Traf Tech
ENGINEERING, INC.

February 27, 2017

Mr. Josiel Ferrer-Diaz – Transportation Manager
City of Miami Beach
1700 Conversion Center Drive
Miami Beach, Florida 33139

Re: Time Out Market – Response to Traffic Comments (February 24, 2017)

Dear Josiel:

We received traffic-related comments prepared by FTE (comment letter dated February 24, 2017) in connection with the Time Out Market (1601 Drexel Avenue) project. The responses to the traffic-related comments are provided below:

Comment 1a: The name of the person designated by the applicant to be coordinating the implementation of the TDM Plan with the City.

Response 1a: Matthias Kiehm
Phone: 781-235-2222
Fax: 781-235-2218
Cell: 781-775-0355

Comment 1b: Please discuss how many employees are expected to work at the site.

Response 1b: The table below reflects the number of employees per shift. Please note that in accordance with the Operations Plan, the number of staff and security personnel will ultimately depend on the day-to-day operations and needs of the restaurant.

Time Out Market
1601 Drexel Avenue

STAFFING LEVELS FOR THE RESTAURANT

According to the hours of operation applied for under this Conditional Use Permit, the Applicants expect to have 15 cooking stations with the below staffing levels:

SHIFT	NO. OF STAFF
Breakfast	18
Lunch	71
Dinner	76

Comment 1c: Please set TDM program targeting both patrons and employees.

Response 1c: An updated TDM program that targets both patrons and employees has been developed and attached to this response.

Comment 1d: The response to comments acknowledges the proximity of Decobike Stations and transit routes. Please consider providing incentives to employees to use those services.

Response 1d: The attached updated TDM plan addresses incentives to employees to use those services.

Comment 1e: The response to comments indicates that carpooling will be encouraged. Please indicate how this will take place.

Response 1e: The attached TDM plan addresses incentives to employees who carpool.

Comment 1f: Please set goals for each of your proposed programs.

Response 1f: The attached TDM plan has goals for each proposed program.

Comment 4: Identify any bike racks provided within the site.

Response 4: There are 17 existing bicycle racks at the property. See attached Sheet A-13 of the plans. These bicycle racks will remain.

New Comment

Comment 6: **SYNCHRO Analysis. Please verify the signal timing input data as it did not match the signal timings provided by the Miami Dade County. In addition, please mark adjacent parking where applicable.**

Response 6: The Synchro analyses were revised and updated accordingly to match the signal timing of Miami Dade County. Moreover, the on-street parking was considered in the revised analyses.

Please call me if you have any questions.

TRAF TECH ENGINEERING, INC.

Joaquin E. Vargas, P.E.
Senior Transportation Engineer

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November 16, 2016

Thomas R. Mooney, Director
City of Miami Beach Planning Department
1700 Convention Center Drive, 2nd Floor
Miami Beach, Florida 33139
Phone: (305) 673-7550, Fax: (786) 394-4799

Reference: Noise Study
Time Out Market
1601 Drexel Avenue
Miami Beach, Florida 33139

Dear Mr. Mooney,

This report provides an assessment of potential noise and sound impact at the above referenced property in conjunction with the Applicant's request for a conditional use permit for a Neighborhood Impact Establishment. This study is based on two site visits during which we were able to inspect the neighborhood, take photographs and gather acoustical measurement data for analysis.

Satellite images, architectural drawings, photographs and acoustical measurements in graphic format are provided to support our findings and recommendations. I welcome any comments or questions you and your staff may have pertaining to our sound study and look forward to assisting in any way possible.

Respectfully submitted,

Donald J. Washburn
President

Time Out Market - 1601 Drexel Avenue

Property Analysis

The subject property consists of a five-story structure which was constructed in 2012. Its footprint is approximately 164,000 ft.^{2} and it occupies approximately 285 feet of the southern half of the block along the east side of Drexel Avenue. The ground floor is designed for retail facilities while the upper four floors represent a parking lot. The parking lot's entrance and exit faces 16th Street.

The Applicant is seeking a Conditional Use Permit as a ground floor, inside restaurant with outdoor seating along the east side of Drexel Avenue. A mixture of DJ / live entertainment level music is planned for the interior space but no loudspeakers are planned for the exterior seating areas. Floor plans and elevations are provided below showing details for both areas of the establishment.

The surrounding neighborhood is in great part residential in nature with apartment and condominium properties along the west side of Drexel Avenue and the three remaining corners of the 16th Street and Drexel Avenue intersection. Commercial properties extend east along 16th Street while apartment buildings continue west along both sides of 16th Street. Records obtained from the Miami-Dade Property Appraiser's web site have been utilized to assist in our analysis of potential noise impact on nearby residential properties. The properties most potentially affected are the apartments due west of the Time Out Market building and the apartment located on the southwest corner of the Drexel Avenue - 16th Street intersection.

Acoustical Data Analysis

Acoustical measurements were conducted at two locations identified as significant just after midnight on Friday, November 11, 2016. This allowed us to assess typical noise levels present in the area around the subject property. Location A, just in front of 1610 Drexel, was chosen as it represents an area where ambient noise levels are among the lowest in the neighborhood. Location B, on the southwest corner of the Drexel Avenue and 16th Street, provided access to traffic noise which is present during both daytime and nighttime hours. Data from these two locations are provided in two graphs (pages 5 and 6) which represent simultaneous measurements at both locations. The measurement period extended over 78 minutes beginning at 12:27 a.m. A-weighted and C-weighted measurements show the differences registered at the two locations.

Location B shows significantly higher sound levels are present at the corner than in the middle of the block along Drexel Avenue. During the entire measurement period, I noticed that music from a nightclub located on the north side of 16th Street just east of the proposed restaurant. Near the end of the on-site noise study, I walked east along the south side of 16th Street and was able to identify the nightclub as *Do Not Sit On The Furniture*. Its address is 423 16th Street.

When the club's front door opened to allow guests to enter or leave, sound levels across the street registered as high as 108 dBC. When the door was closed, music registered between 85 and 90 dBC. Significantly, low frequency (bass) energy was audible at Location B, registering between 70 and 80 dBC depending on the type of music and whether the club's doors were open. This represents a significant source of noise pollution for the residents of the apartments along the south side of 16th Street. It's unlikely that noise associated with the future restaurant would ever approach these levels. The club is licensed to operate until 5:00 a.m.

An industry standard computer design program called **E.A.S.E.** (**E**nhanced **A**coustic **S**imulator for **E**ngineers) was used to design the restaurant's sound system as well as evaluate the potential for music playing inside the restaurant to impact the residential properties across Drexel Avenue. The sound system performance is provided below in the EASE 4.4.8 Sound System Design section of this report beginning on page 7.

While no outdoor loudspeakers will be installed along the sidewalk along Drexel Avenue, operable windows will be located along the west face of the restaurant. The potential for music exiting the restaurant through these operable windows and impacting the residential properties has been evaluated using the EASE modeling program (see page 13). It indicates that music played at the sound system's maximum operational sound pressure level (85 dBC) may reach approximately 74 dBA (windows open) and 58 dBA (windows closed) along the west side of Drexel. With windows open, the music would be very audible in the early morning where the average ambient noise level (L_{90} = 47.4 dBA) is quite a bit lower. Daytime ambient noise levels will be significantly higher, which would indicate that music from the restaurant will not be an annoyance during the day. I am recommending that the operable windows be closed no later than 10:00 p.m. to avoid creating any problems with the neighbors.

I have conducted multiple noise studies in this area and have noticed that there is often very regular pedestrian and vehicle traffic along Drexel Avenue. This is due to people gaining access to Lincoln Road with its restaurants and other retail establishments. While the vehicular traffic can at times be quite loud, pedestrians walking along the sidewalk on both sides of Drexel, most notably on the east side, generate very little noise. Since patrons of the Time Out Market will be parking within the structure above the restaurant, they will be walking from the garage entrance to one of the entrances to the restaurant. This will more than likely generate little substantial noise and can therefore be dismissed as an issue related to noise.

Summary

Sound generated by the activities associated with the Time Out Market will most likely never impact the surrounding residential properties. Based on the measurements taken on November 11, the projected operational conditions outlined by the restaurant's operators and previously observed noise levels, I believe that the new dining establishment will not adversely affect the area. Indeed, I am far more concerned about the impact that music emitted by the nightclub as *Do Not Sit on The Furniture* currently has on the apartments which run along 16th Street.

In my professional opinion, the proposed Time Out Market restaurant venue will have little adverse impact on neighboring residential properties nor will it present any violations of the City of Miami Beach's Noise Ordinance.

