

# **Noise Assessment of Drive-through Kiosk La Cañada Drive and Naranja Drive**

**Prepared for  
La Cañada Naranja LLC**

**Project Manager  
Bob Schwartz**

In a re-submittal, a letter must be provided that  
responds to all staff comments.

<sup>1</sup>

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R. 1, October 28, 2022**

# Summary of Comments on Sub 4 - Comment Responses (Noise Study).pdf

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 Number: 1      Author: Hannah Oden      Subject: Planning Text Box      Date: 11/3/2022 4:40:20 PM -06'00'

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In a re-submittal, a letter must be provided that responds to all staff comments.

Status

Paul Oland Completed      12/14/2022 4:37:58 PM

 Author: Paul Oland Subject: Sticky Note      Date: 12/14/2022 4:38:12 PM

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Comment responses are provided within this PDF.

## 3. Site Plan Analysis

### 3.1 Methodology

The acoustical site model has been constructed using the iNoise package version 2022.01 developed by DGMR. The sound propagation model is ISO 9613. This software conforms with the ISO/TR 17534-3 quality standard for implementing the ISO 9613 Part 2 outdoor sound propagation model.

1  
As there is no guarantee this business will be a Starbucks, please revise this noise study to reflect that.

### 3.2 Drive-through Kiosk Sound Source

#### 3.2.1 Location

The drive-through kiosk will be located south of the Starbucks building and 190 feet west of the residential properties across La Cañada Drive. The height of the loudspeaker is approximately 18 inches above grade. The distance from the loudspeaker to the customer vehicle is 5 feet in the acoustical model.

#### 3.2.2 Use Cases

A well designed kiosk will often have an automated gain control (AGC) function to adjust the output of the loudspeaker based on the background noise level. The AGC reduces the amount of sound produced at times when the background noise is low such as during nighttime hours. This is useful for kiosks located in areas where there is a large variation in background noise at different times of day such near a highway.

This leads to two use cases. One is when the loudspeaker volume is determined relative to the background noise level. The other is when the background noise is not a factor and the kiosk output is set to achieve a normal conversation level.

In the former case, the equivalent-continuous sound pressure level, LAeq, will be set at 15 dBA above the background noise level. This is a common setting for good speech communication in the presence of noise. In the latter case, LAeq will be set to a sound pressure level of 65 dBA at the customer position.

#### 3.2.3 Zoning Code Requirements

The Oro Valley Zoning Code Section 25.1 gives specific recommendations for maximum allowable sound pressure levels according to receiving land use, time of day, and the characteristics of the sound produced. Speech is considered regular impulsive sound. All equivalent-continuous levels will be adjusted by 5 dBA. This includes the one hour broadband

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 Number: 1      Author: Hannah Oden      Subject: Planning Callout      Date: 11/3/2022 8:48:03 AM -06'00'

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As there is no guarantee this business will be a Starbucks, please revise this noise study to reflect that.

## Status

Paul Oland Completed      12/15/2022 10:03:37 AM

 Author: Paul Oland Subject: Sticky Note      Date: 12/15/2022 10:05:07 AM

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Per Willis: References to Starbucks have been removed. The Starbucks menu board is used as an example of a typical drive-through kiosk.



Location	Land Use	Height Above Grade (ft)	Adjusted Sound Pressure Level (dBA)	0700 – 1900 Hourly Limit (dBA)	Exceeds 0700 – 1900 Hourly Limit	1900 - 2200 Hourly Limit (dBA)	Exceeds 1900 – 2200 Hourly Limit	2200 - 0700 Hourly Limit (dBA)	Exceeds 2200 – 0700 Hourly Limit
1393 W Weeping Wash Way	Commercial	16	29.5	65	no	65	no	65	no
1393 W Weeping Wash Way	Commercial	5	25.2	65	no	65	no	65	no
1381 W Weeping Wash Way	Commercial	16	27.5	65	no	65	no	65	no
1381 W Weeping Wash Way	Commercial	5	22.5	65	no	65	no	65	no
11240 N Scioto Ave	Hospital, Hotel	5	15.0	65	no	60	no	55	no
11182 N Sand Pointe Drive	Commercial	5	22.7	65	no	65	no	65	no
11165 N La Cañada Dr	Commercial	4.9	29.5	65	no	65	no	65	no

