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June 25, 2014

Mr. Chris Starr, *Manager*
Smith Legacy Partners Series, LLC
6 Littlefield Road
Acton, MA 01720

Subject: Cushing Village
Belmont, Massachusetts

Dear Chris,

Smith Legacy Partners Series, LLC has proposed the construction of Cushing Village at the intersections of Trapelo Road, Common Street, and Belmont Street. An aerial photo of the area is provided in Figure 1 of this report. Figure 2 is a general plan showing the location of structures and surrounding streets.

On July 27, 2013, the Belmont Planning Board issued a Record of Decision[1] (RoD) presenting a number of specific decisions. Decision 3 address facility sound, and is divided into parts A through D. (For convenience, Decision 3 has been excerpted in Appendix A of this letter.) Part A contains the acoustical requirements for the project. Part B limits the height of rooftop screening. Part C requires emergency generators to be housed within the building. Part D indicates that any subsequent additions made to the building mechanical system, including those placed by tenants, must not cause facility sound to exceed the limits provided in the Decision.

This report responds to the requirements of Part A of Decision 3 in full. Parts B, C, and D will be addressed through other means and/or at another time as appropriate. For convenience, this report has been organized to respond, in so far as practical, to the Decision 3 Part A point-by-point.

Part A of Decision 3 contains four subparts: (i) through (iv). Subpart (i) establishes limits on sound produced by the proposed Cushing Village, and itself can be divided into three subparts. This letter labels them: (i)(a), (i)(b), and (i)(c). The full text of these three subparts, and how each subpart has been addressed, is discussed below.

> (i)(a) Prior to the issuance of a building permit, and before demolition of existing buildings, background sound levels shall he established near the property lines of the properties abutting the Development along Trapelo Road, Common Street, Horne Road and Belmont Street.

Figure 3 of this report indicates the four locations where background sound levels were approved to be and have been measured. Appendix B contains an e-mail dated June 2, 2014 and its attachment from the Town of Belmont acoustical consultant, Eric Wood, Acentech to Ara Yogurtian and Glen Clancy of the Belmont Planning Board.

[1] Planning Board Decision on Application of Smith Legacy Partners, LLC for a Special Permit with Design and Site Plan Review and Waivers Pursuant to Section 8 (Cushing Square Overlay District) of the Town of Belmont Zoning By-Law dated July 27, 2013

(i)(b) The background sound level shall be determined utilizing an appropriate number of unattended sound monitors that would simultaneously and continuously measure A-weighted and C-weighted ambient sound levels to document existing conditions for a period of not less than seven days. The number, location, timing and methods of the sound monitoring shall be subject to the approval of the Town's acoustical engineering consultant. Said baseline measurements and monitoring shall he conducted at the Applicant's expense.

Background sound level monitoring at all locations began on June 4 and concluded on June 12, 2014. The Rion NL-31 sound monitors used were calibrated before use and installed with windscreens. These instruments and their use conform to IEC 61672 for Class 1 precision sound measurement instrumentation. Sound level data are recorded by each instrument onto a flash card, which is removed from the unit and downloaded into a PC. The number, location, timing and methods used were approved by Eric Wood, Acentech, acoustical consultant to the Town of Belmont. An e-mail expressing approval is contained in Appendix B to this letter.

Monitors were programmed to measure several hourly A-weighted sound level descriptors including the 90th percentile sound level (L_{A90}), equivalent sound level (L_{Aeq}), and first percentile (L_{A01}) sound levels.

- The 90th percentile sound level (L_{A90}) is the background or residual sound level in an area and is the lowest level of sound typically occurring. It is the A-weighted sound level exceeded 90% of each hour monitored, and the descriptor used to quantify the background sound levels as required by the RoD and as approved by the Town of Belmont acoustical consultant.
- The equivalent sound level (L_{Aeq}) is the energy average sound level for each hour monitored.
- The first percentile sound level (L_{A01}) is the sound level exceeded one percent of each hour and is representative of the highest sound levels reached in each hour.

The equivalent sound level and the first percentile sound levels have been provided as they were part of the data set submitted for approval. A-weight sound monitoring data measured at the four locations are shown in Figures 4a, 5a, 6a, and 7a. C-weight data is shown in Figures 4b, 5b, 6b, and 7b. As with most acoustic environments, sound levels are generally higher during the day than during the night.

(i)(c) From the data collected in the manner set forth herein, two criteria shall be established as base line or existing conditions, one for daytime use and one for nighttime use. Daytime conditions will be from 7:00 AM to 11:00 PM and nighttime conditions will be 11:00 PM to 7:00 AM. The baseline ambient sound levels will be determined by the average of the ambient sound levels measured each hour during daytime and nighttime hours.

Hourly A-weight sound levels in Figures 4a, 5a, 6a, and 7a are listed in Appendix C for the seven full-days June 5 through June 11, 2014. Each table shows daytime and nighttime averages. Daytime (7:00 AM to 11:00 PM) and nighttime (11:00 PM to 7:00 AM) hours are those of the Record of Decision. Table 1 below reports the 7-day daytime and nighttime averages for each location, and the corresponding sound level limits at each location.

	Location 1 569 Belmont Street	Location 2 13/19 Horne Road	Location 3 125 Trapelo Road (6th flr.)	Location 4 486 Common Street
	7-Day Average Sound Levels			
Day	49.2	50.1	56.4	56.8
Night	37.6	42.5	46.1	42.6
	RoD Limits			
Day	54	55	61	62
Night	43	48	51	48

Table 1. 7-Day average background sound levels at monitoring locations and Record of Decision limits (RoD Decision 3(A)(i))
Proposed Cushing Village, Belmont, MA

(ii) Not less than 60 days prior to issuance of a building permit, the Applicant will submit an acoustical analysis demonstrating the roof mounted mechanicals and other ventilation equipment for all three buildings will not (1) increase sound levels more than 5dBA of the daytime and nighttime background ambient sound levels, or (2) produce a "pure tone" condition (when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 dB or more), as determined in accordance with Section 3A(i) above. This demonstration will be on the basis of sound level data available from building systems equipment manufacturers. Roof mounted mechanicals and other ventilation equipment will be evaluated on both an A-weighted and C-weighted basis. The Applicant will submit the acoustical analysis and model for review by the Town's acoustical engineering consultant at the Applicant's expense. A building permit shall not be issued until the analysis provided by the Applicant and as reviewed by the Town's consultant reasonably demonstrates that operation of the mechanical units will be in compliance with this condition.

Mechanical equipment currently proposed to be installed include 146 compressor/condenser sets to be located on the Hyland, Pomona, and Winslow roofs, including three units serving commons areas in the building. There are also proposed three garage ventilation wall fans to be located in a ground-level well on the Winslow Building facing measurement location 3 at 125 Trapelo Road. Within the garage, and about 10 feet from the garage fan openings, there will be a small emergency generator servicing a dewatering pump. For the acoustical analysis, a 5000 watt unenclosed Honda EM5000S generator serving a 5-HP dewatering pump has been included in the acoustical analysis. It has also been assumed that this would be maintenance operated during weekday daytime hours only. Octave band sound power levels have been obtained from manufacturers' technical information for these units. Sound power levels for all equipment are provided in Table 2.

	Octave Band Center Frequencies (Hz)										
	31	63	125	250	500	1000	2000	4000	8000	A	C
ACCU Carrier 24ABB330-31, 51[1]	69[2]	70[1]	71.1	72.1	71.7	68.5	64.3	60.0	55.1	73	77
EF-1, 2 Greenheck SBE-2H48-50 Sidewall Belt Driven	94[2]	100	94	90	87	84	79	74	73	89	101
EF-3 Greenheck SBE-2H20-7 Sidewall Belt Driven	84[2]	86	86	84	82	79	77	73	69	85	91
Em. Gen. Honda 5000 watt	68	69	70	79	76	79	81	71	66	84	85

[1] This is the largest of the three sized used. All units have been assumed to be the largest for this acoustical analysis, Thus overestimating ACCU sound levels at residences by 1-2 dBA.
[2] Estimated. Not provided by manufacturer. See Appendix E.

Table 2. Manufacturer provided sound power levels for mechanical equipment
Proposed Cushing Village, Belmont, MA

Modeling of facility noise was completed using Cadna/A (Datakustik GmbH, revision 4.4.145, 32-bit). Cadna/A is a computer program that implements the data and modeling techniques of ISO 9613-1 and ISO 9613-2 to estimate sound levels at community receptor locations. In calculating sound pressure levels at receptor locations, Cadna accounts for reductions in facility sound pressure levels associated with distance, shielding provided by intervening structures and topography, and absorption of sound by the atmosphere and local porous surfaces. Appendix D contains a glossary of acoustical terminology used in this report. It includes a discussion of the relationship between sound power level and sound pressure level.

Sound pressure levels produced by the all equipment operating at full capacity are presented in Table 2 for daytime and nighttime condition. Data is also shown plotted in Figures 9a and 9b. Spectra in Table 2 and in Figures 9a and 9b are equipment sound levels determined through computer modeling plus the daytime and nighttime backgrounds respectively. The A-weighted sound levels produced by equipment cannot cause an increase over the established background by more than 5 dBA.

The daytime and nighttime background spectra used are the average daytime and nighttime hourly background sound levels ($L_{A90,1\text{-}hr}$) measured over the 7-day period at Location 2. The instrument used at this location to measure one-third octave band spectra is a Larson-Davis 831 sound level analyzer conforming to the IEC requirements for class 1 sound measurement instrumentation. Corresponding spectra for Locations 1, 3, and 4 have been estimated by adjusting the spectrum shape of background sound measured at Location 2 such that the A-weight sound levels for spectra at other locations are the same as A-weighted sound levels measured at those locations.

From data in Table 2 and Figures 9a and 9b, sound levels produced by building mechanical equipment will produce sound conforming to the limits of the RoD. Sound produced will also not exhibit a pure tone condition as prohibited by the RoD.

	Octave Band Center Frequencies (Hz)											
	31	63	125	250	500	1000	2000	4000	8000	A	Limit (dBA)	C
						Daytime						
Location 1 569 Belmont Street	56	57	54	48	46	44	42	40	33	50	54	60
Location 2 13/19 Horne Road	57	58	55	49	47	45	43	41	34	51	55	61
Location 3 125 Trapelo Road (6th flr.)	63	64	61	55	53	51	49	48	41	57	61	67
Location 4 486 Common Street	63	65	62	55	52	51	49	48	41	57	62	67
						Nighttime						
Location 1 569 Belmont Street	46	47	45	43	40	36	32	29	22	42	43	51
Location 2 13/19 Horne Road	50	52	49	45	43	39	36	34	27	45	48	55
Location 3 125 Trapelo Road (6th flr.)	53	56	53	49	47	44	41	39	31	50	51	59
Location 4 486 Common Street	50	51	49	44	41	38	35	34	27	44	48	55

Table 2. Estimated sound pressures levels for all mechanical equipment operating Proposed Cushing Village, Belmont, MA

(iii) Upon substantial completion of construction of all three buildings of Cushing Village at a time when all initial mechanical equipment can be operating prior to occupancy the Applicant will complete the sound measurements to demonstrate compliance with section 3A(ii) above and the conditions of this Decision. The acoustical analysis shall be varied in the event that there are specific conditions which are created within Cushing Square but not related to the Development that cause a material increase to background sound levels. The first Certificate of Occupancy shall not be issued and no commercial or residential tenant shall occupy the premises if the Development fails to comply with the noise standard adopted by this Decision.

At the time that the building is substantially complete such that all equipment discussed in the report are operable, and prior to occupancy, a test protocol will be prepared for approval by the Town's acoustical consultant. Upon approval, sound levels will be made at the Locations 1-4 discussed in the report.

(iv) In the event that the Applicant seeks occupancy of a building without having tested all three buildings as required under 3A(iii) above, the Applicant shall provide evidence to the satisfaction of the Board that the Development will not exceed the standard established under 3A(ii) when all three buildings are tested cumulatively.

If the condition occurs that all equipment cannot be operated for testing as outlined in the previously mentioned test protocol, then acoustical computer modeling will be used, together with sound measurements, to verify compliance of facility sound with provisions of the RoD.

B. Screening of the roof mounted mechanical equipment shall not exceed the height of the screening of the mechanical equipment as shown on the Project Plans.

This is an architectural issue; however, it must be emphasized that this analysis assumed solid screens that extend a minimum of 4 feet above the highest point of roof decks.

C. All emergency generators shall be housed indoors.

This is the case as previously described.

D. Subsequent uses within the Development, including restaurants, that require additions or modifications to the roof mounted mechanicals and other ventilation equipment shall cumulatively be held to the same standard as set forth in Section 3(A)(ii) above and the conditions of this Decision. Any violations of this standard shall be subject to enforcement action to the maximum extent authorized by law.

This condition has been accepted by the facility Owner.

* * *

We believe that the acoustical analysis presented in this letter respond in full to the July 27, 2013 Belmont Planning Board Record of Decision for the proposed Cushing Village. The analysis concludes that under all circumstances, sound produced by residential facility equipment, even in the unlikely case that they all operate at full capacity simultaneously, will conform to the limits of the Town of Belmont's Record of Decision.

If we can provide any further information, please do not hesitate to contact us. Thank you.

Yours sincerely,
CAVANAUGH TOCCI ASSOCIATES, INC.

Gregory C. Tocci, *Sr. Principal Consultant*

978-639-4102 (d)
508-395-3945 (c)
gtocci@cavtocci.com

cc.: John Fasano
Jerry Pucillo

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Figures

Figure 1. Project area
Proposed Cushing Village, Belmont, MA

Figure 2. Facility concept plan and local streets
Proposed Cushing Village, Belmont, MA

Figure 3. Approved measurement locations for RoD Decision 3
See Appendix B of this letter
Proposed Cushing Village, Belmont, MA

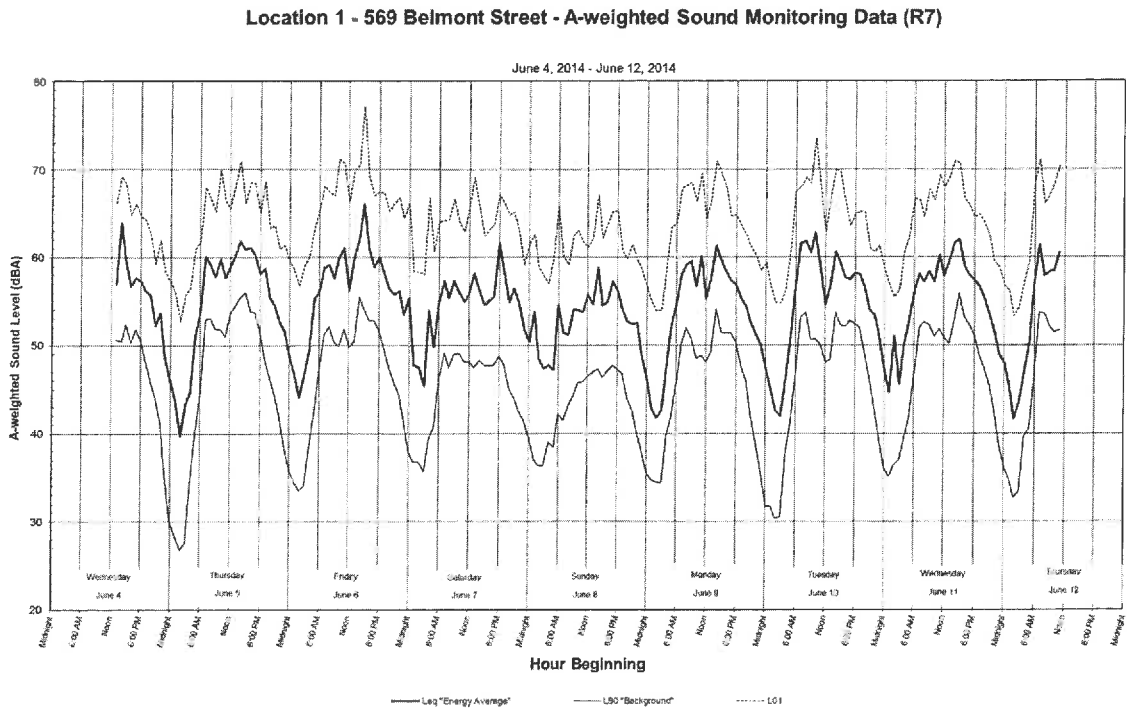

Figure 4a. Measured A-weight sound levels—Location 1 (569 Belmont Street)
Proposed Cushing Village, Belmont, MA

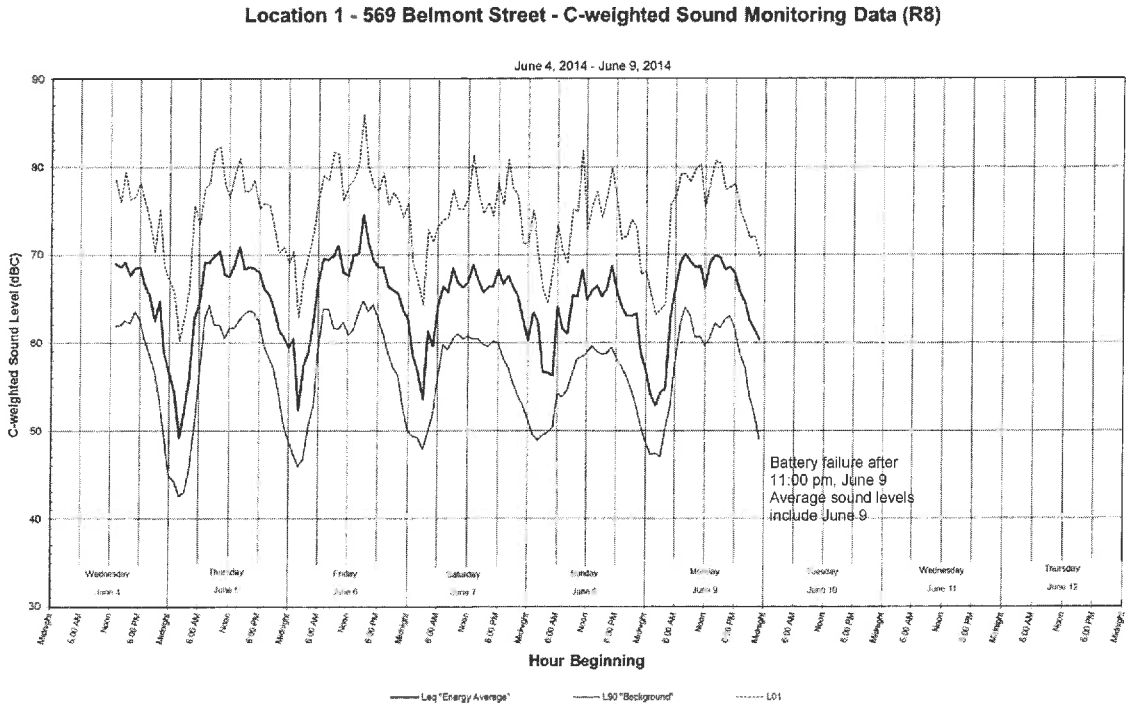

Figure 4b. Measured C-weight sound levels—Location 1 (569 Belmont Street)
Proposed Cushing Village, Belmont, MA

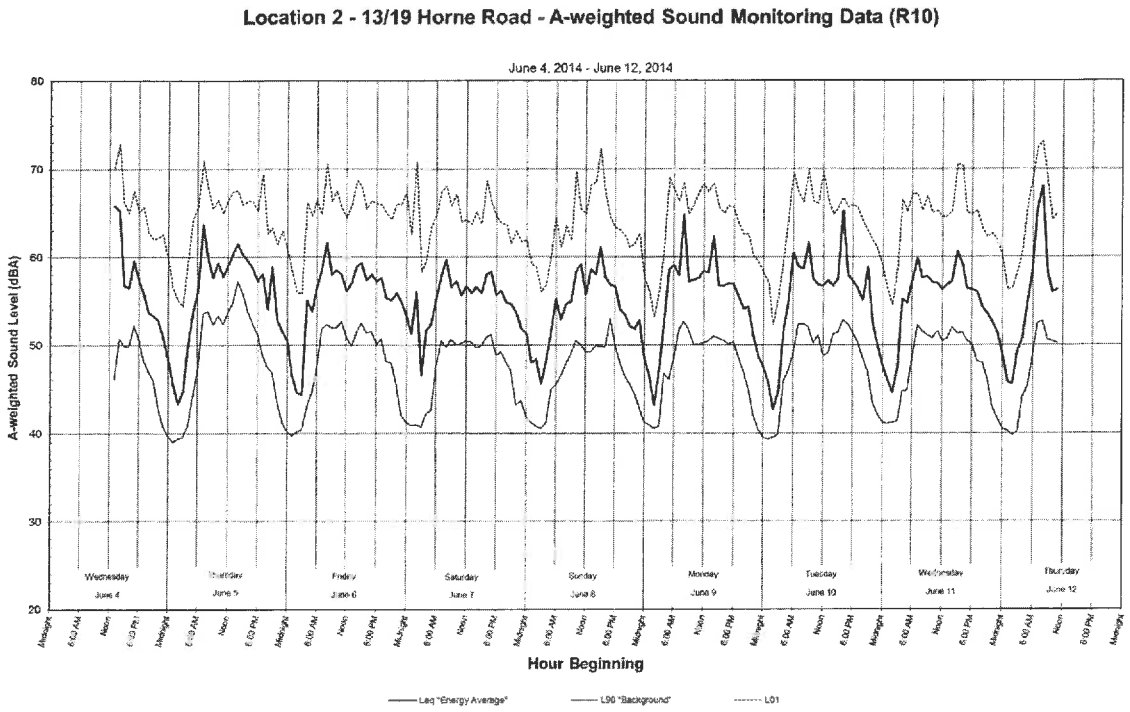

Figure 5a. Measured A-weight sound levels—Location 2 (13/19 Horne Road)
Proposed Cushing Village, Belmont, MA

