

July 11, 2021

Mr. Greg Ruff  
Land Entitlements Manager  
Tri Pointe Homes  
12435 Park Potomac Avenue, Suite 600  
Potomac, MD 20854

Re: Wilgus Property (Northpark at Montrose)  
Indoor Traffic Noise Analysis

Mr. Ruff:

This report summarizes the indoor traffic noise analysis for the Wilgus Property project in Montgomery County, Maryland.

A prior report September 3, 2020, presented outdoor traffic noise levels. Figure 5 from that report is included as Figure 1 below. This figure shows the future Day-Night Average Sound Level (DNL) outdoors at residences on the loudest floor.

This noise analysis was based on the Bellamy, Emery, Sterling, and Quinn interior- and end-unit house DD Set drawings prepared by KTGy dated 4.20.21 (Emery), 4.05.21 (Bellamy), and 4.13.21 (Quinn and Sterling). The drawings show room sizes and types, and window and door sizes. Per your email, exterior walls will be 1/2" gypsum board on 2x6 wood studs with batt insulation, OSB sheathing, and fiber cement siding or brick veneer. On the front façade, brick veneer will be used on all floors of the 2-over-2 units (Bellamy), and at the lower 3 floors for the townhouses (Emery, Sterling, and Quinn) with fiber cement used above and below some windows and at the top floor. Brick veneer will also be used at the end facades in some locations. Windows will likely be by Mi but might also be by Silverline. Per manufacturer's information, these windows have ratings of at least Sound Transmission Class (STC) 27, assuming the windows use double-pane 1/8" (double-strength) glass. The STC rating is a common rating used to describe the sound insulation performance of windows and doors, as well as other products and assemblies. Doors will likely be by Thermatru although they might also be by Mi or Pella. Per manufacturer's information, Thermatru or Pella opaque doors have ratings of STC 23 or higher, and Thermatru, Mi, or Pella glass doors have ratings of STC 25 or higher.

The indoor noise goal is a DNL of 43 dB. It can be seen from Figure 1 that the DNL at the residences will be as high as 73.6 dB. Therefore, the building envelope must reduce noise levels by as much as 30.6 dB.

Sound levels are often expressed for selected ranges of pitches (frequencies). The most common way to divide up frequencies is using one-third octave bands. The Noise Reduction (NR) is the difference between noise levels outdoors and indoors in a single one-third octave frequency band and is calculated based on the noise reduction (NR) in a single one-third octave band, the area of each exterior envelope material (e.g., walls, windows, doors, and roof), the transmission loss (TL) of each exterior envelope material, the surface area of each room finish material (e.g., walls, floors, beds, etc.), and the sound

absorption coefficient of each room finish material. We conservatively assumed that no rooms would have carpeted flooring. The areas of exterior envelope materials were taken from the architectural drawings.

