

December 31, 2025

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Subject: Daytime and Nighttime Operations
Noise Analysis
Republic Services, Devens, MA

Dear Greg,

Republic Services operates a facility that processes construction demolition debris brought by truck to its location at 45 Independence Drive, Devens, MA. Materials are deposited on an enclosed tipping floor, processed, and loaded into rail cars, which are moved to another offsite facility for recycling and/or disposal. Republic Services current operating hours are 7:00 AM to 5:00 PM, Monday through Saturday. In 2022, Cavanaugh Tocci was contracted by Republic Services, to determine whether and to what extent its Devens facility operating hours could be extended to 5:00 AM to 12:00 AM. As discussed in detail below, the proposed operating hours are divided into daytime and nighttime modes of operation. Note that the request for extended hours of operation will not involve an increase in facility design capacity, only the spreading of current trucking and activities over a wider time frame.

Briefly, daytime expanded hours of operation would extend from 5:00 AM to 9:00 PM. Trucks would, as they currently do, deliver waste materials to the site and deposit them onto the tipping floor for processing within the building. Processed materials would then be dumped by front end loaders into rail cars parked within the building. Nighttime operations from 9:00 PM to 12:00 AM would involve waste processing within the building only, without trucks entering or leaving the site. During nighttime operations, all building doors would normally be closed, except for occasional movement of rail cars in and out of the building through doors on the north side of the building.

The computer model developed for the 2023 report has been used to reevaluate facility sound during daytime and nighttime extended operating hours. Also addressed below is an overview of changes in truck traffic sound on Saratoga Boulevard passing behind residences backing onto Bates Service Road. Also addressed is the potential increase in traffic sound were a Republic facility truck to leave or approach the Republic facility using Buena Vista Street.



Figure 1. Residential study (R1-R15), sound monitoring (SM1-SM3), property line (in red), property line study locations (see Fig. 2 for labels), and access roads Republic Services, 45 Independence Drive, Devens, MA

Study Locations

Cavanaugh Tocci letter report to Mr. Brian Skehan, Republic Services dated January 18, 2023 concluded that facility sound levels would comply with DEC Industrial Performance Standards (IPS) during expanded work hours. This letter is an amendment to the January 2023 report providing more detail on source and activity sound levels at nearest receptors.

In Figure 1, study locations R1-R5 are the residences southwest of the facility; R6-R15 are northeast of the facility. In Figure 2, PL1-PL10 are representative Republic property line study locations requested by the DEC peer reviewer to evaluate Republic sound levels possibly transmitted to adjacent industrial property. Sound monitoring locations (SM1-SM3) discussed in our January 18, 2023 report are shown in Figures 1 and 2 of this report, along with the rail spur entering the Republic building and local roads relevant to Republic truck traffic.

Proposed Work Periods

The following defines three proposed work periods and lists the activities that will occur and equipment to be used inside and outside the Republic building. No work will occur in the facility or on its property on Sundays and on legal holidays

- 5:00 AM to 9:00 PM (Monday-Saturday only).
 - Building doors open.
 - Trucks enter, deposit construction waste onto the tipping floor, then exit the site.
 - Waste processing (screening, picking, grinding and consolidating on the tipping floor).
 - Rail car loading inside building
 - Rail car movement in and out of the building
 - Building maintenance (inside and outside)
- 9:00 PM to 12:00 AM (Monday-Saturday only).
 - Building doors closed
 - No truck activity outdoors
 - Waste processing (screening, picking, grinding and consolidating on the tipping floor)
 - Rail car loading (indoors)
 - Rail car movement in and out of building (infrequently)
(While doors are open for rail car movement or any other reason, all indoor processing and rail car loading to stop)¹
 - Building maintenance (inside only).
- 12:00 AM to 5:00 AM (Monday-Saturday)
 - Building doors closed.
 - No truck activity outdoors
 - No waste processing
 - No rail car loading
 - No rail car movement
 - Building maintenance (inside only)
- All Day Sunday and Legal Holidays
 - Closed.

