TOWN OF BEDFORD
PLANNING BOARD MEETING
425 Cherry Street
Bedford Hills, New York 10507
Tuesday
May 12, 2015
8:00 PM

Conferences:

1. Waiver of Site Plan Approval –
Section 72.5 Block 1 Lots 9, 10, RB Zone
527 Bedford Road, Bedford Hills
Owner – **Shullman Family LP**
Applicant – **Russell Speeders of Bedford Hills, LLC**
(Review revised plans and noise report.)

2. - Waiver of Site Plan Approval –
Alterations and Additions to the Lower School Campus
Section 83.9 Block 1 Lot 2, R-4A Zone
325 West Patent Road, Bedford
Owner/Applicant: **Rippowam Cisqua School**
(Consider amendment to approved final site plan.)

3. -Waiver of Site Plan Approval –
Renovation and Modification of Existing Automotive Service Station for Use as Gas Station and Convenience Store
Section 60.13 Block 1 Lot 20, CB Zone
9 Haines Road, Bedford Hills
Owner: **Robert Lee/Apache Oil Company**
Applicant: **Lewis Roane**
(Review revised Site Plan.)
(Consider amendment to approved final site plan.)

Discussion:

Invasive species

Approval of Minutes:

November 18, 2014

Supporting documentation for all items on this agenda is available at the Town of Bedford website.
(www.bedfordny.gov) – Enter - Town Meetings
Larger documents and plans are available at the office of the Planning Board.
Agenda Items Subject To Change.

WILSON ELSER

WILSON ELSER MOSKOWITZ EDELMAN & DICKER LLP

May 6, 2015

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RECEIVED
Town of Bedford
MAY 6 2015
Historic Building
Preservation Commission

Chairperson Deirdre Courtney-Batson and the
Members of the Planning Board of the Town of Bedford
425 Cherry Street
Bedford Hills, NY 10507

Re: Application of Shullman Family Limited Partnership
Russell Speeder's Car Wash
527 North Bedford Road

Dear Chairperson Courtney-Batson and Members of the Planning Board:

On behalf of the Shullman Family Limited Partnership and the Russell Speeder's of Bedford Hills LLC, I am pleased to submit a proposed site plan prepared by KG&D Architects for your consideration.

As you know, this site has been a car wash for many years, dating back, I believe, into the 1950's. Several years ago, the Shullman Family Limited Partnership proposed, and you approved, a site plan for the property. Since that time, Russell Speeder's, which is owned by members of the Shullman family, has taken over the operation of the facility. The proposed site plan that is before you now differs somewhat from the plan you previously approved in that it provides for more landscaping along North Bedford Road and establishes better vehicle queuing and circulation. Also, as a result of the new wash/dry equipment Russell Speeder's has installed, the revised proposal eliminates the connection to the storm drainage system at the street, as well as the need for extensive hand drying at curbside, and the previously proposed garage detail bays.

We are pleased that after an extensive dialogue with the Town's Planning and Legal staffs and its noise expert with respect to compliance with Chapters 83 and 125 of the Town Code, the Town's expert has concluded that with certain mitigating measures the facility will comply with the Town Code's noise provisions and will present no significant environmental impact. In order to expedite compliance with those mitigation measures, Russell Speeder's has already made extensive changes to the equipment within the car wash. Our expert is completing a report now based on actual noise readings from new equipment, which we should be able to

submit by the end of the week. The "initial 'wet' read" of the data, as she has described it, demonstrates that as a result of those changes the facility complies with weekday noise limits at the northerly property line without the proposed barrier wall and "borderline" complies without the proposed barrier wall at the southerly property line. For that reason, and because the Town's consultant has concluded that a barrier wall along the eastern property line is not appropriate, the proposed site plan does not include the any of the suggested barrier walls.

We look forward to meeting with you on Tuesday evening to address any further concerns you may have.

Respectfully yours,

Wilson Elser Moskowitz Edelman & Dicker LLP

Robert A. Spolzino

B. LAING ASSOCIATES
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January 22, 2015

Jeffery Osterman, Senior Planner
Town of Bedford
425 Cherry Street
Bedford Hills, New York 10507

RE: Proposed RUSSELL SPEEDERS Car Wash – Noise Analysis Review

Dear Jeff:

B. Laing Associates, Inc. is in receipt of the Maria L. Castellucci report dated October 17, 2014 in regards to the proposed Russell Speeders Car Wash located at 527 Bedford Road, Bedford Hills, Westchester County. The consultant for the applicant (Maria L. Castellucci, MLC) has conducted analyses of the existing noise levels and potential noise impacts due to the facility's operations and proposed operations. The newest report provides additional data per B. Laing Associates, Inc. comment and analyses report dated March 24, 2014.

To-date we have reviewed the reports submitted to-date for the proposed RUSSELL SPEEDERS car wash – noise analyses. The analyses (to-date) include:

1. MLC - January 28, 2014 – Report of acoustical survey and sound attenuation calculations (impact analysis) for Russell Speeders Car Wash.
2. MLC, March 5, 2014 – Supplemental recommendations, specifications and calculations (impact analysis) for Russell Speeders Car Wash.
3. MLC, October 17, 2014 – Hard Look Acoustical Report of Sound Levels for Russell Speeders Car Wash.

STANDARDS

The Town of Bedford has promulgated two noise ordinances that apply to any noise generated by a proposed or existing use. The first ordinance is contained in the Bedford Town Code, Chapter 83 Noise. The second ordinance is contained in the Bedford Town Code, Chapter 125 Zoning, Article IV Special Environmental Regulations, Section 32 Noise. These two sections of the Town Code have separate requirements.

Chapter 83 outlines maximum sound levels at the property line in total decibels using an A-weighted scale. A daytime maximum sound level of 65dB(A) applies to the time period of 8:00 AM to 6:00 PM on Monday through Saturday. A nighttime maximum sound level of 45dB(A) applies between the hours of 6:00 PM to 8:00 AM and all day on Sunday.

Chapter 125, Section 32 outlines maximum sound levels at the property line in octave band decibels using a flat weighting scale. Two separate maximum sound levels are provided and they apply at any time and day of the week. One applies to any type of property zone (labeled for this case as Commercial); the other applies to properties within 200 feet of a residential zone (labeled for this case as Residential) or all properties at night and on Sunday. The subject site is 182 feet from the closest residential zone (north of the site). This ordinance section states that night time hours are between 9:00 PM and 7:00 AM, which differs from the definition in Chapter 83. The applicable Chapter 125 limits are given in the following **Table 1**:

	Maximum Sound Pressure Levels								
Octave Band Center Frequency (Hz)	**31.5**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
'Residential', Night and Sunday Decibel Level	59	61	60	53	46	40	31	20	11
'Commercial' Day Time Decibel Level	65	67	66	59	52	46	37	26	17

To add some simplicity (for the purpose of understanding), the Chapter 125 standard has been calculated by B. Laing Associates, Inc. as unified, A-weighted, equivalent levels of 50 dB(A) (residential, etc.) and 60 dB(A) (commercial). See text below for both unified and octave band discussions.

The New York State Department of Environmental Conservation (NYSDEC) has also issued guidance for the purposes of evaluating sound levels and characteristics in permit decisions and SEQR reviews. It was issued on February 2, 2001 and titled Assessing and Mitigating Noise Impacts (DEP-001-1). In essence, it establishes an upper limit of 65 dB(A) or little to no "intrusive" increase in sound pressures (roughly defined as under 5 to 6 dB) at the receptor in question (i.e., not at any specific property line and, presumably, in daytime). SEQR reviews also carry with them the necessity to take a "hard look" at a Proposed Action and for disclosure of the methodology used to accomplish that end[1].

SUMMARY

In **summary**, the project, as proposed in January 2014, did not meet the Town code standards as described by the applicant and presented in the MLC January 28, 2014 report. The project **as currently proposed with mitigating measures**, in the October 17, 2014 report (including the additional calculations, support for the calculations and ,mitigating features) meets the Town's property line noise standards at the twelve (12) locations analyzed (ambient data only on R3, R4, R5). The project also appears to meet the NYSDEC DEP-001-1 standard. Refinement of the design and operation plus clarification of the calculations conducted by the

[1] In this case, the entire analysis, including sound levels as compared to local ordinances, is considered the SEQR review and not just whether or not a project meets the criteria established under NYSDEC DEP-001-1.

applicant determined that the system as proposed with mitigation measures will have no significant impact to the existing noise levels.

Per the BLG comment and analyses report from March 24, 2014, the applicant has provided the additional data and calculations for clarity:

The issues and responses are noted below:

1. In a manner similar to the Figure 1 developed by B. Laing Associates, MLC must provide a figure or site plan showing locations of the receptors calculated.

   MLC has provided Sheet D-1 Russell Speeders Car Wash Site plan of Receptors and Measurement Locations. This figure depicts the location of the twelve (12) analyzed receptors.

2. The eastern "receptor" will have to be relocated from the eastern to the western side of Route 117 at the applicant's property line opposite the car wash tunnel's egress.

   R-1 receptor is located on the properties eastern boundary opposite the car wash tunnel egress.

3. No location of northern and southern receptors analyzed to-date was provided.

   MLC has provided Sheet D-1 Russell Speeders Car Wash Site plan of Receptors and Measurement Locations. This figure depicts the location of the twelve (12) analyzed receptors on the north, east and south property lines.

4. A second, northern property line receptor may need to be added opposite the exterior detailing and/or exterior vacuum stations per Figure 1.

   MLC has provided Sheet D-1 Russell Speeders Car Wash Site plan of Receptors and Measurement Locations. This figure depicts the location of the twelve (12) analyzed receptors on the north, east and south property lines. Receptors R-5, R-6, R-7 and R-8 are located on the northern property line. However, per the October 17, 2014 MLC report, no exterior detailing or vacuum stations will be present in the updated facility.

5. A second, southern property line receptor may need to be added opposite the exterior vacuum stations per Figure 1.

   MLC has provided Sheet D-1 Russell Speeders Car Wash Site plan of Receptors and Measurement Locations. This figure depicts the location of the twelve (12) analyzed receptors on the north, east and south property lines. Receptors R-2, R-3, R-4, R-10, R-11 and R-12 (ambient data only on R3, R4) are located on the southern property line. However, per the October 17, 2014, MLC report, no exterior detailing or vacuum stations will be present in the updated facility.

6. Another receptor at the closest residential property (to the north) will need to be added for NYSDEC DEP-001-1 analysis. A discussion of NYSDEC DEP-001-1 with calculations for the closest residential property (to the north) needs to be conducted and provided.

   MLC has provided Sheet D-1 Russell Speeders Car Wash Site plan of Receptors and Measurement Locations. This figure depicts the location of the twelve (12) analyzed receptors on the north, east and south property lines (ambient data only on R3, R4, R5). Receptor R-9 is the closest location to the closest residence (north of the facility) and was analyzed for NYSDEC compliance. Page 5 of the report states that the Russell Speeders facility will comply with the noise ordinance provided by the Town of Bedford which is more stringent than the NYSDEC requirements and so, the NYSDEC goals will be met.

7. All calculations and results to all added receptors should be shown in tabular form in the same format provided in the reports to-date[2]. Typical formulae for these calculations need to be provided/listed in an Appendix.

   Tables depicting results to revised receptors are provided in Appendix B and Appendix C. Tables in Appendix C list equations used from Appendix B in parenthesis for reference. The calculations shown and reference materials used in the October 17, 2014 MLC report were sufficient to support their conclusions.

[2] The tables in the MLC reports provide a good breakdown of the sound source and attenuation/mitigation features of the project blowers to-date. However, several sound sources and receptors need to be added, several credits require further calculation/support and the eastern receptor needs to be relocated/recalculated as provided in the text of B. Laing Associates' review.

8. A 3 dB(A) deduction from sound levels resulting from the blowers is credited due to un-specified building effects. References to support any conclusions drawn, when not based on calculations; need to be provided/listed in an Appendix.

   The deduction from sound levels resulting from blowers credited due to unspecified building effects has been eliminated.

9. What calculation method or support was used to determine directionality of the sound impacts for receptors?

   The MLC report dated October 17, 2014 has provided, in Appendix B- Item 11, Off-Axis Attenuation for a Long Tunnel or Duct with a 12'W x 7'H opening table to depict decibels at octave band center frequency at off-axis angles. This data is incorporated into the calculations presented in Appendix B and C.

10. Was a calculation method used to determine the sound reduction due to building effects (as barriers) for northern and southern receptors?

    The deduction from sound levels resulting from blowers credited due to unspecified building effects has been eliminated.

11. Please show on an added MLC Figure 1 and site plans where, exactly, in the building will the blowers be placed?

    MLC Sheet D-3 Floor Plan depicts the blower within wash bay, 20 feet from the exit bay door. It is a hand-drawn sketch but adequate for the current, planning purposes.

12. The detailing operations will be moved into their own building spaces. These operations involve the frequent use of compressors. As such, these operations must be included in the site's noise calculations in relation to Town Ordinances (see also added receptors as described above). If significant impact from these operations is a possibility, further definition of how the detailing sub-components will operate and the sound sources mitigated within their respective buildings is required. How will HVAC and "garage" doors, etc. be handled?

    Pages 13-15 of the October 17, 2014 MLC report discusses noise related to the compressor, HVAC and the operation of garage doors. The compressor for the detailing operations and floor mat cleaning machines will be located inside the building and will not contribute to the noise level. The overhead doors will be down to prevent excessive noise when the compressor is on including use of air hoses and floor mat cleaning machines. The overhead doors for the detailing operation and for the car wash are recommended using 6mm Macrolux C solid polycarbonate system (a noise-reducing barrier as well as a garage-type

overhead door). Further, acoustical ceiling tiles are recommended and vinyl ribbed interior siding on furring strips. Specifications are provided in Appendix A.

The HVAC system is depicted on D-2 Sound Barrier Wall Locations. The unit does not change/alter the ambient noise levels. No sound reduction is required beyond the 3 foot wall present/proposed. A calculation is shown in Appendix C.

13. Where will HVAC units be located for each building and what will be their noise impacts (see also added receptors as described above)?

    The HVAC system is depicted on D-2 Sound Barrier Wall Locations. The unit does not change/alter the ambient noise levels. No sound reduction is required. Table 35 Existing HV Rooftop Unit Calculated to Location R-8 with Other Equipment Off is provided in Appendix C on page 17. "Big Ass Fans" will be installed in the detailing bay to provide air circulation for the workers. No other heating, cooling or ventilating equipment will be added beyond the 3 foot wall present/proposed.

14. The applicant must state clearly their intentions for hours of operation. Will nighttime or Sunday operations occur; if so, what will be the hours? Will additional mitigating features or operational modifications be needed at those times?

    Page 5 of the report states the hours of operation for Russell Speeders Car Wash as Mon-Saturday 8am to 8pm and Sunday 9am to 5pm. The overhead doors will be used at the tunnel on Sundays and 6pm on all other days to comply with the Town of Bedford ordinance. Further, the applicants have proposed 6mm Macrolux C solid polycarbonate system for the overhead door installation, acoustical ceiling tiles, vinyl ribbed exterior siding on furring strips and sound barrier walls at the property lines.

15. Will amplified audio devices be contained within the site's buildings and will speakers be directed internally or to individuals' headphones? How will automotive audio system be handled/operated (or not) while they are outside the facility's buildings and under the control of the staff (e.g., waiting in line to enter or upon exiting)?

    Page 16 discusses amplified music. There are two exterior speakers which do not exceed local ordinance. There are no "boomboxes" or music players allowed or workers at the facility. Table 36 – Existing Audio Speakers on Building Calculated to Location R-8 with Other Equipment is provided in Appendix C on page 17.

ANALYSIS

The analysis by B. Laing Associates, Inc. (BLG) included review of the applicant's expert (MLC) reports as described above. No new measurements of sound/noise on the site or in the area were conducted by BLG. BLG did, however, review the methodology of those measurements[3], reviewed the calculations provided, conducted additional calculations, reviewed the technical merits and operational details provided to-date for the Proposed Action and compared the results to the appropriate standards.

The MLC report dated October 17, 2014 has provided additional information per the comments provided in the March 24, 2014 BLG report. Overall, the MLC report has provided analysis tables for the proposed blowers at twelve (12) receptors along the north, east and south property lines of the subject property (ambient data only on R3, R4, R5). These receptors are shown on Sheet D-1 Russell Speeders Car Wash Site Plan of Receptors and Measurement Locations. These receptors have been analyzed for Town of Bedford code compliance. Appendix B and C at the rear of the report provide the analyses in tabular form. Supporting calculations and references are shown. Receptor R-9 at the eastern tip of the property line along Route 117 is the closest residential property receptor and was analyzed for compliance with NYSDEC DEP-001-1. Further, the report has provided, in Appendix B- Item 11, Off-Axis Attenuation for a Long Tunnel or Duct with a 12'W x 7'H Opening table to depict decibels at octave band center frequency at off-axis angles. This data is incorporated into the calculations presented in Appendix B and C and provides off-axis credit support requested by BLG in March 2014.

The **Existing Condition** for the site and receptors are dominated by noise generated by traffic on Route 117/North Bedford Road. Measured noise levels toward the site's eastern boundary (adjacent to Route 117) was, "an average of 73 dB(A)." BLG verified these levels with a simple Transportation Noise Model result and it is consistent with 2011 measurements taken in relation to a nearby project. These levels, with weekday, PM traffic, are already in excess of the Town Codes. To account for this, BLG proposes that Chapter 125, Section 32, C. Exemptions "(1) Noises not directly under the control of the property user." be invoked. The practical effect would be to use to the lesser of site-generated noise at the property lines or the standard and NOT add any increase due to the two sources (if they are within 9 dB of each other) when the raw, site-generated result would be equal to less than the Chapter 125-32 standard[4]. In no event should Chapter 83's daytime level be exceeded by the project as considered by itself[5].

[3] MLC'S measurements were consistent with existing sound levels from 2011 taken in the Route 117 corridor and at the same facility under a prior operator.

[4] The normal practice is to add the decibel increment to the higher of the two sources. If, however, the increment were added to a higher existing level resulting from traffic on Route 117, that would penalize the applicant for, "Noises not directly under the control of the property user."

[5] The Town's Chapters 83 and 125 do not mention any relationship of the standards to ambient conditions. So, the project must comply or fail in relation to the standard on its own merits. However, some credit is allowed by not applying additive effects per footnote 6.

The **Proposed Action** in the MLC January 28, 2014 report demonstrated that the proposed project would not meet the sound levels specified by the Town's Codes (see footnote 7). In Table 1 of that report, the existing blowers, with no mitigation applied, result in a sound level of 84 dB(A) and, with mitigation applied (sound attenuating ducts), 74 dB(A) five feet from the tunnel entrance. These levels calculate to 76.5 and 66.5 dB(A), respectively, at the eastern property (on the western side of Route 117). Both levels exceed the daytime Chapter 83 standard of 65 dB(A) (see footnote 7). In Table 6 of that report, the then-proposed, new blowers, with mitigation applied (sound attenuating ducts), would have resulted in a sound level of 68 dB(A) at the property line on the eastern side of Route 117 (i.e., the property line *across* the street) opposite the tunnel entrance. This level calculates to 72.5 and at the subject property's eastern property (on the western side of Route 117). This level would have also exceeded the daytime Chapter 83 standard of 65 dB(A).

The Proposed Action in the MLC March 5, 2014 report demonstrated that the proposed project's blowers with mitigating enclosure doors will meet the sound levels specified by the Town's Codes. However, more documentation as to the supporting calculations and additional receptor locations and sources were needed to support this conclusion for the project as a whole, in a thorough and publicly-disclosed manner. The October 17, 2014 MLC report provides additional supporting calculations and additional receptor locations as recommended.

The difference between the original and current project impact analysis is due to few mitigating measures added to the project since the January 28, 2014 MLC report. The project will now include a blower system rated at 70.9 dB(A) at 20 feet verses 78 dB(A). Also, polycarbonate "garage" doors will be added to the eastern end of the car wash tunnel and to the detailing bays. In the MLC October 17, 2014 report, a -29 dB "credit" is applied to the calculated sound levels in Tables 9, 13, 16, 19, 22, 27, 31, 34, 37, 38 and 39 to account for the reduction due to the 6 millimeter (ml) polycarbonate "garage" doors. The -29 dB credit is supported in the Appendix. Calculations for the varying credit with varying octaves was requested to be provided from the manufacturer. However, a reasonable estimate of the octave by octave reduction has been provided by MLC and is acceptable in this case. .

Supplementary mitigation measures included in the proposed action are acoustical ceiling tiles within the washing tunnel and detailing bays (Specifications in Appendix A). Additionally, the **inside** walls will have white, vinyl, ribbed exterior siding on furring strips to provide noise diffusion. Lastly, the October 17, 2014 MLC report recommends the erection of sound barrier walls. These barriers are shown on Sheet D-2 Sound Barrier Wall Locations. The walls will be placed on the north, east and south property lines and will consist of 8 feet in height on the eastern and southern boundary and 10 feet in height on the northern boundary(it is two feet higher to account for topographic changes at that boundary). Insertion Loss (IL) calculations are provided in Appendix C for receptors R-1, R-2, R-6, R-7, R-10, R-11 for certain barrier heights. Height requirements may need further approval from the Town of Bedford Zoning Board of appeals as a standard fence in the Town cannot exceed 6 feet in height.

A subordinate operation will also occur on site. This operation will include two detailing areas that will occur within their own, enclosed spaces. The MLC report dated October 17, 2014, states the compressor and floor mat cleaning machines for the detailing operations will be located inside the building and will not contribute to the noise level. Tables 37, 38 and 39 in Appendix C determine the total weighted sound pressure level will be between 23 to 37 dB(A) at receptors R-7 (north), R-1 (east) and R-2 (south) with the bay door closed. These values readily comply with the Town's standard. The overhead doors will be down to prevent excessive noise when the compressor is on, including use of air hoses, and floor mat cleaning. "Big Ass Fans" will be mounted to the ceiling of the detailing bays to provide air circulation for workers. The overhead doors for the detailing operation and for the car wash are recommended using 6mm Macrolux C solid polycarbonate system (as previously discussed). Further, acoustical ceiling tiles are recommended and vinyl ribbed interior siding on furring strips. Specifications are provided in Appendix A.

The HVAC system is depicted on D-2 Sound Barrier Wall Locations. The unit does not change/alter the ambient noise levels. No sound reduction is required **added beyond the 3 foot wall present/proposed.** . A calculation is shown in Appendix C.

The MLC October 17, 2014 analysis now includes the sound sources associated with the separate detailing bays and exterior HVAC unit. It should be noted that no exterior detailing or vacuum stations will be present in the updated facility (i.e, to the extent they occur, they will be moved inside).

At this time, the Proposed Action will meet the noise standards enumerated in Chapters 83 and 125 of the Town of Bedford's Code. The applicant has provided the necessary information to support the project and its associated mitigating measures.

However, B. Laing Associates, Inc. recommends to the Town that the mitigating (for Russell Speeders' noise sources) barrier wall (an 8 foot high fence) proposed to be located on the eastern property line, along Route 117 (immediately adjacent to the sidewalk) NOT be installed. This recommendation is based on the potential for the barrier along Route 117 to reflect traffic sounds/noise from the roadway back to the sidewalk, increasing the sound/noise level on the side walk. The ambient sounds/noise levels (mainly due to traffic) at the site's eastern property line are already high (73 dB(A)) in comparison to the Town ordinances (dB(A) 45 or 65). The barrier will reduce sound/noise levels from Russell Speeders' noise sources. However, it will also reflect sound/noise from Rt. 117 back to any "receptor" on the sidewalk. The reflective increase will be minor at 1.0 to 2.2 dB(A) but any increase might be unsuitable at this location. We request that the Board weigh the insertion of the barrier (an 8 foot high fence) on the eastern property line in front of the Russell Speeders' building and immediately adjacent to the sidewalk verses aesthetic values, etc. For example, the existing facility currently does not have a barrier wall along Route 117 and has been in existence for many years. Further, the proposed facility changes will provide for an upgraded appearance.

The barriers proposed on the north and south property lines should be installed as proposed in the October 17, 2014 MLC report.

The Town will have to include mitigating measures in writing as described by the applicant in the October 17, 2014 MLC reports and as recommended by B. Laing Associates, Inc. in any approval the facility might receive. As a further condition of approval, the Town (i.e., via its sound/noise expert) must be allowed to review and have final approval authority for the specification provided in the drawings submitted for Building Permit approvals (i.e, to ensure that the specified mitigating measures have been included). These should also be re-enforced in this case with Town "monitoring" of the facility construction, especially as it relates to sound/noise features specified in the Building Permit process. This monitoring should include daytime/nighttime, inspection/monitoring "immediately" post-construction but prior to issuance of a Certificate of Occupancy plus annual daytime/nighttime inspection/ monitoring of the facility to ensure operational compliance for a period following construction to be specified by the Board.

If you have any questions, please do not hesitate to contact me as provided above.

Sincerely,

Michael P. Bontje, President

WILSON ELSER

WILSON ELSER MOSKOWITZ EDELMAN & DICKER LLP

RECEIVED
OCT 29 2014
BEDFORD PLANNING BOARD

October 28, 2014

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Mr. Jeffrey Osterman
Senior Planner
Town of Bedford
425 Cherry Street
Bedford Hills, NY 10507

Re: Russell Speeder's Car Wash

Dear Mr. Osterman:

We are the attorneys for Russell Speeder's Car Wash. In the furtherance of Russell Speeder's application for a special permit and site plan approval, I am pleased to enclose for your review, and for review by B. Laing Associates, two copies of an acoustical report prepared by Russell Speeder's consultant, Maria Castellucci.

As you will note, the report recommends the construction of acoustical barriers along much of the property line in order to satisfy the noise limitations established by the Bedford Town Code. If the methodology of the report is satisfactory to you and B. Laing Associates, Russell Speeder's is prepared to modify its application to seek approval for those acoustical barriers. That will require height variances. We believe, however, that actual readings after the proposed new blowers and acoustical door are installed will show that the requirements of the Town Code can be met without the acoustical barriers. We will request, therefore, that the approvals be staged so that the construction of the acoustical barriers can be avoided if it proves to be unnecessary.

Thank you for your continuing courtesy in this matter. We look forward to the opportunity to appear again before the Planning Board and the Zoning Board of Appeals with respect tot this application after you and B. Laing Associates have reviewed the enclosed report.

Very truly yours,

Wilson Elser Moskowitz Edelman & Dicker LLP

Robert A. Spolzino

WILSON ELSER

RECEIVED
OCT 29 2014
BEDFORD PLANNING BOARD

October 28, 2014

Robert A. Spolzino
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Mr. Jeffrey Osterman
Senior Planner
Town of Bedford
425 Cherry Street
Bedford Hills, NY 10507

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Very truly yours,

Wilson Elser Moskowitz Edelman & Dicker LLP

Robert A. Spolzino

Maria L. Castellucci, Consultant
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RECEIVED
OCT 29 2014
BEDFORD PLANNING BOARD

October 17, 2014

Mr. Michael Shullman
Russell Speeders Car Wash
527 Bedford Road
Bedford Hills, NY 10507

Re: Hard Look Acoustical Report of Sound Levels
Russell Speeders Car Wash – 527 Bedford Road, Bedford Hills, NY

Dear Michael,

The following is a comprehensive acoustical report of findings and recommendations for the Russell Speeders Car Wash at 527 Bedford Road in Bedford Hills, NY. The purpose of this report is to present an analysis of the existing sound levels at the Russell Speeders lot line due to each individual sound source at Russell Speeders individually and combined as well as the ambient noise at this location due to sources beyond the control of Russell Speeders. Where there are sound sources that exceed the Town of Bedford noise ordinances, these are identified and recommendations are given to attenuate the sound sources at the property lines in order to meet the current noise ordinances. As indicated below, sound readings have been taken on various days and at various times to provide as complete a study as is practical.

As requested during the meeting of April 10, 2014, with Jeffery Osterman, Senior Planner for the Town of Bedford and Michael Bontje, President of B. Laing Associates, we have taken multiple sound readings and extended our acoustical analysis of the Russell Speeders Car Wash facility to ensure the "hard look" requirement for the acoustical review has been satisfied in every practical way. The main blowers and all of the known peripheral noise sources have been analyzed. All references have been footnoted and all formulae included in the Appendix for verification. All intended and recommended modifications to the existing conditions have been noted and analyzed in this process as relates to all known noise ordinances for this location. The following report summarizes our requested "hard look" at the acoustical impact of the Russell Speeders Car Wash at 527 North Bedford Road, Bedford Hills, NY.

Introduction

We begin with a brief summary of definitions and fundamental concepts required to be understood in order for laypersons to easily understand this report and to make it as transparent as possible.

Definitions:
The following are definitions taken from Noise Control by Charles E. Wilson, Harper & Row Publishers, New York, c. 1989 (unless otherwise noted) that will assist the reader in understanding the formulae, statements, and conclusions contained herein:

Acoustics – (1) The science of sound, including the generation, transmission, and effects of sound waves, both audible and inaudible. (2) The physical qualities of a room or other enclosure (such as size, shape, amount of noise) that determine the audibility and perception of speech and music.

Sound – In the case of this report, sound is defined as audible pressure fluctuations in air. When a body moves through a medium or vibrates, some energy is transferred to that surrounding medium in the form of sound waves. Sound is also produced by turbulence in air and other fluids,

and by fluids moving past stationary bodies. Intentionally generated acoustic signals including speech and music are usually referred to as sound.

Noise – A term used to identify unwanted sound, including random sound, and sound generated as a byproduct of other activities, including transportation and industrial operations. Intrusive sound, including speech and music unwelcome to the hearer, are also considered noise.

Frequency – The frequency of a periodic phenomenon such as a sound wave is the number of times in one second (i.e., the number of cycles per second) that this phenomenon repeats itself. Frequency usually is designated by a number, followed by the unit hertz (unit symbol: Hz). For example, in the case of a vibrating tuning fork, the tynes of the tuning fork undergo 440 complete oscillations in one second. Therefore its frequency of vibration is 440 Hz.[1] In layperson's terms, it is the pitch of a sound. For instance, using musical instruments as a reference, a sound high in frequency would be a piccolo, while a sound low in frequency would be the tuba. A normal young adult human can hear from 20 Hz to 20,000 Hz.

Hertz – Unit of measurement of frequency, numerically equal to cycles per second.

Decibel - The decibel (abbreviated "dB") is a measure, on a logarithmic scale, of the magnitude of a particular quantity (such as sound pressure level or sound power level) with respect to a standard reference value.

Sound Power – The total amount of energy radiated into the atmospheric air per unit time by a source of sound. The higher the sound power level, the louder the sound.

Sound Power Level - The level of sound power expressed in terms of dB re: 10^{-12} W. The way the human ear hears is a logarithmic function of sound power. If the power level increases by a factor of 10, the ear perceives it to be doubled in loudness, and if it decreases by a factor of 10, the ear perceives the loudness to be halved. In the logarithmic scale, the power level may have increased 10 times, but the human ear perceives it to only have doubled in loudness.

Sound Pressure – (1) The minute fluctuations in atmospheric pressure that accompany the passage of a sound wave; the pressure fluctuations on the tympanic membrane are transmitted to the inner ear and give rise to the sensation of audible sound. (2) For a steady sound, the value of the sound pressure averaged over a period of time. Sound pressure is usually measured in Newtons per square meter (N/m^2) where 1 N/m^2 = 1 Pa.

Sound Pressure Level –(SPL or L_p) The root-mean-square value of the pressure fluctuations above and below atmospheric pressure due to a sound wave; expressed in decibels re: a reference pressure ($2x10^{-5}$ Pa). The sound pressure level changes by approximately -6 dB per doubling of distance as long as the receiver is greater than one or two wavelengths away, is outside one characteristic source dimension, is away from reflective surfaces, and is not in a significantly high background noise environment.

Octave – An octave is the interval between two sounds having a basic frequency ratio of two. For example, 707 Hz to 1414 Hz is one octave.

Octave Band – All of the components, in a sound spectrum, whose frequencies are between two sine wave components separated by an octave.

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[1] Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, Ph.D, Editor in Chief, Acoustical Society of America, Woodbury, NY, c. 1998, p. 1.3.

Band Center Frequency – The designated (geometric) mean frequency of a band of noise or other signal. For example, 1000 Hz is the band center frequency for the octave band that extends from 707 Hz to 1414 Hz.

Octave Band Sound Pressure Level - The integrated sound pressure level of only those sine wave components in a specified octave band, for a noise or sound having a wide spectrum.

Directivity Index – In a given direction from a sound source, the difference in decibels between (a) the sound pressure level produced by the source in that direction, and (b) the space-average sound pressure level of that source, measured at the same distance.

A-weighted sound level – The human ear does not respond equally to all frequencies, but is less sensitive at low and high frequencies than it is at medium or speech range frequencies. Thus, to obtain a single number representing the sound level of a noise containing a wide range of frequencies in a manner representative of the ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to the medium frequencies. The resultant sound level is said to be A-weighted, and the units are dBA. The A-weighted sound level is also called the noise level.

Equivalent Sound Level (Leq) - The energy average sound level over a period of time.

Ambient Noise – The all-encompassing noise associated with a given environment at a specified time, being usually a composite of sound from many sources at many directions, near and far; no particular sound is dominant. [2]

Room Constant – The room constant is equal to (a) the product of the average absorption coefficient of the room and the total internal area of the room, divided by (b) the quantity 1 minus the average absorption coefficient.[3]

Town of Bedford, NY Noise Code Requirements

The following summarizes the two noise codes in effect for the Town of Bedford, the town in which the Russell Speeders Car Wash facility is located and operating. It is our understanding that Russell Speeders Car Wash needs to be in compliance with both of these codes, although they are different and somewhat conflicting. The code requirements are as follows:

Chapter 83 of the Bedford Town Code Article I. *Noise Control section 83-5 Specific limits; responsibility of owner or lessee* Part A states that "Noise produced by any act or activities, including the use of off-road motor vehicles, on properties within any residential or nonresidential zoning district shall not exceed sixty-five (65) dB(A) during the hours of 8:00 a.m. to 6:00 p.m. or forty-five (45) dB(A) during the hours of 6:00 p.m. to 8:00 a.m. and all day Sunday on any such property within any zoning district." The adoption of this article took place by the Town Board of the Town of Bedford on June 5, 1990. This code requirement does not indicate octave band maximum sound levels, but only overall dBA level maximum requirements.

The earlier noise regulations documented in Chapter 125-32 Noise were adopted on January 18, 1983 and state maximum permitted sound pressure levels in octave bands as shown in Table 1. The levels shown in each separate octave band in the first row of Table 1 are dB levels as indicated in the noise code without the dBA weighting, and the bottom row of Table 1 shows the calculated A-weighted sound levels in each octave band as well as the overall dBA level for all

[2] Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, Ph.D, Editor in Chief, Acoustical Society of America, Woodbury, NY, c. 1998, p. 2.2.
[3] Noise Control – Measurement, Analysis, and Control of Sound and Vibration, Charles E. Wilson, New Jersey Institute of Technology, Harper & Row, Publishers, New York, c.1989, p.546.

bands combined. Most of the car wash equipment manufacturers only supply data in overall dBA levels, so converting the noise code to an overall dBA number assists in the comparison of manufacturers' sound data to the noise ordinance requirements. The overall dBA level also allows the disparate code requirements to be compared using the same units of dBA. Using an overall dBA level substitution for the code octave band maximum levels does not, however, ensure compliance with the octave band portion of the code (Chapter 125-32).

Table 1 Bedford Town Code Chapter 83 Applicable Noise Limits			
	Daytime Limit (8:00am – 6:00pm)	**Nighttime Limit (6:00pm – 8:00am)**	**Sunday Limit (All Hours)**
Maximum permitted SPL (dBA) at the lot line for residential and commercial zones	65 dBA	45 dBA	45 dBA

Table 2 Chapter 125-32 Noise										
	31.5 Hz	**63 Hz**	**125 Hz**	**250 Hz**	**500 Hz**	**1 kHz**	**2 kHz**	**4 kHz**	**8 kHz**	**dBA**
Maximum permitted SPL (dB re: 20µPa) at the lot line for lots within 200 feet of a Residential district and for sound emitted between 9:00pm and 7:00am and on Sundays	59	61	60	53	46	40	31	20	11	
A-weighting[4]	-39.4	-26.2	-16.1	-8.6	-3.2	-0.0	+1.2	+1.0	-1.1	
Sound Pressure Levels (dBA)	19.6	34.8	43.9	44.4	42.8	40.0	32.2	21.0	9.9	**49 dBA**
Maximum permitted SPL (dB re: 20µPa) at the lot line for Commercial Receptors	65	67	66	59	52	46	37	26	17	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	-0.0	+1.2	+1.0	-1.1	
Sound Pressure Levels (dBA)	25.6	40.8	49.9	50.4	48.8	46.0	38.2	27.0	15.9	**55 dBA**

[4] Many sources can verify the A-weighting frequency response calculation, one of which is the Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, Ph.D, Editor in Chief, Acoustical Society of America, Woodbury, NY, c. 1998, p. 1.17 Table 1.2.

Our understanding is that the Chapter 83 Code is a regulatory code which must be met and the Chapter 125-32 Noise section is a zoning law which is not regulatory and we could apply for a variance with respect to this law. However, during the meeting mentioned above with Jeffery Osterman and Michael Bontje, we were informed that both code requirements need to be met. All recommendations are given with the goal of satisfying both requirements at the Russell Speeders facility.

The hours of operation for Russell Speeders Car Wash are Monday through Saturday 8am – 8pm and Sunday 9am-5pm and the facility is located within 200 feet of a residential district. In order to meet both noise ordinances, it is necessary for the car wash to be at or below 45 dBA at the lot line for the 6:00pm – 8:00 pm timeframe Monday through Saturday and all day Sunday **and** be at or below the octave band maximum sound levels in Table 2 at all times. We say this, because it is theoretically possible to achieve the 45 dBA requirement and be above the Table 2 requirements in certain single frequency bands. Therefore, we have prepared our analysis for each noise source with respect to both code requirements and applicable time frames described therein.

New York State Department of Environmental Conservation (NYSDEC)

The NYSDEC has issued a document entitled "Assessing and Mitigating Noise Impacts" (DEP-00-1 Rev.2/2/01). Page 14 of this document establishes that "in non-industrial settings, the SPL" (sound pressure level) "should probably not exceed ambient noise by more than 6 dB(A) at the receptor." Also, "the addition of any noise source, in a non-industrial setting, should not raise the ambient noise level above a maximum of 65 dBA. This would be considered the 'upper end' limit since 65 dB(A) allows for undisturbed speech at a distance of approximately three feet." The next paragraph states that "Ambient noise SPLs in industrial or commercial areas may exceed 65 dB(A) with a high end of approximately 79 dB(A) (EPA 550/9-79-100, November 1979)." "The goal in an industrial/commercial area, where ambient SPLs are already at a high level, should be not to exceed the ambient SPL."

Russell Speeders is located in a commercial zone, but is within 200 feet of a residence only when one measures from the northernmost lot line. The building itself is greater than 200 feet from the nearest residential property line. The ambient noise is controlled by the traffic noise along Route 117 which is normally much higher than even the 65 dBA proposed by the NYSDEC. A discussion of the sound levels at the closest residential property line is given later on in this report as it relates to these NYSDEC recommendations. However, the most stringent noise restrictions placed upon Russell Speeders are the Town of Bedford noise ordinances. By implementing noise control measures to meet these codes, the NYSDEC maximum levels will automatically be met since they are much less stringent. We are therefore providing recommendations to achieve the goal of meeting code sound requirements which are so much lower than the ambient sound at the Russell Speeders site that they could not be measured apart from the ambient noise during the hours of operation.

Summary of Existing Conditions and Acoustical Measurements

The Russell Speeders Car Wash facility is located adjacent to Adzam Auto Sales, Inc. to the north and an empty lot to the immediate south which is the site of another commercial property to be constructed. The west property line borders on the Metro North train track right-of-way area and the east property line abuts Route 117, which is a heavily traveled two lane road with a center turning lane and is traversed by heavy commercial vehicles, trucks, and passenger cars. Attached to this report is Drawing D-1, a satellite view of the Russell Speeders Car Wash facility as well as the surrounding properties to show the measurement receptor locations and existing sound source locations.

An acoustical survey was conducted on Friday, January 17, 2014 from approximately 11:44am to 12:40pm and was confirmed and augmented during subsequent surveys on Thursday, March 20, 2014 from approximately 9:43 to 10:36am, Sunday, April 6, 2014 at various times from 8:14am to 7:31pm and Tuesday, April 8, 2014 from 11:16 to 12:57pm. The dryer noise, ambient noise, and peripheral equipment noise was measured to determine sound levels at each property line for the existing equipment and to provide analyses of sound attenuation measures where required.

Summary of Ambient Noise Levels

During all of the surveys, traffic was the major contributor to the ambient sound levels measured. During the January sound survey, there was constant vehicular traffic measuring an average L_{EQ} of 73 dBA at the east property line (receptor R-1) with no car wash equipment running. Ambient sound levels were also measured on Sunday morning April 6, 2014 to simulate the quietest time of operation. At each test location and time of day, the measured ambient sound levels without any equipment running at the car wash facility far exceeded the Town of Bedford Noise Code requirement of 45 dBA for properties within 200 feet of a residential district. The following table shows a summary of the ambient L_{EQ} sound levels measured at various receptor locations which are shown on Drawing D-1.

Table 3 – Ambient Sound Levels L_{eq} at Russell Speeders Lot Lines
No Equipment at Russell Speeders Running

Description of Measurement	L_{eq} Duration of Run	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Receptor R-1 Fri 1/17/14 12:35pm	30 sec	78.5	73	71.2	70.7	68.6	67	65.2	64.4	63.7	**73**
Receptor R-1 Fri 1/17/14 11:46 am	40 sec	75.2	77.9	72.4	73.2	68.4	68.3	65.1	64.1	60.9	**73.4**
Receptor R-7 Thur 3/20/14 10:36 am	17 sec	66.3	66.9	62.4	58.8	57	57.8	51.5	43	35	**60.8**
Receptor R-1 Sun 4/6/14 8:02 am	8min 15 sec	62	65	65	63	63	66	61	51	43	**68**
Receptor R-9 Sun 4/6/14 8:11am	2 min 34 sec	60	63	62	62	63	67	62	51	42	**69**
Receptor R-7 Sun 4/6/14 8:15am	2 min 33 sec	59	64	58	53	55	55	48	48	42	**58**
Receptor R-6 Sun 4/6/14 8:23am	3 min 44 sec	69	62	59	54	52	52	48	42	34	**56**
Receptor R-3 Sun 4/6/14 8:36am	1 min 51 sec	60	64	65	55	53	52	48	48	36	**57**

Receptor R-9 Sun 4/6/14 8:48am	2 min 33 sec	63	64	64	63	65	69	63	53	43	**71**
Receptor R-9 Sun 4/6/14 7:28pm	2 min 33 sec	64	65	63	64	64	67	62	51	42	**69**
Receptor R-1 Sun 4/6/14 7:31pm	2 min 33 sec	65	68	63	64	65	68	63	52	42	**70**
Receptor R-9 Tues 4/8/14 12:31pm	34 sec	68	67	66	65	64	67	62	52	43	**69**
Receptor R-10 Tues 4/8/14 12:49pm	14 sec	65	63	60	56	54	56	52	47	43	**59**
Receptor R-7 Tues 4/8/14 12:52pm	16 sec	79	72	67	64	65	62	57	51	43	**66**
Receptor R-10 Tues 4/8/14 12:54pm	25 sec	67	63	57	53	53	54	49	42	36	**57**
Receptor R-4 Tues 4/8/14 12:55pm	37 sec	65	61	55	51	50	53	50	52	52	**58**
Receptor R-5 Tues 4/8/14 12:57pm	29 sec	66	64	58	54	52	54	50	53	35	**59**

It is apparent from the above ambient readings, that even for those readings which were taken during the absolute quietest time on Sunday morning, the ambient sound levels are more than 10 dBA above the noise code of 45 dBA at the lot line without any Russell Speeders equipment running. We must make the observation that bringing the Russell Speeders equipment to a level of 45 dBA at each lot line is a bit of an overkill given the ambient noise levels experienced at this location. In order to meet the code maximum sound level requirements, all equipment sound levels must be calculated to the property lines, since sound levels cannot be measured for most of the equipment independent of the ambient noise if they are creating levels below or near ambient sound levels at the property lines. This report will discuss the analysis for the blowers, which are the highest sound level producer at Russell Speeders, and the rest of the peripheral equipment which has to be measured very close to the equipment to obtain the sound level reading and is then calculated over distance to obtain the sound levels this equipment theoretically produces at the lot lines.

Existing Dryer Measurements

Measurements of the existing dryers were taken at the property lines as well as at a distance of 5' from the tunnel exit where the dryers are most audible. This is at a location approximately 20' from the location of the dryers currently within the tunnel.

Several different dryer conditions were tested as listed below to determine the change in sound level with varying motor frequency. The intent is to replace the existing dryers with newer more efficient dryers that also comply with the applicable noise ordinances. There are three older dryers and two newer dryers for a total of five dryers currently at the facility. Of the two newer dryers, one had a sound attenuation duct applied to the intake side of the fan and the other did

not. The fan without the attenuator had its intake facing away from the street and the fan with the attenuator had its intake facing the street. Measurements were taken of the three existing dryers alone, of the newer dryer with the sound attenuation duct, and of the newer dryer without the duct measured with the variable speed fan running at various frequencies to document the resulting reduction in sound. Results are listed in Table 4 below:

Table 4 New Existing Blower Measured at Various Fan Speeds and Old Blowers Alone	
Description of Dryer	***A-weighted Leq measured 5' from dryer tunnel opening (approx. 20' from dryer)***
New Existing Blower at 60 Hz (100%)	78 dBA
New Existing Blower at 50 Hz (80%)	76 dBA
New Existing Blower at 40 Hz (50%)	76 dBA
New Existing Blower at 30 Hz (13%)	63 dBA
New Existing Blower with sound attenuating duct attached full speed 60 Hz	74 dBA
Three existing old Blowers alone	84 dBA
Ambient Sound – all blowers off	73 dBA

Appreciable reductions in sound were not observed until the fans were reduced in frequency to 30Hz, which would put them at only 13% operation.

Please note that due to the high level of traffic noise, the measurements do not effectively differentiate between the noise from the dryers and the noise from the traffic even when standing 5 feet from the tunnel opening since the traffic noise was constant. However, from the above readings, one can calculate the resulting sound levels that would occur using the levels measured if the three old blowers were replaced with six new blowers like the new type measured. These calculations are itemized below for the north, south and east property lines. Sound levels due to the blowers at the west Metro North property line are considered to be negligible. The property line to the east is the worst case scenario since it is in direct line of sight to the blower fan noise. However, the south property line is the closest to the dryer tunnel exit opening. Please see Appendix B and Appendix C for all calculation formulae.

Table 5 – Existing AVW Blowers at South Property Line at 90° from Tunnel Exit Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
New Blower without attenuation duct Sound Pressure Level at 20' measured on-axis (0°) 1/17/14	72	78	75	75	77	73	70	67	66	78 dBA
Addition for 6 blowers[5]	+8	+8	+8	+8	+8	+8	+8	+8	+8	
Attenuation over 10' distance to property line on south side (20log20'/30')[6]	-4	-4	-4	-4	-4	-4	-4	-4	-4	
Off-axis 90 degree attenuation for 10' x 12' opening[7]	-6	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Calculated Due to new blowers at PL on south side 90° off-axis	70	72	65	64	65	60	56	52	51	
Measured Average Ambient Noise Level (Leq) at south property line at location R-1	65	68	63	64	65	68	63	52	42	
Overall Combined Level (dB)	71	74	67	67	68	69	64	55	52	
A-weighting[8]	-39	-26	-16	-9	-3	0	+1	+1	-1	
Combined Sound Pressure Level off-axis 90 degree from tunnel exit	32	48	51	58	65	69	65	56	51	72 dBA

Table 6 - Existing Blowers at South Property Line at 90° from Tunnel Exit Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Existing 5 Blowers Sound Pressure Level Leq measured on 4/8/14 at 90° off-axis at south property line	74	78	73	69	69	65	60	53	47	
Addition of one more blower to make a total of 6.[9]	+1	+1	+1	+1	+1	+1	+1	+1	+1	
A-weighting	-39	-26	-16	-9	-3	0	+1	+1	-1	
Total A-weighted SPL measured due to existing blowers at south PL 90° off-axis	36	53	58	61	67	66	62	55	47	71[10] dBA

[5] See Appendix for formula for adding multiple source sound levels
[6] See Appendix for formula for attenuation of sound pressure level over distance
[7] Koppers Aircoustat Directivity Attenuation Table, 1975 interpolated for opening size at Russell Speeders.
[8] See Appendix for A-weighting calculation
[9] See Appendix for formula for adding multiple source sound levels
[10] Difference between measured and calculated levels is due to the effect of ambient noise on the sound measured on site as shown in table 5.

Table 7 - New Existing Blowers at South Property Line at 45° from Tunnel Exit Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
New Existing Blower without attenuation duct Sound Pressure Level at 20' measured on-axis 1/17/14	72	78	75	75	77	73	70	67	66	78 dBA
Addition for 6 blowers[11]	+8	+8	+8	+8	+8	+8	+8	+8	+8	
Attenuation over 16' distance to property line on south side (20 log20'/36')[12]	-5	-5	-5	-5	-5	-5	-5	-5	-5	
Off-axis 45 degree attenuation for 10' x 12' opening[13]	-2	-3	-4	-3	-1	0	0	0	0	
Total Sound Pressure Level Calculated Due to new blowers at PL on south side	73	78	74	75	79	76	73	70	69	
Measured Average Ambient Noise Level (Leq) at south property line at location R-1	65	68	63	64	65	68	63	52	42	
Overall Combined Level (dB)	74	78	74	75	79	77	73	70	69	
A-weighting[14]	-39	-26	-16	-9	-3	0	+1	+1	-1	
Combined Sound Pressure Level Calculated off-axis 45 degree from tunnel exit due to new blowers at PL on south side	35	52	58	66	76	77	74	71	68	81[15] dBA

Table 8 - Existing Blowers at South Property Line at 45° from Tunnel Exit Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Existing Blowers Leq measured on 4/8/14 at 45° off-axis at south property line	74	81	77	75	75	73	67	63	58	
Addition of one more blower to make a total of 6.[16]	+1	+1	+1	+1	+1	+1	+1	+1	+1	
A-weighting	-39	-26	-16	-9	-3	0	+1	+1	-1	
Total A-weighted Sound Pressure Level Due to existing blowers and traffic noise at PL on south side 45° off-axis	36	56	62	67	73	74	69	65	58	78 dBA

[11] See Appendix for formula for adding multiple source sound levels
[12] See Appendix for formula for attenuation of sound pressure level over distance
[13] Koppers Aircoustat Directivity Attenuation Table, 1975 interpolated for opening size at Russell Speeders.
[14] See Appendix for A-weighting calculation
[15] See Appendix for A-weighting calculation
[16] See Appendix for formula for adding multiple source sound levels

Table 9 - New Existing Blowers Calculated at North Property Line at 45° From Tunnel Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
New Existing Blower without attenuation duct Sound Pressure Level measured at 20' on-axis 0°	72	78	75	75	77	73	70	67	66	78 dBA
6 blowers	+8	+8	+8	+8	+8	+8	+8	+8	+8	
Attenuation over 100 foot distance to property line on north side (20log20'/120')	-16	-16	-16	-16	-16	-16	-16	-16	-16	
Off-axis 45 degree attenuation for 10'x12' opening	-2	-3	-4	-4	-2	0	0	0	0	
Total Sound Pressure Level Due to new blowers at PL on north side	62	67	63	63	67	65	62	59	58	
Measured Average Ambient Noise Level (Leq) at north property line at location R-9	68	67	66	65	64	67	62	52	43	69
Overall Combined Level (dB)	69	70	68	67	69	69	65	60	58	
A-weighting	-39	-26	-16	-9	-3	0	+1	+1	-1	
Total A-weighted Sound Pressure Level Calculated Due to new blowers at PL on north side	30	44	52	58	66	69	66	61	57	72 dBA

Table 10 - Existing Blowers at North Property Line at 45° from Tunnel Exit Opening

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Existing Blowers Sound Pressure Level Leq measured on 4/8/14 at 45° off-axis at north property line with ambient traffic noise	72	77	71	69	69	70	65	56	48	
Addition of one more blower to make a total of 6.[17]	+1	+1	+1	+1	+1	+1	+1	+1	+1	
A-weighting	-39	-26	-16	-9	-3	0	+1	+1	-1	
Total A-weighted Sound Pressure Level Due to existing blowers and traffic noise at PL on north side 45° off-axis near road	64	52	56	61	67	71	67	58	48	74 dBA

[17] See Appendix for formula for adding multiple source sound levels

Table 11 – New Existing Blowers Calculated On-axis to East Property Line

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
New Existing Blower without attenuation duct Sound Pressure Level at 20' on axis (0°)	72	78	75	75	77	73	70	67	66	78 dBA
6 blowers	+8	+8	+8	+8	+8	+8	+8	+8	+8	
Attenuation over distance to property line at sidewalk lot line 34' from initial measurement location (20log20'/54')	-9	-9	-9	-9	-9	-9	-9	-9	-9	
On-axis attenuation	0	0	0	0	0	0	0	0	0	
Total Sound Pressure Level Due to new blowers at East sidewalk PL	71	77	74	74	76	72	69	66	65	
Measured Average Ambient Noise Level (Leq) at east property line at location R-1	65	68	63	64	65	68	63	52	42	
Overall Combined Level (dB)	72	78	74	74	76	74	70	66	65	
A-weighting	-39	-26	-16	-9	-3	0	+1	+1	-1	
Total A-weighted Sound Pressure Level Calculated Due to new blowers at east sidewalk PL	33	52	58	65	73	74	71	67	64	78 dBA

Table 12 New Existing Blowers at East Property Line with Only Inlet Attenuation Ducts	
Description	*A-weighted Sound Level Calculated at East Property Line*
New Existing Blower with inlet attenuation duct at 60 Hz (100%) 20 feet from blower and 5' from tunnel exit opening	74 dBA
Increase due to quantity of six blowers	+8 dBA
Reduction due to distance from measurement location to East sidewalk PL (20 log 20'/54')	-9 dBA
Total Sound Level due to 6 new blowers at East PL	73 dBA
Total Sound Level at East PL	73 dBA
Ambient sound Level at East PL location R-1	68 – 73.4 dBA

The above study indicates that the new blowers even with the inlet attenuation ducts, which were measured at Russell Speeders to test their suitability to replace the existing older blowers, will not meet the Town of Bedford Noise Code requirements as stated above (49 dBA during the hours of 8:00 a.m. to 6:00 p.m. or 45 dBA during the hours of 6:00 p.m. to 8:00 a.m. and all day Sunday).

We have therefore done extensive research to locate car wash blowers that are quieter and have performed an analysis of their expected sound levels at the property lines. It should be noted that there is no octave band test data from the manufacturer for the proposed blowers. The data provided is a single overall 71 dBA level at a distance of 20 feet. The 71 dBA level is projected

by the manufacturer if the blower is supplied with the manufacturer's sound attenuation package. Since the manufacturer does not have any spectral data for the blowers, an estimated octave band noise spectrum has been calculated to use in the following analysis. The following describes this analysis and shows calculations for the analysis.

Recommended New Blowers and Sound Attenuation Measures for Blowers

This section of our report shows estimated sound levels in octave bands to represent the Proto-Vest Windshear blower system with the attenuator package to allow a comparison of resulting octave bands levels to the older noise code from 1983 which is given in octave bands. The newer code can be easily compared using the overall dBA level which is shown at the far right side of the chart in all the calculation tables provided with this report.

Proto-Vest Inc. Model Windshear

Proto-Vest Inc. manufactures a complete dryer system, model Windshear, which can be obtained with a silencer package that further reduces the dryer sound level. The manufacturer has provided sound levels of 70.9 dBA at 20 feet for the dryer system when outfitted with the silencer package. This is the quietest system we found that meets with the drying capacity requirements for Russell Speeders Car Wash at Bedford Hills. Although this dryer system has a lower sound level output with the attenuation package, this unit will still not meet the noise ordinances without additional sound attenuation measures. It should be noted that this sound level given by the manufacturer is a calculated level based upon a measurement of 83 dBA at a distance of 5 feet from the blower with the sound attenuation package (91 dBA at a distance of 5 feet without the attenuation package.) Cut sheets are attached showing the blower configuration and sound data. We suggest locating the blower at least 20 feet inside the tunnel exit to give the exiting car space to wait for the overhead door to open after the blower is finished and this will also add to the sound attenuation capability of the tunnel itself.

The calculations shown in Appendix C include levels for the blowers projected to each of the affected property lines including varying conditions such as noise levels with the blower on and the bay door open with and without the recommended sound barrier walls, levels projected with the blowers off and the bay door open, and for the bay door closed when the blower is on. Since the older noise ordinance lists the maximum sound requirements in octave bands, we have created an estimated octave band sound spectrum for the fans based upon the readings measured for the existing fans and the expected attenuation using the Proto-Vest **Windshear** dryer system with the sound attenuator package. These calculations are shown in Appendix C for your reference.

Overhead Door Construction

We recommend all the bay doors including the detailing bays be constructed using the 6mm Macrolux C solid polycarbonate system having a minimum weight of 7.2 kg/m^2 and full perimeter seals as provided by Airlift Doors, Inc. This will be required to meet the strictest code requirements. Cut sheets are attached in Appendix A. The overhead doors will need to be used at the tunnel exit for Sundays and after 6pm on all other days whenever the blower is in operation. A bay door protocol will be implemented that includes automated bay doors which will be electronically signaled to lift when the blower is finished with the car and has shut down. The overhead door would then close before the blower dries the next car in the tunnel.

In addition, the bay doors will always be down when there is detailing work in the detail bays. If only the vacuums are being used, they can be left open, but whenever the louder equipment is being used, the doors will be closed.

All calculations have been based upon a maximum overhead door height of 84". This is recommended so that the sound barriers can provide essential line-of-sight blocking which will not happen if the bay and tunnel doors are too high. Refer to the barrier wall calculations for further reference.

Tunnel and Detail Bay Ceiling Treatment

We also recommend that the ceiling of the tunnel and the detailing bays be treated with acoustically absorptive material that can withstand water and humidity, such as a water resistant acoustical ceiling tile suspended from a grid such as MBI San Pan PVF Panels series 600P-2060-E in the 1" thickness having a 1.5 mil PVC encapsulated water resistant surface finish with a 1" thick 6-7# fiberglass core. This material has a manufacturer's acoustical performance rating of NRC 0.80. Cut sheets are included in Appendix A. The inside walls will have white vinyl ribbed exterior siding on furring strips to provide some diffusion of sound within the tunnel.

Sound Barrier Walls

The easiest way to reduce the sound level at the property lines is to construct solid barrier walls to block sound from getting to the property lines. We have calculated the barrier wall attenuation that would result from several barrier wall heights. Scale drawings are included in Appendix C including the calculations to achieve the sound attenuation values shown in the tables. The Town of Bedford requires that all barrier walls be 6 feet high or lower, so we first tried this height to see whether it satisfied the code requirements and found that it did not. Additional attenuation is necessary, and we have therefore performed calculations using higher barrier heights and have lowered the tunnel opening heights to the lowest possible opening of 84" which has been used for the opening height in the barrier calculations. In addition, the receptor is 5 feet tall and has been placed two feet on the other side of the barrier wall.

Sound barrier walls will be required in several locations as shown on the attached drawing D-2. The barriers need to be 8 feet in height with the exception of the north property line which needs to be 10 feet in height due to the raised elevation of the neighboring property which diminishes the barrier effect until it blocks the line of sight to the receptors. The barriers shall consist of a continuous double faced stockade fence construction that extends to the ground with no gaps or openings of any type that could allow sound to pass through. The barriers are required due to the fact that there is still noise emitting from the tunnel and detail bays when the doors are opened even if the blowers are turned off and this noise will exceed the code requirements if left unattenuated due to the close proximity of the property lines as shown in the attached calculations.

Summary of Blower Noise Attenuation

Our conclusion is that the current dryers need to be replaced with the Proto-Vest **Windshear** blower system with the silencer package and that the overhead door system should be provided for all bays as described above in conjunction with the ceiling acoustical treatment and barrier walls which will all work together so that the car wash facility is in compliance with the Town of Bedford Noise Ordinances at all times of use.

Peripheral Noise Sources

Measurements were taken of the vacuum systems, rooftop unit, and tunnel entrance at the north and south property lines. However, since the ambient noise level in the area was much higher than these sources, sound readings had to be taken quite near to the sources (3 to 5 feet) and the sound levels had to be calculated from these near-field readings to the property lines to get a true reading on their contribution to the sound level at the property lines. There were simply too many ambient noise sources to get an accurate reading on the contribution of the Russell Speeders equipment to the overall sound level at the property lines.

Please note that there is an existing building at the north property line with little potential for people to be directly impacted at the property line by the sound from Russell Speeders detailing area. In fact, this building has a very loud air release hose that cycles on every few minutes that makes conversation in the Russell Speeders property impossible while it is active. In addition, there is currently a deep hole in the ground at the south property line, so no one will be standing within earshot of the vacuums at that property line either. Additionally, the ambient sound level at both of these locations is affected by traffic noise on Route 117, the nearly constant equipment backup beepers from across the road at the equipment rental store, an air release valve from the building next door, sirens, trains and train horns, all of which are very frequent and subjectively more disturbing to the human ear than the noise coming from the vacuum system located at Russell Speeders. With all this in mind, we present the following findings and recommendations for the peripheral equipment at Russell Speeders.

Vacuum and Compressor at Rear of Property

Measurements were taken on April 8, 2014 of the vacuum noise from the rear property detailing area at the nearest north and south property lines. The existing temporary outdoor air compressor will be located inside the building when the approval is obtained to upgrade the property, and will therefore not be contributing to the noise level. In the updated facility, the vacuums will be used in the detailing bays and will not exceed the noise code at the nearest property lines. The overhead doors will be down to prevent noise from being excessive at the nearest north property line. In addition to the vacuums, there are air hoses and floor mat cleaning tools that make significant sound levels. These will also be located in the detail bays and will only be used when the bay doors are down.

Vacuum System at Free Vacuum Area on North Side of Building

The sound level was measured at the north property line directly in line with the vacuum unit at the north side of the Russell Speeders building and it was the same with and without the vacuum system running, 60.8 dBA, meaning that it does not increase the ambient level at all. In addition, readings were taken 3 feet from the vacuum unit at the north side of the building and it measured 64.9 dBA. When calculated to the property line the level would be 39 dBA if it were possible to hear it above the ambient sound level, which it was not at the time of our readings. Please note that the free vacuum area will not exist in the altered facility.

Rooftop Heating Unit

Measurements were taken at the north and south property lines with the rooftop heating unit on and off. There was no change in the ambient sound level at any property line when the unit was turned on and off, and it was completely inaudible. There are therefore no sound attenuation measures required for this unit. A calculation is shown in Appendix C for this unit to the closest property line.

Residential Properties

There are two residences within 200 feet of the Russell Speeders property. These are both to the north and are shown on the attached detail D-1. In both cases, there are building structures that block the direct line of sight to the residential buildings from the car wash exit tunnel. The only equipment that would be in direct line of sight to the residences would be the north detailing areas. Since these will be enclosed in the alterations, there will be no appreciable effect on these properties, since the sound level will be inaudible as shown in the calculations in Appendix C. Also shown are calculations to the residences of blower noise since it is not currently audible above the ambient noise of the traffic at these residences.

With the planned enclosures for the detail bays to be located at the north side of the building, there will be Big Ass Fans mounted in the ceilings to provide air circulation for workers inside these buildings. These fans do not have sound level data, but according to Travis Simpson, the Vertical Market Specialist for Big Ass Fans, there are several of these fans in all sizes in his office within 30 feet of his desk and they are "inaudible". They do not produce noise even loud enough to measure inside his office. We therefore, conclude that these will not produce measurable noise at the property line which will be 50' away from the one story high detailing bay ceiling, let alone a residence that is 245' away in the case of the closest residence on the north side of the Adzam property. There will be no other heating, ventilating or cooling mechanical equipment added to the site to our knowledge.

Amplified Music

At the existing facility, there are two exterior speakers mounted on the northeast corner of the building facing the car owner waiting area. Measurements were taken of these speakers at 3 feet and then calculated to the nearest north property line. They will not exceed code as currently adjusted.

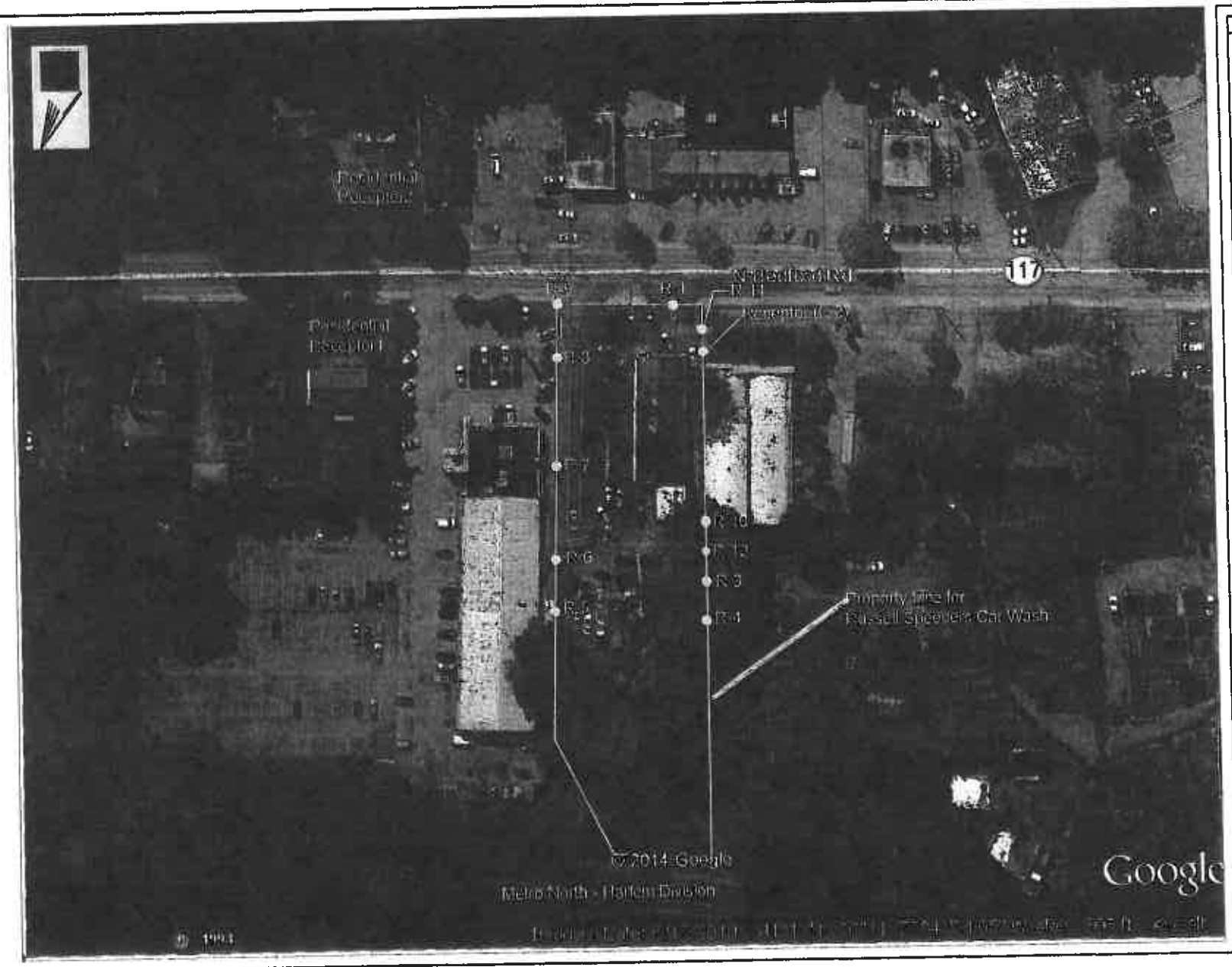
In addition, on all four sound level measurement days, there were no instances of car speakers being played for the workers. There are no "boomboxes" or music players in the facility for the workers and this policy will continue in the altered facility.

The above summarizes our findings and recommendations regarding the equipment at Russell Speeders. Please feel free to contact me if you have any questions or comments.

