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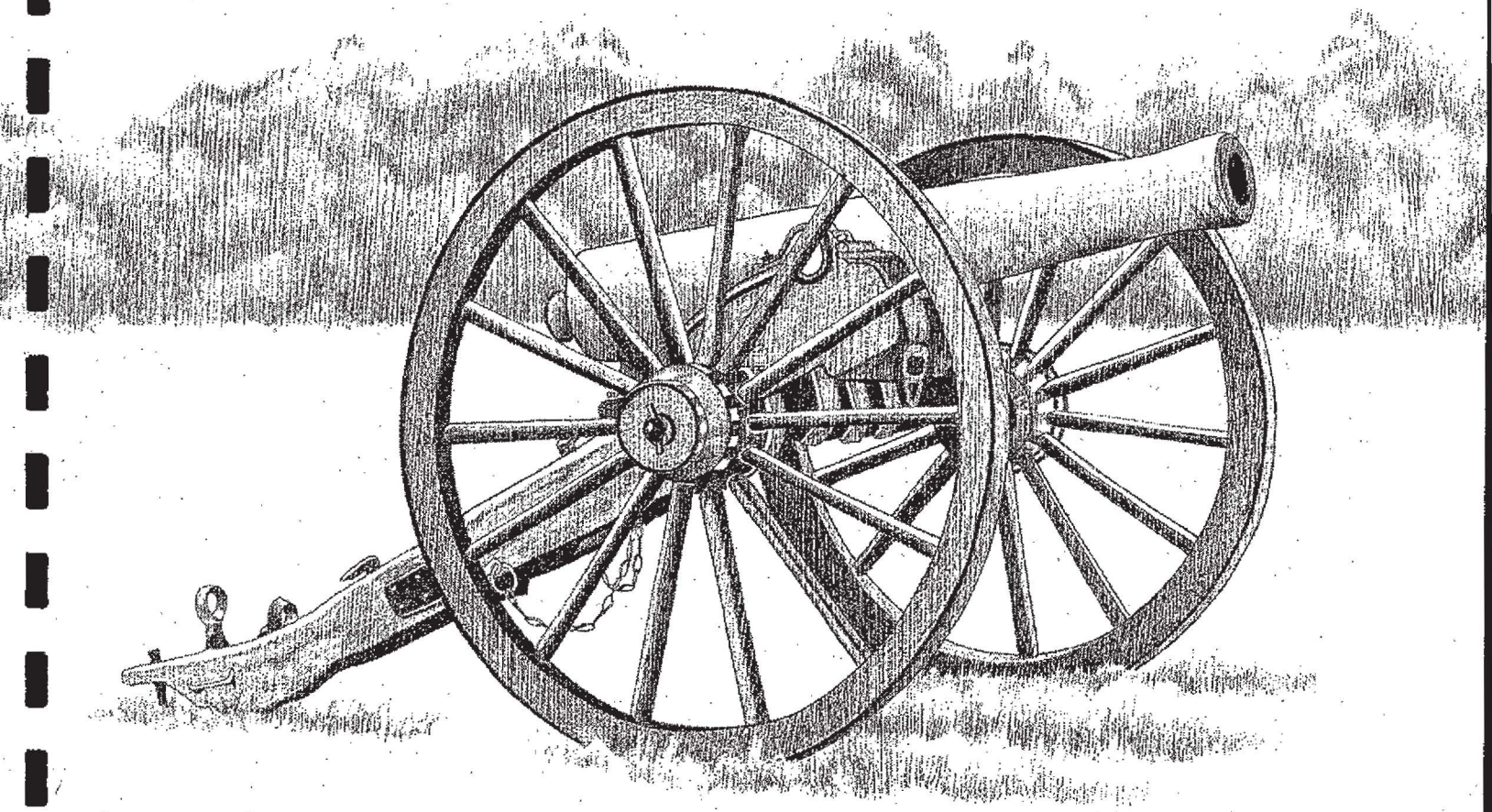
MANASSAS

NATIONAL BATTLEFIELD PARK

TRAFFIC NOISE AND VIBRATION ASSESSMENT



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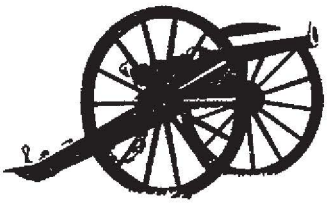

Traffic Noise and Vibration Assessment

Manassas National Battlefield Park, Manassas, Virginia

United States Department of the Interior
National Park Service
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PART 1: Traffic Vibration Assessment

prepared by
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PART 1 - TRAFFIC VIBRATION ASSESSMENT

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FINDINGS AND CONCLUSIONS

The Stone House is a two-story structure with a basement constructed in the 1820s from locally quarried sandstone. The building was in the center of action during the Civil War battles of the First and Second Manassas, serving as a field hospital. Consequently, the structure has considerable historic significance. The crossroads which the Stone House had served as a tavern has become the intersection of U.S. Rte. 29 with Va. Rte. 234. These roads carry substantial heavy-truck traffic. Since the front facade of the Stone House is only 55 ft from the edge of the US 29 pavement, the National Park Service is concerned that traffic-induced vibration will damage the historic building. This report documents the results of vibration measurements performed at various locations in and near the structure to determine the risk of damage to the building due to traffic-induced vibration.

TERMINOLOGY

As highway vehicles travel over a roadway, vibration is created by the vehicle/pavement interaction which depends upon: vehicle speed and weight, natural frequencies of vibration of the vehicle suspensions, irregularities in the roadway pavement, and pavement and subgrade construction. The pavement excitation propagates through the soil to structures causing vibration of the buildings. The building vibration is most clearly manifested in the movement of relatively lightweight structural elements, such as, floors or walls.

The vibration of building surfaces is an oscillatory motion which—in its simplest form—is analogous to the cyclic movement of a mass on a spring after the spring-mass system has been disturbed. The vibratory movement can be described in terms of displacement (e.g., in units of inches), velocity (e.g., in units of inches per second), or acceleration (e.g., in units of inches per second per second—in other words, inches/second^2) of a point (or *particle*) on the vibrating object. For any specific oscillatory frequency, the displacement, velocity, and acceleration can be related by the frequency of the vibration.*

Vibration displacement is often used to quantify imbalance in rotating machines because the greatest displacements usually occur at the relatively low frequencies associated with shaft rotation. Vibration velocity is the best parameter for quantifying the severity of vibration—it is most simply related to the vibratory energy; thus, a measure of the harmful potential of vibration. Vibration acceleration is the preferred parameter for measurement since its high-frequency weighting facilitates measurement over a broad frequency range.

For vibration which is primarily sinusoidal in character (for example, the oscillation caused by a rotating machine imbalance), magnitude often is described in terms of the peak value of displacement, velocity, or acceleration. However, as the character of the vibration time history becomes more complex, other descriptive quantities are preferable since the peak value quantifies only the instantaneous vibration magnitude without giving insight to the process producing it. A more useful statistic is the *root-mean-square* (RMS) value which takes the time history of the vibratory process into consideration and effectively quantifies the power content of the vibration.

Vibration also can be quantified in terms of levels with units of decibels (dB). In this report, vibration will be discussed in terms of *vibration velocity levels*, defined as

$$L_{VV} = 10 \log(v^2/v_R^2)$$

where L_{VV} is the vibration velocity level corresponding to the vibration velocity, v. The RMS magnitude of the time-varying velocity is usually reported.+ The reference velocity, v_R, is 1 micro-inch/second (1 μin./s or 10^{-6} in./s). Note that velocity in terms of levels corresponds to: 0.001 in./s at 60 dB, 0.01 in./s at 80 dB, and 0.1 in./s at 100 dB.

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* For a frequency, f, vibration velocity is related to the vibration displacement, x, as $v = 2\pi fx$ and vibration acceleration is related to the vibration displacement $a = (2\pi f)^2 x$.

+ For sinusoidal oscillations, the RMS average is 71% of the peak amplitude—3.0 dB below the peak amplitude, in terms of levels. For other patterns of temporal variation, the RMS average is smaller compared to the peak (possibly as little as 15-20% of the peak amplitude, i.e., *crest factors* of about 5-6).

For various purposes, a number of different noise metrics or descriptors have been defined to evaluate sound. These metrics also can be applied to vibration levels. The sound-level-type descriptors used in this report are:

- *Equivalent Level* (L_{eq}), also known as average level, is the level of steady vibration equivalent to the total vibrational energy of the time-varying RMS vibration during the measurement period. Typical evaluation periods are 15 min, $L_{eq}(¼)$, or 1 hr, $L_{eq}(1)$.

- *Maximum Level* (L_{max}) is the highest RMS vibration level measured during a time period or event.

Building vibration in the 1-250 Hz frequency range is of the greatest interest.* Vibration frequency characteristics are analyzed in terms of third-octave bands. *Third-octave-band vibration levels* are the levels of vibration in ranges of frequency whose widths are a constant 23% of their geometrically increasing center frequencies. (The center frequency of a given third-octave is about 5/4 as great as the center frequency of an adjacent band below it and about 4/5 as great as the center frequency of an adjacent band above it.)

Vibration is a vector quantity having both magnitude and direction. Therefore, to fully quantify the vibration of an object, measurements must be performed along three orthogonal axes. When the vibration amplitude of a surface is desired, these axes usually are defined in terms of the normal to the surface and two perpendicular axes in a plane parallel to the surface.

CRITERIA

The U.S. Bureau of Mines (USBM) has performed most of the significant work addressing building-damage risk out of concern for explosive-blasting effects on structures. From field measurements of blasting ground vibration and inspections of building structural damage, "safe blasting" limits for residential-structure interior walls were established—initially at 2.0 in./s peak particle velocity.[1] However, subsequent experience showed that low-frequency vibration required a more stringent limit. Later investigations produced recommendations for more restrictive safe levels for blasting causing significant vibration below 40 Hz: 0.75 in./s peak particle velocity for structures with modern *dry-wall construction*, and 0.50 in./s peak particle velocity for older homes with *plaster-on-wood-lath* interior walls.[2] (Note that these limits specifically apply to explosives blasting—brief, impulsive events. Their applicability to relatively steady vibration exposures, such as from highway traffic, have not been conclusively verified.) The blast-vibration

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* Frequency is described in terms of cycles per second having units of hertz (Hz).

criteria are based in part upon an assumption that the building responds as a single-degree-of-freedom system with most of the vibration concentrated at a fundamental resonance frequency. The USBM limits are specified in terms of outdoor ground vibration at the structure or the indoor structure foundation vibration at ground surface elevation. Vibration magnitudes for upper portions of the structure range from typically about 1.5 times the input vibration levels for structural responses (as measured at room corners) to typically about four times input (as measured at the middle of building walls).[2]

Studies of building response with respect to groundborne vibration for longer term sources—such as rail transit, construction equipment and highway traffic—are few. Apparently, many of the recommended limits are derivative from the same references and/or have limited technical basis.[3-8] These evaluations generally recommend limits of ground peak particle velocity of about 0.1-0.2 in./s—i.e., a factor of about 5 below the Bureau of Mines criteria for the impulsive blasting excitation. Based upon the USBM work, 0.1-in./s ground vibration suggests mid-wall responses for the upper building of 0.4 in./s peak particle velocity. In terms of RMS amplitude (assuming a crest factor of five), the ground and mid-wall responses are 0.02 in./s and 0.08 in./s, respectively. The corresponding vibration velocity levels are 86 dB and 98 dB (re 1 μin./s) for ground/foundation and upper building responses, respectively. Reducing these values to the next lowest multiple of five, the limits of 85 dB and 95 dB are obtained and will be used in this evaluation as the basis of comparison for the measured Stone House vibration—where the overall, un-weighted (i.e., linear response with frequency) vibration magnitude measured between 1-250 Hz will be compared to the criteria values.

MEASURED VIBRATION

Test Plan

Procedures. Measurements were performed at a total of eight locations/orientations in and around the Stone House:

- *Second Floor*—normal to the floor, wall and ceiling of the master bed chamber;
- *First Floor*—normal to the floor and wall of the bar room;
- *Basement*—normal to the floor of the storage area; and
- *Outside*—along vertical and horizontal axes at a location setback from the roadway equal to that of the front facade of the Stone House.

These locations are shown in Figures 1-3. At each location, measurements were made for 15-min intervals at various times during three test days (a Sunday and two weekdays). Simultaneously, traffic movements on Rte. 29 were videotaped. In addition, single-truck passbys were measured at the second-floor (wall and floor), first-floor (wall

and floor), and outdoor (vertical and horizontal) locations. The passby tests consisted of the stopping of all vehicular traffic on Rtes. 29 and 234 by National Park Service Police, then the release of one heavy truck westbound on US 29 with the truck passing by the Stone House at the maximum speed possible (at or above the posted limit). Five passby events for each test location were recorded. Measurements also were performed of building vibration induced from footfalls from tourist movements on the first floor of the building. These measurements were two minutes in duration and were obtained at the first-floor (floor and wall) and second-floor (floor, wall and ceiling) locations.

Instrumentation. Vibration was measured simultaneously at two locations with identical B&K 4338 piezoelectric accelerometers. The accelerometers were connected to the analyzer via low-noise miniature, coaxial cable—4 ft + 6 ft lengths for analyzer channel 1 input and 25 ft length for channel 2 input. The accelerometers were calibrated regularly using a B&K 4294 vibration calibrator. The location-specific features of the instrumentation system are documented in Table 1. The accelerometers were secured to the mounting bases via steel studs. The outdoor/ground measurement was performed using a bevel-pointed, 1¼ x 1¼ x 7-in. steel angle embedded approximately 5½ in. in the ground. The top of the angle-iron stake was fitted with a Wilcoxon Research Model TC1 Triax Cube mounting fixture. The accelerometers were attached to the faces of the mounting cube to sense vibration along vertical and horizontal (perpendicular to the US 29 roadway centerline) axes.

The outputs of the accelerometers were analyzed using a Norsonic RTA840 dual-channel real-time frequency analyzer programmed for third-octave band digital frequency analysis. Bands between 0.63-1250 Hz were measured with flat frequency weighting and a 125-ms integration time. The average (equivalent level, L_{eq}) and maximum (L_{max}) spectrum values were retained in each band for each test record. The frequency spectra were stored in the analyzer, then disposed to a computer via diskette for subsequent analyses.

Measurement Results

Measurements were performed on three days:

- *100-Series Measurements*—Sunday, 9 July 1995 between 10:36 AM-3:57 PM;
- *200-Series Measurements*—Tuesday, 11 July 1995 between 8:23 AM-3:28 PM; and
- *300-Series Measurements*—Wednesday, 12 July 1995 between 7:30 AM-1:47 PM.

(On a given day, record numbers were assigned sequentially, starting with record, x01.) 15-min-duration traffic measurements were saved as Records 101-105, 201-203, 209-

214, 301-303 and 309-310. Individual heavy-truck passbys were saved as Records 204-207,* 304-308 and 311-315. Two-minute-duration footfall measurements were saved as Records 106-109. Throughout the measurements, the road surfaces were clear and dry. The US 29 roadway at the Stone House was smooth and in good condition.

The recorded frequency-band vibration acceleration magnitudes were transformed into vibration velocity for comparison to criteria.+ The resultant spectra are given in Figures 4-11. The overall 1-250-Hz vibration velocity levels obtained from the summation of the band levels are provided in Table 2 along with the counts of traffic movements during the measurements. The mean vibration levels are summarized in Tables 3 and 4.

Traffic. The measured building vibration responses appeared to fall into three frequency ranges:

- *1-8 Hz*—In this frequency range the measured third-octave band vibration levels exhibited an approximately -10 dB/octave slope.# Observations during the measurements indicated this response is *not* the result of nearby vehicle movements but probably ambient background vibration.

- *8-50 Hz*—This frequency range includes building response to *groundborne vibration* and probably includes the fundamental whole-structure and building-element resonances excited by nearby vehicles.**

- *50-250 Hz*—Building response in this frequency range appears to be caused by *airborne noise* radiated from passing vehicles.

A crude estimate of the Stone House structural response to ground vibration was made by comparing the mean traffic L_{eq} wall vibration to the horizontal ground vibration and the floor vibration to the vertical ground vibration. The results, presented in Figures 12, suggest resonances at 16-20 Hz and 31.5 Hz.

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* Record 208 was lost due to depletion of analyzer batteries.

+ The vibration velocity was estimated as $v = a/2\pi f$, where f is the center frequency of the 1/3-octave band. (Note that at the highest frequencies, some error may be introduced because of the relatively large absolute width of the third octave, e.g., 58 Hz at 250-Hz center frequency).

Except for the basement floor measurement which may have been influenced by stray electromagnetic radiation or instrument transients at very low frequencies.

** Per Ref. 2, whole-structure distortion (building shell racking or shear) typically occurs at 4-12 Hz and mid-wall bending typically occurs at 10-25 Hz.

The outdoor ground vibration was controlled by the -10 dB/octave characteristic up to about 40 Hz. Above 40 Hz, the local vehicle influences were observed. The 15-min-interval, energy-average (L_{eq}) vibration levels were 103-108 dB—significantly exceeding the 85-dB ground vibration criterion.* However, the overall vibration levels are controlled by the lower frequency bands suspected to be ambient vibration. The responses identifiable as traffic-induced were at ≥50 Hz and at third-octave band levels generally less than 30 dB. Consequently, the damage risk is questionable—at least from nearby vehicles.

Indoors, the mean building response to traffic was L_{eq}(¼) vibration velocity levels of 69-74 dB on the second floor and 77-79 dB on the first floor. These overall levels also are controlled by the low-frequency, -10 dB/octave region (up to about 8 Hz) and are well below the 95-dB upper-building vibration criterion.

Comparison of the overall vibration velocity levels to the observed vehicle movements suggested little correlation with heavy truck activity. At the outdoor and second floor measurement locations, the highest vibration levels were observed during the Sunday measurements—with no heavy trucks! Slightly better correlation appeared to exist between vibration amplitude and *total vehicle counts*; however, the numbers of measurements at individual locations were insufficient to support statistical analysis.

Truck Passbys. Measured single-event heavy-truck passbys yielded building vibration magnitudes also well within the identified 95-dB criterion—second floor, 68-70 dB, and first floor, 80-86 dB. Outdoor mean maximum vibration velocity levels (L_{max}) were 111 and 114 dB for horizontal and vertical axes, respectively. The ground vibration, while well above the 85-dB criterion, did not appear to be truck-excited.

Footfalls. The footfall test was conducted with normal Sunday traffic on Rte. 29. Footfall-induced building vibration exceeded that caused by traffic alone, particularly for frequencies ≥8 Hz. In Figures 4c-11c, the mean traffic vibration levels (for all days) are compared to the measured footfall response. Footfall overall vibration levels exceeded traffic-induced vibration by 7 dB on the second floor and 3-7 dB on the first floor. However, the footfall vibration levels also are well within the building damage-risk criteria. (Note that for the first-floor measurements, tourist movements were limited to the entrance hall for Record 106 but allowed in the bar room for Record 107.)

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* The high recorded vibration levels may be an artifact of the transducer mounting. However, the mounting method was consistent with accepted practice, and the vibration spectra do not suggest a mounting problem.

CONCLUSIONS

While no well-accepted damage-risk criteria exist for traffic-induced building vibration, the defined limits (85 dB, ground/foundation response; 95 dB, building response) are believed to be conservative. The measured *building* vibration for both 15-min traffic average and individual vehicle passbys is well within these limits. The measured *ground* vibration, on the other hand, substantially exceeds the defined criteria. However, the measurements indicate that the high levels are not caused by local vehicle movements but apparently ambient vibration from undetermined sources. Whether this places the Stone House at risk cannot be answered definitively; although, the low vibration levels of the structure itself suggest "probably not." The more severe footfall excitation due to interior tourist movements also does not approach the criterion values. Consequently, the risk to the building due to damage from traffic-induced vibration probably is small. This is likely the result of the massive character of the building construction (which makes it less responsive to vibration) and of the good quality of the US 29-roadway surface (which minimizes the vehicle excitations). However, should the Rte.-29 pavement deteriorate and discontinuities (such as potholes) develop, traffic-induced vibration at the Stone House will increase dramatically—possibly to levels which could incur damage to the structure.

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TABLE 1. LOCATION-SPECIFIC INSTRUMENTATION SYSTEM FEATURES

MEASUREMENT LOCATION	SURFACE/ AXIS	MEAS. CHANNEL	ACCELEROMETER MOUNTING
Indoor/2nd Floor	Floor	2	double-backed adhesive tape
	Wall	1	cemented mounting base
	Ceiling	2	cemented mounting base
Indoor/1st Floor	Floor	2	double-backed adhesive tape
	Wall	1	cemented mounting base
Indoor/Basement	Floor	1	cemented mounting base
Outdoor/Ground	Vertical	1	steel stake with mounting cube
	Horizontal	2	steel stake with mounting cube

TABLE 2. MEASURED OVERALL VIBRATION VELOCITY LEVELS AND OBSERVED VEHICULAR TRAFFIC

REC	SRC	DSCP	LOC	SURFACE DIRECTION	L_{vv} O/A (dB)	—VEHICLE COUNT— LV	MT	HT	MEAS. START TIME
201	Trffc	Leq	OD	Hrzntl	101.2	294	6	12	8:33
105	Trffc	Leq	OD	Hrzntl	108.0	273	4	0	14:09
310	Trffc	Leq	OD	Hrzntl	96.7	153	12	12	12:37
212	Trffc	Leq	OD	Hrzntl	107.6				14:06
		MEAN			103.4	240.0	7.3	8.0	
		STD. DEV.			5.4	76.1	4.2	6.9	
201	Trffc	Leq	OD	Vrtcl	104.0	294	6	2	8:33
310	Trffc	Leq	OD	Vrtcl	101.5	153	12	12	12:37
212	Trffc	Leq	OD	Vrtcl	112.9				14:06
105	Trffc	Leq	OD	Vrtcl	111.7	273	4	0	14:09
		MEAN			107.5	240.0	7.3	4.7	
		STD. DEV.			5.7	76.1	4.2	6.4	
209	Trffc	Leq	F2	Ceiling	71.7	136	2	22	11:52
101	Trffc	Leq	F2	Ceiling	78.9	210	0	0	11:02
302	Trffc	Leq	F2	Ceiling	59.9				8:44
		MEAN			70.2	173.0	1.0	11.0	
		STD. DEV.			9.6	52.3	1.4	15.6	
303	Trffc	Leq	F2	Floor	68.7	162	10	21	9:17
102	Trffc	Leq	F2	Floor	85.0	263	2	0	11:41
210	Trffc	Leq	F2	Floor	77.3	154	5	21	12:22
211	Trffc	Leq	F2	Floor	63.1				13:23
		MEAN			73.5	193.0	5.7	14.0	
		STD. DEV.			9.6	60.8	4.0	12.1	
102	Trffc	Leq	F2	Wall	82.1	263	2	0	11:41
210	Trffc	Leq	F2	Wall	67.8	154	5	21	12:22
303	Trffc	Leq	F2	Wall	53.3	162	10	21	9:17
302	Trffc	Leq	F2	Wall	54.1				8:44
211	Trffc	Leq	F2	Wall	72.6				13:23
101	Trffc	Leq	F2	Wall	81.1	210	0	0	11:02
209	Trffc	Leq	F2	Wall	68.7	136	2	22	11:52
		MEAN			68.5	185.0	3.8	12.8	
		STD. DEV.			11.5	51.5	3.9	11.7	
103	Trffc	Leq	F1	Floor	73.1	283	0	2	12:39
301	Trffc	Leq	F1	Floor	79.8				7:49
214	Trffc	Leq	F1	Floor	77.4				15:17
203	Trffc	Leq	F1	Floor	79.5	130	7	24	9:44
		MEAN			77.5	206.5	3.5	13.0	
		STD. DEV.			3.1	108.2	4.9	15.6	
301	Trffc	Leq	F1	Wall	85.1				7:49
214	Trffc	Leq	F1	Wall	75.7				15:17
103	Trffc	Leq	F1	Wall	75.0	283	0	2	12.39
203	Trffc	Leq	F1	Wall	81.9	130	7	24	9:44
		MEAN			79.4	206.5	3.5	13.0	
		STD. DEV.			4.9	108.2	4.9	15.6	
104	Trffc	Leq	F0	Floor	62.5	240	1	1	13:25
202	Trffc	Leq	F0	Floor	66.6	154	7	23	9:04
309	Trffc	Leq	F0	Floor	61.9	152	4	10	11:47
213	Trffc	Leq	F0	Floor	71.4				14:45
		MEAN			65.6	182.0	4.0	11.3	
		STD. DEV.			4.4	50.2	3.0	11.1	

(Continued)

TABLE 2. MEASURED OVERALL VIBRATION VELOCITY LEVELS AND OBSERVED VEHICULAR TRAFFIC (Continued)

REC	SRC	DSCP	LOC	SURFACE DIRECTION	L_{vv} O/A (dB)
311	Pssby	Lmax	OD	Hrzntl	109.2
315	Pssby	Lmax	OD	Hrzntl	111.8
313	Pssby	Lmax	OD	Hrzntl	112.0
312	Pssby	Lmax	OD	Hrzntl	110.3
314	Pssby	Lmax	OD	Hrzntl	113.8
		MEAN			111.4
		STD. DEV.			1.8
315	Pssby	Lmax	OD	Vrtcl	117.9
313	Pssby	Lmax	OD	Vrtcl	110.4
311	Pssby	Lmax	OD	Vrtcl	116.3
312	Pssby	Lmax	OD	Vrtcl	111.6
314	Pssby	Lmax	OD	Vrtcl	114.5
		MEAN			114.1
		STD. DEV.			3.2
308	Pssby	Lmax	F2	Floor	73.1
305	Pssby	Lmax	F2	Floor	64.9
307	Pssby	Lmax	F2	Floor	76.4
306	Pssby	Lmax	F2	Floor	69.2
304	Pssby	Lmax	F2	Floor	65.8
		MEAN			69.9
		STD. DEV.			4.9
307	Pssby	Lmax	F2	Wall	69.4
304	Pssby	Lmax	F2	Wall	61.5
306	Pssby	Lmax	F2	Wall	65.0
305	Pssby	Lmax	F2	Wall	78.3
308	Pssby	Lmax	F2	Wall	67.0
		MEAN			68.2
		STD. DEV.			6.3
206	Pssby	Lmax	F1	Floor	82.0
207	Pssby	Lmax	F1	Floor	77.1
204	Pssby	Lmax	F1	Floor	82.4
205	Pssby	Lmax	F1	Floor	77.4
		MEAN			79.7
		STD. DEV.			2.9
207	Pssby	Lmax	F1	Wall	87.4
205	Pssby	Lmax	F1	Wall	83.2
204	Pssby	Lmax	F1	Wall	89.3
206	Pssby	Lmax	F1	Wall	83.0
		MEAN			85.7
		STD. DEV.			3.1
108	Ftfll	Leq	F2	Ceiling	83.0
109	Ftfll	Leq	F2	Floor	81.2
108	Ftfll	Leq	F2	Wall	81.7
109	Ftfll	Leq	F2	Wall	69.6
106	Ftfll	Leq	F1	Floor*	82.8
107	Ftfll	Leq	F1	Floor*	80.9
107	Ftfll	Leq	F1	Wall	76.3
106	Ftfll	Leq	F1	Wall	73.7

* overloaded analyzer

TABLE 3. SUMMARY OF MEASUREMENTS—GROUND VIBRATION

MEASURED CONDITION	——MEAN VIBRATION LEVEL (dB re 1 μin./s_{RMS})—— for DIRECTION	
	Horizontal	Vertical
Traffic L_{eq}	103	108
Truck Passby L_{max}	111	114

TABLE 4. SUMMARY OF MEASUREMENTS—BUILDING VIBRATION

BUILDING LEVEL	——MEAN VIBRATION LEVEL (dB re 1 μin./s_{RMS})— for SURFACE		
	Ceiling	Wall	Floor
	TRAFFIC L_{eq}		
2nd Floor	70	69	74
1st Floor	--	79	77
Basement	--	--	66
	TRUCK PASSBY L_{max}		
2nd Floor	--	68	70
1st Floor	--	86	80
	Footfalls L_{eq}		
2nd Floor	83	76	81
1st Floor	--	75	82

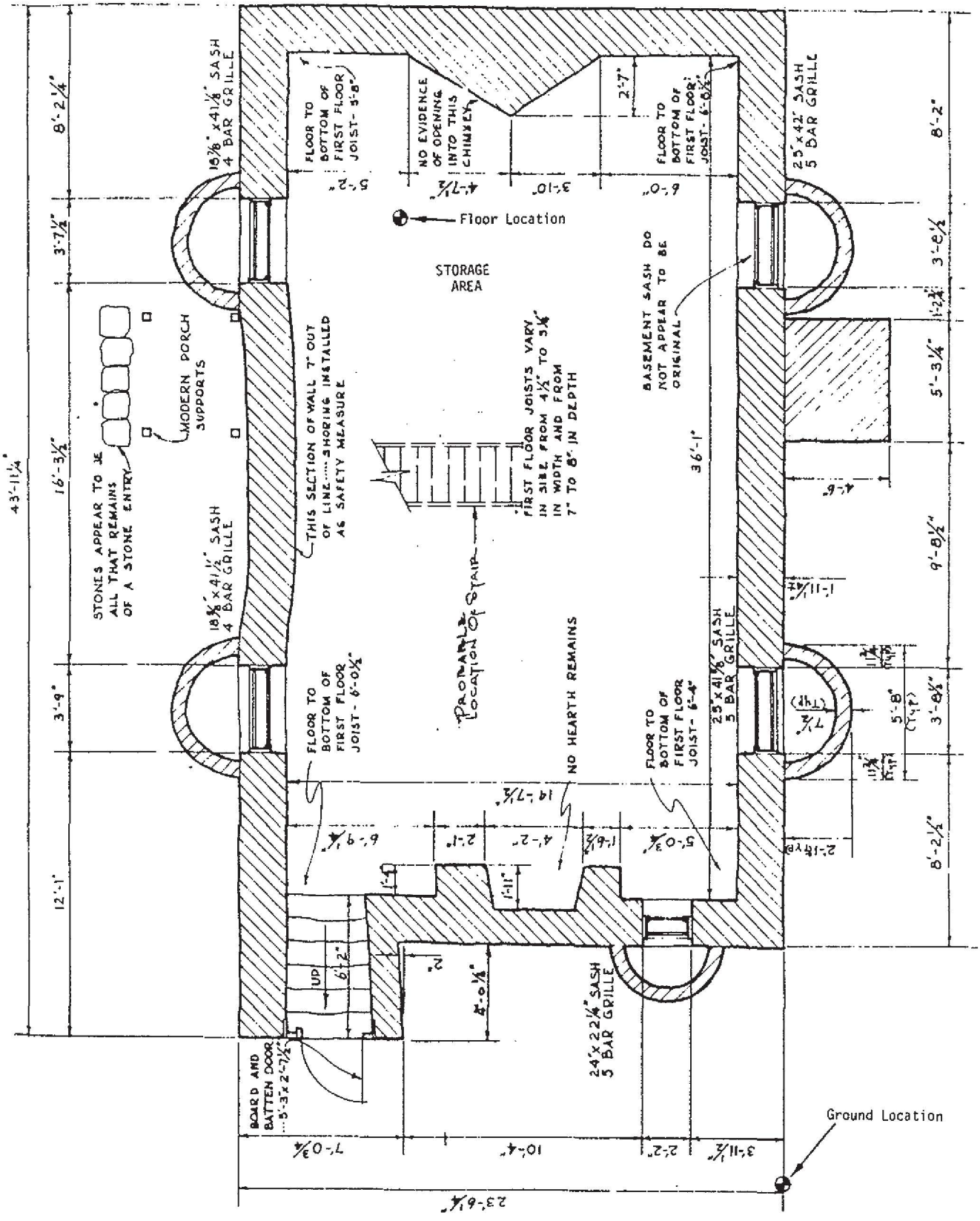


FIGURE 1. VIBRATION MEASUREMENT LOCATIONS—OUTDOOR AND BASEMENT

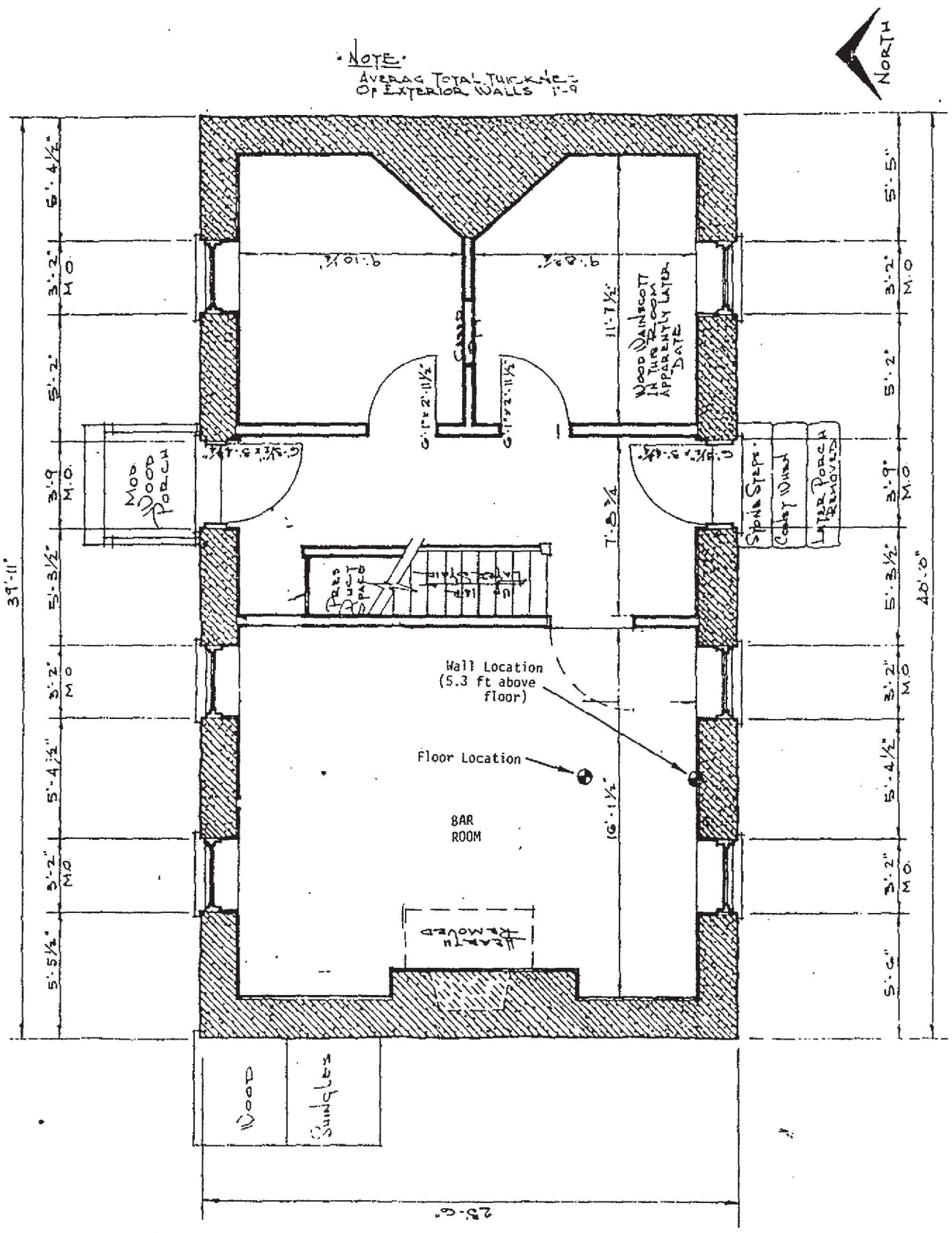


FIGURE 2. VIBRATION MEASUREMENT LOCATIONS—FIRST FLOOR

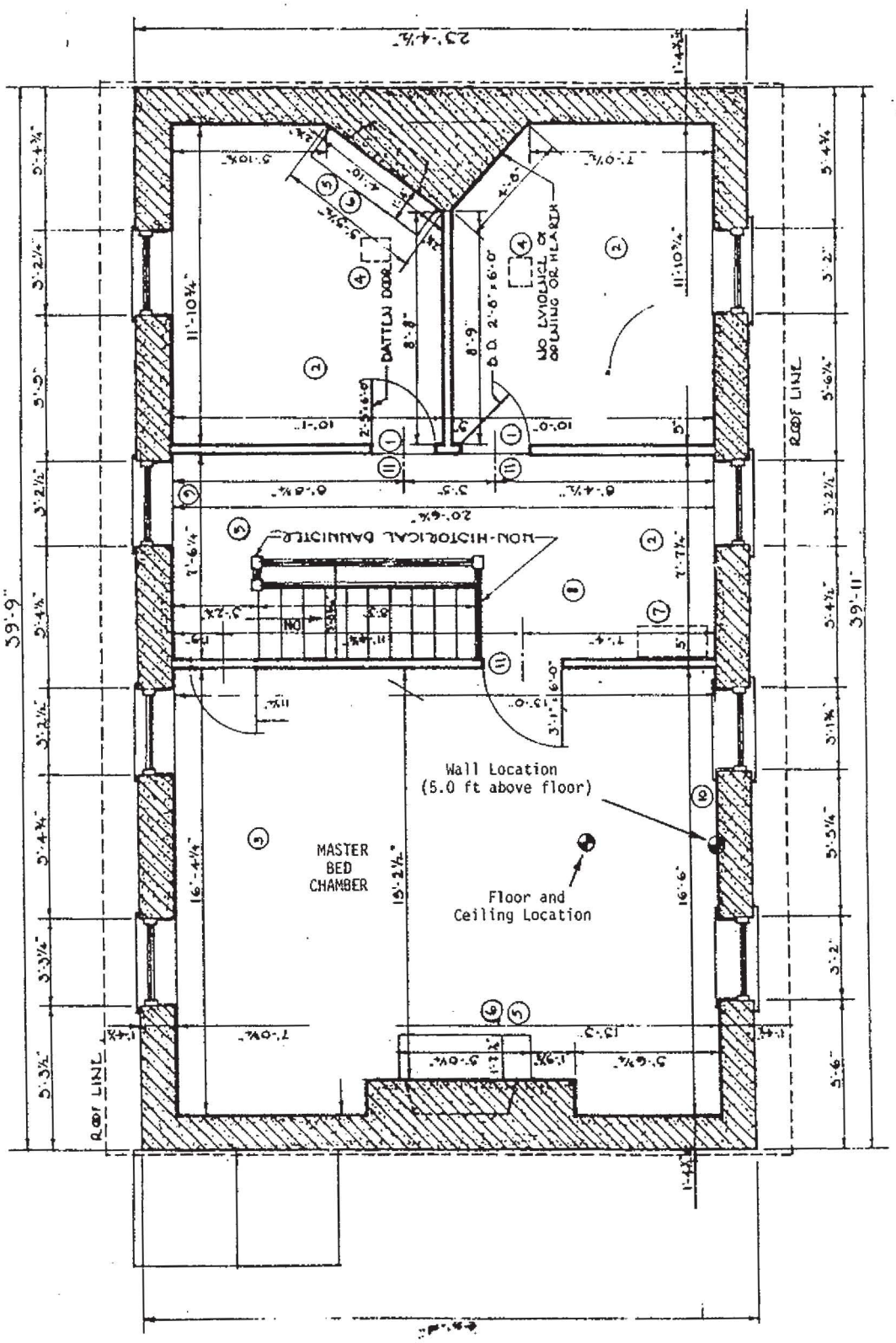
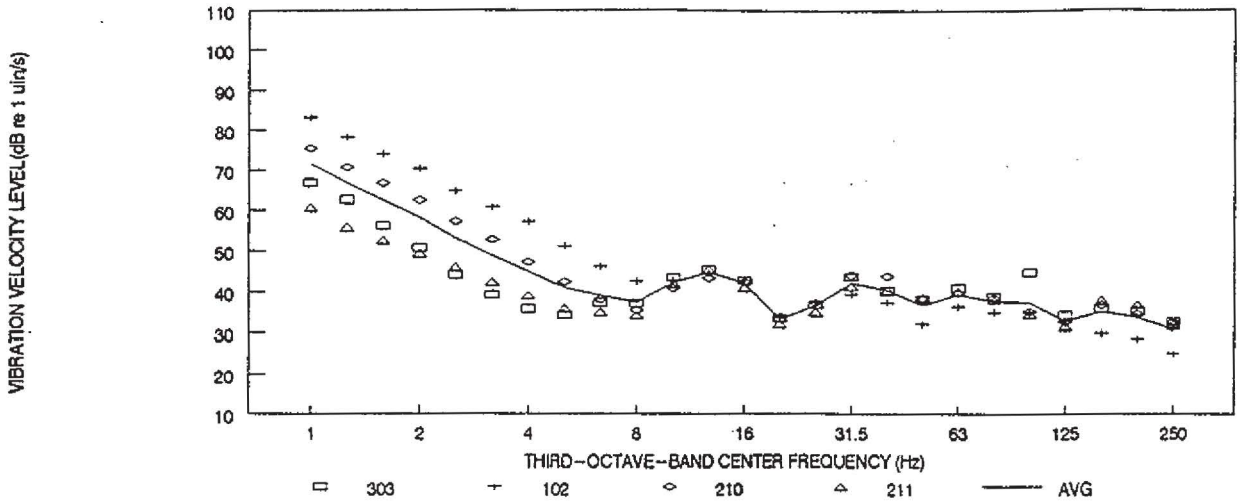
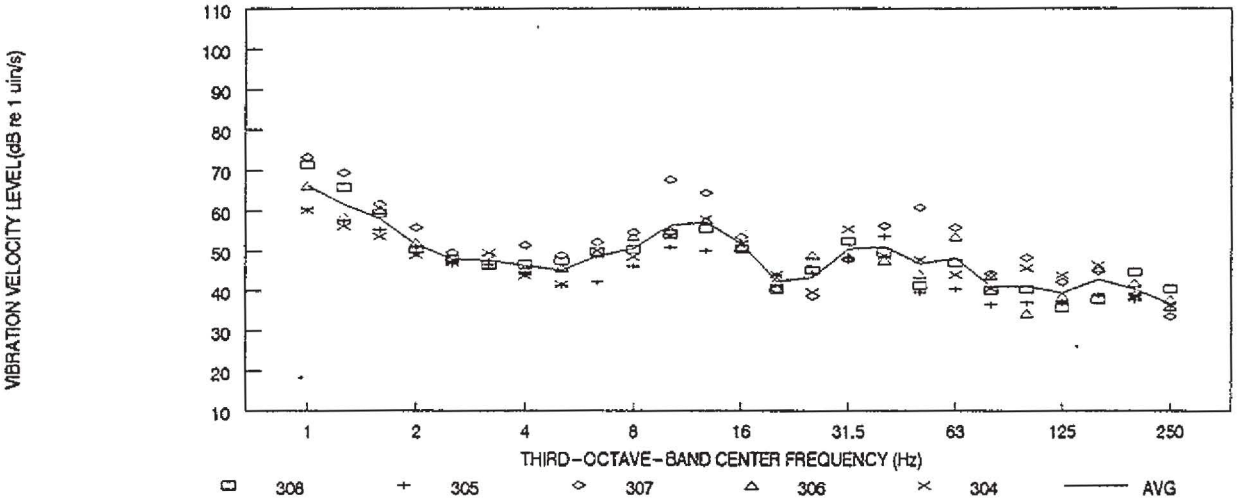


