NOISE ELEMENT

INTRODUCTION

Generally, noise is referred to as being unwanted sound. Whether it be generated by vehicular traffic, a stationary source, or even a barking dog, noise can be particularly disturbing when infringing upon one's surroundings. California's cities and counties are required to address the concerns of the "noise environment" through a noise element of the general plan. The California Office of Noise Control has established four fundamental goals of a noise element:

1. 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 complaint situations.

2. To develop strategies for abatement of excessive noise exposure situations involving implementation of cost effective mitigating measures in combination with rezoning as appropriate to avoid incompatible land uses.

3. To protect those existing regions of the study area whose noise environments are deemed acceptable and also those locations throughout the community deemed "noise sensitive".

4. 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 construction in areas where the outdoor noise exposure exceeds CNEL (or Ldn) 60 dB.*

Enacted by the State Legislature in 1971, California Government Code Section 65302(f) defines the noise element requirements as:

> A noise element which shall identify and appraise noise problems in the community. The noise element shall recognize the guidelines established by the Office of Noise Control in the State Department of Health Services and shall analyze and quantify, to the extent practicable, as determined by the legislative body, current and projected noise levels for all of the following sources:

*Office of Noise Control, Guidelines for the Preparation and Contents of Noise Elements of the General Plan, (Berkeley, 1976), p.1.

(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 shall be shown for all of these sources and stated in terms of community noise equivalent level (CNEL) or day-night average level (Ldn). The noise contours shall be prepared on the basis of noise monitoring or following generally accepted noise modeling techniques for the various sources identified in paragraphs (1) to (6), inclusive.

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

The noise element shall include implementation measures and possible solutions that address existing and foreseeable noise problems, if any. The adopted noise element shall serve as a guideline for compliance with the state's noise insulation standards.

According to the State of California General Plan Guidelines, the noise element is the most specific in content and method of preparation.* This is due in part to the stringent requirements set forth in the law. It is also because of the input that the noise element policies and proposals could have in land use distribution.

*California Governor's Office of Planning and Research, State of California General Plan Guidelines, (Sacramento, 1980), p. 124.

SUMMARY OF NOISE DATA BASE

A. Acoustical Terminology*

The noise element is not only the most specific element to prepare, it is probably the most technical. The following terms should prove to be helpful in understanding items discussed throughout the element:

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.
A-weighted 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 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. Sound pressure levels weighted using this filter are labeled dBA.
CNEL:	Community Noise Equivalent Level. The average equivalent A-weighted sound level during a 24-hour day, obtained after addition of 4.77 decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.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).
Equivalent Energy Level, Leq:	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 sample period. Leq is typically computed over 1, 8, and 24 hour sample periods.

*Brown-Buntin Associates, Preparation of Airport Noise Contours - Westover Field (1986), Appendix A.

Ldn:	Day-Night Average Level. The average equivalent A-weighted 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.
Lmax:	The maximum A-weighted noise level recorded during a noise event.
L(n):	The sound pressure level in decibels which is exceeded n% of the time during a given sample period. For example, L10 is the level exceeded 10% of the time. L(n) values are statistical descriptors of variation in the noise environment. The L10, L50 and L90 are commonly used for this purpose.
Noise Exposure Contours:	Lines drawn about a noise source indicating constant energy levels of noise exposure. CNEL and Ldn are the metrics used most often to describe community exposure to noise.
Single Event Noise Exposure Level (SENEL):	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 level of the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on the reference pressure of 20 micropascals and a reference duration of one second. Also described as Sound Exposure Level (SEL).

NOTE: CNEL and Ldn represent daily levels of noise exposure averaged on an annual basis, while Leq represents the equivalent energy exposure for a shorter time period, typically one hour.

B. Sources of Noise in Jackson

Major noise sources include households, construction equipment, vehicles, ground stationary sources from American Forest Products (AFP), and from air traffic at Westover Field. The discussion on household noise is limited due to limits on control the City has over such noise. Construction equipment is discussed since it can be controlled, although its transient nature makes it less of a long term intrusion. Vehicular noise is of concern, particularly as it relates to State Highways 49 and 88. AFP is a potential noise generator; however, indications are that noise impacts due to AFP operations are insignificant

considering other highway and airport noise in the area. Finally, recent data generated as a result of analysis noise levels attributable to Westover Field is presented.

