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A COMPARISON OF TRAFFIC NOISE FROM ASPHALT RUBBER ASPHALT CONCRETE FRICTION COURSES (ARACFC) AND PORTLAND CEMENT CONCRETE PAVEMENTS (PCCP)

Final Report

Prepared by:

Michael P. Henderson
Sylvester A. Kalevela
JHK and Associates
121 Tijeras Avenue, NE
Suite 3000
Albuquerque, N.M. 87102

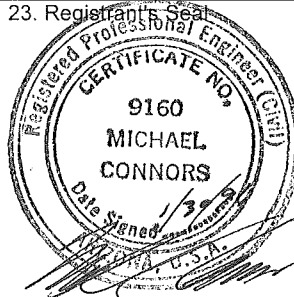
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16. Abstract A study was conducted by the Arizona Department of Transportation to evaluate the potential noise reduction benefits of using Asphalt Rubber Asphalt Concrete Friction Course (ARACFC) as an overlay for Portland Cement Concrete Pavements (PCCP). Comparative noise measurements were performed on several ARACFC and PCCP freeway segments. Third-octave frequency measurements were also performed to compare the frequency content of the noise generated by the two pavement types. Two separate measurement techniques were used to collect noise data. First, roadside traffic noise measurements were performed on adjoining freeway segments that consisted of different pavement types. For these measurements, two noise meters were positioned at equal distances from the adjoining freeway segments, and roadside traffic noise levels were measured simultaneously. The second measurement technique consisted of on-road tire-pavement noise measurements. For these measurements, a specially made bracket was clamped to the frame of a test vehicle, and a noise meter microphone was secured near the tire-pavement contact area. Noise readings were recorded as the test vehicle traveled at highway speeds over various pavement surfaces. Noise frequency data was collected using both measurement techniques. The noise data collected for the study demonstrated that the ARACFC freeway segments produced lower noise levels than the PCCP freeway segments. The extent of the noise differences observed between the two surface types depended on the specific freeway segments being compared. In some cases, the noise level differences would be distinguishable by human perception (differences of 3 decibels or greater). In other cases, the differences would not be noticeable. The frequency data collected for the study also indicated that the ARACFC surfaces generated less high frequency noise than the PCCP surfaces.					
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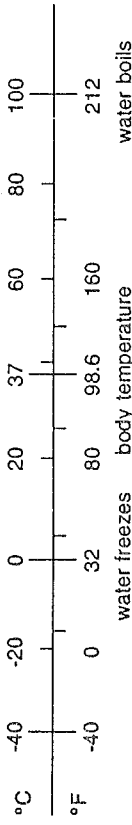
APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	millimeters squared	mm ²
ft ²	square feet	0.093	meters squared	m ²
yd ²	square yards	0.836	meters squared	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	kilometers squared	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	meters cubed	m ³
yd ³	cubic yards	0.765	meters cubed	m ³
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

Symbol	When You Know	Do The Following	To Find	Symbol
°F	Fahrenheit temperature	°F - 32 ÷ 1.8	Celcius temperature	°C



APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	millimeters squared	0.0016	square inches	in ²
m ²	meters squared	10.764	square feet	ft ²
m ²	meters squared	1.19	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	kilometers squared	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	meters cubed	35.315	cubic feet	ft ³
m ³	meters cubed	1.31	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T

TEMPERATURE (exact)

Symbol	When You Know	Do The Following	To Find	Symbol
°C	Celcius temperature	°C x 1.8 + 32	Fahrenheit temperature	°F

METER: a little longer than a yard (about 1.1 yards)
LITER: a little larger than a quart (about 1.06 quarts)
GRAM: a little more than the weight of a paper clip
MILLIMETER: diameter of a paper clip wire
KILOMETER: somewhat further than 1/2 mile (about 0.6 mile)

*SI is the symbol for the International System of Measurement

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1.0 INTRODUCTION

The Arizona Department of Transportation (ADOT) has been using asphalt-rubber materials in a variety of pavement treatments for over 25 years. One common application of asphalt-rubber has been in Asphalt Rubber Asphalt Concrete Friction Courses (ARACFC). In pavement treatments such as ARACFC, a crumb rubber modifier is added as a binder to the asphalt-concrete mixture. The use of scrap rubber in the pavement mixture provides a means for disposing of waste tires. In recent years, asphalt rubber pavements have also been promoted for reducing traffic noise.

Most of the urban freeways in Phoenix and Tucson are constructed of Portland Cement Concrete Pavements (PCCP). Concrete pavements provide a very durable pavement design strategy, however recent concern has focused on the noise generated by vehicle tires on concrete pavement surfaces. It has been suggested that substantial noise reduction benefits (3 - 5 decibels) can be achieved by using ARACFC as an overlay for PCCP.

Measures used to control traffic noise generally use one of two approaches: 1) reducing noise at its source, or 2) by limiting the propagation of noise energy between the source and noise-sensitive locations. The objective of this study was to evaluate the potential use of ARACFC as a means of reducing highway traffic noise at one of its primary sources, the tire-pavement interaction. To evaluate the effectiveness of using ARACFC as a strategy for reducing highway traffic noise, a comparison was made of the noise levels produced by ARACFC and PCCP roadway surfaces. As outlined below, the following chapters of this report document the research approach and findings of the study:

- ◆ **Chapter 2** Summarizes the findings of a literature review.
- ◆ **Chapter 3** Describes the study design effort.
- ◆ **Chapter 4** Presents the results of roadside traffic noise measurements.
- ◆ **Chapter 5** Presents the results of on-road tire-pavement noise measurements.
- ◆ **Chapter 6** Presents the results of frequency spectra measurements.
- ◆ **Chapter 7** Provides conclusions and recommendations of the study.

The following section provides background information on highway traffic noise, and a definition of several terms related to traffic noise issues.

1.1 Highway Traffic Noise - Background

Highway traffic noise is a complex phenomenon involving a variety of factors. The level of noise generated from traffic varies according to the volume of traffic on the roadway, vehicle travel speeds, and the vehicle mix of traffic, i.e., the number of cars and trucks in the vehicle stream. Noise is generated from individual vehicles by a combination of sources, including the vehicle engine and exhaust systems, wind turbulence, and the tire-pavement interaction. For passenger cars and light trucks, tire-pavement noise is the dominant noise source at highway travel speeds. For heavy commercial vehicles, the noise from engine and exhaust systems is also significant at higher speeds. Several factors affect the propagation of traffic noise to the roadside environment, including the distance of the noise receivers from the roadway, roadside topography, ground cover near the roadway, screening from barriers, reflections from buildings and other surfaces, and atmospheric conditions.

The human response that interprets the loudness of sound is directly related to the amplitude of pressure fluctuations, or acoustic vibrations, in the air. Sound pressure is described in units of the micropascal (μ Pa). The range of pressure fluctuations, or degrees of loudness, that the human ear can distinguish is extensive, ranging from 20 to over 6,000,000 μ Pa. The decibel, abbreviated dB, is a mathematical expression that reduces this wide range of audible sound pressures into a condensed, logarithmic scale. The decibel is defined as follows:

$$\text{Decibels} = 20 \log_{10}(p/p_o),$$

where p = sound pressure (in μ Pa)

and $p_o = 20 \mu$ Pa (the threshold of hearing)

When sound pressures are converted to decibels they are referred to as sound pressure *levels*, which are values on a scale relative to the selected reference sound pressure. When expressed in terms of decibels, noise levels correspond closely to the human auditory response to loudness. Because of the logarithmic nature of the decibel, and the similar human response to loudness, a change of 5 decibels, for example, would produce the same perceived change in loudness at any noise level. In general, human hearing can begin to distinguish a difference in loudness when noise levels change by 3 decibels. A noise level increase of 5 decibels would be regarded as being slightly louder. An increase of 10 decibels would be perceived as a doubling of loudness.

The pitch or frequency of a noise is described in units of Hertz (Hz). The frequency range of normal human hearing is between 20 and 20,000 Hz. However, human hearing is not equally sensitive to all sound frequencies. Noises with extremely

low frequencies (less than 500 Hz) or extremely high frequencies (over 10,000 Hz) are attenuated by the human hearing mechanism. For most transportation noise evaluations, an A-weighting filter is used to correlate physical noise levels with the frequency sensitivity of human hearing and the subjective response to noise. Noise levels reported in A-weighted decibels are commonly abbreviated dBA.

Traffic noise is comprised of a wide range of frequency components and is often referred to as a broad-band noise. To describe the frequency distribution for a given noise, individual noise frequencies are grouped into octave bands, which divide the sound spectrum into specific frequency ranges. Each octave band is referred to by its center frequency (the geometric mean of its frequency range). More detailed information on the frequency content of a noise can be obtained by further dividing each octave band into three smaller parts. These smaller units are called third-octave bands.

2.0 LITERATURE REVIEW

The initial task of the study was to conduct a literature review of past research efforts aimed at evaluating tire-pavement noise. The review focused on determining the most suitable methods for measuring and evaluating noise levels produced by different pavement surfaces. The following sections highlight the findings of the literature review. Included is a brief discussion concerning the mechanisms of tire-pavement noise and a summary of the most common methods used for data collection and data analysis found in the literature.

2.1 Mechanisms of Tire-Pavement Noise

Noise generated from individual vehicles is attributed to several sources including engine noise, exhaust noise, wind turbulence, and the tire-pavement interaction. According to the literature, researchers are in general agreement that tire-pavement noise is generally considered the primary source of traffic noise when travel speeds are 45 miles per hour or greater^{1,2,3,4,5}. Therefore, it is appropriate to consider noise-reducing pavements as a means of mitigating traffic noise, especially for highway traffic situations. However, it should be noted that tire-pavement noise is only one of the many factors that influence overall traffic noise levels.

The literature describes roadway-tire noise itself as a complex phenomenon consisting of multiple mechanisms. Several of the mechanisms described in the literature^{5,6,7,8} are provided below:

- A slap down effect occurs at the leading edge of the tire as the treads meet the roadway. Air is forced out from between the tread elements and the roadway (this effect is referred to as "air pumping").
- Tire vibrations, caused by irregularities in the pavement surface, occur in the tire-pavement contact patch. Some of the tire's kinetic energy is converted into acoustic energy.
- Noise is generated at the trailing edge of the tire as the tread is released from the road surface. Pressurized air trapped between the tread and the pavement surface is released ("air pumping"). As the tread snaps back, a resonance effect is produced within the tire tread.

It has been reported that different mechanisms may be responsible for noise generation within certain frequency bands. In addition, different tire types and tread patterns from individual vehicles have been shown to affect these mechanisms in a variety

of ways¹. Furthermore, numerous studies have reported important differences in the frequency content and noise levels produced from different pavement surfaces^{4,9,10,11}.

In past research efforts concrete pavements have generally been shown to produce more noise than bituminous roadway surfaces. More specifically, open graded asphalt surfaces have been shown to produce lower noise levels than tined or deeply grooved concrete surfaces^{12,13}. Differences of nearly 10 decibels in roadside noise levels have been reported between these two surface types¹⁴. The differences in noise produced by these surfaces are generally attributed to the differences in surface texture, rather than the concrete and bituminous materials themselves. In general, higher noise levels are produced by rough roadway surfaces^{3,5,15}.

Open graded asphalt surfaces and other so called "quiet pavements" or surface treatments are reported to affect the tire-pavement noise generating mechanisms by employing a porous surface with a high void content^{2,11,12}. It is theorized that "quiet" surfaces generate less noise than PCCP surfaces because of these surface voids, which allow air to escape more readily from the tread-pavement contact area and thus reduce the "air pumping" effect. Some researchers have determined that certain roadway surfaces also provide noise attenuation by absorbing some of the tire-pavement noise that would otherwise be transmitted to roadside locations^{2,11}.

Some evaluations have been conducted to compare the noise reduction benefits for pavement surfaces constructed with asphalt-rubber materials, such as ARACFC¹⁶. These studies, performed in various countries, have shown that noise reduction benefits of 2 - 10 decibels can be achieved by using a combination of asphalt rubber pavement mixtures on pavements with open-graded surface textures.

2.2 Data Collection Methods

The literature provides several examples of data collection methods that have been used to evaluate tire-pavement noise^{6,17,18,19}. Four principle data collection methods have been used. Some of the measurement methods have been developed to meet vehicle manufacturer and tire industry specifications and/or the vehicle noise regulations of certain countries. The four principal measurement methods identified in the literature review are provided below.

- The laboratory drum method. A test tire is mounted to roll against a drum surface in a laboratory. The microphone is positioned near the tire-drum interface. Different drum surfaces or tires can be tested to evaluate their relative noise effects.

- Roadside noise measurements of individual vehicle passbys. A vehicle coasts by a roadside microphone with the engine switched off. Different vehicles/or tires can be coasted over a standardized pavement surface to evaluate their rolling noise levels or to determine if a vehicle meets a given noise specification.
- Roadside traffic noise measurements. Traffic noise measurements are made adjacent to different pavement surfaces for comparison. This method measures the overall changes in traffic noise that can be attributed to a given pavement surface. Noise measurements can be made before and after a new pavement surface is applied at a given location, or simultaneous measurements can be conducted on adjoining roadway segments with different pavement types.
- On-road tire-pavement method. A microphone is mounted on a trailer or boom close to the tire-pavement contact area. The test tire is driven over various pavement surfaces or with different tires to determine their relative noise effects.

2.3 Data Analysis

Data analysis methods were found to be very similar among the various studies reviewed in the literature^{11,12,14,20}. Data analysis focuses on comparing the noise levels produced by the various pavement surfaces. This data is normally expressed in terms of an average (or equivalent) noise level over a unit of time, in A-weighted decibels, abbreviated Leq dBA. A wide range of averaging times has been used, from several minutes to an hour or more. According to the literature, the arithmetic mean of several Leq measurements provides a reasonable means of quantifying the noise generation characteristics of an individual pavement, if similar conditions are present for each measurement.

While FHWA's traffic noise abatement criteria rely solely on the Leq dBA measurement, several investigators have considered the spectral content to be an important issue in pavement noise studies. Perceptible noises range in frequency from approximately 20 to 20,000 Hertz (Hz). Sounds of 2,000 Hz and above are generally regarded as the most annoying and disruptive, especially if discrete frequency components are present²¹. It was emphasized in the literature that subjective reports often favor certain pavement types as producing less noise than others, even though the overall difference in Leq values should not have been perceivable. The literature explains this subjective response as a reduction in noise generated in the higher frequency bands, which are normally more annoying to people than lower frequencies^{11,14}. Frequency information was collected as part of this study to consider these potential subjective responses to the noise generated by different pavement surfaces.

3.0 STUDY DESIGN

3.1 Measurement Methods

Of the four measurement methods described in the literature review, two were selected to evaluate the noise generation characteristics of ARACFC and PCCP roadway surfaces: 1) roadside traffic noise measurements, and 2) on-road tire-pavement noise measurements. The two separate approaches were selected based on the different advantages offered by each technique.

Both the roadside and on-road measurement techniques offer specific advantages and disadvantages. For example, roadside traffic noise measurements can be used to measure "real world" noise levels produced from different pavement surfaces. Noise measurements conducted using this technique reflect the complex array of variables that influence highway traffic noise, including pavement surface type. However, when simultaneous noise measurements are performed on two different pavements, it is necessary to select measurement sites where traffic volumes, travel speed, vehicle mix, and site acoustics are similar. Thus, the number of potential measurement sites is limited. Furthermore, measurements conducted using this method are necessarily restricted to evaluating the noise produced by relatively short sections of freeway, near the location where the measurements are being performed.

Conversely, the on-road measurements can be performed on any pavement surface, and large amounts of data can be collected over long stretches of a freeway surface. With the on-road measurement method, several potential measurement problems can be eliminated. For example, it is not necessary to account for variations in traffic flow or roadside acoustics. The on-road measurement technique also provides a means for isolating the noise generated from the tire-pavement interaction. There are disadvantages to this measurement method as well. Although this technique can be used to compare the relative tire-pavement noise levels from different pavements, little can be said about noise levels experienced at the roadside based on this measurement approach.

The simultaneous roadside traffic noise and on-road tire-pavement noise measurement methods offer two separate approaches for evaluating the noise generation characteristics of different roadway surfaces. Because of the specific advantages and disadvantages of the two measurement techniques, both approaches were used in this study as independent methods of evaluating tire-pavement noise. No attempt was made to correlate on-road tire-pavement noise levels with roadside traffic noise levels, other than to note general consistencies in the results of the two measurement approaches. Specific advantages and disadvantages of the two methods are summarized in Table 3-1.

TABLE 3-1
ADVANTAGES AND DISADVANTAGES OF NOISE MEASUREMENT METHODS

Data Collection Issue	Method Advantages/Disadvantages	
	Roadside Traffic Method	On-Road Tire-Pavement Method
<i>Site selection</i>	Limited by number of suitable locations, i.e., locations having identical traffic characteristics and acoustical environments.	Can be used on any pavement surface. A large amount of data can be collected quickly.
<i>Ease of measurement technique</i>	Generally, equipment setup is easily accomplished. Prior testing is not necessary for data collection.	Requires design and construction of a special trailer, mounting or boom. Testing is necessary to ensure method precision.
<i>Potential measurement problems</i>	Traffic composition, volume, and speed must remain constant at two measurement sites for a direct comparison of noise levels to be meaningful.	Artificial noise effects such as wind noise, adjacent traffic noise, etc., would have to be minimized. Not limited by traffic fluctuations or roadside acoustics.
<i>Realistic versus relative noise levels</i>	Good at showing <u>realistic</u> noise effects that different pavement surfaces produce on the roadside environment. Relates these differences based on a realistic mixture of traffic noise sources.	Good at showing a <u>relative</u> difference in how the noise generated from an individual tire changes across various pavement surfaces. Not a "real world" noise phenomenon.
<i>Meteorological variance</i>	Could substantially affect roadside measurements if conducted at different times of day or under different conditions.	Little or no effect.
<i>Travel speeds</i>	Measurements could only be performed for the average travel speed occurring in traffic during the measurement period.	Could test pavement-tire noise relationship at different speeds.
<i>Frequency analysis</i>	Is possible.	Is possible.

3.2 Site Selection

At the initiation of the study, an inventory of locations was prepared that identified all locations where ADOT has used ARACFC pavement treatments on Arizona freeways. ARACFC has been applied on segments of I-19 near Tucson, and on segments of I-10 and I-17 near Phoenix. Noise measurement were conducted for each of these locations. Noise measurements were also conducted for an additional freeway

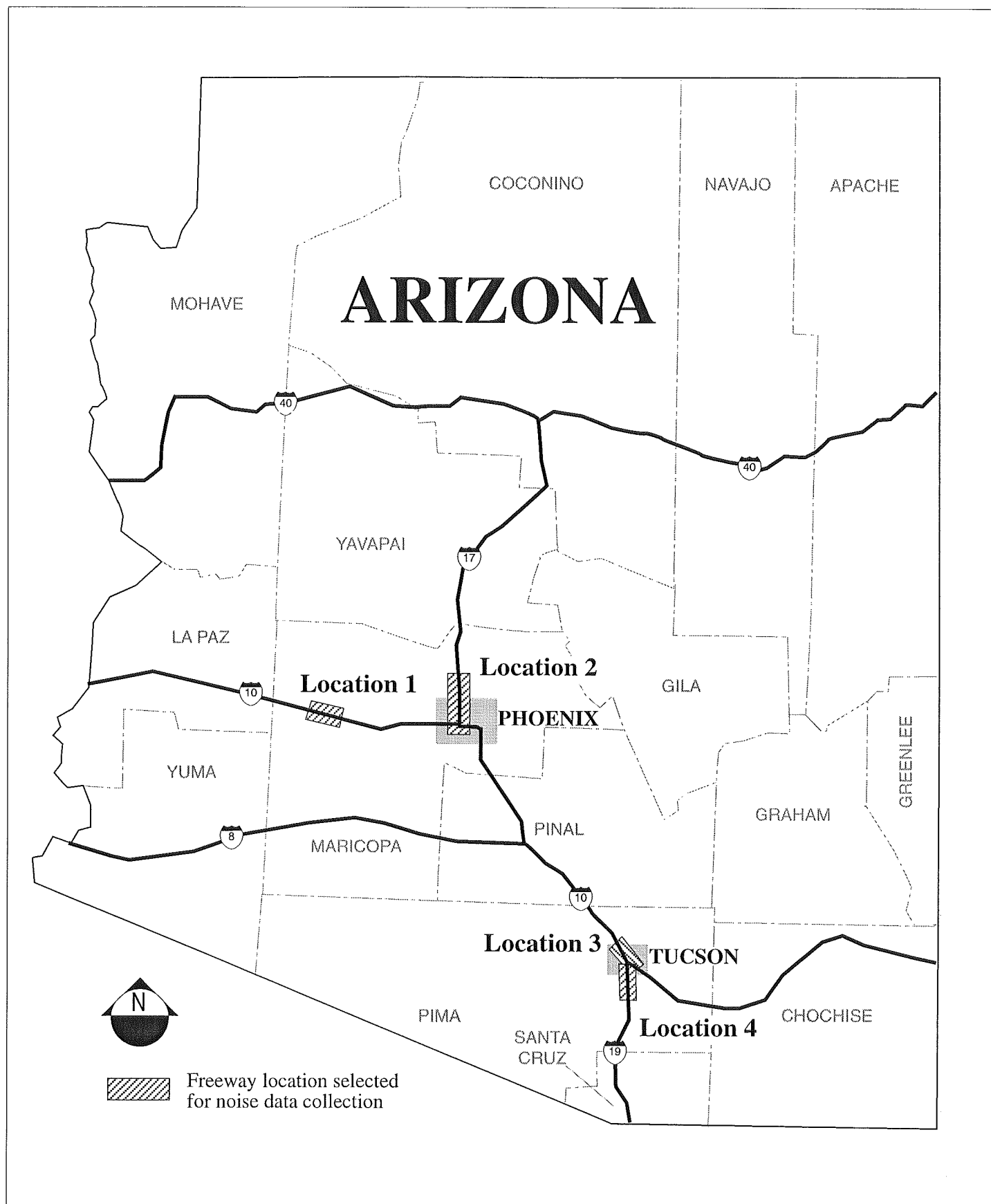
location consisting entirely of PCCP (I-10, in Tucson). The freeway locations considered in the noise study, and the type of noise data collected for each location, are shown in Table 3-2. These locations are shown graphically in Figure 3-1.

For this study, freeway *locations* refer to the general area of a particular freeway included in the evaluation. Each one of the identified freeway locations consists of multiple freeway *segments*. Freeway *segments* refer to a specific length of freeway that is constructed with a single surface type, such as ARACFC.

A variety of surface treatments can occur on PCCP roadways. Since pavement surface texture is thought to be an important factor in the generation of tire-pavement noise, the surface treatments of the various PCCP roadways evaluated in the study were noted. When ADOT constructs a new PCCP freeway section, the pavement surface is normally tined before the concrete mixture dries. *Tining* involves dragging a rake-like instrument with fine tines across the drying concrete surface. The tining produces shallow ridges in the pavement that improve the friction of the roadway surface. Tining is performed in the transverse direction of the roadway, that is, in the direction perpendicular to the roadway centerline. As PCCP surfaces age, different rehabilitation operations are performed to improve their skid resistance and ride. These rehabilitation procedures can substantially alter the surface texture of the pavement. *Grooving* is sometimes performed on aging pavements to improve skid resistance (normally after approximately 10 years of service life). For this procedure, a series of saw blades are used to cut grooves into the pavement that are approximately 3/16 of an inch in depth and spaced approximately 3/4 of an inch apart across the pavement surface. Grooving is nearly always performed in the longitudinal direction, that is, in the direction parallel to the roadway centerline. *Grinding* is a more common rehabilitation procedure that is used

TABLE 3-2
FREEWAY LOCATIONS INCLUDED IN PAVEMENT NOISE EVALUATION

Location Number	Freeway/General Area	Mile Post	Noise Data Collected	
			Roadside	On-road
Location 1	I-10 (50 miles west of Phoenix)	94.7 - 112.2	x	x
Location 2	I-17 Phoenix	194.5 - 226.0		x
Location 3	I-10 Tucson	254.5 - 260.4	x	x
Location 4	I-19 Tucson	87.7 - 100.7	x	x



**FIGURE 3-1
LOCATION MAP**

to improve both the skid resistance and the ride of aging PCCP roadways. The grinding procedure involves using a bank of saw blades to grind away a thin layer from the entire pavement surface. Grinding smoothes out deformities that have developed in the pavement surface profile and improves the frictional characteristics of the surface. Grinding can also be performed on surfaces that have been previously grooved. Like grooving, grinding is normally performed in the longitudinal direction.

Table 3-3 summarizes the different surface types found at each freeway location and segment, and the approximate mile post separating each surface type. Freeway Locations 1, 2 and 4 consist of separate ARACFC and PCCP segments. These locations were used to conduct comparative noise measurements. Noise measurements were also conducted for Location 3 (I-10 in Tucson), however the roadside noise data collected for this location was not used for comparative purposes as part of this study. Location 3 consists of two separate PCCP segments. According to ADOT, ARACFC will be used as an overlay on one of these PCCP segments sometime in 1995. The roadside noise measurements conducted at this location can be used as a comparison with future noise levels after the ARACFC surface is applied. For future use, the data collected at Location 3 is provided in Appendix A.

<p align="center">TABLE 3-3 ROADWAY SURFACES PRESENT AT EACH FREEWAY LOCATION</p>			
Location	Segment Mile Post	Segment Surface Type	Segment Construction Year
Location 1 I-10 West of Phoenix	94.72 - 105.95	ARACFC	1994
	105.95 - 108.95	PCCP, tined	1994
	108.95 - 112.2	ARACFC	1994
Location 2 I-17 Phoenix	194.5 - 198.78	ARACFC	1992
	198.78 - 199.9	PCCP, ground	1991
	210.98 - 213.44	PCCP, ground	1988
	214.7 - 226.0	ARACFC	1994
Location 3 I-10 Tucson	254.5 - 260.4 *	PCCP, ground	1983
	261.4 - 267.5	PCCP, ground	1989
Location 4 I-19 Tucson	54.8 - 58.48	PCCP, grooved	1988
	58.48 - 60.2	ARACFC	1988
	60.2 - 62.95	ARACFC	1992
<p><i>* This segment will be overlaid with 1" ARACFC in 1995. Noise measurements were conducted for this segment for comparison with future measurements after the new ARACFC surface is present.</i></p>			

3.3 Roadside Traffic Noise Measurements

For the roadside traffic noise measurements, two noise meters were positioned adjacent to adjoining pavement segments with different surface types, and noise levels were recorded simultaneously at each site. The noise levels measured at the two sites were then compared to give a relative measure of the noise generation characteristics of the two surfaces.

The intent of conducting simultaneous noise measurements was to minimize variability in the noise measurements due to changes in traffic flow and local meteorology that would potentially occur if the two measurements were to be performed at different times. An effort was also made to select measurement sites with similar acoustic surroundings. The following characteristics were used to evaluate the similarity between each pair of sites used for the simultaneous traffic noise measurements:

- Similar traffic flow characteristics at both sites, including vehicle volumes, truck percentages, and average speeds. Where possible, locations were selected where a transition between ARACFC and PCCP roadway surfaces occurred between service interchange locations.
- Minimal freeway grade at both measurement sites.
- Similar sound propagation rate due to ground attenuation at both sites, i.e., a "hard" or "soft" site, according FHWA traffic noise modeling procedures.
- Absence of nearby reflective surfaces at both sites, such as adjacent buildings, privacy walls, etc.
- Similar roadside topography. Generally, locations where the roadside surroundings were flat and vacant.
- Locations with minimal background noise sources, such as neighborhood noises and traffic noise from nearby roadways.

To ensure that potential differences between the noise monitoring equipment was also considered, each noise meter was calibrated at least twice each day that measurements were performed. Before conducting the roadside measurements, both noise meters were positioned at the same site, and noise measurements were conducted for intervals of 10 to 15 minutes. The noise levels measured by both meters were recorded to determine if any of noise level differences observed in the simultaneous roadside noise measurements could be attributed to the instruments. The calibration data

for each roadside measurement is presented with the complete noise monitoring data in Appendix A.

Traffic data was collected while each of the roadside traffic noise measurements was being conducted. This information was used to verify that traffic conditions were similar at both measurement sites. Traffic data consisted of vehicle volume, vehicle classification, and travel speed for each measurement site. The traffic data collected at each site is provided in Appendix A.

Based on the location characteristics identified for the roadside traffic noise evaluation, segments of Location 1 (I-10, approximately 50 miles west of Phoenix) and segments of Location 4 (I-19, south of Tucson) were selected for conducting the simultaneous roadside noise measurements. No suitable roadside measurements sites were found for Location 2 (I-17, in Phoenix) due to varying traffic flow conditions on the adjoining PCCP-ARACFC segments, and due to substantial differences observed in the roadside terrain surrounding these freeway segments.

3.4 On-Road Tire-Pavement Noise Measurements

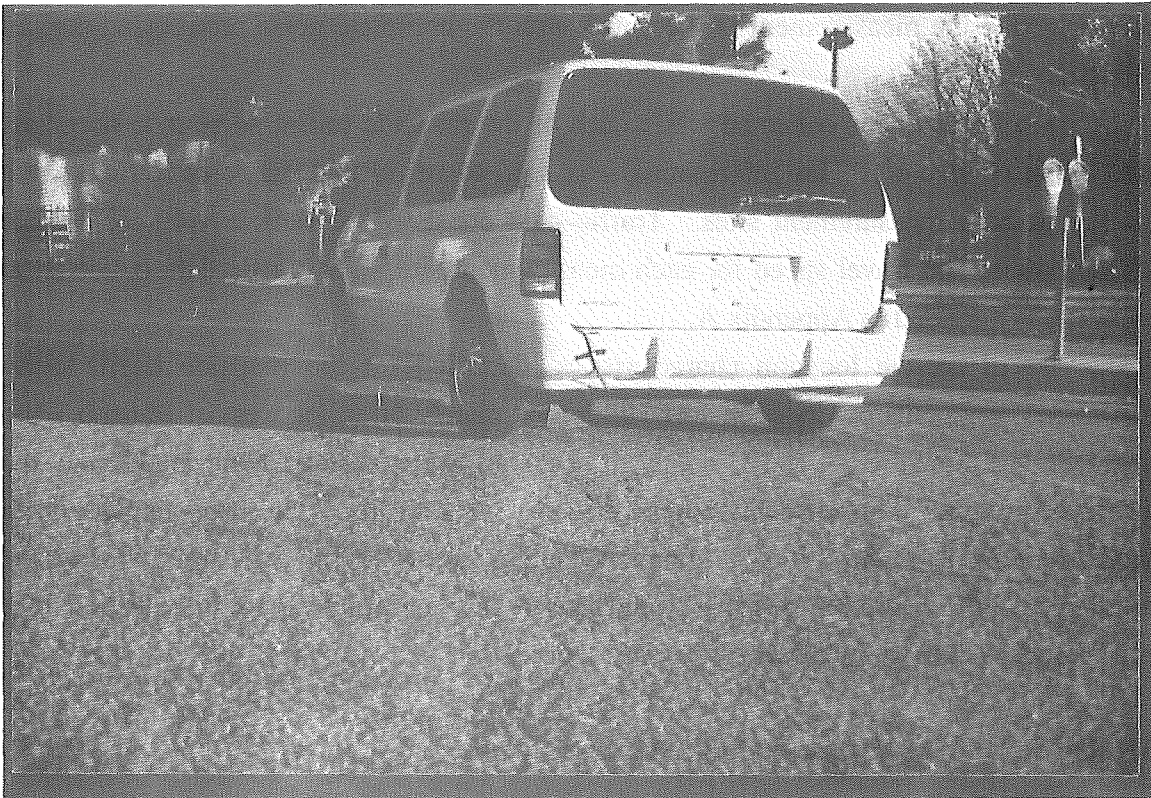
For the on-road noise measurements, a specially made bracket was clamped to the frame of a test vehicle, a 1995 Dodge Caravan. A noise meter microphone/preamplifier was secured to the bracket near one of the rear tires of the test vehicle. The microphone was secured 10 inches from the tire-pavement contact area for all of the on-road measurements. A specially made windscreen was also clamped in front of the microphone bracket to minimize the effects of wind noise. Photographs of the test vehicle, showing the microphone bracket and windscreen are provided in Figure 3-2

Since the on-road measurement technique is not restricted by traffic flow characteristics or site acoustics, tire-pavement noise measurements were performed for all of the freeway segments identified in Table 3-3.

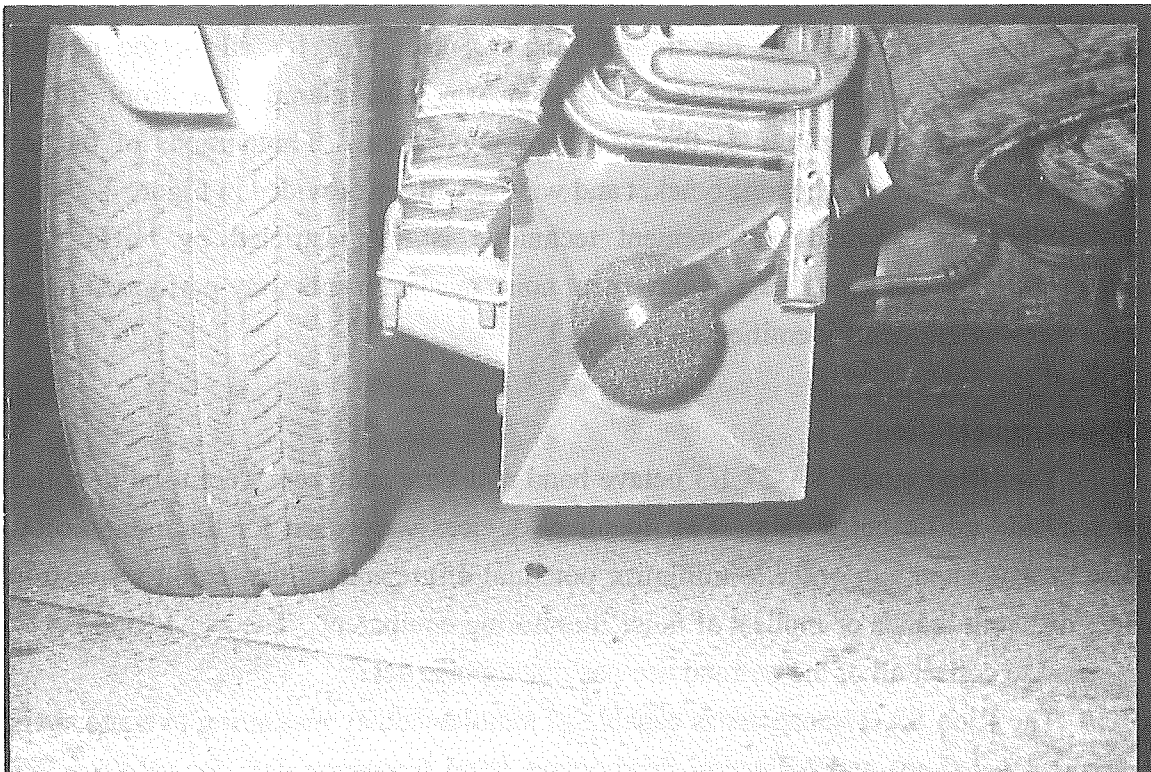
3.5 Instrumentation

Two Rion model SA-27 1/3 octave band real-time analyzers were used to collect the roadside traffic noise data. Two identical devices were used for the simultaneous noise measurements in order to minimize potential discrepancies that could result from using different brands or models of noise monitoring equipment. The same Rion SA-27 was used to collect all of the on-road tire-pavement noise data.

The Rion SA-27 analyzer is capable of simultaneously measuring average sound pressure level (Leq) and collecting third-octave band frequency data for selected time intervals. The SA-27 meets ANSI S1.11 and IEC 225 standards for third-octave band



Test Vehicle - 1995 Dodge Caravan



Microphone Bracket and Windscreen

analyzers. Average 1/3 octave values are recorded both numerically and graphically by the SA-27, and a built-in printer can be used for providing an immediate hard copy of the measurement results. A Larson-Davis CA 250 precision calibrator (114.0 dB, 250 Hz) was used to calibrate both analyzers before each roadside measurement period, and prior to conducting the on-road measurements.

4.0 ROADSIDE NOISE MEASUREMENTS

Roadside traffic noise measurements consisted of simultaneously measuring traffic noise levels on two adjacent freeway segments with different surface types. Two noise meters were positioned an equal distance from the travel lanes of the adjoining freeway segments, and simultaneous noise measurements were conducted for a one hour period. The hourly equivalent noise levels (Leq) measured for the two sites were then compared to determine the relative noise generation characteristics of the two freeway surfaces being tested.

The simultaneous noise measurements were performed at a distance of 25 feet from the nearest freeway travel lane, and also at the edge of freeway right-of-way (60-100 feet from the nearest travel lane, depending on the right-of-way width at a given measurement site). Eight pairs of simultaneous measurements were performed to provide information on the relative noise produced by ARACFC and PCCP surfaces (four at Location 1, and four at Location 4). Four pairs of simultaneous measurements were performed to compare the noise levels produced by two ARACFC segments of different ages (all at Location 4).

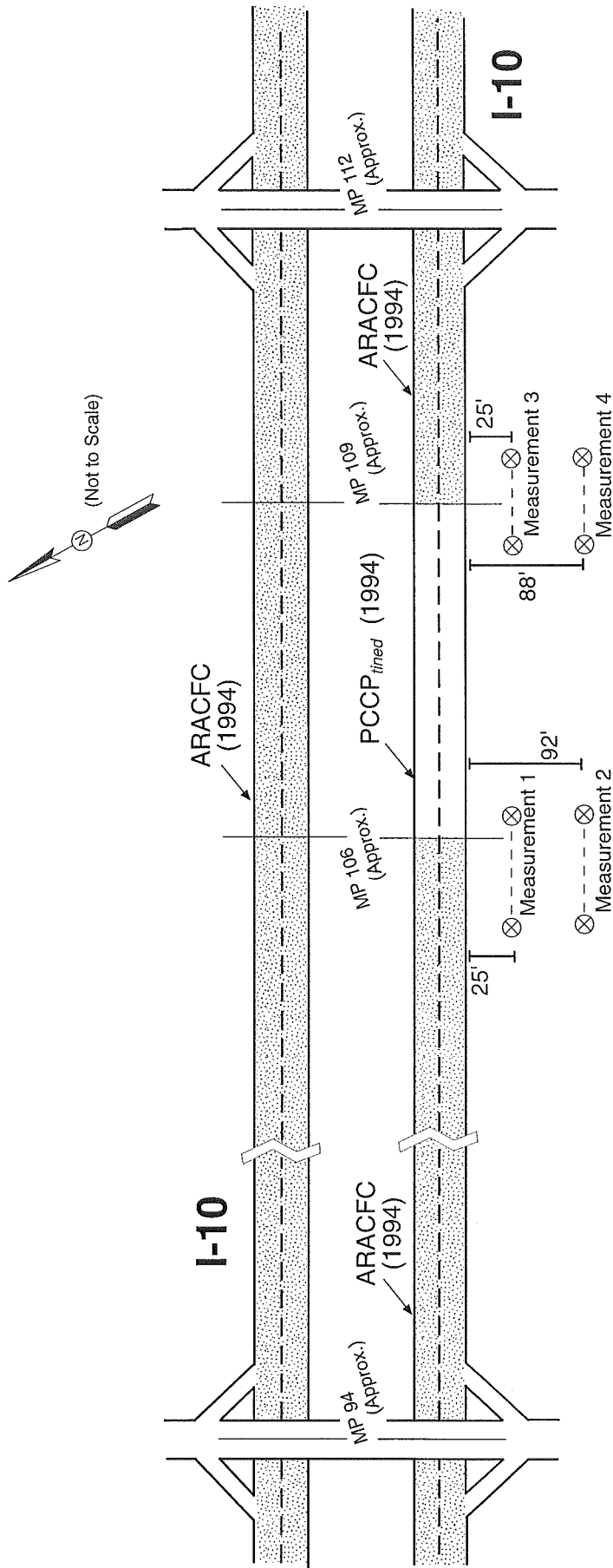
The following paragraphs summarize the results of the roadside traffic noise measurements at the two selected freeway locations: Location 1 (I-10, west of Phoenix) and Location 4 (I-19, Tucson).

4.1 Location 1: I-10 M.P. 94-112 (West of Phoenix)

Figure 4-1 shows a schematic of the pavement transitions and noise monitoring locations selected for Location 1 on I-10. Location 1 consists of an eighteen-mile stretch of I-10, located approximately 50 miles west of Phoenix. As shown in Figure 4-1, the eastbound direction of I-10 consists of adjoining ARACFC and transversely tined PCCP surfaces. The westbound freeway surface consists of ARACFC for its entire length. All ARACFC and PCCP freeway segments at Location 1 were constructed in 1994.

