Joint Hearing - MCC & PC
Z-10030-2025
Exhibit 15

3 March 2025

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Rosedale Casey
Phase I Noise Analysis

City of Gaithersburg, Maryland

Report #250210
Project #RCI2401

For: Rodgers Consulting, Inc.

By: Matthew Foster

Acoustical Engineering Solutions.

1 EXECUTIVE SUMMARY

Phoenix Noise & Vibration has conducted an analysis of roadway noise impact upon Rosedale Casey, a proposed multifamily development in Gaithersburg, Montgomery County, Maryland. Upon completion, the development will consist nine residential buildings. This study was limited to noise impact from Frederick Road (355) and I-370 (along with their associated on/off ramps) as well as Shady Grove Road, and included:

- 24-hour on-site noise measurements and monitoring.
- Computerized 3D noise propagation modeling.
- Determination of future transportation noise impact throughout the site.
- Evaluation according to Montgomery County's noise requirements.

Noise impact at Rosedale Casey will vary with height; therefore, impact has been presented at the ground level (5 feet above adjacent grade) and at the upper level (25 feet above adjacent grade). Impact is presented as noise contours throughout the site indicating the future transportation-generated noise levels. Additionally, 3D views presenting noise impact using a color-scaled grid across the future building façades have also been included. The noise levels presented are due only to surrounding roadways and do not account for noise from other sources such as construction, mechanical noise, environmental noise, etc.

Results of the analysis have found that all nine buildings will have some areas exposed to future transportation noise impact above 65 dBA Ldn, with a maximum noise impact of 77 dBA Ldn upon Building 5. All residential units with future transportation noise impacts exceeding 65 dBA Ldn will require further analysis to determine the precise, minimum building construction upgrades that will be necessary to comply with Montgomery County's noise requirements.

There are seven outdoor open spaces / amenity areas at the site on the current site plan. Two of these areas will be entirely above 65 dBA Ldn, one of them mostly above 65 dBA Ldn, one of them just slightly above 65 dBA Ldn, and the other three are not impacted.

2 NOISE TERMINOLOGY

2.1 dB vs. dBA

While the standard unit of measurement for sound is the decibel (dB), discussions of noise impacting the human ear use "dBA." The "A" refers to a frequency weighting network used to simulate the human ear's unequal sensitivity to different frequencies. The A-weighted noise level is therefore more representative of a human's perception of a noise environment than the unweighted overall noise level in dB and is currently used in most all environmental noise studies.

2.2 Ldn

The day-night average noise level, or Ldn, is the equivalent sound pressure level averaged over a 24-hour period, obtained by adding 10 dB to sound pressure levels measured from 10:00 p.m. to 7:00 a.m. This 10 dB "penalty" accounts for the added sensitivity caused by noise generated during the nighttime hours.

The Ldn is NOT a measurement of the instantaneous noise level. It is very possible to have several short term events (tractor trailer, emergency vehicle siren, car horn, etc.) which generate a relatively high noise level (e.g. 85 dBA) during a given time period, yet have a more moderate overall Ldn value (e.g. 65 dBA Ldn).

2.3 Summing Noise Levels

Noise levels from multiple sources do not add arithmetically; i.e. when two noise sources generate 60 dB individually, they do not produce 120 dB when combined. Noise levels are measured using a logarithmic scale; therefore they must be summed logarithmically. In the decibel scale, two identical, non-coherent noise sources having the same noise level produce a 3 dB increase above the condition of one source alone (i.e. two 80 dB lawnmowers running at the same time generates 83 dB).

Similarly, two different noise sources with a difference of 10 dB in their individual levels results in no measurable increase in noise when they are combined. Put another way, the quieter noise source does not increase the overall noise generated by the louder source; i.e. adding an 80 dB lawnmower into a noise environment where a 90 dB lawnmower is already running does not increase the noise level above 90 dB.

3 NOISE REGULATION

Traffic noise impact for proposed residential developments in Montgomery County is governed by Table 2-1 (reprinted in Table 1) on page 8 of the *Staff Guidelines for the Consideration of Transportation Noise Impacts In Land Use Planning and Development* (June 1983). Accompanying this table is Map 2-1 (see Figure 1), indicating outdoor noise level requirements not to be exceeded throughout the County.

Table 1: Maximum Levels for Exterior Noise & Building Line[1] For Noise Sensitive Land Uses (Table 2-1).