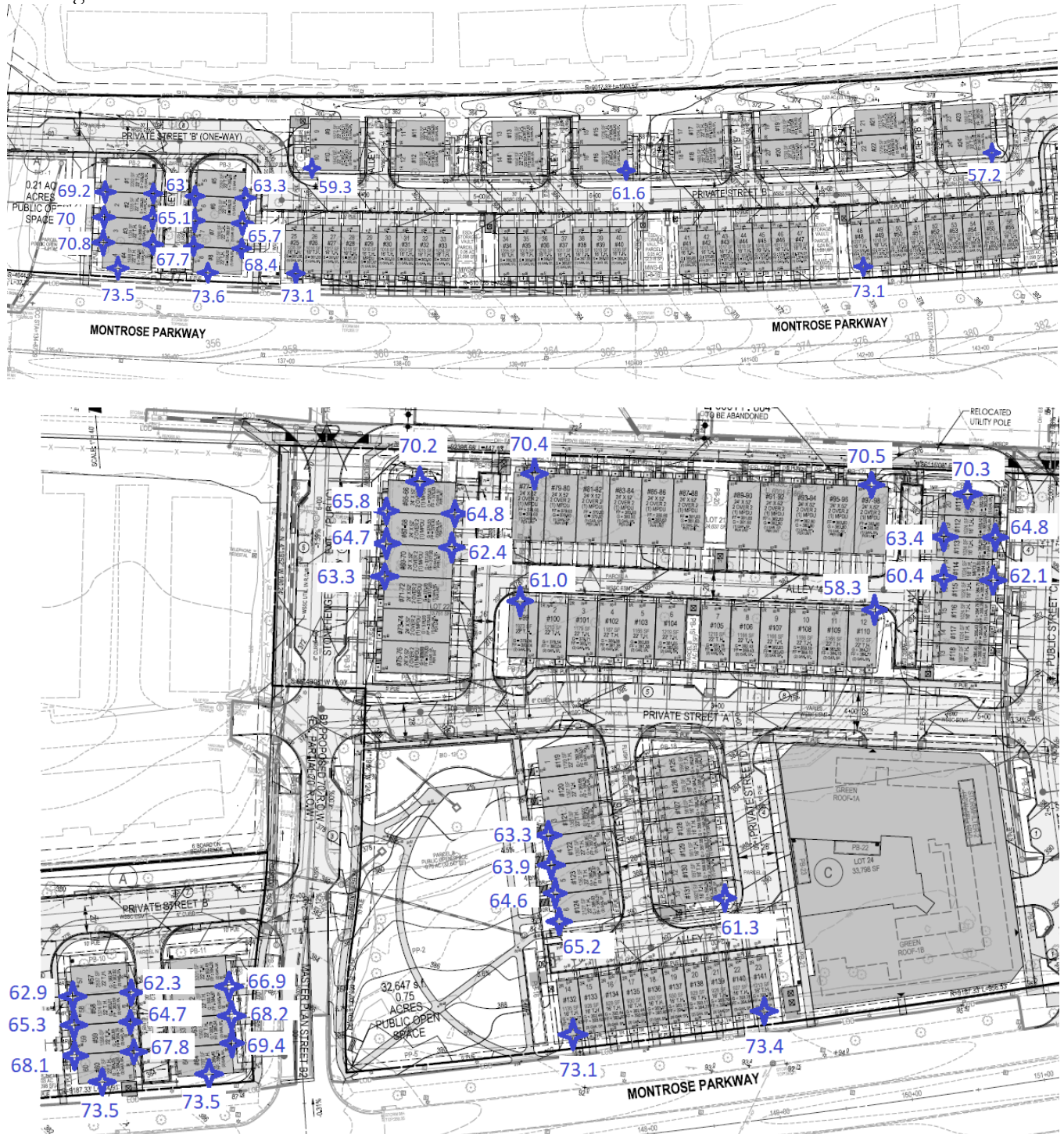


Figure 1. Year 2040 DNL, dB, at Facades of Residences on Loudest Floor

Transmission loss is a laboratory measure of the sound insulation performance in a single one-third octave band of a product or assembly. The transmission losses of the windows and doors were obtained from published test reports provided by various manufacturers; the results were grouped based on ranges of reported STC ratings. Acoustical data for the walls were estimated using a computer model. Since the acoustical performance of the roof will be so much better than that of the walls, windows, and doors, and since the roof is partially shielded from traffic noise, the roof was neglected in our analysis.

The sound absorption coefficient is a value that expresses how much incident sound is absorbed by a room finish material; a value of 0.0 represents no absorption (i.e., complete reflection) while a value of 1.0 represents complete absorption. The areas and sound absorption coefficients of room finish materials were assumed based on typical finishes for the given type of room.

The Noise Level Reduction (NLR) is the A-weighted difference between noise levels outdoors and indoors and is calculated based on the noise level outdoors and the noise reduction values in each frequency band. For the purposes of this calculation, it is not necessary to know the absolute noise level outdoors. Rather, it is only necessary to know how the noise levels vary as a function of frequency; this variation is known as the sound spectrum. The sound spectrum for typical highway noise was obtained from acoustical data in the literature. Table 1 presents the calculated NLR for each room impacted by traffic noise. The second column presents the “base” NLR that would result from off-the-shelf products discussed above. The remaining columns labeled Mod1 to Mod8 show possible modifications/upgrades which include better walls and windows and doors with higher STC ratings. The wall upgrades include “RC” which is to use resilient channels between the studs and interior gypsum board for exterior walls. The indoor DNL can be determined by subtracting the NLR in Table 1 from the DNL in Figure 1. These noise levels are based on the assumption that the rooms are furnished; noise levels in unfurnished rooms will be higher.

In order to reduce the DNL to 43 dB in each room (although the DNL will be 43 to 45 dB in the 1<sup>st</sup> floor and lower level of Sterling/Quinn lots 4, 8, 60, 64, and Emery lots 25-56, 111, 132-141) we recommend using the upgrades shown in Figure 2. These reference the “mods” of Table 1 which are:

- Mod8 which is resilient channels and STC 35 windows and doors for Sterling/Quinn lots 4, 8, 60, 64, and Emery lot fronts 25-56, 111, 132-141; red in Figure 2 (resilient channels are not needed for the front facades of: Quinn Style 1 on the lower 3 floors, or Quinn Styles 2&3 and Emery & Sterling on the lowest floor, or for the end facades on the lowest floor of all units, since there is 100% brick veneer in those locations)
- Mod7 which is resilient channels and STC 34 windows and doors for Bellamy lots 65-66, 77-78, 87-90, 97-98; purple in Figure 2 (resilient channels are not needed at the front facades on all floors or for the end facades on the lowest floor)
- Mod6 which is resilient channels and STC 33 windows and doors for Sterling/Quinn lots 1-3 (front), and Bellamy lots 79-86 (front), 91-96 (front); blue in Figure 2
- Mod4 which is resilient channels and STC 31 for Sterling/Quinn lots 7, 59, 63; green in Figure 2
- Mod3 which is STC 29 for Sterling/Quinn lots 3 (rear), 61-62 (front), 124 (front); gray in Fig. 2
- Mod2 which is STC 28 for Sterling/Quinn lot 6, and Emery lot 112 (front), Bellamy 67-68 (front); gold in Figure 2
- Mod1 which is STC 27 for Sterling/Quinn lot 58, 62 (rear); yellow in Figure 2

**Table 1. Calculated NLR, dB**

	<b>Base</b>	<b>Mod1</b>	<b>Mod2</b>	<b>Mod3</b>	<b>Mod4</b>	<b>Mod5</b>	<b>Mod6</b>	<b>Mod7</b>	<b>Mod8</b>
<b>Wall upgrade ?:</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>None</b>	<b>RC</b>	<b>RC</b>	<b>RC</b>	<b>RC</b>
<b>Window and door STC:</b>	<b>23-27</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>31</b>	<b>32</b>	<b>33</b>	<b>34</b>	<b>35</b>
<b>Bellamy - mid</b>									
Great (front lower level) - mid	22.3	23.2	24.3	25.7	27.1	27.8	28.7	29.5	31.2
Primary - 1st Fl Front - mid styles 1,2	23.5	23.5	24.4	26.1	27.5	28.4	29.3	30.1	31.5
Primary - 1st Fl Front - mid style 3	22.7	22.7	23.5	25.2	26.5	27.6	28.6	29.3	30.7
Dining - 2nd fl front - mid - styles 1,2	22.9	22.9	23.8	25.5	26.9	27.8	28.8	29.6	30.9
Dining - 2nd fl front - mid - style 3	22.1	22.1	22.9	24.6	26.0	27.0	27.9	28.7	30.0
Front Primary/Bed #2 3rd fl mid	23.8	23.8	24.7	26.5	27.9	28.6	29.6	30.4	31.8
Bedroom #2 1st Fl Rear	24.6	24.6	25.4	26.8	27.8	29.9	30.8	31.5	32.8
Bedroom #3 1st Fl Rear mid	24.7	24.7	25.4	26.8	27.8	30.0	30.9	31.6	32.8
Great - rear 2nd floor - mid, set back 8'	22.9	23.3	24.9	25.5	26.8	27.5	28.3	29.2	31.4
Rear Primary 3rd fl mid	25.3	25.3	26.0	27.3	28.1	30.9	31.7	32.4	33.6
Rear Bed #2 3rd fl mid (Bed #3 same)	24.1	24.1	24.8	26.2	27.2	29.4	30.3	31.0	32.3
<b>Bellamy - End</b>									
Great (front lower level) - end	21.1	21.6	22.6	24.2	25.6	26.3	27.3	28.1	29.6
Primary - 1st Fl Front - end styles 1,2	21.9	21.9	22.8	24.5	25.9	26.8	27.7	28.5	29.9
Primary - 1st Fl Front - end style 3	21.4	21.4	22.2	23.9	25.2	26.3	27.2	28.0	29.3
Dining - 2nd fl front - end - styles 1,2	21.4	21.4	22.2	24.0	25.4	26.2	27.2	27.9	29.3
Dining - 2nd fl front - end - style 3	21.0	21.0	21.8	23.5	24.9	25.8	26.8	27.5	28.9
Front Primary/Bed #2 3rd fl end	23.0	23.0	23.9	25.6	27.0	27.8	28.8	29.5	30.9
Bedroom #2 1st Fl Rear	24.6	24.6	25.4	26.8	27.8	29.9	30.8	31.5	32.8
Bedroom #3 1st Fl Rear end	22.3	22.3	23.1	24.5	25.5	27.6	28.5	29.2	30.4
Bedroom #3 1st Fl Rear end HV	22.5	22.5	23.3	24.8	26.0	27.5	28.4	29.2	30.5
Great - rear 2nd fl - end (set back 8')	22.8	23.1	24.5	25.0	26.0	27.7	28.5	29.4	31.4
Great - rear 2nd - end HV, set back 8'	22.9	23.3	24.9	25.5	26.8	27.5	28.3	29.2	31.4
Bed #3 - rear 3rd floor - end HV	23.1	23.1	23.9	25.4	26.6	28.2	29.1	29.8	31.1
Rear Primary 3rd fl end	23.0	23.0	23.7	25.0	25.9	28.4	29.2	29.9	31.1
Rear Primary 3rd fl end HV	23.1	23.1	23.8	25.2	26.2	28.4	29.2	30.0	31.2
Rear Bed #2 3rd fl end	22.3	22.3	23.0	24.4	25.4	27.6	28.4	29.1	30.4
Rear Bed #2 3rd fl end HV	22.4	22.4	23.3	24.8	26.0	27.5	28.4	29.2	30.5
Rear Bed #3	24.1	24.1	24.8	26.2	27.2	29.4	30.3	31.0	32.3
<b>Emery - mid</b>									
Rec (front lower level) - mid	21.8	22.6	23.7	25.1	26.5	27.3	28.2	29.0	30.6
Dining - 1st Fl Front - mid style 1	22.5	22.5	23.4	25.0	26.2	27.6	28.5	29.3	30.6
Dining - 1st Fl Front - mid style 2	22.6	22.8	24.2	25.1	26.4	27.2	28.1	28.9	30.9
Bed #2 - 2nd fl front - mid - style 1	23.8	23.8	24.6	26.1	27.3	28.9	29.9	30.6	31.9
Bed #2 - 2nd fl front - mid - style 2	23.3	23.6	25.0	25.9	27.3	27.9	28.8	29.7	31.6
Loft - front - mid	24.4	24.0	24.5	25.3	28.0	28.7	30.3	30.4	30.6
Great - 1st fl rear mid (no door)	22.7	22.7	23.5	25.0	26.2	27.9	28.8	29.5	30.8
Great - 1st fl rear mid (door)	23.2	23.5	25.0	25.5	26.5	28.1	28.8	29.8	31.8
Primary Suite - rear 2nd floor - mid	25.2	25.2	25.9	27.2	28.2	30.7	31.5	32.2	33.4
Bed #3 - loft level - rear mid	25.2	25.2	25.9	27.2	28.2	30.6	31.5	32.2	33.4

**Emery - end**

Rec (front lower level) - end	21.1	21.7	22.7	24.3	25.6	26.4	27.3	28.1	29.7
Dining - 1st Fl Front - end styles 1,3	20.4	20.4	21.2	22.9	24.2	25.3	26.2	27.0	28.3
Dining - 1st Fl Front - end style 2	20.4	20.5	21.6	23.0	24.3	25.1	26.0	26.9	28.5
Bed #2 - 2nd fl front - end - style 1,3	23.8	23.8	24.6	26.0	27.1	29.0	29.9	30.6	31.9
Bed #2 - 2nd fl front - end - style 2	22.3	22.5	23.7	24.9	26.2	27.0	27.8	28.7	30.5
Loft - front - end	23.1	22.8	23.4	24.3	26.3	27.9	29.3	29.5	29.9
Great - 1st fl rear end (no door)	21.0	21.0	21.9	23.3	24.5	26.2	27.1	27.8	29.1
Great - 1st fl rear end (door)	21.3	21.5	22.6	23.6	24.6	26.3	27.1	28.0	29.6
Great - 1st fl rear end (no door) HV	21.1	21.1	22.0	23.5	24.8	26.2	27.1	27.8	29.2
Great - 1st fl rear end (door) HV	21.4	21.6	22.9	24.0	25.2	26.2	27.1	27.9	29.7
Primary Suite - rear 2nd floor - end	22.8	22.8	23.5	24.8	25.7	28.2	29.0	29.7	31.0
Primary Suite - rear 2nd floor - end HV	23.0	23.0	23.8	25.3	26.4	28.2	29.1	29.8	31.1
Bed #3 - loft level - rear end	23.5	23.5	24.2	25.3	26.2	29.2	30.0	30.6	31.8

**Quinn - mid**

Rec/Foyer (front lower level) - mid	22.2	22.8	23.8	25.3	26.7	27.5	28.4	29.2	30.8
Study/bed (front lower level) - mid	22.5	22.5	23.4	25.2	26.6	27.4	28.3	29.1	30.5
Foyer (front lower level)	22.0	24.1	25.6	26.4	27.7	28.3	29.1	30.0	32.1
Great - 1st Fl Front - mid styles 1,2	22.7	22.7	23.6	25.3	26.6	27.7	28.6	29.4	30.7
Great - 1st Fl Front - mid style 3	22.8	23.1	24.4	25.3	26.6	27.5	28.3	29.2	31.2
Primary - 2nd fl front - mid - styles 1,2	23.3	23.3	24.1	25.7	27.0	28.2	29.2	29.9	31.3
Primary - 2nd fl front - mid - style 3	23.3	23.6	25.3	25.9	27.2	27.8	28.6	29.5	31.7
Kitchen - 1st fl rear mid (no door) (HV end same)	23.6	23.6	24.4	25.7	26.7	29.0	29.9	30.6	31.8
Kitchen - 1st rear mid (door); HV same	23.5	23.6	24.5	25.6	26.6	28.8	29.6	30.4	31.8
Bed #3 - rear 2nd floor	24.5	24.5	25.2	26.6	27.6	29.9	30.7	31.4	32.7
Bed #2 - rear 2nd floor - mid	24.6	24.6	25.3	26.7	27.7	30.0	30.8	31.6	32.8
Loft - rear - mid	25.8	25.8	26.5	27.6	28.4	31.5	32.3	33.0	34.1

**Quinn - end**

Rec/Foyer (front lower level) - end	21.6	22.1	23.1	24.6	26.0	26.8	27.7	28.5	30.0
Study/bed (front lower level) - end	21.7	21.7	22.5	24.3	25.7	26.5	27.4	28.2	29.6
Foyer (front lower level)	22.0	24.1	25.6	26.4	27.7	28.3	29.1	30.0	32.1
Great - 1st Fl Front - end styles 1,2	20.6	20.6	21.5	23.2	24.6	25.5	26.4	27.2	28.6
Great - 1st Fl Front - end style 3	20.6	20.7	21.9	23.2	24.5	25.4	26.3	27.1	28.7
Primary - 2nd fl front - end - styles 1,2	22.1	22.1	22.9	24.6	25.9	27.0	27.9	28.7	30.1
Primary - 2nd fl front - end - style 3	22.1	22.3	23.7	24.7	26.0	26.7	27.6	28.5	30.4
Kitchen - 1st fl rear end (no door)	23.2	23.2	23.9	25.0	25.8	29.0	29.8	30.4	31.6
Kitchen - 1st fl rear end (door)	23.2	23.2	24.0	25.0	25.8	28.7	29.5	30.3	31.6
Bed #3 - rear 2nd floor	24.5	24.5	25.2	26.6	27.6	29.9	30.7	31.4	32.7
Bed #2 - rear 2nd floor - end	22.8	22.8	23.5	24.7	25.6	28.3	29.1	29.8	31.0
Bed #3 - rear 2nd floor - end HV	23.1	23.1	23.9	25.4	26.5	28.3	29.2	29.9	31.2
Loft - rear - end	23.6	23.6	24.3	25.4	26.3	29.2	30.0	30.7	31.8

