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FEDERAL NOISE PROGRAM REPORT SERIES
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Federal Highway Administration:

NOISE POLICY AND RELATED ENVIRONMENTAL PROCEDURES

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DRAFT

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FEDERAL NOISE PROGRAM REPORTS

This report discusses the Federal Highway Administration's noise policy and related environmental procedures. Its purpose is to serve as an aid to persons concerned with noise abatement and control activities in the Federal Government. The report is the third in a series of documents discussing various Federal agency noise programs to be published by the Environmental Protection Agency in partial fulfillment of its responsibility under Section 4 of the Noise Control Act of 1972 (PL92-574). Other reports in this series are: Department of Defense: Air Installations Compatible Use Zones (AICUZ) Program, April 1977, Vol. I (EPA 550/9-77-353); Department of Housing and Urban Development: Noise Abatement and Control Policy, April, 1977, Vol. II (EPA 550/9-77-354).

CONTENTS

CONTENTS (Continued)

APPENDICES

FIGURES

TABLES

SECTION 1. INTRODUCTION

SCOPE AND PURPOSE

The Federal Highway Administration (FHWA), a constituent agency of the U.S. Department of Transportation, is responsible for overseeing the use of Federal funds for construction and improvement of highways on the Federal aid system. In response to the Federal-Aid Highway Act of 1970 and in view of the pervasive problem of noise associated with highway construction and use, the FHWA has developed a noise policy.

Today, there is an increasing need for improved communication among people in the different Federal noise programs. This need is occasioned by the increasing complexity and interdependency of Federal noise programs. This very complexity making communication more necessary, at the same time, makes it more difficult.

This document is intended, therefore, to aid the Environmental Protection Agency (EPA) and other Federal agencies involved in noise abatement and land-use planning activities, by providing a framework for understanding the FHWA noise policy and related environmental procedures.

The Noise Control Act of 1972 (PL92-574) designated EPA as the coordinator of Federal noise programs to ensure that they are consistent and mutually reinforcing. EPA believes that one way to facilitate coordination is to promote an understanding of other agencies' programs by publishing a series of Federal noise program guides. This document covers the important features of FHWA's noise policy and related environmental procedures. It also discusses associated problems. Details of the policy requirements and method of implementation for planned highways are contained in Sections 2 and 3, respectively. FHWA noise policy for existing highways is discussed in Section 4. The Appendices provide supplemental information on the FHWA organization structure and technical aspects of the noise policy.

The Problem of Highway Noise

According to recent estimates,[1] more than 17 million people in the United States are exposed to traffic noise levels greater than L_{dn}[2] = 65 dB. Considering the potential of a 40 percent increase in highway travel between 1975 and 1990[3] the national exposure to such noise becomes of increasing concern.

The critical factors bearing on the problem can be easily highlighted. The individual surface transportation vehicles using the highway are noisy. (Figure 1 shows typical highway vehicle noise levels and potential reductions in noise levels.) The vehicles are numerous: approximately 134 million automobiles, trucks, buses and motorcycles currently are in use in this nation.

The extensity of the highway system also bears on the problem. Federal-aid systems (Appendix A) consist of over 850,000 miles, 22 percent of the nation's total highway miles[4] and, significantly, handle approximately three-fourths of all travel in the country. The noise exposure from highway traffic permeates virtually every community.

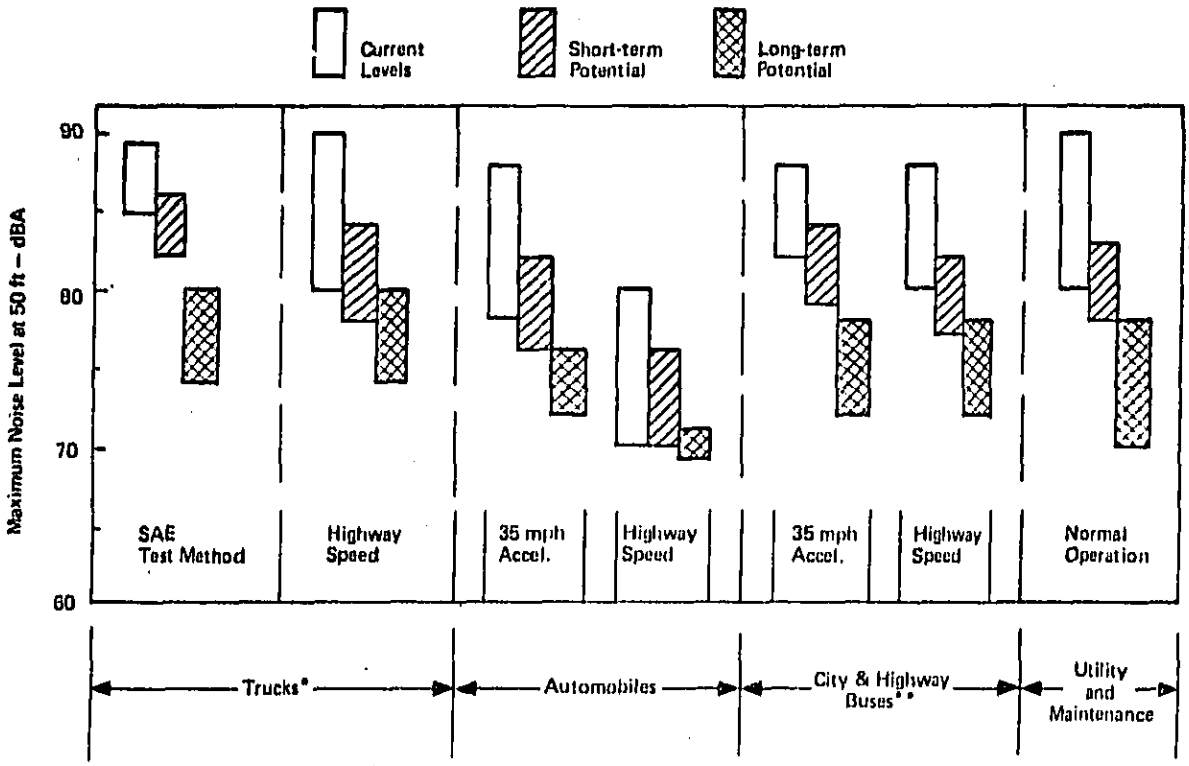
The predominant noise exposure component of the Federal-Aid Highway System is the urban interstate system (Table 1).

Table 1. Area (Square Miles) and People* (Millions) Exposed to Noise from Federally Funded Highways in 1974 (Reference 1)

	L_{dn} Exceeded							
	60		65		70		75	
Road System	Area	People	Area	People	Area	People	Area	People
Urban Interstate	3,033	13.6	1,216	5.5	337	1.5	79	0.36
Urban Primary	2,707	12.2	807	3.6	137	0.62	4	0.02
Rural Interstate	5,130	0.29	2,238	0.13	565	0.032	51	0.003
Rural Primary	13,253	0.74	3,783	0.21	795	0.045	50	0.003

*People impacted based on 4500 people/mi^2 in urban areas and 56 people/mi^2 in rural areas.

1. Reference 1, p. R-1.
2. L_{dn}: Day-night average sound level — the 24-hour A-weighted equivalent sound level, with a 10-decibel penalty applied to nighttime levels.
3. Reference 2, p. R-1.
4. The nation's highway system extends to a total of 3.8 million miles, representing about one-fourth of the highway miles in the world.



* EPA source emission standard in effect January 1978.

** EPA source emission standard proposed 1977.

Figure 1. Current and Potential Noise Levels of Highway Vehicles (1971) (Reference 3)

The Control of Highway Noise

Solutions to the highway noise problem require an extensive coordinated effort on many levels in both the public and the private sector. Figure 2 shows the range of different actors with responsibilities bearing on the problem of highway noise. Figure 2 also indicates that there are three general approaches for controlling the problem: (1) limiting the noise from the individual vehicles, (2) incorporating noise considerations in highway location and design decisions, and (3) controlling land development adjacent to the highway to ensure compatibility with the highway noise. FHWA's direct responsibility extends only to the second approach. That is, State Highway Agencies are not required to use their resources or skills in promoting noise abatement through either vehicular controls or land use controls, with one minor exception. State Highway Agencies are required to provide information to local officials concerning future land uses which would be incompatible with highway noise. However, FHWA strongly supports the position that a combination of the three approaches is needed.[1]

1. A general policy statement issued by FHWA on December 6, 1976, noted: "It is FHWA's policy that noise control mitigation measures be taken, where feasible, when anticipated noise levels for new projects exceed specified levels related to adjacent land uses. In addition, FHWA supports legislation to reduce the noise level of motor vehicles and encourages land-use planning and control by state and local governments to prevent noise-sensitive uses from developing in high noise-impact areas or to ensure that such development is planned to minimize adverse effects.

NOISE CONTROL APPROACH	SPECIFIC MEASURES	RESPONSIBILITY (R) & INVOLVEMENT (I)					
		EPA*	FHWA	HUD†	STATE GOV'T.	LOCAL GOV'T.	PRIVATE SECTOR
1. Individual Vehicle Restrictions	• In-Use Noise Emission Regulations (Inter-State Motor Carriers)	R	R**		I#	I#	I
	• In-Use Noise Emission Regulations (All other vehicles)				R	R	I
	• New Vehicle Noise Emission Regulations	R			I	I	I
2. Highway Mitigation Possibilities	• Highway Route Location	I[X]	R		R	I	I
	• Traffic Management	I[X]	R		R	I	I
	• Adjust horizontal and/or vertical alignments	I[X]	R		R	I	I
	• Build noise barrier	I[X]	R		R	I	I
	• Noise insulate public-use buildings	I[X]	R		R	I	I
	• Special measures i.e., noise insulate private dwellings, purchase dwellings and re-sell for compatible use, relocate dwellings, purchase dwellings and raze	I[X]	R		R	I	I
	• Provide information	R	R		R		
3. Land-Use Controls	• Administrative Techniques i.e., zoning, building codes, health codes, financial incentives, technical assistance			I[Y]		R	I
	• Physical Techniques i.e., site planning, architectural design, acoustical construction, barriers			I[Y]		I	I
	• Provide information	R	I	R			

†Department of Housing and Urban Development.

*The EPA promulgated in-use noise emission regulations for vehicles engaged in interstate commerce exceeding 10,000 pounds GVW in 1974. The EPA promulgated noise regulations for new trucks (effective 1/1/78). Regulations for new buses and new motorcycles will be issued soon.

**Enforcement of EPA's In-Use Standards for vehicles engaged in interstate commerce.

[X]EPA involvement through the EIS review process.

[Y]HUD involvement where FHA Loans are involved.

#May enforce regulations identical to EPA regulations.

Figure 2. Summary of Highway Noise Control Measures

Overview of FHWA Noise Policy

The FHWA noise policy was developed pursuant to Section 109 of Title 23 of the Federal-Aid Highway Act of 1970. This legislation required that noise be "considered" in the development of new projects and that "standards" for highway noise levels compatible with various land uses be developed and implemented. The Act was not definitive in stating that highway noise levels must be met for a highway to be approved since noise is to be considered in light of other factors to insure that actions taken are in "the best public interest". The noise policy, therefore, is structured so as to leave this judgment to State Highway Agencies and the FHWA.

The focus of the policy is to elevate the consideration of noise exposure in highway location and design decisions by requiring substantive study of predicted noise exposure in conjunction with standards featuring highway design noise levels (Table 2). The FHWA's noise policy applies to all Federal-aid highway construction. There are three classifications of highway project type:

Type 1A projects are those related to proposed highways with either partial or full control of access (such as interstates). Type 1B projects are those related to proposed highways with uncontrolled access (such as arterials or urban surface streets). Type II projects are those projects specifically for noise abatement on existing highways; (e.g., placement of barriers) and do not include any construction of reconstruction of the highway.

Table 2. Design Noise Level/Activity Relationships

ACTIVITY CATEGORY	DESIGN NOISE LEVELS[1] (dBA)		DESCRIPTION OF ACTIVITY CATEGORY
	$L_{eq}(h)^{\dagger}$	$L_{10}(h)^{\dagger\dagger}$	
A[2]	57 (Exterior)	60 (Exterior)	Tracts of land which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B[2]	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A and B above.
D	–	–	For requirements on undeveloped lands, see paragraph 11.a and 11.c.
E[3]	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[1] Either L_{eq} or L_{10} design noise levels may be used.
[2] Parks in Categories A and B include all such lands (public or private) which are actually used as parks as well as those public lands officially set aside or designated by a governmental agency as parks on the date of public knowledge of the proposed highway project.
[3] See paragraph 8.c, 8.d, and 8.e in FHPM 7-7-3 for method of application.
[†] Hourly Equivalent A-Weighted Sound Level.
[††] 10% Sound Level, the A-Weighted Sound Level equalled or exceeded 10% of the time.

Source: From Federal-Aid Highway Program Manual, Volume 7, Chapter 7, Section 3.

The term "standards" as used by FHWA in this instance refers to all the administrative procedures involved of which the design levels are one element. Therefore, a highway can be in compliance with the standards and yet exceed the noise levels. The critical element of the policy for understanding this is the design noise level impact exceptions provisions.

The FHWA exceptions policy allows State Highway Agencies flexibility in treating the subject of noise control.

In essence, FHWA may allow exceptions to meeting the design noise levels when the State Highway Agency determines that noise reduction benefits are outweighed by social, economic or other environmental considerations. This policy applies only to controlled access highways (Type 1A projects).

In Type 1A situations, if State Highway Agencies determine that noise abatement measures necessary to meet the design noise levels are unwarranted, they are to request exceptions and such exceptions must be approved by FHWA. The extent to which exceptions have been requested and granted is not clear, since FHWA does not keep centralized records on this matter. It is therefore difficult for EPA to state how the policy is actually working in practice. EPA knows, however, that noise abatement measures, when undertaken, primarily involve the placement of barriers at noise sensitive locations; but as of December 1977, such barriers were constructed in only 17 of the 50 States[1].

1. These projects have provided approximately 33 miles of barriers. Nine additional miles of barriers are planned in 13 States at 22 locations. A great impetus behind the noise barriers constructed initially has been complaints and requests from residents, citizen groups and local governments. This process may not necessarily focus on the worst problems.

This suggests that while some State Highway Agencies may be active in abating highway noise, a large number apparently are not despite the requirements of the FHWA policy.

For uncontrolled access roads (Type 1B), FHWA request that the design levels be considered but leaves entirely to the State's discretion to determine whether noise abatement measures are unwarranted. FHWA does not require that a State request exceptions because barriers are not often feasible in such situations and exceptions would be readily approved. In light of this aspect of FHWA's policy, the extent to which other noise abatement solutions are actually considered is not clear.

While barriers have a typical range of predicted attenuation from 5 to 15dB, there are important limitations on their use and effectiveness (discussed in Section 3). For this reason alone, barriers cannot be relied upon exclusively as a general palliative for highway noise.

The noise policy is carried out as part of the overall environmental assessment process required for Federal actions by the National Environmental Policy Act of 1969 (NEPA). This Act requires that an Environmental Impact Statement (EIS) be written and disseminated for public input prior to the construction of any major Federal project having environmental effects. For most Federal agencies, the timing and content of the EIS is the subject of considerable debate. It should come early enough in the planning and decision process so that decisions concerning major alternatives are not foreclosed, but not so early that substantive analysis of the project is not possible from lack of information. For highway projects, the FHWA requires that the EIS be issued after the location stage, but prior to the design stage (See Section 3). This means that detailed information concerning proposed noise abatement measures may not be available in the EIS. Further, final decisions concerning these measures is not formally made until the design stage is complete. This comes after the final EIS is issued. Persons who are interested in noise abatement of a given highway project should therefore continue to follow the project through the design stage. As indicated in Section 3, State Highway Agencies may be contacted for information at any point in the process.

