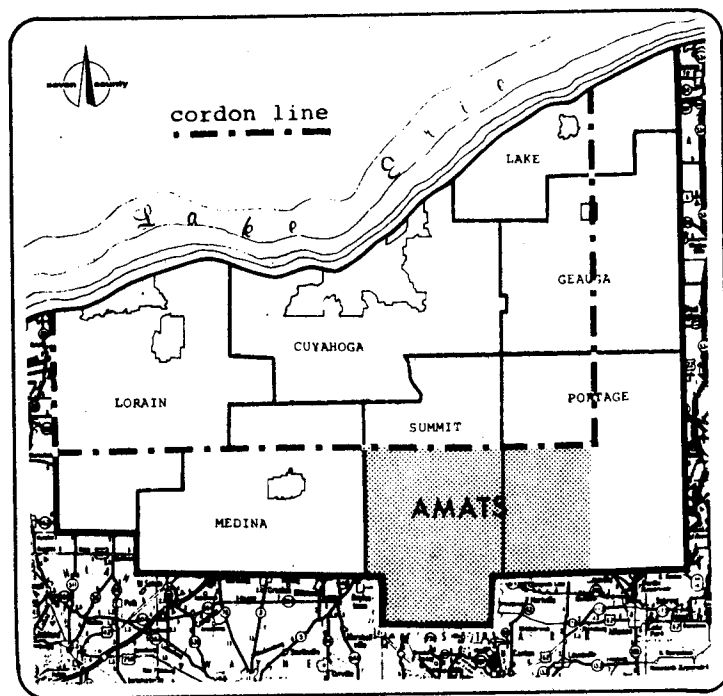


**Accuracy &
Checks
Adjustments
on the
1963
Origin-Destination
Survey**



NOVEMBER 1967 ✓

PROJECT NO. 122003



The **Cleveland-Seven County Transportation-Land Use Study** is a joint effort in planning by governments and technical agencies in Northern Ohio, the State of Ohio and the U.S. Bureau of Public Roads and U.S. Department of Housing and Urban Development. It was established in 1963 for a cooperative, comprehensive and continuing planning of transportation and land use.

The Study Area embraces 2,516 square miles in the seven counties of Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit. The Akron Metropolitan Area Transportation Study also is underway in the Seven County Region and covers a 415 square mile area in Summit and Portage Counties.

The cordon line, established as a boundary for the 1963 Ohio Department of Highways Origin and Destination Survey, encloses an area of 1,445 square miles where the greatest growth is expected to take place.

For additional information about the Study write to: Information Services Center, Cleveland-Seven County Study, 439 The Arcade, Cleveland, Ohio 44114.

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ACCURACY CHECKS OF ADJUSTMENTS ON THE 1963
ORIGIN-DESTINATION SURVEY

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CLEVELAND-SEVEN COUNTY TRANSPORTATION-LAND USE STUDY
439 The Arcade Cleveland, Ohio 44114

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I Introduction

In 1962, the initial steps were taken for the creation of the Cleveland Seven County Transportation-Land Use Study by an organizing committee of representatives from Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit Counties, the City of Cleveland, the Ohio Department of Highways, the Bureau of Public Roads and the Urban Renewal Administration (now Department of Housing and Urban Development). The Study's Central Staff began its operations in June, 1965.

Most of the base data being used by the Study was obtained in an Origin-Destination Survey conducted for the seven counties by the Ohio Department of Highways in 1963.

This report is a part of the documentation of the methods used for the collection, processing, checking and adjustment of the base data. It illustrates the step-by-step approach used in making accuracy checks of the data files to assure that the expanded sample was a reasonable representation of the real world. (These files are also referred to in the report as the "trip files".)

Checks on the sample sufficiency of the dwelling unit data were completed and adjustments made before checks were made on the trip reporting. A separate analysis was made of each major mode with several independent accuracy checks made of the actual trip data. These involved screenlines, total trips and vehicle miles of travel (VMT). It is shown that use of a single control could lead to incorrect adjustment of the file and that it is better to balance among several controls rather than to achieve a perfect match on one control without consideration of the others. In the case of highway travel total screenline, shape of screenline crossing histogram and total VMT were used. For transit travel, the adjustment controls were total trips by rapid transit and by bus, screenline crossings for both modes, screenline histograms, trip volumes to selected areas, and trip volumes by time of day.

Section II describes the details of the travel surveys -- home interview, truck, taxi and external interview -- and it also includes a brief outline of the processing which used the "Street Dictionary" technique to assign trip ends

to zones. Section III outlines the checks on the dwelling unit survey including the establishing of control totals, tabulations of reported data, and the resulting adjustments. Section IV outlines the checks on automobile, truck, and taxi trip making, that includes screenline and vehicle miles of travel controls, tables of reported trip data and adjustments based on trip data. Section V covers the accuracy checks and adjustments on transit travel -- rail rapid and bus. Section VI is collection of tables prepared in connection with the accuracy checks and give a general overview of the data.

Due to the preliminary nature of the data and the fact that some processing was still in progress at the time the accuracy checking was done, totals may not agree exactly from table to table within this report, nor will they agree with final figures obtained from rounded data as presented in the series of SCOTS Data Books. The figures here represent only the actual data used in the checking process and must be considered as such.

II Travel Survey

In 1962, the Ohio Department of Highways (ODH) entered into an agreement with the Cuyahoga, Lake and Lorain County Commissioners and Engineers to conduct a comprehensive origin and destination (O-D) survey. The survey was conducted between June and December of 1963 in a 1,445 square mile Cordon Area (see Figure 1) which also included portions of Geauga, Medina, Summit and Portage Counties.

The Ohio Department of Highways, with the cooperation and assistance of the U. S. Bureau of Public Roads (BPR), undertook the development of a new technique for conducting the survey and processing the data. In the "Ohio Procedure," land use was qualified by means of a dwelling unit inventory at the same time the home interview portion of the survey was conducted. A new process for the automatic zoning of trip ends was also developed.

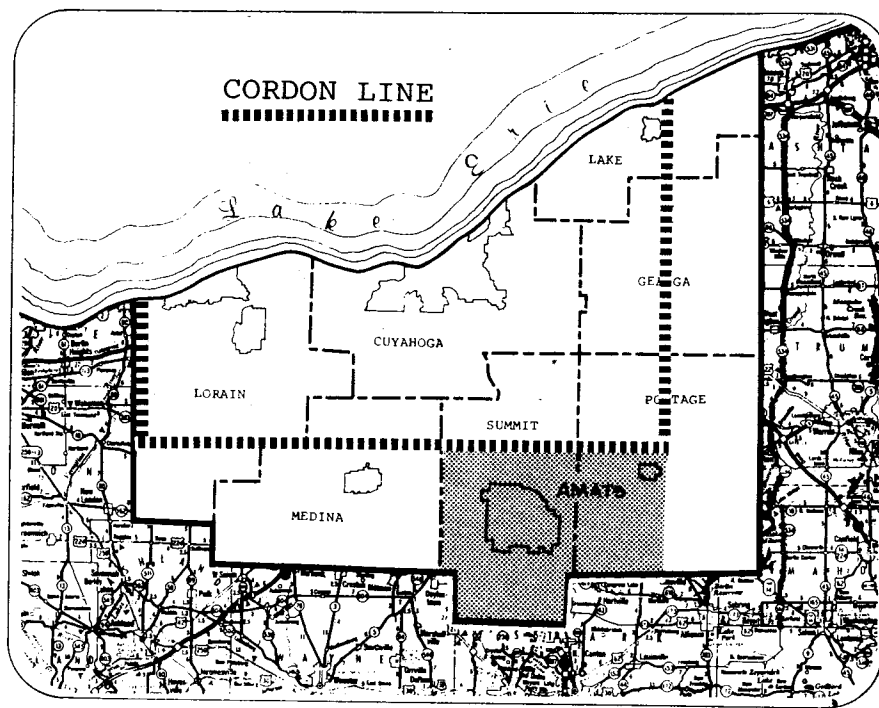


Figure 1 -- Study Cordon Area

Overall Design of Ohio Procedure

SURVEYS

The travel survey was composed of four major sections: Dwelling Unit Inventory, Home Interview, Truck-Taxi Survey, and External Survey.

In the home interview portion of the survey, a leave-behind trip questionnaire booklet was distributed by a field worker to the sample household unit and collected two days later. The questionnaire asked for the same information called for in previous O-D surveys. This includes household characteristics, trip reporting, mode of travel and trip purpose information. The booklets were designed for completion by members of the household without assistance of survey personnel. In low socio-economic areas, however, the need for assistance was anticipated and provided.

The survey was designed for a 25% sample in urban areas and a 33 1/3% sample in rural areas.

In the process of distributing the booklets, the field worker completed a dwelling unit inventory form, logging each parcel of land and its use in his assigned area.

The truck survey was designed to obtain a 50% sample of truck trip information. For fleet owned trucks a leave behind questionnaire was used. Samples were preselected and the questionnaire was delivered to the truck operator for completion and collected two days later in the same manner as the home interview booklets.

Trip reports for non-fleet trucks were obtained by a mail survey. A questionnaire was mailed to a preselected sample for completion and subsequent return to the survey office. Both fleet and non-fleet truck questionnaires were identical and compatible to the home interview reporting format.

The survey of taxi trips was conducted by obtaining copies of the trip logs from the taxi companies. The trip questionnaires were then prepared from these logs by survey personnel. The questionnaire format was also compatible to the home interview reporting format.

The external survey was conducted by means of standard roadside interviews. Reporting of trips was designed for actual addresses of the trip ends and for compatibility with the other phases of the survey.

TRIP END ASSIGNMENT DICTIONARIES

The Ohio Procedure was designed to make use of computerized dictionaries for the automatic zoning of trip ends. Street address, parcel, place name, intersection and external dictionaries and a block-to-zone correspondence table were developed. With these six computerized files any trip end could be zoned.

Street Address and Parcel Dictionaries -- The street address dictionary is a master list of street addresses. In the automatic zoning process, a reported trip is first compared against this dictionary, assigned a street code number and then compared to the parcel dictionary. The parcel dictionary contains land use data from the dwelling unit inventory. The trip end is compared until either a one-to-one match of the address is obtained or the address is located between two addresses in the file. When the trip end is located for either condition, the land use of the parcel and the number of the block in which the parcel is located are assigned to the trip end. The block number is then compared against a table containing block-to-zone combinations and the trip end subsequently assigned to an O-D or traffic zone.

Place Name Dictionary -- A dictionary of prominent business, industrial and commercial establishments, public and private institutions and transportation terminals was created to zone those trips not reported by street address but by name. Typical examples are the Chevrolet Stamping Plant, Ford Engine Plant, Chrysler Stamping Plant or West Park Rapid Transit Station. This dictionary identifies their land use and block location number. Zoning is achieved by comparing the place name against the place dictionary file. When a match occurs, the trip is assigned the corresponding land use and block number. Transition from block-to-zone is the same as for trips reported to street addresses.

Intersection Dictionary -- The reporting of trips to intersections is common in rural areas where conventional house numbering is virtually non-existent. A dictionary of intersections was created to zone these trips. Zoning is accomplished by matching the two intersecting streets reported for the trip against the intersection file. When a match is achieved, the corresponding land use and block number are assigned in the same manner as the other dictionaries. Transition from block-to-zone is also the same.

External -- The three dictionaries previously described cover trip ends, either origins or destinations, that are in the Study Cordon Area. An external dictionary of city and states and other prominent places was prepared for zoning trips that began or ended outside the Study Cordon Area. These trips are reported by city and state or some well-known place title. The trip end is compared against the external dictionary until a match is made. When a trip end is located, the processing code for the particular city or place is assigned.

Specific Surveys and Zoning Process

Dwelling Unit Inventory

DESIGN

For the overall design of the O-D Survey, the demographic reporting unit for travel information was the physical block. Several reasons lay behind this decision. The foremost was flexibility for the initial delineation of O-D zones and for possible rezoning if needed. Secondly, a systematic procedure for updating parcels could best be done using the block as the reference unit.

The geographic control for the land use inventory and the trip surveys consisted of a three-level hierarchy: political unit, tract within political unit, and block within tract. The Study Cordon Area was divided into 117 political units and each unit was assigned a code. Existing census tracts were used and pseudo tracts were created where needed. The tracts were also assigned a code, as were the individual blocks. The full block identity consisted of the block number and the tract number. There are approximately 17,000 distinct blocks in the Study Cordon Area.

SURVEY

A complete inventory of all parcels within the Study Cordon Area was required as the input for the parcel dictionary. A census tract was assigned to each worker. He was given a map showing the census tract boundaries, block numbers and block face designations. His instructions were to complete one set of dwelling unit inventory forms (see Figure 2) for each block. He was to start the inventory at the northeast corner of the blocks and then proceed around the block logging parcel land use, house numbers and street names and intersections defining the blocks. Names of establishments, if evident, were also recorded and the number of units within multiple-dwelling buildings. The inventory form was also used to record the sample distribution of the trip questionnaire booklets.

Figure 3 -- D, D-1 and E cards.

Block control numbers recorded on the D cards were also recorded on the D1 and E cards. Figure 4 depicts the block, parcel and intersection scheme and their corresponding cards.

The D, D1, and E card files were the inputs to build internal street dictionaries. The programs to create the dictionaries are restricted only by data format and not by Study Area size or composition and provide for regular and systematic updates. A generalized procedure and program were also developed to process O-D data from any urban study area.

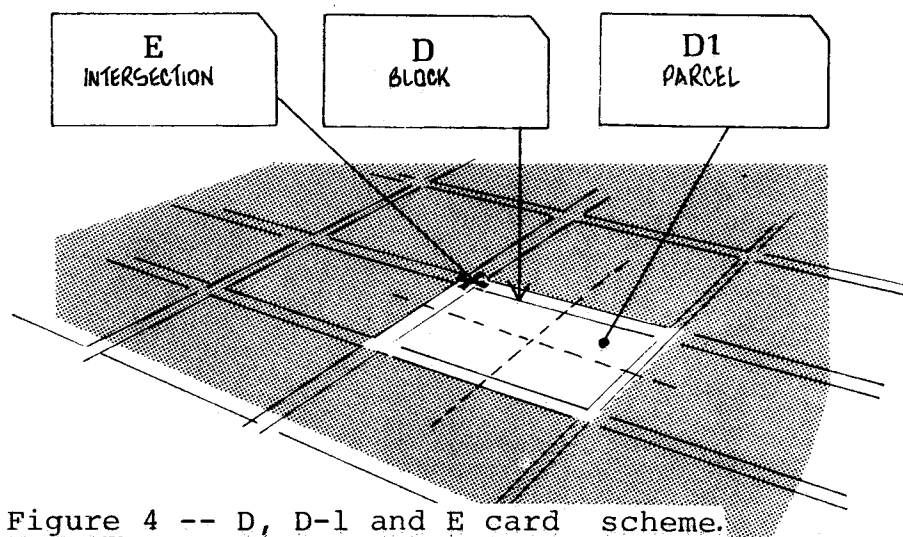


Figure 4 -- D, D-1 and E card scheme.

The D1 card is the individual parcel information card. Land use; street address; number of units (if a multiple dwelling unit), and place name (if one exists), were punched for each parcel on separate cards. A block, therefore, may have as many D1 cards as there are parcels in the block.

The E card is the intersection card on which the two streets defining the block intersection are recorded. A land use is assigned to each intersection based on corner land use on the D1 cards. One or more E cards were prepared for each intersection.

In preparing the dictionaries a set of codes was developed to translate a portion of the data and facilitate data processing. The complete block identification code consists of political unit, tract number and block number. This is an 11-character field containing both alpha and numeric characters and was too complex for efficient processing. To simplify the code, an operating correspondence code was created by sorting all blocks by political unit, alpha tract code, numeric tract number and finally block. The sorted blocks were assigned a five-digit sequence number beginning with 00001. This operating code number is called the Census Tract Block (CTB) number.

For future use, in the event the Study Area is enlarged or rural areas are subdivided, additional blocks can be assigned new CTB numbers following the numerical sequence. For example, if the last sequence number for the initial survey was n , the new CTB block number is $n + 1$.

An allied "quick reference" street dictionary was also created to help reduce processing time when zoning trips. It consists of all streets in a given municipality with a corresponding unique four-digit numeric code for each street.

This quick reference file was created by inputting data from the D1 cards and sorting by political unit. After streets were assigned to their political unit, they were alphabetized, sorted to the list and assigned a unique sequence number. Since each political unit was previously assigned a three-digit numeric code, all streets within the Study Cordon Area may be identified by the three-digit city code and four-digit street code. Additions can be made to the quick reference dictionary similar to additions to the CTB file. A new street is assigned the next highest sequence number in the political unit.

The parcel dictionary was created from the D1 cards. Data were sorted by political unit and then by street within the political unit. Street names were transformed from their alpha name to the four-digit code number in the quick reference street dictionary file.

For each street, house numbers first were sorted into block number groupings. The CTB recode number for the block then was entered. Next, house numbers were split into even and odd numbers and both groups were sorted from low-to-high. A code entry was made indicating if the house number listing was done either ascending or descending on the block face. The land use code for each parcel was also entered in this file. Updating procedure is standardized so addition of new parcels may be made directly.

The place name dictionary was created from D1 cards and supplemental information collected by the survey staff. Data were first sorted by political unit, then alphabetized by place name within the political unit. Each listing in the place name dictionary contains the full name of the place in sort with its land use and CTB recorded block number. Updating this file is accomplished by adding the new place name and resorting alphabetically for the particular political unit.

The intersection dictionary was drawn from the E cards. As in the other dictionaries, data were first sorted by political unit. After the first sort, intersection combinations were alphabetically sorted in each political unit; the first street in each intersection combination is alphabetically lower than the second. The alphabet intersection dictionary was compared against the quick reference street dictionary and the code street numbers assigned. Each entry in the intersection dictionary is then in alphabetic sort by its position in the political unit (with the street code numbers). Its land use and CTB number are also recorded. Updating is done by adding the new intersection to the file and resorting to the correct position.

The external dictionary is independent of the Study Cordon Area and survey work. Data inputs for this file come from two sources: 1) IBM city, county and state codes for political units with over 2,500 population for the United States (including Ohio); and 2) a list of villages, townships, cities with less than 2,500 population and other well-known places in Ohio.

The external dictionary, therefore, is composed of two parts: The standard IBM codes, termed the primary external dictionary; and the supplemental Ohio codes, termed the secondary external dictionary. One reason for the secondary dictionary is uniform external data reporting for all studies conducted in Ohio.

These dictionaries are in sort by state and political unit. Each entry consists of the alphabetical city and state name and the corresponding city, county and state recodes.

Home Interview Survey

DESIGN

The Home Interview Survey was designed for a 25% sample of urban households and a 33 1/3% sample of rural households. The survey was conducted by means of a booklet that was to be completed by the household members.

The design of the booklet had to meet three requirements:

- 1) Simplicity of questions, phrasing and sequencing because the booklet was to be completed with no or minimum aid from survey personnel.
- 2) Coverage of all data necessary to fulfill needs of State planning offices, the Study and local governmental agencies in the Study Area.
- 3) Format to permit the keypunching of data directly from the booklet with a minimum amount of editing.

Booklet layout, resulting from the three requirements, consisted of three major sections: 1) Instruction With Sample Reporting, 2) Dwelling Unit Characteristics and 3) Individual Person Characteristics and Trip Reporting. By following instructions and looking at the sample trip reports, members of the household, in most cases, should have had little difficulty in completing the questionnaire.

The dwelling unit summary questions requested information on number of occupants, number of occupants 5 years-of-age or older, number of roomers, number of automobiles garaged at the sample, persons employed outside of the household and number of non-trip-makers. Questions were arranged so answers were written into keypunching control boxes as illustrated in Figure 5. In subsequent Ohio studies, school enrollment and years at present residence were added.

DWELLING UNIT SUMMARY
(TO BE FILLED IN BY HEAD OF HOUSEHOLD--PERSON NO. 1)

IMPORTANT
PLEASE FURNISH THE FOLLOWING DATA PERTAINING TO YOUR HOUSEHOLD

- 1 HOW MANY PERSONS LIVE AT THIS ADDRESS? ☐
- 2 HOW MANY ARE 5 YEARS OF AGE, OR OLDER? ☐
- 3 HOW MANY ROOMERS, IF ANY? ☐
- 4 HOW MANY PASSENGER CARS ARE OWNED BY ALL PERSONS LIVING AT THIS ADDRESS?
(INCLUDE COMPANY OWNED CARS GARAGED AT HOME) ☐
- 5 HOW MANY PERSONS ARE EMPLOYED OUTSIDE THE HOME? ☐
- 6 HOW MANY PERSONS DID NOT MAKE TRIPS? ☐

Figure 5 -- Dwelling unit summary.

The completion of an individual trip report form (see Figure 6) was requested of each person 5 years-of-age or older. The form's trip-maker characteristics included sex, occupation, relation to head of household and date and day of the week. The person directly recorded this information and his trip reports either in a form and position for direct keypunching or for easy editing and recoding.

Mr. Smith's Report

TRIP REPORT FOR PERSON NO. 1 <small>(PLEASE READ INSTRUCTIONS ON BACK COVER)</small>									
SEX OF PERSON: MALE <input checked="" type="checkbox"/> FEMALE <input type="checkbox"/>		RELATIONSHIP TO HEAD OF HOUSEHOLD: <i>HEAD OF HOUSEHOLD</i>		TIME OF TRIP	METHOD OF TRAVEL	PURPOSE OF TRIP			
OCCUPATION: <i>OFFICE CLERK</i>		DATE OF REPORTED TRIPS: <i>JUNE 7 FRIDAY</i>		RECORD ARRIVAL & LEAVING TIME FOR EACH TRIP	CIRCLE NUMBER UNDER METHOD OF TRANSPORTATION USED TO WALK EACH TRIP	CIRCLE NO. UNDER TEN WHICH BEST DESCRIBES PRIMARY PURPOSE OF EACH TRIP			
IF YOU DID NOT MAKE ANY TRIPS, CHECK HERE <input type="checkbox"/>				MINUTES	TO WALKER	TO WALKER	TO WALKER	TO WALKER	TO WALKER
HOUSE NO.	STREET NAME	CITY OR VILLAGE	TIME STARTED	ARRIVED	LEFT	1	2	3	4
17150	BRADGATE AVE.	CLEVELAND	7:00 A	7:12 A	7:20 A	0	1	2	3
	RAPID TRANSIT STOP AT W. 143 RD ST. CLEVELAND			7:35 A	7:40 A	0	1	2	3
	RAPID TRANSIT STOP AT RAILROAD ST. CLEVELAND			7:50 A	8:00 P	0	1	2	3
	1012 E. EUCLID AVE.	CLEVELAND		8:10 P	8:20 P	0	1	2	3
	27 PROSPECT AVE. N.W.	CLEVELAND		8:30 P	8:40 P	0	1	2	3
	537 E. STATE ST.	PRINCEVILLE		8:50 P	9:00 P	0	1	2	3
	17150 BRADGATE AVE.	CLEVELAND		9:15 P	9:25 P	0	1	2	3
7 THEN TO									
8 THEN TO									
9 THEN TO									
10 THEN TO									

(LIST ADDITIONAL TRIPS ON REVERSE SIDE)

Figure 6 -- Sample report form.

A report of one full day's trips then was requested. Format required reporting house number, street name and designation, and city or village if the trip destination was at a street address. If the trip end was to a named place, the place name and city or village in which the place was located were reported. If the trip end was to an intersection, it required both street names and designation along with the municipality. For trip ends outside of the Study Area, municipality name and state were requested. Method of travel requested for each part of the trip was:

- 1) Auto Driver
- 2) Auto Passenger
- 3) Bus
- 4) Rapid Transit
- 5) Taxi
- 6) Truck Passenger
- 7) Walk-to-or-from Work
- 8) School Bus

Specific information was desired on rapid transit trips because of the two operating rapid transit systems with fully developed park-and-ride and feeder bus operations in the Study Area.

Standard trip purposes were:

- 1) Work
- 2) Personal Business
- 3) Shopping
- 4) Social-Recreation
- 5) School
- 6) Eat a Meal
- 7) Medical or Dental
- 8) Serve Passenger
- 9) Change Way of Travel
- 10) Home

SURVEY AND PROCESSING

The trip questionnaire booklets were distributed by field workers at the same time they were conducting the land use inventory. In urban areas, a booklet was dropped off at every fourth dwelling unit as the worker proceeded around the block. In rural areas, every third dwelling unit received a questionnaire. Sample selection was marked on the Dwelling Unit Inventory sheet and a listing of sampled dwelling units was prepared in the field office for use in

collection and control. This summary sheet is shown in Figure 7.

[illegible]

Figure 7 -- Collection summary sheet.

When delivering the booklet, the field worker explained the need for trip information and requested cooperation from the householders. He also explained that a member of the survey would return in two days to collect the booklet.

Collection design required that at least 85% of the booklets be returned. A total of four call-back attempts was made. On a call-back, the survey worker recorded what happened at the dwelling unit; whether the booklet was completed, refused, or no one was home. If face-to-face contact was not made, a phone call was placed to arrange a collection time. Information on the samples was recorded on the collection summary by block sheet. These data were summarized and punched on the D or summary card (see discussion of processing under Dwelling Unit Inventory) to compute the sample expansion factor.

15

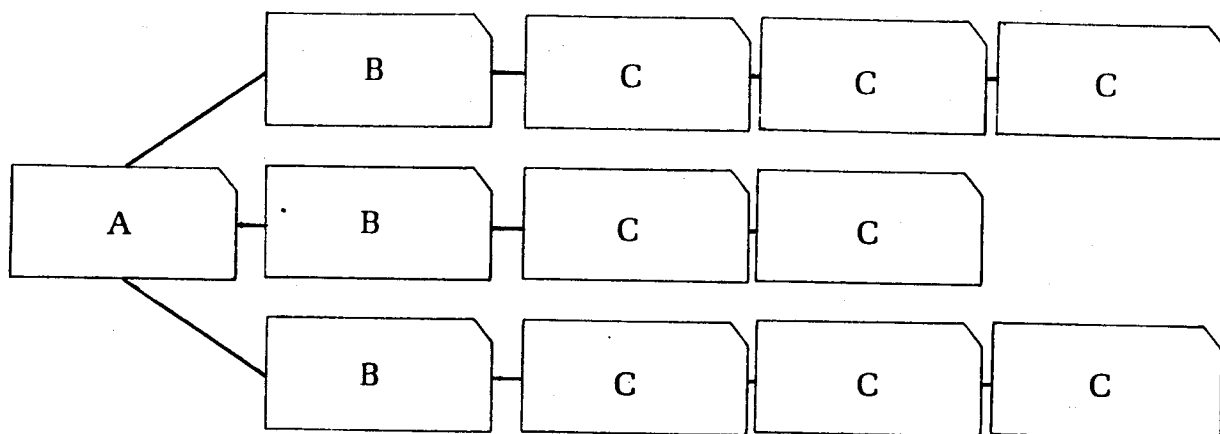


Figure 9 -- A, B, and C card flow.

Truck Survey

DESIGN

Registration records were obtained for all trucks within the Cordon Area. License number, make, address and owner of the truck were punched on cards and the trucks sorted into fleet and non-fleet categories. Fleet was defined as five or more vehicles registered at the same address or by the same firm or person.

Both fleet and non-fleet vehicles were sorted into weight classes using the first two digits of the license number. A 50% sample was selected from each weight class for both fleet and non-fleet groups.

The three requirements set forth for the Home Interview questionnaire were established for the Truck Survey. Questionnaire layout resulting from these three requirements consisted of three major sections: 1) Instructions for Completing the Questionnaire, 2) Characteristics of the Truck and 3) Trip Reports of the Truck. Instructions were simple and explicit so that a minimum of difficulty would be encountered in completing the questionnaire.

An individual trip report form was requested for each selected vehicle. Information asked on the characteristics of each sample included name of owner, type of business for which the truck was used, the principle commodity hauled, the address where the truck was garaged, the type of truck and the date and day of the report. The fleet trip report is shown in Figure 10.

Figure 10 -- Truck fleet trip report form.

A report of the full day's trips was requested for each selected truck. The format for reporting the trip ends was the same as in the Home Interview Survey. It required either a house number, street name and designation and city, place name and city, or city name and state, depending on the location of the trip end.

No indication for mode of travel was necessary because all trips were of one mode -- truck.

Trip purposes used for the survey were:

- 1) To Deliver Goods
- 2) To Pick Up Goods
- 3) To Deliver and Pick Up Goods
- 4) Other Work Connected Business
- 5) To Render a Service
- 6) Personal Errands
- 7) Eat a Meal
- 8) To Operator's Home
- 9) To Base of Operations.

The time of arrival at a destination and the time of departure for the next trip were also requested.

SURVEY

For each fleet truck selected for sampling, the report form was prepared with the license number and address of the owner. This form was delivered to the owner and he was instructed to report trips for that particular vehicle. A pickup of the questionnaire was scheduled for two days later.

The non-fleet survey was conducted by mail. A report form for the selected sample was prepared and mailed to the owner with instructions. These were then mailed back to the survey office.

PROCESSING

Editing of the truck trip reports was kept to a minimum with primary attention paid to the correct presentation of the trip addresses and the logic of the trip flow.

Information from the truck reports was punched on three types of cards: F, G and H cards (see Figure 11). Vehicle characteristics were punched on the F card. Data for fleet and non-fleet vehicles were identical except for the fleet type code.

The first trip end for the day's trips was punched on the G card. If no trips were made, this was indicated on the G card in place of the first trip. For each succeeding trip end an H card was punched with the trip address, time and purpose. The card flow for a single vehicle report is shown in Figure 12.

STREET NAME

HOUSE NO

DIRECTION

STREET NAME

HOUSE NO

DIRECTION

STREET NAME

HOUSE NO

DIRECTION

CONTROL 7

CONTROL 8

CONTROL 9

TRANSPORTATION STUDY
TRUCK AND TAXI TRIP DESTINATION CARD
BUREAU OF PLANNING SURVEY

HACKETT 0700228

Figure 11 -- F, G, and H cards.

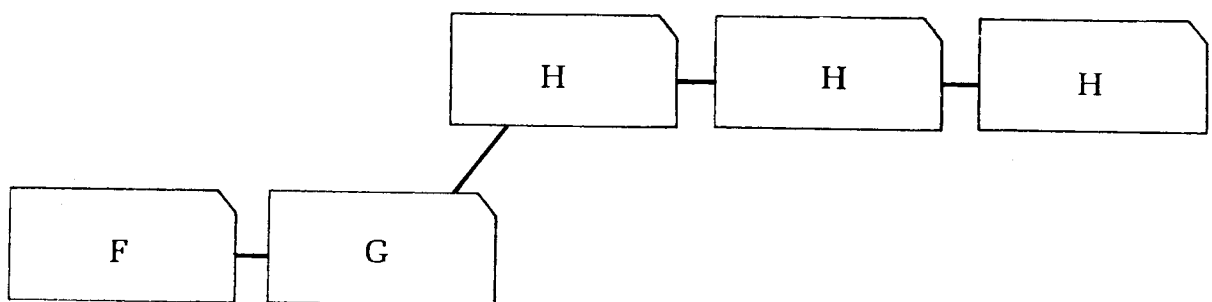


Figure 12 -- F, G, and H card flow.

Taxi Survey

DESIGN AND SURVEY

The survey was designed for a 100% sample or reporting of all taxi trips. For survey purposes, all taxis were classified as fleet-operated.

A listing of all taxi companies was obtained from telephone and business directories. The companies were notified of the survey and then personally contacted for copies of one day's trip log for each taxi. Survey office personnel then completed the trip report forms from the log.

As in the previous two surveys the same set of requirements dictated the questionnaire design. The questionnaire (see Figure 13) was comprised of two basic sections: 1) Characteristics of the Taxi and 2) the Taxi Trip Reports. Since the form was completed by survey personnel, no instructions were necessary for the taxi operators.

A report was prepared for each taxi operation in the Study Area. Information about the characteristics of the taxi included license number, type of business in which taxi is used, name of the owner, address where the taxi is garaged and date and day of the survey.

A report of the full day's trips was requested. The only information desired for the trip report was address and start and arrive time of the trip. Address was recorded according to the standard procedure required for the survey. Mode identification was not necessary or was trip purpose, "serve passenger" being the assumed purpose.

PROCESSING

The taxi trip reports were processed in the same manner as the truck trip reports and the same cards, F, G and H, were used.

Characteristics of the taxi were punched on the F card. A G card was punched for the origin of the first trip end. In the event the taxi made no trips, this was indicated on the G card in place of the first trip end. For each succeeding trip end, an H card was punched.

The card flow for the taxi report was the same as for the truck reports.

CLEVELAND-7 COUNTY AREA TRANSPORTATION SURVEY — TAXI FLEET REPORT

☐ TRACT BLOCK SAMPLE LICENSE NUMBER FLEET **2**

☐ NAME OF OWNER
DRIVEN — PLEASE FILL IN REMAINING PORTION OF REPORT BELOW THIS LINE

☐ (TYPE OF BUSINESS)
ADDRESS WHERE VEHICLE IS GARAGED

STREET (HOUSE) NO. STREET OR ROAD NAME CITY OR VILLAGE

☐ TAXI

DATE OF REPORTED TRIPS
(MONTH) (DATE) (DAY — MON — TUE — WED — ETC.)

IF YOU DID NOT MAKE ANY TRIPS, CHECK HERE ☐

	HOUSE NUMBER	STREET NAME	CITY OR VILLAGE	TIME OF TRIP		
				TIME START-ED	RECORD ARRIVAL AND LEAVING TIME FOR EACH ADDRESS	
				HOUR	MINUTES	AM — PM
MY DAY'S TRIPS STARTED FROM						
THEN I WENT TO				ARR.		M
				LEFT		M
TO				ARR.		M
				LEFT		M
THEN TO				ARR.		M
				LEFT		M
THEN TO				ARR.		M
				LEFT		M
THEN TO				ARR.		M
				LEFT		M
TO				ARR.		M

Figure 13 -- Taxi report form.

External Survey

DESIGN

The external form was designed to facilitate quick and efficient reporting at an interim station and to minimize delay and inconvenience to the person being interviewed. At the same time the format had to correspond to the requirements set forth in the Home Interview and Truck-Taxi surveys.

For each interview, a separate line was coded. Information requested from the trip-maker was:

- 1) Address of Origin
- 2) Address of Destination
- 3) From Purpose
- 4) To Purpose
- 5) Location Where the Vehicle was Garaged
- 6) Entering or Exiting Route (depending on direction of interview) if the trip was a through trip.

Additional information supplied by the interviewer was:

- 1) Vehicle Type
- 2) Number of Occupants of the Vehicle

Addressees were reported using the standard format, depending on the address type.

Trip purposes for the survey were:

- 1) Work
- 2) Personal Business
- 3) Shopping
- 4) Social-Recreation
- 5) School
- 6) Eat a Meal
- 7) Medical-Dental
- 8) Serve Passenger
- 9) Change Way of Travel
- 0) To Home

Vehicle Types for the survey were:

- 1) Passenger Cars
- 2) Taxi
- 3) Panel and Pickup (under one ton)
- 4) Semi and Full Trailer Combination
- 5) All Other Commercial Vehicles

The codes for garage location were:

- 1) At Origin Inside Cordon
- 2) At Destination Outside Cordon
- 3) At Neither
- 4) At Origin Outside Cordon
- 5) At Destination Inside Cordon

SURVEY AND PROCESSING

The External Survey was conducted as a roadside interview at 74 stations which included 24 stations at 6 turnpike interchanges. Duration of sampling at the stations varied with volume and the procedure used was the following:

Two-Way Volume

500-1000
1001-3000
Over-3000

Sampling Duration

8 Hr.
16 Hr.
24 Hr.

A 33 1/3% sample of each vehicle class was conducted.

The vehicle was stopped and the driver interviewed to obtain the information required on the survey form.

An I card was punched for the origin end of the trip and a J card for the destination end (see Figure 14). Characteristics of the vehicle and occupancy are on both the I and J cards.

Card flow is shown in Figure 15.

Figure 14 -- I and J cards.



Figure 15 -- I and J card flow.

Automatic Zoning to Build Trip Files

A series of standardized computer edit and contingency check programs were prepared to process all the detail and trip cards to produce "clean" data files before starting the automatic zoning.

When this process was completed, the trip end cards first were split into internal and external ends. External trips are processed directly against the external dictionary by matching the state and city and then assigning the code name.

Internal trip ends are split into three files -- street address, place name and intersection.

Trips to Street Address

Trip ends reported to street address were first processed against the quick reference street dictionary. This operation located the address' political unit and searched the street listing to determine if the trip was to a valid street. If valid, the street name on the trip card was recorded to the street numeric code.

If a match could not be made, the trip end was listed and manually checked for proper spelling, valid street-city combination or omission of the street from the dictionary. The trip then was either assigned manually to a CTB or corrected for further processing, or if required, the dictionary was updated.

The trip ends, recorded to a three-digit city and four-digit street number, were then compared against the parcel dictionary.

Parcel Dictionary

Only corner parcels, parcels showing land-use change and sample addresses were included in the parcel dictionary. This eliminated one-to-one correspondence. The procedure was to either find a match or locate the trip address between two addresses in the file. In this circumstance, it was necessary to know if the house number in the block inventory was ascending or descending. This, in turn, allowed proper land-use assignment to the trip end. In subsequent Ohio studies, however, all parcels were included in the parcel dictionary.

If the house number could not be located on the street, the non-match was listed. It was checked for valid house number-street combination. It then was either normally assigned, or corrected and reprocessed in the parcel dictionary.

Intersection Dictionary

For an intersection, the recorded address was matched against the intersections listed for the particular political unit. Non-matches were listed and manually checked for valid intersection combination or omission in the dictionary. Manual assignment was then made to CTB and land use or the dictionary was updated and the trip end reprocessed.

Place Dictionary

Reported place names were matched against this dictionary as previously described. If a match could not be made, the trip end was listed. It was checked for incorrect spelling, city location or omission of the place name from the dictionary. This trip end data was then either manually assigned or corrected and run through the dictionary a second time. If the name was omitted from the dictionary, it was added, using the update programs.

COMPUTATION OF EXPANSION FACTORS

Home Interview Survey

Expansion factors for the home interview survey were calculated from data on the block summary of D cards, aggregated to the census tract.

Summary statistics describing the history of sampling within a particular tract were summed from all blocks contained within the tract. These were then used to compute the expansion factor according to the following formula:

$$F = \frac{A - (\frac{A}{B} \times C)}{B - (D_1 + D_2 + D_3 + D_4 + C)}$$

Where

- F = Factor for a census tract
- A = Number of Dwelling Units in the blocks within the tract
- B = Number of Dwelling Units selected for sampling in the blocks within the tract
- C = Number of vacant Dwelling Units samples in blocks within the tract
- D₁ = Number of refusals in the blocks
- D₂ = Number of returns with no information
- D₃ = Number of no contacts
- D₄ = Number of no contacts with no return

Truck Surveys

Both fleet and non-fleet truck surveys were factored on a Cordon Area basis. The data for expansion came from summaries within each category and from the returned questionnaires.

The computational formula for fleet and non-fleet trucks for the Study Area was:

$$T = \frac{J - (L \times \frac{J}{K})}{K - (L + M)}$$

Where

T = Expansion factor

J = Total population of group

K = Total samples selected

L = Total of samples reported as junked, wrecked or out of service

M = Total of non-usable, no contact and no return samples

Taxi Survey

The computational formula for taxis for the Study Area was:

$$T = \frac{J - (L \times \frac{J}{K})}{K - (L + M)}$$

Where

T = Taxi expansion factor

J = Total taxi population

K = Total samples

L = Total taxis reported as junked, wrecked or out of service

M = Total non-usable, no contact or no return samples

External Survey

The External Survey sample was expanded on a station-by-station basis. Controls for expansion came from a twenty-four hour vehicle count and classification.

Expansion was vehicle class by half-hour time period and was calculated using the following formula.

$$F = \frac{(A)}{(B)} \frac{[(C)(D)(E)]}{1}$$

Where

- F = Expansion Factor for a vehicle type for a particular half-hour period at a particular station
- A = Total number of vehicles of the class passing through the station in the half-hour period
- B = Number of vehicles of a class sampled in the half-hour period
- C = Expansion factor to expand counts at 8 hour and 16 hour stations to a 24 hour period
- D = AADT factor for day of sampling for a particular type of highway and volume group
- E = Through trip factor. All through trips were factored by 1/2

The factors computed for each survey were stored by reporting unit until added to the trip file. The reporting unit for the surveys were:

<u>Survey Type</u>	<u>Reporting Unit</u>
Home Interview	Census Tract
Truck/Taxi	
Trucks	Fleet Group
	Non-fleet Group
Taxi	Fleet Group
External	Station by half-hour period by vehicle type

The output of the automatic zoning process for the Home Interview, External and Truck/Taxi surveys are the Number 1, 2, 3, 4 and 5 cards. These are the same files as in the standard Bureau of Public Roads Procedure with format and data changes to reflect the Ohio Procedure.

The Number 1 and Number 2 cards are the final trip records for the Home Interview Survey. Number 1 card is the dwelling unit characteristics card and contains the home CTB number, zone number, census tract number expansion factor and the dwelling unit socio-economic data collected in the survey. Number 2 card is the final trip record and has the home CTB number, the origin CTB number, destination CTB number, O-D land use, O-D

zones, trip-maker characteristics and mode information. If one end of the trip is external, the city, county and state are indicated.

The Number 3 card is for the External Survey and has the station number, sample number, vehicle type, entering or exiting station number, direction of travel, garage location, origin and destination reported, the mode of travel, purposes from and to, date of survey as on the I and J cards and the expansion factor.

The Number 4 card is the Truck Survey Card and contains the home CTB, sample number, vehicle type, trip number, commodity hauled, industry classification, fleet indication, standard O-D address, mode, start and arrive time, weight class, date of survey, purpose from and to, and expansion factor.

The Taxi Survey is reported in the Number 5 card and contains CTB in which vehicle is garaged, sample number, vehicle type, trip hauling, fleet indication, standard O-D address, mode, start and arrive time, date of survey and expansion factor. Figure 16 shows the card formats and Figure 17 shows the processing flow.

Figure 16 -- 1, 2, 3, 4, and 5 card formats.

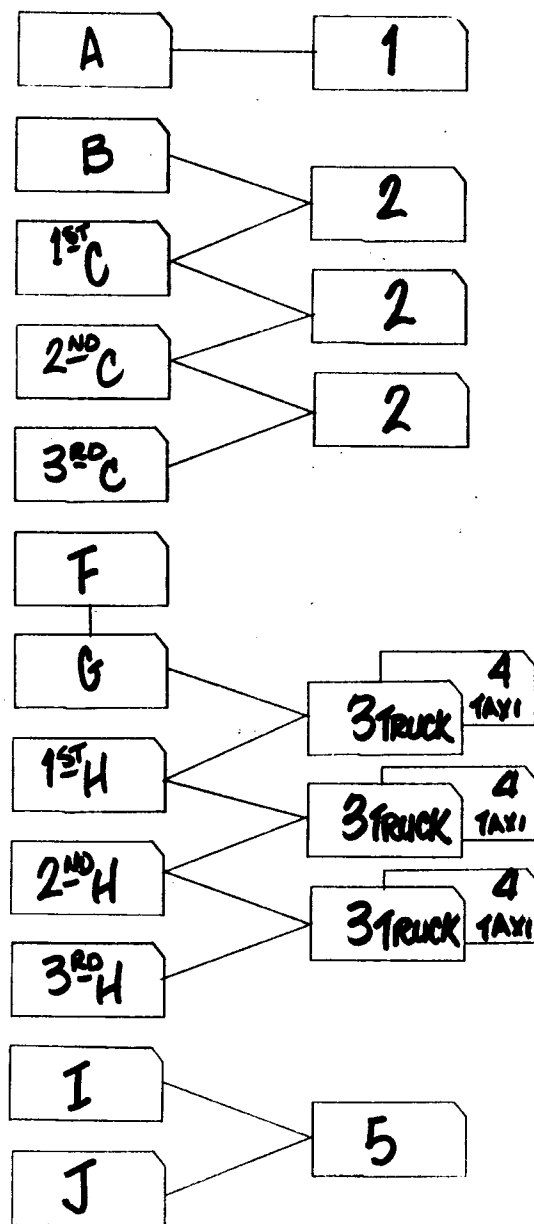


Figure 17 -- 1, 2, 3, 4, and 5 card flow.

III Household Characteristics Checks

The data collected in the 1963 Origin-Destination (O-D) Survey described in this section can be divided into two groupings: 1) data concerning the characteristics of the sampled household and 2) data which describe the trip-maker and his trips. This division was also applied to the data checking. The household characteristics were used to ascertain the validity of the overall sampling procedure and the trip checks were used to determine the quality of trip reporting.

In the household checks, data collected in the O-D and expanded (as previously described) were compared with similar data compiled from other sources. The three main items checked were population, dwelling units and auto ownership. For each of these items there were operational difficulties. Data either did not exist for the survey year, were not available for a given area, or were not collected using the same basic definition. Due to these difficulties, it was not possible to arrive at independent control totals for each item in all areas. Population, the one item for which the best outside data existed, became the major check.

POPULATION

Data used to arrive at control totals for population varied from county to county and, in most cases, required either interpolation between a base year and a future projection, modification of a 1963 projection, or some combination of both.

1. City of Cleveland

Within the City of Cleveland, population data were available at the census tract level from the 1960 U.S. Census and a special 1965 Census. Linear interpolation was used to arrive at a 1963 figure. For analysis purpose, the areas west of the Cuyahoga River were examined separately from those east of the river.

2. Cuyahoga County (excluding City of Cleveland)

The population data used as the control for these areas were obtained from People and Their Homes, a report issued by the Cuyahoga County Regional Planning Commission in September, 1964. This report gives the 1960 Census Population and the 1970 estimated population for each area within the county. An estimate for 1963 was developed, using linear interpolation.

3. Geauga County

The population data used as a base in this county were obtained from a study made by the Regional Church Planning office in 1961 and revised in April, 1963. This provided data for each political subdivision. Further investigation of this data shows that Church Board estimates for the county as a whole are substantially greater than those of other agencies. The data from the other agencies subdivided for smaller areas were unfortunately not available.

Following are the data used:

	<u>1965</u>	<u>1970</u>
Ohio Department of Development	58,560	69,023
Cleveland Electric Illuminating Co.	57,340	69,150
Regional Church Planning Office		94,875
SCOTS	56,000	67,500

(From SCOTS Preliminary Population Forecast, Dec., 1965, Table 9, p. 35(a).)

Based on this, it was decided to modify the Church Board's estimates of growth, assuming that the Church Board's growth figures for each subarea were larger to the same extent as those for the entire county.

The 1960 census population was 47,573; therefore, the growth from 1960 to 1970 predicted by the Church Board is 47,302. Taking 69,000 as the 1970 total county population projected by the other sources, the growth is 22,427. The ratio is $\frac{22,427}{47,302} = 0.476$

This factor was applied to all data derived from Church Board figures.

The computation of the 1963 estimate is: 1963 Estimated Population = 0.476×0.3 (1970 Estimate - 1960 Population).

4. Lake County

For Lake County, the population control was obtained from data completed by the Lake County Regional Planning Commission. The 1960 Census was used as a base and the updating was based on school enrollment and building permits issued.

5. Lorain County

In this county, the basic data source is Lorain County Regional Planning Commission - Report No. 8, issued in 1962, which contains population estimates for the various political subdivisions of the county projected to the year 2000. These estimates provide a high, low and probable figure for each five-year increment beginning in 1965. For the year 1965, the figures for the total county were:

Low 246,900
Probable 262,200

The 1965 population estimate by the Ohio Department of Development was 253,902, indicating that, for the initial time increment, the low projections more closely approximate existing conditions; although this may not be correct for future increments.

Therefore, in evaluating the Trip File Population Data, an independent 1963 estimate was obtained by interpolating between the 1960 Census and the 1965 low estimate of the Lorain County Regional Planning Commission.

In the City of Oberlin, an additional adjustment was made to account for the fact that the O-D Survey was conducted while Oberlin College was not in session. In this case, the control figure was decremented by 2000 to get a comparable figure.

6. Medina, Portage and Summit Counties

Data for these counties were obtained from Tri-County Regional Planning Commission, Regional Study No. 45, published in September, 1966, these data were interpolated to give a 1963 control total.

In all areas where it was felt to be significant, an adjustment was made to account for institutional population counted in the Census but not in the O-D Survey. In these areas, the number reported in the 1960 Census as inmates of institutions was subtracted from the control total on the somewhat rough assumption that there was no change in the number of inmates between 1960 and 1963.

The population controls and the population arrived at by expanding the home interview survey are shown in Table 1.

TABLE 1

UNADJUSTED TRIP FILE POPULATION DATA
COMPARED TO ESTABLISHED CONTROLS

Area	Control	Trip File	Absolute Difference	Percent Difference
City of Cleveland				
East of Cuyahoga River	533,081	505,633	- 27,448	- 5.2
West of Cuyahoga River	297,692	293,544	- 4,148	- 1.4
	<u>830,773</u>	<u>799,177</u>	- 31,596	- 3.8
Cuyahoga County				
Excluding City of Cleveland	841,753	836,770	- 4,983	- 0.6
Cuyahoga County - Total	1,672,526	1,635,947	- 36,579	- 2.2
Geauga County	34,920	33,650	- 1,270	- 3.6
Lake County	152,458	144,455	- 8,003	- 5.2
Lorain County	225,190	220,902	- 4,288	- 1.9
Medina County	20,005	20,358	+ 353	+ 1.8
Portage County	19,247	19,987	+ 740	+ 3.8
Summit County	34,275	33,848	- 427	- 1.2
Total - All Counties	2,158,621	2,109,147	- 49,474	- 2.3

NOTE: Figures for all counties refer to that portion within the Survey Cordon line only.

DWELLING UNIT CHECKS

Development of control totals for checking the SCOTS dwelling unit count was more difficult than developing the population control totals. Not only were 1963 estimates not generally available, but for some counties there were no other counts over comparable areas. In addition, the SCOTS definition of a dwelling unit differed somewhat from that of the U.S. Census.

In the design of the O-D Survey, the Ohio Department of Highways established the dwelling unit as the sampling unit. For the purpose of the survey, they also established their own definition of a dwelling unit. This universe of dwelling units contained those dwelling units defined by the Bureau of Census as such plus additional units not included in the Bureau of Census Definition.

For survey purposes, a dwelling unit was defined under the following, with each definition being mutually exclusive.

1. Bureau of Census definition: "In general, a dwelling unit is a group of rooms or a single room, occupied or intended for occupancy as separate living quarters, by a family or other groups of persons living together or by a person living alone. A group of rooms, occupied or intended for occupancy as separate living quarters, is a dwelling unit, if it has separate cooking equipment or a separate entrance. A single room occupied or intended for occupancy as separate living quarters, is a dwelling unit, if it has separate cooking equipment, or if it constitutes the only living quarters in the structure. Also, each apartment in a regular apartment house is a dwelling unit even though it may not have separate cooking equipment."
2. A dwelling unit may also be a room in a large rooming house, or a room in a structure primarily devoted to business or other non-residential purposes. For example, it may be a superintendent's living quarters in a store or factory; a chauffeur's living quarters in a garage; or a tourist cabin, house trailer, etc., if occupied by persons having no other place of residence. In large rooming houses containing ten or more rooms for rental purposes, each room is considered as one dwelling unit. For rooming houses containing less than ten rooms for rent, they will be counted as one dwelling unit as if they are a single family residence.
3. In hotels, the rooms occupied by employees and permanent guests were considered as dwelling units. A permanent guest is defined as one who pays for his room on a weekly or monthly basis.
4. Military establishments are considered as dwelling units. Each officers quarters is one dwelling unit and each barracks is one dwelling unit.
5. Dormitories -- each sleeping room in a dormitory, sorority or fraternity house was considered as a single dwelling unit.
6. Institutions -- for hospitals, nursing homes, homes for the aged, sanitariums and convents, each sleeping room occupied by officials, nurses or other employees who resided on the premises was counted as a dwelling unit. Rooms occupied by patients and inmates were excluded, except in certain specific cases.

The sources used for controls on the dwelling unit count in various counties were:

1. Cuyahoga County (including City of Cleveland)

The Real Property Inventory (RPI), a private non-profit organization, conducts each year a count of all dwelling units in Cuyahoga County, using the same definition of dwelling unit as the U.S. Census. This was used as the control for all tracts within Cuyahoga County.

2. Lake County

The Lake County Regional Planning Commission prepared a dwelling unit count by municipality for 1963, based on the 1960 U.S. Census and building permits in the intervening years.

3. Medina, Portage and Summit Counties

Tri-County Regional Planning Commission, Regional Study No. 45 gives estimates of "households" in 1960 and 1965. Assuming that there is compatibility between a "household" and a "dwelling unit," linear interpolation established an order of magnitude control.

4. Geauga and Lorain County

The only data in these areas tabulated for comparable areas were from the 1960 U.S. Census.

The dwelling unit controls and the SCOTS counts are shown in Table 2.

OTHER CHECKS

In addition to population and dwelling units, which comprised the major checks, there was also a check on automobile ownership. Again, for various reasons, direct comparison with either Census or registration data was not possible, but approximations were developed.

Changes in automobile ownership occur either because of a change in population or a shift in ownership patterns or a combination of the two. Various sources quoted in Highway Research Board, Research Record No. 106 indicate that both types of change have occurred in Ohio and in the Cleveland Metropolitan Area between 1960 and 1963. Auto ownership per capita increased in both areas .02 cars. Total passenger car registrations also increased in both areas.

TABLE 2

UNADJUSTED TRIP FILE DWELLING UNIT DATA
COMPARED TO ESTABLISHED CONTROLS

Area	Control	Trip File	Percent Difference
City of Cleveland			
East of Cuyahoga River	176,087	182,952	+ 3.9
West of Cuyahoga River	98,015	97,179	- 0.8
	<u>274,102</u>	<u>280,131</u>	+ 2.2
Cuyahoga County			
Excluding City of Cleveland	256,566	258,615	+ 0.8
Cuyahoga County - Total	530,668	538,746	+ 1.6
Lake County	43,861	41,924	- 4.9
Medina County	4,919	5,311	+ 8.1
Portage County	4,786	5,657	+18.5
Summit County	9,410	9,945	+ 5.5
Geauga County	not comparable	10,186	- - -
Lorain County	not comparable	65,044	- - -
Cordon Area Total		676,813	

NOTE: Figures for all counties refer to that portion within the Survey cordon line only.

Ownership patterns are formed from many interacting causes: income, accessibility to public transportation, prestige, number of licensed drivers in household, parking availability and so on. It would be extremely meaningful to develop these relationships as a tool for checking the accuracy of the auto ownership and availability, as defined by Census, reported in the trip file; however, data limitations do not allow this.

Methodology

Since dwelling unit data is available on a census tract or municipality basis for most of the Study Area, it was decided to base the accuracy check on auto ownership per occupied dwelling unit (for the most part this is synonymous with household). Since the household may be considered a consumer unit, making its major buying decisions as a unit, this is a valid measurement.

The first step was to obtain usable occupied dwelling unit data. For Cuyahoga County, the number of occupied dwelling units for 1963 by census tract was available from Real Property Inventory. The Lake County Planning Commission

provided 1963 dwelling unit data based on building permits for each municipality. For Medina, Portage and Summit Counties, 1965 dwelling unit counts from building permits, school records, utility records and other sources are published in Tri-County Regional Planning Commission, Regional Study No. 45 for each municipality and township. The 1963 figures were obtained from these by interpolation. Estimated vacancy rates were applied to total dwelling units in each municipality in Lake, Medina, Portage and Summit to obtain occupied dwelling units. A high degree of reliability is placed on the data for these counties.

The Lorain County Regional Planning Commission made an estimate of 1962 total dwelling units in the county from building permits and the 1960 Census. Occupied dwelling units were based on a 5 percent vacancy rate. This total was extrapolated to 1963 and then stepped down to the Cordon Area.

No 1963 dwelling unit data was available for Geauga County. The population developed as a control total for the population check was divided by 3.8 persons, the average number of persons per occupied dwelling unit reported in the 1960 census, to obtain the number of occupied dwelling units in the portion of Geauga County within the Cordon Area.

Census data on the number of dwelling units in a census tract owning one, two, three or more cars and total cars in the census tract was used to calculate the percentage of dwelling units in each ownership category. These same rates were then applied to the dwelling unit counts obtained above. In Cuyahoga, Lake, Medina, Portage and Summit a further adjustment was made to reflect change in ownership accompanying change in income. Ten percent of the households having no car in 1960 were assumed to have one car in 1963 and five percent of the one-car families were assumed to have moved into the two-car family category. Since Lorain and Geauga auto ownership was not computed on municipality or census tract ownership patterns, no adjustment was made.

Table 3 shows the unadjusted trip file automobile availability compared to established controls.

TABLE 3

UNADJUSTED TRIP FILE AUTOMOBILE AVAILABILITY
COMPARED TO ESTABLISHED CONTROLS

	Control	Trip File	Absolute Difference	Percent Difference
Cuyahoga County	574,060	563,493	-10,567	-1.9
Geauga County	13,397	14,472	+ 1,075	+7.4
Lake County	58,557	59,039	+ 482	+0.8
Lorain County	81,179	78,066	- 3,113	-4.0
Medina County	7,070	7,446	+ 376	+5.3
Portage County	7,093	7,262	+ 169	+2.4
Summit County	13,903	13,645	- 258	-1.9
Total Cordon Area	755,259	743,423	-11,836	-1.6

NOTE: Figures for all counties refer to that portion within the Survey Cordon Line only.

EMPLOYMENT AND INITIAL WORK TRIP ACCURACY CHECKS

Two of the most important control totals developed to determine the accuracy of employment and initial work trips as reported in the trip file are:

- 1) Number of unique workers working in the Cordon Area (employment by place of work) and
- 2) Number of unique workers living in the Cordon Area. The first group, when adjusted for average daily absenteeism and those working at home, compares with total initial work trips beginning and ending within the cordon line, as reported in the 1963 O-D survey, plus work trips beginning outside the Cordon Area and ending inside the Cordon Area, as obtained in the external survey. The second group, unique workers living within the Cordon Area, when adjusted for those working at home, compares with the total number of persons employed outside the home as reported in Question 5 in the 1963 O-D Survey trip questionnaire.

Number of Unique Workers Working Inside the Cordon Area

The first step in determining the number of unique workers working inside the Cordon Area was to ascertain the number of unique jobs within the Cordon Area. Data availability dictated

a block building technique be used to develop this total. The major component was the data available in Employment & Earnings Statistics for States & Areas, 1939-1964, issued by the U.S. Department of Labor, Bureau of Labor Statistics (BLS). This publication covers all full and part-time workers on the payrolls of nonagricultural establishments for the pay period which includes the 12th of each month excluding proprietors, the self-employed, unpaid family workers, farm workers, domestic workers in households and federal military personnel. It should be emphasized that persons who are laid off, on leave without pay or on strike for the entire period, or who are hired but do not report to work during the period are not counted as employed in this publication. This source gives statistics for the Cleveland SMSA (Cuyahoga and Lake Counties) only, and not for the entire Study Area. These figures are in Table 4, column a.

Adjustments were made to include those workers not counted by BLS.

Two assumptions were made in making this adjustment.

- 1) Since BLS shows approximately the same employment in 1960 and 1963, 700,300 and 699,000 respectively, it was assumed that the types of employment not included by BLS also showed no change and that Census data could therefore be used.
- 2) Characteristics of types of employment not included by BLS are such that these workers work in the area (county or SMSA) in which they live (e.g., self-employed persons have relative control over both place of work and place of residence and it is assumed that use of time is optimized; domestic workers in households are low income earners and it is assumed that the expense of traveling to areas outside the Cordon prohibits this type movement, etc.)

In Table 4, column b, Total Employment, is the sum of BLS totals (column a) and workers as reported in Census (PC (1) 37D, Ohio, Table 129) who were proprietors, self-employed, farm workers, unpaid family workers, domestic workers in households and federal military personnel. Table 4, columns c, d and e show the Bureau of Unemployment Compensation's figures for Cuyahoga, Lake and the SMSA.

Bureau of Labor Statistics data were not available for the other counties, but Ohio State Employment Service, Bureau of Unemployment Compensation (BUC) data were available. The BUC provides data for all covered employees. Covered employees are all civilian employed persons excluding all government workers,

all workers covered by railroad retirement, all employees of establishments having less than three employees, all self-employed persons and certain part-time employees. Since these data comprise about eighty percent of the BLS total, it was decided to use the ratios of BUC totals to adjusted BLS totals for the Cleveland SMSA to obtain total number of jobs in the other counties.

TABLE 4

CLEVELAND SMSA EMPLOYMENT

	Bureau of Labor Statistics Employment	Total Employment*	Bureau of Unemployment Compensation			Percent Col. e of Col. b
	(a) Cleveland SMSA	(b) Cleveland SMSA	(c) Cuyahoga County	(d) Lake County	(e) Cleveland SMSA	(f)
Mining & Quarrying	500	526	336	154	490	--
Contract Construction	28,700	34,303	27,221	1,315	28,536	83.188
Manufacturing	272,900	276,327	258,119	13,484	271,603	98.290
Transportation & Utilities	45,300	46,222	37,073	732	37,805	81.790
Wholesale & Retail Trade	142,500	160,048	131,311	5,620	136,931	85.556
Finance, Insurance & Real Estate	33,500	36,228	28,810	716	29,526	81.500
Services & Miscellaneous	94,700	124,942	48,421	1,693	50,114	40.109
Government	80,900	80,900	not included	not included	not included	
Agriculture	not included	3,340	not included	not included	not included	
Military	not included	1,416	not included	not included	not included	
Total	699,000	764,252	531,291	23,714	555,005	

*Adjusted BLS data, see text

Table 5 presents BUC data for Lorain County and total employment developed from the ratios previously described. The results were then compared with Census data to determine the validity of the method. The difference between BUC employment and total employment is 16,057. In 1960 there were 7,497 in the self-employed, unpaid family worker, and private household worker classes; these, added to military, government and agriculture employment, total 15,701. Thus, approximately 350 jobs are attributed to the remainder of uncovered employment -- a not unrealistic number.

To obtain total Cordon Area employment in Lake and Lorain counties, the 1964 Directory of Ohio Manufacturers, 1962 Census of Government, the 1963 Censuses of Retail Trade, Wholesale Trade and Selected Services and local phone books were consulted. As a result, Lake County's total employment was adjusted downward 1,100 and Lorain County's was adjusted downward 2,000.

TABLE 5

LORAIN-ELYRIA SMSA EMPLOYMENT

	Bureau of Unemployment Compensation	Total Employment*
Mining & Quarrying	178	178
Contract Construction	2,324	2,793
Manufacturing	30,151	30,675
Transportation & Utilities	2,111	2,581
Wholesale & Retail Trade	8,400	9,818
Finance, Insurance & Real Estate	1,279	1,569
Services & Miscellaneous	3,136	7,818
Government	not included	5,900
Agriculture	not included	2,222
Military	not included	82
Total	47,579	63,636

*Factored BUC Data; see text

Table 6 shows BUC data and total employment, obtained through the method previously described for Geauga, Medina, Portage and Summit Counties. Relatively small parts of Medina, Portage and Summit Counties are within the Cordon Area and the major employment centers for these counties are outside the Cordon Area. For these counties and for Geauga county, the same sources as were used to step down from total employment to Cordon Area employment for Lake and Lorain Counties were utilized to obtain an estimate of Cordon Area employment.

TABLE 6
GEAUGA, MEDINA, PORTAGE AND SUMMIT EMPLOYMENT

	Gauga County		Medina County		Portage County		Summit County	
	Bureau of Unemployment Compensation	Total Employment*	Bureau of Unemployment Compensation	Total Employment*	Bureau of Unemployment Compensation	Total Employment*	Bureau of Unemployment Compensation	Total Employment*
Mining & Quarrying	186	186	96	96	166	166	72	72
Contract Construction	292	351	573	688	952	1,144	5,423	6,518
Manufacturing	3,341	3,399	4,253	4,326	6,723	6,839	80,164	81,558
Transportation & Utilities	251	306	333	407	409	500	11,456	14,006
Wholesale & Retail Trade	1,075	1,256	2,185	2,553	3,318	5,061	32,268	37,715
Finance, Insurance & Real Estate	146	179	717	879	399	489	4,665	5,723
Services & Miscellaneous	503	1,254	846	2,109	1,070	2,667	10,488	26,148
Government	not included	1,350	not included	2,250	not included	3,100	not included	16,300
Agriculture	not included	1,059	not included	1,610	not included	1,539	not included	1,430
Military	not included	-	not included	13	not included	63	not included	141
TOTAL	5,794	9,340	9,003	14,931	13,037	21,568	144,536	189,611

*Factored BUC Data; see text

Table 7 shows the estimates of the number of unique jobs and the number of unique job holders by place of work for areas within the cordon line by county for 1963, adjusted for those working at home. A confidence level of plus or minus one percent is put on the Cordon Area total figures.

TABLE 7
EMPLOYMENT BY PLACE OF WORK ADJUSTED
FOR MULTIPLE JOBHOLDING AND THOSE WORKING AT HOME

	Unique Jobs	Unique Jobholders	Unique Jobholders Working Outside the Home
Cuyahoga County	734,900	696,685	684,980
Geauga County	5,300	5,024	4,730
Lake County	28,300	26,828	25,815
Lorain County	61,600	58,397	55,895
Medina County	1,100	1,043	820
Portage County	1,300	1,232	1,068
Summit County	8,600	8,153	7,815
Cordon Area Total	841,100	797,362	781,123

NOTE: Figures for all counties refer to that portion within the Survey Cordon Line only.

The number of unique jobholders working within the Cordon Area had to be further adjusted for absenteeism for comparison with the first work trip total from the trip file. No figures were available on absenteeism for 1963 and 12.5 percent, the average of estimates used in other studies, was used. The number of unique jobholders working within the Cordon Area outside the home and adjusted for average daily absenteeism, therefore, is 683,483. Table 8 shows the initial work trips from the trip file.

TABLE 8

INITIAL WORK TRIPS FROM TRIP FILE

Survey	Trips	Trips to Places Within Cordon Area
By residents within Cordon Area to places within Cordon Area from Home Interview Survey	599,294	
By residents within Cordon Area to places within Cordon Area by truck drivers from Truck Survey	1,066	
Total Initial Work Trips from Internal Surveys		600,360
By residents outside Cordon Area to places within Cordon Area from External Survey (18,870 vehicles x 1.18* persons per vehicle)	22,266	22,266
By residents inside Cordon Area to places outside Cordon Area (8,695 vehicles x 1.18* persons per vehicle)	10,260	
TOTAL	632,886	622,626

*1.18 equals average occupancy
for work trips as determined in
the internal survey.

Total first work trips to places within the Cordon Area compare
to total unique persons working within the Cordon Area less
absenteeism as follows:

$$\frac{622,626}{683,483} = 91.1\%$$

Total unique jobholders working within the Cordon Area outside
the home may also be compared with this same figure from the
1963 internal and external surveys.

Persons employed outside the home from internal survey	734,027
Persons employed outside the home working outside the Cordon Area (adjusted for absenteeism)	- 11,726
	<u>722,301</u>
Persons employed inside the Cordon Area residing outside the Cordon Area (adjusted for absenteeism) -- external survey	+ 25,447
Unique jobholders working within the Cordon Area	<u>747,748</u>

$$\frac{747,748}{781,123} = 95.7\%$$

Table 9 shows internal consistency of data reported in the SCOTS survey and in other studies.

TABLE 9

COMPARISON OF INITIAL WORK TRIPS AND EMPLOYED PERSONS
RESIDING IN CORDON AREA BETWEEN SCOTS AND OTHER STUDIES

Study	Employed Persons Residing in Cordon Area	Initial Work Trips by Residents	%
SCOTS	734,027*	610,620	83.2
Penn-Jersey	1,456,135	1,130,800	77.8
Kanawha Co., W. Va.	69,829	61,830	89.0
Pittsburgh Area Transportation Study	555,000	459,931	82.6

*Adjusted Home Interview Survey

Number of Unique Workers Living Within the Cordon Area

Since the number of jobs in Northeastern Ohio shows relatively no change between 1960 and 1963, it was assumed that 1960 Census data could be used to determine unique workers living within the Cordon Area and working outside the home. The number of people working at home reported by Census referred only to persons working during Census week. This figure was adjusted upwards to account for the difference between total employed persons and all workers and for workers not reporting place of work. The allocation was made by the ratio of workers at home to total employed persons.

This procedure is exemplified below for Cuyahoga County.

(a)	Total Employed Persons (Incl. Military)	644,153
(b)	All Workers (Incl. Military)	629,398
(c)	Difference (a) - (b)	14,755
(d)	Worked at Home	11,010
(e)	Percent of All Workers $\frac{(d)}{(b)}$	1.749%
(f)	Place of Work Not Reported	24,920
(g)	(c) plus (f)	39,765
(h)	(g) times (e)	694
(i)	Total Persons Working at Home	11,704

Total persons working at home in the Cordon Area, 16,233, was then subtracted from total employed persons in the Cordon Area, 797,798; this yielded a total of 781,565 persons living within the Cordon Area and working outside the home. The difference between this total and the 734,027 persons employed outside the home reported in the trip file is 47,538 or 6.1 percent.

Other Selected Work Trip Statistics

Employed persons from SCOTS Home Interview Survey	734,027
Employed persons from adjusted Census figures	781,565
Total home-based work trips from trip file	1,170,517
Ratio of home-based work trips to employed persons from SCOTS Home Interview Survey	1.59
Ratio of home-based work trips to employed persons from adjusted Census figures	1.50

Table 10 shows the ratio of home-based work trips per employed person for other areas in the United States.

TABLE 10

RATIO OF HOME-BASED WORK TRIPS PER EMPLOYED PERSONS FROM OTHER AREAS*

Study	Ratio	Study	Ratio
Chicago	1.43	Kansas City	1.50
Detroit	1.45	Fort Lauderdale	1.62
Washington, D.C.	1.45	Charlotte	1.62
St. Louis	1.42	Phoenix	1.73
Penn-Jersey	1.47		

*Source: Wilber Smith and Associates, Future Highways and Urban Growth, Table 17, Home-based Trips per Employed Resident in Study Areas.

The checks described previously support the acceptability of the data in the trip file. However, it was determined to investigate further to determine whether the reason or reasons for the small differences could be identified and explained.

Participation ratios in seventy-five randomly selected tracts in Cuyahoga County were examined as found in the 1960 Census and in the 1963 survey. In seven tracts, the trip file showed a higher rate than Census; in the remaining sixty-eight, Census was higher. A comparison was then made of household stratified by number of employed as reported in the trip file and of families and unrelated individuals in the Cleveland SMSA stratified by the number of earners in 1959 (see Tables 11 and 12).

TABLE 11

FAMILIES AND UNRELATED INDIVIDUALS STRATIFIED
BY NUMBER OF EARNERS FOR THE CLEVELAND SMSA, 1960 CENSUS

	<u>0 Earners</u>	<u>1 Earners</u>	<u>2 Earners</u>	<u>3 Earners</u>
Cleveland SMSA	6.4%	48.5%	35.4%	9.7%

TABLE 12

HOUSEHOLDS STRATIFIED BY
NUMBER OF EMPLOYED, 1963 O-D SURVEY

	<u>0 Employed</u>	<u>1 Employed</u>	<u>2 Employed</u>	<u>3 or More Employed</u>
Cleveland SMSA	19.1%	55.2%	20.6%	5.0%
Geauga	14.0%	57.7%	22.8%	5.5%
Lorain	16.2%	59.3%	20.0%	4.5%
Medina	10.7%	66.0%	19.2%	4.1%
Portage	14.4%	57.4%	23.1%	5.1%
Summit	12.8%	60.5%	22.3%	4.4%

NOTE: Figures for all counties refer to that portion within the Survey Cordon Line.

Families and unrelated individuals are not the same as households; moreover, the Census data covers all of 1959 while the trip file is for one point in time. However, the comparison does lead to two probable explanations for the difference in reported and expected employment and work trips:

1. Inadequate control over question 5, "How many people are employed outside the home?" This question was open to the judgment of the respondent. His decision as to how the question related to self-employed persons, persons such as students and housewives whose main vocation was not employment but who were employed part-time, and to persons with a job but laid off, such as auto workers at model changeover time, is reflected in the number of employed persons reported.
2. Factoring persons in group quarters equally with households. Persons in group quarters compose a very small part of the total population. However, factoring these respondents with equal weight to households increases their relative weight.

Small Area Work Trip Check

Employment for small areas -- plant, municipality or part of a municipality -- was estimated in order to compare reported first work trips to the zone or zones making up the small area. The 1963 Census of Business, 1962 Census of Government, and the Directory of Ohio Manufacturers were the main sources of information. Real Property Inventory and local phone books were also consulted. Table 13 shows estimated total employment, adjusted for 12.5 percent absenteeism, and total first work trips from both the internal and external surveys for specified small areas.

The checks for all areas except Chardon and part of Elyria show very good agreement. It is believed that the presence of a Chevrolet Plant, the largest employer in the selected area in Elyria, is the prime cause of the difference between the estimated employment and reported first work trips due to layoffs because of model changeover, etc.

The cause for the large percentage difference in Chardon cannot be determined. Two points might be considered as possible explanations. First, there was considerably less data available on employment in Chardon than for other areas. Local agencies were contacted but were unable to add to our information. Second, half of the work trips to Chardon were from the external file; these were minor in other areas.

TABLE 13

SMALL AREA WORK TRIP CHECKS

Small Area & County	Estimated Total Employment	Total Employment Adjusted for Absenteeism	Total First Work Trips Internal & External	Difference	Percent
Cleveland CBD, Cuyahoga	117,000*	102,375	102,434	+ 59	.1
Cadillac Plant, Cuyahoga	9,345	8,177	8,119	- 58	-.7
Chardon Village, Geauga	2,204	1,929	2,516	+ 587	+30.4
Wickliffe, Lake	5,776	5,054	4,963	- 91	- 1.8
Elyria (Part), Lorain	4,350	3,806	2,698	-1,108	-29.1
National Tube Div. U.S. Steel, Lorain	6,151	5,382	5,628	+ 246	4.6
Lakewood, Cuyahoga	10,659	9,327	9,113	- 214	- 2.3
Maple Heights, Cuyahoga	7,454	6,522	6,359	- 163	- 2.5

*Ernst & Ernst, Guidelines for Action in Downtown Cleveland.

ADJUSTMENTS

The checks for household characteristics described in the first four sections demonstrate that for the majority of the Study Area there was not only no bias in the sample, but also that the expansion resulted in totals which were within an acceptable level of difference from the control totals. In Lake County and a portion of the City of Cleveland, the differences at the analysis level were large enough, either percentage or absolute, and the control totals were developed with sufficient confidence to indicate that adjustments were warranted. The adjusted trip file data for population and dwelling units are shown in Tables 14 and 15.

TABLE 14
ADJUSTED CORDON AREA POPULATION BY COUNTY

Area	Control	Adjusted Trip File	Absolute Difference	Percent Difference
City of Cleveland				
East of Cuyahoga River	533,081	531,462	- 1,619	- 0.3
West of Cuyahoga River	297,692	293,544	- 4,148	- 1.4
	<u>830,773</u>	<u>825,006</u>	- 5,767	- 0.7
Cuyahoga County				
Excluding City of Cleveland	<u>841,753</u>	<u>836,770</u>	- 4,983	- 0.6
Cuyahoga County - Total	1,672,526	1,661,776	-10,750	- 0.6
Geauga County	34,920	33,650	- 1,270	- 3.6
Lake County	152,458	151,744	- 714	- 0.5
Lorain County	225,190	220,902	- 4,288	- 1.9
Medina County	20,005	20,358	+ 353	+ 1.8
Portage County	19,247	19,987	+ 740	+ 3.8
Summit County	<u>34,275</u>	<u>33,848</u>	- 427	- 1.2
TOTAL	2,158,621	2,142,265	-16,356	- 0.8

In Lake County, where the Regional Planning Commission maintained both population and dwelling unit data, the difference between the trip file and the control totals was 4.9 percent for dwelling units and 5.2 percent population. In this area, all trip file data were adjusted on a census tract basis using the ratio of control dwelling units to trip file dwelling units.

TABLE 15

ADJUSTED CORDON AREA DWELLING UNITS BY COUNTY

Area	Control	Adjusted Trip File	Absolute Difference	Percent Difference
City of Cleveland				
East of Cuyahoga River	176,087	182,952	+ 6,865	+ 3.9
West of Cuyahoga River	98,015	97,179	- 836	- 0.8
	<u>274,102</u>	<u>280,131</u>	+ 6,029	+ 2.2
Cuyahoga County				
Excluding City of Cleveland	256,566	258,615	+ 2,049	+ 0.8
	<u>530,668</u>	<u>538,746</u>	+ 8,078	+ 1.5
Cuyahoga County - Total				
Lake County	43,861	43,861	-0-	0.0
Medina County	4,919	5,311	+ 392	+ 8.0
Portage County	4,787	5,657	+ 870	+18.5
Summit County	9,410	9,945	+ 535	+ 5.7
Geauga County	(NA) *	10,186	- -	- -
Lorain County	(NA) *	<u>64,323</u>	- -	- -
TOTAL		678,029		

*Not Available

For the City of Cleveland, east of the Cuyahoga River, the availability of the 1960 Census and the 1965 special Census provided data of sufficient accuracy that adjustment of population and related data was justified, even though the dwelling unit counts seemed to agree. This tends to indicate there was not complete reporting of all household characteristics in this area. The adjustments for Census tracts in this area were in the ratio of population arrived at by interpolation of the Census data to that of the expanded O-D Survey. This was done for all tracts in this area except those where it was apparent that interpolation would not be valid. These were tracts in which there had been major construction or land clearance in the 1960-65 period. In these tracts, the O-D data was taken as valid.

For the areas in Lake County, the dwelling unit counts were adjusted to agree with the control; for those areas in the City of Cleveland, the reported characteristics were adjusted, but the dwelling unit counts were not.

The adjustments for population in Lake County are shown in Table 16 and for dwelling units in Table 17. The population adjustments for the City of Cleveland east of the Cuyahoga River are shown on Table 18.

TABLE 16

LAKE COUNTY POPULATION ADJUSTMENT TO TRIP FILE

Tract	D.U. % Diff.	Trip File Pop.	Adjusted Trip File Pop.	L.C. RPC Pop.	Absolute Diff.	Percentage Diff.
EL-8	- 11.3	13,572	15,405	15,362	+ 43	- 0.3
LC-3	- 7.8	295	318	369	+ 49	+18.2
LC-4	- 16.5	4,087	4,761	4,509	+252	+ 5.6
LC-6	- 30.3	382	498	360	+138	+37.8
LC-7	- 9.2	815	740	681	+ 59	+ 8.7
LC-13	- 7.3	4,425	4,748	4,564	+184	+ 4.0
LC-14		5,340				
LC-15		21,287				
	+ 0.8	26,627	26,840	26,346	+494	+ 4.6
LC-16	- 18.3	251	297	316	- 19	- 6.0
LC-17	- 1.8	5,309	5,405	5,164	+241	+ 4.7
LC-18	+ 12.0	544	479	484	- 5	- 1.0
LC-19	- 8.8	3,619	3,937	4,299	-362	- 8.4
LC-20	- 8.3	10,521	11,394	11,480	- 86	- 0.7
LC-21	- 11.3	4,269	4,751	4,406	+345	+ 7.8
PN- 9		5,769	6,069			
PN-10		3,070	3,230			
PN-11		3,342	3,515			
PN-12		2,954	3,108			
	- 5.2	15,135	15,922	17,215	-1,293	- 7.5
WB- 5	- 7.0	15,442	16,523	17,644	-1,121	- 6.4
WI- 1	- 1.3	20,570	20,837	20,352	+ 485	+ 2.4
WK- 2	- 1.6	18,592	18,889	19,007	- 118	- 0.6
TOTAL	- 5.2	144,312	151,744	152,458	- 714	- 0.5

TABLE 17

LAKE COUNTY DWELLING UNITS AS ADJUSTED IN TRIP FILE

Eastlake	EL-8	4,432
Lakeline	LC-3	90
Willoughby Hills	LC-4	1,343
Waite Hill	LC-6	132
Timberlake	LC-7	196
Mentor O-T-L	LC-13	1,356
Mentor	LC-14, 15	7,606
Kirtland Hills	LC-16	109
Kirtland Twp.	LC-17	1,473
Grand River	LC-18	142
Fairport	LC-19	1,370
Painesville Twp.	LC-20	3,352
Concord Twp.	LC-21	1,320
Painesville	PN-9, 10, 11, 12	5,304
Willoughby	WB-5	5,240
Willowick	WI-1	5,279
Wickliffe	WK-2	<u>5,117</u>
Total		43,861

TABLE 18

CITY OF CLEVELAND-EAST OF CUYAHOGA RIVER
POPULATION ADJUSTMENTS TO TRIP FILE

Tract	Interpolated Population	Trip File Population	Modifier	Adjusted Trip File	Original Expansion	Adjusted Expansion
G-1	141	71	- - *	71		
2	559	291	1.920	559	4.35	8.35
3	336	222	1.513	336	7.66	11.59
4	18	16	- -	16		
5	1,080	918	1.176	1,080	4.10	4.82
6	444	451	0.984	444	6.73	6.62
7	642	661	- - *	661		
8	2,224	1,258	- - *	1,958		
9	2,249	2,159	1.041	2,249	4.47	4.65
Total	7,693			7,374		
H-1	128	27	4.740	128	3.83	18.15
2	1,537	1,351	1.138	1,537	4.49	5.11
3	2,477	2,420	1.024	2,477	4.49	4.60
4	2,910	2,863	1.016	2,910	4.46	4.53
5	537	587	- - *	587		
6	1,682	1,793	0.938	1,682	4.17	3.91
7	2,473	2,393	1.033	2,473	4.55	4.70
8	2,989	3,416	0.875	2,989	4.38	3.83
9	4,916	5,211	0.943	4,916	4.42	4.17
Total	19,649			19,699		
I-1	5	0	- - *	0		
2	340	317	- - *	317		
3	3,603	2,934	1.228	3,603	4.50	5.53
5	594	31	- - *	31		
6	606	0	- - *	0		
7	2,388	2,029	1.177	2,388	4.56	5.37
8	4,695	4,619	1.016	4,695	4.56	4.63
9	1,677	1,356	1.237	1,677	3.92	4.85
Total	13,908			12,711		
J-1	0	0	- - *	0		
2	135	91	1.484	135	5.33	7.91
3	201	100	- -	100		
4	1,538	865	- - *	865		
5	2,295	2,452	0.936	2,295	4.67	4.37
6	1,275	1,061	1.202	1,275	4.96	5.96
7	1,860	1,760	1.057	1,860	4.77	5.04
8	3,397	3,478	0.977	3,397	5.31	5.19
9	3,516	3,491	1.007	3,516	4.54	4.57
Total	14,217			13,443		

* Tracts in which the Trip File Data was accepted.

