Appendix 5.13-1 Noise and Vibration Technical Memo

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Building Construction w/Pile Driving Noise Levels (LEQ)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
threshold	947	65.0
Center	0	#NUM!
Staging Area	0	#NUM!

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Compactor (ground)	80	0.4
Generator	82	0.4
Crane	85	0.16
Dump Truck	84	0.4
Compressor (air)	80	0.4
Front End Loader	80	0.4
Backhoe	80	0.4
Man Lift	85	0.4
Impact Pile Driver	95	0.2

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Compactor (ground)	76.0
Generator	78.0
Crane	77.0
Dump Truck	80.0
Compressor (air)	76.0
Front End Loader	76.0
Backhoe	76.0
Man Lift	81.0
Impact Pile Driver	88.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
90.5

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Building Construction (No Pile Driving) Construction Noise Levels (LEQ)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
threshold	324	70.0
Center	0	#NUM!
Staging Area	0	#NUM!

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Compactor (ground)	80	0.4
Generator	82	0.4
Crane	85	0.16
Dump Truck	84	0.4
Front End Loader	80	0.4
Man Lift	85	0.4

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Compactor (ground)	76.0
Generator	78.0
Crane	77.0
Dump Truck	80.0
Front End Loader	76.0
Man Lift	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
86.2

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Roadway Construction Noise Levels (LEQ)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
threshold	641	65.0
Center	0	#NUM!
Staging Area	0	#NUM!

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Paver	85	0.4
Roller	85	0.4
Concrete Mixer Truck	85	0.4
Front End Loader	80	0.4
Flat Bed Truck	84	0.4

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Paver	81.0
Roller	81.0
Concrete Mixer Truck	81.0
Front End Loader	76.0
Flat Bed Truck	80.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
87.2

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Utility Construction Noise Levels (LEQ)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
threshold	715	65.0
Center	0	#NUM!
Staging Area	0	#NUM!

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Man Lift	85	0.4
Crane	85	0.4
Flat Bed Truck	84	0.4
Front End Loader	80	0.4
Auger Drill Rig	85	0.4
Excavator	85	0.4

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Man Lift	81.0
Crane	81.0
Flat Bed Truck	80.0
Front End Loader	76.0
Auger Drill Rig	81.0
Excavator	81.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
88.1

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Site Prep Construction Noise Levels (LEQ)

Location	Distance to Nearest Receptor in feet	Combined Predicted Noise Level (L_{eq} dBA)
threshold	665	65.0
Center	0	#NUM!
Staging Area	0	#NUM!

Equipment	Reference Emission Noise Levels (L_{max}) at 50 feet[1]	Usage Factor[1]
Dozer	85	0.4
Grader	85	0.4
Dump Truck	84	0.4
Excavator	85	0.4
Backhoe	80	0.4
Front End Loader	80	0.4

Ground Type	hard
Source Height	8
Receiver Height	5
Ground Factor[2]	0.00

Predicted Noise Level [3]	L_{eq} dBA at 50 feet[3]
Dozer	81.0
Grader	81.0
Dump Truck	80.0
Excavator	81.0
Backhoe	76.0
Front End Loader	76.0

Combined Predicted Noise Level (L_{eq} dBA at 50 feet)
87.5

Sources:

[1] Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

[2] Based on Figure 6-5 from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 6-23).

[3] Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006 (pg 12-3).

$L_{eq}(equip) = E.L.+10*\log(U.F.) - 20*\log(D/50) - 10*G*\log(D/50)$

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects (FTA 2006: pg 6-23); and

D = Distance from source to receiver.

