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A PROCEDURE FOR PROCESSING HIGHWAY NOISE COMPLAINTS

FINAL REPORT

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16. Abstract

This final report presents a comprehensive procedure by which traffic noise complaints received by the New Jersey Department of Transportation will be processed for the Interstate and state freeway systems. This procedure provides a formalized method for responding to the public's complaints of excessive highway noise and for conducting studies of noise abatement measures to mitigate traffic noise impacts in communities. This procedure is described in detail in 84 steps and is accompanied by a flow chart to facilitate its use. In addition, this report includes a Priority Rating Index (PRI) for prioritizing requests for noise abatement from communities throughout the state. The PRI, which ranks requests based on a community's total noise impact, provides a means for equitably administering Federal-aid funds available for noise abatement along completed freeways. Also included is a complete list of the sections of New Jersey Interstate highways for which 65, 70, and 75 dBA (L_{10}) noise contour lines were developed for adjacent noise sensitive areas. The PRI and noise contour line maps are a part of the noise complaint processing procedure.

An interim report was also prepared which covered the procedure for developing noise contour lines, a preliminary priority rating method, a procedure for making noise measurements for noise abatement studies, and a level of effort estimate for the processing of a noise complaint.

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DISCLAIMER STATEMENT

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

ADDENDUM

In reference to the Noise Complaint Processing Procedure, the Level of Action procedures, Steps 28 to 36, have been revised subsequent to the preparation of this report. Effective August 1982 with the distribution of the Department's revised Action Plan, the Bureau of Environmental Analysis completes the Level of Action Determination for all Type II noise abatement projects whether this determination is Class I Action (Environmental Impact Statement), Class II Action (Categorical Exclusion), or Class III Action (Environmental Assessment). Accordingly the Level of Action Committee has been abolished. Thus Steps 29, 32, 33, 34, and 35 of the Noise Complaint Processing Procedure have been eliminated and processing now proceeds from Step 28 directly to Step 30. Level of Action forms are being revised to reflect this new procedure.

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the contributions of the personnel of the Bureau of Environmental Analysis (BEA) toward the completion of this effort. Much of the information which was obtained during discussions with members of this bureau -- in particular from those discussions with Domenick Billera -- was incorporated into the noise complaint processing procedure. In addition BEA contributed the revised Priority Rating Index, which was developed by Mr. Billera and Bruce Cunningham, and the working copy of the flow chart of the procedure. The final copy of the flow chart was completed by Joe Flesch, Bill Crowell and Jan Rita of the Division of Research & Demonstration.

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SUMMARY

Over the years, the New Jersey Department of Transportation (NJDOT) has received a significant number of complaints of excessive highway noise from residents throughout the State. Since New Jersey is the nation's most densely populated state these complaints are likely to continue. To process these complaints in an orderly and equitable manner, a comprehensive procedure was needed.

The noise complaint processing procedure clarifies the steps to be taken to process a noise complaint from the time the complaint is received through the preliminary design of noise abatement measures (if recommended). The step-by-step procedure, which is designed for use on Interstate and State freeway roadways, includes a method for (1) determining the legitimacy of a complaint, (2) prioritizing complaint areas so that communities with the most severe noise impacts will be the first to be eligible for those Federal Highway Administration (FHWA) noise abatement funds that may be available, (3) conducting a study of alternative noise abatement measures with the receipt of federal funding, (4) interacting with the public, and (5) coordinating actions with federal and municipal governments and units within NJDOT.

The Priority Rating Index (PRI), which has been revised since its original presentation in the interim report, uses a rating equation with three major factors: namely, the population, the magnitude of noise impact, and the duration of noise impact. It is much simpler to utilize than the original PRI.

Other aspects of this study include a methodology for developing noise contour lines on aerial photographs of the major noise sensitive areas adjacent to New Jersey's interstate highways, a standard method for conducting noise measurements at a complaint site, and a level of effort estimate for processing a noise complaint. These aspects were covered in the interim report.

INTRODUCTION

NJDOT has received complaints of excessive highway noise for many years, however, prior to 1974 funding for large scale noise abatement projects on existing highways was not available. In 1974 the FHWA, through Federal-Aid Highway Program Manual, Volume 7, Chapter 7, Section 3 (FHPM 7-7-3), made projects for noise abatement on existing highways located on a Federal-aid system eligible for Federal-aid highway funds. These types of projects are referred to as Type II noise abatement projects.* FHPM 7-7-3 does not make Type II projects mandatory whenever noise impacts occur along existing highways but instead leaves abatement in these cases to a state's discretion.

In response to public concerns about transportation noise, NJDOT decided to start a program to mitigate traffic noise impacts on development adjacent to Interstate routes and state freeways. To obtain eligible Federal-aid funds, however, FHPM 7-7-3 required that certain provisions be met; among these being that state agencies perform a noise analysis which identifies noise impacts and considers alternative means of mitigating these impacts. In addition, requesters of Federal-aid funding for Type II noise abatement projects were required to indicate the relative priority of a particular project with respect to other potential Type II projects within their state.

*Type II projects are proposed Federal or Federal-aid highway projects for noise abatement on existing highways located on a Federal-Aid System. A project might include construction of noise walls, earth berms, etc. NJDOT will limit Type II projects to Interstate routes and state freeways.

To address these funding provisions NJDOT decided to develop a comprehensive procedure for processing highway noise complaints, and thus this study was initiated. The complaint processing procedure presented in this report is the culmination of that effort.

The primary objective of this study was to finalize a comprehensive procedure for processing highway noise complaints in an orderly and equitable manner while meeting FHWA requirements for Type II noise abatement project funding. The highway noise complaint processing procedure, which will be utilized by the Bureau of Environmental Analysis of the Division of Project Development, is described in detail on the following pages. It should eliminate many of the opportunities for delay and inequity inherent in processing highway noise complaints without a formalized procedure.

The complaint processing procedure necessitated the development of a priority rating system and noise contour lines. The rating system, hereafter referred to as the Priority Rating Index or PRI, is used at Step 19 of the procedure to assign priorities to noise abatement requests from communities with legitimate complaints in order that NJDOT can equitably distribute Federal-aid highway funds for Type II noise abatement projects. The PRI is based on the total noise impact sustained by a community and calculated from field survey data gathered by the Department. An explanation of the Priority Rating Index is given in the Appendix. The noise contour lines, which indicate the present day noise levels in the major noise sensitive areas adjacent to New Jersey's interstate system, are used at Step 12 for an initial evaluation of a complaint's legitimacy. A list of

sections of Interstate highways for which noise contour lines were completed is presented in the Appendix. The development of the Priority Rating Index and noise contour lines marked the secondary objectives of this study.

At least 10 other states have developed methods for prioritizing potential noise abatement sites. Among them are California, Minnesota, Colorado, Michigan, Connecticut, Iowa, Georgia, Maryland, New York, and Washington. NJDOT's PRI is similar to most of these prioritizing methods in that it features a mathematical formula for producing numerical ratings; a formula which considers most of the same factors. Also NJDOT's PRI is updated on an annual basis like most states. NJDOT's PRI differs from most of the others in that its formula contains the L_{NP} (noise pollution level) and does not consider cost.*

*Because cost can sometimes be prohibitive, it is considered later in the noise complaint processing procedure when the feasibility of abatement measures is determined at Steps (59 and 77).

THE HIGHWAY NOISE COMPLAINT PROCESSING PROCEDURE

There are many aspects to the investigation of a highway noise complaint. Some are described below. First the complaint must be forwarded to the proper agency within the Department. Next personnel investigating the complaint must determine if the highway involved comes under New Jersey jurisdiction. If so, past complaint investigations and environmental impact statements are reviewed to see if the complaint has already been addressed. If the complaint has not been previously investigated, it must be decided if a problem exists, and then the severity of the problem in relation to the traffic noise problems of other areas must be determined. If further action is warranted, it must be determined what type of action to take. If a request for a Type II Federal-aid noise abatement project is made, approval must be obtained for federal funds for a study of noise abatement measures. If and when approval is granted, a detailed study of noise abatement measures (earth berms, noise walls, noise insulation, etc.) must be performed. This noise abatement study includes examination of traffic information and roadway plans, and traffic noise monitoring at the complaint site. A preliminary report is then prepared. If noise abatement measures are judged to be feasible, public information meetings are held to obtain comments from local residents and local government. After the public meeting comments are reviewed, a final noise study report is prepared, and FHWA concurrence in the report's findings is requested.

As indicated by the actions just mentioned, federal, state, and local government representatives must interact at various points in the process; also, the complainant(s) must be notified of the status of the complaint.

Due to the complexity of this traffic noise complaint investigation process, many opportunities for inefficiencies, inequities, and delays arise. To improve complaint processing, a formal and comprehensive procedure was needed to clarify actions and interactions in order to reduce or eliminate these inherent delays and inequities. The Highway Noise Complaint Processing Procedure was developed to meet this need.

The Highway Noise Complaint Processing Procedure consists of 84 steps which are described in detail beginning on page 9 . To facilitate the use of the procedure, an accompanying flow chart is included on pages 49-51. A summary of the complaint processing procedure is given below.

Step Number	Description
1-15	A preliminary investigation of the highway noise complaint is made. Processing stops at Step (15) unless a town resolution or official request for a noise study is received.
16-18	Noise impact is determined based on preliminary noise level measurements made in the complainant community.
19-21	The Priority Rating Index is utilized to determine if a noise abatement request has a high enough priority to begin a Type II study.
22-27	NJDOT and FHWA approval for funding of a Type II noise abatement study is requested.
28-36	Level of Action is determined.*

* See Addendum.

37-64	A Type II noise abatement study is conducted, recommendations are made, and FHWA concurrence is requested.
65-72	Local government and the public participate in the noise abatement process.
73-79	The feasibility of the proposed noise abatement measures is determined. All relevant factors are considered in light of the nature of the town resolution.
80-84	Implementation of the proposed noise abatement measures is recommended in a final report, and when FHWA concurrence is received, the project is transferred to Design.

The final step in the noise complaint processing procedure is the transfer of the noise abatement project to the Division of Design after FHWA concurrence in the findings of the final noise study report has been received. From this point, final design and construction of the noise abatement measures follows in keeping with established NJDOT procedures.

HIGHWAY NOISE COMPLAINT PROCESSING PROCEDURE

STEP 1 Complaint Is Received by BEA

The processing procedure begins when a noise complaint is received by the Bureau of Environmental Analysis (BEA) usually via a letter or phone call. The complaint is either received directly by BEA or forwarded to them -- most often from the Division of Design, the Commissioner's Office, or the Bureau of Quality Control. The complainant is normally either an individual(s) or a municipality.

STEP 2 Fill Out Noise Complaint Form

A standard highway noise complaint form (see next page) is filled out for each complaint. The date and time the complaint was received are recorded, as well as the name, address, and phone number of the complainant. A detailed description of the location of the complaint area (county, municipality, street) is noted. Information about the specific nature of the complaint is entered, and the roadway(s) suspected of generating the excessive noise are identified. If the complaint has been forwarded from another agency, this agency is noted.

STEP 3 Does the Roadway Come Under NJDOT Jurisdiction?

The jurisdiction of the highway which is alleged to be generating excessive noise is now determined. Interstate, United States, and State highways are under NJDOT jurisdiction; county and township roads, and privately owned and operated highways, such as the New Jersey Turnpike and the Garden State Parkway, are not. If the highway does not fall under NJDOT jurisdiction, proceed to Step (4); if it does, to Step (5).