NOTE: In determining the adjustment factors the interpolated population was adjusted to exclude inmates of institutions. For this reason these figures will not agree exactly with those found in the following section, Population of Subareas.

TABLE 18 -- Continued

Tract	Interpolated Population	Trip File Population	Modifier	Adjusted Trip File	Old Factor	New Factor
K-1	1,333	1,438	0.927	1,333	4.73	4.38
2	2,704	2,700	1.001	2,704	4.39	4.39
3	1,621	1,781	0.910	1,621	4.26	3.88
4	6,567	6,056	1.084	6,567	4.81	5.21
5	3,047	2,964	1.028	3,047	4.43	4.55
6	3,218	3,149	1.022	3,218	4.25	4.34
7	4,269	3,863	1.105	4,269	4.37	4.83
8	3,574	3,143	1.137	3,574	4.30	4.89
9	5,116	5,154	0.993	5,116	4.47	4.44
Total	31,449			31,449		
L-1	6,043	5,252	1.151	6,043	4.71	5.42
2	6,344	4,534	1.399	6,344	5.23	7.32
3	5,029	3,194	1.075	5,029	4.48	4.82
4	10,305	8,156	1.2635	10,305	4.60	5.81
5	6,408	5,939	1.079	6,408	4.38	4.73
6	4,529	4,163	1.088	4,529	4.62	5.03
7	2,296	2,163	1.061	2,296	5.42	5.75
8	7,158	6,937	1.032	7,158	4.49	4.63
9	4,370	3,081	1.418	4,370	4.64	6.58
Total	52,482			52,482		
M-1	4,118	4,570	0.901	4,118	4.52	4.07
2	2,065	2,074	0.996	2,065	4.45	4.43
3	4,441	3,707	1.198	4,441	4.56	5.46
4	3,576	3,105	1.152	3,576	4.69	5.40
5	5,082	5,108	0.995	5,082	5.32	5.29
6	4,384	3,190	1.374	4,384	4.67	6.42
7	2,680	3,029	0.885	2,680	5.39	4.77
8	4,657	4,840	0.962	4,657	4.42	4.25
9	752	575	1.308	752	3.89	5.08
Total	31,755			31,755		
N-1	3,877	3,802	1.020	3,877	5.40	5.51
2	3,827	2,806	1.364	3,827	4.83	6.59
3	4,398	4,203	1.046	4,398	4.32	4.52
4	1,794	1,609	1.115	1,794	4.20	4.68
5	2,285	2,263	1.010	2,285	5.04	5.09
6	3,217	3,451	0.932	3,217	5.09	4.74
7	3,786	2,923	1.295	3,786	4.49	5.81
8	3,938	4,305	0.915	3,938	5.18	4.74
9	4,875	5,575	0.874	4,875	4.65	4.06
TOTAL	31,997			31,997		

TABLE 18 -- Continued

Tract	Interpolated Population	Trip File Population	Modifier	Adjusted Trip File	Old Factor	New Factor
O-1	2,860	3,163	0.904	2,860	4.48	4.05
2	2,180	2,420	0.901	2,180	4.82	4.34
3	2,953	3,359	0.879	2,953	5.47	4.81
4	4,237	4,826	0.878	4,237	4.75	4.17
5	1,623	1,531	1.060	1,623	4.67	4.95
6	4,651	4,928	0.944	4,651	4.73	4.47
7	2,817	2,663	1.058	2,817	4.86	5.14
8	6,898	7,026	0.982	6,898	5.26	5.17
9	4,595	5,247	- - *	5,257		
Total	32,814			33,466		
P-1	3,451	3,368	1.025	3,451	4.77	4.89
2	3,561	3,615	0.985	3,561	4.57	4.50
3	4,992	3,708	1.346	4,992	6.88	9.26
4	7,884	6,734	1.171	7,884	4.41	5.16
5	9,928	8,441	1.176	9,928	4.70	5.53
6	8,603	8,775	0.980	8,603	4.98	4.88
7	4,305	3,823	1.126	4,305	4.22	4.75
8	8,833	6,862	1.287	8,833	4.27	5.50
9	5,392	5,280	1.021	5,392	5.50	5.62
Total	56,949			56,949		
Q-1	6,753	6,802	0.993	6,753	4.80	4.77
2	5,592	5,551	1.007	5,592	5.74	5.78
3	6,358	6,236	1.0196	6,358	4.65	4.74
4	3,102	3,474	0.893	3,102	4.87	4.35
5	5,350	5,378	1.014	5,350	4.86	4.93
6	4,320	4,396	0.983	4,320	4.82	4.74
7	6,523	6,733	0.969	6,523	4.58	4.44
8	3,513	3,415	1.029	3,513	4.77	4.91
9	6,214	6,001	1.035	6,214	5.09	5.27
Total	47,725			47,725		
R-1	4,506	4,287	1.051	4,506	4.47	4.70
2	6,379	5,813	1.097	6,379	4.96	5.44
3	6,789	5,737	1.183	6,789	5.18	6.13
4	4,759	4,172	1.141	4,759	4.55	5.19
5	4,533	3,940	1.151	4,533	4.55	5.24
6	6,173	6,043	1.022	6,173	4.45	4.55
7	4,447	4,140	1.074	4,447	4.51	4.84
8	4,374	3,789	1.154	4,374	4.87	5.62
9	9,128	10,487	0.870	9,128	5.02	4.37
Total	51,088			51,088		

TABLE 18 -- Continued

Tract	Interpolated Population	Trip File Population	Modifier	Adjusted Trip File	Old Factor	New Factor
S-1	3,285	3,361	0.977	3,285	5.36	5.24
2	2,861	2,743	1.043	2,861	4.73	4.93
3	7,299	6,574	1.110	7,299	4.76	5.28
4	6,142	6,125	1.003	6,142	4.28	4.29
5	5,431	5,300	1.025	5,431	4.20	4.31
6	4,839	4,739	1.021	4,839	4.35	4.44
7	7,054	7,338	0.961	7,054	4.51	4.33
8	8,096	7,834	1.033	8,096	4.34	4.48
9	4,608	4,654	0.990	4,608	4.42	4.38
Total	49,615			49,615		
T-1	1,765	1,557	1.134	1,765	4.50	5.10
2	4,652	4,909	0.948	4,652	4.52	4.28
3	1,541	1,406	1.096	1,541	4.67	5.12
4	4,905	5,322	0.922	4,905	4.45	4.10
5	5,031	4,806	1.047	5,031	4.53	4.74
6	7,443	6,710	1.109	7,443	4.34	4.81
7	7,516	7,200	1.044	7,516	4.58	4.78
8	9,152	8,577	1.067	9,152	4.41	4.71
9	3,787	3,865	0.980	3,787	5.00	4.90
Total	45,792			45,792		
U-1	3,713	3,710	1.001	3,713	4.23	4.23
2	3,254	3,188	1.021	3,254	4.44	4.53
3	2,610	2,578	1.012	2,610	4.67	4.73
4	6,260	6,324	0.990	6,260	4.66	4.61
5	5,030	4,808	1.046	5,030	4.42	4.62
6	1,505	1,550	0.971	1,505	4.48	4.35
7	6,142	5,438	1.129	6,142	4.34	4.90
8	3,016	2,894	1.042	3,016	4.69	4.89
9	2,133	2,031	1.050	2,133	4.79	5.03
Total	33,663			33,663		
V-1	4,227	3,954	1.069	4,227	4.77	5.10
2	2,866	2,670	1.073	2,866	4.45	4.77
3	2,960	2,915	1.015	2,960	4.54	4.61
	10,053			10,053		
Z-1	2,232	2,269	0.984	2,232	4.76	4.68
TOTAL	533,081			531,462		

Population of Sub Areas

The following tables show the population of individual tracts within the seven counties as obtained by expansion of the 1963 Origin-Destination Survey Data. For Lake County and the east side of the City of Cleveland population figures are not the figures used after adjustment based on the accuracy checks. These may be found in Tables 16 and 18 in the previous section.

TABLE 19

CITY OF CLEVELAND
POPULATION BY CENSUS TRACT

Census Tract	60 Census Population	65 Census Population	63 Estimated Population	Trip File Total Population	Absolute Difference	Percent Difference
A 1	7587	7702	7656	7557.0	-99.0	-1.3
A 2	3920	3692	3783	3463.0	-320.2	-8.5
A 3	2502	2580	2549	2507.0	-41.8	-1.6
A 4	3802	3738	3764	3212.0	-551.6	-14.7
A 5	4530	4438	4475	4397.0	-77.8	-1.7
A 6	3728	3770	3753	3388.0	-365.2	-9.7
A 7	4406	4282	4332	3994.0	-337.6	-7.8
A 8	5324	5242	5275	4802.0	-472.8	-9.0
A 9	3076	3043	3056	3094.0	37.8	1.2
B 1	7417	7725	7602	7185.0	-416.8	-5.5
B 2	3774	3768	3770	3665.0	-105.4	-2.8
B 3	3136	3154	3147	3012.0	-134.8	-4.3
B 4	7830	7650	7722	7413.0	-309.0	-4.0
B 5	5004	4641	4786	4830.0	43.8	.9
B 6	4910	4732	4803	4813.0	9.8	.2
B 7	5966	5739	5830	5586.0	-243.8	-4.2
B 8	3312	3188	3238	3164.0	-73.6	-2.3
B 9	3585	3376	3460	3465.0	5.4	.2
C 1	2658	2311	2450	2448.0	-1.8	-0.1
C 2	2109	1629	1821	1562.0	-259.0	-14.2
C 3	3494	2056	2631	2994.0	362.8	13.8
C 4	6224	6105	6153	6118.0	-34.6	-0.6
C 5	5283	5056	5147	5423.0	276.2	5.4
C 6	4668	4171	4370	4100.0	-269.8	-6.2
C 7	929	2947	2140	916.0	-1223.8	-57.2
C 8	5158	4767	4923	5353.0	429.6	8.7
C 9	7099	6162	6537	6117.0	-419.8	-6.4
D 1	4125	3115	3519	3778.0	259.0	7.4
D 2	2631	2157	2347	2090.0	-256.6	-10.9
D 3	2684	2087	2326	2507.0	181.2	7.8
D 4	3666	1194	2183	3367.0	1184.2	54.3
D 5	2806	2339	2526	2514.0	-11.8	-0.5
D 6	2273	2038	2132	2082.0	-50.0	-2.3
D 7	4927	3957	4345	4290.0	-55.0	-1.3
D 8	4048	3029	3437	3897.0	460.4	13.4
D 9	5076	4783	4900	4746.0	-154.2	-3.1
E 1	4318	4097	4185	4085.0	-100.4	-2.4
E 2	1687	1497	1573	1647.0	74.0	4.7
E 3	5001	4423	4654	4748.0	93.8	2.0
E 4	5700	5086	5332	5978.0	646.4	12.1
E 5	3228	2998	3090	3120.0	30.0	1.0
E 6	6618	5584	5998	6425.0	427.4	7.1
E 7	3992	5162	4694	4330.0	-364.0	-7.8
E 8	5582	5443	5499	5169.0	-329.6	-6.0
E 9	4423	4382	4398	4207.0	-191.4	-4.4
F 1	4716	4648	4675	4573.0	-102.2	-2.2
F 2	6012	5638	5788	5628.0	-159.6	-2.8
F 3	3662	3886	3796	3644.0	-152.4	-4.0
F 4	1515	1502	1507	1624.0	116.8	7.7
F 5	3457	3375	3408	3177.0	-230.8	-6.8
F 6	4731	4757	4747	4661.0	-85.6	-1.8
F 7	4677	5226	5006	4632.0	-324.4	-6.5
G 1	236	78	141	71.0	-70.2	-49.7
G 2	785	408	559	291.0	-267.8	-47.9
G 3	427	275	336	222.0	-113.8	-33.9
G 4	22	15	18	16.0	-1.8	-10.1
G 5	1216	989	1080	918.0	-161.8	-15.0
G 6	516	396	444	451.0	7.0	1.6
G 7	607	665	642	661.0	19.2	3.0
G 8	2658	1934	2224	1958.0	-265.6	-11.9
G 9	2541	2054	2249	2159.0	-89.8	-4.0
H 1	176	96	128	27.0	-101.0	-78.9
H 2	1722	1413	1537	1351.0	-185.6	-12.1
H 3	2764	2286	2477	2420.0	-57.2	-2.3
H 4	3223	2701	2910	2863.0	-46.8	-1.6
H 5	586	505	537	587.0	49.6	9.2
H 6	1996	1472	1682	1793.0	111.4	6.6
H 7	3036	2097	2473	2393.0	-79.6	-3.2
H 8	3578	2597	2989	3416.0	426.6	14.3
H 9	5497	4529	4916	5211.0	294.8	6.0
I 1	1	7	5	0	-4.6	0
I 2	712	92	340	317.0	-23.0	-6.8
I 3	5048	2639	3603	2934.0	-668.6	-18.6
I 5	1439	30	594	31.0	-562.6	-94.8
I 6	1515	0	606	0	-606.0	0
I 7	2411	2373	2388	2029.0	-359.2	-15.0
I 8	5066	4448	4695	4619.0	-76.2	-1.6
I 9	3134	705	1677	1356.0	-320.6	-19.1

TABLE 19 -- Continued

Census Tract	60 Census Population	65 Census Population	63 Estimated Population	Trip File Total Population	Absolute Difference	Percent Difference
J 1	0	0	0	0	0	0
J 2	278	40	135	91.0	-44.2	-32.7
J 3	338	109	201	100.0	-100.6	-50.1
J 4	2745	733	1538	865.0	-672.8	-43.8
J 5	2602	2091	2295	2452.0	156.6	6.8
J 6	1404	1189	1275	1061.0	-214.0	-16.8
J 7	1966	1789	1860	1760.0	-99.8	-5.4
J 8	3608	3256	3397	3478.0	81.2	2.4
J 9	3703	3391	3516	3491.0	-24.8	-0.7
K 1	1474	1239	1333	1438.0	105.0	7.9
K 2	2819	2628	2704	2700.0	-4.4	-0.2
K 3	1796	1504	1621	1781.0	160.2	9.9
K 4	6673	6496	6567	6056.0	-510.8	-7.8
K 5	3225	2929	3047	3964.0	-83.4	-2.7
K 6	3362	3122	3218	3149.0	-69.0	-2.1
K 7	4484	4126	4269	3863.0	-406.2	-9.5
K 8	3690	3497	3574	3143.0	-431.2	-12.1
K 9	5450	4893	5116	5154.0	38.2	.7
L 1	6298	5950	6089	5252.0	-837.2	-13.7
L 2	6977	5922	6344	4534.0	-1810.0	-28.5
L 3	5703	4580	5029	3194.0	-1835.2	-36.5
L 4	11785	9318	10305	8156.0	-2148.8	-20.9
L 5	7430	5915	6521	5939.0	-582.0	-8.9
L 6	5270	4035	4529	4163.0	-366.0	-8.1
L 7	3160	1720	2296	2163.0	-133.0	-5.8
L 8	8246	6432	7158	6937.0	-220.6	-3.1
L 9	5163	3887	4397	3081.0	-1316.4	-29.9
M 1	4789	3757	4170	4570.0	400.2	9.6
M 2	2490	1781	2065	2074.0	9.4	.5
M 3	5148	3970	4441	3707.0	-734.2	-16.5
M 4	3872	3378	3576	3105.0	-470.6	-13.2
M 5	5374	4888	5082	5108.0	25.6	.5
M 6	4739	4196	4413	3190.0	-1223.2	-27.7
M 7	3191	2339	2680	3029.0	349.2	13.0
M 8	5896	4014	4767	4840.0	73.2	1.5
M 9	1222	438	752	575.0	-176.6	-23.5
N 1	4250	3629	3877	3802.0	-75.4	-1.9
N 2	4822	3227	3865	2806.0	-1059.0	-27.4
N 3	4733	4175	4398	4203.0	-195.2	-4.4
N 4	1946	1692	1794	1609.0	-184.6	-10.3
N 5	2461	2167	2285	2263.0	-21.6	-0.9
N 6	3318	3149	3217	3451.0	234.4	7.3
N 7	4027	3625	3786	2923.0	-862.8	-22.8
N 8	4192	3768	3938	4305.0	367.4	9.3
N 9	5046	4761	4875	5575.0	700.0	14.4
O 1	2977	2782	2860	3163.0	303.0	10.6
O 2	2354	2064	2180	2420.0	240.0	11.0
O 3	3191	2795	2953	3359.0	405.6	13.7
O 4	4385	4138	4237	4826.0	589.2	13.9
O 5	1692	1577	1623	1531.0	-92.0	-5.7
O 6	4888	4493	4651	4928.0	277.0	6.0
O 7	2979	2709	2817	2663.0	-154.0	-5.5
O 8	7013	6821	6898	7026.0	128.2	1.9
O 9	8151	6899	7400	5247.0	-2152.8	-29.1
P 1	3577	3367	3451	3368.0	-83.0	-2.4
P 2	3644	3505	3561	3615.0	54.4	1.5
P 3	4486	5329	4992	3708.0	-1283.8	-25.7
P 4	8432	7519	7884	6734.0	-1150.2	-14.6
P 5	10470	9997	10186	8441.0	-1745.2	-17.1
P 6	8550	9139	8903	8775.0	-128.4	-1.4
P 7	3912	4567	4305	3823.0	-482.0	-11.2
P 8	7839	9495	8833	6862.0	-1970.6	-22.3
P 9	5566	5276	5392	5280.0	-112.0	-2.1
Q 1	6943	6626	6753	6802.0	49.2	.7
Q 2	5693	5525	5592	5551.0	-41.2	-0.7
Q 3	6735	6107	6358	6236.0	-122.2	-1.9
Q 4	3338	2945	3102	3474.0	371.8	12.0
Q 5	5436	5292	5350	5278.0	-71.6	-1.3
Q 6	4441	4240	4320	4396.0	75.6	1.7
Q 7	6479	6552	6523	6733.0	210.2	3.2
Q 8	3547	3537	3541	3415.0	-126.0	-3.6
Q 9	5777	6621	6283	6001.0	-282.4	-4.5

TABLE 19 -- Continued

Census Tract	60 Census Population	65 Census Population	63 Estimated Population	Trip File Total Population	Absolute Difference	Percent Difference
R 1	4904	4241	4506	4287.0	-219.2	-4.9
R 2	6784	6142	6399	5813.0	-585.8	-9.2
R 3	7081	6595	6789	5739.0	-1050.4	-15.5
R 4	4923	4649	4759	4172.0	-586.6	-12.3
R 5	4733	4400	4533	3940.0	-593.2	-13.1
R 6	6634	6452	6525	6043.0	-481.8	-7.4
R 7	4758	4375	4528	4140.0	-388.2	-8.6
R 8	4724	4140	4374	3789.0	-584.6	-13.4
R 9	10072	8655	9222	10487.0	1265.2	13.7
S 1	3847	2911	3285	3361.0	75.6	2.3
S 2	2803	2900	2861	2743.0	-118.2	-4.1
S 3	7897	6967	7339	6574.0	-765.0	-10.4
S 4	6350	6004	6142	6125.0	-17.4	-0.3
S 5	5627	5300	5431	5300.0	-130.8	-2.4
S 6	5089	4673	4839	4739.0	-100.4	-2.1
S 7	7089	7031	7054	7338.0	283.8	4.0
S 8	8288	7968	8096	7834.0	-262.0	-3.2
S 9	4565	4636	4608	4654.0	46.4	1.0
T 1	2042	1581	1765	1557.0	-208.4	-11.8
T 2	4921	4472	4652	4909.0	257.4	5.5
T 3	1663	1460	1541	1406.0	-135.2	-8.8
T 4	4887	4917	4905	5322.0	417.0	8.5
T 5	5268	4932	5066	4806.0	-260.4	-5.1
T 6	7057	7701	7443	6710.0	-733.4	-9.9
T 7	7340	7634	7516	7200.0	-316.4	-4.2
T 8	9160	9146	9152	8577.0	-574.6	-6.3
T 9	3634	3889	3787	3865.0	78.0	2.1
U 1	3586	3798	3713	3710.0	-3.2	-0.1
U 2	3193	3295	3254	3188.0	-66.2	-2.0
U 3	2641	2590	2610	2578.0	-32.4	-1.2
U 4	6311	6226	6260	6324.0	64.0	1.0
U 5	4934	394	5030	4808.0	-222.0	-4.4
U 6	1441	1547	1505	1550.0	45.4	3.0
U 7	6170	6123	6142	5438.0	-703.8	-11.5
U 8	3005	3024	3016	2894.0	-122.4	-4.1
U 9	2048	2190	2133	2031.0	-102.2	-4.8
V 1	4048	4347	4227	3954.0	-273.4	-6.5
V 2	2565	3067	2866	2670.0	-196.2	-6.8
V 3	2457	3296	2960	2915.0	-45.4	-1.5
W 1	3995	4178	4105	4141.0	36.2	.9
W 2	5119	5096	5105	4890.0	-215.2	-4.2
W 3	1093	996	1035	1009.0	-25.8	-2.5
W 4	4906	5310	5148	5331.0	182.6	3.5
W 5	7295	8011	7725	7491.0	-233.6	-3.0
W 6	11172	12423	11923	11946.0	23.4	.2
W 7	5064	6851	6136	5595.0	-541.2	-8.8
W 8	4651	4455	4533	4299.0	-234.4	-5.2
W 9	4361	4335	4345	4132.0	-213.4	-4.9
X 1	6767	6806	6790	6592.0	-198.4	-2.9
X 2	5551	6191	5935	5621.0	-314.0	-5.3
X 3	5765	5821	5799	5709.0	-89.6	-1.5
X 4	3614	3474	3530	3489.0	-41.0	-1.2
X 5	5121	5398	5287	5174.0	-113.2	-2.1
X 6	6527	6347	6419	6481.0	62.0	1.0
Z 1	2366	2142	2232	2794.0	62.4	2.8

TABLE 20

CUYAHOGA COUNTY POPULATION BY CENSUS TRACT*

Area	Tracts	Trip File Population	1963 Estimates	Absolute Difference	Percentage Difference
Bay Village	BA-1	15,398	15,482	- 84	- 0.5
Beachwood	BW-1	7,176	8,087	-1,011	- 12.5
Bedford	BD-1	6,220			
	BD-2	3,848			
	BD-3	5,088			
	Total	15,156	16,266	-1,110	- 6.8
Bedford Hts.	BH-1	8,052	7,232	819	+ 11.3
Berea	BE-1	797			
	BE-2	13,527			
	BE-3	4,732			
	Total	19,056	18,274	781	+ 4.3
Brecksville	BR-1	7,501	7,329	171	2.3
Broadview Hts.	BV-1	7,676	7,886		
	-1960 Inmates of Institutions		250 7,636	+ 40	+ 0.5
Brooklyn	BK-1	11,602	12,223	- 621	- 5.1
Brook Park	BP-1	24,413	18,449	5,963	32.3
Cleveland Hts.	CH-1	2,032			
	CH-2	2,148			
	CH-3	6,357			
	CH-4	4,085			
	CH-5	4,587			
	CH-6	1,913			
	CH-7	6,149			
	CH-8	2,956			
	CH-9	2,793			
	CH-10	1,887			
	CH-11	5,425			
	CH-12	5,166			
	CH-13	2,936			
	CH-14	3,916			
	CH-15	2,561			
	CH-16	5,119			
	CH-17	2,311			
	Total	62,341	62,604		
	-1960 Inmates of Institutions		169 62,435	- 95	0.2

*Excluding City of Cleveland.

TABLE 20 -- Continued

Area	Tracts	Trip File Population	1963 Estimates	Absolute Difference	Percentage Difference
East Cleveland	EC-1	5,530			
	EC-2	3,358			
	EC-3	3,228			
	EC-4	4,344			
	EC-5	3,654			
	EC-6	2,644			
	EC-7	5,434			
	EC-8	3,163			
	EC-9	1,210			
	EC-10	3,883			
	Total	36,448	39,493	-3,045	- 7.7
Euclid	EU-1	10,903			
	EU-2	11,412			
	EU-3	14,062			
	EU-4	2,525			
	EU-5	10,749			
	EU-6	10,134			
	EU-7	4,836			
	Total	64,621	65,818	-1,197	- 1.8
Fairview Park	FP-1	15,573	16,651	-1,078	- 6.5
Garfield Hts.	GH-1	3,040			
	GH-2	1,944			
	GH-3	1,581			
	GH-4	3,275			
	GH-5	7,549			
	GH-6	18,349			
	GH-7	3,668			
	Total	39,406	40,703	-1,297	- 3.2
Independence	ID-1	7,011	7,777	- 766	- 9.8
Lakewood	LW-1	2,669			
	LW-2	3,362			
	LW-3	2,674			
	LW-4	4,768			
	LW-5	4,500			
	LW-6	7,340			
	LW-7	1,562			
	LW-8	1,567			
	LW-9	5,657			
	LW-10	2,718			
	LW-11	5,219			
	LW-12	4,164			
	LW-13	3,900			
	LW-14	4,757			
	LW-15	5,610			
	LW-16	2,843			
	LW-17	2,868			
	LW-18	2,055			
	Total	68,233	67,383	850	1.3

TABLE 20 -- Continued

Area	Tracts	Trip File Population	1963 Estimates	Absolute Difference	Percentage Difference
Lyndhurst	LH-1	11,536			
	LH-2	6,100			
	Total	<u>17,636</u>	17,793	- 157	- .88
Maple Hts.	MH-1	19,680			
	MH-2	13,317			
	Total	<u>32,997</u>	33,222	- 225	- .68
Mayfield Hts.	MY-1	10,072			
	MY-2	6,113			
	Total	<u>16,185</u>	15,225	960	6.3
Middleburg Hts.	MB-1	9,171	9,477	- 306	- 3.2
North Olmsted	NO-1	10,297			
	NO-2	9,481			
	Total	<u>19,778</u>	19,218	560	2.9
North Royalton	NR-1	7,289			
	NR-2	3,694			
	Total	<u>10,983</u>	10,793	190	1.8
Parma	PR-1	15,027			
	PR-2	10,610			
	PR-3	11,436			
	PR-4	20,684			
	PR-5	16,003			
	PR-6	13,433			
	Total	<u>87,193</u>	89,191		
	-1960 Inmates of Institutions		<u>687</u>		
			<u>88,503</u>	-1,310	- 1.5
Parma Hts.	PH-1	7,091			
	PH-2	15,913			
	Total	<u>23,004</u>	18,328	4,676	25.5
Richmond Hts.	RH-1	6,066	6,595	- 529	- 8.0
Rocky River	RR-1	7,257			
	RR-2	12,146			
	Total	<u>19,403</u>	19,268	135	0.7
Seven Hills	SV-1	8,129	7,626	503	6.6
Shaker Hts.	SH-1	3,385			
	SH-2	3,442			
	SH-3	5,852			
	SH-4	5,267			
	SH-5	8,111			
	SH-6	10,928			
	Total	<u>36,985</u>	37,582		
	-1960 Inmates of Institutions		<u>-97</u>	- 500	- 1.3
			<u>37,485</u>		

TABLE 20 -- Continued

Area	Tracts	Trip File Population	1963 Estimates	Absolute Difference	Percentage Difference
Solon	SO-1	6,938	8,963	-2,025	- 22.6
South Euclid	SE-1	14,214			
	SE-2	14,479			
	Total	28,693	28,433	260	.91
Strongsville	ST-1	6,317			
	ST-2	4,037			
	Total	10,354	12,402	-2,048	- 16.5
University Hts.	UH-1	16,504	16,808	- 304	- 1.8
Warrensville Hts.	WH-1	12,410	12,226	184	1.5
Westlake	WL-1	13,160	15,124	-1,964	- 13.0
Olmsted Twp.	CC-5	5,548	6,731	-1,183	- 17.6
Olmsted Falls	CC-6	2,143	2,400	- 257	- 10.7
Westview	CC-7	1,305	1,647	- 342	- 20.8
Parkview	CC-9	2,808	2,597	210	8.1
River Edge Twp.	CC-10	553	426	126	29.6
Linndale	CC-15	402	326	75	23.0
Newburgh Hts.	CC-20	3,657	3,523	134	3.8
Cuyahoga Hts.	CC-22	812	842	- 30	- 3.6
Brooklyn Hts.	CC-23	1,485	1,554	- 69	- 4.4
Bratenahl	CC-28	1,171	1,937	- 766	- 39.5
Valley View	CC-29	1,244	1,529	- 285	- 18.6
North Randall	CC-38	758	766	- 8	- 1.0
Warrensville Twp.	CC-30	920	2,362		
	-1960 Inmates of Institutions		1,500		
			862	+ 58	+ 6.7
Oakwood	CC-40	2,742	3,603	- 861	- 23.9
Walton Hills	CC-41	2,061	2,098	- 37	- 1.8
Highland Hts.	CC-42	4,851	4,960	- 109	- 2.2
Mayfield	CC-43	2,387	2,733	- 346	- 12.7

TABLE 20.-- Continued

Area	Tracts	Trip File Population	1963 Estimates	Absolute Difference	Percentage Difference
Gates Mills	CC-45	1,781	1,861	- 80	- 4.3
Pepper Pike	CC-46	4,018	3,960	+ 58	+ 1.5
Hunting Valley	CC-47	663	610	+ 53	+ 8.7
Woodmere	CC-48	538	758	- 220	- 29.0
Orange	CC-49	2,080	2,586	- 506	- 19.6
Glenwillow	CC-51	429	461	- 32	- 6.9
Moreland Hills	CC-52	2,355	2,566	- 211	- 8.2
Bentleyville	CC-53	363	345	17	+ 4.9
Chagrin Falls	CC-54	51	75	- 24	- 32.0
Chagrin Falls Twp.	CC-55	3,393	3,710	- 317	- 8.5
Total Cuyahoga Cty. Excluding Cleve.		836,770	844,819	-8,049	- 0.95
Cuyahoga County		836,770	844,819		
-1960 Inmates of Institutions			3,066		
		836,770	841,753	-4983	- 0.59

TABLE 21

GEAUGA COUNTY POPULATION BY ODH TRACT

	ODH Tract	1960 Census Population	1963 Estimated Population	Trip File Population	Absolute Difference	Percentage Difference
Chardon Twp.	GC-1	2,056	2,319	2,451	+ 132	+ 5.7%
Chardon Vil.	GC-2	3,154	3,389	3,159	- 230	- 6.8
Chester Twp.	GC-3	6,566	7,896	8,397	+ 499	+ 6.3
Munson Twp.	GC-4	2,460	2,965	2,924	- 41	- 1.4
Russell Twp.	GC-5	3,368	4,183	4,030	- 153	- 3.7
So. Russell Twp.	GC-6	1,276	1,376	1,978	+ 602	+43.8
Newbury Twp.	GC-7	3,719	4,373	3,672	- 699	-16.0
Bainbridge Twp.	GC-8	5,423	6,633	5,634	- 999	-15.1
Auburn Twp.	GC-9	1,451	1,786	1,405	- 381	+21.3
		29,473	34,920	33,650	-1,270	- 3.6

TABLE 22
LAKE COUNTY POPULATION BY TRACT

	Tract	Lake County Planning Commission	Trip File	Absolute Difference	Percentage Difference
Eastlake	EL-8	15,362	13,572	-1,790	-11.7
Lakeline	LC-3	269	295	+ 26	+ 9.7
Willoughby Hills	LC-4	4,509	4,087	- 422	- 9.3
Waite Hill	LC-6	360	382	+ 22	+ 2.2
Timberlake	LC-7	681	815	+ 134	+19.7
Mentor OTL	LC-13	4,564	4,425	- 139	- 3.0
Mentor	LC-14		5,340		
	LC-15		21,287		
		26,346	26,627	+ 281	+ 1.1
Kirtland Hills	LC-16	316	251	- 65	-20.6
Kirtland Twp.	LC-17	5,164	5,309	+ 145	+ 2.8
Grand River	LC-18	484	544	+ 60	+12.4
Fairport	LC-19	4,299	3,619	- 680	-15.8
Painesville Twp.	LC-20	11,480	10,521	- 959	- 9.1
Concord Twp.	LC-21	4,406	4,269	- 137	- 3.1
Painesville City	PN-9		5,769		
	PN-10		3,070		
	PN-11		3,342		
	PN-12		2,954		
		17,215	15,135	-2,080	-12.1
Willoughby	WB-5	17,644	15,442	-2,202	-12.5
Willowick	WI-1	20,352	20,570	+ 218	+ 1.1
Wickliffe	WK-2	19,007	18,592	- 415	- 2.2
		152,458	144,455	-8,003	-5.3

NOTE: For adjusted data see Table 16.

TABLE 23

LORAIN COUNTY POPULATION BY AREA

Area	Census 1960	'65 Low Proj.	Inter- polated to 1963	Trip File	Abso- lute Diff.	Per- cent Difference
Avon Lake	9043	11,300	10,397	10,925	+ 528	+ 5.1
Avon	6002	7490	6895	6416	- 479	- 6.9
Sheffield Lake	6884	8650	7944	8182	238	3.0
Sheffield Vil.	1664	2350	2076	1804	- 272	-13.1
Sheffield Twp.	7027	8460	7707	6245	-1462	-19.0
Black River Twp.	853	190	455	910	- 455	100
Brownhelm Twp.	747	820	791	770	- 21	- 2.7
Amherst Vil.	6750	8350	7710	8029	319	4.1
Amherst Twp.	6002	6900	6541	5530	-1011	-15.5
Elyria Twp.	4287	4780	4583	4467	- 116	- 2.5
Vermillion O-T-L Vermillion	1273 1602	1710 2090				
	2875	3800	3430	3303	- 127	- 3.7
Ridgeville	8057	9720	9055	10,031	976	10.8
Columbia Twp.	4474	5740	5234	4791	- 443	- 8.5
Eaton Twp.	5886	7430	6812	5847	- 965	-14.2
Carlisle Twp.	7087	8190	7749	7345	- 404	- 5.2
Oberlin	8198	9000	8679	6426	-2253	-26.0
Russia Twp. South Amherst	1776 1657	2150 2020				
-----	3433	4170	3875	3367	- 508	-13.1
Henrietta Twp.	1390	1590	1510	1439	- 71	- 4.7
Kipton	353	380				
Pittsfield Twp.	1094	1180				
Camden Twp.	771	800				
	2218	2360	3070	1987	-1083	- 35.3

TABLE 23 -- Continued

	Census 1960	1965 Low Projection	Inter- polated to 1963	Trip File	Absolute Difference	Percent Difference
La Grange Vil.	1,007	1,160				
La Grange Twp.	<u>1,391</u>	<u>1,600</u>				
	2,398	2,760	2,615	2,436	-179	-6.8
Grafton Vil.	1,683	1,820				
Grafton Twp.	<u>1,314</u>	<u>1,420</u>				
	2,997	3,240	3,143	3,240	97	3.1
Lorain	68,932	74,100	72,033	71,300	-733	-1.0
Elyria	<u>43,782</u>	<u>48,200</u>	46,433	46,112	-321	- .7
Total	210,986	239,590	228,148	220,902	-7,246	-3.2

TABLE 24

MEDINA COUNTY POPULATION BY AREA

Area	Tract	Tri-County Estimate	Trip File	Absolute Difference	Percentage Difference
Hinckley	MC-1	3,516	3,500	- 16	- 0.5
Brunswick City*	MC-2	12,887	12,167	- 720	- 5.6
Brunswick Hills Twp.*	MC-3	1,233	2,380	+1,147	+93.0
Liverpool Twp.	MC-4	2,369	2,311	- 58	- 2.4
		20,005	20,358	+ 353	+ 1.8

*If data from Brunswick City and Brunswick Hills Township are combined, the figures are:

<u>Tri-County Estimate</u>	<u>Trip File</u>	<u>Absolute Difference</u>	<u>Percentage Diff.</u>
14,120	14,547	+427	+3.0

This tends to indicate that there may be some difference in definition of the area by the two sources.

TABLE 25

PORTAGE COUNTY POPULATION BY CENSUS TRACT

	ODH Tracts	1963 Tri- Co. Estimate	Trip File	Absolute Difference	Percentage Difference
Aurora Vil.	PC-1	4,681	4,779	+ 98	+ 2.1
Mantua Twp.	PC-2	3,197	2,755	-442	-13.8
Mantua Vil.	PC-3	1,208	1,017	-191	-15.8
Streetsboro Twp.	PC-4	6,465	6,865	+400	+ 6.2
Shallersville Twp.	PC-5	3,696	4,571	+875	+23.7
		19,247	19,987	+740	+ 3.8

TABLE 26

SUMMIT COUNTY POPULATION BY ODH TRACT

Area	ODH Tract	1963 Tri-County Estimate	Trip File	Absolute Difference	Percentage Difference
Sagamore Hills Twp.	SC-1	5,068	3,750	-1,318	-26.0
Northfield & North- field Center	SC-2	5,525	6,034	+ 509	+ 9.2
Macedonia	SC-3	5,021	5,217	+ 196	+ 3.9
Twinsburg Vil.	SC-4	4,760	4,620	- 140	- 2.9
Reminderville Vil.	SC-5	231	167	- 64	-27.7
Twinsburg Twp.	SC-6	1,811	1,578	- 233	-12.9
Hudson Twp.	SC-7	3,056	2,949	- 107	- 3.5
Hudson Vil.	SC-8	3,046	2,707	- 339	-11.1
Boston Heights	SC-9	892	829	- 63	- 7.1
Peninsula	SC-10	657	502	- 155	-23.6
Boston Twp.	SC-11	1,860	1,571	- 289	-15.5
Richfield Twp.	SC-12	4,325	3,924	- 401	- 9.3
		36,252	33,848	-2,404	- 6.6
1960 Census Inmates of Institutions		-1,977			
		34,275	33,848	- 427	- 1.2

Dwelling Units in Subareas

The following tables show the dwelling units as reported in the 1963 Origin-Destination Survey in the individual tracts within the seven counties. An independent count is shown where available. In Lake County the Regional Planning Commission data were accepted for the trip file, and these are given in Table 17 on page 55.

TABLE 27

CITY OF CLEVELAND -- WEST OF CUYAHOGA RIVER
DWELLING UNITS BY CENSUS TRACT

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes ^s
A-1	3,060	2,986	- 74	+ 2.4	
A-2	1,365	1,376	+ 11	+ 0.8	
A-3	918	912	- 6	- 0.7	
A-4	1,236	1,191	- 45	- 3.6	
A-5	1,555	1,499	- 56	- 4.2	
A-6	1,178	1,149	- 29	- 2.5	
A-7	1,372	1,379	+ 7	+ 0.5	
A-8	1,662	1,579	- 83	- 5.0	
A-9	945	931	- 14	- 1.5	
Total	13,291	13,002	- 289	- 2.2	
B-1	2,500	2,475	- 25	- 1.0	
B-2	1,166	1,194	+ 28	+ 2.4	
B-3	977	938	- 39	- 4.0	
B-4	2,360	2,263	- 97	- 4.1	
B-5	1,532	1,487	- 45	- 2.9	
B-6	1,602	1,413	- 189	- 11.8	
B-7	1,913	1,836	- 77	- 4.0	
B-8	1,161	1,146	- 15	- 1.3	
B-9	1,137	1,135	- 2	- 0.2	
Total	14,348	13,887	- 461	- 3.2	
C-1	781	793	+ 12	+ 1.5	In 1960 there were in group quarters 137 in C-2 161 in C-3 537 in C-6
C-2	486	644	+ 158	+ 32.5	
C-3	1,112	1,289	+ 177	+ 16.0	
C-4	1,901	1,879	- 22	- 1.2	
C-5	1,617	1,656	+ 39	+ 2.4	
C-6	1,298	1,524	+ 226	+ 17.4	
C-7	319	296	- 23	- 7.2	
C-8	1,625	1,571	- 54	- 3.3	
C-9	2,267	2,238	- 29	- 1.3	
Total	11,406	11,890	+ 484	+ 4.2	
D-1	1,266	1,250	- 16	- 1.3	
D-2	869	790	- 79	- 9.0	
D-3	915	817	- 98	- 10.7	
D-4	1,024	996	- 28	- 2.7	
D-5	943	870	- 73	- 7.7	
D-6	709	754	+ 45	+ 6.3	
D-7	1,495	1,368	- 127	- 8.5	
D-8	1,190	1,188	- 2	- 0.2	
D-9	1,697	1,660	- 37	- 2.2	
Total	10,108	9,693	- 415	- 4.1	

TABLE 27 -- Continued

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
E-1	1,495	1,477	- 18	- 1.2	
E-2	583	586	+ 3	+ 0.5	
E-3	1,646	1,639	- 7	- 0.4	
E-4	1,838	1,809	- 29	- 1.6	
E-5	1,120	1,098	- 22	- 2.0	
E-6	1,840	2,280	+ 440	+23.9	In 1960 there were 318 in group quarters in E-6
E-7	1,472	1,434	- 38	- 2.6	
E-8	1,829	1,733	- 96	- 5.2	
E-9	1,529	1,501	- 28	- 1.8	
Total	13,352	13,557	+ 205	+ 1.5	
F-1	1,622	1,609	- 13	- 0.8	
F-2	1,882	1,864	- 18	- 1.0	
F-3	1,225	1,205	- 20	- 1.6	
F-4	485	501	+ 16	+ 3.3	
F-5	1,134	1,103	- 31	- 2.7	
F-6	1,576	1,538	- 38	- 2.4	
F-7	1,766	1,707	- 59	- 3.3	
Total	9,690	9,527	- 163	- 1.7	
W-1	1,389	1,368	- 21	- 1.5	
W-2	1,725	1,694	- 31	- 1.8	
W-3	364	349	- 15	- 4.1	
W-4	1,571	1,770	199	12.7	In 1960 there were 207 in group quarters in W-4
W-5	2,667	2,566	- 101	- 3.8	
W-6	3,784	3,856	72	1.9	
W-7	1,636	1,582	- 54	- 3.3	
W-8	1,195	1,169	- 26	- 2.2	
W-9	1,409	1,350	- 59	- 4.2	
Total	15,740	15,704	- 36	- 0.2	
X-1	2,140	2,103	- 37	- 1.7	
X-2	1,736	1,725	- 11	- 0.6	
X-3	1,819	1,787	- 32	- 1.8	
X-4	1,019	985	- 34	- 3.3	
X-5	1,508	1,488	- 20	- 1.3	
X-6	1,858	1,831	- 27	- 1.5	
Total	10,080	9,919	- 161	- 1.6	
Grand Total	98,015	97,179	- 836	- .8	

TABLE 28

CITY OF CLEVELAND -- EAST OF CUYAHOGA RIVER
DWELLING UNITS BY CENSUS TRACT

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference
G-1	4	71	+ 67	+ 1,675.
G-2	90	325	+ 235	261.
G-3	146	100	- 46	- 31.6
G-4	11	12	+ 1	9.1
G-5	430	436	+ 6	1.4
G-6	169	408	+ 239	141.4
G-7	66	677	+ 611	925.7
G-8	448	1,530	+ 1,082	241.5
G-9	777	1,554	+ 777	100.0
Total	2,141	5,113	+ 2,972	138.8
H-1	46	23	- 23	- 50.0
H-2	598	538	- 60	- 10.0
H-3	910	848	- 62	- 6.8
H-4	1,113	1,067	- 46	- 4.1
H-5	240	228	- 12	- 5.0
H-6	663	833	+ 170	25.6
H-7	990	1,081	+ 91	9.2
H-8	1,309	1,787	+ 478	36.5
H-9	1,354	1,410	+ 56	4.1
Total	7,223	7,815	+ 592	8.2
I-1	- -	-0-	-0-	- -
I-2	12	317	+ 305	+ 2,541.
I-3	939	1,122	+ 183	19.5
I-5	1	22	+ 21	2,100.
I-6	- -	-0-	-0-	- -
I-7	840	855	+ 15	1.8
I-8	1,359	1,352	- 7	- .5
I-9	917	739	- 178	- 19.4
Total	4,068	4,407	+ 339	8.3
J-1	- -	-0-	-0-	- -
J-2	32	32	-0-	- -
J-3	81	52	- 29	- 35.8
J-4	404	302	- 102	- 25.2
J-5	704	886	+ 182	25.9
J-6	388	391	+ 3	0.8
J-7	579	546	- 33	- 5.7
J-8	1,179	1,197	+ 18	1.5
J-9	1,272	1,210	- 62	- 4.9
Total	4,639	4,616	- 23	- .5

TABLE 28 -- Continued

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference
K-1	529	529	0	- - -
K-2	958	1,020	+ 62	+ 6.5
K-3	638	625	- 13	- 2.0
K-4	1,949	1,891	- 58	- 3.0
K-5	1,194	1,159	- 35	- 2.9
K-6	1,160	1,183	+ 23	+ 2.0
K-7	1,499	1,483	- 16	- 1.1
K-8	1,210	1,157	- 53	- 4.4
K-9	1,745	1,837	+ 92	+ 5.3
Total	10,882	10,884	+ 2	+ .02
L-1	1,724	1,683	- 41	- 2.4
L-2	1,739	1,668	- 71	- 4.1
L-3	1,357	1,386	+ 29	+ 2.1
L-4	2,877	2,954	+ 77	+ 2.7
L-5	2,050	2,045	- 5	- .2
L-6	1,371	1,361	- 10	- .7
L-7	913	1,063	+150	+ 16.4
L-8	2,939	3,120	+181	+ 6.2
L-9	1,468	1,659	+191	+ 13.3
	16,438	16,939	+501	+ 3.0
M-1	1,730	2,212	+482	+ 27.9
M-2	994	1,219	+225	+ 22.6
M-3	1,591	1,465	-126	- 7.9
M-4	1,182	1,136	- 46	- 3.9
M-5	1,830	1,801	- 29	- 1.6
M-6	1,554	1,467	- 87	- 5.6
M-7	934	931	- 3	- .3
M-8	1,641	1,808	+167	+ 10.2
M-9	245	195	- 50	- 20.4
	11,701	12,234	+533	- 4.6
N-1	1,122	1,197	+ 75	+ 6.7
N-2	1,278	1,135	-143	- 11.2
N-3	1,380	1,368	- 12	- .9
N-4	732	656	- 76	- 10.4
N-5	949	967	+ 18	+ 1.9
N-6	1,027	1,046	+ 19	+ 1.9
N-7	1,083	981	-102	- 9.4
N-8	1,590	1,496	- 94	- 5.9
N-9	1,737	1,763	+ 26	+ 1.5
	10,898	10,609	-289	- 2.7

TABLE 28 -- Continued

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference
O-1	1,035	975	- 60	- 5.8
O-2	800	769	- 31	- 3.9
O-3	1,021	1,012	- 9	- .9
O-4	1,515	1,459	- 56	- 3.7
O-5	600	502	- 98	- 16.3
O-6	1,559	1,493	- 66	- 4.2
O-7	922	905	- 17	- 1.8
O-8	2,096	2,089	- 7	- .3
O-9	1,694	1,647	- 47	- 2.8
Total	11,242	10,851	- 391	3.5
P-1	898	903	+ 5	0.6
P-2	954	963	+ 9	0.9
P-3	1,473	1,448	- 25	- 1.7
P-4	2,164	2,157	- 7	- .3
P-5	2,698	2,640	- 58	- 2.1
P-6	2,586	2,513	- 73	- 2.8
P-7	1,253	1,223	- 30	- 2.4
P-8	2,714	2,680	- 34	- 1.3
P-9	1,999	1,973	- 26	- 1.3
Total	16,739	16,500	- 239	- 1.4
Q-1	2,376	2,286	- 90	- 3.8
Q-2	2,094	2,071	- 23	- 1.1
Q-3	2,112	2,120	+ 8	0.4
Q-4	1,075	1,069	- 6	- .6
Q-5	1,731	1,643	- 88	- 5.1
Q-6	1,539	1,547	+ 8	0.5
Q-7	2,353	2,299	- 54	- 2.3
Q-8	1,085	1,061	- 24	- 2.2
Q-9	2,362	2,242	- 120	- 5.1
Total	16,727	16,338	- 389	- 2.3
R-1	1,327	1,216	- 111	- 8.4
R-2	1,805	1,818	+ 13	0.7
R-3	1,787	1,807	+ 20	1.1
R-4	1,443	1,438	- 5	- .3
R-5	1,297	1,243	- 54	- 4.2
R-6	2,424	2,585	+ 161	6.6
R-7	827	2,792	+ 1,965	237.
R-8	1,703	1,503	- 200	- 11.7
R-9	3,752	4,582	+ 830	22.1
Total	16,365	18,984	+ 2,619	16.0

TABLE 28 -- Continued

Tract	Real Property Inventory	1963 Trip File	Absolute Difference	Percent Difference
S-1	1,012	2,339	+ 1,327	131.
S-2	975	1,105	+ 130	13.3
S-3	2,582	2,521	- 61	- 2.4
S-4	2,412	2,390	- 22	- .9
S-5	2,939	2,915	- 24	- .8
S-6	1,771	1,724	- 47	- 2.7
S-7	2,692	2,636	- 56	- 2.1
S-8	2,495	2,461	- 34	- 1.4
S-9	1,542	1,461	- 81	- 5.3
Total	18,420	19,552	+ 1,132	+ 6.1
T-1	566	552	- 14	- 2.5
T-2	1,732	1,684	- 48	- 2.8
T-3	527	505	- 22	- 4.2
T-4	1,705	1,699	- 6	- .4
T-5	1,589	1,567	- 22	- 1.4
T-6	2,199	2,120	- 79	- 3.6
T-7	2,435	2,342	- 93	- 3.8
T-8	2,778	2,694	- 84	- 3.0
T-9	1,145	1,113	- 32	- 2.8
Total	14,676	14,276	- 400	- 2.7
U-1	1,221	1,207	- 14	- 1.1
U-2	1,045	1,021	- 24	- 2.3
U-3	845	828	- 17	- 2.0
U-4	2,090	2,005	- 85	- 4.1
U-5	1,488	1,495	+ 7	+ 0.5
U-6	421	424	+ 3	+ 0.7
U-7	1,735	1,732	- 3	- .2
U-8	869	868	- 1	- .1
U-9	658	646	- 12	- 1.8
Total	10,372	10,226	- 146	- 1.4
V-1	1,121	1,138	+ 17	1.5
V-2	821	835	+ 14	1.7
V-3	812	802	- 10	- 1.2
Total	2,754	2,775	+ 21	0.8
Z-1	802	833	+ 31	+ 3.9
Grand Total	176,087	182,952	+ 6,865	+ 3.9

TABLE 29

CUYAHOGA COUNTY -- EXCLUDING CLEVELAND
DWELLING UNITS BY CENSUS TRACT

Area	Tract	1963 Real Prop- erty Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
Bay Village	BA-1	4,546	4,530	- 16	- 0.4	
Beachwood	BW-1	2,062	2,033	- 29	- 1.4	
Bedford	BD-1	1,919	1,880	- 39	- 2.0	
	BD-2	1,231	1,174	- 57	- 4.6	
	BD-3	1,426	1,526	+ 100	+ 7.0	
		<u>4,576</u>	<u>4,580</u>	+ 4	+ 0.09	
Bedford Hts.	BH-1	2,512	2,583	+ 71	+ 2.8	
Berea	BE-1	202	202	- 0	- -	Univ. Quarters Included in Trip File Dwel- ling Unit Counts
	BE-2	3,999	3,898	- 101	- 2.5	
	BE-3	1,202	2,521	+ 1,319	+ 109.7	
		<u>5,403</u>	<u>6,621</u>	+ 1,218	+ 22.5	
Brecksville	BR-1	1,940	3,034	+ 1,094	+ 56.4	V.A. Hosp. In- cluded in Trip File Dwelling Unit
Broadview Hts.	BV-1	2,188	2,377	+ 189	+ 8.6	
Brooklyn	BK-1	3,536	3,544	+ 8	+ .2	
Brookpark	BP-1	5,921	5,996	+ 75	+ 1.3	
Cleveland Hts.	CH-1	655	675	+ 20	+ 3.1	
	CH-2	685	674	- 11	- 1.6	
	CH-3	2,103	2,108	+ 5	+ .2	
	CH-4	1,369	1,360	- 9	- .7	
	CH-5	1,609	1,534	- 75	- 4.7	
	CH-6	546	530	- 16	-	
	CH-7	1,942	1,906	- 36	- 1.8	
	CH-8	908	866	- 42	- 4.6	
	CH-9	822	810	- 12	- 1.5	
	CH-10	671	637	- 34	- 5.1	
	CH-11	2,462	2,187	- 275	- 11.2	
	CH-12	1,659	1,652	- 7	- 0.4	
	CH-13	894	847	- 47	- 5.3	
	CH-14	974	966	- 8	- 0.8	
	CH-15	828	794	- 34	- 4.1	
	CH-16	1,522	1,517	- 5	- 0.3	
	CH-17	679	704	+ 25	+ 3.7	
		<u>20,328</u>	<u>19,767</u>	- 561	- 2.8	

TABLE 29 -- Continued

Area	Tract	1963 Real Prop- erty Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
E. Cleveland	EC-1	2,056	2,083	+ 27	+ 1.3	
	EC-2	1,473	1,412	- 61	- 4.1	
	EC-3	1,586	1,549	- 37	- 2.3	
	EC-4	1,496	1,441	- 55	- 3.7	
	EC-5	1,570	1,564	- 6	- 0.4	
	EC-6	1,021	1,016	- 5	- 0.5	
	EC-7	1,826	1,860	+ 34	+ 1.9	
	EC-8	1,458	1,480	+ 22	+ 1.5	
	EC-9	475	422	- 53	- 11.2	
	EC-10	1,487	1,484	- 3	- 0.2	
		14,448	14,311	- 137	- 1.0	
Euclid	EU-1	3,279	3,288	+ 9	+ 0.3	
	EU-2	3,366	3,403	+ 37	+ 1.1	
	EU-3	3,951	3,969	+ 18	+ 0.5	
	EU-4	882	861	- 21	- 2.4	
	EU-5	3,189	3,142	- 47	- 1.5	
	EU-6	3,392	3,297	- 95	- 2.8	
	EU-7	1,623	1,590	- 33	- 2.0	
		19,682	19,550	- 132	- 0.8	
Fairview Park	FP-1	5,052	5,173	+ 121	+ 2.4	
Garfield Hts.	GH-1	928	937	+ 9	+ 0.9	
	GH-2	668	705	+ 37	+ 5.5	
	GH-3	491	466	- 25	- 5.1	
	GH-4	931	936	+ 5	+ 0.5	
	GH-5	2,188	2,231	+ 43	+ 1.9	
	GH-6	5,021	5,177	+ 156	+ 3.1	
	GH-7	1,130	1,230	+ 100	+ 8.8	
		11,357	11,682	+ 325	+ 2.9	
Independence	ID-1	2,050	2,106	+ 56	+ 2.7	
Lakewood	LW-1	790	791	+ 1	+ 0.1	
	LW-2	1,014	976	- 38	- 3.8	
	LW-3	911	864	- 47	- 5.2	
	LW-4	1,735	1,681	- 54	- 3.1	
	LW-5	1,641	1,479	- 162	- 9.9	
	LW-6	3,950	3,547	- 403	- 10.2	
	LW-7	843	841	- 2	- 0.2	
	LW-8	562	544	- 18	- 3.2	
	LW-9	1,890	1,879	- 11	- 0.6	
	LW-10	862	861	- 1	- 0.1	
	LW-11	1,784	1,730	- 54	- 3.0	
	LW-12	1,501	1,482	- 19	- 1.3	
	LW-13	1,314	1,307	- 7	- 0.5	
	LW-14	1,589	1,556	- 33	- 2.1	
	LW-15	2,045	1,967	- 78	- 3.8	
	LW-16	942	935	- 7	- 0.7	
	LW-17	1,010	1,024	+ 14	+ 1.4	
	LW-18	830	791	- 39	- 4.7	
		25,213	24,255	- 958	- 3.8	

TABLE 29 -- Continued

Area	Tract	1963 Real Prop- erty Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
Lyndhurst	LH-1	3,107	3,061	- 46	- 1.5	
	LH-2	1,750	1,688	- 62	- 3.5	
		<u>4,857</u>	<u>4,749</u>	- 108	- 2.2	
Maple Hts.	MH-1	5,600	5,538	- 62	- 1.1	
	MH-2	3,580	3,676	+ 96	+ 2.7	
		<u>9,180</u>	<u>9,214</u>	+ 34	+ 0.4	
Mayfield Hts.	MY-1	2,860	2,773	- 87	- 3.0	
	MY-2	1,857	1,799	- 58	- 3.1	
		<u>4,717</u>	<u>4,572</u>	- 145	- 3.1	
Middleburgh Hts.	MB-1	2,619	2,552	- 67	- 2.6	
N. Olmsted	NO-1	2,885	2,884	- 1	- 0.04	
	NO-2	2,669	2,636	- 33	- 1.2	
		<u>5,554</u>	<u>5,520</u>	- 34	- 0.6	
N. Royalton	NR-1	2,017	2,123	+ 106	+ 5.3	
	NR-2	958	989	+ 31	+ 3.2	
		<u>2,975</u>	<u>3,112</u>	+ 137	+ 4.6	
Parma	PR-1	4,729	4,713	- 16	- .3	
	PR-2	3,025	2,952	- 73	- 2.4	
	PR-3	3,452	3,537	+ 85	+ 2.5	
	PR-4	6,174	6,095	- 79	- 1.3	
	PR-5	4,121	4,455	+ 334	+ 8.1	
	PR-6	<u>3,537</u>	<u>3,597</u>	+ 60	+ 1.7	
		<u>25,038</u>	<u>25,349</u>	+ 311	+ 1.2	
Parma Hts.	PH-1	2,286	2,337	+ 51	+ 2.2	
	PH-2	<u>4,345</u>	<u>4,252</u>	- 93	- 2.1	
		<u>6,631</u>	<u>6,589</u>	- 42	- 0.6	
Richmond Hts.	RH-1	1,724	1,745	+ 21	+ 1.2	
Rocky River	RR-1	2,244	2,247	+ 3	+ 0.1	
	RR-2	<u>4,347</u>	<u>4,285</u>	- 62	- 1.4	
		<u>6,591</u>	<u>6,532</u>	- 59	- 0.9	
Seven Hills	SV-1	2,246	2,278	+ 32	+ 1.4	
Shaker Hts.	SH-1	1,426	1,452	+ 26	+ 1.8	
	SH-2	937	912	- 25	- 2.7	
	SH-3	1,517	1,700	+ 183	+ 12.1	GRP. Qtrs. in Univ. School
	SH-4	1,736	1,782	+ 46	+ 2.6	
	SH-5	3,083	3,094	+ 11	+ 0.4	
	SH-6	<u>3,742</u>	<u>3,634</u>	- 108	- 2.9	
		<u>12,441</u>	<u>12,574</u>	+ 133	+ 1.1	
Solon	SO-1	2,012	1,927	- 85	- 4.2	

TABLE 29 -- Continued

Area	Tract	1963 Real Prop- erty Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
South Euclid	SE-1	4,172	4,197	+ 25	+ 0.6	
	SE-2	4,441	4,535	+ 94	+ 2.1	
		8,613	8,732	+ 119	+ 1.4	
Strongsville	ST-1	1,708	1,785	+ 77	+ 4.5	
	ST-2	1,200	1,249	+ 49	+ 4.1	
		2,908	3,034	+ 126	+ 4.3	
University Hts.	UH-1	4,727	5,089	+ 362	+ 7.7	Grp. Qtrs. at John Carrol Univ.
Warrensville Hts.	WH-1	3,611	3,778	+ 167	+ 4.6	
Westlake	WL-1	4,042	3,845	- 197	- 4.9	
Olmsted Twp.	CC-5	1,666	1,641	- 25	- 1.5	
Olmsted Falls	CC-6	604	582	- 22	- 3.6	
Westview	CC-7	371	366	- 5	- 1.4	
Parkview	CC-9	892	865	- 27	- 3.0	
Riveredge Twp.	CC-10	222	225	+ 3	+ 1.4	
Linndale	CC-15	113	110	- 3	- 2.7	
Newburgh Hts.	CC-20	1,179	1,124	- 55	- 4.7	
Cuyahoga Hts.	CC-22	258	238	- 20	- 7.8	
Brooklyn Hts.	CC-23	420	427	+ 7	+ 1.7	
Bratenahl	CC-28	378	399	+ 21	+ 5.6	
Valley View	CC-29	400	379	- 21	- 5.2	
North Randall	CC-38	201	199	- 2	- 1.0	
Warrensville Twp.	CC-39	222	380	+ 158	+ 71.2	Institutional Facilities not counted by RPI
Oakwood	CC-40	979	836	- 143	- 14.6	
Walton Hills	CC-41	529	573	+ 44	+ 8.3	
Highland Hts.	CC-42	1,338	1,281	- 57	- 4.3	
Mayfield	CC-43	740	710	- 30	- 4.0	

TABLE 29 -- Continued

Area	Tract	1963 Real Prop- erty Inventory	1963 Trip File	Absolute Difference	Percent Difference	Notes
Gates Mills	CC-45	529	573	+ 5	+ .9	
Pepper Pike	CC-46	1,144	1,270	+ 126	+11.0	150 Pop. in Grp. Quarter 1960
Hunting Valley	CC-47	162	199	+ 37	+22.8	
Woodmere	CC-48	160	160	-0-	- -	
Orange	CC-49	606	580	- 26	- 4.3	
Glenwillow	CC-51	132	159	+ 27	+20.5	
Moreland Hills	CC-52	668	656	- 12	- 1.8	
Bentleyville	CC-53	110	114	+ 4	+ 3.6	
Chagrin Falls Twp.	CC-54	28	22	- 6	-21.4	
Chagrin Falls	CC-55	<u>1,169</u>	<u>1,207</u>	+ 38	+ 3.3	
UHI-CC-55		15,266	15,282	+ 16	+0.1	
County Total (Excl. Cleve.)		256,566	258,615	+ 2,049	+ 0.8	

TABLE 30

GEAUGA COUNTY DWELLING UNITS BY ODH TRACT
(AS COUNTED IN 1963 TRIP FILE)

Area	ODH Tract	Dwelling Units
Chardon Twp.	GC-1	681
Chardon Vill.	GC-2	948
Chester Twp.	GC-3	2,211
Munson Twp.	GC-4	1,170
Russell Twp.	GC-5	1,202
South Russell	GC-6	543
Newbury Twp.	GC-7	1,227
Bainbridge Twp.	GC-8	1,658
Auburn Twp.	GC-9	<u>546</u>
Total		10,186

TABLE 31

LAKE COUNTY DWELLING UNITS BY TRACT*
(AS COUNTED IN THE 1963 O-D SURVEY)

Area	Tract	Lake County Plng. Comm.	Unadjusted Trip File	Absolute Difference	Percentage Difference
Eastlake	EL-8	4,432	3,931	- 501	- 11.3
Lakeline	LC-3	90	83	7	- 7.8
Willoughby Hills	LC-4	1,343	1,211	- 222	- 16.5
Waite Hill	LC-6	132	92	- 40	- 30.3
Timberlake	LC-7	196	214	+ 18	+ 9.2
Mentor OTL	LC-13	1,356	1,257	- 99	- 7.3
Mentor	(LC-14 (LC-15		1,636 6,032 <u>7,668</u>	+ 62	+ 0.8
Kirtland Hills	LC-16	109	89	- 20	- 18.3
Kirtland Twp.	LC-17	1,473	1,446	- 27	- 1.8
Grand River	LC-18	142	152	+ 10	+ 7.0
Fairport	LC-19	1,370	1,250	- 120	- 8.8
Painesville Twp.	LC-20	3,352	3,074	- 278	- 8.3
Concord Twp.	LC-21	1,320	1,310	- 10	- 0.8
Painesville City	PN-9 PN-10 PN-11 PN-12		1,788 1,000 1,203 <u>1,037</u> <u>5,028</u>	- 276	- 5.2
Willoughby	WB-5	5,240	4,875	- 365	- 7.0
Willowick	WI-1	5,279	5,209	- 70	- 1.3
Wickliffe	WK-2	<u>5,117</u> <u>43,861</u>	<u>5,035</u> <u>41,924</u>	- 82 - 1,937	- <u>1.6</u> - 4.4

*For adjusted data see Table 17.

TABLE 32

LORAIN COUNTY DWELLING UNITS BY AREA
(AS COUNTED IN 1963 TRIP FILE)

Area	Census Tract	Dwelling Units	
Avon Lake	LC-101	1,478	
	LC-102	1,398	
			<u>2,876</u>
Avon	LC-103	1,743	
Sheffield Lake	LC-104	2,225	
Sheffield Vill.	LC-105	497	
Sheffield Twp.	LC-106	1,701	
Black River Twp.	LC-107	259	
Brownhelm Twp.	LC-108	221	
Amherst Vill.	LC-109	2,377	
Amherst Twp.	LC-110	1,480	
Elyria Twp.	LC-111	1,311	
Vermillion O-T-L) Vermillion)	LC-112	1,042	
Ridgeville	LC-113	875	
	LC-114	1,919	
			<u>2,794</u>
Columbia Twp.	LC-115	1,310	
Eaton Twp.	LC-116	1,452	
Carlisle Twp.	LC-117	862	
	LC-118	1,336	
			<u>2,198</u>
Oberlin	OB-119	1,208	
	OB-120	864	
			<u>2,072</u>
Russia Twp.) South Amherst)	LC-121	1,011	

TABLE 32 -- Continued

Area	Census Tract	Dwelling Units
Henrietta Twp.	LC-122	370
Kipton) Pittsfield) Camden)	LC-123	636
LaGrange Vill.) LaGrange Twp.)	LC-126 (pt.)	648
Grafton Vill.) Grafton Twp.)	LC-127	822
Lorain	LR-all	20,656
Elyria	EL-all	<u>14,322</u>
Total		64,323
Elyria	EL-51	1,368
	EL-52	1,584
	EL-53	1,006
	EL-54	946
	EL-55	1,229
	EL-56	1,057
	EL-57	1,654
	EL-58	805
	EL-59	1,302
	EL-60	1,689
	EL-61	<u>1,682</u>
		14,322
Lorain	LR-1	1,179
	LR-2	633
	LR-3	1,953
	LR-4	696
	LR-5	2,124
	LR-6	1,681
	LR-7	2,486
	LR-8	1,956
	LR-9	1,356
	LR-10	1,757
	LR-11	1,861
	LR-12	1,280
	LR-13	<u>1,694</u>
		20,656

TABLE 33

PORTAGE, MEDINA AND SUMMIT COUNTIES DWELLING UNITS
BY ODH CENSUS TRACT

ODH Tract	1963 Estimate Based on Tri-County Data	SCOTS Trip File	Absolute Difference	Percent Difference	
<u>PORTAGE COUNTY</u>					
Aurora Village	PC-1	1,227	1,298	+ 71	+ 5.8
Mantua Twp.	PC-2	823	853	+ 30	+ 3.6
Mantua Village	PC-3	352	343	- 9	- 2.6
Streetsboro Twp.	PC-4	1,561	1,860	+ 299	+ 19.2
Shallersville Twp.*	PC-5	824	1,303	+ 479	+ 58.1
		<u>4,787</u>	<u>5,657</u>	<u>+ 870</u>	<u>+ 18.2</u>
<u>MEDINA COUNTY</u>					
Hinckley Twp.	MC-1	941	1,040	+ 99	+ 10.5
Brunswick City	MC-2	3,049	2,929	- 120	- 3.9
Brunswick Hills Twp.	MC-3	327	670	+ 343	+ 104.9
Liverpool Twp.	MC-4	602	672	+ 70	+ 11.6
		<u>4,919</u>	<u>5,311</u>	<u>+ 392</u>	<u>+ 8.0</u>
<u>SUMMIT COUNTY</u>					
Sagamore Hills Twp.	SC-1	911	1,084	+ 173	+ 19.0
Northfield Center Twp.	SC-2	1,522	1,639	+ 117	+ 7.7
Macedonia	SC-3	1,342	1,398	+ 56	+ 4.2
Twinsburg Village	SC-4	1,258	1,411	+ 153	+ 12.2
Reminderville Village	SC-5	54	61	+ 7	+ 13.0
Twinsburg Twp.	SC-6	461	457	- 4	- 0.9
Hudson Twp.	SC-7	784	814	+ 30	+ 3.8
Hudson Village	SC-8	925	860	- 65	- 7.0
Boston Heights Village	SC-9	249	241	- 8	- 3.2
Peninsula Village	SC-10	197	186	- 11	- 5.6
Boston Twp.	SC-11	536	500	- 36	- 6.7
Richfield Twp.	SC-12	1,171	1,294	+ 123	+ 10.5
		<u>9,410</u>	<u>9,945</u>	<u>+ 535</u>	<u>+ 5.7</u>

* : Some discrepancy arises in dwelling unit definition. For example, in Shallersville Township the trip file counts each unit in the Portage County Home while the household count does not.

IV Vehicle Travel Checks

Adjustments to the data files resulting from checks of basic household characteristics were described in Section III. After these adjustments were made, further checks were made on the trip data and additional adjustments recommended. The checks were:

- 1) Auto driver trips crossing the Cuyahoga River Screenline.
- 2) Vehicle miles of travel in the Study Cordon Area.
- 3) Truck trips crossing the Cuyahoga River Screenline.
- 4) Taxi trips crossing the Cuyahoga River Screenline.
- 5) Rapid transit passenger trips crossing the Cuyahoga River Screenline.
- 6) Total Study Cordon Area rapid transit trips.
- 7) Bus passenger trips crossing the Cuyahoga River Screenline.
- 8) Total Study Cordon Area bus trips.

The auto driver, rapid transit, bus, truck and taxi trip files exhibited different characteristics in trip purpose and time distribution. This difference resulted in separate factoring procedures for each file.

Automobile Trips

SCREENLINE CHECK

The Cuyahoga River Screenline (see Figure 18) was established by the Ohio Department of Highways (ODH) in their 1963 Origin Destination Survey to develop control totals for the internal survey.

During July, August and September of 1963, ODH conducted a twenty-four hour traffic count on each of the five weekdays at each of the 25 auto crossings of the Cuyahoga River. The location of the stations are listed in Table 34. The number of cars, panel trucks, combination trucks, other trucks, taxis, buses and estimated bus passengers was recorded for each half-hour period.

In order to arrive at a control total, it was necessary to adjust these counts to represent an average day during the period of the Home Interview Survey and to discount for trips by vehicles garaged outside the Cordon Area. To adjust to an average day during the survey period, it was assumed that

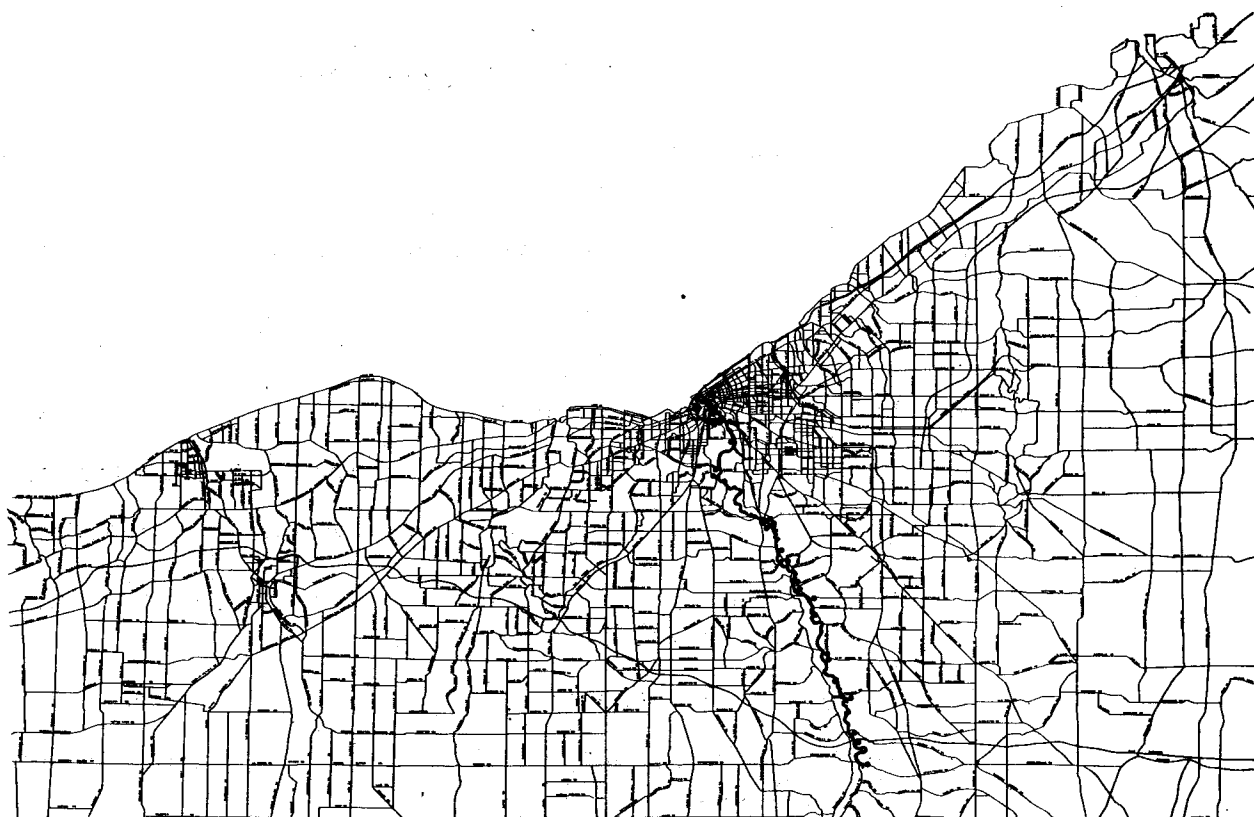


Figure 18 -- Cuyahoga River and Screenline Interview Stations

TABLE 34

CLEVELAND AREA SURVEY SCREENLINE LOCATION

Station Number	Location	Number of Men		Location of Car
		On Station		
		3 Peak Hour		
1	Main Ave. Bridge Over Cuyahoga River	2 Off Hour		W. 6th & Lakeside
2	Center St. Bridge Over Cuyahoga River	1		East End of Bridge North Side of Street
3	Detroit-Superior Bridge Over Cuyahoga River	2		West End of Bridge on Sidewalk N. & S. Side
4	Columbus Rd. Bridge Over Cuyahoga River	1		North End of Bridge East Side of Street
5	Carter Rd. Bridge Over Cuyahoga River	1		South End of Bridge West Side of Road
6	Eagle Ave. Bridge Over Cuyahoga River	1		West End of Bridge North Side of Road
7	Lorain-Carnegie Bridge Over Cuyahoga River	2		West End of Bridge Both Sides of 20th St.
8	Interbelt Bridge Over Cuyahoga River	2		South End of Bridge East Side of Road
9	W. 3rd St. Bridge Over Cuyahoga River	1		Northwest Corner Commerce & W. 3rd St.-Sidewalk
10*	Jefferson Ave. Bridge Over Cuyahoga River	-		Bridge Out -- Road Closed
11	Pershing Ave. Bridge Over Cuyahoga River	1		East End of Bridge on East 43rd St.
12	Harvard-Denison Viaduct Over Cuyahoga River	2		Used Car Lot 901 Harvard Street
13	Willow Freeway Bridge Over Cuyahoga River	2		North End of Bridge in Median Strip
14**	East to North Ramp on US 21 & SR 17 Interchange	1		SR 17 in Island of Ramp Jct.
15**	North to East Ramp on US 21 & SR 17 Interchange	1		US 21 in Island of Ramp Jct.
16	Schaaf-Granger Rd. Bridge Over Cuyahoga River	1		East End of Bridge South Side of Road
17	Old Rockside Rd. Bridge Over Cuyahoga River	1		West End of Bridge South Side of Road
18	Stone Rd. Bridge Over Cuyahoga River	1		East End of Bridge North Side of Road
19	Hillside Rd. Bridge Over Cuyahoga River	1		West End of Bridge North Side of Road
20	Tinkers Creek Rd. Bridge Over Cuyahoga River	1		East End of Bridge South Side of Road
21	Alexander Rd. Bridge Over Cuyahoga River	1		West End of Bridge South Side in Driveway
22	Aurora Rd. Bridge Over Cuyahoga River	1		West End of Bridge South Side of Road
23	Station Rd. Bridge Over Cuyahoga River	1		East End of Bridge North Side of Road
24	Highland Rd. Bridge Over Cuyahoga River	1		East End of Bridge South Side of Road
25	Boston Mills Rd. Bridge Over Cuyahoga River	1		West End of Bridge North Side of Road
26	Streetsboro Rd. Bridge Over Cuyahoga River	1		East End of Bridge South Side of Road
27	Ohio Turnpike Bridge Over Cuyahoga River	1		
28	Harvard Ave. Bridge Over Cuyahoga River	1		
29	Rapid Transit Bridge Over Cuyahoga River	1		

SOURCE: Ohio Department of Highways, Bureau of Planning Survey

*Not used

**Not a crossing, used to check double crossings on Willow Freeway Bridge

the greatest portion of the survey took place between July 1 and December 31, 1963. A multiplicative factor was developed using the ODH Table "Factors for Seasonal Adjustment of Twenty-four Hour Traffic Counts for Urban Arterial Streets in Cities of 50,000 or More Population." This factor is:

$$F'_m = (F_m) \left(\frac{\sum_{i=j}^n \frac{D_i}{F_i}}{\sum_{i=j}^n D_i} \right)$$

Where:

F'_m = Factor to take a count taken in month m to an average weekday in the period from months j thru n, inclusive

F_i = the factor to take a count in month i to an average weekday

D_i = the number of weekdays in month i

Using this formula, the factors used were:

<u>Month of Count</u>	<u>Factor</u>
July	0.995
August	0.985
September	0.975
October	0.985
November	1.016
December	1.049

These adjustments were made to the raw count data, and the five results averaged to give the adjusted counted crossings. To account for screenline crossings made by vehicles not covered in the Home Interview Survey, the External Survey interviews were assumed to be correct (these were a minimum 33 1/3 percent sample). Trips crossing the Cuyahoga River by vehicles garaged outside the Cordon Area were tabulated by vehicle type and time of interview. In the absence of better data, it was assumed that these trips crossed the screenline during the same half-hour period in which they were interviewed at the Cordon Line. While this assumption introduces some error, it does tend to be self-compensating in that the inbound and outbound crossings would balance for the actual time of interview. These "external" crossings were then subtracted from the adjusted counted crossings to give the control totals.

Trip file figures comparable to the control totals were developed by tabulating reported crossings by half-hour periods, making the assumption that all trips crossed the screenline at the midpoint of the reported starting and ending times. This assumption also tends to introduce some error, especially since the Cleveland Central Business District is adjacent to the screenline, but it was felt this error would not significantly affect the results of the screenline checks.

For auto driver trips, the total counted screenline crossings (adjusted to exclude external and through trips) are 307,516 and the total reported screenline crossings are 231,402. The screenline is such that double crossings are minimal and do not have a significant influence on the total analysis, except on the Willow Freeway Crossing (U.S. 21). Stations were established at the interchange of S.R. 17 and U.S. 21 for checking double crossings. Counts were made and it was determined that a five-day average of 9,907 automobiles double-cross. The 24-hour screenline control total is then 286,667. The reported screenline crossings, therefore, have an 80.5 percent check with the control total. Trips going through the Study Cordon Area and those with one end outside the Cordon Area comprise 7.7 percent of the 331,757 screenline crossings (including all double crossings), whereas 2.0 percent of the trips reported in the internal survey are external.

307 516
- 19,814 (2 x 9907)
287,702

The control was plotted to create a histogram showing screenline crossings by half-hour periods. The reported crossings were plotted in a similar manner but subdivided into the following trip-purpose stratifications:

Home Based Work		
"	"	Personal Business
"	"	Shop
"	"	Social-Recreational
"	"	School
"	"	Eat a Meal
"	"	Medical-Dental
"	"	Serve Passenger
"	"	Change Mode
Non-Home Based Work		
"	"	" Other

Plots of the reported crossings were examined to determine which trip purposes seemed to best fit the counted pattern, which seemed under-reported, and which seemed to be significant at particular times of day.

In addition, the percentage of trips by purpose, both crossing the screenline and in the total Cordon Area, were computed and

compared to those found in other transportation studies. Because these other studies were conducted at varying times, and covered dissimilar areas, the comparisons were not considered definitive, but served only as general guidelines.

After the screenline and trip file data were reviewed, adjustment factors for the various trip purposes of the trip file were developed. The criteria used for developing these factors were:

1. The 24-hour total reported screenline should agree well with the counted crossings.
2. The shape of the histogram should be similar to that of the counted data.
3. Both the peak and the off-peak hours should show reasonable agreement between the counted and reported crossings.
4. The percent of trips reported for each purpose should be reasonable when compared to other studies.
5. There should be consistency in the factors used for the various purposes, and the number of different factors should be limited.

Throughout the adjustment procedure, it was assumed the home-based work trips were accurately reported and would not be adjusted. This was based on the excellent screenline agreement in the peak hours when work trips are by far the largest component. The first work trip check discussed in Section III indicated about a 93 percent check. The ratio of home-based work trips to employed persons was very similar to that found in other studies (See Section III, Table 10).

VEHICLE MILES OF TRAVEL CHECK

There are no independent sources for total auto trips in the Cordon Area. The only data which approaches this total trip control figure is the vehicle-miles of travel (VMT) obtained by multiplying the number of vehicles on a given section of road by the length of that section. In the SCOTS Cordon Area, traffic counts were available from the Ohio Department of Highways (ODH), County Engineers and other sources for approximately 55 percent of the links in the arterial network. These counts were adjusted to a traffic count for a 1963 average weekday utilizing the ODH Table "Factors for Seasonal Adjustment of Twenty-four Traffic Counts for Urban Arterial Streets in Cities of 50,000 or More Population." The counts

represented 66 percent of the VMT. Counts were also available for all Interstate, U.S., and State Routes.

A statistical analysis was made of existing volume counts on all major and minor arterials. The stratification of link type by area type was statistically significant. Mean values for each stratification were used as the count volume on all links where a traffic count had not been made. This method is in accordance with "A Short-Count Method for Estimating Vehicle Miles of Travel on A Transportation Network," by John R. Hamburg and Kenneth W. Shiatte. This method resulted in a VMT control total of 20,811,723.

The reported data when assigned to the network is shown in Table 35. Table 36 shows the VMT analysis by functional type, sectors and rings from a free assignment. Table 37 shows the same analysis from a restrained assignment. Figure 19 shows the analysis sectors; Figure 20, the analysis rings.

