

14 May 2013



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# Forester's Property Phase I Noise Analysis

Montgomery County, Maryland

Report #130514

For: EYA

By: Scott Harvey, P.E., INCE Bd. Cert.  
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## EXECUTIVE SUMMARY

Phoenix Noise & Vibration has conducted an analysis of transportation noise impact upon the Forester's Property, a proposed residential development in Montgomery County, Maryland. Upon completion, the Forester's Property will consist of 153 townhomes. This study, limited to noise impact from I-270, I-495, and Grosvenor Road, included:

- 24-hour noise level measurements
- Computer modeling
- Determination of existing and future noise levels
- Preliminary mitigation recommendations

Noise impact throughout the site will vary with height; therefore impact has been presented at heights of 5.5 feet ("ground level") and 25 feet ("upper level") above the ground. Impact is presented in varying levels of noise indicating the future roadway noise level. The noise levels presented are due only to I-270, I-495, and Grosvenor Road and do not account for noise from other sources such as airplanes, construction, mechanical noise, environmental noise, etc.

All calculated noise levels are "mitigated," accounting for the presence of existing buildings, significant structures, and surrounding topography, as well as future buildings and topography. Structures and topography along roadways and the railway act as noise barriers, providing protection from noise exposure and reducing the impact and extent of any potential mitigation required, if any, to comply with Montgomery County's noise regulations. For residential properties in the vicinity of I-270 and I-495, Montgomery County requires further analysis when future noise levels are above 65 dBA Ldn.

The site's ground level (5.5 feet above grade) noise contours indicate impact above 65 dBA Ldn in the backyards of those townhome lots closest to I-270 and I-495, totaling 40 of the 153 lots. If noise levels are to be maintained below 65 dBA Ldn in these outdoor areas, additional mitigation, such as a noise barrier along the site's property line, will be required.

Outdoor noise levels in the remaining 113 townhome backyards will be below 65 dBA Ldn without any additional mitigation.

The site's upper level (25 feet above grade) noise contours indicate impact above 65 dBA Ldn for 65 of the 153 townhomes. These homes require an evaluation of the proposed building structure to determine whether modifications are necessary to maintain indoor noise levels at 45 dBA Ldn (as required by Montgomery County). Modifications, which may include alterations to exterior wall construction and increased STC ratings for windows and doors, can only be determined once architectural drawings for impacted residences are well developed (i.e. floor plans, building elevations, window/door schedules, room dimensions, ceiling heights).

The remaining 88 townhomes will not be exposed to noise levels above 65 dBA Ldn. These homes require no further analysis, and standard building construction may be used to maintain acceptable indoor noise levels.

Further analysis is required to determine the exact mitigation measures necessary to reduce transportation noise impact into compliance with Montgomery County's residential noise standards. Final mitigation designs will be detailed in the Phase II Noise Analysis following the availability of the required information (classification of outdoor areas, final grading, and architectural plans).

## NOISE TERMINOLOGY

### *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.

### *Ldn vs. Leq*

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).

The equivalent-continuous sound level, or Leq, is the sound level averaged over a given time period. The Leq does not include any penalties or adjustments.

### *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 measureable 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.

***Perceived Changes in Noise Level***

On average, the following describes the human ear’s subjective perception of changes in overall noise level:

<b>Change in Noise Level:</b>	<b>Subjectively Heard As:</b>
1 dBA	Imperceptible
3 dBA	Barely perceptible
5 dBA	Clearly perceptible
10 dBA	Twice as loud

Note that the average human ear cannot detect a 1 dBA change in noise level; i.e. if a radio were at a volume of 60 dBA, then the volume were increased to 61 dBA, the average listener would not notice the slight increase in volume.

## NOISE REGULATIONS

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, indicating outdoor noise level requirements not to be exceeded throughout the County.

**Table 1: Maximum Levels for Exterior Noise & Building Line<sup>1</sup> 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.

<sup>1</sup> 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, the Forester's Property is located within the 65 dBA Ldn noise zone, indicating that noise levels in outdoor activity areas throughout the site should be maintained at 60 dBA Ldn. Any outdoor area exposed to future transportation noise levels above 65 dBA Ldn 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 indoor 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 indoor noise levels at 45 dBA Ldn.

## SITE DESCRIPTION

The property (shown in Figure 1) is bounded by I-270 to the east, I-495 to the south, and Grosvenor Road to the north.

**Figure 1: Existing site (limit of disturbance outlined in red).**



## NOISE MEASUREMENTS

On May 31 – June 1, 2012, Phoenix Noise & Vibration conducted an on-site noise measurement survey to determine the existing transportation noise levels throughout the site. This involved continuous noise level measurements and monitoring for one 24-hour period. Measurements were made using three Norsonics Type 118 and one Type 140 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 measurement, noise levels were recorded and averaged over five minute time intervals. Noise measurements were then used to calculate the site’s existing average noise level (or Leq) throughout the daytime and nighttime hours, as well as the 24-hour average (Ldn), which includes the 10 dBA penalty for noise levels measured during nighttime hours.

Noise level measurements were made at the locations shown in Figure 2 (and Drawing 1 of the Appendix). Measurements were made at 5.5 feet (“ground level,” GL) and 25 feet (“upper level,” UL) above adjacent grade to represent noise impact in outdoor activity areas and upper floors of the future single family homes, respectively.

**Figure 2: Long-term noise measurement locations.**





**Results**

Measurement results are presented in Table 2. Figure 3 presents the survey results graphically, showing the noise level as measured in five minute increments throughout the survey.

