Appendix J

Construction Noise Calculations

Sunnyvale East and West Channels Flood Protection Project

Construction Noise

Noise-Generating Construction Equipment

	Individual Equipment		Combined Equipment		
Equipment Type	**SPL Lmax at 50 ft**	**Acoustic Usage Factor**	**No.of Pieces**	**SPL Lmax at 50 ft**	**SPL Leq at 50 ft**
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40			
Excavator	81	0.40			
Flat Bed Truck	74	0.40			
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40	1	85	81.0
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20			
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20			
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40	1	84	80.0
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	**--**	**--**	**3**	**88.1**	**84.1**

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0000	dBA
Anomalous Excess Attenuation	0.000	dBA
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet
FTA Ground Attenuation Factor G	0.643	dBA

	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
Distance from Construction Site (feet)	**Outdoor Leq**	**Outdoor L8**	**Noise Reduction**	**Outdoor Leq**
25	90	93	0	90
50	84	87	0	84
100	76	79	0	76
200	68	71	0	68
300	64	67	0	64
400	60	63	0	60
600	56	59	0	56

Sound propagation calcs by FTA Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.
Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Sunnyvale East and West Channels Flood Protection Project

Construction Noise - Alternative Phase with Vibratory Hammer mounted on Excavator

Noise-Generating Construction Equipment

Equipment Type	Individual Equipment		Combined Equipment		
	SPL Lmax at 50 ft	Acoustic Usage Factor	No.of Pieces	SPL Lmax at 50 ft	SPL Leq at 50 ft
All Other Equipment > 5 HP	85	0.50			
Auger Drill Rig	84	0.20			
Backhoe	78	0.40			
Bar Bender	80	0.20			
Blasting	94	0.01			
Boring Jack Power Unit	83	0.50			
Chain Saw	84	0.20			
Clam Shovel (dropping)	87	0.20			
Compactor (ground)	83	0.20			
Compressor (air)	78	0.40			
Concrete Batch Plant	83	0.15			
Concrete Mixer Truck	79	0.40			
Concrete Pump Truck	81	0.20			
Concrete Saw	90	0.20			
Crane	81	0.16			
Dozer	82	0.40			
Drill Rig Truck	79	0.20			
Drum Mixer	80	0.50			
Dump Truck	76	0.40			
Excavator	81	0.40			
Flat Bed Truck	74	0.40			
Front End Loader	79	0.40	1	79	75.0
Generator	81	0.50			
Generator (<25KVA, VMS signs)	73	0.50			
Gradall	83	0.40			
Grader	85	0.40			
Grapple (on backhoe)	87	0.40			
Horizontal Boring Hydr. Jack	82	0.25			
Hydra Break Ram	90	0.10			
Impact Pile Driver	101	0.20			
Jackhammer	89	0.20			
Man Lift	75	0.20			
Mounted Impact Hammer (hoe ram)	90	0.20	1	90	83.0
Pavement Scarafier	90	0.20			
Paver	77	0.50			
Pickup Truck	75	0.40			
Pneumatic Tools	85	0.50			
Pumps	81	0.50			
Refrigerator Unit	73	1.00			
Rivit Buster/chipping gun	79	0.20			
Rock Drill	81	0.20			
Roller	80	0.20	1	80	73.0
Sand Blasting (Single Nozzle)	96	0.20			
Scraper	84	0.40			
Shears (on backhoe)	96	0.40			
Slurry Plant	78	1.00			
Slurry Trenching Machine	80	0.50			
Soil Mix Drill Rig	80	0.50			
Tractor	84	0.40			
Vacuum Excavator (Vac-truck)	85	0.40			
Vacuum Street Sweeper	82	0.10			
Ventilation Fan	79	1.00			
Vibrating Hopper	87	0.50			
Vibratory Concrete Mixer	80	0.20			
Vibratory Pile Driver	101	0.20			
Warning Horn	85	0.05			
Water Jet Deleading	83	0.20			
Welder / Torch	74	0.40			
COMBINED EQUIPMENT (SPL AT 50 FEET)	**--**	**--**	**3**	**90.7**	**84.0**

Acoustical measurement in FHWA Roadway Construction Noise Model User's Guide. FHWA-HEP-05-054. January 2006.

