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I-95/695 ORIGIN-DESTINATION SURVEY PROCEDURES MANUAL

BY

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16. Abstract

A manual detailing the procedures used in an origin-destination survey was compiled.

The manual specifically dealt with hiring and training of personnel, site selection, scheduling of sites, personnel and police, organizing a roadside interview station, conducting roadside interviews, and data coding. Specific problems encountered during the project were included, along with recommended solutions.

The personnel requirements, time schedules and costs for each task completed as part of the project were reported.

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I. Introduction and Background

As part of the Environmental Impact Statement for the I-95/695 corridor, the Division of Research and Development conducted an Origin-Destination Traffic Survey during the summer of 1976. The request for the participation of the Division of Research and Development in this endeavor came from the Bureau of Environmental Analysis.

The purpose of the survey was to obtain origin and destination traffic data which would be used together with other traffic and socio-economic information in a Standard Urban Transportation Planning Package. The analysis of this information would provide paramenters for a computer model which would simulate base year traffic patterns for the transportation system as a whole. This model would also be used to forecast traffic patterns for the projected design date (1985) and ten years after that.

It must be stated in the beginning that time was a critical factor throughout this project. For various reasons, little effort could be expended prior to late May 1976, which caused higher than desirable rates of use of manpower for many of the work tasks. A more desirable time schedule is shown on page 66 of Appendix E. While the study was completed within the required time, more pre-survey planning would reduce the need for overtime and efforts of other staff required for the I-95/695 project.

In March 1976, a map indicating a cordon line which encompassed the I-95/695 corridor and a list of 42 survey sites on this cordon line was supplied by the Bureau of Environmental Analysis. The cordoned area extended from Scotch Plains on the north to Hornerstown south of Bordentown on the south. It also ran from Perth Amboy on the east to

Lambertville on the west. It was proposed that roadside motorist interviews be conducted at the 42 survey sites to determine the origin, destination and purpose of the trips. An additional survey involving 500 telephone interviews was initially suggested to obtain information on the traffic trip characteristics which were wholly within the cordon line.

In late May, project personnel began locating and scheduling the sites within limits given by the Bureau of Environmental Analysis and arranging for police assistance and necessary equipment. On June 8, the Bureau of Operations Research was informed by the Bureau of Environmental Analysis that the study model on which the cordoned area and list of survey sites were based was not acceptable to the Federal Highway Administration. The Bureau of Environmental Analysis developed a new study design which included a cordoned area smaller than before. The new area extended north-south from Somerville to Robbinsville and east-west from East Brunswick to Flemington. See map in Appendix A, pages 30 - 31 . Motorist interviews were proposed at 33 external stations on roads which crossed the cordon line. Instead of the telephone survey, the new study called for 22 internal roadside interview stations to be located on various cut and screen lines within the cordon.

The new study design was approved by representatives of the Federal Highway Administration on June 15, 1976. The Bureau of Operations Research was supplied with a listing of the stations, which was amended later in the study by the addition of one external site, on July 16. A copy of this list is in the Appendix A, pages 32 - 33. Operations Research personnel scheduled and located sites (within limits set by the Bureau of Environmental Analysis), scheduled

police assistance, hired and trained summer employees and procured necessary equipment and vehicles. Seasonal employees were used on this study since not enough full-time personnel were available. This effort allowed the survey work to commence in time to ensure completion by Labor Day which was the expected departure date of the seasonal employees.

The collection of field data was completed between June 28 and August 31. A total of eleven sites had to be rescheduled for various reasons including inclement weather or insufficient personnel or police. The coding of the interviews which was begun on July 19 was completed on October 22 at which time all the interviews were submitted to the Bureau of Environmental Analysis.

II. Project Procedures and Regulations

At the beginning of the project, a list of procedures including safety procedures was drawn up. These procedures were drafted in order to acquaint both the supervisors and interviewers with the necessary facts in order to ensure a safe, orderly and properly run survey. The general regulations touched on items such as appropriate apparel, reporting times, absences, behavior and care of state equipment. The safety procedures dealt with wearing of safety vests, where and how to stand during interviewing, the proper display of signs and cones, sight distance at the survey site; and an important warning, frequently repeated to all field personnel, to stay alert since motorists may not always do so.

Safety was always considered to be of paramount importance and because of the diligence and awareness of both supervisors and interviewers, no incidents or injuries occurred during the conduct of the roadside surveys.

Copies of the procedures can be found in Appendix B, pages 45 - 48.

III. Hiring and Training of Seasonal Employees

In order to complete the two major portions of work associated with this survey, field interviews and data coding, 20 summer workers were hired and trained.

Candidate employees were sent to the Bureau of Operations Research from the Personnel office. Each candidate had a personal interview and participated in a screening procedure to see whether the requirements for interviewing and coding could be met. This procedure was in three parts:

1. Coding test - Each prospective employee was asked to code information from a schedule onto a data code sheet according to verbal and written instructions. A copy of this information is in Appendix C, pages 52 - 54 . Several candidates were not able to properly follow the instructions and their employment was not considered any further.
2. Each candidate was asked to read aloud a list of typical survey questions in order to test their diction and pronunciation. A copy of the questions used for this test is in Appendix C, page 55. A few of the candidates were unable to satisfactorily complete this section of the screening.
3. The project procedures were reviewed with each candidate to ascertain his or her willingness and ability to abide by them. Several people were unable to accept employment due to their inability to start work at the early hours required.

As the time progressed, it became apparent that screening procedures in the areas of spelling and clarity of handwriting could have prevented problems encountered during interviewing. Serveral employees had difficulty in spelling street and municipality names unfamiliar to them. They were instructed to ask for correct spelling when unsure but did not always do so. The handwriting of some employees was so illegible that they were required to print.

Candidates who passed the screening procedure were accepted and then sent through a training session. This training consisted of the following points.

1. Restatement of the project procedures and regulations including safety procedures.
2. Detailed instructions on the survey questionnaire and the interview procedure and method. These instructions are stated in Section VII "Interview Instructions."
3. Preliminary instructions for the different types of safety set-ups. These set-ups are outlined in Section VI "Site Setup and Field Personnel Responsibilities." Diagrams of the setups are in Appendix B, pages 49 - 50.
4. Study of maps in order to familiarize assistants with the spelling and location of towns and local areas in central New Jersey.
5. Practice interviewing in a parking lot and along a road where uncooperative driver attitudes were simulated.
6. Two full-scale pilot surveys on Route 29 and Bear Tavern Road, Ewing were performed by the first group of ten employees. The second group of ten were hired after the start of the actual field work and received on-the-job

training. This consisted of observing another interviewer and then surveying under the supervision of the field chief.

In mid-July, the Bureau of Environmental Analysis supplied to the project engineer a copy of the coding materials to be used in the project along with guidelines for their use. From these guidelines, the project engineer developed a detailed coding procedure. Small groups of summer employees were scheduled in the office in order to be instructed in these methods. Briefly, this training session covered the following areas.

1. Distribution of individual copies of the coding manual.
2. Detailed instructions of the manual, proper coding procedure and other source materials to be used in data coding (phone books, maps, employment data lists). A copy of the coding procedure is in Appendix D, pages 59 - 61 . Each employee was required to write down the instructions in order to assure good attention and understanding of the proper methods and also to give each person reference information.
3. Practice interviews were performed and checked in order to ascertain each employees' ability to proceed to actual data coding. (The interviews from the two pilot studies were used for practice.)

Throughout the coding period, each individual was checked to assure his or her continued compliance with proper coding techniques.

During the course of the study, certain disciplinary problems were encountered with the summer personnel. Most of the problems were of the nature of unauthorized absences and lateness and taking extended breaks. However, incidents of fighting (two in two months), abusive

language (two in two months) and unauthorized departures from the work area (one time during the summer) occurred.

Six summer employees had to be dismissed because of their continued violation of the rules, even after verbal and written warnings. Other employees experienced some problems, but responded favorably to verbal and written reprimands and were kept employed.

It is the opinion of the project supervisors that the seasonal employees, on the whole, performed adequately on a project which had unusual, difficult and tedious tasks. The hours were varying and started as early as 5 a.m. The interviewed motorists were verbally abusive at times and the data coding was repetitive, boring and arduous.

IV. Site Selection Characteristics

Along with the list of survey stations, the Bureau of Environmental Analysis supplied to the project engineer a list of two intersections on each of the roads to be surveyed between which the survey was to take place. The purpose of the limits was to allow project personnel some latitude in choosing an appropriate site without going beyond an intersection which would significantly change the interviews obtained. Although in most cases the stations were chosen between the original limits, a few sites required the redefinition of these limits in order to allow a safe survey area to be located. All site selections were reviewed and approved by the Bureaus of Environmental Analysis and Project Location. A list of site locations is in Appendix A, pages 34 - 40 .

The major factor in choosing a survey station is the sight distance available in each direction from the interview area. Requirements of 500' sight distance on roads with speed limits up to 35 m.p.h. and 800' for roads with speed limits between 40 and 55 m.p.h. were observed. Where these requirements could not be met, new intersections were chosen by the Bureau of Environmental Analysis between which the survey was to take place. Another item which was considered in this selection was the proximity of a parking area for the state vehicles used to transport the personnel and equipment. Situations which were avoided in choosing a site were crests, dips, curves and the location of a station near a large intersection.

It is recommended that the following secondary characteristics be considered in the site selection process whenever possible: the utilization of shade trees and the avoidance of driveways, houses, buildings and ditches along the side of the road. On routes which have a large percentage of truck traffic, the avoidance of dusty shoulders and roadways can be helpful. When these characteristics can be utilized in conjunction with the proper sight distance, they will go a long way to promote a smoother, more comfortable operation for the public, project personnel and police.

The location of a site was documented with odometer mileage from the nearest intersection, landmark or permanent structure. The use of telephone pole numbers to determine township boundaries can help in avoiding the scheduling of police in one municipality to assist at a site in another. It is recommended that the supervisor, who will be at a given site personally check the site before the day of the survey. Where this is not possible, Polaroid snapshots could be used in order to allow the supervisor to be sure a proper site has been selected.

V. Scheduling of Field Surveys

A tentative schedule of the field surveys was drafted with the following points in mind: availability of police assistance, personnel for interviewing and vehicles for transportation.

The request for police assistance was made as far in advance as possible. Local police were called and asked to supply the necessary officers for surveys to be conducted in their municipality. A follow-up letter with all the pertinent information (date, time and location of survey and number of officers requested) was sent to any police departments able to supply the men. Two days before the survey, a project engineer called the police department to make final arrangements for police assistance on the survey day. State Police were asked to provide officers for any site where local police could not. Originally, a letter was sent to the Superintendent of State Police requesting assistance on this survey. A list of the survey days, times, locations and number of requested officers was sent to the head of the Traffic Section. Two days before the study, the troop supplying men was contacted for final approval of the arrangements. Police were made known of any schedule changes immediately. The police were requested to arrive at the site a half hour before the surveying began (6:30 a.m.). The police should be asked not to inform the public or media of the survey day arrangements since this may alter the traffic patterns for that day. At the end of the study, letters were sent to all local police chiefs and the Superintendent of the State Police thanking them for their generous support.

