Appendix H

Noise and Vibration Technical Memorandum

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INTRODUCTION

This technical memorandum provides supplemental information for Chapters 3.12 and 4.12 of the Administrative Draft EIS for the proposed Navy Base Intermodal Container Transfer Facility (NBIF). It discusses details of the noise and vibration analyses conducted for the assessment of the existing conditions of the affected environment and the potential environmental impacts of the Proposed Project, No Action Alternative, and Alternatives 2 through 7.

A general discussion of the metrics used to quantify noise and vibration effects on the environment is provided in sections 3.12.1 and 3.12.2 of the DEIS, respectively. The noise monitoring program undertaken to establish the existing noise levels in the study area is described in Section 1.0 of the memorandum. It also describes the field data collection of the noise and ground vibration related to freight train operations in the study area. Sections 2.0 through 6.0 of the memorandum describe the analyses performed for traffic noise, rail noise, rail vibration, construction noise and operational noise, respectively. Some materials presented in the memorandum may reiterate provisions of the DEIS Chapters 3.12 and 4.12 to provide a more complete representation of the study methodology and results. In other cases, the results and discussions presented in DEIS are simply referenced in the memorandum to avoid unnecessary duplication.

1.0 EXISTING NOISE AND VIBRATION MEASUREMENTS

1.1 AMBIENT NOISE

The initial step in a noise analysis involves determining the existing baseline noise conditions in the vicinity of the project site. Existing noise conditions in the study area are addressed in DEIS sub-section 3.12.4. A noise survey was conducted in the Navy Base ICTF study area in July and August 2014. The survey included noise monitoring in 20 locations, which were selected in proximity to the Proposed Project and River Center sites where potential noise effects are anticipated, i.e. relatively close (within 1,000 feet) to the future ICTF footprint. A mix of land uses was monitored including residential, institutional, public, and recreational areas. The noise monitoring locations are shown in the DEIS Figure 3.12-3, which is reproduced in Figure H-1 for convenience. In each monitoring location, a Larson Davis Model LD824 integrating sound level meter was installed on a 4 to 5 feet tripod. The calibrated sound level meter was programmed to record 15-minute samples of the average (Leq), maximum, and minimum ambient sound levels. Figure H-2 shows an example of the sound level meter placement in one of the monitoring locations.

A summary of the ambient noise levels recorded in the 20 monitoring locations is provided in DEIS, Table 3.12-1. The Table and follow up discussion of the measurement results in DEIS sub-section 3.12.3 are not reproduced here to avoid unnecessary duplication.

Figure H-1 ICTF Study Area. Noise Monitoring Locations.

Figure H-2 Sound Level Meter Installation.

1.2 RAIL NOISE AND VIBRATION

In order to estimate the existing noise generated by rail operations in the study area, a freight train passby event was monitored near the CSX at-grade Crossing 10 (a single track) at the intersection of Spruill Avenue and Bexley Street, as described in DEIS sub-section 3.12.4 and shown in Figure 3.12-6. A similar sound level meter placement on a tripod was used for the noise measurement at a distance of 50 feet from the track centerline. For this measurement, the sound level meter was set up to collect the 1-second time history for the duration of 3 to 4 minutes.

For the measurement of ground vibration generated by the same train passby, another Larson Davis Model LD824 sound level meter was supplied with an IMI Model V0625A01 velocimeter powered by a PCB Model 480B10 power unit. Prior to field measurement, the assembly was calibrated in a laboratory. In the field, the velocimeter was attached to the top of a 1-foot long metal rod driven into the ground at a distance of 50 feet from the track centerline.

The noise and vibration levels at the site were recorded by the two sound level meters simultaneously both prior to (ambient with no train) and during a freight train passby of the crossing. The measurement results are presented in DEIS, Tables 3.12-2 and 3.12-3.

1.3 1.3 NOISE OF TRAIN OPERATIONS AT ICTF

An additional series of noise measurements was conducted at the existing Port of Charleston Columbus Street Terminal on July 29, 2014. The goal of the measurements was to collect data characterizing primary train activities in a rail yard setting similar to the ones to be conducted at the future ICTF site. The noise measurements were performed for the three primary noise generation movements: freight train arrival or departure (locomotive diesel engine pass-by), general rail car movement (rolling), and rail car coupling (concussion of rail car buffers at stop-and-goes). The sound level meter was again placed on a tripod similar to the installation shown in Figure H-2, but at a distance of 38 feet from the center of the rail track carrying the train operations. Due to impulsive character of noise generated by some of these operations, the sound level meter was set to record the maximum 1-second L_{eq} sound levels during the train operations. The measurement results are summarized in Table H-30 and discussed in sub-section 6.1 of this Appendix.

2.0 TRAFFIC NOISE ANALYSIS

2.1 TRAFFIC NOISE SCREENING PROCEDURE

The Transportation Study for the project provided annual average daily traffic (AADT) volumes for 333 road segments for the 2013 existing conditions, No Action Alternative, and each of the project alternatives for the 2038 full build-out year, including automobiles and heavy trucks for both existing roadways and future road improvements. The noise screening procedure was designed to identify road segments within the study area where the project alternatives may potentially cause a noise impact. Since traffic noise levels increase with the growth of traffic volumes, the Transportation Study traffic data were analyzed to determine road segments where projected traffic increases could potentially generate noticeable noise increases within the study area. The AADT volumes for the 333 road segments were analyzed using the following screening criteria:

a) Increase of 56.7% or more for the project alternatives versus 2013 existing conditions (corresponding to the anticipated 2.0 dB(A) minimum increase in traffic noise level);

b) Increase in (a) is not due to the No Action Alternative (e.g., traffic growth that is not project related);

c) Noise-sensitive land uses exist within 200 feet[1] of the road segment centerline.

As the result of the screening, seven (7) road segments were identified for detailed noise modeling. The road segments are listed below[2]:

- Montague Avenue between Spruill Avenue and Virginia Avenue
- Virginia Avenue between Montague Avenue and Buist Avenue
- Noisette Boulevard between Twiggs Street and McMillan Avenue
- Cosgrove Avenue (SC-7) between Spruill Avenue and Rivers Avenue
- Spruill Avenue between Noisette Creek and N. Carolina Avenue
- St. Johns Avenue between O'Hear Avenue and McMillan Avenue
- Port Drayage Road (future) between Port Access Road and NBIF

[1] A distance of 200 feet covers primarily the first row of buildings nearest to the road. The second and subsequent rows of buildings are more distant and experience additional shielding from traffic noise by intervening structures.

[2] Note that the road segments indicating potential noise impacts for noise-sensitive receivers are concentrated in the immediate vicinity of the projected NBIF locations for the related project alternatives.

2.2 TRAFFIC NOISE SENSITIVE RECEPTORS

In order to evaluate potential project-related noise impacts, noise sensitive receptors along the selected road segments were identified for traffic noise modeling. The receptor locations for noise prediction were selected at building facades exposed to roadways, at a height of 5 feet above the ground. One hundred fifty (150) receptor locations were identified for the project alternatives, representing mostly residential land uses (single- and multi-family residences), as well as churches, schools, parks and recreation areas. Several commercial areas and vacant lots exposed to traffic noise were included for informational purposes. Additional eighteen (18) receptors exposed to future Port Drayage Road under the River Center Site Alternatives 5, 6, and 7 were also identified for noise modeling. Figure H-3 shows where all of these receptor are located in the North Charleston study area. Figures H-3a through H-3l show zoomed-in views of specific noise sensitive receptors that were examined for traffic noise impacts.

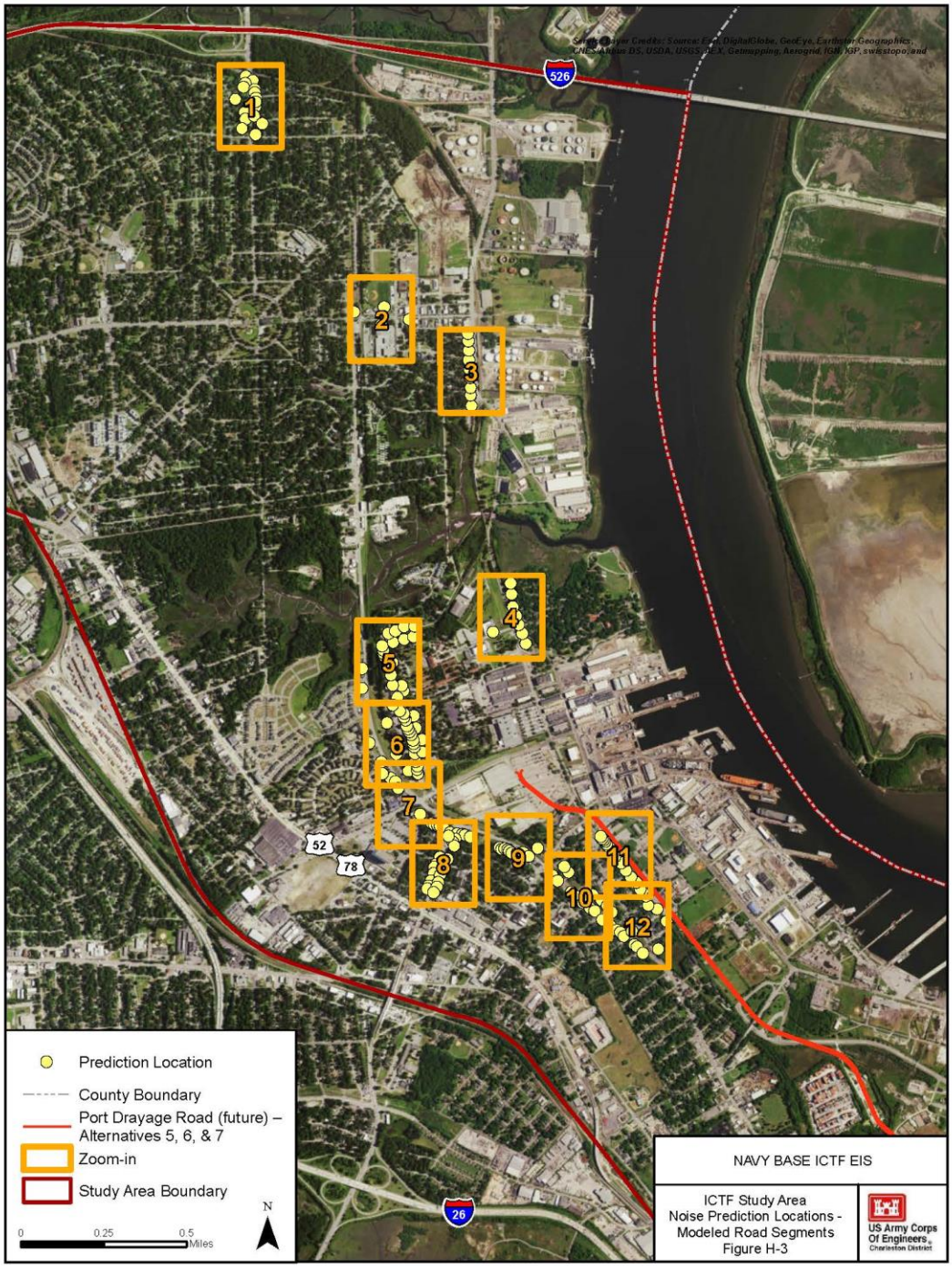

Figure H-3 ICTF Study Area Noise Prediction Locations- Modeled Road Segments

Figure H-3a Noise Prediction Locations at N. Rhett Ave. [Zoom-in 1]

Figure H-3b Noise Prediction Locations at Montague Ave. [Zoom-in 2]

Figure H-3c Noise Prediction Locations at Virginia Ave. [Zoom-in 3]

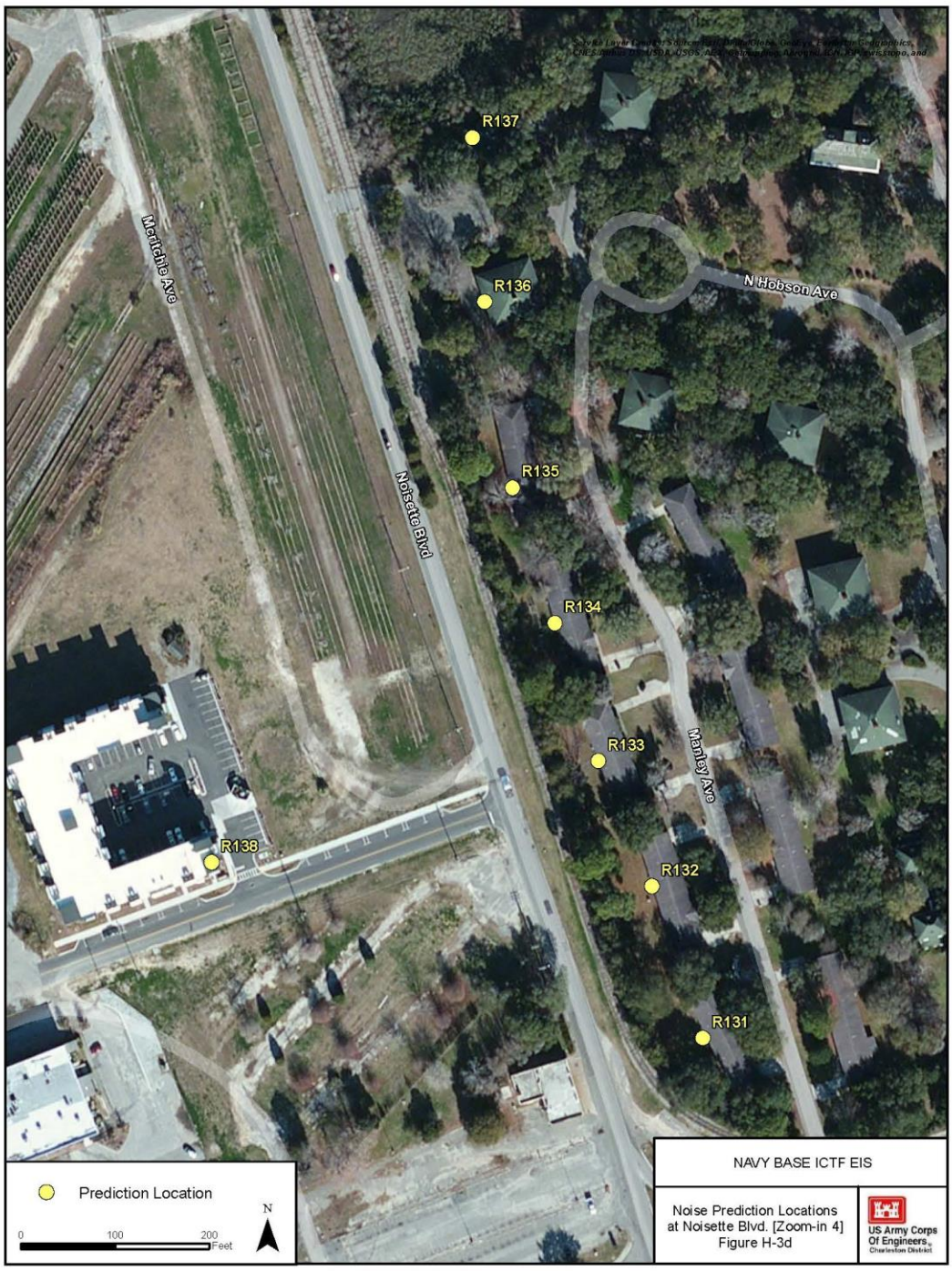

Figure H-3d Noise Prediction Locations at Noisette Blvd. [Zoom-in 4]

