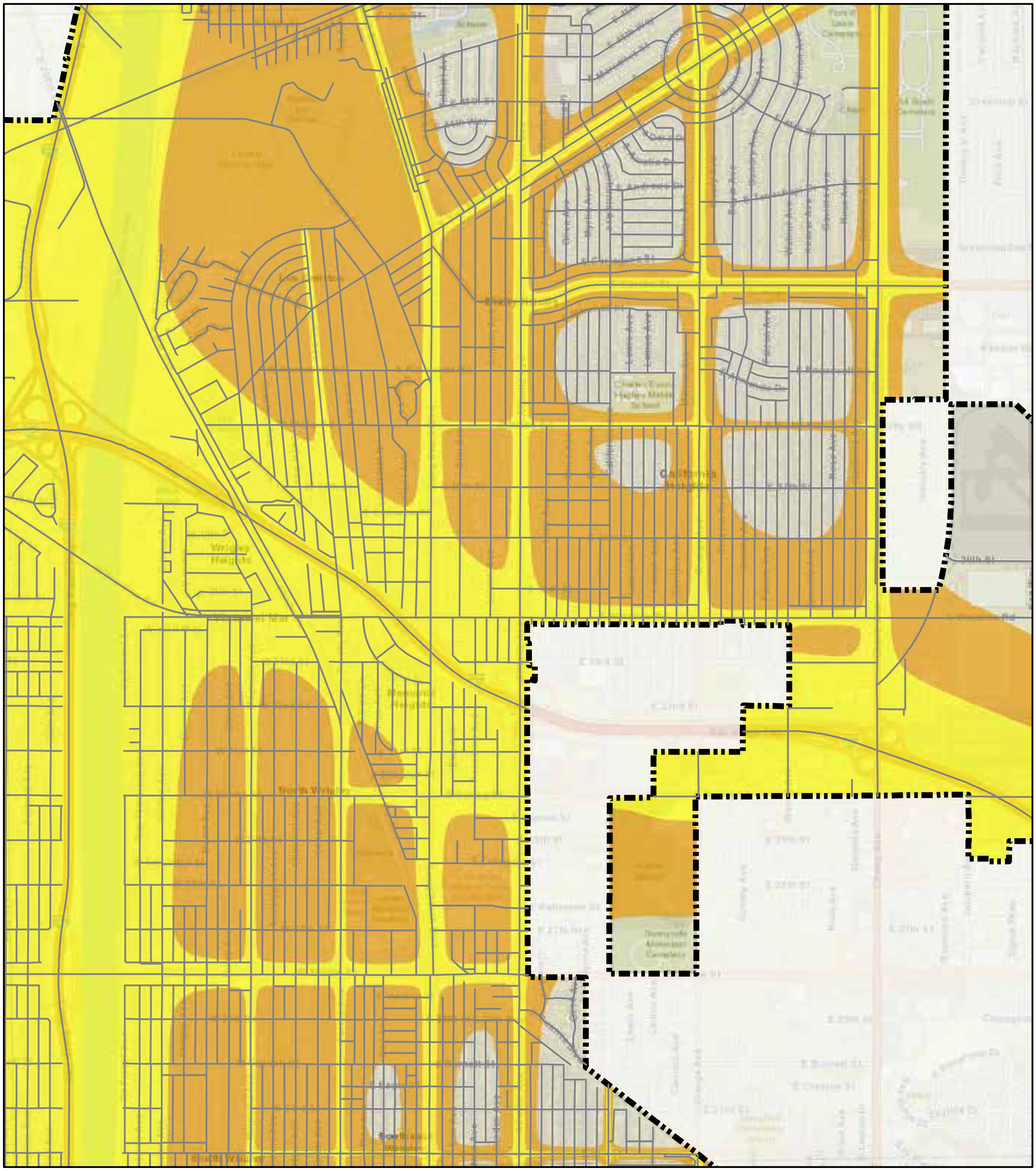

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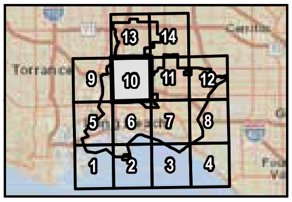

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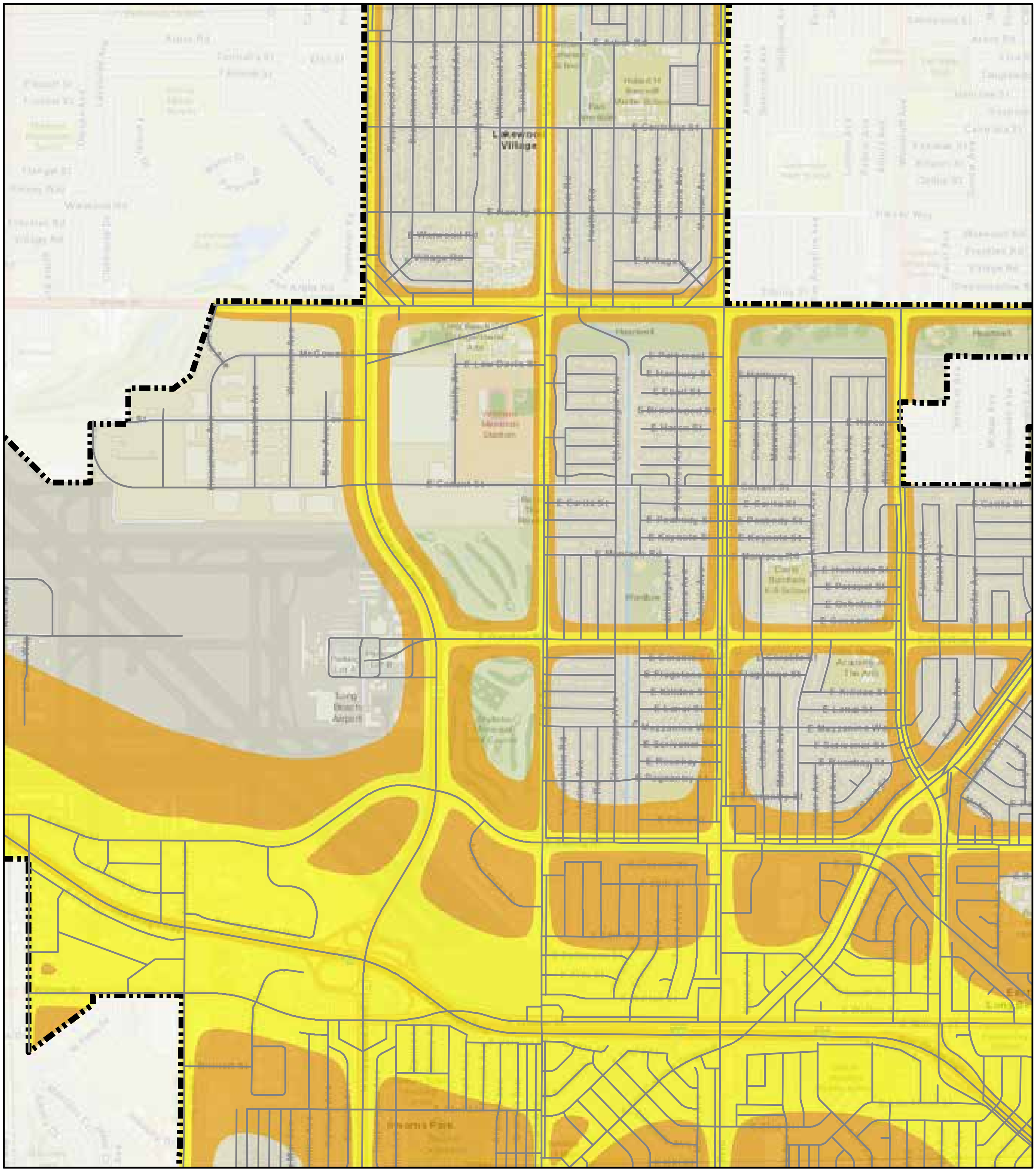

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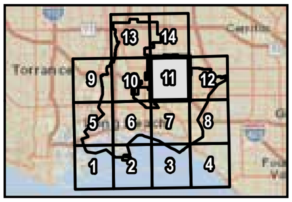

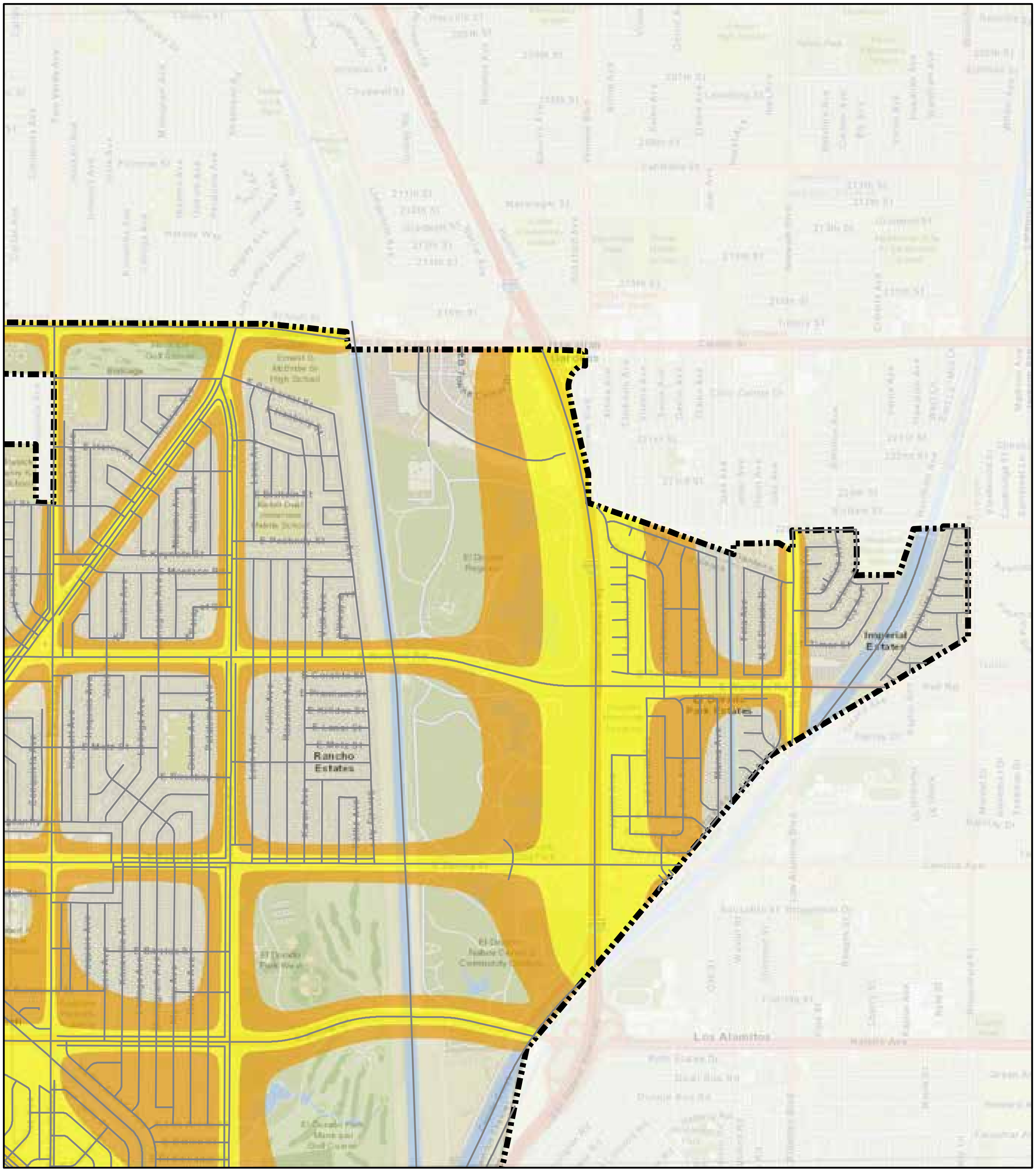

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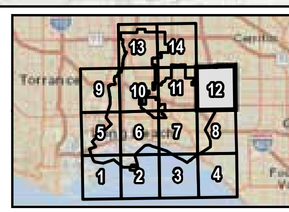

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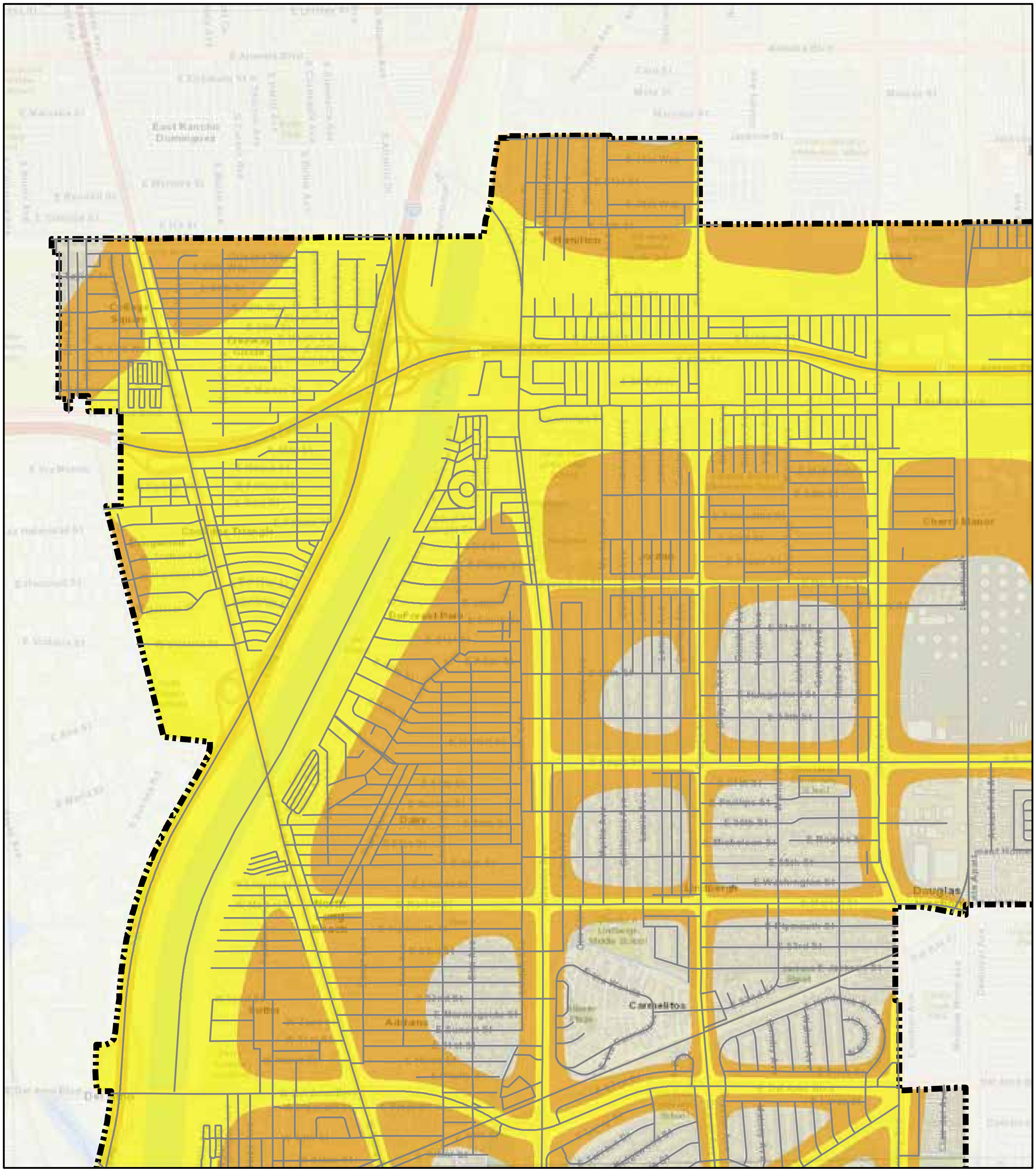

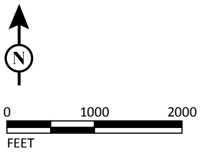

LEGEND

Long Beach City Boundary

Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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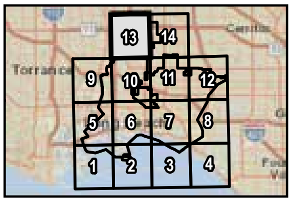

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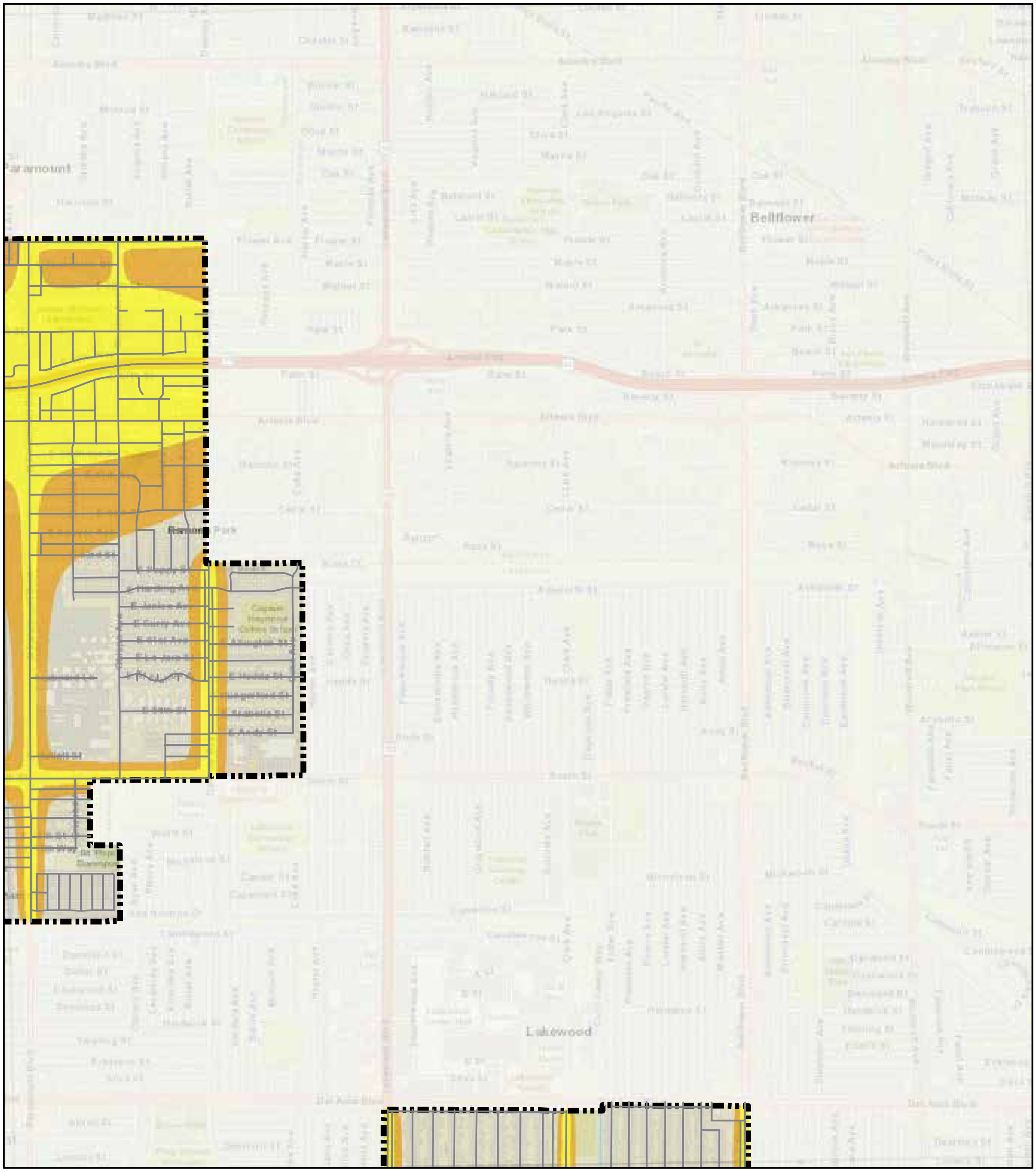

LEGEND

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Long Beach City Centerlines

Future 2040 Traffic Noise Contours

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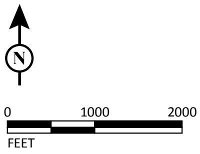

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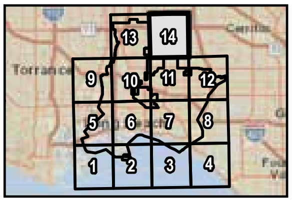

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CHAPTER 8.80 - NOISE

8.80.010 - Policy.

A. In order to control unnecessary, excessive and annoying noise and vibration in the City, it is declared to be the policy of the City to prohibit such noise and vibration generated from or by all sources as specified in this Chapter. It shall be the policy of the City to maintain quiet in those areas which exhibit low noise levels and to implement programs aimed at reducing noise in those areas within the City where noise levels are above acceptable values.

B. It is determined that certain noise levels and vibrations are detrimental to the public health, welfare and safety, and are contrary to the public interest. Therefore, the City Council does ordain and declare that creating, maintaining, causing or allowing to be created, caused or maintained, any noise or vibration in a manner prohibited by or not in conformity with the provisions of this Chapter is a public nuisance and shall be punishable as such.

C. The City Council in adopting this Chapter is aware of the areas of noise control which are preempted by other jurisdictions. Enforcement of these regulations is understood by the City Council to be restricted, in addition to other limitations, by the following:

   1. It is not the intent of this Chapter to control aircraft noise at the Long Beach Airport. Federal law controls noise levels of aircraft in flight; and where federal preemption does not apply to aircraft on the ground, the appropriate provisions of the California Noise Law (Title 4, California Administrative Code, Subchapter 6) would be applicable to deal with this subject matter.
   2. Local noise control of motor vehicles or motorboats operating on public rights-of-way is preempted by State or federal laws and regulations.
   3. Noise in occupational environments is controlled by the California Department of Industrial Relations, whose Division of Industrial Safety enforces the 1973 California Occupational Safety and Health Act (CALOSHA).

(Ord. C-5371 § 1 (part), 1977: prior code § 4430)

8.80.020 - Definitions.

All terminology used in this Chapter, if not defined in this Section, shall have the same meaning as defined by applicable publications of the American National Standards Institute (ANSI), or its successor body.

1. "A-weighted sound level" means the sound pressure level in decibels as measured on a sound level meter using the A-weighting network. The level so read is designated dB(A) or dBA.
2. "Agricultural property" means a parcel of real property which is not developed for any use other than agricultural purposes. Its size shall be construed to be a minimum of ten (10) contiguous acres.
3. "Ambient noise level" means the composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.
4. "Commercial area" means any area occupied by businesses which sell, rent, trade, or store goods, or which provide a service.
5. "Commercial purpose" means the use, operation or maintenance of any sound amplifying equipment for the purpose of advertising any business, goods, or services, or for the purpose of attracting the attention of the public, or soliciting patronage of customers to any performance, show, entertainment, exhibition,

or event, or for the purpose of demonstrating such sound equipment.

6. "Construction" means any site preparation, assembly, erection, substantial repair, alteration, or similar action, but excluding demolition.
7. "Cumulative period" means an additive period of time composed of individual time segments which may be continuous or interrupted.
8. "Decibel (dB)" means a unit for measuring the amplitude of a sound, equal to twenty (20) times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is twenty (20) micropascals (twenty (20) micronewtons per square meter).
9. "Demolition" means any dismantling, intentional destruction or removal of structures, utilities, public or private right-of-way surfaces or similar property.
10. "Emergency" means any occurrence or set of circumstances involving actual or imminent physical trauma or property damage which demands immediate action.
11. "Emergency work" means any work performed for the purpose of preventing or alleviating the physical trauma or property damage threatened or caused by an emergency.
12. "Fixed noise source" means a stationary device which creates sound while fixed or motionless, including, but not limited to, residential, agricultural, industrial, and commercial machinery and equipment, pumps, fans, compressors, air conditioners, and refrigeration equipment.
13. "Gross vehicle weight rating (GVWR)" means the value specified by the manufacturer as the recommended maximum loaded weight of a single motor vehicle. In cases where trailers and tractors are separable, the gross combination weight rating, which is the value specified by the manufacturer as the recommended maximum loaded weight of the combination vehicle shall be used.
14. "Impulsive sound" means sound of short duration, usually less than one (1) second, with an abrupt onset and rapid decay. Examples of sources of impulsive sound include explosions, drop forge impacts, and the discharge of firearms.
15. "Industrial area" means any area occupied by land uses whose primary operation involves manufacturing, assembling, processing, or otherwise treating raw materials, semifinished products, or finished products, for packaging and distribution to either wholesale or retail markets.
16. "Intrusive noise" means that noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency and time of occurrence, and tonal or informational content as well as the prevailing ambient noise level.
17. "Licensed" means the issuance of a formal license or a permit by a City authority; or, where no permits or licenses are issued, the sanctioning of the activity by the City as noted in the public record.
18. "Mobile noise source" means any noise source other than a fixed noise source.
19. "Motor carrier vehicle engaged in interstate commerce" means any vehicle for which regulations apply pursuant to Section 18 of the Federal Noise Control Act of 1972 (P. L. 92-574), as amended, pertaining to motor carriers engaged in interstate commerce.
20. "Motor vehicle" includes any and all self-propelled vehicles as defined in the California Motor Vehicle Code, including all on-highway type motor vehicles subject to registration under said code, and all off-highway type motor vehicles subject to identification under said code.
21. "Motorboat" means any vessel which operates on water and which is propelled by a motor, including, but not limited to, boats, barges, amphibious craft, waterski-towing devices and hovercrafts.
22. "Muffler or sound dissipative device" means a device for abating the sound of escaping gases of an

internal combustion engine.

