MEMORANDUM

DATE: February 5, 2021

FROM: Greg Tocci, 508-395-3945, gtocci@cavtocci.com

TO: Peter Bemis, (508)480-0225 x11, pbemis@edcma.com

SUBJECT: Response to Peer Review Comment
Proposed Warehouse Sound Analysis
555 Hopping Brook Road, Holliston, MA

Christopher Menge, HMMH, Burlington, MA was retained by the Town of Holliston to review Cavanaugh Tocci letter report to Mr. Peter Bemis, Engineering Design Consultants, Inc. dated January 25, 2021 concerning the proposed warehouse at 555 Hopping Brook Road, Holliston, MA. The Cavanaugh Tocci report presents its acoustical analysis of the proposed warehouse project, analyzing both stationary and mobile sources of sound potentially transmitted to the Claybrook Farm Road neighborhood in Medway, immediately southeast of the proposed facility. The analysis focused on second floor elevations of eight representative residences adjacent to the project. In our study, these are identified as R1-R8. Second floor elevations were assumed to be 17 feet above grade. Facility sound levels at residence second-floors are slightly higher than at lower elevations, especially at the facility property line where the berm/barrier and roof edge provide more effective shielding. Residence second floor elevations have been used for evaluation to provide a high estimate of impact in order to be more protective of the community.

Mr. Menge's comment provided by e-mail from Peter Bemis on January 29, 2021 is as follows:

> My comment is that it is clear to me and also to the report's authors that the Mass DEP and the Holliston noise limits apply at the nearest residential property lines as well as at the nearest inhabited dwellings themselves. From what I can tell from the figures provided, the sound level predictions were made at the nearest dwelling locations but not at the nearest property line positions. Sound levels from the facility may well be somewhat higher at the property lines than those at the homes themselves, since I found that the property lines are from about 50 feet to 200 feet closer to the warehouse operations than the homes. Given the relatively low predicted noise levels at the homes and the planned berm and wall for noise abatement, I don't expect predicted continuous sound levels at the property lines would exceed 40 dBA, but I think it is incumbent upon the applicant's consultant to show clearly that this will not be the case using the noise prediction model they've developed. The locations of the property boundaries relative to the buildings is readily seen using the Town of Medway's GIS parcel viewer.

Figure 1 is a site plan sketch indicating the eight receptor locations R1-R8 used in our study and the corresponding paired Hopping Brook Industrial Park property line locations PL1-PL8.

Table 1 lists estimated stationary source sound levels at R1-R8 and at the corresponding property line locations PL-PL8. Also contained in Table 1 are the total sound levels at receptor study locations, and the zoning and MassDEP Noise Policy stationary source limits considered in this study.

Table 2 lists estimated sound levels produced by transient mobile sources at R1-R8 and at PL1-PL8. As transient sounds are at most only seconds in length and very rarely occur at the same time, the total has no physical meaning and is not reported in Table 2.

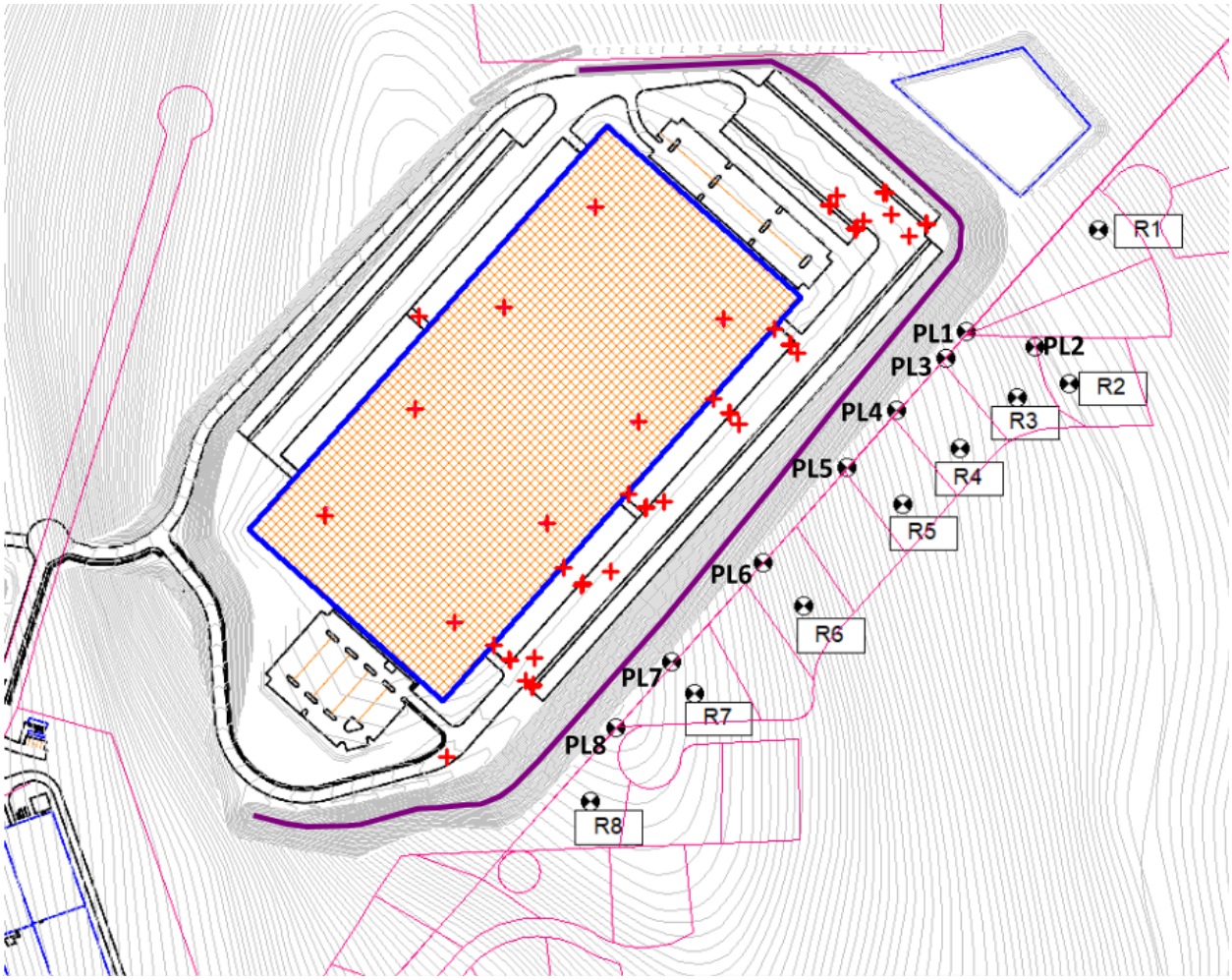

Figure 1. Pairing of property line locations PL1-PL8 with second floor (17' above grade) residential receptors R1-R8 Proposed Warehouse, 555 Hopping Brook Road, Holliston, MA

Stationary Sources	R1	PL1	R2	PL2	R3	PL3	R4	PL4	R5	PL5	R6	PL6	R7	PL7	R8	PL8
Warehouse interior equipment	27	26	28	27	29	27	29	27	29	28	31	29	32	29	31	29
Rooftop make-up air unit	24	20	28	24	29	21	29	22	30	24	33	27	34	28	32	28
Emergency generator	9	10	10	10	10	11	11	11	11	12	12	13	13	13	12	12
Total Continuous	**29**	**27**	**31**	**29**	**32**	**28**	**32**	**28**	**33**	**30**	**35**	**31**	**36**	**32**	**35**	**32**
Holliston 2015 Zoning Bylaw	50															
Holliston 2019 Zoning Bylaw	40															
MassDEP Noise Policy	40															
Medway Zoning Bylaw	45															

Table 1. Summary of stationary equipment sound levels at 2nd floor receptors locations R1-R8 and property line locations PL1-PL8, and applicable limits Proposed Warehouse, 555 Hopping Brook Road, Holliston, MA

Transient Sources	R1	PL1	R2	PL2	R3	PL3	R4	PL4	R5	PL5	R6	PL6	R7	PL7	R8	PL8
Truck high idle	36	37	36	36	37	36	38	35	38	37	38	37	39	37	38	39
Backup alarm, tonal	35	37	34	34	36	36	35	37	35	36	37	36	40	38	38	40
Truck pass-by	41	42	41	41	42	41	41	41	43	41	43	43	44	43	43	44
Truck accelerating	36	36	36	36	37	37	37	37	38	37	41	40	43	43	46	45
Trailer disconnect	47	47	47	46	48	47	48	46	48	47	49	47	49	48	49	49

Table 2. Summary of maximum transient sound levels at 2nd floor receptors locations R1-R8 and property line locations PL1-PL8 Proposed Warehouse, 555 Hopping Brook Road, Holliston, MA

In Table 1, it can be observed that stationary source sound levels at property line locations are generally lower than corresponding levels at 2nd floors of residences studied. The higher sound levels at property line locations, by being closer to stationary sources, are more than offset by the more effective shielding by the berm/barrier and building roof edge. (See Appendix A for a brief discussion of barriers and how they work.)

The same is true for closest transient mobile sources, but to a lesser extent. Transient sources are in some cases as little as half the distance from property line locations than the corresponding residence locations, leading to transient sound levels that are up to 6 dBA higher at property lines than at

residences. These increases at property line locations are in some cases more than offset by the more effective shielding by the berm/barrier, also leading to lower transient sound levels at property line conditions than at second floor locations, but not in all cases.

On average, Table 1 stationary source and Table 2 transient source sound levels are 3 dBA and 1 dBA lower at property line locations than at corresponding residence locations, respectively, again, because of more effective shielding at property line locations.

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Appendix A

Barriers

Barriers

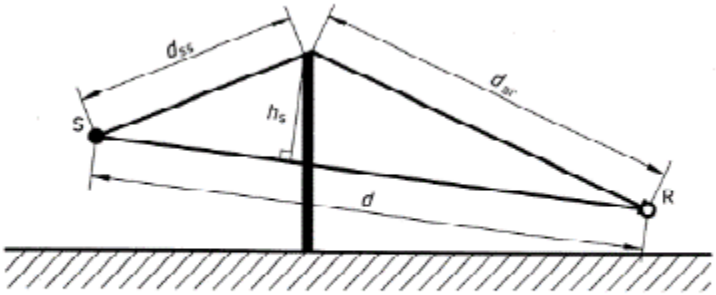

Figure 6 — Geometrical quantities for determining the pathlength difference for single diffraction

Figure 6 is from *ISO standard 9613-2 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation*. The methods and algorithms of this standard are widely used for evaluating sound transmitted from sources to receptors in exterior environments, accounting for a wide variety of sound propagation losses, including barrier attenuation. The ISO barrier attenuation algorithm is implemented by the Cadna/A software for computing source sound levels at study locations, accounting for barrier attenuation.

In Figure 6, the line-of-sight between source and receiver locations "S" and "R" is shown intersected by a barrier. The barrier attenuation is related to the effective barrier height "h_s", i.e., the amount that the barrier penetrates through the line-of-sight. The greater the effective barrier height h_s, the greater the barrier attenuation.

In the source/receiver arrangement shown in Figure 6, were the receiver to be moved closer to the barrier along a line at the same elevation above ground, the effective barrier height h_s would increase slightly, perhaps in some cases, enough to offset the otherwise expected increase in sound level due to decreased distance. In the case of stationary sources on the roof of the 555 Hopping Brook Road building, property line locations are only slightly closer to sound sources than are residences. Being only slightly closer to stationary sources, sound levels at property-line locations would be 1 dB or less higher *due to distance alone*. However, by being closer to the barrier, resulting in a greater effective barrier height, barrier attenuation is increased by 3-4 dBA, more than offsetting the gain due to shortening the source to receiver distance.

However, many transient sources are closer to the property line than stationary sources, in some cases half the distance. At half the distance, transient source sound levels would be up 6 dBA higher than at residences, and in some cases the higher level due to the shorter distance is only partially offset by the increased barrier attenuation of 3-4 dBA.