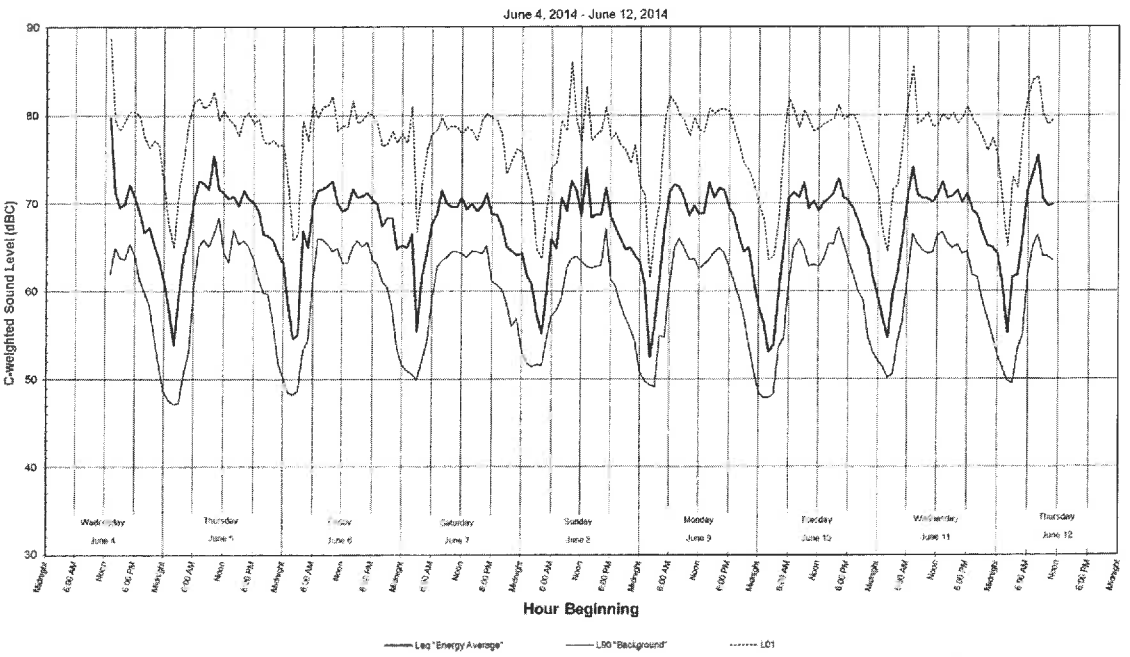

Figure 5b. Measured C-weight sound levels—Location 2 (13/19 Horne Road)
Proposed Cushing Village, Belmont, MA

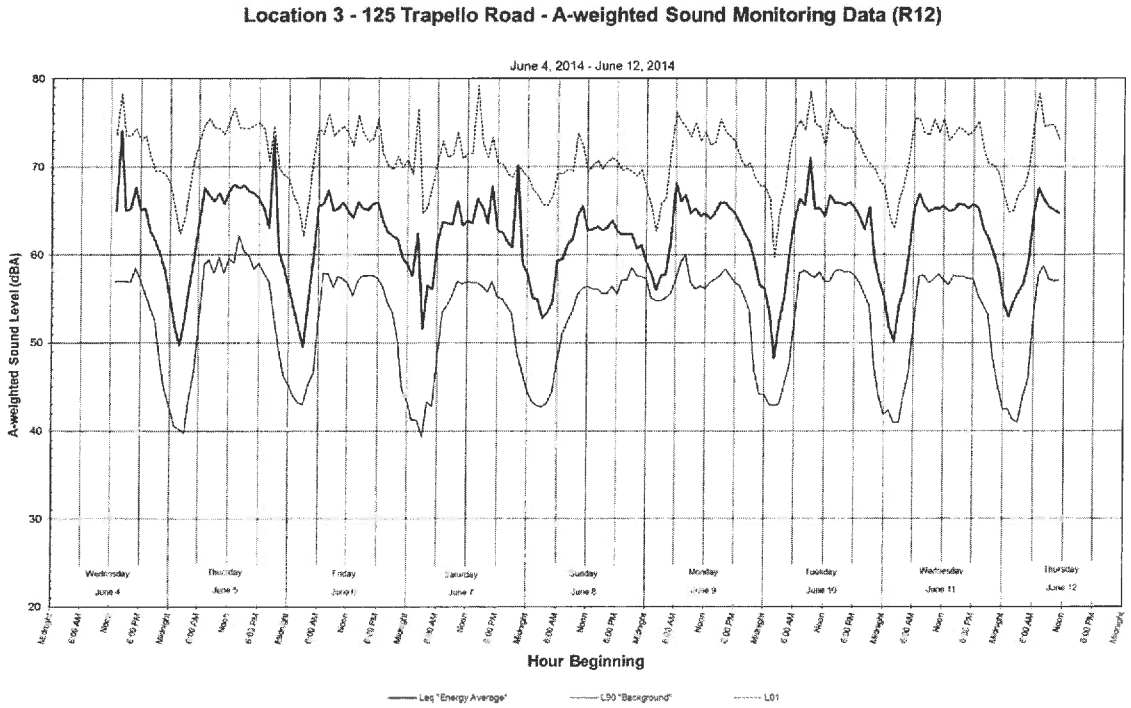

Figure 6a. Measured A-weight sound levels—Location 3 (125 Trapelo Road)
Proposed Cushing Village, Belmont, MA

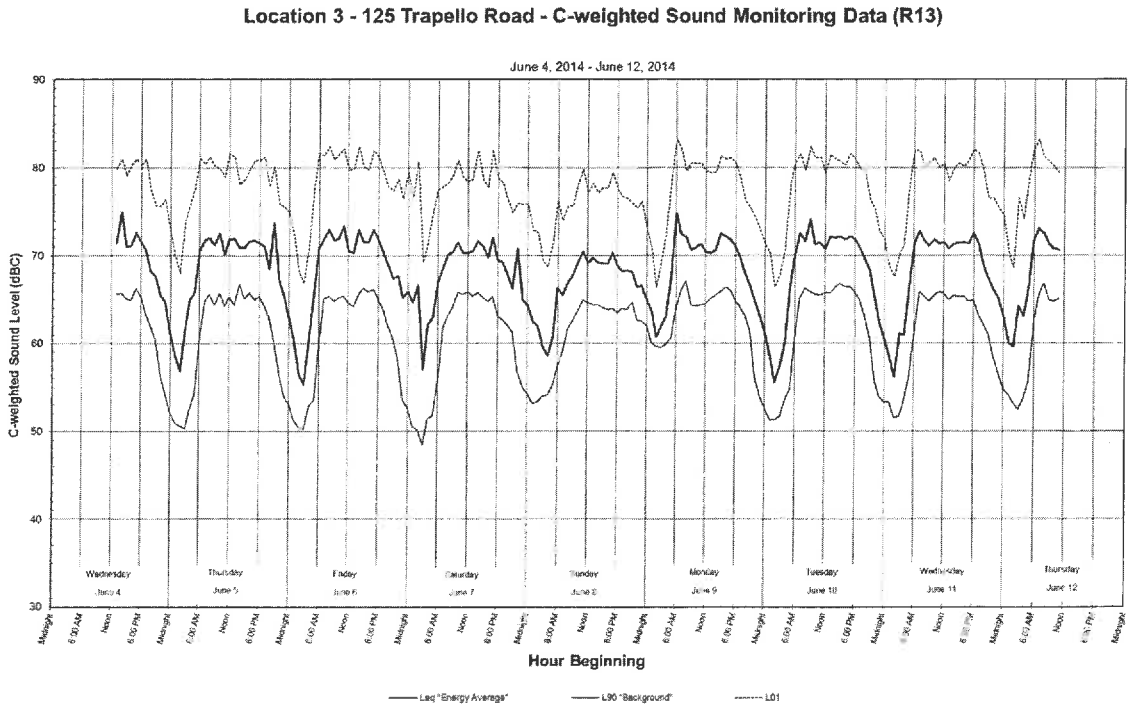

Figure 6b. Measured C-weight sound levels—Location 3 (125 Trapelo Road)
Proposed Cushing Village, Belmont, MA

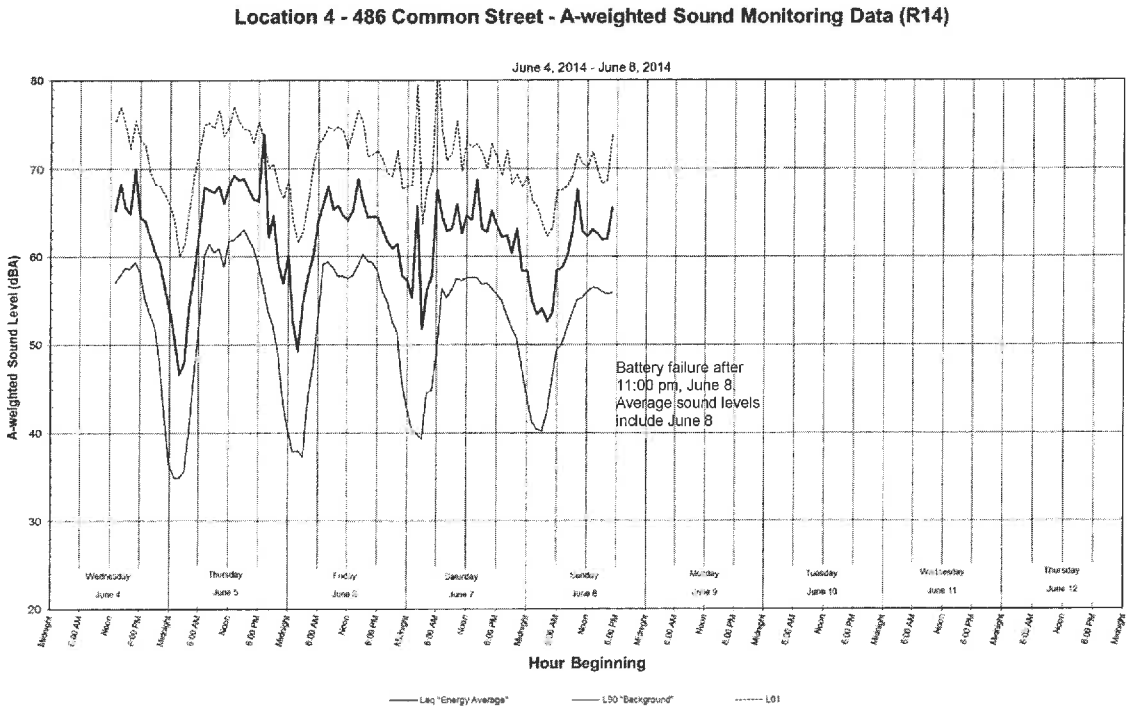

Figure 7a. Measured A-weight sound levels—Location 4 (486 Common Street)
Proposed Cushing Village, Belmont, MA

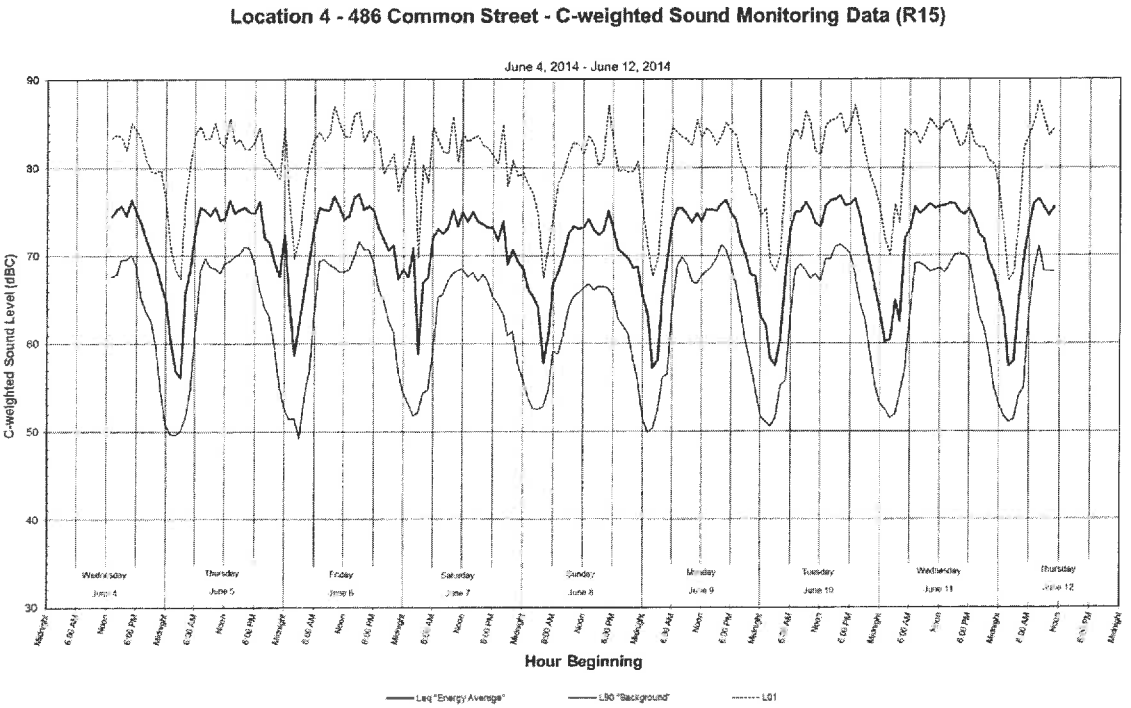

Figure 7b. Measured C-weight sound levels—Location 4 (486 Common Street)
Proposed Cushing Village, Belmont, MA