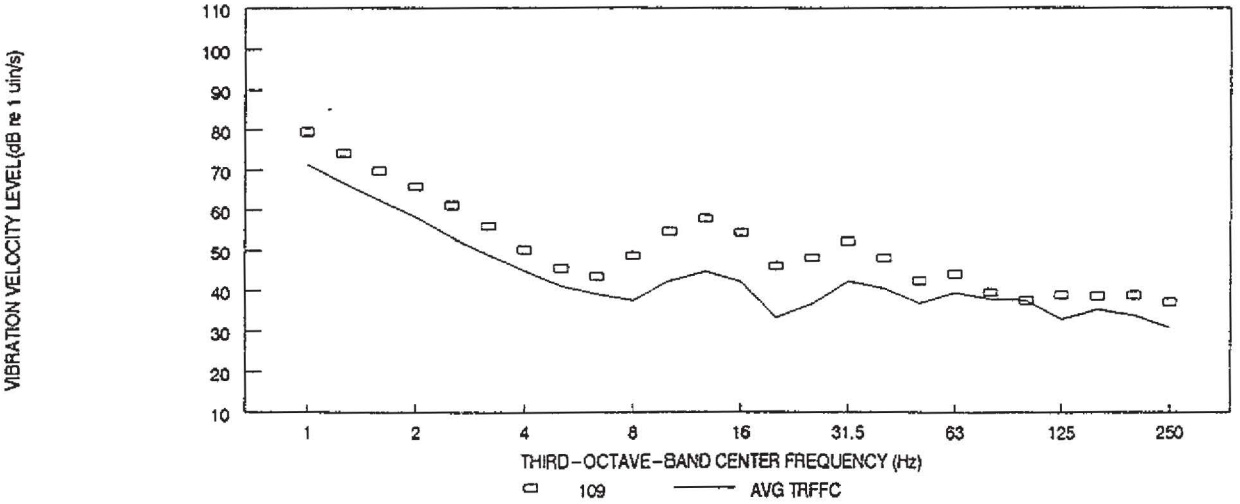
FIGURE 3. VIBRATION MEASUREMENT LOCATIONS—SECOND FLOOR



a. Traffic L_{eq}

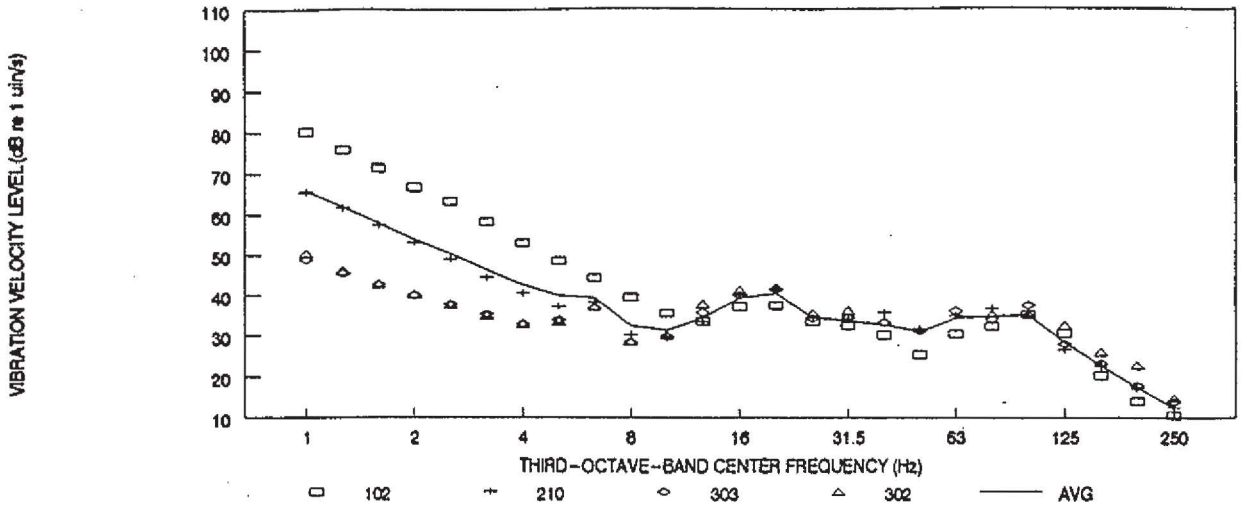


b. Passby L_{max}

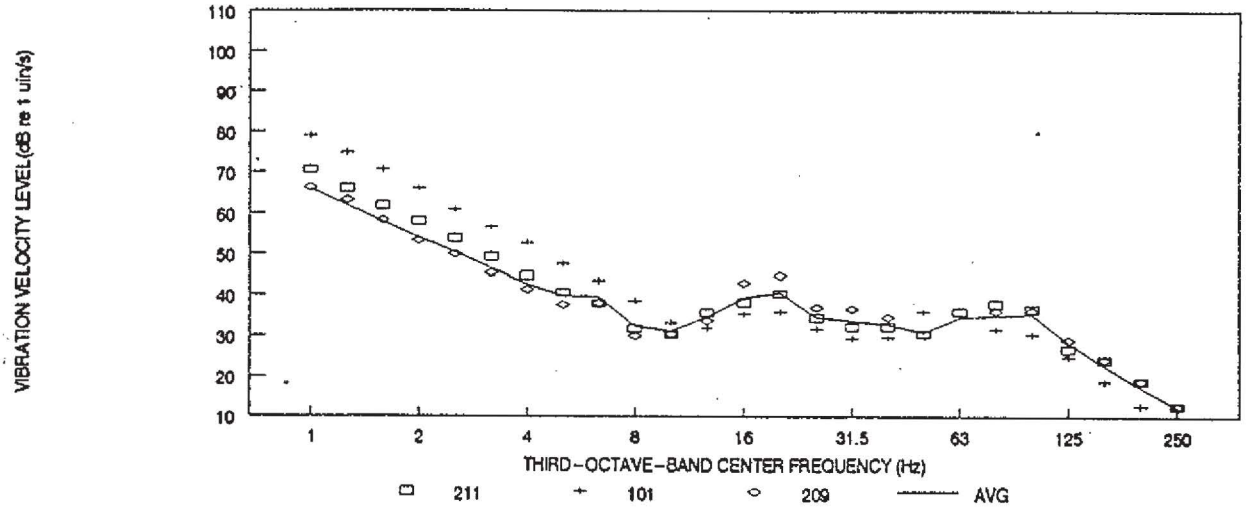


c. Footfall L_{eq}

FIGURE 4. MEASURED VIBRATION VELOCITY LEVELS—SECOND FLOOR/FLOOR

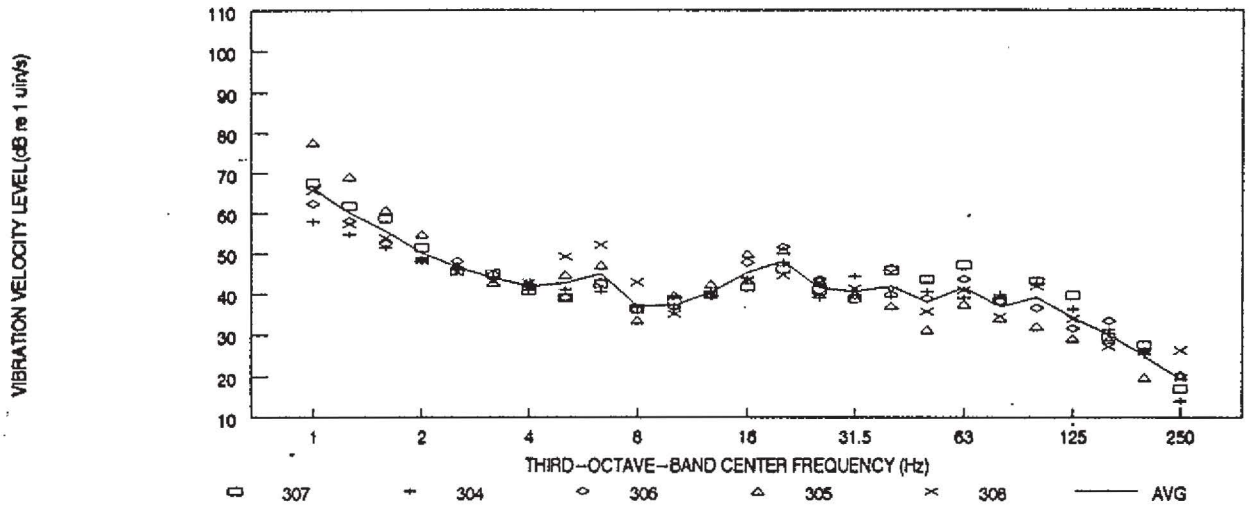


a(1). Traffic L_{eq}

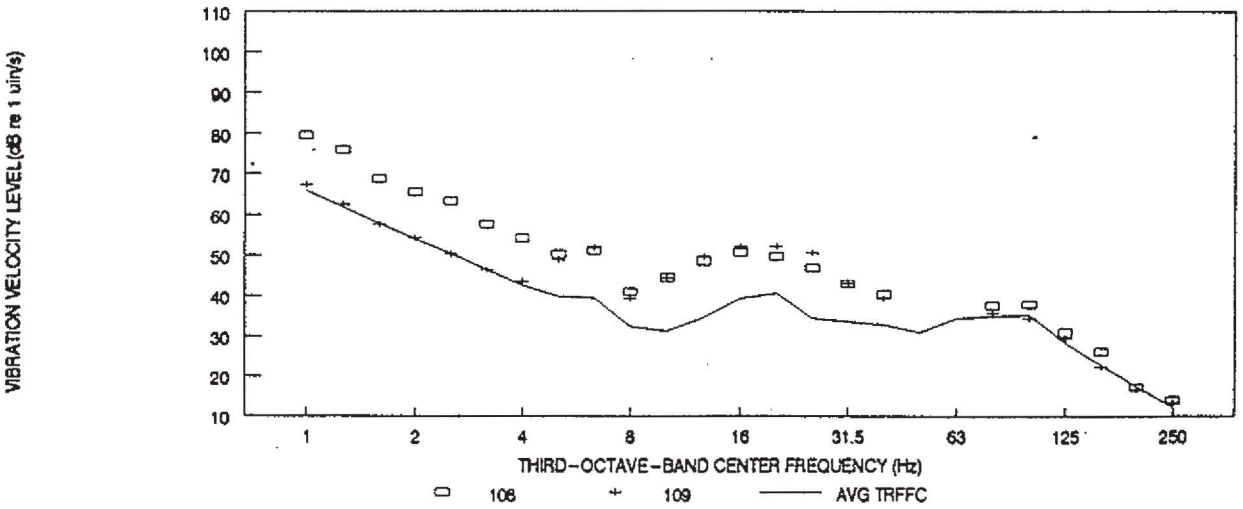


a(2). Traffic L_{eq}

FIGURE 5. MEASURED VIBRATION VELOCITY LEVELS—SECOND FLOOR/WALL

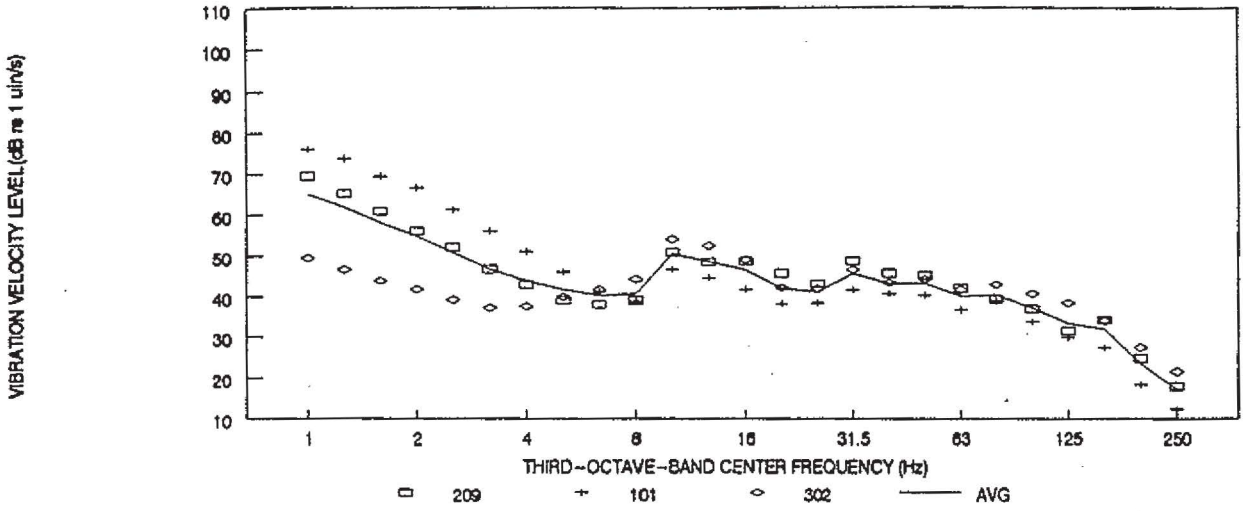


b. Passby L_{max}



c. Footfall L_{eq}

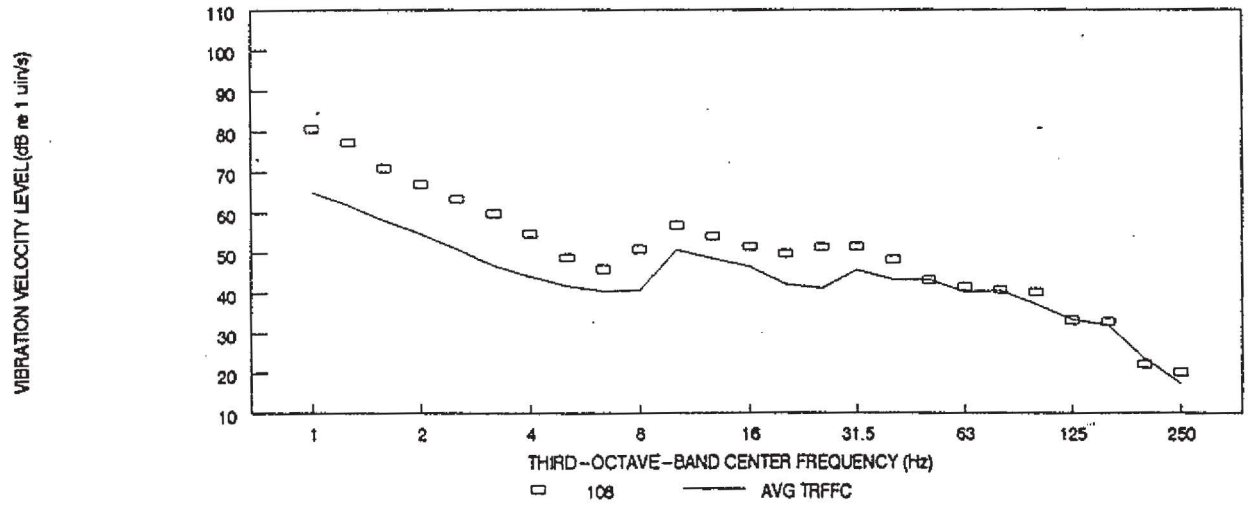
FIGURE 5. MEASURED VIBRATION VELOCITY LEVELS—SECOND FLOOR/WALL (Continued)



a. Traffic L_{eq}

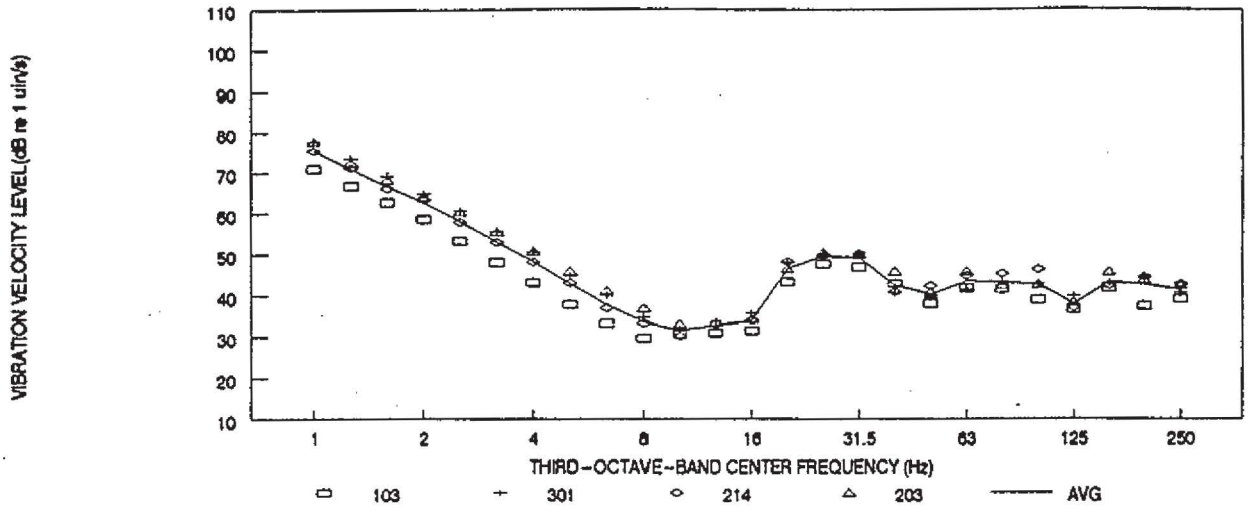
NOT MEASURED

b. Passby L_{max}

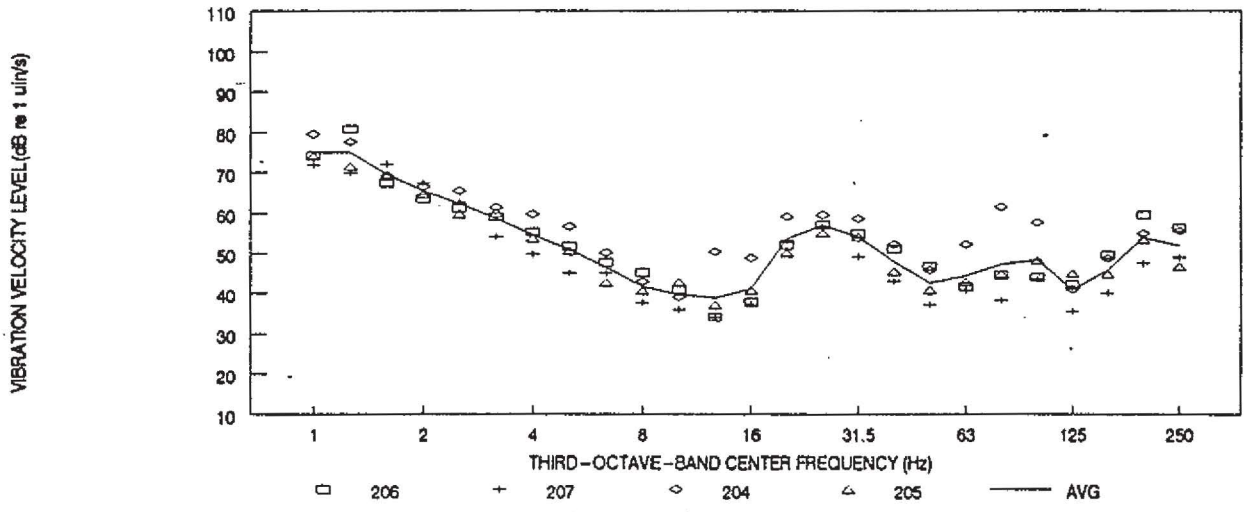


c. Footfall L_{eq}

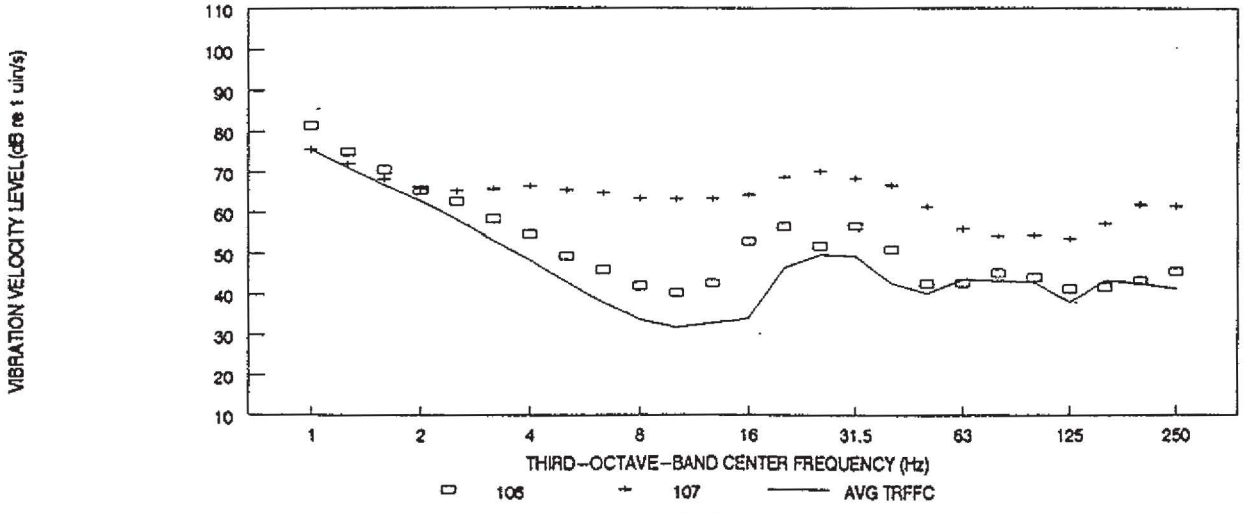
FIGURE 6. MEASURED VIBRATION VELOCITY LEVELS—SECOND FLOOR/CEILING



a. Traffic L_{eq}

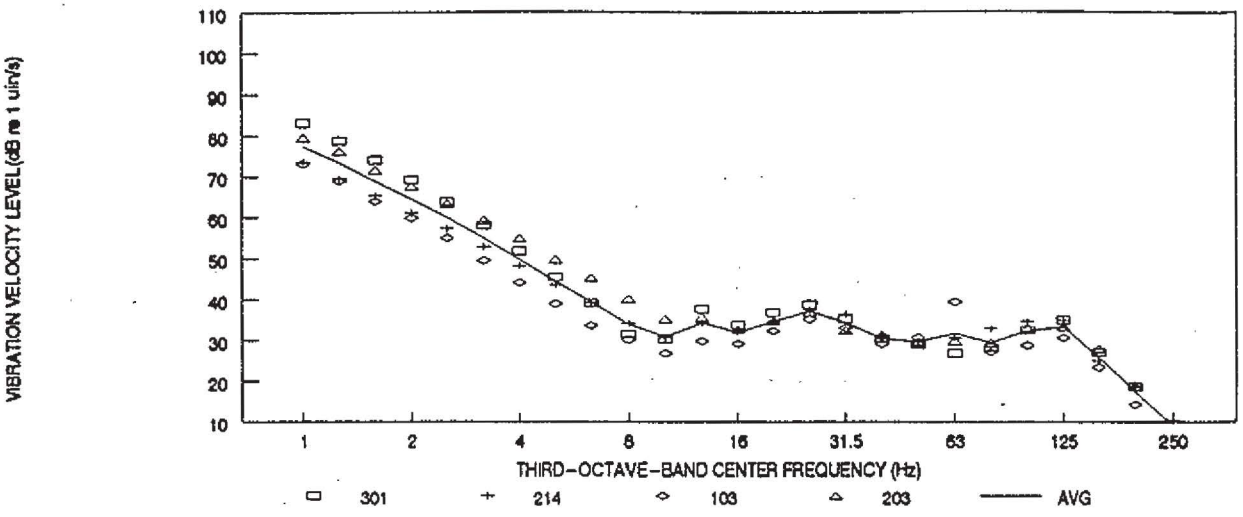


b. Passby L_{max}

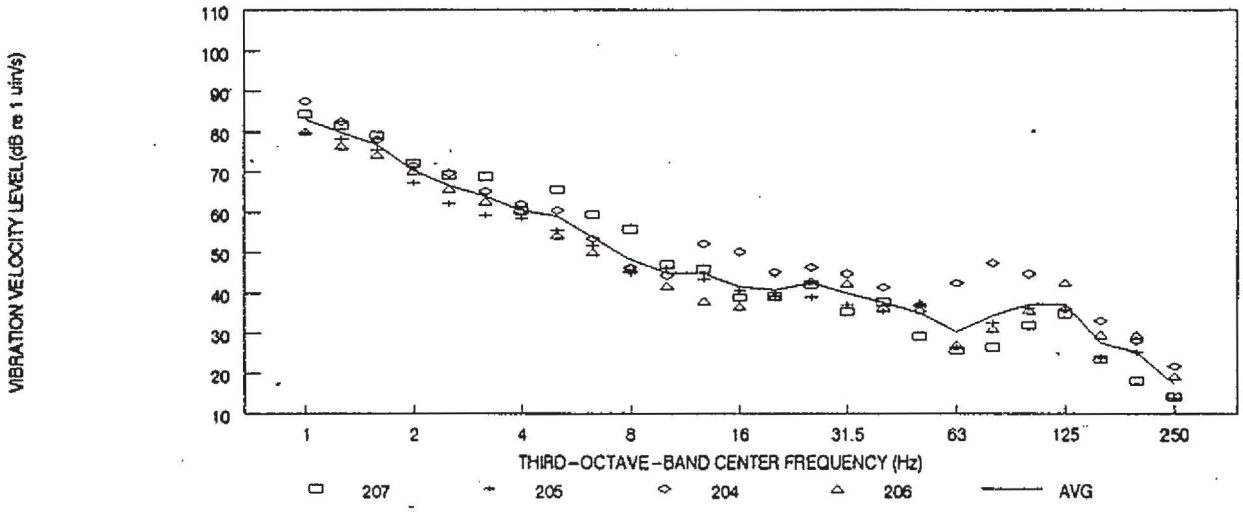


c. Footfall L_{eq}

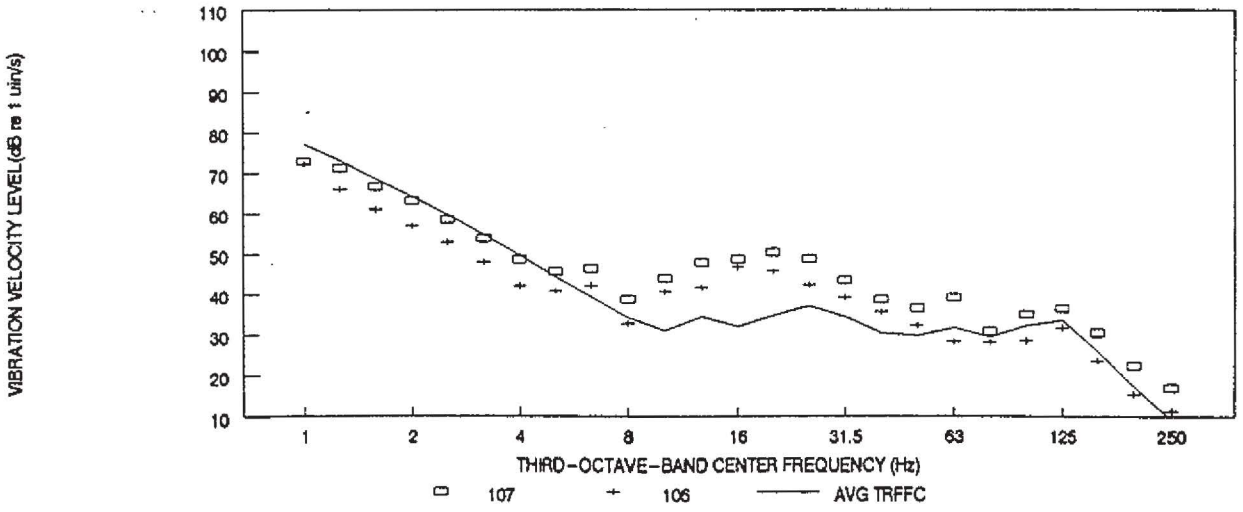
FIGURE 7. MEASURED VIBRATION VELOCITY LEVELS—FIRST FLOOR/FLOOR



a. Traffic L_{eq}

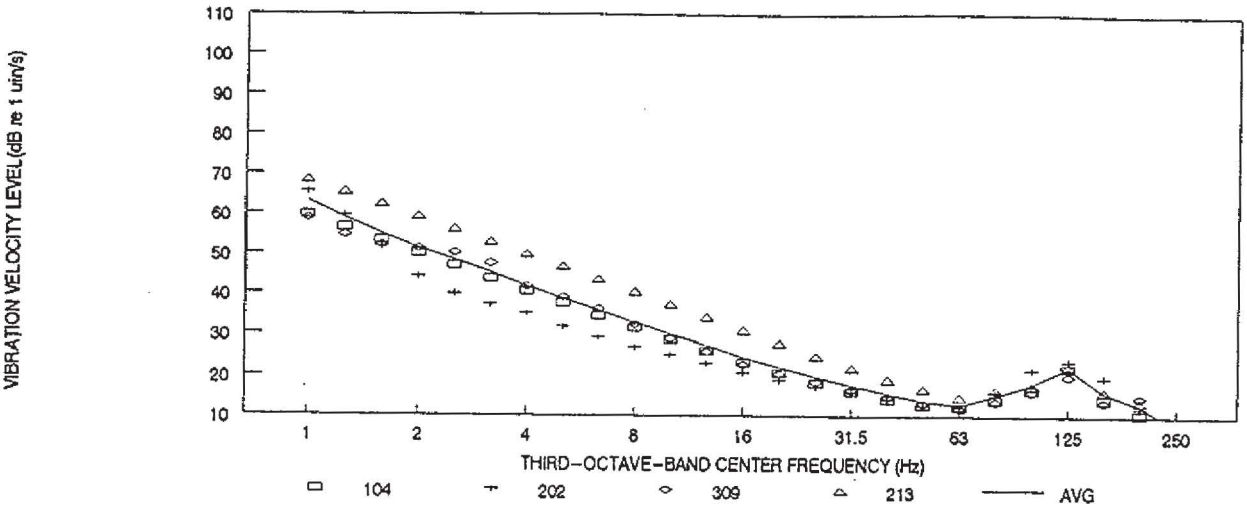


b. Passby L_{max}



c. Footfall L_{eq}

FIGURE 8. MEASURED VIBRATION VELOCITY LEVELS—FIRST FLOOR/WALL



a. Traffic L_{eq}

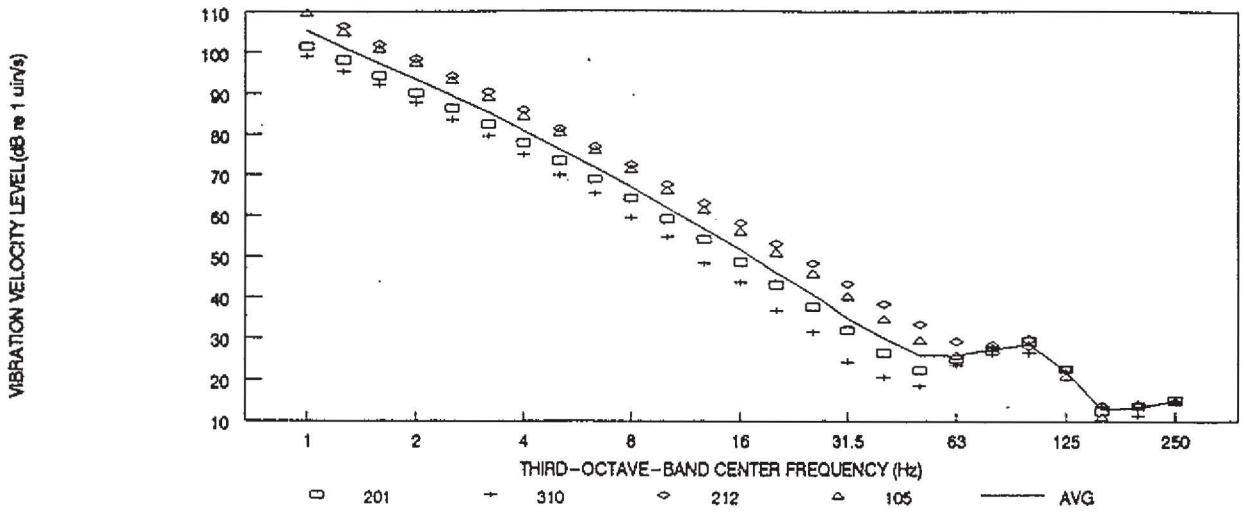
NOT MEASURED

b. Passby L_{max}

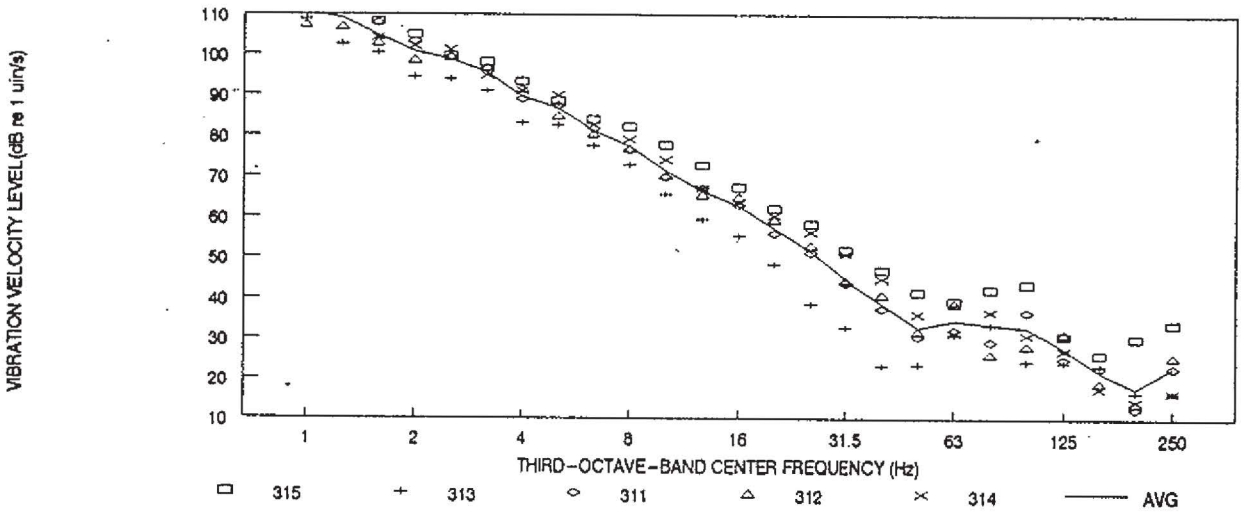
NOT MEASURED

c. Footfall L_{eq}

FIGURE 9. MEASURED VIBRATION VELOCITY LEVELS—BASEMENT/FLOOR



a. Traffic L_{eq}

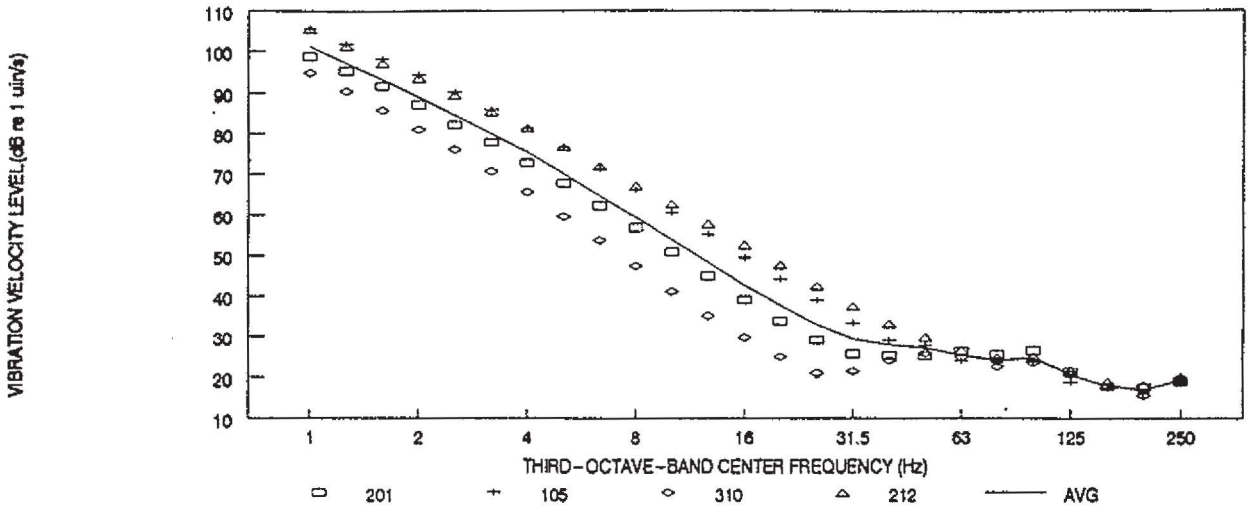


b. Passby L_{max}

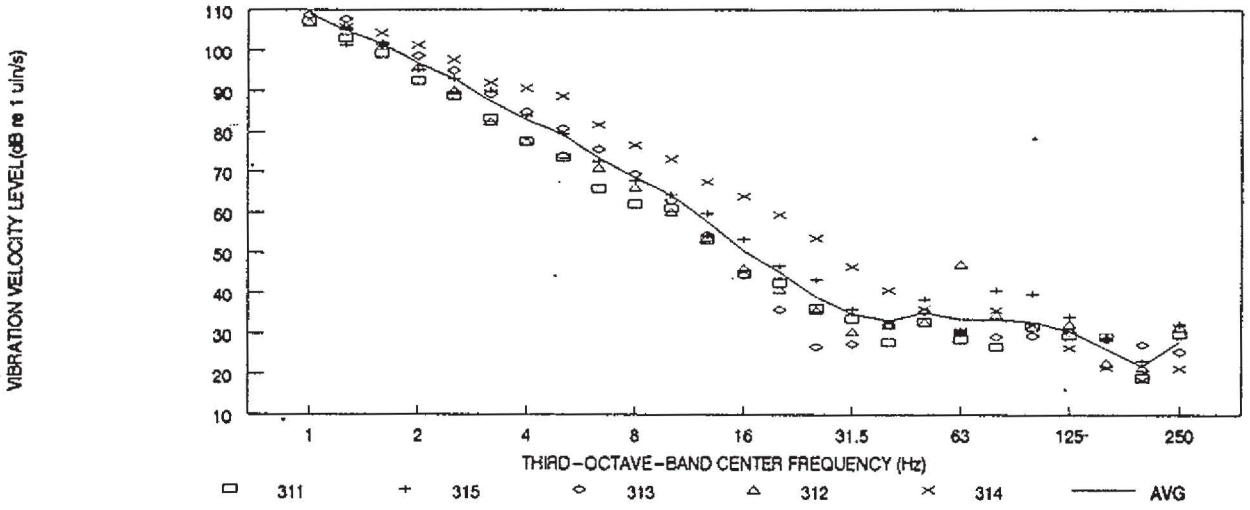
NOT MEASURED

c. Footfall L_{eq}

FIGURE 10. MEASURED VIBRATION VELOCITY LEVELS—GROUND/VERTICAL AXIS



a. Traffic L_{eq}

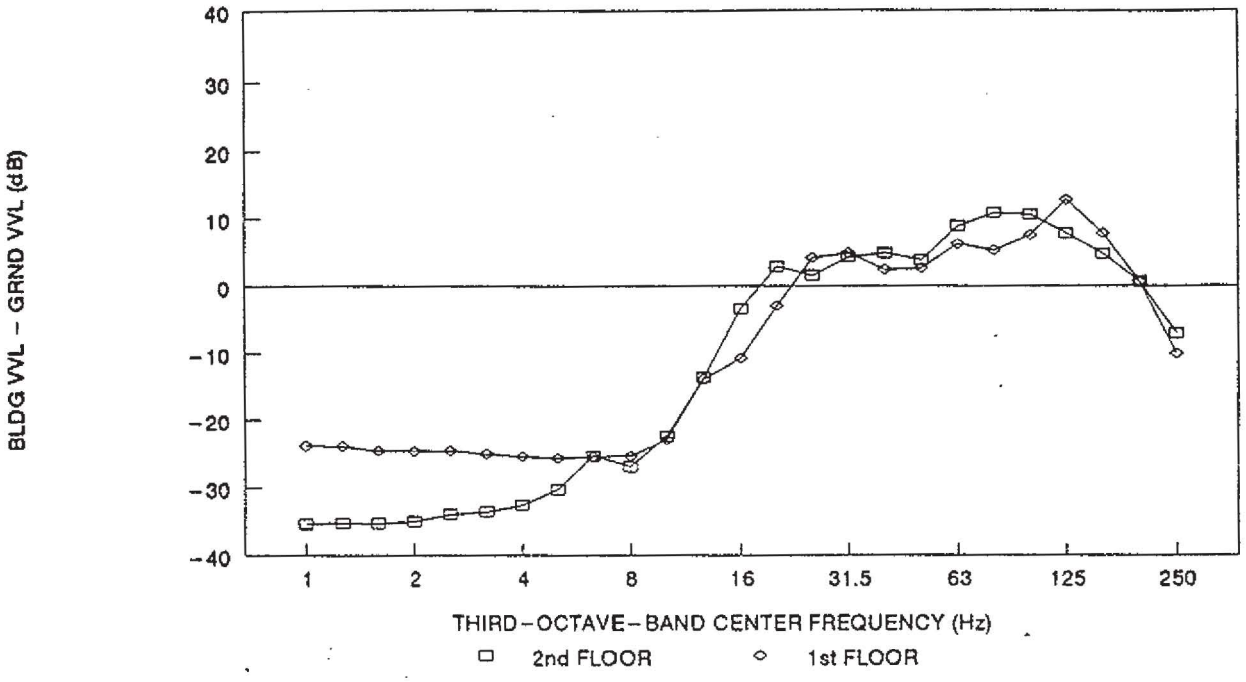


b. Passby L_{max}

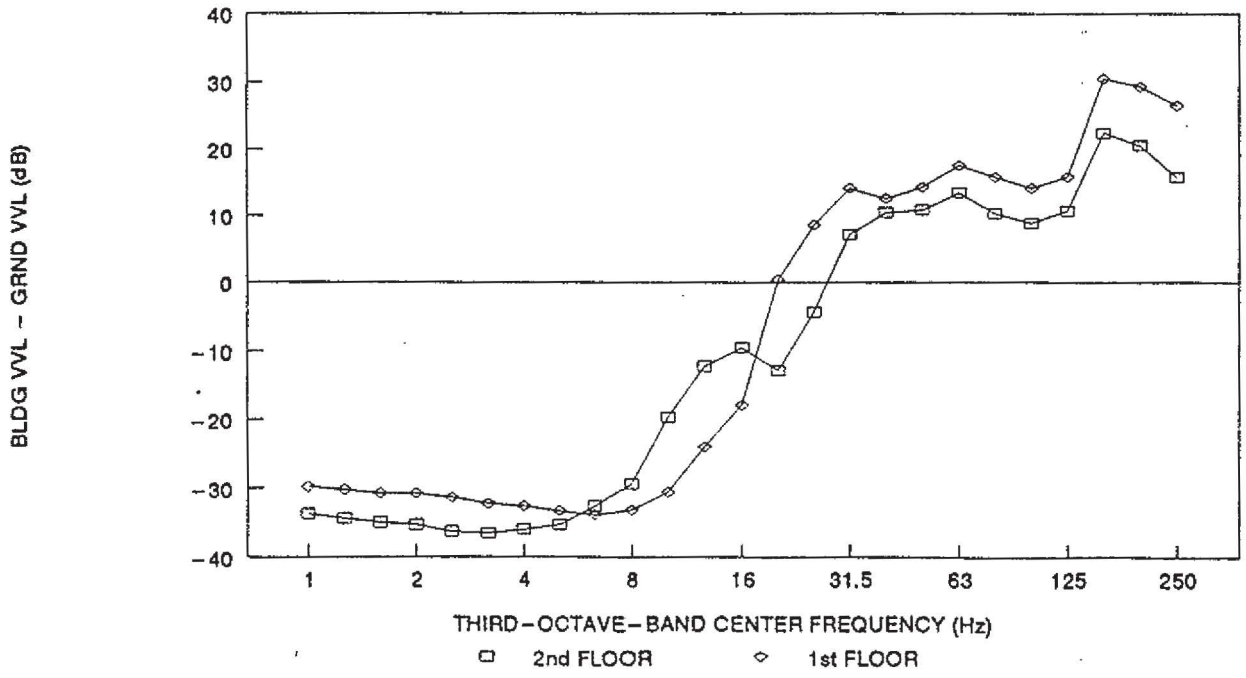
NOT MEASURED

c. Footfall L_{eq}

FIGURE 11. MEASURED VIBRATION VELOCITY LEVELS—GROUND/HORIZONTAL-TRANSVERSE AXIS



a. walls

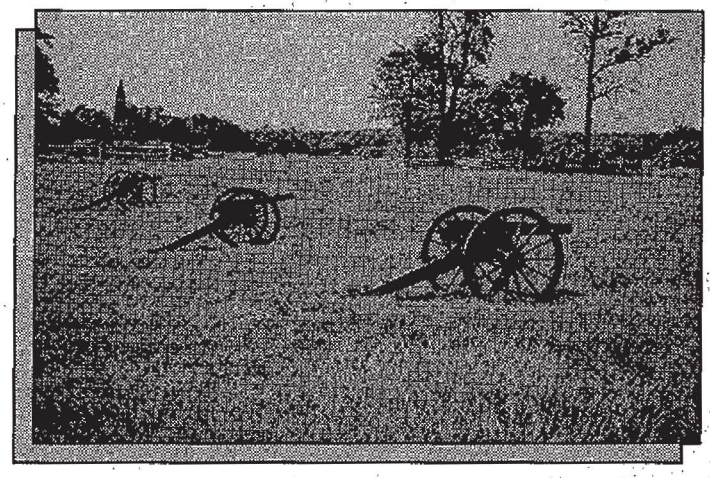


b. Floors

FIGURE 12. BUILDING RESPONSE TO GROUND VIBRATION

PART 2: Traffic Noise Assessment

prepared by
Bowlby & Associates, Inc.



