

SHAcoustics

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DATE: 20 November 2020

TO: Mark Weinberger
Maplewood Senior Living, LLC
One Gorham Island Suite 100
Westport, CT 06880

CC: Peter Romano, Land-Tech Consultants Inc.

RE: Maplewood Senior Living Westport Acoustic Recommendation Memo

Dear Mark,

SH Acoustics (SHA) has been retained by Maplewood Senior Living to assess the noise created by a proposed backup Power Generator and a Cooling Tower to be located at the planned Maplewood Senior Living Center at 176 Post Road West, in Westport, CT. Maplewood would like to understand the noise that neighboring properties would experience while these units are in operation and how those levels would affect the comfort for the neighboring properties. Maplewood expressed that comfort of the neighbors was equally important as code compliance and that they would be willing to implement additional noise mitigation measures should our analysis find that the emitted noise would be bothersome in any way.

High Level Overview:

After performing our analysis, we have found that some relatively minor but effective alterations to the design are required to create a quiet environment for the neighbors. With these changes, the sound produced from the Generator and Cooling Tower will either be completely inaudible or barely audible at the neighboring buildings, even with open windows.

Project Background and Current Design:

The generator and cooling tower are to be situated on the eastern side of the property, slightly recessed into the ground in between the Maplewood building and a retaining wall (see Figure 1). The current design calls for a 6' fence (see Figure 2) which would block the line of sight to the generator and cooling tower from the neighboring property.

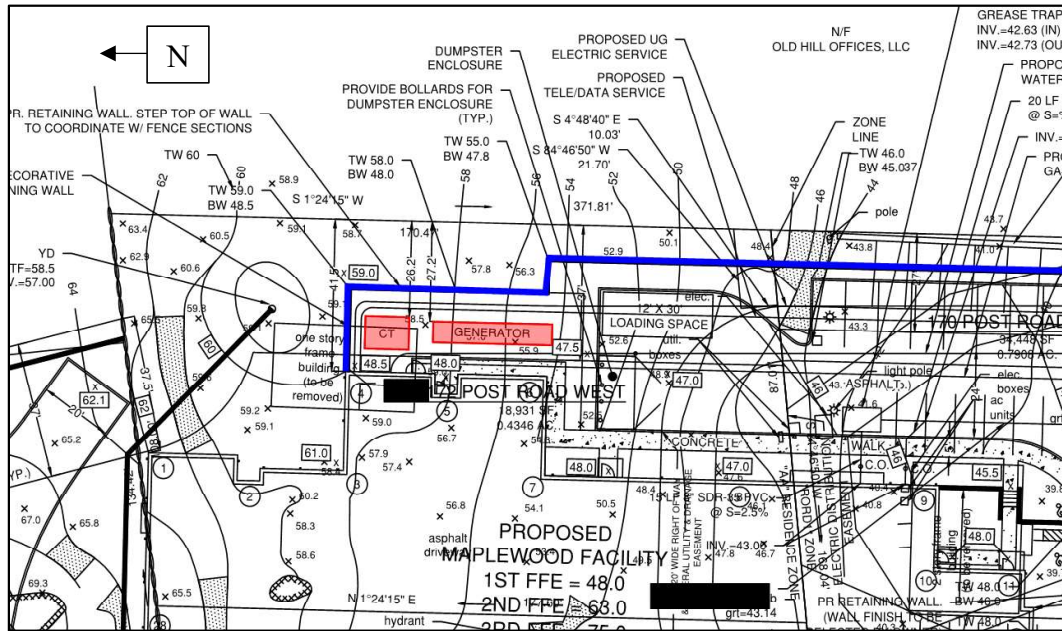
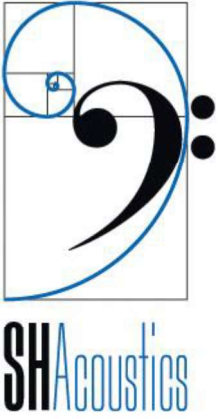


Figure 1 – Eastern property line map showing Retaining Wall (blue), Cooling Tower and Generator (red) locations.

