TWIN CITIES METRO AREA

FREEWAY SYSTEM CHARACTERISTICS

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PREPARED BY:
NORTH CENTRAL SECTION
INSTITUTE OF TRANSPORTATION ENGINEERS

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EXECUTIVE SUMMARY

The "Twin Cities Metro Area Freeway System Characteristics" study was a cooperative data gathering and research effort designed to provide traffic engineers, transportation planners, administrators, and other interested persons with factual information about the Twin Cities freeways. It is the first study of this type in our area.

More specifically, the study was designed to answer questions like the following eight:

1. Which highways are "freeways" and who controls them?

   The study area basically included the I-494/694 circumferential or "beltline" route plus the I-35E/35W triangles which extend both north and south of the beltline. It was found that about 193 miles of freeways were open to traffic, 11 miles were under construction (most of these are now open also), and approximately 74 miles are planned. The jurisdiction or control is either by the State Department of Highways or Hennepin County (in the cases of County State Aid Highways 18 and 62). Routes studied are shown on Exhibit 1.

2. When were the routes opened or what are approximate projected opening dates?

   This portion of the study looked back at history and forward to the future relative to freeways. It was found that the first freeway segments were opened here in 1960 on I-494. Projected future opening dates for remaining missing freeway links are probably the early 1980's though these dates are quite speculative. The 1960 through 1970 decade was clearly the time when most freeways were opened to traffic. Exhibit 3 illustrates the opening dates.

3. How many traffic lanes are there on the metro freeways?

This part of the freeway study looked at the basic number of lanes on the segments of the system. Portions of I-94 and I-35W have 8 lanes (two directions) while portions of I-494, I-35E, I-94, TH 100, TH 12, and I-35W have 6 lanes. The clear majority of the system routes have 4 lanes, much of this mileage being near the outside edges of the system (on the urban fringes). More detailed lane by lane drawings can be found in the "segment" map portion of the study while Exhibit 4 illustrates the overall system pattern.

4. How much traffic is carried by the various freeway routes?

Traffic volumes provide a key indicator of the relative usage various highway systems and individual routes are receiving. The study found that segment volumes varied from 9,700 vehicles per day on I-35E in Anoka County to 111,800 vehicles per day on I-35W in South Minneapolis. I-94 carries about 90,000 vehicles per day on certain segments. The top 15 volume segments were ranked as shown on Exhibit 5. Volumes varied on these from 57,800 to 111,800 vehicles per day (both on I-35W). For perspective, two lane highways carry, at most, about 15,000 vehicles per day.

5. How fast does traffic flow during rush hours?

One indicator of how well the system is operating is the speed encountered during rush hours. Travel time runs were made on each of the segments studied in both AM and PM rush hours. The number of time runs made varied with the segment. Speeds for both directions and both rush hours combined varied from 26 mph on the Mendota Bridge segment of TH 55 (not a complete freeway design per se) to 61 mph on segments of I-35E and I-35W north of the beltline. In general speeds were in the 45-55 mph range on most segments. The speeds indicate a general lack of serious congestion. This is not to say there are not some specific locations and times within the rush hour when flow breakdowns occur-- rather it says these occurrences are not so widespread or of such long duration that greatly reduced average travel speeds result. Exhibit 6 illustrates the overall speeds.

6. What are average accident rates for the various sections?

Accident rates provide an indication of safety or lack thereof on certain design types or on individual routes. Many studies have shown that freeway design is significantly safer than non-freeway design. For this study, rates of 0.4 accidents per million vehicle miles to 5.8 accidents per million vehicle miles traveled were found. Rates between 1.0 and 3.0 were most common. Exhibit 7 illustrates the data graphically.

7. About how much land is devoted to freeway right-of-way?

This heavily researched part of the study looked at the land used for all highways and roads nationally, in large cities, and then gradually focused on freeways in other large cities and then the Twin Cities in particular. It was found that:

- right-of-way for highways and roads is less than 1% of the total U.S. land area
- metropolitan land use studies show that highway and street right-of-way occupy 20-30% of all developed land and that the percentage seems to be going down
- in central cities typically about 25% of the total developed land is used for street and highway right-of-way
- in central business districts street and highway right-of-way typically occupies 30-40% of the land area (excluding parking)
- the 42,500 mile interstate freeway system will use less than one tenth of 1% of the total U.S. land area
- a study of five California cities showed the planned freeway systems would occupy about 1.6% to 2.0% of their land areas
- in our metro area, about 1.6% to 2.2% of our urban area (as defined by the Census Bureau as for the California study) is devoted to freeway right-of-way -- using Metro Council urban area figures, this percentage is 2.4 to 3.2%
- by the year 2000, the freeway system may occupy about 2% to 2.5% of the total urban area while carrying in excess of 35-40% of the total vehicle miles of travel

8. What are typical distances or spacings between freeways and how does our average freeway spacing compare to that of other cities?

The freeway system typically is the backbone of an area's highway system carrying high volumes at high speeds for relatively long trip distances. To ensure a high level of mobility and resulting high percentage of travel utilizing freeway networks, the proper spacing should be provided. Furthermore, proper freeway spacing will aid in reduction of through traffic volumes on local and collector streets as well as on other adjacent freeway system elements. This part of the study concludes that the average freeway spacing in the Twin Cities Metro Area is equal to the mean spacing and is slightly higher than the median and mode in 25 large U.S. metropolitan areas. In general, freeway spacings in metropolitan areas are higher than suggested standards. Stated another way, freeways are usually farther apart than suggested spacing guidelines.

Much of the data gathered for this report will need periodic updating as volumes change, new segments are added to the system, and as accident rates change. Approximately a 3-year cycle seems reasonable to the committee.

ACKNOWLEDGEMENTS

The Committee wishes to thank the Hennepin County Highway Department, the Minnesota Highway Department (especially the Traffic Management Center, District Nine and District Five), Barton-Aschman Associates, Inc., and Bather-Ringrose-Wolsfeld, Inc., for their major contributions to the success of this project.

A special thank you to the technicians, student civil engineer trainees, and others who made the data gathering and display possible. Their work was excellent.

The Committee also wishes to thank the people who reviewed our rough draft for their constructive criticism and comment.

I. INTRODUCTION

A. STUDY PURPOSE

Freeways are often a subject of considerable debate and controversy in this day of environmental awareness and public involvement in decision making. Freeways are viewed by some as the "destroyers of neighborhood tranquility and the cause of the urban sprawl", while others view them as the "safest and most efficient way of carrying the large auto, truck, and bus volumes our low-density area depends on". Proponents point to large volumes of traffic which freeways remove from local streets.

Realizing that this issue was, and still is, an important and interesting one, a North Central Section Institute of Transportation Engineers (ITE) Committee was formed.* Its purpose is to provide traffic engineers, transportation planners, administrators and other interested public and private persons with basic factual information about the Minneapolis/St. Paul area freeway system. It is not meant to deal with the larger environmental and philosophical issues.

More specifically, the data is intended to answer questions like the following:

- Which highways are "freeways" and who controls them? (see Section II)
- When were the routes opened or what are approximate projected opening dates? (see Section III)

*The North Central Section is part of District 4 of the Institute of Transportation Engineers

- How many traffic lanes are there on the routes opened to traffic? (see Section IV)
- How much traffic is carried by the various routes? (see Section V)
- How fast does traffic flow during rush hours? (see Section VI)
- What are average accident rates for the various sections? (see Section VII)
- About how much land is devoted to freeway right-of-way? (see Section VIII)
- What are typical distances or spacings between freeways? (see Section IX)

In answering these questions, the Committee has tried to be thorough and objective. There are obviously many non-transportation aspects related to freeways which have not been included in this study. In handling such a massive amount of information, it is inevitable that some errors have occurred. It is hoped that these are minimal in extent and that users will draw the Committee's attention to them so that they can be corrected.

B. COMMITTEE MEMBERSHIP

The Committee consisted of the following ITE members:

Gary Thompson (MHD - Traffic Management Center)
Jim Povich (Barton-Aschman Associates, Inc.)
Howard Preston (MHD - Districts 5 and 9)

Ralph Clare (Bather, Ringrose, Wolsfeld, Inc.)

Del Gerdes (MHD - District 9 - Chairman)

Dick Koppy* (Hennepin County)

John Utz* (Minnesota Highway Department - Traffic Management Center)

Membership varied from five to seven members during the course of the study which lasted over a year. The Committee members, in turn, had invaluable help from the technical people within their organizations when time could be spared from regular duties.

II. FREEWAY ROUTES STUDIED

A. FREEWAY DEFINITION

At the outset of the study, it became apparent that a definition of the term "freeway" was needed. The Committee agreed that the "full control of access" characteristic was the key one. Only significant route lengths which did not allow at-grade intersections or direct access were considered freeways. This meant, in practice, that some parts of routes like Trunk Highway (T.H.) 100 were not included because access via at-grade intersections is allowed at a few locations. Some sections of routes with rather old ramp designs with "yield" control at ramp merges were included.

B. STUDY AREA

For Parts I-VII of the study, the study area was defined as the area within the I-494/694 "beltline" plus the I-35E/35W "triangles" just

*Denotes members who left the Committee because of new employment.

north and south of the beltline. This area generally includes nearly all the presently urbanized area and freeway segments now opened, under construction, and planned in the near term. It excludes some possible future routes which may be designed as freeways. Firm planning on these is, generally, not yet completed. It was considered to be too speculative to include these in view of the study's main emphasis on existing route data.

C. ROUTES INCLUDED

The freeway "Routes Studied" are shown on system Exhibit 1. This map shows the route markers (Interstate, U.S., State, or County) and the status of the route as of the summer 1975 (Open, Under Construction, or Proposed). It was found that about 193 miles are Open to traffic, 11 miles are Under Construction, and 74 miles are Proposed for the defined study area. Only freeway segments of significant lengths were included. Certain very short segments with full access control were hence omitted to ease the data-gathering problem. Others were included if data was readily available.

It should be noted that the study was in progress when the legislature passed a bill imposing restrictions on various planned routes like I-35E in St. Paul, T.H. 55 in Minneapolis, I-394 in the western suburbs, and I-335 in Minneapolis. The effect is still rather unclear. At any rate, the results of this legisla-

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

LEGEND

ROUTES OPEN TO TRAFFIC

ROUTES UNDER CONSTRUCTION

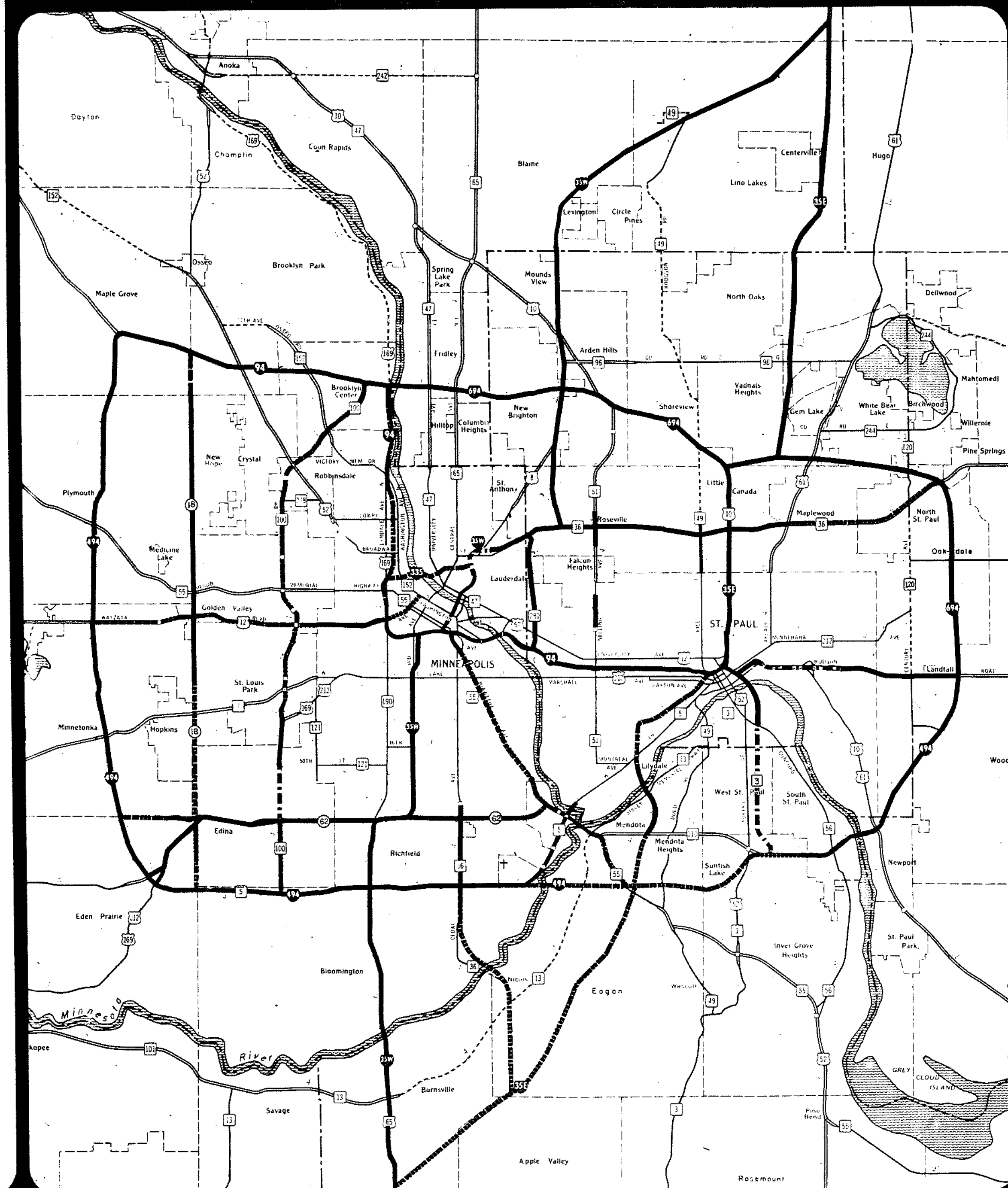
PROPOSED ROUTES

NOTE: ONLY AREA INCLOSED BY THE INTERSTATE SYSTEM WAS INCLUDED IN THE STUDY.

PREPARED IN 1975

EXHIBIT 1

ROUTES STUDIED



tion could not be included. At present, the Metropolitan Council is studying the missing metropolitan interstate freeway links at the request of the legislature. This report is to be completed by February 1, 1976. The net result is that the planned routes are currently of rather uncertain status.

D. "SYSTEM" AND "SEGMENT" DIVISION

For the purpose of displaying the data in a condensed summary form for the system as a whole, "system" exhibit maps were prepared. These system maps each show one data element for the system as a whole with little detail.

The "segment" drawings, then, look at each section or portion of a route in more detail. These segments vary from 0.4 to 7.0 miles in length and contain many data elements. The segment endpoints are usually major route interchanges or locations where freeway design ends.

For example, one of the "system" maps shows two-way average daily traffic volumes for all existing freeway routes. The "segment" drawings show volume for each direction and for rush hour for each segment along with other detailed information about the segments. The "system" can be viewed for a certain characteristic (e.g., volume) or a portion of the system (i.e., a "segment") can be viewed for many detailed characteristics (e.g., volume, lanes, accident rates, etc.).

This method meets the needs of both the person interested in detailed information for a certain segment and the person interested in system overview information for a certain characteristic.

The "system" maps are included as folded exhibits. Larger exhibits are available upon request (1" = 2 miles). The "segment" drawings are attached as a separate set of exhibits with a page of explanation contained in Section VIII.

Exhibit 2 is a "system" map which shows the "segment" numbering system and endpoints. This map may be used to locate segments of particular interest.

Segments that have opened to traffic after the arrow sketches were prepared in the summer of 1975, are listed below. These segments will be added at the time of the next update of this report.

1. T.H. 94 from Mounds Blvd. to White Bear Ave.
2. T.H. 3 from Concord St. to T.H. 110
3. I 35W from Hennepin Ave. to Stinson Blvd.

III. OPENING DATES

A. BRIEF BACKGROUND

It is sometimes of interest to know when a certain freeway section was first opened to traffic or when it is anticipated to be open. Historical dates give an indication of how old various sections are,

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

LEGEND

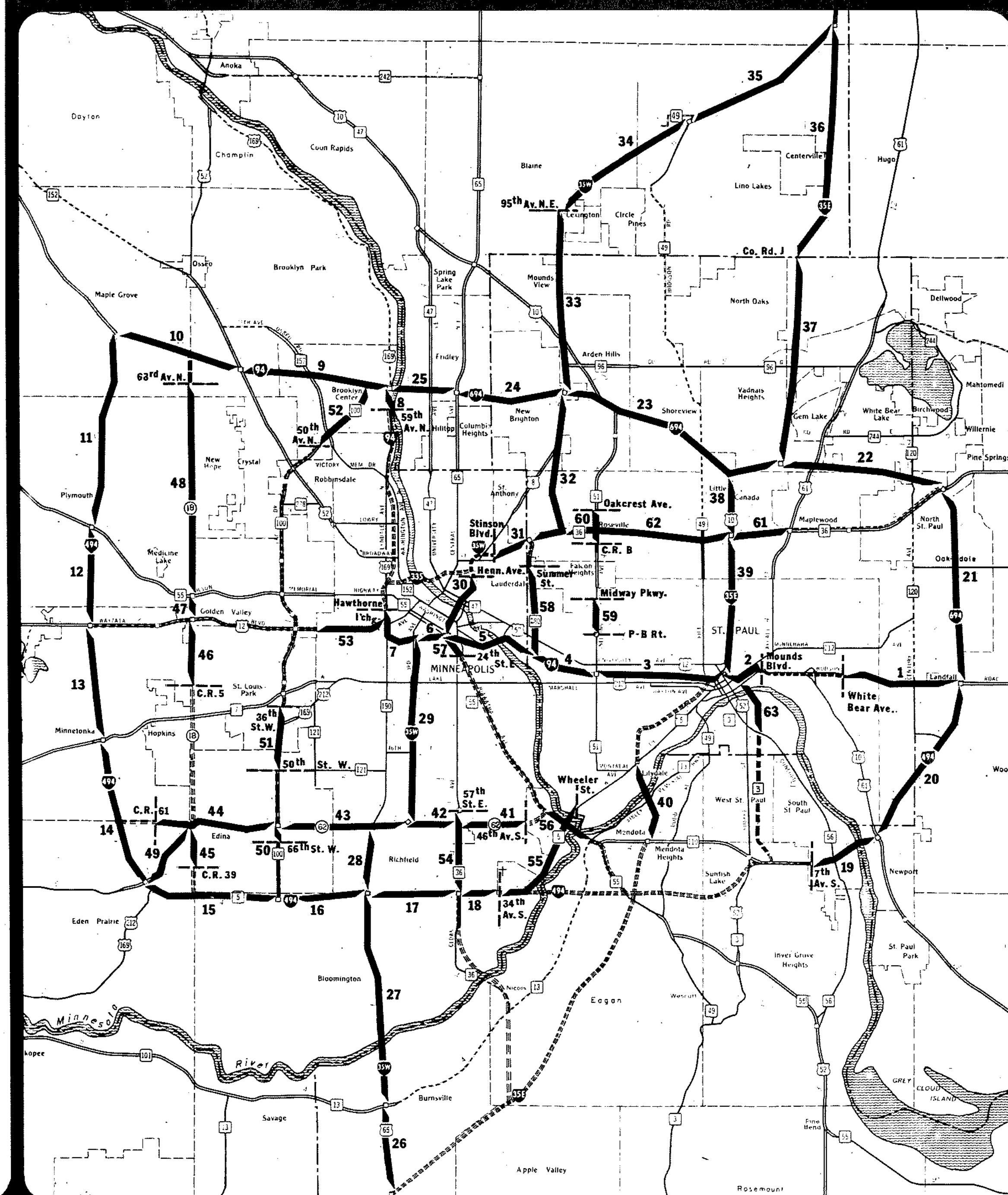
23 SEGMENT NUMBER

PREPARED IN 1975

EXHIBIT 2

0 1 2 3 4 5 MILES

SEGMENT BREAKDOWN



what design standards may have been used (since they have been progressively getting higher), and what design-year traffic was used.

B. DATA GATHERING METHOD

The method used to gather data was chiefly one of research into various sources available within metropolitan transportation agencies. Sources included:

1. Status of Interstate Routes - MHD - July 1, 1973.
2. Interstate Completion File - MHD, District 9.
3. State Project (S.P.) Files - MHD, District 5 and District 9.
4. Dick Koppy and Dennis Hanson - Hennepin County.
5. Project Engineers - MHD (projects under construction).

C. DATA DISPLAY

The opening dates are shown on Exhibit 3. Future opening dates are quite speculative due to recent legislation regarding certain of these routes and also the problem of estimating time for preparation of Environmental Impact Statements and related studies and meetings.

The opening dates were, in a few cases, unavailable since funding and other factors are uncertain. In several cases (e.g., T.H. 36 in Roseville), upgrading to freeway status occurred in numerous stages as various at-grade intersections were replaced by interchanges. These were most difficult to trace with certainty; hence, the presence of year of opening only, rather than month and year. Sections, as defined by an opening date, usually do not correspond to "segments" discussed earlier in Section II.

IV. TRAFFIC LANES INFORMATION

A. BRIEF BACKGROUND

The Committee also felt that a study of the traffic lanes and their arrangements was needed. Lane information can be valuable for looking at lane continuity, capacity calculations, and reserved lane studies for buses, etc.

Prior to this study, one had to rely on memory (which is fallible), the photolog machine (limited availability), layouts (rather cumbersome), or field trips (time consuming) to determine the number and arrangements of lanes in a specific area or location. There was also the problem of not having an overall picture of the lanes on the freeway system as a whole.

B. DATA GATHERING METHOD

The lanes information was gathered principally by using the photolog machine. This method was supplemented by use of construction plans an or field trips in areas of special concern or when film was unavailabl or lanes were unclear.

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

>1965 PAST OPENING DATES

>1980 APPROXIMATE PROJECTED YEAR OF OPENING

• NO PROJECTED YEAR OF OPENING AVAILABLE

NOTES:

Projected dates and routes are speculative due to required studies, permits, and approvals necessary.

Since segment dates varied in detail some opening dates are shown by month and year, others just by year.

ROUTES OPEN TO TRAFFIC

ROUTES UNDER CONSTRUCTION

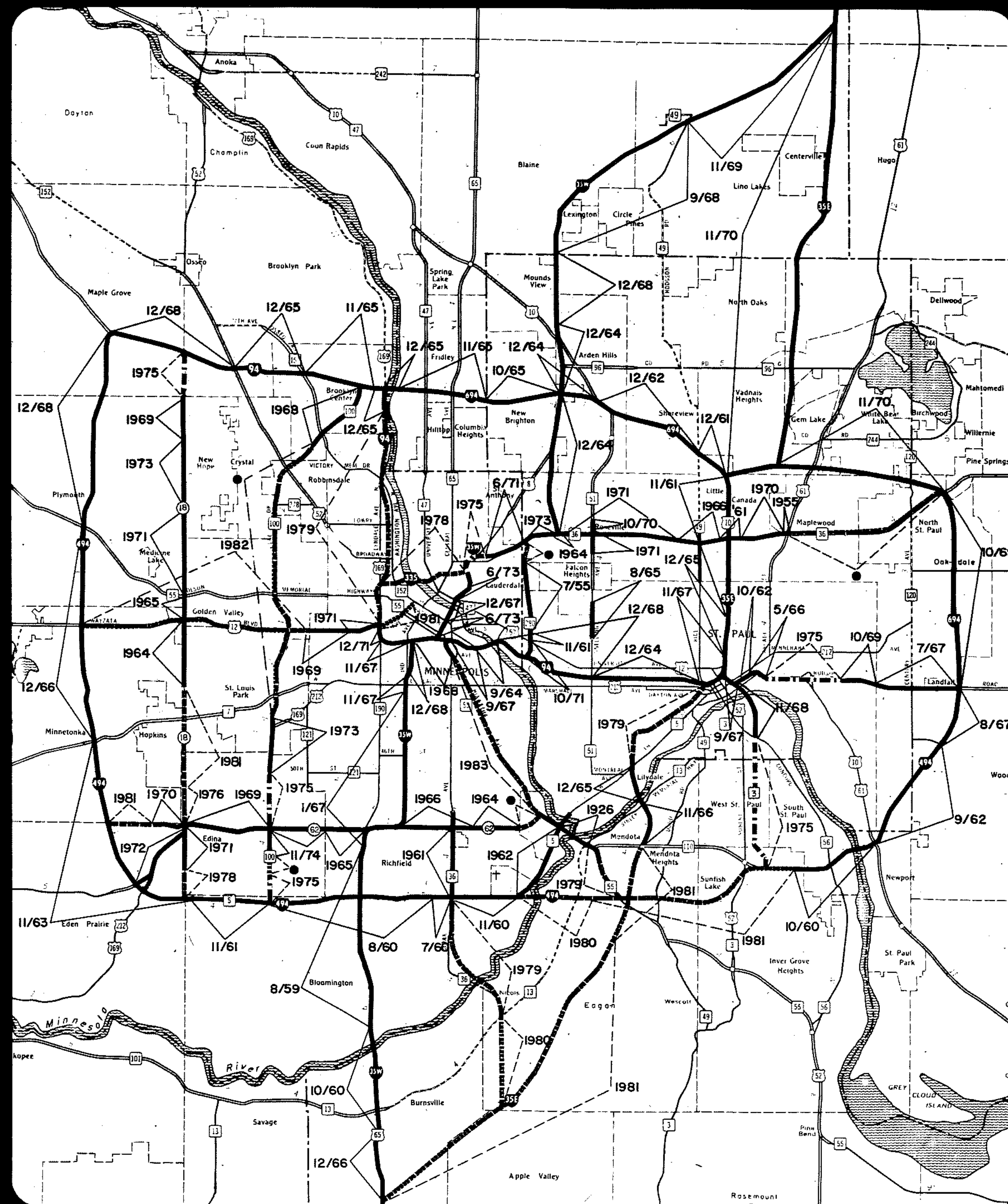
PROPOSED ROUTES

EXHIBIT 3

PREPARED IN 1975

0 1 2 3 4 5 MILES

FREEWAY OPENING DATES



Lane information gathered included the through lanes, lane additions, lane drops, auxiliary lanes, and basic interchange configurations.

C. DATA DISPLAY

A system map (Exhibit 4) was prepared to show the predominant number of traffic lanes on each freeway studied. The system map does not show all lane change details because of graphic limitations on the large-scale map. The segment diagrams do show the lane change details, however. They should be consulted for special areas of detailed interest. The same holds true for certain complex areas circled on the system map. These locations usually involve complex freeway-to-freeway interchanges.

Auxiliary lanes were included if longer than approximately one mile. The number of lanes shown does not strictly correspond to "basic number" of through lanes as defined and used in several road design texts.

The more detailed segment maps show auxiliary lanes, how lanes combine, and whether ramps have one or two lanes (at the freeway terminal area). It does not show the number of lanes at the crossroad terminal.

This data was gathered in 1974-1975, so any changes after mid-1975 are not reflected in the sketches.

V. TRAFFIC VOLUMES

A. BRIEF BACKGROUND

Traffic volume counts are used by the transportation planner or traffic engineer for a wide variety of purposes. They show historical increases in use, are used to calibrate traffic forecasting models, are used in calculating accident rates, show relative levels of use, and are a key input to level of service calculations.

B. DATA GATHERING METHOD

Volume data shown in this report was obtained from automatic traffic recorders (ATRs) wherever possible. However, there are a limited number of these ATRs in the metro area, so 48-hour counts were used to supplement ATR data.

The volume counts were adjusted to account for the season of the year, date of the week, and type of route, as appropriate.

The volume tapes or computer output sheets (for ATR's) were examined to find when the peak or rush hour occurred by selecting the highest four consecutive 15-minute volume increments and adding them. (It is recognized that in a few "forced flow" situations [congested stop and go traffic], volumes could conceivably be lower--but this would be rare on our relatively uncongested metro system.)

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

- INTERSTATE ROUTE MARKER
- U.S. ROUTE MARKER
- STATE HWY. ROUTE MARKER

COUNTY CONTROL

- COUNTY ROUTE MARKER

LEGEND

4 LANES		Schematic width representations only; not to scale.
6 LANES		
8 LANES		

Denotes only the larger interchange areas where lane complexity exists.

NOTES:

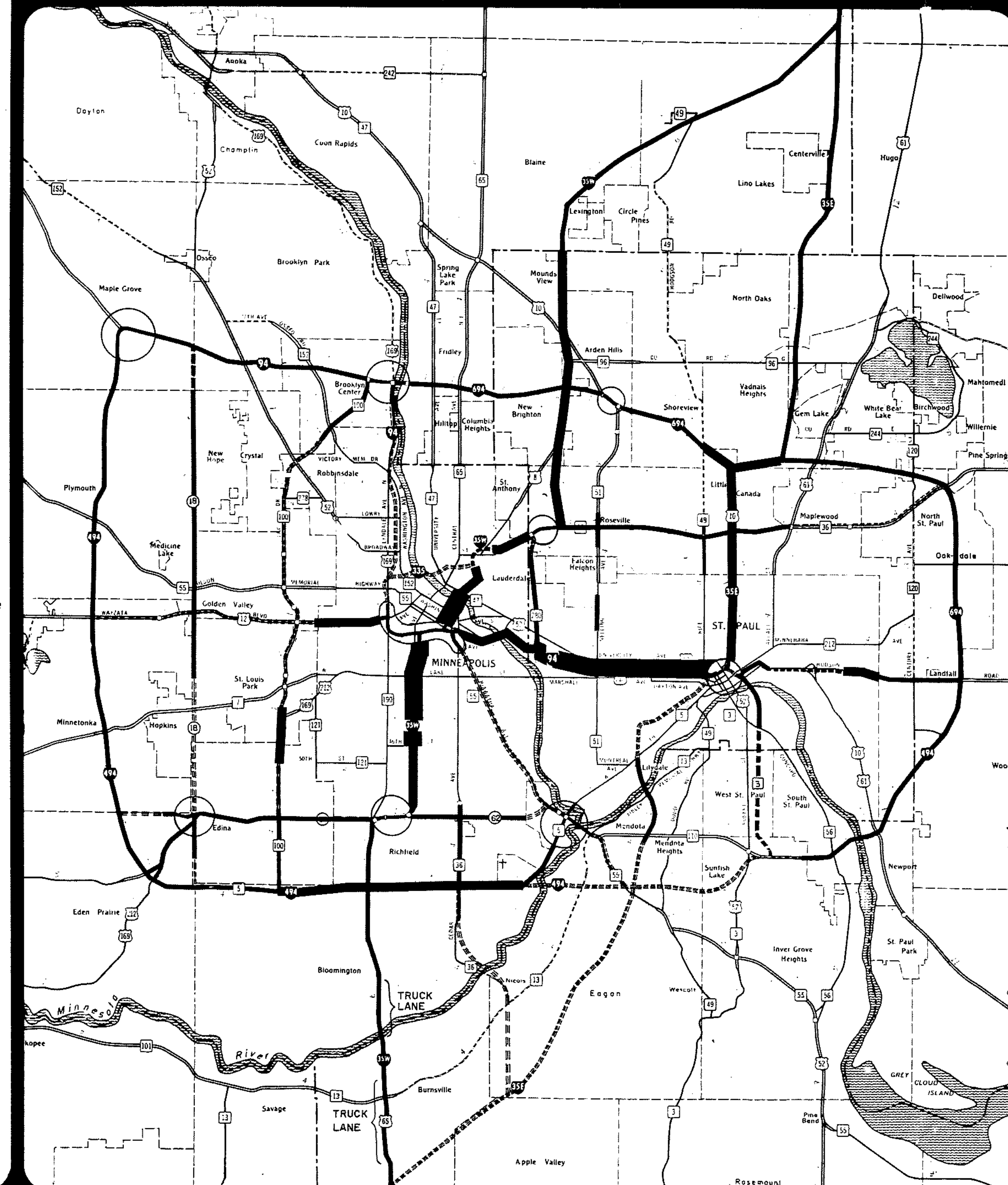
- Number of lanes includes both directions of travel.
- Auxiliary lanes were included if of significant length (greater than 1 mile)
- Map does not show short discontinuities in basic lanes (as at Snelling Ave. on I-94 for example).
- See segment maps for more detail.

PREPARED IN 1975

EXHIBIT 4

0 1 2 3 4 5 MILES

BASIC LANES 1974-1975



C. DATA DISPLAY

The volume data was then displayed on a system map numbered Exhibit 5. This system map shows two-way average weekday traffic at fairly frequent locations. They are shown approximately in the locations where the counts were made. It should be realized that volumes may vary within each section shown since they often contain several interchanges. Volumes vary from 9,700 vehicles per day on I-35E in Anoka County to 111,800 vehicles per day on I-35W in South Minneapolis.

The more detailed segment drawings show ADT by direction, peak-hour volumes by direction, peak-hour times, and dates and approximate locations where counts were taken. The counts were all made in the period from 1973 to mid-1975.

VI. RUSH HOUR TRAVEL SPEEDS

A. BRIEF BACKGROUND

Speed and delay runs (or travel time runs) are a commonly used method of determining how well a facility is functioning. Often, they are part of "before" and "after" studies to measure increases in travel speeds as a result of a certain improvement. The average speeds during weekday rush hours are usually of most interest because these are the time periods when the facility is most likely to be congested and for which the facility is designed.

The travel speeds are one good measure of the overall performance of a route. Average speeds can be converted to "operating speeds" and the level of service can be determined using the Highway Capacity Manual charts.

B. DATA GATHERING METHOD

This portion of the study required fairly extensive field data gathering. The peak or rush hour was determined by studying the volume data which was available in 15-minute increments (as noted in Section V). The "average car" method was used to make the travel time runs for each segment. An attempt was made to spread the runs over the entire rush hour so that speeds representative of the entire hour would be obtained.

The number of runs made varied depending on the segment studied. We generally tried to get the largest number of runs where the level of service seemed lowest. The largest number of runs were available for I-35W where very extensive travel time studies were being made in connection with the I-35W Corridor Demonstration Project. The speeds on parts of that route have a high degree of reliability. On the other hand, routes which have fewer runs probably do not have such high reliability and may be based on a biased sample since they were often taken in a single day (Tuesday, Wednesday, or Thursday). It was decided early in the study that it would not be practical to take a large number of runs on all routes because of time, cost, and manpower constraints. Therefore, the results should be viewed in the context of the number of runs

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

LEGEND

13,500 AVERAGE DAILY TRAFFIC VOLUMES

• Denotes segment where volumes were unavailable.

NOTES: Volumes are based on automatic traffic recorder counts or 48-hour counts depending on the location.

Volumes were adjusted for seasonal and weekly variations when based on 48-hour counts.

Volumes were rounded to nearest 100 vpd.

Locations shown on map are approximate locations where counts were taken.

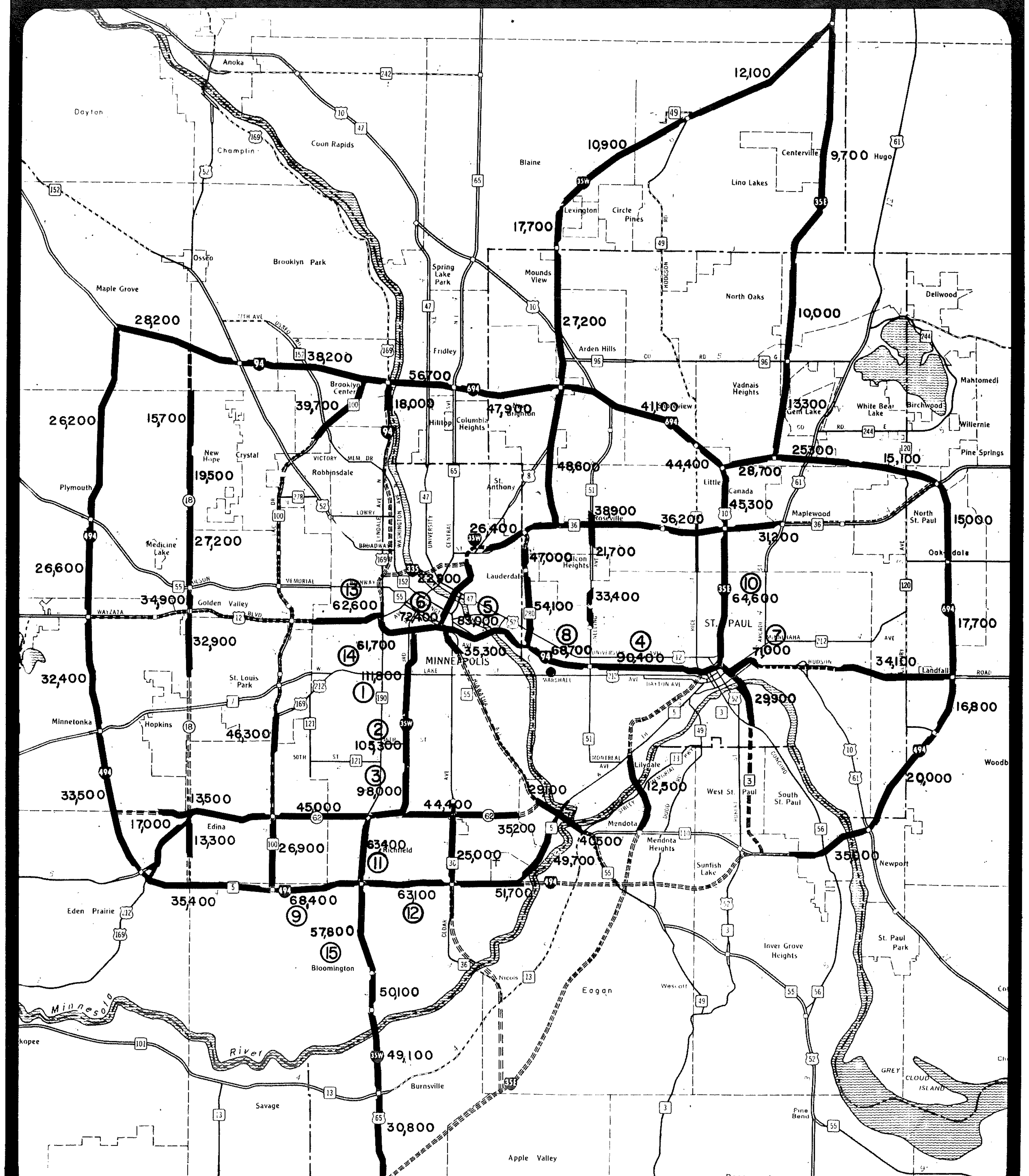
TOP 15 VOLUMES OF TRAFFIC

PREPARED IN 1975

EXHIBIT 5

0 1 2 3 4 5 MILES

TRAFFIC VOLUMES 1973-1975



taken. We have shown the number of runs each speed is based on in the segment sheets. Runs made prior to February 1974 were made before the 55 MPH speed limit was in effect. Speeds appreciably above 60 MPH could be expected to drop to about 60 MPH as a result of the new speed limit.*

C. DATA DISPLAY

The "Travel Speeds" system map (Exhibit 6) shows one speed (boxed number) which represents both travel directions during both rush hours combined. It simply provides a comparative measure for the various routes. Data was not gathered on certain very short segments since it would not have provided meaningful results.

The segment diagrams show speeds in each direction of travel for each rush hour as well as the number of runs each speed is based on. The speeds indicate a general lack of serious congestion problems on the freeway system with present volumes when the entire rush hour is considered. This is not to say there are not some specific locations and times within the rush hour when flow breakdown occurs. Rather, it says these occurrences are not so widespread and of long duration that greatly reduced average travel speeds result.

*Recent Minnesota Highway Department studies of speed trends at various freeway locations.

VII. ACCIDENT RATES

A. BRIEF BACKGROUND

The study of accidents is a broad and complex subject involving much more than just comparative accident rates. However, accident rate calculations do provide one commonly used measure of accident occurrence (number of accidents) relative to exposure (the number of vehicle miles traveled). They can provide the traffic engineer with one important piece of information on which roadway segments or specific locations may require study as to the possible need for safety improvements. It should be emphasized that accident rate information <u>alone</u> is <u>not</u> sufficient to draw conclusions about the relative safety (or lack thereof) of a certain roadway. The selection of segment endpoints, the traffic volume range, the severity of accidents, and numerous other factors are involved in making detailed evaluations. Rate information simply provides one general measure for broad evaluation and screening.

B. DATA GATHERING METHOD

The calculation of accident rates is a fairly uniform and defined procedure. It involves the number of accidents occurring on certain segments, per million vehicle miles traveled on it. The county and state traffic engineering sections provided accident rate information for our study segments for a three-year time period. An average rate for the three-year time period was also calculated.

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

LEGEND

61 — SEGMENT NO.

57 — Average speed in MPH for both directions of travel combined for both AM & PM PEAK HOURS.

NOTES: Based on limited number of runs. More detailed directional & AM and PM breakdown in text.

Runs were made primarily on Tues. - Thurs.

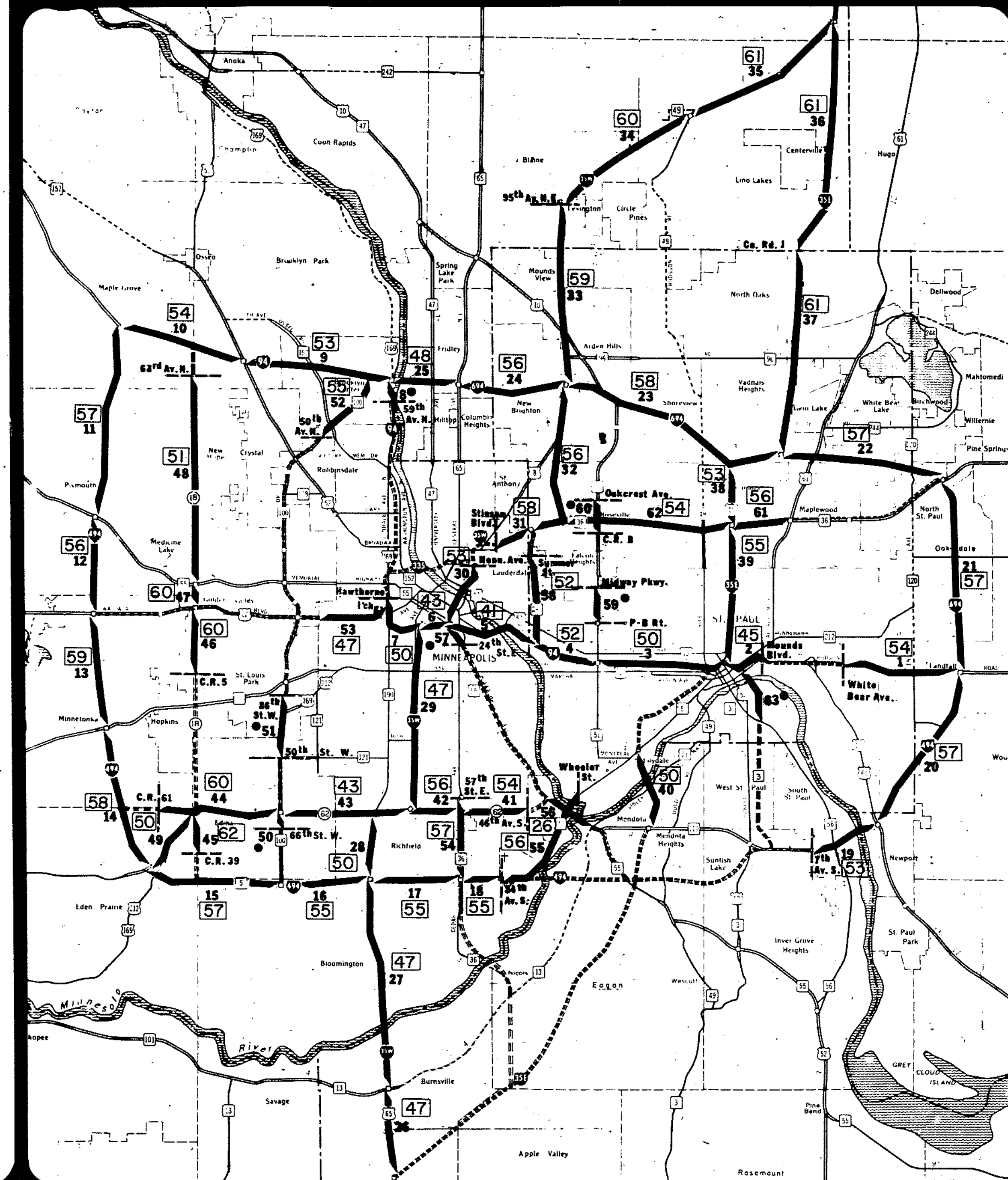
● Denotes segments where no data was gathered.

PREPARED IN 1975

EXHIBIT 6

0 1 2 3 4 5 MILES

TRAVEL SPEEDS 1974 - 1975



C. DATA DISPLAY

The "Accident Rates" system map (Exhibit 7) shows the average three-year rate for the roadways studied for each segment. The more detailed segments sheets show the individual accident rates for each of the three years. Where segment endpoints differ from those used for other parts of the study, these differences are noted. The rates shown are in terms of accidents per million vehicle miles of travel.

VIII. TRANSPORTATION LAND USE

A. INTRODUCTION

There is much concern today about how to properly use our valuable land resources. Certain major and very visible uses come under question as being excessive. Things like land used for urban areas (i.e., "sprawl"), roads and highways (particularly freeways), power plants (e.g., Henderson, Minnesota power plant site controversy), transmission lines, and storage areas (e.g., St. Paul "Pigs Eye" coal storage area), mining (e.g., Northern Minnesota copper-nickel mining controversy), and shopping centers (e.g., Ridgedale) all come to mind as local examples being or having been opposed in part of this "proper land use" issue.

Often individual projects are viewed somewhat in isolation without broader factual data for perspective. The purpose of this portion of the Metro Area Freeway System Study is to provide such perspective for freeways. It is difficult to concentrate solely on freeways, however, without first looking at all highways and roads, both nationally and in large cities.

In this case, the importance of terminology is particularly evident. Various studies may or may not include all roads and streets, farm lanes, boulevards, parking areas, alleys, sidewalks, driveways, and other transportation uses (airports, railroads, pipelines) in their percentage figures for transportation. In the usual case, the percentages reflect right-of-way for all roadways since that is the common area measure used by various public agencies. This study also refers to that method unless otherwise noted.

Roads of all kinds and their right-of-way serve a variety of functions or purposes. They provide:

- for the movement of people and goods via cars, trucks, buses and bicycles
- for access to properties of all types
- for on-street parking
- a corridor for utilities (gas, electric and water)
- a place for walking (sidewalks)
- a grassy strip or boulevard for trees in many areas
- a nesting area for wildlife in rural areas
- form and structure for cities
- a place for transit benches and shelters

Parts of the right-of-way are paved (usually the roadway, shoulders, and sidewalk) while another portion is normally unpaved (boulevards

METRO AREA FREEWAY SYSTEM CHARACTERISTICS

STATE CONTROL

INTERSTATE ROUTE MARKER

U.S. ROUTE MARKER

STATE HWY. ROUTE MARKER

COUNTY CONTROL

COUNTY ROUTE MARKER

LEGEND

23 SEGMENT NUMBER

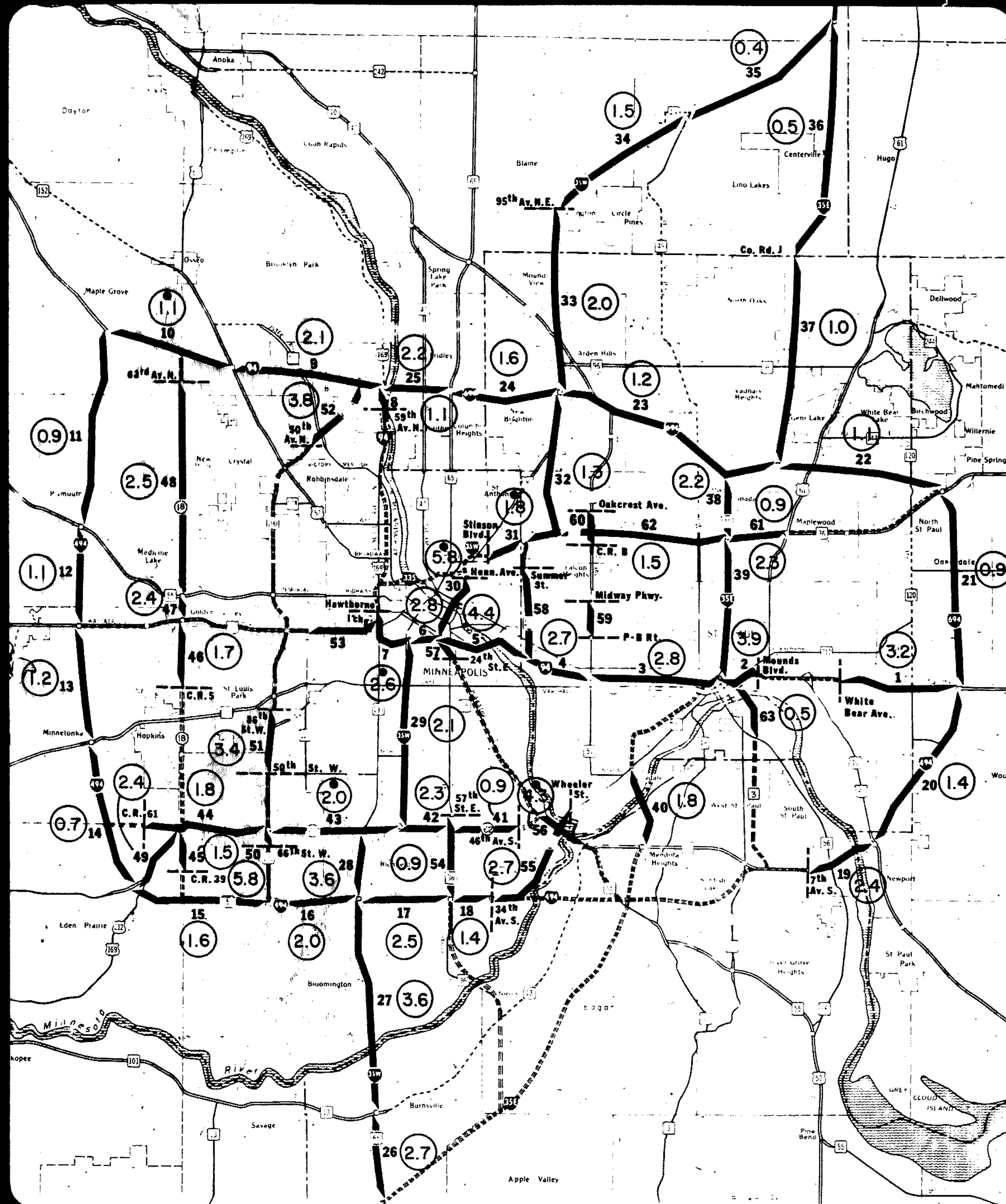
0.0 AVERAGE 3-YEAR ACCIDENT RATES IN TERMS OF ACCIDENTS PER MILLION VEHICLE MILES (EXCEPTION NOTED WITH ●) (1972, 1973, 1974)

PREPARED IN 1975

EXHIBIT 7

0 1 2 3 4 5 MILES

ACCIDENT RATES



or slopes adjacent to or between roadways). In some cases, one function may be stressed above others. For example, a freeway stresses the "safe and rapid movement" function above the "direct land access" function. The purpose of this study, however, is not to make any value judgment on whether the land used for the above purposes is reasonable or excessive per se. Rather, the purpose is to provide factual data on what typical percentages of land are devoted to road rights-of-way and particularly freeways (which are the highest design type of road typically requiring more land and carrying more traffic). The individual reader can then judge whether the services rendered are worth the land (and other) costs. This is obviously a complex issue involving many other factors.

The land devoted to roads and streets (right-of-way) was viewed first from a national perspective, then from an urban area or metropolitan perspective including a look at central cities and their central business districts, and then at suburbs. Lastly, an attempt was made to focus on freeways since they are the most frequently cited transportation users of land.

B. NATIONAL LAND USE

In 1969, the United States Department of Agriculture completed an extensive study of land use in the entire United States.[1] They categorized the nation's 2,264 million acres in a number of ways. Table 1 shows the major uses of land in 1969:

TABLE 1

MAJOR LAND USES

Major Land Use	Acreage	Percentage of Total
	Million Acres	Percent
Cropland[a]	472	20.9
Grassland pasture and range[b] .	604	26.7
Forest land[c]	723	31.9
Special uses[d]	178	7.9
Miscellaneous other land[e] . .	287	12.6
Total land area[f]	2,264	100.0

NOTES:

a. All land in the crop rotation. This total is higher than the 438 million acres reported by the Soil Conservation Service for 1967 (11), due primarily to the inclusion of larger acreages classified as cropland used only for pasture.

b. Permanent grassland and other non-forested pasture and range.

c. Excludes 31 million acres of reserved and other areas duplicated in special-purpose uses. Total forest land is shown in Appendix Table 9.

d. Urban and transportation areas, areas used for recreation and wildlife purposes, various public installations and facilities, farmsteads, and farm roads.

e. Marshes, open swamps, bare rock areas, desert, tundra, and other land generally having low value for agricultural purposes.

f. Includes streams and canals less than one-eighth mile wide; and ponds lakes, and reservoirs covering less than 40 acres.

