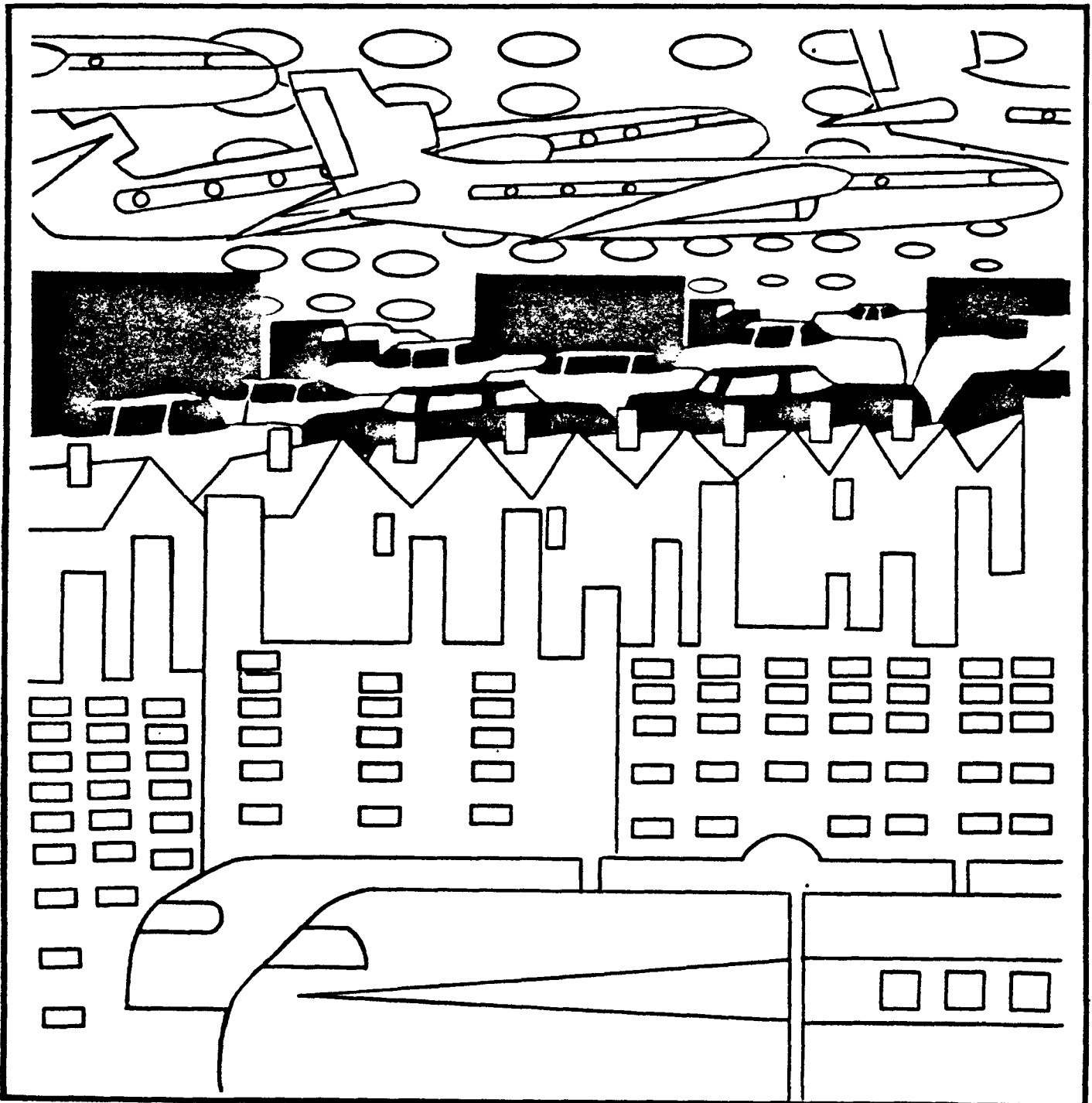




The Review Of Highway Project Related Environmental Impact Statements For Noise Concerns: A Brief Outline And Checksheet



