APPENDIX G

Noise Data and Calculations

Table A
Community Noise Exposure Thresholds[1]

Land Use	Community Noise Exposure CNEL, db			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Single Family, Duplex, Mobile Homes	50 - 60	55 - 70	70 - 75	above 70
Multi-Family Homes	50 - 65	60 - 70	70 - 75	above 70
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 - 80	above 80
Transient Lodging - Motels, Hotels	50 - 65	60 - 70	70 - 80	above 80
Auditoriums, Concert Halls, Amphitheaters		50 - 70		above 65
Sports Arena, Outdoor Spectator Sports		50 - 75		above 70
Playgrounds, Neighborhood Parks	50 - 70		67 - 75	above 72
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 75		70 - 80	above 80
Office Buildings, Business and Professional Commercial	50 - 70	67 - 77	above 75	
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	above 75	
Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.				
Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice.				
Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.				
Clearly Unacceptable: New construction or development should generally not be undertaken.				

Notes:

(1) Source: California Department of Health Services (DHS).

Table B
CA/T Construction Equipment Noise Emissions and Acoustical Usage Factor Database

Equipment Description	Impact Device?	Acoustical use Factor (%)	Spec. Lmax @ 50ft (dBA, slow)	Actual Measured Lmax @ 50ft (dBA, slow)	No. of Actual Data Samples (Count)
Compressor (air)	No	40	80	78	18
Concrete Mixer Truck	No	40	85	79	40
Concrete Saw	No	20	90	89.6	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Forklift[1,2]	No	50	n/a	61	n/a
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Grader	No	40	85	-N/A-	0
Paver	No	50	85	77	9
Pickup Truck	No	50	85	77	9
Paving Equipment	No	20	90	-N/A-	9
Roller	No	20	85	80	16
Tractor/Loader/Backhoe	No	25	80	-N/A-	0
Welder/Torch	No	40	73	74	5

Source: FHWA RCNM User's Guide, 2006

[1] Warehouse & Forklift Noise Exposure - NoiseTesting.info Carl Stautins, November 4, 2014 http://www.noisetesting.info/blog/carl-strautins/page-3/

[2] Data provided Leq as measured at the operator. Sound Level at 50 feet is estimated.

Table C
Construction Noise Levels (L_{eq})

Phase	Receptor Location	Existing Ambient Noise Levels (Leq)[1]	Unmitigated Construction Noise Levels[2,4]	Increase (dB)	Reduction with Mitigation[3] (dB)	Mitigated Construction Noise Levels (Leq)	Mitigated Increase in Ambient Noise Levels
Demolition	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	78.0	12.6	11	67.0	1.6
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	70.7	4.2	11	59.7	-6.8
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	75.8	2.4	11	64.8	-8.6
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	65.4	0.0	11	54.4	-11.0
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	70.3	4.9	11	59.3	-6.1
	(R6) Residential to East (across Grand Ave)	65.4	67.7	2.3	11	56.7	-8.7
	(R7) Residential to Southwest (western side of S Hope St)	66.5	64.6	-1.9	11	53.6	-12.9
	(R9) Residential to South (eastern side of S Hope St)	66.5	63.5	-3.0	11	52.5	-14.0
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	63.9	-1.5	11	52.9	-12.5
	(R4) Church to South (eastern side of S Hope St)	66.5	65.6	-0.9	11	54.6	-11.9
Site Preparation	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	78.6	13.2	11	67.6	2.2
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	71.3	4.8	11	60.3	-6.2
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	76.4	3.0	11	65.4	-8.0
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	66.0	0.6	11	55.0	-10.4
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	70.9	5.5	11	59.9	-5.5
	(R6) Residential to East (across Grand Ave)	65.4	68.3	2.9	11	57.3	-8.1
	(R7) Residential to Southwest (western side of S Hope St)	66.5	65.2	-1.3	11	54.2	-12.3
	(R9) Residential to South (eastern side of S Hope St)	66.5	64.2	-2.3	11	53.2	-13.3
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	64.5	-0.9	11	53.5	-11.9
	(R4) Church to South (eastern side of S Hope St)	66.5	66.2	-0.3	11	55.2	-11.3
Grading	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	78.6	13.2	11	67.6	2.2
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	71.3	4.8	11	60.3	-6.2
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	76.4	3.0	11	65.4	-8.0
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	66.0	0.6	11	55.0	-10.4
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	70.9	5.5	11	59.9	-5.5

