Calculating and Placing Non-Residential Receptors (NRRs)

Methodology: Grid

FHWA-HEP-17-055

This Fact Sheet is intended to provide basic information regarding the calculation (Step 1) and placement (Step 2) of Non-Residential Receptors (NRRs) using the Grid-based Methodology.

1. How many Receptors will I have?
2. Where would I then place those receptors within a site?
3. What impact do these decisions have on the Feasibility and Reasonableness of Noise Abatement?

LEGEND

☆ One star = One receptor

This methodology consists of three basic steps:

1) Define the method for determining the spacing of the grid.
2) Determine the placement of the grid within the property.
3) Place the NRR Points in the grid.

The 3 Steps:

1) Determination of the spacing of the grid generally occurs in one of two ways:

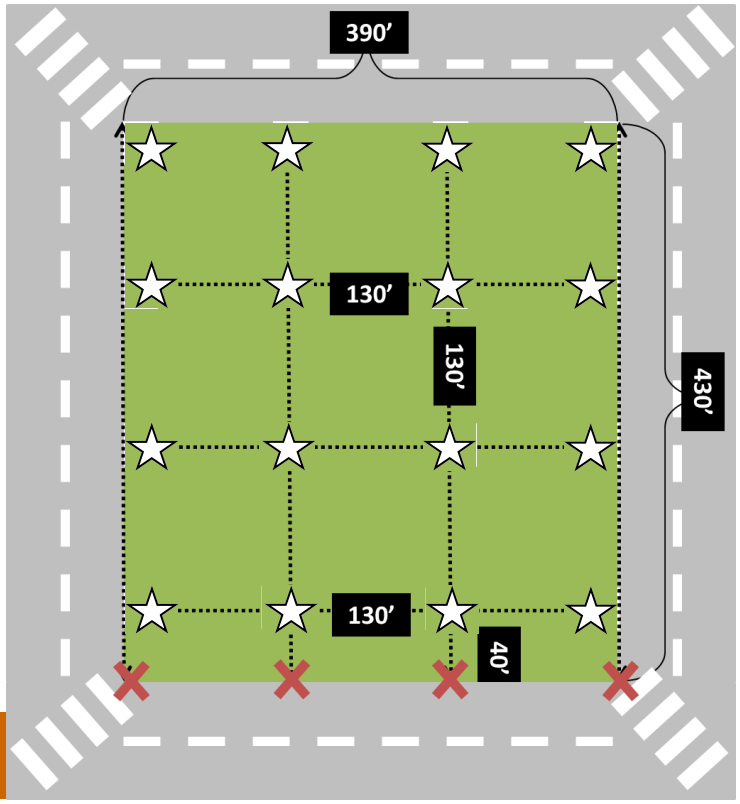
a. Use of average lot sizes where the NRR values and points are evenly distributed.
b. Use of historical data obtained from a State Highway Agency's (SHA) noise barrier database. Using statewide data, the surface area per mile of a SHA's average height barrier would be calculated. The number of residences per mile that would be protected by such a barrier would then be calculated considering the criteria of the SHA.

2) This methodology can be applied two ways to determine NRR Values:

a. Place the grid over an entire parcel.
b. Place the grid only over the portion of a parcel that has been determined to be impacted.

3) The NRR points are created and placed where the grid lines intersect and form complete lots/squares.

This methodology distributes NRRs in a grid over the parcel. The grid method typically uses the Frontage-based methodology's line and its spaced NRR points to "grow" the grid over the parcel. Obtaining the NRR point spacing number using statewide frontage data would be a one-time calculation; otherwise the calculations would need to be run for each project. Noise level predictions at points within the grid can be used to determine the extent of noise impacts within a parcel.



Step 1.a and Step 2.a.
[Result: a total of 16 receptors]

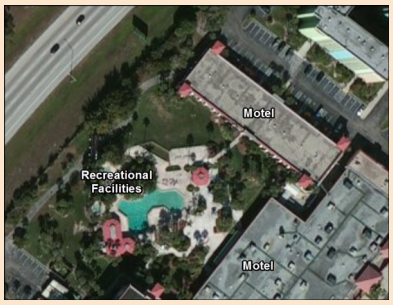
CASE STUDY EXAMPLES

U.S. Department of Transportation
Federal Highway Administration

No actual data on the sites was obtained, the examples assume:

That all properties were impacted.

A value of 100 feet Statewide average frontage length and an associated 100' grid.

Both the East and West parcels of the property have 680' of frontage to the highway. The West parcel has a depth of 240', the East parcel has a depth of 320'. Activity areas are spread throughout the parcels.		West Parcel NRR Value = 12 East Parcel NRR Value = 18 Total facility NRR Value = 30 The grid is placed entirely over both parcels and NRR Points are generated where the grid lines intersect.
The outdoor amphitheatre has 400' of frontage to the highway and a depth of 400'. Seating is located throughout the property.		NRR Value = 16 The grid is placed over the entire parcel and NRR Points are generated where the grid lines intersect.
A property contains a Church, a school, and a cemetery. The parcel has 600' of frontage to the highway and an average depth of 350'. The cemetery surrounds the Church and school lots.		NRR Value = 18 The grid is placed over the entire parcel and NRR Points are generated where the grid lines intersect.
A motel's outdoor use area has 450' frontage facing the highway and a depth of 250'.		NRR Value = 8 The grid is placed over the impacted area outdoors and NRR Points are generated where the grid lines intersect.

The Grid-based methodology usually differs from the Lot Size-based methodology in the following way:

SHAs that use the Lot-Size based methodology calculate NRR values based on the formula which relates to lot sizes. The NRR value may then be distributed in a variety of ways, dependent upon the SHA policy. The Grid-based methodology typically calculates the number of NRR points within a property based on the statewide statistics related to existing noise barriers and automatically places the NRR points where the grid lines intersect.