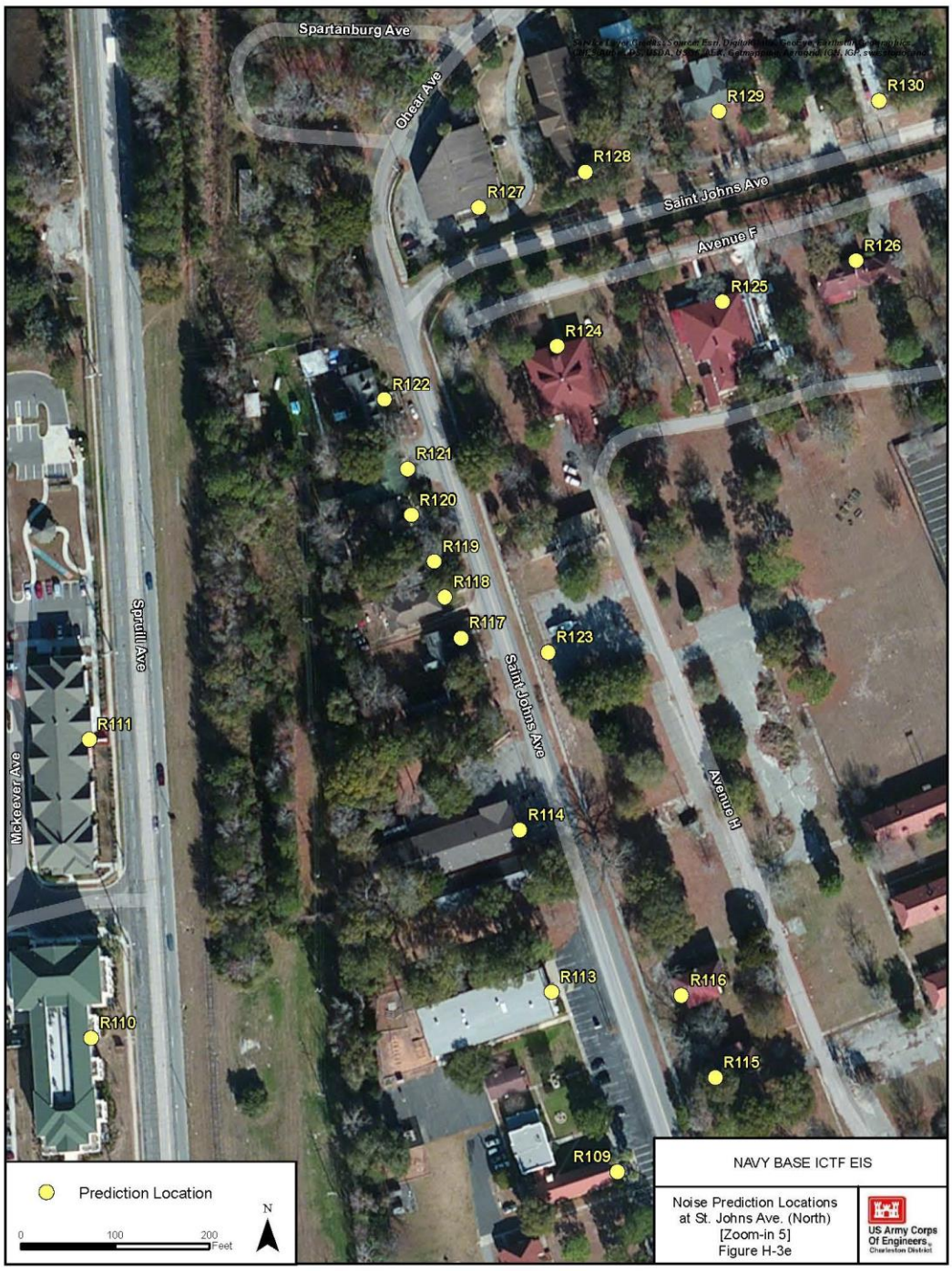

Figure H-3e Noise Prediction Locations at St. Johns Ave. (North) [Zoom-in 5]

Figure H-3f Noise Prediction Locations at Spruill Ave. and St. Johns Ave. (South) [Zoom-in 6]

Figure H-3g Noise Prediction Locations at Spruill Ave. (at McMillan Ave.) [Zoom-in 7]

Figure H-3h Noise Prediction Locations at Spruill Ave. and Cosgrove Ave. [Zoom-in 8]

Figure H-3i Noise Prediction Locations at Spruill Ave. (North of Reynolds Ave.) [Zoom-in 9]

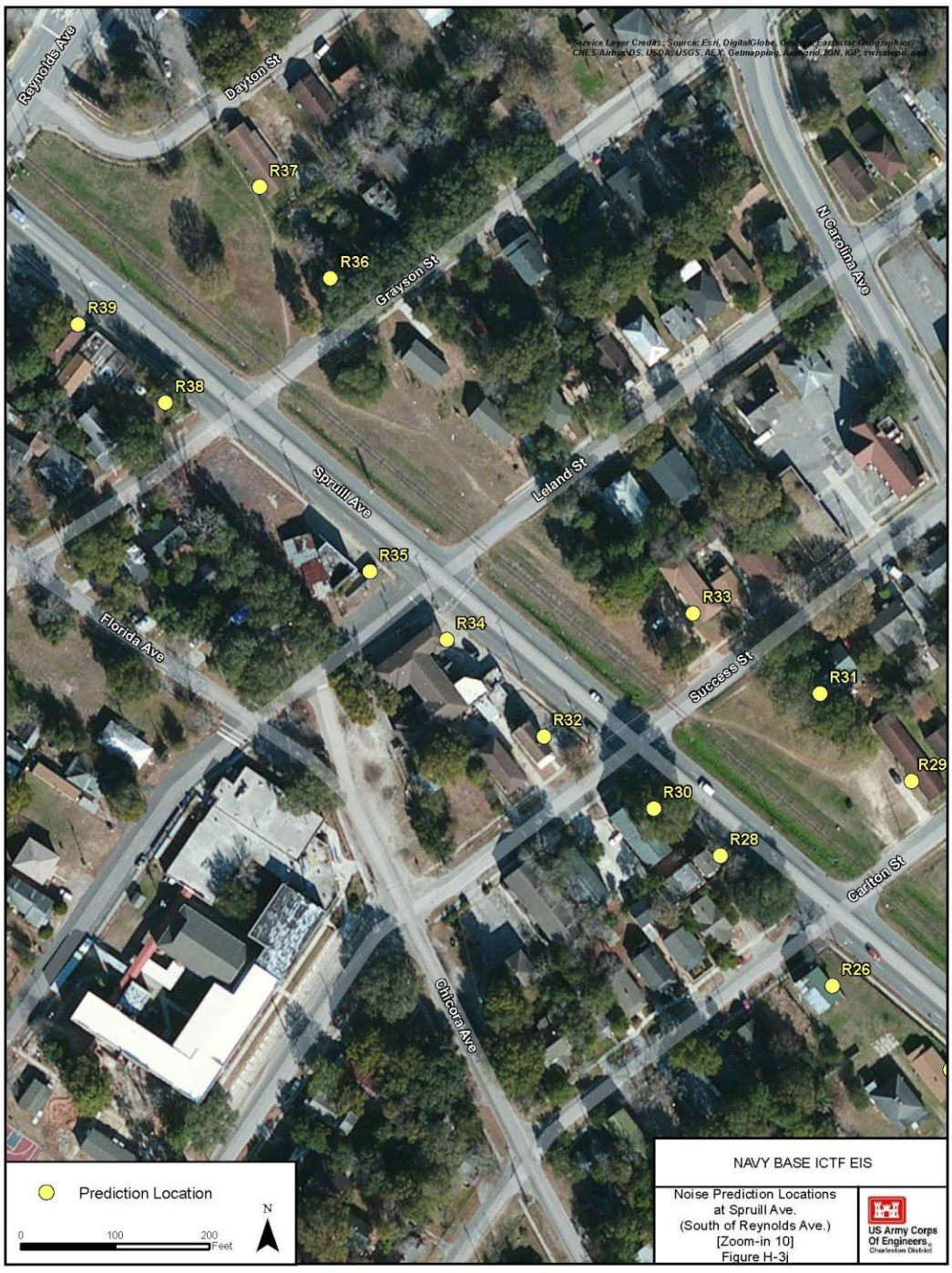

Figure H-3j Noise Prediction Locations at Spruill Ave. (South of Reynolds Ave.) [Zoom-in 10]

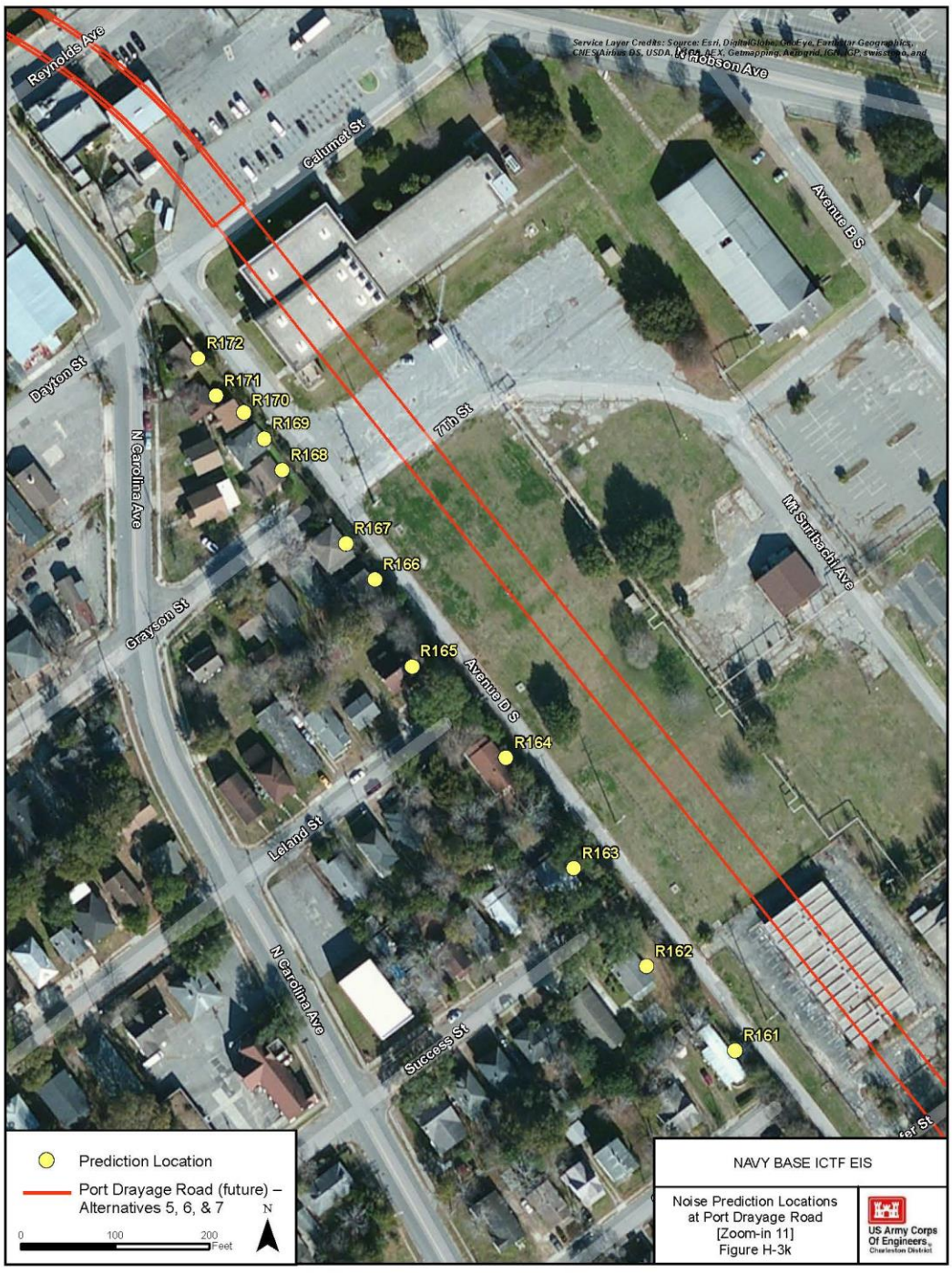

Figure H-3k Noise Prediction Locations at Port Drayage Road [Zoom-in 11]

Figure H-3l Noise Prediction Locations at Spruill Ave. and Port Drayage Road [Zoom-in 12]

2.3 TRAFFIC DATA FOR NOISE PREDICTION

Traffic data for the noise modeling included peak-hour volumes and speeds, broken down by automobiles and heavy trucks for the existing 2013 conditions[3], No Action Alternative, and project alternatives for the 2038 design year. These data for each direction of traffic for the AM and PM peak hours were derived for the selected road segments from the design volumes and truck percentages provided in the transportation study. The posted speed limits for the roads were used for all vehicles. The noise modeling was performed for each scenario for both the AM and PM peak hours, and the highest hourly Leq(h) is reported below as representative of the loudest hour of the day. The following traffic volume data tables were created by incorporating results of the Transportation Study for the study area.

Traffic volume data for the existing 2013 conditions are provided in Table H-1 and include Annual Average Daily Traffic (AADT), AM and PM peak-hour traffic volumes, truck percentages and speed limits (the latter for each road is identical for all alternatives)[4] for the road segments identified for detailed noise modeling.

Table H-1 Traffic Volume Data for Base Year 2013 Existing Conditions

No.	Road [Speed]	Road Segment		Base Year 2013 Existing				
		From	To	AADT	AM Peak Hour		PM Peak Hour	
					Peak-Hour Total	% Trucks	Peak-Hour Total	% Trucks
1	Montague Avenue [20 mph]	Spruill Ave.	Virginia Ave.	3,600	278	11.0	396	4.0
2	Virginia Avenue [45 mph]	Montague Ave.	Avenue B	8,000	558	5.0	665	7.0
		Avenue B	Buist Ave.	2,500	231	1.0	187	7.0
3	Noisette Boulevard [30 mph]	Twiggs Str.	McMillan Ave.	5,700	506	3.0	563	4.0
4	Cosgrove Avenue (SC-7) [35 mph]	Spruill Ave.	Rivers Ave.	9,100	750	4.0	826	2.0
5	Spruill Avenue [40 mph]	Noisette Creek	McMillan Ave.	11,200	905	4.0	1,028	2.0
		McMillan Ave.	Cosgrove Ave.	13,300	1,053	4.0	1,208	2.0
		Cosgrove Ave.	Reynolds Ave.	11,400	752	6.0	891	3.0
		Reynolds Ave.	N. Carolina Ave.	10,400	775	5.0	1,037	2.0
6	St. Johns Avenue [30 mph]	O'Hear Ave.	Turnbull Ave.	2,100	189	4.0	180	1.0
		Turnbull Ave.	McMillan Ave.	2,100	189	4.0	180	1.0
7	Port Drayage Road (future) [30 mph]	Port Access Rd.	ICTF	Not existent				

[3] Modeling of the existing 2013 conditions is not necessary for noise impact analysis based on the NEPA requirements; however, it provides useful perspective for evaluating background growth of traffic and related increase of ambient noise levels in comparison with the No Action conditions.

[4] The traffic speed directly affects noise levels generated by traffic; the higher speed increases the noise level. It is conservatively assumed for the modeling that during the peak hour traffic moves with the speed equal to the speed limit for the road. The speed limits were determined from the field/Google Maps surveys of the roads modeled and have been confirmed by Atkins.

Traffic volume data for the No Action Alternative (design year 2038) are provided in Table H-2 for the road segments identified for detailed noise modeling.

1 Modeling of the existing 2013 conditions is not necessary for noise impact analysis based on the NEPA requirements; however, it provides useful perspective for evaluating background growth of traffic and related increase of ambient noise levels in comparison with the No Action conditions.

1 The traffic speed directly affects noise levels generated by traffic; the higher speed increases the noise level. It is conservatively assumed for the modeling that during the peak hour traffic moves with the speed equal to the speed limit for the road. The speed limits were determined from the field/Google Maps surveys of the roads modeled and have been confirmed by Atkins.