The number of interviewers needed at each site was estimated from peak hour factors obtained from the Bureau of Data Resources.

The peak hour factor was multiplied by half the ADT. The result was the peak hour volume in the peak direction. Assuming the off peak direction contains 2/3 of the traffic in the peak direction and that the average interview time is two minutes, the number of interviewers needed to obtain a 10 percent sample during the peak hour was calculated. Extra interviewers were scheduled at each site to account for absentees (one extra for sites with eight or less interviewers and two extra for sites needing more than eight). Due to the amount of safety equipment and time constraints on set-up, four was the minimum number of interviewers scheduled at a site.

Two sites were scheduled whenever the number of interviewers available was sufficient to accommodate this. A copy of the schedule in Appendix A, pages 41 - 42, indicates that 14 days were left open for rescheduling sites. During the study, eleven sites had to be rescheduled. Two due to failure of the police to show up, one due to failure of sufficient seasonal employees to report to work, four due to inclement weather, three due to requested schedule changes from police, and one due to a massive traffic tie-up caused by the survey operation. A meeting between Department of Transportation personnel and the State Police cleared up a communication problem which caused the police absences and this problem did not reoccur. The use of safety set-up #2 allowed high volume roads to be surveyed without reoccurrence of the traffic jam experienced the first time Route 1 was surveyed.

The survey period lasted from 7 a.m. to 11 a.m. each day. In order to adequately set up the safety equipment and instruct the interviewers on their tasks, arrival at the site was planned between 6 a.m. and 6:15 a.m. In order to accomplish this, departure times from the Fernwood complex varied from 5 a.m. to 5:30 a.m. Supervisors arrived 15 minutes earlier in order to make last minute checks on

equipment. A copy of the supervisor's equipment checklist is in Appendix A, page 43. All project personnel were given a list of the departure times and places during the previous week.

When the data coding began in July, a schedule was drawn up and given to all employees showing which days they were to report for field work and which days they were to perform coding which was conducted from 8:30 a.m. to 5:00 p.m., normal working hours for the Department of Transportation.

In order to help the project run more smoothly, the following situations in scheduling should be avoided:

1. Scheduling two sites on the same day which would require police assistance from the same source. Most of the police departments could not supply up to four officers at a time due to manpower limitations.
2. Scheduling two sites on the same day if a large portion of traffic from one site would be stopped at the other. This will avoid motorist complaints about being delayed twice in one morning.
3. Since employee attendance was sharply off on Monday and Friday, sites which require a large number of seasonal employees should not be scheduled then.
4. Toward the end of the summer, scheduling sites which require a large number of seasonal employees should be avoided since attendance and availability of the employees is reduced.

VI. Site Set-ups and Field Personnel Responsibilities

During the survey period, the responsibilities of the various members of the survey crew were as follows:

A Supervisor:

1. Assures all necessary materials are available to properly conduct the survey.
2. Assures on-site arrival in time to properly prepare safety equipment and interview forms.
3. Directs the setting up of signs and cones.
4. Informs police of desired sample selection. (Vehicles to be excluded from interviewing are buses, funeral processions, emergency vehicles, and mail trucks).
5. Assigns interview stations to seasonal employees and supplies necessary working materials.
6. Checks interviews for accuracy and completeness.
7. Collects in a labeled envelope (date, site location, time, direction of travel) the interviews for each hour and direction of travel.
8. Is responsible for the conduct of a safe survey site.
9. Under no circumstances is a site to be operated without police in attendance.
10. Keeps accurate attendance for all members of the survey party.
11. Is aware of the location of the nearest hospital for each site.
12. Contacts the local police station or appropriate State Police barracks if scheduled police have not arrived by 6:45 a.m. The supervisor must carry enough change in order to make the necessary calls.

An Interviewer:

1. Sets up signs and cones and periodically checks them under the direction of the supervisor.
2. Performs interviews courteously, accurately and quickly.
3. Thanks each motorist for his or her cooperation.
4. Refers all questions from motorists to the supervisor.
5. Is concerned about his own safety and that of his fellow interviewers and acts accordingly.
6. Follows instructions given by the police and supervisor at all times.
7. Takes breaks when indicated by supervisor. If the necessity arises for employees to find a mens or ladies room away from the site, the employee will conduct himself properly and return to the site promptly.
8. Does not litter at the site or while travelling to and from the site.

The Policeman:

1. Has the ultimate responsibility for safety on the site.
2. Halts interviewing if in his opinion a traffic tie-up or other hazardous conditions so dictate.
3. Directs traffic and selects a sample of cars and trucks in a manner indicated by the supervisor.

Five different set-ups of signs and cones were utilized for the 56 survey sites. Each type of set-up had its own peculiar problems, about which recommendations for improvements are listed in the following section. A diagram of all five set-ups is listed in the Appendix B, pages 49 - 50.

Set-Up #1 - Two Lane, No Shoulder (Low Volume) - Page 49in Appendix B.

The interview area for this type of site was located in the center

of the road and consisted of an island formed by cones spaced about 10' apart. A minimum of 12 cones ran down the center line from each end of the island (spacing of 40' or one skip line). Six signs were placed at the approximate locations shown on the diagram. All traffic was stopped while the interviews were taken. The interviewers stood in the middle of the island and surveyed from the driver side of the cars. The policeman stood where indicated and stopped the cars at the beginning of the interview line. Any car or cars which were stopped behind those being interviewed were not stopped again but let through the interview area. Thirty-eight out of the 56 sites were completed in this way.

Recommended improvements in this type of set-up are as follows:

1. Have a "STAY RIGHT" or arrow sign at each end of the center line cones. This will help prevent confused motorists from travelling down the wrong lane, a problem which occurred a few times.
2. As a further warning to motorists, have the police park their cars where indicated on the diagram, with flashers on.
3. Utilize some type of bypass area, where possible, to minimize delay to motorists.
4. Where low volume and low speed limits allow, request only one policeman. He can stop the traffic on one side and then direct a motorist on the other side to stop at the first interviewer. This approach will keep from antagonizing understaffed police departments.
5. Have a trained flagman upstream during the set-up of the cones and signs.

6. As long as a steady stream of traffic exists, put the slower interviewers first in line in order to allow them to begin interviewing first.

Set-Up #2 - Two Lane or Four Lane (High Volume), With Shoulder - Page 49 in Appendix B.

This type of set-up brought a platoon of cars into the shoulder for interviewing. Cones were placed along the edgeline of the road with a space left for cars to pull onto the shoulder. After the space, the cones resumed on the edgeline. The policeman stood after the space in the cones and directed the cars to pull over in front of him. The cars traveled down the shoulder and were stopped by a cone placed in the middle of the shoulder by the first interviewer. The signs and police car were positioned as indicated in the diagram. For safety reasons, surveying was performed from the passenger side of the automobile. This technique was more time consuming and less comfortable to both the motorist and interviewer; however, insufficient room existed between the cars and the first lane of traffic to allow interviews to be taken on the driver side. Eight out of 56 sites were performed with this set-up.

Recommendations for improvement in this type of site are as follows:

1. The opening in the edgeline cones must be large enough for cars to flow onto the shoulder without performing any unusual or quick maneuvers.
2. The resumed string of cones between the cars being interviewed and the roadway should be placed at five foot intervals to prohibit vehicles from exiting through the cones.

3. The police must be instructed to pull in the same number of cars as interviewers. Pulling in more will only antagonize motorists who feel they have been delayed unnecessarily.
4. The police should wait until the last car is completely out of the interview area before pulling in the next platoon of cars. Failure to do this can confuse the first interviewer who may not be able to tell which car he is supposed to stop.
5. Confused motorists often stopped in the vicinity of the policemen. Interviewers should direct the car to proceed forward in the interview area with hand movements.
6. For very high volume roads, a trained flagman should be used to aid the policemen. His presence upstream can slow traffic and allow safer transition from the roadway to the shoulder.

Set-Up #3 - Four Lane (Low Volume), With Shoulder - Page 49 in Appendix B.

On four lane roadways with a low traffic volume, the entire right lane can be coned off and used as the interview area. An extra sign indicating RIGHT LANE CLOSED AHEAD must be used in conjunction with the other three signs. A minimum 500' taper was used to block the right lane. Cones were then run along the lane line until a space was left for pulling cars onto the shoulder. After the space, a tapered coned island was set up in the right lane. The signs, police car, and policeman were positioned as in Set-up #2. The interviewers were stationed in the coned island and surveyed from the driver side of the car. Six of the sites were performed in this manner.

As this site set-up was basically the same as #2, the problems encountered were similar. One situation unique to this station was that some cars attempted to pull into the coned island instead of traveling on the shoulder. A DOT vehicle placed as indicated on the diagram would prevent this and give further protection to the interviewers.

Set-Up #4 - Two Lane (High Volume), No Shoulder - Page 50 in Appendix B.

On this type of set-up, if the road is wide enough, channelization of traffic can be used to avoid stopping all cars while the interviewing proceeds. The positioning of cones, signs, the police car and personnel were as indicated in the diagram. Two policemen are needed, one to direct traffic into the interview area and one to supervise the merging of the two streams of cars after the survey zone. As in Set-up #2, interviewing is performed from the passenger side of the vehicle. As only one direction of travel can be run at a time, two days are needed to complete this set-up. One site out of 56 was run using this type of arrangement.

As in Set-up #2, close positioning of the cones in the survey area (five foot spacing) prevented motorists from exiting through the cones. However, the presence of two policemen may have helped in deterring such maneuvers.

Set-Up #5 - Four Lane, No Shoulder - Page 50 in Appendix B.

This type of set-up is a combination of #2 and #3. It utilized the extra sign (RIGHT LANE CLOSED) and 500' taper as in #3 and the interview area set-up as in #2. Again for safety purposes, the interviews were taken from the passenger side of the vehicle. Three out of the 56 sites were completed in this way.

Since there was no area to pull off the road, it was especially important for this type of set-up to have police back-up during the setting up and taking down of the signs and cones.

It is not recommended that the interviewing take place at a signalized intersection. This set-up was used at one location and in the opinion of the field supervisor was potentially more hazardous than the five set-ups described above. The potential danger resulted from the necessity of the seasonal employees to walk between cars stopped on the through lanes of travel.

VII. Interview Instructions and Field Procedures

The questionnaire form used in this study was a modification of the one used for the Cumberland County Urban Area Transportation Study[1]. Copies of both the external and internal interview forms are in Appendix D, pages 57 - 58.

