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16. Abstract

This project will provide sufficient information to the Texas Department of Transportation and the Texas Transportation Commission to make an informed decision regarding the development and implementation of a statewide Type II Noise Abatement Program. It was not the purpose or intent of the project to provide a recommendation or to propose a specific course of action. The project covers a detailed review of other states' noise abatement policies and programs for existing highways, an estimate of the magnitude of the traffic noise impact from existing highways on Texas residences, and a description of a possible Type II program, including a project prioritization system. This information can be used to decide on an existing highway noise abatement policy and, if necessary, to design a Type II program for Texas.

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STUDY OF STATEWIDE TYPE II NOISE ABATEMENT PROGRAM FOR THE TEXAS DEPARTMENT OF TRANSPORTATION

by

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Research Report Number 1754-1

Study No. 0-1754

Statewide Type II Noise Abatement Program for TxDOT

Conducted for the

TEXAS DEPARTMENT OF TRANSPORTATION

in cooperation with the

U.S. Department of Transportation

Federal Highway Administration

by the

CENTER FOR TRANSPORTATION RESEARCH

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THE UNIVERSITY OF TEXAS AT AUSTIN

February 2000

IMPLEMENTATION STATEMENT

This project provided a detailed review of other states' noise abatement policies and programs for existing highways, an estimate of the magnitude of the traffic noise impact from existing highways on Texas residences, and a description of a possible Type II program, including a project prioritization system. The purpose of the project was to provide sufficient information to the Texas Department of Transportation and the Texas Transportation Commission to make an informed decision regarding the development and implementation of a statewide Type II Noise Abatement Program. It was not the purpose or intent of the project to provide a recommendation or to propose a specific course of action.

DISCLAIMERS

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration or the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

There was no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States of America or any foreign country.

NOT INTENDED FOR CONSTRUCTION,
BIDDING, OR PERMIT PURPOSES

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Research performed in cooperation with the Texas Department of Transportation and the U.S. Department of Transportation, Federal Highway Administration.

EXECUTIVE SUMMARY

The Texas Transportation Commission (the commission), recognizing the importance of environmental mitigation, ordered, and authorized funding for, a study to explore whether it is practical to develop and carry out a statewide Type II Noise Abatement Program for the Texas Department of Transportation (TxDOT). Type II highway projects are federal or federal-aid highway projects aimed at noise abatement along existing highways, with such projects not undertaken in conjunction with a highway construction or improvement project. The Federal Highway Administration (FHWA) has placed a number of specific restrictions on Type II noise abatement that must be met for a Type II project to be approved (eligible for federal aid).

The scope of this project was to perform a study and analysis of Type II noise abatement in order to provide sufficient information to TxDOT and the commission to make an informed decision regarding the possible development and implementation of a Type II Noise Abatement Program in Texas. This includes an analysis of Type II programs in place at other state highway agencies; an estimate of the overall magnitude and preliminary cost of a statewide Type II program; the development of a rating system to quantify and prioritize projects to provide a basis for the decision-making process; and the development of a method to effectively, efficiently, and equitably administer and carry out a Type II Noise Abatement Program statewide. It was not the purpose or intent of this project to provide a recommendation or to propose a specific course of action.

Information on programs other states have implemented for noise abatement on existing highways was obtained by written questionnaires sent to all U.S. state departments of transportation's (DOT's) traffic noise program representatives and by follow-up telephone interviews. A similar study conducted by the Pennsylvania DOT completed in 1996 was reviewed for information on Type II programs in the U.S. and also for ideas on approaching this study.1

Fifteen out of fifty state DOTs currently have Type II noise abatement programs that are approved by the Federal Highway Administration, with varying levels of activity. Seven states that do not have a Type II noise abatement program have constructed one or more retrofit barriers under an informal noise abatement program for existing highways or as special projects. The remaining twenty-eight states do not have a Type II noise abatement program and have not constructed any retrofit noise barriers on existing highways. States that have implemented the largest number (or miles) of Type II noise barriers include California, Colorado, Minnesota, New Jersey, Michigan, Maryland, and Wisconsin. In these states, the technical aspects of identifying, designing, prioritizing, and implementing Type II projects are managed either by the state DOT central office or by the state DOT district offices.

For the twenty-eight states that do not have a Type II noise abatement program and have not constructed any retrofit noise barriers on existing highways, the reasons most often given included: (1) They considered Type I noise abatement the best way to mitigate the

[1] "Statewide Retrofit Noise Abatement Study," Pennsylvania Department of Transportation, May 31, 1996.

environmental impact of highway noise, or (2) they emphasized that capacity improvement projects are the main priority of the state transportation improvement plan.

Comments on lessons learned received from many states covered a variety of perspectives on Type II programs, giving both positive and negative aspects of the way retrofit noise abatement is treated in their respective state. Comments on positive aspects of having a Type II program included: A properly funded program provides noise abatement to some impacted residents; the program provides a positive means to deal with citizen and legislature concerns; and an established program provides for objective and equitable decisions for construction of noise abatement measures. Comments on negative aspects of having a Type II program include: The program can only serve a limited number of the residents that are impacted by highway noise; program allocated budgets typically are much less than that required for timely construction of projects; a Type II program uses funds that could have been used for other highway improvement projects; residents are often satisfied with, and even prefer alternate measures, such as landscaping, that are much less expensive than Type II projects; a Type II program requires extra staff work, particularly during initial implementation; and Type II construction does not improve highway capacity.

A questionnaire was also sent to the twenty-five Texas Metropolitan Planning Organizations (MPOs) in order to establish their current involvement in traffic noise impact problems and their interest and potential willingness to participate in future Type II noise abatement project prioritization and funding. Overall, the results indicate that most of the MPOs have not become actively involved in traffic noise abatement, either because no complaints were received or because persons submitting traffic noise complaints to MPOs were referred to TxDOT. In one MPO (Austin), complaints concerning traffic noise led to a noise study along two noise-impacted freeways. Most MPOs would prefer that the state fund any noise abatement projects on existing highways; they are not willing to cancel or postpone any current safety or capacity improvement projects to support retrofit traffic noise abatement projects in their areas. Some MPOs indicated that, if citizen interest in traffic noise increases, they might become more involved in traffic noise abatement.

The estimate of the overall magnitude and preliminary cost of a statewide Type II program was performed using a geographical information system (GIS) analysis of Dallas County, and then extrapolating the results to include the largest metropolitan areas statewide. It was determined that nearly 22,000 residences of Dallas County are impacted by highway noise. That equates to approximately fifty-three residences impacted per mile of major highway. Among those residences, nearly 5,000 are in the first row of houses next to the highway. The first-row residences are the most impacted and most likely to benefit from highway noise barriers. It was estimated that, using TxDOT reasonable and feasible guidelines, barriers could be built to benefit slightly over 2,000 first-row residences. This would require 39 miles of barriers. Extrapolating this data for Dallas County to the largest metropolitan counties statewide and subtracting existing and proposed noise barriers, the estimated preliminary mileage total for potential Type II noise barrier sites is 142 miles. Associated costs would be approximately $1,000,000 per mile for noise barrier construction plus an additional 20-30% per mile for site surveys, noise analyses, public involvement, overhead, and administration.

The experiences of states that have a Type II program have shown that the list of potential projects will exceed the number that can be constructed with available funding for at least 10 years. Therefore, for any Type II program to function, it is essential that a prioritization method be developed and implemented. The standard, objective quantity that is used for prioritization is cost-effectiveness. A simple formula was developed that weighs current noise level, level of noise reduction possible, and cost per benefited receiver to arrive at a cost-effectiveness number that can be used to rank order potential projects statewide.

Based on information received from the other states and from the Texas MPOs, a program was developed for administration of a Type II program. The main criteria for the program were that it should be fair, consistent, and uniformly applicable statewide. The program consists of four steps. First, a statewide survey must be conducted to determine the location of candidate noise abatement projects. A comprehensive survey of all highways in Texas could require up to 1 year and 2 man-years of effort. If the work is contracted, costs should be on the order of $200,000. Once collected, the data should need only periodic review and updates. Second, a detailed analysis of each candidate project must be conducted to ensure it meets all FHWA and TxDOT criteria. Third, a quantitative means of prioritizing projects should be used to rank the projects. Fourth, projects are selected for implementation. The status of selected projects should be monitored throughout the construction process and follow-up contacts should be made with neighborhood residents. Currently, the Environmental Affairs Division (ENV) of TxDOT is responsible for the statewide noise abatement program for Type I projects. It is logical that ENV should also assume the overall responsibility of any Type II program.

The information gathered from this study indicates both positive and negative aspects. A Type II program does have a limited benefit for the residents that receive noise reduction. Most residents who are impacted by noise on existing highways will not benefit from a Type II program because construction of noise barriers is not feasible and reasonable, the location is not eligible for federal aid, or because of limited funding. Most states do not have a Type II program and only a few have active programs. A Type II program is not required by federal law or regulation and projects compete for funding with other transportation needs statewide.

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CHAPTER 1. INTRODUCTION

On 18 June 1996, the Texas Transportation Commission (the "commission") ordered and authorized funding for a study to explore whether it is practical to develop and carry out a statewide Type II Noise Abatement program for the Texas Department of Transportation (TxDOT). To complete the actions ordered, a project agreement was entered on 26 March 1997 between TxDOT and the Center for Transportation Research (CTR) at The University of Texas at Austin and the Institute for Research in Sciences and Engineering at The University of Texas at San Antonio. This is the final report for that project.

1.1 REASON FOR INITIATION OF PROJECT

The commission has recognized the importance of environmental mitigation through the adoption of Title 43, Texas Administrative Code, Chapter 2, providing environmental policy, review, and public involvement for transportation projects. In accordance with Federal Highway Administration (FHWA) regulation 23 CFR Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise," TxDOT has developed and implemented a traffic noise analysis and abatement program. This program provides for noise abatement in conjunction with federally or state-funded Type I highway projects. Type I highway projects are federal or federal-aid highway projects that involve (1) construction at a new location, (2) the alteration of an existing highway that substantially changes either horizontal or vertical alignment, or (3) an increase in the number of through-traffic lanes. FHWA regulation 23 CFR Part 772 further indicates that a program for Type II highway is not required. Type II highway projects are federal or federal-aid highway projects aimed at noise abatement along existing highways (not in conjunction with a Type I highway construction or improvement project). TxDOT has not developed or implemented a Type II program. FHWA policy and guidance further specifies that Type II noise abatement is not eligible for federal aid unless the state DOT develops a statewide FHWA approved Type II program. The commission noted that TxDOT has received an increasing number of requests from the public and other interested parties for the implementation of Type II noise abatement for traffic noise impacts along existing highways. The commission also recognized that the development and implementation of an effective, efficient, and equitable statewide Type II Noise Abatement program would require extensive study and analysis.

1.2 PROJECT OBJECTIVES AND TASKING

The scope of this project involved performing a study and analysis of Type II noise abatement in order to provide sufficient information to TxDOT and the commission to make an informed decision regarding the possible development and implementation of a statewide Type II Noise Abatement Program. Towards this goal, several objectives were developed, including:

(1) an analysis of Type II programs in place at other state highway agencies,
(2) an estimate of the overall magnitude and preliminary cost of a statewide Type II program,

(3) the development of a rating system to quantify and prioritize projects to provide a basis for the decision-making process, and
(4) the development of a method to effectively, efficiently, and equitably administer and carry out a Type II Noise Abatement program statewide.

It was not the purpose or intent of this project to provide a recommendation or to propose a specific course of action.

1.3 FHWA NOISE ABATEMENT CRITERIA (NAC)

FHWA has developed noise abatement criteria (NAC) that are used to determine when traffic noise impacts occur. The NAC are based on noise levels associated with interference with speech communication. A traffic noise impact occurs at land use activity areas adjacent to a highway project when associated noise levels approach, equal, or exceed the NAC. Approach is defined as one decibel (dBA) below the NAC. For example: A residential area with an NAC of 67 dBA would be impacted by traffic noise at 66 dBA or above.

1.4 FHWA OPTIONS FOR NOISE ABATEMENT

The noise abatement measures that would qualify for federal aid as Type II projects include:

(1) The use of traffic management measures (e.g., traffic control devices and signing for prohibition of certain vehicle types, time-use restrictions for certain vehicle types, modified speed limits, and exclusive land designations)
(2) The alteration of horizontal and vertical alignments
(3) Acquisition of property rights (either in fee or lesser interest) for construction of noise barriers
(4) Construction of noise barriers
(5) Noise insulation of public use or nonprofit institutional structures

Among highway research organizations, there is at this time considerable interest in the development and use of “low noise” highway surfaces to decrease the noise level of traffic. It is clear that noise levels do vary with changes in pavement surfaces and certain surfaces have been identified as having the most promise for low noise. However, additional research is required to determine to what extent a particular pavement can consistently reduce noise levels over another pavement. Under federal guidelines, pavement types or textures cannot now be considered as a noise abatement measure.

Landscaping is sometimes used for aesthetic purposes along a highway right-of-way between the highway and adjacent residential areas. However, under federal guidelines, landscaping (vegetation) is not considered to be a noise abatement measure. The planting of trees and shrubs along a highway normally provides no significant noise reduction.

In the vast majority of cases, the noise abatement measure used is the construction of noise barriers. These barriers can be made from a variety of materials, though reinforced concrete is most prevalent in Texas. The barriers are placed between the highway (noise source) and the place where people (receivers) are impacted by the noise. The barrier also must be long enough and tall enough to block a sufficient portion of the noise traveling to the receivers to give them a substantial noise reduction. Owing to the physics of sound propagation, a barrier can only be of limited effectiveness and only for those receivers that are shielded from the barrier.

1.5 RESTRICTIONS/EVALUATION CRITERIA FOR TYPE II NOISE ABATEMENT

The Federal Highway Administration (FHWA) has placed a number of specific restrictions on Type II noise abatement that must be met for a Type II project to be approved (eligible for federal aid). Any noise abatement project must also meet TxDOT's feasible and reasonable criteria. These FHWA restrictions and TxDOT feasible and reasonable criteria are addressed below.

(1) Type II noise abatement measures will be approved only for projects that were approved before November 28, 1995, or are proposed along lands where land development or substantial construction predated the existence of any highway. The granting of a building permit, filing of a plat plan, or similar action must have occurred prior to right-of-way acquisition or construction approval for the original highway.

(2) Type II noise abatement measures will not be approved at locations where such measures were previously determined not to be feasible and reasonable for a Type I project.

(3) Type II noise abatement will not be approved unless the state DOT develops a statewide FHWA approved Type II program.

(4) A Type II Noise Abatement Program based solely on the selection of specific noise abatement projects at the discretion of Metropolitan Planning Organizations is not considered to be a statewide program and, therefore, would not be approved.

(5) Feasible: Noise abatement is considered to be feasible if it will provide a substantial reduction in noise levels. Substantial reduction is defined as a reduction in noise levels of at least 5 dBA at impacted receivers. Feasibility deals primarily with engineering considerations.

(6) Reasonable: Noise abatement is considered to be reasonable if it is cost effective and approved by a majority of adjacent property owners. A feasible noise abatement measure is considered to be cost effective if the total cost will not exceed $25,000 for each benefited receiver. In order for a receiver to be counted as benefited, noise abatement must reduce the noise level at the receiver by at least 5 dBA.

Additional recommended restrictions:

(7) Future Type I Projects: Type II noise abatement should not be provided for areas where Type I highway projects are planned, programmed, or anticipated. This is necessary to avoid situations where Type II noise abatement (noise barriers) would have to be removed to accommodate a future highway improvement project and to prevent Type II barriers from constraining future development.

(8) Compatible land use planning: Type II noise abatement should be provided only

for areas where the local government agency responsible for approval of development has demonstrated the control of (or has agreed to control) land use activities adjacent to the highway that encourage noise compatible development.

CHAPTER 2. ANALYSIS OF TYPE II PROGRAMS IN PLACE AT OTHER HIGHWAY AGENCIES

The initial task of this project was to collect and evaluate information on programs other states have for noise abatement on existing highways. This effort was carried out by written questionnaires that were sent to all U.S. state departments of transportation's (DOT's) traffic noise program representatives and by follow-up telephone interviews. A similar study conducted by the Pennsylvania DOT in 1996 was reviewed for information on Type II programs in the U.S., and also for ideas on approaching this study. The PennDOT study served as a guide for designing this study and, in particular, for designing the questionnaires (Ref 3).

It is important to note that, by definition (federal regulation 23 CFR 772), the term "Type II" applies only to proposed federally funded projects for noise abatement along an existing highway. Projects for noise abatement along an existing highway that are not federally funded will be referred to by the term retrofit.

2.1 SURVEY METHODOLOGY

Two different mail-in questionnaires were sent to each state DOT. One questionnaire was for states that either have implemented, or are in the process of implementing, a Type II noise abatement program. These states were asked to provide information on the reasons that programs were initiated, implementation of the program, and lessons learned in the process. The other questionnaire was designed for states that do not have a formal Type II noise abatement program. These states may have implemented one or more retrofit traffic noise abatement projects without a formal Type II program. These states were asked to provide information on the reasons that a Type II program was not initiated, what has been done concerning noise abatement on existing highways, and lessons learned in the process. Tailoring these questionnaires to the two groups proved helpful as a time-saving feature for the respondents and enabled the questions to be accurately phrased for each group. Multiple choice answers accompanied most of the questions in order to obtain consistency in the responses and for ease of response, while space for write-in answers was provided for the questions requiring specific information unique to the state programs or their status.