Table H-2 Traffic Volume Data for No Action Alternative 2038 Conditions

No.	Road [Speed]	Road Segment		Design Year 2038 - No Action Alternative				
		From	To	AADT	AM Peak Hour		PM Peak Hour	
					Peak-Hour Total	% Trucks	Peak-Hour Total	% Trucks
1	Montague Avenue [20 mph]	Spruill Ave.	Virginia Ave.	5,900	579	4.0	562	4.0
2	Virginia Avenue [45 mph]	Montague Ave.	Avenue B	10,200	936	10.0	998	8.0
		Avenue B	Buist Ave.	4,100	423	11.0	392	10.0
3	Noisette Boulevard [30 mph]	Twiggs Str.	McMillan Ave.	7,300	676	6.0	744	5.0
4	Cosgrove Avenue (SC-7) [35 mph]	Spruill Ave.	Rivers Ave.	14,900	1,351	5.0	1,484	4.0
5	Spruill Avenue [40 mph]	Noisette Creek	McMillan Ave.	16,600	1,547	10.0	1,473	9.0
		McMillan Ave.	Cosgrove Ave.	22,200	2,041	9.0	2,397	8.0
		Cosgrove Ave.	Reynolds Ave.	13,500	1,241	13.0	1,335	10.0
		Reynolds Ave.	N. Carolina Ave.	13,500	1,242	12.0	1,335	10.0
6	St. Johns Avenue [30 mph]	O'Hear Ave.	Turnbull Ave.	5,200	466	2.0	473	2.0
		Turnbull Ave.	McMillan Ave.	5,200	466	2.0	473	2.0
7	Port Drayage Road (future) [30 mph]	Port Access Rd.	ICTF	Not existent				

Traffic volume data for the full build-out design year 2038 alternatives are provided in Tables H-3, H-4, and H-5 for the road segments identified for detailed noise modeling.

Table H-3 Traffic Volume Data for Full Build-out Design Year 2038, Alternatives 1 and 3

No.	Road [Speed]	Road Segment		Design Year 2038 - Alt 1 & Alt 3				
		From	To	AADT	AM Peak Hour		PM Peak Hour	
					Peak-Hour Total	% Trucks	Peak-Hour Total	% Trucks
1	Montague Avenue [20 mph]	Spruill Ave.	Virginia Ave.	5,100	554	5.0	558	4.0
2	Virginia Avenue [45 mph]	Montague Ave.	Avenue B	11,500	1,081	13.0	1,076	11.0
		Avenue B	Buist Ave.	2,900	348	26.0	287	26.0
3	Noisette Boulevard [30 mph]	Twiggs Str.	McMillan Ave.	9,500	856	5.0	910	3.0
4	Cosgrove Avenue (SC-7) [35 mph]	Spruill Ave.	Rivers Ave.	17,300	1,695	5.0	1,742	4.0
5	Spruill Avenue [40 mph]	Noisette Creek	McMillan Ave.	16,700	1,400	14.0	1,596	11.0
		McMillan Ave.	Cosgrove Ave.	20,800	1,865	14.0	2,004	11.0
		Cosgrove Ave.	Reynolds Ave.	14,400	1,411	4.0	1,364	4.0
		Reynolds Ave.	N. Carolina Ave.	14,600	1,334	4.0	1,388	3.0
6	St. Johns Avenue [30 mph]	O'Hear Ave.	Turnbull Ave.	3,000	269	2.0	291	2.0
		Turnbull Ave.	McMillan Ave.	3,100	269	5.0	291	4.0
7	Port Drayage Road (future) [30 mph]	Port Access Rd.	ICTF	Remote from Noise-sensitive Receptors				

Table H-4 Traffic Volume Data for Full Build-out Design Year 2038, Alternatives 2 and 4

No.	Road [Speed]	Road Segment		Design Year 2038 - Alt 2 & Alt 4				
		From	To	AADT	AM Peak Hour		PM Peak Hour	
					Peak-Hour Total	% Trucks	Peak-Hour Total	% Trucks
1	Montague Avenue [20 mph]	Spruill Ave.	Virginia Ave.	5,100	554	5.0	558	4.0
2	Virginia Avenue [45 mph]	Montague Ave.	Avenue B	11,500	1,081	13.0	1,076	11.0
		Avenue B	Buist Ave.	2,900	348	26.0	287	26.0
3	Noisette Boulevard [30 mph]	Twiggs Str.	McMillan Ave.	8,900	811	5.0	881	3.0
4	Cosgrove Avenue (SC-7) [35 mph]	Spruill Ave.	Rivers Ave.	17,300	1,695	5.0	1,742	4.0
5	Spruill Avenue [40 mph]	Noisette Creek	McMillan Ave.	16,600	1,390	14.0	1,586	11.0
		McMillan Ave.	Cosgrove Ave.	18,700	1,688	14.0	1,817	11.0
		Cosgrove Ave.	Reynolds Ave.	14,400	1,411	4.0	1,364	4.0
		Reynolds Ave.	N. Carolina Ave.	14,600	1,334	4.0	1,388	3.0
6	St. Johns Avenue [30 mph]	O'Hear Ave.	Turnbull Ave.	3,600	329	2.0	337	2.0
		Turnbull Ave.	McMillan Ave.	300	37	5.0	46	4.0
7	Port Drayage Road (future) [30 mph]	Port Access Rd.	ICTF	Remote from Noise-sensitive Receptors				

Table H-5 Traffic Volume Data for Full Build-out Design Year 2038, Alternatives 5, 6, and 7

No.	Road [Speed]	Road Segment		Design Year 2038 - Alt 5, Alt 6 & Alt 7				
		From	To	AADT	AM Peak Hour		PM Peak Hour	
					Peak-Hour Total	% Trucks	Peak-Hour Total	% Trucks
1	Montague Avenue [20 mph]	Spruill Ave.	Virginia Ave.	9,900	949	3.0	855	3.0
2	Virginia Avenue [45 mph]	Montague Ave.	Avenue B	11,500	1,072	13.0	1,152	10.0
		Avenue B	Buist Ave.	7,400	690	13.0	693	11.0
3	Noisette Boulevard [30 mph]	Twiggs Str.	McMillan Ave.	10,600	963	2.0	1,030	2.0
4	Cosgrove Avenue (SC-7) [35 mph]	Spruill Ave.	Rivers Ave.	14,300	1,337	6.0	1,488	5.0
5	Spruill Avenue [40 mph]	Noisette Creek	McMillan Ave.	19,100	1,764	13.0	1,784	11.0
		McMillan Ave.	Cosgrove Ave.	22,400	2,027	13.0	2,109	10.0
		Cosgrove Ave.	Reynolds Ave.	13,900	1,342	14.0	1,491	12.0
		Reynolds Ave.	N. Carolina Ave.	13,700	1,279	15.0	1,329	12.0
6	St. Johns Avenue [30 mph]	O'Hear Ave.	Turnbull Ave.	5,800	571	2.0	563	2.0
		Turnbull Ave.	McMillan Ave.	5,800	571	2.0	563	2.0
7	Port Drayage Road (future) [30 mph]	Port Access Rd.	ICTF	661	66	100.0	66	100.0

2.4 TRAFFIC NOISE MODELING METHODOLOGY

Noise predictions for each project alternative were computed using the FHWA's Traffic Noise Model (TNM), version 2.5 (2004) software. The TNM incorporates algorithms for sound emission and propagation that are based on well-established theory, accepted international standards, and carefully conducted validation measurement programs. The TNM contains a database of reference sound levels for cars, medium trucks, heavy trucks, buses, and motorcycles. The TNM then makes adjustments to the reference sound level for the project specific input parameters. Input parameters for the Model include three-dimensional coordinates of the roadways and evaluation points (receivers); the hourly number and speed of automobiles, medium trucks, heavy trucks, buses, and motorcycles; pavement type and road width; ground type; ground elevation in selected locations; and the location of traffic flow control devices. The primary output from TNM is the hourly average sound level Leq(h) for each input receiver.

A GIS map and electronic aerial imageries for the study area were used as input to the TNM coordinate system. The selected road segments were included in the TNM Model with all elements significant for noise propagation. Although FHWA regulation (Title 23 CFR Part 772) is not applicable to this project, highway noise modeling was performed in accordance with the FHWA procedure, with the pavement type modeled as "average." Sound propagation over acoustically "soft" ground (such as lawn) was assumed for the modeling.

Specific receivers at noise-sensitive land uses along the selected road segments were included in the TNM Model and analyzed under the NEPA approach described in DEIS Section 1.2. The receiver locations were selected at building facades exposed to roadways, at a height of 5 feet above the ground. One hundred fifty (150) receiver locations were identified within approximately 200 feet

from the road centerline, representing mostly residential land uses (single- and multi-family residences), churches, schools, parks, and recreation areas.

2.5 TRAFFIC NOISE MODEL VALIDATION

Prior to conducting noise modeling for the project alternatives, the TNM predictions were validated for the study area using traffic counts and vehicle classifications obtained during the field noise measurements described in DEIS Section 3.12 for two locations along Spruill Avenue, M19 and M20. Traffic volumes for each vehicle type observed during the measurement periods were converted to hourly values. The TNM was run with the actual locations of the sound level meters as the receiver points. The Model outputs utilizing these counts were compared to the measured noise levels at the two locations. Table H-6 lists the two measurement sites along with the field measured Leq and the corresponding computer generated TNM output of Leq(h).

Table H-6 TNM Predictions vs. Field Noise Measurements

Location	Description	TNM Predicted $L_{eq(h)}$, dB(A)	Measured L_{eq}, dB(A)	Difference dB(A)
M19	Spruill Ave. and Calvert Str.	62	59	3
M20	Spruill Ave. and Cosgrove Ave.	65	63	2

As data in Table H-6 show, the output from TNM at the measurement locations M19 and M20 is from 2 to 3 dB(A) greater than the measured noise levels. These over-predictions are due to generally conservative assumptions used for the noise modeling. Representing a conservative over-prediction of traffic noise levels along the roads, the TNM modeling results are within +/- 3 dB(A) of the measured noise levels, which meets validation requirements as discussed in FHWA's *Highway Traffic Noise: Analysis and Abatement Guidance* document. Based on these results, the noise Model was validated and could confidently be used to predict noise levels elsewhere in the study area and with different traffic conditions.

2.6 TRAFFIC NOISE PREDICTION

2.6.1 No Action Alternative

The future traffic volumes for the No Action Alternative reflect the growth rate of traffic not related to the project alternatives that will be generated by various developments in North Charleston, as well as other more remote developments. Table H-7 shows the TNM modeled traffic noise levels $L_{eq(h)}$ in dB(A) for the 150 receptors identified for the No Action Alternative in comparison with the existing 2013 conditions.

Table H-7 Traffic Noise Levels for 2038 No Action Alternative and 2013 Existing Conditions

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
Virginia Avenue					
R1	SF	1004 Delsey St	70	72	2
R2	SF	1005 Delsey St	70	73	3
R3	SF	1004 Crawford St	70	73	3
R4	SF	1005 Crawford St	70	72	2
R5	SF	1004 Bethany St	70	73	3
R6	SF	1005 Bethany St	70	73	3
R7	SF	1004 Alamo St	70	73	3
R8	SF	1005 Alamo St	69	72	3
R9	SF	1004 Buist Ave	67	71	4
Spruill Avenue from North Carolina Avenue to Cosgrove Avenue					
R16	MF	3028 N Carolina Ave	57	62	5
R17	SF	1901 Iris St	66	70	4
R18	SF	1903 Iris St	67	72	5
R19	SF	1902 Iris St	68	72	4
R20	PK	3107 N Carolina Ave	63	67	4
R21	SF	1900 Calvert St	67	71	4
R22	W	3051 Spruill Ave	68	72	4
R23	SF	1901 Orvid St	67	71	4
R24	SF	1902 Orvid St	66	71	5
R25	SF	1825 Carlton St	59	63	4
R26	SF	1903 Carlton St	65	69	4
R28	SF	1902 Carlton St	66	70	4
R29	MF	1824 Carlton St	56	61	5
R30	SF	1901 Success St	65	69	4
R31	SF	1825 Success St	55	60	5

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R32	SF	1902 Success St	64	68	4
R33	SF	1828 Success St	54	59	5
R34	MF	1829 Leland St	66	70	4
R35	SF	3219 Spruill Ave	66	71	5
R36	SF	1830 Grayson St	55	59	4
R37	MF	1831 Dayton St	53	58	5
R38	SF	1902 Grayson St	66	70	4
R39	SF	3255 Spruill Ave	65	70	5
R40	SF	1840 Reynolds Ave	67	71	4
R41	SF	3308 Spruill Ave	66	69	3
R42	SF	3309 Spruill Ave	67	71	4
R43	SF	1900 Ubank Ave	60	64	4
R44	SF	3317 Proctor St	58	62	4
R45	SF	3319 Proctor St	59	63	4
R46	SF	3321 Proctor St	59	63	4
R47	SF	3323 Proctor St	59	63	4
R48	SF	3325 Proctor St	58	62	4
R49	SF	3327 Proctor St	58	62	4
Cosgrove Avenue					
R50	SCH	3377 Ridgeway St	58	64	6
R51	V	Vacant Lot	59	64	5
R52	SF	3421 Ridgeway St	60	64	4
R53	SF	1903 Cosgrove Ave	65	70	5
R54	SF	1911 Cosgrove Ave	64	69	5
R55	SF	1917 Cosgrove Ave	65	69	4
R56	SF	3380 Cochise St	61	65	4
R57	SF	1935 Cosgrove Ave	63	67	4

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R58	SF	2003 Cosgrove Ave	64	68	4
R59	SF	2009 Cosgrove Ave	64	68	4
R60	SF	2015 Cosgrove Ave	64	68	4
R61	SF	2021 Cosgrove Ave	64	68	4
R62	V	Vacant Lot	63	67	4
R63	C	2033 Cosgrove Ave	64	68	4
R64	SF	2032 Cosgrove Ave	64	67	3
R65	SF	2026 Cosgrove Ave	64	67	3
R66	SF	2020 Cosgrove Ave	65	68	3
R67	SF	2014 Cosgrove Ave	64	68	4
R68	SF	2008 Cosgrove Ave	62	65	3
R69	SF	2004 Cosgrove Ave	62	65	3
R70	SF	1936 Cosgrove Ave	64	68	4
R71	SF	1910 Cosgrove Ave	65	68	3
R72	V	1904 Cosgrove Ave	65	69	4
Spruill Avenue from Cosgrove Avenue to Noisette Creek					
R73	SF	3423 Cosgrove Ave	59	63	4
R74	SF	3427 Cosgrove Ave	58	63	5
R75	SF	3431 Cosgrove Ave	58	63	5
R76	SF	3435 Cosgrove Ave	58	62	4
R77	SF	3439 Cosgrove Ave	57	61	4
R78	PK	1901-1999 McMillan Ave	57	61	4
R79	MF	3701-3719 Spruill Ave	62	67	5
R80	MF	3721-3775 Spruill Ave (Apts)	65	70	5
R81	MF	1900-1914 Pine Walk Ct	61	66	5
R82	MF	3721-3775 Spruill Ave	57	63	6

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
		(Apts)			
R83	W	3721-3775 Spruill Ave (Apts)	64	69	5
R84	SCH	3795 Spruill Ave	58	64	6
R110	MF	3777-3799 Spruill Ave	67	70	3
R111	MF	4045 MvKeever Ave	66	69	3
St Johns Avenue					
R85	SF	3733 St Johns Ave	55	61	6
R86	SF	3719 St Johns Ave	53	56	3
R87	SF	3727 St Johns Ave	53	56	3
R88	SF	3735 St Johns Ave	53	56	3
R89	SF	3745 St Johns Ave	53	56	3
R90	SF	1851 Reddin Rd	54	57	3
R91	SF	3756 St Johns Ave	55	58	3
R92	SF	3803 Reddin Rd	56	62	6
R93	SF	3803 St Johns Ave	55	58	3
R94	SF	3807 St Johns Ave	55	58	3
R95	SF	3811 St Johns Ave	56	58	2
R96	SF	1246 Ave H	51	54	3
R97	SF	3821 St Johns Ave	57	59	2
R98	SF	3829 St Johns Ave	55	58	3
R99	SF	3831 St Johns Ave	54	57	3
R100	SF	3833 St Johns Ave	53	56	3
R101	SF	3857 Reddin Rd	54	59	5
R102	SF	3845 St Johns Ave	53	56	3
R103	SF	1300 Ave H	52	54	2
R104	SF	3849 St Johns Ave	56	58	2