Phase	Receptor Location	Existing Ambient Noise Levels (Leq)[1]	Unmitigated Construction Noise Levels[2,4]	Increase (dB)	Reduction with Mitigation[3] (dB)	Mitigated Construction Noise Levels (Leq)	Mitigated Increase in Ambient Noise Levels
Grading	(R6) Residential to East (across Grand Ave)	65.4	68.3	2.9	11	57.3	-8.1
	(R7) Residential to Southwest (western side of S Hope St)	66.5	65.2	-1.3	11	54.2	-12.3
	(R9) Residential to South (eastern side of S Hope St)	66.5	64.2	-2.3	11	53.2	-13.3
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	64.5	-0.9	11	53.5	-11.9
	(R4) Church to South (eastern side of S Hope St)	66.5	66.2	-0.3	11	55.2	-11.3
Building Construction	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	75.4	10.0	11	64.4	-1.0
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	68.1	1.6	11	57.1	-9.4
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	73.1	-0.3	11	62.1	-11.3
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	62.8	-2.6	11	51.8	-13.6
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	67.6	2.2	11	56.6	-8.8
	(R6) Residential to East (across Grand Ave)	65.4	65.1	-0.3	11	54.1	-11.3
	(R7) Residential to Southwest (western side of S Hope St)	66.5	62.0	-4.5	11	51.0	-15.5
	(R9) Residential to South (eastern side of S Hope St)	66.5	60.9	-5.6	11	49.9	-16.6
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	61.3	-4.1	11	50.3	-15.1
	(R4) Church to South (eastern side of S Hope St)	66.5	63.0	-3.5	11	52.0	-14.5
Paving	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	80.5	15.1	11	69.5	4.1
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	73.2	6.7	11	62.2	-4.3
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	78.2	4.8	11	67.2	-6.2
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	67.9	2.5	11	56.9	-8.5
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	72.7	7.3	11	61.7	-3.7
	(R6) Residential to East (across Grand Ave)	65.4	70.2	4.8	11	59.2	-6.2
	(R7) Residential to Southwest (western side of S Hope St)	66.5	67.1	0.6	11	56.1	-10.4
	(R9) Residential to South (eastern side of S Hope St)	66.5	66.0	-0.5	11	55.0	-11.5
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	66.4	1.0	11	55.4	-10.0
	(R4) Church to South (eastern side of S Hope St)	66.5	68.1	1.6	11	57.1	-9.4

Phase	Receptor Location	Existing Ambient Noise Levels (Leq)[1]	Unmitigated Construction Noise Levels[2,4]	Increase (dB)	Reduction with Mitigation[3] (dB)	Mitigated Construction Noise Levels (Leq)	Mitigated Increase in Ambient Noise Levels
Architectural Coating	(R1) Mixed-Use/Residential to East (across alleyway)	65.4	70.0	4.6	11	59.0	-6.4
	(R2) Mixed-Use/Residential to South (across Pico Blvd)	66.5	62.7	-3.8	11	51.7	-14.8
	(R3) Mixed-Use/Residential to West (across S Hope St)	73.4	67.7	-5.7	11	56.7	-16.7
	(R5) Mixed-Use/Residential to Northeast (across W 12th St)	65.4	57.3	-8.1	11	46.3	-19.1
	(R8) Mixed-Use/Residential to North (southern side of W 12th St)	65.4	62.2	-3.2	11	51.2	-14.2
	(R6) Residential to East (across Grand Ave)	65.4	59.6	-5.8	11	48.6	-16.8
	(R7) Residential to Southwest (western side of S Hope St)	66.5	56.6	-9.9	11	45.6	-20.9
	(R9) Residential to South (eastern side of S Hope St)	66.5	55.5	-11.0	11	44.5	-22.0
	(R10) Mixed-Use/Residential to East (western side of S Olive St)	65.4	55.8	-9.6	11	44.8	-20.6
	(R4) Church to South (eastern side of S Hope St)	66.5	57.5	-9.0	11	46.5	-20.0

Notes:

(1) Noise measurement locations are shown on Figure 5. Due to topograpical considerations, noise measurement 1 was chosen to represent noise levels at the property lines of receptors to the south and southwest, noise measurement 2 was chosen to represent noise levels at the property lines of receptors to the west and northwest, and noise measurement 3 was chosen to represent the property lines of receptors to the east, northeast, and north.

