

# Calculating and Placing Non-Residential Receptors (NRRs)

## Methodology: Frontage

FHWA-HEP-17-054

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 Frontage-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 (3) basic steps:**

- 1) Define the method for determining NRR Values (how will the real length of the parcel's frontage to the roadway be divided up into sections representing an NRR value?).
- 2) Determine the placement of the frontage line within the property, and parallel to the highway under study.
- 3) Determine the location and spacing of the NRR Points along that frontage line.

## The 3 Steps:

### **1) Determination of the NRR Values can occur in two general ways:**

- a. Define a standard frontage-length section (typically from 100 to 125 feet).
- b. Base the frontage-length sections on the average frontage of residential properties using an equation.
  - i. In states with many noise barriers, a variation exists where the average frontage length sections are based on determining how many residences per mile would be protected by the average barrier in that state.

$$\text{NRR Value [frontage sections]} = \frac{\text{Frontage of the facility along the highway}}{\text{Average frontage of residential properties within a predetermined zone}}$$

### **2) The placement of the frontage line within the property usually occurs in one of three ways:**

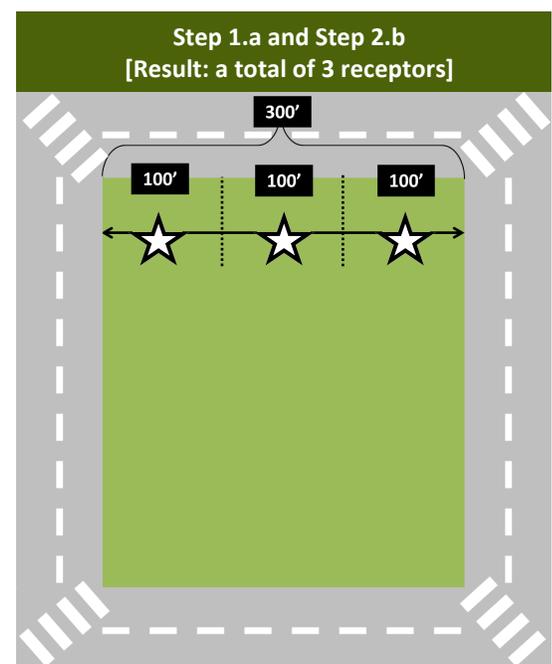
- a. Placed along the property line.
- b. Placed along a line representing front row residential receptors.
- c. Placed at some other predetermined setback distance defined in a State Highway Agency's (SHA) noise policy.

**Note:** The range of residential properties to consider for average frontage length can vary. SHAs usually use one of the following zones to obtain average frontage lengths:

Within the project area	Local (city, subdivision)
CMSA, MSA, or County-wide	Statewide

### **3) In this methodology, the NRR points are equally spaced in the center of each frontage line section**

The point placement options would affect the noise level and insertion loss at each point. This method is best suited for linear facilities such as trails. For fractions of frontage it is acceptable to round to the nearest whole number.



## 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' for the Statewide average residential frontage length and a predetermined setback distance of 100'.

The West Parcel consists of 9 activity areas; the East Parcel consists of 5 activity areas. Both parcels have 680' of frontage to the Interstate highway.



West Parcel NRR Value = 6.8  
East Parcel NRR Value = 6.8  
Total facility NRR Value = 13.6 (rounded to 14)

Seven NRR Points are placed on each side of the highway along the 100' predetermined setback distance, for areas near elevated highways

The outdoor amphitheatre and walking trails have at least 4 activity areas and front on 400 feet of highway.



NRR Value = 4

NRR Points are evenly spaced along the trail closest to the highway.

A 4,000 foot portion of a multi-mile trail parallels a major highway and is used for walking, jogging, and bicycle riding.

Along this 4,000 foot portion there are 5 rest areas with benches and water fountains.



NRR Value = 40

NRR Points evenly spaced along the entire 4,000' of trail.

A property contains a Church, a school, and a cemetery. The parcel has 550' of land fronting the highway and its on-ramps.



NRR Value = 5.5 (rounded to 6)

NRR Points evenly spaced along a line that corresponds to the typical setback distance of a front-row residence in the area.

A motel has an exterior recreation area with 450' of frontage facing the highway. The motel's property line is approximately 75' away from the edge of pavement of the highway.



NRR Value = 4.5 (rounded to 5)

NRR Points evenly spaced along the motel's property line.