

How to Conduct a Noise Measurement

See **Meter Setup** document for direction on how to set up the (Larson Davis LxT1) meters before you begin any noise measurement. It is easiest to do the setup while connected to the meter in the G4 software because you can type in all the information screens rather than scroll through a master alphanumeric list, character by character.

Measurements are to be taken under meteorologically acceptable conditions, with winds less than 12 mph and dry pavement. All measurement equipment shall have a valid calibration certificate at the time of measurement. All staff conducting measurements shall have taken NHI courses on traffic noise FHWA-NHI-142086, Acoustics of Highway Traffic and Construction Noise or FHWA-NHI-142088, How to Measure Traffic Noise.

Use the [FHWA Noise Measurement Handbook](#)

And the [FHWA Noise Measurement Guide](#) as additional, incorporated references

A best practice is to take at least two short-term readings at each location in case one does not validate back at the office. This small time increase in the field is much less burdensome than having to repeat an out-of-town field visit. Short term readings can be 10 or 15 minutes in length (but stay consistent per project).

Conduct field calibration on meter prior to first reading at each location.

Use of the field data collection sheet on page 14 of Field Guide (or similar) with all applicable fields completed is required for all noise collection locations. Meteorological conditions can be entered after the fact by using 'history' function in many weather apps (i.e., weather.com, wunderground.com)

Meter shall be set up at 5' height in a safe location, free from obstruction and reflective noise sources. Noise analyst is to stay near meter during short-term collection periods.

Take photos from each direction around meter location as well as running meter to compliment field sketch. Additional photos can be for dominant noise sources or extra photos of noise environment.

Upon meter reading completion, conduct field calibration on meter after to last reading at each location.

It is best practice to download meter and check to ensure files aren't corrupted prior to moving to next site. If concurrent video is obtained, also download data, and ensure files aren't corrupted prior to moving to next site.

Field Preparation

Preparation prior to field work is key to success. Ensure all equipment is fully charged. Have extra batteries and external power bank available for trip. Have two copies of all potential field locations printed out (one on clipboard, one in backpack), as well as extra R/W entry permits, typical noise source printout for curious citizens who may want to know what you're doing. I usually have both meters with me, set up identically for at least part of the data collection. This ensures if one meter goes down, some data collection can still occur. One meter may be placed for a 24-hour reading at a citizen's residence if applicable.

Ambient/Background Existing Noise Measurements

NDOT generally assumes worst noise hour as the peak traffic volume multiplied by the posted speed limit. This does not always match actual field conditions. An alternative way to gather “worst noise hour” is to take short-term readings during each of three time periods over a 24-hour period. This can be done without also collecting concurrent traffic flow video. The three periods are during AM peak traffic, PM peak traffic, and overnight period. The results from these three readings are averaged together and extrapolated out to a full $Leq_{(1-hr)}$ to achieve an existing “worst noise hour”. The actual hours of AM and PM peak may vary. Retrieve this information from Traffic personnel. Each reading needs to be taken in the same location. Ensure that all applicable information is filled out on field data collection sheet.

Ideally these measurements would be taken in an ideal exterior area of frequent human use (EAFHU), like a private residence for a 24-hour reading, but due to the multiple times of data collection, collection sites are more likely to be somewhere in a public right-of-way (i.e., near park bench, sidewalk, trail).

Model Validation

Values should be used to the tenth of a decibel (XX.X) when collecting field readings. Field values are compared to modeled values to ensure they are within +/-3 dBA. Values will be recorded in the modeling to the tenth of a decibel but rounded to the nearest whole number for reporting purposes. (i.e., 64.0-64.4 will read as 64 dBA, 64.5-64.9 will read as 65 dBA).

http://www.adc40.org/docs/paper_award/2017%20Paper%20Award.pdf

Validation models should be 10 or 15 minutes in length and have video of concurrent traffic flow to calculate volumes. The noise measurement shall be taken during free-flow conditions, without traffic controls, away from sound reflective objects (i.e., buildings, privacy walls, parked vehicles), without interference from other noise sources (i.e., lawn equipment, air conditioners, airplanes, railroads, birds) and with a clear view of the roadway. Any extraneous noise source should be documented in the filed notes for possible time exclusion in the reading. If extraneous noise is excessive, reading should cease until the disturbance is done and then reading retaken. The traffic volumes should be extrapolated to a one-hour increment when being put into TNM for model validation purposes. If a radar detector is not used, then use the posted speed limit as the speed of free-flow traffic.