MEMO

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To: Dover Hankins, Classic Group, LLC

Cc: Gary Unterberg, Rodgers Consulting, Inc.

From: Josh Curley, Senior Engineer

Date: 20 August 2014

Reference: Devlin Property
Updated Railway Noise Analysis

Phoenix Noise & Vibration has conducted an updated analysis of railway noise impact upon the Devlin Property, a small portion of land in the Parklands development (City of Gaithersburg, Maryland) consisting of 19 townhomes. The Devlin Property is (at the closest point) located approximately 100 feet north of the CSX/MARC railway and south of Block N Lots 1 – 12. This analysis:

1. Determined the existing day-night average noise level (Ldn)[1] at the Devlin Property due to the CSX/MARC railway.

2. Evaluated the effect of two 10-foot noise barriers along the common property line (recommended by the City of Gaithersburg) in reducing noise impact upon Devlin Property residences and rear yards.

BACKGROUND

In a memo dated 31 January 2014, Phoenix Noise & Vibration presented Ldn values for Devlin Property residences and private yards due to the railway, future CCT light-rail line, and Watkins Mill Road. Noise levels were presented at the ground and upper level with and without a continuous 10-foot noise barrier along the common property line as recommended by the City of Gaithersburg.

Noise levels presented in the January 2014 memo were based upon a study conducted by Phoenix Noise & Vibration in September 2007 for Classic Community Companies for the Parklands development (excluding the Devlin Property). This study determined future transportation noise impact throughout the development relative to City of Gaithersburg noise

[1] 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.

regulations for residential development, which require noise levels in residences and outdoor activity areas at 45 and 65 dBA Ldn, respectively.

The noise levels presented in the 2007 study were calculated using a computer model developed to simulate the future development and calibrated based upon on-site measurements of railway and roadway noise conducted in June through December of 2005.

After reviewing the Devlin Property memo dated 31 January 2014, the Planning Commission requested the following:

1. Remeasure the noise generated by the railway at the Devlin Property to determine whether the existing level is consistent with that measured in 2005.

2. Remove a significant portion of the continuous 10-foot noise barrier along the property line such that two 10-foot portions remain.

NOISE MEASUREMENTS

On August 6 - 7, 2014, Phoenix Noise & Vibration conducted an on-site noise measurement survey to determine existing noise levels throughout the Devlin Property due to the railway. This involved continuous noise level measurements and monitoring for one 24-hour period. Measurements were made using two Norsonic Type 118 Precision Integrating Sound Level Meters. Both 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 24-hour average day-night noise level (Ldn), which includes a 10 dBA penalty for noise levels measured during nighttime hours.

Noise level measurements were made at Point Y, located on the Devlin Property as shown on enclosed Drawing 1. Also shown on Drawing 1 is Point F, at which 24-hour noise measurements were conducted in June and September 2005. Point F was the measurement location on which noise generated by the railway was based in the original 2007 Parklands noise study.

Measurements at Point Y were made at 5.5 feet ("ground level" - GL) and 25 feet ("upper level" - UL) above existing grade to account for the railway noise level in residential rear yards and upon second stories of residential buildings. Measurement results are presented in Table 1, as well as the measured values at Point F from 2005.

Table 1: 24-hour noise measurement results.

Measurement Location	Date of 24-Hour Measurement	Distance to Railway (feet)	Measured Noise Level (dBA Ldn)
Y GL	Aug. 6 – 7, 2014	192	63.6
Y UL			67.1
F	June 29 – 30, 2005 Sept. 13 – 14, 2005	110	69.9 (Average)

Figure 1 presents the survey results graphically, showing the noise level as measured in five minute increments throughout the survey. Figure 1 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.

In Figure 1, each peak represents a five minute time interval in which at least one train passed by the site. Table 2 summarizes the train activity present during the 24-hour survey. If a train sounded a whistle while passing by the site, the noise generated by the whistle being blown is included in the measured noise level (i.e. the Ldn value).

Table 2: Summary of train activity August 6 – 7, 2014.

Type of Train	Daytime (7:00 AM to 10:00 PM)	Nighttime (10:00 PM to 7:00 AM)	Total
MARC	14	5	19
CSX	8	7	15
Total	**22**	**12**	**34**

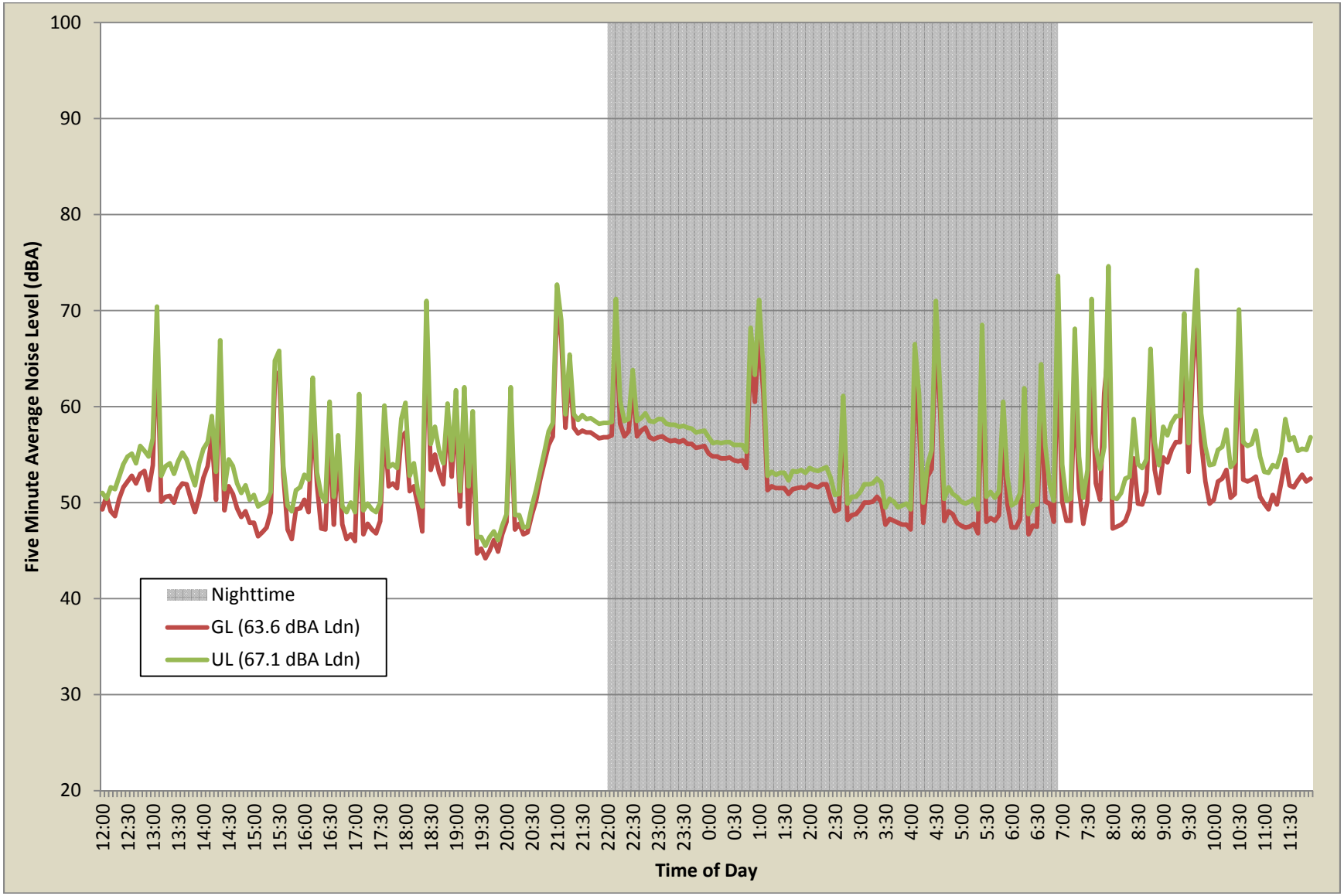
Table 3 compares the train activity from the August 2014 and June/September 2005 measurements.

Table 3: Train activity summary from three 24-hour noise measurements.

Train Event	August 2014	June 2005	September 2005
Total Trains	34	49	47
Commuter Trains	19	17	21
Freight Trains	15	32	25
Nighttime Trains	12	20	19

Note that Table 1 indicates the measured noise level at Point Y is slightly lower than that measured in 2005; however Point Y was located further from the rail line and the train activity (particularly freight) was less than in 2005.

Figure 1: Five minute average roadway noise levels recorded during 24-hour noise survey (August 6 – 7, 2014).



COMPUTER MODELING

The computer model developed for the previous analysis of the Devlin Property was modified to include the revisions to the site since January 2014, including proposed topography and the two 10-foot noise barriers.[2] The modeled railway noise output was not modified, as the recent measurements of railway noise at the Devlin Property validated the 2005 measurements. While the measured noise level was lower than in 2005, the measurement point was further from the rail line and the train activity was less.

The model calculated future transportation noise impact upon residences and in outdoor areas of the Devlin Property, as well as for Parklands Block N Lots 1 through 12. Noise levels were calculated at the ground (5.5 feet above grade) and upper (25 feet above grade) level to represent the impact upon occupants of outdoor spaces and upper floors of residences, respectively.

Future transportation noise levels (as calculated by the computer model) with and without the recommended 10-foot noise barriers are presented on enclosed Drawings 2 and 3, respectively. Drawing 4 indicates the difference in noise level at each location due to the noise barriers. Enclosed Drawings 5 and 6 indicate residences and outdoor activity areas impacted by noise levels above 65 dBA Ldn with and without the noise barriers, respectively.

ANALYSIS

Future transportation noise impact throughout the Devlin Property, Block N Lots 1 - 12, and the effect of the proposed 10-foot noise barriers are as follows:

1. The Devlin Property townhomes act as noise barriers to the townhome rear yards, (as well as to Block N Lots 1 – 10), reducing railway noise propagation to the rear yards such that noise levels will be below 65 dBA Ldn in all townhome rear yards even without any noise barrier(s) (see Drawing 2).

2. The 10-foot noise barriers do not provide a significant amount of noise reduction (less than 1 dBA) for the majority of Devlin Property townhome facades or rear yards (see Drawing 4).

3. Outdoor areas directly in front of townhomes (facing the railway) are occupied entirely by driveways, which are typically not held to the City of Gaithersburg's 65 dBA Ldn outdoor noise level requirement. This is consistent with the Watkins Mill Town Center and other City approvals. Furthermore, the garage is located on the first floor directly facing the railway, such that indoor and outdoor areas at the ground level are not limited by any City of Gaithersburg residential noise level limits. The rear yards are mitigated to acceptable levels by the buildings.

4. Without the 10-foot noise barriers, 15 of the 19 townhomes are exposed to transportation noise levels above 65 dBA Ldn at the upper level (Drawing 5).

[2] Taken from a site plan provided by Rodgers Consulting, Inc.

With the 10-foot noise barriers, 14 of the 19 townhomes are exposed to transportation noise levels above 65 dBA Ldn (Drawing 6) at the upper level. Similar to noise levels at the ground level, the noise barriers provide an insignificant amount of noise reduction at the upper level.

CONCLUSION

Overall, the 10-foot noise barriers are providing an insignificant amount of noise reduction for the Devlin Property, such that were the barriers removed entirely there would be very little difference in the railway noise propagation throughout the site. Furthermore, the 10-foot noise barriers are only providing noise reduction for the garages and driveways. Garages and driveways are typically not considered spaces which must comply with the residential noise limits.

Noise levels resulting from the two 10-foot noise barriers evaluated herein are similar to those resulting from the continuous 10-foot noise barrier evaluated in January 2014 (see enclosed Drawing 4.1), in that even with the continuous 10-foot noise barrier, only the townhome garages and driveways are benefitted. With or without a 10-foot noise barrier, either two separate or one continuous, noise impact upon the townhome front/side elevations of second and higher stories will be above 65 dBA Ldn and must be mitigated through proper building construction to meet the indoor limit, while noise levels in rear yards are below 65 dBA Ldn and in compliance with the outdoor limit.

Given that most townhomes will be exposed to noise levels above 65 dBA Ldn at the upper level with or without the noise barriers, and that all rear yards are below 65 dBA Ldn without the barriers. Noise levels in rear yards are in compliance with the 65 dBA Ldn outdoor limit without the noise barriers, and the 45 dBA Ldn indoor requirement will be maintained using appropriate building construction.

Mitigation to maintain indoor noise levels below 45 dBA Ldn will require modifications to the proposed standard building construction. These modifications can only be determined once architectural drawings for available residential home models are well developed. Modifications, if necessary, may include upgraded windows and doors and slight adjustments to planned exterior wall construction.

