

## 301 US 301 Project Development



### 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 was conducted in accordance with standard FHWA guidelines and current DeIDOT procedures and policies. The analysis began 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 were performed using FHWA-approved methods. The noise predictions were performed 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 retained alternatives is shown. Predicted noise levels were calculated to 0.1 dBA and then rounded to the nearest whole number.

Predicted noise levels shown are 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.

Also shown is an impact and mitigation analysis 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' Commercial Area	70	Shouting at 3 feet
Quiet Urban Daytime	60	Vacuum Cleaner at 10 feet
Quiet Urban Nighttime	50	Normal Speech at 3 feet
Quiet Suburban Nighttime	40	Large Business Office
Quiet Rural Nighttime	30	Dishwasher Next Room
	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.

### DeIDOT'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 301 Noise Analysis
  - All impacts within the US 301 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 **≥ 66 dBA?** OR **≥ 10 dBA Increase?** equal to or greater than 66 dBA or an increase over existing noise levels equal to or greater than 10 dBA

#### Preliminary Noise Results

##### Communities NOT Impacted per FHWA Criteria

- Generally, communities that are at a distance greater than 800 feet from new US 301 or 400 feet from the Spur Road are NOT impacted under the FHWA Noise Regulations and DeIDOT's Noise Policy:
  - Estates at St. Anne's
  - Greenlawn
  - Parkside
  - Bohemia Mill Pond
  - Chesterfield
  - Chestnut Grove
  - Post & Rail Farms
  - Summit Farms
  - Westside Hunt
  - Back Creek
  - Dickerson Farms
  - Fox Hunter Crossing
  - Mount Hope
  - Crystal Run Farms
  - Summit Pond
  - Villages at Fairway Farms
  - Wheatland
- The following communities are less than 800 feet from new US 301 or less than 400 feet from the Spur Road but are NOT impacted per FHWA Noise Regulations and DeIDOT's Noise Policy:
  - The Legends
  - Matapeake
  - Airmont
  - Springmill (Armstrong Corner Interchange Option 1) \*

##### Communities Impacted per FHWA Criteria

- The following communities are impacted under FHWA Noise Regulations and DeIDOT's Noise Policy (approved by FHWA):
  - Southridge (All Alts. but YELLOW)
  - Middletown Village (All alts.)
  - Ratledge Road (Green North Only)
  - Chesapeake Meadow (All Alts. but YELLOW)
  - Summit Bridge Farms (All Alts. but BROWN North)
  - Midland Farms (Green+Spur and Purple+Spur)
  - Lea Eara Farms (BROWN North only)
  - Residences on Boyds Corner Road, east of Mt. Pleasant (YELLOW)
  - Grande View Farms (YELLOW & PURPLE+Spur)
  - Asbury Chase I & II (YELLOW & PURPLE+Spur)

### Noise Mitigation

- With impacts, noise mitigation must be considered
- In addition to barriers, additional measures were examined for abatement feasibility, including:
  - Horizontal and vertical alignment modifications
  - Acquisition of adequate right-of-way to create a buffer between community and roadway
- The Project Team continues to evaluate these measures to minimize noise impacts
- 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?

≥ 5 dBA Reduction?

### Visual Screening - Earth Berms

- Earth berms to screen communities – DeIDOT is proposing earth berms, where feasible and prudent, to provide visual screening between adjacent communities and new roadways
  - In addition to providing visual benefits to communities, the earth berms would also eliminate the projected noise impact under federal criteria for the following communities:
    - Middletown Village (west side)
    - Chesapeake Meadow
    - Summit Bridge Farms (west and south sides)
    - Springmill
    - Lea Eara Farms
    - Southridge
    - Ratledge Road
  - Additional communities that would benefit from proposed earth berms:
    - Springmill

### Noise Mitigation Summary

- Noise mitigation is not feasible (because of other roads like Boyds Corner Rd, US 13, or SR 1 or need to provide access) or not cost-effective (because of the cost of noise walls) for the following communities:
  - Middletown Village (east side) – YELLOW Alternative - walls
  - Summit Bridge Farms (north side) – ALL Alternatives except BROWN North - walls
  - Boyds Corner Road – YELLOW Alternative - Boyds Corner Road - property access
  - Grande View Farms – YELLOW & PURPLE + Spur Alternatives - US 13, SR 1, Boyds Corner Road - walls
  - Asbury Chase I & II – YELLOW & PURPLE + Spur Alternatives - US 13, SR 1, Boyds Corner Road - walls
- The noise impacts to the above communities were considered by DeIDOT in the detailed evaluation of the Retained Alternatives and in making an informed decision regarding a