APPENDIX I

Noise Calculations

Traffic Noise Calculations

	7am-7pm	7pm-10pm	10pm-7am
	12	3	9

Project Number: 3380 Stagecoach
Model Description: Reference Energy Mean Emission Levels (REMEL): originally from FHWA-RD-77-108
See Caltrans Technical Noise Supplement (TeNS 2013): Table 4-2
Model Assumptions: no shielding, no barriers, no finite road adjustment
Results given for Peak or Event Hour [Leq(h)] vph; CNEL from ADT vpd-distributed per time fractions

Road Segment / Receptor Inputs

Road Name/Segment: Lucerne Valley Cutoff Road
Scenario: Existing (2017)

			Average Daily Traffic Mix (%)		
			7am-7pm	7pm-10pm	10pm-7am
			85	5	10
	ADT (vpd)	**Peak Hr (vph)**	Day (vph)	Evening (vph)	Night (vph)
	250	30	17.7	4.2	2.8

Vehicle Type Mix		Peak Hr	Day	Evening	Night
	ADT Mix (%)	(vph)	(vph)	(vph)	(vph)
Autos	97.4	29.2	17.2	4.1	2.7
Medium Duty Trucks	1.8	0.5	0.3	0.1	0.1
Heavy Duty Trucks	0.8	0.2	0.1	0.0	0.0

		REMEL Traffic Flow Adjustment			
	(TeNS 2013)	Peak Hr	Day	Evening	Night
Autos	70.2	-17.2	-19.5	-25.8	-27.5
MD Trucks	77.2	-34.5	-36.8	-43.1	-44.9
HD Trucks	81.3	-38.1	-40.4	-46.6	-48.4

Distance Adjustment
-3.1

Receptor Distance: >15m Ref: 30.5 (m)
100.1 (ft)
Drop-off (alpha 0.5=soft, 0=hard): 0.00 (alpha)
Speed: 45 (mph)
72 (kph)

	A	B	C
Autos	41.7408	1.1485	50.128
MD Trucks	33.919	20.591	68.003
HD Trucks	35.8799	21.0197	74.298

Scenario Results

Leq(h) Peak Hour (dBA)	Leq(h) Day (dBA)	Leq(h) Evening (dBA)	Leq(h) Night (dBA)	Ldn @ Rec (dBA)	CNEL @ Rec (dBA)
50.7	48.4	42.1	40.4	48.9	49.1

Centerline Distance to CNEL Contour

70 Contour XX CNEL (ft)	*65 Contour YY CNEL (ft)*	*60 Contour ZZ CNEL (ft)*	*55 Contour ZZ CNEL (ft)*
4	*9*	*19*	*41*

Road Segment / Receptor Inputs

Road Name/Segment: SR247, s/o Lucerne Valley Cutoff Rd

Scenario: Existing (2017)

			Average Daily Traffic Mix (%)					
			7am-7pm	7pm-10pm	10pm-7am	**Receptor Distance: >15m Ref:**	30.5	(m)
							100.1	(ft)
			85	5	10	**Drop-off (alpha 0.5=soft, 0=hard):**	0.00	(alpha)
	ADT	**Peak Hr**	Day	Evening	Night	**Speed:**	60	(mph)
	(vpd)	**(vph)**	(vph)	(vph)	(vph)		97	(kph)
	2250	250	159.4	37.5	25.0			

Vehicle Type Mix		Peak Hr	Day	Evening	Night
	ADT Mix (%)	(vph)	(vph)	(vph)	(vph)
Autos	82.5	206.3	131.5	30.9	20.6
Medium Duty Trucks	7.5	18.8	12.0	2.8	1.9
Heavy Duty Trucks	10.0	25.0	15.9	3.8	2.5

