NOISE MEASUREMENTS

Project 7787

First Interim Report

1972 - 1973

New Jersey Department of Transportation
Division of Research and Development
Bureau of Instrumentation Services

by

Frank Winters, Project Engineer
Mark Marsella, Principal Engineer
Vincent Gazzillo, Principal Engineer

Trenton, New Jersey

74-018-7787

NOISE MEASUREMENTS

First Interim Report
1972-1973

Frank Winters, Project Engineer
Mark Marsella, Principal Engineer
Vincent Gazzillo, Principal Engineer

June 1974

Prepared by the Bureau of Instrumentation Services, Division of Research and Development, New Jersey Department of Transportation in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

ABSTRACT

To develop improved traffic noise prediction methods and to better understand the generation and propagation of traffic noise, 24 hour noise surveys were made at 12 sites adjacent to highway right of ways prior to construction or opening for traffic. Remeasurements of noise will be made at these sites subsequent to construction and resulting traffic flow. Comparisons of measured "before and after" L_{10}, L_{50}, L_{90} noise levels will be made with theoretical predicted noise levels.

A methodology for determination of duration and frequency of sampling times for a 24-hour period was developed which yielded probabilities for estimating noise levels within given tolerances for different traffic volume situations.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

1. Introduction

1.1 Statement of Problem

In recent years there has been increasing concern on the part of the public regarding high noise levels generated by individual motor vehicles and the collective noise from highway traffic. Presently, there exists little control over the noise emitted by motor vehicles and until the advent of the Federal Noise Standards (PPM 90-2) in February, 1973, there was no standard for noise generated by a highway facility.

In order to develop improved prediction methods and to better understand the generation and propagation of traffic noise in the vicinity of highway facilities it is first necessary to compile a data bank of noise measurements for various types of highway configurations. There does not now exist sufficient diurnal noise measurements in the vicinity of the more complex roadway configurations and existing problem areas or before and after measurements of noise in the vicinity of newly constructed roads or alterations and improvements of existing roads.

1.2 Project Objectives

1.2.1 Determine the current noise levels for 24 consecutive hour periods adjacent to:

1. Rights-of-way of proposed highways prior to construction and existing highways prior to improvements.
2. Highways listed above in Item 1 after construction or improvements and after opening for traffic.

1.2.2 Determine existing noise levels at possible noise problem areas and along existing highways with variations in traffic volumes, roadway configurations and topographical conditions.

1.2.3 Predict noise levels at those locations measured in Item 1.2.2 using both the Michigan Noise Predictor Program and Transportation Systems Center Noise Prediction Program. A comparison of measured noise levels will be made with predicted levels to test the effectiveness of these prediction programs under a variety of conditions.

1.3 Work Program FY 72 and FY 73 Objectives

1. Order new equipment required to conduct noise surveys.
2. Field test equipment and develop field measurement procedures.
3. Determine frequency and duration of noise sampling times for varying traffic conditions.
4. Select 12 sites adjacent to proposed right of ways either prior to construction or reconstruction of a highway.
5. Conduct field measurements of noise levels at each of the 12 selected sites for 24 consecutive hours.
6. Analyze the noise data collected at the above 12 sites to determine significant parameters describing the existing noise levels, such as L_{10}, L_{50}, and L_{90}.

1.4 Future Work

Immediate future efforts for FY 74 will involve selection of and noise measurements at possible problem areas with variations in traffic, roadway, and topographical parameters. In addition, comparison of the measured noise levels influenced by traffic to theoretical predictions

of these noise levels utilizing available highway noise prediction methods will be made. The prediction programs will be the Michigan Noise Predictor Program and the Transportation Systems Center Prediction Program. These measurements were deferred in order that the measurement in FY 73 at the selected proposed highway projects could be successfully made well before actual construction or improvements.

Beyond this work, remeasurements of noise levels subsequent to construction and opening to traffic will be made at those 12 selected highway projects at which noise measurements were made in FY 73.

1.5 Summary of Accomplishments

1. All required equipment was ordered and received.
2. A methodology for determining duration and frequency of sampling times for a 24-hour period was developed.
3. The above methodology was field tested at each of three sites having varied traffic volumes for three consecutive 24-hour periods at each site.
4. A computer program was developed to analyze the noise data collected at the three sites for the purpose of determining sampling times.
5. The computer analysis of the data yielded probabilities for estimating noise levels within given tolerances for various sample durations and frequencies for the different traffic volume situations.
6. A list of possible sites for measurement of noise before construction or reconstruction of a highway facility was compiled.
7. A computer program for analyzing noise sample cumulative distribution data for the purpose of obtaining L_{10}, L_{50}, L_{90}, noise pollu-

tion level (L_{NP}), mean, standard deviation, traffic noise index (TNI), and a parameter measuring the normality of this distribution was developed.

8. Field measurements of noise were made and the data analyzed for the 12 sites of Item 6 above by the end of the Fiscal Year 1973 (June 30, 1973) as follows:

    a) New construction - rural - 2 sites

    b) New construction - suburban - 2 sites

    c) New construction - urban - 3 sites

    d) New construction - interchanges - 3 sites

    e) Reconstruction - 2 sites

9. The manual method of predicting traffic noise following the procedures of HCHRP Report No. 117 was investigated.

10. The Michigan Noise Predictor Computer Program and the Transportation Systems Center Computer Program were adapted to the Department's computer facilities.

2. Instrumentation

2.1 Introduction

In order to attain the project objectives, it was necessary to measure traffic noise at distances up to 800 feet from the nearest lane of proposed and existing roads, in urban, suburban and rural areas. A study of the literature and an analysis of equipment requirements with regard to budget, portability, certain specifications, reliability, ease of operation, and availability of repair service indicated that certain general recording, analysis, and accessory equipment was in common use to implement this particular project.

2.2 Description

The equipment selected for the project is listed in Table 1, page 6. Most of the recording and analysis equipment is produced by Bruel & Kjaer, Demnark, since this combination of units when used in conjunction with the Sony tape recorders resulted in what was considered the most desirable ensemble for project needs.

Figures 1 and 2, pages 7 and 8 , are diagrams of the recording equipment. The analysis and accessory equipment are outlined in Figures 4, 5, 6, and 7, pages 12 , 16, 21 and 22 . The following is a brief description of each component and its use, the reasons for its choice and the major problems encountered with each.

TABLE 1

Equipment List

Recording Equipment		Accuracy
Bruel & Kjaer	4134 Microphone with Windscreed and Preamplifier	±1 dB: 3-10,000 Hz
Bruel & Kjaer	4145 Microphone with Random Incidence Corrector, Windscreen and Preamplifier	+2 dB: 3-10,000 Hz
Bruel & Kjaer	4220 Piston Phone	±0.2 dB
Bruel & Kjaer	2204 Precision Sound Level Meter	Complies with International Electrotechnical Commission Publication 179
Bruel & Kjaer	2209 Precision Sound Level Meter	Complies with International Electrotechnical Commission Publication 179
Sony	TC-770-2 Tape Recorder	±2 dB: 50-14,000 Hz
Sony	TC-770-4 Tape Recorder	----------
Sony	ECM-22P Microphone	----------
Bruel & Kjaer	141-B Field Microphone System	----------

Analysis Equipment		Accuracy
Bruel & Kjaer	2305 Graphic Level Recorder	±1 dB: 2-20,000 Hz
Bruel & Kjaer	4420 Statistical Distribution Analyzer	----------

Accessory Equipment		Accuracy
Bogen	M-120 Audio Amplifier	±1 dB: 20-20,000 Hz
Bogen	SCU-80 Sound Column	50-15,000 Hz
Telex	60C-1 Headphones	----------
Danforth	M-505 Wind Speed Indicator	----------
Danforth	M-515 Wind Direction Indicator	----------
Streeter-Amet	Traffic Counter	----------

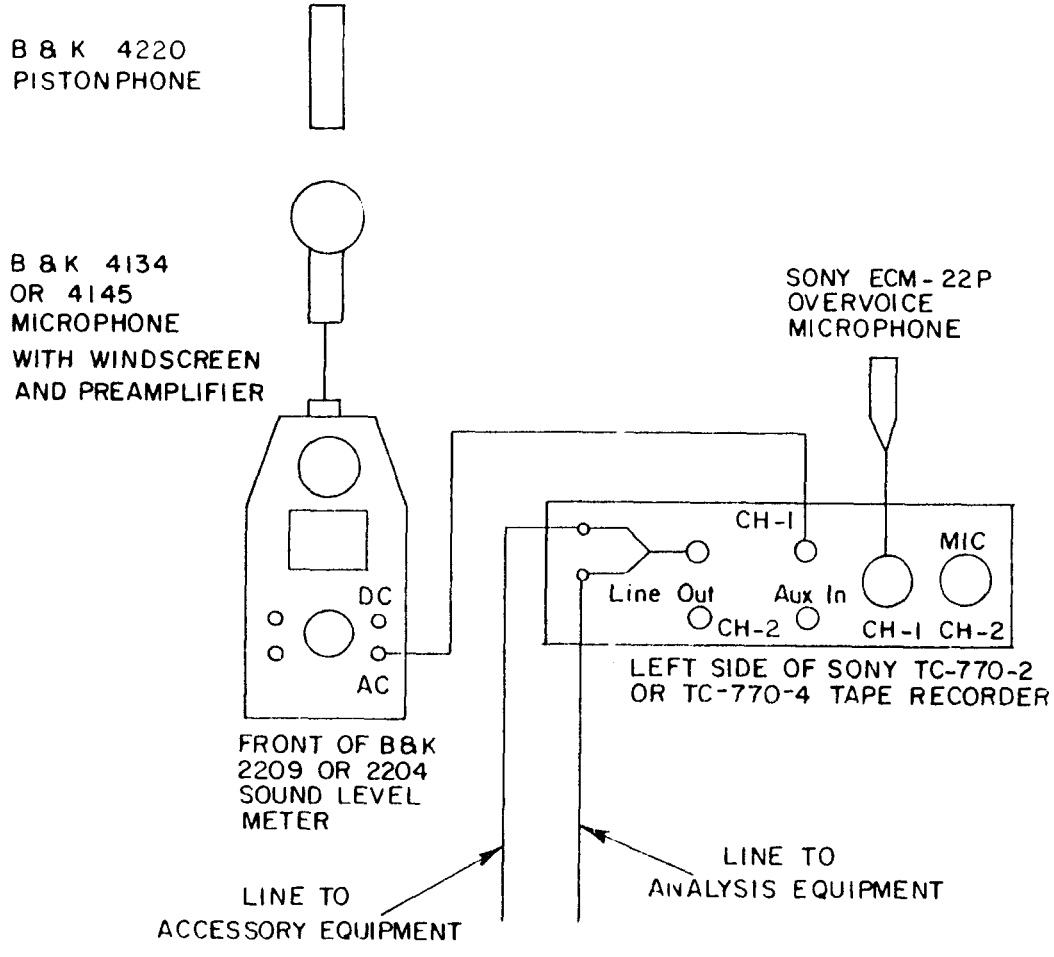


FIGURE 1

Data Recording System Using A Sound Level Meter

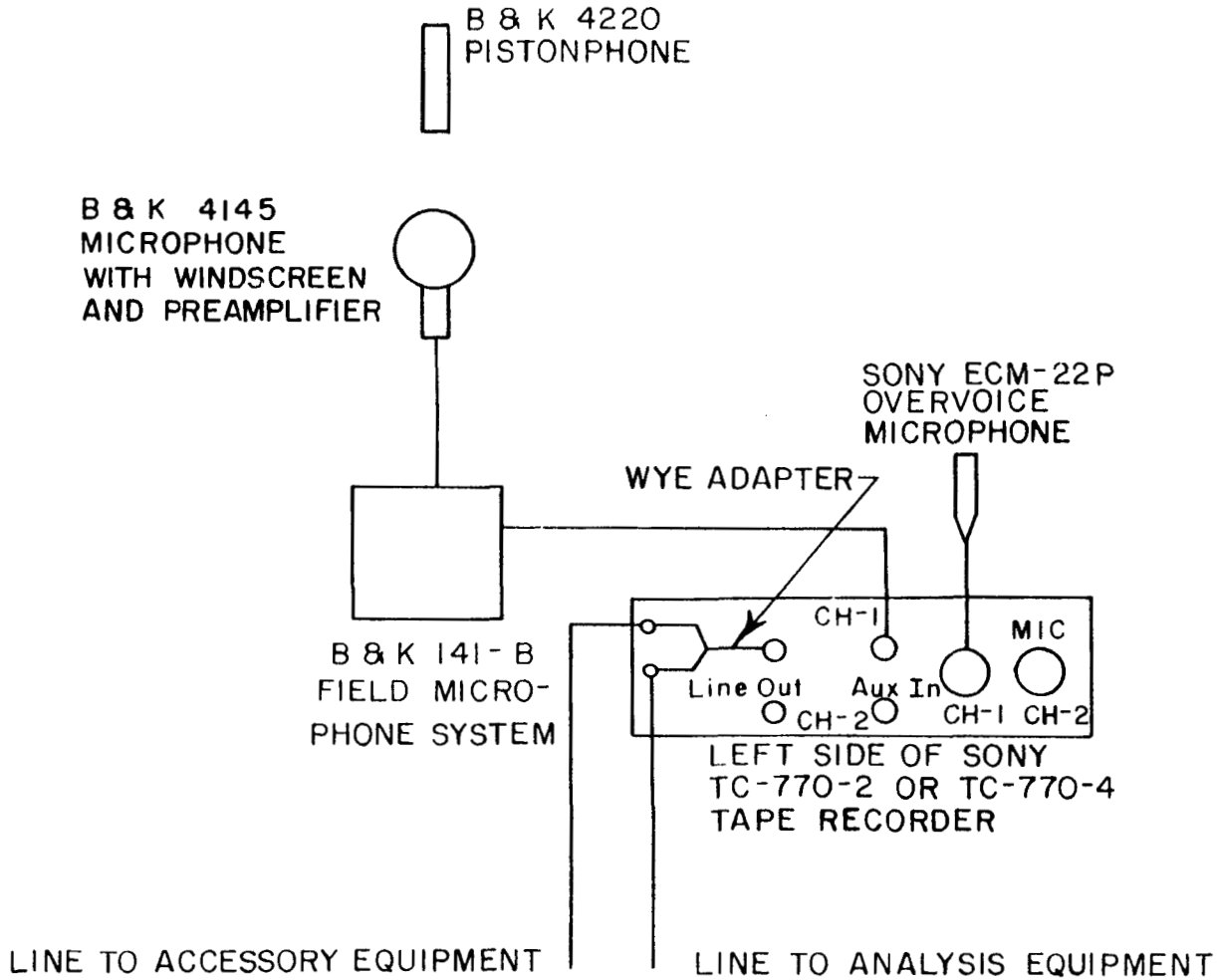


FIGURE 2

Noise Recording System Using A Field Microphone System

2.3 Recording Equipment

B&K 4134 (1/2") and 4145 (1") Microphones: Both of these are condenser microphones, which have a better combination of high sensitivity, flat frequency response and frequency range than other microphones used in noise study. The 4145 can be used as a directional microphone when equipped with its normal protective grid, or can be made omnidirectional by replacing the grid with a random incidence corrector, which allows it to respond equally to noise from all directions. The 4134 is omnidirectional only. Windscreens are used on both microphones at all times. A continuing problem with both microphones is their tendency to condense moisture internally, so that arcing occurs between the diaphragm and the backplate, rendering the microphone temporarily useless. The one-inch microphones seem more prone to this than the half-inch. The problem can be alleviated by drying the microphones in an oven for 24 hours or more and keeping them in a container of silica gel until ready for use. On the site, a heater consisting of a small bulb placed between the windscreen and side of the microphone, and powered by a storage battery, serves to prevent condensation in most instances. Apparently it is necessary to maintain the microphone temperature only a few degrees above ambient.

Each microphone is screwed directly into a preamplifier housed in a metal cylinder. No problem has arisen with these self-contained preamplifiers. The preamplifier, in turn, is connected to the sound level meter by means of a 7-conductor microphone cable in lengths of 100 feet. A maximum of six (600 feet) of these cables may be used between the preamplifier and sound level meter. The cable connectors have presented a constant problem throughout the project. The cables themselves contain

seven conductors inside a braided metal shield, which serves as the ground portion of the circuit. The ground connection is made by a semi-circular clamp which holds the shield against the interior of the cylindrical metal body of the connector. This clamp also holds the cable body in place against the connector body. In handling, the clamps constantly work loose, breaking the ground connection and allowing the cable body to slide in the connector housing. This places a severe strain on the small conductors, which can easily be broken. Figure 3, page 11, is a diagram of one of these connectors. Each time a section of cable is used, each connector housing must be opened up and the clamp retightened. So far this problem has not been alleviated.

The B&K 4220 Pistonphone emits a 124 dB - 250 Hz tone which is used to calibrate each sound level meter at the start of a survey and each time a microphone is changed. This signal is also recorded as a reference signal to be used as a standard in the analysis of the recorded noise.

B&K 2204 and 2209 Precision Sound Level Meter: These meters receive their input from the microphones described above. The signal is amplified and A-weighted for output to a tape recorder or the graphic level recorder (see Figure 1, page 7), during recording, and can also be used to provide the necessary weighting when analyzing a linearly recorded sample (see Figure 4, page 12). They have a dynamic range of 15-140 dB for the 4145 microphone and 38-150 dB for the 4134 microphone, when used with the A-weighting network, and conform to IEC 179 and ANSI S 1.4-1961 which are the most stringent specifications for sound level meters.

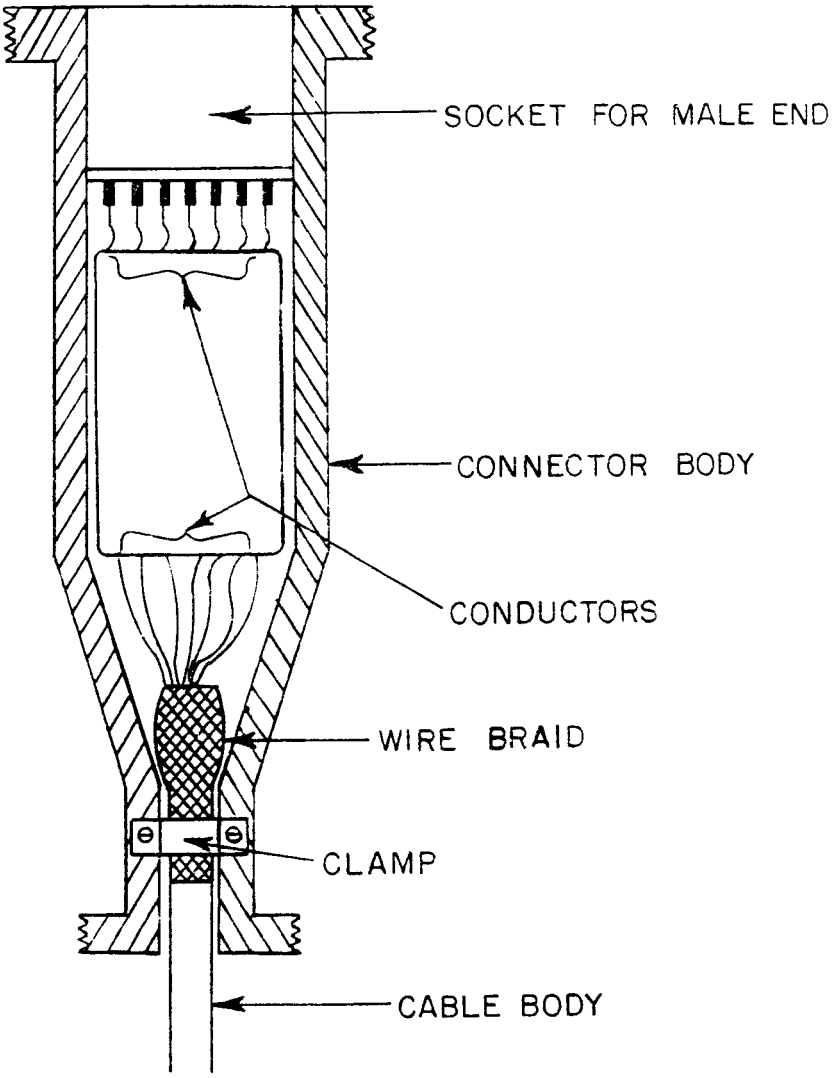


FIGURE 3

Cross-Sectional Diagram Of Female Connector

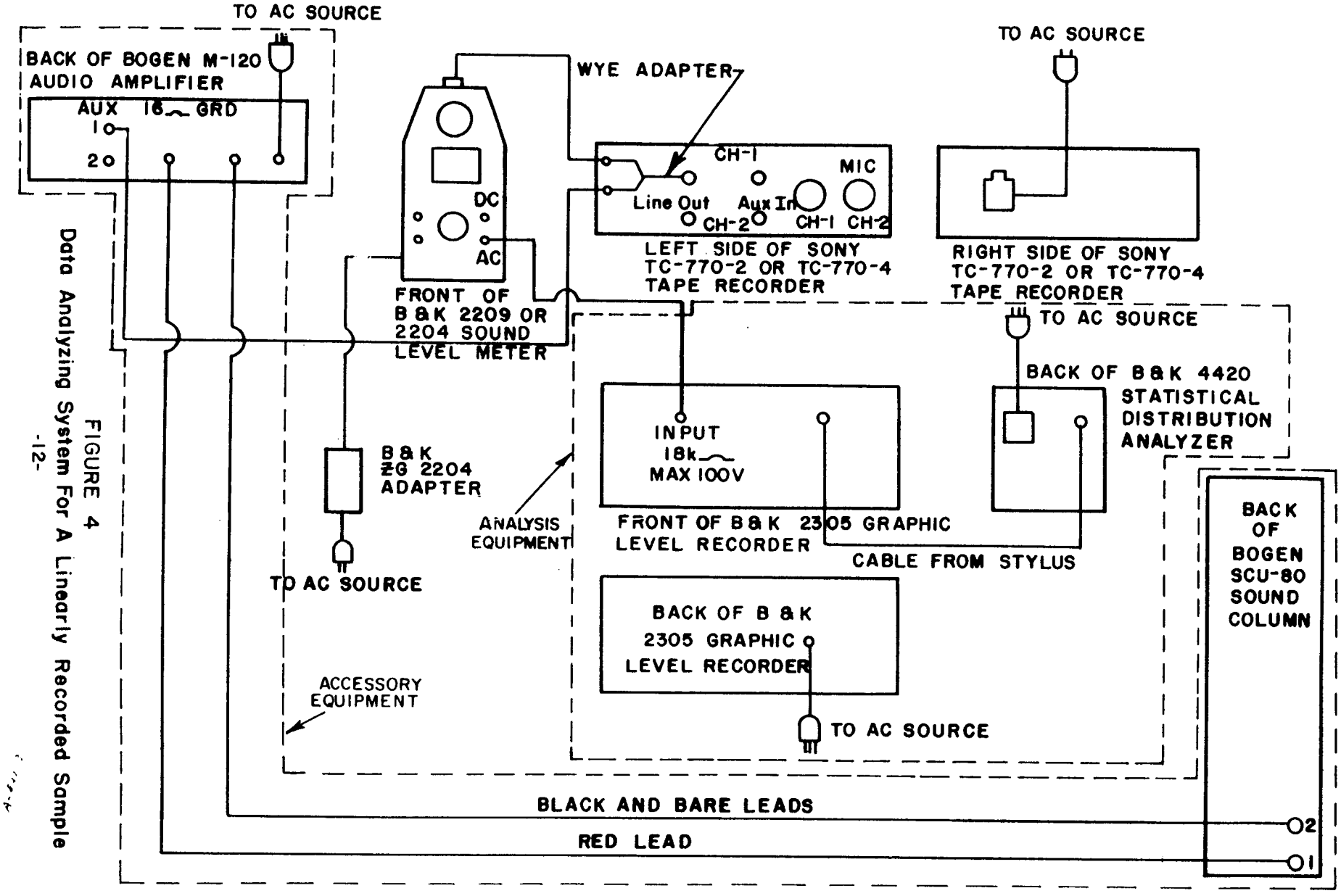


FIGURE 4
Data Analyzing System For A Linearly Recorded Sample

These meters are extremely versatile. They may be hand-held or tripod mounted, the microphone may be mounted remotely (as already noted), and both have A, B, C and D weighting networks and may be utilized with an easily attached octave filter set. In addition, both can be powered by AC or by self-contained rechargeable batteries. No problems have occurred with either of these units.

Sony TC-770-2 or TC-770-4 Tape Recorder: The difference between these units is that one is a two-track and the other is a four-track recorder. These units can be operated on AC or DC, the DC operation is being from self-contained batteries or 12-volt storage batteries. Each recorder has two auxiliary inputs, two overvoice microphone inputs and two playback outputs. The sound level meter provides the signal to the auxiliary input while the overvoice input is used to record location, date, time, etc. at the beginning of each tape (see Figure 1, page 7). During recording, the playback outputs provide an amplified signal for the graphic level recorder and for the audio monitoring system. These are discussed in later sections. Both recorders will take 7-1/2" reels, so that one full hour may be recorded using 1/2 mil tape. The tape used throughout the surveys is Sony PR-200-24. The Sony ECM-22P has been used as the overvoice microphone. No major problems have been encountered in using either of these tape recorders, or with the overvoice microphone or the recording tape.

B&K 141-B Field Microphone System: This is a portable unit which consists of a tripod, microphone, a preamplifier permanently attached to a 10-foot 7-conductor cable, and a waterproof box which houses what is essentially a battery operated sound level meter. This system may be placed several thousand feet from the tape recorder, allowing for

much greater flexibility in microphone positioning than is possible with the microphone-cable-sound level meter arrangement already described. The cable from the unit to the tape recorder is a coaxial type, light in weight, easy to handle, and inexpensive. The signal received at the tape recorder is a linear one, rather than the A-weighted one obtained from the sound level meter. One of the difficulties in using this unit is that a sound level meter must be used when the tapes are being analyzed to provide the A-weighting missing from the original recording (see Figure 4, page 12). These units are presently having A-weighting circuitry installed so that in the future a meter will not be needed for analysis, since the recording will be weighted initially. Another problem is that when used with a half-inch microphone, the noise floor of the unit is 48 dB, which is too high to give an accurate recording of low level noise. This problem has been temporarily alleviated by using a one-inch microphone, which lowers the noise floor to 34 dB. The A-weighting circuitry being installed should lower it another 10 dB, so that both sizes may be used. A third major difficulty concerns the routing of the microphone cable through a water-proof fitting in the hinged top of the case and then into the standard seven-connector female connector in the body of the unit. Since the top must be opened frequently to service the unit, the cable is subjected to constant sharp bending, which causes it to crack. The female connector was remounted at one side of the case, so that the cable is no longer routed through the hinged cover. The last difficulty encountered is that same ground and physical clamp-type connection is used on the pre-amplifier as

is used for the sound level meter cables. On at least three occasions the clamp loosened and caused some of the fragile internal conductors to break, resulting in factory repairs. This problem has not yet been eliminated.

2.4 Analysis Equipment

The analysis equipment is outlined in Figures 4 and 5, pages 12 and 16.

B&K 2305 Graphic Level Recorder: This instrument provides a continuous graph of the noise being recorded, and a graph of calibration signal. The noise graph can be used to monitor the output of the various units and also provides a permanent record. The electrical output of the unit, which drives the stylus, is tapped from a set of contacts attached to the stylus drive mechanism and used to actuate the counters of the statistical distribution analyzer. The recorder is normally used with a 50 dB input potentiometer. It is operated on AC only. There have been no major problems with this unit.

Statistical Distribution Analyzer: As already noted, the statistical distribution analyzer is connected to the stylus of the graphic level recorder. It divides the amplitude of the noise level into twelve intervals, ten of 5 dB each, and one overshoot and one undershoot, thereby, producing data which is used in the statistical analysis of noise. This unit can be operated on AC or DC. Except for occasional anomalous counts, there have been no problems.

2.5 Accessory Equipment

See Figures 4, 5 and 6 pages 12, 16, and 21 for diagrams of accessory equipment.

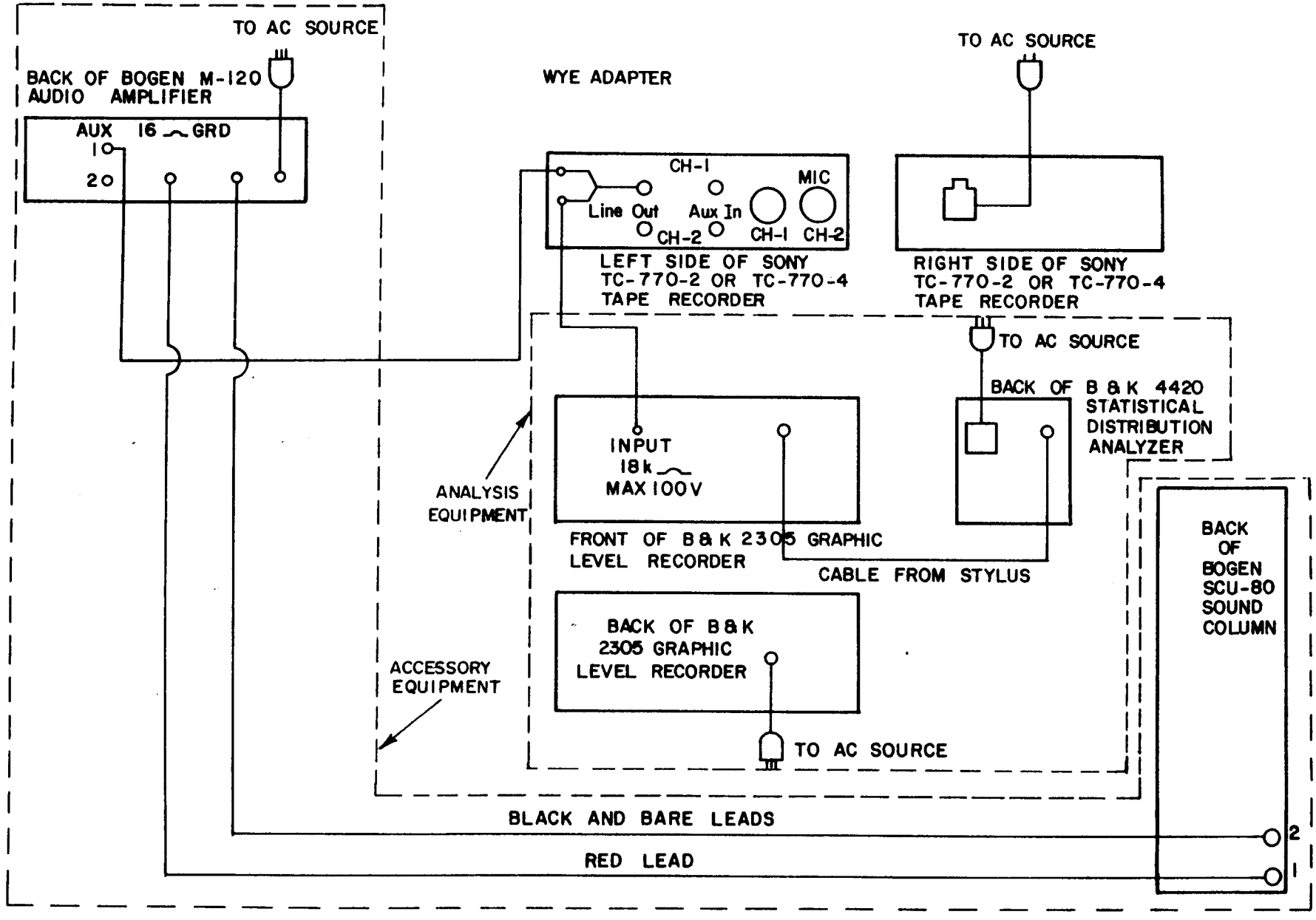


FIGURE 5
Data Analysis Equipment For An A-Weighted Recording

Bogen M-10 Audio Amplifier: Bogen SCU-80 Sound Column: Telex 600-1 Headphones: This equipment enables the operator to listen to the noise during recording and analysis. In the field, the speaker (sound) column or headphones provide the only continuous contact with microphones which may not be visible because of vegetation, ground contours or darkness. Both the audio amplifier and the headphones receive their input from the output side of the tape recorder. By listening to the headphones or the speaker, the operator knows exactly what is being recorded in the field, or what is being analyzed in the laboratory. The amplifier operates on AC only. No problems have occurred with these units.

Danforth Wind Speed and Direction Indicators: The wind instrument pick-ups are mounted together on a tripod, with the dials housed remotely in the van and connected by cables to the tripod units. The direction indicator is AC or DC powered, and the speed indicator is powered by a wind operated generator contained in the mounting. The choice of these instruments was dictated primarily by budget considerations.

Streeter-Amet Traffic Counter: This counter has been the standard one used by the Department for some time. It is actuated by an air hose which is fastened across the lanes of traffic. A battery-operated printer records the cumulative total every 15 minutes for one hour and then returns to zero. Major problems have been difficulty in synchronizing the clock mechanism with the actual time, and in keeping the air hose fastened securely on heavily traveled roads.

3. Field Procedures

3.1 Introduction

All noise surveys were conducted in three major steps. These were preparation, implementation, and analysis. Preparation included on-site inspection of proposed construction projects for availability of electrical power and suitability of terrain, obtaining large scale construction plans of the site, laying out the microphone positions on the plans in relation to existing monuments, making arrangements for electrical power, and securing permission to work on properties adjacent to the right-of-way of the proposed highway. This usually took several weeks of intermittent liaison work within the Department, and with other state agencies, municipal governments and private property owners. Generally, the microphones were placed in locations which were previously unmarked, so that the positions had to be determined by a two-or-three man crew using a transit, rod, tape, and walkie-talkie. Since it was sometimes necessary to cut a path for line-of-sight and for cables, it sometimes took as long as two days to set up the microphone positions in a wooded area. Two or three surveys were planned simultaneously, so that this preparation was continuous.

The next step, implementation, included travel to and from the site, assembling and disassembling the equipment, and the recording itself. The equipment was stowed in a vehicle which housed both men and equipment for the duration of the survey.

The final step, analysis, was sometimes partially completed in the field, during and after recording. The laboratory analysis was performed using the equipment shown in Figures 4 and 5, pages 12 and 16. The data from the statistical distribution analyzer was coded, transferred to punch cards, and printed out by computer. This printout and all other documents

from the survey, including the plans and original work sheets, were placed together and filed in the Bureau's Documentation Room.