23. "Noise" means any sound which annoys or disturbs humans or which causes or tends to cause an adverse psychological or physiological effect on humans.
24. "Noise control office" means the City agency designated by the City Manager having the lead responsibility and authority to enforce this Chapter and to grant variances.
25. "Noise control officer" means the City official appointed by the City Manager to direct the noise control office.
26. "Noise disturbance" means any sound which (a) endangers or injures the safety or health of humans or animals, or (b) annoys or disturbs a reasonable person of normal sensitivities, or (c) endangers or injures personal or real property.
27. "Noise sensitive zone" means any area designated pursuant to Section 8.80.030 for the purpose of insuring exceptional quiet.
28. "Noise source" means a disturbance-causing operation which originates from a single unit or noise generating mechanism which operates simultaneously. Example of a single noise source is the combination of motor, pump, and compressor; oil drilling rig; or a power plant with several boilers.
29. "Noise zone" means defined areas or regions of a generally consistent land use community wherein the ambient noise levels are generally similar (within a range of five (5) decibels). Typically, most sites within any given noise zone will be of comparable proximity to major noise sources.
30. "Noncommercial purpose" means the use, operation or maintenance of any sound equipment for other than a commercial purpose, including, but not limited to, philanthropic, political, patriotic and charitable purposes.
31. "Person" means any individual, association, partnership or corporation, and includes any officer, employee, department, agency or instrumentality of a State or any political subdivision of a State.
32. "Powered model vehicle" means any self-propelled airborne, waterborne, or land-borne plane, vessel or vehicle which is not designed to carry persons, including, but not limited to, any model airplane, boat, car or rocket.
33. "Public right-of-way" means any street, avenue, boulevard, highway, sidewalk or alley or similar place which is owned or controlled by a governmental entity.
34. "Public space" means any real property or structures thereon which are owned or controlled by a governmental entity.
35. "Pure tone" means any sound which can be distinctly heard as a single pitch or a set of single pitches. For the purposes of this Chapter, a pure tone shall exist if the one-third (1/3) octave band sound pressure level in the band with the tone exceeds the arithmetic average of the sound pressure levels of the two (2) contiguous one-third (1/3) octave bands by five (5) decibels for center frequencies of five hundred (500) hertz and above and by eight (8) decibels for center frequencies between one hundred sixty (160) and four hundred (400) hertz and by fifteen (15) decibels for center frequencies less than or equal to one hundred twenty-five (125) hertz.
36. "Real property boundary" means an imaginary line along the ground surface, and its vertical extension, which separates the real property owned by one (1) person from that owned by another person, but not including intra-building real property divisions.
37. "Residential area" means any area wherein the dominant land use is devoted to maintenance, preservation, or propagation of residential dwelling units.

38. "RMS sound pressure" means the square root of the time averaged square of the sound pressure, denoted
39. "Sound" means an oscillation in pressure, particle displacement, particle velocity or other physical parameter, in a medium with internal forces that causes compression and rarefaction of that medium. The description of sound may include any characteristic of such sound, including duration, intensity and frequency.
40. "Sound amplifying equipment" means any machine or device for the amplification of the human voice, or music, or any other sound, excluding standard automobiles when used and heard only by the occupants of the vehicle in which the device is installed and, as used in this Chapter, warning devices on authorized emergency vehicles or horns or other warning devices on any vehicle used only for traffic safety purposes.
41. "Sound level" means the weighted sound pressure level obtained by the use of a sound level meter and frequency weighting network, such as A, B or C, as specified in American National Standards Institute specifications for sound level meters (ANSI S1.4-l971 or the latest approved revision thereof). If the frequency weighting employed is not indicated, the A-weighting shall apply.
42. "Sound level meter" means an instrument, including a microphone, an amplifier, an output meter, and frequency weighting networks for the measurement of sound levels, which satisfies the requirements pertinent for type S2A meters in American National Standards Institute specifications for sound level meters, S1.4-1971, or the most recent revision thereof.
43. "Sound pressure" means the instantaneous difference between the actual pressure and the average or barometric pressure at a given point in space, as produced by sound energy.
44. "Sound pressure level" means twenty (20) times the logarithm to the base ten of the ratio of the RMS sound pressure to the reference pressure of twenty (20) micropascals (20×10^{6} N/M ^{2}). The sound pressure level is denoted L_p or SPL and is expressed in decibels.
45. "Sound truck" means any motor vehicle or any other vehicle, regardless of motive power, whether in motion or stationary, having mounted thereon, or attached thereto, any sound amplifying equipment.
46. "Vibration" means mechanical motion of the earth or ground, building, or other type of structure, induced by the operation of any mechanical device or equipment located upon or affixed thereto. For purposes of this Chapter, the magnitude of the vibration shall be stated as the acceleration in "g" units (1 g is equal to 32.2 ft/sec ^{2}, 9.3 1 meters/sec ^{2}).
47. "Weekday" means any day, Monday through Friday, which is not a federal holiday.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.1)

8.80.030 - Administration and enforcement.

The noise control program established by this Chapter shall be administered by the noise control office as designated by the City Manager. An official within the noise control office shall be appointed as the Noise Control Officer and shall be a person with sufficient knowledge of environmental acoustics to enforce noise regulations.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.2 (a))

8.80.040 - Noise control office—Powers.

In order to implement and enforce this Chapter and for the general purpose of noise abatement and control, the noise control office shall have, in addition to any other authority vested in it, the power to:

A. Studies. Conduct, or cause to be conducted, studies, research, and monitoring related to noise, including joi investigation with public or private agencies, and make application for and accept grants;

B. Education.

1. Conduct programs of public education regarding:

a. The cause and effect of noise and general methods of abatement and control of noise, and

b. The actions prohibited by this Chapter and the procedures for reporting violations, and

2. Encourage the participation of public interest groups in related public information efforts,

3. Provide for training of field inspectors and other technical personnel concerned with noise abatement (in conformance with standards for technical qualifications as established by the State Office of Noise Control).

C. Coordination and Cooperation.

1. Coordinate the noise control activities of all municipal departments,

2. Cooperate where practicable with all appropriate State and federal agencies,

3. Cooperate or combine where practicable with appropriate County and municipal agencies,

4. Advise on the availability of low noise emission products for replacement or retrofit of existing or planned City owned or operated equipment,

5. Enter into contract with the approval of the City Manager for the provision of technical and enforcement services;

D. Actions of Other Departments. Request any other department or agency responsible for a proposed or final standard, regulation or similar action to consult on the advisability of revising the action, if there is reason to believe that the action is not consistent with this Chapter;

E. Public and Private Projects. On all public and private projects which are likely to cause sound in violation of this Chapter and which are subject to mandatory review or approval by other departments or agencies, or which under the environmental review process are judged to be likely to violate these regulations:

1. Review to determine compliance with the intent and provisions of this Chapter,

2. Recommend sound analysis which identify existing and projected noise sources and associated sound levels,

3. Recommend usage of adequate measures to avoid violation of any provision of this Chapter;

F. Inspections. Upon presentation of proper credentials, enter and/or inspect any private property, place, report, or records at any time when granted permission by the owner, or by some other person with apparent authority to act for the owner. When permission is refused or cannot be obtained, a search or inspection warrant may be obtained from a court of competent jurisdiction upon showing of probable cause to believe that a violation of this Chapter may exist. Such inspection may include administration of any necessary tests;

G. Product Performance Standard Recommendations. Develop and recommend (to the City Council or other City agency) provision regulating the use and operation of any product, including the description of maximum sound emission levels of such product, but not in such a manner as to conflict with federal or State new product regulations;

H. Noise Sensitive Zone Recommendation and Enforcement. Prepare recommendations to be approved by the City Council, for the designation of noise sensitive zones which contain noise sensitive activities and to enforce the provisions of Sections 8.80.150 through 8.80.180 on City Council designated noise sensitive zones;

I. Noise Zone Definition. Prepare recommendations, based upon noise survey data and analytical studies, to be approved by the City Council, for the designation of zones of similar ambient environmental noise within regions of generally consistent land use. These zones shall be identified in terms of their day and nighttime ambient noise levels by the classifications given in Section 8.80.160, Table A;

J. Zoning Changes. Prior to the approval of any zoning change:

1. Review the noise impact of the zoning change by identifying existing and projected noise sources and the associated sound levels,
2. Require usage of adequate measures on noise sources identified in subdivision 1 of this subsection which will be in violation of any provision of this Chapter.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.2 (b))

8.80.050 - Noise Control Officer—Duties.

In order to effectively implement and enforce this Chapter, the Noise Control Officer shall, within a reasonable time:

A. Investigate and Pursue Violations. Investigate and pursue possible violations of this Chapter;

B. Delegation of Authority. Delegate functions, where appropriate under this Chapter, to personnel within the noise control office and to other departments, subject to the approval of the City Manager;

C. Community Noise Element.

1. Assist in the preparation or revision thereof of the City noise element of the general plan as required by Government Code Section 65302 (g), following guidelines set forth by the State Office of Noise Control,
2. Assist in or review the total transportation planning of the City, including planning for new roads and highways, bus routes, airports, and other systems for public transportation, to insure that proper consideration is taken with regard to the impact of sound levels and that the policies set forth in the noise element are adhered to,
3. Provide ongoing assistance to local agencies in determining possible mitigating measures for current or future noise problems;

D. Airport Noise Exposure. Assist the department of aeronautics in developing a plan for noise compatible land use in the vicinity of the Long Beach Airport and maintain consistency with the provisions and policies of the noise element of the general plan;

E. State and Federal Laws and Regulations.

1. Prepare and publish with the approval of the City Council a list of those products manufactured to meet specified noise emission limits under federal, State or community law for which tampering enforcement will be conducted, and
2. Make recommendations for modification or amendments to this Chapter to insure consistency with all State and federal laws and regulations;

F. Administer Grants, Funds and Gifts. Administer noise program grants, funds and gifts from public and private sources, including the State and federal governments;

G. Monitoring Responsibilities. Notwithstanding the preemption by federal and State agencies of the enforcement powers over certain activities, such as those at the Long Beach Airport and at the Long

Beach Marine Stadium, the Noise Control Officer shall monitor noise generated by such preempted activities and report any violations of State or federal regulations to the appropriate enforcement agencies and to the City Council.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.2 (c))

8.80.060 - City departments—Policy conformance.

All departments shall, to the fullest extent consistent with their authorities under other ordinances administered by them, carry out their programs in such a manner as to further the policies stated in Section 8.80.010.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (a))

8.80.070 - City departments—Cooperation.

All departments shall cooperate with the noise control office to the fullest extent in enforcing the noise regulations of this Chapter.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (b))

8.80.080 - City departments—Legal compliance.

All departments engaged in any activities which result or may result in the emission of noise, shall comply with federal and State laws and regulations, as well as the provisions of this Chapter, respecting the control and abatement of noise to the same extent that any person is subject to such laws and regulations.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (c))

8.80.090 - City departments—Project approval.

Each department whose duty it is to review and approve new projects or changes to existing projects that result, or may result, in the emission of noise shall consult with the noise control office prior to any such approval.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (d))

8.80.100 - City departments—Review of actions.

If at any time the Noise Control Officer has reason to believe that a standard, regulation, or action or proposed standard, regulation or action of any department respecting noise does not conform to the intent of Section 8.80.010, he may request such department to review and report to him on the advisability of revising such standard or regulation to conform.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (e))

8.80.110 - City departments—Contract compliance.

Any written agreement, purchase order, or instrument whereby the City is committed to the expenditure of funds in return for work, labor, services, supplies, equipment, materials, or any combination of the foregoing, shall not be entered into unless such agreement, purchase order, or instrument contains provisions requiring that any equipment or activities which are subject to the provisions of this Chapter will be operated, constructed, conducted, or manufactured without causing violation of this Chapter.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (f))

8.80.120 - City departments—Low noise emission product use.

Any product which has been certified by the Administrator of the United States Environmental Protection Agency pursuant to Section 15 of the Noise Control Act of 1972 as a low noise emission product and which is determined to be suitable for use as a substitute shall be used in preference to any other product where economically feasible.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.3 (g))

8.80.130 - Disturbing noises prohibited.

A. Notwithstanding any other provision of this Chapter, and in addition thereto, it is unlawful for any person to willfully make or continue, or cause to be made or continued, a loud, unnecessary or unusual noise which disturbs the peace and quiet of any neighborhood or which causes any discomfort or annoyance to any reasonable person of normal sensitiveness residing in the area.

B. The standards which shall be considered in determining whether a violation of the provisions of this Section exist shall include, but not be limited to the following:
   1. The sound level of the objectionable noise;
   2. The sound level of the ambient noise;
   3. The proximity of the noise to residential sleeping facilities;
   4. The nature and zoning of the area within which the noise emanates;
   5. The density of the inhabitation of the area within which the noise emanates;
   6. The time of day or night the noise occurs;
   7. The duration of the noise and its tonal, informational or musical content;
   8. Whether the noise is continuous, recurrent, or intermittent;
   9. Whether the noise is produced by a commercial or noncommercial activity.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.4)

8.80.140 - Noise measurement procedure.

