EC3.6
Attachment D

City of Toronto Municipal Code

Review of Chapter 591, Noise and Proposed Amendments

October 2, 2018
Project: 117-0622

Prepared for

City of Toronto

Prepared by

Mark Levkoe, B.Sc.E., P.Eng.

A. D. Lightstone, Ph.D., P.Eng.

VALCOUSTICS
Canada Ltd.

TABLE OF CONTENTS

…/cont'd

TABLE OF CONTENTS (continued)

cont'd

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF APPENDICES

City of Toronto Municipal Code

REVIEW OF CHAPTER 591, NOISE AND PROPOSED AMENDMENTS

1.0 INTRODUCTION

Valcoustics Canada Ltd. (VCL) was retained to provide a "peer review" of proposed amendments to Chapter 591 of the City of Toronto Municipal Code (the City of Toronto Noise By-law). This report is based on the revised Chapter 591 document included in the Staff Report LS13.1 dated May 5, 2016. This review includes comments on various sections, that in our opinion, merit further consideration. Included as part of the scope of work is commentary on issues and concerns in the current by-law that have not been addressed in the proposed revisions and considerations of enforcement. Rewriting any part of the proposed Chapter 591 wording is not part of the mandate.

Also, the commissioned scope of work includes assessment/commentary on the input provided by the Noise Working Group (NWG); comments on the practicality of banning or setting decibel limits on leaf blowers and a review of noise by-laws in New York City and two other major, populous cities, similar in context to Toronto. Chicago and Portland, Oregon were chosen.

One of the objectives as part of updating this noise by-law is to make it easily understandable to the layman in acoustics. Certain aspects, particularly in relation to sound measurements and numerical limits can become quite technical and it is unavoidable to use technical terms which may need to be defined in the by-law for precision and to avoid any ambiguity. One of the principles of common law applicable to by-laws is that the by-law should not be vague, and the average citizen should be able to easily discern what he/she should do or not do to be fully compliant.

In a setting as large, diverse and complicated as the City of Toronto, there is a large variety of stakeholders that can be affected by the noise by-laws, each with legitimate concerns about the ramifications of the noise by-law on their interests or activities. Often different stakeholders will have opposite positions about a particular clause or set of clauses in the by-law. Sometimes there are irreconcilable differences of opinion or position as to what should or should not be addressed in the noise by-law or how. Rarely is there an "absolute" right or wrong way to address an issue or concern.

The residents of the City have a right to peaceful enjoyment of their environment with freedom from nuisance, annoyance or inconvenience, while at the same time being free to engage in a variety of activities such as sports, entertainment, driving their vehicles, mowing their lawns, having their garbage picked up, etc. Businesses and the municipality want to carry out their

activities and operate their facilities. Contractors building or repairing public infrastructure or buildings need to do construction. Almost all human activities result in the creation of sound (noise). To prohibit all sound would mean nothing could be done and would be totally unrealistic. The objective is to institute controls, which might set prohibitions by time and place or subjective or quantitative controls on the magnitude of sound (noise) generated (which could also be a function of time and place). How enforcement can or would be done and its practicality can also be relevant in deciding what noise control measure is appropriate.

All of these factors are relevant to reviewing the proposed noise by-law revisions as well as to reviewing the comments and suggestions in this by-law review. Some suggestions may not be consistent with a policy City staff (or Council) consider appropriate or desirable for a particular reason as a matter of principle or experience.

Consultations by the City with stakeholders, in the process of updating the noise by-law, does make it clear that creating a satisfactory noise by-law may be more difficult than any other type of by-law.

2.0 REVIEW OF PROPOSED, REVISED CHAPTER 591

2.1 DEFINITIONS, SECTION 591-1

1. AMBIENT SOUND LEVELS: *"means the prevailing background sound level…."*. Since the ambient sound level will typically vary from instant to instant, unless there is a definition of *prevailing* background sound level, this is open to different interpretation. See discussion of Quantitative (Numerical) Sound Level. A descriptor and time period such as L_{90}, L_{99}, or L_{eq} over an hour would assist in clarifying what is meant by prevailing background sound level. See later also.

2. NOISE: Unwanted sound is a correct definition. However, a sound that is in conformity with the requirements of Chapter 591, technically is not noise. The definition should be expanded to: *"Unwanted sound or sound not in conformity with the requirements of Chapter 591"*.

3. POINT OF RECEPTION:

   - Would be more correct to say *"… where sound originating…"*.

   - It would also be appropriate to add "….including any point on the exterior façade of a building or an exterior plane of window to a noise sensitive space….".

   The owners of units in a condominium have individual premises. Thus, a source could be in one unit and the Point of reception in a different unit of the same condominium. As an example, in the case of a mixed-use condo development, if a restaurant occupied a commercial unit and had a noisy fan, any residential condo could be a Point of Reception that could trigger enforcement of Chapter 591.

4. RESIDENTIAL AIR-CONDITIONING DEVICE:

   - There is a typo: *"….serves a…."* is repeated.

   - Presumably an A/C system serving a multi-family building, which is not included in this definition, would be treated as a stationary source.

5. SOUND (PRESSURE) LEVEL: To be completely unambiguous, the mathematical definition of sound level should be added. We realize there is the desire to be as simple and readable as possible. However, this is a technical term and merits a technical definition to be precise. Similarly, a descriptive and mathematical definition of "EQUIVALENT SOUND LEVEL" should also be added.

6. RESIDENTIAL AREA: The current definition would allow an illegal residential use to qualify as a Residential Area. This was probably not intended. Probably the "or" should have been an "and". However, a vacant, zoned, residential lot should also qualify as a Residential Area. Legal non-conforming residential use should also be included and defined.

7. It is recommended that defined terms be capitalized, when used.

2.2 GENERAL PROHIBITION, SECTION 591-2

1. Section 591-2 has a prohibition for making, causing or permitting noise "which is likely to disturb the quiet, peace, rest, enjoyment, comfort or convenience of the inhabitants…". This clause may not always be enforceable. (Many legacy noise by-laws contain such wording.) The reason is that an inhabitant has no way of knowing what will disturb another inhabitant. By-laws have been ruled "void for vagueness" where a citizen cannot establish for himself/herself what he/she has to do (or not do) to comply with the by-law. Notwithstanding the possible difficulties, it is desirable to retain this wording, to send a message to the public as to the objectives of the by-law. We note that in some cases this wording has been ruled void; but that in others, prosecutions under this clause have been successful.

2. The prohibitions/restrictions in this section only apply at night, with some differences in hours between residential Areas and Quiet Zones, except that, the prohibitions are in place all day Sundays and statutory holidays for Quiet Zones.

3. While night time sleeping hours are generally considered most critical, there are valid reasons why daytime sound levels and potential disruptions should also be of concern: young children napping; shift workers; seniors and/or retirees enjoying both indoor and outdoors; people who are ill at home or house bound. In some cases of quiet zones, particularly with hospitals and nursing homes, all hours around the clock may be equally sensitive. There is a growing recognition (especially in Europe) that adverse noise impact is deleterious to health particularly to patients in the process of recovery.

Recommendation:

This clause should be retained but consideration should be given to extending the applicable hours around the clock for residential areas and quiet zones but particularly for quiet zones.

2.3 QUANTITATIVE (NUMERICAL) SOUND LEVELS

This section provides a brief tutorial on sound level metrics/descriptors, to aid in understanding what is meant when a quantitative sound level is specified or discussed.

1) Basic Concepts

A major characteristic of community, environmental noise is that it varies from instant to instant as a function of local and distant activity such as road traffic (cars, buses, trucks, motorcycles, trains, streetcars, airplanes, construction, activities by residents (lawn cutting, etc.), mechanical equipment cycling (e.g., air conditioners), animals (dogs barking), and industrial and commercial operations.

One can make an instantaneous sound level measurement. However, in the case of widely varying sound levels over time, a very brief "snap shot" is not truly representative of the sound environment as a whole or over time. The instantaneous sound level could be taken during a brief peak, brief lull, or anywhere in between and thus, may not be an appropriate representation of the most common sound level over a reasonable time period or the "prevailing ambient".

As a result, some form of statistical approach is much more meaningful and is usually used. There is a large variety of statistical descriptors that can be used to characterize a varying situation. One commonly used concept is that of a cumulative probability distribution, specifically L_n values where L_n is the sound level exceeded for n % of the time. For example, L_{90} is the sound level exceeded 90% of the time. L_{90} is a reasonable representation of minimum residual (background) sound level, because the sound level is only less than L_{90} for 10% of the time. Sometimes L_{99} is used for this. Typically, the lowest sound level in a data set is not more than 1-3 dBA below L_{90} or L_{99}. L_{50}, the sound level exceeded 50% of the time, is the median value. L_{10} is the sound level exceeded for 10% of the time (90% of the time the sound level is less than L_{10}). L_{10} is a good indicator of the upper end of the range. Sometimes L_1 is used for this. The difference $L_{10} – L_{90}$ indicates the range within which the sound levels would vary for 80% of the time.

Various types of averages can be used to characterize a varying situation. However, because of the non-linear, logarithmic relationship between sound energy and sound level and between sound level and human perception of loudness, a simple arithmetic average is not appropriate.

Commonly used is a sound *energy* average as opposed to a simple, arithmetic average of sound (pressure) levels. Probably the most frequently used descriptor for environmental noise, nationally and internationally, is the energy equivalent continuous sound level, sometimes referred to as the equivalent sound level, abbreviated $L_{eq\,x}$, where x is a time period. L_{eq} is the constant sound level that would produce the same total sound energy as the actually varying sound levels, over the defined time period. L_{eq} is a sound energy average and must always be associated with a time period. It must also be associated with a location relative to a source, as is the case with sound (pressure) level.

The shorter the time period, the more stringent the requirement even if the numerical value remains the same. Note, because of the logarithmic relationship between sound energy and

sound level (in decibels), L_{eq} is very sensitive to high sound level events, even if the sound event lasts for a short period of time. Thus, it can be viewed as a descriptor that inherently is in the public interest.

2) Ministry of the Environment , Conservation and Parks (MECP) Noise Criteria

The MECP noise guideline sound level limits (criteria) are expressed in terms of the Equivalent Sound Level (L_{eq}) descriptor. Different time periods are used to define the descriptor for different types of sound sources. The MECP uses a 16-hour daytime period and an 8-hour nighttime period for road and rail noise. For industrial/commercial (stationary) sound sources, a one-hour time period is used. The current Chapter 591 incorporates MOECC (now MECP) noise guideline NPC-205 for stationary sources. The sound (noise) criteria in NPC-205 are in terms of the one-hour L_{eq} descriptor (in dBA). NPC-205 has been replaced by NPC-300 as of 2013. NPC-300 continues to use the one-hour L_{eq} for stationary sources and the numerical limits are basically the same.

Recommendation

To be consistent with the current Chapter 591 and more particularly with the in-place MECP environmental noise guidelines and regulations, it would be desirable for quantitative sound criteria/limits and sound measurements to use the L_{eq} (energy equivalent sound level) descriptor. For stationary sources, a one hour time period, as used in the MECP noise guidelines, is recommended for consistency.

Note, not all sound level meters are capable of measuring L_{eq}. Those that do are known as "integrating sound level meters". See later also.

2.4 AMPLIFIED SOUND, SECTION 591-4 A.

1. Section 591-4 A deals with amplified sound and provides numerical sound limits for different times of day, measured at a point of reception over a period of 5 minutes. (Note, amplified sound is typically not necessarily considered as a stationary source.) However, there is no specification of what descriptor or method is to be used for the measurement. For a reader of the by-law, this is vague and subject to different interpretations and is thus potentially problematic for enforcement. Someone may watch a sound level meter set to Fast for 5 minutes, and pick the highest reading. Alternatively, the meter could be set to Slow. Both are valid measurements but will give different results. One could also measure L_{eq} and get a different number again.

2. Section 591-4 A. sets sound limits both indoors and outdoors. For nighttime, in some subsections, the same numerical values are used for indoors and outdoors. In all cases, the indoor sound levels selected are expected to be readily audible. In the case of indoors at night, the numerical values appear to be high and would be expected to have significant adverse noise impact; for example, in terms of sleep interference for bedrooms. A reduction of the indoor sound limit, both day and night, by 10 dBA (to 35/40 dBA, night/day) would be appropriate. In a typical residence, noise would still be expected to be perceived even at these revised sound levels, but the potential impact would be less.

3. Note, rule-of-thumb: in the middle of a furnished room with an open window, the indoor sound level would be about 10 dB(A) less than the sound level outside the window. With a closed window, the difference would be 20 dB(A), or more, subject to the quality of the window. Thus, there is justification for the outdoor sound levels being higher than the indoor sound levels, by 10 dBA, or visa versa, the indoor sound limits should be 10 dBA lower than outside. Having the same sound limit for inside and outside means that one or the other is either too lenient or too strict.

4. Section 591-4. A.(2) (b) allows the sound level from a sound system device to exceed the ambient sound level at a point of reception by 5 dBA or dBC if the ambient sound level exceeds the numerical limits in 591-4.A.(1). This is considered to be too liberal.

5. When one measures the sound level of a source in the environment, the measurement will be the cumulative sound level of the source plus the ambient. If the source sound level is more than 10 dBA higher than the ambient, the measurement will essentially reflect the source. If the source sound level is less than 10 dBA higher than the ambient, the measured value will be somewhat higher than the source alone, due to the contribution of the ambient sound.

6. In practice, two sound measurements are required, close in time, both preferably at the receptor; one measurement with the source off which would yield ambient and one measurement with source on which would give the cumulative sum of ambient plus source. Subject to what the difference is, a calculation may needed to be done to determine the source sound level [logarithmic energy subtraction: (source + ambient) – ambient = source].

7. The current wording could be interpreted to mean the source (alone) sound limit is 5 dBA higher than the ambient (intended) or interpreted to mean that the source + ambient sound limit is 5 dBA higher than the ambient. (Note, one can measure the ambient without the source. One cannot measure the source without the ambient being present.) These approaches are not identical with respect to source sound limit. The current proposal allows the music to be that much louder if the ambient is higher. The ambient is usually primarily determined by traffic noise. Music has much more annoyance and disruptive potential than does traffic noise. Thus, the elevated sound limit for music has greater potential for adverse impact.

8. As per MECP noise guideline NPC-104, “Sound Level Adjustments”, sounds with characteristics that have increased annoyance potential, such as pure tones, should be penalized by 5 dBA. That is, 5 dBA is added to the measured sound level. Music, particularly with bass beat, would typically qualify for this penalty. NPC-104 is incorporated into the current Chapter 591 (in Schedule A). It would make sense to carry the concept of this type of adjustment forward.

Recommendations

1. The sound measurement should be in terms of one hour L_{eq}. The use of 5-minute periods makes the limit requirement very stringent and is not always adequately representative in time. The definition of L_{eq} should be added to Section 591-1, A. Definitions.

2. (Note, Section 591-8, D. (1) sets a limit in terms of 5-minute equivalent sound level. However, there is no definition of equivalent sound level in the currently proposed Chapter 591.)

3. Consideration should be given to reducing the indoor nighttime sound limits (one hour L_{eq}) by 10 dB(A&C) to 35 dBA and 50 dBC; the indoor daytime to 5 dB(A&C) higher than nighttime, that is 40 dBA and 55 dBC and have the corresponding outdoor sound levels 10 dB(A&C) higher than indoors.

4. When the ambient sound level exceeds the limits of Section 591-4. A. (one hour) it is recommended that the sound level of amplified sound should not exceed the ambient sound level. This is 5 dBA more stringent than the current proposal. For example, if the ambient were 62 dBA, the amplified sound would be limited to 62 dBA; resulting in a cumulative sound level of 65 dBA (logarithmic sum 62 + 62 = 65 dBA).

5. The wording of 591-4. (A)(2)(b) should be revised to clarify that the sound limit for amplified sound, where the ambient exceeds the limits in 591-4. (A)(1), is numerically equal to that of the ambient with the source off, preferably based on one-hour L_{eq}.

6. The concept of "penalties" for annoying sound characteristics, in the form of NPC-104 should be retained.

7. Wording should be added to indicate the outdoor Point of Reception to which the outdoor sound limit applies can also be the outdoor plane of window on the facade of the receptor building, in addition to other locations such a decks, terraces and balconies.

2.5 STATIONARY SOURCE COMPLIANCE, SECTION 591-3, Specific Exemptions

1. Section 591-3. C. provides that stationary sources "in compliance with a provincial environment compliance approval" are in compliance with the proposed Chapter 591-3. This is appropriate and replaces current requirements that certain activities related to stationary sources are prohibited from being "clearly audible" at a point of reception. Also, numerical sound limits for stationary sources are provided as part of the MECP noise guideline NPC-205, currently incorporated into Chapter 591. The "clearly audible" and numerical limits were not necessarily consistent because compliance with the numerical limits could still be non-compliant with "clearly audible". This has been one of the difficulties with the current Chapter 591, particularly with respect to planning new sensitive development close to a stationary source and ensuring that compliance with Chapter 591 is achieved. The current wording resolves this. In addition, NPC-205 has now been replaced by NPC-300.

2. The referenced Environmental Compliance Approval (ECA) originates with and is issued under Section 9 of the Environmental Protection Act (EPA). In January 2017 the MECP issued O. Reg.1/17 which provides for a different but parallel process for most stationary sources, whereby an ECA is not issued and the stationary source must be registered on the Environmental Activity and Sector Registry (EASR). All of the same studies, assessments and reports as for an ECA are required, *except they are not submitted for review by MECP*. Section 591-3. C. should be updated to also account for O.Reg.1/17. The concept that a stationary source that is in compliance with provincial sound (noise) limits and MECP approval requirements is also in compliance with Chapter 591 is useful, practical and desirable. Noise

assessments and studies submitted to the MECP for an ECA are reviewed in detail by MECP specialist engineers. Thus, the City can rely on the review by the MECP. However, in the case of the EASR registration, although the source is required to have done essentially the same noise studies, assessments and reports, because these reports are not required to be submitted to MECP as in the case of an ECA application, there will have been no independent review/verification in most cases (the MECP can audit the documents as it wishes). The matter of compliance is less certain, although in theory there is compliance. An analogy would be a building permit application done by qualified professionals. Often the City Buildings Department, after review, requires revisions or updates to designs to be fully complaint with the Ontario building Code. Thus, although a facility registered on the EASR should be compliant, in practice this may not be the case.

3. Further, O. Reg. 524/98 exempts a number of stationary sources from requiring either an ECA or registration under EASR. As of January 2017, O. Reg.524/98 has expanded the exemptions. It is also the case that not all sources that would otherwise be covered under the definition of a stationary source are industrial and also do not require approval under the EPA. Thus, it must be ensured that these potential noise sources are not inadvertently outside of the jurisdiction of Chapter 591.

Recommendations

1. On the assumption of full compliance by stationary sources registered on the EASR with MECP noise requirements (which means compliance with NPC-300 and the EASR Publication), sources registered on the EASR could be treated similarly to those with ECA's. If a facility or sound source is in fact not in full compliance, notwithstanding registration on the EASR, it would be subject to enforcement by MECP. Such non-compliant sources could also be made subject to Chapter 591.

2. The reference to environmental compliance approval in Section 591-3.C. should be broadened to ensure that the EASR process is unambiguously included in the intent of this clause, because as of January 1, 2017 most industries fall under the EASR process, while before they required ECA's and now they do not.

3. Stationary sources exempted from either requiring an ECA or EASR registration should be subject to Chapter 591.

4. Section 591-3.0. should be updated to account for the EASR process as well as for exempted stationary sources and noise sources not requiring formal environmental approval.

2.6 CLEARLY AUDIBLE, SECTIONS 591-4. B AND C

1. These sections relate to construction and motor vehicles, respectively. They require that specified activities not be *"clearly audible at a POINT OF RECEPTION"* (defined term should be capitalized), and in the case of construction, during defined time periods.

2. There is no definition of clearly audible in Chapter 591. Thus, it is open to interpretation. It should be noted that there is no technical definition of clearly audible and that there is no interpretation of clearly audible that is universally agreed to between experts. As an example of the lengths other by-laws/ordinances use to explain the concept of clearly audible reference may be had to the New York City local law:

> *"(44) Plainly audible sound means any sound for which any of the content of that sound, such as, but not limited to comprehensible musical rhythms, is communicated to a person using his or her unaided hearing faculties. For the purposes of the enforcement of this code, the detection of any component of music, including but not limited to the rhythmic bass by a person using his or her unaided hearing faculties is sufficient to verify plainly audible sound. It is not necessary for such a person to determine the title, specific words or artist of such music. In the case of motor vehicles the detection of the sound of a muffler or of an exhaust by a person using his or her unaided hearing faculties is sufficient to verify plainly audible sound. Plainly audible sound does not require measurement with a sound level meter."*

3. Note, the New York law applies the concept of clearly audible to music and motor vehicles, while Section 591-4, B and C apply it only to construction and motor vehicles, not music.

4. In the absence of a definition, recourse can be had to a dictionary:
   - Clearly: without doubt; obvious
   - Audible: able to be heard

Recommendation

If it is deemed adequate that a by-law enforcement officer or other witness can, in court, convincingly indicate clear audibility and source identification based solely on the dictionary definitions, no change is justified. Otherwise an explanation or clarification of what is meant by clearly audible may be useful.

2.7 ANIMALS, SECTION 591-4. D

This section, in effect, prohibits "persistent" noise-making by a kept animal. There is no definition of persistent and thus, it is vague, open to interpretation and argument. For example, what qualifies as persistent – 2 minutes, 5 minutes, 10 minutes, or intermittently over a full hour, etc.?

Recommendation

A definition of persistent could be useful in Chapter 591. A potential definition is:

> *"PERSISTENT" in reference to barking, howling, whining, or other sound-making by an animal means continuously or incessantly for a period of ten minutes or more or intermittently over a period of one hour or more; providing that if at the time of making of sound by the animal(s) a person is trespassing or threatening to trespass upon the private property on which the animal is situated, the sound-making is not deemed to be an infringement of this by-law."*

2.8 RESIDENTIAL AIR CONDITIONERS, SECTION 591-5.

1. As for the other numerical sound limits, the sound level descriptor for both the source and ambient should be unambiguously specified.

2. Proposed Section 591-5 has a sound limit of 55 dBA at a point of reception in a residential area or quiet zone or if the ambient at the point of reception exceeds 55 dBA, the sound level

limit for an air conditioner is the ambient plus 5 dBA. The same concerns and considerations in Section 2.4 here-in about measuring the sound of the source and ambient and wording as for Section 591-4.(A)(2) apply here also.

3. As in the case of 591-4. Sound measurements with the A/C device on and off would be required to determine the ambient and the A/C source sound level. A similar calculation may also be required to determine the A/C source sound level.

4. Although A/C units will cycle on and off based on cooling demand and environmental temperature, when on, they tend to produce a steady sound level. If the A/C sound level is substantially above the ambient sound level, a measurement time of 10-20 minutes would suffice, even if the descriptor is one hour L_{eq}. Wording could be included to allow a shorter measurement to be representative of one hour when the source sound level is steady (e.g. ± 2 dBA or less) over the measurement period. For the ambient sound measurement, it would be desirable to do a one-hour sound measurement, because the ambient sound levels are likely to be variable with time in many cases.

5. Many A/C devices produce broadband sound with no pure tones or other unusual characteristics particularly where the fan sound is dominant. Thus, where the ambient is above 55 dBA, one can justify a sound limit of ambient plus 5 dBA. Some A/C units may produce pure tones (from the compressor). These situations would be subject to the penalty of NPC-104. Where a penalty is involved, the effect is to reduce the sound limit either to 50 dBA or to the ambient sound level, where the ambient exceeds 55 dBA.

6. It should be noted that in many areas of Toronto with low density development, small lots and small setbacks, it may be difficult or impossible for a residential air conditioner to meet a limit of 55 dBA on the other side of the property line, just a meter or two away.

7. An alternative approach to a sound limit at a point of reception (which may be impossible to meet) is to limit the *sound power level* of an air conditioner (measured in Bels – there are 10 decibels in a Bel). The *sound power level* of a device is an inherent characteristic of the source. The *sound pressure level* at a receptor is a function of the device sound power level, the distance, the path between source and receptor and the environment. An analogy is the wattage of a light bulb versus the illumination on a surface. This approach of limiting the device sound power output allows choosing a quiet unit; but having to accept whatever sound level results in the circumstances, at a point of reception. In practice choosing an air conditioner based on a low number Bel rating results in a relatively quiet unit, usually with an unobtrusive sound characteristic, even if the desirable point of reception sound limit is exceeded.

   There is an enforcement advantage in that the test procedure is standardized (AHRI, the Air conditioning, Hating and Refrigeration Institute has various acoustical test standards) and most A/C unit manufacturers test and rate their units. Directories of models and ratings are published. The by-law could be written so that the higher of 55 dBA sound *pressure* level at the point of reception or a source power level rating of 7.6 Bels would comply. For enforcement, in relation to the unit sound power level rating, it would be a matter of looking up the make and model in the directory to obtain its rating. No sound measurements would be needed.

In the past, complaints about neighbouring residential air conditioners are understood to have been more common than is currently the case. Under these circumstances of lack of complaints, the fact that compliance with the numerical decibel limits is not practical, in most cases, may not be important.

Recommendation

Consideration should be given to revising Section 591-5., B. (2) to clarify that where the ambient sound level (one-hour L_{eq}) exceeds 55 dBA, the applicable A/C sound level limit is numerically equal to the ambient sound level (one-hour L_{eq}) plus 5 dBA, but subject to a penalty, per NPC-104, if warranted by the character of sound (some air conditioning compressors are quite tonal).

2.9 EXEMPTIONS, SECTION 591-8.

1. There appears to ne a typographical error in 591-9. A. It currently states "Where an exemption has been **granted** ……The Executive Director shall require ….a noise mitigation plan….". It likely was intended to say "Where an application for an exemption or permit has been **submitted**….".

2. Section D. (1) sets a limit of 85 dB(A) or 100 dB(C) at a point of reception (L_{eq} over 5-minutes) for sound from a source that would otherwise not comply with Chapter 591, but has obtained an exemption permit. These limits are considered excessively high, particularly because they apply at a point of reception. Such sound levels could be quite disruptive.

3. Sections C. (3) (d), D. (3) and E talk of "sound or construction equipment". Although there is a definition of Sound System Device (electronic sound systems), sound equipment is not defined.

4. In 591-8. I., the reference to Subsection E should be to F.

Recommendations

1. The use of L_{eq} is appropriate. As discussed above, there is no definition of L_{eq}. Thus, such a definition should be added to 591-1.

2. Consideration should be given to lowering the sound limits. A reasonable limit for special, transient events could be 70 dBA and 85 dBC, at a point of reception. Consideration could also be given to a sliding scale of sound limits as a function of time duration. That is, if the total duration of the sound level of a special/exempted event is short at a point of reception, a higher sound level could be tolerable.

3. The phrases "sound equipment" and/or "sound or construction equipment" in 591-8.C.(3)(d) and D.(3) could be clarified by expanding to "sound emitting equipment" and/or "sound emitting sources or equipment or construction equipment". This would obviate the need for a definition. Alternatively, the defined equipment could also be included here.

2.10 NOISE MITIGATION PLAN, SECTION 591-9.

Section B.(1) states: *"A noise mitigation plan shall: (1) set out…all noise mitigation measures…to achieve compliance with this chapter…."*; this chapter being Chapter 591. This could be interpreted to mean compliance with sound limits in 591-4. If compliance with Chapter 591 is possible/practicable, then an exemption would not be needed. Thus, we surmise that what was intended in 591-9. B. (1) was reference to *"….compliance with 591-8. D. (1)"*.

Recommendation

Revise reference in 591-9. B. (1) from *"….this chapter…."* to *"591-8. D. (1)"*.

3.0 ENFORCEMENT

3.1 DATA TRACKING AND MEASURE OF EFFECTIVENESS

If not already being done, keeping records, with an annual summary and report of the following would be highly desirable:

1. Categorizing the type of noise complaint – e.g., barking dog, construction, residential air conditioner, commercial mechanical equipment, deliveries, etc.

2. Tally the number of complaints in each category.

3. Tally the number of charges laid, and under which specific section of the by-law.

4. Tally the convictions and penalties under each specific by-law section.

5. Summarize the disposition of each complaint; for example, satisfactorily resolved without charges, etc.

The measures of effectiveness of the noise by-law and its enforcement could be (in order of importance):

6. A reducing number of complaints;

7. An increasing number of satisfactory resolution of noise complaints without having to lay changes;

8. A good record of convictions and penalties where charges had to be laid.

3.2 ENFORCEMENT ISSUES

This deals with the situation where prosecuting a charge under the by-law is deemed necessary and is the most appropriate method of proceeding.

3.2.1 Charges

The first step would be to ensure a charge is under the most relevant/appropriate clause of the noise by-law and not under one which could be considered vague.

3.2.2 Subjective Clauses

Subjective clauses such as where issues of "clearly audible" or where matters of fact are involved, such as that a particular activity was taking place would not be expected to require a technical, expert witness.

The "reasonable person" in the form of a defined "officer" – e.g., by-law enforcement staff, should be able to give evidence in court.

3.2.3 Quantitative Clauses

Where the by-law provides numeric sound limits, sound measurements would be required for enforcement. Aside from needing the appropriate apparatus, the individual providing the evidence in court would be expected to be the person who did the sound measurements and would be expected to have to be qualified in this regard. This implies a degree of recognized formal training, which would include (but not necessarily be limited to):

1. Expertise in the use of sound level meters and on the particular one used;

2. Expertise in the calibration of the sound level meter; and

3. Understanding of basic acoustics and sound propagation.

With respect to basic acoustics, a full understanding of at least these concepts is required:

4. What is sound pressure level?

5. What is the decibel?

6. Frequency weightings.

7. Logarithmic computations – how to add and subtract decibels.

8. Effects of wind on sound measurements.

9. Sound reflections.

10. What is effect of other sources and the ambient on sound measurements?

11. How to measure sound level of a source in the presence of other sources.

In practice, the measurement of sound levels in the outdoor environment is fraught with pitfalls and practical difficulties, most often related to interference from other sound sources such as road traffic, mechanical equipment on buildings, railway corridors, aircraft flypasts, etc. It is important that staff doing sound measurements are fully aware of these factors so that if presenting sound measurements as evidence in court, reasonable doubt about their validity cannot be introduced by an expert on the other side.

It is understood that City staff doing sound measurements and providing evidence have undergone training in this regard.

3.2.4 Vehicle Issues

Some of the noise issues related to motor vehicles and motor cycles, such as the matter of properly functioning engine mufflers are addressed in other legislation, such as the Ontario Highway Traffic Act. In any event, matters such as defective mufflers, squealing tires and racing are not properly and safely enforceable other than by the police.

4.0 REVIEW OF NOISE WORKING GROUP OUTCOMES REPORT

This section provides a summary of salient points and, where appropriate, commentary on the feedback from the Noise Working Group (NWG) on the proposed noise by-law, as contained in the "Outcomes Report".

The Outcomes Report, in effect, is organized as a table with three columns: The Current By-law; the Proposed By-law and Feedback from the Working Group. The sub-section numbers below and titles correspond to those in the NWG document.

1. General Prohibition

1. The proposed changes are to introduce time periods (basically overnight) during which the clause would be in effect, differentiating between Residential Areas and Quiet Zones, and between week days and weekends/statutory holidays.

2. The Valcoustics opinion is that the "likely to disturb" prohibition may not always be enforceable because of vagueness. This problem is recognized in the comments from NWG.

3. A main NWG concern is the weakening of the by-law by not having the noise restrictions during daytime, to the detriment of shift workers or others such as seniors, retirees or anyone who may be home during the day and evening. This is a valid criticism.

2. Amplified Sound

1. Currently, projecting amplified sound into any street or public place is prohibited.

2. The current section has been successfully enforced in the past. The court has indicated that the concept of projecting sound into a public street is not vague.

3. Proposed change is to introduce numeric sound limits as a function of time and day, measured for 5 minutes at a point of reception.

4. General support by NWG for the concept of quantitative limits, in part because some certainty is introduced for business. However, there was disagreement over the specific sound levels and the time constraints proposed. No further details were provided in the NWG report.

5. The NWG indicated disagreement about sound measurement at the point of reception being desirable because it is intrusive. Also keeping logs appears to be too much trouble for some.

6. Some suggestion about sound level at source being the desirable measurement.

7. With respect to sound limits at the source, while an appealing approach on the surface, Valcoustics does not see it as practicable in an urban setting. In reality there would be a complicated relationship between sound levels at source and at receptors, particularly in downtown Toronto. We see the receptor sound level as paramount (i.e. sound level where the problem/complaint is).

8. Since the burden of proof is beyond a reasonable doubt, if a charge is to be laid, proper evidence must be gathered. Valcoustics sees sound measurements *at the receptor* as being necessary and mandatory. So is logging. If theses aspects are too inconvenient for the complainant, the chances of success are significantly reduced and the desirability of laying a charge disappears in our opinion.

3. Amplified Sound-Exemption Permits and Noise Mitigation Plans

1. The current limit of 85 dBA at 20 m from source, for 5 minutes is proposed to remain, except that instead of at 20 m from the source, the measurement point is proposed to be at a point of reception. A new limit of 105 dBC is proposed to be added to address low frequency sound which is otherwise deweighted by using dBA. (The NWG report says 105 dBC. Our copy of the proposed Chapter 591 says 100 dBC.)

2. Various changes to exemption details are proposed.

3. The NWG expressed concern about: the number of exemption permits issued; the proposal to allow multiple events in an application; the content of noise mitigation plans; and that an 85 dBA limit is too lenient.

4. Valcoustics concurs that 85 dBA and 100/105 dBC *at receptor* is too lenient. See comments and recommendations on Section 591-8, earlier.

5. In some cases, allowing multiple events in a single application is logistically appropriate and more efficient, particularly if the same or similar sound sources are involved, at the same location. An example would be an outdoor stage, such as at Harbourfront, with multiple performance events during the summer season.

6. If events are unrelated, and, if different sound sources would be involved, separate exemption applications should be required.

7. The new provisions for exemptions such as the ability to revoke a permit, to impose conditions and require a mitigation plan, should alleviate the concern about the number of exemption permits, because the revisions increase the safeguards.

8. The NWG supported a graduated system for exemptions, differentiating a small, family birthday party in the park from a large multi-day festival. However, the NWG differed on how to define events.

9. Posting exemption permits so that the permits are available to the public is a good idea.

10. Valcoustics agrees with NWG that any Noise Mitigation Plan should be reviewed for acceptability and approved (revised by the applicant if required) before issuing the exemption permit, not after. See Section 2.9.1 here-in.

4. Construction Noise – Exemption Permits and Noise Mitigation/Management Plans

1. The General Prohibition would still apply to construction, but only during night/evening hours with the current proposal. The construction industry stakeholders would prefer reduced restrictions in the early morning hours that fall into the night category. This is because of concerns about deploying trucks (presumably such as ready-mix concrete) in rush hour causes delays. Other Group members support the time constraints.

2. Automatic exemption for continuous pouring/finishing of concrete currently exists. The proposal is to remove such exemption. The need to apply for an exemption in each case is unacceptable to the construction industry because of potential time delays. However, it should be possible to know in advance about long concrete pours and apply for exemption well in advance, to avoid delays. Consideration could be given to a condition of exemption that a construction plan be prepared, such that long pours start first thing in the morning. What is to be avoided is the starting of a long pour later in the day, so that it must continue into the evening or into the night to properly finish. In any event there was division within the NWG about removing the blanket exemption for long concrete pours. This is an area of legitimate differences between stakeholders, each with valid concerns.

3. The proposed revisions to Chapter 591 include exemptions for work on public projects done by the City, Province or the Federal Government. Some work is done directly by municipal forces (typically emergency repair). Major public projects are typically done by private contractors. Relinquishing control over private contractors by way of an automatic exemption because it is a public project is not necessarily desirable, particularly if the project is long term and has the potential to be disruptive of existing communities. Requiring an exemption to Chapter 591 is an incentive for contractors to pay attention to the impact and disruption they can have on the neighbouring communities An alternative approach, which has already been used, is to maintain the noise by-law exemption but to include requirements to protect adjacent communities in the construction contracts for public projects. Some members of the NWG supported the continued exemption for necessary municipal works. Others wanted to know more about current environmental noise and communications strategies for pubic projects. In any event, exemptions for public projects and how they are applied is a matter of policy, to be decided by City Council.

4. A condition of granting an exemption may be the preparation of a “noise mitigation plan” (Section 591-9). The construction industry members indicated a preference for calling it a “Noise Management Plan” with respect to construction projects, to avoid the false impression that all noise from construction can be eliminated.

5. The Noise Mitigation/Management Plan condition could also incorporate requirements for communicating with the neighbouring community. There seemed to be a consensus in the

NWG that better communications with the public/neighbouring communities, with advance notice of what to expect is highly desirable. Anecdotally, our experience is that in situations of potential inconvenience or disruption because of noise and/or other factors, good communications as to what is being done and what can be expected typically can significantly reduce complaints from the community.

5. Small Engine Equipment

1. Currently, powered equipment (defined in Chapter 591 as a "Power Device") except snow blowers are prohibited from being clearly audible at a POR in a Quiet Zone or Residential Area during prescribed hours. The wording in the NWG document implies incorrectly that the operation of a powered device is prohibited. The proposed Chapter 591 revision deletes specific reference to "Power Device" and would rely on the General Prohibition.

2. It appears that a major concern is leaf blowers as Power Devices. Some members of NWG favoured an outright ban.

3. Some of the NWG felt that allowing audibility of power devices until 11pm was not desirable and an earlier cut-of time is appropriate (e.g. 6 or 7 pm as in some other cities). In the opinion of Valcoustics, those hours should be consistent with what is appropriate to Toronto and be chosen by City staff based on experience in Toronto, rather than what is considered appropriate in other cities.

4. The NWG suggested phasing in a quantitative sound limit for Power Device emission and/or Point of Reception sound limits.

5. The NWG response suggested focusing on small engines, including generators, such as in food trucks and compressors. This implies a separate section, similar to the way the current Chapter 591 is set up, to address these sources, especially if food trucks are proving to be a problem. Generator installations in a vehicle can be designed to be relatively quiet; more so than for portable devices such as leaf blowers. With respect to devices such as construction compressors, it is interesting to note that the City of Toronto noise by-law prior to amalgamation had sound limits for mobile compressors.

6. The NWG suggestion for more public education is always appropriate, and not just for garden/property maintenance equipment, but for noise and the noise by-law in general.

6. Manufacturing Industry: Provincial/Municipal Requirements

1. The NWG agreed with the concept of exempting stationary sources that are in compliance with MOECC, now MECP, stationary source compliance requirements.

2. The NWG document raised the issue of whether residential emergency generators should be registered on the EASR and whether emergency generators should have limitations. It should be noted that currently, by provincial regulation (O.Reg.524/98) emergency generators (referred to as stand-by power systems) are exempted from requiring these approvals. Thus, it would be appropriate for emergency generators to be covered by Chapter 591. Note, conventionally, operation during an emergency is not restricted, but sound limits and/or time prohibitions apply to routine testing.

7. Stationary Mechanical

1. For residential air conditioners the proposal is to use a 55 dBA sound level limit at a point of reception (with +5 dBA for higher ambient). Some of the NWG felt this is too lenient. It should be noted that full compliance with NPC-216, or the 55 dBA limit is often not practicable in many parts of Toronto, where setbacks between neighbours is minimal. The opinion of Valcoustics on the sound limits for residential air conditioners are given earlier. Note, under MECP guidelines residential air conditioners are **not** considered stationary sources and are treated separately under guideline MECP NPC-216.

2. Some members of the NWG suggested using the source sound power emission level in bels as per the manufacturers rating, as opposed to receptor sound pressure level, as discussed in Section 2.8.7 here-in.

3. This section of the NWG document also mentioned residential stand-by generators. This is really the same as emergency generators and should be treated as such and as a type of stationary source.

8. Motor Vehicles

1. No change to the current wording is proposed. Currently, the wording addresses racing, tire squeal, mufflers, operation, horns.

2. The NWG document requests greater enforcement. However, as discussed earlier here-in, enforcement by other than the police is not feasible. Particularly with the police modernization program, enforcement of the noise by-law by the police is unlikely, due to other priorities.

3. In the opinion of Valcoustics, the motor vehicle aspects of Chapter 591 are redundant because the noise matters are addressed in Section 75 of the Ontario Highway Traffic Act and racing in Section 172.

9. Enforcement

1. The NWG notes that the Toronto Noise Coalition finds the matter of logs and court attendance burdensome. However, under our system of justice, when a charge is laid, the burden of proof is with the prosecution.

2. With increasing noise complaints, the requirement for increased enforcement resources is noted.

10. Comments Related to Liveability and Health

The NWG points relate to health impacts of noise. These have long been recognized in various jurisdictions including Toronto. It is interesting to note that the City of Toronto began addressing environmental noise with a major program circa 1970, even before the Ontario Ministry of Environment formed a noise group (circa 1975).

11. Issues of Interest Outside the Noise Working Group

1. The issues summarized at the end of the NWG document are beyond the scope of a noise by-law. However, educational material on noise, its effects, the noise by-law and its enforcement and on aspects of consideration of one's neighbours can always be appropriate.

2. With respect to land use planning, it is the City's policy and practice to require noise studies for Official Plan Amendments and rezoning applications that would introduce new sensitive land uses. Regular feedback and communications from MLS to the Planning Department could be useful in attempting to avoid conflict situations by ensuring proper site planning and architectural design.

5.0 LEAF BLOWERS

The table below provides a simple summary of options to deal with noise from leaf blowers.

OPTIONS TO ADDRESS LEAF BLOWERS:

ACTION	PRO	CON
Do Nothing (retain time prohibitions)	Simple – requires no action	Problem and complaints remain.
Ban	Solves noise problem	• Removes a common tool for property clean up. • Requires finding a substitute.
Set Sound Limit	• Would introduce a measure of control. • Potentially would reduce noise impacts and complaints. • Using ANSI Standard B175.2-2012 leaf blowers can be labelled for sound level.	• Requires manufacturers to design leaf blowers to be quieter and requires formal testing. If the size of the market for quieter units is too small, manufacturers will not bother. • Requires sellers to not sell non-conforming equipment.
Set Sound Limit and Retain Time Prohibitions	• As above for Set Sound Limit, except could relax sound limit somewhat.	• As above for Set Sound Limit.

1. The do nothing option does not appear to be satisfactory, as it simply perpetuates the current situation. In part this could be due to non-compliance with the prohibited hours for audibility.

2. Currently, Chapter 591, Section 591-4, Table entry 6. prohibits the sound from a Power Device (which a leaf blower is, from being audible in a Quiet Zone between 7:00 pm and 7:00 am, Monday to Saturday, 9:00 pm to 9:00 am Sunday and statutory holidays and in a Residential Area between 9:00 pm and 7:00 am Monday to Saturday, 9:00 pm to 9:00 am Sunday and statutory holidays.

    a. The do nothing option would be to retain the above time prohibitions for audibility. Subject to location and relationship to points of reception (i.e. densely developed area), this time prohibition can mean prohibition of use of leaf blowers.

3. The sound of leaf blowers can be particularly annoying, in part because of two stroke engines and in part because of nozzle noise. In densely developed areas the distances to points of reception are small. Few landscape contractors will likely work before 9 am on Sundays and holidays. However, during the rest of the week starting at 7 am (or earlier) is probably common.

4. An outright ban on leaf blowers does not appear to be satisfactory because it would remove a useful tool in property maintenance and thereby create another problem. Further, there are areas where leaf blowers could be used where there may be no neighbours to impact. In such cases an outright ban would serve no purpose.

5. Requiring leaf blowers used in the City to meet a maximum sound emission level (i.e. sound level at a specified distance) appears to be a potentially reasonable solution, although there are practical issues.

   ANSI Standard ANSI/OPEI B175.2-2012 provides techniques for standardized sound measurements and labelling of leaf blowers and similar equipment, Thus, a common tool for rating equipment exists. Major questions are: what sound level limit should be used and how quiet can manufacturers make equipment, with little weight penalty and at reasonable cost? Research and development would have to be done as well as formal testing. All of this would be a cost to manufacturers. If the market for quiet units is small compared to the overall market, manufacturers will abandon the local market. Thus, if Toronto is the only city with sound limits or one of only a small group, units that comply may not be available. Thus, one approach could be to reach out to other North American municipalities to act together setting sound limits and to require sound labelling in order to use a device in the municipality. This would create a stronger incentive for manufacturers to comply. As a start, this could be done through the Federation of Canadian Municipalities, who could then reach out to its US counterpart.

   Implementing sound limits for leaf blowers would require a phased approach, with advanced notice given to manufacturers, suppliers and contractors. For example, the sound limits could begin to apply two to five years from inclusion in Chapter 591, to allow manufacturers to develop complying equipment. Using a formal sound labelling approach as per ANSI/OPEI B175.2-2012 would facilitate enforcement. However, setting a sound limit would not necessarily require labelling. Labelling would make it easier for a purchaser to know the equipment is compliant with the requirements.

6. A target sound level limit of 50 dBA (or less) at 15.3 m (50 ft) would be desirable. This sound level limit (equivalent to 77 dBA at about 0.5 m [1.5 ft], more akin to the sound of a household vacuum cleaner, would produce a more reasonable/bearable sound level at close neighbours. However, before finalizing such a limit, consultations with manufacturers are recommended. This would best be done after other municipalities have been recruited to also adopt the same approach.

6.0 OTHER LARGE CITY NOISE BY-LAWS

6.1 INTRODUCTION

The “noise by-laws” of New York City, Chicago, and Portland, Oregon were chosen for comparative review because these are municipalities of comparable size or larger and comparable complexity and these noise by-laws/ordinances are quite comprehensive. Similar

concerns of those of Toronto would be expected. Notwithstanding that the underlying legislative frameworks may be different, the topics covered and how they are addressed are of interest in comparison to the Toronto approach. As is typically the case in large municipalities these "noise by-laws" have been in place for some time and have undergone revisions or additions over time. The apparent last dates of changes are:

1. New York City: January 2018, coming into effect in July 2018; (NYC has had noise control legislation for many years, with a major update to what is now the Noise Control Code in 2005.).
2. Chicago: 2013;
3. Portland: 2011.

Similar to Toronto, NYC has an Administrative Code and the Chapter on noise is referred to as the NYC Noise Control Code. Chicago has a Municipal Code and the chapter on noise is referred to as the Chicago Noise Ordinance. Portland has a City Code and the segment on noise is Title 18, Noise Control.

6.2 NEW YORK CITY

The City of New York (NYC) noise control code is part of the NYC Administrative Code, Title 24, Chapter 2.

Subchapter 1: Short title, Policy and Definitions

Section 24-202 Declaration of Policy

Summarizes basic objectives. Indicates that designated city staff/agencies and the police have the authority to enforce this code.

Section 24-203 General Definitions

A lengthy and complete list of definitions, including "ambient sound", "decibel" and "sound pressure level", "plainly audible sound".

Subchapter 2: General Provisions

Section 24-204 General powers of the commission

The commission has the power to promulgate rules "to effectuate the purposes of the code" and to regulate the operation, etc. of sound generating devices.

Commentary

This is a potentially useful approach because noise requirements not specifically already in the Code can be changed or added to without actually changing the Code. However, our legal system may not permit this approach.

Section 24-205 Investigations and studies by the commissioner

Section 25-206 Testing by order of the commissioner

Section 24-207 Inspection

Section 24-205 indicates that noise from a number of sources are a particular concern in NYC: airports; rapid transit and railways; audible motor vehicle burglar alarms; motor vehicle back-up warning devices.

The commissioner may order sound tests by the owner or by city staff and make recommendations to bring a device into compliance.

The commissioner can do or cause studies, tests, conduct hearings, compel attendances of witnesses, take testimony under oath, compel production of books, papers etc.

Authorized city staff are to be given reasonable access to noise sources, for inspection and for sound testing including the right to have it temporarily turned off for testing.

Commentary

The commissioner and City staff have several useful powers to aid in investigating and resolving noise complaints. For example, the commissioner can conduct quasi-court proceedings. Again, our legal system may not permit such an approach.

Section 24-217 Exemptions

Organs, bells, chimes or other similar instruments at any church, synagogue, mosque, school, or other house of worship are exempt.

Commentary

This is a potentially problematic blanket exemption. There have been occasions where early morning sounding of chimes or bells has resulted in noise complaints from nearby residents. Control of hours of use would be appropriate.

Section 24-217.1 Measurements

Unless Specified otherwise, all sound level measurements are taken using the L_{max} descriptor (maximum instantaneous sound reading) using the slow response setting on the sound level meter.

Commentary

For some sources, such as steadily operating equipment, such as an exhaust fan, producing an essentially constant sound level, or small variations, this can be appropriate and is a simple, straight-forward descriptor/measurement. Using the slow meter response provides some time averaging. For many sources L_{max} is not the most appropriate.

Subchapter 3: Prohibited Noise: General Prohibitions

Section 24-218 General Prohibitions

1. “Unreasonable Noise (defined) is prohibited.

2. Unreasonable noise is defined in Section 24-203 as excessive or unusually loud sound that disturbs the peace, comfort, repose of a reasonable person of normal sensitives or injures or endangers health, etc.

3. In this section, the following is defined as unreasonable noise unless a limit is prescribed elsewhere:

   - (Non-impulsive) sound 7 dBA or more above ambient, 10 pm to 7 am, at any point within a receiving property or at 15 ft from source on a public right-of-way.
   - (Non-impulsive) sound 10 dBA or more above ambient, 7 am to 10 pm, as above.
   - Impulsive sound 15 dBA or more above ambient as above, measured with the sound level meter set to fast response. Ambient is to be measured with a slow response.

4. Sound limits in this section do not apply to construction.
5. Sound limits in this section do not apply to sound sources for which there is a quantitative (numerical) limit elsewhere.
6. This section singles out refuse collection facility (not refuse collection vehicles) for compliance.
7. Sub-section 24-218.1 Prohibits the use of mobile telephones in a place of public performance (library, museum, gallery, concert hall, cinema, theatre, etc.) during a performance.

Commentary

Unreasonable noise has different definitions in different sections. In this section, quantitative sound limits are used. The variable definition complicates the understanding and interpretation of the code requirements, as do the variable quantitative sound limits. Considering that many specific sources have quantitative sound limits elsewhere in the noise code, the numeric limits here for “unreasonable noise” for both day and night are appropriate for outdoor points of reception.

Subchapter 4: Construction Noise Management

Section 24-219 Noise Mitigation Rules

1. The commissioner shall adopt rules prescribing noise mitigation strategies, methods, procedures and technology for a wide range of construction activities that are listed and includes development of generic noise mitigation plans, where appropriate.
2. The commissioner is to appoint an advisory committee to assist with rules, etc.
3. The construction noise mitigation rules are found in Title 15 of the Rules of the City of New York, Chapter 28. This is a 32 page document that addresses such aspects as:

   - Vehicle idling
   - Back up alarms;
   - Engine enclosures;
   - Noise mitigation plans;

- Specific noise controls for different identified construction equipment;
- Perimeter sound barriers; local sound barriers; jersey barriers; portable noise enclosures;
- Rules of operation for specific equipment;
- Examples of quieter makes and models of equipment.

4. The rules specifically address pile drivers, jackhammers, hoe rams, blasting, earth moving devices, vacuum excavators, trucks cranes, augers, street plates and concrete saws.

Commentary

See also 24-204, which also gives the commissioner the power to promulgate rules to implement the code. The concept of noise mitigation plans is potentially very useful for adoption in Toronto. The concept of an advisory committee may also be useful, but not necessarily to formulate "rules".

In many regards, the construction noise mitigation rules are quite prescriptive and very detailed.

It appears that construction noise, particularly after-hours had become a major problem in NYC, needing addressing.

Section 24-220 Noise Mitigation Plan

1. Anyone doing construction shall adopt a noise mitigation plan prior to beginning construction, or within 3 days for emergency work.
2. Plans must detail noise mitigation strategies, methods, procedures and technology.
3. Plans must be amended or updated for additional devices or activities unforeseen at the beginning.
4. Plans complying with the rules need not be filed or approved. Plans deviating from the rules need to be submitted and approved in advance.
5. This section does not apply to one or two family owner-occupied dwellings (in occupancy group J-3) or a convent or rectory.

Commentary

The concept of mandatory noise mitigation or management plans for construction sites and for activities for which exemption is sought could potentially be useful in Toronto.

Appendix A contains the NYC Construction Noise Mitigation Plan form.

Section 24-221 Alternative noise mitigation plan

1. Upon application, commissioner may approve an alternative noise mitigation plan for a particular construction site, that deviates from strict compliance with noise mitigation rules, based on justification.
2. A rejected alternative plan can be appealed.

Commentary

Provides some flexibility to deal with unique/special circumstances while maintaining control of the situation.

Section 24-222 After hours and weekend limits on construction work

1. Unless otherwise provided, construction is only permitted weekdays between 7 am and 6 pm except for a one or two family owner-occupied dwelling (J-3), convent or rectory for which work is also permitted Saturdays and Sundays 10am to 4pm.

Commentary

Unlike the MOE model municipal noise by-law and the Toronto approach of limiting sound from construction in residential areas, the NYC code actually prohibits construction during prescribed times, although there can be exceptions. See 24 – 223 below. In the case of Toronto, the City may not have the authority to outright prohibit construction during certain times. At any rate a blanket restriction in all areas would not necessarily be appropriate.

Section 24-223 After hours work authorization

1. Permission can be obtained to permit construction during times when otherwise prohibited, subject to conditions:

   - There must be a noise mitigation plan showing compliance with the rules.
   - If aggregate sound levels from the construction site exceeds 8 dBA above ambient sound levels, as measured inside a residential dwelling unit with windows and doors closed, the commissioner may request additional noise mitigation to reduce the noise excess.
   - It is an emergency; it cannot be safely done or there would be traffic congestion during normal hours; it is a city project judicially mandated or is necessary for the public interest.
   - It would have minimal noise impact.
   - Unique or unforeseen site characteristics that would create undue hardship if restricted normally, providing there is an alternative noise mitigation plan (24-221) setting forth additional noise mitigation beyond that normally required, to limit noise emission after hours.

2. Section 24-223 (e) (4) calls for the commissioner to promulgate rules for construction activities with minimal noise impact and specific mitigation measures for such activities. These rules are found in Title 15 of the Rules of the City of New York, Chapter 30. If the rules are followed, the construction activities identified as producing minimal noise impact can be done during otherwise prohibited hours. There is differentiation between conditions where the building under construction has windows yet or not.

   The rules for construction activities with minimal noise impact include:

   - Having all doors and windows sealed, for certain activities;
   - No use of power tools within 25 ft of a legal residential unit;
   - Only non-structural and non-demolition activities are permitted;

- The floors directly above and below the activities must be unoccupied;
- Where power tools are permitted, the quietest tools must be selected.

Commentary

Provides flexibility to Section 24-222 construction prohibitions, with conditions.

Section 24-223.1 Stop work order

1. The department has the power to issue a stop work order, verbally or in writing.
2. Such an order is appealable.

Commentary

This is a useful power. The MECP has this power for sources under its jurisdiction. We are not in a position to comment whether the City has such power under its legislation.

Section 24-224 Construction work without noise mitigation plan unlawful

1. There must be compliance with a noise mitigation plan.
2. Such compliance is deemed compliance with decibel level limits in the code.

Subchapter 5: Prohibited Noise Specific Noise Sources Sound Level Standard

This subchapter sets sound level limits for specific sources(Sections 24-225 to 24-232). For some sources, the code not only sets a sound limit during operation but also prohibits the sale or offering for sale of non-complying equipment. Table 6-1 summarizes the sound limits for various equipment and activities.

Commentary

The power to limit sales of equipment not complying with sound limits is very broad. Such prohibitions may not be permissible under our legal system.

Section 24-231 Commercial Music

1. No particular descriptor is specified for the defined sound limits (see Table 6-1). Thus, L_{max} of the instantaneous sound level (on slow) would apply. See Section 24-217.1.
2. The commissioner has wide discretion to recommend no penalty for a first offence, subject to the source implementing permanent remediation that is verified to result in compliance.
3. The commissioner also has the discretion to grant a variance to the sound limits, applicable only to the owner of the source at the time, not transferable to future owners. The variance can include the imposition of conditions the commissioner deems appropriate.

Commentary

1. It appears that noise problems from the music/entertainment venues are significant. However, entertainment venues are important and a valued feature of the City. The discretion given to the commissioner provides an incentive for cooperative sources to resolve the noise issues to everyone's benefit, without having to go to court or to face penalties or fines.

2. Because music can have transient, high sound level peaks and typically varies significantly form instant to instant, specifying a maximum instantaneous sound level can be very stringent, compared to using some form of energy averaging such as L_{eq}. Note, L_{eq} is very sensitive to high sound level events, even if they last for short periods of time. In addition, without specifying a reasonable time duration, “loop holes” can be created. For example, a measurement time can be chosen when the source sound levels are at a minimum. It is common practice, certainly in Ontario, to use one-hour analysis periods. Notwithstanding, these potential concerns/discrepancies, the NYC sound limits for music (42 dBA or 45 dB in any 1/3 octave band, 63Hz to 500 Hz, in a dwelling) are about the same order of magnitude as the limits recommended by Valcoustics in the discussion of Section 591-4, earlier and are considered reasonable; although music at these sound levels would be perceptible.

TABLE 6-1: NYC SOUND LEVEL LIMITS

Code Section	Source	Sound Level Limit	Comment
24-225	Refuse Collection Vehicles	80 dBA @ 35 ft 80 dBA within 50 ft of residential property, 11:00 pm to 7:00 am	Slow response; during compacting cycle with no compacting load. Does not apply in emergency such as snow storm causing delays in refuse collection.
24-226	Air compressors	80 dBA at 1 m, greater than 350 cfm; 75 dBA at 1 m, 350 cfm or less	Must have muffler & no exhaust leaks
24.227	Circulation Devices	42 dBA inside a receiving property dwelling unit for new device, cumulative total of all devices to not exceed 45 dBA	Circulation Device = any device circulating gas or fluid = fan, blower, pump, cooling tower, air conditioner, etc. Measured inside, 3 ft from open window or terrace door. Commissioner may recommend no civil penalty, subject to conditions.
24-228	Construction, exhausts and other devices	Non-impulsive: 85 dBA at 50 ft from source; at a point outside source property; Impulse: 15 dBA above ambient; at any point on a receiving property or at 15 ft or more from source on public right-of-way	Ambient measured on slow response; impulse on fast response must comply with aggregate limit even if individuals comply.
24-228.1	Exhausts	No unreasonable noise; includes but not limited to sound exceeding limits of 24-228	
24-229	Containers and construction material	Non-impulse: 10 dBA above ambient at any point on receiving property or at 15 ft or more on public right-of-way. Impulsive: 15 dBA above ambient at any point on receiving property or at 15 ft or more on public right-of-way	Applies to handling or transporting construction material. Ambient measured on slow response; impulse on fast response.
24-230	Paving Breakers	95 dBA at 1 m	Requires muffler with 5 dBA insertion loss for air discharge.
24-231	Commercial Music	42 dBA, or 45 dB in any 1/3 octave band, 63 to 500 Hz, or 6 dBC above ambient, providing ambient exceeds 62 dBC, inside a dwelling unit.	Music from or in commercial establishment or enterprise measured inside any receiving property dwelling unit. Commissioner may recommend no civil penalty providing conditions satisfied.

Section 24-232 Allowable decibel levels – octave band measurement.

1. This section provides octave band sound limits in addition to overall A weighted or C weighted sound levels, for commercial or business enterprise sound sources. The octave band limits are in addition to any dBA limits, not in place of. See Table 6-2.

2. Does not apply to impulsive sound, music or construction, nor to electric substations owned or operated by a utility regulated by the New York State public service commission. These sound limits apply to any other source of sound associated with a commercial or business enterprise, such as mechanical equipment (exhaust fans, cooling towers, etc.) or assembly or manufacturing processes, etc.

3. Does not apply to any refuse collection facility owned, operated or regulated by NYC.

TABLE 6-2

ALLOWABLE DECIBEL LEVELS OCTAVE BAND MEASUREMENT

Octave Band	Maximum Sound Pressure Levels (dB) as measured within a receiving property as specified below.	
Frequency	Residential receiving property for mixed use buildings and residential buildings (as measured within any room of the residential portion of the building with windows open, if possible).	Commercial receiving property (as measured within any room containing offices within the building with windows open, if possible).
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

This is a more sophisticated and complicated method of addressing unusual spectral characteristics, including the bass frequencies of music, although music is excluded from this section. In practice it means needing a more sophisticated sound level meter that can also do

spectral analysis; that is, divide the sound frequency spectrum into bands (octave wide bands in this case) and measure the sound energy at each frequency.

Subchapter 6: Specific Noise sources plainly audible and other standards

Section 24-235 Animals

Animals must not produce unreasonable noise plainly audible at any location within a residential receiving property:

- Continuously for 10 minutes or more between 7 am to 10 pm;
- Continuously for 5 minutes or more between 10 pm to 7 am

Commentary

Somewhat similar in concept to Township of Mono limitation re "persistent" barking etc. However, allowing 5 minutes of unreasonable noise in any hour, can potentially be unacceptably disruptive.

Section 24-236 Motor Vehicles

1. The sound from a muffler or exhaust of motor vehicles, other than motorcycles, with gross weight of 10,000 lbs or less must not be plainly audible to another individual 150 ft or more from the motor vehicle.
2. As above for vehicles greater than 10,000 lbs and motorcycles at 200 ft.
3. Applies to streets with speed limits of 35 mph or less.

Commentary

Is somewhat similar to common noise by-law requirements or Ontario Highway Traffic Act requiring proper mufflers, except it adds "plainly audible" criterion at specific distances. Would seem somewhat difficult to enforce.

Section 24-242 Lawn care devices

1. Operation of any lawn care device is prohibited before 8 am and after 7 pm or sunset whichever is later and on weekends before 9 am and after 6 pm or any time such as to create unreasonable noise.
2. For this section, unreasonable noise includes, but is not limited to an aggregate maximum of 75 dBA at any point on a receiving property.
3. Does not apply to 7 am to 8 am for a department of parks and recreation staff or contractor at least 300 ft from any residential building.
4. Leaf blowers must have a functioning muffler.

Commentary

Addresses devices such as leaf blowers by prohibiting use in prescribed hours as well as setting a sound level limit which is relatively lenient at receptor property.

Section 24-243 Snow blowers

- Exempt

Commentary

Interestingly, snow blowers, which could use small gasoline engines similar to leaf blowers and could be used at any hour are exempt. Some snow blowers are electric and not noisy. Engines on snow blowers would be expected to be larger than those on leaf blowers and can more readily use better mufflers and/or 4 stroke engines which are quieter (and heavier) than 2 stroke engines commonly used.

Section 24-244 Sound reproduction devices

1. Must not create unreasonable noise.

2. Use of a sound reproduction device for commercial or business advertising purposes, or to attract attention is prohibited in front of or via openings in buildings, on motor vehicles, at any stand or structure, on airplanes, on any boat, anywhere on public space where such sound may be heard.

3. Incidental sounds from entertainment; sporting or permitted public events (Section 10-108) are excluded.

Commentary

This subject restriction on amplified sound is similar to the prohibition in the previous city of Toronto noise by-law prior to amalgamation.

Subchapter 7: Certificates and Tunnelling Permits

This relates to the issuance, by the commissioner of the environment of certificates/permits for tunnelling and blasting.

Commentary

These provisions are not particularly relevant to a Toronto noise by-law, notwithstanding that the TTC does tunneling.

Subchapter 8: Enforcement

Section 24-257 Powers of the board

Commentary

NYC has an Environmental Control Board which has very broad powers.The structure of the NYC government is quite different than that in Ontario and specifically the City of Toronto. The enforcement regime is thus legally very different and not comparable.

Summary and Conclusions

1. The NYC noise code is very comprehensive. However, it is complex and can be confusing.

2. It uses a combination of subjective/qualitative and quantitative provisions.

3. The subjective provisions use the concepts of “unreasonable noise” and “plainly audible” sound, which are both defined. In some cases, unreasonable noise is also defined by a maximum sound level.

4. A large part of the complexity is that “unreasonable noise” has somewhat different meanings in different sections. Also, the quantitative sound level limits use different receptor points and distances depending on the source. Also, in some cases metric units are used, while in other cases imperial units are used.

5. The commissioner of environmental protection has powers such as to make rules, conduct quasi-court hearings, order studies, order noise mitigation implementation, and seal offending equipment. These powers are eminently useful to achieve the objectives of the noise code. These powers may not be permissible under our legal system.

6. The NYC code is specific as to the sound level descriptor to be used for sound measurements.

7. To address music, the NYC code uses sound level limits expressed in dBA, dBC as well as octave bands. This is a potentially useful method of addressing low frequency sound from music but does introduce additional complexity in sound measurement.

8. A number of the concepts in the NYC code are potentially useful for Toronto, modified and reworded appropriately:

   - quantitative sound limits for identified sources;
   - subjective provisions together with definitions of concepts such as plainly or clearly audible;
   - noise mitigation plans for construction sites and for sources/activities for which an exemption to the noise by-law is sought.

9. Contrary to the current proposal to simplify Chapter 591 and rely heavily on Section 591-2, General Prohibition, the NYC noise code tends to address a wide variety of sound (noise) sources individually and specifically; somewhat similar in concept to the current Chapter 591.

6.3 CITY OF CHICAGO – CHAPTER 8-32 NOISE AND VIBRATION CONTROL (CHICAGO NOISE ORDINANCE)

6.3.1 Section 8-32-030 Rules and Regulations:

Allows the superintendent of police to adopt regulations as appropriate for the proper administration of the ordinance (except in Section 8-32-09 – Mechanical Stationary Source).

Interestingly the section that is exempted, as indicated above, is the section which defines numerical quantitative sound level limits. All other sections in the ordinance are based on subjective standards.

Presumably the superintendent has the ability to set or change the subjective standard as needed.

6.3.2 Section 8-32-050 Remedies and Violations:

Deals with remedies for violations. In addition to monetary fines, where a person is "found liable for a violation" (presumably this means the equivalent of a conviction for a charge), the superintendent of police (or the superintendent's designee) can require the violator to submit a compliance plan indicating how similar violations will be prevented in the future. Not responding to such a request is an additional offence.

6.3.3 Section 8-32-070 Music and Amplified Sound:

1. Covers any instrument (musical instrument) that creates or amplifies sound (e.g. a sound system).

2. When on a public way, must not be louder than average conversational level (a defined term) at 100 ft or more from the source, measured either horizontally or vertically.

3. If on private open space, between 10pm and 8am, must not be louder than average conversational level at 100 ft or more from the property line of the property from which the sound is generated.

4. Excluded during the hours of 8 am to 10 pm are parades, athletic events, public assemblies or special events that have a permit.

5. "Average conversational level" is defined as a level at which normal, unamplified speech is clearly and distinctly audible above ambient noise level (ambient noise level is also a defined term).

6. The definition of "ambient noise level" used by Chicago is:

   "Ambient noise level" means the sound level at a given location that exists as a result of the combined contribution in that location of all sound sources, excluding the contributions of a source or sources under investigation for violation of this Code.

Comments:

1. This is basically very subjective and could pose enforcement challenges in gauging or proving loudness of sounds, particularly against an ambient that could be quite variable with location and time.

2. The restriction in 3. above is only for sources in private open space (outdoors). Does not appear to apply to sources that are indoors and projecting sound out through an open or closed window, door, or other opening in a building.

6.3.4 Section 8-32-080 Regulated Entertainment Businesses:

1. Applies to establishments with a liquor licence or place of amusement.

2. Part (a) limits sound from any electronic amplifier to louder than average conversational level at a distance of 100 feet or more from the property line of the property for which the noise is being generated.

3. Businesses must cooperate with reasonable requests to investigate sound levels (presumably allowing sound measurements).

4. Where a business was found liable for two violations and has been charged with a third, all within one year, the superintendent of police can recommend the revocation/suspension of the liquor or place of amusement licences, or both.

Comments:

1. Again, a subjective test is used to determine compliance and may pose enforcement issues.

2. It is unclear how the restriction in 2. above would apply to complaints of noise within an adjacent building, if at all.

3. The potential suspension of liquor or amusement licences, on the recommendation of the superintendent of police, in addition to the potential fines, is a powerful penalty and incentive for compliance. Such a mechanism is not directly available to the City of Toronto because liquor licences are provincially issued by the Alcohol and Gaming Commission of Ontario (AGCO). The City could make a complaint or recommendation to the AGCO, but could not revoke a liquor licence.

6.3.5 Section 8-32-090 Mechanical Stationary Sources:

1. This is a defined term, meaning any machine or device operated by fuel or electricity that does not change locations while in use. It includes air conditioners, etc. and sound sources such as generators in vehicles or trailers that are used when parked.

2. Part (a) limits the sound level to 55 dBA at 100 ft or more from the source or 70 dBA at 10ft or more from the source. The measurement location shall be at the nearest adjacent public way (a defined term meaning sidewalk, street, alley, highway or other public thoroughfare) or nearest adjacent property, whichever is closer. These limits apply between 8pm and 8am unless other hours are specifically permitted or authorized by the department of environment.

3. Part (c) gives authority to the commissioner of health to enforce the provisions of this section and issue regulations specifying “uniform noise mitigation procedures for air handling and refrigeration units.” Any properly maintained equipment complying with such procedures is deemed to be in compliance with part (a).

4. The sound limits do not apply to generators providing emergency power.

Comments:

1. The sound limits are implicitly outdoors. The 55 dBA limit is reasonable. However, in a dense urban area, the 70 dBA limit would be the applicable limit in most cases. This is very liberal and would be expected to be unacceptable to most people (for example, from a neighbour’s air conditioner).

2. The concept of the City issuing “uniform noise mitigation procedures” for air conditioners is unusual. Because of the large variability in equipment and circumstances we see this approach of prescriptive “pre-engineering” as not practicable.

3. The sound level limits appear to apply individually to a single mechanical unit. This is much less stringent than typical assessments done in Ontario, which are based on a cumulative impact from all sources at the facility.

6.3.6 Section 8-32-100 Emergency Signal Devices:

Emergency signals are essentially exempted in emergencies and during testing. Testing is limited to between 9am and 5pm and each test is limited to 4 minutes. Periodic testing is to occur at the same time of day.

6.3.7 Section 8-32-110 Non-emergency Signal Devices:

1. Non-emergency signal sounds must not create a “noise disturbance” (a defined term) within a residential district for more than 5 minutes in an hour. (Steam whistles are specifically prohibited except as alarm signals.)

2. “Noise disturbance” means any sound audible at 600 ft or more from the source or sound exceeding 70 dBA “on the public way” when measured at 10 ft or more from the source.

Comments

1. Interestingly, there are no time restrictions. Thus, 5-minute, non-emergency, noise disturbances can be produced during any hour.

2. There is both a subjective limit (audible) and quantitative limit (70 dBA at 10 ft or more). The subjective limit is subject to differences of opinion as to what audible means. The numeric limit is relatively liberal.

6.3.8 Section 8-32-120 Restrictions Within Noise Sensitive Zones

Within defined noise sensitive zones, creating any sound that interferes with the functions of any school, library, church, hospital or nursing home is prohibited.

Comments

This is basically subjective. Presumably, for enforcement, if there was disruption, it would not be difficult to provide evidence of how a sound caused interference.

6.3.9 Section 8-32-130 Loading and Unloading Operations:

Causing a noise disturbance in a residential district or noise sensitive zone, between 10pm and 7am is prohibited due to handling or opening or closing of boxes, containers, garbage cans, dumpsters, etc.

Comments

See comment 2. For Section 8-32-110.

6.3.10 Section 8-32-140 Construction, Repair or Demolition Equipment:

Section (a) prohibits the use of any powered mechanical equipment or tool between 8pm and 8am, within 600 ft of any residential building or hospital. Emergency repairs or work on public improvements authorized by a government agency are exempt.

Comments

Compared to the common restriction in Ontario, which typically prohibits the sound from construction/repair/demolition during defined time, either being clearly audible or exceeding a sound limit at a point of reception, this clause actually prohibits the activity itself (use of power tools/equipment) in the defined zone. Prohibiting the activity is not necessarily appropriate because there may be circumstances when the sound inherently may not be audible at a point of reception.

6.3.11 Section 8-32-150 Limitations on Noise Not Otherwise Addressed

This is a “catch-all” that prohibits generating noise on a public way or on any private open space, between 8pm and 8am that is louder than average conversational level at 100 ft or more from the source, or from the property line of the source property, respectively.

Comments

This is basically the same as for music and amplified sound, Section 8-32-070. The same comments apply.

6.3.12 Section 8-32-160 Limitations on Earthshaking Vibrations

1. Part (a) requires any manufacturing use in M2 (General Manufacturing) or M3 (Heavy Manufacturing) that creates “intense earthshaking vibrations” to be set back at least 300 ft from the boundary of a residence, business or commercial district and at least 150 feet from the boundary of an M1 restricted manufacturing district. However, there is no violation if earthshaking vibrations are not perceptible beyond the lot line without the aid of instruments.

2. Part (b) requires that, in other districts, earthshaking vibrations must not be perceptible beyond the lot line without the aid of instruments, except where the affected adjoining property is zoned M3.

3. Part (c) prohibits earthshaking vibrations that create a nuisance or hazard beyond the lot lines of the source, in any district.

Comments

1. The vibration requirements are basically subjective and non-quantitative.

2. It is somewhat unusual to see distance set backs in a noise by-law, even when tied to perceptibility of vibration. Setbacks are more commonly found in zoning by-laws.

6.3.13 Section 8-32-170 Exceptions and Exclusions:

Excluded are aircraft; airports; stadiums; mass transit; special events, public performances or fireworks, that have permits or authorization; construction, demolition or repair work for emergencies or for public improvements authorized by a government agency; earthshaking vibrations caused by construction; demolition or repair work done between 8am and 8pm; unamplified human voices; sounds measured within any manufacturing district (sound generated within a manufacturing district measured outside of the boundary of the manufacturing district is not excluded.)

Comments

The exceptions and exclusions to the noise and vibration by-law are all reasonable.

6.3.14 Summary and Conclusions

1. The Chicago noise ordinance uses a combination of subjective/qualitative and quantitative provisions.

2. Some of the subjective/qualitative provisions could be challenging to enforce.

3. Some of the quantitative sound limits are quite liberal, particularly the indoor sound limits at neighbouring residences for regulated entertainment businesses.

6.4 PORTLAND OREGON – TITLE 18 NOISE CONTROL

6.4.1 Section 18.02.020 - Policy Statement

This is a policy statement that identifies the intent of the document.

Comments:

Having a statement up front that identifies the purpose of the document is beneficial as it outlines the intent and may give additional insight to its application in certain, more complicated, circumstances.

6.4.2 Section 18.04.020 - Measurement of Sound

This section describes general principles for measuring sound and applies to the quantitative limits described further within.

Comments:

1. The sound measurement descriptor is an instantaneous sound pressure level, using a fast response setting on the sound level meter. This can be more restrictive than using an L_{eq} over a longer time-period, since many sounds fluctuate in sound level over short time durations. However, in some cases this approach may be lenient, if there is the opportunity to choose a time for the sound measurements when sound levels are less than they are at other times.

2. There are different classes of sound level meters. Type 1 is the "Precision" class. Type 2 is the "Survey" class. Type 2 has a wider measurement tolerance and thus is somewhat less "accurate" than Type 1. The Portland noise by-law allows Type 2. A wider measurement tolerance may make enforcement more difficult.

6.4.3 Section 18.04.040 - Definitions

A number of terms are defined. Of note are "Noise Disturbance": defined as "Any sound which a) injures or endangers the safety or health of humans; or b) annoys or disturbs a reasonable person of normal sensitivities.", and "Plainly Audible". The term "Plainly Audible" would be similar to the term "Clearly Audible" in the Toronto Noise By-law and is defined in Portland as: "Any sound for which the information content of that sound is unambiguously communicated to the listener, such as, but not limited to, understandable spoken speech, comprehension of whether a voice is raised or normal, or comprehensible musical rhythms.".

6.4.4 Section 18.08.030 Product Selection

Requires the City to consider sound emission in procuring material or equipment where sound is a factor, subject to conditions regarding quality and cost.

6.4.5 Sections 18.060.010 to 030 – Noise Control Officer, Noise Review Board, Responsibilities and Authority

These sections define the roles, responsibilities and the authority of each of Noise Control Officer and Noise Review Board.

A Noise Control Officer is defined as a "special police officer" of the City and is given authority to issue citations for violations under the Noise Control document, including for motor vehicles violations. Section 18.06.010 states that Noise Control Officers are "…special police officers of the City and shall have authority to issue citations for the violations of this Title and to this extent shall exercise full police power and authority.". It is not clear whether this power includes stopping moving vehicles or whether the Noise Control Officer would have the proper training and means to do this safely. (Section 18.10.020 Motor Vehicles, see below, specifically authorizes both a police officer or noise control officer to issue a citation to a motor vehicle operator.)

The Officer can also promulgate rules and procedures for sound measurement.

The Board is charged with education, disseminating information and enlisting cooperation from public, civic, scientific and educational groups; evaluating the effectiveness of the noise control code, making recommendations for changes and developing long term objectives for reducing community sound levels including how to implement the objectives.

6.4.6 Section 18-10-010 Land Use Zones (Sound Level Limits)

This section provides various numerical (quantitative) sound level limits (overall dBA sound levels) for different type of receiver zones (commercial, residential, etc.), depending on the zone the source is located in (commercial, residential, etc.). See Table 6-3

TABLE 6-3
FIGURE 1
PERMISSIBLE SOUND LEVELS
(7 am-10 pm, otherwise minus 5dBA)

		Zone Categories of Receiver (measured at property line)			
Zone Categories of Source		Residential	Open Space	Commercial	Industrial
	Residential	55	55	60	65
	Open space	55	55	60	65
	Commercial	60	60	70	70
	Industrial	65	65	70	75

Adjustments to Figure 1

1. During the night hours, the sound levels of Figure 1 shall be reduced 5 dBA.
2. During all hours, the sound levels of Figure 1 shall be decreased 5 dBA for narrow band or steady sound (apply 1 only).
3. The adjustments provided herein are cumulative.

Both daytime and nighttime sound level limits are given. Adjustments of -5 dBA to the limits are provided for sources that have Narrow Band or Steady Sound characteristics (both defined terms).

Sound limits for impulse sound are 100 dB during day or 80 dB during night, in terms of “peak sound level” (not defined).

Octave band sound level limits are also provided. The use of the octave band sound level limits, over the overall sound level limits, is at the discretion of the Noise Control Officer.

The sound level limits apply at the property lines of another Person (a defined term).

Comments:

1. The quantitative sound level limits generally apply to all sources, except where indicated elsewhere in the document.
2. Sound level limits are also provided for use within zones other than residential, i.e. commercial and industrial zones. This is more comprehensive than the current Toronto By-law and MOE noise guidelines, which do not set sound level limits in areas of commercial or industrial land uses, which are considered not noise sensitive.
3. Sound level limit apply at property lines. This would be easier to measure than a sound level within a dwelling, as the residents do not need to be disturbed. However, the sound level on

the property line may not be representative of the offending noise causing the complaint, especially in multi-storey buildings.

4. The quantitative sound level limits of Table 6-3/Figure 1 are quite high. For example, from a source in an industrial zone to a receiver in a residential zone, the sound level limit is 65 dBA (daytime) and 60 dBA nighttime. This is 15 dBA higher than the minimum exclusion limit in the MOE noise guidelines for receivers in urban areas for both daytime and nighttime. The impulsive sound limits are also quite high, at 100/80 dB day/night, although it is ambiguous as to whether A weighted sound level is meant. Although commercial and industrial land uses are considered not noise sensitive in Ontario, the sound levels of 75 and 70 dBA permitted from industrial/commercial sources to industrial/commercial receptors can potentially be disruptive to business, for example by interfering with speech communications, depending on individual circumstances.

5. There is, in effect, a 5 dBA "penalty" as in the MECP noise guidelines for narrow band sound. This penalty also applies to steady sound. This is unusual because steady sound is usually thought to have less potential for annoyance than varying sound (unless it includes pure tones or peculiar narrow band characteristics).

6.4.7 Section 18.10.20 – Motor Vehicles

Proper mufflers are required, and there are subjective noise requirements.

This section also has sound level limits for various types of vehicles. The sound limits are applied by reference from another Oregon Administrative Rules document, OAR Chapter 340, Division 35.

Interestingly, Noise Control Officers are given authority to issue citations.