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1.0 INTRODUCTION

The overall goal of the study was to determine the impacts of traffic noise on visitors to the Manassas National Battlefield Park, with emphasis on noise from US 29 and VA 234. Figure 1 shows the project location. There were four specific objectives to the noise assessment:

- to characterize the existing and future noise levels due to traffic both inside and outside the historic Stone House, and to compare that noise to accepted impact criteria
- to characterize the existing and future noise environment at the other key tourist attractions, and to compare those noise levels to accepted criteria
- in the pursuit of the above two objectives, to characterize the weekday peak, weekday off-peak, nighttime and weekend traffic noise from US 29 and VA 234 along their routes through the Park, and
- to understand how the existing and future traffic noise levels from each of these two roads decreases as
- distance from them increases, and to determine the distances at which the noise levels fall below the impact criteria.

These objectives were achieved through data collection of existing noise levels by field measurement and through the prediction of future levels based on the results of the measurements and on projected future traffic volumes and speeds. Then, the existing and future levels were compared to noise level acceptability and impact criteria, such as the Federal Highway Administration (FHWA) traffic noise abatement criteria and the American National Standard Institute (ANSI) land use compatibility standards.

This report is divided into five additional sections following this Introduction. Section 2.0 describes the study methods and the noise impact and abatement criteria. Section 3.0 presents the measurement results, while Section 4.0 describes the calculated future noise levels and impacts. Section 5.0 presents the summary and findings. Appendices A and B contain the noise measurement site sketches, the noise measurement data printouts, and the traffic data.

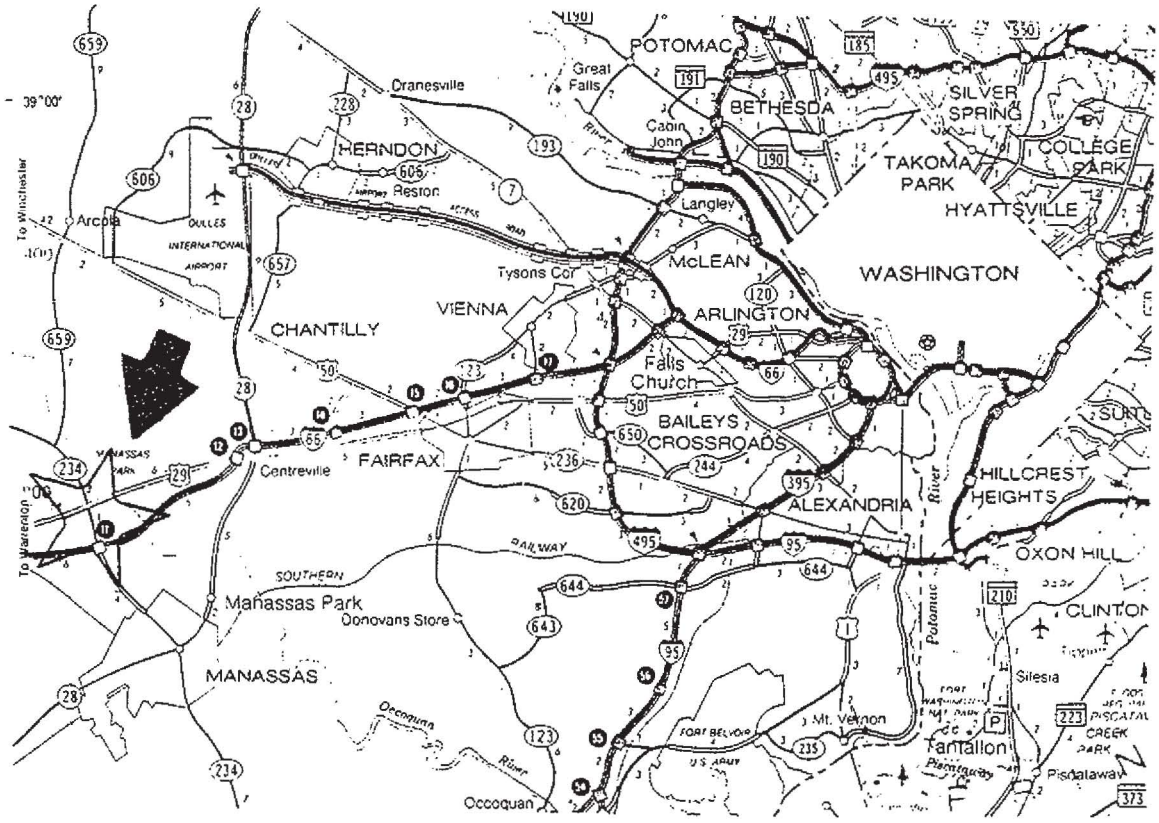


Figure 1. Project Location

2.0 METHODS AND CRITERIA

The Federal Highway Administration (FHWA) has procedures that agencies must follow when doing noise studies for highway projects involving federal-aid funds (*Procedures for Abatement of Highway Traffic Noise and Construction Noise*, 23 CFR Part 772). Since this project had highway traffic noise as the main source of concern, this study was conducted using those procedures (referred to as the "FHWA Noise Standards") as guidelines.

The study included the following steps:

1. identification of noise sensitive areas in the park
2. determination of existing noise levels
3. determination of future noise levels with and without a widening of the roads from two to four lanes
4. determination of impacts

These steps are described below, with the results presented in Sections 3-5.

2.1 *Identification of Noise Sensitive Areas*

The objective of this task of the noise assessment was to identify the noise-sensitive sites ("receptors") in the vicinity of the two major highway noise sources. The staff of Bowlby & Associates, Inc., conducted a detailed field review of the area in May 1995. This review was conducted after discussions with NPS and Peccia, Inc., staff and a review of maps of the area. Selection of sites was based on sensitivity to noise and relative position back from the highways.

In general, points were chosen at areas of human activity. The focus was on the Stone House and on the other key tourist attractions. These attractions were the stops along the driving tour of the Park, plus the picnic area along VA 234, the L. Dogan House along US 29 and the W. Lewis House Site near I-66. Other points were chosen near the Robinson and Henry houses at incremental distances back from the roads to allow study of how the sound level decreases with increasing distance from the road. Figure 2 shows the site locations which are marked with site numbers and letters.

2.2 *Measurement of Existing Noise Levels*

The general strategy for the measurements was first to establish several longer-term, unattended sites along the roads. Sound level analyzers were then set up at these sites to sample both weekday and weekend traffic. Then, the goal was to do short-term sampling (typically, a 15-20 minute period) at the other sites of interest in the Park. Where possible, each of the short-term sites was sampled during the peak and off-peak periods during a weekday, as well as in the evening and on the weekend. The measurement location at each site was typically at a distance from the roads equivalent to where tourists would be when out of their vehicles.

Noise measurements were made starting on Saturday, May 20, throughout the day and evening, and on Monday, Tuesday, Wednesday and Thursday, May 22-25. The following measurement plan was

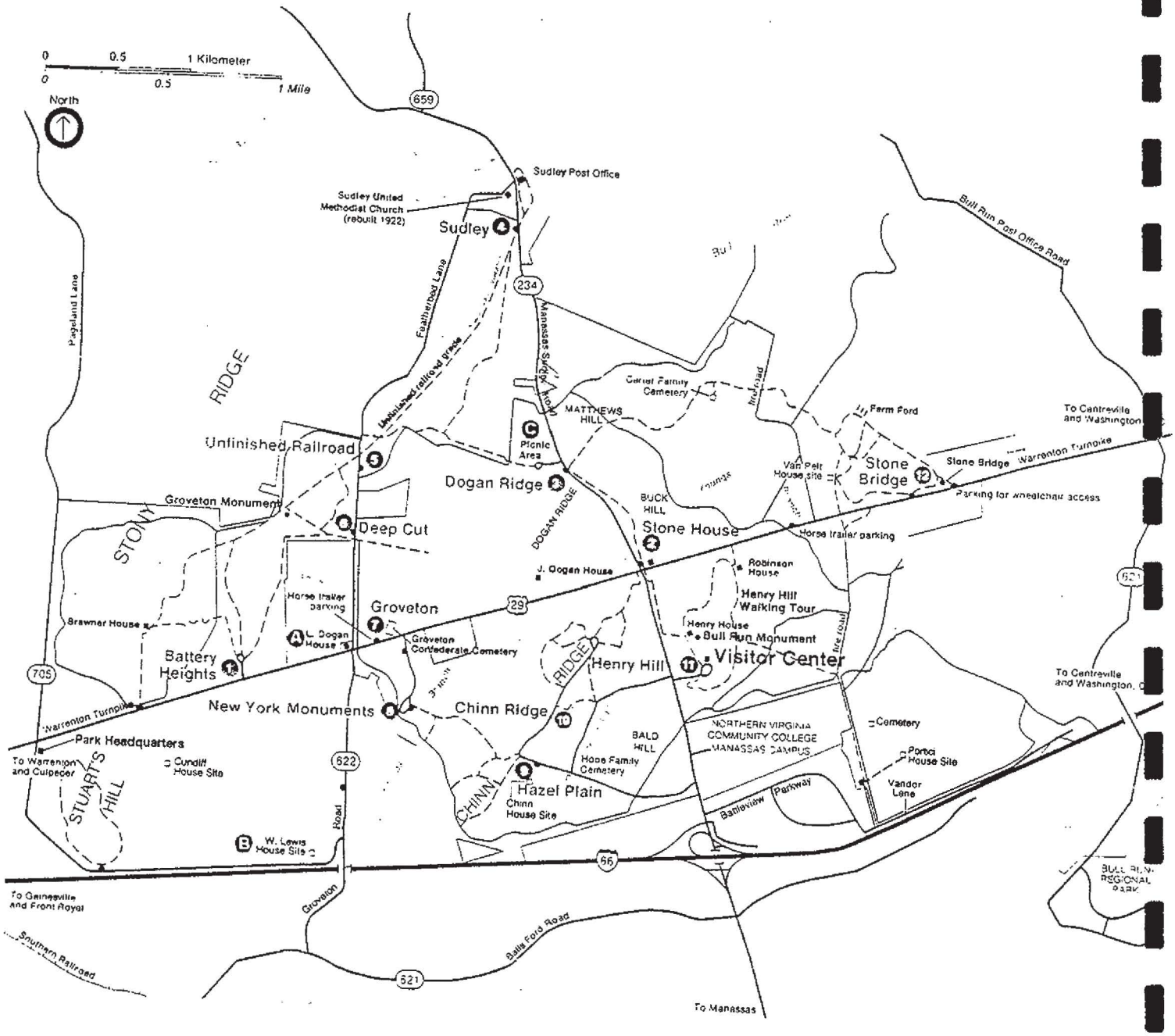


Figure 2. Site Map

used to accomplish the four objectives in the Introduction. The sites and measurement strategy are summarized in Table 1, which also includes the site numbers referenced below:

- Stone House (Site 2): simultaneous indoor/outdoor measurements, with windows both open and closed, measuring on the first floor in a front room and a back room) and on a second floor
- 24-hr measurement sites: at Stone House (both US 29 and VA 234 noise); at the Picnic Area (Site C) (VA 234 noise on the way toward a rock quarry; and at Groveton (Site 7) (US 29 noise)
- Short term weekday peak, off peak and evening samples at sites 1, 3, 4-6, A, 8-12, B
- Short term weekend samples at sites 1, 3, 4-6, A, 8-12, B
- Propagation studies in two areas (at a reference location plus four distances back from the road of interest):
  - US 29: Near Robinson House along Henry Hill Walking Tour
  - VA 234: Near Henry House along Henry Hill Walking Tour

Table 1--Noise Measurement Sampling Plan

Site	Name	Closest Road	24-hour	Weekday Peak	Weekday Off-peak	Weekend	Night
1	Battery Heights	US 29		once	once	once	once
2	Stone House	US 29/VA 234	2 days			24-hr	once
3	Dogan Ridge	VA 234		once	once	once	once
C	Picnic Area	VA 234	1 day		once	24-hr	once
4	Sudley	VA 234		once	once	once	once
5	Unfinished Railroad	VA 622		once	once	once	once
6	Deep Cut	VA 622		once	once	once	once
7	Groveton	US 29/VA 622	1 day		once	24-hr	once
A	L. Dogan House near Groveton	US 29/VA 622		once	once	once	once
8	New York Monuments	US 29		once	once	once	once
9	Hazel Plain/Chinn House Site	I-66		once	once	once	once
10	Chinn Ridge	--		once	once	once	once
11	Henry Hill/Visitor's Center	VA 234 (US 29 near Robinson House)		once, plus propagation study	once	once	once
12	Stone Bridge	US 29/VA 234		once	once	once	once
B	W. Lewis House Site	I-66		once	once	once	once

For the long-term monitoring, Metrosonics db-308 sound level analyzers were used and were programmed to record the following descriptors for each 15-minute period:

- L_{eq}, the energy average of the sound level for the measurement period
- L_{max}, the maximum sound level during the sample period
- L_{10}, the sound level exceeded 10% of the sample time, and
- L_{90}, the sound level exceeded 90% of the sample time.

The short-term measurements were made with either a Metrosonics db-308 analyzer or a Norsonics Model N-116 analyzer, depending on the expected noise level. (The Metrosonics analyzer will only measure levels above approximately 43 dB; the Norsonics has a lower noise floor). Levels at many of the monitoring sites were expected to be below 43 dB in the evening due to the rural nature of the sites. For these sites, the Norsonics analyzer, which has a "noise floor" of 15 dB, was used.

The short-term measurements were recorded as a series of one-minute periods in order to be able to deal with any background noise that might interfere with the measurements. Observations throughout the measurements were made to note any background noise due to sources other than road traffic, such as aircraft flyovers. Wind speed was measured with a handheld wind meter. Spot traffic counts were made during the noise measurements by Bowlby & Associates, Inc., staff during the noise measurements to allow checking of the prediction model.

The propagation measurements consisted of simultaneous measurements with four instruments: three unattended Metrosonics db-308 analyzers and one manually run Norsonics analyzer. The unattended analyzers were set at fixed distances of 50, 200 and 400 feet from the edge of the road being studied (US 29 near the Robinson House or VA 234 near the Henry House). The fourth analyzer was used at three different distances (650, 850 and 1000 ft), being shifted after each 15- minute reading was completed. Level differences were then computed at each distance relative to the 50-ft level. These level differences could then be used to gain insight into how the traffic noise decreased as distance from the road increased, taking into account any shielding provided by the terrain.

The exterior-interior measurements at the Stone House were designed to see how much reduction in traffic noise occurred during propagation into the Stone House. These noise reductions could then be applied to predicted future worst-hour exterior levels to determine expected interior levels. These interior levels could then be compared to interior impact criteria. For these measurements, an unattended Metrosonics analyzer was set up outside the Stone House, programmed to do cumulative sampling in one-minute intervals. Then, the Norsonics was set up for 15-minute periods in each of four rooms (the room number refers to the site sketch in the Results section of this report):

- first floor "barroom" on the west end of the house (Room 1-1)
- first floor, "sitting room" on the front eastern corner of the house (Room 1-2)
- first floor, "dining room" on the rear eastern corner of the house (Room 1-3)
- second floor, "bed chamber" room on the front eastern corner of the house (Room 2-1)

Both open and closed window cases were studied.

In general, measurement procedures at a site included:

1. Record measurement and site information on data sheets: equipment parameters, calibration, time, date, distance to key sources or other landmarks and weather parameters (temperature, wind speed and direction).

2. Set logger and microphone on tripod at height of approximately 1.5 meters above the ground; place a windscreen on the microphone, which was oriented 70 degrees from the horizontal per manufacturer's recommendations.

3. Calibrate before and after each set of measurements with a portable calibrator.

4. Measure for desired number of periods.

5. Download data into portable microcomputer with Metrosonics software.

6. Check data sheet for completeness.

The data were then analyzed to achieve the four objectives. Specifically determined were:

- the hourly average sound levels over the day at the 24-hour sampling sites, as well as the 24-hour Day Night Level
- the short term average sound levels during peak, off-peak, nighttime and weekend periods at the other tourist attractions
- the sound level reduction pattern as one moves away from US 29 and VA 234 in the Henry Hill area.
- the noise levels inside and outside the Stone House and the exterior-to-interior noise level reductions for: open and closed windows in the first floor barroom and rear dining room, open and closed windows in the second floor front bed chamber

2.3 *Prediction of Future Noise Levels*

Based on the projected future traffic volumes, speeds and vehicle type mix and on the existing measured levels and level reductions, future noise levels at the study sites were determined. The FHWA Standards say that the design year of the road should be studied; this year is typically 20 years after a project is completed. Therefore, for this study, predictions of future hourly average sound levels ($L_{eq}(1h)$) were made for the Year 2020 using a spreadsheet based on the FHWA Highway Traffic Noise Prediction Model.

Traffic for the proposed project were taken from Peccia, Inc., documentation of Metropolitan Washington Council of Government (COG) data. Traffic values were based on the projected Average Daily Traffic (ADT). From existing count data, a peak-hour factor of 10% of ADT was computed and applied to the ADTs to get future peak hour traffic. Peccia also had existing vehicle classification counts for determination of truck percentages, and operating speed data by roadway link.

In its Noise Standards, FHWA says to use the worst noise hour as the basis for the analysis. Often, this hour is during the morning or evening peak traffic period. However, when there is much traffic congestion during a peak period, speeds will drop, which will reduce maximum vehicle levels and may reduce the hourly average levels, depending on total traffic flow and vehicle type mix. The extent of the effect depends on the degree of congestion, the amount and duration of vehicle queuing near a site, and the directionality of the traffic.

For this project, the flow was highly directional; additionally there is only one traffic signal. Thus, there is major queuing upstream from the signal and free-flow downstream as vehicles accelerate from their stopped positions upstream from the signal. Based on this observation, it was decided to model each site's worst hour condition with the computed peak hour volume on the downstream side of the traffic signal at a free-flow speed of 50 mph.

The hourly volumes were further divided into three vehicle types. In accordance with FHWA guidance for noise analysis, 2-axle/4-tire vehicles were called automobiles, 2-axle/6-tire vehicles were called medium trucks, and 3-or-more axle vehicles were termed heavy trucks. Peccia staff decided that, based on its examination of existing and future land use and growth patterns that the *number* of trucks on the roads would remain relatively constant into the future (growth in general commercial truck traffic would be counterbalanced by declines in the number of construction/quarry related trucks as the currently heavy amount of development tapers off). Existing classification counts showed the peak period mix to be:

- autos: 96 %
- medium trucks: 1 %
- heavy trucks: 3 %

These percentages were used to compute the current number of medium and heavy trucks. These numbers were then subtracted from the future peak hour volume to get the future number of peak hour automobiles.

Receptor points for noise prediction were selected to represent all of the measured sensitive sites. Typically, receptors were located in exterior areas of normal human activity at heights of 1.5 meters above existing ground.

Use of the FHWA Model requires the characterization of the ground between receptor/roadway pairs as hard or soft, which affects the rate at which the sound level decreases with increasing distance due to geometric spreading or divergence. All receptors for this study were designated as soft sites.

Finally, several of the sites experience shielding of some of the traffic noise by the terrain between the site and the road of interest. To determine the amount of shielding, if any for each site, a prediction was made of the existing level using the traffic counted during the measurement. This predicted level was compared to the measured level and a shielding adjustment was determined. In some cases there was variation in the difference for the different measurement periods at a given site. In these cases, an average value was determined. These adjustments were then applied to the unshielded future predictions to determine the final future levels used in the impact assessment.

2.4 *Determination of Impacts*

There are three relevant guidelines that are used in this study to assess noise impacts.

- FHWA Noise Abatement Criteria in 23 CFR 772
- Federal interagency noise compatibility guidelines
- American National Standards Institute (ANSI S12.40-1990) suggested criteria

The levels used in all of these criteria are in units of decibels (dB) and represent overall A-weighted sound levels averaged over a particular length of time. A-weighting refers to a filtering of the sound frequencies to simulate human response.

The FHWA Noise Standards in 23 CFR Part 772 present Noise Abatement Criteria (NAC) for different land use activity categories, as shown in Table 2. The criteria are in terms of two sound level measures that relate well to the impact of noise on people. These measures are for the worst hour of the day during the design year of the project (which, again, is typically 20 years in the future); they are the level exceeded for 10 percent of that hour (L_{10}(1h)) and the average sound level for that hour (L_{eq}(1h)). This study uses the L_{eq}(1h) descriptor.

Table 2–Federal Highway Administration Noise Abatement Criteria in 23 CFR 772

Activity Category	L_{eq}(1h), dB	L_{10}(1h), dB	Description of activity category
A	57 (Exterior)	60 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose
B	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above
D			Undeveloped lands
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums with no outdoor activities

Activity Category A represents those areas where quiet is essential for enjoyment of the area, such as nature sanctuaries. The criterion level is an outdoor $L_{eq}(1h)$ of 57 dB. Category B includes noise sensitive receptors such as residences, schools, churches, motels, and active outdoor recreation areas. The criterion level is an outdoor $L_{eq}(1h)$ of 67 dB. Category C represents other developed lands such as commercial sites. The criterion level is an outdoor $L_{eq}(1h)$ of 72 dB. Finally Category E is an interior criterion for Category B properties with no normal outdoor activity areas. The criterion level is an indoor $L_{eq}(1h)$ of 52 dB.

The FHWA Noise Standards state that noise impacts that are serious enough to warrant consideration of abatement will occur when either of the following occur:

- the noise levels from the project "approach or exceed" the noise abatement criteria;
- the noise levels from the project substantially exceed existing noise levels ("substantially" is typically defined as 10 or more dB by many state highway agencies).

Based on this guidance, receptors were identified as seriously impacted where noise levels approached or exceeded the NAC or where there were substantial increases in future noise levels.

As a second criterion, the *Federal Interagency Guidelines for Considering Noise in Land Use Planning and Control* were considered. These guidelines were agreed to by the U.S. Department of Housing and Urban Development, the U.S. Department of Transportation, the U.S. Environmental Protection Agency and the U.S. Department of Defense in 1980. These guidelines are the basis for the below-mentioned ANSI noise guidelines.

The levels are in terms of the Day Night Level or DNL. DNL is essentially the level in decibels of the average of all sound levels over a 24-hour period with 10 dB added to levels between 10 p.m. and 7 a.m. as a nighttime sensitivity factor. The sound levels are overall A-weighted sound levels. The compatibility criteria are in terms of a yearly DNL, which is the logarithmic average of each day's DNL in a year.

Some of the pertinent land use/DNL data are in Table 3. No specific guidelines were given for national historic battlefields that involved self-guided tours or interpretative tours with guides. However, for cultural activities, a DNL of 65 dB is suggested as the upper limit on compatibility; for nature exhibits, it is a DNL of 70 dB. For parks, the limit on compatibility is suggested as a DNL of 75 dB, subject to agency interpretation and local concerns and goals. The Guidelines also describe the degree of noise exposure (or "noise exposure class") as a function of DNL, as shown in Table 4. Over a DNL of 65 dB is considered "significant" exposure.

The third guidelines are found as an "information-only" appendix to the American National Standard for Sound Level Descriptors for Determination of Compatible Land Use (ANSI S12.40-1990), a consensus document developed by national experts for the American National Standards Institute. The ANSI standard itself specifies that the DNL descriptor should be used when addressing the issue of noise and land use compatibility.

Table 5 lists some relevant guidelines, although, again, no specific guidelines were given for national historic battlefields. For "neighborhood parks," a DNL between 55 and 65 dB is listed as

marginally compatible, and over 65 dB is incompatible. For extensive natural areas and recreation areas, 60-75 dB is marginally compatible, and over 75 dB is incompatible.

Based on these three sets of criteria, a DNL of 65 dB was chosen as an indicator of compatibility, with a worst-hour average level of 67 dB as the level that, when approached or exceeded, warrants abatement consideration. "Approach" is defined as 66 dB or higher in accordance with recent FHWA guidance.

Table 3--Federal Interagency Suggested Land Use Compatibility Guidelines for Park-like Land Uses

(no specific guidelines given for historic sites with interpretative tours)

Land Use	DNL (dB)	Compatibility Guidelines
Cultural activities	0-65	Compatible
Cultural activities	65-70	Discouraged; at least 25 dB outdoor to indoor Noise Level Reduction (NLR) should be provided
Cultural activities	70-75	Strongly discouraged; at least 30 dB NLR should be provided
Cultural activities	75+	Incompatible
Nature exhibits	0-70	Compatible
Nature exhibits	70+	Incompatible
Parks	0-75	Compatible, subject to agency interpretation and local concerns and goals
Parks	75+	Incompatible

Table 4-- Federal Interagency Noise Guidelines for Degrees of Noise Exposure

DNL (dB)	Noise Exposure Class
Not exceeding 55 dB	Minimal exposure
56-65 dB	Moderate exposure
66-75 dB	Significant exposure
Over 75 dB	Severe exposure

Table 5--ANSI 12.40-1990 Suggested Land Use Compatibility Guidelines for Park-like Land Uses

(no specific guidelines given for historic sites with interpretative tours)

Land Use	DNL (dB)	Compatibility Guidelines
Neighborhood parks	0-55	Compatible
Neighborhood parks	55-65	Marginally compatible
Neighborhood parks	65+	Incompatible
Extensive natural wildlife and recreation areas	0-60	Compatible
Extensive natural wildlife and recreation areas	60-75	Marginally compatible
Extensive natural wildlife and recreation areas	75+	Incompatible

3.0 EXISTING NOISE ENVIRONMENT

Table 6 presents a compilation of all of the measurements of existing noise levels, listed sequentially by site and chronologically within a site. The "Notes" column indicates the key sources or background ambient level in absence of the key sources (GT means gravel truck; HT means other heavy trucks). As shown, aircraft noise was noted at many of the sites; the proximity of Dulles International Airport in the study region was the reason. To study the effect of the aircraft noise on the overall levels, those one-minute periods during which aircraft caused the maximum level were edited out of the overall 10-20 minute sample. The result is shown in the "Adjusted Leq" column. In general, these adjustments only affected the Leq at the quieter sites, where traffic noise was less dominant. In all cases the adjustment was only 1-2 dB, except for the weekend measurement at Hazel Plains, where aircraft had a 4 dB effect.

Table 7 then presents the short-term average sound levels for each site by the measurement condition (peak, off-peak, night, weekend). These results are also shown on Figures 3 and 4. Figure 3 shows the weekday peak and off-peak levels at each site, while Figure 4 shows the night and weekend sampling results.

Finally, Figures 5-10 show the results of the longer term measurements, as follows:

- Figure 5: Stone House, weekday (approximately 60 feet from the edge of US 29)
- Figure 6: Stone House, weekend
- Figure 7: Groveton Cemetery, weekday (approximately 125 feet from the edge of US 29)
- Figure 8: Groveton Cemetery, weekend
- Figure 9: Dogan Ridge (Site 3): weekday (approximately 120 feet from the edge of US 29)
- Figure 10: Picnic Area (Site C), weekend (approximately 650 feet from the edge of VA 234)

The sound level analyzers were located at the positions designated on the site sketches in Appendix A, which also contains the field data sheets and printouts of the results for each measurement. The site names are at the top of each printout. In the printouts, the L_{eq} data are shown as "L_{av}." The traffic counts made during the measurements are in Appendix B.

The long term data will be discussed first.

3.1 Long-term measurements

3.1.1 Stone House

At the Stone House, the weekday results (Figure 5) show that the highest hourly average level was from 9-10 a.m., at a value of 69 dB, although the average level remained at 65 dB or higher from 5 a.m. through 5 p.m. The afternoon peak hour levels were 3-4 dB below the morning peak hour levels due to the queuing and lower speed congested flow of outbound vehicles past the site in the afternoon as they waited for the traffic signal at VA 234. These queued vehicles probably also acted to shield some of the noise from the inbound traffic in the

Table 6. Compilation of All Measurements of Existing Noise Levels (page 1 of 2)

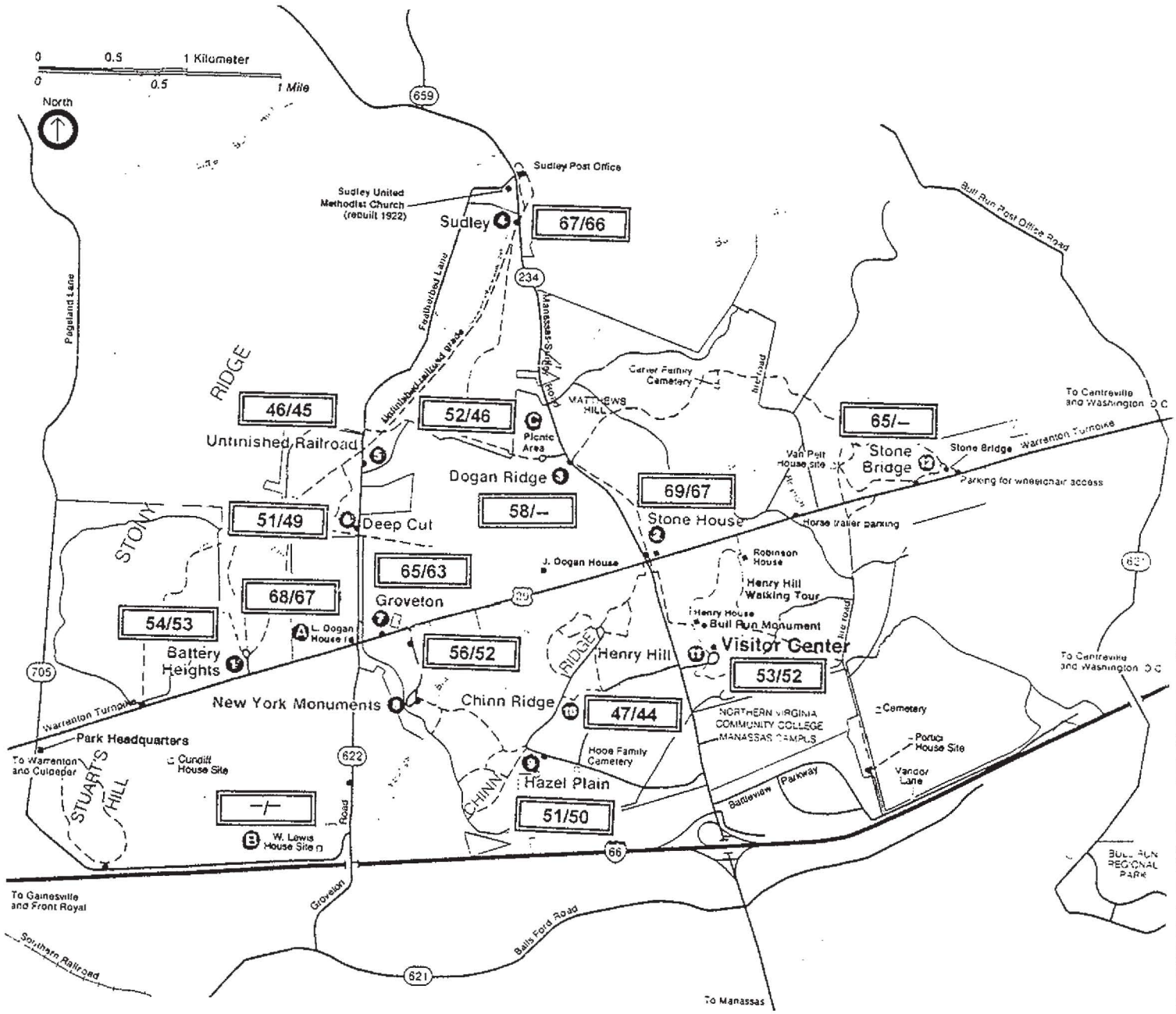
Site	Date	Meas Period	Time	Duration (min)	Overall Leq	Adjusted Leq	L10	L50	L90	Notes (all sound levels are A-weighted)
1: Battery Heights	Sat, 5/20	Weekend	14:00	20	52	52	56	50	44	Ambient = 39, Auto = 48-52, GT = 59-60
	Mon, 5/22	Night	22:00	15	50	50	53	48	43	Traffic on Hwy 29
	Tues, 5/23	AM Peak	6:30	15	54	54	56	54	52	Queueing on 29 NB
	Tues, 5/23	Off-Peak	14:35	15	53	53	55	50	45	Ambient = 43 dB, Auto =54, HT is max
2: Stone House	Sat, 5/20		8:30	28.5 hr			--	--	--	Auto = 62-68, GT = 75
	Mon, 5/22		16:00	24 hr						
2B: West Side of Stone House	Tues, 5/23	Off-Peak	12:15	15	66	66	70	63	58	GT's dominate levels, up to 80 dB
3: Dogan Ridge	Sat, 5/20	Weekend	10:00	20	51	50	54	48	43	Ambient =36-38, Auto =50-51, GT = 54-56
	Mon, 5/22		16:00	24.5 hr						New 24 hour location
4A: Sudley	Sat, 5/20	Weekend	11:00	20	58	56	60	54	45	Ambient =38, GT = 63-68, Plane is max
4B: Sudley	Tues, 5/23	AM Peak	8:30	15	67	67	71	64	47	Auto = 67, HT = 74, GT = 76, GT is max
	Tues, 5/23	Off-Peak	15:00	15	66	66	71	58	46	GT's are max
	Tues, 5/23	Night	21:20	10	62	61	66	57	45	Ambient = 40, Autos = 68
5: Unfinished Railroad	Sat, 5/20	Weekend	11:50	10	44	43	48	41	40	Ambient = 38, Plane causes max levels
	Tues, 5/23	AM Peak	8:56	15	48	46	51	46	43	Ambient = 42, Planes cause max levels
	Tues, 5/23	PM Peak	16:40	15	46	45	49	43	39	Autos up to 58, Planes cause max levels
	Tues, 5/23	Night	21:00	10	43	43	46	40	38	Ambient = 38, Distant traffic up to 46
6: Deep Cut	Sat, 5/20	Weekend	12:15	10	44	44	45	43	40	Ambient = 40, Auto = 48
	Tues, 5/23	Off-Peak	9:20	15	50	49	52	45	42	Ambient = 42, Auto = 53,59, Planes = max
	Tues, 5/23	PM Peak	17:00	15	47	45	50	45	42	Distant traffic = 44, Planes are max levels
	Tues, 5/23	Night	20:30	15	45	44	49	42	40	Distant traffic = 41, Planes are max levels
	Wed, 5/24	Am Peak	7:30	15	52	51	56	49	45	Traffic increase on Featherbed in AM
7: Groveton Cemetary	Sat, 5/20		9:00	33.8 hr	60					
	Mon, 5/22		16:15	24.3 hr						
8A: NY Monuments	Sat, 5/20	Weekend	15:45	--	--		--	--	--	
8B: NY Monuments	Sat, 5/20	Weekend	16:00	20	53	53	56	52	47	Ambient = 39, Auto = 52-54, Plane is max
	Mon, 5/22	PM Peak	17:00	20	53	53	55	51	47	Auto = 50-53, GT = 61-64, Plane is max
	Mon, 5/22	Night	23:00	15	51	51	55	49	44	Traffic on Hwy 29
	Tues, 5/23	AM Peak	7:31	15	56	56	58	55	53	Queueing during measurement
	Wed, 5/24	Off-Peak	10:05	15	52	52	56	51	45	Ambient = 43, Auto =55, GT= 60
9: Hazel Plain	Sat, 5/20	Weekend	17:30	20	49	45	52	42	39	Ambient = 37-41, Planes are max levels
	Tues, 5/23	Off-Peak	10:15	15	51	50	53	50	47	Wind in trees = 52, Plane causes max
	Tues, 5/23	PM Peak	17:30	15	52	51	55	50	48	Auto = 52, I-66 = 51, Planes cause max
	Tues, 5/23	Night	22:40	10	48	48	50	48	46	I-66 = 45-48

Table 6. Compilation of All Measurements of Existing Noise Levels (page 2 of 2)

Site	Date	Meas Period	Time	Duration (min)	Overall Leq	Adjusted Leq	L10	L50	L90	Notes (all sound levels are A-weighted)
10: Chinn Ridge	Sat, 5/20	Weekend	18:00	20	42	42	46	39	36	Ambient = 37, Planes causing max levels
	Tues, 5/23	Off-Peak	10:45	15	44	44	46	44	42	Wind in trees/I-66 = 42-44, Auto = 46
	Tues, 5/23	PM Peak	18:00	15	49	47	51	46	44	Auto = 52, Wind/ /I-66 = 46, Plane is max
	Tues, 5/23	Night	22:55	10	46	46	48	45	44	I-66 = 46-48
11: Visitor Center	Sat, 5/20	Weekend	16:45	20	49	49	52	48	46	Auto = 51-53, cannot get ambient
	Mon, 5/22	PM Peak	17:40	20	47	47	49	47	45	Auto = 47-50
	Tues, 5/23	Off-Peak	15:30	15	52	52	54	51	48	Auto = 50-53, GT = 58 dB, I-66 = 48 dB
	Wed, 5/24	AM Peak	8:10	15	53	53	56	52	49	Amb = 48, Queue past V.C, Plane is max
	Wed, 5/24	Night	22:00	15	49	49	52	48	45	Ambient = 45, Auto =51, Plane is max
12: Stone Bridge	Sat, 5/20	Weekend	18:45	20	61	61	65	59	48	Ambient = 40, Auto = 60-67
	Mon, 5/22	PM Peak	18:15	20	63	63	66	62	51	Auto = 58-67
	Tues, 5/23	PM Peak	16:05	15	65	65	69	63	55	Ambient = 46, Auto = 66, GT = 72
	Tues, 5/23	Night	22:15	10	58	58	62	52	45	Ambient = 42, Autos = 66
	Wed, 5/24	Am Peak	7:00	15	63	63	66	62	59	Autos = 62, GT's are max
A: L. Dogan House	Sat, 5/20	Weekend	13:00	20	67	67	70	61	45	Ambient = 42, Auto= 68-72, GT = 76
	Mon, 5/22	PM Peak	16:30	20	68	68	71	63	50	Auto = 68-72, GT = 76-82
	Mon, 5/22	Night	22:30	15	59	59	61	46	42	Traffic on Hwy 29
	Tues, 5/23	AM Peak	7:00	15	65	65	68	61	57	Queueing during measurement
	Wed, 5/24	Off-Peak	9:40	15	67	67	71	60	48	HT = 85 (max)
B: W. Lewis House Site	Sat, 5/20	Weekend	15:20	10	59		--	--	--	I-66 = 55-58
C: Picnic Area	Sat, 5/20	Weekend	9:30	33 hr	51					Auto = 50-53, GT = 56, Planes are max
	Mon, 5/22	PM Peak	18:55	20	57	52	57	52	47	Auto = 50-54, GT = 54, Planes are max
	Tues, 5/23	AM Peak	8:00	15	52	51	53	50	47	Auto = 52, GT = 53-54, Planes are max
	Tues, 5/23	Night	21:45	10	47	47	50	47	43	Ambient = 42, Autos = 50, Plane is max
	Wed, 5/24	Off-Peak	10:40	15	52	46	54	46	42	Auto = 47, GT = 51, Planes are max

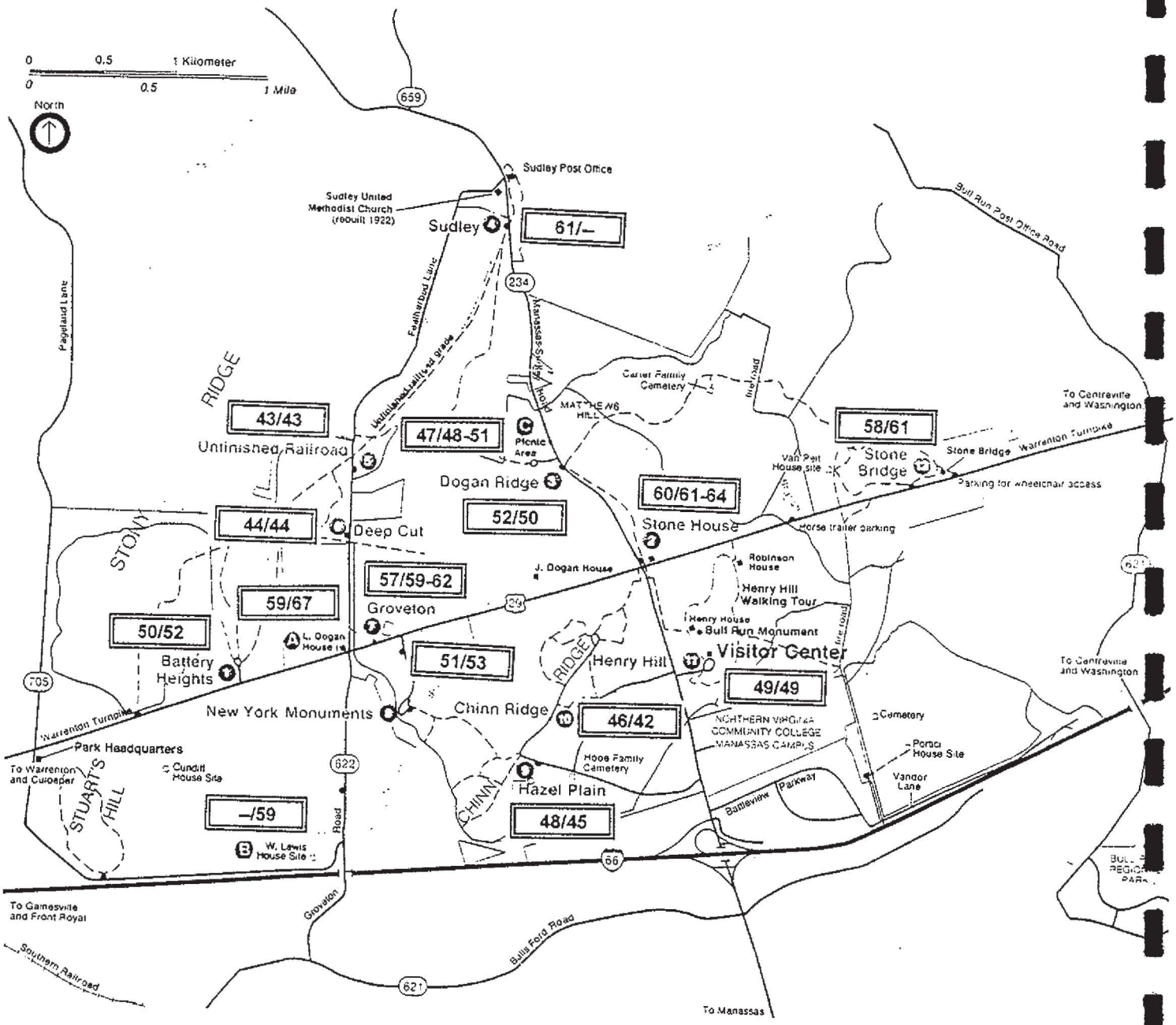
Table 7. Summary of Measured Levels by Measurement Condition

Site	AM Peak	PM Peak	Off-Peak	Night	Weekend
1: Battery Heights	54		53	50	52
2: Stone House	69	65	67	60	61-64
2B: West Side of Stone House			66		
3: Dogan Ridge	58	55		52	50
4A: Sudley					56
4B: Sudley	67		66	61	
5: Unfinished Railroad	46	45		43	43
6: Deep Cut	51	45	49	44	44
7: Groveton Cemetery	65	65	63	57	59-62
8A: NY Monuments					39
8B: NY Monuments	56	53	52	51	53
9: Hazel Plain		51	50	48	45
10: Chinn Ridge		47	44	46	42
11: Visitor Center	53	47	52	49	49
12: Stone Bridge	63	65		58	61
A: L. Dogan House	65	68	67	59	67
B: W. Lewis House Site					59
C: Picnic Area	51	52	46	47	48-51



xx/yy = peak/off-peak

Figure 3. Measured weekday peak and off-peak period average sound levels (A-weighted, dB)



xx/yy = night/weekend

Figure 4. Measured weekday night and weekend day average sound levels (A-weighted, dB)

travel lane on the other side of US 29 from the measurement location. In the morning, the inbound vehicles accelerated past the site as they cleared the intersection.