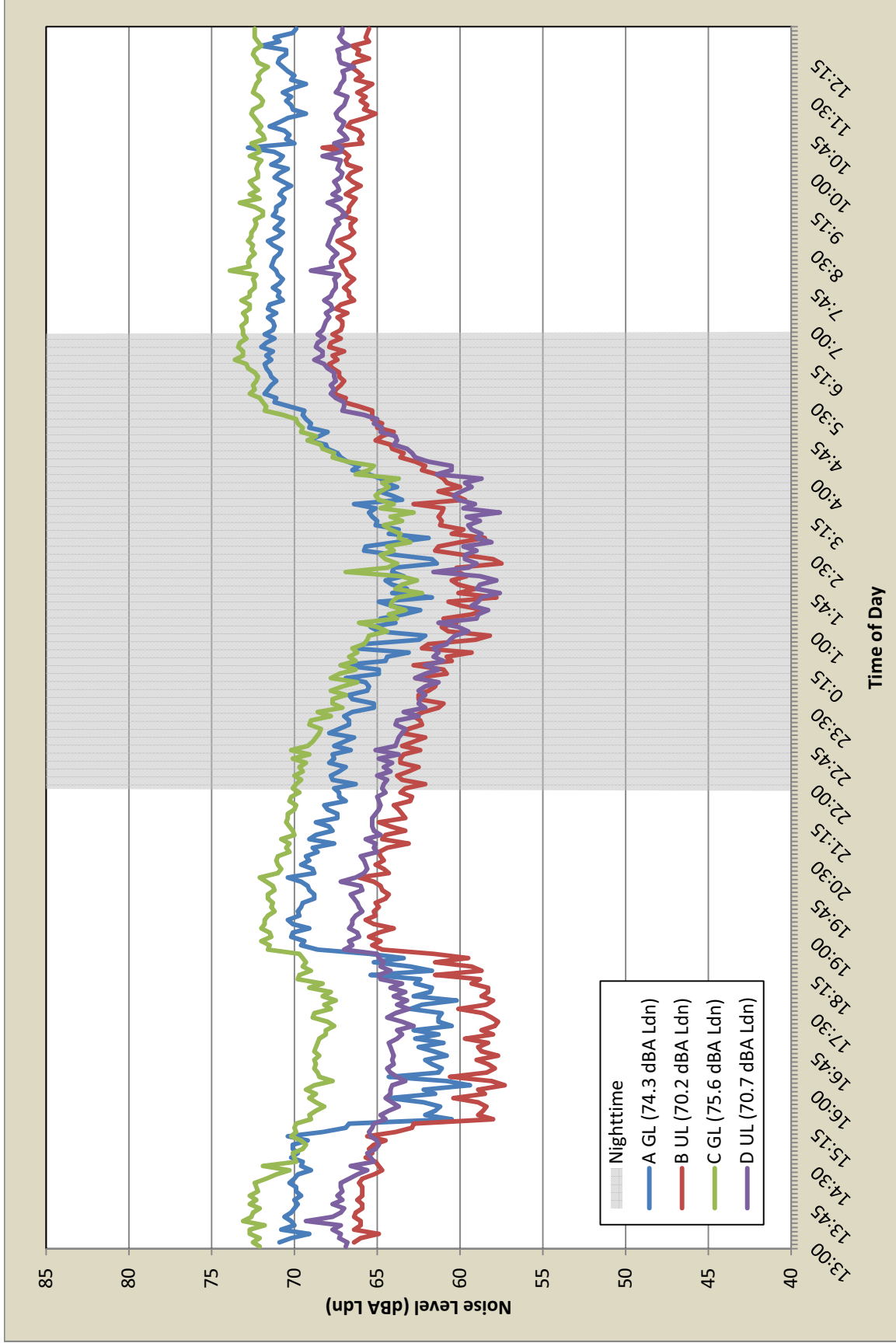
**Table 2: Roadway 24-hour noise measurement results.**

Measurement Location	Height Above Ground	Primary Noise Source	Measured Noise Level (dBA Ldn)
A	5.5 feet	I-495	74.3
B	25 feet		70.2
C	5.5 feet	I-270	75.6
D	25 feet		70.7

Figure 3 indicates the actual measured values over the 24-hour period. While the 10 dBA nighttime penalty is not shown graphically, it was included in the Ldn calculations.

Note that some of the measurement locations contain isolated instances during the 24-hour measurement period 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 unrelated to roadway or railway noise, 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.

Figure 3: Five minute average roadway noise levels recorded during 24-hour noise survey.



## COMPUTER MODELING

The existing and future sites were computer modeled using the CadnaA software program, a three-dimensional noise propagation model capable of determining the noise level impact from multiple noise sources across vertical and horizontal surfaces while accounting for factors such as topography, ground absorption, 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.

### *Current Model*

Information obtained from the current site plan (provided by Axiom Engineering) was used to develop the current model, inputting existing topography and tree lines, roadway alignments, and buildings. Roadway noise levels were calibrated using the on-site noise measurements by adjusting the modeled input until the modeled noise level output matched the measured roadway values. The current model was used to develop existing, mitigated (see “Future Model” for explanation of “mitigated” noise levels) ground and upper level noise contours as presented on Drawings 2 and 3 of the Appendix, respectively.

Roadway traffic data (shown in Table 3) used to calibrate the computer model, including average annual weekday daily traffic (AAWDT) volumes and the future growth rate, was provided by the Maryland State Highway Administration (MDSHA).

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

Traffic Data	I-270	I-495	Grosvenor Lane
2012 AAWDT	131,100	116,300	7,500
2032 AAWDT	136,500	145,000	8,300
Automobile %	93%	92%	97%
Truck %	7%	8%	3%
Nighttime %	16%	19%	8%
Speed Limit	55 mph	55 mph	25 mph

### *Future Model*

A future model was developed by altering the calibrated current model to include the projected roadway data, future topography and tree lines, and future site buildings. The future model calculated the future “mitigated” ground and upper level noise impact throughout the site.

Mitigated noise levels are calculated in the presence of future site topography and buildings to account for the noise reduction provided by these structures. Buildings along the roadways will act as noise barriers to buildings and outdoor areas further into the site, shielding these locations from noise exposure and reducing the impact and extent of mitigation required, if any, to comply with Montgomery County noise regulations.

### ***Future Noise Impact***

Mitigated future ground and upper level noise contours are presented on Drawings 4 and 5 of the Appendix, respectively. Mitigated noise contours represent the noise level throughout the site following the completion of all phases of development.

The site's mitigated noise level contours indicate impact above 65 dBA Ldn at the ground level for 40 townhome lots and above 65 dBA Ldn at the upper level for 65 townhomes. These townhomes require further analysis (see "Further Analysis" below) to determine the mitigation measures necessary to comply with Montgomery County's residential noise standards.

The other 113 townhome lots and 88 townhomes located further into the site are impacted by future transportation noise levels below 65 dBA Ldn at the ground and upper level. These outdoor activity areas and residential units require no further analysis or additional mitigation to comply with the County's residential noise standard.

### **FURTHER ANALYSIS**

Townhomes impacted by noise levels above 65 dBA Ldn at the ground or upper level require further analysis to determine the mitigation measures necessary to maintain noise levels in outdoor activity areas and indoor living spaces at 65 and 45 dBA Ldn, respectively, as required by Montgomery County's residential noise standard.

### ***Outdoor Noise***

Drawing 4 indicates impact above 65 dBA Ldn in the backyards of 40 townhome lots. Townhome backyards closest to I-270 and I-495 will be impacted by noise levels slightly above 70 dBA Ldn and 65 dBA Ldn. All other townhome lots (located further into the site) will not be exposed to noise levels above 65 dBA Ldn due to the distance from the roadways and/or the noise reduction provided by the townhomes closest to I-270 and I-495. No additional mitigation is required for these outdoor areas.

### **Backyards Closest to I-270**

To maintain noise levels below 65 dBA Ldn in the backyard closest to I-270, additional mitigation will be required, such as a noise barrier along the site's property line as shown on Drawing 6 of the Appendix. This 23-foot noise barrier will maintain noise levels in all townhome backyards closest to I-270 below 65 dBA Ldn (as shown on Drawing 6). This barrier may be constructed of wood, vinyl, or concrete/masonry. If a vinyl fence is to function as a noise barrier, it must be selected carefully as not all vinyl fences will provide the required noise reduction (such as the Tuf-Barrier and Silent Protector Noise Walls manufactured by AIL Sound Walls, see product information in the Appendix).