Respectfully submitted,

Donald J. Washburn

Donald J. Washburn
President

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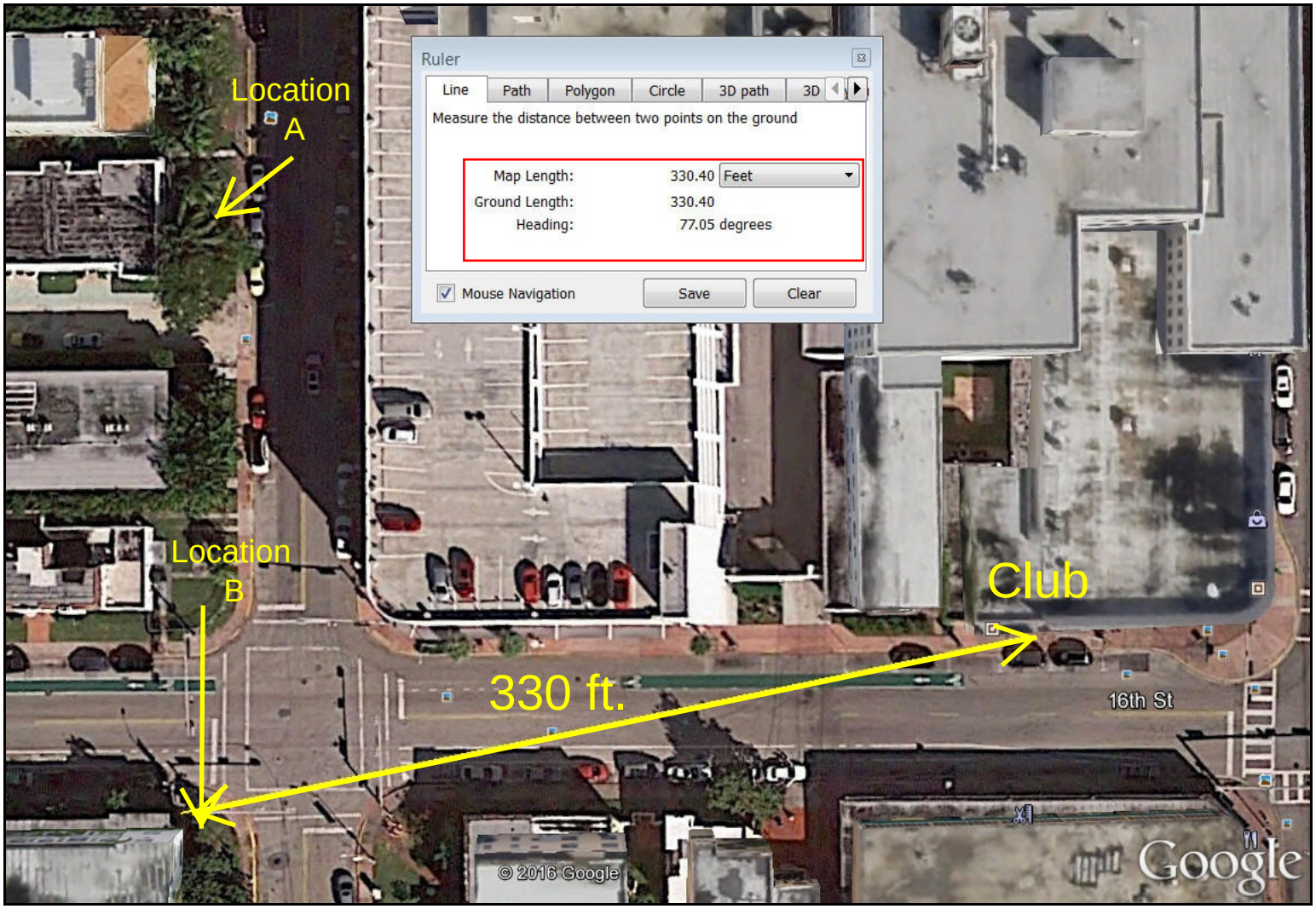
1601 Drexel Avenue, Miami Beach, Florida



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Time Out Market Miami Beach Ambient Noise Level Measurement - A-weighted

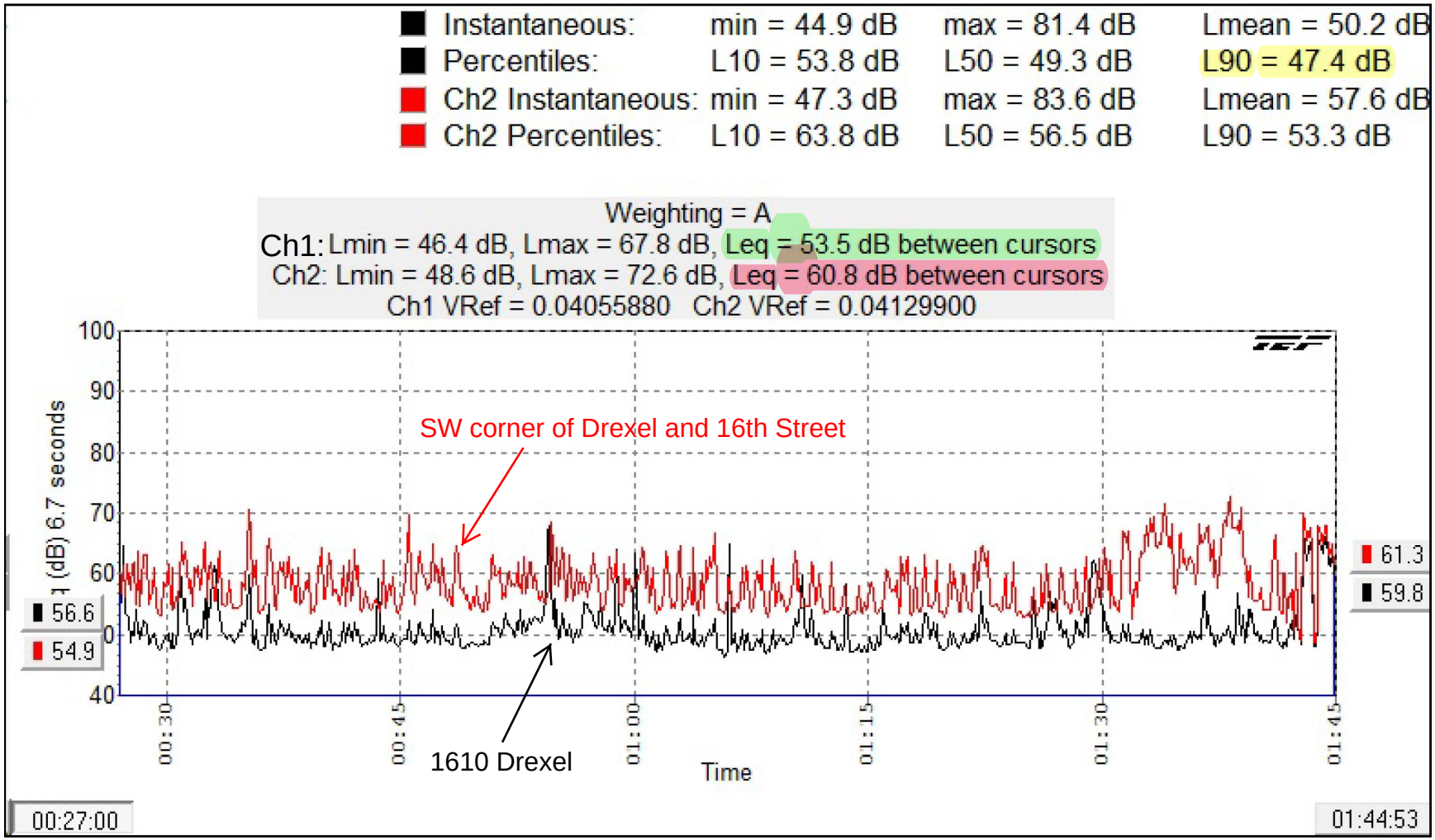


Figure 1 - Ch. 1 measured on west side of Drexel Avenue mid-block. Ch. 2 measured on SW corner of Drexel & 16th Street.

Time Out Market Miami Beach Ambient Noise Level Measurement - C-weighted

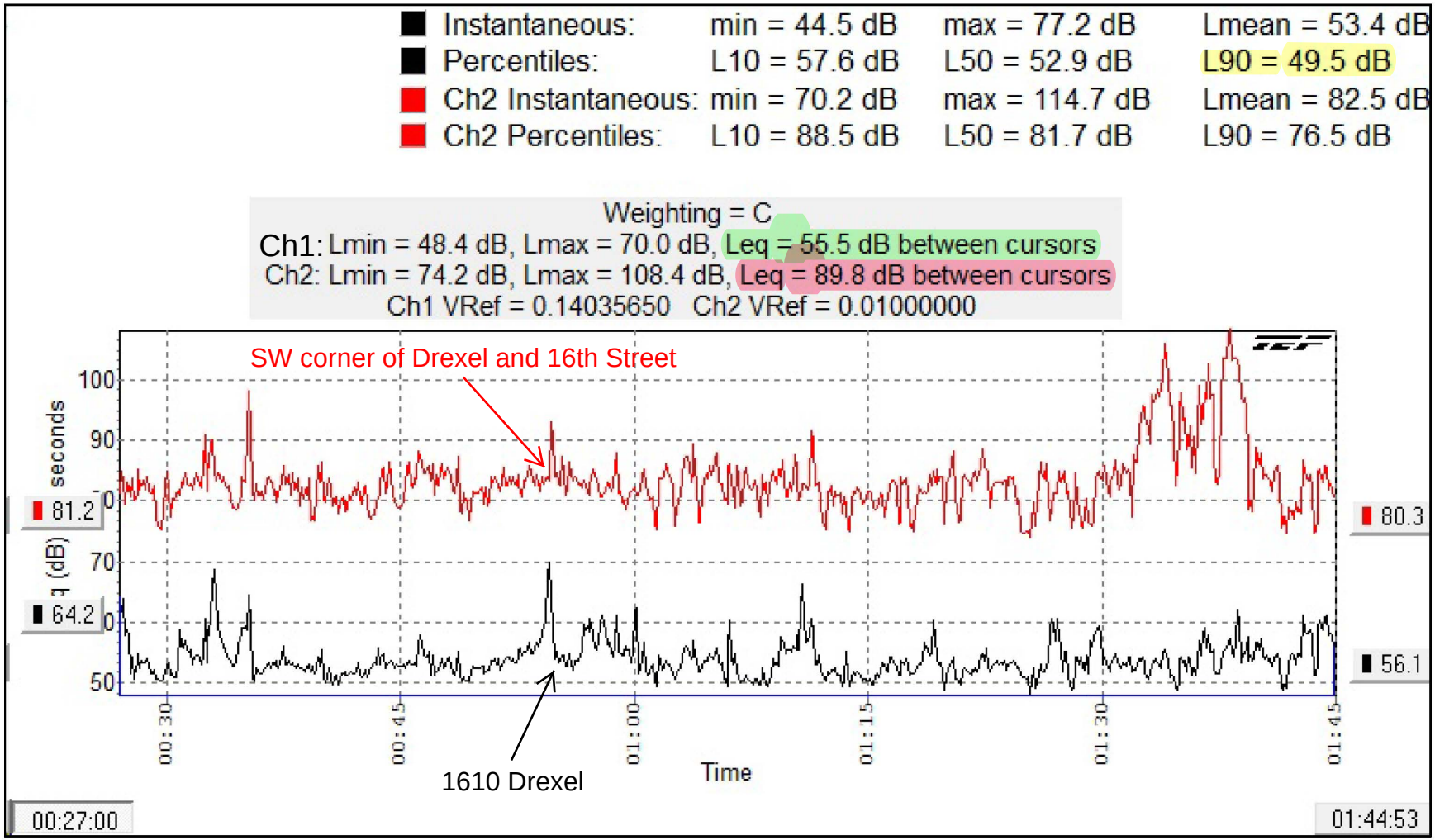
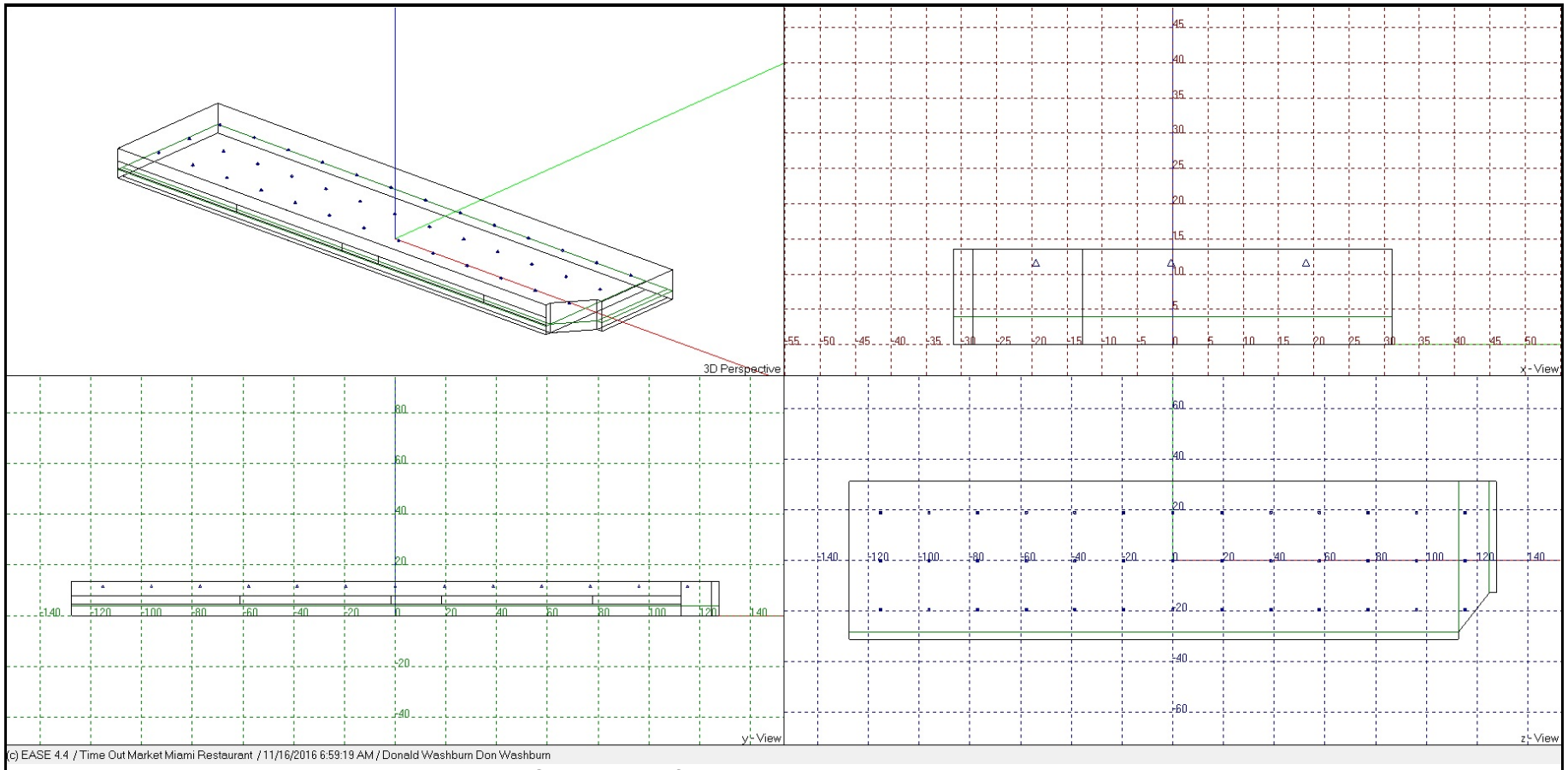