The instructions given to the summer assistants for filling out the interview form were as follows:

Fill in the station number and interviewer's name in the top right-hand corner of the sheet. Also, number all the sheets on your clipboard consecutively.

Line 1 - This information is filled in on all sheets prior to the beginning of interviewing. It is entered in the boxes provided. The supervisor will inform all interviewers of the proper numbers to be used.

Station Number - The number assigned to the site being done is entered here.

1"Cumberland County Urban Area Transportation Study, External Survey Instruction Manual," Prepared for the Bureau of Transportation Planning, NJDOT by Alan M. Voorhees and Associates, Inc., Westgate Research Park, McLean, Virginia, June 1972.

Date of Travel - The day and month on which the survey is being run is entered here. Example: June 15 is coded 0615.

Travel Day - The day of the week on which the survey is being run is entered here using the code found on the bottom of the form.

Hour Beginning - Each hour is recorded here. The change of the hour is announced by the supervisor.

Direction - For the external form, 1 is entered if the direction is into the study area, 2 is used for traffic going out of the study area. For the internal form, 3, 4, 5 or 6 is used to indicate the direction of travel as north, south, east or west.

The information on line 1 (except hour beginning) should be entered on all sheets on the clipboard before the interview period begins.

The following information pertaining to the individual interviews is not to be entered in the coding boxes but in the space above them.

Column 2 - State of Registration

All vehicles with New Jersey license plates receive a 1, all other vehicles receive a 2.

Column 3 - Vehicle Type

The vehicle type is coded according to the classification on the bottom of the form. Passenger cars (including station wagons) and taxis are coded 1, motorcycles 2, light trucks (pick-up, panel, vans) receive a 3, heavy trucks (more than 4 tires*) receive a 4 if a gas user and a 5 if a diesel user. A stack is present on diesel trucks.

Column 4 - Number in Vehicle

All persons in the vehicle including infants and the driver are

* An exception to this rule is that some pick-up trucks or vans have more than four tires but are still considered light trucks.

counted and entered here.

The information in Columns 2, 3 and 4 is to be entered as the car approaches the interviewer and before it stops.

The interview with the motorists is to be initiated with the following statement:

"Good morning, I am from the Department of Transportation and we are conducting a traffic survey. Would you mind answering a few questions, it will only take two minutes?"

If the motorists indicates he is not willing to participate in the survey, he is to be thanked and the interview is ended. If he is willing to cooperate, the following questions are to be asked:

Columns 5 and 6 - Origin and Destination

The following questions are to be asked in order to obtain the origin and destination:

"Where did this trip begin?"

"Where will this trip end?"

For New Jersey addresses, the street and town must be obtained. If the street is not known, other information such as company name, nearest major intersection, permanent landmark or building can be substituted. For Pennsylvania and New York, the town name and state are sufficient. Other states do not need town or city names, just the state name.

It is important to obtain the origin and destination which are connected with the principal purposes of the trip. For example, a motorist going from home to work may stop for gas or cigarettes but his proper origin and destination are still his home and place of work.

The same address cannot be used as both the origin and destination. The intermediate point to which the motorist is travelling to or coming from in order to achieve his purpose has to be obtained as either the origin or destination.

Column 7 - Trip Purpose

The purpose codes are listed at the bottom of the form. Purposes 1 through 5 correspond to vehicle types 1, 2, and 3. Heavy trucks use purpose code 6. The code 3 refers to personal business (doctor, lawyer, beauty parlor, etc.) not job related business which is coded 2. Trip purpose is split into two answers, purpose "from" pertaining to the origin and purpose "to" pertaining to the destination. For example, a man traveling from work to home would receive a code of 2 for "from" and 1 for "to."

Column 8 - Turnpike Use

Ask each motorist: "Have you or will you use the New Jersey Turnpike on this trip?" Record 1 for a no and 2 for a yes answer.

Column 9 - Route of Cordon Exit or Entrance

For the "in" direction, ask the motorist what the next road he will be using after the one he is presently on. For "out" trips ask the last road used prior to entering the one he is presently on. Record the answer in the space provided.

This information is needed to obtain the other cordon crossing for "through" trips, that is trips whose origin and destination are external to the study area.

The questions in columns 8 and 9 were only asked at the external survey stations, not at the internal sites.

During the interviewing, problems arose with the personnel which impaired the proper collection of data. These problems and their handling were as follows:

1. Poor Handwriting - Interviewers who had illegible handwriting were asked to print the information.
2. Poor Spelling - Interviewers were instructed to ask the motorists for any spelling they were unsure of. The supervisors constantly checked the interviews for these mistakes and brought the correct spelling to the attention of the interviewer.
3. Use of Abbreviations - Some interviewers made use of abbreviated street and town names. At times, this caused the interview to be uncodable. When this was found, the supervisors instructed the interviewers to begin writing out the full name.
4. Sloppiness - Stray marks, wrinkled sheets, excessive dirt and food stains were found on interview forms from time to time. Interviewers were compelled to be neater in order to be able to utilize all interviews in coding.
5. Skipping or Changing Questions - Certain interviewers avoided asking some questions or altered the questions they asked. They were instructed to return to the proper method of interviewing. Interviewers who failed to respond to this instruction were reprimanded and told that failure to follow proper methods would result in their dismissal.

As the interviewing proceeded, a major responsibility of the supervisor was spot checking the interviewers and reviewing the interview forms. Each employee was checked several times each day to insure his use of proper interview techniques. The supervisor critiqued the

individual's method and suggested improvements. When the interview sheets were collected each hour, the supervisor carefully reviewed them for accuracy and completeness. Any questionable interviews were discussed with the appropriate employee as soon as possible in an attempt to salvage them. Due to excessive absences on certain days, a supervisor had to fill in as an interviewer which impaired his ability to properly perform the above responsibilities. An emphasis on better attendance could help correct this problem or substitute interviewers could be called on short notice to replace absentees. Another solution would be to have all seasonal employees report for field work each morning. When the field crews were adequately filled, the remainder of the seasonal workers would go to the office for coding work.

Overall, the response of the public was excellent. Although no records were kept, relatively few incidents of uncooperative or extremely abusive motorists were experienced. Many drivers showed slight annoyance at being delayed, but cooperated anyway, possibly due to the presence of the policeman.

VIII. Coding of Roadside Interview Data

Coding of the field interviews was accomplished using a coding manual and other reference materials assembled by the Bureau of Environmental Analysis. The coding manual consisted of the following seven parts:

1. Local Place Name Guide - All local place names in New Jersey were listed indicating which municipality and county they were located in.

2. New Jersey Municipality Codes - All townships, cities and boroughs in New Jersey were listed with an appropriate code.

3-6. Street Address Codes - Several townships in the four counties (Mercer, Middlesex, Hunterdon and Somerset) inside the study area had more than one code. The street address codes listed all roads in all the towns which were partially or totally inside the cordon and assigned a code to each street.

7. Out of State Codes - Each state and certain counties and cities in New York and Pennsylvania were listed with their code.

In addition to this manual, phone books and county road maps covering the central New Jersey area and an Employment Data List were supplied to the project engineer. The Employment Data List contained a listing of all employers and their addresses in the towns which were partly or totally inside the study area.

The problems encountered during coding were in the three following areas:

1. Some interviews were not able to be coded due to insufficient or incorrect information. Where these problems exist due to the performance of the interviewers, better training and checking can be utilized to improve the quality of the interviews.

2. Many interviews required an unusually large amount of time to code. The most common reasons for this problem were:

   a. Some older maps were used to make up the coding manual. Many new roads were not listed in the manual and the townships had to be called in order to ascertain whether they

did exist and where. The use of the newest maps in making up the manual and as a reference by the coders would help eliminate this problem, although some problems will always exist since no map is 100 percent correct.

b. Where a company name was obtained instead of a street name, the Employment Data List had to be used. This list was not alphabetical and companies were not always listed under the towns in which they were located. Moreover, some companies that were located on this list did not have a code entered for them. Using addresses for the companies found in phone books was not possible, since these were mailing addresses and not always accurate. For example, three companies on Route 1, American Cyanimid and RCA in West Windsor and FMC in Plainsboro, all have Princeton mailing addresses. Most motorists, incidently, gave Princeton as the town in which these companies existed. It is recommended that in future surveys a completely coded, alphabetical listing of all companies, schools, parks, government buildings, and other major generators inside the study area be compiled for use by the coders.

3. Two changes were made in the coding manual during the course of the project. These changes did not cause a major problem, since sufficient time and personnel were available to cope with them.

As with all aspects of this project, the coding manual and other reference materials had to be compiled in a shorter period of time than necessary to ensure completeness. The listing of problems two and three above were included not to find fault with creators of the manual but to give a factual account of the events which took place during coding in the hope that future surveys will be able to benefit from the recommendations.

The interviews were coded and checked by separate seasonal employees. Originally the project staff intended to spot check every fifth sheet for accuracy. This was abandoned due to the numerous errors found on the sheets sampled. It became necessary to check each of approximately 25,000 interviews, a process which required six weeks to complete.

Generally, the college level employees performed more satisfactorily on the original coding. Since only five out of twenty-eight seasonal employees had attended college, most of the coding was completed by high school level employees. Use of more college level people may help in reducing the errors found in this endeavor.

Having the seasonal employees check the coding did not yield satisfactory results. Even though they did not check their own work and were instructed to start from the beginning and completely check the coding results, they apparently glossed over the work. At the beginning of the coding process an attempt was made to photocopy the interview sheets so the checkers would start with an uncoded sheet and therefore have to go through the coding process as a check. However, the information written in pencil on the interview sheets did not copy well and this idea was abandoned. Unless employees willing to produce a consistently higher quality of work are hired, having seasonal employees check the coding is not recommended.

IX. Cost Information

Total cost of the study		$51,600
1. Fixed Costs		
a. Planning	$ 8,600	
b. Equipment	1,600	
c. Reporting	1,800	
	$12,000	
2. Variable Costs		
a. Roadside interviewing	$20,000	
b. Vehicle usage	400	
c. Interview coding	19,200	
	$39,600	

Costs were assigned as fixed if they were considered not to be directly dependent on the number of sites studied. They were assigned as variable costs if they were considered to be directly dependent on the number of sites studied. Equipment was considered fixed since it depended on the number of sites performed per day (2 in this study) and not on the total number of sites.

A complete breakdown of the tasks assigned to each category above, the time expended on the tasks, and their costs is in Appendix E.