1. Household Noise

The growth in population and rise in standards of living have resulted in more families having more appliances. The following table illustrates the noise level and weekly operating time of several appliances and tools used about the home.

The table is used to illustrate that, on the average, the middle income person who spends most of the working day at home could be subjected to the above noise as much as 20 hours per week and the lower income person could be exposed to as much as 4.8 hours of noise from appliances.

TABLE 1

USE OF NON-CONTROLLABLE NOISE-PRODUCING APPLIANCES AND TOOLS IN TYPICAL HOUSEHOLDS

		Household #1*	Household #2**
	Average dB(A)***	Total Minutes per week	Total Minutes per week
Major Appliances			
Clothes Washer	64	315	210
Vacuum Cleaner	70	90	50
Clothes Dryer	57	210	--
Room Air Conditioner	58	(full-time, seasonal)	--
Dishwasher	65	472	--
Food Disposal	70	1	--
Household Appliances			
Food Mixer	69	10	15
Can Opener	69	2	--
Sewing Machine	72	15	15
Food Blender	76	3	--
Electric Shaver	64	14	--
Power Tools			
Saw, Drill, etc.	83	10	--
Mower	(Varies)	30	--
Edger	81	30	--
Trimmer	81	4	--

*Two adults, three children (1 pre-school, family income $16,000.
**Two adults, family income $8,000.
***Measurements taken three feet from source during household survey.

Source: Environmental Protection Agency, Bolt, Beranek and Newman, Inc., Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, (1971), p. 104.

2. Construction Noise

Because construction noises are transient, there has not been a concerted effort to reduce the noise levels of the equipment involved. As the City expands and as the older areas are renewed and rehabilitated, the noise from construction will be more noticeable. The following table lists the types and noise levels of equipment used during the different phases of construction.

TABLE 2

NOISIEST EQUIPMENT TYPES OPERATING AT CONSTRUCTION SITES*

	Construction Type		
	Domestic Housing	Office Buildings	Public Works
Ground Clearing	Truck (91) Scraper (88)	Truck (91) Scraper (88)	Truck (91) Scraper (88)
Excavation	Rock Drill (98) Truck (91)	Rock Drill (98) Truck (91)	Rock Drill (98) Truck (91)
Foundations	Concrete Mixer (85) Pneumatic Tool (85)	Concrete Mixer (85) Pneumatic Tool (85)	Concrete Mixer (85) Pneumatic Tool (85)
Erection	Concrete Mixer (85) Pneumatic Tool (85)	Derrick Crane (88) Jack Hammer (88)	Paver (89) Scraper (88)
Finishing	Rock Drill (98) Truck (91)	Rock Drill (98) Truck (91)	Truck (91) Paver (89)

*Numbers in parentheses represent typical dB(A) levels at 50 feet.

Source: Environmental Protection Agency, Bolt, Beranek and Newman, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, (1971), p. 27.

3. Vehicular Noise

Noise generated by autos and trucks on State Highways 49 and 88 represent the principal contributor to local noise. Noise contours for Highway 49 were prepared in 1980 by Caltrans District 10 staff. The contours were based on projected 1985 traffic, so they are reasonably accurate. The descriptor used for the peak noise is Ldn. Those maps are included at the end of this element as Appendix A; they are also on file with the City of Jackson, and Caltrans District 10 in Stockton.

No recent noise contour mapping for Highway 88 could be located. According to Caltrans District 10 staff*, the contours should be similar to those of Highway 49, depending upon the amount of traffic.

Generally, Caltrans estimates that for highways containing traffic volumes below 20,000 vehicles per day (ADT), noise levels within 100 feet of a highway where traffic speeds are less than 45 miles per hour will generally be less than 65 dB, Ldn. Noise levels will usually be 60 dB, Ldn, or less beyond 100 feet. On roadways where speeds exceed 45 mph, noise levels may exceed 70 dB, Ldn, within 100 feet of the roadway. They will generally be around 65 dB, Ldn, between 100 and 200 feet of the roadway and 60 dB, Ldn, or less where greater than 200 feet from the roadway.

4. American Forest Products (AFP)

AFP is considered to be a ground stationary noise source. Overlooking the northwest portion of the City, AFP is a potential contributor to the community noise environment. However, a noise monitoring study** completed in 1986 indicates that the dominant noise sources affecting the CNEL values for this area of the City would be aircraft or highway noise, and not noise generated from the AFP site. Given this, it would appear that even though AFP is a potential noise source for the northwest portion of the City, other factors contributing to the noise environment diminish AFP noise considerations.

