



## MEMORANDUM

**TO:** Mayor and Council

**FROM:** Kevin Johns, Director  
Economic Development Department

**DATE:** September 3, 2014

**SUBJECT:** Recommendations for incorporating C-weighting network in the City's  
Sound mitigation and measurement processes

On June 12, 2014 City Council approved Resolution No. 20140612-076. The Resolution directed the City Manager to work with the Austin Music Commission and stakeholders within the sound-shed of music venues to develop recommendations for incorporating the use of the “C-weighting” of decibels as an auxiliary measure in sound mitigation and measurement processes. “Decibel” is a unit used to measure the intensity of a sound.

### **BACKGROUND**

The current sound ordinance references only the A-weighting network, which does not accurately measure bass frequencies. The C-weighting network is more inclusive and accurate in the measurement of bass frequencies. Sound propagation in an urban environment is challenging to control and requires an overall sound management plan to effectively reduce unwanted sound impact.

### **FINDINGS**

Based on input from the representative groups during stakeholder meetings and discussions, staff does not recommend imposing a citywide C-weighted decibel limit at this time. Because each source and receiver location is unique, a multitude of factors and perspectives must be considered when imposing restrictions and granting allowances for amplified sound permits. It is important not to inadvertently prohibit any specific genre of music, some of which are not possible to perform without an adequate amount of bass energy. Imposing a city wide C-weighting limit could negatively impact events that are neither in close proximity, or impactful to residential or neighboring business uses.

Currently, the sound ordinance allows staff to “conduct an appropriate level investigation based on the type of permit sought and its potential impacts to the surrounding community”. It is recommended that C-weighting be included in the sound ordinance and be used as an additional sound management tool in the Sound Impact Plans (SIP's) that the Music Office writes for outdoor sound permits. The SIP's provide staff the authority to prescribe sound mitigating design, capacity, decibel level, and hours of operation as appropriate for each permitted location.

### **STAKEHOLDER INPUT**

There is much disagreement in the community among residents, sound engineers, acoustic engineers and venue/event managers as to what an acceptable maximum dBC number would be, if one were selected. The A-weighting network was developed using pure tone, non-musical sound sources amplified at low volume levels. A-weighting is representative of the most sensitive portion of human hearing, and became the common sound meter measurement standard in the 1930's. It is not uncommon when measuring a musical sound source at 85 dBA, for the sound meter to also read 95-110 dBC. Providing staff the ability to address heavy bass events with dBC limits prescribed in the SIP (as recommended above), coupled with ample time to collect and analyze the resulting data, is advised.

It is practical to expect that the necessary educational outreach, data gathering and analysis components of any code changes could require a period of up to two years to fully understand the benefits and any unintended consequences of including dBC limits in the sound ordinance.

#### **TESTING dBC LIMITS DURING SXSW 2014**

During SXSW 2014, complaints from indoor venues were received by staff, regarding excessive bass from nearby outdoor events. Music Office staff collaborated with Austin Police Department (APD) Sound Enforcement officers and found the outdoor event locations to be “bass heavy” and operating with sound levels at 85-90 dBA and up to 115 dBC. The Music Office then modified the SIP’s associated with the outdoor event permits to impose a 105 dBC restricted sound limit. In these cases, the 105 dBC limit worked well to eliminate the complaints and negative impact to neighboring venues, while still allowing the outdoor events to have ample sound level and “feel” within the venue listening area. This example highlights how the current sound ordinance provides ample authority for staff to control dBC levels for specific venues and instances.

#### **WEIGHTING COMPARISON CHART** (Source, Cirrus Research plc)

In the chart on the following page, Hertz (Hz) means cycles per second, the red line represents “A” and the green line “C” weighting. The bottom horizontal line graphs frequencies from 10 Hz (sub bass frequencies), up to 20,000 Hz (high treble frequencies). The vertical line represents volume level. The red and orange shaded colored sections highlight sub bass and bass frequencies in the sound spectrum.

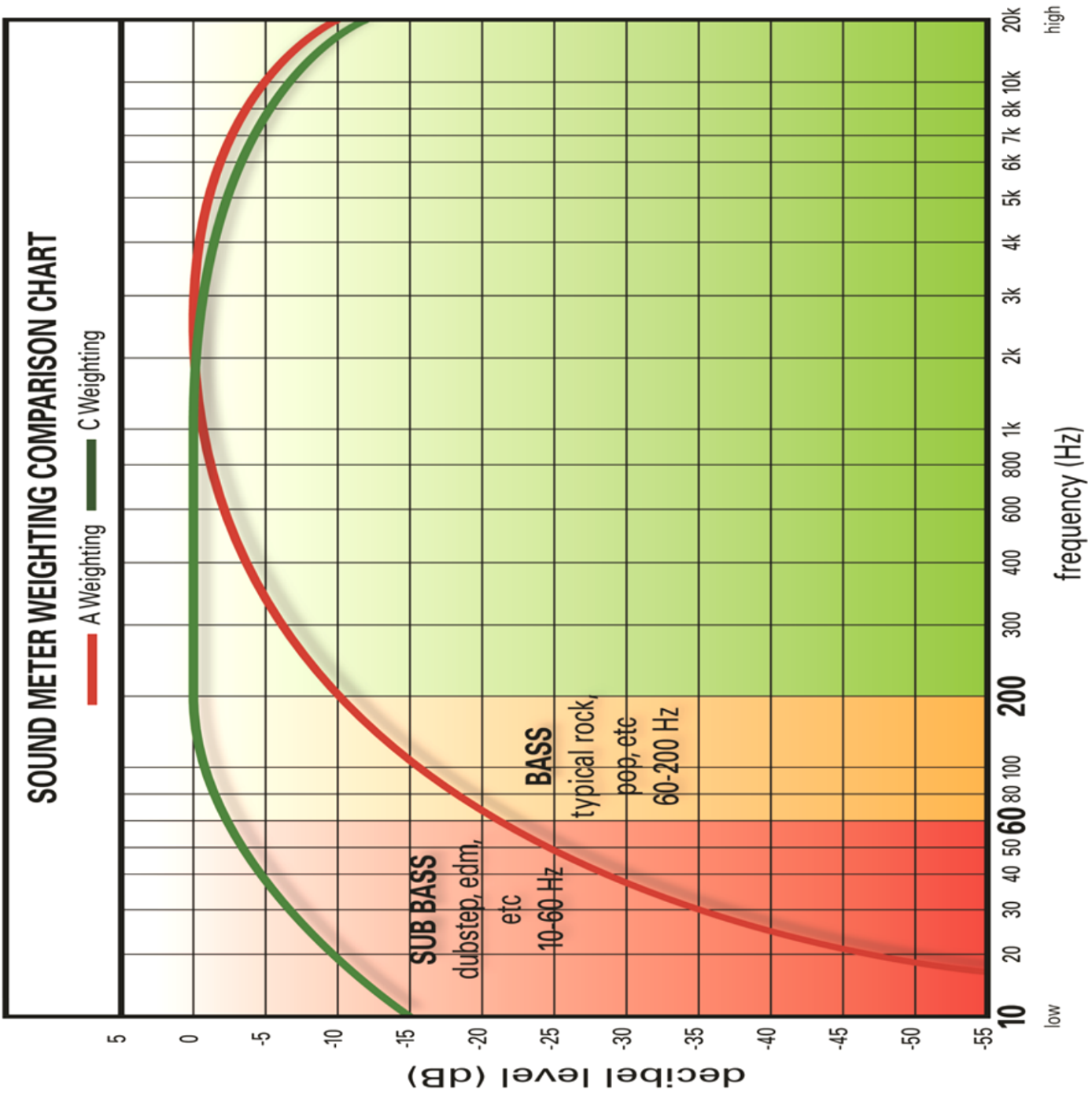
As shown, there is effectively up to a 30 decibel differential between “A” and “C” weighting in the **audible range**, depending on the specific frequency being measured. Musical sources measured at 85 using A-weighting will typically read 95-115 when using the C-weighting, depending on the amount of bass energy present. The greatest differential between “A” and “C” weighting is found when measuring frequencies in the 10-200 Hz range. Sub-Bass, 10Hz to 60Hz encompasses sounds that are often more felt than heard.

#### **STAFF RECOMMENDATIONS**

1. Within Chapter 9-2-1 (2), add “C” weighting network language to sound ordinance definitions.
2. Within Chapter 9-2-41, include a requirement that a Sound Impact Plan must accompany sound permits and be readily available for inspection at venues.
3. Allow for a three (3) month education and outreach period for internal staff, APD and community stakeholders.
4. Allow for a thirty (30) day grace period before APD issues citations for dBC limits imposed within SIP’s.
5. Allow staff to gather information related to dBC limits for Outdoor Music Venue (OMV) sound permits and SIP’s for full one year cycle. An additional time period would be required to accumulate and analyze resulting temporary sound permit data after adoption of dBC limitations placed in SIP’s.

Attachments: Sound Meter Weighting Comparison Chart

xc: Marc A. Ott, City Manager  
Sue Edwards, Assistant City Manager



Meter test range data provided by Cirrus Research PLC