

March 27, 2023

Paul Sardinha
Dunkin' Franchisee

Ref: Dunkin' Yorktown, NY
Drive Thru Noise Level Analysis

Dear Paul,

We have reviewed the Site Plans received on January 20th, 2023 (dated 12/16/2022), for the proposed Dunkin' Drive-Thru project at 3735 Crompond Road in Yorktown, NY. With respect to meeting applicable noise ordinances, we have analyzed the impact of the two proposed drive-thru kiosks, operational activities involving large trucks, and rooftop mechanical equipment on adjacent residential properties. Our site condition assumptions, calculation methodology, and a summary of the results are provided below. Please note that this report has been issued to address acoustical concerns discussed at the Yorktown Planning Board meeting held on March 13th, 2023.

Summary

The results of our analysis show that the proposed Dunkin' drive-thru kiosk and rooftop HVAC equipment will not significantly raise the ambient noise level to a degree that would generally be considered unreasonable, unnecessary, or excessive. Other operational activities such as deliveries may result in exceedances above criteria at the property line, but are not expected to produce unreasonable, unnecessary, or excessive noise at adjacent residences.

Noise Code & Criteria

Town of Yorktown Noise Ordinance

Chapter 216 (Peace and Good Order) Section 2 of the Town of Yorktown Code states the following regarding unreasonable, unnecessary or excessive noise:

- A. *"No person or persons shall cause, make, create or be the means of causing, making creating or allowing any unnecessary, unreasonable or excessive noise which does or may disturb the peace and quietude within the corporate limits of the Town of Yorktown between the hours of 11:00 p.m. and 7:00 a.m., prevailing time."*
- B. *"Notwithstanding the prohibitions of § 216-2A, no person or persons shall cause, make, create, allow or be the means of causing, making, creating or allowing any unnecessary, unreasonable or excessive noise emanating from or amplified by any sound reproduction system or operating or playing radio, portable tape player, television, tape deck or similar device that reproduces or amplifies sound to an unnecessary, unreasonable or excessive extent or degree, at any hour of any day, prevailing time."*

- C. *“Notwithstanding the prohibitions of § 216-2A, no person or persons shall cause, make, create, allow or be the means of causing, making, creating or allowing any unnecessary, unreasonable or excessive noise emanating from any motor vehicle at any hour of any day, prevailing time. For purposes of this section, the term “motor vehicle” shall have the same definition and meaning as used in the New York State Vehicle and Traffic Law.”*

While the definition of “unnecessary, unreasonable or excessive” noise may be open to interpretation, we recommend that the operation of the proposed Dunkin’ raise the ambient noise level no more than **6 dBA**. Conservatively, during nighttime hours, we recommend the increase over ambient be limited to **3 dBA**. When referring to changes in steady-state ambient noise, a 3 dBA increase over the ambient level is generally regarded as a barely perceptible change. A 5 dBA change is considered readily noticeable. These criteria are recognized by the New York State Department of Environmental Conservation (NYSDEC) and have been used in previous environmental noise impact studies conducted in Yorktown, NY. A 3 dBA increase due to a noise source such as a drive-thru kiosk (voices speaking) is expected to be perceptible, but not expected to create a disturbance. We received confirmation that the proposed Dunkin’ will open at 4:30 AM and close at 10 PM for customers seven days a week, during which the drive-thru kiosks will be in operation. In addition, the following operational activities (Table 1) are expected:

Table 1: Expected Operational Activities

Equipment Type	Frequency	Expected Time of Day
Donut Box Truck	Once Daily	Midnight - 2 AM
18-Wheeler Delivery Truck	Twice Weekly	7 AM - 4 PM
Garbage Truck	Thrice Weekly	7 AM - 4 PM

Given that donut box truck delivery and some kiosk operation will take place during nighttime hours, we have analyzed the noise impacts from these sources, limited to a **3 dBA** increase at the adjacent residences.

We conducted a 24-hour noise monitoring survey to establish the ambient noise levels at the property line. Results of this survey (which help determine acoustical criteria specific to this project) are provided below.

Site Survey Results

Our noise study conducted on site consisted of a 24-hour noise monitor and several 5-minute spot measurements taken at various locations around the property line. The measurement period started at 11 AM on Thursday, January 26th and ended at 11 AM on Friday, January 27th. Measurement locations on site are shown in Figure 1 below.