The measurement procedure presented in this Section assumes that personnel performing the noise measurements have been trained in the use of the instruments and in interpretation of measured data. Upon receipt of a complaint from a citizen, the Noise Control Officer, or his agent, equipped with sound level measurement equipment satisfying the requirements specified in Section 8.80.020, shall investigate the complaint. The investigation shall consist of a measurement and the gathering of data to adequately define the noise problem as specified in the California Office of Noise Control Model Enforcement Manual, and shall include the following:

A. Nonacoustic Data.
   1. Type of noise source;
   2. Location of noise source relative to complainant's property;
   3. Time period during which noise source is considered by complainant to be intrusive;
   4. Total duration of noise produced by noise source;
   5. Date and time of noise measurement survey.

B. Procedure. Utilizing the A weighting scale of the sound level meter and the slow meter response, the noise l measured at a position or positions along the complainant's property line closest to the noise source or at t the boundary line where the noise level is at a maximum. In general, the microphone shall be located five fe ground; ten feet (10') or more from the nearest reflective surface, where possible. However, in those cases v elevation is deemed appropriate, the latter shall be utilized. If the noise complaint is related to interior noise noise measurements shall be made at a point at least four feet (4') from the wall, ceiling or floor nearest the with windows in the normal seasonal configuration. Calibration of the instrument being used shall be perfo immediately prior to and following the recording of any noise data utilizing the acoustic calibrator.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.5)

8.80.150 - Exterior noise limits—Sound levels by receiving land use district.

A. The noise standards for the various land use districts identified by the noise control office as presented in Table A in Section 8.80.160 shall, unless otherwise specifically indicated, apply to all such property within a designated district.

B. No person shall operate or cause to be operated any source of sound at any location within the incorporated limits of the City or allow the creation of any noise on property owned, leased, occupied, or otherwise controlled by such person, which causes the noise level when measured from any other property, either incorporated or unincorporated, to exceed:

1. The noise standard for that land use district as specified in Table A in Section 8.80.160 for a cumulative period of more than thirty (30) minutes in any hour; or
2. The noise standard plus five (5) decibels for a cumulative period of more than fifteen (15) minutes in any hour; or
3. The noise standard plus ten (10) decibels for a cumulative period of more than five (5) minutes in any hour; or
4. The noise standard plus fifteen (15) decibels for a cumulative period of more than one (1) minute in any hour; or
5. The noise standard plus twenty (20) decibels or the maximum measured ambient, for any period of time.

C. If the measured ambient level exceeds that permissible within any of the first four (4) noise limit categories in Subsection B of this Section, the allowable noise exposure standard shall be increased in five (5) decibels increments in each category as appropriate to encompass or reflect the ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category in Subsection B of this Section, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level.

D. If the measurement location is on a boundary between two (2) different districts, the noise level limit applicable shall be the arithmetic mean of the two (2) districts.

E. If possible, the ambient noise shall be measured at the same location along the property line utilized in Subsection B of this Section, with the alleged offending noise source inoperative. If for any reason the alleged offending noise source cannot be shut down, then the ambient noise must be estimated by performing a measurement in the same general area of the source but at a sufficient distance such that the offending noise from the source is inaudible. If the difference between the noise levels with noise source operating and not operating is six (6) decibels or greater, then the noise measurement of the alleged source can be considered valid with a small correction applied to account for the contribution of the ambient noise. The correction is to be applied in accordance with data shown in Table B in Section 8.80.160.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.6 (a))

8.80.160 - Exterior noise limits—Correction for character of sound.

In the event that alleged offensive noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content, the standard limits set forth in Table A shall be reduced by five (5) decibels.

Table A

EXTERIOR NOISE LIMITS

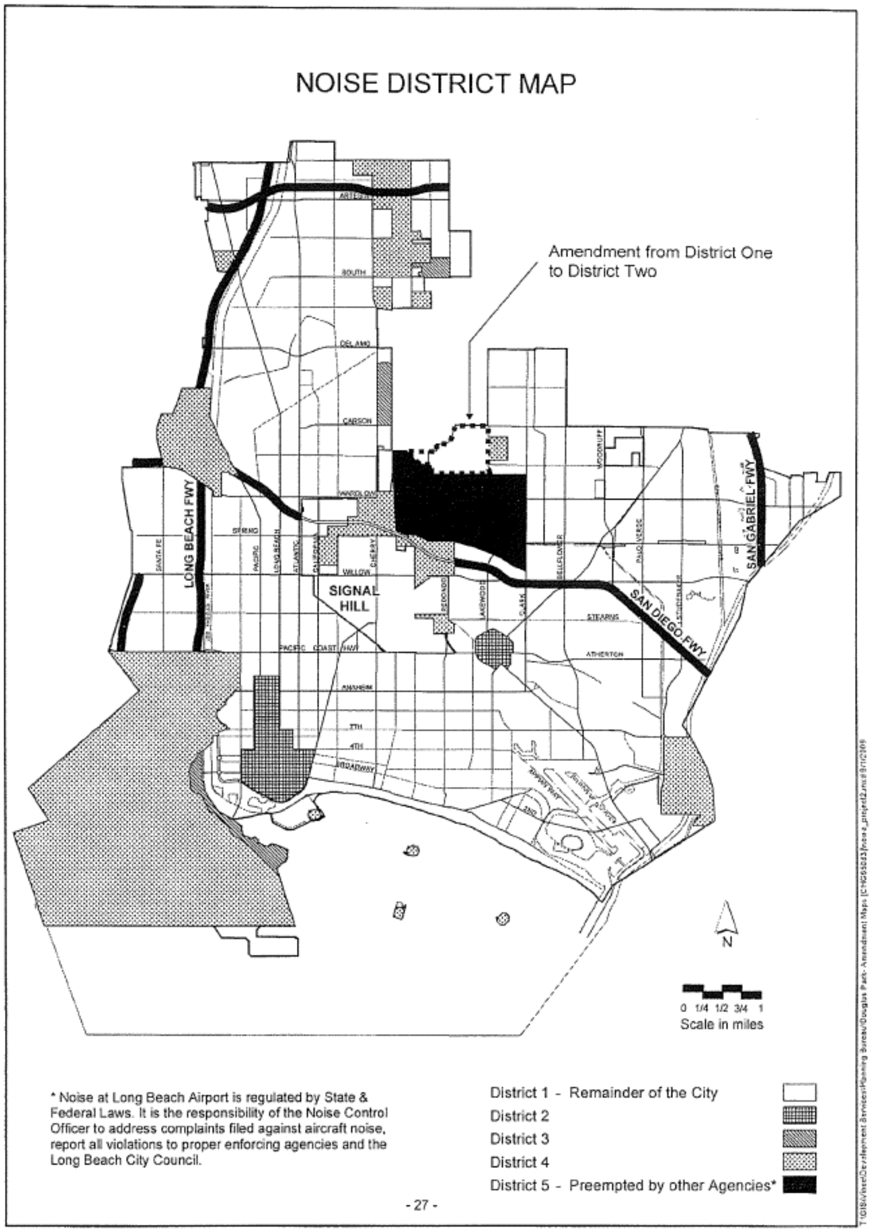
Receiving Land Use District*	Time Period	Noise Level** (dBA)
District One	Night:	
	10:00 p.m.—7:00 a.m.	45
	Day:	
	7:00 a.m.—10:00 p.m.	50
District Two	Night:	
	10:00 p.m.—7:00 a.m.	55
	Day:	
	7:00 a.m.—10:00 p.m.	60
District Three	Any time	65
District Four	Any time	70
District Five	Regulated by other agencies and laws	
*District One:	Predominantly residential with other land use types also present	
District Two:	Predominantly commercial with other land use types also present	
Districts Three and Four:	Predominantly industrial with other land types use also present	

District Five:	Airport, freeways and waterways regulated by other agencies	

** Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within those districts.

Table B
BACKGROUND NOISE CORRECTION

Difference between total noise and background noise alone (decibels)	Amount to be subtracted from
6—8	1
9—10	.5



(ORD-09-0030, § 1(exh. A), 2009; Ord. C-7959 § 1 (exh. A), 2004; Ord. C-5371 § 1 (part), 1977: prior code § 4430.6(b))

8.80.170 - Interior noise limits—Maximum sound levels.

A. The interior noise standards for various land use districts as presented in Table C shall apply, unless otherwise specifically indicated, within structures located in designated zones with windows in their normal seasonal configuration.

TABLE C

Receiving Land Use District	Type of Land Use	Time Interval	Allowable Interior Noise Level (dBA)
All	Residential	10:00 p.m.—7:00 a.m. 7:00 a.m.—10:00 p.m.	35 45

All	School	7:00 a.m.—10:00 p.m. (While school is in session)	45
Hospital, designated quiet zones and noise sensitive zones		Any time	40

B. No person shall operate, or cause to be operated, any source of sound indoors at any location within the incorporated limits of the City or allow the creation of any indoor noise which causes the noise level when measured inside the receiving dwelling unit to exceed:

1. The noise standard for that land use district as specified in Table C for a cumulative period of more than five (5) minutes in any hour; or
2. The noise standard plus five decibels (5 dB) for a cumulative period of more than one (1) minute in any hour; or
3. The noise standard plus ten decibels (10 dB) or the maximum measured ambient, for any period of time.

C. If the measured indoor ambient level exceeds that permissible within any of the first two (2) noise limit categories in this Section, the allowable noise exposure standard shall be increased in five decibel (5 dB) increments in each category as appropriate to reflect the indoor ambient noise level. In the event the indoor ambient noise level exceeds the third noise limit category, the maximum allowable indoor noise level under said category shall be increased to reflect the maximum indoor ambient noise level.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.7(a))

8.80.180 - Interior noise limits—Correction for character of sound.

In the event the alleged offensive noise contains a steady audible tone such as a whine, screech or hum, or is a repetitive noise such as hammering or riveting, or contains music or speech conveying information content, the standard limits set forth in Table C in Section 8.80.170 shall be reduced by five decibels (5 dB).

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.7(b))

8.80.190 - Noise disturbances—Prohibited.

No person shall unnecessarily make, continue or cause to be made or continued, any noise disturbance.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.8(a))

8.80.200 - Noise disturbances—Acts specified.

The following acts, and the causing or permitting thereof, are declared to be in violation of this Chapter:

A. Radios, television sets, musical instruments and similar devices. Operating, playing or permitting the operation or playing of any radio, television set, phonograph, drum, musical instrument, or similar device which produces or reproduces sound:

1. Between the hours of ten p.m. and seven a.m. the following day in such a manner as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of Sections 8.80.150 or 8.80.170 except for activities for which a variance has been issued by the noise control office,
2. In such a manner as to exceed the levels set forth in Table A in Section 8.80.160, measured at a distance of at least fifty feet (50') (fifteen (15) meters) from such device operating on a public right-of-way or public space;

B. Loudspeakers (amplified sound). Using or operating for any purpose any loudspeaker, loudspeaker system, or similar device between the hours of ten p.m. and seven a.m. the following day, such that the sound therefrom creates a noise disturbance across a residential real property line, or at any time violates the provisions of Sections 8.80.150 or 8.80.170, except for any noncommercial public speaking, public assembly or other activity for which a variance has been issued by the noise control office;

C. Street sales. Offering for sale, selling anything or advertising by shouting or outcry within any residential or commercial area or noise sensitive zone of the City except by variance issued by the noise control office. The provisions of this subsection shall not be construed to prohibit the selling by outcry of merchandise, food and beverages at licensed sporting events, parades, fairs, circuses or other similar licensed public entertainment events;

D. Animals and birds. Owning, possessing or harboring any animal or bird which frequently or for continued duration howls, barks, meows, squawks, or makes other sounds which create a noise disturbance across a residential or commercial real property line or within a noise sensitive zone. This provision shall not apply to public zoos;

E. Loading and unloading. Loading, unloading, opening, closing or other handling of boxes, crates, containers, building materials, garbage cans, or similar objects between the hours of ten p.m. and seven a.m. the following day in such a manner as to cause a noise disturbance across a residential real property line or at any time to violate the provisions of Sections 8.80.150 and 8.80.170;

F. Repealed;

G. Vibration. Operating or permitting the operation of any device that creates vibration which is above the vibration perception threshold of an individual at or beyond the property boundary of the source if on private property or at one hundred fifty feet (150') (forty-six (46) meters) from the source if on a public space or public right-of-way. For the purposes of this subsection, "vibration perception threshold" means the minimum ground or structure-borne vibrational motion necessary to cause a normal person to be aware of the vibration by such directed means as, but not limited to, sensation by touch or visual observation of moving objects. The perception threshold shall be presumed to be .001 g's in the frequency range 0—30 hertz and .003 g's in the frequency range between thirty and one hundred hertz;

H. Explosives, firearms and similar devices. Using or firing explosives, firearms, firecrackers or similar devices such that the sound therefrom creates a noise disturbance across a real property line, or within a noise sensitive zone, public space or public right-of-way, without first obtaining a variance issued by the noise control office or other appropriate regulatory agency;

I. Powered model vehicles. Operating or permitting the operation of powered model vehicles:

1. Between the hours of seven p.m. and seven a.m. the following day so as to create a noise disturbance across a residential or commercial real property line or at any time to violate the provisions of Sections 8.80.150 or 8.80.170,