Very truly yours,

Maria L. Castellucci,
Consultant in AV and Acoustics

Appendix A

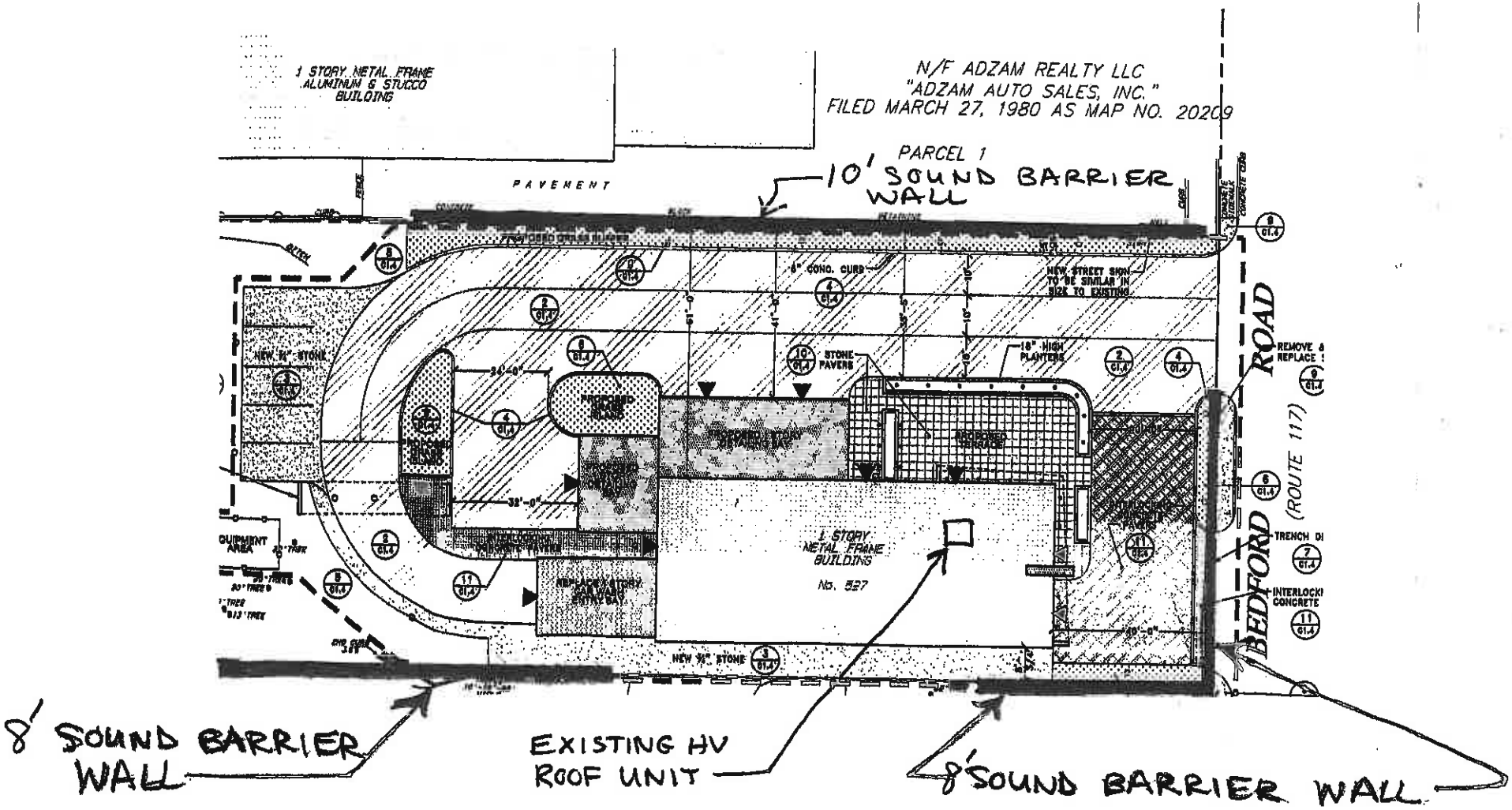


General Notes

No.	Revision/Issue	Date

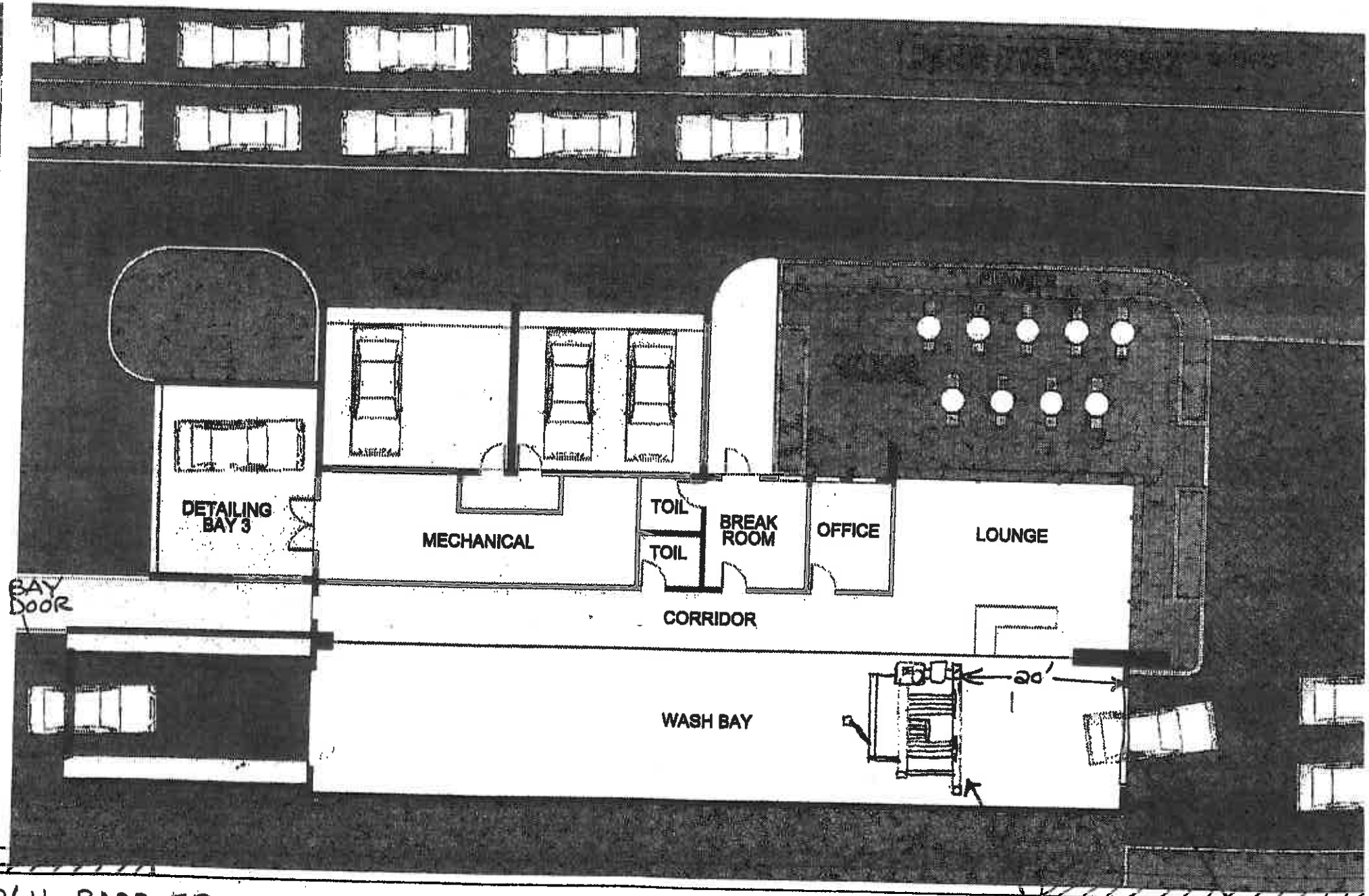
Russell Speedee Car Wash
Site Plan of Receptors and
Measurement Locations

Project RSCW-1	Sheet D-1
Date 10-14-14	
Scale 1:30	



D-2

SOUND BARRIER WALL LOCATIONS

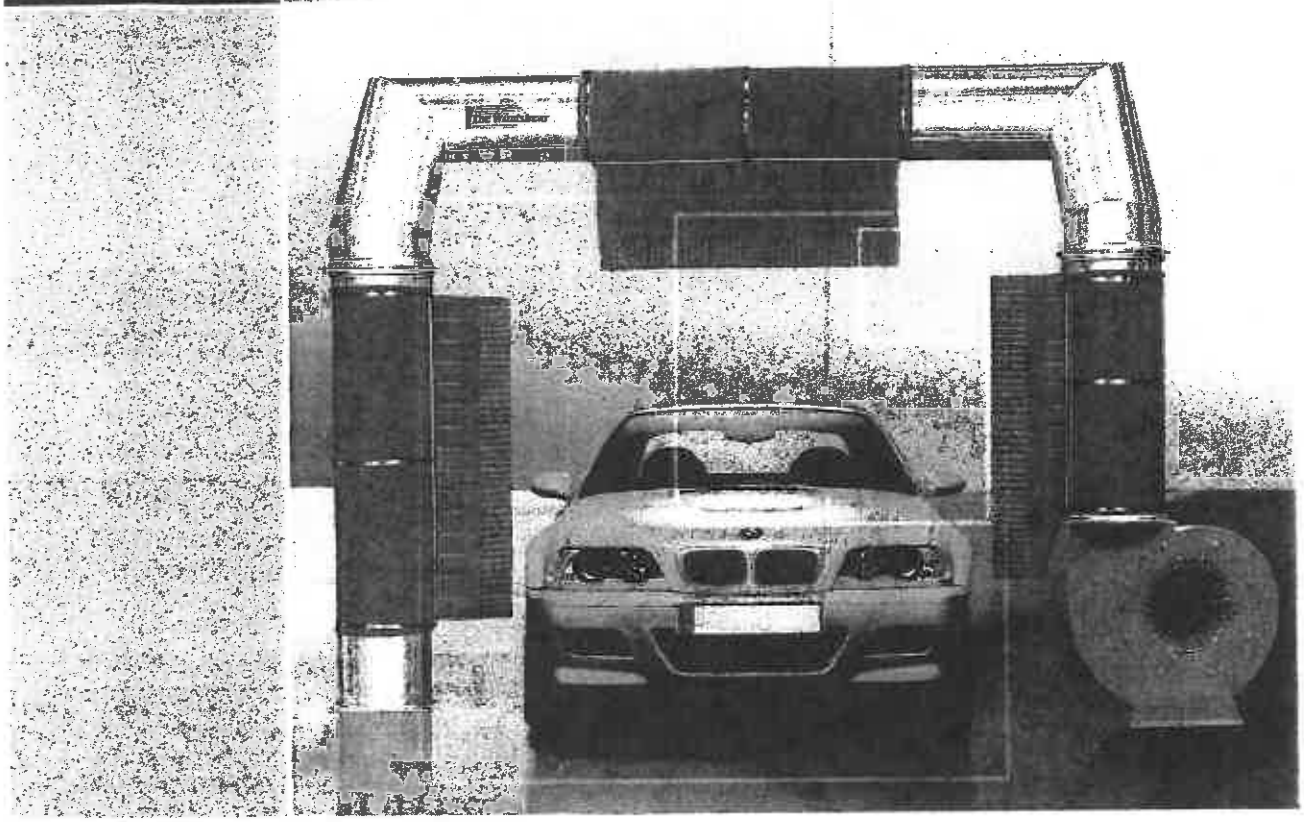


3 **FLOOR PLAN**

SCALE: 1/16" = 1'-0"

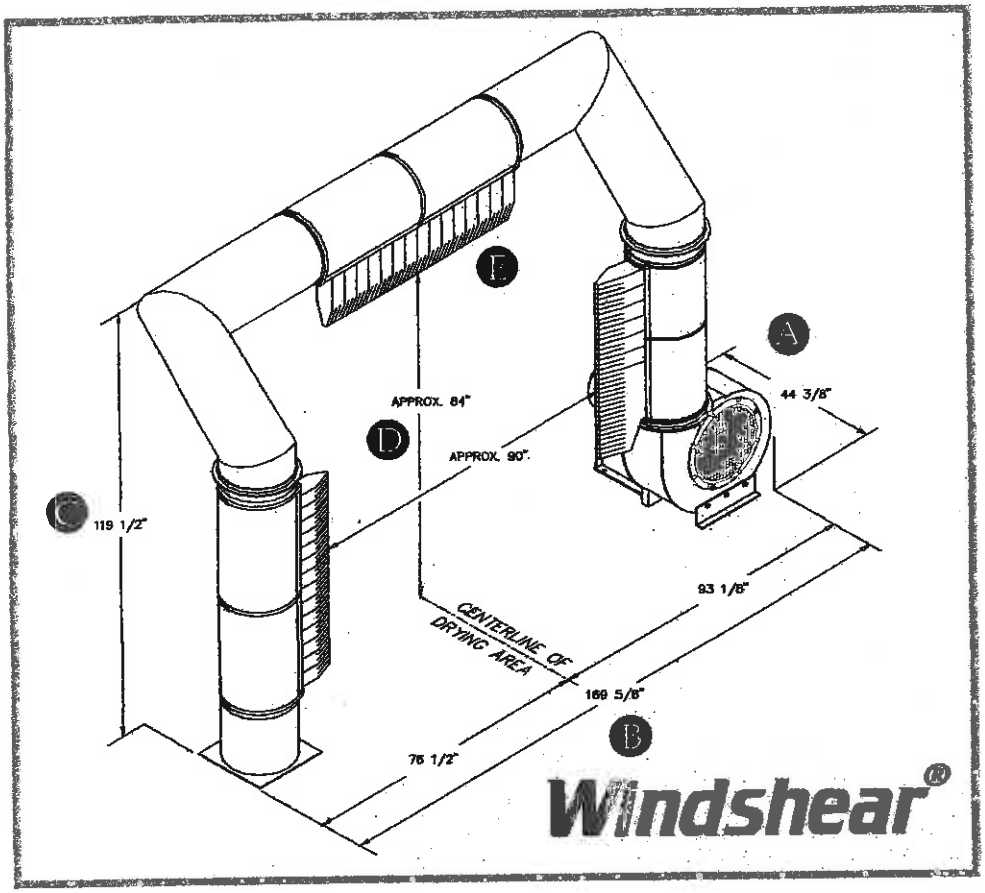
D-3 FLOOR PLAN

The Windshear®



- Touch-Free
- Low Maintenance
- Modular or Stand-Alone Design
- Compact Design
- 30hp Blower

Proto-Vest Inc.®



EQUIPMENT

- A OVERALL LENGTH 44 3/8 in.
- B OVERALL WIDTH 169 5/8 in.
- C OVERALL HEIGHT 119 1/2 in.
- D BAG HEIGHT 84 in.
- E VERTICAL OPENING 60 in.

Machine Operating Requirements*

MOTORS

- 30 hp, 3600 RPM
- 208-230/460 volts
- 1.15 service factor
- Frame: 286TS
- 3 Phase
- Totally enclosed, fan cooled (TEFC)

NOTE: Wiring and controls to be provided by the purchaser. Additional motor specifications available upon request. Additional voltages available on special order.

EQUIPMENT OPTIONS

- Green, Red, Blue, Black or Custom Bag Colors
- The Silencer Package
- Vehicle Recognition System (VRS)

Weight: 1250 lbs. (approximate)

GENERAL DESCRIPTION

The Proto-Vest "Windshear®" is designed as a stand alone drying system that is ideal for tunnels with a variety of line speeds. This patented system utilizes one (1) 30 hp Magnum blower, plenum and three (3) Proto-Duck™ air delivery bags designed to direct air around the vehicle as it passes under the equipment arch. Proto-Vest's blower/motor assemblies are engineered for both maximum efficiency and cost effectiveness allowing the system to operate with only one 30hp Magnum blower. With the improved performance of the Magnum blower assembly the Windshear® s drying quality far surpasses any comparable horsepower dryer in its class.

Proto-Vest's stringent standards in material selection for dryers result in extended equipment life and reduced maintenance. The blower assembly is manufactured from steel that is powder coated while the impeller is electroplated. The blower is AMCA Class IV certified. The plenum is made from 5052-H32 aluminum, while the bags are produced from Proto-Duck™ materials. These materials resist corrosion and tearing.

FEATURES / BENEFITS

Patented Touchless Design: Pressurized air flows through three (3) patented bags which direct the air to the vehicle's horizontal and vertical surfaces. It dries the hood, roof, deck, windows, and sides of the vehicle without touching.

Low Maintenance: Other than the blower / impeller assemblies, there are no moving parts to wear-out or break down. (Please note that Proto-Vest recommends routine maintenance in order to maximize product life.)

Line Speed Efficiency: As a stand alone unit the "Windshear" will provide an effectively dried car at a wide variety of line speeds.

Compact / Modular design: Designed to fit into limited space as a stand alone or supplemental dryer.

DECIBEL READINGS

With Silencer / Without Silencer

	(WS)	(WOS)
Windshear® - (1) 30hp dryer:		
WS: 10 ft=76.9 dBa;		WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;		WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;		WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;		WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;		WOS: 50 ft=77 dBa

(The above decibel readings are interpolated.)

SERVICE / SUPPORT

Proto-Vest recognizes that support after the sale of equipment is critical to the success of our customers. Our company offers its customers access to a wide range of services including: field service technicians, factory direct aftermarket parts, and an engineering staff for custom designed applications.

Proto-Vest Patents:
U.S.: 3,942,430; 4,161,801; 4,409,035; 4,418,442; 4,433,450; 4,445,251; 4,446,592; 4,589,160; 4,700,426; 5,027,714; 5,184,369; 5,187,881; 5,195,207; 5,280,665; 5,421,102; 5,563,346; 5,806,648; 5,901,461; 5,950,324; 5,960,564; 6,038,781; 6,176,024; 6,519,872; others pending.
Canada: 1,021,996; 1,111,328; 1,190,453; 1,201,040; 1,197,439; 1,219,195; 1,219,192; 1,219,194; 1,258,026; 1,219,193; 2,013,749; 2,071,568; 2,071,239; 2,071,388; others pending.

Proto-Vest Inc

*Specifications subject to change without notice.
**If starting motor over 10-12 times an hour it may be more efficient to leave blower on.

Proto-Vest, Inc., • 7400 N. Glen Harbor Blvd., Glendale, AZ 85307 • 800-521-8218 • 623-872-8300 • Fax 623-872-6150
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Silencer Package

GENERAL DESCRIPTION

The Proto-Vest "Silencer Package" was developed to enable our dryers to meet OSHA, federal, state and local noise reduction standards. The OSHA permissible noise exposure is 85 dB for an 8-hour shift. By reducing noise levels into the 70 dB to 80 dB range, you can be assured of a pleasant environment for both your employees and customers. The Silencing Package is a standard feature on all Untouchable dryers, while the Stripper and Windshear drying systems can be equipped with the Silencing Package as an option. Using state-of-the-art materials, which require virtually no maintenance, Proto-Vest has designed three components to comprise the Silencer Package.

- **Blower Inlet:** reduces the noise generated by rapidly moving air being drawn into the blower assembly.
- **Blower-motor Cover:** houses the blower and motor completely to absorb noise emitted from the motor and impeller while providing the assembly additional protection.
- **Riser Can:** absorbs the noise created by the blower, impeller and the movement of the air as it leaves the blower by advancing through the dryer's plenum.

The Silencer Package reduces decibel levels on Proto-Vest dryers on an average of 10 decibels making them approximately 10 times quieter than the un-silenced models!

DECIBEL LEVEL READINGS

With Silencer (WS)	Without Silencer (WOS)
Windshear InBay - (2) 25hp Dryer:	
WS: 10 ft=88 dBa;	WOS: 10 ft=94 dBa
WS: 20 ft=82 dBa;	WOS: 20 ft=88 dBa
WS: 30 ft=78.4 dBa;	WOS: 30 ft=84.5 dBa
WS: 40 ft=76 dBa;	WOS: 40 ft=82 dBa
WS: 50 ft=74 dBa;	WOS: 50 ft=80 dBa
WS: 60 ft=72.4 dBa;	WOS: 60 ft=78.4 dBa
Windshear - 30hp Dryer:	
WS: 10 ft=76.9 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;	WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;	WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;	WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;	WOS: 50 ft=77 dBa
Windshear II - (2) 30hp Dryer:	
WS: 10 ft=88 dBa;	WOS: 10 ft=99 dBa
WS: 20 ft=81.9 dBa;	WOS: 20 ft=92.9 dBa
WS: 30 ft=78.4 dBa;	WOS: 30 ft=89.4 dBa
WS: 40 ft=75.4 dBa;	WOS: 40 ft=86.9 dBa
WS: 50 ft=74 dBa;	WOS: 50 ft=85 dBa
TopShot - 30hp Dryer:	
WS: 10 ft=76.9 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;	WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;	WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;	WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;	WOS: 50 ft=77 dBa
TopShot II - (2) 30hp Dryer:	
WS: 10 ft=88 dBa;	WOS: 10 ft=99 dBa
WS: 20 ft=81.9 dBa;	WOS: 20 ft=92.9 dBa
WS: 30 ft=78.4 dBa;	WOS: 30 ft=89.4 dBa
WS: 40 ft=75.9 dBa;	WOS: 40 ft=86.9 dBa
WS: 50 ft=74 dBa;	WOS: 50 ft=85 dBa
TailWind - (1) 25hp Dryer:	
WS: 10 ft=85 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=79 dBa;	WOS: 20 ft=85 dBa
WS: 30 ft=75.5 dBa;	WOS: 30 ft=83.5 dBa
WS: 40 ft=73 dBa;	WOS: 40 ft=79 dBa
WS: 50 ft=71 dBa;	WOS: 50 ft=77 dBa
SideShot - 15hp Dryer:	
WS: 10 ft=74.5 dBa;	WOS: 10 ft=82.9 dBa
WS: 20 ft=68.5 dBa;	WOS: 20 ft=76.9 dBa
WS: 30 ft=64.9 dBa;	WOS: 30 ft=73.4 dBa
WS: 40 ft=62.4 dBa;	WOS: 40 ft=70.9 dBa
WS: 50 ft=60.5 dBa;	WOS: 50 ft=69 dBa
SideShot II - 30hp Dryer:	
WS: 10 ft=76.9 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;	WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;	WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;	WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;	WOS: 50 ft=77 dBa
90N/90XS - 15hp Dryers:	
WS: 10 ft=74.5 dBa;	WOS: 10 ft=82.9 dBa
WS: 20 ft=68.5 dBa;	WOS: 20 ft=76.9 dBa
WS: 30 ft=64.9 dBa;	WOS: 30 ft=73.4 dBa
WS: 40 ft=62.4 dBa;	WOS: 40 ft=70.9 dBa
WS: 50 ft=60.5 dBa;	WOS: 50 ft=69 dBa
IP330 - 30hp Dryers:	
WS: 10 ft=76.9 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;	WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;	WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;	WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;	WOS: 50 ft=77 dBa
(Proto-Vest's Silencing Package is standard on all of the Untouchable series.)	
IP345 - 45hp Dryers:	
WS: 10 ft=76.9 dBa;	WOS: 10 ft=91 dBa
WS: 20 ft=70.9 dBa;	WOS: 20 ft=84.9 dBa
WS: 30 ft=67.4 dBa;	WOS: 30 ft=81.4 dBa
WS: 40 ft=64.9 dBa;	WOS: 40 ft=78.9 dBa
WS: 50 ft=63 dBa;	WOS: 50 ft=77 dBa
(Proto-Vest's Silencing Package is standard on all of the Untouchable series.)	

*Specifications subject to change without notice.
NOTE: Proto-Vest dryer's dimensions will vary with the Silencer Package.