REFERENCES

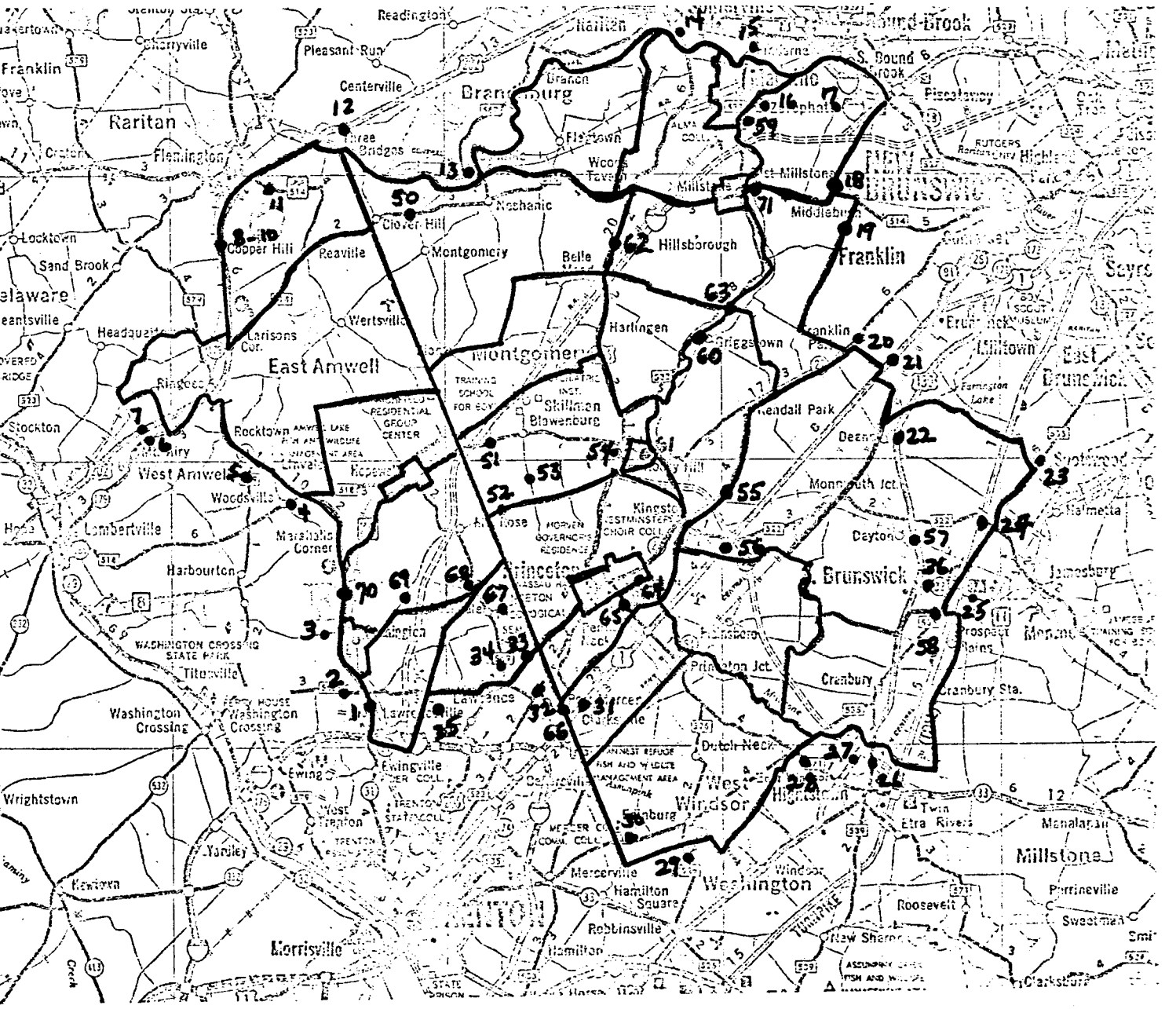
Urban Origin Destination Surveys, FHWA, July 1975

Cumberland County Urban Transportation Study, External Survey Instruction Manual, prepared for the Bureau of Transportation Planning, NJDOT by Alan M. Vorhees and Associates, Inc., Westgate Research Park, McLean, Virginia, June 1972

APPENDIX A

SITE LOCATIONS AND FIELD SURVEY SCHEDULING

I-95/695 ORIGIN DESTINATION STUDY
MAP OF STUDY AREA



External Cordon Line

Internal Cut and Screen Lines

External Survey Stations

Internal Survey Stations

I-95/695 ORIGIN DESTINATION STUDY

ZONAL MAP FOR CODING INTERNAL AREAS

ROUTE I-95 - EXTERNAL CORDON STATIONS

STATION NO.	ROUTE	MUNICIPALITY	APPROX. ADT
1	Rt. 31	Hopewell Twp.	13200
2	Cty. 546	Hopewell Twp.	4600
3	Delaware Ave.	Hopewell Twp.	4900
4	Cty. 518	Hopewell Twp.	2300
5	Cty. 579	E. Amwell Twp.	1500
6	Rt. 179	E. Amwell Twp.	2800
7	US 202	E. Amwell Twp.	4320
8-10	NJ 31 - 202	Raritan Twp.	
11	Cty. 514 Spur	Raritan Twp.	6300
12	US 202	Raritan Twp.	14900
13	Cty. 567	Branchburg Twp.	2840
14	US 206	Somerville	23540
15	Finderne Ave. (Cty. 533)	Somerville	17840
16	Weston Canal Rd.	Franklin Twp.	4500
17	Elizabeth Ave.	Franklin Twp.	2400
18	Cty. 514 (Amwell Rd.)	Franklin Twp.	8500
19	S. Middlebush Ave.	Franklin Twp.	2500
20	NJ 27	Franklin Twp.	11460
21	US 1	N. Brunswick	27900
22	US 130	N. Brunswick	16500
23	Cty. 535	N. Brunswick	8730
24	Cty. 522	S. Brunswick	3770
25 (36)	NJ 32	S. Brunswick	7400
26	Cty. 539	E. Windsor	6500
27	US 130	E. Windsor	17400
28	Cty. 571	E. Windsor	14600
29	Cty. 526	Washington Twp.	2640
30	Cty. 535	W. Windsor	8000
31	US 1	W. Windsor	28400
32	Cty. 583	Lawrence	3500
33	US 206	Lawrence	13800
34	Carter Rd. (Cty. 569)	Lawrence	4400
35	Cty. Rt. 546	Lawrence	8100

ROUTE I-95, INTERNAL SCREENLINE
AND CUTLINE CROSSINGS

STATION NO.	ROUTE	MUNICIPALITY	APPROX. ADT
50	Cty. 514 (Amwell Rd.)	Hillsborough Twp.	1,400
51	Cty. 518	Montgomery Twp.	5,900
52	Mount Rose Rd.	Montgomery Twp.	2,500
53	Blawenburg-Belle Mead Rd.	Montgomery Twp.	3,400
54	Rt. 206	Montgomery Twp.	18,200
55	Rt. 27	S. Brunswick	7,400
56	US Rt. 1	S. Brunswick	23,400
57	US Rt. 130	S. Brunswick	17,000
58	Cty. Rt. 535	Cranbury	5,000
59	Manville-Weston Can. Rd. Br.	Franklin Twp.	3,500
60	Griggstown Bridge	Franklin Twp.	2,000
61	Cty. 518	Franklin Twp.	5,200
62	Rt. 206	Hillsborough Twp.	10,500
63	Rt. 533	Hillsborough Twp.	2,000
64	Harrison St.	Princeton Twp.	8,200
65	Washington Ave.	Princeton Twp.	14,300
66	Cty. Rt. 533	Princeton Twp.	2,900
67	Rosedale Rd.	Princeton Twp.	6,000
68	Carter Rd.	Hopewell Twp.	4,100
69	Mt. Rose Rd.	Hopewell Twp.	5,200
70	Rt. 31	Hopewell Twp.	12,100
71	Cty. 514 Amwell Rd. Br.	Franklin Twp.	4,500

I-95/695 ORIGIN DESTINATION STUDY

SITE LOCATIONS FOR EXTERNAL SITES

Site #1 - Rt. 31 - Hopewell Twp.

Location: 0.5 miles south of circle with 546
4 lane, no shoulder

Site #2 - Rt. 546 - Hopewell Twp.

Location: 0.5 miles east of Scotch Rd.
2 lane, no shoulder

Site #3 - Pennington-Titusville Rd. - Hopewell Twp.

Location: 0.3 miles west of Dublin Rd.
2 lane, no shoulder

Site #4 - Rt. 518 - Hopewell Twp.

Location: 0.25 miles west of Rt. 31
2 lane, no shoulder

Site #5 - Rt. 579 - West Amwell Twp.

Location: 0.3 miles west of Rt. 31
2 lane, no shoulder

Site #6 - Rt. 179 - West Amwell Twp.

Location: Mile Post 4
2 lane with shoulder

Site #7 - Rt. 202 - West Amwell Twp.

Location: 0.6 miles east of Mt. Airy interchange (#5)
4 lane with shoulder

Site #8-10 - Rt. 31 and 202 - Raritan Twp.

Location: Southside - 1.2 below Rt. 11 merger with 202 and 31
Northside - 0.3 miles north Reaville Rd.
4 lane with good shoulders

Site #11 - Rt. 514 Spur - Raritan Twp.

Location: 0.2 miles east of Rt. 202
2 lane, no shoulder

Site #12 - Rt. 202 - Readington Twp.

Location: 0.5 miles north of Three Bridges intersection
4 lane, with shoulder

Site #13 - Rt. 567 - Branchburg Twp.

Location: Just on the Branchburg side of the South Branch, Raritan River - 2 lane, some shoulder

Site #14 - Rt. 206 - Somerville

Location: Just south of Minute Man Restaurant
2 lane with shoulder

Site #15 - Finderne Ave. (Rt. 533) - Bridgewater Twp.

Location: In front of National Starch
4 lane, no shoulder

Site #16 - Weston Canal Rd. - Franklin Twp.

Location: 0.1 mile south of Randolph Rd.
2 lane, no shoulder

Site #17 - Elizabeth Rd. - Franklin Twp.

Location: Between Wiley Rd. and New Brunswick Rd.
2 lane, no shoulder

Site #18 - Amwell Rd. (Rt. 514) - Franklin Twp.

Location: Mile Post 19
2 lane, no shoulder

Site #19 - Middlebush Rd. - Franklin Twp.

Location: 0.2 miles south of Amwell Rd.
2 lane, no shoulder

Site #20 - Rt. 27 - Franklin Twp.

Location: Mile Post 9
2 lane with shoulder

Site #21 - US 1 - North Brunswick

Location: In front of J & J Co.
4 lane with shoulder

Site #22 - Rt. 130 - North Brunswick

Location: Mile Post 77-78
4 lane with shoulder

Site #23 - Rt. 535 - East Brunswick

Location: Mile Post 22
2 lane, no shoulder

Site #24 - Rt. 522 - Monroe Twp.

Location: .3 miles east of Rt. 535
2 lane, no shoulder

Site #25 - Rt. 32 (Forsgate Farm Rd.) - Monroe Twp.

Location: .3 miles east from NJ Turnpike in front of Buxtons Restaurant - 2 lane with shoulder

Site #26 - Rt. 539 - East Windsor

Location: 0.1 miles south of Cranbury Rd.
2 lane with shoulder

Site #27 - US 130 - East Windsor

Location: 0.6 miles south of circle at Hightstown
4 lane with shoulder

Site #28 - Cty. 571 - East Windsor

Location: In front of MacGraw Hill
4 lane, no shoulder

Site #29 - Cty. 526 - Washington

Location: .5 miles south of Line Rd.
2 lane, no shoulder

Site #30 - Cty. 535 - West Windsor

Location: At Mercer County Park entrance
4 lane, no shoulder

Site #31 - Rt. 1 - West Windsor

Location: .5 miles north of Meadow Rd.
4 lane with shoulders

Site #32 - Cty. 583 - Lawrence

Location: Just north of Rt. 569 in front of Lawrence Hospital for Animals - 2 lane with dirt shoulders

Site #33 - Rt. 206 - Lawrence Twp.

Location: Just north of Petersons Nursery
2 lane, no shoulder

Site #34 - Rt. 569 - Lawrence Twp.

Location: Just on Rt. 206 side of Squibb entrance
2 lane, no shoulder

Site #35 - Cty. 546 - Lawrence Twp.

Location: .3 miles north of Federal City Rd.
2 lane, no shoulder

I-95/695 ORIGIN DESTINATION STUDY

SITE LOCATIONS OF INTERNAL SITES

Site #50 - Cty. 514 - Hillsborough Twp.

Location: 1.4 miles west of Black Point Rd.
2 lane, no shoulder

Site #51 - Cty. 518 - Montgomery Twp.

Location: Between Province Line Rd. and Hollow Rd.
2 lane, no shoulder

Site #52 - Mount Rose Rd. - Princeton Twp.

Location: Between Province Line Rd. and Blawenburg Rd.
2 lane, no shoulder

Site #53 - Blawenburg-Belle Mead Rd. (Great Rd.) - Montgomery Twp.

Location: Between Cherry Valley Rd. and Bedens Brook Rd.
2 lane, no shoulder

Site #54 - Rt. 206 - Montgomery Twp.

Location: Between Rt. 518 and Mt. Rose Rd.
2 lane, with shoulder

Site #55 - Rt. 27 - South Brunswick

Location: In front of Kingston Mall
2 lane, no shoulder

Site #56 - Rt. 1 - South Brunswick

Location: Between Rt. 522 and College Rd.
4 lane, with shoulder

Site #57 - Rt. 130 - South Brunswick

Location: Between mile posts 73 and 74
4 lane, with shoulder

Site #58 - Cty. 535 - Cranbury

Location: 0.2 miles south Rt. 32
2 lane, no shoulder

Site #59 - Manville-Weston Canal Bridge - Franklin Twp.

Location: Next to the Canal Bridge
2 lane, no shoulder

Site #60 - Griggstown Br. - Franklin Twp.

Location: 0.2 miles east of the bridge
2 lane, no shoulder

Site #61 - Cty. 518 - Rocky Hill Boro.

Location: 1.1 miles east of 206 - Mile Post 18
2 lane, no shoulder

Site #62 - Rt. 206 - Hillsborough Twp.

Location: Mile Post 63-64
2 lane, with shoulder

Site #63 - Cty. 533 - Hillsborough Twp.

Location: Near Hillcrest Rd.
2 lane, no shoulder

Site #64 - Harrison St. - Princeton

Location: Between Prospect and Western Sts.
2 lane, no shoulder

Site #65 - Washington Ave. - West Windsor

Location: 0.5 miles east of Faculty Rd.
2 lane, no shoulder

Site #66 - Cty. 533 - Lawrence

Location: 0.3 miles east of 533, 569 merge
2 lane, no shoulder

Site #67 - Rosedale Rd. - Lawrence

Location: In front of Educational Testing Service
2 lane, no shoulder

Site #68 - Carter Rd. (Rt. 569) - Hopewell

Location: 0.1 mile north of Rosedale Ave.
2 lane, no shoulder

Site #69 - Mt. Rose Rd. - Hopewell

Location: 0.2 miles north of Elmridge Rd.
2 lane, no shoulder

Site #70 - Rt. 31 - Hopewell

Location: Just south of Woosamonsa Rd.
2 lane, with shoulder

Site #71 - Cty. 514 (Bridge over Millstone River) - Franklin Twp.

Location: Just on Franklin side of Bridge
2 lane, no shoulder

SCHEDULE OF EXTERNAL AND INTERNAL SURVEY SITES
FOR I-95/695 ORIGIN-DESTINATION STUDY - INCLUDING RESCHEDULED SITES

	CREW #1			CREW #2		
DATE	SITE #	LOCATION	NO. OF INTERVIEWERS	SITE #	LOCATION	NO. OF INTERVIEWERS
6-28	25	NJ 32 - Monroe Twp.	8			
6-29	1	Rt.31 - Hopewell Twp.	8			
6-30	28	Cty. 571 - E. Windsor Twp.	8			
7-1	20	Rt. 27 - Franklin Twp.	8			
7-2	5	Cty. 579 - W. Amwell Twp.	4	4	Cty. 518 - Hopewell Twp.	4
7-6	3	Pennington-Titusville Rd.-Hopewell	4	6	Rt. 179 - W. Amwell	4
7-7	18	Cty. 514 - Franklin Twp.	8			
7-8	7	Rt. 202 - W. Amwell Twp.	4	13	Cty. 567 - Branchburg Twp.	4
7-9	12	Rt. 202 - Readington Twp.	10			
7-12	22	Rt. 130 - N. Brunswick Twp.	11	24	Rt. 522 - Monroe Twp.	4
7-13	31	Rt. 1 - W. Windsor Twp.	18			
7-14	15	Finderne Ave., Bridgewater	15	6*	Rt. 179 - W. Amwell	4
7-15	21	Rt. 1 - N. Brunswick	18			
7-16	34	Rt. 569 - Lawrence	5	29	Cty. 526 - Washington	4
7-19	19	Middlebush Ave., Franklin	4	27	US 130 - E. Windsor	11
7-20	8-10	Rt. 31-202 - Raritan	14			
7-21	14	Rt. 206 - Somerville	12			
7-22	32	Cty. 583 - Lawrence	4	26	Cty. 539 - E. Windsor	6
7-23	11	Cty. 514 spur, Raritan	5	2	Cty. 546 - Hopewell	5
7-26	35	Cty. 546 - Lawrence	6	30	Cty. 535 - W. Windsor	6
7-27	16	Weston Canal Rd. - Franklin	5	23	Cty. 535 - E. Brunswick	6
7-28	33	Rt. 206 - Lawrence	10	17	Elizabeth Ave. - Franklin	4
7-29	7*	Rt. 202 - W. Amwell	4			
7-30	15*	Finderne Ave. - Bridgewater	15			
8-2	56	Rt. 1 - Franklin	18			
8-3	54	Rt. 206 - Princeton	14			
8-4	57	Rt. 130 - S. Brunswick	12			
8-5	55	Rt. 27 - Franklin	8	53	Great Rd., Montgomery	4
8-6	62	Rt. 206 - Hillsboro	8	71	Cty. 514 - Bridge, Franklin	6
8-9	66	Cty. 533 - Lawrence	4	69	Mt. Rose - Hopewell	6

	CREW #1			CREW #2		
DATE	SITE #	LOCATION	NO. OF INTERVIEWERS	SITE #	LOCATION	NO. OF INTERVIEWERS
8-10	64	Harrison St. - Princeton Boro	8	52	Mt. Rose Rd. - Princeton Twp.	4
8-11	50	Cty. 514 - Hillsboro	4	59	Weston Causway - Franklin	4
8-12	58	Cty. 535 - S. Brunswick	6	63	Rt. 533 - Hillsboro	4
8-13	65	Washington Ave. - W. Windsor	8	51	Rt. 518 - Montgomery	6
8-16	61	Cty. 518 - Rocky Hill	6	68	Carter Rd. - Hopewell	6
8-17	60	Griggstown Br. - Franklin	4	67	Rosedale Rd. - Lawrence	6
8-18	70	Rt. 31 - Hopewell	10			
8-19	31*	Rt. 1 - W. Windsor	18			
8-20	65*	Washington Ave. - W. Windsor	8			
8-23	58*	Rt. 535 - S. Brunswick	6			
8-24	36	Rt. 32 - S. Brunswick	8			
8-25						
8-26	7*	Rt. 202 - W. Amwell	4			
8-27	71*	Cty. 514 Br. - Franklin	6	7*	Rt. 202 - W. Amwell	4
8-30	7*	Rt. 202 - W. Amwell	4			
8-31	71*	Cty. 514 Br. - Franklin	6			

*Rescheduled Site

SUPERVISOR'S CHECKLIST

Pencils

Pencil Sharpener

Forms

Clipboards

Vests

Signs (6 or 8)

Cones

Water Cooler (filled with ice water)

Cups

Manila Envelopes

Fuel (O.K.)

Map - Cordon

First Aid Kit with aspirin and salt tablets

Diagram of Coning and Signing

Telephone Numbers for Police

Garbage Bags

Cardboard Box

Attendance Forms

Yellow Pads

List of Maintenance Yards, including telephone numbers

Telephone No. for Gatehouse

Schedule of Sites

Location of Sites

Key for Smith Building

APPENDIX B

PROJECT REGULATIONS AND SAFETY SET-UPS

I-95/695 ORIGIN DESTINATION SURVEY

SURVEY SAFETY PROCEDURES

1. Every department employee working near through traffic or survey traffic must wear an orange safety vest.
2. When taking information from drivers, stand to the side of the vehicle on the non-traffic side or on the traffic side facing traffic when no less than 10 feet from traffic. Ask the driver to put his vehicle in "park." Never walk between cars without a verbal understanding from the traffic director and the facing driver. Take all other information, such as the license state, from aside the vehicle not by standing in front of or in back of the vehicle. Always face traffic that is moving or parked.
3. Cones and signs should be displayed in accordance with 6A and 6B of the MUTCD or pages 39-65 of the Department Safety Manual. Cones must be placed so as to clearly mark the area closed to traffic as well as to separate through traffic from interviewers. Cones, signs and a vehicle with a flasher should be used in combination to mark the beginning of the area closed off.
4. Sight distance for approaching motorists <u>should be at least</u> 500 feet for 35 mph limit roads and 800 for 55 mph limit roads.
5. The interviewers and the traffic directors should be different people. Traffic directors are the only people allowed to tell drivers when and where to stop and go. These people should be identified. Under no circumstances is any department employee allowed to direct vehicles out of or into the through traffic stream.

6. Sufficient space and unobstructed view must be allowed for merging drivers. Only one driver should be allowed to merge at a time.

Safety is more important than data collection. Stay alert. Watch the drivers - they might not be alert. Treat the drivers formally and don't confuse them.

Source: Sgt. Golden
Enforcement Bureau
Division of Motor Vehicles
2933

PROJECT REGULATIONS

1. Must wear short or long sleeve shirt. No undershirts, T-shirts, or athletic shirts are permissible. Shoes must have substantial uppers and lowers. No sandals or clogs. Orange safety vests are mandatory and will be supplied.

2. Actual interviews at the sites will take place between 7 and 11 a.m. on weekdays. Travel to the interview sites will vary according to the distance from Trenton, thus the report time at Fernwood will take place between 5 and 6 a.m. Employees must report to Fernwood prior to the scheduled time. One week's schedule report time will be provided in advance. Transportation will be provided from Fernwood to the sites and back again, but will not be provided between your residence and Fernwood.

3. Preliminary orientation and training will take place between 8:30 a.m. and 5:00 p.m. at the Smith Building.

4. If for reason of sickness or any other substantial and unpredictable reason you are not able to come to work at the scheduled time, call the Fernwood Guardhouse at (609) 292-3472 and ask the guard to take a message for the field crew supervisor. The survey crews will not wait for late arrivers. If you miss the crew, you will not work that day will not be paid. Repeated non-approved absence will be cause for dismissal.

5. If you know in advance that you cannot come on a particular day, request a day off using the "REQUEST FOR DAY OFF" form. One week's advanced request is preferred. A request two days in advance is absolute minimum. Same day notification will not be accepted without unusually urgent circimstances, such as a death in the immediate family, a disabling injury, sickness, serious family crisis, etc. Since we have not hired substitutes, repeated absence for any of these reasons will be cause for resignation and replacement.

6. Equip yourself with all-weather gear, food and refreshments.

7. First-aid kits will be located in each vehicle. Report all injuries immediately to the supervisor. The supervisor must fill out the first-aid form and send it to the Safety Office.

8. Each employee must conduct his own behavior with the knowledge that he is a representative of the New Jersey State Government. This means that he must be very conservative in his exposure to the public and that he must never use a State car for purposes that do not relate to the project procedure. No horseplay, intoxication, or sleeping is allowed while on the job.

9. For safety purposes, it is absolutely essential that, when at the study site, interviewers follow the safety regulations.

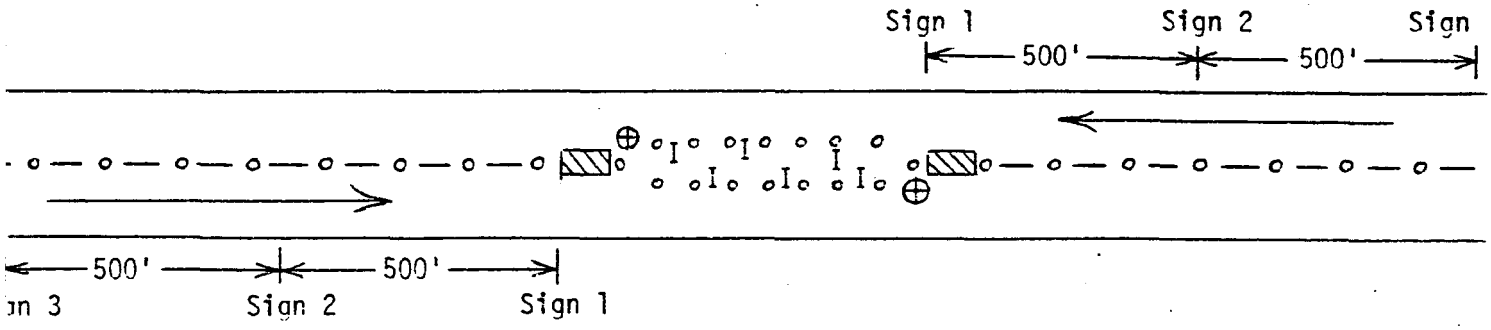
10. Refer complaints or detailed questions from the public to the Bureau of Operations Research, phone number (609) 292-5722.

11. When a State car is abandoned for any length of time, the keys must be taken and the doors must all be locked. Leave at least one window very slightly open. When a State car is left for inspection or repair with the keys in it unlocked, any equipment used for the project including the first-aid supplies must be removed.

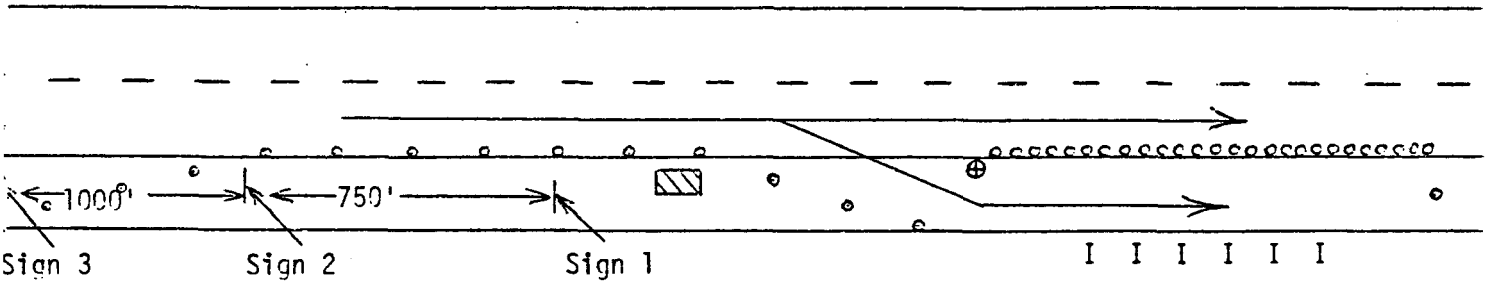
12. Clean the project vehicles each day. Remove all garbage from the inside of the vehicles, <u>including under the seats and in the trunk</u>. Arrange all equipment used neatly every day.

I-95/695 ORIGIN-DESTINATION STUDY
SAFETY SET-UPS

1 2 Lane (Low Volume), No Shoulders

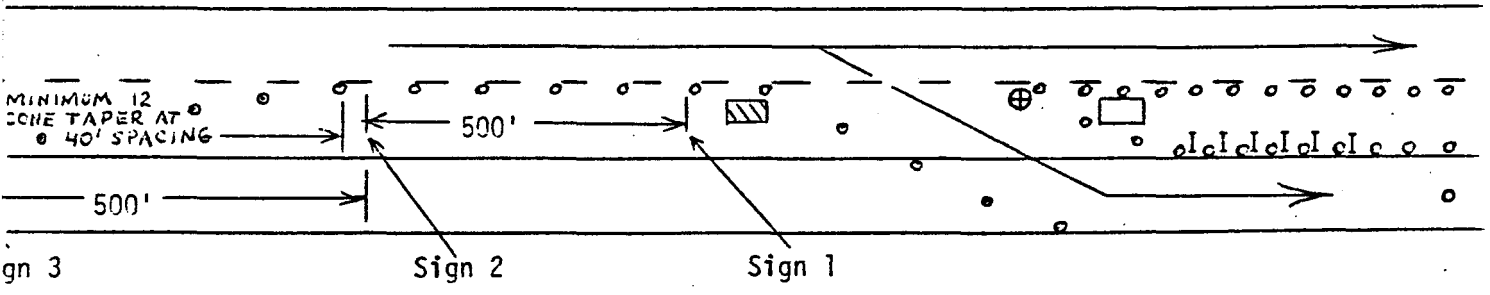


2 2 Lane, with Shoulder; 4 Lane (High Volume), with Shoulder



SET-UP REPEATED ON OTHER SIDE OF ROAD

3 4 Lane (Low Volume), with Shoulder



gn 4 1500' Before Start of Taper

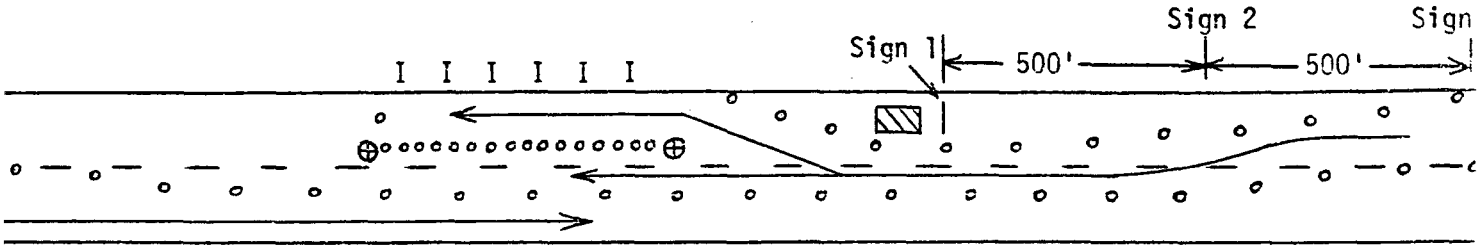
SET-UP REPEATED ON OTHER SIDE OF ROAD

LEGEND

- Policeman
- Interviewers
- Police Car with Flashing Lights
- DOT Vehicles
- Cones

Sign 1: Obey Officer
Sign 2: Slow Down, Traffic Survey
Sign 3: Reduce Speed
Sign 4: Right Lane Closed Ahead

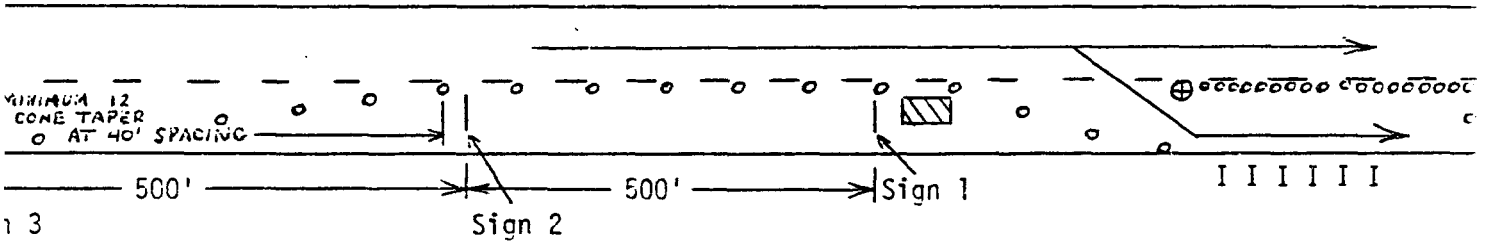
2 Lane (High Volume), No Shoulders



jn 2

OTHER DIRECTION OF TRAVEL COMPLETED
ON ANOTHER DAY

4 Lane, No Shoulders



1 3

1 4 1500' Before Start of Taper

SET-UP REPEATED ON OTHER SIDE OF ROAD

LEGEND

⊕ Policeman	Sign 1: Obey Officer
I Interviewers	Sign 2: Slow Down, Traffic Survey
▨ Police Car with Flashing Lights	Sign 3: Reduce Speed
▭ DOT Vehicle	Sign 4: Right Lane Closed Ahead
o Cones	