The lowest hourly average level during this weekday measurement did not drop below 50 dB, being 51 dB from 2-3 a.m. The DNL was 69 dB.

On the weekend, the highest hourly average levels at the Stone House were in the mid-60 dB range (about 5 dB lower than the highest weekday level), although the level only varied by about 4 dB from 7 a.m. through 10 p.m. At night, levels dropped off into the low 50s, as they did during the weekday measurement. The weekend DNL was 65 dB.

3.1.2 Groveton Cemetery

The long term data at Groveton Cemetery showed generally similar patterns to the Stone House data, both on the weekday and on the weekend. The highest hourly average level on the weekday was 66 dB, which occurred during both 8-9 a.m. and 4-5 p.m. This site did not show a major difference between morning and afternoon levels probably because average vehicle speeds were more consistent for the morning and afternoon due to the larger distance from the traffic signal, as compared to the Stone House. The lowest hourly average level was 49 dB, from 2-3 a.m. The weekend levels were in the upper 50 dB to lower 60 dB range from 6 a.m. through 11 p.m.; the lowest hourly average level was 48 dB from 3-4 a.m.

The DNL were 66 dB on the weekday and 63 dB on the weekend.

3.1.3 Dogan Ridge

The Dogan Ridge data shows some very unusual variation in the sound level during the mid-day hours; the hourly average level for this weekday went from 65 dB in the 10-11 a.m. period to 53 dB in the 11 a.m.-noon period and then up to 70 dB from 12-1 p.m., with continued lesser variations through 4 p.m. The reason for this variation was most likely park visitors' activity near the area of the microphone.

In the night, the lowest hourly average level was 45 dB from 2-3 a.m., although since this level is approaching the noise floor of the Metrosonics analyzer, the actual level was probably even lower. This observation is confirmed by the short term sampling at Site C (Picnic Area) with the Norsonics analyzer, which showed a 10-minute average level of 47 dB from 9:45 to 9:55 p.m. The DNL for this weekday at the Dogan Ridge site was 62 dB.

3.1.4 Picnic Area off VA 234

The weekend levels at the Picnic Area off of VA 234 showed the hourly average levels to remain in the 45-54 dB range throughout the day and night, increasing to about 57 dB from 12-1 p.m. on Saturday, May 20. There was no consistent pattern to the data, with the exception that the levels remained fairly constant from 8 p.m. through midnight on Saturday, in the 52-54 dB range. The DNL for this weekend day at the Picnic Area site was 57 dB.

Figure 5. Site 2: Stone House [24 Hour Data]
Monday (5/22) - Tuesday (5/23)
BIN13.PRN

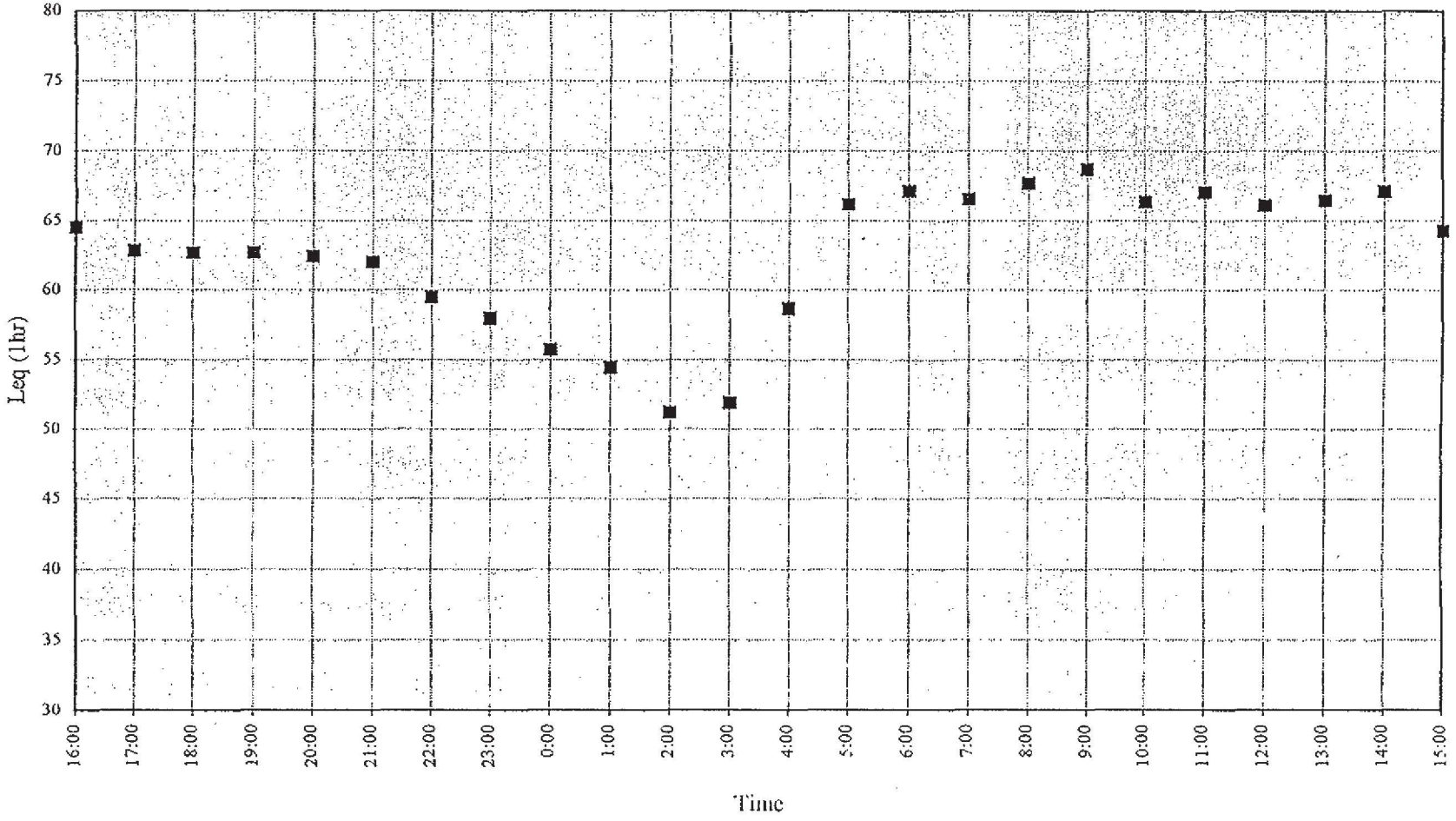


Figure 6. Site 2: Stone House [24 Hour Data]
Saturday (5/20) - Sunday (5/21)
SH520.PRN

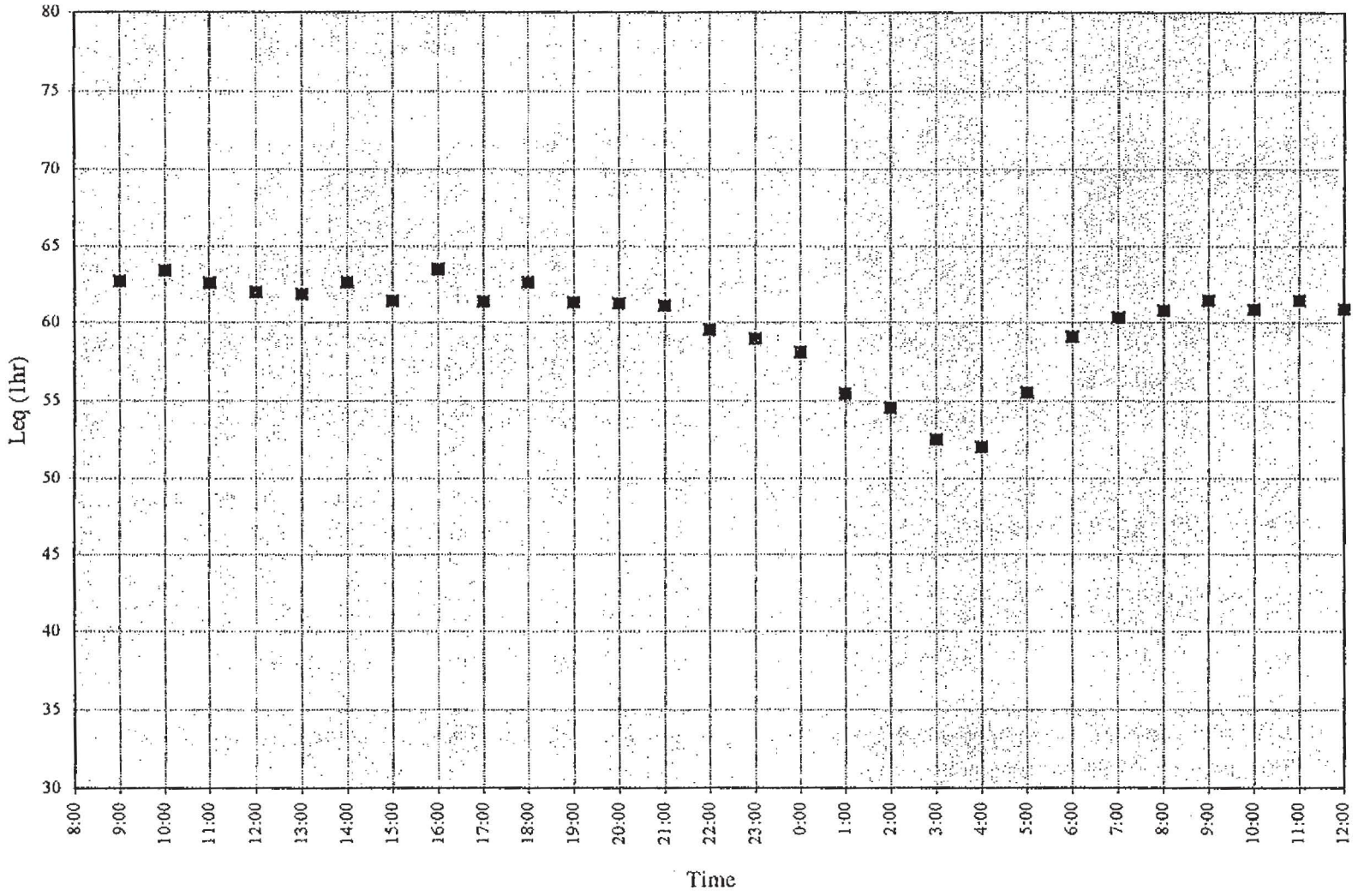


Figure 7. Site 7: Groveton Cemetery [24 Hour Data]
Monday (5/22) - Tuesday (5/23)

BIN11.PRN

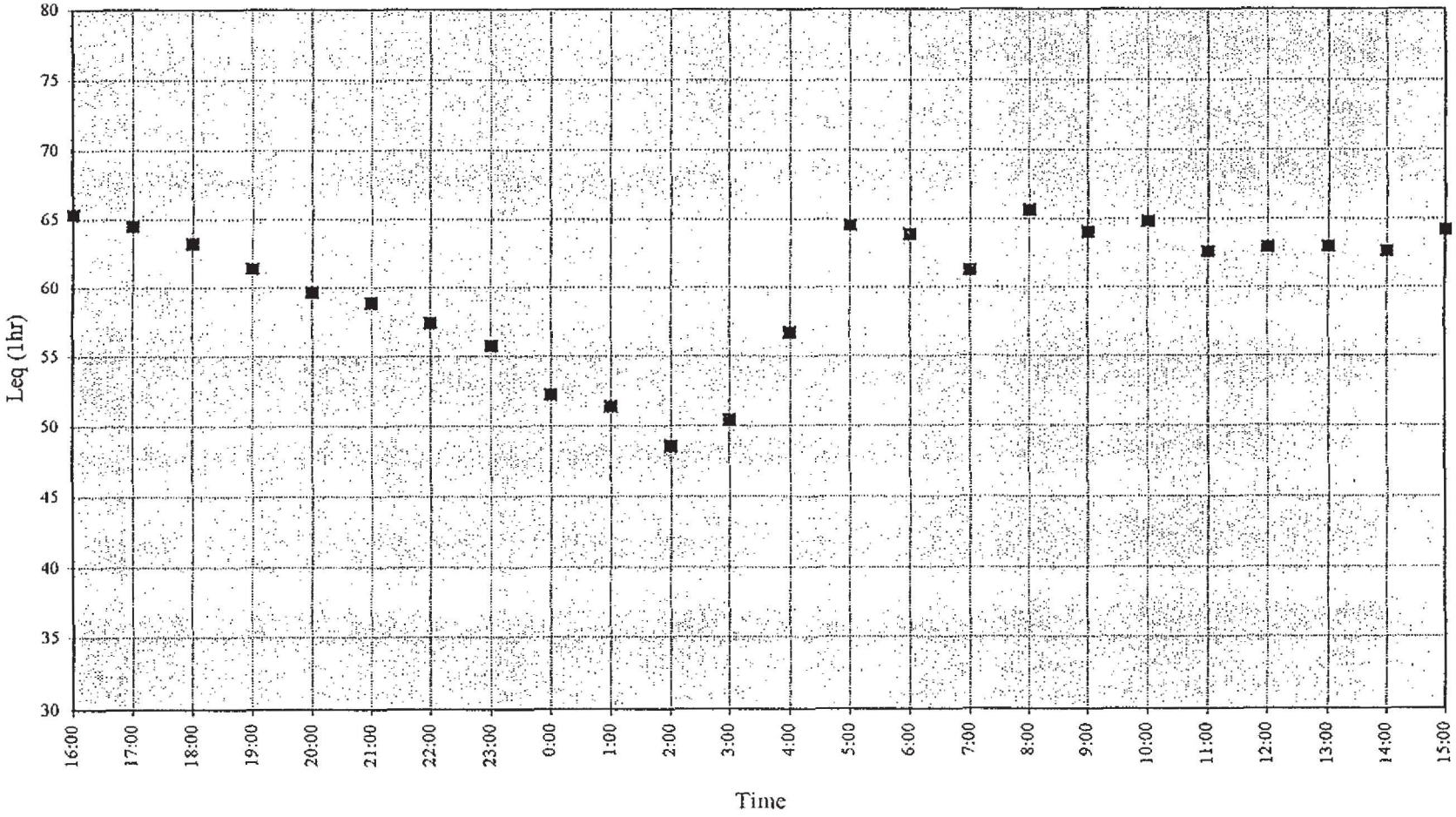


Figure 8. Site 7: Groveton Cemetery [24 Hour Data]
Saturday (5/20) - Sunday (5/21)

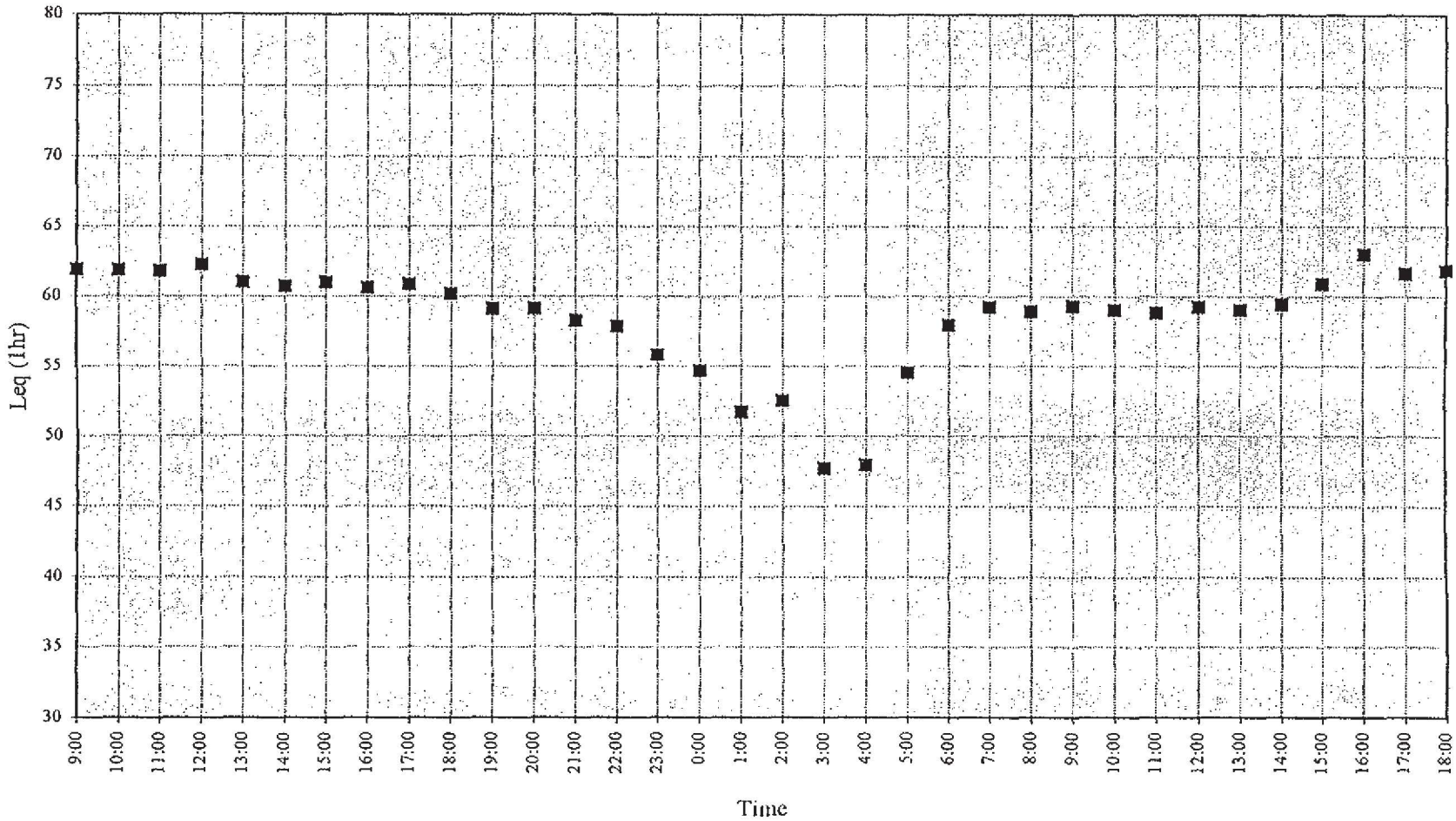


Figure 9. Site 3: Dogan Ridge [24 Hour Data]
Monday (5/22) - Tuesday (5/23)

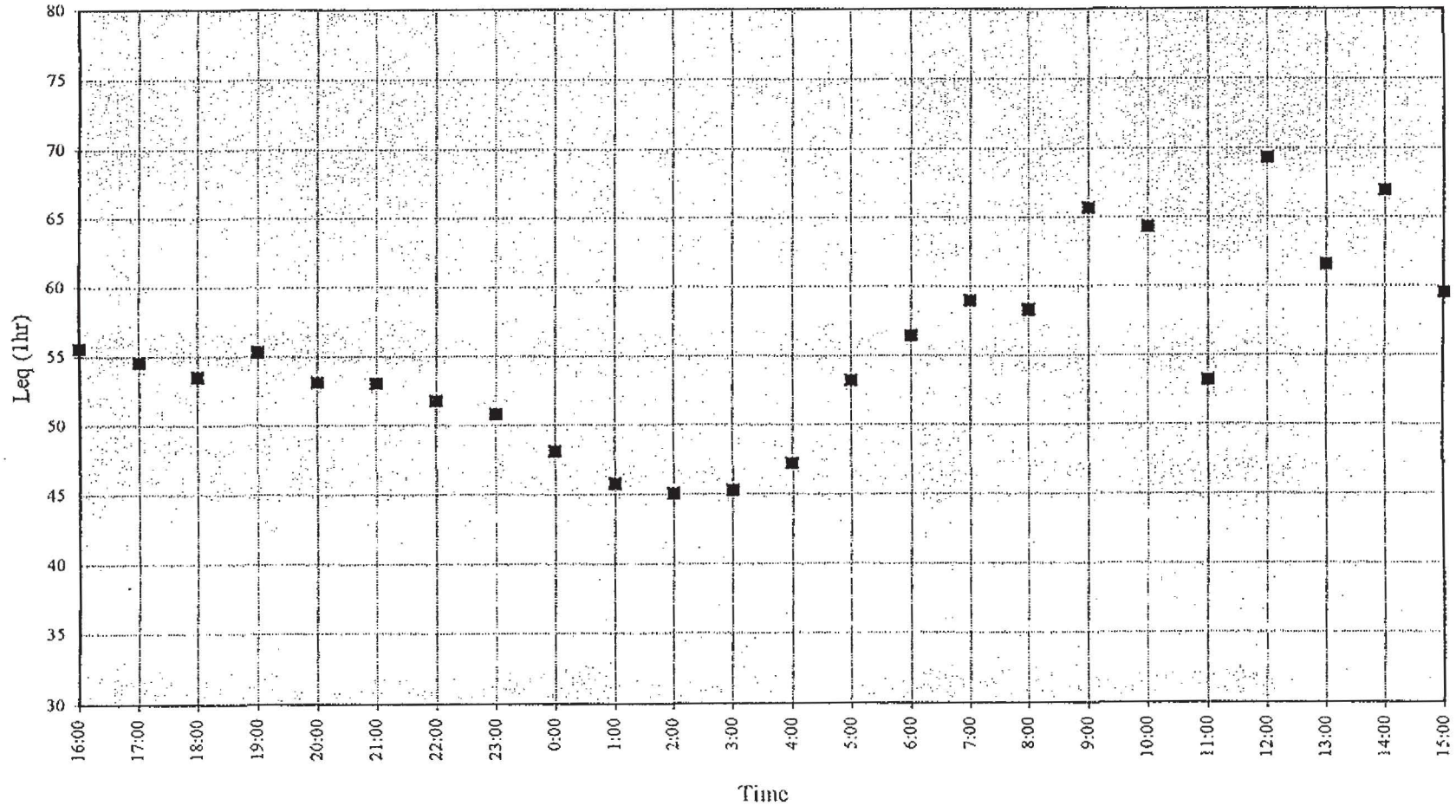


Figure 10. Site C: Picnic Area [24 Hour Data]
Saturday (5/20) - Sunday (5/21)
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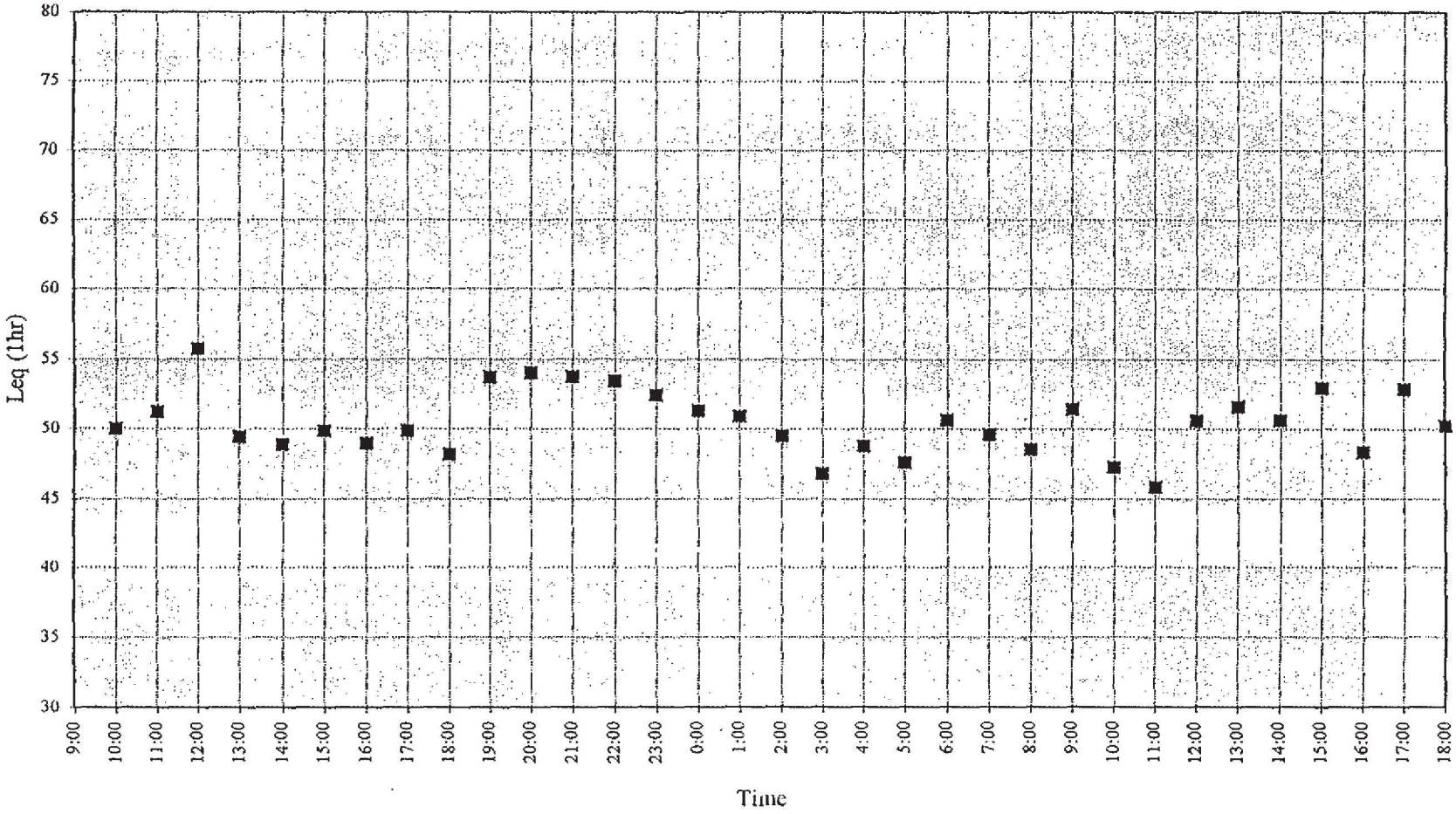


3.2 *Short-term measurements*

The above results help to provide some perspective when looking at the short term data. The short term results showed considerable variation in level depending on the site; this result was expected given the varying distances from the major traffic noise sources.

The results at a given site also depend on when the measurement was taken. Off-peak, weekend and night levels tend to be lower than peak period traffic levels. Morning (a.m.) peak period levels tended to be higher than afternoon (p.m.) peak period levels because more trucks were present during the morning period.

Another factor leading to differences in a.m. and p.m. peak period levels was whether or not the site was upstream or downstream from the traffic signal at US 29 and VA 234 in the direction of peak period flow during the time of greatest congestion. Traffic congestion would cause queuing past several of the sites during parts of the peak period, such as Groveton (Site 7), the Stone House (Site 2), the L. Dogan House (Site A), and even Battery Heights (Site 1) and the Stone Bridge (Site 12). This effect is most evident examining the long-term data at Groveton in Figure 7, where the hourly average level dropped from 64 dB to 61 dB from the 6-7 a.m. period to the 7-8 a.m. period and then increased back up to 66 dB for the 8-9 a.m. period; the 7-8 a.m. period corresponded to the period of greatest congestion.

Traffic on US 29 was the major noise source for those sites along US 29: Battery Heights (Site 1), L. Dogan House (Site A), Groveton (Site 7), New York Monuments (Site 8), Stone House (Site 2), Stone Bridge (Site 12) and Robinson House (propagation site). US 29 was also a major noise source for Unfinished Railroad (Site 5) and Deep Cut (Site 6) in addition to the light traffic on Featherbed Lane.

Traffic on VA 234 was the major noise source for those sites along this road: Dogan Ridge (Site 3), Sudley (Site 4), the Picnic Area (Site C), Visitor Center (Site 11), and Henry House (propagation site).

Traffic on I-66 was the major noise source at Hazel Plain (Site 9), Chinn Ridge (Site 10), and the W. Lewis House (Site B). I-66 was also audible at night for more distant sites such as Unfinished Railroad (Site 5) and Deep Cut (Site 6).

The sites with the highest short-term average sound levels were:

- Site 2B, the west side of Stone House at the information plaque, with an off-peak period level of 66 dB (peak period samples were not made here, but the data at the long term Site 2 showed peak period levels to be 2-4 dB above the daytime off-peak levels)
- Site A, the L. Dogan House, with a p.m. peak level of 68 dB and an of-peak level of 67 dB
- Site 4B, Sudley, with off-peak and peak period levels of 66 and 67 dB, respectively
- Site 12, Stone Bridge, with a p.m. peak period level of 65 dB

At the other short-term sites, the peak period average sound levels were in the upper 40 dB to upper 50 dB range.

Both the long-term and short-term data indicated or suggested that the DNL at the following sites exceeded 65 dB:

- Site 2: Stone House
- Site 2B: West side of Stone House
- Site 4B: Sudley
- Site 7: Groveton Cemetery
- Site 12: Stone Bridge
- Site A: L. Dogan House

3.3 Propagation Measurements

Table 8 shows the results of the traffic noise propagation tests done for US 29 and VA 234. Theory suggests that the sound level should decrease at a rate of approximately 4.5 dB per each doubling of distance from the source, plus any additional reduction due to shielding by terrain. Thus, the decreases relative to the 50-ft measurement position would be expected to be:

- 50-200: 9.0 dB
- 50-400: 13.5 dB
- 50-650: 16.7 dB
- 50-850: 18.5 dB
- 50-1000: 19.5 dB

The measured results in Table 8 show a smaller decrease with distance, especially for US 29 and to a lesser degree for VA 234. Indeed, at both sites, the 1000-ft measured level was higher than at the closer 850-ft measurement point.

The reasons are probably several in number. Key among these are the terrain and the presence of background noise sources such as insects and birds that become the dominant sources as the terrain begins to block the view of the road. For example, the 850 and 1000 ft sites are on the back side of a ridge that shields them from viewing VA 234. Heavy trucks on VA 234 could be barely heard over background sources. This means that the measured difference between the 50-ft site and these sites will be less than the amount be which the traffic noise itself decreases; the background noise prevents the full propagation difference from being measured. Also, at the larger distances (beyond 400 ft), one can expect variability in measured levels that is especially enhanced by atmospheric effects on sound propagation, such as refraction due to wind.

The field notes, summarized below, provide more insight into the terrain and background noise at each point.

VA 234

- 50 ft: Clear view of VA 234 SB lane, small incline to fence line blocks tire noise of NB VA 234 lane. Thin tree line starting 20 feet in either direction at approximately 25 feet away from roadway. Terrain

Table 8. Propagation Study Results at Henry House and Robinson House

Henry House (VA 234) Propagation Study						
Distance (ft)	14:45 - 15:00		15:05 - 15:20		15:25 - 15:40	
	Leq	Diff to 50	Leq	Diff to 50	Leq	Diff to 50
50	66.4		65.7		63.6	
200	60.3	6.2	59.4	6.3	57.3	6.3
400	55.4	11.0	54.0	11.7	55.4	8.2
650	52.4	14.0				
850			46.4	19.3		
1000					48.3	15.3

Robinson House (US 29) Propagation Study						
Distance (ft)	17:20 - 17:35		17:40 - 17:55		18:00 - 18:15	
	Leq	Diff to 50	Leq	Diff to 50	Leq	Diff to 50
50	61.2		61.6		62.7	
200	52.7	8.4	51.5	10.1	51.7	11.1
400	52.9	8.3	49.1	12.5	48.7	14.0
650	46.7	14.5				
850			44.2	17.5		
1000					44.8	17.9

- blocks view of VA 234 approximately 200 feet south of microphone position. Gravel trucks were producing levels as high as 83 dB.

- 200 ft: The terrain is rising from the fence line. View of tires are blocked by terrain but vehicles are still visible.

- 400 ft: The terrain is still rising from the fence line. Can see vehicles in both lanes but autos are almost completely shielded in the NB lane of VA 234.

- 650 ft: The terrain flattens out slightly forming the west edge of the ridge. Walking path is approximately 125 feet to the east. Only heavy trucks are visible from VA 234. Gravel truck readings as high as 63 dB.

- 850 ft: This point is on the downslope (back side, east) of the ridge. The walking trail is approximately 75 feet west and uphill from the microphone. Typical readings are 42 to 46 dB.

- 1000 ft: This point is further down the back slope of the ridge. Higher grass in the area may lead to increased background noise from insects. Can barely hear gravel and heavy trucks on VA 234 at this site. Appears that anything over 47 dB is insect noise or jet noise.

US 29: During this set of propagation measurements the traffic along US 29 was queued up to and usually past the microphone sites. When the traffic was moving, it did so at approximately 25-30 mph for brief periods.

- 50 ft: Clear view of the US 29 EB lane, but the incline from the edge of the drainage ditch to the fence line blocks the view of the tires for the WB lane of US 29. Microphone is in a small valley with small hills rising in both directions. Sparse tree line along the roadside.

- 200 ft: Small rise in elevation from the fence line. Tires of both directions of US 29 are blocked from view by terrain, but vehicles are visible. Vehicles are blocked by the small hills in both directions and are visible for a length of US 29 approximately 150-200 feet in length.

- 400 ft: Continued small rise in elevation from 200 feet site. The tops of vehicles are now visible when they pass behind the small hill to the east but not visible to the west (due to incline of terrain). Vehicles are in view to the east for approximately 600-700 feet interrupted briefly by a knoll at 400 feet to the east.

- 650 ft: This site is at the same distance from the roadway as the back of the Robinson House. At a distance of approximately 500-550 feet from the roadway the terrain begins to slope down. US 29 vehicles are not visible directly in front of the microphone but they are to the east of the small knoll described above. US 29 traffic is only occasionally audible at this site.

- 850 ft: This site is still further along the downslope that starts at 500 feet. Cannot hear traffic along US 29 but some noise is audible from the west. General background noise is approximately 42-44 dB. Only the tops of some vehicles are visible at this site along US 29.

- 1000 ft: Slightly lower elevation than the 850 feet site. US 29 is not visible directly in front of the microphone position. Audible noise seems to be coming from the US 29 / VA 234 intersection area. Background noise readings for this site are 41-43 dB.

The data and the field notes suggest that the measured differences at the 400, 650, 850 and 1000 ft points should not be used to predict traffic noise levels at these distances. However, these data could be used for comparison against predicted levels to see if the traffic noise will increase the overall noise at each point.

The 50-to-200 ft differences will be used to predict the distance at which the worst hour average sound level from traffic will approach the FHWA NAC of 67 dB.

3.4 Exterior-to-Interior Noise Reduction at the Stone House

Table 9 shows the results of the exterior-to-interior US 29 traffic noise reduction measurements at the Stone House.

3.4.1 Open Windows

For the first floor rooms facing US 29, the open window reduction was only 7-8 dB, which is less than is typical for most rooms probably because of the lack of sound absorbing rugs, curtains or furniture in the rooms. For the rear room on the first floor, the level was 16 dB less than the exterior measurement because there was no direct view of the road from the room.

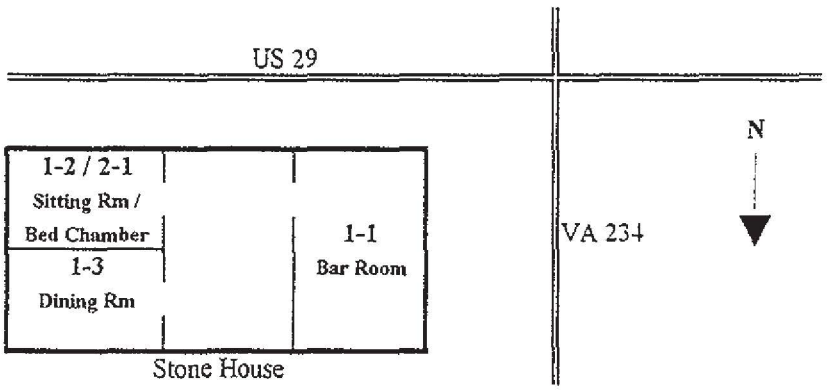
For the second story window, the difference relative to the ground level exterior microphone was only 3 dB, showing the effect of direct propagation without any terrain shielding or excess ground attenuation. This difference is not an exact measure of the noise reduction since the exterior microphone was at a position 5 feet above the ground instead of at a second story elevation. Nonetheless, the measured reduction may be applied to the predicted, worst-hour, exterior, first floor sound level to determine second floor interior levels.

3.4.2 Closed Windows

The noise reduction with closed windows was 19-20 dB for the first floor rooms facing US 29, and 19 dB for the second floor room facing US 29. The rear room on the first floor showed a 23 dB reduction in levels.

Table 9. Exterior/Interior Noise Reduction Measurements at Stone House

	Open Window				Closed Window			
Room	Time	Exterior	Interior	Ext - Int	Time	Exterior	Interior	Ext - Int
1-1	13:00	65.2	58.2	7.0	9:15	66.9	47.5	19.4
1-2	12:30	65.5	57.6	7.9	9:45	66.6	46.8	19.8
1-3	12:00	65.8	49.8	16.0	10:15	64.9	42.2	22.7
2-1	11:30	65.1	62	3.1	11:00	64.7	46.1	18.6



4.0 FUTURE NOISE LEVELS AND IMPACTS

4.1 Exterior Future Levels and Increases over Existing Levels

The results of the future exterior worst hour noise predictions at each of the noise sensitive sites are shown in Table 10. Also, Figure 11 shows the existing as well as these future levels at each site. In general, these future levels are only slightly higher than the existing levels because of the assumptions of constant truck traffic and free-flow speed downstream from the traffic signal. Typical increases over existing levels are 2-3 dB, which are not substantial according to the usual interpretation of the FHWA Noise Standards.

Additionally, there are very little, if any, differences between the worst case for the future 2-lane and future 4-lane cases. The reason for so little difference is the choice of free-flow conditions downstream from the traffic signal as the worst case, couple with the assumption that the volumes would not change.

The only difference would then be the shifting of some of the traffic to the additional two lanes. It was assumed that any improvement to US 29 would be made to the south, in the direction away from key visitor sites such as the Stone House, the Stone Bridge and Groveton Cemetery, all of which are on the north side of US 29.

4.2 FHWA Noise Abatement Criteria (NAC)

4.2.1 Exterior Sites

The exterior FHWA NAC for Activity Category B (67 dB) will be approached or exceeded at several sites:

- Stone House
- Interpretive plaque to the west of the Stone House
- L. Dogan House
- Groveton Cemetery
- Sudley
- Stone Bridge

The exceedances are substantial at the first three of these sites, with predicted worst hour average levels in the low 70 dB range. These exterior results indicate that *all* of these sites warrants consideration of a substantial amount of abatement of the traffic noise. According to the FHWA Noise Standards, this abatement should be a substantial amount, which many transportation agencies interpret as being in the 8-10 dB range.