2. In such a manner as to exceed the levels set forth in Table A in Section 8.80.160 measured at a distanc hundred feet (100') (thirty (30) meters) from any point on the path of a vehicle operating on public spa way;

J. Stationary nonemergency signaling devices.

1. Sounding or permitting the sounding of any electronically amplified signal from any stationary bell, chime, siren, whistle, or similar device, intended primarily for nonemergency purposes, from any place, for more than ten (10) seconds in any hourly period,
2. Houses of religious worship and chimes in the civic center shall be exempt from the operation of this provision,
3. Sound sources covered by this provision and not exempted under Subsection 8.80.200.J.2 of this Section may be exempted by a variance issued by the noise control office;

K. Emergency signaling devices.

1. The intentional sounding or permitting the sounding outdoors of any fire, burglar or civil defense alarm, siren, whistle or similar stationary emergency signaling device, except for emergency purposes or for testing, as provided in Subsection 8.80.200.K.2 of this Section,
2. a. Testing of a stationary emergency signaling device shall not occur before seven a.m. or after seven p.m. Any such testing shall only use the minimum cycle test time. In no case shall such test time exceed ten (10) seconds,

   b. Testing of the complete emergency signaling system, including the functioning of the signaling device and the personnel response to the signaling device shall not occur more than once in each calendar month. Such testing shall not occur before seven a.m. or after ten p.m. The time limit specified in Subsection 8.80.200.K.2.a of this Section shall not apply to such complete system testing,
3. Sounding or permitting the sounding of any exterior burglar or fire alarm unless such alarm is automatically terminated within fifteen (15) minutes of activation;

L. Noise sensitive zones.

1. Creating or causing the creation of any sound within any noise sensitive zone, so as to exceed the specified land use noise standards set forth in Sections 8.80.150 and 8.80.170, or
2. Creating or causing the creation of any sound within or adjacent to any noise sensitive zone containing a hospital, nursing home, school, court or other designated use so as to interfere with the functions of such activity or annoy the patients or participants of such activity;

M. Domestic power tools.

1. Operating or permitting the operation of any mechanically powered saw, sander, drill, grinder, lawn or garden tool, or similar tool between ten p.m. and seven a.m. the following day so as to create a noise disturbance across a residential or commercial real property line,
2. Any motor, machinery, pump, etc., shall be sufficiently enclosed or muffled and maintained so as not to create a noise disturbance,
3. Operating leaf blowers, consisting of portable power equipment used in any landscape maintenance, construction, property repair or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings, or trimmings from plants, trees or other debris is unlawful if operated within any residential area or in any nonresidential area within four hundred feet (400') of any residential area in the City between the hours after eight p.m.

and before eight a.m. Monday through Friday, after five p.m. and before nine a.m. on Saturdays, and after five p.m. and before eleven a.m. on Sundays and legal holidays. Notwithstanding the provisions of Section 8.80.380, violations of this Subsection 8.80.200.M.3 shall be infractions except as specifically provided in this Section. The first violation in any one (1) year period shall be subject to a fine of fifty dollars ($50.00); a second violation in any one (1) year period shall be subject to a fine of seventy-five dollars ($75.00); a third violation in any one (1) year period shall be subject to a fine of one hundred dollars ($100.00). A fourth or subsequent violation of this Subsection in any one (1) year period may be filed as a misdemeanor. Notwithstanding the provisions of any other Section in this Chapter, the provisions of this subsection may be enforced by a Police Officer;

N. Air-conditioning or air refrigerating equipment. Operating or permitting the operation of any air-conditioning or air refrigerating equipment in such a manner as to exceed any of the following sound levels measured as specified in the American Society of Heating, Refrigeration and Air Conditioning Engineers Code of Recommended Practices:

Measurement Location	Units Installed Before 1-1-80 dB (A)	Units Installed On Or After 1-1-80 dB (A)
Any point on neighboring property line, five feet above grade level, no closer than three feet from any wall	60	55
Center of neighboring patio five feet above grade level, no closer than three feet from any wall	55	50
Outside the neighboring living area window nearest the equipment location, not more than three feet from the window opening, but at least three feet from any other surface	55	50

In case of conflict, the interior noise standards as specified in Section 8.80.170 shall nonetheless apply;

O. Places of public entertainment. Operating or permitting to be operated any loudspeaker or other source of sound in any place of public entertainment that exceeds the levels shown in Table D at any point normally occupied by a customer, without a conspicuous and legible sign stating

"WARNING, SOUND LEVELS WITHIN MAY CAUSE PERMANENT HEARING IMPAIRMENT."

Table D
MAXIMUM LEVELS ALLOWED IN PLACES
OF PUBLIC ENTERTAINMENT

Duration Per Day Continuous Hours	Noise Level dB (A)

8	85
6	86
4	88
3	89
2	91
1 ½	92
1	94
½	97
¼ or less	100

P. Tampering. The following acts or the causing thereof are prohibited:
  1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any noise control device or element of design or noise label of any product identified under Subsection 8.80.040.G and Subsection 8.80.050.C. The Noise Control Officer may, by regulation, list those acts which constitute violation of this provision,
  2. The use of a product, identified under Subsection 8.80.040.G and Subsection 8.80.050.C, which has had a noise control device or element of design or noise label removed or rendered inoperative with knowledge that such action has occurred.

(Ord. C-7745 § 1, 2001; Ord. C-7175 § 1, 1994; Ord. C-6474 § 2, 1988; Ord. C-6036 § 1, 1984; Ord. C-5371 § 1 (part), 1977: prior code § 4430.8(b))

8.80.202 - Construction activity—Noise regulations.

The following regulations shall apply only to construction activities where a building or other related permit is required or was issued by the Building Official and shall not apply to any construction activities within the Long Beach harbor district as established pursuant to Section 201 of the City Charter.

A. Weekdays and federal holidays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of seven p.m. and seven am. the following day on weekdays, except for emergency work authorized by the Building Official. For purposes of this Section, a federal holiday shall be considered a weekday.

B. Saturdays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity which produce loud or unusual noise which annoys or disturbs a reasonable person of normal sensitivity between the hours of seven p.m. on Friday and nine a.m. on Saturday and after six p.m. on Saturday, except for emergency work authorized by the Building Official.

C. Sundays. No person shall operate or permit the operation of any tools or equipment used for construction, alteration, repair, remodeling, drilling, demolition or any other related building activity at any time on Sunday, except for emergency work authorized by the Building Official or except for work authorized by permit issued by the Noise Control Officer.

D. Owner's/employer's responsibility. It is unlawful for the landowner, construction company owner, contractor, subcontractor or employer of persons working, laboring, building, or assisting in construction to permit construction activities in violation of provisions in this Section.

E. Sunday work permits. Any person who wants to do construction work on a Sunday must apply for a work permit from the Noise Control Officer. The Noise Control Officer may issue a Sunday work permit if there is good cause shown; and in issuing such a permit, consideration will be given to the nature of the work and its proximity to residential areas. The permit may allow work on Sundays, only between nine a.m. and six p.m., and it shall designate the specific dates when it is allowed.

F. Enforcement. Notwithstanding the provisions of Sections 8.80.370 and 8.80.380, this Section may be enforced by a Police Officer.

Any person who violates any provision of this Section is guilty of a misdemeanor and shall be fined in an amount not to exceed five hundred dollars ($500.00), or be imprisoned for a period not to exceed one hundred eighty (180) days, or by both such fine and imprisonment. Each day that a violation occurs shall constitute a separate offense and shall be punishable as such.

Whenever an employee is prosecuted for a violation of this noise control ordinance, the court shall, at the request of the employee, take appropriate action to make the landowner, construction company owner, contractor, subcontractor or employer a codefendant.

(Ord. C-6488 § 1, 1988; Ord. C-6474 § 1, 1988)

8.80.210 - Refuse collection vehicles.

No person shall collect refuse with a refuse collection vehicle between the hours of seven p.m. and seven a.m. the following day in a residential area or noise sensitive zone.

(Ord. C-5371 § 1 (part), 1981: prior code § 4430.9(a))

8.80.220 - Motor vehicle horns.

It is unlawful for any person within the City to sound a vehicular horn within any residential zone except as a warning signal, as provided in the Vehicle Code of the State.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.9(b))

8.80.230 - Recreational motorized vehicles operating off the public right-of-way.

No person shall operate or cause to be operated any recreational motorized vehicle off a public right-of-way in such a manner that the sound level emitted therefrom violates the provisions of Sections 8.80.150 and 8.80.170. This Section shall apply to all recreational motorized vehicles, whether or not duly licensed and registered, including, but not limited to, commercial or noncommercial racing vehicles, motorcycles, go-carts, amphibious craft, campers, and dune buggies, but not including motorboats.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.9(c))

8.80.240 - Vehicle, motorboat or aircraft repair and testing.

A. Repairing, rebuilding, modifying or testing any motor vehicle, motorboat or aircraft in such a manner as to create a noise disturbance across a residential real property line, or at any time to violate the provisions of Sections 8.80.150 or 8.80.170 shall not be permitted except where said activities are directly related to officially sanctioned events.
B. This provision shall not apply to aircraft within the airport property or within any other aviation-related property abutting it.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.9(d))

8.80.250 - Exemption—Emergencies.

The provisions of this Chapter shall not apply to:

A. The emission of sound for the purpose of alerting persons to the existence of an emergency; or
B. The emission of sound in the performance of emergency work.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10(a))

8.80.260 - Exemption—Oil and gas wells.

The provisions of this Chapter shall not apply to:

A. Normal well servicing, remedial or maintenance work performed within an existing well which does not involve drilling or redrilling and which is restricted to the hours between seven a.m. and seven p.m., exclusive of weekends and holidays, in residential areas;
B. Any drilling or redrilling work which is done in full compliance with Subsection 8.80.040.E and Sections 8.80.060 through 8.80.120, and with the soundproofing and all other requirements of Section 12.32.030.

(Ord. C-5576 § 1, 1980; Ord. C-5371 § 1 (part), 1977: prior code § 4430.10(b))

8.80.270 - Exemption—Warning devices.

Warning devices necessary for the protection of public safety as, for example, police, fire and ambulance sirens and train horns shall be exempted from the provisions of this Chapter.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10(c))

8.80.280 - Exemption—Entertainment events.

The provisions of this Chapter shall not apply to occasional outdoor or indoor gatherings, public dances, shows and sporting and entertainment events, provided said events are conducted pursuant to a permit or license or other entitlement issued by the City relative to the staging of said events.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (d))

8.80.290 - Exemption—From exterior noise standards.

The provisions of Section 8.80.150 shall not apply to activities covered by the following Sections:

A. Section 8.80.200 C, street sales;
B. Section 8.80.200 D, animals and birds;
C. Section 8.80.200 J, stationary nonemergency signaling devices;
D. Section 8.80.200 K, emergency signaling devices;
E. Section 8.80.200 M, domestic power tools;
F. Section 8.80.200 N, air conditioning or air refrigerating equipment; and
G. Section 8.80.210, refuse collection vehicles.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (e))

8.80.300 - Abatement of nonconforming industrial noise sources.

A. Intent. It is the intent of this Section to recognize that the eventual abatement, as expeditiously and as fairly as possible, of existing noise sources that are not in conformity with the provisions of this Chapter is as important as the prohibition of new noise sources that would violate the provisions of this Chapter. It is the intent of this Section that any abatement of nonconforming industrial noise sources shall be effected so as to avoid any undue hardship.
B. Abatement. All existing nonconforming industrial noise sources shall be granted an amortization period of ten (10) years from the effective date of this Chapter to bring their existing facilities into compliance with this Chapter; provided, that:
   1. They are located in industrial districts delineated in the City zoning ordinance or are located in accordance with a valid special use permit at the time of adoption of this Chapter;
   2. They are not changed to another industrial use during the amortization period;
   3. They are not altered so as to increase or intensify their noise generation;
   4. If they are structurally expanded during the amortization period, the new portion must immediately meet the standards of this Chapter;
   5. If they should be rebuilt after damage or destruction of more than fifty percent (50%) of the preexisting value, they must be rebuilt in such a manner as to immediately meet the standards of this Chapter.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (f))

8.80.310 - Exemption—Federal or State preempted activities.

The provisions of this Chapter shall not apply to any other activity to the extent regulation thereof has been preempted by State or federal law.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10(g))

8.80.320 - Conflicting regulations.

A. These regulations are not intended to abrogate or impair the provisions of any other section of this Code which is not in conflict with the provisions of this Chapter. However, where these regulations are more restrictive than those of other laws, regulations or covenants, these regulations shall control.
B. Upon written request, the noise control office is authorized to issue official interpretations of this Chapter without public hearing.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (h))

8.80.330 - Exemption—Public health, welfare and safety activities.

The provisions of this Chapter shall not apply to construction maintenance and repair operations conducted by public agencies and/or utility companies or their contractors which are deemed necessary to serve the best interests of the public and to protect the public health, welfare and safety, including, but not limited to, street sweeping, debris and limb removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, vacuuming catchbasins, repairing of damaged poles, removal of abandoned vehicles, repairing of water hydrants and mains, gas lines, oil lines, sewers, storm drains, roads, sidewalks, etc.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.10 (i))

8.80.340 - Variance—Exemption from regulations.

