# Appendix F

# Noise Measurement Data and Noise Modeling Calculations



# **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).

Measurement Site:	Location 2: Site A
Measurement Date:	8/26/2018-8/27/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound							
Day	Sound	Power	Perio	d of 24-Hou	ur Day	Sound Po	wer Breakdo	own by	
(military	Level Leq	=10*Log(dB	(1=i	ncluded, 0=	=not)	Pe	eriod of Day		
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	-
0:00	27.2	525	0	0	1	0	0	525	
1:00	28.0	631	0	0	1	0	0	631	
2:00	29.6	912	0	0	1	0	0	912	
3:00	31.0	1,259	0	0	1	0	0	1,259	
4:00	29.7	933	0	0	1	0	0	933	
5:00	30.9	1,230	0	0	1	0	0	1,230	
6:00	38.7	7,413	0	0	1	0	0	7,413	
7:00	39.7	9,333	1	0	0	9,333	0	0	
8:00	38.1	6,457	1	0	0	6,457	0	0	
9:00	45.1	32,359	1	0	0	32,359	0	0	
10:00	40.3	10,715	1	0	0	10,715	0	0	
11:00	42.1	16,218	1	0	0	16,218	0	0	
12:00	40.5	11,220	1	0	0	11,220	0	0	
13:00	39.0	7,943	1	0	0	7,943	0	0	
14:00	37.9	6,166	1	0	0	6,166	0	0	
15:00	38.7	7,413	1	0	0	7,413	0	0	
16:00	39.3	8,511	1	0	0	8,511	0	0	
17:00	40.2	10,471	1	0	0	10,471	0	0	
18:00	45.6	36,308	1	0	0	36,308	0	0	
19:00	42.9	19,498	0	1	0	0	19,498	0	
20:00	40.0	10,000	0	1	0	0	10,000	0	
21:00	35.9	3,890	0	1	0	0	3,890	0	
22:00	32.6	1,820	0	0	1	0	0	1,820	
23:00	32.3	1,698	0	0	1	0	0	1,698	
	Sum	of Sound Powe	er during	Period wo	/penalty	163,115	33,389	16,421	
	L	og Factor for <b>C</b>	NEL Pen	alty (i.e., 1	0*log(x))	1	3	10	
		Sound Power	during I	Period with	penalty	163,115	100,167	164,213	
			Total Da	ily Sound P	ower, with	n penalties	427,494		
					Hou	rs per Day	24		Ldn compu-
		Aver	age Houi	rly Sound P	ower, with	n penalties	17,812		tation on next
						CNEL	42.5		page.
					Computa	ation of Ldn			
	Perio Day			Period of Day (1=ir 0=n	24-Hour ncluded, lot)	Sound P Breakdo Period o	ower wn by f Day		
				Day	Night	Day	Night		

	0	1	0	912	
	0	1	0	1,259	
	0	1	0	933	
	0	1	0	1,230	
	0	1	0	7,413	
	1	0	9,333	0	
	1	0	6,457	0	
	1	0	32,359	0	
	1	0	10,715	0	
	1	0	16,218	0	
	1	0	11,220	0	
	1	0	7,943	0	
	1	0	6,166	0	
	1	0	7,413	0	
	1	0	8,511	0	
	1	0	10,471	0	
	1	0	36,308	0	
	1	0	19,498	0	
	1	0	10,000	0	
	1	0	3,890	0	
	0	1	0	1,820	
	0	1	0	1,698	
Sum of Sound Power during	Period wo	o/penalty	196,504	16,421	
Log Factor for Pena	alty (i.e., 1	LO*log(x))	1	10	
Sound Power during P	Period wit	h penalty	196,504	164,213	
Total Dai	ly Sound	Power, wit	h penalties	360,716	
		Но	urs per Day	24	
Average Hour	ly Sound	Power, wit	h penalties	15,030	
			Ldn	41.8	

0

0

1

1

0

0

525

631

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **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).

Measurement Site:	Location 2: Site A
Measurement Date:	8/26/2018-8/27/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound			_				
Day	Sound	Power	Perio	d of 24-Ho	ur Day	Sound Po	wer Breakdo	own by	
(military	Level Leq	=10*Log(dB	(1=i	ncluded, 0=	=not)	Pe	eriod of Day		
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	-
0:00	31.7	1,479	0	0	1	0	0	1,479	
1:00	29.4	871	0	0	1	0	0	871	
2:00	23.0	200	0	0	1	0	0	200	
3:00	25.3	339	0	0	1	0	0	339	
4:00	24.6	288	0	0	1	0	0	288	
5:00	29.0	794	0	0	1	0	0	794	
6:00	34.2	2,630	0	0	1	0	0	2,630	
7:00	39.0	7,943	1	0	0	7,943	0	0	
8:00	38.6	7,244	1	0	0	7,244	0	0	
9:00	40.9	12,303	1	0	0	12,303	0	0	
10:00	37.9	6,166	1	0	0	6,166	0	0	
11:00	40.1	10,233	1	0	0	10,233	0	0	
12:00	44.3	26,915	1	0	0	26,915	0	0	
13:00	46.0	39,811	1	0	0	39,811	0	0	
14:00	39.9	9,772	1	0	0	9,772	0	0	
15:00	41.6	14,454	1	0	0	14,454	0	0	
16:00	42.1	16,218	1	0	0	16,218	0	0	
17:00	41.9	15,488	1	0	0	15,488	0	0	
18:00	41.4	13,804	1	0	0	13,804	0	0	
19:00	40.9	12,303	0	1	0	0	12,303	0	
20:00	34.2	2,630	0	1	0	0	2,630	0	
21:00	33.7	2,344	0	1	0	0	2,344	0	
22:00	32.4	1,738	0	0	1	0	0	1,738	
23:00	33.6	2,291	0	0	1	0	0	2,291	
	Sum	of Sound Powe	r during	Period wo	/penalty	180,352	17,277	10,630	
	L	og Factor for C	NEL Pen	alty (i.e., 1	0*log(x))	1	3	10	
		Sound Power	during l	Period with	penalty	180,352	51,832	106,301	
			Total Da	ily Sound P	ower, with	n penalties	338,485		
					Hou	rs per Day	24		I dn comnu-
		Avera	age Hou	rly Sound P	ower, with	penalties	14,104		tation on next
			-	-		CNFI	41 5		naae
					Comput	ation of I dn	11.5		page.
					computa				
				Doriod of	24 Haur	ومنتعا م	0.W07		
					24-mour	Brookdo	uwei wa by		
					(ciuuea,	Deriod	f Dov		
				U=N	Night	Period 0	Night		
				Day	inigiit	Day	INIGIIL		

	0	1	0	200	
	0	1	0	339	
	0	1	0	288	
	0	1	0	794	
	0	1	0	2,630	
	1	0	7,943	0	
	1	0	7,244	0	
	1	0	12,303	0	
	1	0	6,166	0	
	1	0	10,233	0	
	1	0	26,915	0	
	1	0	39,811	0	
	1	0	9,772	0	
	1	0	14,454	0	
	1	0	16,218	0	
	1	0	15,488	0	
	1	0	13,804	0	
	1	0	12,303	0	
	1	0	2,630	0	
	1	0	2,344	0	
	0	1	0	1,738	
	0	1	0	2,291	
Sum of Sound Power during I	Period wo	o/penalty	197,629	10,630	
Log Factor for Pena	alty (i.e., 1	L0*log(x))	1	10	
Sound Power during P	eriod wit	h penalty	197,629	106,301	
Total Dail	ly Sound	Dowor wit	h nonaltion	202 020	
Total Dan	iy Sound	Power, with	irs por Day	505,950 24	
Avorago Hour	ly Sound		h nonaltion	12 664	
Average Hour	iy Sound	rower, with	in penantes	12,004	
			Ldn	41.0	

0

0

1

1

0

0

1,479

871

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **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).

Measurement Site:	Location 1: Site D
Measurement Date:	8/23/2018-8/24/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound							
Day	Sound	Power	Perio	d of 24-Hou	ur Day	Sound Po	wer Breakdo	wn by	
(military	Level Leq	=10*Log(dB	(1=i	ncluded, 0=	=not)	Pe	riod of Day		
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	_
0:00	29.6	912	0	0	1	0	0	912	
1:00	27.7	589	0	0	1	0	0	589	
2:00	27.9	617	0	0	1	0	0	617	
3:00	24.1	257	0	0	1	0	0	257	
4:00	27.5	562	0	0	1	0	0	562	
5:00	32.5	1,778	0	0	1	0	0	1,778	
6:00	35.6	3,631	0	0	1	0	0	3,631	
7:00	38.5	7,079	1	0	0	7,079	0	0	
8:00	38.2	6,607	1	0	0	6,607	0	0	
9:00	42.9	19,498	1	0	0	19,498	0	0	
10:00	41.1	12,882	1	0	0	12,882	0	0	
11:00	44.1	25,704	1	0	0	25,704	0	0	
12:00	46.4	43,652	1	0	0	43,652	0	0	
13:00	40.8	12,023	1	0	0	12,023	0	0	
14:00	42.6	18,197	1	0	0	18,197	0	0	
15:00	44.7	29,512	1	0	0	29,512	0	0	
16:00	42.7	18,621	1	0	0	18,621	0	0	
17:00	41.9	15,488	1	0	0	15,488	0	0	
18:00	42.2	16,596	1	0	0	16,596	0	0	
19:00	39.6	9,120	0	1	0	0	9,120	0	
20:00	34.9	3,090	0	1	0	0	3,090	0	
21:00	35.6	3,631	0	1	0	0	3,631	0	
22:00	32.8	1,905	0	0	1	0	0	1,905	
23:00	29.6	912	0	0	1	0	0	912	
	Sum	of Sound Powe	er during	Period wo	/penalty	225,860	15,841	11,163	
	L	og Factor for C	NEL Pen	alty (i.e., 1	0*log(x))	1	3	10	
		Sound Power	<sup>.</sup> during l	Period with	n penalty	225,860	47,524	111,634	
			Total Da	ily Sound P	ower, with	n penalties	385,017		
					Hou	rs per Day	24		Ldn compu-
		Avera	age Houi	rly Sound P	ower, with	n penalties	16,042		tation on next
						CNEL	42.1		paae.
					Compute	ation of I dn			
					compati				
				Period of Day (1=ir 0=n	24-Hour ncluded, ot)	Sound P Breakdov Period o	ower wn by f Day		
				Day	Night	Day	Night		

	0	1	0	617	
	0	1	0	257	
	0	1	0	562	
	0	1	0	1,778	
	0	1	0	3,631	
	1	0	7,079	0	
	1	0	6,607	0	
	1	0	19,498	0	
	1	0	12,882	0	
	1	0	25,704	0	
	1	0	43,652	0	
	1	0	12,023	0	
	1	0	18,197	0	
	1	0	29,512	0	
	1	0	18,621	0	
	1	0	15,488	0	
	1	0	16,596	0	
	1	0	9,120	0	
	1	0	3,090	0	
	1	0	3,631	0	
	0	1	0	1,905	
	0	1	0	912	
Sum of Sound Power during	Period wo	p/penalty	241,701	11,163	
Log Factor for Pena	alty (i.e., 1	.0*log(x))	1	10	
Sound Power during P	eriod wit	h penalty	241,701	111,634	
Total Dai	ly Sound I	Power, wit	h penalties	353,334	
		Но	urs per Day	24	
Average Hour	ly Sound I	Power, wit	h penalties	14,722	
			Ldn	41.7	

0

0

1

1

0

0

912

589

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **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).