**Table 3.2. LAeq Levels at Adjacent Land Uses with No Background Noise**

Location	Land Use	Height Above Grade (ft)	LAFmax (dBA)	0700 – 1900 Max Limit (dBA)	Exceeds 0700 – 1900 Max Limit	1900 - 2200 Max Limit (dBA)	Exceeds 1900 – 2200 Max Limit	2200 - 0700 Max Limit (dBA)	Exceeds 2200 – 0700 Max Limit
1393 W Weeping Wash Way	Commercial	16	39.5	85	no	85	no	85	no
1393 W Weeping Wash Way	Commercial	5	35.2	85	no	85	no	85	no
1381 W Weeping Wash Way	Commercial	16	37.5	85	no	85	no	85	no
1381 W Weeping Wash Way	Commercial	5	32.5	85	no	85	no	85	no
11240 N Scioto Ave	Hospital, Hotel	5	25.0	85	no	80	no	75	no
11182 N Sand Pointe Drive	Commercial	5	32.7	85	no	85	no	85	no
11165 N La Cañada Dr	Commercial	4.9	39.5	85	no	85	no	85	no

**Table 3.3. LAmx Levels at Adjacent Land Uses with No Background Noise**

The land uses above should be limited to single-family and commercial as was done with the previous submittal. Please revise. <sup>1</sup>


### 3.6 Use Case with Road Noise Interference

Acoustical measurements of the roadway noise have not been performed on the proposed site to quantify the background noise levels throughout the day. This part of the analysis will look at the difference between ambient and background sound pressure levels as defined in the Zoning Code at the adjacent properties when the road noise drives the kiosk output to higher levels.

The kiosk is a point source whose sound pressure level decreases 6 dB with every doubling of distance. The roadways generating most of the background sound are line sources. Sound radiating from a line source will decrease 3 dB with every doubling in distance from the centerline of the roadway. Because the sound from the kiosk decreases more rapidly than the roadways, there will be a distance from the kiosk where the sound from the roadways becomes dominant. The purpose of this analysis is to determine whether the noise assessment locations receive more sound from the kiosk or the roadways and if it would be possible to measure the kiosk sound in the presence of the roadway sound.

Roadway line sources have been added to the acoustical model. According to the PAG Travel Data and Forecasting website <<https://pag.public.ms2soft.com/tcds/tsearch.asp?loc=Pag&mod=>>>, La Cañada Drive has a daily traffic count of 16,384 vehicles while Naranja Drive has a daily count of 10,885. This is a sound power level difference of 1.8 dBA. The total

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 Number: 1      Author: Hannah Oden      Subject: Planning Text Box      Date: 11/3/2022 9:06:33 AM -06'00'

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The land uses above should be limited to single-family and commercial as was done with the previous submittal. Please revise.

Status

Paul Oland Completed      12/15/2022 10:03:52 AM

 Author: Paul Oland Subject: Sticky Note      Date: 12/15/2022 10:05:02 AM

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Per Willis: Land uses in the levels tables have been corrected.

sound power of the road sources has been set arbitrarily since no measurements are available.

The unadjusted LAeq of the kiosk at the customer vehicle has been set 15 dBA higher than the road noise at the same location. The adjusted LAeq of the kiosk is 5 dBA higher than this level and the LAmax 15 dBA higher.

Table 3.4 lists the differences between ambient sound pressure level (unadjusted LAeq) and background level with the kiosk operating at 15 dBA above the background level at the customer position. Unadjusted levels are used here because they are not being compared to the Code limits, but to the background noise level in order to determine whether measurements of LAeq and LAmax would be possible. At each noise assessment location the difference of the ambient noise level minus the background noise level is less than 3 dBA. It would therefore not be possible to measure the one hour equivalent-continuous sound pressure level and apply a background noise correction. The maximum sound pressure level, LAmax, is also never exceeds the roadway LAeq background noise level by more than 3 dBA at each of the field points.