3.2 Method

Two methods of conducting surveys were used. A stationary survey, operated from a large van and utilizing all available equipment, was used for most locations. A mobile survey, using a carryall, was used in congested urban areas where it was impractical to keep several microphones under surveillance, or where commercial power was not readily available. In both cases, recording followed a predetermined schedule, which was interrupted only because of equipment malfunction, or because of precipitation. Generally, even a light rain striking the microphone windscreen caused enough noise to mask much of the traffic noise and render all or part of the sample invalid. Recording continued regardless of wind velocity, but if wind noise was discernable during the playback for analysis, that part of the sample was discarded.

A maximum of four microphones per day per site was available. For surveys along the main line, these were placed at 100, 200, 400, and 800-foot distances from the edge of the near lane. At intersections, the microphones were located so that the noise contributed by the existing road, the proposed road, and a combination of these, was sampled. For mobile surveys, the microphone positions were located at the edge of the right-of-way and at varying distances therefrom, depending upon the availability of parking space. In all cases care was taken to avoid locations near reflecting surfaces or directly behind barriers, and all locations were chosen so that they would still be usable after the road was opened traffic. Section 6 , Survey Results, contains maps of all survey sites, which show the microphone positions.

The minimum prescribed sampling time was 25 minutes for all positions on all survey sites but samples of up to 55 minutes were recorded whenever possible. Practical considerations determining the sample duration for each survey were availability of recording and analysis equipment and personnel, and, in the case of mobile surveys, distances between sampling positions.

The implementation of a stationary survey was the more complicated, in terms of the amount of equipment, assembly and disassembly, and actual operation. Figure 6, page 21, is a diagram of a recording system used for one microphone on a stationary survey. In practice, two microphones and sound level meters were used, and both were monitored by means of the audio amplifier and speaker column. In addition, two portable microphone units provided input to a second tape recorder, so that four microphone positions could be covered simultaneously. Figure 7, page 22, shows the recording system using the portable units. The microphone height used in all cases was four feet, which was the height recommended in the literature.

All of this equipment, plus weather instruments, tools, cables reels, and accessory items were transported to and from the site in a stripped 27-foot camper-type van which housed both men and equipment, once properly stationed. The microphones, portable units, and wind instruments were set up at pre-determined positions and connected by cables to the recording units in the van. At certain urban locations the wind instruments were not used because the primary noise source was so close to the microphones that the wind direction and velocity would not effect the data.

In the field, the output from one of the sound level meters was not recorded on tape, but routed directly to the graphic level recorder and statistical distribution analyzer for immediate analysis. The output of the remaining units were recorded, and, if the samples were short enough, the recording from the second sound level meter was analyzed after the first one

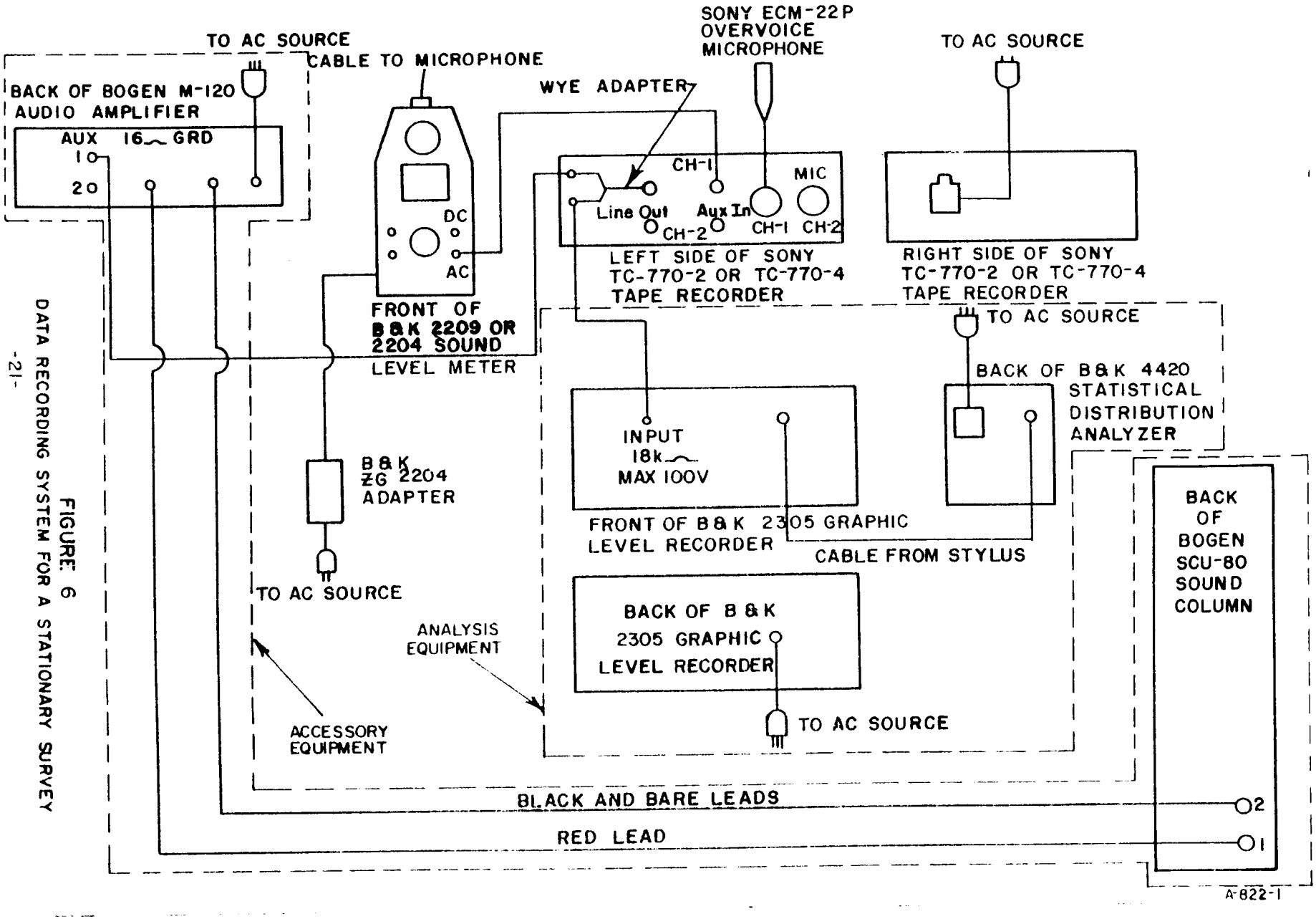


FIGURE 6
DATA RECORDING SYSTEM FOR A STATIONARY SURVEY

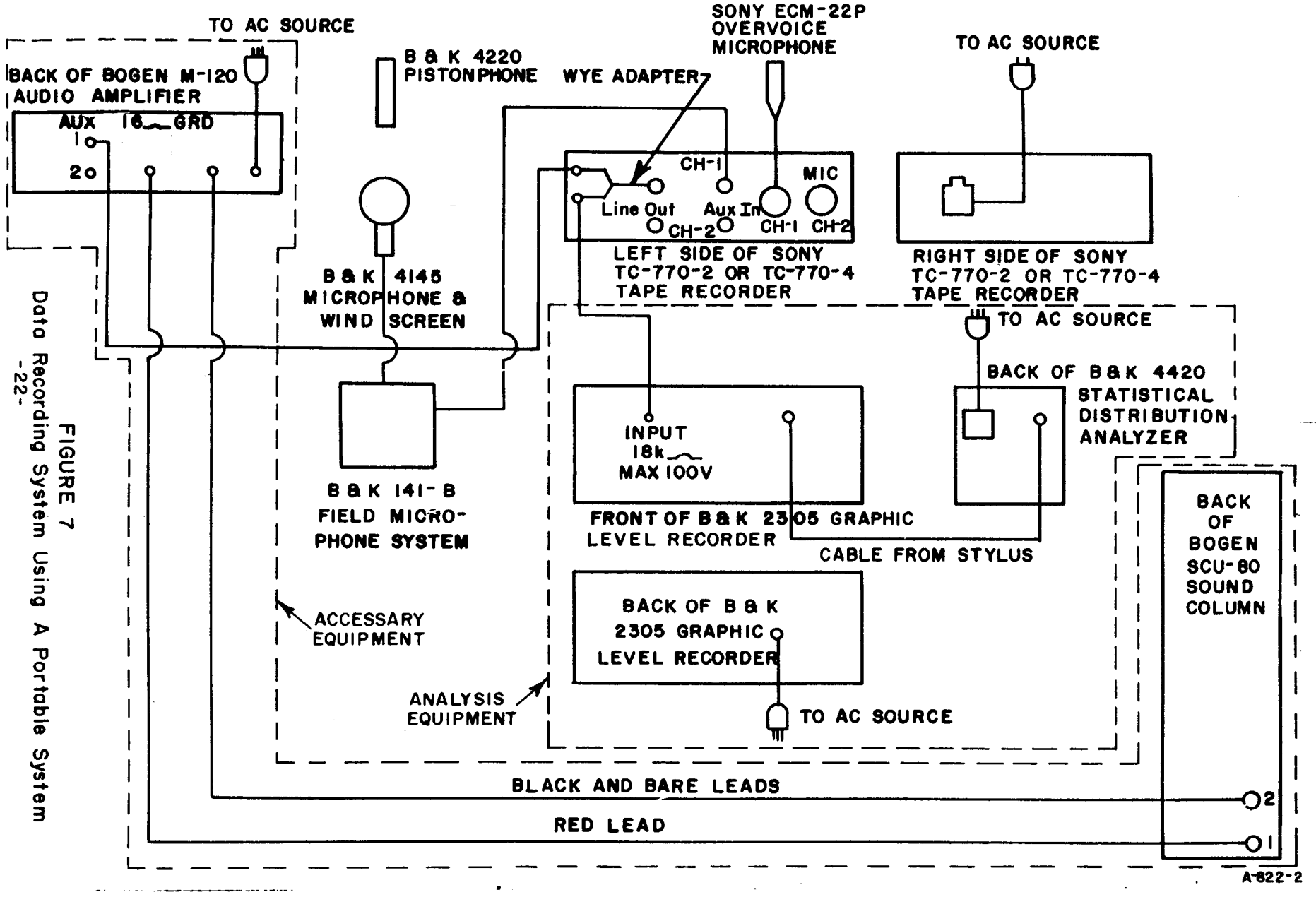


FIGURE 7
Data Recording System Using A Portable System

was completed. The sequence was repeated each hour for the duration of the survey, which lasted from 24 to 96 hours. The remaining recordings were analyzed in the laboratory after the survey was completed.

A stationary survey provided the best complete coverage possible with the available equipment. If the survey was one using seven microphone positions, it was necessary to move all the outside equipment and perhaps the van to new locations after the first 24 hours, which took two or three hours. After the equipment was in place and operating, it required almost continuous monitoring, cleaning and calibration. The statistical and written information also had to be recorded. Most of this work occurred during the 5-10 minutes preceding each recording period, so it was necessary to have two people on duty to get the work done in the time available, as well as to attend to any problems which might occur during operation.

In addition to the noise recording and analysis, wind speed and direction, and temperature were recorded at the beginning of each hour, and and notes were kept on precipitation. For the duration of each sample, there was also a traffic count kept using an automatic mechanical counter to count total traffic, and a manual count to determine the number of trucks. An overall description of the site and other information were all recorded on forms which became part of the permanent file on the survey.

A major problem in doing a stationary survey was the difficutty in maintaining a comfortable temperature range within the van. Both the heating and cooling systems required commercial power. In most instances there was not sufficient power available to operate these systems with any efficiency.

A simpler arrangement was that used for mobile surveys. A diagram of the data recording system used is shown in Figure 8, page 24. This equip-

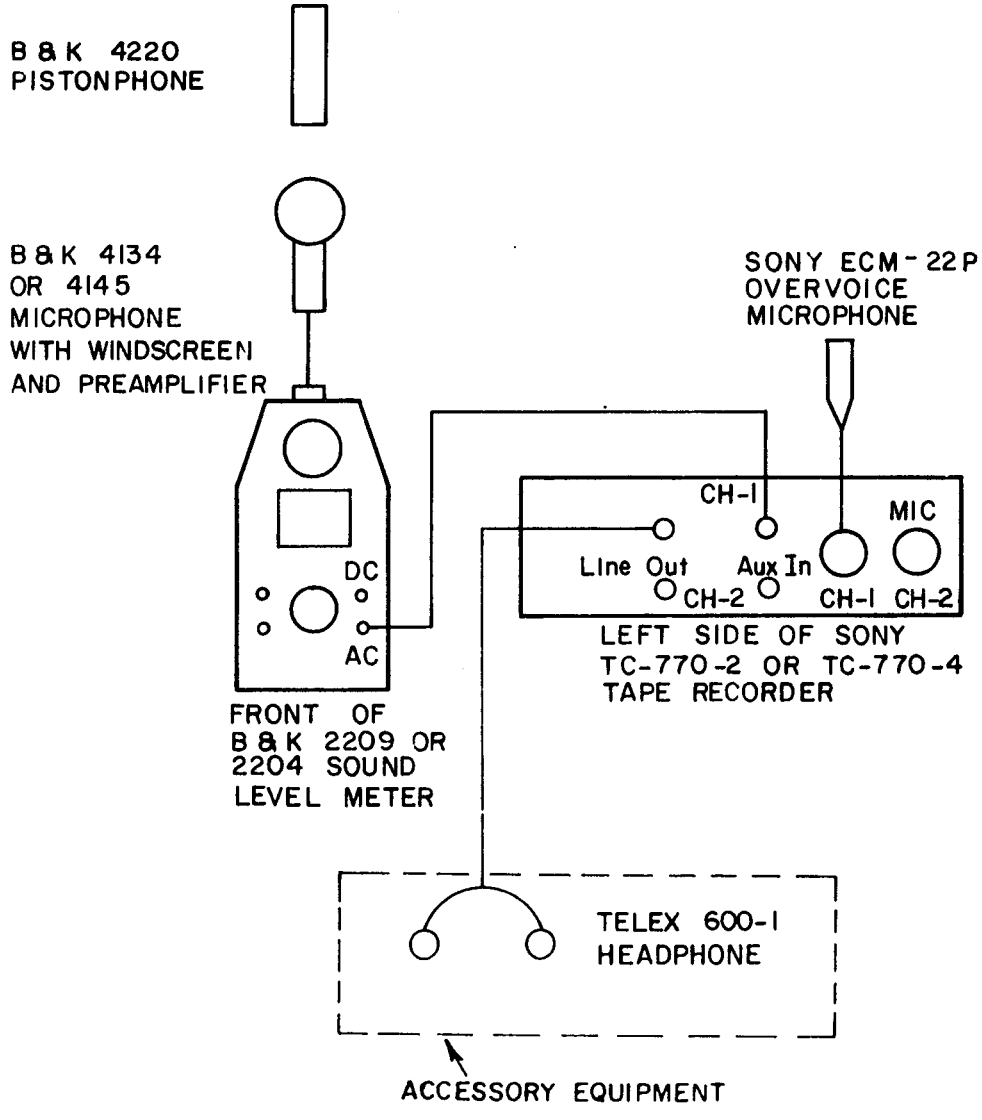


FIGURE 8

DATA RECORDING SYSTEM FOR A MOBILE SURVEY

ment was housed in a carry-all which was driven to various locations on the survey site. The operator recorded the noise at a location for 30 minutes, and then proceeded to another location in the same proposed construction area and recorded the noise at this location. The procedure was repeated on the survey site by shifts of operators working continuously for 24 hours or more. Thus, noise at each location was sampled once every second hour throughout the survey period. Figures 9 and 10 pages 26 and 27 , are drawings of the equipment layout in the carry-all. A special table was constructed which greatly reduced the physical shock to the equipment when the vehicle was being driven between recording locations. The microphone weight was 6.5 feet, which was a compromise between the 4-foot recommended height and the necessity of raising the microphone high enough to minimize reflections from the vehicle body.

Although this method of mobile sampling of urban areas was effective and relatively simple, in terms of the amount of equipment involved, it did have several drawbacks. First, the confined work-space and lack of commercial power precluded the use of the statistical analysis equipment. Second, the equipment performance was monitored only intermittently by headphones, which could have resulted in trouble developing and continuing for some time without the operators' knowledge. Third, there was no practical way to heat or cool the vehicle. Finally, the wind instruments could not be used, since they were not readily portable.

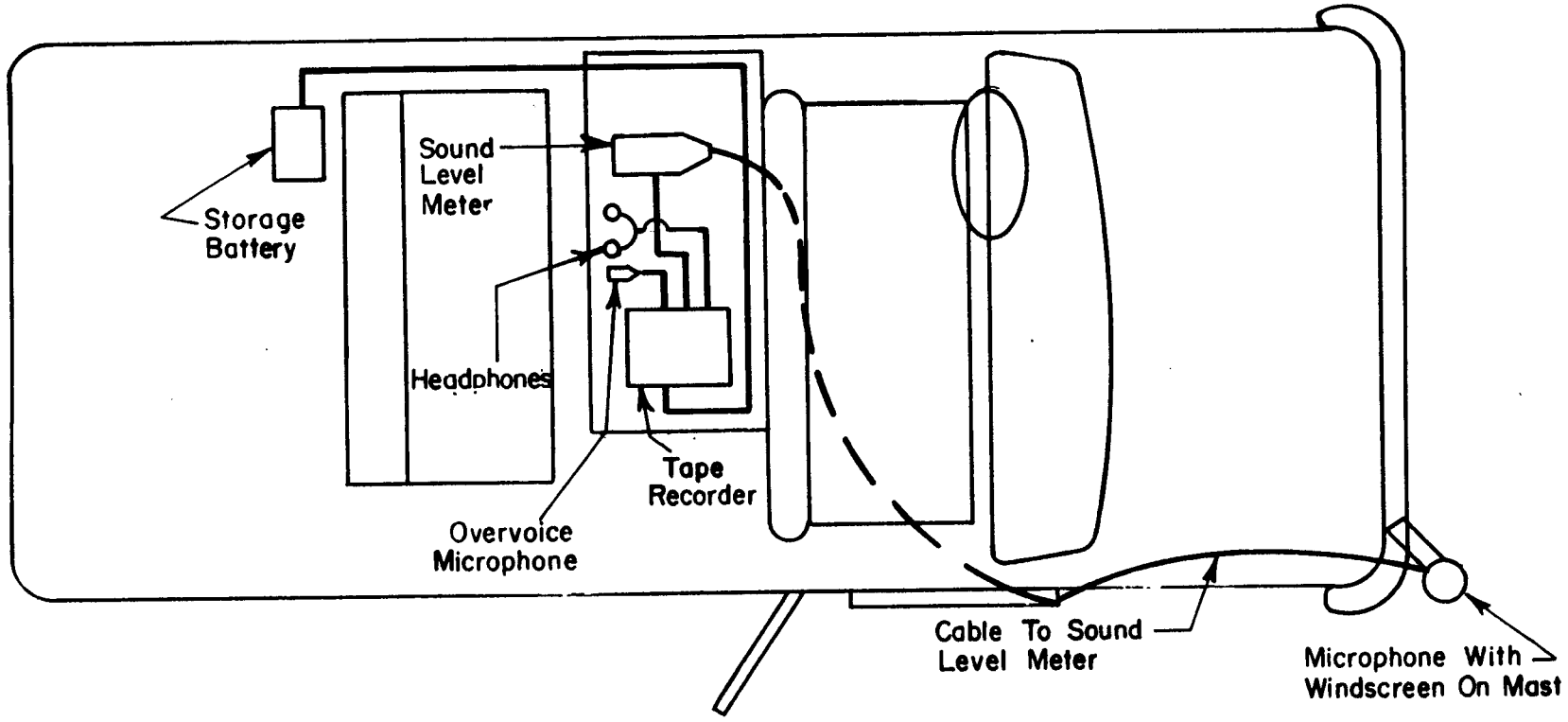


FIGURE 9

MOBILE SURVEY RECORDING EQUIPMENT

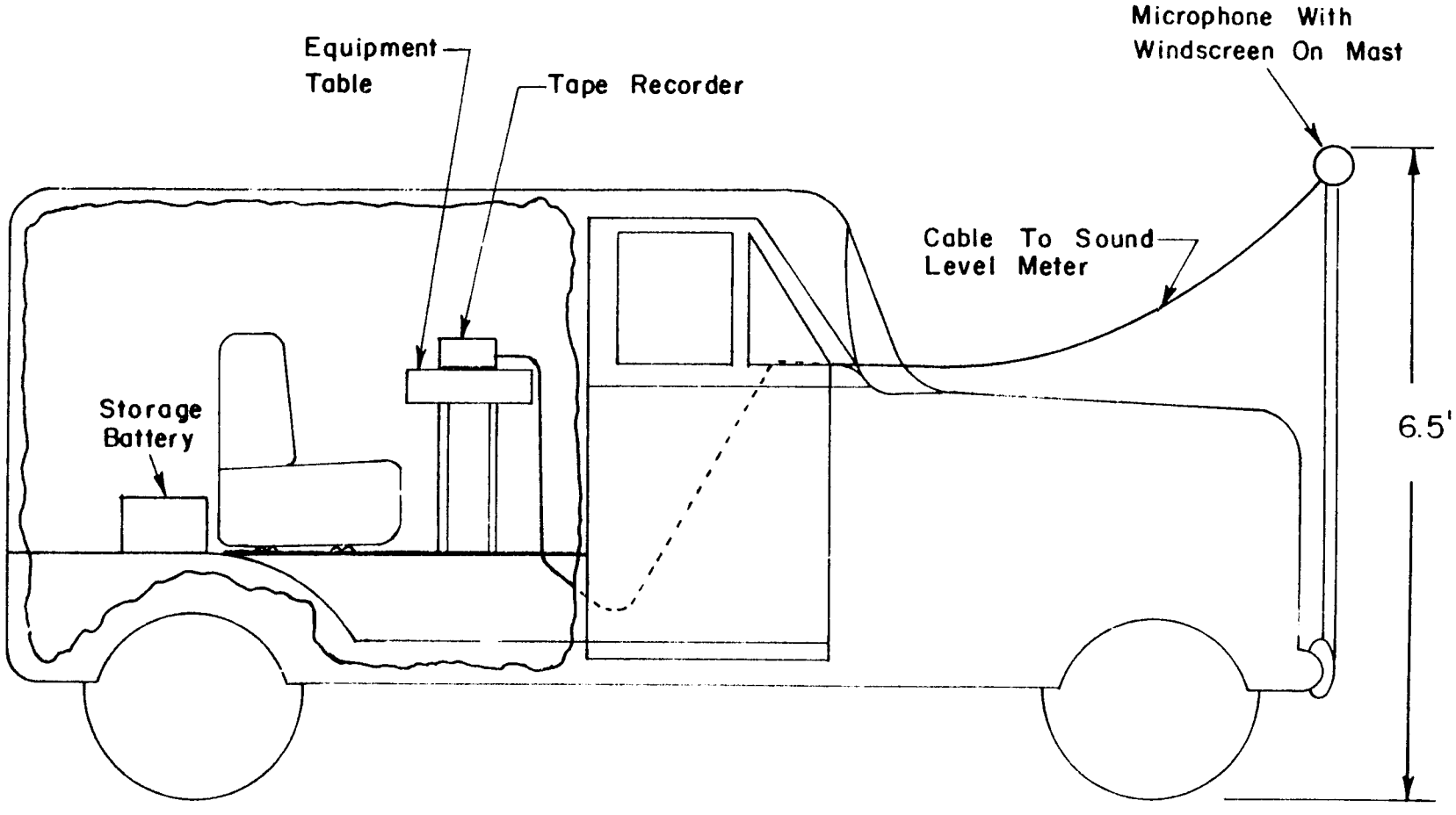


FIGURE 10

MOBILE SURVEY RECORDING EQUIPMENT

4. Sampling Time Determination

4.1 Introduction

The noise measurement study program undertaken by the Bureau of Instrumentation Services is essentially a study of community noise. Emphasis is on traffic noise as it influences existing community noise levels. The temporally fluctuating nature of such noise levels determine the measurement procedure used.

The length of the standard observation period was chosen to be 24 hours or a full day, during each hour of which noise levels were to be measured to obtain a record of the hourly fluctuations in levels. The measurement day was to be a weekday, preferably Tuesday, Wednesday, and Thursday, because a regular cycle of variations can be expected to occur from day to day and week to week if the weekends are excluded, especially in the daily variation of traffic volumes. More than one day was to be spent at each site for measurements to obtain adequate representation of hourly fluctuations in noise levels.

The procedure was to tape record all the noise for each hour in the field and analyze the tapes later in the laboratory. At this stage in the noise measurement program, problems in obtaining full hour measurements over 24 hour periods were anticipated. The basic procedure in gathering and reducing data from a microphone array would be time consuming and costly. Thus an investigation of methods to reduce time and cost of measurement was considered justified.

The basic considerations in community noise measurement procedure are presented in reference (1). The first consideration is to use A-weighted sound levels rather than do analysis in the frequency domain.

A-weighting is considered to adequately account for the frequency component of subjective annoyance and its use reduces analysis time.

The second consideration is obtaining a statistical analysis of the time-varying sound levels. In this study, every hour of the 24 hour time period was to be analyzed. The analysis provides the cumulative distribution of the noise levels, that is, the percent time of the hour that a sound level is exceeded over a range of levels. From this distribution is obtained the most commonly used levels L_{10}, L_{50}, and L_{90}, the levels exceeded 10%, 50% and 90% of the time respectively. The distribution can also supply the mean energy level and the standard deviation from which the L_{NP}, the noise pollution level is derived.

The third consideration is to use a shorter sampling time than an hour to represent the hour measurement if possible. This is a question that is the focus of two investigations in reference (1) and would reduce both recording and analysis time.

The first investigation reported was conducted by the C.S.T.B. (Scientific and Technical Center for Building Construction - Paris). The probabilities of predicting the L_1, L_{10}, L_{50}, and L_{90} for the hour from 2, 5, and 10 minutes samples determined for four hours at different times of day in an urban traffic situation were found. The probabilities were low and unreliable, so the conclusion was that 100% measurement of the hour rather than short samples should be used. The second investigation reported was done by Bolt, Beranek and Newman using longer sampling times of up to 30 minutes out of the hour. The range of differences between the hour and sample levels was computed. The results showed shorter samples' noise levels deviated from hour values within $\pm$2 dBA. Only peak noise sample levels for those hours with highly skewed distributions showed greater variation.

These two investigations provided the basis for the study conducted by the Bureau of Instrumentation Services in conjunction with the testing of field equipment. The Bureau's study was of a larger scope because it had variations in sampling scheme, different locations, and more data. The study investigated the average probabilities of short sample schemes estimating the L_{10} for the hour within specified tolerances at three different locations. The procedure was implemented using a computer program developed for the study.

The only noise measurement used for the study was the L_{10}, the sound level exceeded 10% of the time. The L_{10} of the hour was obtained from the hour cumulative distribution, and the L_{10}'s obtained from shorter sample schemes were compared to it because a) it represents the peak levels of the hour or the shorter sample, b) it contains more data from the hour or shorter sample than a higher level, say L_1, the level exceeded 1% of the time, making it more reliable, c) it contains less data than a lower level, say L_{50} or L_{90}, insuring that if the L_{10} for the hour can be estimated by a shorter sample than so can the lower levels, and d) it is the level of choice in the federal guidelines (PPM 90-2) for predicting highway noise levels and measuring ambient noise levels.

In brief, the procedure was as follows:

(1) Three sites were located. The sites differed in the volume of traffic influencing noise levels.

(2) Continuous tape recordings of ambient noise were made for each hour for 72 hours at each site.

(3) Each hour recording was analyzed into five minute samples for which cumulative distributions were obtained.

(4) Cumulative distributions of longer samples were constructed by adding together the five minute sample cumulative distributions for each hour.

(5) L_{10}'s were computed for the hour and the shorter sample from the cumulative distributions.

(6) Probabilities of estimating the hour L_{10} from the various types of sampling schemes were determined.

(7) The probabilities of the sampling schemes were compared to establish the sampling time to be utilized in the field procedures.

4.2 Field Measurements

Three locations in New Jersey were chosen for continuous noise measurement. The locations differed primarily in the amount of traffic present contributing to the overall noise level. Continuous monitoring over a three day period was done at each location on weekdays. Thus, each of the 24 hours of the day at each location could be represented by up to three hourly samples.

The field noise measuring equipment layout is shown in Figure 11, page 45. The one-inch microphone and sound level meter (SLM) were set out at each site. The rest of the recording equipment was housed in a van located away from the microphone. The microphone signal was A-weighted and amplified by the SLM and then tape recorded. The pistonphone was used to calibrate each tape track with a 124 dB calibration signal. Fifty-five minutes of each hour was recorded per track. The remaining five minutes was used to change tapes, clean and check equipment, take notes, and the like. Due to occasional problems with equipment, rain, and operator error, some hours were only partially recorded or completely missed.

Traffic data was gathered from pneumatic counters and observers noting trucks. Two-way traffic volumes are given. Speeds were obtained by observation.

The three locations are discussed below. Daytime is considered to be 6:00 a.m. to 10:00 p.m. and nighttime, 10:00 p.m. to 6:00 a.m.

Location #1 - State Police Barracks along U. S. Route 1 near Princeton: The microphone was placed 100 feet from the edge of the roadway - four lanes with a two foot high center barrier and shoulders. The terrain was flat, open, mowed grass. Ambient noise levels were predominantly influenced by high auto and truck volume. The mean daytime auto volume was 884 vehicles per hour and the mean daytime truck volume was 123. The mean nighttime auto volume was 240 and the mean nighttime truck was 39. Speeds varied between 50 and 60 mph.

Location #2 - Phillips Farm in Washington Crossing State Park along Route 579 in Mercer County: The microphone was placed 100 feet from the edge of the two-lane roadway with low traffic volume and negligible truck traffic. The terrain was slightly rolling mowed grass. Ambient noise levels were equally influenced by traffic and other types of noise sources. The mean daytime auto volume was 160 vehicles per hour and the mean nighttime auto volume was 26. Speeds varied from 30 to 40 mph.

Location #3 - Turkey Swamp Park, four miles south of Freehold: The microphone was placed in a wooded area approximately 1500' from a very lightly traveled road. Ambient noise was primarily influenced by jet aircraft, birds, wind in trees, and insect noise. Intermittent insect noise caused variation during nighttime hours.

4.3 Data Analysis

4.3.1 Field Data Reduction

The laboratory analysis equipment used to obtain the statistical cumulative distributions of the taped noise is shown in Figure 12, page 46. Each hour's recorded levels were calibrated and traced on the graphic level recorder (GLR) and simultaneously analyzed by the statistical distribution analyzer (SDA). The SDA samples the trace at a rate of ten times per second and counts the number of times ten dBA levels spaced five decibels apart are exceeded by the taped noise sample. This approximates the cumulative distribution for the sample, that is, the percent time of the sample a given level exceeded as a function of level.

Each hour recording was analyzed into five minute samples. Five minutes was decided on as the smallest practical sample size because of the results in reference (1) and the equipment used. For the 55 minute recording time, 11 five minute samples were drawn. For the few partially recorded hours (30 to 50 minutes), as many five minute samples as possible were drawn. Hours which were not recorded for 50 or 55 minutes were eliminated from consideration in the probability analysis. The procedure was to run the tape for five minutes, then stop the tape, and record the counts versus level exceeded on a data coding sheet. Data processing cards were then keypunched from the data coding sheets. The cards were used as input for computer programs that had to be developed to handle the data.

The computer programs served to combine the five minute cumulative distributions into longer sampling time schemes and compute their probabilities of predicting L_{10} for the hour. The programs were written in Fortran IV.

4.3.2 Sample Schemes

The five minute samples were combined into independent longer sample sizes in multiples of five minutes within each 50 or 55 minute hour by the programs. This was accomplished by adding together counts for corresponding points on their cumulative distributions and calculating new L_{10}'s. The cumulative distribution for the hour itself was obtained by adding up all the cumulative distributions for the hour. The five minute multiple samples were formed in the sampling schemes described below:

5 minute sample scheme: L_{10}'s were computed from the raw five minute sample cumulative distributions input to the program. Eleven 5 minute samples could be obtained for each hour.

10 minute sample schemes: Three kinds of 10 minute samples, composed of two 5 minute samples, chosen (1) consecutively, (2) randomly, and (3) spaced 30 minutes apart throughout the hour. Five 10 minute samples of each kind were obtained for the hour.

15 minute sample schemes: Three kinds of 15 minute samples, composed of three 5 minute samples, chosen (1) consecutively, (2) randomly, and (3) spaced 20 minutes apart throughout the hour. Three 15 minute samples of each kind were obtained for the hour.

20 to 40 minute sample schemes: Two kinds of 20, 25, 30, and 40 minute samples, composed of four, five, six, and eight 5 minute samples respectively, chosen (1) consecutively and (2) randomly through the hour. Two each of the 20 minute and 25 minute samples and only one each of the 30 minute and 40 minute samples of each kind were obtained for the hour.

The random samples were formed using a subroutine which had the numbers from 1 to 11 in a repeating sequence obtained from a random number table. Each time the subroutine was called it would supply a number from the sequence and advance to the next and restart the sequence at the end. Another subroutine would initiate as many calls as necessary to pick five minute samples from which to form cumulative distributions for longer random samples.

4.3.2 Probabilities and Tests

The probability analysis was derived from reference (1) with modifications for numerical rather than graphical analysis.

The probabilities of the sample schemes of predicting the hour L_{10} to within ± 1, ± 2, and ± 3 decibels were determined by the program for those sampling schemes for which two or more independent samples could be drawn from the hour.

The procedure for a given sampling scheme for a given hour was to first obtain the L_{10} for the hour from the cumulative distribution for the hour. Then, the L_{10}'s of the cumulative distributions of the samples in the schemes were obtained. The L_{10} was linearly interpolated in the five decibel interval containing it in the cumulative distribution.

The sample L_{10}'s were assumed to be drawn from a normal probability distribution, the mean and standard deviation of which could be estimated from the sample distribution of L_{10}'s which were known. This was assumed because of the independence of samples.

The probability of a sampling scheme predicting the L_{10} for the entire hour within specified tolerances was then determined. This was accomplished by integrating the normal distribution function over limits defined by the upper and lower bounds on the hour L_{10}.

The above procedure was carried out for each hour of the continuous 24 hour day using the given sampling scheme. In the study, three 24 hour days were recorded at a particular location, so the three corresponding hours of each day were taken together, The probabilities of predicting the respective hour L_{10}'s for each hour of the day were averaged and the hour L_{10}'s assumed to have a normal distribution. The hour L_{10} distribution for the hour of the day was statistically compared with the L_{10} distributions of the various sample schemes for respective hours using "t" and "F" tests. The "t" test is used to test and compare the means of two distributions and the "F" test is used to compare the variances. These tests gave an indication of how well a given sampling scheme compares with continuous hour sampling in obtaining an L_{10} representative of the hour of day over a period of days.

In addition to the L_{10} of a particular noise sample determined from the samples cumulative distribution, a chi-squared parameter indicating goodness of fit to a normal cumulative distribution were obtained and used for further analysis. The more normal samples were separated out by testing on the parameter and new probability distributions determined. New probabilities of predicting the hour L_{10} within the specified tolerances were computed.

No probability distributions were obtainable for sample schemes represented by just one independent sample in the hour. This applies to the 30 to 40 minute samples. Only the L_{10} for those samples could be computed for comparison to the hour.

An identical set of results was obtained for the average L_{10} for all the corresponding hours at a particular hour of the day, designated the PL_{10} in the printout.

Finally, a summary page of the results for all the corresponding hours at a particular hour of the day was produced. This supplied the average probabilities of predicting L_{10} and PL_{10} for the chosen tolerances.

A example of the printout for a particular hour and a particular sampling scheme is shown in Table 4, page 47. The lines in the figure are numbered and described below:

1) Title, location, and hour of sample
2) Sampling Scheme
3) First column - hour data (chi-squared parameter, recording time of sample); second column - heading for data pertaining to L_{10} of the particular hour; third column - heading for data pertaining to average hour L_{10} of corresponding hours of the day.
4) Values of hour L_{10} and PL_{10} in dBA.
5) Standard deviation for hour L_{10}'s of corresponding hours of the day
6) Number of corresponding hours of the day from which PL_{10} and standard deviation was computed.
7) Mean of the sampling scheme L_{10} probability distribution.
8) Standard deviation of the sampling scheme L_{10} probability distribution.
9) The number of independent samples in the sampling scheme.
10), 11), 12) The number of sample L_{10}'s greater than, equal to, and less than the L_{10} and the PL_{10}, respectively.
13), 15), 17) The probabilities of estimating the hour L_{10} and the PL_{10} to within ± 1, ± 2, ± 3 decibels, respectively, from the sample L_{10}'s.

14), 16), 18) The number of sample L_{10}'s lying in the hour L_{10} and PL_{10} ± 1, ± 2, ± 3 range, respectively.

19) The "F" value resulting from comparing the variances of the sample L_{10} distribution to the hour L_{10} distribution.

20) The degrees of freedom for the "F" test of 19).

21) The "t" value resulting from comparing the hour L_{10} and the PL_{10} to the mean of the sample L_{10} distribution.

22) The degrees of freedom for the "t" test of 21).

4.4 Analysis of Computer Outputs

The probabilities of predicting the hour L_{10} by the various sampling schemes were used to determine the "best" among the schemes. The "best" sample scheme would be the one of least duration that would be most convenient to record with the best accuracy. For example, a 15 minute sample composed of randomly chosen 5 minute samples would be more difficult to record than a continuous 20 minute sample - given equal probabilities, the 20 minute consecutive sample would be the more desirable.

The "best" sample determination was made from the probabilities of estimating the L_{10} within ± 1 decibel, the closest tolerance, to emphasize the differences between the schemes. The sampling schemes obtained by using the chi-squared parameter to separate out more normal samples were not considered for this determination, because of the arbitrary nature of the criterion. However, whether such criteria on the normality of a sample cumulative distribution provides a better estimation of the hour L_{10} was considered in a different context and will be discussed later.

The probabilities of estimating the hour L_{10} ± 1 dBA for correspond-

ing hours of the day for each scheme at each location were averaged by the programs in the summary page for each hour of the day. These average probabilities represented the probabilities of estimating the L_{10} for particular hours of the 24 hour sampling period. These 24 average probabilities for each location and sampling scheme were themselves averaged and the standard deviation found. The results for those sample schemes (5 to 25 minutes) for which more than one sample could be drawn within one hour are presented in Table 2, page 43.

Comparing locations for given schemes, Table 2 shows the mean probability generally decreases as traffic noise influences the noise levels less. Comparing schemes at given locations, higher probabilities are registered for random and spaced samples than consecutive samples. The mean probabilities were also compared using the "t" test, assuming equal variances, to assist in determining the "best" sample size among the sampling schemes of Table 2. The result of the comparisons among the schemes of Table 2 indicates that, in general, a 20 to 25 minute sample taken consecutively would be the easiest to obtain, given the relative probabilities of predicting the hour L_{10} for the particular situations. If the dominant source of noise is traffic, however, the sampling time could be reduced to 15 consecutive minutes to achieve as good probability as the non-traffic situation.

The probabilities of the 20 to 25 minute consecutive schemes are not high in the absolute sense, being on the order of 60%. Comparably higher probabilities are obtained using samples composed of time segments distributed randomly throughout the hour, as expected; there is greater difficulty in obtaining them, however.

Note that Table 2 only runs as high as a 25 minute sampling period. A longer sampling time, 30 minutes and up, could be represented only by

one sample during any hour in the framework of the study. Thus, an alternate method of obtaining the probability of predicting L_{10} was used to include them.

The alternate method was to consider, at each location, the samples for each hour of the day (1 to 24) from all three days as three trials from which to determine the probability for that hour of the day. If L_{10} for a particular sample came within ± 1 decibel of its hour L_{10}, this was considered a successful trial; if not, an unsuccessful trial. The probability of estimating L_{10} for that hour of the day was the number of successful trials divided by the total number of trials. Thus, if for the 21st hour of the day two 30 minutes samples predicted their respective hour L_{10} to ± 1 decibel and one did not, then the probability of predicting L_{10} for that hour of the day is 67% for the 30 minute sampling scheme. This was done for all 24 hours of the day, the probabilities averaged, and the standard deviation calculated, as before.

In order that comparisons among the schemes be made, the probabilities were obtained for the 20 and 25 minute consecutive samples of Table 2 by the alternate method as well. The results for the sample sizes 20 to 40 minutes are presented in Table 3. Note the probabilities of the alternate method are about $\pm 5\%$ of those in Table 2 for the 20 and 25 minute consecutive samples.

Considering the probabilities of Table 3 using the "t" test as an aid, it is clear that longer sampling times than 25 minutes are really more absolutely accurate. The 40 minute consecutive sample is by far the "best" among all the sampling schemes giving on the order of 90% probability at all locations. However, this length of time does not offer the saving in

time and cost over full hour recording expected from sampling the hour.

Other sampling and schemes of shorter duration may be considered on the basis of estimating not the L_{10} at a particular hour, but at an hour of the day over a period of days. This determination was made by comparing the probability distributions of sampling scheme L_{10}'s to the distribution hour L_{10}'s of corresponding hours over the three day period at each location using the "t" and "F" tests. It was found that there was no significant difference even for the shortest sampling scheme of 5 minutes. This shows the variations in the samples in one hour would match the variation in L_{10} for an hour of the day over a period of days.

Consideration of a shorter sampling scheme can also be made if a less stringent tolerance is applied. In reference (1) a tolerance of ± 2 decibels was considered acceptable. It is to be recalled that in the present study, the ± 1 decibel tolerance for estimating the hour L_{10} was chosen so that differences in the sampling schemes would show up. However, to get L_{10} ± 2 for the hour the mean probabilities for the 20 minute consecutive samples were 89% for the State Police Barracks, 83% for Phillips Farm and 71% for Turkey Swamp Park. This assures L_{10} can be gotten to a less stringent tolerance with good probability for this scheme.

However, for the best accuracy, 40 consecutive minutes or more up to 100% sampling of the hour must be recommended based on the results of the analysis.

The efficacy of selecting the more normal samples from the sampling schemes to estimate the hour L_{10} was investigated for the 5 minute sampling scheme at each location. The procedure was to consider the differences between the probabilities of the more normal 5 minute sampling scheme and those of the conventional scheme.

The chi-squared parameter used to test normality was the chi-squared goodness of fit test to a normal distribution normalized to one second for all noise samples. The normalization was accomplished by dividing the chi-squared test value by the total number of seconds in the sample. The chi-squared distribution was not used to test goodness of fit, rather the chi-squared parameters for samples of varying skewness were observed. It was arbitrarily decided that noise samples having a chi-squared parameter less than or equal to 2.5 would be considered more normal and those greater than 2.5, less normal. This was the test used to separate out the more normal noise samples.

The probabilities of estimating L_{10} for the more normal sampling schemes were computed by the program and the differences from the conventional five minute sampling scheme tabulated for each hour at each location. It was found on the average that the more normal samples did not do better than the conventional scheme for either the normal or less normal hours.

The validity of the chi-squared parameter was corroborated by the tabulated results, in that a greater number of normal hours appeared at the State Police Barracks with heavy traffic than at Turkey Swamp Park with none, as would be expected.

4.5 Future Work

The data, programs, and printout used to conduct the sampling time analysis have been preserved, in order that further analysis can be done in the future. More effort can be devoted to studying the effect of normality of samples, tolerances, time of day, and interpolation technique on estimating L_{10}. Additional studies can be made on the probabilities of estimating L_{50} and L_{90}.

TABLE 2

MEAN PROBABILITIES AND STANDARD DEVIATIONS

Sampling Scheme (Minutes)	State Police Barracks		Phillips Farm		Turkey Swamp Park	
	Mean (%)	S. D. (%)	Mean (%)	S. D. (%)	Mean (%)	S. D. (%)
5 Consecutive	35	9	33	15	33	22
10 Consecutive	50	13	45	21	40	24
10 Random	56	15	46	19	50	30
10 Spaced	55	15	46	18	49	27
15 Consecutive	60	19	55	26	44	25
15 Random	63	16	56	22	60	27
15 Spaced	64	13	61	24	63	26
20 Consecutive	72	18	62	25	54	25
20 Random	74	18	65	28	70	24
25 Consecutive	71	20	66	26	57	26
25 Random	80	15	74	26	68	24

TABLE 3

MEAN PROBABILITIES AND

STANDARD DEVIATIONS (ALTERNATE METHOD)

Sampling Scheme Minutes	State Police Barracks		Phillips Farm		Turkey Swamp Park	
	Mean (%)	S. D. (%)	Mean (%)	S. D. (%)	Mean (%)	S. D. (%)
20 Consecutive	77	23	64	29	50	28
25 Consecutive	76	24	73	29	52	29
30 Consecutive	88	19	78	37	53	35
30 Random	92	19	74	37	72	32
40 Consecutive	100	0	90	25	86	17
40 Random	94	15	88	30	83	23

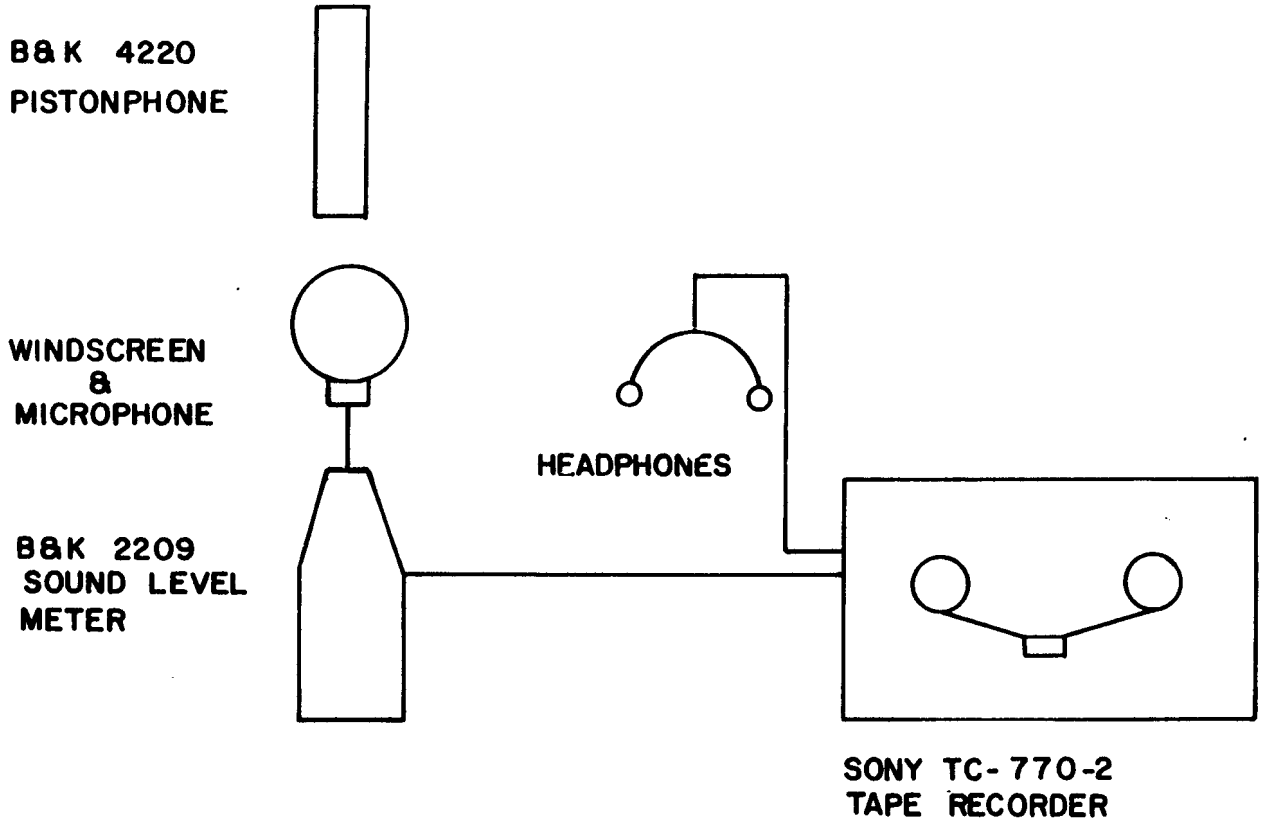
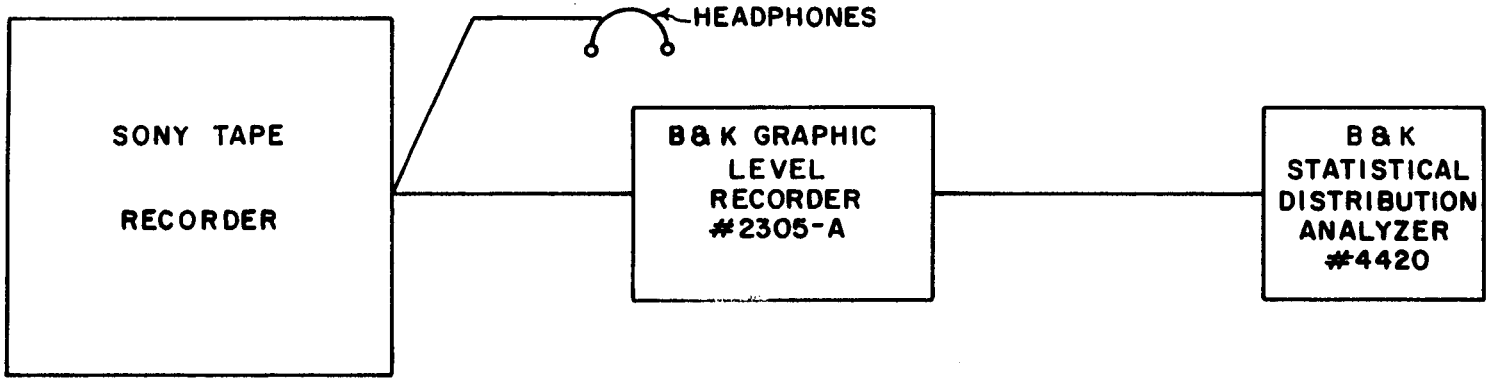


FIGURE 11
FIELD RECORDING INSTRUMENTATION



LABORATORY CONNECTIONS

FIGURE #12

TABLE 4

1) PHILLIPS FARM 8/15/72 HR 16-17 1-5MIN

2) RANDOM 10 MIN SAMPLES

3)	HR DATA (0.3,55 MIN) *****	L10 *****	PL10 *****
4)	VALUE	55.841	54.950
5)	STD. DEV.	--	0.782
6)	N HRLY SAMPLES	--	3
	*****	*****	*****
	SAMPLE DATA **********		
7)	MEAN	55.909	55.909
8)	STD. DEV.	1.296	1.296
9)	N SAMPLES	5	5
10)	N.G.VALUE	3	3
11)	N = VALUE	0	0
12)	N.L.VALUE	2	2
13)	PROB(VALUE+&-1)	55.9	44.7
14)	N(VALUE+&-1)	3	2
15)	PROB(VALUE+&-2)	87.7	77.8
16)	N(VALUE+&-2)	5	4
17)	PROB(VALUE+&-3)	97.9	94.1
18)	N(VALUE+&-3)	5	5
19)	F(NUL,NUS)	--	2.7
20)	NUL,NUS		4, 2
21)	T(NU)	0.1	1.3
22)	NU	4	5

5. Noise Data Analysis

5.1 Input Data

Each noise sample of a given duration was analyzed by determining points on its cumulative distribution function, which expresses the percent time during which the noise levels are exceeded. The percent time is approximated by sampling the noise level using a statistical distribution analyzer at the rate of ten counts per second and registering the total count during which each of twelve discrete levels spaced five decibels apart are exceeded. These twelve counts appear in the statistical distribution analyzer's twelve counters at the end of the noise sample and are recorded by the operator on a standard form, indicating level exceeded versus count for each sample. The two end counters actually represent underflow and overflow counts, which are assumed not to exceed the 50 decibel analyzer range by more than five decibels.

The noise sample data was then transferred onto coding sheets in a standard format and keypunched on computer cards, which serve as the input medium for the data reduction programs. Each noise sample was represented by two cards. Card one contained the data from counters one to six, the noise level exceeded on the first counter, a microphone position number, and hour of the sample. Card two contained the data from counters seven to twelve, the noise level exceeded on the second counter, a microphone position number, and the hour of the sample. For each day's batch of noise sample cards an additional card containing date was supplied.

5.2 Data Reduction Computer Programs

The noise sample data taken from the analyzer must be reduced to

commonly accepted descriptors of noise. The descriptors chosen for this study are as follows:

L_{10} (dBA): The sound pressure level in decibels, A weighted, exceeded 10% of the sample time. This represents the average peak level of the noise sample and is the descriptor of choice in Policy and Procedure Memorandum 90-2 issued by the Federal Highway Administration.

L_{50} (dBA): The sound pressure level in decibels, A weighted, exceeded 50% of the sample time. This represents the average noise level.

L_{90} (dBA): The sound pressure level in decibels, A weighted, exceeded 90% of the sample time. This represents the background noise level.

S. D. (dBA): The statistical standard deviation of the noise sample frequency distribution, which can be constructed from the cumulative distribution. This represents the variation in noise levels of the sample.

L_{NP} (dBA): The noise pollution level defined in reference (4) as:

$$L_{NP} = L_{eq} + 2.56 \text{ S.D.}$$

where L_{eq} is the mean energy level, defined for the statistical distribution analyzer data as:

$$L_{eq} = 10 \log \sum_{i} [10^{L_i/10} \times f_i]$$

where L_i = sound pressure level at the midpoint of the i^{th} class interval of the noise sample frequency distribution.

f_i = frequency of the i^{th} class interval.

The noise pollution level represents both the average level and the variation in levels in a single descriptor.

Data reduction was accomplished using a set of three programs on

the New Jersey Department of Transportation computer, at the time, an IBM 360/50. The first program, FILE, written in FORTRAN IV, reads noise sample data, tests for validity, rejects invalid noise samples, and writes the valid data on tape. The second program, SORT, a utility program, sorts the valid noise data by microphone position, date, and time of sample, and creates a new tape. The third program, SDA, written in Fortran IV, reduces the cumulative distribution data on the new tape and prints out the L_{10}, L_{90}, and L_{NP} (Noise Pollution Level), and standard deviation for each noise sample.

Two validity tests are performed on the input data by FILE. The first simply verifies that the noise sample's two data cards agree in microphone position, hour, and are in consecutive order. The second test checks that the distribution analyzer counts are monotonically non-increasing and that the two given noise levels are five decibels apart.

The program SDA forms an array of the twelve cumulative distribution data points that is, counts versus levels exceeded that are spaced five decibels apart. Because the statistical distribution analyzer is representing the continuously varying noise levels of a noise sample with discrete counts, a discretization error is introduced, so that the twelve data points do not lie exactly on the smooth cumulative distribution curve for the noise sample. The magnitude of the error is given in reference (3) by Foxon and Pearson for a Gaussian cumulative distribution. The total measurement of percent time with error bars for a given level exceeded is given in refernece (3) as:

$$\frac{t}{T} = \frac{n}{N} \pm \sqrt{\frac{\frac{n}{N}\left(1 - \frac{n}{N}\right)}{N}} \times 100\%$$

where n = number of counts at a certain dBA level

N = total number of counts

t/T = percentage of time the dBA level is exceeded

The formula shows that the error decreases as N increases. N is directly proportional to sampling rate and length of sample For example, considering a 25 minute sample at a rate of 10 counts per second, the error in the 10% level would be $\pm$ 0.24% if obtained on a given level of the analyzer. Inconveniently, the distribution analyzer output levels are not the desired levels on the cumulative distribution. The levels of interest are L_{10}, L_{50}, and L_{90}, the dBA levels exceeded 10%, 50%, and 90% of the time respectively. Thus, an interpolation technique must be used to determine the L_{10}, L_{50}, and L_{90} levels of the smooth distribution curve. For the data acquired in this study, cubic spline fitting, reference (4), was used to fit to all twelve data points, a smooth approximation to the entire cumulative distribution function of the noise sample.

The method of spline fitting essentially approximates the curve between neighboring pairs of data points. These curves are simultaneously solved for the complete set of neighboring data point pairs and the result is a smooth interpolation curve through all the data points.

The computerized method of spline fitting used for this study required the counts to be the ordinates and the evenly spaced dBA levels exceeded to be the asscissas for the interpolation curve. Thus the spline fit implicitly gives level exceeded as a function of count. To find L_{10}, L_{50}, and L_{90}, the count is given and the implicit level exceeded is to be determined. This problem amounts to solving for a desired level as a root of the spline fit function evaluated at the given count. The root is found

using Newton's method of iteration to the root. Newton's method requires a first estimate to start the iterations to the specific root. Straight line interpolation between the data point pair bracketing the root was used for this estimate. The iterations were stopped when the root was obtained to $\pm$0.0005 dBA.

There is a pointwise error in using the numerical technique of spline fitting and Newton's method to obtain L_{10}, L_{50}, and L_{90} from the twelve cumulative distribution data points. This error compounds the aforementioned discretization error in obtaining the data points themselves from the statistical distribution analyzer. An estimate of this pointwise error was obtained empirically for an ideal Gaussian noise sample of 20 minute duration with mean noise level of 43 dBA and standard deviation of 4 dBA.

This ideal Gaussian noise sample was specified for the spline fitting program by constructing twelve data points on its cumulative distribution from the standard normal distribution table in reference (2).

A further evaluation was made by determining the levels of the ideal Gaussian noise sample by simple straight line interpolation between neighboring cumulative distribution point pairs.

The table below shows the levels given by spline fitting and by straight line interpolation compared to the actual levels of the ideal Gaussian noise sample to the nearest thousandth of a decibel (for comparison purposes only).

Gaussian Levels (dBA)	L_{10}	L_{50}	L_{90}
Actual	48.128	43.000	37.872
Spline Fitting	48.256	42.972	37.818
Straight Line	48.884	42.940	36.894

Rounding to the nearest decibel as is done in practice, it is seen that spline fitting gives the desired levels exactly, while simple straight line interpolation is in error one decibel too high for L_{10} and one decibel too low for L_{90}.

The program SDA further computes the noise pollution level (L_{NP}) and the standard deviation for each noise sample from the frequency distribution of the noise sample. A subroutine generates twelve frequency distribution data points from the twelve cumulative distribution data points and computes the mean and standard deviation of this frequency distribution. The main program, SDA, then uses the frequency distribution to compute the mean energy level. The mean energy level (L_{eq}) standard deviation (S.D.) are then used to find L_{NP} from the formula.

5.3 Output

The data for each survey site were separately run through the data reduction programs. The resulting printout from the program SDA appears with the site data in Section 6 . Listed for each microphone position are the sampling time period in minutes, the date of sample, the L_{10}, L_{50}, L_{90}, L_{NP}, and the standard deviation at every hour in sequence from the beginning of the survey to the end, during which noise samples were made. All levels are given to the nearest decibel.

Additional information is tabulated on the computer printout Some hours were missed during the surveys, so no noise data can be given for them. For these hours then, the problem accounting for the omission was duly noted. The problems are categorized as due to operator, equipment, weather or nonrepresentative noise. Equipment problems include primarily microphone static due to humidity which necessitated microphone replacement. Weather problems include primarily rain

during which operations had to be stopped. Nonrepresentative noise problems occurred when temporary noise not characteristic of the area intruded.

REFERENCES

(1) Schultz, T. J., "Some Sources of Error in Community Noise Measurement," Sound and Vibration, pp. 18-26, February, 1972

(2) Crow, E. L., Davis, F. A. and Maxfield, M. W., Statistics Manual Dover, 1960

(3) Foxon, J. and Pearson, F. J., "A Statistical Model of Traffic Noise", Applied Acoustics, 1 (3), pp. 175-188, July, 1968

(4) Ahlberg, J. H., Nilson, E. N., and Walsh J. L., "The Theory of Splines and their Applications", Academic Press, 1967.

6. Noise Measurement Results

The records and results of each survey are grouped so that they comprise booklets consisting of the site description(s), site map(s), site photographs, noise data, and traffic and weather data. The booklets are arranged in chronological sequence as follows:

	Route-Section	Survey Dates	Municipality/County
1.	18F - 11B	12/11/72 - 12/13/72	Piscataway Twp./Middlesex
2.	33F - 1A & 2A	1/8/73 - 1/10/73	Freehold Twp./Monmouth
3.	535	2/5/73 - 2/6/73	West Windsor Twp./Mercer
4.	38 - 14A	2/13/73 - 2/16/73	Wall Twp./Monmouth
5.	174 - 1A	2/26/73 - 2/28/73	Lawrence Twp./Mercer
6.	9 - 21C & 22D	3/19/73 - 3/21/73	Howell Twp./Monmouth
7.	I-295 - 8B & 9A	4/9/73 - 4/10/73	Lawrence Twp./Mercer
8.	I-195 - 1B	5/10/73 - 5/11/73	Hamilton Twp./Mercer
9.	I-295 - 7C	5/17/73 - 5/18/73	Hamilton Twp./Mercer
10.	440 - 1D & 3A	5/22/73 - 5/23/73	Perth Amboy/Middlesex
11.	I-95	6/6/73 - 6/7/73	Montgomery Twp./Somerset
		6/11/73 - 6/12/73	Montgomery Twp./Somerset
12.	440F - 2J	7/18/73 - 7/20/73	Bayonne/Hudson

Route and Section 18F - 11B

Station, Ramp, or Street Ramp B

Municipality Piscataway Township County Middlesex

Starting Time and Date of First Sample 16:00, 12/11/72 Starting Time and Date of Last Sample 15:00, 12/13/72

Mobile Survey _____ Stationary Survey X Rural _____ Suburban X

Urban _____

AC Power X Source Outlets on posts on Johnson Park grounds

Inverter _____ DC Power _____

Traffic counter location(s) One on existing Route 18 (River Road) about at outlet of future Ramp B.

Road Description: P.C.C. _____ B.C. X Other _____

N.A._____

Smooth _____ Normal X Rough _____ Bumps _____ Holes _____

No holes or bumps X

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

Traffic signal at Metlars Lane and existing Route 18 (River Road)

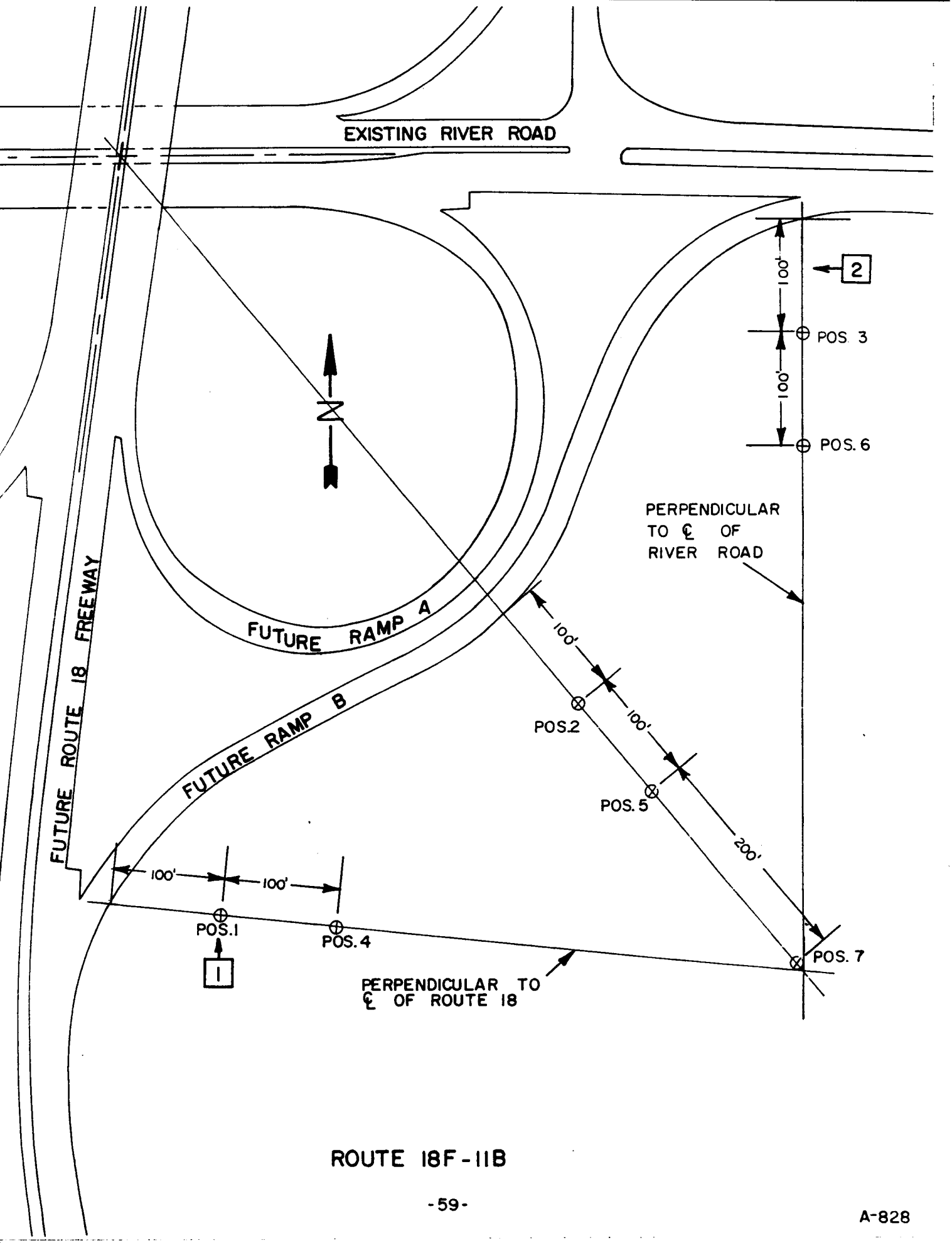
Route and Section 18F - 11B

Station, Ramp, or Street Ramp B

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	-2	600	630
Pos. 2	4	0	420	540
Pos. 3	4	2	115	470
Pos. 4	4	-2	615	660
Pos. 5	4	0	490	630
Pos. 6	4	1	215	510
Pos. 7	4	-2	640	830

Description of Terrain Flat and sloping downward toward all microphone positions from existing Route 18. All positions are on mowed grass, with widely scattered trees. Sight distance 2000 feet, minimum.