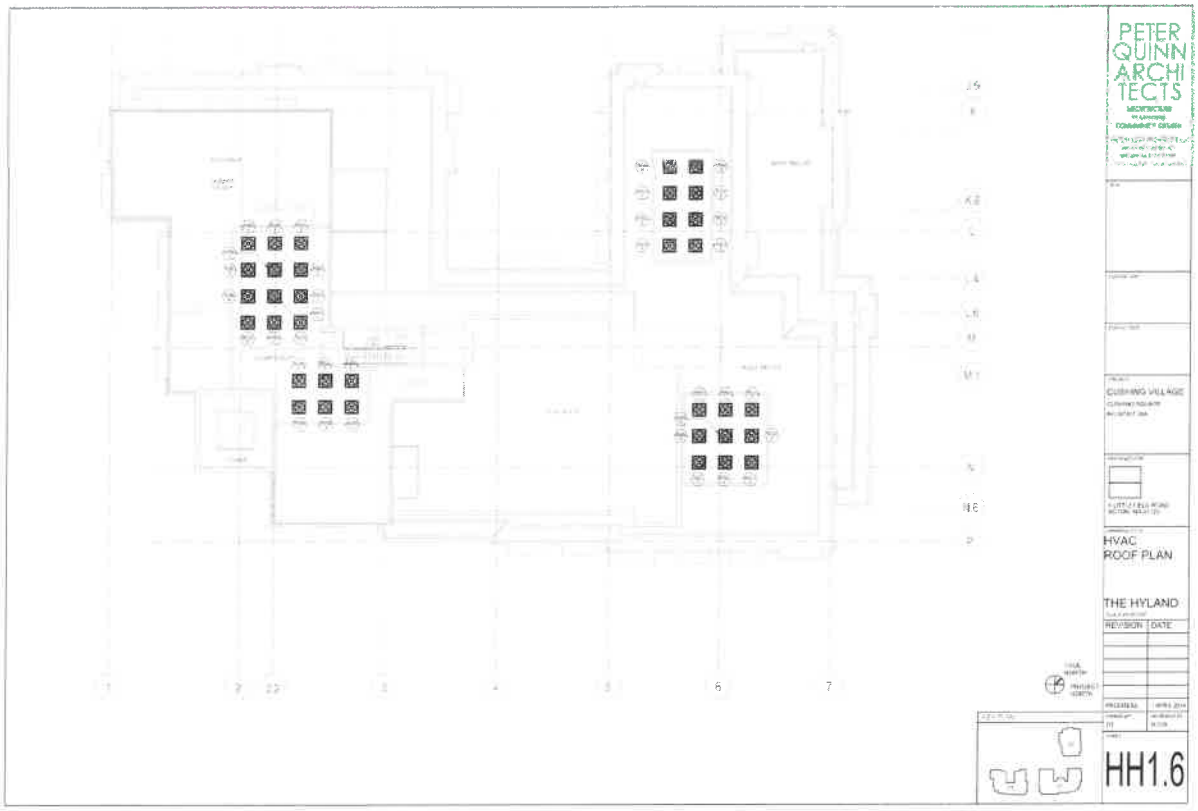

Figure 8a. Hyland Building roof plan showing residential compressor/condenser units
Proposed Cushing Village, Belmont, MA

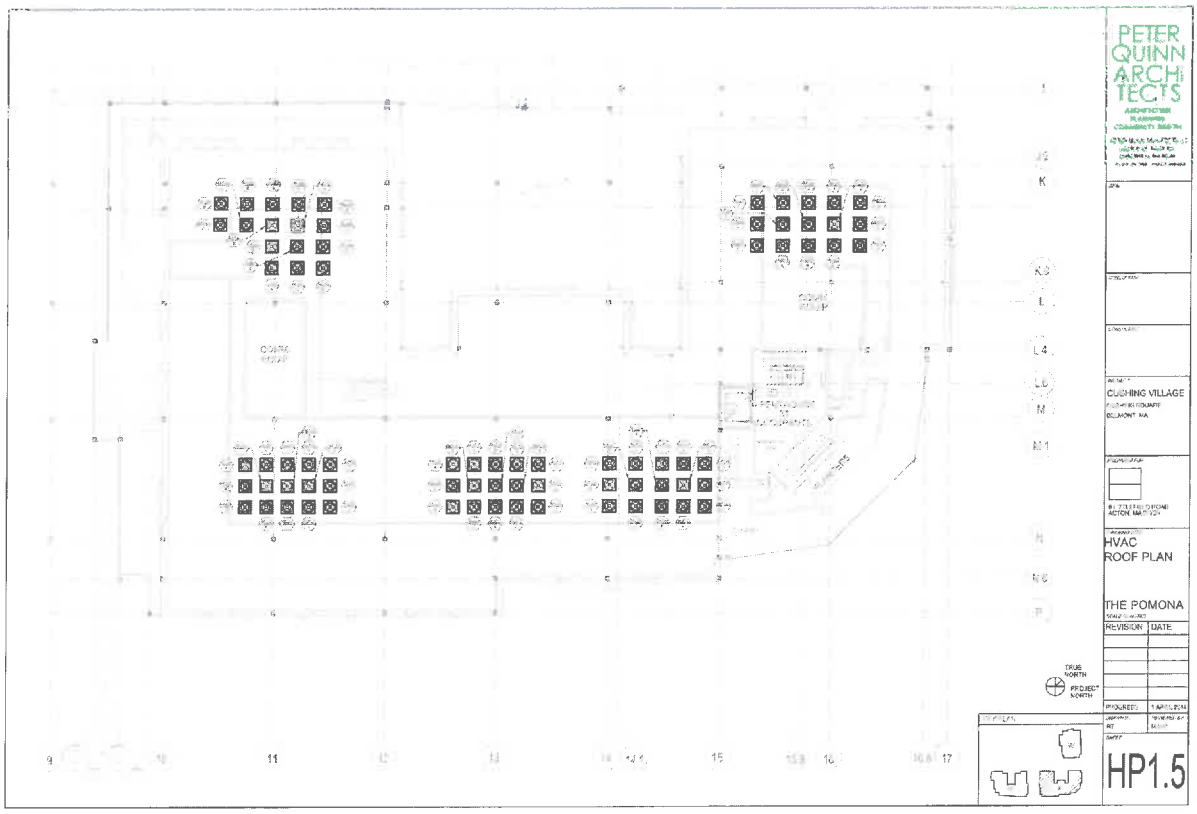

Figure 8b. Pomona Building roof plan showing residential compressor/condenser units
Proposed Cushing Village, Belmont, MA

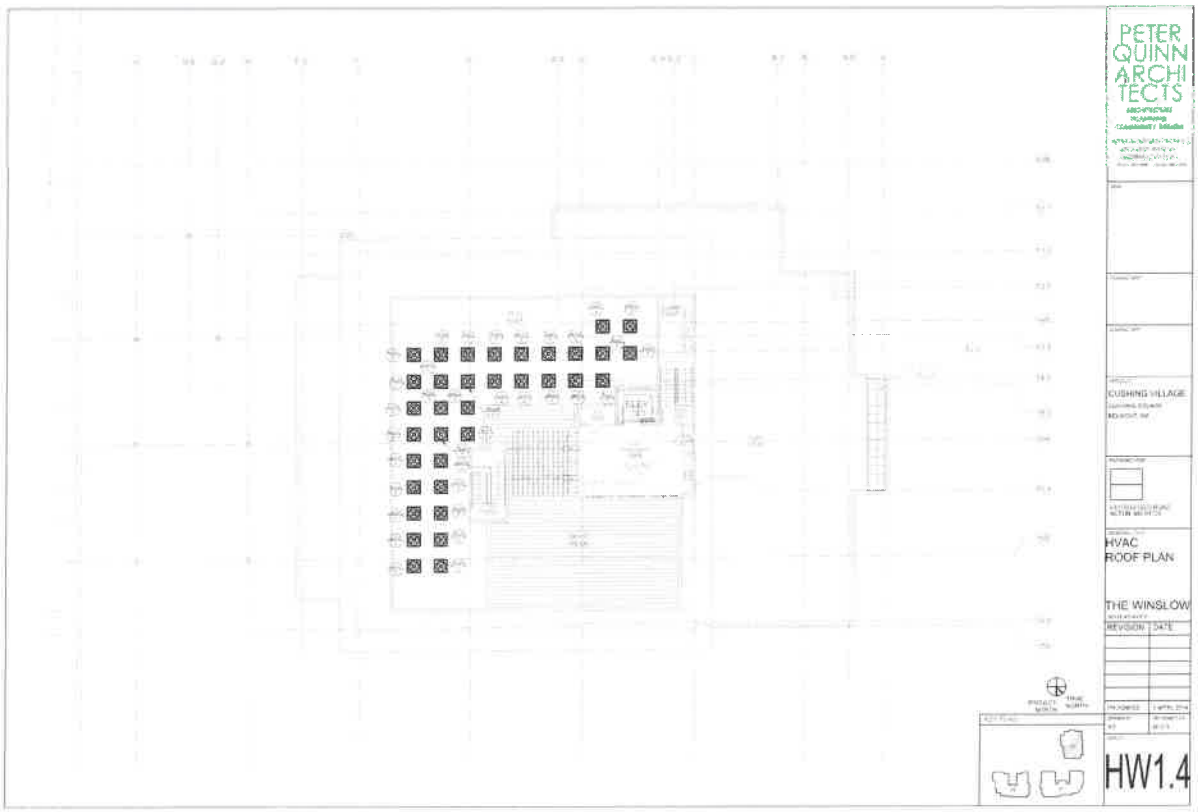

Figure 8c. Winslow Building roof plan showing residential compressor/condenser units
Proposed Cushing Village, Belmont, MA