5. Westover Field

Noise exposure contours have been prepared for the county***, and are herein incorporated by reference. A copy of the noise report and contour maps prepared by the county may be reviewed at City Hall, or at the County Planning Department.

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*Mr. Von Fuertes, Caltrans District 10 Environmental Branch, Personal Contact, February 2, 1987.

**Wilson, Ihrig and Associates, Inc., Analysis of Environmental Noise Levels at the Site of the Proposed Hilltop Development (1986), p.7.

***Brown-Buntin Associates, Preparation of Airport Noise Contours - Westover Field (1986).

The 1986 reports prepared for this area indicate that current aircraft noise is at acceptable levels for development. However, future increases in airport usage will increase noise levels. Appropriate construction features and noise insulation standards will have to be met in order to offset such increases.

Another measure to address noise concerns at an early stage of development is the County's formation of the "Airport Land Use Commission Permit Referral Boundary". Projects proposed within the boundary will be referred to the ALUC for early review and comment. To the extent that the City of Jackson is affected by this process, appropriate input will be solicited from the ALUC by the City.

GOAL STATEMENT

The following goal is established for guidance of efforts to implement the Jackson General Plan Noise Element:

"Reduce or minimize the scale of nuisance created by noise affecting residents, businesses, and visitors."

POLICIES AND IMPLEMENTATION MEASURES

The following policies are established to provide a commitment toward the stated goal. The implementation measures following each policy are actions intended to carry out that policy.

POLICY: Establish standards for ambient community noise environments.

IMPLEMENTATION: The City of Jackson has previously adopted the Land Use Compatibility for Community Noise Environments chart from the Office of Noise Control's Noise Element Guidelines. That chart continues to be a valid guideline for determination of noise compatible land use. The chart is presented at the end of this section.

IMPLEMENTATION: Utilize the Standard of Title 24 of the California Administrative Code for effective sound transmission control in new construction.

POLICY: Reduce levels of noise created by construction equipment.

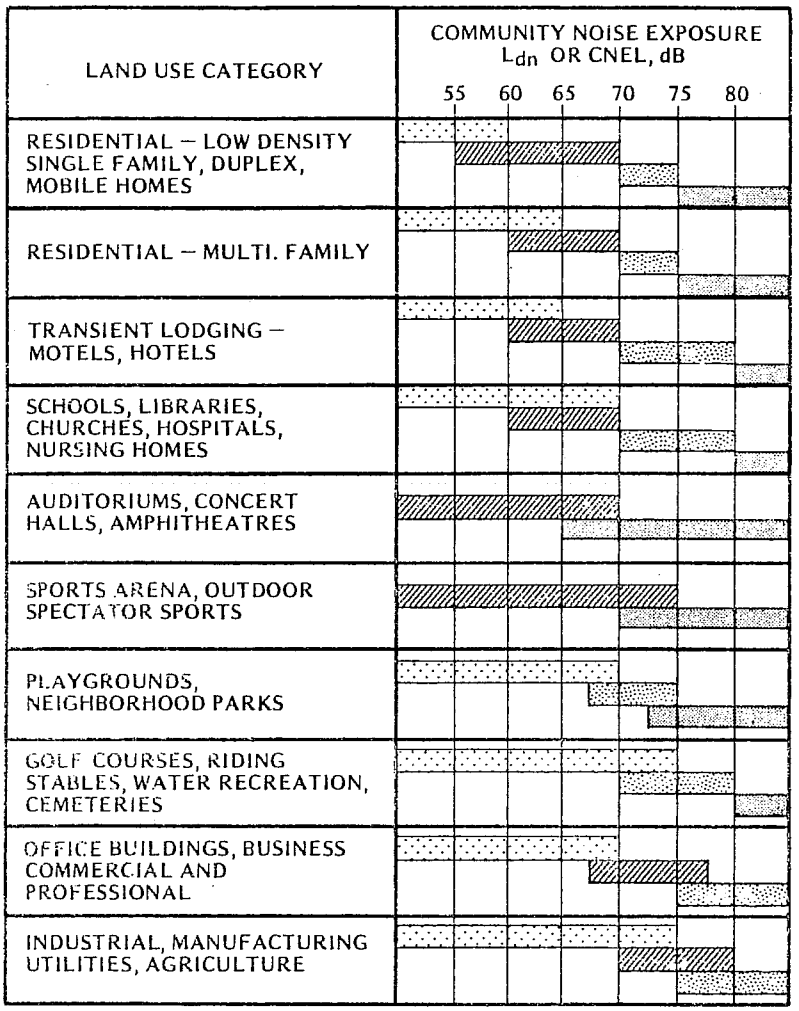
IMPLEMENTATION: All grading and other heavy equipment associated with site development processes should be accoustically muffled in accordance with Caltrans Standard Specifications.