Definition of Highway Projects

FHWA's noise policy applies to all Federal-aid highway construction. Some provisions of the policy vary depending on the type of project. There are *three classifications* of highway project type specified in FHPM 7-7-3.

Types IA and IB projects involve construction or reconstruction of a highway segment excluding projects unrelated to traffic noise, such as lighting or landscaping. They differ in that Type IA projects are those related to highways with either partial or full control of access[2] (such as interstates), while Type IB projects are those related to highways with uncontrolled access (such as arterials or urban surface streets).

Type II projects are those projects specifically for noise abatement (e.g., placement of barriers on existing highways) and do not include any construction or reconstruction of the highway.

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1. Appendix C contains a summary listing of FHWA noise regulations, guidelines and policy statements relating to noise abatement.
2. As defined in FHPM 7-7-3, control of access is the condition where the right of owners or occupants of abutting land or other persons to access, light, air, or view in connection with a highway is fully or partially controlled by public authority.
   (1) Full control of access means that the authority to control access is exercised to give preference to through traffic by providing access connections with selected public roads only and by prohibiting crossings at grade or direct private driveway connections.
   (2) Partial control of access means that the authority to control access is exercised to give preference to through traffic except that, in addition to access connections with selected public roads, there may be some crossings at grade and some private driveway connections.
   (3) Uncontrolled access means that the authority having jurisdiction over a highway, street, or road does not limit the number of points of ingress or egress except through the exercise of control over the placement and the geometrics of connections as necessary for the safety of the travelling public.

Establishment of Design Noise Levels

Recognizing that the degree of noise impact on a land area is dependent in part on land use, the FHWA has defined upper limits of acceptable noise levels for various land uses, outdoor activities, and certain indoor activities. These design noise levels, as given in FHPM 7-7-3, are shown in Table 2.

The exterior noise levels apply to:

- Outdoor areas that have regular human use, and
- Where a lowered noise level would be of benefit to the public.

The interior design noise levels are applicable to:

- Indoor activities for noise impacted areas where no exterior noise-sensitive land use or activity is identified, and
- Those situations where exterior activities are either remote or shielded from the highway such that exterior activities will not be significantly affected by the noise, but the interior activities will be affected.

The values do not apply to an entire tract upon which an activity is based, but only to that portion on which the activity normally occurs. *The design noise levels are presented by FHWA as a balancing of what is desirable and yet still achievable. The FHWA recognizes in FHPM 7-7-3 that impacts can occur even though the design levels are achieved, and points out that greater benefits might result from lower levels.* (italics added)

SECTION 2. FHWA NOISE POLICY REQUIREMENTS FOR PLANNED HIGHWAYS

Federal-Aid Highway Procedures Manual, Volume 7, Chapter 7, Section 3, specifies environmental noise requirements and compliance procedures for the three types[1] of Federal-aid highway projects. State highway authorities, with assistance from local FHWA offices, are required to show project compliance. The resulting documentation and DOT/FHWA approval cycles constitute implementation aspects of these requirements, which are discussed in Section 3. *This section describes the four types of individual investigations and actions normally necessary to show compliance of projects involving construction or reconstruction of a highway (Types IA and IB projects).*

ASSESS POTENTIAL NOISE IMPACT

To assess potential noise impact from the planned highway, FHWA noise policy requires the following:

- Examination of land uses.
- Prediction of future highway noise levels.
- Measurement of existing noise levels.
- Assessment of impact.

Examination of Land Uses

FHWA noise policy requires the identification of existing activities or land uses which may be affected by construction or traffic noise from planned highway projects. For each Type I project, state highway agencies are required to cooperate with local officials and metropolitan planning organizations by furnishing the following kinds of information:

1) Future noise levels along the project;

1. Types IA and IB projects are defined in Section 1, p. 1-6.

2) Information to aid local communities to develop noise compatible land uses along the highway;

3) FHWA's funding policy for lands developed after the effective date of the policy May 24, 1976. This policy, as set forth in PPSM 7-7-3, states that noise abatement measures will not normally be approved for land use which came into effect after this date unless "steps have been taken to adequately exercise land use control over the remaining undeveloped lands adjacent to highways in the local jurisdiction to prevent further development of incompatible activities".

State highway agencies are encouraged to assist local officials in the adoption of noise compatible land use controls.

Prediction of Highway Noise Levels

FHWA currently has approved *two* traffic noise prediction models for use by state highway agencies. These are the National Cooperative Highway Research Program (NCHRP) method and the Transportation Systems Center (TSC) method. A discussion of these methods is presented in Appendix E.

Data requirements for these models include:

- Traffic volume, speed, and percentage of heavy and medium duty trucks.
- Highway width and number of lanes.
- Receiver locations.
- Barrier geometry.
- Ground attenuation.

The predicted noise levels depend on the accuracy of the input data, and to some degree on the model used. Different models can give different values of noise for the same input data. This is due to differences in assumptions, computational procedures and basic data within the models. There are no simple factors that can be applied to relate the noise levels computed by the various models. Partly because of these problems, FHWA is currently developing its own traffic noise prediction method.

The noise levels are predicted for the design year, which is normally 20 years from the construction of the highway, and the design hour, which is the noisiest part of the day containing the top 10% of the noise events. Noise level predictions are also performed for each alternative location being studied by the state highway agency. These are compared with design noise levels to determine impact and the need for noise abatement measures.

Measurement of Existing Noise Levels

FHWA's noise policy defines "*existing noise levels*" as "the noise, made up of *all the natural and man-made noises*," usually present near the planned highway location. Unusual noise events can be excluded from the existing noise level measurements. To determine the existing noise levels, noise measurements are performed on location. At present, FHWA does not provide specific requirements for the noise measurement methodology to be used, and state highway agencies generally adopt their own. (FHWA is currently developing a measurement manual which is expected to be available during 1978.)

Assessment of Impact

FHWA policy requires that the predicted traffic noise levels for each alternative under study be compared with both the existing and design noise levels. The policy states that "impacts can be expected when the predicted traffic noise levels . . . *approach or exceed* the design noise levels . . . or when the predicted traffic noise levels are substantially higher than the existing noise levels."

EVALUATE NOISE ABATEMENT MEASURES

The FHWA requires an evaluation of alternative noise abatement measures for "reducing or eliminating the noise impact on existing activities; developed lands; and undeveloped lands for which development is planned, designed, and programmed." Such measures include:

(a) Traffic management measures.

Examples:

- Prohibition of certain vehicles;
- Change of speed limit.

(b) Horizontal and vertical alignment changes.

(c) Barrier construction (including any extra right-of-way that may be needed).

(d) Purchase of additional land for a buffer zone as a preemptive measure if requested by a State Highway Agency. Lands purchased for buffer zones are to be predominately unimproved properties; the burden is placed on the state to establish that development is forthcoming or already planned.

(e) Noise insulation of public use or non-profit institutional structures (as approved on a case-by-case basis).

(f) Special Measures

These will be provided only if the FHWA Administrator determines that other mitigation measures are physically infeasible or economically unreasonable and that especially severe traffic noise impacts exist or are expected. These include:

(1) Noise insulation of private dwellings.

(2) Relocation of private dwellings.

(3) Purchase and resale of dwellings for compatible use.

(4) Purchase and demolition of dwellings.

DESIGN NOISE LEVEL IMPACT EXCEPTIONS

Although FHWA policy is to abate noise to the maximum extent feasible, FHWA may allow exceptions to meeting the design levels in certain cases for Type 1A projects. FHWA does not require that it approve exceptions to the design levels for Type 1B projects. This policy is based on the fact that the principal noise abatement measure - the noise barrier - is usually not feasible in this instance. Because no requirement to obtain an exception exists, other feasible abatement techniques for these Type 1B projects such as listed above, may not be thoroughly explored by State highway agencies as they are for highways with full or partial control of assess. Type II projects, by definition, are projects specifically on noise abatement; therefore, the concept of exceptions is not relevant. Exceptions are allowed when it is judged that adverse social, economic and environmental effects of providing the noise abatement exceed the benefits derived.

To request an exception, the FHWA requires the state highway agency to provide the following:

- Identification of individual noise-impacted activities from existing and future traffic noise levels.
- An examination of the overall benefits and adverse effects of partial noise abatement measures.[1]
- A weighing of the overall benefits which can be achieved by the noise abatement measures against adverse effects and other conflicting values such as economic reasonableness, air quality, highway safety, and adjacent community desires.

1 Partial noise abatement measures are measures taken to reduce the noise impact but not to a level below the design noise levels.

- Recommendations for incorporating any partial noise abatement measures determined to have benefits consistent with any adverse effects.

Exceptions may be granted where it can be shown that all reasonable options for noise reduction have been examined and that the partial noise abatement measures recommended provide, in FHWA's judgement, the greatest attainable noise reductions consistent with the public interest. Exceptions are also granted when the predicted highway traffic noise levels are less than the existing noise levels (originating from other than the highway being replaced or improved).

Thus far, noise abatement in the form of barrier construction exists in only 17 states.

COORDINATION WITH LOCAL AGENCIES

FHWA noise policy requires the state highway agencies to plan and design highways which will be compatible with planned and existing land uses. FHWA recognizes that local governments have responsibility for future land development and zoning. Thus, FHWA requires state highway agencies to coordinate with local public officials and metropolitan planning organizations by furnishing them:

- Future noise levels (at various distances from the highway) for both developed and undeveloped lands or properties in the areas adjacent to the project.
- Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels.[1]
- The FHWA noise policy regarding development of land use changes which occur after the effective date of FHWA's policy (May 24, 1976).

1. One important general tool FHWA has provided is the manual, *The Audible Landscape* (see Appendix C).

SECTION 3. IMPLEMENTATION OF FHWA NOISE POLICY REQUIREMENTS FOR PLANNED HIGHWAYS

FHWA noise policy for planned highways is implemented as a portion of the overall environmental assessment process required for Federal actions by the National Environmental Policy Act of 1969 (NEPA). Portions of this process for highway noise are also based on the Federal-Aid Highway Act of 1970. The general assessment process is shown in Figure 3 to consist of several key decisions, investigative actions, and documentation. Upon initiation of a Federal-aid highway project by a state highway authority, the state authority and FHWA arrive at key official determinations regarding the project nature and extent. The type of noise impact investigation and report that will be required for the project is determined by these decisions.

STATE ACTION PLAN

The FHWA, in order to assure that full consideration is given to social, economic and environmental aspects of Federal-aid highway projects, requires states to develop State Action Plans.[1] These plans detail the organizational arrangement, assignment of responsibilities, and the process to be followed in the development of highway projects. The Action Plan process is not different from the environmental impact statement process but encompasses it. FHWA requires states to submit the plans to FHWA for approval and, once approved, to actually follow the process the states have described. At present, all states have approved Action Plans. The critical concerns of any Action Plan are that:

- Social, economic, and environmental effects are identified early in the project development process;
- Alternative courses of action are considered throughout the project development process;

1. The key document here is FHPM 7-7-1, "Process Guidelines" (for the development of Environmental Action Plans).

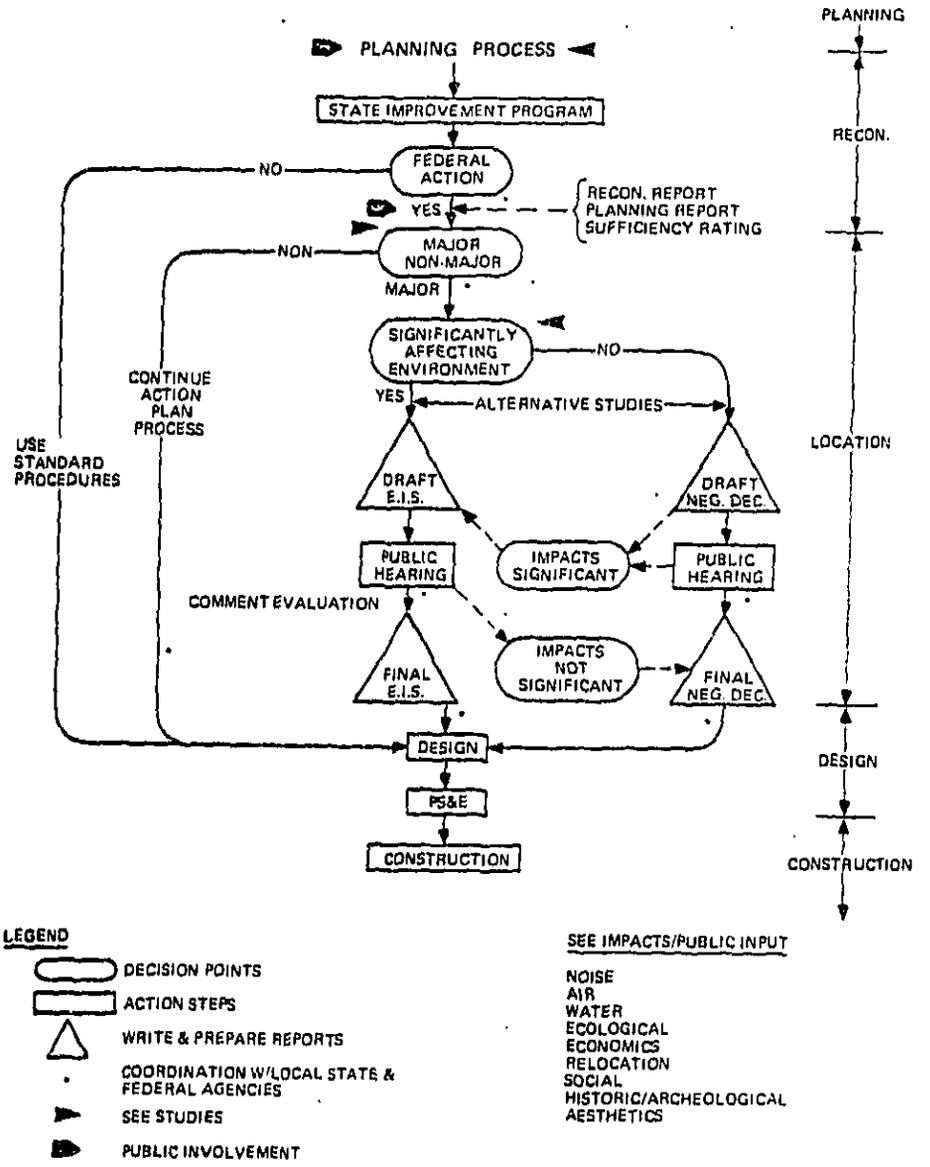

Figure 3. The Environmental Assessment Process

- An interdisciplinary approach is utilized in the evaluation of social, economic, and environmental effects; and
- Other agencies and the public provide input to the decision-making process during all stages of project development.

FHWA reports that the formal public wearing process alone is insufficient for garnering public input and that it is conducting, as a supplement to the hearings, a series of informal meetings.