Encl: Drawing 1: 24-Hour Noise Measurement Locations
Drawing 2: Transportation Noise Levels – No Noise Barrier
Drawing 3: Transportation Noise Levels – With 10 Ft. High Noise Barrier
Drawing 4: Difference in Noise Level Due to 10 Ft. High Noise Barrier
Drawing 4.1: Difference in Noise Level Due to Jan. 2014 10 Ft. Noise Barrier
Drawing 5: Noise Impact – No Barrier
Drawing 6: Noise Impact – With 10 Ft. High Noise Barrier

● NOISE MEASUREMENT LOCATION

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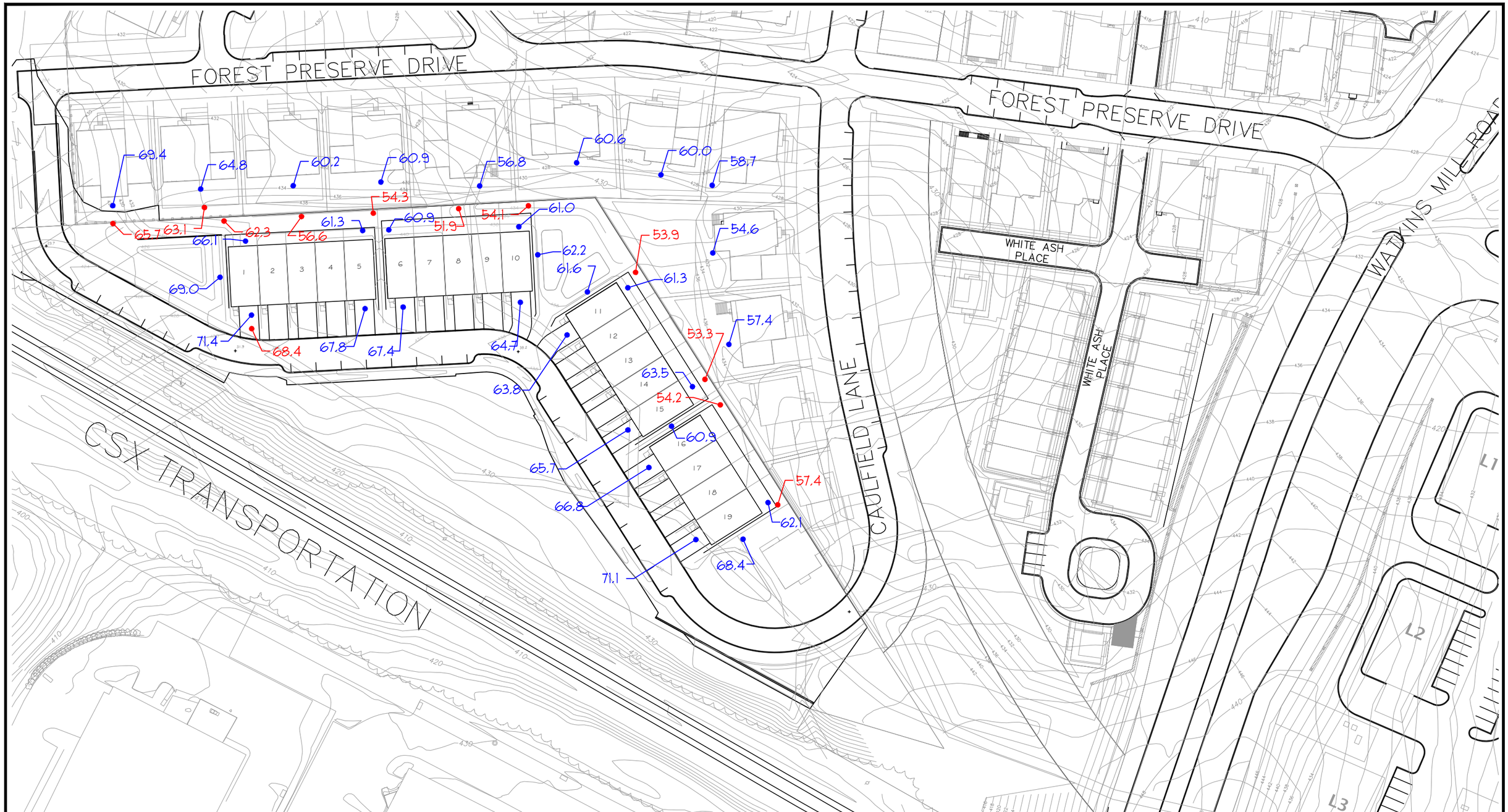
DEVLIN PROPERTY

24-HOUR
NOISE MEASUREMENT LOCATIONS

DWG. NO.	DATE
1	Aug. 8, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC



● GROUND LEVEL: NOISE LEVEL (dBA Ldn) 5.5 FEET ABOVE GRADE.

● UPPER LEVEL: NOISE LEVEL (dBA Ldn) 25 FEET ABOVE GRADE.

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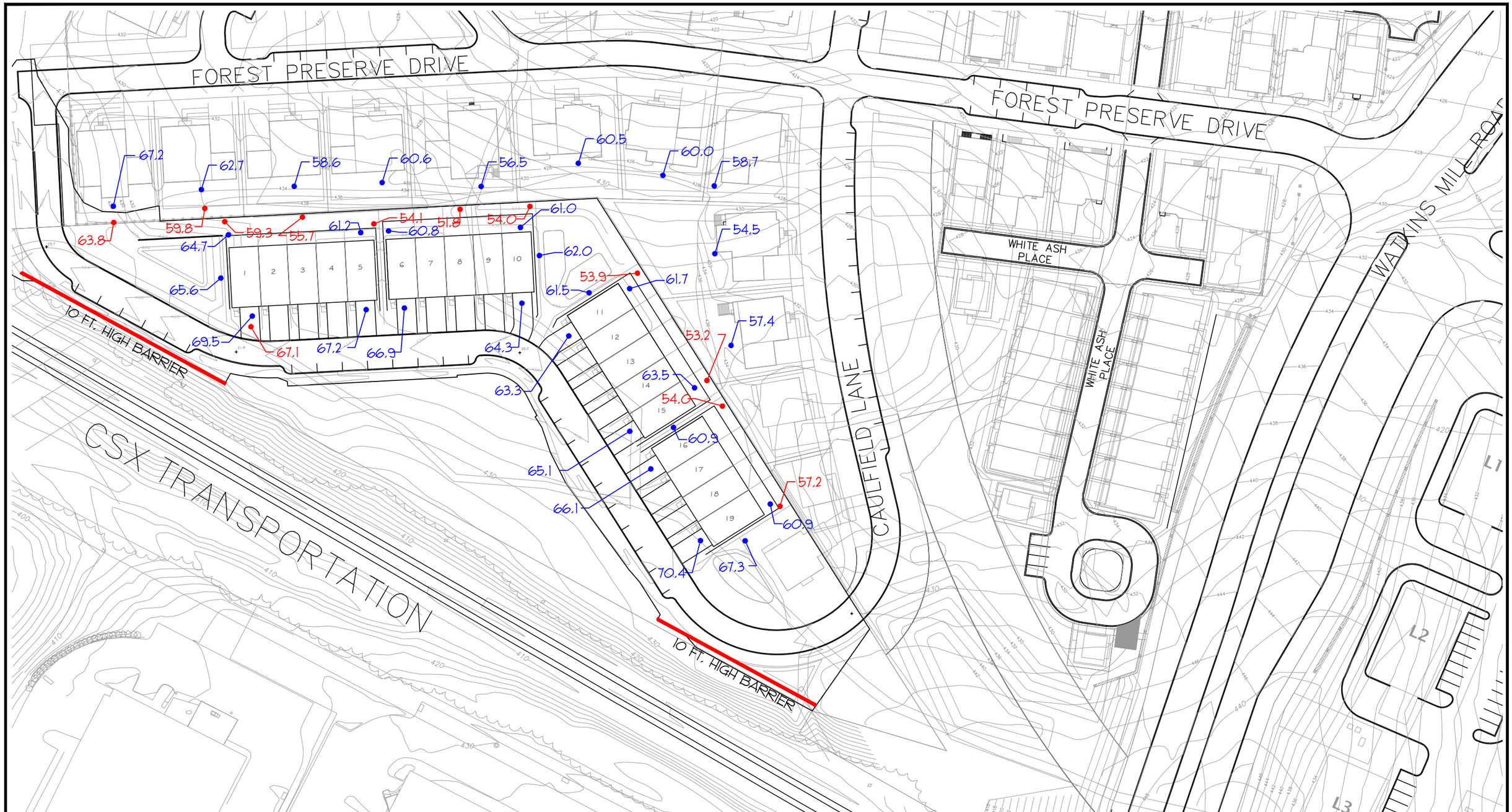
DEVLIN PROPERTY

TRANSPORTATION NOISE LEVELS
NO NOISE BARRIER

DWG. NO.	DATE
2	Aug. 12, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC



● GROUND LEVEL: NOISE LEVEL (dBA Ldn) 5.5 FEET ABOVE GRADE.

● UPPER LEVEL: NOISE LEVEL (dBA Ldn) 25 FEET ABOVE GRADE.

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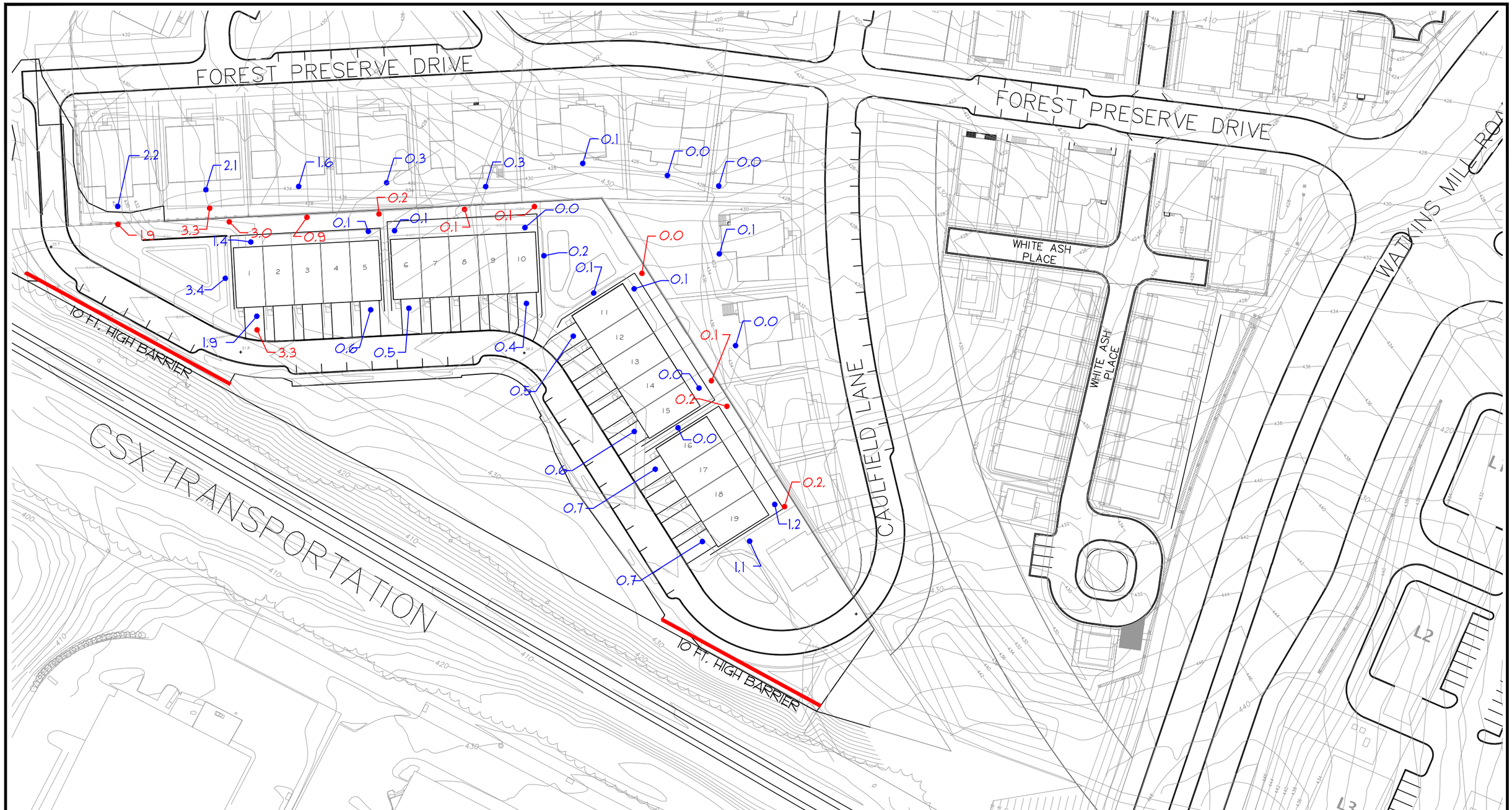
DEVLIN PROPERTY

TRANSPORTATION NOISE LEVELS WITH 10 FT. HIGH NOISE BARRIER

DWG. NO.	DATE
3	Aug. 12, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC



● GROUND LEVEL: REDUCTION IN NOISE LEVEL (dBA Ldn) DUE TO PRESENCE OF 10 FT. HIGH NOISE BARRIER.

● UPPER LEVEL: REDUCTION IN NOISE LEVEL (dBA Ldn) DUE TO PRESENCE OF 10 FT. HIGH NOISE BARRIER

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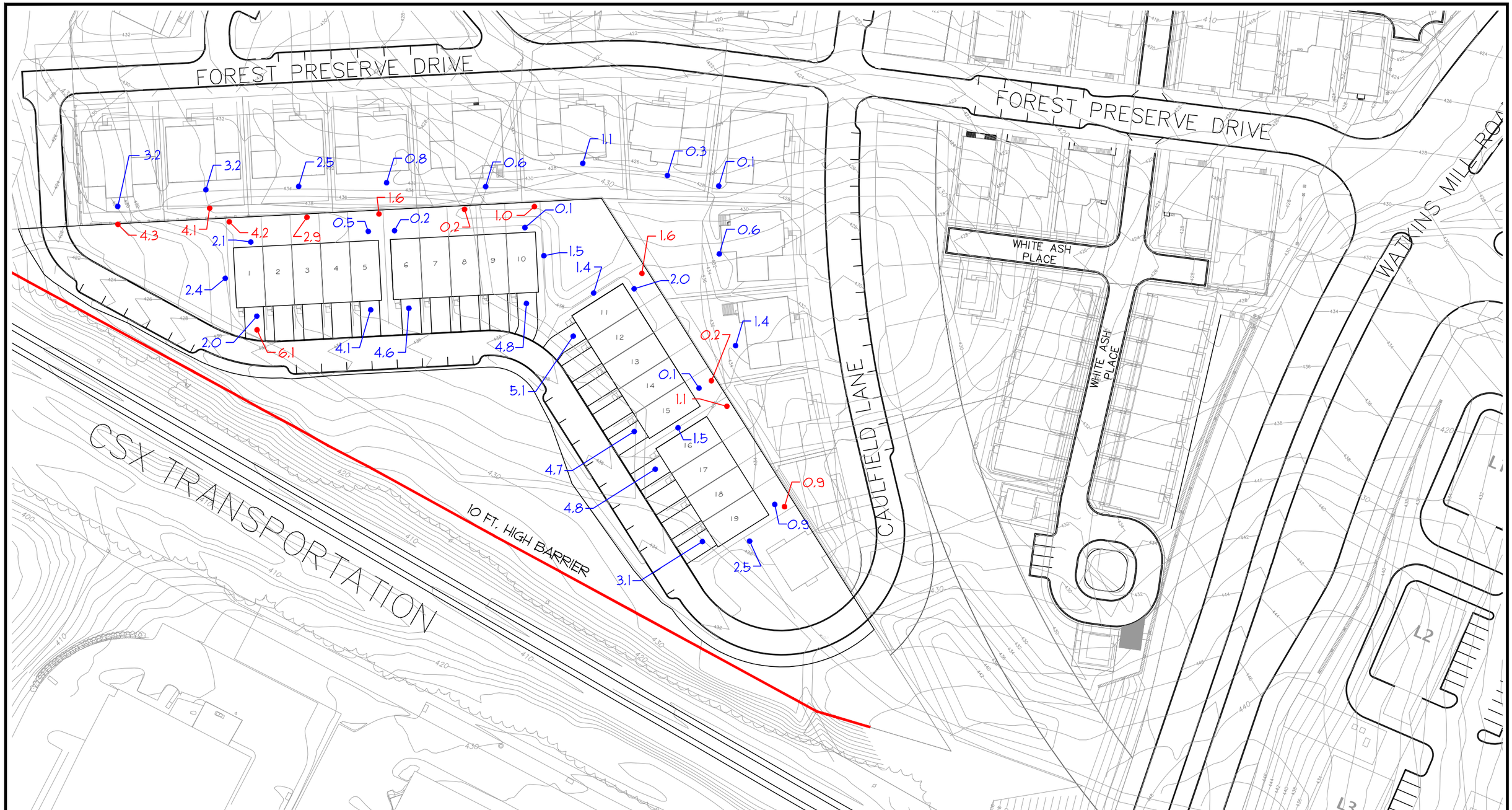
DEVLIN PROPERTY

DIFFERENCE IN NOISE LEVEL
DUE TO 10 FT. HIGH NOISE BARRIER

DWG. NO.	DATE
4	Aug. 12, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC



- GROUND LEVEL: REDUCTION IN NOISE LEVEL (dBA Ldn) DUE TO PRESENCE OF PREVIOUS 10 FT. HIGH NOISE BARRIER EVALUATED IN JANUARY 31, 2014 ANALYSIS.,
- UPPER LEVEL: REDUCTION IN NOISE LEVEL (dBA Ldn) DUE TO PRESENCE OF PREVIOUS 10 FT. HIGH NOISE BARRIER EVALUATED IN JANUARY 31, 2014 ANALYSIS.

