Entering the Quiet Zone: Noise Compatible Land Use Planning

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Noise Compatible Land Use Planning -- What It Is and Why You Should Consider It

Purpose

This brochure has been developed to provide information to elected officials, planners, developers, and the interested public about the problem of highway traffic noise and effective responses to that problem. This report: 1) summarizes the general nature of the problem, 2) provides examples of **Noise Compatible** Land Use strategies either constructed or planned, and 3) encourages a proactive posture by local decision makers,

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developers and citizens to share in and actively influence land use next to highways.

Acknowledgements

Special thanks are offered to the City of Eugene (Oregon) Planning Department and the owners of Quail Run and Camelot Village subdivisions in Eugene, Oregon. We appreciate their time and contribution.

Now?

- Commercial, Industrial, and Retail **Noise Compatible** Land Uses -- What Has Worked?
- Residential Strategies
- Open Space Strategies

What Can You Do?

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Noise Compatible Land Use Planning -- What It Is and Why You Should Consider It

Introduction

Highway traffic noise is an important issue for communities across America. If not properly addressed, highway noise can disrupt our daily routines by interrupting sleep, recreational activities, and even our conversations.

Local planners, developers, and residents attend numerous meetings and spend many hours considering methods to address existing or anticipated noise from nearby roads.

Effective control of highway traffic noise requires a three-part approach:

1. Implementing source control and quieting vehicles at the source.
2. Incorporating noise reduction measures in highway construction projects.
3. Developing land adjacent to highways in a manner that reduces or eliminates noise problems (i.e., noise-compatible land-use planning).

Much emphasis has been given to the first two parts. First, trucks and tires have become quieter. Second, through the end of 1998, 44 State departments of transportation and the Commonwealth of Puerto Rico have constructed more than 1,620 linear miles of barriers at a cost of more than $1.4 billion. However, sufficient attention is often not given to the noise compatible land use planning option.

Avoiding a problem is frequently more effective than trying to correct an existing one. Though we accept that new growth and development often occur next to busy, existing highways, we can help communities address highway traffic noise before -- rather than after -- a frustrating noise problem has occurred.

FHWA wants developers, government officials, planners, and private citizens to know that the best way to reduce highway traffic noise is usually by advance planning and shared responsibility. Local government and developers working cooperatively with Federal and State governments can plan, design, and construct new development projects and new roadways so that traffic noise is reduced. How? One key way is by using **noise compatible land use**

There's something else to consider that reduces noise? Noise compatible land use planning!

What is Noise Compatible Land Use Planning?

Noise compatible land use planning is planning that eliminates or reduces the undesirable effects of highway traffic noise by:

- Encouraging the location of less noise-sensitive land uses next to highways.
- Promoting the use of open space or special

planning.

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FHWA has prepared this booklet to explain noise compatible land use planning, offer strategies, and outline advantages of a proactive approach for sharing in and actively influencing land use next to highways. Read on to learn the "what," "how," and "why," of this important noise-control method.

building construction techniques to minimize noise impact.

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What Is Noise Compatible Land Use Planning, and How Is It Done?

Noise compatible land use planning is a community planning method that helps reduce or eliminate traffic noise along highways. This type of planning means considering land-use options and noise issues more effectively so that the right kinds of development are set up next to highways. Several strategies can be used if you want to start using noise compatible land use planning.

A good first step when beginning this process is to identify land uses that are well suited for areas adjoining highways -- uses that are less sensitive to highway traffic noise. Many times, these uses can create a benefit from their proximity to the roadway and the access it provides. Shopping malls or office space, for instance, are good choices near highways.

Another useful early strategy is to designate open space next to a highway so there is room for noise to dissipate before it reaches sensitive areas.

Local governments can use the following approaches to encourage noise compatible land use planning in their communities:

- Planning, zoning, or other legal means (such as, subdivision or development standards, building codes, health codes, or occupancy permits).
- Municipal controls that include land or easement purchases or the acceptance of land donations.
- Community education to inform citizens, developers, and local planners of the options for structures and land uses that will be harmonious next to a roadway.
- Acoustical site planning, architectural design, or acoustical construction.

Question: What is Noise Compatible Land Use Planning?

Answer: Reducing noise in areas along highways by using adjacent land for activities, services, or businesses that are not disrupted by noise.

These construction-related techniques address where structures are located, how structures are designed, and what types of materials are used in the structures.

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What Are the Benefits of Noise Compatible Land Use Planning?

Noise compatible land use planning can have positive effects on a community's finances, aesthetics, and quality-of-life.

For instance, when communities use noise compatible land use planning to create a "quiet zone" instead of buying noise barriers, State departments of transportation can use the money saved for additional roadway improvements or maintenance programs. Noise compatible land use planning can be used to attractively design open space next to a road or highway for both passive and active recreational uses. Open spaces can also be designed to make commercial or business properties more visible to existing and future customers.

Reduce the Noise and Create a Quiet Zone

Effective noise compatible land use planning can reduce the need for construction of many noise barriers in highway programs

Open space, slightly depressed construction.

Using land in planned, predetermined ways allows greater development flexibility for neighboring communities, since the planning practices are known in advance.

Finally, noise compatible land use planning provides appealing alternatives for reducing traffic noise when compared to noise barriers, which are more visually and physically restrictive.

As vacant land in many communities disappears, the pressure to use areas next to highways may increase. But communities can use noise compatible land use strategies creatively, with very positive results.

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What Are the Costs of Noise Compatible Land Use Planning?

Several types of costs that need to be considered before a community undertakes noise compatible land use planning. The following is a summary of costs that communities and developers can expect:

- Local governments may need to fund administrative costs for including noise compatible land use standards in their guidelines and ordinances.
- Developers may bear a cost for design alternatives that result in fewer homes (or the same number of homes, if denser development is allowed).
- Developers may incur costs for using different materials in construction that are more sound-absorbent than traditional materials. In many instances, however, these costs can be offset by an increase in rental or sales rates, resulting from the reduced effects of highway traffic noise. When developers set a standard for sensitivity and high quality in initial construction, these actions can contribute to long-term value.

Windowless rear exterior; fence to bottom of first floor rooflines.

Why Noise Compatible Land Use? Because it . . .

- Improves community character
  - Protects neighborhood from highway noise.
  - Eliminates restrictive, "hemmed-in" feeling created by noise walls.
  - Reduces complaints about noise from highway neighbors.
- Frees money for other highway needs
- Provides value now and later
  - Enhances commercial and retail visibility and easy access to the highway.
  - Improves aesthetics.
  - Designing quieter structures helps to secure current and increase future property value.
- Complies with changing Federal requirements

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Has Noise Compatible Land Use Planning Been Used Successfully?

The implementation of formal programs for noise compatible land use planning has been limited. However, there are examples where noise compatible land use practices have been used. Commercial entities, industrial space, office parks, and open space are the most common and desirable uses near roadways. These activities, which benefit from locations next to a highway, do not require a quiet ambiance, so highway traffic noise is usually not disruptive.

As vacant land becomes scarcer in many communities, new residential development is frequently constructed adjacent to highways. Modern construction techniques allow residential properties to coexist next to highways, using strategies other than traditional noise barriers.

Illustrations from Eugene, Oregon; Houston, Texas; and Kansas City, Missouri, offer innovative concepts that can be used as models by other communities wanting to apply noise compatible land use planning principles. Houston and Kansas City are typical large urban communities, with populations of 1.7 million and 500,000, respectively. Eugene is a small urban area with a population of 130,000. Examples from Houston and Kansas City illustrate typical designs for commercial developments near roadways, while examples from Eugene and Houston illustrate typical designs of residential developments near roadways.

Important Note:

Federal legislation bans FHWA from participating in construction of most noise barriers related to development or construction next to existing highways.

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Why Use Noise Compatible Land Use Planning Now?

Communities across the country are seeking non-traditional solutions to traditional challenges. Effective planning before development occurs can help create more livable communities, with improved aesthetics and a greater sense of openness. Municipalities and developers can benefit from noise compatible land use planning–and, almost always, the benefits will far outweigh the initial costs. If communities want to eliminate that "walled in" feeling from the use of noise barriers, this noise reduction strategy will be a good fit.

Some communities are beginning to reexamine the use of noise barriers for this reason and due to a loss of visibility for commercial establishments. Residents can be happier, and complaints about noise can go down. Limited highway funds can be used for needs other than noise abatement. Developers can market "quiet developments" and can recover additional development costs in sales and rental prices.