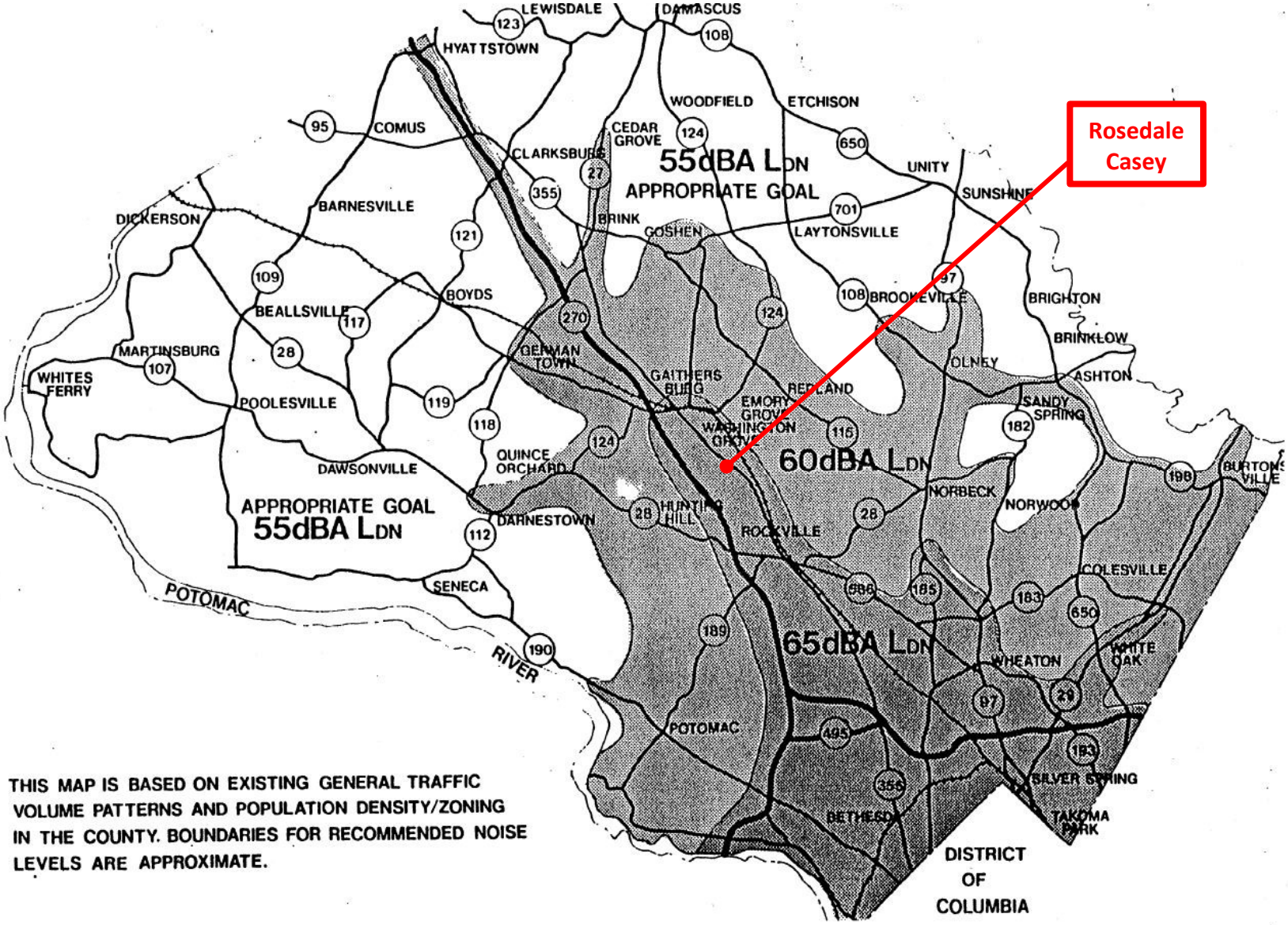
Guideline Value	Area of Application
Ldn = 55 dBA	This guideline is suggested as an appropriate goal in permanent rural areas of the County where residential zoning is for five or more acres per dwelling unit and background levels are low enough to allow maintenance of a 55 dBA Level. This guideline is consistent with Federal, State, and County goals for residential areas.
Ldn = 60 dBA	This is the basic residential noise guideline which will be applied in most areas of the County where suburban densities predominate. Maintenance of this level will protect health and substantially prevent activity interference both indoors and outdoors. Noise attenuation measures will be recommended to allow attainment of this level.
Ldn = 65 dBA	This guideline will generally be applied in the urban ring, freeway, and major highway corridor areas, where ambient levels are such that application of a stricter guideline would be infeasible or inequitable. Significant activity interference will occur outdoors and indoors if windows are partially opened, but available evidence indicates hearing is adequately protected. Noise attenuation measures will be strongly recommended to attain this level.

[1] Building line as used here refers to habitable structures only. It does not include garages, sheds, or recreational accessory buildings.

According to Map 2-1, Rosedale Casey is located within the 65 dBA Ldn noise zone, indicating that noise levels in outdoor activity areas throughout the site should be maintained at 65 dBA Ldn or less. Any outdoor area exposed to future transportation noise levels above 65 dBA Ldn typically requires further analysis to determine the mitigation designs necessary to comply with this requirement.

When outdoor noise levels exceed 65 dBA Ldn, Montgomery County also requires an analysis of interior noise levels in residential buildings. According to Sections 2.2.2 and 2.2.3 of the *Staff Guidelines*, any residential building impacted by noise levels above 65 dBA Ldn must be evaluated to certify that the building structure will be capable of maintaining interior noise levels at 45 dBA Ldn or less.

Figure 1: Map 2-1 from *Staff Guidelines for the Consideration of Transportation Noise Impacts In Land Use Planning and Development* (June 1983).