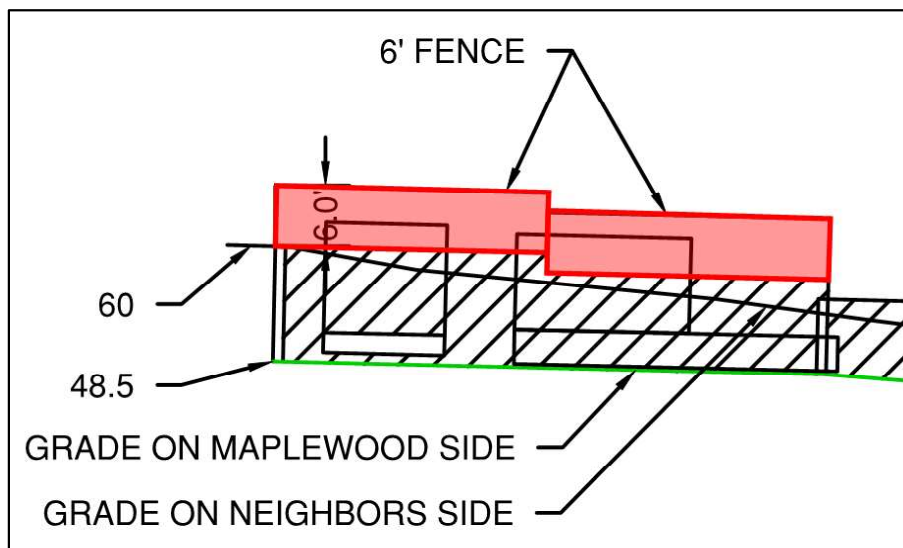
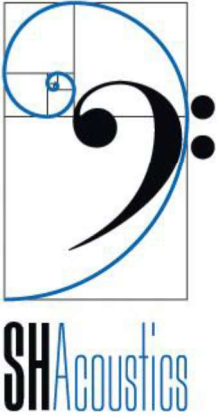


Figure 1 – Proposed grading, retaining wall (hatched) and fencing (red)

The generator is a Generac 600 kW Diesel Generator. It is currently specified with the “Level 2 Sound Package” which consists of an enclosure of High Performance Sound-Absorbing Materials and a thick gauge steel enclosure. The cooling tower is a Baltimore Aircoil Company (BAC) Model XES15E. No specific sound attenuation package is available for the Cooling Tower however there is some site-



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specific sound attenuation provided by measures already integrated into the design as well as additional steps that will be required described in the Recommendations section of this report.

Acoustic Criteria:

While the Town of Westport does not specifically define any noise limits for generators or other mechanical equipment, surrounding towns and other similar towns throughout Connecticut will typically define maximum allowable noise limits as 55 dBA during daytime hours and 45 dBA during nighttime hours when measured at the property line. The exact definition of daytime and nighttime hours varies for each municipality.

We recommend that Maplewood adopt these limits as a target to ensure comfort of the neighbors. Emissions of noise levels like these would likely be less than the noise currently created from traffic along the nearby Route 1/Post Road West.

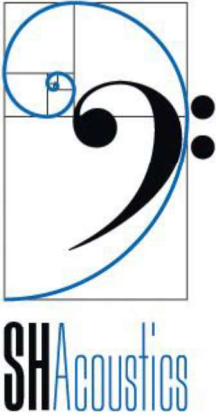
Operation of the Equipment:

For a majority of the time, the generator will not be functioning or creating any noise. Like all generators though, to maintain and test parts and operation, the generator will turn on once a week in a self-test mode. The self-test mode is slightly quieter than the “full load” noise that would be created while a power grid failure were to happen. The estimated noise levels described in this report reflect the “full load” noise levels to reflect the worst-case-scenario.

The cooling tower will likely be in operation far more often and should be reduced to operate at a noise level below the 45 dBA described in the Acoustic Criteria section of this report.

Predicted Noise Levels and Recommendations:

After reviewing drawings provided to us by the project team, SHA carried out calculations considering distances between the mechanical units and property line,



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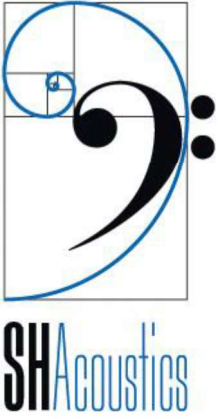
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the proposed elevation differences, and the proximity of the windows of the neighboring buildings.

SHA has found that to meet the specified levels defined in the Acoustic Criteria section of this report, the following recommendations should be incorporated into the design.

1. Install outdoor-rated acoustic absorption on the inside of the retaining wall and on the side of the building adjacent to the Cooling Tower and Generator. Use Kinetics Noise Control KFA-20Q-AA or approved equal.
<https://kineticsnoise.com/environmental/sound-curtains.html>
2. The planned 6' fence along the top of the retaining wall should be constructed as a solid fence with a minimum weight of 4 lbs/ft² with acoustic absorption mounted to the equipment side of the barrier. This could consist of (2) layers of 3/4" plywood with the specified acoustic absorption attached.
3. If a solid barrier described in Recommendation #2 will restrict too much airflow to either of the units, an acoustic louver of the same height can be used in its place. Use Kinetics Noise Control KCAL 6" thick Acoustic Louver or approved equal. In this case, acoustic absorption would not need to be mounted to the inside of the louver but should still be mounted to the other surfaces described in Recommendation #1.
<https://kineticsnoise.com/airflow/acoustic-louvers.html>
4. The Generator must be ordered with the available Level 2 sound package. This is already planned but it is important to emphasize that it cannot be taken out without adding additional noise mitigation.
5. The testing of the generator should take place mid-day (between 10AM and 3PM) when ambient noises from traffic, wind, and other sources are typically elevated.

Below is a table showing the predicted sound pressure levels not only at the property line but the predicted noise levels inside the neighboring building with the windows open.



Sound Pressure Levels by Location, with the Proposed Recommendations

Receiver Location	Sound Pressure Level
Eastern Property Line, Cooling Tower (CT) Only	44.2 dBA
Eastern Property Line, CT & Generator	54.0 dBA
Building to East, Indoors, Open Windows, CT Only	35.2 dBA
Building to East, Indoors, Open Windows, CT & Generator	44.1 dBA

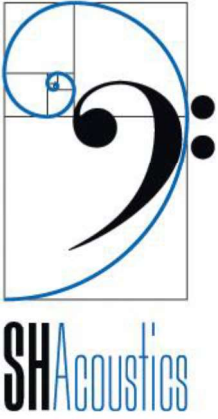
Figure 3 – Calculated Sound Pressure Levels (SPL)

With the recommendations in place, the noise levels from these two units should not exceed the criteria set forth in the Acoustic Criteria section of this document. The Cooling Tower, which will be in operation for longer periods of time will not exceed the 45 dBA limit, and that, combined with the generator will not exceed 54 dBA. Most municipalities exempt emergency generators from the noise code during power grid failures. Still, even in the case of a power failure, the building next door would likely experience more noise from the passing traffic on Route 1 than from the Generator in full operation. We would expect an area like this to have daytime ambient levels ranging from 60 dBA up to 75 dBA depending on the traffic and other ambient sources. The weekly testing of the generator should be scheduled at a reasonable time on a weekday (between 10AM and 3PM) when traffic noise is already elevated.

For context, here are some typical approximate noise levels for comparison:

Decibel Level	Example Source(s)
20 dBA	Broadcast Studio Background Noise
30 dBA	Bedroom at Night / Library Background Noise
40 dBA	Light Rain / Refrigerator @ 5ft
50 dBA	Dishwasher @ 5ft
60 dBA	Normal Conversation @ 3ft
70 dBA	Vacuum Cleaner @ 5ft
80 dBA	Crowded Restaurant / Freight train @ 100 ft
90 dBA	Gas Lawn Mower @ 3ft
100 dBA	Passing Motorcycle @ 10 ft

Figure 4 – Decibel Comparison Chart



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Conclusion:

We hope that you find this report useful. We're confident that the recommendations described in this report will satisfy all parties involved. We look forward to assisting you with any additional coordination, compliance testing, or anything else the project requires. Please do not hesitate to contact SHA with any questions you may have.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kevin Peterson', is centered below the 'Sincerely,' text.

Kevin Peterson
Senior Acoustic/Audio Consultant
SH Acoustics