



NORTH CAROLINA
Department of Transportation



Traffic Noise Policy

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Introduction

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- State v. Federal Funding
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- Noise Abatement Determinations
- Date of Public Knowledge
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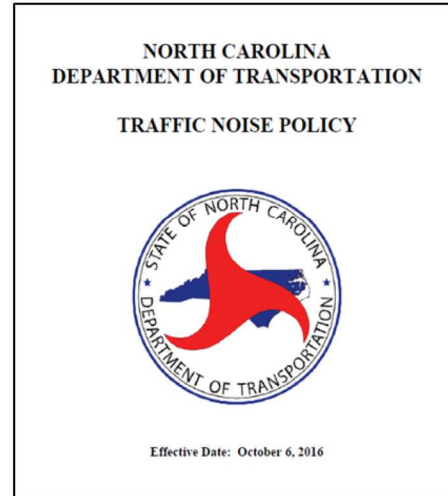


In this presentation we will cover these topics

Type I v. Type III Projects

Type I Projects

- Alterations to the road that may increase noise
- New through lanes including HOV, HOT, restriping existing pavement for new lanes
- New auxiliary lanes that are 2,500 feet long or longer



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Type I projects involve a change to the roadway that may result in noise impacts. The NCDOT policy provides a detailed list of Type I activities, this slide and the following slide summarize the most common actions that require a noise analysis.

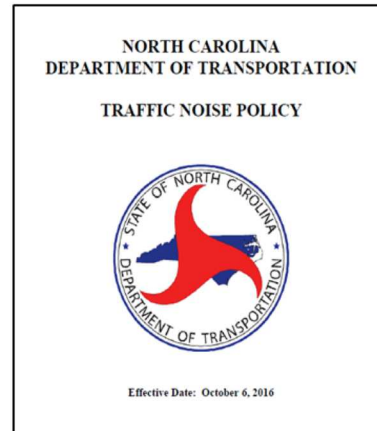
Note that 23 CFR 772 requires a noise analysis for all auxiliary lanes except turn lanes, however, the FHWA noise guidance and FHWA Noise Policy FAQs provide additional guidance to only consider auxiliary lanes that function as through lanes and are 2,500 feet long or longer.

Type I v. Type III Projects

Type I Projects (Cont.)

- Substantial change to the horizontal or vertical alignment
- Substantially altered or new rest areas, park and ride/share facilities, or toll plazas

If any part of the project is Type I, the entire project as defined in the environmental document is Type I.



There is no clear guidance on what is meant by a substantial change in the vertical alignment. In general, focus on changes to the line of site between the source and receptors. Exposing a receptor to a new source due to a change in the vertical alignment requires a noise analysis.

Because of the requirement that if any part of a project has Type I activity the entire project is Type I.

Type I v. Type III Projects

Type III

- In general are exempt from NEPA and noise analysis and include:
 - Maintenance activities
 - Guardrail replacement
 - Bridge replacement on the same alignment
 - KEY: The project activity determines the need for the noise analysis; not the class of environmental document
 - Be mindful of scope creep!



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Type III projects are simple projects that are usually exempt from NEPA and include everything from maintenance activities to bridge replacements. A bridge replacement could be a Type I project, though, if the horizontal or vertical alignment of the new bridge is different from that of the old bridge. There are times when it is not clear whether a project should have a noise analysis because the activity is not specifically listed in the Type I project definition. The options in these cases is to strictly follow the definition, or to consider whether the project may result in noise impacts. For example, a project that involves permanent removal of an existing bridge is not listed in the Type I definition, however, the activity will result in diversion of all traffic that used that bridge to new routes. It may be necessary to perform a noise analysis in this case to address potential noise impacts as part of satisfying NEPA.

It is very important to remember that the category of environmental document may have no bearing on whether a noise study is necessary. The need for a noise analysis is entirely based on the proposed activity.

Type I Project Scope of Work

The key factors to consider for the scope are:

- Proposed project activity
- Funding source
- FHWA approval action

If FHWA funds or approval, then noise regulations apply

Some state funded projects require a noise analysis



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A scope of work that covers the requirements of the project is vital. Consider the questions above about proposed projects to determine whether a noise study is required. As discussed in Slide 5, the proposed action is the first indicator of whether a noise analysis is necessary. Additionally, the project must involve either Title 23 funds or a decision by the FHWA. Even then, there are state funded projects that require a noise analysis under the NCDOT policy. We will discuss this issue later.