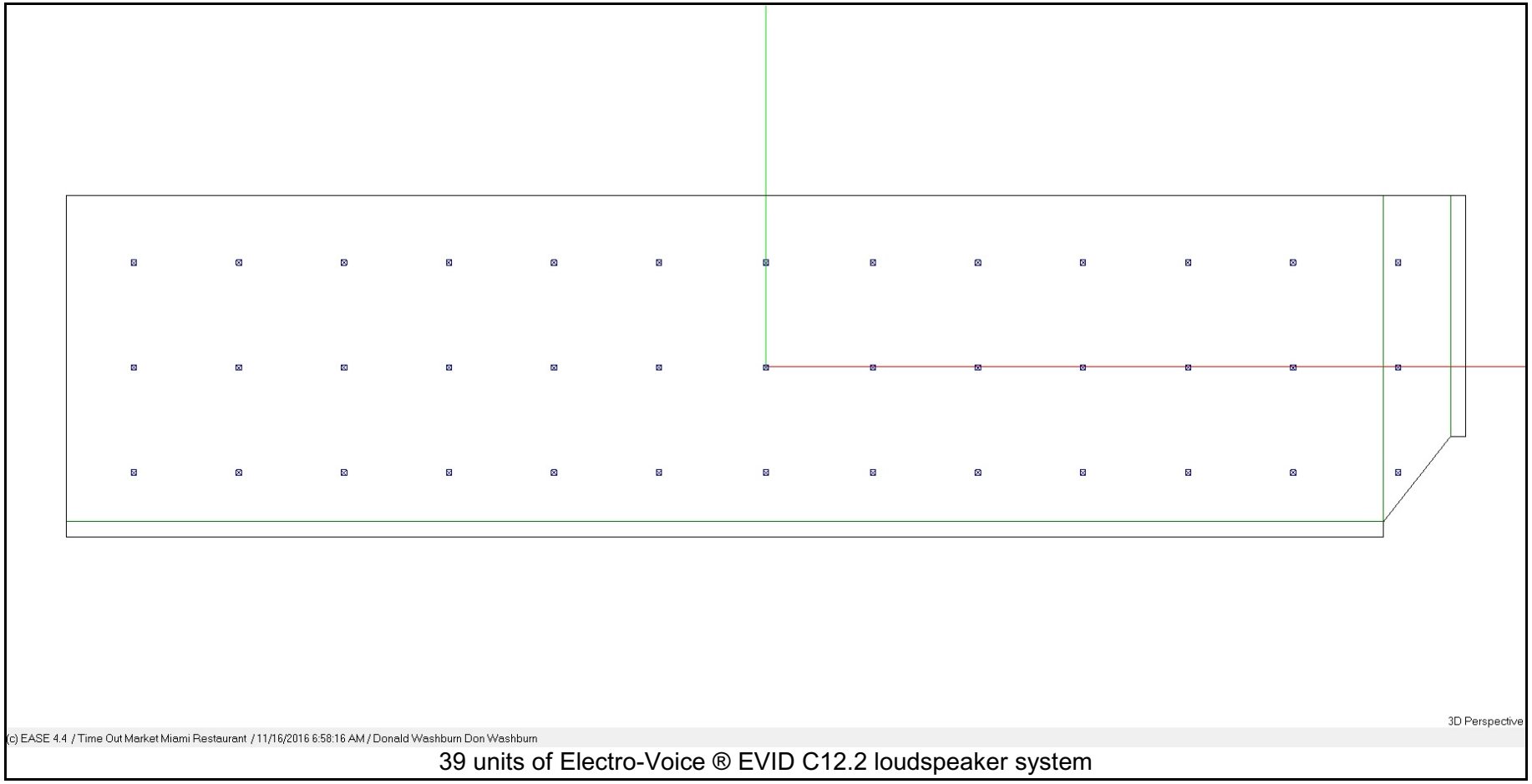
Figure 2 - Ch. 1 measured on west side of Drexel Avenue mid-block. Ch. 2 measured on SW corner of Drexel & 16th Street

EASE 4.4.8 Sound System Design



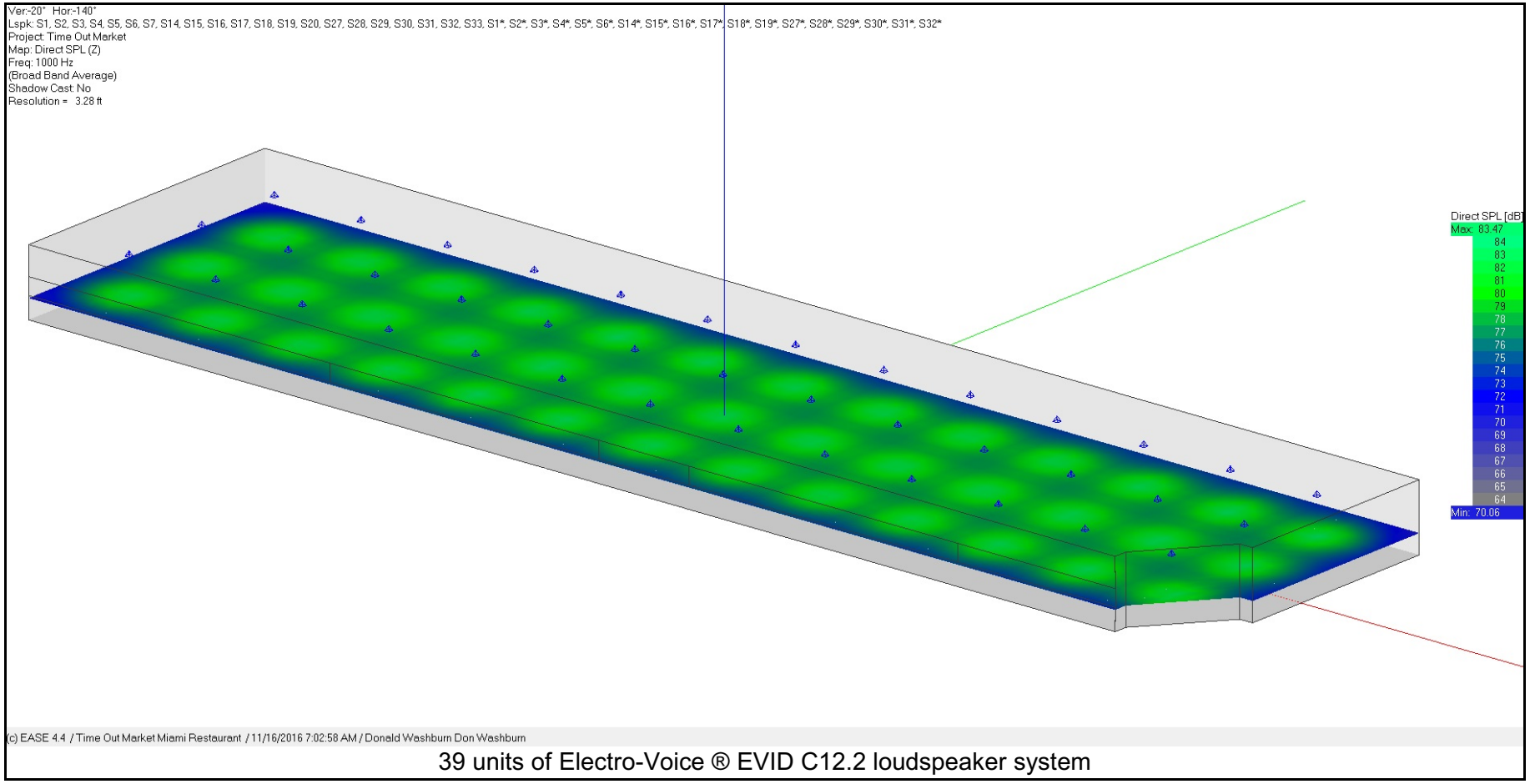
Omni-View of Room and Loudspeaker Layout

Loudspeaker Layout



39 units of Electro-Voice ® EVID C12.2 loudspeaker system

Full Bandwidth Sound Level Distribution



39 units of Electro-Voice ® EVID C12.2 loudspeaker system

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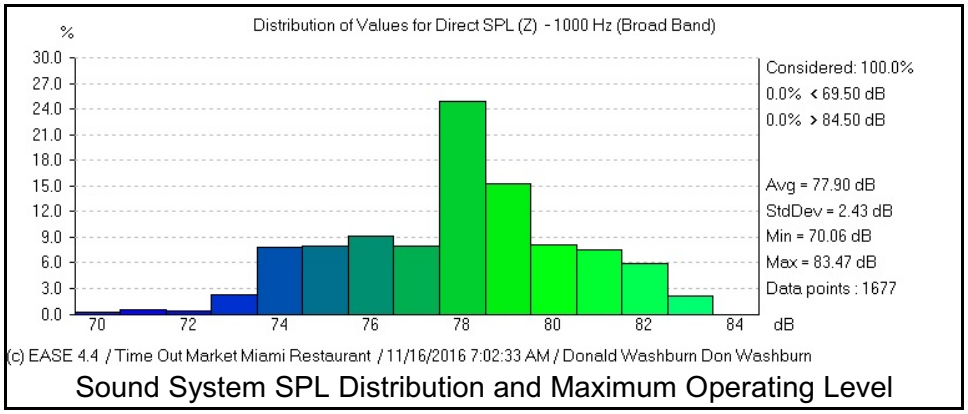
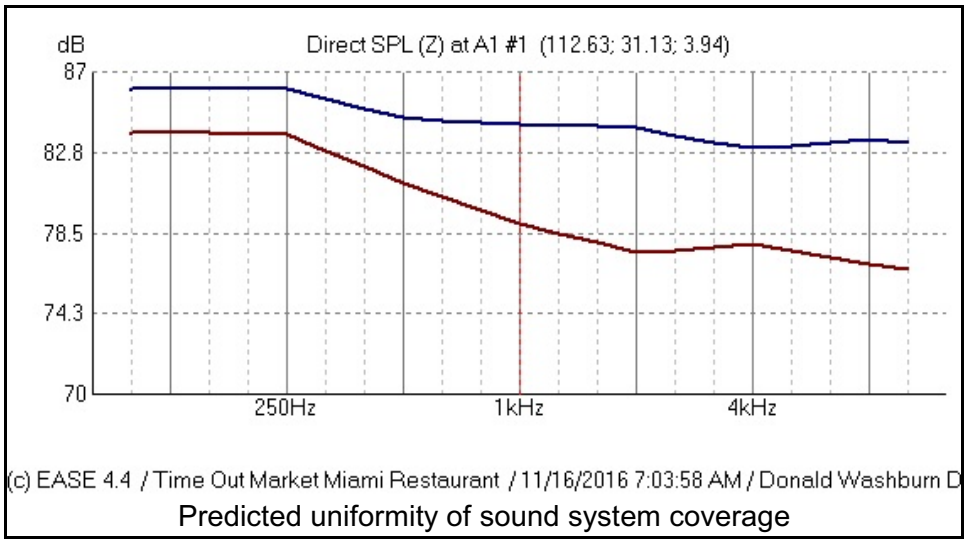
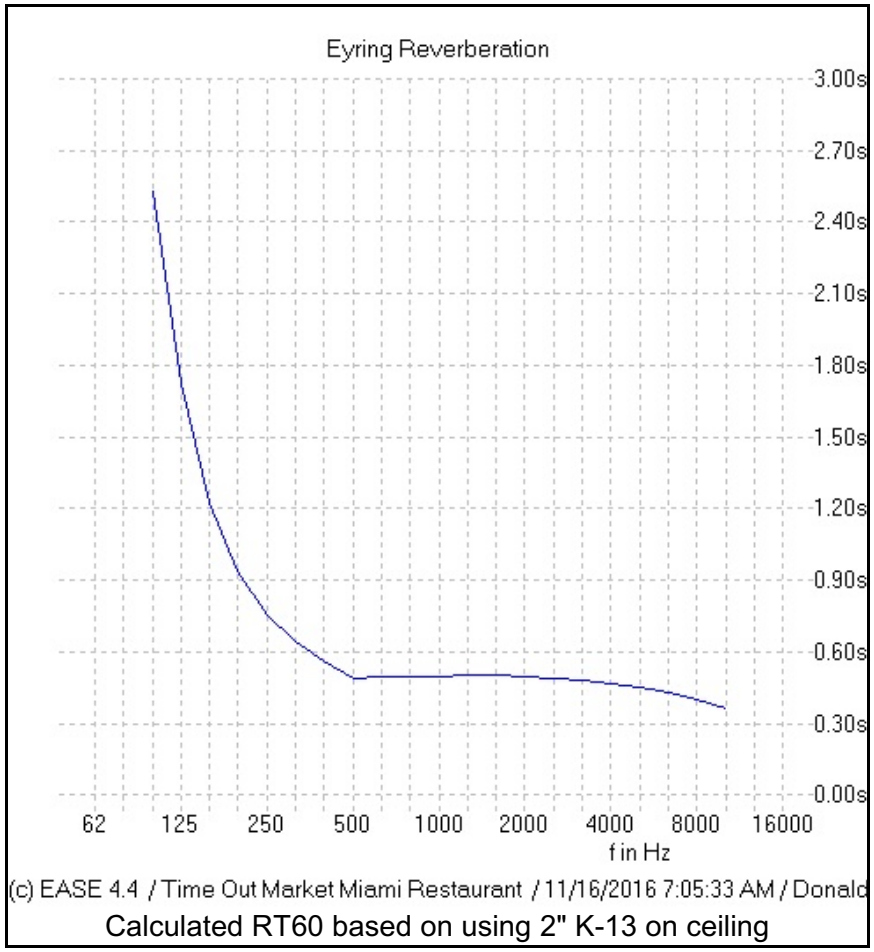
EASE 4.4.8 Sound System Design Predictive Graphs



Sound System SPL Distribution and Maximum Operating Level



Predicted uniformity of sound system coverage



Calculated RT60 based on using 2" K-13 on ceiling

EV Innovative Design

EVID C12.2 Ceiling

12" Two-Way Coaxial Ceiling Loudspeaker System

Key Features:

- **High 100 dB Sensitivity**
- **Wide, Smooth 85 Hz - 18 kHz Frequency Response**
- **High 100W Power Handling**
- **4 Pin Quick Disconnect Phoenix Connector**
- **Integrated 3/8" Threaded Rod and Pendant Mount Rigging Points for use in Open Ceiling Installations**
- **64W Transformer with Automatic Saturation Compensation for 70V/100V Operation**
- **Includes Tile Bridge and Mounting Ring for Easy Installation into Tile Ceilings**

General Description:

The Electro-Voice ® EVID C12.2 loudspeaker system is a high efficiency two-way ceiling loudspeaker package for high ceiling applications. The loudspeaker features the EVID 920-8B transducer, a 12" coaxial with high power handling and 100 dB sensitivity. The integrated 64W transformer allows for use in 70V/100V applications, and includes automatic saturation compensation. Transformer tap selection is via a convenient switch on the front baffle. The perforated grille is finished in semi-gloss white powder-coated enamel. The baffle and bezel are constructed from UL 94V-0 rated ABS. The rear enclosure is constructed from heavy gauge steel, and is has a durable black powder-coat that blends in when used in open ceiling applications. The rear enclosure provides an optimum internal volume for extended low-frequency performance. The C12.2 can be suspended by an integrated 3/8" rigging point for use with threaded rod, or it can be mounted using the 3 pendant mount tabs on the rear enclosure. A rear cover, with provisions for a junction box fitting, provides access to a 4-pin phoenix type connector that allows direct connection to the speaker with 12 gauge wire and provides pass through to additional speakers. A tile bridge is included for safe suspension of the C12.2 ceiling systems in a drop ceiling that uses mineral wool, or other fiber-based ceiling tiles.

Technical Specifications:

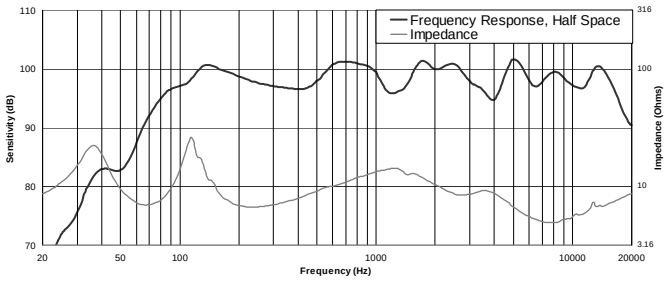
Freq. Response (-3 dB):	85 Hz - 18 kHz
Freq. Range (-10 dB):	65 Hz - 20 kHz
Axial Sensitivity:	100 dB (SPL 1W/1m)
Max Calculated SPL:	126 dB
Power Handling (8 Ohms):	100W RMS
Power Handling (70V):	Up to 64W
Power Handling (100V):	Up to 64W
Impedance:	8 Ohms nominal (transformer bypass)
Crossover Frequency:	2 kHz
Rec. Highpass Frequency:	60 Hz
Transducer:	920-8B, 12 in. (305 mm) High-Efficiency Coaxial Driver
Transformer Taps:	70V: 4, 8, 16, 32 or 64W with ASC 100V: 8, 16, 32 or 64W with ASC Bypass: 8 Ohms Nominal
Connectors:	Phoenix type removable, with screw terminals and "loop-thru", accepts 12 AWG wire
Enclosure Material:	Backcan: Powdercoated Steel Baffle/Bezel: UL 94V-O rated ABS
Grille:	Perforated powder coated steel with safety tether
Mounting System:	Integrated 4-point toggle anchors Integrated 3-point pendant mount Integrated 3/8" threaded rod Additional secondary mount
Support Hardware:	Tile bridge, backing plate support, cutout template, paint shield
Dim (Depth x Dia.):	13.12" x 16.31" (333mm x 414mm)
Cutout Diameter Size:	15.35" (390mm)
Net Weight:	29.3 lbs (13.3 kg)
Shipping Weight:	39.1 lbs (17.7 kg)

All Specifications based on Half Space Environment in ceiling.

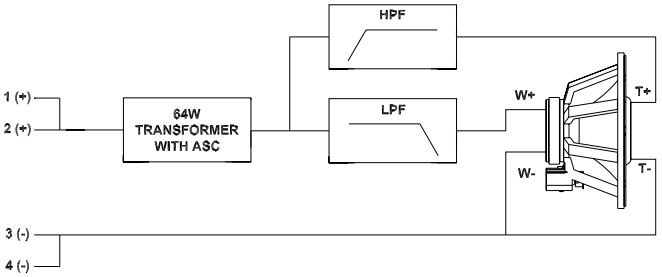
Architects' & Engineers' Specifications:

The EVID C12.2 loudspeaker system shall be comprised of a UL 94V-0 fire rated ABS baffle/bezel assembly, black powder-coated steel rear enclosure, white powder-coated grille with safety tether, 64W transformer with 8 ohm bypass and automatic saturation compensation, and Evid 920-8B 12" coaxial transducer. The loudspeaker shall meet the following criteria: power rating shall be 100 watts of EIA RS-426A pink noise (6 dB crest factor). Frequency response, uniform from 85 Hz to 18 kHz. Pressure sensitivity, 100 dB SPL at 1 meter (3.3 feet) on axis with one watt of pink noise (ref. 20µPa). Minimum impedance, 5.0 ohms. The loudspeaker shall be 333 mm (13.12 in.) deep and 414 mm (16.31 in.) in diameter. Weight shall be 13.3 kg. (29.3 lb) The coaxial ceiling loudspeaker shall be the Electro-Voice ® model EVID C12.2.

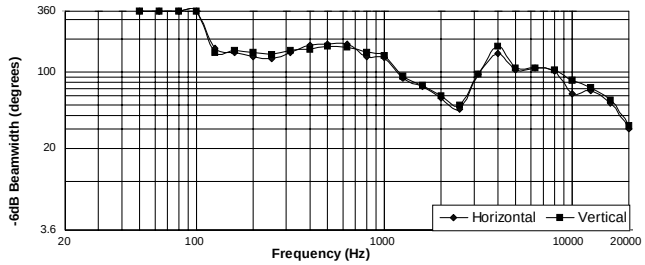
Frequency Response:



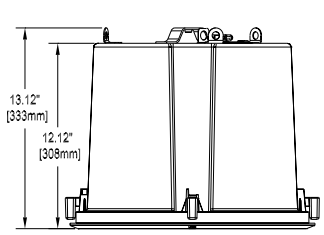
Block Diagram:



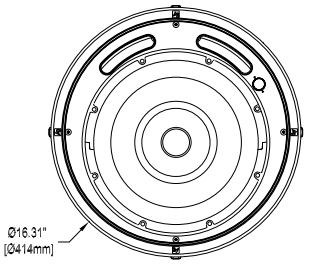
Beamwidth:



Dimension Drawings:

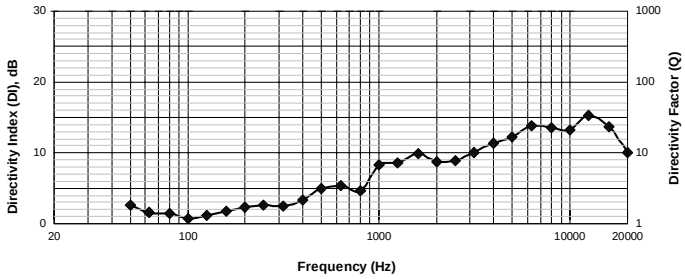


Side View



Bottom View

Directivity:



Performance Match:

- CPS-1 Power Amplifier
- CPS-2 Power Amplifier
- CPS-2T Power Amplifier
- MA-1206 Mixer Amplifier
- MA-1212 Mixer Amplifier

EVID C12.2 Part Numbers

• 301920-000	EVID 12.2, 12" Coaxial Speaker System, Consists of CE-12 and EVID 920-8B Assembled, 64W Transformer with Automatic Saturation Comphensation
• 301921-100	CE-12, 12" Enclosure for EVID 920-8B, Includes 64W Transformer with Automatic Saturation Comphensation
• 301922-100	EVID 920-8B, High-Efficiency 12" Coaxial Driver, 100 dB Sensitivity, 200W Power Handling

12000 Portland Avenue South, Burnsville, MN 55337
Phone:952/884-4051, Fax:952/884-0043
www.electrovoice.com

Part Number LIT000073 Rev C

U.S.A. and Canada only. For customer orders, contact Customer Service at:
800/392-3497 Fax: 800/955-6831
Europe, Africa, and Middle East only. For customer orders, contact Customer Service at:
+ 49 9421-706 0 Fax: + 49 9421-706 265
Other International locations. For customer orders, contact Customer Service at:
+ 1 952 884-4051 Fax: + 1 952 887-9212
For warranty repair or service information, contact the Service Repair department at:
800/685-2606
For technical assistance, contact Technical Support at: **866/78AUDIO**

Specifications subject to change without notice.

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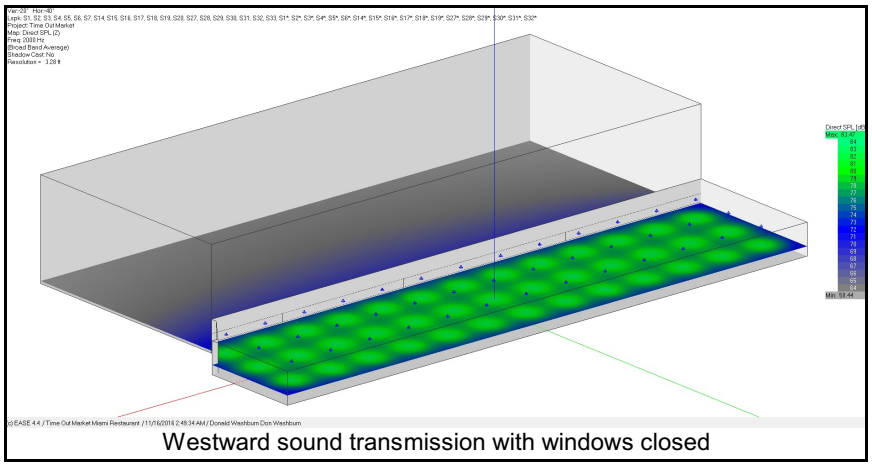
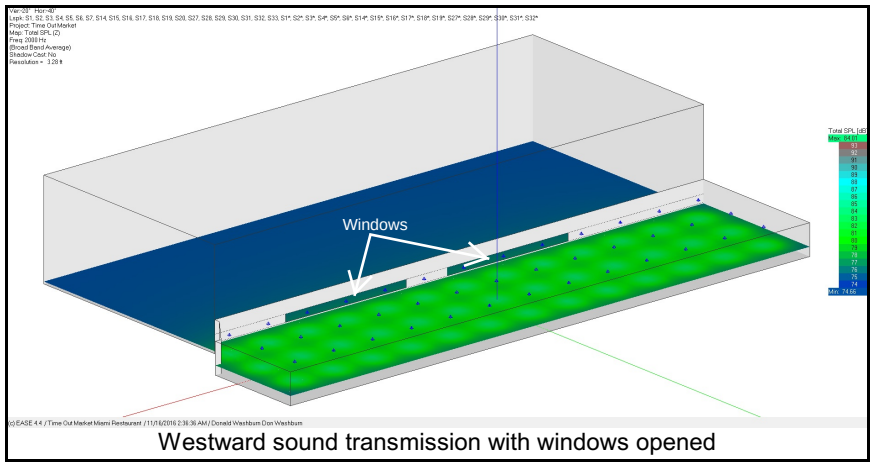
Time Out Market Acoustical Analysis

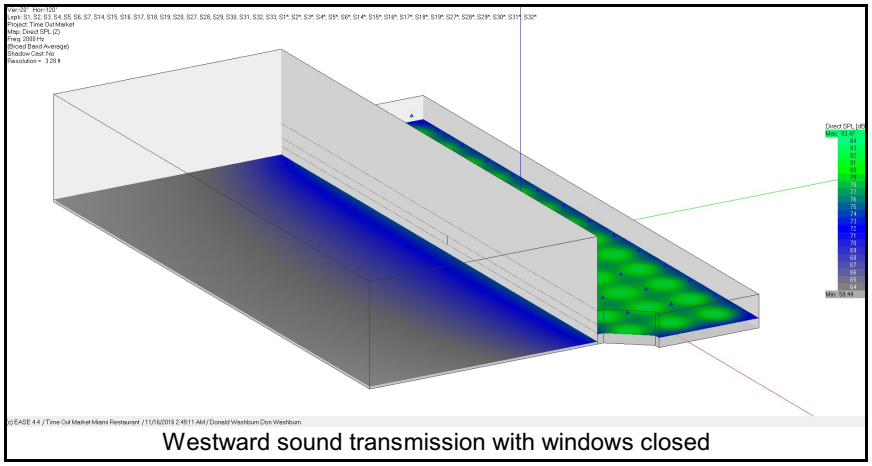
Music generated by the interior sound system, as observed outside the west side of the building when the six window systems are closed, results in an average sound pressure level along the west side of Drexel Avenue of about 58 decibels. When the six window systems are opened, the outside sound level rises to about 74 decibels. This would indicated that the windows should be closed during the evening, perhaps starting at 8:00 p.m. The figures below illustrate these conditions.



