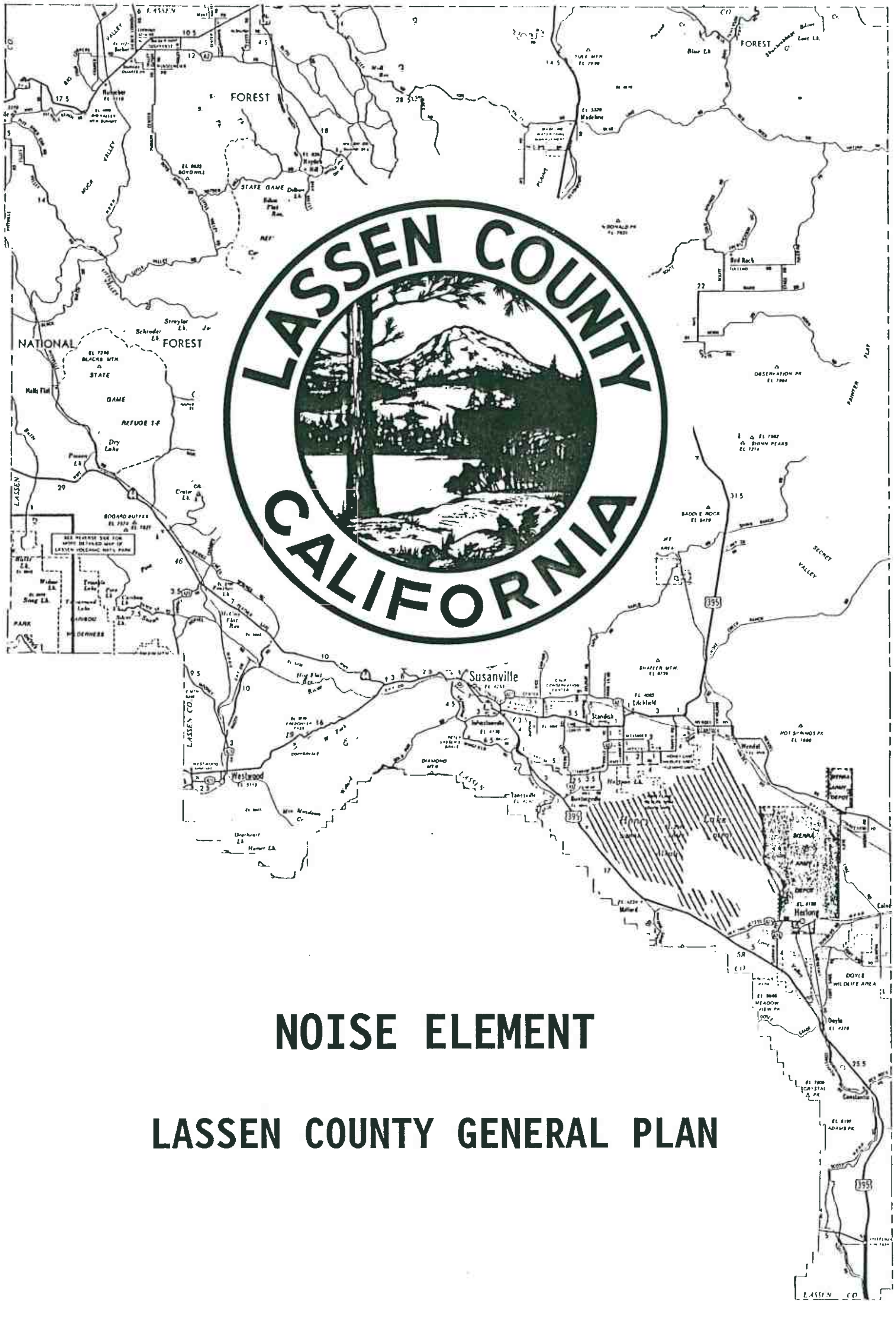

NOISE ELEMENT

LASSEN COUNTY GENERAL PLAN

NOISE ELEMENT

Lassen County General Plan

December 12, 1989

Prepared by
Brown-Buntin Associates, Inc.
Fair Oaks, California

Prepared for
Lassen County Planning Department
707 Nevada Street, Room 236
Susanville, CA 96130

RESOLUTION NO. 89-113

RESOLUTION ADOPTING 1989 NOISE ELEMENT REVISION

BE IT RESOLVED by the Board of Supervisors of the County of Lassen as follows:

WHEREAS, California Government Code Section 65300 requires that counties adopt a comprehensive, long-term general plan for the physical development of the County; and

WHEREAS, Government Code Section 65302 states that the general plan shall, among other elements, include a noise element which shall identify and appraise noise problems in the community and shall include implementation measures and possible solutions that address existing and foreseeable noise problems; and

WHEREAS, this Board has found it timely to revise the 1974 Lassen County Noise Element in order to respond to amendments in relevant State laws and noise control guidelines and changes in the scale and character of the County's development since 1974; and

WHEREAS, this Board held a public hearing on May 23, 1989 and June 27, 1989, and has reviewed the Planning Commission's recommendations regarding adoption of the proposed revision; and

WHEREAS, this Board did, on June 27, 1989, approve the draft noise element with specified modifications and referred the draft back to staff to complete and prepare the element for adoption; and

WHEREAS, the specified modifications to the draft have been incorporated into the proposed noise element;

NOW, THEREFORE, BE IT RESOLVED that the Board of Supervisors of the County of Lassen hereby adopts the 1989 Noise Element presented to it on this date as the complete revision of the 1974 Noise Element; and

BE IT FURTHER RESOLVED that, the 1989 Noise Element shall henceforth supercede all previous General Plan and area plan standards pertaining to the subject of noise whenever such standards are found to conflict with policies and standards set forth in the revised noise element.

The foregoing resolution was adopted at a regular meeting of the Board of Supervisors of Lassen County, California, held on the 12 day of December , 1989 by the following vote:

AYES: Supervisors de Martimprey, Chapman, Gaither, Lemke, Williams

NOES: None

ABSENT: None

Hugues de Martimprey

Chairman of the Board of Supervisors
County of Lassen, State of California

ATTEST:

Theresa Nagel

I, Theresa Nagel, Lassen County Clerk, and ex-officio clerk of the Board of Supervisors, do hereby certify that the foregoing resolution was adopted by the Lassen County Board of Supervisors on the 12th day of December , 1989.

Theresa Nagel

701.01/NCres

Lassen County General Plan

NOISE ELEMENT

Table of Contents

I. INTRODUCTION

The purposes of the Noise Element are to provide mechanisms to mitigate existing noise conflicts, and to minimize future noise conflicts by the adoption of policies and implementation measures designed to achieve land use compatibility for proposed development.

The contents of a Noise Element and the methods used in its preparation have been determined by the requirements of Section 65302 (f) of the California Government Code and by the "Guidelines for the Preparation and Content of Noise Elements of the General Plan" adopted and published by the California Office of Noise Control (ONC) in 1976. The ONC Guidelines require that certain major noise sources and areas containing noise sensitive land uses be identified and quantified by preparing generalized noise exposure contours for current and projected conditions within the community. Contours may be prepared in terms of either the Community Noise Equivalent Level (CNEL) or the Day-Night Average Level (L_{dn})*, which are descriptors of total noise exposure at a given location for an annual average day. It is intended that the noise exposure information developed for the Noise Element be incorporated into the General Plan to serve as a basis for achieving land use compatibility within the community. It is also intended that noise exposure information be used to provide baseline levels for use in the development and enforcement of a local noise control ordinance to address noise produced by non-preempted noise sources. The County recognizes that the Noise Element does not apply to workplace noise exposures, which are regulated by Federal and State agencies.

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* For an explanation of terminology used in this report refer to Appendix A: "Acoustical Terminology."

A. State Policy and Authorization

Section 65302 (f)) of the California Government Code mandates that the General Plan for each County contain a noise element which is designed to identify and appraise noise problems in the community.

The State Office of Noise Control has established guidelines which require that current and projected noise levels be analyzed and quantified for the following noise sources:

1. Highways and freeways.
2. Primary arterials and major local streets.
3. Passenger and freight on-line railroad operations and ground rapid transit systems.
4. Commercial, general aviation, heliport, helistop, and military airport operations, aircraft overflights, jet engine test stands, and all other ground facilities and maintenance functions related to airport operation.
5. Local industrial plants, including, but not limited to, railroad classification yards.
6. Other ground stationary noise sources identified by local agencies as contributing to the community noise environment.

Noise contours are required for these sources, stated in terms of the community noise equivalent level (CNEL) or day-night average level (L_{dn}), and may be used as a guide for establishing a pattern of land uses that minimizes the exposure of community residents to excessive noise.

B. Related State Regulations

Other State laws and regulations regarding noise control are directed towards aircraft, motor vehicles and noise in general.

California Administrative Code, Title 21, Subchapter 6, establishes noise level criteria for airports in California. These regulations apply to the airport operator, and are enforced by the County in which the airport is located. A Noise Impact Boundary based upon the 65 dB CNEL contour is established, and measures are specified to attain land use compatibility with respect to aircraft/airport noise.

The California Vehicle Code sets noise emission standards for new vehicles, including autos, trucks, motorcycles and off-road vehicles. Performance standards are also applied to vehicles operated on public streets and roadways. Section 216 of the Streets and Highways Code regulates traffic noise as received at schools near freeways. The Harbors and Navigation Code regulates noise emissions from new motorboats and those operated in or upon inland waters.

Title 24 of the California Administrative Code regulates interior noise levels within multiple-occupancy dwellings affected by noise from traffic, aircraft operations, railroads and industrial facilities. The State Penal Code (Section 415) prohibits loud and unusual noise that disturbs the peace, while the Civil Code defines public nuisances which may be caused by noise. The California Environmental Quality Act includes noise as one of the factors in determining environmental impacts.

C. Relationship to the General Plan

The Noise Element is most related to the Land Use and Circulation Elements of the general plan. Its relationship to the Land Use Element is direct in that the implementation of either Element has the potential to result in the creation or elimination of a noise conflict between differing land uses. The Land Use Element must be consistent with the Noise Element by preventing the development of incompatible adjacent land uses, preventing impacts upon noise sensitive uses and preventing encroachment upon existing noise-producing facilities.

II. Existing and Future Noise Environments

A. Overview

Based on discussions with the Lassen County staff regarding potential major noise sources, it was determined that there are several potentially significant primary sources of community noise within Lassen County. These sources include traffic on major roadways and highways, railroad operations, and industrial activities.

Analytical noise modeling techniques and noise measurements were used to develop generalized L_{dn} noise contours for the major roadways, railroads and industrial noise sources in Lassen County for existing (1987-1988) and future (2008) conditions.

Analytical noise modeling techniques make use of source-specific data including average levels of activity, hours of operation, seasonal fluctuations, and average levels of noise from source operations. Analytical methods have been developed for a number of environmental noise sources including roadways, railroad line operations, railroad yard operations, industrial plants. Such methods will produce reliable results as long as data inputs and assumptions are valid for the sources being studied. The analytical methods used in this report closely follow recommendations made by ONC, and were supplemented where appropriate by field-measured noise level data to account for local conditions. It should be noted that the noise exposure contours presented in this report are based upon annual average conditions, and are not intended to be site-specific where local topography, vegetation or intervening structures may significantly affect noise exposure at a particular location.

A community noise survey was conducted to describe existing noise levels in noise-sensitive areas within Lassen County so that noise level performance standards could be developed to maintain an acceptable noise environment.

B. Roadways

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used to develop L_{dn} contours for all Highways and major roadways in Lassen County. The FHWA Model is the analytical method presently favored for traffic noise prediction by most state and local agencies, including Caltrans. The FHWA Model is based upon reference energy emission levels for automobiles, medium trucks and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions, and is generally considered to be accurate within 1.5 dB. To predict L_{dn} values it is necessary to determine the hourly distribution of traffic for a typical 24-hour day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Traffic data representing annual average traffic volumes for existing conditions were obtained from Caltrans and the Lassen County Road Department as summarized in Appendix C. The day/night distribution of traffic and the truck mix was based upon Caltrans file data and BBA estimates. Traffic volumes for the year 2008 were projected on the basis of the rate of change in traffic volumes from 1981 to 1987. Using these data and the FHWA methodology, traffic noise levels as defined by L_{dn} were calculated for existing (1987) and projected future (2008) traffic volumes. Distances from the center of the roadway to an L_{dn} contour value of 60 dB are summarized in Table I. Input data are presented in Appendix C.

It should be noted that since calculations did not take into consideration shielding caused by local buildings or topographical features, the distances reported in Table I should be considered as worst-case estimates of noise exposure along roadways in the community. Noise contour maps were prepared from the data contained in Table I to allow implementation of this Noise Element.

TABLE I
NOISE CONTOUR DATA
DISTANCE (FEET) FROM CENTER OF ROADWAY
TO L_{dn} CONTOURS

Segment Nos.	Description	1987 60 dB	2008 60 dB
	Highway 395:		
1-2	South Co. Line to Route A-3	167	238
2-3	Route A-3 to Highway 36	188	269
3-4	Highway 36 to north Co. Line	172	245
	Highway 139:		
7-8	Susanville to Modoc Co. line	45	65
	Highway 299:		
9-10	Shasta Co. to Modoc Co. line	100	143
	Highway 44:		
11-12	Shasta Co. to Highway 36	105	150
	Highway 36:		
13-14	Plumas Co. to Highway 44	116	166
15-16	Highway 44 to Susanville City Limit	165	236
33-34	Hwy. 395 to Susanville City Limit	221	315
	County Roads:		
17-18	A-1 Eagle Lake Road	32	46
19-20	A-2 Susanville Road	18	25
21-22	A-3 Buntingville Road	49	71
23-24	A-21 Mooney Road	19	28
25-26	Richmond Road	65	93
27-28	Johnstonville Road	83	118
29-30	A-25 Herlong Access	38	54
31-32	A-26 Garnier Road	37	53

C. Railroads

Main railroad lines in Lassen County include the north-south Union Pacific line in the south part of the County, the Southern Pacific north-south line (from Wendel to Modoc County), the Sierra Pacific-operated line from Wendel to Susanville and the Western Pacific/Great Northern north-south line from Westwood through Nubieber to Modoc County.

Officials with the Southern Pacific Transportation Company (SPTCo) report that current activity on the north-south mainline includes three (3) operations per week. In October of 1988, operations will increase to two trains per day. There are currently no plans for further future expansion of SPTCo operations in Lassen County.

The Sierra Pacific Lumber company is reported to operate one "local" train three times per week between Wendel and Susanville for the transport of lumber products. Although operators of this local line were unavailable for comment, officials at the SPTCo division in Oregon stated that there are no known plans for expansion of this operation.

The Union Pacific railroad reports operations of one freight train per day on the Western Pacific north-south line in Lassen County.

The maximum train speed in Lassen County is reported to be 40 mph for all tracks.