Questionnaires were completed and returned by thirty-nine states, thirty-two of which included copies or excerpts of their guideline documents on traffic noise abatement project procedures and/or programs. Telephone interviews were conducted with both the responding individuals and with representatives of the remaining state DOTs that did not return questionnaires. Either by questionnaire or telephone interview, information on traffic noise abatement was received from all fifty states. The results were compiled to present a comprehensive database on the use of traffic noise abatement on existing highways throughout the United States.

2.2 STATUS OF STATE RETROFIT NOISE ABATEMENT PROGRAMS

Fifteen of the fifty state DOTs currently have Type II noise abatement programs that are approved by the Federal Highway Administration, with varying levels of activity in the program. Seven states that do not have a Type II noise abatement program have constructed one or more retrofit barriers under an informal noise abatement program for existing highways or as special projects. The remaining twenty-eight states do not have a Type II noise abatement program and have not constructed any retrofit noise barriers on existing highways. These results are shown in Table 2.1.

TABLE 2.1. RETROFIT NOISE ABATEMENT ACTIVITY STATUS OF ALL 50 STATES

Retrofit Noise Abatement Program Activity	Number of States
Active Type II programs with over 20 miles of barrier construction and a dedicated budget for retrofit noise abatement projects	3 (CA, CO, MN)
Active Type II programs and a dedicated budget for retrofit noise abatement projects but less than 10 miles of barrier construction	2 (OH, UT)
Previously Active Type II programs but currently suspended or drastically reduced	4 (MD, MI, NJ, WS)
Low or no Type II program activity	6 (CT, IO, MA, MO, OR,WA)
Informal retrofit program or special projects	7 (FL, GA, ID, IN, NV, NY, OK)
No Type II/retrofit noise abatement activity	28 (all remaining states)

2.3 SURVEY SUMMARY

For all states that have a Type II program, the program was initiated by the state DOT or by the state legislature in response to complaints received from private citizens or to inquiries from local elected officials. The state DOTs that are currently active or that plan to resume activities on Type II or retrofit traffic noise abatement projects all have policies that differ from one another in administration or procedures. Specifically:

(1) The program and specific projects may be directed and funded by the state legislature (New York).
(2) The program may be supported by dedicated continuing state-funded budgets (California, Colorado, Minnesota, Ohio, and Utah).
(3) Programs may require (or soon will be modified to require) local government or community funding or cost sharing for retrofit noise barrier construction (New Jersey, Michigan, Maryland, Missouri, Oregon, Washington).
(4) In one state (Florida), implementation of a noise abatement program has been delayed awaiting reconciliation of differences in a proposed program and existing state law concerning following federal guidance on state highway programs.

States that have implemented the largest number (or miles) of Type II noise barriers are California, Colorado, Minnesota, New Jersey, Michigan, Maryland, and Wisconsin. In these states, the technical aspects of identifying, designing, prioritizing, and implementing Type II projects are managed either by the state DOT central office or by the state DOT district offices.

For the states that have a Type II program, project prioritization is determined by a formula designed to indicate the relative noise abatement and cost-benefit merits of the projects. The top-priority projects are then implemented when funding is available. The prioritization formulas generally place emphasis on the existing noise level relative to 67 dBA as the reference level and the estimated reduction in noise to be provided by the planned noise barrier. Specifically:

(1) Age of the noise impacted residential area (i.e., the occupancy time of the residents relative to initial highway construction date) is taken into account by some states in determining the project priority (California, Colorado, Wisconsin).
(2) Two states incorporate the prevailing and design-year highway traffic volume into their prioritization formulas (Ohio, Wisconsin).
(3) Three states use only the prevailing traffic noise level relative to the 67-dBA reference as the basis for their noise abatement project prioritization (Minnesota, New Jersey, Utah).
(4) Three states include the estimated Type II project cost as part of their prioritization formula (California, Colorado, Wisconsin).
(5) One state, California, has had a policy where, if the local government or noise-impacted residential community for which a Type II noise abatement project is planned provides one-third or more of the project cost, the project is placed at the top of the priority list.
(6) In Utah, the priority rating of each project is reviewed annually and projects that were considered but passed over in the previous year are given an incremental upgrade in priority. However, after being passed over four times, the projects receive no further priority upgrades.
(7) None of the states currently having Type II noise abatement programs employ threshold noise reference levels other than the federally established 67 dBA level in qualifying their retrofit noise abatement projects for eligibility and implementation.
(8) For all states, the estimated project cost must satisfy a state-defined cost per residence limit for the number of residences that benefit from the noise abatement measure. This cost criterion is either a fixed amount for all residences receiving more than a set level of noise reduction or, alternatively, is determined using a specified state-determined cost factor times the estimated reduction in noise level to be gained at each residence (Colorado, Minnesota, Ohio). California is considering a formula-based, cost-effectiveness criteria.

The twenty-eight states that do not have a Type II noise abatement program and have not constructed any retrofit noise barriers on existing highways gave several reasons for their policies. Several states emphasized that, although they do not have a Type II program, they are interested in highway noise abatement and often use Type I traffic noise abatement as part of capacity improvement projects (Georgia, Pennsylvania, Virginia). Those states determined that Type I noise abatement was the best way to mitigate the environmental impact of highway noise. Other states emphasized that capacity improvement projects are the main priority of the state transportation improvement plan and little or no noise barrier construction is undertaken. Typically, these were states that are mainly rural, without any large metropolitan area. Those states determined that, for the limited highway budget, the public priority is improving transportation with new or improved highways.

2.4 LESSONS LEARNED FROM THE SURVEY CONTACTS ON STATE TYPE II PROGRAM POLICY AND IMPLEMENTATION

Comments on lessons learned were received from many states that can provide important information for any state considering implementation of a Type II program. The comments covered a variety of perspectives on Type II programs, giving both positive and negative aspects of the way Type II noise abatement is treated in their respective state. This information ranged from state policy positions and guidelines concerning a Type II noise abatement program, to specific methods by which Type II programs were implemented. Many states responding to the questionnaire and telephone interviews gave similar comments on these aspects of their programs or policy positions. An overview of lessons learned are discussed below:

(1) The majority of traffic noise concerns originate with highway expansion projects. Therefore, attention is focused on Type I noise abatement programs. Many states have concluded that Type I noise abatement projects are adequate for handling a very large majority of all traffic noise impacts. This is true both for states with and without Type II programs. For this reason, many states have elected not to establish a Type II program.

(2) States commented that residential developments impacted by traffic noise were constructed after the highway in nearly all cases. In those cases, residents were told that noise abatement was unavailable because the highway was in existence before the residence. Such policy is common among the states since many states require their programs to follow federal policy.

(3) Limitations in state funding and DOT resources generally prevent the timely implementation of Type II noise abatement projects. Long lists of prioritized Type II projects are the rule in most states. Long or indefinite delays in implementing programmed projects are in conflict with public expectations. Several DOTs commented that it is best to avoid long public lists of projects if they cannot be completed in a reasonable time.

(4) States have found that Type II noise abatement needs are almost exclusively associated with urban highway conditions and are not uniformly distributed in any state. To justify funding for retrofit noise barriers, some states have local municipal government cost-share. In some cases, the lack of local funds, or the unwillingness to provide local funds has stalled or severely limited implementation of projects. Several states commented that local government or private cost sharing of Type II noise abatement projects helps to ensure that limited resources are applied to problems of highest priority to that community.

(5) For the few states that have a dedicated Type II program budget, the program has been funded on a steady basis and construction can be planned with some level of confidence. This has not eliminated long waiting times for most projects. The source of funds is often based on transportation growth factors, such as gasoline tax revenues (and possibly state-issued truck permits, number of licensed vehicles, etc.).

(6) Maintaining an objective and quantifiable prioritized list helps to eliminate successful attempts to readjust the order of the list by influential offices. The survey of the state DOTs showed the importance of keeping the prioritization system as impartial as possible. Several states also pointed out that no formula could work best for all cases. Some states have found that a final review of the prioritized list must include an overall evaluation by an impartial panel of respected officials. The panel can change the project priority list, but only for the most compelling reasons.

(7) Equity in Type II noise abatement project prioritization is necessary for credible program management and public acceptance. Numerical formulas are widely used to ensure unbiased noise impact site priority assignments. Simplicity of such formulas is very important for ease in understanding and acceptance of the prioritization process by the public and by state and local elected officials. Priorities based either exclusively or primarily on sites that have highest excess noise conditions and that have endured such noise impacts for the longest time periods are the most equitable and most easily explained and justified.

(8) Several states have used decentralization of certain Type II program functions and responsibilities to district highway offices, local MPOs, or local government agencies to help ensure that allocated resources are applied to traffic noise problems of recognized importance and need.

(9) Many states have found that aesthetic improvements, such as landscaping or privacy fences that block direct line of sight from the residence to the highway, are often accepted by residents in lieu of a noise barrier. For that reason, they do not have a Type II program or have been able to limit construction under their Type II program.

2.5 CONCLUSIONS FROM LESSONS LEARNED

Possible positive aspects of having a Type II program:

(1) If properly funded, the program provides noise abatement to some impacted residents.
(2) The program provides a positive means to deal with concerns from citizens and legislators.
(3) An objective program provides for equitable decisions for construction of noise abatement measures.

Possible negative aspects of having a Type II program:

(1) Even if fully implemented, the program can only serve a limited number of the residents that are impacted by highway noise. Type II noise abatement projects cannot be approved in many impacted areas due to federal restrictions on eligibility and funding.
(2) The allocated budgets for Type II programs typically are much smaller than those required for timely construction of projects. Residents are often upset with long and sometimes indefinite waiting times.
(3) A Type II program uses funds that could have been used for highway improvement projects.
(4) Residents are often satisfied with, and even prefer, alternatives to noise abatement (e.g., landscaping) that are much less expensive than Type II noise barriers.
(5) A Type II program requires additional personnel, particularly during initial implementation.
(6) Type II construction does not improve highway capacity. Noise barriers benefit only the residents in the immediate vicinity of the barriers. Also, land use of areas protected by Type II noise abatement may change (i.e., become commercial), such that the abatement no longer protects a residential area.

2.6 TEXAS METROPOLITAN PLANNING ORGANIZATION (MPO) INPUT COMMENTS

A questionnaire was sent to the twenty-five Texas MPOs in order to establish their current involvement in traffic noise impact problems and their interest and potential willingness to participate in future Type II noise abatement project prioritization and funding. Responses were received from twelve Texas MPOs; the four MPOs that have the largest metropolitan areas (Dallas-Ft. Worth, San Antonio, Houston-Galveston, and Austin) were contacted by telephone for follow-up questions.

The results include:

1. Overall, most of the MPOs have not become actively involved in traffic noise abatement, either because no complaints were received or because persons submitting traffic noise complaints to MPOs were referred to TxDOT.

2. In one MPO (Austin), complaints concerning traffic noise led to a noise study along two existing noise-impacted freeways. The MPO has considered a plan to construct noise abatement (noise barriers) along sections of the two highways. The plan calls for federal participation, which cannot take place without an FHWA-approved statewide Type II noise abatement program.
3. Most MPO regional transportation plans contain a section on "land use related to traffic noise levels," though the section normally does not specifically address noise abatement on existing highways.
4. Most MPOs would prefer that the state fund any noise abatement projects on existing highways and are not willing to cancel or postpone any current safety or capacity improvement projects to support such projects in their areas.
5. Most MPOs would prefer that the state DOT manage any highway noise abatement projects. However, a few MPOs noted that their citizens have become increasingly concerned with traffic noise; the MPOs indicated that in the future they might become more involved in traffic noise abatement. The one MPO leading in this regard is the Austin MPO, which is willing to dedicate some of its federal-aid money to construct two noise barriers on existing highways.

CHAPTER 3. ESTIMATE OF THE OVERALL MAGNITUDE AND PRELIMINARY COST OF A STATEWIDE TYPE II PROGRAM

Estimating the overall magnitude of a statewide Type II program can be divided into three main steps: (1) determining the locations throughout the state that are likely to be impacted by noise; (2) determining which of the impacted and eligible locations could possibly receive a substantial noise reduction, at a reasonable cost, from the construction of a noise barrier; and (3) determining which of the impacted locations meet the FHWA eligibility criteria for Type II projects. Estimates for steps (1) and (2) were completed in this study. Step (3), which requires research into state and county records for each individual location, is beyond the scope of this project.

Using geographical information system (GIS) technology, combined with aerial photography and historical data on barrier construction, it is possible to develop estimates for steps (1) and (2). GIS technology allows information/attributes of specific geographical places or objects, such as a section of a highway, to be used in noise level calculations. The resulting noise levels can then be visually displayed.

For this study, a GIS analysis was performed for Dallas County. Traffic data and mileage on all state maintained roads were used for the study. Using the estimated magnitude of the noise impact in Dallas County calculated in the GIS analysis, estimates of the noise impact for the other large metropolitan areas could be made. The estimates for the other counties is based on the assumption that the noise impact in Dallas County per roadway mile is representative of the noise impact per roadway mile in other metropolitan counties.

3.1 GIS DEVELOPMENT

The GIS approach was used to display digital ortho-photography with highway data superimposed and aligned with the photography. The photographic display showed images of the area with 0.5-m resolution, which is sufficiently detailed to identify land use of residential properties. The 0.5-m resolution digital orthorectified image files were acquired, on loan, from the North Texas GIS Consortium. A database was created using TxDOT-provided Texas Reference Marker (TRM) data for the entire state (71,147 records), which contained specific information for each section of highway, including for example, location, functional classification of the highway, average annual daily traffic for both autos and trucks, and vehicle speed. This information was the most recent data in computer database format and was estimated to be from 1994 or 1995. The total miles of state-maintained roadways by functional classification was summed for Bexar, Collin, Dallas, Denton, El Paso, Ft. Bend, Galveston, Harris, Tarrant, and Travis counties. TxDOT provided the Dallas County reference marker MicroStation design files and the project export file for the Intergraph Modular GIS Environment (MGE) for Dallas County. Considerable effort was required to adjust this information to conform to GIS standards. The MGE software was used to dynamically segment the state-maintained roadways in Dallas County to display the noise data.

Additional fields needed for calculation and display of the noise-level contours were added to the database. Noise levels were calculated using FHWA-approved equations, which consider the type, frequency, and speed of the vehicles on the highway (Ref 4). Noise level contours superimposed on the photographs clearly revealed which residences were located within the noise-impacted area. Noise level contours for 66 and 75 dBA are shown in Figure 3.1. These levels were used because 66 dBA is the lowest noise level considered by TxDOT to be an impact for residential areas, while 75 dBA was chosen to represent a severe impact. From the example picture in Figure 3.1, the wide, bold black, solid lines on the left and right sides of the photo are the 66 dBA contour lines. The entire area between the lines is impacted by highway noise at 66 dB or higher. The figure gives a good example of the level of detail visible in the GIS analysis and the information available for determining possible noise barrier locations.

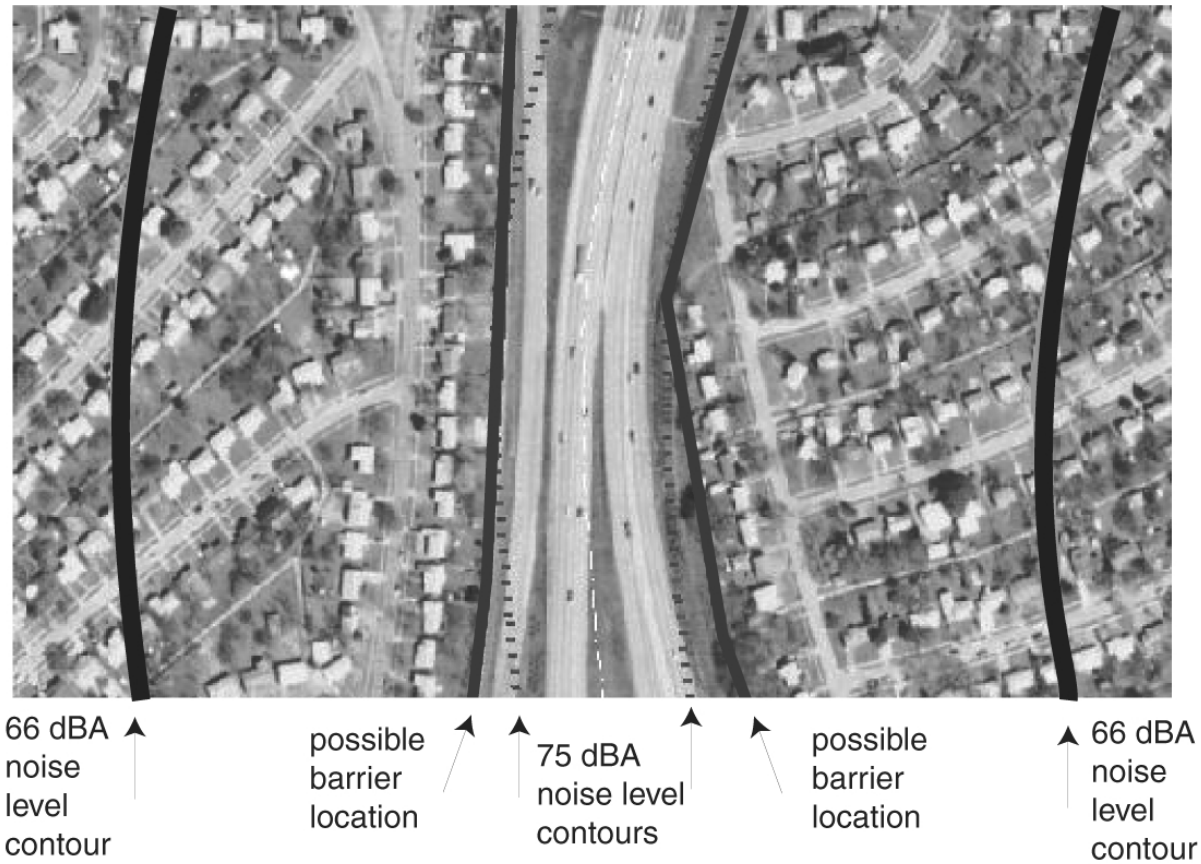

Figure 3.1. Digital orthographic picture with GIS attributes shown. Attributes include 66 and 75dBA contour lines.