Proto-Vest, Inc., 7400 N. Glen Harbor Blvd., Glendale, AZ 85307
800-521-8218 • 623-872-8300
Fax 623-872-6150
www.protovest.com

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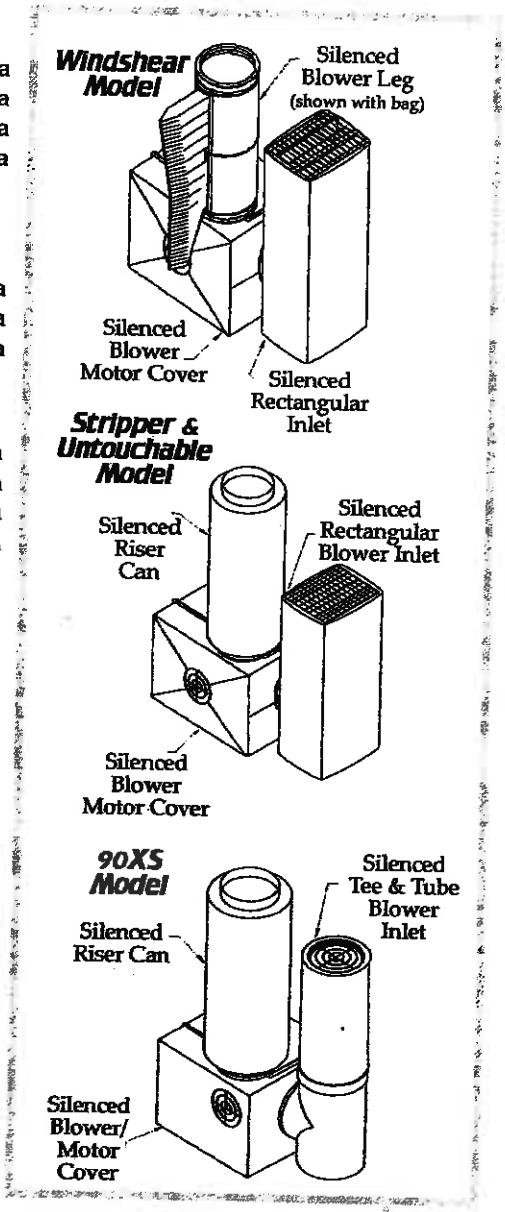
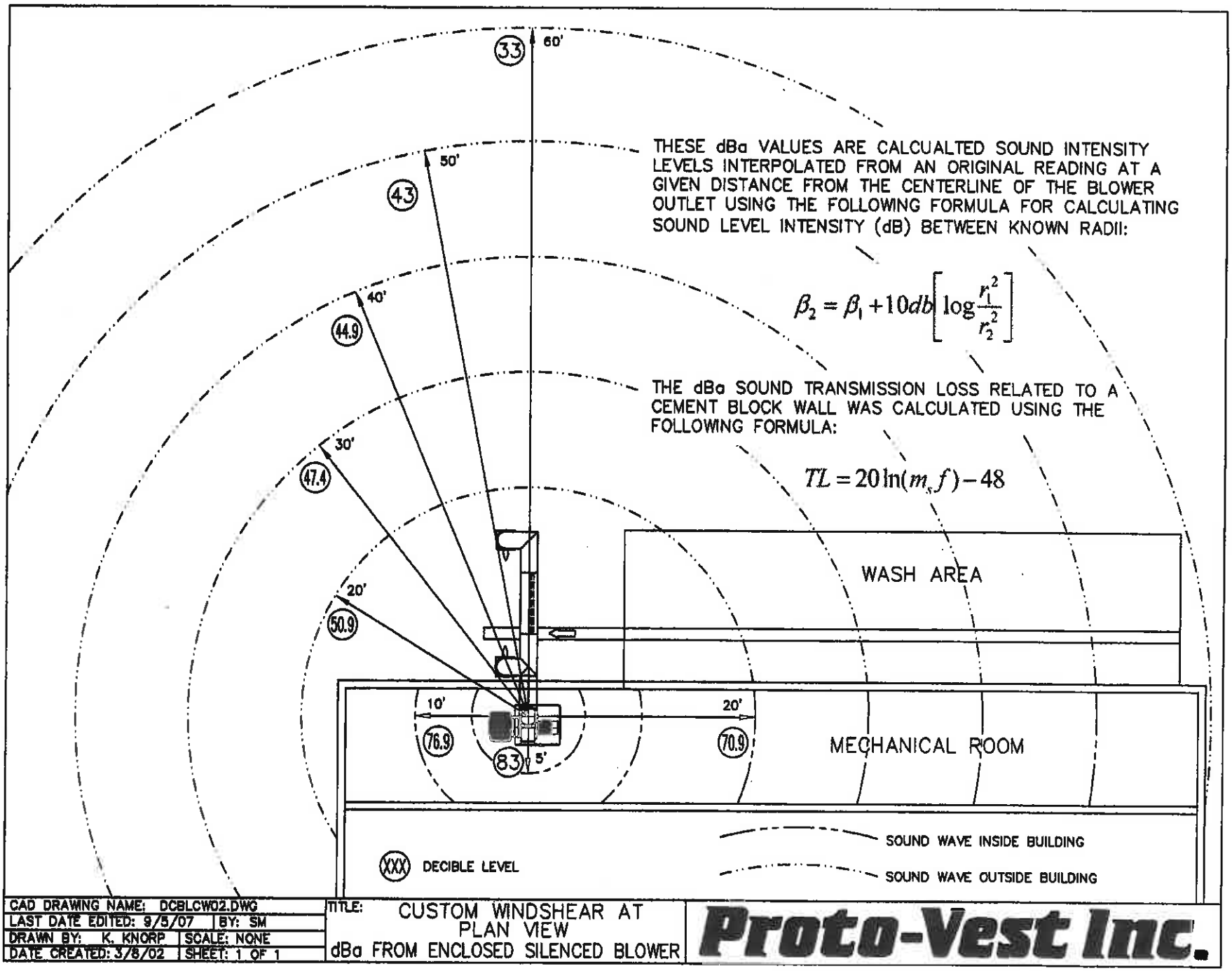




CAD DRAWING NAME: DCBLCW02.DWG	
LAST DATE EDITED: 9/5/07	BY: SM
DRAWN BY: K. KNORP	SCALE: NONE
DATE CREATED: 3/8/02	SHEET: 1 OF 1

TITLE: CUSTOM WINDSHEAR AT PLAN VIEW dBa FROM ENCLOSED SILENCED BLOWER

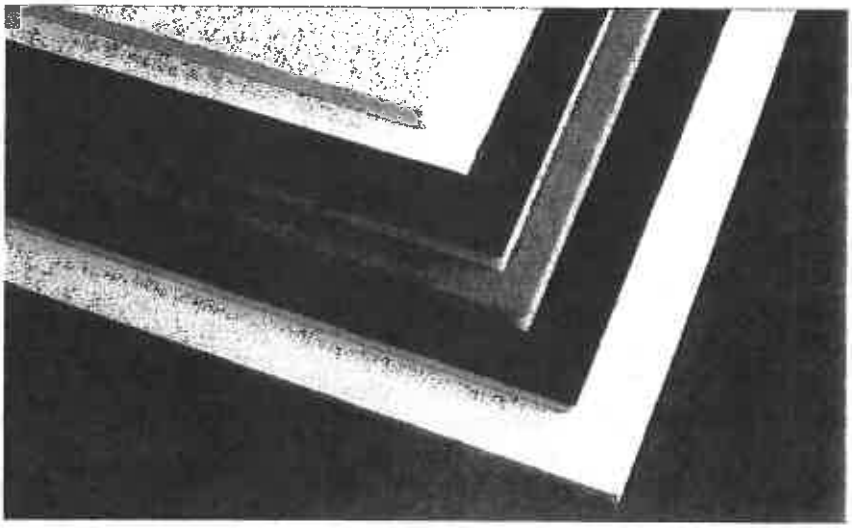
Proto-Vest Inc.

CEILING | TILES

Custom High Performance Ceiling Tiles

The entire line of MBI ceiling tile products is dimensionally stable, market friendly, and designed to last a lifetime. They offer excellent acoustics at economical prices.

PRODUCT DESCRIPTION



MBI Blackout Tiles are ideal for any ceiling where you need maximum sound absorption at a cost-effective price. The matte black finish has very little sheen, making the ceiling disappear. Perfect for home theaters and cinemas.

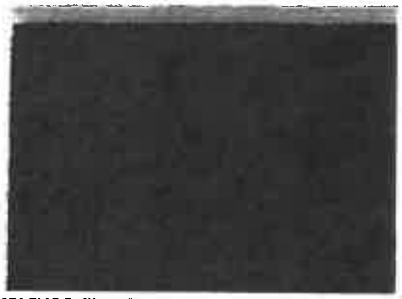
MBI Whiteout Tiles are an eco-friendly, pure white ceiling tile offering good acoustics with an environmentally sustainable design. Get your green points here.

MBI Fabric Ceiling Tiles offer a full palette of patterns and colors with an Ecose friendly core. The fabric finish is 100% recycled polyester, further enhancing its green qualities.

MBI Nubby Ceiling Tiles are a traditional classic, used for decades in the ceiling industry. Offered in small-run quantities and custom sizes.

MBI PVC Ceiling Tiles are a cost-effective solution when color is essential to your project. The PVC facing comes in 10 colors to suit your design needs.

MBI PVC Encapsulated Ceiling Tiles are ideal for all of your clean and high humidity environments. Also see our San Pan® line.



MBI PVC Ceiling Tile, 6000P

ACOUSTICAL PERFORMANCE

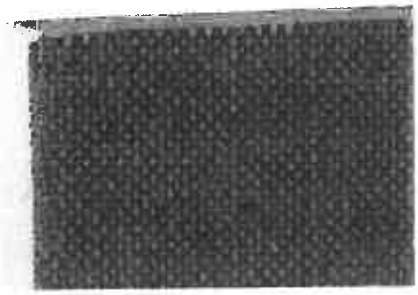
Product Model	Absorption Coefficient						
	125	250	500	1000	2000	4000	NRC*
6000B-1060-N (2" x 6-7# Core, Blackout Faced)	0.78	1.07	0.87	1.04	1.12	1.15	1.05
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6000N-1060-N (2" x 6-7# Core, Nubby Faced)	0.75	0.91	0.70	0.93	0.98	1.03	0.90
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

CODES & CERTIFICATES

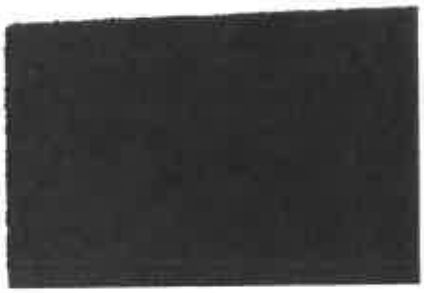
★ Class A per ASTM E84 25/0/50

FOR MORE INFORMATION ON THESE PRODUCTS GO TO WWW.MBIPRODUCTS.COM

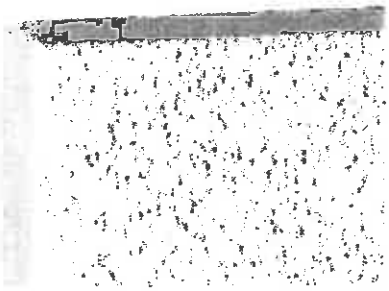
MBI Ceiling Tiles



MBI Fabric Ceiling Tile, 6000F



MBI Blackout Ceiling Tile, 6000B



MBI Nubby Ceiling Tile, 6000N

TECHNICAL SUPPORT

- **Weight:** 0.7# - 1.5# per square foot
- **Density:** 6-7#
- **Shape:** Square, Rectangular
- **Fire Rating:** MBI Ceiling Tiles meet Class A per ASTM E84 25/0/50
- **Dimensional Stability:** Ceiling Tiles are dimensionally stable
- **Maintenance:** Materials selected to provide easy maintenance, durability and abuse resistance.

SIZES AVAILABLE

- Thickness of 1"-2"
- Custom Thicknesses available
- 16 square foot maximum
- Custom sizes available upon request

FINISHES AVAILABLE

- Black Matte Scrim
- Polyester Fabric. Other fabrics, subject to approval
- Sustainable Eco-Fabric
- Nubby Fabric
- 2.5 mil PVC Film

SUSPENSION PROVISIONS

- Grid by others
- Custom suspension available upon request

GENERAL NOTES

- Store products in a cool, dry, and temperature controlled interior location not less than 40°F prior to, during, and after installation.
- Store products out of direct UV sunlight.
- Store and protect products from the elements and from damage.
- Suspension hardware is not to be pre-installed.
- Do not subject acoustical products to critical edge lighting without first consulting manufacturer.
- MBI Ceiling Tiles are custom made. Sizes and quantities need to be determined by field verifying existing job-site conditions. Installer/Contractor is responsible for verifying and providing accurate field dimensions.
- MBI Ceiling Tiles must be kept in temperature-controlled environments.
- High humidity could cause panel fabric to wrinkle and/or de-laminate from fiberglass board.

MBI Penetration Panels are available to make field cuts around existing elements such as sprinkler heads, duct work, vents, lighting, etc.

SOUND experience

MBI

INNOVATION FOR THE SOUND EXPERIENCE

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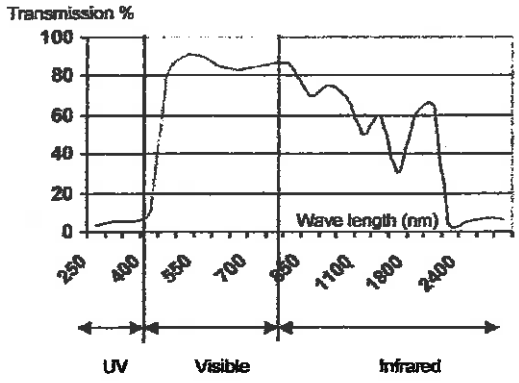
4.4 Sound insulation

MACROLUX® C and MACROLUX® C XL sheets sound-insulation values (reduction of noise) are the following:

Thickness	Weight (kg/m^2)	Reduction Rw
4	4.8	27 dB
5	6.0	28 dB
6	7.2	29 dB
8	9.6	31 dB
10	12.0	32 dB
12	14.4	34 dB

4.5 MACROLUX® C XL (EXTRA LIFE) U.V. protection

In order to prevent a premature aging due to the ultraviolet sun radiation, MACROLUX® C XL sheets are protected on both sides by means of a UV Absorber layer.
The co-extrusion method allows to realize an homogenous layer that strain and stop the ultraviolet component of sun beams.



The response to the solar radiation spectrum evidences how a UV-protected polycarbonate sheet can screen almost completely the ultraviolet component (on average only 4% of the radiation included in the range between 250-380 nanometres can pass through the sheet), while it remains totally transparent as regards to the visible component.
The outstanding characteristics of polycarbonate sheets remains unchanged in the time.
All MACROLUX® C XL sheets are constantly controlled with simulated aging tests (test made with QUV/SE Q-Panel) assuring the UV protection and granting MACROLUX® C XL sheets against loss of brightness, yellowing and breakage due to hail.
Verification test: ASTM D 1925
We ask you to contact our offices to have a copy of our warranty and of its extension.

Appendix B

Please note that all equations used in the calculations in Appendix C are in parentheses to reference the following equation numbers.

1. Attenuation of sound pressure level over distance in a free field[18]:

$$L_{p2} = L_{p1} + 20 \log_{10} (r_2/r_1)$$

L_{p1}= sound pressure level from source at location 1, dB
L_{p2}= sound pressure level from source at location 2, dB
r_1 = distance from source to location 1, ft or m
r_2= distance from source to location 2, ft or m

2. Calculation for adding multiple identical sound sources[19]:

$$L_p(\text{total}) = L_p(\text{single source}) + 10 \log_{10} N$$

L_p(single source) = the sound pressure level for one of the identical sound sources
L_p(total) = the total sum sound pressure level for all identical sources
N = the number of sources

3. Calculation for adding multiple sound sources which may not be identical[20]:

Addition of Sound Levels	
Difference between the two levels, dB	Add to the higher level, dB
0	3
1	2.5
2	2
3	2
4	1.5
5	1
6	1
7	1
8	0.5
9	0.5
10	0

[18] Handbook of HVAC Design, Editors Nils R. Grimm, PE and Robert C. Rosaler, PE, McGraw-Hill Publishing Company, c. 1990, p. 49.14.
[19] Ibid, p. 49.11.
[20] Ibid, p. 49.12, Table 49.5 *Addition of Sound Levels*.

4. A-weighting calculation for octave band spectrum[21]

Octave-Band Relative Frequency Response of a Sound Level Meter with A-Weighting to Sounds Arriving at Random Incidence

Octave Band Center Frequency, Hz	31.5	63	125	250	500	1000	2000	4000	8000
A-weighting, dB	-39.4	-26.2	-16.1	-8.6	-3.2	0.0	+1.2	+1.0	-1.1

5. Estimating Sound Power Level from sound pressure level at given distance from source:

$L_w = L_p - 10 \log_{10} (D/ (4\pi r^2)) - 10.5$

Where:

D = Directivity of 2
R = distance from source
L_w = Sound Power Level
L_p = Sound Pressure Level

6. Room Constant: Assumes tunnel dimensions of 17'W x 99'L x 23'H for main tunnel and 17'W x 30'L x 13'H for entrance tunnel attached to main tunnel:

$RC = A/ (1-\alpha_{avg})$

Where:

A = Total Room Absorption in ft^2 Sabin = $\Sigma S_i \alpha_i$ where S_i is the individual surface area in the room (ft^2) and α_i is the absorption coefficient for the individual surface in the room (Sabin)

α_{avg} = Average Absorption Coefficient = A/S where A is the absorption of the room (ft^2 Sabin) and S is the total surface area in the room (ft^2)

7. Propagation of Sound Indoors in Reverberant Space (within tunnel)[22]

For a continuing sound source in a room, the sound level is the sum of the direct and reverberant sound. The sound pressure for a receiver at a specific distance from the source in a room is expressed as follows:

$L_p = L_w + 10 \log_{10} (D/ (4\pi r^2) + 4 / RC) + 10.5$

Where:

L_p = received sound pressure level at location specified distance from source
L_w = Sound power level from the source
D = directivity coefficient = 2

[21] Handbook of Acoustical Measurements and Noise Control, Third Edition, Cyril M. Harris, Ph.D, Editor in Chief, Acoustical Society of America, Woodbury, NY, c. 1998, p. 1.17 Table 1.2 and p. 1.22 Table 1.4 (derived from the American National Specification for Sound Level Meters, ANSI SI.4-1985, Acoustical Society of America, New York, NY 10017-3483, c.1985.)

[22] 2003 ASHRAE Applications Handbook, Chapter 47 *Sound and Vibration Control*, p. 47.26.

RC = room constant (ft^2 Sabin)
π = 3.14
r = distance from source

8. Transmission Loss Calculation

$L_{p2} = L_{p1} - TL$

Where:
TL = transmission loss of specific material
L_{p1} = sound pressure level on source side of material
L_{p2} = sound pressure level on receiver side of material through which sound is traveling

9. Sound Power Level Calculation for Radiating Surface

$L_w = L_{p2} + 10 \log_{10} (A_{wall}) - 10.5$

Where:
L_w = sound power level
L_{p2} = sound pressure level
A_{wall} = Radiating Surface Area

10. Sound Pressure Calculation Outside the Tunnel Door

$L_p = L_w + 10 \log_{10} (D/ (4\pi r^2)) + 10.5$

Where:
L_p = received sound pressure level at location specified distance from source
L_w = Sound power level
D = directivity coefficient = 2
π = 3.14
r = distance from source

11. Off-Axis Attenuation for a Long Tunnel or Duct with a 12'W x 7'H opening in free space were estimated as follows with 0° as the reference point directly on axis to the tunnel opening and 90° representing the angle perpendicular to the tunnel opening[23]:

Off-Axis Angle	Octave Band Center Frequency (Hz)								
	31.5	.63	125	250	500	1k	2k	4k	8k
0°	0	0	0	0	0	0	0	0	0
45°	3	3	4	3	1	0	0	0	0
60°	3	5	8	10	10	10	10	10	10
90°	7	10	14	15	16	17	18	19	19
135°-180°	7	10	15	18	20	22	24	25	25

[23] Koppers Aircoustat Directivity Attenuation Table, 1975 interpolated for opening size at Russell Speeders.

12. Sound Barrier Wall Calculation for Thin Barriers[24]

$IL_{barrier} = 10 \log [3 + 10/NK] - A_{ground}$ dB

Where:

K is a correction factor for atmospheric effects. For distances between the source and receiver less than 100m, K=1, signifying that atmospheric effects may be neglected.

Negative values of insertion loss from this equation are set to zero.

A_{ground} is the attenuation provided by the ground before the barrier is installed. The first term is the attenuation provided by the barrier plus any attenuation still effective in the propagation path resulting from the ground and atmospheric effects after the installation of the barrier.

$N = (2/\lambda) [d_1 + d_2 - d]$

λ = wavelength
N = the Fresnel number (dimensionless)
d_1, d_2, and d = the distances shown in the figure below.
When the tip of the barrier just touches the line of sight between the source and receiver, or is below it, the value of N is zero.

[24] Ibid, pp. 3.18-3.19

Appendix C

Table 1 - Estimated Octave Band Noise Levels with Blower On and Bay Door Open – No Barrier Walls

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Location R-1	62	64	60	59	60	55	51	44	37	60
Location R-2	61	60	52	50	50	44	39	31	24	50
Location R-6	49	46	36	34	34	27	23	18	11	34
Location R-8	50	49	41	39	39	33	28	20	13	39
Location R-9	53	53	46	43	44	39	35	28	21	44
Location R-10	65	62	52	50	50	43	39	34	27	50
Octave Band Noise Code Limit (Residential)	59	61	60	53	46	40	31	20	11	49 dBA
Octave Band Noise Code Limit (Commercial)	65	67	66	59	52	46	37	26	17	55 dBA

Table 2 - Estimated Octave Band Noise Levels with Blower On and Bay Door Open – With Barrier Walls

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Location R-1 (8' high barrier)	56.1	57.2	51.9	49.0	47.7	40.1	33.3	23.4	13.4	47
Location R-2 (6' high barrier)	56.1	55.1	46.9	44.6	44.0	37.1	30.6	20.7	11.3	43
Location R-10 (6' high barrier)	60	57	47	44	44	36	30	23	13	43
Location R-10 (8' high barrier)	59	55	44	40	38	28	21	14	4	38
Location R-11 (6' high barrier)	59.1	61	55.8	55.3	57.6	52.4	46.7	37.5	28	57
Location R-11 (8' high barrier)	58	59	53	51	52	46	36	23	10	51
Location R-12 (8' high barrier)	58	57	49	47	48	41	32	22	9	48
Octave Band Noise Code Limit (Residential)	59	61	60	53	46	40	31	20	11	49 dBA
Octave Band Noise Code Limit (Commercial)	65	67	66	59	52	46	37	26	17	55 dBA

Table 3 - Estimated Octave Band Noise Levels with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Location R-1	44	51	51	49	44	43	39	32	23	47
Location R-2	49	53	49	46	40	38	33	25	16	43
Location R-6	33	37	33	30	24	22	17	9	-	27
Location R-8	32	36	32	29	23	21	16	8	-	26
Location R-9	41	46	43	39	34	33	29	22	11	37
Location R-10	46	50	46	43	37	35	30	22	13	40
Location R-11 (6' high barrier)	41.1	48	46.8	45.3	41.6	40.4	34.7	25.5	14	44
Location R-12 (8' high barrier)	43	49	47	44	39	37	27	14	-	41
Octave Band Noise Code Limit (Residential)	59	61	60	53	46	40	31	20	11	49 dBA
Octave Band Noise Code Limit (Commercial)	65	67	66	59	52	46	37	26	17	55 dBA

Table 4 - Estimated Octave Band Noise Levels with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Location R-1	58	52	41	37	31	24	18	14	10	33
Location R-2	63	54	39	34	27	19	12	7	3	32
Location R-6	45	36	20	15	8	-	-	-	-	14
Location R-8	44	35	20	15	8	0	-	-	-	14
Location R-9	48	40	26	20	14	7	1	-	-	19
Location R-10	61	52	36	31	24	16	9	5	0	30
Location R-11 (6' barrier wall)	58.1	52	39.8	36.3	31.6	24.4	16.7	10.5	4	33
Location R-12 (8' barrier wall)	54	57	33	28	23	14	2	-	-	31
Octave Band Noise Code Limit (Residential)	59	61	60	53	46	40	31	20	11	49 dBA
Octave Band Noise Code Limit (Commercial)	65	67	66	59	52	46	37	26	17	55 dBA

Table 5 - New Proto-Vest Blower System at Location R-1 with Blower On and Bay Door Open – No Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-1 at 64 feet from source 20 log 20'/64'	-10	-10	-10	-10	-10	-10	-10	-10	-10	
On-axis attenuation (12' x 7' opening)	0	0	0	0	0	0	0	0	0	
Total Sound Pressure Level Due to new blower at R-1	62	64	60	59	60	55	51	44	37	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-1	22.6	37.8	43.9	50.4	57	55	52	45	36	60 dBA

Table 6 - New Proto-Vest Blower System at Location R-1 with Blower On and Bay Door Open – With 6' High Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-1 at 64 feet from source 20 log 20'/64'	-10	-10	-10	-10	-10	-10	-10	-10	-10	
On-axis attenuation (12' x 7' opening)	0	0	0	0	0	0	0	0	0	
Insertion Loss of 6' High Barrier Wall (12)	-4.9	-5.1	-5.4	-5.9	-6.8	-8.2	-10.1	-12.4	-15.0	
Total Sound Pressure Level Due to new blower at R-1	57.1	58.9	54.6	53.1	53.2	46.8	40.9	31.6	22	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL	17.7	32.7	38.5	44.5	50.0	46.8	39.7	32.6	20.9	53 dBA

Table 7 - New Proto-Vest Blower System at Location R-1 with Blower On and Bay Door Open – With 8' High Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-1 at 64 feet from source 20 log 20'/64'	-10	-10	-10	-10	-10	-10	-10	-10	-10	
On-axis attenuation (12' x 7' opening)	0	0	0	0	0	0	0	0	0	
Insertion Loss of 8' High Barrier Wall (12)	-5.9	-6.8	-8.1	-10.0	-12.3	-14.9	-17.7	-20.6	-23.6	
Total Sound Pressure Level Due to new blower at R-1	56.1	57.2	51.9	49.0	47.7	40.1	33.3	23.4	13.4	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-1	16.7	31.0	35.8	40.4	44.5	40.1	32.1	22.4	12.3	47 dBA