As shown in Figure 4-1, the tined PCCP segment is situated between two ARACFC segments. One highly desirable aspect of this location is that all three pavement sections are located between the same two freeway interchange locations. This ensured that hourly traffic volumes, travel speeds, and truck percentages, would essentially be the same at each pair of noise measurement sites.

Roadside acoustic properties were also similar at each pair of measurement sites. The entire length of I-10 considered in Location 1 is located in a rural setting, with only vacant lands adjacent to the selected monitoring sites. The vegetation surrounding the freeway is generally consistent throughout the area, consisting of desert grasses and scrub



Noise Monitoring Summary (Location 1: March 13, 1995)

Simultaneous Measurements	Time	Leq dBA (1 hour)		
		ARACFC	PCCP_tined	Difference
Measurement 1	1:30 - 2:30 PM	71.8	77.5	5.7
Measurement 2	2:45 - 3:45 PM	63.9	68.5	4.6
Measurement 3	5:20 - 6:20 PM	72.9	78.2	5.3
Measurement 4	6:35 - 7:35 PM	66.5	69.8	3.3
	Average			4.7

LEGEND

- ⊗ Noise Monitoring Site
- ⊗ Simultaneous Noise Measurement

FIGURE 4-1
SCHEMATIC FOR LOCATION 1
I-10 WEST OF PHOENIX

brush. Some slight variation occurs in the surrounding topography at different locations near the freeway. However, each pair of measurement sites were selected where the noise meter microphones could be positioned at the same height above the roadway.

Simultaneous roadside traffic noise measurements were performed in the afternoon and evening of March 13, 1995. A summary of the hourly noise data collected for each measurement is provided on Figure 4-1. The traffic and noise data collected at each site is provided in its entirety in Appendix A.

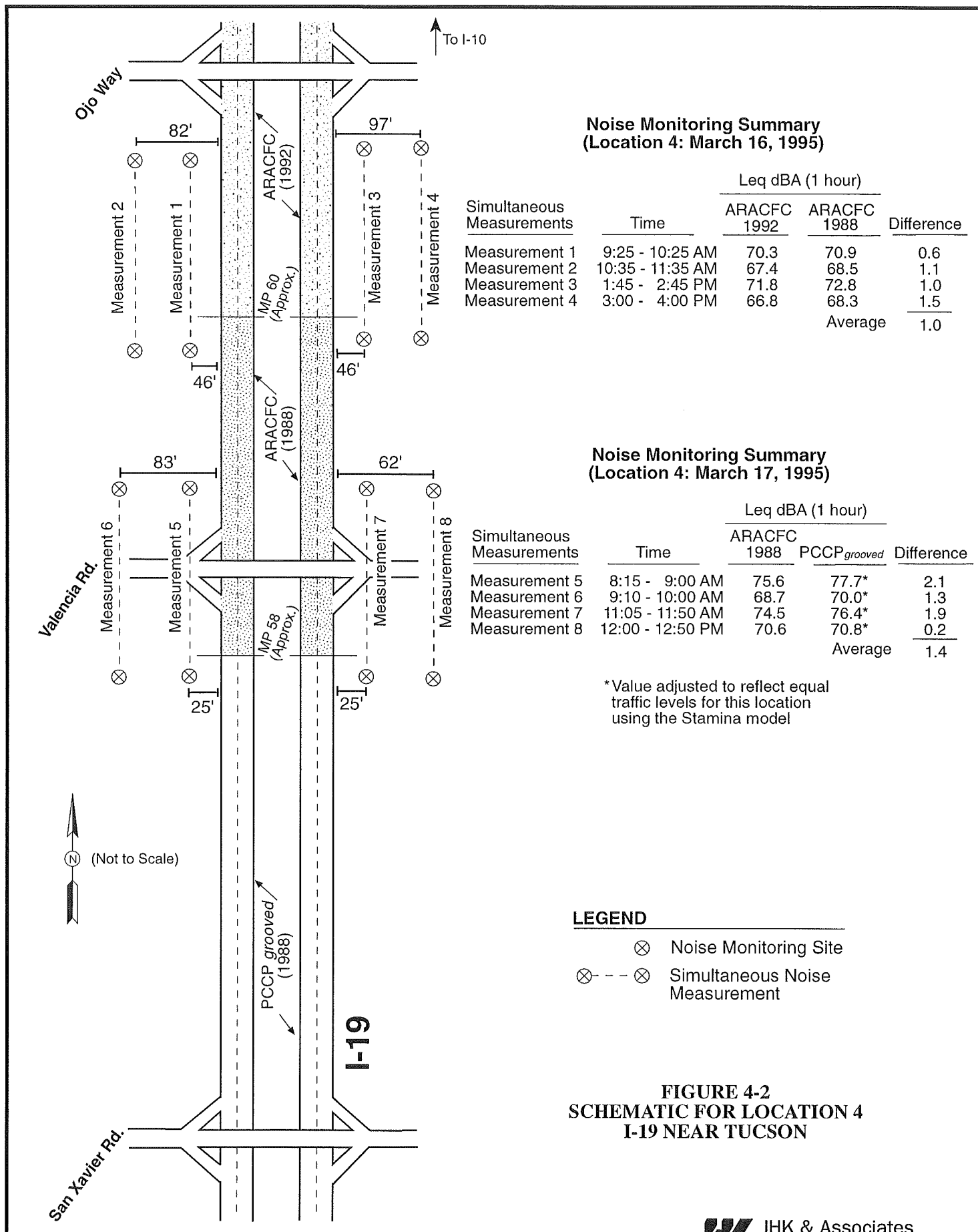
As shown on Figure 4-1, roadside traffic noise levels were consistently higher at the monitoring sites adjacent to the tined PCCP surface than the ARACFC surfaces. The difference in hourly noise levels measured for the two pavement surfaces ranged from 3.3 dBA to 5.7 dBA. Since each pair of measurement sites was selected to maintain equivalent traffic flow, travel speeds, and site acoustics during the measurements, it is reasonable to conclude that the differences in measured noise levels were due to the different pavement surfaces being evaluated.

Based on the roadside noise data collected at Location 1, roadside traffic noise adjacent to the ARACFC surface would be perceived as slightly less noisy than the PCCP surface. Although noise level differences of 3.3 - 5.7 dBA would only be perceived as slightly less noisy than the adjoining PCCP surface, it is useful to consider these differences in terms of sound pressure. At any noise level, a three decibel difference corresponds to a halving (or doubling) of sound pressure. Accordingly, a change of three decibels would be expected if the traffic volumes were to change by a factor of two (doubling traffic would increase noise levels by three decibels, and halving traffic would reduce noise levels by three decibels, if all other factors remained constant). In all of the noise measurements performed at Location 1, the ARACFC segments provided more noise reduction than would have been achieved by reducing traffic on the PCCP freeway segment by 50%. The greatest difference in noise produced by the two pavements, 5.7 dBA, would be equivalent to a traffic reduction of nearly 75% on the PCCP segment.

4.2 Location 4: I-19 M.P. 63-55 (Tucson)

Simultaneous roadside traffic noise measurements were also conducted on I-19 in Tucson. Location 4 consists of an eight mile long stretch of I-19, beginning at the I-10/I-19 interchange and extending south to the Papago Road interchange. A schematic of I-19 showing the noise monitor locations and pavement transition areas within Location 4 is provided in Figure 4-2.

As shown in Figure 4-2, three different pavement segments were evaluated for Location 4. Immediately south of the I-10/I-19 interchange, the I-19 roadway surface consists of an ARACFC overlay that was constructed in 1992. Approximately 1.5 miles



south of I-10, this segment transitions to an older ARACFC surface that was constructed in 1988. Approximately 1.5 miles farther south, just south of a service interchange, the 1988 ARACFC transitions to longitudinally grooved PCCP. The grooved PCCP segment extends for approximately four miles south of the interchange. The northern portion of the freeway configuration shown in Figure 4-2 was used to evaluate the traffic noise levels for the two ARACFC surfaces of different ages (these surfaces were constructed approximately four years apart). The southern portion of the freeway was used to evaluate the traffic noise levels of the grooved PCCP in comparison to the older of the two ARACFC surfaces.

The length of I-19 considered in Location 4 is located in suburban to rural settings south of Tucson. Along the northern half of Location 4, several residential neighborhoods are present on the east side of I-19. The west side of I-19 is predominantly vacant. Noise measurement sites were selected on both sides of the freeway. In some cases, the nearby neighborhoods may have contributed background noise to the monitoring data, especially at the measurement sites set back near the edge of right-of-way. Observations regarding neighborhood and other background noises were recorded during field noise monitoring. These observations are included in Appendix A.

Some variation occurs in the topography surrounding the freeway near Location 4. To minimize any effects that variations in topography might produce in the roadside measurements, each pair of monitoring sites was selected where the noise meter microphones could be positioned at the same height above the adjacent traffic lanes. Generally, the microphone positions ranged between 3-8 feet above the roadway.

Simultaneous roadside traffic noise data was collected near the adjoining freeway segments on March 16 and March 17, 1995. The March 16 measurements were conducted adjacent to the two ARACFC surfaces of different ages. These measurements were performed to evaluate how the noise levels produced by the ARACFC surface might change over time. The March 17 measurements were conducted adjacent to the grooved PCCP and 1988 ARACFC surfaces. Four simultaneous one-hour measurements were performed on both days. A summary of the hourly noise data collected for both days is provided on Figure 4-2. Results from the simultaneous roadside noise measurements are provided in the following sections.

4.2.1 Comparison of 1988 ARACFC with 1992 ARACFC

As shown in Figure 4-2, hourly average noise levels were slightly higher adjacent to the 1988 ARACFC than those measured adjacent to the 1992 ARACFC surface. Differences in the simultaneous noise measurements ranged from 0.6 - 1.5 dBA for the two surfaces. As noted previously, a difference of 3 dBA is normally required before a

difference in noise levels is observed by human hearing. Therefore, the difference in noise levels produced by the two surfaces would not be perceivable. However, the roadside traffic noise measurements demonstrate that some differences exist in the noise generation characteristics of the two ARACFC surfaces.

Although the hourly Leq measurements were consistently higher adjacent to the older ARACFC surface, it not clear whether these subtle differences are a result of pavement aging. It is possible, for example, that the 1988 ARACFC surface produced these slightly higher noise levels when it was new. Without some measure of the noise produced by the 1988 ARACFC at an earlier phase of its service life, it is impossible to draw any conclusions about how its noise generation characteristics may have changed over time. The collected data can only demonstrate that the 1988 ARACFC surface currently produces slightly higher noise levels than the 1992 ARACFC surface, and that the differences in noise produced by the two surfaces are minor.

4.2.2 Comparison of 1988 ARACFC with grooved PCCP

Figure 4-2 also summarizes the hourly noise levels measured adjacent to the 1988 ARACFC in comparison to the grooved PCCP. As shown in Figure 4-2, the transition between these two pavements occurs near a service interchange. This condition resulted in traffic volume differences at the simultaneous noise monitoring sites. During the roadside traffic noise measurements, substantially higher traffic volumes were observed on the ARACFC segment than those found on the PCCP segment south of the interchange. To correct for this discrepancy, FHWA's traffic noise prediction model, STAMINA 2.0, was used to adjust the noise levels measured at the PCCP measurement sites.

To make this adjustment, the STAMINA model was first calibrated so that noise levels predicted by the model would be the same as field-measured noise levels. Roadway and receiver geometry for the PCCP measurement sites were input into STAMINA and modeling was performed using traffic data collected during noise monitoring. This data included traffic volumes, truck percentages and average travel speeds collected during each hourly measurement. Minor adjustments were then made to STAMINA input parameters so that modeled noise levels would be identical to the noise levels measured at the various PCCP monitoring sites. After the model was calibrated in this manner, the traffic parameters used in the model were changed to the values recorded at the adjacent ARACFC sites. Using this modeling process, the noise levels measured at the grooved PCCP monitoring sites were adjusted to reflect the same traffic conditions found on the adjacent ARACFC segment. A detailed description of this adjustment is

provided in Appendix B of this report. The noise levels presented for the PCCP surface in Figure 4-2 reflect this adjustment.

As shown in Figure 4-2, noise levels for the PCCP segment were 0.2 - 2.1 dBA higher than the levels measured for the ARACFC segment. Similar to the differences observed between the two ARACFC pavements of different ages, these differences in noise are regarded as minor. However, the consistently higher hourly noise levels (after adjusting for traffic flow) indicate that some differences exist in the noise generation characteristics of the two surfaces.

Of interest is the fact that the noise level differences observed between the ARACFC and grooved PCCP at Location 4 were much less than the differences observed between the ARACFC and the tined PCCP surface found at Location 1 (on I-10, west of Phoenix). This finding indicates that differences may exist in the noise generation characteristics of the grooved PCCP and tined PCCP surfaces as well.

5.0 ON-ROAD TIRE-PAVEMENT NOISE MEASUREMENTS

For the on-road tire-pavement noise measurements, a Dodge minivan was equipped with a microphone that was secured on the exterior of the vehicle near the tire-pavement contact area. Tire-pavement noise levels were recorded as the van traveled over the various freeway segments considered in the study. For these measurements, 10-second Leq noise levels were collected as the test vehicle traversed each freeway segment. The Leq values were recorded for travel speeds of 55 and 65 miles per hour. More than 700 10-second Leq noise measurements were collected. Complete results of the on-road tire-pavement noise measurements are provided in Appendix C.

Since the on-road measurement technique was not restricted by differences in traffic volume or site acoustics, noise data for all of the freeway segments could be compared directly. The following sections summarize the analysis that was performed for the on-road tire-pavement noise measurements.

5.1 Comparison of ARACFC and PCCP Pavement Types

To compare the on-road tire-pavement noise levels produced by ARACFC and PCCP freeway segments, the 10-second Leq noise measurements were sorted and grouped according to the two general pavement types. To minimize any bias that could have resulted from including pavements of different ages, only noise measurements from freeway segments constructed between 1988 and 1994 were selected. Table 5-1 provides a summary of the average Leq values for the ARACFC and PCCP surface types, for test speeds of 55 and 65 miles per hour. Figure 5-1 and Figure 5-2 present this information graphically.

As shown in Table 5-1 and the accompanying figures, PCCP freeway segments produced higher average, minimum, and maximum noise levels than ARACFC segments. Average noise levels for PCCP surfaces were 3.0 - 3.1 dBA higher than ARACFC surfaces. A relatively wide range of values were recorded for both pavement types. The range of minimum to maximum noise levels measured for the ARACFC surfaces was 3.9 decibels. Similarly, the range of minimum to maximum values for PCCP surfaces was 3.5 - 3.9 decibels. This amount of variation produced some overlap in the relative noise levels produced from the two pavement types. Certain PCCP segments produced less tire-pavement noise than some ARACFC segments. For example, the lowest PCCP measurement (94.7 dBA, for grooved PCCP on I-19) was slightly lower than the highest ARACFC noise level (95.3 dBA, on I-10 west of Phoenix). While this inconsistency was observed in some isolated cases, the predominant trend was for the ARACFC surfaces to generate lower on-road noise levels than the PCCP surfaces.

TABLE 5-1
SUMMARY OF ON-ROAD TIRE-PAVEMENT NOISE DATA
Grouped by General Pavement Type

Surface Type	Number of Samples	Mean Leq dBA (10 sec)	Standard Deviation	Min. Value	Max. Value	95 % Confidence	
						Interval for Mean From	To
<i>For 55 MPH</i>							
ARACFC	89	93.4	1.049	91.4	95.3	93.2	93.6
PCCP	97	96.4	1.093	94.7	98.2	96.2	96.7
<i>For 65 MPH</i>							
ARACFC	86	96.1	1.005	93.7	97.6	95.8	96.3
PCCP	83	99.2	1.091	97.1	101.0	99.0	99.4

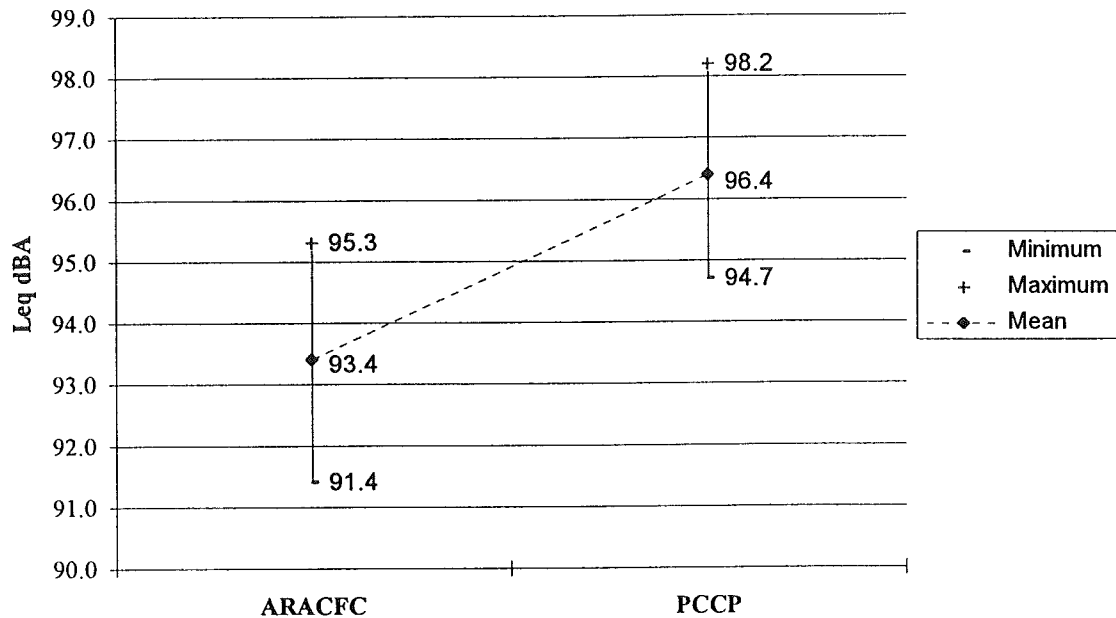
5.2 Comparison of Individual Freeway Segments

To investigate the wide variation in noise levels observed for two general pavement types, the on-road noise measurements were separated into groups according to the individual freeway segments where the data was collected. Tables 5-2 and 5-3 present the tire-pavement noise measurements grouped by freeway segment. Table 5-2 summarizes the measurement data for travel speeds of 55 miles per hour. Table 5-3 summarizes the noise data for 65 miles per hour. Figure 5-3, provides a graphical summary of the average on-road noise measurements for each segment evaluated for both travel speeds.

The average noise levels presented in Figure 5-3 show the amount of variation in the noise produced by the individual freeway segments. As noted by the standard deviations calculated for each segment (see Tables 5-2 and 5-3), a high degree of consistency was observed in the noise levels measured for individual freeway segments. However, the different freeway segments often produced their own characteristic noise levels.

Figure 5-4 shows average tire-pavement noise levels for each of the individual segments sorted in ascending order. As a group, the ARACFC segments produced lower average noise levels than the various PCCP segments. However, the data indicates that a substantial degree of variability exists among the different ARACFC segments. A similar degree of variability was observed among the various PCCP segments. This variability indicates that the noise generation characteristics of a particular pavement is influenced by factors other than material type alone.

**FIGURE 5-1
COMPARISON OF TIRE-PAVEMENT NOISE LEVELS
FOR ALL LOCATIONS AT 55 MILES PER HOUR**



**FIGURE 5-2
COMPARISON OF TIRE-PAVEMENT NOISE LEVELS
FOR ALL LOCATIONS AT 65 MILES PER HOUR**

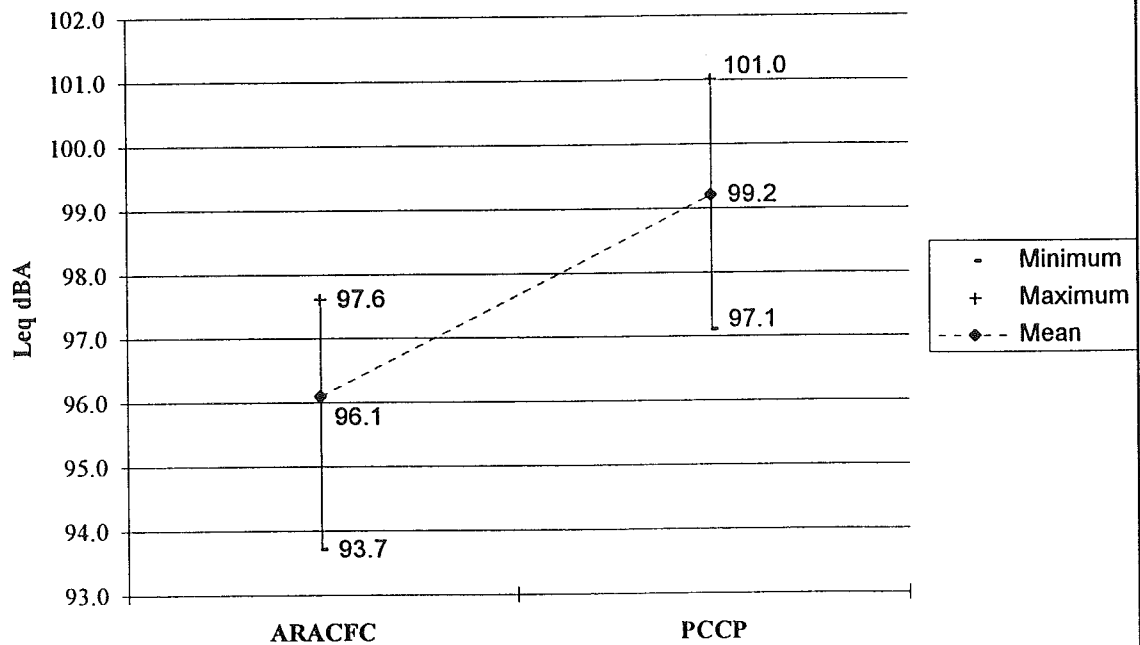


TABLE 5-2
ON-ROAD TIRE-PAVEMENT NOISE MEASUREMENTS AT 55 MILES PER HOUR

Location	Approximate Mile Post	Surface Type	Construction Year	Number of Samples	Standard Deviation	Mean Leq dBA
Location 1: I-10 W. of Phoenix (March 14, 1995)	112.2 - 108.95	ARACFC	1994	34	0.24	94.6
	108.95 - 105.95	PCCP, tined	1994	32	0.35	97.6
	105.95 - 94.72	ARACFC	1994	61	0.44	94.5
Location 2: I-17 Phoenix (March 14, 1995)	226.0 - 214.7	ARACFC	1994	54	0.47	92.7
	199.9 - 198.78	PCCP, ground	1991	7	0.35	96.6
	198.78 - 194.5	ARACFC	1992	27	0.57	94.4
Location 3: I-10 Tucson (March 15, 1995)	267.5 - 261.4	PCCP, ground	1989	66	0.68	96.7
	260.4 - 254.5	PCCP, ground	1983	26	0.54	98.2
Location 4: I-19 Tucson (March 16, 1995)	62.95-60.2	ARACFC	1992	37	0.42	92.3
	60.2-58.48	ARACFC	1988	29	0.81	93.2
	58.48-54.8	PCCP, grooved	1988	46	0.30	95.2
<i>total samples</i>				419		

TABLE 5-3
ON-ROAD TIRE-PAVEMENT NOISE MEASUREMENTS AT 65 MILES PER HOUR

Location	Approximate Mile Post	Surface Type	Construction Year	Number of Samples	Standard Deviation	Mean Leq dBA
Location 1: I-10 W. of Phoenix (March 14, 1995)	112.2 - 108.95	ARACFC	1994	33	0.31	97.2
	108.95 - 105.95	PCCP, tined	1994	29	0.32	100.4
	105.95 - 94.72	ARACFC	1994	106	0.49	97.0
Location 2: I-17 Phoenix (March 14, 1995)	226.0 - 214.7	ARACFC	1994	23	0.83	95.5
	199.9 - 198.78	PCCP, ground	1991	<i>not possible due to urban traffic</i>		
	198.78 - 194.5	ARACFC	1992	6	0.32	95.9
Location 3: I-10 Tucson (March 15, 1995)	267.5 - 261.4	PCCP, ground	1989	39	0.47	99.0
	260.4 - 254.5	PCCP, ground	1983	10	0.30	100.8
Location 4: I-19 Tucson (March 16, 1995)	62.95-60.2	ARACFC	1992	11	0.33	94.7
	60.2-58.48	ARACFC	1988	9	0.54	95.6
	58.48-54.8	PCCP, grooved	1988	15	0.39	97.5
<i>total samples</i>				281		

FIGURE 5-3
ON-ROAD TIRE-PAVEMENT NOISE DATA (In Leq dBA)

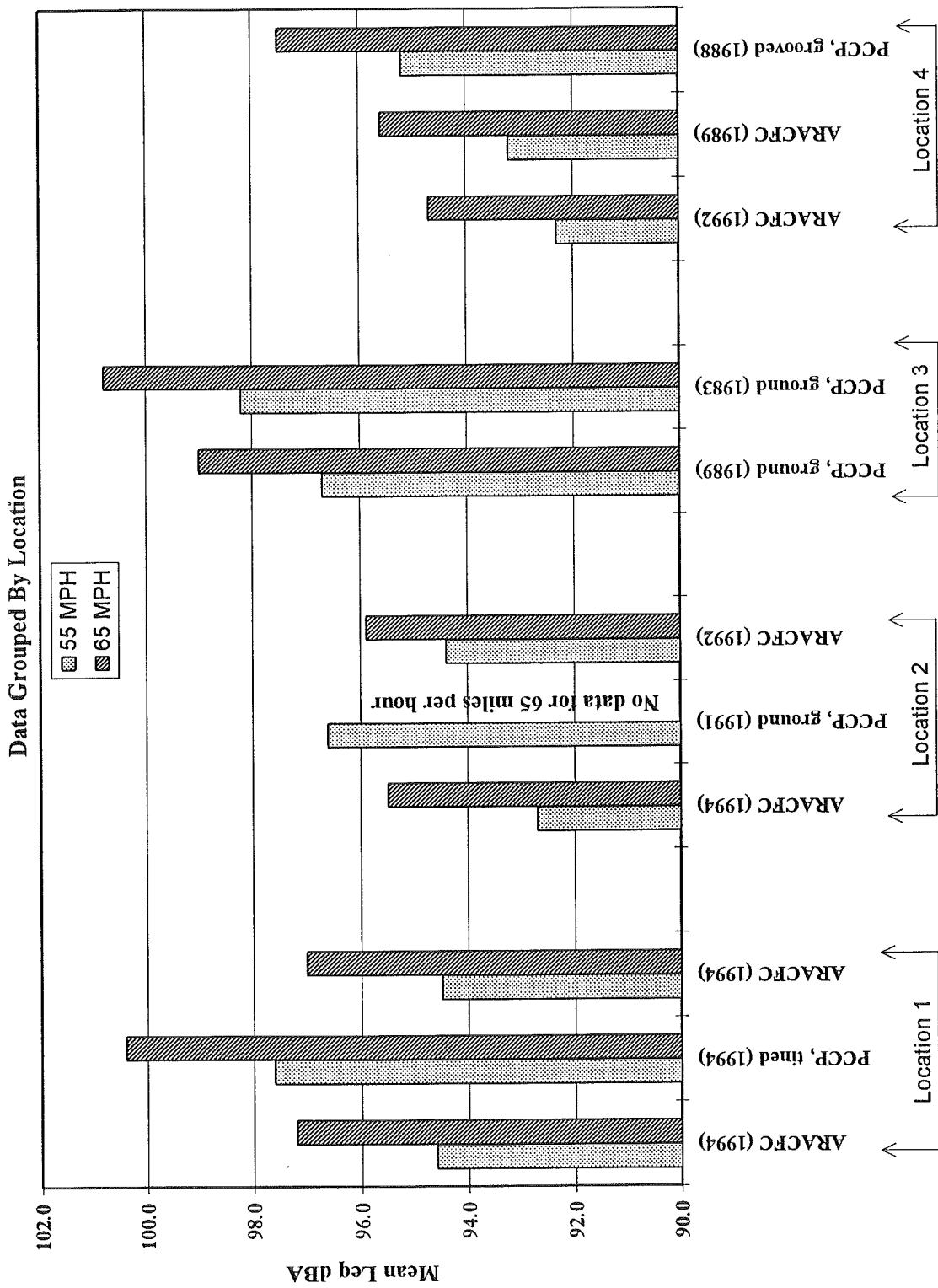
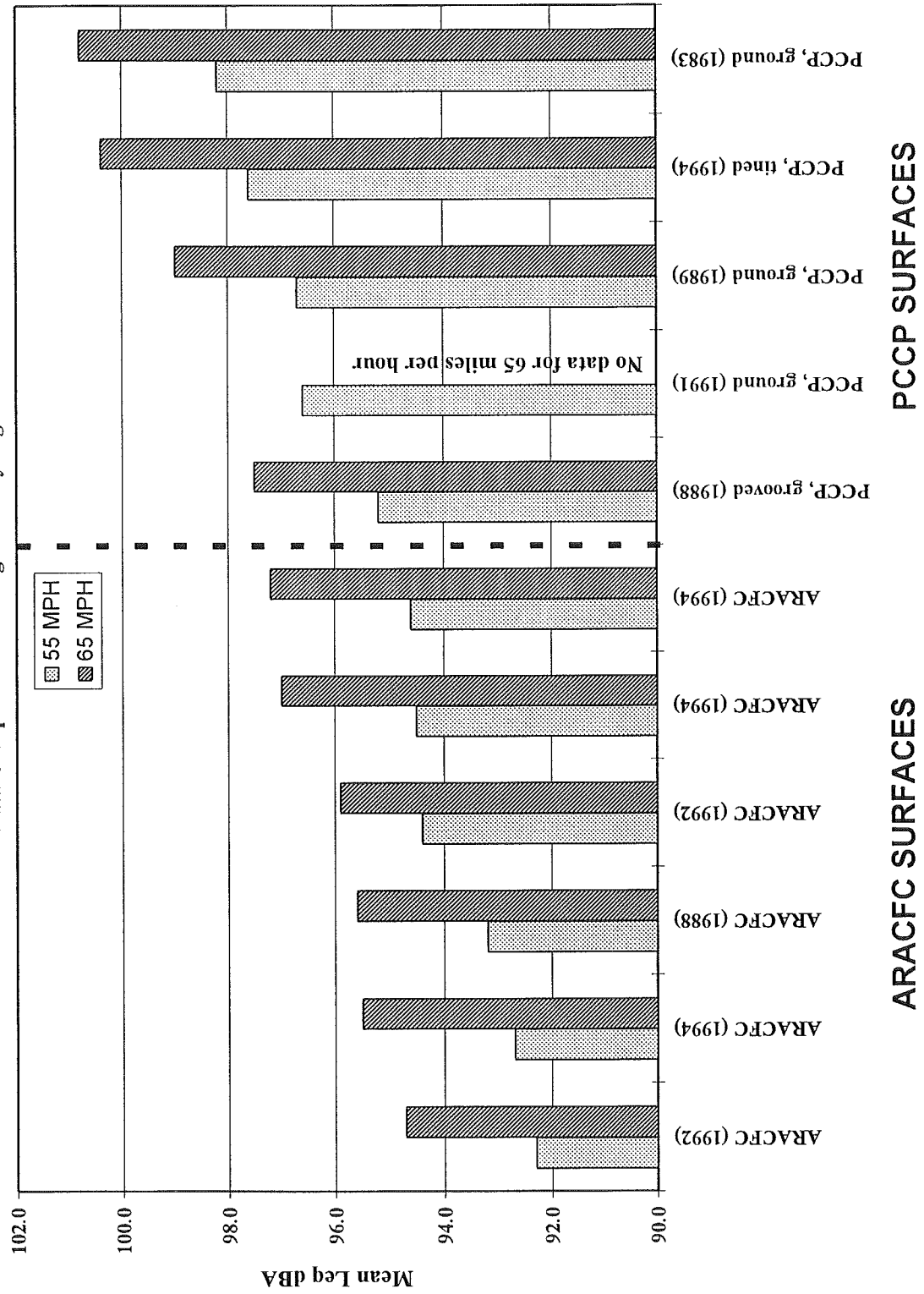


FIGURE 5-4
ON-ROAD TIRE-PAVEMENT NOISE DATA (In Leq dBA)
 Data Grouped in Ascending Order by Segment



5.3 Comparison of Pavement Subtypes

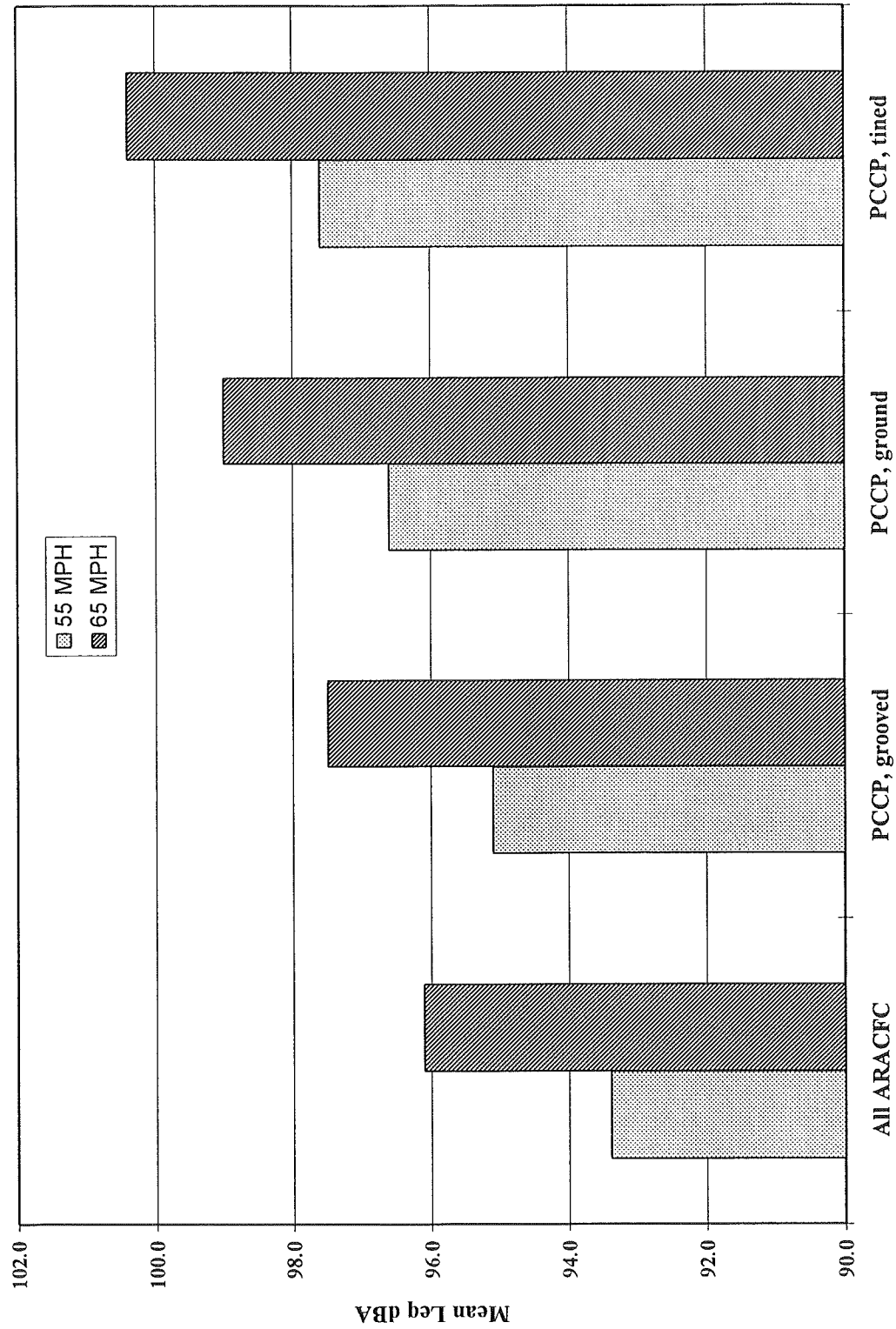
Because of the variation found in the noise produced by pavements constructed with the same material, the on-road noise data was grouped according to pavement subtype. Noise data for the PCCP segments were divided into groups according to surface texture, based on whether the PCCP surface was grooved, ground, or tined. Since no clear means of distinguishing the different ARACFC segments is presently available, noise data for the various ARACFC segments were kept in a single group. Average tire-pavement noise levels by pavement subtype are provided in Table 5-4. This information is presented graphically in Figure 5-5.

As shown in Table 5-4, and Figure 5-5, distinct noise generation characteristics were observed for the different surface subtypes. The group consisting of all ARACFC segments combined resulted in the lowest noise levels. In ascending order, higher noise levels were produced by the grooved PCCP, ground PCCP, and tined PCCP, respectively. Average noise levels for each PCCP subtype differed in noise level by approximately 1.0 - 1.5 dBA from the most similar subtype. Based on this analysis, the three different PCCP surface subtypes have distinctively different noise generation characteristics.

TABLE 5-4
SUMMARY OF ON-ROAD TIRE-PAVEMENT NOISE DATA
Grouped by Pavement Subtype

	Number of Samples	Mean LeqdBA (10 sec)	Standard Deviation	Min. Value	Max. Value	95 % Confidence Interval for Mean	
Surface Type						From	To
<i>For 55 MPH</i>							
ARACFC	89	93.4	1.049	91.4	95.3	93.2	93.6
PCCP,grooved	30	95.1	0.233	94.7	95.6	95.0	95.2
PCCP,ground	37	96.6	0.552	95.8	97.8	96.5	96.8
PCCP,tined	30	97.6	0.363	96.7	98.2	97.5	97.7
<i>For 65 MPH</i>							
ARACFC	86	96.1	1.005	93.7	97.6	95.8	96.3
PCCP,grooved	15	97.5	0.400	97.1	98.2	97.3	97.7
PCCP,ground	39	99.0	0.480	97.9	99.9	98.8	99.1
PCCP,tined	29	100.4	0.324	99.7	101.0	100.2	100.5

FIGURE 5-5
ON-ROAD TIRE-PAVEMENT NOISE DATA (In Leq dBA)
 Data Grouped in Ascending Order by Pavement Subtype



Although it was not possible to divide the various ARACFC segments into subtypes, a similar degree of variability was observed in the measurements performed on these segments. It would be useful to investigate the noise properties of the individual ARACFC segments in more detail to determine what factors are responsible for producing the relatively wide range of measured noise levels. An evaluation with this objective in mind would be useful in deriving the maximum noise reduction benefits possible from the ARACFC surface.

5.4 Comparison of Pavements of Different Ages

Data collected using the on-road tire-pavement noise measurement technique was used to evaluate differences in noise levels for pavements of different ages. For this evaluation, noise data for the ARACFC and PCCP sections were evaluated separately. Only PCCP segments of the ground subtype were included in the pavement age analysis. Multiple year data was not collected for the tined or grooved PCCP subtypes.

Results of the pavement age analysis for test speeds of 55 and 65 miles per hour are shown in Table 5-5 and Table 5-6. This information is presented graphically in Figure 5-6 and Figure 5-7, respectively.

No clear trends were observed in the tire-pavement noise data collected on ARACFC surfaces of different ages. Some of the newest ARACFC surfaces tested (the 1994 ARACFC segments found in Location 1) were observed to generate the highest noise levels of all ARACFC surfaces. A different ARACFC freeway segment that was also constructed in 1994 (Location 2), generated the lowest on-road noise levels.

As noted previously in the roadside traffic noise evaluation, little can be said about the aging properties of the various ARACFC surfaces based on the data collected for this study. A high level of variability exists in the noise produced by the different ARACFC segments. However, the differences observed between the various ARACFC segments do not appear to be the result of pavement aging. For this reason, it is suggested that the most appropriate method for evaluating how the noise characteristics of ARACFC surfaces change over time is to periodically measure the noise levels produced by the individual segments as they age.

Data collected for the PCCP segments indicate that a 1983 ground PCCP surface produced significantly higher noise levels than newer (1989 and 1991) ground PCCP surfaces evaluated. There was no difference in average noise levels for the 1989 and 1991 ground PCCP surfaces. However, the 6-8 year age difference between the 1983 PCCP surface and the 1989 and 1991 PCCP surfaces appears sufficient to produce different noise levels.