¹ Discontinuing indoor waste processing while the east rail door is open during train movement is a contingency that can be employed if residents complain of rail activity sound at night. However, the acoustical analysis has shown this contingency should not be needed to comply with DEC IPS residential sound limits.

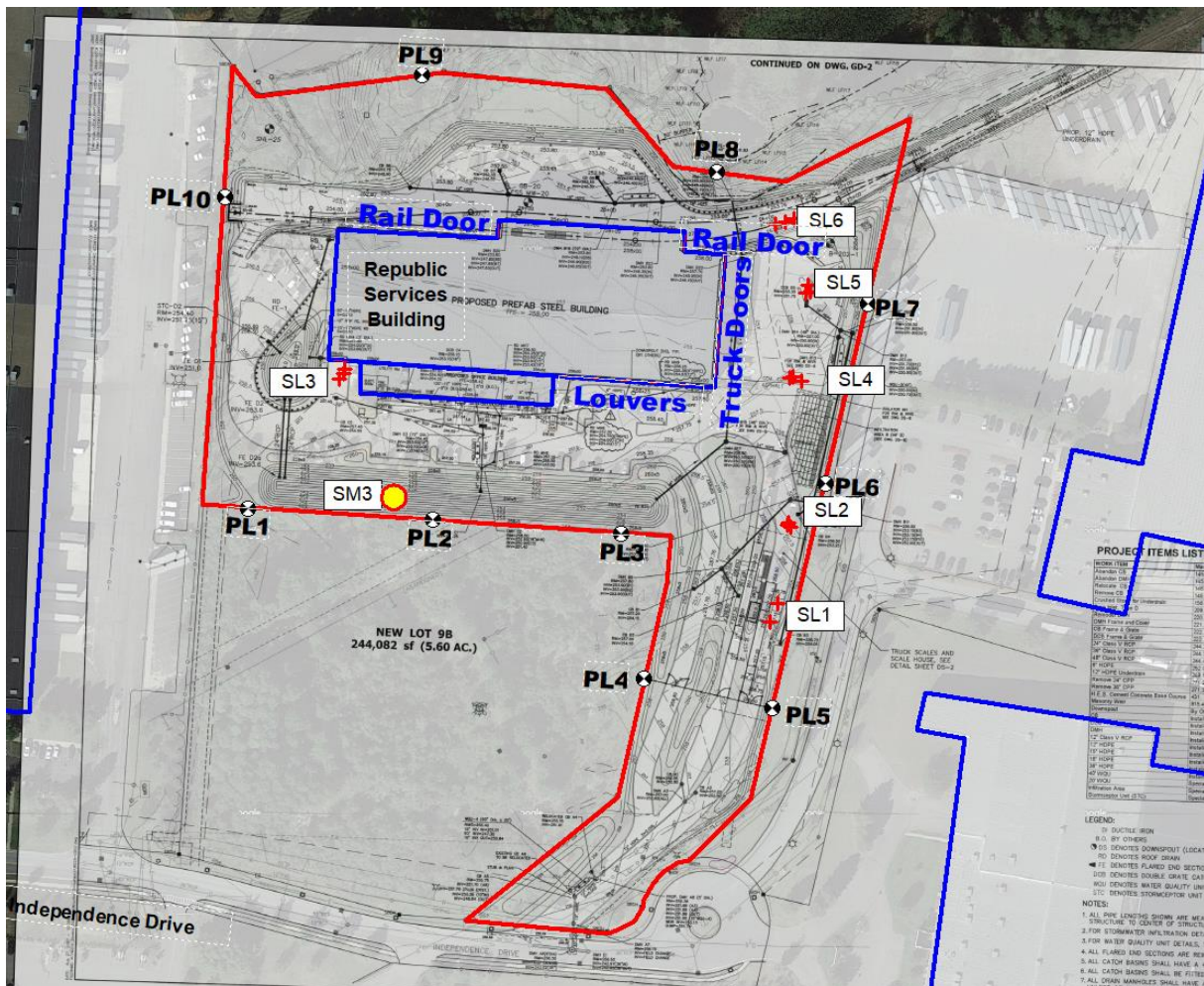


Figure 2. Source group (SL1-SL6) locations
Republic Services, 45 Independence Drive, Devens, MA