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R105	SF	3853 St Johns Ave	54	57	3
R106	SF	3857 St Johns Ave	56	58	2
R107	SF	3861 St Johns Ave	52	55	3
R108	SCH	3921 St Johns Ave	49	53	4
R109	W	3921 St Johns Ave	52	55	3
R113	W	3941 St Johns Ave	54	57	3
R114	MF	3955 St Johns Ave	56	59	3
R115	SF	1416 Ave H	54	57	3
R116	SF	1418 Ave H	55	58	3
R117	SF	3971 St Johns Ave	56	59	3
R118	SF	3975 St Johns Ave	56	59	3
R119	SF	3981 St Johns Ave	56	59	3
R120	SF	3985 St Johns Ave	57	60	3
R121	SF	3991 St Johns Ave	57	60	3
R122	SF	3997 St Johns Ave	57	60	3
R123	SF	1428 Ave G	57	60	3
R124	SF	1895 Ave F	53	56	3
R125	SF	1897 Ave F	50	53	3
R126	SF	1899 Ave F	49	52	3
R127	MF	4015 St Johns Ave	56	59	3
R128	MF	4019 St Johns Ave	55	58	3
R129	SF	4033 St Johns Ave	52	55	3
R130	SF	4055 St Johns Ave	55	58	3
Noisette Boulevard					
R131	SF	1415 Manley Ave	54	56	2
R132	SF	1421 Manley Ave	55	56	1
R133	SF	1441 Manley Ave	56	57	1

Receptor	Land Use[1]	Description	2013 Existing Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	No-Action minus Existing, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R134	SF	1461 Manley Ave	56	57	1
R135	SF	1481 Manley Ave	55	56	1
R136	SF	1501 Manley Ave	54	55	1
R137	SF	1527 Manley Ave	52	53	1
R138	MF	2120 Noisette Blvd	47	48	1
North Rhett Avenue					
R139	SF	5102 N Rhett Ave	66	69	3
R140	SF	5103 N Rhett Ave	58	62	4
R141	SF	1195 Camden St	61	64	3
R142	C	5107 N Rhett Ave	62	66	4
R143	SF	1198 Camden St	67	69	2
R144	C	5111 N Rhett Ave	62	66	4
R145	SF	5122 N Rhett Ave	66	69	3
R146	SF	5116 Victoria Ave	54	58	4
R147	C	5134 N Rhett Ave	65	69	4
R148	SF	5144 N Rhett Ave	65	68	3
R149	C	5148 N Rhett Ave	65	68	3
R150	C	5137 N Rhett Ave	61	65	4
R151	SF	5135 N Rhett Ave	65	69	4
R152	C	5154 N Rhett Ave	62	66	4
R153	SF	5133 N Rhett Ave	67	70	3
R154	SF	5128 N Rhett Ave	65	68	3
Montague Avenue					
R173	R	1103 North Blvd	54	54	0
R174	SCH	1087 E Montague Ave	54	54	0
R175	R	Attaway-Heinsohn Field	52	52	0
R176	MF	1081 E Montague Ave	60	60	0

The loudest-hour $L_{eq(h)}$ at the receptors for the existing conditions (column 4) vary considerably for the selected roads. At the receptors along Virginia Avenue, the existing noise levels are relatively high, from 67 to 70 dB(A). The existing loudest-hour noise levels at the receptors along St Johns Avenue are relatively low, from 49 to 57 dB(A). Consistent with the growth in traffic volumes that are not project related, the traffic noise levels for the 2038 No Action Alternative would exceed the existing 2013 noise levels. As can be seen from Table H-7, the loudest-hour noise levels for the No Action Alternative would increase by 1 to 6 dB(A) versus the existing 2013 condition for most of the noise receptors. For several receptors along Cosgrove Avenue/Spruill Avenue, the increase in traffic noise levels up to 6 dB(A) is projected for the No Action Alternative compared to the 2013 existing conditions. This increase would be caused by growth of traffic volumes, including an increase in the number of heavy trucks during the loudest hour projected for the No Action Alternative. The No Action loudest-hour noise levels at the receptors would vary for different road segments. The lowest No Action noise levels of up to 57 dB(A) would be experienced along Noisette Blvd. (receptors along Manley Avenue). Several noise-sensitive receptors along Spruill Ave. and Virginia Ave. would be subject to relatively high traffic noise levels up to 73 dB(A) under the No Action Alternative. The No Action noise level increase versus the existing condition does not constitute the project-related noise impact. Noise levels for the No Action Alternative are used as a baseline to which the project alternatives are compared in the sub-sections below to determine noise impact for the project alternatives.

2.6.2 Build Alternatives

Tables H-8, H-9, and H-10 show the TNM modeled traffic noise levels $L_{eq(h)}$ in dB(A) for 150 receptors identified for Alternatives 1 through 7 and compare those with the No Action noise levels discussed in the previous section. Since traffic projections for Alternatives 1 and 3 are identical, the modeled noise levels for these two alternatives are also identical, and both are identified in the table. Likewise, Alternatives 2 and 4 are identical and Alternatives 5, 6, and 7 are also identical. Sixteen additional receivers are included for Alternatives 5, 6, and 7 in order to capture estimated traffic noise due to the proposed build location for Port Drayage Road. Positive values in column 6 indicate an increase in the noise level due to the selected build Alternative in comparison with No Action Alternative, and thus a potential for noise impact. Zero values indicate no change in the noise level between the build Alternative and No Action Alternative (no impact). The traffic volumes for some of the road segments for certain Alternatives (for example, Spruill Ave. and St. Johns Ave. for Alternative 1) are predicted lower than for the No Action Alternative due to projected changes in the traffic patterns for these road segments; these traffic volume decreases result in reduction of the noise levels generated for a number of receptors and the negative values of related differentials indicated in column 4 of the Table (improvement of the noise conditions).

Table H-8 2038 Traffic Noise Levels for Alternatives 1 and 3 vs No Action Alternative

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
Virginia Avenue					
R1	SF	1004 Delsey St	73	72	1
R2	SF	1005 Delsey St	74	73	1
R3	SF	1004 Crawford St	74	73	1
R4	SF	1005 Crawford St	74	72	2
R5	SF	1004 Bethany St	74	73	1
R6	SF	1005 Bethany St	74	73	1
R7	SF	1004 Alamo St	74	73	1
R8	SF	1005 Alamo St	73	72	1
R9	SF	1004 Buist Ave	72	71	1
Spruill Avenue from North Carolina Avenue to Cosgrove Avenue					
R16	MF	3028 N Carolina Ave	59	62	-3
R17	SF	1901 Iris St	67	70	-3
R18	SF	1903 Iris St	69	72	-3
R19	SF	1902 Iris St	70	72	-2
R20	PK	3107 N Carolina Ave	64	67	-3
R21	SF	1900 Calvert St	69	71	-2
R22	W	3051 Spruill Ave	70	72	-2
R23	SF	1901 Orvid St	69	71	-2
R24	SF	1902 Orvid St	68	71	-3
R25	SF	1825 Carlton St	60	63	-3
R26	SF	1903 Carlton St	67	69	-2
R28	SF	1902 Carlton St	68	70	-2
R29	MF	1824 Carlton St	58	61	-3
R30	SF	1901 Success St	67	69	-2
R31	SF	1825 Success St	57	60	-3
R32	SF	1902 Success St	66	68	-2
R33	SF	1828 Success St	56	59	-3

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R34	MF	1829 Leland St	68	70	-2
R35	SF	3219 Spruill Ave	68	71	-3
R36	SF	1830 Grayson St	57	59	-2
R37	MF	1831 Dayton St	55	58	-3
R38	SF	1902 Grayson St	68	70	-2
R39	SF	3255 Spruill Ave	67	70	-3
R40	SF	1840 Reynolds Ave	69	71	-2
R41	SF	3308 Spruill Ave	68	69	-1
R42	SF	3309 Spruill Ave	69	71	-2
R43	SF	1900 Ubank Ave	62	64	-2
R44	SF	3317 Proctor St	60	62	-2
R45	SF	3319 Proctor St	61	63	-2
R46	SF	3321 Proctor St	61	63	-2
R47	SF	3323 Proctor St	61	63	-2
R48	SF	3325 Proctor St	60	62	-2
R49	SF	3327 Proctor St	60	62	-2
Cosgrove Avenue					
R50	SCH	3377 Ridgeway St	62	64	-2
R51	V	Vacant Lot	63	64	-1
R52	SF	3421 Ridgeway St	64	64	0
R53	SF	1903 Cosgrove Ave	71	70	1
R54	SF	1911 Cosgrove Ave	69	69	0
R55	SF	1917 Cosgrove Ave	70	69	1
R56	SF	3380 Cochise St	68	65	3
R57	SF	1935 Cosgrove Ave	69	67	2
R58	SF	2003 Cosgrove Ave	69	68	1
R59	SF	2009 Cosgrove Ave	69	68	1
R60	SF	2015 Cosgrove Ave	69	68	1
R61	SF	2021 Cosgrove Ave	69	68	1

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R62	V	Vacant Lot	68	67	1
R63	C	2033 Cosgrove Ave	69	68	1
R64	SF	2032 Cosgrove Ave	68	67	1
R65	SF	2026 Cosgrove Ave	68	67	1
R66	SF	2020 Cosgrove Ave	69	68	1
R67	SF	2014 Cosgrove Ave	69	68	1
R68	SF	2008 Cosgrove Ave	66	65	1
R69	SF	2004 Cosgrove Ave	66	65	1
R70	SF	1936 Cosgrove Ave	69	68	1
R71	SF	1910 Cosgrove Ave	69	68	1
R72	V	1904 Cosgrove Ave	70	69	1
Spruill Avenue from Cosgrove Avenue to Noisette Creek					
R73	SF	3423 Cosgrove Ave	62	63	-1
R74	SF	3427 Cosgrove Ave	61	63	-2
R75	SF	3431 Cosgrove Ave	61	63	-2
R76	SF	3435 Cosgrove Ave	60	62	-2
R77	SF	3439 Cosgrove Ave	60	61	-1
R78	PK	1901-1999 McMillan Ave	59	61	-2
R79	MF	3701-3719 Spruill Ave	68	67	1
R80	MF	3721-3775 Spruill Ave (Apts)	71	70	1
R81	MF	1900-1914 Pine Walk Ct	67	66	1
R82	MF	3721-3775 Spruill Ave (Apts)	63	63	0
R83	W	3721-3775 Spruill Ave (Apts)	70	69	1
R84	SCH	3795 Spruill Ave	65	64	1
R110	MF	3777-3799 Spruill Ave	71	70	1
R111	MF	4045 MvKeever Ave	70	69	1
St Johns Avenue					
R85	SF	3733 St Johns Ave	62	61	1
R86	SF	3719 St Johns Ave	58	56	2

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R87	SF	3727 St Johns Ave	57	56	1
R88	SF	3735 St Johns Ave	57	56	1
R89	SF	3745 St Johns Ave	57	56	1
R90	SF	1851 Reddin Rd	57	57	0
R91	SF	3756 St Johns Ave	58	58	0
R92	SF	3803 Reddin Rd	62	62	0
R93	SF	3803 St Johns Ave	58	58	0
R94	SF	3807 St Johns Ave	58	58	0
R95	SF	3811 St Johns Ave	58	58	0
R96	SF	1246 Ave H	55	54	1
R97	SF	3821 St Johns Ave	59	59	0
R98	SF	3829 St Johns Ave	58	58	0
R99	SF	3831 St Johns Ave	57	57	0
R100	SF	3833 St Johns Ave	57	56	1
R101	SF	3857 Reddin Rd	60	59	1
R102	SF	3845 St Johns Ave	56	56	0
R103	SF	1300 Ave H	55	54	1
R104	SF	3849 St Johns Ave	58	58	0
R105	SF	3853 St Johns Ave	57	57	0
R106	SF	3857 St Johns Ave	58	58	0
R107	SF	3861 St Johns Ave	56	55	1
R108	SCH	3921 St Johns Ave	54	53	1
R109	W	3921 St Johns Ave	55	55	0
R113	W	3941 St Johns Ave	56	57	-1
R114	MF	3955 St Johns Ave	58	59	-1
R115	SF	1416 Ave H	56	57	-1
R116	SF	1418 Ave H	57	58	-1
R117	SF	3971 St Johns Ave	59	59	0
R118	SF	3975 St Johns Ave	59	59	0

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R119	SF	3981 St Johns Ave	59	59	0
R120	SF	3985 St Johns Ave	59	60	-1
R121	SF	3991 St Johns Ave	60	60	0
R122	SF	3997 St Johns Ave	60	60	0
R123	SF	1428 Ave G	58	60	-2
R124	SF	1895 Ave F	56	56	0
R125	SF	1897 Ave F	53	53	0
R126	SF	1899 Ave F	51	52	-1
R127	MF	4015 St Johns Ave	58	59	-1
R128	MF	4019 St Johns Ave	57	58	-1
R129	SF	4033 St Johns Ave	54	55	-1
R130	SF	4055 St Johns Ave	56	58	-2
Noisette Boulevard					
R131	SF	1415 Manley Ave	56	56	0
R132	SF	1421 Manley Ave	57	56	1
R133	SF	1441 Manley Ave	58	57	1
R134	SF	1461 Manley Ave	57	57	0
R135	SF	1481 Manley Ave	57	56	1
R136	SF	1501 Manley Ave	56	55	1
R137	SF	1527 Manley Ave	53	53	0
R138	MF	2120 Noisette Blvd	48	48	0
North Rhett Avenue					
R139	SF	5102 N Rhett Ave	69	69	0
R140	SF	5103 N Rhett Ave	62	62	0
R141	SF	1195 Camden St	64	64	0
R142	C	5107 N Rhett Ave	66	66	0
R143	SF	1198 Camden St	70	69	1
R144	C	5111 N Rhett Ave	66	66	0
R145	SF	5122 N Rhett Ave	69	69	0

Receptor	Land Use[1]	Description	2038 Alternatives 1 & 3 Loudest-Hour $L_{eq(h)}$, dB(A)	2038 No-Action Loudest-Hour $L_{eq(h)}$, dB(A)	Alt 1&3 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R146	SF	5116 Victoria Ave	59	58	1
R147	C	5134 N Rhett Ave	69	69	0
R148	SF	5144 N Rhett Ave	68	68	0
R149	C	5148 N Rhett Ave	68	68	0
R150	C	5137 N Rhett Ave	65	65	0
R151	SF	5135 N Rhett Ave	69	69	0
R152	C	5154 N Rhett Ave	66	66	0
R153	SF	5133 N Rhett Ave	71	70	1
R154	SF	5128 N Rhett Ave	68	68	0
Montague Avenue					
R173	R	1103 North Blvd	54	54	0
R174	SCH	1087 E Montague Ave	54	54	0
R175	R	Attaway-Heinsohn Field	52	52	0
R176	MF	1081 E Montague Ave	60	60	0

Table H-9 2038 Traffic Noise Levels for Alternatives 2 and 4 vs No Action Alternative

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
Virginia Avenue					
R1	SF	1004 Delsey St	73	72	1
R2	SF	1005 Delsey St	74	73	1
R3	SF	1004 Crawford St	74	73	1
R4	SF	1005 Crawford St	74	72	2
R5	SF	1004 Bethany St	74	73	1
R6	SF	1005 Bethany St	74	73	1
R7	SF	1004 Alamo St	74	73	1
R8	SF	1005 Alamo St	73	72	1
R9	SF	1004 Buist Ave	72	71	1
Spruill Avenue from North Carolina Avenue to Cosgrove Avenue					
R16	MF	3028 N Carolina Ave	59	62	-3
R17	SF	1901 Iris St	67	70	-3
R18	SF	1903 Iris St	69	72	-3
R19	SF	1902 Iris St	70	72	-2
R20	PK	3107 N Carolina Ave	64	67	-3
R21	SF	1900 Calvert St	69	71	-2
R22	W	3051 Spruill Ave	70	72	-2
R23	SF	1901 Orvid St	69	71	-2
R24	SF	1902 Orvid St	68	71	-3
R25	SF	1825 Carlton St	60	63	-3
R26	SF	1903 Carlton St	67	69	-2
R28	SF	1902 Carlton St	68	70	-2
R29	MF	1824 Carlton St	58	61	-3
R30	SF	1901 Success St	67	69	-2
R31	SF	1825 Success St	57	60	-3
R32	SF	1902 Success St	66	68	-2

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R33	SF	1828 Success St	56	59	-3
R34	MF	1829 Leland St	68	70	-2
R35	SF	3219 Spruill Ave	68	71	-3
R36	SF	1830 Grayson St	57	59	-2
R37	MF	1831 Dayton St	55	58	-3
R38	SF	1902 Grayson St	68	70	-2
R39	SF	3255 Spruill Ave	67	70	-3
R40	SF	1840 Reynolds Ave	69	71	-2
R41	SF	3308 Spruill Ave	68	69	-1
R42	SF	3309 Spruill Ave	69	71	-2
R43	SF	1900 Ubank Ave	62	64	-2
R44	SF	3317 Proctor St	60	62	-2
R45	SF	3319 Proctor St	61	63	-2
R46	SF	3321 Proctor St	61	63	-2
R47	SF	3323 Proctor St	61	63	-2
R48	SF	3325 Proctor St	60	62	-2
R49	SF	3327 Proctor St	60	62	-2
Cosgrove Avenue					
R50	SCH	3377 Ridgeway St	62	64	-2
R51	V	Vacant Lot	63	64	-1
R52	SF	3421 Ridgeway St	64	64	0
R53	SF	1903 Cosgrove Ave	70	70	0
R54	SF	1911 Cosgrove Ave	69	69	0
R55	SF	1917 Cosgrove Ave	70	69	1
R56	SF	3380 Cochise St	66	65	1
R57	SF	1935 Cosgrove Ave	68	67	1
R58	SF	2003 Cosgrove Ave	69	68	1
R59	SF	2009 Cosgrove Ave	69	68	1
R60	SF	2015 Cosgrove Ave	69	68	1

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R61	SF	2021 Cosgrove Ave	69	68	1
R62	V	Vacant Lot	68	67	1
R63	C	2033 Cosgrove Ave	69	68	1
R64	SF	2032 Cosgrove Ave	68	67	1
R65	SF	2026 Cosgrove Ave	68	67	1
R66	SF	2020 Cosgrove Ave	69	68	1
R67	SF	2014 Cosgrove Ave	69	68	1
R68	SF	2008 Cosgrove Ave	66	65	1
R69	SF	2004 Cosgrove Ave	66	65	1
R70	SF	1936 Cosgrove Ave	69	68	1
R71	SF	1910 Cosgrove Ave	69	68	1
R72	V	1904 Cosgrove Ave	70	69	1
Spruill Avenue from Cosgrove Avenue to Noisette Creek					
R73	SF	3423 Cosgrove Ave	62	63	-1
R74	SF	3427 Cosgrove Ave	61	63	-2
R75	SF	3431 Cosgrove Ave	61	63	-2
R76	SF	3435 Cosgrove Ave	60	62	-2
R77	SF	3439 Cosgrove Ave	60	61	-1
R78	PK	1901-1999 McMillan Ave	59	61	-2
R79	MF	3701-3719 Spruill Ave	68	67	1
R80	MF	3721-3775 Spruill Ave (Apts)	71	70	1
R81	MF	1900-1914 Pine Walk Ct	67	66	1
R82	MF	3721-3775 Spruill Ave (Apts)	63	63	0
R83	W	3721-3775 Spruill Ave (Apts)	70	69	1
R84	SCH	3795 Spruill Ave	65	64	1
R110	MF	3777-3799 Spruill Ave	71	70	1
R111	MF	4045 MvKeever Ave	70	69	1
St Johns Avenue					
R85	SF	3733 St Johns Ave	62	61	1

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R86	SF	3719 St Johns Ave	57	56	1
R87	SF	3727 St Johns Ave	56	56	0
R88	SF	3735 St Johns Ave	55	56	-1
R89	SF	3745 St Johns Ave	55	56	-1
R90	SF	1851 Reddin Rd	55	57	-2
R91	SF	3756 St Johns Ave	53	58	-5
R92	SF	3803 Reddin Rd	62	62	0
R93	SF	3803 St Johns Ave	54	58	-4
R94	SF	3807 St Johns Ave	54	58	-4
R95	SF	3811 St Johns Ave	54	58	-4
R96	SF	1246 Ave H	51	54	-3
R97	SF	3821 St Johns Ave	54	59	-5
R98	SF	3829 St Johns Ave	54	58	-4
R99	SF	3831 St Johns Ave	54	57	-3
R100	SF	3833 St Johns Ave	53	56	-3
R101	SF	3857 Reddin Rd	60	59	1
R102	SF	3845 St Johns Ave	52	56	-4
R103	SF	1300 Ave H	51	54	-3
R104	SF	3849 St Johns Ave	54	58	-4
R105	SF	3853 St Johns Ave	53	57	-4
R106	SF	3857 St Johns Ave	54	58	-4
R107	SF	3861 St Johns Ave	53	55	-2
R108	SCH	3921 St Johns Ave	53	53	0
R109	W	3921 St Johns Ave	54	55	-1
R113	W	3941 St Johns Ave	56	57	-1
R114	MF	3955 St Johns Ave	59	59	0
R115	SF	1416 Ave H	56	57	-1
R116	SF	1418 Ave H	57	58	-1
R117	SF	3971 St Johns Ave	59	59	0

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R118	SF	3975 St Johns Ave	59	59	0
R119	SF	3981 St Johns Ave	59	59	0
R120	SF	3985 St Johns Ave	60	60	0
R121	SF	3991 St Johns Ave	60	60	0
R122	SF	3997 St Johns Ave	60	60	0
R123	SF	1428 Ave G	59	60	-1
R124	SF	1895 Ave F	56	56	0
R125	SF	1897 Ave F	53	53	0
R126	SF	1899 Ave F	51	52	-1
R127	MF	4015 St Johns Ave	58	59	-1
R128	MF	4019 St Johns Ave	57	58	-1
R129	SF	4033 St Johns Ave	54	55	-1
R130	SF	4055 St Johns Ave	56	58	-2
Noisette Boulevard					
R131	SF	1415 Manley Ave	56	56	0
R132	SF	1421 Manley Ave	57	56	1
R133	SF	1441 Manley Ave	58	57	1
R134	SF	1461 Manley Ave	57	57	0
R135	SF	1481 Manley Ave	56	56	0
R136	SF	1501 Manley Ave	55	55	0
R137	SF	1527 Manley Ave	53	53	0
R138	MF	2120 Noisette Blvd	48	48	0
North Rhett Avenue					
R139	SF	5102 N Rhett Ave	69	69	0
R140	SF	5103 N Rhett Ave	62	62	0
R141	SF	1195 Camden St	64	64	0
R142	C	5107 N Rhett Ave	66	66	0
R143	SF	1198 Camden St	70	69	1
R144	C	5111 N Rhett Ave	66	66	0

Receptor	Land Use[1]	Description	2038 Alternatives 2 & 4 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 2&4 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R145	SF	5122 N Rhett Ave	69	69	0
R146	SF	5116 Victoria Ave	59	58	1
R147	C	5134 N Rhett Ave	69	69	0
R148	SF	5144 N Rhett Ave	68	68	0
R149	C	5148 N Rhett Ave	68	68	0
R150	C	5137 N Rhett Ave	65	65	0
R151	SF	5135 N Rhett Ave	69	69	0
R152	C	5154 N Rhett Ave	66	66	0
R153	SF	5133 N Rhett Ave	71	70	1
R154	SF	5128 N Rhett Ave	68	68	0
Montague Avenue					
R173	R	1103 North Blvd	54	54	0
R174	SCH	1087 E Montague Ave	54	54	0
R175	R	Attaway-Heinsohn Field	52	52	0
R176	MF	1081 E Montague Ave	60	60	0

Table H-10 2038 Traffic Noise Levels for Alternatives 5, 6, and 7 vs No Action Alternative

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
Virginia Avenue					
R1	SF	1004 Delsey St	74	72	2
R2	SF	1005 Delsey St	74	73	1
R3	SF	1004 Crawford St	74	73	1
R4	SF	1005 Crawford St	74	72	2
R5	SF	1004 Bethany St	74	73	1
R6	SF	1005 Bethany St	74	73	1

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R7	SF	1004 Alamo St	74	73	1
R8	SF	1005 Alamo St	73	72	1
R9	SF	1004 Buist Ave	73	71	2
Spruill Avenue from North Carolina Avenue to Cosgrove Avenue					
R16	MF	3028 N Carolina Ave	63	62	1
R17	SF	1901 Iris St	70	70	0
R18	SF	1903 Iris St	72	72	0
R19	SF	1902 Iris St	73	72	1
R20	PK	3107 N Carolina Ave	67	67	0
R21	SF	1900 Calvert St	72	71	1
R22	W	3051 Spruill Ave	73	72	1
R23	SF	1901 Orvid St	72	71	1
R24	SF	1902 Orvid St	71	71	0
R25	SF	1825 Carlton St	64	63	1
R26	SF	1903 Carlton St	70	69	1
R28	SF	1902 Carlton St	71	70	1
R29	MF	1824 Carlton St	61	61	0
R30	SF	1901 Success St	70	69	1
R31	SF	1825 Success St	61	60	1
R32	SF	1902 Success St	68	68	0
R33	SF	1828 Success St	60	59	1
R34	MF	1829 Leland St	70	70	0
R35	SF	3219 Spruill Ave	71	71	0
R36	SF	1830 Grayson St	60	59	1
R37	MF	1831 Dayton St	59	58	1
R38	SF	1902 Grayson St	71	70	1
R39	SF	3255 Spruill Ave	70	70	0
R40	SF	1840 Reynolds Ave	71	71	0
R41	SF	3308 Spruill Ave	70	69	1

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R42	SF	3309 Spruill Ave	72	71	1
R43	SF	1900 Ubank Ave	65	64	1
R44	SF	3317 Proctor St	63	62	1
R45	SF	3319 Proctor St	63	63	0
R46	SF	3321 Proctor St	64	63	1
R47	SF	3323 Proctor St	64	63	1
R48	SF	3325 Proctor St	63	62	1
R49	SF	3327 Proctor St	63	62	1
Cosgrove Avenue					
R50	SCH	3377 Ridgeway St	64	64	0
R51	V	Vacant Lot	64	64	0
R52	SF	3421 Ridgeway St	65	64	1
R53	SF	1903 Cosgrove Ave	70	70	0
R54	SF	1911 Cosgrove Ave	69	69	0
R55	SF	1917 Cosgrove Ave	70	69	1
R56	SF	3380 Cochise St	66	65	1
R57	SF	1935 Cosgrove Ave	68	67	1
R58	SF	2003 Cosgrove Ave	69	68	1
R59	SF	2009 Cosgrove Ave	69	68	1
R60	SF	2015 Cosgrove Ave	69	68	1
R61	SF	2021 Cosgrove Ave	68	68	0
R62	V	Vacant Lot	67	67	0
R63	C	2033 Cosgrove Ave	69	68	1
R64	SF	2032 Cosgrove Ave	68	67	1
R65	SF	2026 Cosgrove Ave	68	67	1
R66	SF	2020 Cosgrove Ave	69	68	1
R67	SF	2014 Cosgrove Ave	68	68	0
R68	SF	2008 Cosgrove Ave	66	65	1
R69	SF	2004 Cosgrove Ave	66	65	1

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R70	SF	1936 Cosgrove Ave	68	68	0
R71	SF	1910 Cosgrove Ave	69	68	1
R72	V	1904 Cosgrove Ave	69	69	0
Spruill Avenue from Cosgrove Avenue to Noisette Cree					
R73	SF	3423 Cosgrove Ave	64	63	1
R74	SF	3427 Cosgrove Ave	63	63	0
R75	SF	3431 Cosgrove Ave	63	63	0
R76	SF	3435 Cosgrove Ave	62	62	0
R77	SF	3439 Cosgrove Ave	62	61	1
R78	PK	1901-1999 McMillan Ave	61	61	0
R79	MF	3701-3719 Spruill Ave	68	67	1
R80	MF	3721-3775 Spruill Ave (Apts)	71	70	1
R81	MF	1900-1914 Pine Walk Ct	67	66	1
R82	MF	3721-3775 Spruill Ave (Apts)	63	63	0
R83	W	3721-3775 Spruill Ave (Apts)	70	69	1
R84	SCH	3795 Spruill Ave	65	64	1
R110	MF	3777-3799 Spruill Ave	72	70	2
R111	MF	4045 MvKeever Ave	70	69	1
St Johns Avenue					
R85	SF	3733 St Johns Ave	62	61	1
R86	SF	3719 St Johns Ave	59	56	3
R87	SF	3727 St Johns Ave	58	56	2
R88	SF	3735 St Johns Ave	58	56	2
R89	SF	3745 St Johns Ave	58	56	2
R90	SF	1851 Reddin Rd	58	57	1

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R91	SF	3756 St Johns Ave	59	58	1
R92	SF	3803 Reddin Rd	62	62	0
R93	SF	3803 St Johns Ave	60	58	2
R94	SF	3807 St Johns Ave	59	58	1
R95	SF	3811 St Johns Ave	60	58	2
R96	SF	1246 Ave H	55	54	1
R97	SF	3821 St Johns Ave	61	59	2
R98	SF	3829 St Johns Ave	60	58	2
R99	SF	3831 St Johns Ave	58	57	1
R100	SF	3833 St Johns Ave	58	56	2
R101	SF	3857 Reddin Rd	60	59	1
R102	SF	3845 St Johns Ave	57	56	1
R103	SF	1300 Ave H	56	54	2
R104	SF	3849 St Johns Ave	60	58	2
R105	SF	3853 St Johns Ave	59	57	2
R106	SF	3857 St Johns Ave	60	58	2
R107	SF	3861 St Johns Ave	57	55	2
R108	SCH	3921 St Johns Ave	55	53	2
R109	W	3921 St Johns Ave	56	55	1
R113	W	3941 St Johns Ave	58	57	1
R114	MF	3955 St Johns Ave	60	59	1
R115	SF	1416 Ave H	58	57	1
R116	SF	1418 Ave H	59	58	1
R117	SF	3971 St Johns Ave	61	59	2
R118	SF	3975 St Johns Ave	61	59	2
R119	SF	3981 St Johns Ave	61	59	2
R120	SF	3985 St Johns Ave	61	60	1
R121	SF	3991 St Johns Ave	62	60	2
R122	SF	3997 St Johns Ave	62	60	2

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R123	SF	1428 Ave G	61	60	1
R124	SF	1895 Ave F	57	56	1
R125	SF	1897 Ave F	54	53	1
R126	SF	1899 Ave F	53	52	1
R127	MF	4015 St Johns Ave	60	59	1
R128	MF	4019 St Johns Ave	59	58	1
R129	SF	4033 St Johns Ave	56	55	1
R130	SF	4055 St Johns Ave	59	58	1
Noisette Boulevard					
R131	SF	1415 Manley Ave	56	56	0
R132	SF	1421 Manley Ave	57	56	1
R133	SF	1441 Manley Ave	58	57	1
R134	SF	1461 Manley Ave	57	57	0
R135	SF	1481 Manley Ave	56	56	0
R136	SF	1501 Manley Ave	56	55	1
R137	SF	1527 Manley Ave	53	53	0
R138	MF	2120 Noisette Blvd	48	48	0
North Rhett Avenue					
R139	SF	5102 N Rhett Ave	69	69	0
R140	SF	5103 N Rhett Ave	62	62	0
R141	SF	1195 Camden St	64	64	0
R142	C	5107 N Rhett Ave	67	66	1
R143	SF	1198 Camden St	70	69	1
R144	C	5111 N Rhett Ave	66	66	0
R145	SF	5122 N Rhett Ave	70	69	1
R146	SF	5116 Victoria Ave	59	58	1
R147	C	5134 N Rhett Ave	69	69	0
R148	SF	5144 N Rhett Ave	68	68	0
R149	C	5148 N Rhett Ave	68	68	0

Receptor	Land Use[1]	Description	2038 Alternative 5, 6, & 7 Loudest-Hour Leq(h), dB(A)	2038 No-Action Loudest-Hour Leq(h), dB(A)	Alt 5,6,&7 minus No-Action, dB(A)
1	*2*	*3*	*4*	*5*	*6*
R150	C	5137 N Rhett Ave	65	65	0
R151	SF	5135 N Rhett Ave	69	69	0
R152	C	5154 N Rhett Ave	66	66	0
R153	SF	5133 N Rhett Ave	71	70	1
R154	SF	5128 N Rhett Ave	69	68	1
Port Drayage Road (future)					
R155	MF	1800 Iris St	59	53[2]	6
R156	SF	1800 Calvert St	59	53[2]	6
R157	SF	1805 Orvid St	57	53[2]	4
R158	SF	1806 Orvid St	59	53[2]	6
R159	SF	1807 Carlton St	59	53[2]	6
R160	SF	1805 Carlton St	59	53[2]	6
R161	SF	1804 Carlton St	60	53[2]	7
R162	SF	1801 Success St	59	53[2]	6
R163	SF	1800 Success St	59	53[2]	6
R164	SF	1801 Leland St	60	53[2]	7
R165	SF	1802 Leland St	59	53[2]	6
R166	SF	1803 Grayson St	60	53[2]	7
R167	SF	1801 Grayson St	60	53[2]	7
R168	SF	3250 Grayson St	60	53[2]	7
R169	SF	3244 N Carolina Ave	60	53[2]	7
R170	SF	3250 N Carolina Ave	60	53[2]	7
R171	SF	3264 N Carolina Ave	60	53[2]	7
R172	SF	3286 N Carolina Ave	60	53[2]	7
Montague Avenue					
R173	R	1103 North Blvd	55	54	1
R174	SCH	1087 E Montague Ave	55	54	1
R175	R	Attaway-Heinsohn Field	52	52	0
R176	MF	1081 E Montague Ave	61	60	1

3.0 RAIL NOISE ANALYSIS

3.1 RAIL NOISE SCREENING PROCEDURE

The Transportation Study rail operations data for 31 at-grade crossings in the study area (20 are shown in DEIS Figure 4.12-2; some include multiple nearby crossings) were analyzed to determine rail track segments where operational changes are projected that could potentially generate noticeable noise impact. The DNL was computed for all track segments between railroad crossings at a reference distance of 50 feet from the tracks for all the project alternatives. The differentials were calculated between DNL for each of the alternatives and DNL for the No Action Alternative for the design year 2038. According to the NEPA requirements, differentials exceeding 3 dB(A) indicate potential noise impacts in the vicinity of the rail segment. Changes in noise level that are less than 3 dB(A) may be considered negligible under NEPA as they are barely perceptible. The differentials for the track segments between rail crossings were analyzed using the screening criterion of 2.5 dB(A). The track segments with the DNL differential below the screening criterion were omitted from further analysis, since no or negligible noise impacts would be anticipated near the track segments, as no or little change in the train operations is projected for the particular alternative in comparison with the No Action Alternative. Rail segments were defined using the rail crossings with the DNL differentials of 2.5 dB(A) or higher. These segments extended in both directions along the track centerline from each specified rail crossing to the closest nearby rail intersection. These segments were further reviewed for the presence of noise-sensitive land uses within approximately 300 feet[5] of the track centerline. If no noise-sensitive land uses are present within this screening distance, then no further noise assessment is necessary for these areas. For noise-sensitive land uses present within the screening distance of 300 feet from the tracks, noise assessment was conducted as follows. For each rail segment associated with each identified crossings, DNL noise contours at 70, 65, and 60 dB(A) was calculated as a function of distance away from the rail track centerline. The number of noise-sensitive receiver locations in each level of the noise contours was recorded for each identified rail segment. The majority of noise-sensitive receivers along these rail segments of interest will be single- and multi-family residences.

3.2 RAIL DATA FOR NOISE PREDICTION

Rail operations data included are based on the Transportation Study data for rail crossings. The daily volumes for track segments between rail crossing and times at rail crossings used for the 2013 existing conditions are provided in Table H-11. The average train length is determined from the time spent at the crossing, rather than the speed. According to the updated train speed info

[5] The traffic speed directly affects noise levels generated by traffic; the higher speed increases the noise level. It is conservatively assumed for the modeling that during the peak hour traffic moves with the speed equal to the speed limit for the road. The speed limits were determined from the field/Google Maps surveys of the roads modeled and have been confirmed by Atkins.

provided by Palmetto Railways, it is assumed to be 10 mph at all rail crossings/track segments of interest for all project alternatives in the existing year and the future 2038 year. Each train is assumed to have two locomotives pulling it.

Table H-11 Rail Operations Data for Base Year 2013 Existing Conditions

Crossing Number	Rail Crossing	Base Year 2013 Existing	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	3.1	309
	Dorchester Road & CSX Main 1 (west)	2.2	99
	Dorchester Road & CSX Main 2 (east)	0.0	0
2	Accabee Road & NS Main (central)	3.1	200
	Accabee Road & CSX Main 1 (west)	2.2	99
	Accabee Road & CSX Main 2 (east)	0.0	0
3	Misroon Street & NS Main (central)	3.1	225
	Misroon Street & CSX Main 1 (west)	2.2	99
	Misroon Street & CSX Main 2 (east)	0.0	0
4	Virginia Avenue & NCTC	1.1	1,551
14	Avenue B North & NCTC (existing)	1.1	2,063
15	Hackemann Ave & NS Main (west)	3.1	225
	Hackemann Ave & CSX Main 2 (east)	0.0	0
16	Discher Street & CSX Main 2	0.0	0
	Discher Street & CSX Main 1/NS Main	5.3	173
17	Pittsburgh Avenue & Southern Connection	0.0	0
18	Meeting/Herbert & Southern Connection	0.0	0
19	O'Hear Avenue & NCTC	0.0	0
20	Meeting St & CSX Main 2 (Near Spruill)	0.0	0
	Spruill Ave & CSX Main 2 (Near Meeting)	0.0	0

Rail operations data for track segments between rail crossings for the No Action Alternative are provided in Table H-12.

Table H-12 Rail Operations Data for No Action Alternative 2038 Conditions

Crossing Number	Rail Crossing	Design Year 2038 No-Action	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	3.1	431
	Dorchester Road & CSX Main 1 (west)	2.2	143
	Dorchester Road & CSX Main 2 (east)	0.0	0
2	Accabee Road & NS Main (central)	3.1	431
	Accabee Road & CSX Main 1 (west)	2.2	143
	Accabee Road & CSX Main 2 (east)	0.0	0
3	Misroon Street & NS Main (central)	3.1	329
	Misroon Street & CSX Main 1 (west)	2.2	143
	Misroon Street & CSX Main 2 (east)	0.0	0
4	Virginia Avenue & NCTC	1.1	1,630
14	Avenue B North & NCTC (existing)	1.1	2,129
15	Hackemann Ave & NS Main (west)	3.1	329
	Hackemann Ave & CSX Main 2 (east)	0.0	0
16	Discher Street & CSX Main 2	0.0	0
	Discher Street & CSX Main 1/NS Main	5.3	252
17	Pittsburgh Avenue & Southern Connection	0.0	0
18	Meeting/Herbert & Southern Connection	0.0	0
19	O'Hear Avenue & NCTC	0.0	0
20	Meeting St & CSX Main 2 (Near Spruill)	0.0	0
	Spruill Ave & CSX Main 2 (Near Meeting)	0.0	0

Rail operations data for the full build-out design year 2038 alternatives are provided in Tables H-13 through H-16 for the track segments between rail crossings identified for detail noise modeling.

Table H-13 Rail Operations Data for Full Build-out Design Year 2038, Alternatives 1 and 5

Crossing Number	Rail Crossing	Design Year 2038 Alt 1 & Alt 5	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	3.1	412
	Dorchester Road & CSX Main 1 (west)	2.2	142
	Dorchester Road & CSX Main 2 (east)	4.0	700
2	Accabee Road & NS Main (central)	3.1	412
	Accabee Road & CSX Main 1 (west)	2.2	142
	Accabee Road & CSX Main 2 (east)	4.0	700
3	Misroon Street & NS Main (central)	3.1	328
	Misroon Street & CSX Main 1 (west)	2.2	142
	Misroon Street & CSX Main 2 (east)	4.0	700
4	Virginia Avenue & NCTC	5.1	864
14	Avenue B North & NCTC (existing)	5.1	975
15	Hackemann Ave & NS Main (west)	3.1	328
	Hackemann Ave & CSX Main 2 (east)	4.0	700
16	Discher Street & CSX Main 2	4.0	646
	Discher Street & CSX Main 1/NS Main	5.3	252
17	Pittsburgh Avenue & Southern Connection	4.0	646
18	Meeting/Herbert & Southern Connection	4.0	646
19	O'Hear Avenue & NCTC	0.0	0
20	Meeting St & CSX Main 2 (Near Spruill)	0.0	0
	Spruill Ave & CSX Main 2 (Near Meeting)	0.0	0

Table H-14 Rail Operations Data for Full Build-out Design Year 2038, Alternative 2

Crossing Number	Rail Crossing	Design Year 2038 Alt 2	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	3.1	404
	Dorchester Road & CSX Main 1 (west)	2.2	142
	Dorchester Road & CSX Main 2 (east)	4.0	700
2	Accabee Road & NS Main (central)	3.1	404
	Accabee Road & CSX Main 1 (west)	2.2	142
	Accabee Road & CSX Main 2 (east)	4.0	700
3	Misroon Street & NS Main (central)	3.1	328
	Misroon Street & CSX Main 1 (west)	2.2	142
	Misroon Street & CSX Main 2 (east)	4.0	700
4	Virginia Avenue & NCTC	5.1	874
14	Avenue B North & NCTC (existing)	5.1	983
15	Hackemann Ave & NS Main (west)	3.1	328
	Hackemann Ave & CSX Main 2 (east)	4.0	700
16	Discher Street & CSX Main 2	4.0	645
	Discher Street & CSX Main 1/NS Main	5.3	252
17	Pittsburgh Avenue & Southern Connection	4.0	645
18	Meeting/Herbert & Southern Connection	4.0	645
19	O'Hear Avenue & NCTC	4.0	649
20	Meeting St & CSX Main 2 (Near Spruill)	0.0	0
	Spruill Ave & CSX Main 2 (Near Meeting)	0.0	0

Table H-15 Rail Operations Data for Full Build-out Design Year 2038, Alternatives 3 and 6

Crossing Number	Rail Crossing	Design Year 2038 Alt 3 and Alt 6	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	3.1	419
	Dorchester Road & CSX Main 1 (west)	2.2	142
	Dorchester Road & CSX Main 2 (east)	4.0	702
2	Accabee Road & NS Main (central)	3.1	419
	Accabee Road & CSX Main 1 (west)	2.2	142
	Accabee Road & CSX Main 2 (east)	4.0	702
3	Misroon Street & NS Main (central)	3.1	330
	Misroon Street & CSX Main 1 (west)	2.2	142
	Misroon Street & CSX Main 2 (east)	4.0	702
4	Virginia Avenue & NCTC	5.1	872
14	Avenue B North & NCTC (existing)	5.1	983
15	Hackemann Ave & NS Main (west)	3.1	330
	Hackemann Ave & CSX Main 2 (east)	4.0	702
16	Discher Street & CSX Main 2	0.0	0
	Discher Street & CSX Main 1/NS Main	5.3	253
17	Pittsburgh Avenue & Southern Connection	0.0	0
18	Meeting/Herbert & Southern Connection	0.0	0
19	O'Hear Avenue & NCTC	0.0	0
20	Meeting St & CSX Main 2 (Near Spruill)	4.0	645
	Spruill Ave & CSX Main 2 (Near Meeting)	4.0	645

Table H-16 Rail Operations Data for Full Build-out Design Year 2038, Alternatives 4 and 7

Crossing Number	Rail Crossing	Design Year 2038 Alt 4 and Alt 7	
		Number of Crossings	Seconds Per Crossing
1	Dorchester Road & NS Main (central)	7.1	562
	Dorchester Road & CSX Main 1 (west)	2.2	143
	Dorchester Road & CSX Main 2 (east)	4.0	705
2	Accabee Road & NS Main (central)	7.1	562
	Accabee Road & CSX Main 1 (west)	2.2	143
	Accabee Road & CSX Main 2 (east)	4.0	705
3	Misroon Street & NS Main (central)	7.1	507
	Misroon Street & CSX Main 1 (west)	2.2	143
	Misroon Street & CSX Main 2 (east)	4.0	705
4	Virginia Avenue & NCTC	1.2	1,676
14	Avenue B North & NCTC (existing)	1.2	2,165
15	Hackemann Ave & NS Main (west)	7.1	507
	Hackemann Ave & CSX Main 2 (east)	4.0	705
16	Discher Street & CSX Main 2	4.0	645
	Discher Street & CSX Main 1/NS Main	9.3	422
17	Pittsburgh Avenue & Southern Connection	8.0	646
18	Meeting/Herbert & Southern Connection	8.0	646
19	O'Hear Avenue & NCTC	0.0	0
20	Meeting St & CSX Main 2 (Near Spruill)	0.0	0
	Spruill Ave & CSX Main 2 (Near Meeting)	0.0	0

3.3 RAIL NOISE MODELING METHODOLOGY

Rail noise modeling was conducted using the Federal Transit Administration's (FTA) CREATE Railroad Noise Model (HMMH, 2006) following the manual Transit Noise and Vibration Impact Assessment, FTA-VA-90-1003-06, May 2006. No measurements were required. The spreadsheet calculates noise levels based on a reference Sound Exposure Level (SEL) that is included in a database built into the spreadsheet. CREATE Railroad Noise Model has an SEL specific to freight locomotives and specific to freight cars. CREATE Railroad Noise Model then adjusts the SEL for project specific parameters including train speed, distance from noise source, number of daytime trains, number of nighttime trains, length of cars per train, and number of locomotives per train. Based on these adjustments, the spreadsheet calculates a Day-Night Average Sound Level (DNL or Ldn) for a specific distance.

In addition to noise from locomotive and railcar movement, locomotive horn soundings are also a part of railroad operation noise. Under the Train Horn Rule (49 CFR Part 222), locomotive engineers must begin to sound train warning horns from 15 to 20 seconds in advance of all public grade crossings (for train speeds of 10 mph and below). The rule also provides an opportunity for localities nationwide to mitigate the effects of train horn noise by establishing quiet zones. In a quiet zone, railroads have been directed to cease the routine sounding of their horns when

approaching public highway-rail grade crossings. Localities desiring to establish a quiet zone are first required to mitigate the increased risk caused by the absence of a horn. Horn soundings were modeled for all rail crossings in the study area, with the exception of crossings with currently established 24-hour quiet zones listed in Section 3.12.5. Additionally, quiet zones currently proposed for seven crossings in the study area are listed below by the street name, DOT identification number, and crossing number indicated in DEIS Figure 4.12-2.

- Virginia Ave. (721439M) - Crossing 4
- N. Rhett St. (721434D) - Crossing 5
- Attaway St. (721433W) - Crossing 6
- Rivers Ave. (721432P) - Crossing 8
- Durant Ave. (632152S) - Crossing 12
- Braddock Ave. (632151K) - Crossing 13
- Virginia Ave. at Ave. B (9258984Y) - Crossing 14

However, since these seven crossings are not yet designated as quiet zones, horn soundings were still modeled for these crossings.

3.4 RAIL NOISE CONTOURS

Tables H-17 through H-26 provide information regarding the size of noise contours due to rail activity for the No Action Alternative and all seven build Alternatives. Specifics on the contours are given in terms of distance from the rail centerline. Contours extend in a perpendicular manner from the rail line. At non-quiet zone rail crossings, the contour expands its size from the segment contour due to locomotive horn soundings. The crossing contours extend 200 feet away from the crossings along the rail line. All study area crossings are shown in the following tables, including crossings that are not impacted due to increased rail activity as a result of the various build Alternatives.

Table H-17 2038 No Action Alternative Rail Segment Noise Contour Distances

Locations	Rail Segment	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1 - North	North of Dorchester Road	37	79	170
1 - 2	Dorchester Road to Accabee Road	37	79	170
2 - 3	Accabee Road to Misroon Street	37	79	170
3 - 15	Misroon Street to Hackemann Ave	37	79	170
4 - 14	North of Virginia Avenue to Avenue B	24	52	112
5 - East	East of N.Rhett Avenue	95	205	442
5 - 6	Attaway Street to N Rhett Ave	78	168	361
6 - 7	Rivers Avenue to Attaway St	54	117	253
8 - 9	Rivers Ave/Meeting St to S Rhett Ave	60	129	278
9 - 10	S. Rhett Avenue to Spruill Ave	63	135	290
10 - 11	Spruill Avenue to E Montague Ave	65	141	303
11 - 12	E. Montague Avenue to Durant Ave	74	159	342
12 - 13	Durant Avenue to Braddock Ave	79	169	365
13 - North	North of Braddock Avenue	83	180	387
14 - 19	Avenue B to O'Hear Ave	28	61	131
15 - 16	Hackemann Ave to Discher St	29	55	107
16 - 18	Discher Street to Meeting St	26	56	121

Table H-18 2038 No Action Alternative Rail Crossing Noise Contour Distances

Location	Rail Crossing	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1	Dorchester Road	51	102	206
2	Accabee Road	51	102	206
3	Misroon Street	51	102	206
4	Virginia Avenue	30	61	126
5	N.Rhett Avenue	88	178	363
6	Attaway Street	79	158	319
7	Rivers Avenue	61	119	239
8	Rivers Ave and Meeting St	80	161	327
9	S. Rhett Avenue	83	167	340
10	Spruill Avenue	86	173	353
11	E. Montague Avenue	94	190	389
12	Durant Avenue	99	200	411
13	Braddock Avenue	103	210	433
14	Avenue B	34	69	144
15	Hackemann Avenue	29	55	107
16	Discher Street	44	84	166

Table H-19 2038 Alternatives 1 and 5 Rail Segment Noise Contour Distances

Locations	Rail Segment	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1 - North	North of Dorchester Road	68	147	316
1 - 2	Dorchester Road to Accabee Road	68	147	316
2 - 3	Accabee Road to Misroon Street	68	147	316
3 - 15	Misroon Street to Hackemann Ave	68	147	316
4 - 14	North of Virginia Avenue to Avenue B	41	88	190
5 - East	East of N.Rhett Avenue	90	194	419
5 - 6	Attaway Street to N Rhett Ave	79	171	369
6 - 7	Rivers Avenue to Attaway St	70	151	326
8 - 9	Rivers Ave/Meeting St to S Rhett Ave	69	149	321
9 - 10	S. Rhett Avenue to Spruill Ave	72	156	336
10 - 11	Spruill Avenue to E Montague Ave	76	163	351
11 - 12	E. Montague Avenue to Durant Ave	85	183	395
12 - 13	Durant Avenue to Braddock Ave	92	198	426
13 - North	North of Braddock Avenue	97	210	452
14 - ICTF	Avenue B to ICTF	45	97	208
15 - 16	Hackemann Ave to Discher St	56	113	233
16 - 18	Discher Street to Meeting St	24	52	112
17 - ICTF	Pittsburgh Avenue to ICTF	23	51	109
17 - 18	Meeting St/Herbert St to Pittsburgh Ave	24	52	111

Table H-20 2038 Alternatives 1 and 5 Rail Crossing Noise Contour Distances

Location	Rail Crossing	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1	Dorchester Road	81	166	346
2	Accabee Road	81	166	346
3	Misroon Street	81	166	346
4	Virginia Avenue	54	108	220
5	N.Rhett Avenue	87	174	354
6	Attaway Street	82	162	327
7	Rivers Avenue	73	145	291
8	Rivers Ave and Meeting St	93	186	378
9	S. Rhett Avenue	96	193	393
10	Spruill Avenue	99	199	407
11	E. Montague Avenue	107	218	447
12	Durant Avenue	114	231	477
13	Braddock Avenue	119	243	502
14	Avenue B	57	116	237
15	Hackemann Avenue	56	113	233
16	Discher Street	69	139	286
17	Pittsburgh Avenue	33	65	132
18	Meeting St and Herbert St	34	67	135

Table H-21 2038 Alternative 2 Rail Segment Noise Contour Distances

Locations	Rail Segment	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1 - North	North of Dorchester Road	69	148	319
1 - 2	Dorchester Road to Accabee Road	69	148	319
2 - 3	Accabee Road to Misroon Street	69	148	319
3 - 15	Misroon Street to Hackemann Ave	69	148	319
4 - 14	North of Virginia Avenue to Avenue B	40	87	187
5 - East	East of N.Rhett Avenue	86	186	400
5 - 6	Attaway Street to N Rhett Ave	76	164	353
6 - 7	Rivers Avenue to Attaway St	70	151	326
8 - 9	Rivers Ave/Meeting St to S Rhett Ave	72	155	334
9 - 10	S. Rhett Avenue to Spruill Ave	75	162	348
10 - 11	Spruill Avenue to E Montague Ave	78	168	362
11 - 12	E. Montague Avenue to Durant Ave	88	190	410
12 - 13	Durant Avenue to Braddock Ave	96	206	444
13 - North	North of Braddock Avenue	102	219	472
14 - 19	Avenue B to O'Hear Ave	44	94	202
15 - 16	Hackemann Ave to Discher St	58	118	242
16 - 18	Discher Street to Meeting St	25	54	117
17 - ICTF	Pittsburgh Avenue to ICTF	25	53	114
17 - 18	Meeting St/Herbert St to Pittsburgh Ave	25	55	118
19 - ICTF	O'Hear Avenue to ICTF	27	58	125

Table H-22 2038 Alternative 2 Rail Crossing Noise Contour Distances

Location	Rail Crossing	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1	Dorchester Road	82	169	350
2	Accabee Road	82	169	350
3	Misroon Street	82	169	350
4	Virginia Avenue	53	106	216
5	N.Rhett Avenue	84	168	341
6	Attaway Street	79	156	315
7	Rivers Avenue	73	145	292
8	Rivers Ave and Meeting St	96	193	392
9	S. Rhett Avenue	100	200	407
10	Spruill Avenue	102	206	420
11	E. Montague Avenue	112	226	464
12	Durant Avenue	118	241	496
13	Braddock Avenue	124	253	523
14	Avenue B	56	112	230
15	Hackemann Avenue	58	118	242
16	Discher Street	71	144	295
17	Pittsburgh Avenue	35	69	139
18	Meeting St and Herbert St	36	71	144
19	O'Hear Avenue	40	78	156

Table H-23 2038 Alternatives 3 and 6 Rail Segment Noise Contour Distances

Locations	Rail Segment	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1 - North	North of Dorchester Road	70	150	323
1 - 2	Dorchester Road to Accabee Road	70	150	323
2 - 3	Accabee Road to Misroon Street	70	150	323
3 - 15	Misroon Street to Hackemann Ave	70	150	323
4 - 14	North of Virginia Avenue to Avenue B	40	86	184
5 - East	East of N.Rhett Avenue	91	195	421
5 - 6	Attaway Street to N Rhett Ave	79	171	368
6 - 7	Rivers Avenue to Attaway St	70	151	326
8 - 9	Rivers Ave/Meeting St to S Rhett Ave	67	145	312
9 - 10	S. Rhett Avenue to Spruill Ave	70	151	325
10 - 11	Spruill Avenue to E Montague Ave	73	157	338
11 - 12	E. Montague Avenue to Durant Ave	82	177	382
12 - 13	Durant Avenue to Braddock Ave	89	192	413
13 - North	North of Braddock Avenue	95	204	439
14 - ICTF	Avenue B to ICTF	44	94	202
15 - 20	Hackemann Ave to Discher St	58	116	239
16 - 18	Discher Street to Meeting St	25	54	116
20 - 20	Meeting St to Spruill Ave	26	55	118
20 - ICTF	Spruill Ave to ICTF	26	55	118

Table H-24 2038 Alternatives 3 and 6 Rail Crossing Noise Contour Distances

Location	Rail Crossing	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1	Dorchester Road	83	170	353
2	Accabee Road	83	170	353
3	Misroon Street	83	170	353
4	Virginia Avenue	53	106	215
5	N.Rhett Avenue	87	175	356
6	Attaway Street	81	162	327
7	Rivers Avenue	73	145	291
8	Rivers Ave and Meeting St	91	181	368
9	S. Rhett Avenue	93	187	381
10	Spruill Avenue	96	193	393
11	E. Montague Avenue	104	211	434
12	Durant Avenue	111	225	463
13	Braddock Avenue	116	236	488
14	Avenue B	56	113	232
15	Hackemann Avenue	58	116	239
16	Discher Street	42	81	160
20	Meeting Street at Southern Alignment	36	71	144
	Spruill Avenue at Sothern Alignment	36	71	143

Table H-25 2038 Alternatives 4 and 7 Rail Segment Noise Contour Distances

Locations	Rail Segment	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1 - North	North of Dorchester Road	90	194	419
1 - 2	Dorchester Road to Accabee Road	90	194	419
2 - 3	Accabee Road to Misroon Street	90	194	419
3 - 15	Misroon Street to Hackemann Ave	90	194	419
4 - 14	North of Virginia Avenue to Avenue B	24	51	109
5 - East	East of N.Rhett Avenue	69	148	318
5 - 6	Attaway Street to N Rhett Ave	56	122	262
6 - 7	Rivers Avenue to Attaway St	49	107	230
8 - 9	Rivers Ave/Meeting St to S Rhett Ave	74	159	343
9 - 10	S. Rhett Avenue to Spruill Ave	76	165	355
10 - 11	Spruill Avenue to E Montague Ave	80	171	369
11 - 12	E. Montague Avenue to Durant Ave	90	193	416
12 - 13	Durant Avenue to Braddock Ave	97	209	449
13 - North	North of Braddock Avenue	103	221	476
14 - 19	Avenue B to O'Hear Ave	28	60	128
15 - 16	Hackemann Ave to Discher St	83	171	354
16 - 18	Discher Street to Meeting St	42	90	193
17 - ICTF	Pittsburgh Avenue to ICTF	42	90	193
17 - 18	Meeting St/Herbert St to Pittsburgh Ave	42	90	195

Table H-26 2038 Alternatives 4 and 7 Rail Crossing Noise Contour Distances

Location	Rail Crossing	Distance from Rail Centerline (ft) for DNL of		
		70 dB(A)	65 dB(A)	60 dB(A)
1	Dorchester Road	105	217	453
2	Accabee Road	105	217	453
3	Misroon Street	105	217	453
5	N.Rhett Avenue	69	137	277
6	Attaway Street	63	124	248
7	Rivers Avenue	56	110	219
8	Rivers Ave and Meeting St	98	197	401
9	S. Rhett Avenue	101	203	413
10	Spruill Avenue	104	209	427
11	E. Montague Avenue	113	229	471
12	Durant Avenue	119	243	502
13	Braddock Avenue	125	255	527
14	Avenue B	33	68	141
15	Hackemann Avenue	83	171	354
16	Discher Street	94	191	396
17	Pittsburgh Avenue	57	113	229
18	Meeting St and Herbert St	57	114	231

4.0 RAIL VIBRATION ANALYSIS

4.1 RAIL VIBRATION MODELING

Rail vibration modeling was conducted following FTA's manual Transit Noise and Vibration Impact Assessment. No measurements were required. The FTA's manual provides the reference curve (Figure 10-1) for vibration levels of Locomotive Powered Passenger or Freight (at 50 mph) as a function of distance from the rail track. Adjustments were applied to the curve according to Table 10-1 of the manual to account for the project specific parameters. The reference curve was adjusted for train speed (-14 VdB[6] for 10 mph), stiff primary suspension (+8 VdB), and coupling to house foundation (the worst case of -5 VdB for wood frame houses was used as a conservative assumption in comparison with a larger negative adjustment factor for masonry constructions). The total adjustment factor for shifting the reference curve was determined to be -11 VdB for 10 mph. The adjusted reference curve for a freight train at 10 mph is shown in Figure H-4 reproduced from the FTA's manual. It should be noted that the weight of locomotives and railcars does not play a significant role in vibration; however, the length and frequency of train events does impact the thresholds, where more frequent events lower the level considered an impact.

[6] Right-mean-square (RMS) vibration velocity level is expressed in units of VdB (Velocity-dB) re 1 micro-inch per second.

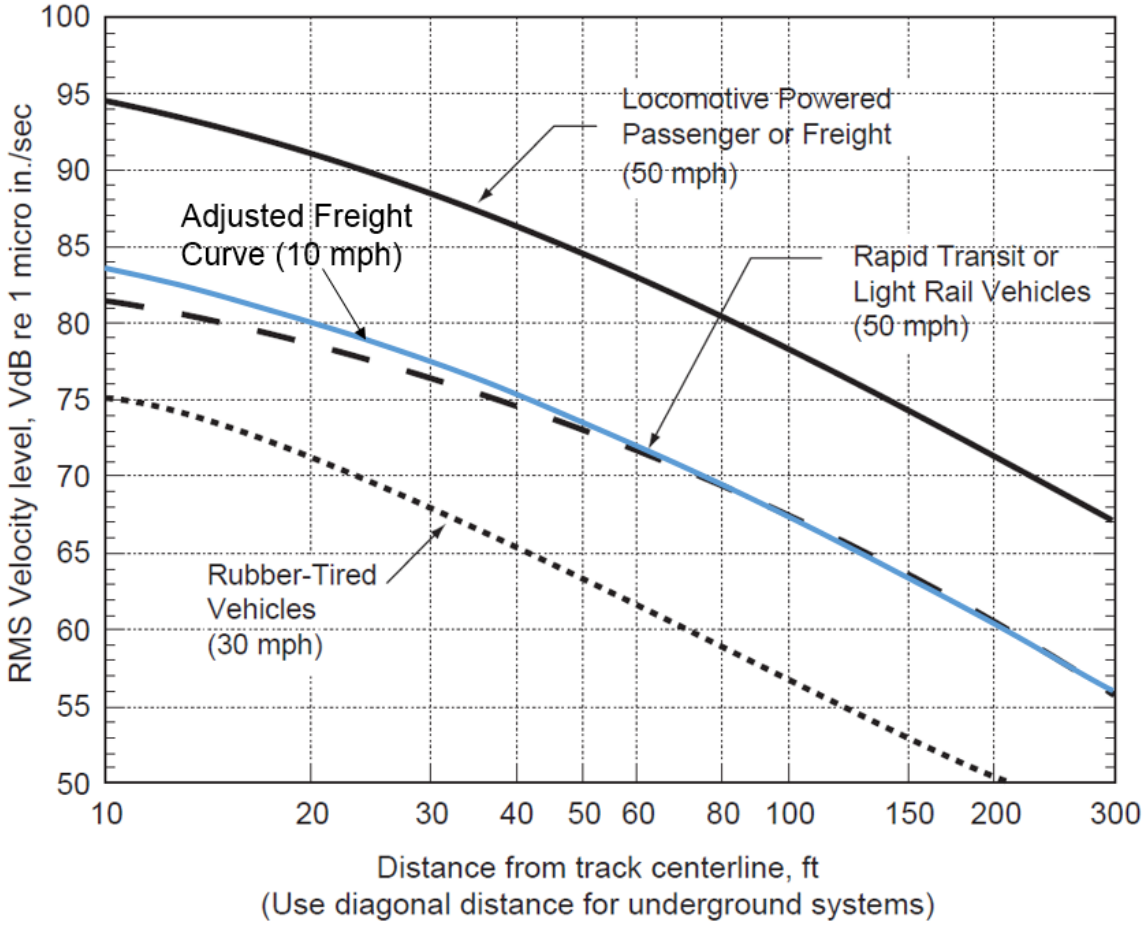

Figure H-4 Adjusted Reference Curve for Vibration Levels of Locomotive Powered Freight

4.2 VIBRATION RECEPTORS

Table H-27 lists the receptors analyzed for vibration impacts due to rail activity. It was determined that none of the examined receptors would likely experience impacts due to vibration.

Table H-27 Vibration Receptors Addresses

Vibration Receptor Addresses		
1651 Greenbay Dr	1117 State Rd S-10-672	3795 Spruill Ave
1655 Greenbay Dr	1123 State Rd S-10-672	3721-3775 Spruill Ave
5465 Califf Rd	1129 State Rd S-10-672	3803 Reddin Rd
5406 Dutton Ave	1052 State Rd S-10-672	3733 St Johns Ave
2001 Sylvia St	1057 State Rd S-10-672	757 Commissary St
2003 Sylvia St	1065 State Rd S-10-672	1811 Commissary St
2005 Sylvia St	1015 Aragon Ave	1014 Hunley Waters Cir
2007 Sylvia St	1071 State Rd S-10-672	4133 St Johns Ave
2009 Sylvia St	1077 State Rd S-10-672	4129 St Johns Ave
2011 Sylvia St	1079 State Rd S-10-672	4107 St Johns Ave
2013 Sylvia St	1093 State Rd S-10-672	1455 Ave H
5403 Gale Ave	1117 State Rd S-10-672	2415 Ave F
5371 Rivers Ave	1123 State Rd S-10-672	3921 St Johns Ave
2116 Taylor St	1129 State Rd S-10-672	1301 Ave H
2218 Taylor St	1052 State Rd S-10-672	1301 Ave G
2312 Taylor St	1057 State Rd S-10-672	1850 Truxtun Ave
1005 E Montague Ave	1065 State Rd S-10-672	1800 Iris St
1004 Delsey St	1015 Aragon Ave	1800 Calvert St
1005 Delsey St	1071 State Rd S-10-672	1805 Orvid St
1004 Crawford St	1077 State Rd S-10-672	1806 Orvid St
1005 Crawford St	1079 State Rd S-10-672	1807 Carlton St
1004 Bethany St	1093 State Rd S-10-672	1805 Carlton St
1005 Bethany St	1117 State Rd S-10-672	1804 Carlton St
1004 Alamo St	1123 State Rd S-10-672	1801 Success St
1005 Alamo St	1129 State Rd S-10-672	1800 Success St
1004 Buist Ave	1046 Spartanburg Ave	1801 Leland St
1005 Buist Ave	3991 St Johns Ave	1802 Leland St
1052 State Rd S-10-672	3975 St Johns Ave	1803 Grayson St
1057 State Rd S-10-672	4045 Gullah Ave	1801 Grayson St
1065 State Rd S-10-672	3955 St Johns Ave	3250 Grayson St
1015 Aragon Ave	3777-3799 Spruill Ave	3244 N Carolina Ave
1071 State Rd S-10-672	3863 Reddin Rd	3250 N Carolina Ave
1077 State Rd S-10-672	3857 Reddin Rd	3264 N Carolina Ave
1079 State Rd S-10-672	3841 Reddin Rd	3286 N Carolina Ave
1093 State Rd S-10-672		

5.0 CONSTRUCTION NOISE ANALYSIS

5.1 NOISE FROM CONSTRUCTION EQUIPMENT

Construction activities would be conducted on approximately 118 acres of land over a total duration of approximately 39 months, six (6) days per week (Monday through Saturday), with 3 acres of disturbance per day. General site demolition and grading activities are scheduled to last approximately 21 month. Construction of an earthen berm along the western border of the Proposed Project Site for abatement of noise produced by ICTF operations would involve temporary activities (15 days) of loud construction equipment in close proximity to the nearest residences, from 10 to 60 feet. Impact pile drivers would be utilized in various locations at the site in construction of support pads for rail mounted gantry (RMG) cranes (60 days) and for driving H-beam piles (type HP) for box culvert upgrades (30 days), as well as in construction of bridges (remote from noise-sensitive receivers).

Noise levels generated by construction equipment vary greatly depending on factors such as the type of equipment, specific model, operation being performed, and condition of the equipment. The equivalent sound level (Leq) of the construction activity also depends on the fraction of time that the equipment is operated over the time period of construction (usage factor). The dominant source of noise from most construction equipment is the engine, usually a diesel, often without sufficient muffling. In a few cases, such as pile-driving or pavement-breaking, noise generated by the process dominates.

Noise assessment for construction operations is conducted in accordance with the FHWA's Roadway Construction Noise Model (RCNM). The RCNM is a national Model based on the noise calculations and extensive construction noise data compiled for the Central Artery/Tunnel (CA/T) project in Boston, MA. It provides a Table of equipment noise emission levels (maximum levels at 50 feet) and usage factors for representative pieces of equipment, which is reproduced in Table H-28. The Model adjusts the noise emission levels for the project specific parameters including the distance between the noise source and receptor, number of pieces of equipment in use at the same time and usage factors.

Table H-28 Construction Equipment Noise Emission Levels and Usage Factors

CA/T Noise Emission Reference Levels and Usage Factors					
filename: EQUIPLST.xls					
revised: 7/26/05		Acoustical	Spec 721.560	Actual Measured	No. of Actual
	Impact	Use Factor	Lmax @ 50ft	Lmax @ 50ft	Data Samples
Equipment Description	Device ?	(%)	(dBA, slow)	(dBA, slow)	(Count)
				(samples averaged)	
All Other Equipment > 5 HP	No	50	85	-- N/A --	0
Auger Drill Rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Bar Bender	No	20	80	-- N/A --	0
Blasting	Yes	-- N/A --	94	-- N/A --	0
Boring Jack Power Unit	No	50	80	83	1
Chain Saw	No	20	85	84	46
Clam Shovel (dropping)	Yes	20	93	87	4
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Concrete Batch Plant	No	15	83	-- N/A --	0
Concrete Mixer Truck	No	40	85	79	40
Concrete Pump Truck	No	20	82	81	30
Concrete Saw	No	20	90	90	55
Crane	No	16	85	81	405
Dozer	No	40	85	82	55
Drill Rig Truck	No	20	84	79	22
Drum Mixer	No	50	80	80	1
Dump Truck	No	40	84	76	31
Excavator	No	40	85	81	170
Flat Bed Truck	No	40	84	74	4
Front End Loader	No	40	80	79	96
Generator	No	50	82	81	19
Generator (<25KVA, VMS signs)	No	50	70	73	74
Gradall	No	40	85	83	70
Grader	No	40	85	-- N/A --	0
Grapple (on backhoe)	No	40	85	87	1
Horizontal Boring Hydr. Jack	No	25	80	82	6
Hydra Break Ram	Yes	10	90	-- N/A --	0
Impact Pile Driver	Yes	20	95	101	11
Jackhammer	Yes	20	85	89	133
Man Lift	No	20	85	75	23
Mounted Impact Hammer (hoe ram)	Yes	20	90	90	212
Pavement Scarafier	No	20	85	90	2
Paver	No	50	85	77	9
Pickup Truck	No	40	55	75	1
Pneumatic Tools	No	50	85	85	90
Pumps	No	50	77	81	17
Refrigerator Unit	No	100	82	73	3
Rivit Buster/chipping gun	Yes	20	85	79	19
Rock Drill	No	20	85	81	3
Roller	No	20	85	80	16
Sand Blasting (Single Nozzle)	No	20	85	96	9
Scraper	No	40	85	84	12
Shears (on backhoe)	No	40	85	96	5
Slurry Plant	No	100	78	78	1
Slurry Trenching Machine	No	50	82	80	75
Soil Mix Drill Rig	No	50	80	-- N/A --	0
Tractor	No	40	84	-- N/A --	0
Vacuum Excavator (Vac-truck)	No	40	85	85	149
Vacuum Street Sweeper	No	10	80	82	19
Ventilation Fan	No	100	85	79	13
Vibrating Hopper	No	50	85	87	1
Vibratory Concrete Mixer	No	20	80	80	1
Vibratory Pile Driver	No	20	95	101	44
Warning Horn	No	5	85	83	12
Welder / Torch	No	40	73	74	5

5.2 CONSTRUCTION NOISE AT SENSITIVE RECEIVERS

The ICTF construction at the Proposed Project Site or River Center Site would be accomplished in several phases. Each phase would have a specific equipment mix depending on the work to be accomplished during that phase. General site demolition and grading activities are scheduled to last approximately 14 month. Among equipment that is scheduled to operate during the site demolition phase, the highest noise emission levels would be generated by cranes, dump and haul trucks, excavators, front end loaders, graders and large dozers. Demolition activities would take place at various locations throughout the large project site, and noise levels at the noise-sensitive land uses near the site would vary noticeably depending on the distance from the activities. Construction of an earthen berm along the western border of the Proposed Project Site for abatement of noise from ICTF operations would last for 15 days in close proximity to the Chicora-Cherokee community. The earthen berm construction would involve excavators, haul trucks, graders, roller compactors, front end loaders, water trucks, and earth mover scrapers. Other NBIF yard on-site construction activities lasting for 24 months would additionally include backhoe loaders, concrete trucks and pumps, generators, rail production and welding machines, and other equipment. Impact pile drivers would be utilized in various locations at the site in construction of support pads for rail mounted gantry (RMG) cranes for 60 days and for driving H-beam piles (type HP) for box culvert upgrades for 30 days, as well as in construction of bridges remote from noise-sensitive receivers.

Construction of a sound attenuation wall along the eastern boundary of the River Center Site for abatement of noise from ICTF operations would be conducted in proximity to the residential community of CNYOQ Historic District. Impact pile drivers would be utilized in various locations at the site in construction of the noise wall, support pads for rail mounted gantry (RMG) cranes, and for driving H-beam piles (type HP) for box culvert upgrades.

The overall noise estimates for the nearest residential land uses in several potential scenarios of the equipment distribution over the construction site and various construction phases are summarized in DEIS Table 4.12-11. In addition, RCNM was used to determine the distances where the noise level would reach the threshold value of 80 dB(A) for the noisiest pieces of construction equipment individually. The data are provided in Table H-29 and may be used for construction planning purposes. For individual piece of equipment placed at a distance closer than shown in the table, the noise level reaching a noise-sensitive receptor would exceed the criterion of 80 dB(A).

Table H-29 Distance from Construction Equipment to Noise Level of 80 dB(A)

Construction Equipment	Distance to Noise Level 80 dB(A), ft
1	*2*
Impact Pile Driver	260
Grader	56
Scraper	48
Dozer	39
Generator	38
Excavator	35
Compactor (ground)	33
Front End Loader	29
Concrete Mixer Truck	28
Concrete Pump Truck	27
Paver	26
Backhoe	24
Crane	22
Dump Truck	21
Flat Bed Truck	17
Rail Welding Machine	16

6.0 OPERATIONAL NOISE ANALYSIS

6.1 NOISE FROM TRAIN OPERATIONS

Train activities in a rail yard setting have three primary noise generation movements: arrival or departure (locomotive diesel engine pass-by), general rail car movement (rolling), and rail car coupling (concussion of rail car buffers at stop-and-goes and during switching operations). To characterize these movements, noise measurements for rail operations similar to the ones to be conducted at ICTF were conducted at Port of Charleston Columbus Street Terminal on July 29, 2014. The noise measurements were performed at a distance of 38 feet from the center of the rail track carrying the train operations.[7] The maximum 1-second Leq sound levels measured for the train operations are summarized in Table H-30 (no locomotive horn soundings were observed). The average noise levels per hour for the train operations were not measured due to time constrains. The rail car coupling is by far the loudest train operation measured [maximum 1-second Leq of 97 dB(A)], but occurred only for several seconds at a time. The average noise level per cycle (engine passing/general car roll/car coupling) of 74 dB(A) at 38 feet from the train was determined from the measurement record, which is 23 dB(A) below the maximum level measured for the car coupling. Since the time sequence of train operations could vary at the proposed NBIF, the hourly average noise levels might differ considerably from the average per cycle value determined at the Columbus Street Terminal. It is conservatively assumed, therefore, that the hourly average noise level of train operations at NBIF would be approximately 15 to 20 dB(A) below the maximum level measured for car coupling. No locomotive horn sounding at the facility or near its gates was also assumed.

6.2 NOISE FROM CRANE OPERATIONS.

Noise specification data for wide-span gantry cranes to be used at NBIF for transferring and processing containers, are also summarized in Table H-30 per the *"Acoustic Requirements for Container Cranes 14 60 43"* by the crane manufacturer Hans Kunz Gesellschaft. The Table provides the maximum permissible acoustic emission levels as measured in specified locations at 82 feet from the crane for the three types of movement: crane traveling, trolley traveling, and hoisting/lowering. Assuming that the three crane movements would be about equally spread through each operating hour, the overall hourly average noise level at a distance of 82 feet from the crane would be approximately 51 dB(A)[8].

[7] The measurement distance of 38 feet was selected based on the field conditions at the site. The measurements are used to obtain input data for the noise analysis of operations at the ICTF facility. This part of noise impact is not analyzed using the CREATE railroad noise model, and the measurement distance used is not associated with the CREATE reference distance of 50 feet.

[8] The value of 51 dB(A) is calculated as a logarithmic sum of the average noise levels for each of the three individual crane movements [55, 47, and 43 dB(A) from Table H-30] with a time-correction factor of minus

6.3 OTHER OPERATIONAL NOISE SOURCES

Container stacking for processing and storing may generate noise from impacts with other containers, truck trailers, or the ground. Table H-30 includes data for container impact noise at a distance of 100 feet, obtained from the 2011 *Southern California International Gateway Draft EIR* document for the Port of Los Angeles. Due to the NBIF layout, container stacking would be conducted at much larger distances from the noise sensitive receivers than train and crane operations, and would produce much lower noise levels at these receivers.

Truck operations within the NBIF are not considered significant noise source in comparison with the train and crane operations either, since the former would be conducted at low speeds and at much larger distances from the noise sensitive receivers, and may also experience additional shielding by intervening rows of containers stacked on the ground or rail cars between the truck drive lanes and property line. Most maintenance activities would be conducted at the NBIF locomotive shop, which is located far from noise-sensitive receivers.

6.4 OPERATIONAL NOISE PROPAGATION AND ATTENUATION

The measured reference noise levels from Table H-30 were adjusted using appropriate distance and sound berm attenuation factors. Under the Proposed Project, the ICTF closest arrival/departure track would be located approximately 134 feet away from the nearest residential land uses in the Chicora-Cherokee community. Since the train noise levels were measured at a distance of 38 feet at the Columbus Street Terminal (see sub-section 1.3), the distance attenuation term for the train noise is about 11 dB(A). The crane operations would be conducted at a distance of about 309 feet from the nearest receiver. The crane noise levels were measured at a distance of 82 feet. The crane noise levels would be attenuated by approximately 12 dB(A) over the distance to the receiver. The nearest train processing track operated on by the crane would also be 309 feet away from the noise-sensitive receivers. Since the train noise levels were measured at a distance of 38 feet, the distance attenuation term for the train at the processing track is about 18 dB(A). Container stacking noise levels were measured at a distance of 100 feet, and the distance attenuation to the nearest receivers would be 15 dB(A).

An earthen berm to be constructed between the ICTF and residential community in the Proposed Project would provide additional noise attenuation. A nearly 70 foot wide berm 10 feet above top of rail would be located 10 to 20 feet away from the nearest residences. A maximum noise attenuation for the berm is estimated at 15 dB(A) following the FTA procedures (FTA 2006, Table 6-9). However, this value does not account for temperature, wind and other weather conditions. From practical experience, a more conservative estimation for the earthen berm attenuation is approximately 10 dB(A).

4.8 dB(A) accounting for the 20-minute operational interval for each movement within an hour [10 log(20/60)].

The noise analysis is summarized in DEIS Table 4.12-12 for the residential receivers 10 feet away from the berm's foot at the Proposed Project Site. For the River Center Site, a similar noise analysis is provided in DEIS Table 4.12-20, including a sound wall attenuation factor in place of the berm.