TABLE 5-5
SUMMARY OF ON-ROAD TIRE-PAVEMENT NOISE DATA FOR ARACFC
Grouped by Pavement Age

Surface Type	Number of Samples	Mean Leqdba (10 sec)	Standard Deviation	Min. Value	Max. Value	95 % Confidence	
						Interval for Mean From	To
For 55 MPH							
ARACFC ₁₉₈₈	29	93.2	0.828	92.1	95.1	92.9	93.5
ARACFC ₁₉₉₂	30	93.4	1.273	91.4	95.3	92.9	93.9
ARACFC ₁₉₉₄	30	93.6	0.983	91.9	94.9	93.3	94.0
For 65 MPH							
ARACFC ₁₉₈₈	9	95.6	0.572	94.8	96.2	95.1	96.0
ARACFC ₁₉₉₂	17	95.1	0.678	94.1	96.6	94.8	95.5
ARACFC ₁₉₉₄	20	96.5	0.606	95.5	97.6	96.2	96.8

TABLE 5-6
SUMMARY OF ON-ROAD TIRE-PAVEMENT NOISE DATA FOR PCCP
Grouped by Pavement Age

Surface Type	Number of Samples	Mean LeqdB(A) (10 sec)	Standard Deviation	Min. Value	Max. Value	95 % Confidence	
						Interval for Mean	
						From	To
For 55 MPH							
PCCP ₁₉₈₃	26	98.2	0.551	97.3	99.9	98.0	98.4
PCCP ₁₉₈₉	30	96.7	0.590	95.8	97.8	96.4	96.9
PCCP ₁₉₉₁	7	96.7	0.381	96.0	97.1	96.3	97.0
For 65 MPH							
PCCP ₁₉₈₃	10	100.8	0.316	100.2	101.2	100.6	101.0
PCCP ₁₉₈₉	39	99.0	0.480	97.9	99.9	98.8	99.1

One PCCP freeway segment (at Location 3) was used to collect the 1983 PCCP noise data. This segment showed visible signs of wear (cracking) as compared to the other ground PCCP segments evaluated. It should be noted that ADOT has scheduled this freeway segment for pavement rehabilitation in 1995. Planned improvements to this segment include an ARACFC overlay.

FIGURE 5-6
COMPARISON OF AVERAGE NOISE LEVELS FOR ARACFC PAVEMENTS
 Data Grouped by Pavement Age

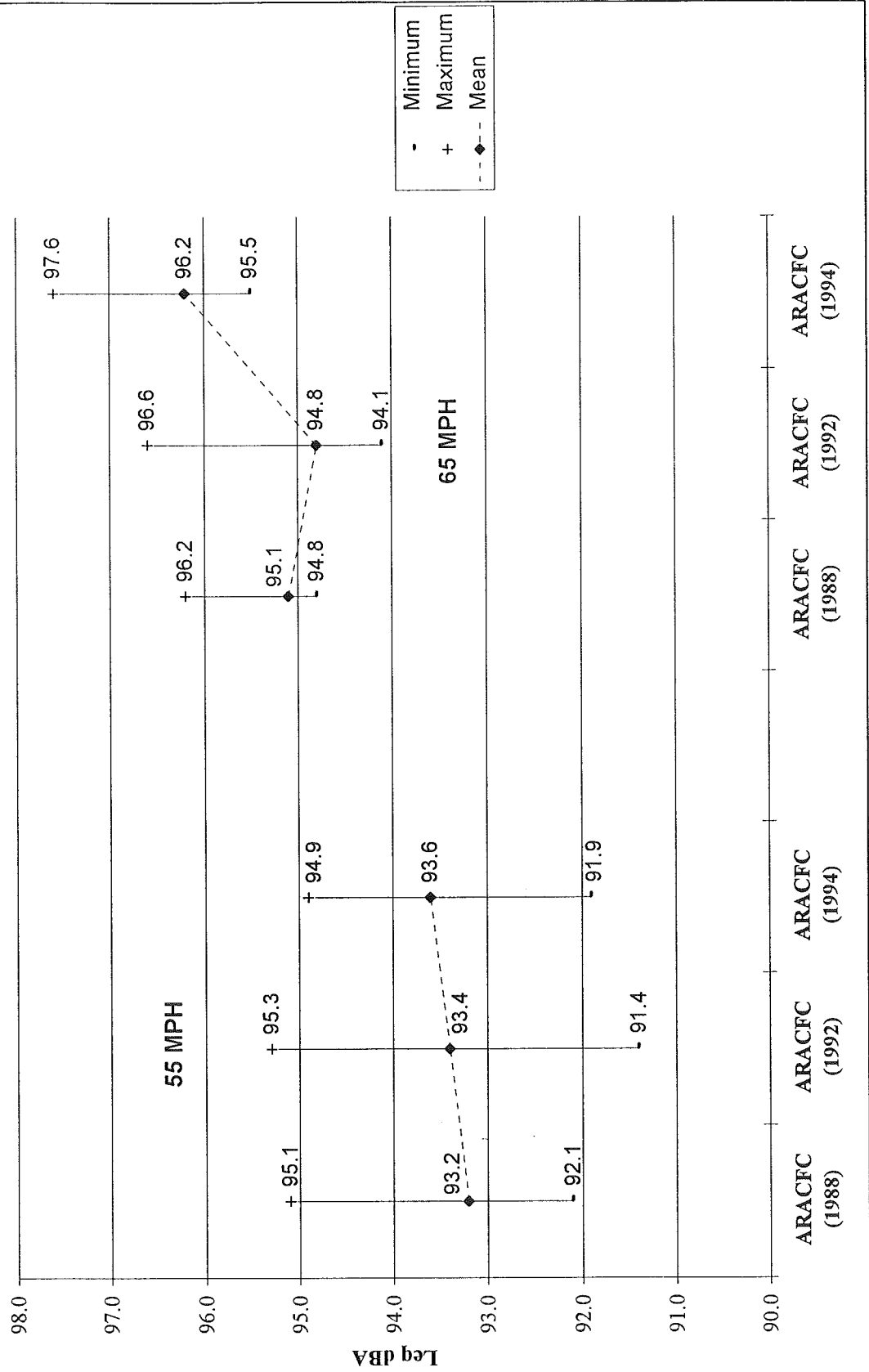
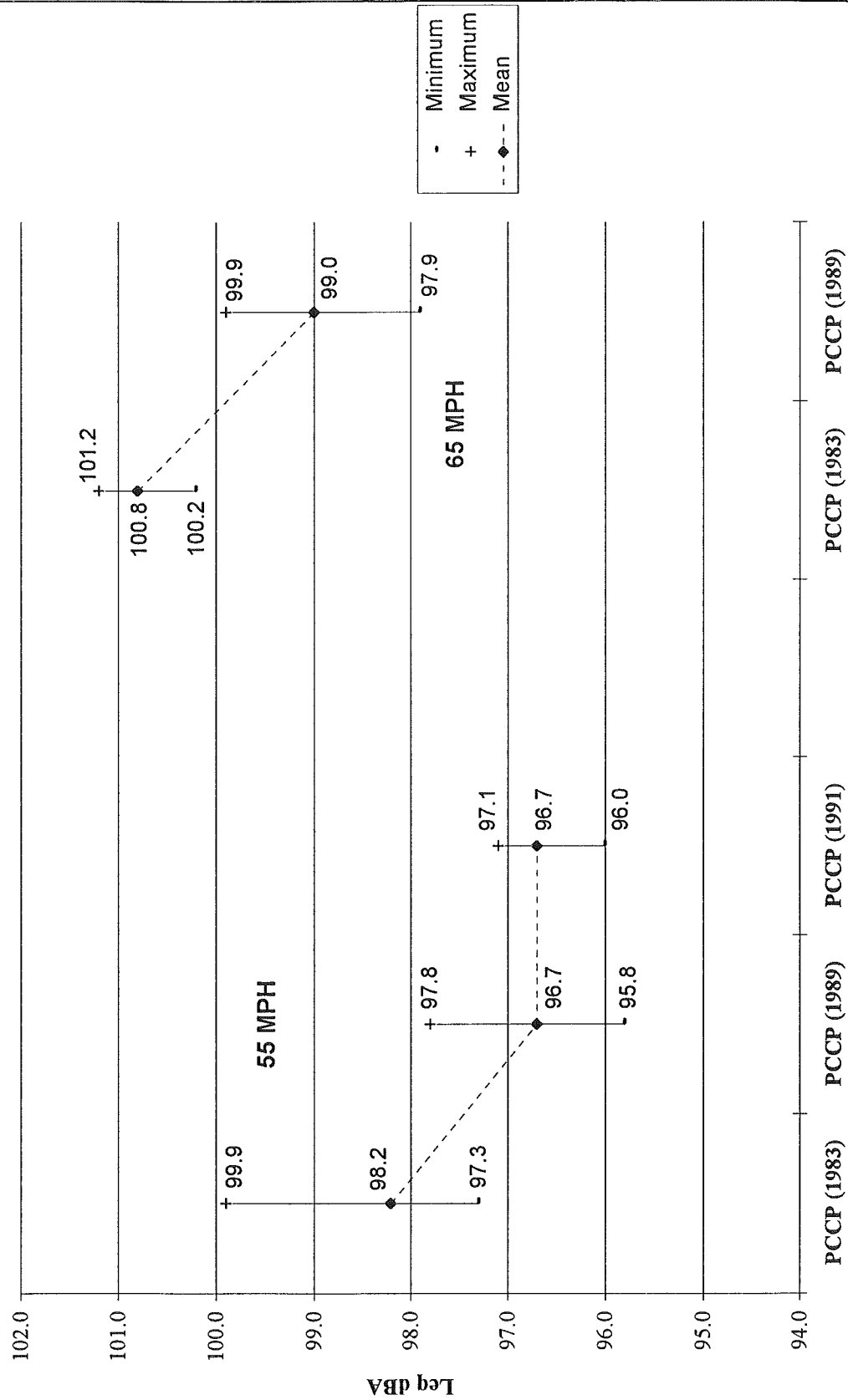


FIGURE 5-7
COMPARISON OF AVERAGE NOISE LEVELS FOR PCC PAVEMENTS
 Data Grouped by Pavement Age



6.0 THIRD-OCTAVE FREQUENCY DATA

Both the roadside traffic noise measurements and the on-road tire noise measurements were collected in A-weighted decibels. A-weighting generally corresponds to the human response to loudness across the range of audible frequencies (20 -20,000 Hz). However, more detailed information on the frequency characteristics of the noise generated from the ARACFC and PCCP freeway surfaces was collected. The Rion SA-27 analyzers used for data collection are capable of measuring average noise levels while simultaneously distinguishing the frequency characteristics of the noise being measured. As part of the study, frequency data was collected in third-octave bands using both the on-road and roadside traffic noise measurement techniques. This information was used to provide a comparison of the frequency content of the different freeway surfaces.

As the on-road and roadside noise measurements were being performed, multiple samples of the frequency data were observed in graphical format on the SA-27 analyzers. The frequency patterns produced by the individual freeway segments were observed to be very consistent, therefore only samples were recorded for each roadway segment. Approximately 50 samples of third octave frequency data (averaged over five-minute intervals) were collected as part of the roadside noise measurements. Approximately 40 samples of third octave data (averaged over 10-second intervals) were collected as part of the on-road noise measurements.

A summary of the frequency data that was collected as part of the on-road tire-pavement noise measurements and the roadside traffic noise measurements is provided in the following sections. Complete information of the third-octave frequency data collected is included in Appendix C.

6.1 On-Road Tire-Pavement Noise Measurements

Sample results of the frequency data collected for PCCP and ARACFC surfaces using the on-road measurement technique are presented graphically in Figure 6-1 for PCCP surfaces, and in Figures 6-2 through 6-4 for ARACFC surfaces.

Figure 6-1 shows sample third-octave center frequency data for the three separate types of PCCP roadways. The graphical data consists of three separate 10-second noise measurements as the test vehicle traveled over separate grooved, ground and tined PCCP surfaces at 65 miles per hour. As noted previously, the tined PCCP surface generally produced the highest noise levels, followed by ground and grooved PCCP surfaces. The frequency data for the PCCP surfaces indicates a related pattern of frequency content for the various PCCP surface types even though the overall noise levels differ.

FIGURE 6-1
THIRD-OCTAVE DATA FOR SAMPLE TIRE-PAVEMENT NOISE MEASUREMENTS

PCCP Surfaces at 65 Miles per Hour

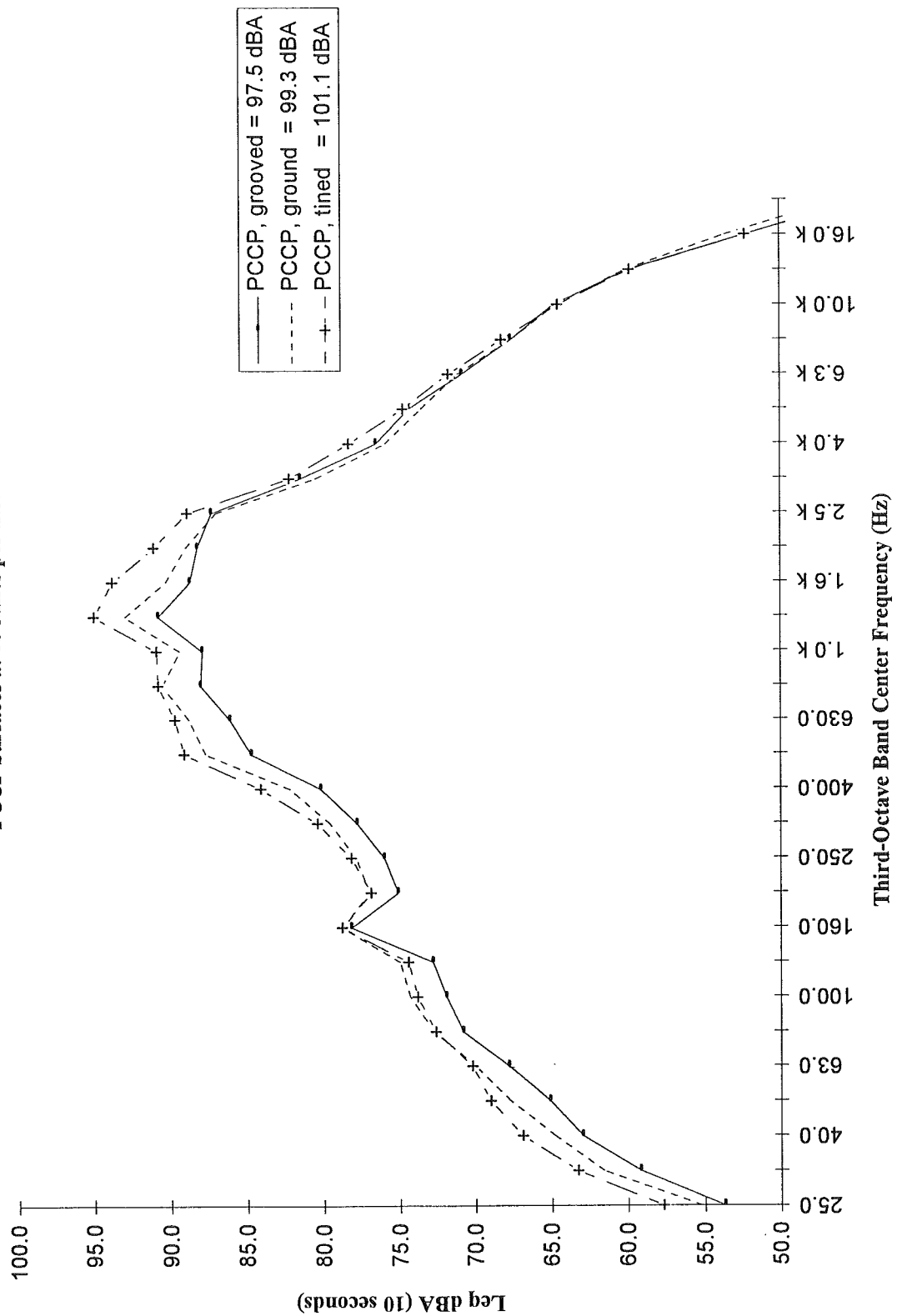


FIGURE 6-2
THIRD-OCTAVE DATA FOR SAMPLE TIRE-PAVEMENT NOISE MEASUREMENTS
 ARACFC Surfaces at 55 Miles per Hour

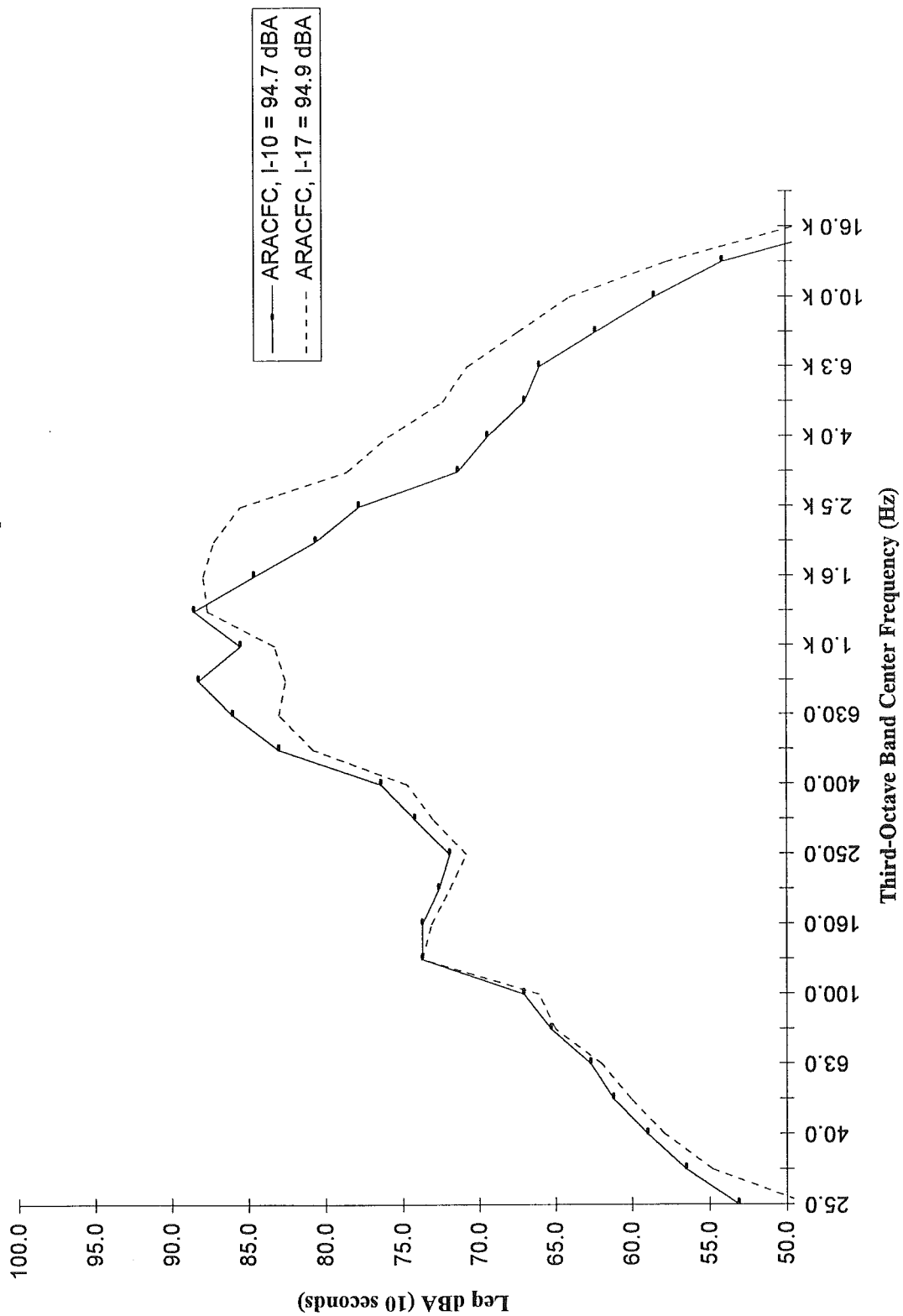


FIGURE 6-3
THIRD-OCTAVE DATA FOR SAMPLE TIRE-PAVEMENT NOISE MEASUREMENTS
 ARACFC Surfaces at 55 Miles per Hour

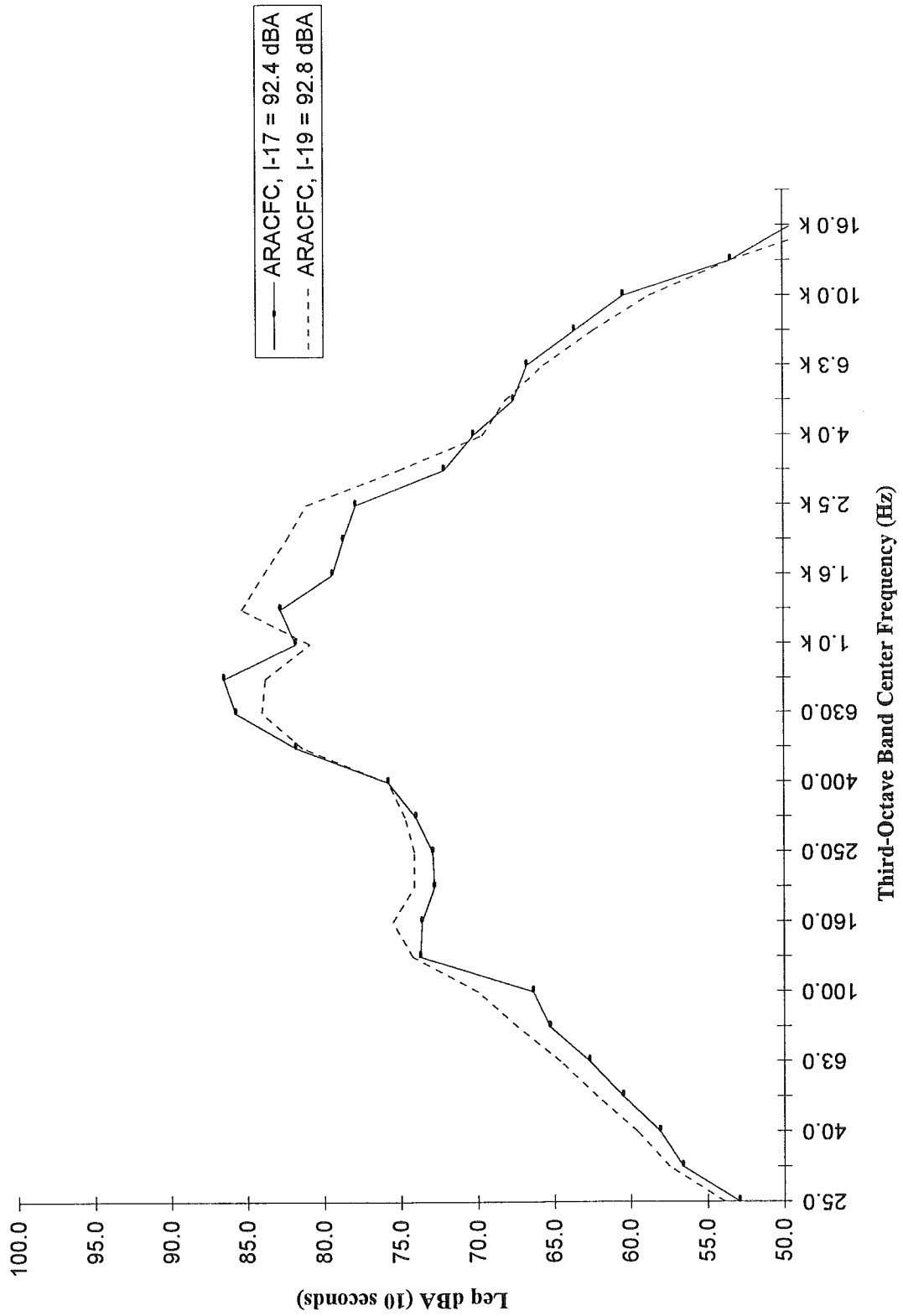
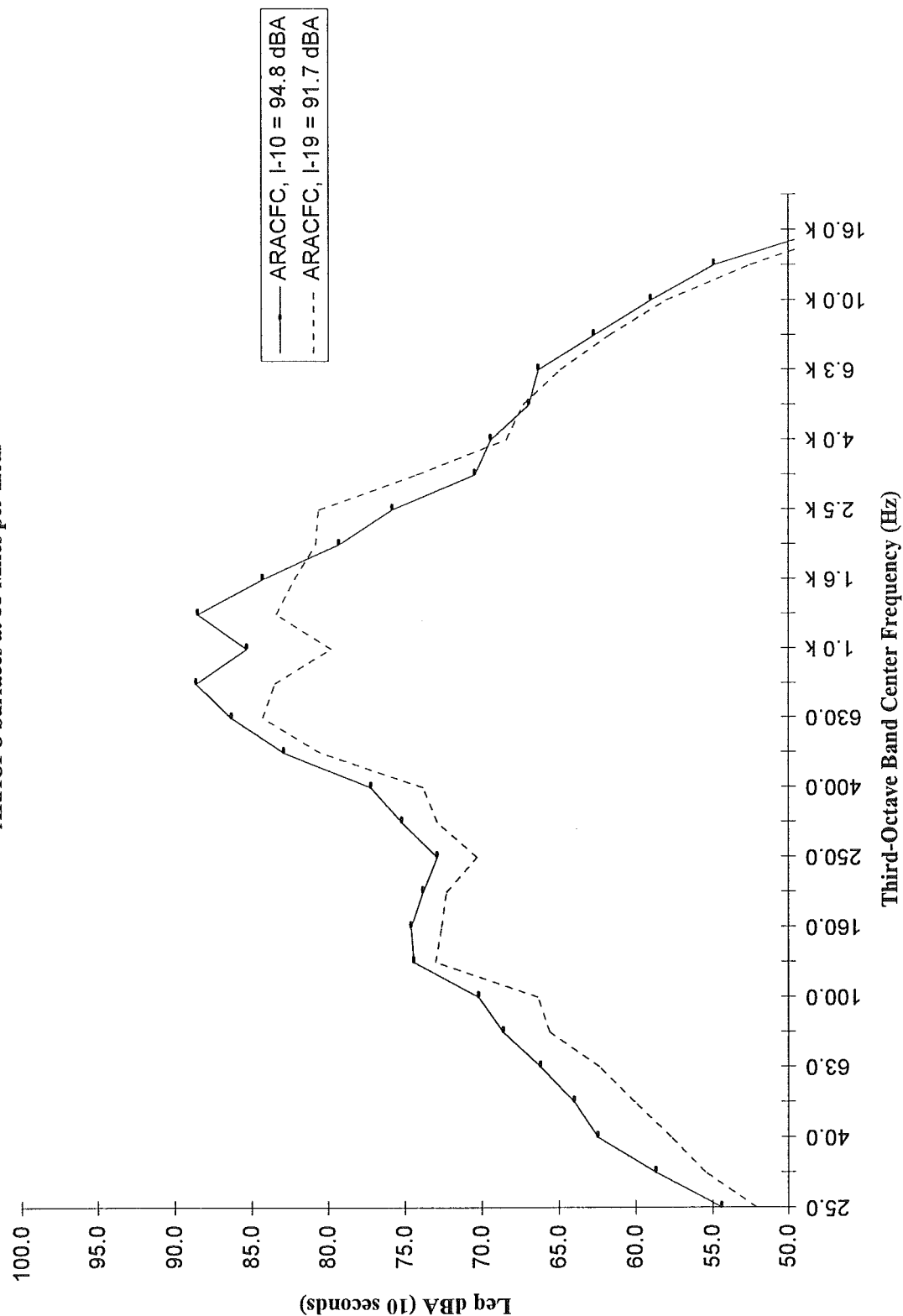


FIGURE 6-4
THIRD-OCTAVE DATA FOR SAMPLE TIRE-PAVEMENT NOISE MEASUREMENTS
 ARACFC Surfaces at 55 Miles per Hour



Figures 6-2 through 6-4 show sample comparisons of different ARACFC segments. The frequency data summarized in these figures were collected on various ARACFC segments as the test vehicle traveled at 55 miles per hour. Unlike the PCCP frequency data, distinct differences were observed in the frequency content of the different ARACFC segments. These different frequency patterns support the previous finding that individual ARACFC segments can have distinctively different noise generation characteristics.

6.2 Roadside Traffic Noise Measurements

Third-octave frequency data for selected roadside measurements are provided in Figures 6-5 through 6-7. These figures summarize the frequency data collected at the same sites where simultaneous roadside noise measurements were performed. Data was selected in this manner in order to minimize the effects that differences in traffic (traffic volume, truck percentages, and vehicle speeds) might produce in the frequency data being compared. The differences in the roadside noise frequency patterns shown in Figures 6-5 through 6-7 are attributed to the different character of the noise produced by the different freeway segments. In each figure, sample on-road tire-pavement frequency data for the same locations is also provided for comparison.

Figure 6-5 shows sample third-octave band frequency data for roadside and on-road noise measurements conducted at Location 1. As shown in Figure 6-5, the frequency content of the roadside noise for ARACFC and tined PCCP surfaces is most different in the 800 - 3150 Hz frequency regions. In general, human perception is most sensitive to noise frequencies in the range of 1000 - 4000 Hz. Noise in these frequency regions are also generally regarded as more annoying, especially when discrete frequency components (pure tones) are present. For this study, it was not possible to assess how the frequency content of these two surfaces might be subjectively interpreted in terms of annoyance. However, based on the preliminary investigation, it is clear that two different surfaces produce noise that differ in character. The tined PCCP surface would not only be perceived as producing a slightly higher noise level, but it would also be perceived as producing noise with a higher frequency content.

Figure 6-6 compares the frequency content of roadside noise produced from grooved PCCP and 1988 ARACFC. Figure 6-7 compares the frequency content of noise from the two ARACFC pavements of different ages. As shown in the figures, these different pavement surfaces produce roadside noise with distinctly different frequency patterns, even though differences in their overall noise levels were minor.

FIGURE 6-5
THIRD-OCTAVE DATA FOR SAMPLE ON-ROAD AND ROADSIDE NOISE MEASUREMENTS

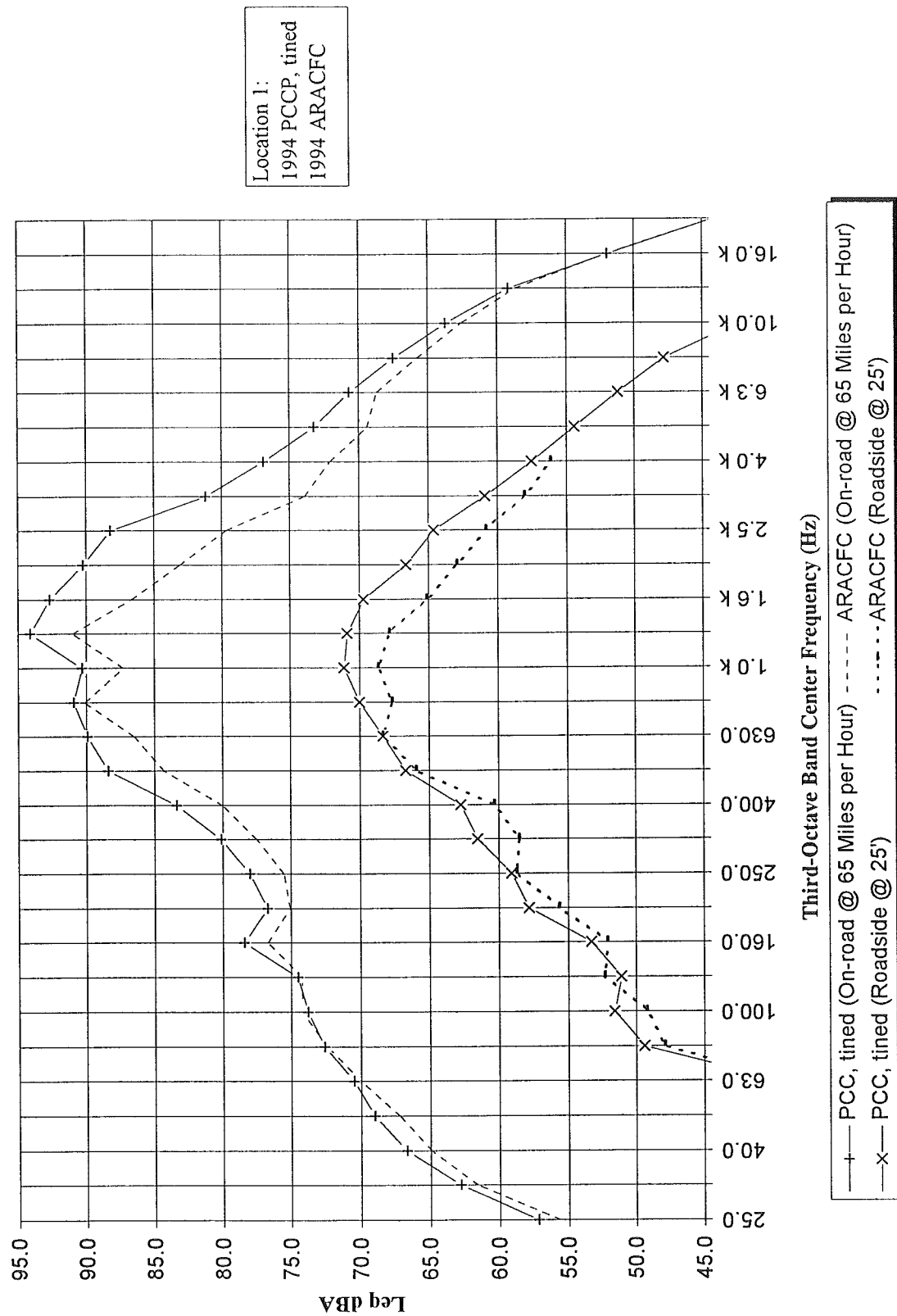


FIGURE 6-6
THIRD-OCTAVE DATA FOR SAMPLE ON-ROAD AND ROADSIDE NOISE MEASUREMENTS

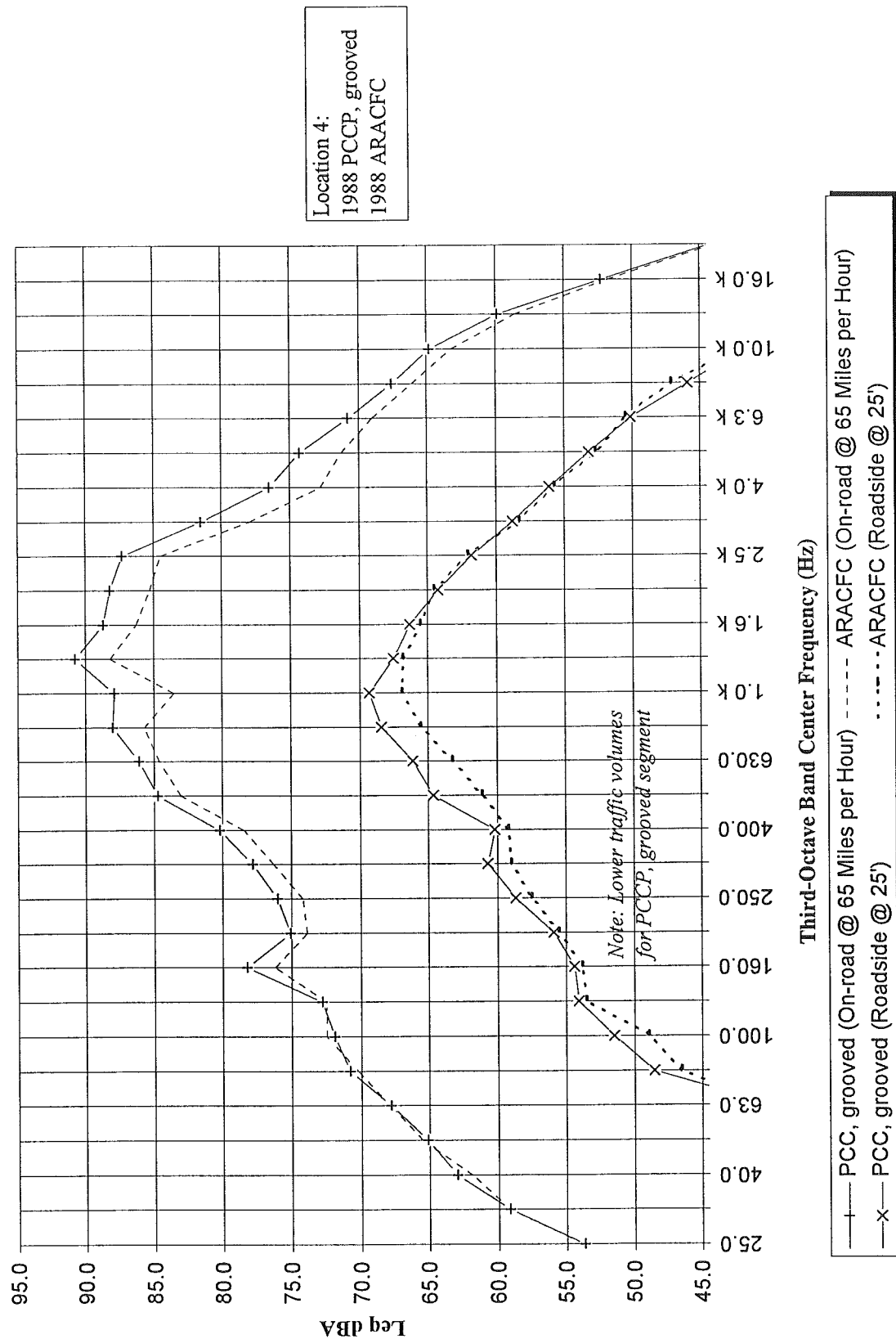
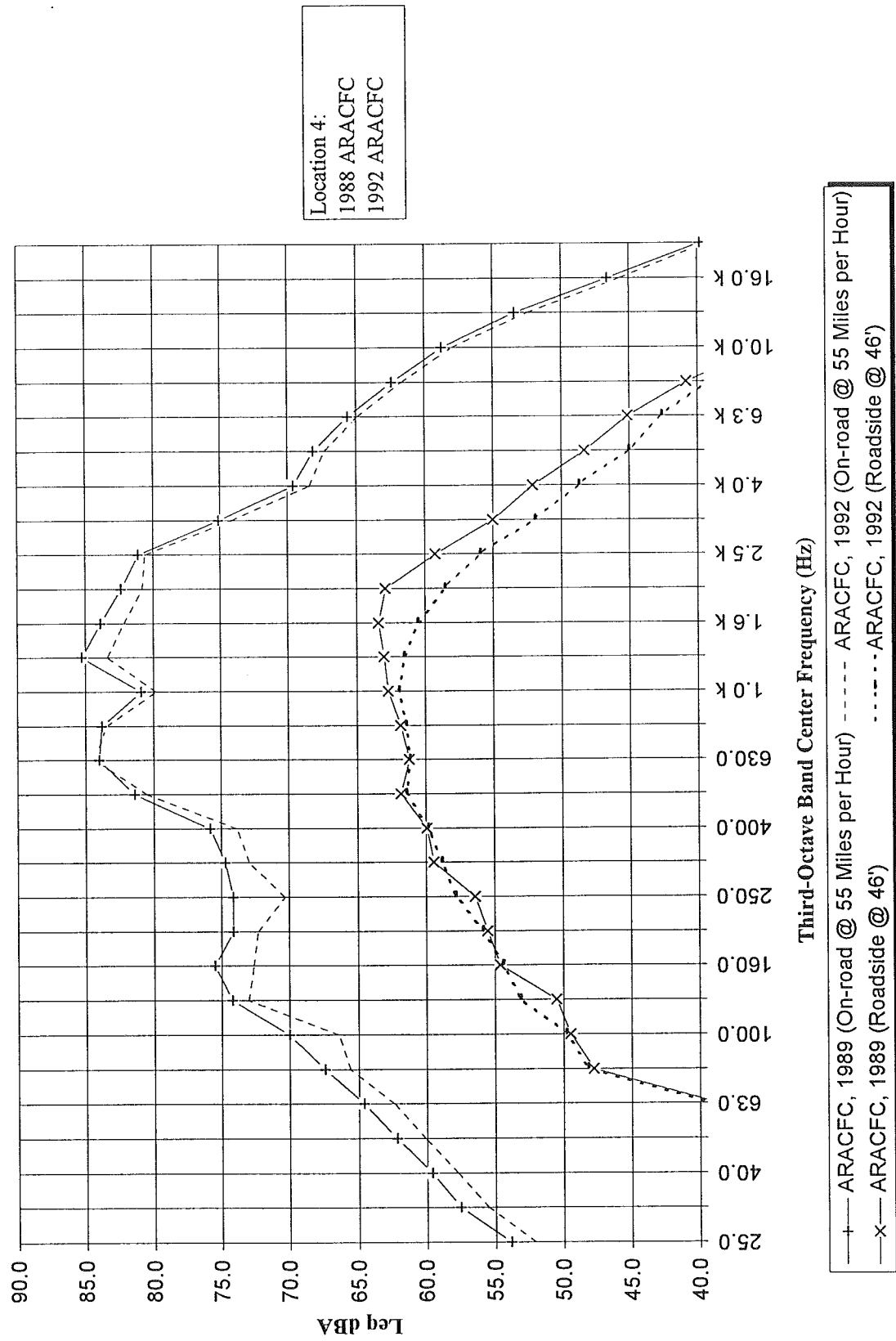


FIGURE 6-7
THIRD-OCTAVE DATA FOR SAMPLE ON-ROAD AND ROADSIDE NOISE MEASUREMENTS



Also shown in Figures 6-5 through 6-7 are sample third-octave frequency components for on-road tire-pavement noise readings for the same freeway segments. The gross patterns between the frequency content of the roadside and on-road noise measurements are similar. However, less distinct peaking characteristics are found for the roadside measurements, which results in a smoother frequency pattern.

