
APPENDICES

APPENDIX A. GLOSSARY OF TERMS^(1, 2)

A-weighting – A standardized filter used to alter the sensitivity of a sound level meter with respect to frequency so that the instrument is less sensitive at low and high frequencies where the human ear is less sensitive. Also written as dBA.

Accelerometer – A transducer that converts vibratory motion to an electrical signal proportional to the acceleration of that motion.

Ambient – The pre-project background noise or vibration level.

Amplitude – Difference between the extremes of an oscillating signal.

Alignment – The horizontal location of a railroad or transit system as described by curved and tangent track.

At-grade – Tracks on the ground surface.

Automated Guideway Transit (AGT) – Guided steel-wheel or rubber-tired transit passenger vehicles operating singly or in multi-car trains with a fully automated system on fixed guideways along an exclusive right-of-way. AGT includes personal rapid transit, group rapid transit and automated people mover systems.

Auxiliaries – The term applied to a number of separately driven machines, operated by power from the main engine or electric generation. They include the air compressor, radiator fan, traction motor blower, and air conditioning equipment.

Ballast mat – A 2- to 3-inch-thick elastomer mat placed under the normal track ballast on top of a rigid slab or packed sub-grade.

Ballast – Granular material placed on the trackbed for the purpose of holding the track in line and at surface.

Bus Rapid Transit (BRT) - A type of limited-stop bus operation that relies on technology to help speed up the service. Buses can operate on exclusive transitways, high-occupancy-vehicle lanes, expressways, or ordinary streets.

Catenary – On electric railroad and light rail transit systems, the term describing the overhead conductor that is contacted by the pantograph or trolley, and its support structure.

Commuter rail – Conventional passenger railroad serving areas surrounding an urban center. Most commuter railroads utilize locomotive-hauled coaches, often in push-pull configuration.

Consist – The total number and type of cars, locomotives, or transit vehicles in a trainset.

Continuous welded rail – A number of rails welded together to form unbroken lengths of track without gaps or joints.

Corrugated rail – A rough condition of alternating ridges and grooves which develops on the rail head in service.

Crest factor - The ratio of peak particle velocity to maximum RMS amplitude in an oscillating signal.

Criteria – Plural form of “criterion,” the relationship between a measure of exposure (e.g., sound or vibration level) and its corresponding effect.

Cross tie – The transverse member of the track structure to which the rails are spiked or otherwise fastened to provide proper gage and to cushion, distribute, and transmit the stresses of traffic through the ballast to the trackbed.

Crossover – Two turnouts with the track between the frogs arranged to form a continuous passage between two nearby and generally parallel tracks.

Cumulative – The summation of individual sounds into a single total value related to the effect over time.

Cut – A term used to describe a trackbed at a lower level than the surrounding ground.

dB – see Decibel.

dba – see A-weighting.

Decibel – The standard unit of measurement for sound pressure level and vibration level. Technically, a decibel is the unit of level which denotes the ratio between two quantities that are proportional to power; the number of decibels is 10 times the logarithm of this ratio. Also written as dB.

Descriptor – A quantitative metric used to identify a specific measure of sound level.

DMU – Diesel-powered multiple unit. See Multiple Unit.

DNL – see L_{dn} .

Electrification – A term used to describe the installation of overhead wire or third rail power distribution facilities to enable operation of trains.

Embankment – A bank of earth, rock or other material constructed above the natural ground surface.

Equivalent Level – The level of a steady sound which, in a stated time period and at a stated location, has the same sound energy as the time-varying sound. Also written as L_{eq} .

Ferry boat – A transit mode comprised of vessels to carry passengers and/or vehicles over a body of water.

Fixed guideway – A mass transit facility with a separate right-of-way for the exclusive use of public transportation and other high-occupancy vehicles.

Flange – The vertical projection along the inner rim of a wheel that serves, together with the corresponding projection of the mating wheel of a wheel set, to keep the wheel set on the track.

Floating slab – A special track support system for vibration isolation, consisting of concrete slabs supported on resilient elements, usually rubber or similar elastomer.

Frequency – The number of times that a periodically occurring quantity repeats itself in a specified period. With reference to noise and vibration signals, the number of cycles per second.

Frequency spectrum – Distribution of frequency components of a noise or vibration signal.

Frog – A track structure used at the intersection of two running rails to provide support for wheels and passageways for their flanges, thus permitting wheels on either rail to cross the other.

Gage (of track) – The distance between the rails on a track.

Grade crossing – The point where a rail line and a motor vehicle road intersect.

Guideway – Supporting structure to form a track for rolling or magnetically-levitated vehicles.

Head-End Power (HEP) – A system of furnishing electric power for a complete railway train from a single generating plant in the locomotive.

Heavy rail – See Rail Rapid Transit.

Hertz (Hz) -- The unit of acoustic or vibration frequency representing cycles per second.

Hourly Average Sound Level – The time-averaged A-weighted sound level, over a 1-hour period, usually calculated between integral hours. Also written as L_{1h} .

Hybrid Bus – A rubber-tired vehicle that features a hybrid diesel-electric propulsion system. A diesel engine runs an electric generator that powers the entire vehicle including electric drive motors that deliver power to the wheels.

Idle – The speed at which an engine runs when it is not under load.

Intermediate Capacity Transit (ICT) – A transit system with less capacity than rail rapid transit, but more capacity than typical bus operations. Examples of ICT include bus rapid transit (BRT), automated guideway transit (AGT), monorails and trolleys.

Intermodal facility – Junction of two or more modes of transportation where transfers may occur.

Jointed rail – A system of joining rails with steel members designed to unite the abutting ends of contiguous rails.

L_{1h} – see Hourly Average Sound Level

L_{dn} – Day-Night Sound Level. The sound exposure level for a 24-hour day calculated by adding the sound exposure level obtained during the daytime (7 a.m. to 10 p.m.) to 10 times the sound exposure level obtained during the nighttime (10 p.m. to 7 a.m.). This unit is used throughout the U.S. for environmental impact assessment. Also written as DNL.

L_{eq} – see Equivalent Level

Light Rail Transit (LRT) – A mode of public transit with tracked vehicles in multiple units operating in mixed traffic conditions on streets as well as sections of exclusive right-of-way. Vehicles are generally powered by electricity from overhead lines.

Locomotive – A self-propelled, non-revenue rail vehicle designed to convert electrical or mechanical energy into tractive effort to haul railway cars. (see also Power Unit)

Main line – The principal line or lines of a railway.

Maglev – Magnetically-levitated vehicle; a vehicle or train of vehicles with guidance and propulsion provided by magnetic forces. Support can be provided by either an electrodynamic system wherein a moving vehicle is lifted by magnetic forces induced in the guideway, or an electromagnetic system wherein the magnetic lifting forces are actively energized in the guideway.

Maximum Sound Level – The highest exponential-time-average sound level, in decibels, that occurs during a stated time period. Also written as L_{\max} . The standardized time periods are 1 second for $L_{\max, \text{slow}}$ and 0.125 second for $L_{\max, \text{fast}}$.

Metric – Measurement value, or descriptor.

Monorail – Guided transit vehicles operating on or suspended from a single rail, beam or tube.

Multiple Unit (MU) – A term referring to the practice of coupling two or more diesel-powered or electric-powered passenger cars together with provision for controlling the traction motors on all units from a single controller.

Noise – Any disagreeable or undesired sound or other audible disturbance.

Octave band – A standardized division of a frequency spectrum in which the interval between two divisions is a frequency ratio of 2.

One-third octave band – A standardized division of a frequency spectrum in which the octave bands are divided into thirds for more detailed information. The interval between center frequencies is a ratio of 1.25.

Pantograph – A device for collecting current from an overhead conductor (catenary), consisting of a jointed frame held up by springs or compressed air and having a current collector at the top.

Park-and-ride facility – A parking garage and/or lot used for parking passengers' automobiles while they use transit agency facilities and vehicles.

Peak factor – see Crest factor.

Plan-and-profile – Mapping used by transportation planners that shows two-dimensional plan views (x- and y- axes) on the same page as two-dimensional profiles (x- and z-axes) of a road or track.

Peak Particle Velocity (ppv) – The peak signal value of an oscillating vibration velocity waveform. Usually expressed in inches/second in the United States.

Peak-to-Peak (P-P) Value – Of an oscillating quantity, the algebraic difference between the extreme values of the quantity.

Power unit – A self-propelled vehicle, running on rails and having one or more electric motors that drive the wheels and thereby propel the locomotive and train. The motors obtain electrical energy either from a rail laid near to, but insulated from, the track rails, or from a wire suspended above the track. Contact with the wire is made by a pantograph mounted on top of the unit.

Pure tone – Sound of a single frequency.

Radius of curvature – A measure of the severity of a curve in a track structure based on the length of the radius of a circle that would be formed if the curve were continued.

Rail – A rolled steel shape, commonly a T-section, designed to be laid end to end in two parallel lines on cross ties or other suitable supports to form a track for railway rolling stock.

Rail Rapid Transit – (often called “Heavy Rail Transit”) A mode of public transit with tracked vehicles in multiple units operating in exclusive rights-of-way. Trains are generally powered by electricity from a third rail alongside the track.

Receiver/Receptor – A stationary far-field position at which noise or vibration levels are specified.

Resonance frequency – The phenomenon that occurs in a structure under conditions of forced vibration such that any change in frequency of excitation results in a decrease in response.

Right-of-Way – Lands or rights used or held for railroad or transit operation.

Root Mean Square (rms) – The square root of the mean-square value of an oscillating waveform, where the mean-square value is obtained by squaring the value of amplitudes at each instant of time and then averaging these values over the sample time.

RMS Velocity Level (L_v) – See “Vibration Velocity Level.”

SEL – see Sound Exposure Level.

Sound Exposure Level – The level of sound accumulated over a given time interval or event. Technically, the sound exposure level is the level of the time-integrated mean square A-weighted sound for a stated time interval or event, with a reference time of one second. Also written as SEL.

Sound – A physical disturbance in a medium that is capable of being detected by the human ear.

Spectrum – See Frequency Spectrum.

Sub-Ballast – Any material of a superior character, which is spread on the finished subgrade of the roadbed and below the top-ballast, to provide better drainage, prevent upheaval by frost, and better distribute the load over the roadbed.

Subgrade – The finished surface of the roadbed below the ballast and track.

Suburban bus – Bus similar to an intercity bus with high-backed seats but no luggage compartment, used in express mode to city centers from suburban locations.

Switch – A track structure used to divert rolling stock from one track to another.

Tangent Track – Track without curvature.

Track – An assembly of rail, ties and fastenings over which cars, locomotives, and trains are moved.

Traction Motor – A specially designed direct current series-wound motor mounted on the trucks of locomotives and self-propelled cars to drive the axles.

Trainset – A group of coupled cars including at least one power unit.

Transducer – Device designed to receive an input signal of a given kind (motion, pressure, heat, etc.) and to provide an output signal of a different kind (electrical voltage, amperage, etc.) in such a manner that desired characteristics of the input signal appear in the output signal for measurement purposes.

Transit center – A fixed location where passengers interchange from one route or vehicle to another.

Trolley bus – A rubber-tired, electrically-powered bus operating on city streets drawing power from overhead lines.

Truck – The complete assembly of parts including wheels, axles, bearings, side frames, bolster, brake rigging, springs and all associated connecting components, the function of which is to provide support, mobility and guidance to a railroad car or locomotive.

Trunk line – See Mainline. The mainline of a commuter railroad where the branch line traffic is combined.

Turnout – An arrangement of a switch and a frog with closure rails, by means of which rolling stock may be diverted from one track to another.

VdB – see Vibration Velocity Level.

Vibration Velocity Level (L_v) – Ten times the common logarithm of the ratio of the square of the amplitude of the RMS vibration velocity to the square of the amplitude of the reference RMS vibration velocity. The reference velocity in the United States is one micro-inch per second. Also written as VdB.

Vibration – An oscillation wherein the quantity is a parameter that defines the motion of a mechanical system.

Wheel Flat – A localized flat area on a steel wheel of a rail vehicle, usually caused by skidding on steel rails, causing a discontinuity in the wheel radius.

Wheel Squeal – The noise produced by wheel-rail interaction, particularly on a curve where the radius of curvature is smaller than allowed by the separation of the axles in a wheel set.

REFERENCES

1. American National Standards Institute, “Acoustical Terminology,” ANSI S1.1-1994
2. American Public Transportation Association, “Public Transportation Factbook,” 55th Edition, March 2004.