Type I Project Scope of Work

- If any Type I activity occurs the project requires a noise study
- Common error: assuming that because noise walls are not possible there is no need for a noise study
- Identify impacts, then consider abatement



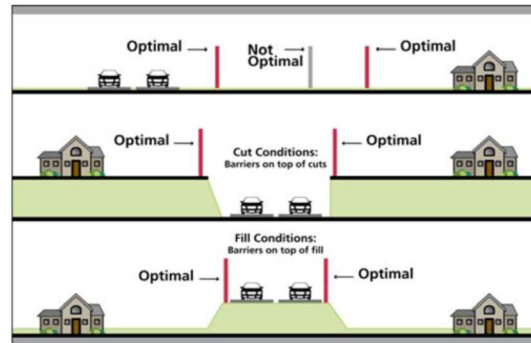
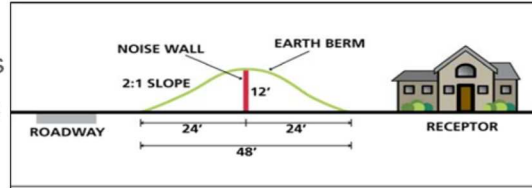
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Also remember, if any Type I activity occurs on the project, the entire project is Type I. It is common to assume that if it is not possible to install noise barriers as a noise mitigation measure, then a noise analysis is unnecessary. This is not true. The requirement is to identify project impacts and then consider abatement for those impacts.

Federal v. State Funding

FHWA Funds or FHWA Approval

- Type I activity
- The project determines whether noise study is needed, NOT the document type



A major change to NCDOT policy is that NCDOT no longer applies the federal noise regulations to projects that do not use Federal-aid funds or do not have an FHWA decision. However, there are exceptions, as discussed on the next slide.

Federal v. State Funding

State Funds Only

- Type I activity for:
 - US or Interstate Route, *and*
 - full control of access, *and*
 - adding a new through-lane
- All other Type I projects with a state EA or EIS
 - Analysis required
 - Division Engineer determines if abatement is practicable



Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

- State Minimum Criteria projects do not require a noise study

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There are state funded projects that require a noise analysis under the new policy if the project is on a US or Interstate Route, has full control of access and involves adding a new through lane. The division engineer will approve abatement if it is practicable.

Practicable is defined in the NCDOT noise manual as: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. Use Morrisville Carpenter Road as an example is when noise walls may not be practicable.

We Are Here to Help

The Traffic Noise & Air Quality Group is available to:

- Assist in determining whether a noise study is needed; if in doubt, please ask
 - Review scopes of work
 - Prepare in-house estimates
 - Negotiate estimates with private firms
 - Conduct QA/QC of Traffic Noise Reports (TNRs) and Design Noise Reports (DNRs)
-
- Our Group must accept all TNRs and DNRs
 - For federal projects, FHWA must accept DNRs only

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The TN&AQ Group is available to assist in many ways.

Preliminary v. Final Design Processes

Traffic Noise Report (TNR)

- Preliminary design noise analysis
- Basis for the DNR
- During Project Development Phase

Design Noise Report (DNR)

- Final design noise analysis
- Follows the recommendations from the TNR
- During Final Design (usually post-NEPA); Design-Build
- Completed without a TNR if abatement is very likely



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Traffic Noise Report (TNR)

Documents the methodology and findings of a preliminary design noise analysis

Serves as the basis for the Design Noise Report

Completed during the environmental/preliminary engineering phase of the project

Design Noise Report (DNR)

Documents the methodology and findings of a final design noise analysis

Follows the recommendations from the TNR

Prepared during Final Design (usually after completion of the NEPA process)

May be prepared without a TNR if abatement is very likely to be included in the project

TNM Receptor Modeling

TNM Receptors represent exterior areas of frequent human use

- Specific location of outdoor activity, or
- The corner of a representative structure
- Indoor noise levels apply in limited situations



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TNM receptors is the term used in the NCDOT noise manual for the receiver object in the Traffic Noise Model. The noise analysis need to include sufficient numbers of receptors to predict all expected impacts associated with the project and to facilitate accurate noise barrier design. This may require a TNM receptor for each Adjacent Receptor as discussed in the balloting section above.