Facility Sound Sources

Republic sources of sound on-site and within the building include truck tonal backup alarms, truck high idle sound, truck pass-by sound, rail car mover, waste processing and handling sound transmitted through open (5:00 AM to 9:00 PM) and closed (9:00 PM to 5:00 AM) building doors and transmitted through building ventilation louvers on the south building facade. Outdoor source group locations (SL1-SL6), building wall louvers on the south wall, truck access doors on the east side of the building, and rail spur doors on the east and west sides of the building identified in Figure 2. Source groups SL1-SL5 are comprised of truck high idle sound, tonal backup alarm sound, and the sound produced by trucks traveling on-site. Source group SL6 is comprised of rail car mover, rail car mover backup alarm, and rail car decoupling.

Equipment source sound power level within the building includes front end loaders, an excavator, and trucks entering and exiting the building. The sound emitted through the east side bay doors was measured at a location 140 feet east of the building at the edge of the paved area. The total emitted

sound power was estimated based on the sound measurement made at this location and reduced by $10 \cdot \log(6)$, i.e. the number of bay doors, to determine the sound power emitted through each individual door. During the period 9:00 PM to 5:00 AM, when all building doors would be closed, a 15 dBA noise reduction was applied to account for the noise reduction of closed doors. See Table A-1 in Appendix A of this report for sound power levels used in computer modeling to estimate facility sound levels at nearest residences.

The ground effect G used to estimate sound levels at receptor locations was reduced from 1.0 used in the 2023 model to 0.5 for the current model, slightly raising receptor sound levels. Foliage sound propagation loss has not been included in computer modeling, thus leading to an overestimate of sound levels at nearest residences. The topography used in this and in the 2023 model was obtained from the US Geological Survey.

Receptor Sound Levels Compared to DEC IPS Limits

Background sound levels, and variable and fixed DEC IPS limits on Republic Services sound at receptor study locations, and estimated facility sound levels are listed in Table 1. Cadna/A has been used to estimate sound levels produced by loudest transient sources closest to residences that may occur simultaneously, but only momentarily. Sound levels produced by all sources at nearest residences comply with the DEC IPS limits on sound. See Appendix A Tables A-2 and A-3 for daytime (5:00 AM to 9:00 PM) and nighttime (9:00 PM to 12:00 AM) source sound levels at all residential and property line study locations.

Receptor	5:00 AM to 9:00 PM (Monday-Saturday only) (dBA)	9:00 PM to 12:00 AM (Monday-Saturday only) (dBA)
Bkgnd (SM1)	34	35
Var. Limit (Bkgnd+5 dB)	39	40
Fixed Limit	45	45
R1	36	18
R2	36	19
R3	33	16
R4	31	15
R5	32	15
Bkgnd(SM2)	35	37
Var. Limit (Bkgnd+5 dB)	40	42
Fixed Limit	40	42
R6	33	28
R7	34	28
R8	34	29
R9	33	29
R10	32	29
R11	32	29
R12	34	29
R13	35	29
R14	33	29
R15	33	30

Facility closed (no activity) all day Sunday, holidays, and 12:00 to 5:00 AM.