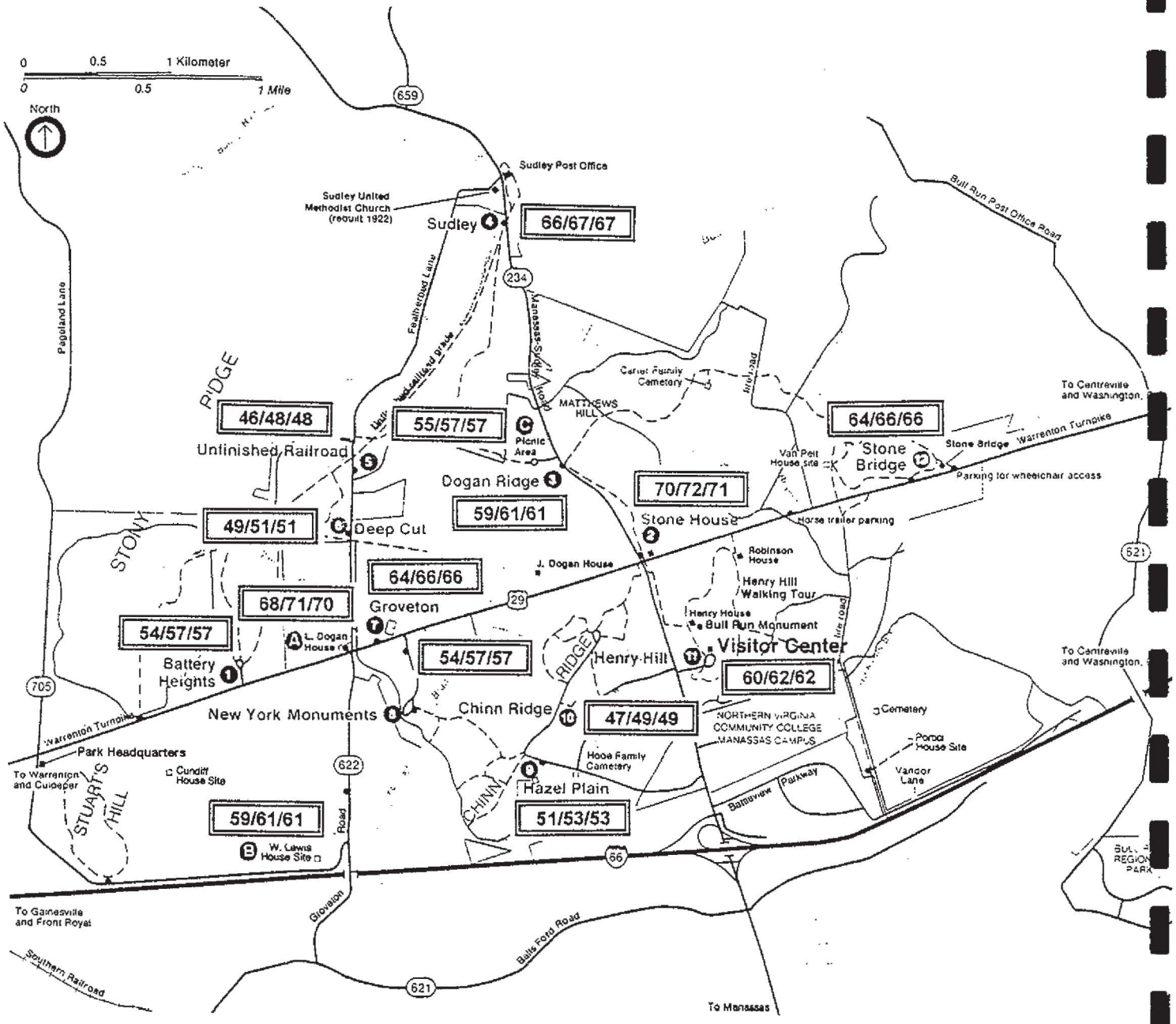
Additionally, the propagation data suggest that the worst hour level will be 66 dB or greater at a distance of 139 ft from US 29 and 112 ft from VA 234. As a point of reference, the Stone House sits 60 ft from US 29.

Table 10. Worst-Hour Exterior Existing and Future Traffic Noise Levels and Impacts According to FHWA Noise Standards

Site	Existing (1996) Leq	Future (2020) 2-Lane Leq	Future (2020) 4-Lane Leq
1: Battery Heights	54	57	57
2: Stone House	70 #	72 #	71 #
2B: West Side of Stone House	70 #	72 #	71 #
3: Dogan Ridge	59	61	61
4A: Sudley	58	60	60
4B: Sudley	66 #	67 #	67 #
5: Unfinished Railroad *	46	48	48
6: Deep Cut *	49	51	51
7: Groveton Cemetery	64	66 #	66 #
8A: NY Monuments *	38	40	40
8B: NY Monuments	54	57	57
9: Hazel Plain *	51	53	53
10: Chinn Ridge *	47	49	49
11: Visitor Center	60	62	62
12: Stone Bridge	64	66 #	65
A: L. Dogan House	68 #	71 #	70 #
B: W. Lewis House Site *	59	61	61
C: Picnic Area	55	57	57

* Based on 1995 measured highest peak hour level, adjusted by +2 dB for future cases (based on predicted increases at other sites)

Approaches or exceeds FHWA Noise Abatement Criteria for Activity Category B



xx/yy/zz = existing, future 2-lane, future 4-lane

Figure 11. Worst-hour existing, future 2-lane and future 4-lane hourly average sound levels (A-weighted, dB)

4.2.2 Interior Site: The Stone House

Table 11 shows the results for the interior levels at the Stone House. For the open window case, the interior (Activity Category E) FHWA NAC (52 dB) will be exceeded at the Stone House by a very large amount (11-17 dB) for the rooms facing US 29 and by 3-4 dB for the rear room away from US 29.

For closed windows for the 2-lane case, the NAC will be equaled or exceeded (by 1 dB) for the rooms facing US-29. The NAC will be approached or equaled for the 4-lane case.

Due to the nature of the historic site and the resultant lack of air conditioning, the open window case is considered to be the applicable case. These interior results indicate that the site warrants consideration of abatement of the traffic noise. Again, this abatement should be a substantial amount.

4.3 Day Night Level

The existing DNL at the 24-hour sites were measured to be as follows:

- Stone House: 69 dB
- Groveton Cemetery: 66 dB
- Picnic Area: 57 dB
- Dogan Ridge: 62 dB

It is reasonable to assume that predicted 1-2 dB increase in the worst-hour future levels would cause the future DNL to increase by similar amounts. It is also reasonable to apply the differences in the worst hour levels between these sites and the other sites identified in Section 4.1 as impacted to approximate DNL at these other sites. The resulting future DNL at the impacted sites are as follows:

- Stone House: 70-71 dB
- Interpretive plaque at Stone House: 70-71 dB
- L. Dogan House: 69-70 dB
- Sudley: 70 dB
- Stone Bridge: 64-65 dB

It needs to be recognized that these DNL were only sampled on single days and are therefore not shown to be representative of annual average DNL. Nonetheless, the noise at these sites is expected to be quite repeatable from day to day due to the nature of the noise source: predictable flows of traffic. Thus, the following comparisons to DNL guidelines need to be viewed in that light.

4.3.1 Federal Interagency Noise Compatibility Guidelines

According to these guidelines, all of these sites, with the borderline exception of the Stone Bridge, would be discouraged as being sites for cultural activities. The Stone House site would be incompatible as

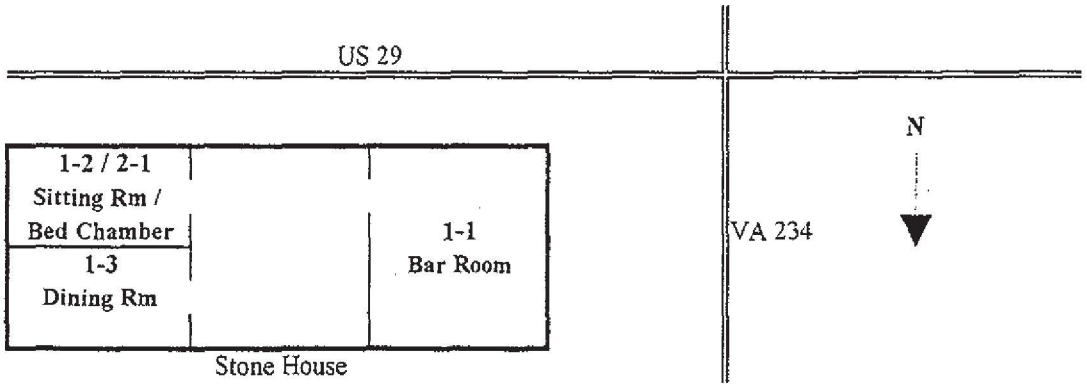
a nature exhibit. All would be compatible as parks. All would be considered as having significant noise exposure.

4.3.2 American National Standards Institute (ANSI S12.40-1990) Suggested Criteria

According to these criteria, all of these sites, with the borderline exception of the Stone Bridge, would be incompatible as neighborhood parks. The Stone Bridge would be considered marginally compatible. All of the sites would be considered marginally compatible as extensive natural wildlife and recreation areas.

Table 11. Stone House Worst-Hour Interior Existing and Future Traffic Noise Levels and Impacts According to FHWA Noise Standards

	Existing (1996)		Future (2020), 2-Lane		Future (2020), 4-Lane	
Room	Open	Closed	Open	Closed	Open	Closed
1-1	63	51	65	53	64	51
1-2	62	51	64	52	63	51
1-3	54	48	56	49	55	48
2-1	67	52	69	53	68	52



5.0 SUMMARY AND FINDINGS

This study examined the current and future traffic noise levels and impacts in Manassas National Battlefield Park. The park is bisected by US 29, a major east-west commuting route and by VA 234, a busy north-south 2-lane road that carries much traffic to and from an interchange with Interstate 66 to the south of the park. Rock quarries to the north of the park also generate a great deal of heavy truck traffic along these roads.

The Park has a self-guided driving tour with stops for visitors to exit their vehicles to view the historic sites. Many of the stops are along these two roads and several other minor roads passing through the Park. As such, these sites are exposed to varying levels of traffic noise that impose upon the visitors. Chief among the sites is the historic Stone House in the northeastern quadrant of the intersection of these two major roads. This site has an outdoor interpretive plaque close to the intersection and guided tours into the two-story building. Other important sites that are very close to US 29 are the Groveton Cemetery, the L. Dogan House and the Stone Bridge. Sites that are very close to VA 234 include Sudley and Dogan Ridge.

This study used noise measurements to characterize the noise environment at the sites along the driving tour, as well as levels in the vicinity of the Henry Hill walking tour in the southeastern sector of the Park.

- Short term samples (typically 15-20 minutes) were taken during peak and off-peak traffic periods on a weekday, plus in the evening on a weekday and during the day on a weekend day. These data gave information on the extent of noise impact at each site.

- Also, 24-hour measurements of one-hour average sound levels were made at the Stone House, Groveton Cemetery, Dogan Ridge and the picnic area along VA 234 north of US 29. These data showed how the noise levels varied over the course of a day to help determine the worst noise hour, which needs to be addressed in the impact analysis, as well as the Day Night Level (DNL) at each site. DNL is a single level averaged over a full day with a 10 decibel "penalty" added to the nighttime levels.

- Sound propagation measurements were made at a series of distances back from each road in the Henry Hill area (near the Robinson House off US 29 and near the Henry House off VA 234). These measurements gave insight into how the sound levels decreased with increasing distance form each road to help assess the extent of the noise impact areas.

- Finally, simultaneous exterior and interior sound level measurements at the Stone House provided noise reductions for open and closed window cases in four of its rooms. These measured reductions were applied to future predictions of exterior levels to determine interior levels.

From the 24-hour data, the worst hour was determined to be during the peak traffic period, and specifically, on the downstream side of the traffic signal at US 29 and VA 234. On the upstream side of the signal during peak periods, there was considerable queuing of vehicles trying to get through the traffic signal, resulting in low travel speeds and lower nose levels than during free-flow conditions. However, on the downstream side, the vehicles traveled in a free-flow condition as they accelerated away from their stopped position in the queue. For example, at the Stone House, the morning peak period was worst since the Stone House is east of the intersection and the major traffic flow is from west to east.

Predictions of future traffic levels were then made for the current 2-lane configuration for each road and for a widened 4-lane section. Traffic volumes were kept equal for the two cases, based on direction from the project's transportation consultants. Additionally, the current truck volumes were kept constant into the future despite growth in total traffic as projected by the Washington Council of Government, again based on direction from the project's transportation consultants.

Impacts were assessed using three sets of criteria:

- FHWA Traffic Noise Abatement Criteria
- Federal Interagency Noise Compatibility Guidelines
- American National Standards Institute (ANSI S12.40-1990) Suggested Criteria

The FHWA criteria are used when studying the noise impact of highway projects. They are based on the worst noise hour of the day, which is typically the peak travel period, and are studied for the design year of a planned facility, typically 20 years from the date of study. The Park sites would be classified as land use Activity Category B, with a Noise Abatement Criterion of 67 dB. The FHWA Noise Standards say that when this level is approached or exceeded, then the noise impact is serious enough to warrant consideration of providing a substantial amount of noise abatement.

The Federal Interagency Noise Compatibility guidelines are annual average Day Night Levels (DNL) for different land uses that indicate the agencies' sense of the compatibility of that land use in that noise environment. The American National Standards Institute (ANSI S12.40-1990) suggested criteria are also in terms of DNL. No specific levels are given for battlefield parks in either document. However, related land uses suggest an exterior DNL of 65 dB as an appropriate level for compatibility.

The results showed both existing and future impacts at several of the sites. The exterior FHWA NAC for Activity Category B (67 dB) will be approached or exceeded at several sites:

- Stone House
- Interpretive plaque to the west of the Stone House
- L. Dogan House
- Groveton Cemetery
- Sudley
- Stone Bridge

The exceedances are substantial at the first three of these sites, with predicted worst hour average levels in the low 70 dB range.

These exterior results indicate that *all* of these sites warrants consideration of a substantial amount (e.g., 8-10 dB) of abatement of the traffic noise.

Additionally, the propagation data suggest that the worst hour level will be 66 dB or greater at a distance of 139 ft from US 29 and 112 ft from VA 234.

At the Stone House, for the open window case, the worst hour existing and future levels exceed the interior FHWA NAC by a very large amount for the rooms facing US 29 and by a smaller amount for the rear room away from US 29. The open window case is the applicable case for assessing impacts. Even for closed

windows, the NAC will be equaled or exceeded (by 1 dB) for the rooms facing US-29 for the 2-lane future case, and will be approached or equaled for the 4-lane future case.

These interior results indicate that the Stone House definitely warrants consideration of a substantial amount of abatement of the traffic noise.

According to the Federal Interagency Noise Compatibility Guidelines, the Stone House, Groveton Cemetery, L. Dogan House and the Sudley site will have future DNL exceeding 65 dB and would be discouraged as being sites for "cultural activities." The Stone House site would be incompatible as a "nature exhibit." All would be compatible as "parks," but all would be considered as having significant noise exposure.

According to the American National Standards Institute (ANSI S12.40-1990) criteria, all of the above sites would be incompatible as "neighborhood parks". The Stone Bridge would be considered marginally compatible. All of the sites would be considered marginally compatible as "extensive natural wildlife and recreation areas."

In summary, the existing and future traffic noise levels create noise impacts serious enough to consider noise abatement at several of the key visitor sites in the Park, namely the Stone House, Groveton Cemetery, the L. Dogan House and the Sudley site. The interior noise impacts in the Stone House are especially severe with the open window situation and even exceed the FHWA Noise Abatement Criterion for closed windows.

Worst hour levels will increase slightly in the future, but there will be little difference in worst hour levels whether or not the roads are widened, assuming the widening was in the direction away from the sensitive sites. Widening the roads will lead to fewer periods of stop-and-go traffic, where traffic noise tends to be lower the free flow conditions because of the reduced speed. This means that with the widening, the levels would increase more in the "shoulders" of the peak periods and in any congested off-peak hours compared to the future 2-lane case.

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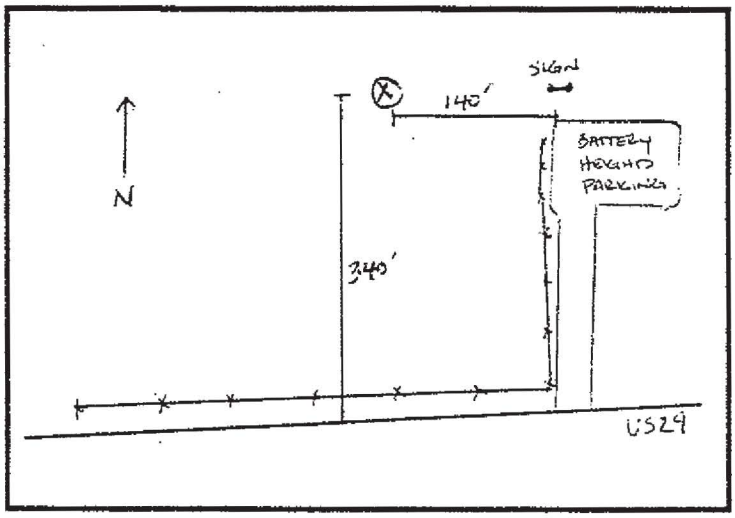
APPENDIX A -- NOISE MEASUREMENT SITE SKETCHES AND RESULTS

Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #1



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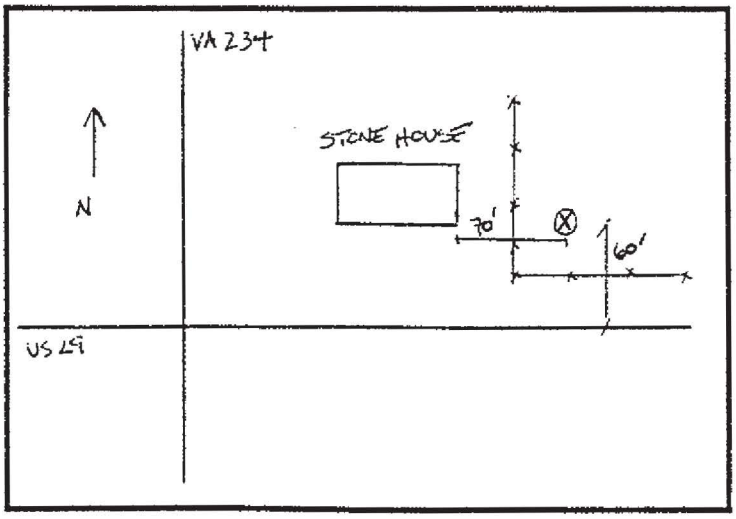
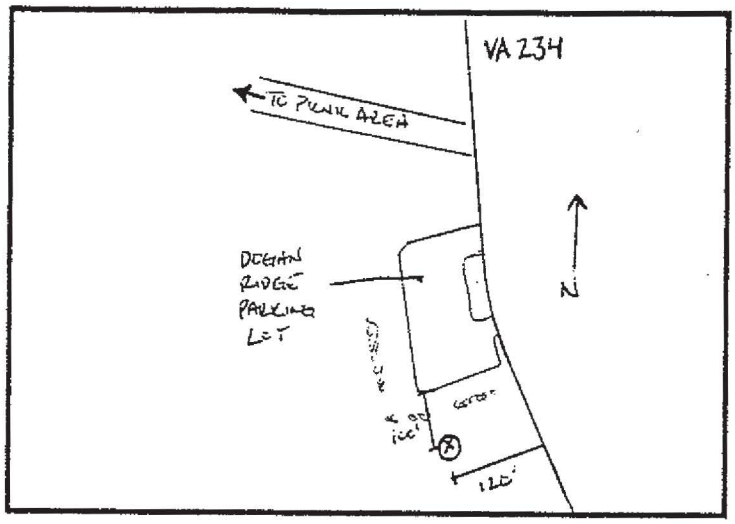


Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #3



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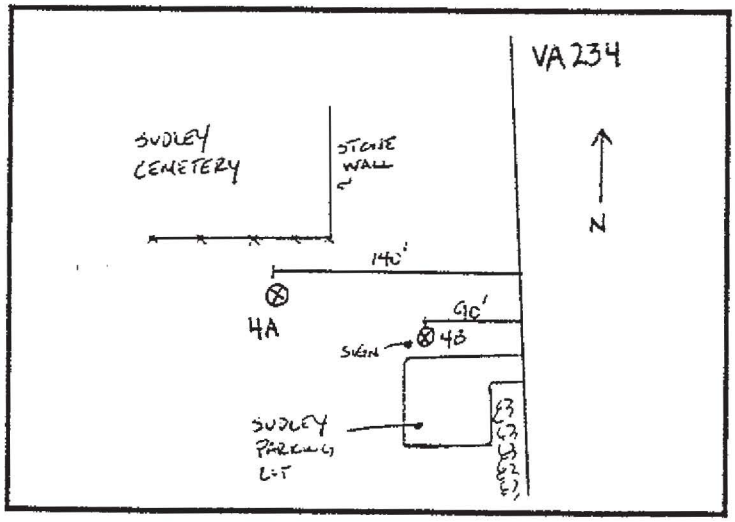
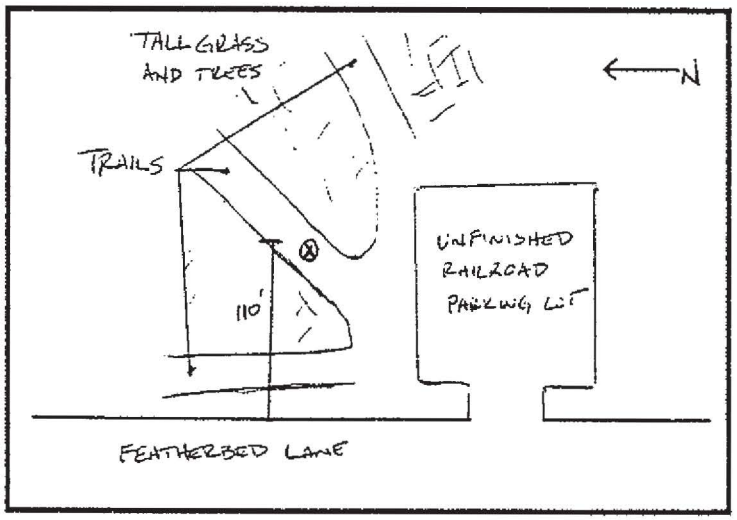
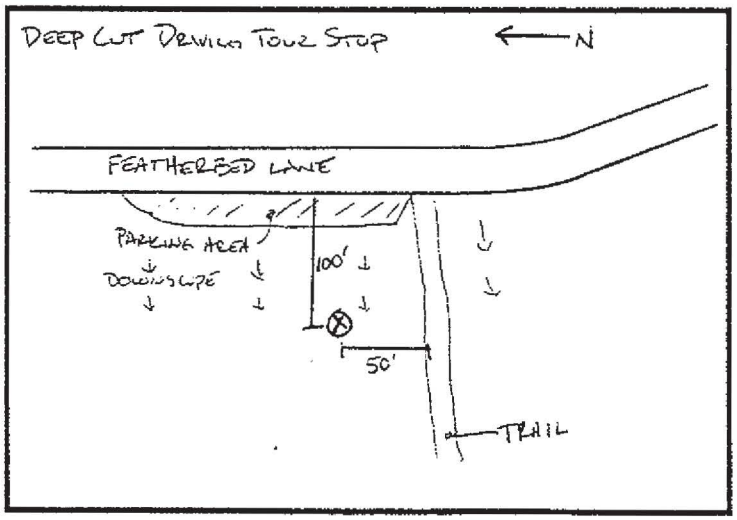


Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #5

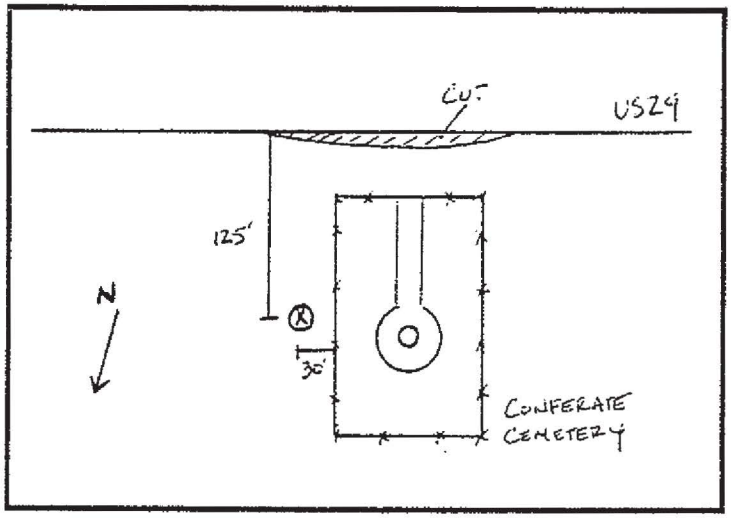


Site #6

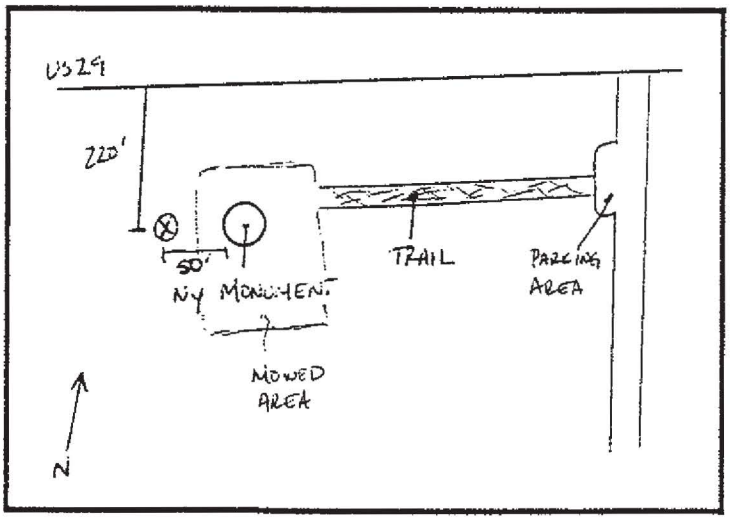


Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #7

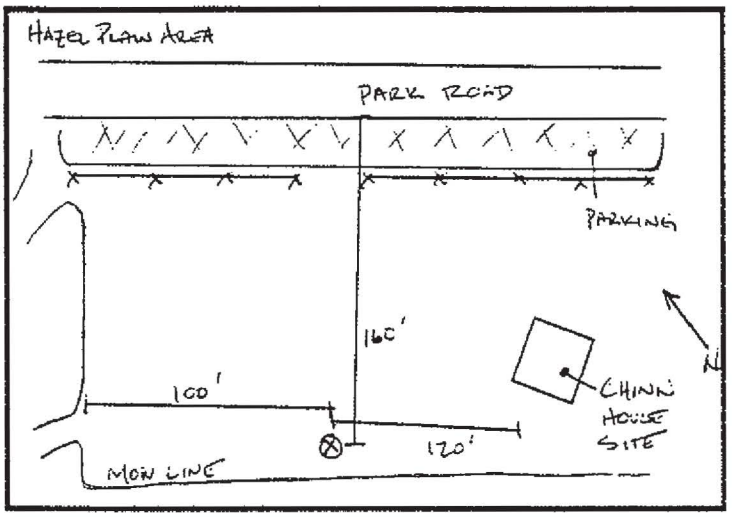


Site #8

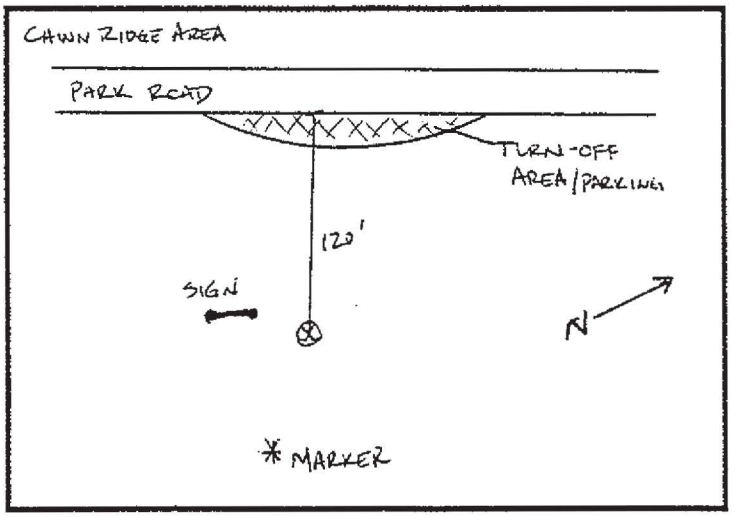


Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #9

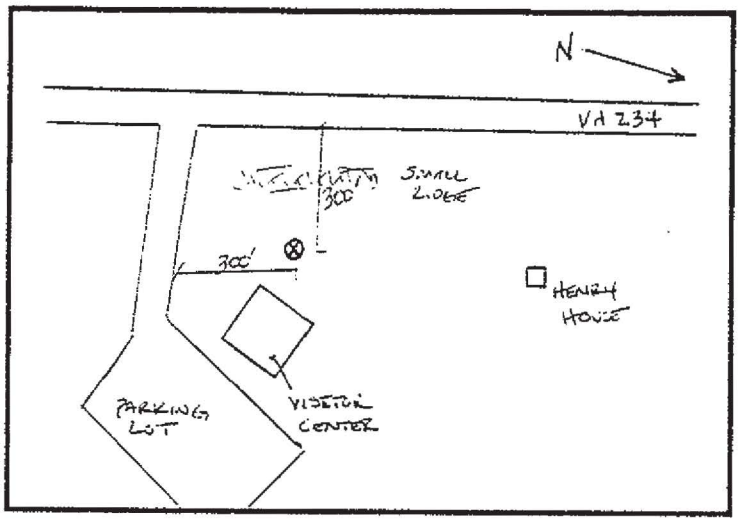


Site #10

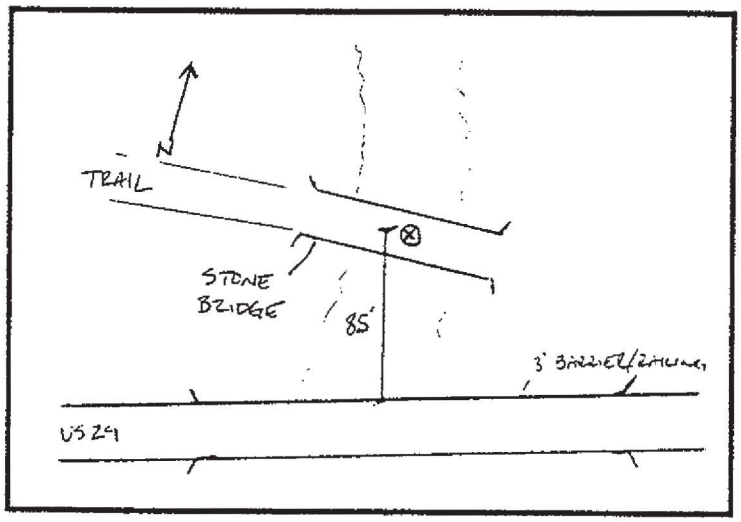


Manassas National Battlefield Park
Noise Measurement Site Sketches

Site #11



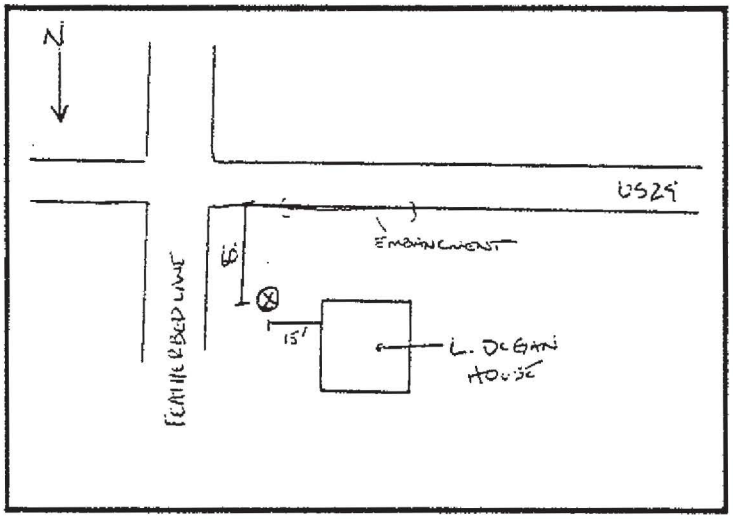
Site #12



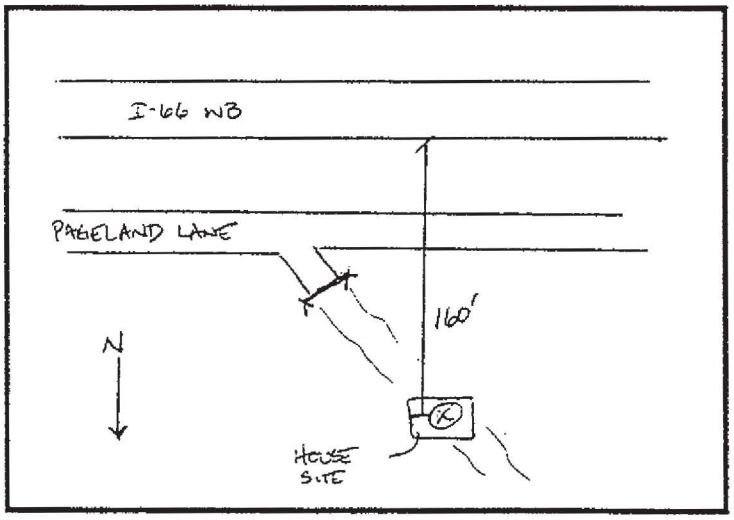
Manassas National Battlefield Park

Noise Measurement Site Sketches

Site A



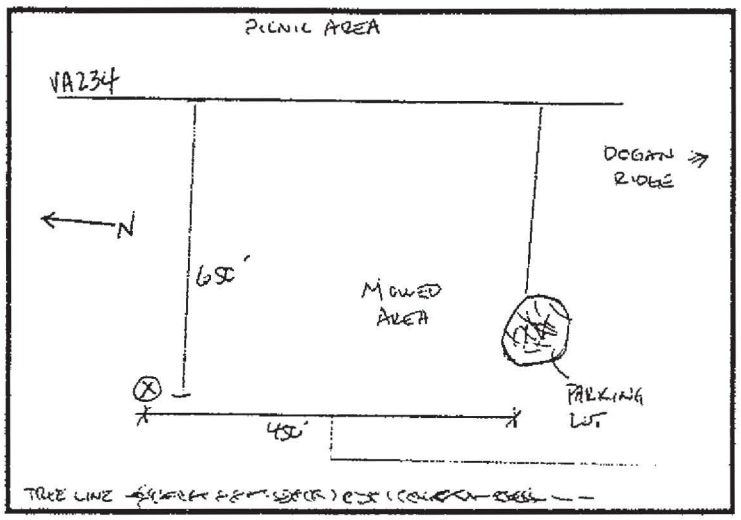
Site B



Manassas National Battlefield Park

Noise Measurement Site Sketches

Site C



"File Name.....BIN3
"Test Location.....Manassas / Site 3
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Dogan Ridge
"Comment Field 2...10:00 - 10:20
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:34:06

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 9:51:42
"PRE-TEST CALIBRATION RANGE... 43.2dB TO 139.2dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 10:00:00
"TEST LENGTH... 0 DAYS 0:20:00

"Lav..... 54.0dB
"SEL..... 84.7dB
"Lmax..... 81.0dB ON 5/20/95 AT 10:19:40
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 21 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"10:00:00"	49.7	54.3	52	46
2	"10:01:00"	52.6	57.5	56	46
3	"10:02:00"	51.1	57.2	54	46
4	"10:03:00"	45.8	51.1	48	43
5	"10:04:00"	49.8	54.6	51	45
6	"10:05:00"	52.8	59.2	56	46
7	"10:06:00"	50.2	54.9	52	46
8	"10:07:00"	48.4	53.4	52	43
9	"10:08:00"	48.3	53.4	51	44
10	"10:09:00"	49.7	53.8	52	45
11	"10:10:00"	58.3	64.8	63	48
12	"10:11:00"	54.6	59.3	58	50
13	"10:12:00"	54.8	58.1	57	51
14	"10:13:00"	51.4	56.0	55	45
15	"10:14:00"	47.5	51.8	49	45
16	"10:15:00"	49.4	54.4	52	45
17	"10:16:00"	46.9	52.2	49	43
18	"10:17:00"	47.3	50.2	49	43
19	"10:18:00"	49.8	57.5	54	43
20	"10:19:00"	63.5	81.0	57	45
21	"10:20:00"	48.2	48.6	48	47

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 9603

"dB"	"SAMPLES"		"% OF TOTAL"
43	703	*******	7.32
44	359	****	3.74
45	687	*******	7.15
46	991	**********	10.32
47	1148	************	11.95
48	866	*********	9.02
49	997	**********	10.38
50	862	*********	8.98
51	699	*******	7.28
52	547	******	5.70
53	434	*****	4.52
54	373	****	3.88
55	289	***	3.01
56	197	**	2.05
57	159	**	1.66
58	82	*	0.85
59	33	+	0.34
60	32	+	0.33
61	26	+	0.27
62	32	+	0.33
63	24	+	0.25
64	35	+	0.36
65	1	.	0.01
66	2	.	0.02
67	1	.	0.01
68	2	.	0.02
69	2	.	0.02
70	2	.	0.02
71	2	.	0.02
72	2	.	0.02
73	2	.	0.02
74	1	.	0.01
75	2	.	0.02
76	2	.	0.02
77	1	.	0.01
78	2	.	0.02
79	1	.	0.01
80	2	.	0.02
81	1	.	0.01

"Ln(0.0) = 81dB
"Ln(10.0) = 54dB
"Ln(50.0) = 49dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	53.6dB	45.3dB	43.2dB
"Ldod	51.6dB	43.2dB	43.2dB
"Losha	50.8dB	43.2dB	43.2dB
"Leq(6)	50.4dB	43.2dB	43.2dB

"File Name.....BIN4
"Test Location.....Manassas / Site 4
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Sudley
"Comment Field 2...11:00 - 11:45
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:34:17

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 9:51:42
"PRE-TEST CALIBRATION RANGE... 43.2dB TO 139.2dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 11:00:01
"TEST LENGTH... 0 DAYS 0:20:04

"Lav..... 58.4dB
"SEL..... 89.1dB
"Lmax..... 78.2dB ON 5/20/95 AT 11:05:31
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 21 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"11:00:01"	53.1	58.1	56	44
2	"11:01:01"	56.6	64.4	62	49
3	"11:02:01"	53.6	59.0	57	43
4	"11:03:01"	56.0	66.1	60	45
5	"11:04:01"	54.0	58.7	57	47
6	"11:05:01"	67.5	78.2	73	49
7	"11:06:01"	59.2	66.2	62	52
8	"11:07:01"	53.6	60.3	57	48
9	"11:08:01"	55.6	65.0	61	43
10	"11:09:01"	59.0	65.0	61	52
11	"11:10:01"	56.7	64.9	61	49
12	"11:11:01"	56.5	61.1	59	51
13	"11:12:01"	53.1	58.7	57	44
14	"11:13:01"	53.6	59.8	58	45
15	"11:14:01"	57.5	66.2	60	48
16	"11:15:01"	55.2	59.6	59	48
17	"11:16:01"	54.3	59.5	59	45
18	"11:17:01"	57.6	64.7	62	47
19	"11:18:01"	59.1	67.2	62	52
20	"11:19:01"	56.5	62.1	59	48
21	"11:20:01"	53.1	54.6	54	50

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 9635

"dB"	"SAMPLES"		"% OF TOTAL"
43	228	**	2.37
44	236	**	2.45
45	276	***	2.86
46	278	***	2.89
47	386	****	4.01
48	389	****	4.04
49	399	****	4.14
50	520	*****	5.40
51	597	******	6.20
52	694	*******	7.20
53	701	*******	7.28
54	797	********	8.27
55	738	********	7.66
56	632	*******	6.56
57	669	*******	6.94
58	576	******	5.98
59	433	****	4.49
60	267	***	2.77
61	240	**	2.49
62	197	**	2.04
63	103	*	1.07
64	113	*	1.17
65	61	*	0.63
66	24	+	0.25
67	5	.	0.05
68	4	.	0.04
69	4	.	0.04
70	4	.	0.04
71	5	.	0.05
72	6	.	0.06
73	12	+	0.12
74	9	.	0.09
75	14	+	0.15
76	4	.	0.04
77	9	.	0.09
78	5	.	0.05

"Ln(0.0) = 78dB
"Ln(10.0) = 60dB
"Ln(50.0) = 54dB
"Ln(99.9) = 43dB

" .	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	57.9dB	43.2dB	43.2dB
"Ldod	56.5dB	43.2dB	43.2dB
"Losha	55.8dB	43.2dB	43.2dB
"Leq(6)	55.3dB	43.2dB	43.2dB

"File Name.....BIN5
"Test Location.....Manassas / Site A
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...L. Dogan House
"Comment Field 2...13:00 - 13:20
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:34:28

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 12:39:45
"PRE-TEST CALIBRATION RANGE... 43.3dB TO 139.3dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 13:00:01
"TEST LENGTH... 0 DAYS 0:20:07

"Lav..... 67.9dB
"SEL..... 98.6dB
"Lmax..... 83.1dB ON 5/20/95 AT 13:00:40
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 21 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"13:00:01"	71.7	83.1	76	51
2	"13:01:01"	67.0	78.1	70	47
3	"13:02:01"	67.5	80.1	71	46
4	"13:03:01"	67.1	76.0	70	53
5	"13:04:01"	68.6	81.4	70	47
6	"13:05:01"	69.8	77.7	72	60
7	"13:06:01"	65.9	79.0	69	49
8	"13:07:01"	67.3	73.6	71	49
9	"13:08:01"	69.0	81.0	70	43
10	"13:09:01"	65.8	71.9	70	48
11	"13:10:01"	67.3	73.9	71	55
12	"13:11:01"	65.2	71.0	69	56
13	"13:12:01"	65.2	77.5	68	45
14	"13:13:01"	70.7	81.6	74	57
15	"13:14:01"	63.4	70.7	68	44
16	"13:15:01"	66.9	76.8	70	50
17	"13:16:01"	66.6	73.4	71	44
18	"13:17:01"	66.8	77.3	71	49
19	"13:18:01"	62.8	70.7	68	43
20	"13:19:01"	70.1	80.1	74	43
21	"13:20:01"	73.6	82.0	79	56

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 9657

"dB"	"SAMPLES"	"% OF TOTAL"
43	328 ***	3.40
44	188 **	1.95
45	282 ***	2.92
46	197 **	2.04
47	221 **	2.29
48	169 **	1.75
49	176 **	1.82
50	243 ***	2.52
51	202 **	2.09
52	231 **	2.39
53	265 ***	2.74
54	205 **	2.12
55	277 ***	2.87
56	302 ***	3.13
57	288 ***	2.98
58	313 ***	3.24
59	362 ****	3.75
60	300 ***	3.11
61	323 ***	3.34
62	366 ****	3.79
63	324 ***	3.36
64	342 ****	3.54
65	422 ****	4.37
66	404 ****	4.18
67	425 ****	4.40
68	484 *****	5.01
69	553 ******	5.73
70	412 ****	4.27
71	321 ***	3.32
72	177 **	1.83
73	114 *	1.18
74	74 *	0.77
75	60 *	0.62
76	84 *	0.87
77	72 *	0.75
78	58 *	0.60
79	41 +	0.42
80	25 +	0.26
81	18 +	0.19
82	6 .	0.06
83	3 .	0.03

