PARKER
ENVIRONMENTAL CONSULTANTS

Table 12-1. Construction Equipment Noise Emission Levels

EQUIPMENT	Typical Noise Level at 50 feet from source	Quantities Used
Air Compressor	81	
Backhoe	80	3
Ballast Equalizer	82	
Ballast Tamper	83	
Compactor	82	
Concrete Mixer	85	
Concrete Pump	82	
Concrete Vibrator	76	
Crane, Derrick	88	
Crane, Mobile	83	1
Dozer	85	
Excavator	85	4
Generator	81	
Grader	85	2
Impact Wrench	85	
Jack Hammer	88	
Loader	85	2
Paver	89	
Pile-driver (Impact)	101	
Pile-driver (Sonic)	96	
Pneumatic Tool	85	
Pump	76	
Rail Saw	90	
Rock Drill	98	
Roller	74	3
Saw	76	
Scarifier	83	
Scraper	89	
Shovel	82	
Spike Driver	77	
Tie Cutter	84	
Tie Handler	80	
Tie Inserter	85	
Tractor	84	1
Truck	88	

Adding Equal Noise Sources

Refernce noise level	**units used**	**Noise Increase**	**Noise Impact**	
85	9	9.5	94.5	9.45
80	3	4.8	84.8	8.48
			89.0	8.90

Adding Unequal Noise Sources: **SPL:** 96.0

*Note: This equipment based on Phase 1 - Grading/Excavation phase, since this phase would utilize the most equipment.

FORMULA:
Leq(equip) = E.L. + 10 log(U.F.) – 20 log(D/50) – 10G log(D/50)

where: Leq (equip) is the Leq at a receiver resulting from the operation of a single piece of equipment over a specified time period
E.L. is the noise emission level of the particular piece of equipment at the reference distance of 50 feet, taken from Table 12-1
G is a constant that accounts for topography and ground effects, taken from Figure 6-5 (Chapter 6)
D is the distance from the receiver to the piece of equipment, and
U.F. is a usage factor that accounts for the fraction of time that the equipment is in use over the specified time period.

The combination of noise from several pieces of equipment operating during the same time period is obtained from decibel addition of the Leq of each single piece of equipment found from the above equation.
General Assessment
The approach can be as detailed as necessary to characterize the construction noise by specifying the various quantities in the equation. For projects in an early assessment stage when the equipment roster and schedule are undefined, only a rough estimate of construction noise levels is practical.
The following assumptions are adequate for a general assessment of each phase of construction:
• Full power operation for a time period of one hour is assumed because most construction equipment operates continuously for periods of one hour or more at some point in the construction period. Therefore, U.F. = 1, and 10 log(U.F.) = 0.
• Free-field conditions are assumed and ground effects are ignored. Consequently, G = 0.
• Emission level at 50 feet, E.L., is taken from Table 12-1.
• All pieces of equipment are assumed to operate at the center of the project, or centerline, in the case of a guideway or highway construction project.
The predictions include only the two noisiest pieces of equipment expected to be used in each construction phase.

Detailed Assessment
A more detailed approach can be used if warranted, such as when a large number of noise-sensitive sites are adjacent to a construction project or where contractors are faced with stringent local ordinances or heightened public concerns expressed in early outreach efforts. Additional details include:
• Duration. Long-term construction project noise impact is based on a 30-day average Ldn, the times of day of construction activity (nighttime noise is penalized by 10 dB in residential areas), and the percentage of time the equipment is to be used during a period of time which will affect U.F. For example, an 8-hour Leq is determined by making U.F. the percentage of time each individual piece of equipment operates under full power in that period. Similarly, the 30-day average Ldn is determined from the U.F. expressed by the percentage of time the equipment is used during the daytime hours (7 a.m. to 10 p.m.) and nighttime (10 p.m. to 7 a.m.), separately over a 30-day period. However, to account for increased sensitivity to nighttime noise, the nighttime percentage is multiplied by 10 before performing the computation.
• Site Characteristics. Taking into account the site topography, natural and man-made barriers and ground effects will involve the factor G. Use Figure 6-5 (Chapter 6) to calculate G.
• Noise Sources. Measuring or certifying the emission level of each piece of equipment will refine E.L.
• Site Layout. Determining the location of each piece of equipment while it is working will specify the distance factor D more accurately.
•Combined Sources. Including all pieces of equipment in the computation of the 8-hour Leq and the 30-day average Ldn will determine the total noise levels using Table 6-11 (Chapter 6).

Construction Site Noise Level

SPL:	96.0

E.L.	96.0				
U.F	#REF!				NOISE LEVEL
(D/150)	SR 1	at 290 feet	0.17241379	0.01234326	76.9
	SR2	at 130 feet	0.38461538	0.09174167	85.6
	SR 3	at 490 feet	0.10204082	0.0033261	71.2
	SR 4	at 490 feet	0.10204082	0.0033261	71.2
	SR 5	at 245 feet	0.20408163	0.01881524	78.7
	SR 6	at 230 feet	0.2173913	0.02203461	79.4
	SR 7	at 160 feet	0.38461538	0.09174167	85.6
	SR 8	at 90 feet	0.55555556	0.23004815	89.6