

Appendix E Noise and Vibration Supporting Information

Contains:

- On-site Noise Measurement Data, undertaken by AECOM, February 16-17, 2021
- Noise and Vibration Calculations and Assumptions, prepared by AECOM in support of CEQA analysis
- RCP Construction Inc. 2022. Construction Noise Mitigation Plan, Proposed Project
- RCP Construction Inc. 2023. Construction Noise Mitigation Plan, Alternative 3

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Long-Term 24 Hour Continuous Noise Monitoring
Model Input Sheet



Project: 60649732 - Saratoga Retirement Exp. EIR
Date: Tuesday, February 16, 2021 to Wednesday, February 17, 2021
Site: LT-01

Hour	Leq	Lmax	L50	L90
16:01	50.4	81.7	44.7	43.6
17:00	47.7	62.7	43.9	42.8
18:00	46.4	62.7	44.2	43.2
19:00	45.0	63.6	44.0	43.1
20:00	44.6	64.4	43.2	42.2
21:00	43.0	58.5	41.7	40.6
22:00	43.9	61.2	41.8	40.9
23:00	43.5	60.8	41.6	40.6
0:00	41.6	56.0	41.4	40.4
1:00	41.2	45.3	41.2	40.2
2:00	41.8	58.5	41.3	40.3
3:00	48.2	74.0	41.8	40.8
4:00	42.9	60.2	42.0	41.1
5:00	44.6	58.5	43.4	42.3
6:00	47.2	60.3	45.3	43.6
7:00	53.3	74.8	47.5	46.0
8:00	52.9	75.1	46.3	45.1
9:00	54.3	74.3	47.8	44.8
10:00	69.8	88.0	50.4	45.7
11:00	48.3	64.6	46.6	44.3
12:00	60.0	75.9	51.2	45.9
13:00	56.6	67.3	49.8	45.3
14:00	50.5	68.0	48.4	45.4
15:00	56.3	72.7	51.6	46.4

Daytime (7 a.m. - 10 p.m.)
 Nighttime (10 p.m. - 7 a.m.)

Averages			
Leq	Lmax	L50	L90
59.2	70.3	46.8	44.3
44.6	59.4	42.2	41.1

Daytime (7 a.m. - 10 p.m.)
 Nighttime (10 p.m. - 7 a.m.)

Uppermost-Level			
Leq	Lmax	L50	L90
69.8	88.0	51.6	46.4
48.2	74.0	45.3	43.6

Percentage of Energy	
Daytime	98%
Nighttime	2%

Calculated L _{dn} , dBA
58.0

Long-Term 24 Hour Continuous Noise Monitoring

Model Input Sheet



Project: 60649732 - Saratoga Retirement Exp. EIR

Date: Tuesday, February 16, 2021 to Wednesday, February 17, 2021

Site: LT-01

Hour	Leq	Lmax	L50	L90
16:01	50.4	81.7	44.7	43.6
17:00	47.7	62.7	43.9	42.8
18:00	46.4	62.7	44.2	43.2
19:00	45.0	63.6	44.0	43.1
20:00	44.6	64.4	43.2	42.2
21:00	43.0	58.5	41.7	40.6
22:00	43.9	61.2	41.8	40.9
23:00	43.5	60.8	41.6	40.6
0:00	41.6	56.0	41.4	40.4
1:00	41.2	45.3	41.2	40.2
2:00	41.8	58.5	41.3	40.3
3:00	48.2	74.0	41.8	40.8
4:00	42.9	60.2	42.0	41.1
5:00	44.6	58.5	43.4	42.3
6:00	47.2	60.3	45.3	43.6
7:00	53.3	74.8	47.5	46.0
8:00	52.9	75.1	46.3	45.1
9:00	54.3	74.3	47.8	44.8
10:00	69.8	88.0	50.4	45.7
11:00	48.3	64.6	46.6	44.3
12:00	60.0	75.9	51.2	45.9
13:00	56.6	67.3	49.8	45.3
14:00	50.5	68.0	48.4	45.4
15:00	56.3	72.7	51.6	46.4

Daytime (7 a.m. - 7 p.m.)
 Evening (7 p.m. - 9 p.m.)
 Nighttime (9 p.m. - 7 a.m.)

Averages			
Leq	Lmax	L50	L90
60.2	72.3	47.7	44.9
44.3	62.2	43.0	42.0
44.6	59.4	42.2	41.1

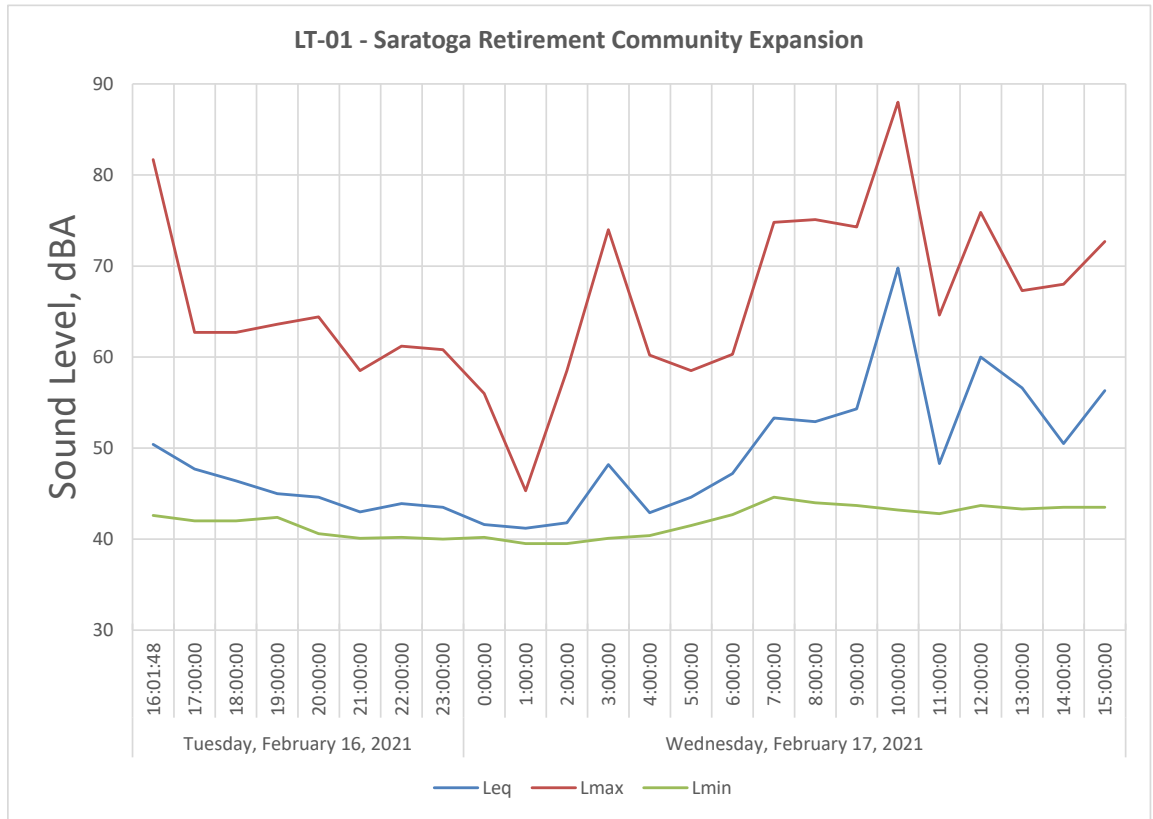
Daytime (7 a.m. - 7 p.m.)
 Evening (7 p.m. - 9 p.m.)
 Nighttime (9 p.m. - 7 a.m.)

Uppermost-Level			
Leq	Lmax	L50	L90
69.8	88.0	51.6	46.4
45.0	64.4	44.0	43.1
48.2	74.0	45.3	43.6

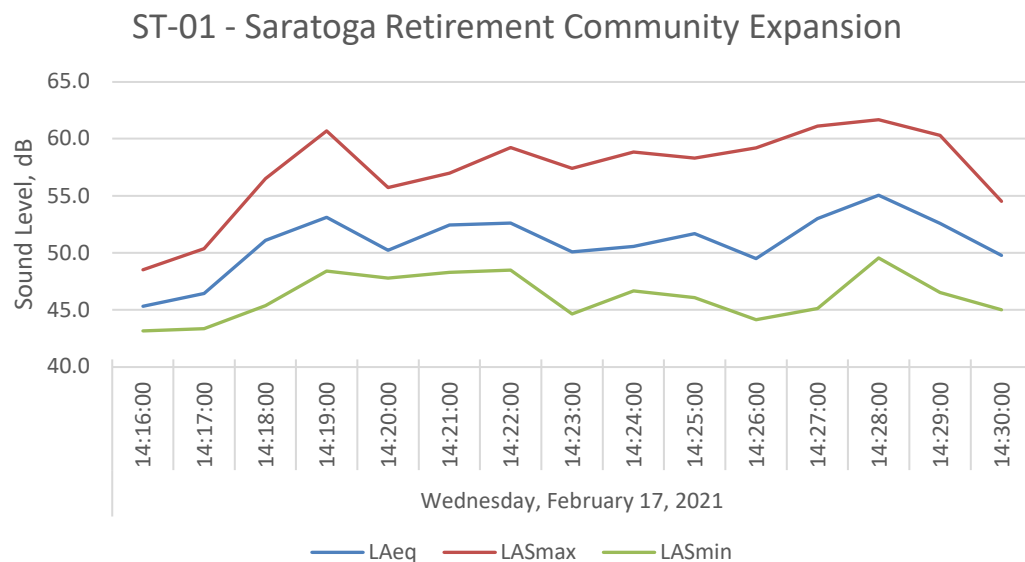
Percentage of Energy	
Daytime	97%
Evening	1%
Nighttime	2%

Calculated CNEL, dBA
58.0

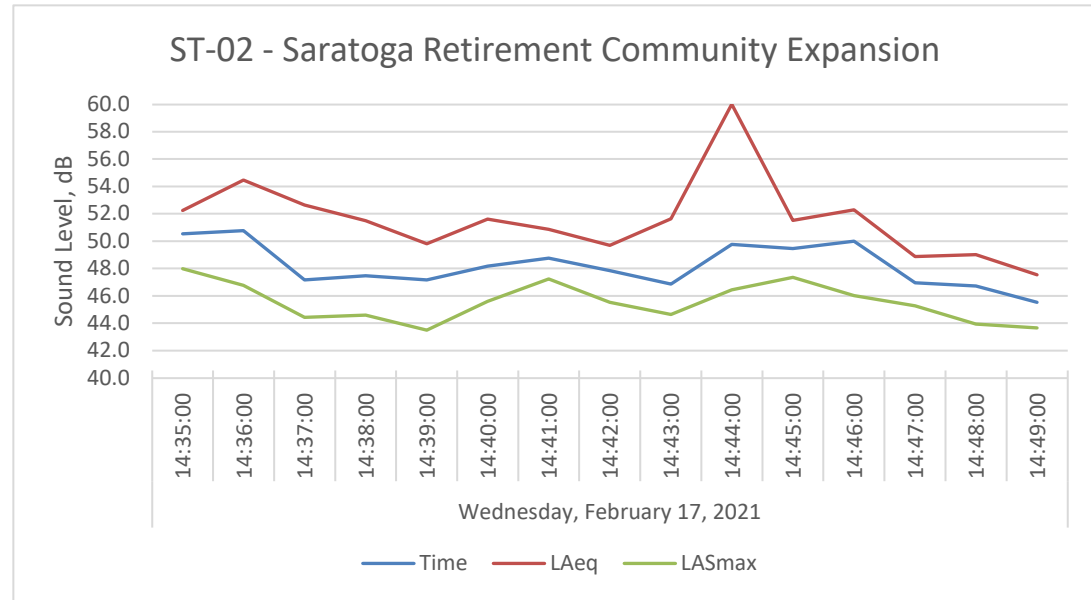
Date	Time	Leq	Lmax	Lmin
Tuesday, February 16, 2021	16:01:48	50.4	81.7	42.6
	17:00:00	47.7	62.7	42
	18:00:00	46.4	62.7	42
	19:00:00	45	63.6	42.4
	20:00:00	44.6	64.4	40.6
	21:00:00	43	58.5	40.1
	22:00:00	43.9	61.2	40.2
	23:00:00	43.5	60.8	40
Wednesday, February 17, 2021	0:00:00	41.6	56	40.2
	1:00:00	41.2	45.3	39.5
	2:00:00	41.8	58.5	39.5
	3:00:00	48.2	74	40.1
	4:00:00	42.9	60.2	40.4
	5:00:00	44.6	58.5	41.5
	6:00:00	47.2	60.3	42.7
	7:00:00	53.3	74.8	44.6
	8:00:00	52.9	75.1	44
	9:00:00	54.3	74.3	43.7
	10:00:00	69.8	88	43.2
	11:00:00	48.3	64.6	42.8
	12:00:00	60	75.9	43.7
	13:00:00	56.6	67.3	43.3
	14:00:00	50.5	68	43.5
	15:00:00	56.3	72.7	43.5
		57.3		



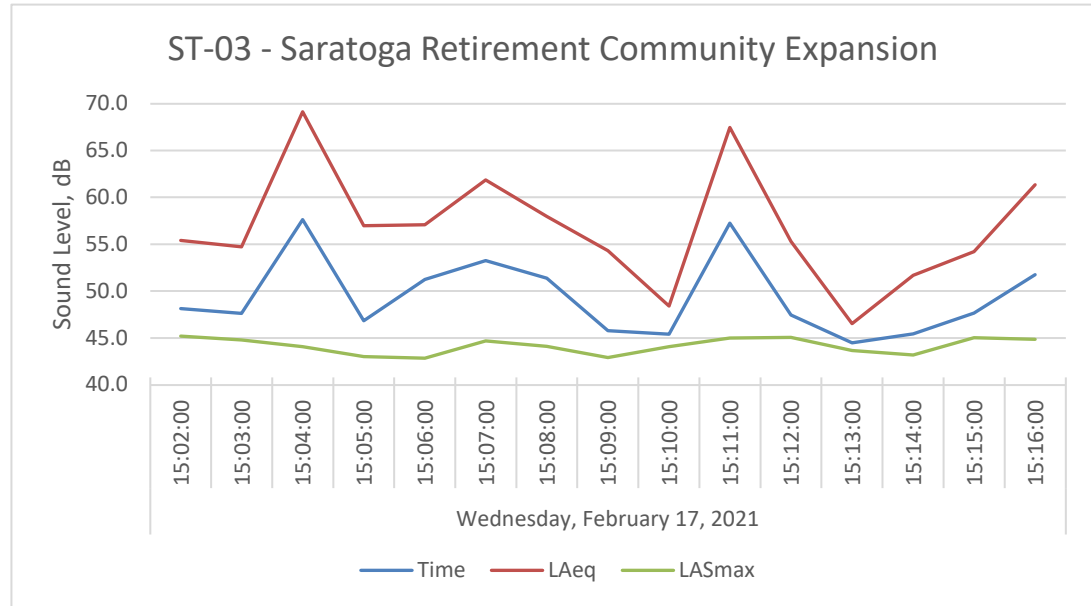
Record #	Date	Time	LAeq	LASmax	LASmin
1	Wednesday, February 17, 2021	14:16:00	45.3	48.5	43.2
2		14:17:00	46.4	50.3	43.4
3		14:18:00	51.1	56.5	45.4
4		14:19:00	53.1	60.7	48.4
5		14:20:00	50.2	55.7	47.8
6		14:21:00	52.4	57.0	48.3
7		14:22:00	52.6	59.2	48.5
8		14:23:00	50.1	57.4	44.6
9		14:24:00	50.6	58.8	46.7
10		14:25:00	51.7	58.3	46.1
11		14:26:00	49.5	59.2	44.1
12		14:27:00	53.0	61.1	45.1
13		14:28:00	55.0	61.7	49.5
14		14:29:00	52.6	60.3	46.5
15		14:30:00	49.8	54.5	45.0



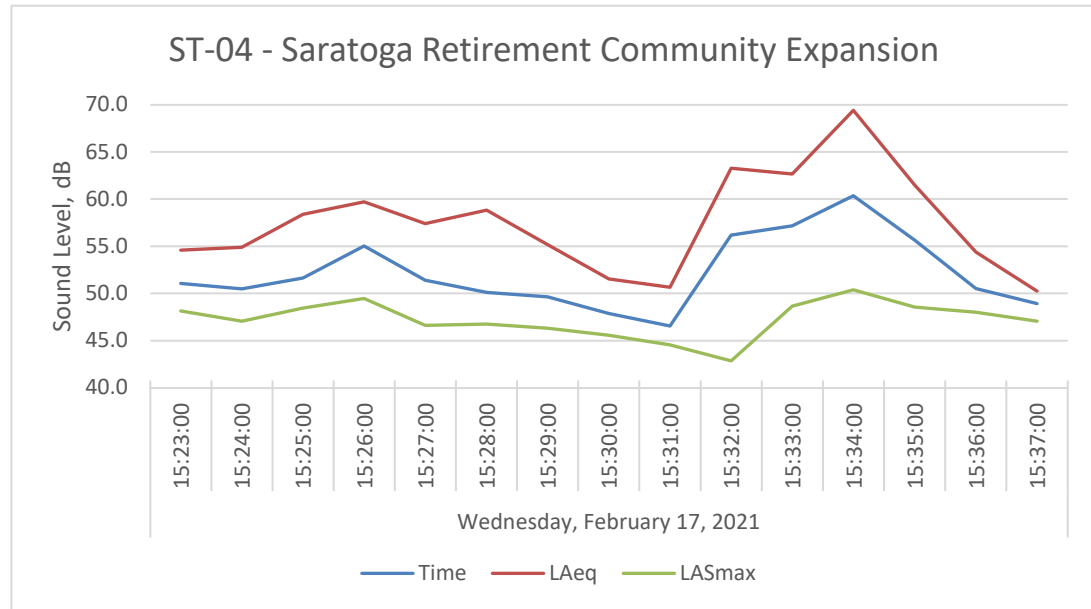
Record #	Date	Time	LAeq	LASmax	LASmin
1	Wednesday, February 17, 2021	14:35:00	50.5	52.2	48.0
2		14:36:00	50.8	54.5	46.8
3		14:37:00	47.2	52.6	44.4
4		14:38:00	47.5	51.5	44.6
5		14:39:00	47.2	49.8	43.5
6		14:40:00	48.2	51.6	45.6
7		14:41:00	48.8	50.9	47.2
8		14:42:00	47.8	49.7	45.5
9		14:43:00	46.9	51.6	44.6
10		14:44:00	49.7	60.0	46.4
11		14:45:00	49.5	51.5	47.4
12		14:46:00	50.0	52.3	46.0
13		14:47:00	47.0	48.9	45.3
14		14:48:00	46.7	49.0	43.9
15		14:49:00	45.5	47.5	43.7