APPENDIX C

TEST INFORMATION FOR HIRING SEASONAL EMPLOYEES

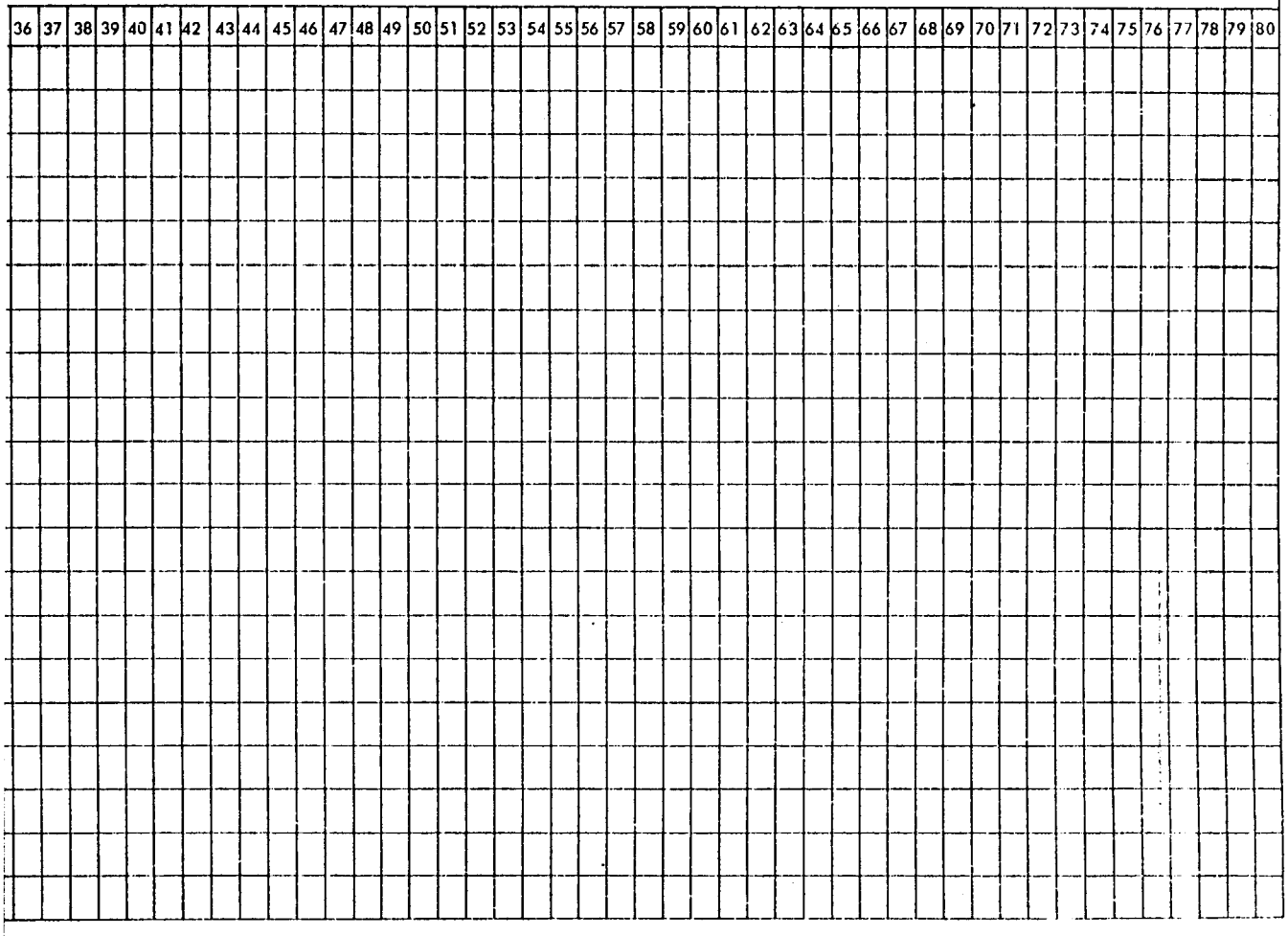
I-95/695 O-D SURVEY

CODING TEST INSTRUCTIONS FOR SUMMER EMPLOYEES

1. Put your name on top of the Data Code Sheet.
2. Capitalize all letters.
3. Code the data from the attached schedule in the following manner.
4. Date - When putting down the month, use both columns under "Date" such as 06 or 07. When putting down the day, again use both columns such as 03 or 17. The date for both Crew 1 or Crew 2 will come from the left column of the data sheet.
5. Site - Use both columns with numbers like 03 or 16.
6. Crew 1 or Crew 2 Location - Copy the route identification with no spaces. Put a space before and between all town and street words.
7. Int. (Interviewers) - Use both columns with numbers such as 04 or 11
8. Vehicle - Use the code on top of the data sheet.
9. Under departure or return time identified as Dep. or Ret. use military time such as 0600, 0545, 1200.
10. Job Time - Job time for both Crew 1 and Crew 2 will be found in the middle of the column under "Job Time." Use all three columns with numbers such 060 or 065.

Check your work as often as possible to prevent making any mistakes and print as neatly as you can. There is no time limit.

DATA CODE SHEET



SCHEDULE FOR I-95/695 ORIGIN DESTINATION SURVEY
USED FOR TESTING SUMMER EMPLOYEES

Date	Site No.	Location	No. of Interviews	Vehicles Needed	Dept. Time	Return Time	Time On Job
6-21	31	Broad St., Scotch Plains	5	1CA	5:15	12:45	7.5
6-22	26	Plainfield Ave., Berkeley Hgts.	7	1CA,1S	5:15	12:45	7.5
6-23	27	Diamond Hill Rd., Berkeley Hgts.	5	1CA	5:15	12:45	7.5
6-24	16	Rt. 12, Kingwood Twp.	5	1CA	5:45	12:15	6.5
6-25	34	Oak Ridge Rd., Clark Twp.	5	1CA	5:30	12:30	7
6:28	21	I-287, Bridgewater Twp.	16	2CA,1S	5:30	12:30	7
6-29	2	Rt. 18, Madison Twp.	16	2CA,1S	5:30	12:30	7
6-30	38	Rt. 1, Edison Twp.	16	2CA,1S	5:30	12:30	7
7-1	41	Rt. 440, Edison Twp.	16	2CA,1S	5:30	12:30	7
7-2	28	Rt. 22, Scotch Plains	16	2CA,1S	5:15	12:45	7.5
7-6	10	Rt. 206, Hamilton Twp.	13	1CA,2S	6:00	12:00	6
7-7	29	Cooper Rd., Scotch Plains	3	1CA	5:15	12:45	7.5
7-8	10	Rt. 130, Hamilton Twp.	11	1CA,2S	6:00	12:00	6
7-9	7	Rt. 539, Upper Freehold Twp.	3	1CA	6:00	12:00	6
7-12	30	Rt. 28, Fanwood	10	1CA,1S	5:15	12:45	7.5
7-13	32	Raritan Rd., Scotch Plains	3	1CA	5:15	12:45	7.5
7-14	12	Calhoun St. Br., Trenton	10	1CA,1S	6:15	11:45	5.5
7-15	24	Rt. 527, Warren Twp.	3	1CA	5:30	12:30	7
7-16	36	Oak Tree Rd., Edison Twp.	8	1CA,1S	5:30	12:30	7
7-19	20	Lamington Rd., Branchburg	4	1CA	5:30	12:30	7
7-20	6	I-195, Upper Freehold Twp.	7	1CA, 1S	6:00	12:00	6
7-21	22	Rt. 202-206,Bridgewater Twp.	5	1CA	5:30	12:30	7
7-22	14	Rt. 202, Delaware Twp.	7	1CA,1S	6:00	12:00	6
7-23	8	Ellisdale-Crosswicks Rd., North Hanover Twp.	5	1CA	6:00	12:00	6

PRONUNCIATION AND DICTION TESTS
FOR SUMMER EMPLOYEES

Read the following questions:

"How many passenger cars are owned by members of this household?"

"How many vehicles, such as trucks or company-owned cars, are garaged or kept on the premises?"

"How many people are living in your household at the present time?"

"How many of these people are 5 years of age or older?"

"How many people in the household are employed?"

"Who is head of your household?"

"And who are the other members of your household in relation to the head?"

APPENDIX D

INTERVIEW FORMS AND CODING PROCEDURES

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-95 / 695 ORIGIN DESTINATION SURVEY

EXTERNAL ROADSIDE INTERVIEW

STA NO ______

SHEET ______ OF ______

INTERVIEWER ______

1) CARD [3] STATION NO. [ ][ ] DATE OF TRAVEL [ ][ ][ ][ ] TRAVEL DAY [0][ ] HOUR BEGINNING [ ][ ] DIRECTION 1-IN 2-OUT [ ]

2 STATE OF REGISTRATION	3 VEHICLE TYPE	4 NUMBER IN VEHICLE	5 WHERE DID THIS TRIP BEGIN (TRIP ORIGIN)	6 WHERE WILL THIS TRIP END (TRIP DESTINATION)	7 PURPOSE FROM	PURPOSE TO	8 TURN-PIKE USE	9 ROUTE OF EXIT OR ENTRANCE
1-NJ 2-OTHR			ST. & NO. CITY STATE	ST. & NO. CITY STATE			1-NO 2-YES	
			ST. & NO. CITY STATE	ST. & NO. CITY STATE				
			ST. & NO. CITY STATE	ST. & NO. CITY STATE				
			ST. & NO. CITY STATE	ST. & NO. CITY STATE				
			ST. & NO. CITY STATE	ST. & NO. CITY STATE				
			ST. & NO. CITY STATE	ST. & NO CITY STATE				

VEHICLE TYPE
1) PASSENGER, TAXI
2) MOTORCYCLE
3) LIGHT TRUCK
2 AXLE, SINGLE TIRE
4) HEAVY TRUCK, GAS
5) HEAVY TRUCK, DIESEL

TRIP PURPOSES
1) HOME
2) WORK
3) BUS.- SHOP.
4) SOC.- RECREATIONAL
5) OTHER
6) TRUCK PURPOSE

TRAVEL DAY
1) MONDAY
2) TUESDAY
3) WEDNESDAY
4) THURSDAY
5) FRIDAY

NEW JERSEY DEPARTMENT OF TRANSPORTATION

I-95 / 695 ORIGIN DESTINATION SURVEY

INTERNAL ROADSIDE INTERVIEW

STA NO _____

SHEET _____ OF _____

INTERVIEWER _____

1) CARD [3] STATION NO. [ ][ ] DATE OF TRAVEL [ ][ ][ ][ ] TRAVEL DAY [0][ ] HOUR BEGINNING [ ][ ] DIRECTION [ ]
3-NORTH
4-SOUTH
5-EAST
6-WEST