HIGHWAY NOISE COMPLAINT REPORT

RECEIPT OF COMPLAINT:

___/___/___ Date	___:___ AM PM Time	____________ Forwarding Agency
______ Letter	______ Phone Call	______ Other(specify)

COMPLAINANT INFORMATION:

____________ Name		____________ Phone Number
____________ Mailing Address (Street/Route)		____________ Municipality
____________ City,Town, or Post Office	______ Zip	____________ County

ADDITIONAL DESCRIPTION OF COMPLAINANT'S LOCATION (if necessary):

____

____

SPECIFIC NATURE OF COMPLAINT:

____

____

____

____

NOISE SOURCE:

____
Highway or Highway Section

____
Preparer's Name or Initials

STEP 4 Notify Complainant Concerning Responsibility for Roadway

The complainant is notified by letter that the highway does not come under NJDOT jurisdiction and is informed of the agency which has responsibility for the road.

STEP 5 Has Priority Rating System Already Been Applied?

The highway noise complaint priority list is checked to determine if the priority rating index method has already been applied for the area of complaint. If it has, proceed to Step (6); if not, proceed to Step (7).

STEP 6 Notify Complainant of Priority Assignment

The complainant is informed by letter that his town has already submitted to the State a noise resolution or official position covering his area, and therefore his complaint is under consideration. He is notified of the priority assigned to this area, and the year in which it is expected that a Type II noise abatement study will begin.

STEP 7 Is NJDOT About to Begin a Type I Project?

The monthly report of the status of active projects (Status of Plans Report) is checked to determine if a Type I reconstruction project covering the complaint area is about to begin. If it is, proceed to Step (8); if not, proceed to Step (9).

STEP 8 Notify Complainant of Planned Highway Reconstruction and Associated Noise Study

The complainant is notified by letter that reconstruction of the highway causing his noise problem is planned. He is informed that prior to this

reconstruction an environmental study considering the expected traffic noise impacts of the reconstructed highway will be carried out, and if this study indicates that a noise impact, as defined by Federal-Aid Highway Program Manual, Volume 7, Chapter 7, Section 3 (FHPM 7-7-3) exists, then measures designed to abate the noise reaching his area will be implemented if feasible.

STEP 9 Former Type I or Type II Action?

The file of former Type I and Type II studies is reviewed. If NJDOT has conducted a Type I or Type II study for the complaint area, proceed to Step (10); otherwise proceed to Step (11).

STEP 10 Notify Complainant of Results of Previous Studies and FHPM Regulations

If NJDOT has previously conducted a Type I noise study for the complaint area, the complainant is notified by letter that a noise study completed when the highway in question was constructed found that his area was not expected to sustain any significant noise impacts. In addition, he is informed that NJDOT does not investigate noise complaints from individual complainants, and he is advised that if he would like to pursue his complaint further he should have his municipality make an official request to NJDOT for an additional noise study.

If the complainant is located in an area whose development was not planned at the time of highway construction, he will be informed by letter that because of the unplanned development of his community, noise abatement measures to reduce the traffic noise impact on his area were not designed

when the highway was constructed. Therefore, he will be advised that NJDOT does not bear the responsibility for noise problems resulting from the development of his area subsequent to highway construction.

If NJDOT has previously conducted a Type II noise study for the complaint area, the complainant is informed by letter that NJDOT has already completed a study of traffic noise impacts in his area, and that either noise abatement measures have already been implemented to reduce the traffic noise in his area to acceptable levels, or that even though there were significant noise impacts in his area it was found infeasible to implement noise abatement measures. He is notified that if he wishes to pursue his complaint further he should have his municipality make an official request to NJDOT for an additional noise study.

STEP 11 Are Noise Contour Maps or Existing Noise Data Available?

At this point, noise contour maps and the existing noise measurement data file are checked to determine if any noise level information is available for the complaint area. If information is available, proceed to Step (12); if it is not, proceed to Step (14).

STEP 12 Do Noise Levels Approach or Exceed Design Noise Levels?

The available noise level information is now examined to estimate whether noise levels in the complaint area approach or exceed the design noise levels in FHPM 7-7-3. If they do, proceed to Step (14); if they do not, proceed to Step (13).

STEP 13 Notify Complainant of FHPM Regulations

The complainant is notified by letter that according to available noise level information he does not have a significant traffic noise impact as

defined by FHPM 7-7-3. He will also be informed that if he wishes to pursue the matter further he should have his municipality make an official request to NJDOT for a noise study.

STEP 14 Town Resolution or Official Request for Noise Study?

At this point, a town resolution or official request to NJDOT for a noise study is required before further processing of the complaint takes place. This policy should have the effect of involving other residents in the complainant's community, as well as local government officials, in the noise complaint process. This involvement is beneficial because any noise abatement measures which might be implemented in the area in the future would most likely influence the entire community. If a town resolution or official request has been received, proceed to Step (16); if neither has been received, proceed to Step (15).

STEP 15 Advise Complainant that Local Government Support Is Needed

The complainant is now informed that NJDOT will not process his complaint further without support from his local government in the form of a resolution or official position requesting the Department to perform a traffic noise study.

If and when a town resolution or official position requesting a noise study is received by BEA, processing of the noise complaint resumes at Step (14).

STEP 16 Preliminary Noise Level Measurements

Preliminary noise level measurements are now conducted by the Bureau of Quality Control. These measurements consist of a 24 hour continuous noise

sample and additional spot measurements at various locations throughout the community. They reveal whether existing noise levels approach or exceed the design noise levels in FHPM 7-7-3 and provide acoustic information which is used when the priority rating index method is applied (Step 19).

STEP 17 Do Noise Levels Approach or Exceed Design Noise Levels?

If the noise levels measured in the complaint area as in Step (16) approach or exceed the design noise levels in FHPM 7-7-3, proceed to Step (19); if they do not, proceed to Step (18).

STEP 18 Notify Municipality of FHPM Regulations

The municipality is notified by letter that NJDOT has taken noise level measurements in the complaint area. Noise levels, measurement locations, as well as the dates and times of measurement are indicated in the letter. The municipality is informed that there is not a significant noise impact in the complaint area according to FHPM 7-7-3 because the measured noise levels did not approach or exceed the design noise levels contained therein. The design noise levels which are applicable to the activity category(s) in the complaint area are outlined. The municipality is informed that NJDOT does not intend to address this noise complaint further, and that if at some future date, local government suspects that the traffic noise in the complaint area has increased considerably from present levels, they should submit another town resolution or official request to NJDOT at that time.

STEP 19 Apply Priority Rating Index Method

The priority rating index method is applied. This method assigns relative priorities to potential projects for community noise abatement so that

those communities with the most severe noise impacts are the first to become eligible for FHWA noise abatement funding. The index is based on three measures of noise impact; namely population, and the magnitude and duration of noise impact. The values for these measures are developed from field survey data gathered in the complainant communities in Step (16). A Fortran computer program facilitates the use of the method.

STEP 20 Is Priority Rating High Enough to Begin Study?

If the priority rating assigned to the noise abatement project for the complaint area is high enough to begin a Type II noise abatement study, proceed to Step (22); if it is not, proceed to Step (21).

Generally, federal funding for a noise study is requested for the one or two highest rated projects of those under consideration in a given year. The number of noise study requests may change, of course, depending on available funds. Those projects for which funding is not requested in a particular year because of low rankings are reconsidered and reranked the following year along with any new noise complaints which have been received.

STEP 21 Notify Municipality of Priority Assignment

The municipality is informed by letter of the following:

(a) the noise abatement project for its complaint area has been assigned a priority according to NJDOT's priority rating method,

(b) each year NJDOT usually requests federal funds for noise abatement studies for only the one or two projects with the highest priorities, and

(c) since the project for its complaint area did not have a high enough priority, federal funds were not requested, and thus a noise abatement study for the area will not begin this coming year. However, next year, and every year thereafter if required, the project for the complaint area will be reconsidered and assigned a new priority along with the projects for any other noise complaint areas which are awaiting noise abatement study. If it is then one of the highest priority projects, federal funding for a noise abatement study will be requested.

STEP 22 BEA Submits Project Programming Request (T-PT-930)

A project programming request (Form T-PT-930) is prepared and submitted to the Office of Programming and Monitoring. This form requires a general description of the project and its limits, cost estimates for preliminary engineering (both State and federal), and a project justification. A map showing the location of the project is attached to this form. Submission of this request initiates both Federal-aid programming and NJDOT construction programming.

STEP 23 Approval Is Received on Federal-Aid Work Program

The Bureau of Environmental Analysis is notified either by memorandum or other means that a project has been approved for the Federal-Aid Work Program. This approval signifies that the federal funds requested by BEA for preliminary engineering work have been set aside.

STEP 24 Approval Is Received on NJDOT Construction Program

The Bureau of Environmental Analysis is notified either by memorandum or other means that a project has been approved for the NJDOT construction

program. This approval signifies that the state funds requested by BEA for preliminary engineering have been set aside.

STEP 25 Obtain Present & Future Traffic Data from BTP for FA-9

Estimated present and future traffic data for the project area is requested from the Bureau of Travel Projections (BTP). This data, which includes AADT, DHV, and % Trucks, is required for Form FA-9, Step (26).

STEP 26 BEA Submits FA-9 Request for Federal-Aid Project Approval

A request for Federal-Aid Project Approval (Form FA-9) is prepared and submitted to the Office of Programming and Monitoring. This form requires a description of the project and its limits, project cost estimates (both state and federal), present and future traffic estimates, and Federal-Aid Program and NJDOT Construction Program item numbers. A map showing project location is attached. This form requests authorization to use Federal-aid funds for a project.

STEP 27 FHWA Authorizes the Project Via Form PR-1240

The Bureau of Environmental Analysis receives, via the Office of Programming and Monitoring, a copy of FHWA Form PR-1240, "Letter of Approval and/or Authorization". This letter authorizes the use of Federal-aid funds. As a consequence of receiving Form PR-1240, NJDOT assigns a job number to the project thereby authorizing the use of matching state funds.

STEP 28 BEA Prepares LOA Assessment (See Addendum)

BEA prepares a Level of Action (LOA) assessment and in the process examines the likelihood of significant environmental impacts due to implementation of the proposed noise abatement measures for this project.

STEP 29 Is Project Categorical Exclusion?

If the LOA assessment finds that implementation of the noise abatement measures does not have a significant effect on the environment (this is normally the finding), then the project is identified as a categorical exclusion. (Proceed to Step (30)).

Though it is highly unlikely, if it is found that implementation of the noise abatement measures has the potential for significant environmental impacts, the project is not specifically identified as a categorical exclusion and is classified in accordance with the LOA procedures in the Action Plan. (Proceed to Step (32)).

STEP 30 BEA Completes LOA Determination

BEA completes the LOA determination and fills out Form T-SA-1097, "Level of Action Determination". The Chief of BEA reviews and approves this determination.

STEP 31 Director of Division of Project Development Concurs in LOA

The Director of the Division of Project Development concurs in BEA's LOA determination and forwards Form T-SA-1097 and a memorandum requesting concurrence to the FHWA. Proceed to Step (36).

STEP 32* BEA Solicits Level of Action Responses from LOA Committee Members

The Bureau of Environmental Analysis sends a memorandum describing the proposed Type II noise abatement project to each of the members of the Level

*Steps (32) to (35) on the accompanying flow chart are enclosed by dotted lines to indicate that this path is almost never taken.

of Action Committee. This committee, which includes the Chiefs of the Bureaus of Surface Design and Landscape Architecture, the Directors of the Office of Community Involvement and the Division of Right of Way, and others, including the Chief of the Bureau of Environmental Analysis itself, determines the extent of environmental documentation required for a proposed project. The memorandum from BEA requests a response from committee members regarding any possible adverse social, economic, or environmental impacts of the proposed project in their particular areas of expertise. Form T-SA-1097, ("Level of Action Determination") which lists the type of proposed project and its location, extent, and estimated cost, is attached to the memorandum along with a map showing project location.

