Instruction sheet for using the FRA horn noise model.

Cells in Blue are inputs.
Cells in Green are lookup tables.
Cells in Yellow are output.

Only cells in blue can be changed. The rest of the spreadsheet is locked and is not to be altered by the user.
The four cells in dark blue can be changed, but they contain formulas critical to the operation of the spreadsheet.
If they are changed, do not save the spreadsheet (or save it under a different name) or the formulas will be lost.
Note that the spreadsheet may take a few seconds to update after any changes to the input (especially with slower computers).

1 Noise Situation: Use the lookup table to specify the horn sounding condition of interest.

2 Horn Lmax: The maximum A-weighted sound level of the train horn at 100 feet from the front of the train.
If your Lmax is not at 100 feet, use the following converter to get the Lmax at 100 feet.

Your Lmax	110	dBA
Your distance	50	feet
Lmax at 100 feet	104	dBA

3 Horn Location on Locomotive: Use the lookup table to specify the location of the horns on the locomotives.
There are 4 options:

1 National average. Use this if the mix of horns is not known. It represents the national average of several thousand locomotives.
2 All front mounted: All the horns are located at the front of the locomotive.
3 All middle mounted: All the horns are mounted in the middle of the locomotive.
4 User defined percentage: If there is detailed knowledge about the horn location mix, use this and input the percentage of the front mounted horns in the blue input box in the lookup table.

4 Non Train Noise Environment: This represents the noise environment without any train noise (the background noise). Use the lookup table to determine the type of noise environment. A specific noise environment can be input, if the data is available. The values used for the non train noise environment are as follows:
Urban: 65 dBA Ldn
Suburban: 55 dBA Ldn
Rural: 45 dBA Ldn

5 Shielding: Use the lookup table to specify the type of shielding by the type of area where the grade crossing is located.
Near grade crossings, shielding is generally provided by rows of buildings. Using no shielding is not recommended.

6 Length of Impact Area: This determines the length of the impact area along the tracks. The default is 1/4 mile. The 20 second and 15 second options calculate the distance based on the speed of the train, up to a maximum of 1/4 mile for higher speed trains.

7 Train Speed: The speed of the train, in miles per hour. There are separate entries for existing and future trains.

8 Existing and future numbers of Trains: Use this to input the number of trains at the crossing. You should input the number of trains in one direction only, do not sum both directions. The split between day and night trains assumes an even distribution over the entire 24 hours of the day. Night is considered to be 10 pm to 7 am and day is 7 am to 10 pm. The user can input specific numbers for the day and night trains in the dark blue boxes if the split is not uniform (for commuter rail systems, as an example), but do not save the spreadsheet (or save it as a different name) or the formulas in those boxes will be lost. If you do lose the formulas, the following are the formulas you should use in those four cells.
Cell C14: +C12*15/24
Cell C15: +C13*15/24
Cell C16: +C12*9/24
Cell C17: +C13*9/24

9 Number of Cars: Enter the average number of cars, for both the existing and future cases.

10 Number of Locomotives: Enter the average number of locomotives, for both the existing and future cases.

11 Numeric Output: These two tables give the numeric output of the program. All distances are in feet.

Ldn 65 Contours Numeric Output: The first two numbers represent the distance perpendicular to the tracks to the Ldn 65 contour at the crossing, for both the existing and future conditions. The next two numbers represent the distance perpendicular to the tracks to the Ldn 65 contour at the halfway point of the horn zone. The final two numbers represent the distances along the track that define the half and full impact zone lengths.

Impact Zones Numeric Output: The first two numbers represent the distance perpendicular to the tracks to impact and severe impact at the crossing. The next two numbers represent the distance perpendicular to the tracks to the impact and severe impact at the halfway point of the horn zone. The final two numbers represent the distances along the track that define the half and full impact zone lengths.

12 Graphs: The graphs provide a visual means of comparing changes in the input parameters. Both scales remain constant, so you can do relative comparisons.

The Ldn 65 graph shows the existing (in blue) and the future (in red) Ldn 65 contours for the data provided by the user.

The Impact graph shows the impact (in blue) and the severe impact (in red) for the data provided by the user.

FRA Grade Crossing Noise Model

User Input	
Noise Situation (Pick from List)	3
Horn Lmax (dBA) @ 100 feet	104
Horn Location on Locomotive(Pick from List)	1
Non Train Noise Environment (pick from list)	2
Shielding (Pick from List)	3
Length of Impact Area (pick from list)	1
Existing Train Speed (mph)	40
Future Train Speed (mph)	40
Number of Existing Trains in one Direction	10
Number of Future Trains in one Direction	10
Existing Number of Day Trains (7 am to 10 p.m.)	6.25
Future Number of Day Trains (7 am to 10 p.m.)	6.25
Existing Number of Night Trains (10 p.m. to 7 am)	3.75
Future Number of Night Trains (10 p.m. to 7 am)	3.75
Existing Average Number of Cars	20
Future Average Number of Cars	20
Existing Average Number of Locomotives	2
Future Average Number of Locomotives	2

Noise Situation	
Horns Existing and Future	1
Horns in Future Only	2
No Horns Existing and Future	3

Horn Location on Locomotive			
National Average (50% front, 50% middle)			1
All Front Mounted			2
All Middle Mounted			3
User Defined	80	% front mounted horns	4

Non Train Noise Environment			
Urban			1
Suburban			2
Rural			3
User Defined Ldn =	50	dBA	4

Shielding	
Dense Urban	1
Light Urban	2
Dense Suburban	3
Light Suburban	4
Rural	5
No Shielding	6

Length of Impact Area	
1/4 mile	1
20 seconds	2
15 seconds	3

Ldn 65 Contours Numeric Output (in feet)	
Existing 65 Ldn Contour at X-ing	131
Future 65 Ldn Contour at X-ing	131
Existing 65 Ldn Contour at 1/2 zone length	131
Future 65 Ldn Contour at 1/2 zone length	131
Zone Length	1320
1/2 Zone Length	660

Impact Zones Numeric Output (in feet)	
Impact Distance at X-ing	0
Severe Impact Distance at X-ing	0
Impact Distance at 1/2 zone length	0
Severe Impact Distance at 1/2 zone length	0
Zone Length	1320
1/2 Zone Length	660