Estimates are based primarily on reports and records of the Bureau of the Census and Federal and State land management and conservation agencies.

Urban and transportation uses are part of the 7.9% classified as "special uses". The "special uses" can be broken down as follows:

TABLE 2

SPECIAL LAND USES

Land Use	Acreage	Percentage of Total
	Million Acres	Percent
Urban and other built up areas[a]	61	2.7
Primarily for recreation and wildlife[b] .	81	3.6
Public installations and facilities[c] . .	27	1.2
Farmsteads, farm roads	9	0.4
Total in Special Uses	178	7.9% (of total U.S. land)

NOTES:

a. Urban areas; highway, road, and railroad rights-of-way; and airports.

b. National and State Parks and related recreational areas, National and State wildlife refuges, and National forest wilderness and primitive areas.

c. Federal land administered by the Department of Defense and the Atomic Energy Commission, and State land in institutional and miscellaneous special uses.

Urban and transportation uses are about 2.7% of the 7.9% "special uses" total. Unfortunately, urban and transportation uses often take level, well-drained land, the report notes. The "special use" area can be further broken down as the next table shows.

Table 3 (see next page) reveals that "highways and roads" occupy approximately 11.8% of the 7.9% in "special uses" or 0.94% of the total land area in the United States. Slightly less than 2% of the total land area is devoted to urban development.

It would be difficult to estimate how much of the right-of-way is actually paved since it varies widely. Parkways and rural highways have a relatively low percentage paved while city streets in busy areas have a high proportion of the right-of-way width paved.

This, then, provides one macro scale overview of the land use issue as related to highways and other public roads. The key figure is that about <u>1%</u> of the U.S. land area is devoted to public road right-of-way.

TABLE 3

SPECIAL USE AREAS, UNITED STATES
ESTIMATES FOR 1969

Special Use Area	Area 1,000 acres	Share of Total Percent
Non-Agricultural:		
Intensive Uses:		
Urban areas	34,590	19.5
Highways and roads	20,977	11.8
Railroads	3,221	1.8
Airports	1,755	1.0
Total	60,543	34.1
Extensive Uses:		
National Parks	28,281	15.9
State Parks	6,710	3.8
Wilderness and primitive areas	14,290	8.0
Federal wildlife refuges	25,422	14.3
State wildlife refuges	6,634	3.7
National defense areas	23,441	13.2
Federal industrial lands	2,146	1.2
State institutional and other uses	1,918	1.1
Total	108,842	61.2
Total Non-Agricultural Lands	169,385	95.3
Agricultural:		
Farmsteads	6,564	3.7
Farm roads and lanes	1,856	1.0
Total Agricultural Special Use Lands	8,420	4.7
Total Special Use Areas		100.0

C. LAND USE IN METROPOLITAN AREAS

It is interesting historically to note that transportation has been a major urban land use. L'Enfants' Washington, D.C. plan dedicated 49% of all land to arterial streets. The visual radial routes focusing on the Capitol and the use of wide parkway-like designs are probably several of the reasons why the proportion was so high in Washington, D.C. Captain John Sutter's Sacramento plan reserved about 38% for street use.[2] These two cities were laid out in the pre-auto era.

In contrast, portions of Sacramento laid out in the post-auto era (1900 to 1930) allocated only 21% of their area to streets and some new areas developed since World War II have reserved only 15% of the subdivided land for transportation purposes.[2]

Most land use studies show the highway and street rights-of-way occupy 20-30% of all developed land regardless of city size or density. In the following pages, various parts of metropolitan (or urban) area will be looked at separately. One problem is that most of the data is from the mid-fifties to the mid-sixties and is, therefore, not as up-to-date as would be desirable. More will be said about this later.

1. Central Cities

Niedercorn and Hearle gathered a massive amount of data on land use in 48 large American cities in 1963.[3] Minneapolis and St. Paul were two of the cities studied.

The attached table gives the mean proportions of land devoted to the various uses.

TABLE 4

MEAN PROPORTIONS OF LAND DEVOTED TO VARIOUS USES IN 48 LARGE AMERICAN CITIES[3]

Type of Use	Proportion of Total Land	Proportion of Developed Land
Total Developed	.770	1.000
Residential	.296	.390
Industrial	.086	.109
Commercial	.037	.048
Road and highway	.199	.257
Other public	.153	.197
Total Undeveloped	.230	
Vacant	.207	
Underwater	.023	

This table shows that typically 20% of the total land area is devoted to "road and highway" right-of-way. The total land area includes vacant land and underwater land. When these unused lands are excluded, the "developed land" proportion for roads and highways is about 26%.

This study also looked at trends which may have been occurring in regard to land use (by studying early and late data from the same city). They concluded that "road and highway uses have been decreasing" as a percentage of developed land.[3]

An earlier study done by Bartholomew in 1955[4] found generally similar results as shown in Table 5.

TABLE 5

CENTRAL CITY DEVELOPED AREA LAND USE

Number of Cities	Population Group	Streets Percentage of Total Developed Area
28	50,000 or less	28.33
13	50,000 - 100,000	33.27
7	100,000 - 250,000	27.57
5	250,000 and over	24.75

The average was slightly higher--about [illegible]8.1% of the developed land was devoted to all types of public and private vehicle rights-of-w called"streets".

The 1958 Twin Cities Area Transportation Study (TCATS) of land use revealed similar figures for Minneapolis and St. Paul as Table 6 below shows.[5]

TABLE 6

LAND IN URBAN USE

	St. Paul		Minneapolis	
Category	Sq. Mi.	%	Sq. Mi.	%
Residential	16.8	37.0	22.8	41.7
Commercial	1.5	3.3	2.4	4.4
Industrial	6.7	14.8	6.4	11.7
Public & Quasi-Public*	8.0	17.6	8.9	16.2
Streets & Alleys	12.4	27.3	14.2	26.0
Total	45.4	100.0	54.7	100.0

Source: 1958 TCATS Land Use Study

*Includes land used by government buildings, museums, churches, non-profit organizations, hospitals, parks, golf courses, cemeteries, and open space owned by government.

Typically, about 1/3 of most street right-of-way is sidewalk or planting strips (boulevards).

2. Central Business Districts (CBD's).

The land use in downtowns or central business districts is one sub-part of the "central cities" figures discussed above.

A 1966 study by Wilbur Smith and Associates dealt quite extensively with land devoted to streets and parking in central business districts.

This study found that: "Because downtown has always attracted large numbers of people, a high proportion of its area has been required for transportation purposes. As urbanized areas have grown larger, the proportion of CBD land area devoted to transportation (streets and parking) often has increased."

"In 1930, the proportion of ground area devoted to roadways in selected American cities ranged from 21% in downtown Los Angeles to 44% in downtown Washington, D. C., usually with negligible off-street terminal space."

"Today...<u>approximately half</u> of all downtown land is occupied by streets, alleys, sidewalks, <u>and parking</u>. Thus about 1/3 is actually devoted to motor vehicle purposes when sidewalk space is excluded."[2]

Table 7 (see next page) shows the data for a number of large American cities including Minneapolis and St. Paul.[2]

This table shows that streets (right-of-way) occupy about 30-40% of CBD's.

This article further points out that the CBD must be considered in three-dimensional terms because of the predominance of tall buildings. The floor area to land area ratio is very high in typical large cities. It also notes that parking is actually a productive enterprise or business in itself. Therefore, it can be considered a business in the usual sense.

TABLE 7

PROPORTION OF CBD LAND DEVOTED TO STREETS AND PARKING

Central Business District	Year	Total Acres	PER CENT OF CBD LAND DEVOTED TO Streets	Parking	Streets and Parking
Los Angeles	1960	400.7	35.0	24.0	59.0
Chicago	1956	677.6*	31.0	9.7	40.7
Detroit	1953	690.0	38.5	11.0	49.5
Pittsburgh	1958	321.3*	38.2	**	**
Minneapolis	1958	580.2	34.6	13.7	48.3
St. Paul	1958	482.0	33.2	11.4	44.6
Cincinnati	1955	330.0	**	**	40.0
Dallas	1961				
Core Area		344.3	34.5	18.1	52.6
Central District		1,362.0	28.5	12.9	41.4
Sacramento	1960	350.0	34.9	6.6	41.5
Columbus	1955	502.6	40.0	7.9	47.9
Nashville	1959	370.5	30.8	8.2	39.0
Tucson	1960	128.9	35.2	*	*
Charlotte	1958	473.0	28.7	9.7	38.4
Chattanooga	1960	246.0	21.8	13.2	35.0
Winston-Salem	1961	334.0	25.1	15.0	40.1

* Excludes undevelopable land.
**Not itemized.

SOURCE: Transportation and land-use studies in each urban area.

A recent study of downtown Minneapolis parking by Barton Aschmann Associates,[6] found that about 61% of the downtown study area was used for streets, sidewalks, alleys, railroads and parking facilities. When railroads and parking facilities were excluded, this figure was reduced to 43% for street and alley right-of-way. (This is slightly higher than the 30-40 percent range noted earlier.)

About 14% of the land area is devoted to parking. Therefore 57% (43% plus 14%) is devoted "to the auto" in broad terms, but this figure reduces to about 38% when 1/3 is deducted for sidewalks.

Downtown streets and alleys serve numerous functions in addition to auto and bus movement, since they provide access to intensely developed properties, provide movement corridors for emergency services, provide a place for utilities, air rights for skyways and perhaps future people mover systems, and provide light, air, and open space between uses and buildings.

Therefore there are a number of aspects to the land use issue in downtowns. The simple generalization that autos take 60% of the land in a CBD is quite misleading since it overstates the true percentage and over-simplifies a complex situation. Downtowns grow skyward! A better figure is about 30-40% in contrast to 25% for the central cities as a whole (noted earlier). The percentage is higher because of the intense development and short block spacing pattern.

3. The Suburbs

The study by Bartholomew states that land devoted to streets, alleys, highways and other public and private thoroughfares in suburbs is, on the average, 27.67%.[4] This can be contrasted with 28.10% this same study found for the central cities. Therefore a very minor reduction was evident.

The TCATS study for the Twin Cities Area (done in 1958), found that streets and alleys occupy 29% of the land in urban use. However, they noted that this percentage was decreasing "primarily because of the more efficient design of many new subdivisions."[5]

The study by Niedercorn and Hearle had compared "early data" with "late data" for 22 large cities. This study concluded that road and highway right-of-way percentages had decreased slightly but significantly.[3] However, it should be noted that even the late data was collected prior to 1963.

A recent publication entitled "The Accessible City" by Wilfred Owen points out the reduced street acreage requirements in cluster development patterns as compared to normal subdivisions.

More recent data on land devoted to transportation is available in the Urban Transportation Factbook[7] published in March of 1974. This study points out the problem of different reporting methods used by various cities. However, some of the more recent studies (1964-1970) do include land devoted to streets, highways, right-of-way, parking and other transportation facilities as shown in Table 8.

TABLE 8

LAND DEVOTED TO TRANSPORTATION FACILITIES

City	Survey Year	% Res.	% Comm'l Ind'l	%* Transp.	% Instit.	% Recre.	% Agri. & Vacant	Transp. as % of Developed La
Wash., D. C.	1968	11.1	2.2	5.7	5.6	5.9	69.4	5.7/30.6 = 18
Dallas, Texas	1964	12.3	3.1	8.7	2.0	1.8	72.2	8.7/27.8 = 31
Atlanta, Georgia	1970	12.9	2.2	5.2	3.8	N/A	75.8	5.2/24.2 = 21
Denver, Colorado	1970	10.5	4.2	6.5	N/A	2.7	75.8	6.5/24.2 = 27
Indianapolis, Ind.	1964	16.8	2.3	11.0	2.4	2.8	63.7	11/36.3 = 30

* Includes streets, highways, parking right-of-way, and other transportation uses (railroads, airports).

SOURCE: Urban Transportation Fact Book, Am. Institute of Planners & Motor Vehicle Manufacturers Assoc., Barton Aschman Assoc., March 1974.

This data shows a range of values from 18.5% to 31% of total developed land devoted to all transportation uses. If we assume that 8% of transportation right-of-way is devoted to railroads and airports,[6] the range then lowers to 17% to 28% for street and highway right-of-way and parking. When one compares these values to earlier studies which indicated a percentage range of 25-35% excluding parking, it appears that roads and streets are taking less land on a percentage basis, eve though later studies include more freeways and parking. This may be due to larger lot sizes, lower densities, wider block spacings, more efficient subdivision design practices, or perhaps a combination of th above.

D. LAND DEVOTED TO FREEWAYS

When "ribbons of concrete" or "paving paradise" are mentioned, one knows that freeways are probably referred to! Freeways, as used here, denote road facilities with fully controlled access and no at-grade intersections. The Interstate System is the best known and largest component part of the freeway system. However, toll roads and certain other state, county, or municipal roadways with full access control and no at-grade intersections are also included. A freeway is simply a certain design type.

1. National Perspective

From a national perspective, a 1968 article on the Interstate System[8] stated that the 41,000-mile system would require 1.6 million acres of land. This amounts to an average right-of-way width of 330 feet. As a percentage of the total land area in the United States (noted in Section B), this amounts to 1.6 million acres divided by 2,264 million acres, or .00071. This is seven one-hundredths of 1% of our total land area for the Interstate System. Early estimates of projected Interstate System travel were that it would carry 20% of all vehicle miles of travel on less than 1% of the road miles.

A 1974 report on the "Social and Economic Effects of Highways" states that the Interstate System will use 2.2 million acres when completed (42,500-mile system). This is about 1/10 of 1% of the total area of the United States used for over 20% of the nation's travel.

National Cooperative Highway Research Project #25 noted that in 1973 there were 38,000 miles of freeways (interstate freeways which were complete, plus other non-interstate freeways). If we assume typical width of 330 feet (as noted earlier), this would mean that about .00066 of our total United States land area is now freeway right-of-way. The previous figures included the Interstate program which is not yet totally completed while thi figure includes all freeways now constructed.

Since these figures are only approximate values, a conservative estimate would be to say that all freeways now take about 1/10 of 1% of our total land area. The same value will eventually hold for Interstates only (if the system is completed as planned).

Well under half of this area is actually pavement--the other portic is generally landscaped area used for drainage and safety separatic between opposing directions of traffic flow and backslopes.

2. Metropolitan Perspective

The Metropolitan Area is probably of more interest to most of us, since this is where intense activity is located, and where land is most valuable.

An article by Karl Moskowitz[3] published in a 1964 issue of "California Highways and Public Works" provides some information on this topic. He looked at five urban areas in California, at present and projected freeway mileages, and found that the proportion of their areas occupied by freeways would be 1.6% to 2.0% if their freeway building plans were carried out.[9]

It is interesting to note that Los Angeles was one of the five areas studied. As of 1962, less than 1% of the greater metropolitan Los Angeles area (slightly larger than the Census Bureau definition) was devoted to freeways while an additional .6% was planned for a total of 1.6%.

This article goes on to say that:

> "There has been a lot of loose talk and writing about the area consumed by freeways, streets, and parking. The facts...are different from much of this talk. In order to provide for 50-60% of all travel in an automobile-oriented community, about 1.6% to 2.0% of the area should be devoted to freeways. The other 40% to 50% of the travel will take place on conventional roads and streets, which occupy <u>22%</u> of the total urban area. This travel will mostly be short trips and really can be looked upon as land access travel. No trip can begin or end on a freeway."[9]

He also noted that the trend in Sacramento has been toward a decreasing percentage of area for streets.

1850	38%
1900-1930 subdivisions	21%
Post-1945 subdivisions	15%

He attributed this reduction to the wider block spacings common in the automobile age. He concluded that the area thus saved (18% relative to 1850) will make up for the area required for freeways tenfold.[9]

While this reduction in need may be overstated, it does make the point that freeways in themselves are probably not large enough consumers of land to greatly change the percentages noted in Section C of this study. The trends seem to be pointing toward a reduction in land devoted to the auto over time on a percentage basis, despite the presence of wide freeways which began to gain prominence in the 1950's.

3. Twin Cities Freeway System

As far as the Minneapolis/St. Paul metropolitan area is concerned, the existing freeway mileage within the Interstate System skelton (see Exhibit 1 of this report) consists of about 193 miles complete and open to traffic, 11 miles under construction, and 74 miles planned. The mileage of planned freeways is somewhat speculative because designs could well change and sections might be deleted or perhaps new sections could be added.

Widths of freeways vary quite markedly from section to section. Therefore, it seemed logical to use a typical width range. This was determined to be 300-400 feet based on an examination of typical widths from other studies, right-of-way maps, and maintenance inventory data (from the Minnesota Highway Department).

A recent study of Interstate freeway widths in the Twin Cities area found the prevailing mainline width to be about 310 feet.[10]

Using the lengths listed above, the range of areas comes out to be 11.6 to 15.5 square miles at present (open plus under construction). This area will likely grow to about 15.8 to 21.1 square miles if the planned freeways in our study area are completed.

The present (1974) urban area, as defined by the Metropolitan Council, is 483 square miles. The Census Bureau area figure, based on a complex set of criteria on what is urban and what is rural, has found the area to be 721 square miles as of 1970.[7]

Using these two areas and the freeway area range of square miles, the following results:

Freeways	Metro Council Area		Census Bureau Area	
	Min.	Max.	Min.	Max.
Present/Under Construction (approx. 199 miles)	$\frac{11.6}{483} = 2.4\%$	$\frac{15.5}{483} = 3.2\%$	$\frac{11.6}{721} = 1.6\%$	$\frac{15.5}{721} = 2.2\%$

The study by Moskowitz cited earlier used areas very close to the Census Bureau figures. Thus, it appears the percentage range for the Twin Cities is very close to his findings (1.6% to 2.0%).

