Appendix F

Noise Modeling

Traffic Noise Spreadsheet Calculator

Project: UCP Update/VST Specific Plan (existing Leq)

Noise Level Descriptor: Leq
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor: 10

Segment Description and Location				Input										Output				
					Speed	Distance to Directional Centerline, (feet)$_4$		Traffic Distribution Characteristics						Leq,	Distance to Contour, (feet)$_3$			
Number	Name	From	To	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA)$_{5,6,7}$	75 dBA	70 dBA	65 dBA	60 dBA
#######																		
1	Bellevue Road	Snelling Hwy to G St		7,000	50	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	65.8	12	38	121	384
2	Bellevue Road	G St to Lake Road		7,500	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	67.4	17	55	173	547
3	Lake Road	Campus Pkwy to Meyers Gate Road		6,400	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	66.7	15	47	148	467
4	Lake Road	Meyers Gate Road to Cardella Road		6,400	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	66.7	15	47	148	467
5	Lake Road	Cardella Road to Yosemite Ave		6,300	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	66.6	15	46	145	459
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
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					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Spreadsheet Calculator

Project: **UCP Update/VST Specific Plan (existing Ldn)**

Noise Level Descriptor: Ldn
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor:

	Segment Description and Location			Input										Output				
					Speed	Distance to Directional Centerline, (feet)$_4$		Traffic Distribution Characteristics						Ldn,	Distance to Contour, (feet)$_3$			
Number	**Name**	**From**	**To**	**ADT**	**(mph)**	**Near**	**Far**	**% Auto**	**% Medium**	**% Heavy**	**% Day**	**% Eve**	**% Night**	**(dBA)$_{5,6,7}$**	**75 dBA**	**70 dBA**	**65 dBA**	**60 dBA**
#######																		
1	Bellevue Road	Snelling Hwy to G St		7,000	50	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	63.7	7	23	73	232
2	Bellevue Road	G St to Lake Road		7,500	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	65.2	10	33	104	330
3	Lake Road	Campus Pkwy to Meyers Gate Road		6,400	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	64.5	9	28	89	282
4	Lake Road	Meyers Gate Road to Cardella Road		6,400	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	64.5	9	28	89	282
5	Lake Road	Cardella Road to Yosemite Ave		6,300	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	64.4	9	28	88	277
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
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					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Spreadsheet Calculator

Project: **UCP Update/VST Specific Plan (2023 Plus Project Ldn)**

Noise Level Descriptor: Ldn
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor:

	Segment Description and Location			Input										Output				
						Distance to Directional Centerline, (feet)[4]		Traffic Distribution Characteristics							Distance to Contour, (feet)[3]			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	Ldn, (dBA)[5,6,7]	75 dBA	70 dBA	65 dBA	60 dBA
1	Bellevue Road	Snelling Hwy to G St		11,500	50	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	65.8	12	38	121	381
2	Bellevue Road	G St to Lake Road		14,300	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	68.0	20	63	199	630
3	Lake Road	Campus Pkwy to Meyers Gate Road		n/a	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
4	Lake Road	Meyers Gate Road to Cardella Road		800	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	55.5	1	4	11	35
5	Lake Road	Cardella Road to Yosemite Ave		900	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	56.0	1	4	13	40
6	Campus Parkway	Bellevue Road to Meyers Gate Road		14,700	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	68.1	20	65	205	647
7	Campus Parkway	Meyers Gate Road to Cardella Road		15,800	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	68.4	22	70	220	696
8	Campus Parkway	Cardella Road to Yosemite Ave		13,700	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	67.8	19	60	191	603
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
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					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

Traffic Noise Spreadsheet Calculator

Project: UCP Update/VST Specific Plan (2042 Plus Project Ldn)

Noise Level Descriptor: Ldn
Site Conditions: Hard
Traffic Input: ADT
Traffic K-Factor:

				Input										Output				
Segment Description and Location						Distance to Directional Centerline, (feet)$_4$		Traffic Distribution Characteristics							Distance to Contour, (feet)$_3$			
Number	Name	From	To	ADT	Speed (mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	Ldn, (dBA)$_{5,6,7}$	75 dBA	70 dBA	65 dBA	60 dBA
#######																		
1	Bellevue Road	Snelling Hwy to G St		22,500	50	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	68.7	24	75	236	746
2	Bellevue Road	G St to Lake Road		33,900	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	71.7	47	149	472	1493
3	Lake Road	Campus Pkwy to Meyers Gate Road		n/a	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
4	Lake Road	Meyers Gate Road to Cardella Road		3,800	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	62.2	5	17	53	167
5	Lake Road	Cardella Road to Yosemite Ave		4,000	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	62.5	6	18	56	176
6	Campus Parkway	Bellevue Road to Meyers Gate Road		16,200	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	68.5	23	71	226	713
7	Campus Parkway	Meyers Gate Road to Cardella Road		19,000	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	69.2	26	84	265	837
8	Campus Parkway	Cardella Road to Yosemite Ave		21,300	55	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	69.7	30	94	297	938
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
					35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					

*All modeling assumes average pavement, level roadways (less than 1.5% grade), constant traffic flow and does not account for shielding of any type or finite roadway adjustments. All levels are reported as A-weighted noise levels.

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
6	Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.	Caltrans Technical Noise Supplement. 2013 (September). Equation (2-24), Pg 2-53
7	Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.	Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.
8	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.	FHWA 2004 TNM Version 2.5
9	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.	FHWA 2004 TNM Version 2.5
10	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.	FHWA 2004 TNM Version 2.5
11	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.	FHWA 2004 TNM Version 2.5
12	Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.	FHWA 2004 TNM Version 2.5
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	
15	Federal Highway Administration Traffic Noise Model Technical Manual. Report No. FHWA-PD-96-010. 1998 (January). Equation (18), Pg 69	

References

California Department of Transportation (Caltrans). 2009 (November). Technical Noise Supplement. Available: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf. Accessed Aug 2017.

Distance Propagation Calculations for Stationary Sources of Ground 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 (Threshold for human annoyance)	112	@	25	70.0	@	630
Impact pile driver (Theshold of perception)	112	@	25	65.0	@	925

The Lv metric (VdB) is used to assess the likelihood for vibration to result in human annoyance.

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	1.518	@	25	0.199	@	97

The PPV metric (in/sec) is used for assessing the likelihood for the potential of structural damage.

Notes:

Computation of propagated vibration levels is based on the equations presented on pg. 185 of FTA 2018. 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.

Federal Transit Association (FTA). 2018 (September). Transit Noise and Vibration Impact Assessment Manual. FTA Report
ot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta