

17 June 2024

PN Restaurants  
c/o Mr. Lawrence BenBassett  
301 Route 17 North, Suite 802  
Rutherford, New Jersey 07070  
[LB@pnrestaurants.com](mailto:LB@pnrestaurants.com)

Re: Acoustical Evaluation  
Proposed Popeye's and IHOP Restaurants, West Orange, New Jersey  
LSG&A File 2023031

Dear Mr. BenBassett:

Lewis S. Goodfriend & Associates (LSG&A) has completed an evaluation of the expected outdoor sound pressure levels due to the mechanical equipment and drive-thru intercom loudspeaker for the proposed Popeye's and IHOP restaurants to be located in West Orange, New Jersey. This letter summarizes the results of our evaluation, including a summary of the applicable noise regulations and expected sound levels at the nearest property lines due to the proposed equipment and operations. With the recommendations provided in this letter, the sound levels due to the proposed intercom loudspeaker, rooftop mechanical equipment, and delivery truck refrigeration unit are expected to meet the applicable limits of the state and local noise regulations at the adjacent property lines.

## **1.0 SITE LAYOUT**

The proposed Popeye's and IHOP restaurants are to be located within the existing building at 470 Eagle Rock Avenue in West Orange, New Jersey. Residential properties are located to the south and west of the site. Commercial properties are located to the east and north across Eagle Rock Avenue. Figure 1, at the end of this letter, shows an aerial view of the site and surrounding areas.

LSG&A understands that the proposed hours of operation are as follows:

- IHOP: 24 Hours
- Popeye's: 10:30 A.M. to 11:00 P.M. Sunday to Thursday  
10:30 A.M. to 11:30 P.M. Friday and Saturday

## **2.0 AMBIENT SOUND PRESSURE LEVEL MEASUREMENTS**

### **2.1 Proposed Site**

On Tuesday, 20 June 2023, the sound levels at the site were continuously monitored over a 24 hour period beginning at 8:00 A.M. Figure 1, at the end of this letter, shows an aerial view of the site with the acoustical measurement location identified. The measured 30-minute ambient  $L_{eq}^1$ ,  $L_{10}^2$ ,  $L_{50}^3$ , and  $L_{90}^4$  sound levels are presented in Figure 5, at the end of this letter. Sound sources that contributed to the ambient sound pressure levels at the proposed site during the measurement included traffic, wildlife, and aircraft.

### **2.2 Data Acquisition and Analysis**

The measurements at the proposed site were performed using a Rion Type NL-52 precision sound level meter, equipped with a Rion Type US-59 microphone. The analyzer automatically recorded statistical A-weighted and one-third octave band sound pressure levels and stored the results in memory for later retrieval. The microphone was mounted on a tripod at a height of approximately 5 feet above grade, and a windscreen was placed over the microphone for all measurements. The system's calibration was verified in the field before and after the measurements using a Brüel & Kjær Type 4231 acoustical calibrator. The stored data was later downloaded and transferred to a spreadsheet for evaluation. Copies of the NIST traceable calibration certificates for the sound level measurement equipment are available upon request.

## **3.0 REQUIREMENTS OF THE APPLICABLE NOISE REGULATIONS**

The New Jersey Department of Environmental Protection (NJDEP) maintains a statewide noise regulation, and the Township of West Orange code also includes regulations regarding sound.

### **3.1 NJDEP Noise Regulation**

The NJDEP noise regulation is set forth in N.J.A.C. 7:29 and limits the A-weighted sound levels produced by a commercial facility, when measured at a residential property line, to the following sound levels.

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<sup>1</sup> The  $L_{eq}$  represents the energy-averaged continuous sound pressure level during the measurement period.

<sup>2</sup> The  $L_{10}$  is the sound pressure level exceeded 10 percent of the time, and represents the transient sound pressure levels during the measurement period.

<sup>3</sup> The  $L_{50}$  is the sound pressure level exceeded 50 percent of the time during the measurement, and represents the median sound pressure levels during the measurement period.