In the future, the planned freeways (now usually designed for the year 2000) will probably be constructed and the urbanized area they serve will also grow. The Metro Council envisions a 1990

Metropolitan Urban Services Area (MUSA) of 800 square miles within which they hope to contain urban growth. There is no comparable projected Census Bureau area, to our knowledge.

By the year 2000, one would anticipate MUSA to encompass about 900 square miles if the 1974-1990 trend continues (roughly 100 square miles added per 10 years). The freeway area to total urbanized area percentage will then be:

	Minimum	Maximum
Present/Under Construction/Planned (Approx. 274 Miles)	$\frac{15.8}{900} = 1.7\%$	$\frac{21.1}{900} = 2.3\%$

If one adds certain radial freeway routes (which were outside the area of our study) but within the MUSA line, one would arrive at a slightly higher percentage range.

	Minimum	Maximum
Present/Under Construction/Planned/ Freeway Beyond Study Area (Approx. 314 Miles)	$\frac{17.8}{900} = 2.0\%$	$\frac{23.7}{900} = 2.6\%$

The Census Bureau (in the year 2000) would likely include a larger area in the urbanized classification, thereby reducing these percen ages. Therefore, these percentages should not be compared directl to the Moskowitz percentage range of 1.6% of 2.0% citied earlier.

Recent studies by the Minnesota Highway Department forecast that about 35-40% of the total vehicle miles of travel would be carried by freeways in 1985. This provides an approximate frame of reference for the land use percentages noted above relative to usage.

E. SUMMARY

1. Right of way for highways and roads uses slightly less than 1% of the total U.S. land area.

2. Urban areas occupy just less than 2% of the total U.S. land area.

3. Most land use studies in metropolitan areas show that highway and street rights-of-way occupy 20-35% of all developed land regardless of city size or density. The percentages seem to be going down.

4. In central cities, about 25% of the total developed land is used for road and highway right-of-way.

5. In central business districts (CBDs) street and highway right-of-way typically occupies 30-40% of the land area. This figure is deceptive because of the three-dimensional character of CBD space and high density.

6. In the suburbs, about 28% of the land is used for streets, alleys, highways and other private thoroughfares.

7. The 42,500 mile Interstate System will use less than one tenth of 1% of the total U.S. area but will carry over 20% of the total vehicle miles of travel.

8. Presently, freeways occupy about .00066 of our total U.S. land area since there are about 38,000 miles.

9. A study of five California cities showed the planned freeway systems would occupy about 1.6% to 2.0% of their areas.

10. In our metropolitan area about 2.4 to 3.2% of our area is now devoted to freeways using Metro Council area figures. Using Census Bureau figures (which are more comparable to California methods) 1.6% to 2.2% is devoted to freeway right-of-way.

11. By the year 2000, the freeway system may occupy about 2% to 2.5% of the total urban area while carrying in excess of 35-40% of the total vehicle miles of travel.

IX. FREEWAY SPACING STUDY

A. INTRODUCTION

The Minneapolis/St. Paul metropolitan area's transportation system is composed, in part, of highway facilities that serve a variety of functions. That is, functions range from local streets which are land access facilities providing limited mobility, to principal arterials which are limited access facilities providing high mobility. While principal arterials rarely account for more than five percent of the total highway system mileage in any metropolitan area, their relative size in comparison to other highway system components is great. Typical right-of-way widths for principal arterials are 200 to 400 feet, compared to less than 100 feet for minor arterials, collectors and local streets.

Freeways are the major component of the principal arterial system in the Minneapolis/St. Paul metropolitan area. Approximately 3 percent of the total urban land area is devoted to freeways, but they carry 30 to 50 percent of all highway travel.[11] To ensure a high level of mobility and resulting high percentage of travel utilizing freeway networks, the proper spacing of these facilities should be provided. Furthermore, proper freeway spacing will aid in the reduction of through traffic volumes on local and collector streets. The purpose of this section is to evaluate the spacing of freeways in the Minneapolis/St. Paul metropolitan area as compared to suggested standards and to existing spacing in other metropolitan areas.

B. METHODOLOGY

Proper freeway spacing is a function of many variables including trip end density, spacing of other principal and minor arterials, land development patterns, and degree of transit usage. Various studies have been done to determine general guidelines for freeway spacing. Presented in Table 9 are suggested spacing standards from several sources.

TABLE 9

SUGGESTED FREEWAY SPACING STANDARDS

Study	Spacing Guidelines	Traffic Lanes	Suggested Spacing (Miles)
Chicago Source: "Urban Transportation Planning" R.L. Creighton (1970) pp. 221-228	Dense, Apartment Types		2.9
	Suburban		6.3
Leisch	8000 Persons/Sq. Mi.		2-3 Min.
	2000-4000 Persons/Sq. Mi.		4-6
Joint Program Source: Twin Cities Area Metropolitan Development Guide, Report #5 April, 1968, p. 24	Near CBD		1-2
	Urban		2-4
	Suburban		4-6
	Rural		6 or More
Metropolitan Council Source: "Metropolitan Development Guide", p. 27, #37-Transportation Chapter, dated 3/73	Heavily Developed		3 Min.
	Lower Density Urban		5
AASHO Redbook Source: "Future Highways and Urban Growth"-Wilbur Smith and Associates, Feb. 6, 1971	Density	Traffic Lanes	
	12,000/Sq. Mi.	4	1.7
		6	2.5
		8	3.3
	8,000/Sq. Mi.	4	2.5
		6	3.8
		8	5
	4,000/Sq. Mi.	4	5
			7.5
			10

As an indication of the adequacy of freeway spacing in the Minneapolis/St. Paul metropolitan area, its freeway spacing was compared to the suggested standards and to the average spacing in 25 other metropolitan areas throughout the United States. The procedure used to calculate and analyze spacing included the following tasks.

1. Determine 1970 urbanized area. The source of this information was the Urban Transportation Factbook - Part 1, prepared by Barton-Aschman Associates, Inc. March, 1974.

2. Determine 1970 urbanized area population. (same source) An urbanized area contains a city of 50,000 or more population plus the surrounding closely settled incorporated and unincorporated area which meet certain criteria of population size or density. Urbanized areas (UA) were established primarily to distinguish the urban from the rural population in the vicinity of large cities. They differ from Standard Metropolitan Statistical Areas (SMSA) chiefly in excluding the rural portions of counties composing the SMSA's and excluding those places which are separated by rural territory from the densely populated fringe around the central city. Also, urbanized areas are defined on the basis of the population distribution at the time of the census, and, therefore, the boundaries are not permanent. The components of UA's and their specific definitional criteria are as follows:

   Central City of an Urbanized Area - an urbanized area contains at least one city which has 50,000 inhabitants in the census as well as the surrounding closely settled incorporated and unincorporated areas that meet the criteria for urban fringe areas.

   Urban Fringe - In addition to its central city or cities, an urbanized area also contains the following types of contiguous areas, which together constitute its urban fringe:

A. Incorporated places with 2,500 inhabitants or more.

B. Incorporated places with less than 1,500 inhabitants, provided each has a closely settled area of 100 dwelling units or more.

C. Enumeration districts in unincorporated areas with a population density of 1,000 inhabitants or more per square mile.

D. Other enumeration districts in unincorporated territory with lower population density provided that it serves one of the following purposes:

1. To eliminate enclaves.

2. To close indentations in the urbanized area of one mile or less across the open end.

3. To link outlying enumeration districts of qualifying density that were no more than one and one-half miles from the main body of the urbanized area.

3. Calculate 1970 population density. (#2 ÷ #1). Population/Urbanized area.

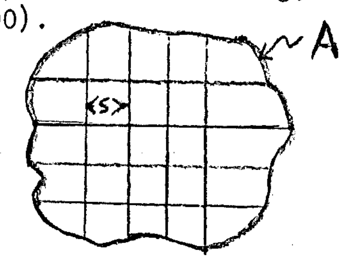
4. Determine length of freeways within urban area. The boundaries of the urban area as determined from #1 above were estimated by proceeding outward from the Central City until the area encompassed by the boundary line equalled the given urbanized area in square miles. Within this area all existing freeways (including tollways) were measured to determine their total length. Since highway maps from each jurisdictional authority were not available for every metropolitan area, the Rand McNally Road Atlas - 1975 was used as a source. Inherent in this, is the problem of obtaining the most current information; however, spot checks of various metropolitan

areas revealed a high degree of correlation between the source and those freeways which were existing or under construction. While a further investigation to determine freeway "lane miles" is considered important, it would be difficult to obtain this information for every metropolitan area and was beyond the scope of this analysis.

5. Determine average freeway spacing. The average freeway spacing for each metropolitan area was calculated using the following formula:

$$\text{Spacing in miles} = \frac{2 \times \text{land area in square miles (A)}}{\text{length of freeway in miles (1) for that area}}$$

(Source: Urban Transportation Planning, Roger L. Creighton, 1970, p. 100).



Spacing is defined as the distance between parallel freeways, assuming that all freeways in the urbanized area lie in a uniform grid. This assumption is never true; however, the measure is a useful indicator of average supply of freeways. Presented in Table 10 are the average freeway spacings for 26 metropolitan areas.

C. ANALYSIS

The average freeway spacing for the Minneapolis/St. Paul urbanized area was found to be 8.5 miles which was also found to be the mean spacing of all urbanized areas analyzed. The range of spacing values varied from a low of 5.1 miles in Buffalo to a high of 16.3 miles in Philadelphia. Table 11 gives the range of all comparative values in the analysis.

TABLE 10

COMPARISON OF FREEWAY SPACING IN VARIOUS METROPOLITAN AREAS

Metropolitan Center	1970 Urbanized Area (Sq. Mi.)	1970 Urbanized Area Population	1970 Urbanized Area Pop. Density (Pers./sq. mi.)	Length of Freeways (Existing and under construction as of Jan. 1, 1975	Average Freeway Spacing (miles)
Philadelphia	752	4,022,000	5,349	92	16.3
Pittsburgh	596	1,845,000	3,095	77	15.5
Tampa-St. Petersburg	291	864,000	2,969	48	12.2
Milwaukee	456	1,251,000	2,744	75	12.1
Detroit	872	3,970,000	4,553	167	10.4
Boston	664	2,651,000	3,992	137	10.0
Houston	539	1,679,000	3,115	108	10.0
San Francisco/Oakland	681	2,988,000	4,387	148	9.2
Kansas City	493	1,101,000	2,234	107	9.2
Portland	267	826,000	3,092	58	9.2
Cleveland	646	1,959,000	3,033	142	9.1
Chicago	1,277	6,700,000	5,257	295	8.7
Minneapolis/St.Paul	720	1,701,000	2,363	170	8.5
Los Angeles	1,572	8,350,000	5,313	385	8.2
San Jose	277	1,025,000	3,699	72	7.7
Seattle	413	1,238,000	2,997	108	7.6
Denver	293	552,000	1,884	78	7.5
St. Louis	461	1,884,000	4,088	128	7.2
Washington D.C.	494	2,479,000	5,018	143	6.9
Indianapolis	381	820,000	2,152	111	6.9
Cincinnati	335	1,110,000	3,314	99	6.8
Dallas	674	1,338,000	1,986	200	6.7
Atlanta	435	1,173,000	2,696	138	6.3
Baltimore	310	1,582,000	5,103	103	6.0
Miami	259	1,221,000	4,715	88	5.9
Buffalo	214	1,088,000	5,085	84	5.1
Total	14,372	55,417,000	-	3,371	-
Average	-	-	3,856	-	8.5

NOTES: Tollways are included in freeway lengths.
Minneapolis/St. Paul freeway length is less than that noted on p. 5 because of rural/urban distinction.

TABLE 11

RANGE OF COMPARATIVE VALUES

ITEM	RANGE OF SAMPLE
urbanized area	259 - 1,572 square miles
population of urbanized area	552,000 - 8,350,000
population density	1,884 - 5,349 persons/square mile
length of freeways within urbanized area	48 - 385 miles
freeway spacing	5.1 - 16.3 miles

While the range and the mean of the sample provide an indication of typical freeway spacings, the median and the mode provide additional insight. The median value (i.e., the midpoint) is 8.35 miles or only slightly less than the calculated value for the Twin Cities. However, the mode, or the most frequently occurring value, is between 6 to 8 miles (see Figure 1). The mode value of this analysis correlates more closely with the suggested spacing standards shown in Table 9.

While it would be expected that freeway spacing decreases with increasing population density, further analysis of the sample reveals little correlation between these factors (see Table 12).

TABLE 12

COMPARISON OF POPULATION DENSITY AND FREEWAY SPACING

Metropolitan Area Population Density (persons/square mile)	Number of Cities in Sample	Mean Freeway Spacing
1000-2000	2	7.0
2000-3000	7	8.4
3000-4000	7	9.6
4000-5000	4	8.6
5000-6000	6	8.4

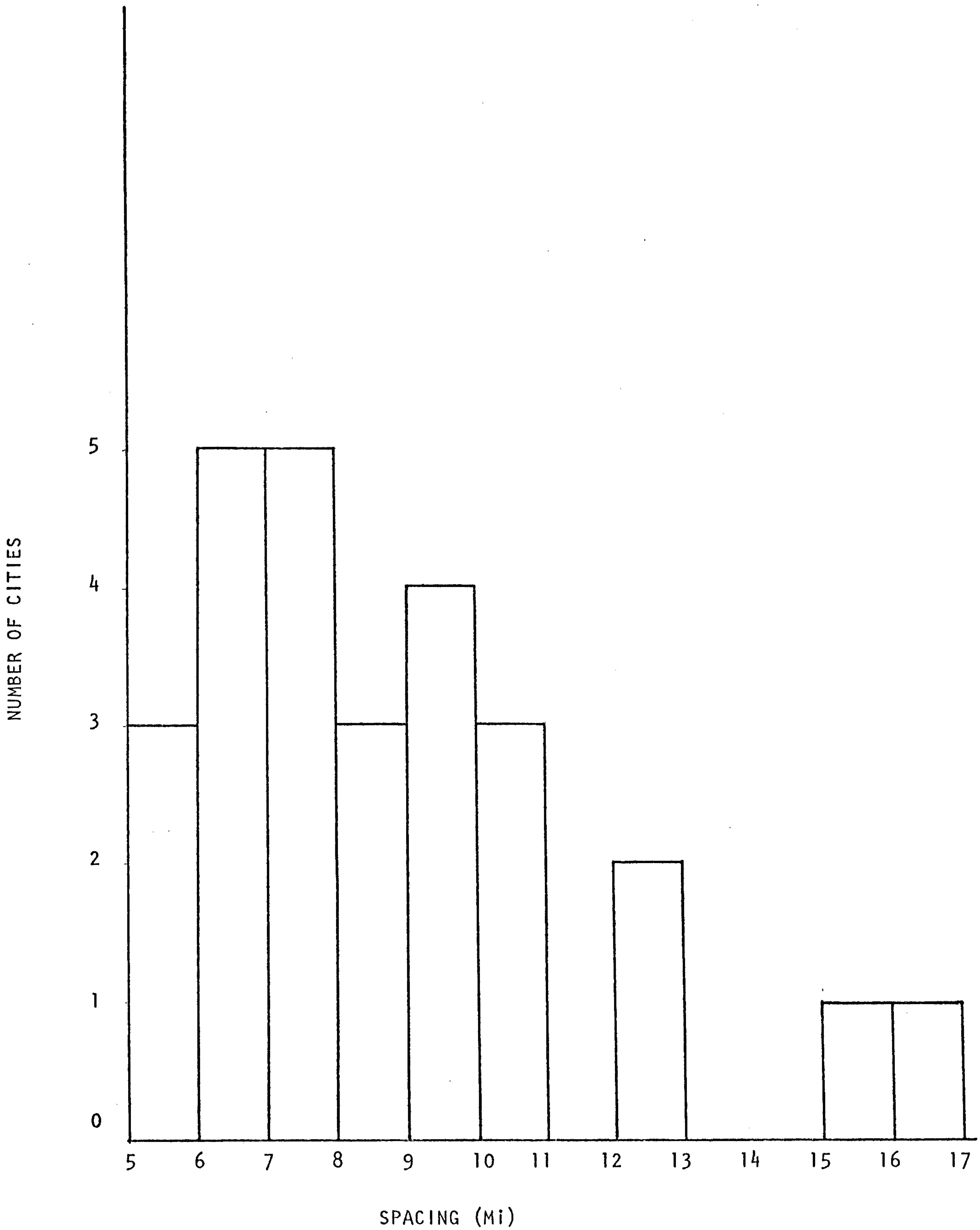


FIGURE 1
SPACING HISTOGRAM

A further illustration of this point is presented in Figure 2.

D. CONCLUSIONS

1. The average freeway spacing in the Minneapolis/St. Paul Metropolitan area is equal to the mean spacing and is slightly higher than the median and the mode in 25 large metropolitan areas throughout the United States.

2. Generally, freeway spacings in metropolitan areas are higher than suggested standards. Stated another way, freeways are usually further apart than suggested spacing guidelines.

3. No correlation was found relating population density - and assumed trip end density magnitudes - and average freeway spacing.