Noise barriers are often perceived as an answer to eliminating or reducing highway traffic noise impacts. Many miles and types of barriers have been

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Residential neighborhood separated from highway traffic noise by space and terrain.

constructed over the years. However, there are indications that Federal and State funding that finance noise barriers may be restricted. In fact, Federal legislation has already been enacted to prohibit participation in the construction of most noise barriers for new development that occurs next to existing highways.*

** For more information about legislation, see Title 23 of the Code of Federal Regulations, 23 CFR 772.13(b).*

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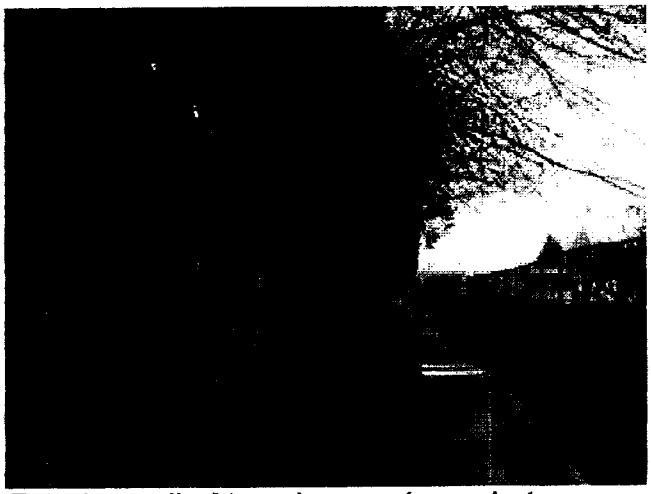
Residential Strategies

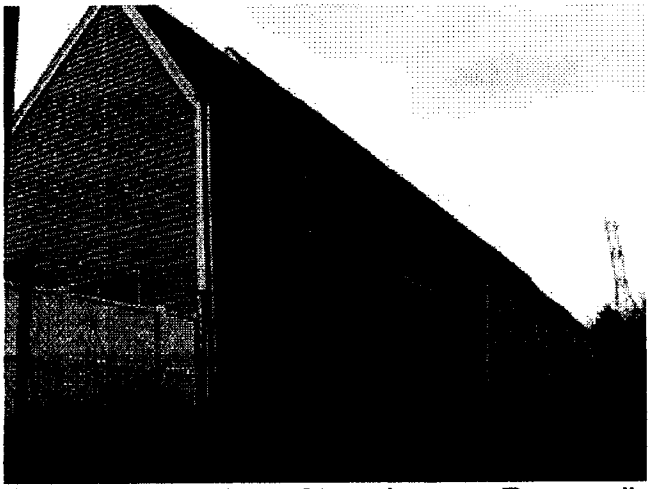
In many areas of the country, competitive use of land means that residential areas are being developed next to highways. This proximity is a benefit for residents, because it helps increase their mobility.

Today many cities feature well-designed residential developments near highways. One example is Eugene, Oregon. Community leaders in Eugene are aware of the impact of noise pollution on adjacent residential development. While no official rules govern residential development near major arterials in Eugene, developers consistently work to reduce the negative impacts of noise from nearby roadways and freeways. Open space buffers are widely used along I-5, a north-south arterial in the city's east side.

Another important method of noise abatement used in Eugene involves the positioning and design of buildings. Along I-5, developers designed multi-family buildings with no windows on the sides facing highways. One development of townhomes is uniquely constructed to curb the noise from I-5, which is directly behind the units. In addition to the solid blocks used as the outside building surface, several layers of high quality, sound-absorbent insulation almost eliminates roadway noise from the interior of the townhomes. Also, a row of existing trees was left to serve as a visual buffer.



Exterior wall of townhomes (seen between the trees) is designed to reduce effect of highway traffic noise. Trees and vegetation act as a visual buffer.



Side and rear view of townhomes. Rear wall has special insulation; in addition to solid surface.

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Developers in Houston address the negative impacts of noise and the visual effects along roadways. Although Houston has no zoning or ordinances requiring design modifications in such locations, the developers use the design of their developments to lessen the impact of highway traffic noise. Homes are designed so they do not face the freeway right-of-way (ROW). Homes that back-up to the ROW are completely bricked on the rear exterior surfaces. This serves two purposes: (1) visually the homes are more desirable because of the greater quantity of brick exterior and (2) the presence of the brick material minimizes the effects of traffic noise. Another design feature that minimizes noise is increasing the height of the residential property fences facing the ROW. Fences facing the ROW are 10 feet tall, as compared to 6 feet throughout the remainder of the housing development, providing both mitigation and privacy.

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Open Space Strategies

Open space reduces highway traffic noise levels by increasing the distance between the noise source and the noise sensitive activity. An open space method of noise reduction can be used in combination with commercial/ industrial, residential, or construction mitigation strategies to reduce impacts from highway traffic noise.

Planners, decision makers, and community stakeholders should think innovatively about open space and look for ways to put it to productive use. Examples of successful uses include walking trails, bike paths, and other leisure options. Planners and designers should take advantage of natural features, such as "rolling hills" -- or should feel free to create such effects. Adding vegetation to the open space strategy can dramatically increase its attractiveness. For example, trees planted intermittently can provide shade for recreational activities and give a linear park appearance.

Open space buffer between highway and residential community.

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What Can You Do?

The Charge to Begin

An essential element for noise compatible land use planning is a local government or developer that is interested in new options for community planning and design. There must be an understanding of the "big picture" and a willingness to plan ahead to successfully implement this approach to noise reduction.

FHWA hopes that this brochure provides a first-step toward using noise compatible land planning. We want to spread the word that you can abate noise without totally enclosing your communities within barriers. You can preserve more open landscapes. Considering and using a full range of noise abatement options is part of improving the environmental quality of a community.

Planners, elected officials, developers, and community residents have choices. It is important to analyze options in advance of construction to identify the best long-term approach for maintaining quiet, aesthetically pleasing, and accessible neighborhoods. Clearly, there will be occasions when noise barriers or other highway construction techniques are desirable. The key is to consider a range of options, discuss the options with all affected groups, and identify the most appropriate response.

Next Steps

Here are some steps your community can take to make your neighborhood a quiet zone:

- Include noise compatible land use as a key option during planning meetings.
- Advocate noise compatible land use options to developers.
- Educate elected officials and community residents about noise compatible land use planning.
- Enhance zoning or other legal measures that encourage noise compatible land use planning.
- Include municipal land use or easement purchases as an active strategy to promote noise compatible land use planning.

Administrative tools that can help your community build a quiet zone:

- Health Codes
- Property Tax Incentives
- Zoning Ordinances
- Subdivision Regulations
- Building Codes
- "Set Back" Regulations

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For more information about reducing noise in your community, contact the FHWA:

Federal Highway Administration
Office of Natural Environment
400 Seventh St., SW
Washington, D.C. 20590

www.fhwa.dot.gov/environment/noise/

Your Community Deserves Noise Compatible Land Use Planning

Communities deserve for city officials, developers, planners and other stakeholders to incorporate noise compatible land use planning options into the growth and development process. Doing so will make it possible to:

- Create more livable communities
- Increase options for reducing the problems of highway traffic noise.
- Improve community aesthetics.
- Use funding for highway needs other than noise abatement.

AN ORDINANCE AMENDING CHAPTER 11, ARTICLE III OF THE TOWN CODE OF ORDINANCES REGARDING NOISE (2001-09-24/O-8)

(84)

BE IT ORDAINED by the Council of the Town of Chapel Hill as follows:

Section I. Article III, Chapter 11 of the Town Code is hereby revised to read as follows:

ARTICLE III. NOISE

Sec. 11-37. Article designated noise control code.

This article shall be known as the "Noise Control Code for the Town of Chapel Hill."

Sec. 11-38. Terminology and standards.

(a) *Terminology.* Major terminology used in this article is defined below. Terms not defined herein shall be in conformance with applicable publications of the American National Standards Institute (ANSI) or its successor body.

(1) *A-weighted sound level:* The sound pressure level in decibels as measured on a sound level meter using the A-frequency-weighted network and slow meter response_setting. The level so read is designated dB(A).

(2) *Decibel (dB)*: Unit of level when the base of the logarithm is the tenth root of ten and the quantities concerned are proportional to power. Unit symbol, dB.

(3) *Sound pressure level:* Ten times the logarithm to the base ten (10) of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 micro Pa. Unit decibel (dB); abbreviation, SPL; symbol, Lp.

(4) *Sound level meter:* Device used to measure sound pressure levels with a standardized frequency weighting and indicated exponential time weighting for measurements of sound level, or without time weighting for measurement of time-average sound pressure level or sound exposure level.

(5) *Sound level weighted sound pressure level*: Ten times the logarithm to the base ten of the ratio of the squared A-frequency-weighted sound pressure to the squared reference sound pressure of 20 micro Pa, the squared sound pressure being obtained with slow (S) (1000 ms) exponentially weighted time-averaging selected. Unit decibel (dB). [However, herein the unit for A-frequency weighted measurements will be referred to simply as dB(A).]

(6) *Time-interval equivalent continuous A-frequency-weighted sound pressure level:* Ten times the logarithm to the base ten of the ratio of the time-mean-square instantaneous A-frequency-weighted sound pressure during a stated time interval T, to the square of the standard reference sound pressure. Unit, decibel (dB); abbreviated as $L_{Aeq,T}$

(7) *Time-interval equivalent continuous band sound pressure level:* Sound pressure level for sound contained within a restricted frequency band during a stated time interval T. Unit, decibel (dB); abbreviated as $L_{b,eq,T}$.

11) Adjoining Property: Property which shares a contiguous boundary with another.

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(b) Instrumentation, requirements and measurement procedures: The instrumentation requirements, personnel training or qualifications and reporting procedures to be used in the measurement of sound as provided for in this section shall be those as specified herein:

(1) Sound level measurements shall be obtained following the general guidelines outlined in the references listed below and as specified in documents formulated by the city pertaining to the enforcement of this code.

(2) Sound level meters shall be of a least Type Two as defined in ANSI S1. 4-1997-for integrating-averaging sound level meters. The sound measurement system shall be serviced and calibrated and operated as recommended by the manufacturer or as outlined in the general order defined in (4) below.

(3) Persons using the sound measuring equipment and related instrumentation shall be trained in its proper operation, use, and care.

(4) The town manager or his designee shall issue a general order adopting standards and procedures for sound level measurements and enforcement consistent with this article.

(c) References:

(1) ANSI S1.43-1997. American National Standard Specifications for Integrating-Averaging Sound Level Meters. Standards Secretariat, Acoustical Society of America, New York, NY.

(2) ANSI S1.4-1983 (R 1997). American National Standard Specification for Sound Level Meters. Standards Secretariat, Acoustical Society of America, New York, NY.

(3) ANSI S2.11-1966 (R 1993). American National Standard Specifications for octave, half-octave, and third-octave band filter sets. Standards Secretariat, Acoustical Society of America, New York, NY.

(4) ANSI S1.1-1994. American National Standard Acoustical Terminology. Standards Secretariat, Acoustical Society of America, New York, NY.

(5) ANSI S3.20-1995. American National Standard Bioacoustical Terminology. Standards Secretariat, Acoustical Society of America, New York, NY.

(6) ANSI S1.40-1984(R 1997). American National Standard Specification for Acoustical Calibrators. Standards Secretariat, Acoustical Society of America, New York, NY.

Sec. 11-39. Maximum permitted steady-state sound levels and sound pressure levels.

(a) No person or group of persons shall operate or cause to be operated any source of sound in such a manner as to create a root mean square (rms) steady-state sound level that exceeds the limits set forth either in Table 1 or in Table 2 when measured at any point on the boundary planes of the property line from which the sound originates, or beyond.

(1) A-frequency-Weighted Sound Pressure Levels:

Table 1. Maximum Sound Level Limitations at the Property Boundary-Plane by Primary Use Category, dBA (86)

Primary Use Category	Daytime *	Nighttime *
Residential	50	45
Business, Office, Commercial, and Institutional	65	55
Shopping Center, Thoroughfare, and Industrial	70	65

* Daytime and nighttime are defined in section 11-39(d).

(2) One-Third Octave-Band Sound Pressure Levels:

Table 2. Maximum One-Third Octave-Band Sound Pressure Level Limitations At The Property Boundary-Plane by Primary Use Category, dB

One-Third Octave-Band Center Frequency, Hertz	One-Third Octave-Band SPL, dB			
	Residential		Business, Office, Commercial, Institutional	
	Daytime	Nighttime	Daytime	Nighttime
16	83	78	98	88
20	75	70	90	80
25	67	62	82	72
31.5	60	55	75	65
40	57	52	72	62
50	56	51	71	61
63	55	50	70	60
80	54	49	69	59
100	53	48	68	58
125	52	47	67	57
160	51	46	66	56
200	50	45	65	55
250	49	44	64	54
315	47	42	62	52
400	45	40	60	50
500	43	38	58	48
630	41	36	56	46

(b) In Table 2, the allowed one-third octave-band sound pressure levels for the nighttime and daytime for the shopping center, thoroughfare and industrial boundaries are +5 and +10 dB higher than is defined for the daytime business, office and commercial, and institutional boundary planes.

(c) When the primary use of the property where the noise is produced differs from the primary use of the adjoining sound-receiving property, then the maximum permitted sound levels or sound pressure levels which will apply are the lower of the levels shown in Tables 1 and 2 for the two primary use categories

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Highway Project Noise Mitigation

The National Environmental Policy Act (NEPA) of 1969 provides broad authority and responsibility for evaluating and mitigating adverse environmental effects including highway traffic noise. The NEPA directs the Federal government to use all practical means and measures to promote the general welfare and foster a healthy environment.

A more important Federal legislation which specifically involves abatement of highway traffic noise is the Federal-Aid Highway Act of 1970. This law mandates **FHWA** to develop noise standards for mitigating highway traffic noise.

The law requires promulgation of traffic noise-level criteria for various land use activities. The law further provides that **FHWA** not approve the plans and specifications for a federally aided highway project unless the project includes adequate noise abatement measures to comply with the standards. The **FHWA** has developed and implemented regulations for the mitigation of highway traffic noise in federally-aided highway projects.

The **FHWA** regulations for mitigation of highway traffic noise in the planning and design of federally aided highways are contained in Title 23 of the United States Code of Federal Regulations Part 772 (attached). The regulations require the following during the planning and design of a highway project: 1) identification of traffic noise impacts; examination of potential mitigation measures; 2) the incorporation of reasonable and feasible noise mitigation measures into the highway project; and 3) **coordination with local officials** to provide helpful information on compatible land use planning and control. The regulations contain noise abatement criteria which represent the upper limit of acceptable highway traffic noise for different types of land uses and human activities. The regulations do not require that the abatement criteria be met in every instance. Rather, they require that every reasonable and feasible effort be made to provide noise mitigation when the criteria are approached or exceeded. Compliance with the noise regulations is a prerequisite for the granting of Federal-aid highway funds for construction or reconstruction of a highway.

FHWA NOISE ABATEMENT PROCEDURES

The **FHWA** noise abatement procedures are codified in the Code of Federal Regulations (23 CFR 772). The procedures are described in the following sections.

Noise Descriptors

Noise descriptors are used to describe the time-varying nature of noise. The L10 and Leq noise descriptors are used in the abatement procedures. The former is the noise level exceeded 10% of the time in the noisiest hour of the day. The latter is the constant, average sound level, which over a period of time contains the same amount of sound energy as the varying levels of the traffic noise. The L10 is a statistical descriptor that is easy for most people to determine and understand. While the Leq descriptor is harder for inexperienced people to understand, it has the advantages over L10 of being more reliable for low-volume roadways and of permitting noise levels from different sources to be added directly to one another for inclusion in noise analyses. Leq for typical traffic conditions is usually about 3 dBA less than L10 for the same conditions.

Impact Criteria

A traffic noise impact occurs when either of the following conditions exist:

1. The projected traffic noise levels approach or exceed the noise abatement criteria (NAC) shown in Table 5, or
2. The projected traffic noise levels substantially exceed the existing noise levels in an area.

Table 5
Noise Abatement Criteria (NAC) Hourly A-Weighted Sound Level - decibels (dBA)*

Activity Category	Leq(h)	L10(h)	Description of Activity Category
A	57 (Exterior)	60 (Exterior)	Lands 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 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	–	–	Undeveloped lands.
			Residences, motels, hotels, public meeting rooms, schools, churches, libraries,

US DOT / FHA HIGHWAY TRAFFIC NOISE IN THE U.S. APRIL 2000

INTRODUCTION

Studies have shown that some of the most pervasive sources of noise in our environment today are those associated with transportation. Traffic noise tends to be a dominant noise source in our urban as well as rural environment. In response to the problems associated with traffic noise, the United States code of Federal Regulations Part 772 (23 CFR 772), "Procedures for Abatement of Highway Traffic Noise and Construction Noise," establishes standards for mitigating highway traffic noise.

The purpose of this document is to provide Federal Highway Administration (FHWA) policies and guidance for the analysis and abatement of highway traffic noise. A 3 1/2-day training course, sponsored by the National Highway Institute, is available for instructing FHWA field and State highway agency (SHA) staffs in the details of the policies and the technical procedures required for analyzing and abating traffic noise impacts.