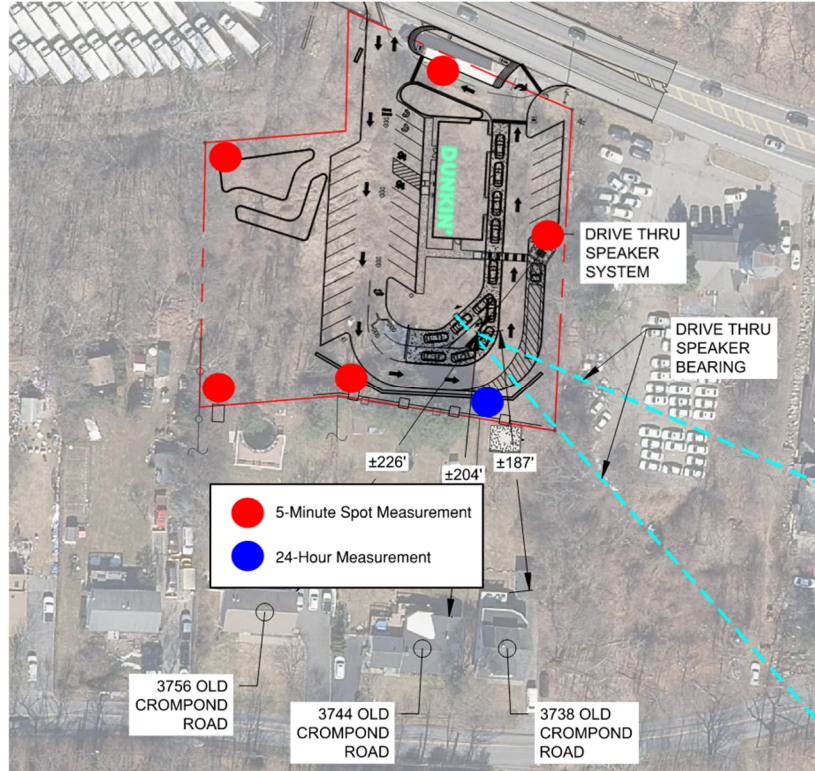


Figure 1: Site Survey Measurement Locations

Results of the 24-hour measurement period are provided in Figure 2 below. A-weighted sound level results (dBA; reported each hour) are provided at the L_{Aeq} thresholds. L_{Aeq} refers to the average equivalent sound level during a given measurement period; A-weighted noise levels are used to account for the relative loudness perceived by the human ear.