Differences observed in the frequency patterns between the on-road and roadside noise measurement methods are attributed to the different measurement techniques. The on-road noise measurements should be viewed as an attempt to isolate noise produced from the tire-pavement interaction from a single test vehicle (with a single tire type and tread pattern). The roadside traffic noise measurements consider tire-pavement noise as well, however, tire-pavement noise that is transmitted to the roadside environment is comprised of noise generated from the wide variety of vehicles and tire types present in the vehicle stream. Furthermore, the roadside traffic noise measurements represent a variety of additional factors, such as vehicle engine and exhaust noise (especially from heavy trucks), site acoustics, as well as noise produced from background sources. The roadside frequency data reflects this diverse combination of factors which act in combination to smooth the more defined peaks associated with the on-road measurements of the test vehicle.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Two different measurement techniques were used to compare the noise generation characteristics of Asphalt Rubber Asphalt Concrete Friction Courses (ARACFC) and Portland Cement Concrete Pavements (PCCP). Roadside traffic noise measurements and on-road tire-pavement noise measurements were conducted at selected freeway locations to compare the relative noise levels produced by the two pavement types. The noise data collected using both measurement techniques demonstrate that ARACFC freeway surfaces produce lower noise levels than PCCP surfaces. It is not clear whether the noise reduction benefits are the result of asphalt-rubber materials used in the ARACFC. Based on the findings of several previous studies, differences in pavement surface texture are likely to be a critical factor in the relative noise levels produced by the PCCP and ARACFC segments evaluated in this study. A summary of the noise data collected using roadside traffic noise measurements and on-road tire-pavement noise measurements is provided below.

7.1 Simultaneous Roadside Traffic Noise Measurements

Simultaneous roadside traffic noise measurements were conducted adjacent to adjoining freeway segments with different pavement surfaces. In every case, roadside noise levels were higher for PCCP pavements than for ARACFC pavements. A range of differences was observed in the hourly equivalent noise levels measured at each pair of roadside measurement sites. The differences observed in the roadside noise levels are summarized below.

- Roadside noise levels near a tined PCCP surface were 3.3 - 5.7 dBA greater than levels measured near an adjoining ARACFC surface. Based on four separate hourly measurements, the average difference between the two surfaces was 4.7 dBA.
- Roadside noise levels near an ARACFC surface that was constructed in 1988 were 0.6 - 1.5 dBA greater than levels measured near an adjoining ARACFC surface that was constructed in 1992. Based on four separate hourly measurements, the average difference between the two surfaces was 1.0 dBA.
- Roadside noise levels near a grooved PCCP surface were 0.2 - 2.1 dBA greater than levels measured near an adjoining ARACFC surface. Based on four separate hourly measurements, the average difference between the two surfaces was 1.4 dBA.

7.2 On-Road Tire-Pavement Noise Measurements

A specially made bracket was used to attach a noise meter microphone on the exterior of a test vehicle. The microphone was secured near the tire-pavement contact area and noise levels were measured as the test vehicle was driven over different pavement surfaces. Average noise levels for the various pavement surfaces were compared to give an indication of their relative noise generation characteristics. Results of the on-road tire-pavement noise measurements are summarized below.

- On-road tire-pavement noise levels for PCCP surfaces were approximately 3 dBA greater than noise levels measured for ARACFC surfaces. The average difference of 3 dBA was consistent for travel speeds of both 55 and 65 miles per hour.
- A relatively wide range of noise levels was observed for both PCCP and ARACFC surfaces. However, individual pavement segments tended to produce consistent noise levels.
- Because of the variability found in the on-road noise measurements, noise data from the PCCP surfaces were grouped according to whether their surfaces were tined, ground, or grooved. This analysis indicated that the three PCCP subtypes produced distinctly different noise levels.
- There was no clear means of grouping the noise levels associated with the different ARACFC freeway segments. However, a similar degree of variability was found on the different ARACFC segments as was found on the PCCP segments.
- No relationships were found regarding the different noise levels produced by ARACFC segments of different ages. Other factors appear to be responsible for the variation found in noise levels for the different ARACFC surfaces.
- Due to the high variability found for the different ARACFC surfaces, it is recommended that the most appropriate method for evaluating how the noise characteristics of these surfaces change over time is to periodically evaluate the individual surfaces as they age.
- It is recommended that the various ARACFC segments be investigated in greater detail to determine what factors are responsible for producing the relatively wide range of noise levels observed for this surface type. This information would be useful in deriving the maximum noise reduction benefits possible from the ARACFC surface.

- Statistically significant noise level differences were observed when comparing a 1983 ground PCCP surface with 1989 and 1991 ground PCCP surfaces. Average on-road noise levels were 1.5 - 1.8 dBA higher for the older PCCP surface.

7.3 Third-Octave Frequency Data

Sample third-octave frequency data was collected for both the roadside traffic and on-road tire-pavement noise measurements. Results of the frequency evaluation of the various pavement surfaces is summarized below.

- Individual freeway segments tended to produce consistent frequency patterns for both the on-road and roadside noise measurements.
- Third-octave band frequency patterns were very similar for the various PCCP segments evaluated, regardless of whether the surface was tined, grooved or ground. Variation was observed in the frequency patterns produced by the different ARACFC segments.
- Roadside measurements for a tined PCCP surface produced higher noise levels than an adjoining ARACFC surface in the 800 - 3150 frequency regions, the frequency region where human perception is most sensitive.
- For the roadside noise measurements, distinct differences were observed in the frequency patterns of different the freeway surfaces being compared. This finding indicates that the different surfaces produce a different character of noise in terms of frequency as well as overall noise level.

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APPENDICES

APPENDIX A
ROADSIDE TRAFFIC NOISE DATA

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: ARACFC
Year: 1994
Direction: EB

Date: 3/13
Start Time: 1:30 PM
End Time: 2:30 PM
Meter Name: OSO
Amb. Temp: 80 F

Cal. Time/Period: 1:00 PM - 5 min x 3
Cal. Values OSO LUCKY d.
1 77.1 76.7 0.4
2 77.1 76.9 0.2
3 77.8 77.6 0.2

Site Description
I-10 east of M.P. 104.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	76	82	73	67	70	65	62	57	66	62	65	60				67
2	55	62	62	66	58	70	66	60	66	65	63	69	69	66	66	64
3	71	73	62	70	59	64	68	63	66	58	68	67	65	63	73	66
4	66	72	65	73	63	68	73	64	64	56	57	65	70	64	65	66
5	70	66	65	56	71	78	74	53	61	60	62	58	62			64
6	64	66	64	66	69	68	72	63	66	76	57	72	70	66	61	67
7	63	63	66	63	70	70	62	68	66	65	64	67	72	65	76	67
8	64	72	77	64	64	63	58	67	61	65	56	62	64	71	68	65
9	72	74	65	84	59	62	68	61	64	68	63	66	66	63	59	66
10	60	62	63	66	63	66	65	69	56	78	70	61	66	73	59	65
11	63	69	68	69	69	80	70	57	62	68	64	68	65	76	56	67
12	69	70	66	70	68	74	58	65	70	67	75	66	55	69	66	67
	Hourly Mean															66

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	73.1	90,371	29	6	6	22	11	15	
2	73.0	89,337	20	13	5	26	9	25	
3	70.2	64,719	34	5	1	31	5	12	
4	71.1	71,784	23	9	4	30	2	13	
5	72.6	85,316	30	5	3	25	6	17	
6	72.6	85,316	26	5	9	35	5	17	
7	70.9	70,150	35	12	1	29	8	19	
8	70.6	67,769	19	3	5	34	0	9	
9	72.9	88,314	30	4	3	39	7	14	
10	71.1	71,784	32	15	6	19	4	6	
11	71.6	76,038	37	8	5	37	6	26	
12	71.2	72,616	14	4	4	28	7	6	
Total	Mean 71.7	Leq dBA 71.8	329	89	52	355	70	179	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: PCCP
Year: 1994
Direction: EB

Date: 3/13
Start Time: 1:30 PM
End Time: 2:30 PM
Meter Name: LUCKY
Amb. Temp: 80 F

Cal. Time/Period: 1:00 PM - 5 min x 3			
Cal. Values	OSO	LUCKY	d.
1	77.1	76.7	0.4
2	77.1	76.9	0.2
3	77.8	77.6	0.2

Site Description
I-10 east of M.P. 106.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1																
2	66	65	73	70	68	72	61	65	56	56	66	60	67	65	64	65
3	57	66	67	68	72	71	65	63	67	68	60	69	64	72	75	67
4	72	67	63	71	61	68	70	67	70	66	58	65	67	56	65	66
5	66	66	58	65	62	71	68	66	66	57	73	56	63	67	70	65
6																
7																
8																
9	64	65	72	63	64	64	69	65	67	70	69	65	63	60	72	66
10	65	66	64	64	59	65	66	58	66	66	65	62	64	65	63	64
11	62	70	64	74	68	68	70	67	58	65	71	51	74	67	68	66
12																
Hourly Mean																66

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	77.2	144,887	29	6	6	22	11	15	
2	77.9	157,047	20	13	5	26	9	25	
3	77.8	155,249	34	5	1	31	5	12	
4	76.3	130,626	23	9	4	30	2	13	
5	76.8	138,366	30	5	3	25	6	17	
6	77.5	149,979	26	5	9	35	5	17	
7	79.0	178,250	35	12	1	29	8	19	
8	76.3	130,626	19	3	5	34	0	9	
9	76.7	136,782	30	4	3	39	7	14	
10	78.3	164,449	32	15	6	19	4	6	
11	78.4	166,353	37	8	5	37	6	26	
12	76.9	139,968	14	4	4	28	7	6	
Total	Mean 77.4	Leq dBA 77.5	329	89	52	355	70	179	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: PCCP
Year: 1994
Direction: EB

Date: 3/13
Start Time: 2:45 PM
End Time: 3:45 PM
Meter Name: LUCKY
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement
Cal. Values
1
2
3

Site Description
I-10 east of M.P. 106.
92 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1																
2																
3	73	62	70	65	71	67	71	68	67	65	70	68	72	67	69	68
4	67	70	56	67	71	65	70	72	56	68	63	64	69	56	73	66
5	68	63	65	68	68	69	63	65	68	64	50	68	71	69	65	66
6	66	71	61	70	76	63	68	69	70	67	65	72	62	67	56	67
7	64	60	73	61	58	70	72	76	67	71	56	72	68	65	69	67
8																
9																
10	58	59	72	64	71	66	64	63	72	82	72	65	64	67	69	67
11	63	70	66	68	71	67	75	51	65	70	73	77	74	68	75	69
12	67	70	68	67	64	66	69	70	66	70	64	65	65	70	74	68
	Hourly Mean															67

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	69.1	57,020	20	11	7	26	7	15	
2	69.4	59,024	41	1	6	22	2	14	
3	68.8	55,085	23	1	2	19	3	22	
4	61.2	22,963	33	3	2	20	5	28	
5	69.1	57,020	22	4	6	23	4	19	
6	69.2	57,681	27	5	6	27	6	12	
7	69.7	61,098	42	7	7	30	1	14	
8	68.1	50,819	38	5	5	22	2	9	
9	68.0	50,238	35	6	4	21	3	16	
10	69.5	59,708	39	6	7	27	1	14	
11	69.7	61,098	36	3	3	24	3	7	
12	67.8	49,094	43	6	8	29	1	17	
Total	Mean 68.3	Leq dBA 68.5	399	58	63	290	38	187	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: ARACFC
Year: 1994
Direction: EB

Date: 3/13
Start Time: 2:45 PM
End Time: 3:45 PM
Meter Name: OSO
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement
Cal. Values
1
2
3

Site Description
I-10 200 feet east of M.P. 104.
92 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	69	76	69	80	66	69	68	68	62	70	68	67	74	71		70
2	62	70	60	70	71	61	71	67	73	64	66	63	72	61	70	67
3	68	64	63	68	67	56	55	70	64	70	72	60	71	73	66	66
4	66	64	72	70	66	68	65	66	66	69	68	72	80	66	69	68
5	64	68	68	62	69	68	68	66	68	68	79	71	62	77	63	68
6	62	65	63	59	62	71	56	67	75	67	63	75	69	69	68	66
7	63	69	67	63	72	85	75	62	65	77	74	61	62	68	62	68
8	73	69	67	62	65	52	63	89	68	54	64	69	71	70	59	66
9	66	58	61	69	61	69	71	67	62	64	63	64	70	56	70	65
10	72	71	70	69	66	68	61	67	70	63	67	68	72	69	59	67
11	71	67	71	66	64	69	67	61	77	59	67	70	67	65	64	67
12	67	66	67	62	61	63	60	77	63	71	55	56	62	67	74	65
	Hourly Mean															67

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	65.0	35,566	20	11	7	26	7	15	
2	60.7	21,679	41	1	6	22	2	14	
3	61.1	22,700	23	1	2	19	3	22	
4	65.7	38,550	33	3	2	20	5	28	
5	64.3	32,812	22	4	6	23	4	19	
6	64.6	33,965	27	5	6	27	6	12	
7	63.3	29,244	42	7	7	30	1	14	
8	61.8	24,605	38	5	5	22	2	9	
9	66.0	39,905	35	6	4	21	3	16	
10	63.2	28,909	39	6	7	27	1	14	
11	64.2	32,436	36	3	3	24	3	7	
12	65.0	35,566	43	6	8	29	1	17	
Total	Mean 63.7	Leq dBA 63.9	399	58	63	290	38	187	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: ARACFC
Year: 1994
Direction: EB

Date: 3/13
Start Time: 5:20 PM
End Time: 6:20 PM
Meter Name: OSO
Amb. Temp: 70 F

Cal. Time/Period: 4:30 PM - 3 x 5 min
Cal. Values OSO LUCKY d.
1 77.5 77.3 0.2
2 77.1 76.9 0.2
3 78.6 78.5 0.1

Site Description
I-10 approximately M.P. 108.5.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	69	73	67	64	66	64	64	75	71							68
2	65	64	62	70	65	68	75	70	71	62	67	64	65	66	65	67
3	66	67	67	61	73	65	65	67	63	67	58	71	66	64	64	66
4	60	68	70	64	65	65	64	71	63	60	60	67	63	68	61	65
5	59	55	63	65	58	54	59	59	62	60	63	64	65	68	60	61
6	63	61	59	58	62	60	58	57	53	62	64	61	62	70	67	61
7	60	62	58	61	70	68	64	49	61	64	54	63	61	63	65	62
8	60	73	66	63	60	63	61	68	61	60	58	57	52	66	68	62
9	58	62	68	64	65	64	45	70	68	66	65	58	61	62	57	62
10	61	64	67	50	63	66	61	64	63	60	64	68	62	63	63	63
11	66	59	67	58	62	65	64	61	55	64	55	66	61	68	66	62
12	60	65	57	61	66	62	63	56	57							61
Hourly Mean																63

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	72.1	80,543	29	1	5	32	2	13	
2	73.0	89,337	35	3	5	26	8	22	
3	72.2	81,476	29	2	5	17	1	11	
4	75.7	121,907	47	1	12	26	3	8	
5	72.1	80,543	37	8	3	18	3	7	A traffic stop west of this location.
6	74.1	101,398	39	4	13	20	3	12	
7	73.9	99,090	51	3	7	24	1	12	
8	72.7	86,304	33	5	7	21	2	9	Lasted remainder of measurement period.
9	74.0	100,237	28	4	10	29	3	22	Slower speeds.
10	72.0	79,621	22	1	10	21	1	16	Traffic tends to stay in northernmost lane.
11	71.0	70,963	21	2	4	21	4	14	
12	71.4	74,307	34	3	4	12	1	13	
Total	Mean 72.9	Leq dBA 72.9	405	37	85	267	32	159	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: PCC
Year: 1994
Direction: EB

Date: 3/13
Start Time: 5:20 PM
End Time: 6:20 PM
Meter Name: LUCKY
Amb. Temp: 70 F

Cal. Time/Period: 4:30 PM - 3 x 5 min			
Cal. Values	OSO	LUCKY	d.
1	77.5	77.3	0.2
2	77.1	76.9	0.2
3	78.6	78.5	0.1

Site Description
I-10 approximately M.P. 108.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	64	71	65	61	60	67	65	66	69	66	68	56	64	63	69	65
2	64	65	71	67	64	63	70	69	65	65	68	66	68	66	68	67
3	67	66	62	66	61	65	67	65	53	70	74	65	58	69	65	65
4	66	64	64	67	70	66	68	66	67	72	64	67	65	60	63	66
5	60	67	65	67	72	70	64	64	77	67	65	69	70	64	67	67
6	69	59	68	62	67	69	71	66	74	65	68	60	66	63	68	66
7	57	65	62	67	71	64	69	64	57	68	63	68	65	68	67	65
8	74	67	71	66	70	69	68	70	60	70	60	68	67	66	67	68
9	71	69	66	54	73	65	66	68	68	61	70	64	65	75	69	67
10	70	67	54	67	72	69	65	63	73	70	66	66	69	65	66	67
11	68	65	68	65	70	60	66	63	75	59	65	73	64	69	67	66
12	69	67	66	69	72	62	68	66	57	64	62	66	74	66	73	67
Hourly Mean																66

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	78.6	170,228	29	1	5	32	2	13	Truck honks horn.
2	77.1	143,229	35	3	5	26	8	22	
3	76.9	139,968	29	2	5	17	1	11	
4	79.5	188,812	47	1	12	26	3	8	
5	78.9	176,210	37	8	3	18	3	7	
6	78.2	162,566	39	4	13	20	3	12	
7	78.5	168,279	51	3	7	24	1	12	
8	79.4	186,651	33	5	7	21	2	9	
9	78.5	168,279	28	4	10	29	3	22	
10	78.5	168,279	22	1	10	21	1	16	
11	76.3	130,626	21	2	4	21	4	14	
12	77.7	153,472	34	3	4	12	1	13	
Total	Mean 78.2	Leq dBA 78.2	405	37	85	267	32	159	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: ARACFC
Year: 1994
Direction: EB

Date: 3/13
Start Time: 6:35 PM
End Time: 7:35 PM
Meter Name: OSO
Amb. Temp: 60 F

Cal. Time/Period: See previous measurement.			
Cal. Values	OSO	LUCKY	d.
1			
2			
3			

Site Description
I-10 approximately M.P. 108.5.
88 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	64	65	67	67	66	68	58	62	64	62	63	62	68	64	70	65
2	60	66	63	65	63	64	55	60	66	67	65	56	54	65	61	62
3	60	57	62	56	62	73	66	63	64	62	59	60	62	63	61	62
4	67	64	64	65	55	70	67	69	65	66	65	70	66	68	73	66
5	58	72	62	69	58	73	63	60	75	62	63	64	65	71	64	65
6	62	63	68	59	58	62	61	70	62	74	64	71	68	68	67	65
7	66	68	65	69	68	56	71	68	58	72	71	64	59	61	63	65
8	65	71	65	62	64	61	50	68	62	64	68	60	69	61	65	64
9	67	52	64	72	63	64	65	56	71	65	68	70	57	64	63	64
10	57	66	67	60	67	70	65	70	60	65	63	64	65	60	68	64
11	64	72	70	67	64	51	63	56	71	64	71	68	60	65	69	65
12	65	69	68	63	61	55	60	68	75	67	65	70	63	70	73	66
Hourly Mean																64

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	64.9	35,158	26	4	3	13	4	17	Intervals 1-4 traffic stop from previous interval still in effect.
2	65.8	38,997	32	2	5	14	5	16	
3	67.0	44,774	40	5	8	6	7	20	
4	59.4	18,665	40	1	8	13	3	12	Slower speeds.
5	69.2	57,681	44	3	14	15	3	19	Aircraft Flyover
6	68.8	55,085	16	0	5	6	0	6	
7	66.1	40,367	38	4	6	8	0	11	
8	67.4	46,885	16	1	10	13	3	21	
9	66.6	42,759	27	3	14	7	0	5	
10	68.2	51,408	21	1	12	9	1	12	
11	66.1	40,367	29	1	6	11	0	16	
12	65.2	36,394	23	1	10	8	4	6	
Total	Mean 66.2	Leq dBA 66.5	352	26	101	123	30	161	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 1
Pavement Type: PCCP
Year: 1994
Direction: EB

Date: 3/13
Start Time: 6:35 PM
End Time: 7:35 PM
Meter Name: OSO
Amb. Temp: 60 F

Cal. Time/Period: See previous measurement.			
Cal. Values OSO	LUCKY	d.	
1			
2			
3			

Site Description
I-10 approximately M.P. 108.
88 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	68	66	65	63	64	65	72	73	66	70	64	67	58	67	56	66
2	63	62	69	64	59	66	71	72	59	68	58	67	64	65	66	65
3	67	70	59	58	68	59	67	71	65	71	66	65	56	66	72	65
4	65	60	64	64	68	64	59	64	63	68	65	60	59	64	71	64
5	70	68	63	74	64	63	58	70	74	75	57	72	66	62	65	67
6	72	67	65	71	63	71	54	71	60	59	71	69	64	65	72	66
7	64	65	67	75	62	70	67	69	72	63	62	71	63	75	65	67
8	75	67	68	70	61	75	72	63	66	64	71	61	70	70	67	68
9	67	56	61	60	60	64	66	67	59	65	63	68	69	67	70	64
10	64	62	68	56	66	60	70	69	66	66	74	70	64	60	62	65
11	63	71	66	67	65	66	64	63	63	72	70	64	65	63	71	66
12	62	70	69	70	64	54	60	61	64	56	71	72	70	64	65	65
Hourly Mean																66

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	68.2	51,408	26	4	3	13	4	17	
2	69.2	57,681	32	2	5	14	5	16	
3	69.6	60,399	40	5	8	6	7	20	
4	70.4	66,226	40	1	8	13	3	12	
5	71.4	74,307	44	3	14	15	3	19	
6	71.8	77,809	16	0	5	6	0	6	
7	68.0	50,238	38	4	6	8	0	11	
8	69.4	59,024	16	1	10	13	3	21	
9	70.3	65,468	27	3	14	7	0	5	
10	68.7	54,454	21	1	12	9	1	12	
11	71.8	77,809	29	1	6	11	0	16	
12	67.8	49,094	23	1	10	8	4	6	
Total	Mean 69.7	Leq dBA 69.8	352	26	101	123	30	161	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 3
Pavement Type: PCCP Ground
Year: 1983
Direction: WB

Date: 3/15
Start Time: 10:20 AM
End Time: 11:20 AM
Meter Name: LUCKY
Amb. Temp: 80 F

Cal. Time/Period: 9:30 AM - 5 min x 3				
	Cal. Values	OSO	LUCKY	d.
	1	75.3	74.9	0.4
	2	75.6	75.2	0.4
	3	75.0	74.7	0.3

Site Description
I-10 east of M.P. 257
Approximately 80 feet from edge of nearest travel lane.
(near right-of-way fence).

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	61	56	59	52	63	58	57	66	55	56	55	54	55	56	58	57
2	57	57	53	58	53	54	58	56	57	57	55	62	62	60	53	57
3	65	55	60	59	60	51	61	56	68	67	52	56	55	60	68	60
4	56	52	56	57	58	60	64	55	62	56	53	63	58	63	52	58
5	57	64	54	62	59	59	53	53	63	59	51	58	55	64	57	58
6	58	57	60	56	58	53	62	57	61	54	53	58	57	65	62	58
7	59	54	53	58	67	62	56	60	55	55	54	59	56	55	64	58
8	57	53	62	59	62	63	60	57	60	59	58	57	58	58	51	58
9	56	61	55	55	57	54	57	58	62	60	58	55	54	61	58	57
10	57	59	58	62	55	61	56	59	54	63	62	58	57	63	53	58
11	59	52	60	56	57	55	52	55	57	58	57	52	65	60	61	57
12	60	56	61	66	60	54	65	54	60	52	52	55	62	64	54	58
	Hourly Mean															58

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	74.8	109,908	242	23	22	204	28	21	
2	73.6	95,726	207	27	19	207	23	18	
3	73.1	90,371	211	17	30	212	30	21	
4	74.3	103,760	196	13	18	207	17	16	
5	74.5	106,177	168	20	33	291	13	36	
6	74.8	109,908	196	19	25	148	27	21	
7	73.7	96,834	197	14	26	179	20	12	
8	75.0	112,468	196	13	21	192	16	21	
9	74.2	102,572	236	21	35	188	18	22	
10	74.5	106,177	205	19	25	218	7	27	
11	73.9	99,090	159	23	22	191	13	11	
12	73.9	99,090	232	12	24	244	11	15	
Total	Mean 74.2	Leq dBA 74.2	2445	221	300	2481	223	241	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 3
Pavement Type: PCCP Ground
Year: 1983
Direction: WB

Date: 3/15
Start Time: 10:20 AM
End Time: 11:20 AM
Meter Name: OSO
Amb. Temp: 80 F

Cal. Time/Period: 9:30 AM - 5 min x 3
Cal. Values OSO LUCKY d.
1 75.3 74.9 0.4
2 75.6 75.2 0.4
3 75.0 74.7 0.3

Site Description
I-10 west of M.P. 256
Approximately 63 feet from edge of nearest travel lane. (near tree).

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	56	60	63	62	57	59	54	55	60	52	53	59	55	54	45	56
2	55	57	51	46	59	61	46	62	50	41	47	48	53	57	53	52
3	51	50	57	57	61	55	49	43	47	53	56	55	65	65	62	55
4	50	60	51	46	47	50	60	57	42	53	54	53	58	56	59	53
5	56	46	59	55	59	50	51	58	62	58	59	62	64	50	51	56
6	54	60	63	49	57	59	66	52	55	51	57	62	40	53	50	55
7	48	55	62	55	57	52	56	58	61	49	58	53	51	43	56	54
8	57	53	51	49	56	63	55	61	48	54	57	58	59	62	54	56
9	54	59	38	49	56	55	62	57	58	53	52	71	59	58	56	56
10	54	51	53	51	54	47	52	49	57	55	56	56	60	57	51	54
11	58	59	51	52	47	50	53	54	52	53	62	56	57	48	52	54
12	54	62	60	58	53	53	64	57	59	52	57	51	58	54	57	57
Hourly Mean																55

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	75.5	119,132	198	16	17	185	22	20	Gusty winds, 5-10 mph from South.
2	75.0	112,468	143	22	21	172	13	17	
3	75.8	123,319	169	15	22	182	21	17	
4	74.8	109,908	156	10	17	194	16	9	
5	75.0	112,468	120	14	30	168	14	20	
6	75.4	117,769	210	15	26	171	16	14	
7	75.1	113,771	179	16	25	178	26	23	
8	75.5	119,132	198	12	33	225	12	20	
9	75.3	116,421	144	15	31	162	17	26	Winds Calmer now.
10	75.5	119,132	215	23	28	237	11	25	
11	75.2	115,088	158	13	19	197	12	15	
12	75.7	121,907	200	9	23	776	6	27	no trains during hour.
Total	Mean 75.3	Leq dBA 75.3	2090	180	292	2847	186	233	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 3
Pavement Type: PCCP Ground
Year: 1983
Direction: EB

Date: 3/15
Start Time: 12:10 PM
End Time: 1:10 PM
Meter Name: LUCKY
Amb. Temp: 85 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-10 west of M.P. 257
Approximately 60 ft. from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	51	54	52	58	52	50	59	54	59	58	58	56	56	59	55	55
2	57	52	49	57	61	54	53	57	59	50	51	60	54	62	58	56
3	60	62	60	59	57	59	52	59	66	54	51	55	57	59	55	58
4	52	51	62	57	62	55	56	54	60	55	57	63	56	60	62	57
5	55	61	52	56	49	52	57	50	53	52	54	52	54	53	53	54
6	64	55	52	54	61	59	61	57	55	59	63	56	65	57	59	58
7	65	57	58	55	66	62	64	60	48	53	61	57	56	52	52	58
8	57	54	55	55	58	63	62	61	57	59	50	55	58	50	55	57
9	72	63	50	57	58	53	65	56	54	58	60	54	51	56	55	57
10	54	68	59	57	61	64	59	50	55	54	63	58	57	52	59	58
11	53	61	65	60	57	59	64	55	53	61	58	57	59	52	51	58
12	57	53	65	63	58	60	60	61	56	58	53	52	53	20	56	55
Hourly Mean																57

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	76.9	139,968	147	6	10	183	22	16	
2	77.8	155,249	213	13	42	199	16	22	
3	75.8	123,319	227	12	24	217	18	14	
4	76.8	138,366	122	5	13	179	14	12	
5	78.0	158,866	255	13	44	206	11	25	
6	77.3	146,565	209	16	38	206	10	16	
7	77.7	153,472	202	25	27	199	28	13	2 Trains pass.
8	78.2	162,566	202	25	27	219	18	17	1 Train passes, and
9	77.0	141,589	205	24	23	205	19	20	Police stop, speaker.
10	76.7	136,782	235	21	23	206	12	16	1 Train.
11	76.7	136,782	104	12	25	178	15	20	
12	77.5	149,979	269	14	32	228	19	21	
Total	Mean 77.2	Leq dBA 77.2	2390	186	328	2425	202	212	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 3
Pavement Type: PCCP Ground
Year: 1983
Direction: EB

Date: 3/15
Start Time: 12:30 PM
End Time: 1:30 PM
Meter Name: OSO
Amb. Temp: 85 F

Cal. Time/Period: See previous measurement.			
Cal. Values OSO	LUCKY	d.	
1			
2			
3			

Site Description
I-10 Days Inn parking lot, near M.P. 258.
Near building see photos and diagram.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1																
2																
3		Note	Traffic data was not taken.													
4			Elevated freeway mainline, at-grade frontage road.													
5			No safe location to view mainline traffic.													
6																
7			Some noise from frontage road, but primary noise source													
8			is elevated freeway mainline. Quite loud here.													
9																
10																
11																
12																
Hourly Mean																

Interval Noise/Traffic Data	Leq	Average Sound Pressure	EB			WB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	74.5	106,177							
2	73.5	94,630							
3	74.5	106,177							
4	73.9	99,090							
5	74.2	102,572							
6	71.8	77,809							
7	73.7	96,834							
8	73.0	89,337							
9	72.0	79,621							
10	73.3	92,476							
11	72.7	86,304							
12	72.5	84,339							
Total	Mean 73.3	Leq dBA 73.3							

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1992
Direction: SB

Date: 3/16
Start Time: 9:25 AM
End Time: 10:25 AM
Meter Name: OSO
Amb. Temp: 78 F

Cal. Time/Period: 8:35 AM - 5 min x 3
Cal. Values OSO LUCKY d.
1 69.6 69.2 0.4
2 70.4 70.0 0.4
3 69.0 68.6 0.4

Site Description
I-19 between K.M.P. 97-98.
46 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	56	68	66	54	57	60	60	50	49	52	59	55	60	58	62	58
2	68	66	52	64	64	67	62	61	56	60	50	54	57	68	58	60
3	57	56	57	49	50	65	67	58	58	63	64	69	59	58	63	60
4	54	58	53	58	54	56	55	61	57	56	52	64	67	70	57	58
5																
6																
7																
8	59	61	61	60	50	55	57	51	65	60	54	66	60	54	53	58
9	52	54	51	60	52	55	56	55	58	56	60	57	58	55	57	56
10	54	49	60	66	62	67	68	55	54	61	54	65	72	59	62	61
11	59	58	55	62	57	61	54	65	55	54	54	64	60	60	67	59
12	66	48	67	63	60	61	60	57	71	63	65	60	59	60	52	61
	Hourly Mean															59

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	69.1	57,020	70	2	1	53	4	5	
2	69.6	60,399	72	10	6	82	4	6	
3	68.9	55,722	79	6	6	75	5	3	
4	68.8	55,085	77	4	4	72	2	6	Aircraft
5	70.1	63,978	87	6	2	79	7	8	
6	69.5	59,708	93	5	3	77	1	5	Aircraft x 2
7	71.0	70,963	93	8	5	86	8	4	
8	70.9	70,150	70	7	4	69	3	1	
9	70.6	67,769	74	5	4	74	2	2	
10	73.0	89,337	69	3	3	84	3	7	Crane, interval 10.
11	69.4	59,024	75	1	4	82	3	7	Aircraft (8, 9, 12)
12	71.3	73,456	62	3	7	70	2	10	
Total	Mean 70.2	Leq dBA 70.3	921	60	49	903	44	64	Aircraft were directly over this site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: SB

Date: 3/16
Start Time: 9:25 AM
End Time: 10:2 AM
Meter Name: LUCKY
Amb. Temp: 78 F

Cal. Time/Period: 8:35 AM - 5 min x 3				
	Cal. Values	OSO	LUCKY	d.
	1	69.6	69.2	0.4
	2	70.4	70.0	0.4
	3	69.0	68.6	0.4

Site Description
I-19 near K.M.P. 97.
46 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	58	57	57	63	60	59	58	59	60	63	66	60	61	62	54	60
2	65	63	56	62	60	55	62	64	66	61	56	58	55	55	58	60
3	59	67	63	58	55	53	69	57	61	63	59	56	59	62	60	60
4	66	57	62	70	65	61	60	55	58	58	57	61	59	57	51	60
5	63	56	55	63	66	54	66	58	52	56	54	59	57	60	55	58
6	62	55	52	58	49	62	60	59	61	55	57	61	65	60	54	58
7	55	56	61	54	56	59	58	56	55	67	59	58	59	55	61	58
8	59	55	68	65	58	56	63	72	63	57	61	55	66	60	58	61
9	58	54	59	62	59	58	61	62	60	63	54	71	65	66	62	61
10	56	53	60	70	56	61	53	58	54	65	55	59	68	62	71	60
11	54	68	59	56	63	60	58	46	67	60	63	56	54	57	58	59
12	57	60	64	58	56	67	57	60	62	58	61	57	60	60	57	60
	Hourly Mean															59

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	71.2	72,616	98	1	3	77	4	5	
2	71.1	71,784	73	10	6	81	5	5	
3	70.7	68,554	82	5	5	74	4	3	
4	70.2	64,719	82	5	4	83	4	7	
5	70.2	64,719	99	1	2	81	8	4	2 fighter planes (N.)
6	69.6	60,399	80	8	2	73	2	4	Commercial Plane
7	70.9	70,150	86	7	5	77	10	3	Commercial Plane
8	70.4	66,226	84	6	5	87	5	4	
9	69.9	62,522	62	2	6	69	5	2	
10	71.1	71,784	76	2	6	77	4	5	
11	74.0	100,237	67	1	3	84	4	7	Crane Passes.
12	71.1	71,784	68	1	5	78	3	10	
Total	Mean 70.9	Leq dBA 70.9	957	49	52	941	58	59	Aircraft were directly over other site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1992
Direction: SB

Date: 3/16
Start Time: 10:35 AM
End Time: 11:35 AM
Meter Name: OSO
Amb. Temp: 81 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 between K.M.P. 97-98.
82 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	53	54	60	58	66	60	63	64	51	67	47	57	64	61	58	59
2	62	64	54	67	55	62	71	63	64	55	51	57	60	62	62	61
3	56	49	57	61	61	56	66	55	61	55	51	61	66	62	51	58
4	52	61	58	55	60	60	58	55	65	65	61	64	56	54	67	59
5	64	59	64	61	64	55	58	67	68	56	67	59	69	63	65	63
6	63	61	60	72	68	52	70	58	60	61	64	57	54	55	59	61
7	55	60	52	61	62	73	59	74	59	60	61	60	63	60	66	62
8	64	54	55	62	59	48	57	59	59	60	56	54	68	64	65	59
9	45	54	60	63	55	54	61	53	62	65	58	72	54	56	62	58
10	59	63	57	59	51	56	59	62	63	54	56	56	69	52	55	58
11	58	57	61	57	60	60	57	66	59	57	56	60	60	55	59	59
12	63	58	62	61	55	63	64	57	62	67	57	60	58	58	58	60
Hourly Mean																60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	70.0	63,246	62	5	9	81	2	10	2 commercial jets
2	67.3	46,348	78	2	6	63	0	6	1 cessna
3	65.2	36,394	106	6	2	74	4	9	
4	66.8	43,755	63	4	3	85	1	4	1 commercial jet
5	68.1	50,819	59	2	2	65	3	6	
6	68.5	53,215	101	3	3	107	3	9	1 commercial jet
7	67.6	47,977	83	8	4	74	5	8	1 commercial jet
8	66.6	42,759	82	6	6	89	3	7	
9	66.1	40,367	94	5	3	73	4	5	
10	66.5	42,270	98	7	8	69	2	7	
11	68.3	52,003	88	2	5	91	3	16	1 commercial jet
12	66.3	41,308	89	5	4	75	1	6	
Total	Mean 67.3	Leq dBA 67.4	1003	55	55	946	31	93	Aircraft were directly over this site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: SB

Date: 3/16
Start Time: 10:35 AM
End Time: 11:35 AM
Meter Name: LUCKY
Amb. Temp: 81 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 near K.M.P. 97.
82 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	57	60	54	51	64	53	57	54	62	67	55	65	56	54	61	58
2	60	59	59	58	57	59	56	66	61	56	58	57	63	68	57	60
3	56	62	57	55	58	57	64	59	59	57	59	65	60	61	51	59
4	58	57	62	61	56	55	56	66	65	50	61	59	66	55	59	59
5	62	56	55	59	53	52	68	58	56	61	71	66	55	66	57	60
6	68	54	53	59	57	58	58	59	54	59	61	65	61	52	64	59
7	62	58	62	63	60	62	57	63	62	54	58	61	59	74	62	61
8	66	57	58	56	61	63	67	56	51	58	62	56	58	64	60	60
9	59	55	54	53	57	58	59	58	51	59	62	61	59	54	57	57
10	56	50	52	60	51	57	55	56	57	54	51	53	56	70	57	56
11	57	63	58	68	69	59	56	55	54	62	58	62	67	62	69	61
12	54	55	64	63	59	60	62	60	59	54	53	56	57	53	58	58
Hourly Mean																59

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	68.7	54,454	93	6	9	97	4	10	2 planes.
2	69.1	57,020	66	0	4	47	3	4	
3	67.4	46,885	84	5	1	78	5	7	car honked.
4	67.2	45,817	74	4	3	90	2	6	1 aircraft (North)
5	68.9	55,722	70	0	3	80	6	7	
6	68.5	53,215	65	5	3	104	3	11	1 aircraft (North)
7	69.5	59,708	70	6	4	68	4	8	1 aircraft (North)
8	67.2	45,817	90	8	7	90	2	7	
9	68.8	55,085	93	2	2	76	6	6	
10	68.2	51,408	107	3	9	70	3	8	
11	69.3	58,349	77	2	4	85	7	11	2 aircraft (North)
12	68.3	52,003	86	4	4	77	2	6	
Total	Mean 68.4	Leq dBA 68.5	975	45	53	962	47	91	Aircraft were over other site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1992
Direction: NB

Date: 3/16
Start Time: 1:45 PM
End Time: 2:45 PM
Meter Name: OSO
Amb. Temp: 84 F

Cal. Time/Period: 1:15 PM - 5 min x 3
Cal. Values OSO LUCKY d.
1 70.4 70.3 0.1
2 72.9 72.9 0.0
3 71.3 71.3 0.0

Site Description
I-19 between K.M.P. 97-98.
46 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	63	59	63	64	61	77	57	58	59	60	64	61	65	57	58	62
2	52	53	61	55	53	55	55	60	62	50	57	70	53	61	61	57
3	54	56	54	61	63	61	62	59	58	62	57	55	56	64	60	59
4	59	63	53	52	57	58	57	58	60	54	65	70	56	53	61	58
5	65	62	62	57	55	62	57	62	61	62	48	64	55	60	54	59
6	54	57	65	58	60	59	54	54	52	64	65	56	57	59	54	58
7	61	54	53	55	54	57	54	59	59	72	52	56	53	63	56	57
8	54	57	52	58	52	63	64	61	59	56	57	59	53	47	51	56
9	66	61	56	58	55	53	54	62	59	68	58	67	64	61	55	60
10	56	61	64	70	56	58	60	56	52	60	54	57	54	55	58	58
11	61	58	56	60	52	57	61	59	67	58	51	56	53	60	64	58
12	59	63	55	59	71	55	59	57	59	66	60	56	57	61	58	60
Hourly Mean																59

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	70.5	66,993	66	2	4	74	2	5	2 AF jets, tandem
2	70.5	66,993	94	7	8	69	3	4	
3	71.0	70,963	91	5	12	88	6	10	
4	71.6	76,038	93	2	8	73	6	9	2 AF jets; 1 commer.
5	70.1	63,978	88	5	7	88	7	5	
6	69.9	62,522	86	8	6	92	3	5	1 commercial jet
7	79.7	193,210	85	7	3	93	4	7	1 cessna; truck honks
8	69.6	60,399	115	2	8	92	4	3	1 cessna
9	70.6	67,769	81	8	8	77	3	4	
10	70.3	65,468	112	8	7	75	2	6	
11	71.1	71,784	103	5	4	104	3	4	
12	70.5	66,993	108	2	10	95	4	1	
Total	Mean 71.3	Leq dBA 71.8	1122	61	85	1020	47	63	Aircraft were directly over this site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: NB

Date: 3/16
Start Time: 1:45 PM
End Time: 2:45 PM
Meter Name: LUCKY
Amb. Temp: 84 F

Cal. Time/Period: 1:15 PM - 5 min x 3			
Cal. Values	OSO	LUCKY	d.
1	70.4	70.3	0.1
2	72.9	72.9	0.0
3	71.3	71.3	0.0

Site Description
I-19 between K.M.P. 96-97.
46 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	51	53	52	50	55	59	61	63	54	56	55	60	61	58	54	56
2	58	56	52	60	58	57	55	62	65	62	69	50	57	61	68	59
3	54	59	58	62	58	56	53	72	57	58	50	61	58	57	56	58
4	62	52	51	55	52	54	56	60	55	62	61	55	64	64	57	57
5	64	66	68	66	65	61	59	61	60	63	64	59	55	54	52	61
6	53	52	52	55	59	55	52	59	54	56	53	55	56	62	63	56
7	68	62	58	62	60	59	52	62	64	58	61	51	56	55	61	59
8	60	55	57	62	60	59	62	56	59	57	56	71	60	58	58	59
9	54	55	54	57	62	61	59	58	54	63	54	57	64	55	61	58
10	57	54	55	61	64	53	60	51	53	64	57	55	48	62	54	57
11	60	66	60	64	63	58	65	66	58	55	57	56	57	61	57	60
12	50	54	44	67	55	62	63	57	53	59	56	60	53	56	61	57
Hourly Mean																58

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	73.0	89,337	93	4	7	82	3	6	2 AF jets, tandem
2	72.6	85,316	104	4	9	71	3	4	
3	73.5	94,630	86	5	12	96	5	11	
4	73.1	90,371	92	2	3	77	6	9	4 AF jets;
5	72.9	88,314	90	4	6	91	7	4	2 pickup trucks pass
6	72.1	80,543	81	10	6	83	2	4	3 cars pass
7	72.3	82,420	98	6	5	98	4	7	
8	72.8	87,303	109	4	6	90	1	3	2 cars pass
9	72.8	87,303	94	6	5	90	1	4	1 AF jet.
10	72.4	83,374	114	7	5	70	0	7	
11	72.3	82,420	114	9	5	106	3	5	
12	73.7	96,834	102	2	11	107	5	1	1 car passes
Total	Mean 72.8	Leq dBA 72.8	1177	63	80	1061	40	65	Aircraft were directly over other site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1992
Direction: NB

Date: 3/16
Start Time: 3:00 PM
End Time: 4:00 PM
Meter Name: OSO
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 between K.M.P. 97-98.
97 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	60	66	51	53	47	58	58	52	71	64	56	53	62	56	60	58
2	55	53	60	62	54	53	57	60	61	53	62	56	50	51	58	56
3	59	55	51	67	61	53	57	56	54	67	57	53	56	65	53	58
4	52	54	53	60	55	59	62	57	60	52	63	53	65	54	57	57
5	51	67	54	58	64	60	55	61	58	54	66	62	54	59	64	59
6	61	53	57	62	56	61	58	63	51	59	69	58	57	60	59	59
7	54	56	65	66	59	50	58	56	65	55	62	68	52	54	57	58
8	65	63	59	57	53	69	51	54	67	58	59	52	56	62	55	59
9	67	59	60	56	55	57	66	53	60	63	58	59	61	64	53	59
10	57	53	54	65	71	64	56	55	68	52	54	56	72	60	63	60
11	66	58	62	55	58	59	53	67	56	53	54	59	60	63	55	59
12	51	57	63	67	66	61	54	58	56	69	50	52	61	59	62	59
	Hourly Mean															58

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	67.8	49,094	106	3	9	95	3	5	Cessna
2	67.8	49,094	116	5	2	93	6	5	Commercial jet
3	68.0	50,238	125	7	3	108	1	4	
4	65.0	35,566	120	5	2	107	2	7	
5	67.0	44,774	112	2	5	105	1	5	Cessna
6	66.7	43,254	111	2	6	99	3	10	2 cars drive by mike
7	66.4	41,786	115	4	6	87	4	9	Backhoe and car
8	66.4	41,786	167	1	6	96	5	8	(compressor noise for
9	67.1	45,293	132	7	5	105	4	6	rest of measurement
10	65.8	38,997	173	8	5	122	4	2	from nearby house)
11	67.4	46,885	189	6	4	102	3	6	
12	65.7	38,550	193	5	5	99	3	7	
Total	Mean 66.8	Leq dBA 66.8	1659	55	58	1218	39	74	Aircraft flew directly over this site.