TNM Receptors also represent activity areas other than residences, such as parks and schools.

Noise Abatement Determinations

Feasibility

- *Acoustic feasibility*: 5 dB(A) insertion loss for at least 2 impacted receptors
- *Engineering feasibility*: adverse impacts to property access, drainage, topography, utilities, safety, and maintenance
- Effects of secondary traffic
- Stop consideration for noise abatement if it is not feasible



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Noise abatement determinations are based on the feasibility and reasonableness of noise abatement. The key points for feasibility are the new item in the policy that at least two receptors must get a 5 dB reduction and that if abatement is not feasible, there is no need to continue considering it. Simply document the finding and finalize the report. For the most part, engineering feasibility issues have design solutions and it is unusual to eliminate noise abatement for this reason.

Noise Abatement Determinations

Reasonableness

- Property Owner and Tenant Preferences
- Cost effectiveness
- One receptor with a 7 dB(A) reduction



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For reasonableness, the key point is that all factors must be achieved for abatement to be reasonable.

Noise Abatement Determinations

Table 11.1

Allowable Noise Abatement Base Quantities

	Noise Level Consideration	Noise Wall	Berm	Buffer Zone
Maximum Allowable Base Quantity		1,500 ft ²	4,200 yd ³	\$22,500
Average dB(A) Increase Between Existing and Future Build for All Impacted Receptors	< 5 dB(A)	+ 0 ft ²	+ 0 yd ³	+ \$0
	5-10 dB(A)	+ 500 ft ²	+ 1,400 yd ³	+ \$7,500
	> 10 dB(A)	+ 1,000 ft ²	+ 2,800 yd ³	+ \$15,000
Average Exposure to Absolute Noise Levels for All Impacted Receptors	5-10 dB(A) Over NAC Activity Category	+ 500 ft ²	+ 1,400 yd ³	+ \$7,500
	> 10 dB(A) Over NAC Activity Category	+ 1,000 ft ²	+ 2,800 yd ³	+ \$15,000

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This table summarizes NCDOT approaches to cost reasonableness. For barriers, each receptor gets an allowance for a maximum area of noise barrier. The total barrier area for a neighborhood must be less than the total allowance for all residences to meet the criteria.

Date of Public Knowledge

The date of approval of the final environmental document:

- Categorical Exclusion (CE)
- Finding of No Significant Impact (FONSI)
- Record of Decision (ROD).

Use 2011 manual/policy for projects with Date of Public Knowledge (DoPK) prior to October 6, 2016

Must determine impacts for lands permitted prior to DoPK



Date of public knowledge can be confusing. The key thing to remember is that the NCDOT policy requires that a property is classified in the noise analysis based on the permitted use of the property on the date the CE, FONSI, or ROD are approved.

The manual provides additional guidance that abandoned properties are treated as vacant land. The manual defines abandoned property as any property that requires substantial reconstruction and/or a new permit to resume active use.

Construction Noise

Must include assessment of construction noise

Level of detail depends on:

- Scale of the project
- Project activities
- Proximity of sensitive land uses to the project

Typically a qualitative analysis



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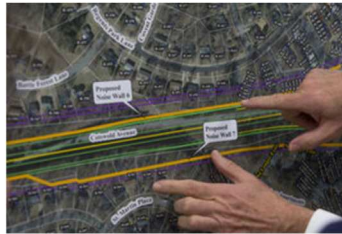
Consideration of construction noise is required, but the FHWA does not provide a lot of guidance on how to determine the necessary level of detail. Some key factors include the duration of the project, the scale of the project, and the type of construction activities. For example, overnight pile driving in a residential area is probably not something the people who live there will be happy about. In many cases, construction noise issues can be addressed qualitatively and using standardized language in the noise analysis report, however, there are cases where in depth analysis, including prediction of construction noise is necessary.

Noise Study Documentation

The NEPA/SEPA document must identify:

- Land uses impacted by noise
- Locations where abatement is preliminarily feasible and reasonable and “likely” to be included in the project

No impacts for existing and no build – only occur with a project



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The NCDOT noise manual does not specify the exact format of a noise analysis, but it does provide an outline of required contents of the noise analysis. There are also contents required in the NEPA /SEPA document as shown on the slide. These requirements are outlined in the FHWA noise regulation and the NCDOT policy.

The statement of likelihood outlines where noise abatement is feasible and reasonable and likely to be included in the project. A key item to keep in mind is that the statement of likelihood is based on the information available at the time of approval of the environmental document. It is unusual under the NCDOT process to have completed the balloting process at this stage.

Noise Wall Aesthetics

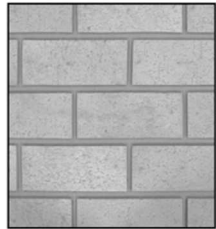
Texture Options:



1. Ashlar Stone



2. Dry Stack Stone



3. Standard Brick



4. Old Brick

Other Options Available

NCDOT standard wall: Pre-cast concrete panels. Texture applied to both sides (highway side and community side). Uppermost foot of noise wall to be smooth to simulate a coping effect. Concrete columns except where steel is needed due to soil conditions.

Noise Wall Aesthetics

Stain Options: Federal Standard 595 Paint Colors

30032	30040	30045	30049	30051
30055	30059	30061	30062	30070
30075	30076	30080	30081	30083
30087	30090	30100	30108	30109
30111	30114	30117	30118	30122
30123	30126	30128	30129	30138
30136	30205	30210	30213	30227
30233	30234	30237	30250	30255
30277	30279	30313	30315	30319
30324	30331	30372	30400	30450
30425				

Brown Palette

<http://www.colorserver.net/showpalette.asp?group=0&cmd=append%20-%20search>

30032	30040	30045	30049	30051
30055	30059	30061	30062	30070
30075	30076	30080	30081	30083
30087	30090	30100	30108	30109
30111	30114	30117	30118	30122
30123	30126	30128	30129	30138
30136	30205	30210	30213	30227
30233	30234	30237	30250	30255
30277	30279	30313	30315	30319
30324	30331	30372	30400	30450
30425				

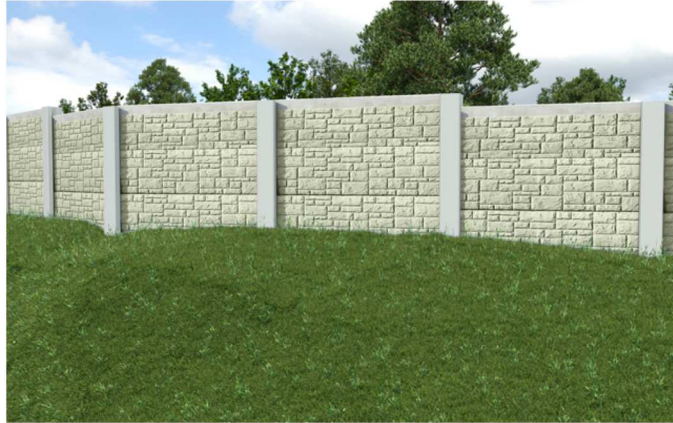
Gray Palette

<http://www.colorserver.net/showpalette.asp?group=6>

Stain applied to both sides. No stain on uppermost foot and no stain on columns.

Noise Wall Aesthetics

Division Engineer Determines Texture and Stain Color



Ashlar Stone with FS 36559 Stain, depicted in this visualization, is being used throughout Division 7.

Division Engineer can coordinate with others (e.g. local governments) as desired.

Public Involvement and Balloting

Stakeholder/project scoping

- Nature of highway traffic noise
- Types and effects of noise abatement measures
- Invite traffic noise staff; utilize traffic noise PI materials



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Public involvement requires early and continuous communication with communities adjacent to the project about highway noise and the abatement options available to mitigate any noise impacts. It is helpful to provide information outlining the decision making process and public input opportunities.

There is no one size fits all approach to public involvement. Some projects may require several meetings and centralized locations and others may require holding meetings on site. The key is to provide clear and consistent materials that explain to the public what they should expect. Standalone project mapping should show areas of study, but should not show proposed noise barriers. The noise report will include figures with recommended noise barrier locations.

Public Involvement and Balloting

Public Hearings

- Preliminary noise study
- EA, DEIS is complete
- Noise Study Areas on maps;
noise walls not shown



Public Involvement and Balloting

Final design

- Detailed noise abatement study
- Noise walls are shown on maps
- Balloting occurs for benefited receptors



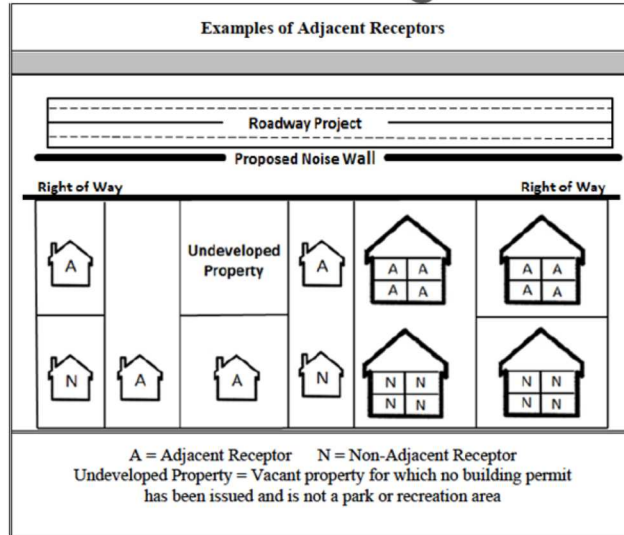
Public Involvement and Balloting

- Obtain views from property owners and tenants of benefited receptors
- Weight ballots as follows:
 - 5 points/ballot for adjacent property owners who reside at property
 - 4 points/ballot for adjacent property owners who rent property to others
 - 3 points/ballot for all non-adjacent property owners who reside at property
 - 2 points/ballot for all non-adjacent property owners who rent property to others
 - 1 point/ballot vote for all tenants of rental property
- Adjacent Receptor is a benefited receptor that
 - 1) represents a property that abuts the highway right of way or
 - 2) has no benefited receptor between it and the highway.

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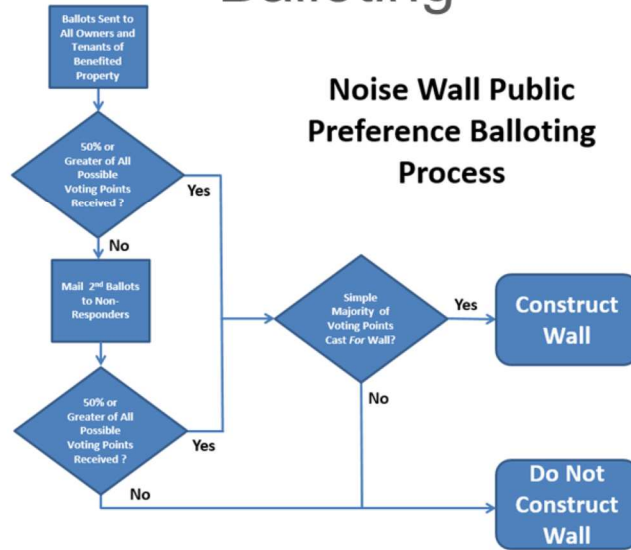
The final decision about noise abatement comes down to the views of the affected public. NCDOT solicits votes from the owners and residents of properties that are expected to benefit from recommended noise abatement measures. NCDOT weights votes based on a variety of factors as shown here to give greater consideration to property owners and to those most affected by highway noise.

Public Involvement and Balloting



Adjacent receptors will most often, but not always, be part of the front row of benefited receptors.

Public Involvement and Balloting



This flowchart outlines the voting process

Public Involvement Displays and Handouts

HOW DOES NCDOT DECIDE WHICH COMMUNITIES GET NOISE WALLS?

EVALUATION

For the first step in the process, NCDOT goes to areas that may be affected by increased noise from a proposed highway project and uses special equipment to monitor existing noise.