Modeled Noise Levels at Varying Distances (Includes Hemispherical Spreading and Atmospheric Absorption)

Molecular Absorption	0.0000	dBA
Anomalous Excess Attenuation	0.000	dBA
Equivalent Source-Receiver Height (Hs+Hr)/2	6	feet
FTA Ground Attenuation Factor G	0.643	dBA

Distance from Construction Site (feet)	Noise Level with Attenuation		Noise Level with Barrier (Levees)	
	Outdoor Leq	Outdoor L8	Noise Reduction	Outdoor Leq
25	90	93	0	90
50	84	87	0	84
100	76	79	0	76

This spreadsheet calculates traffic noise levels based on TNM Version 2.5 Lookup Tables

******** PRESS F9 to Calculate ****** then, wait approx. 10 seconds until status at lower left of window says "Ready"**

**** Type in yellow cells only.**

** Day/Eve/Night & Auto/MT/HT cells must add to 100

** Be sure to indicate ENGLISH or METRIC units

** Note that both Ldn and CNEL require input for evening traffic

Day = 12 hours, 7:00 AM to 7:00 PM
Eve = 3 hours, 7:00 PM to 10:00 PM
Night = 9 hours, 10:00 PM to 7:00 AM

CONTOUR VALUES		
1	65	dB
2	60	dB
3	55	dB
4	50	dB

UNITS	english

"english" OR "metric"

DAY PEAK/OFFPEAK SPLITS		PENALTIES
4	no. of hours - peak	dB
8	no. of hours - offpeak	
3	no. of hours - evening	+ 5
9	no. of hours - night	+ 10
24	TOTAL no. of hours	

METRIC/ENGLISH CALCULATOR				
80	MPH	equals	128.74	KPH
100	KPH	equals	62.14	MPH
680	feet	equals	207.26	meters
9	meters	equals	29.53	feet

Mix 1.

		Day			
		Peak	Offpk	Eve	Night
		35	40	10	15
Auto	97	.340	.388	.097	.146
MT	2	.007	.008	.002	.003
HT	1	.004	.004	.001	.002

Mix 2.

		Day			
		Peak	Offpk	Eve	Night
		44	34	9	13
Auto	94	.414	.320	.085	.122
MT	2	.009	.007	.002	.003
HT	4	.018	.014	.004	.005

Mix 3.

		Day			
		Peak	Offpk	Eve	Night
		37	38	10	15
Auto	96	.355	.365	.096	.144
MT	2	.007	.008	.002	.003
HT	2	.007	.008	.002	.003

Number	Roadway	Segment Location	Hard or Soft Ground (H or S)	Total Daily Traffic Volumes	SPEED MPH	Mix Number
	Sunnyvale East and West Channels Flood Protection Project				ENGLISH	
1						
2	**Existing**					
3	Local Street		H	1500	35	1
4	Local Collector		H	8000	40	1
5	Local Arterial		H	20000	45	1
6	Regional Arterial		H	80000	45	1
7						
8	**Existing plus Construction Trips**					
9	Local Street		H	1602	35	2
10	Local Collector		H	8102	40	3
11	Local Arterial		H	20102	45	4
12	Regional Arterial		H	80211	45	4
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

* distance from center of roadway

RECEIVER			
Distance * (feet)	dB Ldn	dB CNEL	dBA Pk Leq1h
ENGLISH			
35	58.1	58.5	57.7
45	65.8	66.2	65.6
60	69.9	70.3	69.7
60	75.9	76.3	75.7
35	59.5	59.9	60.4
45	66.4	66.8	66.3
60	70.0	70.4	69.9
60	76.0	76.4	75.9