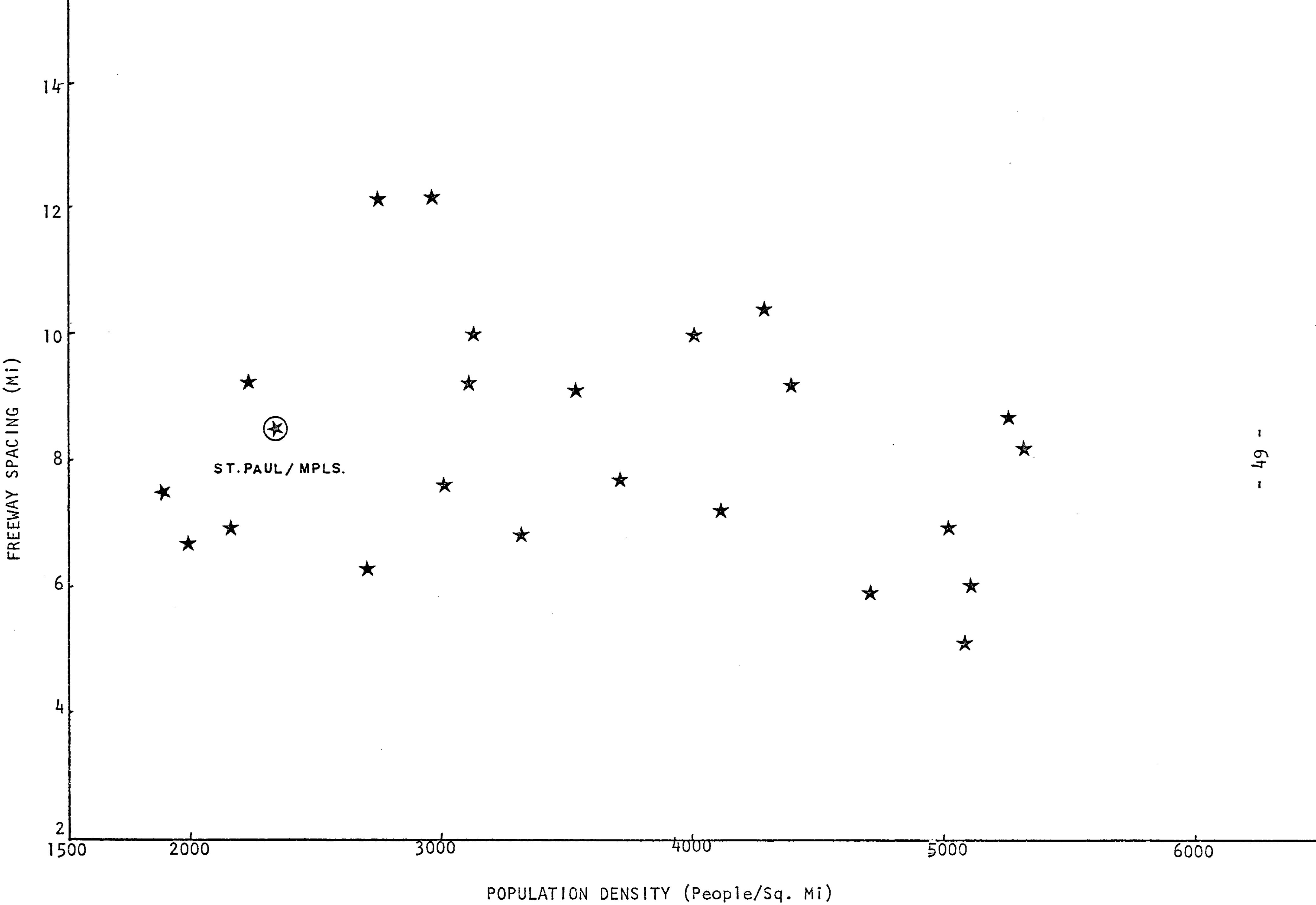


FIGURE 2
Density/Spacing Comparison

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SEGMENT DRAWINGS

The following are brief explanations for abbreviations used on segment drawings.

Rate	=	Accidents/million vehicle miles
L.A.	=	Lane Addition
L.D.	=	Lane Drop
AUX	=	Auxiliary Lane
ENT.	=	Entrance Ramp
TCL	=	Truck Climbing Lane
NBL	=	Northbound Lanes
SBL	=	Southbound Lanes
ADT	=	Average Daily Traffic
C.D.	=	Collector Distributor

Each arrow represents one lane

Segment # 1

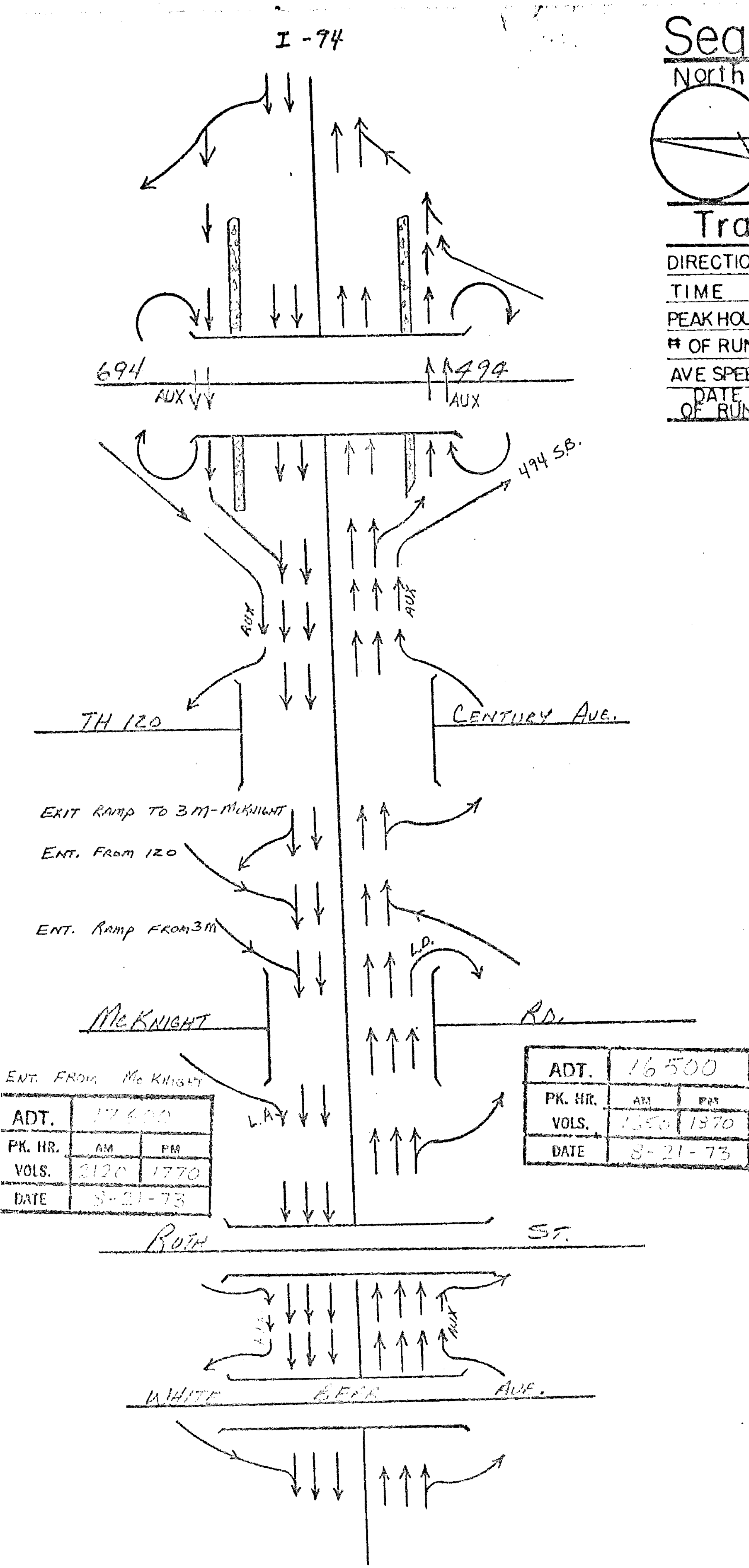
North	Route # 94	From White Bear Ave.	
		To 694 - 494	
	Direction	EBL	WBL
	Length	3.3	3.3

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-5:00
# OF RUNS	6	6	5	5
AVE SPEED	53	54	55	53
DATE OF RUNS	3-22-74	3-20-74	3-22-74	3-20-74

Accident Data

YEAR	RATE	AVE RATE
1972	3.4	3.2
1973	3.8	
1974	2.4	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 2

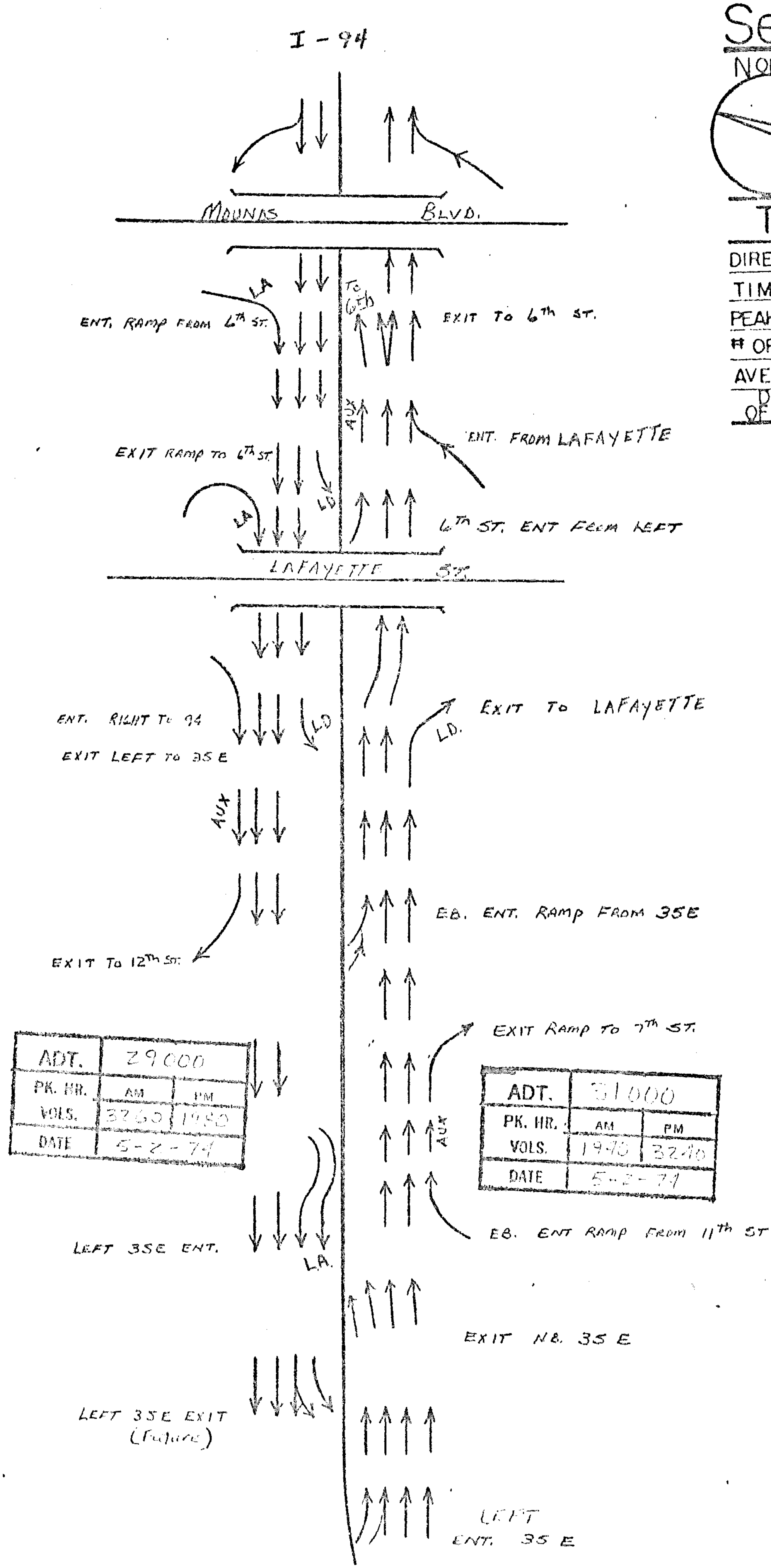
North	Route # 94	From 35E	
		To MOUNDS BLV	
	Direction	EBL	WB
	Length	1.4	1.4

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-
# OF RUNS	6	5	5	5
AVE SPEED	47	45	43	4
DATE OF RUNS	3-22-74	3-20-74	3-22-74	3-

Accident Data

YEAR	RATE	AVE RA
1972	4.2	
1973	3.9	3.
1974	3.8	



ADT.	29000	
PK. HR.	AM	PM
VOLS.	3260	1950
DATE	5-2-74	

ADT.	31000	
PK. HR.	AM	PM
VOLS.	1940	3240
DATE	5-2-74	

PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment 3

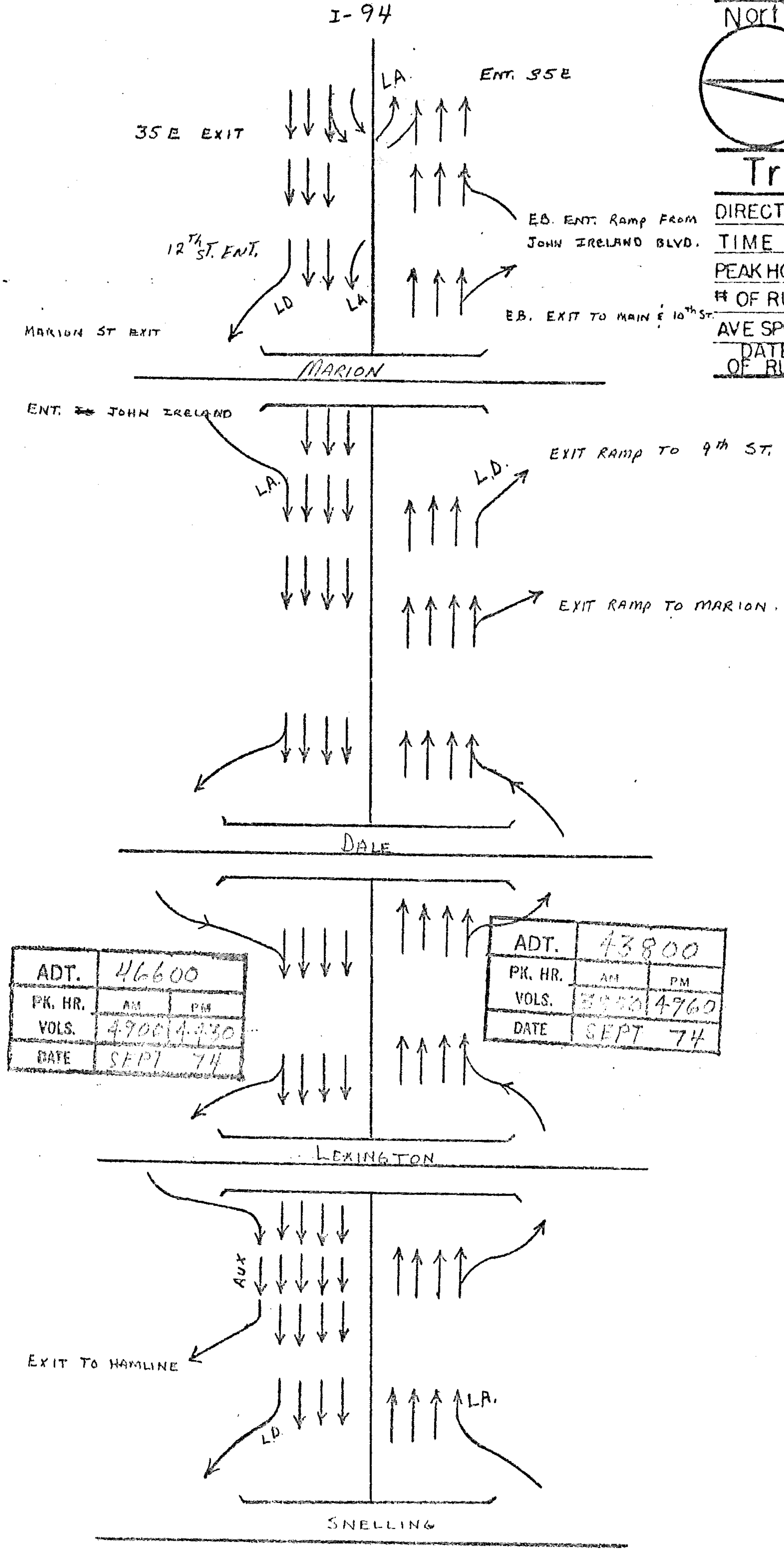
Route # 94	From	T.H. 51
	To	35E
Direction	EBL	WBL
Length	3.6	3.6

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-5:15
# OF RUNS	6	6	5	5
AVE SPEED	50	50	49	50
DATE OF RUNS	3-22-74	3-20-74	3-22-74	3-20-74

Accident Data

YEAR	RATE	AVE RATE
1972	3.0	2.8
1973	3.2	
1974	2.3	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 4