DEPARTMENT OF TRANSPORTATION

The Review of Highway Project Related Environmental
Impact Statements for Noise Concerns:
A Brief Outline and Checksheet

By

Gale R. Hruska
Noise Control Specialist
Region V Noise Program
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

DRAFT COPY
SUBJECT :

PREFACE

Many projects, especially those involving Federal actions or Federal funding, require the submission of environmental impact statements (EIS). To assist the people responsible for EIS preparation, many useful sources of information have been developed. However, almost no attention has been given to assisting the person who has to review one. It seems to be implied that the same material used for preparation of the document is adequate for its review. Unfortunately, as people who have had to review EIS's know, this is not quite the case. The different perspectives of the preparer and the reviewer require that they approach the EIS from different directions. The EIS preparer strives to include sufficient information to provide a complete description of the noise impact of the project, while the reviewer must be able to ask the right questions to pinpoint the inadequacies that remain.

In response to requests from both professional EIS reviewers and the public, the Region V Noise Program has assembled a list of concerns that it feels every EIS should address. This particular document is concerned with highway projects. It is our hope that, in spite of its brevity, it will be a basis from which a competent noise review can be effected.

DRAFT COPY
SUBJECT

CONTENTS

| | |
|--|----------------|
| INTRODUCTION | A1 - A2 |
| CHECKSHEET | B1 - B5 |
| COMMENTARY ON CHECKSHEET CONCERNS | C1 - C7 |
| REFERENCES | D1 |

INTRODUCTION

DRAFT COPY
50

Anyone who reviews Environmental Impact Statements (EIS) for noise consideration is certain to discover that there is no single set of questions that can be used to judge EIS adequacy. The reasoning behind this conclusion is that each project (and the environment that the project impacts) is unique. What is a major concern for one project can often have minimal impact on another. However, this is not to say that there is no systematic way to evaluate an EIS.

After reviewing many EIS's for noise impact, the Region V Noise Program has come to feel that there are five basic areas in which an EIS should provide information:

1. Site description
2. Project description
3. Existing and future noise levels
4. Noise impact caused by the project
5. Mitigation measures necessary to reduce noise impact to acceptable levels

To assist the reviewer on determining whether or not a highway related EIS has adequately addressed these concerns, an EIS Review Checksheet has been prepared. The purpose of this exercise is not to set standards, but only to provide a systematic list of concerns that the ideal EIS will address. Therefore, there is no discussion of the quantitative aspects of environmental review. There are no tables, graphs, or equations for predicting how much noise will be produced or how serious the noise impact will be. If the reviewer wants to corroborate this type of information, he will have to go to other sources, such as those given in the references.

The checksheet consists of six major questions relevant to the adequacy of the noise portion of the EIS. Associated with each question are a number of minor aspects which can be used to determine if the question is adequately addressed. It is suggested that the reviewer checkoff the minor aspects as he encounters them in the EIS. Those that are poorly discussed should be noted. For those aspects that are not discussed at all, the reviewer should determine if they are relevant to the particular project. Those that are not discussed but are relevant should be noted. After the adequacies and inadequacies of all of the minor aspects have been examined, the reviewer then uses the accumulated findings to determine how well he feels the major question has been answered, i.e. Has the EIS addressed the question adequately, adequately with reservations, or not adequately?

Those who are not familiar with environmental noise assessment may find the checksheet rather terse. For these people, a brief commentary dealing with each of the six basic questions has been included. Should one want to dig deeper into this subject, he must go to the literature.