TABLE 35

ASSIGNED UNADJUSTED O-D SURVEY

Type	VMT
Internal Auto Trips	12,138,561
Internal Truck Trips	1,028,856
Internal Taxi Trips	105,199
External Trips	<u>3,351,441</u>
Total	16,624,057

TABLE 36

VMT ANALYSIS FROM FREE ASSIGNMENT BEFORE TRIP FILE FACTORING

Analysis Base	Assigned VMT	Count VMT	Percent of Control Total
Total	15,727,810*	20,811,723**	75.6
Functional Link Type***			
Freeway	2,847,223	2,530,721	112.5
Expressway	328,627	352,574	93.2
Major Arterial	7,978,280	11,325,109	70.4
Minor Arterial	3,649,895	6,024,145	60.6
Turnpike	692,779	498,019	139.1
Total	15,496,804	20,730,568	74.8
Sectors			
0	412,384	661,221	62.4
1	2,654,257	2,870,654	92.5
2	1,704,698	2,296,925	74.2
3	1,102,896	1,494,307	73.8
4	934,806	1,116,836	83.7
5	943,454	1,308,517	72.1
6	2,041,383	2,674,391	76.3
7	1,738,607	2,369,412	73.4
8	2,048,687	2,951,384	69.4
9	2,637,879	3,484,310	75.7
Rings			
0	412,384	661,221	62.4
1	689,595	999,434	69.0
2	1,652,246	1,946,666	84.9
3	3,027,323	3,527,085	85.8
4	3,806,893	4,211,411	90.4
5	3,248,946	4,014,294	80.9
6	3,561,172	5,004,303	71.2
7	572,900	863,543	66.3

*Without local streets.

**Without through turnpike volumes.

***Ramps and special facilities are not included. Differences in percentage figures are related to inclusion of only those ramps with actual traffic counts in count total and all ramps in assigned totals.

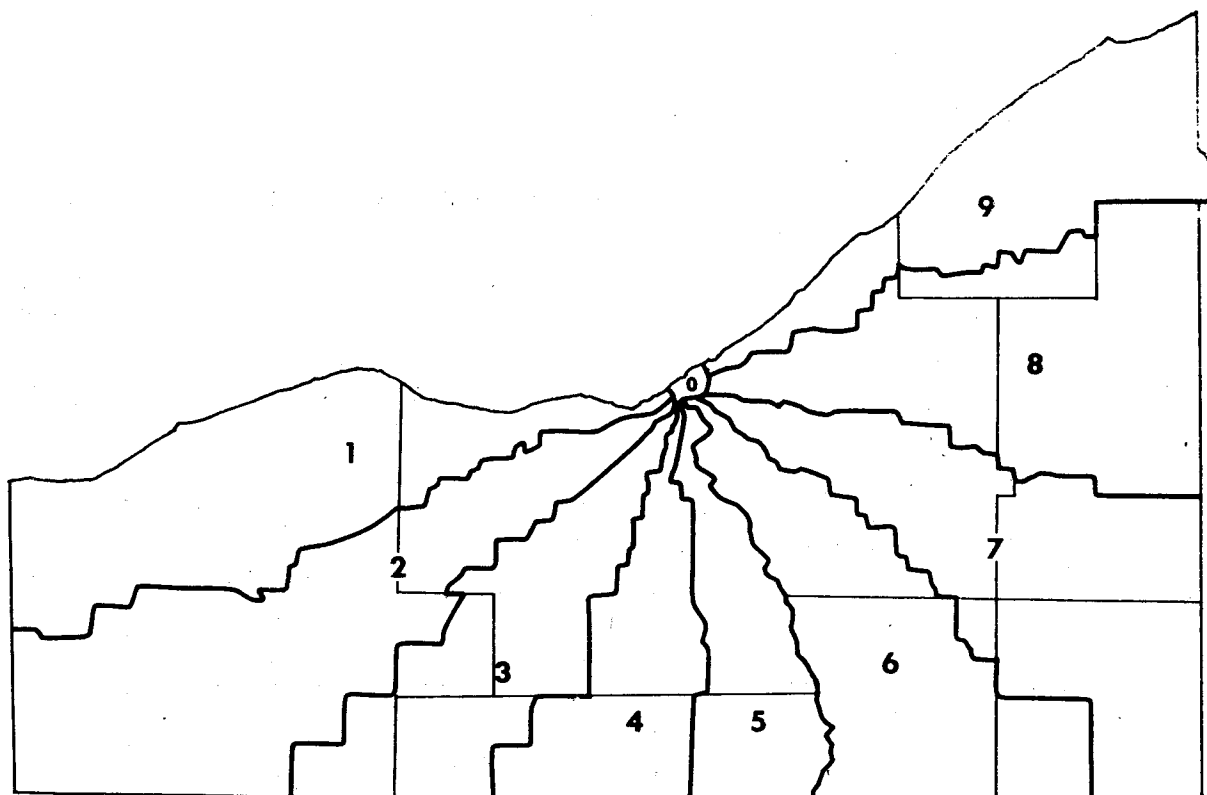


Figure 19 -- Study Cordon Area Analysis Sectors.

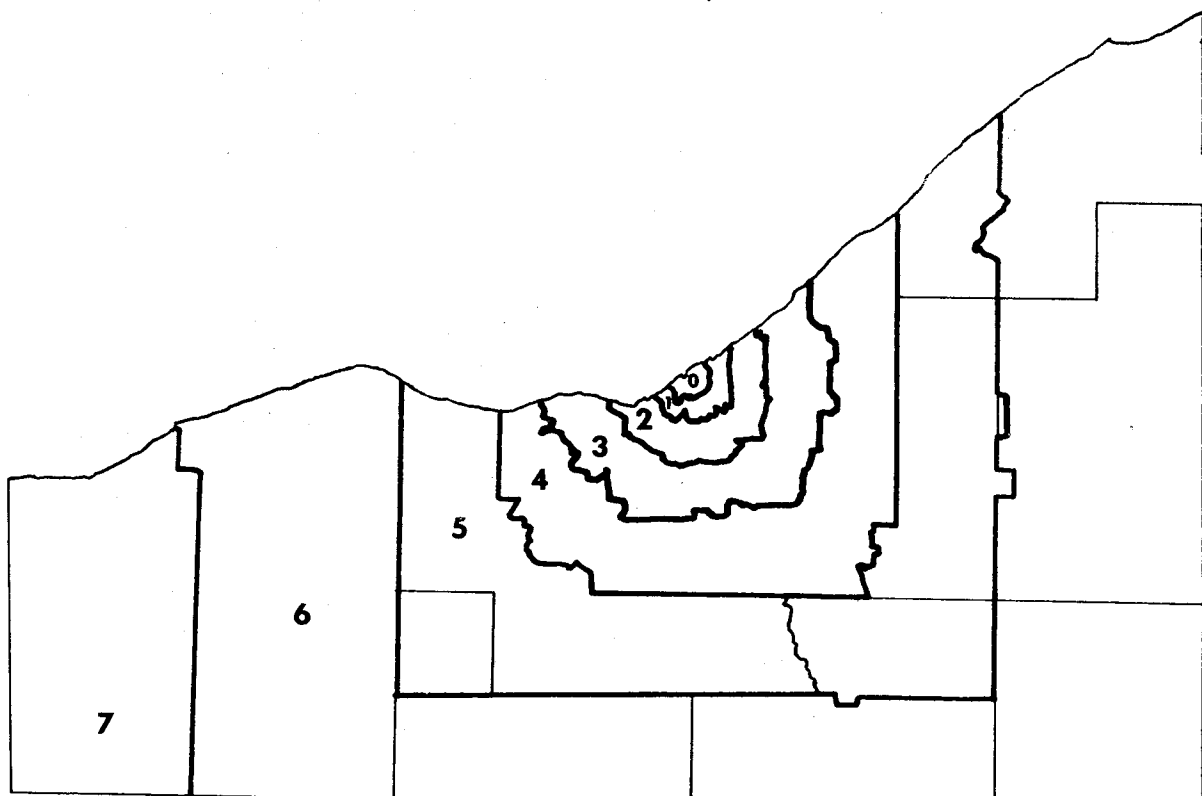


Figure 20 -- Study Cordon Area Analysis Rings.

TABLE 37

VMT ANALYSIS FROM FIRST RESTRAINED ASSIGNMENT (4 ITERATIONS)

Analysis Base	Assigned VMT	Count VMT	Percent of Control Total
Total	20,553,451*	20,811,723**	98.8
Functional Link Type***			
Freeway	2,888,517	2,530,721	114.1
Expressway	352,054	352,574	99.9
Major Arterial	11,168,722	11,325,109	98.6
Minor Arterial	4,736,582	6,024,145	78.6
Turnpike	786,120	498,019	157.8
Total	19,931,995	20,730,568	96.1
Sectors			
0	510,393	661,211	77.2
1	3,148,349	2,870,654	109.7
2	2,473,738	2,296,925	107.7
3	1,572,544	1,494,307	105.2
4	1,239,061	1,116,836	110.9
5	1,207,450	1,308,517	92.3
6	2,425,138	2,674,391	90.7
7	2,299,521	2,369,412	97.1
8	2,868,561	2,951,384	97.2
9	3,747,262	3,484,310	107.5
Ring			
0	510,393	661,221	77.2
1	879,348	999,434	88.0
2	2,036,491	1,946,666	104.6
3	3,953,780	3,527,085	112.1
4	5,090,091	4,211,411	120.9
5	4,016,004	4,014,294	100.0
6	4,329,138	5,004,303	86.5
7	676,772	863,543	78.4

*Without local streets.

**Without through turnpike volumes.

***Ramps and special facilities are not included. Differences in percentage figures are related to inclusion of only those ramps with actual traffic counts in count total and all ramps in assigned totals.

CORDON LINE CHECK

In addition to the Cuyahoga River Screenline, data from the internal trip reports may be checked against an independent count at the Study Area Cordon Line. In the External Survey traffic counts were made at the cordon line and 33 1/3 percent sample of crossing vehicles were interviewed. For auto trips crossings the cordon line, the location at which the car was garaged was determined. For the most part, this permitted trips by vehicles owned by residents of the Cordon Area to be segregated and compared against reported crossings from the Home Interview Survey.

Auto driver trips crossing the cordon are shown in Table 38.

TABLE 38

AUTO DRIVER TRIPS CROSSING CORDON LINE STRATIFIED BY GARAGE LOCATION

Garage Location	Trips
Origin within cordon	28,754
Destination within cordon	26,182
Total	54,936
Origin outside cordon	39,891
Destination outside cordon	35,930
Total	75,821
Neither origin nor destination	
Total	12,204
	<u>142,961</u>

From the internal survey, reported auto driver trips crossing the cordon line are 42,718.

It is impossible to classify those trips garaged at neither origin nor destination for comparison with the internal survey.

If it is assumed that none of this group are garaged within the Cordon Area the check is 77.8 percent. If it is assumed that these 12,204 trips are divided in the same proportion as those garaged at an origin or a destination, then the crossings by cars garaged within the Cordon Area are 60,076 and the check is 71.1 percent.

As a check on the consistency of the data reported in the internal survey, a histogram (see Figure 21) was prepared showing the reported cordon crossings by half-hour period compared to counted crossings by vehicles garaged at an origin or destination within the Cordon Area. This showed some under-reporting of trips, but the pattern of reported crossings was consistent with the counts.

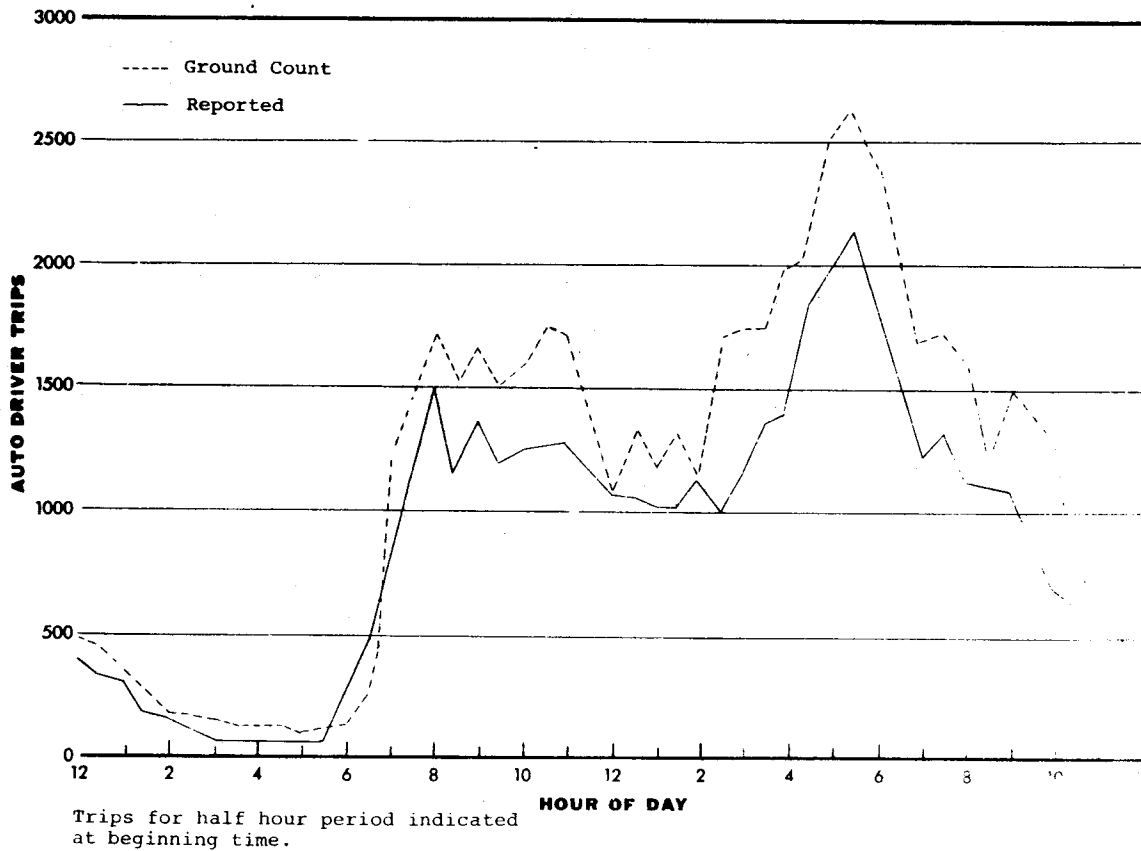


Figure 21 -- Resident auto driver Cordon line crossings. unadjusted trip file and ground count.

CORRIDOR CHECKS

The corridor checks are presented as an additional check on total trips in the Study Cordon Area. An attempt was made to select locations where trips were required to pass through the corridor because of physical routing restrictions. Fourteen locations were selected for this purpose. A listing of the streets, the assigned volumes, the count volumes, and the total percentage relationship is shown in Table 39. The map, Figure 22, shows the relative location of each corridor in the Study Area.

While these corridor checks are an indication of the total trip reporting they are subject to error. First, error can be introduced because the network is not calibrated. It is possible for trips to take circuitous routings due to illogical time paths. This problem becomes critical when a partial freeway system exists in the network. The freeway segment can cause significant deficiencies in assigned volumes on arterial streets in areas larger than what can normally be called a corridor.

Secondly, errors can be introduced by the technique used in getting the trips on the network. Artificial loading links are limited to four per zone. In fact, each zone has many local streets feeding those streets which are included on the network. The percent of error introduced is then a function of the number of trips having origins or destinations in a given zone and the total volume of vehicles in the corridor in question. Corridor 12 in the listing gives an excellent example of this situation. When the street links are cut north of the point of connection of artificial street links, the corridor check indicates that vehicle trips in the corridor are 150 percent high. When the street links are cut below the local loading links, the corridor check is 103 percent. While this situation has been minimized as much as possible, it is estimated that 50 percent of the links on the network are connected to artificial local street links. This precludes the elimination of the effect of loading from only four points per zone.

The corridor check indicates that the assigned volume is reasonable, but for the above reasons the corridor check should be considered secondary to the other accuracy checks.

TABLE 39
CORRIDOR CHECKS

Corridor Number	Street	Assigned Volume	Ground Count	Percent of Control Total
1	Chester	29,533	32,900	95.9
	Euclid	11,924	19,200	
	Carnegie	16,550	13,400	
	Cedar	17,675	13,400	
	Total	75,682	78,900	
2	Lake Avenue	21,335	17,800	109.5
	Detroit	15,683	12,050	
	Hilliard	11,016	11,500	
	Center Ridge	9,278	11,600	
	West Wood	5,270	3,800	
	Lorain	20,792	19,900	
	Brookpark	17,763	16,100	
	Mastick	6,077	5,200	
	Total	107,214	97,950	
3	Shoreway EB	39,302	35,600	117.7
	Shoreway WB	50,188	35,600	
	Detroit	21,066	21,400	
	Franklin	10,941	9,000	
	Madison	13,492	9,600	
	Lorain	26,139	17,300	
	Clark	12,911	17,250	
	Denison	28,165	26,000	
	Total	202,204	171,750	
4	Ridge	22,537	23,000	93.7
	Pearl	19,835	32,500	
	State	23,488	18,700	
	Broadview	20,509	18,000	
	Total	86,369	92,200	
5	Lakeshore Blvd.	9,036	10,300	96.6
	S.R. 2 EB	7,109	7,300	
	S.R. 2 WB	7,543	7,300	
	Euclid	14,897	14,300	
	Johnny Cake Ridge	6,722	5,300	
	I.R. 90 EB	8,050	10,400	
	I.R. 90 WB	9,701	10,400	
	Total	63,058	65,300	

TABLE 39 -- Continued

Corridor Number	Street	Assigned Volume	Ground Count	Percent of Control Total
6	Lakeshore Blvd.	16,264	17,300	
	Groveswood Ave.	322	3,800	
	N. Waterloo	6,880	5,700	
	Lakeland EB	47,287	39,100	
	Lakeland WB	52,032	39,100	
	S. Waterloo	1,383	2,900	
	St. Clair	9,176	14,800	
	Euclid	18,702	24,200	
	Total	152,046	146,900	103.5
7	Brecksville	45,311	34,500	
	Canal Road	9,382	7,300	
	Turney Road	23,469	18,400	
	Dunham Road	10,275	9,800	
	Broadway	13,326	15,800	
	Total	101,763	85,800	118.6
8	Pearl	33,863	30,000	
	Ridge	18,098	22,200	
	W. 54	8,364	11,800	
	State	17,116	19,200	
	Total	64,083	64,000	100.1
		77,441	83,200	107.4
9	State	12,476	18,000	
	Broadview	11,198	10,800	
	Brecksville	38,355	30,200	
	Canal	9,549	10,200	
	Dunham	1,700	4,400	
	Total	73,278	73,600	99.6
10	Solon	2,410	2,600	
	Aurora	13,014	11,700	
	Total	15,424	14,300	107.9
11	Northfield	22,182	21,500	
	Broadway	10,788	10,900	
	Total	32,970	32,400	101.8

TABLE 39 -- Continued

Corridor Number	Street	Assigned Volume	Ground Count	Percent of Control Total
12A	Warrensville	22,759	16,000	
	Northfield	33,898	21,100	
	Aurora Road	<u>24,466</u>	<u>16,900</u>	
	Total	81,123	54,000	150.2
12B	Warrensville	11,410	16,000	
	Northfield	27,271	21,100	
	Aurora Road	<u>16,954</u>	<u>16,900</u>	
	Total	55,635	54,000	103.0
13	Monticello	15,862	16,800	
	Mayfield	21,787	23,100	
	Cedar	10,914	13,800	
	Fairmount	5,776	8,300	
	Shaker Blvd. EB	9,190	4,900	
	Shaker Blvd. WB	7,408	4,900	
	S. Woodland	3,523	5,400	
	Chagrin Blvd.	16,439	13,900	
	Harvard	4,994	6,100	
	Emery	3,953	5,100	
	Miles	<u>14,569</u>	<u>13,700</u>	
	Total	115,803	116,000	99.8
		120,919	119,400	101.3

ADJUSTMENTS

Several sets of factors were developed and checked for total day, peak-hours and general conformance to the pre-set criteria. Some of the trial factors which were considered but rejected are:

- A. Work - 1.0, Personal Business - 2.4, Shop and Social-Recreation - 1.7, All Others - 1.5.

Rejected because of high peaks, low mid-day, and unusual variations.

- B. Work - 1.2, Personal Business - 2.4, Shop - 1.7, Social-Recreation - 2.2, School - 1.5, All Others - 1.0.

Rejected because of same reasons as the factors in "A," as well as lack of uniformity of factors.

- C. Work - 1.0, Shop - 1.4, Social-Recreation and Non-home Based - 2.0, All Others - 1.0.

Rejected because set finally adopted gave better fit with lower peak and slightly better percentage distribution.

- D. Work - 1.0, Shop and Social-Recreation and Non-home Based - 1.8, All Others - 1.3.

Rejected for the same reasons as "C."

- E. All Non-home Based - 2.15, All Others - 1.0.

Rejected because high peaks, low evening, and poor percentage breakdown.

The set of factors finally developed which best meet the criteria are shown in Table 40.

TABLE 40

AUTO DRIVER TRIP FILE ADJUSTMENT FACTORS

Home Based Work	1.0
Home Based Shop and Social-Recreation	2.2
Home Based Other	1.3
Non-home Based Work	2.2
Non-home Based Other	1.3

These factors give a screenline crossing total of 295,952 for a check of 103.5 percent. The histogram compares favorably with that for the counted crossings. The percentage breakdown of auto driver screenline crossing before and after adjustment is shown in Table 41.

TABLE 41
AUTO DRIVER SCREENLINE CROSSINGS

Type	Number of Trips	Percent* of Total
Before Adjustment		
Home Based Work	137,169	59.3
Personal Business	13,697	5.9
Shop	7,493	3.2
Social-Recreation	13,853	6.0
School	2,416	1.1
Eat Meal	1,024	0.4
Medical-Dental	2,027	0.9
Serve Passenger	7,265	3.1
Change Mode	904	0.4
Non-home Based Work	19,752	8.5
Other	25,802	11.2
Total	231,402	100.0
After Adjustment		
Home Based Work	137,169	46.3
Personal Business	17,086	5.8
Shop	16,485	5.6
Social-Recreation	30,488	10.3
School	3,141	1.1
Eat Meal	1,331	0.4
Medical-Dental	2,635	0.9
Serve Passenger	9,445	3.2
Change Mode	1,175	0.3
Non-home Based Work	43,454	14.7
Other	33,543	11.3
Total	295,952	100.0

Retrieval Date: 11/14/66

*Percents may not add to 100 due to rounding.

Total auto driver trips in the Study Cordon Area after adjustment amounted to 3,043,234. This compares with a total reported auto driver trips of 2,105,667, including 1,842 home-to-home trips which are considered in further processing as home to personal business, making the adjusted total 144.6 percent of the reported. The percentage breakdown of total auto driver trips before and after adjustment are shown in Table 42.

TABLE 42
AUTO DRIVER TRIPS IN STUDY CORDON AREA

Type	Number of Trips	Percent of Total
Before Adjustment*		
Home Based Work	766,549	36.5
Personal Business	185,928	8.9
Shop	278,132	13.2
Social-Recreation	177,585	8.5
School	29,348	1.4
Eat Meal	18,110	0.9
Medical-Dental	28,499	1.3
Serve Passenger	145,996	7.0
Change Mode	14,248	0.6
Non-home Based Work	142,315	6.7
Other	317,114	15.0
Total	2,103,824	100.0
After Adjustment		
Home Based Work	766,549	25.2
Personal Business	241,706	7.9
Shop	611,890	20.1
Social-Recreation	390,687	12.8
School	38,152	1.4
Eat Meal	23,543	0.8
Medical-Dental	37,049	1.2
Serve Passenger	189,795	6.2
Change Mode	18,522	0.6
Non-home Based Work	313,093	10.3
Other	412,248	13.5
Total	3,043,234	100.0

*Excludes 1,842 home-to-home trips.

Using this set of factors, a full assignment of the internal file was made to check the VMT. This assignment yielded a check of 96.1 percent to the control total.

The chart in Figure 23 shows the percent variation in the VMT check plotted against the percent variation in the screenline check. In theory a set of factors could be derived which would give a point anywhere in the space. There is, however, the additional constraint that the histogram of the reported crossings should have a pattern similar to that of the counted crossings.

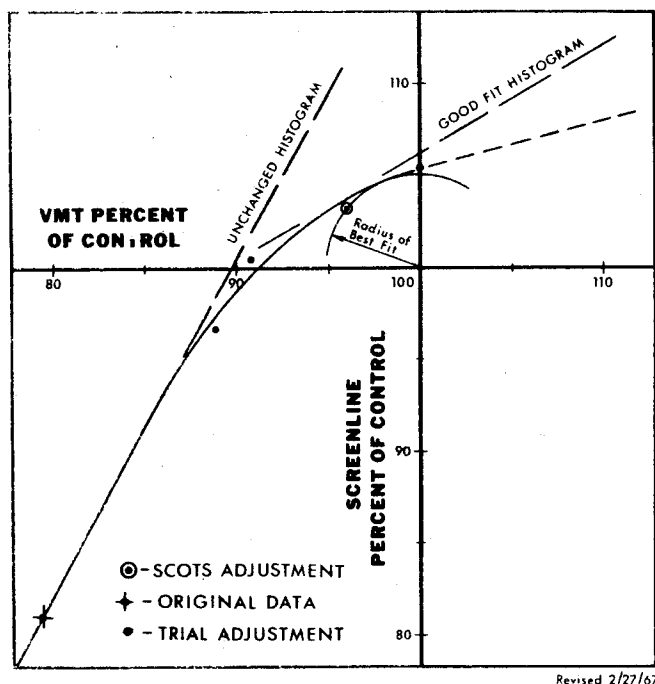


Figure 23 -- Percent variation in vehicle miles of travel (VMT) versus percent variation in screenline.

The plot appears as a straight line in the lower left quadrant where the screenline is the major control. As the screenline approaches 100 percent this linear relationship changes as we begin to sacrifice the histogram fit and the VMT to hold the screenline excess down. The extrapolation beyond 100 percent VMT is relatively meaningless; but it does show that we can hold screenline excess to a minimum at high levels, if we are willing to sacrifice the histogram.

Assigning an equal weight to the screenline and the VMT, on the basis that an over-estimate is no more serious than an under-estimate, the optimal location on the curve is that which is the smallest distance from the ideal point (100,100). From the curve it is apparent that the region of best fit lies between (103,95) and (105,100). In other words the screenline will be high and the VMT will be low.

It is agreed that the control afforded by the screenline counts is an accurate measure of traffic over the Cuyahoga River Valley. However, since the characteristics of trips over the valley are significantly different from those in the overall Study Cordon Area, the question arises whether or not the under-reporting of river crossings is different than Study Cordon Area under-reporting. A comparison of the percentage breakdowns of these trips by purpose shows approximately 75 percent of the river crossings are work-oriented while only 50 percent of the total Study Cordon Area trips are work-oriented. This indicates river crossings were reported differently.

In addition, the screenline checks for modes with better total usage control required a greater overall adjustment than the screenline checks for auto driver trips. This indicated the necessity of developing Cordon Area trip control figures for accuracy checks and the development of adjustment factors. The VMT, which is a fairly accurate measure of traffic on arterial streets, provides this control for Study Cordon Area auto driver trips.

An attempt was made to develop a set of adjustment factors that would exactly meet the VMT, screenline total and screenline histogram. This was not possible and the accepted set of adjustment factors represents a compromise which results in a 103.5 percent screenline check and a 96.1 percent VMT check. The histogram was permitted to be high in the peaks and low in the off-peaks so the fit would be acceptable throughout the day.

Tables 43, 44, and 45 show the effect of the adjustment on peak periods. Figures 24, 25, and 26 are graphs showing results of the total adjustment.

TABLE 43

AUTO DRIVER SCREENLINE CROSSINGS BY HALF-HOUR PERIOD
GROUND COUNT AND REPORTED TRIPS

Time Period	Ground Count			Reported Trips	
	Count ^a	External Trips ^b	Adjusted Ground Count ^c	Unadjusted	Adjusted
A.M.					
12:00-12:30	3,239	353	2,886	2,341	2,486
12:30-1:00	2,119	223	1,896	1,561	1,954
1:00-1:30	1,472	172	1,300	956	1,191
1:30-2:00	1,103	135	968	413	545
2:00-2:30	850	95	755	360	447
2:30-3:00	715	65	650	404	471
3:00-3:30	576	32	546	295	349
3:30-4:00	636	42	594	298	336
4:00-4:30	632	45	587	358	362
4:30-5:00	770	50	720	556	570
5:00-5:30	1,200	47	1,153	975	1,002
5:30-6:00	2,146	55	2,391	2,186	2,237
6:00-6:30	5,857	109	5,748	6,491	6,727
6:30-7:00	9,871	204	9,667	10,674	11,108
7:00-7:30	13,509	332	13,177	13,871	14,791
7:30-8:00	15,579	651	14,928	16,137	17,611
8:00-8:30	11,761	717	11,044	9,470	10,915
8:30-9:00	8,656	595	8,061	6,720	8,241
9:00-9:30	6,396	640	5,756	4,189	5,822
9:30-10:00	6,089	758	5,331	3,320	5,133
10:00-10:30	6,054	723	5,331	3,413	5,559
10:30-11:00	6,070	900	5,170	3,226	5,387
11:00-11:30	5,958	826	5,132	3,397	5,436
11:30-12:00	6,402	782	5,620	3,607	5,772
P.M.					
12:00-12:30	6,431	673	5,758	3,518	5,387
12:30-1:00	6,134	714	5,420	3,422	5,485
1:00-1:30	6,422	664	5,758	3,496	5,574
1:30-2:00	6,923	664	6,259	3,712	5,937
2:00-2:30	7,776	599	7,177	4,513	6,791
2:30-3:00	8,635	754	7,881	5,586	7,775
3:00-3:30	9,622	803	8,819	7,157	9,444
3:30-4:00	11,679	872	10,807	9,601	12,012
4:00-4:30	12,671	867	12,004	10,035	12,112
4:30-5:00	16,353	880	15,473	14,282	16,600
5:00-5:30	16,469	1,147	15,322	16,202	18,462
5:30-6:00	12,318	1,159	11,159	11,885	13,844
6:00-6:30	9,238	1,112	8,126	7,150	8,909
6:30-7:00	7,712	1,041	6,671	4,834	6,624
7:00-7:30	7,273	735	6,538	4,742	7,178
7:30-8:00	6,991	716	6,275	3,896	6,026
8:00-8:30	6,169	591	5,578	3,133	4,774
8:30-9:00	5,613	432	5,181	2,786	4,321
9:00-9:30	5,521	435	5,086	2,988	4,591
9:30-10:00	4,977	459	4,518	2,686	4,018
10:00-10:30	5,008	447	4,561	2,793	4,025
10:30-11:00	4,790	311	4,479	2,621	3,941
11:00-11:30	4,888	334	4,554	2,922	4,348
11:30-12:00	4,165	317	3,848	2,658	3,410
TOTAL	311,938	25,275	286,663	231,836	296,038^d

^aExcluding Double Crossings.

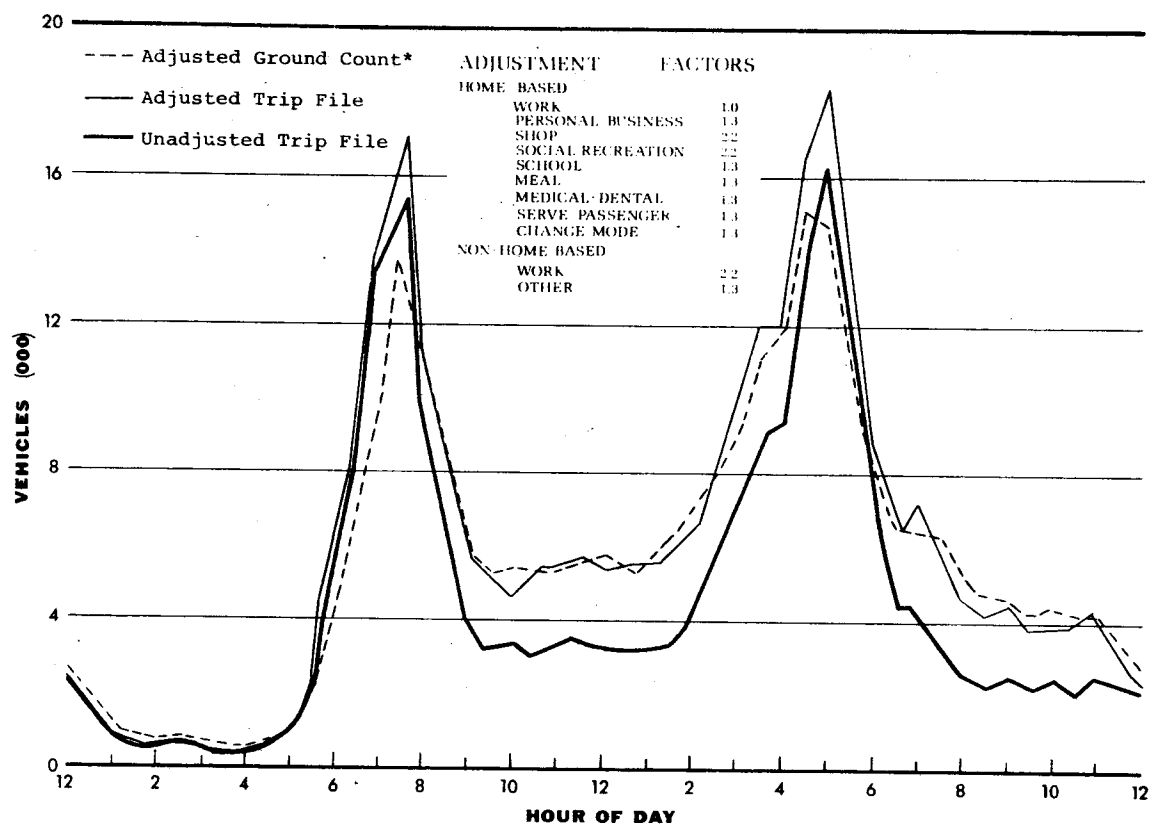
^bTrips through or with one end outside Study Cordon Area.

^cCount minus External Trips.

^dTotal shown was calculated before rounding of individual entries for presentation.

TABLE 44
PEAK PERIOD ANALYSIS --
AUTO DRIVER SCREENLINE CROSSINGS

Time Period	Ground Count	Unadjusted Trip File		Adjusted Trip File	
		Trips	Percent of Ground Count	Trips	Percent of Ground Count
A.M. Peak Period					
7-7:30	13,177	13,871	105.3	14,790	112.2
7:30-8	14,928	16,137	108.1	17,611	118.0
8-8:30	11,044	9,470	85.7	10,915	98.8
8:30-9	<u>8,061</u>	<u>6,720</u>	83.4	<u>8,241</u>	102.2
Total	47,210	46,198	97.9	51,557	109.1
P.M. Peak Period					
4-4:30	12,004	10,035	83.6	12,112	100.9
4:30-5	15,473	14,282	92.3	16,600	107.3
5-5:30	15,322	16,202	105.7	18,461	120.5
5:30-6	<u>11,159</u>	<u>11,888</u>	106.5	<u>13,884</u>	124.4
Total	53,958	52,407	97.1	61,057	113.2



Trips for half hour period are indicated at beginning time.

*Double crossings taken out.

Figure 24-- Auto driver Cuyahoga River screenline crossings by half-hour period, adjusted ground count and unadjusted and adjusted trip file.

TABLE 45

PEAK PERIOD ANALYSIS -- VEHICLE SCREENLINE CROSSINGS

Time Period	Ground Count		Adjusted Trip Files		Externals		Total Vehicles		
	Autos*	Trucks	Autos	Trucks	Autos	Trucks	Ground Count	Trip Files	Percent of Ground Count
A.M.									
7 - 7:30	13,509	1,279	14,790	966	332	212	14,788	16,300	110.2
7:30 - 8	15,579	1,596	17,611	1,028	651	179	17,175	19,469	113.4
8 - 8:30	11,761	1,752	10,915	1,716	717	213	13,513	13,561	100.4
8:30 - 9	8,656	1,877	8,241	1,621	595	226	10,533	10,683	101.4
Total	49,505	6,504	51,557	5,331	2,295	830	56,009	60,013	107.1
P.M.									
4 - 4:30	12,871	1,674	12,112	1,263	867	196	14,545	14,438	99.3
4:30 - 5	16,353	1,583	16,600	1,308	880	181	17,936	18,969	105.8
5 - 5:30	16,469	1,324	18,461	1,156	1,147	250	17,793	21,014	118.1
5:30 - 6	12,318	1,137	13,884	834	1,159	164	13,455	16,041	119.2
Total	58,011	5,718	61,057	4,561	4,053	791	63,729	70,462	110.6

*Does not include double crossings.

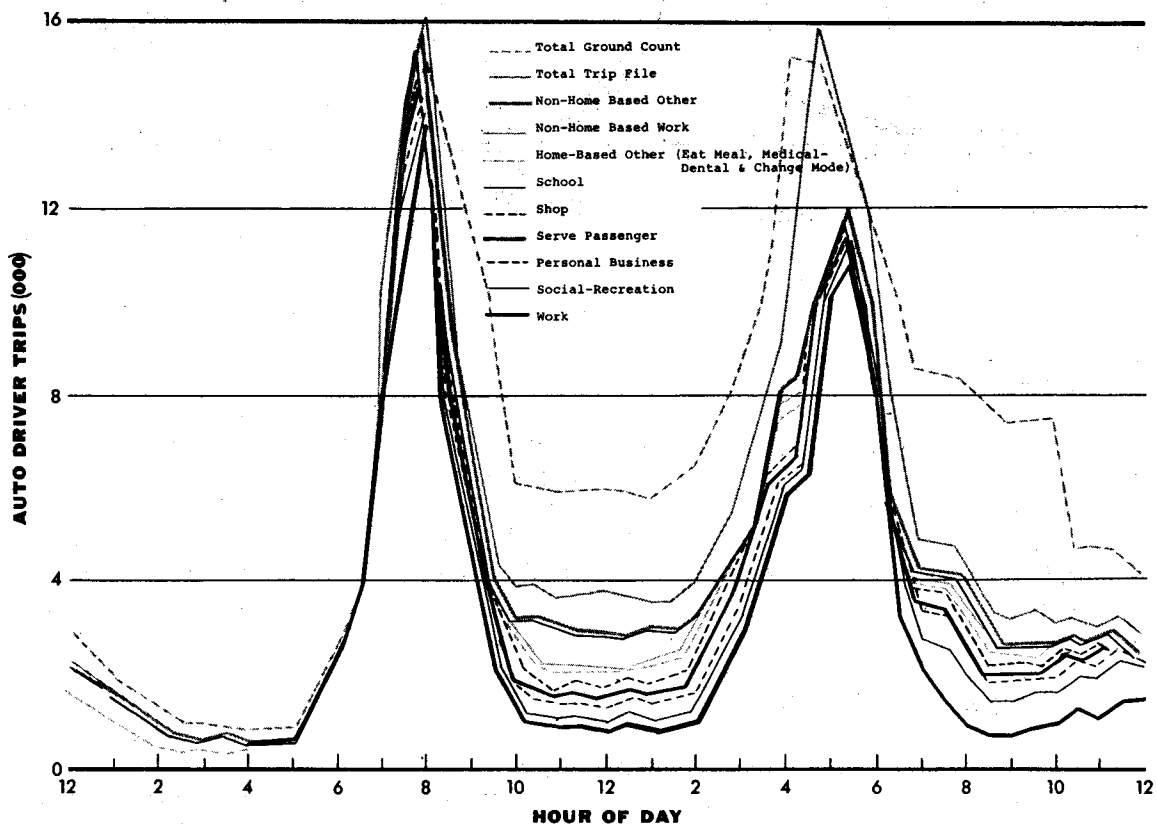


Figure 25 -- Auto driver Cuyahoga River screenline crossings by half-hour period, total ground count and unadjusted trip count by purpose.

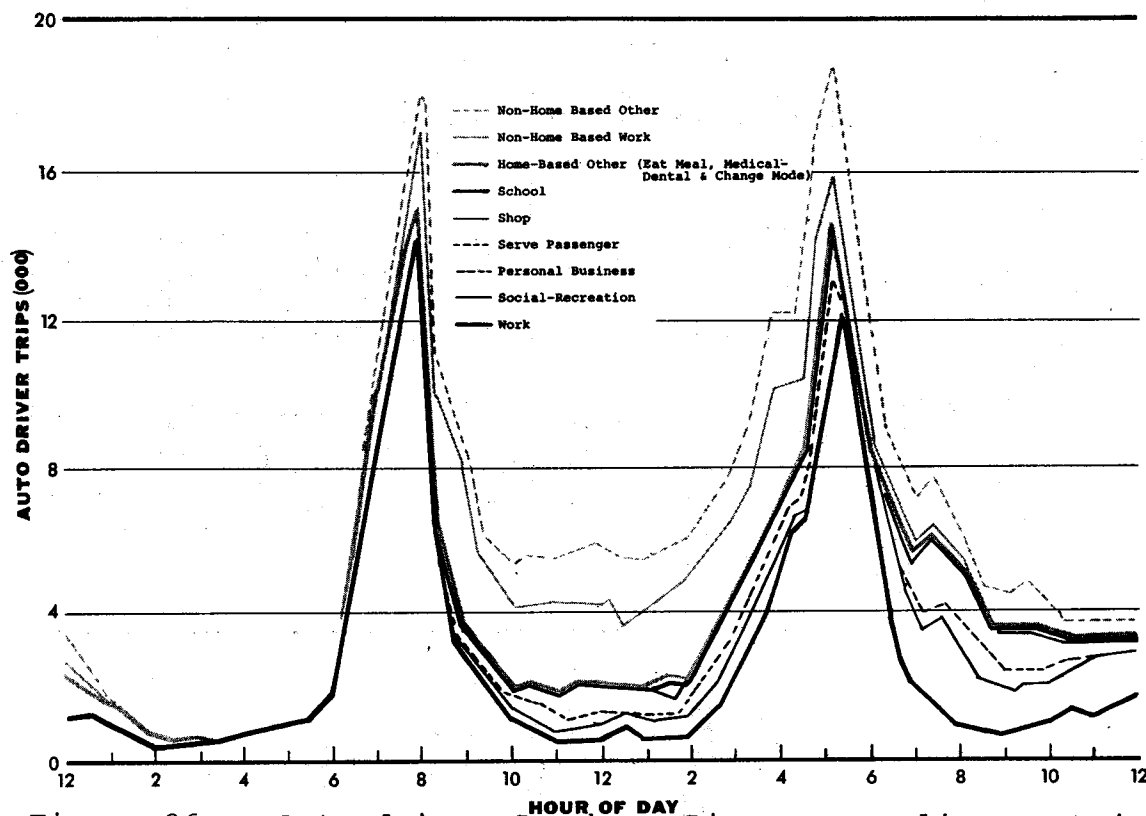


Figure 26 -- Auto driver Cuyahoga River screenline crossings by half-hour period, adjusted trip file by purpose.