3.2 ASSESSMENT FOR DALLAS COUNTY

For all state-maintained roadways in Dallas County, the total number of residences and first-row residences inside the 66-dBA contour were summed. First-row residences are the residences that are alongside the highway and have no intervening buildings. The number of first-row residences is differentiated from the total number of residences inside the 66-dBA contour, since they are most affected by the highway noise and also since they are the residences that can potentially benefit the most from a noise barrier. The number of residences in both the total and first row categories are divided by the total length of urban principal arterial roadways in Dallas County to give a residence per mile number. Thus, for Dallas County, the average number of noise-impacted residences per roadway mile is 52.9. The average number of noise-impacted residences that are in the first row near the roadway per roadway mile is 11.6. These figures reflect the fact that highway noise barriers are more likely to be a reasonable form of noise mitigation in a relatively densely populated area. This number was used to extrapolate the Dallas County data to nine other metropolitan counties in Texas. The results are shown in Table 3.1.

TABLE 3.1 ESTIMATED NUMBER OF RESIDENCES INSIDE THE 66-dBA CONTOUR IN DALLAS COUNTY

Classification	Residences (Res)	Roadway miles (RM)	Res/RM
Total impacted residences	21,911	414.3	52.9
First row residences	4,795	414.3	11.6

Using the aerial photography displayed on a workstation monitor, each section of state-maintained roadway in Dallas County was visually inspected to determine if a Type II noise barrier was potentially feasible and reasonable. The two most common reasons a barrier was determined to be not feasible were (1) the inability to maintain a continuous barrier owing to access roads and (2) the location of the impacted residences was too far from the right-of-way to receive the required benefit. Reasonableness was determined by the length of barrier required for each benefited receiver. If over 39.6 m (130 feet) of barrier were required for each benefited receiver, the barrier was determined to not meet the reasonableness criterion. There were only three functional roadway classifications in Dallas County where noise barriers were potentially feasible and reasonable. The noise barriers were summed by length for each functional classification and then divided by the total roadway mileage in Dallas County for the functional classification, giving a number for barrier miles per roadway miles as shown in Table 3.2.

TABLE 3.2. ESTIMATED POTENTIAL NOISE BARRIER MILES IN DALLAS COUNTY

Functional Classification	Barrier Miles (BM)	Roadway Miles (RM)	BM/RM
Urban Principal Arterial (interstate)	19.4	150.8	0.128
Urban Principal Arterial (other freeway)	5.0	88.6	0.057
Urban Principal Arterial (other)	15.1	175.0	0.086
All Urban Principal Arterial	39.5		

To estimate the number of impacted residences that could benefit by installation of a noise barrier, the number of first-row residences that are behind the potential barrier locations was determined by manually counting residences in the orthographic display. The total came to 2,243 benefited residences in the first row next to the barriers, as shown in Table 3.4. Divide 2,243 by 39.5, the total number of potential barrier miles on all urban principal arterial roads in Dallas County, to obtain 56.8, the number of benefited first-row residences per barrier mile. That number was used to estimate the number of benefited residences in the other metropolitan counties.

3.3 EXTRAPOLATION TO LARGE METROPOLITAN AREAS IN TEXAS

The number of impacted residences and the length of noise barriers warranted in the other metropolitan counties were estimated from the Dallas County data. The number of impacted residences per roadway mile number (52.9) was multiplied by the total roadway miles in Bexar, Collin, Denton, El Paso, Ft. Bend, Galveston, Harris, Tarrant, and Travis counties, giving the estimate of impacted residences shown in Table 3.3 below. Using the number of impacted first-row residences per roadway mile number (11.6), the same was done to estimate impacted first-row residences in the other counties.

The barrier miles per roadway mile numbers from Table 3.2 were multiplied by the respective type of roadway miles in Bexar, Collin, Denton, El Paso, Ft. Bend, Galveston, Harris, Tarrant, and Travis counties, giving the estimate of potential barrier miles shown in Table 3.4.

The estimated preliminary mileage total for potential Type II barrier sites in the large metropolitan counties of Texas is 200 miles. Excluding the 58 miles of existing and proposed Type I noise barriers, statewide, the estimate is reduced to 142 miles. Based on the average length of completed Type I noise barrier projects in Texas (2000 feet), this could equate to more than 300 potential Type II noise barrier projects. There are several other counties that have smaller metropolitan areas or border the ten largest metropolitan counties that have potential for noise barriers that were not analyzed. For example, the only noise barrier constructed in the San Antonio District is in Guadalupe County. However, based on our survey of the other states and on the barrier construction history of Texas, the percentage of potential Type II barrier sites outside the metropolitan counties included in this study would be relatively small. Considering all the other uncertainties involved in the estimates, the calculated total barrier miles need not be adjusted for the possibility of those barrier sites.

TABLE 3.3. ESTIMATION OF IMPACTED RESIDENCES IN TEXAS

	Bexar	**Collin**	**Dallas**	**Denton**	**El Paso**	**Ft. Bend**	**Galveston**	**Harris**	**Tarrant**	**Travis**	**Total**
Total Roadway Miles (Urban Principal Arterial)	331.5	65.3	414.3	76.2	114.1	60.0	121.6	438.0	398.0	173.9	2,004
Total Impacted Residences (Roadway miles x 52.9)	17,536	3,454	21,911*	4,031	6,634	3,174	6,433	23,170	21,054	9,199	116,594
Total First Row Impacted Residences (Roadway miles x 11.6)	3,845	754	4,795*	884	1,455	696	1,411	5,081	4,616	2,017	25,564

*actual count

TABLE 3.4. ESTIMATE OF POSSIBLE BARRIER MILES AND POTENTIALLY BENEFITED RESIDENCES

	Bexar	Collin	Dallas	Denton	El Paso	Ft. Bend	Harris	Galveston	Tarrant	Travis	Total
Miles of Urban Principal Arterial (interstate)	132.7	0	150.8	33.5	29.7	1.3	121.4	21.3	122.2	27.6	
Barrier miles (0.128 BM/RM)	17.0	0	19.4	4.4	3.8	0.2	15.6	2.7	15.7	3.5	82.27
Miles of Urban Principal Arterial (other freeway)	75.6	31.6	88.6	3.3	21.7	19.5	168.6	27.0	76.1	67	
Barrier miles (0.057 BM/RM)	4.3	1.8	5.0	0.2	1.2	1.1	9.6	1.5	4.3	3.8	32.9
Miles of Urban Principal Arterial (other)	123.2	33.7	175	39.4	74.6	39.2	147.8	73.3	199.3	79.4	
Barrier miles(0.086 BM/RM	10.6	2.9	15.1	3.4	6.4	3.4	12.7	6.3	17.2	6.8	84.8
Barrier miles on All Arterial	31.9	4.7	39.5	7.9	11.4	4.7	37.9	10.5	37.2	14.2	199.9
Residences potentially benefited (Barrier miles x 56.8)	1,812	267	2,243*	449	648	267	2,153	596	2,113	807	11,355**

*actual count

** reduced to 8,061 when taking into account existing and proposed noise barriers (58 miles)

Also, the potential Type II barrier sites have not been evaluated with respect to the prior-existence criteria for qualifying for federal aid. Determining if the location qualifies for federal aid will require a site-specific investigation of county and highway records.

Estimates of barrier construction costs in Texas are $1 million per mile of barrier for standard construction. It is estimated that the total cost of implementing a statewide Type II program would include an additional 20-30% for each barrier mile because of associated statewide costs for site surveys, detailed noise analyses, public involvement, overhead, and administration (additional full-time employees).

CHAPTER 4. RATING/PRIORITIZATION SYSTEM

Type I highway noise abatement projects are evaluated against standard set criteria as part of a particular highway improvement project. Type II projects, on the other hand, are stand-alone projects that are selected from the pool of eligible project locations. As shown in the previous section, it must be anticipated that the list of potential projects will exceed the number that can be built with available funding. In fact, the Type II programs of other states have shown that the list of potential projects will exceed the number that can be constructed with available funding for at least 10 years. Therefore, for any Type II program to function, it is essential that a prioritization method be developed and implemented. Selection and prioritization of projects, based on objective criteria in contrast to number of complaints, status of people making the complaints, or undue political pressure, are essential for securing federal funding. The prioritization method is at the heart of a Type II program that is fair, consistent, and uniform statewide.

It is important to note that, unlike most highway projects that provide improvements that benefit the overall transportation system and, consequently, a large number of people, a noise abatement project has no affect on the overall transportation system and benefits only a limited number of people. This benefit is not in the form of improved transportation capacity but as an improvement of the environment by reduced noise levels. The goal of the prioritization scheme is to determine a cost-effectiveness value for a noise abatement project. This type of rating system could allow for comparison between noise abatement projects and other environmental improvement projects, and possibly even between noise abatement projects and highway improvement projects.

The standard, objective quantity that is used for prioritization is cost effectiveness. In this case, cost effectiveness can be expressed as a number, hereafter called the *cost effectiveness factor*. The noise benefit per receiver should take into consideration the severity of the noise and the amount of reduction achieved by the project. With a goal to make a simple, easily understandable, and intuitive formula for quantitative ranking of Type II noise abatement projects, the following formula is proposed:

Cost-effectiveness factor = B/cost

$$B = L_{eq_\Delta} \bullet (L_{eq_P} - 60) \bullet V_R$$

where:

B = noise abatement benefit/receiver,

cost = cost of project/number of benefited receivers,

L_{eq_Δ} = noise reduction achieved (average),

L_{eq_P} = present noise level, and

V_R = dollar value of relief/receiver.

The dollar value of relief (V_R) is proposed to be $833. This would give a cost-effectiveness factor of 1 for a noise abatement project that has a present noise level of 66 dBA (the lowest noise level considered an impact), will achieve 5 dBA of noise reduction (the lowest level considered feasible), and will cost $25,000 per benefited receiver (the highest allowable cost considered reasonable). The noise reduction achieved (L_{eq_Δ}) must be at least 5 dBA for the project to be acceptable. Consideration should be given to using 5 in the formula even if the noise reduction achieved is greater. Setting L_{eq_Δ} to 5 will encourage keeping the barrier cost to a minimum. The dollar value of relief can be adjusted to raise or lower the cost-effectiveness number of Type II projects if they are to be compared with other types of projects. Once an acceptable value is determined, straightforward quantitative comparisons can be made. This should aid TxDOT and the commission in deciding which, if any, Type II projects should be approved.

For clarification it may help to look at two hypothetical competing projects.

Project A:	present noise level	70 dBA
	noise reduction achieved	6 dBA
	cost/benefited receiver	$23,000
	cost-effectiveness factor	2.17
Project B:	present noise level	68 dBA
	noise reduction achieved	5 dBA
	cost/benefited receiver	$18,000
	cost-effectiveness factor	1.85

In this case, Project A has a higher cost-effectiveness factor and would be placed higher on the prioritized list. Even though Project A costs more per benefited receiver, because of the higher present noise level and the higher noise reduction achievable, Project A has higher cost effectiveness. However, if a maximum of 5 dBA is used for noise reduction achieved, then Project A would have a cost-effectiveness factor of 1.81, or slightly less than Project B. In that case, because of the significantly lower cost of Project B, it would have a higher cost-effectiveness factor and would be placed higher on the prioritized list. Either way, once a set formula is established, prioritizing projects should be reasonably straightforward.

CHAPTER 5. ADMINISTRATION

The following method for implementing a Type II program is based primarily on an assessment of the information received from the other states regarding their experience with Type II noise abatement. In addition, since the MPOs in Texas, especially the MPOs for the larger metropolitan areas, would be affected by the implementation of a Type II program, information was also obtained on their involvement in noise abatement and their input on program design and implementation.

The goal was to develop a program that was fair, consistent, and uniformly applicable statewide. The proposed statewide Type II noise abatement project selection process consists of the four steps shown in Figure 5.1. First, a statewide survey must be conducted to determine the location of candidate noise abatement projects. Second, a detailed analysis of each candidate project must be conducted to ensure it meets all FHWA and TxDOT criteria. Third, a quantitative means of prioritizing projects should be used to rank the projects. Fourth, projects are selected for implementation. Currently, the Environmental Affairs Division (ENV) of TxDOT is responsible for the statewide noise abatement program for Type I projects. It is both logical and prudent that ENV should also assume the overall operation of any Type II program.

5.1 STEP 1: STATEWIDE SURVEY

The initial step in project identification should be a state-directed survey of the entire state highway system to identify locations where the most severe noise levels exist. The noise level where an impact occurs in a residential area is 66 dBA. For this screening a higher noise level should be used in order to identify the most severe impact areas. The preliminary survey of Dallas County has shown that at 50 meters outside the highway right-of-way, noise levels usually exceed 66 dBA but seldom exceed 75 dBA. A distance of 50 meters was chosen to include the first row of residential receivers. Therefore, a reasonable noise level for the initial screening could be 72 dBA at the residence location. Data should be collected only at locations having a lower minimum noise level if additional candidate projects are warranted. In addition, information should be sought from the TxDOT districts concerning their knowledge of noise-impacted locations in their areas. The districts that contain a metropolitan planning area could also seek assistance from the respective MPO. The information gathered by the district office can be compared with the survey data. The use of both sources for the noise-impacted location should help reduce the risk of overlooking any significant noise-impacted location.

A comprehensive survey of all highways in Texas would require more than 2 man-years of effort. If the work is contracted, costs would exceed $200,000. Once collected, the data should need only periodic review and updates. Every effort, therefore, should be made to preserve the survey data and to incorporate them into the highway database maintained by TxDOT.

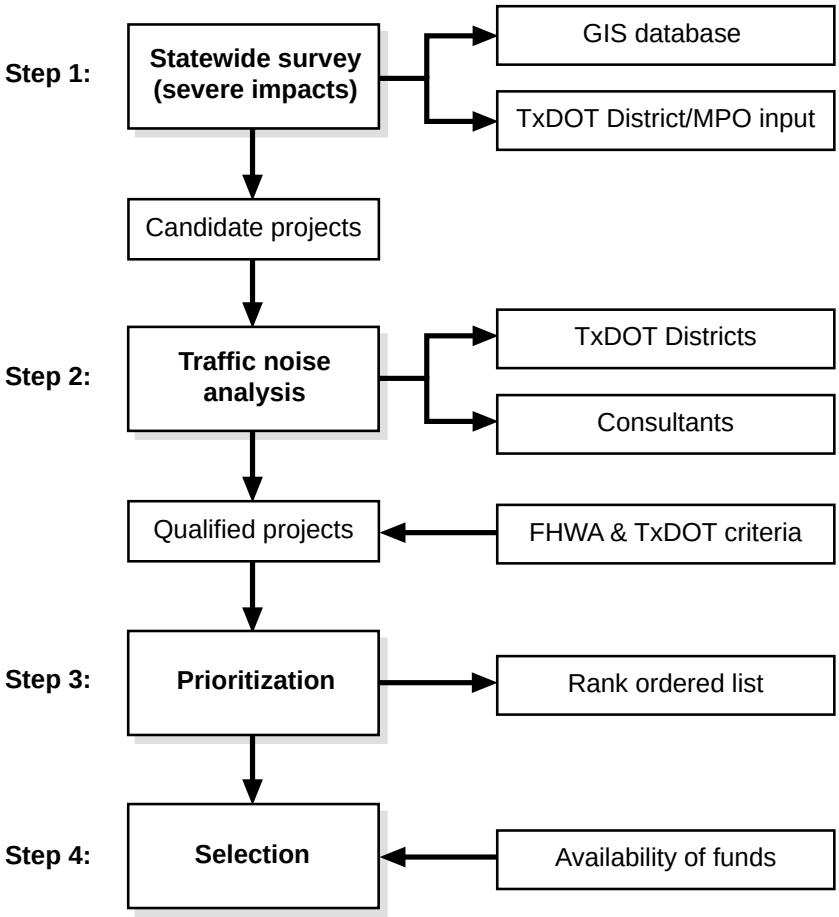

Figure 5.1. Statewide Type II noise abatement program project selection process.