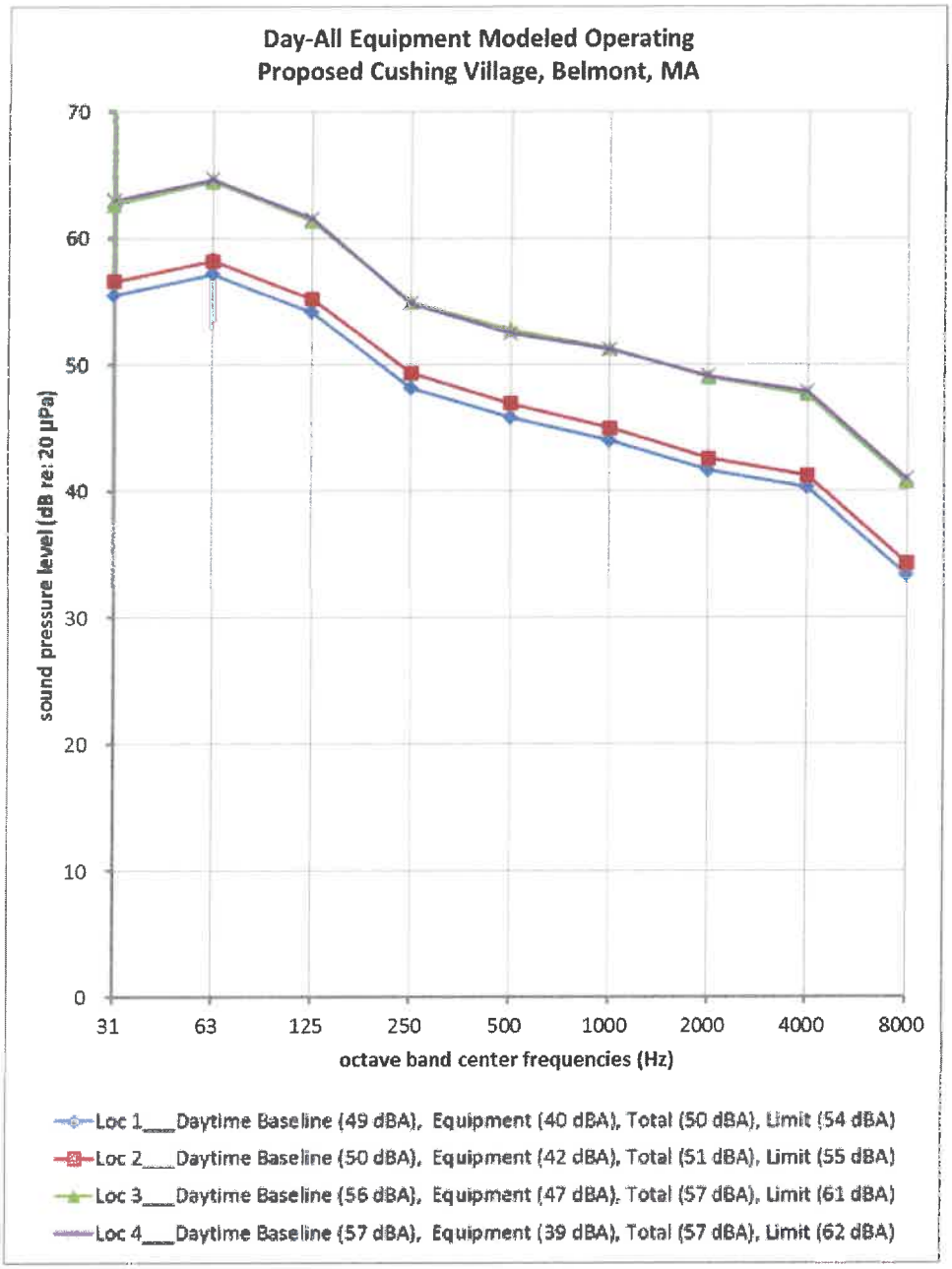

Figure 9a. Estimated daytime sound levels with all mechanical equipment modeled operating
Proposed Cushing Village, Belmont, MA

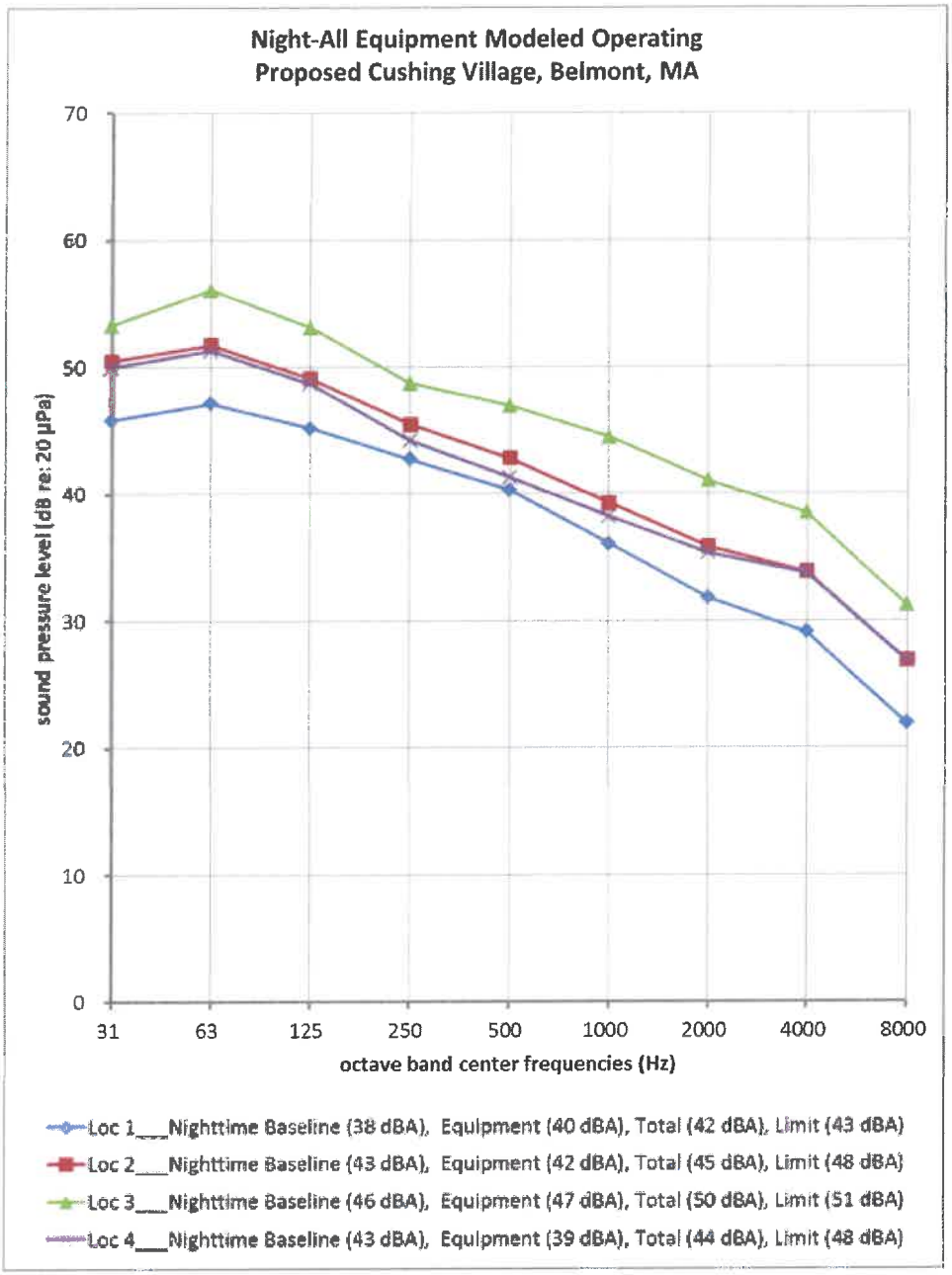

Figure 9b. Estimated nighttime sound levels with all mechanical equipment modeled operating Proposed Cushing Village, Belmont, MA

Appendix A

Decision 3 Noise/Sound
of the
Cushing Village
Record of Decision
July 27, 2013

cta

EXCERPT

PLANNING BOARD
DECISION ON APPLICATION OF SMITH LEGACY PARTNERS, LLC FOR
A SPECIAL PERMIT WITH DESIGN AND SITE PLAN REVIEW AND WAIVERS
PURSUANT TO SECTION 8
(Cushing Square Overlay District)
OF THE TOWN OF BELMONT ZONING BY-LAW

July 27, 2013

3. Noise/Sound

A. Acoustical Analysis:

(i) Prior to the issuance of a building permit, and before demolition of existing buildings, background sound levels shall he established near the property lines of the properties abutting the Development along Trapelo Road, Common Street, Home Road and Belmont Street. The background sound level shall be determined utilizing an appropriate number of unattended sound monitors that would simultaneously and continuously measure A-weighted and C-weighted ambient sound levels to document existing conditions for a period of not less than seven days. The number, location, timing and methods of the sound monitoring shall be subject to the approval of the Town's acoustical engineering consultant. Said baseline measurements and monitoring shall he conducted at the Applicant's expense. From the data collected in the manner set forth herein, two criteria shall be established as base line or existing conditions, one for daytime use and one for nighttime use. Daytime conditions will be from 7:00 AM to 11:00 PM and nighttime conditions will be 11:00 PM to 7:00 AM. The baseline ambient sound levels will be determined by the average of the ambient sound levels measured each hour during daytime and nighttime hours.

(ii) Not less than 60 days prior to issuance of a building permit, the Applicant will submit an acoustical analysis demonstrating the roof mounted mechanicals and other ventilation equipment for all three buildings will not (1) increase sound levels more than 5dBA of the daytime and nighttime background ambient sound levels, or (2) produce a "pure tone" condition (when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 dB or more), as determined in accordance with Section 3A(i) above. This demonstration will be on the basis of sound level data available from building systems equipment manufacturers. Roof mounted mechanicals and other ventilation equipment will be evaluated on both an A-weighted and C-weighted basis. The Applicant will submit the acoustical analysis and model for review by the Town's acoustical engineering consultant at the Applicant's expense. A building permit shall not be issued until the analysis provided by the Applicant and as reviewed by the Town's consultant reasonably demonstrates that operation of the mechanical units will be in compliance with this condition.

(iii) Upon substantial completion of construction of all three buildings of Cushing Village at a time when all initial mechanical equipment can be operating prior to occupancy the Applicant will complete the sound measurements to demonstrate compliance with section 3A(ii) above and the conditions of this Decision. The acoustical analysis shall be varied in the event that there are specific conditions which are created within Cushing Square but not related to the Development that cause a material increase to background sound levels. The first Certificate of Occupancy shall not be issued and no commercial or residential tenant shall occupy the premises if the Development fails to comply with the noise standard adopted by this Decision.

(iv) In the event that the Applicant seeks occupancy of a building without having tested all three buildings as required under 3A(iii) above, the Applicant shall provide evidence to the satisfaction of the Board that the Development will not exceed the standard established under 3A(ii) when all three buildings are tested cumulatively.

B. Screening of the roof mounted mechanical equipment shall not exceed the height of the screening of the mechanical equipment as shown on the Project Plans.

C. All emergency generators shall be housed indoors.

D. Subsequent uses within the Development, including restaurants, that require additions or modifications to the roof mounted mechanicals and other ventilation equipment shall cumulatively be held to the same standard as set forth in Section 3(A)(ii) above and the conditions of this Decision. Any violations of this standard shall be subject to enforcement action to the maximum extent authorized by law.

Appendix B

Measurement Protocol Approval

Gregory C. Tocci

From: Brion G. Koning
Sent: Tuesday, June 17, 2014 6:31 PM
To: Gregory C. Tocci
Subject: FW: proposed Cushing Village request to Town of Belmont / Eric Wood
Attachments: CushingVillage-ProposedJune2014SoundMonitoringLocationsPhoto.pdf

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From: Wood, Eric W. [ewood@ACENTECH.com]
Sent: Monday, June 02, 2014 12:35 PM
To: ayogurtian@belmont-ma.gov; gclancy@belmont-ma.gov
Cc: Brion G. Koning
Subject: FW: proposed Cushing Village request to Town of Belmont / Eric Wood

Ara Yogurtian,

It is my opinion that the below email message dated 30 May 2014 from Brion Koning of CTA together with his attached aerial photograph properly describe the new preconstruction sound measurements to be made adjacent to the Cushing Village development and follow the special permit conditions relating to noise dated 27 July 2013.