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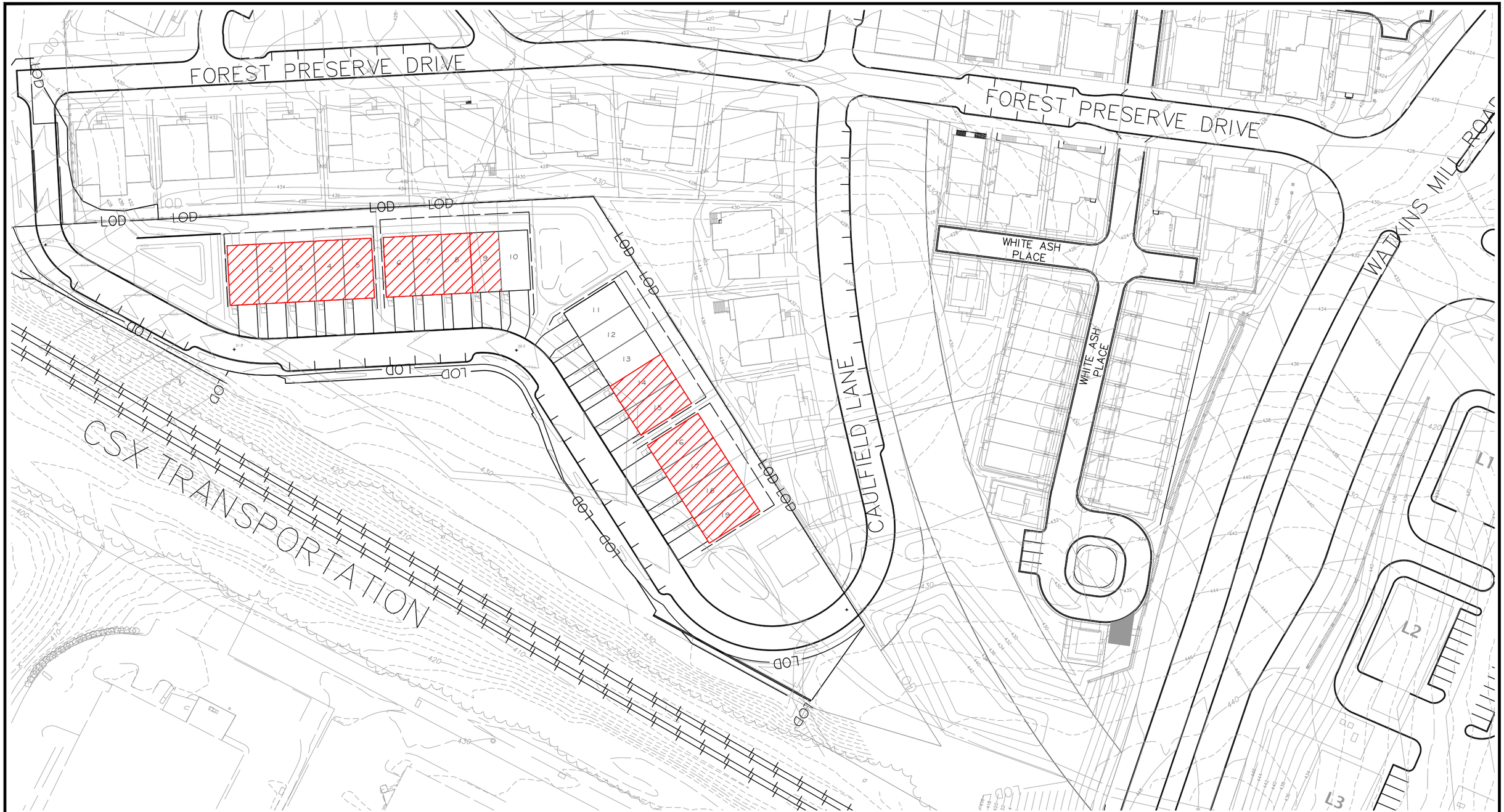
DEVLIN PROPERTY

DIFFERENCE IN NOISE LEVEL DUE TO JAN. 2014 10 FT. NOISE BARRIER

DWG. NO.	DATE
4.1	Aug. 20, 2014
SCALE	DRAWN BY
NOT TO SCALE	WCC



RESIDENCE WITH TRANSPORTATION NOISE IMPACT ABOVE 65 dBA Ldn.

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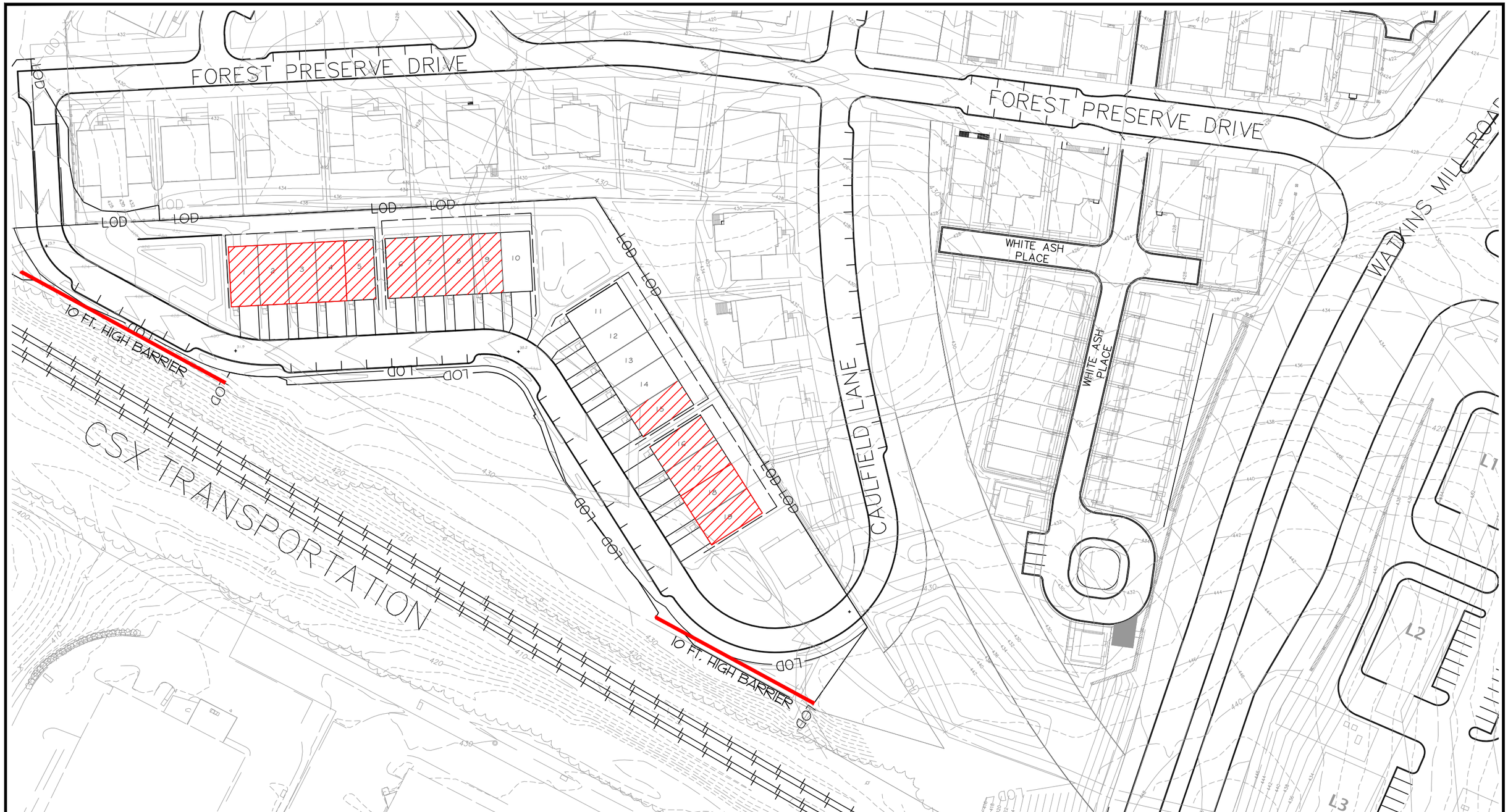
DEVLIN PROPERTY

NOISE IMPACT
NO BARRIER

DWG. NO.	DATE
5	Aug. 12, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC



RESIDENCE WITH TRANSPORTATION NOISE IMPACT ABOVE 65 dBA Ldn.

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DEVLIN PROPERTY

NOISE IMPACT
WITH 10 FT. HIGH BARRIER

DWG. NO.	DATE
6	Aug. 12, 2014
SCALE	DRAWN BY
NOT TO SCALE	JVC

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28 August 2007

Transportation Noise Analysis, Future Conditions With Building Shell Analysis

Watkins Mill Town Center
Montgomery County, Maryland

Report #070828

For: Classic Community Companies
By: Scott Harvey, P.E.

Joint Hearing - MCC & PC
SDP-4560-2014
61

Executive Summary

Phoenix Noise & Vibration has conducted a noise impact analysis on the proposed mixed use development at the Watkins Mill Town Center in Montgomery County, Maryland. This analysis included on-site traffic and railway noise measurements, traffic and railway noise modeling, future traffic noise level analysis, and determination of impact upon proposed mixed use areas based upon current site layouts and grading plans.

The analysis also included determination of the impact from the proposed Corridor Cities Transitway or CCT. This analysis was based upon the DEIS and supplemental measurements on the existing Baltimore MTA light rail system. The results of this analysis were incorporated in the computer model to determine the combined impact from the various sources.

Results indicate that outdoor noise levels in some outdoor activity areas will exceed Montgomery County Guidelines for the specified use. Building orientation will aid in shielding areas toward the middle of the site. Those areas not shielded by buildings may require berms or barriers to meet county standards. Buildings along the roadways and railways will be impacted by noise levels exceeding county limits. With proper construction techniques, interior noise level requirements recommended by the City of Gaithersburg for residential occupancy can be met. This will, however, require a building shell analysis of specific architectural plans and drawings for each building type. A preliminary building shell analysis has been conducted for currently available architectural drawings for the proposed houses and the results are presented herein.

This analysis is based upon measurements during the summer, autumn, and winter months when leaves were both on and off the trees. Leaves are a slight factor for those areas which are along Interstate 270 at elevations lower than the roadway. However it was determined that at areas on approximately the same level as the roadway, the presence of the leaves were of no significance. In those areas impacted by the leaves, noise measurements made under the various conditions were used to determine an annual average noise level which was used in this analysis.

Noise Regulations

Traffic noise impact for proposed residential developments in the City of Gaithersburg and Montgomery County is governed by "Staff Guidelines for the Consideration of Transportation Noise Impacts In Land Use Planning and Development", June 1983. Specifically for residential developments, the guidelines are presented in Table 2-1 on page 8, as reprinted here:

Table 2-1
Maximum Levels for Exterior Noise at the Building Line[1]
For Noise Sensitive Land Uses

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.

Given the close proximity to Interstate 270 for the proposed site, the proposed site use, and references made to highways and freeways in the guidelines, the 65 dBA Ldn guideline value is chosen as most appropriate for the Watkins Mill Town Center Development. This will also be applied to the railway noise impact.

Ldn indicates the "Day Night Average" noise level on site. This is the average noise level over a continuous 24 hour period with a 10 dBA penalty added to measurements made during the nighttime hours. This penalty is added to account for increased sensitivity during the nighttime. Nighttime hours are defined as the hours between 10:00 PM and 7:00 AM.

Noise Measurements

Phoenix NV personnel conducted an on-site noise measurement survey to determine the current levels of traffic and railway noise which included both short term and long term measurements. Measurements were made on three separate occasions which are outlined below:

Date of Measurement	Type of Measurement	Locations
June 29-30	Short Term	A through E
	24 hr	A and F
Sept 13	Short Term	A and B
	24 hr	F and G
October 12-13	Short Term	A, B, D, E, and Z
December 21-22	24 hr	A and B
	Short Term	B and D

Short term measurements were made in seven different locations to determine the noise distribution along I-270. Long term measurements were made in three of those locations to determine the Day Night Average level from Interstate 270 and the railway.

Long term measurements were made in accordance with Montgomery County Standards. This involved noise level measurement and logging for a continuous 24-hour period. During that period, short term Leq values were recorded. These measured levels were in turn used to calculate the Day-Night Average Noise Level or Ldn, which is consistent with the County guidelines. Long term measurements were made in four locations, designated as A, B, F and G, the results of which are provided in the following table:

Noise Measurement Location	Day Night Avg. Noise Level, Ldn	
	With Leaves	*Without Leaves*
A	63.4 dBA	66.4 dBA
B	-	66.0 dBA
F	68.7 dBA/70.8 dBA	-
G	80.2 dBA	-

The exact locations of the measurement points are shown on the enclosed site plan.

Observations

Traffic Noise - While leaves on the trees do not affect the levels measured from the railway, the significant tree buffer along I-270 has some effect. The depth of the buffer ranges between 350 and 500 feet and approximately 60 feet high. Current plans show that a majority of the buffer will remain. To determine the effectiveness of this buffer, measurements were made with trees in full leaf and with trees bare. From these measurements, it was determined that the noise will increase when the leaves are off the trees in areas which are both close to and at elevations lower than the roadway (i.e. Position A).

However, in positions which were at equal elevations to the roadway, the presence or absence of leaves showed no effect.

Results from 24 hour measurements in Positions A and B along with the short term measurements were used to calculate the 24 hour levels in locations B through Z. They are as follows:

Location	Noise Level, dBA Ldn
A	65.2*
B	66.1
D	66.0
E	64.1
Z	64.0

*Logarithmic average of measurements with and without leaves.