DRAFT COPY
SUBMITTED

HIGHWAY PROJECT EIS REVIEW CHECKSHEET

DRAFT COPY

PROJECT _____

DATE _____

1. IS AN ADEQUATE VISUAL DESCRIPTION OF THE SITE PROVIDED?

Adequate Adequate with reservations Not adequate

Aerial Photograph Drawn schematic None

Map scale: reasonable size, explicitly given

Project route superimposed on map

Identification of affected roadways

Preferred alternative

Other alternatives

Existing roads

Identification of land use and zoning districts

Identification of noise sensitive sites

Residential areas

Churches

Schools and libraries

Hospitals and nursing homes

Parks and zoos

Other

2. IS SUFFICIENT QUANTITATIVE INFORMATION ABOUT THE SITE AND ITS PRESENT USAGE GIVEN?

Adequate Adequate with reservations Not adequate

Physical layout of present road system detailed: dimensions, right of-ways

Traffic volumes provided for all affected roads

Average Daily Traffic (ADT)

Maximum hourly volumes (MHV)

- Speed limits provided
- Relative distribution of truck and non-truck traffic provided
- Information relative to noise affected sites provided
 - Identification
 - Population affected and times of usage
 - Distances from roadways

DATE: 10/10/01
BY: [signature]

3. IS THE SCOPE OF THE PROPOSED PROJECT ADEQUATELY DESCRIBED?

- Adequate Adequate with reservations Not adequate
- Physical changes to be made: dimensions, distances, new construction
- Expected traffic volumes for project road
 - Average daily traffic: near future, far future
 - Maximum hourly volume: near future, far future
- Expected traffic volumes for affected non-project roads
 - Average daily traffic: near future, far future
 - Maximum hourly volume: near future, far future
- Speed limits: existing , future
- Relative distribution of truck and non-truck traffic: future
- Newly impacted noise sensitive sites - all roads
 - Identification
 - Population affected
 - Distances from roadways
- Identification of noise sensitive sites which will experience a decrease in impact due to the project
- Identification of expected relocations and demolitions
- Description of construction activities, including truck hauling routes

- Description of alternatives considered but not chosen
- Development anticipated after completion of proposed project
 - New Roads
 - New building projects

[] Adequate
[] Adequate with reservations
[] Not adequate

4. ARE ADEQUATE NOISE LEVEL PREDICTIONS PROVIDED?

- Adequate Adequate with reservations Not adequate
- Noise descriptors used
 - Day-Night Equivalent Sound Level L(dn)
 - Hourly Equivalent Sound Level Leq(h)
 - Exceedence levels L(1), L(50), etc.
 - Other

| Present | After Project | |
|--------------------------|--------------------------|---|
| <u> </u> | <u>Completion</u> | |
| <input type="checkbox"/> | <input type="checkbox"/> | Predicted noise contours for preferred alternative route |
| <input type="checkbox"/> | <input type="checkbox"/> | Predicted noise levels at specific noise sensitive sites-preferred alternative route |
| <input type="checkbox"/> | | Measured noise levels <ul style="list-style-type: none"> <input type="checkbox"/> Adequate site selection <input type="checkbox"/> Adequate times and durations of measurements |
| <input type="checkbox"/> | <input type="checkbox"/> | Discussion of noise levels for non-preferred alternatives |
| <input type="checkbox"/> | <input type="checkbox"/> | Noise level predictions from affected non-project roads |
| | <input type="checkbox"/> | Construction noise levels, including noise levels generated by truck hauling to site |

5. IS THE NOISE IMPACT ADEQUATELY DISCUSSED?

- Adequate Adequate with reservations Not adequate
- Discussion of noise measures and their relation to impact
- Definition of noise level metrics (L(dn), Leq(h), L(10), etc.)
- Discussion of relations between noise levels and degrees of hearing loss and annoyance
- Discussion of the impact on the area in general
- Numbers of people affected at various noise levels
- Land use zones affected at various noise levels
- Discussion of areas which will experience significant increased impact
- Discussion of areas which will experience significant decreased impact
- Discussion of increased or decreased impact on specific noise sensitive sites
- Residential properties
- Schools and libraries
- Churches
- Hospitals and nursing homes
- Parks and zoos
- Other
- Concerns and comments from other governmental agencies and the general public included and discussed
- Discussion of relative impact between alternatives
- Discussion of construction noise impact