The magnitude of the highway noise impact survey completed as part of this study can represent a good start on the identification of potential barrier locations in Dallas County. As noted earlier, actual potential barrier locations were identified in Dallas County, and estimates of the barrier mileage in other major cities were made. The initial part of the comprehensive survey of all highways in Texas should be undertaken at the state level, by a research or consulting team, and could utilize the GIS technology developed for this study. Similar GIS databases for other Texas metropolitan areas could be developed based on the Dallas model. The technology allows displaying noise level contours at user-specified levels. Thus, as suggested earlier, 72 dBA contours can be displayed and potential barrier locations inside those contours could be identified. From these databases, all potential barrier locations in metropolitan areas could be identified. Any potential barrier locations outside these areas would be identified through the district's knowledge of traffic in its area of responsibility. The districts would then perform a preliminary review of the potential barrier locations to eliminate any locations that would obviously not meet federal restrictions or TxDOT criteria. Districts should take advantage of information available from the applicable MPO, in

particular on determination of when the residential area was established in relation to the highway. Locations that initially appear likely to meet the feasible and reasonable criteria will be retained for further consideration.

5.2 STEP 2: TRAFFIC NOISE ANALYSIS OF POTENTIAL PROJECTS

At this stage, the districts or consultants would perform comprehensive analyses of all candidate locations with emphasis on existing noise levels and noise barrier evaluation criteria. The results of each analysis would be provided to ENV.

5.3 STEP 3: PROJECT PRIORITIZATION

All statewide candidate projects would be prioritized by ENV according to the prioritization formula described in Chapter 4. Once the projects are prioritized, subjective adjustments and/or outside influences should be avoided to preserve the objectivity of the process.

5.4 STEP 4: PROJECT SELECTION

At this stage TxDOT should compare the prioritized list with the expected available funding. Based on the experience of all the other states that have a Type II program, it is advisable to keep the list of selected projects within the expected budget of no more than a few years. The estimate of available funds per year for Type II projects, especially during the first few years of the program, should be conservative. For example, an estimate of no more than $2 million per year is reasonable for a start-up program. That level of funding should allow for the construction of approximately 10,000 linear feet of noise barrier, or two to ten projects, depending on the size of the barriers in the projects.

5.5 PROJECT REVIEW

Once project selection is completed, the list should be updated with each project status. As construction proceeds on Type II projects, ENV will maintain the list of projects with their current status. Periodic review of potential projects and their priority should also be performed. Since Type II projects deal with older neighborhoods and existing highways, new Type II project sites would only appear after the initial survey if the site had been previously overlooked. It is expected that such cases would be brought to the attention of TxDOT through citizens or their local representatives inquiries. Another reason for periodic project review is possible changes in the makeup of the neighborhoods of prioritized projects. For example, the predominate function of a site may change from residential to commercial. In such a case, Type II action may no longer be appropriate or even desired by the effected property owners. ENV will maintain the prioritized lists with current project status, perform project reviews as appropriate and, to a reasonable extent, keep the effected residents informed of project status. This additional workload may require an increase in full-time employees in ENV.

CHAPTER 6. IMPLEMENTATION TASKS AND CONSIDERATIONS

This report has defined a Type II noise abatement program and has described the FHWA regulations governing such a program. The status of Type II programs in other states was summarized, identifying at the same time reasons why states have or have not elected to initiate and sustain a Type II program. A survey and analysis of the largest metropolitan counties in Texas was conducted to obtain an estimate of the magnitude of the traffic-noise-impacted areas in the state. Existing FHWA and TxDOT guidelines identifying when a noise barrier project is reasonable and feasible were applied to impacted areas in Dallas County to estimate benefited receivers. The results of that analysis were extrapolated to the largest metropolitan counties in Texas to arrive at a preliminary estimate of the total magnitude of potential Type II projects. An objective method to prioritize Type II projects was proposed. Finally, a brief description of the administration of a Type II program was given.

This information is intended to assist those involved in deciding if TxDOT should have a Type II program. Towards that goal, the required tasks and factors to consider are briefly restated below.

6.1 REQUIRED TASKS IF TYPE II PROGRAM IS INITIATED

1. The TxDOT noise abatement policy and guidelines must be changed to include Type II noise abatement projects. The change should detail what Type II project prioritization system will be used. The change must be consistent with all applicable FHWA regulations and guidelines and be approved by the FHWA to use federal funding for projects.
2. The Type II project selection process must be completed. This process could take 2 to 3 years to complete.
3. A source and amount of funds must be identified for the administration of a Type II Program and construction and maintenance of associated noise barriers.
4. TxDOT may need to augment personnel in the districts and ENV with additional full-time employees to cover the addition workload associated with the implementation and administration of a Type II Program.

6.2 FACTORS TO CONSIDER

1. A Type II noise abatement program is not required by federal law or regulation. The majority of states do not have a Type II noise abatement program. Only a few states have active Type II programs.

2. The federal government provides no additional funding for Type II projects. States must use existing federal aid on Type II projects. Therefore, Type II projects must compete for funding with other transportation needs statewide.

3. Noise barriers constructed under Type II projects benefit only those people in the immediate vicinity of the barrier who receive some substantial noise level reduction.

4. A formal administrative infrastructure is required to ensure consistent, fair, and uniform application of a statewide program. Staffing requirements will remain indefinitely for proper update and maintenance of the program.

5. Even if actively implemented, the program will produce only a limited amount of noise abatement for a limited number of impacted residents.

6. In many cases, even if a noise barrier may be the only technically effective way to reduce traffic noise levels at residential locations, other alternate actions, such as landscaping, may be less expensive and more effective in improving relations between TxDOT and impacted residents.

REFERENCES

1. "Highway Traffic Noise Analysis and Abatement, Policy and Guidance," U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch, Washington, D.C., June 1995.
2. "Guidelines for Analysis and Abatement of Highway Traffic Noise," Texas Department of Transportation, Environmental Affairs Division, July 1997.
3. "Statewide Retrofit Noise Abatement Study," Pennsylvania Department of Transportation, May 31, 1996.
4. FHWA Highway Traffic Noise Prediction Model, U.S. Department of Transportation, FHWA, December 1978.

APPENDIX A.

SURVEY OF U.S. STATE DOTs AND TEXAS MPOs IN REFERENCE TO TYPE II TRAFFIC NOISE ABATEMENT PROGRAMS

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SURVEY OF U.S. STATE DOTs AND TEXAS MPOs IN REFERENCE TO TYPE II TRAFFIC NOISE ABATEMENT PROGRAMS

A.1 Survey Purpose and Methodology

Surveys of the fifty U.S. State Departments of Transportation (DOTs) and the twenty-five Metropolitan Planning Organizations (MPOs) in Texas were conducted to gather information on national and Texas activities, status, policies, and programs regarding Type II traffic noise abatement. Information collected through these surveys has provided an up-to-date database for formulating a Type II traffic noise abatement program structure for the Texas Department of Transportation.

The surveys were conducted by mail-return questionnaires sent to the attention of an identified principal environmental noise specialist in each state DOT and to an identified environmental specialist in each Texas MPO. Included in the list of questions was a request to receive any pertinent state DOT or MPO documents giving guidelines or program policies and procedures related to Type II traffic noise abatement. Replies received from these contacts were collected and summarized for use in carrying out follow-up telephone interviews with the persons that submitted the questionnaire responses. The results of the telephone interviews were generally supplementary to the data obtained in the questionnaires and, as a minimum, served to provide some information on the subject from each state DOT. This survey methodology resulted in thirty-nine questionnaires returned from the state DOTs, nearly all of which included some form of noise abatement guideline documentation. Twelve questionnaire responses were received from the Texas MPOs, none of which provided any supplemental guidelines on traffic noise abatement. Telephone contacts were made and documented for all of the state DOT traffic noise specialists.

A.2 U.S. State DOT Survey

Considerable efforts were applied to the development and formulation of questions to be asked of the state DOT environmental divisions or offices, with the objective of receiving the following primary information:

(1) Background and status of existing and emerging traffic noise abatement activities and programs in each state;

(2) Type II traffic noise abatement programs in each state having such programs, including:
   * Policy development;
   * Program features with emphasis on project prioritization;
   * Program implementation and decision support;
   * Hindsight assessment of the Type II policy and program; and

(3) Reasons why some states have chosen not to develop a Type II traffic noise abatement program.

Given that only twelve or thirteen states were expected to have formal Type II traffic noise abatement programs (either active or inactive), two questionnaires were designed: (1) one for states having Type II noise abatement programs and (2) one for states that do not have Type II noise abatement programs. The second-category questionnaire was intentionally developed to gather information on the potential need for formal state DOT Type II noise abatement programs in states that do not have a formal Type II policy or program, and to solicit information on any retrofit noise abatement projects implemented to date in those states. The specific questions asked in each of the questionnaires were aimed toward gaining information that could be interpreted or translated into useful guidance for defining Type II traffic noise abatement concepts. Previous experience reported by the Pennsylvania DOT in conducting an earlier survey of U.S. state DOTs concerning methods and policies in use by other states concerned with traffic noise provided some helpful guidance in identifying several questions important to the subject of Type II traffic noise abatement needs.[1]

A.2.1 Questionnaires and Telephone Interviews

Figures A.1 and A.2 present specimen versions of the two questionnaires. The questionnaire for states having a Type II program is the most comprehensive in content. The questionnaire for states that do not have a Type II program (aimed mainly at retrofit noise abatement projects in those states) contains a short-cut that allows the respondents to skip questions 7–10 if the state has not yet constructed any traffic noise abatement barriers of any kind.

[1] Heishman, P. (1995). "Statewide Retrofit Noise Abatement Study," Pennsylvania Department of Transportation Report on 2-year study conducted by Greenhorn & O'Mara, Inc., May 1, 1995.

Figure A.1.

QUESTIONNAIRE FOR STATES HAVING EXISTING OR EMERGING TYPE II NOISE ABATEMENT PROGRAM

1. Development of our Type II noise abatement policy and program was initiated by: (check all that apply)

- ☐ The Governor's office;
- ☐ State legislation;
- ☐ State DOT;
- ☐ State department of environment;
- ☐ Other:

_____

_____

_____

2. The initial impetus for our policy was in response to external requests from: (check all that apply)

- ☐ Private citizens;
- ☐ Local public officials;
- ☐ State public officials;
- ☐ Organized interest groups;
- ☐ Other:

_____

_____

_____

3. Our Type II traffic noise abatement program was established by:

- ☐ Executive order;
- ☐ Legislative act;
- ☐ Voter referendum;
- ☐ Agency regulation;
- ☐ Other:

_____

_____

_____

4. What procedures are used in the Type II retrofit traffic noise abatement program inyour state? (check all that apply)

- ☐ Informal retrofit noise abatement procedures;
- ☐ Routine consideration of potential noise impacts that may require retrofit abatement;
- ☐ A written policy guideline for Type II traffic noise impact assessments;
- ☐ Written mandatory Type II noise abatement policy provisions and procedures for traffic noise impact assessments and project implementation;
- ☐ An official and active program that addresses Type II traffic noise impacts and retrofit projects;
- ☐ Other:

_____
_____
_____

5. What procedures do you currently use to initially identify potential Type II noise abatement projects? (check all that apply)

- ☐ Traffic density trends;
- ☐ Adjacent land development trends;
- ☐ Traffic flow and/or traffic noise measurements;
- ☐ Citizen complaints;
- ☐ Elected official requests;
- ☐ We retain formal decision support documentation on factors identifying potential noise impact sites.
- ☐ Other:

_____
_____
_____

6. How are Type II noise abatement sites evaluated for acceptability for design and construction? (check all that apply)

- ☐ Evaluate adjacent land uses/zoning/impacted occupancy;
- ☐ Measure traffic noise and/or estimate design-year traffic noise levels;
- ☐ Determine potential for Type I project intervention;
- ☐ Conduct public hearings and obtain acceptance by impacted occupants;
- ☐ Potential noise impact sites must satisfy a defined Type II qualification decision milestone before receiving further consideration;
- ☐ Technical noise abatement design solutions are effective (i.e., meet criteria for beneficial abatement);
- ☐ Technical design solutions are within a defined Type II maximum mitigation cost per impacted residence;
- ☐ Type II noise abatement projects must satisfy a decision milestone where the potential traffic barrier construction is determined to be effective before it is eligible for detailed design and further consideration for implementation;
- ☐ We retain formal decision support documentation on the factors listed above for all projects.
- ☐ Other:

_____
_____
_____ _____

7. For noise barriers constructed on existing highways, how were the sites prioritized for project implementation? (check all that apply)

- ☐ Our Type II projects do not compete with other projects for funding or other implementation action;
- ☐ Projects are ranked on basis of technical measures of noise impact;
- ☐ Projects are ranked on basis of cost considerations;
- ☐ Projects are ranked on basis of effective noise abatement for a threshold minimum number of impacted residents;
- ☐ Project priority is determined by a numerical formula based on weighted technical measures of effectiveness and other weighted factors (non-technical) related to the site. Please give formula and define terms (attach separate sheet if necessary):
- ☐ Local county and/or municipal agencies provide advisory assistance in ranking Type II noise abatement projects in their jurisdiction;
- ☐ Efforts are made to achieve a statewide balance in Type II noise abatement projects and/or funding;
- ☐ We retain formal decision support documentation on all factors pertaining to prioritization of Type II noise abatement projects;
- ☐ We have provisions for project priority assignment reviews/changes/public appeals.
- ☐ Other:

_____ _____

_____

_____

8. What are the sources of funding for Type II noise barriers in your state and approximately what percent does each source contribute?
(check all that apply)

		Percent
☐	Federal funds;	_____
☐	State funds;	_____
☐	Municipal government funds;	_____
☐	Private or Community funds;	_____
☐	Other: _____	Percent: _____

9. What is the funding structure for Type II noise abatement projects in your state?

- ☐ A central authority administers funds based on statewide long-range planning;
- ☐ District authorities are allotted fixed shares of an available funding pool;
- ☐ A central state authority administers funds and gives attention to available sources of cooperative funding from counties, municipalities, and/or communities;
- ☐ Special funding is allocated for particular projects;
- ☐ Other:

_____

_____

_____

10. What evaluations are applied to determine the effectiveness and public acceptance of Type II traffic noise abatement projects in your state? (check all that apply)

- ☐ Field measurements of traffic noise in impact areas;
- ☐ Computer simulation of as-built new highways including the noise abatement structures;
- ☐ Public meetings are held during planning and construction of traffic noise projects.
- ☐ Public opinion surveys are used as a measure of public acceptance of completed noise abatement projects;
- ☐ Other:

_____

_____

_____

11. Approximately how many Type II noise abatement projects have been implemented in your state?

Under informal Type II guidelines:

_____	_____	$_____
Number Completed	Total Miles	Allotted Funding

_____
Number Pending

Under formal Type II program:

_____	_____	$_____
Number Completed	Total Miles	Allotted Funding

_____
Number Pending

12. The FHWA traffic noise abatement criteria provide the states with some degree of flexibilityin defining noise impacts. Please list the following noise impact guidelines adopted by your state:

>> The noise level (in dBA) at which traffic noise conditions require abatem ent attention.
My state: _____dBA

>> The noise level change (in dB) corresponding to a "Substantial Increase" in noise impact.
My state: _____dB

>> The noise level change (in dB) corresponding to a "Substantial Reduc tion" in noise impact.
My state: _____dB

>> The "Cost Effectiveness" criterion for traffic noise abatement projects.
My state: $_____

>> The "Reasonableness" criterion for noise abatement projects pertains to a combination o f "cost effectiveness" (defined above) and the views and desires of the public affected by the project. In Texas, this criterion is met when the cost effectiveness is less than $ 25,000 per impacted receiver *and* a majority of the owners of the impacted properties vote in favor of the project. My state reasonableness criterion: _____

_____

_____ _____

_____

_____

_____
(attach separate sheet if necessary)

13. Do your Type II noise abatement project design procedures include considerations for: (check all that apply)

- ☐ attention to aesthetics;
- ☐ landscaping;
- ☐ barrier size constraints;
- ☐ barrier materials standards or restrictions;
- ☐ secondary effects (i.e., unintentional noise reflections);
- ☐ abatement structures erected on private property;
- ☐ privately constructed noise abatement structures.
- ☐ Other:

_____ __

_____

_____

14. Briefly describe how your Type II Program is organized to effect decision authority, program administration, technical analyses, management and evaluation:

_____

_____

_____

_____

_____(attach separate sheet if necessary)

15. What personnel and/or staff needs have resulted from your Type II Program?

_____

_____

_____

_____(attach separate sheet if necessary)

16. How are your completed Type II noise abatement projects evaluated for effectiveness and public acceptance?

_____

_____

_____

_____(attach separate sheet if necessary)

17. Briefly describe any public notices, presentations, hearings, studies, and the topics covered during the development of your Type II noise abatement policy:

_____

_____

_____

_____ (attach separate sheet if necessary)

18. Other state agencies, local agencies, and/or organized interest groups that participated in the initiation or enactment of our Type II noise abatement policy were:

_____

_____

_____

19. What has been the public response to your Type II Program?

_____

_____

_____ (attach separate sheet if necessary)

20. Have elected officials, either state or local, made comments or suggestions concerning implementation of Type II projects or the program in general?

_____

_____

_____(attach separate sheet if necessary)

21. Have you had any official review or revisions of your Type II Program?

☐ Yes ☐ No

Comment:

_____

_____

_____(attach separate sheet if necessary)

22. What changes do you think might improve your Type II Program?

_____

_____

_____(attach separate sheet if necessary)

23. What tools and procedures do you use in traffic noise abatement assessments and projects? (check all that apply)

☐ Approved standardized sound level meters;

Computer simulation traffic noise modeling:

☐ STAMINA

☐ Other computer programs _____

_____

☐ Formalized field measurement procedures and documentation;

☐ Formalized requirements for computer modeling of noise abatement project designs.

24. Do you have a specific annual budget allocated to assessment of traffic noise impacts?

☐ Yes Approximate budget amount $ _____

☐ No

25. Have you considered the use of any traffic noise abatement methods other than noise barriers? (check all that apply)

☐ Earth berms;

☐ Vegetation;

☐ Quieter pavement surface courses;

☐ Traffic management;

☐ Land purchase or land use restrictions;

☐ Other:

_____

_____

_____

26. Please identify any other divisions, offices, or authorities within your state that administer a noise abatement program:

_____

_____

_____

27. Please provide us with a copy of your FHWA approved traffic noise abatement policy (Type I and Type II) or Program document. (Mail to address shown below)

28. In the absence of a formal Type II noise abatement policy document, would you please provide us with a copy of any written guideline document addressing Type II noise abatement issues in your state ? (Mail to address shown below)

☐ Yes ☐ No written guidelines available

29. Please add any supplemental comments: _____

_____

_____

_____

_____(attach separate sheet if necessary)

30. Please give us a brief description of yourself, including, present position, experience and expertise in transportation projects, direct experience in traffic noise impact assessments and abatement projects, current responsibilities related to traffic noise impact studies, etc.

Name:_____Title:_____ _____Ph._____

_____

_____

_____ _____

_____(attach separate sheet if necessary)

31. Do you wish to receive a summary of this Type II noise program survey?

☐ Yes ☐ No

THANK YOU VERY MUCH FOR YOUR COOPERATION AND VALUED ASSISTANCE.

PLEASE RETURN THIS COMPLETED QUESTIONNAIRE TO:

T.E. Owen, Director
Institute for Research in Sciences and Engineering
The University of Texas at San Antonio
6900 N. Loop 1604 West
San Antonio, TX 78249-0661

For your convenience, a prepaid return-addressed postal mailer is enclosed. Use this mailer to send the completed questionnaire, your state traffic noise assessment guidelines, Type II noise abatement Program, and any other documents that may be relevant to this information survey.

Figure A.2

QUESTIONNAIRE FOR STATES THAT DO NOT HAVE A TYPE II NOISE ABATEMENT PROGRAM

1. What level of activity is devoted to traffic noise impacts in your state? (check all that apply)

- ☐ Traffic noise is not an issue of concern in my state;
- ☐ Traffic noise investigations are performed based on complaints received;
- ☐ We have a centralized state DOT office that is responsible for assessing and responding to traffic noise impacts;
- ☐ Our state DOT districts are responsible for assessing and responding to regional traffic noise impacts.
- ☐ Traffic noise investigations are documented and evaluated using state-developed guidelines for mitigating traffic noise impact;
- ☐ Other:_____

_____

_____

2. In your state DOT office, how many man-hours per week are devoted to noise abatement issues?

My state:_____man-hours/week:_____

3. What are the reasons why your state does not have a Type II noise abatement program? (check all that apply)

- ☐ Not considered;
- ☐ The need for a Type II program was considered but we found that traffic noise levels along existing highways are not high enough to warrant such a formal process;
- ☐ Traffic noise abatement along existing highways in our state is not a priority requirement;
- ☐ Some specific existing highway locations were found to have a traffic noise impact; however, these problems can be solved without the need for a formal Type II program;
- ☐ Although a Type II program would be useful in our state, the required funding and manpower is not presently available;
- ☐ Other:_____

_____

_____ _____

4. If your state has not constructed any Type II traffic noise barriers, what are the reasons? (check all that apply)

- ☐ Not considered;
- ☐ Traffic noise levels are below the designated noise impact level;
- ☐ No complaints have been received concerning traffic noise on existing highways;
- ☐ Complaints received were evaluated and determined not to require action;
- ☐ Highway planning and adjacent land use management has minimized Type II traffic noise impacts;
- ☐ Noise barriers were considered but did not meet feasibility and cost effectiveness criteria;

- ☐ Funding limitations have precluded implementation of any Type II traffic noise abatement projects;
- ☐ Lack of an established policy for Type II traffic noise abatement;
- ☐ Other:_____

_____

_____

5. Has your state constructed traffic noise barriers on existing highways even though you do not have a Type II program?

☐ Yes. (Continue with Question 6) ☐ No. (Skip to Question 11)

6. For noise barriers constructed on existing highways, how were the noise impacts first identified? (check all that apply)

- ☐ State DOT or district office surveys of traffic flow or traffic noise measurements;
- ☐ Citizen complaints;
- ☐ Elected official requests;
- ☐ We retain formal decision support documentation on factors identifying potential noise impact sites.
- ☐ Other:_____

_____

_____

7. For noise barriers constructed on existing highways, how were the sites evaluated for acceptability for design and construction? (check all that apply)

- ☐ Legislative directive rendered a comprehensive evaluation unnecessary;
- ☐ Construction costs paid by private funding rendered a comprehensive evaluation unnecessary;
- ☐ Evaluated adjacent land uses/zoning/impacted occupancy;
- ☐ Measured traffic noise and/or estimate design-year traffic noise levels;
- ☐ Determined potential for Type I project intervention;
  Conducted public hearings and obtain acceptance by impacted occupants;
- ☐ Potential noise impact site had to satisfy a defined Type II qualification decision milestone before receiving further consideration;
- ☐ Technical noise abatement design solutions were determined to be effective (i.e., meet criteria for beneficial abatement);
- ☐ Technical design solutions were within a defined Type II maximum mitigation cost per impacted residence;
- ☐ Type II noise abatement projects must satisfy a decision milestone where the potential traffic barrier construction is determined to be effective before they are eligible for detailed design and further consideration for implementation;
- ☐ We retain formal decision support documentation on the factors listed above for all projects.
- ☐ Other: _____

_____

_____

8. For noise barriers constructed on existing highways, how were the sites prioritized for project implementation? (check all that apply)

- ☐ Our Type II projects do not compete with other projects for funding or other implementation action;
- ☐ Projects are ranked on basis of technical measures of noise impact;
- ☐ Projects are ranked on basis of cost considerations;
- ☐ Projects are ranked on basis of effective noise abatement for a threshold minimum number of impacted residents;
- ☐ Local county and/or municipal agencies provide advisory assistance in ranking Type II noise abatement projects in their jurisdiction;
- ☐ Efforts are made to achieve a statewide balance in Type II noise abatement projects and/or funding;
- ☐ We retain formal decision support documentation on all factors pertaining to prioritization of Type II noise abatement projects;
- ☐ Project priority is determined by a numerical formula based on weighted technical measures of effectiveness and other weighted factors (nontechnical) related to the site. Please give formula(s) and define terms (attach separate sheet if necessary):
- ☐ We have provisions for project priority assignment reviews/changes/public appeals.
- ☐ Other:_____

_____

_____

9. What evaluations are applied to determine the effectiveness and public acceptance of Type II traffic noise abatement projects in your state? (check all that apply)

- ☐ Field measurements of traffic noise in impact areas;
- ☐ Computer simulation of as-built new highways including the noise abatement structures;
- ☐ Public meetings are held during planning and construction of traffic noise projects;
- ☐ Public opinion surveys are used as a measure of public acceptance of completed noise abatement projects;
- ☐ Other:

_____

_____

_____

10. What is the approximate collective length (miles) of Type II noise barriers constructed in your state?

Total Length: ☐ 0.1-2 mi. ☐ 2-5 mi. ☐ 5-15 mi. ☐ >15 mi.

11. The FHWA traffic noise abatement criteria provide the states with some degree of flexibility in defining noise impacts. Please list the following noise impact guidelines adopted by your state:

>> The noise level (in dBA) at which traffic noise conditions require abatement attention.
My state: _____dbA

>> The noise level change (in dB) corresponding to a "Substantial Increase" in noise impact.
My state: _____dB

>> The noise level change (in dB) corresponding to a "Substantial Reduction" in noise impact.
My state: _____dB

>> The "Cost Effectiveness" criterion for traffic noise abatement projects
My state: $_____

>> The "Reasonableness" criterion for noise abatement projects pertains to a combination of 'cost effectiveness' (defined above) and the views and desires of the public affected by the project. In Texas, this criterion is met when the cost effectiveness is less than $ 25,000 per impacted receiver and a majority of the owners of the impacted properties vote in favor of the project.
My state: $_____per impacted receiver

Other Comments:_____

_____ _____

_____

_____(attach separate sheet if necessary)

12. If your state considered setting up a traffic noise abatement program for existing highways (Type II projects) but has not initiated the program, what factors have influenced the need or progress? (check all that apply)

- ☐ Not considered;
- ☐ Traffic noise levels in our state are not sufficient to warrant a Type II noise abatement program;
- ☐ Traffic noise is a significant issue in our state and we are currently evaluating the need for a future Type II noise abatement program;
- ☐ Funds are not available for a Type II noise abatement program;
- ☐ Other:

_____

_____

_____

13. What tools and procedures do you use in traffic noise abatement assessments and projects? (check all that apply)

☐ Approved standardized sound level meters;

Computer simulation traffic noise modeling:
☐ STAMINA
☐ Other computer programs _____
☐ Formalized field measurement procedures and documentation;
☐ Formalized requirements for computer modeling of noise abatement project designs.
☐ Other:
_____

_____

_____

14. Have you considered the use of any traffic noise abatement methods other than noise barriers? (check all that apply)

☐ Earth berms;
☐ Vegetation;
☐ Quieter pavement surface courses;
☐ Traffic management;
☐ Land purchase or land use restrictions;
☐ Other:
_____

_____

_____

15. Please identify any other divisions, offices, or authorities within your state that conduct traffic noise abatement assessments or projects:
_____

_____

_____

16. Please provide us with a copy of your Type II traffic noise abatement policy or Program document. (Mail to address shown below)

17. In the absence of a formal Type II noise abatement policy document, would you please provide us with a copy of any written guideline document addressing Type II noise abatement issues in your state ? (Mail to address shown below)

☐ Yes ☐ No written guidelines available

18. Please add any supplemental comments:

_____

_____

_____

_____(attach separate sheet if necessary)

19. Please give us a brief description of yourself, including, present position, experience and expertise in transportation projects, direct experience in traffic noise impact assessments and abatement projects, current responsibilities related to traffic noise impact studies, etc.

Name:_____Title:_____Ph._____

_____

_____(attach separate sheet if necessary)

THANK YOU VERY MUCH FOR YOUR COOPERATION AND VALUED ASSISTANCE.

PLEASE RETURN THIS COMPLETED QUESTIONNAIRE TO:

T.E. Owen, Director
Institute for Research in Sciences and Engineering
The University of Texas at San Antonio
6900 N. Loop 1604 West
San Antonio, TX 78249-0661

For your convenience, a prepaid return-addressed postal mailer is enclosed. Use this mailer to send the completed questionnaire, your state traffic noise assessment guidelines, and any other documents that may be relevant to this information survey.

The questionnaires were mailed to the state DOTs in the second half of August 1997 and, with one or more telephone reminders to some states, thirty-nine responses were received by the end of November 1997. Of these responses, ten states indicated that they have a Type II noise abatement program and reported their program status using the questionnaire exhibited in Figure A-1. Five additional states that did not reply by questionnaire were contacted later in the telephone interviews and they indicated that they have a formal Type II program. Thus, a total of fifteen states currently have Type II traffic noise abatement programs. Of the thirty-five states that do not have a Type II noise program, seven states have constructed retrofit noise barriers on existing highways.

Telephone interviews were conducted with traffic noise specialists in all state DOTs to clarify and supplement the responses to the questionnaires. The primary information gained from the interviews included:

(1) additional detail on Type II retrofit noise barrier projects (if any) concerning:
  (i) assessment of noise impact along existing highways;
  (ii) prioritization of project implementation; and
  (iii) methods of funding (including private or municipal funding support).

(2) methods by which public complaints are handled with respect to traffic noise on existing highways;

(3) methods by which complaints or requests by elected officials are handled with respect to traffic noise on existing highways;

(4) additional information on 'reasonableness of cost' per benefited receiver in evaluating and implementing noise abatement projects; and

(5) other relevant aspects of traffic noise abatement and Type II noise programs specific to each state.

The opportunity to communicate directly with traffic noise specialists in each state revealed, in many cases, significantly more detail about their noise abatement programs and implementation strategies than was reported in the questionnaires. Also, as a result of these direct contacts, several states that did not initially send copies of their traffic noise abatement guideline documents as part of their questionnaire responded by sending their available information, some of which was only very recently completed.

A.2.2 Information Database

One goal of the survey of state DOTs was to develop an overview of traffic noise abatement activity in the states, with emphasis placed on Type II noise abatement projects. A useful indication of the national activities related to traffic noise is illustrated by the collective responses from the states that returned questionnaires. These results also serve to broadly

indicate the common trends and practices concerning Type II noise abatement issues among the fifty states. The results of the survey are presented in more complete detail later in this appendix.

Table A.1 summarizes the collective responses received from states having Type II noise abatement programs. Highlights and common trends noted among these state activities and programs include the following (percentages denote the number of states responding):

Type II program was initiated by the state DOT (58%) or by the state legislature (42%).

Type II program was initiated because of complaints received from private citizens (75%) or from local elected officials (67%).

Formal Type II written policy guidelines exist in state DOTs (67%) or Type II program is informally administered (33%).

Potential Type II noise abatement projects are initially identified from private citizen complaints (67%) or by elected official requests (50%).

Type II noise abatement projects are prioritized using a formula that involves weighted indicators of technical performance and cost of noise barriers per benefited receiver (67%). These formulas, their dependent variables, and their weighting factors are somewhat similar but are not the same among the states that use them.

State DOT funds provide the total support for Type II noise abatement projects (67%). Municipal and private funding is (can be) used (25%).

State DOT central offices (50%) and state DOT district offices (50%) administer the currently active Type II programs. Special funding is rarely appropriated for Type II projects (8%).

Public meetings are held to gain approval of Type II noise abatement projects (67%). Opinion surveys of benefited residents are conducted after Type II noise barrier construction (33%).

The states that have a formal Type II traffic noise abatement program and have been active in implementing Type II projects are: California, Colorado (more than 20 mi. of Type II noise barriers constructed to date), and Minnesota, followed by Ohio and Utah (between 1 and 8.5 mi. of Type II noise barriers constructed to date).

Table A-2 summarizes the collective responses received from states that do not have a Type II noise abatement program but have constructed one or more retrofit noise barriers on existing highways. Several common trends noted among these state activities are:

Retrofit noise abatement policy is informal based on state DOT-developed guidelines (71%).

Type II traffic noise abatement program has not been established because of limitations in state funding and manpower (57%).

Retrofit projects have been implemented in response to complaints from private citizens (71%) or elected officials (43%).

The states that do not have a formal Type II traffic noise abatement program but have been the most active in implementing retrofit noise barriers are: New York (several), Nevada (2), Florida (2), and Oklahoma (1).

State DOT responded with a copy of its written traffic noise abatement guideline document (86%).

Table A-3 summarizes the collective responses received from states that do not have a Type II noise abatement program and have not implemented any retrofit noise abatement projects to date. Several common trends noted among these state activities are:

Traffic noise is not a priority requirement (38%).

State DOT has not considered establishing a Type II traffic noise program (50%).

Funding and manpower limitations have prevented implementation of any retrofit noise abatement projects (62%).

State DOT responded with a copy of its written (or informal) traffic noise abatement guideline document (81%).

This state DOT Type II noise program survey was effective in gathering responses from all states that are active in addressing traffic noise abatement problems (80 % response to mail-return questionnaires) with telephone interview confirmation of the level of activity applied to traffic noise in each state DOT (nearly 100%). This nationwide survey, which has successfully identified the states in which traffic noise is having a significant impact on the public, contains a valuable database describing the various methodologies now in use by many state DOTs to relieve such noise impacts. The remaining parts of this appendix document and evaluate this database in an effort to characterize the state DOT Type II noise programs and to identify the most effective methodologies presently used for identifying and prioritizing Type II noise abatement projects.