Measurement Site:	Location 1: Site D
Measurement Date:	8/24/2018-8/25/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound							
Day	Sound	Power	Perio	d of 24-Hoເ	ur Day	Sound	Power Break	down by	
(military	Level Leq	=10*Log(dB	(1=iı	ncluded, 0=	=not)		Period of Day	/	
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	_
0:00	30.2	1,047	0	0	1	(	0 0	1,047	
1:00	38.4	6,918	0	0	1	(	0 0	6,918	
2:00	23.1	204	0	0	1	(	0 0	204	
3:00	24.6	288	0	0	1	(	0 0	288	
4:00	26.4	437	0	0	1	(	0 0	437	
5:00	31.4	1,380	0	0	1	(	0 0	1,380	
6:00	34.0	2,512	0	0	1	(	0 0	2,512	
7:00	35.4	3,467	1	0	0	3,467	7 0	0	
8:00	34.0	2,512	1	0	0	2,512	2 0	0	
9:00	34.7	2,951	1	0	0	2,951	L 0	0	
10:00	38.1	6,457	1	0	0	6,457	7 0	0	
11:00	38.7	7,413	1	0	0	7,413	3 0	0	
12:00	42.6	18,197	1	0	0	18,197	7 0	0	
13:00	47.1	51,286	1	0	0	51,286	5 0	0	
14:00	55.1	323,594	1	0	0	323,594	1 0	0	
15:00	42.8	19,055	1	0	0	19,055	5 0	0	
16:00	44.0	25,119	1	0	0	25,119	9 0	0	
17:00	40.8	12,023	1	0	0	12,023	3 0	0	
18:00	40.3	10,715	1	0	0	10,715	5 0	0	
19:00	39.5	8,913	0	1	0	(	) 8,913	0	
20:00	34.4	2,754	0	1	0	(	) 2,754	0	
21:00	34.1	2,570	0	1	0	(	) 2,570	0	
22:00	34.0	2,512	0	0	1	(	0	2,512	
23:00	29.5	891	0	0	1	(	) 0	891	
		(c ) b			, .	400 704		46.400	
	Sum	of Sound Powe	r during	Period wo	/penalty	482,788	3 14,237	16,190	
		Log Factor for C	NEL Pen	alty (i.e., 10	U*log(x))	102 700	L 3	10	
		Sound Power	during	Period with	penalty	482,788	3 42,711	161,899	
				ily Cound P			607 200		
			i otal Da	iiy souna P	ower, witi	n penaities	687,399		
		•			HOU	irs per Day	24		Ldn compu-
		Avera	age Houi	riy Sound P	ower, witi	n penaities	<b>5</b> 28,642		tation on next
						CNE	44.6		page.
					Comput	ation of Lo	In		
				Period of	24-Hour	Sound	d Power		
				Day (1=ir	ncluded,	Break	down by		
				0=n	ot)	Perio	d of Day		
				Dav	Night	Dav	Night		

	0	1	0	204
	0	1	0	288
	0	1	0	437
	0	1	0	1,380
	0	1	0	2,512
	1	0	3,467	0
	1	0	2,512	0
	1	0	2,951	0
	1	0	6,457	0
	1	0	7,413	0
	1	0	18,197	0
	1	0	51,286	0
	1	0	323,594	0
	1	0	19,055	0
	1	0	25,119	0
	1	0	12,023	0
	1	0	10,715	0
	1	0	8,913	0
	1	0	2,754	0
	1	0	2,570	0
	0	1	0	2,512
	0	1	0	891
Sum of Sound Power during I	Period wo	p/penalty	497,025	16,190
Log Factor for Pena	lty (i.e., 1	LO*log(x))	1	10
Sound Power during P	eriod wit	h penalty	497,025	161,899
Total Dail	y Sound I	Power, with	n penalties	658,925
		Hou	irs per Day	24
Average Hourl	y Sound I	Power, with	n penalties	27,455
			Ldn	44.4

0

0

1

1

0

0

1,047

6,918

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **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).

Measurement Site:	Location 1: Site D
Measurement Date:	8/25/2018-8/26/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound						_	
Day	Sound	Power	Perio	d of 24-Ho	ur Day	Sound Po	wer Breakdo	own by	
(military	Level Leq	=10*Log(dB	(1=ir	ncluded, 0=	=not)	Pe	eriod of Day		
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	-
0:00	28.5	708	0	0	1	0	0	708	
1:00	26.9	490	0	0	1	0	0	490	
2:00	25.3	339	0	0	1	0	0	339	
3:00	25.3	339	0	0	1	0	0	339	
4:00	27.7	589	0	0	1	0	0	589	
5:00	29.1	813	0	0	1	0	0	813	
6:00	34.0	2,512	0	0	1	0	0	2,512	
7:00	35.3	3,388	1	0	0	3,388	0	0	
8:00	40.2	10,471	1	0	0	10,471	0	0	
9:00	39.7	9,333	1	0	0	9,333	0	0	
10:00	42.7	18,621	1	0	0	18,621	0	0	
11:00	47.4	54,954	1	0	0	54,954	0	0	
12:00	43.6	22,909	1	0	0	22,909	0	0	
13:00	40.9	12,303	1	0	0	12,303	0	0	
14:00	40.2	10,471	1	0	0	10,471	0	0	
15:00	42.7	18,621	1	0	0	18,621	0	0	
16:00	43.4	21,878	1	0	0	21,878	0	0	
17:00	41.5	14,125	1	0	0	14,125	0	0	
18:00	42.2	16,596	1	0	0	16,596	0	0	
19:00	41.4	13,804	0	1	0	0	13,804	0	
20:00	35.3	3,388	0	1	0	0	3,388	0	
21:00	32.8	1,905	0	1	0	0	1,905	0	
22:00	35.7	3,715	0	0	1	0	0	3,715	
23:00	30.6	1,148	0	0	1	0	0	1,148	
	Sum	of Sound Powe	er during	Period wo	/penalty	213,670	19,098	10,652	
	l	og Factor for C	NEL Pen	alty (i.e., 1	0*log(x))	1	3	10	
		Sound Power	r during F	Period with	penalty	213,670	57,293	106,525	
			Total Dai	ily Sound P	ower, witl	n penalties	377,488		
					Ηοι	irs per Day	24		Ldn compu-
		Aver	age Hour	ly Sound P	ower, witl	n penalties	15,729		tation on ne
						CNEL	42.0		page.
					Comput	ation of Ldn			
					-				
				Period of	24-Hour	Sound P	ower		
				Day (1=iı	ncluded,	Breakdo	wn by		
				0=n	ot)	Period o	f Day		
				Day	Night	Day	Night		

	0	1	0	339
	0	1	0	339
	0	1	0	589
	0	1	0	813
	0	1	0	2,512
	1	0	3,388	0
	1	0	10,471	0
	1	0	9,333	0
	1	0	18,621	0
	1	0	54,954	0
	1	0	22,909	0
	1	0	12,303	0
	1	0	10,471	0
	1	0	18,621	0
	1	0	21,878	0
	1	0	14,125	0
	1	0	16,596	0
	1	0	13,804	0
	1	0	3,388	0
	1	0	1,905	0
	0	1	0	3,715
	0	1	0	1,148
Sum of Sound Power during	Period wo	o/penalty	232,767	10,652
Log Factor for Pena	alty (i.e., 1	LO*log(x))	1	10
Sound Power during P	eriod wit	h penalty	232,767	106,525
Total Dai	ly Sound	Power, wit	h penalties	339,292
		Hou	irs per Day	24
Average Hour	ly Sound	Power, wit	h penalties	14,137
			Ldn	41.5

0

0

1

1

0

0

708

490

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **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).

Measurement Site:	Location 1: Site D
Measurement Date:	8/26/2018-8/27/2018
Project Name:	Tahoe XC

**Computation of CNEL** 

Hour of		Sound							
Day	Sound	Power	Perio	d of 24-Hou	ur Day	Sound Po	wer Breakdo	own by	
(military	Level Leq	=10*Log(dB	(1=i	ncluded, 0=	=not)	Pe	eriod of Day		
time)	(dBA)	A/10)	Day	Evening	Night	Day	Evening	Night	
0:00	28.2	661	0	0	1	0	0	661	
1:00	27.0	501	0	0	1	0	0	501	
2:00	25.8	380	0	0	1	0	0	380	
3:00	22.0	158	0	0	1	0	0	158	
4:00	23.8	240	0	0	1	0	0	240	
5:00	30.2	1,047	0	0	1	0	0	1,047	
6:00	39.2	8,318	0	0	1	0	0	8,318	
7:00	37.6	5,754	1	0	0	5,754	0	0	
8:00	40.6	11,482	1	0	0	11,482	0	0	
9:00	40.0	10,000	1	0	0	10,000	0	0	
10:00	42.1	16,218	1	0	0	16,218	0	0	
11:00	41.3	13,490	1	0	0	13,490	0	0	
12:00	40.5	11,220	1	0	0	11,220	0	0	
13:00	44.8	30,200	1	0	0	30,200	0	0	
14:00	46.7	46,774	1	0	0	46,774	0	0	
15:00	48.0	63,096	1	0	0	63,096	0	0	
16:00	47.8	60,256	1	0	0	60,256	0	0	
17:00	44.7	29,512	1	0	0	29,512	0	0	
18:00	43.0	19,953	1	0	0	19,953	0	0	
19:00	35.3	3,388	0	1	0	0	3,388	0	
20:00	33.8	2,399	0	1	0	0	2,399	0	
21:00	34.1	2,570	0	1	0	0	2,570	0	
22:00	33.7	2,344	0	0	1	0	0	2,344	
23:00	29.0	794	0	0	1	0	0	794	
	Sum	of Sound Powe	er during	Period wo	/penalty	317,953	8,358	14,444	
	L	og Factor for C	NEL Pen	alty (i.e., 1	0*log(x))	1	3	10	
		Sound Power	<sup>.</sup> during l	Period with	penalty	317,953	25,073	144,438	
			Total Da	ily Sound P	ower, with	n penalties	487,464		
					Hou	rs per Day	24		Ldn compu-
		Avera	age Hou	rly Sound P	ower, with	n penalties	20,311		tation on next
						CNEL	43.1		paae.
					Compute	ation of I dn			
					comput				
				Period of Day (1=ir 0=n	24-Hour ncluded, ot)	Sound P Breakdov Period o	ower wn by f Day		
				Day	Night	Day	Night		

	0	1	0	380	
	0	1	0	158	
	0	1	0	240	
	0	1	0	1,047	
	0	1	0	8,318	
	1	0	5,754	0	
	1	0	11,482	0	
	1	0	10,000	0	
	1	0	16,218	0	
	1	0	13,490	0	
	1	0	11,220	0	
	1	0	30,200	0	
	1	0	46,774	0	
	1	0	63,096	0	
	1	0	60,256	0	
	1	0	29,512	0	
	1	0	19,953	0	
	1	0	3,388	0	
	1	0	2,399	0	
	1	0	2,570	0	
	0	1	0	2,344	
	0	1	0	794	
Sum of Sound Power during	Period wo	p/penalty	326,311	14,444	
Log Factor for Pena	alty (i.e., 1	LO*log(x))	1	10	
Sound Power during P	eriod wit	h penalty	326,311	144,438	
T. (. ) D. (				470 740	
i otal Dai	ly Sound	rower, wit	n penalties	470,749	
A		HO 	urs per Day	24	
Average Hour	ly Sound	Power, wit	n penalties	19,615	
			Ldn	42.9	

0

0

1

1

0

0

661

501

# Notes:

Computation of the CNEL based on 1-hour Leq measurements for each hour of a day are based on equation 2-27 on pg. 2-57 of Caltrans 2009.