From these measurements, a very interesting condition exists. Normally traffic noise levels decrease as one moves further away from the roadway. However in this case, the noise level stays the same and in some cases, actually increases with distance. Because the measurement points close to the roadway are lower in elevation than the roadway, the southbound lanes of the roadway act as a noise barrier to the northbound lanes. As one moves away from the roadway and coincidentally up in elevation, the barrier effect is reduced and the noise level increases. This condition makes delineation of a noise contour very uncertain. Normally one thinks that the noise level in locations further from the roadway than the noise contour will have lower levels than at the contour. In this case, the noise level may be higher than at the contour. For this reason, noise contours have not been delineated along I-270.

Railway Noise - The choice of Position F was based upon the proposed single family housing units along the railway to the west of the site. This location was in clear line of site of the railway and unshielded by cuts in the topography for the tracks. It is within 90 feet of the proposed residential lot lines. Position G was chosen based upon the proposed multistory building. The measured noise levels are as follows:

Noise Measurement Location	Day Night Avg. Noise Level, Ldn
F	69.9 dBA*
G	80.2 dBA

* The logarithmic average of the two measurements made at Point F.

Two types of trains dominated the activity on this line during the surveys: MARC and Freight. One Amtrak train was measured during each 24 hour survey. In all, the number of trains observed during the two 24 hour surveys is as follows:

Date	Total Trains	Freight	MARC	Amtrak	Nighttime* Trains
June 29	49	32	16	1	20
Sept 13	47	25	20	1	19

*10:00 PM to 7:00 AM

All trains are required to sound a horn upon approach to an at-grade crossing, such as the crossing for Metropolitan Grove. The point where the train engineer sounds the horn varies from train to train, however observations during the survey show that the horn blowing for south bound trains does not occur until after the trains have passed Position F. Therefore the horns do not significantly impact position F. The horns are being blown however in the area of the MARC train station. The horn use accounts for the significant difference in measured noise level at positions F and G.

Unlike traffic noise, the noise levels 20 years into the future are not considered when analyzing railway noise. Therefore no "forecasted railway noise" will be determined even with the more detailed analysis.

CCT Impact

Currently the plans for the Corridor Cities Transitway (CCT) through the property are uncertain, however efforts have been made here to account for noise impact from the CCT. Currently there is available from MTA the Draft Environmental Impact Statement (DEIS) for the CCT in the areas of the Watkins Mill Town Center project which includes estimations of noise level impacts based upon light rail use.

Phoenix Noise & Vibration has conducted on site noise measurements of the Baltimore Light Rail activity for comparison to the Draft Environmental Impact Statement (DEIS) of the I-270/US15 Multimodal Corridor Study. Within the DEIS, noise levels from the proposed CCT in the areas of the Watkins Mill Town Center were estimated. The results of the Phoenix NV measurements indicate that light rail service at the CCT would be significantly quieter than the noise levels proposed in the DEIS. The following provides some detail of these findings.

DEIS

The DEIS from Maryland Transportation Authority assumes light rail as the transportation mode for the CCT. This study calculates noise levels from the proposed train operations at select receiver locations. While no receivers were selected in the Casey West area, estimations have been made by Phoenix NV based upon selected receivers in similar conditions to those at Casey West. The results of these estimations indicate that there will be significant impact from the CCT, especially on blocks M and O at Watkins Mill Town Center. This impact is due solely to the fact that the light rail train will be required to blow a horn on approaching the at-grade crossing for Parklands Avenue which leads into Block N. For lots closest to the rail line (40 to 50 feet) the noise level is expected to be 82 to 83 dBA Ldn. Across the tracks at the face of the closest houses in Block N (100 feet away) the noise level will be in the mid 70's.

If the horn was not required, the noise level in all locations would be reduced by 14 to 20 dBA resulting in little or no impact.

Baltimore Light Rail Measurements

On February 21, 2006 on site measurements were made by Phoenix NV in two locations of the existing Baltimore Light Rail system. Measurements were made in accordance with the Federal Transit Administration's "Transit Noise & Vibration Impact Assessment" which specifies measurements at a distance of 50 feet from the railway. Both locations were near the Lutherville light rail stop, just south of the rail's intersection with Business Park Drive.

Measurements were made using a Norsonics Type 118 Precision Sound Level Meter. The instrument was calibrated prior to the survey, traceable to National Institute of Standards and Technology (NIST). The weather conditions were clear and cold (30 to 40 degrees F) with a slight breeze. The site around the measurements was considered acoustically "hard".

The first measurement location, designated as Position A, was about 65 feet south of Business Park Drive, chosen so that warning devises such as horns and bells would be included in the measurements. Upon the train's approach to the crossing the crossing gates are lowered and a bell begins to sound. It was noted that the all train operators sounded the horn for one very short blast, approximately 1 second long, at a distance of 100 feet from the roadway crossing. Just north of this crossing is a loading platform where the train stops to take on passengers. Therefore all the southbound trains are accelerating, which is a very similar condition expected for the Casey West Project. Train speed in this location ranged from 15 to 20 mph. Note that similar short horn blasts were also observed upon approaches to loading platforms. Also the horns observed at the Baltimore Light Rail system are not as long or nearly as loud as those used for the larger freight or high speed passenger trains.

The second measurement location was further south on the same rail line in an area where the train moves freely at speed. The speed was approximately 20 mph. In this location no horns were being blown. This position is designated as Position B. See attached aerial view of measurement locations.

In accordance with the FTA assessment guidelines, the SEL of each train pass by was measured and the relative SEL calculated. The relative SEL is the fundamental unit used to determine the overall impact of a railway on its surroundings. Please note that this is not the Ldn value which is the governing value used in the analysis; however the Ldn is based upon the relative SELs of the train pass by. The average relative SELs for the two measured positions is as follows:

Position	Relative SEL, avg.	Condition
A	77.1 dBA	Horn
B	79.2 dBA	No Horn

The important point revealed by these measurements is that there is little or no difference between the 'With Horn' condition and the 'No Horn' condition, as compared to the DEIS analysis which indicates that horn use will increase the noise level by 14 to 20 dBA. This is a significant difference. Note, since both SEL and Ldn values are based upon the dBA scale, the differences between two SELs can be applied the two Ldn values.

From this the noise level impact near the Watkins Mill Town Center at-grade crossing is determined to be no higher than the impact without the horn. As mentioned above, this level will be 14 to 20 dBA less than the 83 dBA Ldn stated above. It is concluded that the highest noise level at the proposed houses will be in the range of 63 to 69 dBA Ldn, considered 'no' to 'moderate' impact.

As a side note, in conversation with MTA's Rick Kiegel, project manager for the CCT through Gaithersburg, he stated that the Light Rail system in Baltimore has the one of largest engine/car sizes of any light rail in the United States. He also stated that these cars are considered very quiet and that train technology is only expected to improve (i.e. get quieter) by the time the CCT is installed in Montgomery County.

CCT Conclusion

Based upon the DEIS values for no horn condition and the on site measurements of the Baltimore Light Rail system, the impact upon the proposed residential living units at Blocks M and O will be in the range of 63 to 69 dBA. These levels of impact can easily be mitigated by architectural modifications and localized noise barriers for the indoor and outdoor noise, respectively.

Computer Modeling

In order to determine the future noise impact on the property as well as the effects of topographical changes and the addition of buildings, the Watkins Mill Town Center site was computer modeled using the Federal Highway Administration's Traffic Noise Model (TNM). This is a three dimensional model capable of determining traffic noise levels based upon roadway characteristics such as width, grade, and speed, traffic volumes, site topography and ground cover, and distances to the roadway. Information from the site survey, the current the site plan, and proposed grading plan was used to create the computer model.

Current Calibration Run

A model was first created which produced noise level results that match the actual on site measurements by Phoenix NV. This is referred to as the calibration or current run. The site was modeled "as is" with current roadway layout and significant topographical features, including the large tree stand situated between the property and I-270. While TNM is not truly designed to model railway noise, railway noise can be simulated in TNM by modeling only heavy trucks slowly moving along the railway. The volume of the heavy trucks was adjusted to produce results which matched the measured noise level in the field. Using TNM in this way enables it to be used as a propagation tool for determining the noise from the railway at various distances with different intervening topographical features and future buildings. The results of the current run are presented in the following table along with the measured noise levels for comparison.

Noise Measurement Location	**Day Night Avg. Noise Level, Ldn dBA**	
	Current Model Run Results	On site Measured Results
A	65.4	65.2
B	68.4	66.1
F	70.0	69.9
G	79.3	80.2

The results are within a margin of error that is considered acceptable for this study. While the model slightly over predicts at Location B, the results were accepted which produces a more conservative analysis.

Future Run

After the creation of the current run, a Future Run was created to determine the effects several changes in the transportation noise on the site. These changes include the following:

- additional traffic on the Interstate 270
- addition of Watkins Mill Road
- barrier effect of new I-270 exit/entrance ramps
- effects of site grading
- removal of trees for both Watkins Mill Road and the ramps
- combined effects of intersecting roadways and railways
- addition of the CCT

Two models were created for the future condition, one to determine noise levels at the ground level, a second to determine the noise impact at upper levels.

Existing and future traffic volumes and composition for I-270 and Watkins Mill Road were obtained from either Maryland State Highway Administration or The Traffic Group. Specific data used for this analysis are as follows:

Roadway	I-270	Watkins Mill Road
Current Volume (AADT)	164,181 vpd	NA
Future 2025 Volume (AADT)	213,500 vpd	64,939 vpd
Posted Speed	55 mph	45 mph
% Med Trucks	3.81%	2%
% Heavy Trucks	3.13%	1%

Using the most current grading plan, the noise levels were plotted based upon future topographical conditions.

The future modeling results in absence of the buildings were used to delineate the "unmitigated" noise contours. Contours were determined for both the ground level and upper level conditions and are shown on the enclosed site plan. Upper levels were calculated at 25 to 40 feet above the proposed grade to understand the impact on any town homes and between 60 and 90 feet above grade to determine impact on multistory buildings. These contours can be seen on Drawings 1 and 2. As mentioned earlier, given the inconsistent noise variations for areas along I-270, a noise contour was not delineated for I-270.

Those buildings which are situated closest to a noise source, either roadway or railway, will provide shielding to buildings and outdoor areas situated further toward the site center. To determine the amount of shielding, two more models were developed and are referred to as the "With Buildings Condition" runs. In these runs the proposed buildings at the perimeter of the site were modeled as barriers. Due to the complex nature of delineating noise contours in the presence of buildings on the site, post construction or "with buildings contours" have not been determined. (This concept of "mitigated noise contours" is not generally accepted in the noise control industry.) However, more than 100 receiver locations on the site have been modeled in strategic areas in order to show the effect of the placing the buildings on the site. These receivers are located both at building facades and in outdoor

areas. In the building locations, receivers are modeled at ground and upper levels. See Drawings 3 and 4 to see the receiver locations and the resultant noise level after the buildings will be constructed.

A graphical representation of the model is also presented in the appendix. The input and output data for the model runs are not included in the appendix but are available upon request.

Indoor Noise Levels – Building Shell Analysis

By reviewing the results, one can clearly see that the proposed building areas along the transportation corridors will be impacted by noise levels higher than 65 dBA Ldn, however, future buildings will provide significant shielding to areas closer to the center of the project. A house or residential structure of standard construction in today's market will reduce noise levels as high as 65 dBA to an interior noise level of 45 dBA without modification.

Designated outdoor activity areas should not exceed 65 dBA Ldn. Current noise levels expected for tot lots and play courts easily meet this requirement. In areas which currently show rear yards with roadway noise exposure, barriers in the form of walls or berms have been designed and presented in a separate report, "Noise Barrier Designs Casey Property West" for Classic Community Companies, 26 January 2006.

When exterior noise levels rise above 65 dBA it is uncertain whether or not required interior noise levels will be met. It is understood that a majority of the housing units will be faced with brick which greatly increases the noise reducing capabilities of a structure; however, the window types and size are generally the weak link in a building's overall ability to reduce exterior noise to the interior. To insure achievement of required interior noise levels, Sound Transmission Class ratings (STC) of building elements should be specified. Those facades which may require further analysis are indicated with a circled N on Drawing 5.

Based upon currently available (as of 10 August 2007) architectural plans and elevation drawings of the proposed buildings, a building shell noise analysis has been carried out for each room within the proposed residential units exposed to transportation noise across the site. This involved the analysis of 8 different unit types which include:

House Type Analyzed
Bartholomew
Cottage (Currently Unavailable)
Cape Hatteras
Dartmouth
Emory
Fairgate
Michener
Vanderbilt (Currently Unavailable)

Interior noise level is dependant upon the future exterior noise level, the Sound Transmission Class (STC) ratings of the various building components, the amount of exterior wall exposed to the noise, and the size and finish of the room being analyzed. (Sound Transmission Class is a one number rating of a

building element's ability to block noise from one side to another. The higher the STC rating, the more noise blocked.) All of this information is used to calculate the resultant interior noise level of each analyzed room. Since windows and doors are the weak link in a rooms' ability to block noise, the percentages of the exterior surface areas occupied by windows and doors becomes a significant issue. This information is recorded and tracked. If the desired interior noise level is not achieved by a certain design, normally the STC rating of the windows and doors are adjusted accordingly. The required interior noise level for both HUD and Montgomery County is 45 dBA Ldn.

Given the breadth of noise exposure at different locations on the site and the number of house types exposed, an STC Schedule has been developed which breaks down the site by block, lot, house type, and expected outdoor noise level and the resulting STC ratings of windows, walls, and doors required to achieve an interior noise level of 45 dBA Ldn. This schedule is presented in the appendix as well as on the attached site plan, drawing 5. To clarify which units on the site require mitigation, the associated buildings are marked with a circled "N" on the site plan.

According to the current site plans and key lot exhibit, many of the units on this site will include brick facades; some with brick on all four sides and others will full brick fronts and first floor brick on the remaining three sides. The results presented in the schedule follow the key lot exhibit dated 3 August 2007 for units shown with brick on all four sides. This established the STC of the exterior walls at a fixed 56 STC. Where there is an option on the siding, the STC rating of the unit was adjusted according to the need.

The following paragraphs are offered to indicate what is required to achieve the various STC ratings for building elements listed in the STC Schedule.

An exterior wall constructed of 2x4 wood studs, a minimum exterior layer of cementous siding ("Hardi-Plank") and either ½-inch exterior grade drywall, OSB, or plywood with an interior layer of drywall and 3½ inches of fiberglass batt in the cavity will achieve a rating of 43 STC.

An exterior wall constructed of 2x4 wood studs, a minimum exterior layer of cementous siding ("Hardi-Plank") and either ½-inch exterior grade drywall, OSB, or plywood mounted on resilient channel (RC-1) with an interior layer of drywall and 3½ inches of fiberglass batt in the cavity will achieve a rating of 47 STC.