Next, using complex computer modeling, we predict expected noise changes at these locations after the road is built and traffic increases. Vehicle types and speeds play a significant role in estimating loud noises. Trucks create more noise than cars. Additionally, the faster the vehicle speed, the louder the noise.

Then, we must determine which noise-sensitive locations were in place or had building permits issued before the Date of Public Knowledge and, therefore, are eligible for noise reduction.

If the anticipated noise increase is MORE than the levels defined by NCDOT policy, we begin to consider possible ways to reduce the noise, such as with noise walls and earth berms, at all eligible locations.

CONSIDERATIONS

Once NCDOT has completed the technical evaluation, they also consider the following questions:

- Will a noise wall reduce the noise enough to justify its construction?
Sometimes, a noise wall will not reduce the noise enough.
- Is a noise wall technically realistic?
Every road is different - sometimes the terrain makes building a wall very difficult.
- How many people will benefit from a noise wall? Is this number high enough to justify the cost?
Sometimes, the state cannot afford to build a wall because the cost is too high when compared to the benefits received.
- Do property owners and tenants who would receive a predicted noise level reduction with the proposed noise wall actually want the wall?

LIKELIHOOD OF QUALIFYING FOR A NOISE WALL

Not Desirable	Low Desirable	Desirable
		
More likely, because a wall would reduce noise of many houses.	Unlikely, because the cost of the wall would be high when compared to the benefits received.	Unlikely, because a few houses there are more desirable. They are too far from the road and not a noise wall. The road is not a noise wall.

Scan to Access the NCDOT Traffic Noise Policy



This is one of three PI display boards.

Public Involvement Displays and Handouts

MEASURES TO REDUCE TRAFFIC NOISE

There are many ways to reduce noise. Noise walls are one option, but berms and highway design can help reduce noise, as well. Sometimes, noise walls will not reduce the noise because of the location of the road. Each new road must be examined individually to determine what measures can be taken.

ARE THERE ALTERNATIVES TO NOISE WALLS?

Other options may also help reduce traffic noise. Some of these may be provided by NCDOT, and others are alternatives that might be considered by private developers or homeowners.

- Land use design—homes are set back from the road or are separated from the road by other development, the noise levels may be lower.
- Earth Berms—a sloping mound of earth running parallel to the highway. Because of the amount of land required, a berm is not usually the most practical solution to highway noise.
- Pavement design—research is being conducted on how different types of pavement might reduce traffic noise.
- Types of vehicles/speed limits—noise can be reduced with lower speed limits and truck restrictions on a road. However, reducing the speed limit below the appropriate speed for which the road is designed will have only a moderate effect on traffic noise.
- Building insulation—noise insulation in buildings, such as replacing doors and windows or adding insulation to walls and attics.

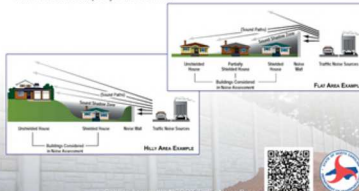
WHEN DO NOISE WALLS WORK?

Sound travels very much like water or light. It follows the easiest path over, under, and around things in its path. The farther away from the source of the sound, the lower the noise. Noise walls are usually only effective for buildings less than 500 feet from the highway.

Noise walls do not work if the source of the noise can be seen. The noise will simply travel through that opening much like water will flow through a crack in a dam. If a building is located higher than a noise wall, the noise will flow over the wall to the building.

The graphics below show two examples of noise walls located between buildings and a road. In both cases, the wall will shield one of the houses but will not shield them all.

Noise walls do not completely eliminate all noise.



This is one of three PI display boards.

Public Involvement Displays and Handouts

WHEN IS TRAFFIC NOISE CONSIDERED?

Whenever a highway project uses state or federal funds, the potential for increased traffic noise—and how to reduce it—must be evaluated. Whenever traffic noise impacts are predicted, noise abatement (typically in the form of noise walls) must be considered. Potential traffic noise increases are evaluated only for buildings permitted before the "Date of Public Knowledge."

WHAT IS THE "DATE OF PUBLIC KNOWLEDGE?"