IMPLEMENTATION: On a project specific basis, construction start up time in the morning and ending time in the evening will be controlled so as to not adversely affect adjacent uses.

POLICY: Provide for early review and identification of potential noise concerns associated with new development.

IMPLEMENTATION: Utilize the provisions of the State CEQA Guidelines for preliminary review of projects in order to identify noise concerns.

IMPLEMENTATION: As applicable, refer project applications to the Airport Land Use Commission for such applications located within the "Permit Referral Boundary".



INTERPRETATION

NORMALLY ACCEPTABLE

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

CONDITIONALLY ACCEPTABLE

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

NORMALLY UNACCEPTABLE

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

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

CONSIDERATIONS IN DETERMINATION OF NOISE–COMPATIBLE LAND USE

A. NORMALIZED NOISE EXPOSURE INFORMATION DESIRED

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

B. NOISE SOURCE CHARACTERISTICS

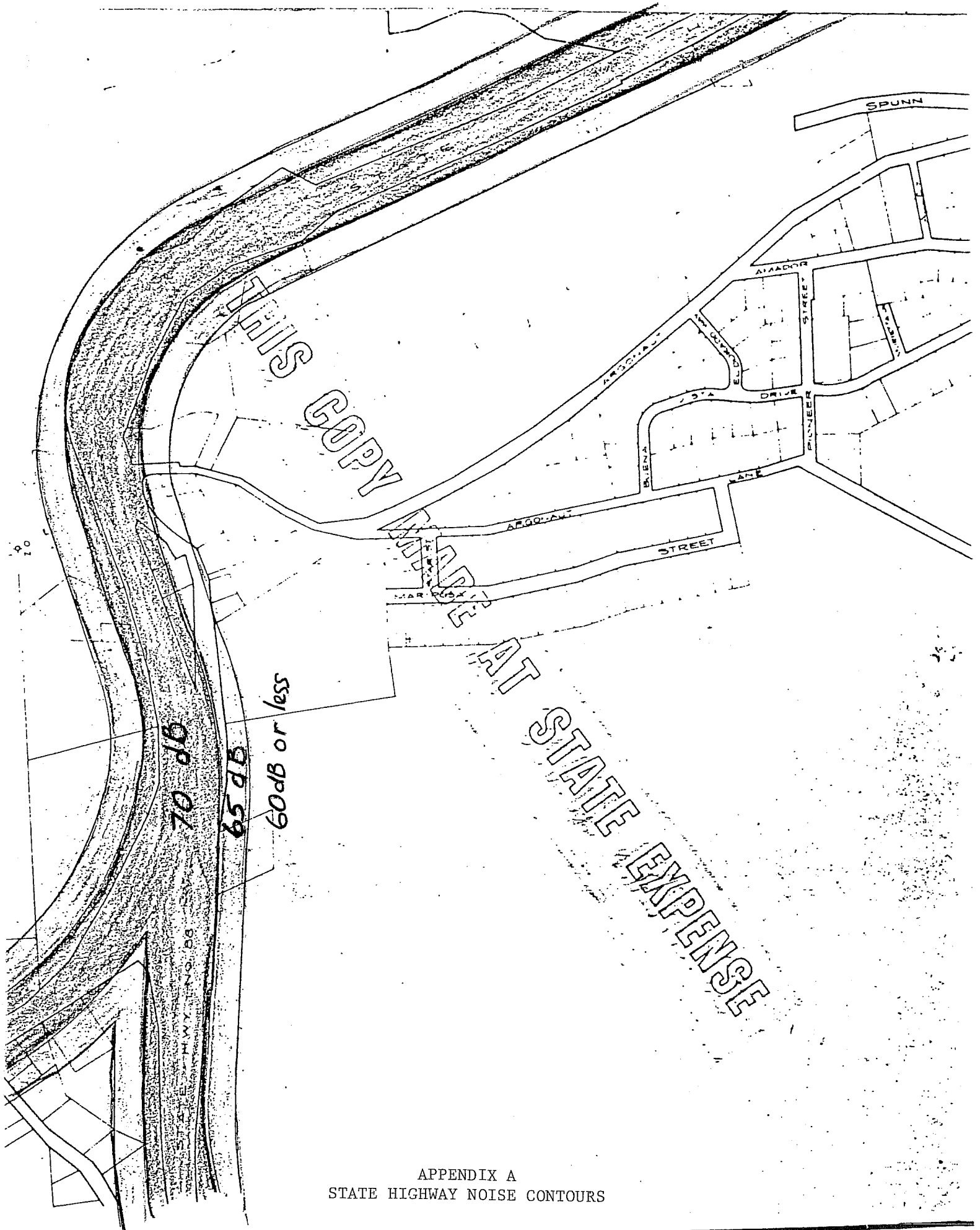
The land use-noise compatibility recommendations should be viewed in relation to the specific source of the noise. For example, aircraft and railroad noise is normally made up of higher single noise events than auto traffic but occurs less frequently. Therefore, different sources yielding the same composite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