STEP 33 BEA Conducts Environmental Analysis in the Appropriate Disciplines

BEA completes an environmental analysis giving consideration to possible adverse social, economic, and environmental impacts of the proposed noise abatement project in any of BEA's areas of expertise which include air and water quality, socio-economic conditions, land use, and cultural resources among others.

STEP 34 Level of Action Meeting Is Requested and Scheduled

BEA adds its environmental analysis response for the proposed Type II project to the responses received from the Level of Action (LOA) Committee members and sends them, with a request for an LOA meeting, to the chairman of the LOA Committee; namely, the Chief of the Bureau of Surface Design. The chairman distributes all of the responses to each LOA Committee member and schedules an LOA meeting.

STEP 35 The Project is Assigned a Level of Action and FHWA Concurrence is Requested

A Level of Action meeting is held during which the committee determines the environmental documentation required for the proposed noise abatement project and classifies it into one of three categories, Classes I, II, and III. For a Class I project, an Environmental Impact Statement (EIS) is required because the project is of a large scale and probably will have significant social, economic, and environmental impacts. A Class II project is categorically excluded from any further environmental analyses because it is a small scale project of a type which does not normally have significant social, economic, or environmental impacts. For a Class III project, an environmental assessment is required because further investigation of potential social, economic, and environmental impacts is necessary.

The Level of Action Committee sends a memorandum to the FHWA requesting concurrence in the LOA assignment. Form T-SA-1097, "Level of Action Determination", is attached.

Noise abatement projects, being actions listed as categorical exclusions in the October 30, 1980 Federal Register, will ordinarily be assigned a Class II project category by BEA at Step (30) and will not require further environmental documentation. However, if a noise abatement project is assigned a Class III project category by the LOA Committee, then an environmental assessment will be required. In this case, the environmental

assessment will be completed at Step (75) after the conceptual (basic) design of noise abatement measures has been finalized, and public meeting comments and local government recommendations have been evaluated.

STEP 36 FHWA Concurs in Level of Action Assignment

The FHWA indicates concurrence in the Level of Action recommendation by returning Form T-SA-1097 with the appropriate signatures to BEA.

NOTE: Completion of the Level of Action process (Steps 28-36) is not required before BEA can begin the Type II noise abatement study (Step 37). However, FHWA concurrence in the Level of Action recommendation (Step 36) should be received by Step (84) (Transfer of Project to Division of Design) because concurrence in the LOA is required before preliminary design can be initiated.

STEP 37 BEA Begins Type II Noise Study

The Bureau of Environmental Analysis begins the Type II noise abatement study. The purpose of this study is to identify traffic noise impacts and to evaluate alternative noise abatement measures for reducing or eliminating them. As part of the study, existing noise levels are determined and future traffic noise levels are predicted.

STEP 38 BEA Obtains Noise Monitoring Data from BQC

Extensive noise level monitoring is conducted in the complaint area by the Bureau of Quality Control (BQC) for the purpose of obtaining a detailed description of the acoustic environment of the community. Measurements are

taken at various locations throughout the community with a greater concentration of measurements being taken in areas of noise sensitive activities and land uses (parks, schools, residences, etc.) thereby giving them special attention. Twenty-four hour continuous noise samples are taken utilizing a portable outdoor microphone system which can be left unattended. In addition, traffic data consisting of hourly car, medium truck, and heavy truck volumes and speeds are collected simultaneously with noise level measurements for some locations. These noise level and traffic measurements are used to calibrate the computer programs which will predict future noise levels for the design year.

STEP 39 BEA Obtains Traffic Data from BTP

BEA obtains traffic data, which will be used for predicting the highest expected future noise levels, from the Bureau of Travel Projections (BTP). This data normally consists of design hourly volumes and speeds and level of service C volumes and speeds for cars, medium trucks, and heavy trucks, as well as directional distributions. Design hourly volumes and level of service C volumes generally occur during peak hours. In some instances, however, the noise levels measured in Steps (16) and (38) indicate that the highest noise levels in an area occur outside of the peak hour. This can happen because there may be more trucks, which are the major source of highway noise, on a highway during an off-peak hour. For these special cases, BEA also obtains from BTP the design year volumes and speeds of cars and trucks for this off-peak hour.

STEP 40 BEA obtains Plans, Profiles, & Cross Sections from BSD as Necessary

To accurately describe the noise source, BEA obtains highway construction plans, which include plan sheets, profiles, and cross sections, from the Bureau of Surface Design (BSD). These plans are also used to accurately position noise barriers, locate residences near the highway, and construct noise contours for predicted levels.

STEP 41 Liaison Developed between BEA and Municipal Engineer

BEA develops a liaison with municipal government officials -- particularly with the municipal engineer or town manager -- whose jurisdiction includes the complaint area. In the process, the municipality is informed that NJDOT has begun a Type II noise study for their community. BEA interacts primarily with the municipal engineer since he usually has the most knowledge about local maps and other technical information about the community. From the municipality BEA obtains available local maps, aerial photographs, and other information, as required, for the complaint area.

STEP 42 Does BEA Require Additional Mapping or other Information?

BEA gathers maps, plans, and aerial photographs for the purpose of correctly defining the relative positions of (1) the noise source (the highway), (2) the sound path (the terrain adjacent to the highway), and (3) the sound receivers (residences, schools, etc.). As mentioned, most of these materials are supplied by the Bureau of Surface Design and the municipality through the municipal engineer. Additional information of this type is sometimes obtained from other sources within the Department. On occasion, however, maps, plans, and aerial photographs from these sources are not sufficient; for example, they may be outdated or incomplete. If

BEA requires additional topographic or other technical information, proceed to Step (43); if not, proceed to Step (45).

STEP 43 BEA Prepares Form PS-40, "General Requisition"

BEA prepares Form PS-40, "General Requisition", in order to obtain necessary topographic or other information. Attached to the form is a specification sheet which describes in detail the services which BEA requests. Since in most instances BEA will require aerial photography or elevation contours, specifications will usually include the area of coverage, scale of maps and/or photos, the accuracy required, etc. This form is processed through normal channels leading to the eventual selection of an aerial photographer or engineering firm to provide the service.

STEP 44 BEA Reviews Information Requested on PS-40

BEA receives the information requested on Form PS-40 and reviews it to verify that the work specified on this form has been completed.

STEP 45 BEA Begins Noise Predictions and Analysis of Impacts

In predicting traffic noise levels and assessing noise impacts, BEA uses the traffic characteristics which yield the worst hourly traffic noise impacts which are expected to occur in the complaint area on a regular basis in the design year*. This worst case traffic for the design year is selected from the traffic volume projections supplied by BTP in Step (39). Traffic for the design year is used because noise abatement measures would probably be underdesigned if based on present day traffic.

*Highways are designed based on the future traffic volumes projected for the design year which is usually 10 to 20 years after the proposed start of highway construction

Future noise levels are predicted using a computer program named "STAMINA 1.0" which is the FHWA Level 2 Highway Traffic Noise Prediction Model. This program is approved for use by FHPM 7-7-3. STAMINA 1.0 is an equivalent sound level, L_{eq}, based prediction method for which the highway, the adjacent terrain, and nearby noise sensitive areas such as parks, schools, and residences are modelled by means of a three dimensional rectangular coordinate system. Specification of roadway characteristics, traffic characteristics, topography (allowance is made for absorptive ground strips and finite length barriers), and sound receiver locations is required for prediction. The program incorporates three classes of vehicles--automobiles, medium trucks, and heavy trucks. For medium trucks and heavy trucks, reference energy mean emission levels measured for New Jersey trucks during 1977 [Reference 1] are used; for autos, the national reference mean emission levels given in FHPM 7-7-3 are used.

To improve prediction accuracy the program is calibrated utilizing the existing noise level measurements and traffic data obtained in Step (38) before predictions of future noise levels are made. Future noise levels are then predicted for locations throughout the complaint area, however, a greater number of predictions are made for the noise sensitive areas which have been identified in order to better define the future levels for these areas. Noise contour lines are constructed from the predicted noise levels to aid in evaluating noise impacts.

Predicted noise levels are now studied to determine the extent of traffic noise impacts in the community. Impacts are determined in keeping with the

definition contained in FHPM 7-7-3, which states that traffic noise impacts occur when predicted traffic noise levels approach or exceed the design noise levels given therein, or when the predicted traffic noise levels substantially exceed the existing noise levels. Accordingly, the predicted traffic noise levels for the community are compared to the design noise levels in FHPM 7-7-3 and also to the existing noise levels measured in Step (38).

STEP 46 BEA Initiates Detailed Analysis of Various Noise Attenuation Measures

BEA begins its evaluation of alternative noise abatement measures to reduce or eliminate the expected traffic noise impacts on the noise sensitive areas identified in Step (45). The following noise abatement measures are normally considered:

(1) traffic management measures such as signing for modified speed limits, prohibition of certain vehicle types, time-use restrictions for certain vehicle types, etc.,

(2) construction of noise barriers (including landscaping for aesthetic purposes) whether within or outside the highway right-of-way. Property rights may be acquired, when necessary, for construction of noise barriers, and

(3) noise insulation of public use or nonprofit institutional structures.

Of course, there may be some instances where measures other than those listed above may be examined. Because measure 1 is not usually practical

for Type II noise abatement projects, this noise complaint processing procedure only includes an evaluation of measures 2 and 3, specifically, noise walls, earth berms, and noise insulation.

In evaluating the various noise abatement measures, BEA analyzes the benefits, costs, and overall adverse social, economic, and environmental effects of abatement. Naturally, the abatement measure which provides the greatest benefit for the lowest cost, and the least adverse social, economic, and environmental effects is preferred. In some instances, several different noise abatement measures or a combination of measures may be indicated, for example, a noise wall used in conjunction with the noise insulation of a public structure.

This initial evaluation of noise abatement measures for a complaint area leads to a preliminary determination of the length, height, and location of alternative abatement measures. This information is submitted to the Bureaus of Surface Design, Landscape Architecture, and Structural Design, and the Office of the Deputy Attorney General, as necessary, for their review and comments prior to BEA's preparation of preliminary noise abatement recommendations for transmittal to the FHWA. These recommendations include feasible measures for mitigating traffic noise impacts in the complaint area, as well as an identification of noise impacts for which no apparent solution has been found if this is the case.

STEP 47 Are Noise Walls Appropriate for Noise Attenuation?

Noise walls are appropriate for noise attenuation in urban areas where NJDOT right-of-way is narrow and in applications where they are less expensive than other noise abatement measures of equal effectiveness.

A preliminary determination of the locations of noise walls and their heights and lengths is completed using the FHWA barrier nomograph and the STAMINA 1.0 computer program. The nomograph is used to get a rough idea of the noise wall dimensions that will provide the desired noise attenuation (Noise walls are usually designed to provide 8-12 dBA of attenuation). STAMINA 1.0 is then used to fine tune the noise wall dimensions and locations in the following manner. STAMINA 1.0 predicts the expected noise levels with the various size walls in place. These levels are compared with the levels predicted without the walls in Step (45). In this way, the dimensions and locations necessary to provide the desired noise attenuation are determined.

BEA considers the following materials for construction of noise walls: concrete (masonry block), concrete panels (precast, cast in place), wood (plywood, planking), brick, metal, and plastics used in conjunction with sound absorbing materials. Other new and effective materials and noise wall shapes will be considered as they are developed.

Some other factors which BEA examines in designing and selecting noise walls, and for that matter earth berms, are maintenance, appearance, ease of construction, transmission loss, and safety.

If noise walls are appropriate noise abatement measures for the complaint area proceed to Step (48); if not, proceed to Step (51).