"Ln(0.0) = 83dB
"Ln(10.0) = 71dB
"Ln(50.0) = 61dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	67.4dB	58.2dB	43.3dB
"Ldod	66.1dB	50.7dB	43.3dB
"Losha	65.1dB	43.3dB	43.3dB
"Leq(6)	64.4dB	43.3dB	43.3dB

"File Name.....BIN6
"Test Location.....Manassas / Site 1
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Battery Heights
"Comment Field 2...14:00-14:20
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:34:41

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 13:39:43
"PRE-TEST CALIBRATION RANGE... 43.4dB TO 139.4dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 14:00:00
"TEST LENGTH... 0 DAYS 0:20:16

"Lav..... 53.1dB
"SEL..... 83.9dB
"Lmax..... 63.9dB ON 5/20/95 AT 14:11:29
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 21 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"14:00:00"	53.2	59.1	57	47
2	"14:01:00"	50.8	57.2	55	45
3	"14:02:00"	53.0	62.4	57	44
4	"14:03:00"	50.1	54.3	53	45
5	"14:04:00"	54.4	60.8	58	47
6	"14:05:00"	52.6	58.1	55	43
7	"14:06:00"	50.8	58.9	54	43
8	"14:07:00"	53.7	61.8	57	45
9	"14:08:00"	52.7	59.2	55	45
10	"14:09:00"	53.7	58.2	57	46
11	"14:10:00"	51.2	57.4	53	45
12	"14:11:00"	55.7	63.9	58	47
13	"14:12:00"	51.8	59.3	56	45
14	"14:13:00"	55.3	61.2	58	50
15	"14:14:00"	54.8	63.8	59	45
16	"14:15:00"	54.6	60.4	58	48
17	"14:16:00"	48.7	58.0	52	43
18	"14:17:00"	51.8	55.8	55	46
19	"14:18:00"	52.0	58.4	54	46
20	"14:19:00"	52.3	57.0	54	48
21	"14:20:00"	57.8	59.1	59	56

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 9735

"dB"	"SAMPLES"	"% OF TOTAL"
43	279 ***	2.87
44	315 ***	3.24
45	519 *****	5.33
46	597 ******	6.13
47	891 *********	9.15
48	732 ********	7.52
49	679 *******	6.97
50	846 *********	8.69
51	813 ********	8.35
52	842 *********	8.65
53	783 ********	8.04
54	678 *******	6.96
55	480 *****	4.93
56	363 ****	3.73
57	353 ****	3.63
58	256 ***	2.63
59	140 *	1.44
60	83 *	0.85
61	39 +	0.40
62	20 +	0.21
63	27 +	0.28

"Ln(0.0) = 63dB
"Ln(10.0) = 56dB
"Ln(50.0) = 51dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	52.7dB	43.4dB	43.4dB
"L.dod	52.2dB	43.4dB	43.4dB
"Losha	51.9dB	43.4dB	43.4dB
"Leq(6)	51.7dB	43.4dB	43.4dB

"File Name.....BIN7
"Test Location.....Manassas / Site B
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Lewis House Site Area
"Comment Field 2...15:20-15:30
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:34:54

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 13:39:43
"PRE-TEST CALIBRATION RANGE... 43.4dB TO 139.4dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 15:20:00
"TEST LENGTH... 0 DAYS 0:10:02

"Lav..... 58.8dB
"SEL..... 86.5dB
"Lmax..... 66.6dB ON 5/20/95 AT 15:28:51
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 11 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"15:20:00"	57.0	60.0	59	54
2	"15:21:00"	57.3	59.7	59	53
3	"15:22:00"	56.4	60.0	59	54
4	"15:23:00"	57.7	61.1	59	55
5	"15:24:00"	56.7	59.3	57	55
6	"15:25:00"	57.5	59.7	58	56
7	"15:26:00"	59.0	60.5	60	57
8	"15:27:00"	59.6	63.3	61	56
9	"15:28:00"	61.8	66.6	63	59
10	"15:29:00"	60.8	65.1	63	57
11	"15:30:00"	65.0	66.0	65	63

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 4822

"dB"	"SAMPLES"		"% OF TOTAL"
52	35	*	0.73
53	106	**	2.20
54	228	*****	4.73
55	429	*********	8.90
56	759	**********	15.74
57	890	**********	18.46
58	698	**********	14.48
59	788	**********	16.34
60	357	*******	7.40
61	193	****	4.00
62	151	***	3.13
63	89	**	1.85
64	57	*	1.18
65	24	+	0.50
66	18	+	0.37

"Ln(0.0) = 66dB
"Ln(10.0) = 61dB
"Ln(50.0) = 57dB
"Ln(99.9) = 52dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	58.4dB	43.4dB	43.4dB
"Ldod	58.2dB	43.4dB	43.4dB
"Losha	58.1dB	43.4dB	43.4dB
"Leq(6)	58.0dB	43.4dB	43.4dB

"File Name.....BIN8
"Test Location.....Manassas / Site C
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Picnic Area, 24 hr
"Comment Field 2...5/20-21/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1947 V2.3
"REPORT PRINTED 09/11/95 AT 23:35:02

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 9:15:58
"PRE-TEST CALIBRATION RANGE... 43.8dB TO 139.8dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 9:30:01
"TEST LENGTH... 1 DAYS 9:06:36

"Lav..... 51.1dB
"SEL.....101.7dB
"Lmax..... 83.1dB ON 5/20/95 AT 12:55:04
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.00%
"8 HR DOSE (90dB CUTOFF)..... 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 133 MODE: CONTINUOUS
"PERIOD LENGTH: 0:15:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	" 9:30:01"	49.8	61.1	52	44
2	" 9:45:01"	48.8	59.8	52	43
3	"10:00:01"	47.7	57.8	50	43
4	"10:15:01"	51.7	64.4	55	43
5	"10:30:01"	51.6	64.0	55	43
6	"10:45:01"	47.0	58.7	49	43
7	"11:00:01"	54.3	71.6	55	43
8	"11:15:01"	49.8	61.3	53	43
9	"11:30:01"	49.0	58.6	51	44
10	"11:45:01"	49.4	68.5	51	44
11	"12:00:01"	50.1	58.8	52	44
12	"12:15:01"	48.4	54.6	51	44
13	"12:30:01"	51.1	62.9	54	43
14	"12:45:01"	60.8	83.1	53	44
15	"13:00:01"	48.5	60.1	50	44
16	"13:15:01"	51.1	62.7	55	44
17	"13:30:01"	50.2	65.6	50	43
18	"13:45:01"	46.8	54.5	49	43
19	"14:00:01"	50.5	74.3	51	43
20	"14:15:01"	48.9	56.3	51	44
21	"14:30:01"	48.9	63.3	49	43
22	"14:45:01"	46.3	55.5	49	43
23	"15:00:01"	47.4	57.9	50	43
24	"15:15:01"	45.3	52.3	47	43
25	"15:30:01"	53.8	70.3	53	43
26	"15:45:01"	47.6	60.5	50	43
27	"16:00:01"	48.2	60.6	50	43
28	"16:15:01"	50.8	67.2	52	43
29	"16:30:01"	49.6	61.0	53	43
30	"16:45:01"	45.8	53.8	47	43
31	"17:00:01"	47.1	53.4	49	43
32	"17:15:01"	53.1	67.8	53	43
33	"17:30:01"	49.2	63.3	50	43
34	"17:45:01"	46.8	56.4	49	43
35	"18:00:01"	46.0	53.0	48	43
36	"18:15:01"	48.1	60.1	50	43
37	"18:30:01"	48.7	61.0	51	43
38	"18:45:01"	49.2	55.8	51	44
39	"19:00:01"	50.2	58.0	53	44
40	"19:15:01"	54.8	61.5	58	46
41	"19:30:01"	54.2	61.5	57	47
42	"19:45:01"	54.4	60.9	57	47
43	"20:00:01"	53.6	61.5	57	46
44	"20:15:01"	53.1	60.1	56	47
45	"20:30:01"	53.9	60.9	56	49
46	"20:45:01"	55.3	67.6	57	48

47	"21:00:01"	54.2	61.5	57	47
48	"21:15:01"	54.3	60.4	56	48
49	"21:30:01"	52.4	62.6	56	45
50	"21:45:01"	53.9	64.3	57	46
51	"22:00:01"	53.5	60.7	57	46
52	"22:15:01"	53.5	65.8	56	45
53	"22:30:01"	53.4	61.0	56	47
54	"22:45:01"	53.4	58.3	56	48
55	"23:00:01"	52.7	59.5	55	47
56	"23:15:01"	53.0	59.0	55	48
57	"23:30:01"	52.0	58.8	55	45
58	"23:45:01"	51.9	61.9	55	44
59	" 0:00:01"	52.5	61.7	55	46
60	" 0:15:01"	51.3	62.7	54	43
61	" 0:30:01"	50.0	61.3	53	43
62	" 0:45:01"	51.0	60.9	54	43
63	" 1:00:01"	51.0	61.0	55	43
64	" 1:15:01"	50.5	61.0	54	43
65	" 1:30:01"	51.5	61.5	55	43
66	" 1:45:01"	50.5	60.7	55	43
67	" 2:00:01"	49.8	60.0	53	43
68	" 2:15:01"	48.4	57.8	52	43
69	" 2:30:01"	49.5	62.5	53	43
70	" 2:45:01"	50.0	63.3	53	43
71	" 3:00:01"	46.6	58.6	49	43
72	" 3:15:01"	47.0	58.1	50	43
73	" 3:30:01"	45.9	58.5	47	43
74	" 3:45:01"	47.5	58.0	51	43
75	" 4:00:01"	51.6	63.5	55	43
76	" 4:15:01"	46.3	57.9	49	43
77	" 4:30:01"	47.9	56.9	51	43
78	" 4:45:01"	47.1	59.8	49	43
79	" 5:00:01"	49.2	57.9	52	43
80	" 5:15:01"	46.7	54.5	49	43
81	" 5:30:01"	47.1	60.1	49	43
82	" 5:45:01"	46.8	56.5	49	43
83	" 6:00:01"	47.5	57.8	50	43
84	" 6:15:01"	50.5	60.6	54	43
85	" 6:30:01"	50.8	61.1	55	43
86	" 6:45:01"	52.4	62.7	57	43
87	" 7:00:01"	48.0	53.9	50	44
88	" 7:15:01"	47.3	59.4	50	43
89	" 7:30:01"	46.2	59.9	48	43
90	" 7:45:01"	53.1	65.2	57	43
91	" 8:00:01"	46.0	54.5	48	43
92	" 8:15:01"	51.6	63.6	54	44
93	" 8:30:01"	45.3	55.1	46	43
94	" 8:45:01"	48.2	60.8	49	43
95	" 9:00:01"	45.5	54.2	47	43
96	" 9:15:01"	46.3	58.6	47	43
97	" 9:30:01"	50.4	67.7	49	43
98	" 9:45:01"	55.6	73.0	56	43
99	"10:00:01"	45.0	51.6	47	43
100	"10:15:01"	47.0	58.4	49	43
101	"10:30:01"	46.8	57.8	49	43
102	"10:45:01"	49.1	65.7	49	43
103	"11:00:01"	45.5	62.5	46	43
104	"11:15:01"	44.4	50.2	45	43

105	"11:30:01"	44.8	51.8	46	43
106	"11:45:01"	47.7	61.1	48	43
107	"12:00:01"	47.0	59.3	49	43
108	"12:15:01"	52.8	71.3	53	43
109	"12:30:01"	45.9	61.0	47	43
110	"12:45:01"	52.5	66.3	57	43
111	"13:00:01"	48.7	62.9	50	43
112	"13:15:01"	55.6	73.9	55	43
113	"13:30:01"	45.7	57.4	47	43
114	"13:45:01"	50.2	64.5	54	43
115	"14:00:01"	49.5	64.3	51	43
116	"14:15:01"	45.3	55.3	47	43
117	"14:30:01"	46.8	58.8	49	43
118	"14:45:01"	54.7	75.9	49	43
119	"15:00:01"	50.9	74.3	49	43
120	"15:15:01"	54.9	78.9	46	43
121	"15:30:01"	54.0	75.0	53	43
122	"15:45:01"	50.4	74.9	50	43
123	"16:00:01"	50.0	63.9	54	43
124	"16:15:01"	47.1	58.9	50	43
125	"16:30:01"	47.7	56.1	50	43
126	"16:45:01"	48.1	60.5	50	43
127	"17:00:01"	47.7	60.1	48	43
128	"17:15:01"	52.2	60.8	55	45
129	"17:30:01"	53.4	62.1	56	46
130	"17:45:01"	55.3	64.9	59	46
131	"18:00:01"	51.2	59.4	54	44
132	"18:15:01"	52.9	65.4	55	45
133	"18:30:01"	49.9	62.0	52	44

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 953568

"dB"	"SAMPLES"		"% OF TOTAL"
43	247575	**************************	25.96
44	98082	**********	10.29
45	87514	*********	9.18
46	85117	*********	8.93
47	67702	*******	7.10
48	60872	******	6.38
49	52662	******	5.52
50	48312	*****	5.07
51	40653	****	4.26
52	35252	****	3.70
53	30855	***	3.24
54	27380	***	2.87
55	22069	**	2.31
56	15696	**	1.65
57	11130	*	1.17
58	9143	*	0.96
59	4400	+	0.46
60	3020	+	0.32
61	1801	+	0.19
62	1156	+	0.12
63	729	.	0.08
64	541	.	0.06
65	429	.	0.04
66	308	.	0.03
67	220	.	0.02
68	232	.	0.02
69	172	.	0.02
70	135	.	0.01
71	103	.	0.01
72	108	.	0.01
73	52	.	0.01
74	54	.	0.01
75	30	.	0.00
76	29	.	0.00
77	11	.	0.00
78	12	.	0.00
79	2	.	0.00
80	2	.	0.00
81	2	.	0.00
82	4	.	0.00
83	2	.	0.00

"Ln(0.0) = 83dB
"Ln(10.0) = 54dB
"Ln(50.0) = 46dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	50.6dB	43.8dB	43.8dB
"Ldod	49.4dB	43.8dB	43.8dB
"Losha	48.9dB	43.8dB	43.8dB
"Leq(6)	48.5dB	43.8dB	43.8dB

"File Name.....BIN9
"Test Location.....Manassas / Site 7
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Groveton Cemetary, 24 hr
"Comment Field 2...5/20-21/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1948 V2.3
"REPORT PRINTED 09/11/95 AT 23:35:10

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/20/95 AT 8:44:47
"PRE-TEST CALIBRATION RANGE... 44.0dB TO 140.0dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/20/95 AT 9:00:00
"TEST LENGTH... 1 DAYS 9:47:41

"Lav..... 59.6dB
"SEL.....110.3dB
"Lmax..... 90.0dB ON 5/21/95 AT 16:01:20
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.01%
"8 HR DOSE (90dB CUTOFF)..... 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 136 MODE: CONTINUOUS
"PERIOD LENGTH: 0:15:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/20/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	" 9:00:00"	61.5	75.3	65	46
2	" 9:15:00"	62.9	74.5	66	46
3	" 9:30:00"	61.1	72.1	64	46
4	" 9:45:00"	62.0	79.6	65	46
5	"10:00:00"	61.3	73.1	64	45
6	"10:15:00"	61.0	73.1	64	45
7	"10:30:00"	61.9	72.2	65	46
8	"10:45:00"	63.1	76.0	65	47
9	"11:00:00"	61.9	72.6	65	45
10	"11:15:00"	62.3	74.1	65	48
11	"11:30:00"	62.6	76.7	65	45
12	"11:45:00"	60.3	73.6	63	46
13	"12:00:00"	61.3	73.8	65	46
14	"12:15:00"	61.3	72.5	65	48
15	"12:30:00"	62.5	76.7	65	48
16	"12:45:00"	63.6	77.9	66	47
17	"13:00:00"	61.8	75.1	65	48
18	"13:15:00"	61.2	74.2	65	47
19	"13:30:00"	61.5	73.5	65	46
20	"13:45:00"	59.3	70.1	63	45
21	"14:00:00"	61.0	74.1	64	46
22	"14:15:00"	61.3	75.0	64	48
23	"14:30:00"	60.1	71.5	64	46
24	"14:45:00"	60.4	72.7	64	46
25	"15:00:00"	59.8	74.7	63	47
26	"15:15:00"	60.8	81.6	63	45
27	"15:30:00"	62.5	83.1	64	47
28	"15:45:00"	60.6	70.6	64	47
29	"16:00:00"	60.3	71.0	63	47
30	"16:15:00"	60.8	71.0	64	47
31	"16:30:00"	61.3	83.3	64	45
32	"16:45:00"	60.0	68.2	64	45
33	"17:00:00"	60.4	68.5	64	47
34	"17:15:00"	61.8	73.0	65	47
35	"17:30:00"	60.9	71.4	64	46
36	"17:45:00"	60.2	73.0	64	44
37	"18:00:00"	60.2	69.8	64	44
38	"18:15:00"	60.3	71.8	64	45
39	"18:30:00"	60.2	70.7	64	44
40	"18:45:00"	60.2	73.9	64	44
41	"19:00:00"	60.2	72.9	64	44
42	"19:15:00"	59.3	70.1	63	46
43	"19:30:00"	58.4	69.0	63	44
44	"19:45:00"	58.4	68.9	63	44
45	"20:00:00"	59.0	71.1	63	45
46	"20:15:00"	59.3	69.6	64	45

47	"20:30:00"	59.4	74.4	63	45
48	"20:45:00"	58.9	72.8	63	45
49	"21:00:00"	56.6	68.6	61	44
50	"21:15:00"	59.1	70.0	63	45
51	"21:30:00"	59.1	72.8	63	45
52	"21:45:00"	58.0	70.7	63	44
53	"22:00:00"	58.0	77.5	62	44
54	"22:15:00"	57.8	69.9	63	44
55	"22:30:00"	58.2	69.8	63	44
56	"22:45:00"	57.6	70.6	63	44
57	"23:00:00"	55.8	69.6	61	44
58	"23:15:00"	56.5	69.8	61	44
59	"23:30:00"	55.6	70.1	60	44
60	"23:45:00"	55.3	68.5	60	44
61	" 0:00:00"	54.6	67.2	59	44
62	" 0:15:00"	53.7	68.7	56	44
63	" 0:30:00"	53.5	69.0	52	44
64	" 0:45:00"	56.4	73.5	59	44
65	" 1:00:00"	51.5	67.1	51	44
66	" 1:15:00"	51.4	68.4	51	44
67	" 1:30:00"	50.2	67.0	47	44
68	" 1:45:00"	53.2	72.1	50	44
69	" 2:00:00"	51.7	69.5	49	44
70	" 2:15:00"	52.3	70.4	51	44
71	" 2:30:00"	53.6	73.0	54	44
72	" 2:45:00"	52.3	69.5	53	44
73	" 3:00:00"	50.2	66.5	46	44
74	" 3:15:00"	47.2	66.4	44	44
75	" 3:30:00"	44.0	47.4	44	44
76	" 3:45:00"	47.3	66.6	44	44
77	" 4:00:00"	46.2	63.4	44	44
78	" 4:15:00"	49.0	67.4	44	44
79	" 4:30:00"	46.8	67.1	44	44
80	" 4:45:00"	49.0	67.5	49	44
81	" 5:00:00"	48.7	64.2	49	44
82	" 5:15:00"	52.8	68.9	52	44
83	" 5:30:00"	56.2	68.7	61	44
84	" 5:45:00"	56.6	70.8	59	44
85	" 6:00:00"	57.3	70.6	62	44
86	" 6:15:00"	56.4	69.6	61	45
87	" 6:30:00"	58.8	71.0	63	49
88	" 6:45:00"	59.0	75.0	63	46
89	" 7:00:00"	60.1	70.1	65	47
90	" 7:15:00"	59.1	70.5	64	45
91	" 7:30:00"	59.0	70.1	64	45
92	" 7:45:00"	58.7	69.8	63	45
93	" 8:00:00"	58.2	68.7	63	45
94	" 8:15:00"	60.2	73.4	64	45
95	" 8:30:00"	58.7	71.4	63	44
96	" 8:45:00"	58.4	68.2	62	44
97	" 9:00:00"	58.9	70.1	63	44
98	" 9:15:00"	59.5	70.6	63	44
99	" 9:30:00"	59.3	72.4	63	46
100	" 9:45:00"	59.7	68.2	64	44
101	"10:00:00"	58.2	69.9	62	44
102	"10:15:00"	58.3	65.6	62	45
103	"10:30:00"	60.6	79.8	62	46
104	"10:45:00"	58.7	66.7	62	46

105	"11:00:00"	58.2	71.5	62	44
106	"11:15:00"	59.2	71.0	63	44
107	"11:30:00"	57.9	69.5	62	45
108	"11:45:00"	59.9	75.4	62	46
109	"12:00:00"	57.6	67.4	61	44
110	"12:15:00"	58.8	69.5	62	47
111	"12:30:00"	60.1	69.6	63	47
112	"12:45:00"	60.2	74.7	63	45
113	"13:00:00"	59.2	68.2	63	45
114	"13:15:00"	59.0	67.3	62	47
115	"13:30:00"	58.6	72.1	62	45
116	"13:45:00"	59.5	73.1	63	47
117	"14:00:00"	59.3	72.9	63	45
118	"14:15:00"	60.2	73.3	63	48
119	"14:30:00"	58.8	70.1	62	46
120	"14:45:00"	59.5	69.8	63	48
121	"15:00:00"	60.9	72.3	64	48
122	"15:15:00"	61.1	75.5	64	45
123	"15:30:00"	61.2	74.0	64	49
124	"15:45:00"	60.6	70.7	64	47
125	"16:00:00"	66.1	90.0	65	47
126	"16:15:00"	61.3	72.9	65	48
127	"16:30:00"	60.8	71.0	65	45
128	"16:45:00"	61.6	72.1	65	46
129	"17:00:00"	60.1	71.7	64	46
130	"17:15:00"	62.4	69.9	65	50
131	"17:30:00"	61.9	69.6	66	45
132	"17:45:00"	61.9	69.9	65	49
133	"18:00:00"	61.5	74.7	65	47
134	"18:15:00"	62.4	70.4	66	50
135	"18:30:00"	61.6	70.4	65	48
136	"18:45:00"	61.8	70.3	65	46

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 973295

"dB"	"SAMPLES"		"% OF TOTAL"
44	192328	**********	19.76
45	40699	****	4.18
46	37974	****	3.90
47	38966	****	4.00
48	41596	****	4.27
49	38000	****	3.90
50	33152	***	3.41
51	31344	***	3.22
52	27096	***	2.78
53	27479	***	2.82
54	26740	***	2.75
55	26555	***	2.73
56	29307	***	3.01
57	30774	***	3.16
58	41861	****	4.30
59	40624	****	4.17
60	45351	*****	4.66
61	45492	*****	4.67
62	45973	*****	4.72
63	39266	****	4.03
64	31419	***	3.23
65	23106	**	2.37
66	15547	**	1.60
67	8544	*	0.88
68	5041	*	0.52
69	3308	+	0.34
70	2611	+	0.27
71	1146	+	0.12
72	800	.	0.08
73	501	.	0.05
74	281	.	0.03
75	127	.	0.01
76	91	.	0.01
77	38	.	0.00
78	26	.	0.00
79	33	.	0.00
80	17	.	0.00
81	24	.	0.00
82	25	.	0.00
83	9	.	0.00
84	6	.	0.00
85	4	.	0.00
86	3	.	0.00
87	6	.	0.00
88	3	.	0.00
89	1	.	0.00
90	1	.	0.00

"Ln(0.0) = 90dB
"Ln(10.0) = 63dB
"Ln(50.0) = 53dB
"Ln(99.9) = 44dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	59.2dB	44.0dB	44.0dB
"Ldod	58.0dB	44.0dB	44.0dB
"Losha	57.1dB	44.0dB	44.0dB
"Leq(6)	56.5dB	44.0dB	44.0dB

"File Name.....BIN10
"Test Location.....Manassas / Site 2
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Stone House, ext. mic
"Comment Field 2...5/22/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1948 V2.3
"REPORT PRINTED 09/11/95 AT 23:35:21

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/22/95 AT 6:27:31
"PRE-TEST CALIBRATION RANGE... 43.8dB TO 139.8dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/22/95 AT 6:32:00
"TEST LENGTH... 0 DAYS 7:11:33

"Lav..... 66.0dB
"SEL.....110.0dB
"Lmax..... 88.4dB ON 5/22/95 AT 8:33:49
"Lpk.....UNDER
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.02%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.02%
"8 HR DOSE (90dB CUTOFF)..... 0.00%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 432 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/22/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	" 6:32:00"	68.7	80.6	72	60
2	" 6:33:00"	59.1	63.6	61	55
3	" 6:34:00"	61.5	65.9	63	59
4	" 6:35:00"	66.8	75.4	71	61
5	" 6:36:00"	65.4	69.9	67	62
6	" 6:37:00"	65.2	70.4	67	62
7	" 6:38:00"	64.9	69.3	67	62
8	" 6:39:00"	63.0	67.8	65	60
9	" 6:40:00"	68.8	76.5	72	61
10	" 6:41:00"	65.6	71.9	67	62
11	" 6:42:00"	64.1	70.5	67	61
12	" 6:43:00"	66.5	71.8	70	59
13	" 6:44:00"	59.4	62.2	61	58
14	" 6:45:00"	63.2	69.8	67	58
15	" 6:46:00"	69.3	82.0	69	60
16	" 6:47:00"	66.1	77.0	69	59
17	" 6:48:00"	70.0	75.8	75	59
18	" 6:49:00"	67.1	72.6	69	61
19	" 6:50:00"	63.4	66.5	65	61
20	" 6:51:00"	68.5	79.0	71	63
21	" 6:52:00"	62.2	65.4	64	59
22	" 6:53:00"	64.6	72.6	68	60
23	" 6:54:00"	61.3	65.1	62	59
24	" 6:55:00"	61.4	66.1	64	58
25	" 6:56:00"	63.3	66.5	65	60
26	" 6:57:00"	62.6	68.3	64	59
27	" 6:58:00"	65.6	74.2	67	62
28	" 6:59:00"	70.0	80.5	73	64
29	" 7:00:00"	65.8	73.0	68	61
30	" 7:01:00"	62.6	68.3	65	57
31	" 7:02:00"	68.2	76.1	71	63
32	" 7:03:00"	64.6	69.7	66	62
33	" 7:04:00"	61.6	65.1	63	59
34	" 7:05:00"	62.9	66.4	65	59
35	" 7:06:00"	64.2	68.6	65	62
36	" 7:07:00"	64.5	68.1	65	63
37	" 7:08:00"	66.5	72.9	70	61
38	" 7:09:00"	64.4	74.1	65	59
39	" 7:10:00"	63.5	68.5	67	58
40	" 7:11:00"	65.5	67.1	66	64
41	" 7:12:00"	64.7	68.5	66	62
42	" 7:13:00"	64.5	69.7	67	62
43	" 7:14:00"	62.2	67.5	65	58
44	" 7:15:00"	67.9	75.3	73	61
45	" 7:16:00"	63.0	65.1	64	60
46	" 7:17:00"	67.4	75.7	71	60

47	" 7:18:00"	65.4	71.2	68	60
48	" 7:19:00"	65.8	70.7	69	60
49	" 7:20:00"	63.8	73.7	67	56
50	" 7:21:00"	64.5	70.6	68	59
51	" 7:22:00"	61.4	67.4	64	56
52	" 7:23:00"	62.5	68.0	65	58
53	" 7:24:00"	62.2	69.1	65	57
54	" 7:25:00"	67.3	75.8	71	62
55	" 7:26:00"	62.8	66.4	64	60
56	" 7:27:00"	63.6	70.2	65	60
57	" 7:28:00"	65.2	73.1	68	60
58	" 7:29:00"	61.9	66.9	64	57
59	" 7:30:00"	64.6	77.0	67	58
60	" 7:31:00"	62.0	65.4	63	60
61	" 7:32:00"	62.2	65.7	64	60
62	" 7:33:00"	65.6	73.4	69	61
63	" 7:34:00"	62.1	65.1	63	61
64	" 7:35:00"	66.7	70.4	68	64
65	" 7:36:00"	67.9	78.1	71	57
66	" 7:37:00"	65.5	73.9	68	59
67	" 7:38:00"	62.5	64.7	63	61
68	" 7:39:00"	60.8	68.8	62	56
69	" 7:40:00"	64.5	74.3	68	54
70	" 7:41:00"	64.9	72.2	67	59
71	" 7:42:00"	65.9	72.8	69	62
72	" 7:43:00"	65.9	69.3	67	64
73	" 7:44:00"	66.3	70.1	68	63
74	" 7:45:00"	71.3	82.2	71	66
75	" 7:46:00"	69.2	75.8	72	65
76	" 7:47:00"	67.3	72.6	69	65
77	" 7:48:00"	67.5	74.5	70	64
78	" 7:49:00"	65.9	72.6	67	63
79	" 7:50:00"	65.3	68.8	67	63
80	" 7:51:00"	68.2	73.6	69	66
81	" 7:52:00"	66.3	77.0	70	60
82	" 7:53:00"	63.4	70.2	66	60
83	" 7:54:00"	67.1	71.6	69	63
84	" 7:55:00"	63.1	67.7	64	61
85	" 7:56:00"	64.8	72.8	68	60
86	" 7:57:00"	65.8	70.9	69	62
87	" 7:58:00"	63.8	70.3	67	57
88	" 7:59:00"	62.1	65.2	63	60
89	" 8:00:00"	62.3	65.0	63	61
90	" 8:01:00"	68.0	77.0	71	63
91	" 8:02:00"	71.1	77.0	75	62
92	" 8:03:00"	65.3	76.6	67	61
93	" 8:04:00"	65.7	73.6	68	62
94	" 8:05:00"	67.4	74.9	71	61
95	" 8:06:00"	64.2	69.3	66	61
96	" 8:07:00"	63.4	68.8	65	60
97	" 8:08:00"	67.7	74.0	71	62
98	" 8:09:00"	62.3	71.1	65	57
99	" 8:10:00"	63.6	69.1	66	61
100	" 8:11:00"	62.0	67.1	65	58
101	" 8:12:00"	59.6	63.0	61	57
102	" 8:13:00"	65.5	72.9	68	60
103	" 8:14:00"	59.9	62.2	61	58
104	" 8:15:00"	63.8	70.6	66	60

105	" 8:16:00"	68.5	74.2	71	62
106	" 8:17:00"	62.3	66.8	65	60
107	" 8:18:00"	64.2	69.1	65	62
108	" 8:19:00"	70.0	77.7	75	63
109	" 8:20:00"	69.2	75.8	73	63
110	" 8:21:00"	65.0	72.5	67	61
111	" 8:22:00"	69.9	75.7	74	64
112	" 8:23:00"	63.8	71.2	66	60
113	" 8:24:00"	63.9	69.9	68	56
114	" 8:25:00"	71.9	79.2	74	68
115	" 8:26:00"	70.4	78.2	75	57
116	" 8:27:00"	61.3	70.1	63	57
117	" 8:28:00"	68.2	75.5	71	59
118	" 8:29:00"	71.2	82.1	76	61
119	" 8:30:00"	67.2	73.6	70	61
120	" 8:31:00"	64.7	72.6	68	59
121	" 8:32:00"	62.2	66.4	65	58
122	" 8:33:00"	76.3	88.4	79	66
123	" 8:34:00"	70.6	78.3	74	60
124	" 8:35:00"	64.4	72.2	66	60
125	" 8:36:00"	71.9	79.4	75	62
126	" 8:37:00"	65.2	72.9	70	58
127	" 8:38:00"	67.0	76.3	68	63
128	" 8:39:00"	67.6	76.2	70	62
129	" 8:40:00"	66.9	71.7	70	63
130	" 8:41:00"	64.8	68.6	66	62
131	" 8:42:00"	70.1	77.7	74	62
132	" 8:43:00"	68.1	76.1	70	65
133	" 8:44:00"	68.7	76.3	72	64
134	" 8:45:00"	64.6	67.0	65	64
135	" 8:46:00"	68.1	78.1	72	61
136	" 8:47:00"	60.9	68.8	64	57
137	" 8:48:00"	67.4	73.5	71	59
138	" 8:49:00"	65.5	75.2	69	59
139	" 8:50:00"	68.2	75.6	71	63
140	" 8:51:00"	71.9	78.9	77	65
141	" 8:52:00"	68.1	74.1	71	64
142	" 8:53:00"	65.4	71.9	69	58
143	" 8:54:00"	62.9	67.8	65	59
144	" 8:55:00"	66.4	75.3	70	58
145	" 8:56:00"	71.2	82.0	75	60
146	" 8:57:00"	65.7	70.5	68	61
147	" 8:58:00"	67.6	75.2	73	55
148	" 8:59:00"	67.3	79.6	68	62
149	" 9:00:00"	66.8	74.7	71	57
150	" 9:01:00"	62.7	69.3	65	53
151	" 9:02:00"	66.9	74.6	70	61
152	" 9:03:00"	66.7	72.6	70	60
153	" 9:04:00"	67.7	74.1	71	58
154	" 9:05:00"	65.7	76.6	70	55
155	" 9:06:00"	65.0	75.1	67	55
156	" 9:07:00"	69.8	79.9	74	54
157	" 9:08:00"	64.0	73.3	69	53
158	" 9:09:00"	69.2	78.0	73	60
159	" 9:10:00"	63.3	68.4	66	58
160	" 9:11:00"	64.5	72.1	68	57
161	" 9:12:00"	69.9	83.1	71	58
162	" 9:13:00"	64.8	74.1	69	52

163	" 9:14:00"	67.0	73.8	71	57
164	" 9:15:00"	65.0	72.8	66	62
165	" 9:16:00"	70.2	79.3	75	58
166	" 9:17:00"	68.2	77.6	73	61
167	" 9:18:00"	66.7	74.1	69	61
168	" 9:19:00"	66.2	74.5	70	56
169	" 9:20:00"	67.9	75.0	72	59
170	" 9:21:00"	64.8	73.1	69	57
171	" 9:22:00"	64.6	74.1	67	53
172	" 9:23:00"	68.6	81.2	70	58
173	" 9:24:00"	68.1	76.3	71	62
174	" 9:25:00"	58.6	66.9	62	49
175	" 9:26:00"	62.0	69.2	65	54
176	" 9:27:00"	67.9	75.3	72	60
177	" 9:28:00"	66.5	74.8	69	53
178	" 9:29:00"	67.7	74.3	71	62
179	" 9:30:00"	64.6	68.8	66	59
180	" 9:31:00"	67.1	75.1	70	57
181	" 9:32:00"	66.8	75.7	70	57
182	" 9:33:00"	66.9	75.1	70	61
183	" 9:34:00"	65.8	74.0	70	54
184	" 9:35:00"	65.7	73.7	69	54
185	" 9:36:00"	68.2	77.2	70	60
186	" 9:37:00"	66.9	75.8	71	54
187	" 9:38:00"	67.5	73.7	71	60
188	" 9:39:00"	73.8	85.6	75	64
189	" 9:40:00"	69.4	82.5	71	57
190	" 9:41:00"	65.7	72.8	69	57
191	" 9:42:00"	68.1	76.7	73	59
192	" 9:43:00"	69.1	78.1	73	56
193	" 9:44:00"	68.6	75.4	72	62
194	" 9:45:00"	64.3	74.3	66	53
195	" 9:46:00"	63.8	74.4	67	55
196	" 9:47:00"	60.5	66.3	64	53
197	" 9:48:00"	62.8	72.2	65	54
198	" 9:49:00"	65.7	74.3	69	56
199	" 9:50:00"	65.1	74.5	69	54
200	" 9:51:00"	65.1	71.5	68	54
201	" 9:52:00"	61.2	69.2	64	56
202	" 9:53:00"	70.1	78.8	72	60
203	" 9:54:00"	65.9	74.5	69	55
204	" 9:55:00"	65.9	76.2	70	52
205	" 9:56:00"	59.9	66.1	64	49
206	" 9:57:00"	60.4	70.9	63	50
207	" 9:58:00"	74.6	84.9	77	55
208	" 9:59:00"	57.7	63.8	61	51
209	"10:00:00"	60.2	71.4	63	51
210	"10:01:00"	61.9	66.5	65	54
211	"10:02:00"	65.0	71.6	69	58
212	"10:03:00"	58.3	64.3	61	50
213	"10:04:00"	71.2	81.7	74	55
214	"10:05:00"	68.5	76.7	73	59
215	"10:06:00"	67.4	75.5	70	58
216	"10:07:00"	66.3	75.1	71	56
217	"10:08:00"	68.6	75.3	73	57
218	"10:09:00"	67.7	76.6	72	55
219	"10:10:00"	60.9	70.4	65	51
220	"10:11:00"	65.3	72.1	69	56

221	"10:12:00"	62.3	70.9	64	55
222	"10:13:00"	62.6	75.6	65	53
223	"10:14:00"	62.5	71.5	66	51
224	"10:15:00"	62.1	70.6	64	53
225	"10:16:00"	66.5	73.8	71	54
226	"10:17:00"	67.4	77.7	69	56
227	"10:18:00"	67.8	79.6	70	58
228	"10:19:00"	61.5	70.6	64	51
229	"10:20:00"	63.6	70.1	66	53
230	"10:21:00"	59.6	63.5	62	51
231	"10:22:00"	62.1	69.9	65	52
232	"10:23:00"	64.8	73.3	69	52
233	"10:24:00"	63.8	71.5	67	56
234	"10:25:00"	57.1	66.2	60	50
235	"10:26:00"	68.1	73.1	71	62
236	"10:27:00"	68.9	75.3	74	57
237	"10:28:00"	58.2	65.6	63	50
238	"10:29:00"	66.1	76.8	71	58
239	"10:30:00"	60.5	69.3	65	48
240	"10:31:00"	63.1	70.4	67	52
241	"10:32:00"	64.8	71.5	69	58
242	"10:33:00"	63.5	71.5	68	53
243	"10:34:00"	63.5	73.1	66	54
244	"10:35:00"	63.4	73.5	65	56
245	"10:36:00"	62.8	71.5	67	48
246	"10:37:00"	63.7	75.4	64	50
247	"10:38:00"	59.1	65.8	62	53
248	"10:39:00"	62.0	69.8	65	55
249	"10:40:00"	66.2	76.0	70	54
250	"10:41:00"	63.6	70.1	68	55
251	"10:42:00"	69.9	82.0	72	59
252	"10:43:00"	66.0	74.2	70	54
253	"10:44:00"	66.6	76.0	71	55
254	"10:45:00"	60.9	67.3	64	54
255	"10:46:00"	61.7	69.6	65	53
256	"10:47:00"	60.8	65.8	64	53
257	"10:48:00"	64.1	75.5	67	49
258	"10:49:00"	64.2	72.8	68	55
259	"10:50:00"	64.4	72.8	68	50
260	"10:51:00"	63.5	69.8	66	55
261	"10:52:00"	67.2	75.5	73	50
262	"10:53:00"	61.9	67.8	65	52
263	"10:54:00"	58.5	65.2	64	48
264	"10:55:00"	65.0	76.0	69	47
265	"10:56:00"	65.3	75.8	69	56
266	"10:57:00"	63.4	71.9	69	50
267	"10:58:00"	61.0	70.7	63	49
268	"10:59:00"	65.9	75.0	70	56
269	"11:00:00"	59.6	68.3	65	50
270	"11:01:00"	65.6	73.8	70	58
271	"11:02:00"	62.6	68.4	66	49
272	"11:03:00"	65.5	71.2	69	60
273	"11:04:00"	63.7	71.4	68	51
274	"11:05:00"	65.8	71.3	69	56
275	"11:06:00"	66.5	73.3	69	54
276	"11:07:00"	65.9	72.8	69	59
277	"11:08:00"	65.7	74.1	69	52
278	"11:09:00"	64.0	72.8	68	55

279	"11:10:00"	61.6	70.1	65	51
280	"11:11:00"	65.1	74.3	68	55
281	"11:12:00"	65.1	77.7	67	58
282	"11:13:00"	66.0	73.6	70	59
283	"11:14:00"	63.4	72.7	67	55
284	"11:15:00"	57.8	62.4	60	49
285	"11:16:00"	63.6	70.7	66	58
286	"11:17:00"	65.5	75.1	67	54
287	"11:18:00"	64.5	71.7	68	56
288	"11:19:00"	64.8	73.9	69	57
289	"11:20:00"	66.6	75.4	71	55
290	"11:21:00"	58.1	63.9	61	50
291	"11:22:00"	60.9	69.4	64	51
292	"11:23:00"	61.2	66.9	64	54
293	"11:24:00"	64.8	73.7	69	56
294	"11:25:00"	62.5	71.9	66	51
295	"11:26:00"	65.4	77.4	67	55
296	"11:27:00"	63.5	74.4	66	51
297	"11:28:00"	61.0	69.7	64	47
298	"11:29:00"	61.8	69.4	64	54
299	"11:30:00"	61.5	67.8	64	54
300	"11:31:00"	65.4	73.2	70	57
301	"11:32:00"	62.0	69.4	67	52
302	"11:33:00"	65.0	73.8	69	58
303	"11:34:00"	68.1	76.5	72	58
304	"11:35:00"	63.8	69.7	67	55
305	"11:36:00"	64.4	71.4	67	54
306	"11:37:00"	64.9	75.2	69	51
307	"11:38:00"	65.3	72.8	68	53
308	"11:39:00"	70.0	78.9	75	57
309	"11:40:00"	64.4	76.9	68	49
310	"11:41:00"	61.5	67.0	64	55
311	"11:42:00"	60.3	72.1	62	53
312	"11:43:00"	62.6	73.2	66	50
313	"11:44:00"	66.1	75.1	70	56
314	"11:45:00"	63.3	71.7	67	57
315	"11:46:00"	66.5	73.1	71	54
316	"11:47:00"	63.1	71.3	68	52
317	"11:48:00"	65.9	75.5	70	51
318	"11:49:00"	61.4	69.7	65	54
319	"11:50:00"	62.4	67.9	65	55
320	"11:51:00"	63.9	74.6	66	51
321	"11:52:00"	58.4	66.6	63	49
322	"11:53:00"	70.1	77.2	73	62
323	"11:54:00"	68.0	77.2	72	55
324	"11:55:00"	66.4	77.4	68	59
325	"11:56:00"	63.5	72.5	67	55
326	"11:57:00"	56.4	63.6	59	50
327	"11:58:00"	60.5	66.8	63	55
328	"11:59:00"	68.1	77.1	73	54
329	"12:00:00"	63.1	70.7	67	54
330	"12:01:00"	59.6	67.5	63	52
331	"12:02:00"	59.6	66.8	63	49
332	"12:03:00"	57.0	64.5	60	51
333	"12:04:00"	64.4	74.3	66	55
334	"12:05:00"	59.9	65.7	63	52
335	"12:06:00"	61.5	66.8	64	56
336	"12:07:00"	69.4	78.2	74	60