Computation of the Ldn based on 1-hour Leq measurements for each hour of a day are based on equation 2-26 on pg. 2-56 of Caltrans 2009.

Log factors for the Ldn and CNEL penalties are provided in Table 2-12 on pg. 2-52 of Caltrans 2009.

# Source:



# **Construction Source Noise Prediction Model: Tuolumne**

				Reference Emission	
	Distance to Nearest	Combined Predicted		Noise Levels (L <sub>max</sub> ) at 50	Usage
Location	Receptor in feet	Noise Level (L <sub>eq</sub> dBA)	Equipment	feet <sup>1</sup>	Factor <sup>1</sup>
Threshold	1,218	50.0	Front End Loader	80	0.4
Residence 1	370	61.8	Grader	85	0.4
Alt A	120	74.7	Dozer	85	0.4
NT School	335	62.9			
			Ground Type Source Height Receiver Height Ground Factor <sup>2</sup>	soft 8 5 0.63	
			Predicted Noise Level <sup>3</sup>	L <sub>eq</sub> dBA at 50 feet <sup>3</sup>	
			Front End Loader	76.0	
			Grader	81.0	
			Dozer	81.0	

Combined Predicted Noise Level (L<sub>eq</sub> dBA at 50 feet) 84.7

Sources:

 $^{\rm 1}$  Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

<sup>2</sup> 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;

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

D = Distance from source to receiver.



# **Construction Source Noise Prediction Model**

				Reference Emission	
	Distance to Nearest	<b>Combined Predicted</b>		Noise Levels (L <sub>max</sub> ) at 50	Usage
Location	Receptor in feet	Noise Level (L <sub>eg</sub> dBA)	Equipment	feet <sup>1</sup>	Factor <sup>1</sup>
Threshold	1,757	50.0	Grader	85	1
Residence 1	370	65.8	Front End Loader	80	1
Alt A	120	78.6	Dozer	85	1
NT School	335	66.9			1
					1
			Ground Type	coft	
			Source Height	solt	
			Boceiver Height	0	
				5	
			Ground Factor	0.63	
			Predicted Noise Level <sup>3</sup>	L <sub>eq</sub> dBA at 50 feet <sup>3</sup>	
			Grader	85.0	
			Front End Loader	80.0	
			Dozer	85.0	

Combined Predicted Noise Level (Leq dBA at 50 feet)

88.6

Sources:

 $^{\rm 1}$  Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

<sup>2</sup> 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;

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

D = Distance from source to receiver.

Auger Drill Rig         20         85         84         36         79.0         72.0         100         78.0         71.0           Bar Bender         20         80         na         0         74.0         70.0         100         72.0         68.0           Bar Bender         20         80         na         0         84.0         100           Boring Jack Power Unit         50         80         83         1         74.0         67.0         100         77.0         74.0           Cam Shovel (dropping)         20         93         87         4         87.0         80.0         100         77.0         70.0         73.0         68.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70	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 brill Rig         20         85         84         36         79.0         72.0         100         78.0         71.0           Barkhoe         40         80         78         372         74.0         70.0         100         72.0         68.0           Barthender         20         80         71         74.0         67.0         100         71.0         74.0           Bining Lack Power Unit         50         80         84         46         79.0         72.0         100         71.0         74.0           Chain Save (dropping)         20         83         87         74.0         67.0         100         71.0         70.0         70.0           Compressor (ground)         20         83         73         74.0         67.0         100         73.0         68.0           Concrete Batch Flant         15         83         na         0         77.0         76.0         68.0         100         75.0         67.0         75.0         67.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0										
Bar Bender         20         80         na         0         74.0         67.0         100           Boring Jack Power Unit         50         80         83         1         74.0         71.0         100         77.0         74.0           Clam Showel (dropping)         20         85         84         46         79.0         70.0	Auger Drill Rig Backhoe	20 40	85 80	84 78	36 372	79.0 74.0	72.0 70.0	100 100	78.0 72.0	71.0 68.0
Boring Jack Power Unit         50         80         83         1         74.0         71.0         100         77.0         74.0           Chan Saw         20         85         84         46         87.0         72.0         100         77.0         74.0           Cam Shovel (dropping)         20         83         87         4         87.0         80.0         100         77.0         70.0           Compactor (ground)         20         80         83         57         74.0         67.0         100         73.0         69.0           Concrete Mure Truck         40         85         79         40         75.0         100         75.0         68.0           Concrete Swa         20         90         90         55         84.0         77.0         100         74.0         71.0         100         74.0         71.0         100         74.0         67.0         Doce         73.0         160         85.0         73.0         100         75.0         160.0         73.0         160.0         73.0         100         73.0         100         73.0         100         73.0         100         73.0         100         73.0         100         73	Bar Bender Blasting	20 na	80 94	na na	0 0	74.0 88.0	67.0	100 100		
Chain Saw       20       85       84       46       79.0       72.0       100       71.0         Compactor (ground)       20       80       83       57       74.0       67.0       100       77.0       70.0         Comprestor (ground)       20       80       78       18       74.0       67.0       100       72.0       68.0         Concrete Batch Plant       15       83       na       0       77.0       100       75.0       68.0         Concrete Saw       20       90       95       84.0       77.0       100       75.0       68.0         Crane       68       81       405       75.0       100       75.0       67.0         Doump Truck       20       84       79       22       78.0       71.0       100       75.0       70.0         Dump Truck       40       85       81       170       78.0       71.0       100       73.0       66.0         Dump Truck       40       85       81       170       78.0       100       73.0       60.0       64.0         Crane tarta       40       85       81       17.0       73.0       100       7	Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Cam Shove! (dropping) 20 93 87 4 87.0 87.0 100 71.0 74.0 Compares (pin) 40 80 78 18 74.0 67.0 100 77.0 76.0 Compressor (air) 40 80 78 18 74.0 77.0 66.7 100 75.0 Concrete Biate Plant 15 83 na 0 77.0 66.7 100 75.0 60.0 Concrete Biate Plant 15 83 79 40 79.0 75.0 100 73.0 69.0 Concrete Saw 20 90 90 95 84.0 77.0 100 75.0 60.0 Concrete Saw 40 85 81 405 79.0 71.0 100 75.0 67.0 Dozer 40 85 82 55 79.0 75.0 100 75.0 67.0 Dozer 40 85 81 405 79.0 71.0 100 74.0 75.0 Dozer 40 85 81 170 79.0 75.0 100 74.0 75.0 Dozer 74.0 85 81 170 79.0 75.0 100 74.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 74.0 71.0 Dom Truck 40 85 81 170 79.0 75.0 100 75.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 74.0 71.0 Gozen 74.0 75.0 Truc 16.0 Dozer 40 85 81 19 76.0 73.0 100 75.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 75.0 71.0 Gozen 75.0 Truc 16.0 Dozer 50 82 81 19 76.0 73.0 100 75.0 71.0 Gozen 75.0 50 82 81 19 76.0 73.0 100 75.0 72.0 Gozen 75.0 100 75.0 72.0 Gozen 75.0 100 75.0 72.0 Gozen 75.0 100 75.0 73.0 Gozen 75.0 75.0 100 75	Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Compares         Can         B3         S7         74.0         67.0         100         77.0         68.0           Compressor (a)         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         75.0         100         75.0         69.0           Concrete Batch Plant         20         82         81         30         76.0         69.0         100         75.0         69.0           Concrete Batch Plant         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         76.0           Drum Mixer         50         80         81         170         79.0         75.0         100         75.0         100         75.0         70.0         75.0         100         75.0         70.0         75.0         100         75.0         70.0         75.0         100         75.0         100         75.0         100	Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Concrete Bark Plant 15 83 na 0 77.0 67.0 100 75.0 68.0 Concrete Miker Truck 40 85 79 40 79.0 75.0 100 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 75.0 72.0 Drull Rig Truck 20 84 79 22 78.0 71.0 100 75.0 67.0 Drull Rig Truck 20 84 79 22 78.0 71.0 100 75.0 67.0 Drull Rig Truck 40 84 76 31 78.0 74.0 100 75.0 67.0 Front End Loader 40 85 81 170 79.0 75.0 100 75.0 71.0 Front End Loader 40 85 81 170 79.0 75.0 100 75.0 72.0 Generator 50 80 80 79 96 74.0 70.0 100 75.0 72.0 Generator 50 82 81 19 76.0 73.0 100 75.0 72.0 Generator 50 82 81 19 76.0 73.0 100 75.0 72.0 Generator 25 88.2 85 71 79.0 75.0 100 75.0 72.0 Generator 40 85 83 70 79.0 75.0 100 75.0 72.0 Generator 40 85 87 1 79.0 75.0 100 75.0 72.0 Gradel 40 85 87 1 79.0 75.0 100 75.0 70.0 73.0 Grader 40 85 87 1 79.0 75.0 100 75.0 70.0 73.0 Grader 40 85 87 1 79.0 75.0 100 75.0 70.0 Gradel 10 90 na 0 84.0 74.0 100 	Compactor (ground)	20	80	83	5/	74.0	67.0	100	77.0	/0.0
Concrete Miker Fruck         13         83         11a         0         77.0         85.7         100           Concrete Miker Fruck         20         82         81         30         76.0         69.0         100         75.0         69.0           Concrete Miker         16         85         81         405         77.0         100         75.0         67.0           Crane         16         85         82         55         79.0         77.0         100         76.0         72.0           Dorer         40         85         82         55         79.0         77.0         100         76.0         67.0           Drum Miker         50         80         80         17.0         79.0         75.0         100         76.0         71.0           Dump Truck         40         84         76         31         78.0         77.0         100         75.0         100         75.0         100         75.0         100         75.0         100         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         77.0         77.0         16.0         77.	Compressor (air)	40	80	/8	18	74.0	70.0	100	72.0	68.0
Cancele Innea Index         Ho         Lo         Lo <thlo< th="">         Lo         Lo         Lo<td>Concrete Mixer Truck</td><td>10</td><td>05 85</td><td>70</td><td>40</td><td>77.0</td><td>75.0</td><td>100</td><td>73.0</td><td>69.0</td></thlo<>	Concrete Mixer Truck	10	05 85	70	40	77.0	75.0	100	73.0	69.0
Concrete Saw         20         90         90         55         84.0         77.0         100         77.0         77.0           Crane         16         85         81         405         79.0         71.0         100         75.0         67.0           Drull Migr Tuck         20         84         79         22         78.0         71.0         100         73.0         66.0           Drum Mixer         50         80         80         1         74.0         100         75.0         71.0           Dump Truck         40         84         74         4         78.0         74.0         100         75.0         71.0           Fita Bed Truck         40         84         74         4         78.0         73.0         100         75.0         72.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Gradel         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradel         40         85         83         37         79.0         75.0         100	Concrete Pump Truck	20	82	81	30	75.0	69.0	100	75.0	68.0
Crane         16         85         81         405         79.0         71.0         100         75.0         67.0           Dozer         40         85         82         55         79.0         71.0         100         74.0         71.0           Drum Miker         50         80         80         1         74.0         71.0         100         74.0         71.0           Dump Truck         40         85         81         170         79.0         75.0         100         75.0         71.0           Front End Loader         40         84         74         4         78.0         70.0         100         75.0         70.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Gradel         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradel         40         85         87         1         79.0         75.0         100         76.0         70.0           Grader         40         85         87         1         79.0         75.0         10	Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Dazer         40         85         82         55         79.0         75.0         100         76.0         77.0 <td>Crane</td> <td>16</td> <td>85</td> <td>81</td> <td>405</td> <td>79.0</td> <td>71.0</td> <td>100</td> <td>75.0</td> <td>67.0</td>	Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Drill Rig Truck         20         84         79         22         78.0         71.0         100         73.0         66.0           Drum Miker         50         80         80         1         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         85         81         19         76.0         73.0         100         75.0         69.0           Generator (25XVA, VMS 5         50         70         73         74         64.0         61.0         100         77.0         73.0           Grader         40         85         83         70         79.0         75.0         100         77.0         73.0           Grader         40         85         87         1         79.0         75.0         100         81.0         77.0           Hydra Break Ram         10         90         na         0         84.0         74.0         86.0         100         76.0         88.0           Jackhammer         20         85         75         23         79.0	Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drum Niker         50         80         80         1         74.0         71.0         100         74.0         71.0           Dump Truck         40         84         76         31         78.0         74.0         100         75.0         71.0           Flat Bed Truck         40         84         74         4         78.0         74.0         100         66.0           Front End Loader         40         83         81         170         79.0         75.0         100         75.0         72.0           Generator         50         82         81         19         76.0         73.0         100         67.0         64.0           Gradall         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradal         40         85         87         1         79.0         75.0         100         76.0         70.0           Gradal         20         85         87         1         79.0         75.0         100         81.0         77.0           Invischhei         10         90         n2         23         79.0         72.0         100	Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
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           Firat Ed Truck         40         80         79         95         74.0         100         75.0         69.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Generator         40         85         83         70         79.0         75.0         100         77.0         73.0           Grader         40         85         87         1         79.0         75.0         100         81.0         77.0           Grader         10         90         na         0         84.0         74.0         100         81.0         76.0         83.0         76.0         70.0         83.0         76.0         70.0         83.0         76.0         100         84.0         77.0         100         84.0         77.0         100         84.0         77.0         100         84.0         77.0 </td <td>Drum Mixer</td> <td>50</td> <td>80</td> <td>80</td> <td>1</td> <td>74.0</td> <td>71.0</td> <td>100</td> <td>74.0</td> <td>71.0</td>	Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Excavator         40         85         81         170         79.0         75.0         100         75.0         71.0           Flat Bed Truck         40         80         79         96         74.0         70.0         100         73.0         69.0           Generator         50         82         81         19         76.0         100         77.0         72.0           Generator (<25KVA, VMS s	Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Flat Bed Truck       40       84       74       4       78.0       74.0       100       68.0       64.0       64.0       67.0       100       73.0       69.0         Generator       50       82       81       19       76.0       73.0       100       73.0       69.0         Gradall       40       85       83       70       79.0       75.0       100       77.0       73.0         Grader       40       85       87       1       79.0       75.0       100       81.0       77.0         Grader       40       85       87       1       79.0       75.0       100       81.0       77.0       70.0         Horizontal Boring Hydr. Jac       25       80       82       6       74.0       68.0       100       76.0       70.0         Hackhammer       20       95       101       11       88.0       82.0       100       69.0       62.0         Mounted Impact Hammer /       20       90       90       21.2       84.0       77.0       100       84.0       77.0         Paver       50       85       77       9       79.0       76.0       100	Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
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       77.0       72.0         Generator       (<25KVA, VMS s	Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
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           Grapple (on Backhoe)         40         85         87         1         79.0         75.0         100         77.0         70.0           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         77.0         100         83.0         76.0           Mounted Impact Hamer         20         85         75         23         79.0         72.0         100         84.0         77.0           Pavement Scarafier         20         85         90         2         79.0         72.0         100         74.0         68.0           Pickup Truck         40         55         75	Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator (<25KVA, VMS s         50         70         73         74         64.0         61.0         100         67.0         67.0         67.0         67.0         73.0           Gradel         40         85         na         0         79.0         75.0         100         81.0         77.0           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         83.0         76.0           Jackhammer         20         85         89         133         79.0         72.0         100         84.0         77.0           Paver         20         85         75         23         79.0         72.0         100         84.0         77.0           Paver         50         85         77         9         79.0         76.0         100         71.0         68.0         100         73.0         66.0	Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Gradali         40         85         83         70         79.0         75.0         100         77.0         73.0           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         75.0         100         83.0         76.0           Jackhammer         20         85         89         133         79.0         72.0         100         68.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         65.0         77.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0	Generator (<25KVA, VMS s	50	70	/3	74	64.0	61.0	100	67.0	64.0
Gradel       40       63       1a       0       75.0       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       85.0       88.0         Jackhammer       20       85       89       133       79.0       72.0       100       83.0       76.0         Mounted Impact Hammer         20       85       75       23       79.0       72.0       100       84.0       77.0         Pavemet Scarafier       20       85       90       2       79.0       76.0       100       71.0       68.0         Pickup Truck       40       55       75       1       49.0       45.0       100       73.0       66.0         Puemet Scarafier       20       85       85       90       72.0       100       73.0       66.0       62.0         Puemps       50       77       81	Gradali	40	85	83	70	79.0	75.0	100	//.0	/3.0
Ordprint	Grannle (on Backhoe)	40	85 85	11d 87	0	79.0	75.0 75.0	100	81.0	77.0
Non-Karl Born Rate         Lo         So         Lo         Fail         Tail         Tail <thtaili< th="">         Tail         <thtail< th=""></thtail<></thtaili<>	Horizontal Boring Hydr Jac	25	80	82	6	73.0	68.0	100	76.0	70.0
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         84.0         77.0           Pavement Scarafier         20         85         90         212         84.0         77.0         100         84.0         77.0           Pavement Scarafier         20         85         90         2         79.0         76.0         100         71.0         68.0           Pickup Truck         40         55         75         1         49.0         45.0         100         67.0         67.0           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         74.0         67.0           Rock Drill         20         85         81         3         7	Hydra Break Ram	10	90	na	0	84.0	74.0	100	70.0	70.0
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         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         76.0           Roir Bigreator Unit         100         82         73         3         76.0         76.0         100         73.0         66.0           Roir Bigreator Unit         100         85         81         79.0	Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
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       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       79       19       79.0       72.0       100       73.0       66.0         Roller       20       85       81       3       79.0       72.0       100       74.0       67.0         Scraper       40       85       84       12       79.0       75.0       100       74.0       74.0         Shears (on backhoe)       40 <t< td=""><td>Jackhammer</td><td>20</td><td>85</td><td>89</td><td>133</td><td>79.0</td><td>72.0</td><td>100</td><td>83.0</td><td>76.0</td></t<>	Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
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         77.0         72.0           Refrigerator Unit         100         82         73         3         76.0         76.0         100         67.0         67.0           Rock Drill         20         85         81         3         79.0         72.0         100         75.0         68.0           Rock Drill         20         85         84         12         79.0         75.0         100         74.0         74.0           Stars (n backhoe)         40         85         96         5	Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
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         77.0         76.0           Pumps         50         77         81         17         71.0         68.0         100         73.0         66.0           Refrigerator Unit         100         82         73         3         76.0         76.0         100         73.0         66.0           Rock Drill         20         85         81         3         79.0         72.0         100         74.0         67.0           Sand Blasting (Single Nozzly         20         85         96         9         79.0         75.0         100         74.0         74.0           Shars (on backhoe)         40         85         96         5	Mounted Impact Hammer	20	90	90	212	84.0	77.0	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         Rock Drill       20       85       81       3       79.0       72.0       100       74.0       67.0         Scaper       40       85       84       12       79.0       75.0       100       74.0       67.0         Shears (on backhoe)       40       85       86       5       79.0       75.0       100       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       7	Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
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       70.0       73.0       66.0         Rok brill       20       85       79       19       79.0       72.0       100       73.0       66.0         Rock Drill       20       85       81       3       79.0       72.0       100       74.0       67.0         Scraper       40       85       84       12       79.0       75.0       100       90.0       83.0         Shears (on backhoe)       40       85       84       12       79.0       75.0       100       90.0       86.0         Slurry Plant       100       78       78       1       72.0       70.0       70.0       72.0       70.0       72.0       72.0       72.0       72.0       72.0	Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
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         Roivit 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       73.0       66.0         Sand Blasting (Single Nozzl       20       85       96       9       79.0       72.0       100       74.0       67.0         Shears (on backhoe)       40       85       96       5       79.0       75.0       100       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0	Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
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       80       16       79.0       72.0       100       74.0       67.0         Sand Blasting (Single Nozzli       20       85       96       9       79.0       72.0       100       74.0       67.0         Sand Blasting Single Nozzli       20       85       96       9       79.0       75.0       100       78.0       74.0         Scraper       40       85       96       5       79.0       75.0       100       72.0	Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Remigerator Unit1008273376.076.010067.067.0Rivit Buster/chipping gun2085791979.072.010073.066.0Rock Drill208581379.072.010075.068.0Roller2085861679.072.010074.067.0Sand Blasting (Single Nozzli208596979.072.010090.083.0Scraper4085841279.075.010078.074.0Shears (on backhoe)408596579.075.010072.072.0Slurry Plant1007878172.072.010074.071.0Soil Mix Drill Rig5080na074.071.010074.071.0Soil Mix Drill Rig5080na078.074.010074.071.0Vacuum Excavator (Vac-tru40858514979.075.010079.075.0Vacuum Street Sweeper1080821974.064.010076.066.0Veibratory Concrete Mixer208080174.067.010074.078.0Vibratory Pile Driver208080174.067.010076.066.0Vibratory Pile Driver	Pumps	50	//	81	1/	/1.0	68.0	100	/5.0	/2.0
Number Buster/Chipping gun       20       85       75       15       72.0       100       75.0       68.0         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 Nozzli       20       85       96       9       79.0       72.0       100       90.0       83.0         Scraper       40       85       84       12       79.0       75.0       100       90.0       86.0         Slurry Plant       100       78       78       1       72.0       100       72.0       72.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0       71.0         Soil Mix Drill Rig       50       80       na       0       78.0       74.0       100       75.0       100       79.0       75.0         Vacuum Excavator (Vac-tru       40       85       85       149       79.0       75.0       100       73.0       73.0       73.0	Reingerator Unit	20	82 85	73	3 10	70.0	70.0	100	67.0 73.0	67.0
Roller       20       85       80       16       79.0       72.0       100       74.0       67.0         Sand Blasting (Single Nozzli       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       70.0       72.0       100       74.0       71.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0       71.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0 </td <td>Rock Drill</td> <td>20</td> <td>85</td> <td>81</td> <td>3</td> <td>79.0</td> <td>72.0</td> <td>100</td> <td>75.0</td> <td>68.0</td>	Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Sand Blasting (Single Nozzli       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       78.0       74.0       100       74.0       71.0       100       75.0       100       72.0       75.0       100       74.0       75.0       76.0	Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
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         75.0         75.0         100         74.0         71.0           Vacuum Excavator (Vac-tru         40         84         na         0         78.0         74.0         100         75.0         100         75.0         75.0         100         75.0         100         75.0         100         75.0         100         74.0         66.0         100         76.0         66.0         100         76.0         66.0         100         73.0         73.0         73.0         73.0         73.0         73.0 <td< td=""><td>Sand Blasting (Single Nozzle</td><td>20</td><td>85</td><td>96</td><td>9</td><td>79.0</td><td>72.0</td><td>100</td><td>90.0</td><td>83.0</td></td<>	Sand Blasting (Single Nozzle	20	85	96	9	79.0	72.0	100	90.0	83.0
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         74.0         71.0           Yacuum Excavator (Vac-tru         40         84         na         0         78.0         74.0         100         75.0         100         75.0         75.0         100         75.0<	Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Slurry Plant         100         78         78         1         72.0         72.0         100         72.0	Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
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         74.0         71.0           Tractor         40         84         na         0         78.0         74.0         100         75.0         100         75.0         100         75.0         75.0         100         75.0	Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
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           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           Warding Horn         5         85         83         12         79.0         66.0         100	Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Tractor4084na078.074.0100Vacuum Excavator (Vac-tru40858514979.075.010079.075.0Vacuum Street Sweeper1080821974.064.010076.066.0Ventilation Fan10085791379.079.010073.073.0Vibrating Hopper508587179.076.010081.078.0Vibratory Concrete Mixer208080174.067.010074.067.0Vibratory Pile Driver20951014489.082.010095.088.0Warning Horn585831279.066.010077.064.0Welder / Torch407374567.063.010068.064.0	Soil Mix Drill Rig	50	80	na	0	74.0	71.0	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	Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Street Sweeper1080821974.064.010076.066.0Ventilation Fan10085791379.079.010073.073.0Vibrating Hopper508587179.076.010081.078.0Vibratory Concrete Mixer208080174.067.010074.067.0Vibratory Pile Driver20951014489.082.010095.088.0Warning Horn585831279.066.010077.064.0Welder / Torch407374567.063.010068.064.0	Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Ventulation Fan         100         85         79         13         79.0         79.0         100         73.0         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	Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
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	ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibratory Pile Driver         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	Vibrating Hopper	50	85	8/	1	/9.0	/6.0	100	81.0	/8.0
Warning Horn         5         85         83         12         79.0         66.0         100         95.0         88.0           Welder / Torch         40         73         74         5         67.0         63.0         100         68.0         64.0	Vibratory Concrete Mixer	20	8U 0E	8U	1	/4.0	٥/.U م دە	100	/4.0	b/.U
Welder / Torch 40 73 74 5 67.0 63.0 100 68.0 64.0	Warning Horn	20	95 95	50 TOT	44 10	89.0	82.U 66.0	100	95.0	88.0 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



# **Construction Source Noise Prediction Model: Tuolumne**

				Reference Emission	
	Distance to Nearest	Combined Predicted		Noise Levels (L <sub>max</sub> ) at 50	Usage
Location	Receptor in feet	Noise Level (L <sub>eq</sub> dBA)	Equipment	feet <sup>1</sup>	Factor <sup>1</sup>
Threshold	1,218	50.0	Front End Loader	80	0.4
Residence 1	200	68.8	Grader	85	0.4
	120	74.7	Dozer	85	0.4
			Ground Type	soft	
			Source Height	8	
			Receiver Height	5	
			Ground Factor <sup>2</sup>	0.63	
			Predicted Noise Level <sup>3</sup>	L <sub>eq</sub> dBA at 50 feet <sup>3</sup>	
			Predicted Noise Level <sup>3</sup> Front End Loader	L <sub>eq</sub> dBA at 50 feet <sup>3</sup> 76.0	
			Predicted Noise Level <sup>3</sup> Front End Loader Grader	L <sub>eq</sub> dBA at 50 feet <sup>3</sup> 76.0 81.0	

Combined Predicted Noise Level (L<sub>eq</sub> dBA at 50 feet) 84.7

Sources:

 $^{\rm 1}$  Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

<sup>2</sup> 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;

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

D = Distance from source to receiver.



# **Construction Source Noise Prediction Model**

location	Distance to Nearest Receptor in feet	Combined Predicted	Fauinment	Reference Emission Noise Levels (L <sub>max</sub> ) at 50 feet <sup>1</sup>	Usage Factor <sup>1</sup>
Threshold	1.757	50.0	Grader	85	1
Residence 1	200	72.8	Front End Loader	80	1
	120	78.6	Dozer	85	1
		•			1
					1
			Ground Type Source Height Receiver Height Ground Factor <sup>2</sup>	soft 8 5 0.63	
			Predicted Noise Level <sup>3</sup>	L <sub>eq</sub> dBA at 50 feet <sup>3</sup>	
			Grader	85.0	
			Front End Loader	80.0	
			Dozer	85.0	

Combined Predicted Noise Level (L<sub>eq</sub> dBA at 50 feet)

88.6

Sources:

 $^{\rm 1}$  Obtained from the FHWA Roadway Construction Noise Model, January 2006. Table 1.

<sup>2</sup> 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;

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

D = Distance from source to receiver.

Auger Drill Rig         20         85         84         36         79.0         72.0         100         78.0         71.0           Bar Bender         20         80         na         0         74.0         70.0         100         72.0         68.0           Bar Bender         20         80         na         0         84.0         100           Boring Jack Power Unit         50         80         83         1         74.0         67.0         100         77.0         74.0           Cam Shovel (dropping)         20         93         87         4         87.0         80.0         100         77.0         70.0         73.0         68.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70.0         75.0         70	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 brill Rig         20         85         84         36         79.0         72.0         100         78.0         71.0           Barkhoe         40         80         78         372         74.0         70.0         100         72.0         68.0           Barthender         20         80         71         74.0         67.0         100         71.0         74.0           Bining Lack Power Unit         50         80         84         46         79.0         72.0         100         71.0         74.0           Chain Save (dropping)         20         83         87         74.0         67.0         100         71.0         70.0         70.0           Compressor (ground)         20         83         73         74.0         67.0         100         73.0         68.0           Concrete Batch Flant         15         83         na         0         77.0         76.0         68.0         100         75.0         67.0         75.0         67.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0         75.0										
Bar Bender         20         80         na         0         74.0         67.0         100           Boring Jack Power Unit         50         80         83         1         74.0         71.0         100         77.0         74.0           Clam Showel (dropping)         20         85         84         46         79.0         70.0	Auger Drill Rig Backhoe	20 40	85 80	84 78	36 372	79.0 74.0	72.0 70.0	100 100	78.0 72.0	71.0 68.0
Boring Jack Power Unit         50         80         83         1         74.0         71.0         100         77.0         74.0           Chan Saw         20         85         84         46         87.0         72.0         100         77.0         74.0           Cam Shovel (dropping)         20         83         87         4         87.0         80.0         100         77.0         70.0           Compactor (ground)         20         80         83         57         74.0         67.0         100         73.0         69.0           Concrete Mure Truck         40         85         79         40         75.0         100         75.0         68.0           Concrete Swa         20         90         90         55         84.0         77.0         100         74.0         71.0         100         74.0         71.0         100         74.0         67.0         Doce         73.0         160         85.0         73.0         100         75.0         160.0         73.0         160.0         73.0         100         73.0         100         73.0         100         73.0         100         73.0         100         73.0         100         73	Bar Bender Blasting	20 na	80 94	na na	0 0	74.0 88.0	67.0	100 100		
Chain Saw       20       85       84       46       79.0       72.0       100       71.0         Compactor (ground)       20       80       83       57       74.0       67.0       100       77.0       70.0         Comprestor (ground)       20       80       78       18       74.0       67.0       100       72.0       68.0         Concrete Batch Plant       15       83       na       0       77.0       100       75.0       68.0         Concrete Saw       20       90       95       84.0       77.0       100       75.0       68.0         Crane       68       81       405       75.0       100       75.0       67.0         Doump Truck       20       84       79       22       78.0       71.0       100       75.0       70.0         Dump Truck       40       85       81       170       78.0       71.0       100       73.0       66.0         Dump Truck       40       85       81       170       78.0       100       73.0       60.0       64.0         Crane tarta       40       85       81       17.0       73.0       100       7	Boring Jack Power Unit	50	80	83	1	74.0	71.0	100	77.0	74.0
Cam Shove! (dropping) 20 93 87 4 87.0 87.0 100 71.0 74.0 Compares (pin) 40 80 78 18 74.0 67.0 100 77.0 76.0 Compressor (air) 40 80 78 18 74.0 77.0 66.7 100 75.0 Concrete Biate Plant 15 83 na 0 77.0 66.7 100 75.0 60.0 Concrete Biate Plant 15 83 79 40 79.0 75.0 100 73.0 69.0 Concrete Saw 20 90 90 95 84.0 77.0 100 75.0 60.0 Concrete Saw 40 85 81 405 79.0 71.0 100 75.0 67.0 Dozer 40 85 82 55 79.0 75.0 100 75.0 67.0 Dozer 40 85 81 405 79.0 71.0 100 74.0 75.0 Dozer 40 85 81 170 79.0 75.0 100 74.0 75.0 Dozer 74.0 85 81 170 79.0 75.0 100 74.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 74.0 71.0 Dom Truck 40 85 81 170 79.0 75.0 100 75.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 74.0 71.0 Gozen 74.0 75.0 Truc 16.0 Dozer 40 85 81 19 76.0 73.0 100 75.0 71.0 Dom Truck 40 84 76 31 78.0 74.0 100 75.0 71.0 Gozen 75.0 Truc 16.0 Dozer 50 82 81 19 76.0 73.0 100 75.0 71.0 Gozen 75.0 50 82 81 19 76.0 73.0 100 75.0 72.0 Gozen 75.0 100 75.0 72.0 Gozen 75.0 100 75.0 72.0 Gozen 75.0 100 75.0 73.0 Gozen 75.0 75.0 100 75	Chain Saw	20	85	84	46	79.0	72.0	100	78.0	71.0
Compares         Can         B3         S7         74.0         67.0         100         77.0         68.0           Compressor (a)         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         75.0         100         75.0         69.0           Concrete Batch Plant         20         82         81         30         76.0         69.0         100         75.0         69.0           Concrete Batch Plant         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         76.0           Drum Mixer         50         80         81         170         79.0         75.0         100         75.0         100         75.0         70.0         75.0         100         75.0         70.0         75.0         100         75.0         70.0         75.0         100         75.0         100         75.0         100	Clam Shovel (dropping)	20	93	87	4	87.0	80.0	100	81.0	74.0
Concrete Bark Plant 15 83 na 0 77.0 67.0 100 75.0 68.0 Concrete Miker Truck 40 85 79 40 79.0 75.0 100 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 75.0 72.0 Drull Rig Truck 20 84 79 22 78.0 71.0 100 75.0 67.0 Drull Rig Truck 20 84 79 22 78.0 71.0 100 75.0 67.0 Drull Rig Truck 40 84 76 31 78.0 74.0 100 75.0 67.0 Front End Loader 40 85 81 170 79.0 75.0 100 75.0 71.0 Front End Loader 40 85 81 170 79.0 75.0 100 75.0 72.0 Generator 50 80 80 79 96 74.0 70.0 100 75.0 72.0 Generator 50 82 81 19 76.0 73.0 100 75.0 72.0 Generator 50 82 81 19 76.0 73.0 100 75.0 72.0 Generator 25 88.2 85 71 79.0 75.0 100 75.0 72.0 Generator 40 85 83 70 79.0 75.0 100 75.0 72.0 Generator 40 85 87 1 79.0 75.0 100 75.0 72.0 Gradel 40 85 87 1 79.0 75.0 100 75.0 70.0 73.0 Grader 40 85 87 1 79.0 75.0 100 75.0 70.0 73.0 Grader 40 85 87 1 79.0 75.0 100 75.0 70.0 Gradel 10 90 na 0 84.0 74.0 100 	Compactor (ground)	20	80	83	5/	74.0	67.0	100	77.0	/0.0
Concrete Miker Fruck         13         83         11a         0         77.0         85.7         100           Concrete Miker Fruck         20         82         81         30         76.0         69.0         100         75.0         69.0           Concrete Miker         16         85         81         405         77.0         100         75.0         67.0           Crane         16         85         82         55         79.0         77.0         100         76.0         72.0           Dorer         40         85         82         55         79.0         77.0         100         76.0         67.0           Drum Miker         50         80         80         17.0         79.0         75.0         100         76.0         71.0           Dump Truck         40         84         76         31         78.0         77.0         100         75.0         100         75.0         100         75.0         100         75.0         100         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         76.0         77.0         77.0         16.0         77.	Compressor (air)	40	80	/8	18	74.0	70.0	100	72.0	68.0
Cancele Innea Index         Ho         Lo         Lo <thlo< th="">         Lo         Lo         Lo<td>Concrete Mixer Truck</td><td>10</td><td>05 85</td><td>70</td><td>40</td><td>77.0</td><td>75.0</td><td>100</td><td>73.0</td><td>69.0</td></thlo<>	Concrete Mixer Truck	10	05 85	70	40	77.0	75.0	100	73.0	69.0
Concrete Saw         20         90         90         55         84.0         77.0         100         77.0         77.0           Crane         16         85         81         405         79.0         71.0         100         75.0         67.0           Drull Migr Tuck         20         84         79         22         78.0         71.0         100         73.0         66.0           Drum Mixer         50         80         80         1         74.0         100         75.0         71.0           Dump Truck         40         84         74         4         78.0         74.0         100         75.0         71.0           Fita Bed Truck         40         84         74         4         78.0         73.0         100         75.0         72.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Gradel         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradel         40         85         83         37         79.0         75.0         100	Concrete Pump Truck	20	82	81	30	75.0	69.0	100	75.0	68.0
Crane         16         85         81         405         79.0         71.0         100         75.0         67.0           Dozer         40         85         82         55         79.0         71.0         100         74.0         71.0           Drum Miker         50         80         80         1         74.0         71.0         100         74.0         71.0           Dump Truck         40         85         81         170         79.0         75.0         100         75.0         71.0           Front End Loader         40         84         74         4         78.0         70.0         100         75.0         70.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Gradel         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradel         40         85         87         1         79.0         75.0         100         76.0         70.0           Grader         40         85         87         1         79.0         75.0         10	Concrete Saw	20	90	90	55	84.0	77.0	100	84.0	77.0
Dazer         40         85         82         55         79.0         75.0         100         76.0         77.0 <td>Crane</td> <td>16</td> <td>85</td> <td>81</td> <td>405</td> <td>79.0</td> <td>71.0</td> <td>100</td> <td>75.0</td> <td>67.0</td>	Crane	16	85	81	405	79.0	71.0	100	75.0	67.0
Drill Rig Truck         20         84         79         22         78.0         71.0         100         73.0         66.0           Drum Miker         50         80         80         1         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         85         81         19         76.0         73.0         100         75.0         69.0           Generator (25XVA, VMS 5         50         70         73         74         64.0         61.0         100         77.0         73.0           Grader         40         85         83         70         79.0         75.0         100         77.0         73.0           Grader         40         85         87         1         79.0         75.0         100         81.0         77.0           Hydra Break Ram         10         90         na         0         84.0         74.0         86.0         100         76.0         88.0           Jackhammer         20         85         75         23         79.0	Dozer	40	85	82	55	79.0	75.0	100	76.0	72.0
Drum Niker         50         80         80         1         74.0         71.0         100         74.0         71.0           Dump Truck         40         84         76         31         78.0         74.0         100         75.0         71.0           Flat Bed Truck         40         84         74         4         78.0         74.0         100         66.0           Front End Loader         40         83         81         170         79.0         75.0         100         75.0         72.0           Generator         50         82         81         19         76.0         73.0         100         67.0         64.0           Gradall         40         85         83         70         79.0         75.0         100         77.0         73.0           Gradal         40         85         87         1         79.0         75.0         100         76.0         70.0           Gradal         20         85         87         1         79.0         75.0         100         81.0         77.0           Invischhei         10         90         n2         23         79.0         72.0         100	Drill Rig Truck	20	84	79	22	78.0	71.0	100	73.0	66.0
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           Firat Ed Truck         40         80         79         95         74.0         100         75.0         69.0           Generator         50         82         81         19         76.0         73.0         100         77.0         73.0           Generator         40         85         83         70         79.0         75.0         100         77.0         73.0           Grader         40         85         87         1         79.0         75.0         100         81.0         77.0           Grader         10         90         na         0         84.0         74.0         100         81.0         76.0         83.0         76.0         70.0         83.0         76.0         70.0         83.0         76.0         100         84.0         77.0         100         84.0         77.0         100         84.0         77.0         100         84.0         77.0 </td <td>Drum Mixer</td> <td>50</td> <td>80</td> <td>80</td> <td>1</td> <td>74.0</td> <td>71.0</td> <td>100</td> <td>74.0</td> <td>71.0</td>	Drum Mixer	50	80	80	1	74.0	71.0	100	74.0	71.0
Excavator         40         85         81         170         79.0         75.0         100         75.0         71.0           Flat Bed Truck         40         80         79         96         74.0         70.0         100         73.0         69.0           Generator         50         82         81         19         76.0         100         77.0         72.0           Generator (<25KVA, VMS s	Dump Truck	40	84	76	31	78.0	74.0	100	70.0	66.0
Flat Bed Truck       40       84       74       4       78.0       74.0       100       68.0       64.0       64.0       67.0       100       73.0       69.0         Generator       50       82       81       19       76.0       73.0       100       73.0       69.0         Gradall       40       85       83       70       79.0       75.0       100       77.0       73.0         Grader       40       85       87       1       79.0       75.0       100       81.0       77.0         Grader       40       85       87       1       79.0       75.0       100       81.0       77.0       70.0         Horizontal Boring Hydr. Jac       25       80       82       6       74.0       68.0       100       76.0       70.0         Hackhammer       20       95       101       11       88.0       82.0       100       69.0       62.0         Mounted Impact Hammer /       20       90       90       21.2       84.0       77.0       100       84.0       77.0         Paver       50       85       77       9       79.0       76.0       100	Excavator	40	85	81	170	79.0	75.0	100	75.0	71.0
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       77.0       72.0         Generator       (<25KVA, VMS s	Flat Bed Truck	40	84	74	4	78.0	74.0	100	68.0	64.0
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           Grapple (on Backhoe)         40         85         87         1         79.0         75.0         100         77.0         70.0           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         77.0         100         83.0         76.0           Mounted Impact Hamer         20         85         75         23         79.0         72.0         100         84.0         77.0           Pavement Scarafier         20         85         90         2         79.0         72.0         100         74.0         68.0           Pickup Truck         40         55         75	Front End Loader	40	80	79	96	74.0	70.0	100	73.0	69.0
Generator (<25KVA, VMS s         50         70         73         74         64.0         61.0         100         67.0         67.0         67.0         67.0         73.0           Gradel         40         85         na         0         79.0         75.0         100         81.0         77.0           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         83.0         76.0           Jackhammer         20         85         89         133         79.0         72.0         100         84.0         77.0           Paver         20         85         75         23         79.0         72.0         100         84.0         77.0           Paver         50         85         77         9         79.0         76.0         100         71.0         68.0         100         73.0         66.0	Generator	50	82	81	19	76.0	73.0	100	75.0	72.0
Gradali         40         85         83         70         79.0         75.0         100         77.0         73.0           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         75.0         100         83.0         76.0           Jackhammer         20         85         89         133         79.0         72.0         100         68.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         66.0         62.0         65.0         77.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0         78.0	Generator (<25KVA, VMS s	50	/0	/3	74	64.0	61.0	100	67.0	64.0
Gradel       40       63       1a       0       75.0       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       85.0       88.0         Jackhammer       20       85       89       133       79.0       72.0       100       83.0       76.0         Mounted Impact Hammer         20       85       75       23       79.0       72.0       100       84.0       77.0         Pavemet Scarafier       20       85       90       2       79.0       76.0       100       71.0       68.0         Pickup Truck       40       55       75       1       49.0       45.0       100       73.0       66.0         Puemet Scarafier       20       85       85       90       72.0       100       73.0       66.0       62.0         Puemps       50       77       81	Gradali	40	85	83	70	79.0	75.0	100	//.0	/3.0
Ordprint	Grannle (on Backhoe)	40	85 85	11d 87	0	79.0	75.0 75.0	100	81.0	77.0
Non-Karl Born Rate         Lo         So         Lo         Fail         Tail         Tail <thtaili< th="">         Tail         <thtail< th=""></thtail<></thtaili<>	Horizontal Boring Hydr Jac	25	80	82	6	73.0	68.0	100	76.0	70.0
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         84.0         77.0           Pavement Scarafier         20         85         90         212         84.0         77.0         100         84.0         77.0           Pavement Scarafier         20         85         90         2         79.0         76.0         100         71.0         68.0           Pickup Truck         40         55         75         1         49.0         45.0         100         67.0         67.0           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         74.0         67.0           Rock Drill         20         85         81         3         7	Hydra Break Ram	10	90	na	0	84.0	74.0	100	70.0	70.0
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         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         76.0           Roir Bigreator Unit         100         82         73         3         76.0         76.0         100         73.0         66.0           Roir Bigreator Unit         100         85         81         79.0	Impact Pile Driver	20	95	101	11	89.0	82.0	100	95.0	88.0
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       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       79       19       79.0       72.0       100       73.0       66.0         Roller       20       85       81       3       79.0       72.0       100       74.0       67.0         Scraper       40       85       84       12       79.0       75.0       100       74.0       74.0         Shears (on backhoe)       40 <t< td=""><td>Jackhammer</td><td>20</td><td>85</td><td>89</td><td>133</td><td>79.0</td><td>72.0</td><td>100</td><td>83.0</td><td>76.0</td></t<>	Jackhammer	20	85	89	133	79.0	72.0	100	83.0	76.0
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         77.0         72.0           Refrigerator Unit         100         82         73         3         76.0         76.0         100         67.0         67.0           Rock Drill         20         85         81         3         79.0         72.0         100         75.0         68.0           Rock Drill         20         85         84         12         79.0         75.0         100         74.0         74.0           Stars (n backhoe)         40         85         96         5	Man Lift	20	85	75	23	79.0	72.0	100	69.0	62.0
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         77.0         76.0           Pumps         50         77         81         17         71.0         68.0         100         73.0         66.0           Refrigerator Unit         100         82         73         3         76.0         76.0         100         73.0         66.0           Rock Drill         20         85         81         3         79.0         72.0         100         74.0         67.0           Sand Blasting (Single Nozzly         20         85         96         9         79.0         75.0         100         74.0         74.0           Shars (on backhoe)         40         85         96         5	Mounted Impact Hammer	20	90	90	212	84.0	77.0	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         Rock Drill       20       85       81       3       79.0       72.0       100       74.0       67.0         Scaper       40       85       84       12       79.0       75.0       100       74.0       67.0         Shears (on backhoe)       40       85       86       5       79.0       75.0       100       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       74.0       7	Pavement Scarafier	20	85	90	2	79.0	72.0	100	84.0	77.0
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       70.0       73.0       66.0         Rok brill       20       85       79       19       79.0       72.0       100       73.0       66.0         Rock Drill       20       85       81       3       79.0       72.0       100       74.0       67.0         Scraper       40       85       84       12       79.0       75.0       100       90.0       83.0         Shears (on backhoe)       40       85       84       12       79.0       75.0       100       90.0       86.0         Slurry Plant       100       78       78       1       72.0       70.0       70.0       72.0       70.0       72.0       72.0       72.0       72.0       72.0	Paver	50	85	77	9	79.0	76.0	100	71.0	68.0
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         Roivit 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       73.0       66.0         Sand Blasting (Single Nozzl       20       85       96       9       79.0       72.0       100       74.0       67.0         Shears (on backhoe)       40       85       96       5       79.0       75.0       100       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0       72.0       70.0	Pickup Truck	40	55	75	1	49.0	45.0	100	69.0	65.0
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       80       16       79.0       72.0       100       74.0       67.0         Sand Blasting (Single Nozzli       20       85       96       9       79.0       72.0       100       74.0       67.0         Sand Blasting Single Nozzli       20       85       96       9       79.0       75.0       100       78.0       74.0         Scraper       40       85       96       5       79.0       75.0       100       72.0	Pneumatic Tools	50	85	85	90	79.0	76.0	100	79.0	76.0
Remigerator Unit1008273376.076.010067.067.0Rivit Buster/chipping gun2085791979.072.010073.066.0Rock Drill208581379.072.010075.068.0Roller2085861679.072.010074.067.0Sand Blasting (Single Nozzli208596979.072.010090.083.0Scraper4085841279.075.010078.074.0Shears (on backhoe)408596579.075.010072.072.0Slurry Plant1007878172.072.010074.071.0Soil Mix Drill Rig5080na074.071.010074.071.0Soil Mix Drill Rig5080na078.074.010074.071.0Vacuum Excavator (Vac-tru40858514979.075.010079.075.0Vacuum Street Sweeper1080821974.064.010076.066.0Veibratory Concrete Mixer208080174.067.010074.078.0Vibratory Pile Driver208080174.067.010076.066.0Vibratory Pile Driver	Pumps	50	//	81	1/	/1.0	68.0	100	/5.0	/2.0
Number Buster/Chipping gun       20       85       75       15       72.0       100       75.0       68.0         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 Nozzli       20       85       96       9       79.0       72.0       100       90.0       83.0         Scraper       40       85       84       12       79.0       75.0       100       90.0       86.0         Slurry Plant       100       78       78       1       72.0       100       72.0       72.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0       71.0         Soil Mix Drill Rig       50       80       na       0       78.0       74.0       100       75.0       100       79.0       75.0         Vacuum Excavator (Vac-tru       40       85       85       149       79.0       75.0       100       73.0       73.0       73.0	Reingerator Unit	20	82 85	73 70	3 10	70.0	70.0	100	67.0 73.0	67.0
Roller       20       85       80       16       79.0       72.0       100       74.0       67.0         Sand Blasting (Single Nozzli       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       70.0       72.0       100       74.0       71.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0       71.0         Soil Mix Drill Rig       50       82       80       75       76.0       73.0       100       74.0 </td <td>Rock Drill</td> <td>20</td> <td>85</td> <td>81</td> <td>3</td> <td>79.0</td> <td>72.0</td> <td>100</td> <td>75.0</td> <td>68.0</td>	Rock Drill	20	85	81	3	79.0	72.0	100	75.0	68.0
Sand Blasting (Single Nozzli       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       78.0       74.0       100       74.0       71.0       100       75.0       100       72.0       75.0       100       74.0       75.0       76.0	Roller	20	85	80	16	79.0	72.0	100	74.0	67.0
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         75.0         75.0         100         74.0         71.0           Vacuum Excavator (Vac-tru         40         84         na         0         78.0         74.0         100         75.0         100         75.0         75.0         100         75.0         100         75.0         100         75.0         100         74.0         66.0         100         76.0         66.0         100         76.0         66.0         100         73.0         73.0         73.0         73.0         73.0         73.0 <td< td=""><td>Sand Blasting (Single Nozzle</td><td>20</td><td>85</td><td>96</td><td>9</td><td>79.0</td><td>72.0</td><td>100</td><td>90.0</td><td>83.0</td></td<>	Sand Blasting (Single Nozzle	20	85	96	9	79.0	72.0	100	90.0	83.0
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         74.0         71.0           Yacuum Excavator (Vac-tru         40         84         na         0         78.0         74.0         100         75.0         100         75.0         75.0         100         75.0<	Scraper	40	85	84	12	79.0	75.0	100	78.0	74.0
Slurry Plant         100         78         78         1         72.0         72.0         100         72.0	Shears (on backhoe)	40	85	96	5	79.0	75.0	100	90.0	86.0
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         74.0         71.0           Tractor         40         84         na         0         78.0         74.0         100         75.0         100         75.0         100         75.0         75.0         100         75.0	Slurry Plant	100	78	78	1	72.0	72.0	100	72.0	72.0
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           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           Warding Horn         5         85         83         12         79.0         66.0         100	Slurry Trenching Machine	50	82	80	75	76.0	73.0	100	74.0	71.0
Tractor4084na078.074.0100Vacuum Excavator (Vac-tru40858514979.075.010079.075.0Vacuum Street Sweeper1080821974.064.010076.066.0Ventilation Fan10085791379.079.010073.073.0Vibrating Hopper508587179.076.010081.078.0Vibratory Concrete Mixer208080174.067.010074.067.0Vibratory Pile Driver20951014489.082.010095.088.0Warning Horn585831279.066.010077.064.0Welder / Torch407374567.063.010068.064.0	Soil Mix Drill Rig	50	80	na	0	74.0	71.0	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	Tractor	40	84	na	0	78.0	74.0	100		
Vacuum Street Sweeper1080821974.064.010076.066.0Ventilation Fan10085791379.079.010073.073.0Vibrating Hopper508587179.076.010081.078.0Vibratory Concrete Mixer208080174.067.010074.067.0Vibratory Pile Driver20951014489.082.010095.088.0Warning Horn585831279.066.010077.064.0Welder / Torch407374567.063.010068.064.0	Vacuum Excavator (Vac-tru	40	85	85	149	79.0	75.0	100	79.0	75.0
Ventulation Fan         100         85         79         13         79.0         79.0         100         73.0         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	Vacuum Street Sweeper	10	80	82	19	74.0	64.0	100	76.0	66.0
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	ventilation Fan	100	85	79	13	79.0	79.0	100	73.0	73.0
Vibratory Pile Driver         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	Vibrating Hopper	50	85	8/	1	/9.0	/6.0	100	81.0	/8.0
Warning Horn         5         85         83         12         79.0         66.0         100         95.0         88.0           Welder / Torch         40         73         74         5         67.0         63.0         100         68.0         64.0	Vibratory Concrete Mixer	20	8U 0E	8U	1	/4.0	٥/.U م دە	100	/4.0	b/.U
Welder / Torch 40 73 74 5 67.0 63.0 100 68.0 64.0	Warning Horn	20	95 95	50 TOT	44 10	89.0	82.U	100	95.0	88.0 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



# 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									
	vibration level		distance							
	(VdB)	@	(ft)							
large bull dozer	87.0	@	25							

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

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

Noise Source/ID	Referenc	e No	oise Level
	vibration level		distance
	(PPV)	@	(ft)
large bull dozer	0.089	@	25

# Attenuated Noise Level at Receptorvibration leveldistance(VdB)@(ft)79.3@45

# **STEP 3B: Select the distance to the receiver.**

Attenuated Noi	se Lo	evel at Receptor
vibration level		distance
(PPV)	@	(ft)
0.191	@	15

# 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: <a href="http://www.fta.dot.gov/documents/FTA\_Noise\_and\_Vibration\_Manual.pdf">http://www.fta.dot.gov/documents/FTA\_Noise\_and\_Vibration\_Manual.pdf</a>>. 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<br/>noise level (dBA and distance).STEP 2: Select the ground type (hard or soft),<br/>and enter the source and receiver heights.

# **STEP 3: Select the distance to the receiver.**

Noise Source/ID	Reference	e Noi	se Level	A		Attenu	uated Nois	e Leve	el at Recep	otor		
	noise level		distance	Ground Type	Source	Receiver	Ground		noise leve	I	distance	
	(dBA)	@	(ft)	(soft/hard)	Height (ft) Height (ft)		Factor	(dBA) (		@	(ft)	
Speaker (facing toward SR)	76.0	@	75	soft	12	5	0.60		59.1	@	335	
Speaker (facing toward SR)	76.0	@	75	soft	12	5	0.60		58.0	@	370	
Speaker (facing toward SR)	76.0	@	75	soft	12	5	0.60		70.7	@	120	
Speaker Facing away MM (Alt A)	59.0	@	50.00	soft	12	5	0.60		49.1	@	120	
Speaker Facing away MM (Project)	71.0	@	50.00	soft	12	5	0.60		49.5	@	335	
Speaker Facing away MM (Project)	72.0	@	50	soft	12	5	0.60		49.4	@	370	
							0.66					
							0.66					
							0.66					
							0.66					
							0.66					
							0.66					
							0.66					
							0.66					

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: <a href="http://www.fta.dot.gov/documents/FTA\_Noise\_and\_Vibration\_Manual.pdf">http://www.fta.dot.gov/documents/FTA\_Noise\_and\_Vibration\_Manual.pdf</a>>. Accessed: September 24, 2010.