**Table 1. Background sound levels, DEC IPS variable and fixed residential limits and loudest estimated sound levels at nearest residences that may occur momentarily
Republic Services, 45 Independence Drive, Devens, MA**

Site Zoning

Figure 3 is a zoning map² showing the Republic Recycling building and property line. Republic property is fully within the Rail, Industrial, and Trade Related zone. Thus, the DEC IPS limit on facility sound is the lower of the variable limit (background during day and night periods plus 10 dB) and a fixed limit of 60 dBA. Both limits apply at abutting or nearest property lines. It is our understanding that the Republic property line limit will not be enforced unless there is an industrial abutter complaint. In the unlikely case that there is a complaint, some combination of site barriers and/or reorganization of site activities may be implemented depending on sound levels, source and receptor elevations and distances.

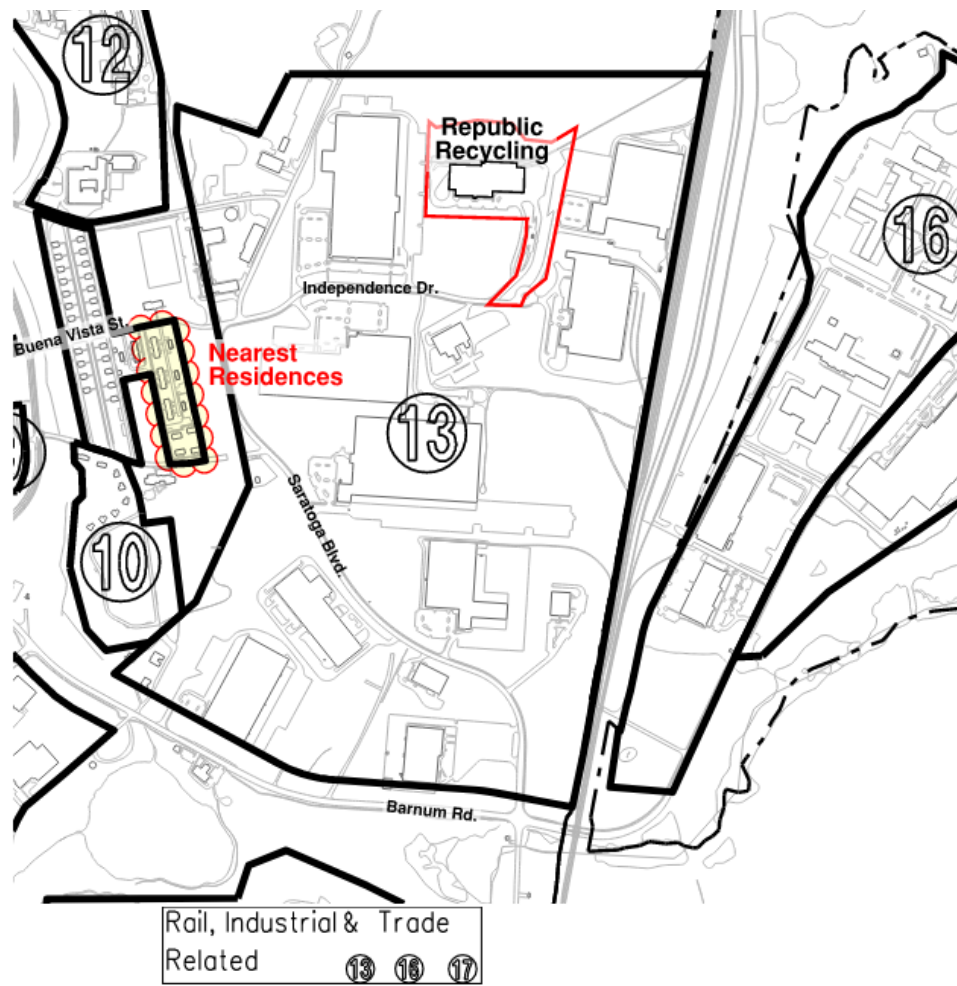


Figure 3. DEC zoning map
Republic Services, 45 Independence Drive, Devens, MA

Property Line Sound Levels

As similarly completed for Republic sound at nearest residences, background sound levels at SM3 located at the Republic sound property line have been used to establish daytime and nighttime variable