**Sterling - mid**

Rec (front lower level) - mid	22.2	22.8	23.8	25.3	26.7	27.5	28.4	29.2	30.8
Study/bed (front lower level) - mid	22.6	22.6	23.5	25.3	26.7	27.5	28.4	29.2	30.6
Foyer (front lower level)	23.2	25.3	26.8	27.7	29.0	29.5	30.4	31.3	33.4
Dining - 1st Fl Front - mid styles 1,2	22.6	22.6	23.4	25.1	26.5	27.5	28.4	29.2	30.6

Dining - 1st Fl Front - mid style 3	22.7	22.9	24.3	25.2	26.4	27.3	28.2	29.1	31.0
Primary - 2nd fl front - mid - styles 1,2	23.6	23.6	24.4	26.1	27.3	28.6	29.5	30.3	31.6
Primary - 2nd fl front - mid - style 3	23.6	24.0	25.6	26.2	27.5	28.1	29.0	29.9	32.1
Great - 1st fl rear mid (no door)	22.6	22.6	23.4	24.9	26.0	27.8	28.6	29.4	30.7
Great - 1st fl rear mid (door)	23.1	23.4	24.8	25.3	26.2	27.9	28.7	29.6	31.6
Bed #2 - rear 2nd floor	24.6	24.6	25.3	26.7	27.7	30.0	30.8	31.6	32.8
Bed #3 - rear 2nd floor - mid	24.5	24.5	25.3	26.6	27.6	29.9	30.8	31.5	32.7
Loft - rear - mid	25.8	25.8	26.5	27.6	28.4	31.5	32.3	33.0	34.1
<b>Sterling - end</b>									
Rec (front lower level) - end	21.6	22.1	23.1	24.6	26.0	26.8	27.7	28.5	30.0
Study/bed (front lower level) - end	21.8	21.8	22.7	24.4	25.8	26.6	27.6	28.3	29.7
Foyer (front lower level)	23.2	25.3	26.8	27.7	29.0	29.5	30.4	31.3	33.4
Dining - 1st Fl Front - end styles 1,2	20.4	20.4	21.3	23.0	24.4	25.3	26.2	27.0	28.4
Dining - 1st Fl Front - end style 3	20.4	20.6	21.7	23.0	24.3	25.2	26.1	26.9	28.6
Primary - 2nd fl front - end - styles 1,2	22.4	22.4	23.3	24.9	26.3	27.3	28.3	29.0	30.4
Primary - 2nd fl front - end - style 3	22.4	22.7	24.1	25.0	26.4	27.1	27.9	28.8	30.7
Great - 1st fl rear end (no door)	21.1	21.1	21.8	23.2	24.2	26.4	27.2	28.0	29.2
Great - 1st fl rear end (door)	20.8	21.0	22.2	23.2	24.3	25.7	26.5	27.4	29.1
Great - 1st fl rear end (no door) HV	21.3	21.3	22.2	23.9	25.4	26.2	27.1	27.9	29.3
Great - 1st fl rear end (door) HV	20.9	21.1	22.5	23.5	24.9	25.6	26.4	27.3	29.2
Bed #2 - rear 2nd floor	24.6	24.6	25.3	26.7	27.7	30.0	30.8	31.6	32.8
Bed #3 - rear 2nd floor - end	22.7	22.7	23.4	24.7	25.6	28.2	29.1	29.8	31.0
Bed #3 - rear 2nd floor - end HV	23.0	23.0	23.8	25.3	26.4	28.2	29.1	29.8	31.1
Loft - rear - end	23.6	23.6	24.2	25.4	26.3	29.1	30.0	30.7	31.8

If you have any questions, please contact me at 703/534-2790 or via e-mail at [Gary@HushAcoustics.com](mailto:Gary@HushAcoustics.com).

Sincerely,

Gary Ehrlich, P.E.  
Principal





Figure 2. Recommended Upgrades (see Table 1 for Descriptions)