I. LEGISLATION

Effective control of the undesirable effects of highway traffic noise requires that (1) land use near highways be controlled, (2) vehicles themselves be quieted, and (3) mitigation of noise be undertaken on individual highway projects.

The first component is traditionally an area of local responsibility. The other components are the joint responsibility of private industry and of Federal, State, and local governments.

A. Land Use Planning and Control

The Federal Government has essentially no authority to regulate land use planning or the land development process. The FHWA and other Federal agencies encourage State and local governments to practice land use planning and control in the vicinity of highways. The FHWA advocates that local governments use their power to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized.

Some State and local governments have enacted legislative statutes for land use planning and control. As an example, the State of California has legislation on highway noise and compatible land use development. This State legislation requires local governments to consider the adverse environmental effects of noise in their land development process. In addition, the law gives local governments broad powers to pass ordinances relating to the use of

NPC Online Library
NPC Law Library
NPC NoiseNews
NPC Resources
NPC Home

land, including among other things, the location, size, and use of buildings and open space. Wisconsin has a State law which requires formal adoption of a local resolution supporting the construction of a proposed noise barrier and documenting the existence of local land use controls to prevent the future need for noise barriers adjacent to freeways and expressways.

Although some other states and local governments have similar laws, the entire issue of land use is extremely complicated with a vast array of competing considerations entering into any actual land use control decisions. For this reason, it is nearly impossible to measure the progress of using land use to control the effects of noise

U.S. DOT/FHA HIGHWAY TRAFFIC NOISE & ABATEMENT JUNE 1995

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772.15: INFORMATION FOR LOCAL OFFICIALS In an effort to prevent future traffic noise impacts on currently undeveloped lands, highway agencies shall inform local officials within whose jurisdiction the highway project is located of the following:

a. The best estimation of future noise levels (for various distances from the highway improvement) for both developed and undeveloped lands or properties in the immediate vicinity of the project,

b. Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels, and

c. eligibility for Federal-aid participation for Type II projects as described in paragraph 772.13b of this directive.

The prevention of future impacts is one of the most important parts of noise control. The compatibility of the highway and its neighbors is essential for the continuing growth of local areas. Both development and highways can be compatible. But, local government officials need to know what noise levels to expect from a highway and what techniques they can use to prevent future impacts, states can help by providing this information to local governments; such information should be made available for disclosure in real estate transactions.

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081803noisestudiesnotrequired

To: Roger Waldon

From: Seymour Freed

Re: Noise Studies Not Required in Chapel Hill

It was stated at the May 12, 2003 Town Council meeting that noise studies have never been required of Chapel Hill developers. That was correct up until the submission to the Council of the Erwin Road Subdivision Concept Plan on April 23 of this year. A chronology follows:

January 27, 2003

The Council enacted a Land Use Management Ordinance requiring that the Council conduct a Concept Plan review for proposed development meeting specific land or floor area thresholds. Applications meeting any of the minimum thresholds require Town Council review in addition to Community design Commission review. The Council has the opportunity to hear the applicant's presentation, receive a set of comments from the Community design Commission, hear public comment and offer suggestions to the applicant for consideration as further plans are drawn.

ELEMENTS OF REVIEW

The Land Use Management Ordinance states that design and construction of site elements should include:

- Arrangement and orientation of buildings and amenities in relation to... neighboring... streets.
- Mitigation of traffic impacts.

Summary of Community Design Commission Action

Subject:	Erwin Road Subdivision Concept Plan
Meeting date:	March 19, 2003
Recommendation:	That the comments of the Commission be forwarded to the applicant and the Town Council
Vote;	By acclamation

Commission Member Comments:

- Noise associated with Interstate-40 was an issue with the neighbors and Commission members. Commission members asked the developer if sound attenuation, such as a sound barrier wall might be appropriate. It was suggested that it would not be appropriate for the tax payers to pay for this type of wall.
- It was noted that many of the two-family units appear to back up to the Interstate.

Chapel Hill Town Council Agenda
Wednesday, April 23, 2003
Town Council Public Hearing and Concept Plan Review
Concept Plan Review
Item 2 Erwin Road Subdivision

(Dawn Heric, Planning Director for the John R. McAdams Company and representing Grande Park LLC) stated that the applicant was studying the potential noise from I-40...

... Terry Eason, Chair of the Community Design Commission (CDC), directed the Council's attention to the CDC's written summary, included in agenda materials...

John Sampson, a resident of Englewood subdivision, discussed... sound pollution... With regard to sound pollution, Mr. Sampson stated that the applicant had not addressed the CDC's recommendation for an effective sound barrier...

Mr. Sampson recommended that the Council insist that all new developers in the area preserve every possible tree...

Council Member Strom... asked for information on NCDOT's High Occupancy Vehicle (HOV) lane study, which calls for a dedicated entry point from I-40 to the HOV lanes at Erwin Road. Council member Strom wondered what the implications of that would be for the area and what opportunities the Town would have to weigh in on such an entry point...

Mayor pro tem Evans asked if the CDC had addressed sound barrier walls prior to this discussion. Mr. Eason replied that some CDC members thought those barriers were aesthetically acceptable but others did not think they were acoustically effective. Mayor pro tem Evans asked if there had been any discussion by the CDC regarding noise abatement in relation to construction. Mr. Eason replied that he had not remembered such a discussion within the past six years or so.

Mayor Foy, noting that I-40 would be widened to six lanes in Orange County, asked the Manager to bring back information on who would pay for noise abatement, which would benefit other neighborhoods and Town lands as well...

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Summary of
Community Design Commission Action

Subject: Erwin Road Subdivision Concept Plan

Meeting Date: March 19, 2003

Recommendation: That the comments of the Commission be forwarded to the applicant and the Town Council.

Vote: By acclamation (Members present: Terry Eason, Thatcher Freud, Alice Ingram, Charlotte Newby, Weezie Oldenburg, Martin Rody, Polly Van de Velde)

Commission Member Comments:

- While noting that this plan was a big improvement over the previous apartment proposal, Commission members expressed concern about additional traffic on Erwin Road. It was noted that often the speed limit is not followed.
- Commission members reviewed photographs presented by citizens of high water in the area. Members expressed concern about the amount of water in the low areas associated with the creek and the associated federally regulated floodplain. The applicant was asked to confirm the location of the 100 year floodplain on the drawings. Members asked if the water quality pond was large enough for this size of development.
- Noise associated with Interstate-40 was an issue with the neighbors and Commission members. Commission members asked the developer if sound attenuation, such as a sound barrier wall, might be appropriate. It was suggested that it would not be appropriate for the tax payers to pay for this type of wall.
- A Commission member expressed concern about the length of the cul-de-sac and asked about connecting this neighborhood to others in the area. It was pointed out that no opportunities existed for connections, as the other areas have all been platted.
- It was noted that many of the two-family units appear to back-up to the Interstate.
- A concern was expressed about the safety of children around the water quality pond.
- A member indicated that Orange County has designed this area as environmentally sensitive.
- Commission members were supportive of the central green area at the end of the cul-de-sac.

Prepared by: Terry Eason, Chair
J.B. Culpepper, Staff

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CHAPEL HILL TOWN COUNCIL AGENDA
Wednesday, April 23, 2003

7:00 p.m. Town Council Public Hearing and Concept Plan Review

Estimated Time		
		Public Hearing
30	1.	1723 Homestead Road Subdivision: Application for Preliminary Plat Approval. (Without objection, the Manager's report and any other materials submitted at the hearing for consideration by the Council will be entered into the record):

- Swearing of persons wishing to present evidence.
- Introduction and preliminary recommendation by the Manager.
- Presentation by the applicant.
- Recommendation of Planning Board.
- Recommendations of other boards and commissions.
- Comments from citizens.
- Comments and questions from the Mayor and Town Council.
- Applicant's statement regarding proposed conditions.
- Motion to recess Public Hearing to May 12.
- Referral to Manager and Attorney.

Concept Plan Reviews

45	2.	Concept Plan Review: Erwin Road Subdivision

- Review of process by the Manager
- Presentation by the applicant
- Comments of Community Design Commission
- Comments from citizens
- Comments and questions from the Mayor and Town Council
- Resolution transmitting Council comments to applicant (R-1).