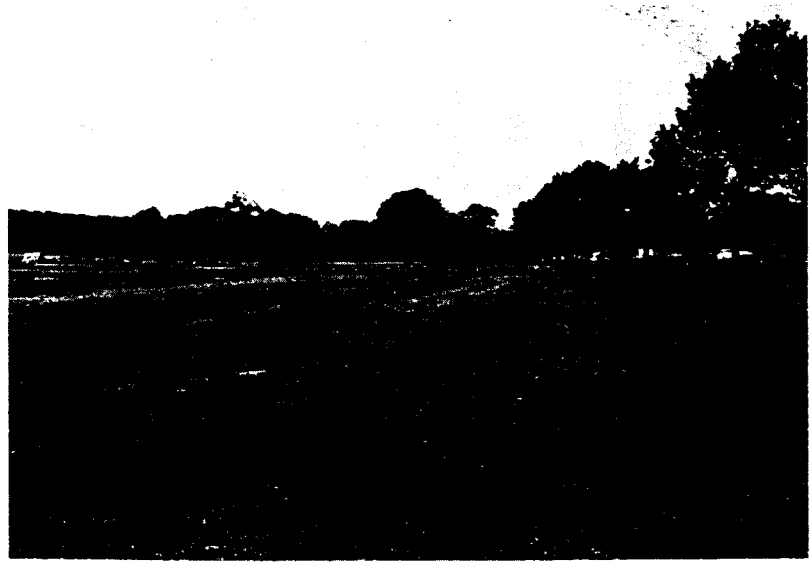


ROUTE 18F-11B

A-828

RT. 18F SECTION 11B

1



2

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 118

MICROPHONE POSITION 1

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1500	0	12/11/72	NO DATA - MICROPHONE MALFUNCTION				
1600	30	12/11/72	62	58	55	68	3
1700	29	12/11/72	59	56	52	63	3
1800	30	12/11/72	58	54	51	63	3
1900	30	12/11/72	59	54	51	66	4
2000	30	12/11/72	57	53	51	63	3
2100	30	12/11/72	60	57	53	65	3
2200	30	12/11/72	61	57	53	69	4
2300	30	12/11/72	53	49	46	57	3
0000	30	12/12/72	50	44	41	56	4
0100	30	12/12/72	56	47	42	68	6
0200	30	12/12/72	52	47	42	60	4
0300	30	12/12/72	51	46	42	61	4
0400	29	12/12/72	50	46	43	56	3
0500	30	12/12/72	56	48	44	68	5
0600	30	12/12/72	58	49	46	65	4
0700	30	12/12/72	61	53	50	67	4
0800	29	12/12/72	61	55	51	69	4
0900	29	12/12/72	60	55	51	77	5
1000	30	12/12/72	61	56	52	68	4
1100	30	12/12/72	62	58	54	68	4
1200	30	12/12/72	62	56	52	70	4
1300	30	12/12/72	60	55	51	66	3
1400	29	12/12/72	60	55	51	67	4

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 118

MICROPHONE POSITION 2

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1500	29	12/11/72	62	57	52	71	4
1600	30	12/11/72	71	66	62	79	4
1700	30	12/11/72	61	58	55	68	3
1800	30	12/11/72	60	56	52	67	4
1900	30	12/11/72	60	55	51	68	4
2000	30	12/11/72	58	54	50	65	4
2100	10	12/11/72	56	52	48	63	3
2200	30	12/11/72	59	54	50	67	4
2300	30	12/11/72	49	46	42	54	3
0000	30	12/12/72	56	50	46	63	4
0100	30	12/12/72	58	49	43	73	6
0200	30	12/12/72	54	49	43	64	5
0300	30	12/12/72	53	44	41	65	5
0400	30	12/12/72	50	44	41	60	4
0500	30	12/12/72	58	46	42	75	7
0600	30	12/12/72	61	51	45	72	6
0700	30	12/12/72	64	54	51	73	5
0800	30	12/12/72	64	57	52	74	5
0900	29	12/12/72	62	58	54	69	4
1000	30	12/12/72	60	57	54	68	3
1100	30	12/12/72	64	58	54	71	4
1200	30	12/12/72	64	57	52	73	5
1300	30	12/12/72	61	57	52	69	4
1400	30	12/12/72	61	57	53	68	4

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 11B

MICROPHONE POSITION 3

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1600	28	12/12/72	64	58	54	75	5
1700	30	12/12/72	63	58	53	74	4
1800	30	12/12/72	61	56	51	71	5
1900	30	12/12/72	60	55	49	68	4
2000	30	12/12/72	59	53	47	68	5
2100	0	12/12/72	NO DATA - OPERATOR ERROR				
2200	30	12/12/72	59	52	47	68	5
2300	30	12/12/72	58	51	46	70	5
0000	30	12/13/72	59	51	46	69	5
0100	30	12/13/72	55	46	42	66	5
0200	30	12/13/72	55	47	42	73	6
0300	30	12/13/72	58	47	42	82	7
0400	30	12/13/72	53	43	41	65	5
0500	30	12/13/72	66	50	44	85	9
0600	30	12/13/72	61	52	47	76	6
0700	30	12/13/72	68	59	54	80	6
0800	30	12/13/72	69	61	57	82	5
0900	29	12/13/72	68	61	56	80	5
1000	30	12/13/72	64	57	52	75	5
1100	30	12/13/72	66	58	53	78	5
1200	30	12/13/72	67	59	54	77	5
1300	30	12/13/72	65	56	51	75	5
1400	30	12/13/72	65	58	54	77	5
1500	30	12/13/72	67	59	54	80	6

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 11B

MICROPHONE POSITION 4

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	0	12/11/72	NO DATA - MICROPHONE MALFUNCTION				
1600	30	12/11/72	61	57	54	68	3
1700	29	12/11/72	59	56	52	65	3
1800	30	12/11/72	58	54	51	62	3
1900	30	12/11/72	56	53	50	64	3
2000	30	12/11/72	55	52	50	61	3
2100	30	12/11/72	55	52	49	60	3
2200	30	12/11/72	56	52	49	63	3
2300	30	12/11/72	53	49	46	57	3
0000	30	12/12/72	54	49	46	60	3
0100	29	12/12/72	55	49	45	65	4
0200	30	12/12/72	50	45	42	58	4
0300	30	12/12/72	51	45	42	61	4
0400	29	12/12/72	50	46	42	56	3
0500	30	12/12/72	57	48	44	69	5
0600	30	12/12/72	58	49	46	65	4
0700	30	12/12/72	60	52	47	68	5
0800	30	12/12/72	61	53	50	69	4
0900	28	12/12/72	58	54	51	68	3
1000	30	12/12/72	60	54	51	66	4
1100	30	12/12/72	60	56	51	67	4
1200	30	12/12/72	61	54	51	69	4
1300	30	12/12/72	60	55	51	66	3
1400	30	12/12/72	60	54	51	72	4

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 11B

MICROPHONE POSITION 5

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	29	12/11/72	66	60	56	74	4
1600	30	12/11/72	65	59	56	72	4
1700	30	12/11/72	61	58	54	67	3
1800	30	12/11/72	60	56	52	67	3
1900	30	12/11/72	60	56	52	68	4
2000	30	12/11/72	59	54	51	65	3
2100	30	12/11/72	58	53	50	65	3
2200	30	12/11/72	60	54	50	67	4
2300	30	12/11/72	55	52	49	59	3
0000	30	12/12/72	57	51	46	67	5
0100	30	12/12/72	58	49	42	73	6
0200	30	12/12/72	55	49	43	64	5
0300	30	12/12/72	53	44	41	65	5
0400	30	12/12/72	49	44	41	59	4
0500	30	12/12/72	58	47	42	75	7
0600	30	12/12/72	60	50	46	71	6
0700	30	12/12/72	65	56	52	73	5
0800	30	12/12/72	65	58	54	74	5
0900	29	12/12/72	61	57	53	68	3
1000	30	12/12/72	63	58	53	70	4
1100	30	12/12/72	61	57	52	68	4
1200	30	12/12/72	62	55	51	69	4
1300	30	12/12/72	59	55	51	66	3
1400	0	12/13/72	NO DATA - RAIN				

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 11B

MICROPHONE POSITION 6

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1600	28	12/12/72	61	57	54	70	4
1700	30	12/12/72	60	57	52	69	4
1800	30	12/12/72	61	57	52	68	4
1900	30	12/12/72	59	56	52	65	3
2000	30	12/12/72	58	53	48	65	4
2100	30	12/12/72	57	53	48	64	4
2200	30	12/12/72	57	52	48	65	4
2300	30	12/12/72	54	49	45	63	4
0000	30	12/13/72	56	51	46	65	4
0100	30	12/13/72	53	46	42	61	4
0200	30	12/13/72	55	47	42	66	5
0300	30	12/13/72	56	45	42	76	7
0400	30	12/13/72	52	44	41	62	5
0500	0	12/13/72	NO DATA - MICROPHONE MALFUNCTION				
0600	14	12/13/72	62	56	52	73	5
0700	30	12/13/72	66	59	55	74	4
0800	30	12/13/72	67	61	57	77	5
0900	30	12/13/72	66	60	56	75	4
1000	30	12/13/72	66	60	56	74	4
1100	30	12/13/72	61	56	52	70	4
1200	30	12/13/72	69	63	59	77	4
1300	30	12/13/72	65	58	53	74	5
1400	30	12/13/72	65	59	56	74	4
1500	30	12/13/72	67	59	56	76	5

NOISE MEASUREMENT DATA

ROUTE 18F SECTION 11B

MICROPHONE POSITION 7

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1600	28	12/12/72	59	54	50	69	5
1700	30	12/12/72	58	54	51	64	3
1800	30	12/12/72	56	53	51	61	3
1900	30	12/12/72	55	52	49	59	3
2000	30	12/12/72	54	50	46	60	3
2100	30	12/12/72	54	50	46	59	3
2200	30	12/12/72	54	50	46	60	3
2300	30	12/12/72	54	49	46	60	3
0000	30	12/13/72	54	49	46	60	3
0100	30	12/13/72	49	46	42	55	3
0200	30	12/13/72	53	48	44	63	4
0300	30	12/13/72	56	47	43	68	5
0400	0	12/13/72	NO DATA - MICROPHONE MALFUNCTION				
0500	0	12/13/72	NO DATA - MICROPHONE MALFUNCTION				
0600	14	12/13/72	62	54	51	70	5
0700	30	12/13/72	60	56	52	67	3
0800	30	12/13/72	63	58	56	70	3
0900	30	12/13/72	63	59	55	72	4
1000	30	12/13/72	63	58	56	68	3
1100	30	12/13/72	65	59	56	71	4
1200	30	12/13/72	66	62	58	73	4
1300	30	12/13/72	62	58	55	70	4
1400	30	12/13/72	62	58	56	68	3
1500	30	12/13/72	58	53	51	64	3

ROUTE 18F SECTION 11B - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1500	12/11/72	997	56	0	68	37	55
1600	12/11/72	1663	39	0	45	37	62
1700	12/11/72	1590	16	0	45	35	62
1800	12/11/72	1229	10	0	23	37	82
1900	12/11/72	973	5	0	90	35	70
2000	12/11/72	748	4	0	135	32	89
2100	12/11/72	608	4	0	135	35	62
2200	12/11/72	566	4	0	135	28	74
2300	12/11/72	437	1	0	135	37	64
0000	12/12/72	280	4	0	135	32	71
0100	12/12/72	135	8	0	135	33	57
0200	12/12/72	67	1	0	135	37	62
0300	12/12/72	57	3	0	135	38	58
0400	12/12/72	47	6	0	135	38	58
0500	12/12/72	98	7	0	135	38	46
0600	12/12/72	294	18	0	135	38	42
0700	12/12/72	1078	13	0	135	38	74
0800	12/12/72	1547	34	0	135	39	72
0900	12/12/72	1171	49	0	180	37	72
1000	12/12/72	972	56	0	180	36	71
1100	12/12/72	1048	58	0	202	36	71
1200	12/12/72	1036	41	0	180	33.5	79
1300	12/12/72	915	40	0	158	34	78

*SAMPLE TIME 30 MIN.

ROUTE 18F SECTION 11B - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1400	12/12/72	967	28	0	180	32	78
1500	12/12/72	-	-	-	-	-	-
1600	12/12/72	1460	19	0	180	33	78
1700	12/12/72	1225	14	0	180	33	90
1800	12/12/72	988	5	0	180	33	90
1900	12/12/72	858	5	0	180	33	90
2000	12/12/72	603	2	0	135	32	90
2100	12/12/72	564	2	0	135	33	100
2200	12/12/72	467	1	0	135	33	100
2300	12/12/72	374	5	0	135	36	100
0000	12/13/72	251	2	0	135	36	100
0100	12/13/72	122	1	0	113	36	100
0200	12/13/72	67	2	0	68	36	100
0300	12/13/72	46	7	0	68	35	100
0400	12/13/72	62	2	0	68	35	100
0500	12/13/72	162	12	0	68	36	100
0600	12/13/72	339	16	0	23	37	100
0700	12/13/72	1228	32	0	338	45	100
0800	12/13/72	1438	47	0	0	46	-
0900	12/13/72	1165	38	0	23	46	-
1000	12/13/72	964	63	1	23	46	-
1100	12/13/72	993	55	4	23	47	-
1200	12/13/72	1196	49	7	23	48	-

*SAMPLE TIME 30 MIN.

ROUTE 18F SECTION 11B - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1300	12/13/72	1079	48	8	23	48	-
1400	12/13/72	1121	36	5	23	45	-
1500	12/13/72	988	45	8	45	43	-

*SAMPLE TIME 30 MIN.

Route and Section 33F-1A & 2A

Station, Ramp, or Street Ramp EN

Municipality Freehold Township County Monmouth

Starting Time and Date of First Sample 14:00, 1/8/73 Starting Time and Date of Last Sample 13:00, 1/10/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban X

Urban _____

AC Power X Source Outlet on pole adjacent to Willowbrook Maintenance Yard office

Inverter _____ DC Power _____

Traffic counter location(s) One counter on Rt. 79 at outlet of future Ramp EN, approximately.

Road Description: P.C.C. _____ B.C. X Other _____

N.A. _____

Smooth _____ Normal X Rough _____ Bumps _____ Holes _____

No holes or bumps X

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

Traffic signal at Rt. 9 & Rt. 79. Stop sign at Rt. 79 & Willowbrook Rd.

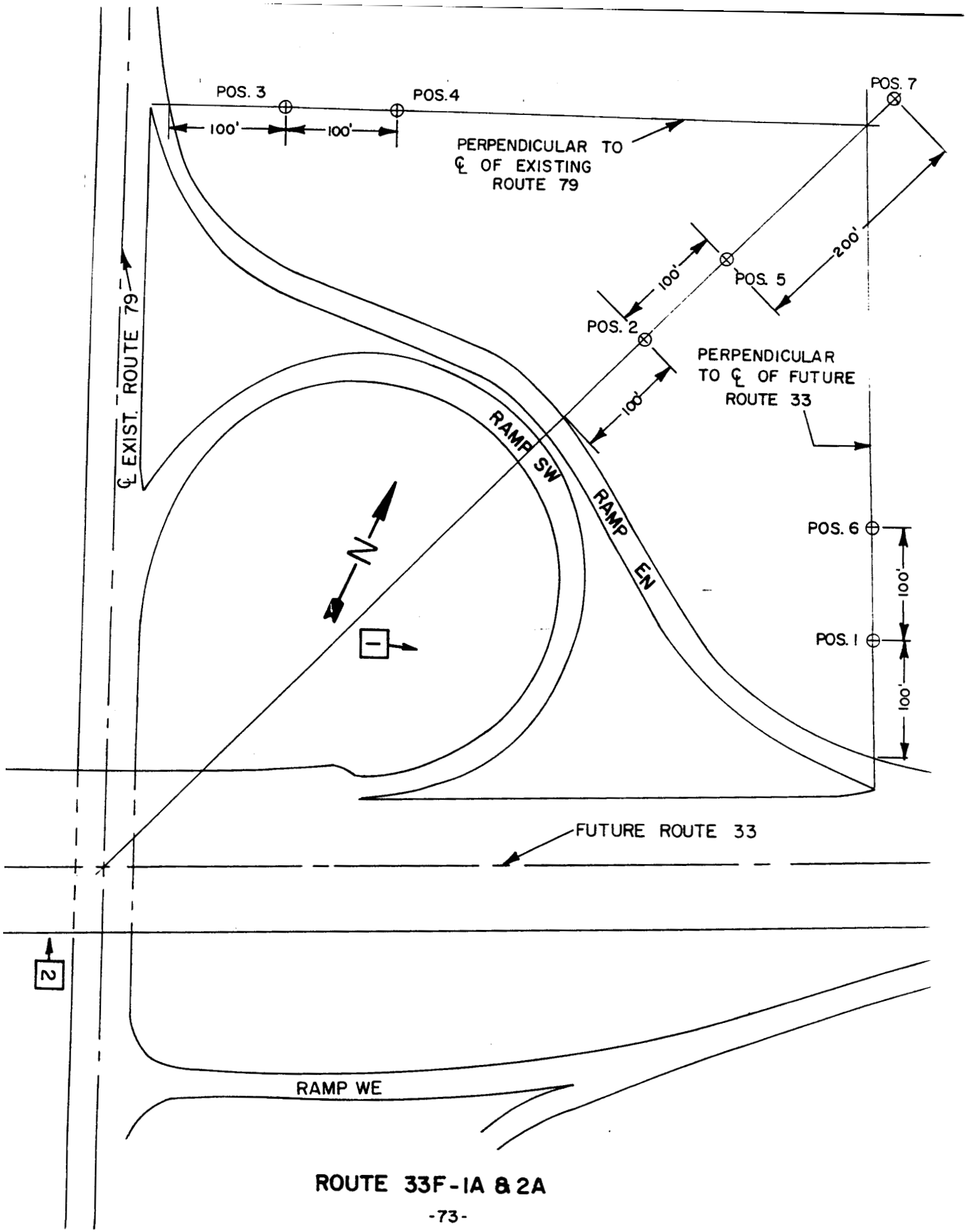
Route and Section 33F-1A & 2A

Station, Ramp, or Street Ramp EN

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	4	650	800
Pos. 2	4	4	380	875
Pos. 3	4	4	120	1000
Pos. 4	4	4	640	850
Pos. 5	4	4	450	975
Pos. 6	4	4	220	1050
Pos. 7	4	4	580	1175

Description of Terrain Flat. Windbreak of deciduous trees and shrubs to 15 ft. height along Rt. 79 and along Willowbrook Rd. Dead grass and weeds to 3 ft. height over most of survey area. Positions 1, 2, 5, 6, and 7 are in this grass. Positions 3 and 4 also have sparse deciduous trees and brush. No solid barriers of any kind between existing Rt. 79 and existing Willowbrook Rd. and microphone positions. Sight distance over grass 1000 feet minimum and 400 feet at Positions 3 and 4. Shopping center on west side of Rt. 79 opposite most of survey area.

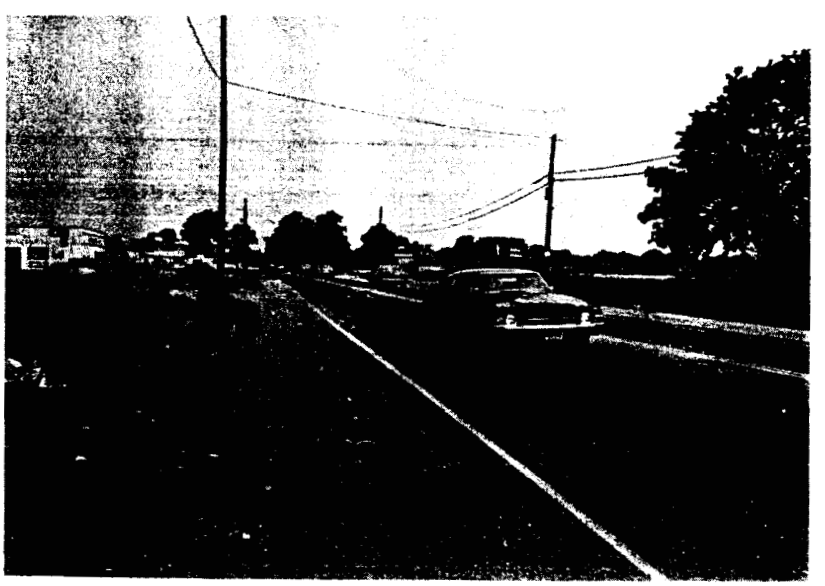


ROUTE 33F-1A & 2A

A-827

RT. 33F SECTION 1A & 2A

1



2

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 1

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1400	30	01/08/73	54	48	45	65	4
1500	30	01/08/73	51	48	45	56	3
1600	30	01/08/73	53	49	46	60	3
1700	30	01/08/73	54	49	46	60	3
1800	30	01/08/73	51	47	43	58	3
1900	30	01/08/73	51	47	43	60	4
2000	0	01/08/73	NO DATA - OPERATOR ERROR				
2100	0	01/08/73	NO DATA - OPERATOR ERROR				
2200	30	01/08/73	48	43	38	55	4
2300	30	01/08/73	49	42	38	56	4
0000	30	01/09/73	51	45	41	59	4
0100	30	01/09/73	51	43	40	63	5
0200	30	01/09/73	48	41	37	61	5
0300	30	01/09/73	46	42	38	53	4
0400	30	01/09/73	50	44	41	56	4
0500	30	01/09/73	53	47	42	60	4
0600	30	01/09/73	53	49	45	58	3
0700	29	01/09/73	56	53	49	62	3
0800	30	01/09/73	55	53	50	61	3
0900	30	01/09/73	55	51	47	62	4
1000	30	01/09/73	55	50	47	64	4
1100	30	01/09/73	55	51	47	60	3
1200	30	01/09/73	55	52	49	61	3
1300	30	01/09/73	57	53	50	63	3

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	30	01/09/73	57	53	50	64	3
1500	29	01/09/73	57	53	50	64	3
1600	0	01/09/73	NO DATA - OPERATOR ERROR				
1700	0	01/09/73	NO DATA - OPERATOR ERROR				
1800	30	01/09/73	58	54	51	67	4
1900	30	01/09/73	60	54	51	69	4
2000	30	01/09/73	59	55	51	64	3
2100	30	01/09/73	59	55	51	65	3
2200	30	01/09/73	57	53	49	63	3
2300	30	01/09/73	56	51	47	67	4
0000	30	01/10/73	57	51	46	65	4
0100	30	01/10/73	56	49	44	64	5
0200	30	01/10/73	53	46	41	62	5
0300	30	01/10/73	51	44	40	59	5
0400	30	01/10/73	54	48	42	65	5
0500	30	01/10/73	54	47	42	62	5
0600	30	01/10/73	57	53	49	63	3
0700	30	01/10/73	60	56	52	66	3
0800	30	01/10/73	61	58	55	65	2
0900	30	01/10/73	61	57	54	67	3
1000	30	01/10/73	62	57	53	69	4
1100	30	01/10/73	61	57	53	67	3
1200	30	01/10/73	60	56	52	67	4
1300	30	01/10/73	60	55	51	65	3

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 3

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
2200	30	01/08/73	55	48	42	67	5
2300	30	01/08/73	54	48	41	64	5
0000	30	01/09/73	58	49	45	67	5
0100	30	01/09/73	56	47	42	67	5
0200	30	01/09/73	55	50	46	64	4
0300	30	01/09/73	55	52	48	64	4
0400	30	01/09/73	55	50	46	68	4
0500	30	01/09/73	57	53	50	67	4
0600	30	01/09/73	58	50	46	68	5
0700	30	01/09/73	62	56	49	73	5
0800	30	01/09/73	64	60	54	72	4
0900	30	01/09/73	63	57	52	71	4
1000	30	01/09/73	63	57	51	72	5
1100	30	01/09/73	63	58	53	71	4
1200	30	01/09/73	63	57	53	71	4
1300	30	01/09/73	62	58	53	70	4
1400	0	01/09/73	NO DATA - OPERATOR ERROR				
1500	0	01/09/73	NO DATA - OPERATOR ERROR				
1600	0	01/09/73	NO DATA - OPERATOR ERROR				
1700	0	01/09/73	NO DATA - OPERATOR ERROR				
1800	0	01/09/73	NO DATA - OPERATOR ERROR				
1900	0	01/09/73	NO DATA - OPERATOR ERROR				
2000	0	01/09/73	NO DATA - OPERATOR ERROR				
2100	0	01/09/73	NO DATA - OPERATOR ERROR				

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 4

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	30	01/09/73	55	52	48	63	3
1500	29	01/09/73	55	52	48	62	3
1600	0	01/09/73	NO DATA - OPERATOR ERROR				
1700	0	01/09/73	NO DATA - OPERATOR ERROR				
1800	30	01/09/73	57	53	51	65	3
1900	30	01/09/73	55	52	50	64	3
2000	30	01/09/73	56	53	51	61	2
2100	30	01/09/73	55	53	50	61	3
2200	30	01/09/73	58	54	51	63	3
2300	30	01/09/73	56	53	49	65	4
0000	30	01/10/73	53	48	44	60	4
0100	30	01/10/73	51	47	42	59	4
0200	30	01/10/73	50	46	42	57	4
0300	30	01/10/73	48	43	38	56	4
0400	30	01/10/73	52	45	41	61	5
0500	30	01/10/73	53	47	42	61	4
0600	30	01/10/73	55	51	48	60	3
0700	30	01/10/73	58	54	51	62	3
0800	30	01/10/73	60	57	54	64	3
0900	30	01/10/73	60	55	51	66	4
1000	30	01/10/73	59	54	51	66	4
1100	30	01/10/73	59	54	51	64	3
1200	30	01/10/73	59	54	51	66	3
1300	30	01/10/73	57	53	50	63	3

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 5

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	30	01/08/73	54	48	45	64	4
1500	30	01/08/73	50	48	45	56	3
1600	30	01/08/73	53	49	46	60	3
1700	30	01/08/73	55	49	46	71	5
1800	30	01/08/73	52	48	44	58	3
1900	30	01/08/73	51	47	44	60	4
2000	30	01/08/73	50	47	43	59	4
2100	30	01/08/73	51	46	42	62	5
2200	30	01/08/73	52	47	44	61	4
2300	30	01/08/73	51	46	42	58	4
0000	30	01/09/73	50	44	40	60	5
0100	30	01/09/73	50	41	37	65	6
0200	29	01/09/73	47	39	36	58	4
0300	30	01/09/73	44	39	37	50	3
0400	30	01/09/73	46	41	37	54	4
0500	30	01/09/73	51	44	40	57	4
0600	30	01/09/73	53	48	44	59	4
0700	30	01/09/73	57	53	50	65	3
0800	30	01/09/73	55	53	50	60	3
0900	30	01/09/73	55	51	47	62	3
1000	30	01/09/73	56	51	47	66	4
1100	30	01/09/73	55	52	48	60	3
1200	30	01/09/73	55	51	47	60	3
1300	30	01/09/73	55	52	48	62	3

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 6

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
2200	30	01/08/73	52	47	43	63	4
2300	30	01/08/73	53	46	42	62	5
0000	30	01/09/73	53	48	45	60	4
0100	30	01/09/73	51	47	43	62	4
0200	29	01/09/73	49	44	41	55	3
0300	30	01/09/73	49	46	42	55	3
0400	30	01/09/73	49	45	41	57	4
0500	30	01/09/73	50	47	45	57	3
0600	30	01/09/73	53	49	46	60	3
0700	30	01/09/73	57	53	49	65	4
0800	0	01/09/73	NO DATA - OPERATOR ERROR				
0900	0	01/09/73	NO DATA - OPERATOR ERROR				
1000	30	01/09/73	58	53	49	68	4
1100	30	01/09/73	58	53	50	64	3
1200	30	01/09/73	57	53	50	64	3
1300	30	01/09/73	58	54	51	64	3
1400	0	01/09/73	NO DATA - OPERATOR ERROR				
1500	0	01/09/73	NO DATA - OPERATOR ERROR				
1600	0	01/09/73	NO DATA - OPERATOR ERROR				
1700	0	01/09/73	NO DATA - OPERATOR ERROR				
1800	0	01/09/73	NO DATA - OPERATOR ERROR				
1900	0	01/09/73	NO DATA - OPERATOR ERROR				
2000	0	01/09/73	NO DATA - OPERATOR ERROR				
2100	0	01/09/73	NO DATA - OPERATOR ERROR				

NOISE MEASUREMENT DATA

ROUTE 33F SECTION 1A & 2A

MICROPHONE POSITION 7

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	30	01/09/73	55	51	47	64	4
1500	29	01/09/73	54	50	46	61	4
1600	30	01/09/73	56	53	51	64	3
1700	30	01/09/73	55	51	47	65	4
1800	0	01/09/73	NO DATA - OPERATOR ERROR				
1900	0	01/09/73	NO DATA - OPERATOR ERROR				
2000	30	01/09/73	55	51	47	60	3
2100	30	01/09/73	55	52	49	61	3
2200	30	01/09/73	57	53	50	63	3
2300	30	01/09/73	45	43	41	52	3
0000	30	01/10/73	50	47	43	57	3
0100	28	01/10/73	49	45	41	55	3
0200	30	01/10/73	47	44	41	51	2
0300	30	01/10/73	46	43	41	50	2
0400	30	01/10/73	48	44	41	53	3
0500	30	01/10/73	48	44	41	53	3
0600	30	01/10/73	52	49	46	57	3
0700	30	01/10/73	54	51	48	59	3
0800	30	01/10/73	55	53	51	59	2
0900	30	01/10/73	56	53	50	62	3
1000	30	01/10/73	57	53	51	62	3
1100	30	01/10/73	56	53	51	61	2
1200	30	01/10/73	53	49	46	59	3
1300	30	01/10/73	52	48	46	57	3

ROUTE 33F SECTION 1A & 2A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1400	01/08/73	664	30	0	15	30	-
1500	01/08/73	655	24	0	330	26	-
1600	01/08/73	1012	24	0	340	21	-
1700	01/08/73	1169	10	0	340	18	-
1800	01/08/73	1237	9	0	360	18	-
1900	01/08/73	850	9	0	360	18	-
2000	01/08/73	746	5	0	330	18	-
2100	01/08/73	755	1	0	350	17	-
2200	01/08/73	609	1	0	350	17	-
2300	01/08/73	393	3	0	15	15	-
0000	01/09/73	312	2	0	15	13	-
0100	01/09/73	217	2	0	12	13	-
0200	01/09/73	79	0	0	0	12	-
0300	01/09/73	32	3	0	342	12	-
0400	01/09/73	35	2	0	0	10	-
0500	01/09/73	32	8	0	341	10	-
0600	01/09/73	40	19	0	319	10	-
0700	01/09/73	144	23	0	300	10	-
0800	01/09/73	463	22	0	300	10	-
0900	01/09/73	894	23	0	310	15	-
1000	01/09/73	802	24	0	320	15	-
1100	01/09/73	773	26	0	320	20	-
1200	01/09/73	799	19	0	310	21	-
1300	01/09/73	882	22	0	310	23	-

*SAMPLE TIME 30 MIN.

ROUTE 33F SECTION 1A & 2A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1400	01/09/73	1012	27	0	300	25	-
1500	01/09/73	918	24	0	310	24	-
1600	01/09/73	1080	11	0	290	23	-
1700	01/09/73	1146	5	0	285	20	-
1800	01/09/73	1234	8	0	270	17	-
1900	01/09/73	803	-	0	260	13	-
2000	01/09/73	771	-	0	255	12	-
2100	01/09/73	664	3	0	255	12	-
2200	01/09/73	476	1	0	246	12	-
2300	01/09/73	361	2	0	259	10	-
0000	01/10/73	267	0	0	255	10	-
0100	01/10/73	186	1	0	265	10	-
0200	01/10/73	74	-	0	249	10	-
0300	01/10/73	19	-	0	262	10	-
0400	01/10/73	36	0	0	262	10	-
0500	01/10/73	22	1	0	248	10	-
0600	01/10/73	64	7	0	250	10	-
0700	01/10/73	204	20	0	248	13	-
0800	01/10/73	604	25	0	260	16	-
0900	01/10/73	863	23	2	245	24	-
1000	01/10/73	742	27	6	270	24	
1100	01/10/73	800	20	7	280	27	-
1200	01/10/73	783	16	7	240	29	-
1300	01/10/73	976	22	10	280	31	-

*SAMPLE TIME 30 MIN.

Route and Section 535

Station, Ramp, or Street 186 + 00 S. B.

Municipality West Windsor Township County Mercer

Starting Time and Date of First Sample 15:00, 2/5/73 Starting Time and Date of Last Sample 14:00, 2/6/73

Mobile Survey _____ Stationary Survey X Rural X Suburban _____

Urban _____

AC Power X Source Mercer County Park Commission maintenance building

Inverter _____ DC Power _____

Traffic counter location(s) Route 535 at Station 186 approximately

Road Description: P.C.C. _____ B.C. X Other _____

N.A. _____

Smooth _____ Normal _____ Rough X Bumps X Holes X

No holes or bumps _____

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

None

Route and Section 535

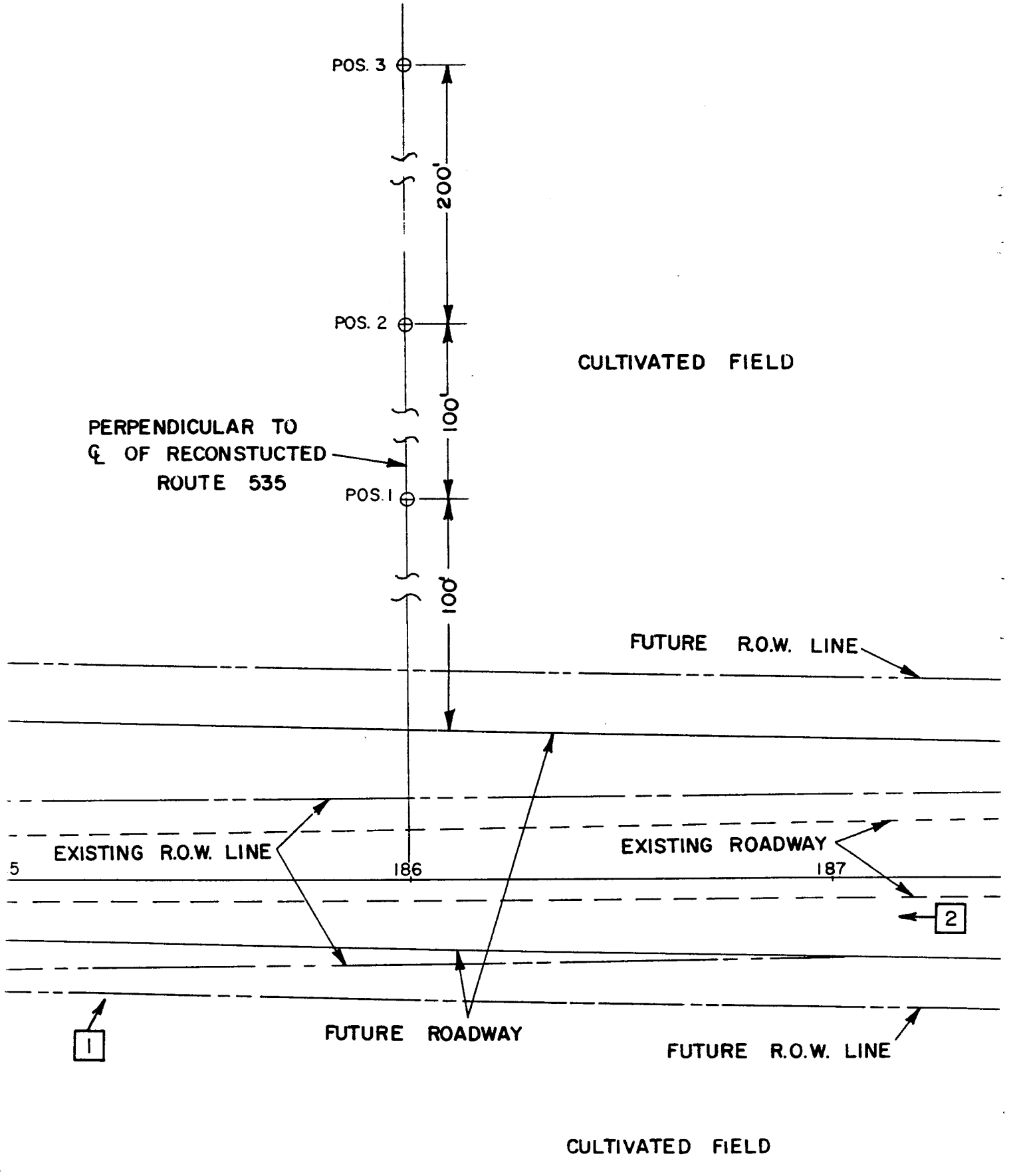
Station, Ramp, or Street 186 + 00 S. B

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	4	125	N/A
Pos. 2	4	4	225	
Pos. 3	4	2	425	
Pos. 4	Deleted because of equipment trouble			
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

Description of Terrain Rolling slightly downward toward Position 3.

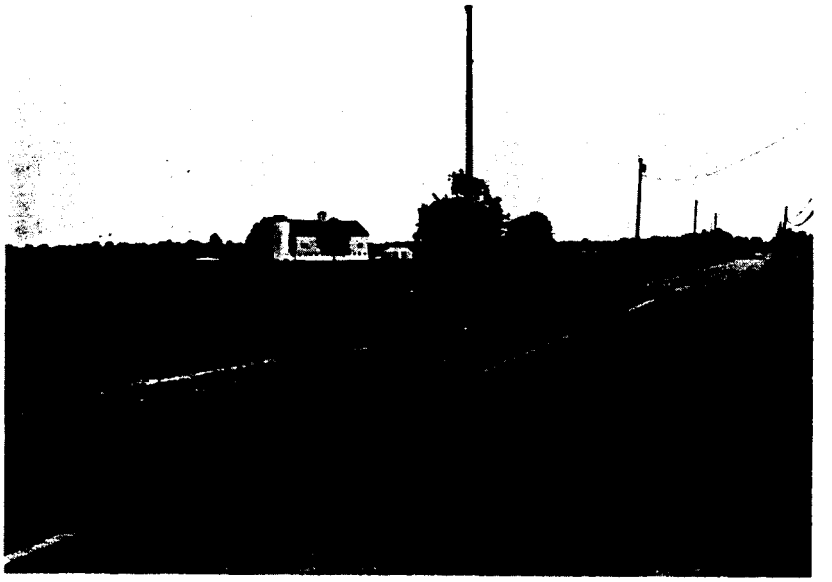
Field covered with short grass stubble. Sight distance 2000 ft. minimum.



ROUTE 535

A-831

RT. 535



1

2

NOISE MEASUREMENT DATA

ROUTE 535

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	30	02/05/73	60	51	43	74	7
1600	30	02/05/73	61	55	45	73	6
1700	30	02/05/73	64	59	52	73	5
1800	30	02/05/73	63	54	46	74	6
1900	30	02/05/73	59	51	43	74	7
2000	30	02/05/73	58	48	40	71	7
2100	30	02/05/73	58	47	41	71	7
2200	30	02/05/73	57	45	41	70	6
2300	30	02/05/73	57	45	41	69	6
0000	30	02/06/73	58	48	42	71	6
0100	30	02/06/73	53	45	41	66	5
0200	30	02/06/73	53	48	46	60	3
0300	30	02/06/73	50	48	45	56	3
0400	29	02/06/73	50	48	45	63	3
0500	30	02/06/73	50	47	43	58	3
0600	30	02/06/73	57	46	42	69	6
0700	30	02/06/73	63	55	48	74	6
0800	30	02/06/73	64	58	51	73	5
0900	30	02/06/73	62	54	47	72	5
1000	30	02/06/73	55	46	41	65	5
1100	30	02/06/73	61	51	46	73	6
1200	30	02/06/73	61	54	47	72	6
1300	30	02/06/73	61	52	45	74	6
1400	30	02/06/73	61	52	46	73	6

NOISE MEASUREMENT DATA

ROUTE 535

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	30	02/05/73	55	52	48	64	4
1600	0	02/05/73	NO DATA - MICROPHONE MALFUNCTION				
1700	0	02/05/73	NO DATA - MICROPHONE MALFUNCTION				
1800	0	02/05/73	NO DATA - MICROPHONE MALFUNCTION				
1900	30	02/05/73	56	51	44	68	5
2000	30	02/05/73	55	49	42	65	5
2100	30	02/05/73	53	46	41	62	5
2200	30	02/05/73	53	45	41	61	5
2300	30	02/05/73	53	45	41	62	5
0000	30	02/06/73	53	46	41	61	5
0100	30	02/06/73	51	44	41	58	4
0200	30	02/06/73	51	48	45	59	3
0300	30	02/06/73	50	48	45	57	3
0400	29	02/06/73	50	48	45	59	3
0500	30	02/06/73	51	48	45	58	3
0600	30	02/06/73	60	50	45	74	6
0700	30	02/06/73	59	54	48	67	4
0800	30	02/06/73	60	55	51	66	4
0900	30	02/06/73	58	53	48	65	4
1000	30	02/06/73	57	51	47	65	4
1100	30	02/06/73	58	52	47	68	5
1200	30	02/06/73	58	53	48	66	4
1300	30	02/06/73	58	51	46	68	5
1400	0	02/06/73	NO DATA - MICROPHONE MALFUNCTION				

NOISE MEASUREMENT DATA

ROUTE 535

MICROPHONE POSITION 3

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	28	02/05/73	50	46	42	63	4
1600	30	02/05/73	52	48	44	60	4
1700	30	02/05/73	61	57	52	69	4
1800	30	02/05/73	58	53	51	63	3
1900	30	02/05/73	50	44	41	57	4
2000	30	02/05/73	50	44	41	57	4
2100	30	02/05/73	50	47	43	56	3
2200	30	02/05/73	45	41	37	50	3
2300	30	02/05/73	47	42	38	56	4
0000	30	02/06/73	46	43	40	52	3
0100	30	02/06/73	45	42	39	52	3
0200	29	02/06/73	51	47	44	59	3
0300	30	02/06/73	50	48	45	56	3
0400	29	02/06/73	49	45	41	55	3
0500	0	02/06/73	NO DATA - MICROPHONE MALFUNCTION				
0600	30	02/06/73	48	44	41	53	3
0700	30	02/06/73	52	48	45	57	3
0800	30	02/06/73	53	49	46	58	3
0900	30	02/06/73	52	48	45	57	3
1000	30	02/06/73	56	51	47	63	4
1100	30	02/06/73	57	52	47	65	4
1200	29	02/06/73	51	47	43	60	4
1300	0	02/06/73	NO DATA - MICROPHONE MALFUNCTION				
1400	30	02/06/73	50	46	42	57	4

ROUTE 535 - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1500	02/05/73	-	7	0	350	54	-
1600	02/05/73	-	3	0	325	52	-
1700	02/05/73	-	2	0	334	50	-
1800	02/05/73	-	0	0	345	45	-
1900	02/05/73	-	1	0	360	41	-
2000	02/05/73	-	0	0	5	44	-
2100	02/05/73	-	0	0	1	45	-
2200	02/05/73	-	0	0	332	40	-
2300	02/05/73	-	0	1	334	39	-
0000	02/06/73	-	0	0	334	38	-
0100	02/06/73	-	0	0	350	37	-
0200	02/06/73	-	0	0	342	39	-
0300	02/06/73	-	0	0	344	38	-
0400	02/06/73	-	2	0	341	38	-
0500	02/06/73	-	0	5	11	36	-
0600	02/06/73	-	1	0	12	36	-
0700	02/06/73	-	3	-	13	34	-
0800	02/06/73	-	8	0	20	37	-
0900	02/06/73	-	1	0	30	38	-
1000	02/06/73	-	7	4	360	44	-
1100	02/06/73	-	5	7	40	43	-
1200	02/06/73	-	3	0	22	42	
1300	02/06/73	-	0	5	38	40	-
1400	02/06/73	-	2	3	28	44	-

*SAMPLE TIME 30 MIN.

Route and Section 38-14A

Station, Ramp, or Street Ramp W S

Municipality Wall Township County Monmouth

Starting Time and Date of First Sample 17:00, 2/13/73 Starting Time and Date of Last Sample 08.00, 2/16/73

Mobile Survey _____ Stationary Survey X Rural X Suburban _____

Urban _____

AC Power X Source N.J.D.O.T. junction box at intersection of existing Rt. 38 and Rt. 34.

Inverter _____ DC Power _____

Traffic counter location(s) One at Rt. 34 N. B. and one at Rt. 34 S. B.

Road Description: P.C.C. X B.C. X Other _____

N.A. _____

Smooth _____ Normal X Rough _____ Bumps _____ Holes _____

No holes or bumps X

Grade: Near lanes -2.5% Far lanes +2.5% Number of lanes: Near side 2

Far side 2

Center Barrier _____ Height _____ Median X No Median _____

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

Traffic light at intersection of Rt. 34 and existing Rt. 38

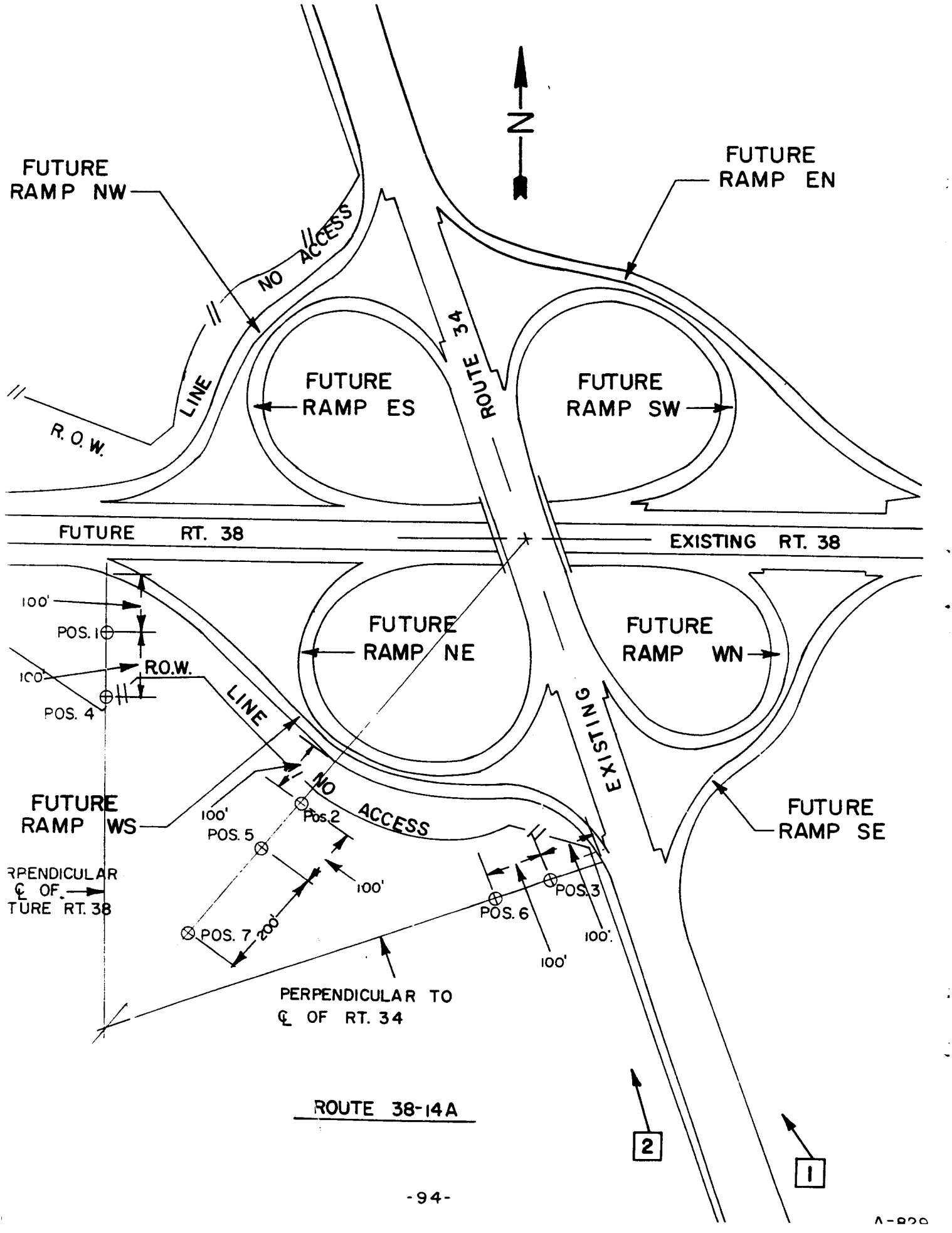
Route and Section 38-14A

Station, Ramp, or Street Ramp W S

Microphone Locations:

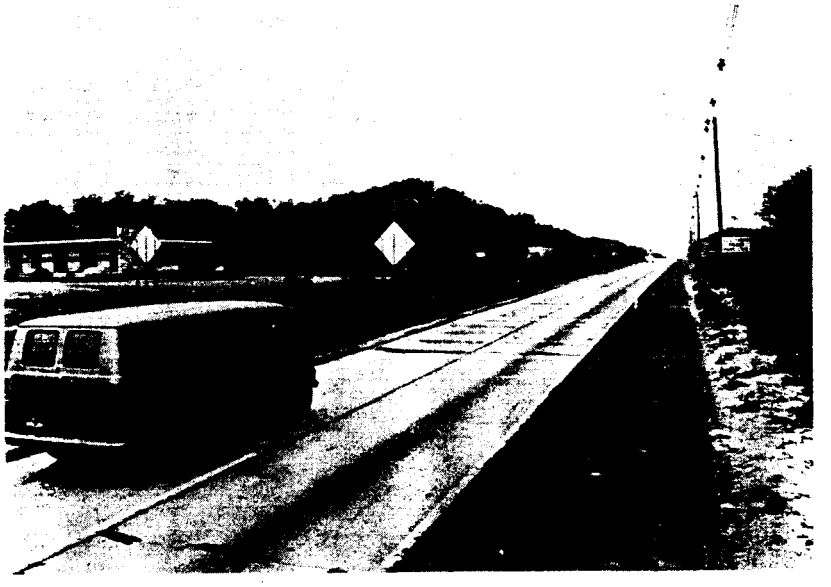
	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	4	670	670
Pos. 2	4	7	400	600
Pos. 3	4	8	115	500
Pos. 4	4	4	710	720
Pos. 5	Deleted because of equipment trouble			
Pos. 6	4	5	215	650
Pos. 7	4	8	730	900

Description of Terrain Rolling slightly upwards from existing Rt. 34 towards all microphone positions, with isolated hillocks. At least 75% scrub pine and oak to 20 ft. in height; remainder other deciduous trees to 20 ft. in height. Moderate brush to 3 ft. in height. Sight distance in woods - 75 ft. maximum. Sight distance in open areas - 150 ft. maximum.

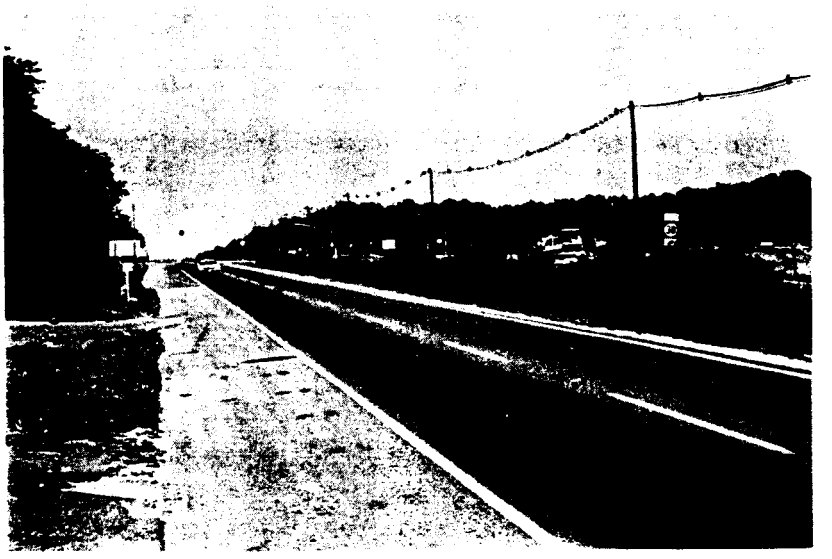

N
FUTURE RAMP NW
FUTURE RAMP EN
NO ACCESS
LINE
R.O.W.
FUTURE RAMP ES
ROUTE 34
FUTURE RAMP SW
FUTURE RT. 38
EXISTING RT. 38
100'
POS. 1
R.O.W.
100'
POS. 4
FUTURE RAMP NE
FUTURE RAMP WN
LINE
EXISTING
NO ACCESS
FUTURE RAMP WS
100'
POS. 5
Pos. 2
FUTURE RAMP SE
RPENDICULAR
℄ OF
TURE RT. 38
100'
POS. 6
POS. 3
100'
POS. 7
200'
100'
PERPENDICULAR TO
℄ OF RT. 34
ROUTE 38-14A
2
1

A-829

RT. 38 SECTION 14A



1



2

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	25	02/13/73	50	42	37	69	6
1800	10	02/13/73	45	37	33	59	6
1900	0	02/13/73	NO DATA - MICROPHONE MALFUNCTION				
2000	25	02/13/73	45	39	35	58	5
2100	25	02/13/73	47	39	35	56	5
2200	25	02/13/73	47	39	35	55	5
2300	25	02/13/73	45	39	36	52	4
0000	25	02/14/73	39	33	29	52	5
0100	25	02/14/73	42	35	29	56	6
0200	25	02/14/73	39	31	27	50	5
0300	25	02/14/73	43	30	26	54	6
0400	25	02/14/73	41	31	27	56	6
0500	25	02/14/73	48	39	31	61	7
0600	25	02/14/73	49	44	40	55	4
0700	25	02/14/73	52	48	45	58	3
0800	25	02/14/73	48	44	41	52	3
0900	25	02/14/73	47	42	38	53	4
1000	25	02/14/73	45	40	36	52	4
1100	25	02/14/73	45	41	37	57	4
1200	25	02/14/73	50	43	38	53	5
1300	25	02/14/73	54	44	40	74	7
1400	25	02/14/73	53	49	46	58	3
1500	25	02/14/73	56	51	46	68	5
1600	25	02/14/73	61	50	46	73	6

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
0400	21	02/15/73	39	36	32	47	4
0500	25	02/15/73	43	39	36	49	3
0600	25	02/15/73	44	40	37	49	3
0700	25	02/15/73	50	46	42	56	3
0800	25	02/15/73	49	45	41	55	3
0900	25	02/15/73	63	48	42	85	8
1000	25	02/15/73	60	49	44	80	7
1100	25	02/15/73	64	48	41	87	9
1200	25	02/15/73	53	45	41	63	5
1300	25	02/15/73	71	63	54	85	7
1400	25	02/15/73	70	60	45	91	9
1500	25	02/15/73	71	56	48	91	9
1600	0	02/15/73	NO DATA - MICROPHONE MALFUNCTION				
1700	25	02/15/73	56	46	42	62	4
1800	25	02/15/73	57	45	41	68	6
1900	25	02/15/73	55	45	41	66	5
2000	25	02/15/73	54	43	38	67	6
2100	25	02/15/73	52	44	40	66	5
2200	25	02/15/73	53	44	41	64	5
2300	25	02/15/73	46	43	40	52	3
0000	25	02/16/73	49	44	40	58	4
0100	25	02/16/73	48	42	37	61	5
0200	25	02/16/73	46	39	35	56	5
0300	25	02/16/73	54	39	35	68	7

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 1-A

MICROPHONE POSITION 2

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
0400	25	02/15/73	40	36	32	48	4
0500	25	02/16/73	45	39	35	54	4
0600	25	02/16/73	48	42	38	61	5
0700	25	02/16/73	52	48	44	58	3
0800	25	02/16/73	54	49	45	62	4

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 3

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1800	25	02/14/73	61	56	52	68	4
1900	25	02/14/73	61	57	53	67	3
2000	25	02/14/73	59	52	46	69	5
2100	25	02/14/73	59	53	50	65	4
2200	0	02/14/73	NO DATA - RAIN				
2300	0	02/14/73	NO DATA - RAIN				
0000	0	02/15/73	NO DATA - RAIN				
0100	0	02/15/73	NO DATA - RAIN				
0200	0	02/15/73	NO DATA - RAIN				
0300	0	02/15/73	NO DATA - RAIN				
0400	20	02/15/73	51	37	32	63	7
0500	25	02/15/73	53	41	37	66	7
0600	0	02/15/73	NO DATA - EQUIPMENT PROBLEM				
0700	25	02/15/73	62	55	47	74	6
0800	25	02/15/73	59	53	48	67	4
0900	25	02/15/73	65	54	48	79	7
1000	25	02/15/73	63	54	48	76	6
1100	25	02/15/73	64	53	46	79	7
1200	25	02/15/73	55	50	46	63	4
1300	25	02/15/73	64	57	51	75	5
1400	25	02/15/73	63	57	51	73	5
1500	25	02/15/73	64	56	49	76	6
1600	25	02/15/73	60	55	48	71	5
1700	25	02/15/73	61	52	50	66	4

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 3

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1800	25	02/15/73	61	54	46	73	6
1900	25	02/15/73	60	53	47	70	5
2000	25	02/15/73	57	50	41	70	6
2100	25	02/15/73	58	50	44	71	6
2200	25	02/15/73	57	49	42	68	6
2300	25	02/15/73	56	47	42	67	6
0000	25	02/16/73	56	47	41	69	6
0100	25	02/16/73	52	41	36	65	6
0200	25	02/16/73	47	37	31	61	7
0300	25	02/16/73	51	35	29	72	9
0400	25	02/16/73	46	35	31	62	6
0500	25	02/16/73	55	45	37	69	7
0600	25	02/16/73	56	50	45	68	5
0700	25	02/16/73	62	57	52	72	4
0800	25	02/16/73	62	55	50	73	5

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 4

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	25	02/13/73	48	40	36	70	6
1800	25	02/13/73	47	37	33	60	6
1900	0	02/13/73	NO DATA - MICROPHONE MALFUNCTION				
2000	25	02/13/73	42	38	34	57	5
2100	25	02/13/73	47	39	35	55	5
2200	25	02/13/73	45	39	35	54	4
2300	25	02/13/73	45	39	35	51	4
0000	0	02/14/73	NO DATA - EQUIPMENT PROBLEM				
0100	25	02/14/73	41	34	29	54	5
0200	25	02/14/73	39	31	27	51	5
0300	25	02/14/73	44	30	26	57	7
0400	25	02/14/73	40	31	26	54	6
0500	25	02/14/73	50	40	34	64	7
0600	25	02/14/73	51	46	39	61	5
0700	25	02/14/73	50	47	42	57	3
0800	25	02/14/73	47	43	41	52	3
0900	25	02/14/73	45	39	35	57	5
1000	25	02/14/73	43	38	35	49	3
1100	25	02/14/73	45	40	36	57	4
1200	25	02/14/73	47	40	36	57	5
1300	25	02/14/73	52	43	37	74	7
1400	25	02/14/73	51	48	44	56	3
1500	25	02/14/73	55	49	46	67	5
1600	25	02/14/73	60	50	46	74	6

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 6

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1800	25	02/14/73	59	55	52	65	3
1900	25	02/14/73	60	57	54	64	3
2000	25	02/14/73	58	54	51	61	3
2100	25	02/14/73	57	53	51	62	3
2200	0	02/14/73	NO DATA - RAIN				
2300	0	02/14/73	NO DATA - RAIN				
0000	0	02/15/73	NO DATA - RAIN				
0100	0	02/15/73	NO DATA - RAIN				
0200	0	02/15/73	NO DATA - RAIN				
0300	0	02/15/73	NO DATA - RAIN				
0400	0	02/15/73	NO DATA - MICROPHONE MALFUNCTION				
0500	25	02/15/73	50	46	42	57	4
0600	0	02/15/73	NO DATA - EQUIPMENT PROBLEM				
0700	25	02/15/73	57	52	47	66	4
0800	0	02/15/73	NO DATA - EQUIPMENT PROBLEM				
0900	25	02/15/73	64	56	48	77	6
1000	25	02/15/73	62	53	49	75	6
1100	0	02/15/73	NO DATA - MICROPHONE MALFUNCTION				
1200	25	02/15/73	56	50	45	64	4
1300	25	02/15/73	65	59	51	79	6
1400	25	02/15/73	67	57	50	81	7
1500	25	02/15/73	66	57	51	79	6
1600	25	02/15/73	59	56	52	65	3
1700	25	02/15/73	63	58	53	70	4

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 6

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1800	25	02/15/73	58	52	48	66	4
1900	25	02/15/73	63	57	51	70	4
2000	25	02/15/73	60	55	45	72	6
2100	25	02/15/73	57	47	42	68	6
2200	0	02/15/73	NO DATA - RAIN				
2300	0	02/15/73	NO DATA - RAIN				
0000	0	02/16/73	NO DATA - OPERATOR ERROR				
0100	25	02/16/73	54	45	41	66	6
0200	25	02/16/73	47	39	33	58	5
0300	25	02/16/73	53	39	32	68	8
0400	25	02/16/73	51	43	38	63	5
0500	25	02/16/73	51	46	41	59	4
0600	25	02/16/73	55	50	46	64	4
0700	25	02/16/73	59	54	51	66	4
0800	25	02/16/73	61	55	51	70	4

NOISE MEASUREMENT DATA

ROUTE 38 SECTION 14A

MICROPHONE POSITION 7

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	25	02/13/73	49	40	36	66	6
1800	25	02/13/73	48	38	35	61	6
1900	25	02/13/73	45	40	36	52	4
2000	25	02/13/73	42	38	36	57	4
2100	25	02/13/73	44	37	33	55	5
2200	25	02/13/73	45	39	36	53	4
2300	25	02/13/73	45	40	36	52	4
0000	22	02/14/73	45	39	36	54	4
0100	25	02/14/73	43	38	33	54	5
0200	25	02/14/73	40	35	32	50	4
0300	25	02/14/73	45	34	31	56	6
0400	0	02/14/73	NO DATA - OPERATOR ERROR				
0500	25	02/14/73	50	41	35	61	6
0600	25	02/14/73	49	43	39	57	4
0700	25	02/14/73	52	48	44	59	4
0800	25	02/14/73	65	59	55	74	5
0900	25	02/14/73	44	38	34	60	5
1000	25	02/14/73	43	39	36	58	4
1100	25	02/14/73	45	40	36	57	4
1200	25	02/14/73	47	41	37	57	5
1300	25	02/14/73	52	43	37	74	7
1400	25	02/14/73	53	49	46	58	3
1500	25	02/14/73	56	51	47	67	4
1600	25	02/14/73	62	53	50	73	5

ROUTE 38 SECTION 14A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC NB	TRUCKS* NB	TOTAL TRAFFIC SB	TRUCKS* SB	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1700	02/13/73	-	-	958	-	0	270	41	-
1800	02/13/73	-	-	858	-	0	300	23	-
1900	02/13/73	-	-	473	-	0	294	21	-
2000	02/13/73	-	1	249	1	0	270	18	-
2100	02/13/73	-	1	208	1	0	294	17	-
2200	02/13/73	-	1	199	1	0	294	17	-
2300	02/13/73	-	1	162	1	0	315	15.5	-
0000	02/14/73	-	0	121	4	0	316	13	-
0100	02/14/73	-	2	117	1	0	318	13	-
0200	02/14/73	-	1	54	1	0	319	15.5	-
3000	02/14/73	-	1	30	1	0	318	12	-
0400	02/14/73	-	2	16	1	0	320	13	-
0500	02/14/73	-	8	26	4	0	320	13	-
0600	02/14/73	-	3	58	3	0	320	10	-
0700	02/14/73	-	4	135	20	0	321	11	-
0800	02/14/73	-	5	498	25	0	320	23	-
0900	02/14/73	-	10	425	28	0	320	30	-

*SAMPLE TIME 30 MIN.

ROUTE 38 SECTION 14A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC NB	TRUCKS* NB	TOTAL TRAFFIC SB	TRUCKS* SB	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1000	02/14/73	-	13	357	19	0	308	43	-
1100	02/14/73	-	9	343	16	0	128	46	-
1200	02/14/73	-	10	355	25	0	210	44	-
1300	02/14/73	-	-	382	-	0	214	43.5	-
1400	02/14/73	-	12	325	36	0	208	47	-
1500	02/14/73	-	14	436	11	0	230	45	-
1600	02/14/73	-	13	576	12	0	178	39	-
1700	02/14/73	-	-	976	-	-	-	-	-
1800	02/14/73	-	5	891	5	-	-	-	-
1900	02/14/73	-	1	444	2	-	-	42	-
2000	02/14/73	-	1	314	1	-	-	42	-
2100	02/14/73	-	0	191	1	-	-	42	-
2200	02/14/73	-	-	187	-	-	-	45	-
2300	22/14/73	-	-	137	-	-	-	-	-
0000	02/15/73	-	-	102	-	-	-	-	-
0100	02/15/73	-	4	101	0	-	-	-	-
0200	02/15/33	-	-	59	-	-	-	-	-

*SAMPLE TIME 30 MIN.

ROUTE 38 SECTION 14A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC NB	TRUCKS* NB	TOTAL TRAFFIC SB	TRUCKS* SB	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
0300	02/15/73	-	-	29	-	-	-	-	-
0400	02/15/73	-	2	18	0	2	225	52	-
0500	02/15/73	-	2	36	4	2	225	49	-
0600	02/15/73	-	3	42	5	2	225	47	-
0700	02/15/73	-	2	138	21	2	225	43	-
0800	02/15/73	-	8	475	24	2	335	43	-
0900	02/15/73	-	10	472	24	0	90	45	-
1000	02/15/73	135	7	374	25	0	120	47	-
1100	02/15/73	152	8	319	24	0	130	49	-
1200	02/15/73	175	1	354	9	0	130	56	-
1300	02/15/73	237	15	394	18	0	120	57	-
1400	02/15/73	250	7	355	16	0	180	55	-
1500	02/15/73	202	14	405	17	0	158	52	-
1600	02/15/73	212	5	626	15	0	178	52	-
1700	02/15/73	176	6	994	3	0	10	48	-
1800	02/15/73	139	2	818	8	0	270	45	-
1900	02/15/73	95	4	424	5	0	242	41	-

*SAMPLE TIME 30 MIN.

ROUTE 38 SECTION 14A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC NB	TRUCKS* NB	TOTAL TRAFFIC SB	TRUCKS* SB	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
2000	02/15/73	86	1	258	3	0	252	41	-
2100	02/15/73	68	1	203	1	0	213	40.5	-
2200	02/15/73	64	1	176	0	0	208	36	-
2300	02/15/73	67	1	164	2	0	214	36	-
0000	02/16/73	28	1	127	1	0	220	32	-
0100	02/16/73	17	0	108	1	0	220	35	-
0200	02/16/73	11	1	56	0	0	230	35	-
0300	02/16/73	12	1	22	0	0	240	35	-
0400	02/16/73	15	0	14	1	0	240	32	-
0500	02/16/73	59	1	33	3	0	290	31.5	-
0600	02/16/73	137	4	60	9	0	245	32	-
0700	02/16/73	408	8	151	20	0	205	31	-
0800	02/16/73	429	7	487	23	0	192	31	-

*SAMPLE TIME 30 MIN.

Route and Section 174 - 1A

Station, Ramp, or Street 235 + 25 S. B.

Municipality Lawrence Township County Mercer

Starting Time and Date of First Sample 17:00, 2/26/73 Starting Time and Date of Last Sample 16:00, 2/28/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban X

Urban _____

AC Power X Source Resident Engineer's office on Hopatcong Drive

Inverter _____ DC Power _____

Traffic counter location(s) N/A

Road Description: P.C.C. _____ B.C._____ Other _____

N.A. X

Smooth _____ Normal _____ Rough _____ Bumps _____ Holes _____

No holes or bumps _____

Grade: Near lanes _____ Far lanes _____ Number of lanes: Near side _____

Far side _____

Center Barrier _____ Height _____ Median _____ No Median _____

Ramp _____ Overpass _____ Underpass _____ At grade _____

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

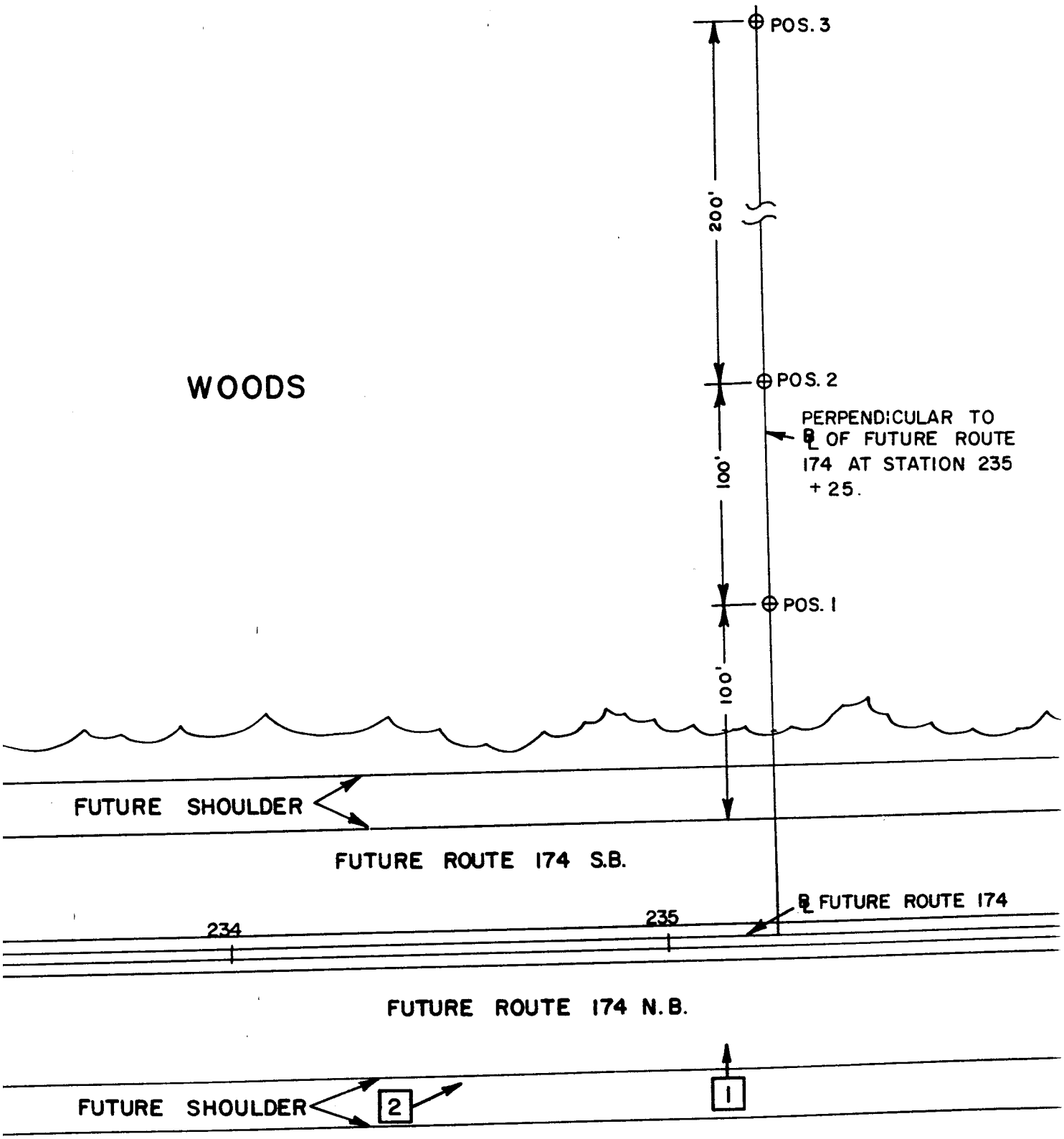
Route and Section 174 - 1A

Station, Ramp, or Street 235 + 25 S. B.