Equipment Description	Acoustical Usage Factor (%)	Spec 721.560 Lmax @ 50ft (dBA slow)	Actual Measured Lmax @ 50ft (dBA slow)	No. of Actual Data Samples (count)	Spec 721.560 LmaxCalc	Spec 721.560 Leq	Distance	Actual Measured LmaxCalc	Actual Measured Leq
Auger Drill Rig	20	85	84	36	79.0	72.0	100	78.0	71.0
Backhoe	40	80	78	372	74.0	70.0	100	72.0	68.0
Bar Bender	20	80	na	0	74.0	67.0	100		
Blasting	na	94	na	0	88.0		100		
Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Compactor (ground)	20	80	83	57	74.0	67.0	100	77.0	70.0
Compressor (air)	40	80	78	18	74.0	70.0	100	72.0	68.0
Concrete Batch Plant	15	83	na	0	77.0	68.7	100		
Concrete Mixer Truck	40	85	79	40	79.0	75.0	100	73.0	69.0
Concrete Pump Truck	20	82	81	30	76.0	69.0	100	75.0	68.0
Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Generator (<25KVA, VMS s	50	70	73	74	64.0	61.0	100	67.0	64.0
Gradall	40	85	83	70	79.0	75.0	100	77.0	73.0
Grader	40	85	na	0	79.0	75.0	100		
Grapple (on Backhoe)	40	85	87	1	79.0	75.0	100	81.0	77.0
Horizontal Boring Hydr. Jac	25	80	82	6	74.0	68.0	100	76.0	70.0
Hydra Break Ram	10	90	na	0	84.0	74.0	100		
Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
Mounted Impact Hammer (	20	90	90	212	84.0	77.0	100	84.0	77.0
Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Pumps	50	77	81	17	71.0	68.0	100	75.0	72.0
Refrigerator Unit	100	82	73	3	76.0	76.0	100	67.0	67.0
Rivit Buster/chipping gun	20	85	79	19	79.0	72.0	100	73.0	66.0
Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
Sand Blasting (Single Nozzl	20	85	96	9	79.0	72.0	100	90.0	83.0
Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Soil Mix Drill Rig	50	80	na	0	74.0	71.0	100		
Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
Ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibrating Hopper	50	85	87	1	79.0	76.0	100	81.0	78.0
Vibratory Concrete Mixer	20	80	80	1	74.0	67.0	100	74.0	67.0
Vibratory Pile Driver	20	95	101	44	89.0	82.0	100	95.0	88.0
Warning Horn	5	85	83	12	79.0	66.0	100	77.0	64.0
Welder / Torch	40	73	74	5	67.0	63.0	100	68.0	64.0

Source:
FHWA Roadway Construction Noise Model, January 2006. Table 9.1
U.S. Department of Transportation
CA/T Construction Spec. 721.560

Distance Propagation Calculations for Construction Vibration

KEY: Orange cells are for input.

Grey cells are intermediate calculations performed by the model.

Green cells are data to present in a written analysis (output).

STEP 1: Determine units in which to perform calculation.

— If vibration decibels (VdB), then use Table A and proceed to Steps 2A and 3A.

— If peak particle velocity (PPV), then use Table B and proceed to Steps 2B and 3B.

STEP 2A: Identify the vibration source and enter the reference vibration level (VdB) and distance.

STEP 3A: Select the distance to the receiver.

Table A. Propagation of vibration decibels (VdB) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor		
	vibration level (VdB)	@	distance (ft)	vibration level (VdB)	@	distance (ft)
Impact pile driver	104	@	25	65.0	@	500
vibratory roller	95	@	25	79.8	@	80

STEP 2B: Identify the vibration source and enter the reference peak particle velocity (PPV) and distance.

STEP 3B: Select the distance to the receiver.

Table B. Propagation of peak particle velocity (PPV) with distance

Noise Source/ID	Reference Noise Level			Attenuated Noise Level at Receptor		
	vibration level (PPV)	@	distance (ft)	vibration level (PPV)	@	distance (ft)
Impact pile driver	0.644	@	25	0.197	@	55
vibratory roller	0.210	@	25	0.210	@	25

Notes:

Computation of propagated vibration levels is based on the equations presented on pg. 12-11 of FTA 2006. Estimates of attenuated vibration levels do not account for reductions from intervening underground barriers or other underground structures of any type, or changes in soil type.

Sources:

Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

Attenuation Calculations for Stationary Noise Sources

KEY: Orange cells are for input.
Grey cells are intermediate calculations performed by the model.
Green cells are data to present in a written analysis (output).

STEP 1: Identify the noise source and enter the reference noise level (dBA and distance).

STEP 2: Select the ground type (hard or soft), and enter the source and receiver heights.

STEP 3: Select the distance to the receiver.

Noise Source/ID	Reference Noise Level			Attenuation Characteristics				Attenuated Noise Level at Receptor		
	noise level (dBA)	@	distance (ft)	Ground Type (soft/hard)	Source Height (ft)	Receiver Height (ft)	Ground Factor	noise level (dBA)	@	distance (ft)
Loading Dock Activity Leq (day)	77.0	@	100	soft	6	5	0.65	64.7	@	290
Loading Dock Activity Leq (night)	77.0	@	100	soft	6	5	0.65	59.9	@	440
HVAC leq (day)	70.0	@	50	soft	6	5	0.65	64.6	@	80
HVAC Leq (night)	70.0	@	50	soft	6	5	0.65	59.9	@	120

Notes:

Estimates of attenuated noise levels do not account for reductions from intervening barriers, including walls, trees, vegetation, or structures of any type.

Computation of the attenuated noise level is based on the equation presented on pg. 12-3 and 12-4 of FTA 2006.

Computation of the ground factor is based on the equation presentd in Figure 6-23 on pg. 6-23 of FTA 2006, where the distance of the reference noise leve can be adjusted and the usage factor is not applied (i.e., the usage factor is equal to 1).

Sources:

Federal Transit Association (FTA). 2006 (May). Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. Washington, D.C. Available: <http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf>. Accessed: September 24, 2010.