Railroad operations in Lassen County are not considered to make a significant contribution to the noise environment. Due to the low number of reported trains, the 60 dB L_{dn} noise contour for the forementioned railroads is predicted to fall within the railroad right-of-way. Although average noise levels resulting from train operations would be low, single event maximum noise levels of 100 dBA at 100 feet could be offensive where warning horns are used at grade crossings. If the number of railroad operations on any line were to increase to 4 trains per day, the 60 dB L_{dn} contour would lie about 100 feet from the railroad centerline.

D. Industrial Facilities

The production of noise is an inherent part of many industrial processes, even when the best available noise control technology is applied. Noise production within an industrial facility is controlled by Federal and State employee health and safety regulations (OSHA and Cal-OSHA), but exterior noise emissions from industrial operations have the potential to exceed locally acceptable standards at noise sensitive land uses.

From a land use planning perspective, industrial noise control issues focus upon two objectives: to prevent the introduction of new noise-producing uses in a noise sensitive area, and to prevent encroachment of noise sensitive uses upon existing industrial facilities. The first objective can be achieved by applying noise performance standards to proposed new industrial uses. The second objective can be met by requiring that new noise sensitive uses in proximity to existing industrial facilities include mitigation measures to ensure compliance with noise performance standards.

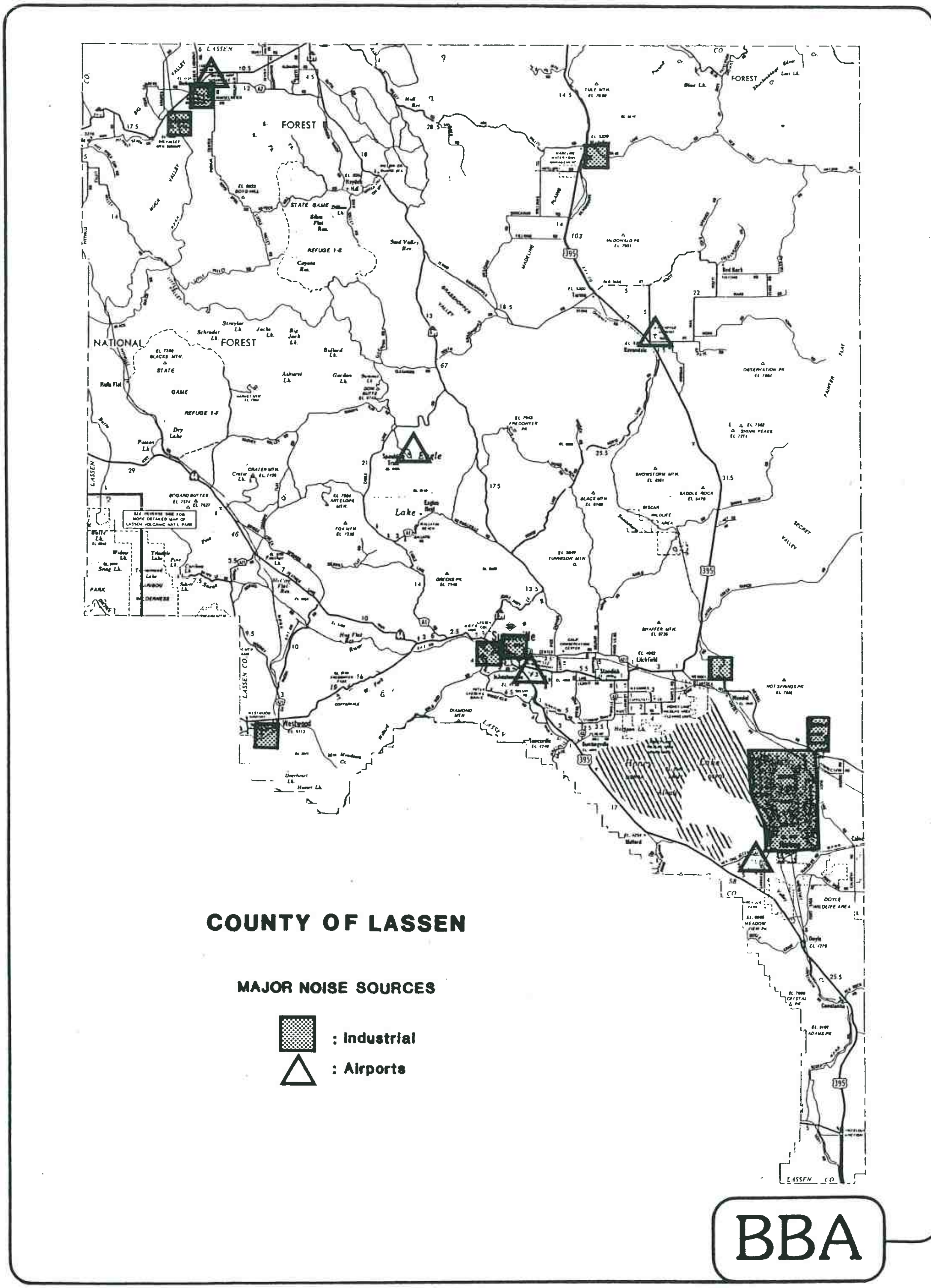
The following descriptions of existing industrial noise sources in Lassen County are intended to be representative of the relative noise impacts of such uses, and to identify specific noise sources which should be considered in the review of development proposals in their environs. The locations of these noise sources are shown by Figure 1.

Big Valley Lumber Company:

Located on Highway 299 in Bieber, the Big Valley Lumber Company operates a forest products processing plant. Hours of operation of the sawmill are 24 hours per day, seven days per week. The planing mill usually operates from 6:30 a.m. to 4:30 p.m. with operations varying with demand. Noise generating equipment includes saws, planers, fans and a cogeneration plant which operates 24 hours per day. Heavy trucks and fork-lifts are also used extensively in moving materials and in providing fuel for the cogeneration plant. Intensive stockpiling is reported to occur between September and December, which would result in elevated noise levels in the project vicinity due to a prevalence of heavy trucks. The median noise level due to nighttime operations is shown in Appendix D.

Contact: Mr. Bruce Main

FIGURE 1



FOREST
NATIONAL
FOREST
STATE GAME REFUGE 1-F
Lake
COUNTY OF LASSEN
MAJOR NOISE SOURCES
: Industrial
: Airports
BBA

Generator Pump Stations:

The use of diesel generator powered pump stations for rural agricultural needs is common in Lassen County. These pump stations often operate during nighttime and early morning hours. The County has received some complaints regarding pump stations where residential uses occur in agricultural areas. Noise measurements of a representative diesel powered pump station were conducted at a location approximately 1/4 mile south of Madeline at midnight on July 12, 1988. An average noise level of 66.5 dBA was measured at a distance of 200 feet from the source. Location of this type of pump station near a residence could result in noise complaints and could require noise mitigation. Measures which could effectively be employed to reduce noise from these stations include engine mufflers, acoustical enclosures, noise barriers and setbacks.

P & M Cedar Products, Inc.:

P & M Cedar Products, Inc. operates a log storage yard on the south side of Westwood. The primary roles of this facility are to receive, store and ship logs for sale or processing. Noise-producing activities include truck traffic on access roads, and the onsite use of 3 log loaders and a water truck. No wood product processing occurs at the yard, which typically operates from 7 a.m. to 5 p.m. Observations revealed that onsite equipment noise was effectively reduced by stacked logs between noise sources and the community. The intermittent nature of log yard activity and the relatively low noise levels produced by onsite equipment precluded development of off-site noise contours for this operation.

Contact: Mr. Randall Bradshaw

Sierra Army Depot:

The United States Army operates the Sierra Army Depot located in Herlong. Noise generating activities at this depot include ordinance demolition and aircraft operations at the onsite Army airstrip. An Installation Compatible Use Zone (ICUZ) analysis is being prepared by the Army. The ICUZ is expected to be completed in 1989, and will provide recommendations for land use planning on and adjacent to the Depot. Sierra Army Depot will prepare a memorandum of agreement with Lassen County to implement solutions to possible noise problems.

C-weighted L_{dn} contours for the Sierra Army Depot are included in Appendix D. The 65 dB L_{cdn} contour may be compared directly to the L_{dn}/CNEL land use criteria of the Noise Element.

Contact: Mr. Jim Ryan, Environmental Officer

Sierra Pacific Industries, Susanville Division:

Sierra Pacific Industries operates a lumber manufacturing facility outside the Susanville city limits. Noise generating equipment used at this facility includes saws, planers, heavy trucks, a turbine generator and five diesel generators. The saw mill is reported to operate on two 9-hour shifts while the planing mill operates on two 10-hour shifts. The power house is in operation 24 hours per day using woodwaste as fuel under normal operating mode. Officials at Sierra Pacific indicate that there are currently no plans for future expansion other than the shifting of some of the sawmill workload to the planing mill. The location of the 50 dBA median noise level contour is shown in Appendix D for normal operating conditions. The 5 diesel generators reportedly operate 1 week out of every 6 months while the turbine is being serviced. During periods of diesel generator operation, noise levels in the Riverside Drive area may increase by up to 10 dBA.

Contact: Bob Deaton

Susanville Forest Products:

Susanville Forest Products is one of several lumber manufacturing mills in Lassen County. Located on Johnstonville Road outside the Susanville City limits, this plant operates from 6 a.m. to 1 a.m. Monday through Friday. Although logging season is reported to be from June through November, operations are year round due to stockpiling. Noise generating equipment used at this facility includes high pressure blowers, conveyers, saws, a cogeneration plant and a diesel generator. Heavy trucks involved in the transport of logs and finished timber products also contribute to the noise environment. The location of the 50 dBA median noise level contour is shown in Appendix D. The mill currently occupies approximately 40 acres.

Contact: Mr. Bob Turner

Ultrapower 2 Energy Plant:

Located adjacent to the community of Westwood, Ultrapower 2 is a woodwaste burning plant used for the production of electricity only. Ultrapower staff report that operations occur 24 hours per day. Primary noise sources associated with plant operations include heavy trucks providing fuel, front loaders, conveyers and fans. Noise studies of the Westwood facility conducted by the Ultrapower 2 plant staff agree with noise measurements performed by BBA staff on July 12-14, 1988. Average noise levels during plant operation ranged from 49.4 to 56.7 dBA at a distance of approximately 600 feet north of the plant. There is currently no residential development in the near vicinity of the Ultrapower 2 plant. A representative median noise level contour for this facility is shown in Appendix D.

Contact: Mr. Garry Pritchard

E. Airports

There are five public use airports in Lassen County: Susanville Municipal Airport, Herlong, Spaulding, Bieber and Ravendale. All but the Susanville Municipal Airport are operated by Lassen County. Noise exposure contours have been prepared for the County-owned airports in terms of the Community Noise Equivalent Level (CNEL) descriptor as required by the California Administrative Code, Title 21. Airport Land use Plans have been adopted by the Lassen County Airport Land Use Commission (ALUC) for each of the airports listed below. These Plans indicate that the following land uses are incompatible within the 60 dB CNEL contour of each airport: all residential uses; schools; hospitals; convalescent homes; other in-patient health care facilities; public or quasi-public uses which would entail meetings; churches; other uses similar to those identified above which involve group activities sensitive to noise interference. The Plans also state that the 55 dB CNEL contour should be projected, and the ALUC should consider policy amendments to maximize compatibility between airport noise and surround land uses. A general description of each airport is provided in the following section. CNEL contours for each airport are shown by Appendix D.

Bieber Airport:

The Bieber Airport has a paved, lighted 2,980 foot runway. The elevation is 4,158 feet MSL. For CNEL contour preparation, an average busy day was defined as having 11 operations, with 60% single-engine and 40% twin-engine aircraft. Most operations were assumed to occur on Runway 22, with 75% during daytime and 25% during evening hours.

Herlong Airport:

The Herlong Airport has a paved, unlighted 3,260 foot runway. The elevation is 4,050 feet MSL. For CNEL contour preparation, an average busy day was defined as having 5 operations, with 60% single-engine and 40% twin-engine aircraft. Most operations were assumed to occur on Runway 24, with 75% during daytime and 25% during evening hours.

Ravendale Airport:

The Ravendale Airport has a paved, unlighted 2,900 foot runway. The elevation is 5,280 feet MSL. For CNEL contour preparation, an average busy day was defined as having 5 operations, with 60% single-engine and 40% twin-engine aircraft. Most operations were assumed to occur on Runway 17, with 75% during daytime and 25% during evening hours.

Spaulding Airport:

The Spaulding Airport has a paved, unlighted 4,850 foot runway. The elevation is 5,110 feet MSL. For CNEL contour preparation, an average busy day was defined as having 12 operations, with 60% single-engine and 40% twin-engine aircraft. Most operations were assumed to occur on Runway 16, with 75% during daytime and 25% during evening hours.

Susanville Municipal Airport:

The Susanville Municipal Airport is operated by the City of Susanville. The airport has a paved, lighted 4,050 foot runway and a graded dirt 2,500 foot runway. The elevation is 4149 feet MSL. The 1980 Airport Master Plan recommended that the airport provide capacity for 112 based aircraft and 90,000 operations per year.

The approximate locations of the 60 and 65 dB CNEL contours for this airport were obtained from the Airport Land Use Plan adopted by Lassen County ALUC in March 1987. The contours reflect 100,000 operations per year, which is slightly greater than the capacity recommended by the 1980 Master Plan.

F. Community Noise Survey

As required by the ONC Guidelines, a community noise survey was conducted to document noise exposure in areas of the community containing noise sensitive land uses. For that purpose, noise sensitive land uses in Lassen County were considered to include residential areas, schools and hospitals.

Noise monitoring sites were selected to be representative of typical conditions in areas of the community where such uses were located. Short-term noise monitoring was conducted during two or three periods of the day and night on July 12-13, 1988, so that reasonable estimates of L_{dn} could be prepared. Two long-term noise monitoring sites were established to record day-night statistical trends during the same period. The data collected included the L_{eq} and other statistical descriptors. Noise monitoring sites, measured noise levels and estimated L_{dn} values at each site are summarized in Table II; monitoring sites are shown by Figure 2.

Community noise monitoring equipment consisted of a Larson-Davis Laboratories (LDL) Model 800B Precision integrating sound level meter, a Bruel & Kjaer (B&K) Type 2218 Precision integrating sound level meter, a Metrosonics dB 604 environmental noise analyzer, and an LDL Model 700B integrating sound level meter. The measurement systems were calibrated in the field prior to use with acoustical calibrators, and comply with all pertinent requirements of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters.

The community noise survey results indicate that typical noise levels in noise sensitive areas of Lassen County are in the range of 45 dB to 55 dB L_{dn}. Noise from traffic on local roadways and industrial sources is the controlling factor for background noise levels in the County. In general, the areas of Lassen County which contain noise sensitive uses are relatively quiet except near major roadways, the railroad tracks and industrial areas.

FIGURE 2

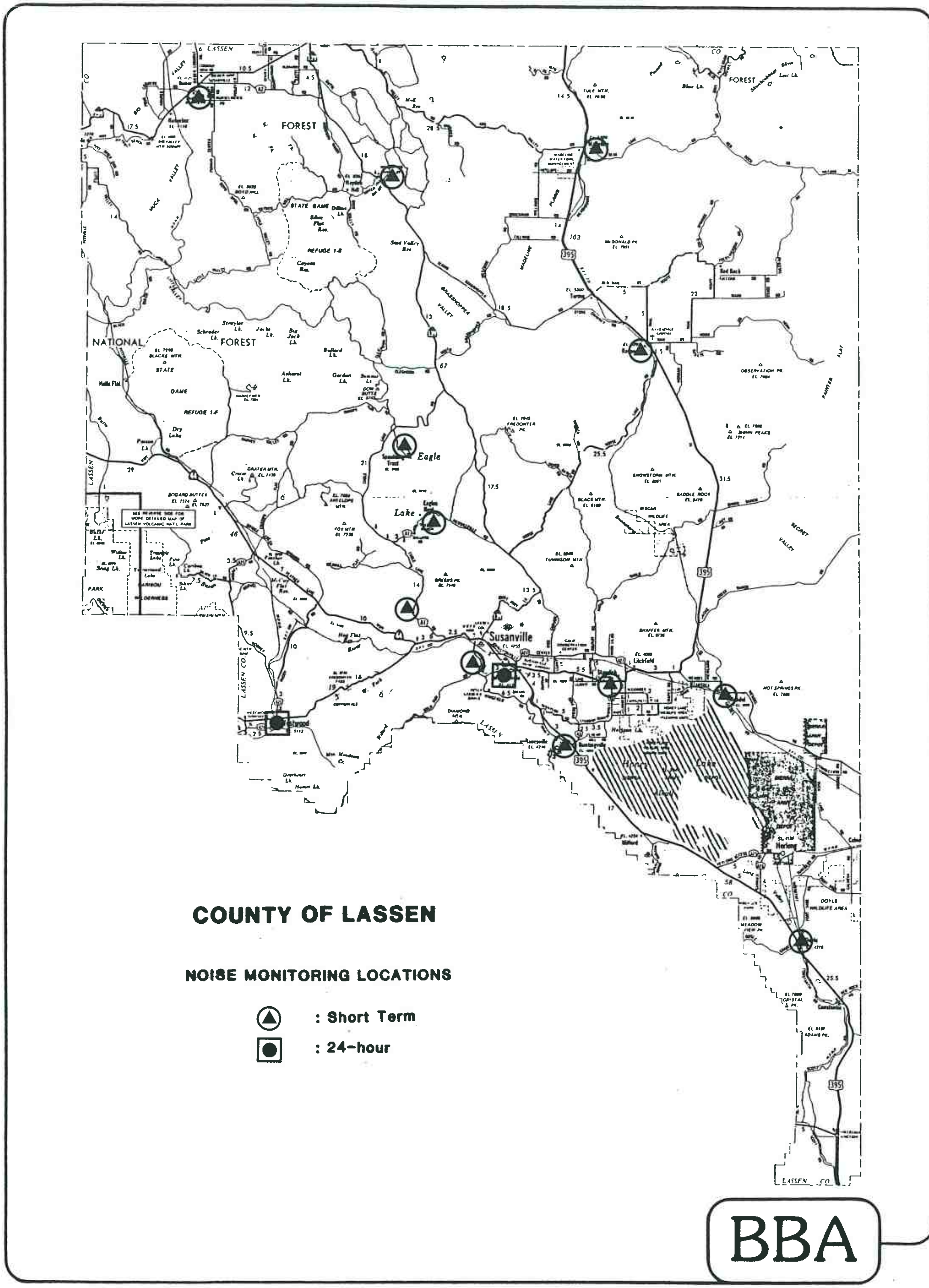

COUNTY OF LASSEN
NOISE MONITORING LOCATIONS
: Short Term
: 24-hour
NATIONAL
FOREST
FOREST
Eagle
Lake
Susanville
Litchfield
STATE GAME
REFUGE 1-E
STATE
GAME
REFUGE 1-F
395
BBA

TABLE II

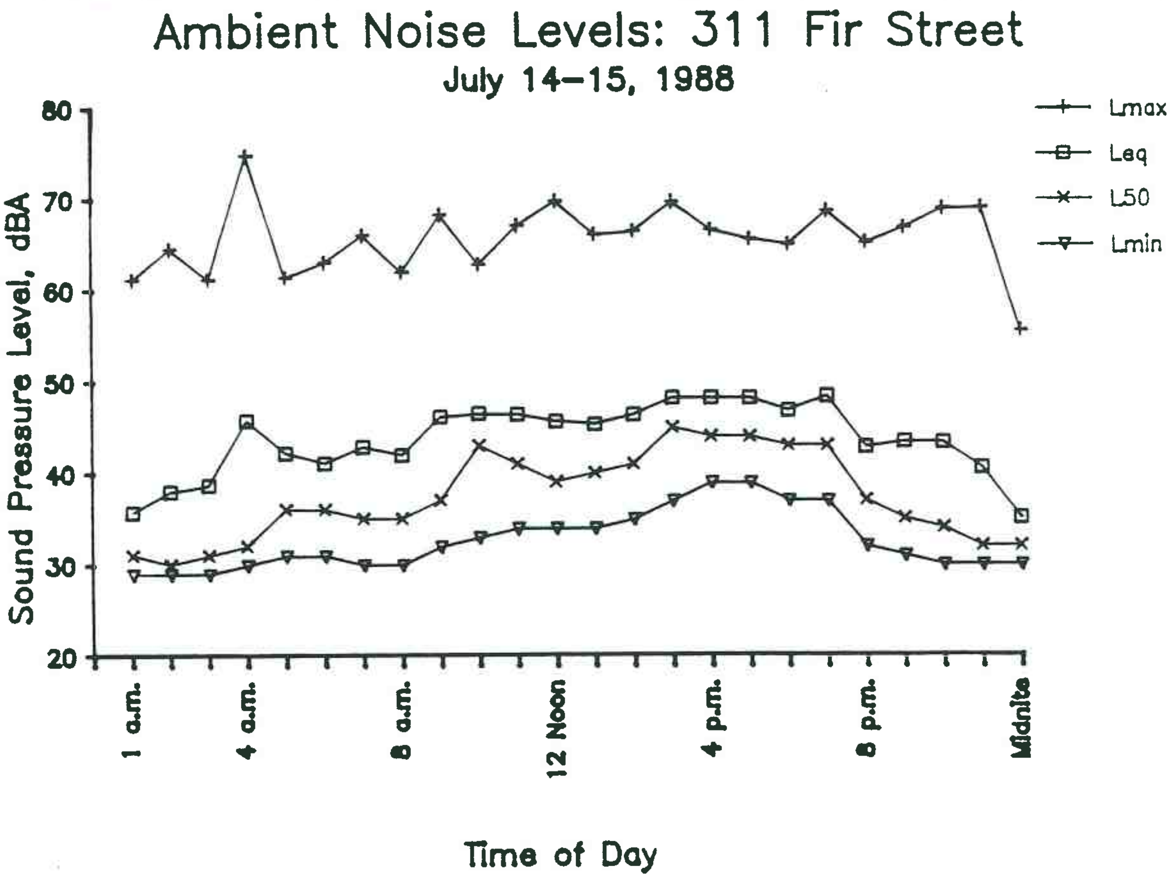
SUMMARY OF MEASURED NOISE LEVELS AND ESTIMATED DAY-NIGHT AVERAGE LEVELS (L_{dn}) IN AREAS CONTAINING NOISE SENSITIVE LAND USES

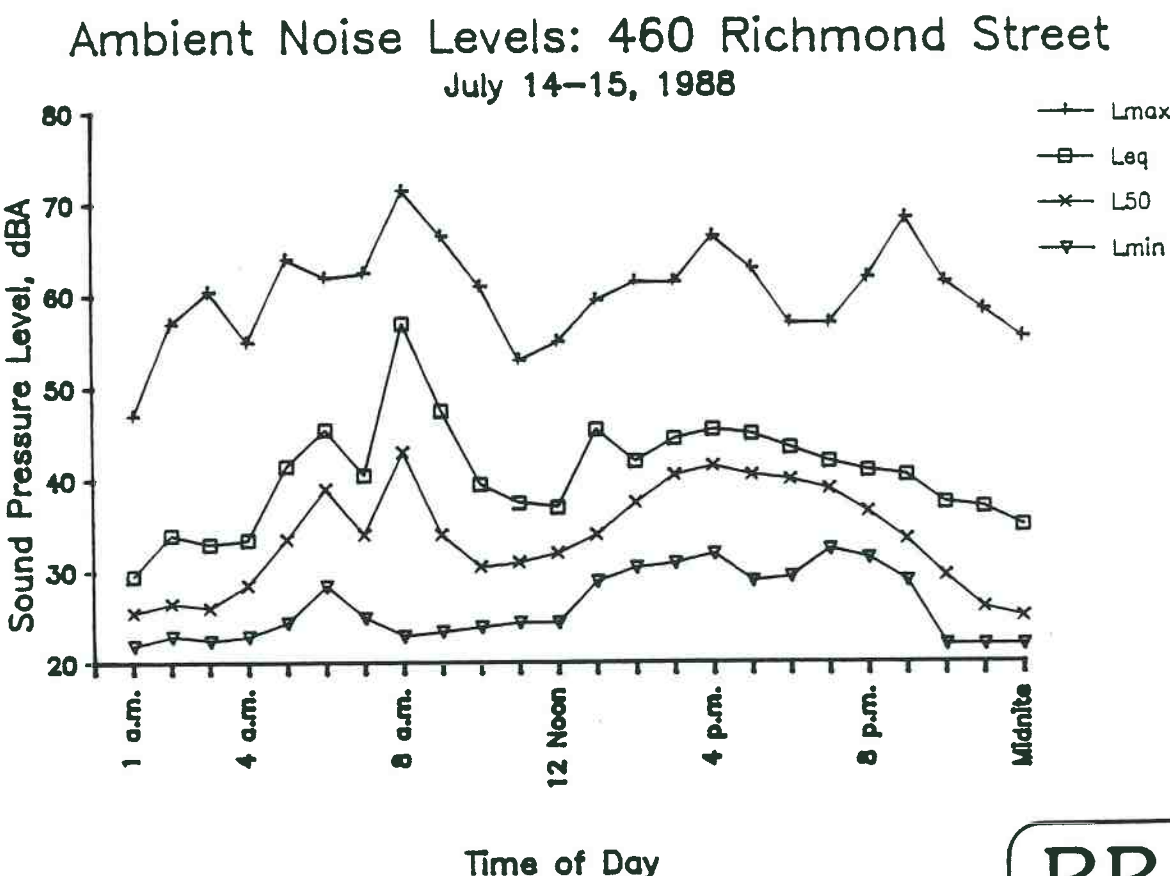
Site#	Description	Level, dBA L_d (1)	L_d (2)	L_n	Est. L_{dn}
1	Doyle: Clark Street	41.0	45.1	--	43.5
2	Audry & Susan Hill Rds	44.5	44.6	37.8	46.1
3	Sears & Janesville Rds	44.5	44.4	28.4	43.0
4	Road 218 at Road 211	42.7	46.5	30.1	43.7
5	Wendel on Road 319	43.1	41.7	28.4	41.3
6	Forest Dr. & Tara Way	48.2	50.1	27.7	47.4
7	Ravendale Post Office	53.0	--	32.5	51.2
8	Madeline	48.5	--	41.0	49.6
9	Bieber: Juniper & Market	55.5	--	30.5	53.5
10	Willow Creek Campground	47.0	--	30.0	45.4
11	Spaulding: Lincoln Street	39.0	--	34.5	41.9
12	Gallatin Beach	48.5	--	29.0	46.7
13	311 Fir Street: Westwood*	46.4	--	41.3	48.9
14	460 Richmond Street*	47.1	--	39.0	47.9

* = long-term monitoring site
L_d = Leq during daytime hours (7a.m. to 10 p.m.)
L_n = Leq during nighttime hours (10 p.m. to 7 a.m.)

Figure 3 illustrates ambient noise levels at the long-term monitoring sites over typical 24-hour weekdays.

FIGURE 3


Ambient Noise Levels: 311 Fir Street
July 14–15, 1988
Lmax
Leq
L50
Lmin
Sound Pressure Level, dBA
80
70
60
50
40
30
20
1 a.m.
4 a.m.
8 a.m.
12 Noon
4 p.m.
8 p.m.
Midnite
Time of Day


Ambient Noise Levels: 460 Richmond Street
July 14–15, 1988
Lmax
Leq
L50
Lmin
Sound Pressure Level, dBA
80
70
60
50
40
30
20
1 a.m.
4 a.m.
8 a.m.
12 Noon
4 p.m.
8 p.m.
Midnite
Time of Day

BBA

III. NOISE ELEMENT GOALS AND OBJECTIVES

A. Goals

The overall goals of the Lassen County Noise Element are to protect the citizens of Lassen County from the harmful and annoying effects of exposure to excessive noise, and to protect the economic base of Lassen County by preventing the encroachment of incompatible land uses within areas affected by existing noise-producing uses.

B. Objectives

The general objectives of the Lassen County Noise Element are to:

1. Develop and adopt specific policies and an effective implementation program to abate and avoid excessive noise exposures in the county by requiring that effective noise mitigation measures be incorporated into the design of new noise-generating and new noise-sensitive land uses.

2. Provide sufficient noise exposure information so that existing and potential noise impacts may be effectively addressed in the land use planning and project review processes.

3. Protect areas within the county where the present noise environment is within acceptable limits.

IV. IMPLEMENTATION PROGRAM

The following specific policies are adopted for implementation by Lassen County to accomplish the goals and objectives of the Noise Element:

1. Noise created by locally-regulated noise sources associated with new projects or developments shall be controlled so as not to exceed the noise level standards as set forth below as measured at any affected residentially designated lands or land use situated in either the incorporated or unincorporated areas. New residential development shall not be allowed where the ambient noise level due to locally-regulated noise sources will exceed the noise level standards as set forth below. These standards do not apply to residential units established in conjunction with industrial or commercial uses (e.g., caretaker dwellings).

TABLE III

NOISE LEVEL PERFORMANCE STANDARDS FOR NEW PROJECTS AND DEVELOPMENTS

	Exterior Noise Level Standards, dBA		
Category	Cumulative Number of minutes in any one-hour time period	Daytime 7 a.m. to 10 p.m.	Nighttime 10 p.m. to 7 a.m.
1	30	50	40
2	15	55	45
3	5	60	50
4	1	65	55
5	0	70	60

Each of the noise level standards specified above shall be reduced by five dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises.

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2. The compatibility of proposed projects with existing and future noise levels due to traffic on public roadways, railroad line operations and

aircraft in flight shall be evaluated by comparison to Figure 4.

3. Areas within Lassen County shall be defined as noise-impacted if exposed to existing or projected exterior noise levels exceeding either 60 dB L_{dn}/CNEL or the performance standards of Table III.

4. New development of residential land uses will not be permitted in noise-impacted areas unless the project design includes effective mitigation measures to reduce noise to the following levels:

A. For noise due to traffic on public roadways, railroad line operations and aircraft in flight: 60 dB L_{dn}/CNEL or less in outdoor activity areas, and 45 dB L_{dn}/CNEL or less in indoor areas. Where it is not possible to reduce exterior noise to 60 dB L_{dn}/CNEL or less by incorporating a practical application of the best available noise-reduction technology, an exterior noise level of up to 65 dB L_{dn}/CNEL will be allowed. Under no circumstances will interior noise levels be permitted to exceed 45 dB L_{dn}/CNEL with the windows and doors closed.

B. For noise sources other than those described in Section 4A: compliance with the performance standards contained within Table III.

5. Where new residential land uses are proposed in a noise-impacted area, an acoustical analysis shall be required as part of the environmental review process so that noise mitigation may be included in the project design. An acoustical analysis shall also be required where other proposed new land uses are likely to result in noise conflicts with existing land uses as determined in Policies 1 or 2. The acoustical analysis shall:

A. Be the responsibility of the applicant.

B. Be prepared by a qualified person experienced in the fields of environmental noise assessment and architectural acoustics.

C. Include representative noise level measurements with sufficient sampling periods and locations to adequately describe local conditions.

D. Estimate existing and projected (20 years) noise levels in terms of L_{dn}/CNEL and/or the standards of Table III, and compare those levels to the adopted policies of the Noise Element.

E. Recommend appropriate mitigation to achieve compliance with the adopted policies and standards of the Noise Element. Where the noise source in question consists of intermittent single events, the report must address the effects of maximum noise levels in sleeping rooms in terms of possible sleep disturbance.

F. Estimate noise exposure after the prescribed mitigation measures have been implemented. If the project does not comply with the adopted standards and policies of the Noise Element the analysis must provide acoustical information for a statement of overriding considerations for the project.

G. Describe a post-project assessment program which could be used to evaluate the effectiveness of the proposed mitigation measures.

6. Lassen County shall develop and employ procedures to ensure that requirements imposed pursuant to the findings of an acoustical analysis are implemented as part of the project review and building permit processes.

7. Noise produced by commercial uses shall not exceed 67.5 dB L_{dn}/CNEL at the nearest property line.

8. Noise produced by industrial uses shall not exceed 70 dB L_{dn}/CNEL at the nearest property line.

9. Exceptions to the noise standards for commercial and industrial uses may be granted only if a recorded noise easement is conveyed by the affected property owners.

10. Lassen County shall work with the U.S. Army and the Department of Defense to determine appropriate and mutually acceptable policies to control noise impacts due to operations at the Sierra Army Depot.

11. Lassen County shall enforce the State Noise Insulation Standards (California Administrative Code, Title 24) and Chapter 35 of the Uniform Building Code (UBC).

12. Lassen County shall prepare a community noise control ordinance in accordance with the following policies and procedures:

A. A draft ordinance shall be prepared by the County Counsel with the assistance of the County Planning Department.

B. The preparation of the draft ordinance shall consider guidelines of the California Office of Noise Control and noise control ordinances of other California counties.

C. The intent of the draft ordinance shall be to protect persons from excessive levels of noise which interfere with sleep, communication, relaxation, health or legally permitted use of property, whether such noise is from existing or future sources.

D. "Excessive" levels of noise shall be defined as levels which exceed the standards of Table III and other policies of the Noise Element.

E. The draft noise ordinance may contain maximum allowable levels of interior noise created by exterior sources.

F. The draft noise ordinance may provide for exemptions or modifications to noise requirements for existing industrial facilities, agricultural uses, construction activities, school functions, property maintenance, heating and cooling equipment, utility facilities, waste collection and other sources.

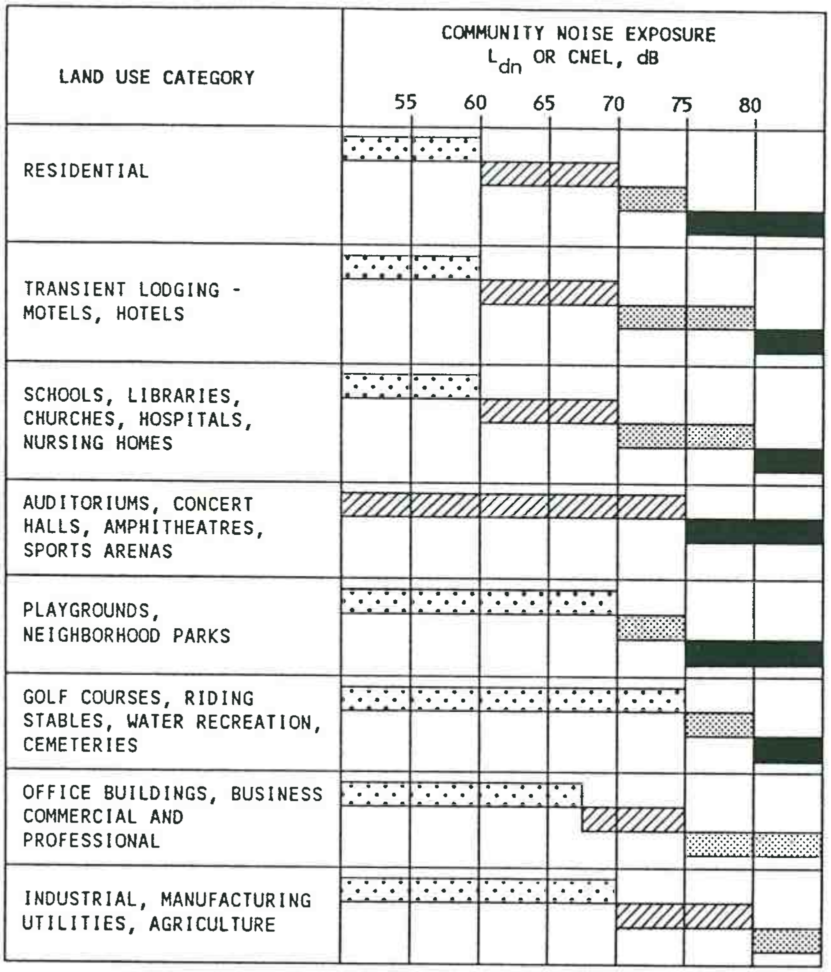
G. The draft ordinance shall provide responsibilities and procedures for noise measurements, enforcement, abatement and variances.

13. Lassen County shall encourage enforcement of California Vehicle Code sections relating to adequate vehicle mufflers and modified exhaust systems.

14. New equipment and vehicles purchased by Lassen County shall comply with noise level performance standards consistent with the best available noise reduction technology.

15. Lassen County shall periodically review and update the Noise Element to ensure that noise exposure information and specific policies are consistent with changing conditions within the community and with noise control regulations or policies enacted after the adoption of this Element.

FIGURE 4
LAND USE COMPATIBILITY FOR COMMUNITY NOISE ENVIRONMENTS



INTERPRETATION

NORMALLY ACCEPTABLE

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

CONDITIONALLY ACCEPTABLE

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

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and the needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

BBA

APPENDIX A

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL: 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.

CNEL: Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.

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

L_{dn}: Day-Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.

L_{eq}: Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.

NOTE: CNEL and L_{dn} represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.

L_{max}: The maximum sound level recorded during a noise event.

L_n: The sound level exceeded "n" percent of the time during a sample interval. L_{10} equals the level exceeded 10 percent of the time (L_{90}, L_{50}, etc.)

BBA

ACOUSTICAL TERMINOLOGY

NOISE EXPOSURE CONTOURS: Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and L_{dn} contours are frequently utilized to describe community exposure to noise.

SEL or SENEL: Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound level for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

SOUND LEVEL: The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

TECHNICAL BACKGROUND DOCUMENT
Appendix B

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APPENDIX B

TECHNICAL BACKGROUND DOCUMENT
Lassen County Noise Element

1. Description of Noise

Noise is often defined simply as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers for many years have grappled with the problem of translating objective measurements of sound into directly correlatable measures of public reaction to noise. The descriptors of community noise in current use are the results of these efforts, and represent simplified, practical measurement tools to gauge community response. Before elaborating on these descriptors, it is useful to first discuss some fundamental concepts of sound.

Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and hence are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, now called Hertz (Hz) by international agreement.

The speed of sound in air is approximately 770 miles per hour, or 1,130 feet/second. Knowing the speed and frequency of a sound, one may calculate its wavelength, the physical distance in air from one compression of the atmosphere to the next. An understanding of wavelength is useful in evaluating the effectiveness of physical noise control devices such as mufflers or barriers, which depend upon either absorbing or blocking sound waves to reduce sound levels.

To measure sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold as a point of reference, defined as 0 dB. Other sound pressures are then compared to the reference pressure, and the logarithm is taken to keep the numbers in a practical range.

Use of the decibel scale allows a million-fold increase in pressure to be expressed as 120 dB. Another useful aspect of the decibel scale is that changes in levels (dB) are uniform throughout the scale, corresponding closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, in the range of usual environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighting the frequency response of a sound level measurement device (called a sound level meter) by means of the standardized A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and community response to noise. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. Figure B-1 illustrates typical A-weighted noise levels and subjective reaction due to recognizable sources.

It is common to describe community noise in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, and shows very good correlation with community response to noise.

Two composite noise descriptors are in common use today: L_{dn} and CNEL. The L_{dn} (day-night average level) is based upon the average hourly L_{eq} over a 24-hour day, with a +10 decibel weighting applied to nighttime (10:00 p.m. to 7:00 a.m.) L_{eq} values. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were subjectively twice as loud as daytime exposures. The CNEL (Community Noise Equivalent Level), like L_{dn}, is based upon the weighted average hourly L_{eq} over a 24-hour day, except that an additional +4.77 decibel penalty is applied to evening (7:00 p.m. to 10:00 p.m.) hourly L_{eq} values. The CNEL was developed for the California Airport Noise Regulations, and is applied specifically to airport/aircraft noise assessment. The L_{dn} descriptor is a simplification of the CNEL concept, but the two will usually agree, for a given situation, within 1 dB. Like the L_{eq}, these descriptors are also averages and tend to disguise short-term variations in the noise environment. Because they presume for land uses where nighttime noise exposures are critical to the acceptability of the noise environment, such as residential developments.

FIGURE B-1

EXAMPLES OF NOISE LEVELS

NOISE SOURCE	NOISE LEVEL	SUBJECTIVE DESCRIPTION
AMPLIFIED ROCK'N ROLL BAND ►	120 dB(A)	
COMMERCIAL JET TAKEOFF AT 200 FEET ►		DEAFENING
	100 dB(A)	
BUSY URBAN STREET ►		VERY LOUD
	80 dB(A)	
FREEWAY TRAFFIC AT 50 FEET ►		LOUD
NORMAL CONVERSATION AT 6 FEET ►	60 dB(A)	
TYPICAL OFFICE (INTERIOR) ►		MODERATE
SOFT RADIO MUSIC ►	40 dB(A)	
TYPICAL RESIDENTIAL (INTERIOR) ►		FAINT
TYPICAL WHISPER AT 6 FEET ►	20 dB(A)	
HUMAN BREATHING ►		VERY FAINT
	0 dB(A)	

Noise in the community has often been cited as being a health problem, not in terms of actual physiological damage such as hearing impairment, but in terms of inhibiting general well-being and contributing to undue stress and annoyance. The health effects of noise in the community arise from the interference with human activities such as sleep, speech, recreation, and tasks demanding concentration or coordination. When community noise interferes with human activities or contributes to stress, public annoyance with the noise source increases, and the acceptability of the environment for people decreases. This decrease in acceptability and the threat to public well-being is the basis for land use planning policies directed towards the prevention of exposure to excessive community noise levels.

To control noise from fixed sources which have come into existence by processes other than zoning or land use planning, many jurisdictions have adopted community noise control ordinances. Such ordinances are intended to abate noise nuisances and to control noise from existing sources. They may also be used as performance standards to judge the potential creation of a nuisance, or potential encroachment of sensitive uses upon noise-producing facilities. Community noise control ordinances are generally designed to resolve noise problems on a short-term basis (usually by means of hourly noise level criteria), rather than on the basis of 24-hour or annual cumulative noise exposures.

In addition to the A-weighted noise level, other factors should be considered in establishing criteria for noise sensitive land uses. For example, sounds with noticeable tonal content such as whistles, horns, or droning or high-pitched sounds may be more annoying than the A-weighted sound level alone will suggest. Many noise standards apply a penalty, or correction, of 5 dBA to such sounds. The effects of unusual tonal content will generally be more of a concern at nighttime, when residents may notice the sound in contrast to background noise.

Because many rural residential areas experience very low noise levels, residents may express concern about the loss of "peace and quiet" due to the introduction of a sound which was not audible previously. In very quiet environments, the introduction of virtually any change in local activities will cause an increase in noise levels. A change in noise level and the loss of "peace and quiet" is the inevitable result of land use or activity changes in such areas. Audibility of a new noise source and/or increases in noise levels within recognized acceptable limits are not usually considered to be significant noise impacts, but these concerns should be addressed and considered in the planning and environmental review processes.

2. Criteria for Acceptable Noise Exposures

The State Office of Noise Control (ONC) "Guidelines for the Preparation and Content of Noise Elements of the General Plan", include recommended exterior and interior noise level standards for local jurisdictions to identify and prevent the creation of incompatible land uses due to noise. The ONC guidelines contain a land use compatibility table which describes the compatibility of different land uses with a range of environmental noise levels in terms of L_{dn} or CNEL. A noise environment of 50 to 60 dB L_{dn} or CNEL is considered to be "normally acceptable" for residential uses according to those guidelines. The ONC recommendations also note that, under certain conditions, more restrictive standards than the maximum levels cited may be appropriate. As an example, the standards for quiet suburban and rural communities may be reduced by 5 to 10 dB to reflect lower existing outdoor noise levels.

The U.S. Environmental Protection Agency (EPA) also prepared guidelines for community noise exposure in the publication "Information on the Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety". These guidelines are based upon assumptions regarding acceptable noise levels which consider occupational noise exposure as well as noise exposure in the home. The "Levels Document" recognizes an exterior noise level of 55 dB L_{dn} as a goal to protect the public from hearing loss, activity interference, sleep disturbance and annoyance. The EPA notes, however, that this level is not a regulatory goal, but is a level defined by a negotiated scientific concensus without concern for economic and technological feasibility or the needs and desires of any particular community. The EPA and other Federal agencies have adopted suggested land use compatibility guidelines which indicate that residential noise exposures of 55 to 65 dB L_{dn} are within acceptable limits.

The U.S. Environmental Protection Agency has also prepared a Model Community Noise Control Ordinance, using L_{eq} as the means of defining allowable noise level limits. The EPA model contains no specific recommendations for local noise level standards, but reports a range of L_{eq} values as adopted by various local jurisdictions. The mean daytime noise standard reported by the EPA is

56.75 dBA (L_{eq}); the mean nighttime noise standard is 51.76 dBA (L_{eq}). This ordinance format has been applied by the City and County of San Diego.

3. Techniques for Noise Control

Any noise problem may be considered as being composed of three basic elements: the noise source, a transmission path, and a receiver. Local control of noise sources is practical only with respect to fixed sources (e.g., industrial facilities, outdoor activities, etc.), as control of vehicular sources is generally preempted by federal or state law. Control of fixed noise sources is usually best obtained by enforcement of a local noise control ordinance. The emphasis of noise control in land use planning is therefore placed upon acoustical treatment of the transmission path and the receiving structures.

The appropriate acoustical treatment for a given project should consider the nature of the noise source and the sensitivity of the receiver. The problem should be defined in terms of appropriate criteria (L_{dn}, L_{eq}, or L_{max}), the location of the sensitive receiver (inside or outside), and when the problem occurs (daytime or nighttime). Noise control techniques should then be selected to provide an acceptable noise environment for the receiving property while remaining consistent with local aesthetic standards and practical structural and economic limits. Fundamental noise control techniques include the following:

a. Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setback areas can take the form of open space, frontage roads, recreational areas, storage yards, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 4 to 6 dBA per doubling of distance from the source.

b. Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increasing the distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "pathlength difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends upon the relative heights of the source, barrier and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller pathlength difference for a given increase in barrier height than does a location closer to either source or receiver.

For maximum effectiveness, barriers must be continuous and relatively airtight along their length and height. To ensure that sound transmission through the barrier is insignificant, barrier mass should be about 4 lbs./square foot, although a lesser mass may be acceptable if the barrier material provides sufficient transmission loss in the frequency range of concern. Satisfaction of the above criteria requires substantial and well-fitted barrier materials, placed to intercept line-of-sight to all significant noise sources. Earth, in the form of berms or the face of a depressed area, is also an effective barrier material.

The attenuation provided by a barrier depends upon the frequency content of the source. Generally, higher frequencies are attenuated (reduced) more readily than lower frequencies. This results because a given barrier height is relatively large compared to the shorter wavelengths of high frequency sounds, while relatively small compared to the longer wavelengths of the frequency sounds. The effective center frequency for traffic noise is usually considered to be 550 Hz. Railroad engines, cars and horns emit noise with differing frequency content, so the effectiveness of a barrier will vary for each of these sources. Frequency analyses are necessary to properly calculate barrier effectiveness of noise from sources other than highway traffic.

There are practical limits to the noise reduction provided by barriers. For highway traffic noise, a 5 to 10 dBA noise reduction may often be reasonably attained. A 15 dBA noise reduction is sometimes possible, but a 20 dBA noise reduction is extremely difficult to achieve. Barriers usually are provided in the form of walls, berms, or berm/wall combinations. The use of an earth berm in lieu of a solid wall will provide up to 3 dBA additional attenuation over that attained by a solid wall alone, due to the absorption provided by the earth. Berm/wall combinations offer slightly better acoustical performance than solid walls, and are often preferred for aesthetic reasons.

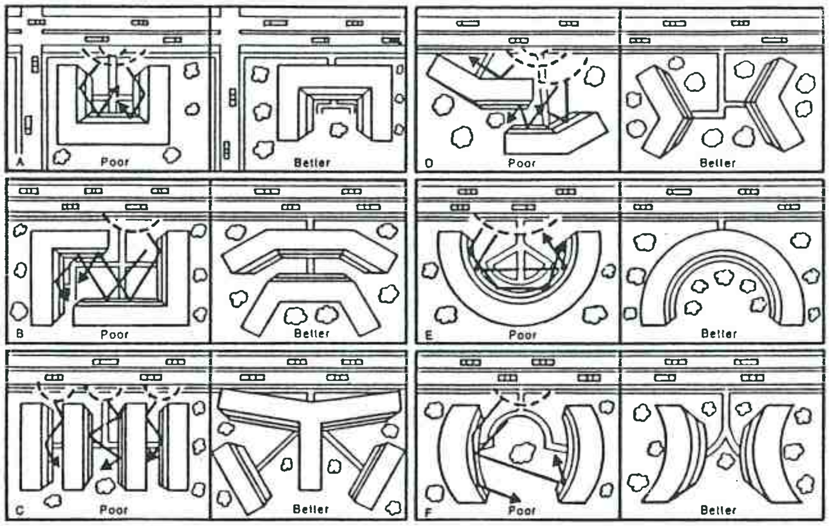
Another form of barrier is the use of a depressed noise source location, such as depressed loading areas in shopping centers or depressed roadways. The walls of the depression serve to break line-of-sight between the source and receiver, and will provide absorption if left in earth or vegetative cover.

c. Site Design

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise level caused by reflections. The use of one building to shield another can significantly reduce overall project noise control costs, particularly if the shielding structure is insensitive to noise. As an example, carports or garages can be used to form or complement a barrier shielding adjacent dwellings or an outdoor activity area. Similarly, one residential unit can be placed to shield another so that noise reduction measures are needed for only the building closest to the noise source. Placement of outdoor activity areas within the shielded portion of a building complex, such as a central courtyard, can be an effective method of providing a quiet retreat in an otherwise noisy environment. Patios or balconies should be placed on the side of a building opposite the noise source, and "wing walls" can be added to buildings or patios to help shield sensitive uses.

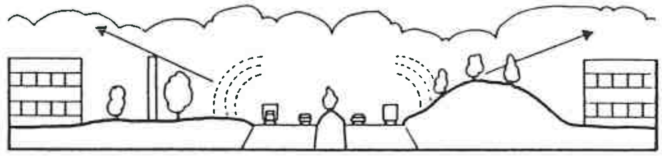
Where project design does not allow using buildings or other land uses to shield sensitive uses, noise control costs can be reduced by orienting buildings with the narrow end facing the noise source, reducing the total area of the building requiring acoustical treatment. Some examples of building orientation to reduce noise impacts are shown in Figure B-2.

FIGURE B-2



Another option in site design is the placement of relatively insensitive land uses, such as commercial or storage areas, between the noise source and a more sensitive portion of the project. Examples include development of a commercial strip along a busy arterial to block noise affecting a residential area, or providing recreational vehicle storage or travel trailer parking along the noise-impacted edge of a mobile home park. If existing topography or development adjacent to the project site provides some shielding, as in the case of an existing berm, knoll or building, sensitive structures or activity areas may be placed behind those features to reduce noise control costs. (See Figure B-3

FIGURE B-3



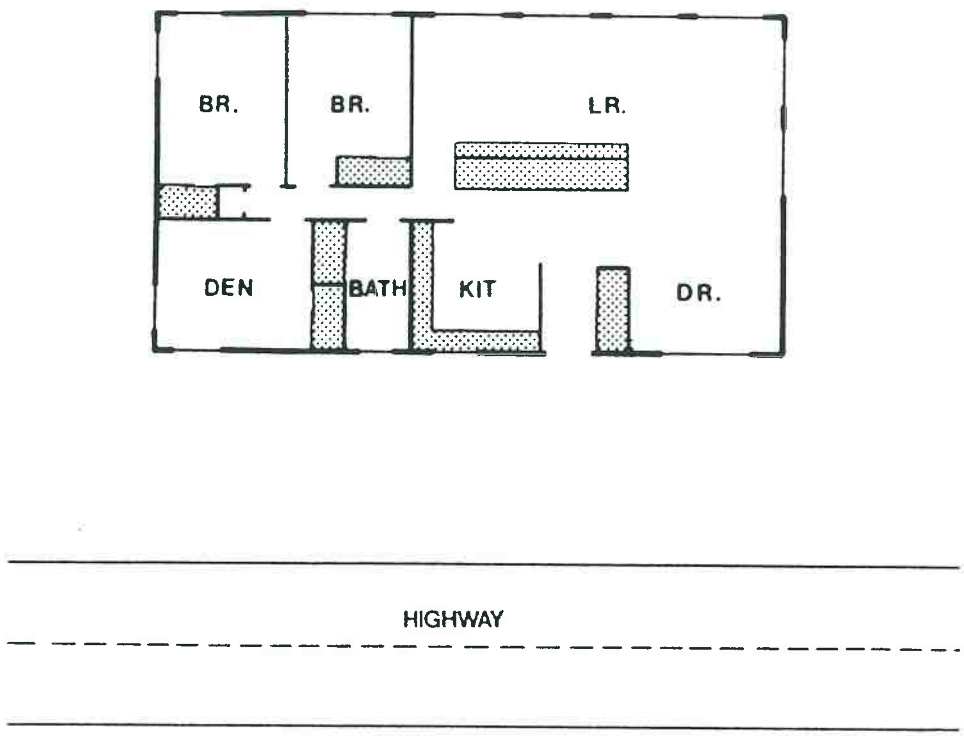
Site design should also guard against the creation of reflecting surfaces which may increase onsite noise levels. For example, two buildings placed at an angle facing a noise source may cause noise levels within that angle to increase by up to 3 dBA. The open end of "U"-shaped buildings should point away from noise sources for the same reason. Landscaping walls or noise barriers located within a development may inadvertently reflect noise back to a noise-sensitive area unless carefully located. Avoidance of these problems while attaining an aesthetic site design requires close coordination between local agencies, the project engineer and architect, and the noise consultant.

Another important aspect of site design is avoiding the creation of noise problems at adjacent noise-sensitive properties. For example, air conditioning units for multi-family developments should not be placed adjacent to living areas of adjoining single-family residences unless provided with adequate shielding. Swimming pools and outdoor activity areas such as "tot lots" should be located away from adjoining residences, and adequate shielding should be provided.

d. Building Design

When structures have been located to provide maximum noise reduction by barriers or site design, noise reduction measures may still be required to achieve an acceptable interior noise environment. The cost of such measures may be reduced by placement of interior dwelling unit features. For example, bedrooms, living rooms, family rooms and other noise-sensitive portions of a dwelling can be located on the side of the unit farthest from the noise source, as shown by Figure B-4.

FIGURE B-4



Bathrooms, closets, stairwells and food preparation areas are relatively insensitive to exterior noise sources, and can be placed on the noisy side of a unit. When such techniques are employed, noise reduction requirements for the building facade can be significantly reduced, although the architect must take care to isolate the noise impacted areas by the use of partitions or doors.

In some cases, external building facades can influence reflected noise levels affecting adjacent buildings. This is primarily a problem where high-rise buildings are proposed, and the effect is most evident in urban areas, where an "urban canyon" may be created. Bell-shaped or irregular building facades and attention to the orientation of the building can reduce this effect.

e. Noise Reduction by Building Facades

When interior noise levels are of concern in a noisy environment, noise reduction may be obtained through acoustical design of building facades. Standard residential construction practices provide 12-15 dBA noise reduction for building facades with open windows, and 20-25 dBA noise reduction when windows are closed. Thus a 20 dBA exterior-to-interior noise reduction can be obtained by the requirement that building design include adequate ventilation systems, allowing windows on a noise-impacted facade to remain closed under any weather condition.

Where greater noise reduction is required, acoustical treatment of the building facade is necessary. Reduction of relative window area is the most effective control technique, followed by providing acoustical glazing (thicker glass or increased air space between panes) in low air infiltration rate frames, use of fixed (non-movable) acoustical glazing or the elimination of windows. Noise transmitted through walls can be reduced by increasing wall mass (using stucco or brick in lieu of wood siding), isolating wall members by the use of double- or staggered- stud walls, or mounting interior walls on resilient channels. Noise control for exterior doorways is provided by reducing door area, using solid-core doors, and by acoustically sealing door perimeters with suitable gaskets. Roof treatments may include the use of plywood sheathing under roofing materials.

Standard energy-conservation double-pane glazing with an 1/8" or 1/4" air-space is not considered acoustical glazing, as its sound transmission loss for some noise sources is actually less than that of single-pane glazing.

Whichever noise control techniques are employed, it is essential that attention be given to installation of weatherstripping and caulking of joints. Openings for attic or subfloor ventilation may also require acoustical treatment; tight-fitting fireplace dampers and glass doors may be needed in aircraft noise-impacted areas.

Design of acoustical treatment for building facades should be based upon analysis of the level and frequency content of the noise source. The transmission loss of each building component should be defined, and the composite noise reduction for the complete facade calculated, accounting for absorption in the receiving room. A one-third octave band analysis is a definitive method of calculating the A-weighted noise reduction of a facade.

A common measure of transmission loss is the Sound Transmission Class (STC). STC ratings are not directly comparable to A-weighted noise reduction, and must be corrected for the spectral content of the noise source. Requirements for transmission loss analyses are outlined by Section 2-3501 of the California Administrative Code, Title 24.

f. Use of Vegetation

It is often supposed that trees and other vegetation can provide significant noise attenuation. However, approximately 100 feet of dense foliage (so that no visual path extends through the foliage) is required to achieve a 5 dBA attenuation of traffic noise. Thus the use of vegetation as a noise barrier should not be considered a practical method of noise control unless large tracts of dense foliage are part of the existing landscape.

Vegetation can be used to acoustically "soften" intervening ground between a noise source and receiver, increasing ground absorption of sound and thus increasing the attenuation of sound with distance. Planting of trees and shrubs is also of aesthetic and psychological value, and may reduce adverse public reaction to a noise source by removing the source from view, even though noise levels will be largely unaffected. It should be noted, however, that trees planted on the top of a noise control berm can actually slightly degrade the acoustical performance of the barrier. This effect can occur when high frequency sounds are diffracted (bent) by foliage and directed downward over a barrier.

In summary, the effects of vegetation upon noise transmission are minor, and are primarily limited to increased absorption of high frequency sounds and to reducing adverse public reaction to the noise by providing aesthetic benefits.

g. Sound Absorbing Materials

Absorptive materials such as fiberglass, foam, cloth and acoustical tiles or panels, are used to reduce reflections or reverberation in closed spaces. Their use in exterior environmental noise control may reduce reflections between parallel noise barriers or other reflective surfaces. Maintenance of absorptive materials used outdoors is difficult, as most such materials are easily damaged by sunlight and moisture. Their application as an outdoor noise control tool is limited to special cases where the control of reflected noise is critical.

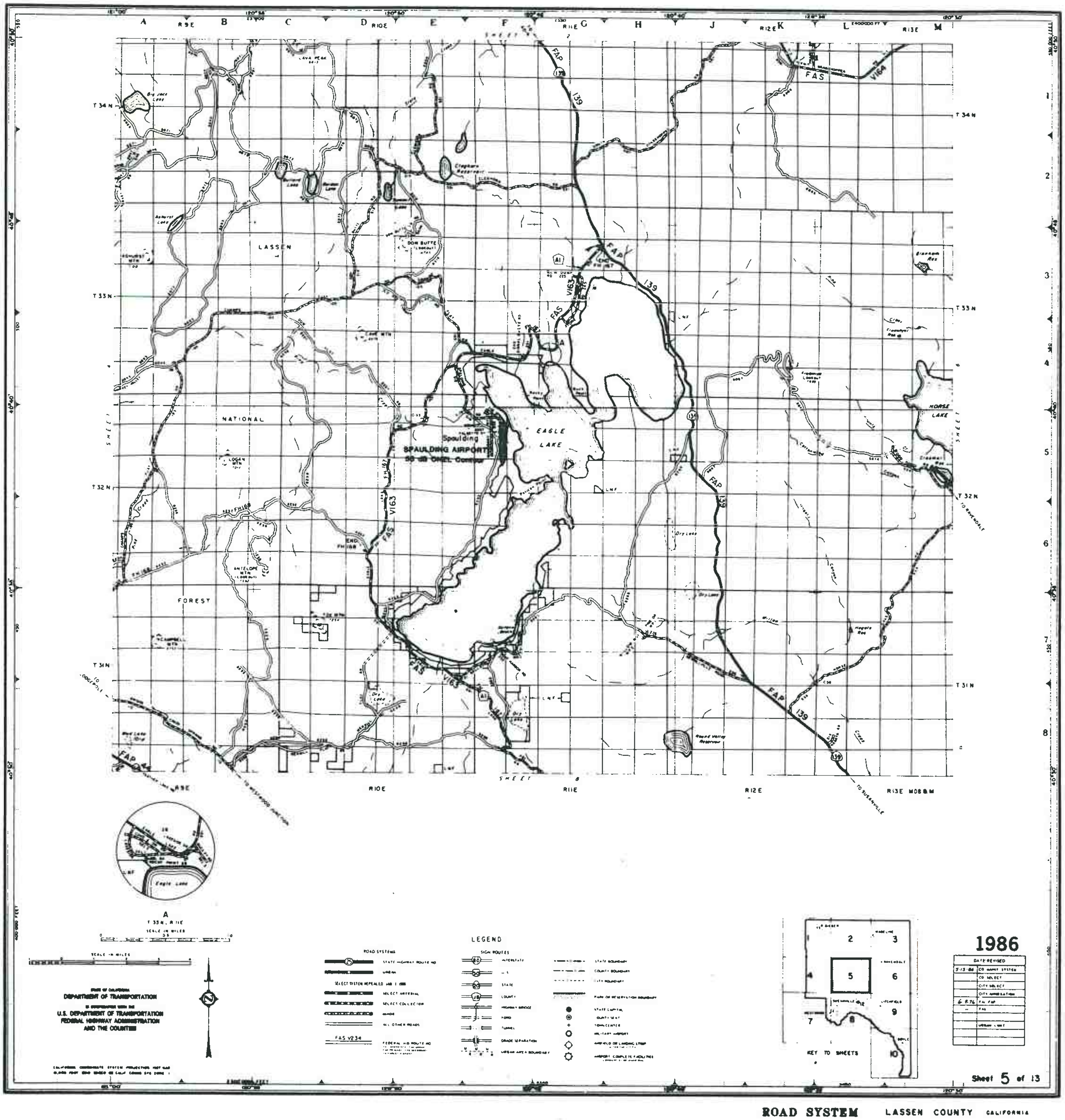
Appendix C
Input Data for
FHWA Highway Traffic Noise Prediction Model

FHWA Model RD-77-108: Brown-Buntin Associates, Inc.
Calveno Emission Curves
Project Number: 88-267
Year: 1987 and 2008
Soft Site

INPUT DATA SUMMARY:

Segment	ADT	Day%	Eve%	Nite%	%MT	%HT	Speed	Distance
1	4000.0	88.0	0.0	12.0	6.9	9.1	55.0	100.0
2	6840.0	88.0	0.0	12.0	6.9	9.1	55.0	100.0
3	5600.0	88.0	0.0	12.0	5.7	6.7	55.0	100.0
4	9576.0	88.0	0.0	12.0	5.7	6.7	55.0	100.0
5	3200.0	88.0	0.0	12.0	7.1	15.2	55.0	100.0
6	5472.0	88.0	0.0	12.0	7.1	15.2	55.0	100.0
7	640.0	88.0	0.0	12.0	1.8	8.7	55.0	100.0
8	1095.0	88.0	0.0	12.0	1.8	8.7	55.0	100.0
9	1900.0	88.0	0.0	12.0	6.3	8.9	55.0	100.0
10	3249.0	88.0	0.0	12.0	6.3	8.9	55.0	100.0
11	1450.0	88.0	0.0	12.0	8.2	16.3	55.0	100.0
12	2480.0	88.0	0.0	12.0	8.2	16.3	55.0	100.0
13	2000.0	88.0	0.0	12.0	6.4	12.5	55.0	100.0
14	3420.0	88.0	0.0	12.0	6.4	12.5	55.0	100.0
15	4250.0	88.0	0.0	12.0	4.2	8.6	55.0	100.0
16	7268.0	88.0	0.0	12.0	4.2	8.6	55.0	100.0
17	315.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
18	539.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
19	129.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
20	221.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
21	598.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
22	1023.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
23	147.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
24	251.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
25	900.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
26	1539.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
27	1300.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
28	2223.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
29	397.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
30	679.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
31	390.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
32	667.0	88.0	0.0	12.0	6.0	11.0	55.0	100.0
33	7900.0	88.0	0.0	12.0	4.1	5.6	55.0	100.0
34	13430.0	88.0	0.0	12.0	4.1	5.6	55.0	100.0

Appendix D-1



LEGEND

Future Traffic Noise Contours:

: 60 dB Ldn

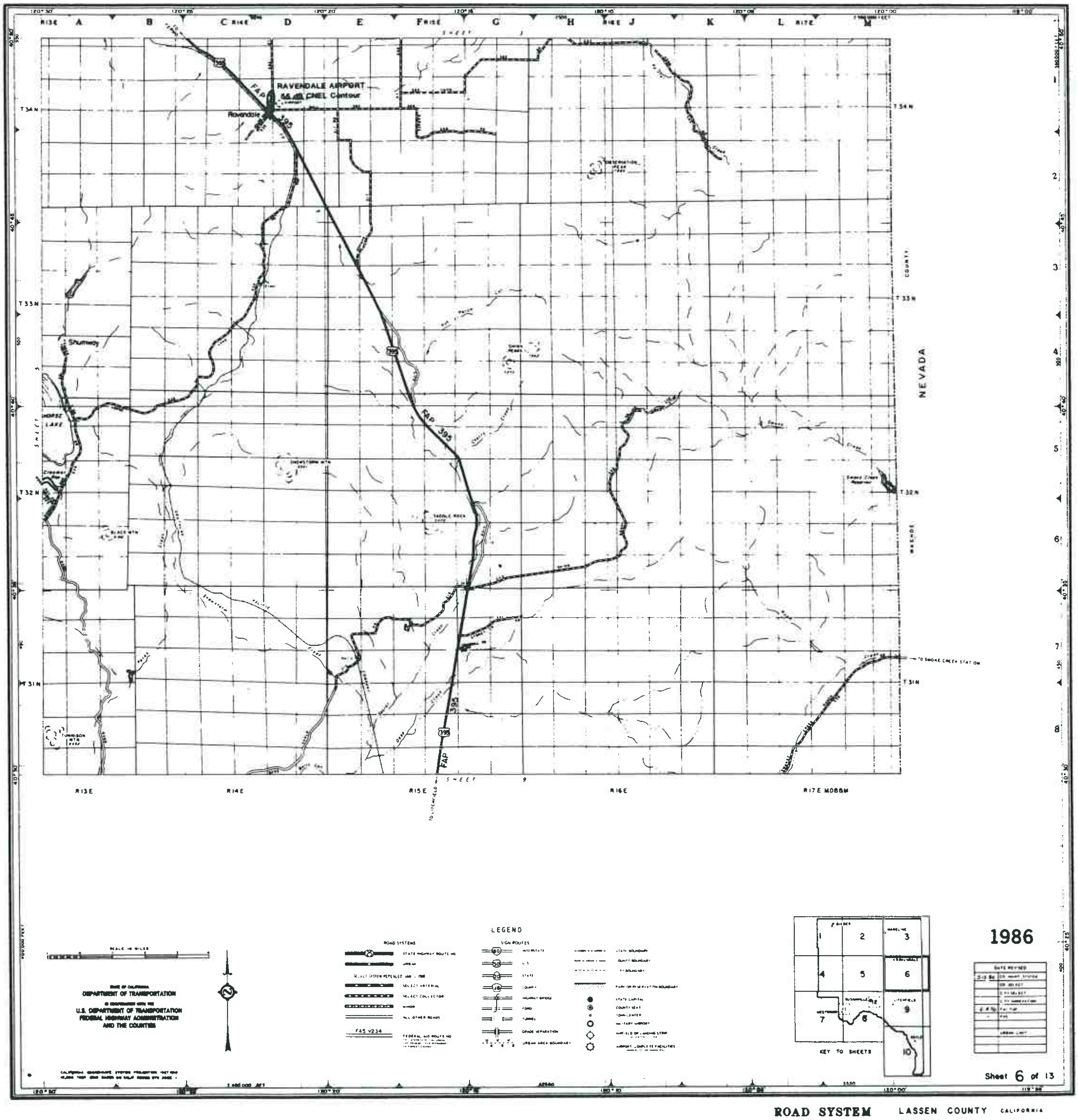
: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

: 50 dBA L50 Contour

: Approximate Location

Appendix D-2



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

Future Traffic Noise Contours:

: 60 dB Ldn

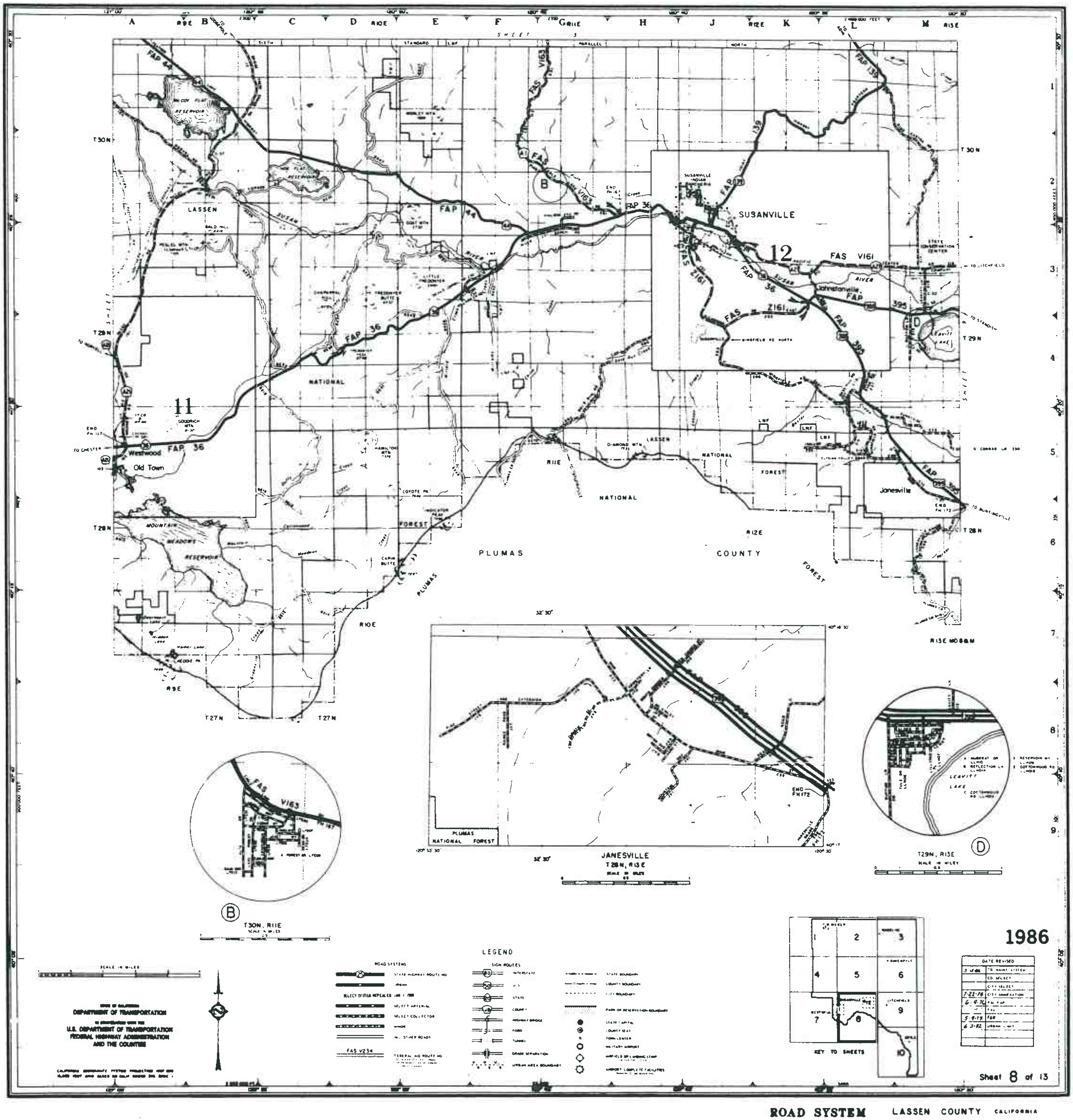
: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

: 50 dBA L50 Contour

: Approximate Location

Appendix D-3



LEGEND

Future Traffic Noise Contours:

═══════: 60 dB Ldn

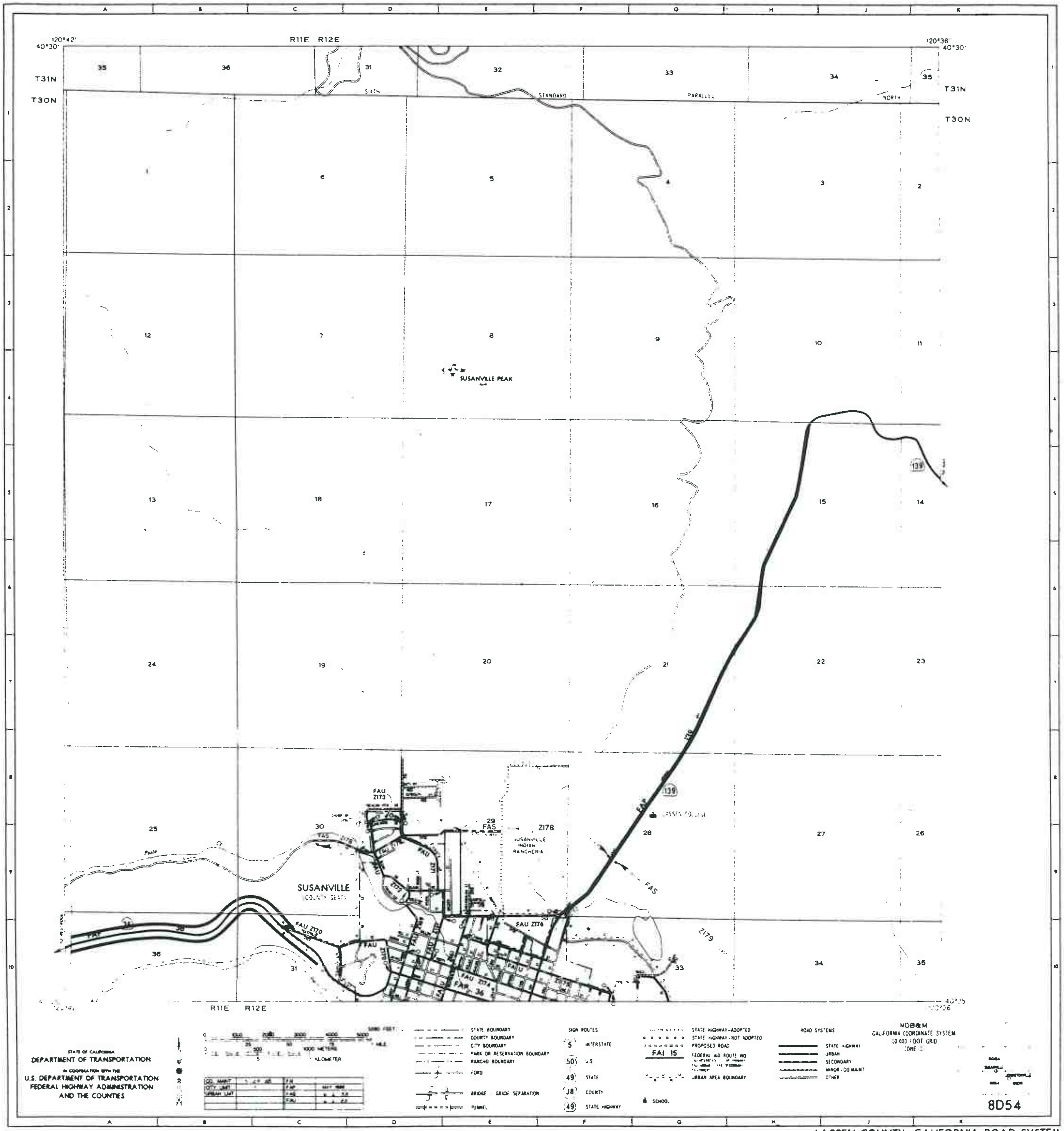
▬▬▬▬▬▬: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

————————: 50 dBA L50 Contour

..................: Approximate Location

Appendix D-4



LASSEN COUNTY- CALIFORNIA ROAD SYSTEM

LEGEND

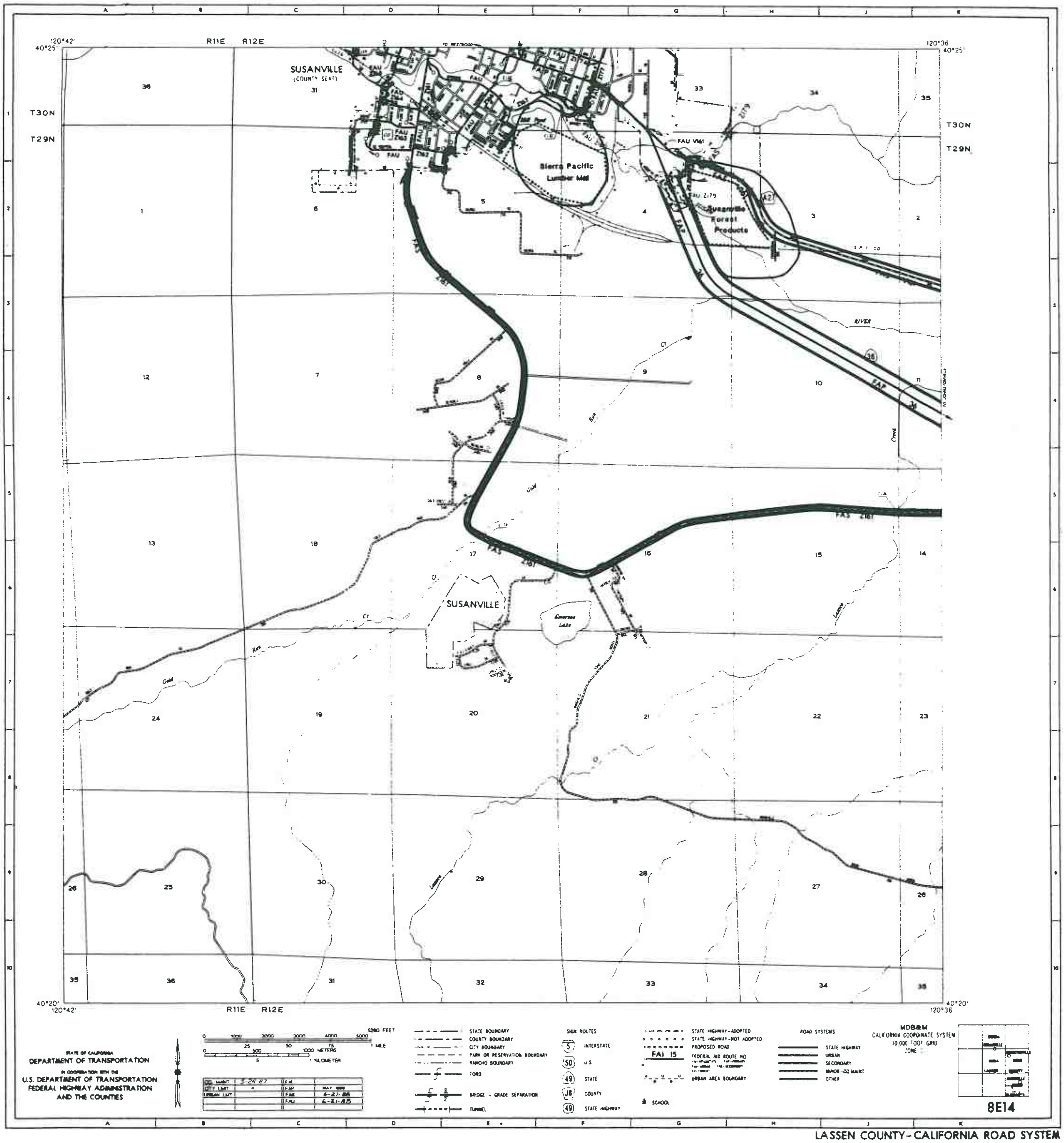
Future Traffic Noise Contours:

- **: 60 dB Ldn**
- **: 60 dB Ldn**
  (Less than 75' from C/L of roadway)

Industrial Facilities:

- **: 50 dBA L50 Contour**
- **……………………: Approximate Location**

Appendix D-5



LEGEND

Future Traffic Noise Contours:

: 60 dB Ldn

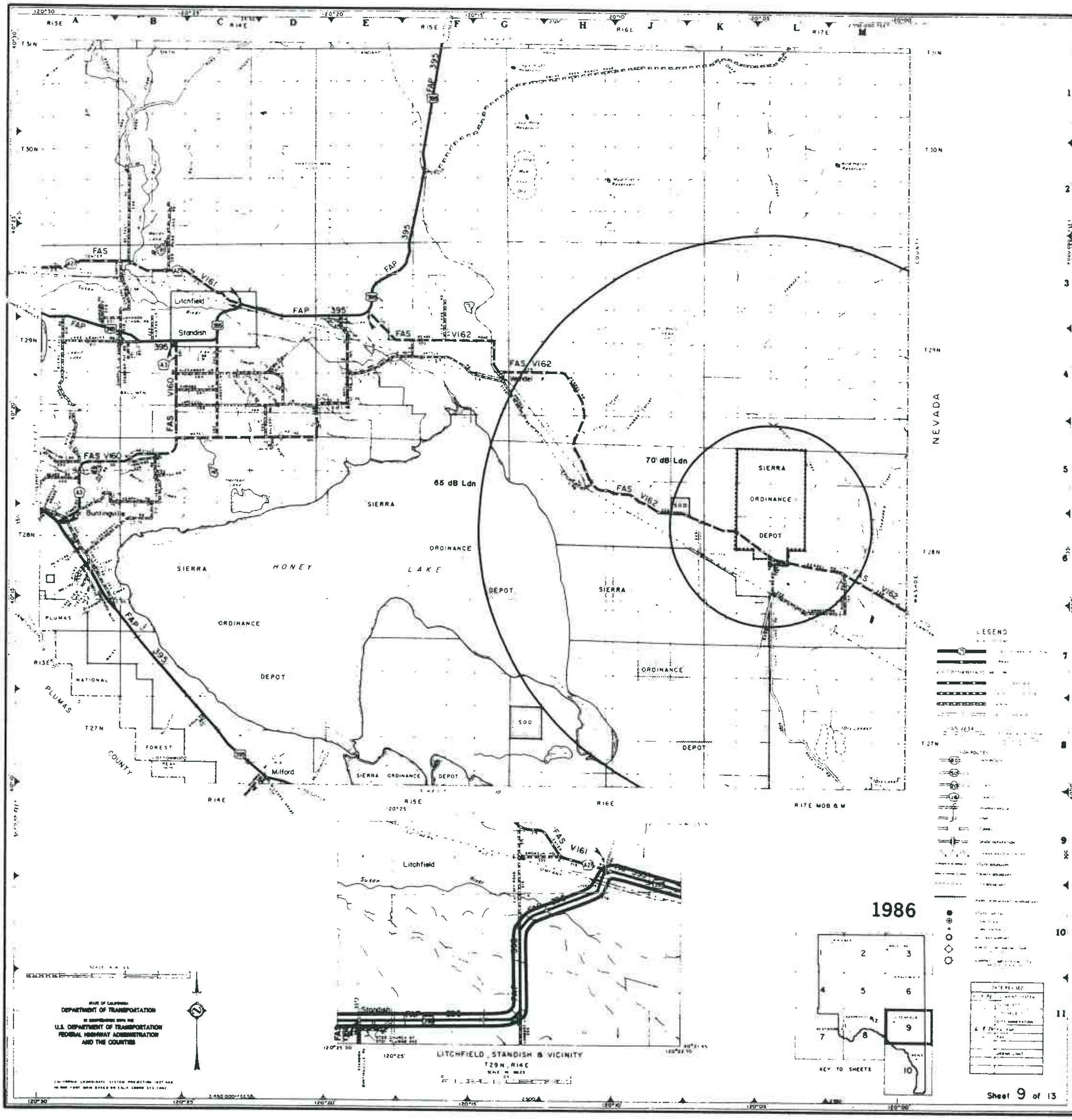
: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

: 50 dBA L50 Contour

: Approximate Location

Appendix D-6



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

Future Traffic Noise Contours:

: 60 dB Ldn

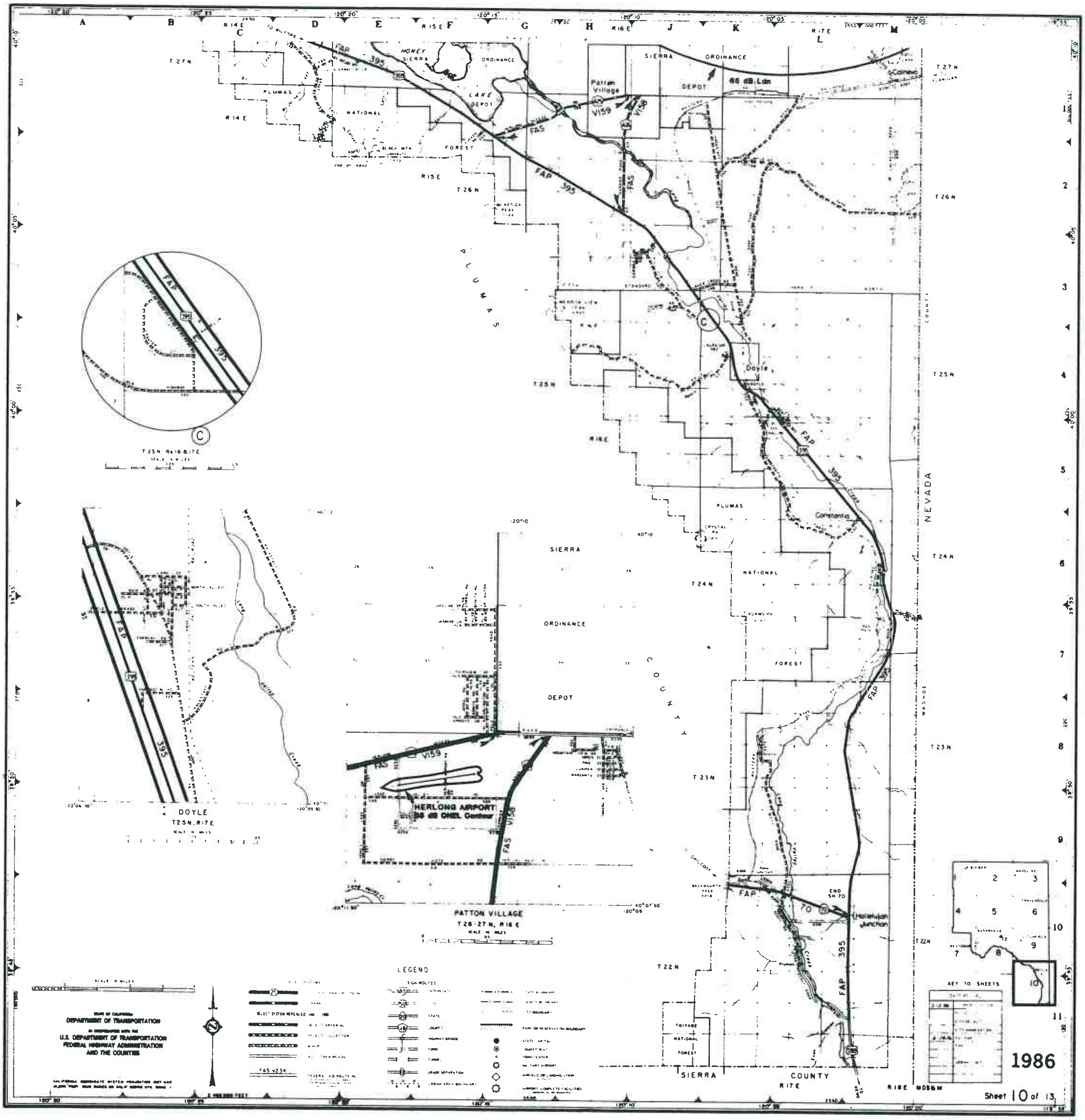
: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

: 60 dBA L50 Contour

: Approximate Location

Appendix D-7



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

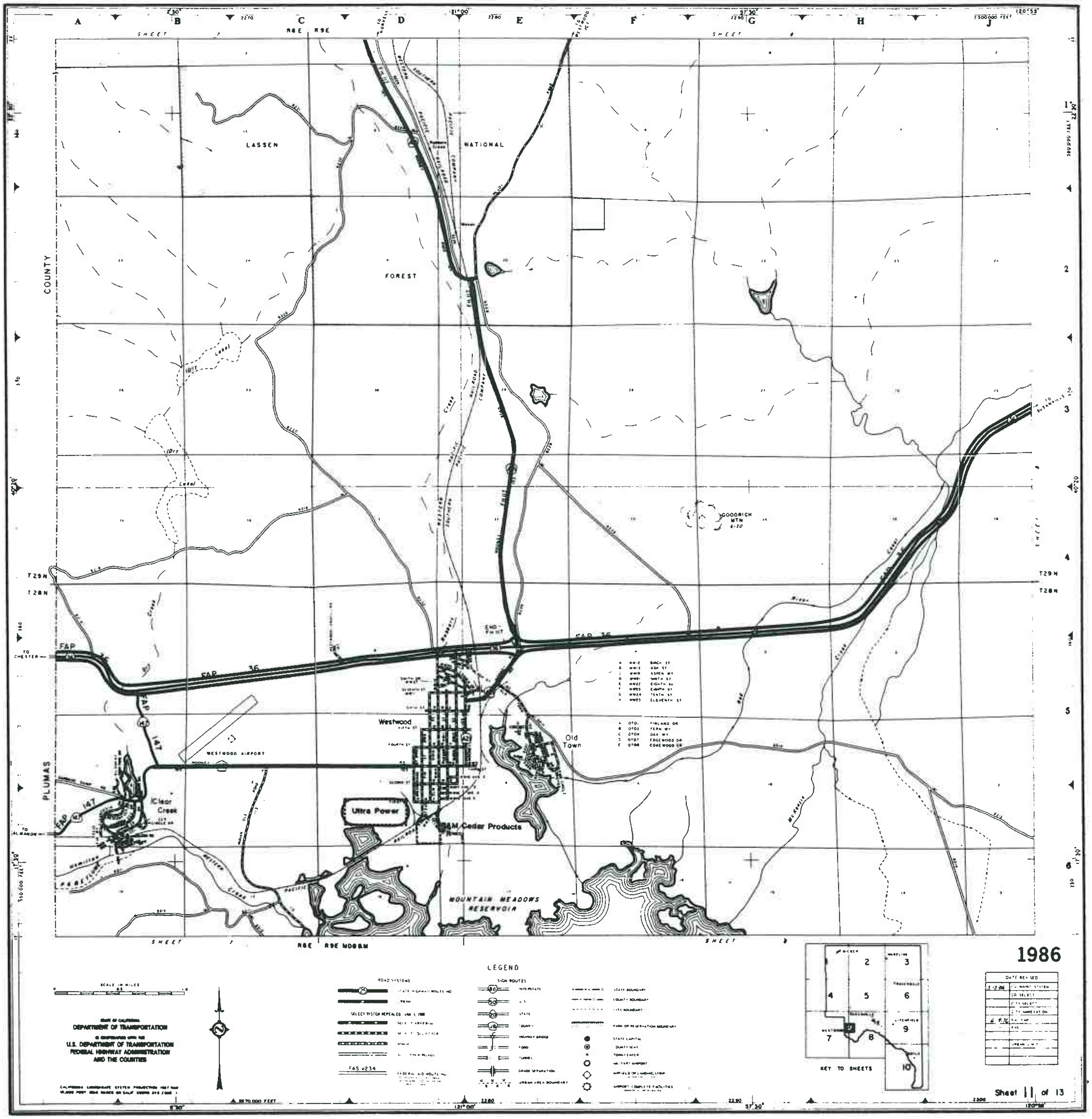
Future Traffic Noise Contours:

- : 60 dB Ldn
- : 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

- : 50 dBA L50 Contour
- ......: Approximate Location

Appendix D-8



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

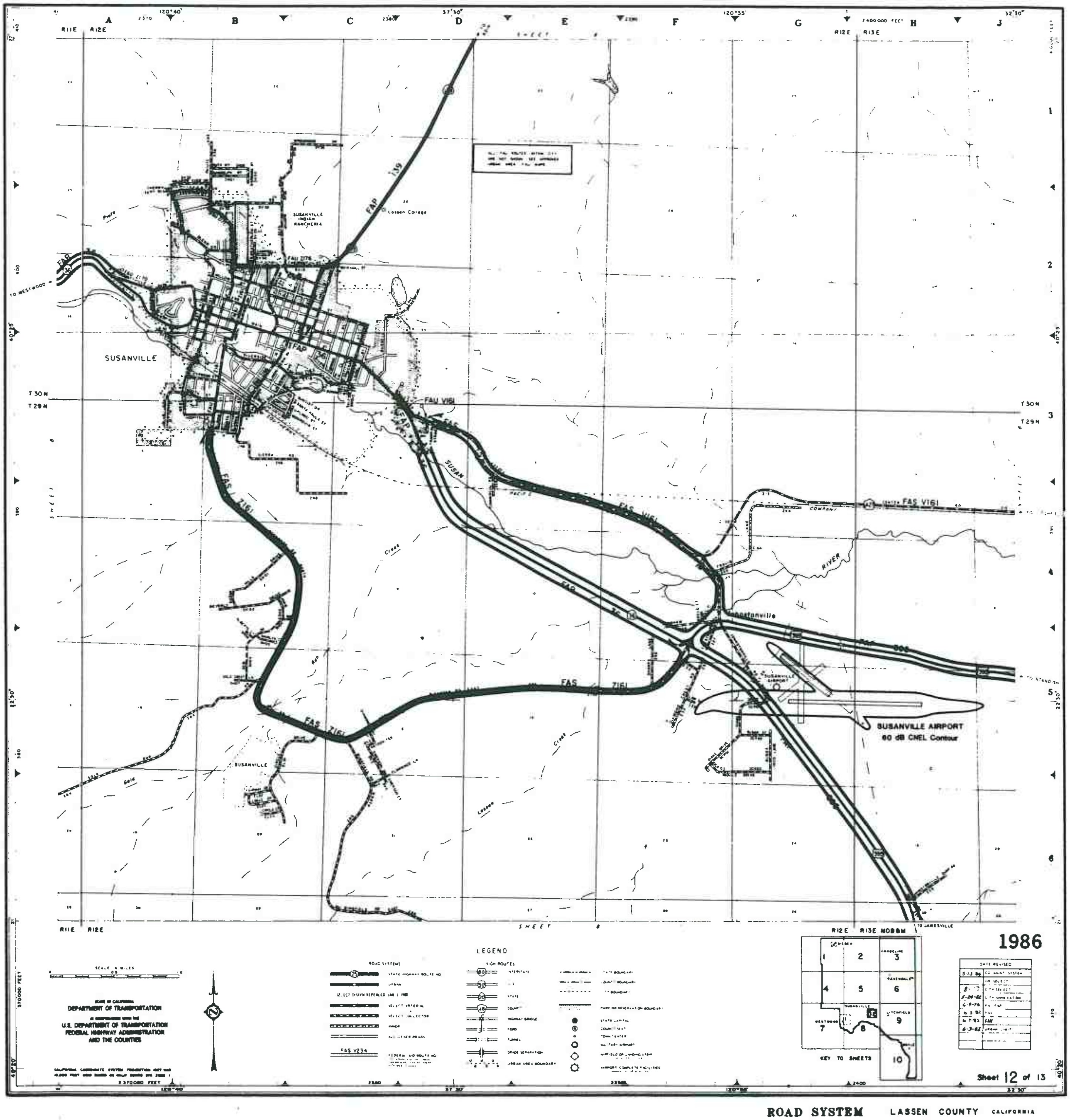
Future Traffic Noise Contours:

- (double line): 60 dB Ldn
- (heavy line): 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

- (solid line): 50 dBA L50 Contour
- (dotted line): Approximate Location

Appendix D-9



LEGEND

Future Traffic Noise Contours:

═══════: 60 dB Ldn

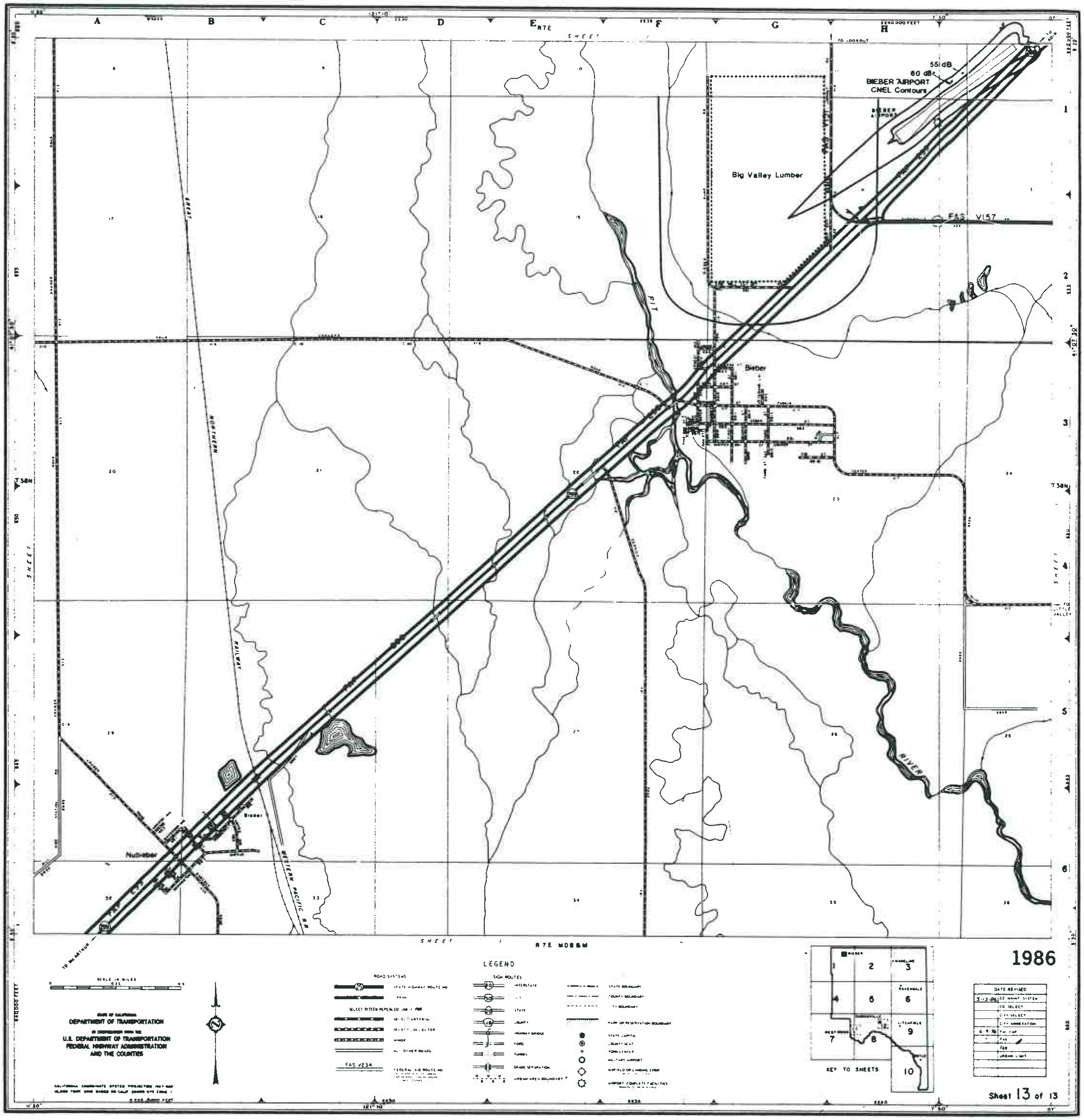
▬▬▬▬▬▬: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

———————: 50 dBA L50 Contour

....................: Approximate Location

Appendix D-10



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

Future Traffic Noise Contours:

: 60 dB Ldn

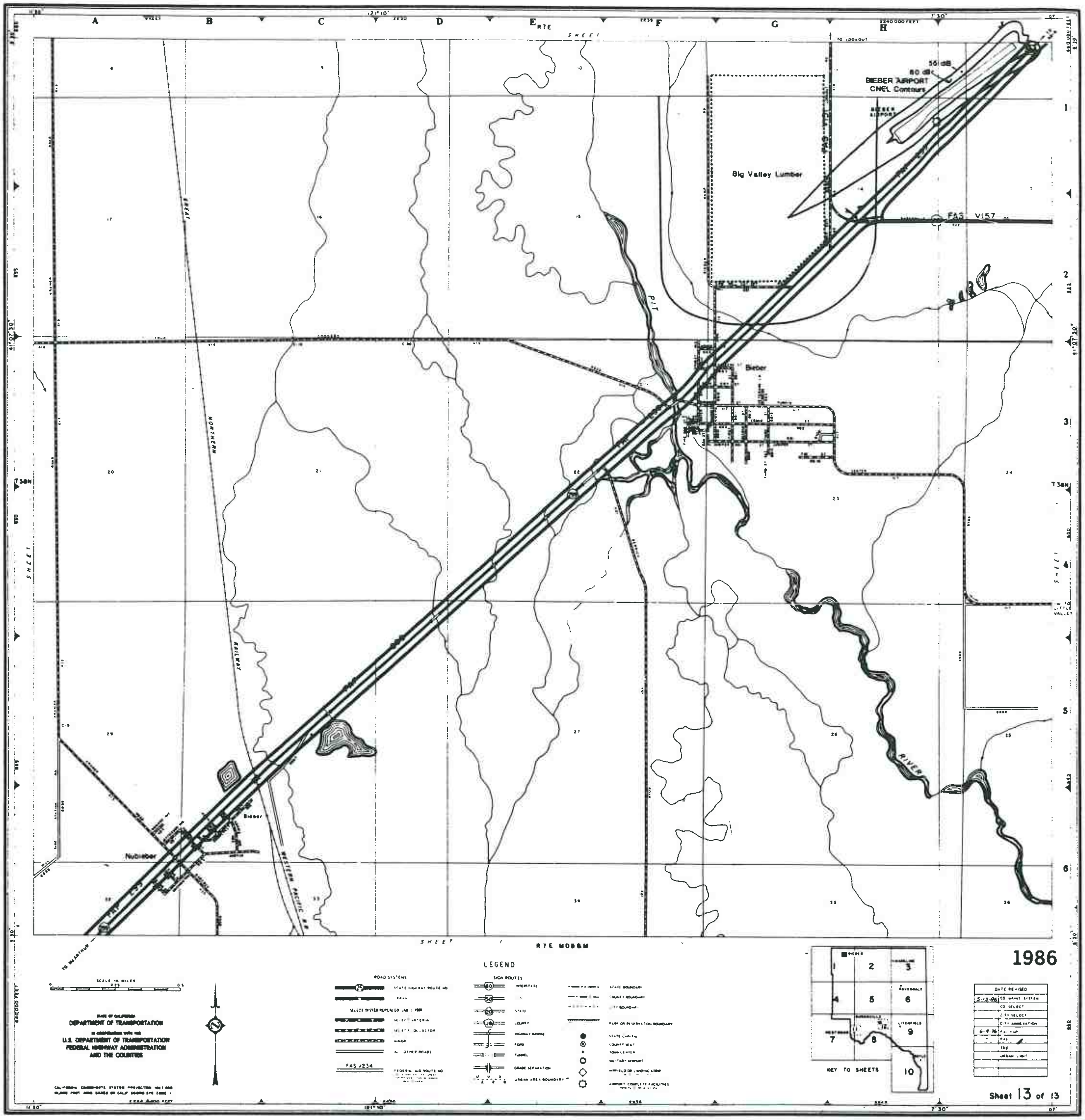
: 60 dB Ldn (Less than 75' from C/L of roadway)

Industrial Facilities:

: 50 dBA L50 Contour

: Approximate Location

Appendix D-10



ROAD SYSTEM LASSEN COUNTY CALIFORNIA

LEGEND

Future Traffic Noise Contours:

═══: **60 dB Ldn**

▬▬▬: **60 dB Ldn** (Less than 75' from C/L of roadway)

Industrial Facilities:

———: **50 dBA L50 Contour**

·········: **Approximate Location**