Eric Wood
Acentech

From: Brion G. Koning [mailto:BKoning@cavtocci.com]
Sent: Friday, May 30, 2014 3:30 PM
To: gclancy@belmont-ma.com; Wood, Eric W.
Cc: Chris Starr (chrisstarr123@gmail.com); Jerry Pucillo (jerry@centergreen.com); Gregory C. Tocci
Subject: RE: proposed Cushing Village request to Town of Belmont / Eric Wood

Gentlemen,

This email (and attached aerial photograph) supersedes the email that I sent to you on Wednesday afternoon this week (May 28th).

This current email follows my telephone conversations with Eric Wood of Acentech over the past two days.

The photograph attached hereto shows currently-proposed sound monitoring locations (as of today), which differ from the locations identified in Wednesday's email.

Currently-Proposed Sound Monitoring and Data Reporting

Cavanaugh Tocci Associates, Inc. proposes to install sound monitors at the four locations shown on the attached photograph, to continuously and simultaneously measure A-weighted (dBA) and C-weighted (dBC) sound levels, for a time duration of not less than 7 days.

We propose to program the monitors to report standardized environmental sound level descriptors (including energy-equivalent Leq sound level, and 90th percentile L90 sound level) in one-hour intervals.

We propose to submit a concise written report summarizing the monitoring data that are specifically pertinent to the Cushing Village environmental sound levels evaluation in accordance with the Town of Belmont requirements. However, all of the electronic data collected by the acoustical instrumentation (all measurement data, calibration records, etc.) will be freely available to Acentech/Town of Belmont upon request at any time.

The purpose of the proposed sound monitoring is to fulfill the pre-construction sound monitoring portion of the acoustical requirements set forth in Condition 3 of the Town of Belmont Planning Board Decision dated July 27, 2013 regarding the Cushing Village project application.

The sound monitoring locations shown on the attached aerial photograph/street map are on the four streets listed in Condition 3 (Trapelo Road, Common Street, Horne Road and Belmont Street).

In addition, although not technically required by the Town of Belmont, we propose to monitor 1/3 octave sound spectra at one or more of the monitoring locations, to address potential concerns regarding sound that may be produced by insects (crickets, etc.) during the proposed June 2014 sound monitoring time interval, such that background sound without insect sound could be derived from the monitoring data.

- We request Acentech/Town of Belmont review and written approval of the proposed measurement and data reporting protocol outlined herein.

We are currently contacting/coordinating with owners of the properties at the addresses listed on the attached photograph, to obtain their permission to install the sound monitors on private properties.

We are prepared to install sound monitors within one business day of receipt of approval.

Please call or email if you have any questions or comments.

Brion Koning
Senior Consultant

Cavanaugh Tocci Associates, Inc.
327F Boston Post Road | Sudbury, MA 01776
(d): (978) 639-4105
(o): (978) 443-7871
bkoning@cavtocci.com<mailto:bkoning@cavtocci.com>
www.cavtocci.com<http://www.cavtocci.com/>

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Proposed Pre-Construction Sound Monitoring Locations - Cushing Village, Belmont, MA

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Appendix C

Measured
A-Weight Background
Sound Levels

Hour Begin	June 5, 2014	June 6, 2014	June 7, 2014	June 8, 2014	June 9, 2014	June 10, 2014	June 11, 2014
0:00	30.0	35.8	37.9	39.4	35.6	31.8	36.1
1:00	28.4	34.5	36.8	37.0	34.7	31.7	35.1
2:00	26.8	33.5	36.8	36.4	34.5	30.4	36.5
3:00	27.6	34.0	35.7	36.4	34.4	30.5	37.0
4:00	34.4	38.5	39.4	39.0	39.6	37.8	39.3
5:00	40.2	42.6	40.7	38.5	42.1	41.6	41.8
6:00	44.7	47.2	46.3	42.2	45.9	46.6	47.0
7:00	52.9	51.2	49.1	41.5	50.2	53.2	52.0
8:00	53.1	52.1	47.5	43.2	52.0	53.7	52.6
9:00	51.8	50.3	49.0	44.4	50.8	50.6	52.3
10:00	51.8	49.9	49.1	45.8	48.5	50.7	51.0
11:00	51.0	51.8	48.1	45.9	48.8	50.1	51.8
12:00	53.6	49.8	48.2	46.5	48.1	48.1	50.9
13:00	54.5	50.5	47.5	47.0	49.3	48.4	50.2
14:00	55.5	55.5	48.3	47.3	54.1	53.7	52.8
15:00	56.0	54.1	47.7	46.4	51.4	52.3	55.9
16:00	53.9	52.8	47.7	47.1	51.4	52.1	53.2
17:00	53.7	52.8	47.8	47.7	51.4	52.8	52.4
18:00	51.4	51.5	48.8	47.3	50.3	52.4	51.1
19:00	48.3	49.6	47.7	46.8	47.6	52.0	48.9
20:00	46.2	47.5	45.0	44.0	45.9	49.0	47.3
21:00	44.4	45.8	44.1	42.6	42.0	46.0	45.7
22:00	41.6	44.4	42.5	40.0	39.1	42.6	42.7
23:00	38.2	41.4	41.4	38.1	35.7	39.4	38.7
Day	51.2	50.6	47.4	45.2	48.8	50.5	50.7
Night	33.8	38.4	39.4	38.4	37.8	36.2	38.9

Table C-1. Measured A-weighted hourly background sound levels ($L_{A90,1\text{-}hr}$)
Location 1—569 Belmont Street
Proposed Cushing Village, Belmont, MA

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Hour Begin	June 5, 2014	June 6, 2014	June 7, 2014	June 8, 2014	June 9, 2014	June 10, 2014	June 11, 2014
0:00	39.7	40.2	41.3	41.8	41.3	39.5	41.2
1:00	39.0	39.7	40.9	41.2	40.9	39.3	41.1
2:00	39.4	40.2	41.0	40.8	40.5	39.5	41.2
3:00	39.6	40.4	40.7	40.5	40.8	39.9	41.4
4:00	40.8	43.0	42.2	41.2	46.8	45.9	44.8
5:00	44.2	44.7	42.6	45.0	46.1	47.2	44.9
6:00	47.5	47.4	47.8	45.5	48.7	49.0	48.7
7:00	53.6	51.8	50.4	46.5	51.7	52.3	52.2
8:00	53.9	52.3	49.8	47.9	52.7	52.4	51.6
9:00	52.3	51.9	50.6	49.1	51.7	52.0	51.1
10:00	53.3	52.0	50.0	50.4	50.0	50.2	50.8
11:00	52.4	52.7	50.2	50.1	50.1	51.0	51.6
12:00	53.7	50.9	50.4	49.2	50.2	48.8	50.5
13:00	54.8	49.9	50.3	49.2	50.4	49.1	50.7
14:00	57.2	51.6	49.7	49.9	51.0	51.2	52.0
15:00	55.8	52.5	49.9	49.8	50.7	51.4	51.3
16:00	53.7	51.4	50.9	49.8	50.5	52.8	51.4
17:00	52.4	51.5	51.2	52.9	50.1	52.3	50.5
18:00	51.2	50.1	48.8	49.9	50.3	51.3	50.1
19:00	48.8	50.7	49.2	48.0	48.5	50.3	48.1
20:00	47.5	48.2	48.0	46.5	46.9	48.5	48.0
21:00	46.9	48.0	47.1	45.6	45.1	46.9	46.2
22:00	43.5	45.4	43.2	44.4	42.0	43.4	43.0
23:00	41.2	42.1	43.7	42.9	40.4	42.2	41.7
Day	51.9	50.7	49.4	48.7	49.5	50.2	49.9
Night	41.4	42.2	42.5	42.4	43.2	42.8	43.1

Table C-2. Measured A-weighted hourly background sound levels ($L_{A90,1\text{-}hr}$)
Location 2—13/19 Horne Road
Proposed Cushing Village, Belmont, MA

Hour Begin	June 5, 2014	June 6, 2014	June 7, 2014	June 8, 2014	June 9, 2014	June 10, 2014	June 11, 2014
0:00	42.7	45.3	43.4	44.5	57.3	44.1	41.9
1:00	40.6	44.0	41.3	43.3	55.1	43.0	42.3
2:00	40.2	43.2	41.2	42.9	54.8	42.9	40.9
3:00	39.8	43.0	39.3	42.7	54.8	43.0	40.9
4:00	43.6	45.3	43.3	43.2	55.1	45.3	44.0
5:00	46.6	46.5	42.8	44.5	55.6	47.5	46.7
6:00	52.5	52.3	48.4	47.8	57.2	52.3	52.5
7:00	58.9	57.9	53.5	50.9	59.2	57.9	57.6
8:00	59.4	57.8	54.3	52.4	60.0	58.2	57.7
9:00	57.9	56.3	55.4	53.6	56.9	57.8	56.8
10:00	59.7	57.5	57.0	55.5	56.1	57.4	57.2
11:00	57.9	57.3	56.7	56.2	56.4	58.0	57.8
12:00	59.6	56.7	57.0	56.4	56.2	57.0	57.1
13:00	59.1	55.3	56.8	56.1	56.9	57.0	56.6
14:00	62.2	57.1	56.8	56.1	57.2	58.1	57.7
15:00	60.4	57.6	56.4	55.6	57.6	58.3	57.5
16:00	59.8	57.6	55.8	55.6	58.4	58.0	57.5
17:00	58.4	57.7	57.0	56.4	57.7	58.1	57.3
18:00	59.0	57.3	55.2	55.5	56.9	57.6	57.2
19:00	57.9	56.4	55.0	57.1	56.5	56.8	55.3
20:00	57.0	54.6	54.1	57.1	55.1	55.5	54.2
21:00	53.3	53.4	53.3	58.5	53.7	54.2	53.2
22:00	49.4	50.3	48.9	57.6	46.9	47.2	48.1
23:00	46.3	44.7	46.7	57.5	44.2	44.0	45.1
Day	58.1	56.3	55.2	55.7	56.4	56.7	56.2
Night	44.0	45.5	43.3	45.8	54.3	45.3	44.3

Table C-3. Measured A-weighted hourly background sound levels ($L_{A90,1\text{-}hr}$)
Location 3—125 Trapelo Road (6th floor)
Proposed Cushing Village, Belmont, MA

Hour Begin	June 5, 2014	June 6, 2014	June 7, 2014	June 8, 2014	June 9, 2014	June 10, 2014	June 11, 2014
0:00	36.4	40.1	42.8	44.0	0.0	0.0	0.0
1:00	34.9	37.9	40.4	41.2	0.0	0.0	0.0
2:00	34.9	38.0	39.9	40.4	0.0	0.0	0.0
3:00	35.7	37.3	39.3	40.2	0.0	0.0	0.0
4:00	40.3	44.1	44.5	42.3	0.0	0.0	0.0
5:00	46.8	47.6	44.9	46.2	0.0	0.0	0.0
6:00	52.2	52.8	49.3	49.4	0.0	0.0	0.0
7:00	60.1	59.1	56.4	50.1	0.0	0.0	0.0
8:00	61.4	59.4	55.3	52.0	0.0	0.0	0.0
9:00	60.5	58.7	56.3	53.7	0.0	0.0	0.0
10:00	60.9	57.8	57.5	55.1	0.0	0.0	0.0
11:00	58.9	57.8	57.3	55.3	0.0	0.0	0.0
12:00	61.7	57.5	57.6	56.0	0.0	0.0	0.0
13:00	61.9	57.9	57.6	56.5	0.0	0.0	0.0
14:00	62.4	59.0	57.6	56.4	0.0	0.0	0.0
15:00	63.1	60.3	56.9	56.0	0.0	0.0	0.0
16:00	61.9	59.5	57.0	55.7	0.0	0.0	0.0
17:00	60.9	59.3	56.4	55.9	0.0	0.0	0.0
18:00	59.0	58.3	55.8		0.0	0.0	0.0
19:00	56.4	56.1	55.0		0.0	0.0	0.0
20:00	53.6	54.9	53.3		0.0	0.0	0.0
21:00	52.1	52.7	51.9		0.0	0.0	0.0
22:00	49.0	51.3	50.7		0.0	0.0	0.0
23:00	43.3	45.9	47.3		0.0	0.0	0.0
Day	59.0	57.5	55.8	54.8	0.0	0.0	0.0
Night	40.6	43.0	43.6	43.4	0.0	0.0	0.0

Table C-4. Measured A-weighted hourly background sound levels ($L_{A90,1\text{-}hr}$)
Location 4—486 Common Street
Proposed Cushing Village, Belmont, MA

Appendix D

Glossary

Glossary

The definitions of acoustical terms used in this publication are most often based on American National Standards Institute (ANSI) S1.1-1994 Acoustical Terminology. Some of the acoustical terms briefly defined below are explained in greater detail elsewhere in the *Solutia Acoustical Glazing Design Guide.*

A-Weighting (dBA)

The filtering of sound that replicates the human hearing frequency response. The human ear is most sensitivity to sound at mid frequencies (500 to 4,000 Hz) and is progressively less sensitive to sound at frequencies above and below this range. A-weighted sound level is the most commonly used descriptor to quantify the relative loudness of various types of sounds with similar or differing frequency characteristics.