STEP 48 BEA Submits Various Heights, Lengths, and Locations to BSD, BLA, & BSTD for Review

BEA submits noise wall locations, heights, lengths, and other details to the Bureaus of Surface Design (BSD), Structural Design (BSTD), and

Landscape Architecture (BLA) for their review. The Bureau of Surface Design advises BEA on the placement of posts and footings to support the noise wall for the soil conditions which are present. If a noise wall is to be located on an existing structure (such as a bridge or overpass), the Bureau of Structural Design provides design information. The Bureau of Landscape Architecture reviews noise wall locations and appearance to determine where, if necessary, to place plants (trees and shrubs, etc.) in order that construction of the noise wall will not significantly degrade the aesthetic qualities of the community.

STEP 49 BSD, BLA, & BSTD Respond with their Recommendations

The Bureaus of Surface Design, Structural Design, and Landscape Architecture respond to BEA with their recommendations regarding the proposed noise wall. BEA may be led to the selection of a somewhat different noise wall construction or material by BSD's and BSTD's recommendations relating to physical restraints (soil conditions, wind loadings, size of footings, drainage, etc.) and/or special structural requirements.

STEP 50 Are Noise Walls Feasible for All Impacted Areas?

Noise walls may not be feasible or reasonable for all impacted areas because of technical, aesthetic, or cost considerations. As for cost, for some areas noise walls may simply be more expensive than other equally effective noise abatement measures. If noise walls are not feasible for all impacted areas, proceed to Step (51); if they are, proceed to Step (62).

STEP 51 Are Earth Berms Appropriate for Noise Attenuation?

Earth berms (earth mound barriers) are appropriate for noise attenuation along highways in rural areas with a wide right-of-way and in applications where they are less expensive than other equally effective abatement measures. Earth berms are often indicated for highway sections with wide right-of-ways* because when landscaped they are unobtrusive and natural looking, and usually offer improved safety. If fill material is readily available, berms are often cheaper than noise walls; in addition, they are as effective, if not more effective**, in noise attenuation than noise walls of the same height and length.

A preliminary determination of the locations of earth berms and their heights and lengths is completed through the use of the FHWA barrier nomograph and the STAMINA 1.0 noise prediction computer program in generally the same manner as for noise walls (see Step (47)).

If earth berms are appropriate for noise attenuation in the complaint area, proceed to Step (52); if they are not, proceed to Step (55).

Because noise barriers combining earth mounds with panel noise walls (so called combination berm-walls) can be effective noise abatement measures, they will also be considered by BEA. Berm-walls can in some situations have cost, visual, and safety benefits.

*A 12 foot earth berm can require between 50 and 75 feet of right-of-way.
**Reference [2] states that earth berms provide about 3 dBA more attenuation than freestanding walls of the same height.

STEP 52 BEA Submits Various Heights, Lengths, and Locations to BSD & BLA for their Review

BEA submits earth berm locations, heights, lengths, and other specifics to the Bureaus of Surface Design and Landscape Architecture for their review. The Bureau of Surface Design reviews berm dimensions and locations in regard to soil stability, drainage, safety, maintenance and other factors; the Bureau of Landscape Architecture, in regard to determining the types and locations of plants (grass, bushes, trees, etc.) to be placed on the berm in order to improve its appearance and make it more aesthetically acceptable to the community.

STEP 53 BSD & BLA Respond with their Recommendations

The Bureaus of Surface Design and Landscape Architecture respond to BEA with their recommendations concerning the proposed earth berms. Landscape Architecture gives BEA planting recommendations for the berm. Surface Design may advise BEA on the type of soil material for the berm, nearby sites where it can be obtained, the estimated cost of the soil, and safety, drainage, or maintenance concerns and how to address them. Surface Design may also advise BEA on the slope of the berm sides which is a factor in soil stability (the proper slope can reduce erosion, and cracking and sliding failures), safety, drainage, and maintenance. As a result of these recommendations BEA may modify their preliminary berm designs and locations.

STEP 54 Are Earth Berms Feasible for All Impacted Areas?

Earth berms may not be feasible for impacted areas for the following reasons:

(1) berms require so much space that there could be insufficient right-of-way in some highway sections, and

(2) berms require large quantities of earth, thus they may be more expensive than other noise abatement measures if fill material is not readily available from other grading projects.

Furthermore, there could be technical problems with earth berms in certain locations which can not be solved. If earth berms are not feasible for all impacted areas, proceed to Step (55); if they are, proceed to Step (62).

STEP 55 Is Noise Insulation of Structures Appropriate?

Noise insulation of public use or nonprofit institutional structures, such as schools, churches, libraries, hospitals, etc., is a noise abatement measure to mitigate interior noise impacts. As defined in FHPM 7-7-3, these impacts occur when interior noise levels approach or exceed an hourly L_{10} of 55 dBA or an hourly L_{eq} of 52 dBA.*

Noise insulation is appropriate in the following situations:

(1) where it is unreasonably expensive or physically impossible to construct a noise barrier to sufficiently abate interior noise impacts. For example in some cases, it may be cheaper to noise insulate several isolated and severely impacted structures instead of constructing barriers, and

(2) where interior impacts occur in spite of the fact that no exterior activities are impacted (these activities may be far from or physically shielded from the highway).

*Measured with open windows if the structure is not air conditioned.

BEA determines noise insulation requirements in the following manner. From measurements of existing exterior and interior noise levels, BEA approximates the noise reduction supplied by the structure. This noise reduction factor is then subtracted from predicted exterior noise levels for the design year to yield predicted future interior noise levels. By comparing these predicted interior noise levels to the design noise levels in FHPM 7-7-3, BEA determines the noise attenuation required to mitigate the expected impacts.

Alternative noise insulation treatments which provide the necessary noise attenuation are then selected from the types of insulation described below.

For structures without air conditioning, the simplest and least expensive type of noise insulation entails closing and sealing windows and doors, and installing air conditioning. This treatment usually provides about 10 dB of interior noise attenuation. For structures with closed windows, improved insulation can be obtained by modifying small structural elements; namely, replacing existing glass with acoustic-type glass or double glazing windows, and replacing doors with solid core sound rated doors with perimeter seals. This treatment can provide an interior noise attenuation of about 4-7 dB. If the aforementioned treatments are still inadequate, an additional interior noise attenuation of about 7-10 dB can be obtained by making major modifications to basic structural elements (walls, roof, ceilings).* One such modification would be removing windows and filling the space with materials similar to the existing walls.

*Noise insulation attenuations from Reference [3].

BEA also studies the use of noise insulation in combination with noise barriers. In some locations, cost considerations and/or physical constraints make this alternative the most suitable form of noise abatement.

If noise insulation of noise sensitive structures is appropriate, proceed to Step (56); if it is not, proceed to Step (59).

STEP 56 BEA Submits Various Alternatives and Locations to BSD, BSTD, & DAG for Review

BEA submits various noise insulation alternatives and locations to the Bureaus of Surface Design and Structural Design, and to the Office of the Deputy Attorney General (DAG) for their review. The Bureaus of Surface Design and Structural Design review the proposed noise insulation with regard to design matters, and, if necessary, retain and supervise an engineering consultant who designs an air conditioning system to meet the requirements of the structure. The Office of the Deputy Attorney General reviews the proposed noise insulation of structures with regard to legal matters.

STEP 57 BSD, BSTD, & DAG Respond with their Recommendations

The Bureaus of Surface Design and Structural Design and the Office of the Deputy Attorney General respond to BEA with their recommendations. The Bureaus of Surface Design and Structural Design may make recommendations regarding design aspects of the proposed noise insulation. They also may review and comment on the engineering consultant's air conditioning plan for the structure. The Office of the Deputy Attorney General may supply BEA with opinions or advise on the legal consequences (liabilities, responsibilities, etc.) of NJDOT modifying a publicly or privately owned structure for the purpose of noise insulation.

STEP 58 Is Noise Insulation Feasible for All Impacted Structures?

Noise insulation may not be feasible for noise impacted receptors because of technical, legal, and cost considerations among others. In regard to cost, noise insulation of several adjacent institutional structures may just be more expensive than noise barrier construction. Noise insulation is also not feasible for impacted private residences since noise insulation is only presently approved (see FHPM 7-7-3) for public use or nonprofit institutional structures. Thus for a community with both impacted institutional structures and private residences, a barrier is always indicated; though costs or other reasons may dictate that the insulation of institutional structures be used in conjunction with this barrier. If noise insulation is feasible for all impacted receptors, proceed to Step (62); if it is not, proceed to Step (59).

STEP 59 Are Partial or Full Noise Attention Measures Feasible?

As defined for this step, full noise attenuation occurs when by the implementation of various measures all of the traffic noise impacts in the community can be eliminated. In other words, with the noise abatement measures in place, future noise levels in the community should not approach or exceed the design noise levels in FHPM 7-7-3.

In contrast, partial noise attenuation occurs when noise abatement measures do not provide all impacted areas with full noise attenuation. For example, noise abatement measures may provide only a portion of the impacted areas with full noise attenuation, reduce future noise levels for all impacted areas but not to levels below the design noise levels, or provide only a portion of the impacted areas with less than full noise attenuation.

Full or partial noise attenuation measures are feasible when it is determined that the noise abatement measures will reduce the traffic noise impact, and that the benefits of noise abatement outweigh the cost of abatement and the overall adverse social, economic, and environmental effects.

Every reasonable effort is made to provide a community with full noise attenuation but this is not always possible. Partial noise abatement measures are recommended for some locations because full noise attenuation is physically infeasible or economically unreasonable, or the adverse social, economic, and environmental effects of full noise attenuation outweigh the benefits.

Partial or full noise attenuation can be provided by any of the measures considered in the previous steps of this procedure, i.e. earth berms, noise walls, and noise insulation, or by a combination of these and other measures.

If partial or full noise attenuation measures to reduce or eliminate noise impacts in the complaint area are feasible and reasonable, proceed to Step (62); if they are not, proceed to Step (60).

STEP 60 Finalize the Preliminary Results, Prepare a Report, and Request FHWA Concurrence

Preliminary results of the Type II study are finalized and a report is prepared. This report discusses the existing noise levels which were measured

in the complaint area, the future noise levels which were predicted, the expected traffic noise impacts which were identified for noise sensitive areas in the community, and the alternative noise abatement measures which were evaluated in an effort to abate these impacts. The report highlights the reasons why the full and partial noise abatement measures which were evaluated were not feasible for the complaint area by virtue of a detailed analysis of the overall benefits, costs, and adverse effects of these measures. A copy of this report is sent to the FHWA and concurrence is requested.

STEP 61 Inform Municipality of NJDOT's Intent to Drop Project

Once FHWA concurrence in the noise study report is received, a copy with a cover letter is sent to the municipality representing the complainants. The letter summarizes the findings and conclusions of the noise study and informs the municipality of the Department's intent to discontinue the project.

STEP 62 BEA Prepares Aesthetic Recommendations

If earth berms and/or noise walls are appropriate for noise abatement, BEA prepares aesthetic recommendations for these barriers according to the guide "Visual Quality in Noise Barrier Design" (Reference [4]). In this manner BEA addresses the visual significance of noise barriers in the environment.

Because of acoustical requirements, highway noise barriers are usually both long and high, and therefore can create visual problems since after construction they become a permanent part of a community's environment.

The aforementioned guide illustrates potential visual problems caused by noise barriers and identifies design measures for minimizing the visual disruption of the environment due to them. BEA utilizes the visual principles outlined in this guide (such as color, line, form, texture, etc.) for the purpose of designing attractive noise barriers which visually complement the highway and the character of the community --- whether it be rural, urban, or suburban --- for which they are built. Improving the visual appeal of the barriers, which is accomplished through a combination of wall or berm design and plant materials, usually leads to better acceptance by the public.

STEP 63 BEA Coordinates Noise Attenuation Recommendations with FHWA

BEA coordinates their noise attenuation recommendations with the FHWA by sending to the local office information about the locations and designs of the proposed noise abatement measures and holding a follow-up meeting. This coordination informs the FHWA of BEA's abatement proposals for the complaint area and provides an opportunity for the FHWA to comment on them. Coordination takes place at this step so that BEA can obtain the FHWA's informal approval of the proposed abatement measures before presenting them to local government (Step (67)) and the public (Step (70)).