337	"12:08:00"	67.6	74.6	72	56
338	"12:09:00"	68.4	78.6	73	55
339	"12:10:00"	68.9	77.8	71	55
340	"12:11:00"	67.3	76.3	73	50
341	"12:12:00"	68.8	76.5	73	60
342	"12:13:00"	64.1	72.5	66	57
343	"12:14:00"	64.6	75.3	67	51
344	"12:15:00"	65.4	77.6	68	57
345	"12:16:00"	68.3	78.9	71	55
346	"12:17:00"	63.3	71.5	68	54
347	"12:18:00"	63.7	74.0	67	53
348	"12:19:00"	63.7	71.6	66	56
349	"12:20:00"	62.1	69.8	63	57
350	"12:21:00"	65.4	72.8	70	55
351	"12:22:00"	63.9	72.8	69	51
352	"12:23:00"	63.2	71.6	68	54
353	"12:24:00"	69.0	78.3	73	56
354	"12:25:00"	61.5	70.6	64	55
355	"12:26:00"	58.7	69.3	61	43
356	"12:27:00"	63.8	72.6	67	45
357	"12:28:00"	59.0	66.8	61	51
358	"12:29:00"	65.8	74.2	70	57
359	"12:30:00"	62.5	73.5	64	50
360	"12:31:00"	63.3	74.3	67	55
361	"12:32:00"	67.3	75.4	71	56
362	"12:33:00"	61.7	70.9	65	52
363	"12:34:00"	63.0	69.8	66	57
364	"12:35:00"	69.9	77.7	75	59
365	"12:36:00"	66.6	75.3	71	55
366	"12:37:00"	65.7	75.1	69	57
367	"12:38:00"	65.5	75.3	68	53
368	"12:39:00"	59.9	69.3	62	53
369	"12:40:00"	62.0	68.7	65	55
370	"12:41:00"	67.5	77.4	72	54
371	"12:42:00"	67.7	77.6	73	50
372	"12:43:00"	66.8	74.9	72	58
373	"12:44:00"	67.5	77.5	72	57
374	"12:45:00"	61.5	71.7	63	55
375	"12:46:00"	66.0	75.1	70	57
376	"12:47:00"	63.0	74.2	65	52
377	"12:48:00"	61.2	69.2	63	52
378	"12:49:00"	63.4	71.9	69	55
379	"12:50:00"	61.3	69.4	65	53
380	"12:51:00"	69.0	78.4	73	55
381	"12:52:00"	65.5	76.1	70	49
382	"12:53:00"	61.2	65.8	63	58
383	"12:54:00"	66.2	75.3	70	60
384	"12:55:00"	65.1	73.7	69	54
385	"12:56:00"	67.0	73.4	71	58
386	"12:57:00"	61.9	70.6	66	52
387	"12:58:00"	66.4	75.8	69	58
388	"12:59:00"	58.9	65.0	63	51
389	"13:00:00"	68.5	79.1	73	52
390	"13:01:00"	59.1	69.2	62	50
391	"13:02:00"	62.6	70.7	66	56
392	"13:03:00"	65.3	69.8	68	59
393	"13:04:00"	65.1	71.5	68	59
394	"13:05:00"	64.8	71.6	68	57

395	"13:06:00"	64.1	74.5	67	56
396	"13:07:00"	63.6	70.5	66	57
397	"13:08:00"	67.8	79.7	70	57
398	"13:09:00"	55.9	63.1	59	47
399	"13:10:00"	65.5	73.7	70	54
400	"13:11:00"	69.0	75.8	73	61
401	"13:12:00"	64.0	71.8	68	54
402	"13:13:00"	63.1	75.1	65	52
403	"13:14:00"	65.0	70.4	69	59
404	"13:15:00"	62.8	71.6	64	55
405	"13:16:00"	62.0	70.7	66	55
406	"13:17:00"	66.3	73.7	69	58
407	"13:18:00"	68.7	78.9	73	54
408	"13:19:00"	67.5	76.2	73	57
409	"13:20:00"	61.2	69.4	64	53
410	"13:21:00"	59.1	65.1	62	52
411	"13:22:00"	68.0	75.8	73	56
412	"13:23:00"	58.8	69.8	62	49
413	"13:24:00"	68.1	72.8	71	59
414	"13:25:00"	66.4	73.9	71	51
415	"13:26:00"	66.8	74.1	72	53
416	"13:27:00"	65.4	76.5	68	49
417	"13:28:00"	68.3	79.2	71	49
418	"13:29:00"	60.4	66.4	63	49
419	"13:30:00"	57.7	65.9	60	49
420	"13:31:00"	63.1	72.5	65	49
421	"13:32:00"	62.2	71.5	65	55
422	"13:33:00"	63.6	71.2	67	52
423	"13:34:00"	68.0	76.5	71	60
424	"13:35:00"	61.0	67.4	64	55
425	"13:36:00"	64.7	76.2	67	54
426	"13:37:00"	66.3	74.4	72	56
427	"13:38:00"	64.3	75.0	66	53
428	"13:39:00"	64.1	74.5	66	55
429	"13:40:00"	70.8	81.9	76	52
430	"13:41:00"	60.4	67.7	65	50
431	"13:42:00"	57.3	63.0	60	51
432	"13:43:00"	59.6	65.8	63	53

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 207146

"dB"	"SAMPLES"		"% OF TOTAL"
43	93	.	0.04
44	45	.	0.02
45	49	.	0.02
46	49	.	0.02
47	399	+	0.19
48	777	+	0.38
49	1400	*	0.68
50	1926	*	0.93
51	2865	*	1.38
52	3490	**	1.68
53	4041	**	1.95
54	4934	**	2.38
55	5727	***	2.76
56	6415	***	3.10
57	9154	****	4.42
58	10522	*****	5.08
59	11687	******	5.64
60	15321	*******	7.40
61	17851	*********	8.62
62	17893	*********	8.64
63	16908	********	8.16
64	15245	*******	7.36
65	13700	*******	6.61
66	10496	*****	5.07
67	7035	***	3.40
68	6296	***	3.04
69	5369	***	2.59
70	4431	**	2.14
71	3515	**	1.70
72	2745	*	1.33
73	2079	*	1.00
74	1829	*	0.88
75	1124	*	0.54
76	699	+	0.34
77	392	+	0.19
78	254	+	0.12
79	127	.	0.06
80	67	.	0.03
81	90	.	0.04
82	40	.	0.02
83	15	.	0.01
84	27	.	0.01
85	10	.	0.00
86	8	.	0.00
87	4	.	0.00
88	3	.	0.00

"Ln(0.0) = 88dB
"Ln(10.0) = 69dB
"Ln(50.0) = 62dB
"Ln(99.9) = 46dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	65.5dB	53.3dB	43.8dB
"Ldod	64.6dB	43.8dB	43.8dB
"Losha	64.0dB	43.8dB	43.8dB
"Leq(6)	63.6dB	43.8dB	43.8dB

"File Name.....BIN11
"Test Location.....Manassas / Site 7
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Groveton Cem.
"Comment Field 2...5/22-23/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1948 V2.3
"REPORT PRINTED 09/11/95 AT 23:35:33

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/22/95 AT 15:30:30
"PRE-TEST CALIBRATION RANGE... 43.8dB TO 139.8dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/22/95 AT 16:00:20
"TEST LENGTH... 1 DAYS 0:30:00

"Lav..... 62.2dB
"SEL.....111.5dB
"Lmax..... 93.4dB ON 5/22/95 AT 16:07:39
"Lpk.....131 dB ON 5/22/95 AT 16:01:07
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.03%
"8 HR DOSE (90dB CUTOFF)..... 0.01%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 98 MODE: CONTINUOUS
"PERIOD LENGTH: 0:15:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/22/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"16:00:20"	67.7	93.4	68	44
2	"16:15:20"	64.9	75.7	68	50
3	"16:30:20"	63.9	78.7	67	46
4	"16:45:20"	63.5	76.9	67	47
5	"17:00:20"	64.8	84.7	67	49
6	"17:15:20"	65.5	84.2	68	52
7	"17:30:20"	64.6	75.8	68	48
8	"17:45:20"	62.8	71.9	67	47
9	"18:00:20"	64.6	80.1	68	48
10	"18:15:20"	63.1	71.6	67	46
11	"18:30:20"	63.1	73.1	67	47
12	"18:45:20"	61.9	76.1	66	46
13	"19:00:20"	62.4	74.7	66	45
14	"19:15:20"	61.1	77.1	65	46
15	"19:30:20"	61.3	72.1	65	46
16	"19:45:20"	60.5	76.2	65	43
17	"20:00:20"	59.9	72.1	65	45
18	"20:15:20"	59.6	75.1	64	45
19	"20:30:20"	59.9	77.0	64	43
20	"20:45:20"	59.2	70.8	64	45
21	"21:00:20"	59.8	73.8	64	45
22	"21:15:20"	59.5	75.8	64	45
23	"21:30:20"	57.6	70.7	62	43
24	"21:45:20"	58.3	71.3	63	43
25	"22:00:20"	58.4	72.9	63	44
26	"22:15:20"	58.4	73.7	63	43
27	"22:30:20"	56.3	77.1	58	43
28	"22:45:20"	56.1	70.5	60	43
29	"23:00:20"	56.1	69.4	61	44
30	"23:15:20"	56.9	73.8	61	44
31	"23:30:20"	55.5	70.9	58	44
32	"23:45:20"	54.3	69.4	55	43
33	" 0:00:20"	55.4	75.1	55	44
34	" 0:15:20"	52.8	69.2	51	43
35	" 0:30:20"	50.1	67.4	47	43
36	" 0:45:20"	46.0	64.7	46	43
37	" 1:00:20"	51.6	71.7	49	43
38	" 1:15:20"	53.7	77.0	49	43
39	" 1:30:20"	47.9	66.5	46	43
40	" 1:45:20"	50.6	69.9	50	43
41	" 2:00:20"	50.9	70.1	49	44
42	" 2:15:20"	48.3	67.5	48	43
43	" 2:30:20"	48.6	67.7	45	43
44	" 2:45:20"	44.0	60.0	43	43
45	" 3:00:20"	49.6	68.8	45	43
46	" 3:15:20"	51.2	68.8	48	43

47	" 3:30:20"	50.7	68.3	48	43
48	" 3:45:20"	50.1	68.6	49	43
49	" 4:00:20"	55.7	76.9	51	43
50	" 4:15:20"	55.4	70.2	57	45
51	" 4:30:20"	56.3	71.6	60	45
52	" 4:45:20"	58.7	72.3	63	48
53	" 5:00:20"	60.6	75.4	65	49
54	" 5:15:20"	64.5	74.5	68	53
55	" 5:30:20"	66.0	72.2	69	56
56	" 5:45:20"	65.4	74.0	69	55
57	" 6:00:20"	66.9	73.4	69	60
58	" 6:15:20"	63.7	73.2	67	55
59	" 6:30:20"	60.0	74.7	62	54
60	" 6:45:20"	61.9	76.0	65	54
61	" 7:00:20"	60.1	74.8	62	54
62	" 7:15:20"	61.7	74.1	65	54
63	" 7:30:20"	62.7	76.2	66	54
64	" 7:45:20"	59.7	72.7	63	53
65	" 8:00:20"	64.8	77.6	68	54
66	" 8:15:20"	66.4	78.9	69	54
67	" 8:30:20"	66.2	76.5	69	53
68	" 8:45:20"	64.9	74.0	68	51
69	" 9:00:20"	65.4	83.0	68	50
70	" 9:15:20"	64.6	80.5	67	49
71	" 9:30:20"	63.1	76.1	66	47
72	" 9:45:20"	62.4	76.2	66	46
73	"10:00:20"	64.0	80.3	68	47
74	"10:15:20"	68.0	91.4	66	46
75	"10:30:20"	61.8	72.6	65	48
76	"10:45:20"	62.6	81.4	66	45
77	"11:00:20"	62.9	81.2	66	47
78	"11:15:20"	62.6	77.1	66	48
79	"11:30:20"	62.2	74.7	66	46
80	"11:45:20"	62.7	75.3	66	46
81	"12:00:20"	62.9	81.1	66	47
82	"12:15:20"	62.9	79.6	66	46
83	"12:30:20"	62.4	76.7	66	47
84	"12:45:20"	63.6	77.9	67	46
85	"13:00:20"	64.4	81.2	68	48
86	"13:15:20"	61.7	73.9	65	47
87	"13:30:20"	63.0	76.9	66	47
88	"13:45:20"	62.5	76.2	66	48
89	"14:00:20"	62.0	74.9	66	46
90	"14:15:20"	61.7	76.5	66	47
91	"14:30:20"	63.5	81.0	67	49
92	"14:45:20"	63.3	81.9	66	47
93	"15:00:20"	63.8	75.8	67	50
94	"15:15:20"	63.7	78.0	67	48
95	"15:30:20"	64.2	76.0	67	51
96	"15:45:20"	65.0	78.4	68	51
97	"16:00:20"	65.3	78.8	68	50
98	"16:15:20"	64.2	81.9	67	47

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 705600

"d8"	"SAMPLES"		"% OF TOTAL"
43	58823	********	8.34
44	34904	*****	4.95
45	34864	*****	4.94
46	39164	******	5.55
47	33653	*****	4.77
48	31285	****	4.43
49	27249	****	3.86
50	24809	****	3.52
51	21042	***	2.98
52	18273	***	2.59
53	18893	***	2.68
54	22086	***	3.13
55	22748	***	3.22
56	21875	***	3.10
57	21056	***	2.98
58	21847	***	3.10
59	19427	***	2.75
60	20899	***	2.96
61	23398	***	3.32
62	23867	***	3.38
63	24315	***	3.45
64	26477	****	3.75
65	27235	****	3.86
66	25120	****	3.56
67	20047	***	2.84
68	15260	**	2.16
69	11246	**	1.59
70	6485	*	0.92
71	3602	*	0.51
72	2085	+	0.30
73	1335	+	0.19
74	930	+	0.13
75	508	.	0.07
76	270	.	0.04
77	131	.	0.02
78	101	.	0.01
79	68	.	0.01
80	69	.	0.01
81	47	.	0.01
82	20	.	0.00
83	19	.	0.00
84	18	.	0.00
85	9	.	0.00
86	6	.	0.00
87	5	.	0.00
88	5	.	0.00
89	5	.	0.00
90	10	.	0.00
91	5	.	0.00
92	3	.	0.00
93	2	.	0.00

"Ln(0.0) = 93dB
"Ln(10.0) = 66dB
"Ln(50.0) = 54dB
"Ln(99.9) = 43dB

	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	61.8dB	49.6dB	45.5dB
"Ldod	60.3dB	43.8dB	43.8dB
"Losha	59.3dB	43.8dB	43.8dB
"Leq(6)	58.6dB	43.8dB	43.8dB

"File Name.....BIN12
"Test Location.....Manassas / Site 3
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Dogan Ridge, 24 hr
"Comment Field 2...5/22-23/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1947 V2.3
"REPORT PRINTED 09/11/95 AT 23:35:48

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/22/95 AT 15:32:28
"PRE-TEST CALIBRATION RANGE... 43.9dB TO 139.9dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/22/95 AT 16:00:00
"TEST LENGTH... 1 DAYS 0:30:00

"Lav..... 60.4dB
"SEL.....109.7dB
"Lmax..... 98.0dB ON 5/23/95 AT 12:07:08
"Lpk.....124 dB ON 5/23/95 AT 12:07:08
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.24%
"8 HR DOSE (90dB CUTOFF)..... 0.18%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 98 MODE: CONTINUOUS
"PERIOD LENGTH: 0:15:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/22/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"16:00:00"	57.3	76.2	58	45
2	"16:15:00"	56.3	73.8	59	46
3	"16:30:00"	53.9	66.5	57	46
4	"16:45:00"	54.5	73.0	57	45
5	"17:00:00"	57.0	75.3	57	44
6	"17:15:00"	54.0	65.7	56	48
7	"17:30:00"	53.9	69.5	56	47
8	"17:45:00"	52.0	64.1	54	45
9	"18:00:00"	52.1	63.4	54	46
10	"18:15:00"	54.7	64.7	58	48
11	"18:30:00"	54.1	64.2	57	47
12	"18:45:00"	52.9	60.5	55	45
13	"19:00:00"	57.4	73.3	57	48
14	"19:15:00"	53.1	61.7	55	47
15	"19:30:00"	54.1	64.5	56	49
16	"19:45:00"	55.6	70.3	57	47
17	"20:00:00"	52.0	65.3	54	46
18	"20:15:00"	52.6	59.9	55	47
19	"20:30:00"	53.0	61.9	55	48
20	"20:45:00"	54.7	67.3	57	47
21	"21:00:00"	52.8	62.1	55	46
22	"21:15:00"	54.0	61.6	57	47
23	"21:30:00"	53.3	59.7	56	46
24	"21:45:00"	52.1	62.0	55	45
25	"22:00:00"	52.9	63.7	56	45
26	"22:15:00"	52.4	59.9	55	47
27	"22:30:00"	52.0	63.6	55	44
28	"22:45:00"	48.9	58.9	52	43
29	"23:00:00"	51.4	61.1	54	43
30	"23:15:00"	52.7	66.2	55	43
31	"23:30:00"	49.4	60.8	52	43
32	"23:45:00"	48.7	58.5	52	43
33	" 0:00:00"	47.8	59.8	50	43
34	" 0:15:00"	48.6	58.9	53	43
35	" 0:30:00"	48.5	61.0	52	43
36	" 0:45:00"	47.5	57.9	51	43
37	" 1:00:00"	46.2	58.6	48	43
38	" 1:15:00"	44.7	54.3	46	43
39	" 1:30:00"	44.6	52.9	43	43
40	" 1:45:00"	47.1	59.4	49	43
41	" 2:00:00"	44.4	52.6	43	43
42	" 2:15:00"	44.5	53.5	45	43
43	" 2:30:00"	46.0	59.9	46	43
44	" 2:45:00"	45.1	55.2	46	43
45	" 3:00:00"	44.3	51.8	44	43
46	" 3:15:00"	44.3	51.9	44	43

47	" 3:30:00"	45.3	55.3	47	43
48	" 3:45:00"	46.7	59.6	49	43
49	" 4:00:00"	45.9	55.3	48	43
50	" 4:15:00"	46.9	58.6	50	43
51	" 4:30:00"	47.5	60.0	50	43
52	" 4:45:00"	48.3	59.8	51	44
53	" 5:00:00"	49.0	55.0	51	45
54	" 5:15:00"	52.3	62.7	54	49
55	" 5:30:00"	54.5	65.2	56	51
56	" 5:45:00"	55.0	62.9	57	51
57	" 6:00:00"	56.5	70.5	58	51
58	" 6:15:00"	55.1	66.2	57	51
59	" 6:30:00"	56.5	66.3	59	51
60	" 6:45:00"	57.4	75.0	58	51
61	" 7:00:00"	55.7	71.2	57	50
62	" 7:15:00"	54.6	66.6	57	50
63	" 7:30:00"	57.6	71.8	60	52
64	" 7:45:00"	62.8	83.6	60	51
65	" 8:00:00"	54.8	63.5	58	50
66	" 8:15:00"	57.2	70.9	59	50
67	" 8:30:00"	61.5	82.4	60	51
68	" 8:45:00"	56.9	71.4	59	50
69	" 9:00:00"	56.9	70.2	60	48
70	" 9:15:00"	56.8	71.8	58	47
71	" 9:30:00"	55.4	69.9	58	46
72	" 9:45:00"	71.3	94.4	59	47
73	"10:00:00"	53.5	70.2	55	46
74	"10:15:00"	64.9	88.0	59	46
75	"10:30:00"	53.5	70.7	56	45
76	"10:45:00"	68.6	93.4	57	46
77	"11:00:00"	52.6	67.3	55	46
78	"11:15:00"	54.0	67.7	57	45
79	"11:30:00"	53.4	71.9	55	46
80	"11:45:00"	52.9	70.2	54	46
81	"12:00:00"	75.0	98.0	58	47
82	"12:15:00"	52.6	66.1	55	46
83	"12:30:00"	53.8	69.5	56	46
84	"12:45:00"	63.6	86.0	60	47
85	"13:00:00"	62.3	79.7	64	46
86	"13:15:00"	65.4	89.2	58	46
87	"13:30:00"	54.1	68.6	58	46
88	"13:45:00"	54.4	67.3	57	46
89	"14:00:00"	65.0	89.1	57	47
90	"14:15:00"	54.1	67.2	57	47
91	"14:30:00"	72.1	95.6	55	46
92	"14:45:00"	53.3	69.9	56	45
93	"15:00:00"	54.0	70.4	56	47
94	"15:15:00"	55.1	70.8	57	46
95	"15:30:00"	64.1	87.7	56	46
96	"15:45:00"	56.5	69.9	60	48
97	"16:00:00"	52.0	66.4	54	46
98	"16:15:00"	54.4	73.1	55	46

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 705600

"dB"	"SAMPLES"		"% OF TOTAL"
43	106986	**********	15.16
44	22363	***	3.17
45	27792	****	3.94
46	30956	****	4.39
47	38352	*****	5.44
48	47859	*******	6.78
49	51815	*******	7.34
50	52986	********	7.51
51	60189	*********	8.53
52	52892	*******	7.50
53	51301	*******	7.27
54	44420	******	6.30
55	33982	*****	4.82
56	21400	***	3.03
57	17611	**	2.50
58	14167	**	2.01
59	7714	*	1.09
60	5867	*	0.83
61	3697	*	0.52
62	2937	+	0.42
63	2238	+	0.32
64	1786	+	0.25
65	1324	+	0.19
66	1019	+	0.14
67	676	.	0.10
68	530	.	0.08
69	556	.	0.08
70	433	.	0.06
71	258	.	0.04
72	199	.	0.03
73	171	.	0.02
74	160	.	0.02
75	113	.	0.02
76	77	.	0.01
77	72	.	0.01
78	49	.	0.01
79	39	.	0.01
80	47	.	0.01
81	62	.	0.01
82	70	.	0.01
83	73	.	0.01
84	37	.	0.01
85	45	.	0.01
86	30	.	0.00
87	40	.	0.01
88	34	.	0.00
89	11	.	0.00
90	12	.	0.00
91	16	.	0.00
92	26	.	0.00
93	46	.	0.01
94	28	.	0.00
95	15	.	0.00
96	5	.	0.00
97	16	.	0.00
98	1	.	0.00

"Ln(0.0) = 98dB

"Ln(10.0) = 56dB
"Ln(50.0) = 50dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	59.9dB	58.6dB	57.4dB
"Ldod	54.7dB	47.8dB	45.4dB
"Losha	52.9dB	43.9dB	43.9dB
"Leq(6)	52.1dB	43.9dB	43.9dB

"File Name.....BIN13
"Test Location.....Manassas / Site 2
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...Stone House, 24 hr
"Comment Field 2...5/22-23/95
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:36:00

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/22/95 AT 15:35:23
"PRE-TEST CALIBRATION RANGE... 43.3dB TO 139.3dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/22/95 AT 16:00:19
"TEST LENGTH... 1 DAYS 0:00:00

"Lav..... 64.5dB
"SEL.....113.7dB
"Lmax..... 89.0dB ON 5/23/95 AT 9:19:37
"Lpk.....118 dB ON 5/23/95 AT 14:28:52
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.09%
"8 HR DOSE (90dB CUTOFF)..... 0.00%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 96 MODE: CONTINUOUS
"PERIOD LENGTH: 0:15:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/22/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"16:00:19"	65.4	79.4	68	58
2	"16:15:19"	64.7	78.7	67	57
3	"16:30:19"	63.8	76.6	66	57
4	"16:45:19"	64.0	82.7	65	54
5	"17:00:19"	64.2	81.4	65	55
6	"17:15:19"	62.6	80.9	64	55
7	"17:30:19"	62.3	75.4	64	56
8	"17:45:19"	61.8	72.2	64	54
9	"18:00:19"	63.2	75.3	66	56
10	"18:15:19"	62.0	74.0	64	53
11	"18:30:19"	62.2	73.6	65	55
12	"18:45:19"	63.2	81.7	65	54
13	"19:00:19"	63.2	74.4	66	54
14	"19:15:19"	62.9	75.3	65	55
15	"19:30:19"	62.0	72.7	65	54
16	"19:45:19"	62.5	78.3	65	52
17	"20:00:19"	62.8	77.4	65	53
18	"20:15:19"	63.4	83.5	65	52
19	"20:30:19"	62.0	77.0	65	52
20	"20:45:19"	61.1	71.5	64	52
21	"21:00:19"	61.7	76.7	65	52
22	"21:15:19"	62.2	80.2	65	51
23	"21:30:19"	60.3	71.8	64	51
24	"21:45:19"	63.3	85.3	64	50
25	"22:00:19"	60.3	73.4	64	50
26	"22:15:19"	60.1	74.3	64	50
27	"22:30:19"	58.7	71.2	63	48
28	"22:45:19"	58.6	69.9	63	47
29	"23:00:19"	59.1	70.6	63	48
30	"23:15:19"	59.0	74.6	63	47
31	"23:30:19"	57.4	74.9	61	44
32	"23:45:19"	55.6	69.7	59	44
33	" 0:00:19"	57.9	74.4	61	44
34	" 0:15:19"	54.3	70.8	56	43
35	" 0:30:19"	54.3	69.9	56	43
36	" 0:45:19"	55.4	71.5	57	43
37	" 1:00:19"	54.2	69.3	57	43
38	" 1:15:19"	56.6	80.1	52	43
39	" 1:30:19"	50.9	69.9	50	43
40	" 1:45:19"	54.4	72.6	57	44
41	" 2:00:19"	51.9	70.7	50	43
42	" 2:15:19"	51.1	70.4	50	43
43	" 2:30:19"	51.9	70.0	51	43
44	" 2:45:19"	49.6	69.8	49	43
45	" 3:00:19"	49.5	67.5	47	43
46	" 3:15:19"	51.8	69.6	51	44

47	" 3:30:19"	53.4	69.9	52	45
48	" 3:45:19"	52.2	70.1	52	43
49	" 4:00:19"	57.1	77.9	54	43
50	" 4:15:19"	59.1	82.0	60	45
51	" 4:30:19"	58.4	70.9	62	47
52	" 4:45:19"	59.8	74.6	64	48
53	" 5:00:19"	62.9	76.7	67	49
54	" 5:15:19"	65.2	74.6	69	55
55	" 5:30:19"	67.5	78.2	70	59
56	" 5:45:19"	67.5	79.8	69	62
57	" 6:00:19"	69.5	86.6	70	65
58	" 6:15:19"	65.7	78.0	68	59
59	" 6:30:19"	66.2	79.5	69	60
60	" 6:45:19"	65.9	81.0	68	59
61	" 7:00:19"	65.0	74.0	67	60
62	" 7:15:19"	67.0	85.6	69	59
63	" 7:30:19"	65.7	75.3	69	59
64	" 7:45:19"	67.9	81.0	70	63
65	" 8:00:19"	68.3	83.6	70	62
66	" 8:15:19"	66.6	77.5	69	60
67	" 8:30:19"	68.4	84.2	70	61
68	" 8:45:19"	67.1	78.0	70	59
69	" 9:00:19"	70.3	85.0	72	58
70	" 9:15:19"	69.2	89.0	71	55
71	" 9:30:19"	67.1	85.1	70	57
72	" 9:45:19"	67.4	84.9	69	55
73	"10:00:19"	68.1	84.4	71	55
74	"10:15:19"	66.4	84.6	69	54
75	"10:30:19"	65.9	78.3	69	56
76	"10:45:19"	64.2	79.9	67	53
77	"11:00:19"	68.5	85.0	71	57
78	"11:15:19"	65.7	81.8	69	54
79	"11:30:19"	65.8	81.9	69	56
80	"11:45:19"	67.6	83.7	70	54
81	"12:00:19"	66.6	82.0	70	55
82	"12:15:19"	64.3	76.6	67	55
83	"12:30:19"	67.2	84.3	70	57
84	"12:45:19"	65.8	83.9	68	54
85	"13:00:19"	67.9	83.7	71	55
86	"13:15:19"	67.1	78.7	71	55
87	"13:30:19"	64.7	78.6	68	56
88	"13:45:19"	65.5	81.7	69	55
89	"14:00:19"	69.0	84.6	72	55
90	"14:15:19"	67.4	88.9	69	55
91	"14:30:19"	65.2	80.9	68	53
92	"14:45:19"	65.8	82.7	67	56
93	"15:00:19"	65.9	79.0	69	58
94	"15:15:19"	63.2	73.5	66	56
95	"15:30:19"	63.2	74.1	66	56
96	"15:45:19"	64.2	76.9	67	57

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 691200

"dB"	"SAMPLES"		"% OF TOTAL"
43	29993	****	4.34
44	16524	**	2.39
45	18368	***	2.66
46	17183	**	2.49
47	17816	***	2.58
48	13867	**	2.01
49	14411	**	2.08
50	14169	**	2.05
51	14897	**	2.16
52	16075	**	2.33
53	17783	***	2.57
54	19360	***	2.80
55	19398	***	2.81
56	20553	***	2.97
57	24777	****	3.58
58	28923	****	4.18
59	36531	*****	5.29
60	35127	*****	5.08
61	40848	******	5.91
62	44081	******	6.38
63	43785	******	6.33
64	37891	*****	5.48
65	35397	*****	5.12
66	28821	****	4.17
67	21205	***	3.07
68	16097	**	2.33
69	14469	**	2.09
70	9523	*	1.38
71	7247	*	1.05
72	4955	*	0.72
73	3603	*	0.52
74	2558	+	0.37
75	1375	+	0.20
76	948	+	0.14
77	627	.	0.09
78	450	.	0.07
79	351	.	0.05
80	312	.	0.05
81	300	.	0.04
82	219	.	0.03
83	175	.	0.03
84	114	.	0.02
85	32	.	0.00
86	16	.	0.00
87	22	.	0.00
88	23	.	0.00
89	1	.	0.00

"Ln(0.0) = 89dB
"Ln(10.0) = 67dB
"Ln(50.0) = 60dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	64.1dB	54.8dB	43.3dB
"Ldod	62.7dB	45.6dB	43.3dB
"Losha	61.9dB	43.3dB	43.3dB
"Leq(6)	61.4dB	43.3dB	43.3dB

"File Name.....BIN14
"Test Location.....Manassas / Propagation
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...50' monitor at both sites
"Comment Field 2...
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1948 V2.3
"REPORT PRINTED 09/11/95 AT 23:36:10

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/24/95 AT 13:42:36
"PRE-TEST CALIBRATION RANGE... 43.7dB TO 139.7dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/24/95 AT 14:00:20
"TEST LENGTH... 0 DAYS 4:24:48

"Lav..... 69.2dB
"SEL.....111.0dB
"Lmax.....105.7dB ON 5/24/95 AT 16:30:21
"Lpk.....144 dB ON 5/24/95 AT 16:30:21
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.29%
"8 HR PROJ. DOSE (80dB CUTOFF).. 0.52%
"8 HR DOSE (90dB CUTOFF)..... 0.23%
"8 HR PROJ. DOSE (90dB CUTOFF).. 0.41%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 265 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/24/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"14:00:20"	69.8	79.1	75	51
2	"14:01:20"	71.3	82.3	75	56
3	"14:02:20"	58.2	67.6	62	46
4	"14:03:20"	60.6	69.3	64	52
5	"14:04:20"	60.1	67.5	63	53
6	"14:05:20"	60.2	65.8	63	54
7	"14:06:20"	68.5	78.4	71	58
8	"14:07:20"	58.8	65.1	62	48
9	"14:08:20"	57.6	64.1	60	51
10	"14:09:20"	63.0	72.8	68	50
11	"14:10:20"	62.5	72.9	64	50
12	"14:11:20"	58.8	63.6	62	49
13	"14:12:20"	69.0	78.8	74	55
14	"14:13:20"	73.2	83.5	80	52
15	"14:14:20"	73.1	82.5	77	60
16	"14:15:20"	57.6	63.1	61	48
17	"14:16:20"	60.4	69.6	63	49
18	"14:17:20"	64.7	72.5	68	57
19	"14:18:20"	57.4	64.0	61	49
20	"14:19:20"	60.9	67.6	64	48
21	"14:20:20"	60.2	67.0	64	51
22	"14:21:20"	70.1	80.2	74	61
23	"14:22:20"	59.1	64.3	62	49
24	"14:23:20"	62.8	71.4	66	54
25	"14:24:20"	62.3	70.8	63	55
26	"14:25:20"	70.5	82.8	73	56
27	"14:26:20"	69.6	81.0	74	57
28	"14:27:20"	59.0	67.5	63	47
29	"14:28:20"	65.6	73.6	69	54
30	"14:29:20"	62.0	68.2	65	57
31	"14:30:20"	66.5	73.9	71	56
32	"14:31:20"	64.0	71.9	68	56
33	"14:32:20"	62.0	69.6	64	54
34	"14:33:20"	62.7	73.2	66	49
35	"14:34:20"	63.5	71.6	69	54
36	"14:35:20"	54.7	62.4	59	47
37	"14:36:20"	63.7	73.6	67	51
38	"14:37:20"	70.4	84.3	73	53
39	"14:38:20"	62.9	71.6	66	52
40	"14:39:20"	58.0	63.4	61	45
41	"14:40:20"	60.4	65.4	63	44
42	"14:41:20"	57.9	64.9	61	49
43	"14:42:20"	60.2	67.3	63	44
44	"14:43:20"	59.4	64.3	62	46
45	"14:44:20"	65.3	77.3	69	46
46	"14:45:20"	63.1	73.9	66	48

47	"14:46:20"	62.6	70.1	67	53
48	"14:47:20"	73.0	83.1	77	55
49	"14:48:20"	61.0	67.3	63	57
50	"14:49:20"	56.6	62.9	60	45
51	"14:50:20"	60.3	66.0	64	53
52	"14:51:20"	56.7	65.3	61	47
53	"14:52:20"	69.0	78.4	74	58
54	"14:53:20"	63.9	73.7	67	50
55	"14:54:20"	59.4	65.0	63	50
56	"14:55:20"	60.9	70.2	66	49
57	"14:56:20"	60.2	71.3	63	45
58	"14:57:20"	73.0	81.4	78	47
59	"14:58:20"	62.2	66.7	64	57
60	"14:59:20"	58.4	63.0	61	48
61	"15:00:20"	64.3	71.3	69	51
62	"15:01:20"	60.5	70.6	64	48
63	"15:02:20"	61.3	71.2	63	48
64	"15:03:20"	59.1	65.2	62	54
65	"15:04:20"	58.6	64.7	62	49
66	"15:05:20"	58.9	66.7	64	45
67	"15:06:20"	56.5	63.4	61	45
68	"15:07:20"	63.6	72.7	68	52
69	"15:08:20"	66.2	73.8	71	57
70	"15:09:20"	67.7	80.0	71	51
71	"15:10:20"	64.4	78.1	65	51
72	"15:11:20"	60.1	66.3	63	54
73	"15:12:20"	61.7	69.5	65	51
74	"15:13:20"	72.5	82.8	77	55
75	"15:14:20"	59.8	71.8	62	49
76	"15:15:20"	63.2	71.9	66	57
77	"15:16:20"	60.1	65.6	63	52
78	"15:17:20"	61.4	74.1	64	46
79	"15:18:20"	69.3	79.9	73	51
80	"15:19:20"	58.9	63.1	62	53
81	"15:20:20"	58.9	64.7	62	50
82	"15:21:20"	64.6	75.0	67	49
83	"15:22:20"	63.6	74.4	65	54
84	"15:23:20"	61.3	69.5	64	52
85	"15:24:20"	65.2	73.4	70	50
86	"15:25:20"	63.2	68.6	66	56
87	"15:26:20"	61.4	65.5	64	55
88	"15:27:20"	62.8	69.7	65	55
89	"15:28:20"	59.2	65.4	63	48
90	"15:29:20"	62.6	70.6	65	55
91	"15:30:20"	69.7	78.5	75	54
92	"15:31:20"	62.8	77.1	62	51
93	"15:32:20"	63.5	72.3	68	52
94	"15:33:20"	61.7	67.2	65	56
95	"15:34:20"	64.1	74.8	66	56
96	"15:35:20"	60.8	67.3	63	52
97	"15:36:20"	63.0	71.3	66	53
98	"15:37:20"	64.4	72.5	68	54
99	"15:38:20"	64.4	72.3	69	56
100	"15:39:20"	60.3	65.1	63	55
101	"15:40:20"	64.7	74.9	67	56
102	"15:41:20"	59.2	63.1	62	50
103	"15:42:20"	61.1	66.3	64	53
104	"15:43:20"	61.7	68.5	64	54

105	"15:44:20"	62.5	67.3	65	53
106	"15:45:20"	60.0	64.9	63	51
107	"15:46:20"	62.8	70.7	65	57
108	"15:47:20"	71.8	80.1	77	60
109	"15:48:20"	72.3	83.0	77	59
110	"15:49:20"	72.1	83.4	77	58
111	"15:50:20"	75.8	82.3	80	62
112	"15:51:20"	78.9	88.7	82	66
113	"15:52:20"	66.2	71.5	69	60
114	"15:53:20"	68.3	73.2	70	60
115	"15:54:20"	66.3	79.2	70	43
116	"15:55:20"	44.1	45.9	45	43
117	"15:56:20"	51.9	65.1	57	43
118	"15:57:20"	54.5	62.6	59	43
119	"15:58:20"	54.4	58.7	57	48
120	"15:59:20"	74.6	87.7	78	54
121	"16:00:20"	52.3	60.4	53	49
122	"16:01:20"	78.3	94.0	79	44
123	"16:02:20"	69.7	82.9	73	45
124	"16:03:20"	47.5	53.5	49	44
125	"16:04:20"	45.5	47.6	46	44
126	"16:05:20"	46.8	52.5	48	44
127	"16:06:20"	46.5	49.5	48	44
128	"16:07:20"	53.6	58.4	57	48
129	"16:08:20"	47.1	53.2	49	44
130	"16:09:20"	51.8	57.9	55	45
131	"16:10:20"	50.4	56.3	53	47
132	"16:11:20"	47.9	54.4	50	45
133	"16:12:20"	54.0	60.7	59	45
134	"16:13:20"	46.2	49.1	47	45
135	"16:14:20"	48.8	52.9	50	47
136	"16:15:20"	47.8	50.3	49	46
137	"16:16:20"	71.9	82.2	75	46
138	"16:17:20"	81.8	96.6	83	47
139	"16:18:20"	68.0	72.8	70	56
140	"16:19:20"	66.4	81.1	69	46
141	"16:20:20"	70.7	81.8	71	67
142	"16:21:20"	70.3	73.9	72	67
143	"16:22:20"	68.3	72.5	70	65
144	"16:23:20"	68.1	75.0	70	64
145	"16:24:20"	69.3	81.6	71	62
146	"16:25:20"	64.7	80.2	68	45
147	"16:26:20"	69.9	80.8	73	50
148	"16:27:20"	72.1	82.2	73	68
149	"16:28:20"	68.8	83.7	71	53
150	"16:29:20"	81.7	97.2	79	60
151	"16:30:20"	89.5	105.7	92	65
152	"16:31:20"	75.4	82.3	79	67
153	"16:32:20"	65.1	78.1	68	55
154	"16:33:20"	62.6	69.8	66	58
155	"16:34:20"	63.7	75.3	64	55
156	"16:35:20"	61.4	67.4	65	52
157	"16:36:20"	64.3	71.0	69	56
158	"16:37:20"	66.6	79.1	67	58
159	"16:38:20"	61.6	69.3	63	56
160	"16:39:20"	58.6	67.8	61	54
161	"16:40:20"	62.4	71.1	65	57
162	"16:41:20"	67.4	78.5	69	60

163	"16:42:20"	60.2	70.5	63	51
164	"16:43:20"	58.2	64.1	61	55
165	"16:44:20"	63.7	70.0	67	57
166	"16:45:20"	65.5	74.2	71	56
167	"16:46:20"	59.5	66.2	63	54
168	"16:47:20"	62.7	71.8	66	56
169	"16:48:20"	67.6	79.0	72	55
170	"16:49:20"	60.0	66.1	63	54
171	"16:50:20"	58.4	65.4	63	48
172	"16:51:20"	59.2	66.4	63	54
173	"16:52:20"	62.8	70.8	68	54
174	"16:53:20"	63.7	71.1	70	52
175	"16:54:20"	61.9	65.8	65	57
176	"16:55:20"	63.6	74.3	66	49
177	"16:56:20"	56.6	62.1	60	52
178	"16:57:20"	64.3	71.9	67	49
179	"16:58:20"	62.5	69.7	66	54
180	"16:59:20"	57.1	64.6	60	52
181	"17:00:20"	58.7	64.9	62	54
182	"17:01:20"	65.6	71.5	69	58
183	"17:02:20"	56.1	62.7	58	53
184	"17:03:20"	63.6	70.4	68	56
185	"17:04:20"	60.7	67.2	63	56
186	"17:05:20"	59.3	67.2	62	54
187	"17:06:20"	57.5	64.4	60	54
188	"17:07:20"	64.0	72.3	66	60
189	"17:08:20"	63.4	73.7	65	55
190	"17:09:20"	60.4	65.5	63	54
191	"17:10:20"	58.8	65.2	62	52
192	"17:11:20"	63.5	73.3	66	57
193	"17:12:20"	65.9	75.1	71	55
194	"17:13:20"	60.3	67.4	63	55
195	"17:14:20"	58.4	66.3	62	53
196	"17:15:20"	59.9	67.4	64	53
197	"17:16:20"	61.4	66.1	64	55
198	"17:17:20"	59.6	69.2	61	55
199	"17:18:20"	58.9	64.5	60	54
200	"17:19:20"	62.2	70.1	64	58
201	"17:20:20"	62.0	66.6	64	57
202	"17:21:20"	62.1	73.3	65	53
203	"17:22:20"	63.4	70.1	67	56
204	"17:23:20"	64.5	70.4	68	58
205	"17:24:20"	56.7	66.1	58	53
206	"17:25:20"	61.6	66.9	63	57
207	"17:26:20"	61.7	71.1	64	55
208	"17:27:20"	60.9	70.2	64	56
209	"17:28:20"	57.8	65.2	60	51
210	"17:29:20"	62.6	67.3	65	59
211	"17:30:20"	61.3	66.3	65	53
212	"17:31:20"	58.7	66.4	62	52
213	"17:32:20"	60.2	68.5	62	57
214	"17:33:20"	64.1	72.0	66	57
215	"17:34:20"	61.3	70.2	65	54
216	"17:35:20"	59.2	66.0	63	53
217	"17:36:20"	61.2	66.7	63	57
218	"17:37:20"	57.1	63.8	59	52
219	"17:38:20"	61.1	69.6	64	54
220	"17:39:20"	59.6	65.8	64	50