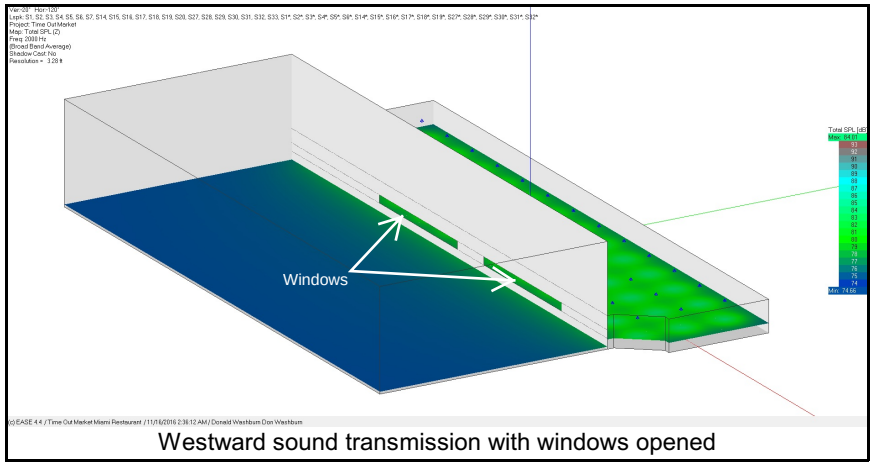
Westward sound transmission with windows closed



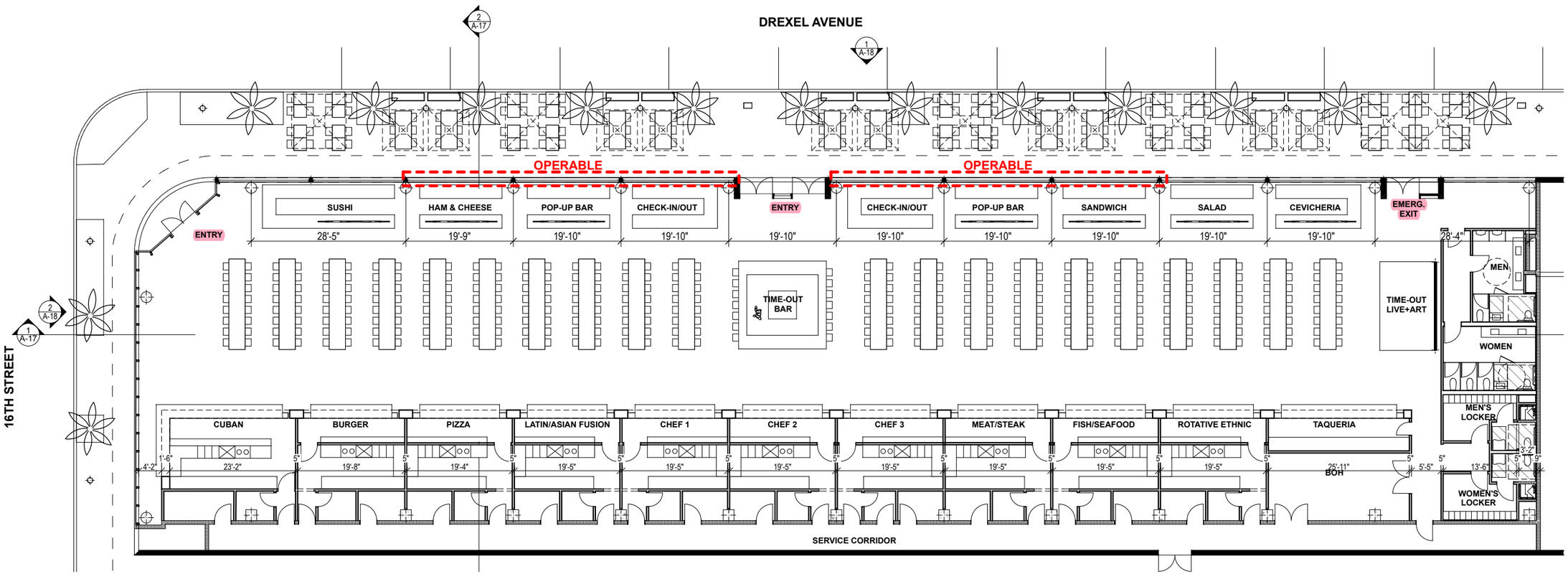
Westward sound transmission with windows opened



Westward sound transmission with windows closed



Westward sound transmission with windows opened



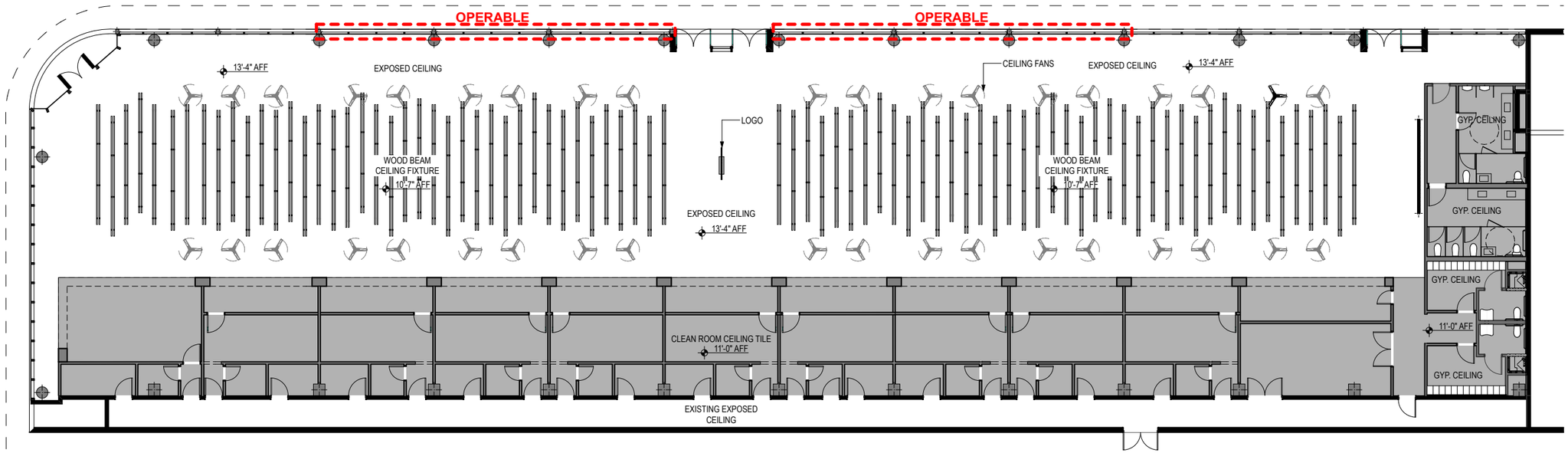
NOTE

1. LANDSCAPE IS NOT APPLICABLE. ALL EXISTING STREET LANDSCAPE MATERIAL, LIGHTING, IRRIGATION, CURBS, AS WELL AS UNDERGROUND AND OVER HEAD UTILITIES WILL REMAIN AS IS.

2. HARDSCAPE IS NOT APPLICABLE. ALL EXISTING PAVING MATERIAL WILL REMAIN AS IS.

1 GROUND LEVEL FLOOR PLAN

SCALE: 1" = 20'



1 GROUND LEVEL REFLECTED CEILING PLAN

SCALE: 1" = 20'

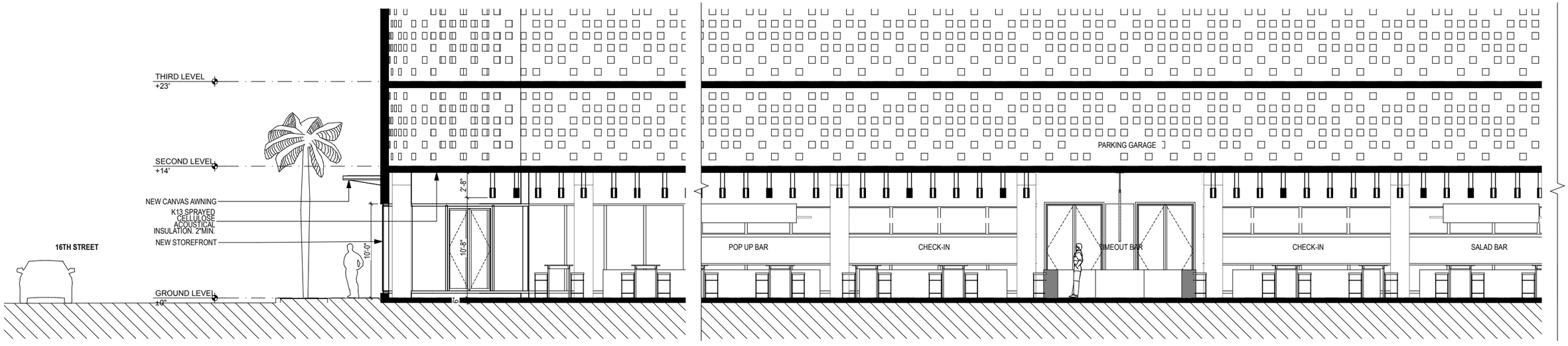
A-16

REFLECTED CEILING PLAN

P B S U B M I T T A L

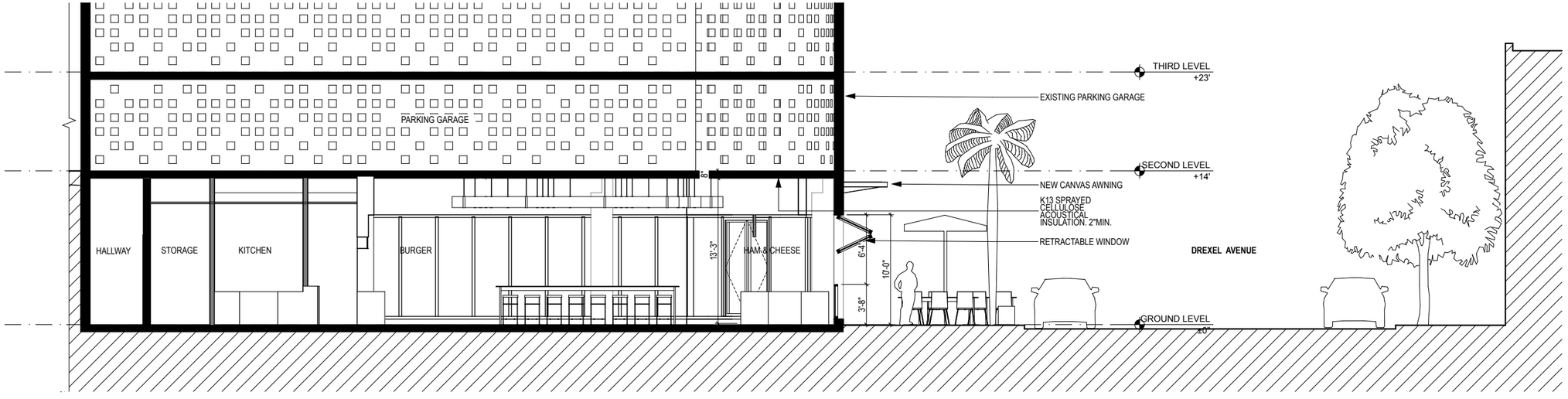
1601 DREXEL AVE :: MIAMI BEACH, FL 33139

11/15/2016



SECTION A
SCALE: 3/32" = 1'-0"

1



SECTION B
SCALE: 3/32" = 1'-0"

2

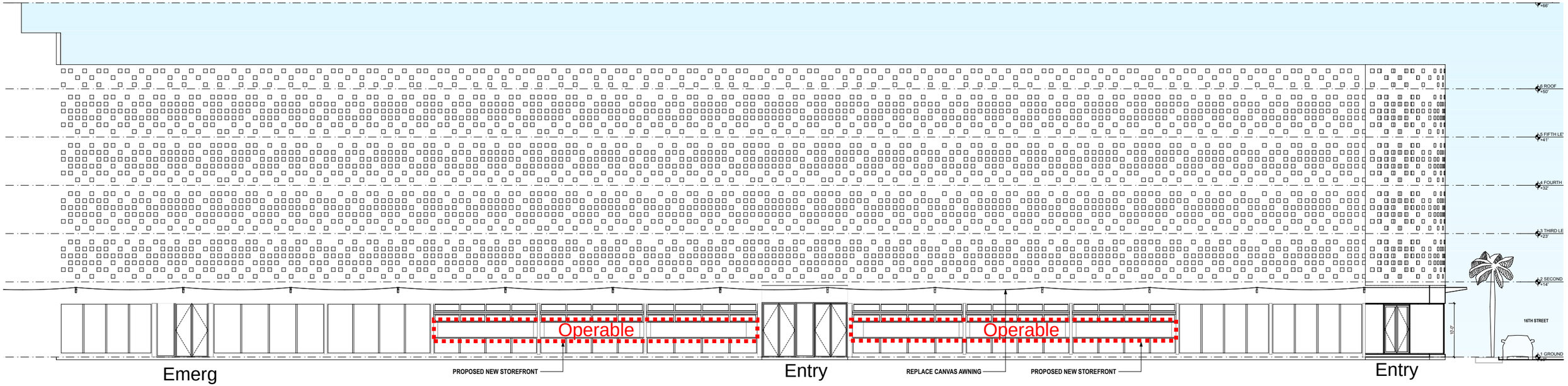
A-17

SECTIONS

P B SUBMITTAL

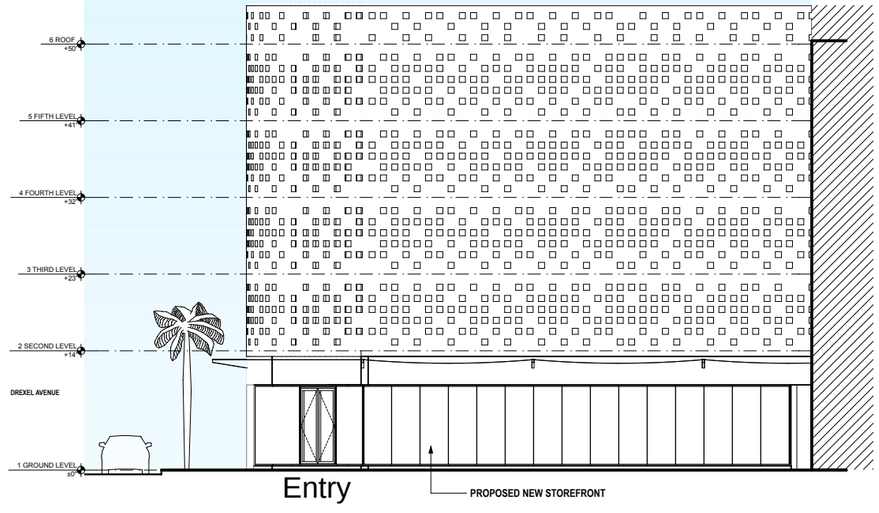
1601 DREXEL AVE :: MIAMI BEACH, FL 33139

11/15/2016 URBAN ROBOT © 2016



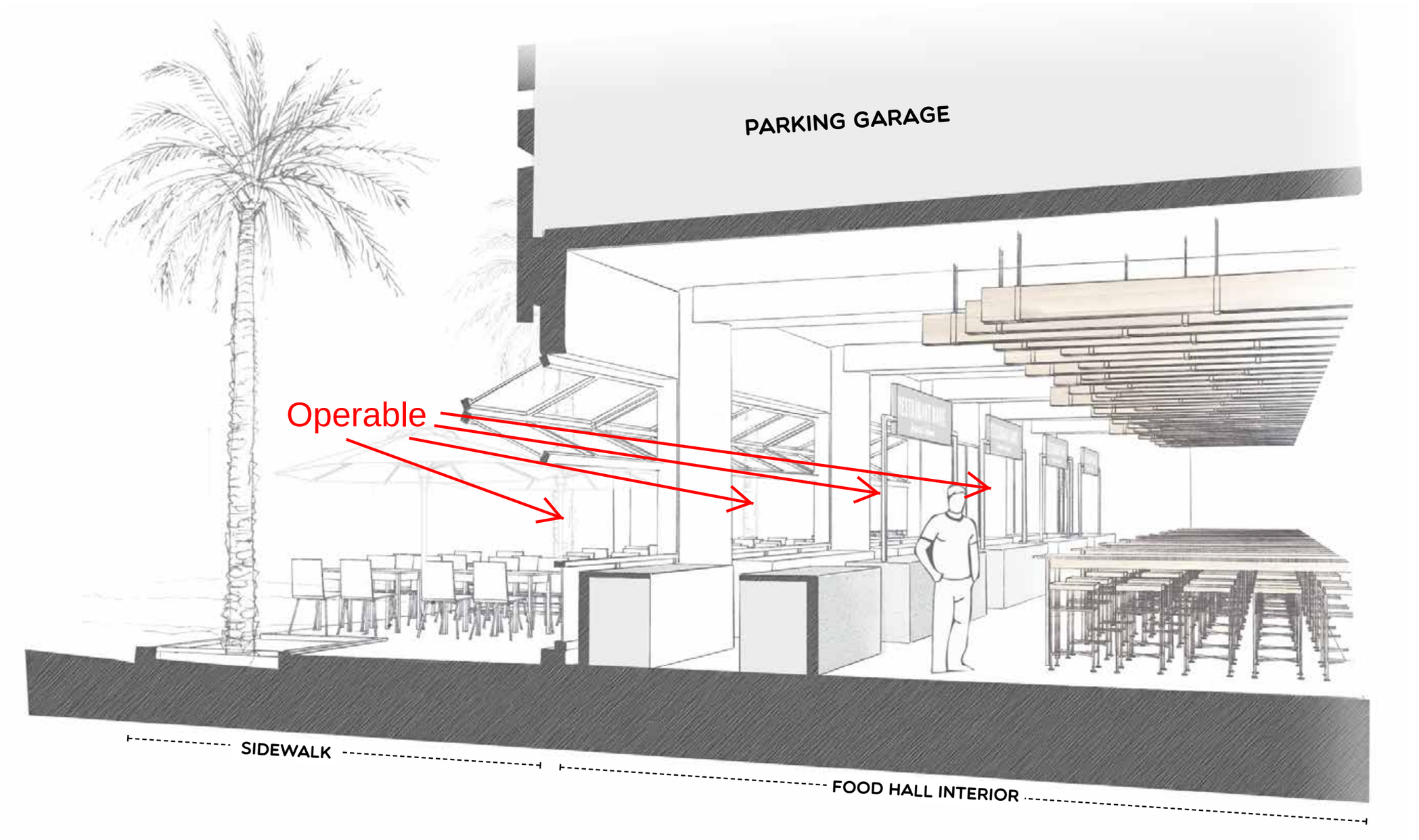
WEST ELEVATION 1

NOT TO SCALE



SOUTH ELEVATION 2

NOT TO SCALE



STOREFRONT SECTION 1
SCALE: 1' = 1'-0"

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NOISE LEVEL ANALYSIS TERMS

Sound Pressure Level (SPL) = The RMS sound pressure expressed in dB re 20 microPa, the lowest threshold of hearing for 1 kHz for a healthy auditory system. [As points of reference, 0 dB-SPL equals the threshold of hearing, while 140 dB-SPL equals irreparable hearing damage.] See: **inverse square law** below. 1 Pascal = 94 dB SPL. Average face-to-face conversation equals approximately 65 dB SPL.

Decibel (dB) = means of expressing power ratios, i.e. the difference between two sound levels, or an absolute sound level expressed in Sound Pressure Level (SPL) referenced to a standard pressure, i.e. 94 dB SPL = 1 Pascal.

dBA = "A" weighted sound pressure level. Please refer to the attached discussion of weighting filters and their applications.

SLM = Sound Level Meter. Device used to measure sound pressure levels.

$\mathbf{L_{min}}$ = Lowest, or softest, Sound Pressure Level measured during the test period.

$\mathbf{L_{max}}$ = Highest, or loudest, Sound Pressure Level measured during the test period.

$\mathbf{L_{eq}}$ = Equivalent continuous sound level. The steady level which would produce the same sound energy over the test period as the specified time-varying sound. This figure is useful for studying long-term trends in environmental noise. A single L_{eq} number is often used to define an entire measurement period.

$\mathbf{L_{10}}$ = Sound level exceeded 10% of the measurement period. Highest of the Ln figures.

$\mathbf{L_{50}}$ = Sound level exceeded 50% of the measurement period. Median of the Ln figures.

$\mathbf{L_{90}}$ = Sound level exceeded 90% of the measurement period. Lowest of the Ln figures. This figure is most commonly used in estimating true ambient noise level.

$\mathbf{L_{mean}}$ = Mathematically averaged Sound Pressure Level.

NC = Noise Criteria, a standardized method of characterizing noise loudness. Extensively used in the analysis of noise and vibration.

Sone = a subjective unit of loudness for an average listener equal to the loudness of a 1 kHz. sound that has an intensity 40 decibels above the listener's own threshold of hearing.

Phon = the unit of loudness on a scale beginning at zero for the faintest audible sound (0.00002 Pascals) and corresponding to the decibel scale of sound intensity with the number of phons of a given sound being equal to the decibels of a pure 1 kHz tone judged by the average listener to be equal in loudness to the given sound.