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: NB

Date: 3/16
Start Time: 3:00 PM
End Time: 4:00 PM
Meter Name: LUCKY
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 between K.M.P. 96-97.
97 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	54	62	65	66	59	56	55	59	62	58	54	58	64	60	64	60
2	71	56	60	58	59	62	60	54	56	59	66	72	64	56	55	61
3	57	60	70	51	54	65	57	62	67	60	55	55	59	67	60	60
4	60	55	56	64	63	62	55	55	54	55	53	60	56	63	55	58
5	63	59	57	56	62	61	56	53	60	52	62	54	55	55	53	57
6	62	62	55	65	57	60	58	59	58	61	57	55	59	67	62	60
7	57	60	66	56	59	55	56	66	53	59	52	57	67	68	70	60
8	64	60	59	69	54	72	48	50	62	64	57	62	58	65	62	60
9	60	59	57	63	63	60	63	56	56	66	59	64	63	57	58	60
10	62	66	60	58	51	60	65	66	62	63	61	64	60	65	64	62
11	53	68	59	62	55	68	59	57	60	55	58	61	57	62	51	59
12	58	55	57	60	56	54	57	57	61	54	56	60	60	55	50	57
Hourly Mean																59

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	66.7	43,254	123	6	3	106	3	4	
2	68.2	51,408	125	6	4	114	3	5	car passes meter
3	66.8	43,755	131	9	2	100	1	6	car passes meter
4	66.7	43,254	126	3	3	106	2	5	2 cars pass meter
5	69.7	61,098	133	5	4	107	1	6	2 cars pass meter
6	68.3	52,003	123	4	3	87	4	9	car, helicopter
7	69.3	58,349	132	8	5	104	5	10	3 cars pass meter
8	68.4	52,605	161	3	3	106	3	8	
9	68.1	50,819	136	7	6	97	2	5	
10	68.2	51,408	176	7	8	137	3	2	
11	69.9	62,522	165	15	4	107	0	7	4 cars pass meter
12	68.4	52,605	150	8	2	87	1	7	2 cars pass meter
Total	Mean 68.2	Leq dBA 68.3	1681	81	47	1258	28	74	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: SB

Date: 3/17
Start Time: 8:15 AM
End Time: 9:00 AM
Meter Name: LUCKY
Amb. Temp: 68 F

Cal. Time/Period: 7:35 AM - 5 min x 2
Cal. Values
OSO LUCKY d.
1 75.9 75.7 0.2
2 76.4 76.2 0.2
3

Site Description
I-19 near K.M.P. 96.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	58	61	63	58	59	58	57	58	66	58	64	62	57	63	62	60
2	59	59	67	56	54	62	62	55	60	65	60	61	59	61	55	60
3	63	59	62	62	71	60	61	58	59	68	59	66	58	65	56	62
4	54	62	59	59	58	66	65	56	63	64	64	57	54	60	69	61
5	60	66	61	65	64	67	65	60	51	59	57	60	53	50	59	60
6	56	53	59	54	57	55	57	57	54	61	60	64	55	57	63	57
7	63	61	57	70	54	55	59	63	57	54	50	52	58	61	57	58
8	65	56	67	59	60	57	64	63	68	54	52	59	65	58	55	60
9	57	64	53	52	56	59	57	61	56	58	64	55	59	63	52	58
10																
11																
12																
45 Min. Mean																60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	76.5	133,669	97	2	4	72	11	13	
2	75.9	124,747	104	4	6	84	5	9	
3	75.4	117,769	77	3	6	81	5	3	
4	75.3	116,421	85	4	5	67	7	4	
5	75.7	121,907	89	3	0	77	8	8	4 AF jets
6	75.9	124,747	78	3	2	91	7	5	1 commercial jet
7	75.6	120,512	79	2	4	86	4	7	2 AF jets
8	75.8	123,319	110	5	4	93	2	3	2 AF jets
9	74.1	101,398	70	2	3	70	3	3	1 commercial jet
10			65	7	4	81	4	3	
11			89	0	3	93	4	4	
12			77	6	8	70	5	9	
Total	Mean 75.6	Leq dBA 75.6	1020	41	49	965	65	71	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: PCC Grooved
Year: 1988
Direction: SB

Date: 3/17
Start Time: 8:15 AM
End Time: 9:00 AM
Meter Name: OSO
Amb. Temp: 68 F

Cal. Time/Period: 7:35 AM - 5 min x 2
Cal. Values OSO LUCKY d.
1 75.9 75.7 0.2
2 76.4 76.2 0.2
3

Site Description
I-19 south of K.M.P. 94.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	69	72	63	66	64	61	63	57	59	64	49	68	69	62	59	63
2	56	67	65	64	68	63	62	59	65	63	57	64	65	61	62	63
3	55	60	67	58	63	66	57	58	63	56	62	58	67	51	56	60
4	57	59	66	57	63	55	65	63	55	53	57	55	56	66	67	60
5	60	59	60	64	65	63	70	63	66	50	60	58	62	54	61	61
6	66	56	56	63	61	59	69	61	52	62	64	57	64	65	58	61
7	60	59	62	52	63	62	56	60	58	55	59	61	62	51	59	59
8	62	63	57	72	56	62	57	54	71	64	63	58	58	62	55	61
9	51	68	53	70	62	56	62	53	64	59	61	60	59	58	59	60
10																
11																
12																
45 Min. Mean																61

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	78.6	170,228	33	3	2	35	4	10	
2	77.2	144,887	35	0	3	56	6	9	
3	76.7	136,782	34	2	4	52	3	3	
4	76.9	139,968	26	0	4	47	2	7	1 Cessna
5	76.7	136,782	32	3	0	54	3	7	
6	76.7	136,782	44	1	2	51	2	6	
7	76.8	138,366	48	1	6	71	6	9	1 2-prop aircrft.
8	76.6	135,217	47	2	2	57	3	4	
9	76.1	127,653	46	3	3	53	2	5	
10			43	2	2	43	3	3	
11			47	1	6	77	11	5	
12			50	4	0	53	2	6	
Total	Mean 76.9	Leq dBA 76.9	485	22	34	649	47	74	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: PCC Grooved
Year: 1988
Direction: SB

Date: 3/17
Start Time: 9:15 AM
End Time: 10:00 AM
Meter Name: OSO
Amb. Temp: 83 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 south of K.M.P. 94.
83 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	51	60	57	65	62	58	62	67	70	64	66	57	48	67	48	60
2	58	68	62	48	55	48	76	55	58	60	64	62	56	59	61	59
3	64	53	51	54	63	56	62	61	56	60	58	62	62	50	59	58
4	57	59	62	58	62	60	59	56	53	63	51	67	65	60	65	60
5	52	55	56	52	67	69	70	68	56	55	56	69	66	63	60	61
6	66	66	54	54	60	55	56	61	62	62	56	59	58	58	62	59
7	58	56	59	56	58	60	60	60	50	63	65	54	59	58	56	58
8	59	59	62	55	74	69	50	51	68	62	52	66	56	52	73	61
9	65	62	53	56	71	56	67	71	56	60	63	55	59	61	63	61
10																
11																
12																
45 Min. Mean																60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	68.6	53,831	43	2	2	59	11	3	
2	69.7	61,098	47	1	6	50	2	6	
3	69.9	62,522	50	4	0	59	10	6	
4	70.2	64,719	47	7	8	51	4	16	
5	68.1	50,819	46	1	4	50	4	6	
6	69.9	62,522	49	3	1	60	2	6	
7	68.9	55,722	57	3	5	45	1	6	
8	68.5	53,215	61	4	2	54	3	8	
9	68.8	55,085	43	1	6	43	2	6	
10			53	0	4	52	4	6	
11			45	2	2	23	2	3	
12			49	3	4	50	4	7	
Total	Mean 69.2	Leq dBA 69.2	590	31	44	596	49	79	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: SB

Date: 3/17
Start Time: 9:10 AM
End Time: 10:00 AM
Meter Name: LUCKY
Amb. Temp: 83 F

Cal. Time/Period: See previous measurement.			
Cal. Values	OSO	LUCKY	d.
1			
2			
3			

Site Description
I-19 near K.M.P. 96.
83 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	58	51	50	65	57	58	64	56	58	60	55	57	58	57	63	58
2	59	67	61	57	56	64	54	57	59	61	61	60	56	57	67	60
3	61	55	59	64	71	54	57	53	56	68	64	56	64	58	51	59
4	59	64	65	61	55	59	64	59	58	57	62	65	54	64	57	60
5	61	58	54	56	67	64	60	58	56	51	53	54	61	62	61	58
6	67	63	64	68	62	67	54	64	61	59	60	60	66	64		63
7	56	61	55	60	52	55	54	56	59	63	64	62	68	65	57	59
8	64	60	58	54	57	58	57	59	62	56	69	65	62	57	55	60
9	57	62	64	56	52	62	60	56	56	54	62	58	58	57	58	58
10	61	58	66	58	56	57	56	64	63	58	65	62	61	56	55	60
11																
12																
50 Min. Mean																59

Interval Noise/Traffic Dat	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	68.4	52,605	77	6	8	70	5	9	1 commercial jet
2	67.8	49,094	80	6	2	98	9	1	1 commercial jet
3	69.6	60,399	80	1	5	76	7	6	1 cessna (loud)
4	70.0	63,246	87	2	3	79	6	12	1 car honks, 4 AF jets
5	68.8	55,085	81	4	8	73	5	11	1 cessna
6	68.3	52,003	86	1	5	96	2	1	2 AF jets
7	68.1	50,819	85	3	4	97	3	6	1 commercial jet
8	68.4	52,605	89	4	7	77	3	10	1 car honks, 1 jet
9	68.0	50,238	104	4	3	80	3	5	
10	69.1	57,020	85	5	4	90	6	6	1 car honks
11			79	3	8	82	7	9	
12			103	5	4	74	7	8	
Total	Mean 68.7	Leq dBA 68.7	1036	44	61	992	63	84	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: PCC Grooved
Year: 1988
Direction: NB

Date: 3/17
Start Time: 11:00 AM
End Time: 11:50 AM
Meter Name: OSO
Amb. Temp: 84 F

Cal. Time/Period: 10:15 AM - 5 min x 3
Cal. Values OSO LUCKY d.
1 76.0 75.9 0.1
2 76.2 76.2 0.0
3 74.1 74.1 0.0

Site Description
I-19 south of K.M.P. 95.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	72	71	57	60	65	54	63	58	57	60	65	55	60	63	64	62
2	47	59	55	69	59	57	66	62	60	56	67	66	60	53	55	59
3	56	59	59	65	62	64	58	52	57	60	63	61	61	56	64	60
4	57	72	58	53	59	60	67	68	55	58	70	70	57	58	60	61
5	66	68	56	61	49	56	68	55	59	63	64	65	66	53	59	61
6	54	66	67	61	56	59	55	62	69	58	45	53	51	61	68	59
7	51	65	63	54	60	42	60	57	62	63	57	56	55	70	58	58
8	59	57	71	74	59	55	57	59	57	55	65	60	53	63	58	60
9	62	77	64	54	76	58	70	63	50	61	63	58	63	60	59	63
10	69	65	61	61	70	63	71	59	61	61	63	67	58	60	61	63
11																
12																
50 Min. Mean																61

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	75.5	119,132	53	0	5	46	2	5	1 cessna
2	74.2	102,572	54	4	4	61	3	5	
3	74.1	101,398	36	0	3	67	3	4	
4	74.5	106,177	50	1	3	66	1	9	
5	75.1	113,771	58	4	3	60	6	9	
6	73.7	96,834	61	1	1	58	0	10	
7	76.2	129,131	47	5	6	50	2	5	
8	74.6	107,406	59	1	3	79	3	4	
9	75.4	117,769	41	0	3	70	1	12	
10	74.9	111,181	44	2	5	55	3	10	
11			51	4	2	47	2	9	
12			56	3	2	51	5	4	
Total	Mean 74.8	Leq dBA 74.8	610	25	40	710	31	86	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: NB

Date: 3/17
Start Time: 11:05 AM
End Time: 11:50 AM
Meter Name: LUCKY
Amb. Temp: 84 F

Cal. Time/Period: 10:15 AM - 5 min x 3			
Cal. Values	OSO	LUCKY	d.
1	76.0	75.9	0.1
2	76.2	76.2	0.0
3	74.1	74.1	0.0

Site Description
I-19 near K.M.P. 96.
25 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	57	55	53	65	64	55	61	59	65	67	62	60	55	59	56	60
2	61	60	62	56	56	62	62	52	62	70	54	63	60	54	53	59
3	51	64	58	63	62	54	55	52	64	52	63	62	68	64	57	59
4	60	69	56	58	54	57	56	59	56	60	59	58	64	63	61	59
5	67	60	50	57	58	59	56	66	59	54	63	62	61	58	62	59
6	70	65	60	61	66	63	59	61	56	56	61	58	62	59	60	61
7	61	54	53	64	62	59	62	57	66	57	64	59	70	61	66	61
8	52	57	56	63	60	58	55	61	63	59	59	61	54	55	67	59
9	66	57	63	58	56	57	53	52	54	60	57	59	70	62	60	59
10																
11																
12																
45 Min. Mean																60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	74.4	104,961	96	7	4	86	8	7	2 aircraft
2	73.8	97,956	92	2	3	90	2	8	
3	74.4	104,961	85	7	3	94	4	9	
4	74.9	111,181	99	7	4	98	5	9	
5	74.0	100,237	91	4	0	85	0	10	1 aircraft
6	74.6	107,406	85	1	6	80	3	7	
7	74.5	106,177	94	11	2	107	1	4	1 aircraft
8	74.6	107,406	96	4	5	94	2	14	
9	74.9	111,181	87	6	7	87	7	13	
10			88	3	5	96	6	10	
11			88	6	7	70	5	3	
12			88	7	0	92	3	2	
Total	Mean 74.5	Leq dBA 74.5	1089	65	46	1079	46	96	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: PCC Grooved
Year: 1988
Direction: NB

Date: 3/17
Start Time: 12:00 PM
End Time: 12:50 PM
Meter Name: OSO
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 south of K.M.P. 95.
62 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	64	56	63	62	63	64	68	52	54	56	57	62	62	53	61	60
2	61	59	51	64	65	54	55	55	61	55	57	55	57	61	63	58
3	69	69	55	54	72	53	59	63	64	56	63	54	56	68	56	61
4	64	59	58	68	56	63	58	53	54	71	58	68	55	60	62	60
5	60	61	66	57	59	50	56	58	59	56	46	70	61	66	64	59
6	67	62	56	63	70	56	59	57	79	64	65	59	49	62	56	62
7	54	63	68	61	63	61	61	60	54	47	58	58	60	63	59	59
8	62	42	57	58	59	65	62	57	58	62	53	55	61	58	58	58
9	57	64	63	57	51	62	55	49	64	55	62	59	70	54	68	59
10	62	54	62	62	64	61	55	58	54	63	63	64	72	61	60	61
11																
12																
	50 Min. Mean															60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	69.1	57,020	50	5	2	68	0	10	
2	69.2	57,681	66	2	3	50	3	7	
3	70.1	63,978	55	2	5	62	2	7	
4	69.9	62,522	39	1	2	43	3	8	
5	69.9	62,522	48	2	4	57	4	9	
6	69.0	56,368	35	0	4	51	6	7	
7	68.6	53,831	37	1	1	61	5	13	
8	69.6	60,399	46	1	5	52	1	7	
9	69.2	57,681	50	2	4	49	4	7	
10	69.1	57,020	53	4	4	65	1	9	
11			48	2	3	56	3	8	
12			48	2	3	56	3	8	
Total	Mean 69.4	Leq dBA 69.4	575	24	40	670	35	101	

ROADSIDE NOISE DATA COLLECTION SHEET

Location: 4
Pavement Type: ARACFC
Year: 1988
Direction: NB

Date: 3/17
Start Time: 12:00 PM
End Time: 12:50 PM
Meter Name: LUCKY
Amb. Temp: 84 F

Cal. Time/Period: See previous measurement.
Cal. Values OSO LUCKY d.
1
2
3

Site Description
I-19 north of K.M.P. 96.
62 feet from edge of nearest travel lane.

Interval Speed Data	Number															Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	58	59	62	60	53	62	65	67	62	57	55	57	56	55	51	59
2	60	57	51	66	59	57	62	60	59	58	62	62	61	55	57	59
3	57	56	66	63	57	62	65	67	57	65	60	55	62	61	56	61
4	68	68	62	59	58	60	64	59	55	59	63	56	58	57	65	61
5	56	57	63	62	59	52	62	63	56	58	61	69	63	56	62	60
6	56	59	65	64	58	64	57	59	58	56	68	53	57	60	56	59
7	63	60	54	66	62	58	54	60	62	59	55	61	64	55	61	60
8	65	66	57	67	61	56	56	58	57	58	65	54	62	64	59	60
9	51	54	63	56	58	61	62	70	62	58	57	56	59	67	55	59
10	54	58	60	72	58	64	60	65	63	51	62	53	60	59	61	60
11																
12																
50 Min. Mean																60

Interval Noise/Traffic Data	Leq	Average Sound Pressure	NB			SB			Interval Notes
			CAR	MT	HT	CAR	MT	HT	
1	70.4	66,226	88	7	0	92	3	12	
2	70.9	70,150	98	8	6	77	3	7	
3	70.5	66,993	100	3	2	91	3	7	
4	70.2	64,719	91	3	5	86	4	8	1 aircraft
5	70.4	66,226	92	8	5	92	4	6	1 aircraft
6	70.6	67,769	83	3	5	95	5	6	3 aircraft
7	71.1	71,784	104	5	5	78	7	14	2 aircraft
8	70.6	67,769	84	1	5	87	0	8	1 aircraft
9	70.3	65,468	99	5	4	90	3	8	
10	70.8	69,347	102	3	5	80	2	9	1 aircraft
11			95	1	1	93	3	1	
12			70	2	3	84	1	13	
Total	Mean 70.6	Leq dBA 70.6	1106	49	46	1045	38	99	

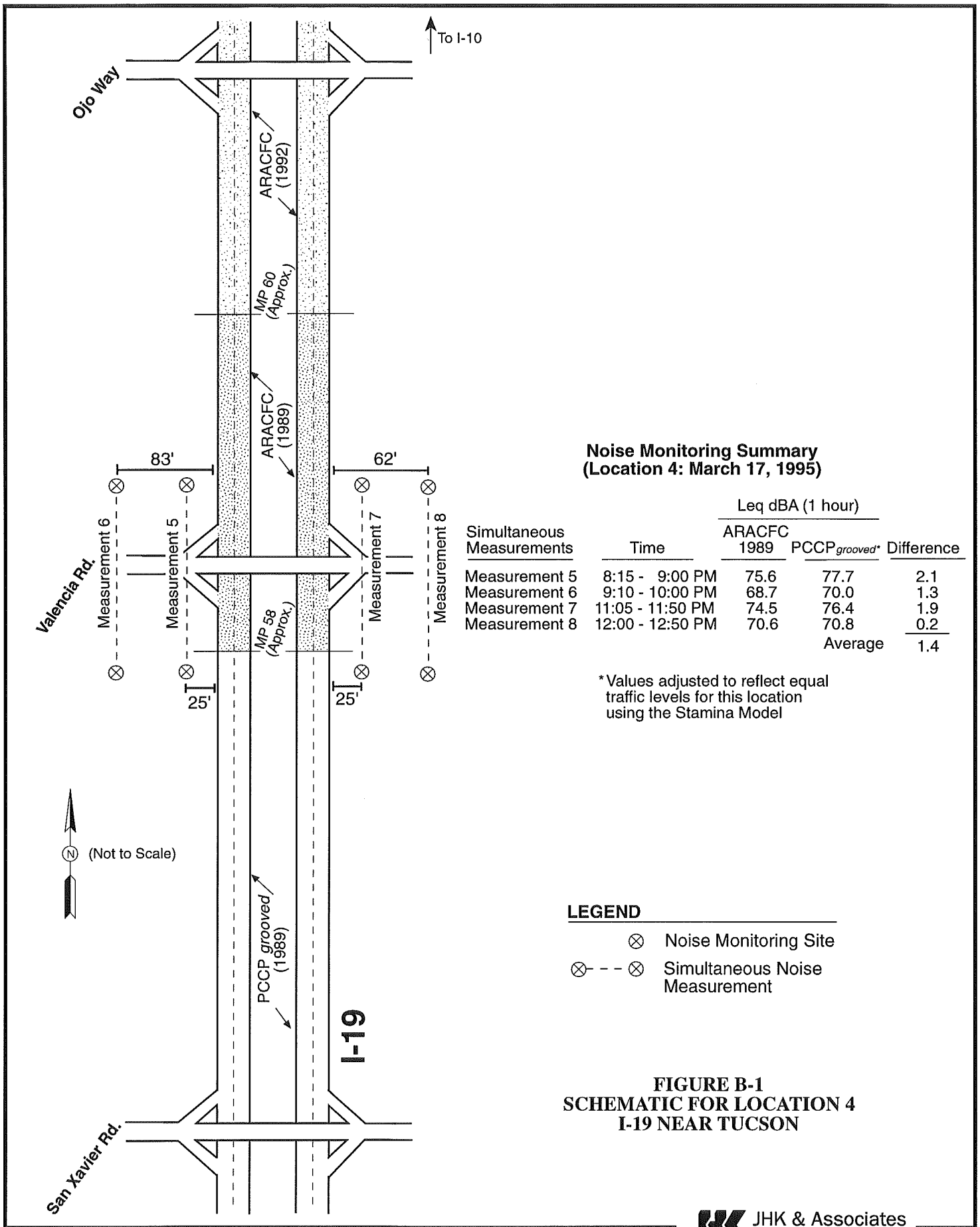
APPENDIX B
ADJUSTMENT MADE TO LOCATION 4 NOISE MEASUREMENTS
(Stamina 2.0 Noise Prediction Model)

As discussed in Chapter 4, the transition between the grooved PCCP and the 1988 ARACFC freeway segments occurs near a service interchange location (see Figure B-1). Because of the interchange, different traffic volumes were present on the adjoining freeway segments during the simultaneous roadside noise measurements (measurements 5 - 8, shown on Figure B-1). To ensure that a fair comparison is made between the noise levels produced by the two surface types, it is important that traffic volumes for both segments be similar. FHWA's traffic noise prediction model, STAMINA 2.0, was used to adjust the noise levels measured at sites adjacent to the PCCP freeway segment to reflect the higher traffic volumes observed on the ARACFC segment. The following discussion details how the STAMINA model was used to make this adjustment.

The STAMINA model uses site specific information including traffic volume, average speed, vehicle classification data, roadway-receiver geometry and site acoustical properties to predict hourly average (Leq) noise levels at selected noise receiver locations. The STAMINA model was first calibrated so that noise levels predicted by the model would be identical to field-measured noise levels. Information collected at each PCCP measurement site was input into the model, including roadway-receiver geometry, hourly traffic volumes (for cars, medium trucks and heavy trucks), and average speeds. A summary of the traffic assumptions and the modeling results for the roadside noise measurements is provided in Table B-1.

As shown in Table B-1, STAMINA modeling results were slightly different than field-measured noise levels at each measurement site. Modeling parameters known as "shielding factors" were used to adjust these modeled noise levels to be identical to the field-measured values. A shielding factor is a real number that is applied to a modeled noise level after the noise calculations have been performed. These factors are normally used to account for additional attenuation caused by shielding from buildings, house rows, or other terrain features. Negative shielding factors can also be used to provide an increase in modeled noise levels. Table B-1 shows the shielding factors used in the STAMINA model to calibrate field measured noise levels with modeled noise levels. By including the shielding factors shown in Table B-1, modeled noise levels were identical to the field measured noise levels at each PCCP monitoring site.

After model calibration, the traffic assumptions used in the STAMINA model were adjusted. For each PCCP monitoring site, traffic volumes were changed to reflect the same traffic volumes and vehicle mix counted on the adjacent 1988 ARACFC segment. Table B-2 provides the traffic assumptions and the resulting modeled noise levels after making the adjustment in traffic. Using this modeling process, the noise levels measured at the PCCP monitoring sites were adjusted to reflect the same traffic conditions found on the 1988 ARACFC segment. Noise levels presented for the PCCP measurement sites in Figure B-1 reflect this adjustment.



LEGEND

- ⊗ Noise Monitoring Site
- ⊗ - - - ⊗ Simultaneous Noise Measurement

**FIGURE B-1
SCHEMATIC FOR LOCATION 4
I-19 NEAR TUCSON**

TABLE B-1
CALIBRATION OF STAMINA 2.0 FOR ROADSIDE TRAFFIC NOISE MEASUREMENTS
(Used for Location 4 - Grooved PCCP Measurement Sites)

Measurement Number	Traffic Direction/ Setback Distance	Hourly Traffic Volume						Average Speed	Leq dBA		Shielding Factor Adjustment
		CARS	NB	MT	HT	CARS	MT	HT	Measured	Modeled	
Measurement 5	SB - 25 feet	485	22	34	34	649	47	74	76.9	76.1	-0.8
Measurement 6	SB - 83 feet	590	31	44	44	596	49	79	69.2	70.5	1.3
Measurement 7	NB - 25 feet	610	25	40	40	710	31	86	74.8	74.7	-0.1
Measurement 8	NB - 62 feet	575	24	40	40	670	35	101	69.4	70.8	1.4

TABLE B-2
STAMINA 2.0 MODELING RESULTS AFTER ADJUSTING FOR TRAFFIC FLOW
 (Used for Location 4 - Grooved PCCP Measurement Sites)

Measurement Number	Traffic Direction/ Setback Distance	Hourly Traffic Volume						Average Speed	Leq dBA Modeled
		CARS	NB	MT	HT	CARS	SB		
Measurement 5	SB - 25 feet	1020	41	49	49	965	65	61	77.7
Measurement 6	SB - 83 feet	1036	44	61	61	992	63	59	70.0
Measurement 7	NB - 25 feet	1089	65	46	46	1079	46	60	76.4
Measurement 8	NB - 62 feet	1106	49	46	46	1045	38	60	70.8

After model calibration, the traffic assumptions used in the STAMINA model were adjusted. For each PCCP monitoring site, traffic volumes were changed to reflect the same traffic volumes and vehicle mix counted on the adjacent 1989 ARACFC segment. Table B-2 provides the traffic assumptions and the resulting modeled noise levels after making the adjustment in traffic. Using this modeling process, the noise levels measured at the PCCP monitoring sites were adjusted to reflect the same traffic conditions found on the 1988 ARACFC segment. Noise levels presented for the PCCP measurement sites in Figure B-1 reflect this adjustment.

STAMINA 2.0 MODEL CALIBRATION OUTPUT FILES

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
 MODIFIED FROM FHWA VERSION 3 (MARCH 1983)
 TRAFFIC NOISE PREDICTION MODEL

MODIFIED TO:

1. ALLOW EQUIVALENT SPEEDS BELOW 30 MPH PER NCHRP 311;
2. CORRECT MEDIUM TRUCK BARRIER CALCULATION ERROR BY USING VEH4, VEH5 AND VEH6 FOR CARS, MT AND HT; AND
3. PLACE REFERENCE ENERGY MEAN EMISSION LEVELS IN A DATA FILE CALLED REMEL.DTA TO ALLOW USER TO USE LEVELS OTHER THAN THE FHWA NATIONAL AVERAGES.

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NOTE:

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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 25 feet from roadway edge (SB)

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	649.	61.0
	VEH5	47.	61.0
	VEH6	74.	61.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-113.0	-1000.0	.0 0
2	-113.0	1000.0	.0 0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	485.	61.0
	VEH5	22.	61.0
	VEH6	34.	61.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-12.0	-1000.0	.0 0
2	-12.0	1000.0	.0 0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
25 feet	-150.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * .5
2 * .5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * -.8
2 * -.8

RECEIVER	LEQ(H)	L10
25 feet	76.9	80.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1 1
76.6
2 1
65.1

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 Version 1.35

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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 83 feet from roadway edge

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	596.	60.0
	VEH5	49.	60.0
	VEH6	79.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-113.0	-1000.0	.0 0
2	-113.0	1000.0	.0 0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	590.	60.0
	VEH5	31.	60.0
	VEH6	44.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-12.0	-1000.0	.0 0
2	-12.0	1000.0	.0 0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
83 feet	-208.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	.5
2 *	.5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	1.3
2 *	1.3

RECEIVER	LEQ(H)	L10
83 feet	69.2	72.6

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	68.3
2	1
	61.6

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
 MODIFIED FROM FHWA VERSION 3 (MARCH 1983)
 TRAFFIC NOISE PREDICTION MODEL

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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 25 feet from roadway edge (NB)

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

VEH4	710.	61.0
VEH5	31.	61.0
VEH6	86.	61.0

	-----COORDINATES-----			
	X	Y	Z	GRADE
1	-113.0	-1000.0	.0	0
2	-113.0	1000.0	.0	0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	610.	61.0
	VEH5	25.	61.0
	VEH6	40.	61.0

	-----COORDINATES-----			
	X	Y	Z	GRADE
1	-12.0	-1000.0	.0	0
2	-12.0	1000.0	.0	0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
25 feet	25.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	.5
2 *	.5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	-.1
2 *	-.1

RECEIVER	LEQ(H)	L10
25 feet	74.8	78.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	67.5
2	1
	73.9

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
 MODIFIED FROM FHWA VERSION 3 (MARCH 1983)
 TRAFFIC NOISE PREDICTION MODEL

MODIFIED TO:

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2. CORRECT MEDIUM TRUCK BARRIER CALCULATION ERROR BY USING VEH4, VEH5 AND VEH6 FOR CARS, MT AND HT; AND
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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 62 feet from roadway edge (NB)

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	670.	60.0
	VEH5	35.	60.0
	VEH6	101.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-113.0	-1000.0	.0 0
2	-113.0	1000.0	.0 0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	575.	60.0
	VEH5	24.	60.0
	VEH6	40.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-12.0	-1000.0	.0 0
2	-12.0	1000.0	.0 0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
62 feet	62.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * .5
2 * .5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * 1.4
2 * 1.4

RECEIVER	LEQ(H)	L10
62 feet	69.4	72.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	64.7
2	1
	67.6

STAMINA 2.0 MODEL OUTPUTS
(Adjusted Traffic)

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
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 TRAFFIC NOISE PREDICTION MODEL

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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 25 feet from roadway edge

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	965.	61.0
	VEH5	65.	61.0
	VEH6	71.	61.0
	-----COORDINATES-----		
	X	Y	Z
1	-113.0	-1000.0	.0
2	-113.0	1000.0	.0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	1020.	61.0
	VEH5	41.	61.0
	VEH6	49.	61.0
	-----COORDINATES-----		
	X	Y	Z
1	-12.0	-1000.0	.0
2	-12.0	1000.0	.0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
25 feet	-150.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	.5
2 *	.5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 *	-.8
2 *	-.8

RECEIVER	LEQ (H)	L10
25 feet	77.7	81.1

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	77.2
2	1
	67.5

 STAM2VU1
 Version 1.35

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 TRAFFIC NOISE PREDICTION MODEL

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(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 83 feet from roadway edge

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	992.	59.0	
	VEH5	63.	59.0	
	VEH6	84.	59.0	
	-----COORDINATES-----			
	X	Y	Z	GRADE
1	-113.0	-1000.0	.0	0
2	-113.0	1000.0	.0	0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED	
	CARS	0.	30.0	
	HT	0.	30.0	
	MT	0.	30.0	
	VEH4	1036.	59.0	
	VEH5	44.	59.0	
	VEH6	61.	59.0	
	-----COORDINATES-----			
	X	Y	Z	GRADE
1	-12.0	-1000.0	.0	0
2	-12.0	1000.0	.0	0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
83 feet	-208.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * .5
2 * .5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * 1.3
2 * 1.3

RECEIVER	LEQ (H)	L10
83 feet	70.0	73.6

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	69.0
2	1
	63.2

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
 MODIFIED FROM FHWA VERSION 3 (MARCH 1983)
 TRAFFIC NOISE PREDICTION MODEL

MODIFIED TO:

1. ALLOW EQUIVALENT SPEEDS BELOW 30 MPH PER NCHRP 311;
2. CORRECT MEDIUM TRUCK BARRIER CALCULATION ERROR BY USING VEH4, VEH5 AND VEH6 FOR CARS, MT AND HT; AND
3. PLACE REFERENCE ENERGY MEAN EMISSION LEVELS IN A DATA FILE CALLED REMEL.DTA TO ALLOW USER TO USE LEVELS OTHER THAN THE FHWA NATIONAL AVERAGES.

MODIFIED FOR IBM-COMPATIBLE PC WITH MATH COPROCESSOR
 BY VANDERBILT UNIVERSITY, NASHVILLE, TN 37235
 AND BOWLBY & ASSOCIATES, INC.
 2014 BROADWAY, SUITE 210
 NASHVILLE, TN 37203-2425
 TEL 615-327-8130, FAX 615-327-8137

NOTE:

IN STAM2VU1, THE TRAFFIC DATA FROM THE ORIGINAL DATA FILE HAS BEEN SHIFTED TO CORRECT THE STAMINA 2.0 MEDIUM TRUCK CALCULATION ERROR. THIS SHIFT IS REFLECTED BELOW IN THE *.STA OUTPUT FILE. THE ORIGINAL DATA FILE IS UNCHANGED.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 25 feet from roadway edge

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	1079.	60.0
	VEH5	46.	60.0
	VEH6	96.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-113.0	-1000.0	.0 0
2	-113.0	1000.0	.0 0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	1089.	60.0
	VEH5	65.	60.0
	VEH6	46.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-12.0	-1000.0	.0 0
2	-12.0	1000.0	.0 0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
25 feet	25.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * .5
2 * .5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * -.1
2 * -.1

RECEIVER	LEQ (H)	L10
25 feet	76.4	79.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1	1
	68.3
2	1
	75.7

 STAM2VU1
 Version 1.35

 STAMINA 2.0/BCR
 MODIFIED FROM FHWA VERSION 3 (MARCH 1983)
 TRAFFIC NOISE PREDICTION MODEL

MODIFIED TO:

1. ALLOW EQUIVALENT SPEEDS BELOW 30 MPH PER NCHRP 311;
2. CORRECT MEDIUM TRUCK BARRIER CALCULATION ERROR BY USING VEH4, VEH5 AND VEH6 FOR CARS, MT AND HT; AND
3. PLACE REFERENCE ENERGY MEAN EMISSION LEVELS IN A DATA FILE CALLED REMEL.DTA TO ALLOW USER TO USE LEVELS OTHER THAN THE FHWA NATIONAL AVERAGES.