6. ARE MITIGATION MEASURES ADEQUATELY CONSIDERED?

- Adequate Adequate with reservations Not adequate
- Areas needing noise mitigation specifically documented
- Specific mitigation measures proposed for each impacted area
 - Recessed roadways
 - Relocations
 - Noise barriers or earth berms
 - Sound insulation of residences
 - Zoning and land use restrictions
 - Speed limit restrictions
 - Other
- Stated commitment to provide noise mitigation where needed

COMMENTARY TO EIS CHECKSHEET

1. IS AN ADEQUATE VISUAL DESCRIPTION OF THE SITE PROVIDED?

There is no better way to obtain an overall view of a project than to have access to an aerial photograph of the impacted area. This is particularly true for highway projects that cover large areas. The photograph should be of sufficient scale and clarity so that individual noise sensitive receptors can be identified. Superimposed on the photo will be the routes of the various road alternatives under consideration, the names of the major existing roads that can be expected to be affected by traffic pattern changes, an identification of important noise sensitive sites, and an explicit map scale so that the reviewer can determine distances. The identification of land use and zoning districts is also useful.

Blueprints and site drawings can provide much of the above information, but the aerial photograph is by far the better tool. It allows the reviewer an independent view of the impact area. There have been many instances where the perusal of one of these photographs has located potential noise affected areas not discussed in the EIS. Close scrutiny of this photograph should always be made if it is provided.

2. IS SUFFICIENT QUANTITATIVE INFORMATION ABOUT THE SITE AND ITS PRESENT USAGE GIVEN?

In order to assess the accuracy of the EIS predicted noise levels, the reviewer needs quantitative data about the road system, road usage, and the area impacted. It frequently happens that one or more pieces of this information are omitted in the EIS.

DRAFT COPY
SU

Should this situation occur, the reviewer can often make some judicious guesses of his own as to what values of the parameters to use. For instance, it is our practice that when only average daily traffic volumes are given, but hourly traffic volumes are needed in the noise calculations, we divide the daily volume by 10 and use it as a maximum hourly traffic volume. When the distribution between truck volumes and non-truck volumes is not available, we generally assume a six percent distribution of trucks. If the road appears to have a large truck usage, we might increase the percentage; if truck usage appears small, we would decrease the value. As the reviewer becomes more experienced, he will develop his own set of "rules of thumb". He should be careful, however, not to forget that these are his estimates, and that if his noise level predictions vary significantly from the EIS values, it could be that his assumptions, and not the EIS calculations, are inaccurate.

The EIS should provide details about the noise affected sites which would not be evident from the visual material alone. The kinds of noise sensitive activities at each site, the number of people that will be affected, and the usage schedule are examples of the type of information that will be useful for assessing noise impact.

3. IS THE SCOPE OF THE PROPOSED PROJECT ADEQUATELY DESCRIBED?

In this context, the scope of a project refers to all of the physical and operational changes that will occur as a result of the project being implemented. This includes physical changes in the road system, operational changes related to traffic flow, newly affected noise sensitive sites, relocations and demolitions, and construction activities. A description of the project alternatives that were considered, but not chosen, should also be given.

There are two areas where many EIS's fail to provide adequate information. The first involves projects that are expected to come on board after the present project is initiated. This would include industrial parks, shopping centers, residential developments, etc; which become attractive to developers as a result of the new road. If the possibility of such development is known, it should be documented.

The second area in which information is often not included in an EIS involves the benefits that would accrue if the highway is built. Many projects, especially those involving road relocations, will cause significant reductions in noise impact to areas presently experiencing noise problems. The EIS should provide the details necessary to substantiate this benefit. It is surprising how many EIS's fail to even consider this aspect.