KEY DETERMINATIONS

FHWA policy requirements apply only to Federally assisted highway project, which then are considered Federal actions. The National Environmental Policy Act (NEPA) of 1969 requires environmental impact statements (EIS) to be prepared for *major* Federal actions which significantly affect the quality of the human environment. FHWA policy based on this Act and on the Federal-Aid Highway Act of 1970 requires various types of environmental evaluations depending on whether or not the action can be considered major or non-major, and whether a significant effect on the human environment is likely.

Major or Non-Major Federal Action

When a Federal-aid highway project is proposed, the first environmental consideration is whether it is a major Federal action as defined in NEPA. FHWA lists actions that would normally be considered "major" and "non-major" Federal actions. *The major actions list includes most Type IA and Type IB projects.*[1] When a project is not readily classifiable or when an otherwise non-major action may require special consideration, the FHWA Division Administrator may decide the status of the action and may ask for public comment prior to making his decision. The Division Administrator must approve all major/non-major decisions.

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1. Some Type IA projects (reconstruction projects) will fall into the non-major category. Some Type IB projects also will fall into the non-major category when construction of a new rural two-lane highway does not provide new access to an area and would not be likely to precipitate significant changes in land-use or development patterns. Type II noise projects could theoretically go either way.

As indicated in Figure 3, a project which is assigned major action status is further investigated to determine the extent of likely impact, possibly resulting in a complete environmental impact statement. For all projects except those unrelated to traffic noise, FHPM 7-7-3 requires the state highway authority to prepare a "noise study" which eventually can become part of a complete EIS if one is deemed necessary. These noise studies are a principal product of FHWA noise policy requirements. NEPA does not require EIS consideration for non-major actions, but the Federal-Aid Highway Act of 1970 does require state authorities to consider environmental effects. Thus, FHPM 7-7-1 was prepared to require state highway agencies to prepare a State Action Plan which describes the state's highway project development process and which ensures that environmental impacts are considered in all Federal-aid highway projects.

Significant Effect on the Human Environment

For an action which is considered "major," it must be decided whether a significant impact on the quality of the human environment is likely. Guidance as to what constitutes a significant impact on the quality of the human environment is less precise than that provided for a decision on whether an action is major or non-major. EPA believes that most *Types IA and IB projects appear to qualify as having a significant environmental impact for any of several reasons* (such as having a significant detrimental impact on air or water quality or on ambient noise levels, causing a significant increase in traffic congestion, or being highly controversial on other environmental grounds). While the decision is made by the state highway agency in conjunction with the FHWA division office, the state is required to consult and coordinate with the public and with other governmental agencies.

A "major" Federal action which does significantly impact the human environment must have a complete environmental impact statement approved before construction can begin. FHPM 7-7-2 specifies detailed requirements for a complete EIS while FHPM 7-7-3 describes the noise study requirements. EIS review and approval is carried out at all levels of FHWA, and often approval is required from supervisory offices at DOT (Appendix A). For "major" actions where significant effects are *not* likely, a "negative declaration" is prepared to verify and document the lack of significant impact. Negative declarations are approved by FHWA division offices.

DOCUMENTATION

Noise Study Report

As stated earlier, all Federal-aid highway projects (except those projects unrelated to traffic noise) require a noise study by the state highway authority per FHPM 7-7-3. A summary of noise study report normally becomes a portion of the final EIS, but the study itself is carried out and approved separately from the remainder of the EIS. This is because the detail required in a noise study must be addressed in the design stage of project development. But because decisions on noise abatement are prerequisites to determining environmental impacts and because these impacts influence decisions on adoption of a highway location, preliminary determinations on the likelihood of abatement are made at the EIS stage. This study must meet the policy requirements indicated in Section 2 of this report including:

- Identification of existing activities or land uses which may be affected by noise from use and construction of the planned highway.
- Prediction of the traffic noise levels for each alternative location.
- Measurements of the existing noise levels for existing activities.
- Comparison of the predicted noise levels with the existing noise levels and with the design noise levels.
- Examination and evaluation of the alternative noise abatement measures for reducing or eliminating the noise impact on existing activities, developed lands, and undeveloped lands for which development is planned.
- Identification of the noise abatement measures which are planned for the highway.
- Determination of procedures for minimizing the impact of highway construction noise.
- Identification of noise impacts for which no reasonable solution is available.
- Coordination with local public officials.
- Requests for exceptions to the design noise levels.

State highway engineers usually prepare the noise studies, but consultants are occasionally used. The study report may be in preparation throughout the planned project, and therefore may not be complete prior to issuing the draft or final EIS. Thus, while requests for exceptions to design noise levels are approved by FHWA concurrence in the final noise study report, information as to whether or not such exceptions have been

approved may not be included in the EIS. The EIS will indicate:

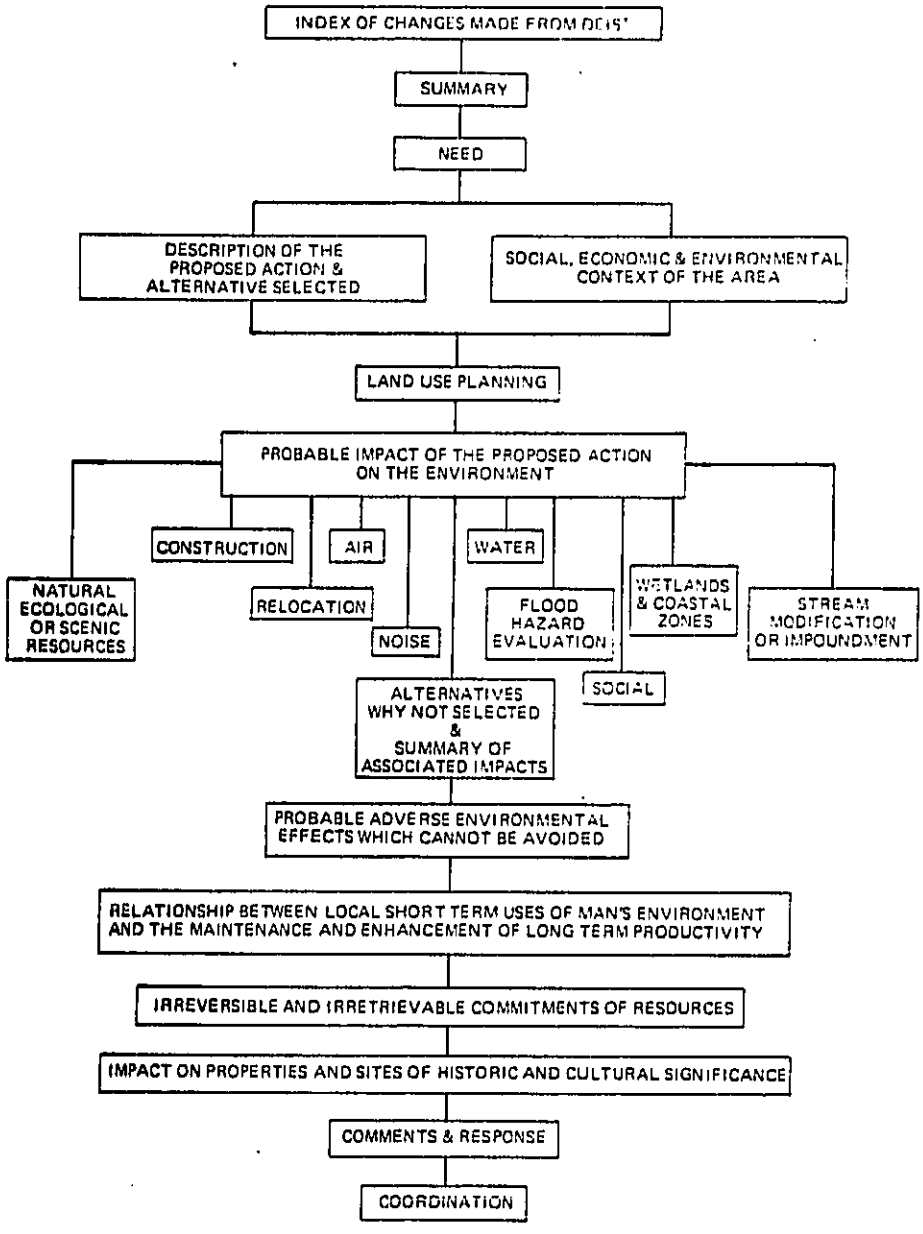
1. The numbers and types of activities which may be affected,
2. Extent of impact,
3. Likelihood that noise abatement measures can reduce the noise impacts,
4. Noise abatement measures which will likely be incorporated into the project, and
5. Noise problems for which no apparent solution is available.

The noise report must be completed prior to approval of the plans and specifications. A summary of the findings of the preliminary version of the report is included in the EIS. The noise report must be approved prior to the approval of plans, specifications and estimate for the highway project. FHWA's division offices approve all noise studies.

Environmental Impact Statement (EIS)

FHWA requirements for a Federal-aid highway project EIS are specified in FHPM 7-7-2. The development of a complete highway EIS can be followed according to the major phases identified in the right side of Figure 3.

- *Planning and Programming Phases* involve meetings between the FHWA division office staff and state highway agencies. Long-range planning and funding of projects and status of approved projects are discussed. Social, economic and environmental factors are identified and analysis begun.
- The *Corridor Study* serves as a connecting process between planning and location of the highway project. FHWA determines whether the planned project is "major or non-major action." Public involvement and hearings are accomplished in this phase. Environmental impacts from the planned projects are discussed in the public involvement phase.
- In the *Location Study* the social, economic and environmental factors are studied in more detail. A draft environmental impact statement is circulated to all FHWA offices, state and local agencies and to others interested in the project, for review and comment. Public involvement and hearings are also accomplished in this phase. After the review and the comments from the public, a project location is determined and a final environmental impact statement is written. The required format of this document is shown in Figure 4. The final environmental impact statement is transmitted to the FHWA Regional Administrator for concurrence and adoption. In many cases, concurrence by FHWA headquarters and DOT is also



* Draft EIS

Figure 4. Format of a Final Highway EIS

required (see Appendix B). Approval of the final environmental impact statement constitutes acceptance of public hearing procedures and the general location of the highway.

- The *Design Phase* normally starts *after* the environmental impact statement is approved. If a project involves park, recreational or other lands covered by Section 4 (f) of the 1966 DOT Act, much of the detailed design that is normally done later must be accomplished prior to location approval. At this time the state's Design Section starts collecting design information and more specific information on the project. Noise abatement options are studied in more detail at this time.

  For projects where the highway location is not in question, an environmental assessment is prepared at this time. If a public hearing has not been held, a design public hearing is provided. Following the design hearing and evaluation of hearing comments, the state highway agency requests design approval from the Division Administrator. Following design approval, plans, specifications and estimate are prepared by the SHA and approved by FHWA. Authorization for the SHA to advertise for bids follows.

- *Construction Phase* of the project is monitored by the construction staff of the highway agencies. Appropriate inspections are made during the construction phase by FHWA engineers. Following the construction of the project, a final inspection is made and the completed project is accepted by FHWA. State or county highway agencies assume maintenance of the completed project.

Negative Declaration

When it can be shown that a "major" Federal action will not produce significant effects on the quality of the human environment, a "negative declaration" is prepared as verifying documentation. State highway authorities follow procedures similar to those required for a noise study report in demonstrating the absence of significant impact. Typically included in a negative declaration are:

- Summary
- Need
- Description of Proposed Action
- Alternative Considered
- Basis for Negative Declaration

- Social, Economic and Environmental Effects Considered and Why
- Comments and Coordination

Occasionally, an EIS in the draft stage will reveal that the action does not significantly affect the environment, and is transformed into a negative declaration. FHWA division offices approve all final negative declarations and changes of draft EIS's into negative declarations.

INVOLVEMENT OF LOCAL OFFICIALS AND PUBLIC

Local officials and the public can participate in decision processes through the several avenues of environmental assessment for Federal-aid highway projects. As Figure 3 indicates, public involvement (including hearings) is accomplished during the environmental assessment process. FHPM 7-7-3 requires state highway authorities to furnish the following information for Type IA and IB projects *to metropolitan planning agencies and local officials:*

- Generalized future noise levels in the vicinity of the project.
- Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels.
- FHWA policy regarding land use initiated after issuance of FHPM 7-7-3 (i.e., after May 14, 1976).

Further, *FHPM 7-7-1 requires that states provide for the involvement of the public and other agencies in their highway project development process.* Public involvement requirements in FHPM 7-7-1 include:

- Providing for one or more formal public hearings;
- Insuring that information is made available to other agencies and the public throughout the development process; and
- Insuring, both directly and through area-wide agencies, that all interested parties (governmental and private) have an opportunity for an open exchange of views throughout the planning process.

Information Available for Review

All highway planning studies, from overall transportation systems plans through location studies and design documents, *are available for public review at the state highway*

agency office and at some location in a community prior to holding a hearing or less formal informational meeting in that community. Draft negative declarations, draft EIS's, and preliminary noise study documentation should be available in the same manner as above and by request from the highway agency. Several states have established a procedure for distributing this type of information by mail.[1]

Problems in Implementation

FHWA has had various problems in implementing its noise policy, some of which are:

Location Constraints

Highways are built to service and connect populated areas. The predominant component of noise exposure from the Federal Aid Highway System is attributed to the urban interstate system (Table 1). However, it is precisely in urban areas that location and design options are most limited. Often in these areas, high noise (and other environmental) impacts are associated with *all* feasible locations so that proper consideration of noise in location decisions does not avoid increased population exposure to highway noise.

Limitations on Feasibility of Barriers

As mentioned in Section 1, FHWA's principal highway design noise mitigation option is the noise barrier. Depending on the type of barrier, the typical range of predicted attenuation is from 5 to 15 dB. However, costs alone prevent reliance on barriers *as a general palliative* for highway noise. This is clear upon an examination of Table 3 which provides estimates of the number of barrier miles required on the urban interstate system in order to achieve reasonable noise reduction goals. In addition, while barriers can be effective in the vicinity of roads on which the access is controlled, they cannot be incorporated into uncontrolled access highways (which are common in urban areas). Finally, barriers can conflict with other values. State highway agencies and FHWA, for example, have received complaints from citizens where views have been obstructed and where the type of barrier selected has been incompatible with local architecture.

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1. Some EPA regions, for example, receive negative declaration notices routinely from the state highway agencies.

Table 3. Noise Exposure From Urban Interstates in 1974 for Several Barrier Scenarios (Reference 2) .

Scenario	Miles of Barriers			People Exposed to Greater L_{dn} (Millions)			
	10'	15'	20'	60 dB	65 dB	70 dB	75 dB
Baseline – No Barrier	0	0	0	13.6	5.5	1.5	0.36
A – Eliminate $L_{dn} \geq 75$ dB	7,338	390	0	13.1	5.1	1.1	0
B – Eliminate $L_{dn} \geq 70$ dB	7,822	6,138	1,590	6.7	1.7	0.002*	0
C – Eliminate $L_{dn} \geq 65$ dB	2,242	4,338	11,212	3.0	0.31*	0.002	0
D – Eliminate $L_{dn} \geq 60$ dB	108	2,242	15,550	2.5*	0.31	0.002	0

*Not feasible to completely eliminate exposure with barriers.