## **Backyards Closest to I-495**

If noise levels in the townhome backyards closest to I-495 are to be maintained below 65 dBA Ldn, a noise barrier along the site's property line (comparable to the proposed noise barrier along I-270) will be necessary; however a noise barrier is not recommended in this location since the amount of noise reduction provided to these backyards may be offset by the environmental cost.

The noise level in the backyards closest to I-495 will be slightly above 65 dBA (compared to above 70 dBA Ldn in backyards closest to I-270), such that a noise barrier for these outdoor areas would be reducing noise levels 1 – 3 dBA Ldn (compared to at least 5 dBA Ldn provided by the noise barrier along I-270). Recall that a 1 – 3 dBA difference is only barely perceptible by the human ear (see “Noise Terminology”), while a 5 dBA difference is clearly perceptible.

## ***Indoor Noise***

Drawing 5 indicates noise levels above 65 dBA Ldn (and up to 72 dBA Ldn) for 65 townhomes at the upper level (shown on Drawing 7 of the Appendix). These homes require further analysis to determine the mitigation measures necessary to meet the required indoor noise level. According to Montgomery County's residential noise standard, these units must be evaluated to determine whether the proposed building construction will be capable of maintaining indoor noise levels at or below 45 dBA Ldn.

This evaluation, or “building shell analysis,” calculates a room's indoor noise level based upon its exterior noise level, the Sound Transmission Class (STC) ratings<sup>1</sup> of its various building components, the amount of exposed exterior wall area, and the room's size and finish.

Windows and doors act as weak spots which allow higher noise transmission than what would otherwise pass through a homogenous wall partition. These are typically the weak link in a room's ability to block noise; consequently the STC ratings and exterior surface area percentages they occupy are significant issues.

When windows and/or doors occupy a high percentage of impacted façades, substantially higher window/door STC ratings than those typically used in standard construction may be required depending upon the noise level impact. High STC rated windows/doors can be significantly more expensive than standard windows/doors (up to three to four times the cost of standard windows/doors.) Phoenix Noise & Vibration should be contacted early in the single family home design and window/door selection process to provide recommendations to minimize incurred material costs.

Modifications to standard building construction may not be necessary for all residences impacted by future noise levels above 65 dBA Ldn. It is possible that the proposed standard building construction will provide sufficient noise reduction to maintain the required 45 dBA Ldn indoor noise level for outdoor noise levels above 65 dBA Ldn. The noise reduction provided by the

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<sup>1</sup> The STC rating is a single number value which describes a building element's (wall, window, door, roof, etc.) ability to reduce noise transmission from one side of the partition to the other.

proposed standard building construction will depend upon the exterior wall construction, amount of windows and doors in each room, and STC ratings of the selected windows and doors.

As of the date of this Phase I Noise Analysis, architectural drawings for the townhomes offered at the Forester's Property are not available; therefore an accurate building shell analysis cannot be conducted. Once architectural drawings are well developed, STC ratings for all impacted residential units can be calculated. Building shell analysis results will be presented in the site's Phase II Noise Analysis.

## CONCLUSION

The Forester's Property will be exposed to future roadway noise levels slightly above 70 dBA Ldn. While this represents a moderate level of noise impact, compliance with Montgomery County's residential noise regulations can be achieved through reasonable modifications to proposed building plans.

Outdoor areas belonging to the 40 townhome lots closest to I-270 and I-495 will be exposed to noise levels above 65 dBA Ldn. If noise levels in these outdoor activity areas are to be maintained below 65 dBA Ldn, additional mitigation, such as a noise barrier along the site's property line, will be required.

The 65 townhomes exposed to future noise levels above 65 dBA Ldn require further analysis and may require modifications to standard building construction. Depending upon noise level specific to each impacted townhome, modifications may include increased window/door STC ratings and slight adjustments to exterior wall construction. Further analysis is required to determine the exact mitigation designs necessary, which will be established during the Phase II Noise Analysis.


The remaining townhomes located further into the site will not be exposed to noise levels above 65 dBA Ldn. These outdoor areas and residences require no further analysis or modifications to comply with Montgomery County's residential noise standard.

**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, existing roadway alignments, projected roadway traffic volumes, and the proposed building layout. Should any of this information be altered, including significant modifications to proposed topography or roadway alignment and projected data, additional analysis will be required to determine if the results and recommendations presented herein are capable of reducing exterior and indoor noise levels to comply with Montgomery County's noise level requirements for residential development.*

**APPENDIX**






  
**B UL**  
**70.2**

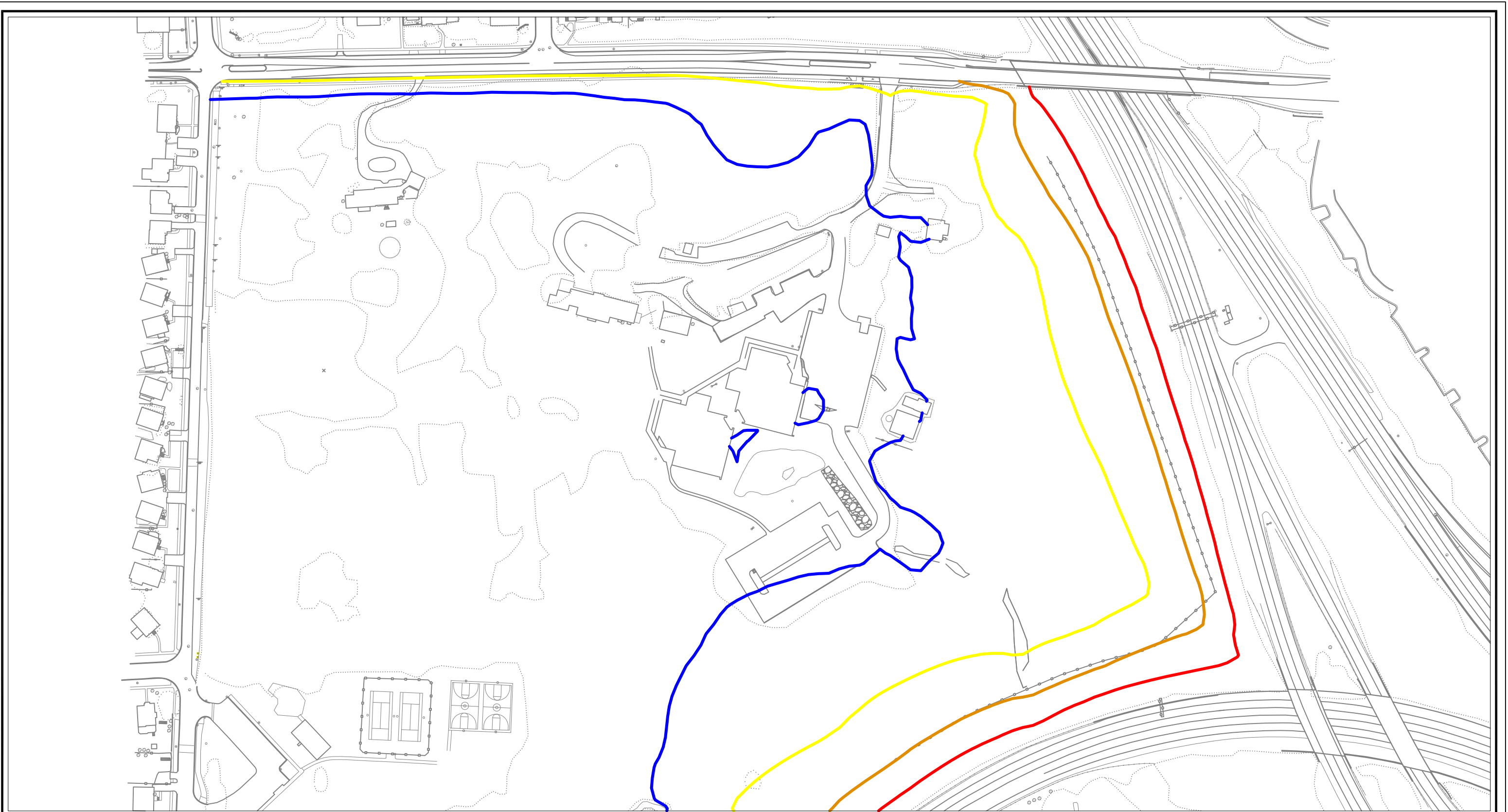
24-Hour Noise Measurement Location  
 Measured Noise Level (dBA Ldn)