Table 8 - New Proto-Vest Blower System at Location R-1 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-1 at 64 feet from source 20 log 10'/64'	-16	-16	-16	-16	-16	-16	-16	-16	-16	
On-axis attenuation (12' x 7' opening)	0	0	0	0	0	0	0	0	0	
Total Sound Pressure Level with new blower off at R-1	44	51	51	49	44	43	39	32	23	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-1	5.6	24.8	34.9	40.4	40.8	43	40.2	33.0	21.9	47 dBA

Table 9 - New Proto-Vest Blower System at Location R-1 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 20' (7)	83	83	78	77	78	72	69	64	58	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	62	58	52	45	39	35	31	
PWL Radiated by Door (9)	88	82	71	67	61	54	48	44	40	
SPL at 40' from door to location R-1 (10)	58	52	41	37	31	24	18	14	10	
On-axis attenuation due to tunnel @ 0° (12' x 7' opening)(11)	0	0	0	0	0	0	0	0	0	
Total Sound Pressure Level Due to new blower at R-1	58	52	41	37	31	24	18	14	10	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-1	18.6	25.8	24.9	28.4	27.8	24	19.2	15	8.9	33 dBA

Table 10 - New Proto-Vest Blower System at Location R-2 with Blower On and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-2 at 31 feet from source 20 log 20'/31' (1)	-4	-4	-4	-4	-4	-4	-4	-4	-4	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-2	61	60	52	50	50	44	39	31	24	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-2	21.6	33.8	37.9	41.4	46.8	44	40.2	32	22.9	50 dBA

Table 11 - New Proto-Vest Blower System at Location R-2 with Blower On and Bay Door Open – With 6' High Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-2 at 31 feet from source 20 log 20'/31' (1)	-4	-4	-4	-4	-4	-4	-4	-4	-4	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Insertion Loss of 6' High Barrier Wall (12)	-4.9	-4.9	-5.1	-5.4	-6.0	-6.9	-8.4	-10.3	-12.7	
Total Sound Pressure Level Due to new blower at R-2	56.1	55.1	46.9	44.6	44.0	37.1	30.6	20.7	11.3	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-1	16.7	28.9	30.8	36.0	40.8	37.1	31.8	21.7	10.2	43 dBA

Table 12 - New Proto-Vest Blower System at Location R-2 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-2 at 31 feet from source 20 log 10'/31'	-4	-4	-4	-4	-4	-4	-4	-4	-4	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level with new blower off at R-2	49	53	49	46	40	38	33	25	16	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-2	9.6	26.8	32.9	37.4	36.8	38	34.2	26	14.9	43 dBA

Table 13 - New Proto-Vest Blower System at Location R-2 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 20' (7)	83	83	78	77	78	72	69	64	58	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	62	58	52	45	39	35	31	
PWL Radiated by Door (9)	88	82	71	67	61	54	48	44	40	
SPL at 11' from door to location R-2 (10)	70	64	53	49	43	36	30	26	22	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-2	63	54	39	34	27	19	12	7	3	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-2	23.6	27.8	22.9	25.4	23.8	19	13.2	8	1.9	32 dBA

Table 14 - New Proto-Vest Blower System at Location R-6 with Blower On and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
SPL outside door (8)	83	83	77	76	77	71	68	64	57	
PWL Radiated by Opening (9)	92	92	86	85	86	80	77	73	66	
SPL at 89' from door to location R-6 (10)	56	56	50	49	50	44	41	37	30	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-6	49	46	36	34	34	27	23	18	11	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	9.6	19.8	19.9	25.4	30.8	27	24.2	19	9.9	34 dBA

Table 15 - New Proto-Vest Blower System at Location R-6 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-6 at feet from source 20 log 10'/99' (1)	-20	-20	-20	-20	-20	-20	-20	-20	-20	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level with new blower off at R-6	33	37	33	30	24	22	17	9	-	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-8	-	10.8	16.9	21.4	20.8	22	18.2	10	-	27 dBA

Table 16 - New Proto-Vest Blower System at Location R-6 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	61	57	51	44	38	35	30	
PWL Radiated by Door (9)	88	82	70	66	60	53	47	44	39	
SPL at 89' from door to location R-6 (10)	52	46	34	30	24	17	11	8	3	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-6	45	36	20	15	8	-	-	-	-	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	5.6	9.8	3.9	6.4	4.8	-	-	-	-	14 dBA

Table 17 - New Proto-Vest Blower System at Location R-8 with Blower On and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-8 at 110 feet from source 20 log 20'/110' (1)	-15	-15	-15	-15	-15	-15	-15	-15	-15	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-8	50	49	41	39	39	33	28	20	13	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	10.6	22.8	24.9	30.4	35.8	33	29.2	21.0	11.9	39 dBA

Table 18 - New Proto-Vest Blower System at Location R-8 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-8 at 110 feet from source 20 log 20'/110' (1)	-15	-15	-15	-15	-15	-15	-15	-15	-15	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level with new blower off at R-8	38	42	38	35	29	27	22	14	5	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-8	-	15.8	21.9	26.4	25.8	27	23.2	15.0	3.9	32 dBA

Table 19 - New Proto-Vest Blower System at Location R-8 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 20' (7)	83	83	78	77	78	72	69	64	58	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	62	58	52	45	39	35	31	
PWL Radiated by Door (9)	88	82	71	67	61	54	48	44	40	
SPL at 90' from door to location R-8 (10)	51	45	34	30	24	17	11	7	3	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-8	44	35	20	15	8	0	-	-	-	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	4.6	8.8	3.9	6.4	4.8	0	-	-	-	14 dBA

Table 20 - New Proto-Vest Blower System at Location R-9 with Blower On and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-9 at 120 feet from source 20 log 20'/120' (1)	-16	-16	-16	-16	-16	-16	-16	-16	-16	
Off-axis attenuation (12' x 7' opening) 60° from tunnel opening (11)	-3	-5	-8	-10	-10	-10	-10	-10	-10	
Total Sound Pressure Level Due to new blower at R-9	53	53	46	43	44	39	35	28	21	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-11	13.6	26.8	29.9	34.7	40.8	39	36.2	29	19.9	44 dBA

Table 21 - New Proto-Vest Blower System at Location R-9 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-9 at 120 feet from source 20 log 10'/120'	-16	-16	-16	-16	-16	-16	-16	-16	-16	
Off-axis attenuation (12' x 7' opening) 60° from tunnel opening (11)	-3	-5	-8	-10	-10	-10	-10	-10	-10	
Total Sound Pressure Level with new blower off at R-9	41	46	43	39	34	33	29	22	11	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-9	1.6	19.8	26.9	30.4	30.8	33	30.2	23	9.9	37 dBA

Table 22 - New Proto-Vest Blower System at Location R-9 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 20' (7)	83	83	78	77	78	72	69	64	58	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	62	58	52	45	39	35	31	
PWL Radiated by Door (9)	88	82	71	67	61	54	48	44	40	
SPL at 100' from door to location R-9 (10)	51	45	34	30	24	17	11	7	3	
Off-axis attenuation (12' x 7' opening) 60° from tunnel opening (11)	-3	-5	-8	-10	-10	-10	-10	-10	-10	
Total Sound Pressure Level Due to new blower at R-9	48	40	26	20	14	7	1	-	-	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-9	8.6	13.8	9.9	11.4	10.8	7	2.2	-	-	19 dBA

Table 23 - New Proto-Vest Blower System at Location R-10 with Blower On and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
SPL outside door (8)	83	83	77	76	77	71	68	64	57	
PWL Radiated by Opening (9)	92	92	86	85	86	80	77	73	66	
SPL at 13' from door to location R-10 (10)	72	72	66	65	66	60	57	53	46	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-10	65	62	52	50	50	43	39	34	27	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	25.6	35.8	35.9	41.4	46.8	43	40.2	35	25.9	50 dBA

Table 24 - New Proto-Vest Blower System at Location R-10 with Blower On and Bay Door Open with 6' Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
SPL outside door (8)	83	83	77	76	77	71	68	64	57	
PWL Radiated by Opening (9)	92	92	86	85	86	80	77	73	66	
SPL at 13' from door to location R-10 (10)	72	72	66	65	66	60	57	53	46	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Insertion Loss of 6' barrier	-5	-5	-5	-6	-6	-7	-9	-11	-14	
Total Sound Pressure Level Due to new blower at R-10	60	57	47	44	44	36	30	23	13	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	20.6	30.8	30.9	35.4	40.8	36	31.2	24	11.9	43 dBA

Table 25 - New Proto-Vest Blower System at Location R-10 with Blower On and Bay Door Open with 8' Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
SPL outside door (8)	83	83	77	76	77	71	68	64	57	
PWL Radiated by Opening (9)	92	92	86	85	86	80	77	73	66	
SPL at 13' from door to location R-10 (10)	72	72	66	65	66	60	57	53	46	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Insertion Loss of 8' barrier	-6	-7	-8	-10	-12	-15	-18	-20	-23	
Total Sound Pressure Level Due to new blower at R-10	59	55	44	40	38	28	21	14	4	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	19.6	28.8	27.9	31.4	34.8	28	22.2	15	2.9	38 dBA

Table 26 - New Proto-Vest Blower System at Location R-10 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-10 at 13 feet from source 20 log 10'/23' (1)	-7	-7	-7	-7	-7	-7	-7	-7	-7	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level with new blower off at R-10	46	50	46	43	37	35	30	22	13	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-8	6.6	23.8	29.9	34.4	33.8	35	31.2	23	11.9	40 dBA

Table 27 - New Proto-Vest Blower System at Location R-10 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	61	57	51	44	38	35	30	
PWL Radiated by Door (9)	88	82	70	66	60	53	47	44	39	
SPL at 13' from door to location R-10 (10)	68	62	50	46	40	33	27	24	19	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at R-8	61	52	36	31	24	16	9	5	0	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	21.6	25.8	19.9	22.4	20.8	16	7.8	6.0	-	30 dBA

Table 28 - New Proto-Vest Blower System at Location R-11 with Blower On and Bay Door Open – With 6' High Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-11 at 36 feet from source 20 log 20'/36' (1)	-5	-5	-5	-5	-5	-5	-5	-5	-5	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 6' High Barrier Wall (12)	-4.9	-5.0	-5.2	-5.7	-6.4	-7.6	-9.3	-11.5	-14.0	
Total Sound Pressure Level Due to new blower at R-11	59.1	61	55.8	55.3	57.6	52.4	46.7	37.5	28	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-11	19.7	34.8	39.7	46.7	54.4	52.4	47.9	38.5	26.9	57 dBA

Table 29 - New Proto-Vest Blower System at Location R-11 with Blower On and Bay Door Open – With 8' High Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to R-11 at 36 feet from source 20 log 20'/36' (1)	-5	-5	-5	-5	-5	-5	-5	-5	-5	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 8' High Barrier Wall (12)	-6	-7	-8	-10	-12	-14	-20	-26	-32	
Total Sound Pressure Level Due to new blower at R-11	58	59	53	51	52	46	36	23	10	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-11	18.6	32.8	36.9	42.4	48.8	46	37.2	24	8.9	51 dBA

Table 30 - New Proto-Vest Blower System at Location R-11 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-11 at 36 feet from source 20 log 10'/36'	-11	-11	-11	-11	-11	-11	-11	-11	-11	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss for 6' barrier wall (12)	-4.9	-5.0	-5.2	-5.7	-6.4	-7.6	-9.3	-11.5	-14.0	
Total Sound Pressure Level with new blower off at R-11	41.1	48	46.8	45.3	41.6	40.4	34.7	25.5	14	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-2	1.7	21.8	30.7	36.7	38.4	40.4	35.9	26.5	12.9	44 dBA

Table 31 - New Proto-Vest Blower System at Location R-11 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 20' (7)	83	83	78	77	78	72	69	64	58	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	62	58	52	45	39	35	31	
PWL Radiated by Door (9)	88	82	71	67	61	54	48	44	40	
SPL at 16' from door to location R-11 (10)	66	60	49	45	39	32	26	22	18	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss for 6' Barrier Wall	-4.9	-5.0	-5.2	-5.7	-6.4	-7.6	-9.3	-11.5	-14.0	
Total Sound Pressure Level Due to new blower at R-11	58.1	52	39.8	36.3	31.6	24.4	16.7	10.5	4	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-11	18.7	25.8	23.7	27.7	28.4	24.4	17.9	11.5	2.9	33 dBA

Table 32 - New Proto-Vest Blower System at Location R-12 with Blower On and Bay Door Open with 8' Barrier Wall

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
SPL outside door (8)	83	83	77	76	77	71	68	64	57	
PWL Radiated by Opening (9)	92	92	86	85	86	80	77	73	66	
SPL at 25' from door to location R-12 (10)	67	67	61	60	61	55	52	48	41	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 8' barrier	-6	-7	-8	-10	-12	-14	-20	-26	-32	
Total Sound Pressure Level Due to new blower at R-12	58	57	49	47	48	41	32	22	9	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-12	18.6	30.8	32.9	38.4	44.8	42	33.2	23.0	8.9	48 dBA

Table 33 - New Proto-Vest Blower System at Location R-12 with Blower Off and Bay Door Open

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound levels in tunnel with blower off	60	67	67	65	60	59	55	48	39	64 dBA
Attenuation over distance to R-3 at 25 feet from source 20 log 10'/25' (1)	-8	-8	-8	-8	-8	-8	-8	-8	-8	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 8' barrier	-6	-7	-8	-10	-12	-14	-20	-26	-32	
Total Sound Pressure Level with new blower off at R-12	43	49	47	44	39	37	27	14	-	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-12	3.6	22.8	30.9	35.4	35.8	37	28.2	15	-	41 dBA

Table 34 - New Proto-Vest Blower System at Location R-12 with Blower On and Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in tunnel with blower on (5)	96	98	94	93	94	89	85	78	71	
Room Constant (6)	986	1580	2187	2278	2153	3124	2302	1217	1028	
SPL inside door at 110' (7)	83	83	77	76	77	71	68	64	57	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	79	73	61	57	51	44	38	35	30	
PWL Radiated by Door (9)	88	82	70	66	60	53	47	44	39	
SPL at 25' from door to location R-12 (10)	63	67	45	41	35	28	22	19	14	
Off-axis attenuation (12' x 7' opening) 45° from tunnel opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 8' barrier	-6	-7	-8	-10	-12	-14	-20	-26	-32	
Total Sound Pressure Level Due to new blower at R-12	54	57	33	28	23	14	2	-	-	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-12	14.6	30.8	16.9	19.4	19.8	14	3.2	-	-	31 dBA

Peripheral Sound Sources Measured on Property:

Table 35 - Existing HV Rooftop Unit Calculated to Location R-8 with Other Equipment Off

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Sound level measured on roof at 3 feet from unit	62	66	63	55	56	55	52	47	40	60 dBA
Attenuation over distance to R-8 at 75 feet from source 20 log 3'/75' (1)	-28	-28	-28	-28	-28	-28	-28	-28	-28	
Parapet 3' high barrier effect	-4.9	-4.9	-5.1	-5.4	-6.0	-7.0	-8.5	-10.4	-12.8	
Total Sound Pressure Level for Rooftop HV unit at R-8 with new blower off	29.1	33.1	29.9	21.6	22	20	15.5	8.6	-	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-8	-	6.9	13.8	13	18.8	20	16.7	9.6	-	**24 dBA**

Table 36 - Existing Audio Speakers on Building Calculated to Location R-8 with Other Equipment Off

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Sound level measured near audio speakers mounted on building at 3 feet from unit	68	68	71	65	62	65	63	59	50	69 dBA
Attenuation over distance to R-8 at 62 feet from source 20 log 3'/62' (1)	-26	-26	-26	-26	-26	-26	-26	-26	-26	
Total Sound Pressure Level for audio speakers at R-8 with new blower off	42	42	45	39	36	39	37	33	24	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated with new blower off at R-8	2.6	15.8	28.9	30.4	32.8	39	38.2	34.0	22.9	**43 dBA**

Table 37 - Detailing Bay Calculated to Location R-7 with Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in detailing bay with air hose and floor mat cleaner on (5)	101	100	95	92	91	97	107	102	102	
Room Constant (6)	361	678	974	993	927	1499	1014	461	365	
SPL inside door at 10' (7)	92.5	89.2	83.5	80	79.2	73.3	94.9	92.6	93.5	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	88.5	79.2	67.5	61	53.2	46.3	64.9	63.6	66.5	
PWL Radiated by Door (9)	102.5	93.2	81.5	75	67.2	60.3	78.9	77.6	80.5	
SPL at 45' from door to location R-7 (10)	72	62.7	51	44.5	36.7	29.8	48.4	47.1	50	
Insertion Loss of 10' barrier	-6	-6	-7	-9	-11	-13	-16	-18	-21	
Total Sound Pressure Level Due to detail bay at R-7	66	56.7	44	35.5	25.7	16.8	32.4	29.1	29	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated	26.6	30.5	27.9	26.9	22.5	16.8	33.6	30.1	27.9	37 dBA

Table 38 - Detailing Bay Calculated to Residential Receptor R-1 with Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in detailing bay with air hose and floor mat cleaner on (5)	101	100	95	92	91	97	107	102	102	
Room Constant (6)	361	678	974	993	927	1499	1014	461	365	
SPL inside door at 10' (7)	92.5	89.2	83.5	80	79.2	73.3	94.9	92.6	93.5	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	88.5	79.2	67.5	61	53.2	46.3	64.9	63.6	66.5	
PWL Radiated by Door (9)	102.5	93.2	81.5	75	67.2	60.3	78.9	77.6	80.5	
SPL at 245' from door to Residential receptor 1 (10)	57.5	48.2	36.5	30	22.2	15.3	33.9	32.6	35.5	
Insertion Loss of 10' barrier	-6	-6	-7	-9	-11	-13	-16	-18	-21	
Total Sound Pressure Level Due to detail bay at Residential receptor 1	51.5	42.2	29.5	21	11.2	2.3	17.9	14.6	14.5	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL	12.1	16	13.4	12.4	8	2.3	19.1	15.6	13.4	23 dBA

Table 39 - Detailing Bay Calculated to Residential Receptor R-2 with Bay Door Closed

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Estimated sound power levels in detailing bay with air hose and floor mat cleaner on (5)	101	100	95	92	91	97	107	102	102	
Room Constant (6)	361	678	974	993	927	1499	1014	461	365	
SPL inside door at 10' (7)	92.5	89.2	83.5	80	79.2	73.3	94.9	92.6	93.5	
Estimated Transmission Loss of 6mm Macrolux C Polycarbonate Overhead Door	-4	-10	-16	-19	-26	-27	-30	-29	-27	
SPL outside door (8)	88.5	79.2	67.5	61	53.2	46.3	64.9	63.6	66.5	
PWL Radiated by Door (9)	102.5	93.2	81.5	75	67.2	60.3	78.9	77.6	80.5	
SPL at 245' from door to Residential receptor 2 (10)	57.5	48.2	36.5	30	22.2	15.3	33.9	32.6	35.5	
Off-axis attenuation (12' x 7' opening) 45° from detail bay opening (11)	-3	-3	-4	-3	-1	0	0	0	0	
Insertion Loss of 10' barrier	-6	-6	-7	-9	-11	-13	-16	-18	-21	
Total Sound Pressure Level Due to detail bay at Residential receptor 1	48.5	39.2	25.5	18	10.2	2.3	17.9	14.6	14.5	
A-weighting (4)	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL	9.1	13	9.4	9.4	7	2.3	19.1	15.6	13.4	23 dBA

Table 40 - New Proto-Vest Blower System Calculated to Residential Receptor 1 with Blower On and Bay Door Open (worst case)

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to Residential Receptor 1 at 245 feet from source 20 log 20'/265' (1)	-22	-22	-22	-22	-22	-22	-22	-22	-22	
Off-axis attenuation (12' x 7' opening) 90° from tunnel opening (11)	-7	-10	-14	-15	-16	-17	-18	-19	-19	
Total Sound Pressure Level Due to new blower at Residential receptor 1	43	42	34	32	32	26	21	13	6	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-8	3.6	15.8	17.9	23.4	28.8	26	22.2	14	4.9	32 dBA

Table 41 - New Proto-Vest Blower System Calculated to Residential Receptor 2 with Blower On and Bay Door Open (worst case)

	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dBA
Windshear estimated sound levels with attenuator package - Sound Pressure Level at 20'	72	74	70	69	70	65	61	54	47	71 dBA
Attenuation over distance to Residential Receptor 2 at 245 feet from source 20 log 20'/265' (1)	-22	-22	-22	-22	-22	-22	-22	-22	-22	
Off-axis attenuation (12' x 7' opening) 60° from tunnel opening (11)	-3	-5	-8	-10	-10	-10	-10	-10	-10	
Total Sound Pressure Level Due to new blower at Residential Receptor 2	47	47	40	37	38	33	29	22	15	
A-weighting	-39.4	-26.2	-16.1	-8.6	-3.2	0	+1.2	+1.0	-1.1	
Total A-weighted SPL estimated Due to new blower system at R-11	7.6	20.8	23.9	28.4	34.8	33	30.2	23.0	13.9	38 dBA

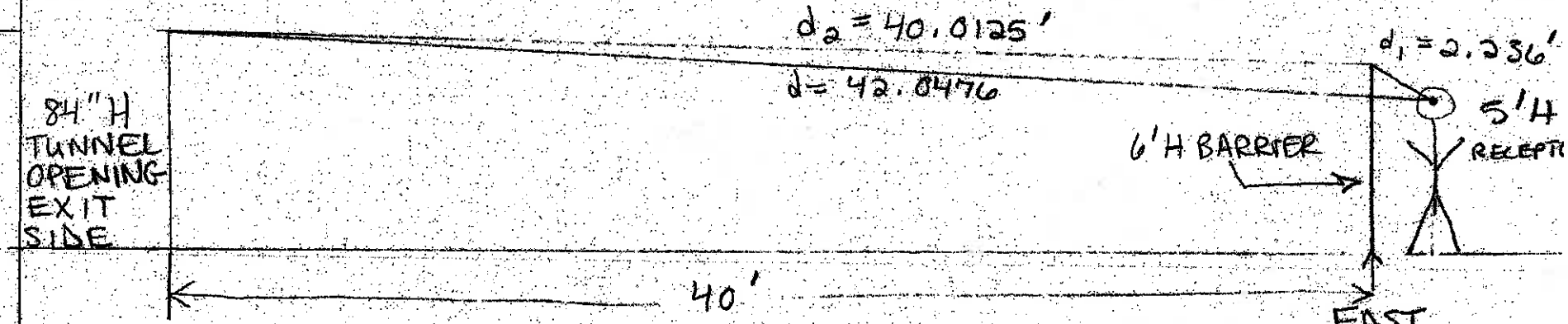
R-1

$$IL_{Barrier} = 10 \log [3 + 10NK] - A_{Ground}$$

$A_{Ground} = 0$

$K = 1$

$N = \left(\frac{2}{\lambda}\right)\delta$



ELEVATION FACING NORTH

$d_1 + d_2 - d = \delta$

$2.236' + 40.0125' - 42.0476' = 0.201'$

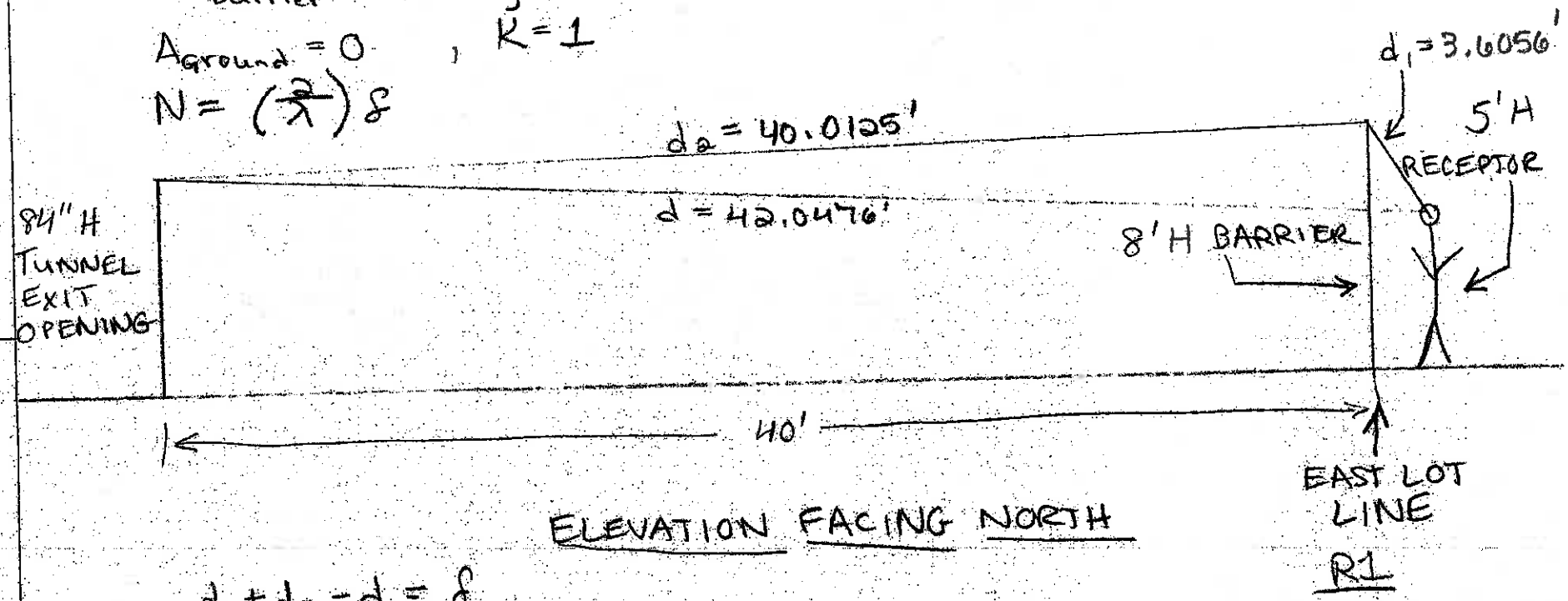
Hz	31.5	63	125	250	500	1K	2K	4K	8K
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.0112	0.0225	0.0445	0.0891	0.1787	0.3558	0.7179	1.4357	2.8714
$IL_{Barrier}$ (dB)	4.9	5.1	5.4	5.9	6.8	8.2	10.1	12.4	15.0