						Change			
	Sogr	ment Description and Location			Existing +	Change	Cumulativo	Cumulative	Δ Cumulative –
Number	Name	From	То	Existing	Conditions		Conditions	Conditions	Proiect
Summ	ary of Project Net Changes								
Winter We	eekday								
1	Village Road, between Polaris A	Road and Country Club Drive		45.1	43.6	-1.5	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			44.4	45.4	0.9	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	to Old Mill Road		46.7	47.6	0.9	#REF!	#REF!	#REF!
4	Polaris Road , east of North Tal	hoe High School		49.5	50.3	0.8	#REF!	#REF!	#REF!
Winter We	eekend						#REF!	#REF!	#REF!
1	Village Road, between Polaris F	Road and Country Club Drive		47.2	44.9	-2.3	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			37.7	42.6	4.9	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	to Old Mill Road		38.0	44.1	6.1	#REF!	#REF!	#REF!
4	Polaris Road , east of North Tal	hoe High School		40.7	46.4	5.6	#REF!	#REF!	#REF!
Summer D	Daily						#REF!	#REF!	#REF!
1	Village Road, between Polaris R	Road and Country Club Drive		44.3	36.9	-7.4	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			45.7	44.6	-1.2	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	to Old Mill Road		41.1	43.7	2.6	#REF!	#REF!	#REF!
4	Polaris Road , east of North Tal	hoe High School		40.7	47.2	6.4	#REF!	#REF!	#REF!
5	SR 28 in project vicinity			59.7	59.7	0.027	#REF!	#REF!	#REF!





							1		
	Seg	ment Description and Location				Change	Cumulative	Cumulative +Project	Δ Cumulative – Cumulative +
Number	Name	From	То	Existing	Existing + Alt		Conditions	Conditions	Project
Summ	nary of Project Net Changes								
Winter W	eekday								
1	Village Road, between Polaris	Road and Country Club Drive		45.1	45.8	0.7	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			44.4	44.4	0.0	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	e to Old Mill Road		46.7	46.7	0.0	#REF!	#REF!	#REF!
4	Polaris Road , east of North Ta	ihoe High School		49.5	49.5	0.0	#REF!	#REF!	#REF!
Winter W	eekend						#REF!	#REF!	#REF!
1	Village Road, between Polaris	Road and Country Club Drive		47.2	47.8	0.6	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			37.7	37.7	0.0	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	e to Old Mill Road		38.0	38.0	0.0	#REF!	#REF!	#REF!
4	Polaris Road , east of North Ta	hoe High School		40.7	40.7	0.0	#REF!	#REF!	#REF!
						0.0			
Summer [	Daily						#REF!	#REF!	#REF!
1	Village Road, between Polaris	Road and Country Club Drive		44.3	46.4	2.1	#REF!	#REF!	#REF!
2	Old Mill Rd, North of SR 28			45.7	45.7	0.0	#REF!	#REF!	#REF!
3	Polaris Road from Village Drive	e to Old Mill Road		41.1	41.1	0.0	#REF!	#REF!	#REF!
4	Polaris Road , east of North Ta	ihoe High School		40.7	40.7	0.0	#REF!	#REF!	#REF!
5	SR 28 in project vicinity			59.7	59.7	0.0	#REF!	#REF!	#REF!



Project:									
							Input		
	Noise Level Descriptor: Ldn Site Conditions: Soft Traffic Input: ADT Traffic K-Factor:				Distan	ice to			
					Direct	ional			
	Segment Description and Location			Speed	Centerline	e, (feet) <sub>4</sub>		Traffic Di	stribution
Number	Name From	То	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy
Existi	ng Conditions								
Weekday									
1	Village Road, between Polaris Road and Country Club Drive		499	35	100	100	97.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		431	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		728	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road, east of North Tahoe High School		1,370	35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
Weekend				35	100	100	97.0%	2.0%	1.0%
1	Village Road, between Polaris Road and Country Club Drive		815	35	100	100	97.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		91	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		97	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road, east of North Tahoe High School		183	35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%



Project:									
							Input	:	
	Noise Level Descriptor: Ldn Site Conditions: Soft Traffic Input: ADT Traffic K-Factor:				Distan	nce to			
	Segment Description and Location			Snood	Direct	(feet)		Traffic D	istribution
Number	Name Erom	То	ADT	Speed	Noar	E, (IEEL) <sub>4</sub>	% Auto	Medium	
Twieti		10	ADT	(inpii)	INCOL	Fai	78 Auto		76 Heavy
EXIST	ng Conditions								
vvеекаау	Village Road, between Polaris Road and Country Club Drive		252	25	100	100	07.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		536	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		895	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road , east of North Tahoe High School		1,642	35	100	100	97.0%	2.0%	1.0%
5	, C			35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
Weekend	I			35	100	100	97.0%	2.0%	1.0%
1	Village Road, between Polaris Road and Country Club Drive		475	35	100	100	97.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		279	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		398	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road, east of North Tahoe High School		672	35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%



Project:									
							Input		
	Noise Level Descriptor: Ldn Site Conditions: Soft Traffic Input: ADT				Distan	ce to			
					Direct	ional			
	Segment Description and Location			Speed	Centerline	e, (feet) <sub>4</sub>		Traffic Di	stribution
Number	Name From	То	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy
Existi	ng Conditions								
Weekday	,								
1	Village Road, between Polaris Road and Country Club Drive		593	35	100	100	97.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		431	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		728	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road, east of North Tahoe High School		1,370	35	100	100	97.0%	2.0%	1.0%
5				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
Weekend				35	100	100	97.0%	2.0%	1.0%
1	Village Road, between Polaris Road and Country Club Drive		932	35	100	100	97.0%	2.0%	1.0%
2	Old Mill Rd, North of SR 28		91	35	100	100	97.0%	2.0%	1.0%
3	Polaris Road from Village Drive to Old Mill Road		97	35	100	100	97.0%	2.0%	1.0%
4	Polaris Road, east of North Tahoe High School		183	35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%
				35	100	100	97.0%	2.0%	1.0%



Traffic	Noise Spreadsheet Calculator															ENVIRONMENTAL	
Project:	:																
	Noise Level Descriptor: Ldn						Input	t							Output		
	Site Conditions: Soft																
	Traffic Input: ADT																
	Traffic K-Factor:				Distance	to											
					Direction	nal											
	Segment Description and Location			Speed	Centerline,	(feet) <sub>4</sub>		Traffic Di	istribution	Characte	ristics		Ldn,	Dis	stance to Co	ntour, (feet)	3
Number	Name From	То	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA) <sub>5,6,7</sub>	70 dBA	65 dBA	60 dBA	55 dBA
Exist	ting Conditions																
Daily																	
1	Village Road, between Polaris Road and Country Club Drive		414	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	44.3	2	4	9	19
2	Old Mill Rd, North of SR 28		580	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	45.7	2	5	11	24
3	Polaris Road from Village Drive to Old Mill Road		198	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	41.1	1	3	5	12
4	Polaris Road, east of North Tahoe High School		183	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	40.7	1	2	5	11
5	SR 28 in project vicinity		14,500	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	59.716	21	44	96	206
				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%					
				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%					

ASCENT

Traffic	Noise Spreadsheet Calculator															ENVIRONMENTAL	
Project:																	
	Noise Level Descriptor: Ldn Site Conditions: Soft Traffic Input: ADT Traffic K-Factor:				Distance to Direction	to al	Input	t							Output		
	Segment Description and Location			Speed	Centerline, (1	feet) <sub>4</sub>		Traffic Di	istribution	Characte	ristics		Ldn,	Dis	tance to Co	ntour, (feet)	3
Number	Name From	То	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA) <sub>5,6,7</sub>	70 dBA	65 dBA	60 dBA	55 dBA
Existi	ing Conditions																
Daily																	
1	Village Road, between Polaris Road and Country Club Drive		76	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	36.9	1	1	3	6
2	Old Mill Rd, North of SR 28		444	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	44.6	2	4	9	20
3	Polaris Road from Village Drive to Old Mill Road		364	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	43.7	2	4	8	18
4	Polaris Road, east of North Tahoe High School		808	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	47.2	3	6	14	30
5	SR 28 in project vicinity		14,590	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	59.743	21	45	96	207
				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%					
				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%					
				25	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%					
				55	100	100	57.070	2.070	1.070	00.070	10.070	5.070					

ASCENT

Traffic	Noise Spreadsheet Calculator															ASCE	NT
Project:							_										
	Noise Level Descriptor: Ldn Site Conditions: Soft Traffic Input: ADT Traffic K-Factor:				Distanc Directio	e to onal	Input								Output		
	Segment Description a	nd Location		Speed	Centerline,	, (feet) <sub>4</sub>		Traffic D	istribution	Characte	ristics		Ldn,	Di	stance to Co	ontour, (feet	)3
Number	Name From	То	ADT	(mph)	Near	Far	% Auto	% Medium	% Heavy	% Day	% Eve	% Night	(dBA) <sub>5,6,7</sub>	70 dBA	65 dBA	60 dBA	55 dBA
Existi	ing Conditions																
Daily																	
1	Village Road, between Polaris Road and Coun	try Club Drive	669	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	46.4	3	6	12	27
2	Old Mill Rd, North of SR 28		580	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	45.7	2	5	11	24
3	Polaris Road from Village Drive to Old Mill Ro	ad	198	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	41.1	1	3	5	12
4	Polaris Road , east of North Tahoe High School		183	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	40.7	1	2	5	11
5	SR 28 in project vicinity		14,580	35	100	100	97.0%	2.0%	1.0%	80.0%	15.0%	5.0%	59.7	21	45	96	207
				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%					
				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%					

### Citation # Citations

- 1 Caltrans Technical Noise Supplement. 2009 (November). Table (5-11), Pg 5-60.
- 2 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-26), Pg 5-60.
- 3 Caltrans Technical Noise Supplement. 2009 (November). Equation (2-16), Pg 2-32.
- 4 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-11), Pg 5-47, 48.
- 5 Caltrans Technical Noise Supplement. 2009 (November). Equation (2-26), Pg 2-55, 56.
- 6 Caltrans Technical Noise Supplement. 2009 (November). Equation (2-27), Pg 2-57.
- 7 Caltrans Technical Noise Supplement. 2009 (November). Pg 2-53.
- 8 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-7), Pg 5-45.
- 9 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-8), Pg 5-45.
- 10 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-9), Pg 5-45.
- 11 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-13), Pg 5-49.
- 12 Caltrans Technical Noise Supplement. 2009 (November). Equation (5-14), Pg 5-49.

Caltrans Technical Noise Supplement. 2013 (September). Table (4-2), Caltrans Technical Noise Supplement. 2013 (September). Equation (4-FHWA 2004 TNM Version 2.5

FHWA 2004 TNM Version 2.5

Caltrans Technical Noise Supplement. 2013 (September). Equation (2-Caltrans Technical Noise Supplement. 2013 (September). Equation (2-

Caltrans Technical Noise Supplement. 2013 (September). Pg 2-57.

- FHWA 2004 TNM Version 2.5
- 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. Ac 2017.

Pg 4-17. -5), Pg 4-17.

-23), Pg 2-5: -24), Pg 2-5:

ccessed Aug