Appendix D

Acoustical Analysis Data and Output

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per City of San Diego = 75
allowable hours over which Leq is to be averaged (example: 12 for City of San Diego) = 8

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq
Demolition	Concrete Saw	1	20	90		280	75.0	8	480	68
	Excavator	1	40	81		280	66.0	8	480	62
	Dozer	1	40	82		280	67.0	8	480	63
							Total for Demolition Phase:			**70.0**
Site Preparation	Dozer	1	40	82		115	74.8	8	480	71
	tractor	1	40	84		115	76.8	8	480	73
							Total for Site Preparation Phase:			**74.9**
Grading	Excavator	1	40	81		303	65.4	8	480	61
	Grader	1	40	85		303	69.4	8	480	65
	Dozer	1	40	82		303	66.4	8	480	62
	Scraper	1	40	84		303	68.4	8	480	64
	Backhoe	1	40	78		303	62.4	8	480	58
							Total for Grading Phase:			**70.0**
Building Construction	Crane	1	16	81		126	73.0	7	420	64
	Man lift	1	20	75		126	67.0	8	480	60
	Generator	1	50	72		126	64.0	8	480	61
	Backhoe	1	40	78		126	70.0	8	480	66
	Welder / Torch	1	40	73		126	65.0	7	420	60
							Total for Building Construction Phase:			**70.0**
Paving	Paver	1	50	77		160	66.9	8	480	64
	Concrete Mixer Truck	1	40	79		160	68.9	8	480	65
	Roller	1	20	80		160	69.9	8	480	63
	Backhoe	1	40	78		160	67.9	8	480	64
							Total for Paving Phase:			**70.0**
Architectural Coating	compressor (air)	1	40	78		398	60.0	8	480	56
							Total for Architectural Coating Phase:			**56.0**
Pile Driving	Vibratory Pile Driver	1	20	95		398	77.0	8	480	70
							Total for Pile Driving Phase:			**70.0**

Table 4.14-4 Construction Noise: Screening Distance to Adjoining Receptor Within Which Significant Impact Occurs - Duration Less Than 10 Days

Construction Phase	Screening Distance (feet)		
	Single-family residential (75 dBA)	Multi-family residential (80 dBA)	Semi-residential/commerical (85 dBA)
Demo	157	90	50
Site Prep/Grading	114	65	36
Grading	170	96	54
Building Construction	71	40	23
Paving	90	50	29
Architectural Coating	45	25	15
Pile Driving	223	126	71

Table 4.14-5 Construction Noise: Screening Distance to Adjoining Receptor Within Which Significant Impact Occurs - Duration 10 Days or More

Construction Phase	Screening Distance to Adjoining Receptor Within Which Significant Impact Occurs (in feet)		
	Single-family residential (60 dBA)	Multi-family residential (65 dBA)	Semi-residential/commerical (70 dBA)
Demo	900	500	280
Site Prep/Grading	650	360	115
Grading	952	535	303
Building Construction	405	225	126
Paving	505	285	160
Architectural Coating	250	142	79
Pile Driving	1255	705	398

PhaseName	OffRoadEquipmentType	OffRoadEqui (Ignore for n	UsageHours	HorsePower	LoadFactor
Demolition	Concrete/Industrial Saws	40	8	81	0.73
Demolition	Excavators	120	8	158	0.38
Demolition	Rubber Tired Dozers	80	8	247	0.4
Site Preparation	Rubber Tired Dozers	120	8	247	0.4
Site Preparation	Tractors/Loaders/Backhoes	160	8	97	0.37
Grading	Excavators	80	8	158	0.38
Grading	Graders	40	8	187	0.41
Grading	Rubber Tired Dozers	40	8	247	0.4
Grading	Scrapers	80	8	367	0.48
Grading	Tractors/Loaders/Backhoes	80	8	97	0.37
Building Construction	Cranes	40	7	231	0.29
Building Construction	Forklifts	120	8	89	0.2
Building Construction	Generator Sets	40	8	84	0.74
Building Construction	Tractors/Loaders/Backhoes	120	7	97	0.37
Building Construction	Welders	40	8	46	0.45
Paving	Pavers	80	8	130	0.42
Paving	Paving Equipment	80	8	132	0.36
Paving	Rollers	80	8	80	0.38
Architectural Coating	Air Compressors	40	6	78	0.48

To User: bordered cells are inputs, unbordered cells have formulae

noise level limit for construction phase, per City of San Diego = 75

allowable hours over which Leq is to be averaged (example: 12 for City of San Diego) = 8

Construction Phase	Equipment	Total Equipment Qty	AUF % (from FHWA RCNM)	Reference Lmax @ 50 ft. from FHWA RCNM	Client Equipment Description, Data Source and/or Notes	Source to NSR Distance (ft.)	Distance-Adjusted Lmax	Allowable Operation Time (hours)	Allowable Operation Time (minutes)	Predicted 8-hour Leq	Combined equipment type and quantity (for table in report document?)
RCNM construction list	All Other Equipment > 5 HP	1	50	85		50	85.0	8	480	82	All Other Equipment > 5 HP (1)
	Auger Drill Rig	1	20	84		50	84.0	8	480	77	Auger Drill Rig (1)
	Backhoe	1	40	78		50	78.0	8	480	74	Backhoe (1)
	Bar Bender	1	20	80		50	80.0	8	480	73	Bar Bender (1)
	Boring Jack Power Unit	1	50	80		50	80.0	8	480	77	Boring Jack Power Unit (1)
	Chain Saw	1	20	84		50	84.0	8	480	77	Chain Saw (1)
	Clam Shovel (dropping)	1	20	87		50	87.0	8	480	80	Clam Shovel (dropping) (1)
	Compactor (ground)	1	20	80		50	80.0	8	480	73	Compactor (ground) (1)
	Compressor (air)	1	40	78		50	78.0	8	480	74	Compressor (air) (1)
	Concrete Batch Plant	1	15	83		50	83.0	8	480	75	Concrete Batch Plant (1)
	Concrete Mixer Truck	1	40	79		50	79.0	8	480	75	Concrete Mixer Truck (1)
	Concrete Pump Truck	1	20	81		50	81.0	8	480	74	Concrete Pump Truck (1)
	Concrete Saw	1	20	90		50	90.0	8	480	83	Concrete Saw (1)
	Crane	1	16	81		50	81.0	8	480	73	Crane (1)
	Dozer	1	40	82		50	82.0	8	480	78	Dozer (1)
	Drill Rig Truck	1	20	79		50	79.0	8	480	72	Drill Rig Truck (1)
	Drum Mixer	1	50	80		50	80.0	8	480	77	Drum Mixer (1)
	Dump Truck	1	40	76		50	76.0	8	480	72	Dump Truck (1)
	Excavator	1	40	81		50	81.0	8	480	77	Excavator (1)
	Flat Bed Truck	1	40	74		50	74.0	8	480	70	Flat Bed Truck (1)
	Front End Loader	1	40	79		50	79.0	8	480	75	Front End Loader (1)
	Generator	1	50	72		50	72.0	8	480	69	Generator (1)
	Generator (<25KVA, VMS signs)	1	50	70		50	70.0	8	480	67	Generator (<25KVA, VMS signs) (1)
	Gradall	1	40	83		50	83.0	8	480	79	Gradall (1)
	Grader	1	40	85		50	85.0	8	480	81	Grader (1)
	Grapple (on backhoe)	1	40	85		50	85.0	8	480	81	Grapple (on backhoe) (1)
	Horizontal Boring Hydr. Jack	1	25	80		50	80.0	8	480	74	Horizontal Boring Hydr. Jack (1)
	Hydra Break Ram	1	10	90		50	90.0	8	480	80	Hydra Break Ram (1)
	Impact Pile Driver	1	20	95		50	95.0	8	480	88	Impact Pile Driver (1)
	Jackhammer	1	20	85		50	85.0	8	480	78	Jackhammer (1)
	Man Lift	1	20	75		50	75.0	8	480	68	Man Lift (1)
	Mounted Impact Hammer (hoe ram)	1	20	90		50	90.0	8	480	83	Mounted Impact Hammer (hoe ram) (1)
	Pavement Scarafier	1	20	85		50	85.0	8	480	78	Pavement Scarafier (1)
	Paver	1	50	77		50	77.0	8	480	74	Paver (1)
	Pickup Truck	1	40	55		50	55.0	8	480	51	Pickup Truck (1)
	Pneumatic Tools	1	50	85		50	85.0	8	480	82	Pneumatic Tools (1)
	Pumps	1	50	77		50	77.0	8	480	74	Pumps (1)
	Refrigerator Unit	1	100	73		50	73.0	8	480	73	Refrigerator Unit (1)
	Rivit Buster/chipping gun	1	20	79		50	79.0	8	480	72	Rivit Buster/chipping gun (1)
	Rock Drill	1	20	81		50	81.0	8	480	74	Rock Drill (1)
	Roller	1	20	80		50	80.0	8	480	73	Roller (1)
	Sand Blasting (Single Nozzle)	1	20	85		50	85.0	8	480	78	Sand Blasting (Single Nozzle) (1)
	Scraper	1	40	84		50	84.0	8	480	80	Scraper (1)
	Shears (on backhoe)	1	40	85		50	85.0	8	480	81	Shears (on backhoe) (1)
	Slurry Plant	1	100	78		50	78.0	8	480	78	Slurry Plant (1)
	Slurry Trenching Machine	1	50	80		50	80.0	8	480	77	Slurry Trenching Machine (1)
	Soil Mix Drill Rig	1	50	80		50	80.0	8	480	77	Soil Mix Drill Rig (1)
	Tractor	1	40	84		50	84.0	8	480	80	Tractor (1)
	Vacuum Excavator (Vac-truck)	1	40	85		50	85.0	8	480	81	Vacuum Excavator (Vac-truck) (1)
	Vacuum Street Sweeper	1	10	80		50	80.0	8	480	70	Vacuum Street Sweeper (1)
	Ventilation Fan	1	100	79		50	79.0	8	480	79	Ventilation Fan (1)
	Vibrating Hopper	1	50	85		50	85.0	8	480	82	Vibrating Hopper (1)
	Vibratory Concrete Mixer	1	20	80		50	80.0	8	480	73	Vibratory Concrete Mixer (1)
	Vibratory Pile Driver	1	20	95		50	95.0	8	480	88	Vibratory Pile Driver (1)
	Warning Horn	1	5	83		50	83.0	8	480	70	Warning Horn (1)
	Welder / Torch	1	40	73		50	73.0	8	480	69	Welder / Torch (1)
							Total for RCNM construction list Phase:			96.4	