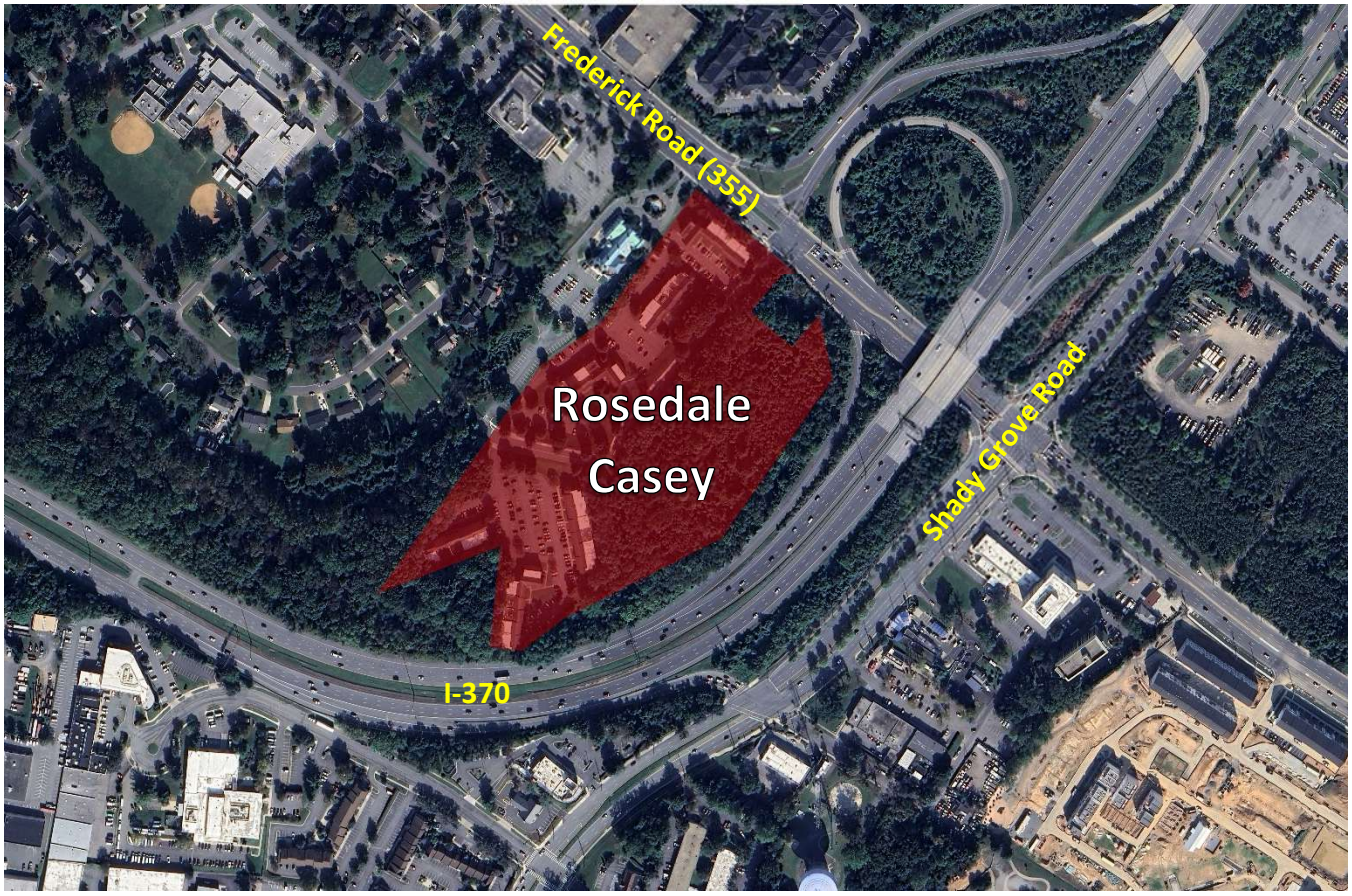


4 SITE DESCRIPTION

Rosedale Casey (site shaded red in Figure 2) will be located south of Frederick Road (355), west of its intersection with I-370 and Shady Grove Road. In the vicinity of the site, Frederick Road and I-370 both consist of three travel lanes and an additional turning/merging lane in each direction, while Shady Grove Road consists of three to six lanes in each direction, including turning lanes.

There are multiple railways to the northeast of the site, however they are approximately 3,000 feet away which is typically the limit for consideration of railway noise, and the measurements show that the much closer I-370 overwhelms any railway noise. No distinct railway noise audio captures were recorded during the 24-hour on-site noise measurement survey, nor was any train noise noted by the field technician on-site for the duration of the 24-hour survey.

Figure 2: Existing site (shaded in red) and surroundings.
Aerial image from Google Earth, dated 12 December 2024.



5 NOISE MEASUREMENTS

On May 28 – 29, 2024, Phoenix Noise & Vibration conducted an onsite noise measurement survey to determine existing transportation noise levels throughout the site. This involved continuous noise level measurements and monitoring for one 24-hour period. Measurements were made using four Norsonic Type 139 Precision Integrating Sound Level Meters. All meters were calibrated prior to the survey traceable to National Institute of Standards and Technology (NIST). Each meter meets the ANSI S1.4 standard for Type 1 sound level meters.

During the 24-hour measurements, noise levels were recorded and averaged over five-minute time intervals. Noise measurements were then used to calculate the site's 24-hour average day-night noise level (Ldn), which includes the 10 dB penalty for noise levels measured during nighttime hours. Measurements were made at 5 and 25 feet above adjacent grade to represent the noise impact upon first floor and upper floors, respectively, of the future buildings.

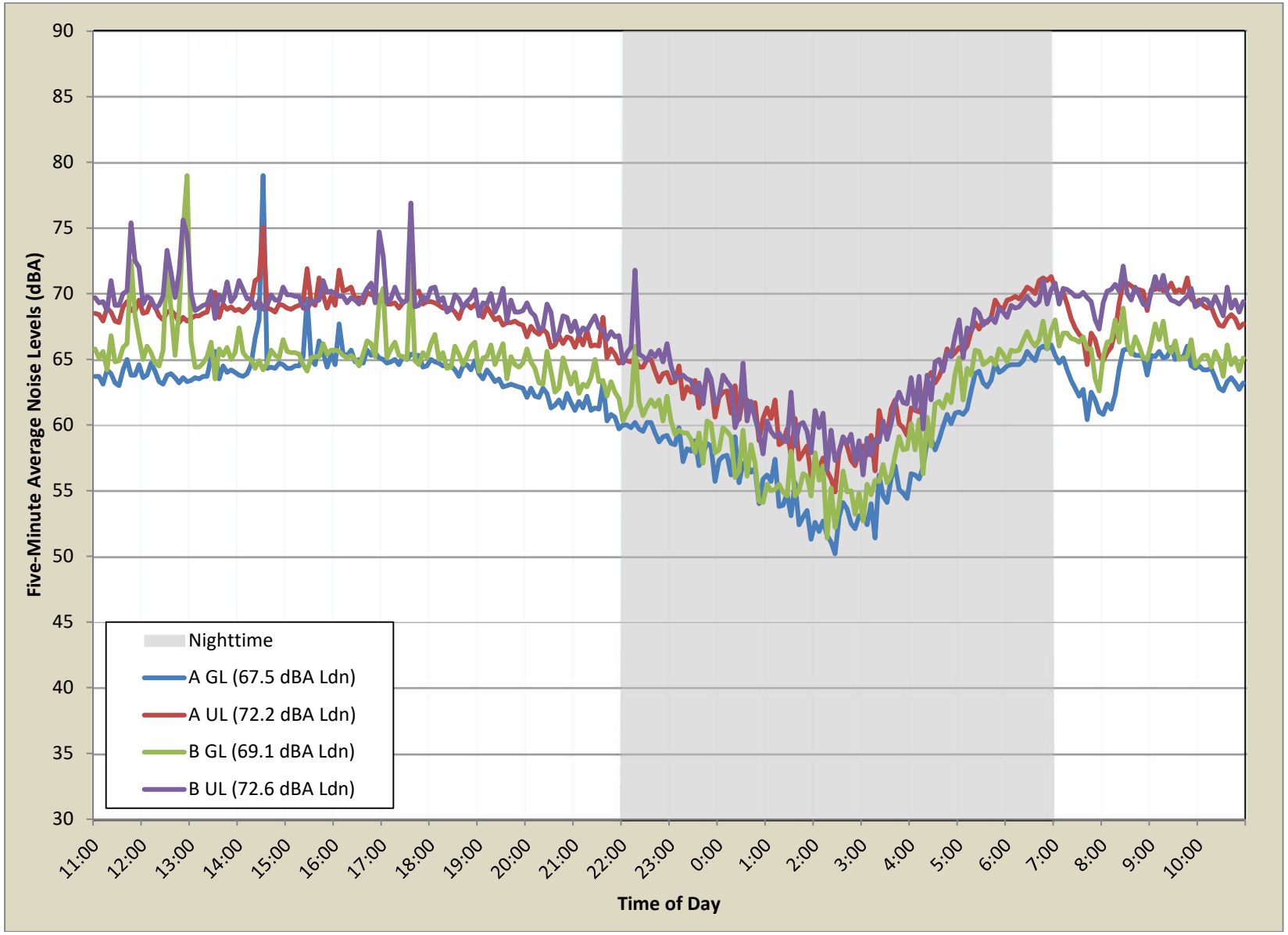
Measurement results are presented in Table 2. Noise level measurements were made at the locations shown on Drawing 1 of the Appendix. Figure 3 presents the survey results graphically, showing the noise levels as measured in five-minute increments throughout the survey. Figure 3 indicates the actual measured values over the 24-hour period at noise measurement locations A and B. While the 10 dB nighttime penalty is not shown graphically, it was included in the Ldn calculations.

Table 2: 24-hour noise measurement results.

Measurement Location	Height Above Existing Grade (feet)	Measured Noise Level (dBA Ldn)
A	5	67.5
	25	72.2
B	5	69.1
	25	72.6

Note that some of the measurement locations contain isolated instances during the 24-hour measurement periods at which the noise level appears inconsistent with the rest of the noise profile (i.e. peaks, spikes, or dips in the graph). These inconsistencies are typically due to extraneous occurrences, such as emergency sirens or temporary traffic congestion. Such short term events, while producing a relatively high or low noise level and which may have a significant impact on the five-minute average, generally have an insignificant effect on the overall, 24-hour Ldn value. However, they can be disruptive and audible within occupied spaces.

Figure 3: Five-minute average noise levels recorded during 24-hour noise survey from 5/28/2024 – 5/29/2024.



6 COMPUTER MODELING

The existing and future sites were computer modeled using the CadnaA software program, a three-dimensional noise propagation model capable of determining noise impact from multiple noise sources across vertical and horizontal surfaces while accounting for factors such as topography, buildings, barriers, surface reflections, and roadway data (traffic volumes, speeds, and vehicle classifications, etc.). Noise levels can be presented either in spot locations or as noise contours of equal value throughout a defined surface area.

6.1 Current Model

A current model was developed to simulate the existing site and its surroundings using data obtained from Montgomery County GIS and data collected during the 24-hour measurement survey by inputting existing topography, roadway alignments, and buildings. Roadway noise levels were calibrated using the onsite noise measurements by adjusting the modeled input until the modeled noise level output matched the measured values.

6.2 Future Model

A future model was developed by altering the calibrated current model to include projected roadway data, future site grading, and all future buildings. This model calculated the future transportation noise levels throughout the site. The varying colors shown on Drawings 2 - 3 of the Appendix represent the future noise impact throughout the site at ground and upper levels, respectively. Drawing 4 of the Appendix present the future noise impact upon the proposed residential buildings.

6.3 Roadway Data

Average annual weekday traffic (AAWDT) volumes, vehicle class percentages, and nighttime percentages for the roadways were based upon the most recent data published by the Maryland State Highway Administration (MDSHA). MDSHA does not typically provide future traffic data; therefore, a conservative, 2% increase in traffic compounded annually until 2045 was assumed.[1] All necessary traffic data used in the analysis is provided in Table 3.

Table 3: Roadway traffic data used in the computer models.

Roadway	I-370	Frederick Rd (355)	Shady Grove Rd
2021 AAWDT	101,692	42,009	34,321
2045 AAWDT	163,565	67,569	55,203
Nighttime Percentage	12%	10%	11%
Truck Percentage	9%	7%	5%
Speed Limit (mph)	55	40	40

[1] Montgomery County typically requires that roadway noise impact studies be conducted using the projected traffic volumes 20 years from the date of the study.

6.4 Future Noise Impact

6.4.1 Interior Noise Impact

The degree of future noise impact upon residential units at Rosedale Casey is dependent upon the proximity and viewing angle to Frederick Road (355) and/or I-370. Residential units facing away from these roadways, or with greater distance to this roadways will be less impacted. All nine building will have some degree of future transportation noise impact exceeding the 65 dBA Ldn threshold requiring further analysis and potential noise mitigation measures. However, even the buildings with the most/highest noise impact will not require further analysis for every unit in that building. Table 4 below notes the maximum future transportation noise impact per building at the site. Additionally, see Drawing 4 of the Appendix for more detailed 3D views of noise impact upon the proposed buildings.

Table 4: Future transportation noise impact upon Rosedale Casey by building number.

Building Number	Maximum Future Noise Impact (dBA Ldn)
1	**74**
2	**71**
3	**73**
4	**73**
5	**77**
6	**71**
7	**66**
8	**67**
9	**74**
Table 4 Notes: Noise levels shown in **BOLD RED** indicate noise impact greater than 65 dBA Ldn.	

6.4.2 Outdoor Noise Impact

Outdoor open spaces and amenity are designed with letters A – G. These can be seen on Drawing 2 of the Appendix, which presents the ground-level noise contours throughout the site. As shown, areas F and G are entirely above 65 dBA Ldn. Area D is mostly above 65 dBA Ldn. Area E is only slightly above 65 dBA Ldn on the southern end. Areas A, B, and C are not impacted by future transportation noise levels exceeding 65 dBA Ldn.

7 CONCLUSION

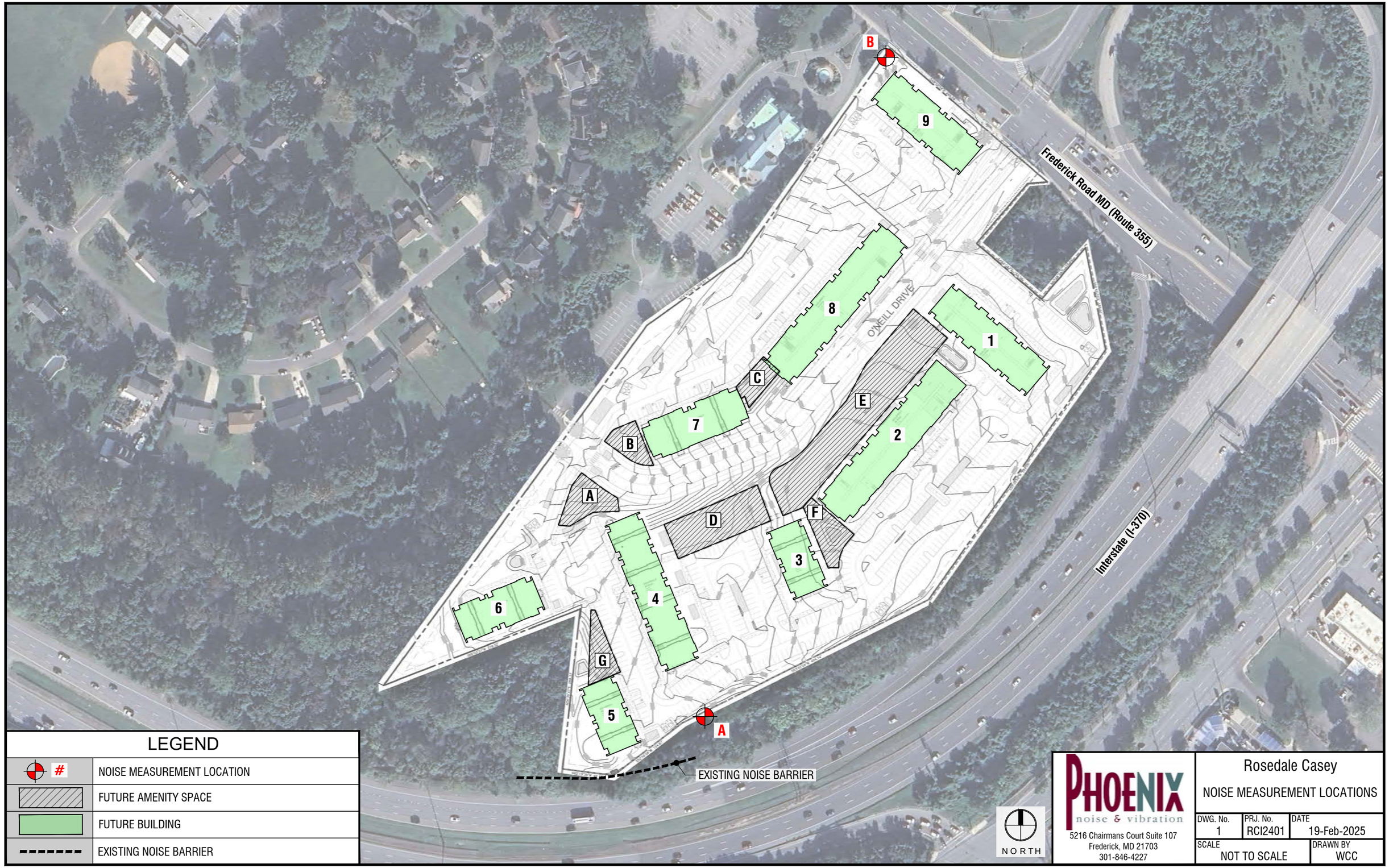
Future transportation noise impact upon the nine residential buildings at Rosedale Casey by year 2045 will exceed 65 dBA Ldn, with a maximum impact of 77 dBA Ldn at the southeast elevation of Building 5. Noise impact is highest for residential units in close proximity to, and directly facing either Frederick Road (355) or I-370. While all nine buildings have some areas with future noise impact exceeding 65 dBA Ldn, all buildings also have areas that are not impacted by noise exceeding 65 dBA Ldn.

Residential units with impact above 65 dBA Ldn require further analysis and may require modifications to proposed standard building construction. Depending upon the noise level specific to each impacted unit, modifications may include increased window/door STC ratings. Where noise impact is significantly above 65 dBA Ldn, exterior wall modifications may also be necessary. As noise impact increases into the mid 70-s dBA Ldn, brick exterior construction should be considered where possible. Further analysis to determine the precise mitigation designs necessary will be conducted once architectural plans (building elevations, window/door schedule, unit plans) are further developed.

Additionally, there are currently seven outdoor areas on the site plan classified as open spaces or amenity areas. Noise impact in these areas is shown on Drawing 2 of the Appendix.

Please Note: The results of this Phase I Noise Analysis have been based upon the site information made available at the time of this study, including existing and proposed topography, projected roadway traffic volumes, and the proposed building layout. Should any of this information be altered, additional analysis will be required to determine if the results and recommendations presented herein remain valid.