<sup>4</sup> The  $L_{90}$  is the sound pressure level exceeded 90 percent of the time, and represents the continuous sound pressure levels during the measurement period.

|           |                             |   |          |
|-----------|-----------------------------|---|----------|
| Daytime   | (7:00 A.M. -to- 10:00 P.M.) | – | 65 dB(A) |
| Nighttime | (10:00 P.M. -to- 7:00 A.M.) | – | 50 dB(A) |

When the sound from the source is constant in level and in character, the NJDEP regulation also provides limits for sound pressure levels in the preferred octave bands with center frequencies between 31.5 and 8000 Hz, as summarized in Table 1.

| <b>Table 1 – Daytime and Nighttime Sound Pressure Level Limits [dB re: 20μPa] of the NJDEP Noise Regulation for Residential Property Receivers (N.J.A.C. 7:29)</b> |                                         |           |            |            |            |             |             |             |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|------------|------------|------------|-------------|-------------|-------------|-------------|
|                                                                                                                                                                    | <b>Octave Band Center Frequency, Hz</b> |           |            |            |            |             |             |             |             |
|                                                                                                                                                                    | <b>31.5</b>                             | <b>63</b> | <b>125</b> | <b>250</b> | <b>500</b> | <b>1000</b> | <b>2000</b> | <b>4000</b> | <b>8000</b> |
| <b>Daytime Limits</b>                                                                                                                                              | 96                                      | 82        | 74         | 67         | 63         | 60          | 57          | 55          | 53          |
| <b>Nighttime Limits</b>                                                                                                                                            | 86                                      | 71        | 61         | 53         | 48         | 45          | 42          | 40          | 38          |

For commercial receiving property lines, the limits are the same as the daytime limits listed above and are applicable 24 hours a day.

### 3.2 Township of West Orange Noise Regulation

The local noise regulation is set forth in Chapter 4 of the Code of the Township of West Orange. Section 4-4 (*Noise*) provides language that subjectively prohibits “excessively loud and disturbing noise which injures or endangers the health, comfort or safety of others within the limits of the Township.” As the local noise regulation does not provide any quantitative sound level limits, the results of the evaluation were evaluated with respect to the NJDEP noise regulation.

## 4.0 ACOUSTICAL EVALUATION AND RECOMMENDATIONS

The evaluation of the sound pressure levels due to the operation of the proposed equipment was based on the manufacturers’ sound pressure level data for the typical restaurant mechanical equipment and drive-thru intercom system, as well as sound data from LSG&A’s database for typical car and truck operations. To calculate the sound pressure levels at the adjacent properties, an acoustical model was developed that considered the propagation of sound over distance, the shielding and reflection of sound due to buildings, the effect of topography, and the effect of air and ground absorption. Attenuation due to foliage was not considered. The modeling was performed using SoundPLAN software and the calculation methodology outlined in ISO Standard 9613-2.

#### **4.1 Fence**

LSG&A understands that a 6 foot tall board on board fence is proposed at the south and west sides of the site. LSG&A recommends constructing the fence with two layers of  $\frac{3}{4}$  inch plywood with overlapping joints. The two layers should be on the same side of the supports.

#### **4.2 Intercom System**

The acoustical model included one intercom at the drive-thru. LSG&A recommends that the intercom system include automatic volume control (AVC) which restricts the output to 15 dB above the ambient sound level, such as those by HME. Based upon the measured ambient sound levels and typical sound levels from idling cars, LSG&A estimated the intercom loudspeakers to have a sound output of up to 76 dB(A) at 1 foot from each loudspeaker.

#### **4.3 Rooftop HVAC**

The following rooftop equipment and associated manufacturers' sound data was included in the acoustical model for each restaurant, assumed to be located towards the middle of the roof.

- Two Rooftop Units (RTU) – 82 dB(A) sound power level
- Two Kitchen Exhaust Fans (KEF) – 76 dB(A) sound power level
- One Bathroom Exhaust Fan – 65 dB(A) sound power level

If louder equipment is selected, or equipment is located toward the south of the roof, additional noise control measures may be required such as roof screening or equipment reselection with low-noise options.

#### **4.4 Delivery Truck**

The acoustical model included a truck refrigeration unit and trailer in the proposed unloading area on the north side of the building, with a sound power level of 93 dB(A).

#### **4.5 Idling Cars**

Per the guidance documents associated with the NJSDA noise regulation, customer vehicles are not subject to the limits of the noise code. However, idling cars were modelled, each with a sound power level of 76 dB(A).

## 5.0 RESULTS

Table 2, below, shows the expected A-weighted sound levels due to the operation of the proposed rooftop mechanical equipment, drive-thru intercom loudspeaker, and truck refrigeration unit in various configurations. The results are compared to the ambient  $L_{eq}$  sound levels measured over a 24-hour period, and to the applicable limits of the NJDEP noise regulation. For each location, the expected sound levels were evaluated at the property line and at each story of the building façade, and the highest level is reported.

| <b>Table 2 – Expected A-weighted Sound Levels due to Mechanical Equipment, Drive-Thru Intercom, and Truck Refrigeration, 470 Eagle Rock Avenue, West Orange, New Jersey.</b> |                           |                          |                                                |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------|------------------------------------------------|--------------|
| <b>Location</b>                                                                                                                                                              | <b>Sound Level, dB(A)</b> |                          |                                                |              |
|                                                                                                                                                                              | <b>HVAC Only</b>          | <b>HVAC and Intercom</b> | <b>HVAC, Intercom, and Truck Refrigeration</b> | <b>Limit</b> |
| 1                                                                                                                                                                            | 43                        | 43                       | 43                                             | 50           |
| 2                                                                                                                                                                            | 49                        | 49                       | 50                                             | 50           |
| 3                                                                                                                                                                            | 49                        | 49                       | 50                                             | 50           |
|                                                                                                                                                                              | 46                        | 46                       | 47                                             | 50           |
| Measured Ambient $L_{eq}$                                                                                                                                                    | <b>Sound Level, dB(A)</b> |                          |                                                |              |
|                                                                                                                                                                              | 46 to 60                  |                          |                                                |              |

Although customer cars are not subject to the limits of the NJDEP noise regulation, the table below shows the expected sound levels with 8 cars idling in the drive-thru lane and with a single car idling at the menu board. The results are compared to the ambient  $L_{eq}$  sound levels measured over a 24-hour period.

| <b>Table 3 – Expected A-weighted Sound Levels due to Idling Cars, 470 Eagle Rock Avenue, West Orange, New Jersey.</b> |                                  |                            |
|-----------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------|
| <b>Location</b>                                                                                                       | <b>Sound Level, dB(A)</b>        |                            |
|                                                                                                                       | <b>8 Cars in Drive-Thru Lane</b> | <b>1 Car at Drive-Thru</b> |
| 1                                                                                                                     | 35                               | 28                         |
| 2                                                                                                                     | 47                               | 42                         |
| 3                                                                                                                     | 48                               | 41                         |
| 4                                                                                                                     | 37                               | 32                         |
| Measured Ambient $L_{eq}$                                                                                             | <b>Sound Level, dB(A)</b>        |                            |
|                                                                                                                       | 46 to 60                         |                            |

Figures 2 through 4, at the end of this letter, show the expected octave band sound pressure levels at the nearest residential property lines due to the proposed mechanical equipment, intercom loudspeaker, and delivery truck refrigeration unit compared to the applicable limits of the NJDEP noise regulation. The results of the evaluation indicate that the sound levels due to the mechanical equipment, intercom loudspeaker, and truck refrigeration unit are expected to meet the applicable limits of the NJDEP noise regulation at the nearest property lines with the recommendations provided in this letter.

Please note that all recommendations included in this report are acoustical in nature and should be reviewed by the appropriate licensed design professionals. Alternative products should be submitted for review. I trust that this information is sufficient for your present needs. Please call if you have any questions regarding this letter.