Lack of Control Over Land Uses Adjacent to the Highway

Since FHWA has no control over land development adjacent to the highway, it must depend on the authorities of state and local governments or on the willingness of individuals in the private land development community. Communities are only beginning to adopt proper land-use controls which take highway traffic noise into account.[1] If proper land-use controls are not adopted, the effectiveness of design measures such as barriers can be negated through encroachment on the highway of noise-sensitive land uses (e.g., construction of high-rise apartments). In some cases, even where proper land-use controls are adopted by local government, intense pressure by local developers can undermine their usefulness. On the other hand, where proper land-use controls are adopted and enforced, millions of dollars which might otherwise be expended for noise mitigation design measures can be saved. FHWA policy, therefore, is not normally to approve expenditures for noise abatement measures along highway segments for which adjacent lands became developed after May 19, 1976, unless local officials have provided proper land-use controls throughout their remaining jurisdiction.

Lack of Standardization in Noise Prediction

At present, FHWA has approved two methods (NCHRP and TSC) for predicting traffic noise levels. Due to differences in assumptions, computational procedures, and basic data

1. There are approximately 80,000 units of state and local governments in this country. As of mid-1977, reportedly only about 54 have land-use regulations in effect which consider highway traffic noise.

associated with each model, they can provide divergent noise predictions if not used intelligently. The two models should complement each other and provide the right model for a particular situation. FHWA is developing another model which is expected to eliminate many of the problems associated with the above two models. Currently, FHWA will grant modifications to the models on a case-by-case basis.

Lack of Standardization in Noise Measurement

Noise measurements are often required as part of the noise study. At present, no standardized methodology exists for undertaking these measurements. The FHWA has provided some guidance through training courses and demonstration programs, but these have been directed primarily toward fundamentals. Each state has been in the position of developing its own procedures, with lack of uniformity. FHWA is currently developing a measurement manual to meet this need.

Difficulty in Comparison of FHWA Noise Criteria with Those of Other Agencies

With the issuance of FHPM 7-7-3, the FHWA has expressed design noise levels in terms of the energy equivalent L_{eq} noise metric as well as the L_{10} metric. Difficulty still remains, however, in comparison of FHWA noise criteria with those of other agencies.

Some Common Misconceptions Concerning the Noise Policy and Related Environmental Procedures

1) Meaning of the design noise levels:

A common misconception is that if the design noise levels are not met, then the project cannot be approved. In reality, the policy requires only that noise impact be considered in light of other environmental effects and noise be abated to the extent warranted.

2) Meaning and content of the noise portion of an environmental impact statement:

Several misconceptions exist as to the meaning and content of the noise portion of an EIS for a proposed highway. First, it is commonly thought that the complete noise study will be part of an EIS. In reality, only a brief summary is included. Second, many people have thought that decisions concerning noise abatement measures and design are detailed in an EIS. In reality, as Figure 1 indicates, the EIS is written prior to the design stage and while measures identified are those expected to be included, design details are often unavailable. Thirdly, it is commonly thought that the noise abatement measures identified in an EIS represent a legal commitment by a state highway agency. In reality, the full study may not have been completed and full approval for the studies not obtained. *Exceptions are still possible.* Attachment 2 is one statement of how the process purportedly works in one state.

SECTION 4. FHWA NOISE POLICY FOR EXISTING HIGHWAYS

NOISE POLICY REQUIREMENTS (EXISTING HIGHWAYS)

FHWA noise policy provides that where a state identifies a need for a noise mitigation measure on an existing Federal-aid highway, FHWA may participate in the funding if certain requirements are met. These projects, not involving construction of the roadway itself, are referred to in FHPM 7-7-3 as "Type II" projects. The requirements for these projects are very similar to those for planned highways and include a requirement for a noise analysis similar to that described in Section 2 with a noise report containing recommendations. The noise report should indicate and identify noise impacts. *The design noise levels shown in Table 2 may be used as guidelines for judging impact, but are not prescribed for Type II projects.*

The following noise abatement measures are eligible for Federal-aid participation as Type II highway projects:

- Acquisition of property rights for constructing noise barriers.
- Construction of noise barriers.
- Traffic management measures such as traffic-control devices, prohibiting certain types of vehicles, time-use restrictions for certain types of vehicles and modifying speed limits.
- Noise insulation of public-use buildings.

FHWA normally will not approve noise abatement measures for those activities and land uses which came into existence after May 14, 1976. However, it may approve noise abatement measures for those activities and land uses which came into existence after this effective date *provided local officials have taken measures to exercise land-use control over the remaining undeveloped lands adjacent to the highway.*

IMPLEMENTATION OF NOISE POLICY (EXISTING HIGHWAYS)

Only a state highway agency can initiate a Type II Federal-aid highway project.[1] FHPM 7-7-3 requires that when requesting FHWA funds for Type II projects, state highway agencies must perform a noise analysis for the proposed project and must indicate the relative priority with other potential Type II projects in the state. FHPM 7-7-3 recommends the following factors be considered, as appropriate, in the state's priority ranking:

- Applicable state law
- Type of development to be protected
- Magnitude of the traffic noise impact
- Costs-benefits
- Population density of the affected area
- Day-night land uses
- Feasibility and practicability of noise abatement at the site
- Availability of funds
- Existing noise levels
- Achievable noise reductions
- Intrusiveness of highway noise ($L_{10} - L_{90}$)
- Public attitude
- Feasibility of abating the noise with traffic control measures
- Local governments' efforts to control land use adjacent to the highway
- Local noise ordinances
- Date of construction of adjoining development
- Increase in traffic noise since the development was constructed.

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1. In FY 78, the following states budgeted for Type II projects in their annual capital program: Minnesota, California, Washington, Connecticut, Michigan, Massachusetts, Colorado, New Jersey and Maryland.

SECTION 5. HOW OTHER FEDERAL AGENCIES CAN UTILIZE THE FHWA NOISE POLICY AND INFLUENCE ITS IMPLEMENTATION

The FHWA and state highway agencies generate much data and information that can be utilized by other Federal agencies in controlling their noise problems. Examples are: (1) noise level data generated pursuant to FHWA's requirement to consider noise impact in the location and design of new highways, (2) local and state planning information, (3) information on noise attenuation techniques such as barriers and noise insulation which could have applicability for use near other sources. Specific guidance documents which FHWA has published are listed in Appendix C.

As indicated in various sections of this document, FHWA has a strong interest in encouraging local jurisdictions to ensure that future land development, or re-development, is compatible with the highway noise environment. This general problem of the possibility of incompatible development near major noise generators is shared by many Federal agencies. The programs of such agencies, some of which are discussed below, would be well served by mutual exchanges of data and information with FHWA.

Federal agencies can also profit by being kept informed of and *influencing* the FHWA noise policy at appropriate points in the process described in Section 3. Highway decision making can affect their activities in numerous ways (such as housing site selections at military bases).

Federal Highway Administration and Environmental Protection Agency

While communication between the EPA and FHWA has been constant over the years, its quality sometimes has been mediocre. FHWA and EPA field offices has indicated some confusion over EPA's policy positions[1] and the role of the EPA regional offices.

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1. A point of misunderstanding (now resolved) involved what EPA considered acceptable levels of noise generated by a highway. Some FHWA people had received the impression that EPA was recommending that highway EIS's not be approved unless design levels of L_{dn} = 55 dB were achieved. An EPA internal memorandum clarifying EPA's position and guiding EPA regions to use FHWA's design levels in review of EIS received wide circulation in FHWA and served to purge the confusion.

FHWA has also indicated that the EPA regions sometimes are confused and misinformed with respect to FHWA's noise policy and programs. On the other hand, some EPA regions have indicated difficulty in obtaining close cooperation with FHWA personnel. In some cases, the nature of the roles of the agencies can tend to promote formality. EPA, for example, is a reviewer of all FHWA environmental impact statements for highways. Conversely, it appears to EPA that FHWA is unsure of how EPA technical assistance programs to state and local governments may affect the close partnership FHWA has developed with the states.

At the headquarters level, EPA and FHWA worked closely on the development of FHWA's design noise levels and EPA's source standards for highway vehicles. At present, the two agencies are involved in exploring ways closer communication can be achieved.

Federal Highway Administration and Department of Housing and Urban Development

There is a natural interest in these two agencies communicating closely. FHWA seeks ways to encourage noise-compatible land-use planning, development and control, and HUD's noise policy[1] provides one important tool. On the other hand, for HUD's policy to work effectively it must rely on the data generated by other agencies, in this case FHWA. At the headquarters level, HUD, EPA and FHWA recently participated together in a Noise Workshop — one goal of which was to explore ways of encouraging noise-compatible land-use planning, development and control. Both HUD and FHWA consider this workship as only the first step in a program of cooperation and mutual assistance.

Federal Highway Administration and the Department of Defense

The DOD's AICUZ[2] program assists local communities in controlling land use around major military air installations. Until recently, there was virtually no communication between FHWA and either the Navy or Air Force with respect to FHWA's noise policy.

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1. The HUD noise policy is discussed in Volume II of this series (EPA 550/8-77-354).
2. Air Installations Compatible Use Zones. This program is discussed in Volume I of this series (EPA 550/9-77-353).

Federal Highway Administration and Federal Aviation Administration (FAA)

FAA shares the same problem as FHWA (and other agencies) of encroachment in a major noise source being beyond its direct control and yet being potentially formidable enough in many cases, to mitigate the effects of noise control measures. The amount of communication between these two constituent agencies of the Department of Transportation has been limited. FHWA was involved in working with FAA on their noise insulation of public buildings project.

REFERENCES

1. Plotkin, K. J., "National Impact of Highway Noise and Effectiveness of Noise Abatement Strategies to the Year 2000," draft Wyle Research Report WR 77-13, prepared for the U.S. Environmental Protection Agency, June 1977.

2. "A Statement of National Highway Transportation Policy," Federal Highway Administration, December 1976.

3. Report to the President and Congress on Noise, U.S. Environmental Protection Agency, Washington, D.C., December 31, 1971.

4. Burke, R. E., "A Baseline Measurement of Highway Vehicle Noise Levels," Wyle Research Report WR 77-8, prepared for the U.S. Environmental Protection Agency, March 1977.

APPENDIX A

DESCRIPTION OF THE FEDERAL-AID HIGHWAY PROGRAM[1]

1. Excerpted from the 1977 edition of the Federal Highway Administration document, "America on the Move!"

FHWA administers the Federal-aid highway program, a federally assisted, State-administered program which operates through the grant of Federal funds to the States to construct and improve designated highway systems.

The Federal-aid highway program, governed by the laws embodied in Title 23, United States Code, has changed considerably over the years in three major areas — systems, programs, and eligible activities — which are discussed later in detail. Despite the changes, the program has retained its basic chracteristic of being a State-administered program receiving Federal assistance.

History

Roadbuilding in the United States traditionally has been largely a State and local activity. Federal support on a regular continuing basis did not occur until the 20th Century, but is now firmly established in the Federal-aid highway program.

While the Federal Government first became involved in building roads in 1806, the emphasis on construction of highways waned as the newly built railroads emerged in the mid-1800's as the solution to long-distance travel.

Although Congress had passed hundreds of laws providing Federal funds ($17 million cumulative to 1891) for particular roads, it was not until the late 19th Century that a definite movement for "good roads" began. The forces behind this movement were strange bedfellows — bicyclists, who wanted roads they could ride on for a relatively long distance, and farmers, who needed good roads to move their crops to market. In response, the Office of Road Inquiry was created in the U.S. Department of Agriculture in 1893 to investigate, educate, and distribute information on roadbuilding. (This agency subsequently became the U.S. Bureau of Public Roads, the predecessor organization of FHWA.)

In 1912, Congress responded to requests for Federal assistance for roadbuilding by passing the Rural Post Roads Act. Instead of providing funds for specific projects as had been done in the 1800's, the Act provided $500,000 to be available to those States that wanted the Federal Government to finance one-third of the cost of any of their post road (routes upon which the mail was delivered) projects. Seventeen States participated and built 425 miles of road under this program.

The Federal-Aid Road Act of 1916 and the Federal Highway of 1921 provided the basis for the Federal-aid highway program as it exists today. At the same time those Acts were passed, roads had been mainly the concern of local governments. Some States had State highway agencies but overall there was little coordination of roads between counties, much less between States.

Thus, one of the major provisions of the 1916 Act was to require each State to organize a State highway department, which was requested to designate a limited system of main and interconnecting roads.

The Federal-State cooperative relationship was defined by the 1916 Act and made permanent in the 1921 Act. The States retained the initiative in constructing roads while the Federal role was to review and approve work done with the assistance of Federal funds. This partnership relation remains in effect today.

Federal-Aid Systems

At the core of the Federal-aid highway program are the Federal-aid systems. These are the routes, generally, upon which Federal funds may be used. There are *three Federal-aid highway systems — the Primary (including the Interstate highways), Secondary, and Urban Systems* — each of which consists of routes which serve different functions. It is this concept, termed "functional classification," which is the basis for placing routes on one or the other of the Federal-aid systems.

Functional classification is concerned with three broad types of routes — arterial roads, collector roads, and local roads. Arterials are those routes whose function is mainly *mobility* — moving persons and vehicles from one place to another. They are characterized by long-distance travel, high volumes, and higher speeds, and they provide a higher type of service than the other routes. At the opposite end of the functional hierarchy are local roads and streets. These routes have as their main function the provision of *access* to rural resources and farms and urban businesses and residences.

People usually travel only a short distance on local roads and streets and they are characterized by low speeds. Collectors are those routes which gather vehicles from the local roads and streets and funnel them into the arterials.

Nationwide, arterials account for only 11 percent of all road mileage, but they carry two-thirds of all travel. Local roads and streets, on the other hand, comprise nearly 70 percent of total mileage but carry only 16 percent of total travel.

In determining which routes can be included in the various Federal-aid systems, the foregoing concepts were used. The purpose is to assure that Federal funds will be used in the most effective manner possible, consistent with stated national objectives. Thus, *the Primary System (which includes the Interstate System) consists of rural routes and their urban extensions which are classified as arterials. The Secondary System is comprised of rural routes which are classified as major collectors such as farm-to-market roads, while*

the Urban System may consist of all arterial and collector routes in urban areas (places of 5,000 or more population) which are not on the Primary System.

The Federal-aid systems, built on the above concepts, consist of about 850,000 miles, 22 percent of the Nation's total, but they handle approximately three-fourths of all travel in the Nation, emphasizing the fact that they consist of the country's most important roads and streets.

It is important to note that designation of a road as part of a Federal-aid system does not mean that the road is owned, operated or maintained by the Federal Government. The designation simply is the first step in providing *eligibility* of selected State and local road systems for most of the Federal assistance programs.

As stated before, the Federal Government does not own any roads except those on Federal lands. The familiar U.S. route shield does not necessarily signify Federal or even Federal-aid roads; it is simply a route-marking system set up by the State to guide travelers. The Federal-aid system that is easiest to identify through road signs is the Interstate System, with its distinctive red, white, and blue shield.

It is also significant to realize that designation of a route as part of a Federal-aid system does not imply that Federal funds have been, or necessarily will be, spent on all portions of that route.

It should be noted, too, that in addition to their Federal-aid routes, many States build and improve other roads entirely with their own funds. The Federal Government has no direct responsibility in the planning or construction of such roads.

Federal-Aid Programs

The Federal funding of highway projects on routes on the Federal-aid systems, or in some cases on routes not on one of the systems, is what is often referred to as the "Federal-aid highway program." Although *the term "Federal-aid highway program" does not have a strict meaning (since it is neither defined in law nor regulation) it refers to those expenditures, usually on one of the Federal-aid systems, which are governed by provisions of Title 23 of the United States Code, and which are administered through State highway agencies.*

Federal assistance for highways is reflected in the several programs which, when combined, make up the Federal-aid highway program. The programs, each of which is separately funded by Congress, can be organized into three groups — system-related programs, nationally oriented programs, and special programs.