This is the date that the public and local government is officially notified of a future project. After this date, the federal and state governments are no longer responsible for providing noise reduction for new development along the proposed highway project. NCDOT strongly encourages local governments and private landowners to ensure that noise-compatible designs are used for development permitted after the "Date of Public Knowledge."

- If a road project was approved BEFORE September 2, 2004—this date is based on either the approval of the Final Environmental Document or the Design Public Hearing (whichever is later).
- If a road project was approved ON or AFTER September 2, 2004, this date is the same as the Final Environmental Document.

WHERE DO I FIND MORE INFORMATION?

For more information about NCDOT's noise policy and how it is applied, or about how noise is measured, call or email us.

Detailed noise analysis information can also be found at the Federal Highway Administration's website, <http://www.fhwa.dot.gov/environment/noise/>.

North Carolina Department of Transportation
Traffic Noise & Air Quality Group
Human Environment Section
1098 Mail Service Center
Raleigh, N.C. 27699-1598
Phone: 919-707-6000
E-mail: www.ncdot.gov/contact



Scan to Access the NCDOT Traffic Noise Policy

This is one of three PI display boards.

Public Involvement Displays and Handouts

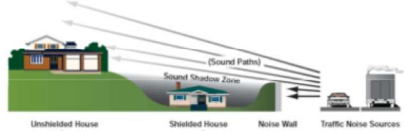
WHEN DO NOISE WALLS WORK?

Sounds travels very much like water or light. It follows the easiest path over, under, and around things in its path. The further away from the source of the sound, the lower the noise.

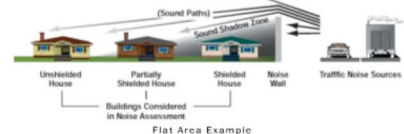
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The graphics below show two examples of noise walls located between buildings and a road. In both cases, the wall will shield one of the houses but will not shield them all.

Noise walls do not completely eliminate all noise.



Hilly Area Example



Flat Area Example

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North Carolina Department of Transportation

Answering Your Questions About HIGHWAY TRAFFIC NOISE



MEASURES TO REDUCE TRAFFIC NOISE

There are many ways to reduce noise. Noise walls are one tool, but berms and highway design can help reduce noise as well. Sometimes, noise walls will not reduce the noise because of the location of the road. Each new road must be examined individually to determine what measures can be taken. This pamphlet will briefly describe how NCDOT determines when a noise wall should be built, and provides contact information if you have more questions.

WHERE DO I FIND MORE INFORMATION ABOUT NCDOT'S TRAFFIC NOISE POLICY?

For more information about NCDOT's noise policy and how it is applied, or about how noise is measured, call or email us. Detailed noise analysis information can also be found at Federal Highway's website, <http://www.fhwa.dot.gov/environment/noise>.

North Carolina Department of Transportation
Traffic Noise & Air Quality
Homes/Environment Section
1598 Mail Service Center
Raleigh, NC 27699-1598
Phone: 919-707-6000
Email: www.ncdot.gov/contact

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This is the PI Brochure.

Public Involvement Displays and Handouts

WHEN ARE NOISE WALLS CONSIDERED?

- Whenever a highway project uses state or federal funds, the potential for increased traffic noise—and how to reduce it—must be evaluated. Whenever traffic noise impacts are predicted, noise abatement typically in the form of noise walls must be considered.
- Potential traffic noise increases are evaluated for any building permitted before the "Date of Public Knowledge."

WHAT IS THE "DATE OF PUBLIC KNOWLEDGE?"

This is the date that the public (and local government) is notified of the future path of the road.

- If a road project was approved BEFORE September 2, 2004—this date is based on either the approval of the Final Environmental Document or the Design Public Hearing (whichever is later).
- If a road project was approved ON or AFTER September 2, 2004, this date is the same as the Final Environmental Document.

The Final Environmental Document could be a Categorical Exclusion (CE), State or Federal Finding of No Significant Impact (FONSI), or State or Federal Record of Decision (ROD).

HOW IS TRAFFIC NOISE EVALUATED?