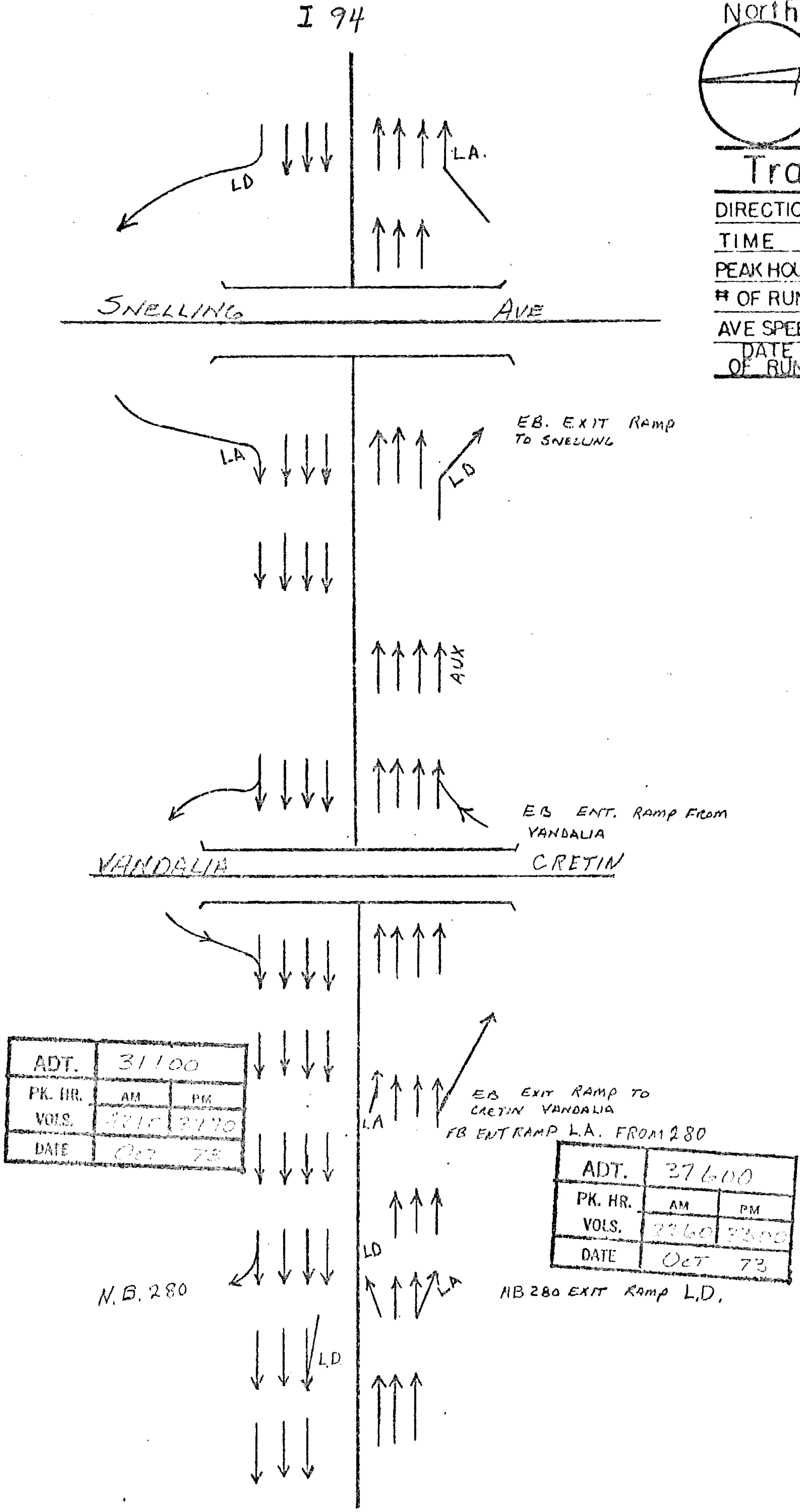
North	Route # 94	From 280	
		To T.H. 51	
	Direction	EBL	WBL
	Length	1.9	1.9

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-
# OF RUNS	6	6	5	5
AVE SPEED	51	52	52	[illegible]
DATE OF RUNS	3-22-74	3-20-74	[illegible]	[illegible]

Accident Data

YEAR	RATE	AVE RA
1972	3.6	
1973	2.6	2.7
1974	1.9	



PREPARED SUMMER 197

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Sketch shows approx
interchange configurat

Segment # 5 1 of 2

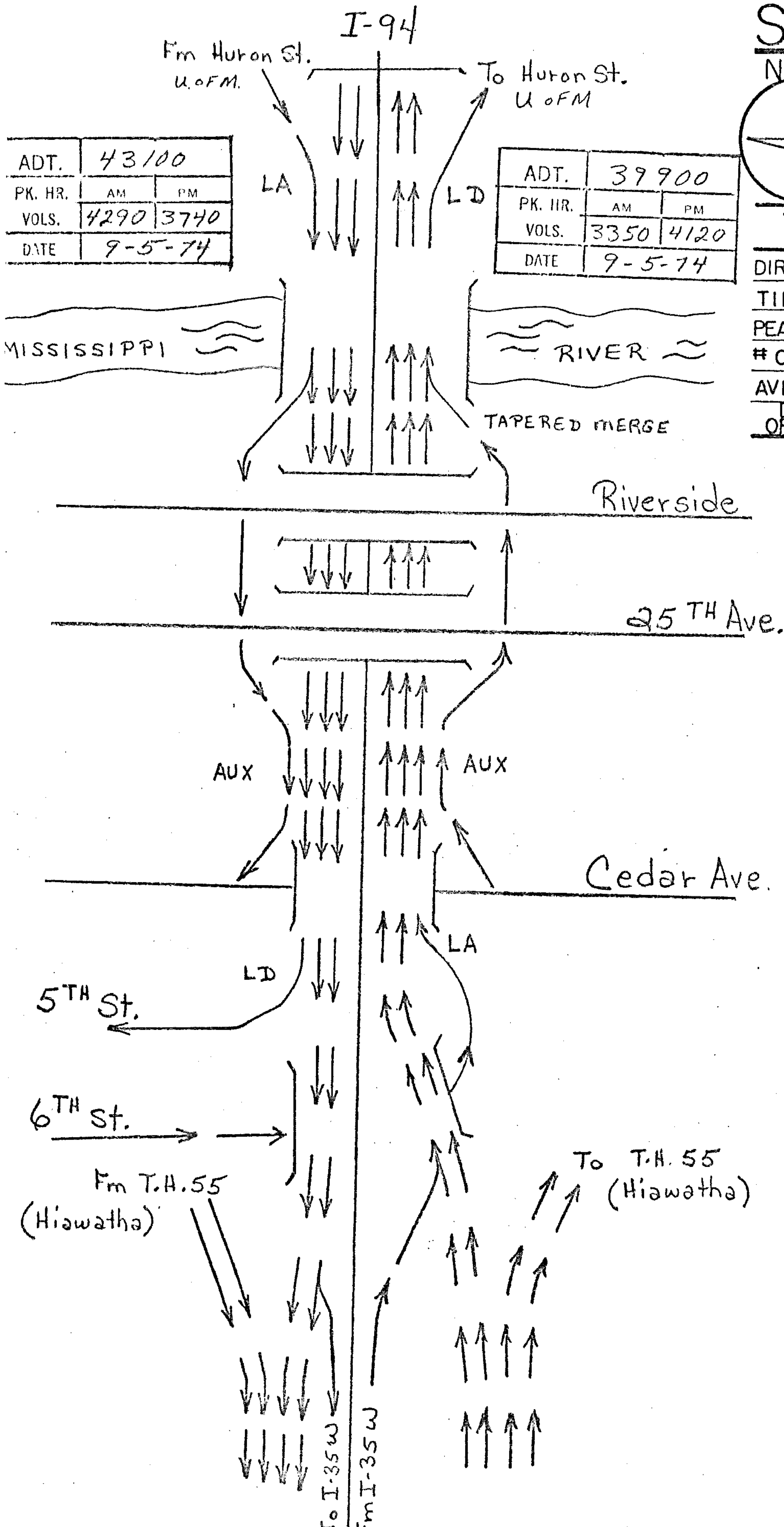
North	Route	From E JcT. 35W	
	# 94	To HENN-RAMSEY CO. LINE	
	Direction	EBL	WBL
	Length	2.8	2.8

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:00-5:00	7:30-8:30	4:30-5:30
# OF RUNS	8	3	8	4
AVE SPEED	38	44	35	45
DATE OF RUNS	6-73	10-73	6-73	10-73

Accident Data

YEAR	RATE	AVE RATE
1972	5.8	4.4
1973	5.3	
1974	2.1	



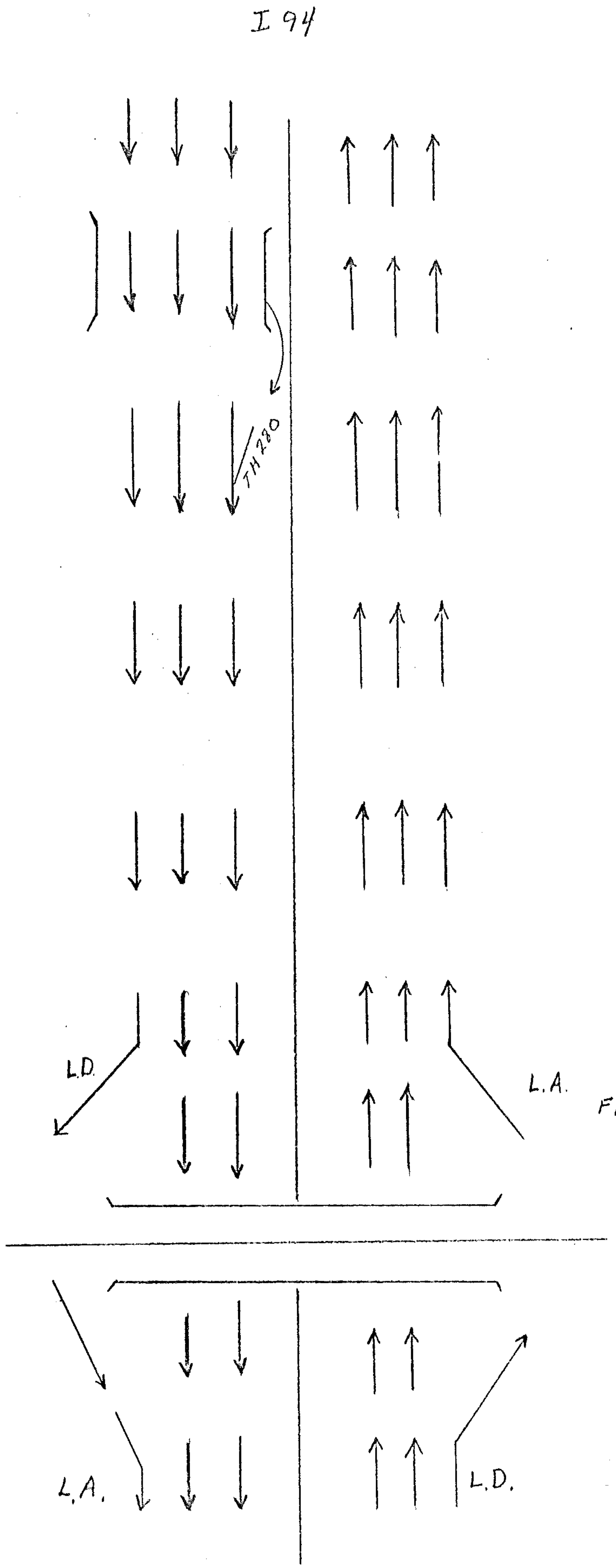
ADT.	43100
PK. HR.	AM / PM
VOLS.	4290 / 3740
DATE	9-5-74

ADT.	39900
PK. HR.	AM / PM
VOLS.	3350 / 4120
DATE	9-5-74

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 5 2 of



North	Route	From
	# 94	To
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Dat

YEAR	RATE	AVE

PREPARED SUMMER

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Sketch shows app
interchange confi

Segment # 6

North	Route # 94	From W. JcT. 35W	
		To E JcT. 35W	
	Direction	EBL	WBL
	Length	0.6	0.6

Travel Time Data

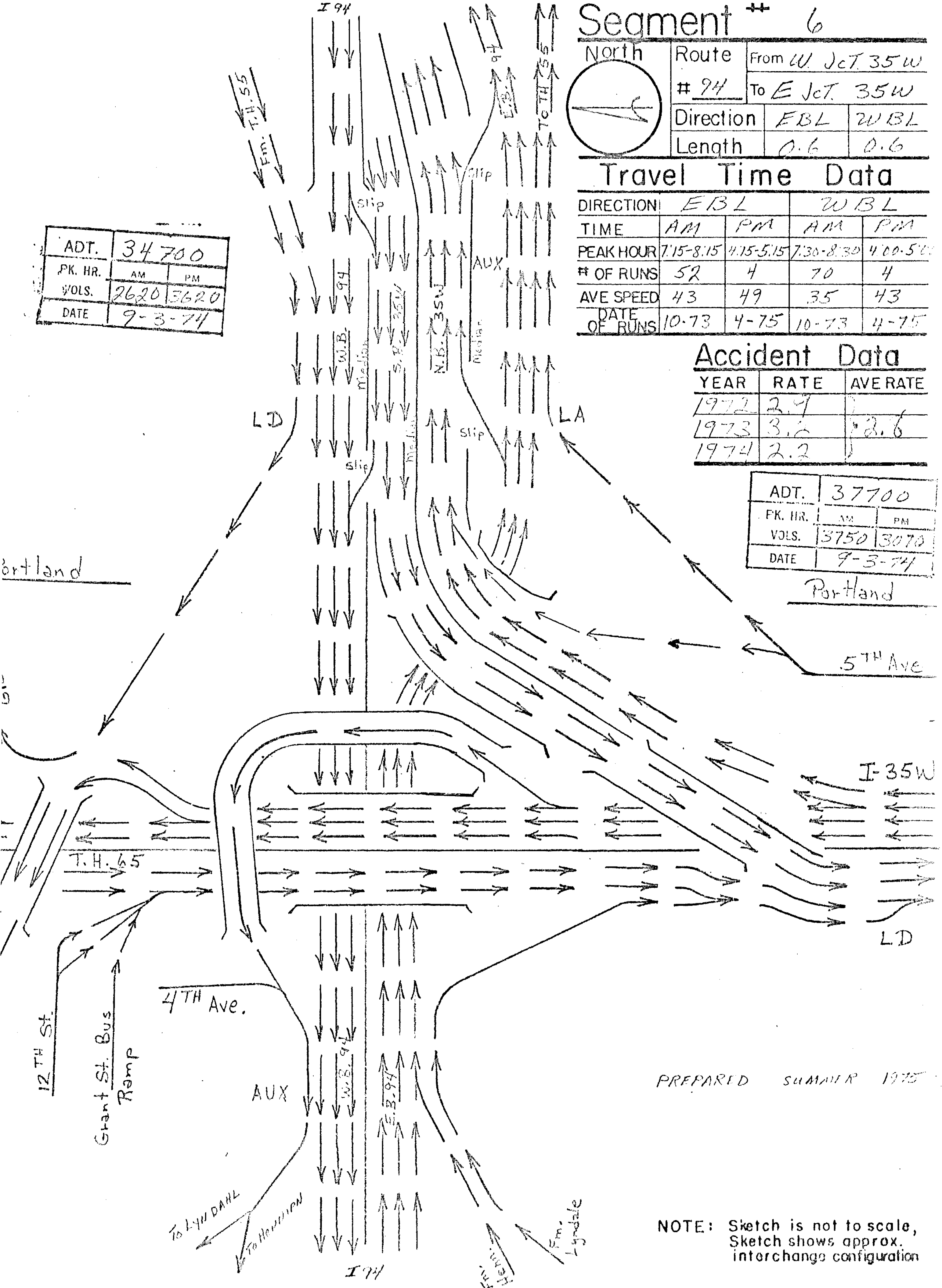
DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:15-5:15	7:30-8:30	4:00-5:00
# OF RUNS	52	4	70	4
AVE SPEED	43	49	35	43
DATE OF RUNS	10-73	4-75	10-73	4-75

Accident Data

YEAR	RATE	AVE RATE
1972	2.9	
1973	3.2	2.6
1974	2.2	

ADT.	34700	
PK. HR.	AM	PM
VOLS.	2620	3620
DATE	9-3-74	

ADT.	37700	
PK. HR.	AM	PM
VOLS.	3750	3070
DATE	9-3-74	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 7

Route	From 35W	
# 94	To HAWTHOR	
Direction	EBL	W
Length	1.6	1.