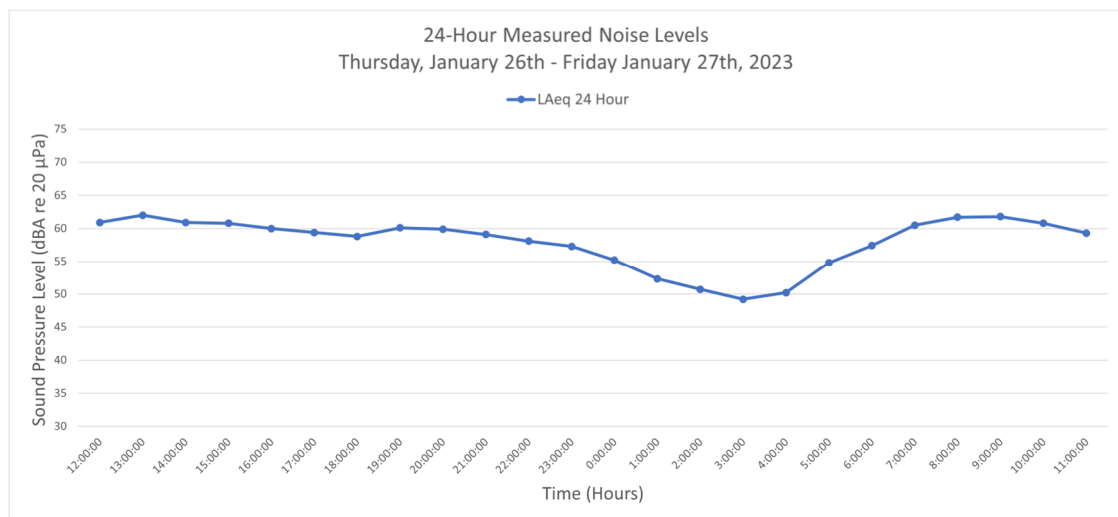


Figure 2: 24 Hour Noise Study Results

As shown in Figure 2 above, the minimum L_{Aeq} during Dunkin' business hours (4:30 AM - 10 PM) was during the 4 AM - 5 AM period, with an ambient noise level of 50 dBA. As stated above, the operation of the proposed Dunkin' should raise the ambient noise level no more than 3-6 dBA, depending on time of day. As such, the criterion used for our analysis of drive-thru kiosk noise was 53 dBA at the receiving property line and 51 dBA at the residences. Results of these calculations are presented in the 'Assumptions and Calculations Results' section of this report.

Drive-Thru Kiosk - Assumptions & Calculation Results

Included in our analysis are the two drive-thru kiosks as shown on the site plan drawings as well as a proposed board-on-board fence. For the drive-thru kiosk loudspeakers, an overall sound pressure level of 90 dBA at a distance of 1 foot was established based on available white papers and our experience with drive-thru audio systems. We note that the proposed system is equipped with "Automatic Volume Control" that will decrease the volume below the 90 dBA when ambient conditions are quieter; based on the manufacturer's information, the loudspeaker will be 15 decibels above ambient to a maximum of 90 dBA, at 1 foot from the loudspeaker. We understand the proposed fence is 8 feet in height at minimum. Our calculations assume worst-case conditions, accounting for two loudspeakers used simultaneously, in which the shortest distance (in plan) to the property line is approximately 55 feet and approximately 185 feet to residential receivers. Residential receivers included in our analysis are shown in Figure 3 below.

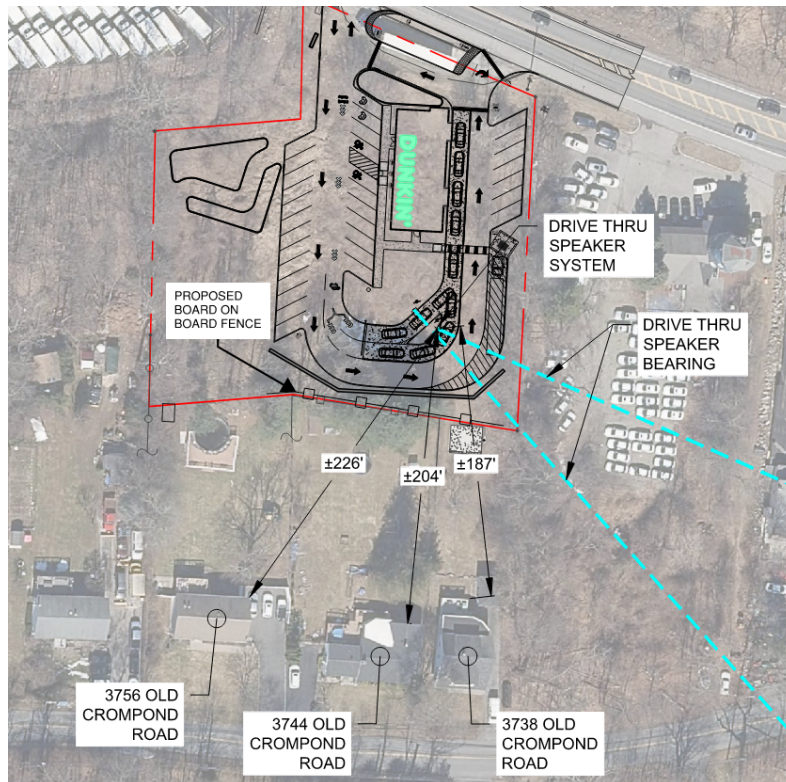


Figure 3: Source and Residential Receiver Locations

Noise propagation calculations include sound attenuation due to distance as well as the proposed 8-foot tall fence serving as a noise barrier by breaking line of sight. Expected noise levels at the nearest (worst-case) property line and residence are presented in Table 2 below.