Traffic Noise Spreadsheet Calculator
Existing Conditions

Project: Rancho Cucamonga GPU

CNEL
Soft
ADT

Number	Segment Description and Location Segment	ADT	Speed (mph)	Distance to Directional Centerline, (feet)$_4$ Near	Far	Traffic Distribution Characteristics % Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)$_{5,6,7}$	Distance to Contour, (feet)$_3$ 75 dBA	70 dBA	65 dBA	60 dBA
	Input											**Output**				
SEG ID																
1	Wilson Ave from Carnelian St to Archibald Ave	4,740	40	88	112	98.8%	0.42%	0.8%	84.8%	5.4%	9.7%	57.5	7	15	31	68
2	Wilson Ave from Archibald Ave to Haven Ave	5,190	45	88	112	98.9%	0.46%	0.6%	83.7%	6.1%	10.1%	59.5	9	20	43	92
3	Wilson Ave from Haven Ave to Milliken Ave	7,860	45	94	106	98.4%	0.67%	1.0%	82.6%	7.0%	10.4%	61.5	12	27	58	125
4	Wilson Ave from Milliken Ave to Etiwanda Ave	2,090	45	88	112	98.9%	0.43%	0.7%	82.8%	6.2%	11.0%	55.7	5	11	24	51
5	Wilson Ave from Etiwanda Ave to City Limits	8,240	35	88	112	97.4%	0.68%	1.9%	79.7%	8.6%	11.7%	59.5	9	20	43	92
6	Banyan St from Carnelian St to Archibald Ave	3,470	30	94	106	99.1%	0.39%	0.5%	82.5%	7.5%	10.0%	52.5	3	7	15	32
7	Banyan St from Archibald Ave to Haven Ave	3,900	30	94	106	99.3%	0.32%	0.4%	77.6%	10.5%	11.9%	53.3	4	8	17	36
8	Banyan St from Haven Ave to Milliken Ave	9,690	45	94	106	99.3%	0.31%	0.4%	73.4%	12.3%	14.3%	62.9	16	34	72	156
9	Banyan St from Milliken Ave to Etiwanda Ave	10,530	45	94	106	98.8%	0.44%	0.8%	83.1%	6.7%	10.2%	62.5	15	32	69	148
10	Banyan St from Etiwanda Ave to Wardman Bollock Rd	8,210	45	94	106	98.4%	0.61%	1.0%	79.7%	8.6%	11.8%	62.0	13	29	63	135
11	19th St from Carnelian St to Archibald Ave	17,050	45	88	112	98.8%	0.50%	0.7%	83.4%	6.0%	10.7%	64.8	21	45	96	207
12	19th St from Archibald Ave to Haven Ave	15,630	45	88	112	98.7%	0.54%	0.8%	82.2%	7.4%	10.4%	64.5	20	42	92	197
13	Base Line Rd from Carnelian St to Archibald Ave	22,550	40	88	112	98.1%	0.67%	1.2%	82.4%	7.3%	10.2%	64.8	21	44	96	206
14	Base Line Rd from Archibald Ave to Haven Ave	21,140	40	88	112	98.2%	0.67%	1.2%	81.5%	8.5%	10.1%	64.5	20	42	91	197
15	Base Line Rd from Haven Ave to Milliken Ave	25,150	45	82	118	98.2%	0.69%	1.1%	82.9%	7.5%	9.6%	66.7	27	59	128	275
16	Base Line Rd from Milliken Ave to Etiwanda Ave	22,780	50	82	118	98.2%	0.67%	1.1%	81.0%	8.4%	10.6%	67.9	33	71	153	329
17	Church St west of Archibald Ave	5,370	40	94	106	98.5%	0.72%	0.8%	83.3%	7.0%	9.7%	58.1	7	16	35	75
18	Church St from Archibald Ave to Haven Ave	9,060	40	88	112	98.7%	0.61%	0.7%	85.3%	3.7%	11.0%	60.5	11	23	50	107
19	Church St from Haven Ave to Milliken Ave	16,730	40	88	112	97.9%	0.96%	1.2%	79.4%	9.6%	11.0%	63.7	18	38	82	176
20	Church St from Milliken Ave to Day Creek Blvd	19,240	45	88	112	98.2%	1.00%	0.8%	82.1%	7.7%	10.2%	65.4	23	49	106	228
21	Church St from Day Creek Blvd to Etiwanda Ave	14,520	45	88	112	98.1%	0.96%	0.9%	83.0%	7.8%	9.2%	64.0	18	40	86	185
22	Church St from Etiwanda Ave to East Ave	9,780	35	88	112	98.8%	0.57%	0.6%	86.5%	3.2%	10.3%	58.9	8	18	39	84
23	Foothill Blvd from City Limits to Carnelian St/Vineyard Ave	32,820	45	88	112	97.6%	0.92%	1.5%	77.9%	9.9%	12.2%	68.5	36	78	169	363
24	Foothill Blvd from Carnelian St/Vineyard Ave to Archibald Ave	31,300	45	82	118	97.7%	0.93%	1.4%	78.0%	9.7%	12.3%	68.4	36	77	165	356
25	Foothill Blvd from Archibald Ave to Haven Ave	32,420	50	88	112	97.7%	0.92%	1.4%	76.5%	11.2%	12.4%	69.8	45	96	207	446
26	Foothill Blvd from Haven Ave to Milliken Ave	38,140	50	82	118	97.4%	1.00%	1.6%	75.4%	11.2%	13.4%	70.9	53	113	244	526
27	Foothill Blvd from Milliken Ave to Day Creek Blvd	37,330	50	82	118	96.7%	1.14%	2.2%	73.6%	12.1%	14.3%	71.2	55	119	256	551
28	Foothill Blvd from Day Creek Blvd to Etiwanda Ave	45,190	50	82	118	95.8%	1.23%	3.0%	70.5%	13.8%	15.7%	72.6	68	147	316	681
29	Foothill Blvd from Etiwanda Ave to City Limits	34,430	50	88	112	96.4%	1.17%	2.5%	73.0%	12.7%	14.3%	70.8	52	113	243	524
30	Arrow Rte from City Limits to Vineyard Ave	19,710	45	88	112	96.5%	1.05%	2.4%	84.3%	5.6%	10.1%	66.1	25	54	117	253
31	Arrow Rte from Vineyard Ave to Archibald Ave	22,570	45	88	112	95.4%	1.26%	3.3%	79.7%	8.9%	11.4%	67.4	31	67	144	310
32	Arrow Rte from Archibald Ave to Haven Ave	26,340	45	88	112	95.3%	1.43%	3.2%	81.7%	7.6%	10.7%	67.9	33	72	155	334
33	Arrow Rte from Haven Ave to Milliken Ave	24,300	50	88	112	94.4%	2.12%	3.5%	80.3%	8.6%	11.1%	69.1	40	86	186	401
34	Arrow Rte from Milliken Ave to Etiwanda Ave	25,000	50	94	106	96.4%	1.48%	2.1%	78.0%	10.3%	11.6%	68.8	38	82	178	383
35	Arrow Rte from Etiwanda Ave to City Limits	20,140	50	88	112	97.7%	0.93%	1.3%	81.4%	8.5%	10.1%	67.2	30	64	139	299
36	6th St from City Limits to Archibald Ave	10,940	45	94	106	96.4%	1.00%	2.6%	82.4%	7.4%	10.2%	63.6	17	37	81	174
37	6th St from Archibald Ave to Haven Ave	15,080	45	94	106	96.0%	1.42%	2.6%	81.7%	7.8%	10.5%	65.1	22	47	102	219
38	6th St from Haven Ave to Milliken Ave	14,860	45	88	112	96.7%	1.28%	2.1%	79.9%	9.0%	11.1%	65.1	22	47	101	217
39	6th St from Milliken Ave to Etiwanda Ave	13,870	35	88	112	95.5%	1.83%	2.7%	88.1%	4.1%	7.9%	61.4	12	27	57	124
40	4th St from Archibald Ave to Haven Ave	17,780	50	88	112	96.5%	1.29%	2.2%	80.0%	9.0%	11.0%	67.2	30	65	139	300
41	4th St from Haven Ave to Milliken Ave	26,570	50	76	124	95.8%	1.41%	2.7%	85.1%	5.7%	9.2%	69.0	39	84	180	388