Very truly yours,

LEWIS S. GOODFRIEND & ASSOCIATES



Matthew T. Murello, P.E.  
President



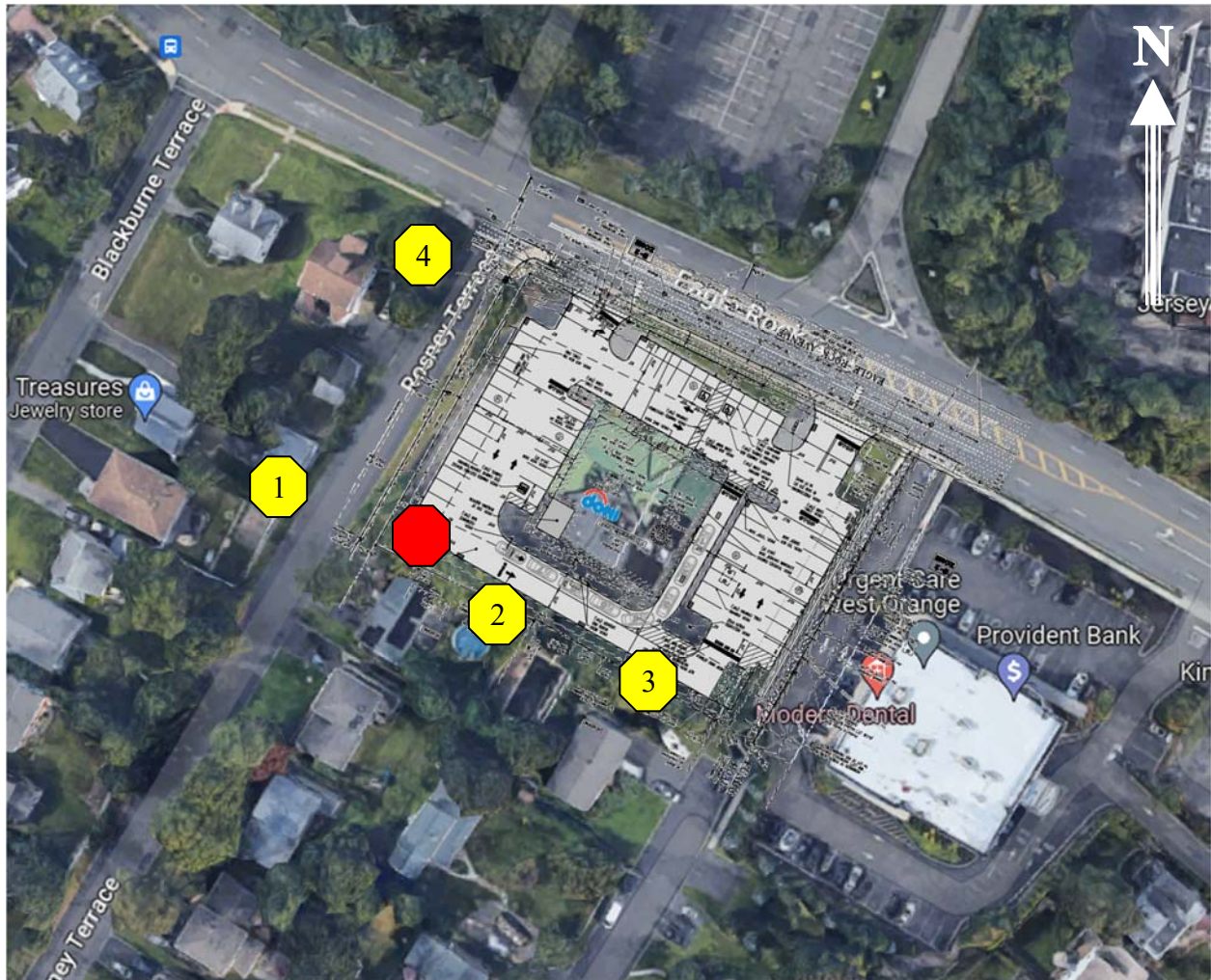
Michael J. Dick, INCE Bd. Cert.  
Project Manager

MJD:mjd

Enclosures

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Figure 1 – Aerial View Showing the Proposed Site, Ambient Measurement Location, and Acoustical Evaluation Locations, 470 Eagle Rock Avenue, West Orange, New Jersey.



NOTES: All Locations Approximate  
Not to Scale  
Not for Construction



Evaluation Location



Measurement Location

Figure 2 – Expected Sound Pressure Levels (Lp) due to Proposed Rooftop Mechanical Equipment, Compared to the Nighttime Residential Limits of the Noise Regulations, 470 Eagle Rock Avenue, West Orange, New Jersey.