TABLE A.1. Collective responses to questionnaire by states having Type II noise abatement programs*

Question**	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding
1a	1→ 7%	WI	6a	8→53%	CA, CO, CT, IA, MI, NJ, OR, UT	10a	12→ 80%	CA, CT, IA, MA, MI, MN, NJ, OH, OR, UT, WA, WI	16a	10→ 67%	CA, CO, IA, MI, MN, MO, OH, OR, UT, WI
1b	5→33%	CA, CT, OH, UT, WI	6b	12→80%	CA, CO, CT, IA, MA, MD, MI, MN, OH, OR, UT, WI	10b	7→47%	CA, CT, MI, OH, OR, UT, WI	17a	9→60%	CA, CO, IA, MI, MN, MO, OH, OR, WI
1c	12→80%	CA, CT, IA, MA, MD, MI, MN, MO, NJ, OR, WA, WI	6c	8→53%	CO, CT, IA, MI, NJ, OR, UT, WA	10c	8→53%	CA, CO, IA, MI, OH, OR, UT, WI	18a	7→47%	CA, CT, IA, MI, MO, OR, UT, WI
1d	1→ 7%	CO	6d	9→60%	CA, CO, IA, MI, NJ, OH, OR, UT, WI	10d	4→27%	CA, IA, MN, UT	19a	10→67%	CA, CO, IA, MI, MN, MO, OH, OR, UT, WI
1e	2→13%	CA, IA	6e	9→60%	CT, IA, MD, MI, MN, OR, UT, WA, WI	10e	0→0%		20a	9→60%	CA, CO, IA, MI, MO, OH, OR, UT, WI
2a	11→73%	CA, CT, IA, MA, MD, MI, MN, NJ, OH, OR, UT	6f	9→60%	CA, CO, IA, MI, NJ, OH, OR, UT, WI	11a	6→40%	CO, IA, OR, UT, WA, WI	21a	5→33%	CO, MI, MO, OH, UT, WI
2b	9→60%	CA, IA, MA, MI, MN, MO, NJ, OH, UT	6g	8→53%	CA, CO, IA, MI, OH, OR, UT, WI	11b	6→40%	CO, IA, NJ, OR, WA, WI	21b	7→47%	CA, IA, MD, MN, OR, WA, WI
2c	7→47%	MI, MD, NJ, OH, OR, UT, WI	6h	7→47%	CO, IA, MI, NJ, OR, UT, WI	11c	5→33%	IA, NJ, UT, WA, WI	22a	6→40%	CO, MI, OH, OR, UT, WI
2d	4→27%	CA, MI, MN, NJ	6i	6→40%	CA, CO, IA, MI, UT, WI	11d	2→13%	WA,WI	23a	9→60%	CA, CO, CT, IA, MI, MO, OR, UT, WI
2e	1→ 7%	CO	6j	2→13%	CA, NJ	11e	7→47%	CO, MD, MI, MN, OH, UT, WI	23b	9→60%	CO, CT, IA, MI, MO, OH, OR, UT, WI

Question**	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding
3a	0→ 0%		7a	2→13%	CO, CT	11f	8→53%	CA, CO, IA, MI, MN, NJ, OH, UT, WI	23c	3→20%	CA, MI, OR
3b	2→13%	CT, MN	7b	8→53%	CA, CT, IA, MD, MI, MN, UT, WI	11g	7→47%	CA, MI, MN, NJ, OH, UT, WI	23d	6→40%	CA, CT, MI, MN, OR, WI
3c	0→ 0%		7c	8→53%	CA, CO, CT, MI, MN, OR, WA, WI	11h	7→47%	CA,MD,MI,MN, OH, UT,WI	23e	6→40%	CA, CO, CT, OH, OR, WI
3d	6→40%	CO, MA, MI, OH, OR, UT	7d	5→33%	CO, MD, MI, WA, WI	12a	14→93%	CA, CO, CT, IA, MA, MI, MN, MO, NJ, OH, OR, UT, WA, WI	24a	2→13%	CO, MN
3e	7→47%	CA, CO, IA, MO, NJ, WA, WI	7e	6→40%	CA, CT, MI, OH,UT, WI	12b	13→87%	CA, CO, CT, IA, MI, MN, MO, NJ, OH, OR, UT, WA, WI	24b	10→67%	CA, CT, IA, MI, MO, NJ, OH, OR, UT, WI
4a	4→27%	IA, NJ, OH, OR	7f	1→7%	WI	12c	13→87%	CA, CO, CT, IA, MI, MN, MO, NJ, OH, OR, UT, WA, WI	25a	10→67%	CA, CO, CT, IA, MI, MO, OH, OR, UT, WI
4b	2→13%	MN, OH	7g	3→20%	CO, UT, WI	12d	12→80%	CA, CO, IA, MA, MI, MN, MO, NJ, OH, OR, UT, WI	25b	5→33%	CT, MI, MO, OR, UT
4c	11→73%	CO, CT, MA, MD, MI, MN, MO, NJ, OH, UT, WA	7h	2→13%	MI, WI	12e	11→73%	CA, CO, IA, MA, MI, MN, MO, NJ, OH, OR, WI	25c	6→40%	CT, MI, MN, OR, UT, WI
4d	2→13%	NJ, UT	7i	0→ 0%		13a	11→73%	CA, CO, CT, IA, MD, MI, MO, OH, OR, UT, WI	25d	4→27%	MI, MN, OH, UT
4e	6→40%	CA, CO, MD, OH, UT, WI	7j	4→27%	CA, IA, NJ, OR	13b	8→53%	CA, CO, CT, IA, MI, MO, UT, WI	25e	3→20%	CO, MI, UT
4f	2→13%	IA, WI	8a	6→40%	CO, IA, MA,	13c	10→67%	CA, CO, CT, IA, MI, MN, MO,	25f	0→ 0%	

Question**	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding
					MD, MI, WI			NJ, OH, OR			
5a	1→ 7%	IA	8b	9→60%	CO, CT, IA, MD, MI, NJ, OH, UT, WI	13d	10→ 67%	CA, CO, CT, MI, MN, MO, NJ, OR, UT, WI	26a	9→60%	CA, CO, IA, MI, OH, OR, UT, WI
5b	0→ 0%		8c	3→20%	MI, OR, WI	13e	7→ 47%	CA, CO, CT, MI, OH, UT, WI	27a	12→80%	CA, CO, CT, IA, MI, MO, OH, OR, UT, WA, WI
5c	5→33%	CT, IA, NJ, UT, WI	8d	5→33%	MD, MN, OR, WA, WI	13f	4→27%	CA, MI, OR, UT	28a	8→55%	CA, CO, CT, MD, MO, OH, OR, WA
5d	10→67%	CT, IA, MA, MD, MN, MO, NJ, OR, UT, WI	8e	1→ 7%	MN	13g	3→20%	CA, MI, UT	28b	2→ 13%	MN, WA
5e	6→40%	CT, MN, MO, OR, UT, WA, WI	9a	3→20%	CA, CT, MI	13h	1→ 7%	CO	29a	5→33%	CA, IA, MI, MO, WI
5f	5→33%	CO, IA, MD, MI, WI	9b	2→13%	NJ, WI	14a	9→60%	CA, CO, IA, MI, OH, OR, UT, WI	30a	13→87%	CA, CO, IA, MD, MI, MN, MO, NJ, OH, OR, UT, WA, WI
5g	4→27%	CO, IA, NJ, OH	9c	3→20%	CA, MN, OR	15a	11→73%	CA, CO, IA, MD, MI, MO, NJ, OH, OR, UT, WI	31a	12→80%	CA, CO, IA, MD, MI, MN, MO, NJ, OH, OR, WA, WI
			9d	2→13%	UT, WA				31b	1→ 7%	UT
			9e	4→27%	CO, IA, MN, OH						

* Fifteen states have Type II noise abatement programs: CA, CO, CT, IA, MI, MO, OH, OR, UT, WI; (MA, MD, MN, NJ, WA did not respond by questionnaire), ** Letter suffixes indicate answer choices for each question.

TABLE A.2. Collective responses to questionnaire by states that do not have a Type II noise abatement program but have constructed retrofit noise barriers along existing highways*

Question**	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding
1a	0→ 0%		7a	1→14%	NY	11a	7→100%	FL, GA, ID, IN, NV, NY, OK
1b	4→57%	FL, GA, NV, NY	7b	0→ 0%		11b	7→100%	FL, GA, ID, IN, NV, NY, OK
1c	5→71%	GA, ID, IN, NV, OK	7c	4→57%	FL, GA, ID, IN	11c	7→100%	FL, GA, ID, IN, NV, NY, OK
1d	2→29%	FL, NY	7d	6→86%	FL, GA, ID, IN, NV, NY	11d	7→100%	FL, GA, ID, IN, NV, NY, OK
1e	5→71%	FL, GA, NV, NY, OK	7e	3→43%	FL, GA, ID	11e	6→86%	FL, GA, ID, IN, NY, OK
1f	0→ 0%		7f	5→71%	FL, GA, ID, IN, NV	12a	3→43%	GA, ID, OK
2a	7→100%	FL, GA, ID, IN, NV, NY, OK	7g	1→14%	NY	12b	0→ 0%	
3a	1→ 14%	IN	7h	5→71%	FL, GA, ID, IN, NV, NY, OK	12c	1→ 14%	NV
3b	0→ 0%		7i	1→14%	FL, GA, ID, IN, NV	12d	7→100%	FL, GA, ID, IN, NV, NY, OK
3c	2→29%	FL, NY	7j	3→43%	GA, IN, NY	12e	3→43%	FL, IN, NY
3d	3→43%	IN, NV, NY	7k	2→29%	FL, IN	13a	7→100%	FL, GA, ID, IN, NV, NY, OK
3e	4→57%	FL, GA, NV, OK	7l	2→29%	IN, OK	13b	7→100%	FL, GA, ID, IN, NV, NY, OK
3f	5→71%	FL, ID, IN, NV, NY	8a	2→29%	NY, OK	13c	1→14%	OK
4a	0→ 0%		8b	2→29%	FL, NV	13d	4→57%	FL, IN, NV, NY
4b	0→ 0%		8c	2→29%	FL, NY	13e	4→57%	FL, IN, NV, NY
4c	0→ 0%		8d	2→29%	FL, NV	13f	2→29%	IN, NY
4d	0→ 0%		8e	1→14%	NV	14a	7→100%	FL, GA, ID, IN, NV, NY, OK
4e	1→14%	ID	8f	1→14%	NV	14b	2→29%	FL, ID
4f	0→ 0%		8g	0→ 0%		14c	3→43%	GA, NV, NY
4g	4→57%	FL, GA, ID, OK	8h	0→ 0%		14d	2→29%	GA, ID

Question**	Percent Responding	States Responding	Question	Percent Responding	States Responding	Question	Percent Responding	States Responding
4h	2→29%	FL, GA	8i	0→ 0%		14e	3→43%	FL, IN, NY
4i	1→ 14%	FL	8j	5→71%	FL, GA, ID, IN, OK	14f	4→ 57%	ID, IN, NV, NY
5a	7→100%	FL, GA, ID, IN, NV, NY, OK	9a	3→43%	FL, NV, NY	15a	5→71%	FL, GA, ID, IN, NY
5b	0→ 0%		9b	3→43%	FL, IN, NY	16a	6→86%	FL, GA, ID, NV, NY, OK
6a	3→43%	FL, IN, NY	9c	3→43%	FL, GA, NY	17a	3→43%	FL, ID, IN
6b	5→71%	FL, IN, NV, NY, OK	9d	1→14%	FL	17b	3→43%	GA, NV, OK
6c	3→43%	FL, NV, NY	9e	0→ 0%		18a	3→43%	FL, IN, NY
6d	1→ 14%	FL	10a	2→29%	FL, OK	19a	6→86%	FL, ID, IN, NV, NY, OK
6e	2→29%	GA, ID	10b	1→14%	GA	20a	7→100%	FL, GA, ID, IN, NV, NY, OK
10d	0→ 0%		10c	2→29%	IN, NY	20b	0→ 0%	

* Seven states w/o Type II programs have constructed retrofit barriers: FL, GA, ID, IN, NV, NY, OK
** Letter suffixes indicate answer choices for each question.

TABLE A.3. Collective responses to questionnaire by states that do not have a Type II noise abatement program and have not constructed retrofit noise barriers along existing highways*

Question**	Percent Responding	States Responding	Question**	Percent Responding	States Responding	Question**	Percent Responding	States Responding
1a	3→ 11%	AR, MS, RI	4f	1→ 4%	WV	13c	8→30%	AL, AZ, HI, MS, NH, SC, VA, WY
1b	11→41%	AZ, AR, DE, HI, IL, KY, ME, NH, RI, SC, SD	4g	16→59%	AL, AZ, DE, HI, IL, KS, LA, MT, NE, NH, PA, SC, TN, TX, VA, WV	13d	14→52%	AL, AZ, DE, KS, KY, MT, NH, ND, PA, SC, TN, TX, VT, VA
1c	19→70%	AL, AZ, DE, HI, KS, KY, LA, ME, MS, MT, NH, NC, ND, SC, TN, VT, VA, WV, WY	4h	11→41%	AL, AZ, HI, MT, NH, NC, SC, TN, TX, VA, WV	13e	9→33%	KS, KY, MT, NH, PA, TN, TX, VT, VA
1d	3→11%	IL, RI, TX	4i	1→ 4%	MT	13f	1→ 4%	KY
1e	16→59%	AZ, DE, HI, KS, KY, MT NE, NH, NC, PA, SC, TN TX, VT, VA, WV	5a	0→ 0%		14a	21→78%	AL, AZ, DE, HI, IL, KS, KY, LA, ME, MT, NE, NH, NC, PA, SC, TN, TX, VT, VA, WV, WY
1f	3→11%	PA, TN, TX	5b	27→100%	AL, AK, AZ, AR, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, RI, SC, SD, TN, TX, VT, VA, WV, WY	14b	12→44%	AL, KS, KY, LA, ME, NH, NC, RI, SC, SD, VT, VA
2a	22→81%	AL, AZ, DE, HI, IL, KS, LA, ME, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	11a	23→85%	AL, AZ, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	14c	6→22%	DE, KS, LA, MT, NE, WV
3a	9→33%	AZ, AR, HI, IL, KY, ME, MT, ND, RI	11b	23→85%	AL, AZ, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	14d	7→26%	KS, KY, LA, ME, TN, TX, VA
3b	1→ 4%	WY	11c	22→81%	AZ, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	14e	4→15%	KS, NE, NH, VT
3c	11→41%	AK, AR, HI, KS, LA, ME, MS, MT, RI, VT, WV	11d	24→89%	AL, AZ, AR, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	14f	4→15%	DE, KY, MT, VA
3d	1→ 4%	WY	11e	22→81%	AL, AK, AZ, DE, HI, IL, KS, LA, ME, MS, MT, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	15a	9→33%	AZ, DE, HI, KY, MT, NE, NC, TX, WV

Question**	Percent Responding	States Responding	Question**	Percent Responding	States Responding	Question**	Percent Responding	States Responding
3e	11→41%	AL, AZ, DE, HI, KS, NE NH, NC, PA, SC, TN	12a	14→52%	AZ, HI, KS, KY, MS, MT, NE, NC, ND, RI, SC, TN, VA, WV	16a	13→48%	AL, DE, KS, KY, MS, MT, NH, NC, PA, SC, VA, WV, WY
3f	6→22%	KS, SC, TN, TX, VT, VA	12b	4→15%	ME, RI, VA, WY	17a	9→33%	DE, MS, MT, ND, PA, RI, SC, VA, WY
4a	8→30%	AK, HI, KY, MS, MT, NC ND, RI	12c	1→ 4%	TX	17b	12→44%	AZ, HI, KS, KY, ME, NE, NH, NC, TN, TX, VT, WV
4b	5→19%	AK, ME, SD, VT, WY	12d	12→44%	AL, AZ, DE, HI, IL, KS, ME, NH, PA, TN, VT, VA	18a	3→11%	LA, NC, WV
4c	1→ 4%	AK	12e	0→ 0%		19a	26→96%	AL, AK, AZ, AR, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, RI, SC, TN, TX, VT, VA, WV, WY
4d	5→19%	AR, IL, KS, SD, VT	13a	20→74%	AL, DE, HI, KS, KY, LA, MS, MT, NE, NH, NC, ND, PA, SC, TN, TX, VT, VA, WV, WY	20a	27→100%	AL, AK, AZ, AR, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, RI, SC, SD, TN, TX, VT, VA, WV, WY
4e	1→ 4%	VT	13b	20→74%	AL, AZ, DE, HI, KS, KY, LA, ME, MS, MT, NE, NH, NC, PA, SC, TN, TX, VT, VAWV	20b	0→0%	

* Twenty-seven states: AL, AK, AZ, AR, DE, HI, IL, KS, KY, LA, ME, MS, MT, NE, NH, NC, ND, PA, RI, SC, SD, TN, TX, VT, VA, WV, WY (NM did not respond by questionnaire). Letter suffixes indicate answer choices for each question.

A.2.3 Characteristics of Type II Noise Abatement Programs in Other States

A.2.3.1 States Having Type II Programs

Fifteen state DOTs currently have Type II noise abatement programs that are approved by the Federal Highway Administration. After reviewing the questionnaire responses and conducting telephone interviews with representatives of these fifteen states, five states were found to have active Type II programs with dedicated state budgets for retrofit noise abatement projects, four states were found to have had previously strong retrofit project activities but have now suspended all Type II program activities, and six states were found either to have low (or no) Type II retrofit activity or have suspended action on their Type II noise abatement program. Table A-4 lists the 15 states having Type II noise abatement programs and summarizes their current status.

TABLE A.4 States that have a Type II noise abatement program

STATE	Dedicated Type II Budget	>20 Miles of Type II Barriers	2 to 20 Miles of Type II Barriers	0.5 to 2 Miles of Type II Barriers	Type II Sites Pending
CURRENTLY ACTIVE TYPE II PROGRAMS					
California	X	X			60
Colorado	X	X			101
Minnesota	X	X			54
Ohio				X	14
Utah				X	0
MEDIUM (M), LOW (L), OR INACTIVE (I) TYPE II PROGRAMS					
New Jersey		M, I			
Michigan		M			
Maryland			M, I		
Wisconsin			M, I		

MEDIUM (M), LOW (L), OR INACTIVE (I) TYPE II PROGRAMS					
Connecticut				L, I	
Iowa				L, I	
Massachusetts				**L**	
Missouri				**L, I**	
Oregon				**L**	
Washington				---	

The primary characteristics of the Type II noise abatement programs in the five states that have active programs are:

(1) California

Program Administration

Project Identification, Evaluation, Design: CalTrans District Offices
Project Prioritization: CalTrans HQ Central Office
Project Funding Decision: California Transportation Commission

Program Procedure

(i) District Offices submit projects and Priority Index
(ii)Central HQ Office compiles Priority List
(iii) California Transportation Commission Review/Funding Authorization
(iv) District Offices conduct analyses, design, and implementation

Project Prioritization

If measured noise level at site is > 67 MPO, compute Priority Index:

$$\text{Priority Index} = \frac{[\text{achievable noise reduction}] \times [\text{measured NL} - 67] \times [\text{no. of living units}]}{\text{project cost (in \$1,000's)}}$$

$$+ [\text{percent of residents (if} > 50\% \text{ of current number) in living units prior to highway construction} - 50\%]$$

Note: Project is placed at the top of the priority list if the city contributes 33% or more of cost.

Project Cost Effectiveness Criterion: $35,000 per benefited Living Unit

(2) Colorado

Program Administration

Project Identification, Evaluation, Design: Colorado DOT Central Office
Project Prioritization: Colorado DOT Central Office
Project Funding Decision: Colorado DOT Central Office

Program Procedure

All traffic noise abatement projects are identified, prioritized and implemented by the Colorado DOT Central Office

Project Prioritization

If noise level at each dwelling (i=1, 2,... N) at site is >67, compute Rating Factor:

$$\text{Rating Factor} = \frac{\sum_{i=1}^{N} \left[(\text{existing NL at dwelling } i) - \text{desigh year NL}\right]^2 \times [\text{no. of dwellings}]}{[\text{proj}[\text{project cost (in \$1,000' s)}]}$$

Project Cost Effectiveness Criterion: $3,000 per reduction per benefited receiver

(3) Minnesota

Program Administration

Project Identification, Evaluation, Design: Minnesota DOT District Offices

Project Prioritization: Minnesota DOT District Offices

Project Funding Decision: Minnesota DOT Central Office. Four or five top priority projects are programmed over each three-year period

Program Procedure: The MetroDistrict of MinDOT (Minneapolis-St. Paul) is the only district actively involved in traffic noise abatement. Collaboration and cost sharing is provided by Metro MPO and local communities for accelerated completion of projects.

Project Prioritization

If noise level at site is >67 MPO, compute Priority Index:

Project Cost Effectiveness Criterion: $3,250 per dBA x Number of Residences Receiving > 5 MPO Noise Reduction

(4) Ohio

Program Administration

Project Identification, Evaluation, Design: Ohio DOT and Local MPO Gov’ts

Project Prioritization: Ohio DOT Central Office

Project Funding Decision: Ohio DOT Central Office.

Program Procedure

The Ohio DOT Central Office conducts all Type II traffic noise abatement studies (identification, evaluation, eligibility, prioritization, funding decision, design, and implementation).

Project Prioritization

If noise level at site is >67 dBA, compute Priority Index:

$$\text{Priority Index} = T \cdot \left[N_{100} \cdot D + N_{200} \cdot \frac{D}{2} + N_{300} \cdot \frac{D}{4} \right]$$

Where: T = average daily traffic (T = 1 for 0-15K veh/day; 2 for 15-30K veh/day; etc.);
N_d = number of residential units within distance d (ft) of highway;
D = noise impact duration (D =1 for 0-5 yrs; 2 for 5-10 yrs; etc.).

Project Cost Effectiveness Criterion: $25,000 per benefited receiver if >5 dBA

(5) Utah

Program Administration

Project Identification and Request for Retrofit: Local Government Agency
Evaluation and Project Prioritization: Utah DOT Region Director
Project Funding Decision: Utah DOT Chief Environmental Engineer

Program Procedure

(i) Local government agencies submit Type II noise abatement request;
(ii) Utah DOT Region Director initiates evaluation and eligibility study;
(iii) Utah DOT Chief Environmental Engineer conducts review, design, and funding authorization;
(iv) Utah DOT Project Engineer and Environmental Engineer perform design, analyses, specification, and implementation.

Project Prioritization

If noise level at site is >67 dBA, compute Priority Index:

$$\text{Priority Index} = [\text{design noise level}] + N$$

where N is the number of times that a project has been passed over for implementation but not greater than 4.

Project Cost Effectiveness Criterion: $20.000 per benefited receiver if noise reduction is > 5 dBA

The primary characteristics of the Type II noise abatement programs in the four most active states that have low activity or currently suspended program activities are:

(6) New Jersey

Program Administration

Type II program is inactive; No new Type II sites pending
One large previously approved project is in progress ($34M)
Type II noise abatement policy is being revised (a change will be incorporated to require community cost share participation in future projects)

Project Prioritization

If noise level at site is >67 dBA, compute Priority Index:

Priority Index = [measured noise level - 67]

Project Cost Effectiveness Criterion: $40,000 per benefited receiver if noise reduction is >5 dBA

(7) Michigan

Program Administration

Five new Type II sites are pending state funding authorization

Michigan DOT enters into an agreement with local governments to construct traffic noise barriers. Michigan DOT maintains the barrier for five years after which the local government must accept ownership and maintenance.

Project Prioritization

No Type II noise abatement project prioritization procedure is defined in the Michigan DOT Traffic Noise Abatement Policy

Project Cost Effectiveness Criterion: $27,000 per benefited receiver if >5 dBA

(8) Maryland

Program Administration

Type II program is inactive; 26 new sites are pending state funding authorization after completion and approval of revised Type II noise abatement policy.

Type II noise abatement policy is being revised (changes will be incorporated to require community cost share participation in future projects and define a revised project prioritization criterion)

(9) Wisconsin

Program Administration

Type II program is inactive; No state funds are available for Type II noise abatement. One hundred sites are pending state funding allocation. Some where cost criterion is exceeded will require community cost share participation to qualify for future implementation.

Project Prioritization

If noise level at the site is >67 dBA, compute the Priority Ranking Factor:

First, compute each Site Ranking Factor based on Barrier Factors, E, TF, AF, CEF:

$$\text{Site Ranking Factor} = 0.5 \times E + 0.25 \times TF + 0.15 \times AF + 0.10 \times CEF$$

where E (site noise energy), TF (site traffic exposure factor), AF (site age factor), CEF (cost effectiveness factor) are defined as:

$$E = \frac{\sum_{i=1}^{N} 10^{L_{eq_i}/10} \times \text{res}_i}{\sum_{i=1}^{N} \text{res}_i} \quad ,$$

where L_{eq_i} is the noise level at receiver *i*
res_i is the number of residences covered by receiver *i*

$$TF = \frac{ADT}{24 \times LOSC} \quad ,$$

where ADT is the average daily traffic and LOSC is the traffic level of service. TF = 1 for optimum 24 hr/day volume and speed.

$$AF = \frac{\sum_{i=1}^{N} (SY - \text{resY}_i) \times \text{res}_i}{\sum_{i=1}^{N} \text{res}_i} \quad ,$$

where SY is the site study year and resY_i is the year of construction of receiver dwelling *i*.

$$CEF = \frac{CC/WIL}{\sum_{i=1}^{N} \text{res}_i} \quad ,$$

where CC is the estimated barrier construction cost and WIL is the Wisconsin cost-effectiveness criterion.

Then, to rank the various sites for priority, the barrier factors, E, TF, AF, CEF, for each site are normalized by statistical methods to obtain standardized factors (Sse, SSt, Ssa, SSce) and a final site ranking score is then computed as

$$\text{Priority Ranking Factor} = 0.5 \times SSe + 0.25 \times SSt + 0.15 \times SSa + 0.1 \times SSce$$

Project Cost Effectiveness Criterion: $40,000 per benefited receiver

A.2.3.2 States That Do Not Have a Type II Program

Two of the seven states that do not have a Type II noise abatement program but have constructed two or more retrofit barriers have procedures and status conditions of particular interest:

(10) New York

Program Administration

Impact Site Identification: Complaints go to NY State Legislature

Prioritization and Funding: Legislative Order

Project Implementation: New York DOT Carries Out Order

Project Prioritization

Prioritization is governed by Legislative Order sequence

Project Cost Effectiveness Criterion: $50,000 per benefited receiver

(11) Florida

Program Administration

Project Identification, Evaluation, and Design: Florida DOT Districts

Prioritization and Funding:

Florida MPOs Assign Priorities

Project Implementation: Florida DOT District Offices implement the projects'

Based on availability of state funds (at present there is a legislative hold because of conflict between Florida state law and federal laws governing retrofit noise abatement projects in reference to federal matching funding)

Project Prioritization

MPOs establish priority factors for each retrofit impact site

Project Cost-Effectiveness Criterion: $30,000 per benefited receiver

A.3 Texas MPO Survey

A mail-return questionnaire similar to that distributed to the state DOTs was prepared and distributed to twenty-five metropolitan planning organizations in Texas. This questionnaire was designed to determine the involvement of Texas MPOs in traffic noise planning and abatement. Questions asked of the MPOs also solicited their views on the benefits of formal interactions with MPO concerning planning for new or growing traffic noise impacts in their areas, the degree of responsibility that should be borne by the MPOs in identifying and prioritizing retrofit noise abatement projects, and their willingness and ability to provide partial funding support for such noise abatement projects.

A.3.1 Questionnaire

The questionnaire sent to the Texas MPOs consisted of twenty-two questions presented in three pages. The questionnaire was made shorter be allowing those MPOs that are not involved with traffic noise complaints or impacts to skip questions 2–5 and only respond to questions concerning their potential interest in participating in traffic noise planning and implementation. Included in the list of questions was a request to receive any MPO documents or guidelines pertaining to policies or procedures for identifying and implementing traffic noise abatement projects.

Figure A.4 presents a specimen version of the MPO questionnaire. The questionnaires were

mailed to the MPOs in the second half of September 1997; twelve of the twenty-five MPOs in Texas responded with questionnaire replies.

A.3.2 Information Database and Survey Results

The primary goals of the Texas MPO survey were to establish their current involvement in traffic noise impact problems and to determine their interest and potential willingness to participate in Type II noise abatement project prioritization and local financial support.

Table A.5 summarizes the collective responses received from the Texas MPOs in reference to urban traffic noise abatement activities and projects. The highlights and common trends noted among these MPOs are (percentages denote the number of MPOs responding):

(1) Complaints made to MPOs concerning noise along existing highways are primarily received from residential occupants rather from businesses.
(2) Complaints made to MPOs are general but the most common comment involved "too noisy at night."
(3) MPO has received no complaints concerning traffic noise (50%) and, for those MPOs receiving complaints, the persons making the complaints are routinely referred to TxDOT for a response (33%).
(4) MPO regional plans contain a section on 'land use related to traffic noise levels' (40%).
(5) Retrofit traffic noise abatement should not be included in MPO regional transportation plans (60%).
(6) MPO is potentially willing to participate in selecting and prioritizing retrofit traffic noise abatement projects (33%).
(7) Funding of retrofit traffic noise abatement projects is considered to be an MPO or local government responsibility (17%).
(8) State should allocate funds to MPOs for implementing retrofit traffic noise abatement projects in their areas (67%).
(9) MPOs are not willing to cancel or postpone any current projects to support retrofit traffic noise abatement projects in their areas (90%);.
(10) MPO representative sent a copy of their policy documents or guidelines related to traffic noise (0%).

Figure A.3

METROPOLITAN PLANNING ORGANIZATION SURVEY ON RETROFIT TRAFFIC NOISE ABATEMENT

1. What is the extent of your MPOs current involvement in traffic noise abatement?

- ☐ No involvement. **[PLEASE SKIP TO QUESTION 6]**;
- ☐ We have been involved in the identification of traffic noise impacts and follow-up actions.

2. How are traffic noise concerns in your area identified?
Check all that apply:

- ☐ Occasional monitoring of traffic noise throughout the MPO area;
- ☐ Complaints from residential occupants adjacent to roadway;
- ☐ Complaints from businesses adjacent to roadway;
- ☐ Requests for abatement from elected or other public officials;
- ☐ Other:_____

_____

3. Describe any traffic noise complaints your MPO has received from the public.
Check all that apply:

- ☐ No public complaints;
- ☐ Too noisy during rush hours;
- ☐ Too noisy at night;
- ☐ Too noisy at all times;
- ☐ Too much noise from heavy trucks;
- ☐ Other:_____

_____

_____

4. Identify who submitted any traffic noise complaints.
Check all that apply:

☐ Individuals submitted complaints;

☐ Residential community organizations submitted complaints;

☐ Public officials submitted complaints;

☐
Other:_____

_____

5. Describe any requests for Type II retrofit traffic noise abatement received from elected or other public officials.

Check all that apply:

☐ No requests received from public officials;

☐ Requests for MPO action expressed on behalf of an individual group of residents;

☐ Requests for noise abatement included preferences or recommendations for the type of noise-reducing treatment to be used;

☐ Requests for noise abatement actions contained recommendations for project funding;

☐ Requests emphasized a strong priority for MPO attention and solution to problem;

☐
Other:_____

_____

_____

6. How has your MPO responded to the complaints and what follow-up actions are normally taken?

_____

_____

_____

7. Does your regional plan contain a section on "land use related to traffic noise levels"?

☐ Yes. ☐ No.

If yes, please send us a copy of the noise-related sections at the return address indicated at the end of this questionnaire.

8. Does your MPO maintain information on noise regulations established by local governments and used for decisions related to land use, zoning, and approval of building permits?

☐ Yes. ☐ No.
If yes, please describe the MPO inputs, authority, and participation.

_____

_____

_____

9. Should Type II retrofit traffic noise abatement be included as a part of regional transportation plans?

☐ Yes. ☐ No.
If yes, please give the MPO inputs, authority, and participation recommended for this purpose.

_____

_____

_____

10. What factors should be considered in determining whether or not a roadway segment is eligible for Type II retrofit traffic noise abatement?
Check all that apply:

☐ Intensity of noise levels;

☐ Traffic volume and number of traffic lanes;

☐ Residential density;

☐ Opinions of area residents concerning the traffic noise and the mitigation measures required for abatement;

☐ Technical feasibility and effectiveness of mitigation measures;

☐ Overall cost of abatement project;

☐ Cost per impacted residence;

☐ Other:_____

_____

_____

11. In your opinion, what should be the primary factors that affect the priority for implementing a Type II retrofit traffic noise abatement project?
Check all that apply:

- ☐ Overall severity of the noise impact;
- ☐ A majority opinion by the impacted residents in favor of the noise abatement project, including construction inconvenience and the location and appearance of the final noise barriers;
- ☐ Technical feasibility and effectiveness of the potential noise barriers;
- ☐ Overall cost of the noise abatement project;
- ☐ Ability to complete the project within TxDOT or other cost-benefit criteria for retrofit noise abatement projects, including technical reduction of noise levels and cost limits per impacted residence;
- ☐ Other:_____
_____
_____

12. Would your MPO be willing to accept responsibility for advising and participating in the selection and prioritization of TxDOT Type II retrofit traffic noise abatement projects in your area? Please comment: _____
_____
_____

13. How would you evaluate potential noise impacts on existing roadways in your area?
Check all that apply:

- ☐ Conduct office studies using maps, residential density, and traffic density information;
- ☐ Conduct office studies (as above) including traffic noise computer modeling;
- ☐ Conduct occasional monitoring of noise levels throughout the MPO area;
- ☐ Investigate traffic noise conditions associated with noise complaints;
- ☐ Assign a special team to identify potential noise impact locations;
- ☐ Engage a consulting firm to conduct traffic noise surveys and noise impact predictions;
- ☐ Other:_____
_____
_____

It should be expected that there will be no additional federal funding for highway projects due to Type II retrofit traffic noise abatement programs. Therefore, funding for Type II projects will come from existing allocations. With that in mind:

14. How should Type II retrofit traffic noise abatement projects be funded?

- ☐ The state should establish a funding pool for Type II retrofit traffic noise abatement projects that will be allotted through statewide priorities.
- ☐ The state should allocate funds to the MPO areas for Type II retrofit traffic noise abatement projects that will be used based on the MPOs priorities.
- ☐ MPOs should be willing to use local public funding for at least some of Type II retrofit traffic noise abatement projects in their areas.
- ☐ Local private funding should be encouraged for Type II retrofit traffic noise abatement projects.
- ☐ Other:_____

_____

_____

15. Which current projects would your MPO be willing to cancel, postpone, or reduce in funding in order to support a Type II retrofit traffic noise abatement barrier construction project?