Equipment Description	Impact Device?	Acoustical Use Factor (%)	Lesser of or available Lmax	Spec. 721 Lmax	Measured L_{max} @50ft (dBA, slow)
All Other Equipment > 5 HP	No	50	85	85	-- N/A --
Auger Drill Rig	No	20	84	85	84
Backhoe	No	40	78	80	78
Bar Bender	No	20	80	80	-- N/A --
Blasting	Yes	-- N/A --	94	94	-- N/A --
Boring Jack Power Unit	No	50	80	80	83
Chain Saw	No	20	84	85	84
Clam Shovel (dropping)	Yes	20	87	93	87
Compactor (ground)	No	20	80	80	83
Compressor (air)	No	40	78	80	78
Concrete Batch Plant	No	15	83	83	-- N/A --
Concrete Mixer Truck	No	40	79	85	79
Concrete Pump Truck	No	20	81	82	81
Concrete Saw	No	20	90	90	90
Crane	No	16	81	85	81
Dozer	No	40	82	85	82
Drill Rig Truck	No	20	79	84	79
Drum Mixer	No	50	80	80	80
Dump Truck	No	40	76	84	76
Excavator	No	40	81	85	81
Flat Bed Truck	No	40	74	84	74
Front End Loader	No	40	79	80	79
Generator	No	50	72	72	81
Generator (<25KVA, VMS signs)	No	50	70	70	73
Gradall	No	40	83	85	83
Grader	No	40	85	85	-- N/A --
Grapple (on backhoe)	No	40	85	85	87
Horizontal Boring Hydr. Jack	No	25	80	80	82
Hydra Break Ram	Yes	10	90	90	-- N/A --
Impact Pile Driver	Yes	20	95	95	101
Jackhammer	Yes	20	85	85	89
Man Lift	No	20	75	85	75
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	90
Pavement Scarafier	No	20	85	85	90
Paver	No	50	77	85	77
Pickup Truck	No	40	55	55	75
Pneumatic Tools	No	50	85	85	85
Pumps	No	50	77	77	81
Refrigerator Unit	No	100	73	82	73
Rivit Buster/chipping gun	Yes	20	79	85	79

Rock Drill	No	20	81	85	81
Roller	No	20	80	85	80
Sand Blasting (Single Nozzle)	No	20	85	85	96
Scraper	No	40	84	85	84
Shears (on backhoe)	No	40	85	85	96
Slurry Plant	No	100	78	78	78
Slurry Trenching Machine	No	50	80	82	80
Soil Mix Drill Rig	No	50	80	80	-- N/A --
Tractor	No	40	84	84	-- N/A --
Vacuum Excavator (Vac-truck)	No	40	85	85	85
Vacuum Street Sweeper	No	10	80	80	82
Ventilation Fan	No	100	79	85	79
Vibrating Hopper	No	50	85	85	87
Vibratory Concrete Mixer	No	20	80	80	80
Vibratory Pile Driver	No	20	95	95	101
Warning Horn	No	5	83	85	83
Welder / Torch	No	40	73	73	74

Appendix D

Development Size (number of residential units)	Screening Distance (feet) to Threshold of Adjoining Noise Zone (within which exceedance and thus significant impact would occur)					
	Noise Zone I (anytime) 45 dBA	Noise Zone II		Noise Zone III		Noise Zone IV (anytime) 70 dBA
		Day 50 dBA	Night 45 dBA	Day 60 dBA	Night 55 dBA	
1-2	65	36	65	12	20	4
3-4	90	50	90	16	30	6
5-8	102	70	102	24	42	8
9-16	131	87	131	33	59	11
17-32	173	110	173	47	74	15
33-64	231	143	231	66	94	21
65-128	314	190	314	81	120	30
129-256	428	256	428	102	158	42

2 tons per unit

Development Size	Tonnage needed	Carrier 2 ton units	sound level at 1
1-2	4	2	71.0
3-4	8	4	74.0
5-8	16	8	77.0
9-16	32	16	80.0
17-32	64	32	83.1
33-64	128	64	86.1
65-128	256	128	89.1
129-256	512	256	92.1

Noise Level @ 1 meter

Carrier 2 ton 68

Development Size (number of residential units)

meter	feet	1-2	3-4	5-8	9-16	17-32	33-64	65-128	129-256
1	3.28084	71.00	74.02	77.03	80.04	83.05	86.06	89.07	92.08
2	6.56168	64.98	67.99	71.00	74.01	77.02	80.03	83.04	86.05
3	9.84252	61.46	64.47	67.48	70.49	73.50	76.51	79.52	82.53
4	13.12336	58.95	61.96	64.97	67.98	70.99	74.01	77.02	80.03
5	16.4042	57.01	60.02	63.03	66.04	69.05	72.06	75.07	78.08
6	19.68504	55.43	58.44	61.45	64.46	67.47	70.48	73.49	76.50
7	22.96588	54.08	57.09	60.10	63.11	66.12	69.13	72.14	75.16
8	26.24672	52.92	55.93	58.94	61.95	64.96	67.97	70.98	73.99
9	29.52756	51.89	54.90	57.91	60.92	63.93	66.95	69.96	72.97
10	32.8084	50.98	53.99	57.00	60.01	63.02	66.03	69.04	72.05
11	36.08924	50.14	53.15	56.16	59.18	62.19	65.20	68.21	71.22
12	39.37008	49.39	52.40	55.41	58.42	61.43	64.44	67.45	70.46
13	42.65092	48.69	51.70	54.71	57.72	60.73	63.74	66.75	69.76
14	45.93176	48.04	51.05	54.06	57.07	60.08	63.09	66.10	69.11
15	49.2126	47.44	50.45	53.46	56.47	59.48	62.49	65.50	68.51
16	52.49344	46.87	49.88	52.89	55.90	58.91	61.92	64.93	67.95
17	55.77428	46.34	49.35	52.36	55.37	58.38	61.39	64.41	67.42
18	59.05512	45.84	48.85	51.86	54.87	57.88	60.90	63.91	66.92
19	62.33596	45.37	48.38	51.39	54.40	57.41	60.42	63.43	66.44
20	65.6168	44.92	47.93	50.94	53.95	56.96	59.97	62.98	65.99
21	68.89764	44.24	47.25	50.26	53.27	56.28	59.29	62.30	65.31
22	72.17848	43.53	46.54	49.55	52.56	55.57	58.58	61.59	64.60
23	75.45932	42.88	45.89	48.90	51.91	54.92	57.93	60.94	63.95
24	78.74016	42.27	45.28	48.29	51.30	54.31	57.32	60.33	63.34
25	82.021	41.70	44.71	47.72	50.73	53.74	56.75	59.76	62.77
26	85.30184	41.17	44.18	47.19	50.20	53.21	56.22	59.23	62.24
27	88.58268	40.67	43.68	46.69	49.70	52.71	55.72	58.73	61.74
28	91.86352	40.19	43.20	46.21	49.22	52.23	55.24	58.25	61.26
29	95.14436	39.74	42.75	45.76	48.77	51.78	54.79	57.80	60.81
30	98.4252	39.31	42.32	45.33	48.34	51.35	54.36	57.37	60.38
31	101.706	38.90	41.91	44.92	47.93	50.94	53.95	56.96	59.97
32	104.9869	38.51	41.52	44.53	47.54	50.55	53.56	56.57	59.58
33	108.2677	38.14	41.15	44.16	47.17	50.18	53.19	56.20	59.21
34	111.5486	37.78	40.79	43.80	46.81	49.82	52.83	55.84	58.85
35	114.8294	37.44	40.45	43.46	46.47	49.48	52.49	55.50	58.51
36	118.1102	37.11	40.12	43.13	46.14	49.15	52.16	55.17	58.18
37	121.3911	36.79	39.80	42.81	45.82	48.83	51.84	54.85	57.86
38	124.6719	36.48	39.49	42.50	45.52	48.53	51.54	54.55	57.56
39	127.9528	36.19	39.20	42.21	45.22	48.23	51.24	54.25	57.26
40	131.2336	35.90	38.91	41.92	44.93	47.94	50.95	53.96	56.97
41	134.5144	35.63	38.64	41.65	44.66	47.67	50.68	53.69	56.70
42	137.7953	35.36	38.37	41.38	44.39	47.40	50.41	53.42	56.43
43	141.0761	35.10	38.11	41.12	44.13	47.14	50.15	53.16	56.17
44	144.357	34.84	37.85	40.87	43.88	46.89	49.90	52.91	55.92
45	147.6378	34.60	37.61	40.62	43.63	46.64	49.65	52.66	55.67
46	150.9186	34.36	37.37	40.38	43.39	46.40	49.41	52.42	55.43
47	154.1995	34.13	37.14	40.15	43.16	46.17	49.18	52.19	55.20
48	157.4803	33.90	36.91	39.92	42.93	45.94	48.95	51.96	54.97
49	160.7612	33.68	36.69	39.70	42.71	45.72	48.73	51.74	54.75
50	164.042	33.47	36.48	39.49	42.50	45.51	48.52	51.53	54.54
51	167.3228	33.26	36.27	39.28	42.29	45.30	48.31	51.32	54.33
52	170.6037	33.05	36.06	39.07	42.08	45.09	48.10	51.11	54.12
53	173.8845	32.85	35.86	38.87	41.88	44.89	47.90	50.91	53.92
54	177.1654	32.66	35.67	38.68	41.69	44.70	47.71	50.72	53.73
55	180.4462	32.46	35.47	38.49	41.50	44.51	47.52	50.53	53.54
56	183.727	32.28	35.29	38.30	41.31	44.32	47.33	50.34	53.35
57	187.0079	32.09	35.10	38.11	41.12	44.14	47.15	50.16	53.17
58	190.2887	31.91	34.92	37.93	40.95	43.96	46.97	49.98	52.99
59	193.5696	31.74	34.75	37.76	40.77	43.78	46.79	49.80	52.81
60	196.8504	31.57	34.58	37.59	40.60	43.61	46.62	49.63	52.64
61	200.1312	31.40	34.41	37.42	40.43	43.44	46.45	49.46	52.47

62	203.4121	31.23	34.24	37.25	40.26	43.27	46.28	49.29	52.30
63	206.6929	31.07	34.08	37.09	40.10	43.11	46.12	49.13	52.14
64	209.9738	30.91	33.92	36.93	39.94	42.95	45.96	48.97	51.98
65	213.2546	30.75	33.76	36.77	39.78	42.79	45.80	48.81	51.82
66	216.5354	30.60	33.61	36.62	39.63	42.64	45.65	48.66	51.67
67	219.8163	30.44	33.45	36.46	39.47	42.48	45.50	48.51	51.52
68	223.0971	30.29	33.30	36.32	39.33	42.34	45.35	48.36	51.37
69	226.378	30.15	33.16	36.17	39.18	42.19	45.20	48.21	51.22
70	229.6588	30.00	33.01	36.02	39.03	42.04	45.05	48.07	51.08
71	232.9396	29.86	32.87	35.88	38.89	41.90	44.91	47.92	50.93
72	236.2205	29.72	32.73	35.74	38.75	41.76	44.77	47.78	50.79
73	239.5013	29.58	32.59	35.60	38.61	41.62	44.63	47.65	50.66
74	242.7822	29.45	32.46	35.47	38.48	41.49	44.50	47.51	50.52
75	246.063	29.31	32.32	35.33	38.35	41.36	44.37	47.38	50.39
76	249.3438	29.18	32.19	35.20	38.21	41.22	44.23	47.24	50.25
77	252.6247	29.05	32.06	35.07	38.08	41.09	44.10	47.11	50.12
78	255.9055	28.92	31.94	34.95	37.96	40.97	43.98	46.99	50.00
79	259.1864	28.80	31.81	34.82	37.83	40.84	43.85	46.86	49.87
80	262.4672	28.67	31.68	34.69	37.71	40.72	43.73	46.74	49.75
81	265.748	28.55	31.56	34.57	37.58	40.59	43.60	46.61	49.62
82	269.0289	28.43	31.44	34.45	37.46	40.47	43.48	46.49	49.50
83	272.3097	28.31	31.32	34.33	37.34	40.35	43.36	46.37	49.38
84	275.5906	28.19	31.20	34.21	37.22	40.23	43.24	46.26	49.27
85	278.8714	28.08	31.09	34.10	37.11	40.12	43.13	46.14	49.15
86	282.1522	27.96	30.97	33.98	36.99	40.00	43.01	46.02	49.03
87	285.4331	27.85	30.86	33.87	36.88	39.89	42.90	45.91	48.92
88	288.7139	27.74	30.75	33.76	36.77	39.78	42.79	45.80	48.81
89	291.9948	27.63	30.64	33.65	36.66	39.67	42.68	45.69	48.70
90	295.2756	27.52	30.53	33.54	36.55	39.56	42.57	45.58	48.59
91	298.5564	27.41	30.42	33.43	36.44	39.45	42.46	45.47	48.48
92	301.8373	27.30	30.31	33.32	36.33	39.34	42.35	45.36	48.37
93	305.1181	27.20	30.21	33.22	36.23	39.24	42.25	45.26	48.27
94	308.399	27.09	30.10	33.11	36.12	39.13	42.14	45.15	48.16
95	311.6798	26.99	30.00	33.01	36.02	39.03	42.04	45.05	48.06
96	314.9606	26.89	29.90	32.91	35.92	38.93	41.94	44.95	47.96
97	318.2415	26.79	29.80	32.81	35.82	38.83	41.84	44.85	47.86
98	321.5223	26.69	29.70	32.71	35.72	38.73	41.74	44.75	47.76
99	324.8032	26.59	29.60	32.61	35.62	38.63	41.64	44.65	47.66
100	328.084	26.49	29.50	32.51	35.52	38.53	41.54	44.55	47.56
101	331.3648	26.39	29.40	32.41	35.42	38.43	41.44	44.45	47.47
102	334.6457	26.30	29.31	32.32	35.33	38.34	41.35	44.36	47.37
103	337.9265	26.20	29.21	32.22	35.23	38.24	41.25	44.26	47.27
104	341.2074	26.11	29.12	32.13	35.14	38.15	41.16	44.17	47.18
105	344.4882	26.02	29.03	32.04	35.05	38.06	41.07	44.08	47.09
106	347.769	25.92	28.93	31.94	34.96	37.97	40.98	43.99	47.00
107	351.0499	25.83	28.84	31.85	34.86	37.87	40.88	43.90	46.91
108	354.3307	25.74	28.75	31.76	34.77	37.78	40.79	43.81	46.82
109	357.6116	25.65	28.66	31.67	34.69	37.70	40.71	43.72	46.73
110	360.8924	25.57	28.58	31.59	34.60	37.61	40.62	43.63	46.64
111	364.1732	25.48	28.49	31.50	34.51	37.52	40.53	43.54	46.55
112	367.4541	25.39	28.40	31.41	34.42	37.43	40.44	43.45	46.46
113	370.7349	25.31	28.32	31.33	34.34	37.35	40.36	43.37	46.38
114	374.0158	25.22	28.23	31.24	34.25	37.26	40.27	43.28	46.29
115	377.2966	25.14	28.15	31.16	34.17	37.18	40.19	43.20	46.21
116	380.5774	25.05	28.06	31.07	34.08	37.09	40.10	43.11	46.13
117	383.8583	24.97	27.98	30.99	34.00	37.01	40.02	43.03	46.04
118	387.1391	24.89	27.90	30.91	33.92	36.93	39.94	42.95	45.96
119	390.42	24.81	27.82	30.83	33.84	36.85	39.86	42.87	45.88
120	393.7008	24.73	27.74	30.75	33.76	36.77	39.78	42.79	45.80
121	396.9816	24.65	27.66	30.67	33.68	36.69	39.70	42.71	45.72
122	400.2625	24.57	27.58	30.59	33.60	36.61	39.62	42.63	45.64
123	403.5433	24.49	27.50	30.51	33.52	36.53	39.54	42.55	45.56
124	406.8242	24.41	27.42	30.43	33.44	36.45	39.46	42.47	45.48
125	410.105	24.33	27.34	30.35	33.36	36.37	39.38	42.39	45.40
126	413.3858	24.26	27.27	30.28	33.29	36.30	39.31	42.32	45.33
127	416.6667	24.18	27.19	30.20	33.21	36.22	39.23	42.24	45.25
128	419.9475	24.10	27.11	30.13	33.14	36.15	39.16	42.17	45.18
129	423.2284	24.03	27.04	30.05	33.06	36.07	39.08	42.09	45.10
130	426.5092	23.96	26.97	29.98	32.99	36.00	39.01	42.02	45.03
131	429.79	23.88	26.89	29.90	32.91	35.92	38.93	41.94	44.95
132	433.0709	23.81	26.82	29.83	32.84	35.85	38.86	41.87	44.88
133	436.3517	23.74	26.75	29.76	32.77	35.78	38.79	41.80	44.81
134	439.6326	23.66	26.67	29.68	32.69	35.71	38.72	41.73	44.74
135	442.9134	23.59	26.60	29.61	32.62	35.63	38.64	41.65	44.66
136	446.1942	23.52	26.53	29.54	32.55	35.56	38.57	41.58	44.59
137	449.4751	23.45	26.46	29.47	32.48	35.49	38.50	41.51	44.52
138	452.7559	23.38	26.39	29.40	32.41	35.42	38.43	41.44	44.45
139	456.0368	23.31	26.32	29.33	32.34	35.35	38.36	41.37	44.38

Road	Description	Segment	GP 2035 ADT	Project Trips	Notes	Traffic Distribution Notes	Residentia	Non-Resid	Total	Existing	E+P	dB Change	GP 2035	GP + P	dB Change		
Lennox Blvd	west of	Hawthorne Blvd	10871	860		Net Total **3441 ADT** from pa	9790	-6349	3441	10091	10951	0.4	10871	11731	0.3		
Lennox Blvd	east of	Hawthorne Blvd	8112	860		Net Total **3441 ADT** from pa	9790	-6349	3441	7832	8692	0.5	8112	8972	0.4		
Avalon Blvd	South of	El Segundo Blvd	17414	-5394		Since reduction of project tra	12620	-23408	-10788	16074	10680	-1.8	17414	12020	-1.6		
Avalon Blvd	North of	El Segundo Blvd	22824	-3560		75 % reduction applied for p	5667	-10413	-4746	18604	15045	-0.9	22824	19265	-0.7		
El Segundo Blvd	between	S main Street/ San Pedro Street	21020	-4711		Reduction of 827 ADT from p	1011	-1838	-827	19010	14300	-1.2	21020	16310	-1.1		
El Segundo Blvd	between	San Pedro Street/ Avalon	24370	-4297		25% reduction assumed from parcels along north and south of Avalon Blvd/El Segundo				21180	16883	-1.0	24370	20073	-0.8		
El Segundo Blvd	between	Avalon blvd/ central	22951	-4297	Already inclu	25% reduction assumed from parcels along north and south of Avalon Blvd/El Segundo				21701	17404	-1.0	22951	18654	-0.9		
E Alondra Blvd	west of	S Atlantic Ave	10098	-231		148 ADT added assumed fro	-1412	-3453	-4865	10098	9867	-0.1	10725	9867	-0.4		
W Century Blvd	west of	S Normandie Ave	29560	-605		100%, 50%, 25% and 10 % reduction from parcels along Century Boulevard, Normandie				25660	25055	-0.1	29560	28955	-0.1		
Compton Ave	Between	E Florence Ave/ Nadeau St	18420	4343		100% from parcels along Co	2897	830	3727	16640	20983	1.0	18420	22763	0.9		
Compton Ave	Between	E Florence Ave/ E Gage Ave	18978	8338		50% from parcels n/o of Gag	3792	1096	4888	16998	25336	1.7	18978	27316	1.6		
E Gage Ave	west of	Compton Blvd	28750	3215		25% from parcels along Compton, Gage and Central near the Gage/Compton intersectio				26630	29845	0.5	28750	31965	0.5		
E Florence Ave	east of	Alameda St	30750	5154	Already inclu	25% from parcels w/o Florence and 25% from parcels e/o Florence and 100% from parc				31325	36479	0.7	30750	35904	0.7	15522	15803
Santa Fe Ave	south of	Broadway	19506	435		100% from parcels along Santa Fe s/o Broadway				16386	16821	0.1	19506	19941	0.1		
Santa Fe Ave	between	Broadway / E Florence Ave	22255	2187		100% from parcels along Santa Fe btw Florence Ave and Broadway, 25% from parcels a				22465	24652	0.4	22255	24442	0.4		
E Florence Ave	west of	Santa Fe Ave	35999	4313	This value is s	25% from parcels w/o Alameda and 50% from parcels along Florence and -50% from p				34175	38488	0.5	35999	40312	0.5	16793	17382
E Florence Ave	east of	Santa Fe Ave	35778	4313		25% from parcels w/o Alameda and 50% from parcels along Florence and -50% from p				35396	39709	0.5	35778	40091	0.5	17614	17782
E Florence Ave	east of	Pacific blvd	29540	2129		15% from parcels w/o Alameda and 25% from parcels along Florence and -50% from p				27460	29589	0.3	29540	31669	0.3		
E Florence Ave	east of	Seville Ave	27170	2129		15% from parcels w/o Alameda and 25% from parcels along Florence and -50% from p				25260	27389	0.4	27170	29299	0.3		
Telegraph Rd	west of	Leffingwell rd	25560	-2412		75% reduction from parcels along Telegraph and Leffingwell Rd.				30890	28478	-0.4	25560	23148	-0.4		
Hacienda Blvd	between	Halliburton/las lomitas	52115	-6293		65% reduction from parcels along Haceinda near Haliburton (check for Las Lomitas)				48866	42573	-0.6	52115	45822	-0.6	25998	22868
Whittier Blvd	between	Garfield Ave/S Atlantic Blvd	21305	-5200		Since reduction of project traffic would result in negative volumes, only 50% reduction				21745	16546	-1.2	21305	16106	-1.2		
Whittier Blvd	between	S Atlantic Blvd/ S Arizona Ave	29012	-4531		100% reduction from parcels along Whittier Blvd btw Atlantic and Arizona				26362	21831	-0.8	29012	24481	-0.7		
S Atlantic Ave	North of	Whittier blvd	26672	-2198	Already inclu	100% reduction from parcels along Atlantic Blvd and 20% from 3rd Street TOD				25177	22979	-0.4	26672	24474	-0.4	12563	12614
E Amar Rd	Between	Valinda Ave/ S Hacienda Blvd	17804	-2505		100% reduction from parcels along Amar Drive				17614	15109	-0.7	17804	15299	-0.7		
E Arrow Hwy	between	N Glendora Ave/ Bonnie Cove Ave	17380	-1302		10%, 25% and 100% reduction from parcels along Arrow Highway and Grand Avenue ba				19340	18038	-0.3	17380	16078	-0.3		
E Arrow Hwy	between	Bonnie Cove Ave/N Sunflower Ave	17440	-2021		10%, 25%, 50% and 100% reduction from parcels along Arrow Highway and Grand Aver				19030	17009	-0.5	17440	15419	-0.5		
E Arrow Hwy	between	N Sunflower Ave/ Valley Center Av	20640	-1832		10%- 100% reduction from parcels along Arrow Highway and Grand Avenue based on p				22550	20718	-0.4	20640	18808	-0.4		
Allen Avenue	north of	New York Drive	7972	143		25% reduction parcels from parcels at the Allen Ave/New York Dr intersection and 10%				7201	7344	0.1	7972	8115	0.1	3758	3443
Allen Avenue	south of	New York Drive	9249	143		25% reduction parcels from parcels at the Allen Ave/New York Dr intersection and 10%				8436	8579	0.1	9249	9392	0.1	4347	4089
N Lake Ave	Between	New York Drive/ E Altadena Dr	14184	761		100% addition from parcels along Lake Avenue and 10-20% from adjacent parcels.				10244	11005	0.3	14184	14945	0.2		
E Woodbury Rd	East of	Fair Oaks Ave	26925	1097		100% and 75% additon from parcels along Woodbury and Lake Ave, 25% and 10% redu				22483	23580	0.2	26925	28022	0.2	11752	10731
Fair Oaks Ave	north of	E woodbury rd	1022	-56		100% reduction from parcels along Fair Oaks and 10-25% addition from parcels along W				854	798	-0.3	1022	966	-0.2	280	574

	Road	Segment	Existing ADT	Existing plus Project ADT	Resulting Noise Increase /Decrease (dBA)		
1	Lennox Blvd	West of Hawthorne Blvd	10091	10951	0.4	1.7	1.6
2	Lennox Blvd	East of Hawthorne Blvd	7832	8692	0.5		
3	Avalon Blvd	South of El Segundo Blvd	16074	10680	-1.8		
4	Avalon Blvd	North of El Segundo Blvd	18604	15045	-0.9		
5	El Segundo Blvd	Between S main Street/ San Pedro Street	19010	14300	-1.2		
6	El Segundo Blvd	Between San Pedro Street/ Avalon	21180	16883	-1.0		
7	El Segundo Blvd	Between Avalon Blvd/ central	21701	17404	-1.0		
8	E Alondra Blvd	West of S Atlantic Ave	10098	9867	-0.1		
9	W Century Blvd	West of S Normandie Ave	25660	25055	-0.1		
10	Compton Ave	Between E Florence Ave/ Nadeau St	16640	20983	1.0		
11	Compton Ave	Between E Florence Ave/ E Gage Ave	16998	25336	1.7		
12	E Gage Ave	West of Compton Blvd	26630	29845	0.5		
13	E Florence Ave	East of Alameda St	31325	36479	0.7		
14	Santa Fe Ave	South of Broadway	16386	16821	0.1		
15	Santa Fe Ave	Between Broadway / E Florence Ave	22465	24652	0.4		
16	E Florence Ave	West of Santa Fe Ave	34175	38488	0.5		
17	E Florence Ave	East of Santa Fe Ave	35396	39709	0.5		
18	E Florence Ave	East of Pacific blvd	27460	29589	0.3		
19	E Florence Ave	East of Seville Ave	25260	27389	0.4		
20	Telegraph Rd	West of Leffingwell Rd	30890	28478	-0.4		
21	Hacienda Blvd	Between Halliburton/Las Lomitas	48866	42573	-0.6		
22	Whittier Blvd	Between Garfield Ave/S Atlantic Blvd	21745	16546	-1.2		
23	Whittier Blvd	Between S Atlantic Blvd/ S Arizona Ave	26362	21831	-0.8		
24	S Atlantic Ave	North of Whittier Blvd	25177	22979	-0.4		
25	E Amar Rd	Between Valinda Ave/ S Hacienda Blvd	17614	15109	-0.7		
26	E Arrow Hwy	Between N Glendora Ave/ Bonnie Cove Ave	19340	18038	-0.3		
27	E Arrow Hwy	Between Bonnie Cove Ave/N Sunflower Ave	19030	17009	-0.5		
28	E Arrow Hwy	Between N Sunflower Ave/ Valley Center Av	22550	20718	-0.4		
29	Allen Avenue	North of New York Drive	7201	7344	0.1		
30	Allen Avenue	South of New York Drive	8436	8579	0.1		
31	N Lake Ave	Between New York Drive/ E Altadena Dr	10244	11005	0.3		
32	E Woodbury Rd	East of Fair Oaks Ave	22483	23580	0.2		
33	Fair Oaks Ave	North of E Woodbury Rd	854	798	-0.3		