Location	Land Use	Height Above Grade (ft)	Ambient – Background (Leq, dBA)	Maximum Level – Background (Lmax, dBA)
1393 W Weeping Wash Way	Commercial	16	0.2	0.6
1393 W Weeping Wash Way	Commercial	5	0.1	-1.4
1381 W Weeping Wash Way	Commercial	16	0.1	-2.7
1381 W Weeping Wash Way	Commercial	5	0.0	-4.7
11240 N Scioto Ave	Hospital, Hotel	5	0.0	-12.2
11182 N Sand Pointe Drive	Commercial	5	0.0	-8.1
11165 N La Cañada Dr	Commercial	5	0.1	-3.5

**Table 3.4. Sound Pressure Level Differences at Adjacent Land Uses in Comparison to Roadway Noise**

The land uses above should be limited to single-family and commercial as was done with the previous submittal. Please revise.

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 Number: 1      Author: Hannah Oden      Subject: Planning Text Box      Date: 11/3/2022 9:08:48 AM -06'00'

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The land uses above should be limited to single-family and commercial as was done with the previous submittal. Please revise.

Status

Paul Oland Completed      12/15/2022 10:04:12 AM

 Author: Paul Oland Subject: Sticky Note      Date: 12/15/2022 10:04:57 AM

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Per Willis: Land uses in the level differences table have been corrected.

## 4. Conclusions and Recommendations


An investigation of the noise impact of a proposed drive-through kiosk at La Cañada Drive and Naranja Drive has been carried out for two use cases. In one case, for daytime hours, the kiosk loudspeaker must overcome the background noise created by the two adjacent roadways. In the other use case for nighttime hours, moderate conversational sound pressure levels produced by the kiosk were evaluated against the sound pressure level limits in Section 25.1 of the Oro Valley Zoning Code. In the daytime use case, kiosk sound levels were found to decrease faster than and fall below the roadway noise levels at the adjacent properties. In the nighttime use case kiosk sound pressure levels were found to meet the limits in Table 25-1.A of the Code.

If the kiosk is operated during evening or nighttime hours an automated gain control (AGC) system may be needed to reduce the kiosk sound level when the background noise level decreases.

The following are guidelines for minimizing the noise impact of the loudspeaker on the surrounding area and optimizing communication with the customer.

- Place loudspeakers as close as possible to the customer in order to reduce the required amplification for necessary for good communication.
- Avoid placing the kiosk on a curve that will force the vehicle farther away from the loudspeaker.
- Aim the loudspeaker away from noise sensitive areas and avoid directing sound upward.
- To the degree possible, locate kiosks so as to utilize vehicles, buildings, and other structures to block the line of sight from the loudspeakers to noise sensitive areas. A menu board or wall can also be used for this purpose.
- Adjust the loudspeaker volume to the minimum necessary for good communication. In most applications, this should not be more than 15 dBA above the background noise level at the customer's vehicle (including the customer's vehicle).
- If necessary, such as may be the case for kiosks that are operated into the evening or nighttime hours, use an automatic gain control (AGC) amplifier to power the loudspeaker. This will reduce the gain to the loudspeaker during times of lower background noise level.
- Don't place the kiosk in a location with high background noise levels that will require increasing the loudspeaker volume for effective communication.

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 Number: 1      Author: Hannah Oden      Subject: Planning Text Box      Date: 11/3/2022 9:26:34 AM -06'00'

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As previously stated, the recommendations on this page will be conditions of approval as part of the CUP as well as the requirement for an automatic gain control.

Status

Paul Oland Accepted      12/15/2022 10:04:34 AM

 Author: Paul Oland Subject: Sticky Note      Date: 12/15/2022 10:04:50 AM

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Per Willis: The AGC is only a recommendation for evening and nighttime operation of the drive-through. This should be evaluated according to the tenant's planned use case.