System-Related Programs

The largest portion of Federal assistance for highways — more than 80 percent of total Federal funds authorized — is earmarked for improving the Federal-aid systems. These programs have as their goals the construction, reconstruction, and improvement of roads on the Federal-aid systems. They consist of the following programs:

- Primary (including Interstate)
- Secondary
- Urban

Interstate Program

The Interstate program is the largest funded Federal-aid highway program. Over $3.5 billion per year, nearly one-half of all Federal-aid highway funds, is authorized for the Interstate System. Most of these funds are used for the initial construction of the 42,500-mile National System of Interstate and Defense Highways. The remainder, only 5 percent of the total, are used for resurfacing, restoration, and rehabilitation of Interstate routes already open to traffic.

The designation of a 40,000-mile Interstate System was called for in 1944 and by 1947, 37,861 miles were approved. The System continued to be studied but no earmarked funds were authorized for it until 1952, when $25 million was authorized for each of two years. Previously, only Urban and Primary funds could be used for Interstate purposes. In 1954, $175 million was authorized for each of Fiscal Years 1956 and 1957. Also, at this time the Federal share was increased from 50 percent to 60 percent.

It was not until 1956 that the Interstate program began to accelerate to its present prominence. The Federal-aid Highway Act of 1956 added $1 billion to the 1957 authorization and made sufficient additional authorizations to finance the System's estimated completion by 1972. Additionally, the Act provided another incentive to States for investment in the System by raising the Federal share to 90 percent of a project's cost.

The revenues for this accelerated total highway program came from the Highway Trust Fund, which was established by the Highway Revenue Act of 1956. Set up as a wholly user-supported trust fund, it derives its income from increased existing highway user taxes and new user taxes.

The Interstate Program has explicitly stated goals — the initial construction to the latest and safest design standards of a 42,500-mile connected network of freeways which must be built to meet the anticipated traffic needs 20 years into the future. These roads, in both rural and urban areas, connect most of the Nation's cities of 50,000 or more

population; provide transportation for manufacturing activity and agriculture; provide overall traffic service; serve the needs of national defense; and connect at suitable border points with routes of continental importance.

Interstate freeways are divided, have no traffic lights or stop signs, no intersections at grade, and no sharp curves or steep hills. Access and egress are completely controlled, and generally wide medians separate opposing lanes of traffic. Traffic lanes are 12 feet wide.

Benefits associated with the Interstate System can be divided into user and non-user benefits. User benefits encompass those gains which accrue to travelers on the Interstate System. In large part they include savings in travel time, energy consumption, and operating costs, reduction in accidents and congestion in the traffic corridor, and facilitation of goods movement. Perhaps the most striking example of user benefits are reflected in the low accident rates on Interstate facilities. The safest of all road systems, Interstate routes are nearly three times safer than non-Interstate routes in terms of fatalities and almost four times safer when considering injury-producing accidents.

Non-user benefits provided include improved opportunities for leisure activities, for work, and for residential location by essentially enlarging the area people can reach within a certain time.

When the Interstate Program was established, Congress provided that most Federal-aid Interstate funds could be used only for the initial construction of the System. (Federal-aid Primary funds can be used for reconstruction on the Interstate System since it is a part of the Primary System.) The reasoning was that the System was of paramount importance to the Nation and its completion was to be accomplished at the earliest possible date. Although funds could be spent to improve roads open to traffic, this was permitted only to incorporate the latest design standards and safety features into those routes. (It was not until 1976 that a relatively small amount of Interstate funds were authorized specifically for Interstate System rehabilitation.) At the same time, some 2,300 miles of toll roads, tunnels, and bridges that already existed in Interstate System corridors were taken into the System. Thus, motorists must pay tolls in a few Interstate routings, while the rest of the System is free. (Under law, no Federal funds can be used in construction of a toll facility, nor can they be used for improvements to a toll facility except under very special circumstances.)

Certain Interstate routes (usually those within large urban areas) may, under certain conditions, be withdrawn from the System and replaced with either another type of Federal-aid highway project or a mass transit project. Highway Trust funds, however, are

not used for the substitute projects; instead, an equal amount of Federal general treasury funds are provided.

The Federal share for substituted highway projects is the same as for other projects on the Federal-aid systems, usually 70 percent. The Department of Transportation's Urban Mass Transportation Administration administers the funds for mass transit projects and the Federal share is 80 percent. This "Interstate transfer" provision provides State and local governments the needed flexibility to choose the type of transportation project which best suits their needs. However, because of the national importance placed on the Interstate System, the Secretary of Transportation has to decide that the route to be withdrawn is not essential for completion of a unified and connected Interstate System.

Originally, the System was expected to be completed in 1972. Because of changes in design standards mandated by Federal law, extensions of the System from the 41,000 miles authorized in 1956 to its present extent of 42,500 miles, and increases in construction costs due to inflation, the entire length of the System is not yet in use. *As of October 1977, about 91 percent of the System's miles were open to traffic, although much of the mileage was not yet constructed to final standards. Nearly one-third of the System's $104 + billion cost still remains to be placed under contract.*

Primary Program

The original Federal-aid highway program, established in 1916 and 1921 legislation, was the predecessor of the present Federal-aid Primary System Program. As far back as 1921, Congress recognized the need for "an adequate and connected system of highways, interstate in character." The most recent reclassification of the Primary System, which occurred in 1976, still retains this principle by defining the Primary System as those roads which are the most important to interstate, regional, and statewide travel. (The Interstate System, which actually is a part of the Primary System, is made up of the highest type Primary routes.) Primary routes, which are rural arterials and their extensions through urban areas, are chosen by the States with the approval of the Secretary of Transportation. Most of the routes are State-owned-and-maintained systems.

The Primary System in each State is limited in mileage only to the extent that it cannot exceed the mileage of arterials in the State. In 1921, the system had 169,000 miles; today that mileage is more than 260,000.

The Primary Program, which provides financial assistance to the States to improve roads on the Primary System, is authorized at $1.4 billion for FY 1978, which is 18 percent of the total Federal-aid highway authorizations for that year. The Federal-State matching ratio is 70/30 (as it also is for the Secondary and Urban Systems).

Secondary Program

The Secondary Program was inaugurated in 1944 with the establishment of the Secondary System. Comprised originally of farm-to-market and feeder roads on State highways and county and local roads, and now of the more important intracounty routes, the Secondary System totals about 415,000 miles. The Secondary System cannot exceed the total mileage of rural major collector routes in each State. Funding of the program was set at $400 million for FY 1978, 5 percent of the total Federal-aid highway program. The system consists of many locally owned and maintained routes, as well as the less important State routes.

Urban Program

In 1944, the Federal-Aid Highway Act established a specific category of assistance for extensions of the Primary and Secondary Systems into urban areas (places of 5,000 or more population). This could be considered the beginning of a specific urban highway program even though other funds were spent in urban areas prior to that date. In 1970, a separate Urban System was established as a system of supplementary roads to serve local urban transportation needs. Selection of the System locations in each urban area is made by the local officials with the concurrence of the State highway or transportation agency.

The Urban System consists of about 130,000 miles of arterials and collectors. The program was funded at a level of $800 million for FY 1978, which is 10 percent of all Federal-aid highway funds for that year. Most of the routes are locally owned and maintained, but also may include State routes of lesser importance.

Urban System funds, in addition to having the normal uses of all Federal-aid highway funds, may be used for the purchase of transit buses and rapid rail cars, and for the construction, reconstruction, and improvement of fixed rail facilities. This broad use of highway funds is at the discretion of local and State officials.

Further emphasizing the local nature of the Urban System program is the requirement that projects shall be selected by the appropriate local officials (with the subsequent concurrence of the State) whereas projects under most other programs are initiated by the State highway or transportation agencies.

APPENDIX B

DOT/FHWA ORGANIZATION AND RESPONSIBILITIES IN HIGHWAY NOISE

INTRODUCTION

This Appendix presents a detailed organizational breakdown and functional description of all DOT/FHWA agencies involved in the creation and implementation of Federal policies concerning noise from Federally assisted highway projects. In general, the policies have been developed at DOT and FHWA Headquarters offices. The policy implementation requires that state highway agencies prepare documentation for each Federal-aid highway project they initiate, showing compliance with environmental noise and public informational requirements of the policy. This documentation is reviewed by FHWA division, regional, and sometimes headquarters offices before DOT/FHWA approval of the project. The FHWA division offices (one per state) are the most active in this implementation process, working closely with the state agencies and making most highway project-related determinations.

DOT ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

Figure B-1 shows the overall organization of the Department of Transportation (DOT). The agency within DOT that processes state-initiated Federal-aid highway projects is the Federal Highway Administration (FHWA). It is during this processing that FHWA has established and implemented Federal policy concerning noise impact from Federally assisted highway and highway improvement projects. FHWA actions and policies, however, are subject to DOT review and approval.

Office of the Assistant Secretary for Environment, Safety, and Consumer Affairs

This office, along with subordinate FHWA offices, reviews all drafts of environmental impact statements which are required of state agencies for most Federally assisted highway projects. Since the draft EIS normally contains a noise study prepared according to FHWA Federal-Aid Highway Procedures Manual, Volume 7, Chapter 7, Section 3 (FHPM 7-7-3), the office has the opportunity to review proposed implementation of FHWA noise policy. This office also reserves the right of approval of final EIS's for certain highway projects including interstate projects, those in populous areas, and those involving new limited-access freeways. In recent years, an average of approximately 300 EIS's per year have been handled by FHWA, about one-third of which have required DOT approval by this office.

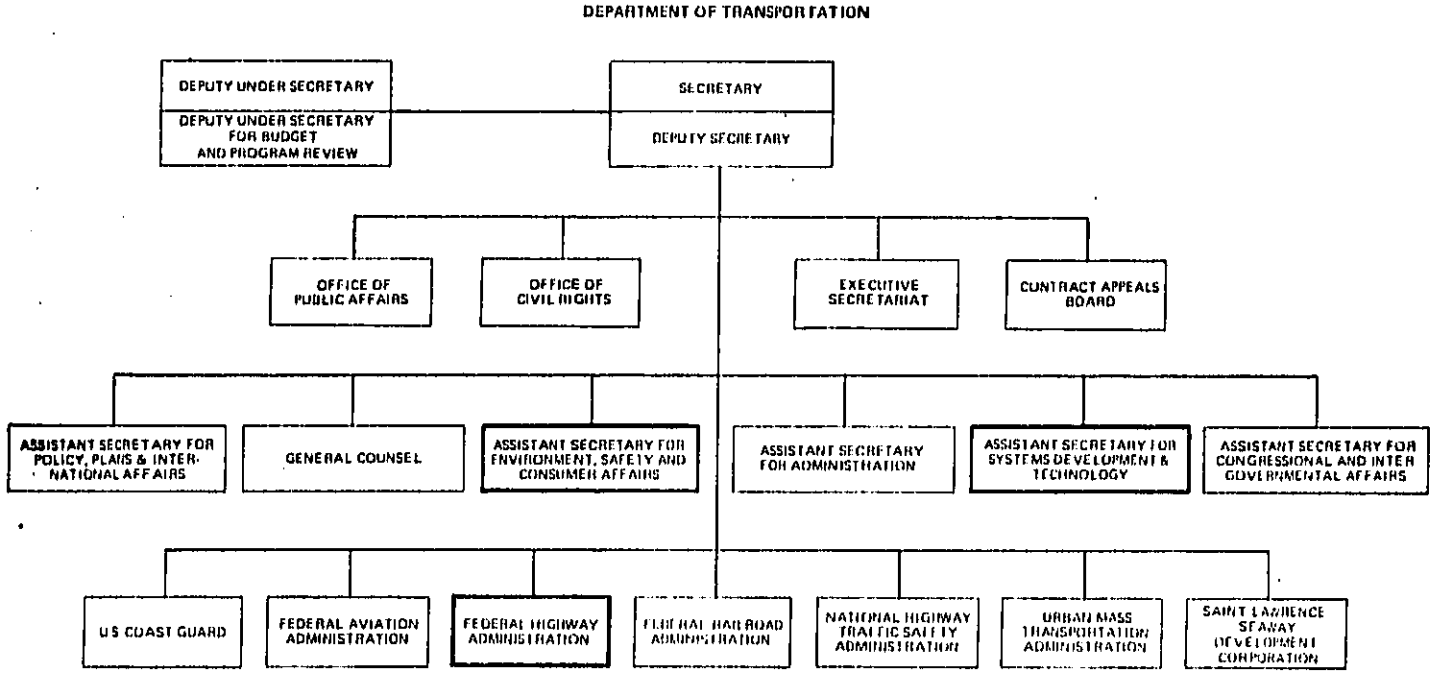


Figure B-1. Organizational Chart of the U.S. Department of Transportation Showing the Agencies Involved With Federal Highway Noise Policy

Office of the Assistant Secretary for Systems Development and Technology

This office maintains a noise-related agency which is not involved with policy implementation procedures, but provides supportive activities.

- Transportation Systems Center, Cambridge, Massachusetts (TSC). TSC was responsible for the development of one of the two highway noise prediction models currently DOT-approved for use in highway project noise studies. The Center is also responsible for validating new models and variations to the present ones.

FHWA ORGANIZATIONAL STRUCTURE AND RESPONSIBILITIES

The overall organization of FHWA is shown in Figure B-2 to contain three basic levels:

- FHWA Headquarters — Washington, D.C.
- 9 Regional Offices — locations shown in Figure B-3.
- 55 Division Offices — located in each region, one per state, plus District of Columbia, American Samoa, Guam, Puerto Rico, and the Virgin Islands.

Activities relating to FHWA noise policy occur at each of the three levels.

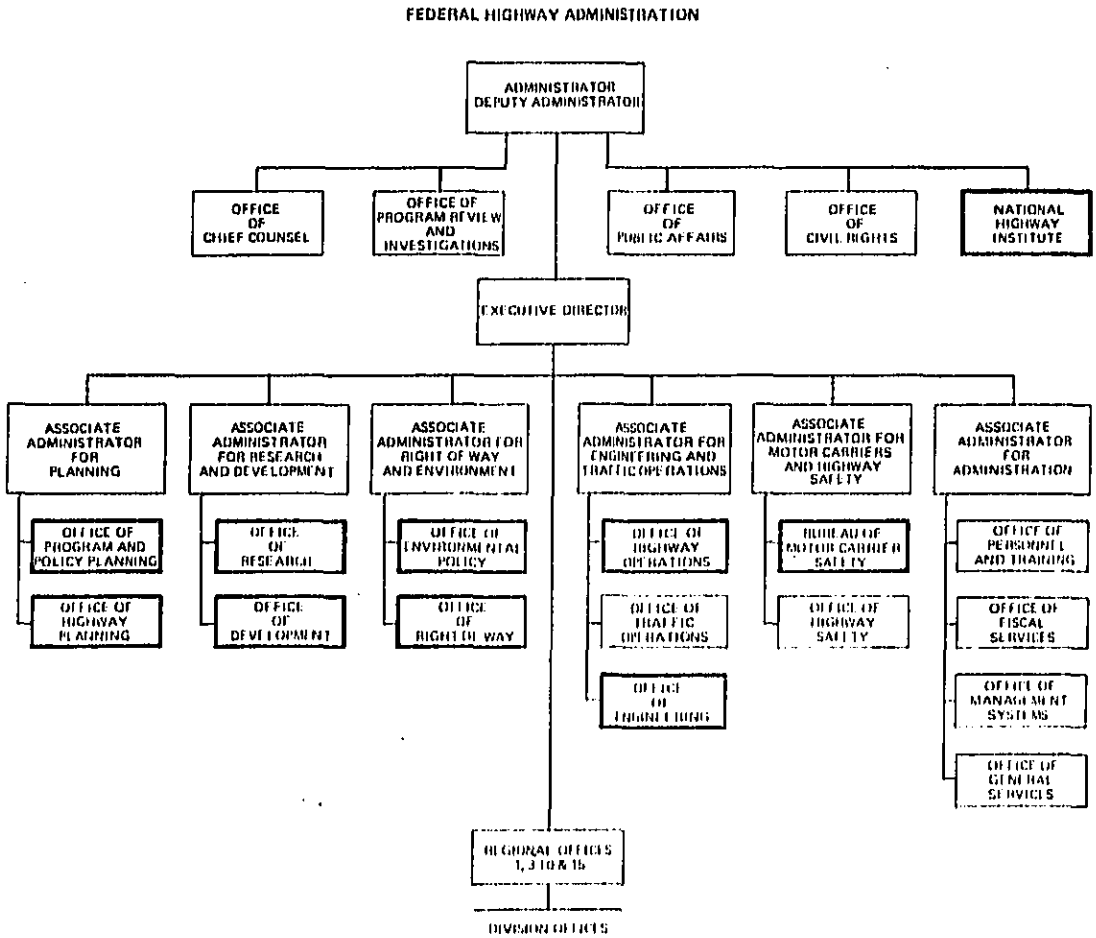
Role of FHWA Headquarters

The FHWA Headquarters organization is given in Figure B-2. As indicated therein, 10 of the 20 offices play a role in administering FHWA's noise abatement program:

- *Office of Environmental Policy*

  This office has the lead role in the noise area. It performs such functions as:

  - Promulgating FHWA's noise standards and procedures;
  - Reviewing environmental impact statements;
  - Developing technical and instructional manuals;
  - Coordinating research and technical study needs that are accomplished by other FHWA offices and other Federal agencies;
  - Coordination with other Federal agencies on noise matters.



Figufe B-2. Organizational Chart of the Federal Highway Administration

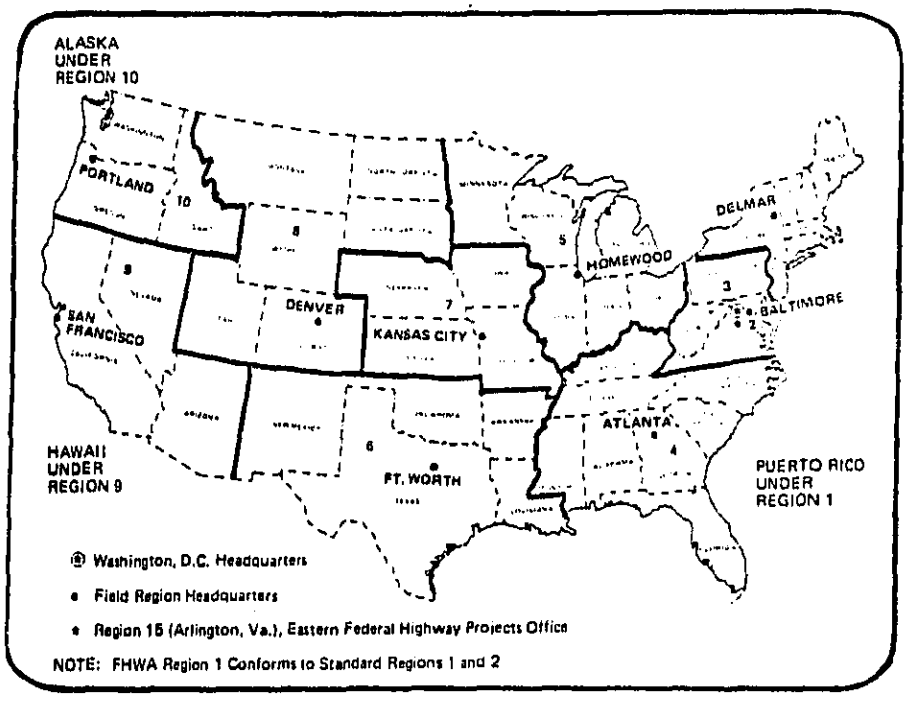


Figure B-3. Field Regions of the Federal Highway Administration

- *Office of Engineering*

  This office provides technical assistance in the analysis of highway traffic noise problems to FHWA's field organization and the State highway agencies.

- *Office of Highway Planning*

  This office is responsible for providing guidance to the FHWA field organization and the State highway agencies on methods for consideration of highway traffic noise during the planning stage.

- *Office of Right-of-Way*

  This office provides policy guidance and operational instructions to the FHWA field organization and State highway agencies on real property acquisition.

- *Office of Highway Operations*

  This office is concerned with construction noise. The National Experimental and Evaluation Program (NEEP) is administered by this office. One such NEEP project concerns the noise insulation of private dwellings.

- *Office of Research*

  This office performs, with its own personnel and through consultant services, research in several sub-areas of highway noise. The FHWA's highway traffic noise prediction model, for example, is being developed jointly by the Offices of Research and Environmental Policy.

- *Office of Development*

  This office provides (through contractual services) informational and educational materials. A recent example was the preparation of manual and a training course on the insulation of buildings against highway noise.

- *Office of Program and Policy Planning*

  This office is involved in the noise area through their work in environmental studies and socio-economic studies.

- *National Highway Institute*

  This is the training arm of the FHWA. Each year several courses in the fundamentals and abatement of highway traffic noise are given. Some 50 courses, involving around 1,500 students, have been taught to date.

- *Bureau of Motor Carrier Safety*

  This office is responsible for developing and for enforcing regulations to implement EPA's noise emission standards for vehicles involved in interstate commerce.

Role of the Regional Offices

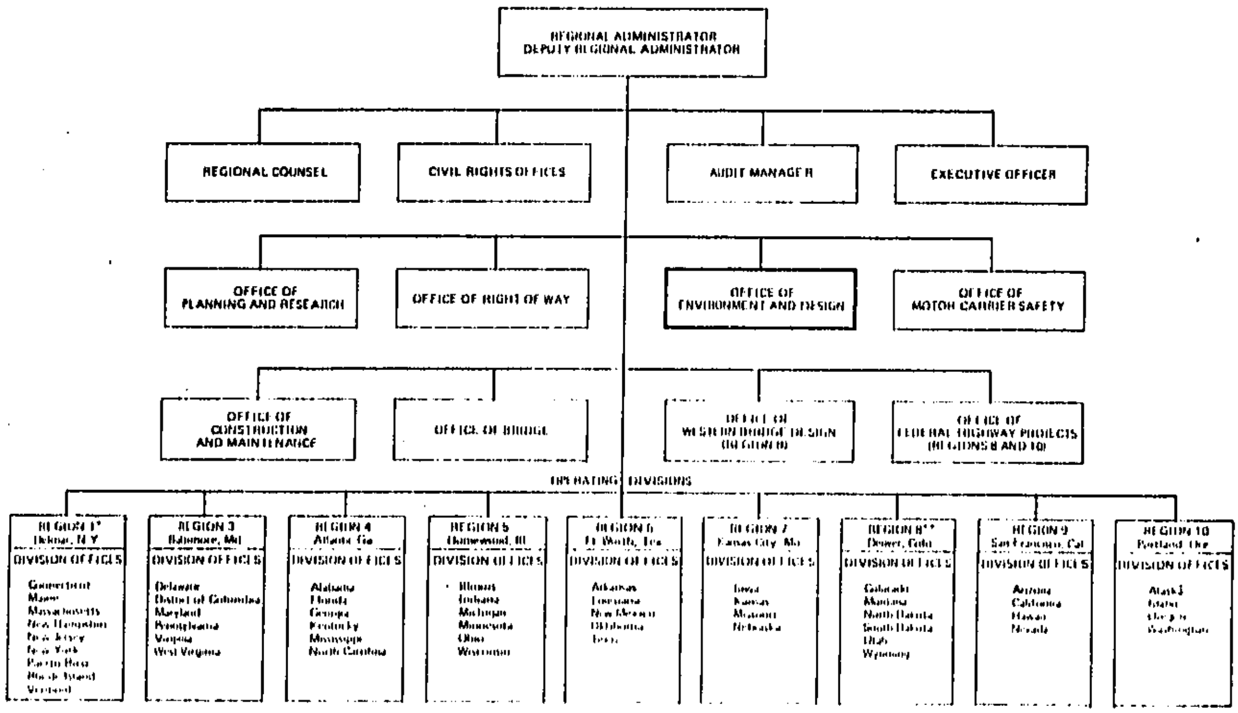
Regional FHWA offices conform to the Organization shown in Figure B-4. In general, highway noise matters are handled by an Environmental Engineer working in the Office of Environment and Design who devotes 25 to 50 percent of his time to this subject.

In general, the role of the regional office is to assist and advise division offices. In the area of highway noise, regional offices review and approve all draft and final EIS's, approve noise abatement measures not specifically authorized in policy issued by FHWA Headquarters, and approve State Action Plans. The regional offices also provide guidance on FHWA policy to the division offices.

Role in the Division Offices[1]

The division offices (one located in each state) provide assistance to the state highway agencies in all phases of highway projects, and perform the bulk of FHWA review and approval actions. In fact, FHWA estimates that approximately 97 percent of the project development decisions are made at the division level. The decision-making process is not precise in that FHWA divisions not only give final approvals but also serve as day-to-day consultants to the state highway agencies in EIS preparation and other matters. Therefore, most disagreements between FHWA and the state highway agencies are resolved before formal approvals are requested. This is particularly true of the EIS process where the states are required to consult with FHWA on each major step in the process.

1. See Appendix F for a listing of FHWA Division Offices and State Highway Agencies by Region.



* FHWA Region 1 conforms to standard Regions 1 and 2

** Region 8 also administers the direct Federal highway construction program in Region 8 and in Kansas, Nebraska, New Mexico, Oklahoma and Texas.

[illegible]

Figure B-4. FHWA Regional Office Organizational Chart

The regional grouping of the division offices is shown in Figure B-4. Most division offices are internally structured either by project or by function, not conforming to any single organizational framework. In project organization, individuals (or groups of staff engineers) are assigned to processing applications for specific projects. Responsibility for advising state highway agencies and division office personnel on noise is assigned to a staff member as a collateral duty. Functional offices are organized similarly to FHWA Headquarters or regional offices. One staff member under this organization will handle all environmental matters on a full-time basis devoting from 25 to 50 percent of his time to noise. Regardless of the organizational structure, the individual assigned to noise problems will provide advice to and answer questions of FHWA division office staff and state highway agency personnel. The federal-state relationship is strongest at the division office level.

Specific actions taken by division offices, as appropriate, include:

- Review all state highway agency draft EIS's.
- Approve the assignment of "major Federal action" status to project (thus requiring an environmental assessment).
- Approve the determination that a major Federal action significantly affects the human environment (thereby requiring an EIS per the National Environmental Policy Act of 1969).
- Approve all final negative declarations.
- Approve state highway agency noise study reports.
- Approve highway project plans at the ends of the location and design phases.

Role of State Highway Agencies

State highway agencies have the primary responsibility for initiating any action involving the Federal-Aid Highway System. In addition, state highway agencies interact with FHWA division offices when preparing an EIS, negative declaration, project plans, or other procedural documentation related to noise from the state highway project. Organization, internal procedures, and environmental concerns (beyond what is required by FHWA) vary considerably from state to state.

APPENDIX C

FHWA REGULATIONS, INSTRUCTIONS AND ISSUANCES RELATING TO NOISE ABATEMENT

FHWA REGULATIONS, INSTRUCTIONS AND ISSUANCES RELATIVE TO NOISE ABATEMENT

SUBJECT AREA	ISSUING AGENCY	TITLE & TYPE OF ISSUANCE INSTRUCTION, GUIDANCE MEMO, OTHER	DATE OF ISSUANCE	BRIEF DESCRIPTION
1. Principal Noise Policy Documents	Federal Highway Administration Office of Environmental Policy	Federal-Aid Highway Program Manual (FHPM), Vol. 7, Ch. 7		Basic policy and procedure manual for states and FHWA personnel. Chapter 7 contains all FHWA environmental standards for highway construction projects.
		"Process Guidelines (for the Development of Environmental Action Plans)" (FHPM 7-7-1)	12/30/74	Sets guidelines for the development of Environmental Action Plans for each state.
		"Public Hearings and Location/ Design Approval" (FHPM 7-7-5)	1/2/76	Provides procedures to be followed by states not operating under an approved Action Plan.
		Environmental Impact and Related Statements (FHPM 7-7-2)	1/2/76	Provides detailed information for completing and processing EIS's and negative declarations. Provides guidance for decision on whether an action is major or non-major.
		Procedures for Abatement of Highway Traffic Noise and Construction Noise (FHPM 7-7-3)	5/14/76	Provides FHWA's noise standards, methods to be used in predicting highway noise levels.
2. Technical Assistance	Federal Highway Administration Office of Environmental Policy	Progress Report on Implementation of Process Guidelines	5/10/74	Guidelines to assure full consideration of social, economic, and environmental effects.

FHWA REGULATIONS, INSTRUCTIONS AND ISSUANCES RELATING TO NOISE ABATEMENT (Continued)

SUBJECT AREA	ISSUING AGENCY	TITLE & TYPE OF ISSUANCE INSTRUCTION, GUIDANCE MEMO, OTHER	DATE OF ISSUANCE	BRIEF DESCRIPTION
2. Technical Assistance (Continued)	Federal Highway Administration Office of Research & Development	The Audible Landscape: A Manual for Highway Noise and Land Use	11/74 (reprinted 8/76)	Land-use planning near highways.
	Department of Transportation	Physical Impacts	1975	Provides guidance for the assessment of physical impacts due to highway facility improvements.
	Federal Highway Administration Federal Highway Projects	Action Plan for Consideration of Social, Economic and Environmental Effects	5/25/76	Covers the organization and procedure followed by Federal Highway Projects in Regions 8, 10, and 15.
	Office of Environmental Policy National Highway Institute	Preparation of Environmental Impact/4 (f) Statements		Three-day course on preparation of Environmental Impact Statements.
	Highway Research Board National Research Council National Academy of Science	National Cooperative Highway Research Report 117, "Highway Noise: Design Guide for Highway Engineers"	1971	Procedures for calculation of highway traffic noise.
	Office of Secretary Office of Noise Abatement	DOT-TSC-FHWA-72-1, "Manual for Highway Noise Prediction and Control"	5/72	Computer Model for predicting highway noise.