Truck Trips

Since actual truck registration data was used to determine the sample, there are no accuracy checks similar to the household checks of the person trip file for the truck file. The VMT check is not applicable because truck travel is of considerably lower magnitude than auto travel. The screenline crossings, therefore, are the only applicable check.

SCREENLINE CHECK

The total reported truck screenline crossings showed a 65 percent check with the ground count. Rather than attempting to apply a uniform factor, it was decided to work with truck types. This information was recorded on both the sample and the screenline count. Further investigation revealed the differences in the rate of under-reporting were large enough to warrant the need for this breakdown.

The truck types were defined as:

Panel

1. Panel
2. Pick-up
3. Two-axle-four-tire vehicle

Combination

1. Semi-trailer -- all-axle configurations
2. Any combination with a full trailer

Other

1. Two-axle -- six-tire vehicle
2. All three-axle single-unit vehicles

The control figures for screenline crossings were obtained by adjusting the counts to an average day in the reporting period (a minor adjustment), subtracting external trips crossing the screenline as reported in the External Survey for all stations except those on the Ohio Turnpike (a major item, especially for combination trucks), and where significant, subtracting the counted crossings on the Ohio Turnpike. Determining if Turnpike trips crossed the screenline required the treatment described above; it was significant only for combination trucks.

An examination of the histogram of crossings by half-hour periods showed that panel trucks were well reported in the period from 6 a.m. to 6 p.m. Any adjustment which gave better agreement in the evening hours would yield excessive values during the major portion of the day. It was, therefore, decided not to adjust panel truck trip reporting.

For combination and other trucks, it was obvious there was significant under-reporting and that a uniform factor would give unsatisfactory results. In order to determine the best method of adjustment, the trips were examined in three ways:

1. By reported trip purpose
2. By those trips with the base of operations at either trip end
3. By fleet and non-fleet trip reports

Examination of the histogram indicated that a breakdown by fleet and non-fleet vehicles would give the most satisfactory adjustment.

ADJUSTMENT

Several groups of adjustment factors were studied and all indicated:

1. The variation in reported crossings was such that the histogram could not give as good a match as that obtained on the auto trip file. This is probably due to the smaller number of trips.
2. Any set of factors which gave a 100 percent check for the full day would over exaggerate the trips in the period from 6 a.m. to 6 p.m.

It was decided to accept adjustment factors which gave an acceptable full day check and which matched the histogram fairly well in the 6 a.m. to 6 p.m. period. The factors finally decided upon are shown in Table 46. The truck screenline crossings before and after adjustment are shown in Table 47 and the effect of the factors on total Study Cordon Area truck movement is shown in Table 48. Figures 27 through 32 graphically illustrate truck trips by half-hour period before and after adjustment.

TABLE 46

TRUCK FILE ADJUSTMENT FACTORS

Type	Factor
Combination	
Fleet	1.5
Non-Fleet	2.0
Other	
Fleet	1.3
Non-Fleet	2.2

TABLE 47

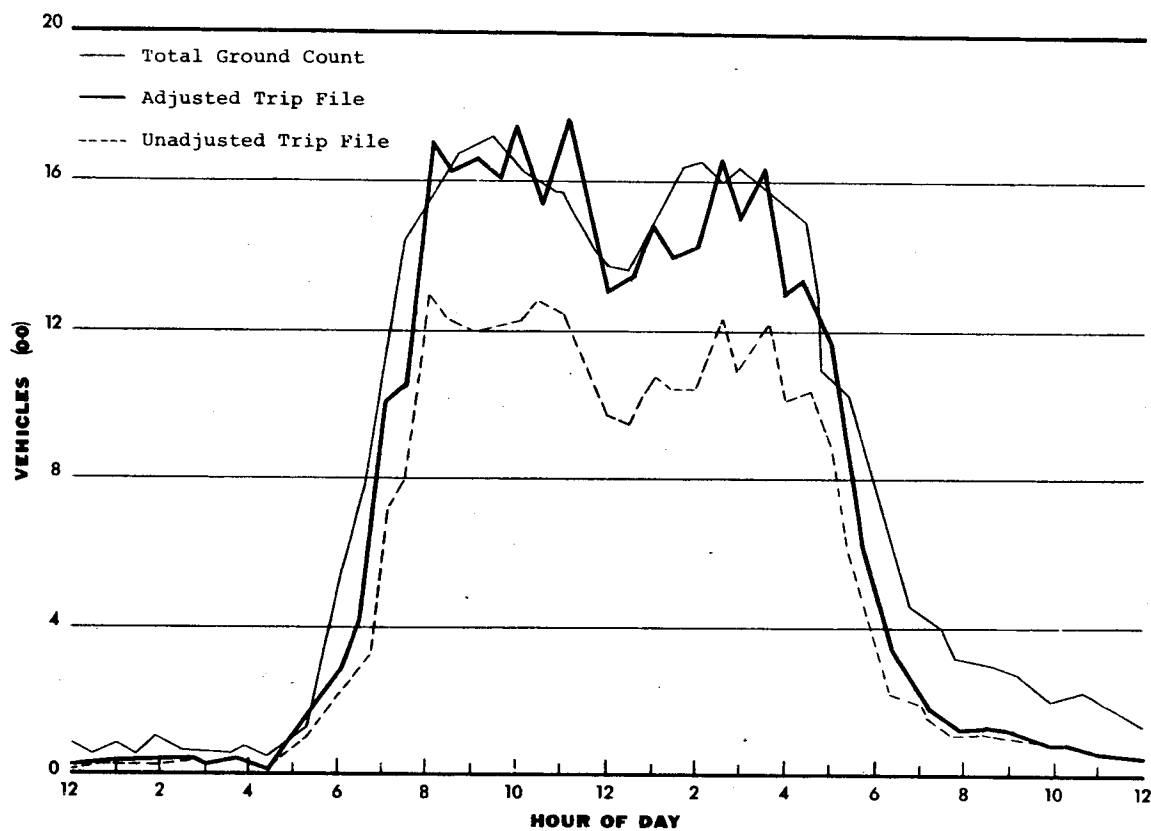
REPORTED TRUCK SCREENLINE CROSSINGS

Type of Truck	Control	Reported	Percent of Control
Before Adjustment			
Panel	13,038	11,649	89.3
Combination	8,439	5,009	59.3
Other	<u>15,465</u>	<u>8,435</u>	54.5
Total	36,942	25,093	67.9
After Adjustment			
Panel	13,038	11,649	89.3
Combination	8,439	7,951	94.2
Other	<u>15,465</u>	<u>14,650</u>	94.7
Total	36,942	34,250	92.7

TABLE 48

STUDY CORDON AREA TRUCK TRIPS -- BEFORE AND AFTER ADJUSTMENT

Type	Before Adjustment		After Adjustment		Adjusted as Percent of Unadjusted
	Trips	Percent	Trips	Percent	
Panel	122,756	54.3	122,756	43.4	100.0
Combination	31,681	14.0	49,161	17.4	155.2
Other	<u>71,515</u>	31.7	<u>110,709</u>	39.2	154.8
Total	225,952	100.0	282,626	100.0	125.1



Trips for half hour period indicated
at beginning time.

Figure 27 -- Truck Cuyahoga River screenline crossings by half-hour period, ground count and unadjusted and adjusted trip file.

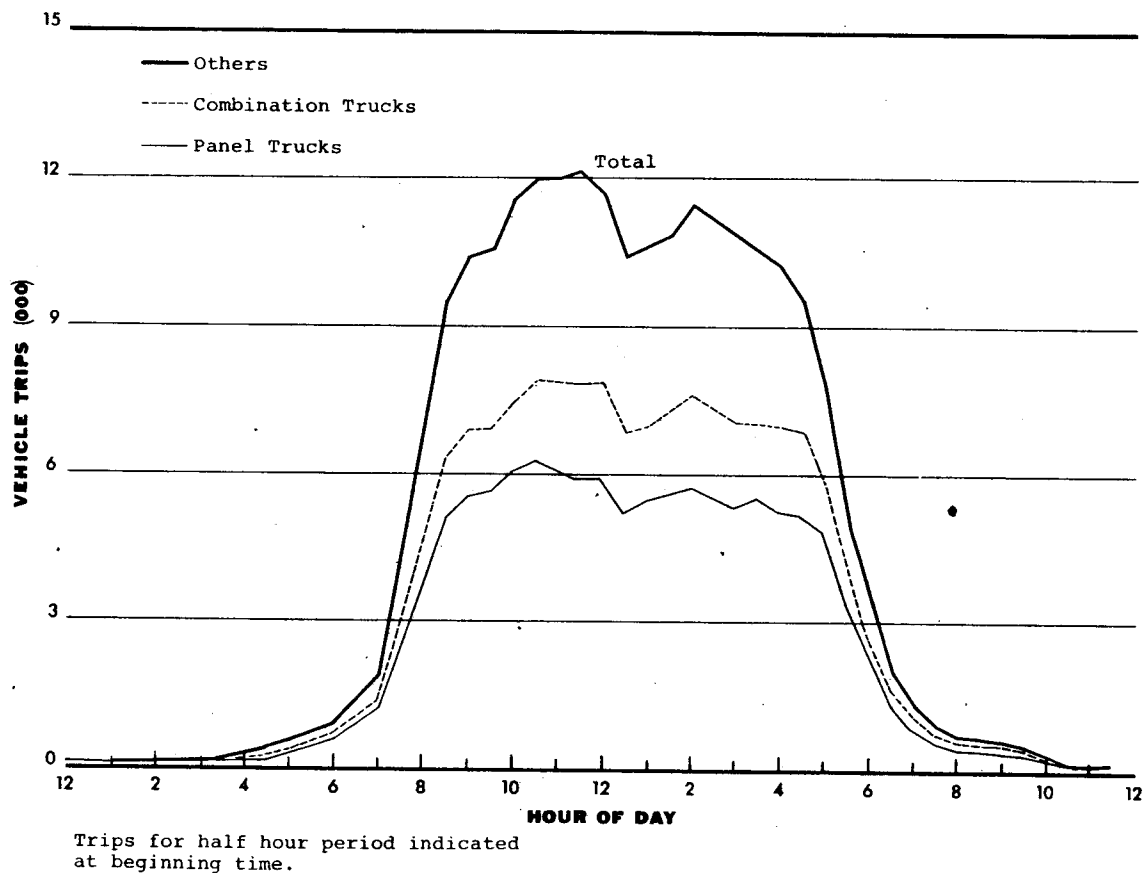


Figure 28 -- Truck trips by type in Study Cordon Area by half-hour period, unadjusted trip file.

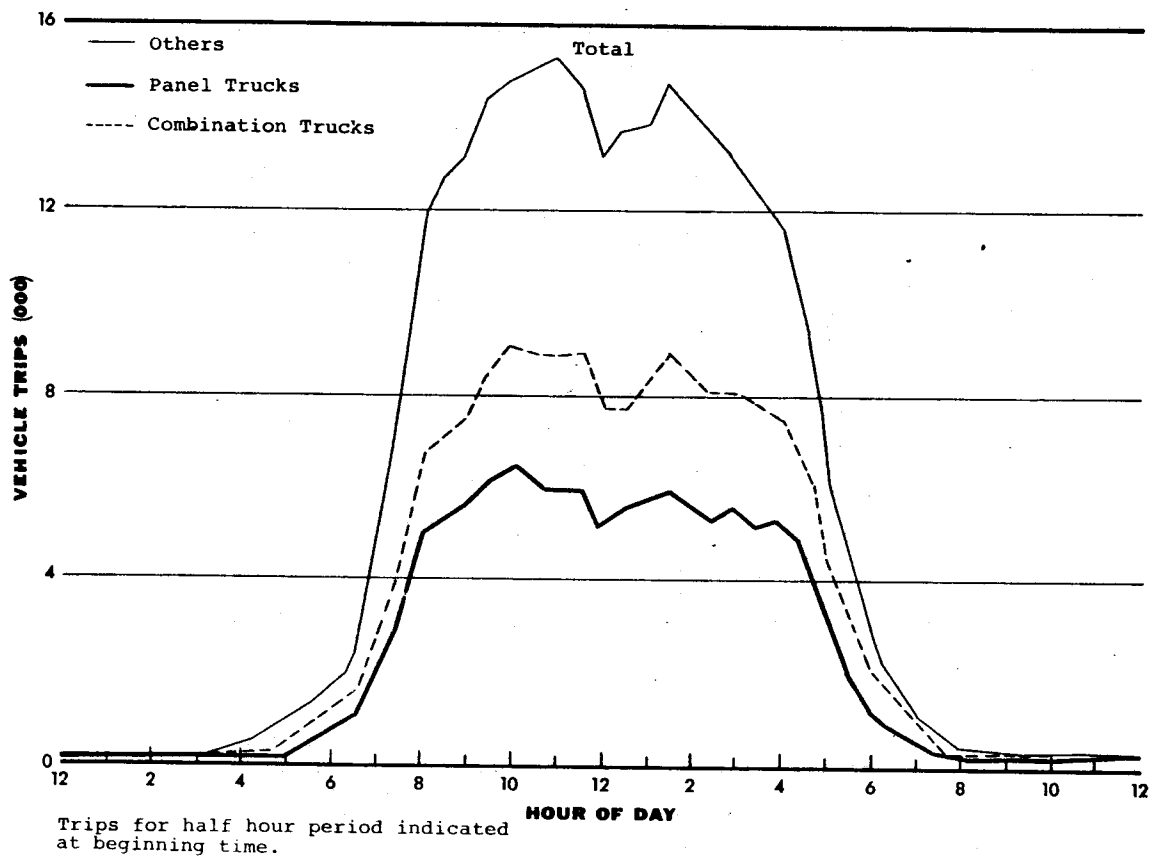


Figure 29 -- Truck trips by type in Study Cordon Area by half-hour period, adjusted trip file.

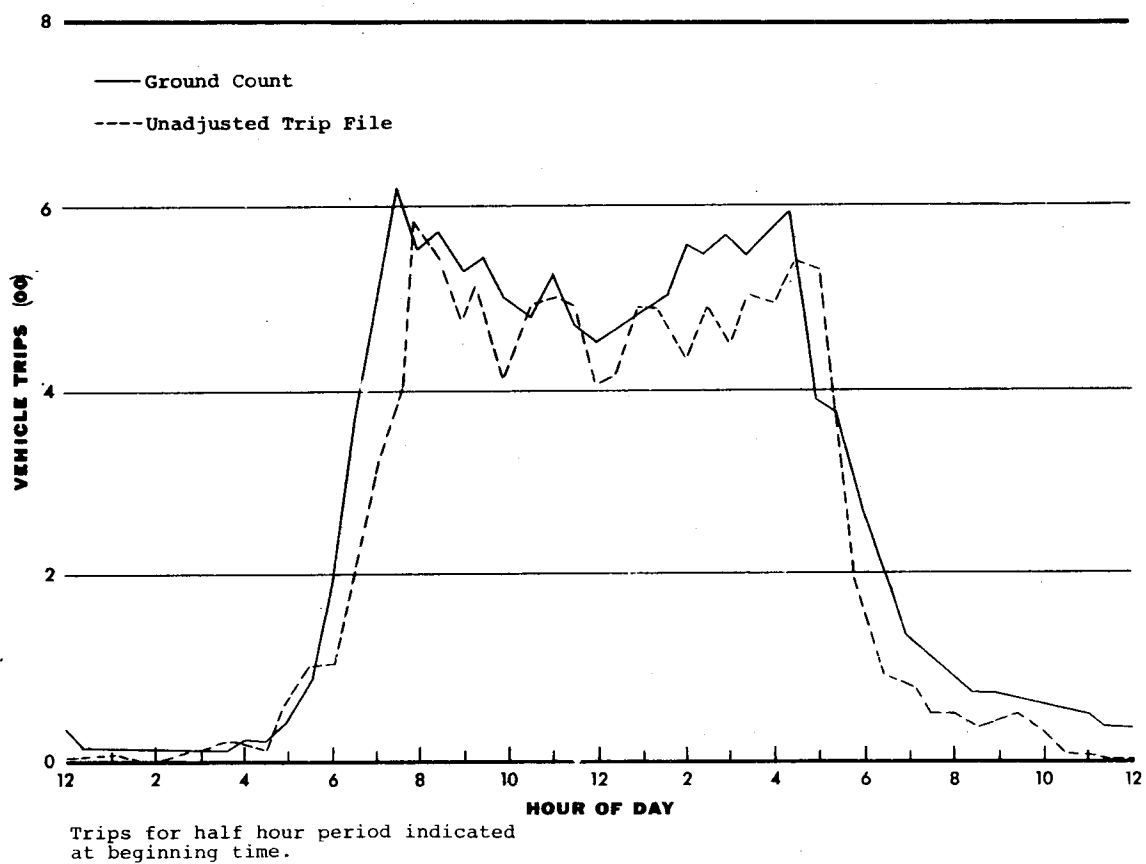


Figure 30 -- Panel Truck Cuyahoga River screenline crossings by half-hour period ground count and unadjusted trip file.

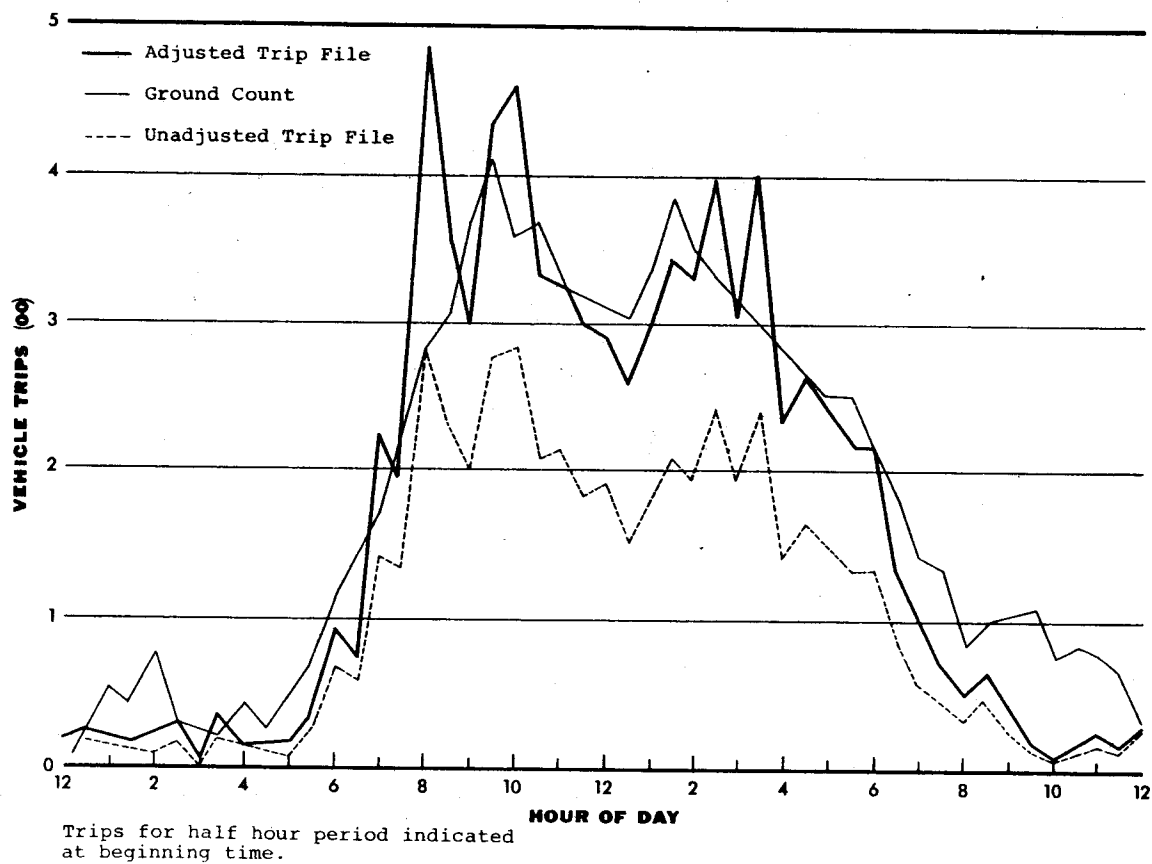


Figure 31 -- Combination Truck Cuyahoga River screenline crossings by half-hour period ground count and unadjusted and adjusted trip file.

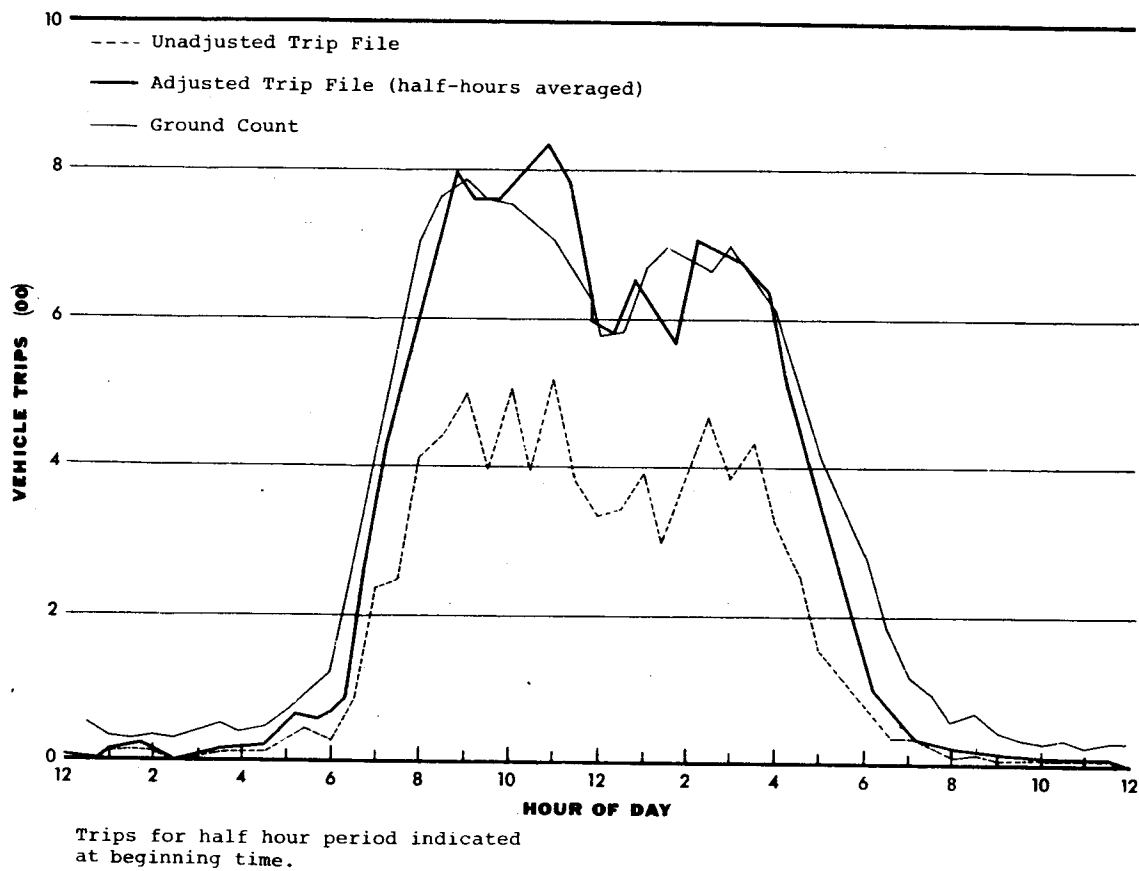


Figure 32 -- Other truck Cuyahoga River screenline crossings by half-hour period, ground count and unadjusted and adjusted trip file.

Taxi Trips

The taxi trip file contains 4,162 reported screenline crossings; the screenline count indicates 2,885 crossings. This results in a 144.2 percent check of reported to counted crossings. The histogram of reported trips appears quite erratic when summarized to the half-hour; but if the variations are smoothed by averaging reported half-hour data, the reported and counted histograms are similar. For this reason it was decided not to adjust the taxi file. Figure 33 graphically illustrates the reported and counted taxi screenline crossings.

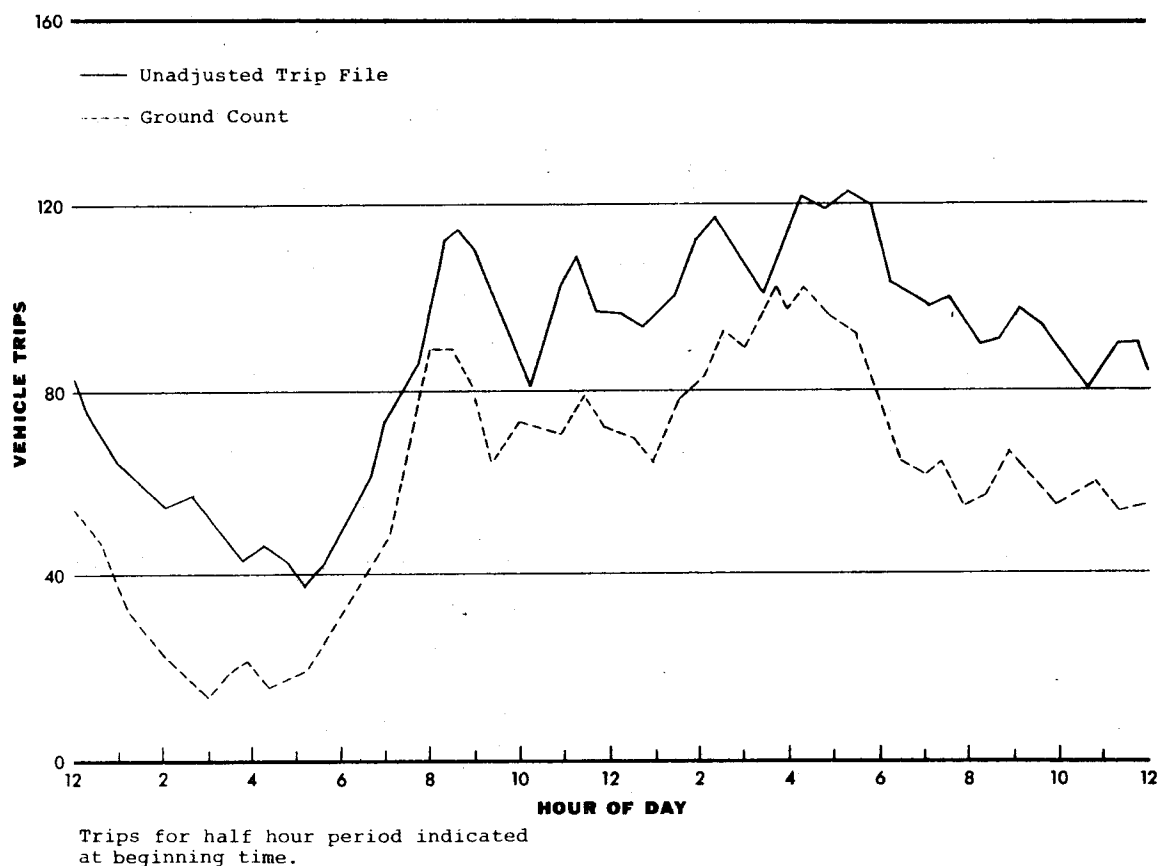


Figure 33 -- Taxi trip Cuyahoga River screenline crossings by half-hour period, ground count and trip file. (Trip file was not adjusted.)

V Transit

Rapid Transit

In conducting accuracy checks on the trip file, rapid transit trips were analyzed as a separate group of trips. The existence of exogenous counts by time of day, location and Study Cordon Area and information on rider characteristics provided sufficient controls for the analyses and subsequent adjustment of the rapid transit portion of the trip file. The sources of this information were the two transit companies providing rapid transit service in the Study Area -- Cleveland Transit System (CTS) and Shaker Heights Rapid Transit System. Controls developed from these sources provide the basis of the analysis.

ANALYSIS CONTROLS

An estimate of the total rapid transit riders within the Cordon Area for an average weekday was compiled from two sources:

1. Counts were conducted during the week of March 24, 1966 on the Shaker Heights Rapid and adjusted to average annual daily traffic (AADT) in 1963.
2. Total CTS riders on weekdays in 1963 divided by the number of weekdays in the year. The estimate of total riders on an average weekday in 1963 used as a control is 76,399. Appendix A contains the procedures for arriving at the volume.

Cleveland Central Business District (CBD) orientated trips provide another control. A single terminal exists in the CBD for rapid transit trips. Therefore, all trip ends at this station are in the CBD and are comparable to trips with ends in the CBD from the unlinked trip file for rapid transit. Total trip ends at the station, both origins and destinations, are 54,763. The development of this control is shown in Appendix B.

A counting program conducted by the Study on the Shaker Heights Rapid Transit and turnstile data obtained from CTS provided an external control for the number of boarding passengers between 4:00 P.M. and 5:59 P.M. by sector.¹ The development of the counts and adjustment to an average day for the time period is shown in Appendix C. Summary of the volumes is given in the Table 49.

TABLE 49

RAPID TRANSIT BOARDING PASSENGERS 4:00 P.M. TO 5:59 P.M.

Developed From Count Data

Sector	Volume	Sector	Volume	Sector	Volume
0	15,143	4	497	8	2,298
1	412	5	0	9	0
2	1,587	6	0	Total	22,007
3	0	7	2,070		

¹SCOTS conducted a passenger counting program on July 5, 1966 on the CTS rapid. A raw count of 2,182 passengers boarding between 2:00 P.M. and 3:00 P.M. was adjusted to an average weekday in March yielding 2,346 for the period. CTS turnstile counts taken on March 25, 1966 indicated 2,269 boarding passengers in the same period which, when adjusted to an average day in March, resulted in 2,298 passengers. The close correspondence of SCOTS independent counts with the CTS turnstile counts substantiates the use of CTS counts for control purposes.

Ground counts conducted at the screenline provided the fourth major control. Because of the system configuration, rapid transit screenlines could be established at the Cuyahoga River and at East 55th Street. The former is referred to as the West Side Screenline and the latter as the East Side Screenline. Field data were obtained from both CTS and the Shaker Heights Rapid Transit System. Counts were adjusted to an AADT. Counts for CTS do not include four train trips that occur after 12:30 A.M. and before 5:30 A.M. Counts for the corresponding time periods of 12:30-1:00 A.M. and 5:00-5:30 A.M. were arrived at by using the average volume on a car between 12:00-12:30 A.M. Tabular displays of the screenline are shown in Appendix D. Screenline information provided a time histogram and AADT total of riders crossing the screenlines, as follows:

Total Volume Across Screenlines From Ground Counts

East Side	37,539
West Side	33,059

ANALYSIS

The expanded unlinked trip file provided all trip file information used in the analysis checks. The comparison of the total reported Study Cordon Area trips with the control counts is shown in Table 50.

TABLE 50

RAPID TRANSIT TRIPS
TOTAL REPORTED COMPARED TO CONTROL COUNTS

Control Counts	Reported Trips	Difference	Percent Difference	Percent of Control Counts
76,399	45,531	30,868	40.40	59.60

The next analysis was performed on CBD trip ends. Two checks were performed; the first was a comparison of reported CBD trip ends versus the control, and the second a comparison of CBD trip ends versus total reported Study Cordon Area trips. The first check is on magnitude of reporting and is shown in Table 51; the second, on trip characteristics, is shown in Table 52.

Comparing the percentage of CBD orientation from the report to the control counts results in a 101.88 percent comparison. This indicates the expanded trip file does have the correct CBD orientation characteristics.

Another analysis check involved the stratification of trips occurring in a specific period of the day. Control counts were prepared for boarding passengers between 4:00 P.M. to 5:59 P.M. for each sector. These correspond to reported origins in the unlinked trip file and provide a basis for the comparison shown in Table 53. (A map showing the sectors appears in Section IV, page 98).

TABLE 51

REPORTED CBD RAPID TRANSIT TRIPS
COMPARED TO CONTROL COUNTS

Control Counts	Reported Trips	Difference	Percent Difference	Percent of Control Counts
54,763	33,253	21,510	39.28	60.72

TABLE 52

RAPID TRANSIT TRIPS REPORTED
CBD AND STUDY CORDON AREA TRIPS COMPARED TO CONTROL COUNTS

	CBD Trips	Study Area Trips	Percent CBD Orient
Control Counts	54,763	76,399	71.68
Reported	33,253	45,531	73.03

TABLE 53

4:00-5:59 P.M. RAPID TRANSIT BOARDING PASSENGERS BY SECTOR
REPORTED COMPARED TO CONTROL COUNTS

Sector	Control Counts	Reported Trips	Difference	Percent Difference	Percent of Control Counts
0	15,143	10,308	-4,835	-31.93	68.0
1	412	332	- 80	-19.42	80.58
2	1,587	566	-1,021	-64.35	35.66
3	0	105	+ 105	----	0.0
4	497	103	- 394	-79.28	20.72
5	0	60	+ 60	----	----
6	0	121	+ 121	----	----
7	2,070	843	-1,227	-59.28	40.72
8	2,298	1,201	-1,097	-47.74	52.26
9	0	192	+ 192	----	0.0
Total	22,007	13,831	-8,176	-37.15	62.84

A certain amount of self-linking of trips by the respondent resulted in reported origins in sectors where there is no rapid transit service. To minimize this, the two-hour comparison was made for three areas, the CBD (Sector 0), the west side and the east side. It is shown in Table 54.

TABLE 54

4:00-5:59 P.M. REPORTED RAPID TRANSIT BOARDING PASSENGERS
BY MAJOR GEOGRAPHIC AREA
COMPARED TO CONTROL COUNTS

Area	Sector	Control Counts	Reported Trips	Difference	Percent Difference	Percent of Control Counts
CBD	0	15,143	10,308	-4,835	-31.93	68.07
West Side	1-5	2,496	1,166	-1,330	-53.29	46.71
East Side	6-9	4,368	2,357	-2,011	-46.09	53.96

A check for the characteristic of areal distribution of trips during the two-hour period was conducted. The results are shown in Table 55.

The ratio of control counts to reported trips gives an indication of areal distribution characteristics. While a difference exists, it is apparent the trip file generally has the same areal characteristic as the control.

TABLE 55
4:00-5:50 P.M. RAPID TRANSIT BOARDING PASSENGERS
BY MAJOR GEOGRAPHIC AREA
PERCENTAGE BREAKDOWN OF REPORTED
AND CONTROL COUNTS

Area	Control Counts	Trip File	Control Counts	Reported Trips	Percent of Control Counts
CBD	15,143	10,308	68.81	74.53	108.31
West Side	2,496	1,166	11.34	8.43	74.34
East Side	4,368	2,357	19.85	17.04	85.84
Total	22,007	13,831	100.00	100.00	

Analysis of the two-hour boarding also indicates the same approximate 60 percent check of reported trips with the control counts. It, however, also indicates that the trip file has the proper characteristics.

The final analysis of the trip file involves the screenline controls. For purposes of the accuracy check analysis only the West Side Screenline was used. This was done to maintain compatibility with the other mode checks which used the Cuyahoga River as the screenline. To evaluate the resulting factors, the East Side Screenline was used.

Three comparisons were made at the West Side Screenline; time of day histogram, total crossings and percentage of Study Cordon Area trips crossing the screenline. A graphic display of the histogram in Figure 34 shows under-reporting throughout the entire day. As indicated by the graph, the difference between the control counts and reported trips at the half-hour time points does not seem to vary among the points. This apparently indicates the same amount of under-reporting through the day.

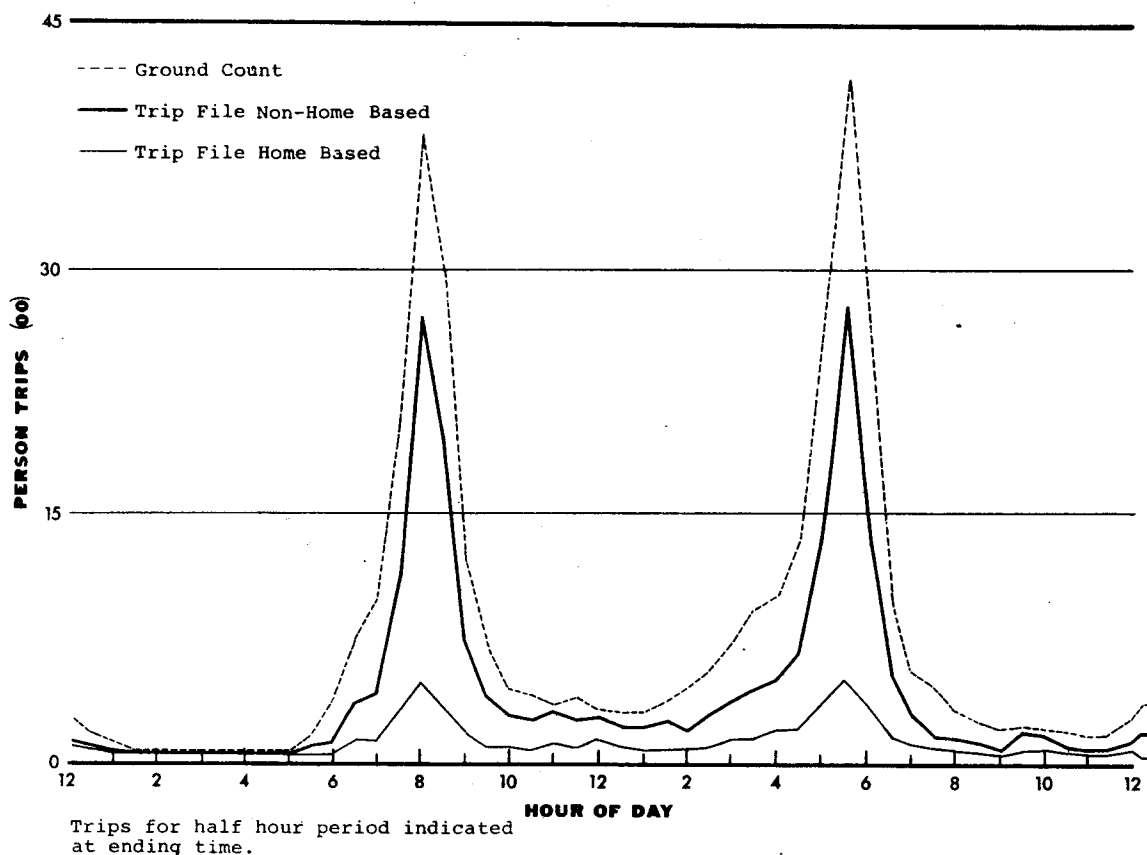


Figure 34 -- Rapid transit passenger West Side screenline crossings by half-hour period, ground count and unadjusted trip file.

Comparison of total screenline crossings from the control counts with the reported trips is shown in Table 56. A percent check of 56.54 percent is of the same general value of the other checks.

TABLE 56

WEST SIDE RAPID TRANSIT SCREENLINE COMPARISON

Control Counts	Reported Trips	Difference	Percent Difference	Percent of Control Count
33,059	18,690	14,369	43.46	56.54

As a check on the trip characteristics, the percentage of trips crossing the West Side Screenline in relationship to the Study Cordon Area trips was analyzed. The results are shown in Table 57. Comparing the percentage of screenline crossings from the trip file to the control counts results in a 94.87 percent comparison. This indicates the basic trip file does have the correct screenline characteristics.

TABLE 57

RAPID TRANSIT WEST SIDE SCREENLINE CROSSINGS
COMPARED TO STUDY CORDON AREA TRIPS REPORTED
AND CONTROL COUNTS

	West Side Screenline	Study Area	Percentage
Counts	33,059	76,399	43.27
Trip File	18,690	45,531	41.05

SUMMARY OF ANALYSIS

The results of the analysis are shown in the following as two separate evaluations. Characteristics of the basic trip file comprise the first while magnitude comparisons comprise the second.

Characteristic Checks

<u>Analysis Item</u>	<u>Ratio</u>
CBD Study Cordon Area	1.02
Peak Two-Hour Boards	
CBD	1.08
West Side	0.74
East Side	0.86
Screenline Crossing-Study Cordon Area	
Comparison	0.95

Magnitude Checks

<u>Analysis Item</u>	<u>Check</u>
Study Cordon Area Trips	59.60%
CBD Trips	60.72%
Peak Two-Hour Boards	62.84%
CBD	68.07%
West Side	46.71%
East Side	53.96%
West Side Screenline Crossings	56.54%

The conclusion reached from the characteristic checks is that the basic trip file possesses the same characteristics as the control population. Ratio factors close to 1.00 indicate good correspondence.

Evaluation of the magnitude checks indicates only approximately 60 percent of the rapid transit trips are in the basic trip file. Whether this is due to under-reporting or an idiosyncrasy of the sample cannot be determined.

The results of the analysis indicate the basic sample does exhibit the proper characteristics and that the magnitude discrepancy should be accounted for by adjustment.