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	7	N/A	N/A
Pos. 2	"	"	N/A	N/A
Pos. 3	"	"	N/A	N/A
Pos. 4	N/A			
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

Description of Terrain Flat. Thick woods and brush, 95% deciduous, except at Position 1, where the first 50 feet adjacent to the highway was covered with dead grass to 2 feet in height. Maximum sight distance about 75 feet in woods. Traffic on Route 1 was audible as ambient, with occasional trucks clearly audible.


POS. 3
200'
WOODS
POS. 2
PERPENDICULAR TO ℄ OF FUTURE ROUTE 174 AT STATION 235 + 25.
100'
POS. 1
100'
FUTURE SHOULDER
FUTURE ROUTE 174 S.B.
℄ FUTURE ROUTE 174
234
235
FUTURE ROUTE 174 N.B.
FUTURE SHOULDER
2
1

ROUTE 174-1A

RT. 174 SECTION 1A

1

2

NOISE MEASUREMENT DATA

ROUTE 174 SECTION 1A

MICROPHONE POSITION 1

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1700	25	02/26/73	53	49	46	56	2
1800	25	02/26/73	50	46	42	56	3
1900	25	02/26/73	49	46	43	53	2
2000	25	02/26/73	50	47	45	52	2
2100	0	02/26/73	NO DATA - EQUIPMENT PROBLEM				
2200	25	02/26/73	50	47	45	53	2
2300	25	02/26/73	50	47	43	54	3
0000	25	02/27/73	53	48	44	60	4
0100	25	02/27/73	54	49	45	60	4
0200	25	02/27/73	52	46	41	61	5
0300	25	02/27/73	50	44	40	58	4
0400	25	02/27/73	50	46	41	57	4
0500	25	02/27/73	50	46	42	57	3
0600	25	02/27/73	50	48	46	55	2
0700	25	02/27/73	54	50	46	62	3
0800	25	02/27/73	54	51	47	58	3
0900	25	02/27/73	52	48	46	56	3
1000	25	02/27/73	53	49	46	59	3
1100	25	02/27/73	52	48	46	55	2
1200	25	02/27/73	53	49	46	62	3
1300	25	02/27/73	52	48	46	58	3
1400	25	02/27/73	54	49	45	64	4
1500	25	02/27/73	50	48	45	53	2
1600	25	02/27/73	51	48	46	54	2

NOISE MEASUREMENT DATA

ROUTE 174 SECTION 1A

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	25	02/26/73	45	43	41	48	2
1800	25	02/26/73	52	48	46	56	3
1900	25	02/26/73	50	48	46	51	1
2000	25	02/26/73	50	48	46	52	1
2100	25	02/26/73	50	48	46	54	2
2200	25	02/26/73	50	48	45	52	2
2300	25	02/26/73	52	48	45	55	2
0000	25	02/27/73	49	44	40	56	4
0100	25	02/27/73	47	43	40	52	3
0200	25	02/27/73	47	40	36	56	4
0300	25	02/27/73	45	40	36	55	4
0400	25	02/27/73	45	41	37	52	3
0500	25	02/27/73	46	43	41	52	3
0600	25	02/27/73	48	43	40	54	3
0700	25	02/27/73	50	48	45	58	3
0800	25	02/27/73	50	48	46	53	2
0900	0	02/27/73	NO DATA - MICROPHONE MALFUNCTION				
1000	25	02/27/73	54	49	46	60	3
1100	25	02/27/73	50	48	45	54	2
1200	25	02/27/73	52	48	46	59	3
1300	25	02/27/73	54	50	46	60	3
1400	25	02/27/73	55	50	46	64	4
1500	25	02/27/73	51	48	46	55	2
1600	15	02/27/73	53	49	46	57	3

NOISE MEASUREMENT DATA

ROUTE 174 SECTION 1A

MICROPHONE POSITION 3

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	55	02/27/73	50	48	45	55	2
1800	55	02/27/73	50	48	45	55	2
1900	55	02/27/73	50	47	45	54	2
2000	55	02/27/73	49	45	42	53	3
2100	55	02/27/73	49	46	42	55	3
2200	55	02/27/73	50	46	42	55	3
2300	55	02/27/73	50	48	46	58	3
0000	55	02/28/73	50	47	43	56	3
0100	55	02/28/73	49	44	39	60	5
0200	55	02/28/73	50	43	38	63	5
0300	55	02/28/73	49	41	36	60	5
0400	55	02/28/73	50	43	38	59	5
0500	55	02/28/73	50	45	41	58	4
0600	55	02/28/73	51	48	44	58	3
0700	55	02/28/73	51	48	46	55	2
0800	55	02/28/73	51	47	44	57	3
0900	55	02/28/73	50	44	41	56	3
1000	55	02/28/73	49	44	40	56	4
1100	55	02/28/73	50	44	39	58	4
1200	55	02/28/73	50	43	37	60	5
1300	55	02/28/73	48	43	38	56	4
1400	55	02/28/73	48	40	36	59	5
1500	55	02/28/73	49	43	39	58	4
1600	22	02/28/73	53	45	40	63	5

ROUTE 174 SECTION 1A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1700	02/26/73	-	-	0	55	37	-
1800	02/26/73	-	-	0	60	36	-
1900	02/26/73	-	-	0	60	35.5	-
2000	02/26/73	-	-	0	60	35	-
2100	02/26/73	-	-	0	60	34.5	-
2200	02/26/73	-	-	0	57	34	-
2300	02/26/73	-	-	0	32	33.5	-
0000	02/27/73	-	-	0	39	32.5	-
0100	02/27/73	-	-	0	40	32	-
0200	02/27/73	-	-	0	56	31	-
0300	02/27/73	-	-	0	50	31	-
0400	02/27/73	-	-	0-9	58	29	-
0500	02/27/73	-	-	0-2	58	28	-
0600	02/27/73	-	-	0	58	27	-
0700	02/27/73	-	-	0-2	54	26	-
0800	02/27/73	-	-	0	60	27.5	-
0900	02/27/73	-	-	7	60	35	-
1000	02/27/73	-	-	7	58	41	-
1100	02/27/73	-	-	0	96	38.5	-
1200	02/27/73	-	-	8	52	38	-
1300	02/27/73	-	-	2	82	34	-
1400	02/27/73	-	-	0	124	37	-
1500	02/27/73	-	-	0	70	37	-
1600	02/27/73	-	-	0	50	38	-
1700	02/27/73	-	-	0	68	30	-

ROUTE 174 SECTION 1A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1800	02/27/73	-	-	0	62	27.5	-
1900	02/27/73	-	-	0	62	26.5	-
2000	02/27/73	-	-	0	54	25	-
2100	02/27/73	-	-	0	60	22	-
2200	02/27/73	-	-	0	30	20	-
2300	02/27/73	-	-	0	20	20	-
0000	02/28/73	-	-	0	17	18	-
0100	02/28/73	-	-	0	22	19	-
0200	02/28/73	-	-	0	23	16	-
0300	02/28/73	-	-	0	22	17	-
0400	02/28/73	-	-	0	8	12	-
0500	02/28/73	-	-	0	24	15	-
0600	02/28/73	-	-	0	10	13	-
0700	02/28/73	-	-	0	8	14	-
0800	02/28/73	-	-	0	4	27	-
0900	02/28/73	-	-	0	60	27	-
1000	02/28/73	-	-	0	28	28	-
1100	02/28/73	-	-	0	-	35	-
1200	02/28/73	-	-	0	130	35	-
1300	02/28/73	-	-	0	310	37	-
1400	02/28/73	-	-	0	40	44	-
1500	02/28/73	-	-	0	237	47	-
1600	02/28/73	-	-	0	260	39	-

Route and Section 9 - 21C & 22D

Station, Ramp, or Street 306 + 00 N. B.

Municipality Howell Township County Monmouth

Starting Time and Date of First Sample 14:00, 3/19/73 Starting Time and Date of Last Sample 14:00, 3/21/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban X

Urban _____

AC Power X Source Region #3, Bureau of Plant and Project

Inspection offices

Inverter _____ DC Power _____

Traffic counter location(s) Approximately at Station 306, across both

lanes of existing Route 9.

Road Description: P.C.C. X B.C._____ Other _____

N.A._____

Smooth _____ Normal X Rough _____ Bumps X Holes _____

No holes or bumps _____

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

Signal at Route 9 and West Farm Road

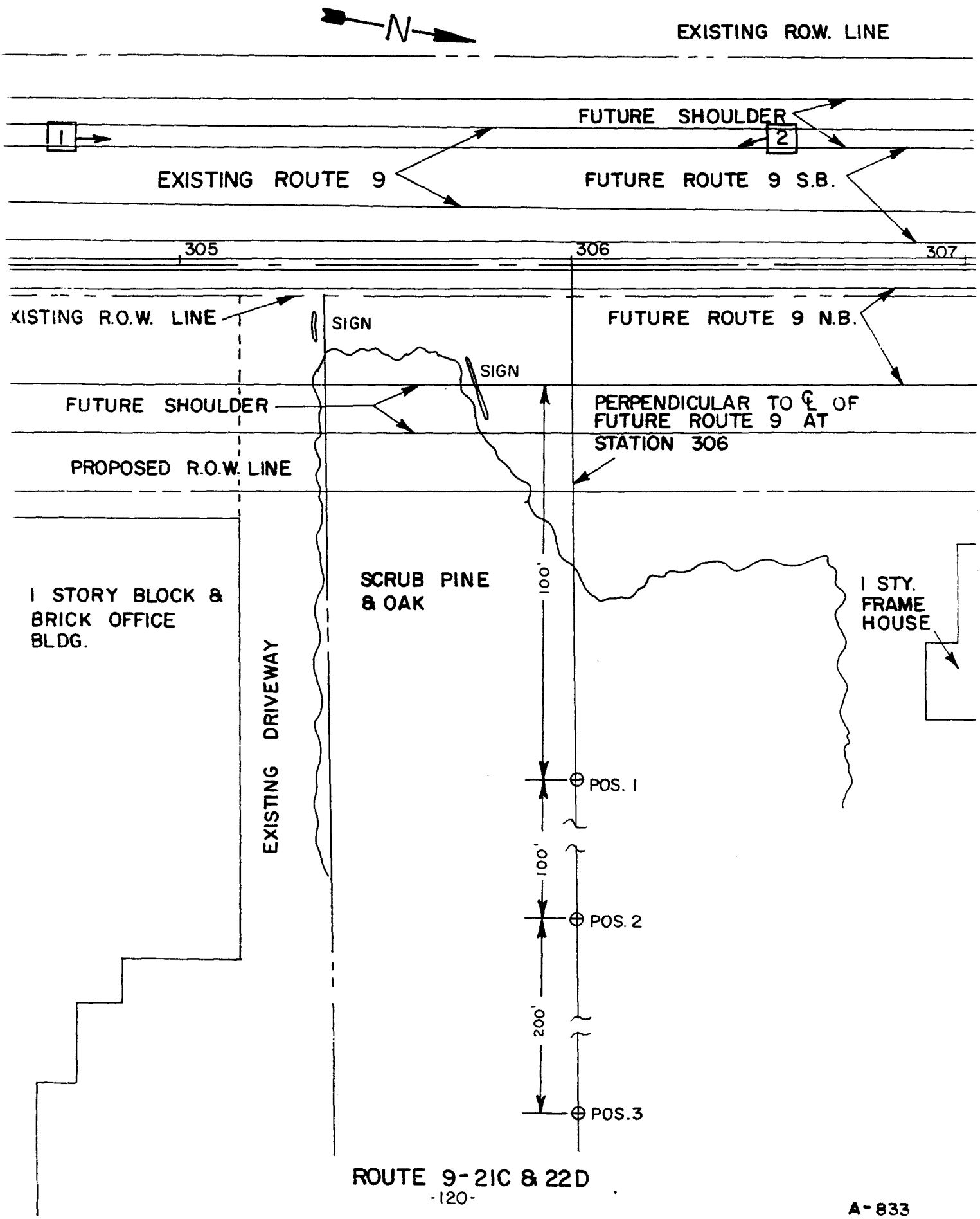
Route and Section 9 - 21C & 22D

Station, Ramp, or Street 306 + 00 N. B.

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	4	132	900
Pos. 2	4	6	232	900
Pos. 3	4	8	432	900
Pos. 4	N.A.			
Pos. 5	N.A.			
Pos. 6	N.A.			
Pos. 7	N.A			

Description of Terrain Flat with slight upgrade toward Position 3. Scrub pine and oak to 20 ft. height. Dead grass, weeds, and shrubbery to 3 ft. height. Sight distance about 50 ft. from Route 9 to Position 2 and about 100 ft. from Position 2 to Position 3.



ROUTE 9-21C & 22D

A-833

RT. 9 SECTION 21C & 22D

1

2

NOISE MEASUREMENT DATA

ROUTE 9 SECTION 21C & 22D

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	50	03/19/73	69	63	59	78	4
1500	50	03/19/73	68	63	58	76	4
1600	25	03/19/73	67	63	59	74	4
1700	55	03/19/73	69	65	61	75	3
1800	50	03/19/73	68	63	59	75	4
1900	50	03/19/73	67	62	57	75	4
2000	50	03/19/73	62	57	51	72	5
2100	45	03/19/73	65	60	52	75	5
2200	50	03/19/73	65	59	49	78	6
2300	55	03/19/73	64	58	50	74	5
0000	50	03/20/73	61	54	44	75	7
0100	55	03/20/73	62	51	41	78	8
0200	55	03/20/73	60	47	36	80	9
0300	55	03/20/73	58	45	35	79	9
0400	55	03/20/73	62	50	39	81	9
0500	55	03/20/73	65	56	45	81	8
0600	55	03/20/73	66	61	53	78	6
0700	55	03/20/73	67	62	56	76	5
0800	55	03/20/73	69	63	58	78	5
0900	55	03/20/73	70	63	57	80	5
1000	50	03/20/73	70	63	58	79	5
1100	55	03/20/73	69	62	55	80	5
1200	55	03/20/73	66	61	55	76	5
1300	45	03/20/73	67	62	56	77	5

NOISE MEASUREMENT DATA

ROUTE 9 SECTION 21C & 22D

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	30	03/20/73	66	61	55	77	5
1500	50	03/20/73	66	60	54	77	5
1600	55	03/20/73	67	62	59	74	4
1700	0	03/20/73	NO DATA - OPERATOR ERROR				
1800	50	03/20/73	65	62	56	73	4
1900	55	03/20/73	65	61	54	75	5
2000	0	03/20/73	NO DATA - OPERATOR ERROR				
2100	55	03/20/73	64	58	51	74	5
2200	55	03/20/73	63	57	51	73	5
2300	55	03/20/73	63	56	47	75	6
0000	55	03/21/73	61	55	47	73	6
0100	55	03/21/73	61	49	41	78	8
0200	55	03/21/73	58	44	34	78	9
0300	55	03/21/73	57	43	33	78	9
0400	55	03/21/73	61	48	33	83	10
0500	55	03/21/73	65	56	47	81	7
0600	55	03/21/73	67	62	53	78	5
0700	42	03/21/73	68	62	57	79	5
0800	55	03/21/73	66	60	55	77	5
0900	55	03/21/73	65	59	53	75	5
1000	55	03/21/73	68	62	56	78	5
1100	0	03/21/73	NO DATA - OPERATOR ERROR				
1200	49	03/21/73	65	59	54	75	5
1300	55	03/21/73	66	59	54	77	5

NOISE MEASUREMENT DATA

ROUTE 9 SECTION 21C & 22D

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1400	54	03/19/73	66	62	57	75	4
1500	55	03/19/73	65	61	56	72	4
1600	0	03/19/73	NO DATA - OPERATOR ERROR				
1700	50	03/19/73	65	62	58	72	3
1800	50	03/19/73	64	60	56	72	4
1900	50	03/19/73	62	58	54	69	4
2000	50	03/19/73	61	56	50	71	5
2100	45	03/19/73	60	56	50	67	4
2200	50	03/19/73	61	55	48	71	5
2300	50	03/19/73	59	54	48	67	5
0000	50	03/20/73	58	52	45	68	5
0100	50	03/20/73	59	51	40	73	7
0200	50	03/20/73	56	46	36	74	8
0300	50	03/20/73	56	43	34	74	8
0400	50	03/20/73	58	48	38	74	7
0500	50	03/20/73	60	52	44	74	6
0600	50	03/20/73	64	58	52	74	5
0700	50	03/20/73	65	60	55	73	4
0800	50	03/20/73	65	59	54	72	4
0900	50	03/20/73	65	59	54	74	5
1000	50	03/20/73	63	58	53	71	4
1100	50	03/20/73	62	57	51	73	5
1200	50	03/20/73	61	56	51	69	4
1300	40	03/20/73	64	58	53	72	4

NOISE MEASUREMENT DATA

ROUTE 9 SECTION 21C & 220

MICROPHONE POSITION 3

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1500	45	03/20/73	59	53	50	66	4
1600	50	03/20/73	59	55	51	65	3
1700	55	03/20/73	56	53	49	63	3
1800	50	03/20/73	59	54	50	64	3
1900	50	03/20/73	58	54	51	63	3
2000	50	03/20/73	55	51	46	63	4
2100	50	03/20/73	58	54	50	65	4
2200	50	03/20/73	59	56	45	70	5
2300	50	03/20/73	50	46	41	58	4
0000	50	03/21/73	52	46	41	60	4
0100	42	03/21/73	52	44	37	63	6
0200	29	03/21/73	46	38	33	53	5
0300	0	03/21/73	NO DATA - MICROPHONE MALFUNCTION				
0400	0	03/21/73	NO DATA - MICROPHONE MALFUNCTION				
0500	0	03/21/73	NO DATA - MICROPHONE MALFUNCTION				
0600	0	03/21/73	NO DATA - MICROPHONE MALFUNCTION				
0700	50	03/21/73	64	56	47	78	7
0800	50	03/21/73	55	52	47	63	4
0900	50	03/21/73	55	51	47	61	3
1000	50	03/21/73	57	52	48	65	4
1100	55	03/21/73	56	52	48	62	3
1200	45	03/21/73	56	52	49	64	4
1300	50	03/21/73	56	53	50	65	3
1400	43	03/21/73	56	53	50	63	3

ROUTE 9 SECTION 21C & 22D - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1400	03/19/73	1395	137	0	-	51	-
1500	03/19/73	1455	114	17	-	47	-
1600	03/19/73	1556	35	10	305	43	-
1700	03/19/73	1500	-	2	295	41	-
1800	03/19/73	1336	36	0	275	39	-
1900	03/19/73	1044	21	0	320	38	-
2000	03/19/73	664	22	0	305	37	-
2100	03/19/73	612	7	0	336	37	-
2200	03/19/73	541	15	0	325	37	-
2300	03/19/73	495	14	0	300	66.5	-
0000	03/20/73	365	8	0	338	36	-
0100	03/20/73	236	13	0	336	36	-
0200	03/20/73	123	28	0	321	34.5	-
0300	03/20/73	101	18	0	34	34.5	-
0400	03/20/73	188	43	0	310	32	-
0500	03/20/73	475	57	0	310	31.5	-
0600	03/20/73	1107	101	0	294	29	-
0700	03/20/73	1554	93	0	300	32	-
0800	03/20/73	1417	121	0	312	34.5	-
0900	03/20/73	1129	119	1	304	39	-
1000	03/20/73	1053	117	4	310	43	-
1100	03/20/73	1127	-	0	312	45	-
1200	03/20/73	1065	46	0	314	45	-
1300	03/20/73	1209	107	4	292	45	-

*SAMPLE TIME 55 MIN.

ROUTE 9 SECTION 21C & 22D - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS*	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1400	03/20/73	1344	89	0	286	45	-
1500	03/20/73	1384	55	0	250	46	-
1600	03/20/73	1572	109	0	300	49	-
1700	03/20/73	1622	-	0	327	45	-
1800	03/20/73	1296	50	0	321	40	-
1900	03/20/73	1062	56	0	325	30	-
2000	03/20/73	738	30	0	349	30	-
2100	03/20/73	581	20	0	350	30	-
2200	03/20/73	562	31	0	8	29.5	-
2300	03/20/73	506	7	0	13	28	-
0000	03/21/73	380	17	0	0	27	-
0100	03/21/73	258	29	0	0	25	-
0200	03/21/73	147	18	0	0	25	-
0300	03/21/73	89	13	0	20	24	-
0400	02/21/73	132	29	0	30	25	-
0500	02/21/73	392	40	0	31	25.5	-
0600	03/21/73	962	73	0	31	26	-
0700	03/21/73	1397	-	0	43	30	-
0800	03/21/73	1444	151	0	71	31	-
0900	03/21/73	1153	-	0	49	37	-
1000	03/21/73	1147	155	0	70	45	-
1100	03/21/73	1088	114	0	90	42	-
1200	03/21/73	1115	110	0	94	40	-
1300	03/21/73	1188	147	0	100	46	-
1400	03/21/73	1248	-	0	75	45	-

*SAMPLE TIME 55 MIN.

Route and Section I-295 - 8B & 9A

Station, Ramp, or Street 356 + 40 S. B.

Municipality Lawrence Township County Mercer

Starting Time and Date of First Sample 17:00, 4/9/73 Starting Time and Date of Last Sample 16:00, 4/10/73

Mobile Survey _____ Stationary Survey X Rural X Suburban _____

Urban _____

AC Power X Source Tapped into fuse box of house on right-of-way, scheduled to be demolished.

Inverter _____ DC Power _____

Traffic counter location(s) N.A.

Road Description: P.C.C. _____ B.C._____ Other _____

N.A. X

Smooth _____ Normal _____ Rough _____ Bumps _____ Holes _____

No holes or bumps _____

Grade: Near lanes _____ Far lanes _____ Number of lanes: Near side _____

Far side _____

Center Barrier _____ Height _____ Median _____ No Median _____

Ramp _____ Overpass _____ Underpass _____ At grade _____

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) N.A.

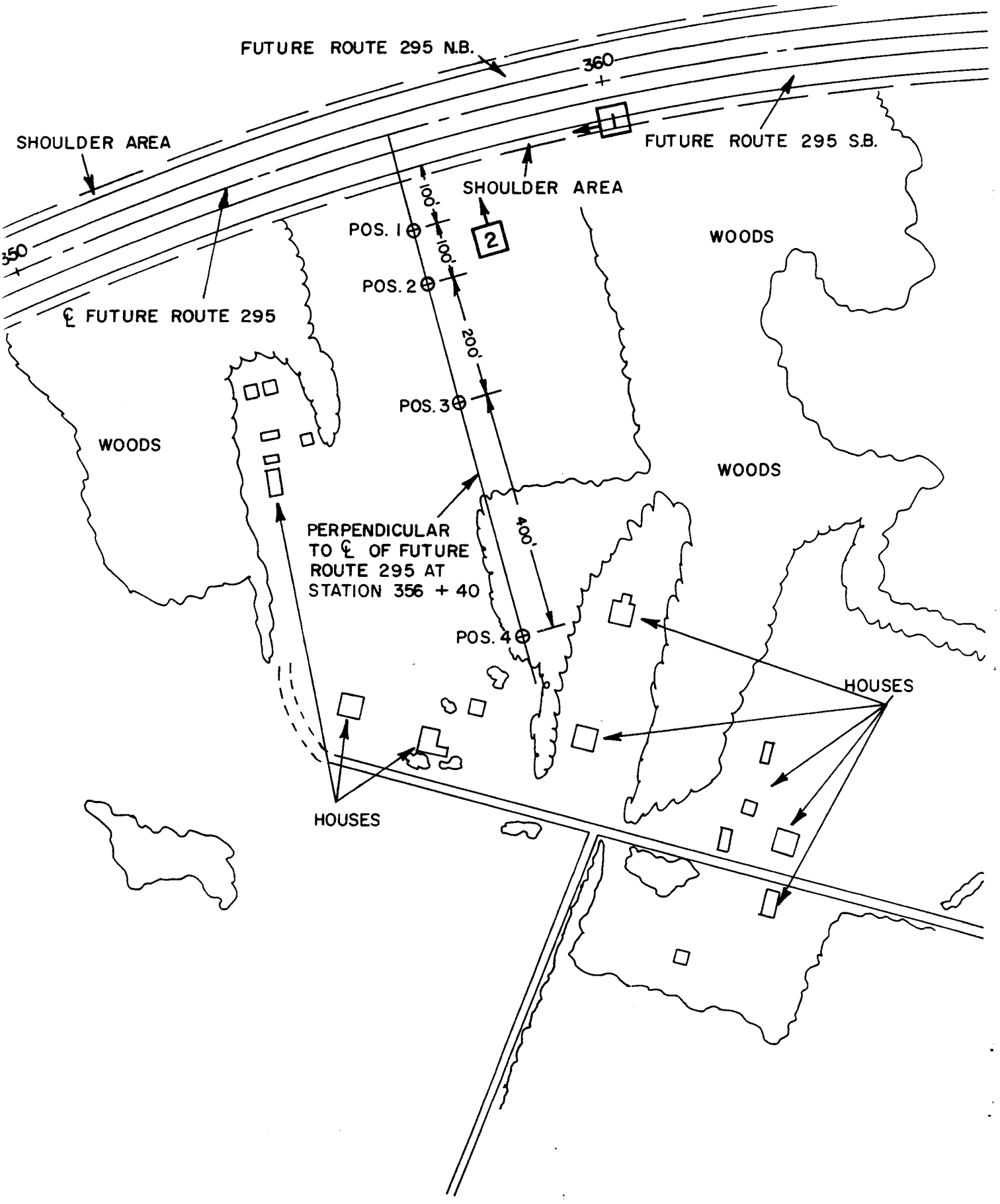
Route and Section I-295 - 8B & 9A

Station, Ramp, or Street 356 + 40 S. B.

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	Deleted - equipment trouble			
Pos. 2	4	N.A.	N.A.	N.A.
Pos. 3	Deleted - equipment trouble			
Pos. 4	"	"	"	
Pos. 5	N.A.			
Pos. 6	"			
Pos. 7	"			

Description of Terrain Flat with scattered deciduous trees to 15 foot height, and dead grass to 3 foot height at Positions 1, 2, and 3. Maximum sight distance 300 feet. Deciduous woods at Position 4. Sight distance 150 feet maximum. Traffic on Route 1 audible as ambient, with occasional trucks clearly distinguishable.



ROUTE 295 - 8B & 9A

RT. I-295 SECTION 8B & 9A

1

2

NOISE MEASUREMENT DATA

ROUTE I-295 SECTION 8B & 9A

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1700	55	04/09/73	46	39	36	53	4
1800	55	04/09/73	51	43	39	58	5
1900	55	04/09/73	47	43	41	54	3
2000	55	04/09/73	46	41	37	54	4
2100	55	04/09/73	46	43	41	55	3
2200	55	04/09/73	49	44	41	56	4
2300	50	04/09/73	50	44	41	58	4
0000	55	04/10/73	51	44	41	58	4
0100	12	04/10/73	54	44	41	64	5
0200	46	04/10/73	56	47	43	65	5
0300	41	04/10/73	51	47	43	62	4
0400	0	04/10/73	NO DATA - RAIN				
0500	0	04/10/73	NO DATA - RAIN				
0600	0	04/10/73	NO DATA - MICROPHONE MALFUNCTION				
0700	55	04/10/73	54	51	47	58	3
0800	55	04/10/73	54	51	47	58	3
0900	55	04/10/73	53	49	46	57	3
1000	55	04/10/73	53	49	46	59	3
1100	55	04/10/73	52	49	46	57	3
1200	55	04/10/73	53	49	46	57	3
1300	55	04/10/73	51	48	46	57	3
1400	0	04/10/73	NO DATA - RAIN				
1500	55	04/10/73	55	52	48	62	3
1600	55	04/10/73	55	52	48	61	3

ROUTE I-295 SECTION 8B & 9A - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1700	04/09/73	-	-	0	90	51	-
1800	04/09/73	-	-	0	80	47.5	-
1900	04/09/73	-	-	0	50	44.5	-
2000	04/09/73	-	-	0	70	44.5	-
2100	04/09/73	-	-	0	70	44	-
2200	04/09/73	-	-	0	44	44	-
2300	04/09/73	-	-	0	44	44	-
0000	04/10/73	-	-	0	44	45	-
0100	04/10/73	-	-	0	42	45	-
0200	04/10/73	-	-	-	-	-	-
0300	04/10/73	-	-	0	58	48.5	-
0400	04/10/73	-	-	0	90	53	-
0500	04/10/73	-	-	-	-	-	-
0600	04/10/73	-	-	10	225	48	-
0700	04/10/73	-	-	0	230	44.5	-
0800	04/10/73	-	-	0	216	58	-
0900	04/10/73	-	-	0	252	48	-
1000	04/10/73	-	-	0	251	50	-
1100	04/10/73	-	-	0	223	52	-
1200	04/10/73	-	-	0	250	52	-
1300	04/10/73	-	-	0	247	52	-
1400	04/10/73	-	-	-	198	49	-
1500	04/10/73	-	-	-	-	50	-
1600	04/10/73	-	-	-	-	50	-

Route and Section I-195 - 1B

Station, Ramp, or Street Spicer Street

Municipality Hamilton Township County Mercer

Starting Time and Date of First Sample 10:00, 5/10/73 Starting Time and Date of Last Sample 06:00, 5/11/73

Mobile Survey X Stationary Survey _____ Rural _____ Suburban _____

Urban X

AC Power _____ Source _____

Inverter _____ DC Power X

Traffic counter location(s) N.A.

Road Description: P.C.C. X B.C. _____ Other _____

N.A. _____

Smooth _____ Normal _____ Rough X Bumps X Holes X

No holes or bumps _____

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade _____

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) N.A.

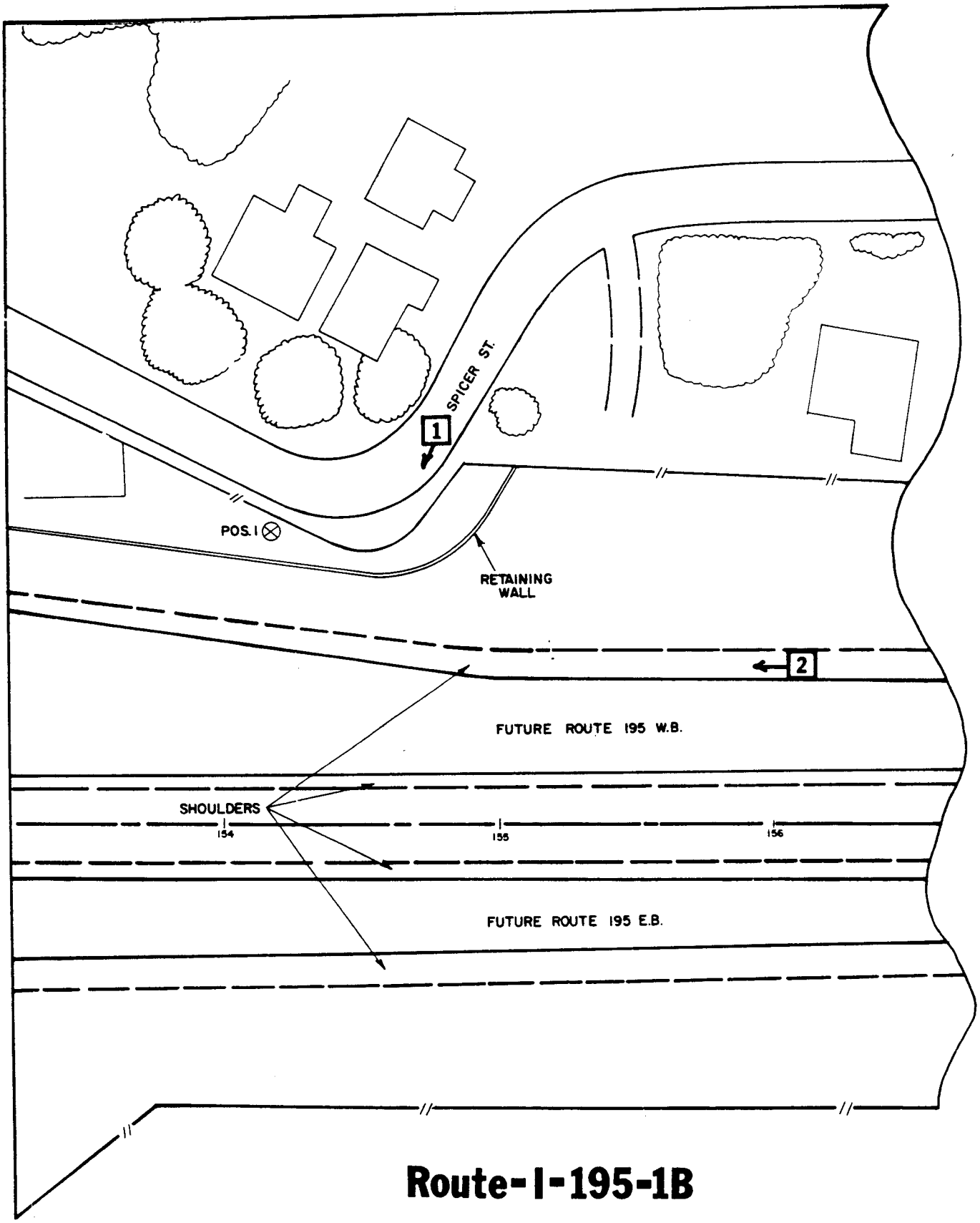
Route and Section I-195 - 1B

Station, Ramp, or Street Spicer Street

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	6	6	N/A	N/A
Pos. 2	N/A	N/A	N/A	N/A
Pos. 3	"	"	"	"
Pos. 4	"	"	"	"
Pos. 5	"	"	"	"
Pos. 6	"	"	"	"
Pos. 7	"	"	"	"

Description of Terrain Urban residential. Microphone position was about 30 feet above Route 195 roadways. Roadways in a cut but clearly visible from microphone position. Very light traffic on adjacent roads, except for intermittent heavy traffic on Route 524 (South Broad Street). This traffic was discernible as ambient, with occasional trucks clearly audible. Sight distance from microphone towards Route 195 and Route 524, 2000 feet maximum.