_____

_____

16. Should the amount of local funding available affect the priority for receiving state funding assistance?

☐ Yes. ☐ No.

Comments:_____

_____

_____

17. Are there any conditions under which a barrier should be built ahead of the order based on established priorities?

_____

_____

_____

18. What steps should be taken to encourage compatible land use planning as it applies to highway traffic noise?

_____

_____

_____

19. Please add any supplemental comments:

_____

_____

_____

20. Please attach any MPO documents related to highway noise abatement that may help us.

21. Please give us a brief description of yourself, including present position, experience and expertise in transportation projects, etc.

Name:_____

Title:_____

Telephone No. _____

_____

22. Do you wish to receive a summary of this survey?

☐ Yes. ☐ No.

If yes, please confirm that the mailing address on this survey package is correct or enter your mailing address below.

_____

_____

_____

THANK YOU VERY MUCH FOR YOUR COOPERATION AND VALUED ASSISTANCE.

Table A.5 Collective responses to questionnaire by Texas Metropolitan Planning Organizations

Question**	Percent Responding	MPOs Responding	Question	Percent Responding	MPOs Responding	Question	Percent Responding	MPOs Responding
1a	10→83%	BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H	6a	12→100%	AMA, AUS, BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H	12a	12→100%	AMA, AUS, BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H
1b	1→8%	AUS	7a	0→0%		13a	5→42%	AMA, CPC, HAR/SB, KI/T, MD/O
2a	1→8%	AUS	7b	12→100%	AMA, AUS, BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H	13b	2→17%	CPC, KI/T
2b	2→17%	AMA, AUS	8a	0→0%		13c	4→33%	CPC, HAR/SB, KI/T, SH/D/H
2c	0→0%		8b	12→100%	AMA, AUS, BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H	13d	5→42%	AUS, B/CS, CPC, HAR/SB, MD/O
2d	1→8%	AUS	9a	4→33%	AMA, AUS, BRV, HAR/SB	13e	1→8%	CPC
2e	0→0%		9b	7→58%	B/CS, CPC, DFW, HID, KI/T, LUB, SH/D/H	13f	5→42%	AUS, B/CS, HAR/SB, HID, LUB
3a	0→0%					13g	1→ 8%	DFW
3b	1→8%	AUS	10a	9→75%	AMA, AUS, BRV, B/CS, CPC, HAR/SB, HID, LUB, SH/D/H	14a	3→25%	HAR/SB, HID, MD/O
3c	2→17%	AMA, AUS	10b	6→50%	CPC, HAR/SB, HID, KI/T, LUB, SH/D/H	14b	8→67%	AMA, AUS, B/CS, CPC, HAR/SB, KI/T, LUB, SH/D/H
3d	1→8%	AUS	10c	7→58%	AMA, AUS, CPC, HAR/SB, KI/T, MD/O, SH/D/H	14c	5→42%	AMA, AUS, B/CS, HAR/SB, HID
3e	1→8%	AUS	10d	7→58%	AUS, CPC, HAR/SB, HID, LUB, MD/O, SH/D/H	14d	2→17%	HAR/SB, MD/O
3f	0→0%		10e	8→67%	AUS, B/CS, CPC, HAR/SB, HID, LUB, MD/O, SH/D/H	14e	1→8%	DFW

Question**	Percent Responding	MPOs Responding	Question	Percent Responding	MPOs Responding	Question	Percent Responding	MPOs Responding
4a	2→17%	AMA, AUS	10f	5→42%	AMA, BRV, CPC, HAR/SB, HID	15a	10→83%	AMA, AUS, B/CS, CPC, DFW, HID, KI/T, LUB, MD/O, SH/D/H
4b	1→8%	AUS	10g	5→42%	AUS, B/CS, HAR/SB, LUB, MD/O	16a	5→42%	B/CS, CPC, DFW, MD/O, SH/D/H
4c	0→ 0%		10h	1→8%	CPC	16b	6→50%	AMA, AUS, HAR/SB, HID, KI/T, LUB
4d	0→ 0%		11a	10→83%	AMA, AUS, B/CS, CPC, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H			
5a	1→0%	AMA	11b	7→58%	AMA, AUS, CPC, HAR/SB, KI/T, MD/O, SH/D/H	17a	10→83%	AMA, AUS, B/CS, CPC, DFW, HAR/SB, KI/T, LUB, MD/O, SH/D/H
5b	1→ 8%	AUS	11c	7→58%	AMA, B/CS, CPC, HAR/SB, HID, LUB, SH/D/H	18a	10→83%	AUS, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H
5c	0→0%		11d	4→ 33%	AMA, CPC, HAR/SB, LUB	19a	2→17%	DFW, SH/D/H
5d	1→8%	AUS	11e	5→ 42%	AMA, B/CS, HAR/SB, LUB, MD/O	20a	0→0%	
5e	1→ 8%	AUS	11f	1→8%	DFW	21a	12→ 100%	AMA, AUS, BRV, B/CS, CPC, DFW, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H
5f	0→0%					22a	10→83%	AUS, BRV, B/CS, CPC, HAR/SB, HID, KI/T, LUB, MD/O, SH/D/H
						22b	2→17%	AMA, DFW

*Twelve MPOs responded to the mail-in questionnaire: Amarillo (AMA); Austin (AUS); Brownsville (BRV); Bryan-College Station (B/CS); Corpus Christi (CPC); Dallas-Ft. Worth (DFW); Harlingen-San Benito (Har/SB); Killeen-Temple (KI/T); Lubbock (LUB); McAllen (McA); Midland-Odessa,(MD/O);Sherman(SH/D/H).

A.4 U.S. State DOT and Texas MPO Contacts and Distribution Lists

Names, addresses, and telephone numbers of the environmental and traffic noise specialists contacted in the fifty U.S. state departments of transportation and the twenty-five transportation planning specialists in the Texas Metropolitan Planning Organizations are listed in Tables A.6 and A.7.

Table A.6. U.S. state DOT traffic noise survey contacts

Alabama
Gary W. Moore
Environmental Technical Section
Alabama Department of Transportation
1409 Coliseum Blvd. Montgomery, Alabama 36130
Tel: 334-242-6142

Alaska
Nate Johnson
Research Manager
Alaska Department of Transportation
2301 Peger Naco
Fairbanks, Alaska 99701
Tel: 907-465-6954

Arizona
Fred Garcia
Environmental Planning Section
Arizona Department of Transportation
205 South 17th Avenue, Room 213,
Mail Drop 619E Phoenix, Arizona 85007-3212
Tel: 602-255-8635

Arkansas
Lynn Malbrough
Environmental Division
Arkansas Department of Transportation
P.O. Box 2261 Little Rock, Arkansas 72203
Tel: 501-569-2281

California
Rudy Hendricks
CALTRANS Environmental Program
1120 N Street, Mail Station 27
Sacramento, California 95814
Tel: 916-653-2271

Colorado
Makeba Adesunloye
Colorado Dept. of Transportation
Office of Environmental Services
4201 East Arkansas Ave., Room 284
Denver, Colorado 80222-3400

Connecticut
Paul Dickey
Environmental Planning Division
Connecticut Dept. of Transportation
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Newington, Connecticut
Tel: 860-594-2945

Delaware
Richard Vetter
Delaware Dept. of Transportation
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Dover, Delaware 19903
Tel: 302-739-3828

Florida
Win Lindeman
Florida Dept. of Transportation
605 Suwannee St., MS-37
Tallahassee, Florida 32399-0450
Tel: 850-488-2914

Georgia
J. Byron Pirkle
Georgia Dept. of Transportation
3993 Aviation Circle
Atlanta, Georgia
Tel: 404-699-4410

Hawaii
Alfred E. Makinu
Hawaii Dept. of Transportation Highway
Division 869 Punchbowl Street
Honolulu, Hawaii 96813
Tel: 808-832-3557

Idaho
Roy Jost
Environmental Planner
Idaho Department of Transportation
P.O. Box 7129
Boise, Idaho 83707-1129
Tel: 208-334-8477

Illinois
Mike Bruns
Noise Specialist
Illinois Department of Transportation
2300 South Dirksen Parkway, Room 330
Springfield, Illinois 62764
Tel: 217-782-7077

Indiana
Juan Polit
Indiana Department of Highways
Room, 848, State Office Building
Indianapolis, Indiana 46204-2249
Tel: 317-232-5203

Iowa
Ron Ridnour
Office of Project Planning
Iowa Department of Transportation
Ames, Iowa 50010
Tel: 515-239-1613

Kansas
Thomas L. Eisenbarth
Environmental Services Section
Kansas Department of Transportation
Docking State Office Building
Topeka, Kansas 66612
Tel: 785-296-0853

Kentucky
Barry C. Adkins
Kentucky Transportation Cabinet
Division of Environmental Analysis
125 Holmes Street
Frankfort, Kentucky 40622-1994
Tel: 502-564-7250

Louisiana
Noel Ardin
Louisiana Dept. of Transportation and Development
P.O. Box 94245
Baton Rouge, Louisiana 70804-9245
Tel: 504-929-9171

Maine
William S. Rollins
Maine Dept. of Transportation
Design Division
16 State House Station
Augusta, Maine 04333-0016
Tel: 207-287-3944

Maryland
Ken Polcak
Maryland State Highway ADM.
Office of Environmental Design
707 N. Calvert Street C-305
Baltimore, Maryland 21202
Tel: 410-545-8601

Massachusetts
Tim Roach
Massachusetts Highway Department
10 Park Plaza
Boston, Massachusetts 02116-3973
Tel: 617-973-7259

Michigan
Leo De Frain
Michigan Department of Transportation
P.O. Box 30049
Lansing, Michigan 48909
Tel: 517-322-5715

Minnesota
Melvin Rossen
Minnesota Dept. of Transportation
Noise Analysis Unit
6000 Minnehaha Avenue, South
St. Paul, Minnesota 55111
Tel: 612-725-2373

Mississippi
Elton Holloway
Planning Division
Mississippi Dept. of Transportation
P.O. Box 1850
Jackson, Mississippi 39215-1850
Tel: 601-359-7685

Missouri
Macey Jett
Missouri Department of Transportation
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Jefferson City, Missouri 65102
Tel: 573-526-5648

Montana
Cora G. Helm
Montana Department of Transportation
P.O. Box 201001
Helena, Montana 59620-1001
Tel: 406-444-7659

Nebraska
Mark Ottoman
Project Development Division
Nebraska Department of Roads
P.O. Box 94759
Lincoln, Nebraska 68509
Tel: 402-479-4684

Nevada
Earl Case
Environmental Services Division
Nevada Department of Transportation 1263 S. Steward Street
Carson City, Nevada 89701-5229
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Bureau of Environment, Room 109
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New Jersey
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Trenton, New Jersey 08625
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New Mexico State Highway and Trans. Dept.
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Tel: 505-827-5235

New York
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Environmental Analysis Bureau
New York State Dept. of Trans.
State Campus 5-303
Albany, New York 12232
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North Carolina
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North Carolina Dept. of Transportation Planning and Environmental Branch
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Raleigh, North Carolina 27611
Tel: 919-733-3141

North Dakota
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North Dakota Dept. of Transportation
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Bismarck, North Dakota 58505-0700
Tel: 701-328-3555

Ohio
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Ohio Department of Transportation
25 South Front Street
Columbus, Ohio 43215
Tel: 614-466-5154

Oklahoma
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Transportation Planning Branch
Oklahoma Dept. of Transportation
200 Northeast 21st Street
Oklahoma City, Oklahoma 73105
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Oregon
David Goodwin
Environmental Services
Oregon Department of Transportation
1158 Chemekota Street NE
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Tel: 503-986-3488

Pennsylvania
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Pennsylvania Dept. of Transportation
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555 Walnut Street
Harrisburg, Pennsylvania 17101-1900
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Rhode Island
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Rhode Island Dept. of Transportation
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Pierre, South Dakota 57501-2586
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Tennessee
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Tennessee Department of Transportation
Environmental Planning Division
900 James K. Polk Building
Nashville, Tennessee 37243-0334
Tel: 615-741-5367

Texas
Mike Shearer
Texas Department of Transportation
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Austin, Texas 78071-2483
Tel: 512-416-2622

Utah
John Neil
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Materials Division
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Tel: 801-965-4227

Vermont
Dennis Benjamin
Director of Planning Agency of Transportation
133 State Street
Montpelier, Vermont 05602
Tel: 802-828-3983

Virginia
Cary B. Adkins
Environmental Division
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219
Tel: 804-371-6765

Washington
Peter Downey
Environmental Affairs Office
Washington State Dept. of Transportation
P.O. Box 47331
Tel: 360-705-7492

West Virginia
James M. Colby
West Virginia Dept. of Transportation
State Capital Complex Bldg. 5, Room A-830
Charleston, West Virginia 25305
Tel: 304-558-2885

Wisconsin
Jay Wald Schmidt
Wisconsin Dept. of Transportation
Bureau of Environment, Room 451
4802 Sheboygan Avenue
P.O. BOX 7965
Madison, Wisconsin 53707-7965
Tel: 608-267-9806

Wyoming
Charles Reed
Environmental Services Engineer
Wyoming Department of Transportation
P.O. Box 1708
Cheyenne, Wyoming 82003-1708
Tel: 307-777-4156

Table A.7. Texas MPO survey — District contacts and addresses

Abilene
Robert Allen
City of Abilene
P.O. Box 60
Abilene, Texas 79604
Tel: 915-676-6812

Amarillo
Taylor Withrow
City of Amarillo
P.O. Box 1971
Amarillo, Texas 79186
Tel: 806-378-4218

Austin
Austin Urban Transportation Study
Policy Advisory Committee
Transportation Planning Director
P.O. Box 1088- Annex
Austin, Texas 78767
Tel: 512-4996423

Beaumont/ Port Arthur
Bob Dickinson
South East Texas Regional Planning Commission
P.O. Box 1387
Nederland, Texas 77627
Tel: 409-724-1911

Brownsville
Mark Lund
City of Brownsville
P.O. Box 911
Brownsville, Texas 78520
Tel: 956-548-6150

Bryan-College Station
Michael Park
Bryan-College Station Urban
Transportation Study Steering Committee
4001 E. 29th, Suite 170-B
Bryan, Texas 77802
Tel: 409-260-5298

Corpus Christi
Muhammad A. Ulkarim
City of Corpus Christi
P.O. Box 9277
Corpus Christi, Texas 78469
Tel: 512-884-0687

Dallas-Fort Worth
Dan Kessler
North Central Texas Council of Governments
P.O. Box 5888
Arlington, Texas 76005-5888
Tel: 817-695-9248

El Paso
Ricardo Dominguez
City of El Paso
#2 Civic Center Plaza, 8th Floor
El Paso, Texas 79901
Tel: 915-430-6606

Harlingen-San Benito
Anthony Tangwa
Harlingen-San Benito
118 East Tyler Street
Harlingen, Texas 78550
Tel: 956-430-6606

Hidalgo County
Edward L. Molitor
Lower Rio Grande Valley Development Council
311 N. 15th Street
McAllen, Texas 78501
Tel: 956-682-3481

Houston, Galveston
Alan Clark
Houston-Galveston Area Council
P.O. Box 22777
Houston, Texas 77227
Tel: 713-627-3200

Kileen and Temple
Jim Reed
Central Texas Council of Governments
P.O. Box 729
Belton, Texas 76513
Tel: 254-933-7075 X 203

Laredo
Marina Sukup
Laredo Urban Transportation Study Steering Committee
1110 Houston Street
Laredo, Texas 78042
Tel: 210-791-7441

Longview
Scott Sopchak
City of Longview
P.O. Box 1952
Longview, Texas 75606
Tel: 903-510-9119

Lubbock
Nancy Harvieux
City of Lubbock
P.O. Box 2000
Lubbock, Texas 79457
Tel: 806-775-2349

Midland-Odessa
Jerry Tcshauner
Permian Basin Regional Planning Commission
P.O. Box 60660
Midland, Texas 79711
Tel: 915-563-1061

San Angelo
Nancy Harvieux
City of San Angelo
P.O. Box 1751
San Angelo, Texas 76902-1751
Tel: 915-657-4210

San Antonio
Janet Kennison
San Antonio-Bexar County MPO
603 Navarro St., Suite 904
San Antonio, Texas 78205
Tel: 210-615-5920

Sherman-Denison-Howe
Wally Johnson
Texoma Council of Governments
3201 Texoma Parkway Suite 240
Sherman, Texas 75090
Tel: 903-813-3531

Texarkana
Beverly Pearson
Ark-Tex Council of Governments
P.O. Box 5307
Texarkana, Texas 75505

Tyler
Larry Badon
City of Tyler
P.O. Box 2039
Tyler, Texas 75710
Tel: 903-531-1175

Victoria
Dave Hill
City of Victoria
P.O. box 1758
Victoria, Texas 77902
Tel: 512-572-2795

Waco
Anna Hayes
City of Waco
P.O. Box 2570
Waco, Texas 76702
Tel: 817-867-2745

Wichita Falls
Steve Seese
City of Wichita Falls
P.O. Box 1431
Wichita Falls, Texas 76307
Tel: 817-720-7712