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AGENDA #2

MEMORANDUM

TO: Mayor and Town Council

FROM: W. Calvin Horton, Town Manager

SUBJECT: Concept Plan: **Erwin Road Subdivision**

DATE: April 23, 2003

INTRODUCTION

Attached for your consideration is an application for Concept Plan Review. The proposed use is residential development consisting of 41 dwelling units. The 30-acre site is located on the east side of Erwin Road, immediately south of Interstate 40 (I-40). The Concept Plan proposes a cul-de-sac with one point of access off of Erwin Road.

PROCEDURAL BACKGROUND

On January 27, 2003, the Council enacted a Land Use Management Ordinance requiring that the Council conduct a Concept Plan Review for proposed developments meeting specific land or floor area thresholds. Applications (other than in Town Center) meeting any of the minimum thresholds as shown below require Town Council review in addition to Community Design Commission review:

Characteristic	Threshold Triggering Council Review
Land Area	5 acres
Floor Area	100,000 square feet
# of Dwelling Units	50 dwelling units

The Council has the opportunity tonight to hear this applicant's presentation, receive a set of comments from the Community Design Commission, hear public comment, and offer suggestions to the applicant for consideration as further plans are drawn. At the conclusion of the evening's discussions, we recommend that the Council adopt a resolution (attached) transmitting comments to the applicant.

An excerpt from the Land Use Management Ordinance with a description of the process for Concept Plans is attached.

(95)

The Council has the opportunity tonight to hear this applicant's presentation, receive a set of comments from the Community Design Commission, hear public comment, and offer suggestions to the applicant for consideration as further plans are drawn. At the conclusion of the evening's discussions, we recommend that the Council adopt a resolution (attached) transmitting comments to the applicant.

An excerpt from the Land Use Management Ordinance with a description of the process for Concept Plans is attached.

ELEMENTS OF REVIEW

A Concept Plan is a preliminary step toward the preparation of a formal development plan and application. The Land Use Management Ordinance states that design and construction of site elements should include:

- Appropriate descriptions and explanations of the relationship and balance among site elements;
- The relationship of the development to natural features, neighboring developments and undeveloped land;
- Access and circulation systems;
- Retention of natural vegetation, minimal alteration of natural topography, mitigation of erosion and sedimentation, mitigation of stormwater drainage and flooding;
- Arrangement and orientation of buildings and amenities in relation to each other and to neighboring developments and streets;
- Landscaping, preservation or enhancement of vistas; and
- Mitigation of traffic impacts.

The Town Council and Community Design Commission, in examining development applications, are to consider the various aspects of design, with special emphasis on whether the proposed development is consistent with the Town's Design Guidelines and the Goals and Objectives of the Town's Comprehensive Plan.

This Concept Plan was reviewed by the Community Design Commission on March 19, 2003. A summary of comments from that meeting is attached to this memorandum.

4.3 Concept Plan Review

Purpose Statement: *It is the intent of the Site Analysis Data and Conceptual Development Plan process to provide an opportunity for the Town Council, Town Manager, the Community Design Commission and citizens to review and evaluate the impact of a major development proposal on the character of the area in which it is proposed to be located. This process is intended to take into consideration the general form of the land before and after development as well as the spatial relationships of the proposed structures, open spaces, landscaped areas, and general access and circulation patterns as they relate to the proposed development and the surrounding area.*

4.3.1 Applicability

(a) Proposals Subject to Review by Community Design Commission

This Section applies to any:

(1) Special Use Permit or a Special Use Permit Modification; or

(2) Master Land Use Plan or a Master Land Use Plan Modification; or

(3) Major Subdivisions.

(b) Proposals Subject to Additional Review by Town Council

(1) An application that meets any of the minimum thresholds established in subsections (1) or (2), below, shall require Town Council review as provided in Section 4.3.2, below, in addition to Community Design Commission review:

Thresholds (minimum)	TC-1, TC-2 Zoning Districts	All Other Zoning Districts
Land Area	15,000 square feet	5 acres
Floor Area	20,000 square feet	100,000 square feet
Dwelling Units	35 dwelling units	50 dwelling units

(2) If an application does not meet the thresholds established in subsection (1), above, the applicant may request review by the Town Council. The Town Council may determine to review the application, or it may decline to review the application. Such request shall be filed at least fifteen (15) days in advance of a regular meeting of the Town Council. The Town Council's determination shall be rendered at its next regular meeting after receiving a complete request for Town Council review.

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COUNCIL MEMBER HARRISON MOVED, SECONDED BY COUNCIL MEMBER WARD, TO ADOPT R-1. THE MOTION WAS ADOPTED UNANIMOUSLY (9-0).

A RESOLUTION TRANSMITTING COUNCIL COMMENTS ON A CONCEPT PLAN FOR THE ERWIN ROAD SUBDIVISION (2003-04-23/R-1)

WHEREAS, a Concept Plan has been submitted for review by the Council of the Town of Chapel Hill, proposing general development plans for a project on Erwin Road, called Erwin Road Subdivision; and

WHEREAS, the Council has heard presentations from the applicant, the Community Design Commission, and citizens; and

WHEREAS, the Council has discussed the proposal, with Council members offering reactions and suggestions;

NOW, THEREFORE, BE IT RESOLVED by the Council of the Town of Chapel Hill that the Council transmits comments to the applicant regarding this proposal, as expressed by Council members during discussion on April 23, 2003, and reflected in minutes of that meeting.

This the 23rd day of April, 2003.

081803I-40HOV

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August 18, 2003

NCDOT I-40 High Occupancy Vehicle Congestion Management Study

It is clear from the attached documents that NCDOT is strongly committed to constructing High Occupancy Vehicle Lanes (HOV) alongside the Habitat project. Other transportation planning assumes the HOV will be built. The HOV/Express lanes will consist of approximately 38-feet of roadway to be built between the breakdown lane and the Habitat property line. The express roadway will accommodate high-speed buses as well as cars. I estimate that the nearest traffic lane will be 45 to 50-feet closer to the property line than it is at at present.

Final Report (2003)

1.2.1 Phase I

Key recommendations from Phase I

- Move forward with congestion management strategies... These include managed lanes (particularly high occupancy vehicle (HOV) lanes)...
- Strongly support recent public and private initiatives... which... provide a solid foundation for strategies such as HOV lanes.

1.2.2 Phase II

... Phase II focused, in greater detail, upon the feasibility of providing an HOV network for the region by 2025. Specifically, four alternative HOV configurations were developed and analyzed between NC 86 and US 1/US 64.

Key recommendations from Phase II

- Develop a detailed HOV phasing plan to maximize HOV ridership with a strategy that can be successfully implemented.
- Select a viable roadway alternative for future HOV design and assure that any interim improvements to I-40 do not preclude HOV.

6.5 Elevated Configuration

The Elevated configuration assumes that a two-lane viaduct will be constructed on both sides of the I-40 freeway from NC 86 near Chapel Hill to US 1/ US 64 in Cary. These two-lane elevated structures will provide additional travel lanes for HOV and Express traffic.

For this configuration, six access locations were identified—the western approach near NC 86, NC 54 near Chapel Hill... These are the same access points identified for the Modified Complex configuration.

Typical Sections

Western Corridor: NC 86 to NC 54

The Elevated configuration from NC 86 to NC 54 would include the existing three lanes plus two elevated bridges, or viaducts, along each side. The viaduct consists of two 12-foot shared HOV/ Express lanes with a 4 foot left shoulder and a 10-foot right shoulder.

Environmental Screening

Environmental screening was not performed for the Elevated configuration. It was originally anticipated that the elevated structure could be fit entirely within the median of the existing roadway, and therefore the impact on the environment would be negligible. As the analysis progressed it became apparent that the two-lane viaducts would need to be placed outside the existing roadway. This finding resulted in expanding the required ROW slightly wider than that for the Complex configuration. Although not analyzed, this ROW is expected to cause similar but somewhat greater environmental impacts than the Complex configuration.

...8. FINDINGS AND NEXT STEPS

The I-40 High Occupanct Vehicle Mamagement Study has determined that there is enough HOV demand by the year 2025 to support a 100-mile HOV network. While it may not be realistic to believe that the cities of... Chapel Hill can implement an extensive HOV lane system in such a relatively short time, it is important to develop the planning framework and funding plans for this strategic congestion management effort.

Given the strong projected demand and the continuing growth in regional traffic congestion anticipated in the Triangle Region, this 100-mile network should serve as the "blue-print" for a long-range future HOV system... The first step toward implementation is to include all or portions of the HOV network in short-, mid-, and long-range transportation programs... It is imperative that each agency within the region champion the HOV "cause" now. HOV treatment has been (sic) proven itself as an appropriate tool for addressing current and forecasted congested conditions in numerous other locations across the country. This study indicates that HOV facilities are an appropriate strategy for managing congestion in this region as well.