At the meeting, members of BEA's noise technical section explain the results of their Type II noise study for the highway and community under consideration. In the process, BEA identifies the noise impacts for the community and describes the measures which are proposed to mitigate them. Basic information about the locations and designs of the proposed noise

abatement measures --- heights, lengths, materials, etc. for barriers; materials, method, structural modifications, etc. for noise insulation --- is presented with the aid of maps or other illustrations. Approximate cost of the measures is also briefly discussed.

STEP 64 FHWA Input on Recommendations Is Received

BEA receives by letter comments from the FHWA local office in regard to BEA's noise abatement recommendations. By making the changes in location and design suggested by the FHWA in these comments, BEA, in effect, obtains the FHWA's informal approval of the proposed noise abatement measures.

STEP 65 Prepare Graphics & Presentation for Public Information Meeting

BEA prepares the graphics and presentation for the public information meeting which is held in Step (70) to assure community participation in the project. The graphics consist of visual aids such as maps, charts, and artist's drawings. In addition to the graphics, educational materials such as pamphlets on highway traffic noise are also obtained if available for circulation at the meeting. BEA prepares the public meeting presentation so that the noise abatement proposals are introduced to the public in a logical and understandable manner. A presentation outline is also prepared.

STEP 66 Request OCI to Schedule Meeting with Local Government Officials

By memorandum, BEA requests the Office of Community Involvement (OCI) to schedule a meeting with local government officials (municipal engineer, planner, administrator, etc.) of the municipality with jurisdiction over the complaint area. This meeting is held prior to the public information

meeting to obtain advance input from local government. OCI arranges a convenient time and place for the meeting.

STEP 67 BEA Provides Local Government Officials with Proposed Abatement Measures for their Review and Recommendations

A meeting is held between members of BEA, OCI, and local government officials usually at a location within the municipality. BEA's noise technical section and aesthetic specialist present to the local officials NJDOT's noise abatement proposals for their community. Locations and designs of proposed measures are provided. During the meeting BEA seeks to answer questions and clear up misunderstandings about the proposed measures and to obtain input and recommendations from local government prior to presenting the proposals to the public.

STEP 68 BEA Responds to Local Government Officals

After careful consideration of the input from local government officials in regard to the proposed noise abatement measures, BEA responds to them if necessary by letter stating NJDOT's position with explanation. Local government input may have come in the form of questions or recommendations stated verbally at the meeting (Step (67)) and/or transmitted to BEA by letter after the meeting. Sound recommendations by local government may lead BEA to change some of the locations and designs of the proposed noise abatement measures before the public information meeting.

BEA attempts to clear up any misunderstandings and address local government recommendations at this point in order that the public information meeting might progress more smoothly.

STEP 69 Request OCI to Arrange Public Information Meeting

By memo, BEA requests the Office of Community Involvement to arrange a public information meeting with members of NJDOT, the local government for the complaint area, and the public in attendance. By letter, OCI invites area residents to the meeting. The meeting is usually held in a municipal building or school in the community at a convenient time as arranged by OCI.

STEP 70 Hold Public Information Meeting

A public meeting is held with members of NJDOT, local government, and the public in attendance. In this meeting, BEA presents to the public the locations and designs of the proposed measures for mitigating the noise impacts in their community in accordance with the outline prepared in Step (65). This formal presentation is followed by a session for individual and group dialogue, that is a "question and answer" period. During this period members of BEA try to interact with the public as much as possible on a one-to-one basis. The graphics prepared in Step (65) are used to illustrate the locations, designs, and appearance of the proposed noise abatement measures. Educational pamphlets discussing highway traffic noise are made available to all attendees. The mayor or administrator, municipal engineer, and town council members, etc. are usually present representing the local government. Members of BEA and the Office of Community Involvement are present representing NJDOT and also on occasion members of the Bureau of Quality Control if requested by BEA to demonstrate noise levels. Members of BEA's noise technical section attend as well as BEA's aesthetic specialist who because of his/her expertise in aesthetics also addresses landscape matters.

As part of the presentation, the public is informed that they, through their local government, have the option to accept or reject the proposed measures, offer suggestions for improvement of the proposed measures, or recommend alternative measures. The public information meeting not only provides an opportunity for the Department to present its proposed noise abatement measures to the public, but also for the public to express its views on NJDOT's proposals. The public information meeting is held to assure public participation in the noise abatement project development process which aids in assuring that decisions are made in the best overall public interest.

STEP 71 BEA Receives Public Meeting Comments from Residents through their Local Government Officials

After the public information meeting, BEA receives by letter public meeting comments from area residents by way of their local government in regard to NJDOT's proposed noise abatement measures. These comments may reflect public dissatisfaction with some aspect of NJDOT's abatement proposals or indicate that some unanswered questions still exist. The public and the local government may recommend that the state consider an alternative measure for a particular location or an additional measure in a new location. In some instances, members of the community may desire some modification of the proposed measures for aesthetic reasons (a change in color, texture, materials, etc.). On the other hand, the public meeting comments may indicate preliminary approval of the Department's noise abatement proposals.

STEP 72 BEA Evaluates Public Meeting Comments and Responds to Municipality

BEA responds to the public meeting comments by a letter to the municipality. If the public raises questions in their comments, BEA answers them with explanation. If the comments reflect preliminary approval of the Department's abatement proposals, BEA requests official approval from the municipality in the form of a town resolution.

If the public and local government suggest alternative or additional noise abatement measures, BEA evaluates their recommendations. If these suggested measures are found to be reasonable and feasible, BEA modifies NJDOT's proposed noise abatement measures in keeping with the public's recommendations and notifies the municipality of this fact. If BEA determines that the measures suggested by the public are either physically infeasible or economically unreasonable, BEA explains to the municipality the reasons for this determination and notifies the municipality that the noise abatement measures proposed by NJDOT at the public information meeting remain unchanged. In either case, BEA requests the official approval or disapproval of NJDOT's proposed noise abatement measures in the form of a town resolution.

STEP 73 BEA Receives Town Resolution from Municipality

BEA receives a town resolution from the community via local government which officially approves or disapproves of the implementation of some or all of the measures which NJDOT has proposed for mitigating the noise in the complaint area. Town resolutions sometimes take the form of a conditional approval; that is, approval is contingent upon NJDOT meeting certain stipulations in the resolution. For this reason, and because the

views of the impacted residents are the major consideration in deciding whether or not to implement the proposed abatement measures, BEA evaluates the town resolution to determine if noise abatement is still feasible.

STEP 74 Does Project Require an Environmental Assessment?

Though it is highly unlikely, if the noise abatement project was assigned in Step (35) a Class III Level of Action (environmental assessment), proceed to Step (75); if not, proceed to Step (77).

STEP 75* Complete Environmental Assessment & Circulate to Municipality

If required, a document assessing the social, economic, and environmental impacts of the implementation of the noise abatement measures is completed at this step. This environmental assessment is circulated to the municipality which is given the opportunity to request a public meeting or hearing regarding this assessment.

STEP 76* Complete FONSI & Send with EA to FHWA for Concurrence

If the environmental assessment finds that implementation of the noise abatement measures will result in no significant social, economic, or environmental impacts and no significant public comments in this regard are received, Form "Finding of No Significant Impact" (FONSI) is completed. This form and a cover letter are attached to the environmental assessment document which is sent to the FHWA for concurrence.

If the environmental assessment finds that significant, unmitigatible, social, economic, or environmental impacts are likely to result from imple-

*Steps (75) and (76) on the accompanying flow chart are enclosed by dotted lines to indicate that this path is almost never taken.

mentation of the noise abatement measures, then the abatement project will either be discontinued at this point or reassigned by BEA as a Class I project requiring an EIS. If the project is discontinued, the municipality will be notified of the Department's reasons for this decision.

STEP 77 Is Project Still Feasible?

Implementation of NJDOT's proposed noise abatement measures is feasible if these measures are approved in the town resolution and if the overall noise abatement benefits still outweigh the cost and the adverse social, economic, and environmental effects of the noise abatement measures. If implementation is feasible, proceed to Step (80); if not, proceed to Step (78).

STEP 78 Complete Final Report & Send to Municipality, FHWA, & other Interested Parties

A final report is prepared which presents the results of the Type II noise study for the community. The report covers existing noise levels, the priority rating index, prediction of future noise levels, analysis of noise impacts, analysis of alternative noise abatement measures, and BEA's proposed abatement measures. Also discussed are BEA's reasons for discontinuing the project. Accordingly, public meeting comments and local government's final recommendation -- i.e., the town resolution -- are included. A copy of the report is sent to the municipality and to the FHWA.

STEP 79 Inform Local Municipality of Department's Intent to Drop Project

The municipality is informed of NJDOT's intent to drop the project via a cover letter attached to the final report described in Step (78). This letter usually recommends that to avoid additional noise impacts in the future the municipality should control land use as an alternative to noise

barriers. The noise contour maps included in the report can be utilized for this purpose.

STEP 80 Prepare Final Report

A final report is prepared which describes the findings of the Type II noise abatement study. Thus, it covers existing and future noise levels, expected noise impacts, and the analysis of alternative noise abatement measures. The report recommends the design and construction of the proposed noise abatement measures as approved by the public in their town resolution. Any relevant public meeting comments or local government suggestions which have resulted in a change in the location or design of barriers or other measures as originally proposed are also included. Finally, the report documents the priority rating of the noise abatement project.

STEP 81 Request FHWA Concurrence in Final Noise Report

The final report is sent to the FHWA with a cover letter requesting concurrence.

STEP 82 FHWA Concurs in Final Noise Report and EA/FONSI if Required.

The FHWA indicates concurrence in the final report and the environmental assessment/FONSI(if required) with the appropriate signatures.

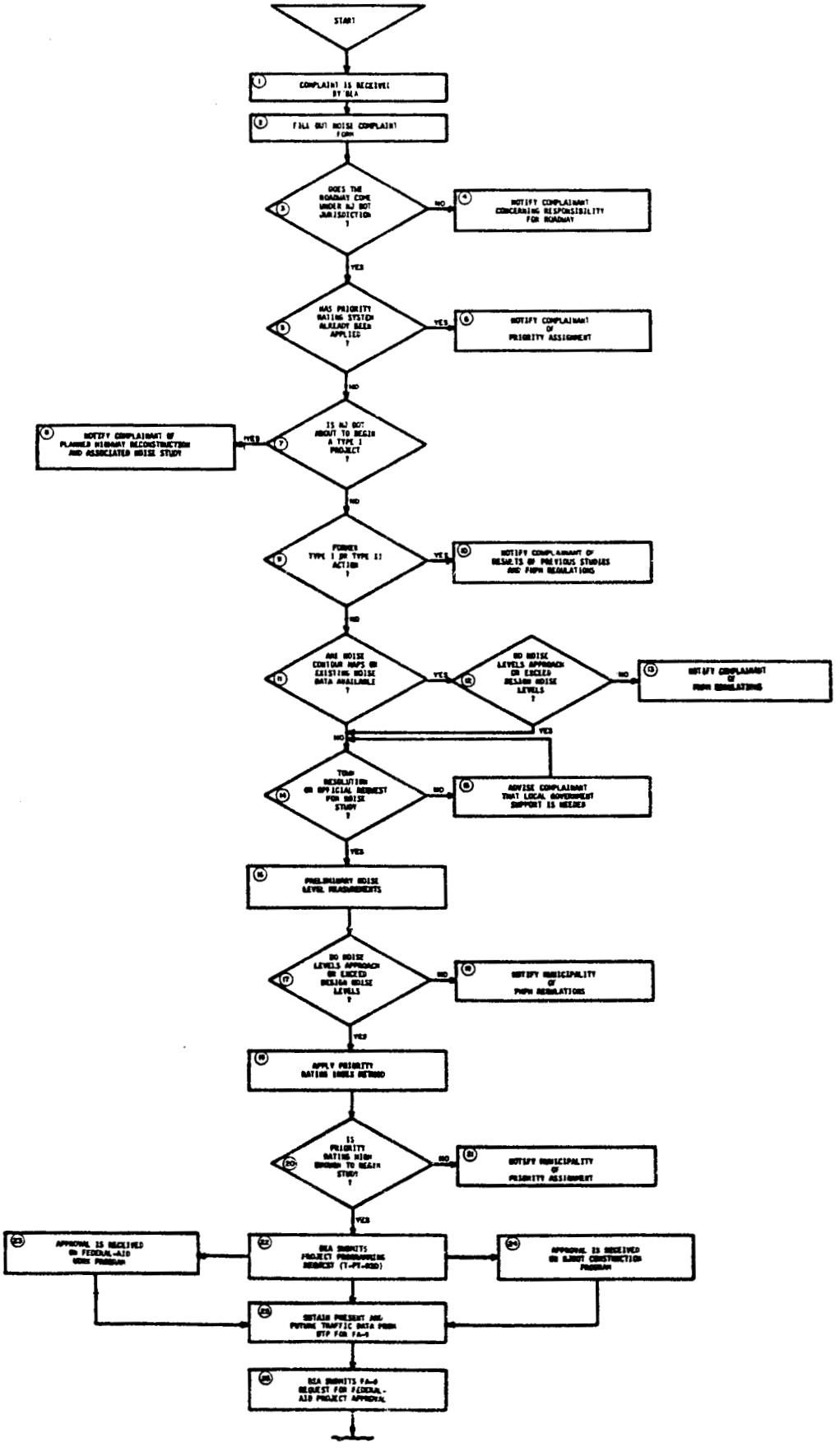
STEP 83 Inform Municipality of Department's Intent to Provide Noise Attenuation

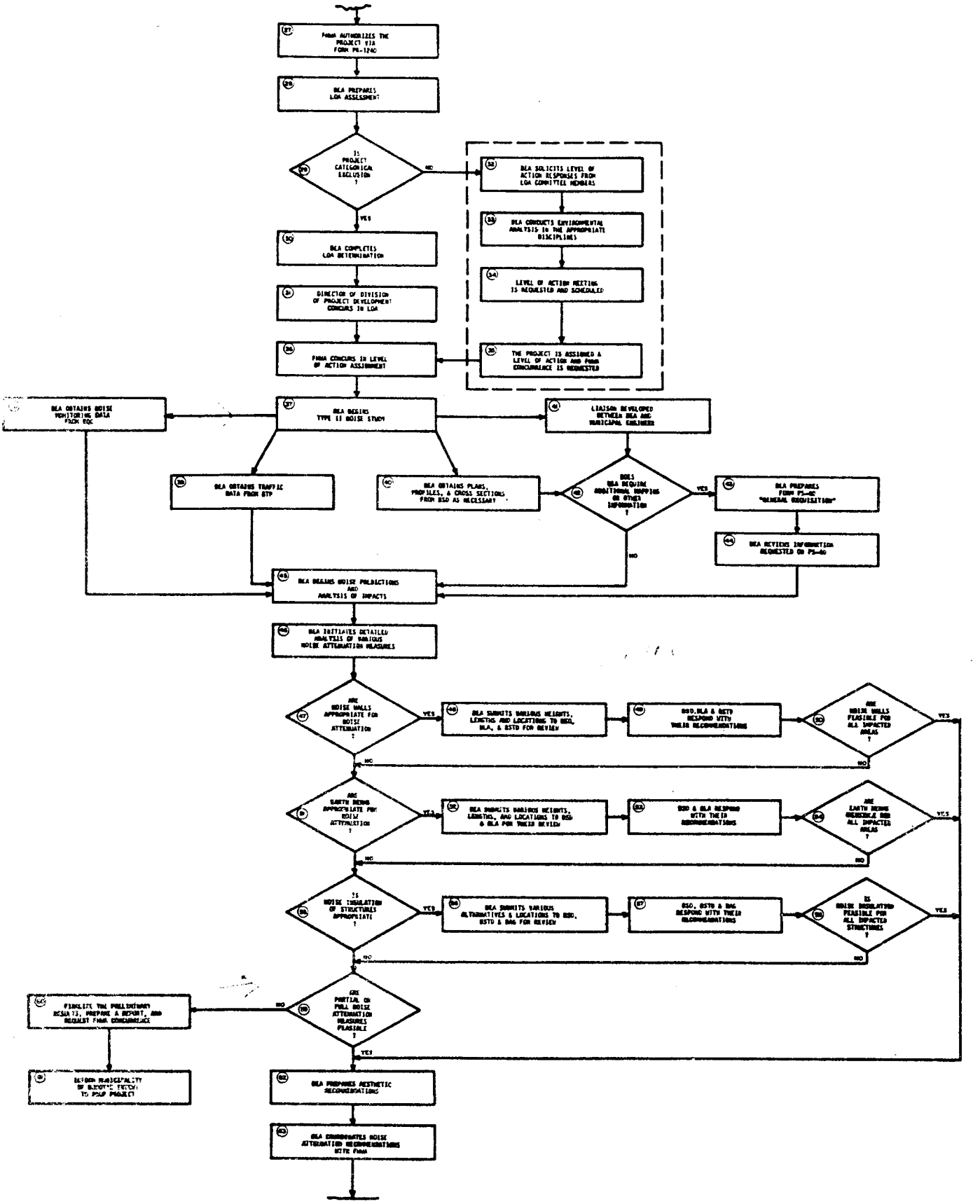
The municipality is informed by letter that FHWA concurrence in the proposed noise attenuation measures has been received and that the project will be transferred to the Division of Design for implementation. The letter is accompanied by the final report.

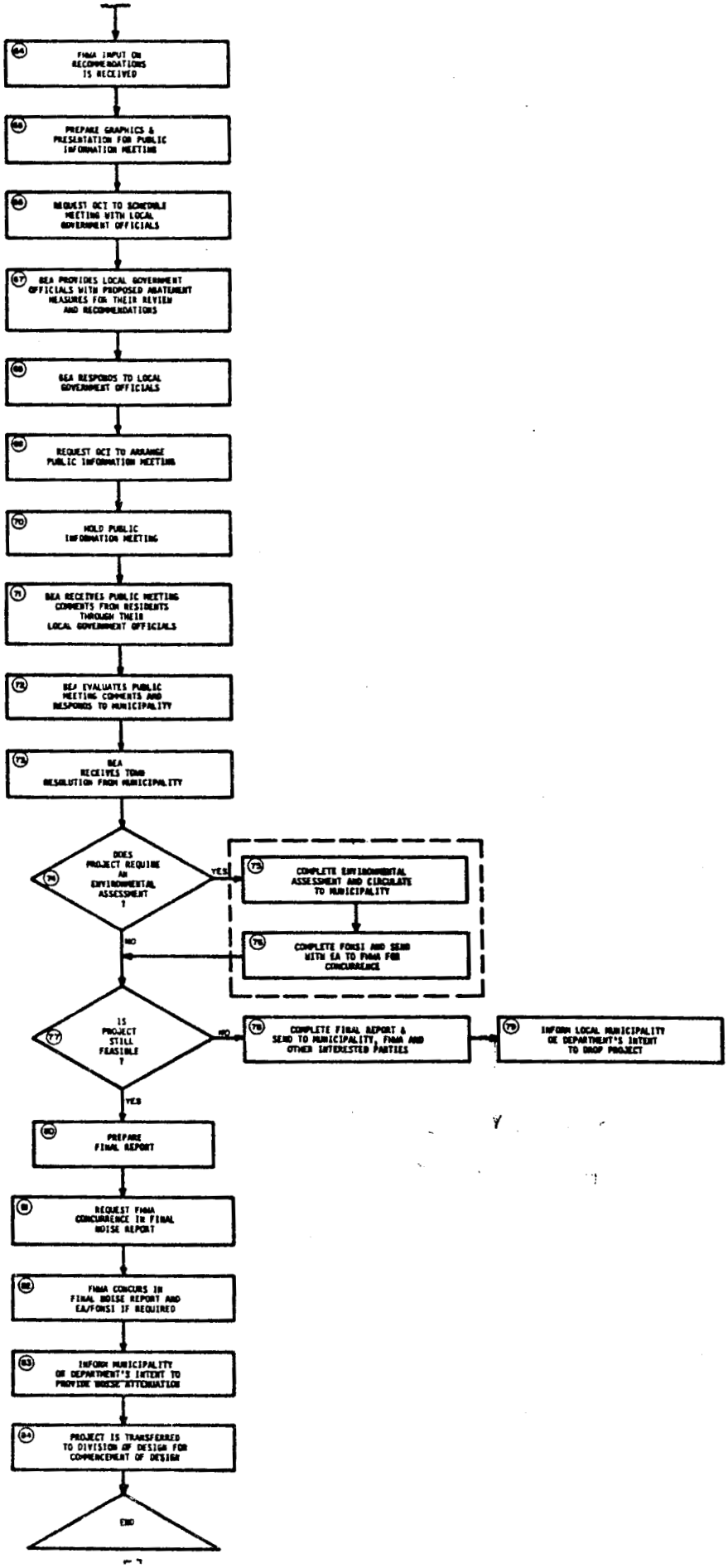
STEP 84 Project is Transferred to Division of Design for Commencement of Design

The noise abatement project is transferred to the Division of Design for implementation. This is accomplished by sending the Director of Design a memorandum and the final report accompanied by whatever additional information BEA has pertaining to materials for the proposed noise abatement measures.

- HIGHWAY NOISE COMPLAINT PROCESSING PROCEDURE -






64
FHWA INPUT ON RECOMMENDATIONS IS RECEIVED
66
PREPARE GRAPHICS & PRESENTATION FOR PUBLIC INFORMATION MEETING
68
REQUEST OCI TO SCHEDULE MEETING WITH LOCAL GOVERNMENT OFFICIALS
69
BEA PROVIDES LOCAL GOVERNMENT OFFICIALS WITH PROPOSED ABATEMENT MEASURES FOR THEIR REVIEW AND RECOMMENDATIONS
69
BEA RESPONDS TO LOCAL GOVERNMENT OFFICIALS
69
REQUEST OCI TO ARRANGE PUBLIC INFORMATION MEETING
70
HOLD PUBLIC INFORMATION MEETING
71
BEA RECEIVES PUBLIC MEETING COMMENTS FROM RESIDENTS THROUGH THEIR LOCAL GOVERNMENT OFFICIALS
72
BEA EVALUATES PUBLIC MEETING COMMENTS AND RESPONDS TO MUNICIPALITY
73
BEA RECEIVES TOWN RESOLUTION FROM MUNICIPALITY
74
DOES PROJECT REQUIRE AN ENVIRONMENTAL ASSESSMENT ?
YES
75
COMPLETE ENVIRONMENTAL ASSESSMENT AND CIRCULATE TO MUNICIPALITY
76
COMPLETE FONSI AND SEND WITH EA TO FHWA FOR CONCURRENCE
NO
77
IS PROJECT STILL FEASIBLE ?
NO
78
COMPLETE FINAL REPORT & SEND TO MUNICIPALITY, FHWA AND OTHER INTERESTED PARTIES
79
INFORM LOCAL MUNICIPALITY OF DEPARTMENT'S INTENT TO DROP PROJECT
YES
80
PREPARE FINAL REPORT
81
REQUEST FHWA CONCURRENCE IN FINAL NOISE REPORT
82
FHWA CONCURS IN FINAL NOISE REPORT AND EA/FONSI IF REQUIRED
83
INFORM MUNICIPALITY OF DEPARTMENT'S INTENT TO PROVIDE NOISE ATTENUATION
84
PROJECT IS TRANSFERRED TO DIVISION OF DESIGN FOR COMMENCEMENT OF DESIGN
END

IMPLEMENTATION OF FINDINGS

The procedure for processing noise complaints was developed by the Bureau of Transportation Technology Research of the Division of Research and Demonstration with input from the Bureau of Environmental Analysis (BEA) of the Division of Project Development. BEA will ultimately utilize the procedure. After the noise complaint processing procedure is forwarded to BEA, the Bureau of Transportation Technology Research will continue to maintain a liaison, and if requested, will assist in the resolution of any problems arising with the use of the procedure.