6.4.8 Section 18.10.030 Home Equipment and Powered Tools

Covers powered tools and equipment for home use or lawn and garden maintenance, except leaf blowers and tools and equipment used for a home occupation.

When used inside a dwelling, between 7 am and 10 pm, the limit is 60 dBA measured at the property line. For outside use, between 7 am and 10 pm, for 5 HP or less, the limit is 80 dBA at 25 ft (7.6 m). For more than 5 HP the limit is 85 dBA at 25 ft, including snow removal equipment (e.g. snow blowers).

For use inside or outside, between 10 pm and 7 am, the sound limits are those in 18.10.010.

For home occupation the limit is 50 dBA at the lot line.

Comments

The numerical sound limits are high in our opinion and likely to create adverse impact and conflicts, particularly in dense residential areas where distances between dwellings are small.

6.4.9 Section 18.10.035 – Leaf Blowers

1. Restrictions are given for the use of leaf blowers at certain times of the day, depending on the zone (residential, commercial, etc.) that the equipment is used in.

2. The Noise Control Officer is to establish a "list", which is updated at least yearly, of leaf blowers that do not exceed 65 dBA at 50 feet and which do not exceed 70 dBA at 50 feet.

3. (It is unclear if the "list" is general and refers to manufacturers' equipment or is specific and refers to equipment owned by individuals).

4. From March 1 to October 31 only leaf blowers on the list that meet the 65 dBA at 50 feet sound level requirement (or quieter) can be used.

5. From November 1 to February 28 only leaf blowers on the list that meet the 70 dBA at 50 feet sound level requirement (or quieter) can be used.

6. Sound level limits are also provided for Leaf blowers operated on Open Space land use zones.

Comments:

1. Sound emission limits are set for leaf blowers as opposed to a sound level limit at a point of reception.

2. A leaf blower must be registered with the Noise Control Officer with proof of the sound emission level following a recognized standard. This effectively limits the types of leaf blowers that could be used in the City.

3. There are two different sound emission limits used. Leaf blowers meeting the lower sound emission standard can be used at all times of the year. Leaf blowers meeting the higher sound emission standard can only be used in the late fall and winter.

6.4.10 Section 18.10.040 Watercraft

Motorboats operating within city limits are required to have a functioning underwater exhaust or muffler or discharge water continuously piped into the exhaust line.

Sound limits are 75 dBA, 7am to 10 pm and 65 dBA, 10 pm to 7 am as measured on shore.

Comments

1. With the preponderance of new residential development along the Toronto waterfront, the potential for complaints about "party boats" and conflict with residents will likely increase. Similar provision in Chapter 591 should be considered.

2. The muffler/exhaust requirements are similar to those relatively recently introduced for Canadian waterways.

6.4.11 Section 18.10.060 – Construction Activities and Equipment

A maximum sound level limit of 85 dBA at 50 ft (15.2 m) is given for construction activities and equipment, (although this does not apply to trucks, pile drivers, pavement breakers, scrapers, concrete saws and rock drills during daytime, which appear not to have a daytime sound limit).

Outside of business hours (that is, during 1800 to 0700 Monday to Friday and 1800 Saturday to 0700 Monday), the sound level limits in Section 18.10.010, including adjustments, apply, even to the exempted equipment from the general sound level limit listed above.

Comments

Both the daytime and nighttime sound limits are relatively high and would be expected to create unacceptable noise impact on residential neighbours, especially in dense areas. This aside from the fact that the indicated equipment is exempt from a sound limit during the daytime.

6.4.12 Section 18.12.010 – Noise Disturbance Prohibited

This is a general clause that uses the defined term "Noise Disturbance", which is a subjective test, stating it is unlawful to make, continue, cause or permit to be made or continued any Noise Disturbance.

Noise Disturbance is defined as: "Any sound which: a) injures or endangers the safety or health of humans; or b) annoys or disturbs a reasonable person of normal sensitivities.

Comments

1. Typically, any sound likely to be encountered in an urban environment is unlikely to cause injury or endanger health and safety directly. Indirectly, it could cause danger by masking warning signals to make them not perceptible.

2. Knowing what will disturb or annoy another person is potentially problematic. One person's music can be another person's noise.

6.4.13 Section 18.12.20 Specific Prohibitions

Clause A limits noise disturbance from animals any time day or night that may be heard beyond the owner's property. The description indicates the noise is in violation if it is continuous for more than 10 minutes or there are repeated episodes that last for more than 30 minutes. Does not apply to authorized kennels.

Clause B restricts noise from sound producing or reproducing equipment: that causes a "Noise Disturbance"; or between the hours of 2200 and 0700 if it is "Plainly Audible" within a dwelling unit; or from operating on public property or on a public right of way if it is "Plainly Audible" 100 feet or more from the device. If the device is operated in a public park and the operator has a permit, it would only be in violation if the sound is "Plainly Audible" at the park boundary.

Plainly Audible is defined as: "Any sound for which the information content of that sound is unambiguously communicated to the listener, such as, but not limited to, understandable spoken speech, comprehension of whether a voice is raised or normal, or comprehensive musical rythms.

Clause C restricts noise from parked motor vehicles (10,000 lbs or more) if the noise is "Plainly Audible" within a dwelling unit.

Comments:

The restrictions for sound producing/reproducing equipment are all based on violating the "Plainly Audible" subjective test, in one form or another or causing a "noise disturbance".

6.4.14 Summary and Conclusions

1. The City of Portland Noise Control document uses a combination of subjective and objective (quantitative) provisions.
2. The quantitative sound limits apply at property lines and would be easier to measure, but would not necessarily be representative of locations where noise complaints occur.
3. The use of quantitative sound level limits requires specialized equipment and training knowledge for the Noise Control Officers.

7.0 NOISE MITIGATION PLAN

A noise mitigation plan (NMP) should, as a minimum, be comprised of the items listed below. Implementation and review can be facilitated by having a formal checklist and requiring the NMP to be organized as per the checklist to make review easy.

1. Nature of project (e.g. construction of 30 storey residential building with three levels of underground parking);
2. Address;
3. Key Plan;
4. Site Plan;
5. Description of the activities and noise sources (e.g. excavation, dewatering, pouring concrete; excavators, front end loader, dump trucks, pumps, ready-mix concrete trucks);
6. Start date; end date;
7. Normal hours of operation;
8. Sound emission levels of each sound source (sound power levels or sound pressure levels at specific distance);
9. Source of data and standards by which data obtained;
10. Identification of receptors on adjacent properties potentially impacted by noise (show on area plan);
11. Identification of the noise criteria applicable at each receptor (The applicable noise criterion is the stated limit or the adjusted limit based on the ambient. Thus each receptor may have a different noise criterion. Also there may be differences at any receptor depending on time of day.);

12. The predicted sound level at each receptor must be compared to the applicable noise criteria. Where there is an excess, this will define the amount of noise mitigation needed for compliance. The noise excesses (if any) at each receptor are to be determined;

13. Detailed description of noise mitigation measure(s) to be applied to each sound (noise) source contributing to excess (e.g. limiting hours, sound barriers, acoustic enclosure, upgraded muffler, silencer at air outlet or inlet).

ADL\tk\hd
J:\2017\1170622\000\Reports\Review of Proposed Revised Chapter 591 V0_12 Dft.docx

APPENDIX A

NEW YORK CITY CONSTRUCTION NOISE MITIGATION PLAN

THE CITY OF NEW YORK
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Environmental Compliance
59-17 Junction Boulevard, 9th Floor, Flushing, New York 11373
Records Control (718) 595–3855

Construction Noise Mitigation Plan

IT IS NOT NECESSARY TO FILE THIS DOCUMENT WITH DEP; HOWEVER, IT MUST BE POSTED AND/OR ACCESSIBLE TO INSPECTORS.
IF THIS DOCUMENT IS NOT POSTED ON SITE, CONTACT SHEET MUST BE POSTED

The responsible party shall be liable for the accuracy of the document and compliance with all applicable rules in Title 15 Rules of the City of New York - RCNY Chapter 28.

Contact Information

Name of Responsible Party as defined in Title 15 RCNY §28-109: _____

Work Site Location: _____
Address Zip Borough Block Lot

Contact Phone Number of Responsible Party: _____

Approximate Distance to Closest Receptor (defined in Title 15 RCNY §28-109 of) _____feet.

Demolition Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Excavation Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Foundation Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Superstructure Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Finishing Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Other Construction Work is Taking Place from: _____ (Month) / _____ (Year) To _____ (Month) / _____ (Year)

Normal Work Hours (as defined in NYC Administrative Code §24-222) _____

NYC Department of Transportation Permit number(s) _____

NYC Department of Buildings Permit number(s) _____

Construction Devices

Check applicable boxes below:

List of §102 construction devices to be used at the site. When the additional devices listed below each category are utilized, the use of barriers as set forth in section IV herein is not required unless the NYC Department of Environmental Protection receives complaints as set forth in §28-102(C) of Title 15 of the RCNY for each device. If however, the specific devices listed below each main category of devices are not checked, and you are using any of the main devices listed below, then the use of barriers set forth in Section IV herein shall be utilized. However, if you specified "other" in a category, you shall be required to utilize barriers as set forth in Section IV herein.

☐ PILE DRIVERS

- ☐ Vibratory Pile Driver or Hydraulic Impact Pile Driver as defined in 102(a)(1)(B)(ii)
- ☐ Noise Bellows as defined in 102(a)(1)(B)(viii)
- ☐ No

☐ JACKHAMMERS

- ☐ Quieter makes and models as defined in 102(a)(2)(B)(i)
- ☐ No

☐ HOE RAMS

- ☐ Quieter makes and models as defined in 102(a)(3)(B)(i)
- ☐ Noise Shroud as defined in 102(a)(3)(B)(iii
- ☐ No

☐ BLASTING

☐ VACUUM EXCAVATORS

- ☐ Smaller Capacity vac-truck as defined in 102(b)(1)(B)(i)
- ☐ Silencer as defined in 102(b)(1)(B)(iii)
- ☐ No

☐ DUMP TRUCKS

- ☐ US Made European Environmental Label equipment or equivalent as defined in 102(c)(1)(B)(iii)
- ☐ No

☐ CRANES

- ☐ Modern Hydraulic Crane as defined in 102(d)(1)(B)(ii)
- ☐ US Made European Environmental Label equipment or equivalent as defined in 102(d)(B)(1)(iii)
- ☐ No

☐ CONCRETE SAWS

☐ SANDBLASTING

☐ AUGER DRILL RIGS.

☐ OTHER

_____

_____

_____

Additional Construction Devices

List of additional applicable construction devices to be used at the site:

☐ **GENERATORS** ☐ **COMPRESSORS** ☐ **STREET PLATES** ☐ **BACKUP ALARMS** ☐ **PUMPS**

Note: DEP will utilize the Federal Highway Administration Roadway Construction Model as a means of identifying equipment either in Section II or III, that may be the cause of a noise complaint, see §28-101(a) of Title 15 of the RCNY for compliance options.

Mitigation Barriers

Noise Mitigation Barriers Utilized: If required as set forth in §28-101(g) of Title 15 of the RCNY.

Required to use Perimeter barrier /DOB construction fence or temporary/moveable barrier:

○ **YES** ○ **NO**

☐ PILE DRIVERS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ JACKHAMMERS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ HOE RAMS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ BLASTING

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ VACUUM EXCAVATORS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ DUMP TRUCKS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ CRANES

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ AUGER DRILL RIGS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ STREET PLATES

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ BACKUP ALARMS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

☐ CONCRETE SAWS

☐ Perimeter barrier/DOB Construction Fence ☐ Temporary barrier ☐ Moveable barrier

I _____ of the _____
Name of Responsible Party Company

hereby certify that the information contained in this form is true and accurate.

_____ _____
Signature Date

Notary Public