Traffic Volumes for Studied Segments

Appendix D

	Road	Segment	Existing ADT	Existing plus Project ADT	Resulting Noise Increase /Decrease (dBA)
1	Lennox Blvd	West of Hawthorne Blvd	10091	10951	0.4
2	Lennox Blvd	East of Hawthorne Blvd	7832	8692	0.5
3	Avalon Blvd	South of El Segundo Blvd	16074	10680	-1.8
4	Avalon Blvd	North of El Segundo Blvd	18604	15045	-0.9
5	El Segundo Blvd	Between S main Street/ San Pedro Street	19010	14300	-1.2
6	El Segundo Blvd	Between San Pedro Street/ Avalon	21180	16883	-1.0
7	El Segundo Blvd	Between Avalon Blvd/ central	21701	17404	-1.0
8	E Alondra Blvd	West of S Atlantic Ave	10098	9867	-0.1
9	W Century Blvd	West of S Normandie Ave	25660	25055	-0.1
10	Compton Ave	Between E Florence Ave/ Nadeau St	16640	20983	1.0
11	Compton Ave	Between E Florence Ave/ E Gage Ave	16998	25336	1.7
12	E Gage Ave	West of Compton Blvd	26630	29845	0.5
13	E Florence Ave	East of Alameda St	31325	36479	0.7
14	Santa Fe Ave	South of Broadway	16386	16821	0.1
15	Santa Fe Ave	Between Broadway / E Florence Ave	22465	24652	0.4
16	E Florence Ave	West of Santa Fe Ave	34175	38488	0.5
17	E Florence Ave	East of Santa Fe Ave	35396	39709	0.5
18	E Florence Ave	East of Pacific Blvd	27460	29589	0.3
19	E Florence Ave	East of Seville Ave	25260	27389	0.4
20	Telegraph Rd	West of Leffingwell Rd	30890	28478	-0.4
21	Hacienda Blvd	Between Halliburton/Las Lomitas	48866	42573	-0.6
22	Whittier Blvd	Between Garfield Ave/S Atlantic Blvd	21745	16546	-1.2
23	Whittier Blvd	Between S Atlantic Blvd/ S Arizona Ave	26362	21831	-0.8
24	S Atlantic Ave	North of Whittier Blvd	25177	22979	-0.4
25	E Amar Rd	Between Valinda Ave/ S Hacienda Blvd	17614	15109	-0.7
26	E Arrow Hwy	Between N Glendora Ave/ Bonnie Cove Ave	19340	18038	-0.3
27	E Arrow Hwy	Between Bonnie Cove Ave/N Sunflower Ave	19030	17009	-0.5
28	E Arrow Hwy	Between N Sunflower Ave/ Valley Center Ave	22550	20718	-0.4
29	Allen Avenue	North of New York Drive	7201	7344	0.1
30	Allen Avenue	South of New York Drive	8436	8579	0.1
31	N Lake Ave	Between New York Drive/ E Altadena Dr	10244	11005	0.3
32	E Woodbury Rd	East of Fair Oaks Ave	22483	23580	0.2
33	Fair Oaks Ave	North of E Woodbury Rd	854	798	-0.3

Calculate Groundborne Vibration using FTA Noise and Vibration Manual guidance (Chapter 12)

Distance (feet)	PPV_{equip} (inches/sec)		
	Dozer	Roller	Impact Pile Driver
1	11.125	26.250	80.500
2	3.933	9.281	28.461
3	2.141	5.052	15.492
4	1.391	3.281	10.063
5	0.995	2.348	7.200
6	0.757	1.786	5.477
7	0.601	1.417	4.347
8	0.492	1.160	3.558
9	0.412	0.972	2.981
10	0.352	0.830	2.546
11	0.305	0.720	2.207
12	0.268	0.631	1.937
13	0.237	0.560	1.717
14	0.212	0.501	1.537
15	0.191	0.452	1.386
16	0.174	0.410	1.258
17	0.159	0.375	1.148
18	0.146	0.344	1.054
19	0.134	0.317	0.972
20	0.124	0.293	0.900
21	0.116	0.273	0.837
22	0.108	0.254	0.780
23	0.101	0.238	0.730
24	0.095	0.223	0.685
25	0.089	0.210	0.644
26	0.084	0.198	0.607
27	0.079	0.187	0.574
28	0.075	0.177	0.543
29	0.071	0.168	0.515
30	0.068	0.160	0.490
31	0.064	0.152	0.466
32	0.061	0.145	0.445
33	0.059	0.138	0.425
34	0.056	0.132	0.406
35	0.054	0.127	0.389
36	0.052	0.122	0.373
37	0.049	0.117	0.358
38	0.047	0.112	0.344
39	0.046	0.108	0.331
40	0.044	0.104	0.318
41	0.042	0.100	0.307
42	0.041	0.096	0.296
43	0.039	0.093	0.285
44	0.038	0.090	0.276
45	0.037	0.087	0.267
46	0.036	0.084	0.258
47	0.035	0.081	0.250
48	0.033	0.079	0.242
49	0.032	0.077	0.235
50	0.031	0.074	0.228
51	0.031	0.072	0.221
52	0.030	0.070	0.215
53	0.029	0.068	0.209
54	0.028	0.066	0.203
55	0.027	0.064	0.197
56	0.027	0.063	0.192
57	0.026	0.061	0.187
58	0.025	0.059	0.182
59	0.025	0.058	0.178
60	0.024	0.056	0.173
61	0.023	0.055	0.169
62	0.023	0.054	0.165
63	0.022	0.052	0.161
64	0.022	0.051	0.157
65	0.021	0.050	0.154
66	0.021	0.049	0.150
67	0.020	0.048	0.147
68	0.020	0.047	0.144
69	0.019	0.046	0.140
70	0.019	0.045	0.137

Screening Distance (feet) to Adjoining Receptor for 0.01 in/sec from 1-100 Hz		
Dozer	Roller	Impact Pile Driver
104	185	389

$Lv(D) = Lv(25\ ft) - 30\log(D/25)$

PPVequip = PPVref x (25/D)1.5

Input			Ouput
Equipment	$L_{v(25')}$ (VdB)	D (feet)	Lv (VdB)
Loaded Trucks	94	1600	39.8

Input			Ouput
Equipment	PPV_{ref} (inches/sec)	D (feet)	PPV (inches/se
Impact Pile Drive	0.644	250	0.020
Large Bulldozer	0.089	65	0.0212
Roller	0.21	25	0.2100

Table 12-2. Vibration Source Levels for Construction Equipment (From measured

Equipment		PPV at 25 ft (in/sec)	Approximate L_v† at 25 ft
Pile Driver (impact)	upper range	1.518	112
	typical	0.644	104
Pile Driver (sonic)	upper range	0.734	105
	typical	0.170	93
Clam shovel drop (slurry wall)		0.202	94
Hydromill (slurry wall)	in soil	0.008	66
	in rock	0.017	75
Vibratory Roller		0.210	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

† RMS velocity in decibels (VdB) re 1 micro-inch/second

12-12 Transit Noise and Vibration Impact Assessment

Table 8-1. Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB re 1 micro-inch /sec)			GBN Impact Levels (dB re 20 micro Pascals)		
	Frequent Events1	Occasional Events2	Infrequent Events3	Frequent Events1	Occasional Events2	Infrequent Events3
Category 1:	65 VdB4	65 VdB4	65 VdB4	N/A4	N/A4	N/A4
Category 2: Residences and buildings where	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Notes:

1. "Frequent Events" is defined as more than 70 vibration events of the same source per day. Most rapid transit projects fall into this category.

2. "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day. Most commuter trunk lines have this many operations.

3. "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day. This category includes most commuter rail branch lines.

4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research

5. Vibration-sensitive equipment is generally not sensitive to ground-borne noise.

Table 8-2. Ground-Borne Vibration and Noise Impact Criteria for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact		Ground-Borne Noise Impact Levels	
	Frequent 1 Events	Occasional or Infrequent2 Events	Frequent1 Events	Occasional or Infrequent2 Events
Concert Halls TV Studios	65 VdB	65 VdB	25 dBA	25 dBA
Recording Studios Auditoriums	65 VdB	65 VdB	25 dBA	25 dBA
Theaters	65 VdB	65 VdB	25 dBA	25 dBA
	72 VdB	80 VdB	30 dBA	38 dBA
	72 VdB	80 VdB	35 dBA	43 dBA

Notes:

1."Frequent Events" is defined as more than 70 vibration events per day. Most rapid transit projects fall into this category. 2."Occasional or Infrequent Events" is defined as fewer than 70 vibration events per day. This category includes most commuter rail systems.