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NOTE:

IN STAM2VU1, THE TRAFFIC DATA FROM THE ORIGINAL DATA FILE HAS BEEN SHIFTED TO CORRECT THE STAMINA 2.0 MEDIUM TRUCK CALCULATION ERROR. THIS SHIFT IS REFLECTED BELOW IN THE *.STA OUTPUT FILE. THE ORIGINAL DATA FILE IS UNCHANGED.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

I-19 Grooved PCCP Calibration Run 62 feet from roadway edge

EMISSION LEVELS: FHWA NATIONAL (ENGLISH)

PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
.00	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)
.000	6	HEIGHT ADJUSTMENT FOR TYPE4 VEHICLES (VEH4)
		CARS--FHWA ENG
		C0 = 4.80 C1 = 38.05 S0 = 2.50
2.300	7	HEIGHT ADJUSTMENT FOR TYPE5 VEHICLES (VEH5)
		MT--FHWA ENG
		C0 = 22.06 C1 = 33.91 S0 = 3.37
8.000	8	HEIGHT ADJUSTMENT FOR TYPE6 VEHICLES (VEH6)
		HT--FHWA ENG
		C0 = 42.62 C1 = 24.56 S0 = 2.84

ROADWAY 1 SB I-19 MAINLINE

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.0
HT	0.	30.0
MT	0.	30.0

	VEH4	1045.	60.0
	VEH5	38.	60.0
	VEH6	99.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-113.0	-1000.0	.0 0
2	-113.0	1000.0	.0 0

ROADWAY 2 NB I-19 MAINLINE

	VEHICLE TYPE	VEHICLES/HOUR	SPEED
	CARS	0.	30.0
	HT	0.	30.0
	MT	0.	30.0
	VEH4	1106.	60.0
	VEH5	49.	60.0
	VEH6	46.	60.0
	-----COORDINATES-----		
	X	Y	Z GRADE
1	-12.0	-1000.0	.0 0
2	-12.0	1000.0	.0 0

RECEIVERS

	-----COORDINATES-----		
	X	Y	Z
62 feet	62.0	.0	5.0

ALPHA FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * .5
2 * .5

SHIELDING FACTORS - RECEIVER ACROSS, ROADWAY DOWN

1 * 1.4
2 * 1.4

RECEIVER	LEQ(H)	L10
62 feet	70.8	74.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 1.0 DBA

ROADWAY SEGMENT

1 1
65.1
2 1
69.4

APPENDIX C
ON-ROAD TIRE-PAVEMENT NOISE DATA

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.0

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	95.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	93.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.1
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.7
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.1
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	95.1
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	95.0
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	55	94.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	95.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.9

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	95.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	95.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	95.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	93.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	75	55	94.1
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.6
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.9
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	98.1
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.7
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.7
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.5
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	98.0

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.9
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.6
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.5
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.3
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.1
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.3
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	96.7
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.2
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.6
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.9
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.8
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.9
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.5
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.4
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	98.2
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.8
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.8
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.4
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.7
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.6
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.3
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.3
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	96.8
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	98.1
1	3/14	M.P. 108.95-105.95	EB	PCC, tined	1994	80	55	97.7
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.5
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.4
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.8
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	93.6
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.0
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.1
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.1
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.1
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.3
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.1
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.5
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	94.2
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	93.9
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	93.6
2	3/14	M.P. 194.5-198.78	NB	ARACFC	1992	70	55	93.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	91.9
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.2
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.0
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.2
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.2
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	91.9
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.3
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.3
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.4
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.3
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.5
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.3
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.0
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.6
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	91.8
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	91.7
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.7
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.4
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.2
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.4
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	93.1
2	3/14	M.P. 214.7-226.0	NB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.8
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.2
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.8
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.5
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.8
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.9
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.3
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.7
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	93.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	55	92.8

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	93.7
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	94.0
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.0
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.0
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	94.9
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	94.3
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.1
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.2
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.3
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	94.9
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.2
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	55	95.1
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	97.0
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	96.7
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	96.6
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	96.0
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	96.6
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	97.1
2	3/14	M.P. 198.78-199.9	NB	PCCP, ground	1991	70	55	96.3
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.2
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.2
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	98.4
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	98.0
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	98.7
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	98.7
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.3
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.8
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.4
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.8
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.6
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.7
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.6
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.5
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.6
2	3/14	M.P. 210.98-213.44	NB	PCCP, ground	1988	70	55	99.7
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	99.4
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	98.1
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	98.8
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	98.8
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	98.3
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	97.3
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	97.9
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	98.7
2	3/14	M.P. 213.44-210.98	SB	PCCP, ground	1988	70	55	99.9
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.0
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.9
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.6
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.3
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.2
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.0
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.4
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.8
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.3
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.9
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.0
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.3
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	97.9
3	3/15	M.P. 261.4-267.5	EB	PCCP, ground	1989	83	55	98.3
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	95.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	95.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.2
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.0
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	95.9
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	95.9
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.1
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	95.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.7
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.3
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	97.2
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	97.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	97.4
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	97.1
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 267.5-261.4	WB	PCCP, ground	1989	83	55	96.8
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	97.7
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	97.7
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	97.7
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	97.9
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	98.3
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	98.2
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	98.6
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	98.5
3	3/15	M.P. 260.4-254.5	WB	PCCP, ground	1983	83	55	98.0

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.2
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.1
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.0
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	97.8
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.3
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.5
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	97.3
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	97.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.6
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	99.9
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	99.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.4
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.1
3	3/15	M.P. 257-260.4	EB	PCCP, ground	1983	75	55	98.0
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	97.8
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	98.1
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	98.5
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	97.5
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	97.7
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.9
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.6
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.4
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.2
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.3
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	95.9
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.0
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.5
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	95.7
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	95.9
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.4
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.2
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	95.8
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.9
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.3
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.3
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.6
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.5
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	96.1
3	3/16	M.P. 261.4-267.5	EB	PCCP, ground	1989	70	55	95.8
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.0
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.5
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.3
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.9

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.0
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.6
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.1
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.9
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	95.1
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	94.0
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	94.9
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	93.5
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	93.1
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.5
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.5
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.3
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	92.8
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	92.6
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	92.8
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	92.7
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	93.6
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	93.8
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	93.8
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	94.3
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	94.2
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	55	94.4
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.6
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.0
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	91.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.4
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	55	92.6
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.2
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.4
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.8
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.9
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.5
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.5
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.8
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	91.7
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.3
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.0
4	3/16	M.P. 62.95-60.2	SB	ARACFC	1992	70	55	92.0
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.4
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	93.1
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.9
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.8
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.6
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.4
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.9
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.8
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.2
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	92.1
4	3/16	M.P. 60.2-58.48	SB	ARACFC	1988	70	55	93.8
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.0
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.0
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.9
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.3
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.0
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.6
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.7
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	94.7
4	3/16	M.P 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.4
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.6
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	95.3
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	55	94.8
4	3/16	M.P. 54.8-58.48	SB	PCC, grooved	1988	70	55	95.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 55 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.8
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.3
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.5
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.5
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	94.9
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.0
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.4
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.1
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.4
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.8
4	3/16	M.P. 58.48-54.8	SB	PCC, grooved	1988	70	55	95.5

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.7

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	74	65	97.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.2
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.3
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	98.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	98.0
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.7
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.1
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.5
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.9
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	96.4
1	3/14	M.P. 105.95-94.72	EB	ARACFC	1994	80	65	95.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.3
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.2
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.1
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.2
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.5
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.4
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.2
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	96.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.0
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.6
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	96.9
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	97.1
1	3/14	M.P. 112.2-108.95	EB	ARACFC	1994	80	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	95.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	95.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.2
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.2

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.0
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	97.1
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.8
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.9
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.3
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.6
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.5
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.4
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 94.72-112.2	WB	ARACFC	1994	74	65	96.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.6
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	101.0
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.5
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.5
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.5
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.4
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	99.9
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.1
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.3
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	99.9

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.0
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	74	65	100.5
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.8
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.6
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.4
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.4
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.4
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.4
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.3
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.2
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.1
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.1
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	99.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	99.7
1	3/14	M.P. 108.95-105.9	EB	PCC, tined	1994	80	65	100.3
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	94.1
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	93.7
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	93.7
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	94.5
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.9
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	94.9
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	94.7
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.2
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.6
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.7
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.8
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.6
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.5
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.3
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.1
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.5
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	96.0
2	3/14	M.P. 226.0-214.7	SB	ARACFC	1994	70	65	95.8
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	95.7
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	95.9
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	95.7
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	95.8
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	95.7
2	3/14	M.P. 198.78-194.5	SB	ARACFC	1992	70	65	96.6
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.9

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.4
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.4
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.5
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.5
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.4
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.1
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.2
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.1
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.5
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.2
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.8
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	98.9
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.0
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.6
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.3
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.9
2	3/16	M.P. 267.5-261.4	WB	PCC, ground	1989	70	65	99.3
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	101.1
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	101.1
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.9
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.7
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	101.2
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.7
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.5
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	101.0
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.6
3	3/15	M.P. 257-260.4	EB	PCC, ground	1983	75	65	100.2
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.7
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.1
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.1
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.2
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.5
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.2
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.2
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	97.9
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.9
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.5
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.7
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.5
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.9
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.9
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.2
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.3
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.7
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.0
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	99.1
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.6

ON-ROAD TIRE-PAVEMENT NOISE LEVELS AT 65 MPH

Location	Date	Location	Dir	Pavement Type	Age	Ambient Temp.	Test Speed	Leq (10-Sec)
3	3/15	M.P. 261.4-267.5	EB	PCC, ground	1989	75	65	98.4
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	95.0
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	94.8
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	95.0
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	95.1
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	95.9
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	96.0
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	96.1
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	96.2
4	3/16	M.P. 58.48-60.2	NB	ARACFC	1988	70	65	96.0
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.5
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.1
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.2
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.8
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.7
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.8
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	95.1
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	94.9
4	3/16	M.P. 60.2-62.95	NB	ARACFC	1992	70	65	95.3
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.6
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.1
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.5
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.1
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	98.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	98.1
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	98.0
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.2
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.3
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.6
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1988	70	65	97.3
4	3/16	M.P. 54.8-58.48	NB	PCC, grooved	1989	70	65	98.1

APPENDIX D
ON-ROAD AND ROADSIDE NOISE FREQUENCY DATA

On-Road Frequency Data

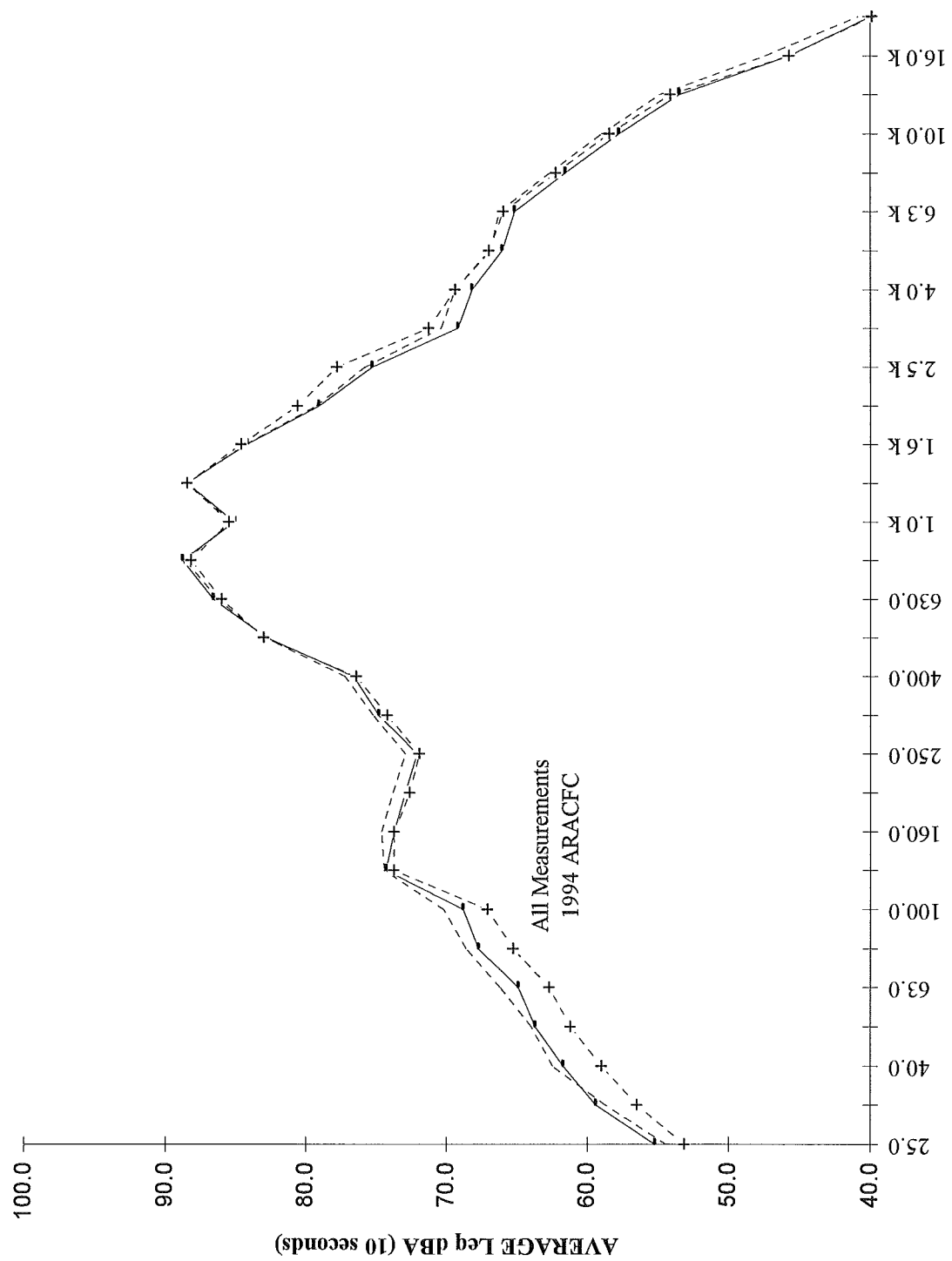
FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (55 Miles per Hour)

63.0	80.0	100.0	125.0	160.0	200.0	250.0	315.0	400.0	500.0	630.0	800.0	1.0 k	1.25 k
64.9	67.7	68.8	74.3	73.7	72.9	72.1	74.8	76.6	82.8	86.6	88.8	85.1	88.5
66.2	68.6	70.2	74.4	74.6	73.8	72.9	75.2	77.2	82.9	86.3	88.6	85.3	88.5
62.7	65.3	67.1	73.7	73.7	72.6	71.9	74.2	76.4	83.0	86.0	88.2	85.5	88.5
64.1	67.3	67.8	73.3	73.9	72.7	71.9	73.7	75.5	80.8	82.7	82.6	82.7	87.0
62.7	65.3	66.4	73.7	73.6	72.8	72.9	74.0	75.8	81.8	85.7	86.5	81.8	82.8
62.8	64.9	65.3	70.2	71.4	70.1	70.2	73.5	76.0	82.5	86.8	88.0	83.7	85.5
62.0	65.0	66.1	73.7	73.1	71.9	70.8	73.0	74.7	80.8	83.0	82.6	83.3	87.6
62.4	65.6	66.4	73.0	72.6	72.3	70.3	72.9	73.8	80.5	84.3	83.5	79.8	83.4
64.6	67.4	70.0	74.2	75.5	74.1	74.1	74.7	75.8	81.4	84.0	83.8	80.9	85.3
63.2	67.5	68.2	74.2	77.5	75.1	74.5	75.8	76.9	82.7	85.3	87.1	85.7	87.7
62.0	68.1	68.5	74.9	77.3	75.3	75.0	76.9	78.0	85.0	87.3	87.3	86.8	90.8
62.1	69.5	67.4	73.0	76.0	74.0	74.5	76.4	78.3	84.7	86.2	86.4	86.0	89.0

FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (55 Miles per Hour)

Location	Date	Type	Year	Location	Dir.	Speed	Temp	25.0	31.5	40.0	50.0
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	55	75	55.2	59.4	61.7	63.7
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	55	75	54.4	58.7	62.5	64.0
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	55	75	53.1	56.5	59.0	61.2
2	3/14	ARACFC	1992	M.P. 194.5-198.78	NB	55	70	53.0	56.9	60.0	62.0
2	3/14	ARACFC	1994	M.P. 214.7-226.0	NB	55	70	52.9	56.6	58.1	60.5
2	3/14	ARACFC	1994	M.P. 226.0-214.7	SB	55	70	51.6	55.7	58.1	60.1
2	3/14	ARACFC	1992	198.78-194.5	SB	55	70	48.6	54.8	57.9	60.1
4	3/16	ARACFC	1992	KMP 98	SB	55	78	52.1	55.5	57.7	60.1
4	3/16	ARACFC	1988	KMP 95	SB	55	78	53.9	57.5	59.6	62.2
4	3/16	PCC, grooved	1988	KMP 87.7-93.6	SB	55	78	51.6	56.4	59.0	60.8
3	3/15	PCC, ground	1983	M.P. 254.5-260.40	EB	55	75	50.0	53.7	56.4	59.3
2	3/14	PCC, ground	1991	M.P. 198.78-199.9	NB	55	70	51.5	54.7	57.2	59.3

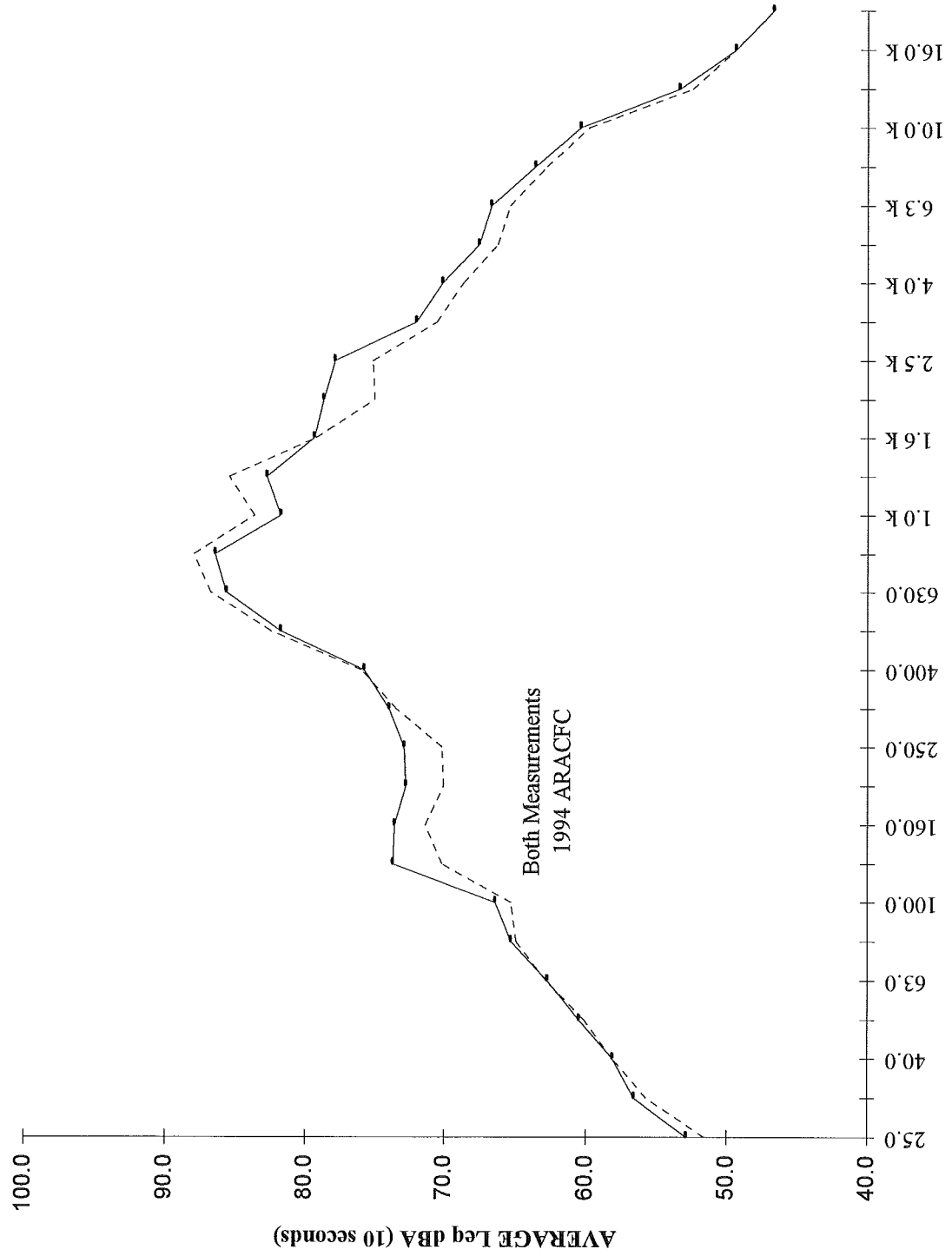
LOCATION 1
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



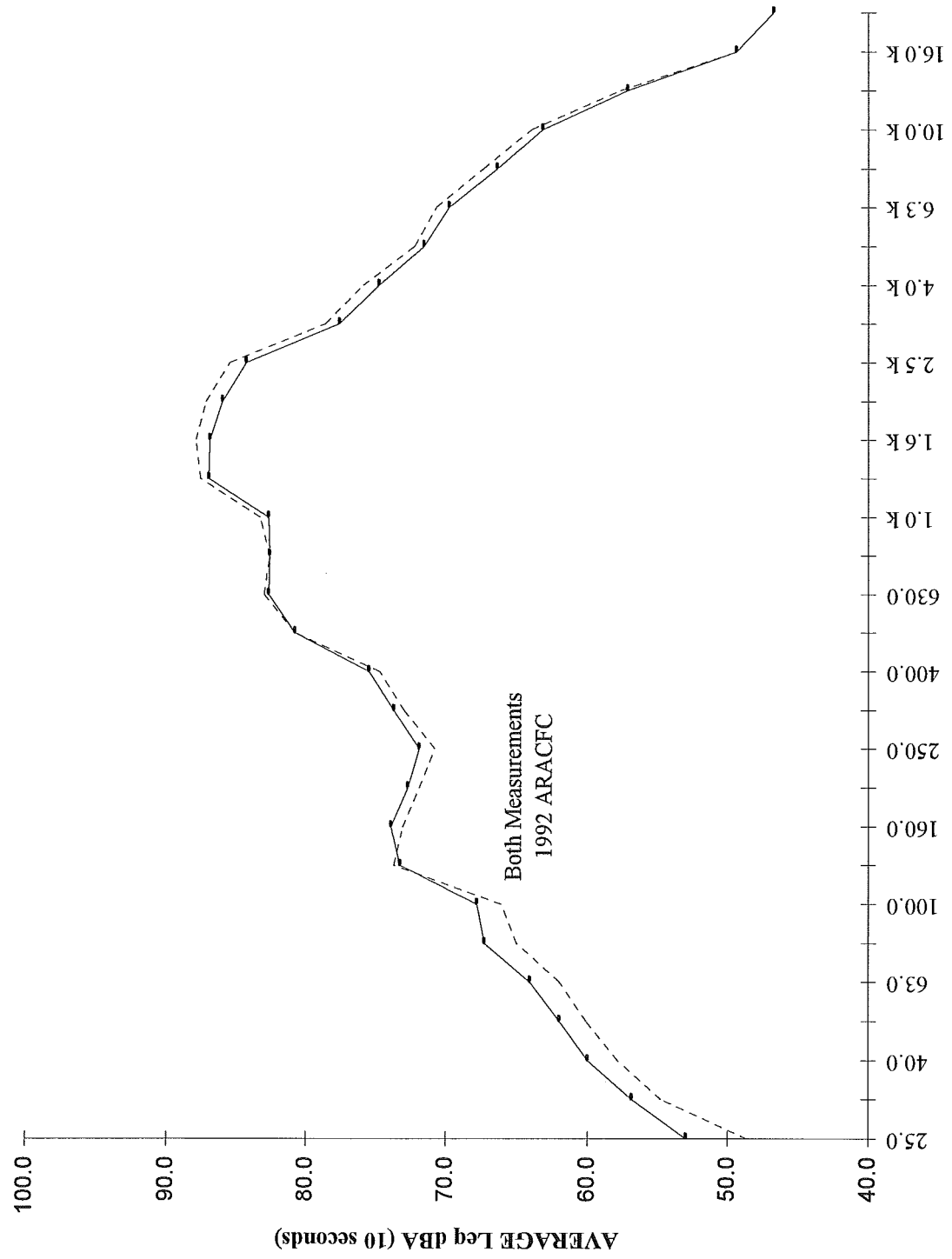
FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (55 Miles per Hour)

1.6 k	2.0 k	2.5 k	3.15 k	4.0 k	5.0 k	6.3 k	8.0 k	10.0 k	12.5 k	16.0 k	20.0 k	dB(A)
84.2	79.1	75.3	69.2	68.2	66.1	65.2	61.6	57.8	53.5	45.7	40.0	94.8
84.3	79.3	75.8	70.4	69.4	66.9	66.3	62.7	59.0	54.9	47.4	40.9	94.8
84.6	80.6	77.8	71.3	69.4	67.0	66.0	62.3	58.5	54.1	45.7	39.9	94.7
86.9	86.0	84.3	77.6	74.8	71.6	69.8	66.4	63.2	57.2	49.4	46.7	94.2
79.4	78.7	77.9	72.1	70.2	67.6	66.7	63.6	60.4	53.4	49.4	46.7	92.4
79.3	75.1	75.2	70.6	68.7	66.3	65.4	62.8	59.8	52.5	49.4	46.7	93.4
87.9	87.2	85.5	78.6	75.9	72.3	70.7	67.4	64.0	57.7	49.4	46.7	94.9
82.2	80.8	80.6	74.2	68.4	67.3	64.9	61.7	58.0	52.5	45.7	39.3	91.7
83.9	82.4	81.1	75.1	69.6	68.1	65.6	62.4	58.7	53.4	46.6	39.8	92.8
87.0	85.8	84.6	78.5	73.2	70.9	67.2	63.6	60.5	54.4	46.5	40.0	95.5
89.1	87.9	86.2	79.7	74.9	72.2	68.8	65.3	61.6	55.6	47.6	42.0	97.3
88.4	87.3	85.0	78.5	75.5	72.1	69.8	66.5	62.9	56.6	49.4	46.7	96.3

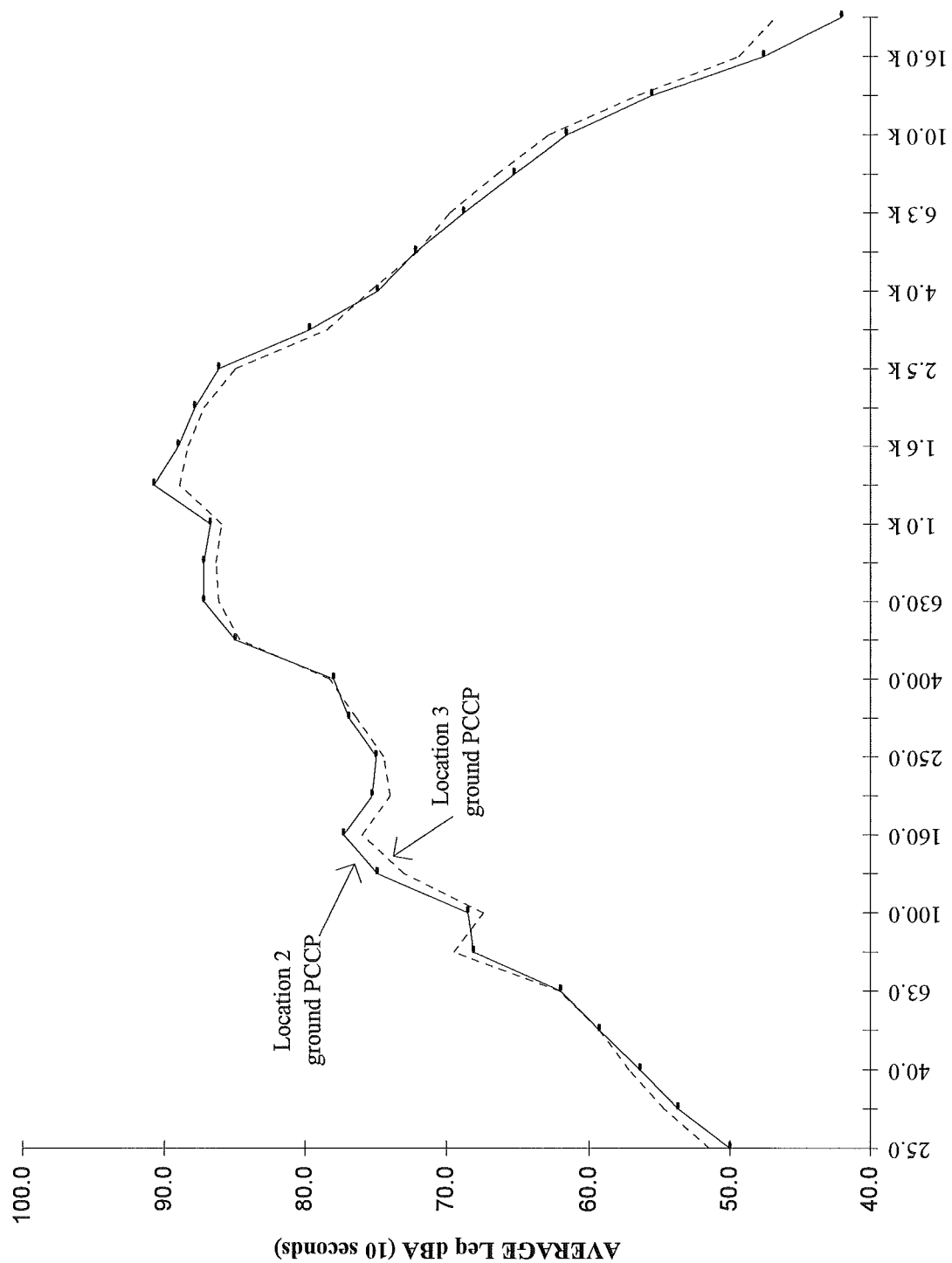
LOCATION 2
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



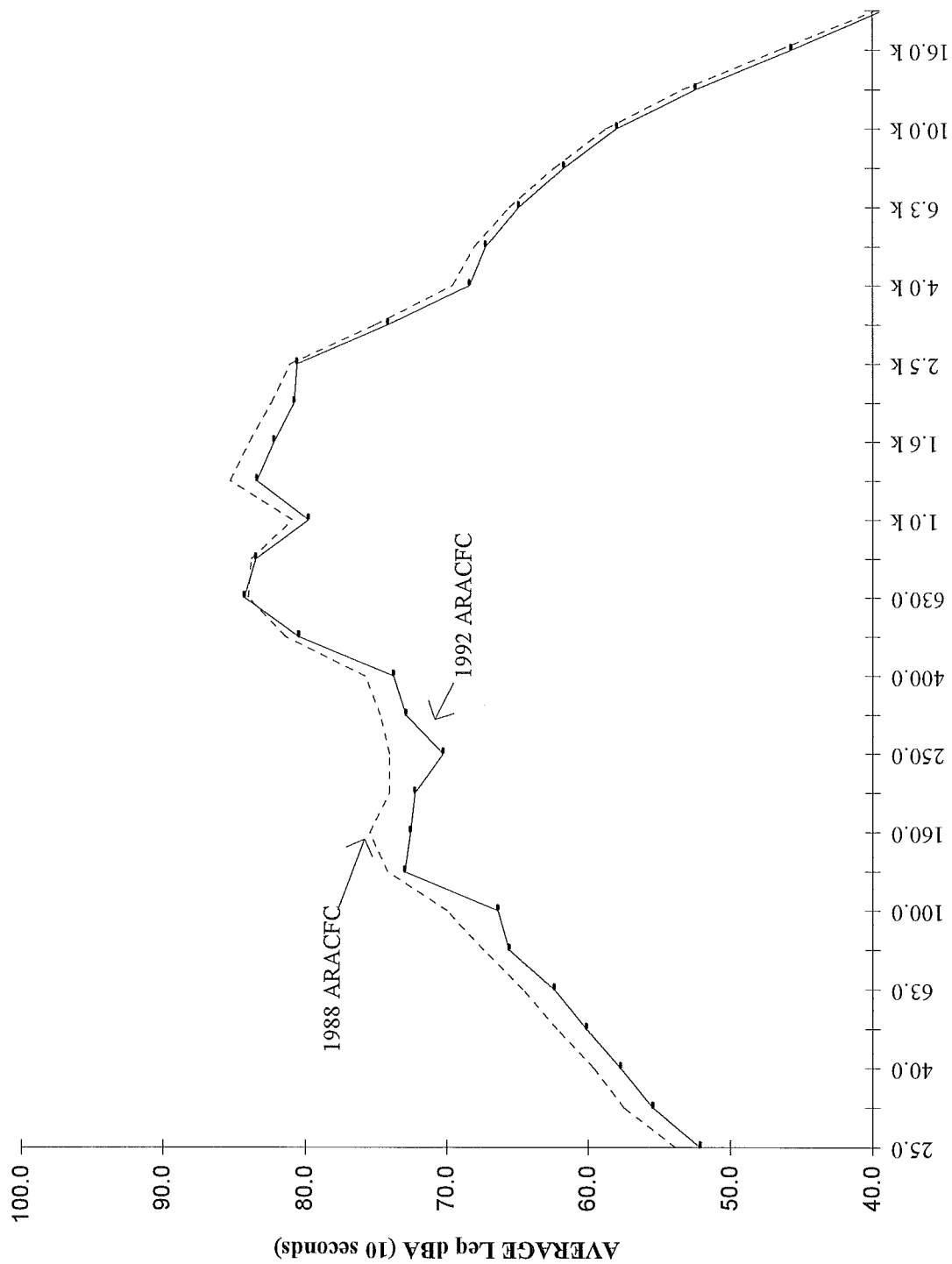
LOCATION 2
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



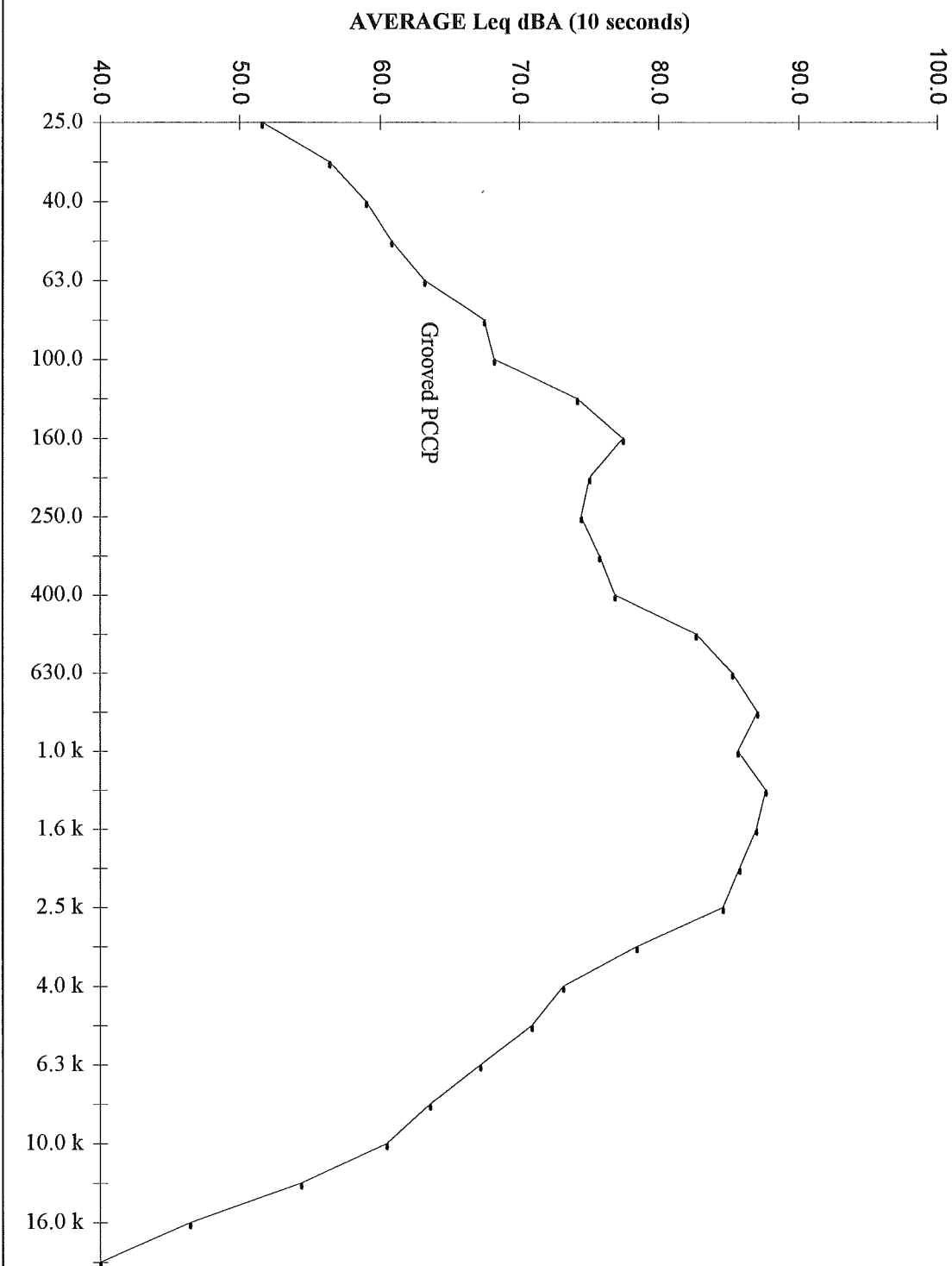
LOCATIONS 2 & 3
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



LOCATION 4
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



LOCATION 4
THIRD-OCTAVE FREQUENCY DATA FOR 55 MPH



FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (65 Miles per Hour)

Segment	Date	Type	Year	Location	Dir.	Speed	Temp	25.0	31.5	40.0	50.0
1	3/14	ARACFC	1994	M.P. 94.72-105.95	EB	65	74	56.1	61.0	64.5	66.3
1	3/14	ARACFC	1994	M.P. 94.72-105.95	EB	65	74	55.7	60.5	63.9	66.1
1	3/14	ARACFC	1994	M.P. 94.72-105.95	EB	65	74	56.4	61.2	65.1	67.0
1	3/14	ARACFC	1994	M.P. 112.2-108.95	EB	65	74	55.6	61.6	64.9	67.2
1	3/14	ARACFC	1994	M.P. 112.2-108.95	EB	65	74	56.4	62.1	63.6	67.1
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	65	74	55.9	60.9	64.7	67.1
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	65	74	56.9	62.0	66.3	67.5
1	3/14	ARACFC	1994	M.P. 94.72-112.2	WB	65	74	58.1	63.0	66.8	68.3
2	3/14	ARACFC	1992	198.78-194.5	SB	65	70	56.4	59.9	63.2	66.2
2	3/14	ARACFC	1994	M.P. 226.0-214.7	SB	65	70	53.9	58.8	61.4	64.4
4	3/16	ARACFC	1988	KMP 95	NB	65	78	53.8	59.2	61.9	65.5
4	3/16	ARACFC	1992	KMP 99	NB	65	78	51.5	56.7	59.4	62.4
4	3/16	PCC, grooved	1988	KMP 87.7-93.6	NB	65	78	53.7	59.2	63.0	65.1
3	3/15	PCC, ground	1983	M.P. 254.5-260.40	EB	65	75	53.8	59.6	62.1	66.6
3	3/15	PCC, ground	1989	M.P. 261.4-267.5	EB	65	75	55.2	61.6	64.8	67.7
1	3/14	PCC, tined	1994	M.P. 108.95-105.95	EB	65	74	57.2	62.8	66.7	69.0
1	3/14	PCC, tined	1994	M.P. 108.95-105.95	EB	65	74	57.7	63.3	66.9	69.0

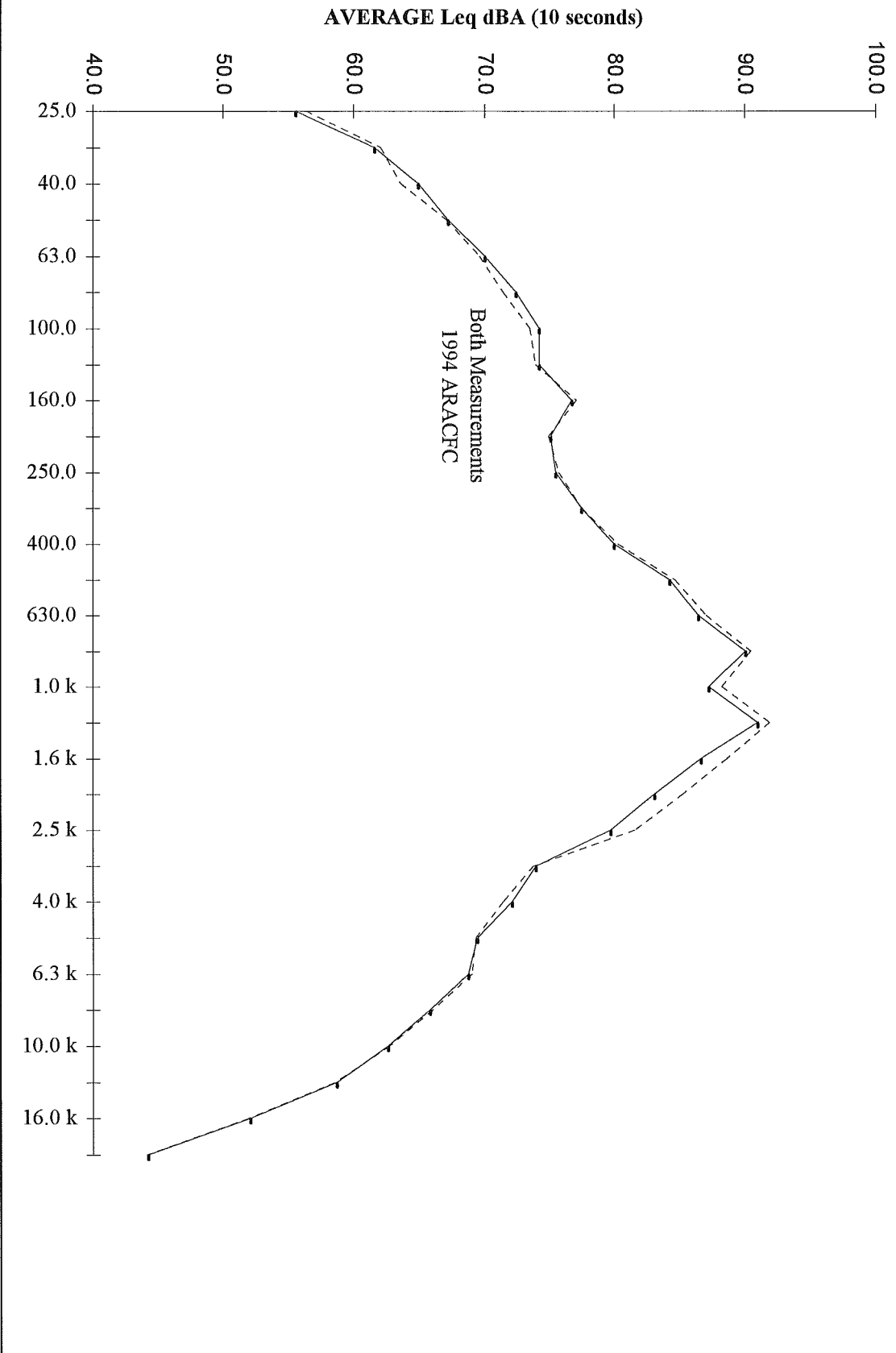
FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (65 Miles per Hour)