An exterior wall constructed of 2x4 wood studs, 4-inch brick façade and an interior layer of drywall and 3½ inches of fiberglass batt in the cavity will achieve a rating of 56 STC.

Properly constructed, a ½-inch insulated window composed of two ⅛-inch panes separated by a ¼-inch air space is capable of achieving a rating of 28 STC.

Properly constructed, a ½-inch insulated window composed of two ⅛-inch panes separated by a ¼-inch air space with an integrated storm window ("triple pane") is capable of achieving a rating of 34 to 36 STC.

Properly construction, a standard insulated metal door with a magnetic weather strip is capable of achieving a rating of 28 STC.

Properly constructed, a 1-inch insulated window or sliding glass door composed of two ¼-inch panes separated by a ½-inch air space is capable of achieving a rating of 34 STC.

For all window and door systems, it is strongly recommended that test results from a certified third party laboratory be obtained from prospective suppliers <u>before</u> purchase.

Conclusion

With the proposed STC ratings, Phoenix Noise & Vibration concludes that the interior noise level in the residential units at Watkins Mill Town Center project will be 45 dBA Ldn or less in accordance with City of Gaithersburg and Montgomery County noise standards.

Appendix

Watkins Mill Town Center
STC Schedule
28-Aug-07

Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
E	1	Emory	73	36	43	30
	2	Cape Hatteras	70	30	43	27
	3	Cape Hatteras	70	28	56	27
	4	Cape Hatteras	70	28	56	27
	5	Cape Hatteras	70	30	43	27
	6	Cape Hatteras	70	30	43	27
	7	Cape Hatteras	70	30	43	27
	8	Cape Hatteras	68	27	56	27
	9	Cottage	67		56	
	10	Cape Hatteras	67	27	43	27
	11	Cape Hatteras	67	27	43	27
	12	Cape Hatteras	67	27	43	27
	13	Cape Hatteras	67	27	43	27
	14	Emory	67	27	56	27
	15	Dartmouth	67	27	56	27
	26	Cottage	66		56	
	27	Cottage	66		56	
	28	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	29	Fairgate	66	27	43	27
		Vanderbilt	66			
	30	Fairgate	66	27	43	27
		Vanderbilt	66			
	31	Fairgate	66	27	43	27
		Vanderbilt	66			
	32	Fairgate	66	27	43	27
		Vanderbilt	66			
	33	Fairgate	66	27	43	27
		Vanderbilt	66			
	34	Cape Hatteras	66	27	56	27

* - Indicates facades requiring resilient channel

- Indicates all brick facades

	35	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	36	Fairgate	67	27	43	27
		Vanderbilt	67			
	37	Fairgate	67	27	43	27
		Vanderbilt	67			
	38	Fairgate	67	27	43	27
		Vanderbilt	67			
	39	Bartholomew	67	28	56	27
	40	Dartmouth	69	27	56	28
	41	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	42	Fairgate	71	30	56	28
		Vanderbilt	71		56	
	43	Fairgate	72	30	56	30
		Vanderbilt	72		56	
	44	TBD	72			
		TBD	72			
	45	TBD	72		56	
		TBD	72		56	
	46	Bartholomew	73	36	47*	34
	47	Dartmouth	66	27	56	28
	48	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	49	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	50	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	51	Emory	66	27	56	27
	52	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	53	Fairgate	66	27	43	27
		Vanderbilt	66			
	54	Fairgate	66	27	43	27
		Vanderbilt	66			
	55	Fairgate	66	27	43	27
		Vanderbilt	66			
	56	Fairgate	66	27	43	27
		Vanderbilt	66			
	57	Fairgate	66	27	56	27
		Vanderbilt	66		56	

* - Indicates facades requiring resilient channel

- Indicates all brick facades

Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
F	1	Cape Hatteras	65	27	56	27
	2	Cape Hatteras	65	27	56	27
	3	Cape Hatteras	65	27	56	27
	4	Michener	66	27	56	27
	5	Michener	66	27	43	27
	6	Michener	66	27	43	27
	7	Michener	66	27	43	27
	8	Michener	66	27	56	27
	9	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	10	Fairgate	68	27	43	27
		Vanderbilt	68			
	11	Fairgate	68	27	43	27
		Vanderbilt	68			
	12	Fairgate	68	27	43	27
		Vanderbilt	68			
	13	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	14	Michener	73	36	43	27
	15	Michener	73	34	56	27
	16	Michener	73	34	56	27
	17	Michener	73	34	56	27
	18	Cape Hatteras	73	34	56	28
I	1	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	2	Fairgate	68	27	43	27
		Vanderbilt	68			
	3	Fairgate	68	27	43	27
		Vanderbilt	68			
	4	Fairgate	68	27	43	27
		Vanderbilt	68			
	5	Fairgate	68	27	43	27
		Vanderbilt	68			
	6	Fairgate	68	27	43	27
		Vanderbilt	68			
	7	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	8	Emory	66	27	56	27
	30	Fairgate	67	27	56	27

* - Indicates facades requiring resilient channel

- Indicates all brick facades

	Vanderbilt	67		56	
31	Fairgate	67	27	43	27
	Vanderbilt	67			
32	Fairgate	67	27	43	27
	Vanderbilt	67			
33	Fairgate	67	27	43	27
	Vanderbilt	67			
34	Fairgate	67	27	43	27
	Vanderbilt	67			
35	Fairgate	67	27	43	27
	Vanderbilt	67			
36	Fairgate	67	27	43	27
	Vanderbilt	67			
37	Fairgate	67	27	43	27
	Vanderbilt	67			
38	Fairgate	67	27	43	27
	Vanderbilt	67			
39	Fairgate	67	27	43	27
	Vanderbilt	67			
40	Fairgate	67	27	43	27
	Vanderbilt	67			
41	Fairgate	67	27	43	27
	Vanderbilt	67			
42	Fairgate	67	27	56	27
	Vanderbilt	67		56	
43	Fairgate	68	27	43	27
	Vanderbilt	68			
44	Fairgate	68	27	43	27
	Vanderbilt	68			
45	Fairgate	68	27	43	27
	Vanderbilt	68			
46	Fairgate	70	27	43	27
	Vanderbilt	70			
47	Fairgate	70	28	56	27
	Vanderbilt	70		56	
48	Michener	73	36	43	27
49	Michener	73	34	56	27
50	Michener	73	36	43	27

* - Indicates facades requiring resilient channel

- Indicates all brick facades

Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
M	1	Michener	70	32	56	27
	2	Bartholomew	68	30	43	27
	3	Bartholomew	67	28	56	27
	4	Bartholomew	70	32	56	27
	5	Bartholomew	74	36	47*	34
	6	Fairgate	74	32	56	32
		Vanderbilt	74		56	
	7	Fairgate	74	34	43	34
		Vanderbilt	74			
	8	Fairgate	74	34	43	34
		Vanderbilt	74			
	9	Fairgate	74	34	43	34
		Vanderbilt	74			
	10	Fairgate	74	34	43	34
		Vanderbilt	74			
	11	Fairgate	74	34	43	34
		Vanderbilt	74			
	12	Fairgate	74	34	43	34
		Vanderbilt	74			
	13	Fairgate	74	34	43	34
		Vanderbilt	74			
	14	Fairgate	74	32	56	32
		Vanderbilt	74		56	
	15	Cottage	74		56	
	16	Cottage	71		56	
	17	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	18	Fairgate	70	30	43	27
		Vanderbilt	70			
	19	Fairgate	70	30	43	27
		Vanderbilt	70			
	20	Fairgate	70	30	43	27
		Vanderbilt	70			
	21	Fairgate	70	30	43	27
		Vanderbilt	70			
	22	Fairgate	70	30	43	27
		Vanderbilt	70			
	23	Fairgate	70	30	43	27
		Vanderbilt	70			

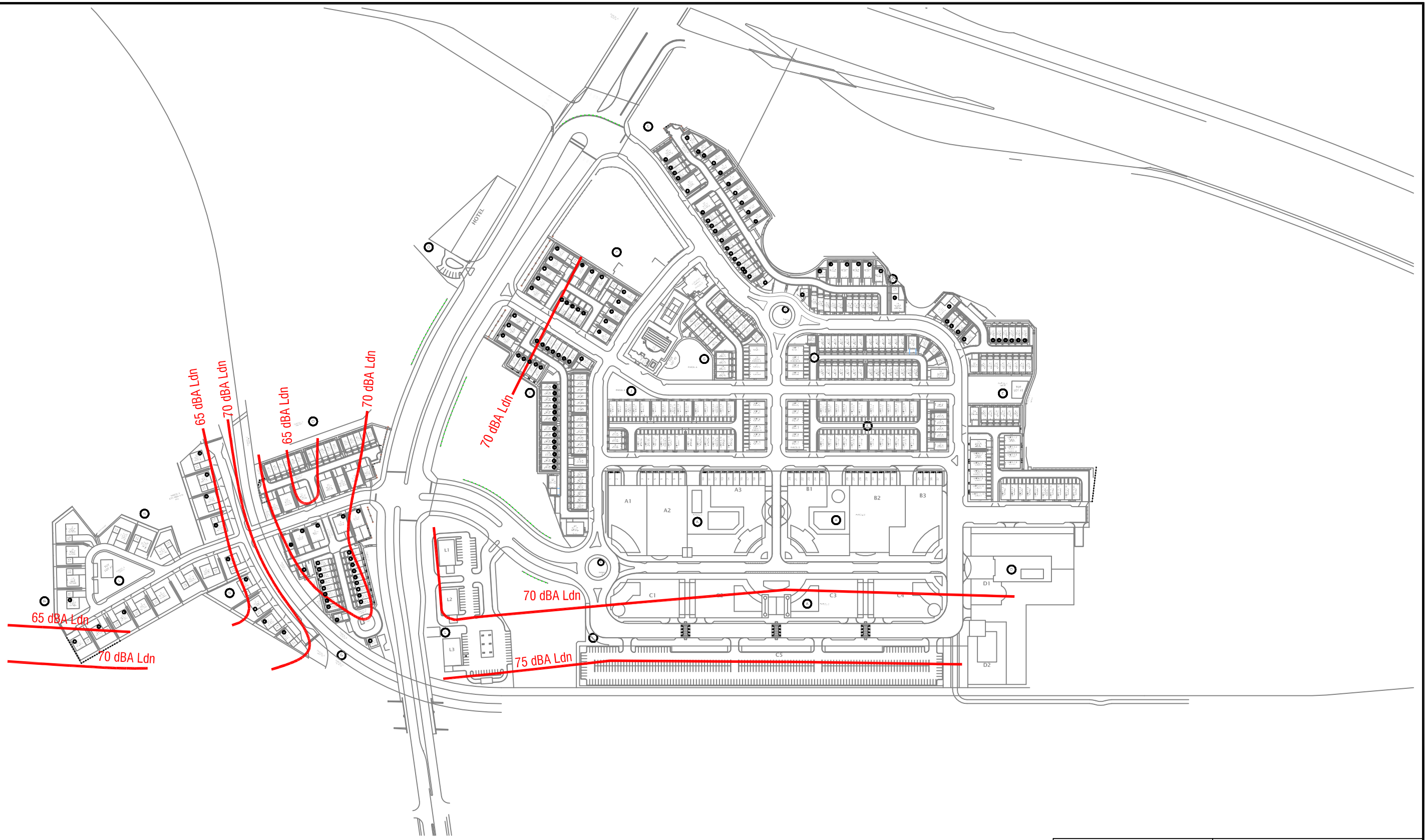
* - Indicates facades requiring resilient channel

- Indicates all brick facades

	24	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	25	Cottage	67		56	
N	**1**	Emory	69	28	56	27
	2	Dartmouth	69	27	56	28
	3	Dartmouth	69	27	56	28
	4	Dartmouth	67	27	56	27
	5	Dartmouth	67	27	43	27
	11	Dartmouth	70	30	43	30
	12	Dartmouth	70	28	56	30
	13	Dartmouth	70	28	56	30
	20	Dartmouth	66	27	43	27
	21	Dartmouth	66	27	56	27
	22	Dartmouth	66	27	56	27
	23	Dartmouth	66	27	56	27
O	**1**	Fairgate	68	27	56	27
	2	Fairgate	68	27	43	27
	9	Fairgate	66	27	56	27
	10	Fairgate	67	27	56	27
	11	Fairgate	69	27	56	27
	12	Fairgate	69	27	56	27
	13	Fairgate	69	27	56	27
	14	Fairgate	73	32	56	32
	15	Fairgate	73	32	56	32
	16	Fairgate	73	32	56	32
	17	Emory	75	36	47*	32
	18	Dartmouth	74	32	56	34
	19	Michener	70	32	43	27
	20	Bartholomew	68	30	56	27
	21	Bartholomew	68	30	56	27
	22	Bartholomew	68	30	43	27
	23	Cape Hatteras	69	27	56	27

* - Indicates facades requiring resilient channel

- Indicates all brick facades

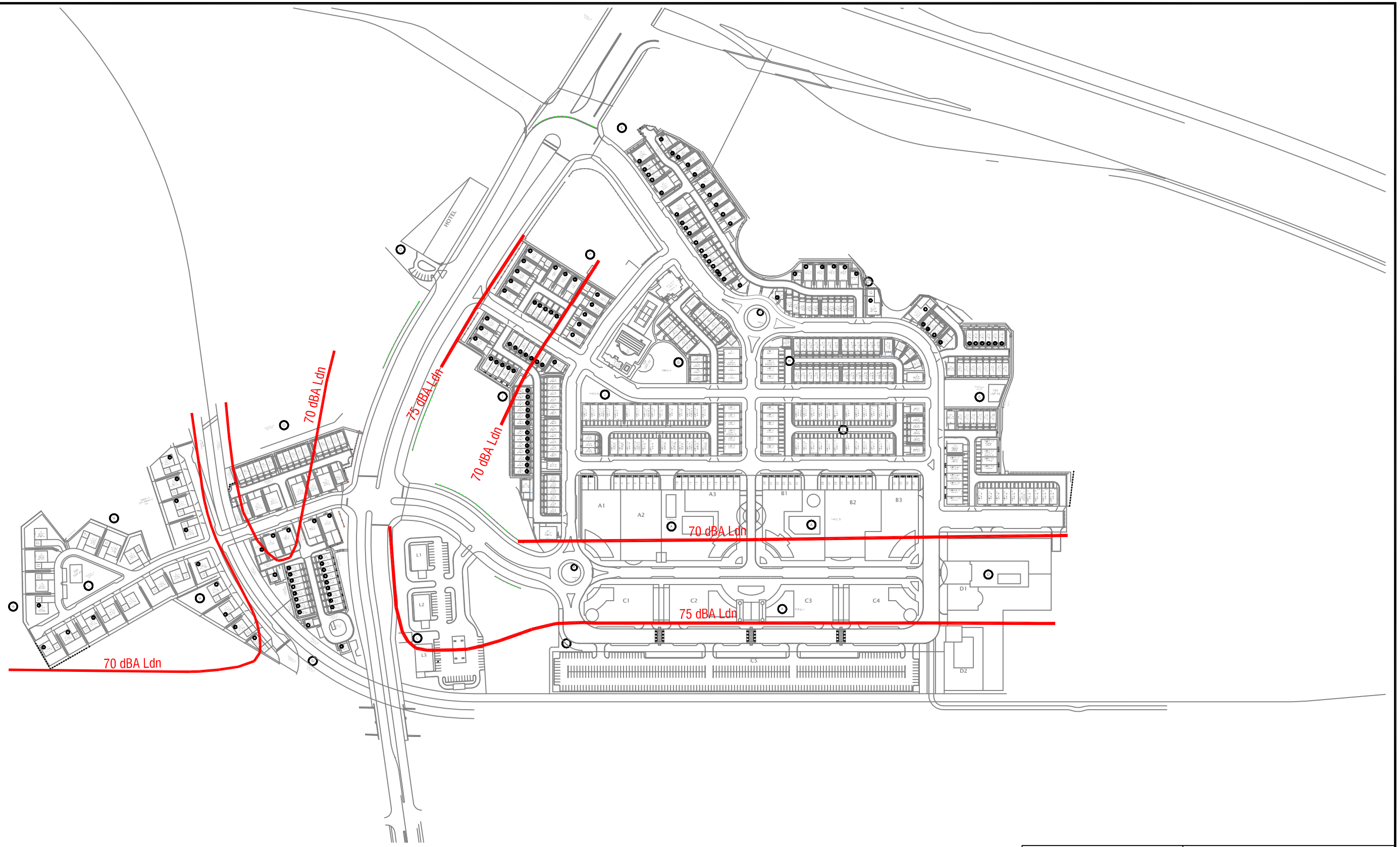


Represents Future Year, unmitigated (in absence of buildings and topography) noise contour, dBA Ldn.