Record #	Date	Time	LAeq	LASmax	LASmin
1	Wednesday, February 17, 2021	15:02:00	48.1	55.4	45.2
2		15:03:00	47.6	54.7	44.8
3		15:04:00	57.6	69.1	44.1
4		15:05:00	46.8	57.0	43.0
5		15:06:00	51.2	57.1	42.9
6		15:07:00	53.3	61.8	44.7
7		15:08:00	51.4	58.0	44.1
8		15:09:00	45.8	54.3	42.9
9		15:10:00	45.4	48.4	44.1
10		15:11:00	57.2	67.5	45.0
11		15:12:00	47.4	55.3	45.1
12		15:13:00	44.5	46.5	43.7
13		15:14:00	45.4	51.7	43.2
14		15:15:00	47.7	54.2	45.0
15		15:16:00	51.7	61.3	44.9



Record #	Date	Time	LAeq	LASmax	LASmin
1	Wednesday, February 17, 2021	15:23:00	51.1	54.6	48.1
2		15:24:00	50.5	54.9	47.0
3		15:25:00	51.6	58.4	48.5
4		15:26:00	55.0	59.7	49.5
5		15:27:00	51.4	57.4	46.6
6		15:28:00	50.1	58.8	46.8
7		15:29:00	49.6	55.1	46.3
8		15:30:00	47.9	51.5	45.6
9		15:31:00	46.6	50.6	44.6
10		15:32:00	56.2	63.3	42.9
11		15:33:00	57.1	62.7	48.7
12		15:34:00	60.4	69.4	50.4
13		15:35:00	55.6	61.5	48.5
14		15:36:00	50.5	54.4	48.0
15		15:37:00	48.9	50.2	47.1



Project-Generated Construction Source Noise Prediction Model

AECOM

PROPOSED PROJECT

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Reference Emission Noise Levels (L _{max}) at 50		Usage Factor ¹
			Assumptions:	feet ¹	
Threshold*	10	City Threshold	100	75	0.2
	104	FTA Guidance	80.0	78	0.4
25 feet from construction zone	25	92	Drill Rig Truck	79	0.2
			Concrete Mixer Truck	79	0.4
			Crane	81	0.16
			Dozer	82	0.4
			Excavator	81	0.4
			Man Lift	75	0.2
			Generator	81	0.5
			Compactor (ground)	83	0.2
			Paver	77	0.5
			Paver	77	0.5
			Roller	80	0.2
			Front End Loader	79	0.4
			Welder / Torch	74	0.4

Construction Zone	Receptor	Distance to Acoustic Center of Construction Zone	
Building A	6114/6116 West Cottage Lane	140	77
Building A	Apartment Building 1	180	75
Building B	Manor Building (3 north-facing units at east and west wing)	35	89
Building B	14505 Chester Avenue	150	77
Building B	Assisted Living Building (north-facing units, west wing)	230	73
Building C	Assisted Living Building (north-facing units)	50	86
Building C	14506 Chester Avenue	180	75
Meeting Room	Manor Building (west-facing units in west wing)	18	95
Meeting Room	6102-6108 West Cottage Lane	120	79
Fitness Center	Apartment Building 2 (north-facing unit, northwest corner)	102	80
Fitness Center	6118/6120 West Cottage Lane	100	80
Streetsweeper	See separate sheet		

Ground Type Hard
Ground Factor 0.00

Predicted Noise Level ²	L _{eq} dBA at 50 feet ²
Man Lift	68.0
Compressor (air)	74.0
Drill Rig Truck	72.0
Concrete Mixer Truck	75.0
Crane	73.0
Dozer	78.0
Excavator	77.0
Man Lift	68.0
Generator	78.0
Compactor (ground)	76.0
Paver	74.0
Paver	74.0
Roller	73.0
Front End Loader	75.0
Welder / Torch	70.0

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

86.4

Sources:

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

² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

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

Where: E.L. = Emission Level;

U.F. = Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Project-Generated Construction Source Noise Prediction Model



Street Sweeper

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Reference Emission Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold*	25	Daytime 100 Nighttime n/a	Vacuum Street Sweeper	82	0.1
25 feet from construction zone	25	78			

Receptor - Project	Distance to Center of Road	Combined Predicted Noise Level (L _{eq} dBA)
San Marcos Road residences (Odd Fellows Drive)	80	68
Cottages (West Cottages Lane)	50	72
Apartment Building 1 (Pavilion Circle)	25	78
Apartment Building 2 (Pavilion Circle)	45	73

Receptor - Alternative 1	Distance to Center of Road	Combined Predicted Noise Level (L _{eq} dBA)
San Marcos Road residences (Odd Fellows Drive)	80	68
Assisted Living Building (McLaren Lane)	12	84
Apartment Building 1 (McLaren Lane)	40	74

Receptor - Alternative 2	Distance to Center of Road	Combined Predicted Noise Level (L _{eq} dBA)
San Marcos Road residences (Odd Fellows Drive)	80	68
Cottages (West Cottages Lane)	50	72
Apartment Building 1 (Pavilion Circle)	25	78
Apartment Building 2 (Pavilion Circle)	45	73

Receptor - Alternative 3	Distance to Center of Road	Combined Predicted Noise Level (L _{eq} dBA)
San Marcos Road residences (Odd Fellows Drive)	80	68
Cottages (West Cottages Lane)	50	72
Apartment Building 1 (Pavilion Circle)	25	78
Apartment Building 2 (Pavilion Circle)	45	73

Sources:

¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006.² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Ground Type Hard
Ground Factor 0.00

Predicted Noise Level ² L_{eq} dBA at 50 feet²
Vacuum Street Sweeper 72.0

Alternative 1 - construction activities

Location		Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Reference Emission Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold*		10	Daytime	100	Man Lift	0.2
		104	FTA Guidance	80	Compressor (air)	0.4
25 feet from construction zone		25			Drill Rig Truck	0.2
					Concrete Mixer Truck	0.4
					Crane	0.16
					Dozer	0.4
					Excavator	0.4
					Man Lift	0.2
					Generator	0.5
					Compactor (ground)	0.2
					Paver	0.5
					Paver	0.5
					Roller	0.2
					Front End Loader	0.4
					Welder / Torch	0.4

Construction Zone	Receptor	Distance to Acoustic Center of Construction Zone	
Skilled Nursing (Bldg C)	Assisted Living Building (north-facing units)	50	86
Skilled Nursing (Bldg C)	14506 Chester Avenue	180	75
Building D	Apartment Building 1 (east-facing units)	146	77
Building D	6131 South Cottages Lane	190	75
Building D	Assisted Living Building (south-facing units)	203	74
Building D	Fellowship Plaza (west-facing units, closest building)	245	73
Fitness Center	Apartment Building 2 (north-facing unit, northwest corner)	102	80
Fitness Center	6118/6120 West Cottage Lane	100	80
Healthcare Building Demo	See separate sheet		
Streetsweeper	See separate sheet		

Predicted Noise Level ²	L _{eq} dBA at 50 feet ²
Man Lift	68.0
Compressor (air)	74.0
Drill Rig Truck	72.0
Concrete Mixer Truck	75.0
Crane	73.0
Dozer	78.0
Excavator	77.0
Man Lift	68.0
Generator	78.0
Compactor (ground)	76.0
Paver	74.0
Paver	74.0
Roller	73.0
Front End Loader	75.0
Welder / Torch	70.0

Ground Type	Hard
Ground Factor	0.00

Sources:

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

² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

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

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Combined Predicted Noise Level (L _{eq} dBA at 50 feet)
86.4

Project-Generated Construction Source Noise Prediction Model



Alternative 1 - demolition activities

			Reference Emission		
Location		Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold*		23	Daytime 100	Concrete Saw 90	0.2
		233	FTA Guidance 80	Crane 81	0.16
25 feet from construction zone		25	99	Dozer 82	0.4
				Dump Truck 76	0.4
				Excavator 81	0.4
				Man Lift 75	0.2
				Mounted Impact Hammer (hoe ram) 90	0.2
				Shears (on backhoe) 96	0.4
				Front End Loader 79	0.4
Construction Zone	Receptor	Distance to Acoustic Center of Construction Zone			
Building D	Apartment Building 1 (east-facing units)	146		84	
Building D	6131 South Cottages Lane	190		82	
Building D	Assisted Living Building (south-facing units)	203		81	
Building D	Fellowship Plaza (west-facing units, closest building)	245		80	
Alt 1 construction	See separate sheet				
Streetsweeper	See separate sheet				
Sources:				Ground Type	Hard
¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006.				Ground Factor	0.00
² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.					
L _{eq} (equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)					
Where: E.L. = Emission Level;					
U.F.= Usage Factor;					
G = Constant that accounts for topography and ground effects; and					
D = Distance from source to receiver.					
*Project specific threshold					
				Predicted Noise Level ²	
				L _{eq} dBA at 50 feet ²	
				Concrete Saw	83.0
				Crane	73.0
				Dozer	78.0
				Dump Truck	72.0
				Excavator	77.0
				Man Lift	68.0
				Mounted Impact Hammer (hoe ram)	83.0
				Shears (on backhoe)	92.0
				Front End Loader	75.0
				Combined Predicted Noise Level (L _{eq} dBA at 50 feet)	
				93.4	

Sources:

¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006.² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.L_{eq}(equip) = E.L. + 10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F. = Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Project-Generated Construction Source Noise Prediction Model

AECOM

Alternative 2 - construction activities

Location		Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Reference Emission Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold*		10	Daytime 100	Man Lift	75	0.2
		104	FTA Guidance 80	Compressor (air)	78	0.4
25 feet from construction zone		25	92	Drill Rig Truck	79	0.2
				Concrete Mixer Truck	79	0.4
				Crane	81	0.16
				Dozer	82	0.4
				Excavator	81	0.4
				Man Lift	75	0.2
				Generator	81	0.5
				Compactor (ground)	83	0.2
				Paver	77	0.5
				Paver	77	0.5
				Roller	80	0.2
				Front End Loader	79	0.4
				Welder / Torch	74	0.4
				Ground Type	Hard	
				Ground Factor	0.00	
Construction Zone		Receptor	Distance to Acoustic Center of Construction Zone	Predicted Noise Level ²	L _{eq} dBA at 50 feet ²	
Building A	6114/6116 West Cottage Lane		140		68.0	
Building A	Apartment Building 1 (west-facing units)		180		74.0	
Building C	Assisted Living Building (north-facing units)		50		72.0	
Building C	14506 Chester Avenue		180		75.0	
Meeting Room	Manor Building (west-facing units in west wing)		18		73.0	
Meeting Room	6102-6108 West Cottage Lane		120		78.0	
Fitness Center	6118/6120 West Cottage Lane		100		77.0	
					68.0	
					78.0	
					77.0	
					78.0	
					76.0	
					74.0	
					74.0	
					73.0	
					75.0	
					70.0	
Streetsweeper	various	See separate sheet				
				Combined Predicted Noise Level (L _{eq} dBA at 50 feet)		
				86.4		

Sources:

¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006.² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.L_{eq}(equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Project-Generated Construction Source Noise Prediction Model



Alternative 3 - construction activities

Location	Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Reference Emission	Usage
				Noise Levels (L _{max}) at 50 feet ¹	Factor ¹
Threshold*	10	City Threshold	100	75	0.2
	104	FTA Guidance	80.0	78	0.4
25 feet from construction zone	25	92	Drill Rig Truck	79	0.2

Construction Zone	Receptor	Distance to Acoustic Center of Construction Zone	
Building A	6114/6116 West Cottage Lane	140	77
Building A	Apartment Building 1	180	75
Manor Circle Parking	Manor Building (3 north-facing units at east and west wing)	35	89
Manor Circle Parking	14505 Chester Avenue	150	77
Building C	Assisted Living Building (north-facing units)	50	86
Building C	14506 Chester Avenue	180	75
Meeting Room	Manor Building (west-facing units in west wing)	18	95
Meeting Room	6102-6108 West Cottage Lane	120	79
Fitness Center	6118/6120 West Cottage Lane	100	80
New Cottage	6118/6120 West Cottage Lane	50	86
New Cottage	19300 Chablis Court	60	85
Building D	6016 West Cottage Lane	120	79
Building D	14622 Burgundy Way	130	78
Demolition of Cottage	see separate sheet		
Streetsweeper	See separate sheet		

	Reference Emission	Usage
Assumptions:	Noise Levels (L _{max}) at 50 feet ¹	Factor ¹
Man Lift	75	0.2
Compressor (air)	78	0.4
Drill Rig Truck	79	0.2
Concrete Mixer Truck	79	0.4
Crane	81	0.16
Dozer	82	0.4
Excavator	81	0.4
Man Lift	75	0.2
Generator	81	0.5
Compactor (ground)	83	0.2
Paver	77	0.5
Paver	77	0.5
Roller	80	0.2
Front End Loader	79	0.4
Welder / Torch	74	0.4

Ground Type	Hard
Ground Factor	0.00
Predicted Noise Level ²	L_{eq} dBA at 50 feet ²
Man Lift	68.0
Compressor (air)	74.0
Drill Rig Truck	72.0
Concrete Mixer Truck	75.0
Crane	73.0
Dozer	78.0
Excavator	77.0
Man Lift	68.0
Generator	78.0
Compactor (ground)	76.0
Paver	74.0
Paver	74.0
Roller	73.0
Front End Loader	75.0
Welder / Torch	70.0

Sources:

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

² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

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

Where: E.L. = Emission Level;

U.F.= Usage Factor,

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

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

86.4

Project-Generated Construction Source Noise Prediction Model



Alternative 3 - demolition activities

				Reference Emission		
Location		Distance to Nearest Receiver in feet	Combined Predicted Noise Level (L _{eq} dBA)	Assumptions:	Noise Levels (L _{max}) at 50 feet ¹	Usage Factor ¹
Threshold*		23	Daytime 100	Concrete Saw	90	0.2
		233	FTA Guidance 80	Crane	81	0.16
25 feet from construction zone		25	99	Dozer	82	0.4
				Dump Truck	76	0.4
				Excavator	81	0.4
				Man Lift	75	0.2
				Mounted Impact Hammer (hoe ram)	90	0.2
				Shears (on backhoe)	96	0.4
				Front End Loader	79	0.4
Construction Zone	Receptor	Distance to Acoustic Center of Construction Zone				
Demolition of Cottage	6016 West Cottage Lane	60		92		
Demolition of Cottage	14622 Burgundy Way	100		87		
Alt 3 construction	See separate sheet					
Streetsweeper	See separate sheet					
				Ground Type	Hard	
				Ground Factor	0.00	
Sources:						
¹ Obtained from the FHWA Roadway Construction Noise Model, January 2006.						
² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.						
L _{eq} (equip) = E.L.+10*log (U.F.) - 20*log (D/50) - 10*G*log (D/50)						
Where: E.L. = Emission Level;						
U.F.= Usage Factor;						
G = Constant that accounts for topography and ground effects; and						
D = Distance from source to receiver.						
*Project specific threshold						

Sources:

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

² Based on the following from the Federal Transit Noise and Vibration Impact Assessment, 2006.

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

Where: E.L. = Emission Level;

U.F.= Usage Factor;

G = Constant that accounts for topography and ground effects; and

D = Distance from source to receiver.

*Project specific threshold

Construction Traffic Assumptions

Project Construction

Construction Phase	Haul Truck Trips (One-Way)	Vendor Trips (One-Way)	Total Trips	Notes	Phase Duration (days)	Total # Trucks	Average Truck Trips per Day	Average Truck Trips per Hour	Average # Workers	Maximum # Workers	Average # Commutes	Maximum # Commutes	Average # Shuttles	Maximum # Shuttles
Phase 1 – Bldg A & Fitness Center	600	2258	2858	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	360	1429	7.94	0.99	50	74	100	148	10.0	14.8
Phase 2 – Bldg B	1906	1988	3894	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	355	1947	10.97	1.37	27	41	54	82	5.4	8.2
Phase 3 – Bldg C & Meeting Room	1558	2936	4494	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	440	2247	10.21	1.28	46	75	92	150	9.2	15.0
Phase 4 – Healthcare Reno	20	0	20	Drop-off and pick-up of debris drop boxes.	495	10	0.04	0.01	10	16	20	32	2.0	3.2
Total	4064	7182	11266	For period when all 4 phases overlapping		5633	29	4	133	206	266	412	27	41
Average	4084	7182	11266	For entire duration	535	5633	21.06	2.63	98.6	153.5	197.3	307.0	19.7	30.7

Alternative 1 Construction

Construction Phase	Haul Truck Trips (One-Way)	Vendor Trips (One-Way)	Total	Notes	Phase Duration (days)	Total # Trucks	Average Truck Trips per Day	Average Truck Trips per Hour	Average # Workers	Maximum # Workers	Average # Commutes	Maximum # Commutes	Average # Shuttles	Maximum # Shuttles
Phase 1 Skilled Nursing Facility	1328	1934	3262	Haul truck trips and vendor trips based on haul truck trips associated with Building C from Proposed Project.	630	1631	5.18	0.65	46	75	92	150	9.2	15.0
Phase 2 Transfer of Patients	0	0	0	Negligible	20	0	0.00	0.00	10	15	20	30	2.0	3.0
Phase 3 Demo of Existing HC Building	2128	0	2128	Haul truck trips based on truck trips provided by cost est	40	1064	53.20	6.65	20	30	40	60	4.0	6.0
Phase 4 Building D and Fitness Center	2841	3908	6749	Haul truck trips based on grading quantities, vendor trips based on CalEEMod rate of 0.1069 vendor trips/day/DU.	565	3374.5	11.95	1.49	50	75	100	150	10.0	15.0
Total/Average	6297	5842	12139	Over entire duration	1255	6069.5	9.67	1.21	46.4	75	92.8	145.2	9.3	14.5

0

Alternative 2 Construction

Construction Phase	Haul Truck Trips (One-Way)	Vendor Trips (One-Way)	Total	Notes	Phase Duration (days)	Total # Trucks	Average Truck Trips per Day	Average Truck Trips per Hour	Average # Workers	Maximum # Workers	Average # Commutes	Maximum # Commutes	Average # Shuttles	Maximum # Shuttles
Phase 1 – Bldg A & Fitness Center	600	2258	2858	Same as Proposed Project	360	1429	7.94	0.99	50	74	100	148	10.0	14.8
Phase 2 – Bldg C & Meeting Room	2370	2936	5306	Same as Proposed Project, plus additional 6,500 CY of excavation to account for larger parking garage	440	2653	12.06	1.51	46	75	92	150	9.2	15.0
Phase 3 – Healthcare Reno	20	0	20	Same as Proposed Project	495	10	0.04	0.01	10	16	20	32	2.0	3.2
Total	2990	5194	8184	For period when all phases overlapping		4092	20	3	106	165	212	330	21	33
Average	2990	5194	8184	For entire duration	535	4092	15.30	1.91	80.7	126.3	161.5	252.6	16.1	25.3