Absorption

The attenuation (or reduction) of sound level that results when sound propagates through a medium (usually air) or through a dissipative material (sound absorptive material) such as glass fiber or open-cell foam. In the case of sound absorptive materials used in the building industry, attenuation of sound is produced by the conversion of molecular motion, which is sound, into thermal energy due to friction of air molecules with fibrous or cellular materials.

Acoustics

(1) Acoustics is the science of sound, including its production, transmission and effects.

(2) The acoustics of a room are those qualities that together determine its character with respect to the perception of sound.

Ambient Noise

Ambient noise encompasses all sound present in a given environment, being usually a composite of sounds from sources near and far.

Background Sound

The lowest sound level typically occurring during a monitoring period.

Band Pass Filter

The filtering of sound within specified frequency limits or frequency bands. The audible frequency range is often sub-divided into octave, one-third octave, or other fractions of octave bands.

Barriers

A solid obstacle that blocks the line-of-sight between a sound source and a receiver, thereby providing barrier attenuation, i. e., reducing sound level at the receptor. Sound attenuation provided by barriers is related to the transmission loss through the barrier material and diffraction of sound over and around the barrier.

Community Noise Exposure Level (CNEL)

The 24-hour energy average sound level where a 10 dB "penalty" is applied to sound occurring at night between 10:00 PM and 7:00 AM, and a 5 dB penalty is applied to sound occurring during evening hours between 7:00 PM and 10:00 PM. The penalties are intended to account for the increased sensitivity of a community to sound occurring during evening and nighttime hours.

Day Night Sound Level (DNL, L_{dn})

The 24-hour energy average sound level where a 10 dB "penalty" is applied to sound occurring at night between 10:00 PM and 7:00 AM. The 10 dB penalty is intended to account for the increased sensitivity of a community to sound occurring at night.

Decibel (dB)

A dimensionless unit which denotes the ratio between two quantities that are proportional to power, energy, or intensity. One of these quantities is a designated reference by which all other quantities of identical units are divided. The sound pressure level in decibels is equal to 10 times the logarithm (to the base 10) of the ratio between the pressure squared divided by the reference pressure squared. The reference pressure used in acoustics is 20 microPascals.

Energy Average Sound Level

In real-world circumstances, sound levels vary considerably over time. The L_{EQ} is the energy average or equivalent sound level over a monitoring time interval. It is a hypothetical continuous sound level that contains the same sound energy as the actual sound level occurring during the time interval. A letter symbol (such as A or C, i.e. LA_{EQ}) typically implies frequency weighting (i.e., the energy average sound level in dBA). In addition, the duration of measurement is typically stated (i.e. $LA_{EQ,1\text{-}hr.}$).

Frequency

Frequency is the number of oscillations or cycles per unit time. In acoustics, frequency usually is expressed in units of Hertz (Hz), where one Hertz is equal to one cycle per second.

Noise

(1) Noise is undesired sound. By extension, noise is an unwanted disturbance within a useful frequency band, such as excessive traffic sound transmission into a sensitive building space.

(2) Noise is an erratic, intermittent or statistically random oscillation.

Octave

The ratio of a higher and lower frequencies that equals two.

Octave Band

Groups of frequencies defined by standards where the upper frequency of each band is equal to twice the lower frequency of each band. Octave bands are usually named by their geometric center frequency. For example, the octave band extending between 44.7 Hz and 89.1 Hz is called the 63 Hz octave band. The octave band extending between 89.1 Hz and 178 Hz is called the 125 Hz octave band. The full complement of octave bands in the audible frequency range is as follows: 31, 63, 125, 250, 500, 1000, 2000, 4000, 8000, and 16,000 Hz.

Octave Band Sound Pressure Level

Sound pressure level for all sound contained within a specified octave band.

Percentile Sound Levels

Besides frequency and level, environmental sounds exhibit a time-varying or temporal characteristic. The temporal character of noise level can be illustrated by considering noise levels that occur near a highway.

During the day, traffic sound levels are generally high, increasing to higher peaks when a noisy truck or multi-vehicle platoon passes and decreasing to a lower level between vehicle pass-bys. At night, when traffic volumes are lower, the same variation occurs, but is centered around a lower level.

Environmental sound descriptors are quantifications of sound that combine, into a single value, the three chief features of environmental sound: level, frequency and temporal characteristics.

The use of A-weighted sound pressure level combines the first two characteristics — level and frequency — into a single number. Then, by averaging A-weighted sound pressure levels over time in various fashions, acoustical descriptors that combine all three features can be developed.

Commonly used descriptors are percentile A-weighted sound levels, A-weighted sound pressure levels exceeded for specific percentages of time within a specific noise monitoring period. For example, the one-hour 50^{th} percentile A-weighted noise level, symbolized as the L_{50} (1 hour), is the A-weighted sound level exceeded a total of 30 minutes out of a continuous 60-minute period. Likewise, the L_{10} (20 minutes) is the A-weighted sound level exceeded a total of two minutes out of a continuous 20 minute period.

Percentile A-weighted sound levels most often are used to assess the time-varying character of environmental sound. The residual sound level (defined as the nearly constant, low level of sound produced by distant motor vehicle traffic or industrial activity) is indicative of the lowest sound level in a monitoring period. The residual or background sound level is commonly defined as the L_{90}, i.e., the A weighted sound level exceeded 90% of a monitoring time period.

Sound

(1) Sound is an oscillation in pressure, stress, particle displacement, particle velocity, etc., in a medium.

(2) Sound is an auditory sensation evoked by the oscillation described above.

Sound Pressure

The sound pressure at a point is the total instantaneous pressure at that point, in the presence of a sound wave, minus the static pressure at that point.

Sound Pressure Level

The sound pressure level, in decibels, of a sound is 20 times the logarithm to the base 10 of the ratio of the sound pressure to the reference pressure. The reference pressure shall be explicitly stated and is defined by standards.

Unless otherwise specified, the sound fields on both sides of the partition are assumed to be diffuse.

Sound Power Level

The computation of sound pressure levels at receptor locations requires determining sound power levels for all sources modeled. Sound power level quantifies the amount of sound produced by a source and is expressed in decibels referenced to 1 picoWatt (pW or 10^{-12} watts).

The distinction between "sound power" and "sound pressure" is quite important and can be explained as follows:

> *Sound power* is analogous to the power rating in watts of a light bulb.
>
> *Sound pressure* is analogous to the light intensity (perceived as brightness) at a given distance from a light bulb.

The shorter the distance from the bulb, the greater is the light intensity or perceived brightness at a particular location. Conversely, the longer the distance from the bulb, the less is the light intensity or perceived brightness at a particular location. Note that bulb power rating does not change with viewing distance from the bulb, but the apparent brightness does. Similarly, the sound power of a source does not change with distance from the source, but the sound pressure does.

Spectrum

A group of sound levels in frequency bands covering a wide frequency range. Generally, this term is used with some modifier indicating the resolution bandwidth, e.g., octave band spectrum or one-third octave band spectrum.

Appendix E

Mechanical Equipment
Technical Information

24ABB3
Comfort™13 Air Conditioner
with Puron® Refrigerant
1–1/2 to 5 Nominal Tons

Carrier
turn to the experts

Product Data

Puron

Comfort SERIES

Carrier's Air Conditioners with Puron® refrigerant provide a collection of features unmatched by any other family of equipment. The 24ABB has been designed utilizing Carrier's Puron refrigerant. The environmentally sound refrigerant allows you to make a responsible decision in the protection of the earth's ozone layer.

NOTE: Ratings contained in this document are subject to change at any time. Always refer to the AHRI directory (www.ahridirectory.org) for the most up-to-date ratings information.

INDUSTRY LEADING FEATURES / BENEFITS

Efficiency

- 13.0 - 13.2 SEER/10.8- 11.0 EER (based on tested combinations)
- Microtube Technology™ refrigeration system
- Indoor air quality accessories available

Sound

- Sound level as low as 72 dBA
- Sound level as low as 71 dBA with accessory sound blanket

Comfort

- System supports Edge® Thermidistat™ or standard thermostat controls

Reliability

- Puron® refrigerant - environmentally sound, won't deplete the ozone layer and low lifetime service cost.
- Scroll compressor
- Internal pressure relief valve
- Internal thermal overload
- Filter drier
- Balanced refrigeration system for maximum reliability

Durability

WeatherArmor™ protection package:

- Solid, durable sheet metal construction
- Dense wire coil guard available
  (3-phase units come standard with dense wire coil guard)
- Baked-on, complete outer coverage, powder paint

Applications

- Long-line - up to 250 feet (76.20 m) total equivalent length, up to 200 feet (60.96 m) condenser above evaporator, or up to 80 ft. (24.38 m) evaporator above condenser (See Longline Guide for more information.)
- Low ambient (down to -20°F/-28.9°C)) with accessory kit

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ELECTRICAL DATA

UNIT SIZE– VOLTAGE, SERIES	V/PH	OPER VOLTS*		COMPR		FAN	MCA	MIN WIRE SIZE†	MIN WIRE SIZE†	MAX LENGTH ft. (m)‡	MAX LENGTH ft. (m)‡	MAX FUSE** or CKT BRK AMPS
		MAX	MIN	LRA	RLA	FLA		60° C	75° C	60° C	75° C	
18–33	208/230/1	253	197	56.6	9.4	0.50	12.3	14	14	61 (18.6)	58 (17.7)	20
24–33				60.8	11.2	0.77	14.8	14	14	45 (13.7)	43 (13.1)	25
30–31				64.0	12.8	0.77	16.8	14	14	47 (14.3)	45 (13.7)	25
36–34				70.0	14.2	1.40	19.2	14	14	39 (11.9)	37 (11.3)	30
42–30				112.0	17.9	1.10	23.5	12	12	53 (16.2)	51 (15.5)	40
48–34				93.0	18.3	1.40	24.3	12	12	50 (15.2)	48 (14.6)	40
60–34				125.0	22.1	1.40	29.0	10	10	69 (21.0)	66 (20.1)	50
30–51	208/230–3	253	187	58.0	8.3	0.77	11.2	14	14	81 (24.7)	77 (23.5)	20
36–51				71.0	10.5	1.40	14.5	14	14	63 (19.2)	60 (18.3)	20
42–50				88.0	13.5	1.10	18.0	14	14	51 (15.5)	48 (14.6)	30
48–51				83.1	13.1	1.40	17.8	10	10	130 (39.6)	123 (37.5)	30
60–52				110.0	16.0	1.40	21.4	12	12	67 (20.4)	64 (16.5)	30
36–61	460–3	506	414	38.0	5.6	0.70	7.7	14	14	236 (71.9)	225 (68.5)	15
42–60				44.0	6.0	0.60	8.1	14	14	225 (68.5)	214 (65.2)	15
48–61				41.0	6.1	0.70	8.3	14	14	219 (66.8)	208 (63.4)	15
60–62				52.0	7.8	0.70	10.5	14	14	173 (52.7)	165 (50.3)	15
36–11	575–3	532	518	36.5	3.8	0.50	5.3	14	14	343 (104.5)	326 (99.4)	15
48–11				33.0	4.4	0.50	6.0	14	14	303 (92.4)	288 (87.8)	15
60–12				38.9	5.7	0.50	7.6	14	14	239 (72.8)	228 (69.5)	15