A check of approximately 60 percent would result in the application of factors that would yield an average factor of approximately 1.7. While at first this factor may appear too large, under the existing conditions, it is quite reasonable.²

DEVELOPMENT OF ADJUSTMENT FACTORS

A study of the trip file West Side Screenline crossings stratified by purpose and displayed as a histogram for each of the purposes indicated a major breakout for factoring was non-home based and home based trips. Further study indicated a finer stratification into 12 purposes -- six home based and six non-home based. There purposes are:

<u>Home Based</u>	<u>Non-Home Based</u>
Work	Work
Personal Business	Personal Business
Shop	Shop
School	School
Change Mode	Change Mode
Other	Other

Trips contained in the "other" category amounted to a very small percentage for both the screenline and the total Study Cordon Area.

The percentage distribution of trips by purpose is shown in Table 58. The percentages for West Side Screenline and Study Cordon Area are approximately the same. This indicates the screenline check for rapid transit is representative of the Study Cordon Area.

Adjustment factors were developed by a technique of systematic trials based on a fixed control total. This technique is explained in the section on bus accuracy checks, page .

Control totals for the Study Cordon Area, West Side Screenline, 8:00 A.M. peak, 5:30 P.M. peak and 12:00 noon provided the information for evaluating the factors. Graphic displays of each of the 12 trip purposes provided insight into the magnitude of the factors.

²"Sampling Procedures II, Sample Expansion" (memo), M. Golenberg, March 15, 1967, SCOTS.

TABLE 58
RAPID TRANSIT TRIP PURPOSE
DISTRIBUTION BEFORE ADJUSTMENT

Purpose	Home Based		Non-Home Based	
	West Side Screenline	Study Area	West Side Screenline	Study Area
Work	13.09	17.89	21.84	18.96
Personal Business	0.92	2.04	2.15	2.67
Shops	2.17	3.53	2.84	3.72
Change-Mode	2.75	4.85	48.08	39.05
School	1.29	2.17	1.37	1.07
Other	0.87	1.66	1.71	2.32

Because five control figures existed, it was not necessary to plot the resultant screen from each set of factors but only compare the factored totals to the controls.

The set of factors developed for use in adjusting the Rapid Transit File are shown in Table 59. Their selection was based on the control shown in Table 60.

The final percentage distribution of trips by purpose for the West Side Screenline and Study Cordon Area after adjustment are shown in Table 61.

Table 62 provides a summary of two other factor trials and the resulting screenline and Cordon Area volume.

TABLE 59
RAPID TRANSIT TRIP FILE ADJUSTMENT FACTORS

Purpose	Home Based Factor	Non-Home Based Factor
Work	1.0	1.4
Personal Business	2.5	2.5
Shop	3.0	3.0
School	3.0	3.0
Change-Mode	1.7	1.7
Other	1.5	2.5

TABLE 60

RAPID TRANSIT TRIPS ADJUSTED TRIP FILE
COMPARED TO CONTROL COUNT

	Control Count	Adjusted Trip File	Percent Difference	Percent of Control Total
West Side Screenline	33,059	31,244.06	- 5.5	94.5
Study Area	76,399	77,673.88	1.7	101.7
8:00 A.M. Peak	3,784	4,086.88	8.0	
12:00 Noon	290	384.97	32.7	
5:30 P.M. Peak	4,143	4,459.31	7.6	

TABLE 61

RAPID TRANSIT TRIP PURPOSE DISTRIBUTION AFTER ADJUSTMENT

Purpose	Home Based		Non-Home Based	
	West Side Screenline	Study Area	West Side Screenline	Study Area
Work	8.31	10.49	18.29	15.56
Personal Business	1.38	2.98	3.21	3.91
Shop	3.90	6.21	5.11	6.54
School	2.31	3.81	2.45	1.88
Change-Mode	2.80	4.83	48.89	38.91
Other	0.78	1.46	2.56	3.40

TABLE 62

TWO SETS OF FACTORS CONSIDERED FOR RAPID TRANSIT
TRIP FILE ADJUSTMENT

Purpose	Factor I	Factor II
Home Based		
Work	1.0	1.0
Personal Business	4.0	4.0
Shop	4.0	4.5
School	2.0	1.5
Change Mode	1.5	1.7
Other	2.0	1.5
Non-Home Based		
Work	1.5	1.5
Personal Business	4.0	4.0
Shop	4.0	4.0
School	2.0	2.0
Change Mode	1.5	1.5
Other	2.0	2.0
Resulting Adjustment		
Area	Trips	Trips
Screenline	30,974	32,646
Study Cordon Area	71,347	83,226

ANALYSIS OF THE ADJUSTED RAPID TRANSIT TRIP FILE

Screenline Comparison

For the screenline comparison both the East Side and West Side Screenlines were employed. Checking was for both magnitude and characteristics. The results of the magnitude checks are shown in Table 63; these results are considered acceptable.

A comparison was made for peak two-hour trips for the A.M. and P.M. periods for both screenlines. The results are shown in Table 64.

TABLE 63

RAPID TRANSIT SCREENLINE CROSSINGS
ADJUSTED TRIP FILE COMPARED TO CONTROL COUNT

Screenline	Adjusted Trip File	Control Count	Difference	Percent Difference	Percent of Control Count
West Side	31,244	33,059	-1,815	-5.49	94.51
East Side	36,981	37,539	- 558	-1.49	98.51

TABLE 64

RAPID TRANSIT PEAK PERIOD SCREENLINE CROSSINGS
ADJUSTED TRIP FILE COMPARED TO CONTROL COUNT

Screenline	Time Period	Adjusted Trip File	Control Count	Percent of Control Count
East Side	7-9	9,699	10,203	95.06
East Side	4-6	10,580	10,449	101.25
West Side	7-9	9,654	10,044	96.11
West Side	4-6	9,834	10,585	92.91

The second group of checks, characteristic checks, shows the degree of correspondence to the controls.

The East and West Side Screenline crossing histograms are shown in Figure 35 and Figure 36 for the adjusted trip file. An adequate reproduction of the control count is indicated from both screenlines.

Comparison of the percentage of trips crossing both screenlines with total Study Cordon Area trips for both the adjusted trip file and controls is shown in Table 65.

For the East Side Screenline, the adjusted trip file has a 97.31 percent check with the control count; for the West Side Screenline, a 93.37 percent check. Both of these checks indicate that the adjusted trip file maintains the control characteristics.

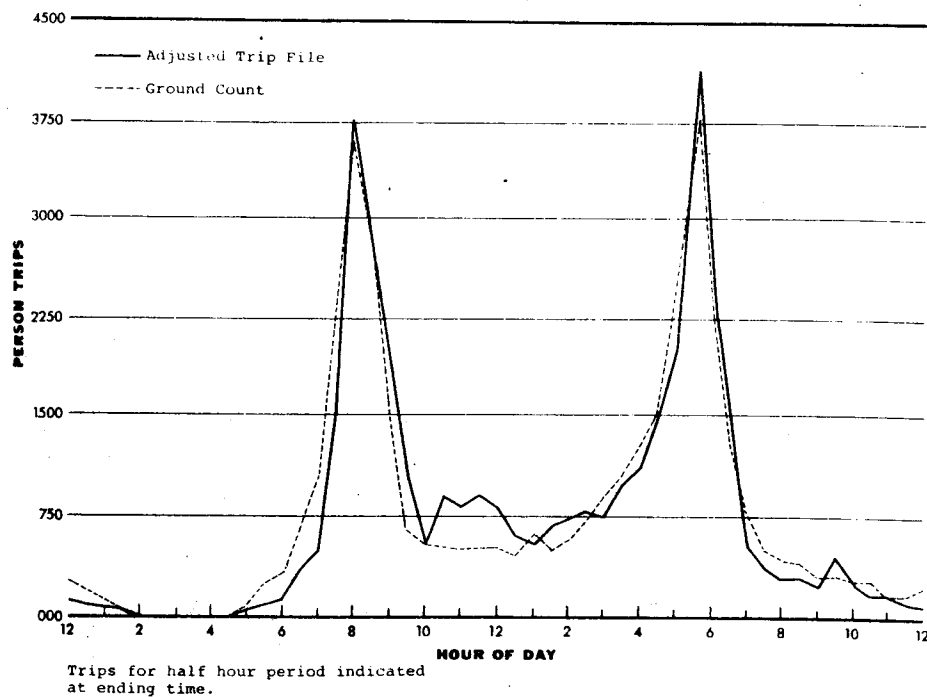


Figure 35 -- East side rapid transit screenline crossing by half-hour period, ground count and adjusted trip file.

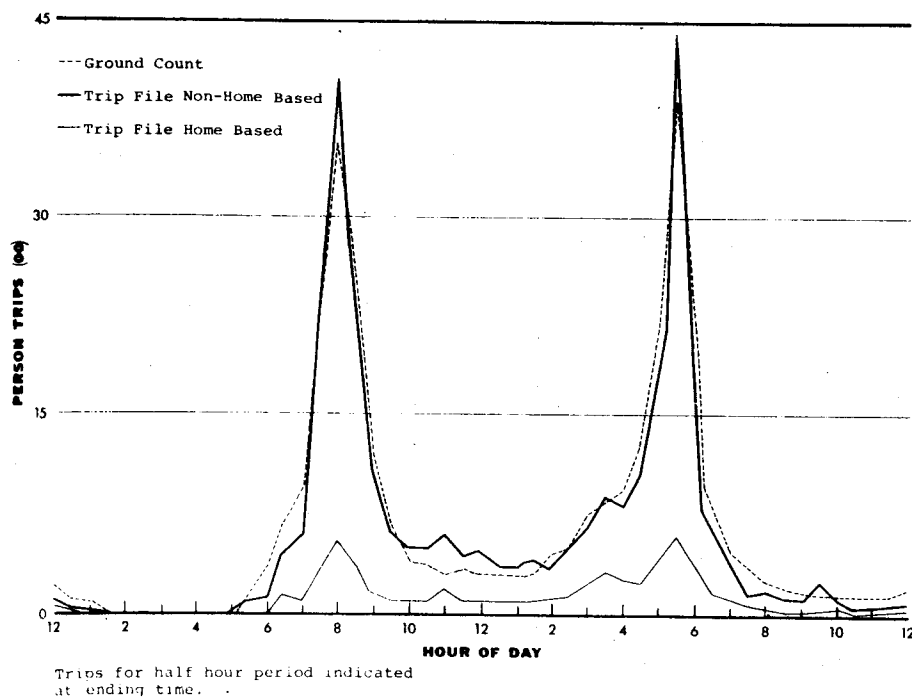


Figure 36 -- Rapid transit passenger West Side screenline crossings by half-hour period, ground count and adjusted trip file.

TABLE 65

RAPID TRANSIT SCREENLINE CROSSINGS COMPARED TO
STUDY CORDON AREA TRIPS ADJUSTED TRIP FILE AND CONTROL COUNT

Base	Study Cordon Area	Screenline	Percent of Study Cordon Area
East Side Screenline			
Control Count	76,399	37,539	49.14
Adjusted Trip File	77,336	36,981	47.82
West Side Screenline			
Control Count	76,399	33,059	43.27
Adjusted Trip File	77,336	31,244	40.40

CBD Characteristics

The number of trip ends in the Cleveland CBD from the adjusted trip file was compared against the control count. The results, shown in Table 66, are considered reasonable.

The percentage of Study Cordon Area trip ends in the Cleveland CBD for both the adjusted trip file and control count were compared. The comparison, shown in Table 67, results in a 99.75 percent check. This again indicates a reasonable adjustment was made.

TABLE 66

RAPID TRANSIT TRIPS ADJUSTED TRIP FILE
CBD TRIPS COMPARED TO CONTROL COUNT

	Control Count	Adjusted Trip File	Difference	Percent Difference	Percent of Control Count
CBD Trip Ends	54,763	55,530	+767	+1.40	101.40

TABLE 67

RAPID TRANSIT TRIPS ADJUSTED TRIP FILE CBD
AND STUDY CORDON AREA TRIPS COMPARED TO CONTROL COUNT

	CBD Ends	Study Cordon Area	Percent CBD Oriented
Control Count	54,763	76,399	71.68
Adjusted Trip File	55,530	77,336	71.80

Study Area Trip Check

The final analysis of the adjustment was the comparison of trip origins between 4:00 P.M. and 5:59 P.M. with counts of boardings. This is presented in Table 68. For the total time period a 103.15 percent check results. Even though the checks for different portions of the Study Cordon Area are low, these represent small volume groups and are minimized by the volume of trips to the Cleveland CBD.

TABLE 68

4:00- 5:59 RAPID TRANSIT BOARDING PASSENGERS
BY MAJOR GEOGRAPHIC AREA
ADJUSTED TRIP FILE COMPARED TO CONTROL COUNT

Area	Sector	Control Count	Adjusted Trip File	Difference	Percent Difference	Percent of Control Count
CBD	0	15,143	16,639	+1,496	+ 9.88	109.88
East Side	6-9	4,368	4,148	- 220	- 5.04	94.96
West Side	1-5	2,496	1,914	- 582	-23.32	76.68
Total		22,007	22,701	+ 694	3.15	103.15

CONCLUSION

The analysis of the adjusted trip file indicates a good correspondence with all controls established to evaluate the basic trip file. Adjustment has increased the trips to adequately meet the controls. Since these controls are in part exclusive and the characteristics of the adjusted file maintain the characteristics of the controls, the factors for adjustment have been accepted as reasonable and valid.

Appendix B

PROCEDURE FOR DEVELOPING RAPID TRANSIT CBD TRIP CONTROL TOTAL*

Shaker Heights Rapid Transit

TABLE B-1

CBD ORIGINS AND DESTINATIONS 1966

Division	East (Origins)	West (Destinations)
Van Aken	4,576	5,020
Green Rd.	<u>2,310</u>	<u>2,414</u>
TOTAL	6,886	7,434

Total Origin and Destinations = 14,320

Factors

March AADT	0.950
1966-1963	1.032
Adjusted origins	6,749
Adjusted destinations	<u>7,286</u>
TOTAL	14,035

Cleveland Transit System

Total 1963 CBD weekday origins ^a	5,192,797 ^a
Total 1963 weekdays	255
1963 average daily CBD origins	20,364
1963 average daily CBD destinations (estimated) ^b	<u>20,364</u>
TOTAL	40,728

^aTotal passenger boards at Cleveland Union Terminal,
calculated from averages.

^bVolume count not available.

*Slight discrepancies in calculations may occur due to rounding.

Control Total

Origins

Shaker Hts. Rapid Transit	6,749
Cleveland Transit System	<u>20,364</u>

1963 Average Daily CBD Origins	27,113
--------------------------------	--------

Destinations

Shaker Hts. Rapid Transit	7,286
Cleveland Transit System	<u>20,364</u>

1963 Average Daily CBD Destinations	27,650
-------------------------------------	--------

Total 1963 Average Daily CBD Origins and Destinations	54,763
--	--------

TABLE C-3

RAPID TRANSIT BOARDING PASSENGERS CONTROL TOTALS BY SECTOR

Sector	Total 1963 AADT Counts
0	15,143
1	412
2	1,587
3	0
4	497
5	0
6	0
7	2,070
8	2,298
9	0
Total	22,007

Appendix D

RAPID TRANSIT SCREENLINE TABULATIONS

TABLE D-1

WEST SIDE RAPID TRANSIT SCREENLINE CROSSINGS REPORTED COMPARED TO CONTROL COUNTS

Time	Reported Trips	AADT Counts	Difference	Percent Difference
West Bound -- East to West				
12:00 - 12:30	32.93	75	42.07	56.1
12:30 - 1:00	17.81	40	22.19	55.5
1:00 - 1:30	0	0		0
1:30 - 2:00	0	0		0
2:00 - 2:30	4.96	- - -	- - -	0
2:30 - 3:00	0	0	0	0
3:00 - 3:30	0	0		0
3:30 - 4:00	0	0		0
4:00 - 4:30	0	0		0
4:30 - 5:00	0	0		0
5:00 - 5:30	35.20	70	34.80	49.7
5:30 - 6:00	16.15	146	129.85	88.9
6:00 - 6:30	73.09	339	265.91	78.4
6:30 - 7:00	103.76	243	139.24	57.3
7:00 - 7:30	110.93	306	195.07	63.7
7:30 - 8:00	191.28	373	181.72	48.7
8:00 - 8:30	115.99	268	152.01	56.7
8:30 - 9:00	53.42	140	86.58	61.8
9:00 - 9:30	50.73	73	22.27	30.5
9:30 - 10:00	31.92	70	38.08	54.4
10:00 - 10:30	37.61	67	29.39	43.9
10:30 - 11:00	36.60	82	45.40	55.4
11:00 - 11:30	70.39	111	40.61	36.6
11:30 - 12:00	63.59	149	85.41	57.3
12:00 - 12:30	78.44	132	53.56	40.6
12:30 - 1:00	70.74	134	63.26	47.2
1:00 - 1:30	115.74	166	50.26	30.3
1:30 - 2:00	63.82	228	164.18	72.0
2:00 - 2:30	120.82	299	178.18	59.6
2:30 - 3:00	262.84	409	146.16	35.7
3:00 - 3:30	296.11	506	209.89	41.5
3:30 - 4:00	308.74	602	293.26	48.7
4:00 - 4:30	539.74	826	286.26	34.6

TABLE D-1 (Cont'd)

Time	Reported Trips	AADT Counts	Difference	Percent Difference
11:00 - 11:30	151.91	239	87.09	36.4
11:30 - 12:00	173.62	147	- 26.62	-18.1
12:00 - 12:30	106.05	158	51.95	32.9
12:30 - 1:00	104.30	154	49.70	32.3
1:00 - 1:30	111.03	152	40.97	27.0
1:30 - 2:00	98.25	216	117.75	54.5
2:00 - 2:30	138.19	218	79.81	36.6
2:30 - 3:00	92.76	303	210.24	69.4
3:00 - 3:30	123.76	366	242.24	66.2
3:30 - 4:00	161.94	352	190.06	54.0
4:00 - 4:30	96.09	490	393.91	80.4
4:30 - 5:00	178.18	504	325.82	64.6
5:00 - 5:30	186.93	565	378.07	66.9
5:30 - 6:00	145.68	493	347.32	70.4
6:00 - 6:30	61.73	242	180.27	74.5
6:30 - 7:00	45.85	188	142.15	75.6
7:00 - 7:30	29.08	207	177.92	86.0
7:30 - 8:00	31.00	151	120.00	79.5
8:00 - 8:30	12.36	100	87.64	87.6
8:30 - 9:00	7.90	57	49.10	86.1
9:00 - 9:30	25.31	55	29.69	54.0
9:30 - 10:00	31.22	59	27.78	47.1
10:00 - 10:30	13.56	61	47.44	77.8
10:30 - 11:00	23.62	44	20.38	46.3
11:00 - 11:30	13.55	36	22.45	62.4
11:30 - 12:00	20.74	34	13.26	39.0
TOTAL	9,700.93	17,339	-7,638.07	-44.05

TABLE D-2

WEST SIDE RAPID TRANSIT SCREENLINE CROSSINGS
(ADJUSTED TRIP FILE*)

Time Period	Trips	
	A.M.	P.M.
12:00 - 12:30	38.19	375.27
12:30 - 1:00	34.63	374.45
1:00 - 1:30	15.87	430.37
1:30 - 2:00	0.00	341.67
2:00 - 2:30	8.43	518.34
2:30 - 3:00	0.00	644.67
3:00 - 3:30	0.00	842.31
3:30 - 4:00	4.78	838.99
4:00 - 4:30	0.00	1092.38
4:30 - 5:00	18.55	2119.19
5:00 - 5:30	93.86	4475.47
5:30 - 6:00	123.19	2147.13
6:00 - 6:30	462.43	826.01
6:30 - 7:00	589.84	407.21
7:00 - 7:30	1631.03	162.77
7:30 - 8:00	4090.29	192.88
8:00 - 8:30	2819.99	140.82
8:30 - 9:00	1112.41	130.57
9:00 - 9:30	635.37	259.66
9:30 - 10:00	522.21	217.64
10:00 - 10:30	516.42	72.69
10:30 - 11:00	638.65	75.54
11:00 - 11:30	438.73	102.94
11:30 - 12:00	511.11	91.70
TOTAL	31186.65	

*Total may not agree with that used in text due to process editing.

TABLE D-3

EAST SIDE RAPID TRANSIT SCREENLINE CROSSINGS
(ADJUSTED TRIP FILE)

Time Period	Trips	
	A.M.	P.M.
12:00 - 12:30	42.63	624.78
12:30 - 1:00	36.44	581.83
1:00 - 1:30	7.76	662.30
1:30 - 2:00	4.84	727.63
2:00 - 2:30	No Service	777.94
2:30 - 3:00	No Service	744.16
3:00 - 3:30	No Service	1041.41
3:30 - 4:00	4.78	1121.49
4:00 - 4:30	6.46	1482.83
4:30 - 5:00	43.44	2016.09
5:00 - 5:30	79.79	4071.87
5:30 - 6:00	101.43	3009.44
6:00 - 6:30	342.46	1553.51
6:30 - 7:00	505.87	565.45
7:00 - 7:30	1465.79	330.74
7:30 - 8:00	3604.87	278.07
8:00 - 8:30	2815.71	284.15
8:30 - 9:00	1812.25	231.10
9:00 - 9:30	989.73	406.81
9:30 - 10:00	548.12	180.43
10:00 - 10:30	904.55	140.63
10:30 - 11:00	794.83	143.21
11:00 - 11:30	889.76	114.45
11:30 - 12:00	806.53	83.07
TOTAL	36981.43	

TABLE D-4

EAST SIDE RAPID TRANSIT SCREENLINE CROSSINGS
1963 AADT COUNTS

Time Period	A.M.			P.M.		
	CTS Counts	Shaker Counts	Total	CTS Counts	Shaker Counts	Total
12:00 - 12:30	133	32	165	264	177	441
12:30 - 1:00	85	10	95	441	180	621
1:00 - 1:30	22	13	35	348	189	537
1:30 - 2:00	0	4	4	385	181	566
2:00 - 2:30	0	0	0	513	195	708
2:30 - 3:00	0	0	0	656	205	861
3:00 - 3:30	0	0	0	821	269	1,090
3:30 - 4:00	0	0	0	895	331	1,226
4:00 - 4:30	0	0	0	1,175	373	1,548
4:30 - 5:00	81	0	81	1,405	992	2,397
5:00 - 5:30	202	4	206	2,073	1,695	3,763
5:30 - 6:00	249	42	291	1,484	1,257	2,741
6:00 - 6:30	578	76	654	777	557	1,334
6:30 - 7:00	769	303	1,072	493	251	744
7:00 - 7:30	1,250	1,235	2,485	321	189	510
7:30 - 8:00	1,896	1,578	3,474	294	139	433
8:00 - 8:30	1,719	1,044	2,763	190	137	327
8:30 - 9:00	802	679	1,481	165	126	291
9:00 - 9:30	369	298	667	158	180	338
9:30 - 10:00	363	200	563	142	97	239
10:00 - 10:30	307	214	521	171	70	241
10:30 - 11:00	326	168	494	106	58	164
11:00 - 11:30	298	198	496	114	42	156
11:30 - 12:00	289	211	500	173	43	216
TOTAL						37,539

Bus

Accuracy checks on the reporting of person bus trips were based on exogenous Study Cordon Area control totals. Analysis was made by an aggregate evaluation because a stratified analysis, due to data requirements, would have been a slow and costly process.

DEVELOPMENT OF CONTROL TOTALS

The control totals developed for accuracy checks on person bus trips are:

1. Screenline across the Cuyahoga River Valley.
2. Total first board bus trips in the Study Cordon Area.

The screenline totals are a composite of volume counts from four sources:

1. 1963 Ohio Department of Highways (ODH) Origin-Destination Survey
2. Cleveland Transit System (CTS)
3. Suburban bus companies
4. Seven County Study (Counts were taken in 1966 and adjusted to 1963.)

Total first boards on the buses were taken as being equal to origins of bus trips in the basic trip file. In the trip file all segments of a trip by bus are reported as one trip because there is no change mode. This corresponds to an original board, which does not include transfer boards. Data for total Study Cordon Area original boards were obtained from:

1. The Study's 1966 counts factored to 1963.
2. Bus company records.
3. Fare classification counts conducted by the Study to determine the percentage of total boards that are transfers.

Bus Trip Screenline Control Totals

ODH conducted a count of bus passengers as part of the 24-hour five-weekday traffic counts made during their 1963 O-D Survey. The bus passenger counts were taken at seven crossings of the Cuyahoga River Screenline used by buses. Table 34 in Section IV shows the locations.

One man (two in certain high volume locations and periods) was assigned a direction for one eight-hour period to count vehicles, classified by type, and bus passengers. At high volume locations -- such as the Main Avenue, Lorain-Carnegie and Detroit-Superior Bridges -- half-hour directional vehicle volumes approached 2500 with buses passing at intervals of less than two minutes.

The count of bus passengers was based on an estimate of the bus loading; e.g., one-fourth, one-third, one-half up to full. This estimate was then converted into number of passengers based on the seating capacity. The capacity for each type of bus was supplied by CTS.

CTS also conducted its own bus passenger counts at the seven crossings of the screenline and used more counters during high volume periods. CTS counters are permanently employed and specifically trained in counting bus passengers. The ODH counters, however, did not have this training.

The ODH counts for the same location and time period on different days exhibit an unusually large variation range. This is more than would be normally expected for an area such as the screenline where over 60 percent of the reported bus trips are home-based work trips. In addition, for several locations, the total volumes reported by ODH for the five weekdays show a more reverse pattern than should exist. Friday was reported as a high volume day when historical data indicate this is the lowest volume weekday.

A comparison, therefore, was made of ODH and CTS counts at three screenline crossings used exclusively by CTS buses. For the comparison, ODH counts for each of the five weekdays were adjusted to an AADT, summed for each half-hour period and averaged. This minimized variations in the counts and made them comparable to the CTS counts which had been adjusted to an AADT.

Bus

Accuracy checks on the reporting of person bus trips were based on exogenous Study Cordon Area control totals. Analysis was made by an aggregate evaluation because a stratified analysis, due to data requirements, would have been a slow and costly process.

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1. The Study's 1966 counts factored to 1963.
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The ODH counts for the same location and time period on different days exhibit an unusually large variation range. This is more than would be normally expected for an area such as the screenline where over 60 percent of the reported bus trips are home-based work trips. In addition, for several locations, the total volumes reported by ODH for the five weekdays show a more reverse pattern than should exist. Friday was reported as a high volume day when historical data indicate this is the lowest volume weekday.

A comparison, therefore, was made of ODH and CTS counts at three screenline crossings used exclusively by CTS buses. For the comparison, ODH counts for each of the five weekdays were adjusted to an AADT, summed for each half-hour period and averaged. This minimized variations in the counts and made them comparable to the CTS counts which had been adjusted to an AADT.

The comparison (see Table 69) shows compatibility in low-volume periods but lower reporting by ODH in high-volume periods. Individually, the ODH volumes vary as much as 17.45 percent from the CTS counts; however, the aggregate difference is only 2.77 percent. It is felt the method of estimating bus passengers used by ODH is the reason for the individual variation and the aggregate difference results from compensation of over- and underestimating.

TABLE 69

CTS -- ODH 24-HOUR BUS PASSENGER COUNT COMPARISON
THREE SCREENLINE CROSSINGS

	Direction	Count		Absolute Difference	Percent Difference
		C.T.S.	O.D.H.		
Eagle St.	West	2,310	2,713	+ 403	+ 17.45
Eagle St.	East	2,467	2,506	+ 39	+ 1.58
Main Ave.	West	5,702	5,158	- 544	- 9.54
Main Ave.	East	4,783	4,976	+ 193	+ 4.04
Lorain Ave.	West	5,652	5,149	- 503	- 8.90
Lorain Ave.	East	5,805	5,478	- 327	- 5.63
Total		26,719	25,980	- 739	- 2.77

As a result of this comparison and in consideration of the more experienced counters used by CTS, it was decided to use the CTS counts in place of the ODH counts for the screenline control. CTS counts were not made from 12:30-5:00 A.M. This, however, is a low volume period and these ODH counts are considered valid.

TABLE 70

WESTBOUND BUS PASSENGER SCREENLINE CONTROL COUNTS COMPARED TO REPORTED TRIPS (ADJUSTED TO 1963 AADT)

Screenline Counts										
Time Period	Location of Screenline Crossing							Total	Reported Trips	
	Main ^a	Detroit		Lorain ^a	Eagle ^c	Pershing ^d	Harvard ^a			Willow ^d
		CTS ^a	SCOTS ^b							
A.M.										
12:00 - 12:30	8	89		39	10	5	3	0	154	163.67
12:30 - 1:00	6	101		11	11	3	4	0	136	156.51
1:00 - 1:30	4	103		14	8	0	0	0	129	77.83
1:30 - 2:00	2	37		0	2	0	2	0	43	76.36
2:00 - 2:30	8	26		4	3	0	1	0	42	50.96
2:30 - 3:00	2	25		2	1	0	1	0	31	14.80
3:00 - 3:30	5	26		4	3	0	0	0	38	25.95
3:30 - 4:00	1	22		1	1	0	2	0	27	25.03
4:00 - 4:30	9	32		11	6	0	3	0	61	4.57
4:30 - 5:00	0	40		3	16	1	8	0	68	33.10
5:00 - 5:30	4	93		19	21	4	12	0	153	63.66
5:30 - 6:00	8	176	0	37	51	13	38	0	323	85.97
6:00 - 6:30	27	259	6	79	47	23	64	0	505	241.36
6:30 - 7:00	57	300	38	71	123	29	62	0	680	428.92
7:00 - 7:30	104	450	12	105	88	6	73	0	838	556.90
7:30 - 8:00	214	663	15	73	73	26	77	0	1,141	820.73
8:00 - 8:30	152	360	47	72	77	12	25	26	771	1,015.98
8:30 - 9:00	128	212	22	44	59	8	15	42	530	689.45
9:00 - 9:30	184	162	18	20	76	6	25	5	496	491.15
9:30 - 10:00	30	119	18	30	63	9	15	0	284	262.77
10:00 - 10:30	32	222	18	23	59	5	10	5	374	217.28
10:30 - 11:00	32	212	14	23	54	11	12	10	368	186.71
11:00 - 11:30	33	295	14	36	52	6	10	0	446	295.08
P.M.										
11:30 - 12:00	30	276	24	57	64	12	5	5	473	302.11
12:00 - 12:30	34	258	33	42	60	16	11	0	454	403.23
12:30 - 1:00	50	288	13	48	106	20	5	0	530	382.71
1:00 - 1:30	50	318	43	30	76	7	9	16	549	272.41
1:30 - 2:00	49	321	29	111	47	12	10	0	579	425.05
2:00 - 2:30	26	486	57	25	95	14	24	0	727	505.67
2:30 - 3:00	84	706	19	147	71	16	11	16	1,070	597.97
3:00 - 3:30	136	682	115	109	47	6	51	0	1,146	749.38
3:30 - 4:00	139	918	122	170	84	23	34	47	1,537	1,095.86
4:00 - 4:30	270	1,072	105	362	64	15	54	0	1,942	1,324.20
4:30 - 5:00	578	1,580	405	830	103	21	42	0	3,559	1,691.42
5:00 - 5:30	1,652	2,682	681	1,624	202	16	23	157	7,037	2,266.51
5:30 - 6:00	801	1,599	443	693	250	15	15	183	3,999	5,227.96
6:00 - 6:30	401	858	148	427	91	8	26	47	2,006	4,316.72
6:30 - 7:00	37	486	14	84	25	14	17	37	714	1,917.54
7:00 - 7:30	59	300	65	46	23	6	24	0	523	592.86
7:30 - 8:00	60	324	20	33	17	11	14	37	516	297.40
8:00 - 8:30	56	314	29	35	26	8	12	0	480	274.30
8:30 - 9:00	38	222	0	27	9	6	10	0	312	249.36
9:00 - 9:30	34	319	21	42	21	9	8	16	470	221.97
9:30 - 10:00	17	196	45	27	11	7	5	31	339	364.06
10:00 - 10:30	31	243	29	35	13	13	6	0	370	273.75
10:30 - 11:00	23	156	0	6	30	9	14	0	238	188.00
11:00 - 11:30	21	190	0	16	8	9	6	5	255	166.39
11:30 - 12:00	27	158	0	13	4	7	4	0	213	193.73
									37,676	30,285.30

Comparison of reported trips and total control counts

Absolute Difference -- 7,391
Percent Difference -- 19.62%

^aCounts from 12:00 A.M. to 5:30 A.M. are ODH counts. All others are Cleveland Transit System counts.

^bCounts of suburban buses by the Study (SCOTS). No suburban runs were made from 12:00 A.M. to 5:30 A.M.

^cCounts from 12:00 A.M. to 5:30 A.M. and 10:00 A.M. to 10:30 A.M. are ODH counts.

^dAll ODH counts.

TABLE 71

EASTBOUND BUS PASSENGER SCREENLINE CONTROL COUNTS COMPARED TO REPORTED TRIPS (ADJUSTED TO 1963 AADT)

Screenline Counts										
Time Period	Location of Screenline Crossing								Total	Reported Trips
	Main ^a	Detroit		Lorain ^a	Eagle ^c	Pershing ^d	Harvard ^a	Willow ^d		
		CTS ^a	SCOTS ^b							
A.M.										
12:00 - 12:30	4	75		5	6	7	5	0	102	105.6
12:30 - 1:00	6	37		9	7	2	3	0	64	98.21
1:00 - 1:30	1	33		1	2	0	3	0	38	66.09
1:30 - 2:00	3	25		4	2	0	1	0	35	32.84
2:00 - 2:30	1	25		1	3	0	0	0	30	23.94
2:30 - 3:00	7	17		5	4	0	1	0	35	20.23
3:00 - 3:30	0	21		1	3	0	2	0	27	0
3:30 - 4:00	4	22		5	6	0	1	0	38	9.12
4:00 - 4:30	0	38		2	1	0	0	0	41	4.40
4:30 - 5:00	4	100		11	3	4	7	0	129	28.47
5:00 - 5:30	3	165		11	8	5	6	0	198	69.02
5:30 - 6:00	25	363	8	91	28	4	30	0	549	104.40
6:00 - 6:30	38	623	18	202	61	11	42	48	1,043	376.41
6:30 - 7:00	135	995	39	224	80	13	49	69	1,604	698.32
7:00 - 7:30	274	1,730	317	666	270	9	55	137	3,458	1,203.48
7:30 - 8:00	976	2,078	573	995	218	23	72	69	5,004	3,332.37
8:00 - 8:30	1,000	1,388	444	942	240	12	34	69	4,129	4,726.53
8:30 - 9:00	774	896	457	708	140	5	22	111	3,113	3,355.38
9:00 - 9:30	235	344	116	237	79	8	21	37	1,077	2,203.43
9:30 - 10:00	106	427	113	105	66	6	17	5	845	823.87
10:00 - 10:30	159	408	64	116	55	5	6	0	813	627.16
10:30 - 11:00	92	436	57	99	98	5	10	0	797	747.49
11:00 - 11:30	30	346	41	65	67	7	7	0	563	521.31
11:30 - 12:00	95	435	26	71	67	14	13	0	721	683.04
P.M.										
12:00 - 12:30	82	348	11	75	78	5	5	48	652	575.91
12:30 - 1:00	60	427	32	54	49	13	7	0	642	381.06
1:00 - 1:30	31	402	11	68	63	14	6	5	600	373.54
1:30 - 2:00	38	482	21	77	75	11	16	16	736	392.21
2:00 - 2:30	38	386	7	85	65	11	19	0	611	448.77
2:30 - 3:00	50	421	42	111	74	9	29	26	762	416.89
3:00 - 3:30	54	538	13	84	97	12	48	0	846	637.01
3:30 - 4:00	55	618	27	132	133	16	37	0	1,018	598.34
4:00 - 4:30	84	592	12	72	110	10	49	32	961	966.54
4:30 - 5:00	74	548	47	131	51	17	34	11	913	863.27
5:00 - 5:30	56	430	27	59	71	16	43	0	702	1,002.46
5:30 - 6:00	40	508	39	93	41	11	24	0	556	930.03
6:00 - 6:30	49	190	6	51	8	8	34	0	346	717.62
6:30 - 7:00	20	195	25	17	22	9	23	0	311	404.64
7:00 - 7:30	38	243	0	27	33	9	13	0	363	299.12
7:30 - 8:00	9	199	14	33	22	9	23	5	314	176.91
8:00 - 8:30	5	173	3	16	10	8	15	0	230	177.05
8:30 - 9:00	14	190	1	24	27	8	13	0	277	55.64
9:00 - 9:30	9	97	8	17	3	8	14	5	161	79.08
9:30 - 10:00	8	146	11	21	10	9	13	0	218	115.06
10:00 - 10:30	12	79	0	6	4	11	11	0	123	75.58
10:30 - 11:00	7	141	5	7	7	9	7	0	183	101.49
11:00 - 11:30	4	95	1	16	2	9	8	0	135	97.50
11:30 - 12:00	3	91	2	8	22	8	4	5	143	68.28
									36,256	29,815.23

Comparison of reported trips and total control counts

Absolute Difference -- 6,441
Percent Difference -- 17.77%

^aCounts from 12:00 A.M. to 5:30 A.M. are ODH counts. All others are Cleveland Transit System counts.

^bCounts of suburban buses by the Study (SCGTS). No suburban runs were made from 12:00 A.M. to 5:30 A.M.

^cCounts from 12:00 A.M. to 5:30 A.M.; 10:00 A.M. to 10:30 A.M.; and 7:00 P.M. to 7:30 P.M. are ODH counts.

^dAll ODH counts.

TABLE 72

TOTAL EAST AND WESTBOUND BUS PASSENGER SCREENLINE
CROSSINGS CONTROL COUNTS COMPARED TO REPORTED TRIPS

Time Period	Control Counts			Reported Trips		
	East	West	Total	Total	East	West
12:00 - 12:30	102	154	256	254.72	98.21	156.51
12:30 - 1:00	64	136	200	143.92	66.09	77.83
1:00 - 1:30	38	129	167	109.20	32.84	76.36
1:30 - 2:00	35	43	78	74.90	23.94	50.96
2:00 - 2:30	30	42	72	35.03	20.23	14.80
2:30 - 3:00	35	31	66	25.95	0.0	25.95
3:00 - 3:30	27	38	65	34.15	9.12	25.03
3:30 - 4:00	38	27	65	8.97	4.40	4.57
4:00 - 4:30	41	61	102	61.57	28.47	33.10
4:30 - 5:00	129	68	197	132.68	69.02	63.66
5:00 - 5:30	198	153	351	190.37	104.40	85.97
5:30 - 6:00	549	323	872	617.77	376.41	241.36
6:00 - 6:30	1,043	505	1,548	1,127.24	698.32	428.92
6:30 - 7:00	1,604	680	2,284	1,760.38	1,203.48	556.90
7:00 - 7:30	3,458	838	4,296	4,153.10	3,332.37	820.73
7:30 - 8:00	5,004	1,141	6,145	5,742.51	4,726.53	1,015.98
8:00 - 8:30	4,129	771	4,900	4,044.83	3,355.38	689.45
8:30 - 9:00	3,113	530	3,643	2,694.58	2,203.43	491.15
9:00 - 9:30	1,077	496	1,573	1,086.64	823.87	262.77
9:30 - 10:00	845	284	1,129	844.44	627.16	217.28
10:00 - 10:30	813	374	1,187	934.20	747.49	186.71
10:30 - 11:00	797	368	1,165	816.39	521.31	295.08
11:00 - 11:30	563	446	1,009	985.15	683.04	302.11
11:30 - 12:00	721	473	1,194	979.14	575.91	403.23
12:00 - 12:30	652	454	1,106	763.77	381.06	382.71
12:30 - 1:00	642	530	1,172	645.95	373.54	272.41
1:00 - 1:30	600	549	1,149	817.26	392.21	425.05
1:30 - 2:00	736	579	1,315	954.44	448.77	505.67
2:00 - 2:30	611	727	1,338	1,014.86	416.89	597.97
2:30 - 3:00	762	1,070	1,832	1,386.39	637.01	749.38
3:00 - 3:30	846	1,146	1,992	1,694.20	598.34	1,095.86
3:30 - 4:00	1,018	1,537	2,555	2,290.74	966.54	1,324.20
4:00 - 4:30	961	1,942	2,903	2,554.69	863.27	1,691.42
4:30 - 5:00	913	3,559	4,472	3,268.97	1,002.46	2,266.51
5:00 - 5:30	702	7,037	7,739	6,157.99	930.03	5,227.96
5:30 - 6:00	556	3,999	4,555	5,034.34	717.62	4,316.72
6:00 - 6:30	346	2,006	2,352	2,322.18	404.64	1,917.54
6:30 - 7:00	311	714	1,025	891.98	299.12	592.86
7:00 - 7:30	363	523	886	474.31	176.91	297.40
7:30 - 8:00	314	516	830	451.35	177.05	274.30
8:00 - 8:30	230	480	710	305.00	55.64	249.36
8:30 - 9:00	277	312	589	301.05	79.08	221.97
9:00 - 9:30	161	470	631	479.12	115.06	364.06
9:30 - 10:00	218	339	567	349.33	75.58	273.75
10:00 - 10:30	123	370	493	209.49	101.49	188.00
10:30 - 11:00	183	238	421	263.89	97.50	166.39
11:00 - 11:30	135	255	390	262.01	68.28	193.73
11:30 - 12:00	143	213	356	269.29	105.62	163.67

First Board Bus Passenger Control Totals For Study Cordon Area

The method of developing first boards for each area bus line is presented below. The volumes shown for all bus lines, with the exception of the Cleveland Transit System, are first boards. Transfers were eliminated from the count of those lines having transfer privileges.