R-1

$IL_{Barrier} = 10 \text{ Log}[3 + 10\,NK] - A_{Ground}$

$A_{Ground} = 0$, $K = 1$

$N = \left(\frac{2}{\lambda}\right)\delta$



ELEVATION FACING NORTH

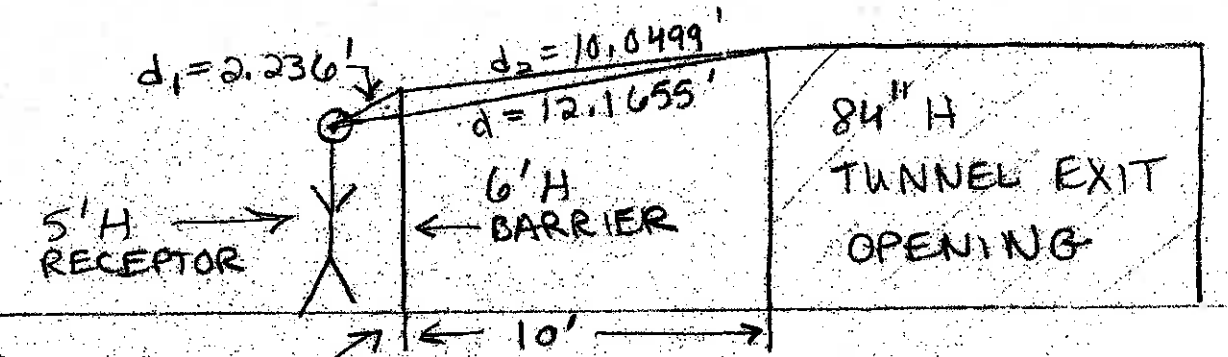
$d_1 + d_2 - d = \delta$

$3.6056' + 40.0125' - 42.0476' = 1.5705'$

Az	31.5	63	125	250	500	1K	2K	4K	8K
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.0878	0.1756	0.3482	0.6965	1.396	2.7796	5.6089	11.2179	22.4357
$IL_{Barrier}$ (dB)	5.9	6.8	8.1	10.0	12.3	14.9	17.7	20.6	23.6

$IL_{Barrier} = 10 \log[3 + 10NK] - A_{Ground}$ $\quad A_{Ground} = 0$

$N = \left(\frac{2}{\lambda}\right)\delta$ $\quad K = 1$

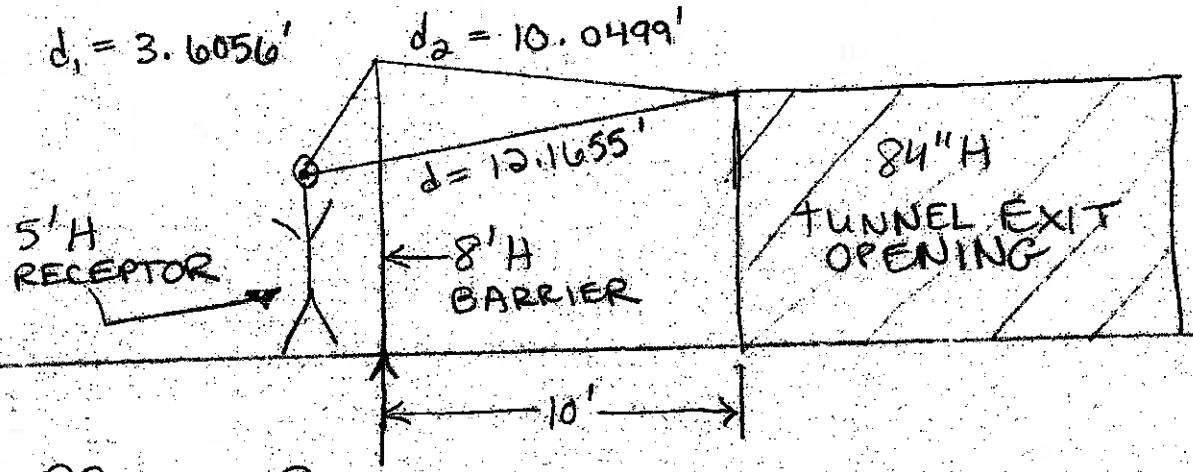


ELEVATION FACING WEST

$d_1 + d_2 - d = \delta$

$2.236' + 10.0499' - 12.1655' = 0.1204' = \delta$

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	.00673	0.0135	0.0247	0.0534	0.1070	0.2131	0.4300	0.8600	1.72
$IL_{Barrier}$ (dB)	4.9	5.0	5.1	5.5	6.1	7.1	8.6	10.6	13.1



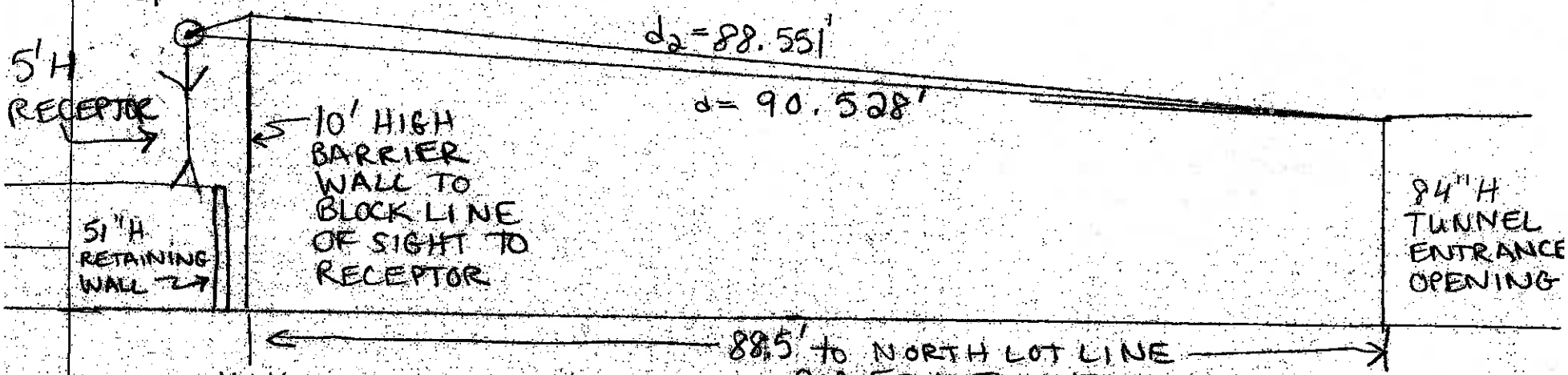
R2 SOUTH LOT LINE ELEVATION FACING WEST

$d_1 + d_2 - d = \delta = 3.6056' + 10.0499' - 12.1655' = 1.49' = \delta$

Hz	315	63	125	250	500	1K	2K	4K	8K
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.08331	0.1666	0.3304	0.6608	1.324	2.637	5.321	10.64	21.29
$IL_{Barrier}$ (dB)	5.8	6.7	8.0	9.8	12.1	14.7	17.5	20.39	23.3

$IL_{Barrier} = 10 \log [3 + 10NK] - A_{Ground}$ $\quad A_{Ground} = 0$

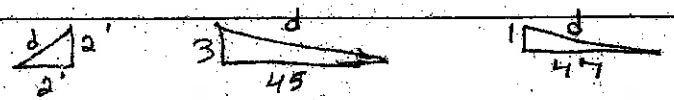
$N = \left(\frac{2}{\lambda}\right)\delta$ $\quad 0.318$ $\quad K = 1$

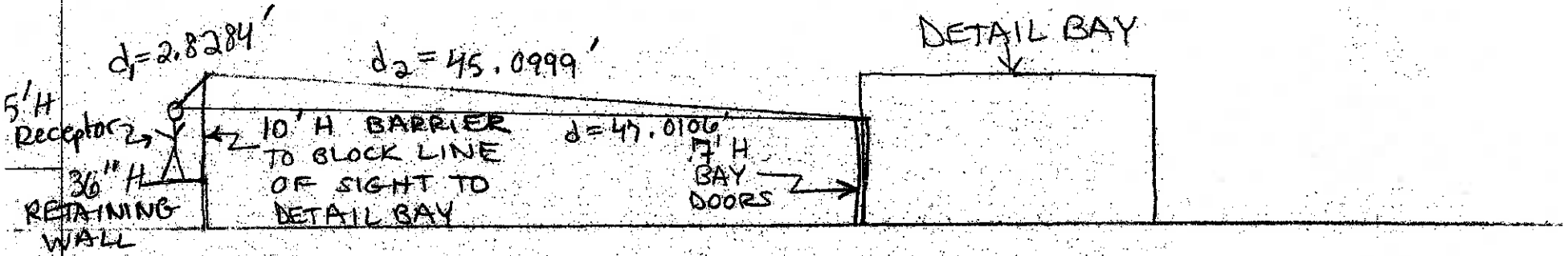


ELEVATION FACING EAST

$d_1 + d_2 - d = \delta = 2.136' + 88.551' - 90.528' = 0.159'$

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.008881	0.01778	0.03525	0.07051	0.1413	0.2814	0.5679	1.136	2.271
$IL_{Barrier}$ (dB)	4.9	5.0	5.3	5.7	6.4	7.6	9.4	11.6	14.1



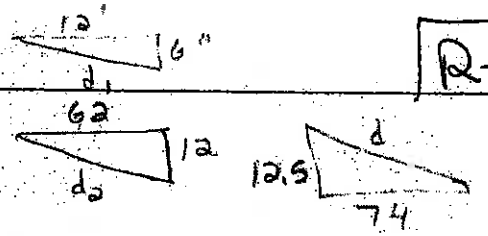


R-7 ELEVATION FACING EAST

$d_1 + d_2 - d = \delta = 2.8284' + 45.0999' - 47.0106' = 0.9177'$

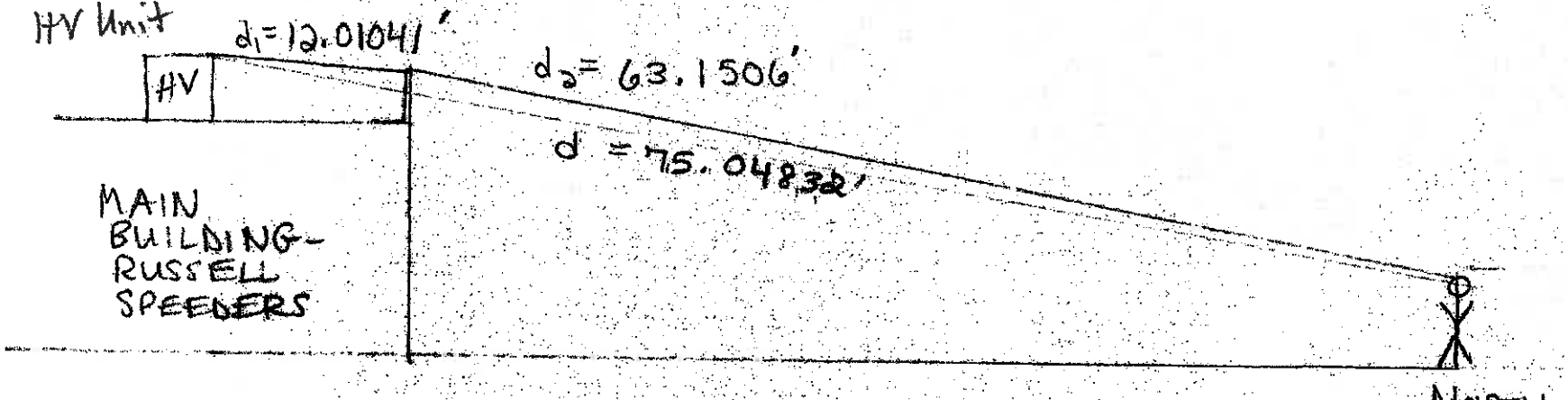
Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.05131	0.1026	0.2035	0.4070	0.8157	1.6242	3.278	6.555	13.11
$IL_{Barrier}$ (dB)	-5.5	-6.0	-7.0	-8.5	-10.5	-12.8	-15.5	-18.4	-21.3

R-8



36" H PARAPET

42" H HV Unit



12.01041' + 63.1506' - 75.04832' = 0.11269'

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.00'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	.006301	0.01260	.02499	.04997	0.1002	0.1995	0.41025	0.8049	1.6099
IL Barrier (dB)	-4.9	-4.9	-5.1	-5.4	-6.0	-7.0	-8.5	-10.4	-12.8

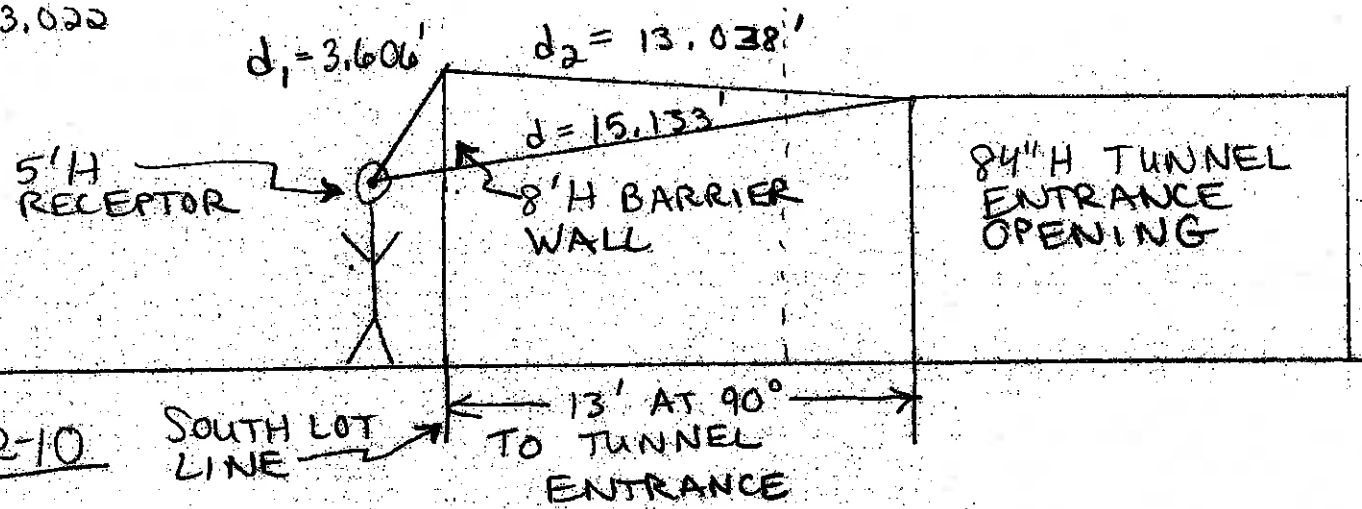
EXISTING ROOFTOP HV UNIT

$IL_{Barrier} = 10 \text{ Log } [3 + 10 NK] - A_{Ground}$ $\quad A_{Ground} = 0$

$K = 1$

$N = \left(\frac{2}{\lambda}\right)\delta$

3.022



SECTION FACING WEST

$d_1 + d_2 - d = \delta = 3.606' + 13.038' - 15.133' = \delta = 1.511'$

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.08448	0.1689	0.3350	0.6701	1.343	2.674	5.396	10.79	21.59
$IL_{Barrier}$ (dB)	5.8	6.7	8.0	9.9	12.2	14.7	17.6	20.4	23.4

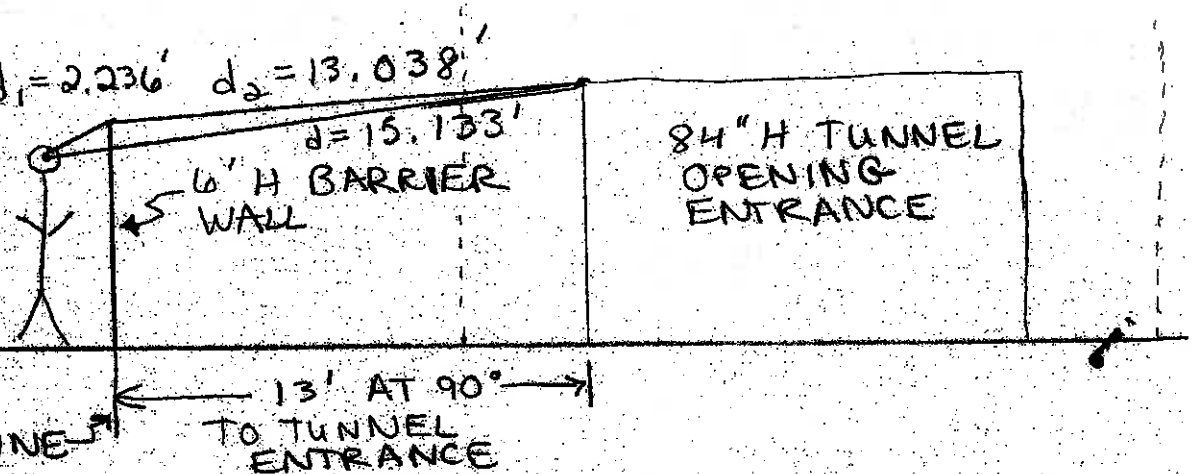
$IL_{BARRIER} = 10 \log [3 + 10NK] - A_{Ground}$

$A_{Ground} = 0$

$K = 1$

$N = \left(\frac{2}{\lambda}\right)\delta$

0.282



R-10

SECTION FACING WEST

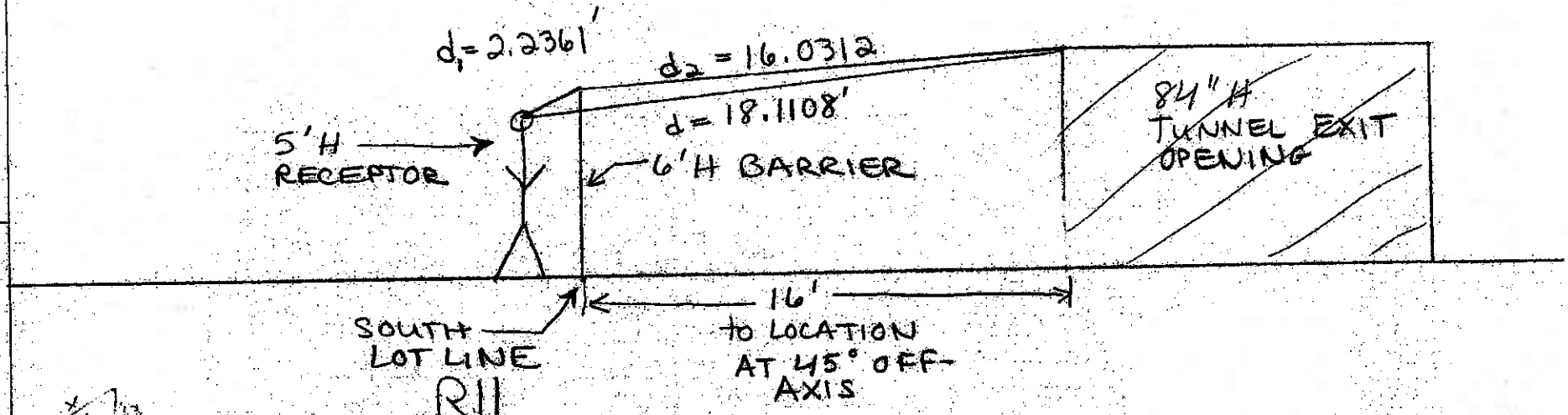
$d_1 + d_2 - d = \delta = 2.236' + 13.038' - 15.133' = 0.141' = \delta$

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.007884	0.01576	0.03126	0.06253	0.1253	0.2496	0.5036	1.007	2.014
$IL_{Barrier}$ (dB)	4.9	5.0	5.2	5.6	6.3	7.4	9.1	11.2	13.6

R11

$IL_{Barrier} = 10 \log[3 + 10NK] - A_{Ground}$ $\quad A_{Ground} = 0$, $K = 1$

$N = \left(\frac{2}{\lambda}\right)\delta$



R11

$d_1 + d_2 - d = \delta = 2.2361' + 16.0312' - 18.1108' = 0.1565'$

Hz	31.5	63	125	250	500	1K	2K	4K	8K
λ	35.77'	17.89'	9.02'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	.008750	0.01750	0.03470	0.06940	0.1391	0.2770	0.5589	1.118	2.236
$IL_{Barrier}$ (dB)	4.9	5.0	5.2	5.7	6.4	7.6	9.3	11.5	14.0

R11

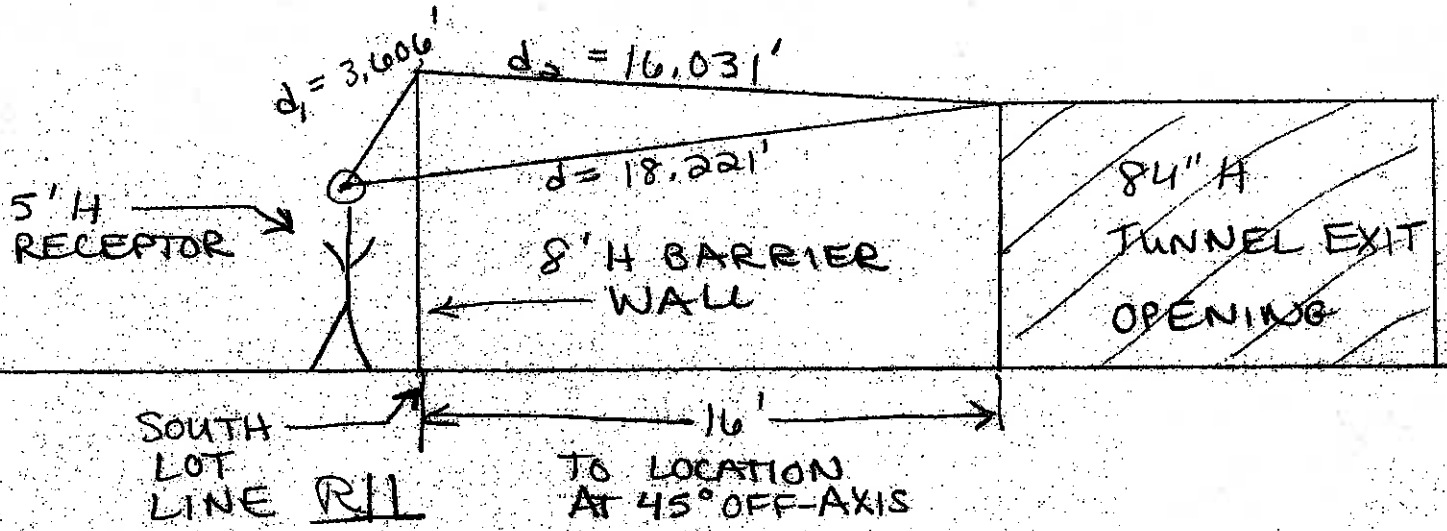
$IL_{Barrier} = 10 \log [3 + 10 NK] - A_{Ground}$

$A_{Ground} = 0$

$K = 1$

$N = \left(\frac{2}{\lambda}\right) \delta$

2.832



$d_1 + d_2 - d = \delta = 3.606' + 16.031' - 18.221' = 1.416 = \delta$

Hz	31.5	63	125	250	500	1k	2k	4k	8k
λ	35.77'	17.89'	9.00'	4.51'	2.25'	1.13'	0.56'	0.28'	0.14'
N	0.07917	0.1583	0.3140	0.6279	1.259	2.506	9.031	36.12	144.5
$IL_{Barrier}$ (dB)	6	7	8	10	12	14	20	26	32

Strategic Partnership Questions and Answers

The Northern Westchester Hospital Board of Trustees has unanimously approved our joining the North Shore-LIJ Health System. We are extremely pleased to report that this agreement meets all of the objectives set out by our Board, acting on behalf of our community.