C. SUITABLE INTERIOR ENVIRONMENTS

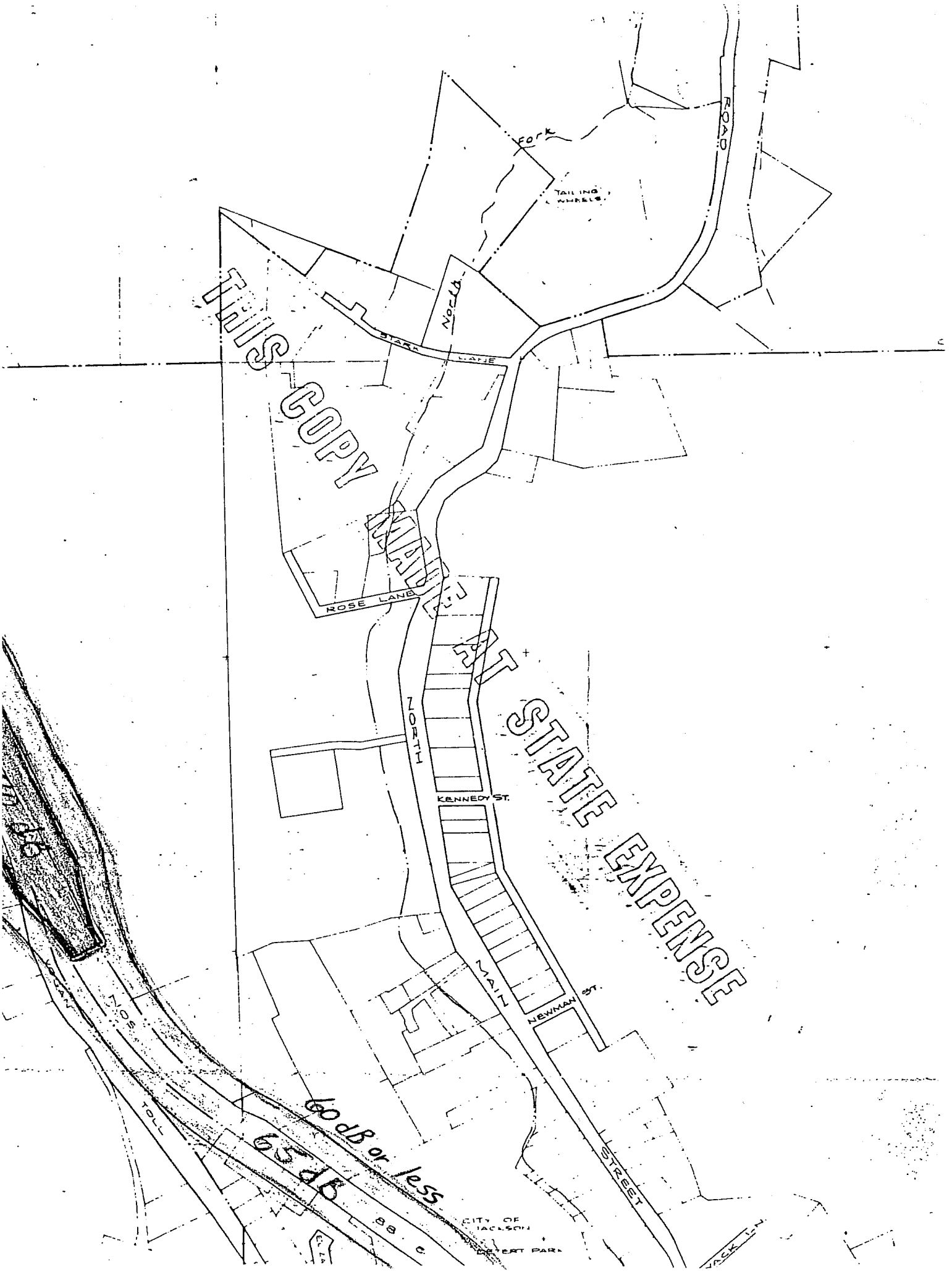
One objective of locating residential units relative to a known noise source is to maintain a suitable interior noise environment at no greater than 45 dB CNEL of L_{dn}. This requirement, coupled with the measured or calculated noise reduction performance of the type of structure under consideration,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