* Permissible limits of the voltage range at which the unit will operate satisfactorily

† If wire is applied at ambient greater than 30°C, consult table 310–16 of the NEC (NFPA 70). The ampacity of non–metallic–sheathed cable (NM), trade name ROMEX, shall be that of 60°C conditions, per the NEC (NFPA 70) Article 336–26. If other than uncoated (no–plated), 60 or 75°C insulation, copper wire (solid wire for 10 AWG or smaller, stranded wire for larger than 10 AWG) is used, consult applicable tables of the NEC (NFPA 70).

‡ Length shown is as measured one way along wire path between unit and service panel for voltage drop not to exceed 2%.

** Time–Delay fuse.

FLA – Full Load Amps

LRA – Locked Rotor Amps

MCA – Minimum Circuit Amps

RLA – Rated Load Amps

NOTE: Control circuit is 24–V on all units and requires external power source. Copper wire must be used from service disconnect to unit. All motors/compressors contain internal overload protection.

Complies with 2007 requirements of ASHRAE Standards 90.1

A-WEIGHTED SOUND POWER LEVEL

UNIT SIZE	STANDARD RATING dBA	TYPICAL OCTAVE BAND SPECTRUM (dBA, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24ABB318–33	72	59.5	59.5	63.5	67.0	63.5	59.0	52.5
24ABB324–33	73	60.5	64.0	67.0	66.0	65.0	60.0	55.0
24ABB330–31, 51	74	66.0	65.5	66.5	66.5	65.5	61.0	54.0
24ABB336–34	73	63.0	61.0	67.0	66.0	65.5	61.0	56.5
24ABB336–51, 61, 11	75	59.5	63.0	68.5	70.0	65.5	61.5	53.5
24ABB342–30, 50, 60	78	57.5	65.0	71.0	73.0	70.5	67.5	62.5
24ABB348–34	77	54.0	67.5	71.5	71.5	69.5	67.0	61.5
24ABB348–51, 61, 11	80	58.5	67.5	73.5	75.0	70.5	67.5	64.5
24ABB360–34	79	57.5	67.0	72.0	75.0	72.5	68.0	61.0
24ABB360–52, 62, 12	79	59.5	69.5	72.5	73.5	71.0	68.0	63.5

NOTE: Tested in accordance with AHRI Standard 270–2008 (not listed in AHRI).

A-WEIGHTED SOUND POWER LEVEL WITH SOUND SHIELD

UNIT SIZE	STANDARD RATING dBA	TYPICAL OCTAVE BAND SPECTRUM (dBA, without tone adjustment)						
		125	250	500	1000	2000	4000	8000
24ABB318–33	71	55.5	60.5	64.0	66.0	63.0	58.5	52.0
24ABB324–33	73	53.0	62.0	67.5	68.0	65.0	60.0	53.5
24ABB330–31, 51	73	55.5	64.0	68.0	67.0	64.0	60.0	52.5
24ABB336–34	73	54.5	61.5	66.5	68.5	65.0	61.5	62.5
24ABB336–51, 61, 11	74	59.5	63.0	68.0	69.5	65.0	60.5	50.5
24ABB342–50, 60	77	57.5	65.0	70.5	72.0	70.0	67.0	62.0
24ABB348–34	77	54.0	68.0	71.5	71.5	69.0	66.5	61.0
24ABB348–51, 61, 11	79	60.5	67.5	73.5	74.5	71.0	68.0	63.5
24ABB360–34	79	57.5	68.0	72.5	74.5	72.5	68.0	60.5
24ABB360–52, 62, 12	78	60.5	69.5	72.5	73.0	71.0	67.5	61.5

NOTE: Tested in accordance with AHRI Standard 270–2008 (not listed in AHRI).

CHARGING SUBCOOLING (TXV-TYPE EXPANSION DEVICE)

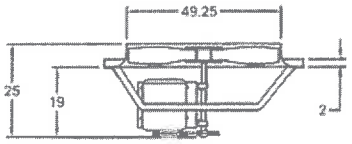
UNIT SIZE– VOLTAGE & SERIES	REQUIRED SUBCOOLING °F (°C)
18–33	10 (5.6)
24–33	10 (5.6)
30–31, 51	10 (5.6)
36–34	12 (6.7)
36–51, 61, 11	14 (7.8)
42–30, 50, 60	10 (5.6)
48–34, 51, 61, 11	15 (8.3)
60–34	15 (8.3)
60–52, 62, 12	10 (5.6)

GREENHECK
Building Value in Air.

Printed Date: 6/13/2014
Job: BELMONT
Mark: EF-1

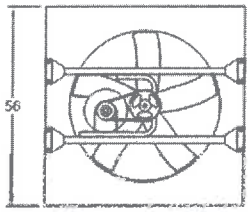
Model: SBE-2H48-50

Sidewall Belt Drive Exhaust Fan



AIR FLOW

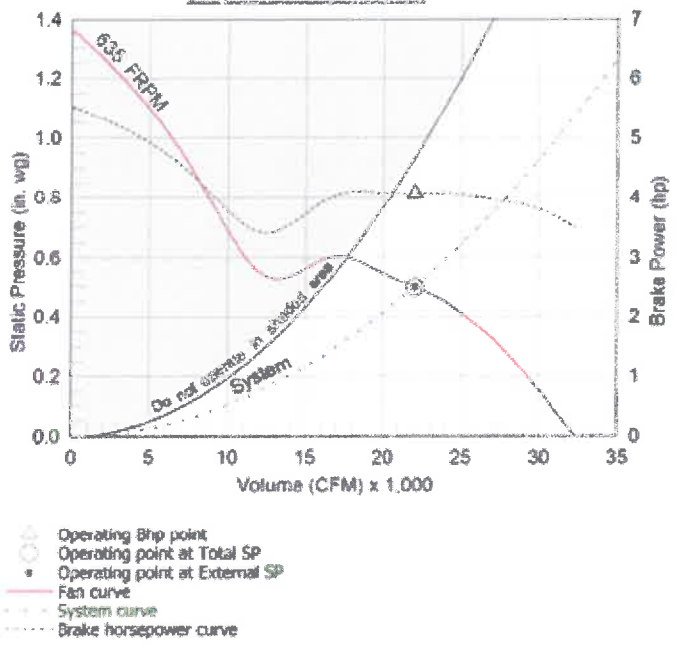
See the Assembly Drawing For Selected Accessories



Dimensional	
Quantity	1
Weight w/o Acc's (lb)	256
Weight w/ Acc's (lb)	697
Max T Motor Frame Size	184
Optional Damper (in.)	50 x 50
Roof Opening (in.)	57.75 x 57.75

Performance	
Requested Volume (CFM)	22,000
Actual Volume (CFM)	22,000
External SP (in. wg)	0.5
Total SP (in. wg)	0.5
Fan RPM	635
Operating Power (hp)	4.08
Elevation (ft)	30
Airstream Temp (F)	70
Air Density (ft3)	0.075
Drive Loss (%)	4.1
Tip Speed (ft/min)	7,978
Static Eff. (%)	44

Motor	
Motor Mounted	Yes
Size (hp)	5
V/C/P	460/60/3
Enclosure	ODP
Motor RPM	1725
Windings	1
NEC FLA* (Amps)	7.6



Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	100	94	90	87	84	79	74	73	90	78	33

Notes:

All dimensions shown are in units of in.
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary for sizing thermal overload, consult factory.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft.

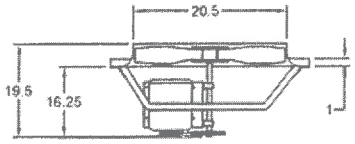
amca CERTIFIED RATINGS PROGRAM

GREENHECK
Building Value in Air.

Printed Date: 6/13/201
Job: BELMON
Mark: EF-

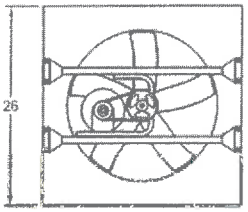
Model: SBE-2H20-7

Sidewall Belt Drive Exhaust Fan



AIR FLOW

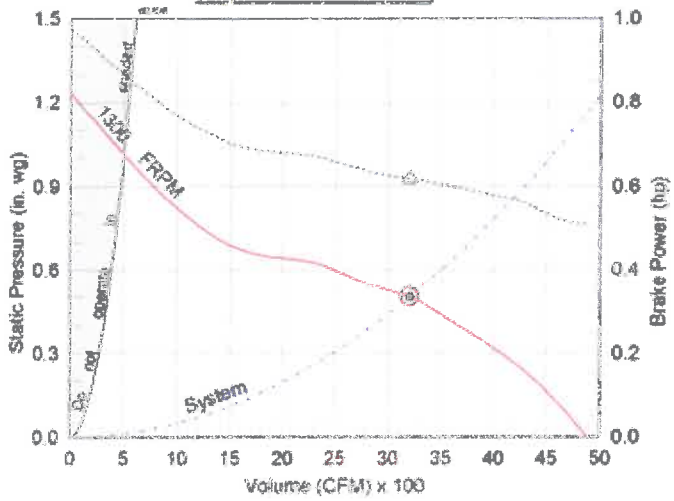
See the Assembly Drawing For Selected Accessories



Dimensional	
Quantity	1
Weight w/o Acc's (lb)	68
Weight w/ Acc's (lb)	220
Max T Motor Frame Size	145
Optional Damper (in.)	22 x 22
Roof Opening (in.)	27.25 x 27.25

Performance	
Requested Volume (CFM)	3,200
Actual Volume (CFM)	3,200
External SP (in. wg)	0.5
Total SP (in. wg)	0.5
Fan RPM	1300
Operating Power (hp)	0.62
Elevation (ft)	30
Airstream Temp.(F)	70
Air Density (ft3)	0.075
Drive Loss (%)	7.6
Tip Speed (ft/min)	6,806
Static Eff. (%)	44

Motor	
Motor Mounted	Yes
Size (hp)	3/4
V/C/P	460/60/3
Enclosure	ODP
Motor RPM	1725
Windings	1
NEC FLA* (Amps)	1.6



Operating Bhp point
Operating point at Total SP
Operating point at External SP
Fan curve
System curve
Brake horsepower curve

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	86	86	84	82	79	77	73	69	85	73	23

Notes:

All dimensions shown are in units of in.
*FLA - based on tables 150 or 148 of National Electrical Code 2002. Actual motor FLA may vary, for sizing thermal overload, consult factory.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft