Preliminary Construction Noise Calculations - Silicon Sage Centerville Mixed Use Project - 37358 to 37494 Fremont Boulevard, Fremont, California

Phase 1						Phase 2		Phase 3	
Client-listed Equipment	FHWA RCNM UG comparable equipment*	Qty	Lmax*	AUF*	hourly dBA	Qty	hourly dBA	Qty	hourly dBA
Air Compressors	same	2	78	40%	67.5	0	0.0	1	64.5
Backhoes	same	1	78	40%	64.5	2	67.5	2	67.5
Concrete/Industrial Saws	same	3	90	20%	78.2	0	0.0	2	76.5
Compactor	same	0	83	20%	0.0	2	69.5	0	0.0
Cranes	same	0	81	16%	0.0	0	0.0	4	69.5
Crawler Tractors	used "tractor" from Table 1	0	84	40%	0.0	1	70.5	0	0.0
Dozer	same	1	82	40%	68.5	1	68.5	0	0.0
Excavator	same	2	81	40%	70.5	0	0.0	3	72.2
Forklifts, Rough Terrain	used "man lift" from Table 1	0	75	20%	0.0	0	0.0	4	64.5
Pavers	same	0	77	50%	0.0	0	0.0	2	67.5
Paving Equipment***	assumed "all other equipment > 5hp"	0	85	50%	0.0	0	0.0	2	75.5
Rollers	same	0	80	20%	0.0	2	66.5	0	0.0
Scraper	same	0	84	40%	0.0	1	70.5	0	0.0
Signal Boards**	assumed this is "<25kVA generator"	4	73	50%	66.5	6	68.2	4	66.5
Skid Steer Loaders****	"front end loader" but less by 3 dB due to size	0	76	40%	0.0	1	62.5	3	67.2
Surfacing Equipment***	assumed "all other equipment > 5hp"	0	85	50%	0.0	0	0.0	1	72.4
Trenchers	"slurry trenching machine"	0	80	50%	0.0	0	0.0	3	72.2
Total					79.9		77.5		82.2

*based on FHWA RCNM User's Guide Table 1 "Actual Measured Lmax @ 50ft" (or Spec 721, if Act. Meas. n/a, and AUF [%])

user enters distance between geog. center of project and noise-sensitive receiver location: 150 feet

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Project Option	Building(s)	Length (ft)	Width (ft)	Estimated Area (total square feet [SF])	Minimum req'd airflow (CFM per garage SF) [A]	est. CFM needed	est. m^3/sec needed	Est. fan TSP (Pa) [B]	Estimated Fan Noise Level (1-meter SPL, dBA) at 1kHz [C]	Distance (feet) from Fan Intake or Discharge Opening to Nearest Community Receiver	calc'd SPL	criteria [D]	calc'd SPL - criteria	w/ mitigation	Estimated Sound Pressure Level (SPL) at the Nearest Receiver (hourly L_{eq}, dBA)
1	Parking Garage	443	62	27466	0.75	20600	9.7	750	88	150	55.2	45	10.2	12	43.2
2	Parking Garage	691	62	42842	0.75	32132	15.2	750	90	150	57.1	45	12.1	12	45.1

[A] specified by the International Mechanical Code (IMC) and adopted by industry (INTEC Controls 2015).

[B] assumes 3 inches water gauge of total static pressure per fan, to handle duct losses, etc.; 1 iwg ~ 250 Pascals (Pa)

[C] per Bies & Hansen, Engineering Noise Control, 2nd ed., 1996, eq. 11.1 and Table 11.4. Assume tubeaxial fans, < 1m diameter.

[D] Leq, per City's GP Noise Element Table 10-2, nighttime

user enters a value for sound atttenuation (dBA) here: **12** dBA of mitigation (e.g., acoustical louver, silencer, etc.)

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Project Option	Building(s)	Occupancy (people per 1000 SF) [A, E]	Outdoor Air Req'd (CFM per person) [A, E]	Estimated Area (total square feet [SF])	est. CFM needed	est. m^3/sec needed	Est. fan TSP (Pa) [B]	Estimated Fan Noise Level (1-meter SPL, dBA) at 1kHz [C]	Distance (feet) from Fan Intake or Discharge Opening to Nearest Community Receiver	calc'd SPL [F]	criteria [D]	calc'd SPL - criteria	w/ mitigation	Estimated Sound Pressure Level (SPL) at the Nearest Receiver (hourly L_{eq}, dBA)
1	Retail Space (Bldg. A)	15	7.5	9000	1013	0.5	1000	67	50	43.1	50	-6.9	0	43.1
1	Retail Space (Bldg. B)	15	7.5	16000	1800	0.8	1000	69	50	45.6	50	-4.4	0	45.6
2	Retail Space (Bldg. A)	15	7.5	10000	1125	0.5	1000	67	50	43.6	50	-6.4	0	43.6
2	Retail Space (Bldg. B)	15	7.5	16000	1800	0.8	1000	69	50	45.6	50	-4.4	0	45.6
either	Sample Residential	20	5	2000	200	0.1	500	54	50	41.9	50	-8.1	0	41.9

[A] per ASHRAE Standard 62.1-2012 (Ventilation Rates for Acceptable Indoor Air Quality) for Retail space

[B] assumes 4 inches water gauge of total static pressure per Retail fan, to handle duct losses, etc.; 2 iwg for residential unit; 1 iwg ~ 250 Pa

[C] per Bies & Hansen, Engineering Noise Control, 2nd ed., 1996, eq. 11.1 and Table 11.4. Assume airfoil-bladed centrifugal fans, under 0.9m diameter

[D] Leq, per City's GP Noise Element Table 10-2, daytime

[E] per ASHRAE Standard 62.1-2012 (Ventilation Rates for Acceptable Indoor Air Quality) for Sleeping space

[F] assumes point source for the Retail AHU, line source for multiple residential unit fans

user enters a value for sound atttenuation (dBA) here: **0** dBA of mitigation (e.g., acoustical louver, silencer, etc.)