A. The Noise Control Officer is authorized to grant variances for exemption from any provision of this Chapter, subject to limitations as to area, noise levels, time limits, and other terms and conditions as the Noise Control Officer determines are appropriate to protect public health, safety and welfare from the noise emanating therefrom. This Section shall in no way affect the obligation to obtain any permit or license required by law for such activities.
B. Any person seeking a variance shall file an application with the noise control office. The application shall contain information which demonstrates that bringing the source of sound or activity for which the variance is sought into compliance with this Chapter would create an unreasonable hardship on the applicant, on the community, or on other persons. The application shall be accompanied by a fee in the amount set by resolution of the City Council. A separate application shall be filed for each noise source; provided, however, that several fixed sources on a single property may be combined into one (1) application. Notice of an application for a variance shall be published according to rules established by the noise control office; all residents whom the Noise Control Officer determines may be adversely affected by the noise shall be notified. Any individual who claims to be adversely affected by the issuance of the variance may file a statement with the noise control office containing any information to support his claim. If at any time the Noise Control Officer finds that a sufficient controversy exists regarding an application, a public hearing will be held.
C. In determining whether to grant or deny the application, the Noise Control Officer shall balance the hardship on the applicant, the community, or other persons by not granting the variance against the adverse impact on the health, safety and welfare of persons affected, the adverse impact on property affected, and any other adverse impact by granting the variance. Applicants for variances and persons contesting variances may be

required to submit such information as the noise control office may reasonably require. In granting or denying an application, the Noise Control Officer shall keep a public record of the decision and the reasons for denying or granting the variance.

D. A variance shall be granted by written notice to the applicant containing all necessary conditions, including a time limit on the permitted activity. The variance shall not become effective until all conditions are agreed to by the applicant. Noncompliance with any condition of the variance shall terminate the variance.

E. The term of a variance may not exceed three hundred sixty-five (365) days from the date of issuance. An application for extension of time limits specified in a variance or for modification of other substantial conditions shall be treated as an application for a new variance.

F. The Noise Control Officer will issue guidelines defining the procedures to be followed in applying for a variance and the criteria to be considered in deciding whether to grant a variance.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.11(a))

8.80.350 - Variance—Time to comply.

Within ninety (90) days following the effective date of this Chapter, the owner of any commercial or industrial source of sound may apply to the noise control office for a time variance to comply with the provisions of this Chapter. The Noise Control Officer shall have the authority, consistent with these Sections 8.80.340 through 8.80.360, to grant a time variance (not to exceed one hundred eighty (180) days from the effective date of this Chapter). The same procedures and considerations by the Noise Control Officer as provided in Section 8.80.340 shall likewise apply.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.11(b))

8.80.360 - Variance—Appeal to decision.

Within ten (10) days after notice by the Noise Control Officer or denial or conditional approval of a variance, or within ten (10) days after the effective date of the revocation of a variance by the Noise Control Officer, the affected person may appeal to the City Council, in writing. The City Council, after notice and a public hearing, may sustain, reverse or modify the decision of the Noise Control Officer; such order may be made subject to specified conditions.

A. Filing Fee. The appeal shall be filed in triplicate with the City Clerk at the City Hall, 333 West Ocean Boulevard, Long Beach, California, along with the payment of a fee in the amount set by resolution of the City Council. A copy of the appeal shall also be served on the Noise Control Officer.

B. Contents of Appeal. An appeal to review a denial or conditional approval of a variance shall contain the application, a copy of the Noise Control Officer's action setting forth the reasons for the denial or the conditions of the approval, and the reasons for appeal. An appeal to review a variance revocation shall include a copy of the variance, the Noise Control Officer's revocation notice, and his reasons for revocation, and the reasons for appeal.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.11(c))

8.80.370 - Violation—Presumed.

Any noise exceeding the level limit which can be attributed to a specific facility in a designated noise district as specified in Sections 8.80.150 through 8.80.180, or the prohibited actions specified in Sections 8.80.190 and 8.80.200 shall be presumed to be a violation of the provisions of these regulations. Enforcement of noise control regulations shall be undertaken only upon receipt of a written sworn complaint made by a person who resides or owns property within the noise district into which the alleged noise intrudes.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.12(a))

8.80.380 - Violation—Penalty.

Any person found in violation of any of the provisions of this Chapter upon a documented determination and the failure to comply with an abatement order or other notice issued by the Noise Control Officer and subsequently convicted in a court of competent jurisdiction for such violation will be deemed guilty of a misdemeanor and shall be fined in an amount not to exceed five hundred dollars ($500.00), or be imprisoned for a period not to exceed one hundred eighty (180) days, or by both such fine and imprisonment. Each day (after the Noise Control Officer has made a documented determination and has issued an abatement order) that a violation is permitted to continue shall constitute a separate offense and shall be punishable as such.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.12(b))

8.80.390 - Violation—Abatement order.

A. Except as provided in Subsection 8.80.390.B, in lieu of issuing a notice of violation as provided in Section 8.80.400, the Noise Control Officer may issue an order requiring the abatement of a sound source alleged to be in violation within a reasonable time period and according to guidelines adopted by the noise control office.
B. An abatement order shall not be issued for any violation when the Noise Control Officer or other enforcement agency has reason to believe that there will not be compliance with an abatement order.
C. No further action shall be taken in the event that the cause of the violation has been removed and the condition abated or fully corrected within the time period specified in the written notice.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.12(c))

8.80.400 - Violation—Notice.

Except where a person is acting in good faith to comply with an abatement order issued pursuant to Subsection 8.80.390.A, violation of any provision of this Chapter shall be cause for a notice of violation to be issued by the Noise Control Officer or other responsible enforcement official according to procedures which the noise control office may prescribe. Thereafter, the City may resort to any other appropriate legal action as provided by law.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.12(d))

8.80.410 - Violation—Additional remedies.

As an additional remedy, the operation or maintenance of any device, instrument, vehicle or machinery in violation of any provision of this Chapter, which operation or maintenance causes or creates sound levels or vibration exceeding the allowable limits as specified in this Chapter, shall be deemed and is declared to be a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction. Additionally, no provision of this Chapter shall be construed to impair any common law or statutory cause of action, or legal remedy therefrom, of any person for injury or damage arising from any violation of this Chapter or from other law.

(Ord. C-5371 § 1 (part), 1977: prior code § 4430.12(e))

CONSTRUCTION NOISE MODELING

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Demolition	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50.0	0.0
Front End Loader	No	40		79.1	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	79.1	75.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	84.0	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Site Prep	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Rough Grading	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Extra Foundation Prep	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20	84.4		50.0	0.0
Crane	No	16	80.6		50.0	0.0
Tractor	No	40		84.0	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Auger Drill Rig	84.4	77.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	84.4	82.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Utility Trenching	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Spec Usage (%)	Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	50.0	0.0
Chain Saw	No	20		83.7	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	80.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chain Saw	83.7	76.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	83.7	79.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Building Construction	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16	80.6		50.0	0.0
Generator	No	50	80.6		50.0	0.0
Tractor	No	40		84.0	50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	80.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Generator	80.6	77.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	84.0	82.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Architectural Coating	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Compressor (air)	No	40		77.7	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Compressor (air)	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	77.7	73.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Asphalt Demolition	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Spec Usage (%)	Actual Lmax (dBA)	Receptor Lmax (dBA)	Estimated Distance (feet)	Shielding (dBA)
Concrete Saw	No	20		89.6	50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Concrete Saw	89.6	82.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.6	85.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
Asphalt Paving	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Drum Mixer	No	50		80.0	50.0	0.0
Pavement Scarafier	No	20		89.5	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA) Day		Evening		Night		Noise Limit Exceedance (dBA) Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Drum Mixer	80.0	77.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pavement Scarafier	89.5	82.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	89.5	85.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Fine Grading	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Grader	No	40	85.0		50.0	0.0
Dozer	No	40		81.7	50.0	0.0
Tractor	No	40	84.0		50.0	0.0

Results

	Calculated (dBA)		Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
			Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Grader	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dozer	81.7	77.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tractor	84.0	80.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	84.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 07/24/2020
Case Description: COLB-09

**** Receptor #1 ****

Baselines (dBA)

Description	Land Use	Daytime	Evening	Night
Finish/Landscaping	Residential	65.0	60.0	55.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Man Lift	No	20		74.7	50.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Calculated (dBA) Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Man Lift	74.7	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	74.7	67.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Project: COLB-09.0 Century Villages at Cabrillo

Equipment Type	FTA Reference PPV at 25 Feet 25	Offsite Buildings School NE at 175 feet 175
Vibratory Roller	0.21	0.011
Clam shovel	0.20	0.011
Hoe Ram	0.089	0.005
Large Bulldozer	0.089	0.005
Caisson Drilling	0.089	0.005
Loaded Trucks	0.076	0.004
Jackhammer	0.035	0.002
Small Bulldozer	0.003	0.000
Vibroflot Max	0.445	0.024

Mitigation Table Calculation

Equipment Type	FTA Reference PPV at 25 Feet 25	Distance at which 0.20 in/sec PPC occurs	PPV Output per Equipment
Clam shovel	0.20	25	0.20
Hoe Ram	0.089	15	0.19
Large Bulldozer	0.089	15	0.19
Caisson Drilling	0.089	15	0.19
Loaded Trucks	0.076	13.5	0.19
Jackhammer	0.035	8	0.19
Small Bulldozer	0.003	1.5	0.20
Vibroflot Max	0.445	42	0.20

Equipment Type	Reference PPV in mm/sec at 8 meters	PPV in in/sec at8 meters	PPV in in/sec at 25 feet
Vibroflot Min	0.9	0.035	0.038
Vibroflot Max	10.5	0.413	0.445

Project: COLB-09.0 Century Villages at Cabrillo

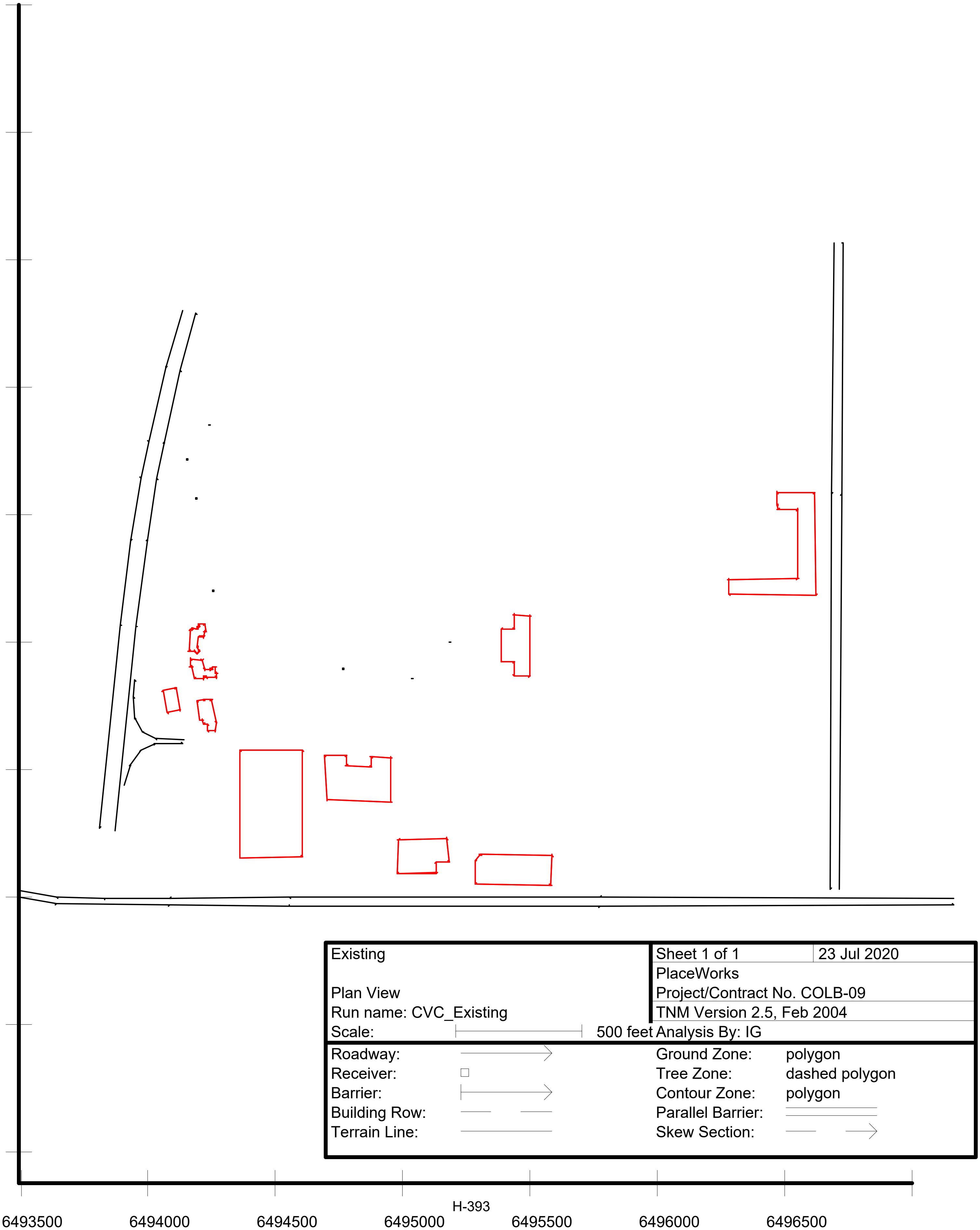
Activity Phase**	RCNM Outputs, dBA Leq, at 50 feet	Noise Level at Job Corps from Phase B (100 feet)	Noise Level at Cabrillo High from Phase B (300 feet)	Noise Level at Cabrillo High Play Fields from Phase K (120 feet)
Building Demolition	83	77	67	75
Site Preparation	85	79	69	77
Rough Grading	85	79	69	77
Extra Foundation Preparation	82	76	67	75
Utility Trenching	80	74	64	72
Building Construction	83	76	67	75
Architectural Coating	74	68	58	66
Asphalt Demolition	85	79	70	78
Asphalt Paving	85	79	70	78
Fine Grading	85	79	69	77
Finish/Landscaping	68	62	52	60

Attenuation calculated through Inverse Square Law: Lp(R2) = Lp(R1) - 20Log(R2/R1)

***Provided by Applicant and equipment mix generated by CalEEMod Defaults*

TRAFFIC NOISE CALCULATIONS & MODELING

Segment	ADT Volumes				dBA, CNEL		
	Existing No Project	Existing Plus Project	Future No Project	Future Plus Project	Project Noise Increase	Cumulative Increase	Project Cumulative Contribution
Alameda Street - north of connector to Sepulveda Boulevard	22,626	23,166	20,930	21,470	0.1	-0.2	0.1
Alameda Street - south of connector to Sepulveda Boulevard	17,138	17,388	17,510	430	0.1	-16.0	-16.1
Connector to Sepulveda Boulevard - east of Alameda Street	8,161	8,451	6,140	6,430	0.2	-1.0	0.2
Connector to Alameda Street - north of Sepulveda Boulevard	5,028	5,322	2,940	3,230	0.2	-1.9	0.4
Connector to Alameda Street - south of Sepulveda Boulevard	440	440	430	430	0.0	-0.1	0.0
Sepulveda Boulevard - east of conector to Alameda Street	10,534	11,004	7,860	8,330	0.2	-1.0	0.3
Sepulveda Boulevard - west of conector to Alameda Street	9,488	9,672	8,970	9,150	0.1	-0.2	0.1
Terminal Island Fwy - north of Willow Street	41	41	40	40	0.0	-0.1	0.0
Terminal Island Fwy - south of Willow Street	8,763	9,383	6,080	6,700	0.3	-1.2	0.4
Willow Street - Terminal Island Fwy to Santa Fe Avenue	14,710	14,880	15,040	15,210	0.0	0.1	0.0
Willow Street - west of Terminal Island Fwy	16,250	16,700	13,720	14,170	0.1	-0.6	0.1
Santa Fe Avenue - north of Willow Street	18,219	18,399	18,720	18,900	0.0	0.2	0.0
Santa Fe Avenue - south of Willow Street	16,974	17,334	17,450	17,810	0.1	0.2	0.1
Willow Street - east of Santa Fe Avenue	23,340	23,690	23,850	24,200	0.1	0.2	0.1
Alameda Street - north of O Street	13,777	14,027	13,390	13,640	0.1	0.0	0.1
Alameda Street - south of O Street	10,046	10,116	10,250	10,320	0.0	0.1	0.0
O Street - east of Alameda Street	7,205	7,525	6,680	7,000	0.2	-0.1	0.2
O Street - north of Pacific Coast Highway	7,299	7,611	6,790	7,100	0.2	-0.1	0.2
Pacific Coast Highway - east of O Street	21,314	21,804	21,280	21,770	0.1	0.1	0.1
Pacific Coast Highway - west of O Street	23,574	23,756	24,270	24,450	0.0	0.2	0.0
San Gabriel Avenue - south of SR-103 NB Ramps	3,404	4,374	4,470	5,440	1.1	2.0	0.9
SR-103 NB Ramps - west of San Gabriel Avenue	3,107	3,551	4,150	4,590	0.6	1.7	0.4
Technology Place - south of Pacific Coast Highway	2,328	2,398	2,440	2,510	0.1	0.3	0.1
Pacific Coast Highway - Technology Place to Santa Fe Avenue	23,986	26,196	23,420	25,630	0.4	0.3	0.4
Pacific Coast Highway - weast of Technology Place	23,889	24,654	23,270	24,030	0.1	0.0	0.1
Santa Fe Avenue - north of Pacfic Coast Highway	11,801	12,143	12,120	12,460	0.1	0.2	0.1
Santa Fe Avenue - south of Pacific Coast Highway	9,238	9,308	9,590	9,660	0.0	0.2	0.0
Pacific Coast Highway - Santa Fe Avenue to Harbor Avenue	21,777	23,577	21,220	23,020	0.3	0.2	0.4
Harbor Avenue - north of Pacific Coast Highway	5,263	5,264	5,410	5,410	0.0	0.1	0.0
Harbor Avenue - south of Pacific Coast Highway	2,981	3,091	3,070	3,180	0.2	0.3	0.2
Pacific Coast Highway - Santa Fe Avenue to Harbor Avenue	30,760	32,450	30,500	32,190	0.2	0.2	0.2
Magnolia Avenue - north of Pacific Coast Highway	7,486	7,594	7,750	7,860	0.1	0.2	0.1
Magnolia Avenue - south of Pacific Coast Highway	8,073	8,143	8,440	8,510	0.0	0.2	0.0
Pacific Coast Highway - east of Magnolia Avenue	26,375	26,665	27,170	27,460	0.0	0.2	0.0
Pacific Coast Highway - west of Magnolia Avenue	27,160	27,627	28,100	28,570	0.1	0.2	0.1
Santa Fe Av - south of Willard	13,763	14,073	14,136	14,446	0.1	0.2	0.1
Pacific Coast Hwy - east of O street	26,099	26,555	26,839	27,295	0.1	0.2	0.1
Terminal Island Fwy - south of Pacific Coast Highway	11,017	11,115	12,948	13,046	0.0	0.7	0.0
Technology Place - south of 20th Street	869	2,979	990	3,100	5.4	5.5	5.0
Technology Place - north of Pacific Coast Highway	1,059	3,164	1,190	3,290	4.8	4.9	4.4



Existing	Sheet 1 of 1	23 Jul 2020
	PlaceWorks	
Plan View	Project/Contract No. COLB-09	
Run name: CVC_Existing	TNM Version 2.5, Feb 2004	
Scale: 500 feet	Analysis By: IG	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

PlaceWorks 23 July 2020
IG TNM 2.5

INPUT: ROADWAYS
PROJECT/CONTRACT: COLB-09
RUN: Existing

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA

Roadway Name	Width	Points Name	No.	Coordinates (pavement) X	Y	Z	Flow Control Control Device	Speed Constraint	Percent Vehicles Affected	Segment Pvmt Type	On Struct?
	ft			ft	ft	ft		mph	%		
PCH WB	30.0	point1	1	6,496,656.5	1,745,998.2	0.00				Average	
		point2	2	6,495,268.5	1,746,003.6	0.00				Average	
		point3	3	6,494,047.0	1,746,002.5	0.00				Average	
		point4	4	6,493,577.5	1,746,000.4	0.00				Average	
		point5	5	6,493,320.0	1,745,996.9	0.00				Average	
		point6	6	6,493,134.5	1,746,002.4	0.00				Average	
		point7	7	6,492,875.0	1,746,050.1	0.00					
PCH EB	30.0	point8	8	6,492,868.5	1,746,021.4	0.00				Average	
		point9	9	6,493,133.0	1,745,976.9	0.00				Average	
		point10	10	6,493,578.0	1,745,970.4	0.00				Average	
		point11	11	6,494,050.0	1,745,968.2	0.00				Average	
		point12	12	6,495,268.5	1,745,965.8	0.00				Average	
		point13	13	6,496,656.5	1,745,974.5	0.00					
103 NB on Ramp	24.0	point14	14	6,493,634.0	1,746,623.6	0.00				Average	
		point15	15	6,493,524.0	1,746,626.2	0.00				Average	
		point16	16	6,493,469.0	1,746,654.0	0.00				Average	
		point17	17	6,493,439.5	1,746,707.0	0.00				Average	
		point18	18	6,493,437.0	1,746,788.6	0.00				Average	
		point19	19	6,493,440.5	1,746,855.4	0.00					
103 NB off Ramps	12.0	point26	26	6,493,398.0	1,746,443.4	0.00				Average	
		point27	27	6,493,423.0	1,746,523.2	0.00				Average	
		point28	28	6,493,463.0	1,746,579.8	0.00				Average	
		point29	29	6,493,521.5	1,746,604.0	0.00				Average	
		point30	30	6,493,630.5	1,746,607.5	0.00					
103 North of PCH NB	35.0	point31	31	6,493,364.0	1,746,266.4	0.00				Average	

		point32	32	6,493,446.0	1,747,067.8	0.00				Average	
		point33	33	6,493,488.5	1,747,409.0	0.00				Average	
		point34	34	6,493,528.0	1,747,647.8	0.00				Average	
		point35	35	6,493,557.0	1,747,789.2	0.00				Average	
		point36	36	6,493,620.0	1,748,069.8	0.00				Average	
		point37	37	6,493,681.0	1,748,296.2	0.00					
103 north of PCH SB	35.0	point38	38	6,493,626.5	1,748,308.8	0.00				Average	
		point39	39	6,493,561.5	1,748,083.5	0.00				Average	
		point40	40	6,493,495.0	1,747,789.2	0.00				Average	
		point41	41	6,493,463.5	1,747,647.2	0.00				Average	
		point42	42	6,493,426.0	1,747,403.8	0.00				Average	
		point43	43	6,493,384.0	1,747,068.2	0.00				Average	
		point44	44	6,493,304.5	1,746,273.2	0.00					
Santa Fe NB	12.0	point45	45	6,496,209.5	1,746,035.5	0.00				Average	
		point46	46	6,496,217.0	1,747,587.8	0.00				Average	
		point47	47	6,496,221.5	1,748,574.1	0.00					
Santa Fe SB	12.0	point52	52	6,496,185.5	1,748,571.0	0.00				Average	
		point53	53	6,496,177.5	1,747,585.2	0.00				Average	
		point54	54	6,496,172.5	1,746,034.6	0.00					

PlaceWorks **23 July 2020**
IG **TNM 2.5**

INPUT: TRAFFIC FOR Ldn
PROJECT/CONTRACT: **COLB-09**
RUN: **Existing**

Roadway	Points																		
Name	Name	No.	Segment																
			ADT	Autos			MTrucks			HTrucks			Buses			Motorcycles			
				%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S	%D	%N	S	
			veh/24hrs	%	%	mph	%	%	mph	%	%	mph	%	%	mph	%	%	mph	
PCH WB	point1	1	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point2	2	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point3	3	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point4	4	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point5	5	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point6	6	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point7	7																	
PCH EB	point8	8	13049	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point9	9	6973	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point10	10	6973	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point11	11	6973	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point12	12	6973	78	78	40	4	4	40	18	18	40	0	0	0	0	0	0	
	point13	13																	
103 NB on Ramp	point14	14	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point15	15	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point16	16	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point17	17	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point18	18	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point19	19																	
103 NB off Ramps	point26	26	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point27	27	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point28	28	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	
	point29	29	3107	78	78	30	4	4	30	18	18	30	0	0	0	0	0	0	

	point30	30																
103 North of PCH NB	point31	31	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point32	32	5506	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point33	33	5506	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point34	34	5506	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point35	35	5506	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point36	36	5506	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point37	37																
103 north of PCH SB	point38	38	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point39	39	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point40	40	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point41	41	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point42	42	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point43	43	5508	78	78	65	4	4	65	18	18	65	0	0	0	0	0	0
	point44	44																
Santa Fe NB	point45	45	6881	78	78	35	4	4	35	18	18	35	0	0	0	0	0	0
	point46	46	6881	78	78	35	4	4	35	18	18	35	0	0	0	0	0	0
	point47	47																
Santa Fe SB	point52	52	6881	78	78	35	4	4	35	18	18	35	0	0	0	0	0	0
	point53	53	6881	78	78	35	4	4	35	18	18	35	0	0	0	0	0	0
	point54	54																

PlaceWorks						**23 July 2020**						
IG						**TNM 2.5**						
INPUT: RECEIVERS												
PROJECT/CONTRACT:	**COLB-09**											
RUN:	**Existing**											