REFERENCES

1. "Determination of Truck Noise Levels for New Jersey", NJDOT Report No. 81-006-7791, HPR Study 7791, Final Report, July 1980.

2. "Noise Barrier Design Handbook", Research Report FHWA-RD-76-58, FHWA, Washington, D.C., February 1976.

3. "Proceedings of the Conference on Highway Traffic Noise Mitigation", Los Angeles, California, December 1978, pages 105-113.

4. "A Guide to Visual Quality in Noise Barrier Design", Implementation Package 77-12, USDOT, FHWA, Washington, D.C., December 1976.

5. "A Procedure for Processing Highway Noise Complaints", NJDOT, HPR Study 4596, Interim Report, October 1980.

APPENDIX

NOISE COMPLAINT PRIORITY RATING INDEX

INTRODUCTION

The Priority Rating Index presented in this appendix is a significant revision of the priority rating method described in the interim report for this study (October 1980 - Reference [5]). The revision was completed by the Bureau of Environmental Analysis.

The need for a priority rating method was demonstrated by the large number of requests for highway traffic noise abatement received by the Department, the limited availability of funding and staff, and FHWA requirements. These circumstances made it a necessity to develop a method of ranking requests which insures that the communities with the most severe noise impacts are the first to become eligible for FHWA funding. The method developed was the Priority Rating Index or PRI. The PRI utilizes field survey data gathered by the Department in the complainant community as input. Noise abatement requests along Interstate routes will be ranked separately from requests along non-Interstate freeways. A Fortran computer program was written for the user's convenience in applying the PRI, and is included in this report (page 74).

PRIORITY RATING INDEX

A. General

This priority index is a relatively simple equation used to determine a community's total noise impact. The index is based on three measures of noise impact. These measures are the population (weighted with a factor for land use sensitivity), the magnitude of noise impact (the degree of annoyance and energy content), and the duration of noise impact (the number of years people have been exposed to high traffic noise levels).

The information from each community land use which is used to determine the priority rating consists of eight pieces of data. A description of each piece of data and the variable assigned in the fortran computer program follows.

1. Population (P) - the total number of people exposed to noise levels above Design Noise Levels for the respective land use (see data piece number 6, page 57).

2. Sensitive Area Usage (U) - the decimal fraction representing the average portion of a 24 hour day during which a person or persons would occupy the noise sensitive area. For example, if the area is occupied for 12 hours, U = 0.50.

3. Weighted Land Use (W) - empirical weighting of noise sensitivity based on land usage (see Table A, next page).

TABLE A

Empirical Weighting of Noise Sensitive Land Use

Weighting	Land Use
1	Category C
2	sports complex, playground, picnic area
3	residences, apartments, motels, hotels
4	schools, churches, libraries, hospitals
6	Category A

4. Equivalent Sound Level (LEQ) - the highest hourly L_{eq} measured during the time period when a sensitive land area is normally in use.

5. Noise Pollution Level (LNP) - the highest hourly L_{NP} measured during the time period when a sensitive land area is normally in use.

6. Design Noise Level (DNL) - the L_{eq} noise levels that define noise impact in FHPM 7.7.3

Category A - 57dBA (Exterior)
Category B - 67dBA (Exterior)
Category C - 72dBA (Exterior)
Category E - 52dBA (Interior)

When interior sensitive land uses (Category E) are being prioritized using an exterior noise measurement, the noise reduction due to the exterior of a building must be accounted for based on Table B, next page.

TABLE B

Building Attenuation by Structure Type

Building Type	Window Condition	Noise Reduction Due To Structure
All	Open	10 dB
Light Frame	Ordinary Sash (closed)	20
Light Frame	Storm Windows	25
Masonry	Single Glazed	25
Masonry	Double Glazed	35

7. Population Percentage Before Road (B) - a decimal fraction representing the percentage of the total population using a sensitive land use that was present before the road was opened. For example, if 45%, B=0.45.

8. Years (RO) - the number of years that the roadway has been open.

B. Rating Equation

The priority rating is ten times the common logarithm of the sum of the multiple products of the population, magnitude, and duration of noise impact for all sensitive land uses within a given project.

In other words:

$$\text{Project Rating} = 10 \times \log \left[\sum_{i=1}^{n} (C_1 \times C_2 \times C_3)_i \right]$$

where:

n = number of sensitive land use types within a community.

C_1 = population exposed to noise impact

C_2 = magnitude of noise impact

C_3 = duration of noise impact

1. Population Factor

Factor C_1 is the number of noise impacts. It is basically a measure of the number of people exposed to noise levels above the Design Noise Level (DNL). It is determined as follows:

$$C_1 = P \times U \times W$$

where:

P - is the total impacted population utilizing a sensitive land use.

U - is the decimal fraction representing the typical number of hours a person is present at a sensitive land use during a 24 hour day (average hours a person present/24).

W - is an empirical weighting (determined by the Bureau of Environmental Analysis) based on the noise sensitivity of a particular area.

This factor (C_1) will double if any of the three variables double.

The basic L_{NP} equation was modified to show these increases in annoyance directly when referenced to a steady state DNL. The function is:

$$\text{Annoyance} = 2^{[L_{NP} - DNL]/10}$$

where:

L_{NP} - is the measured highest hourly noise pollution level while a sensitive area is in use.

DNL - is the appropriate Design Noise Level for a sensitive area as defined by FHPM 7.7.3.

This function is set so that an increase of one in the exponent (corresponding to a 10dB increase or doubling of loudness) will result in a doubling of annoyance. This basic function remains unchanged and is multiplied by the fraction of the total population who are located in land uses developed after the roadway was constructed to account for annoyance to them.

The function is then:

$$\text{Annoyance} = A \times 2^{[L_{NP} - DNL]/10}$$

where:

A - is the percentage of the total population that moved in after the roadway was opened expressed as a decimal fraction (A = 1 - B).

The function has an additional 10dB added to the exponent to account for a doubling of annoyance to people present before the roadway was opened. The function then becomes:

$$\text{Annoyance} = B \times 2^{[(L_{NP}-DNL)+10]/10}$$

where:

B - is the percentage of the total population present before the roadway was opened expressed as a decimal fraction.

The total annoyance term is then the sum of these two functions.

The total noise magnitude factor is the product of the energy content and annoyance terms as follows:

$$C_2 = (10^{[L_{eq}-DNL]/10}) \times [(B \times 2^{[(L_{NP}-DNL)+10]/10}) + (A \times 2^{[L_{NP}-DNL]/10})]$$

3. Duration Of Impact Factor

The measure for the duration of noise impact is Factor C_3. It is based on the number of years that the population has been exposed to high traffic noise levels.

Where people were present before the roadway was constructed the measure for duration is as follows:

$$\text{Duration} = B \times RO$$

where:

B - is the percentage of total population present before the roadway was opened expressed as a decimal fraction.

RO- is the number of years the roadway has been open.

Where people moved in after the roadway was open the duration measure is as follows:

$$\text{Duration} = A \times (RO/2)$$

where:

A - is the percentage of total population that moved in after the roadway was opened expressed as a decimal fraction.

RO/2- the mean number of years that residents who moved in after the roadway was opened have been present.

The total duration of impact term is the sum of these two quantities as follows:

$$C_3 = \frac{[B \times RO] + [A \times (RO/2)]}{2}$$

The sum is divided by 2 to reduce the magnitude of the final ranking number.

BIBLIOGRAPHY

1. Applied Acoustics, G. Porges, 1977, Edward Arnold (Publishers) Limited, 25 Hill Street, London WIXBLL

2. Acoustic Noise Measurements, Hassall, J.R. and M. Zaveri, 1978, Bruel & Kjaer. Copenhagen, Denmark

3. Bolt, Beranek and Newman, "Fundamentals and Abatement of Highway Traffic Noise", USDOT, FHWA, 1973.

4. Committee on Appraisal of Societal Consequences of Transportation Noise Abatement. "Noise Abatement: Policy Alternatives for Transportation", Volume VIII, National Academy of Sciences, 1977.

5. Federal Aid Highway Program Manual (FHPM) Volume 7, Chapter 7, Section 3.

6. A Procedure for Processing Highway Noise Complaints, Sasor, S.R. NJDOT Interim Report, HPR Study 4596. 1980.

PROGRAM DOCUMENTATION

Program Name: PRIORTIZ EXEC

Purpose of Program: Running of PRIORTIZ FORTRAN and ordering the output from PRIORTIZ FORTRAN.

Documentation:

I Subscripted variables and data contained in each.

None

II Important bookkeeping and computational variables.

None

III Requirements and format of input to program.

None

IV Form and format of output

The output format is shown on the data code sheet on page 70. The output is shown on page 71.

V Called or calling programs

This program executes PRIORTIZ (TEXT).

VI Additional comments

The results are filed and printed on the operators terminal. They are then erased from the file PROJECT RATINGS to conserve disk space. To retain the results the file must be renamed.

VII Printout of program

The program is listed on page 67.

PRIORTIZ EXEC

```
&CONTROL ERROR
FILEDEF 05 TERMINAL
FILEDEF 06 TERMINAL
FILEDEF 08 DISK UNSORTED RATINGS
LOAD PRIORTIZ
START
&STACK HT
STATEW PROJECT RATINGS
&IF &RETCODE NE 0 &GOTO -NEXT
ERASE PROJECT RATINGS
-NEXT
&STACK 34 39 CH D
SORTF UNSORTED RATINGS A PROJECT RATINGS A
&BEGSTACK
     INPUT PROJECT NAME                          RATING
     INPUT ******* ****                          ******
     INPUT *
     C/*/ /
     FILE
&END
EDIT PROJECT RATINGS
ERASE UNSORTED RATINGS
&STACK RT
&SPACE 1
TYPE PROJECT RATINGS A
```

PROGRAM DOCUMENTATION

Program Name: PRIORTIZ FORTRAN

Purpose of Program: To compute a priority index based on raw field data collected by environmental engineers in the Bureau of Quality Control.

Documentation:

I Variable and data contained in each.

PN(30) - contains the 30 character alphanumeric identification for each project.

P - contains the number of impacted people as input data.

U - contains the percentage of time an area is in use with respect to 24 hours as input data. Expressed as a decimal fraction.

W - contains the degree of noise sensitivity of an area as input data.

LEQ - contains the peak hourly L_{eq} measured during the time a sensitive area is in use as input data.

LNP - contains the highest hourly L_{NP} measured during the time a sensitive area is in use as input data.

DNL - contains the design noise level for various sensitive areas specified in FHPM 7.7.3 as input data.

B - contains the percentage of population present before the roadway was opened as input data. Expressed as a decimal fraction.

RO - contains the number of years the roadway has been opened as input data.

If more than 30 characters are input into the "PN" array to identify a project, the program will truncate the identification at the thirty-first character.