Traffic Noise Spreadsheet Calculator
2040 Conditions

Project: Rancho Cucamonga GPU

CNEL
Soft
ADT

Number	Segment Description and Location Segment	ADT	Speed (mph)	Distance to Directional Centerline, (feet)[4] Near	Far	Traffic Distribution Characteristics % Auto	% Medium	% Heavy	% Day	% Eve	% Night	CNEL, (dBA)[5,6,7]	Distance to Contour, (feet)[3] 75 dBA	70 dBA	65 dBA	60 dBA
		Input										Output				
SEG ID																
1	Wilson Ave from Carnelian St to Archibald Ave	7,380	40	88	112	98.8%	0.42%	0.8%	84.8%	5.4%	9.7%	59.4	9	20	42	91
2	Wilson Ave from Archibald Ave to Haven Ave	8,490	45	88	112	98.9%	0.46%	0.6%	83.7%	6.1%	10.1%	61.6	13	27	59	127
3	Wilson Ave from Haven Ave to Milliken Ave	11,540	45	94	106	98.4%	0.67%	1.0%	82.6%	7.0%	10.4%	63.1	16	35	75	161
4	Wilson Ave from Milliken Ave to Etiwanda Ave	2,970	45	88	112	98.9%	0.43%	0.7%	82.8%	6.2%	11.0%	57.2	7	14	30	65
5	Wilson Ave from Etiwanda Ave to City Limits	12,480	35	88	112	97.4%	0.68%	1.9%	79.7%	8.6%	11.7%	61.3	12	26	56	121
6	Banyan St from Carnelian St to Archibald Ave	3,800	30	94	106	99.1%	0.39%	0.5%	82.5%	7.5%	10.0%	52.9	3	7	16	34
7	Banyan St from Archibald Ave to Haven Ave	3,970	30	94	106	99.3%	0.32%	0.4%	77.6%	10.5%	11.9%	53.4	4	8	17	36
8	Banyan St from Haven Ave to Milliken Ave	12,240	45	94	106	99.3%	0.31%	0.4%	73.4%	12.3%	14.3%	63.9	18	39	85	182
9	Banyan St from Milliken Ave to Etiwanda Ave	12,100	45	94	106	98.8%	0.44%	0.8%	83.1%	6.7%	10.2%	63.2	16	35	75	162
10	Banyan St from Etiwanda Ave to Wardman Bollock Rd	10,340	45	94	106	98.4%	0.61%	1.0%	79.7%	8.6%	11.8%	63.0	16	34	73	157
11	19th St from Carnelian St to Archibald Ave	20,840	45	88	112	98.8%	0.50%	0.7%	83.4%	6.0%	10.7%	65.6	24	51	110	236
12	19th St from Archibald Ave to Haven Ave	19,310	45	88	112	98.7%	0.54%	0.8%	82.2%	7.4%	10.4%	65.4	23	49	105	227
13	Base Line Rd from Carnelian St to Archibald Ave	26,170	40	88	112	98.1%	0.67%	1.2%	82.4%	7.3%	10.2%	65.4	23	49	106	228
14	Base Line Rd from Archibald Ave to Haven Ave	24,830	40	88	112	98.2%	0.67%	1.2%	81.5%	8.5%	10.1%	65.2	22	47	102	219
15	Base Line Rd from Haven Ave to Milliken Ave	32,780	45	82	118	98.2%	0.69%	1.1%	82.9%	7.5%	9.6%	67.8	33	71	152	328
16	Base Line Rd from Milliken Ave to Etiwanda Ave	34,870	50	82	118	98.2%	0.67%	1.1%	81.0%	8.4%	10.6%	69.7	44	94	203	437
17	Church St west of Archibald Ave	6,390	40	94	106	98.5%	0.72%	0.8%	83.3%	7.0%	9.7%	58.9	8	18	39	84
18	Church St from Archibald Ave to Haven Ave	13,540	40	88	112	98.7%	0.61%	0.7%	85.3%	3.7%	11.0%	62.2	14	30	65	140
19	Church St from Haven Ave to Milliken Ave	22,290	40	88	112	97.9%	0.96%	1.2%	79.4%	9.6%	11.0%	65.0	21	46	99	213
20	Church St from Milliken Ave to Day Creek Blvd	23,830	45	88	112	98.2%	1.00%	0.8%	82.1%	7.7%	10.2%	66.3	26	57	122	263
21	Church St from Day Creek Blvd to Etiwanda Ave	19,630	45	88	112	98.1%	0.96%	0.9%	83.0%	7.8%	9.2%	65.4	23	49	105	226
22	Church St from Etiwanda Ave to East Ave	12,360	35	88	112	98.8%	0.57%	0.6%	86.5%	3.2%	10.3%	60.0	10	21	46	99
23	Foothill Blvd from City Limits to Carnelian St/Vineyard Ave	38,620	45	88	112	97.6%	0.92%	1.5%	77.9%	9.9%	12.2%	69.2	40	87	188	405
24	Foothill Blvd from Carnelian St/Vineyard Ave to Archibald Ave	46,470	45	82	118	97.7%	0.93%	1.4%	78.0%	9.7%	12.3%	70.1	46	100	215	464
25	Foothill Blvd from Archibald Ave to Haven Ave	42,170	50	88	112	97.7%	0.92%	1.4%	76.5%	11.2%	12.4%	70.9	53	114	247	531
26	Foothill Blvd from Haven Ave to Milliken Ave	46,080	50	82	118	97.4%	1.00%	1.6%	75.4%	11.2%	13.4%	71.7	60	129	277	597
27	Foothill Blvd from Milliken Ave to Day Creek Blvd	50,790	50	82	118	96.7%	1.14%	2.2%	73.6%	12.1%	14.3%	72.6	68	146	314	676
28	Foothill Blvd from Day Creek Blvd to Etiwanda Ave	55,460	50	82	118	95.8%	1.23%	3.0%	70.5%	13.8%	15.7%	73.5	78	168	362	780
29	Foothill Blvd from Etiwanda Ave to City Limits	38,790	50	88	112	96.4%	1.17%	2.5%	73.0%	12.7%	14.3%	71.4	57	122	263	568
30	Arrow Rte from City Limits to Vineyard Ave	24,750	45	88	112	96.5%	1.05%	2.4%	84.3%	5.6%	10.1%	67.1	29	63	136	294
31	Arrow Rte from Vineyard Ave to Archibald Ave	26,320	45	88	112	95.4%	1.26%	3.3%	79.7%	8.9%	11.4%	68.1	34	74	160	344
32	Arrow Rte from Archibald Ave to Haven Ave	34,800	45	88	112	95.3%	1.43%	3.2%	81.7%	7.6%	10.7%	69.1	40	87	187	402
33	Arrow Rte from Haven Ave to Milliken Ave	30,900	50	88	112	94.4%	2.12%	3.5%	80.3%	8.6%	11.1%	70.1	47	101	219	471
34	Arrow Rte from Milliken Ave to Etiwanda Ave	34,960	50	94	106	96.4%	1.48%	2.1%	78.0%	10.3%	11.6%	70.2	48	103	222	479
35	Arrow Rte from Etiwanda Ave to City Limits	29,810	50	88	112	97.7%	0.93%	1.3%	81.4%	8.5%	10.1%	68.9	39	84	180	389
36	6th St from City Limits to Archibald Ave	13,370	45	94	106	96.4%	1.00%	2.6%	82.4%	7.4%	10.2%	64.5	20	43	92	199
37	6th St from Archibald Ave to Haven Ave	18,810	45	94	106	96.0%	1.42%	2.6%	81.7%	7.8%	10.5%	66.1	25	55	118	254
38	6th St from Haven Ave to Milliken Ave	21,570	45	88	112	96.7%	1.28%	2.1%	79.9%	9.0%	11.1%	66.7	28	60	129	278
39	6th St from Milliken Ave to Etiwanda Ave	18,220	35	88	112	95.5%	1.83%	2.7%	88.1%	4.1%	7.9%	62.6	15	32	69	148
40	4th St from Archibald Ave to Haven Ave	22,810	50	88	112	96.5%	1.29%	2.2%	80.0%	9.0%	11.0%	68.3	35	76	164	354
41	4th St from Haven Ave to Milliken Ave	36,230	50	76	124	95.8%	1.41%	2.7%	85.1%	5.7%	9.2%	70.4	48	103	221	477

Citation #	Citations	
1	Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Pg 4-17.
2	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.	Caltrans Technical Noise Supplement. 2013 (September). Equation (4-5), Pg 4-17.
3	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.	FHWA 2004 TNM Version 2.5
4	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.	FHWA 2004 TNM Version 2.5
5	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-23), Pg 2-51, 52.
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13	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (16), Pg 67	
14	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (20), Pg 69	
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California Department of Transportation (Caltrans). 2013 (September). Technical Noise Supplement. Available: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013A.pdf. Accessed August 17, 2017.

Federal Highway Administration. 2004. Traffic Noise Model Version 2.5. Available: https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v25/. Accessed August 17, 2017.

Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 7/3/2007

Project:	Rancho Cucamong GPU

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	50 dBA

Noise Source Parameters	
Number of Noise Sources:	2

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	1
	Speed (mph)	120
	Avg. Number of Events/hr	5.25
Nighttime hrs	Avg. Number of Locos/train	1
	Speed (mph)	120
	Avg. Number of Events/hr	3.75
Distance	Distance from Source to Receiver (ft)	33
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Transit warning device
Daytime hrs		
	Speed (mph)	120
	Avg. Number of Events/hr	5.25
Nighttime hrs		
	Speed (mph)	120
	Avg. Number of Events/hr	3.75
Distance	Distance from Source to Receiver (ft)	33
	Number of Intervening Rows of Buildings	0
Adjustments		

Project Results Summary

Existing Ldn:	50 dBA
Total Project Ldn:	75 dBA
Total Noise Exposure:	75 dBA
Increase:	25 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour (Sources 1+2):	860 ft
Dist to Sev. Impact Contour (Sources 1+2):	330 ft

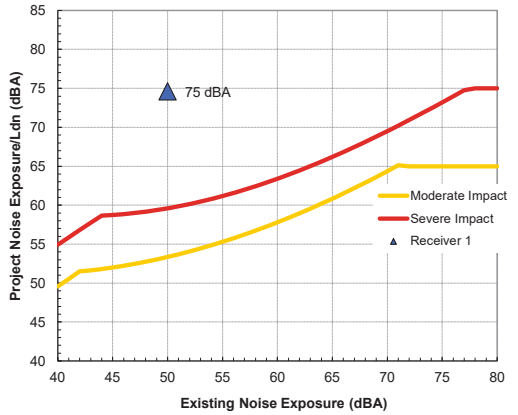
Source 1 Results

Leq(day):	68.1 dBA
Leq(night):	66.6 dBA
Ldn:	73.3 dBA

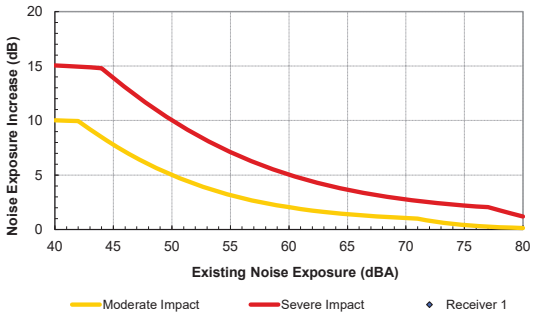
Source 2 Results

Leq(day):	63.5 dBA
Leq(night):	62.0 dBA
Ldn:	68.7 dBA
Incremental Ldn (Src 1-2):	74.6 dBA

Noise Impact Criteria
(FTA Manual, Fig 3-1)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Fig 3-2)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 7/3/2007

Project:	Rancho Cucamong GPU

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	50 dBA

Noise Source Parameters	
Number of Noise Sources:	3

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Rail Transit Vehicle
Daytime hrs	Avg. Number of Transit Vehicles/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	75
Nighttime hrs	Avg. Number of Transit Vehicles/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	2.81
Distance	Distance from Source to Receiver (ft)	60
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Jointed Track?	No
	Embedded Track?	No
	Aerial Structure?	No

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	3
	Speed (mph)	40
	Avg. Number of Events/hr	75
Nighttime hrs	Avg. Number of Rail Cars/train	3
	Speed (mph)	40
	Avg. Number of Events/hr	2.814814815
Distance	Distance from Source to Receiver (ft)	60
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Jointed Track?	No
	Embedded Track?	No
	Aerial Structure?	No

Noise Source Parameters		Source 3
	Source Type:	Fixed Guideway
	Specific Source:	Transit warning device
Daytime hrs		
	Speed	40
	Avg. Number of Events/hr	75
Nighttime hrs		
	Speed	40
	Avg. Number of Events/hr	2.81
Distance	Distance from Source to Receiver (ft)	60
	Number of Intervening Rows of Buildings	0
Adjustments		

Project Results Summary

Existing Ldn:	50 dBA
Total Project Ldn:	75 dBA
Total Noise Exposure:	75 dBA
Increase:	25 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour:	---
Dist to Sev. Impact Contour:	---

Source 1 Results

Leq(day):	62.0 dBA
Leq(night):	47.8 dBA
Ldn:	60.9 dBA

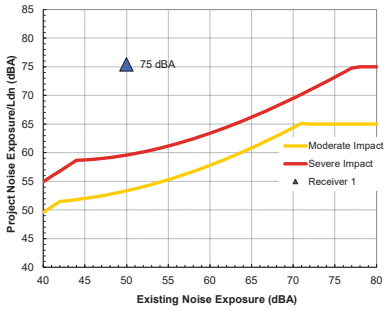
Source 2 Results

Leq(day):	66.8 dBA
Leq(night):	52.5 dBA
Ldn:	65.6 dBA
Incremental Ldn (Src 1-2):	66.9 dBA

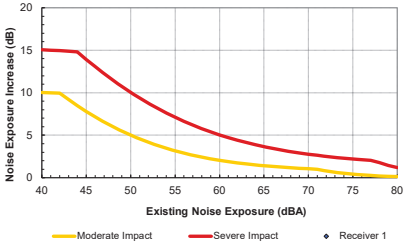
Source 3 Results

Leq(day):	75.9 dBA
Leq(night):	61.7 dBA
Ldn:	74.8 dBA
Incremental Ldn (Src 1-3):	75.4 dBA

Noise Impact Criteria
(FTA Manual, Fig 3-1)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Fig 3-2)



Federal Transit Administration
Noise Impact Assessment Spreadsheet

version: 7/3/2007

Project:	Rancho Cucamong GPU

Receiver Parameters	
Receiver:	Receiver 1
Land Use Category:	2. Residential
Existing Noise (Measured or Generic Value):	50 dBA

Noise Source Parameters	
Number of Noise Sources:	6

Noise Source Parameters		Source 1
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Multiple Unit (DMU)
Daytime hrs	Avg. Number of DMU's/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	2
Nighttime hrs	Avg. Number of DMU's/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	2.00
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 2
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	3
	Speed (mph)	40
	Avg. Number of Events/hr	2
Nighttime hrs	Avg. Number of Rail Cars/train	3
	Speed (mph)	40
	Avg. Number of Events/hr	2
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	0
Adjustments	Noise Barrier?	No
	Jointed Track?	No
	Embedded Track?	No
	Aerial Structure?	No

Noise Source Parameters		Source 3
	Source Type:	Fixed Guideway
	Specific Source:	Transit warning device
Daytime hrs		
	Speed	40
	Avg. Number of Events/hr	2
Nighttime hrs		
	Speed	40
	Avg. Number of Events/hr	2.00
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 4
	Source Type:	Fixed Guideway
	Specific Source:	Diesel Electric Locomotive
Daytime hrs	Avg. Number of Locos/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	2
Nighttime hrs	Avg. Number of Locos/train	1
	Speed (mph)	40
	Avg. Number of Events/hr	0.89
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	0
Adjustments		

Noise Source Parameters		Source 5
	Source Type:	Fixed Guideway
	Specific Source:	Rail Car
Daytime hrs	Avg. Number of Rail Cars/train	170
	Speed (mph)	40
	Avg. Number of Events/hr	2
Nighttime hrs	Avg. Number of Rail Cars/train	170
	Speed (mph)	40
	Avg. Number of Events/hr	0.89
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	
Adjustments	Noise Barrier?	No
	Jointed Track?	No
	Embedded Track?	No
	Aerial Structure?	No

Noise Source Parameters		Source 6
	Source Type:	Fixed Guideway
	Specific Source:	Locomotive Warning Horn
Daytime hrs		
	Speed	40
	Avg. Number of Events/hr	2
Nighttime hrs		
	Speed	40
	Avg. Number of Events/hr	0.89
Distance	Distance from Source to Receiver (ft)	69
	Number of Intervening Rows of Buildings	
Adjustments		

Project Results Summary

Existing Ldn:	50 dBA
Total Project Ldn:	75 dBA
Total Noise Exposure:	75 dBA
Increase:	25 dB
Impact?:	Severe

Distance to Impact Contours

Dist to Mod. Impact Contour:	---
Dist to Sev. Impact Contour:	---

Source 1 Results

Leq(day):	50.3 dBA
Leq(night):	50.3 dBA
Ldn:	56.7 dBA

Source 2 Results

Leq(day):	50.1 dBA
Leq(night):	50.1 dBA
Ldn:	56.6 dBA
Incremental Ldn (Src 1-2):	59.7 dBA

Source 3 Results

Leq(day):	59.3 dBA
Leq(night):	59.3 dBA
Ldn:	65.7 dBA
Incremental Ldn (Src 1-3):	66.7 dBA

Source 4 Results

Leq(day):	58.3 dBA
Leq(night):	54.8 dBA
Ldn:	61.9 dBA
Incremental Ldn (Src 1-4):	67.9 dBA

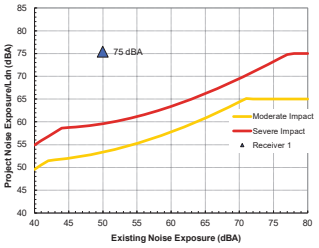
Source 5 Results

Leq(day):	67.7 dBA
Leq(night):	64.2 dBA
Ldn:	71.3 dBA
Incremental Ldn (Src 1-5):	72.9 dBA

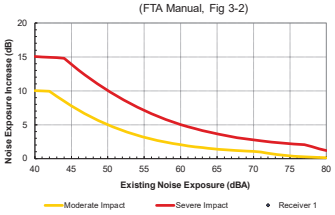
Source 6 Results

Leq(day):	75.3 dBA
Leq(night):	71.8 dBA
Ldn:	78.9 dBA
Incremental Ldn (Src 1-6):	79.9 dBA

Noise Impact Criteria
(FTA Manual, Fig 3-1)



Increase in Cumulative Noise Levels Allowed
(FTA Manual, Fig 3-2)



Assumptions

Brightine

		Peak HR		Off-Peak Hr		Source
		train/hr	PK HR/Day	train/hr	NON PK HR/Day	Fehr & Peers 2021: email communication from Jason Pack to Dimitri Antoniou of Ascent on 4/26/2021
Frequency		1	4	0.25	20	
		Hr/period	PK HR/Perio	NN PK HR/Period		
Daytime	7am-10pm	15	2	13	5.25	
Night	10pm-7am	9	2	7	3.75	

Gold Line Gold Line Schedule (Oct, 2025)

		counted from sch.	every 12 min		
		10p-5:20a	5:20a-7am	Total	Tr/hr
Night	frequency	17	8.33	25.33	2.81

	Min/hr	Min/period	Freq. (min/hr)	Train/hr
Day	60	900	12	75

Distance (ft) To Contour

	75 dBA Ldn	70 dBA Ldn	65 dBA Ldn	60 dBA Ldn	55 dBA Ldn
			feet		
Brightline HSR	33	63	136	306	772
Gold Line Extension	60	129	281	632	1595
Metrolink	69	148	322	725	1828