Receiver												
Name	**No.**	**#DUs**	**Coordinates (ground)**			**Height**	**Input Sound Levels and Criteria**				**Active**
			X	**Y**	**Z**	**above**	**Existing**	**Impact Criteria**		**NR**	**in**
						Ground	**Ldn**	**Ldn**	**Sub'l**	**Goal**	**Calc.**
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Receiver1	1	1	6,493,747.0	1,747,206.1	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver2	3	1	6,493,827.5	1,746,943.6	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver3	4	1	6,494,259.0	1,746,901.2	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver4	5	1	6,494,531.0	1,746,861.1	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver5	6	1	6,494,679.5	1,747,004.2	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver6	7	1	6,493,681.5	1,747,569.2	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver7	8	1	6,493,646.5	1,747,722.9	0.00	4.92	0.00	66	10.0	8.0	Y
Receiver8	10	1	6,493,734.0	1,747,857.0	0.00	4.92	0.00	66	10.0	8.0	Y

PlaceWorks 23 July 2020
IG TNM 2.5

INPUT: BARRIERS
PROJECT/CONTRACT: COLB-09
RUN: Existing

Barrier Name	Type	Height Min	Height Max	If Wall $ per Unit Area	If Berm $ per Unit Vol.	Top Width	Run:Rise	Add'tnl $ per Unit Length	Points Name	No.	Coordinates (bottom) X	Y	Z	Height at Point	Segment Seg Ht Incre-ment	Perturbs #Up	#Dn	On Struct?	Important Reflec-tions?
		ft	ft	$/sq ft	$/cu yd	ft	ft:ft	$/ft			ft	ft	ft	ft	ft				
Onsite B1	W	0.00	99.99	0.00				0.00	point5	5	6,493,756.0	1,746,656.8	0.00	40.00	0.00	0	0		
									point6	6	6,493,728.0	1,746,656.8	0.00	40.00	0.00	0	0		
									point7	7	6,493,728.0	1,746,682.5	0.00	40.00	0.00	0	0		
									point8	8	6,493,712.0	1,746,683.1	0.00	40.00	0.00	0	0		
									point9	9	6,493,705.5	1,746,700.5	0.00	40.00	0.00	0	0		
									point10	10	6,493,695.5	1,746,696.2	0.00	40.00	0.00	0	0		
									point11	11	6,493,686.0	1,746,773.4	0.00	40.00	0.00	0	0		
									point12	12	6,493,715.0	1,746,779.0	0.00	40.00	0.00	0	0		
									point13	13	6,493,743.0	1,746,777.6	0.00	40.00	0.00	0	0		
									point14	14	6,493,759.5	1,746,690.1	0.00	40.00	0.00	0	0		
									point161	161	6,493,756.0	1,746,656.8	0.00	40.00					
Onsite B2	W	0.00	99.99	0.00				0.00	point15	15	6,493,618.0	1,746,736.6	0.00	12.00	0.00	0	0		
									point16	16	6,493,568.0	1,746,727.6	0.00	12.00	0.00	0	0		
									point17	17	6,493,551.0	1,746,814.4	0.00	12.00	0.00	0	0		
									point18	18	6,493,602.5	1,746,824.1	0.00	12.00	0.00	0	0		
									point162	162	6,493,618.0	1,746,736.6	0.00	12.00					
Onsite B3	W	0.00	99.99	0.00				0.00	point36	36	6,493,761.0	1,746,865.1	0.00	12.00	0.00	0	0		
									point37	37	6,493,720.0	1,746,865.1	0.00	12.00	0.00	0	0		
									point38	38	6,493,719.5	1,746,870.5	0.00	12.00	0.00	0	0		
									point39	39	6,493,711.5	1,746,870.5	0.00	12.00	0.00	0	0		
									point40	40	6,493,711.5	1,746,861.2	0.00	12.00	0.00	0	0		
									point41	41	6,493,676.5	1,746,862.8	0.00	12.00	0.00	0	0		
									point42	42	6,493,665.0	1,746,908.6	0.00	12.00	0.00	0	0		
									point43	43	6,493,659.0	1,746,907.2	0.00	12.00	0.00	0	0		
									point44	44	6,493,661.5	1,746,939.0	0.00	12.00	0.00	0	0		
									point45	45	6,493,705.5	1,746,935.1	0.00	12.00	0.00	0	0		
									point46	46	6,493,714.5	1,746,896.2	0.00	12.00	0.00	0	0		
									point47	47	6,493,739.0	1,746,896.8	0.00	12.00	0.00	0	0		
									point48	48	6,493,738.5	1,746,900.5	0.00	12.00	0.00	0	0		
									point49	49	6,493,744.0	1,746,899.2	0.00	12.00	0.00	0	0		
									point50	50	6,493,744.0	1,746,906.2	0.00	12.00	0.00	0	0		
									point51	51	6,493,759.0	1,746,906.0	0.00	12.00	0.00	0	0		
									point52	52	6,493,758.5	1,746,882.5	0.00	12.00	0.00	0	0		
									point53	53	6,493,762.5	1,746,882.5	0.00	12.00	0.00	0	0		
									point163	163	6,493,761.0	1,746,865.1	0.00	12.00					

Offsite S B1	W	0.00	99.99	0.00				0.00	point93	93	6,493,853.5	1,746,158.8	0.00	40.00	0.00	0	0		
									point94	94	6,494,096.5	1,746,163.1	0.00	40.00	0.00	0	0		
									point95	95	6,494,101.0	1,746,579.8	0.00	40.00	0.00	0	0		
									point96	96	6,493,853.5	1,746,579.8	0.00	40.00	0.00	0	0		
									point164	164	6,493,853.5	1,746,158.8	0.00	40.00					
Offsite S B3	W	0.00	99.99	0.00				0.00	point105	105	6,494,476.0	1,746,228.2	0.00	40.00	0.00	0	0		
									point106	106	6,494,472.0	1,746,095.8	0.00	40.00	0.00	0	0		
									point107	107	6,494,626.0	1,746,098.0	0.00	40.00	0.00	0	0		
									point108	108	6,494,624.0	1,746,141.4	0.00	40.00	0.00	0	0		
									point109	109	6,494,673.5	1,746,143.6	0.00	40.00	0.00	0	0		
									point110	110	6,494,667.0	1,746,234.8	0.00	40.00	0.00	0	0		
									point165	165	6,494,476.0	1,746,228.2	0.00	40.00					
Offsite S B4	W	0.00	99.99	0.00				0.00	point111	111	6,494,780.0	1,746,147.9	0.00	40.00	0.00	0	0		
									point112	112	6,494,780.0	1,746,054.6	0.00	40.00	0.00	0	0		
									point113	113	6,495,075.0	1,746,050.2	0.00	40.00	0.00	0	0		
									point114	114	6,495,079.5	1,746,167.4	0.00	40.00	0.00	0	0		
									point115	115	6,494,797.5	1,746,169.6	0.00	40.00	0.00	0	0		
									point166	166	6,494,780.0	1,746,147.9	0.00	40.00					
Offsite E B1	W	0.00	99.99	0.00				0.00	point116	116	6,494,992.0	1,746,871.4	0.00	14.00	0.00	0	0		
									point117	117	6,494,993.5	1,747,108.4	0.00	14.00	0.00	0	0		
									point118	118	6,494,928.5	1,747,112.8	0.00	14.00	0.00	0	0		
									point119	119	6,494,929.5	1,747,056.2	0.00	14.00	0.00	0	0		
									point120	120	6,494,880.0	1,747,055.5	0.00	14.00	0.00	0	0		
									point121	121	6,494,880.0	1,746,927.9	0.00	14.00	0.00	0	0		
									point122	122	6,494,928.5	1,746,927.0	0.00	14.00	0.00	0	0		
									point123	123	6,494,928.5	1,746,874.0	0.00	14.00	0.00	0	0		
									point167	167	6,494,992.0	1,746,871.4	0.00	14.00					
Offsite E B2	W	0.00	99.99	0.00				0.00	point124	124	6,495,964.0	1,747,544.2	24.00	0.00	0.00	0	0		
									point125	125	6,495,963.0	1,747,592.8	24.00	0.00	0.00	0	0		
									point126	126	6,496,109.0	1,747,591.1	24.00	0.00	0.00	0	0		
									point127	127	6,496,117.5	1,747,190.0	24.00	0.00	0.00	0	0		
									point128	128	6,495,774.0	1,747,190.9	24.00	0.00	0.00	0	0		
									point129	129	6,495,773.0	1,747,251.6	24.00	0.00	0.00	0	0		
									point130	130	6,496,045.0	1,747,252.5	24.00	0.00	0.00	0	0		
									point131	131	6,496,043.0	1,747,526.0	24.00	0.00	0.00	0	0		
									point132	132	6,495,966.0	1,747,526.0	24.00	0.00	0.00	0	0		
									point168	168	6,495,964.0	1,747,544.2	24.00	0.00					
Onsite B4	W	0.00	99.99	0.00				0.00	point133	133	6,493,684.5	1,746,959.6	0.00	12.00	0.00	0	0		
									point134	134	6,493,677.0	1,746,969.0	0.00	12.00	0.00	0	0		
									point135	135	6,493,652.5	1,746,970.8	0.00	12.00	0.00	0	0		
									point136	136	6,493,659.5	1,747,054.4	0.00	12.00	0.00	0	0		
									point137	137	6,493,667.5	1,747,054.8	0.00	12.00	0.00	0	0		
									point138	138	6,493,667.0	1,747,058.9	0.00	12.00	0.00	0	0		
									point139	139	6,493,686.5	1,747,056.8	0.00	12.00	0.00	0	0		
									point140	140	6,493,687.0	1,747,063.8	0.00	12.00	0.00	0	0		
									point141	141	6,493,693.0	1,747,063.1	0.00	12.00	0.00	0	0		
									point142	142	6,493,691.0	1,747,073.5	0.00	12.00	0.00	0	0		
									point143	143	6,493,715.5	1,747,075.9	0.00	12.00	0.00	0	0		
									point144	144	6,493,718.5	1,747,047.1	0.00	12.00	0.00	0	0		

									point145	145	6,493,714.0	1,747,045.8	0.00	12.00	0.00	0	0		
									point146	146	6,493,712.5	1,747,024.5	0.00	12.00	0.00	0	0		
									point147	147	6,493,701.5	1,747,025.9	0.00	12.00	0.00	0	0		
									point148	148	6,493,691.0	1,747,026.6	0.00	12.00	0.00	0	0		
									point149	149	6,493,687.0	1,746,984.6	0.00	12.00	0.00	0	0		
									point150	150	6,493,693.5	1,746,969.0	0.00	12.00	0.00	0	0		
									point169	169	6,493,684.5	1,746,959.6	0.00	12.00					
Offsite S B2	W	0.00	99.99	0.00				0.00	point151	151	6,494,187.5	1,746,558.1	0.00	40.00	0.00	0	0		
									point152	152	6,494,196.5	1,746,384.5	0.00	40.00	0.00	0	0		
									point153	153	6,494,448.0	1,746,377.9	0.00	40.00	0.00	0	0		
									point154	154	6,494,446.0	1,746,551.6	0.00	40.00	0.00	0	0		
									point155	155	6,494,367.5	1,746,553.8	0.00	40.00	0.00	0	0		
									point156	156	6,494,367.5	1,746,514.8	0.00	40.00	0.00	0	0		
									point157	157	6,494,272.0	1,746,521.2	0.00	40.00	0.00	0	0		
									point158	158	6,494,272.0	1,746,558.1	0.00	40.00	0.00	0	0		
									point170	170	6,494,187.5	1,746,558.1	0.00	40.00					

PlaceWorks							**23 July 2020**						
IG							**TNM 2.5**						
							Calculated with TNM 2.5						
RESULTS: SOUND LEVELS													
PROJECT/CONTRACT:		**COLB-09**											
RUN:		**Existing**											
BARRIER DESIGN:		**INPUT HEIGHTS**						**Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.**					
ATMOSPHERICS:		**68 deg F, 50% RH**											

Receiver													
Name	**No.**	**#DUs**	**Existing Ldn**	**No Barrier Ldn Calculated**	**Crit'n**	**Increase over existing Calculated**	**Crit'n Sub'l Inc**	**Type Impact**	**With Barrier Calculated Ldn**	**Noise Reduction Calculated**	**Goal**	**Calculated minus Goal**
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	64.6	66	64.6	10	----	64.6	0.0	8	-8.0
Receiver2	3	1	0.0	57.5	66	57.5	10	----	57.5	0.0	8	-8.0
Receiver3	4	1	0.0	53.6	66	53.6	10	----	53.6	0.0	8	-8.0
Receiver4	5	1	0.0	52.2	66	52.2	10	----	52.2	0.0	8	-8.0
Receiver5	6	1	0.0	51.5	66	51.5	10	----	51.5	0.0	8	-8.0
Receiver6	7	1	0.0	69.9	66	69.9	10	Snd Lvl	69.9	0.0	8	-8.0
Receiver7	8	1	0.0	73.4	66	73.4	10	Snd Lvl	73.4	0.0	8	-8.0
Receiver8	10	1	0.0	70.1	66	70.1	10	Snd Lvl	70.1	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction Min**	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	8	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0