63.0	80.0	100.0	125.0	160.0	200.0	250.0	315.0	400.0	500.0	630.0	800.0	1.0 k	1.25 k
67.8	69.8	71.4	71.6	75.8	73.7	73.9	76.0	79.2	84.1	86.6	90.0	87.5	91.4
67.4	68.5	70.8	71.8	76.3	73.7	73.7	76.1	79.5	84.4	86.9	90.2	87.6	91.3
68.4	71.1	73.0	73.0	77.0	74.3	74.7	77.2	79.9	84.1	87.2	90.2	86.8	89.9
70.0	72.4	74.2	74.2	76.7	75.1	75.5	77.5	80.0	84.3	86.5	90.1	87.3	91.0
69.6	71.4	73.5	73.9	77.1	74.9	75.7	77.5	80.3	84.7	87.1	90.5	88.3	91.9
69.1	71.2	73.8	73.0	77.0	74.5	75.0	76.7	79.4	83.8	86.9	89.1	86.8	90.5
69.7	71.7	73.6	74.0	76.9	74.9	75.8	77.2	79.8	84.4	87.3	90.4	87.0	90.3
70.2	72.8	74.3	74.3	77.3	75.1	75.5	77.4	80.2	84.5	86.6	89.8	87.4	91.1
67.6	70.3	71.6	73.0	77.8	75.2	76.4	78.3	81.1	86.3	87.2	88.1	89.2	92.3
67.2	69.3	71.0	70.7	75.9	72.5	72.8	75.8	78.7	83.2	84.8	87.1	86.2	90.2
67.9	70.2	72.5	72.5	76.2	73.9	74.2	76.3	78.4	83.0	84.6	85.7	83.5	88.2
64.7	68.4	73.7	69.4	75.2	73.0	72.6	74.9	77.7	82.4	84.2	85.8	83.4	87.9
67.8	70.8	71.9	72.8	78.2	75.1	76.0	77.8	80.2	84.7	86.1	88.0	87.9	90.8
68.4	71.0	72.7	75.0	80.7	78.4	79.4	80.6	82.7	88.3	89.2	90.2	90.3	95.4
70.0	72.7	74.3	75.0	78.8	77.0	77.9	79.6	82.2	87.7	88.8	90.5	89.4	93.0
70.5	72.6	73.8	74.5	78.4	76.7	78.0	80.1	83.4	88.4	89.9	90.9	90.3	94.1
70.2	72.6	73.8	74.4	78.8	76.9	78.2	80.4	84.1	89.1	89.7	90.8	90.9	95.0

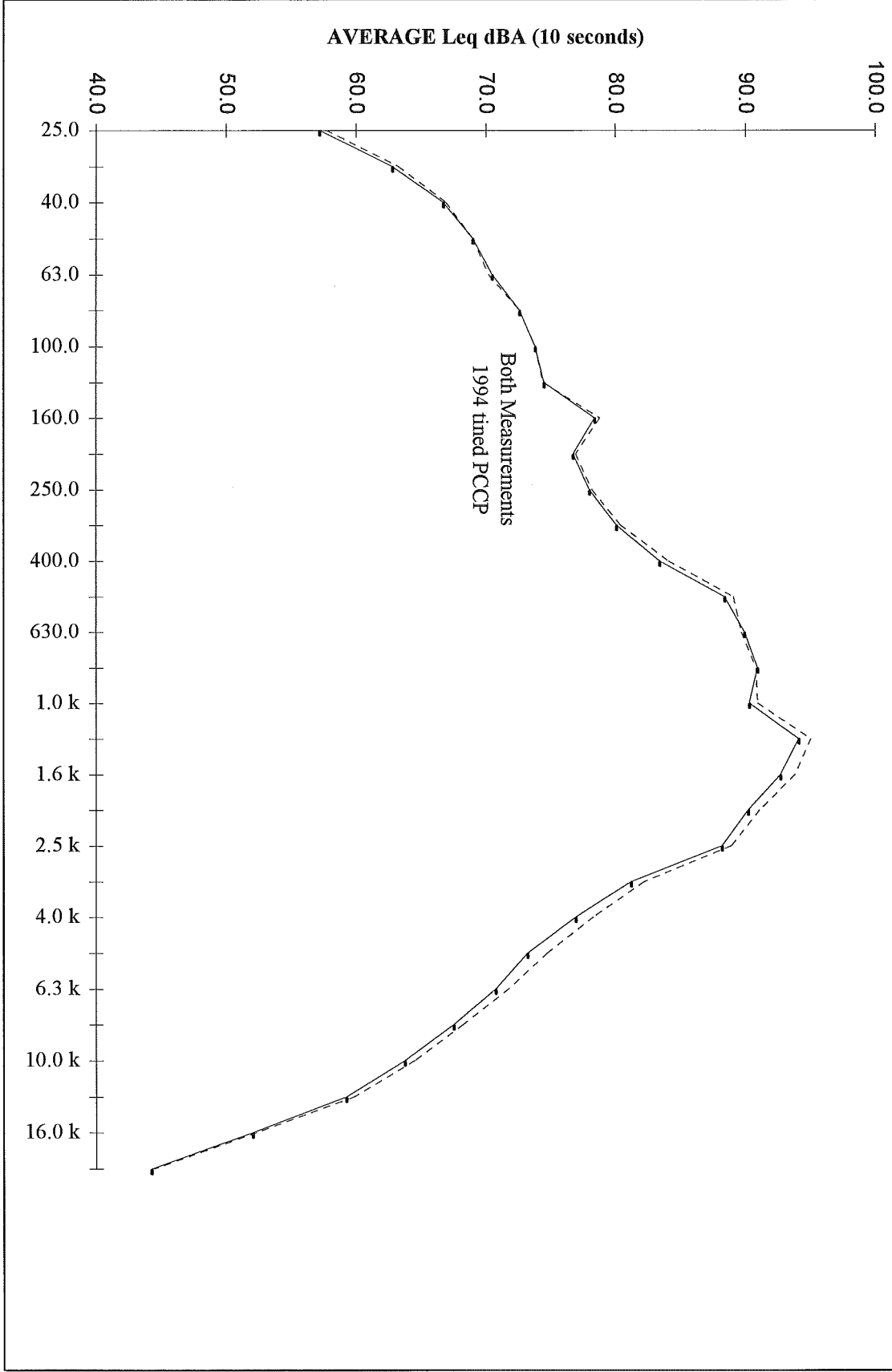
FINAL A-weighted Levels for On-Road Tire-Pavement Noise Measurements (65 Miles per Hour)

1.6 k	2.0 k	2.5 k	3.15 k	4.0 k	5.0 k	6.3 k	8.0 k	10.0 k	12.5 k	16.0 k	20.0 k	dB(A)
87.3	83.1	79.8	73.1	71.6	69.3	68.3	65.1	61.5	57.3	50.5	42.9	96.8
87.6	83.7	80.5	73.3	71.3	69.0	68.2	65.0	61.5	57.2	50.4	42.8	97.0
85.4	81.5	79.9	73.8	71.8	68.9	68.2	65.1	61.8	57.7	51.2	43.3	96.3
86.7	83.1	79.7	73.9	72.1	69.4	68.7	65.8	62.6	58.7	52.1	44.2	96.7
88.7	85.3	81.6	73.7	71.4	69.3	69.0	66.0	62.7	58.6	52.0	44.1	97.6
87.1	83.9	82.0	75.1	73.2	70.5	69.6	66.2	63.0	58.9	51.7	43.9	96.5
85.6	81.4	79.8	74.4	72.7	70.0	69.1	66.0	62.7	58.7	51.9	44.0	96.5
87.1	83.5	80.8	74.6	72.8	70.2	69.3	66.1	62.8	58.5	51.6	43.9	96.8
90.6	90.0	87.9	81.8	79.3	75.5	73.5	70.1	66.6	61.1	52.7	46.7	98.8
87.9	85.4	83.4	76.8	74.0	71.1	69.9	67.0	63.9	58.4	51.0	46.7	96.0
86.3	85.3	84.5	78.0	72.8	71.3	69.0	66.1	63.2	58.6	51.8	43.8	95.0
85.8	85.1	84.5	78.3	72.8	71.7	68.9	65.9	62.7	57.8	50.5	42.7	94.7
88.7	88.2	87.3	81.5	76.5	74.3	70.8	67.6	64.8	59.9	52.3	44.2	97.5
93.7	91.6	90.0	84.0	79.5	76.4	72.7	68.9	65.2	59.8	52.5	45.6	101.1
90.3	89.0	87.0	80.5	75.9	73.5	71.1	67.6	64.6	60.1	53.6	45.9	99.3
92.7	90.2	88.2	81.2	76.9	73.2	70.7	67.5	63.7	59.2	52.0	44.2	100.4
93.8	91.1	88.9	82.2	78.3	74.7	71.7	68.2	64.5	59.8	52.3	44.4	101.1

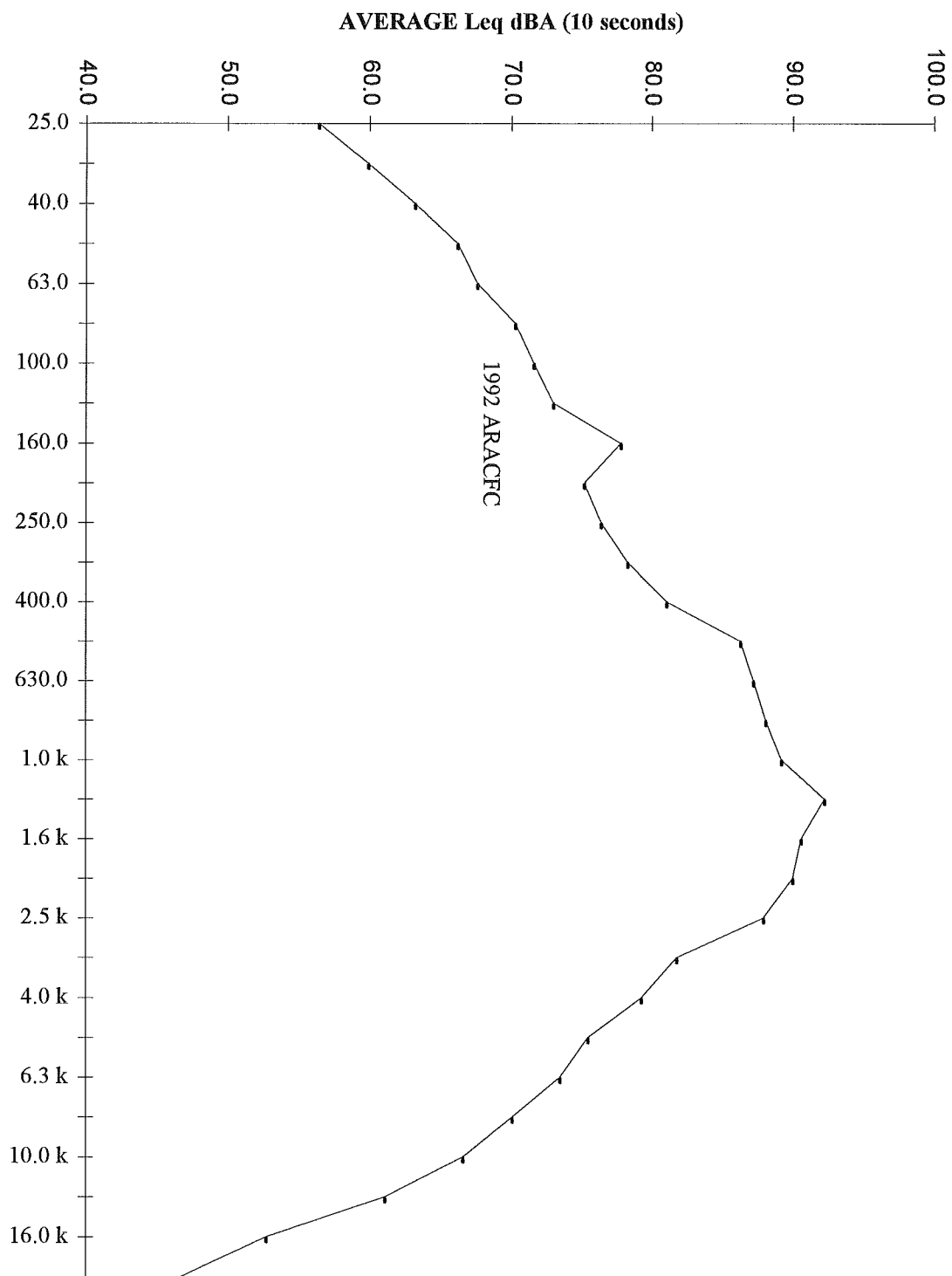
LOCATION 1
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



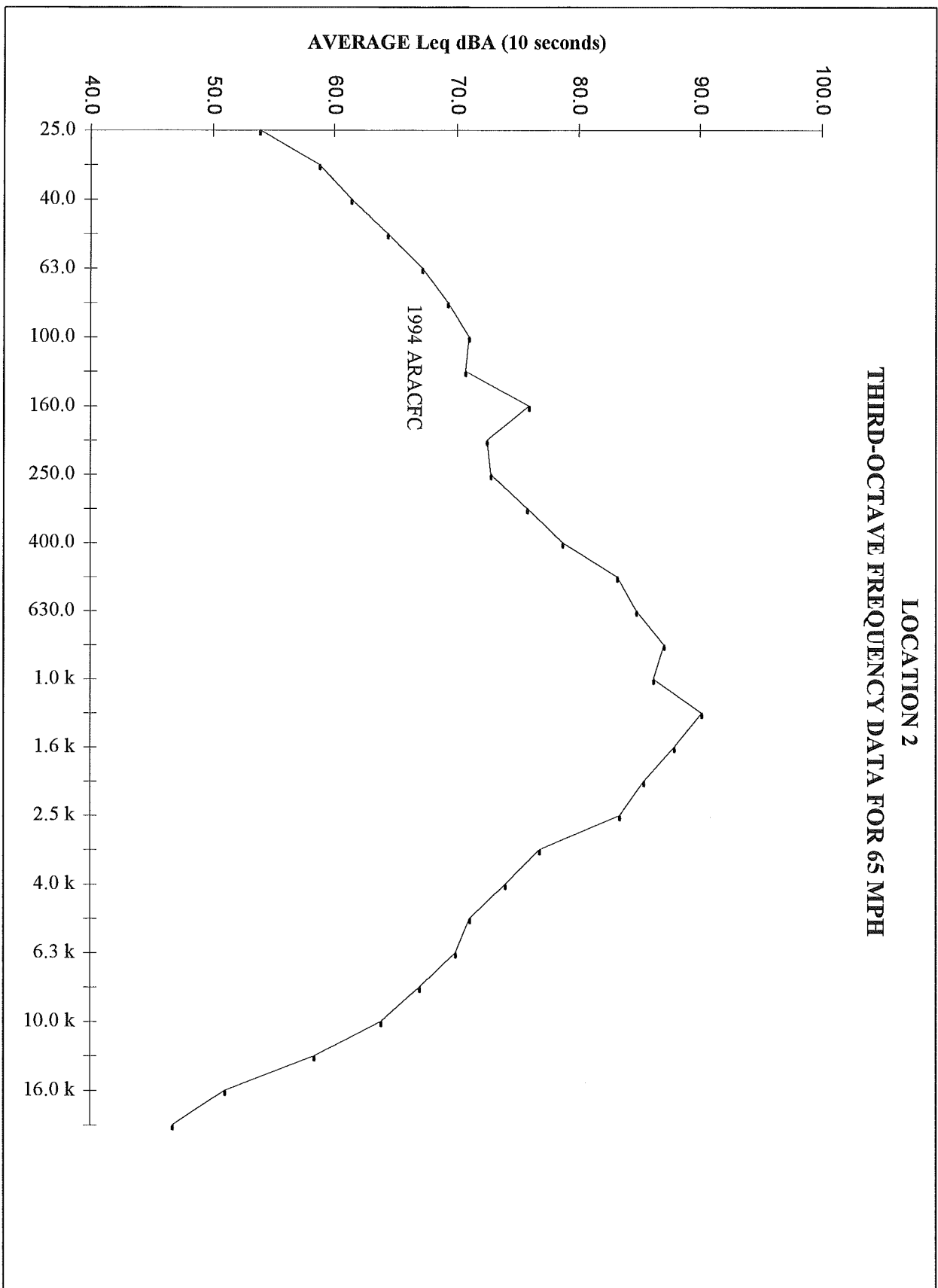
LOCATION 1
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



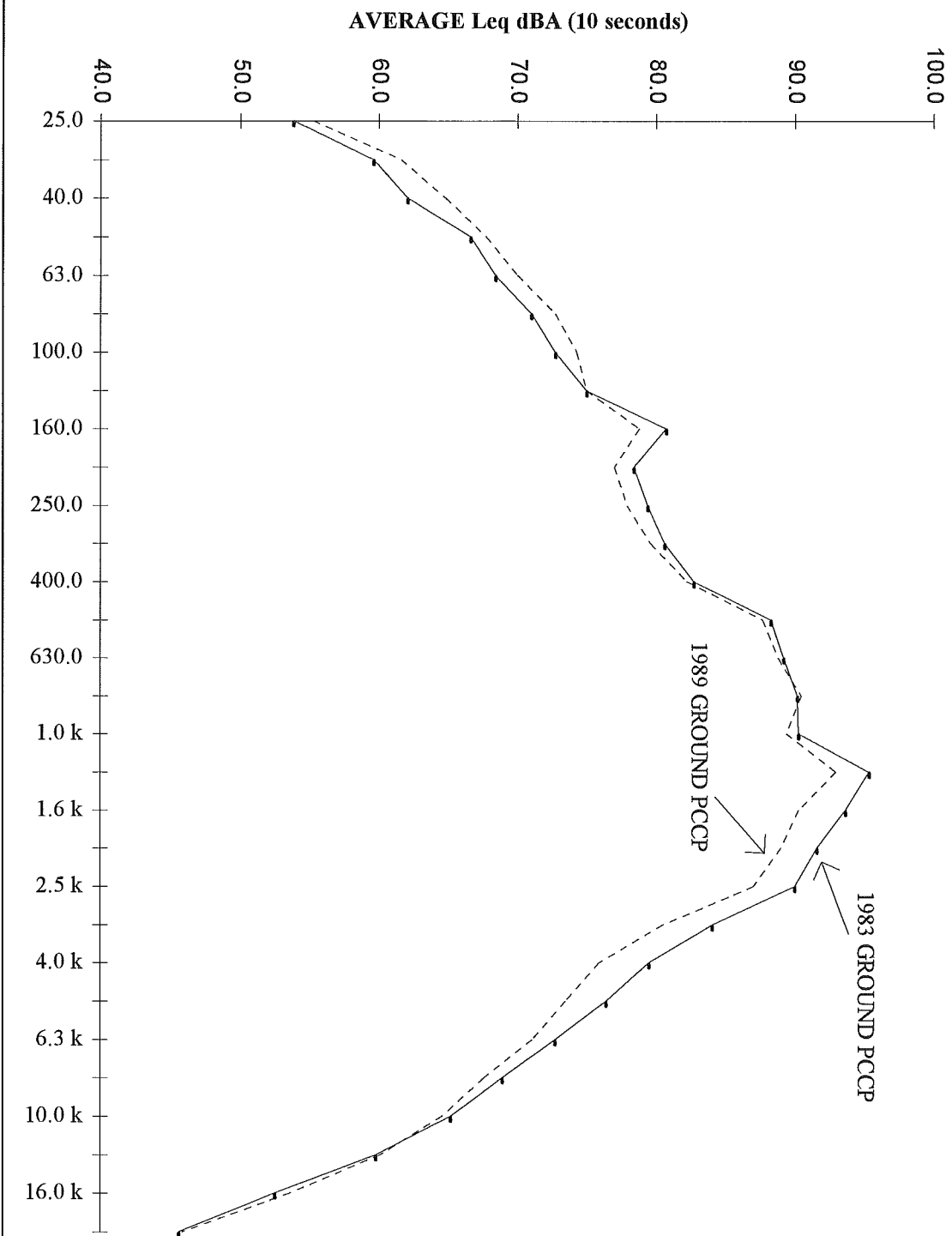
LOCATION 2
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



LOCATION 2
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



LOCATION 3
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



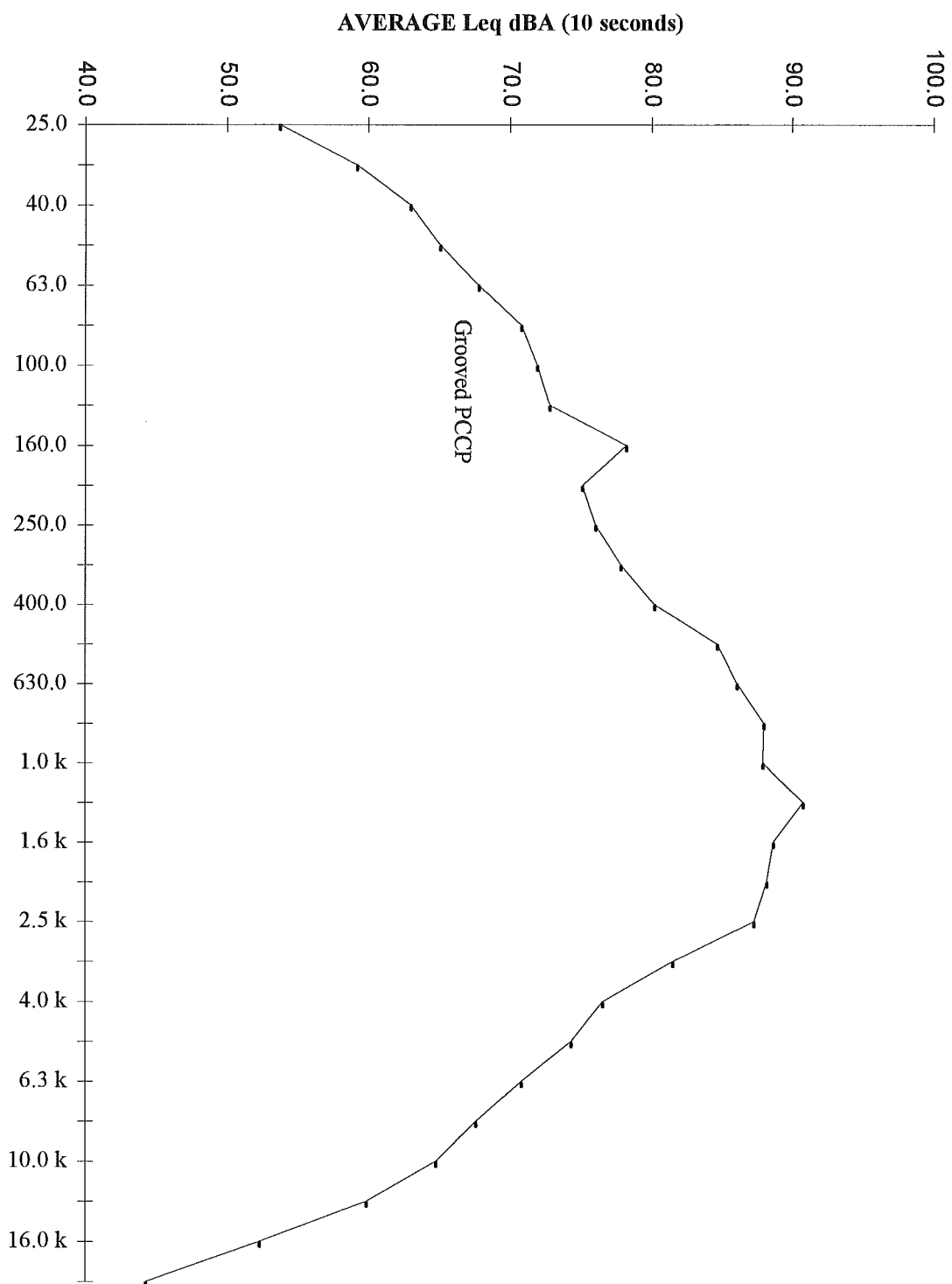
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH

LOCATION 4

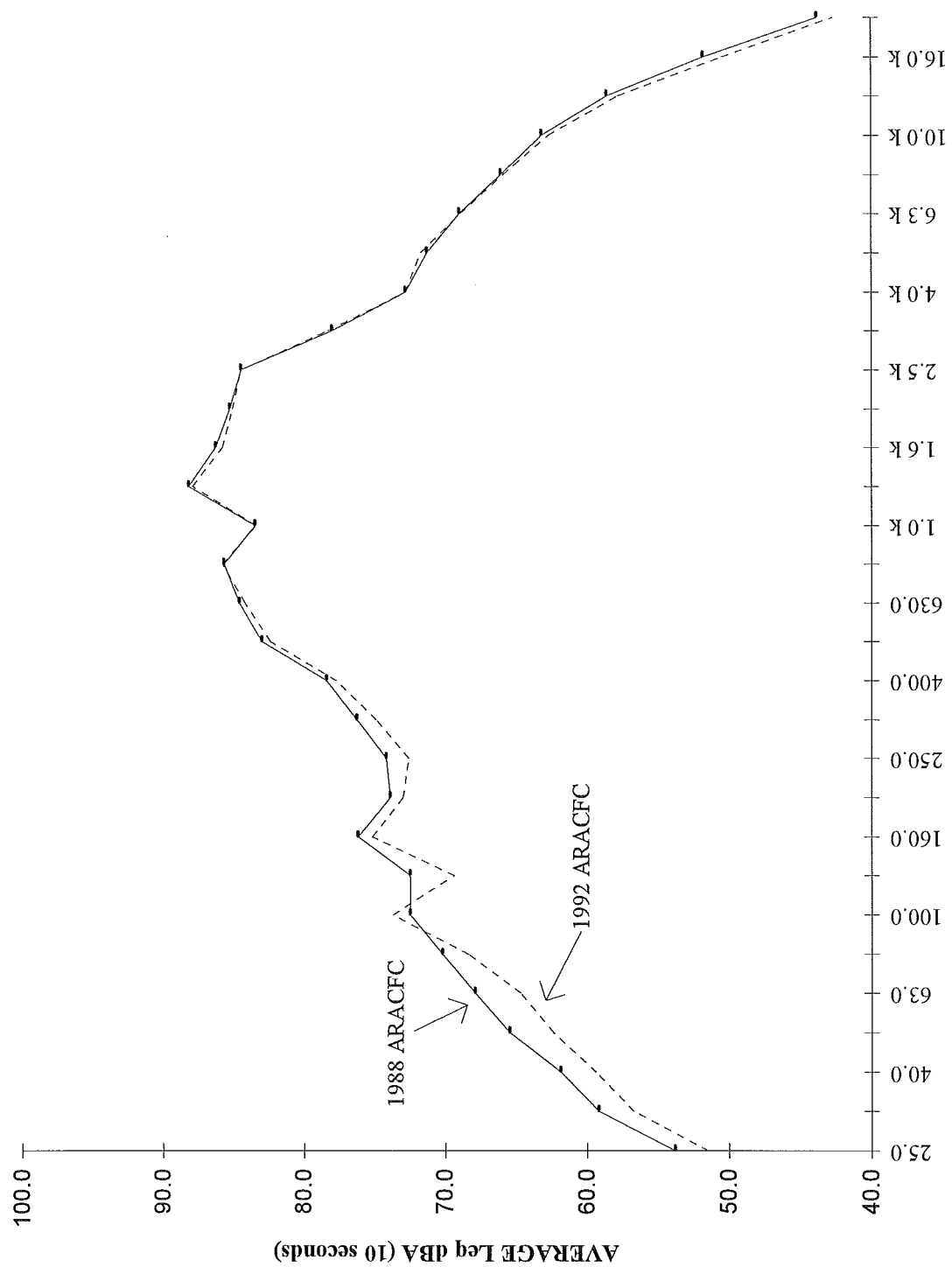
AVERAGE Leq dBA (10 seconds)

Grooved PCCP

Frequency (Hz)	Average Leq dBA (10 seconds)
25.0	95.0
31.5	92.0
39.8	88.0
50.1	84.0
63.1	80.0
79.2	76.0
100.0	72.0
125.9	68.0
158.5	65.0
200.0	62.0
251.2	60.0
315.0	58.0
398.1	56.0
501.2	54.0
631.0	52.0
792.0	50.0
1000.0	48.0
1259.0	46.0
1585.0	45.0
2000.0	44.0
2512.0	43.0
3150.0	42.0
3981.0	41.0
5012.0	40.0
6310.0	39.0
7920.0	38.0
10000.0	37.0
12590.0	36.0
15850.0	35.0
20000.0	34.0



LOCATION 4
THIRD-OCTAVE FREQUENCY DATA FOR 65 MPH



Roadside Frequency Data

Final A-weighted Levels for Roadside Traffic Noise Measurements

Location	Date	Type	Year	Location	Dir	Ave.									
						Speed	Temp	25.0	31.5	40.0	50.0	63.0	80.0		
1	3/13	ARACFC	1994	Approx. M.P. 108.5	EB	64	60	19.6	21.9	26.2	30.4	35.1	45.3		
1	3/13	ARACFC	1994	Approx. M.P. 108.5	EB	64	60	19.6	25.8	30.3	35.1	41.5	49.3		
1	3/13	ARACFC	1994	Approx. M.P. 108.5	EB	64	60	17.1	23.5	27.4	33.1	38.8	46.9		
1	3/13	ARACFC	1994	East of M.P. 104	EB	66	80	21.7	26.0	30.3	34.8	39.0	47.9		
4	3/16	ARACFC	1992	KMP 97-98	SB	60	81	18.4	22.9	27.6	32.2	40.5	48.1		
4	3/16	ARACFC	1992	KMP 97-98	SB	60	81	17.7	21.9	27.7	31.2	37.6	44.4		
4	3/16	ARACFC	1992	KMP 97-98	SB	59	78	18.5	23.7	29.3	33.0	38.1	46.1		
4	3/16	ARACFC	1992	KMP 97-98	SB	59	78	20.0	25.3	30.7	36.2	42.6	49.4		
4	3/16	ARACFC	1988	KMP 97	SB	59	81	17.9	22.3	27.3	33.2	39.6	45.3		
4	3/16	ARACFC	1988	KMP 97	SB	59	81	16.7	21.8	27.1	32.7	39.4	46.4		
4	3/16	ARACFC	1988	KMP 97	SB	59	81	15.1	20.0	26.7	31.6	38.5	44.1		
4	3/16	ARACFC	1988	KMP 97	SB	59	78	18.2	23.5	29.0	33.0	38.8	46.6		
4	3/16	ARACFC	1988	KMP 97	SB	59	78	17.6	24.1	28.1	34.5	38.4	46.2		
4	3/16	ARACFC	1992	KMP 97-98	NB	58	84	16.6	22.9	28.1	32.8	37.7	44.5		
4	3/16	ARACFC	1992	KMP 97-98	NB	59	84	22.5	27.3	32.7	36.3	41.0	49.6		
4	3/16	ARACFC	1992	KMP 97-98	NB	59	84	18.1	23.3	28.8	34.5	39.3	48.2		
4	3/16	ARACFC	1988	KMP 97	NB	59	84	16.7	21.4	27.7	33.7	36.7	45.8		
4	3/16	ARACFC	1988	KMP 97	NB	59	84	17.4	22.0	27.8	32.0	38.1	45.6		
4	3/16	ARACFC	1988	KMP 96-97	NB	58	84	21.1	26.1	30.3	33.8	42.1	51.2		
4	3/16	ARACFC	1988	KMP 96-97	NB	58	84	17.1	22.7	27.5	32.9	38.7	47.8		
4	3/17	ARACFC	1988	Near KMP 96	NB	60	84	19.4	22.8	29.0	34.8	40.4	46.5		
4	3/17	ARACFC	1988	Near KMP 96	NB	60	84	19.5	24.5	30.9	35.7	39.8	49.3		
4	3/17	ARACFC	1988	Near KMP 96	SB	60	68	19.7	24.6	30.4	36.1	41.2	47.4		
4	3/17	ARACFC	1988	Near KMP 96	NB	60	84	17.8	24.2	29.4	33.7	38.4	45.2		
4	3/17	ARACFC	1988	Near KMP 96	NB	60	84	15.5	21.8	26.0	31.3	35.7	43.0		
4	3/17	ARACFC	1988	Near KMP 96	NB	60	84	16.8	22.7	29.0	32.4	37.1	50.7		
4	3/17	ARACFC	1988	Near KMP 96	SB	60	83	18.4	23.2	28.4	33.0	37.8	44.9		
4	3/17	ARACFC	1988	Near KMP 96	SB	60	83	17.3	24.3	28.1	32.6	38.4	45.9		
4	3/17	PCC, grooved	1988	south of KMP 94	SB	60	83	16.5	22.4	29.1	35.0	42.9	47.2		
4	3/17	PCC, grooved	1988	south of KMP 95	NB	61	84	20.2	23.9	28.3	32.8	36.7	44.1		
4	3/17	PCC, grooved	1988	south of KMP 95	NB	61	84	20.6	25.7	32.6	36.0	39.9	48.5		
4	3/17	PCC, grooved	1988	south of KMP 94	SB	61	68	18.0	24.0	28.9	35.4	41.9	50.3		
4	3/17	PCC, grooved	1988	south of KMP 94	SB	61	68	20.7	24.9	30.4	35.8	39.8	49.8		
4	3/17	PCC, grooved	1988	south of KMP 95	NB	60	84	19.8	23.7	28.2	31.7	39.6	46.0		
4	3/17	PCC, grooved	1988	south of KMP 95	NB	60	84	16.2	22.2	27.9	32.2	36.0	44.7		

Final A-weighted Levels for Roadside Traffic Noise Measurements (continued)

Location	Date	Type	Year	Location	Dir	Ave.									
						Speed	Temp	25.0	31.5	40.0	50.0	63.0	80.0		
3	3/15	PCCP, ground	1983	West of M.P. 257	EB	57	85	27.9	31.5	40.0	50.0	63.0	80.0		
3	3/15	PCCP, ground	1983	West of M.P. 257	EB	57	85	27.3	30.3	36.9	41.4	49.0	54.1		
3	3/15	PCCP, ground	1983	West of M.P. 256	WB	55	80	23.7	29.3	34.8	40.2	45.1	51.7		
3	3/15	PCCP, ground	1983	West of M.P. 256	WB	55	80	22.6	28.6	33.5	39.2	46.2	52.6		
3	3/15	PCCP, ground	1983	East of M.P. 257	WB	58	80	26.0	29.8	34.1	38.6	44.1	50.8		
3	3/15	PCCP, ground	1983	East of M.P. 257	WB	58	80	25.9	30.0	35.0	39.6	43.7	50.6		
3	3/15	PCCP, ground	1983	East of M.P. 257	WB	58	80	25.1	29.3	33.6	37.4	43.2	50.2		
3	3/15	PCCP, ground	1983	Days Inn	EB	-	85	26.1	27.8	32.8	40.7	47.2	53.0		
3	3/15	PCCP, ground	1983	Days Inn	EB	-	85	27.3	29.2	33.1	39.9	48.5	54.5		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	70	22.6	28.3	31.2	35.8	40.4	50.9		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	70	19.8	22.5	27.8	33.6	38.8	47.5		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	70	22.3	26.2	31.8	35.3	39.5	49.4		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	60	16.2	21.1	26.5	30.8	35.6	45.1		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	60	15.6	20.4	24.8	31.8	34.0	42.8		
1	3/13	PCCP, timed	1994	East of M.P. 108	EB	66	60	16.1	21.3	26.4	29.7	39.9	46.3		
1	3/13	PCCP, timed	1994	East of M.P. 106	EB	67	84	19.8	22.7	29.2	33.6	37.5	47.9		
1	3/13	PCCP, timed	1994	East of M.P. 106	EB	67	84	20.3	24.2	29.7	33.3	38.8	47.1		