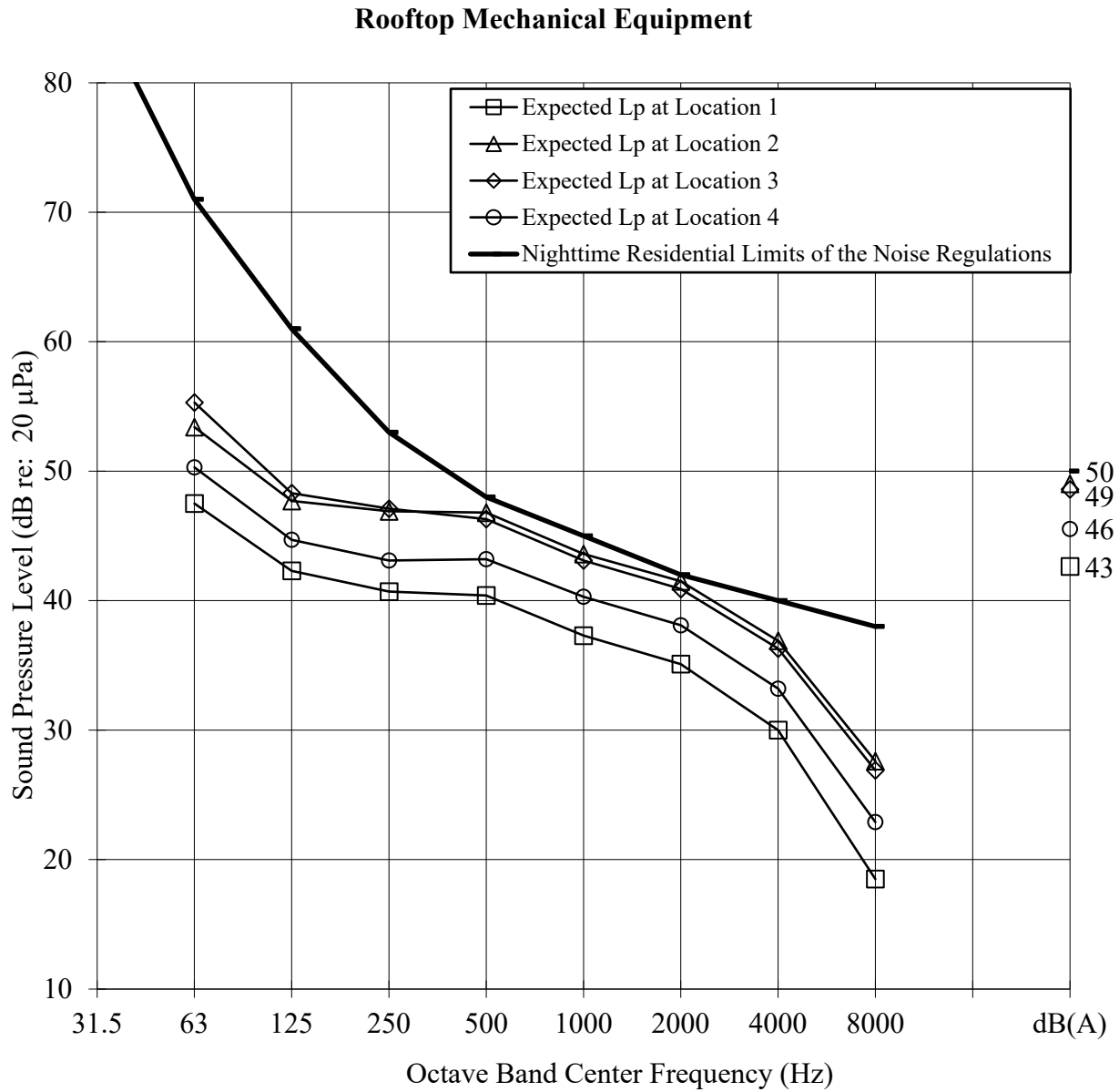


Figure 3 – Expected Sound Pressure Levels (Lp) due to Proposed Rooftop Mechanical Equipment and Intercom Loudspeaker, Compared to the Nighttime Residential Limits of the Noise Regulations, 470 Eagle Rock Avenue, West Orange, New Jersey.

