



# NOISE ANALYSIS



## 113 US 113 North / South Study

### NOISE ANALYSIS

#### Federal Noise Regulations

The Federal Highway Administration (FHWA) has issued guidelines for noise evaluation as established in Title 23 of the Code of Federal Regulations (CFR) Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. Highway traffic noise studies, noise abatement procedures, coordination requirements and design noise levels in CFR Part 772 constitute the noise standards mandated by 23 U.S.C. 109(i). Design noise levels for various types of activity (land use) categories are summarized in the table below.

FHWA Noise Abatement Criteria Activity Relationships

Activity Category	Design Noise Level Leq(h)	Description of Activity Category
A	57 dBA (Exterior)	Land on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 dBA (Exterior)	Residences, motels, hotels, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
C	72 dBA (Exterior)	Developed lands, properties or activities not included in categories A and B above.
D	--	Undeveloped lands.
E	52 dBA (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums.

#### Outline of Noise Analysis Procedures

1. Identify Noise-Sensitive Land Uses
2. Determine Existing Noise Levels
3. Compare Computed and Measured Noise Levels
4. Predict Design-Year Noise Levels
5. Project Noise Impacts
6. Assess Mitigation Measures

#### Analysis Procedures and Methodology

This analysis is being conducted in accordance with standard FHWA guidelines and current DeIDOT procedures and policies. The analysis begins with the determination of existing noise levels along the project corridor in order to assess the traffic noise contributions on the neighboring noise sensitive areas. Future proposed design year 2030 alternatives noise calculations and predictions are performed using FHWA-approved methods. The noise predictions are made with the FHWA Traffic Noise Model (TNM) version 2.5 (FHWA-PD-96-009). The model incorporates vehicle noise emission levels, updated for modern vehicle classification, traffic speed and traffic volume, sound propagation factors from atmospheric absorption, divergence, intervening ground, intervening barriers, intervening rows of buildings and areas of heavy vegetation.

A comparison of predicted existing and future noise levels, including the No-Build Alternative and other retained alternatives will be developed and shown. Predicted noise levels will be calculated to 0.1 dBA and then rounded to the nearest whole number.

Predicted noise levels shown will be averaged over a 1-hour time period, as per FHWA/DeIDOT policy, and are for traffic conditions that generate the highest overall noise levels. Loudest-hour noise conditions typically occur when traffic flow on a roadway is at a sustainable high volume, LOS D/E, allowing for the greatest number of vehicles to travel at high speeds.

An impact and mitigation analysis will also be developed and shown for each community.

Common Outdoor Noise Levels	Noise Level dBA	Common Indoor Noise Levels
Jet Flyover at 1,000 ft.	110	Rock Band
Gas Lawn Mower at 3 feet	100	Inside Subway Train (NY)
Diesel Truck at 50 feet	90	Food Blender at 3 feet
Noisy Urban Daytime	80	Garbage Disposal at 3 feet
Gas Lawn Mower at 100'	70	Shouting at 3 feet
Commercial Area	60	Vacuum Cleaner at 10 feet
Quiet Urban Daytime	50	Normal Speech at 3 feet
Quiet Urban Nighttime	40	Large Business Office
Quiet Suburban Nighttime	30	Dishwasher Next Room
Quiet Rural Nighttime	20	Small Theater, Large Conference Room (Background)
	10	Library
	0	Bedroom at Night, Concert Hall (Background)
		Broadcast & Recording Studio
		Threshold of Hearing

Adapted from Guide on Evaluation and Attenuation of Traffic Noise, AASHTO-1974.

### DELDOT'S NOISE ABATEMENT POLICY

- DeIDOT noise policy states that noise impact is assessed and mitigation is to be considered when either of the following conditions is satisfied:
  - Predicted design-year noise levels approach (defined as 1 dBA less) or exceed the FHWA noise abatement criteria, i.e. for Category B, a design-year noise level of 67 dBA or
  - An increase of 10 dBA or greater over existing conditions
- DeIDOT noise policy for mitigation requires that:
  - Noise mitigation be effective, i.e. 5 dBA or greater noise reduction goal for impacted receptors and
  - Noise mitigation be reasonable and feasible, not causing additional social, economic or environmental concerns and
  - Noise mitigation be cost-effective, i.e. Cost not to exceed \$20,000 per benefitted residence

Note: A benefitted residence is one that receives a noise reduction of at least 3 dBA, regardless of impact status
- US 113 Noise Analysis
  - All impacts within the US 113 North-South Study Area are defined as Category B under the FHWA Noise Abatement Criteria.
  - Category B receptors are residences, motels, hotels, schools, churches, libraries, hospitals, picnic areas, recreation areas, playgrounds, active sports areas, and parks.
  - Noise impacts to Category B receptors occur with a traffic noise level equal to or greater than 66 dBA or an increase over existing noise levels equal to or greater than 10 dBA



### PRELIMINARY NOISE RESULTS

- Generally, communities that are at a distance greater than 900 feet from each of the US 113 Alternatives Retained for Detailed Study are NOT impacted under the FHWA Noise Regulations and DeIDOT's Noise Policy.
- There may be communities that are less than 900 feet from each of the Alternatives Retained for Detailed Study but are NOT impacted per FHWA Noise Regulations and DeIDOT's Noise Policy.
- This does not mean the communities will not notice an increase in noise levels, it means the increase does not meet federal criteria.

### NEXT STEPS

#### Communities Impacted per FHWA Criteria

- The Project Team will determine those communities impacted under FHWA Noise Regulations and DeIDOT's Noise Policy (approved by FHWA).
- The impacts, along with the results of the mitigation analysis, will be presented in the DEIS and at the next round of public workshops.

#### Noise Mitigation

- Noise mitigation will be considered for impacted areas.
- In addition to barriers, additional measures will be examined for abatement feasibility, including:
  - Horizontal and vertical alignment modifications
  - Acquisition of adequate right-of-way to create a buffer between community and roadway
- Potential mitigation measures must be:
  - Effective - Does it reduce noise levels by at least 5 dBA for the impacted receptors
  - Reasonable and Feasible - Does it cause additional social, economic or environmental concerns?
  - Cost-effective - Does it cost less than \$20,000 per benefitted residence?



#### Visual Screening - Earth Berms

- Earth berms to screen communities - DeIDOT will consider earth berms, where feasible and prudent, to provide visual screening between adjacent communities and new US 113.
  - In addition to providing visual benefits to communities, the earth berms may also reduce or eliminate the projected noise impacts.