² https://devensec.com/development/ZD_keymap_09-24-2016.pdf

limits. As mentioned above, the fixed limit on abutting industrial property is 60 dBA day and night. Cadna/A has been used to estimate sound levels produced by loudest transient sources at property line study locations. Most source sounds are intermittent occurring only briefly. Sound levels produced by sources, because of their proximity to the property line, exceed DEC limits as seen in Table 2. See Appendix A Tables A-2 and A-3 for daytime (5:00 AM to 9:00 PM) and nighttime (9:00 PM to 12:00 AM) individual source sound levels at all property line study locations.

Receptor	5:00 AM to 9:00 PM (Monday-Saturday only) (dBA)	9:00 PM to 12:00 AM (Monday-Saturday only) (dBA)
Bkgnd (SM3)	41	43
Var. Limit (Bkgnd+10 dB)	51	53
Fixed Limit	60	60
PL1	66	33
PL2	62	36
PL3	62	44
PL4	63	48
PL5	68	48
PL6	73	57
PL7	73	63
PL8	71	70
PL9	61	50
PL10	62	53

Facility closed (no activity) all day Sunday, holidays, and 12:00 to 5:00 AM.

**Table 2. Background sound levels, DEC IPS variable and fixed industrial limits and loudest estimated property line sound levels that may occur momentarily
Republic Services, 45 Independence Drive, Devens, MA**

Traffic Sound on Access Roads

In its Site Assignment Regulations for Solid Waste Facilities³, the Commonwealth of Massachusetts does not set measurable limits on traffic sound *per se*. Rather, 310 CMR 16.40(4)(g) prohibits the operation of a waste management facility from creating a nuisance condition including a noise nuisance. Traffic sound has been addressed in a general way by evaluating changes (increases) in traffic sound resulting from Republic expanded operating hours at nearest residences along the primary travel route to and from Republic Recycling. The primary travel route for Republic trucks leaving the facility is west on Independence Drive, then left onto Saratoga Boulevard heading south to Barnum Road. The only residences that might be affected are those on Bates Street situated about 400 feet from Saratoga Boulevard.

Presently, Republic trucks traveling west on Independence Drive are required to turn left onto Saratoga Boulevard. They are not permitted to continue straight onto Buena Vista Street. As requested, we have evaluated the potential increase in traffic sound produced by one Republic truck traveling in both directions on Buena Vista Street. Current and future auto, non-Republic trucks, and Republic truck counts during the three periods: 5-7 AM expanded operating hours, 7 AM- 5 PM current operating

³ <https://www.mass.gov/doc/310-cmr-16-site-assignments-for-solid-waste-facilities/download>

hours, and 5-9 PM expanded operating hours are listed in the sub-tables of Table 3. Table 3 provides traffic volumes on Saratoga Boulevard and Buena Vista Street, and current and future sound reference levels and corresponding increases.

On Saratoga south of the Buena Vista intersection							Reference Sound Levels		
(to assess Republic traffic sound at Bates Service Road residences)									
Time Periods	Current			Future			Current	Future	Increase
	Autos	Trucks	Republic Trucks	Autos	Trucks	Republic Trucks			
5-7 AM Expansion Hours	192	38	None	193	38	16	93.7	95.1	1.3
7 AM-5 PM Current Operating Hours	1356	781	164	1434	781	292	107.2	107.7	0.5
5-9 PM Expansion Hours	226	87	None	230	87	10	97.0	97.4	0.4
On Buena Vista west of the Saratoga intersection with Independence Dr.							Reference Sound Levels		
(to assess violation by one Republic truck during each time window)									
Time Periods	Current			Future			Current	Future	Increase
	Autos	Trucks	Republic Trucks	Autos	Trucks	Republic Trucks			
5-7 AM Expansion Hours	109	0	None	109	0	0	83.4	83.4	0.0
7 AM-5 PM Current Operating Hours	584	9	2	604	9	2	92.4	92.5	0.1
5-9 PM Expansion Hours	159	1	None	160	1	0	85.7	85.7	0.0

**Table 3. Traffic current and future traffic counts on
Saratoga Boulevard and Buena Vista Street
Republic Services, 45 Independence Drive, Devens, MA**

Note that current traffic volumes are below those expected were the facility to process waste to its full design capacity. Hence, current total daily Republic truck counts are lower than total future counts which assume waste processing growth to full design capacity. From Table 3, the anticipated increases in energy-average traffic sound levels over operating periods studied are negligible, i.e., less than 1 dB.

Conclusions

Republic Services, 45 Independence Drive, Devens, MA is seeking a permit from the Devens Enterprise Commission for extended hours of operation. Facility sound has been analyzed and determined to be within Devens Enterprise Commission Industrial Performance Standards for noise transmitted to all residential receptors during current and future expanded hours of operation. This analysis has determined that all rail activity sound at nearest residences will conform to DEC IPS limits. Train movements in and out of the building through open doors will occur from time to time. Sound emitted through these doors and accompanying rail activity sound have been shown to comply with DEC IPS limits. However, if nearby residents complain of waste processing sound emitted through open doors, waste processing within the building could be discontinued while rail doors are open at night. It has also been determined that Republic trucking now and in the future will only negligibly increase traffic sound at nearby residences. As requested, estimated Republic equipment and activity sound levels have been estimated at Republic industrial property lines for possible future reference.

* * *

Mr. Gregory C. Wirsen, Green Seal Environmental, LLC
Daytime and Nighttime Operations Noise Analysis
Republic Services, 45 Independence Drive, Devens, MA

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If we can provide further details, please do not hesitate to contact us. Thank you.

Sincerely,
CAVANAUGH TOCCI

A handwritten signature in black ink, appearing to read 'Gregory C. Tocci', with a stylized flourish at the end.

Gregory C. Tocci, *Sr. Principal Consultant*

22238 Republic Ext Ops 1c.Docx

Appendix A

Source Sound Power Levels and Estimated Receptor Sound Levels

Daytime and Nighttime Operations
Noise Analysis
Republic Services
45 Independence Drive
Devens, MA

Source Name	31.5	63	125	250	500	1000	2000	4000	8000	A
Backup Alarm Tonal	54	68	78	79	89	107	91	86	77	107
Truck High Idle	100	104	102	103	103	99	97	92	85	105
Truck or Switcher Pass-by	69	87	94	98	100	100	99	97	91	105
Open East Bay Truck Doors	104	105	104	108	103	99	104	91	87	108
South Wall Louver	90	88	81	81	77	74	71	60	52	79
Open SW Bay Truck Door	85	84	84	79	78	81	79	73	62	85
Track Mobile Solo	106	106	111	113	106	98	92	89	75	108
Track Mobile Backup Alarm	119	109	104	99	95	94	89	83	68	99
Decoupling - Handbrake	113	111	106	101	97	98	97	94	82	103