- For the first step in the process, NCDOT experts go to homes, churches, businesses, etc. that may be affected by a proposed highway project and use special equipment to monitor existing noise.
- Next, using complex computer modeling, we predict expected noise changes at these locations once the road is built and traffic increases.
- Then we must determine which noise sensitive locations were permitted before the Date of Public Knowledge and, therefore, are eligible for noise reduction.
- If the anticipated noise increase is MORE than the level defined by NCDOT policy, we begin to consider possible ways to reduce the noise, such as with noise walls and earth berms, at all eligible locations.

ARE THERE ALTERNATIVES TO NOISE WALLS?

Other options may also help reduce traffic noise. Some of these may be provided by NCDOT, and others are alternatives that might be considered by private developers or homeowners.

- Land use design—if homes are set back from the road or are separated from the road by other development, the noise levels may be lower.
- Earth berm—a sloping mound of earth running parallel to the highway. Because of the amount of land required, a berm is not usually the most practical solution to highway noise.
- Pavement design—research is being conducted on how different types of pavement might reduce traffic noise.
- Types of vehicles/speed limits—noise can be reduced with lower speed limits and truck restrictions on a road. However, reducing the speed limit below the appropriate speed based on the design will have only a moderate effect on traffic noise and may actually increase the number of accidents on the roadway.
- Building insulation—noise insulation in buildings, such as replacing doors and windows or adding insulation to walls and attics.

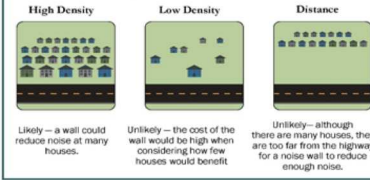
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HOW DOES NCDOT DECIDE WHICH COMMUNITIES GET NOISE WALLS AND WHICH DO NOT?

Once NCDOT has completed the technical evaluation, they also consider the following questions:

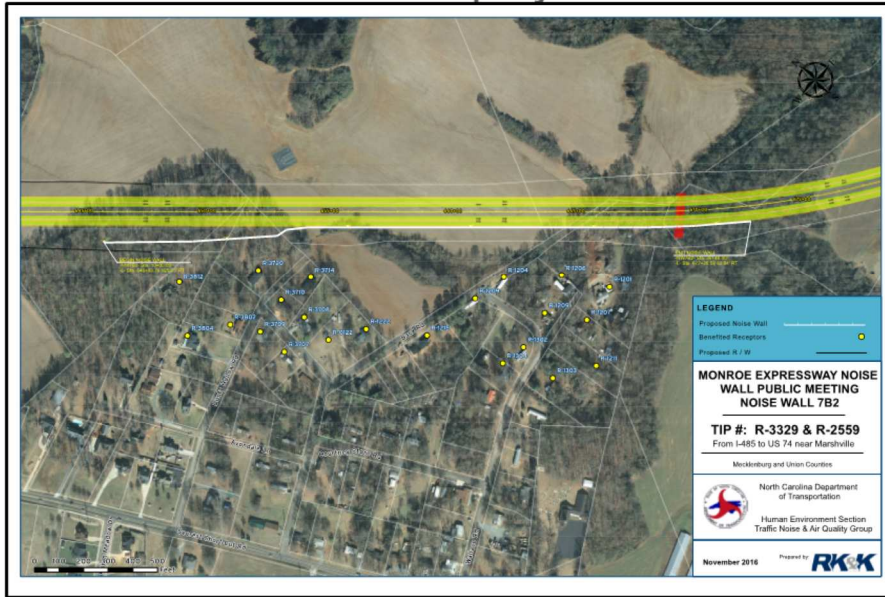
- Will a noise wall reduce the noise enough to justify its construction? Sometimes, a noise wall will not reduce the noise enough.
- Is a noise wall technically realistic? Every road is different – sometimes the terrain makes building a wall difficult.
- How many people will hear a difference in noise? Is that number high enough to justify the cost? Sometimes, the state just cannot afford to build a wall because the cost is too high when compared to the benefits received.
- Does a simple majority of property owners and tenants who receive a predicted noise level reduction due to construction of a noise wall actually want the wall? Public preference for or against a wall is obtained through a balloting process.
- Are alternatives to noise walls available?

LIKELIHOOD OF QUALIFYING FOR A NOISE WALL:



3

Public Involvement Displays and Handouts



This is a sample display.

Additional Information?

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