D. ACCEPTABLE OUTDOOR ENVIRONMENTS

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



APPENDIX A
STATE HIGHWAY NOISE CONTOURS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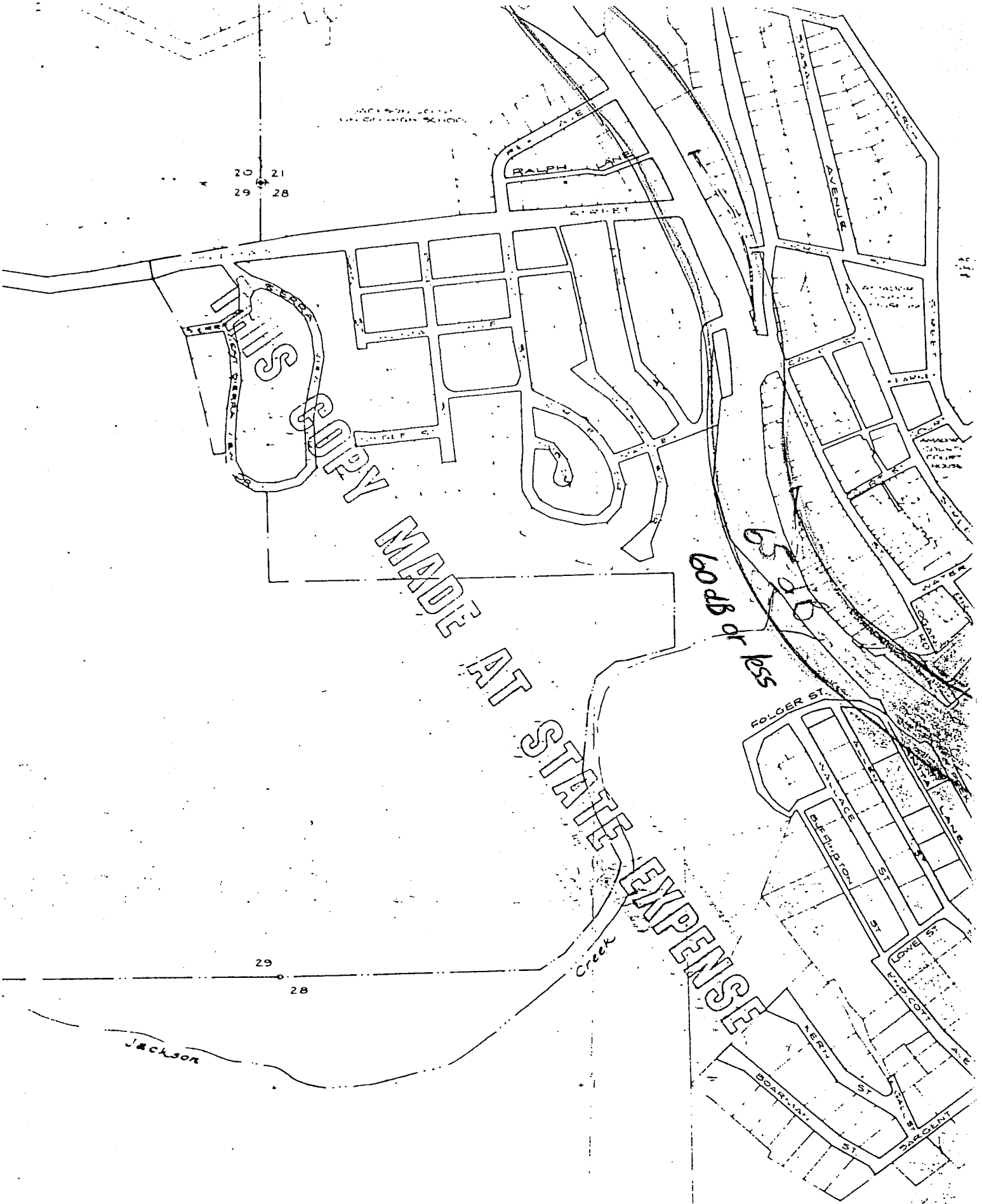
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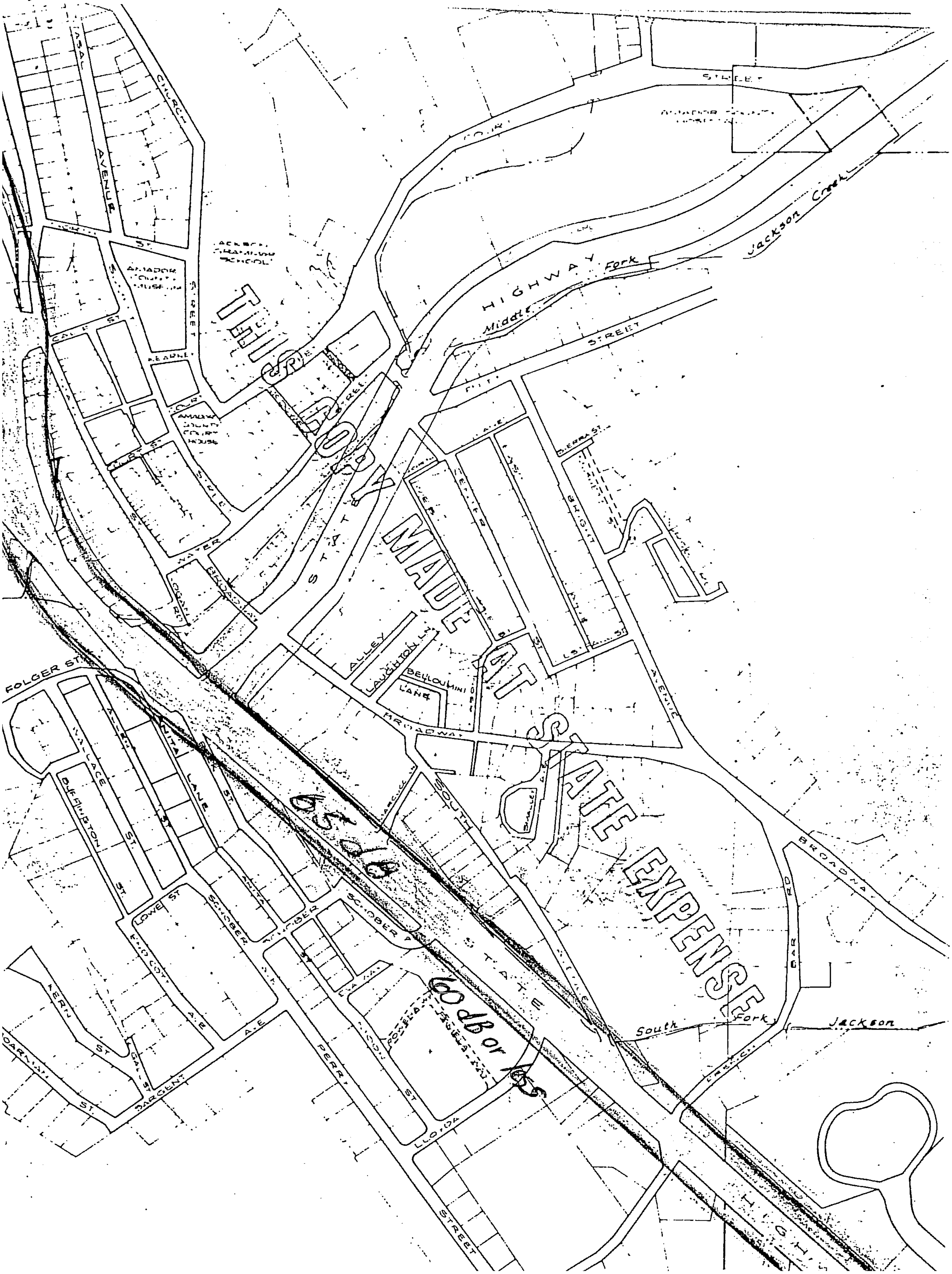