PHOENIX noise & vibration
930 North East Street, Suite 4
Frederick, Maryland 21701
301-846-4227

Watkins Mill Town Center
Ground Level
Noise Contours

DWG. NO.	DATE
1	28 Aug. 2007
SCALE	DRAWN BY
1:300	SMB

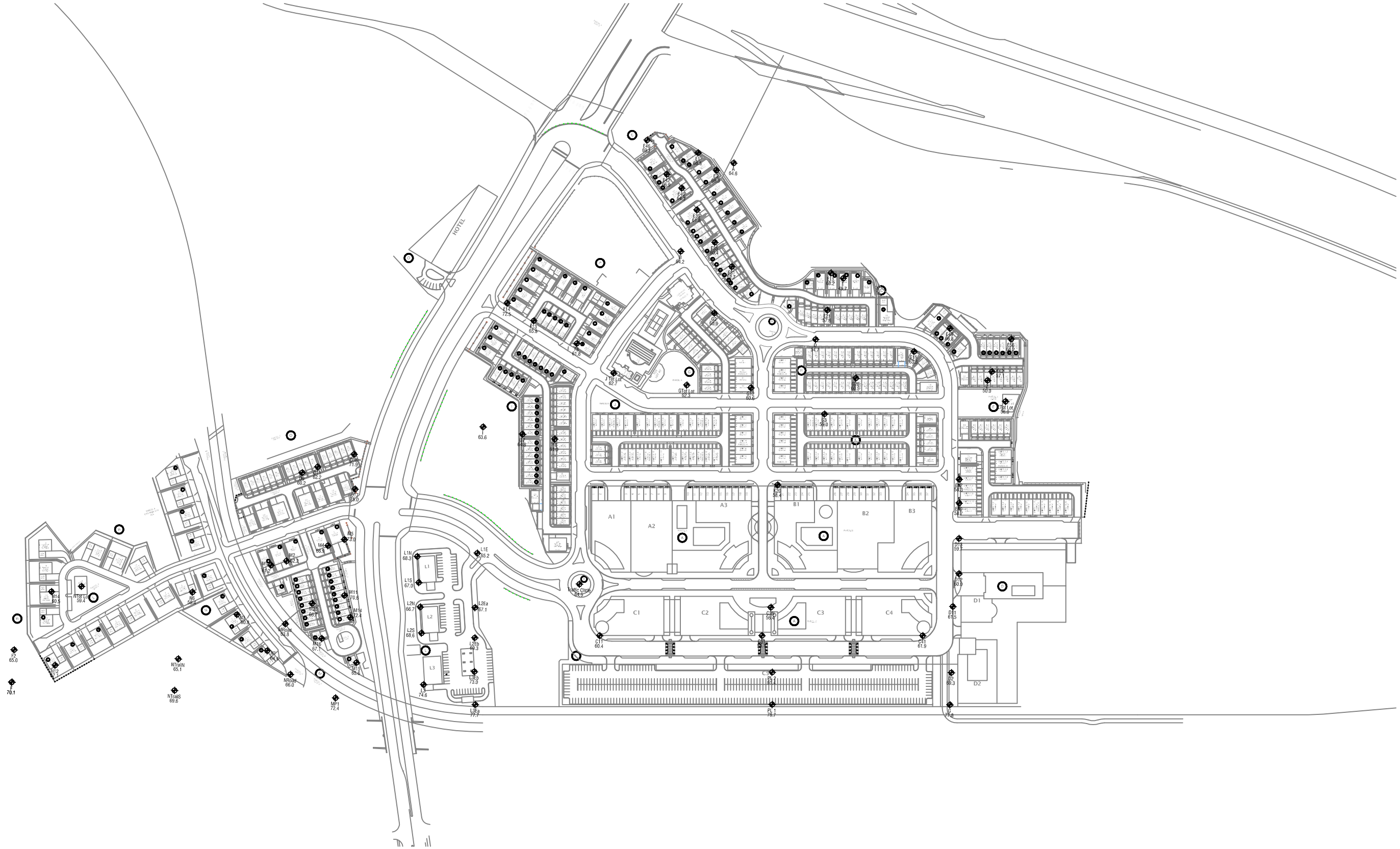


Represents Future Year, unmitigated (in absence of buildings and topography) noise contour, dBA Ldn.

PHOENIX noise & vibration
930 North East Street, Suite 4
Frederick, Maryland 21701
301-846-4227

Watkins Mill Town Center
Upper Level
Noise Contours

DWG. NO.	DATE
2	28 Aug. 2007
SCALE	DRAWN BY
1:300	SMB



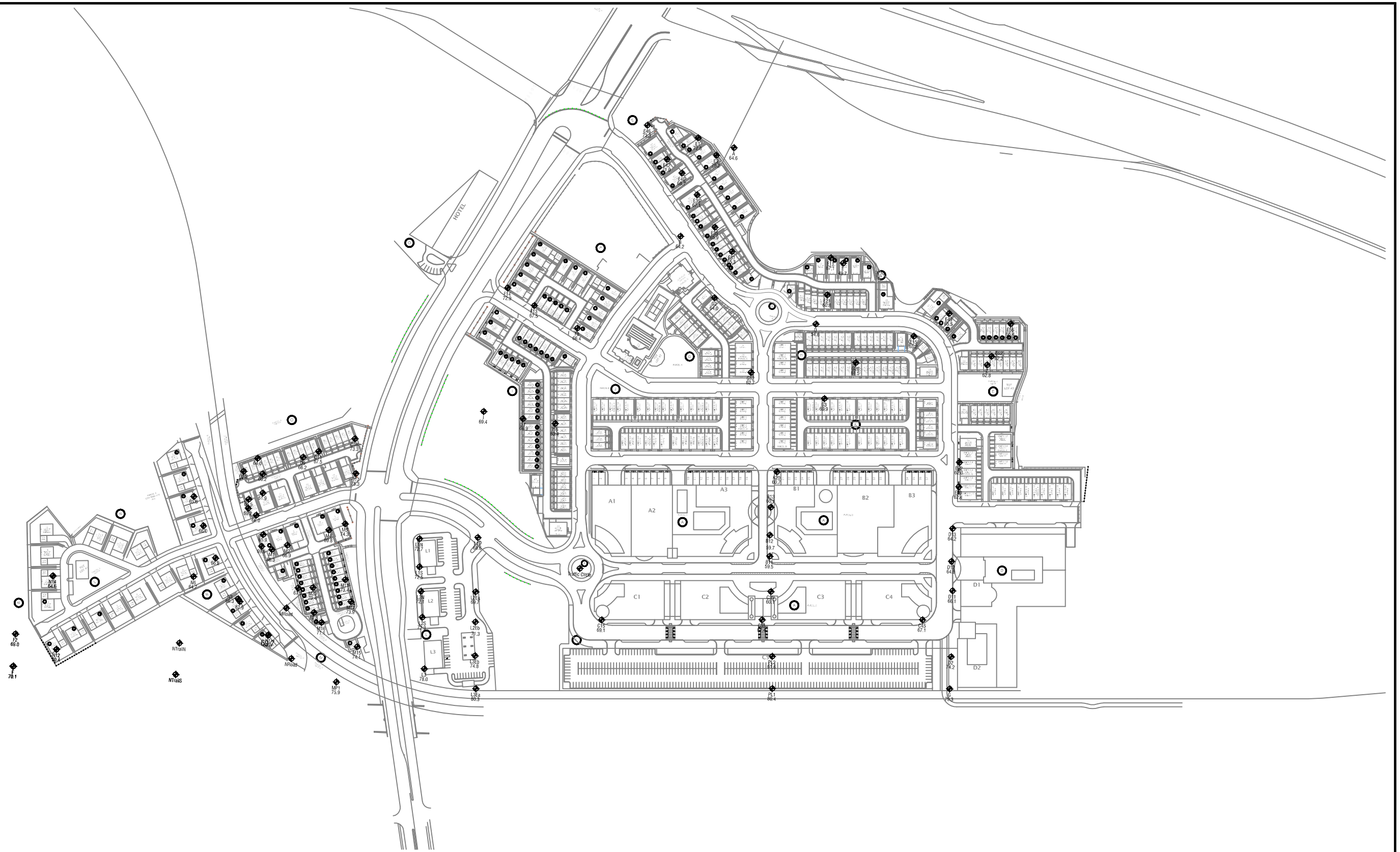
XXX
XX.X

On Site Measurement Point or
Modeled Reciever Point w/ Resultant
Noise Level, dBA Ldn.

PHOENIX
noise & vibration
930 North East Street, Suite 4
Frederick, Maryland 21701
301-846-4227

Watkins Mill Town Center
Ground Level
Noise Impact

DWG. NO.	DATE
3	28 Aug. 2007
SCALE	DRAWN BY
1:300	SMB



XXX
XX.X

On Site Measurement Point or
Modeled Reciever Point w/ Resultant
Noise Level, dBA Ldn.

PHOENIX
noise & vibration

930 North East Street, Suite 4
Frederick, Maryland 21701
301-846-4227

Watkins Mill Town Center
Upper Level
Noise Impact

DWG. NO.	DATE
4	28 Aug. 2007
SCALE	DRAWN BY
1:300	SMB

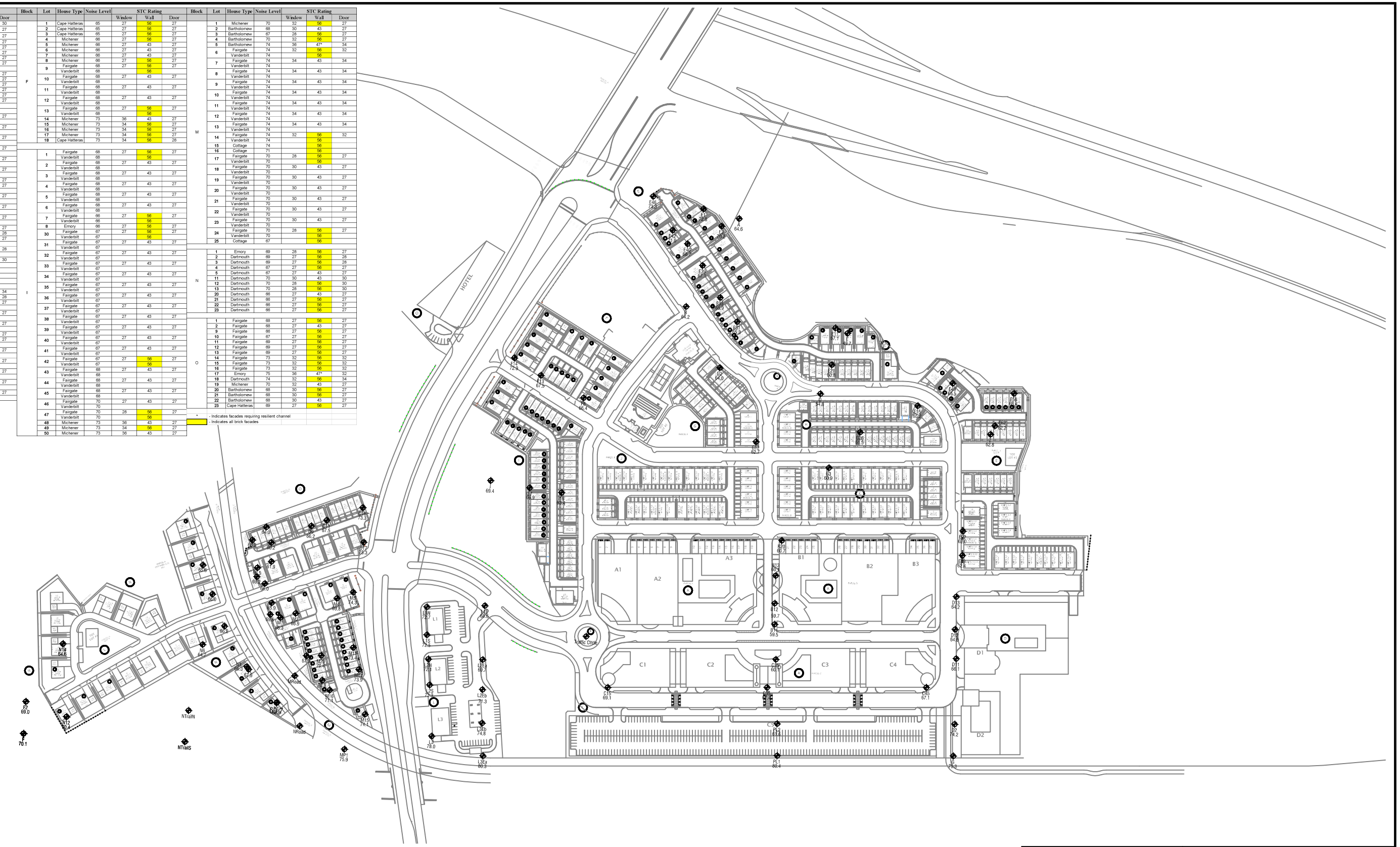
Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
E	1	Emory	73	36	43	30
	2	Cape Hatteras	70	30	43	27
	3	Cape Hatteras	70	28	56	27
	4	Cape Hatteras	70	28	56	27
	5	Cape Hatteras	70	30	43	27
	6	Cape Hatteras	70	30	43	27
	7	Cape Hatteras	70	30	43	27
	8	Cape Hatteras	68	27	56	27
	9	Cottage	67		56	
	10	Cape Hatteras	67	27	43	27
	11	Cape Hatteras	67	27	43	27
	12	Cape Hatteras	67	27	43	27
	13	Cape Hatteras	67	27	43	27
	14	Emory	67	27	56	27
	15	Dartmouth	67	27	56	27
	26	Cottage	66		56	
	27	Cottage	66		56	
	28	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	29	Fairgate	66	27	43	27
		Vanderbilt	66			
	30	Fairgate	66	27	43	27
		Vanderbilt	66			
	31	Fairgate	66	27	43	27
		Vanderbilt	66			
	32	Fairgate	66	27	43	27
		Vanderbilt	66			
	33	Fairgate	66	27	43	27
		Vanderbilt	66			
	34	Cape Hatteras	66	27	56	27
	35	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	36	Fairgate	67	27	43	27
		Vanderbilt	67			
	37	Fairgate	67	27	43	27
		Vanderbilt	67			
	38	Fairgate	67	27	43	27
		Vanderbilt	67			
	39	Bartholomew	67	28	56	27
	40	Dartmouth	69	27	56	28
	41	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	42	Fairgate	71	30	56	28
		Vanderbilt	71		56	
	43	Fairgate	72	30	56	30
		Vanderbilt	72		56	
	44	TBD	72			
		TBD	72			
	45	TBD	72		56	
		TBD	72		56	
	46	Bartholomew	73	36	47*	34
	47	Dartmouth	66	27	56	28
	48	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	49	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	50	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	51	Emory	66	27	56	27
	52	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	53	Fairgate	66	27	43	27
		Vanderbilt	66			
	54	Fairgate	66	27	43	27
		Vanderbilt	66			
	55	Fairgate	66	27	43	27
		Vanderbilt	66			
	56	Fairgate	66	27	43	27
		Vanderbilt	66			
	57	Fairgate	66	27	56	27
		Vanderbilt	66		56	

Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
F	1	Cape Hatteras	65	27	56	27
	2	Cape Hatteras	65	27	56	27
	3	Cape Hatteras	65	27	56	27
	4	Michener	66	27	56	27
	5	Michener	66	27	43	27
	6	Michener	66	27	43	27
	7	Michener	66	27	43	27
	8	Michener	66	27	56	27
	9	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	10	Fairgate	68	27	43	27
		Vanderbilt	68			
	11	Fairgate	68	27	43	27
		Vanderbilt	68			
	12	Fairgate	68	27	43	27
		Vanderbilt	68			
	13	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	14	Michener	73	36	43	27
	15	Michener	73	34	56	27
	16	Michener	73	34	56	27
	17	Michener	73	34	56	27
	18	Cape Hatteras	73	34	56	28
I	1	Fairgate	68	27	56	27
		Vanderbilt	68		56	
	2	Fairgate	68	27	43	27
		Vanderbilt	68			
	3	Fairgate	68	27	43	27
		Vanderbilt	68			
	4	Fairgate	68	27	43	27
		Vanderbilt	68			
	5	Fairgate	68	27	43	27
		Vanderbilt	68			
	6	Fairgate	68	27	43	27
		Vanderbilt	68			
	7	Fairgate	66	27	56	27
		Vanderbilt	66		56	
	8	Emory	66	27	56	27
	30	Fairgate	67	27	56	27
		Vanderbilt	67		56	
	31	Fairgate	67	27	43	27
		Vanderbilt	67			
	32	Fairgate	67	27	43	27
		Vanderbilt	67			
	33	Fairgate	67	27	43	27
		Vanderbilt	67			
	34	Fairgate	67	27	43	27
		Vanderbilt	67			
	35	Fairgate	67	27	43	27
		Vanderbilt	67			
	36	Fairgate	67	27	43	27
		Vanderbilt	67			
	37	Fairgate	67	27	43	27
		Vanderbilt	67			
	38	Fairgate	67	27	43	27
		Vanderbilt	67			
	39	Fairgate	67	27	43	27
		Vanderbilt	67			
	40	Fairgate	67	27	43	27
		Vanderbilt	67			
	41	Fairgate	67	27	43	27
		Vanderbilt	67			
	42	Fairgate	67	27	56	27
		Vanderbilt	67		56	
	43	Fairgate	68	27	43	27
		Vanderbilt	68			
	44	Fairgate	68	27	43	27
		Vanderbilt	68			
	45	Fairgate	68	27	43	27
		Vanderbilt	68			
	46	Fairgate	70	27	43	27
		Vanderbilt	70			
	47	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	48	Michener	73	36	43	27
	49	Michener	73	34	56	27
	50	Michener	73	36	43	27

Block	Lot	House Type	Noise Level	STC Rating		
				Window	Wall	Door
M	1	Michener	70	32	56	27
	2	Bartholomew	68	30	43	27
	3	Bartholomew	67	28	56	27
	4	Bartholomew	70	32	56	27
	5	Bartholomew	74	36	47*	34
	6	Fairgate	74	32	56	32
		Vanderbilt	74		56	
	7	Fairgate	74	34	43	34
		Vanderbilt	74			
	8	Fairgate	74	34	43	34
		Vanderbilt	74			
	9	Fairgate	74	34	43	34
		Vanderbilt	74			
	10	Fairgate	74	34	43	34
		Vanderbilt	74			
	11	Fairgate	74	34	43	34
		Vanderbilt	74			
	12	Fairgate	74	34	43	34
		Vanderbilt	74			
	13	Fairgate	74	34	43	34
		Vanderbilt	74			
	14	Fairgate	74	32	56	32
		Vanderbilt	74		56	
	15	Cottage	74		56	
	16	Cottage	71		56	
	17	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	18	Fairgate	70	30	43	27
		Vanderbilt	70			
	19	Fairgate	70	30	43	27
		Vanderbilt	70			
	20	Fairgate	70	30	43	27
		Vanderbilt	70			
	21	Fairgate	70	30	43	27
		Vanderbilt	70			
	22	Fairgate	70	30	43	27
		Vanderbilt	70			
	23	Fairgate	70	30	43	27
		Vanderbilt	70			
	24	Fairgate	70	28	56	27
		Vanderbilt	70		56	
	25	Cottage	67		56	
N	1	Emory	69	28	56	27
	2	Dartmouth	69	27	56	28
	3	Dartmouth	69	27	56	28
	4	Dartmouth	67	27	56	27
	5	Dartmouth	67	27	43	27
	11	Dartmouth	70	30	43	30
	12	Dartmouth	70	28	56	30
	13	Dartmouth	70	28	56	30
	20	Dartmouth	66	27	43	27
	21	Dartmouth	66	27	56	27
	22	Dartmouth	66	27	56	27
	23	Dartmouth	66	27	56	27
O	1	Fairgate	68	27	56	27
	2	Fairgate	66	27	43	27
	9	Fairgate	66	27	56	27
	10	Fairgate	67	27	56	27
	11	Fairgate	69	27	56	27
	12	Fairgate	69	27	56	27
	13	Fairgate	69	27	56	27
	14	Fairgate	73	32	56	32
	15	Fairgate	73	32	56	32
	16	Fairgate	73	32	56	32
	17	Emory	75	36	47*	32
	18	Dartmouth	74	32	56	34
	19	Michener	70	32	43	27
	20	Bartholomew	68	30	56	27
	21	Bartholomew	68	30	56	27
	22	Bartholomew	68	30	43	27
	23	Cape Hatteras	69	27	56	27

* - Indicates facades requiring resilient channel

- Indicates all brick facades



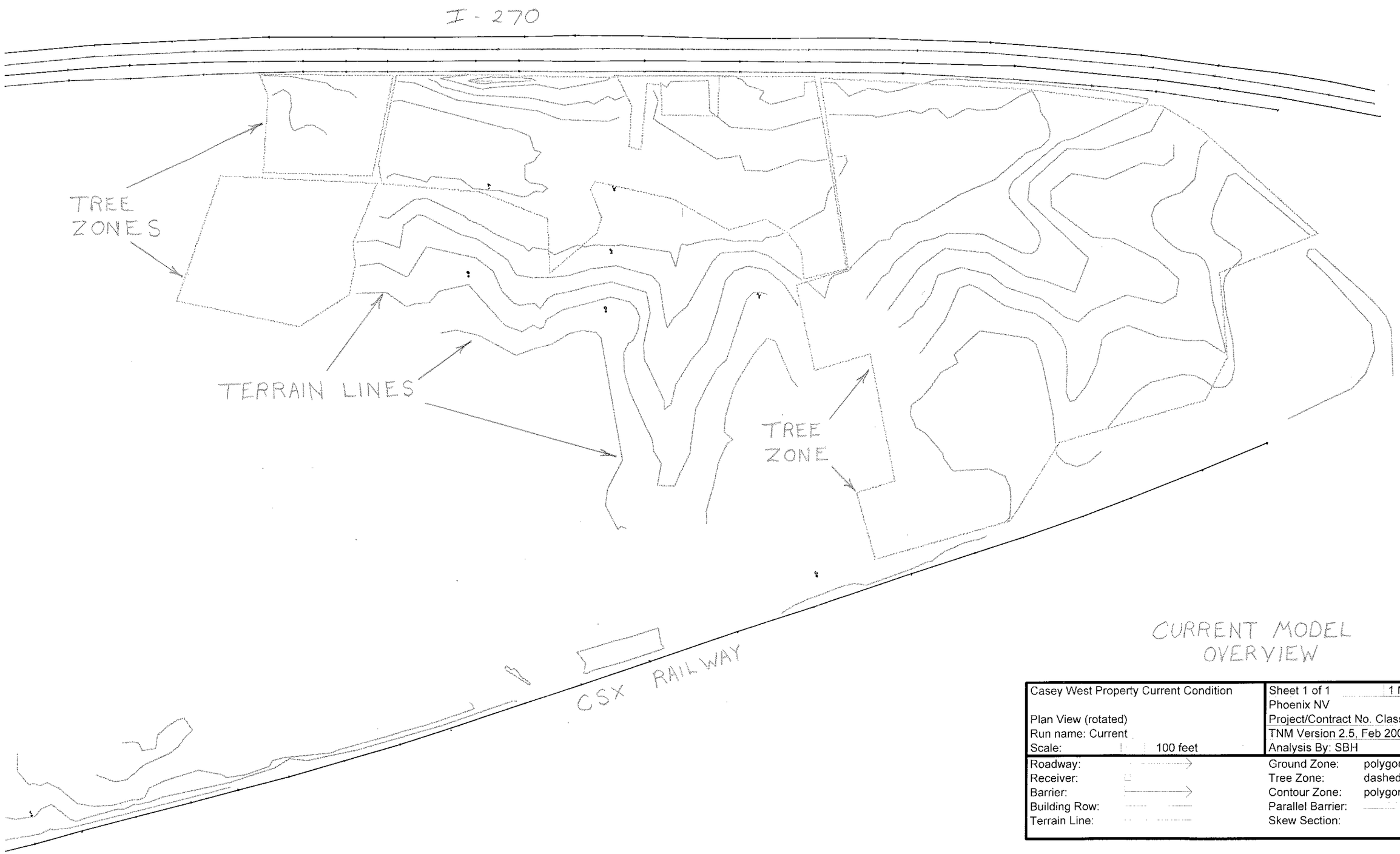
X Future Mitigated Noise Level, Upper Level.
XX.X

N Requires Noise Mitigation.

PHOENIX noise & vibration
930 North East Street, Suite 4
Frederick, Maryland 21701
301-846-4227

Watkins Mill Town Center
Noise
Mitigation Plan

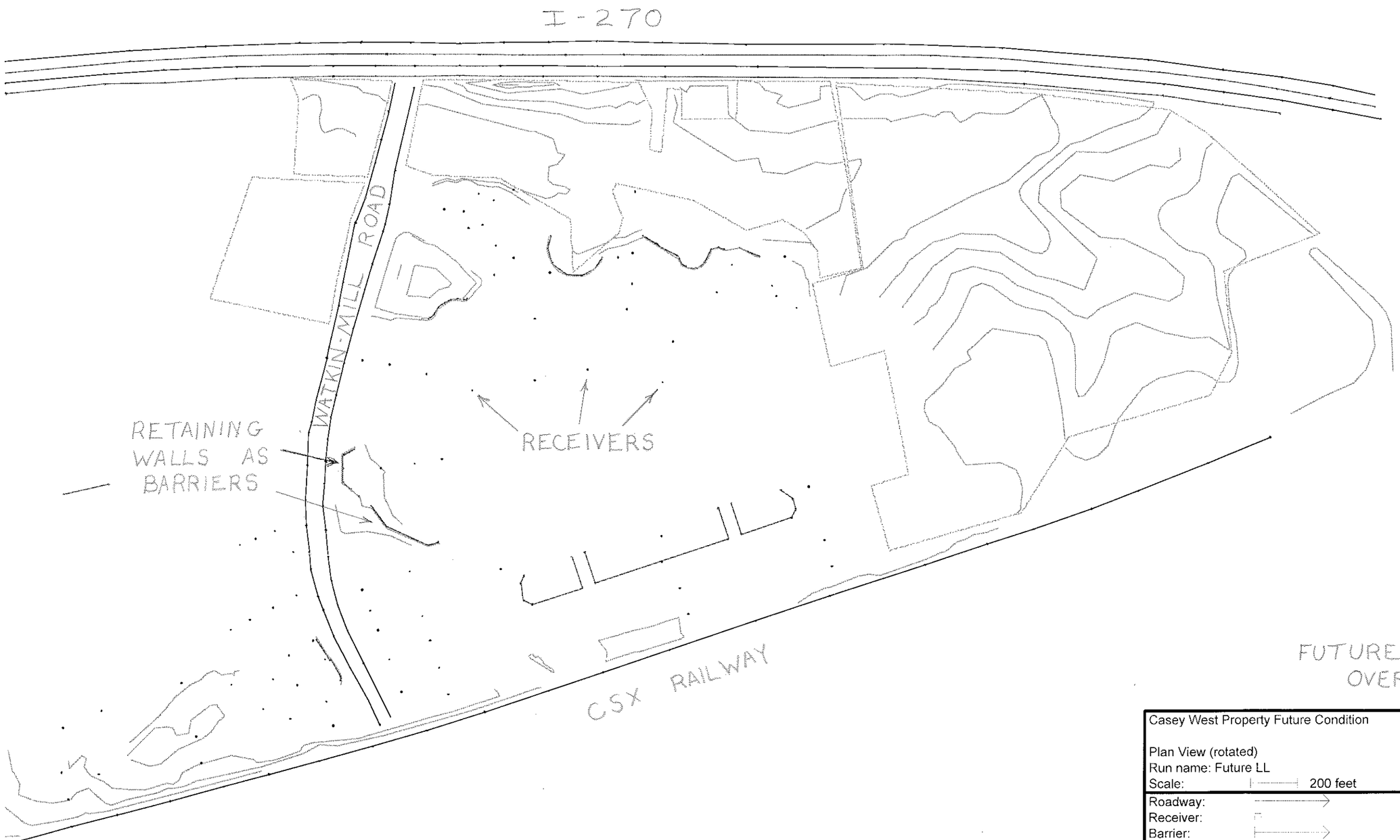
DWG. NO.	DATE
5	28 Aug. 2007
SCALE	DRAWN BY
1:300	SMB



CURRENT MODEL OVERVIEW

Casey West Property Current Condition	Sheet 1 of 1 — 1 Nov 2005
	Phoenix NV
Plan View (rotated)	Project/Contract No. Classic Community
Run name: Current	TNM Version 2.5, Feb 2004
Scale: 100 feet	Analysis By: SBH

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	



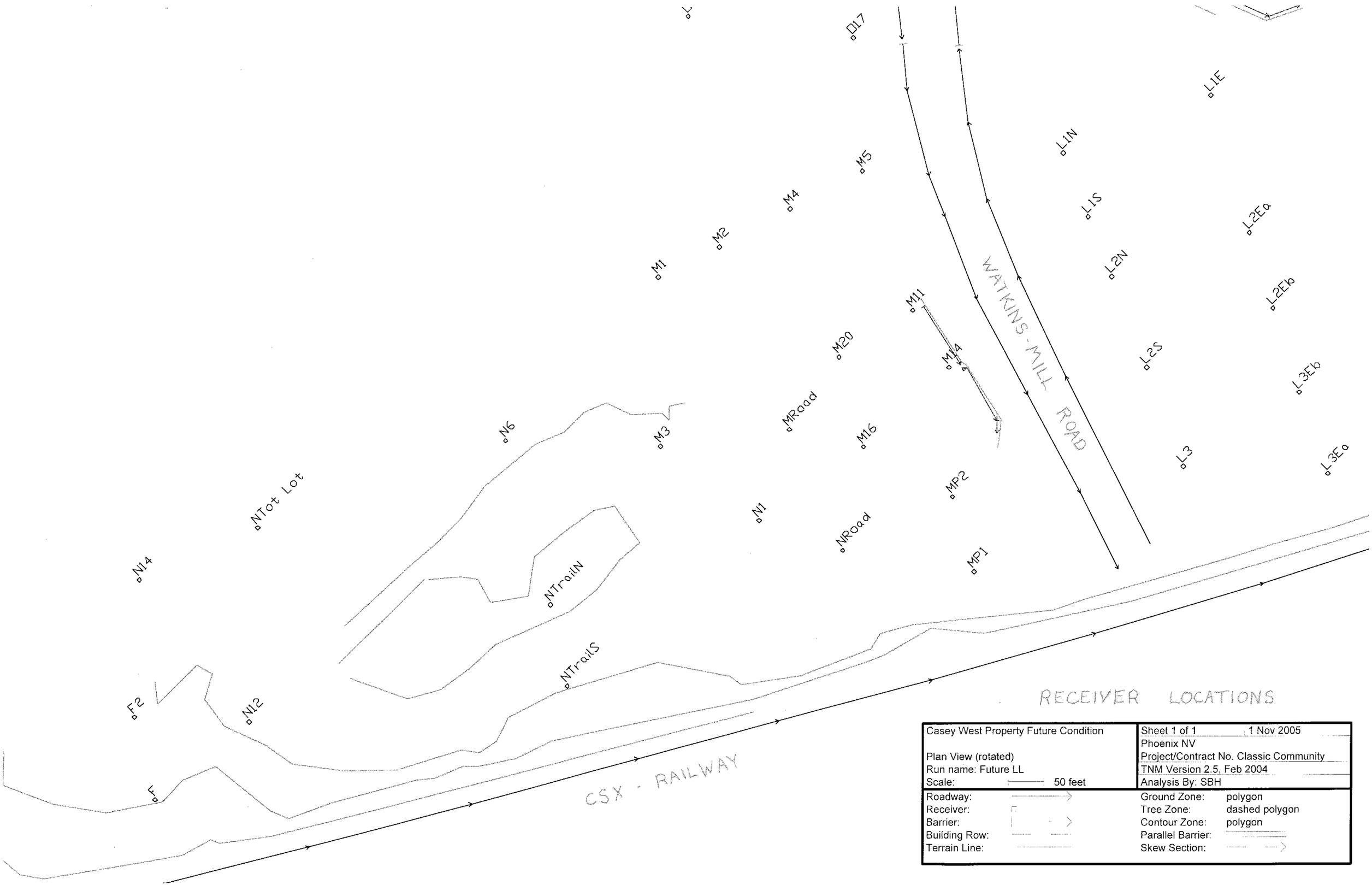
FUTURE MODEL OVERVIEW

Casey West Property Future Condition	Sheet 1 of 1 1 Nov 2005
	Phoenix NV
Plan View (rotated)	Project/Contract No. Classic Community
Run name: Future LL	TNM Version 2.5, Feb 2004
Scale: 200 feet	Analysis By: SBH

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

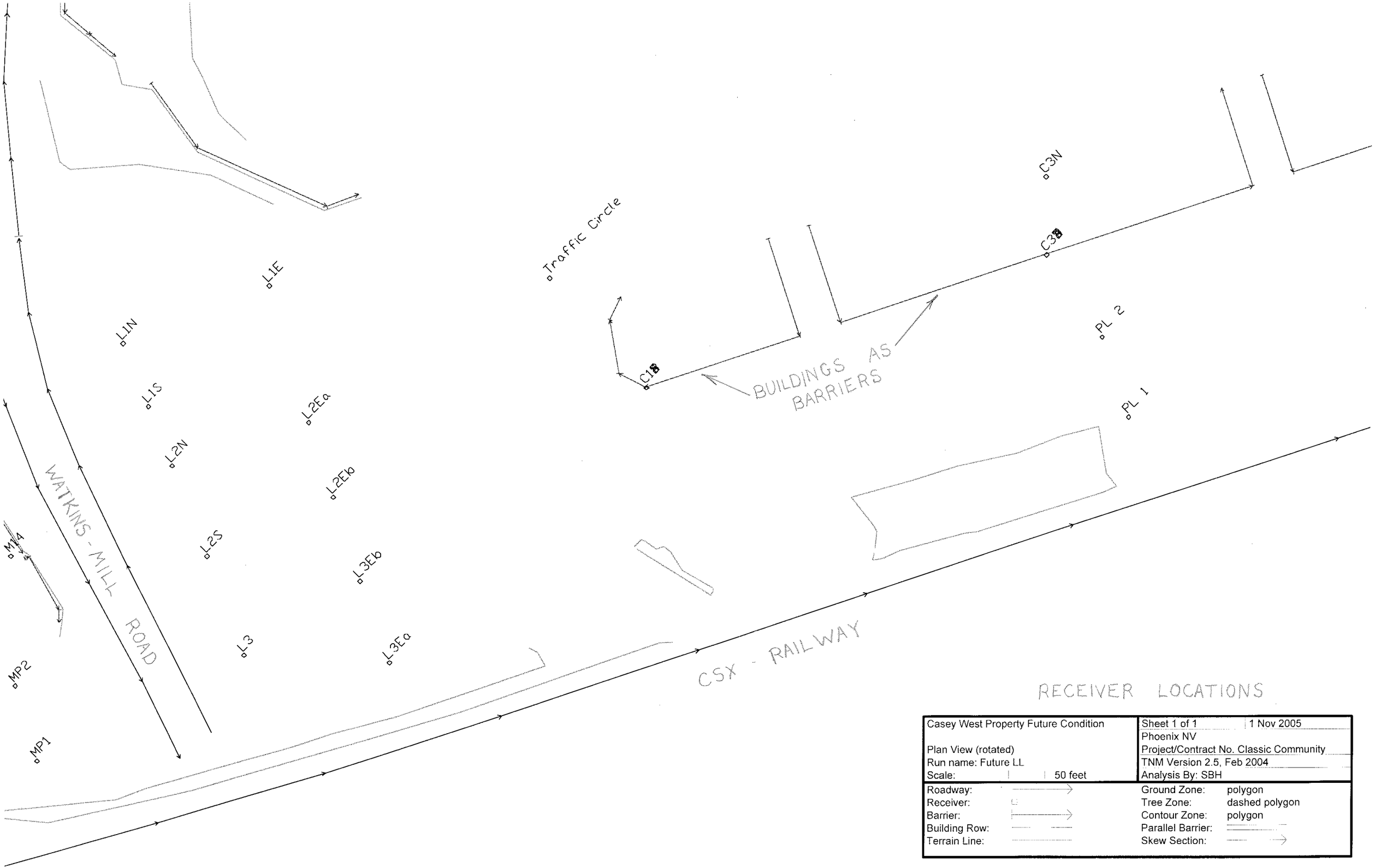
RECEIVER LOCATIONS

Casey West Property Future Condition	Sheet 1 of 1 1 Nov 2005
	Phoenix NV
Plan View (rotated)	Project/Contract No. Classic Community
Run name: Future LL	TNM Version 2.5, Feb 2004
Scale: 50 feet	Analysis By: SBH
Roadway:	Ground Zone: polygon
Receiver:	Tree Zone: dashed polygon
Barrier:	Contour Zone: polygon
Building Row:	Parallel Barrier:
Terrain Line:	Skew Section:



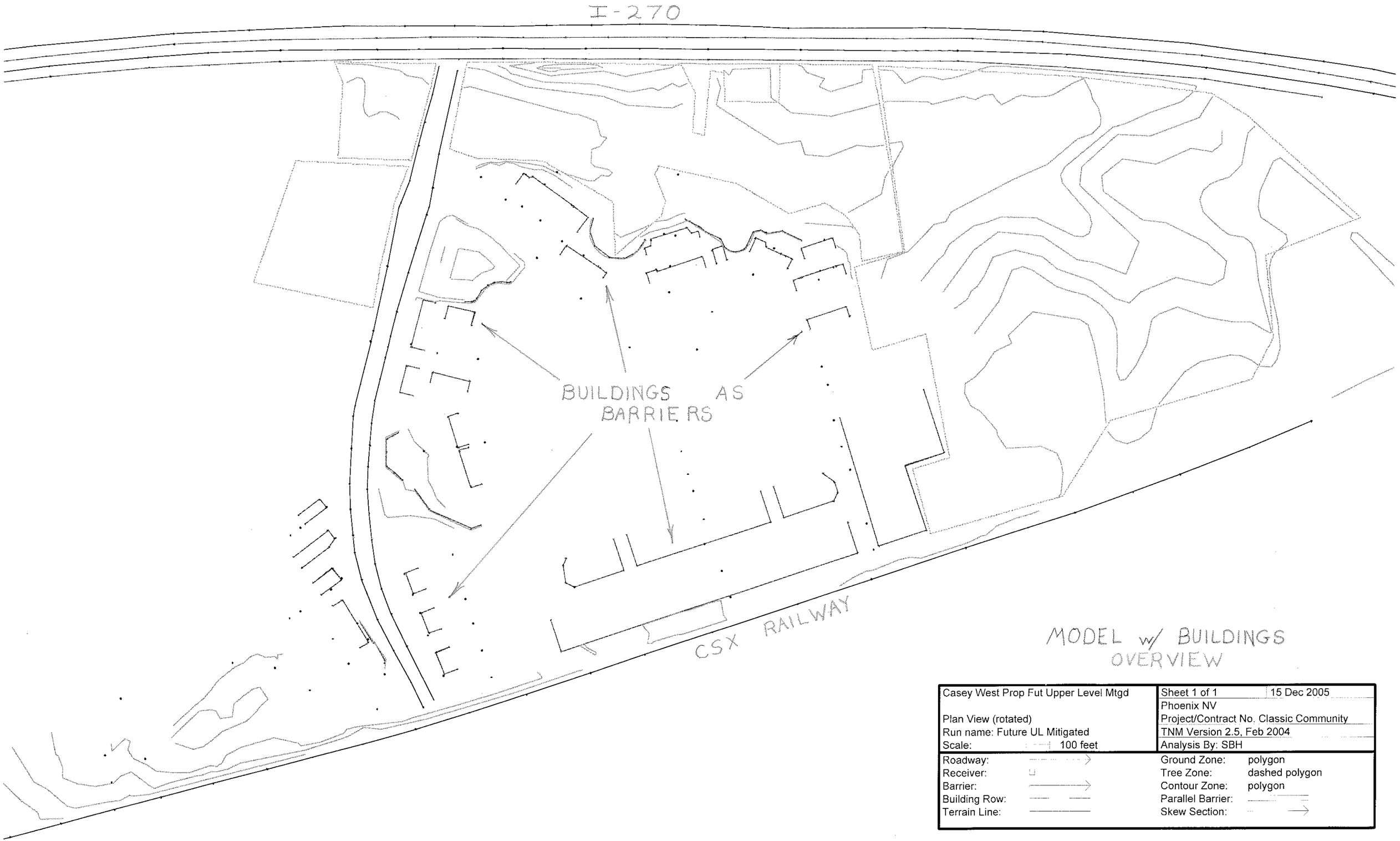
Casey West Property Future Condition	Sheet 1 of 1 1 Nov 2005
	Phoenix NV
Plan View (rotated)	Project/Contract No. Classic Community
Run name: Future LL	TNM Version 2.5, Feb 2004
Scale: 50 feet	Analysis By: SBH

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	



Casey West Property Future Condition	Sheet 1 of 1	1 Nov 2005
	Phoenix NV	
Plan View (rotated)	Project/Contract No. Classic Community	
Run name: Future LL	TNM Version 2.5, Feb 2004	
Scale: 50 feet	Analysis By: SBH	

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	



Casey West Prop Fut Upper Level Mtgd	Sheet 1 of 1 — 15 Dec 2005
	Phoenix NV
Plan View (rotated)	Project/Contract No. Classic Community
Run name: Future UL Mitigated	TNM Version 2.5, Feb 2004
Scale: 100 feet	Analysis By: SBH

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	