3.If the building will rarely be occupied when the trains are operating, there is no need to consider impact. As an example, consider locating a commuter rail line next to a concert hall. If no commuter trains will operate after 7 pm, it should be rare that the trains interfere with the use of the hall.

71	0.019	0.044	0.135
72	0.018	0.043	0.132
73	0.018	0.042	0.129
74	0.017	0.041	0.126
75	0.017	0.040	0.124
76	0.017	0.040	0.121
77	0.016	0.039	0.119
78	0.016	0.038	0.117
79	0.016	0.037	0.115
80	0.016	0.037	0.113
81	0.015	0.036	0.110
82	0.015	0.035	0.108
83	0.015	0.035	0.106
84	0.014	0.034	0.105
85	0.014	0.033	0.103
86	0.014	0.033	0.101
87	0.014	0.032	0.099
88	0.013	0.032	0.098
89	0.013	0.031	0.096
90	0.013	0.031	0.094
91	0.013	0.030	0.093
92	0.013	0.030	0.091
93	0.012	0.029	0.090
94	0.012	0.029	0.088
95	0.012	0.028	0.087
96	0.012	0.028	0.086
97	0.012	0.027	0.084
98	0.011	0.027	0.083
99	0.011	0.027	0.082
100	0.011	0.026	0.081
101	0.011	0.026	0.079
102	0.011	0.025	0.078
103	0.011	0.025	0.077
104	0.010	0.025	0.076
105	0.010	0.024	0.075
106	0.010	0.024	0.074
107	0.010	0.024	0.073
108	0.010	0.023	0.072
109	0.010	0.023	0.071
110	0.010	0.023	0.070
111	0.010	0.022	0.069
112	0.009	0.022	0.068
113	0.009	0.022	0.067
114	0.009	0.022	0.066
115	0.009	0.021	0.065
116	0.009	0.021	0.064
117	0.009	0.021	0.064
118	0.009	0.020	0.063
119	0.009	0.020	0.062
120	0.008	0.020	0.061
121	0.008	0.020	0.060
122	0.008	0.019	0.060
123	0.008	0.019	0.059
124	0.008	0.019	0.058
125	0.008	0.019	0.058
126	0.008	0.019	0.057
127	0.008	0.018	0.056
128	0.008	0.018	0.056
129	0.008	0.018	0.055
130	0.008	0.018	0.054
131	0.007	0.018	0.054
132	0.007	0.017	0.053
133	0.007	0.017	0.052
134	0.007	0.017	0.052
135	0.007	0.017	0.051
136	0.007	0.017	0.051
137	0.007	0.016	0.050
138	0.007	0.016	0.050
139	0.007	0.016	0.049
140	0.007	0.016	0.049
141	0.007	0.016	0.048
142	0.007	0.016	0.048
143	0.007	0.015	0.047
144	0.006	0.015	0.047
145	0.006	0.015	0.046
146	0.006	0.015	0.046
147	0.006	0.015	0.045
148	0.006	0.015	0.045
149	0.006	0.014	0.044
150	0.006	0.014	0.044
151	0.006	0.014	0.043
152	0.006	0.014	0.043
153	0.006	0.014	0.043
154	0.006	0.014	0.042
155	0.006	0.014	0.042
156	0.006	0.013	0.041
157	0.006	0.013	0.041
158	0.006	0.013	0.041
159	0.006	0.013	0.040
160	0.005	0.013	0.040
161	0.005	0.013	0.039
162	0.005	0.013	0.039

Table 12-3. Construction Vibration Damage Criteria(11)

Building Category	PPV (in/sec)	Approximate L_v†
I. Reinforced-concrete, steel or	0.5	102
II. Engineered concrete and	0.3	98
III. Non-engineered timber	0.2	94
IV. Buildings extremely	0.12	90

† RMS velocity in decibels (VdB) re 1 micro-inch/second

163	0.005	0.013	0.039
164	0.005	0.012	0.038
165	0.005	0.012	0.038
166	0.005	0.012	0.038
167	0.005	0.012	0.037
168	0.005	0.012	0.037
169	0.005	0.012	0.037
170	0.005	0.012	0.036
171	0.005	0.012	0.036
172	0.005	0.012	0.036
173	0.005	0.012	0.035
174	0.005	0.011	0.035
175	0.005	0.011	0.035
176	0.005	0.011	0.034
177	0.005	0.011	0.034
178	0.005	0.011	0.034
179	0.005	0.011	0.034
180	0.005	0.011	0.033
181	0.005	0.011	0.033
182	0.005	0.011	0.033
183	0.004	0.011	0.033
184	0.004	0.011	0.032
185	0.004	0.010	0.032
186	0.004	0.010	0.032
187	0.004	0.010	0.031
188	0.004	0.010	0.031
189	0.004	0.010	0.031
190	0.004	0.010	0.031
191	0.004	0.010	0.030
192	0.004	0.010	0.030
193	0.004	0.010	0.030
194	0.004	0.010	0.030
195	0.004	0.010	0.030
196	0.004	0.010	0.029
197	0.004	0.009	0.029
198	0.004	0.009	0.029
199	0.004	0.009	0.029
200	0.004	0.009	0.028
201	0.004	0.009	0.028
202	0.004	0.009	0.028
203	0.004	0.009	0.028
204	0.004	0.009	0.028
205	0.004	0.009	0.027
206	0.004	0.009	0.027
207	0.004	0.009	0.027
208	0.004	0.009	0.027
209	0.004	0.009	0.027
210	0.004	0.009	0.026
211	0.004	0.009	0.026
212	0.004	0.009	0.026
213	0.004	0.008	0.026
214	0.004	0.008	0.026
215	0.004	0.008	0.026
216	0.004	0.008	0.025
217	0.003	0.008	0.025
218	0.003	0.008	0.025
219	0.003	0.008	0.025
220	0.003	0.008	0.025
221	0.003	0.008	0.025
222	0.003	0.008	0.024
223	0.003	0.008	0.024
224	0.003	0.008	0.024
225	0.003	0.008	0.024
226	0.003	0.008	0.024
227	0.003	0.008	0.024
228	0.003	0.008	0.023
229	0.003	0.008	0.023
230	0.003	0.008	0.023
231	0.003	0.007	0.023
232	0.003	0.007	0.023
233	0.003	0.007	0.023
234	0.003	0.007	0.022
235	0.003	0.007	0.022
236	0.003	0.007	0.022
237	0.003	0.007	0.022
238	0.003	0.007	0.022
239	0.003	0.007	0.022
240	0.003	0.007	0.022
241	0.003	0.007	0.022
242	0.003	0.007	0.021
243	0.003	0.007	0.021
244	0.003	0.007	0.021
245	0.003	0.007	0.021
246	0.003	0.007	0.021
247	0.003	0.007	0.021
248	0.003	0.007	0.021
249	0.003	0.007	0.020
250	0.003	0.007	0.020
251	0.003	0.007	0.020
252	0.003	0.007	0.020
253	0.003	0.007	0.020
254	0.003	0.006	0.020
255	0.003	0.006	0.020
256	0.003	0.006	0.020
257	0.003	0.006	0.020
258	0.003	0.006	0.019