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Inverse Square Law = inverse square law Sound Pressure Level. Sound propagates in all directions to form a spherical field, thus sound energy is inversely proportional to the square of the distance, i.e., doubling the distance quarters the sound energy (the inverse square law), so SPL is attenuated 6 dB for each doubling of distance from the source.

Noise Reduction Coefficient (NRC) = The average of the individual sound absorption coefficients at 250, 500, 1000 and 2000 Hz, to the nearest .05.

Impact Insulation Class (IIC) = Single-number rating that indicates the amount of impact noise isolation provided by a floor/ceiling assembly. The higher the number, the better the floor/ceiling assembly.

Sound Transmission Class (STC) = A single-number rating that indicates the sound transmission loss of a partition or ceiling system between adjacent closed rooms. STC Ratings are:

25 Normal speech can be understood quite clearly
30 Loud speech can be understood fairly well
35 Loud speech is audible but not intelligible
42 Loud speech is audible as a murmur
45 Must strain to hear loud speech
48 Some loud speech is barely audible
50 Loud speech is not audible

Definitions

1) **sonic**: utilizing, produced by, or relating to sound waves; broadly: of or involving sound: having a frequency within the audibility range of the human ear: of, relating to, or being the speed of sound in air or about 761 miles per hour (1224 kilometers per hour) at sea level at 59°F (15°C)
2) **subsonic**: of, relating to, or being a speed less than that of sound in air
3) **supersonic**: of, being, or relating to speeds from one to five times the speed of sound in air
4) **hypersonic**: of or relating to speed five or more times that of sound in air
5) **audio**: of or relating to acoustic, mechanical, or electrical frequencies corresponding to normally audible sound waves which are of frequencies approximately from 20 to 20,000 hertz
6) **infrasonic**: having or relating to a frequency below the audibility range of the human ear (< 20 Hz)
7) **ultrasonic**: having a frequency above the human ear's audibility limit of about 20,000 hertz
8) **audible**: heard or capable of being heard
9) **intelligible**: capable of being understood or comprehended
10) **aural**: heard or perceived with the ear

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11) **auditory**: of, relating to, or experienced through the sense of hearing

12) **acoustic**: of or relating to the sense or organs of hearing, to sound, or to the science of sounds

13) **vibration**: a periodic motion of the particles of an elastic body or medium in alternately opposite directions from the position of equilibrium when that equilibrium has been disturbed (as when a stretched cord produces musical tones or particles of air transmit sounds to the ear)

14) **noise**:
- **1** loud, confused, or senseless shouting or outcry
- **2** **a:** SOUND; *esp.* **:** one that lacks agreeable musical quality or is noticeably unpleasant
  - **b:** any sound that is undesired or interferes with one's hearing of something
  - **c:** an unwanted signal or a disturbance (as static or a variation of voltage) in an electronic device or instrument (as radio or television); *broadly* **:** a disturbance interfering with the operation of a usu. mechanical device or system
  - **d:** electromagnetic radiation (as light or radio waves) that is composed of several frequencies and that involves random changes in frequency or amplitude
  - **e:** irrelevant or meaningless data or output occurring along with desired information

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Sound Level Meter Weighting Networks

The following brief description of how the various weighting networks are used is intended to provide the reader an understanding of the purposes for and applications of standard weighting networks found in professional sound level meters. The information is an extract from "The New Audio Cyclopedia, Handbook for Sound Engineers", edited by Glen Ballou. It can be found on page 21 of that reference publication.

1.16 Weighting Networks

Sound level meters come with one or more weighting networks built in. The question confronting the user is, "Which one should I use?" The frequency responses of the three standard networks (A, B and C) are shown in figure 1-16. In the simplest terms, these different curves are designed to give readings of sound pressure level that will correspond, at least roughly, with human response to the sound. As we shall see in Chapter 2 "Psycho Acoustics," the Fletcher-Munson curves show that the human ear is less sensitive at lower frequencies than at a frequency of 1 kHz. This effect is greater for lower-level sounds than for louder sounds. Therefore, it makes sense to reduce the sensitivity of the sound level meter (chiefly in the lower frequencies) so that its readings follow the characteristics of the ear more closely.

The A-weighted curve of Fig. 1-16 is based on the 40 phon Fletcher-Munson equal-loudness contour and is to be preferred for measuring lower-level sounds such as background noise. The B-weighted curve is based on the 70-phon equal-loudness contour and is suitable for measuring sounds of intermediate level. Measurements taken with the A and B weighting are called *weighted sound levels*. The C weighting is essentially flat and is used for very loud sounds. It is also used when *sound pressure levels* are to be measured and generally when the sound level meter feeds a signal to other instruments for analysis.

Table 1-4. Use of Weighting Networks

Sound Level Range, in dB	Recommended Weighting Network
20 - 55	A
55 - 85	B
85 - 140	C

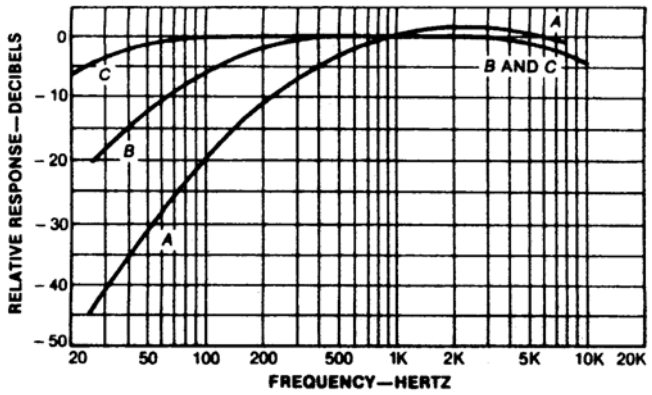
Table 1-4 gives general suggestions as to which weighting to use for different sound level ranges.

When comparing different sound levels, such as in Table 1-5, it may be expedient to use the A-weighting for the entire range rather than to shift weighting in the midst of a series of measurements to be directly compared.

Table 1-5. Typical A-Weighted Sound Levels

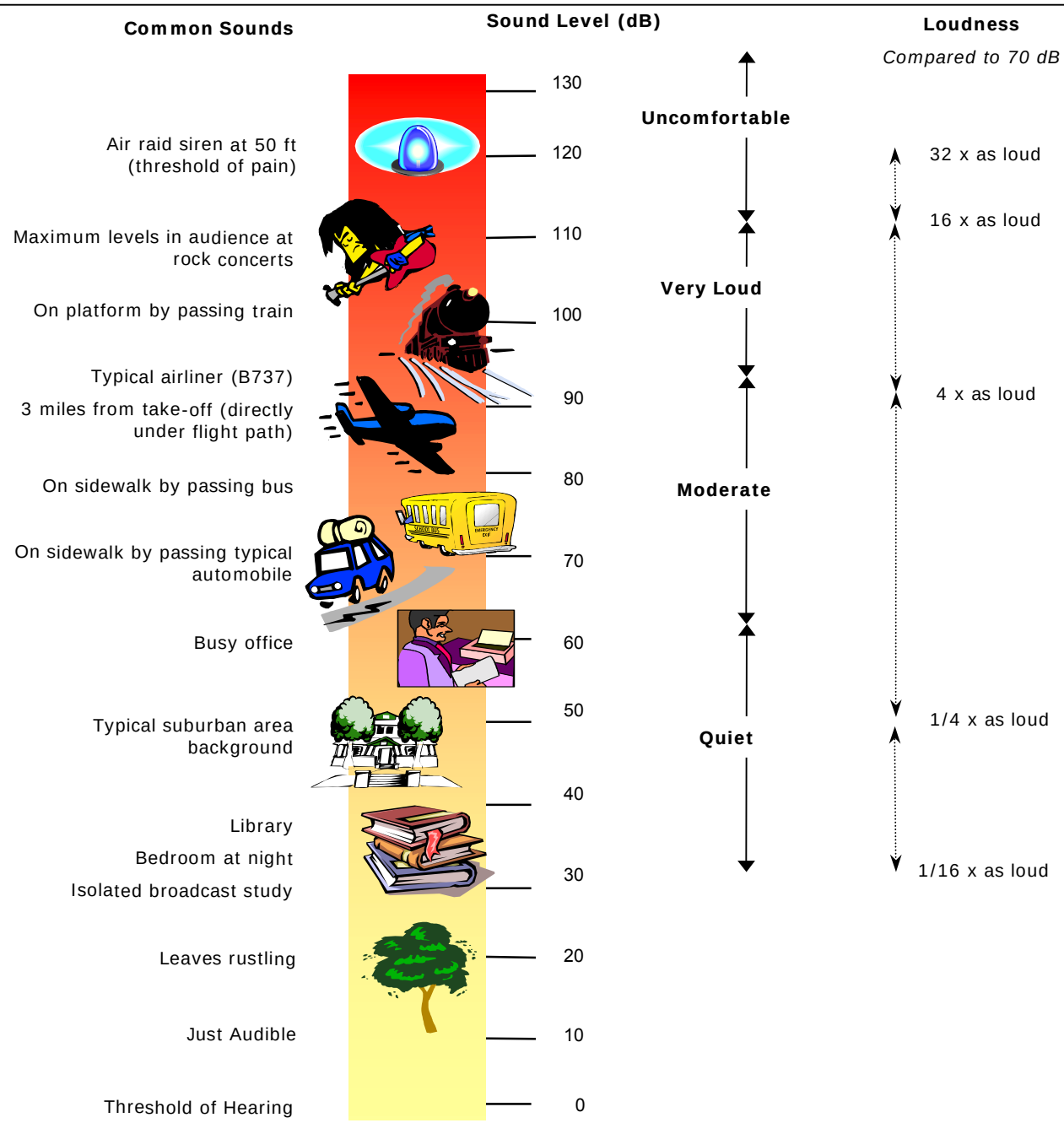
Sound Source	Sound Pressure Level, Decibels, (A-Weighted)
Jet airplane taking off (200 ft.)	120
Subway train (20 ft.)	90
Freight Train (100 ft.)	70
Speech (1 ft.)	70
Shopping Mall	60
Average residence with TV	50
Quiet residential area at night	40
Soft whisper	30
Recording studio background noise	30
Threshold of hearing	20

Figure 1.16 - Weighting Networks



Frequency Response Characteristics in the American National Standard Specification for Sound Level Meters, ANSI-31.4-1971.

Typical Sound Levels



Source: Handbook of Environmental Acoustics, James P. Cowan, 1994