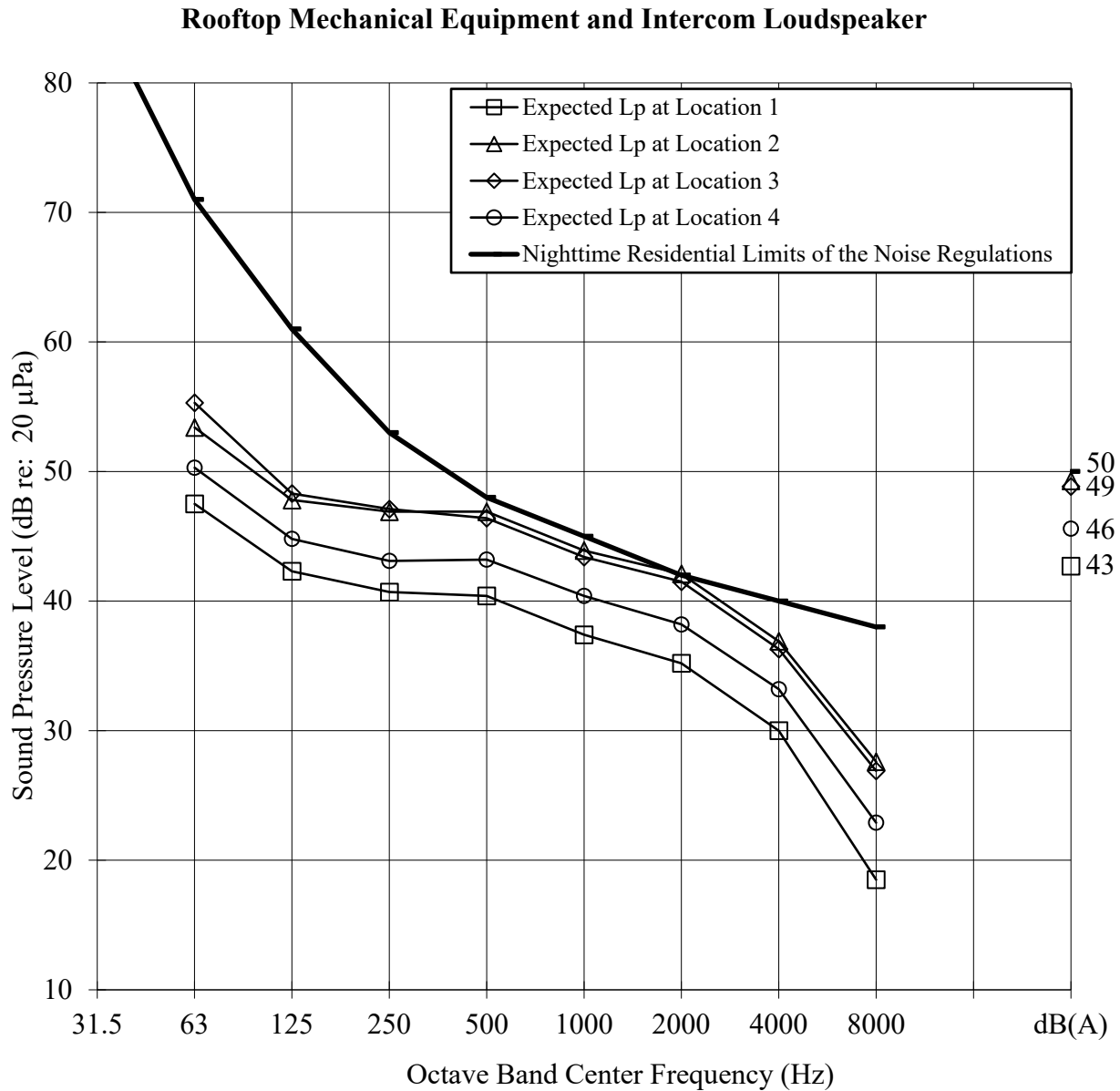


Figure 4 – Expected Sound Pressure Levels (Lp) due to Proposed Rooftop Mechanical Equipment, Intercom Loudspeaker, and Truck Refrigeration Unit, Compared to the Nighttime Residential Limits of the Noise Regulations, 470 Eagle Rock Avenue, West Orange, New Jersey.