...However, the study also concluded that the need is not simply to serve RTP but to serve trips passing through RTP. Therefore, it is recommended that more detailed environmental analysis be conducted for HOV facilities between NC 86 near Chapel Hill and US 1/US 64 near Cary. The proposed study corridor limits allow for a more focused evaluation of trips destined to and through the RTP...

...Moving forward with the next steps to implementation can make HOV a reality for the region.

NC 54/140 TRANSIT CORRIDOR FEASIBILITY STUDY

7.0 POTENTIAL ALIGNMENTS

Three potential alignments have been identified...

A. Using the planned High Occupancy Vehicle (HOV) lanes on I-40 wherever feasible (buses only). This alternative assumes the HOV lanes are constructed...

7.2 ALIGNMENT A: I-40 HIGH OCCUPANCY VEHICLE LANE

This alignment assumes that HOV lanes will be constructed on I-40 beginning west of NC 54 and continuing east of Page Road along the entire length of I-40 within the NC 54/I-40 study area. The feasibility of HOV lanes has been studied by NCDOT and a final report is expected early in 2003.

...Four basic types of HOV facilities were assessed in the NCDOT study:

□ Complex, barrier-separated lanes with dedicated, grade separated access at key entry/exit locatiosn. Direct access ramps are proposed at several locations... While this option is much costlier, it facilitates movement in and out of the HOV lane and allows higher speeds. This is particularly beneficial for transit vehicles that can travel at high speed between access points, and exit to pick up passengers or circulate on local roads at the access points.

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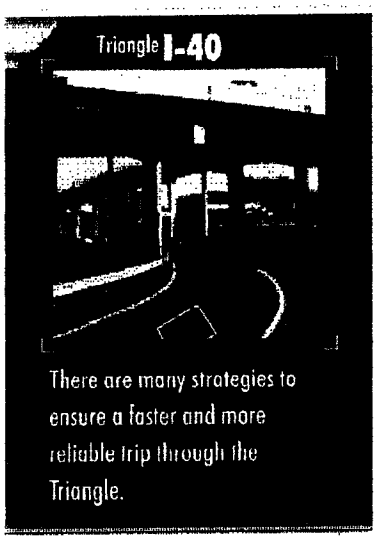
NCDOT HOV HIGH OCCUPANCY VEHICLE LANES



Overview

The Triangle has distinguished itself as one of the "best places" in the country to live and work. Thousands of families and companies have moved here to take advantage of the area's excellent business climate and North Carolina's rich history, diverse culture and natural beauty. While this growth brings many benefits, the increasing number of automobiles on our highways threatens the Triangle's quality of life. North Carolina is struggling with what to do about increasing traffic congestion caused by the tremendous influx of citizens.

The I-40 High Occupancy Vehicle Congestion Management Study (I-40 HOV CMS), a project of the North Carolina Department of Transportation (NCDOT), will examine a variety of innovative transportation and congestion management techniques. There are many strategies that can improve the trip for I-40 travelers; these strategies become even more effective when they are combined and coordinated. Some of these strategies can ensure a faster and more reliable trip. Others can lessen the inevitable operational deterioration of our state's highway system. Thus, a multidimensional approach to congestion management will be required to achieve noticeable effects. The I-40 HOV CMS will evaluate and identify the most appropriate solution(s) for local needs and problems. Of course, the ultimate effectiveness of any of these alternatives depends on the willingness of travelers to change their habits and alter their expectations.

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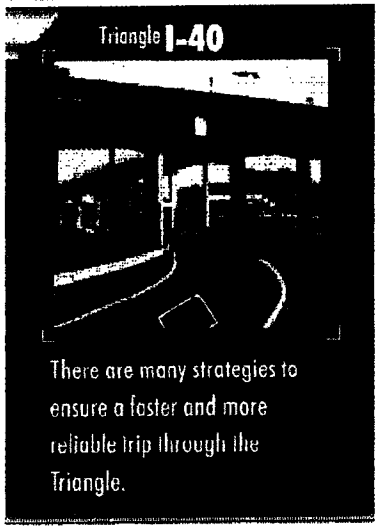
General Information

- About HOV Lanes
- Rules
- Facts and Myths
- FAQs
- HOVs in the US
- I-77

I-40

- Goals & Objectives

Public Outreach



Goals & Objectives

Phase One -- 2000/2001

- Identify strategies that have the potential to improve the vehicle carrying capacity of I-40 in the Triangle Region.
- Evaluate options, including high occupancy vehicle (HOV) lanes, toll lanes and express/truck lanes.

Phase Two - 2001/2002

- Develop a Congestion Management Plan with specific projects and actions for adoption by North Carolina Department of Transportation, Durham Chapel Hill Carrboro Metropolitan Planning Organization, Capital Area Metropolitan Planning Organization, and Triangle Transit Authority.
- In-depth evaluation of HOV including forecasts using the financially constrained HOV facilities, demand-driven implementation phasing, traffic analysis, and functional design.

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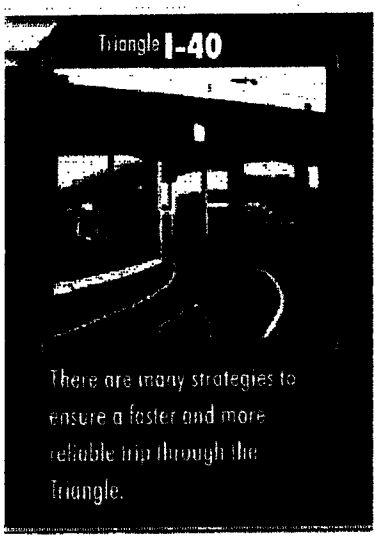

Public Outreach

The I-40 HOV toll free hotline: 866-527-7715

Handouts

For additional project related information, please click on one of the links below for online viewing and/or downloading. Download a free copy of Adobe Acrobat Reader to view the materials below. Please be patient some files will take several minutes to download.

- Phase I Executive Summary (PDF/1.4M)
- Phase I Brochure (PDF/550K)
- Phase II Newsletter No. 1, November 2001 (PDF/435K)
- Phase II Newsletter No. 2, April 2002 (PDF/1.5M)
- Phase II Tri-fold Brochure (PDF/181K)
- Phase II December Open House Displays (PDF/3.0M)

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I-40 High Occupancy Vehicle / Congestion Management Study

1. THE I-40 HIGH OCCUPANCY VEHICLE/CONGESTION MANAGEMEN STUDY

The I-40 High Occupancy Vehicle/Congestion Management Study was commissioned by the North Carolina Department of Transportation (NCDOT) to identify strategies that could improve mobility in the I-40 corridor between NC 42 in Johnston County and I-85 in Orange County. This corridor is the Triangle Region's primary commuting artery, serving major employment centers including Raleigh, Durham, Chapel Hill, and the Research Triangle Park (RTP). The study examines various strategies for effectively managing the increasing traffic volumes, as well as alternatives to regional commuting. While the focus of the study is the I-40 corridor, other major transportation facilities that intersect or parallel I-40 are considered in this analysis also. A map of the Triangle Region, including its major roadways, is shown in Figure 1-1.

Figure 1-1

Triangle Region Study Area

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I-40 High Occupancy Vehicle / Congestion Management Study

1.1 Transportation Objectives

In addition to evaluating potential congestion management strategies for the **I-40** corridor, it was important to identify the objectives that these strategies should achieve. This required an understanding of the current and anticipated transportation problems in the corridor, the level of mobility desired by the community and the types of improvements that could realistically be achieved. The following specific objectives were established to assess the effectiveness of the various strategies in the **I-40** corridor:

- Manage the corridor to enhance mobility for all travelers;
- Reduce the amount of single-occupant vehicle (SOV) travel;
- Increase the proportion of commuters using ridesharing programs and transit in the corridor;
- Improve the reliability (or predictability) of the trip time;
- Increase the people-moving capacity;
- Manage the single-occupant vehicle demand;
- Reduce the peak period congestion, delay and travel time;

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- Reduce the peak period congestion, delay and travel time;
- Reduce the peak period travel time for transit;
- Reduce the crash rates in the corridor;
- Reduce the incident response times; and
- Promote better traveler information.

These objectives served as guiding principles in the **I-40** High Occupancy Vehicle/

Congestion Management Study (**I-40 HOV**/CMS).

1.2

Study Process

The **I-40 HOV**/CM study was undertaken in two major phases. This report documents the

findings and recommendations from Phase I and Phase II including:

- An evaluation of a broad range of congestion management strategies, policies and actions;
- Identification of those congestion management strategies that have the potential to improve mobility and trip reliability within the **I-40** corridor;
- Evaluation of the feasibility of **HOV** facilities in the Triangle Region;
- Identification of a potential phasing plan for the implementation of **HOV** facilities; and
- Detailed examination of four potential **HOV** alternatives.