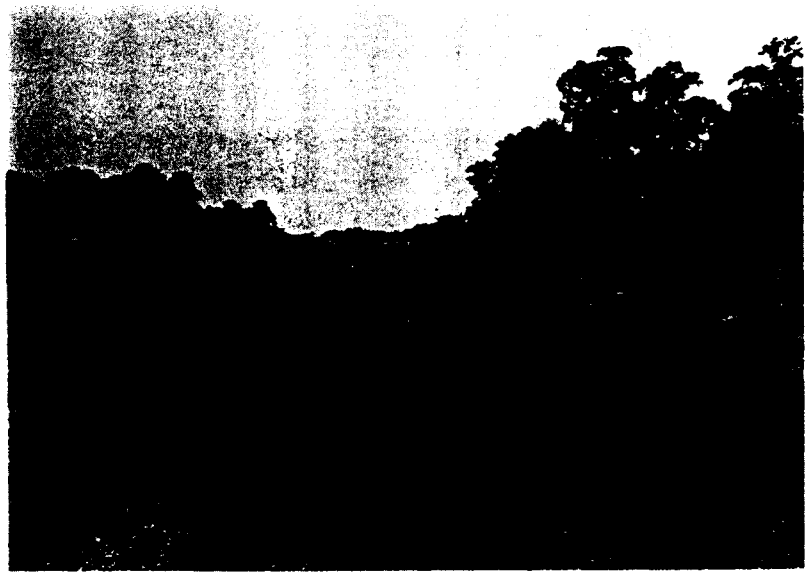
Route-I-195-1B

(Position 1)

Trenton, N.J.

RT. I-195 SECTION 1 B

1



2

NOISE MEASUREMENT DATA

ROUTE I-195 SECTION 1B

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1800	30	05/10/73	55	52	50	59	2
2000	30	05/10/73	56	53	50	62	3
2100	0	05/10/73	NO DATA - MICROPHONE MALFUNCTION				
2300	25	05/10/73	52	48	46	55	2
0100	30	05/11/73	50	48	46	51	1
0300	30	05/11/73	50	48	45	54	2
0500	30	05/11/73	52	48	45	59	3
0700	8	05/11/73	68	64	52	80	6

Route and Section I-195 - 1B

Station, Ramp, or Street Walnut Street

Municipality Hamilton Township County Mercer

Starting Time and Date of First Sample 18:00, 5/10/73 Starting Time and Date of Last Sample 07:00, 5/11/73

Mobile Survey X Stationary Survey _____ Rural _____ Suburban _____

Urban X

AC Power _____ Source _____

Inverter _____ DC Power X

Traffic counter location(s) N.A.

Road Description: P.C.C. X B.C._____ Other _____

N.A._____

Smooth _____ Normal _____ Rough X Bumps X Holes X

No holes or bumps _____

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade _____

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) N.A.

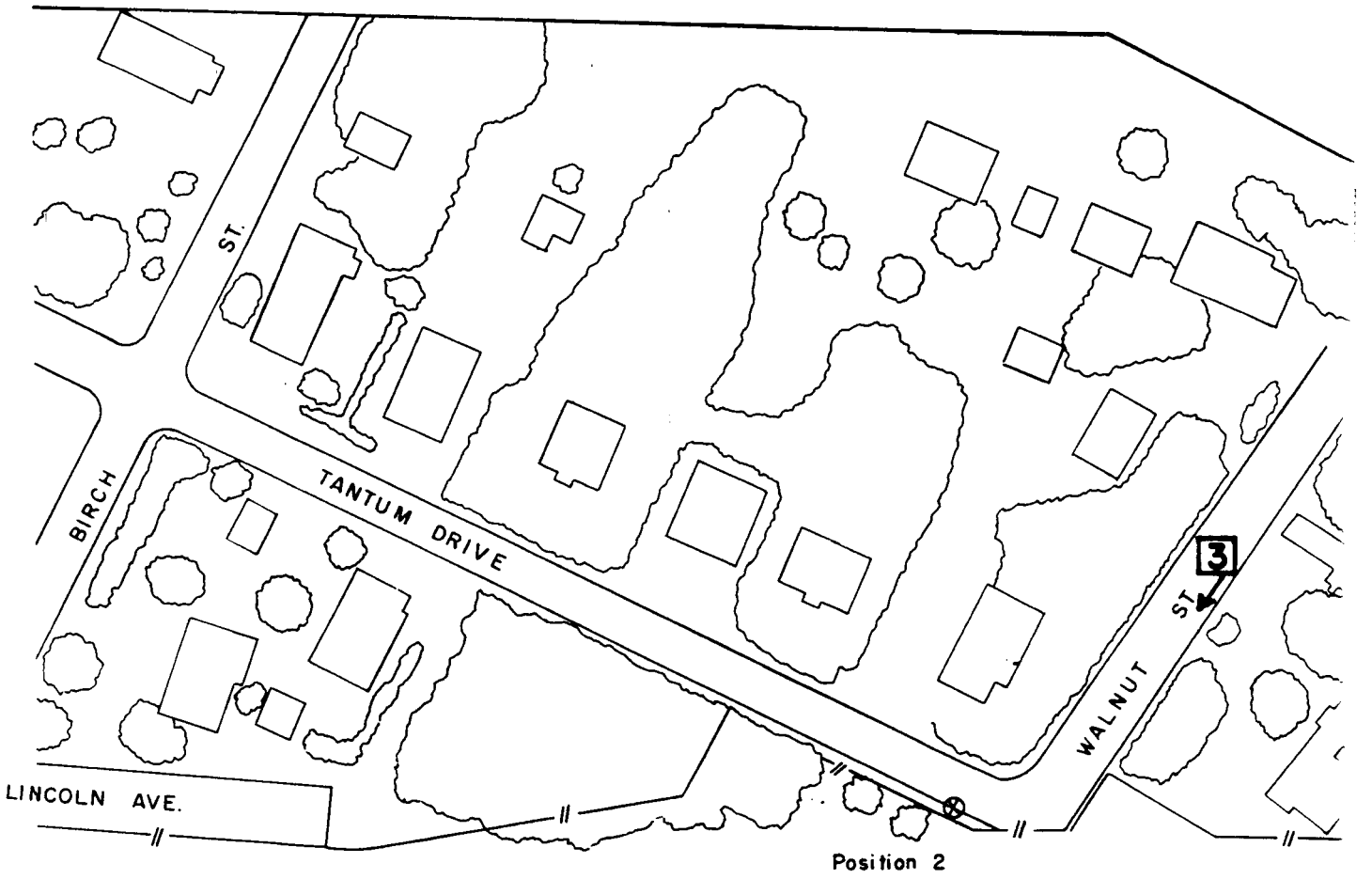
Route and Section I-195 - 1B

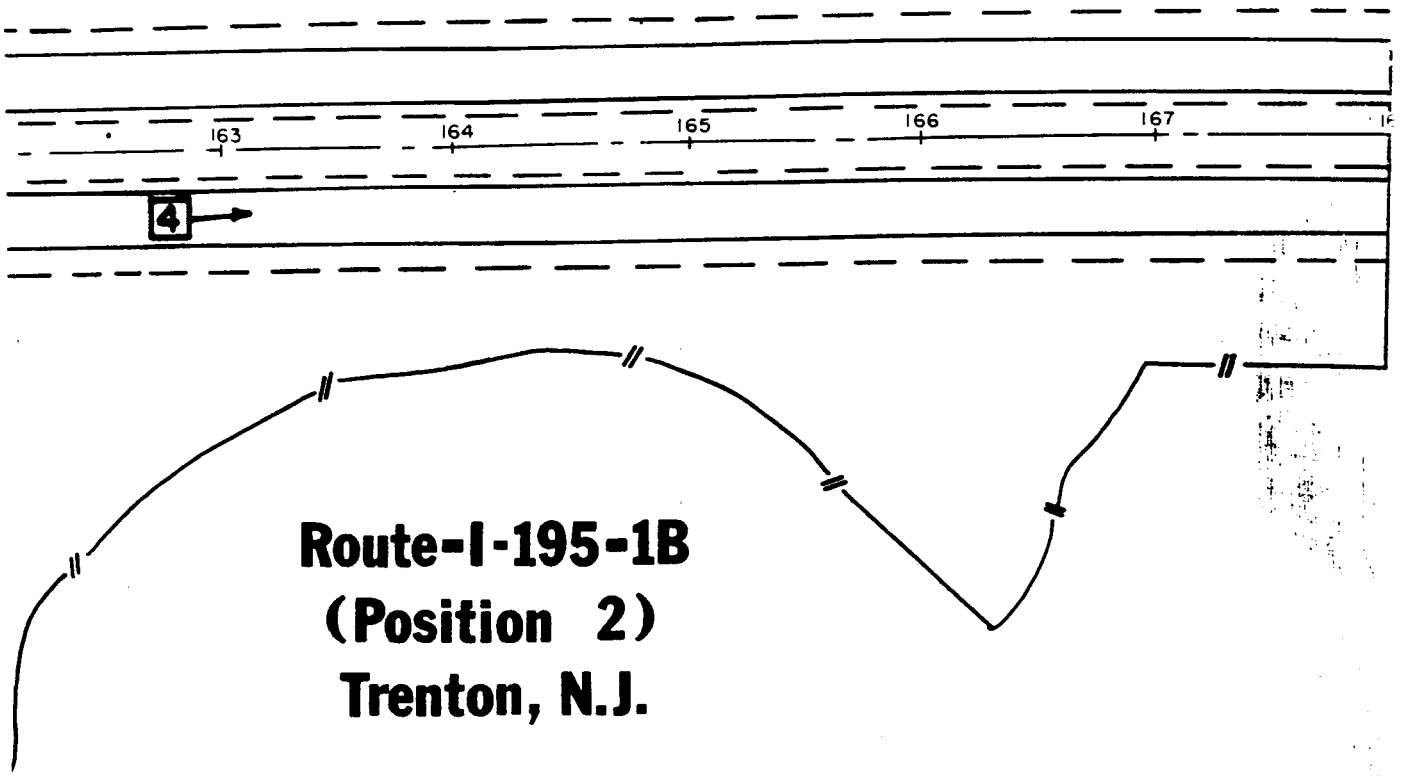
Station, Ramp, or Street Walnut Street

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	N/A	N/A	N/A	N/A
Pos. 2	6	6	N/A	N/A
Pos. 3	N/A	N/A	"	"
Pos. 4	"	"	"	"
Pos. 5	"	"	"	"
Pos. 6	"	"	"	"
Pos. 7	"	"	"	"

Description of Terrain Urban residential. Microphone position was about 30 feet above Route 195 roadways. Roadways in a cut but clearly visible from microphone position. Very light traffic on adjacent roads, except for intermittent heavy traffic on Route 524 (South Broad Street). This traffic was discernible as ambient, with occasional trucks clearly audible. Sight distance from microphone towards Route 195 and Route 524, 2000 feet, maximum.





Route-I-195-1B
(Position 2)
Trenton, N.J.

RT. I-195 SECTION 1 B

3

4

NOISE MEASUREMENT DATA

ROUTE I-195 SECTION 1B

MICROPHONE POSITION 2

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1000	11	05/10/73	52	44	41	59	4
1100	5	05/10/73	60	56	51	63	4
1200	26	05/10/73	52	46	42	62	5
1300	0	05/10/73	NO DATA - NONREPRESENTATIVE NOISE				
1400	0	05/10/73	NO DATA - NONREPRESENTATIVE NOISE				
1500	0	05/10/73	NO DATA - NONREPRESENTATIVE NOISE				
1600	24	05/10/73	46	40	36	53	4
1700	30	05/10/73	56	50	46	64	4
1900	29	05/10/73	54	49	46	61	3
2200	30	05/10/73	50	48	46	55	2
0000	30	05/11/73	50	48	46	51	1
0200	30	05/11/73	50	48	46	51	1
0400	30	05/11/73	48	44	41	53	3
0600	30	05/11/73	52	48	46	57	3

ROUTE I-195 SECTION 1B - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1000	05/10/73	-	-	0-2	-	-	-
1100	05/10/73	-	-	-	-	-	-
1200	05/10/73	-	-	-	-	-	-
1300	05/10/73	-	-	-	-	-	-
1400	05/10/73	-	-	-	-	-	-
1500	05/10/73	-	-	-	-	-	-
1600	05/10/73	-	-	-	-	-	-
1700	05/10/73	-	-	-	-	-	-
1800	05/10/73	-	-	-	-	-	-
1900	05/10/73	-	-	-	-	-	-
2000	05/10/73	-	-	-	-	-	-
2100	05/10/73	-	-	-	-	-	-
2200	05/10/73	-	-	5-10	-	-	-
2300	05/10/73	-	-	0-5	-	-	-
0000	05/10/73	-	-	0-5	-	-	-
0100	05/10/73	-	-	0	-	-	-
0200	05/10/73	-	-	0-2	-	-	-
0300	05/10/73	-	-	0	-	-	-
0400	05/10/73	-	-	0	-	50-55	-
0500	05/10/73	-	-	0	-	50-55	-
0600	05/10/73	-	-	0	-	50-55	-
0700	05/10/73	-	-	0	-	62	-

Route and Section I-295 - 7C

Station, Ramp, or Street 665 + 37 S. B.

Municipality Hamilton Township County Mercer

Starting Time and Date of First Sample 15:00, 5/17/73 Starting Time and Date of Last Sample 14:00, 5/18/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban _____

Urban X

AC Power _____ Source _____

Inverter _____ DC Power X

Traffic counter location(s) None used

Road Description: P.C.C. _____ B.C. X Other Applies to both streets.

N.A. _____

Smooth _____ Normal X Rough _____ Bumps X Holes X

No holes or bumps _____

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other Hunter St. above microphone and Exton Avenue below.

Location(s) and type(s) of nearest flow interrupting device(s) _____

Stop signs at Hunter Avenue and Exton Avenue, and Exton and Beech Avenue.

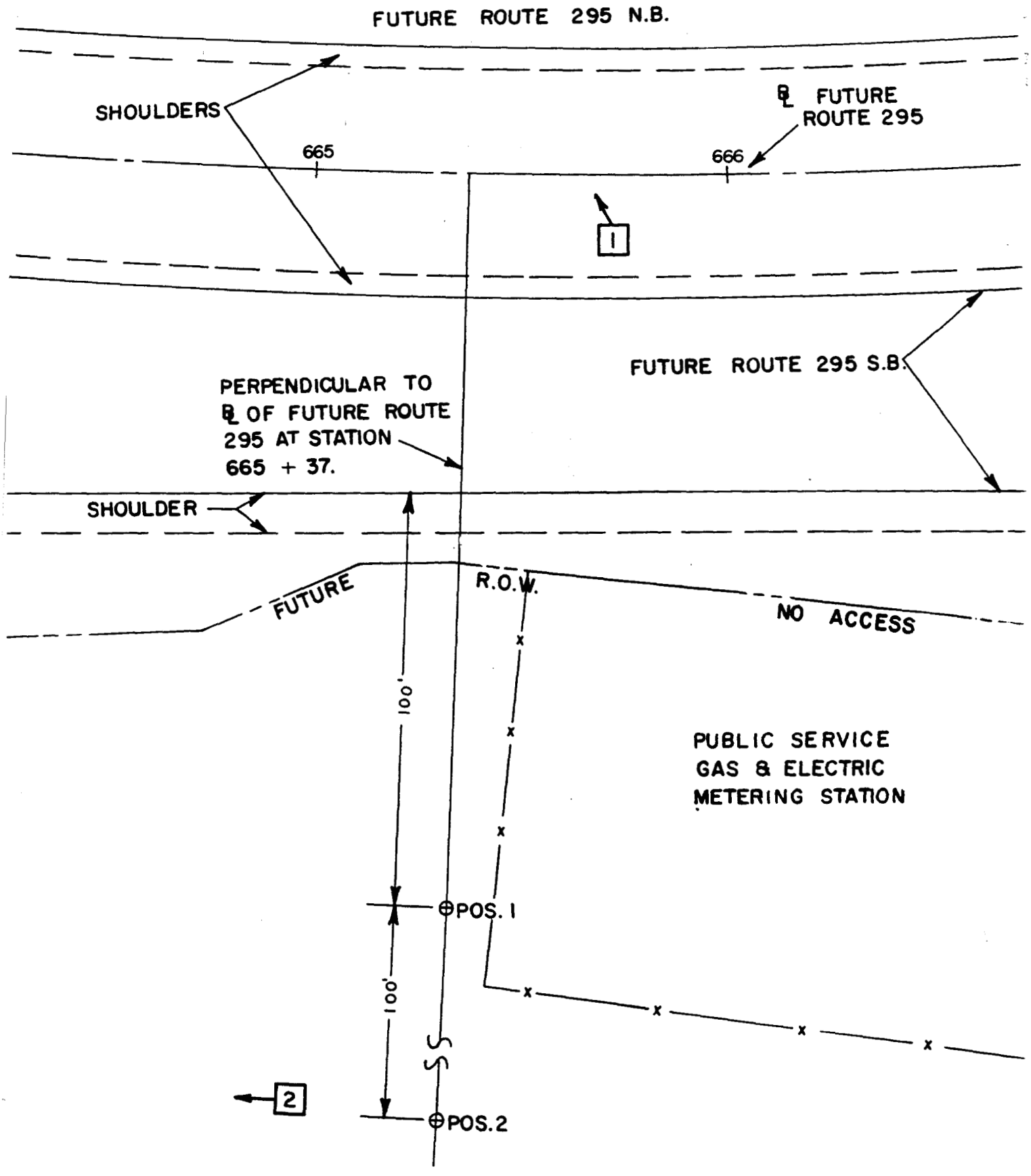
Route and Section I-295-7C

Station, Ramp, or Street 665 + 37 S. B.

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	8	400	425
Pos. 2	4	-6	400	450
Pos. 3	N/A			
Pos. 4	N/A			
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

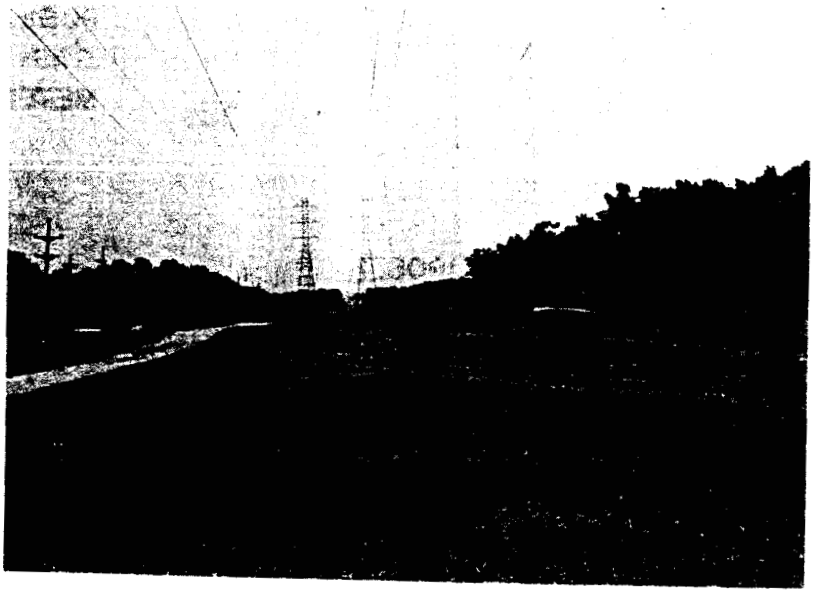
Description of Terrain Slight upgrade from Exton Avenue. About 10 ft. lower than Hunter Avenue. Open field with short grass to Exton Avenue and for 135 ft. towards Hunter Avenue. Ten ft. embankment upwards at this point and then flat, covered with short grass and scattered deciduous trees and brush for next 200 ft. to Hunter Avenue. Public Service Gas and Electric metering station adjacent to site. Machinery and equipment clearly audible throughout survey.


FUTURE ROUTE 295 N.B.
SHOULDERS
℄ FUTURE ROUTE 295
665
666
1
FUTURE ROUTE 295 S.B.
PERPENDICULAR TO ℄ OF FUTURE ROUTE 295 AT STATION 665 + 37.
SHOULDER
FUTURE
R.O.W.
NO ACCESS
100'
PUBLIC SERVICE GAS & ELECTRIC METERING STATION
POS. 1
100'
2
POS. 2

ROUTE 295-7C

RT. I-295 SECTION 7C

1



2

NOISE MEASUREMENT DATA

ROUTE I-295 SECTION 7C

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	30	05/17/73	55	52	49	62	3
1600	30	05/17/73	56	53	50	60	3
1700	30	05/17/73	59	55	51	63	3
1800	30	05/17/73	55	53	51	58	2
1900	30	05/17/73	55	51	47	61	3
2000	0	05/17/73	NO DATA - RAIN				
2100	0	05/17/73	NO DATA - RAIN				
2200	0	05/17/73	NO DATA - RAIN				
2300	7	05/17/73	53	49	46	57	3
0000	0	05/18/73	NO DATA - RAIN				
0100	30	05/18/73	52	48	45	57	3
0200	30	05/18/73	51	48	46	57	3
0300	30	05/18/73	53	49	46	56	2
0400	30	05/18/73	54	51	47	59	3
0500	30	05/18/73	55	52	50	59	2
0600	30	05/18/73	58	54	51	62	3
0700	30	05/18/73	61	58	56	65	2
0800	30	05/18/73	60	58	56	61	1
0900	30	05/18/73	59	55	51	63	3
1000	30	05/18/73	59	56	52	63	3
1100	30	05/18/73	62	58	56	66	2
1200	30	05/18/73	62	58	56	67	3
1300	30	05/18/73	63	59	56	68	3
1400	30	05/18/73	61	58	56	65	2

NOISE MEASUREMENT DATA

ROUTE I-295 SECTION 7C

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	30	05/17/73	52	49	46	58	3
1600	30	05/17/73	53	49	46	56	3
1700	30	05/17/73	54	52	50	57	2
1800	0	05/17/73	NO DATA - MICROPHONE MALFUNCTION				
1900	0	05/17/73	NO DATA - MICROPHONE MALFUNCTION				
2000	0	05/17/73	NO DATA - RAIN				
2100	0	05/17/73	NO DATA - RAIN				
2200	0	05/17/73	NO DATA - RAIN				
2300	7	05/17/73	64	59	56	68	3
0000	0	05/18/73	NO DATA - RAIN				
0100	30	05/18/73	54	50	46	60	3
0200	30	05/18/73	63	57	52	72	5
0300	20	05/18/73	53	49	46	58	3
0400	30	05/18/73	54	50	47	59	3
0500	0	05/18/73	NO DATA - EQUIPMENT PROBLEM				
0600	0	05/18/73	NO DATA - MICROPHONE MALFUNCTION				
0700	0	05/18/73	NO DATA - MICROPHONE MALFUNCTION				
0800	30	05/18/73	60	58	55	64	2
0900	30	05/18/73	59	55	51	64	3
1000	30	05/18/73	59	55	51	63	3
1100	0	05/18/73	NO DATA - OPERATOR ERROR				
1200	0	05/18/73	NO DATA - OPERATOR ERROR				
1300	30	05/18/73	69	67	64	75	3
1400	30	05/18/73	69	67	65	73	2

Route and Section 440-1D & 3A

Station, Ramp, or Street Brace Avenue

Municipality Perth Amboy County Middlesex

Starting Time and Date of First Sample 12:00, 5/22/73 Starting Time and Date of Last Sample 08:00, 5/23/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban _____

Urban X

AC Power X Source Outlet in basement of church

Inverter _____ DC Power _____

Traffic counter location(s) None used

Road Description: P.C.C. _____ B.C. X Other _____

N.A. _____

Smooth _____ Normal X Rough _____ Bumps _____ Holes _____

No holes or bumps X

Grade: Near lanes -2% Far lanes +2% Number of lanes: Near side 1

Far side 1

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

Stop signs at Brace Avenue and Hazel Avenue, and Brace Avenue and Carlock Avenue.

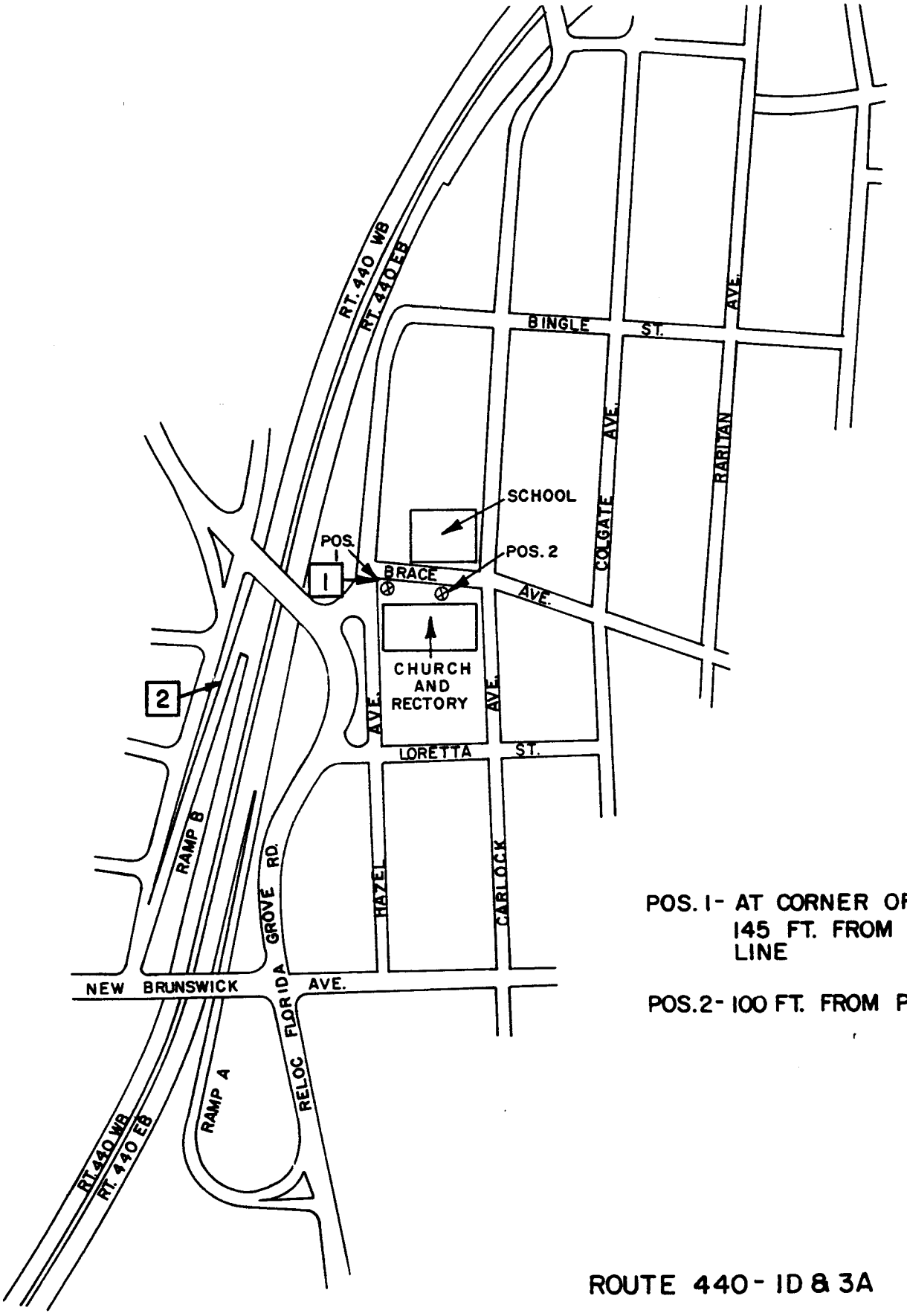
Route and Section 440-1D & 3A

Station, Ramp, or Street Brace Avenue

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	5	12	45
Pos. 2	4	5	12	50
Pos. 3	N/A			
Pos. 4	N/A			
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

Description of Terrain Urban residential with church and school. Microphones placed on lawn adjacent to church. Sight distance towards Rt. 440 about 400 ft. Roadways are in a cut approximately 25 ft. deep and are not visible from either microphone position.



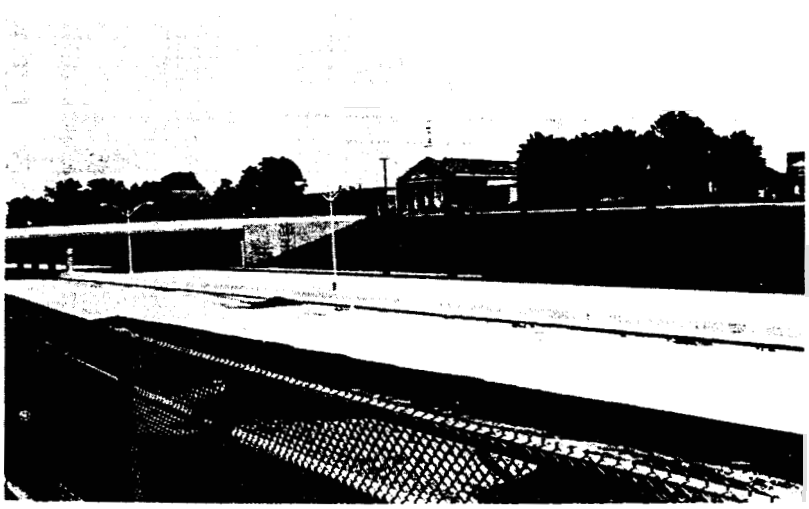
POS. 1- AT CORNER OF LAWN, 145 FT. FROM R.O.W. LINE

POS. 2- 100 FT. FROM POS. 1

ROUTE 440- ID & 3A

RT. 440 SECTION 1D & 3A

1



2

NOISE MEASUREMENT DATA

ROUTE 440 SECTION 1D & 3A

MICROPHONE POSITION 1

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1200	25	05/22/73	68	64	61	75	3
1300	0	05/22/73	NO DATA - NONREPRESENTATIVE NOISE				
1400	30	05/22/73	65	60	56	73	4
1500	25	05/22/73	67	62	57	75	4
1600	0	05/22/73	NO DATA - EQUIPMENT PROBLEM				
1700	25	05/22/73	67	60	56	75	5
1800	25	05/22/73	65	60	55	72	4
1900	25	05/22/73	64	59	55	71	4
2000	25	05/22/73	62	55	51	71	4
2100	25	05/22/73	62	55	48	74	6
2200	25	05/22/73	66	59	53	75	5
2300	25	05/22/73	62	53	49	74	5
0000	25	05/23/73	60	51	47	71	5
0100	25	05/23/73	54	49	46	64	4
0200	25	05/23/73	52	48	46	62	4
0300	25	05/23/73	50	48	46	60	3
0400	25	05/23/73	50	48	45	57	3
0500	25	05/23/73	50	48	45	57	3
0600	25	05/23/73	60	51	47	70	5
0700	25	05/23/73	58	52	47	68	5
0800	25	05/23/73	62	56	51	71	5
0900	0	05/23/73	NO DATA - RAIN				
1000	0	05/23/73	NO DATA - RAIN				
1100	0	05/23/73	NO DATA - RAIN				

NOISE MEASUREMENT DATA

ROUTE 440 SECTION 1D & 3A

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1200	25	05/22/73	73	68	63	81	4
1300	30	05/22/73	62	56	51	77	5
1400	30	05/22/73	62	56	52	73	4
1500	25	05/22/73	62	57	52	70	4
1700	25	05/22/73	64	57	52	72	5
1800	25	05/22/73	63	57	52	71	4
1900	25	05/22/73	62	57	52	71	4
2000	25	05/22/73	61	54	51	69	4
2100	25	05/22/73	62	53	48	72	5
2200	25	05/22/73	64	57	52	74	5
2300	25	05/22/73	61	51	47	75	6
0000	25	05/23/73	59	49	46	69	5
0100	25	05/23/73	52	48	46	62	4
0200	25	05/23/73	51	48	46	61	3
0300	25	05/23/73	50	48	45	60	3
0400	25	05/23/73	50	47	43	56	3
0500	25	05/23/73	50	47	44	56	3
0600	25	05/23/73	54	43	41	63	5
0700	25	05/23/73	60	52	47	69	5
0800	25	05/23/73	66	60	55	75	5
0900	0	05/23/73	NO DATA - RAIN				
1000	0	05/23/73	NO DATA - RAIN				
1100	0	05/23/73	NO DATA - RAIN				

Route and Section I-95, Skillman

Station, Ramp, or Street 314 + 00 N. B.

Municipality Montgomery Township County Somerset

Starting Time and Date of First Sample 15:00, 6/6/73 Starting Time and Date of Last Sample 14:00, 6/7/73

Mobile Survey _____ Stationary Survey X Rural X Suburban _____

Urban _____

AC Power X Source Cottage on school grounds opposite survey site.