Alternative 3 Construction

Construction Phase	Haul Truck Trips (One-Way)	Vendor Trips (One-Way)	Total	Notes	Phase Duration (days)	Total # Trucks	Average Truck Trips per Day	Average Truck Trips per Hour	Average # Workers	Maximum # Workers	Average # Commutes	Maximum # Commutes	Average # Shuttles	Maximum # Shuttles
Phase 1 – Site Prep/Parking & Staging (70 workdays)	438	0	438	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	70	219	6.26	0.78	10	15	20	30	2.0	3.0
Phase 2 – Building C & Cottage Demo (425 workdays)	1,328	1934	3262	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	425	1631	7.68	0.96	46	75	92	150	9.2	15.0
Phase 3 – Building D, Meeting Room, Fitness Center Addition, and new Cottage (340 workdays)	1,418	3320	4738	Earthwork quantity/16CY truck + CalEEMod defaults for vendor/concrete	340	2369	13.94	1.74	48	74	96	148	9.6	14.8
Phase 4 – Building A (360 workdays)	592	1692	2284	Same as Phase 1 of Proposed Project	360	1142	6.34	0.79	50	74	100	148	10.0	14.8
Phase 5 – Healthcare Reno (495 workdays)	20	0	20	Same as Proposed Project	495	10	0.04	0.01	10	16	20	32	2.0	3.2
Total	2766	5254	8020	For 6-month period when Phases 2, 3 and 5 overlap		4010	22	3	104	165	208	330	21	33
Average	3796	6946	10742	For entire duration	1050	5371	10.23	1.28	56.7	88.2	113.4	176.5	11.3	17.6

Construction Traffic Noise

PROJECT CONSTRUCTION (Most intensive truck traffic - all phases overlap)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	4	133	0	209	1,936	12.13%	0.5
Fruitvale Avenue between Allendale and South College Circle	1,083	4	133	0	209	1,292	19.34%	0.8
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	4	133	14	223	1,306	20.63%	0.8
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0	133	0	133	959	16.10%	0.6
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	4	0	14	90	181	99.34%	3.0
Odd Fellows	67	4	0	14	90	157	134.93%	3.7

Increase in noise due to traffic volume equals:

$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$

ALT 1 CONSTRUCTION (Most intensive truck traffic - Phase 3 Demo)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	6.65	20	0	147	1,874	8.51%	0.4
Fruitvale Avenue between Allendale and South College Circle	1,083	6.65	20	0	147	1,230	13.57%	0.6
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	6.65	20	2	149	1,232	13.76%	0.6
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0.00	20	0	20	846	2.42%	0.1
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	6.65	0	2	129	220	141.77%	3.8
Odd Fellows	67	6.65	0	2	129	196	192.56%	4.7

Increase in noise due to traffic volume equals:

$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$

ALT 1 CONSTRUCTION (average over entire construction duration)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	1.30	46	0	71	1,798	4.10%	0.2
Fruitvale Avenue between Allendale and South College Circle	1,083	1.30	46	0	71	1,154	6.54%	0.3
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	1.30	46	10	81	1,164	7.46%	0.3
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0.00	46	0	46	872	5.57%	0.2
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	1.30	0	10	35	126	38.27%	1.4
Odd Fellows	67	1.30	0	10	35	102	51.99%	1.8

Increase in noise due to traffic volume equals:

$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$

ALT 2 CONSTRUCTION (Most intensive truck traffic - all phases overlap)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	2.50	115	0	163	1,890	9.42%	0.4
Fruitvale Avenue between Allendale and South College Circle	1,083	2.50	115	0	163	1,246	15.03%	0.6
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	2.50	115	18	181	1,264	16.69%	0.7
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0.00	115	0	115	941	13.92%	0.6
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	2.50	0	18	66	157	72.25%	2.4
Odd Fellows	67	2.50	0	18	66	133	98.13%	3.0

Increase in noise due to traffic volume equals:

$$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$$

ALT 3 CONSTRUCTION (Most intensive truck traffic - Phases 2, 3, 5 overlap, 6 months)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	3.00	104	0	161	1,888	9.34%	0.4
Fruitvale Avenue between Allendale and South College Circle	1,083	3.00	104	0	161	1,244	14.89%	0.6
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	3.00	104	22	183	1,266	16.93%	0.7
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0.00	104	0	104	930	12.59%	0.5
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	3.00	0	22	79	170	87.14%	2.7
Odd Fellows	67	3.00	0	22	79	146	118.36%	3.4

Increase in noise due to traffic volume equals:

$$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$$

ALT 3 CONSTRUCTION (average over entire construction duration)

Roadway	Existing Traffic Volume (vehicles per hour)	# Truck Trips/Hour	# Commute Trips/Hour	# Shuttle Trips/Hour	Construction-related equiv passenger VPH	Existing Plus Project Traffic Volume (vehicles per hour)	Percent Increase	Estimated Increase in Noise Level due to Traffic Volume (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	1.28	57	0	81	1,808	4.72%	0.2
Fruitvale Avenue between Allendale and South College Circle	1,083	1.28	57	0	81	1,164	7.52%	0.3
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	1.28	57	12	93	1,176	8.63%	0.4
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	0.00	57	0	57	883	6.90%	0.3
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	1.28	0	12	36	127	40.05%	1.5
Odd Fellows	67	1.28	0	12	36	103	54.40%	1.9

Increase in noise due to traffic volume equals:

$$10 \cdot \log(\text{Existing} + \text{Project traffic} / \text{existing traffic})$$

Cumulative Construction Traffic					
Roadway	Existing Peak-Hour Traffic Volumes (vph)	Project Construction Peak-Hour passenger equivalent VPH	Threshold of Significance for Increased Traffic Noise (dBA)	Estimated number of peak-hour truck trips from other cumulative projects that would be required to result in exceedance of threshold when combined with Project Construction and Existing Traffic	Estimated Increase in Noise Level due to Project + Cumulative Operations (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	209	5	190	5.08
Fruitvale Avenue between Allendale and South College Circle	1,083	209	5	115	5.08
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	223	5	115	5.10
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	133	5	90	5.11
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	90	5	6	5.12
Odd Fellows	67	90	5	3	5.05

Note: A Passenger-Vehicle Equivalence Factor of 19.1 is applied to peak hour truck trips as an approximation for the increased level of traffic noise generated by heavy vehicles.

Operational Traffic Noise

PROJECT OPERATION

Roadway	Existing Traffic Volumes (vph)	Project Operational Traffic Volumes (vph)	Existing + Project Ops (vph)	Percent Increase Above Existing	Estimated Increase in Noise Level due to Project Operations (dBA)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	14	1,741	0.81%	0.04
Fruitvale Avenue between Allendale and South College Circle	1,083	14	1,097	1.29%	0.06
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	14	1,097	1.29%	0.06
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	14	840	1.69%	0.07
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	14	105	15.38%	0.62
Odd Fellows	67	14	81	20.90%	0.82

PROJECT OPERATION - Cumulative

Roadway	Existing Traffic Volumes (vph)	Project Operational Traffic Volumes (vph)	Other Cumulative Project Traffic Volumes (vph)	Cumulative Plus Project Traffic Volumes (vph)	Future Traffic Volume (with Cum + Proj)	Percent Increase Above Existing (Cum + Proj)	Estimated Increase in Noise Level due to Project + Cumulative Operations (dBA)	Project's Contribution to Cumulative Increase (%)
Fruitvale Avenue between Saratoga and Allendale Avenues	1,727	14	21	35	1,762	2.03%	0.09	40%
Fruitvale Avenue between Allendale and South College Circle	1,083	14	21	35	1,118	3.23%	0.14	40%
Fruitvale Avenue between South College Circle and San Marcos Road	1,083	14	21	35	1,118	3.23%	0.14	40%
Fruitvale Avenue between San Marcos Road and Los Gatos-Saratoga Road	826	14	21	35	861	4.24%	0.18	40%
San Marcos Road between Fruitvale Avenue and Odd Fellows Drive	91	14	21	35	126	38.46%	1.41	40%
Odd Fellows	67	14	21	35	102	52.24%	1.83	40%

Vibration Calculations - Construction

Project Construction

Reference PPV @25 ft (in/sec)	Reference Lv @25 ft (VdB)	Vibration Source	Construction Zone	Sensitive Receptor	Minimum distance between Source and Receptor (Feet)	Estimated PPV at receptor (in/sec)	Estimated Lv at receptor (VdB)	Threshold for structural damage (in/sec PPV)	Threshold for human annoyance (VdB)
0.21	94	Roller	A	Manor Building	50	0.074	85	0.2	80
0.21	94	Roller	A	6114/6116 West Cottage	75	0.040	80	0.3	80
0.21	94	Roller	B	Manor Building	7.5	1.278	110	0.2	80
0.21	94	Roller	B	14505 Chester Avenue	70	0.045	81	0.3	80
0.21	94	Roller	C	Manor Building	35	0.127	90	0.2	80
0.21	94	Roller	C	Assisted Living Building	20	0.293	97	0.3	80
0.21	94	Roller	Meeting	Manor Building	3	5.052	122	0.2	80
0.21	94	Roller	Meeting	6102-6108 West Cottage	50	0.074	85	0.3	80
0.21	94	Roller	Fitness	Manor Building	360	0.004	59	0.2	80
0.21	94	Roller	Fitness	6118/6120 West Cottage	50	0.074	85	0.3	80

Source: calculated by AECOM 2020, based on reference values from FTA 2018, Caltrans 2020.

Notes: Vibration levels for large and small excavators are conservatively based on reference values for large and small bulldozers, respectively, as reference values were not available for all equipment types. Similarly, vibration levels for a crawler crane are conservatively based on reference values for a large bulldozer due to lack of equipment-specific reference values. Vibration levels for "sheepsfoot roller" is based on reference value for vibratory roller. Values shown in **bold with asterisk*** indicate that applicable thresholds would be exceeded, as discussed further in the text.

Acronyms: in/sec = inches per second; Lv = velocity level in decibels, based on the root mean square velocity amplitude; PPV = peak particle velocity; VdB = velocity decibels.

Alt 1 Construction

Reference PPV @25 ft (in/sec)	Reference Lv @25 ft (VdB)	Vibration Source	Construction Zone	Sensitive Receptor	Minimum distance between Source and Receptor (Feet)	Estimated PPV at receptor (in/sec)	Estimated Lv at receptor (VdB)	Threshold for structural damage (in/sec PPV)	Threshold for human annoyance (VdB)
0.21	94	Roller	Skilled Nursing Construction	Manor Building	35	0.127	90	0.2	80
0.21	94	Roller	Skilled Nursing Construction	Assisted Living Building	20	0.293	97	0.3	80
0.089	87	Hoe Ram/Dozer	Healthcare Demolition	Manor Building	325	0.002	54	0.2	80
0.089	87	Hoe Ram/Dozer	Healthcare Demolition	Assisted Living Building	40	0.044	81	0.3	80
0.21	94	Roller	Building D Construction	Manor Building	325	0.004	61	0.2	80
0.21	94	Roller	Building D Construction	Assisted Living Building	40	0.104	88	0.3	80
0.21	94	Roller	Fitness Center Addition	Manor Building	360	0.004	59	0.2	80
0.21	94	Roller	Fitness Center Addition	6118/6120 West Cottage Lane	50	0.074	85	0.3	80

Alt 2 Construction

Reference PPV @25 ft (in/sec)	Reference Lv @25 ft (VdB)	Vibration Source	Construction Zone	Sensitive Receptor	Minimum distance between Source and Receptor (Feet)	Estimated PPV at receptor (in/sec)	Estimated Lv at receptor (VdB)	Threshold for structural damage (in/sec PPV)	Threshold for human annoyance (VdB)
0.21	94	Roller	A	Manor Building	50	0.074	85	0.2	80
0.21	94	Roller	A	6114/6116 West Cottage	75	0.040	80	0.3	80
0.21	94	Roller	C	Manor Building	35	0.127	90	0.2	80
0.21	94	Roller	C	Assisted Living Building	20	0.293	97	0.3	80
0.21	94	Roller	Meeting	Manor Building	3	5.052	122	0.2	80
0.21	94	Roller	Meeting	6102-6108 West Cottage	50	0.074	85	0.3	80
0.21	94	Roller	Fitness	Manor Building	360	0.004	59	0.2	80
0.21	94	Roller	Fitness	6118/6120 West Cottage	50	0.074	85	0.3	80

Alt 3 Construction

Reference PPV @25 ft (in/sec)	Reference Lv @25 ft (VdB)	Vibration Source	Vibration Source	Receptor	Minimum ¹ Distance (feet)	Estimated PPV at receptor (in/sec)	Estimated Lv at receptor (VdB)	Threshold for structural damage (in/sec PPV)	Threshold for human annoyance (VdB)
0.21	94	Roller	Parking Area	Manor Building	85	0.033	78	0.2	80
0.21	94	Roller		14505 Chester Avenue	75	0.040	80	0.3	80
0.21	94	Roller	Building C Construction	Manor Building	35	0.127	90	0.2	80
0.21	94	Roller		Assisted Living Building	20	0.293	97	0.3	80
0.089	87	Hoe Ram/Dozer	Cottage Demolition	Manor Building	95	0.012	70	0.2	80
0.089	87	Hoe Ram/Dozer		6016 West Cottage Lane	10	0.352	99	0.3	80
0.089	87	Hoe Ram/Dozer		14622 Burgundy Way	16	0.174	93	0.3	80
0.21	94	Roller	Building D Construction	Manor Building	95	0.028	77	0.3	80
0.21	94	Roller		6016 West Cottage Lane	10	0.830	106	0.3	80
0.21	94	Roller		14622 Burgundy Way	16	0.410	100	0.3	80
0.21	94	Roller	Cottage Construction	6118/6120 West Cottage	8	1.160	109	0.3	80
0.21	94	Roller		19300 Chablis Court	16	0.410	100	0.3	80
0.21	94	Roller	Meeting Room Addition	Manor Building	3	5.052	122	0.2	80
0.21	94	Roller		6102-6108 West Cottage	50	0.074	85	0.3	80
0.21	94	Roller	Fitness Center Addition	Manor Building	360	0.004	59	0.3	80
0.21	94	Roller		6118/6120 West Cottage	50	0.074	85	0.3	80
0.21	94	Roller	Building A Construction	Manor Building	50	0.074	85	0.3	80
0.21	94	Roller		6114/6116 West Cottage	75	0.040	80	0.3	80

Minimum Distances Required to Avoid Exceeding Thresholds

Minimum Distances to avoid Human Annoyance

Reference Lv @25 ft (VdB)	Vibration Source	Vibration Source	Receptor	Minimum ¹ Distance (feet)	Estimated Lv at receptor (VdB)	Threshold for human annoyance (VdB)
94	Roller	Any	Any	75	80	80
87	Dozer/Drill	Any	Any	44	80	80
86	Truck	Any	Any	41	80	80

Minimum Distances to avoid Building Damage (non-engineered timber and masonry buildings)

Reference PPV @25 ft (in/sec)	Vibration Source	Vibration Source	Receptor	Minimum ¹ Distance (feet)	Estimated PPV at receptor (in/sec)	Threshold for structural damage (in/sec PPV)
0.21	Roller	Any	Any	25.83	0.200	0.2
0.089	Dozer/Drill	Any	Any	14.58	0.200	0.2
0.076	Truck	Any	Any	13.12	0.200	0.2

Minimum Distances to avoid Building Damage (engineered concrete and masonry buildings)

Reference PPV @25 ft (in/sec)	Vibration Source	Vibration Source	Receptor	Minimum ¹ Distance (feet)	Estimated PPV at receptor (in/sec)	Threshold for structural damage (in/sec PPV)
0.21	Roller	Any	Any	19.73	0.300	0.3
0.089	Dozer/Drill	Any	Any	11.13	0.300	0.3
0.076	Truck	Any	Any	10.01	0.300	0.3



RCP Construction Inc.

Construction Noise Mitigation Plan

for the

**Saratoga Retirement Community – Expansion
14500 Fruitvale Ave
Saratoga, CA 95070**

Overview:

This plan has been prepared to reduce construction noise annoyance and/or disturbance to adjacent facilities and surrounding neighbors.

Documentation:

1. Provide to the residents and surrounding neighbors the name of a responsible party (i.e. Disturbance Coordinator) for construction noise mitigation activities including all applicable contact information. Their duties include, but are not limited to, the following:
 - a. Familiarity with the project and construction schedule, including attending weekly construction meetings.
 - b. An active role in monitoring project compliance with respect to noise.
 - c. Consider rescheduling noisy construction activities to minimize effects on surrounding noise sensitive receivers.
 - d. Site supervision of all potential sources of noise (e.g., material delivery, shouting, debris box pick-up and delivery) for all trades.
 - e. Intervene or discuss mitigation options with contractor.
2. Site plan showing location and distance to the closest receptors of noise. (Exhibit A)
3. List of proposed construction activities with dates and working times of proposed noise creating construction activities. (Exhibit B – Preliminary Schedule)
4. Provide a plan showing the locations of noise barriers with specifications of how they would be constructed and the decibel reduction that would be provided by each type of barrier (Exhibit C).

Mitigation:

1. Provide ongoing coordination and training to all subcontractors on “Noise Awareness Training”. Training will help ensure the Construction Noise Mitigation Plan is implemented effectively.
2. Engage the public and residents for active feedback
 - a. Provide sufficient notice to the facility and neighboring properties (if needed) on future construction activities.
 - b. Provide a point of contact for residents and neighbors to contact to address questions or noise concerns.
 - c. Conduct weekly status meeting with the Facilities team outlining upcoming activities so they can be relayed to the residents.
3. Identify Noise abatement opportunities during design.
 - a. Locate Haul routes away from active buildings
 - b. Locate storage and construction staff parking areas off site.
 - c. Design foundation systems that eliminate noise creating work, (i.e., driving piles, blasting, etc.)
 - d. Design shoring systems that prevent un-necessary noise or vibration.
 - e. If feasible, pre-cut metal decks and, to the extent possible, metal studs off-site to minimize on-site sawing.
 - f. Retain an acoustical consultant to periodically measure noise levels and aid with developing additional noise attenuation techniques where needed.

4. Mitigation at noise source.
 - a. Specify the use of less noisy equipment in the contract documents.
 - i. All internal combustion engine-driven construction equipment should be equipped with the best available mufflers and kept in good condition.
 - ii. Avoid idling vehicles when not in use.
 - iii. When feasible, “quiet” gasoline or electric-powered compressors should be used.
 - iv. When feasible electric rather than gasoline or diesel-powered forklifts should be used. However, we understand that the load demands cannot be handled by electric lifts.
 - v. Where feasible, welded rather than bolted steel connections should be used, when possible, to minimize the use of impact wrenches.
 - vi. For excavation, use drilled soldier piles with wood lagging instead of sheet pile driving techniques.
 - vii. Avoid impact pile driving.
 - viii. Where reasonable, avoid hammer drilling; use core bits, instead.
 - ix. Where possible, avoid using powder-actuated fasteners; use concrete screws, instead.
 - x. Avoid sheet metal debris chutes; use plastic chutes, instead.
 - xi. Where possible, avoid sand blasting
 - b. Reduce equipment sound levels to less than 100dB when measured at the nearby residences.
 - c. Schedule construction activities that create higher noise levels at optimal times of the day.
 - d. Keep all construction activities within the working hours prescribed by the City of Saratoga.
5. Path mitigation by providing sound / visual barriers and favorable construction routes.
 - a. Provide visual barriers around all active construction.
 - b. Provide a temporary noise barrier to be installed from the existing structures as indicated on Exhibit C. The barrier should consist of 1 lb/sf mass loaded vinyl. In the areas shown in red, the barrier should be suspended from roof levels of the existing building and extend to ground level. Drape the barrier material onto the ground to prevent sound transfer. Overlap the material where seams occur to prevent gaps. Seal seams with duct tape or similar adhesive. At the area shown in purple, the barrier shall be mounted at ground level to construction fencing and have a vertical extent of 8 feet with no gaps at seams or the bottom.
 - c. Temporary sound barriers along heavy traffic paths and portions of the site haul route will not be required, as all transportation equipment will operate below 100 dB.
6. Noise Receptor Mitigation
 - a. Working with the facility to move residents temporarily if needed during construction activities that are disruptive.
 - b. Weekly updates of upcoming construction activities to a facility representative in each building so it can be communicated to the residents.

Exhibit A

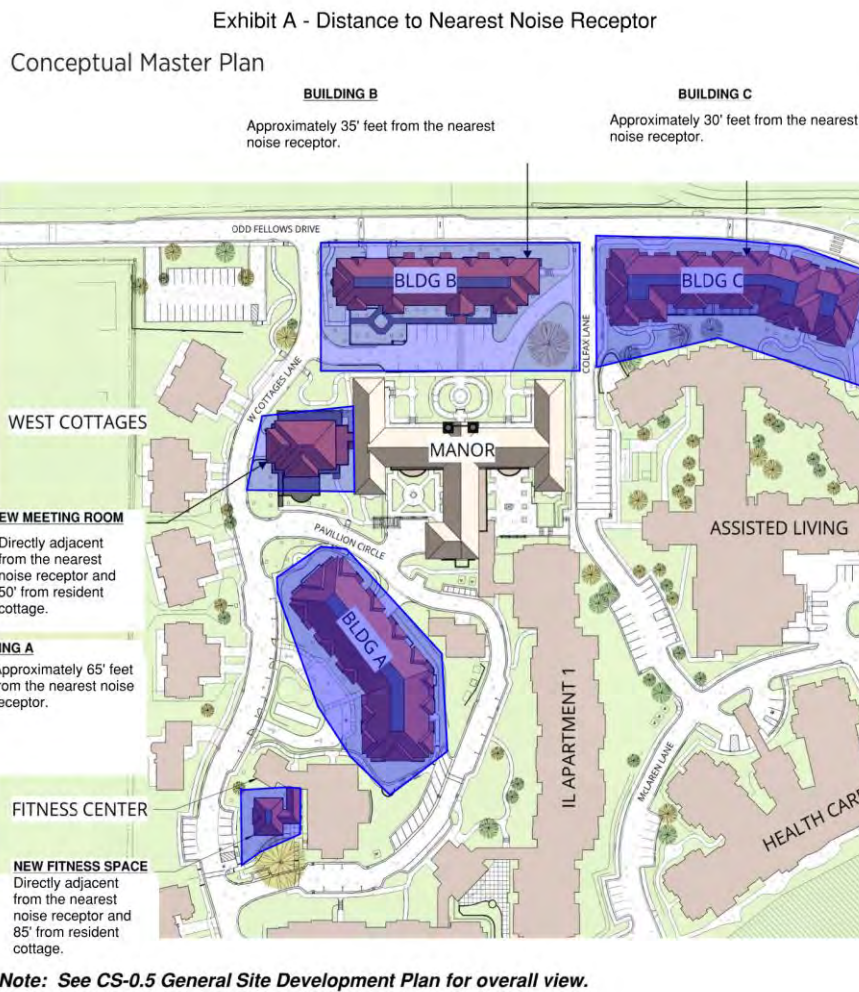


Exhibit B – Construction Durations

- Work Hours will be City of Saratoga Ordinance 7 am – 4:00 pm
- Noise creating activities are noted with an *

Phase1 - Building A	360 days	Mon 11/14/22	Fri 3/29/24
* Excavation and Off haul	20 days	Mon 11/14/22	Fri 12/9/22
* Concrete Foundations /PT	90 days	Mon 12/12/22	Fri 4/14/23
Building Frame	75 days	Mon 4/17/23	Fri 7/28/23
Building Exterior	65 days	Mon 7/31/23	Fri 10/27/23
Interiors	110 days	Mon 10/30/23	Fri 3/29/24
Phase 1 - Fitness Center	155 days	Mon 4/17/23	Fri 11/17/23
* Building Foundation	35 days	Mon 4/17/23	Fri 6/2/23
* Building Framing	45 days	Mon 6/5/23	Fri 8/4/23
Building Exterior	35 days	Mon 8/7/23	Fri 9/22/23
Interiors	40 days	Mon 9/25/23	Fri 11/17/23
Phase 2 - Building B	355 days	Mon 4/17/23	Fri 8/23/24
* Excavation and Off haul	30 days	Mon 4/17/23	Fri 5/26/23
* Concrete Foundations /PT	135 days	Mon 5/29/23	Fri 12/1/23
Building Frame	50 days	Mon 12/4/23	Fri 2/9/24
Building Exterior	50 days	Mon 2/12/24	Fri 4/19/24
Interiors	90 days	Mon 4/22/24	Fri 8/23/24
Phase 3 - Building C	425 days	Mon 12/4/23	Fri 7/18/25
*Excavation and Off haul	30 days	Mon 12/4/23	Fri 1/12/24
* Concrete Foundations /PT	125 days	Mon 1/15/24	Fri 7/5/24
* Building Frame	75 days	Mon 7/8/24	Fri 10/18/24
Building Exterior	70 days	Mon 10/21/24	Fri 1/24/25
Interiors	125 days	Mon 1/27/25	Fri 7/18/25
Phase 3 - Meeting Hall	170 days	Mon 8/26/24	Fri 4/18/25
* Excavation and Off haul	20 days	Mon 8/26/24	Fri 9/20/24
*Concrete Foundations /PT	50 days	Mon 9/23/24	Fri 11/29/24
* Building Frame	25 days	Mon 12/2/24	Fri 1/3/25

Building Exterior	35 days	Mon 1/6/25	Fri 2/21/25
Interiors	40 days	Mon 2/24/25	Fri 4/18/25
Project Complete	0 days	Tue 11/19/24	Tue 11/19/24



RCP Construction LLC

Construction Noise Mitigation Plan

for the

**Saratoga Retirement Community – Expansion
14500 Fruitvale Ave
Saratoga, CA 95070**

Overview:

This plan has been prepared to reduce construction noise annoyance and/or disturbance to adjacent facilities and surrounding neighbors.

Documentation:

1. Provide to the residents and surrounding neighbors the name of a responsible party (i.e. Disturbance Coordinator) for construction noise mitigation activities including all applicable contact information. Their duties include, but are not limited to, the following:
 - a. Familiarity with the project and construction schedule, including attending weekly construction meetings.
 - b. An active role in monitoring project compliance with respect to noise.
 - c. Consider rescheduling noisy construction activities to minimize effects on surrounding noise sensitive receivers.
 - d. Site supervision of all potential sources of noise (e.g., material delivery, shouting, debris box pick-up and delivery) for all trades.
 - e. Intervene or discuss mitigation options with contractor.
2. Site plan showing location and distance to the closest receptors of noise. (Exhibit A)
3. List of proposed construction activities with dates and working times of proposed noise creating construction activities. (Exhibit B – Preliminary Schedule)
4. Provide a plan showing the locations of noise barriers with specifications of how they would be constructed and the decibel reduction that would be provided by each type of barrier (Exhibit C).

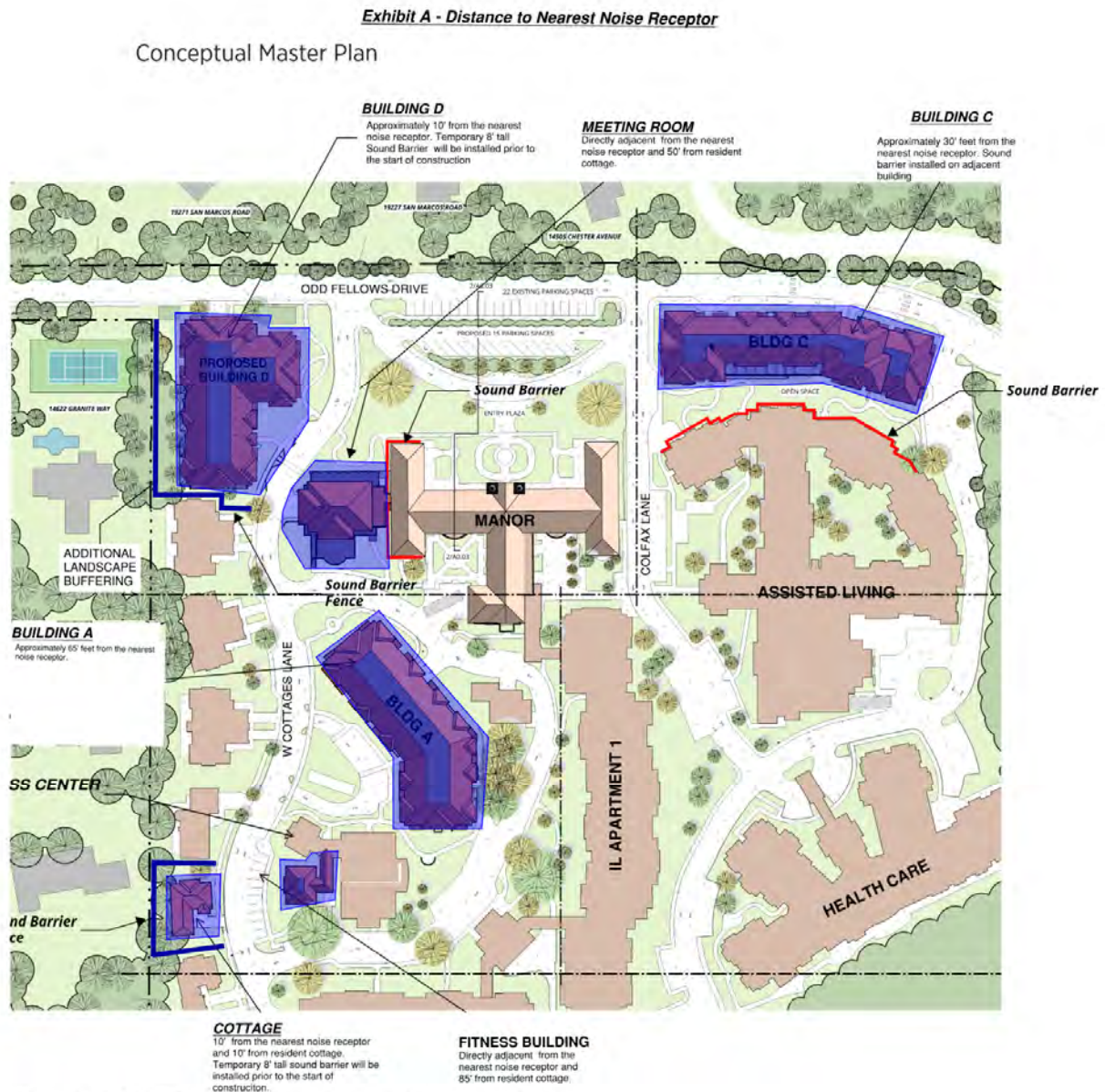
Mitigation:

1. Provide ongoing coordination and training to all subcontractors on “Noise Awareness Training”. Training will help ensure the Construction Noise Mitigation Plan is implemented effectively.
2. Engage the public and residents for active feedback
 - a. Provide sufficient notice to the facility and neighboring properties (if needed) on future construction activities.
 - b. Provide a point of contact for residents and neighbors to contact to address questions or noise concerns.
 - c. Conduct weekly status meeting with the Facilities team outlining upcoming activities so they can be relayed to the residents.
3. Identify Noise abatement opportunities during design.
 - a. Locate Haul routes away from active buildings
 - b. Locate storage and construction staff parking areas off site.
 - c. Design foundation systems that eliminate noise creating work, (i.e., driving piles, blasting, etc.)
 - d. Design shoring systems that prevent un-necessary noise or vibration.
 - e. If feasible, pre-cut metal decks and, to the extent possible, metal studs off-site to minimize on-site sawing.
 - f. Retain an acoustical consultant to periodically measure noise levels and aid with developing additional noise attenuation techniques where needed.

4. Mitigation at noise source.
 - a. Specify the use of less noisy equipment in the contract documents.
 - i. All internal combustion engine-driven construction equipment should be equipped with the best available mufflers and kept in good condition.
 - ii. Avoid idling vehicles when not in use.
 - iii. When feasible, “quiet” gasoline or electric-powered compressors should be used.
 - iv. When feasible electric rather than gasoline or diesel-powered forklifts should be used. However, we understand that the load demands cannot be handled by electric lifts.
 - v. Where feasible, welded rather than bolted steel connections should be used, when possible, to minimize the use of impact wrenches.
 - vi. For excavation, use drilled soldier piles with wood lagging instead of sheet pile driving techniques.
 - vii. Avoid impact pile driving.
 - viii. Where reasonable, avoid hammer drilling; use core bits, instead.
 - ix. Where possible, avoid using powder-actuated fasteners; use concrete screws, instead.
 - x. Avoid sheet metal debris chutes; use plastic chutes, instead.
 - xi. Where possible, avoid sand blasting
 - b. Reduce equipment sound levels to less than 100dB when measured at the nearby residences.
 - c. Schedule construction activities that create higher noise levels at optimal times of the day.
 - d. Keep all construction activities within the working hours prescribed by the City of Saratoga.
5. Path mitigation by providing sound / visual barriers and favorable construction routes.
 - a. Provide visual barriers around all active construction.
 - b. Provide a temporary noise barrier to be installed from the existing structures as indicated on Exhibit C. The barrier should consist of 1 lb/sf mass loaded vinyl. In the areas shown in red, the barrier should be suspended from roof levels of the existing building and extend to ground level. Drape the barrier material onto the ground to prevent sound transfer. Overlap the material where seams occur to prevent gaps. Seal seams with duct tape or similar adhesive. At the area shown in purple, the barrier shall be mounted at ground level to construction fencing and have a vertical extent of 8 feet with no gaps at seams or the bottom.
 - c. Provide a temporary Sound Barrier Fence in the areas shown with a blue line in Exhibit B. We would recommend a solid acoustical barrier (i.e. <https://www.soundfighter.com/> or similar wall system constructed onsite) at least 8-feet tall (minimum 4 lbs/sq.ft.)
 - d. Temporary sound barriers along heavy traffic paths and portions of the site haul route will not be required, as all transportation equipment will operate below 100 dB.
6. Noise Receptor Mitigation

- Working with the facility to move residents temporarily if needed during construction activities that are disruptive.
- Weekly updates of upcoming construction activities to a facility representative in each building so it can be communicated to the residents.
- A noise officer should be assigned to closely monitor construction noise complaints and act as a project liaison to the neighbor
- Implement real time noise monitoring to have statistical data to show project compliance to pro-actively prepare for noise complaints.

Exhibit A



Note: See CS-0.5 General Site Development Plan for overall view.

Exhibit B – Construction Durations

Work Hours will be City of Saratoga Ordinance 7 am – 4:00 pm

Noise creating activities are noted with an *

Task Name	Duration	Start	Finish
Construction	1060 days	Tue 9/3/24	Tue 9/26/28
Phase 1 - Site Prep	70 days	Tue 9/3/24	Mon 12/9/24
Construction Start	0 days	Tue 9/3/24	Tue 9/3/24
Utility Relocation Prep	40 days	Tue 9/3/24	Mon 10/28/24
Roadway Reconfigure	40 days	Tue 10/15/24	Mon 12/9/24
Phase 2 - Building C	425 days	Tue 11/12/24	Mon 6/29/26
*Excavation and Off haul	30 days	Tue 11/12/24	Mon 12/23/24
*Concrete Foundations /PT	125 days	Tue 12/24/24	Mon 6/16/25
*Building Frame	75 days	Tue 6/17/25	Mon 9/29/25
Building Exterior	70 days	Tue 9/30/25	Mon 1/5/26
Interiors	125 days	Tue 1/6/26	Mon 6/29/26
Phase 3 - Fitness Center	155 days	Tue 1/6/26	Mon 8/10/26
*Building Foundation	35 days	Tue 1/6/26	Mon 2/23/26
*Building Framing	45 days	Tue 2/24/26	Mon 4/27/26
Building Exterior	35 days	Tue 4/28/26	Mon 6/15/26
Interiors	40 days	Tue 6/16/26	Mon 8/10/26
Phase 3 - Building D	340 days	Tue 1/6/26	Mon 4/26/27
*Demolish Cottage	10 days	Tue 1/6/26	Mon 1/19/26
*Excavation and Off haul	30 days	Tue 1/20/26	Mon 3/2/26
*Concrete Foundations /PT	90 days	Tue 3/3/26	Mon 7/6/26
Building Frame	50 days	Tue 7/7/26	Mon 9/14/26
Building Exterior	50 days	Tue 9/15/26	Mon 11/23/26
Interiors	110 days	Tue 11/24/26	Mon 4/26/27
Phase 3 - Cottage	120 days	Tue 1/6/26	Mon 6/22/26
*Excavation and Off haul	10 days	Tue 1/6/26	Mon 1/19/26
*Concrete Foundations /PT	20 days	Tue 1/20/26	Mon 2/16/26
Building Frame	25 days	Tue 2/17/26	Mon 3/23/26
Building Exterior	25 days	Tue 3/24/26	Mon 4/27/26
Interiors	40 days	Tue 4/28/26	Mon 6/22/26
Phase 3 - Meeting Hall	170 days	Tue 1/6/26	Mon 8/31/26
*Excavation and Off haul	20 days	Tue 1/6/26	Mon 2/2/26
*Concrete Foundations /PT	50 days	Tue 2/3/26	Mon 4/13/26
Building Frame	25 days	Tue 4/14/26	Mon 5/18/26
Building Exterior	35 days	Tue 5/19/26	Mon 7/6/26
Interiors	40 days	Tue 7/7/26	Mon 8/31/26
Phase 4 - Building A	360 days	Tue 4/27/27	Mon 9/11/28
*Excavation and Off haul	20 days	Tue 4/27/27	Mon 5/24/27
*Concrete Foundations /PT	90 days	Tue 5/25/27	Mon 9/27/27
Building Frame	75 days	Tue 9/28/27	Mon 1/10/28
Building Exterior	65 days	Tue 1/11/28	Mon 4/10/28
Interiors	110 days	Tue 4/11/28	Mon 9/11/28
Project Complete	0 days	Tue 9/26/28	Tue 9/26/28