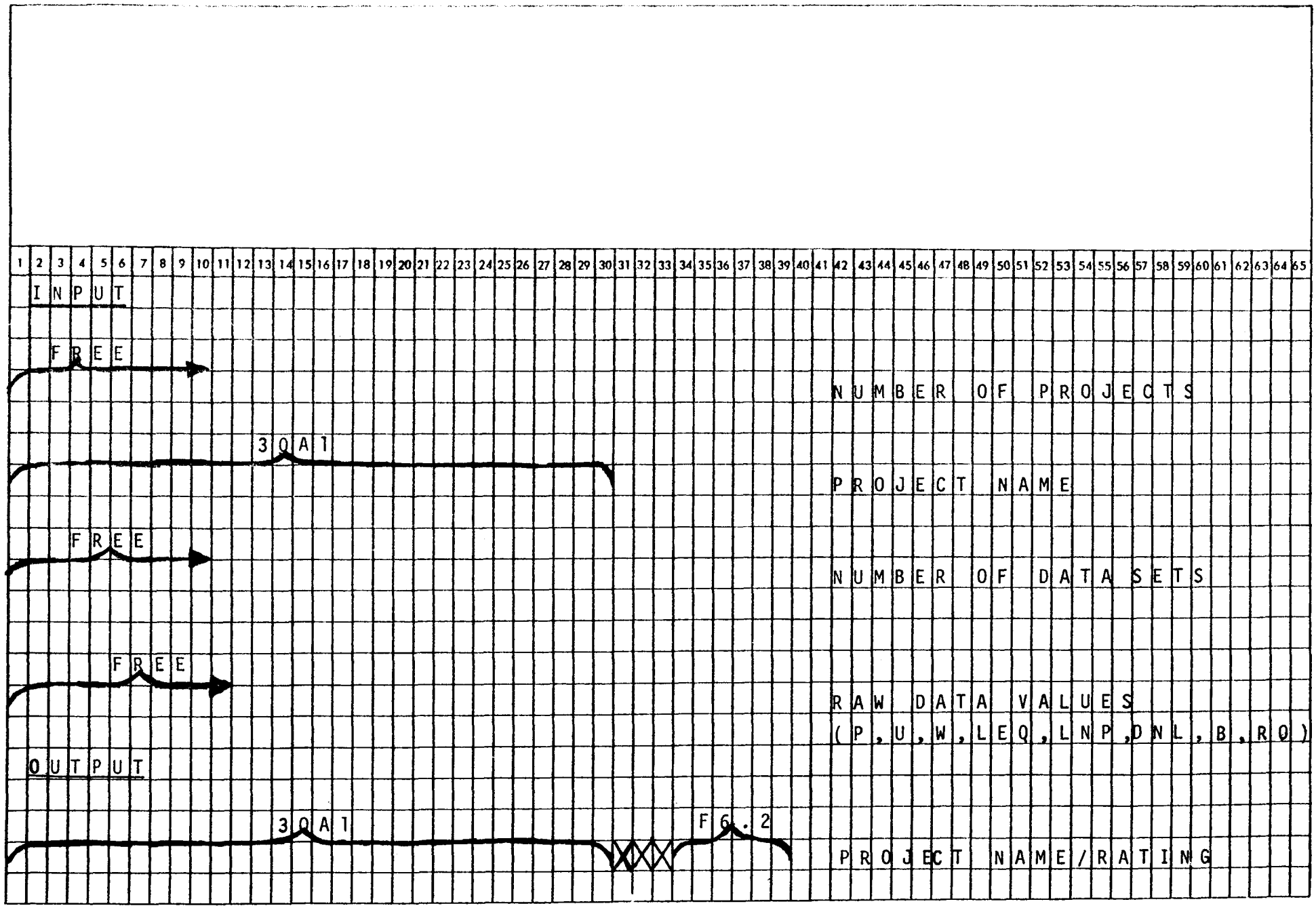
II Important Bookkeeping and Computational Variables

I	-	sets counter for project loop.
M	-	counter for project loop.
K	-	sets counter of data set loop.
J	-	counter of data set loop.
AA,AB	-	variables used in calculation of C_2
DRA,DRB	-	variables used in calculation of C_3
C1,C2,C3	-	variables used to calculate total noise impact.
TOT	-	contains rating number of each sensitive area.
TOTAL	-	contains partial sums of sensitive area rating numbers for a given community.
RATING	-	contains the final rating number for a community.

III Requirements and Format of Input to Program

The format for input data is shown on the data code sheet on page 70. The program is designed to interact with the operator. A hard copy of the interactive input and output is shown on page 71.

The number of projects to be run is input starting in column one. This determines the number of times the program will loop. The number of projects input must equal this number. The community name is input starting in column one. The program is designed to accept up to 30 alphanumeric characters for each project. The number of data sets for each community is also input starting in column one. This determines the number of times the nested loop for sensitive areas in each community will cycle. The number of data sets input for a project must equal this number.


INPUT
FREE
3QA1
FREE
FREE
OUTPUT
3QA1
F6.2
NUMBER OF PROJECTS
PROJECT NAME
NUMBER OF DATA SETS
RAW DATA VALUES
(P,U,W,LEQ,LNP,DNL,B,RQ)
PROJECT NAME/RATING

```
priortiz
EXECUTION BEGINS...

                    ***** PRIORITY RATING PROGRAM *****


HOW MANY PROJECTS ARE YOU GOING TO DO?
?
3

ENTER THE PROJECT NAME (DO NOT EXCEED 30 CHARACTERS)
rt. 29 trenton

HOW MANY SETS OF DATA DO YOU WANT TO ENTER FOR THIS PROJECT?
?
2

ENTER DATA IN THE FOLLOWING ORDER:
POP   U   W   LEQ   LNP   DNL   B   YRS
?
1086 1 3 77 95 67 1 23
?
48 0.3 2 77 95 67 1 23

ENTER THE PROJECT NAME (DO NOT EXCEED 30 CHARACTERS)
i-80 rockaway

HOW MANY SETS OF DATA DO YOU WANT TO ENTER FOR THIS PROJECT?
?
1

ENTER DATA IN THE FOLLOWING ORDER:
POP   U   W   LEQ   LNP   DNL   B   YRS
?
9 1 3 69 80 67 1 8

ENTER THE PROJECT NAME (DO NOT EXCEED 30 CHARACTERS)
i-78 metuchen

HOW MANY SETS OF DATA DO YOU WANT TO ENTER FOR THIS PROJECT?
?
1

ENTER DATA IN THE FOLLOWING ORDER:
POP   U   W   LEQ   LNP   DNL   B   YRS
?
102 1 3 76 86 67 0.65 18


PROJECT NAME                          RATING
******* ****                          ******

RT. 29 TRENTON                         67.21
I-78 METUCHEN                          50.46
I-80 ROCKAWAY                          29.26

R$
```

The eight pieces of raw data for each data set must be inputted in the proper order, however the format is free. The following order must be maintained: Population, Sensitive Area Usage, Weighted Land Use, Equivalent Sound Level, Noise Pollution Level, Design Noise Level, Population Present Before Roadway, and Years the Roadway has been Open. Each piece of raw data should be separated by a blank space on input. A typical data code sheet is shown on page 73.

IV Form and Format of Output

The data code sheet on page 70 shows the output format. The output is ordered by PRIORTIZ EXEC. An example of the ordered output is shown on page 71.

The output will consist of the project identification contained in the PN array and the priority rating number contained in the variable RATING.

V Called or calling programs

None

VI Additional notes and comments

None

VII Printout of program

The program is listed on page 74.

```
1Ø86 1 3 77 95 67 1 23      RT. 29 TRENTON
48 0.3 2 77 95 67 1 23

9 1 3 69 8Ø 67 1 8          I-8Ø ROCKAWAY

1Ø2 1 3 76 86 67 0.65 18    I-78 METUCHEN
```

```
      REAL LEQ,LNP
      DIMENSION PN(30)
      WRITE(6,100)
  100 FORMAT(//,18X,'***** PRIORITY RATING PROGRAM *****')
      WRITE(6,1)
    1 FORMAT(//,1X,'HOW MANY PROJECTS ARE YOU GOING TO DO?')
      READ(5,*)I
      DO 999 M=1,I
      WRITE(6,2)
    2 FORMAT(/,1X,'ENTER THE PROJECT NAME (DO NOT EXCEED 30 CHARACTERS)'
     *)
      READ(5,3)(PN(L),L=1,30)
    3 FORMAT(30A1)
      WRITE(6,4)
    4 FORMAT(/,1X,'HOW MANY SETS OF DATA DO YOU WANT TO ENTER FOR THIS P
     *ROJECT?')
      READ(5,*)K
      WRITE(6,14)
   14 FORMAT(/,1X,'ENTER DATA IN THE FOLLOWING ORDER:')
      WRITE(6,15)
   15 FORMAT (1X,'POP',2X,'U',2X,'W',2X,'LEQ',2X,'LNP',2X,'DNL',2X,'B'
     *,2X,'YRS')
      TOTAL=0.0
      DO 50 J=1,K
      READ(5,*)P,U,W,LEQ,LNP,DNL,B,RO
C  POPULATION EXPOSED TO NOISE IMPACT
      C1=P * U * W
C  ANNOYANCE-RESIDENTS MOVED IN AFTER ROAD OPENED
      AA=(1.- B)*2.**((LNP-DNL)/10.)
C  ANNOYANCE-RESIDENTS PRESENT BEFORE ROAD OPENED
      AB=(B)*2.**((LNP-DNL+10.)/10.)
C  MAGNITUDE OF NOISE IMPACT
      C2=(10.**((LEQ-DNL)/10.))*(AA+AB)
C  DURATION OF IMPACT-RESIDENTS PRESENT BEFORE ROAD OPENED
      DRB=B * RO
C  DURATION OF IMPACT-RESIDENTS MOVED IN AFTER ROAD OPENED
      DRA=(1.- B)*(RO/2.)
C  TOTAL DURATION OF NOISE IMPACT
      C3=(DRB+DRA)/2.
C  TOTAL RATING FOR DATA SET
      TOT=C1*C2*C3
C  TOTAL PROJECT RATING
      TOTAL=TOTAL+TOT
   50 CONTINUE
      RATING= 10. * ALOG10(TOTAL)
      WRITE(8,51)(PN(L),L=1,30),RATING
   51 FORMAT(30A1,3X,F6.2)
  999 CONTINUE
      STOP
      END
```

NOISE CONTOUR LINES

Contour lines of 65, 70, and 75 dBA L_{10} noise levels were developed for noise sensitive areas adjacent to New Jersey's interstate highways. These noise contour lines are lines of equal noise level drawn on aerial photographs of a highway and the adjacent community. Noise contour lines were developed from noise levels predicted by a computer which modeled the highway (including traffic volumes), the adjacent terrain, and the surrounding community. The noise prediction computer program was calibrated using actual field noise measurements.

Aerial photographs with noise contour lines are used as an aid in noise complaint processing. They make possible a quick assessment of the validity of a noise complaint by providing an estimate of the noise level in the complainant's community. The methodology for developing noise contour lines for noise sensitive areas near highways was presented in the interim report [Reference 5].

Following is a list of the sections of interstate highways along which noise contour lines were developed for this study. Traffic volumes for the year in parentheses were used.

1. a 3 mile section of I-95 from the I-80 Interchange to the George Washington Bridge - (1978)*
2. a 5 mile section of I-80 from Exists 53 to 58 - (1977)

*1976 traffic projected to 1978 using a growth rate of 2.25 % a year.

3. a 10 mile section of I-80 from Exits 58 to 68 - (1977)
4. a 6 mile section of I-80 from Exits 47B to 53 - (1977)
5. an 11 mile section of I-80 from Exits 27 to 38 - (1977)
6. a 16 mile section of I-287 from Exits 10 to 26 - (1977)
7. a 5 mile section of I-287 from Exits 35 to 42 - (1977)
8. a 10 mile section of I-78 from Exits 26 to 36 - (1979)
9. a 13 mile section of I-295 from Exits 27 to 40 - (1979)
10. a 7 mile section of I-295 from Exits 20 to 27 - (1979).