4. ARE ADEQUATE QUANTITATIVE NOISE LEVEL PREDICTIONS PROVIDED?

The corroboration of the noise level predictions given in the EIS is the most technically difficult part of an EIS review. If all of the previous questions have been answered satisfactorily, the reviewer will have all of the data required to assess this concern. The references in the appendix provide methods for calculating the noise levels. We prefer to use one of the Federal Highway Administration methods (Reference 1) since they are ones used by most highway EIS preparers. We have found the hand-held calculator program (Reference 2) to be especially convenient.

Noise levels in highway project EIS's are usually given in any of three metrics: the day-night equivalent sound level $L(dn)$, the hourly equivalent sound level $Leq(h)$, or the 10% exceedance level $L(10)$. The hourly equivalent sound level is an energy-averaged sound level over a one hour period. $L(dn)$ is similar to $Leq(h)$ in that it also is an energy-averaged sound level. However, in this case the sound energy is averaged for a 24 hour period, with a 10 decibel penalty added to all noise occurring between the normal sleeping hours of 10 p.m. to 7 a.m. U.S. Environmental Protection Agency has correlated annoyance and hearing loss to $L(dn)$ values, which makes it useful in assessing noise impact. The exceedance level $L(10)$ is the noise level exceeded 10% of the time for a stated time period. There are methods given in the references for converting from one metric to another when enough data is given. In "normal" situations when complete data is not available, we have used the following two "rules-of-thumb":

The $L(dn)$ value in a given situation will be about 3-4 db lower than the $Leq(h)$ value for a maximum traffic volume hour.

The $L(10)$ value in any hour will be about 3 db higher than the $Leq(h)$ value for that hour.

The use of these rules will allow one to estimate $L(dn)$ from $Leq(h)$ or $L(10)$.

How should the EIS present the quantitative noise level predictions? The predominant format in use today is that of noise contour maps. A noise level contour is a line drawn over a site map, together with an associated noise level, such that the land within the contour experiences noise levels greater than or equal to the given noise level. The noise contour map is analagous to a topographic map, where points at a specific height are connected together to make an equal height contour, only in this case it is equal noise level points that are connected.

A complete noise contour map consists of a set of contours (usually in 5 or 10 db increments) ranging from the highest expected noise levels down to about the 40 or 45 db level. Contours should be shown for both pre-project and post project conditions.

In addition to the overall view given by the noise contour map, the good EIS will provide specific noise levels expected at important noise sensitive sites. It also provides noise level predictions for non-project roads which could be affected by changing traffic patterns. Some discussion of the noise levels which would have occurred had one of the non-preferred alternates been chosen is also useful for evaluation of their merits relative to the chosen alternate.

The effects of construction noise on the public can often be significant. The EIS should address this concern. Earth moving and pile driving equipment are frequent sources of complaint. In addition to actual construction site noise, attention should be paid to the noise caused by trucks hauling material to and from the site. This often overlooked aspect can be the cause of major noise impact, especially when the truck routes pass through normally quiet residential areas.

Many EIS's include a report of noise measurements made under existing conditions. The quality of these reported studies varies greatly from EIS to EIS. Before the reviewer puts much credence in one, he should verify that the data: (1) are taken at a sufficient number of "good" sites to adequately represent the existing noise environment, (2) are taken at times that include maximum traffic flows (i.e. rush hours), and (3) are taken for a reasonable period (normally 15 minutes or greater) at each measurement site.

5. IS THE NOISE IMPACT ADEQUATELY DISCUSSED?

A discussion of noise impact involves more than simply providing noise levels. The EIS should discuss how the noise measures used in the EIS relate to hearing loss and annoyance. General relations between noise levels and the degree of impact on people (e.g. noise levels vs percent of people annoyed) can be obtained from the literature and should be incorporated. The annoyance aspects are most important since there are very few sites that will experience noise levels so loud as to cause physical hearing damage.