APPENDIX



LEGEND

#	NOISE MEASUREMENT LOCATION
	FUTURE AMENITY SPACE
	FUTURE BUILDING
	EXISTING NOISE BARRIER

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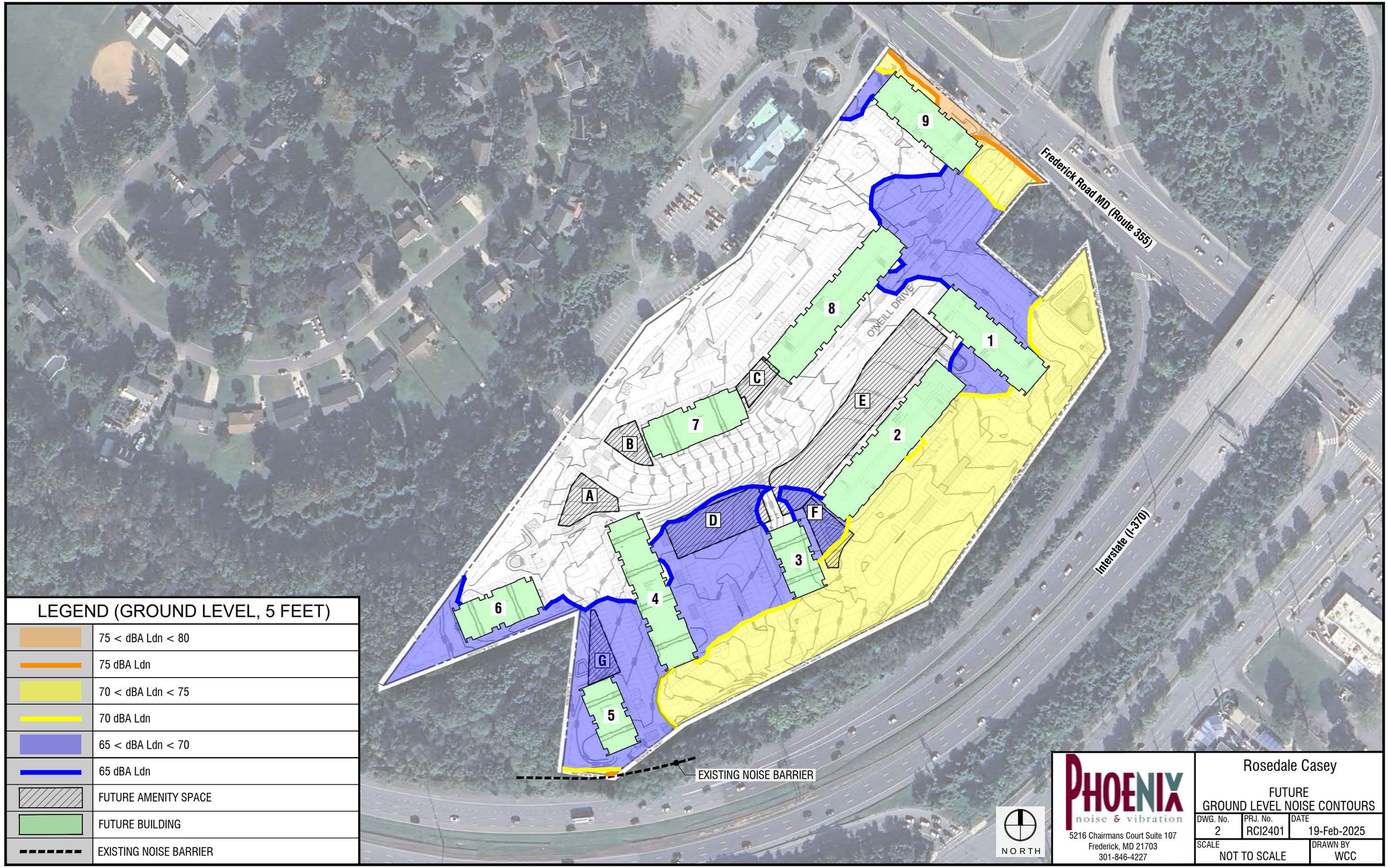
Rosedale Casey

NOISE MEASUREMENT LOCATIONS

DWG. No.	PRJ. No.	DATE
1	RCI2401	19-Feb-2025

SCALE	DRAWN BY
NOT TO SCALE	WCC



LEGEND (GROUND LEVEL, 5 FEET)	
	75 < dBA Ldn < 80
	75 dBA Ldn
	70 < dBA Ldn < 75
	70 dBA Ldn
	65 < dBA Ldn < 70
	65 dBA Ldn
	FUTURE AMENITY SPACE
	FUTURE BUILDING
	EXISTING NOISE BARRIER

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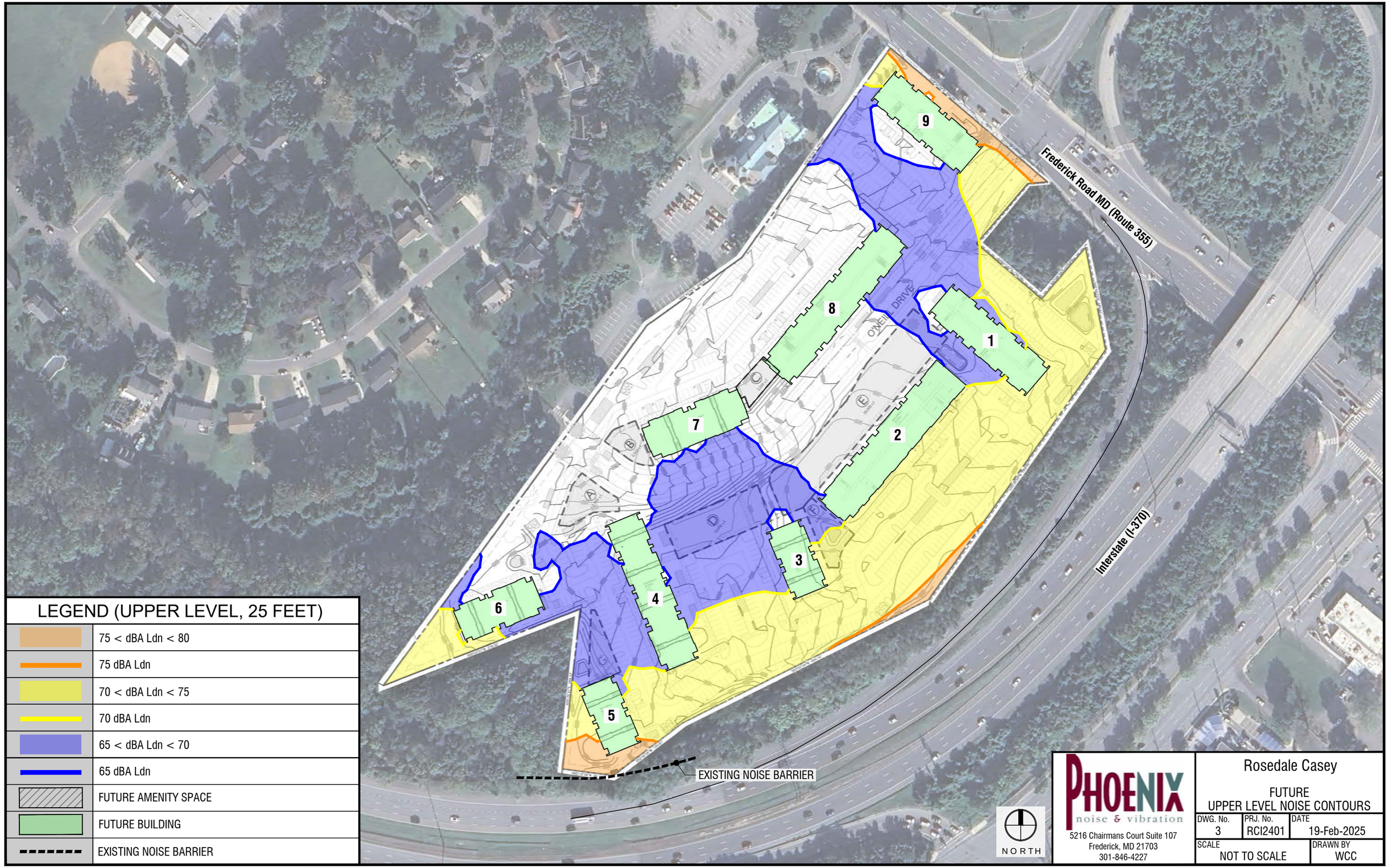
FUTURE
GROUND LEVEL NOISE CONTOURS

DWG. No.	PRJ. No.	DATE
2	RCI2401	19-Feb-2025

SCALE	DRAWN BY
NOT TO SCALE	WCC



LEGEND (UPPER LEVEL, 25 FEET)	
	75 < dBA Ldn < 80
	75 dBA Ldn
	70 < dBA Ldn < 75
	70 dBA Ldn
	65 < dBA Ldn < 70
	65 dBA Ldn
	FUTURE AMENITY SPACE
	FUTURE BUILDING
	EXISTING NOISE BARRIER

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FUTURE
UPPER LEVEL NOISE CONTOURS

DWG. No.	PRJ. No.	DATE
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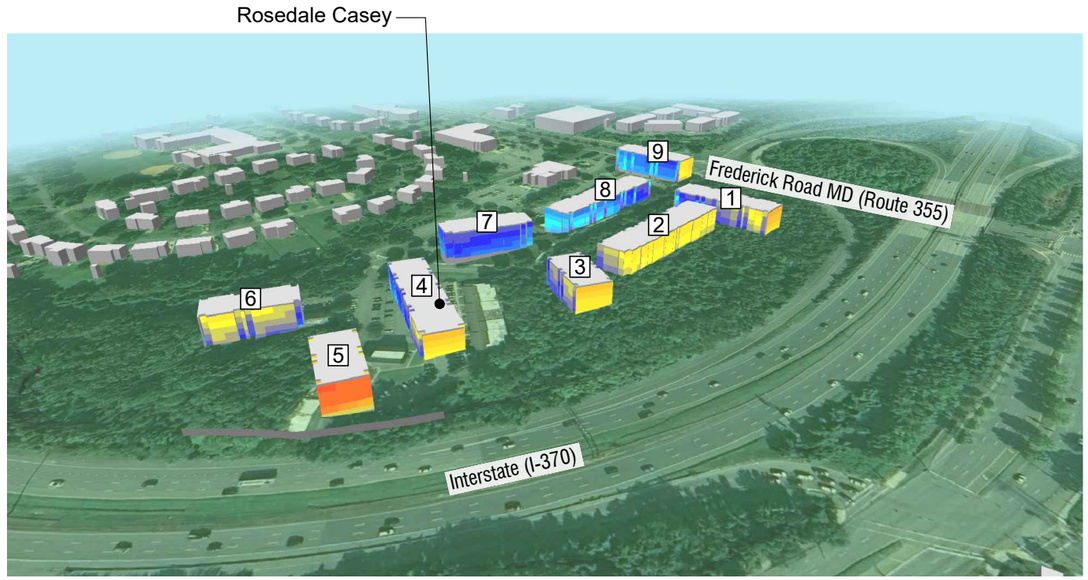
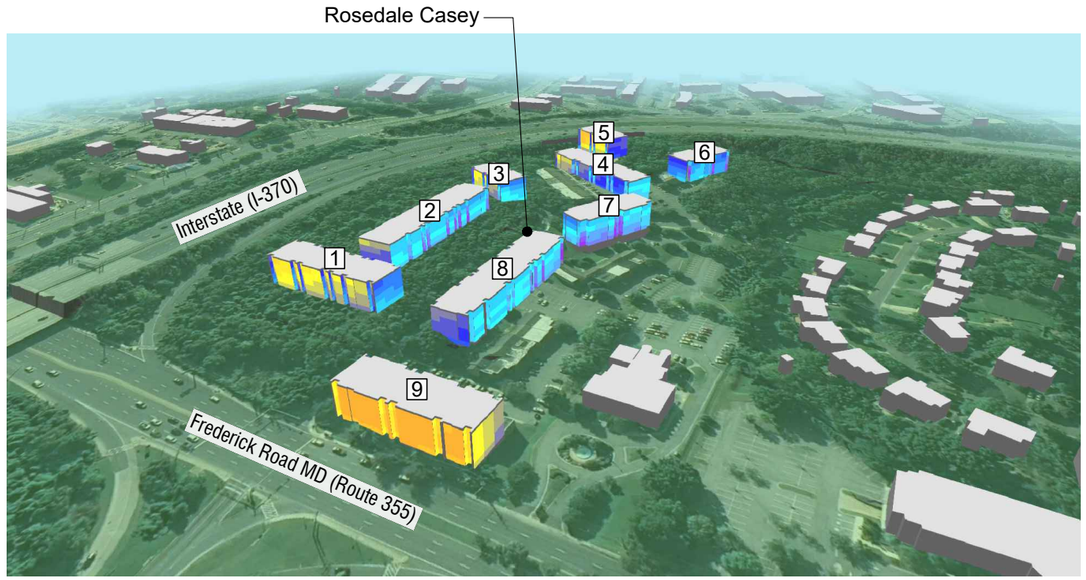
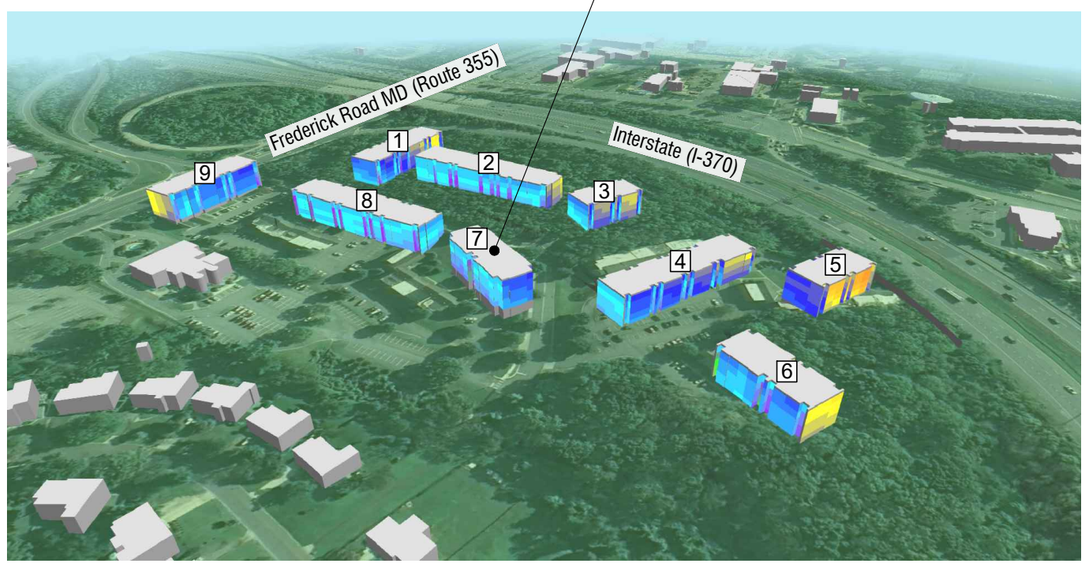
SCALE	DRAWN BY
NOT TO SCALE	WCC



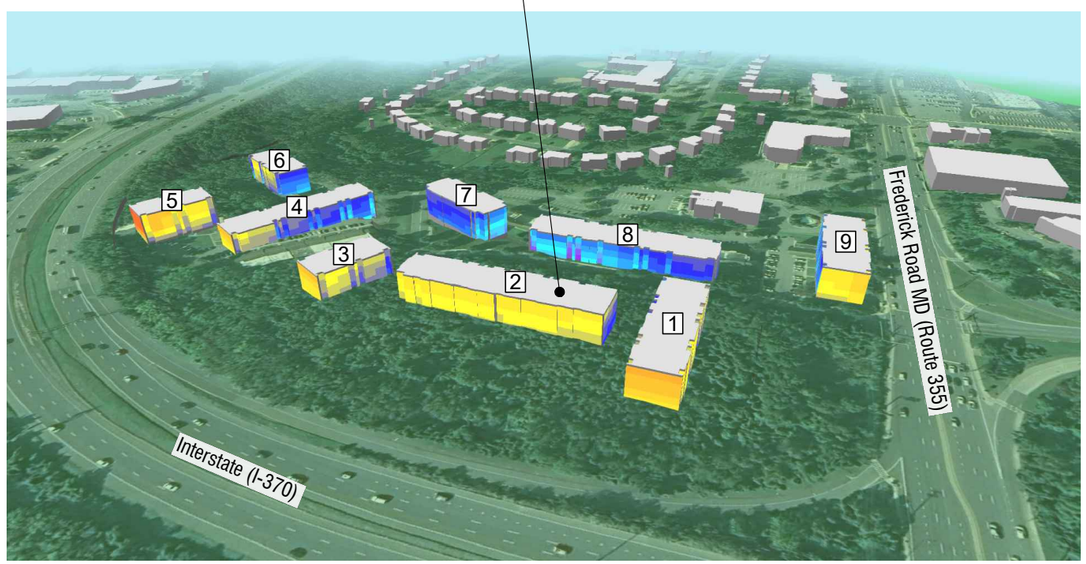
1 Looking North



2 Looking South



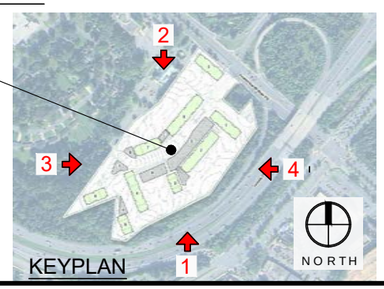
3 Looking East



4 Looking West

Future Transportation Noise Levels (dBA Ldn)

77 76 75 74 73 72 71 70 69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50



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FUTURE TRANSPORTATION NOISE IMPACT

DWG. No.	PRJ. No.	DATE
4	RCI2401	19-Feb-2025

SCALE	DRAWN BY
NOT TO SCALE	WCC