 Existing Chain Link Fence

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 301-846-4227

Forrester Property  
 24-Hour Noise  
 Measurement Locations

DWG. NO.	1	DATE	20 March 2013
SCALE	1" = 150'	DRAWN BY	JVC



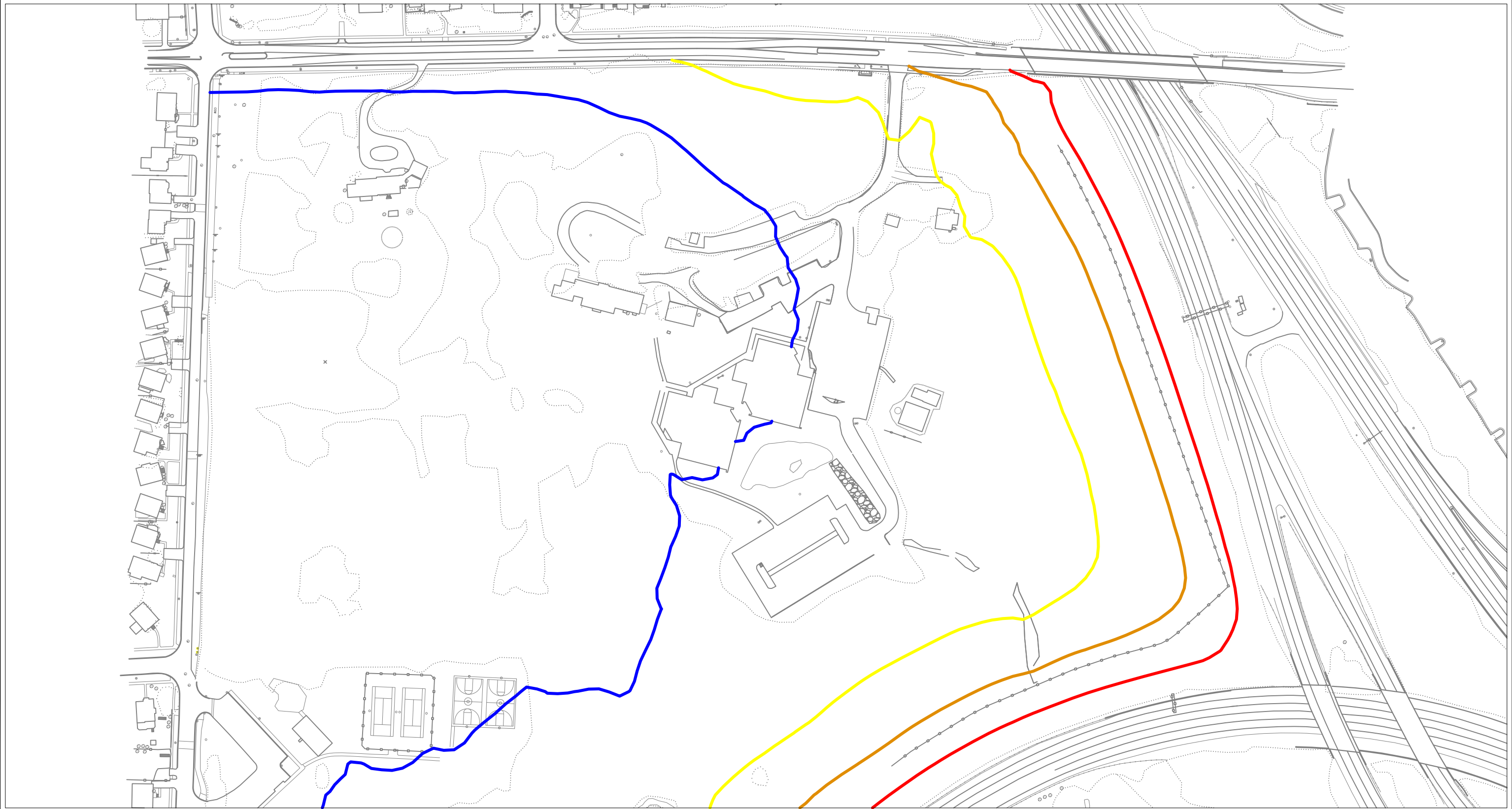
Existing Mitigated Ground Level Noise Level

- 80 dBA Ldn
- 75 dBA Ldn
- 70 dBA Ldn
- 65 dBA Ldn

Existing Chain Link Fence

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<b>Forrester Property Mitigated Existing Ground Level Noise Contours</b>	
DWG. NO. 2	DATE 14 May 2013
SCALE 1" = 150'	DRAWN BY JVC



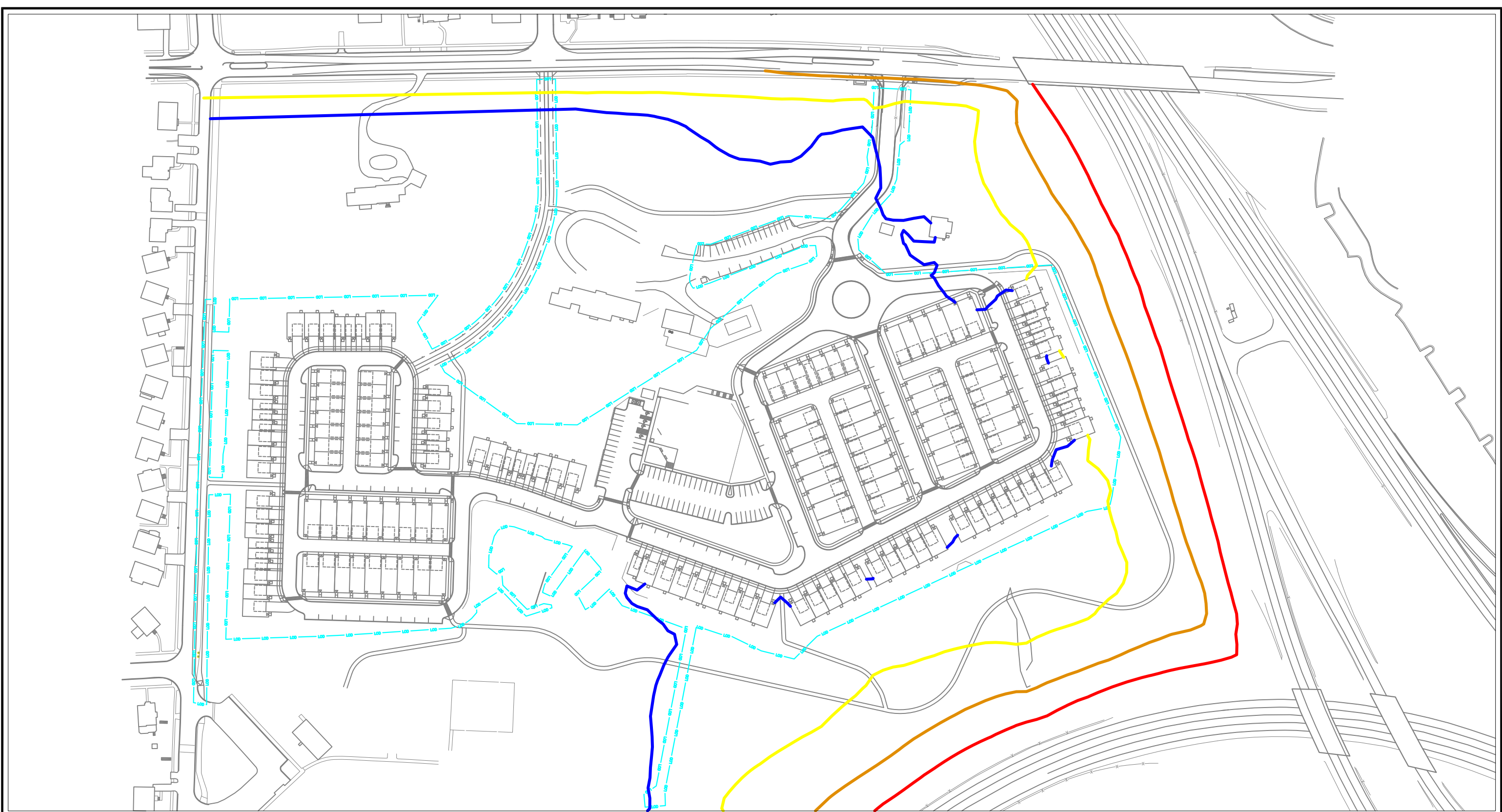
**Existing Mitigated Upper Level Noise Level**

- 80 dBA Ldn
- 75 dBA Ldn
- 70 dBA Ldn
- 65 dBA Ldn

— Existing Chain Link Fence

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<b>Forrester Property Mitigated Existing Upper Level Noise Contours</b>	
DWG. NO. 3	DATE 14 May 2013
SCALE 1" = 150'	DRAWN BY JVC

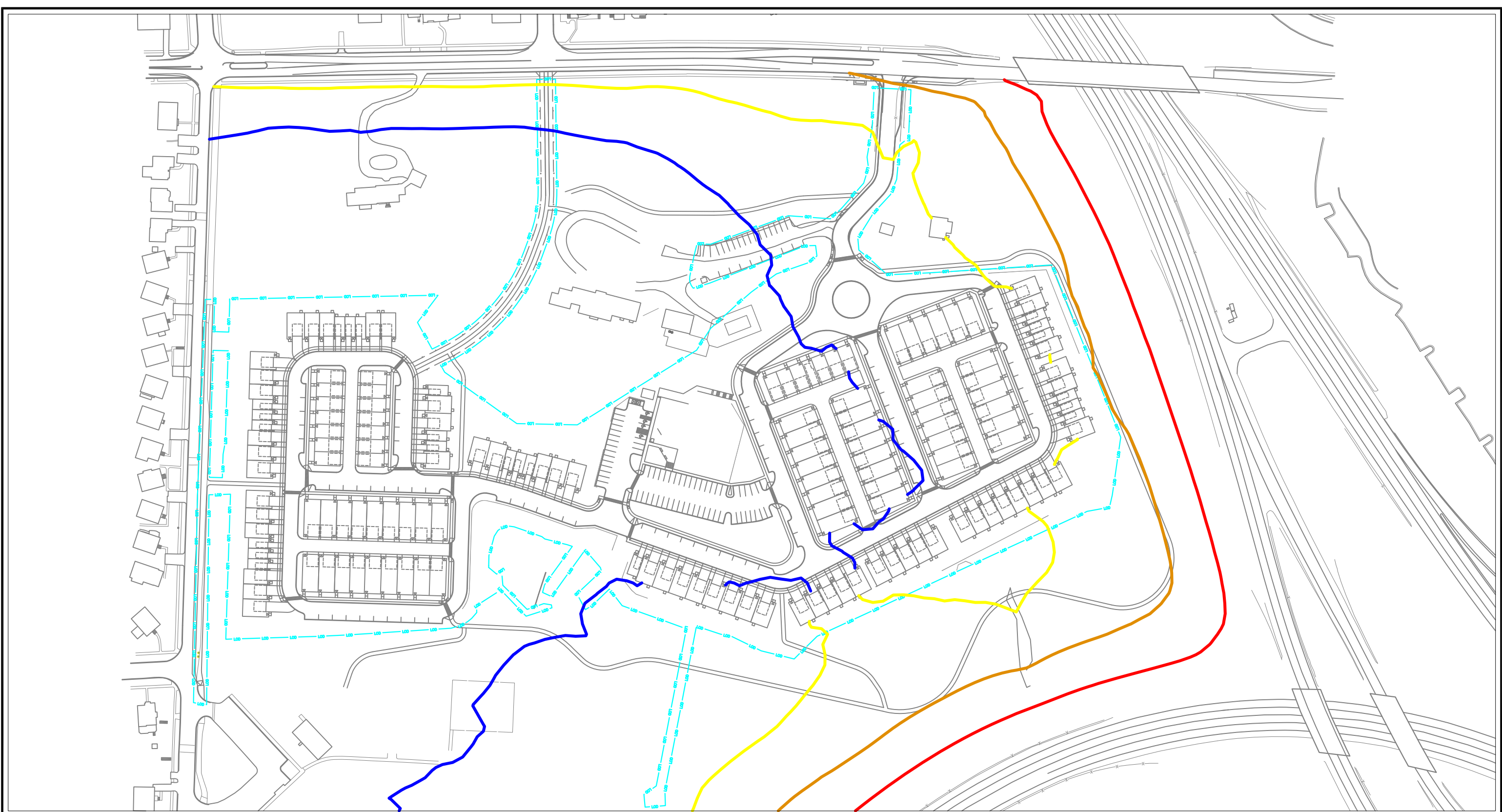


Future Mitigated Ground Level Noise Level

- 80 dBA Ldn
- 75 dBA Ldn
- 70 dBA Ldn
- 65 dBA Ldn

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Forrester Property Mitigated Future (2032) Upper Level Noise Contours	
DWG. NO. 4	DATE 20 March 2013
SCALE 1" = 150'	DRAWN BY JVC