Inverter _____ DC Power _____

Traffic counter location(s) None used

Road Description: P.C.C. _____ B.C._____ Other _____

N.A. X

Smooth _____ Normal _____ Rough _____ Bumps _____ Holes _____

No holes or bumps _____

Grade: Near lanes _____ Far lanes _____ Number of lanes: Near side _____

Far side _____

Center Barrier _____ Height _____ Median _____ No Median _____

Ramp _____ Overpass _____ Underpass _____ At grade _____

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) _____

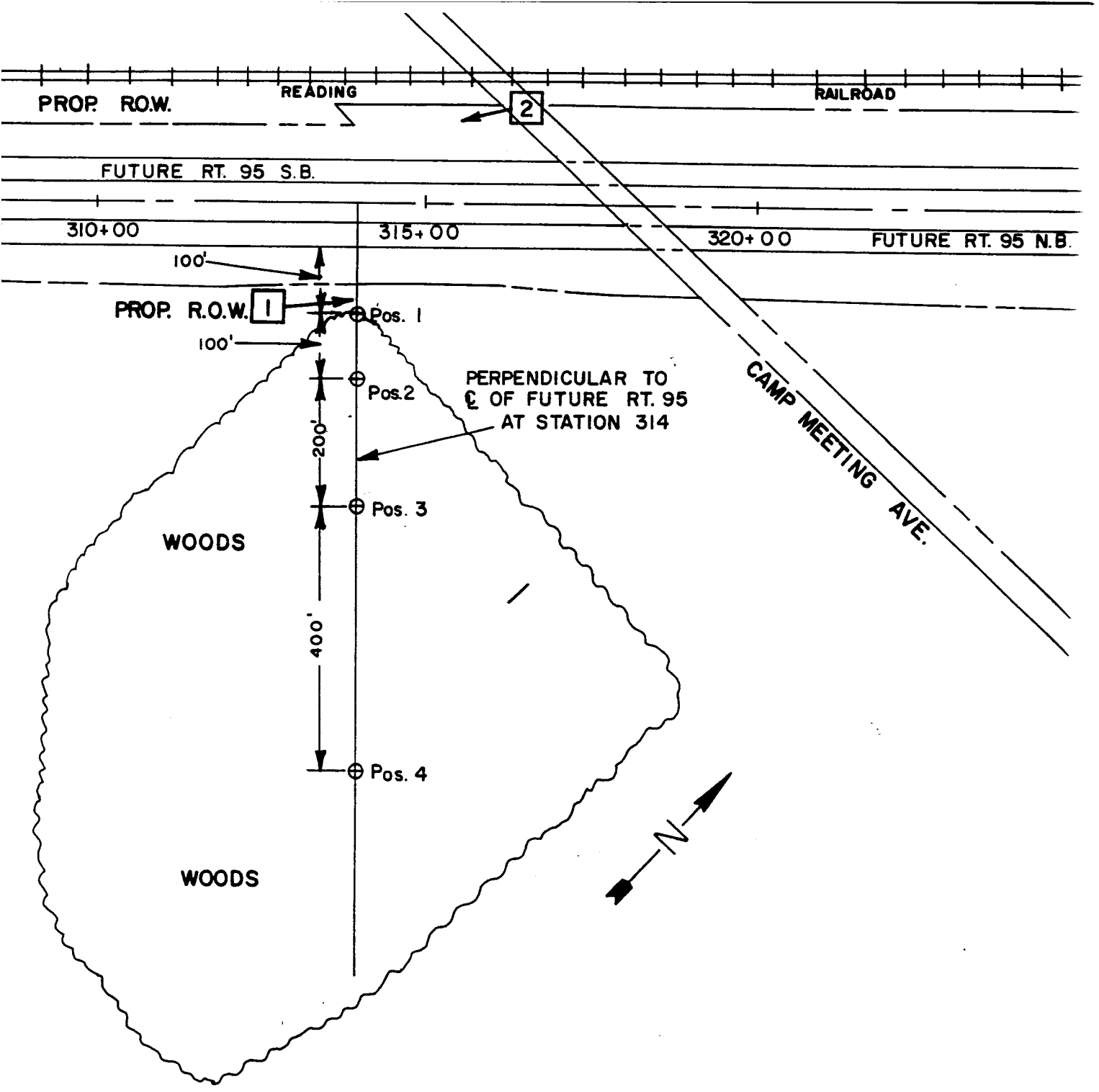
Route and Section I-95, Skillman

Station, Ramp, or Street 314 + 00 N. B.

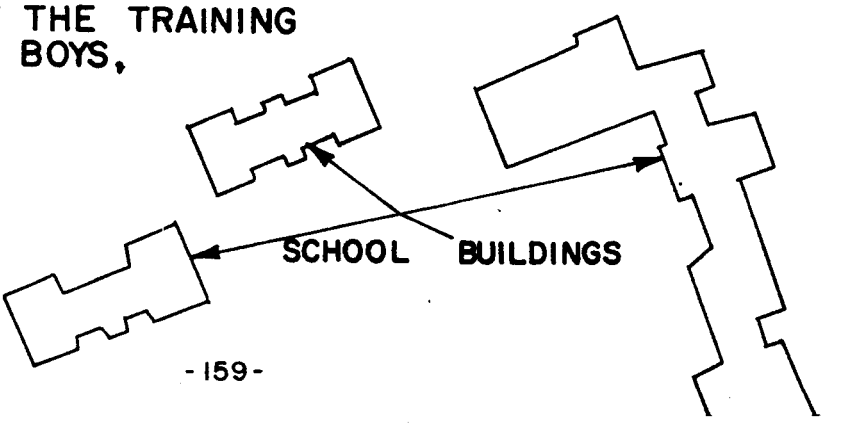
Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	Deleted due to equipment difficulties			
Pos. 2	Deleted due to equipment difficulties			
Pos. 3	Deleted due to equipment difficulties			
Pos. 4	4	N/A	N/A	N/A
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

Description of Terrain Flat, uncultivated farmland with 3 foot high grass and weeds to Position 1. Maximum sight distance 300 feet. Thick deciduous woods to 50 feet high from Position 2 through Position 4. Maximum sight distance about 100 feet. Almost no traffic on nearby roads. At least three freight trains per day, clearly audible.



ROUTE 95 AT THE TRAINING SCHOOL FOR BOYS, SKILLMAN



A-834

NOISE MEASUREMENT DATA

ROUTE I-95 (SKILLMAN)

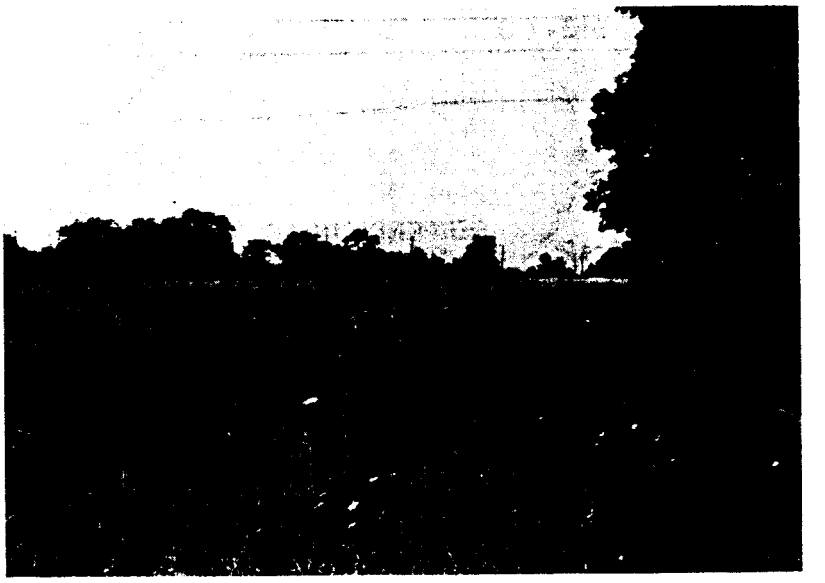
MICROPHONE POSITION 4

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1500	40	06/06/73	48	44	41	53	3
1600	50	06/06/73	53	48	43	60	4
1700	50	06/06/73	49	44	41	58	4
1800	50	06/06/73	59	46	39	74	8
1900	50	06/06/73	52	45	38	64	6
2000	50	06/06/73	56	49	44	66	5
2100	0	06/06/73	NO DATA - MICROPHONE MALFUNCTION				
2200	50	06/06/73	57	49	46	71	5
2300	50	06/06/73	46	40	36	63	5
0000	50	06/07/73	41	36	27	65	7
0100	50	06/07/73	39	35	31	44	3
0200	50	06/07/73	36	33	31	44	3
0300	50	06/07/73	38	34	31	53	4
0400	50	06/07/73	40	37	34	46	3
0500	50	06/07/73	41	37	33	53	4
0600	50	06/07/73	50	38	35	72	8
0700	50	06/07/73	43	39	36	58	4
0800	50	06/07/73	46	42	33	56	4
0900	50	06/07/73	46	42	38	64	5
1000	50	06/07/73	47	43	40	58	4
1100	0	06/07/73	NO DATA - OPERATOR ERROR				
1200	50	06/07/73	46	41	37	64	6
1300	50	06/07/73	45	41	37	58	4
1400	50	06/07/73	45	42	38	53	3

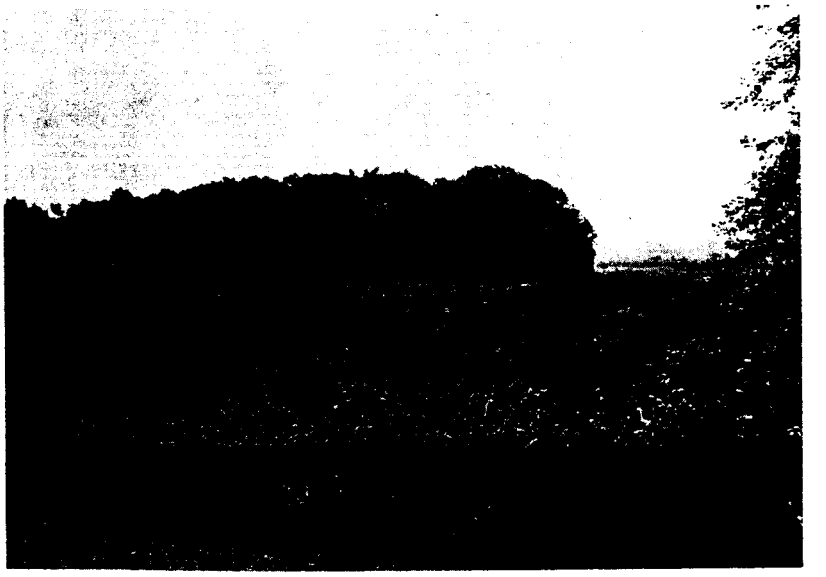
ROUTE I-95 & SKILLMAN - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1500	06/06/73	-	-	0	235	86	-
1600	06/06/73	-	-	0	240	85	-
1700	06/06/73	-	-	0	192	81	-
1800	06/06/73	-	-	0	230	77	-
1900	06/06/73	-	-	0	210	77	
2000	06/06/73	-	-	0	230	75	-
2100	06/06/73	-	-	0	240	72.5	-
2200	06/06/73	-	-	0	190	71	-
2300	06/06/73	-	-	0	220	69	-
0000	06/07/73	-	-	0	35	68	-
0100	06/07/73	-	-	0	143	67.5	-
0200	06/07/73	-	-	0	135	67	
0300	06/07/73	-	-	0	150	65	-
0400	06/07/73	-	-	0	93	65	-
0500	06/07/73	-	-	0	46	66	-
0600	06/07/73	-	-	0	60	67	-
0700	06/07/73	-	-	0	61	68	-
0800	06/07/73	-	-	0	126	70	-
0900	06/07/73	-	-	0	99	75	-
1000	06/07/73	-	-	0	19	75	-
1100	06/07/73	-	-	0	246	77	-
1200	06/07/73	-	-	0	193	79	-
1300	06/07/73	-	-	0	163	80	-
1400	06/07/73	-	-	0	239	92	-

RT. I-95, SKILLMAN



1



2

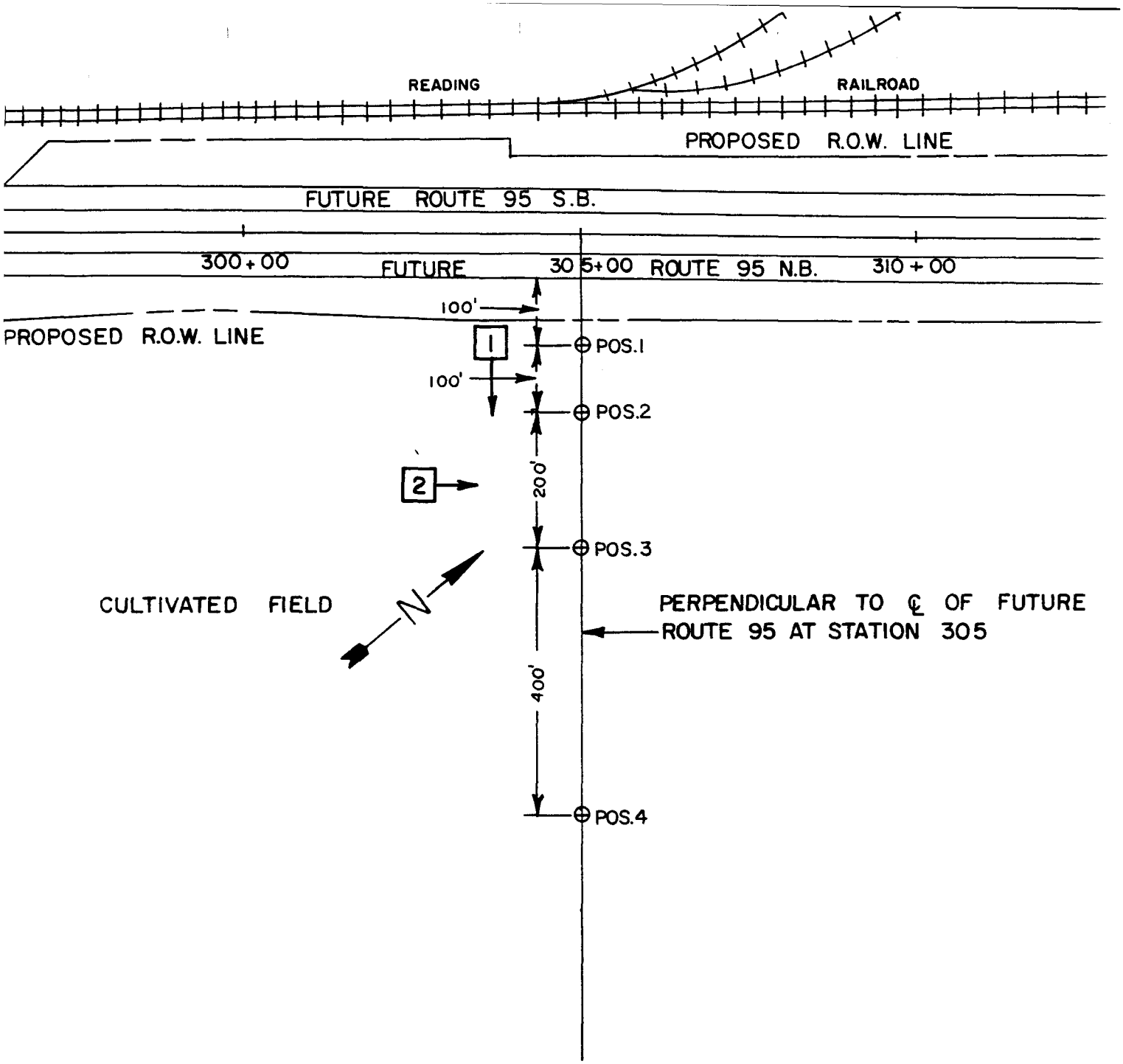
Route and Section I-95, N.P.I.

Station, Ramp, or Street 305 + 00 N.B.

Microphone Locations:

	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	Deleted because of equipment trouble			
Pos. 2	Deleted because of equipment trouble			
Pos. 3	Deleted because of equipment trouble			
Pos. 4	4	N/A	N/A	N/A
Pos. 5	N/A			
Pos. 6	N/A			
Pos. 7	N/A			

Description of Terrain Flat, uncultivated farmland with grass and weeds to 3 foot height. Sight distance 2000 feet minimum. Almost no traffic on nearby roads. At least three freight trains per day, clearly audible.



ROUTE 95 AT THE NEW JERSEY
NEURO-PSYCHIATRIC INSTITUTE, SKILLMAN

A-832

RT. 95, N.P.I

1

2

NOISE MEASUREMENT DATA

ROUTE I-95 (NPI)

MICROPHONE POSITION 4

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1200	50	06/11/73	39	36	33	55	4
1300	40	06/11/73	40	36	32	57	5
1400	50	06/11/73	45	36	33	54	5
1500	50	06/11/73	45	37	34	62	5
1600	50	06/11/73	39	36	34	47	3
1700	50	06/11/73	38	35	33	49	4
1800	50	06/11/73	43	37	34	53	4
1900	50	06/11/73	42	37	34	52	4
2000	50	06/11/73	41	37	34	52	4
2100	39	06/11/73	46	42	38	54	4
2200	0	06/11/73	NO DATA - EQUIPMENT PROBLEM				
2300	0	06/11/73	NO DATA - EQUIPMENT PROBLEM				
0000	50	06/12/73	49	46	42	55	3
0100	50	06/12/73	50	47	44	55	3
0200	27	06/12/73	44	40	36	49	3
0300	50	06/12/73	46	40	36	61	5
0400	50	06/12/73	44	39	36	63	5
0500	50	06/12/73	42	38	36	61	4
0600	50	06/12/73	49	40	36	59	5
0700	50	06/12/73	47	42	38	55	4
0800	50	06/12/73	52	44	41	65	5
0900	50	06/12/73	49	43	38	53	4
1000	50	06/12/73	50	44	38	61	5
1100	50	06/12/73	49	43	38	61	5

ROUTE I-95 (NPI) - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1200	06/1173	-	-	0	270	88	-
1300	06/11/73	-	-	2	250	90	-
1400	06/11/73	-	-	0	228	93	-
1500	06/11/73	-	-	0	228	92	-
1600	06/11/73	-	-	2	248	91	-
1700	06/11/73	-	-	0	242	89	-
1800	06/11/73	-	-	0	236	87	-
1900	06/11/73	-	-	0	230	84	-
2000	06/11/73	-	-	0	225	80	-
2100	06/11/73	-	-	0	225	76	-
2200	06/11/73	-	-	-	-	-	--
2300	06/11/73	-	-	0	225	-	-
0000	06/12/73	-	-	0	225	69	-
0100	06/12/73	-	-	0	225	68	-
0200	06/12/73	-	-	0	220	72	-
0300	06/12/73	-	-	0	220	70	-
0400	06/12/73	-	-	0	220	69	-
0500	06/12/73	-	-	0	220	68	-
0600	06/12/73	-	-	0	220	69	-
0700	06/12/73	-	-	0	220	74	-
0800	06/12/73	-	-	0	216	77	-
0900	06/12/73	-	-	0	220	80	-
1000	06/12/73	-	-	0	218	85	-
1100	06/12/73	-	-	0	196	88	-

Route and Section 440F-2J

Station, Ramp, or Street 326 + 00 N.B.

Municipality Bayonne County Hudson

Starting Time and Date of First Sample 16:00, 7/18/73 Starting Time and Date of Last Sample 15:00, 7/20/73

Mobile Survey _____ Stationary Survey X Rural _____ Suburban _____

Urban X

AC Power X Source Fuse box in boiler room next to pond.

Inverter _____ DC Power _____

Traffic counter location(s) None used-nearest street was Kennedy Blvd. about 1500 ft. west of Position 4.

Road Description: P.C.C. _____ B.C. X Other _____

N.A. _____

Smooth _____ Normal X Rough _____ Bumps _____ Holes _____

No holes or bumps X

Grade: Near lanes 0 Far lanes 0 Number of lanes: Near side 2

Far side 2

Center Barrier _____ Height _____ Median _____ No Median X

Ramp _____ Overpass _____ Underpass _____ At grade X

Other _____

Location(s) and type(s) of nearest flow interrupting device(s) N.A.

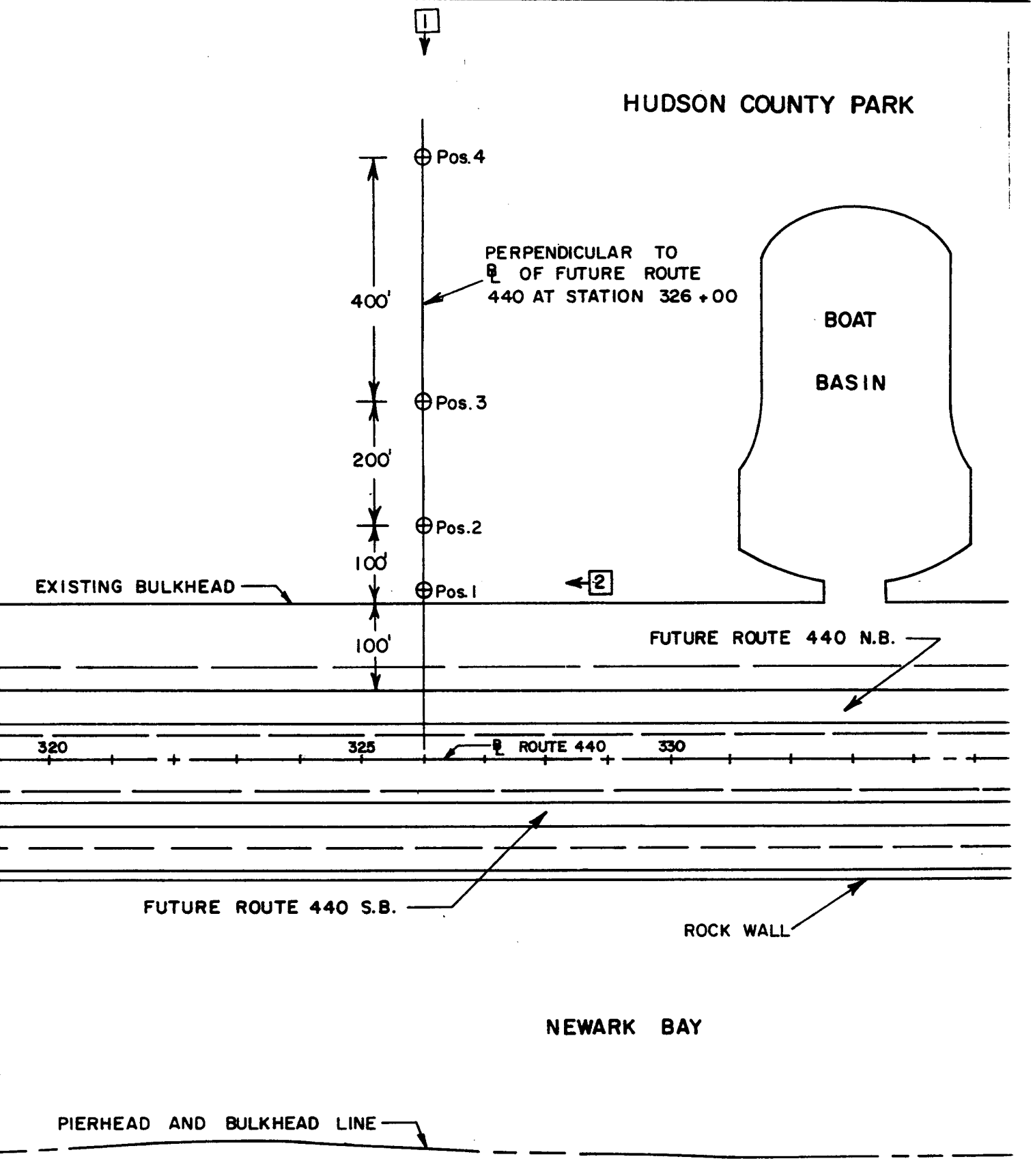
Route and Section 440F-2J

Station, Ramp, or Street 326 + 00 N.B.

Microphone Locations:

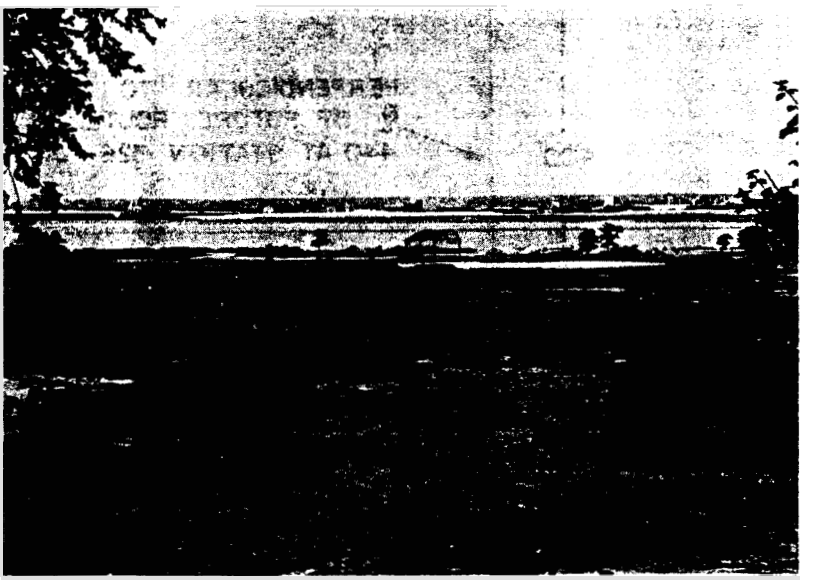
	Height of microphone - in feet	Height of microphone above grade - in feet	Distance to near lane - in feet	Distance to flow interruption device - in feet
Pos. 1	4	N.A.	N.A.	N.A.
Pos. 2	4	N.A.	N.A.	N.A.
Pos. 3	4	N.A.	N.A.	N.A.
Pos. 4	4	N.A.	N.A.	N.A.
Pos. 5	N.A.	N.A.	N.A.	N.A.
Pos. 6	N.A.	N.A.	N.A.	N.A.
Pos. 7	N.A.	N.A.	N.A.	N.A.

Description of Terrain Hudson Co. Park-48th St. Bayonne. Flat, with mowed grass. Very widely scattered trees. Sight distance over 3000 ft. in all directions except east towards Kennedy Blvd. Sight distance to east about 100 ft. to edge of embankment east of Pos. #4. Abrupt increase of about 12 ft. with trees brush and other vegetation along top of embankment. Kennedy Blvd. not visible and traffic not audible. Planes at Newark Airport and ships in Newark Airport and ships in Newark Bay clearly audible. Traffic on New Jersey Turnpike Extension audible as ambient.


1
HUDSON COUNTY PARK
Pos. 4
PERPENDICULAR TO
℄ OF FUTURE ROUTE
440 AT STATION 326 + 00
400'
BOAT
BASIN
Pos. 3
200'
Pos. 2
100'
EXISTING BULKHEAD
Pos. 1
2
100'
FUTURE ROUTE 440 N.B.
320
325
℄ ROUTE 440
330
FUTURE ROUTE 440 S.B.
ROCK WALL
NEWARK BAY
PIERHEAD AND BULKHEAD LINE

ROUTE 440-2J

RT. 440F SECTION 2 J



1

2

NOISE MEASUREMENT DATA

ROUTE 44OF SECTION 2J

MICROPHONE POSITION 1

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1600	55	07/18/73	69	64	61	75	3
1700	55	07/18/73	70	65	61	77	4
1800	55	07/18/73	68	63	59	75	4
1900	55	07/18/73	69	64	60	75	4
2000	55	07/18/73	67	63	59	77	5
2100	53	07/18/73	67	63	61	73	3
2200	25	07/18/73	65	62	59	72	3
2300	25	07/18/73	65	63	61	69	2
0000	25	07/19/73	65	62	60	74	3
0100	25	07/19/73	65	62	60	74	3
0200	0	07/19/73	NO DATA - NONREPRESENTATIVE NOISE				
0300	0	07/19/73	NO DATA - NONREPRESENTATIVE NOISE				
0400	53	07/19/73	68	63	61	76	3
0500	55	07/19/73	69	65	61	72	3
0600	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
0700	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
0800	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
0900	55	07/19/73	71	68	66	74	2
1000	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
1100	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
1200	50	07/19/73	70	64	61	77	4
1300	55	07/19/73	69	64	60	77	4
1400	55	07/19/73	69	64	61	76	4
1500	55	07/19/73	67	62	47	87	8

NOISE MEASUREMENT DATA

ROUTE 440F SECTION 2J

MICROPHONE POSITION 2

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1600	55	07/18/73	59	54	51	67	4
1700	55	07/18/73	61	55	51	70	4
1800	55	07/18/73	61	57	52	69	4
1900	55	07/18/73	64	58	53	73	4
2000	45	07/18/73	57	53	51	66	3
2100	54	07/18/73	55	53	51	61	2
2200	55	07/18/73	55	51	47	61	3
2300	55	07/18/73	59	53	51	67	4
0000	55	07/19/73	55	52	48	62	3
0100	55	07/19/73	57	53	50	68	4
0200	55	07/19/73	55	52	50	62	3
0300	55	07/19/73	55	53	51	59	2
0400	50	07/19/73	56	53	51	64	3
0500	55	07/19/73	55	53	51	56	1
0600	55	07/19/73	59	54	51	71	4
0700	55	07/19/73	62	58	56	66	3
0800	45	07/19/73	63	59	56	70	3
0900	55	07/19/73	60	58	55	64	2
1000	55	07/19/73	62	58	56	67	3
1100	50	07/19/73	61	57	54	69	4
1200	50	07/19/73	60	53	50	68	4
1300	50	07/19/73	60	55	51	69	4
1400	55	07/19/73	62	57	52	70	4
1500	35	07/19/73	66	55	51	75	5

NOISE MEASUREMENT DATA

ROUTE 440F SECTION 2J

MICROPHONE POSITION 3

HOUR ****	SAMPLE SIZE (MIN.) ****	DATE ****	L10 (DBA) ***	L50 (DBA) ***	L90 (DBA) ***	LNP (DBA) ***	STD DEV (DBA) ***
1600	20	07/19/73	51	48	45	60	3
1700	55	07/19/73	60	57	53	70	3
1800	55	07/19/73	76	64	59	91	7
1900	40	07/19/73	66	62	58	74	4
2000	55	07/19/73	65	61	55	75	5
2100	40	07/19/73	64	60	57	69	3
2200	25	07/19/73	62	59	56	69	3
2300	0	07/19/73	NO DATA - OPERATOR ERROR				
0000	25	07/20/73	64	59	56	70	3
0100	25	07/20/73	71	62	57	79	5
0200	25	07/20/73	70	61	57	79	5
0300	25	07/20/73	70	61	57	79	5
0400	25	07/20/73	60	58	55	70	4
0500	25	07/20/73	59	57	54	63	2
0600	20	07/20/73	60	58	56	63	2
0700	25	07/20/73	63	60	56	67	3
0800	25	07/20/73	66	63	60	73	3
0900	30	07/20/73	66	63	61	71	2
1000	50	07/20/73	65	62	59	71	3
1100	55	07/20/73	65	62	59	72	3
1200	55	07/20/73	67	63	59	83	5
1300	55	07/20/73	61	54	51	74	5
1400	55	07/20/73	62	58	56	71	4
1500	55	07/20/73	61	56	52	68	4

NOISE MEASUREMENT DATA

ROUTE 440F SECTION 2J

MICROPHONE POSITION 4

HOUR	SAMPLE SIZE (MIN.)	DATE	L10 (DBA)	L50 (DBA)	L90 (DBA)	LNP (DBA)	STD DEV (DBA)
****	****	****	***	***	***	***	***
1600	20	07/19/73	58	54	51	67	3
1700	56	07/19/73	59	54	51	68	3
1800	50	07/19/73	57	53	51	70	4
1900	40	07/19/73	58	54	51	64	3
2000	50	07/19/73	60	57	55	66	3
2100	55	07/19/73	59	57	53	64	3
2200	55	07/19/73	59	54	51	66	4
2300	0	07/19/73	NO DATA - EQUIPMENT PROBLEM				
0000	55	07/20/73	58	54	51	64	3
0100	55	07/20/73	57	53	51	63	3
0200	55	07/20/73	57	53	51	65	3
0300	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0400	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0500	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0600	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0700	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0800	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
0900	0	07/20/73	NO DATA - MICROPHONE MALFUNCTION				
1000	55	07/20/73	64	60	56	70	3
1100	0	07/20/73	NO DATA - NONREPRESENTATIVE NOISE				
1200	0	07/20/73	NO DATA - OPERATOR ERROR				
1300	55	07/20/73	68	64	60	75	3
1400	0	07/20/73	NO DATA - NONREPRESENTATIVE NOISE				
1500	0	07/20/73	NO DATA - EQUIPMENT PROBLEM				

ROUTE 440F SECTION 2J - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1600	07/18/73	-	-	0	320	82	-
1700	07/18/13	-	-	0	120	80	-
1800	07/18/73	-	-	0	160	76	-
1900	07/18/73	-	-	0	180	76	-
2000	07/18/73	-	-	0	178	74	-
2100	07/18/73	-	-	0	202	72	-
2200	07/18/73	-	-	0	200	73	-
2300	07/18/73	-	-	0	200	71	-
0000	07/19/73	-	-	0	200	69	-
0100	07/19/73	-	-	0	210	65	-
0200	07/19/73	-	-	0	210	67	-
0300	07/19/73	-	-	0	210	66	-
0400	07/19/73	-	-	0	211	62	-
0500	07/19/73	-	-	0	226	62	-
0600	07/19/73	-	-	0	225	67	-
0700	07/19/73	-	-	0	240	69	-
0800	07/19/73	-	-	0	255	71	-
0900	07/19/73	-	-	0	256	73	-
1000	07/19/73	-	-	0	232	78	-
1100	07/19/73	-	-	0	230	82	-
1200	07/19/73	-	-	0	228	85	-
1300	07/19/73	-	-	0	230	86	-
1400	07/19/73	-	-	0	228	86	-
1500	07/19/73	-	-	0	230	85	-
1640	07/19/73	-	-	0	258	85	-

ROUTE 440F SECTION 2J - TRAFFIC AND WEATHER DATA

HOUR	DATE	TOTAL TRAFFIC	TRUCKS	WIND SPEED MPH	WIND DIRECTION DEGREE	TEMPERATURE °F	HUMIDITY %
1700	07/19/73	-	-	0	246	84	-
1800	07/19/73	-	-	0	244	84	-
1900	07/19/73	-	-	0	250	82	-
2000	07/19/73	-	-	0	248	80	=
2100	07/19/73	-	-	0	228	76.5	-
2200	07/19/73	-	-	0	216	74.5	-
2300	07/19/73	-	-	-	-	-	-
0000	07/20/73	-	-	0	220	73	-
0100	07/20/73	-	-	0	226	73	-
0200	07/20/73	-	-	0	215	71	-
0300	07/20/73	-	-	0	214	72	-
0400	07/20/73	-	-	0	214	71.5	-
0500	07/20/73	-	-	0	212	70	-
0530	07/20/73	-	-	0	205	69.7	-
0600	07/20/73	-	-	0	214	69.5	-
0640	07/20/73	-	-	0	210	72	-
0805	07/20/73	-	-	0	220	74	-
0900	07/20/73	-	-	0	222	75	-
1000	07/20/73	-	-	0	220	79	-
1100	07/20/73	-	-	0	226	82	-
1200	07/20/73	-	-	0	226	83	-
1300	07/20/73	-	-	0	234	84	-
1400	07/20/73	-	-	0	223	84	-
1500	07/20/73	-	-	0	225	84	-