259	0.003	0.006	0.019
260	0.003	0.006	0.019
261	0.003	0.006	0.019
262	0.003	0.006	0.019
263	0.003	0.006	0.019
264	0.003	0.006	0.019
265	0.003	0.006	0.019
266	0.003	0.006	0.019
267	0.003	0.006	0.018
268	0.003	0.006	0.018
269	0.003	0.006	0.018
270	0.003	0.006	0.018
271	0.002	0.006	0.018
272	0.002	0.006	0.018
273	0.002	0.006	0.018
274	0.002	0.006	0.018
275	0.002	0.006	0.018
276	0.002	0.006	0.018
277	0.002	0.006	0.017
278	0.002	0.006	0.017
279	0.002	0.006	0.017
280	0.002	0.006	0.017
281	0.002	0.006	0.017
282	0.002	0.006	0.017
283	0.002	0.006	0.017
284	0.002	0.005	0.017
285	0.002	0.005	0.017
286	0.002	0.005	0.017
287	0.002	0.005	0.017
288	0.002	0.005	0.016
289	0.002	0.005	0.016
290	0.002	0.005	0.016
291	0.002	0.005	0.016
292	0.002	0.005	0.016
293	0.002	0.005	0.016
294	0.002	0.005	0.016
295	0.002	0.005	0.016
296	0.002	0.005	0.016
297	0.002	0.005	0.016
298	0.002	0.005	0.016
299	0.002	0.005	0.016
300	0.002	0.005	0.015
301	0.002	0.005	0.015
302	0.002	0.005	0.015
303	0.002	0.005	0.015
304	0.002	0.005	0.015
305	0.002	0.005	0.015
306	0.002	0.005	0.015
307	0.002	0.005	0.015
308	0.002	0.005	0.015
309	0.002	0.005	0.015
310	0.002	0.005	0.015
311	0.002	0.005	0.015
312	0.002	0.005	0.015
313	0.002	0.005	0.015
314	0.002	0.005	0.014
315	0.002	0.005	0.014
316	0.002	0.005	0.014
317	0.002	0.005	0.014
318	0.002	0.005	0.014
319	0.002	0.005	0.014
320	0.002	0.005	0.014
321	0.002	0.005	0.014
322	0.002	0.005	0.014
323	0.002	0.005	0.014
324	0.002	0.005	0.014
325	0.002	0.004	0.014
326	0.002	0.004	0.014
327	0.002	0.004	0.014
328	0.002	0.004	0.014
329	0.002	0.004	0.013
330	0.002	0.004	0.013
331	0.002	0.004	0.013
332	0.002	0.004	0.013
333	0.002	0.004	0.013
334	0.002	0.004	0.013
335	0.002	0.004	0.013
336	0.002	0.004	0.013
337	0.002	0.004	0.013
338	0.002	0.004	0.013
339	0.002	0.004	0.013
340	0.002	0.004	0.013
341	0.002	0.004	0.013
342	0.002	0.004	0.013
343	0.002	0.004	0.013
344	0.002	0.004	0.013
345	0.002	0.004	0.013
346	0.002	0.004	0.013
347	0.002	0.004	0.012
348	0.002	0.004	0.012
349	0.002	0.004	0.012
350	0.002	0.004	0.012
351	0.002	0.004	0.012
352	0.002	0.004	0.012
353	0.002	0.004	0.012
354	0.002	0.004	0.012

355	0.002	0.004	0.012
356	0.002	0.004	0.012
357	0.002	0.004	0.012
358	0.002	0.004	0.012
359	0.002	0.004	0.012
360	0.002	0.004	0.012
361	0.002	0.004	0.012
362	0.002	0.004	0.012
363	0.002	0.004	0.012
364	0.002	0.004	0.012
365	0.002	0.004	0.012
366	0.002	0.004	0.011
367	0.002	0.004	0.011
368	0.002	0.004	0.011
369	0.002	0.004	0.011
370	0.002	0.004	0.011
371	0.002	0.004	0.011
372	0.002	0.004	0.011
373	0.002	0.004	0.011
374	0.002	0.004	0.011
375	0.002	0.004	0.011
376	0.002	0.004	0.011
377	0.002	0.004	0.011
378	0.002	0.004	0.011
379	0.002	0.004	0.011
380	0.002	0.004	0.011
381	0.001	0.004	0.011
382	0.001	0.004	0.011
383	0.001	0.004	0.011
384	0.001	0.003	0.011
385	0.001	0.003	0.011
386	0.001	0.003	0.011
387	0.001	0.003	0.011
388	0.001	0.003	0.011
389	0.001	0.003	0.010
390	0.001	0.003	0.010
391	0.001	0.003	0.010
392	0.001	0.003	0.010
393	0.001	0.003	0.010
394	0.001	0.003	0.010
395	0.001	0.003	0.010
396	0.001	0.003	0.010
397	0.001	0.003	0.010
398	0.001	0.003	0.010
399	0.001	0.003	0.010
400	0.001	0.003	0.010
401	0.001	0.003	0.010
402	0.001	0.003	0.010
403	0.001	0.003	0.010
404	0.001	0.003	0.010
405	0.001	0.003	0.010
406	0.001	0.003	0.010
407	0.001	0.003	0.010
408	0.001	0.003	0.010
409	0.001	0.003	0.010
410	0.001	0.003	0.010
411	0.001	0.003	0.010
412	0.001	0.003	0.010
413	0.001	0.003	0.010
414	0.001	0.003	0.010
415	0.001	0.003	0.010
416	0.001	0.003	0.009
417	0.001	0.003	0.009
418	0.001	0.003	0.009
419	0.001	0.003	0.009
420	0.001	0.003	0.009
421	0.001	0.003	0.009
422	0.001	0.003	0.009
423	0.001	0.003	0.009
424	0.001	0.003	0.009
425	0.001	0.003	0.009
426	0.001	0.003	0.009
427	0.001	0.003	0.009
428	0.001	0.003	0.009
429	0.001	0.003	0.009
430	0.001	0.003	0.009
431	0.001	0.003	0.009
432	0.001	0.003	0.009
433	0.001	0.003	0.009
434	0.001	0.003	0.009
435	0.001	0.003	0.009
436	0.001	0.003	0.009
437	0.001	0.003	0.009
438	0.001	0.003	0.009
439	0.001	0.003	0.009
440	0.001	0.003	0.009
441	0.001	0.003	0.009
442	0.001	0.003	0.009
443	0.001	0.003	0.009
444	0.001	0.003	0.009
445	0.001	0.003	0.009
446	0.001	0.003	0.009
447	0.001	0.003	0.009
448	0.001	0.003	0.008
449	0.001	0.003	0.008
450	0.001	0.003	0.008

451	0.001	0.003	0.008
452	0.001	0.003	0.008
453	0.001	0.003	0.008
454	0.001	0.003	0.008
455	0.001	0.003	0.008
456	0.001	0.003	0.008
457	0.001	0.003	0.008
458	0.001	0.003	0.008
459	0.001	0.003	0.008
460	0.001	0.003	0.008
461	0.001	0.003	0.008
462	0.001	0.003	0.008
463	0.001	0.003	0.008
464	0.001	0.003	0.008
465	0.001	0.003	0.008
466	0.001	0.003	0.008
467	0.001	0.003	0.008
468	0.001	0.003	0.008
469	0.001	0.003	0.008
470	0.001	0.003	0.008
471	0.001	0.003	0.008
472	0.001	0.003	0.008
473	0.001	0.003	0.008
474	0.001	0.003	0.008
475	0.001	0.003	0.008
476	0.001	0.003	0.008
477	0.001	0.003	0.008
478	0.001	0.003	0.008
479	0.001	0.003	0.008
480	0.001	0.002	0.008
481	0.001	0.002	0.008
482	0.001	0.002	0.008
483	0.001	0.002	0.008
484	0.001	0.002	0.008
485	0.001	0.002	0.008
486	0.001	0.002	0.008
487	0.001	0.002	0.007
488	0.001	0.002	0.007
489	0.001	0.002	0.007
490	0.001	0.002	0.007
491	0.001	0.002	0.007
492	0.001	0.002	0.007
493	0.001	0.002	0.007
494	0.001	0.002	0.007
495	0.001	0.002	0.007
496	0.001	0.002	0.007
497	0.001	0.002	0.007
498	0.001	0.002	0.007
499	0.001	0.002	0.007
500	0.001	0.002	0.007