221	"17:40:20"	61.0	70.3	64	53
222	"17:41:20"	62.8	69.5	65	56
223	"17:42:20"	63.7	74.9	65	52
224	"17:43:20"	57.7	65.2	60	53
225	"17:44:20"	62.3	68.1	65	57
226	"17:45:20"	60.6	66.6	64	55
227	"17:46:20"	58.6	65.4	62	53
228	"17:47:20"	66.1	73.5	69	60
229	"17:48:20"	60.6	67.3	64	54
230	"17:49:20"	55.3	63.2	57	52
231	"17:50:20"	62.0	66.9	64	57
232	"17:51:20"	59.0	66.5	62	53
233	"17:52:20"	59.2	66.5	63	54
234	"17:53:20"	62.1	67.0	66	54
235	"17:54:20"	62.4	71.4	66	55
236	"17:55:20"	55.9	63.5	59	50
237	"17:56:20"	64.3	75.7	68	54
238	"17:57:20"	60.0	66.1	61	57
239	"17:58:20"	61.8	69.1	64	57
240	"17:59:20"	62.1	66.5	64	59
241	"18:00:20"	62.5	68.4	64	59
242	"18:01:20"	57.1	62.0	60	52
243	"18:02:20"	62.4	68.0	64	58
244	"18:03:20"	62.4	71.6	67	56
245	"18:04:20"	63.0	73.4	67	51
246	"18:05:20"	64.9	73.6	68	59
247	"18:06:20"	61.6	69.7	64	51
248	"18:07:20"	60.6	66.6	64	52
249	"18:08:20"	62.9	72.5	65	57
250	"18:09:20"	63.2	69.6	67	56
251	"18:10:20"	65.6	76.4	68	53
252	"18:11:20"	66.0	72.2	69	60
253	"18:12:20"	61.9	71.8	64	57
254	"18:13:20"	63.6	71.1	67	58
255	"18:14:20"	63.0	72.0	67	53
256	"18:15:20"	60.7	66.7	64	54
257	"18:16:20"	60.7	67.0	64	56
258	"18:17:20"	64.0	70.7	67	59
259	"18:18:20"	61.3	66.9	64	56
260	"18:19:20"	59.1	64.7	62	54
261	"18:20:20"	61.4	64.9	63	58
262	"18:21:20"	59.3	64.6	62	53
263	"18:22:20"	58.8	66.3	61	53
264	"18:23:20"	59.6	66.0	63	54
265	"18:24:20"	64.2	71.5	68	58

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 127108

"dB"	"SAMPLES"	"% OF TOTAL"
43	954 *	0.75
44	850 *	0.67
45	2405 **	1.89
46	2014 **	1.58
47	1915 **	1.51
48	2081 **	1.64
49	1863 *	1.47
50	2066 **	1.63
51	2133 **	1.68
52	3412 ***	2.68
53	4243 ***	3.34
54	6066 *****	4.77
55	5643 ****	4.44
56	7044 ******	5.54
57	8389 *******	6.60
58	9092 *******	7.15
59	8231 ******	6.48
60	9746 ********	7.67
61	7849 ******	6.18
62	7991 ******	6.29
63	6964 *****	5.48
64	4874 ****	3.83
65	3717 ***	2.92
66	2818 **	2.22
67	2026 **	1.59
68	2198 **	1.73
69	2270 **	1.79
70	1867 *	1.47
71	1432 *	1.13
72	904 *	0.71
73	800 *	0.63
74	559 +	0.44
75	477 +	0.38
76	356 +	0.28
77	356 +	0.28
78	321 +	0.25
79	271 +	0.21
80	259 +	0.20
81	201 +	0.16
82	142 +	0.11
83	64 .	0.05
84	32 .	0.03
85	27 .	0.02
86	22 .	0.02
87	20 .	0.02
88	20 .	0.02
89	8 .	0.01
90	11 .	0.01
91	12 .	0.01
92	17 .	0.01
93	16 .	0.01
94	16 .	0.01
95	17 .	0.01
96	10 .	0.01
97	3 .	0.00
98	1 .	0.00
99	2 .	0.00
100	2 .	0.00

101	1 .	0.00
102	2 .	0.00
103	2 .	0.00
104	2 .	0.00
105	2 .	0.00

"Ln(0.0) = 105dB
"Ln(10.0) = 68dB
"Ln(50.0) = 59dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	68.7dB	66.8dB	65.7dB
"Ldod	64.8dB	58.2dB	55.1dB
"Losha	63.1dB	50.2dB	44.8dB
"Leq(6)	62.2dB	43.7dB	43.7dB

"File Name.....BIN15
"Test Location.....Manassas / Propagation
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...200'monitor at both sites
"Comment Field 2...
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1947 V2.3
"REPORT PRINTED 09/11/95 AT 23:36:19

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/24/95 AT 13:44:27
"PRE-TEST CALIBRATION RANGE... 43.7dB TO 139.7dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/24/95 AT 14:00:20
"TEST LENGTH... 0 DAYS 4:29:57

"Lav..... 71.6dB
"SEL.....113.5dB
"Lmax.....107.3dB ON 5/24/95 AT 16:03:02
"Lpk.....133 dB ON 5/24/95 AT 16:03:02
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.71%
"8 HR PROJ. DOSE (80dB CUTOFF).. 1.26%
"8 HR DOSE (90dB CUTOFF)..... 0.61%
"8 HR PROJ. DOSE (90dB CUTOFF).. 1.08%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 270 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/24/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"14:00:20"	52.8	57.7	56	47
2	"14:01:20"	56.3	70.0	57	48
3	"14:02:20"	71.4	85.7	72	45
4	"14:03:20"	78.3	87.7	82	62
5	"14:04:20"	53.5	58.0	55	51
6	"14:05:20"	53.8	57.5	55	51
7	"14:06:20"	63.6	71.6	68	52
8	"14:07:20"	51.5	54.3	53	47
9	"14:08:20"	52.9	58.9	54	50
10	"14:09:20"	56.2	64.3	62	50
11	"14:10:20"	56.1	63.5	60	49
12	"14:11:20"	52.4	55.6	54	50
13	"14:12:20"	62.1	71.8	66	52
14	"14:13:20"	65.7	73.9	71	52
15	"14:14:20"	67.0	74.2	72	58
16	"14:15:20"	51.2	54.0	53	48
17	"14:16:20"	53.4	58.5	55	48
18	"14:17:20"	56.7	61.7	59	53
19	"14:18:20"	51.5	54.5	53	49
20	"14:19:20"	54.0	58.0	56	48
21	"14:20:20"	53.3	58.7	56	49
22	"14:21:20"	62.9	71.5	65	55
23	"14:22:20"	52.9	55.6	55	49
24	"14:23:20"	55.8	60.7	58	52
25	"14:24:20"	55.5	60.8	58	52
26	"14:25:20"	63.2	71.8	65	55
27	"14:26:20"	61.9	70.4	65	55
28	"14:27:20"	53.7	58.7	58	48
29	"14:28:20"	58.9	64.4	63	52
30	"14:29:20"	57.1	62.5	58	54
31	"14:30:20"	61.8	72.1	63	54
32	"14:31:20"	57.8	61.9	60	53
33	"14:32:20"	56.0	61.1	58	52
34	"14:33:20"	57.0	63.5	60	51
35	"14:34:20"	55.6	61.1	59	51
36	"14:35:20"	50.1	53.3	52	47
37	"14:36:20"	56.3	63.4	60	49
38	"14:37:20"	62.3	74.7	64	50
39	"14:38:20"	56.4	61.4	60	52
40	"14:39:20"	51.4	55.0	54	47
41	"14:40:20"	53.5	57.8	56	45
42	"14:41:20"	52.5	56.1	54	48
43	"14:42:20"	53.4	57.7	56	46
44	"14:43:20"	52.6	55.4	54	47
45	"14:44:20"	56.0	61.6	59	47
46	"14:45:20"	55.9	64.3	60	47

47	"14:46:20"	55.1	58.6	58	51
48	"14:47:20"	66.6	74.0	71	52
49	"14:48:20"	54.1	57.7	55	51
50	"14:49:20"	51.2	54.3	53	46
51	"14:50:20"	53.6	58.6	55	49
52	"14:51:20"	50.8	55.0	53	47
53	"14:52:20"	64.3	71.4	69	55
54	"14:53:20"	56.6	63.8	59	49
55	"14:54:20"	53.0	56.1	55	50
56	"14:55:20"	54.4	60.3	59	48
57	"14:56:20"	53.1	60.6	57	46
58	"14:57:20"	66.4	73.2	71	47
59	"14:58:20"	58.7	67.6	61	53
60	"14:59:20"	51.9	54.5	53	48
61	"15:00:20"	57.2	61.8	60	50
62	"15:01:20"	53.8	61.2	58	48
63	"15:02:20"	53.9	59.8	55	50
64	"15:03:20"	52.1	55.5	53	50
65	"15:04:20"	51.5	54.9	54	47
66	"15:05:20"	52.1	58.2	56	45
67	"15:06:20"	49.7	55.0	53	45
68	"15:07:20"	56.9	62.4	60	51
69	"15:08:20"	59.1	64.7	62	55
70	"15:09:20"	61.4	70.7	66	50
71	"15:10:20"	60.1	69.7	63	50
72	"15:11:20"	54.5	59.7	56	50
73	"15:12:20"	54.5	59.6	59	49
74	"15:13:20"	67.3	75.4	74	50
75	"15:14:20"	54.1	61.8	57	48
76	"15:15:20"	56.1	61.7	59	52
77	"15:16:20"	52.6	56.5	54	49
78	"15:17:20"	54.8	64.8	56	47
79	"15:18:20"	62.4	71.2	67	50
80	"15:19:20"	51.5	53.8	52	49
81	"15:20:20"	51.2	54.5	53	48
82	"15:21:20"	56.5	64.3	60	48
83	"15:22:20"	55.0	61.8	57	50
84	"15:23:20"	54.2	58.4	56	51
85	"15:24:20"	58.4	63.9	62	50
86	"15:25:20"	55.9	58.8	57	53
87	"15:26:20"	55.5	59.0	57	52
88	"15:27:20"	56.6	60.5	58	53
89	"15:28:20"	53.4	57.5	55	49
90	"15:29:20"	56.3	61.1	58	53
91	"15:30:20"	64.3	70.5	69	52
92	"15:31:20"	55.4	65.5	57	50
93	"15:32:20"	54.9	59.7	58	50
94	"15:33:20"	54.9	58.7	56	52
95	"15:34:20"	55.9	63.4	58	52
96	"15:35:20"	53.0	58.4	55	48
97	"15:36:20"	55.9	61.8	58	52
98	"15:37:20"	61.4	68.6	65	54
99	"15:38:20"	59.1	66.8	62	53
100	"15:39:20"	54.1	58.2	55	52
101	"15:40:20"	57.0	64.3	59	52
102	"15:41:20"	52.6	55.5	54	50
103	"15:42:20"	54.1	57.9	56	50
104	"15:43:20"	53.5	56.2	55	51

105	"15:44:20"	55.9	59.2	58	52
106	"15:45:20"	53.1	58.0	54	49
107	"15:46:20"	56.1	62.4	59	52
108	"15:47:20"	66.4	72.7	71	56
109	"15:48:20"	66.3	73.9	71	58
110	"15:49:20"	57.6	68.2	60	50
111	"15:50:20"	71.2	81.8	77	47
112	"15:51:20"	79.0	88.7	83	55
113	"15:52:20"	74.6	89.0	78	57
114	"15:53:20"	77.2	87.4	82	64
115	"15:54:20"	72.9	86.7	75	46
116	"15:55:20"	47.0	49.1	48	45
117	"15:56:20"	56.4	70.4	57	47
118	"15:57:20"	55.1	61.9	58	45
119	"15:58:20"	53.8	59.4	56	50
120	"15:59:20"	66.6	83.2	61	51
121	"16:00:20"	51.5	54.9	52	50
122	"16:01:20"	51.5	58.6	55	47
123	"16:02:20"	91.5	107.3	85	46
124	"16:03:20"	48.8	57.5	50	45
125	"16:04:20"	46.8	58.7	46	44
126	"16:05:20"	47.6	55.0	50	45
127	"16:06:20"	47.0	50.3	49	45
128	"16:07:20"	54.8	61.0	57	50
129	"16:08:20"	47.3	53.1	49	44
130	"16:09:20"	54.4	61.1	58	45
131	"16:10:20"	51.9	60.3	55	48
132	"16:11:20"	47.8	53.6	50	45
133	"16:12:20"	53.6	62.4	57	47
134	"16:13:20"	47.1	50.5	48	45
135	"16:14:20"	50.5	56.7	52	48
136	"16:15:20"	49.6	55.2	51	47
137	"16:16:20"	74.9	85.4	80	47
138	"16:17:20"	86.7	104.0	86	49
139	"16:18:20"	75.8	92.7	74	55
140	"16:19:20"	69.1	83.5	71	46
141	"16:20:20"	72.9	83.4	76	67
142	"16:21:20"	74.2	83.6	76	69
143	"16:22:20"	74.6	82.0	77	69
144	"16:23:20"	71.8	83.2	75	65
145	"16:24:20"	71.6	83.7	75	63
146	"16:25:20"	68.9	82.1	69	46
147	"16:26:20"	72.7	82.3	77	52
148	"16:27:20"	73.4	84.7	74	68
149	"16:28:20"	86.9	104.6	77	56
150	"16:29:20"	87.9	104.4	87	60
151	"16:30:20"	60.6	69.2	63	53
152	"16:31:20"	59.7	70.1	61	54
153	"16:32:20"	80.9	94.4	83	61
154	"16:33:20"	74.1	85.3	79	50
155	"16:34:20"	78.3	94.2	79	55
156	"16:35:20"	72.8	84.3	77	60
157	"16:36:20"	56.3	69.7	59	49
158	"16:37:20"	57.2	64.8	61	48
159	"16:38:20"	67.6	83.7	69	46
160	"16:39:20"	47.8	52.8	49	45
161	"16:40:20"	50.7	57.8	53	48
162	"16:41:20"	53.3	60.9	55	48

163	"16:42:20"	50.0	58.0	53	45
164	"16:43:20"	47.6	51.7	49	46
165	"16:44:20"	52.0	56.0	53	49
166	"16:45:20"	53.0	62.4	55	49
167	"16:46:20"	48.7	52.5	50	47
168	"16:47:20"	53.2	60.7	55	49
169	"16:48:20"	54.7	63.2	60	47
170	"16:49:20"	49.7	54.2	52	46
171	"16:50:20"	47.2	52.8	49	44
172	"16:51:20"	47.3	51.2	49	45
173	"16:52:20"	51.5	58.7	55	46
174	"16:53:20"	50.6	56.1	54	46
175	"16:54:20"	50.4	54.0	53	46
176	"16:55:20"	52.9	59.7	57	46
177	"16:56:20"	47.3	50.5	48	45
178	"16:57:20"	51.4	56.6	54	46
179	"16:58:20"	50.2	55.2	53	46
180	"16:59:20"	46.8	50.1	48	45
181	"17:00:20"	48.0	50.4	49	46
182	"17:01:20"	52.0	56.4	54	49
183	"17:02:20"	48.2	51.4	49	46
184	"17:03:20"	51.4	56.9	55	46
185	"17:04:20"	49.0	52.1	51	47
186	"17:05:20"	48.5	52.8	50	46
187	"17:06:20"	47.0	49.0	48	45
188	"17:07:20"	55.4	60.9	59	49
189	"17:08:20"	53.9	62.6	58	48
190	"17:09:20"	48.8	50.6	49	47
191	"17:10:20"	47.6	50.6	49	45
192	"17:11:20"	54.9	64.9	59	46
193	"17:12:20"	55.7	64.1	62	47
194	"17:13:20"	50.0	55.2	51	47
195	"17:14:20"	47.7	51.3	49	45
196	"17:15:20"	49.3	54.0	51	46
197	"17:16:20"	53.2	57.9	55	50
198	"17:17:20"	48.5	53.4	50	47
199	"17:18:20"	47.1	51.4	48	45
200	"17:19:20"	50.4	56.2	52	47
201	"17:20:20"	49.5	51.8	51	47
202	"17:21:20"	50.7	58.0	52	46
203	"17:22:20"	59.9	68.2	65	47
204	"17:23:20"	60.5	70.2	66	49
205	"17:24:20"	47.8	51.6	49	46
206	"17:25:20"	53.7	60.4	58	49
207	"17:26:20"	49.7	56.1	51	47
208	"17:27:20"	48.9	54.1	51	46
209	"17:28:20"	49.3	56.0	52	46
210	"17:29:20"	58.2	62.6	61	54
211	"17:30:20"	50.2	55.8	52	47
212	"17:31:20"	47.5	50.6	48	46
213	"17:32:20"	49.2	53.6	51	47
214	"17:33:20"	52.0	56.5	54	48
215	"17:34:20"	53.6	60.8	58	47
216	"17:35:20"	51.7	55.5	53	49
217	"17:36:20"	50.2	54.1	51	48
218	"17:37:20"	48.7	52.2	50	47
219	"17:38:20"	52.8	59.6	57	48
220	"17:39:20"	54.4	62.6	59	46

221	"17:40:20"	51.7	56.0	54	49
222	"17:41:20"	53.5	56.4	56	51
223	"17:42:20"	53.1	58.5	55	50
224	"17:43:20"	51.0	53.9	52	49
225	"17:44:20"	56.0	61.0	59	50
226	"17:45:20"	53.3	61.3	58	48
227	"17:46:20"	54.8	63.5	60	47
228	"17:47:20"	53.2	58.6	55	50
229	"17:48:20"	49.0	53.5	51	46
230	"17:49:20"	47.1	50.5	48	46
231	"17:50:20"	50.5	53.7	52	48
232	"17:51:20"	48.8	52.0	51	47
233	"17:52:20"	49.4	52.8	51	47
234	"17:53:20"	52.3	56.6	54	48
235	"17:54:20"	51.8	59.0	55	47
236	"17:55:20"	49.2	53.1	51	47
237	"17:56:20"	53.2	61.7	58	46
238	"17:57:20"	50.8	54.0	52	48
239	"17:58:20"	52.7	58.7	55	50
240	"17:59:20"	54.0	58.8	55	52
241	"18:00:20"	51.5	55.2	52	50
242	"18:01:20"	48.3	50.3	49	47
243	"18:02:20"	50.3	54.0	52	48
244	"18:03:20"	50.9	56.2	54	47
245	"18:04:20"	50.7	59.0	52	47
246	"18:05:20"	56.4	61.9	59	52
247	"18:06:20"	54.6	62.0	58	48
248	"18:07:20"	49.2	52.3	51	47
249	"18:08:20"	51.6	56.9	53	48
250	"18:09:20"	52.4	56.5	55	49
251	"18:10:20"	55.1	61.9	59	50
252	"18:11:20"	62.4	68.3	66	51
253	"18:12:20"	52.6	59.8	54	49
254	"18:13:20"	51.5	54.1	52	50
255	"18:14:20"	52.7	56.1	54	50
256	"18:15:20"	52.5	57.0	55	50
257	"18:16:20"	50.1	52.9	51	48
258	"18:17:20"	51.8	54.6	53	49
259	"18:18:20"	50.4	53.5	51	49
260	"18:19:20"	49.7	51.8	50	48
261	"18:20:20"	54.5	61.4	58	50
262	"18:21:20"	57.3	63.8	61	49
263	"18:22:20"	49.5	52.0	51	48
264	"18:23:20"	50.2	52.2	51	49
265	"18:24:20"	52.3	58.3	55	49
266	"18:25:20"	49.0	51.0	49	48
267	"18:26:20"	51.4	55.8	53	48
268	"18:27:20"	55.2	60.8	59	49
269	"18:28:20"	51.2	54.7	53	48
270	"18:29:20"	54.0	69.3	51	48

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 129579

"dB"	"SAMPLES"	"% OF TOTAL"
43	1 .	0.00
44	366 +	0.28
45	2752 **	2.12
46	6779 *****	5.23
47	8783 *******	6.78
48	11286 *********	8.71
49	11205 *********	8.65
50	11409 *********	8.80
51	11233 *********	8.67
52	10949 ********	8.45
53	9294 *******	7.17
54	8286 ******	6.39
55	6253 *****	4.83
56	4563 ****	3.52
57	3624 ***	2.80
58	3342 ***	2.58
59	2204 **	1.70
60	2100 **	1.62
61	1488 *	1.15
62	1183 *	0.91
63	1158 *	0.89
64	974 *	0.75
65	972 *	0.75
66	973 *	0.75
67	803 *	0.62
68	855 *	0.66
69	947 *	0.73
70	947 *	0.73
71	844 *	0.65
72	645 +	0.50
73	542 +	0.42
74	406 +	0.31
75	314 +	0.24
76	267 +	0.21
77	213 +	0.16
78	208 +	0.16
79	216 +	0.17
80	270 +	0.21
81	232 +	0.18
82	132 +	0.10
83	124 .	0.10
84	70 .	0.05
85	63 .	0.05
86	43 .	0.03
87	33 .	0.03
88	41 .	0.03
89	19 .	0.01
90	15 .	0.01
91	16 .	0.01
92	21 .	0.02
93	16 .	0.01
94	18 .	0.01
95	8 .	0.01
96	6 .	0.00
97	7 .	0.01
98	8 .	0.01
99	7 .	0.01
100	6 .	0.00

101	8 .	0.01
102	9 .	0.01
103	7 .	0.01
104	9 .	0.01
105	3 .	0.00
106	3 .	0.00
107	1 .	0.00

"Ln(0.0) = 107dB
"Ln(10.0) = 62dB
"Ln(50.0) = 52dB
"Ln(99.9) = 44dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	71.1dB	70.6dB	69.9dB
"Ldod	64.5dB	61.9dB	59.8dB
"Losha	60.7dB	53.9dB	49.8dB
"Leq(6)	58.6dB	46.3dB	43.7dB

"File Name.....BIN16
"Test Location.....Manassas / Propagation
"Employee Name.....CP
"Employee Number...
"Department.....
"Comment Field 1...400'monitor at both sites
"Comment Field 2...
"Numeric Code #1... #2... #3... #4... #5...

"METROSONICS db-308 SN 1967 V2.3
"REPORT PRINTED 09/11/95 AT 23:36:37

"EXCHANGE RATE..... 3dB FILTER.....A WGHT
"DOSE CRITERION.... 90dB RESPONSE...SLOW
"PRE-TEST CALIBRATION TIME.... 5/24/95 AT 13:46:06
"PRE-TEST CALIBRATION RANGE... 43.1dB TO 139.1dB
"Calibrator Type & Serial #..._____

"Calibrator Calibration Date.._____

"-- OVERALL STATISTICS REPORT --

"TEST BEGAN.... 5/24/95 AT 14:00:19
"TEST LENGTH... 0 DAYS 4:29:09

"Lav..... 71.7dB
"SEL.....113.6dB
"Lmax.....104.5dB ON 5/24/95 AT 16:59:08
"Lpk.....135 dB ON 5/24/95 AT 15:45:06
"TIME OVER 115dB.. 0 DAYS 0:00:00.00

"8 HR DOSE (80dB CUTOFF)..... 0.71%
"8 HR PROJ. DOSE (80dB CUTOFF).. 1.26%
"8 HR DOSE (90dB CUTOFF)..... 0.59%
"8 HR PROJ. DOSE (90dB CUTOFF).. 1.05%

"-- TABULAR TIME HISTORY REPORT --

"# OF PERIODS: 270 MODE: CONTINUOUS
"PERIOD LENGTH: 0:01:00
"TIME HISTORY CUTOFF: NONE
"Ln(1): 10.0% Ln(2): 90.0%

"DATE: 5/24/95

"INT"	"TIME"	"Lav"	"Lmx"	"L1"	"L2"
1	"14:00:19"	54.9	57.8	54	54
2	"14:01:19"	54.9	54.9	54	54
3	"14:02:19"	54.9	57.8	54	54
4	"14:03:19"	54.9	57.7	54	54
5	"14:04:19"	54.9	57.3	54	54
6	"14:05:19"	54.9	54.9	54	54
7	"14:06:19"	54.9	57.4	54	54
8	"14:07:19"	54.9	55.6	54	54
9	"14:08:19"	75.0	92.6	69	54
10	"14:09:19"	53.6	68.0	56	43
11	"14:10:19"	55.0	68.6	60	43
12	"14:11:19"	58.6	72.0	61	43
13	"14:12:19"	49.5	58.9	53	43
14	"14:13:19"	66.7	83.0	67	44
15	"14:14:19"	55.0	64.1	58	45
16	"14:15:19"	66.5	81.9	69	43
17	"14:16:19"	43.1	43.1	43	43
18	"14:17:19"	43.1	43.1	43	43
19	"14:18:19"	86.4	103.5	85	50
20	"14:19:19"	56.8	69.1	59	48
21	"14:20:19"	69.5	84.0	72	46
22	"14:21:19"	76.7	92.0	80	58
23	"14:22:19"	66.9	81.9	68	54
24	"14:23:19"	65.7	73.3	69	57
25	"14:24:19"	73.3	84.1	78	59
26	"14:25:19"	86.8	104.0	83	60
27	"14:26:19"	67.0	79.8	70	57
28	"14:27:19"	58.9	68.1	63	47
29	"14:28:19"	60.9	70.0	65	50
30	"14:29:19"	61.8	72.3	64	53
31	"14:30:19"	69.7	83.3	72	56
32	"14:31:19"	74.8	85.4	79	59
33	"14:32:19"	58.8	71.2	58	53
34	"14:33:19"	81.1	94.4	83	55
35	"14:34:19"	51.1	54.8	53	47
36	"14:35:19"	50.4	62.1	52	47
37	"14:36:19"	51.3	56.2	54	47
38	"14:37:19"	54.1	64.7	56	47
39	"14:38:19"	51.8	55.2	54	48
40	"14:39:19"	52.3	59.2	55	45
41	"14:40:19"	51.0	57.2	53	45
42	"14:41:19"	51.8	58.2	54	48
43	"14:42:19"	52.0	56.2	54	48
44	"14:43:19"	54.8	62.7	57	49
45	"14:44:19"	52.4	56.2	54	48
46	"14:45:19"	51.3	57.8	54	47

47	"14:46:19"	51.9	56.1	54	48
48	"14:47:19"	60.8	66.1	64	51
49	"14:48:19"	49.7	51.0	50	48
50	"14:49:19"	48.0	52.8	50	45
51	"14:50:19"	51.0	57.6	53	47
52	"14:51:19"	48.3	53.7	50	45
53	"14:52:19"	59.8	65.8	63	52
54	"14:53:19"	54.5	58.9	57	47
55	"14:54:19"	49.6	51.9	51	47
56	"14:55:19"	51.2	57.4	53	47
57	"14:56:19"	49.7	54.3	52	46
58	"14:57:19"	61.2	69.2	66	49
59	"14:58:19"	53.4	61.1	57	49
60	"14:59:19"	48.9	50.8	50	47
61	"15:00:19"	52.6	56.1	54	49
62	"15:01:19"	50.3	56.0	52	47
63	"15:02:19"	50.9	57.9	53	48
64	"15:03:19"	49.3	52.3	50	48
65	"15:04:19"	48.8	51.4	50	46
66	"15:05:19"	48.6	52.7	51	45
67	"15:06:19"	46.8	51.0	49	44
68	"15:07:19"	52.9	57.3	55	48
69	"15:08:19"	55.7	60.8	59	51
70	"15:09:19"	58.3	66.8	63	50
71	"15:10:19"	55.2	61.5	59	49
72	"15:11:19"	51.5	58.6	54	48
73	"15:12:19"	50.2	54.9	52	47
74	"15:13:19"	59.9	67.5	65	48
75	"15:14:19"	51.2	58.7	54	46
76	"15:15:19"	51.3	56.4	53	48
77	"15:16:19"	48.4	50.8	49	46
78	"15:17:19"	50.1	54.9	52	46
79	"15:18:19"	56.1	62.6	61	47
80	"15:19:19"	48.0	49.6	48	47
81	"15:20:19"	47.2	49.0	48	45
82	"15:21:19"	50.8	55.2	54	47
83	"15:22:19"	50.3	54.1	53	47
84	"15:23:19"	50.3	52.6	51	48
85	"15:24:19"	54.0	59.0	56	49
86	"15:25:19"	52.8	56.1	55	50
87	"15:26:19"	54.5	59.8	58	48
88	"15:27:19"	55.5	61.5	57	52
89	"15:28:19"	50.3	53.9	51	48
90	"15:29:19"	52.9	58.3	55	50
91	"15:30:19"	57.8	65.6	61	50
92	"15:31:19"	51.9	59.8	55	47
93	"15:32:19"	51.6	58.8	54	48
94	"15:33:19"	51.7	56.8	52	50
95	"15:34:19"	51.1	53.8	53	49
96	"15:35:19"	49.2	54.6	51	46
97	"15:36:19"	51.2	57.1	52	49
98	"15:37:19"	61.4	69.7	64	51
99	"15:38:19"	54.7	60.1	57	51
100	"15:39:19"	50.6	56.3	51	49
101	"15:40:19"	52.2	56.9	54	49
102	"15:41:19"	62.4	78.9	57	48
103	"15:42:19"	51.4	59.1	52	48
104	"15:43:19"	50.8	54.9	52	48

105	"15:44:19"	87.4	104.1	88	50
106	"15:45:19"	69.7	81.3	71	56
107	"15:46:19"	70.8	79.6	75	47
108	"15:47:19"	71.8	83.2	75	55
109	"15:48:19"	74.0	86.9	78	57
110	"15:49:19"	72.6	83.4	77	51
111	"15:50:19"	76.3	84.3	80	62
112	"15:51:19"	80.5	90.7	84	67
113	"15:52:19"	68.1	73.2	70	61
114	"15:53:19"	74.5	81.4	78	65
115	"15:54:19"	71.3	82.6	76	44
116	"15:55:19"	44.7	46.6	45	43
117	"15:56:19"	50.8	63.7	54	43
118	"15:57:19"	54.5	62.6	59	44
119	"15:58:19"	56.0	62.6	59	50
120	"15:59:19"	72.3	85.8	76	54
121	"16:00:19"	53.2	59.7	55	50
122	"16:01:19"	68.9	81.3	71	46
123	"16:02:19"	68.8	84.4	71	45
124	"16:03:19"	47.5	52.8	49	44
125	"16:04:19"	45.6	47.4	46	44
126	"16:05:19"	47.0	53.0	49	44
127	"16:06:19"	46.8	50.4	49	44
128	"16:07:19"	53.2	58.2	55	49
129	"16:08:19"	48.4	55.8	50	44
130	"16:09:19"	49.8	56.1	52	45
131	"16:10:19"	51.1	56.9	53	48
132	"16:11:19"	48.7	57.1	51	45
133	"16:12:19"	55.9	63.1	61	45
134	"16:13:19"	46.3	49.6	47	45
135	"16:14:19"	49.7	54.5	51	47
136	"16:15:19"	48.5	51.1	50	46
137	"16:16:19"	71.3	84.4	73	47
138	"16:17:19"	75.2	88.5	79	48
139	"16:18:19"	74.3	82.8	79	54
140	"16:19:19"	67.6	81.8	69	46
141	"16:20:19"	74.2	82.8	79	66
142	"16:21:19"	72.8	80.8	76	66
143	"16:22:19"	66.9	71.0	69	64
144	"16:23:19"	66.7	72.1	68	64
145	"16:24:19"	70.0	82.3	72	62
146	"16:25:19"	65.5	81.3	68	46
147	"16:26:19"	70.8	80.5	75	51
148	"16:27:19"	72.6	82.8	74	67
149	"16:28:19"	75.8	93.1	71	54
150	"16:29:19"	70.9	81.5	74	60
151	"16:30:19"	67.6	80.8	72	53
152	"16:31:19"	59.3	68.1	61	54
153	"16:32:19"	71.0	83.3	74	59
154	"16:33:19"	79.0	93.4	81	51
155	"16:34:19"	66.4	81.0	69	47
156	"16:35:19"	80.5	94.9	83	45
157	"16:36:19"	69.8	81.3	73	53
158	"16:37:19"	69.4	85.4	70	47
159	"16:38:19"	45.5	48.6	46	44
160	"16:39:19"	45.1	52.2	46	43
161	"16:40:19"	46.1	51.5	47	44
162	"16:41:19"	47.3	50.6	48	45

163	"16:42:19"	47.2	53.1	50	43
164	"16:43:19"	45.5	49.9	47	43
165	"16:44:19"	49.1	51.4	50	47
166	"16:45:19"	47.5	49.1	48	46
167	"16:46:19"	46.4	51.4	47	45
168	"16:47:19"	52.2	57.8	54	49
169	"16:48:19"	47.6	51.2	49	45
170	"16:49:19"	47.6	52.6	51	43
171	"16:50:19"	44.3	49.0	45	43
172	"16:51:19"	44.4	47.0	45	43
173	"16:52:19"	46.5	51.0	48	44
174	"16:53:19"	46.2	49.4	48	44
175	"16:54:19"	48.2	57.9	50	44
176	"16:55:19"	48.7	54.7	51	44
177	"16:56:19"	44.9	47.7	46	43
178	"16:57:19"	47.9	59.0	48	44
179	"16:58:19"	90.3	104.5	91	44
180	"16:59:19"	83.7	97.3	88	57
181	"17:00:19"	71.8	84.0	76	47
182	"17:01:19"	55.9	68.6	59	47
183	"17:02:19"	46.9	51.7	48	45
184	"17:03:19"	46.1	48.3	47	45
185	"17:04:19"	46.4	48.9	47	45
186	"17:05:19"	45.8	47.8	47	44
187	"17:06:19"	45.5	49.8	46	44
188	"17:07:19"	54.6	61.1	58	47
189	"17:08:19"	53.1	61.2	56	47
190	"17:09:19"	47.5	55.2	49	45
191	"17:10:19"	46.1	47.9	46	45
192	"17:11:19"	49.3	55.2	53	45
193	"17:12:19"	49.9	54.9	54	45
194	"17:13:19"	47.0	49.4	48	45
195	"17:14:19"	45.2	47.2	45	44
196	"17:15:19"	49.1	54.3	52	45
197	"17:16:19"	52.5	58.3	55	48
198	"17:17:19"	46.5	50.3	47	45
199	"17:18:19"	45.2	47.9	47	44
200	"17:19:19"	48.0	51.5	50	46
201	"17:20:19"	47.2	48.6	48	46
202	"17:21:19"	48.3	51.1	49	44
203	"17:22:19"	61.1	71.9	66	45
204	"17:23:19"	59.7	68.9	64	49
205	"17:24:19"	46.7	49.4	48	45
206	"17:25:19"	53.3	62.0	58	45
207	"17:26:19"	46.3	48.7	47	45
208	"17:27:19"	46.7	50.6	48	44
209	"17:28:19"	48.2	55.9	51	44
210	"17:29:19"	57.5	61.8	59	54
211	"17:30:19"	47.9	52.1	49	45
212	"17:31:19"	45.8	48.4	46	44
213	"17:32:19"	46.8	49.0	48	45
214	"17:33:19"	50.3	54.5	52	47
215	"17:34:19"	50.3	54.5	53	46
216	"17:35:19"	51.2	54.6	53	48
217	"17:36:19"	48.4	54.2	49	47
218	"17:37:19"	47.5	50.2	48	46
219	"17:38:19"	53.3	64.7	56	46
220	"17:39:19"	54.2	64.2	59	45

221	"17:40:19"	47.4	51.6	50	45
222	"17:41:19"	49.7	54.2	51	48
223	"17:42:19"	50.8	57.3	53	46
224	"17:43:19"	46.7	48.9	48	45
225	"17:44:19"	56.1	63.2	59	47
226	"17:45:19"	53.7	64.2	58	46
227	"17:46:19"	53.0	60.4	57	46
228	"17:47:19"	49.2	51.6	50	47
229	"17:48:19"	46.0	48.6	47	44
230	"17:49:19"	45.3	48.5	45	44
231	"17:50:19"	47.7	49.9	49	46
232	"17:51:19"	47.3	51.5	48	45
233	"17:52:19"	47.6	52.1	49	45
234	"17:53:19"	50.7	56.0	53	47
235	"17:54:19"	49.6	56.2	52	46
236	"17:55:19"	47.1	50.6	48	45
237	"17:56:19"	48.5	52.7	51	45
238	"17:57:19"	50.3	55.2	52	47
239	"17:58:19"	51.8	56.1	54	49
240	"17:59:19"	54.2	60.3	56	52
241	"18:00:19"	50.4	54.6	52	48
242	"18:01:19"	46.5	48.7	47	45
243	"18:02:19"	46.6	47.9	47	46
244	"18:03:19"	48.3	52.7	50	45
245	"18:04:19"	47.7	50.0	48	46
246	"18:05:19"	55.8	61.4	58	49
247	"18:06:19"	53.1	61.2	55	48
248	"18:07:19"	47.4	51.0	48	45
249	"18:08:19"	49.0	53.0	51	46
250	"18:09:19"	48.3	50.6	49	47
251	"18:10:19"	52.4	59.5	56	46
252	"18:11:19"	62.8	69.2	67	50
253	"18:12:19"	48.4	53.5	49	46
254	"18:13:19"	48.8	51.6	50	47
255	"18:14:19"	52.3	56.9	55	48
256	"18:15:19"	51.1	57.7	55	47
257	"18:16:19"	46.5	49.4	48	44
258	"18:17:19"	47.5	49.3	48	46
259	"18:18:19"	46.9	49.4	48	45
260	"18:19:19"	46.4	48.1	47	45
261	"18:20:19"	53.3	64.3	57	46
262	"18:21:19"	56.6	65.2	61	46
263	"18:22:19"	48.8	57.3	51	45
264	"18:23:19"	46.5	48.1	47	45
265	"18:24:19"	48.6	52.6	52	45
266	"18:25:19"	44.9	45.9	45	44
267	"18:26:19"	47.4	51.0	49	44
268	"18:27:19"	54.0	60.5	58	47
269	"18:28:19"	48.4	50.6	50	46
270	"18:29:19"	52.5	59.0	57	49

"-- AMPLITUDE DISTRIBUTION REPORT --

"TOTAL SAMPLES = 129194

"dB"	"SAMPLES"		"% OF TOTAL"
43	2994	**	2.32
44	5494	****	4.25
45	10457	********	8.09
46	12790	**********	9.90
47	13148	**********	10.18
48	11396	*********	8.82
49	9673	*******	7.49
50	8954	*******	6.93
51	7048	*****	5.46
52	4860	****	3.76
53	4351	***	3.37
54	7584	******	5.87
55	2660	**	2.06
56	2404	**	1.86
57	2395	**	1.85
58	1927	*	1.49
59	1631	*	1.26
60	1288	*	1.00
61	1254	*	0.97
62	1461	*	1.13
63	1215	*	0.94
64	1357	*	1.05
65	1282	*	0.99
66	1180	*	0.91
67	1006	*	0.78
68	1348	*	1.04
69	1165	*	0.90
70	830	*	0.64
71	792	*	0.61
72	733	*	0.57
73	590	+	0.46
74	499	+	0.39
75	447	+	0.35
76	384	+	0.30
77	363	+	0.28
78	313	+	0.24
79	413	+	0.32
80	425	+	0.33
81	236	+	0.18
82	148	+	0.11
83	122	.	0.09
84	79	.	0.06
85	57	.	0.04
86	44	.	0.03
87	42	.	0.03
88	46	.	0.04
89	40	.	0.03
90	35	.	0.03
91	41	.	0.03
92	45	.	0.03
93	33	.	0.03
94	21	.	0.02
95	7	.	0.01
96	12	.	0.01
97	11	.	0.01
98	9	.	0.01
99	11	.	0.01
100	10	.	0.01

			0.01
101	13	.	0.01
102	6	.	0.00
103	11	.	0.01
104	4	.	0.00

"Ln(0.0) = 104dB
"Ln(10.0) = 64dB
"Ln(50.0) = 49dB
"Ln(99.9) = 43dB

"	NO CUTOFF	80.0dB CUTOFF	90.0dB CUTOFF
"Leq	71.2dB	70.6dB	69.8dB
"Ldod	65.2dB	62.6dB	60.4dB
"Losha	61.5dB	55.3dB	51.1dB
"Leq(6)	59.1dB	48.1dB	43.1dB

APPENDIX B -- TRAFFIC DATA

Manassas Project

Peak Hour Traffic Determination

	Peak Hour	Peak Hr Volume	Average Daily	**Peak Hr Percent**	
Weekday Hourly Average	17:00	3500	31160	**11%**	
Weekend Hourly Average	14:00	2200	23050	**10%**	**{Will use 10% for Peak Hour}**
Weekly Hourly Average	17:00	3000	28843	**10%**	

	Mon	Tues	Wed	Thur	Fri	Average
Weekday Daily Average	32800	31200	30900	30400	30500	**31160**

	Sat	Sun	Average
Weekend Daily Average	24600	21500	**23050**

	Average
Weekly Daily Average	**28843**

Volumes are total vehicles entering the 29/234 intersection

Manassas Project

Peak Hour Traffic Determination

	Count Based : May					
	7-Day Avg	Peak Hour	Avg Weekend	Peak Hour	Avg Weekday	Peak Hour
US29						
West of Pageland	11300	1130	8700	870	12300	1230
Pageland to Featherbed	9900	990	8000	800	10600	1060
Featherbed to 234	10200	1020	8400	840	10900	1090
East of 234	19200	1920	14000	1400	21200	2120
US234						
South of 29	15100	1510	13500	1350	15800	1580
North of 29	11200	1120	10100	1010	11600	1160
Other						
Groveton Road	1500	150	400	40	1900	190
Featherbed Lane	500	50	400	40	500	50
New York Monuments						
Chinn Ridge/ Hazel Plain						
Visitor Center Drive	700	70	1200	120	500	50

	Projections							
	1996	Peak Hour	2000	Peak Hour	2010	Peak Hour	2020	Peak Hour
US29								
West of Pageland	7600	760	8400	840	16600	1660	25100	2510
Pageland to Featherbed								
Featherbed to 234	9200	920	10300	1030	18500	1850	26600	2660
East of 234	14900	1490	15600	1560	21500	2150	27700	2770
US234								
South of 29	15900	1590	16200	1620	22300	2230	32800	3280
North of 29	15000	1500	16000	1600	19700	1970	29200	2920

Manassas Project

Peak Hour Traffic Determination

	1996	Peak Hour	96% Auto	1% MT	3% HT	Total
US29						
West of Pageland	7600	760	730	8	23	760
Pageland to Featherbed						
Featherbed to 234	9200	920	883	9	28	920
East of 234	14900	1490	1430	15	45	1490
US234						
South of 29	15900	1590	1526	16	48	1590
North of 29	15000	1500	1440	15	45	1500

	2020	Peak Hour	Auto	(1996) MT	(1996) HT	Total
US29						
West of Pageland	25100	2510	2480	8	23	2510
Pageland to Featherbed						
Featherbed to 234	26600	2660	2623	9	28	2660
East of 234	27700	2770	2710	15	45	2770
US234						
South of 29	32800	3280	3216	16	48	3280
North of 29	29200	2920	2860	15	45	2920

1996 Trucks = 2010 Trucks