Table 2: Calculated Noise Levels at Nearby Receiver Locations (Kiosk Noise)

Receiver Location	Calculated Noise Level, dBA	Analysis Criteria, dBA	Minimum Ambient Noise Level*, L_{eq} , dBA	Comments
Residential Property Line	45	53	50	Meets Analysis Criteria
Residence	38	51	48	Approaching Inaudibility

*During Dunkin' business hours

As indicated in Table 2, noise generated by drive-thru kiosk loudspeakers is expected to be below the analysis criteria when received at the property line. With an 8-foot tall fence, noise generated by the drive-thru kiosk is approaching inaudibility at the residences. Our analysis assumes worst case conditions such that each kiosk loudspeaker is operating simultaneously at a level of 90 dBA at 1 foot from the loudspeaker. Additionally, we understand there will be a retaining wall as well as evergreen tree plantings provided at the property line. Both of these elements are included in the total "barrier height" between the Dunkin' and the Residences. The board-on-board fence reaches the highest elevation between noise sources and receiver points and is therefore the focus of any barrier analysis between these areas. Evergreen trees have not been included in our analysis as it would take a deep / dense wooded area to make a truly significant impact. While the trees may provide some additional attenuation, this should be considered a visual / psychoacoustic effect. Given our conservative calculation assumptions, we expect typical operation of the drive-thru kiosks will result in noise impacts less significant than those presented in Table 2.

Additionally, we understand a feature known as Automatic Volume Control or "AVC" can be activated to reduce the output sound level generated by the drive-thru kiosk speakers. With AVC turned on, the speaker output level is limited to 15 dB above the ambient noise level of the surrounding environment. The use of AVC features would cause a significant reduction in overall sound pressure levels generated by drive-thru equipment. Based on measured ambient sound levels (L_{eq}), drive-thru kiosks would operate at an overall sound pressure level of 65 dBA at night and up to 78 dBA during the day. A noisy vehicle at the drive-thru would increase the ambient noise level and therefore the loudspeaker output sound level, but the level will not exceed 90 dBA. With AVC features turned on, sound levels measured at all nearby receivers are expected to meet the established analysis criteria.

Expected Operational Activities - Assumptions & Calculation Results

Our analysis of expected operation activities such as garbage removal and deliveries accounts for noise generated by a box truck, garbage truck, and 18-wheeler (semi) at 85 dBA, 90 dBA, and 95 dBA, respectively. Our calculations assume worst-case scenarios in which the vehicles are operating along the southernmost point of the project footprint, in which the shortest distance (in plan) to the property line is approximately 20 feet and approximately 150 feet to residential receivers. For each type of truck, an 8-foot tall fence is expected to result in some exceedances at the property line but meet criteria at each residence. Results are provided in Table 3 below.

Table 3: Calculated Noise Levels at Nearby Receiver Locations (Truck Noise)

Receiver Location	Calculated Noise Level, dBA	Analysis Criteria, dBA	Minimum Ambient Noise Level*, L_{eq} , dBA	Comments
Box Truck Assessment				
Residential Property Line	47	53	50	Meets Analysis Criteria
Residence	41	51	48	Approaching Inaudibility
Garbage Truck Assessment				
Residential Property Line	63	66	60	Meets Analysis Criteria
Residence	50	64	58	Approaching Inaudibility
18-Wheeler Assessment				
Residential Property Line	68	66	60	Above Criteria
Residence	55	64	58	Meets Analysis Criteria

*During corresponding truck activity periods.

Box Truck Assessment

Box truck noise (between midnight and 2 AM) is expected to meet criteria at the property line and subjectively approach inaudibility at all residences. The box truck delivery path involves a stop at the vestibule near the front end of the site, then turning around to exit. Box trucks are not expected to enter the drive-thru pass-by near the property line.

Garbage Truck Assessment

Garbage truck noise (during daytime hours) is expected to meet criteria at the property line and subjectively approach inaudibility at all residences.

18-Wheeler Assessment

Noise generated by an 18-wheeler is not expected to meet analysis criteria at the residential property line but is expected to meet analysis criteria at all residences. As stated above, deliveries are expected during daytime hours (7 AM - 4 PM).

