

## **APPENDIX F**

### **NOISE AND VIBRATION PREDICTION MODEL OUTPUTS**

**Table A.1: Construction Noise Predictions - Summary**

Alternative No. *LPA/Baseline*  
 Description EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

ID	REC	<i>LPA</i>		<i>Alternative A</i>		<i>Alternative B</i>	
		Noise (dBA)		Noise (dBA)		Noise (dBA)	
		Lmax	LeqSum	Lmax	LeqSum	Lmax	LeqSum
1	Standard Hotel	85	86	85	90	85	90
2	City National Plaza	84	86	84	90	84	90
3	California Club	85	86	85	90	85	90
4	Los Angeles Public Library	70	71	70	78	70	77
5	Los Angeles Public Library Park	85	86	87	94	87	94
6	Citi Group Center	76	77	76	83	76	80
7	Westin Bonaventure Hotel	89	91	92	97	89	91
8	Hynes Property	79	81	79	85	79	81
9	Savoy Apartments (Little Tokyo)	68	83	68	89	68	89

Predicted exceedance

NB1: LeqDAY applied to evening period between 6-10PM (daytime construction is exempt).

NB2: Equipment reference noise levels were taken from the FHWA RCNM database, Table 1 (pg. 3).

**Table A.2: Construction Vibration Predictions - Summary**

Alternative No. *LPA/Baseline*  
 Description EPBM Bored tunnels to 4th St, C&C from 4th St to 7th/Metro

ID	REC	<i>LPA</i>		<i>Alternative A</i>		<i>Alternative B</i>	
		VdB	PPV (in/s)	VdB	PPV (in/s)	VdB	PPV (in/s)
1	Standard Hotel	78	0.031	78	0.031	78	0.031
2	City National Plaza	77	0.027	77	0.027	77	0.027
3	California Club	78	0.031	78	0.031	78	0.031
4	Los Angeles Public Library	55	0.002	61	0.003	60	0.003
5	Los Angeles Public Library Park	78	0.031	78	0.031	78	0.031
6	Citi Group Center	64	0.006	70	0.010	69	0.009
7	Westin Bonaventure Hotel	85	0.068	91	0.118	85	0.068
8	Hynes Property	69	0.012	75	0.018	72	0.013
9	Savoy Apartments (Little Tokyo)	65	0.006	65	0.006	65	0.006

Predicted exceedance

NB1: LeqDAY applied to evening period between 6-10PM (daytime construction is exempt).

NB2: Equipment reference noise levels were taken from the FHWA RCNM database, Table 1 (pg. 3).

**Table A.3: Receptor Distances**

ID	REC	Description	Distance (ft)					Little Tokyo Portal
			<i>4th St - 6th St</i>	<i>5th St. - 6th St.</i>	<i>4th St. - 5th St.</i>	<i>5th St. - 6th St.</i>	<i>4th St. - 5th St.</i>	
			General Construction	Grouting Plant 1	Grouting Plant 2	Grouting Rigs 1	Grouting Rigs 2	
1	R1	Standard Hotel	50	320	880	50	550	N/A
2	R2	City National Plaza	55	90	500	55	192	N/A
3	R3	California Club	50	160	715	50	400	N/A
4	R4	Los Angeles Public Library	285	265	480	285	300	N/A
5	R5	Los Angeles Public Library Park	50	30	390	50	108	N/A
6	R6	Citi Group Center	145	240	155	240	145	N/A
7	R7	Westin Bonaventure Hotel	30	345	65	278	20	N/A
8	R8	Hynes Property	97	477	117	417	97	N/A
9	R9	Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A	N/A	130



















**Table A.13: Construction Equipment 50-Foot Noise Emission Limits (FHWA Table 2)**

<b>Equipment Category</b>	<b>Lmax Level (dBA, slow)</b>	<b>Type</b>
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	95	Impact
In situ Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