North Shore-LIJ is taking a patient-centered approach to expanding its health system to this region so that our patients can continue to receive the same high-quality healthcare that they have grown to expect from Northern Westchester Hospital. This focus on local care will be supported by a commitment to maintain and enhance the key services that serve our community today

As a member of the NS-LIJ Health System, Northern Westchester Hospital and its leadership team will have an important role in developing expansion plans for the North Shore-LIJ Health System in the greater Hudson Valley.

About Joining the North Shore-LIJ Health System

Q: What does joining the North Shore-LIJ Health System mean?
A: By joining the North Shore-LIJ Health System (North Shore-LIJ), we are becoming an important part of one of the most successful hospital systems in the U.S. North Shore-LIJ has 17 hospitals in their system, employs 48,000 people, and in 2013 saw revenues of $7 billion and a net income of $285 million. The system also includes a rapidly emerging medical school and the Feinstein Institute for Medical Research.

North Shore-LIJ is well ahead of other area health systems in Population Health Management, which will benefit our community by coordinating care across providers and reducing healthcare costs. They have launched a care management company and a health insurance product called CareConnect that are the foundations of a regional health plan. North Shore-LIJ already has agreements with Montefiore, Yale-New Haven, Saint Barnabas (NJ) and Maimonides to be included in the CareConnect network. Area medical groups also have agreements with CareConnect, guaranteeing that our patients can continue seeing their current physicians and receiving high-quality care at NWH.

Q: Who will be in charge of NWH when we become part of the NS-LIJ system?
A: One of the key partnership criteria used by the NWH Board of Trustees was a commitment to our leadership team and local oversight. This will enable our staff to continue providing our community with high-quality medical care at a local level. The North Shore-LIJ team recognizes that NWH is a high quality and financially strong hospital .

An important part of this agreement enables the NWH Board of Trustees to continue having a crucial role in the governance of NWH. The NWH Board will eventually include members appointed by North Shore-LIJ, who will be knowledgeable about the healthcare needs of our community.

Members of the NWH Board will join the North Shore-LIJ Board and its committees, which will enable us to provide a Westchester voice on all health system initiatives. In addition, one member of the NWH Board will be appointed to the North Shore-LIJ Executive Committee.

Q: Is this a permanent decision?
A: The selection of North Shore-LIJ is the result of a comprehensive evaluation that included all of the major health systems in our region, as well as some located outside of the area. This decision truly represents a commitment by both parties, and while there are details in our agreement that make it possible to change, the NWH Board of Trustees and Senior Management team are confident that North Shore-LIJ is the right long-term partner for our community.

Q: How will NWH maintain its identity as part of a larger system?
A: North Shore-LIJ recognizes the successes achieved by the staff of Northern Westchester Hospital and plans to build upon these, including our culture of patient safety, our Magnet and Planetree Designations, and our numerous processes for providing high-quality care. As with other North Shore-LIJ hospitals, we will also maintain our name.

Q: What are the benefits to joining a larger system?
A: Joining a well-developed regional system will provide us with greater access to highly-specialized clinical expertise, and additional resources to advance our sophisticated clinical programs and technologies. Importantly, joining this system will also enable us to achieve the scale necessary to participate in population health management on a regional basis.

North Shore-LIJ will also be making a financial investment in NWH, and in health care services for our community. This investment will help to accelerate our facility modernization plans, while supporting greater ambulatory care (out-of-hospital) capabilities, and advancing our surgical and technological sophistication.

Q: Will the NWH name change?
A: The Northern Westchester Hospital name will remain with an added reference to North Shore-LIJ. In addition, North Shore-LIJ is currently investigating a new "brand identity" to better represent its role as a leading national healthcare system.

Q: Will NWH remain as a Planetree hospital as part of a new system? Will NWH still be a Magnet Designated hospital?
A: Yes. There is a strong commitment from the NWH Board and from North Shore-LIJ to maintaining our Planetree and Magnet designations.

Q: Phelps has also joined North Shore-LIJ—Will there be consolidation?
A: Phelps serves a large community and North Shore-LIJ will support their efforts to meet the healthcare needs of that community. However, over time, we would expect to create efficiencies across our two hospitals, and with the larger system as well. Interestingly, the two hospitals have many strengths that are complementary. For instance, Phelps has strong programs in behavioral health services and inpatient rehabilitation, while NWH has strengths in robot-assisted surgery, stereotactic radiosurgery, and advanced breast cancer care. We expect the two hospitals will work closely together to find efficiencies and improve access to care.

Q: How will fundraising work? Will my donations go directly to NWH?
A: The financial investment from North Shore-LIJ will be extremely helpful, but insufficient to carry out the modernization of NWH without the ongoing support of our community. The NWH Foundation will continue overseeing all fundraising activities at NWH, and all funds raised through the NWH Foundation will remain in our community and continue to support NWH.

Q: When will NWH officially become part of North Shore-LIJ?
A: Our agreement with North Shore-LIJ must be reviewed and approved by State and Federal agencies. We expect to receive their final approval and be able to finalize our agreement during the first quarter of 2015.

Access to my physician

Q: How does this impact our relationship with area medical groups?
A: NWH employs very few physicians and instead partners with our area physicians and medical groups. We will always have strong relationships with area physicians to ensure our patients have access to high-quality medical care.

As necessary, agreements will be established across healthcare networks to enable patients to access seamless care among their providers. We see this already happening. By remaining a high-quality, lower-cost provider, NWH will continue to be sought out as a facility of choice by our medical groups and by all health plans.

f/qa-joining

PLANNING BOARD
TOWN OF BEDFORD
WESTCHESTER COUNTY, NEW YORK

ENVIRONMENTAL CLEARANCE FORM
(This Side to be Completed by Applicant)

1. INDENTIFICATION OF OWNER

Name of owner: Ruppowam Cisqua school
Address: 325 West patent Rd Mt Kisco NY Phone: (914) 244-1281

2. INDENTIFICATION OF APPLICANT, IF OTHER THAN OWNER

Name of applicant: Kevin Daly
Address: 325 West patent Rd Mt Kisco, NY Phone: (914) 244 1281

3. INDENTIFICATION OF SITE INVOLVED, if any

a. Name or other identification of site Ruppowam Cisqua School's
b. Roads which site abuts west patent + Rt 172
c. Bedford tax map designation: Section: 83.9 Block 1 Lot (s) 2
d. Total site area 6.4 acres
e. Does the applicant have a whole or partial interest in lands adjoining this site?

4. INDENTIFICATION OF PROPOSED ACTION

a. Description of Proposed Action Replace a fence and add a gate
b. Relationship to other actions:

1. List any further actions which may be undertaken, of which this proposed action is part or first step, e. g. further subdivision of a large parcel of land:
2. List any related actions which may be undertaken, of which this proposed action, e.g. highway reconstruction to serve increased traffic:
3. List any actions which are dependent upon this proposed action, and therefore should be reviewed as part of this action, e.g. house construction in the case of a residential subdivision:

All such actions must be reviewed in conjunction with the action proposed.

RECEIVED
MAY 5 2015
BEDFORD PLANNING BOARD

5. CLASSIFICATION OF PROPOSED ACTION (see lists of Type I, II, Exempt, Excluded Actions)

☐ **Type I.** An Environmental Impact Statement is required unless the applicant demonstrates conclusively that one is not needed. Proceed to Environmental Assessment Form.

☒ **Type II** or **Exempt Action.** No Environmental Impact Statement is needed. Submit this form only.

☐ **Unlisted Action.** Pending Analysis of further information, an Environmental Impact Statement may be required. Proceed to Environmental Assessment Form.

04/05

Kevin Daly
Signature of Applicant

4/15/15
Date

TOWN OF BEDFORD
ENVIRONMENTAL CLEARANCE FORM
(This side only for Official Use Only)

1. CLASSIFICATION APPROVED; FURTHER ACTION REQUIRED:

☐ **Type I Action.** The proposed action will have a significant effect on the environment. An Environmental Impact Statement is required unless the applicant demonstrates conclusively that one is not needed. Proceed to Environmental Assessment Form.

☐ **Type II** or **Exempt** or **Excluded Action.** No Environmental Impact Statement is needed. No further action required.

☐ **Unlisted Action.** The proposed project may have a significant effect on the environment. Pending analysis of further information, an Environmental Impact Statement may be required. Proceed to Environmental Assessment Form.

2. COMMENTS:

_____

_____

_____

_____

_____

_____ _____ _____

Town Agency | Agency Signature | Date

#500

Waiver of Site Plan Approval

325 west Patent Rd, ~~Mt Kisco, NY 10549~~
Applicant's Home Address

Date:

Mt Kisco, NY 10549
City, Town, Village

Town of Bedford Planning Board
Town House
Bedford Hills, New York 10507

RECEIVED
MAY 5 2015
BEDFORD PLANNING BOARD

Sir or Madam:

I/We am/are the owner (s) of property located on west patent Rd Mount Kisco, ny shown and designated on the Town Tax Maps as: Section 83.9 Block 1 Lot(s) 2.

It is my/our intention to Replace a fence and add a gate along South Bedford Road
(Describe proposal)

Because of the limited nature of the proposed development or change of use, or to special conditions peculiar to this site, I/we am/are requesting a waiver of the requirement of site plan approval pursuant to Article IX Section 125-93 of the Code of the Town of Bedford.

Very truly yours,

Kevin Daly
Signature of Owner and/or Applicant

3/05

Signature of Owner and/or Applicant

PLANNING BOARD
TOWN OF BEDFORD
WESTCHESTER COUNTY, NEW YORK

RECEIVED
APR 2 2 2015
BEDFORD PLANNING BOARD

ENVIRONMENTAL CLEARANCE FORM
(This Side to be Completed by Applicant)

1. INDENTIFICATION OF OWNER

Name of owner: APACHE OIL
Address: _____ Phone: _____

2. INDENTIFICATION OF APPLICANT, IF OTHER THAN OWNER

Name of applicant: LEWIS ROANE
Address: 3WINDSOR Rd CROTON NY 10520 Phone: 914-330-1801

3. INDENTIFICATION OF SITE INVOLVED, if any

a. Name or other identification of site 9 HAINES Rd BEDFORD
b. Roads which site abuts _____
c. Bedford tax map designation: Section: 6013 Block 1 Lot (s) 20
d. Total site area _____
e. Does the applicant have a whole or partial interest in lands adjoining this site? _____

4. INDENTIFICATION OF PROPOSED ACTION

a. Description of Proposed Action AMEND APPROVED FINAL SITE PLAN
b. Relationship to other actions:

1. List any further actions which may be undertaken, of which this proposed action is part or first step, e. g. further subdivision of a large parcel of land: _____
2. List any related actions which may be undertaken, of which this proposed action , e.g. highway reconstruction to serve increased traffic: _____
3. List any actions which are dependent upon this proposed action, and therefore should be reviewed as part of this action, e.g. house construction in the case of a residential subdivision: _____

All such actions must be reviewed in conjunction with the action proposed.

5. CLASSIFICATION OF PROPOSED ACTION (see lists of Type I, II, Exempt, Excluded Actions)

☐ **Type I.** An Environmental Impact Statement is required unless the applicant demonstrates conclusively that one is not needed. Proceed to Environmental Assessment Form.

☐ **Type II** or **Exempt Action**. No Environmental Impact Statement is needed. Submit this form only.

☐ **Unlisted Action.** Pending Analysis of further information, an Environmental Impact Statement may be required. Proceed to Environmental Assessment Form.

04/05

Signature of Applicant

4/22/2015
Date

TOWN OF BEDFORD
ENVIRONMENTAL CLEARANCE FORM
(This side only for Official Use Only)

1. CLASSIFICATION APPROVED; FURTHER ACTION REQUIRED:

☐ **Type I Action.** The proposed action will have a significant effect on the environment. An Environmental Impact Statement is required unless the applicant demonstrates conclusively that one is not needed. Proceed to Environmental Assessment Form.

☐ **Type II** or **Exempt** or **Excluded Action.** No Environmental Impact Statement is needed. No further action required.

☐ **Unlisted Action.** The proposed project may have a significant effect on the environment. Pending analysis of further information, an Environmental Impact Statement may be required. Proceed to Environmental Assessment Form.

2. COMMENTS:

_____

_____

_____

_____

_____

_____	_____	_____
Town Agency	Agency Signature	Date

Waiver of Site Plan Approval

Date: 4/22/2015

~~3~~ 3 WINDSOR Rd
Applicant's Home Address

CROTON NY 10520
City, Town, Village

Town of Bedford Planning Board
Town House
Bedford Hills, New York 10507

RECEIVED
APR 22 2015
BEDFORD PLANNING BOARD

Sir or Madam:

I/We am/are the owner (s) of property located on 9 HAINES

shown and designated on the Town Tax Maps as:

Section 60.13 Block 1 Lot(s) 20.

It is my/our intention to AMEND APPROVED FINAL SITE PLAN
(Describe proposal)
RELOCATE GENERATOR, ADD WALK-IN BOX REFRIGERATOR
AND 3 LIGHT POLES

Because of the limited nature of the proposed development or change of use, or to special conditions peculiar to this site, I/we am/are requesting a waiver of the requirement of site plan approval pursuant to Article IX Section 125-93 of the Code of the Town of Bedford.

Very truly yours,

Signature of Owner and/or Applicant

3/05

LEWIS ROANE
Signature of Owner and/or Applicant
LEWIS ROANE DESIGN@GMAIL.COM
914-330-1802

Town of Bedford Planning Board

2nd Floor Conference Room
425 Cherry Street
Bedford Hills, New York 10507

Tuesday, November 18, 2014

Minutes

A meeting of the Planning Board was held on November 18, 2014, starting at 8:00 P.M., at 425 Cherry Street, Bedford Hills, New York. Present were Chairman Deirdre Courtney-Batson, Vice Chairman John Sullivan, Board Members: William Colavito, and Diane Lewis, Secretary Anne Paglia. Absent was Board Member Felix Cacciato. Planning Director Jeffrey Osterman joined the meeting for the third Conference. *[All Planning Board meetings are recorded. A CD copy of this recording may be obtained from the Planning Board Office.]*

Conference:
Waiver of Site Plan Approval
Added Use: Photography / Merchandise Packaging / Private Viewings / Storage of Rugs, Furniture and Art
Section 49.15 Block 4 Lot 11.1, Central Business Zone
15-31 Katonah Avenue, Katonah
Owner: **15-31 Katonah Avenue, LLC**
Applicant: **Melissa Dilmaghani**
(Review waiver of site plan approval..)

Present:
Melissa Dilmaghani, Applicant

Deirdre-Courtney Batson recused herself from this agenda item.

Mr. Sullivan asked the applicant if the space is presently occupied. Mrs. Dilmaghani stated that it was not and has not been occupied for at least a year and a half and that the building is currently zoned to be storage. She stated that she and her husband were running the business from an e-commerce retail site and are selling on-line. They are currently working out of their home but would like to have a place to store their merchandise and also photograph the merchandise for insurance and website purposes.

Mr. Sullivan asked the applicant if they have had an engineer or architect look at the building structurally to see if it would support the storage of carpeting. The applicant responded that she had not, as yet. Mrs. Dilmaghani stated that she would not be storing more than 200 rugs.

Mr. Sullivan asked about deliveries. The applicant responded that they would be bringing the merchandise to the building in a car or a small SUV. The applicant discussed the size of any truck to be used for pickup or deliveries. It was decided that nothing larger than a pick-up truck could be used. Mr. Colavito asked how close the adjoining buildings were. The applicant responded that they were probably about 50 feet away. Mr. Colavito asked the applicant if she considered the possibility of a sprinkler system for the building. Mr. Sullivan stated that that was a Building Code issue and the applicant should discuss it with the Building Inspector.

Mr. Sullivan then asked about the hours of operation. The applicant stated that since they have a home office, they would not be doing any office work in the building. They would be wrapping and packaging the merchandise in the building. They would not be having UPS pick up at the site; they would be taking the merchandise to UPS. The Board discussed hours of operation with the applicant and it was agreed the hours would be Monday through Saturday from 10:00 AM to 3:00 PM.

Mr. Sullivan listed the conditions of Planning Board Resolution No. 03/23, approved on 6/10/03:

1. A wall unit may be installed on the north or east side of the building only, for air conditioning and heat.
2. There shall be no sales or gallery displays in the building.
3. There shall be no office use except for dead file storage.
4. There shall be no installation of running water or a lavatory.
5. The exterior light located next to the door shall be a down light to be operated on a timer or photocell (motion sensor).
6. There shall be no windows on the rear side (west elevation) of the barn.
7. Four windows are permitted on the eaves across the front of the building.
8. On the north side of the building, the larger window peak shall be 6 feet off the floor area.
9. The siding on the barn shall be a lap-type siding and shall serve to retain the appearance as a barn structure.
10. The shed dormer shall be eliminated.
11. All plantings shall be installed on the north or east sides of the building only.

Mr. Sullivan also stated the condition of Amendment No. 1 to Planning Board Resolution No. 03/23, approved on 10/14/03:
Skylights to be installed on the front of the barn instead of windows.

John Sullivan listed conditions of approval for this application::

1. All of the eleven conditions of Planning Board Resolution No. 03/23, approved 6/10/03, and including Amendment No. 1 to Planning Board Resolution No. 03/23, approved on 10/14/03, shall apply.
2. The hours of operation shall be from 10:00 AM to 3:00 PM, Monday through Saturday, up to six days a week.
3. There shall be no truck larger than a pick-up truck on the street making deliveries or on the site.

4. The applicant shall confirm and review the operations with the Director of Planning one year from the date of the Certificate of Occupancy.

Motion: A motion was made by Mr. Colavito to approve this application with the conditions stated.
Motion seconded by Mrs. Lewis.

The Board reviewed the Environmental Clearance Form and unanimously determined that this proposal is a "Type II or Exempt Action" under SEQR. Mr. Sullivan endorsed the Board's determination on the ECF. Mr. Colavito seconded.

Vote: Ayes: Sullivan, Colavito, Lewis
Nays: None

Vote: Ayes: Sullivan, Colavito, Lewis
Nays: None

Conference:
Final Site Plan Approval
Six Tennis Courts
Section 50.13 Block 1 Lot 8.1, R-2A and R-4A Zones
240 Jay Street, Katonah
Owner/Applicant: **The Harvey School**
(Consider final site plan approval.)

Present:
Russell A. Davidson, FAIA, KG&D Architects
Barry Fenstermacher, Headmaster, The Harvey School
Joseph C. Riina, P.E., Site Design Consultants

Mr. Davidson advised the Planning Board that they have been to the Zoning Board of Appeals. He stated that his engineer has submitted a Stormwater Pollution Prevention Plan to Jim Hahn's office. He then discussed the revisions made to the planting plan.

Mrs. Courtney-Batson listed the following conditions for approval:

1. The Stormwater Pollution Prevention Plan shall be approved by the Town Engineer.
2. The wildflower border shall be extended to the full length of the Stormwater Management System and the smaller wildflower plantings shall be expanded, if practicable.
3. The spruces shall be relocated to the area south of the tennis courts to provide screening for the neighboring property.

Motion: A motion was made by Mrs. Lewis to approve this application for final site plan approval with the conditions stated.
Motion seconded by Mr. Colavito.

Vote: Ayes: Courtney-Batson, Sullivan, Colavito, Lewis
Nays: None

Conference:
Proposed Conservation Development
Section 84.18 Block 1 Lot 14, R-2A Zone
325-361 Old Post Road, Bedford
Owner: **Old Post Holdings, LLC**
Applicant: **Wilder Balter Partners, Inc.**
(Presentation of sketch plan..)

Present:
William G. Balter, President, Wilder Balter Partners, Inc.
James Wendling, Wilder Balter Partners, Inc.
Marina Khoury, Duany Plater-Zyberk & Company
Thomas A. O'Brien, O'Brien Architecture, LLC

Mrs. Courtney-Batson read the beginning of a letter from Steven Cipolla dated 11/18/14. The letter addressed the time requirements for a public hearing according to the Town code. Mrs. Courtney-Batson explained that tonight's meeting was not a public hearing and, therefore, did not have to meet those requirements. She stated that the meeting agenda was mailed to neighbors of the property to be developed so that people would be aware that the applicant would be presenting a sketch plan to the Planning Board.

Mr. Balter described his company and the projects it has been responsible for. He told the board that the working title of the project is "Bedford Farms."

Ms. Khoury then described the project and made a slide presentation of the project for the members of the Planning Board.

Mr. Balter then summarized what he anticipated the process would involve.

Mr. Osterman then requested he discuss the traffic issues involved.

The Planning Board decided to do a field trip to the Wilder Balter property on Wednesday, December 3, 2014.

Mrs. Courtney-Batson then described the process that this proposal needs to go through in order to be approved, including an estimate of the time lines.

Mrs. Courtney-Batson then read the remainder of the letter from Steven Cipolla dated 11/18/14.

Mrs. Courtney-Batson then discussed the notification process. It was requested that people who wish notification of meetings where this proposal appears on the agenda should send their e-mail address to the Planning Board Secretary.

The next meeting will be on November 25, 2014.

Mrs. Lewis moved to close the meeting; Mr. Colavito seconded the motion.
Vote: Ayes: Courtney-Batson, Sullivan, Colavito, Lewis Nays: None
The meeting was adjourned at 10:00 PM.

Date these minutes were approved by the Planning Board: _____

Respectfully submitted,

_____ _____
Anne Paglia, Secretary Date
Town of Bedford Planning Board