(2) Construction noise worksheets are provided in Appendix D.

(3)This reduction can be verified by measuring on-site equipment or by special ordering mufflers to meet reduction requirement, or by providing sheilding/acoustic tent that provides a 20 dB reduction. See Appendix D.

(4) Source: Referenced construction equipment noise levels taken from the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual (September 2018); the FHWA Roadway Construciton Noise Model User's Guide (January 2006); and http://www.noisetesting.info/blog/warehouse-forklift-workplace-noise-levels.

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MEMO: Requirements for Determining and Mitigating Traffic Noise Impacts to Residential Structures.

NOISE STANDARDS:

1. The Noise Element of the General Plan indicates that to avoid future noise hazard, the maximum capacity design standard for highways and major roads will be used for determining the maximum future noise level or, in the case of freeways and airports, the estimated conditions 20 years in the future.
2. The interior noise levels in residential dwellings shall not exceed 45 Ldn/CNEL.
3. The exterior noise level shall not exceed 65 Ldn/CNEL.
4. Required Noise Prediction Model B Traffic Noise: FHWA RD 77-108 Highway Traffic Prediction Model, Sound 32 or the equivalent.

REQUIRED TRAFFIC NOISE MODELING PARAMETERS:

1. Roadway Classification: All roadways must be classified into one of the following categories as defined in the General Plan: Secondary, Major, Arterial, Urban Arterial, Expressway, Freeway, and Specific Plan Road.
2. Roadway Traffic Volume: All roadways must be modeled using Average Daily Trip (ADT) Level of Service "C" design capacities. For roadways classified by the General Plan as variable, future build-out traffic volumes must be obtained from the County's Transportation Department
3. or in the case of freeways, from Caltrans.
4. Required vehicle mix.
   - Freeways: Vehicle mix information must be obtained from Caltrans.
   - Roadways designated as major, arterial highways, or expressways:

VEHICLE	OVERALL %	DAY (7AM-7PM) %	EVENING (7PM-10PM) %	NIGHT (10PM-7AM) %
Auto	92	69.5	12.9	9.6
Medium Truck	3	1.44	0.06	1.5
Heavy Truck	5	2.4	0.1	2.5

   - Roadways designated as secondary, collectors, or smaller:

VEHICLE	OVERALL %	DAY (7AM-7PM) %	EVENING (7PM-10PM) %	NIGHT (10PM-7AM) %
Auto	97.4	73.6	13.6	10.22
Medium Truck	1.84	0.9	0.04	0.9
Heavy Truck	0.74	0.35	0.04	0.35

5. Traffic Speed: For County roads assume an average traffic speed of 40 MPH. For freeways, contact CALTRANS and use what speed they recommend.
6. Terrain conditions for modeling noise propagation: Assume Ahard site@ conditions in determining noise propagation (no more than 3 dB of attenuation per doubling of distance between source and receiver).
7. Noise attenuation attributed to standard residential architecture: It is assumed that standard residential design (with windows closed) will provide no more than 20 dB (A) of attenuation. Additional mitigation must be demonstrated via modeling.

Table D

Noise Levels 50 feet from Roadway Centerline*

Road Segments	Existing (2019)		Existing Plus Project			Is the Increase Significant ?	Future without Project		Future with Project			Is the Increase Significant ?
	ADT	dB CNEL	ADT	Total	Project-Specific Increase		ADT	dB CNEL	ADT	Total	Project-Specific Increase	
Hope Street												
n/o 12th Street	2,450	61.6	2,900	62.3	0.7	**No**	5,700	65.3	6,060	65.5	0.2	**No**
n/o Pico Boulevard	2,590	61.8	4,580	64.3	2.5	**No**	5,470	65.1	8,880	67.2	2.1	**No**
s/o Pico Boulevard	1,830	60.3	1,980	60.7	0.4	**No**	4,200	63.9	4,350	64.1	0.2	**No**
Grand Avenue												
s/o 12th Street	16,090	69.8	16,690	69.9	0.1	**No**	19,970	70.7	20,570	70.8	0.1	**No**
s/o Pico Boulevard	12,200	68.6	13,010	68.8	0.2	**No**	14,860	69.4	15,690	69.7	0.3	**No**
12th Street												
e/o Hope Street	3,280	62.9	4,350	64.1	1.2	**No**	5,900	65.4	7,000	66.2	0.8	**No**
e/o Grand Avenue	3,310	62.9	3,580	63.2	0.3	**No**	5,160	64.8	5,700	65.3	0.5	**No**
Pico Boulevard												
w/o Hope Street	8,680	67.1	9,120	67.3	0.2	**No**	11,180	68.2	11,620	68.4	0.2	**No**
e/o Hope Street	5,600	65.2	5,860	65.4	0.2	**No**	8,090	66.8	8,360	66.9	0.1	**No**
e/o Grand Avenue	6,040	65.5	6,230	65.6	0.1	**No**	9,160	67.3	9,350	67.4	0.1	**No**

*The uniform distance of 50 feet allows for direct comparisons of potential increases or decreases in noise levels based upon various traffic scenarios; however, at this distance, no specific noise standard necessarily applies

VdB Calculations
Based on reference equation 7-3 from Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, 2018, pg 185

*Lv (distance) = Lv (ref) - 30*log (D/25)*

large bulldozer @ 20 feet

Lv 89.91

large bulldozer @ 80 feet

Lv 71.85

Vibratory Roller @ 20 feet

Lv 96.9073

Vibratory Roller @ 136 feet

Lv 71.93203

large bulldozer @ 50 feet

Lv 77.97

large bulldozer @ 240 feet

Lv 57.53

Vibratory Roller @ 50 feet

Lv 84.9691

Vibratory Roller @ 240 feet

Lv 64.53186

GROUNDBORNE VIBRATION ANALYSIS

Project:	Morrison	Date:	3/2/22
Source:	Roller		
Scenario:	Unmitigated		
Location:	Project Site		
Address:	Industrial building adjacent to the boundary		

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	1.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.

RESULTS

PPV =	26.250	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	Morrison	Date:	3/2/22
Source:	Roller		
Scenario:	Mitigated		
Location:	Project Site		
Address:	Industrial building adjacent to the boundary		

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	12.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.

RESULTS

PPV =	0.268	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	Morrison	Date:	3/2/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Project Site		
Address:	Industrial building adjacent to the boundary		

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	1.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.

RESULTS

PPV =	11.125	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	Morrison	Date:	3/2/22
Source:	Roller		
Scenario:	Unmitigated		
Location:	Project Site		
Address:	E on Grand Mixed Use		

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	1	Vibratory Roller	INPUT SECTION IN GREEN
PPVref =	0.21	Reference PPV (in/sec) at 25 ft.	
D =	20.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.

RESULTS

PPV =	0.293	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS

Project:	Morrison	Date:	3/2/22
Source:	Large Bulldozer		
Scenario:	Unmitigated		
Location:	Project Site		
Address:	E on Grand Mixed Use		

PPV = PPVref(25/D)^n (in/sec)

INPUT

Equipment = Type	2	Large Bulldozer	INPUT SECTION IN GREEN
PPVref =	0.089	Reference PPV (in/sec) at 25 ft.	
D =	1.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	

Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.

RESULTS

PPV =	11.125	IN/SEC	OUTPUT IN BLUE

GROUNDBORNE VIBRATION ANALYSIS			
Project:	Morrison		Date: 3/2/22
Source:	Loaded Truck		
Scenario:	Unmitigated		
Location:	Project Site		
Address:	Residential Uses that line the haul route		
PPV = PPVref(25/D)^n (in/sec)			
INPUT			
Equipment = Type	4	Loaded Trucks	INPUT SECTION IN GREEN
PPVref =	0.076	Reference PPV (in/sec) at 25 ft.	
D =	30.00	Distance from Equipment to Receiver (ft)	
n =	1.50	Vibration attenuation rate through the ground	
Note: Based on reference equations from Vibration Guidance Manual, California Department of Transportation, 2013, pgs 35-40.			
RESULTS			
PPV =	0.058	IN/SEC	OUTPUT IN BLUE