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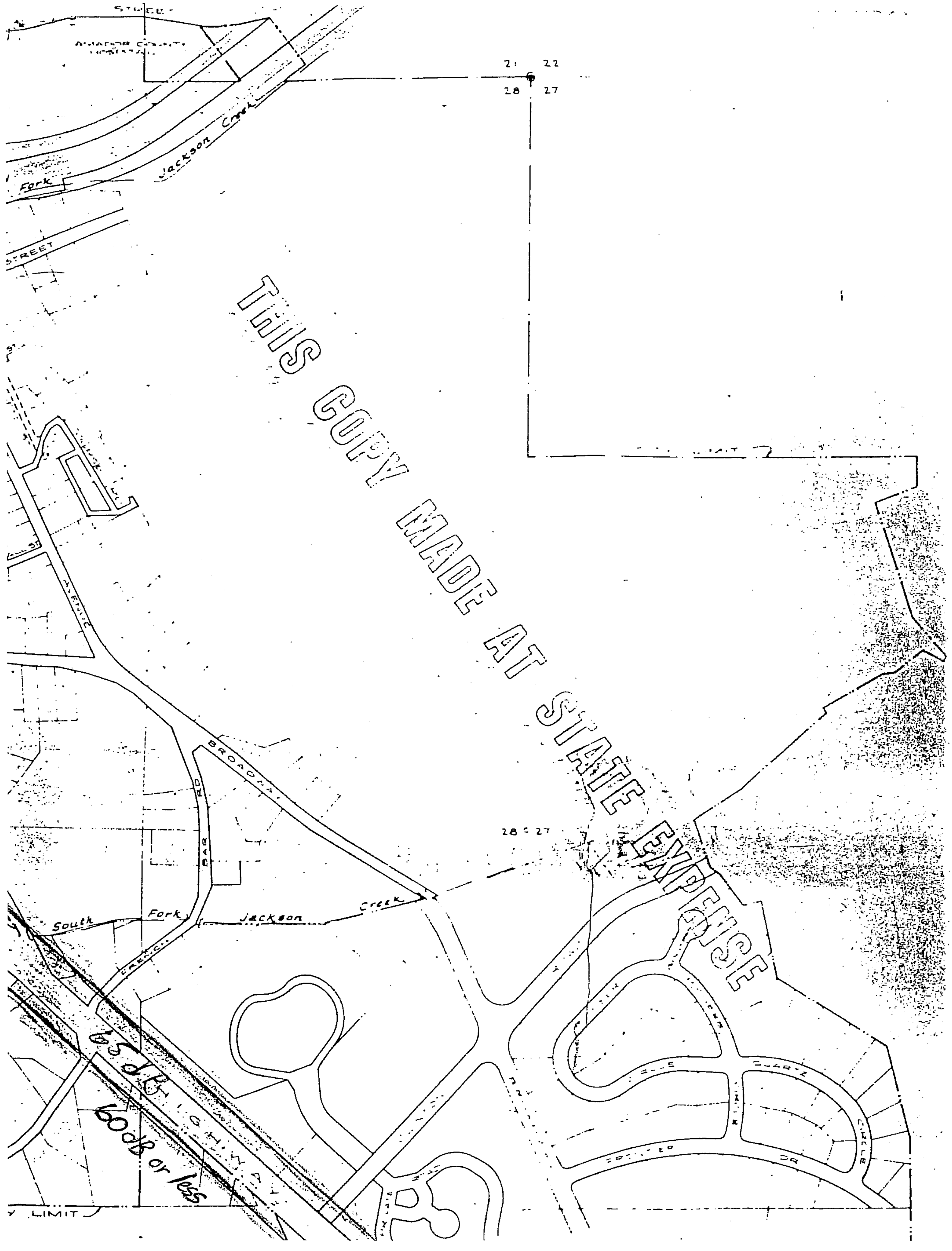

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