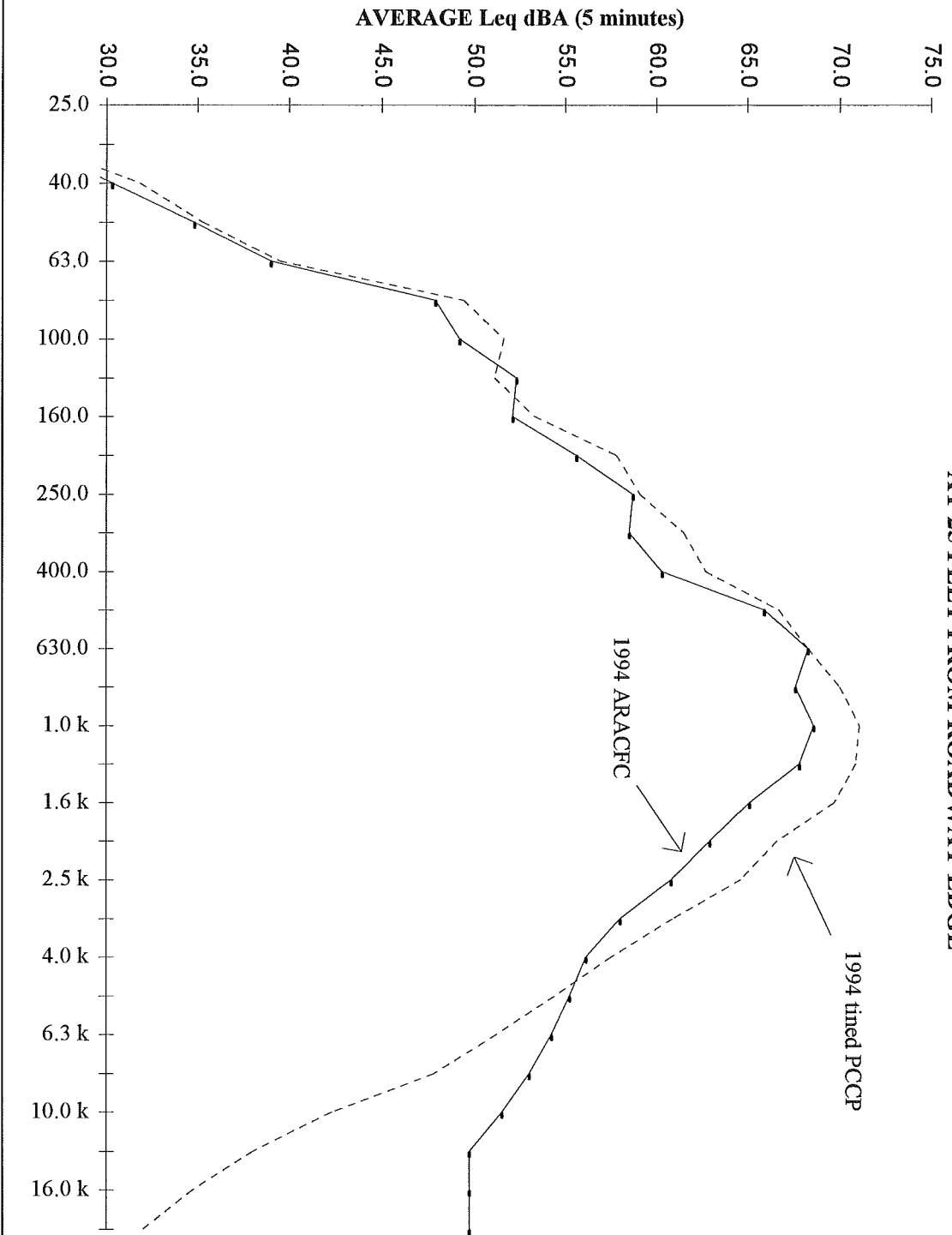
	100.0	125.0	160.0	200.0	250.0	315.0	400.0	500.0	630.0	800.0	1.0k	1.25k	1.6k	2.0k
47.5	47.5	48.8	49.2	51.0	51.7	53.1	50.7	50.9	53.2	56.0	58.4	57.8	53.9	50.9
48.3	49.2	54.6	51.0	51.5	51.0	51.6	51.3	51.5	56.6	59.7	58.6	54.4	52.4	
48.5	46.8	48.6	50.8	51.0	51.0	50.8	52.4	53.0	57.6	60.7	58.9	55.3	53.5	
49.2	52.3	52.1	55.6	58.7	58.5	60.3	65.9	68.3	67.6	68.6	67.8	65.1	62.9	
52.1	51.9	52.4	53.8	53.6	54.8	55.0	59.0	58.2	57.8	57.3	56.0	55.8	55.5	
49.1	49.1	50.5	52.8	52.5	53.3	53.8	56.4	56.2	56.8	56.4	55.2	54.9	54.0	
50.9	52.2	56.0	54.8	55.5	56.3	57.6	60.4	60.8	59.1	59.3	59.7	58.9	57.5	
50.3	51.9	54.2	55.5	57.0	58.0	59.1	59.7	60.5	61.5	61.7	61.5	61.0	59.8	
45.7	48.3	49.1	50.5	51.8	52.9	54.6	57.4	57.6	58.8	58.4	57.2	56.9	56.6	
47.6	50.3	49.3	52.2	52.9	54.9	55.4	59.9	59.6	60.3	59.8	58.1	57.0	57.7	
48.4	47.5	49.0	49.7	51.7	54.6	54.5	57.1	57.3	58.7	58.4	57.0	56.2	55.5	
50.4	50.7	52.8	54.7	55.7	58.1	57.3	58.8	58.1	59.4	60.6	61.1	61.2	60.4	
51.1	49.0	51.3	54.7	55.5	58.3	57.8	60.7	59.4	60.6	61.6	61.9	61.9	61.2	
47.3	49.3	50.1	52.4	53.4	55.0	56.9	58.7	59.8	59.6	58.8	57.7	56.2	54.1	
53.6	54.1	54.9	58.5	58.3	59.6	60.4	61.1	60.4	61.0	61.4	60.5	59.5	58.5	
49.8	53.1	54.4	55.8	57.8	58.8	59.8	61.4	61.1	61.4	61.9	61.5	60.5	58.5	
47.6	46.5	48.6	51.9	54.0	53.5	54.4	57.7	56.0	57.5	58.2	56.8	55.5	54.2	
50.1	49.5	51.0	53.0	54.1	56.2	56.8	58.1	58.1	59.0	59.2	58.3	57.0	55.6	
50.7	53.7	55.1	54.7	56.5	58.5	59.1	61.8	61.4	62.1	63.2	62.9	63.1	63.0	
49.5	50.5	54.6	55.5	56.4	59.4	59.9	61.8	61.2	61.8	62.7	63.0	63.4	62.9	
48.9	53.5	53.8	55.5	57.5	59.0	59.2	61.1	63.2	65.5	66.9	66.8	65.5	64.5	
51.7	51.3	53.1	55.8	57.3	58.3	60.6	63.0	63.9	66.1	67.2	67.1	65.4	64.3	
52.2	54.9	57.1	55.3	56.9	58.7	60.0	62.8	63.8	66.7	67.6	67.5	66.4	65.1	
49.7	51.6	52.8	55.5	60.1	57.8	58.3	60.2	59.7	61.2	61.8	60.8	58.5	57.0	
46.9	49.8	49.8	52.2	53.6	55.5	57.9	61.2	60.0	61.6	62.2	61.5	59.0	57.6	
51.6	53.8	52.5	53.7	55.2	58.7	58.7	61.2	60.7	62.1	62.8	62.0	59.7	58.5	
49.2	50.6	50.7	53.7	56.2	59.4	58.7	60.8	60.1	61.2	60.9	59.5	58.4	57.3	
48.3	50.2	52.1	51.0	52.3	54.4	56.2	60.3	57.6	59.6	59.4	57.9	57.2	57.2	
50.0	49.6	50.7	53.1	54.4	58.0	58.4	60.6	59.6	60.2	60.8	60.7	60.5	59.5	
50.6	50.7	50.9	54.1	54.9	56.3	58.1	62.5	64.0	66.1	67.4	65.9	64.7	62.2	
51.5	54.1	54.4	55.9	58.7	60.7	60.2	64.6	66.1	68.4	69.3	67.5	66.3	64.2	
53.7	52.8	54.6	58.2	58.3	59.8	61.6	65.8	66.4	68.8	70.6	68.6	67.7	65.8	
51.7	53.8	53.7	56.3	57.4	59.1	60.4	65.0	66.0	68.1	69.9	68.6	67.6	65.7	
48.6	48.9	51.1	53.7	54.9	57.6	58.1	61.0	59.8	60.8	61.3	60.0	58.7	57.4	
47.8	49.4	50.2	53.4	54.9	56.3	57.5	61.2	59.1	60.1	61.2	59.4	58.6	57.5	

	100.0	125.0	160.0	200.0	250.0	315.0	400.0	500.0	630.0	800.0	1.0 k	1.25 k	1.6 k	2.0 k
56.4	57.5	60.4	63.5	63.8	64.6	65.6	66.8	66.7	68.6	69.3	68.9	68.3	67.5	
55.6	56.8	59.2	61.5	62.1	63.4	64.6	66.8	66.7	68.5	69.2	68.5	67.6	66.7	
53.5	55.2	57.0	59.3	60.1	60.6	61.4	63.7	64.9	66.7	67.6	67.1	66.0	63.9	
54.6	55.0	55.9	58.2	60.8	62.0	61.5	63.7	64.4	67.0	68.0	67.4	66.5	64.4	
52.2	54.0	55.4	58.0	58.6	60.5	61.8	63.9	65.0	67.2	67.4	65.7	63.7	62.2	
52.9	53.6	55.9	57.9	58.8	60.9	61.5	64.3	65.3	67.1	67.3	65.4	63.4	62.1	
51.2	53.4	54.2	57.8	57.9	59.3	61.5	63.1	63.7	66.1	66.7	64.9	62.8	61.2	
54.1	56.0	56.5	58.6	57.3	57.5	57.8	59.9	61.6	64.4	65.5	64.0	62.6	60.0	
54.8	58.3	60.1	60.6	59.1	59.2	59.1	61.4	63.0	65.8	67.1	65.7	63.7	60.8	
52.4	52.6	54.9	57.2	58.6	60.5	62.0	67.7	68.3	69.8	71.4	71.0	69.6	66.8	
47.7	53.1	51.0	55.4	56.5	58.2	59.4	66.2	66.5	68.6	69.8	69.7	68.5	65.3	
51.6	51.1	53.3	57.8	59.1	61.5	62.7	66.7	68.3	70.0	71.1	70.9	69.7	66.6	
47.6	49.0	51.8	54.2	53.1	55.1	54.1	55.3	57.6	59.0	61.7	62.3	60.3	57.1	
46.2	47.6	49.9	52.8	53.4	53.4	55.0	56.2	56.0	57.4	60.5	61.0	59.1	56.0	
47.5	47.4	47.6	51.7	51.7	52.0	52.8	55.6	55.9	58.4	60.9	60.7	58.3	55.3	
48.1	48.5	51.0	53.8	54.4	55.3	56.4	59.4	59.4	60.5	61.8	61.4	60.8	58.5	
50.3	50.7	52.5	55.4	54.6	55.6	56.5	58.3	59.4	60.6	61.7	61.9	61.2	59.1	

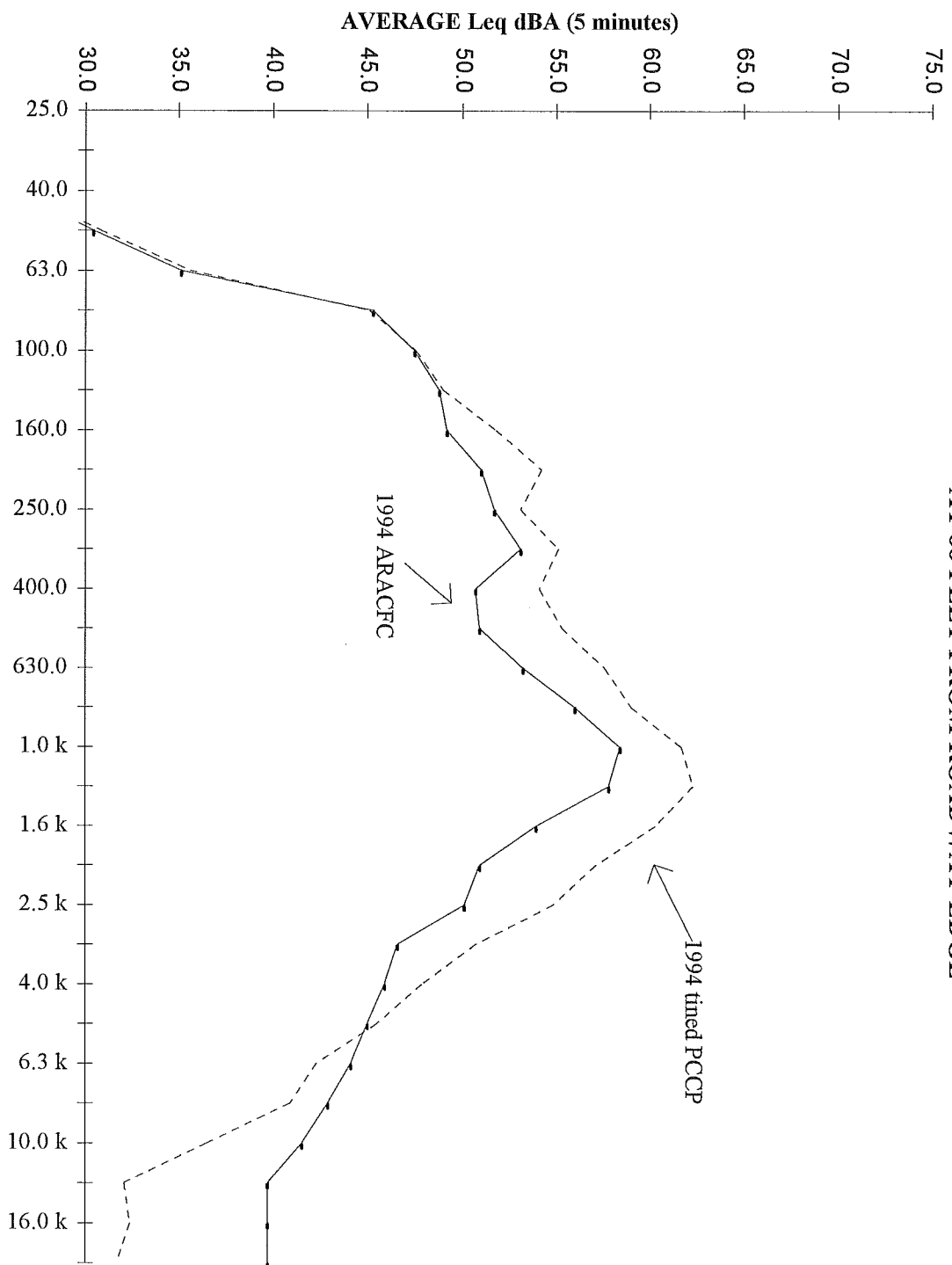
	2.5 k	3.15 k	4.0 k	5.0 k	6.3 k	8.0 k	10.0 k	12.5 k	16.0 k	20.0 k	Leq dBA
	50.1	46.6	45.9	45.0	44.1	42.9	41.5	39.7	39.7	39.7	65.5
	50.8	47.4	46.8	45.5	44.3	43.1	41.5	39.7	39.7	39.7	66.3
	52.0	48.9	47.3	45.6	44.4	43.0	41.5	39.9	39.7	39.7	66.6
	60.8	58.0	56.1	55.2	54.2	53.0	51.5	49.7	49.7	49.7	76.2
	52.7	49.8	47.3	44.1	40.4	37.7	36.1	34.2	34.2	34.2	67.6
	51.5	48.1	45.7	42.7	39.5	37.5	36.0	34.2	34.2	34.2	66.1
	55.2	52.0	48.4	45.1	41.9	38.8	36.3	34.2	34.2	34.2	69.7
	56.7	52.7	49.5	46.6	43.6	40.0	37.0	34.5	34.5	34.2	70.9
	54.1	51.2	48.4	45.1	41.1	36.6	31.1	25.1	22.9	21.8	67.4
	55.1	52.8	50.0	47.0	43.6	39.3	33.8	27.5	24.0	22.1	68.9
	53.0	50.2	47.4	43.9	39.6	35.3	30.2	23.1	22.5	21.7	67.2
	57.2	54.2	51.6	48.6	45.6	42.0	39.0	33.9	29.9	26.1	70.2
	58.0	55.4	53.5	50.0	46.3	41.8	38.0	30.2	26.3	23.0	71.1
	51.0	45.6	42.4	40.2	38.8	37.4	36.0	34.2	34.2	34.2	68.0
	55.9	52.6	50.7	46.9	43.8	39.6	36.5	34.2	34.2	34.2	71.1
	55.9	51.9	48.7	45.0	42.6	39.1	36.3	34.2	34.2	34.2	71.1
	50.7	46.8	45.0	46.6	43.3	35.3	29.8	22.8	21.8	21.7	66.7
	52.2	48.1	46.1	42.5	39.2	35.2	29.3	22.4	21.8	21.7	68.1
	59.4	55.3	52.8	48.8	45.7	41.3	35.4	28.1	24.4	22.3	72.4
	59.2	55.0	52.1	48.3	45.1	40.8	35.1	27.8	24.4	22.3	72.3
	62.0	58.3	55.7	52.7	50.5	47.1	41.9	35.9	33.1	31.9	74.6
	61.9	58.0	54.9	51.6	49.6	46.2	41.2	35.7	32.6	31.8	74.9
	62.8	58.8	56.1	53.0	50.9	47.6	43.1	38.1	34.6	32.2	75.4
	55.2	52.3	49.1	45.9	43.0	38.9	32.6	25.6	23.0	21.8	70.4
	55.8	52.6	49.6	46.5	43.8	40.0	33.7	27.0	24.1	22.0	70.2
	56.6	53.2	50.4	47.0	44.1	39.9	34.0	26.6	23.4	21.9	71.1
	54.9	52.1	50.4	47.9	44.4	41.4	37.1	31.9	32.0	31.7	70.1
	55.1	52.1	49.8	47.1	44.4	41.5	37.5	32.0	32.2	31.7	68.5
	57.7	54.3	51.7	49.9	48.5	47.4	46.0	44.2	44.2	44.2	70.4
	59.7	56.5	52.9	49.6	46.4	42.2	38.4	35.1	34.3	34.2	74.2
	61.8	58.8	56.1	53.2	50.1	45.9	41.6	36.9	35.3	34.5	76.2
	62.5	59.0	56.1	53.9	51.0	48.5	46.4	44.2	44.2	44.2	77.2
	62.2	59.2	56.9	54.1	51.1	48.5	46.4	44.4	44.2	44.2	76.7
	55.4	52.0	48.1	44.9	42.2	38.6	36.2	34.2	34.2	34.2	69.9
	55.3	52.1	48.1	45.0	42.0	38.5	36.2	34.2	34.2	34.2	69.6

	2.5 k	3.15 k	4.0 k	5.0 k	6.3 k	8.0 k	10.0 k	12.5 k	16.0 k	20.0 k	Leq dBA
	63.9	59.8	56.7	52.9	48.6	44.5	39.8	33.2	32.6	31.9	78.1
	63.1	59.0	55.9	51.9	47.8	44.2	39.4	33.8	33.1	32.1	77.5
	61.4	56.3	51.6	49.6	48.5	47.4	46.0	44.2	44.2	44.2	75.5
	61.7	56.3	51.7	49.7	48.5	47.4	46.0	44.2	44.2	44.2	75.8
	59.5	54.2	51.1	47.2	44.0	41.0	36.5	31.7	32.0	31.7	74.8
	59.2	54.0	50.9	46.9	43.8	41.3	36.7	31.7	31.9	31.7	74.8
	58.5	53.7	50.7	46.4	43.4	41.2	36.6	31.7	31.8	31.7	73.9
	57.7	52.8	47.9	43.2	39.1	37.5	36.0	34.2	34.2	34.2	72.7
	57.8	52.6	48.1	44.8	39.7	37.7	36.0	34.2	34.2	34.2	74.2
	64.9	61.2	57.9	54.3	51.0	46.9	41.8	36.5	34.1	32.0	78.6
	63.0	59.1	55.7	52.2	49.3	45.2	40.6	34.9	33.4	31.8	77.1
	64.6	60.9	57.5	54.4	51.2	47.8	42.3	38.0	34.7	32.0	78.5
	54.8	50.7	47.9	45.5	42.3	40.9	36.5	32.1	32.4	31.7	69.2
	53.4	50.0	48.1	45.8	41.8	40.3	36.7	32.1	32.4	31.7	68.2
	53.1	50.1	47.6	44.9	41.6	40.0	35.9	32.3	32.4	31.7	67.9
	56.1	52.3	50.6	51.4	49.2	50.0	45.8	41.7	41.7	41.7	70.2
	56.6	52.9	51.1	51.7	49.4	50.0	45.9	41.7	41.7	41.7	70.4

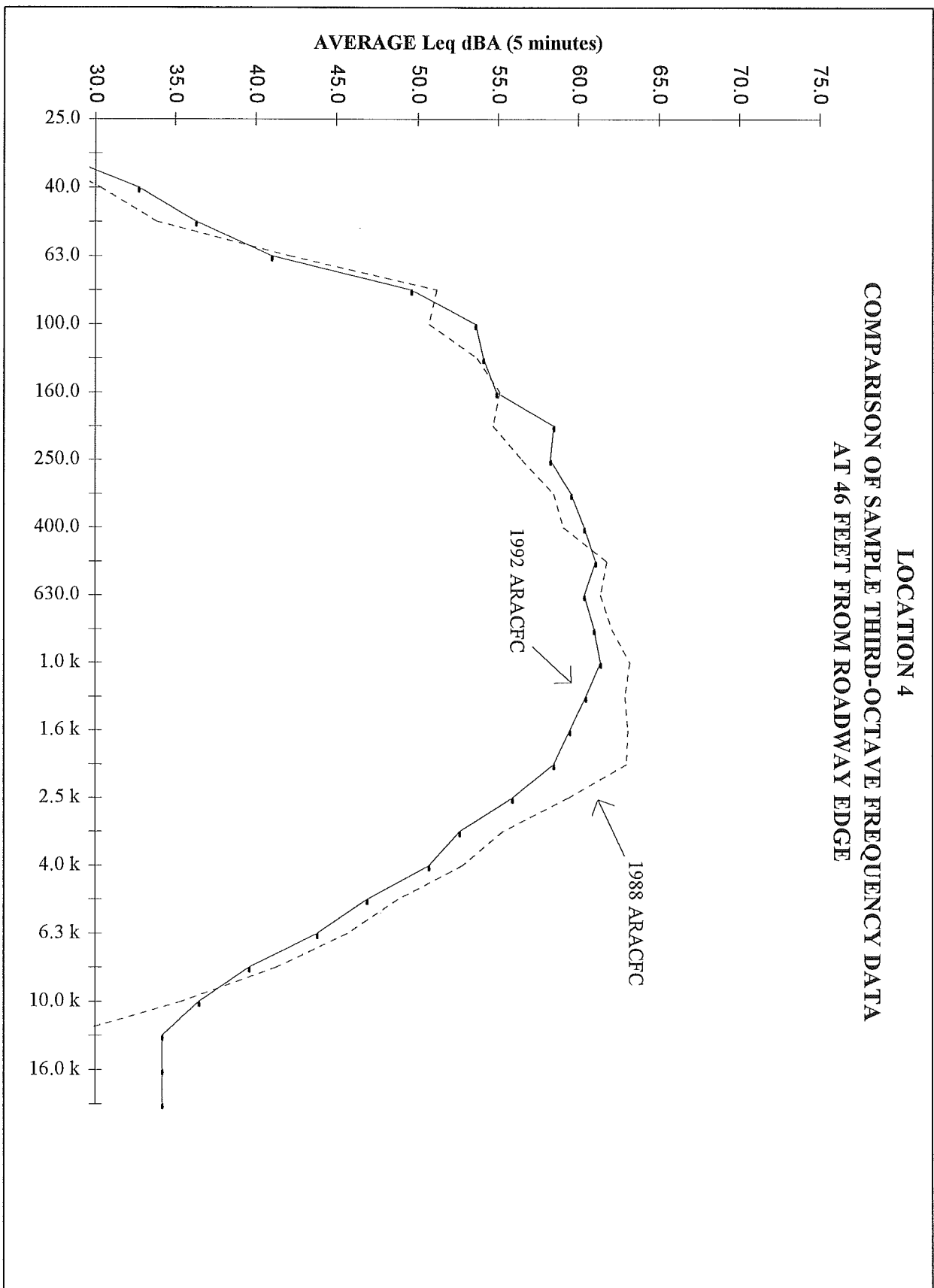
LOCATION 1 COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA AT 25 FEET FROM ROADWAY EDGE



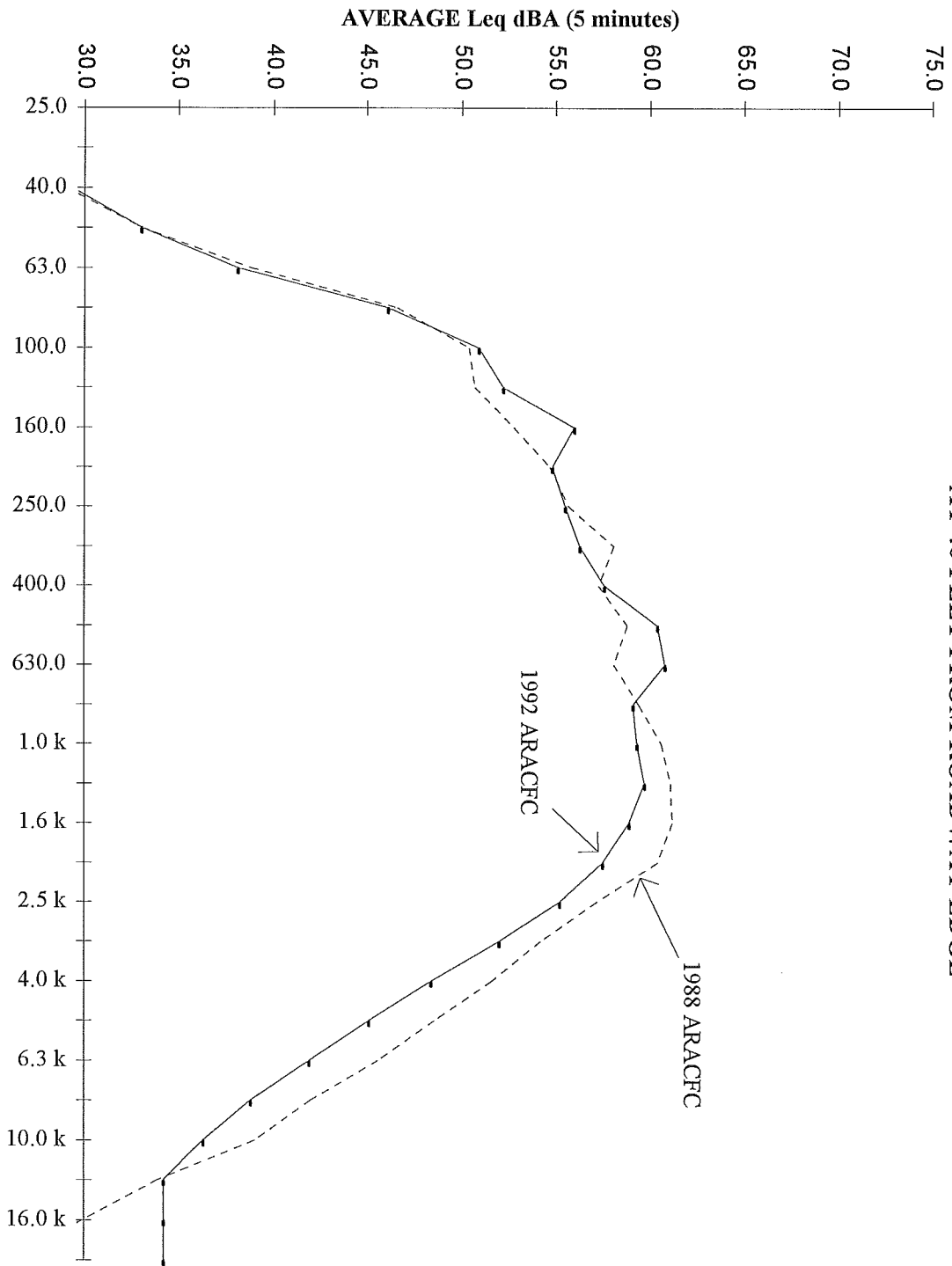
LOCATION 1
COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA
AT 88 FEET FROM ROADWAY EDGE



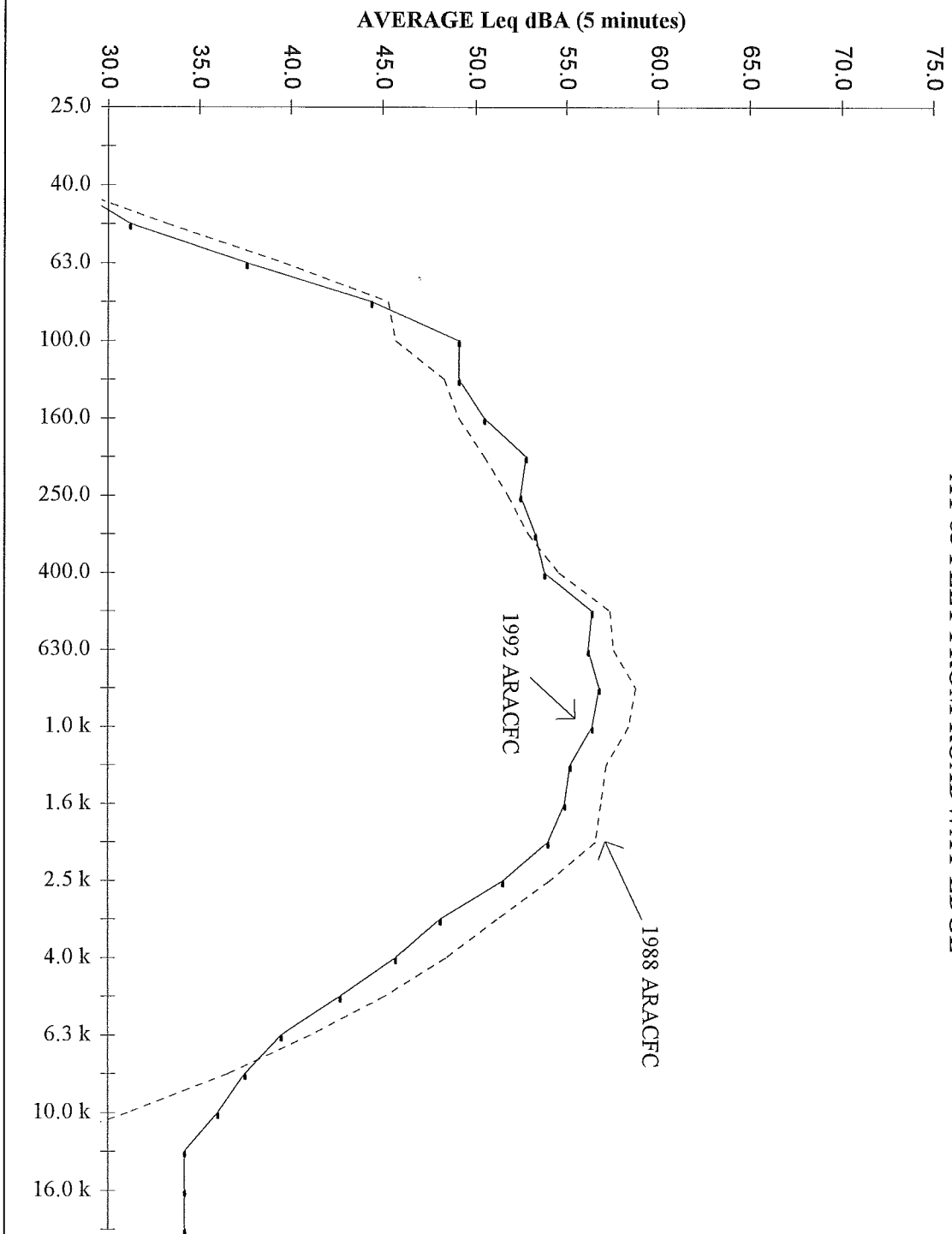
LOCATION 4 COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA AT 46 FEET FROM ROADWAY EDGE



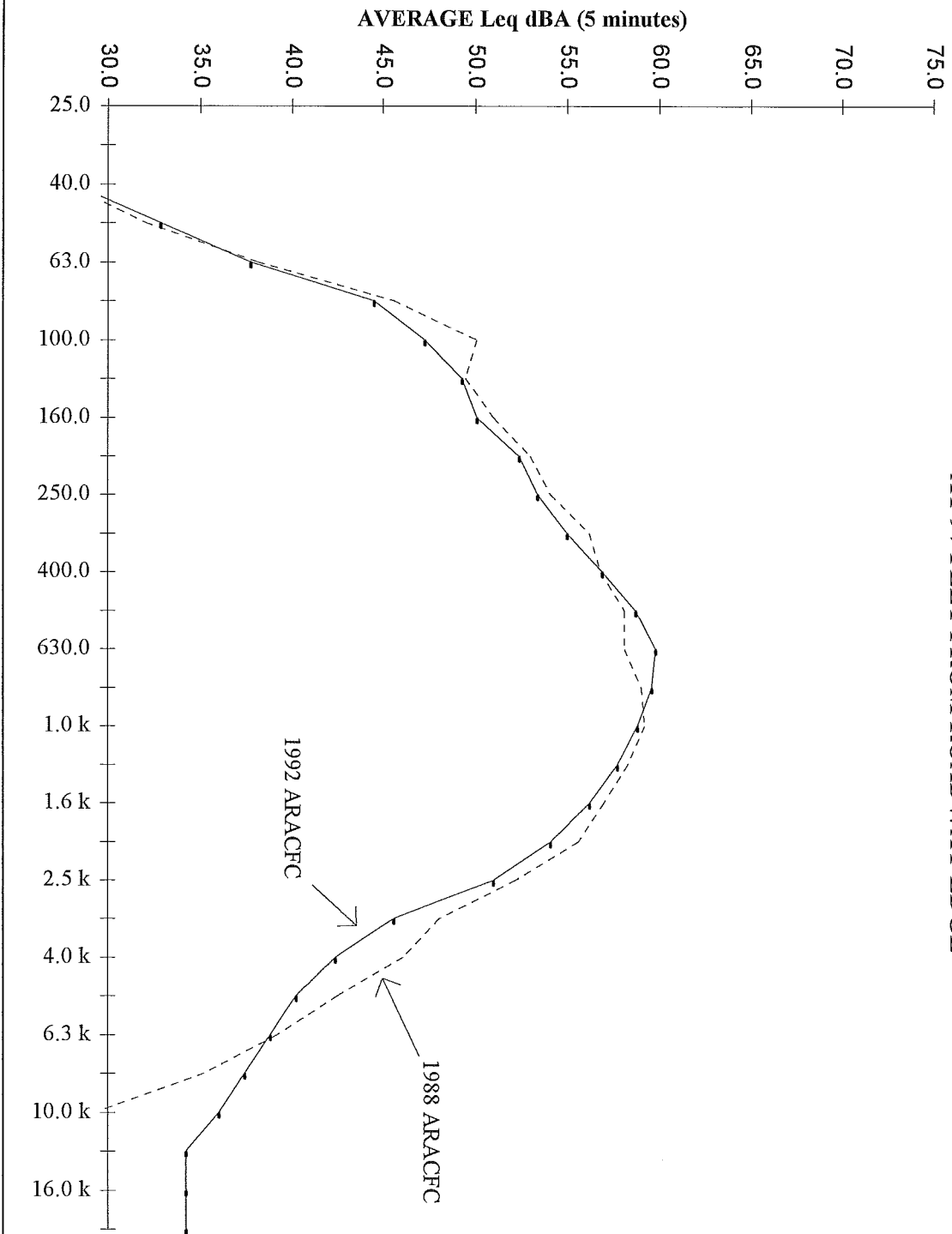
LOCATION 4
COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA
AT 46 FEET FROM ROADWAY EDGE



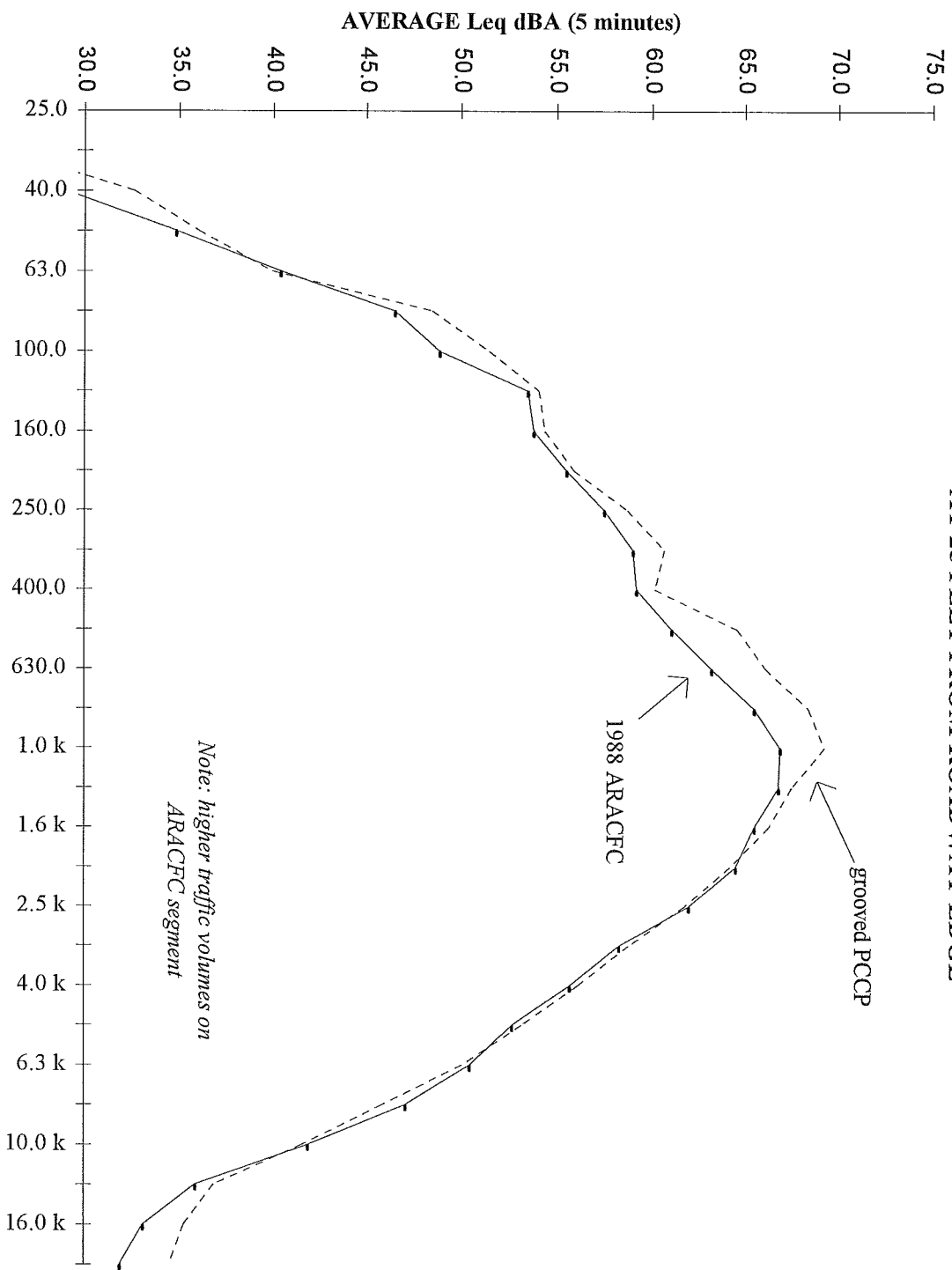
LOCATION 4
COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA
AT 83 FEET FROM ROADWAY EDGE



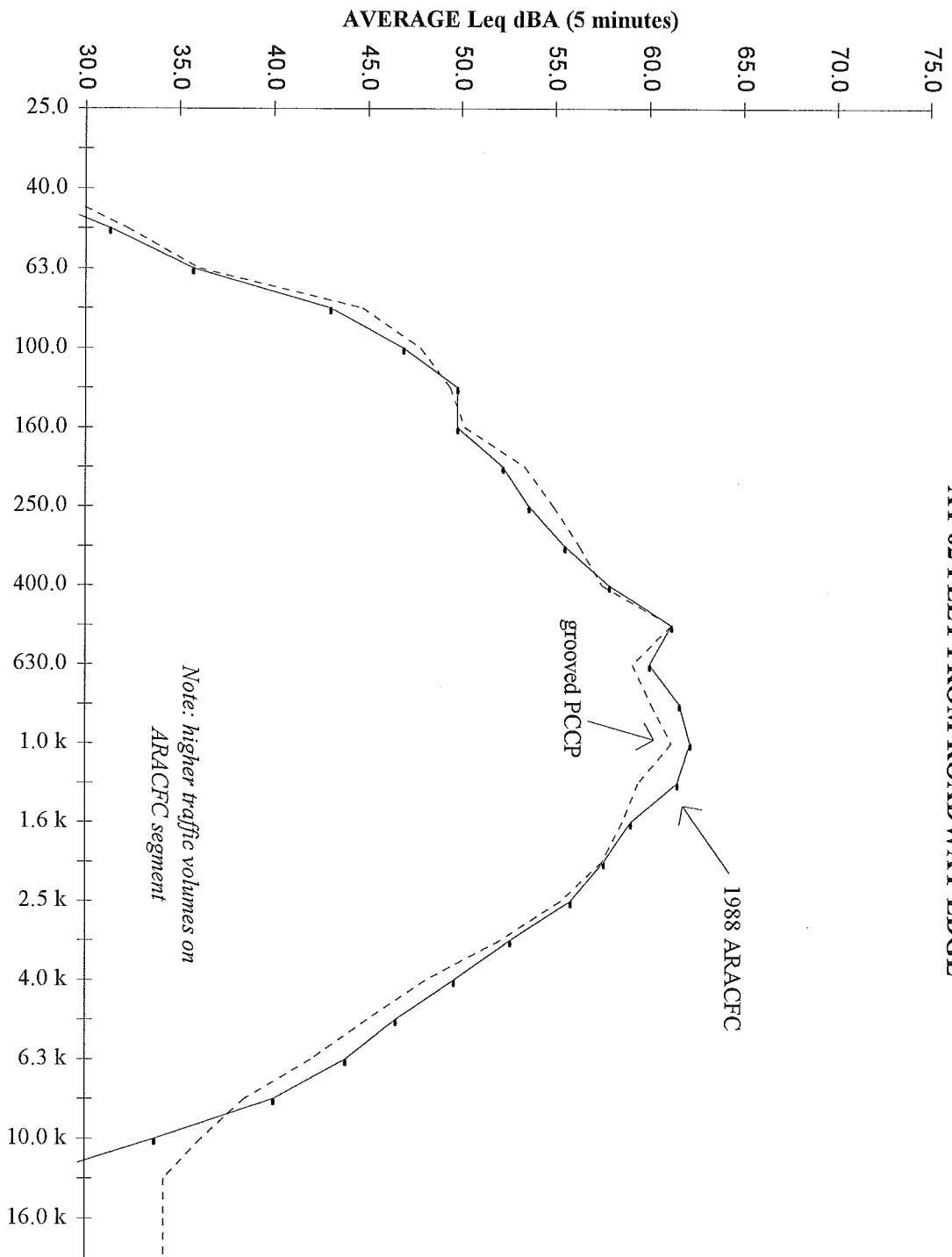
LOCATION 4
COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA
AT 97 FEET FROM ROADWAY EDGE



LOCATION 4 COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA AT 25 FEET FROM ROADWAY EDGE



LOCATION 4 COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA AT 62 FEET FROM ROADWAY EDGE



LOCATION 4 COMPARISON OF SAMPLE THIRD-OCTAVE FREQUENCY DATA AT 83 FEET FROM ROADWAY EDGE