While the study presents a broad overview of congestion management strategies and

techniques, much of the analysis focused on High Occupancy Vehicle (**HOV**) lanes on **I-40** and other major highways within Johnston, Wake, Durham, and Orange counties. Previously, these types of facilities have not been thoroughly evaluated for the region.

FINALREPORT

1.2.1 ***Phase I***

Phase I of the **I-40 HOV**/CMS was commissioned by the **NCDOT** to review a broad range

strategies for addressing congestion in the Research Triangle. This study is not intended

to justify or eliminate the need for transportation improvements currently planned and programmed; rather the purpose of the study is to find additional ways to maximize the transportation system investments already planned for this region.
Phase I, which was conducted over a six-month period, brought together many of the

transportation leaders from the region. These leaders provided invaluable knowledge about the region's transportation issues, concerns and ongoing planning efforts. The study also provided the opportunity for transportation professionals from around the region to work together on regional challenges that go beyond geographical and institutional boundaries and to consider the impact that other ongoing initiatives and studies could play in managing congestion.

Key Recommendations from Phase I

- Move forward with congestion management strategies that can be implemented to provide alternatives to single occupancy vehicular travel within the region. These include managed lanes (particularly high occupancy vehicle (**HOV**) lanes), transit system improvements (rail and regional bus), travel demand management (TDM) strategies, and freeway management techniques including ramp metering, intelligent transportation systems (ITS) and transportation systems management (TSM).
- Strongly support recent public and private initiatives in ITS and TDM, which are essential elements of a congestion management program, and, along with transit initiatives, provide a solid foundation for strategies such as **HOV** lanes.
- Proceed with the transportation improvements currently planned and programmed in the **NCDOT** Transportation Improvement Program (TIP) and those identified in local agency plans and programs.
- Study short-term geometric improvements to enhance the efficiency of **I-40**, including addressing the bottlenecks between I-540 and NC 147 and Wade Avenue and US 1/ US 64.
- Establish a review process to ensure better coordination of ongoing transportation studies and projects in the region, including public involvement efforts.
- Establish an appropriate institutional framework for implementing an ongoing congestion management process.
- Study, promote and implement smart growth policies that support desired growth patterns, which can be effectively served by future transportation investments.
- Review current mechanisms and policies for funding transportation programs and identify new funding sources, which can provide financial resources for implementing congestion management strategies.
- Engage the public, in the broadest sense of the word, in developing future transportation strategies.

Page 4

I-40 High Occupancy Vehicle / Congestion Management Study

1.2.2 Phase II

Phase II of the **I-40 HOV**/CMS developed a congestion management program for **I-40** and other major roadways in the Triangle Region. The program identified specific projects and actions that could be adopted and incorporated into the **NCDOT**, Durham-Chapel Hill-Carrboro Metropolitan Planning Organization (DCHC), Capital Area Metropolitan Planning Organization (CAMPO), and Triangle Transit Authority (TTA) long range plans and Transportation Improvement Programs (TIPs).
Phase II built upon the works and recommendations of Phase I both in terms of strategies

and process. Phase II focused, in greater detail, upon the feasibility of providing an **HOV** network for the region by 2025. Specifically, four alternative **HOV** configurations were developed and analyzed between NC 86 and US 1/US 64. The results of Phase II provide a transportation blueprint for **I-40** that cut across geographical, institutional and modal boundaries.
A comprehensive public involvement program was implemented during Phase II. The

purpose of the public involvement program was to educate the public, involve them in the formulation and evaluation of alternatives and gain widespread understanding and support for the final congestion management strategies for **I-40**.

Key Recommendations from Phase II

- Identify short term, low cost improvements to address existing bottleneck issues on **I-40**.
- Develop a detailed **HOV** phasing plan to maximize **HOV** ridership with a strategy that can be successfully implemented.
- Select a viable roadway alternative for future **HOV** design and assure that any interim improvements to **I-40** do not preclude **HOV**.
- Implement and support additional congestion management strategies focused on providing additional capacity including planned roadway improvements, ITS implementation, ramp metering, and transportation systems management (TSM) improvements.
- Support and expand programs aimed at reducing single occupancy vehicle (SOV) trips

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I-40 High Occupancy Vehicle / Congestion Management Study

6.5 Elevated Configuration

The Elevated configuration assumes that a two-lane viaduct will be constructed on both sides of the **I-40** freeway from NC 86 near Chapel Hill to US 1/ US 64 in Cary. These two-lane elevated structures will provide additional travel lanes for **HOV** and Express traffic. Th Express lanes on the elevated structures add GP "through movement" capacity.

For this configuration, six access locations were identified – the western approach near NC 86, NC 54 near Chapel Hill NC 147, I-540, Wade Avenue, and the eastern approach near US 1/US 64. These are the same access points identified for the Modified Complex configuration.

The following sections describe in more detail the design assumptions associated with the Elevated configuration. Section 6.5.2 describes the implications of this design for travel demand on the **HOV** facility as well as on GP lanes. Section 6.5.3 describes the traffic operations conditions for the Elevated configuration. Section 6.5.4 provides a brief comment about the environmental issues. The construction implications are summarized in Section 6.5.5.

6.5.1 Typical Sections

The functional design of the Elevated configuration followed consistent design criteria as defined for the other **HOV** configurations, but incorporated additional criteria that are unique to this configuration. The elevated structures pass over existing interchanges. As in the Modified Complex configuration, access points for **HOV** and Express traffic are provided at six interchange locations at or near NC 86, NC 54, NC 147, I-540, Wade Avenue and US 1/ US 64.

The typical section includes elevated structures consisting of two 12-foot lanes on each side of the existing GP lanes. The elevated structures will not require widening the existing **I-40** roadway or changing the existing cut-and-fill slopes; thus the need for additional right-

(110)

of-way is minimized.
Illustrated typical sections showing the Elevated **HOV** configuration follow for four **I-40**

sections.

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I-40 High Occupancy Vehicle /
Congestion Management Study

Western Corridor: NC 86 to NC 54
The Elevated configuration from NC 86 to NC 54 would include the existing three GP lanes

plus two elevated bridges, or viaducts, along each side. The viaduct consists of two 12-foot shared **HOV**/ Express lanes with a 4-foot left shoulder and a 10-foot right shoulder. A typical cross-section of this design is shown in Figure 6-32.
Figure

6-32 Existing and Elevated Configuration Typical Sections
Between NC 86 and NC 54

Westbound I-40

1. Eastern – US 1/US 64 to Wade Ave	3.8
2. Airport Corridor – Wade Ave to Aviation Pkwy	4.1
3. Eastern RTP – Aviation Pkwy to NC 147	5.6
4. Western RTP – NC 147 to NC 54	6.4
5. Western Corridor – NC 54 to NC 86	6.9
WESTBOUND TOTAL	**26.8**

Delay Analysis

The FRESIM micro-simulation model was used to analyze the traffic operations for the I-40 corridor from NC 86 to US 1/US 64 and understand how the Elevated configuration would handle the projected traffic demand. The goal was to simulate specific traffic bottlenecks at higher level of detail than the demand model in order to produce more realistic estimates of total delay, unit delay and average speed along the corridor. The results of this micro-simulation analysis are summarized and compared to the No-Build statistics in Table 6-32.

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Table 6-32 Elevated Configuration Delay Analysis Results

I-40 Measures of Effectiveness	No-Build	Elevated Percer
AM Peak Hour		
Vehicle-Miles Traveled (VMT)	323,461	405,843
Average Speed in Network, mph	38.9	41.8
Total Delay Time, vehicle-hours	3,298	3,352
Unit Delay Time, sec/veh-mile	36.6	30.0
PM Peak Hour		
Vehicle-Miles Traveled (VMT)	324,920	405,202

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Vehicle-Miles Traveled (VMT)	324,850	405,392
Average Speed in Network, mph	38.8	48.2
Total Delay Time, vehicle-hours	3,350	2,047
Unit Delay Time, sec/veh-mile	37.2	18.0

As illustrated in the table, the Elevated configuration would reduce unit delay by 18 to 52 percent, and improve average speed by 7 to 24 percent during AM and PM peak hours, while accommodating a 25 percent increase in the VMT demand. These operational benefits are more pronounced during the PM peak hour, as it shows 52 percent reduction in travel delay for each vehicle traveling one mile along the corridor. However, this configuration shows a two percent increase in delay in the AM peak hour due to high increase in VMT.