**Rooftop Mechanical Equipment, Intercom Loudspeaker, and Truck Refrigeration Unit**

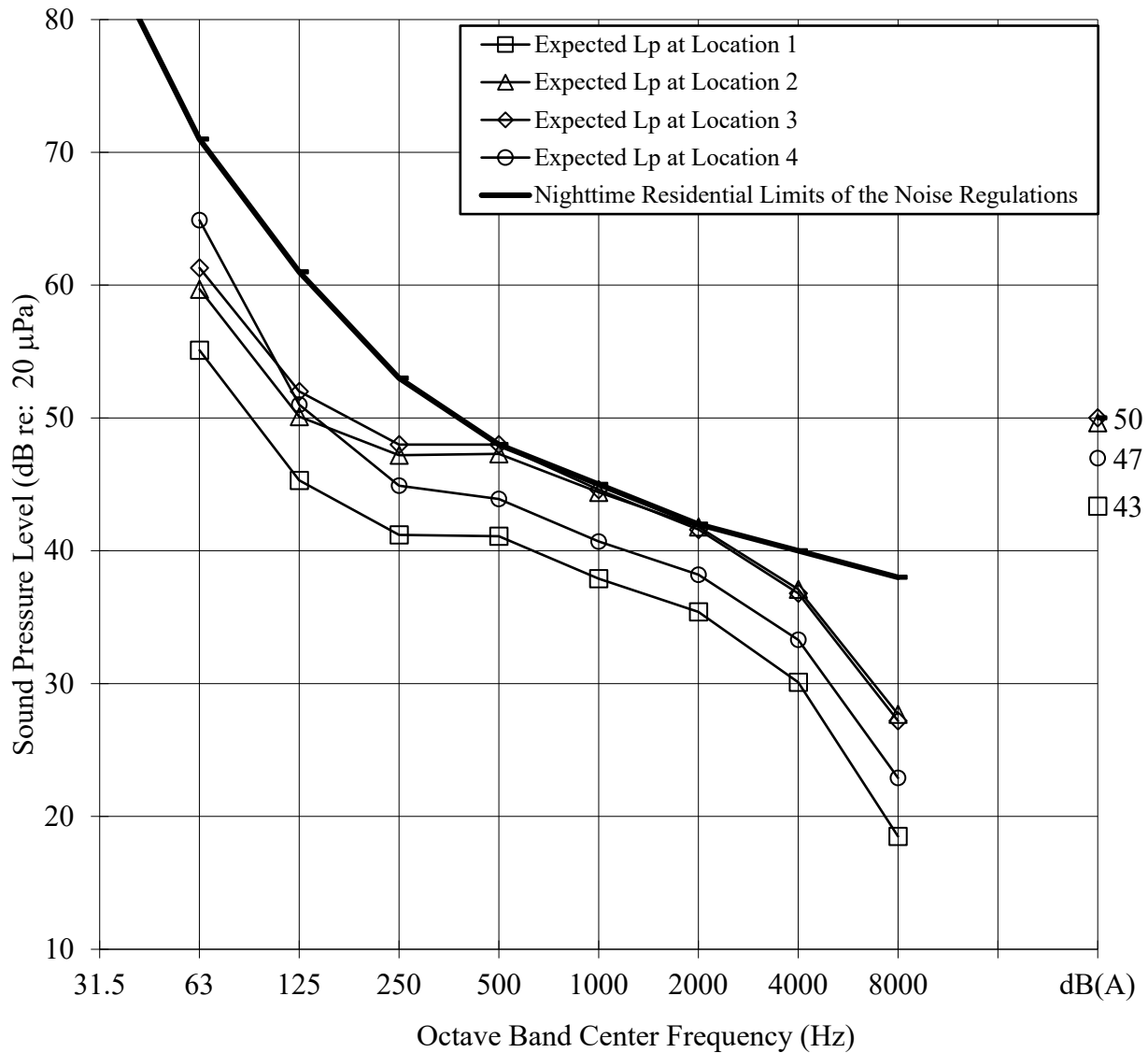


Figure 5 – 30-minute Ambient Sound Levels Measured During Proposed Popeye's and IHOP Hours of Operation, 470 Eagle Rock Avenue, West Orange, New Jersey, 20-21 June 2023.