FHWA REGULATIONS, INSTRUCTIONS AND ISSUANCES RELATING TO NOISE ABATEMENT (Continued)

SUBJECT AREA	ISSUING AGENCY	TITLE & TYPE OF ISSUANCE INSTRUCTION, GUIDANCE MEMO, OTHER	DATE OF ISSUANCE	BRIEF DESCRIPTION
2. Technical Assistance (Continued)	Office of Secretary Office of Noise Abatement	DOT-TSC-315-1 "User's Manual for the Prediction of Road Traffic Noise Computer Program"	5/72	Guide for using a computer program for prediction of noise from freely flowing road traffic.
	Highway Research Board National Research Council National Academy of Science	National Cooperative Highway Research Report 144, "A Field Evaluation of Traffic Noise Reduction Measures"	1973	Procedures for evaluating the noise reduction from barriers, elevated and depressed highway sections, and roadside structures.
	Federal Highway Administration National Highway Institute	Fundamentals and Abatement of Highway Traffic Noise	6/73	One-week training course on highway noise and abatement.
	Federal Highway Administration National Highway Institute	Fundamentals and Abatement of Highway Traffic Noise, "Noise Barrier Design and Abatement Measures"	4/74	General Information on design of highway barriers.
	Federal Highway Administration Assoc. Admin. for Right-of-Way & Environment	Highway Noise Prediction Methods	6/9/75	Kentucky Prediction Procedure Correction Factor Nomograph to be used with NCHRP Methods.
	Federal Highway Administration Office of Research & Development	FHWA-RD-76-58 Noise Barrier Design Handbook	2/76	Provides a tool for use by highway designers to aid in design of noise abatement barriers.

FHWA REGULATIONS, INSTRUCTIONS AND ISSUANCES RELATING TO NOISE ABATEMENT (Continued)

SUBJECT AREA	ISSUING AGENCY	TITLE & TYPE OF ISSUANCE INSTRUCTION, GUIDANCE MEMO, OTHER	DATE OF ISSUANCE	BRIEF DESCRIPTION
2. Technical Assistance (Continued)	Federal Highway Administration Office of Research & Development Office of Engineering	Implementation Package 76-8 Highway Noise Barrier Selection, Design and Construction Experiences	1976	Provides guidance in barriers selection, location design and construction. Not for actual design purposes.
	Federal Highway Administration Office of Environmental Policy	Insulation of Buildings Against Highway Noise	9/76	Procedures are presented to determine the acoustical insulation of planned or existing buildings against highway noise.
	Assoc. Admin. for Engineering & Traffic Operations	National Experimental and Evaluation Progress Report No. 21. Noise Insulation for Private Dwellings	1/17/77	Encourage experimental projects for providing traffic noise insulation features in residences.
	Federal Highway Administration Office of Environmental Policy	Special Report, Highway Construction Noise: Measurement, Prediction and Mitigation	5/19/77	Provides a manual for use by highway oriented groups and individuals in the state of the art of the measurement, prediction and mitigation of highway construction noise; a "logical starting point into the evaluation and control of highway construction noise;" will assist state highway agencies in meeting requirements of FHPM 7-7-3.
	Federal Highway Administration Office of Development	Design Against Noise	1978	A Guide to Visual Quality of Barrier Design.

APPENDIX D

TECHNICAL BACKGROUND FOR THE DESIGN NOISE LEVELS

BACKGROUND

The Federal-Aid Highway Act of 1970 contained a requirement that the Secretary of Transportation develop and promulgate noise standards for the planning and design of Federal-aid highways. The Act required that the standards assign (design) noise levels compatible with different land uses. It further provided that the plans and specifications for a highway project could not be approved unless they included measures adequate to comply with the standards. Interim standards were adopted in April 1972, and an environmental statement on the standards was circulated and reviewed. After consideration of the review comments, the final standards were promulgated initially as Policy and Procedure Memorandum (PPM) 90-2 in February 1973, and revised as Federal Highway Program Manual (FHPM), Volume 7, Chapter 7, Section 3, "Procedures for Abatement of Highway Traffic Noise and Construction Noise" (FHPM 7-7-3), 1976.

The standards require that a noise analysis be conducted for each highway project, except those projects unrelated to highway traffic noise. Noise-sensitive land uses and activities in the vicinity of highway projects must be identified, and anticipated noise levels computed in terms of L_{10} or L_{eq} for the noise-sensitive areas on the basis of the worst noise situation expected to occur in the design year from the highway in question. The standards contain design noise levels of L_{10} or L_{eq} values considered by FHWA to be the *upper limits of acceptable noise levels* for exterior land uses, outdoor activities, and certain interior uses. These design levels are given in Table D-1.

Noise level predictions are to be compared with the appropriate design noise levels for existing developed land as one indicator of whether or not an impact is expected. If an impact is expected, every reasonable effort to achieve substantial noise level reductions must be taken. However, there are situations where abatement measures are not feasible or where the adverse social, economic and environmental effects of providing abatement measures are too high. For each individual case where the circumstances warrant, FHWA's noise policy provides the FHWA Division Administrator the authority to approve exceptions to the requirement of abating identified impacts which are based upon exceeding the design noise levels.

The standards do not guarantee the elimination of annoyance or disturbance from traffic noise even in those situations where the design noise levels given in Table D-1 are met. The design noise levels were established for various activities and land uses as a compromise between that which may be desirable and that which is achievable. FHWA acknowledges that noise impacts can occur even though the design noise levels are achieved. For these reasons, FHWA views the design noise levels as the upper limit of acceptable traffic noise conditions, recognizing that in many cases the achievement of lower noise levels would result in even greater benefits to the community.

Table D-1. Design Noise Level/Activity Relationships*

ACTIVITY CATEGORY	DESIGN NOISE LEVELS[1] dBA		DESCRIPTION OF ACTIVITY CATEGORY
	$L_{eq}(h)$	$L_{10}(h)$	
A[2]	57 (Exterior)	60 (Exterior)	Tracts of land which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, open spaces, or historic districts which are dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet.
B[2]	67 (Exterior)	70 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, and parks which are not included in Category A and residences, motels, hotels, public meeting rooms, schools, churches, libraries, and hospitals.
C	72 (Exterior)	75 (Exterior)	Developed lands, properties or activities not included in Categories A and B above.
D	–	–	For requirements on undeveloped lands, see Paragraph 11.a and 11.c.
E	52 (Interior)	55 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

[1] Either L_{eq} or L_{10} design noise levels may be used.

[2] Parks in Categories A and B include all such lands (public or private) which are actually used as parks as well as those public lands officially set aside or designated by a governmental agency as parks on the date of public knowledge of the proposed highway project.

*Federal-Aid Highway Program Manual, Vol. 7, Chapter 7, Section 3.

TECHNICAL BASIS[D1]

Initially, three types of highway noise impact were considered in the selection of the design noise levels. These were:

- Hearing impairment or damage
- Sleep and task interference, or annoyance
- Speech communication interference

FHWA determined that insufficient information existed in the hearing impairment and annoyance areas to develop criteria upon which design noise levels could be based. Thus, speech interference criteria became the sole basis of the design noise levels selected.

Interference by noise with speech communication depends on the level of the noise, level of the speech, and distance between speaker and listener. The relationship between these quantities for normally acceptable intelligibility is indicated in Table D-2.

Table D-2 indicates the speech-masking effect of steady-state noise. However, the fluctuating nature of highway traffic noise must be taken into account. When this is done, the speech-distance relationship can be explored to select design noise levels based on speech distances and voice efforts reasonable for the land-use and activity categories being considered. Table D-3 shows the selected design noise levels and communication distances up to which speech communications will be intelligible 90 percent of the time. Since the design noise levels are specified in FHPM 7-7-3 to be the highest hourly L_{10} or L_{eq} values during the day, the indicated speech distances will increase during the remaining less severe hours.

REFERENCE FOR APPENDIX D

D1. "Noise Standards and Procedures," EIS-AA-72-5822-F, Federal Highway Administration, November 1972.

Table D-2. Masking of Speech by Steady-State Noise*

STEADY-STATE A-WEIGHTED SOUND LEVEL (dB)	MAXIMUM DISTANCE FOR ADEQUATE SPEECH COMMUNICATION (FT)		
	NORMAL VOICE	RAISED VOICE	VERY LOUD VOICE
52	17	33	70
55	11	22	43
57	9	17	35
60	6.5	13	20
67	2.5	5	11
70	2	4	8
72	1.5	3	6
75	1	2	5

*EPA Report NTID 300.3, "Community Noise," Figure 19, was used as the source for the table.

Table D-3. Masking of Speech by FHWA Design Noise Levels

CATEGORY	LAND USE	DESIGN NOISE LEVELS L_{10} (dB)	DISTANCE FOR SATISFACTORY SPEECH COMMUNICATION - 90 PERCENT OF THE TIME (FT)		
			NORMAL VOICE	RAISED VOICE	VERY LOUD VOICE
A	Outdoor uses for which quiet is particularly important	60	6.5	13	26
B	Exterior of residences, motels, schools, churches, etc. Also parks, playgrounds, etc.	70	2	4	8
C	Exterior of developed lands not included in A or B above	75	1	2	5
D	Undeveloped	–	–	–	–
E	Interior of residences, schools, churches, etc.	55	11	22	43

APPENDIX E

HIGHWAY NOISE PREDICTION MODELS

There are presently two highway noise prediction models authorized by FHWA for use on Federal-aid highway projects. These are referred to as the "NCHRP"[E1] and "TSC"[E2] models. This Appendix summarizes the characteristics of these two models.

NCHRP Model

This model was originally designed as a series of nomograms and charts;[E3, E4] however, a computerized version is currently available from FHWA. The model predicts L_{50} and L_{10} noise levels, at a given point, due to one or several highways. The levels are based on calculations from a semi-empirical traffic noise model. Data requirements for this model are:

- Traffic volume, speed, and percentage of heavy vehicles.
- Highway locations, elevations and/or depressions, and gradients.
- Highway surface roughness.
- Location of traffic controls.
- Highway width (number of lanes).
- Receiver locations.
- Barrier locations and geometry.

The basic calculation of the program is for L_{50} from each highway. L_{10} is then obtained from L_{50} by applying adjustments based on the statistics and geometry of the traffic flow. Due to limitations in the statistical model, calculations for low truck volumes or interrupted flow may be of questionable accuracy. The combination of several highways of similar noise output, or the presence of barriers, in certain cases, may also reduce the reliability of the L_{10} calculation.

TSC Model

This model can handle the same multiple-road and complex barrier configurations as the NCHRP model. However, the basic calculation is in terms of L_{eq}, which allows predictions to be accurate for low traffic volumes and complex road configurations. In addition to L_{eq}, the program also computes L_{10}, L_{50}, L_{90}, L_{NP},[1] and A-weighted octave band levels. The statistical metrics are obtained by applying theoretical adjustments to L_{eq}. The accuracy of the statistical metrics is decreased in complex situations, although not so much as with the NCHRP model because of the reliability of the basic L_{eq} calculation. The basic input data are similar to that for the NCHRP model, with the addition of

1. Noise Pollution Level.

topography and ground surface acoustical properties. All locations must be specified in three-dimensional Cartesian coordinates, which can make input data quite lengthy.

This model allows for reflection of sound from surfaces, and includes a calculation of ground attenuation. The ground attenuation algorithm is extremely crude, however, and must be regarded as approximate. Individual vehicle noise levels form the basis of the L_{eq} calculation. The user has the option of specifying vehicle noise levels other than those provided within the program.

COMPARISON OF THE MODELS

In using the noise models described above, it may be found that different models often provide different values of the noise level. This is due to differences in assumptions, computational procedures and basic data within the models. There is no simple factor that can be applied to relate the noise levels computed by the various models because the differences are strongly dependent on the highway conditions. A detailed comparison of these models as well as other models used in highway noise research has been made in Reference E5. This reference includes a series of charts which may be used to estimate differences among the models for any specific case.

REFERENCES FOR APPENDIX E

E1. Grove, G.H., "Traffic Noise Level Predictor Computer Program," Research Report No. R-942, Michigan State Highway Commission, October 1974.

E2. Kurze, U.J., Levison, W.H., and Serben, S., "User's Manual for the Prediction of Road Traffic Noise Computer Programs," U.S. Department of Transportation Report DOT-TSC-315-1, May 1972.

E3. Gordon, C.G., Galloway, W.J., Kugler, B.A., and Nelson, D.L., "Highway Noise — A Design Guide for Engineers," NCHRP Report 117 (1971).

E4. Kugler, B.A., and Pierson, A.G., "Highway Noise — A Field Evaluation of Traffic Noise Reduction Measures," NCHRP Report 144 (1973).

E5. "Comparison of Highway Noise Prediction Models," U.S. Environmental Protection Agency, May 1977. EPA Report No. 550/9-77-355.

APPENDIX F

WHERE TO GO TO GET INFORMATION ON FHWA NOISE POLICY

KEY FHWA HEADQUARTERS PERSONNEL INVOLVED IN NOISE

ORGANIZATION ELEMENT	ADDRESS	PERSONNEL			OFFICE ROLE IN HIGHWAY NOISE POLICY
		NAME	TITLE	TELEPHONE NUMBER	
Office of Environmental Policy	400 Seventh Street Washington, D.C. 20590	Michael Lash	Director	426-0351	*Lead Role:* • Promulgates FHWA's noise standards and procedures. • Reviews environmental impact statements. • Develops technical manuals. • Coordinates noise research and technical study needs accomplished by other operating elements within FHWA and other Federal agencies.
		R. I. Wells	Chief, Environmental Programs Division	426-0106	
		Russell E. Machol	Chief, Environmental Quality Division	426-9764	
		Harter M. Rupert	Chief, Noise and Air Quality Branch	426-4836	
Office of Engineering	400 Seventh Street Washington, D.C. 20590	W. J. Wilkes	Director		Provides technical assistance in the analysis of highway traffic noise problems to FHWA's field organization and the State Highway Agencies.
		David Phillips	Chief, Highway Design Division		
		Roger Scott	Chief, Environmental and Public Transportation Branch		
Office of Highway Planning	400 Seventh Street Washington, D.C. 20590	Richard Morgan	Director	426-2951	Provides guidance to FHWA field organization and the State Highway Agencies for consideration of highway traffic noise during the planning stage.
		Kevin Heanue	Chief, Urban Planning Division	426-0166	

KEY FHWA HEADQUARTERS PERSONNEL INVOLVED IN NOISE (Continued)

ORGANIZATION ELEMENT	ADDRESS	PERSONNEL			OFFICE ROLE IN HIGHWAY NOISE POLICY
		NAME	TITLE	TELEPHONE NUMBER	
Office of Highway Operations	400 Seventh Street Washington, D.C. 20590	Wesley Mendenhall	Director	426-0340	Concerned with construction noise.
		Sanford Lahue	Chief, Construction and Maintenance Division	426-0392	
		J. D. Coursey	Chief, Experimental Construction and Application Branch	426-0420	
Office of Right-of-Way	400 Seventh Street Washington, D.C. 20590	David Levin	Director	426-0342	Provides policy guidance and operational instructions to the FHWA field organization and State Highway Agencies on real property acquisition.
		Gerald B. Saunders	Chief, Real Property Acquisition Division	426-0142	
		R. Bowman	Chief, Appraisal Branch	426-0144	
Office of Research	400 Seventh Street Washington, D.C. 20590	C. F. Scheffey	Director	426-2943	Performs research in various sub-areas of highway noise.
		David Solomon	Chief, Environmental Design and Control Division	426-0291	
		B. W. Stephens	Chief, Socio-Economic and Environmental Design Group	426-0257	

KEY FHWA HEADQUARTERS PERSONNEL INVOLVED IN NOISE (Continued)