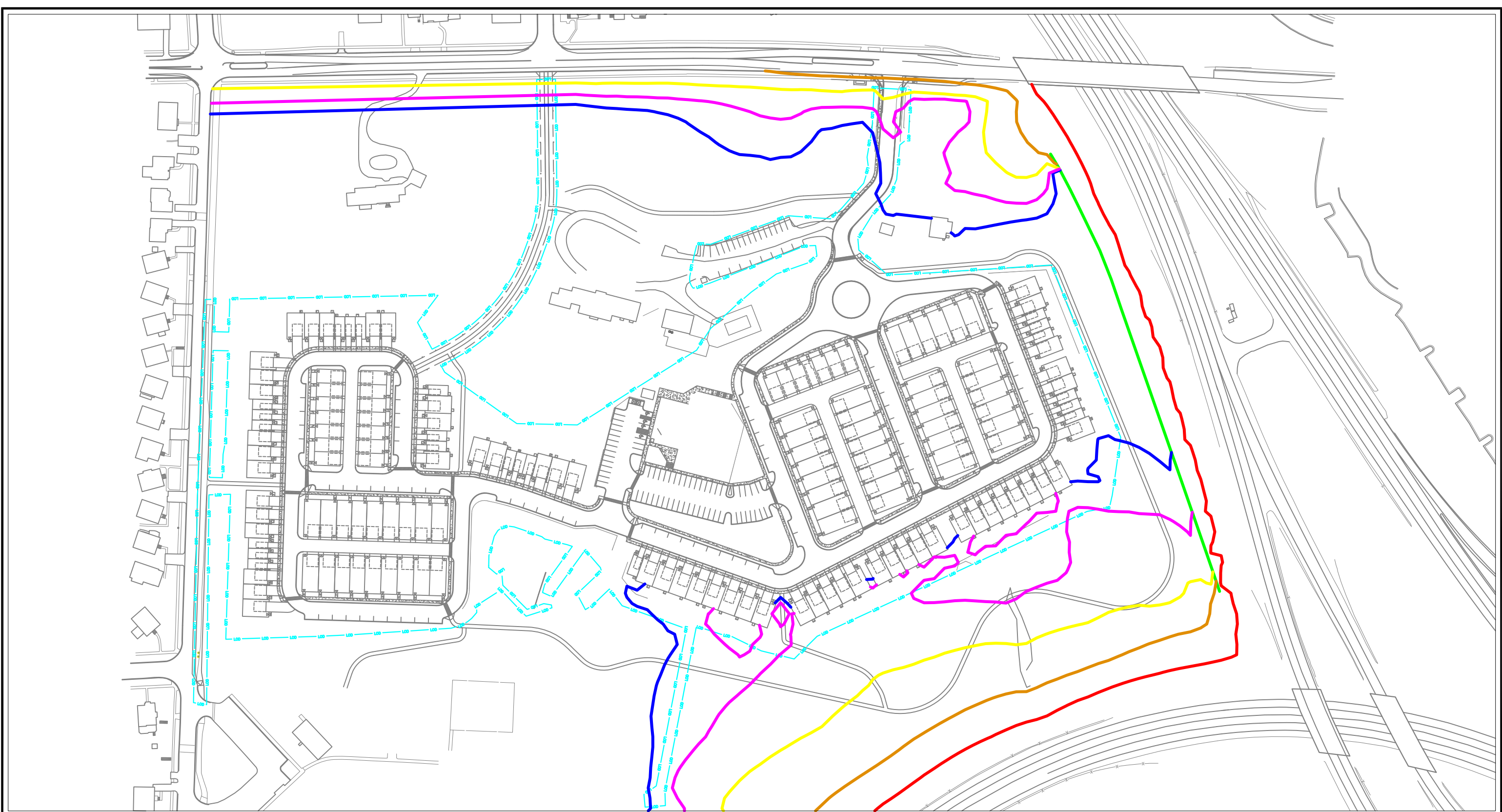


**Future Mitigated Upper Level Noise Level**

- 80 dBA Ldn
- 75 dBA Ldn
- 70 dBA Ldn
- 65 dBA Ldn

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<b>Forrester Property Mitigated Future (2032) Upper Level Noise Contours</b>	
DWG. NO. 5	DATE 20 March 2013
SCALE 1" = 150'	DRAWN BY JVC



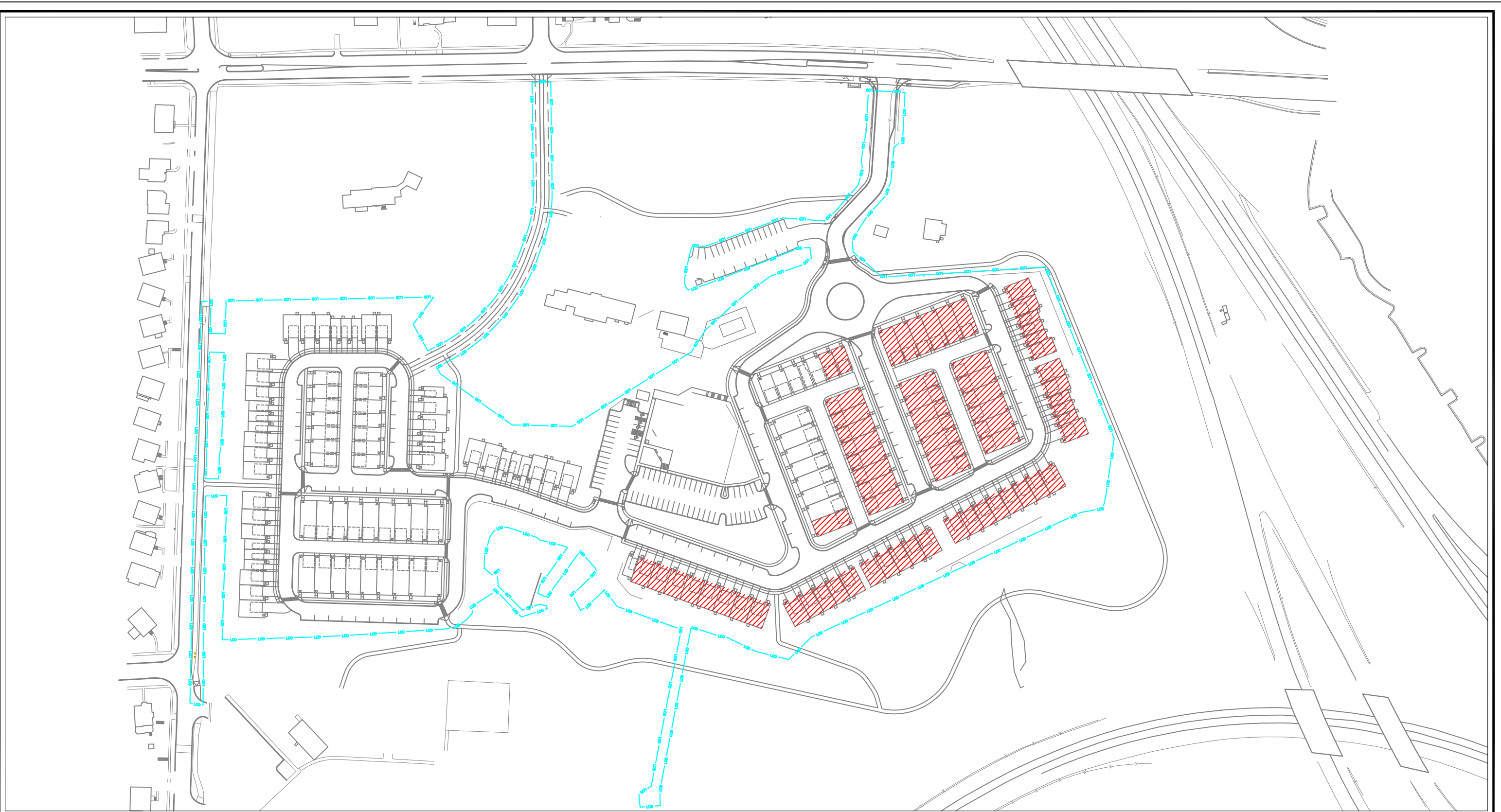
Future Mitigated Ground Level Noise Level

- 80 dBA Ldn
- 75 dBA Ldn
- 70 dBA Ldn
- 67 dBA Ldn
- 65 dBA Ldn

— 23-Foot Noise Barrier

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Proposed Noise Barrier & Future Mitigated (2032) Ground Level Noise Levels	
DWG. NO. 6	DATE 20 March 2013
SCALE 1" = 150'	DRAWN BY JVC



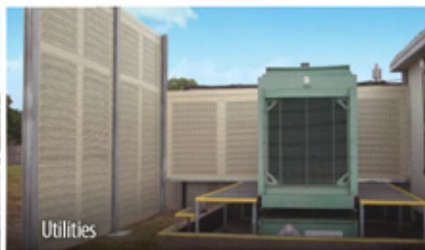
Townhome impacted by future transportation noise level above 65 dBA Ldn at the upper level.

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<b>Forrester Property Upper Level Noise Impact Above 65 dBA Ldn</b>	
DWG. NO. 7	DATE 20 March 2013
SCALE 1" = 150'	DRAWN BY JVC

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- ▶ Graffiti and tagging can be easily removed

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CLASS RATINGS UP TO  
**STC 36**

**EASY-OFF  
GRAFFITI  
AND TAGGING**

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Excessive noise is one of the most common occupational health hazards in today's heavy industrial or manufacturing environments, and permanent hearing loss is a serious health concern.

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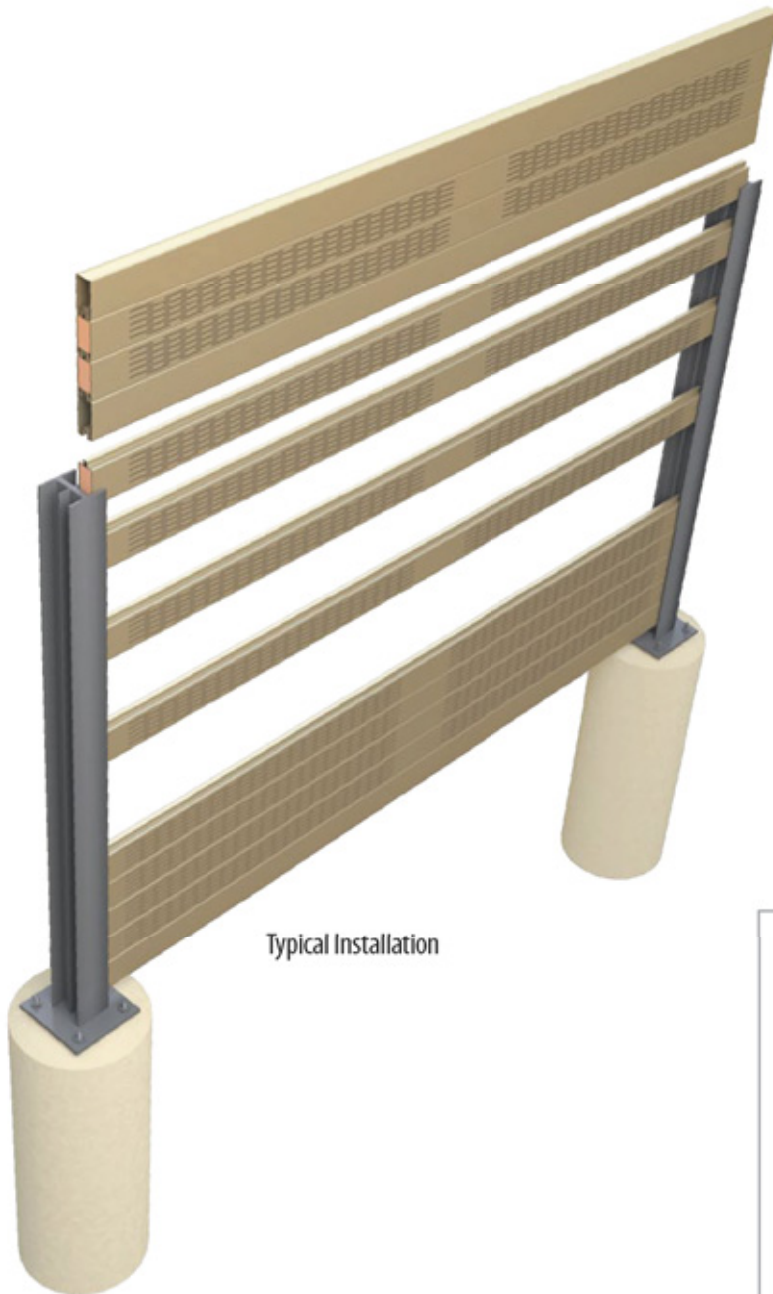
Sustainable Design in Noise & Sound Barriers is a free one-hour online professional development credit course offered by AIL Sound Walls through AECdaily.com. It provides an overview of the negative impacts of noise, the science of noise barriers, as well as a discussion on the features and benefits of absorptive and reflective noise barriers made of tongue and groove PVC panels. Contact AIL Sound Walls at 1-866-231-7867 or visit [aecdaily.com](http://aecdaily.com) for more information on the course.



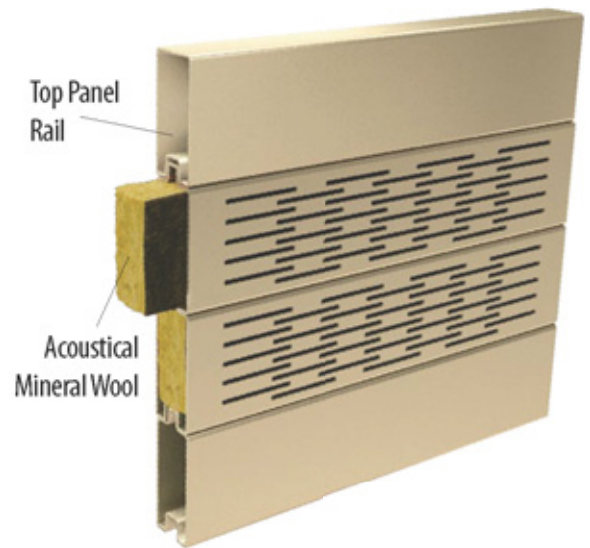
For more information on AIL Sound Wall solutions, call 1-866-231-7867 or visit [ailsoundwalls.com](http://ailsoundwalls.com)

# Easy to install with local crews and reduced need for lifting equipment.

ALL Sound Walls are constructed with tongue and groove PVC panels. Panels are stacked and placed within standard steel posts to the required height and capped with a top panel.



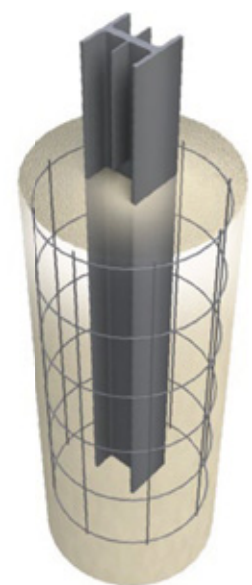
Typical Installation



Flange Mounted Footing



Direct Bury Footing



For more information on ALL Sound Wall solutions, call 1-866-231-7867 or visit [ailsoundwalls.com](http://ailsoundwalls.com)



All Sound Walls are available in a variety of attractive colors.

### Product Specifications

### Silent Protector® (Absorptive)

### Tuf Barrier® (Reflective)

Panel Length	8 ft - 12 ft (2.44 m - 3.66 m)	8 ft - 14 ft (2.44 m - 4.27 m)
Panel Width	2.70 in (68.58 mm)	2.70 in (68.58 mm)
Panel Height	5.96 in ± .10 in (151.38 mm ± 0.25 mm)	5.96 in ± .10 in (151.38 mm ± 0.25 mm)
Weight	4.30 lbs/ft <sup>2</sup> (21 kg/m <sup>2</sup> )	Min. 4.10 lbs/ft <sup>2</sup> (20 kg/m <sup>2</sup> )
Absorptive	yes	n/a
Reflective	n/a	yes
STC Rating	up to 36	up to 32
NRC Rating	1.0	n/a
Plain Finish	yes	yes
Embossed Finish	n/a	yes



For product technical specifications visit [ailsoundwalls.com](http://ailsoundwalls.com)

### Sound Transmission Loss ASTM E90 / E413

Octave Band Number	2	3	4	5	6	7	STC
Center Frequency (Hz)	125	250	500	1000	2000	4000	–
Silent Protector®	20	21	26	40	40	44	<b>RATINGS UP TO</b> <b>STC 36</b> <b>ASK FOR DETAILS</b>
Tuf-Barrier®	16	22	31	39	41	49	

### Sound Absorption Coefficients ASTM C423/E795

Octave Band Number	2	3	4	5	6	7	NRC
Center Frequency (Hz)	125	250	500	1000	2000	4000	–
Silent Protector®	0.41	0.84	1.19	1.06	1	0.81	1.0

#### STC – Sound Transmission Class

STC is a single-number index used to rate the material's ability to reflect noise and to reduce the decibel level.

#### NRC – Noise Reduction Coefficient

NRC is a single-number index rating used to determine how absorptive the material is. Industry standard ranges from zero to 1. An absorptive sound wall reduces the sound energy that would typically reflect back toward the sound source and has a higher decibel reduction.

#### NRC

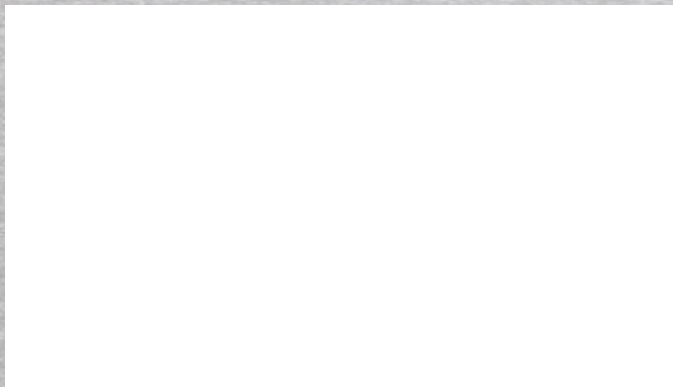
#### Qualitative

0.4 or less	Poor
0.5 to 0.6	Mediocre
0.6 to 0.7	Good
0.7 to 0.85	Very Good
> 0.85	Excellent
1.0	AIL Silent Protector®

ASK ABOUT RENTING  
AIL SOUND WALLS

# We support you.

- ▶ Be confident with a solution from AIL Sound Walls
- ▶ Designs based on wind loading and soil conditions
- ▶ Detailed proposals complete with installation budget estimates
- ▶ Engineer-stamped project drawings for approvals and construction
- ▶ Professional support in engineering, project management and site assistance



The information and suggested applications in this brochure are accurate and correct to the best of our knowledge and are intended for general information purposes only.

These general guidelines are not intended to be relied upon as final specifications and we do not guarantee specific results for any particular purpose.

We strongly recommend consultation with an AIL Sound Walls Technical Sales Representative before making any design and purchasing decisions.

## Save time. Save money. Choose efficient sound mitigation solutions from AIL Sound Walls.

AIL Sound Walls is a member of The AIL Group of Companies. The AIL Group is made up of a network of companies with technical sales teams, engineering departments, manufacturing plants and distribution centers across Canada and in the United States. AIL International and the operations of the AIL Group's licensees in Australia, Europe and Asia help extend our global reach.



Head Office: 640 Waydom Drive, Ayr, Ontario, Canada N0B 1E0  
Manufactured in USA.

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For more information on AIL Sound Wall solutions, call 1-866-231-7867 or visit [ailsoundwalls.com](http://ailsoundwalls.com)