*Section 01575 Construction Noise and Vibration Control (February 2009)*

Table A.14: CA/T Noise Emission Reference Levels and Usage Factors

Equipment Description	Impact Device?	Acoustical	Spec 721.560	Actual Measured	No. of Actual
		Use Factor (%)	<u>L<sub>max</sub>@50ft</u> (dBA, slow)	<u>L<sub>max</sub>@50ft</u> (dBA, slow)	Data Samples (Count, samples averaged)
All Other Equipment >5 HP	No	50	85	--N/A--	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
BarBender	No	20	80	--N/A--	0
Blasting	Yes	--N/A--	94	--N/A--	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	--N/A--	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA,VMSsigns)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	--N/A--	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	--N/A--	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	--N/A--	0
Tractor	No	40	84	--N/A--	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder/Torch	No	40	73	74	5

Source: Roadway Construction Noise Model (RCNM 1.0), filename:EQUIPLST.xls (revised: 7/26/05)

**Table A.15: Vibration Source Levels for Construction Equipment (FTA Table 12-2)**

Equipment	PPV at 25 ft (in/sec)		Approx. Lv at 25 ft (VdB)	
	Upper Range	Typical	Upper Range	Typical
Pile Driver (impact)	1.518	0.644	112	104
Pile Driver (sonic)	0.734	0.170	105	93
Clam shovel drop (slurry wall)		0.202		94
Hydromill (slurry wall), in soil		0.008		66
Hydromill (slurry wall), 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
MIN (Sm. Dozer)		0.035		79
Locomotive		0.126		90

Note: TDH estimate from FTA FIG 10-1

**Table A.16: FTA Construction Equipment Source Reference Levels - Noise**

<b>Equipment</b>	<b>Typical Noise Level (dBA) 50 ft from Source</b>
Air Compressor	81
Backhoe	80
Ballast Equalizer	82
Ballast Tamper	83
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pile-driver (Impact)	101
Pile-driver (Sonic)	96
Pneumatic Tool	85
Pump	76
Rail Saw	90
Rock Drill	98
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Truck	88

NB: Table based on an EPA Report (4), measured data from railroad construction equipment taken

Note: FTA Table 12-1. Construction Equipment Noise Emission Levels

**Table A.17: Truck Activity**

Alternative	Average Trucks Per Day	Percent of Excavated Materials Removed from each Location		Estimated Breakdown in Distribution of Average Daily Trucks		Max Hourly Trucks (total/10)	
		Flower Street	Little Tokyo	Flower Street	Little Tokyo	Flower Street	Little Tokyo
Baseline/LPA	40	81%	19%	32	8	3	1
A: EPBM/Open-Face Shield/ SEM Profile Alternative	40	25%	75%	10	30	1	3
B: EPBM/SEM Low Alignment Alternative	40	20%	80%	8	32	1	3

**Table A.18: Tunnel Depth Distance Adjustments**

<b>Alternative</b>	<b>Min</b>	<b>Max</b>	<b>Adjust_Tunnel_Hgt</b>	<b>Depth</b>
LPA	40	40	20	20
A	40	40	20	20
B	95	105	20	75

	<b>Lateral</b>	<b>LPA</b>	<b>A</b>	<b>B</b>
Standard Hotel	555	555.4	555.4	560.0
City National Plaza	190	191.0	191.0	204.3
California Club	400	400.5	400.5	407.0
Los Angeles Public Library	300	300.7	300.7	309.2
Los Angeles Public Library Park	100	102.0	102.0	125.0
Citi Group Center	145	146.4	146.4	163.2
Westin Bonaventure Hotel	20	28.3	28.3	77.6
Hynes Property	97	99.0	99.0	122.6
Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A

**Table A.18: Tunnel Depth Distance Adjustments**

<b>Alternative</b>	<b>Min</b>	<b>Max</b>	<b>Adjust_Tunnel_Hgt</b>	<b>Depth</b>
LPA	40	40	20	20
A	40	40	20	20
B	95	105	20	75

	<b>Lateral</b>	<b>LPA</b>	<b>A</b>	<b>B</b>
Standard Hotel	555	555.4	555.4	560.0
City National Plaza	190	191.0	191.0	204.3
California Club	400	400.5	400.5	407.0
Los Angeles Public Library	300	300.7	300.7	309.2
Los Angeles Public Library Park	100	102.0	102.0	125.0
Citi Group Center	145	146.4	146.4	163.2
Westin Bonaventure Hotel	20	28.3	28.3	77.6
Hynes Property	97	99.0	99.0	122.6
Savoy Apartments (Little Tokyo)	N/A	N/A	N/A	N/A