2 STATE OF REGISTRATION	3 VEHICLE TYPE	4 NUMBER IN VEHICLE	5 WHERE DID THIS TRIP BEGIN (TRIP ORIGIN)	6 WHERE WILL THIS TRIP END (TRIP DESTINATION)	7 PURPOSE FROM	7 PURPOSE TO	8 TURNPIKE USE	9 ROUTE OF EXIT OR ENTRANCE
1-NJ 2-OTHR			ST. & NO. / CITY / STATE	ST. & NO. / CITY / STATE			1-NO 2-YES	
			ST. & NO. / CITY / STATE	ST. & NO. / CITY / STATE				
			ST. & NO. / CITY / STATE	ST. & NO. / CITY / STATE				
			ST. & NO. / CITY / STATE	ST. & NO. / CITY / STATE				
			ST & NO. / CITY / STATE	ST. & NO. / CITY / STATE				
			ST. & NO. / CITY / STATE	ST. & NO. / CITY / STATE				

VEHICLE TYPE
1) PASSENGER, TAXI
2) MOTORCYCLE
3) LIGHT TRUCK 2 AXLE, SINGLE TIRE
4) HEAVY TRUCK, GAS
5) HEAVY TRUCK, DIESEL

TRIP PURPOSES
1) HOME
2) WORK
3) BUS.- SHOP.
4) SOC.- RECREATIONAL
5) OTHER
6) TRUCK PURPOSE

TRAVEL DAY
1) MONDAY
2) TUESDAY
3) WEDNESDAY
4) THURSDAY
5) FRIDAY

I-95/695 ORIGIN-DESTINATION STUDY
PROCEDURE FOR CODING INTERVIEWS

ONLY CODE WHAT YOU ARE ABSOLUTELY SURE OF

1. Check and make sure the top of the interview form is completely filled in (Line 1). Erase and write over again if it is light or not legible.
2. Code Columns 2, 3, and 4 by entering whatever number is written into the box. NEATLY and LEGIBLY.
3. There are three types of codes used for Columns 5 and 6.

Type A - Inside the Study Area	0 0 0 X X
Type B - Outside Study area but in N.J.	X X X X 0
Type C - Outside New Jersey	X X X X X

The zeros are entered at all times for each type of code. The X's are what the coder determines.

a) If the origin or destination is out of state, refer to the "Out of State Code Numbers" and enter the appropriate code. Note that New York and Pennsylvania have numerous codes.

b) If the address is in New Jersey, look in the "Local Names Code" sheets and determine what county the municipality is in. If the same name occurs more than once, the entry is <u>not</u> codable at this time. If the name occurs only once, go to the "New Jersey Municipality Codes" and look up the county and municipality. Under <u>Code No.</u> is a four digit number which is the first 4 digits in the Type B code -- always followed by a zero. If the four digit number has been penciled out and one or more two digit numbers have been entered next to the municipal name, then the town is in the study area and uses Type A code. 0 0 0 X X.

If there is more than 1 code, (for example, Hopewell) go to the appropriate "County Address Coding Guide" and determine the code by street and zone.

Note: Hopewell has three 2 digit codes in addition to a four digit. This is because Hopewell is partially in and partially out of the study area.

Note: For Hopewell and Princeton, the borough must be differentiated from the township. If this is not done on the interview form, see if the street occurs only in one or the other. If it does, it is codable, if the street occurs in both, the entry is not codable.

4. Next, code Columns 7 and 8 by entering the appropriate number in the box. NEATLY and LEGIBLY.

5. To code Column 9, use the following guide. If either Column 5 or 6 utilized a Type A code (OOOXX) the trip is not a through trip and, therefore, Question 9 does not apply, do not code it. If 5 and 6 are Type B and/or Type C codes, code question 9 by entering the Route # in the boxes.

Example:	Rt. 1	is	0 0 1
	Rt. 202	is	2 0 2
	Rt. 31	is	0 3 1

If the answer is a name and not a number route, go to the county maps and see of the road has a route number. If it does, enter it and record the information on the available sheet or blackboard.

After awhile, this list will grow and be of service to everyone. If you cannot find a number for the road, Column 9 is to be left blank.

6. If you have completely coded the interview, put a check on the LEFT side of the sheet. If not, put an X.

APPENDIX E

COST INFORMATION AND RECOMMENDED TIME & TASK SCHEDULE

I-95/695 ORIGIN-DESTINATION STUDY
COST INFORMATION

FIXED COSTS

I. Planning

1. Supervision	3/4 man-months		$1300
2. Technical	3-1/2 man months		4550
a. scheduling of sites, personnel, and vehicles	5 man-weeks		
b. obtaining equipment	2 man-weeks		
c. scheduling police assistance	2 man-weeks		
d. interviewing and hiring seasonal employees	1 man-week		
e. training seasonal employees	4 man-weeks		
3. Clerical	1/4 man-month		160
		TOTAL	6010
	+43% Additive		2580
			$8590

II. Equipment*

1. Field Equipment

a. 20 clip boards - 8-1/2" x 11"	$ 10.00
b. 2 car top flashing lights	40.00
c. 150 cones - 28"	750.00
d. 8 signs	400.00
e. 3 pencil sharpeners	12.00
f. 8 boxes of drinking cups 3 oz.	2.00
g. 1 case of paper towels	12.00
h. 3 cans of hand cleaner	3.00
i. 8 doz. pencils	10.00
j. 20 pkgs. of manila envelopes - 25 per pkg.	14.00
k. 4 water coolers, 3 gallon capacity	50.00
l. 20 safety flags, red	15.00
m. 10 plastic garbage bags	1.00

n.	50 bags of ice**	50.00
o.	4 first aid kits	40.00
p.	8,000 interview forms	38.00
q.	22 safety vests, orange	75.00

* Equipment costs based on materials needed to perform 2 sites per day.

** Used in coolers for drinking water each survey day.

2. Office Equipment

a.	8 county maps	16.00
b.	20 file boxes, record storage	10.00
c.	miscellaneous office supplies	5.00
		$1553.00

III. Reporting

1. Technical	3/4 man-month	$ 900
a. writing	2 man-weeks	
b. editing	1 man-week	
2. Clerical	1/2 man-month	320
		1220
	+43% Additive	524
		$1744

VARIABLE COSTS

I. Roadside Interviewing

1. Technical	6 man-months	$8400
a. site location	1/2 man-month	
b. field supervision	5-1/2 man-months	
	+43% Additive	3612
		12012
2. Seasonal Employees	20 man-months	8000
a. interviewing		20012

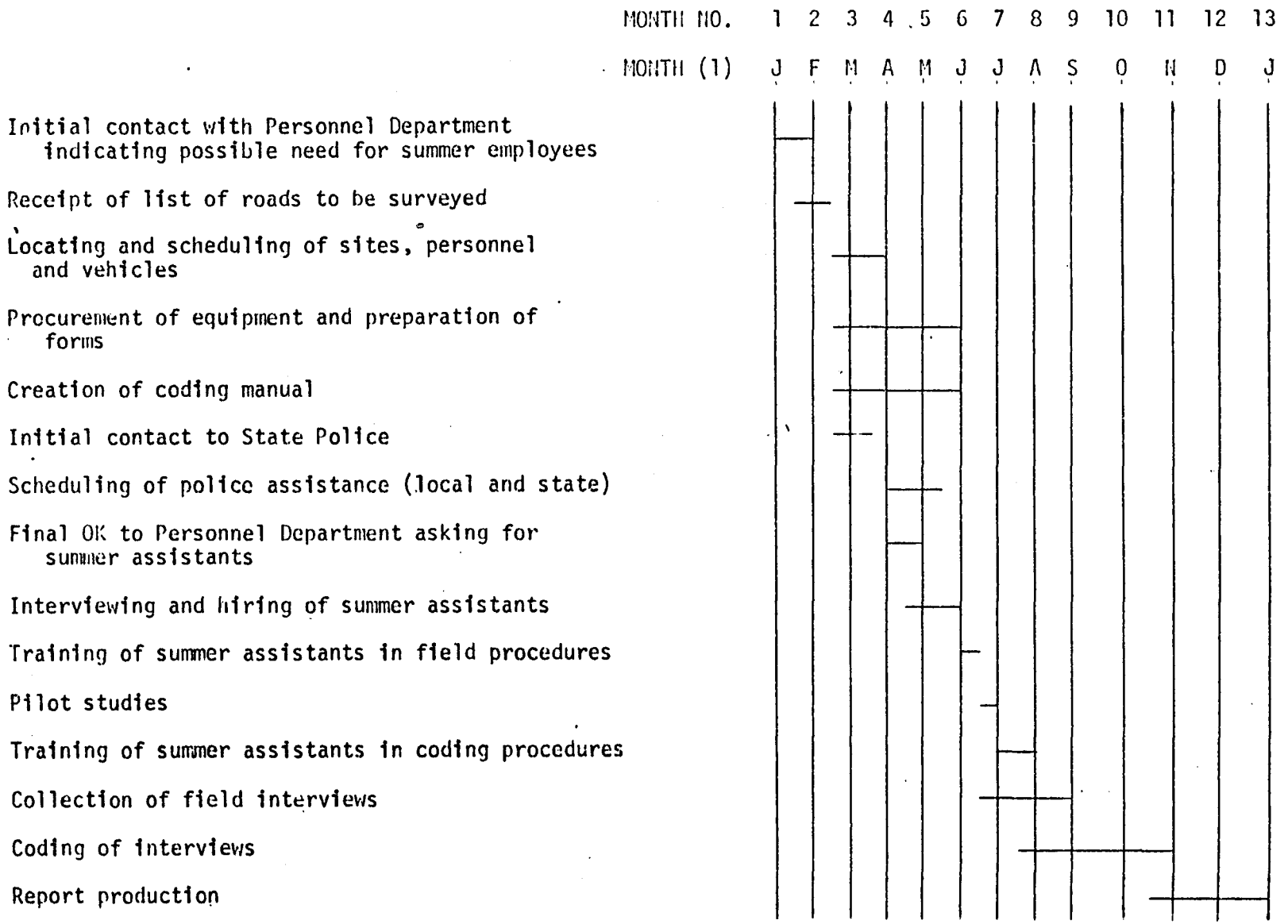
II. Vehicle Usage

1. 5600 miles @ 7¢ per mile		$ 400

III. Interview Coding

1. Seasonal Employees	17.5 man-months	$7,000
a. coding		
2. Technical	7 man-months	8,500
a. checking of coding	3 man-months	
b. supervision	4 man-months	
	+43% Additive	3,655
		$19,155

RECOMMENDED WORK SCHEDULE FOR O-D STUDY OF A SIMILAR SIZE TO THE I-95/695 STUDY



(1) If high school and college students are to be used in the study, the tasks should be performed in the months indicated since such employees are available only in the summer.