Most first board volumes are for an average day in particular month and year. A monthly factor was used to adjust this figure to an average day of that year; and a yearly factor, to adjust it to an average day in 1963.

Ashland City Lines

Average weekday volume, June, 1966	160
June, 1966 factor	1.051
1966 to 1963 factor	0.996
Average daily first boards	<u>167</u>

Bedford Hts. Bus Line (Operated by: Maple Hts. Transit System)

Average weekday volume, January, 1966	163
January, 1966 factor	1.329
1965* to 1963 factor	0.444
Average daily first boards	<u>72</u>

Berea Bus Line Co.

Counts were not available from the bus line and a P.M. peak period boarding count was conducted by the Study on a Thursday in April, 1966 and expanded to a full day using the City of Cleveland Cordon Count, 1966

Study P.M. peak period boarding count	507
Full day expansion factor	3.049
Thursday factor	0.988
April, 1966 factor	0.967
1966 to 1963 factor	1.029
Average daily first boards	<u>1,520</u>

Brecksville Rd. Transit Inc.

Counts were not available from the bus line and a P.M. peak period boarding count was conducted by the Study on a Monday in April, 1966, and expanded to a full day using the City of Cleveland Cordon Count, 1966

(Brecksville Rd. Transit Inc. continued)

Study P.M. peak period boarding count	543
Full day expansion factor	2.684
Monday factor	0.977
April, 1966 factor	0.967
1966 to 1963 factor	1.102
Average daily first boards	<u>1,202</u>

Cleveland-Lorain Coach Lines

Average weekday volume, June, 1966	1,004
June, 1966 factor	0.987
1965 to 1963 factor	1.012
Average daily first boards	<u>1,002</u>

Cleveland Southeast Bus Co. (Bedford)

Average weekday volume, November, 1963	1,158
November, 1966 adjustment factor	0.994
1965 to 1963 factor	0.975
Average daily first boards	<u>1,122</u>

Cleveland Transit System

In November, 1965, a classification count was conducted twelve sample line -- six local, four crosstown, and two radial express -- to determine the percentage of total riders who are first boards or initial riders.

The results are:

1. Express Buses -- 96.4% Initial Riders
2. Local Buses -- 78.79% Initial Riders

The system-wide weighted percentage of first boards, based on 1965 volume counts for the week of November 15 to November 19 for both express and local buses, is 81.29 percent. It was assumed this figure would be applicable throughout the system for 1963.

Estimate of First Boards

November, 1963 average weekday volume	551,910
November factor	1.044
First board factor	.8129
Average daily first boards	<u>468,389</u>

Econo Lines (Painesville)

1965 average daily passengers (Not adjusted to 1963, change would be insignificant.)	<u>60</u>
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Euclid Bus Company

Lake Shore

April, 1966 Counts	
Week	21,928
Day	4,386
April, 1966 factor	0.916
1966 to 1963 factor	1.163
Average daily first boards	<u>4,672</u>

Garfield Heights Coach Lines Inc.

Average weekday volume, November, 1965	4,450
November, 1966 adjustment factor	0.955
1965 to 1963 adjustment factor	0.982
Estimated average daily first boards	<u>4,173</u>

Geauga Transit Co.

Average weekday volume, September, 1964	341
September, 1964 factor	1.033
(No 1964 to 1963 factor available)	
Average daily first boards	<u>352</u>

Greyhound (Painesville and Elyria)

For Greyhound Lorain-Sandusky, 94.46 percent of the week trips are on the five weekdays. The same percentage was assumed for Greyhound Painesville and Elyria.

Painesville

Total 1963 volume	421,326
Weekday factor	0.945
Total weekdays	260
Average daily first boards	<u>1,533</u>

Elyria

Total 1963 volume	147,326
Weekday factor	0.945
Total weekdays	260
Average daily first boards	<u>535</u>

Lake County Transportation Co.

1965 average daily passengers	231
(Not adjusted to 1963, change would be insignificant.)	

Lorain-Elyria City Lines

Counts were not available from the bus line and a P.M. peak period boarding count was conducted by the Study on a Tuesday in June, 1966 and expanded to a full day using factors from Lorain-Elyria.

Study PM peak period boarding count	827
Full Day expansion factor	7.374
Tuesday factor	1.008
June factor	1.062
1966 to 1963 factor	1.057
Average daily first boards	<u>6,900</u>

Maple Heights Transit System

Average weekday volume, January, 1966	4,296
January, 1966 factor	1.039
1965 ^a to 1963 factor	1.033
Average daily first boards	<u>4,611</u>

North Olmsted Municipal Bus Line

Counts were not available from the bus line and a P.M. peak period boarding count was conducted by the Study on a Wednesday in June, 1966 and expanded to a full day using the City of Cleveland Cordon Count, 1966

Rapid Feeders

Study P.M. peak period boarding count	357 ^b
Full day expansion factor	2.354
Wednesday factor	1.005
June, 1966 factor	0.963
1966 to 1963 factor	
Average daily first boards	<u>813</u>

Radial

Study P.M. peak period boarding count	1,031 ^b
Full day expansion factor	3.074
Wednesday factor	1.005
June, 1966 factor	1.004
1966 to 1963 factor	
Average daily first boards	<u>3,198</u>

^aTotal volume for 1966 was not available to develop 1966 to 1963 factor.

Local

Study P.M. peak period counts	92 ^b
Full day expansion factor	3.074
Wednesday factor	1.005
June factor	1.004
1966 to 1963 factor	
Average daily first boards	285
Total North Olmsted average daily first boards, 1963	<u>4,296</u>

Redifer Bus Co.

Average weekday volume, September, 1963	3,318
September, 1963 factor	1.033
Average daily first boards	<u>3,428</u>

Total First Board Control Count for Study Area	<u>510,639</u>
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^bRaw counts (1966) adjusted to 1963 prior other adjustments.

ANALYSIS OF CONTROL COUNTS AND REPORTED TRIPSScreenline

The screenline counts indicate 1963 average daily two-way crossings of 73,932 while the trip file indicates 1963 average daily crossings of 60,004. The trip file is under-reported at the screenline by -18.71%. Bus trips that cross the screenline comprise 35.18% of the total person bus trips in the Study Cordon Area.

Study Cordon Area

Reported First Boards for Study Cordon Area (1963)	331,018
First Board Control Count for Study Cordon Area (Average Day in 1963)	510,639
Absolute Difference	-179,621
Percent Difference	35.18%

Percentage Breakdown of Reported Trips by Purpose

<u>Purpose</u>	<u>Screenline</u>	<u>Study Cordon Area</u>
<u>Home Based</u>		
Work	60.28	39.05
Personal Business	4.98	7.75
Shop	7.84	8.58
Social-Recreation	2.90	4.04
School	4.55	17.75
Meal	0.38	0.28
Medical-Dental	2.80	2.73
Serve Passenger	0.06	0.07
Change Mode	1.76	4.52
<u>Non-Home Based</u>		
Work	5.06	4.73
Personal Business	2.15	2.53
Shop	1.86	2.26
Social-Recreation	1.13	1.27
School	0.52	0.79
Meal	0.23	0.55
Medical-Dental	0.22	0.31
Serve Passenger	0.07	0.07
Change Mode	3.60	3.10

NOTE: Percentages may not add to 100 due to rounding.

Conclusion

The difference in reporting at the screenline and for the Study Cordon Area indicates that there is a higher degree of under-reporting of certain trip purposes. These trip purposes are primarily those which do not enter or pass through the CBD (there are few bus lines which cross the screenline outside of the CBD). Therefore, it was decided to factor the basic bus passenger trip file by purpose only.

DEVELOPMENT OF ADJUSTMENT FACTORS

Three controls exist for factoring the basic bus trip file.

1. Total Screenline Volume
2. Total Study Area Volume
3. Screenline Histogram

A procedure was developed whereby each trip purpose was broken out for the total screenline, Study Cordon Area, and eight critical times on the screenline (see Table 73). By doing this, a set of proposed factors can be tested and evaluated rapidly and without the need of drawings. In this manner, twelve sets of factors (see Table 74) were developed and evaluated in a day.

For each trial, an attempt was made first to match the screenline crossings and the Study Cordon Area total (first nine trials). When these appeared to be met, certain critical times were then checked (last three trials). The factors in trial "K" appeared to best meet all controls and were selected as those to be used in adjusting the reported bus trips.

Table 75 shows the adjusted bus passenger trip file compared to the adjusted file and the ground counts. Table 76 shows the bus passenger trip purpose distribution before and after adjustment of the file. Figure 37 is a histogram comparing the ground count and unadjusted trip file bus passenger trip screenline crossings. Figure 38 is the same comparison for the adjusted trip file.

TABLE 73

REPORTED BUS PASSENGER TRIPS BY PURPOSE FOR SCREENLINE,
STUDY CORDON AREA AND EIGHT CRITICAL TIMES ON SCREENLINE

Purpose	Screenline	Study Cordon Area	Eight Critical Times on Screenline							
			AM	AM	AM	AM	PM	PM	PM	PM
			6:30-7:00	7:30-8:00	8:30-9:00	10:00-10:30	12:30-1:00	4:00-4:30	5:00-5:30	6:00-6:30
Home Based										
Work	36,172.09	129,265.65	1,505.95	4,322.11	1,965.05	157.93	96.38	1,441.27	4,603.03	1,581.29
Personal										
Business	2,988.75	24,348.25	37.80	49.96	98.82	158.71	78.54	141.45	138.96	50.83
Shop	4,704.35	28,388.34	8.88	32.59	45.01	344.36	130.04	336.97	179.95	105.00
Social-										
Recreation	1,742.66	13,387.08	4.17	18.43	23.18	60.54	76.11	45.09	75.06	80.51
School	2,729.77	58,745.05	4.62	504.85	173.02	8.45	16.91	172.22	91.94	35.53
Eat Meal	229.89	928.26	0	21.04	0	0	8.92	17.49	18.85	18.77
Medical-										
Dental	1,677.79	9,047.27	0	83.45	76.59	47.50	92.25	57.65	65.84	20.55
Serve										
Passenger	36.49	230.52	0	4.55	0	0	0	0	4.71	0
Change Mode	1,056.05	14,950.58	64.66	77.61	15.65	0	5.37	26.70	114.10	39.43
Non-Home Based										
Work	3,033.47	15,672.95	99.52	516.90	233.35	35.28	32.76	32.60	82.75	54.06
Personal										
Business	1,291.38	8,390.25	4.36	19.60	12.99	28.18	37.42	122.22	143.84	53.94
Shop	1,114.85	7,481.67	8.95	14.33	12.53	57.70	13.75	32.39	54.96	35.47
Social-										
Recreation	675.23	4,206.04	0	0	0	14.03	22.94	21.68	72.56	44.17
School	311.74	2,639.57	5.53	49.28	24.73	9.10	7.98	4.69	8.82	9.07
Eat Meal	140.02	1,833.01	0	3.21	0	4.57	4.41	4.41	22.38	4.08
Medical-										
Dental	130.69	1,019.60	0	0	0	0	4.68	11.15	44.59	0
Serve										
Passenger	41.88	233.21	0	0	0	0	0	4.33	12.73	7.68
Change Mode	1,926.45	10,250.63	15.94	20.13	13.66	4.52	17.49	82.38	403.76	173.10
Total	60,003.55	330,654.52	1,760.38	5,738.05	2,694.58	934.20	645.95	2,554.69	6,138.83	2,313.46
Control Counts	73,932.00	510,639.00	2,284.00	6,145.00	3,643.00	1,187.00	1,172.00	2,903.00	7,739.00	2,352.00

TABLE 74

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TABLE 75

BUS PASSENGER TRIPS ADJUSTED TRIP FILE COMPARED
TO UNADJUSTED TRIP FILE AND CONTROL COUNTS

Base	Unadjusted Trip File	Adjusted Trip File	Absolute Difference	Adjusted As Percent of Unadjusted	Control Counts	Percent Diff. of Adjusted to Control
Screenline	60,004	74,155	+14,151	123.6%	73,932	+0.3%
Study Cordon Area	331,018	503,075	+172,057	152.0%	510,639	-1.5%

TABLE 76

BUS PASSENGER TRIP PURPOSE DISTRIBUTION
BEFORE AND AFTER TRIP FILE ADJUSTMENT

Trip Purpose	Screenline		Study Cordon Area	
	Before Adjustment	After Adjustment	Before Adjustment	After Adjustment
<u>Home-Based Work</u>	60.28	48.77	39.05	25.70
Personal Bus.	4.98	5.64	7.25	6.67
Shop	7.84	11.42	8.58	10.16
Social Rec.	2.90	3.53	4.04	3.99
School	4.55	9.57	17.75	30.36
Meal	0.38	0.34	0.28	0.21
Med.-Dent.	2.80	2.49	2.73	1.98
Serve Pass.	0.06	0.05	0.07	0.05
Change Mode	1.76	2.14	4.52	4.46
<u>Non-Home Based Work</u>	5.06	4.09	4.73	3.12
Personal Bus.	2.15	2.79	2.53	2.67
Shop	1.86	2.71	2.26	2.68
Social-Rec.	1.13	2.26	1.27	1.25
School	0.52	1.09	0.79	1.36
Meal	0.23	0.21	0.55	0.40
Med.-Dent.	0.22	0.19	0.31	0.22
Serv. Pass.	0.07	0.06	0.07	0.05
Change Mode	3.60	5.98	3.10	4.69
Total Home Based	85.55	83.95	84.27	83.58
Total Non-Home Based	14.84	19.38	15.61	16.44

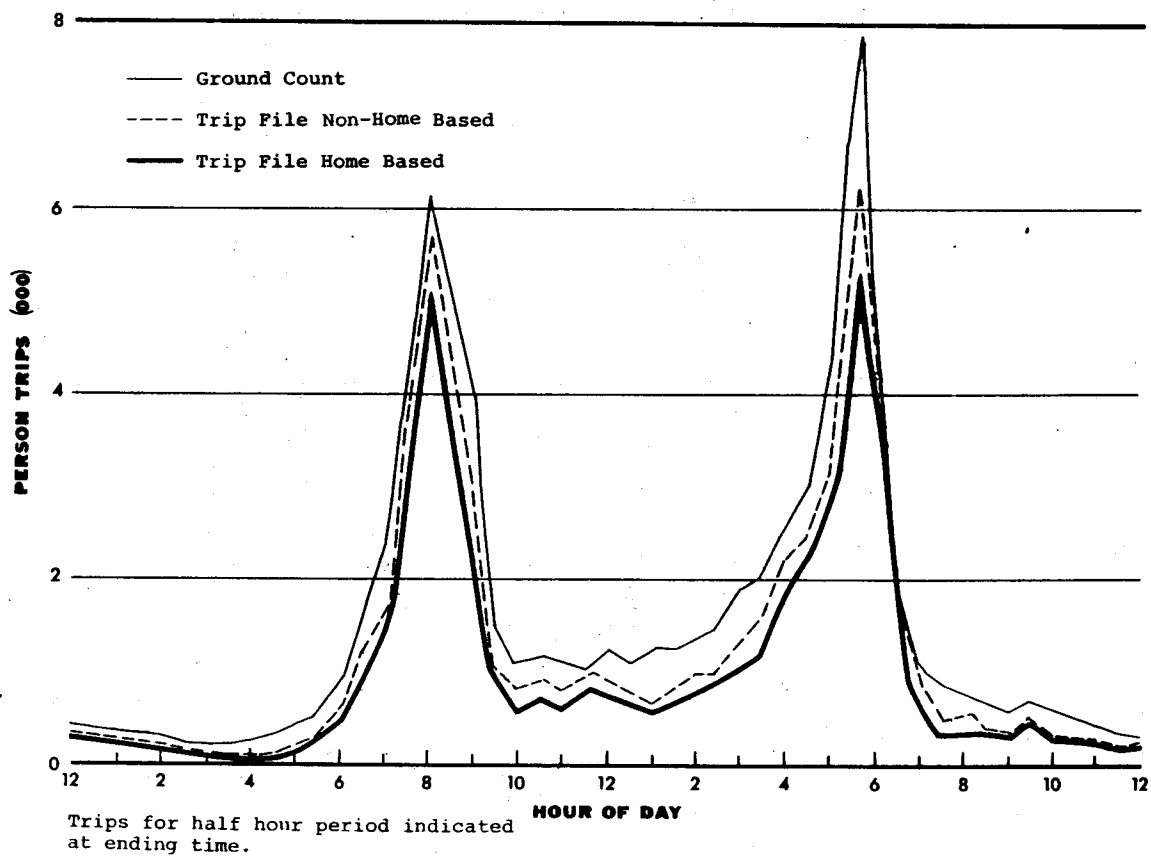


Figure 37 -- Bus passenger trip Cuyahoga River screenline crossings by half-hour period, ground count and unadjusted trip file.

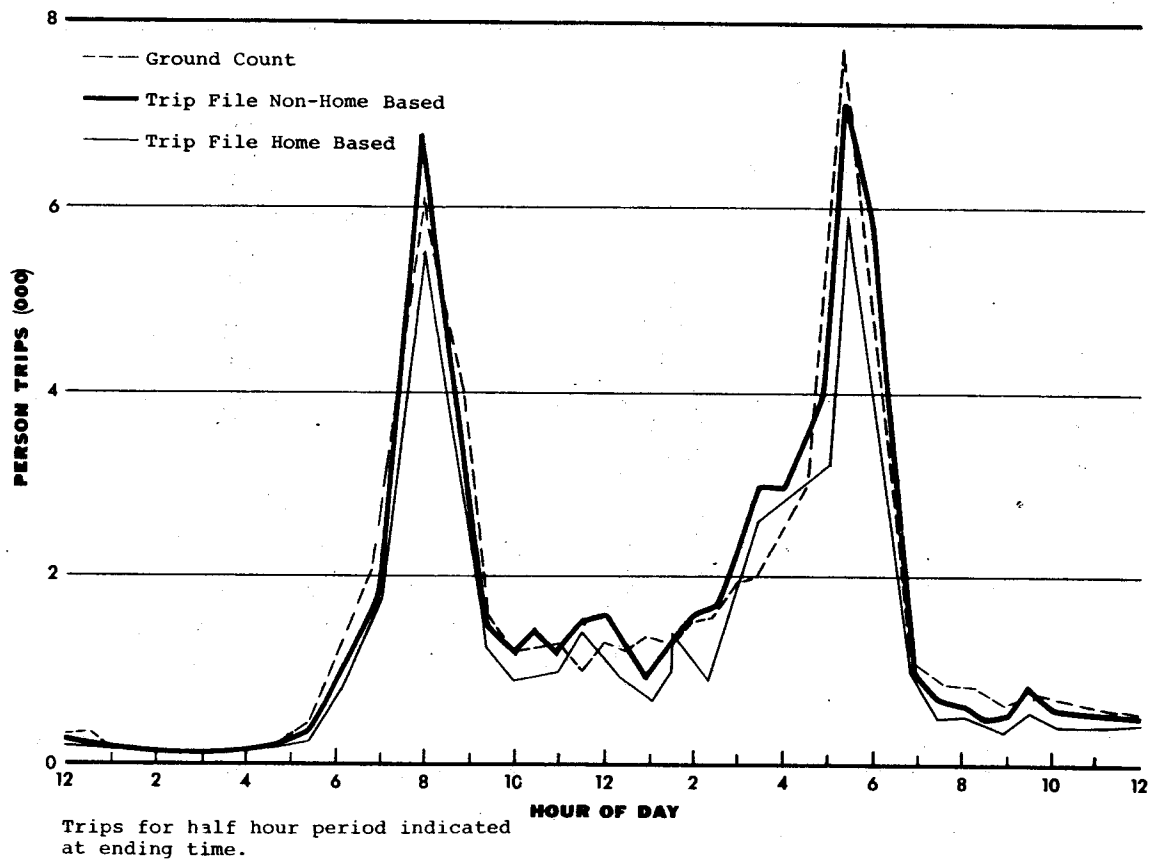


Figure 38 -- Bus passenger trip Cuyahoga River screenline crossings by half-hour period, ground count and adjusted trip file.

**Selected Study Cordon
Area Trip Statistics**

TABLE 77

MODE AS PERCENT OF "PURPOSE TO" TOTAL
UNLINKED, UNADJUSTED, INTERNAL FILE

Purpose To	Mode								Total
	Auto Driver	Auto Passenger	Bus	Rapid	Taxi	Truck Passenger	Walk to & From Work	School Bus	
Home	828,024 58.82	348,922 24.78	138,557 9.87	7,354 0.52	3,949 0.28	3,195 0.23	15,168 1.08	62,180 4.42	1,407,349 100.00
Work	537,757 72.02	87,691 11.74	82,234 11.01	12,740 1.71	1,369 0.18	8,055 1.08	16,630 2.23	230 0.03	746,706 100.00
Personal Business	168,002 65.79	63,560 24.92	19,990 7.82	1,663 0.65	762 0.30	820 0.32	199 0.08	295 0.12	255,291 100.00
Shop	223,578 62.27	110,864 30.88	21,084 5.87	2,471 0.69	549 0.15	275 0.08	127 0.04	89 0.02	359,037 100.00
Social Recreation	135,697 49.21	126,107 45.73	10,828 3.93	865 0.31	621 0.23	219 0.08	193 0.07	1,237 0.44	275,767 100.00
School	19,826 12.38	41,048 25.64	31,860 19.90	913 0.57	259 0.16	73 0.05	482 0.30	65,653 41.00	160,114 100.00
Eat Meal	36,267 62.75	18,157 31.41	2,227 3.85	174 0.30	196 0.34	312 0.54	293 0.51	173 0.30	57,799 100.00
Medical-Dental	22,172 50.77	14,519 33.25	5,600 12.82	321 0.74	988 2.26	45 0.10	11 0.03	12 0.03	43,668 100.00
Serve Passenger	125,641 82.19	26,320 17.21	334 0.22	61 0.04	42 0.03	151 0.10	9 0.01	304 0.20	152,862 100.00
Change Mode	8,703 4.99	10,444 17.99	18,303 31.52	18,969 32.67	407 0.70	278 0.48	258 0.44	704 1.21	58,066 100.00

Retrieval Date: 10/3/66

TABLE 78

"PURPOSE TO" AS PERCENT OF MODE
UNLINKED, UNADJUSTED, INTERNAL FILE

Mode	Purpose To										Total
	Home	Work	Personal Business	Shop	Social Recreation	School	Eat Meal	Medical-Dental	Serve Passenger	Change Mode	
Auto Driver	828,024 39.33	537,757 25.53	168,002 7.98	223,578 10.62	135,697 6.44	19,826 0.95	36,267 1.72	22,172 1.06	125,641 5.96	8,703 0.41	2,105,667 100.00
Auto Passenger	348,922 41.16	687,691 10.35	63,560 7.50	110,864 13.08	126,107 14.88	41,048 4.84	18,157 2.14	14,519 1.71	26,320 3.11	10,444 1.23	847,632 100.00
Bus	138,557 41.87	82,234 24.85	19,990 6.05	21,084 6.38	10,828 3.28	31,860 9.63	2,227 0.68	5,600 1.70	334 0.02	18,303 5.54	331,017 100.00
Rapid	7,354 16.15	12,740 27.98	1,663 3.65	2,471 5.43	865 1.90	913 2.01	174 0.38	321 0.71	61 0.13	18,969 41.66	45,531 100.00
Taxi	3,949 43.19	1,369 14.98	762 8.33	549 6.91	621 6.79	259 2.83	196 2.15	988 10.81	42 0.46	407 4.45	9,142 100.00
Truck Passenger	3,195 23.80	8,055 60.01	820 6.10	275 2.04	219 1.63	73 0.55	312 2.33	45 0.34	151 1.13	278 2.07	13,423 100.00
Walk to & from Work	15,168 45.45	16,630 49.84	199 0.60	127 0.38	193 0.58	482 1.44	293 0.88	11 0.03	9 0.03	258 0.77	33,370 100.00
School Bus	62,180 47.51	230 0.18	295 0.23	89 0.07	1,237 0.94	65,653 50.16	173 0.13	12 0.01	304 0.23	704 0.54	130,877 100.00

Retrieval Date: 10/3/66

TABLE 79

TOTAL PERSON TRIPS BY "PURPOSE TO"
UNLINKED, UNADJUSTED, INTERNAL FILE

Purpose To	Number of Trips	Percent of Total
Home	1,407,349	40.02
Work	746,706	21.23
Personal Business	255,291	7.26
Shop	359,037	10.21
Social Recreation	275,767	7.84
School	160,114	4.55
Eat Meal	57,799	1.65
Medical- Dental	43,668	1.24
Serve Passenger	152,862	4.35
Change Mode	58,066	1.65
Total	3,516,659	100.00

Retrieval Date: 10/3/66

TABLE 80

CAR OCCUPANCY BY "PURPOSE TO"
UNLINKED, UNADJUSTED, INTERNAL FILE

Purpose To	Auto Driver	Auto Passenger	Average Car Occupancy
Home	828,024	348,922	1.42
Work	537,757	87,691	1.16
Personal Business	168,002	63,560	1.38
Shop	223,578	110,864	1.50
Social Recreation	135,697	126,107	1.93
School	19,826	41,048	3.07
Eat Meal	36,267	18,157	1.50
Medical-Dental	22,172	14,519	1.65
Serve Passenger	125,641	26,320	1.21
Change Mode	8,703	10,444	2.20
Total	2,105,667	847,632	1.40

Retrieval Date: 10/3/66

TABLE 81

MODE AS PERCENT OF "GENERAL PURPOSE"
LINKED, ADJUSTED, INTERNAL FILE

General Purpose	Mode								Total
	Auto Driver	Auto Passenger	Bus	Rapid	Taxi	Truck Passenger	Walk to & From Work	School Bus	
Work	804,591 68.74	148,432 12.68	140,160 11.97	41,822 3.57	1,693 0.15	5,045 0.43	28,581 2.44	203 0.02	1,170,527 100.00
Personal Business	384,984 69.93	121,138 22.00	35,321 6.42	5,451 0.99	1,670 0.30	1,147 0.21	404 0.07	452 0.08	550,567 100.00
Shop	626,055 61.95	318,168 31.48	52,571 5.20	10,269 1.01	2,400 0.24	582 0.06	367 0.04	232 0.02	1,010,644 100.00
Social Recreation	401,806 48.39	400,013 48.18	21,024 2.53	2,441 0.30	1,834 0.22	631 0.07	682 0.08	1,913 0.23	830,344 100.00
School	40,041 8.76	92,053 20.13	155,188 33.95	5,735 1.25	619 0.14	131 0.03	1,500 0.33	161,897 35.41	457,164 100.00
Eat Meal	25,640 52.95	20,714 42.78	1,178 2.43	440 0.91	182 0.38	85 0.18	62 0.13	118 0.24	48,419 100.00
Medical-Dental	38,822 48.28	27,987 34.81	10,196 12.68	1,060 1.32	2,194 2.73	90 0.11	45 0.06	4 0.01	80,398 100.00
Non-Home Based	608,967 70.20	179,838 20.73	46,723 5.39	9,489 1.10	2,018 0.23	12,694 1.46	3,935 0.45	3,835 0.44	867,499 100.00

Compiled: 3/1/67

TABLE 82

GENERAL PURPOSE AS PERCENT OF MODE
LINKED, ADJUSTED, INTERNAL FILE

Mode	General Purpose								Total
	Work	Personal Business	Shop	Social Recreation	School	Eat Meal	Medical-Dental	Non-Home Based	
Auto Driver	804,591 27.45	384,984 13.14	626,055 21.36	401,806 13.71	40,041 1.37	25,640 0.87	38,822 1.32	608,967 20.78	2,930,906 100.00
Auto Passenger	148,432 11.35	121,138 9.26	318,168 24.32	400,013 30.57	92,053 7.04	20,714 1.58	27,987 2.14	179,838 13.74	1,308,343 100.00
Bus	140,160 30.31	35,321 7.64	52,571 11.37	21,024 4.55	155,188 33.56	1,178 0.25	10,196 2.21	46,723 10.11	462,360 100.00
Rapid	41,822 54.52	5,451 7.11	10,269 13.39	2,441 3.08	5,735 7.48	440 0.57	1,060 1.38	9,489 12.37	76,707 100.00
Taxi	1,693 13.43	1,670 13.24	2,400 19.03	1,834 14.55	619 4.91	182 1.44	2,194 17.40	2,018 16.00	12,611 100.00
Truck Passenger	5,045 24.73	1,147 5.62	582 2.85	631 3.09	131 0.64	85 0.42	90 0.44	12,694 62.21	20,405 100.00
Walk to & from Work	28,581 80.34	404 1.13	367 1.03	682 1.92	1,500 4.22	62 0.17	45 0.13	3,935 11.06	35,575 100.00
School Bus	203 0.12	452 0.27	232 0.14	1,913 1.13	161,897 95.99	118 0.07	4 0.01	3,835 2.27	168,654 100.00

Compiled: 3/1/67

TABLE 83

TOTAL PERSON TRIPS BY GENERAL PURPOSE
LINKED, ADJUSTED, INTERNAL FILE

General Purpose	Number of Trips	Percent of Total
Work	1,170,527	23.34
Personal Business	550,567	10.98
Shop	1,010,644	20.15
Social Recreation	830,344	16.55
School	457,164	9.11
Eat Meal	48,419	0.97
Medical- Dental	80,398	1.60
Non-Home Based	867,499	17.30
Total	5,015,562	100.00

Compiled 3/1/67

TABLE 84
CAR OCCUPANCY BY GENERAL PURPOSE
LINKED, ADJUSTED, INTERNAL FILE

General Purpose	Auto Driver	Auto Passenger	Average Car Occupancy
Work	804,591	148,432	1.18
Personal Business	384,984	121,138	1.31
Shop	626,055	318,168	1.51
Social Recreation	401,806	400,013	2.00
School	40,041	92,053	3.30
Eat Meal	25,640	20,714	1.81
Medical- Dental	38,822	27,987	1.72
Non-Home Based	608,967	179,838	1.30
Total	2,930,906	1,308,343	1.45

Compiled: 3/1/67

TABLE 85

MODE AS PERCENT OF "PURPOSE TO" TOTAL
LINKED, ADJUSTED, INTERNAL FILE

Purpose To	Mode								Total
	Auto Driver	Auto Passenger	Bus	Rapid	Taxi	Truck Passenger	Walk to & From Work	School Bus	
Home	1,174,684 56.00	574,697 27.43	208,772 9.97	31,605 1.52	5,682 0.28	3,696 0.19	15,600 0.75	80,855 3.86	2,095,591 100.00
Work	708,071 72.29	102,341 11.85	79,155 9.18	23,277 2.70	1,829 0.21	14,143 1.63	18,105 2.10	342 0.04	947,263 100.00
Personal Business	291,604 69.11	91,417 21.67	30,002 7.11	5,809 1.38	1,085 0.27	1,142 0.27	297 0.07	544 0.13	421,900 100.00
Shop	405,492 61.65	204,338 31.06	37,630 5.72	8,381 1.28	1,051 0.16	458 0.07	221 0.04	153 0.02	657,724 100.00
Social Recreation	249,470 48.70	239,872 46.83	16,279 3.18	2,645 0.52	1,158 0.23	414 0.08	343 0.07	1,980 0.39	512,161 100.00
School	25,785 10.30	53,615 21.42	81,936 32.73	3,400 1.36	319 0.13	87 0.03	621 0.25	84,540 33.78	250,303 100.00
Eat Meal	47,060 62.98	23,280 31.15	2,506 3.35	635 0.85	244 0.33	407 0.54	374 0.50	224 0.30	74,730 100.00
Medical-Dental	28,739 51.42	18,783 33.61	6,080 10.88	956 1.71	1,243 2.26	58 0.11	14 0.02	16 0.03	55,889 100.00

Retrieval Date: 1/12/67

TABLE 86

"PURPOSE TO" AS PERCENT OF MODE
LINKED, ADJUSTED, INTERNAL FILE

Mode	Purpose To								Total
	Home	Work	Personal Business	Shop	Social Recreation	School	Eat Meal	Medical-Dental	
Auto Driver	1,174,684 40.08	708,071 24.16	291,604 9.95	405,492 13.83	249,470 8.51	25,785 0.88	47,060 1.61	28,739 0.98	2,930,906 100.00
Auto Passenger	574,697 43.92	102,341 7.82	91,417 6.99	204,338 15.61	239,872 18.34	53,615 4.10	23,280 1.78	18,783 1.44	1,308,343 100.00
Bus	208,772 45.15	79,155 17.12	30,002 6.49	37,630 8.14	16,279 3.52	81,936 17.72	2,506 0.54	6,080 1.32	462,360 100.00
Rapid	31,605 41.20	23,276 30.35	5,809 7.57	8,381 10.92	2,645 3.45	3,400 4.43	635 0.83	956 1.25	76,707 100.00
Taxi	5,682 45.15	1,829 14.50	1,085 8.60	1,051 8.34	1,158 9.18	319 2.53	2,244 1.93	1,243 9.86	12,611 100.00
Truck Passenger	3,696 18.11	14,143 69.31	1,142 5.60	458 2.24	414 2.03	87 0.44	407 1.99	58 0.29	20,405 100.00
Walk to & from Work	15,600 43.85	18,105 50.89	297 0.84	221 0.62	343 0.97	621 1.74	374 1.05	14 0.04	35,575 100.00
School Bus	80,855 47.94	342 0.20	544 0.32	153 0.09	1,980 1.17	84,540 50.13	224 0.13	16 0.01	168,654 100.00

Retrieval Date: 1/12/67

TABLE 87

TOTAL PERSON TRIPS BY "PURPOSE TO"
LINKED, ADJUSTED, INTERNAL FILE

Purpose To	Number of Trips	Percent of Total
Home	2,095,591	42.49
Work	947,263	17.51
Personal Business	421,900	8.55
Shop	657,724	13.34
Social Recreation	512,161	10.38
School	250,303	5.08
Eat Meal	74,730	1.52
Medical- Dental	55,889	1.13
Total	5,015,561	100.00

Retrieval Date: 1/12/67

TABLE 88

CAR OCCUPANCY BY "PURPOSE TO"
LINKED, ADJUSTED, INTERNAL FILE

Purpose To	Auto Driver	Auto Passenger	Average Car Occupancy
Home	1,174,684	574,697	1.49
Work	708,071	102,341	1.14
Personal Business	291,604	91,417	1.31
Shop	405,492	204,338	1.51
Social Recreation	249,470	239,872	1.96
School	25,785	53,615	3.08
Eat Meal	47,060	23,280	1.49
Medical-Dental	28,739	18,783	1.65
Total	2,930,906	1,308,343	1.45

Retrieval Date: 1/12/67

TABLE 89
EXPANDED TRIPS PER TRIP-MAKING SAMPLE

Mode	Day					Total
	Monday	Tuesday	Wednesday	Thursday	Friday	
Auto Driver	24.24	24.80	24.48	25.91	28.19	25.60
Auto Passenger	9.66	10.78	10.63	11.44	14.20	11.37
Bus	3.84	4.04	4.07	4.15	4.06	4.04
Rapid	0.75	0.68	0.62	0.69	0.63	0.67
Taxi	0.09	0.12	0.09	0.13	0.12	0.11
Truck Passenger	0.18	0.19	0.17	0.18	0.17	0.18
Walk to Or From Work	0.29	0.32	0.31	0.32	0.32	0.31
School Bus	1.53	1.37	1.43	1.47	1.47	1.47
Total	40.58	42.30	41.80	44.29	49.16	43.82

Source: Linked, Adjusted, #2 File

Compiled: 1/29/67

TABLE 90

TOTAL PERSON TRIPS BY PURPOSE, UNADJUSTED, UNLINKED
INTERNAL FILE AND ADJUSTED, LINKED INTERNAL FILE

Purpose	Trips	Percent of Base Group	Percent of Total
Unadjusted, Unlinked Internal File			
<u>Home Based</u>			
Work	1,084,985	38.7	30.8
Personal			
Business	291,182	10.4	8.3
Shop	453,009	16.2	12.9
Social			
Recreation	373,691	13.3	10.6
School	284,273	10.2	8.1
Eat Meal	34,855	1.2	1.0
Medical-			
Dental	60,624	2.2	1.7
Serve			
Passenger	174,735	6.2	5.0
Change			
Mode	45,146	1.6	1.3
Total	2,802,500	100.0	79.7
<u>Non-Home Based</u>			
Work	188,942	26.6	5.4
Personal			
Business	111,883	15.8	3.2
Shop	147,149	20.7	4.2
Social			
Recreation	100,349	14.1	2.9
School	13,056	1.8	0.4
Eat Meal	42,171	5.9	1.2
Medical-			
Dental	11,774	1.7	0.3
Serve			
Passenger	61,740	8.7	1.7
Change			
Mode	33,708	4.7	1.0
Total	710,772	100.0	20.3
Total Internal File 3,516,272*			100.0

*Percent increase in adjusted trip file trips is 141.67 percent.

TABLE 90 -- Continued

Purpose	Trips	Percent of Base Group	Percent of Total
Adjusted, Linked Internal File			
<u>Home Based</u>			
Work	1,170,527	28.2	23.3
Personal			
Business	550,566	13.3	11.0
Shop	1,010,642	24.4	20.2
Social			
Recreation	830,346	20.0	16.6
School	457,165	11.0	9.1
Eat Meal	48,420	1.2	1.0
Medical-			
Dental	80,398	1.9	1.6
Total	4,148,064	100.0	82.8
<u>Non-Home Based</u>			
Work	338,538	39.0	6.7
Personal			
Business	143,196	16.5	2.8
Shop	182,350	21.0	3.6
Social			
Recreation	122,034	14.1	2.4
School	14,900	1.7	0.3
Eat Meal	53,045	6.1	1.1
Medical-			
Dental	13,437	1.6	0.3
Total	867,500	100.0	17.2
Total Internal File 5,015,564*			100.0

*Percent increase in adjusted trip file trips is 141.67 percent.

Compiled February 27, 1967

TABLE 91

STUDY CORDON AREA TRIPS PER PERSON AND TRIPS
PER DWELLING UNIT BY MODE

Mode	Trips	Trips Per Person	Trips Per Dwelling Unit
Unadjusted, Unlinked Internal File			
Auto Driver	2,105,667	0.98	3.11
Auto Passenger	847,631	0.39	1.25
Bus	331,017	0.15	0.49
Rapid	45,531	0.02	0.07
Taxi	9,141	0.005	0.01
Truck Passenger	13,423	0.01	0.02
Walk	33,370	0.02	0.05
School Bus	130,876	0.06	0.19
Total	3,516,656	1.63	5.19
Adjusted, Unlinked Internal File			
Auto Driver	3,043,702	1.42	4.49
Auto Passenger	1,357,646	0.63	2.00
Bus	501,651	0.23	0.74
Rapid	77,289	0.04	0.11
Taxi	13,577	0.01	0.02
Truck Passenger	21,317	0.01	0.03
Walk	36,560	0.02	0.05
School Bus	170,539	0.08	0.25
Total	5,222,281	2.44	7.69
Adjusted, Linked Internal File ^c			
Auto Driver	2,930,905	1.37	4.32
Auto Passenger	1,308,342	0.61	1.93
Bus	462,360	0.21	0.68
Rapid	76,706	0.04	0.11
Taxi	12,611	0.01	0.02
Truck Passenger	20,405	0.01	0.03
Walk	35,576	0.02	0.05
School Bus	168,655	0.08	0.25
Total	5,015,560	2.35	7.39

^aTotal Study Cordon Area Population -- 2,142,265.

^bTotal Study Cordon Area Dwelling Units -- 678,029.

^c214,567 trips (4.1%) lost in linking.

TABLE 92
COMPLETE ADJUSTED TRIP FILE

Mode	Trips	Percent of Individual Survey Total
Internal Home Interview Survey		
Auto Driver	2,930,905	58.4
Auto Passenger	1,308,342	26.1
Bus Passenger	462,360	9.2
Rapid Transit Pass.	76,706	1.5
Taxi	12,611	0.3
Truck Passenger	20,405	0.4
Walk to or from Work ^a	35,576	0.7
School Bus	<u>168,655</u>	<u>3.4</u>
Total	5,015,560	100.0
Truck Survey Internal		
Panel	122,756	43.4
Combination	49,161	17.4
Other	<u>110,709</u>	<u>39.2</u>
Total	282,626	100.0
Taxi Survey Internal		
Taxi	33,852	100.0
External Survey		
Internal to External		
	Percent of Mode	Percent of Int. - Ext.
Auto	134,536	83.1
Truck		
Panel	8,735	5.3
Combination	12,091	7.5
Other	<u>6,560</u>	<u>4.1</u>
Total	27,386	16.9
Total Int.-Ext.	161,850	100.0
Through Trips		
External Survey ^b		(Percent)
Auto	5,734	74.7
Truck	1,938	25.3
Taxi	- - -	
Total	7,672	
Ohio Turnpike ^c		(Percent)
Auto	4,258	74.7
Truck	1,438	25.3
Taxi	- - -	
Total	5,696	
Total auto through trips		(Percent)
9,992		74.7
Total truck through trips		<u>25.3</u>
<u>3,376</u>		
Total through trips	13,368	7.6

^aIncludes some trips incorrectly reported to other purposes.

^bDoes include through trips on Ohio Turnpike.

^cFrom Ohio Turnpike toll data.

TABLE 93
SUMMARY OF ADJUSTED TRIP FILE

Survey	Trips	Percent of Total
Internal	5,015,560	91.1
Truck	282,626	5.1
Taxi	33,852	0.6
External		
Internal-External	161,850	2.9
Thru (Including Ohio Turnpike)	<u>13,368</u>	<u>0.3</u>
TOTAL	5,507,256	100.0