The EIS should first consider the overall noise impact on the area affected by the highway. The land use zones and the number of people (or residences) exposed to various levels of noise should be identified and the magnitude of the impact stated. The previously identified noise sensitive activities should be discussed in detail with respect to potential noise impact. The degree of impact and its ramifications should be covered. If no significant impact is expected at a particular site, that fact should be stated.

It should be noted that "the degree of impact" is a relative concept. If ambient noise levels are low to begin with, the impact of a project could be significant in spite of the fact that the new noise levels might not exceed normal standards. For example, consider a highway built in a rural area which originally experienced $L(dn)$ noise levels in the 40 db range. If the post-project levels turn out to be 10 db greater, they would still be acceptable for most urban areas. To the people living in the rural area, however, the new levels would cause an appreciable impact since they would be subjectively twice as loud as the one the people were used to.

In our considerations of noise impact, we generally feel that outdoor L(dn) levels of 55 db or less are reasonable for residential areas, while levels above 65-70 db are definitely excessive. In terms of noticeable changes of impact, a 3-4 db increase will be noticeable, while increases greater than 7-8 db are considered major.

The impact of construction noise, although it is only temporary, can be substantial. In the immediate neighborhood of the site earth moving activities and pile driving can generate annoyance. If hauling trucks are extensively used, the impact could be extended to all of those neighborhoods along the truck routes. The EIS should assess these potential problems in detail. Too many EIS's only make a token effort in discussing this problem.

6. ARE MITIGATION MEASURES ADEQUATELY CONSIDERED?

After all of the noise analysis of the project has been presented, there are often a number of sites where the noise impact is large enough to warrant the consideration of implementing noise mitigation measures. (We consider levels above L(dn) values of 65 db in residential areas as prime candidates.) The EIS should explicitly identify these sites, provide a discussion of those mitigation measures which are applicable at each site, and provide a clear-cut statement of the degree of commitment to implementing them. We see more than a few EIS's that simply dismiss mitigation with a wave of the hand and with unsupported statements to the effect that mitigation would be either too expensive or ineffective. It is possible that these conclusions are accurate, however, the EIS must provide supporting data.

APPENDIX

REFERENCES

1. FHWA Highway Noise Prediction Model, U.S. Department of Transportation, Federal Highway Administration Report FHWA-RD-77-108, 1978
2. "Hand -Held Calculator Listings for the FHWA Highway Traffic Noise Prediction Model", U.S. Department of Transportaion, Federal Highway Administration, FHWA Technical Advisory T5040.5
3. A Manual For the Review of Highway Noise Impact, U.S. Environmental Protection Agency, 550/9-77-356, 1977
4. Design Guide for Reducing Transportation Noise in and Around Buildings, D. Pallett, et al, U.S. Department of Commerce, National Bureau of Standards Stock Number 003-003-01687-0, 1978
5. Guidelines for Preparing Environmental Impact Statements on Noise, Committee on Hearing, Bioacoustics, and Biomechanics, National Research Council, National Academy of Sciences, Washington, D.C. 1977
6. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, U.S. Environmental Protection Agency, EPA 550/9-74-004, 1974
7. The Audible Landscape: A Manual for Highway Noise and Land Use, U.S. Department of Transportation, Washingt on, D.C. 1974 Stock Number 5000-00079

Appendix 1 - References

1. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety, U.S. Environmental Protection Agency, Washington, D.C. 20460, 550/9-74-004 March 1974
2. Calculation of Day-Night Levels Resulting from Civil Aircraft Operations, U.S. Environmental Protection Agency, EPA 550/9-77-450 January 1977
3. Guidelines for Preparing Environmental Impact Statements on Noise, Committee on Hearing, Bioacoustics, and Biomechanics, National Research Council, National Academy of Sciences, Washington, D.C. 1977
4. Aircraft Noise Impact Planning Guidelines for Local Agencies, U.S. Department of Housing and Urban Development. TE/NA - 472 November 1972
5. Design Guide for Reducing Transportation Noise in and Around Buildings, U.S. Department of Commerce, National Bureau of Standards, 003-003-01687-0, 1978