**Figure A-1. Source sound power levels in dB re: 1 pW
Republic Services, 45 Independence Drive, Devens, MA**

Source	Partial Level Day (dB(lin))																								
Name	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
Backup Alarm Tonal Truck	31	31	31	29	31	23	23	23	23	23	23	23	23	24	24	54	57	61	59	61	71	59	48	27	25
Backup Alarm Tonal Truck	28	30	31	26	26	1	1	1	2	2	2	2	2	3	3	66	62	39	41	36	33	26	27	31	44
Backup Alarm Tonal Truck	30	30	29	27	27	23	23	23	23	23	24	24	32	24	24	52	55	59	56	57	65	67	53	30	25
Backup Alarm Tonal Truck	12	16	9	9	9	23	23	23	24	24	24	27	24	25	25	28	34	57	54	48	63	71	58	46	31
Truck High Idle	31	30	27	28	29	21	21	21	21	21	22	22	22	22	22	49	51	58	60	65	60	53	43	23	24
Truck High Idle	29	30	29	28	30	21	21	22	22	22	22	22	22	22	22	50	53	58	56	57	69	56	46	25	24
Truck High Idle	29	28	30	27	27	3	3	3	2	3	3	3	3	2	3	64	59	39	42	37	32	24	25	29	46
Truck High Idle	28	28	27	26	26	22	24	22	22	22	22	27	23	23		48	51	55	52	53	62	64	53	28	23
Truck High Idle	14	18	11	11	11	22	22	22	22	23	23	23	23	23	23	26	32	53	50	51	59	69	60	44	30
Truck Pass-by	26	26	26	24	24	20	23	21	20	20	21	21	24	21	21	48	52	56	52	53	64	65	53	27	22
Truck Pass-by	28	29	28	28	28	20	19	20	20	20	20	20	21	21	21	51	54	59	57	58	69	56	46	24	23
Truck Pass-by	11	14	8	8	8	20	20	20	21	21	21	22	21	22	22	25	30	54	51	51	60	69	61	44	29
Truck Pass-by	27	26	24	19	22	1	1	1	0	1	1	1	1	0	1	63	59	44	50	49	34	25	24	28	58
Truck Pass-by	34	34	26	24	24	19	19	19	20	20	20	20	20	20	20	50	54	59	60	64	62	54	45	23	22
Track Mobile Solo	17	18	14	14	14	27	27	28	28	28	28	28	28	29	29	28	32	43	48	47	56	62	68	49	53
Track Mobile Backup Alarm	8	10	6	6	6	17	17	17	17	18	18	18	18	18	18	20	24	35	39	38	48	55	59	39	44
Decoupling	11	12	8	8	8	20	20	20	20	20	21	21	21	21	21	23	26	39	44	43	53	60	63	44	48
SW Opening	10	10	11	6	6	-18	-18	-18	-17	-17	-17	-17	-17	-17	-16	44	39	22	22	20	19	11	7	11	22
East Bay Opening 1	9	14	5	5	5	24	24	23	22	21	20	24	24	20	22	25	30	40	41	51	58	58	44	24	21
East Bay Opening 2	8	11	5	5	5	24	23	23	22	21	20	25	23	20	22	24	28	37	39	50	57	59	45	25	21
East Bay Opening 3	7	10	5	5	5	23	23	23	21	21	20	24	24	20	22	23	27	35	37	49	56	59	47	25	21
East Bay Opening 4	7	9	5	5	5	23	23	23	21	21	20	23	24	20	22	22	26	34	36	49	56	59	49	26	22
East Bay Opening 5	7	8	5	5	5	23	23	24	21	21	20	23	24	20	22	22	25	33	35	48	55	59	51	27	22
East Bay Opening 6	7	8	5	5	5	23	23	24	21	21	20	23	24	20	22	21	25	32	34	48	54	59	55	31	24
East Rail Opening	6	6	5	5	4	19	20	24	20	20	20	20	21	20	21	21	24	26	23	25	31	51	65	31	28
West Rail Opening	11	11	10	10	9	1	1	2	2	2	2	3	3	0	3	27	26	25	21	20	23	26	35	61	59
SE Louver 1	-9	-8	-11	-11	-11	-26	-26	-26	-26	-25	-25	-25	-25	-26	-25	9	18	32	23	24	27	11	0	-3	-3
SE Louver 2	-5	-1	1	-1	-2	-26	-26	-25	-25	-25	-25	-25	-25	-26	-25	13	27	30	23	22	28	12	1	-3	-4
SE Louver 3	0	2	1	-2	-2	-25	-25	-25	-25	-25	-25	-25	-25	-26	-25	21	26	31	23	23	28	14	1	-3	-4
SE Louver 4	0	3	1	-2	-2	-25	-25	-25	-25	-25	-25	-25	-24	-25	-24	20	25	30	23	23	29	15	2	-4	-5
SE Louver 5	0	4	0	-2	-2	-24	-24	-24	-24	-24	-24	-24	-24	-25	-24	20	24	30	23	23	30	16	3	-4	-5
Truck High Idle	31	30	30	28	30	22	24	22	22	23	23	23	27	23	23										
Truck Pass-by	34	34	28	28	28	20	23	21	21	21	21	22	24	22	22										
Rail Sources	17	18	14	14	14	27	27	28	28	28	28	28	28	29	29	28	32	43	48	47	56	62	68	49	53
Open Building Doors	18	20	17	15	15	31	31	32	30	29	29	32	32	29	31	44	40	44	46	57	64	67	66	61	59
Building Louvers	5	8	7	5	4	-18	-18	-18	-18	-18	-18	-18	-18	-19	-17	25	32	38	30	30	36	21	9	4	3
Sums	36	36	33	31	32	33	34	34	33	32	32	34	35	33	33	44	41	47	50	58	65	68	70	61	60

**Table A-2. Summary of source levels estimated at receptor locations (G=0.5)
5:00 AM to 9:00 PM, Monday-Saturday (Closed All Day Sunday and Legal Holidays)
Republic Services, 45 Independence Drive, Devens, MA**

**Table A-3. Summary of source levels estimated at receptor locations (G=0.5)
9:00 PM to 12:00 AM, Monday-Saturday (Closed All Day Sunday and Legal Holidays)
Republic Services, 45 Independence Drive, Devens, MA**

Appendix B

Traffic Reference Sound Level Computation

Comparison of Expanded Operations

Republic Services
45 Independence Drive
Devens, MA

On Saratoga south of the Buena Vista intersection									
(to assess Republic traffic sound at Bates Service Road residences)							Reference Sound Levels		
Time Periods	Current			Future			Current	Future	Increase
	Autos	Trucks	Republic Trucks	Autos	Trucks	Republic Trucks			
5-7 AM Expansion Hours	192	38	None	193	38	16	93.7	95.1	1.3
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5-9 PM Expansion Hours	226	87	None	230	87	10	97.0	97.4	0.4
On Buena Vista west of the Saratoga intersection with Independence Dr.									
(to assess violation by one Republic truck during each time window)							Reference Sound Levels		
Time Periods	Current			Future			Current	Future	Increase
	Autos	Trucks	Republic Trucks	Autos	Trucks	Republic Trucks			
5-7 AM Expansion Hours	109	0	None	109	0	0	83.4	83.4	0.0
7 AM-5 PM Current Operating Hours	584	9	2	604	9	2	92.4	92.5	0.1
5-9 PM Expansion Hours	159	1	None	160	1	0	85.7	85.7	0.0

$$L_{ref}^{total} = 10 \log (c_A 10^{L_{ref}^A/10} + c_T 10^{L_{ref}^T/10} + c_{RT} 10^{L_{ref}^{RT}/10})$$

Where:

c_A = Automobile count during operating period

c_T = Heavy truck count during operating period

c_A = Republic heavy truck count during operating period

L_{ref}^A = Auto reference sound level = 63 dBA at 50 feet at 30 mph cruise throttle

L_{ref}^T = Heavy truck reference sound level = 77 dBA at 50 feet at 30 mph cruise throttle

L_{ref}^{RT} = Republic heavy truck reference sound level = 77 dBA at 50 feet at 30 mph cruise throttle

L_{ref}^{total} = Total reference sound level

Traffic counts have been provided by Greenman-Pedersen, Inc. Reference sound levels are from Federal Highway Administration Traffic Noise Model 3.0 Technical Manual (FHWA-HEP-20-012) dated December 2019.