ORGANIZATION ELEMENT	ADDRESS	PERSONNEL			OFFICE ROLE IN HIGHWAY NOISE POLICY
		NAME	TITLE	TELEPHONE NUMBER	
Office of Development	400 Seventh Street Washington, D.C. 20590	Rex Leathers	Director	426-0255	Provides informational and educational materials on highway noise.
		Milton Criswell	Chief, Implementation Division	426-9230	
		E. A. Hodgkins	Chief, Engineering, Location and Design Group	426-9205	
Office of Program and Policy Planning	400 Seventh Street Washington, D.C. 20590	William R. McCallum	Director	426-0587	Performs environmental and socio-economic studies concerned with noise.
		Gene Tyndall	Chief, Socio-Economics Studies Division	426-0226	
		Floyd Thiel	Chief, Socio-Economics Studies Division	426-2923	
National Highway Institute	400 Seventh Street Washington, D.C. 20590	Roy Tidwell	Director	426-4878	Is the training arm of FHWA (conducts courses on highway noise).
		George Shrieves	State Programs Officer	426-9141	
Bureau of Motor Carrier Safety	400 Seventh Street Washington, D.C. 20590	Dr. R. Kaye	Director	426-1790	Responsible for developing and enforcing regulations to implement EPA's interstate motor carrier noise standards.
		Gary Curtis		426-1724	
		Donald Morrison	Chief, Vehicle Requirements Branch	426-1700	

FHWA DIRECTORS OF REGIONAL OFFICES OF ENVIRONMENT AND DESIGN

FHWA REGION	ADDRESS	NAME OF DIRECTOR	TELEPHONE NUMBER
I	Leo W. O'Brien Federal Building, Room 709 Clinton Avenue and North Pearly Street Albany, New York 12207	W. A. Nostrand	(518) 472-6476 FTS 562-6476
III	George H. Fallon Federal Office Building 31 Hopkins Plaza, Room 1633 Baltimore, Maryland 21201	Raymond W. Bergeron	(301) 962-2361 FTS 922-2361
IV	Suite 200, 1720 Peachtree Road, N. W. Atlanta, Georgia 30309	Ivan C. Jenkins	(404) 881-4078 FTS 257-4078
V	10209 Dixie Highway Homewood, Illinois 60430	William F. Emrich	(312) 799-6300
VI	819 Taylor Street Fort Worth, Texas 76102	Wayne D. Heel	(817) 334-3221
VII	6301 Rockhill Road (P.O. Box 19715) Kansas City, Missouri 64131	Steiner M. Silence	(816) 926-5053 FTS 926-5053
VIII	Denver Federal Center, Building 40 P. O. Box 25246 Denver, Colorado 80225	F. S. Allison	(303) 234-4051 FTS 234-4051
IX	2 Embarcadero Center (P. O. Box 7616) Suite 530 San Francisco, California 94111	Robert C. S. Young	(415) 556-3951
X	Mohawk Building, Room 412 222 S. W. Morrison Street Portland, Oregon 97204	Richard C. Cowdery	(503) 221-2052 FTS 423-005

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES

FHWA REGION I

FHWA Division Administration	*State Highway Agency*
Donald J. Altobelli 990 Wethersfield Avenue Hartford, Connecticut 06114	Department of Transportation 20 Wolcott Hill Road, P.O. Drawer A Wethersfield, Connecticut 06109
J. J. Barakos Federal Building, U.S. Post Office 40 Western Avenue, Room 614 Augusta, Maine 04330	Department of Transportation State Office Building Augusta, Maine 04330
Norman J. Van Ness 101 Summer Street, Suite 1517 Boston, Massachusetts 02110	Massachusetts Department of Public Works 100 Nashua Street Boston, Massachusetts 02114
F. T. Comstock, Jr. Federal Building, Room 219 55 Pleasant Street Concord, New Hampshire 03301	Department of Public Works and Highways John O. Mort n Building 85 Loudon Road Concord, New Hampshire 03301
John J. Kessler, Jr. Suburban Square Building, 2nd Floor 25 Scotch Road Trenton, New Jersey 08628	Department of Transportation 1035 Parkway Avenue Trenton, New Jersey 08625
Victor E. Taylor Leo W. O'Brien Federal Building, 9th Floor Clinton Avenue and North Pearl Street Albany, New York 12207	Department of Transportation State Campus 1220 Washington Avenue Albany, New York 12232
Frank Geiser, Jr. Federal Highway Administration Caso Building, Room 805 1225 Ponce De Leon Avenue San Juan, Puerto Rico 00907	Department of Transportation and Public Works Box 3909 C.P.O. San Juan, Puerto Rico 00936
Gordon C. Hoxie Federal Building and U.S. Post Office Exchange Terrace, Suite 250 Providence, Rhode Island 02903	Department of Transportation State Office Building Providence, Rhode Island 02903
David B. Kelley Federal Building, P.O. Box 568 Montpelier, Vermont 05602	Department of Highways 133 State Street Montpelier, Vermont 05602

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION III

FHWA Division Administrators	*State Highway Agency*
Paul F. Chamberlain Federal Office Building, Floor 2 300 South New Street, P.O. Box 517 Dover, Delaware 19901	Department of Highways & Transportation Highway Department, Administration Building P.O. Box 778 Dover, Delaware 19901
Marshall Jacks Pennsylvania Building, Room 1248 425 13th Street, N.W. Washington, D.C. 20004	Department of Transportation Presidential Building, Room 508 415 12th Street, N.W. Washington, D.C. 20004
Richard Ackroyd The Rotunda, Suite 220 711 West 40th Street Baltimore, Maryland 21211	Maryland Department of Transportation Maryland State Highway Administration 300 West Preston Street, P.O. Box 717 Baltimore, Maryland 21201 (21203)
Donald E. Hammer 228 Walnut Street, P.O. Box 1086 Harrisburg, Pennsylvania 17108	Department of Transportation 1220 Transportation & Safety Building Commonwealth & Forster Streets Harrisburg, Pennsylvania 17120
Harold C. King 400 N. 8th Street, P.O. Box 10045 Richmond, Virginia 23240	Department of Highways and Transportation 1221 E. Broad Street Richmond, Virginia 23219
Merrill W. Nelson Courthouse and Federal Office Building 500 Quarrier Street Charleston, West Virginia 25301	West Virginia Department of Highways 1900 Washington Street, East Charleston, West Virginia 25305

FHWA REGION IV

FHWA Division Administrators	*State Highway Agency*
Richard B. Gillette, III 441 High Street Montgomery, Alabama 36104	State of Alabama Highway Department State Highway Building 11 South Union Street Montgomery, Alabama 36104
P. E. Carpenter Ackerman Building, P.O. Box 1079 223 W. College Avenue Tallahassee, Florida 32302	Florida Department of Transportation Haydon Burns Building 605 Suwannee Street Tallahassee, Florida 32304

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION IV (Continued)

FHWA Division Administrators	*State Highway Agency*
Herschel Bryant 1422 Peachtree Street, N.W., Suite 700 Atlanta, Georgia 30309	Department of Transportation No. 2 Capitol Square Atlanta, Georgia 30334
Robert E. Johnson John C. Watts Federal Building and U.S. Courthouse 3330 W. Broadway, P.O. Box 536 Frankfort, Kentucky 40601	Department of Transportation State Office Building High and Clinton Streets Frankfort, Kentucky 40601
Emery L. Shaw 666 North Street, Suite 105 Jackson, Mississippi 39202	State Highway Department Woolfolk State Office Building Northwest Street, P.O. Box 1850 Jackson, Mississippi 39205
Teddy J. Morawski 310 New Bern Avenue, P.O. Box 26806 Raleigh, North Carolina 27611	Department of Transportation and Highway Safety 1 South Wilmington Street, P.O. Box 25201 Raleigh, North Carolina 27611
Edward G. Oakley Federal Building, U.S. Courthouse 801 Broadway, Room A-926 Nashville, Tennessee 37219	Tennessee Department of Transportation Highway Building, Corner 6th Avenue North and Deaderick Streets Nashville, Tennessee 37219
Wilbur N. Dulin 2001 Assembly Street, Suite 203 Columbia, South Carolina 29201	State Highway Department State Highway Building, Drawer 191 Columbia, South Caroline 29202

FHWA REGION V

FHWA Division Administrators	*State Highway Agency*
Jay W. Miller 3085 East Stevenson Drive, P.O. Box 3307 Springfield, Illinois 62708	Illinois Department of Transportation 2300 South Dirksen Parkway Springfield, Illinois 62764
George D. Gibson, Jr. I.S.T.A. Center, Room 707 150 W. Market Street Indianapolis, Indiana 46204	State Highway Commission State Office Building, Room 101 100 North Senate Avenue Indianapolis, Indiana 46204

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION V (Continued)

FHWA Division Administrators	*State Highway Agency*
David A. Merchant Federal Building, Room 211 315 West Allegan Street, P.O. Box 147 Lansing, Michigan 48901	Michigan Department of State Highways and Transportation 425 West Ottowa, P.O. Drawer K Lansing, Michigan 48904
E. Dean Carlson Metro Square Building, Suite 490 Seventh and Robert Streets St. Paul, Minnesota 55101	Department of Highways State Highway Building St. Paul, Minnesota 55155
John W. McBee Bryson Building, Room 333 700 Bryden Road Columbus, Ohio 43215	Ohio Department of Transportation 25 S. Front Street Columbus, Ohio 43215
John O. Hibbs 4502 Vernon Boulevard, P.O. Box 5428 Madison, Wisconsin 53705	Department of Transportation 4802 Sheboygan Avenue Madison, Wisconsin 53702

FHWA REGION VI

FHWA Division Administrators	*State Highway Agency*
Charles F. McMillen Federal Office Building, Room 3128 700 West Capitol Avenue Little Rock, Arkansas 72201	Arkansas State Highway Department State Highway Department Building 9500 New Benten Highway, P.O. Box 2261 Little Rock, Arkansas 72203
Morris C. Reinhardt Federal Building, Room 239 750 Florida Street Baton Rouge, Louisiana 70801	Department of Highways Capitol Station, P.O. Box 44245 Baton Rouge, Louisiana 70804
John McAllister 117 U.S. Court House Santa Fe, New Mexico 87501	New Mexico State Highway Department State Highway Department Building 1120 Cerrillos Road, P.O. Box 1149 Santa Fe, New Mexico 87503 (87501)
Gordon E. Penney 2409 North Broadgay Avenue Oklahoma City, Oklahoma 73103	Oklahoma Department of Highways 200 N.E. 21st Street Oklahoma City, Oklahoma 73105
John H. Conrado 826 Federal Office Building 300 East 8th Street Austin, Texas 78701	State Department of Highways and Public Transportation Texas Highway Building, 11th and Brazos 11th and Brozos Streets Austin, Texas 78701

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION VI (Continued)

FHWA Division Administrator	*State Highway Agency*
John H. Conrado 826 Federal Office Building 300 East 8th Street Austin, Texas 78701	State Department of Highways and Public Transportation Texas Highway Building 11th and Brazos Streets Austin, Tecas 78701

FHWA REGION VII

FHWA Division Administrator	*State Highway Agency*
Leon N. Larson 105 Sixth Street, P.O. Box 627 Ames, Iowa 50010	Iowa Depa rtment of Transportation Highway Division 826 Lincoln Way Ames, Iowa 50010
Robert W. Morrissey 1263 Topeka Avenue Topeka, Kansas 66610	Kansas Department of Transportation State Office Building Topeka, Kansas 66612
Rudolf M. Lemke 209 Adams Street, P.O. Box 148 Jefferson City, Missouri 65101	Missouri State Highway Commission State Highway Building 119 W. Capitol Avenue Jefferson City, Missouri 65101
Raymond H. Hogrefe Federal Building, Room 487 100 Centennial Mall North Lincoln, Nebraska 68508	Department of Roads Central Office Building, Room 212 South Junction U.S. 77 and N-2 Lincoln, Nebraska 68509 Mailing Address: P.O. Box 94759 Statehouse Station Lincoln, Nebraska 68509

FHWA REGION VIII

FHWA Division Administrator	*State Highway Agency*
Thomas O. Willett 3500 N. Central Avenue, Suite 201 Phoenix, Arizona 85012	Arizona Department of Transportation 206 South 17th Avenue Phoenix, Arizona 85007
Omar L. Homme Federal Building, 2nd Floor 801 I Street, P.O. Box 1915 Sacramento, California 95809	Department of Transportation Division of Highways 1120 N Street, P.O. Box 1499 Sacramento, California 95814

FHWA DIVISION ADMINISTRATORS AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION VIII (Continued)

FHWA Division Administrators	*State Highway Agency*
A. J. Siccardi 10488 W. 6th Place Denver, Colorado 80222	State Department of Highways 4201 East Arkansas Avenue Denver, Colorado 80222
Harold N. Stewart 501 N. Fee Street Helena, Montana 59601	Department of Highways East Sixth Avenue and Roberts Street Helena, Montana 59601
George H. Seaworth P.O. Box 1755 Bismark, North Dakota 58501	North Dakota Highway Department State Highway Building Bismark, North Dakota 58501
Arthur L. Johnson P.O. Box 700 Federal Office Building Pierre, South Dakota 57501	Department of Transportation Transportation Building East Broadway Pierre, South Dakota 57501
George W. Bohn Federal Building 125 South State Street Salt Lake City, Utah 84147	Utah Department of Transportation 603 State Office Building Salt Lake City, Utah 84114
James N. McDonald O'Mahoney Federal Center P.O. Box 1127 Cheyenne, Wyoming 82001	Wyoming Highway Department State Highway Office Building P.O. Box 1708 Cheyenne, Wyoming 82001

FHWA REGION IX

FHWA Division Administrators	*State Highway Agency*
Thomas O. Willett 3500 N. Central Avenue, Suite 201 Phoenix, Arizona 85012	Arizona Department of Transportation 206 South 17th Avenue Phoenix, Arizona 85007
Omar L. Homme Federal Building, 2nd Floor 801 I Street, P.O. Box 1915 Sacramento, California 95809	Department of Transportation Division of Highways 1120 N Street, P.O. Box 1499 Sacramento, California 95814
Ralph T. Segawa Pacific International Gold Bond Building 677 Ala Moana Boulevard, Suite 613 Honolulu, Hawaii 96813	Department of Transportation 869 Punchbowl Street Honolulu, Hawaii 96813

FHWA DIVISION ADMINISTRATION AND STATE HIGHWAY AGENCY ADDRESSES (Continued)

FHWA REGION IX (Continued)

FHWA Division Administrators	*State Highway Agency*
Albert E. Stone, Jr. 106 East Adams Street Carson City, Nevada 89701	Nevada Department of Highways Administration Building, Room 201 1263 South Stewart Street Carson City, Nevada 89701

FHWA REGION X

FHWA Division Administrators	*State Highway Agency*
Gene A. Hanna Federal Building, P.O. Box 1648 709 W. Ninth Street Juneau, Alaska 99802	Department of Highways Third Street Douglas, Alaska Mailing Address: P.O. Box 1467 Juneau, Alaska 99802
Edwin M. Wood 3010 W. State Street Boise, Idaho 83703	State of Idaho Transportation Department Division of Highways 3311 West State Street, P.O. Box 7129 Boise, Idaho 83707
Glen L. Green Standard Insurance Building 477 Cottage Street, N.E., P.O. Box 300 Salem, Oregon 97301 (97308)	Department of Transportation Oregon State Highway Division State Highway Building, Room 140 Salem, Oregon 97310
Paul C. Gregson Evergreen Plaza Building 711 S. Capitol Way, P.O. Box 29 Olympia, Washington 98507	Washington State Highway Commission Highway Administration Building Franklin at Maple Park Olympia, Washington 98504