	REMEL Traffic Flow Adjustment							
	(TeNS 2013)	Peak Hr	Day	Evening	Night	A	B	C
Autos	75.4	-10.0	-11.9	-18.2	-20.0	41.7408	1.1485	50.128
MD Trucks	81.1	-20.4	-22.3	-28.6	-30.4	33.919	20.591	68.003
HD Trucks	85.2	-19.1	-21.1	-27.4	-29.1	35.8799	21.0197	74.298

Distance Adjustment
-3.1

Scenario Results

						Centerline Distance to CNEL Contour			
						70	*65*	*60*	*55*
Leq(h)	Leq(h)	Leq(h)	Leq(h)	Ldn	CNEL	*Contour*	*Contour*	*Contour*	*Contour*
Peak Hour	Day	Evening	Night	@ Rec	@ Rec	*XX CNEL*	*YY CNEL*	*ZZ CNEL*	*ZZ CNEL*
(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	*(ft)*	*(ft)*	*(ft)*	*(ft)*
66.3	64.4	58.1	56.3	64.8	65.1	*47*	*101*	*218*	*470*

Road Segment / Receptor Inputs

Road Name/Segment: SR247, n/o Lucerne Valley Cutoff Rd

Scenario: Existing (2017)

			Average Daily Traffic Mix (%)				
			7am-7pm	7pm-10pm	10pm-7am		
			85	5	10	**Drop-off (alpha 0.5=soft, 0=hard):**	0.00 (alpha)
	ADT	**Peak Hr**	Day	Evening	Night	**Speed:**	60 (mph)
	(vpd)	**(vph)**	(vph)	(vph)	(vph)		97 (kph)
	2500	275	177.1	41.7	27.8		

Receptor Distance: >15m Ref: 30.5 (m) / 100.1 (ft)

Vehicle Type Mix		Peak Hr	Day	Evening	Night
	ADT Mix (%)	(vph)	(vph)	(vph)	(vph)
Autos	82.5	226.9	146.1	34.4	22.9
Medium Duty Trucks	7.5	20.6	13.3	3.1	2.1
Heavy Duty Trucks	10.0	27.5	17.7	4.2	2.8

	REMEL Traffic Flow Adjustment							
	(TeNS 2013)	Peak Hr	Day	Evening	Night	A	B	C
Autos	75.4	-9.6	-11.5	-17.8	-19.5	41.7408	1.1485	50.128
MD Trucks	81.1	-20.0	-21.9	-28.2	-29.9	33.919	20.591	68.003
HD Trucks	85.2	-18.7	-20.6	-26.9	-28.7	35.8799	21.0197	74.298

Distance Adjustment: -3.1

Scenario Results

Leq(h) Peak Hour (dBA)	Leq(h) Day (dBA)	Leq(h) Evening (dBA)	Leq(h) Night (dBA)	Ldn @ Rec (dBA)	CNEL @ Rec (dBA)
66.7	64.8	58.5	56.8	65.3	65.5

Centerline Distance to CNEL Contour

70 Contour XX CNEL (ft)	*65 Contour YY CNEL (ft)*	*60 Contour ZZ CNEL (ft)*	*55 Contour ZZ CNEL (ft)*
50	*109*	*234*	*504*

Noise Calculation, Construction Equipment & Stationary Source Noise

Project Number: 3380 Stagecoach

Model Description: Composite Noise Level Calc, Various Distances, No Shielding
Model Approach and Cite: General Assesessment: FTA, 2018: Transit Noise and Vibration Impact Assessment Guidelines. Section 7.1
Levels and Use Factors: FHWA, 2006: Roadway Construction Noise Model, User's Guide. Table 1 (Actual measured Lmax).

		Refc (ft)						
		50						
Sources / Activity	**Equipment**	**Lmax**	**Acoustic Use Factor**	**Refc Leq(h)**	**Recept @ (ft)**	**Item @ Recept Leq (dBA)**		**Composite @ Recept Leq (dBA)**
PV Panel System Installation (Impact Hammer)						Composite >>>>>>>>>>>>>>		73
	Pile Driver (Impact; Table 7-1: FTA, 2018)	101	20	94	600	72	1.7E+07	
	Crane	81	20	74	600	52	1.7E+05	
	Backhoe or Loader	79	40	75	600	53	2.2E+05	
	Dump Truck	76	40	72	600	50	1.1E+05	
PV Panel System Installation (Light-Duty Hammer = Vermeer PD10, 49 hp: 114 dBA contin @ 1m)						Composite >>>>>>>>>>>>>>		63
	Mounted Impact Hammer (FHWA, 2006)	90	20	83	600	61	1.4E+06	
	Crane	81	20	74	600	52	1.7E+05	
	Backhoe or Loader	79	40	75	600	53	2.2E+05	
	Dump Truck	76	40	72	600	50	1.1E+05	
Site Preparation						Composite >>>>>>>>>>>>>>		62
	Grader	85	40	81	600	59	8.8E+05	
	Dozer	82	40	78	600	56	4.4E+05	
	Backhoe or Loader	79	40	75	600	53	2.2E+05	
	Dump Truck	76	40	72	600	50	1.1E+05	
						Composite >>>>>>>>>>>>>>		83
Electrical System Installation	Crane	81	20	74	50	74	2.5E+07	
	Drill rig, auger	84	20	77	50	77	5.0E+07	
	Concrete Mixer Truck	79	40	75	50	75	3.2E+07	
	Compactor	83	20	76	50	76	4.0E+07	
	Generator	81	50	78	50	78	6.3E+07	

Individual Construction Equipment (Typical Noise Levels)

Pile Driver (Impact; Table 7-1: FTA, 2018)	101	20	94
Pile Driver (Sonic; Table 7-1: FTA, 2018 & FHWA, 2006)	95	20	88
Mounted Impact Hammer (FHWA, 2006)	90	20	83
Scraper	84	40	80
Dozer	82	40	78
Grader	85	40	81
Forklift or Man Lift	75	20	68
Crane	81	20	74
Backhoe or Loader	79	40	75
Excavator	81	40	77
Compactor	83	20	76
Generator	81	50	78
Drill rig, auger	84	20	77

Operation Phase	Equipment	Lmax	Acoustic Use Factor	Refc Leq(h)	Recept @ (ft)	Item @ Recept Leq (dBA)		Composite @ Recept Leq (dBA)
						Composite >>>>>>>>>>>>>>		45
Operations (Inverters/Tracker Motors)	Inverters (spec. @ 10m, SMA 2015)	66	100	66	600	44	2.8E+04	
	Tracker Motors (estd. PVMS DEIR p.3.11-15)	50	10	40	600	18	6.9E+01	
	Pickup Truck (RCNM, sporadic use factor)	75	1	55	600	33	2.2E+03	
						Composite >>>>>>>>>>>>>>		41
Operations (Inverters/Tracker Motors)	Inverters (spec. @ 10m, SMA 2015)	66	100	66	900	41	1.2E+04	
	Tracker Motors (estd. PVMS DEIR p.3.11-15)	50	10	40	900	15	3.1E+01	
	Pickup Truck (RCNM, sporadic use factor)	75	1	55	900	30	9.8E+02	
						Composite >>>>>>>>>>>>>>		45
Operations (hypothetical BESS, a/c or hvac)	Generic Equiv (81 dB @ 10 ft, Sta Paula 2017 IS)	67	100	67	900	42	1.5E+04	
	Inverters (spec. @ 10m, SMA 2015)	66	100	66	900	41	1.2E+04	
	Tracker Motors (estd. PVMS DEIR p.3.11-15)	50	10	40	900	15	3.1E+01	
	Pickup Truck (RCNM, sporadic use factor)	75	1	55	900	30	9.8E+02	

Vibration Source Levels for Construction Equipment

Project Number: 3380 Stagecoach

Model Approach and Cite: FTA, 2018: Table 7-4 and Eq. 7-2, 7-3.
Caltrans, 2020 = "Distinctly Perceptible" over 0.24 in/sec

Vibration Assessment, Individual Source

Reference Source (at 25 ft): PPV 0.644 in/sec , Pile Driver (impact, upper range)
Reference Source (at 25 ft): Lv 104 VdB, Pile Driver (impact, typical)

	D (ft) =	ppv(eq) =	Damage Criterion (over 0.5 in/sec)	Development Code 83.01.090 (over 0.2 in/sec)	Lv(D) =	Human Perceptibilty (over 65 Vdb)	Human Annoyance (over 80 VdB)
(ref)	25	0.644 in/sec	Yes	Yes	104.0 VdB	Yes	Yes
At 50 feet	50	0.228 in/sec	No	Yes	95.0 VdB	Yes	Yes
At 100 feet	100	0.081 in/sec	No	No	85.9 VdB	Yes	Yes
At 300 feet	300	0.015 in/sec	No	No	71.6 VdB	Yes	No
	600	0.005 in/sec	No	No	62.6 VdB	No	No

Vibration Assessment, Individual Source

Reference Source (at 25 ft): PPV 0.210 in/sec , Vibratory Roller (compactor)
Reference Source (at 25 ft): Lv 94 VdB, Vibratory Roller (compactor)

	D (ft) =	ppv(eq) =	Damage Criterion (over 0.5 in/sec)	Development Code 83.01.090 (over 0.2 in/sec)	Lv(D) =	Human Perceptibilty (over 65 Vdb)	Human Annoyance (over 80 VdB)
(ref)	25	0.210 in/sec	No	Yes	94.0 VdB	Yes	Yes
At 50 feet	50	0.074 in/sec	No	No	85.0 VdB	Yes	Yes
At 100 feet	100	0.026 in/sec	No	No	75.9 VdB	Yes	No
At 300 feet	300	0.005 in/sec	No	No	61.6 VdB	No	No
	600	0.002 in/sec	No	No	52.6 VdB	No	No

Vibration Assessment, Individual Source

Reference Source (at 25 ft): PPV 0.089 in/sec , Large Bulldozer
Reference Source (at 25 ft): Lv 87 VdB, Large Bulldozer

	D (ft) =	ppv(eq) =		Damage Criterion (over 0.5 in/sec)	Development Code 83.01.090 (over 0.2 in/sec)	Lv(D) =	Human Perceptibilty (over 65 Vdb)	Human Annoyance (over 80 VdB)
(ref)	25	0.089	in/sec	No	No	87.0 VdB	Yes	Yes
At 50 feet	50	0.031	in/sec	No	No	78.0 VdB	Yes	No
At 100 feet	100	0.011	in/sec	No	No	68.9 VdB	Yes	No
At 300 feet	300	0.002	in/sec	No	No	54.6 VdB	No	No
	600	0.001	in/sec	No	No	45.6 VdB	No	No

Vibration Assessment, Individual Source

Reference Source (at 25 ft): PPV 0.076 in/sec , Loaded Trucks
Reference Source (at 25 ft): Lv 86 VdB, Loaded Trucks

	D (ft) =	ppv(eq) =		Damage Criterion (over 0.5 in/sec)	Development Code 83.01.090 (over 0.2 in/sec)	Lv(D) =	Human Perceptibilty (over 65 Vdb)	Human Annoyance (over 80 VdB)
(ref)	25	0.076	in/sec	No	No	86.0 VdB	Yes	Yes
At 50 feet	50	0.027	in/sec	No	No	77.0 VdB	Yes	No
At 100 feet	100	0.010	in/sec	No	No	67.9 VdB	Yes	No
At 300 feet	300	0.002	in/sec	No	No	53.6 VdB	No	No
	600	0.001	in/sec	No	No	44.6 VdB	No	No