6.5.4

Environmental Screening

Environmental Screening was not performed for the Elevated configuration. It was originally anticipated that the elevated structure could be fit entirely within the median of the existing roadway, and therefore the impact on the environment would be negligible. As the analysis progressed it became apparent that the two-lane viaducts would need to be placed outside of the existing roadway. This finding resulted in expanding the required right-of-way slightly wider than that for the Complex configuration. Although not analyzed, this right-of-way expansion is expected to cause similar but somewhat greater environmental impacts than the Complex configuration.

6.5.5

Roadway Design and Cost Estimate

Functional roadway design for the Elevated configuration was developed and is shown in Appendix A. The following sections focus on these roadway elements:

- Bridge Design and Construction
- Construction Phasing
- Cost Estimates

Bridge Design and Construction

The elevated structures pass over existing interchanges and provide exclusive access at only a few key locations. Consequently, no changes would be necessary to the existing

cut-and-fill slopes, retaining walls, box culverts and bridges along the corridor. The only change would occur at the I-40/NC 147 interchange for the existing ramps.

Construction Phasing

The construction sequence for the Elevated design would consist of constructing elevated structures along both sides of I-40, spanning over top of existing interchanges, and connecting the elevated structures to appropriate access points. This construction could be accomplished with very minimal impacts to existing general purpose traffic patterns as all of the construction would be adding bridges to the outside of the existing travel lanes. The elevated design could be implemented in any phasing pattern as long as two access points are open. Use of this configuration is concentrated in the RTP and Airport Corridors during peak hours and thus implementation of HOV lanes at this part of the I-40 corridor first would be most logical. The construction would then need to be completed from the middle of the corridor and out. As one section is completed to the next access point, the elevated structure could be opened. To allow for express service, most of the elevated structure along I-40 would need to be opened because the access points to the I-40 GP lanes are at the beginning and end of the corridor.

Cost Estimates

Functional design cost estimates were developed for five corridors as shown in Table 6-33.

Cost estimates were based on functional design rather than a per mile cost. Quantities for pavement and structures were estimated based on geometric design from the 200 scale plans. Unit costs were developed and applied in accordance with NCDOT procedures for preliminary design. Costs are first estimated in 2002 dollars and then inflated to year 2025 using an inflation rate of 2.7 percent per year. The costs include engineering and other factors as outlined in Section 6.2, but do not include right-of-way costs.

Table 6-33 Elevated Configuration Estimated Cost (in millions)

Project	Estimated 2002 Cost of Construction
Western Corridor (NC 86 to NC 54)	$ 232M
RTP Corridor – West (NC 54 to NC 147)	$ 465M
RTP Corridor – East (NC 147 to Aviation Pkwy)	$ 617M
Airport Corridor (Aviation Pkwy to Wade Ave)	$ 323M

(14)

I-40 High Occupancy Vehicle / Congestion Management Study

8. FINDINGS AND NEXT STEPS

The **I-40** High Occupancy Vehicle/Congestion Management Study has determined that there is enough **HOV** demand by the year 2025 to support a 100-mile **HOV** network. While may not be realistic to believe that the cities of Raleigh, Durham and Chapel Hill can implement an extensive **HOV** lane system in such a relatively short time, it is important to develop the planning framework and funding plans for this strategic congestion management effort.

Given the strong projected demand and the continuing growth in regional traffic congestion anticipated in the Triangle Region, this 100-mile network should serve as the "blue-print" fo a long-range future **HOV** system. The plan also recognizes the needed regional components of a major highway and arterial improvement program, a TDM program and the high capacity transit investment. The study has determined a high **HOV** demand in some sections of **I-40** for interim years 2005 and 2015. This demand exists in spite of a number of new highway projects targeted to come on line in the near future. The network needed to handle this interim **HOV** demand is smaller and indicates where the more immediate needs exist. These are the **HOV** segments that should move forward first.

The first step towards implementation is to include all or portions of the **HOV** network in short-, mid- and long-range transportation programs. The **NCDOT** along with CAMPO, DCHC, TTA and other transportation planning agencies should work together to confirm the overall congestion management "blue print," including it in master plans and transportation improvement plans. It is imperative that each agency within the region champion the **HOV** "cause" now. **HOV** treatment has been proven itself as an appropriate tool for addressing current and forecasted congested conditions in numerous other locations across the country. This study indicates that **HOV** facilities are an appropriate strategy for managing congestion in this region as well.

It is very important that the first **I-40 HOV** project to move forward is considered a success by the public. This project has to be seen as an immediate success; otherwise future investments in extensions could be questioned for effectiveness and thus be lost as a

(15)

transportation tool for some time to come.
Not surprisingly, the study determined that the highest priority segment for **HOV** on **I-40** is

in Research Triangle Park between NC 147 and I-540 and implementing this segment can generate a project success. However, the study also concluded that the need is not simply to serve RTP but to serve trips passing through RTP. Therefore, it is recommended that more detailed environmental analysis be conducted for **HOV** facilities between NC 86 near Chapel Hill and US 1/US 64 near Cary. The proposed study corridor limits allow for a more focused evaluation of trips destined to and through the RTP. These limits also provide for reasonable NEPA coverage that addresses logical termini and segmentation issues.
The **HOV** concept should not be studied in isolation. Other elements can contribute to the

potential success of **HOV** and should be studied in conjunction with it. At a minimum, these studies should include park-and-ride lots that support the proposed **HOV** lanes and bus service that could take advantage of HOV lane travel-time savings.
The HOV concept can also potentially "buy time" for the NCDOT. By improving the

efficiency of a facility, some transportation improvements could be delayed or eliminated

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altogether.
As the saying goes, "You cannot build your way out of congestion." It is important to look

at options that better manage the transportation resources that exist. **HOV** is a tool that meets that objective. By moving more people in fewer cars, the overall transportation system can become more efficient. Moving forward with the next steps to implementation can make **HOV** lane a reality for the region.

7.0 POTENTIAL ALIGNMENTS

Three potential alignments have been identified for determining physical feasibility, calculating order-of-magnitude costs, and estimating ridership. These alignments are very preliminary and were developed for the purpose of determining overall corridor feasibility, and not for selecting a preferred alignment or technology. The latter would be the objective of a Phase II study. The three alignments are shown in Figure 7-1 and are:

A. Using the planned High Occupancy Vehicle (HOV) lanes on I-40 wherever feasible (buses only). This alternative assumes the HOV lanes are constructed, as a separate project, by the state for carpools and vanpools.

B. An exclusive right-of-way for the entire length (bus or rail). This alignment is designed to be suitable for rail use, but also can be a busway. While it uses exclusive right-of-way, many streets can be, and are, crossed at grade. Much of it parallels I-40.

C. Use of NC 54 for substantial sections (bus or rail). This alignment attempts to use NC 54 to the degree feasible, with the objective of minimizing capital costs and maximizing accessibility to land uses. This alignment is designed primarily for BRT, but also can be used by LRT or light DMUs.

Note that for all options two lanes (or tracks) are assumed for the entire length of the corridor.

7.1 KEY ACTIVITY CENTERS

Key activity centers that the alignments attempt to serve include:

- UNC-Chapel Hill Main Campus
- Friday Center (the master plan for this area anticipates increased development, and the Meadowmont development includes existing and planned facilities in that area on the south side of NC 54)
- Meadowmont mixed-use development
- Southwest Durham mixed-use development (between George King and

- Complex, barrier-separated lanes with dedicated, grade-separated access at key entry/exit locations. Direct access ramps are proposed at several locations on I-40 within the NC 54/I-40 study area, however, these locations are preliminary only and can be changed to support a bus rapid transit system for the corridor. While this option is much costlier, it facilitates movement in and out of the HOV lane and allows higher speeds. This is particularly beneficial for transit vehicles that can travel at high speed between access points, and exit to pick up passengers or circulate on local roads at the access points.

- Complex, barrier-separated lanes as described above, but with less access points.

- A two-lane, elevated viaduct on each side of I-40 for HO Vs and express (longer distance) traffic. Access to these lanes would be limited as for the **complex configuration**. This is the highest cost option, and the study concluded that viaduct may be the best option for the bottleneck portion of I-40 between NC 147 and I-540.

For the purpose of the Phase I evaluation, the barrier-separated lanes are assumed since buses could cruise at 55 MPH regardless of traffic conditions on I-40. For safety reasons, the travel speed on the concurrent lanes cannot be more that 15 MPH greater than speeds in the adjacent general use lanes; therefore, in the peak period, all traffic in the HOV lanes, including buses, could not operate at the preferred speed of 55 MPH.