Rooftop HVAC Equipment Noise Level Analysis

Units RTU-1 and RTU-2 will be located on the rear façade (facing East parking lot) on a small rooftop terrace. The sound power level data set for these units was provided for review and is attached to this report for reference. We have assumed this equipment may be operating during nighttime hours. As such, criteria for the cumulative noise level from this equipment has been set at 3 dBA above the ambient noise level. In our analysis, we have accounted for distance attenuation, the proposed 8-foot tall board-on-board fence, and shielding from building elements. The rooftop mechanical terrace is approximately 150 feet from the property line and 280 feet from the nearest residence. Results are provided in Table 4 below.

Table 4: Calculated Noise Levels at Nearby Receiver Locations (Rooftop HVAC)

Receiver Location	Calculated Noise Level, dBA	Analysis Criteria, dBA	Minimum Ambient Noise Level, L_{eq} , dBA	Comments
Residential Property Line	40	53	50	Meets Analysis Criteria
Residence	44	51	48	Meets Analysis Criteria

Additional Noise Attenuation

At the planning board meeting on March 13th, it was discussed that the proposed 8-foot tall board-on-board fence would potentially reduce resident exposure to noise generated by activity from other adjacent commercial properties. A noticeable reduction (5 dB or more) is expected where the proposed fence blocks the line of sight between these noise sources and each residence.

Recommendations Summary

Considering distance attenuation and the proposed 8-foot board-on-board fence, drive-thru kiosk noise levels are expected to meet analysis criteria. No further treatments are required to meet criteria, which is expected to satisfy Town of Yorktown noise ordinances.

With an 8-foot tall fence, the expected noise generated by 18-wheeler activity would be reduced to a noise level within approximately 2 dBA of criteria near the property line. Noise generated by the 3 different types of expected trucks is otherwise expected to meet design criteria.

This concludes our comments and observations at this time. Should you have any questions, please do not hesitate to contact us.

Regards,



Isaac Gadikian
Associate



Christopher A. Peltier, PE
Partner

CC: Paul Sardinha, Mario Sardinha | Dunkin' Franchisee
Cynthia Falls | GK+A Architects
Reuben Buck | Engineering & Surveying Properties
Christopher Peltier, Adam Paolino | Cerami

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Yorktown NY - Noise Sources Analysis.docx

Tags	RTU-1	RTU-2
Corner Weight B (lb)	345.0	348.0
Corner Weight C (lb)	199.0	200.0
Corner Weight D (lb)	213.0	215.0
Center of Gravity - Length (ft)	3.58	3.58
Center of Gravity - Width (ft)	1.58	1.58
Ducted Discharge - 63 Hz (dB)	78	86
Ducted Discharge - 125 Hz (dB)	84	87
Ducted Discharge - 250 Hz (dB)	76	79
Ducted Discharge - 500 Hz (dB)	70	72
Ducted Discharge - 1 kHz (dB)	65	67
Ducted Discharge - 2 kHz (dB)	62	64
Ducted Discharge - 4 kHz (dB)	62	64
Ducted Discharge - 8 kHz (dB)	62	65
Ducted Inlet - 63 Hz (dB)	76	82
Ducted Inlet - 125 Hz (dB)	74	75
Ducted Inlet - 250 Hz (dB)	70	73
Ducted Inlet - 500 Hz (dB)	60	62
Ducted Inlet - 1 kHz (dB)	56	60
Ducted Inlet - 2 kHz (dB)	54	59
Ducted Inlet - 4 kHz (dB)	54	57
Ducted Inlet - 8 kHz (dB)	54	57
Outdoor Noise - 63 Hz (dB)	85	86
Outdoor Noise - 125 Hz (dB)	85	87
Outdoor Noise - 250 Hz (dB)	89	91
Outdoor Noise - 500 Hz (dB)	91	89
Outdoor Noise - 1 kHz (dB)	88	88
Outdoor Noise - 2 kHz (dB)	82	83
Outdoor Noise - 4 kHz (dB)	79	79
Outdoor Noise - 8 kHz (dB)	73	73
Acoustic Footnote 1	Ducted Discharge and Ducted Inlet Sound in accordance with AHRI 260-2017	Ducted Discharge and Ducted Inlet Sound in accordance with AHRI 260-2017
Acoustic Footnote 2	Outdoor Sound in accordance with AHRI 270-2015	Outdoor Sound in accordance with AHRI 270-2015
Heat pump heating ambient temperature (F)	47.00	47.00
Heat pump heating ambient relative humid (%)	70.00	70.00
Supply Fan Count (Number)	1.00	1.00