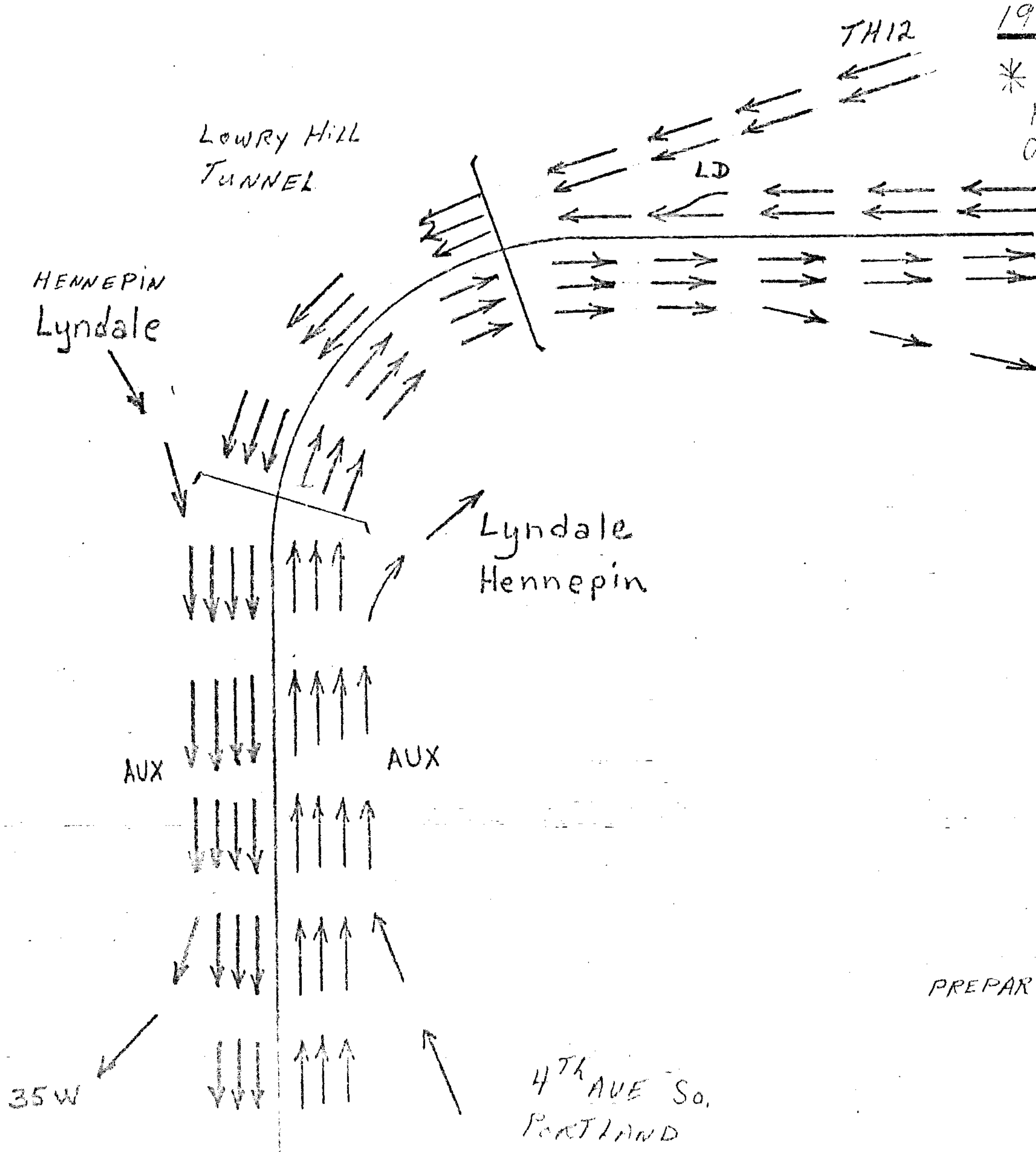
Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:
# OF RUNS	4	4	2	
AVE SPEED	48	50	51	5
DATE OF RUNS	9-74	9-74	9-74	9

Accident Dat

* YEAR	RATE	AVE
1972		
1973	2.5	2
1974	2.6	2

* NO DATA AVAIL
FOR 1972. SEG
OPENED LATE 1



PREPARED SUMMER 1

I94

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Sketch shows app
interchange config

Segment # 8

North	Route # 94	From 59 th AVE N To 694	
	Direction	NBL	SBL
	Length	0.6	0.6

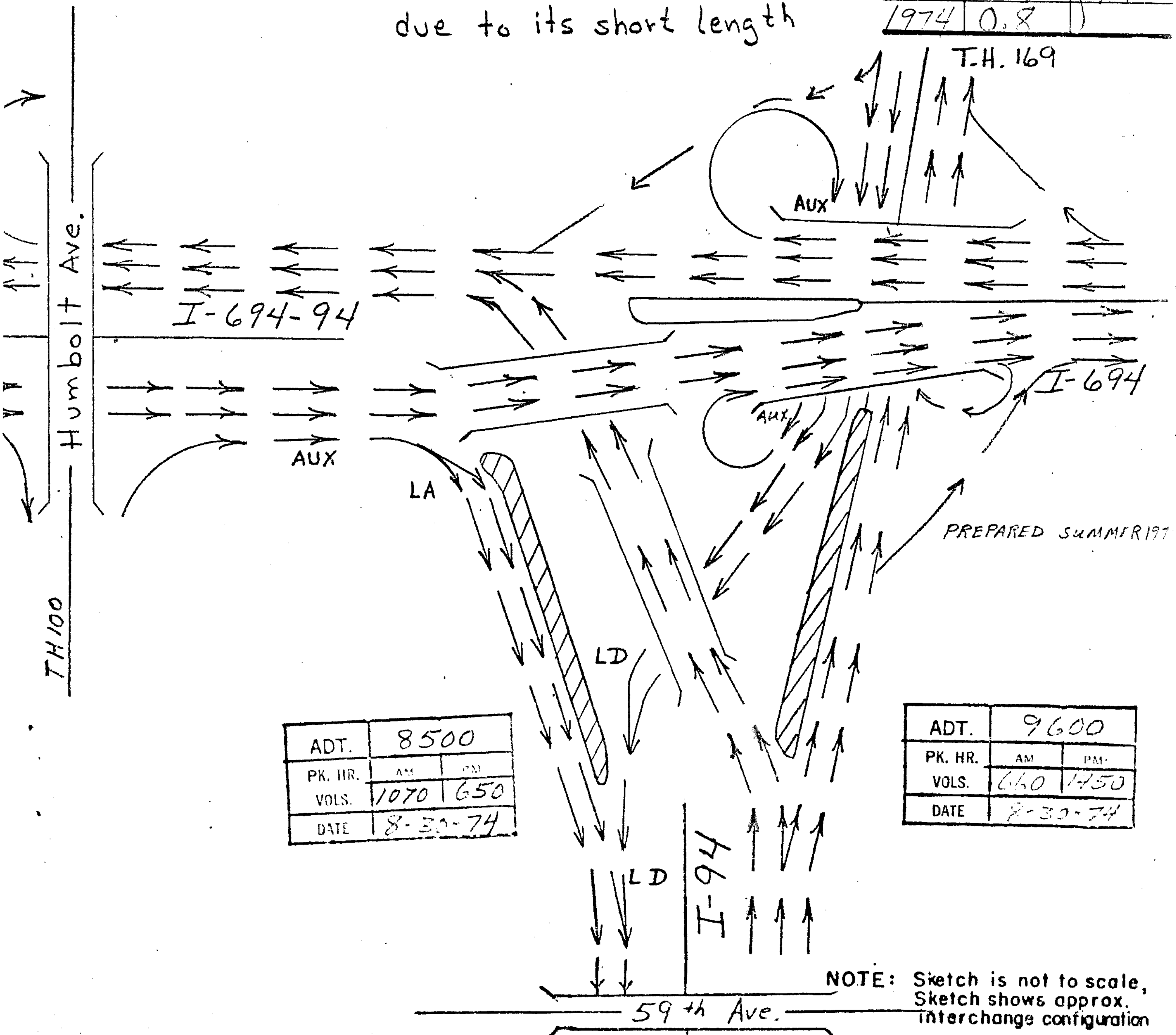
* Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:45-5:45	6:45-7:45	4:00-5:[illegible]
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

* Note: Travel time runs not made on this segment due to its short length

Accident Data

YEAR	RATE	AVE RATE
1972	2.1	1.1
1973	0.5	
1974	0.8	



ADT.	8500	
PK. HR. VOLS.	AM 1070	PM 650
DATE	8-30-74	

ADT.	9600	
PK. HR. VOLS.	AM 660	PM 1450
DATE	8-30-74	

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 9

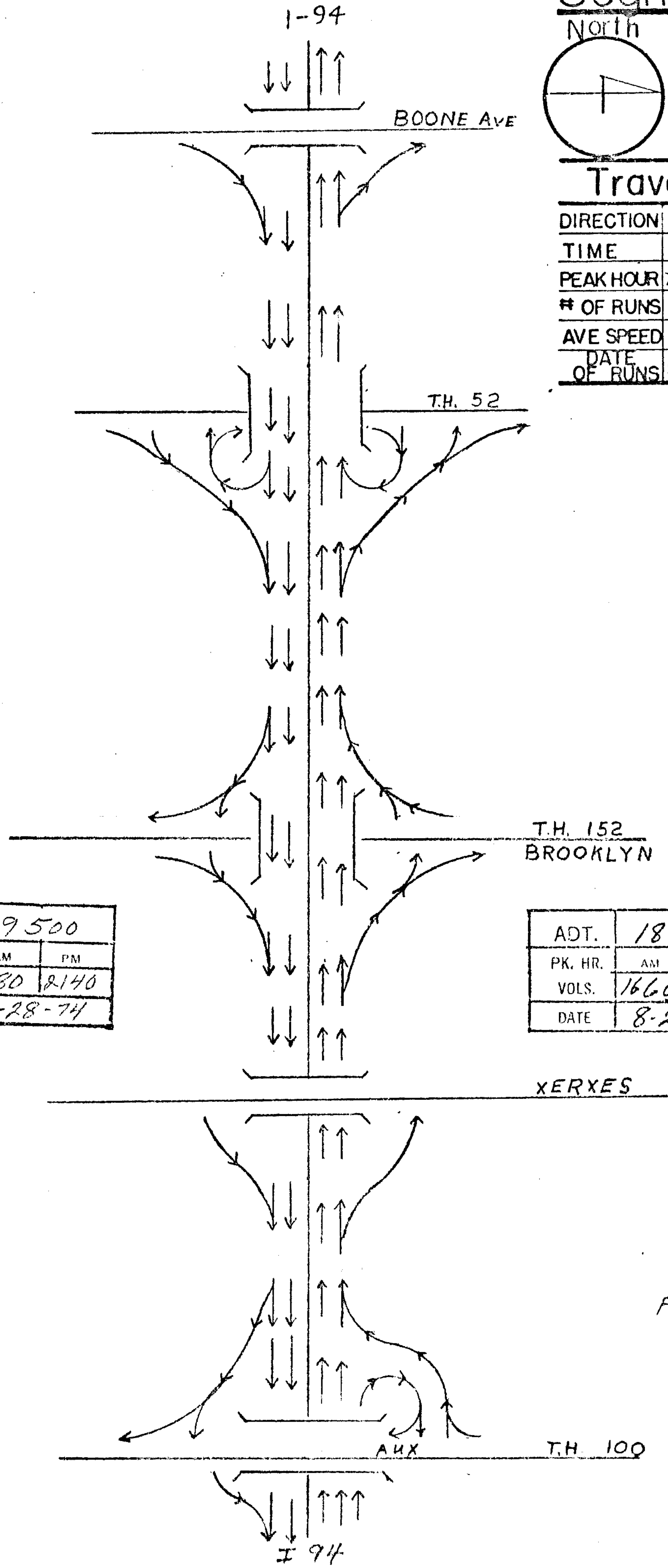
North	Route	From TH 16	
	# 94	To TH 52	
	Direction	EBL	W
	Length	4.4	4.

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	P
PEAK HOUR	7:00-8:00	4:15-5:15	6:45-7:45	4:00
# OF RUNS	4	3	3	3
AVE SPEED	52	52	54	5
DATE OF RUNS	8-7-74	8-7-74	8-7-74	8-

Accident Data

YEAR	RATE	AVER
1972	1.5	
1973	2.8	2.
1974	2.1	



ADT.	19 500	
PK. HR.	AM	PM
VOLS.	2080	2140
DATE	8-28-74	

ADT.	18 800	
PK. HR.	AM	PM
VOLS.	1660	2220
DATE	8-28-74	

PREPARED SUMMER 197

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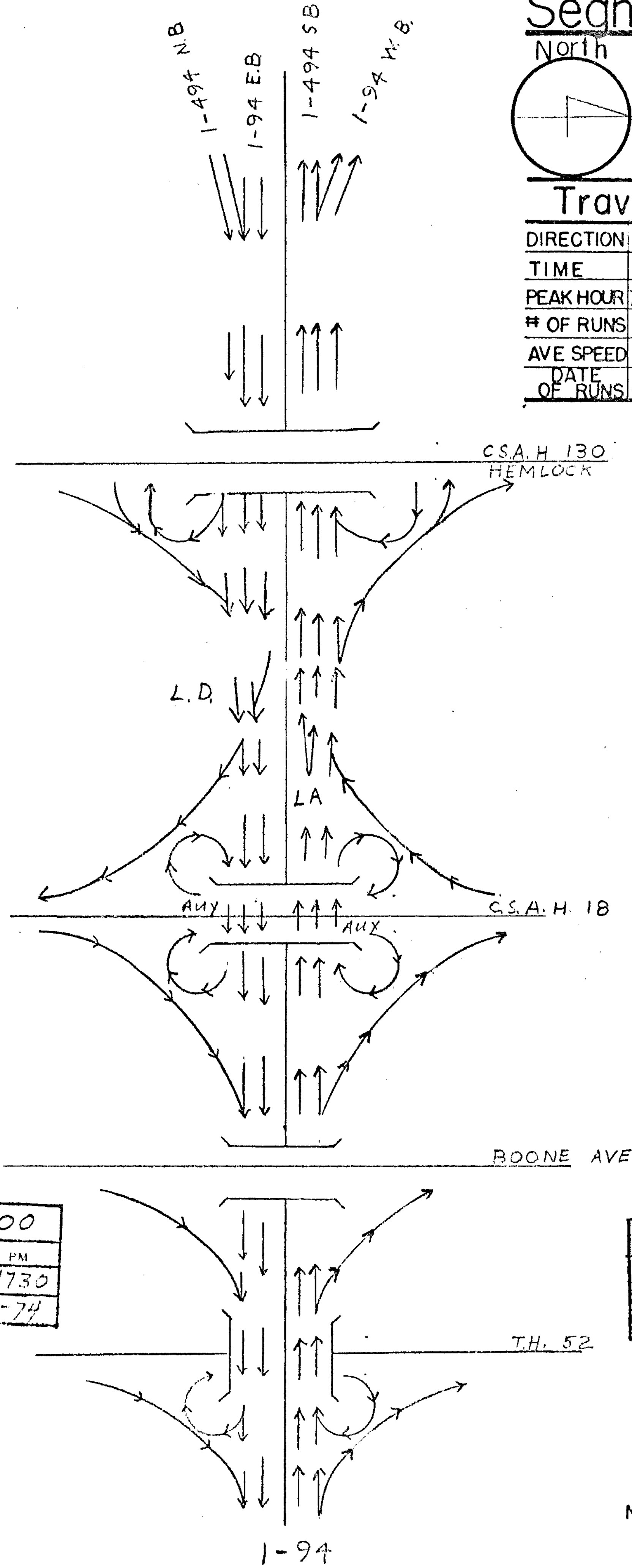
interchange configu



Segment # 10

1 OF 2

North	Route # 94	From 52	
		To 494	
	Direction	EBL	WBL
	Length	3.5	3.5

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	6:45-7:45	4:00-5:00
# OF RUNS	4	3	3	3
AVE SPEED	52	52	55	56
DATE OF RUNS	8-8-74	8-8-74	8-8-74	8-8-74

Accident Data

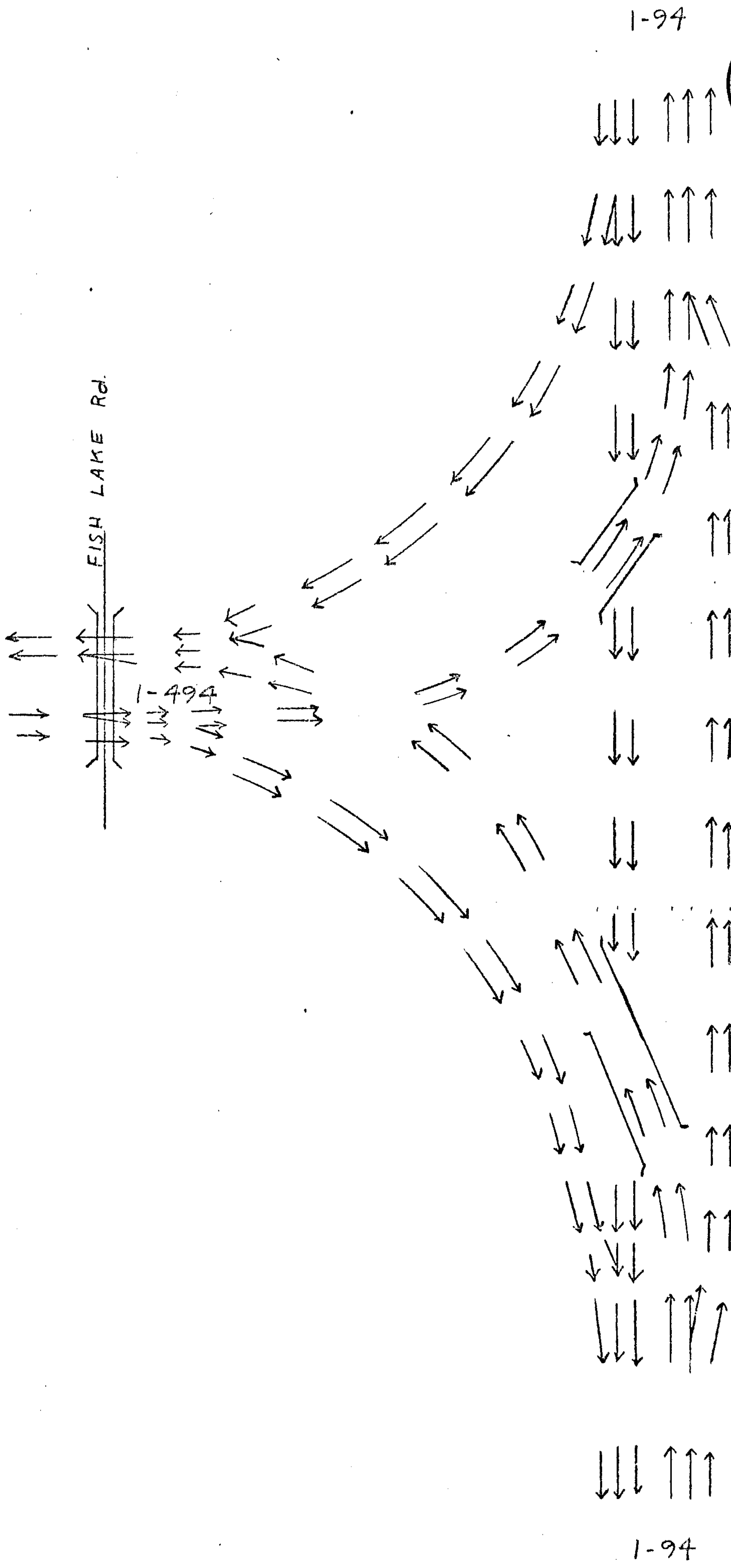
YEAR	RATE	AVE RATE
1972	NO DATA	
1973	0.9	1.1
1974	1.3	

ADT.	15400	
PK. HR. VOLS.	AM	PM
	1250	1730
DATE	7-23-74	

ADT.	12800	
PK. HR. VOLS.	AM	PM
	1330	1140
DATE	7-23-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration



Segment # 10 2 OF

North	Route	From
	# ___	To
	Direction	
	Length	

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE
.		

PREPARED SUMMER

NOTE: Sketch is not to sc
Sketch shows appr
interchange configu

Segment # 11

North	Route	From 55
	# 494	To 94

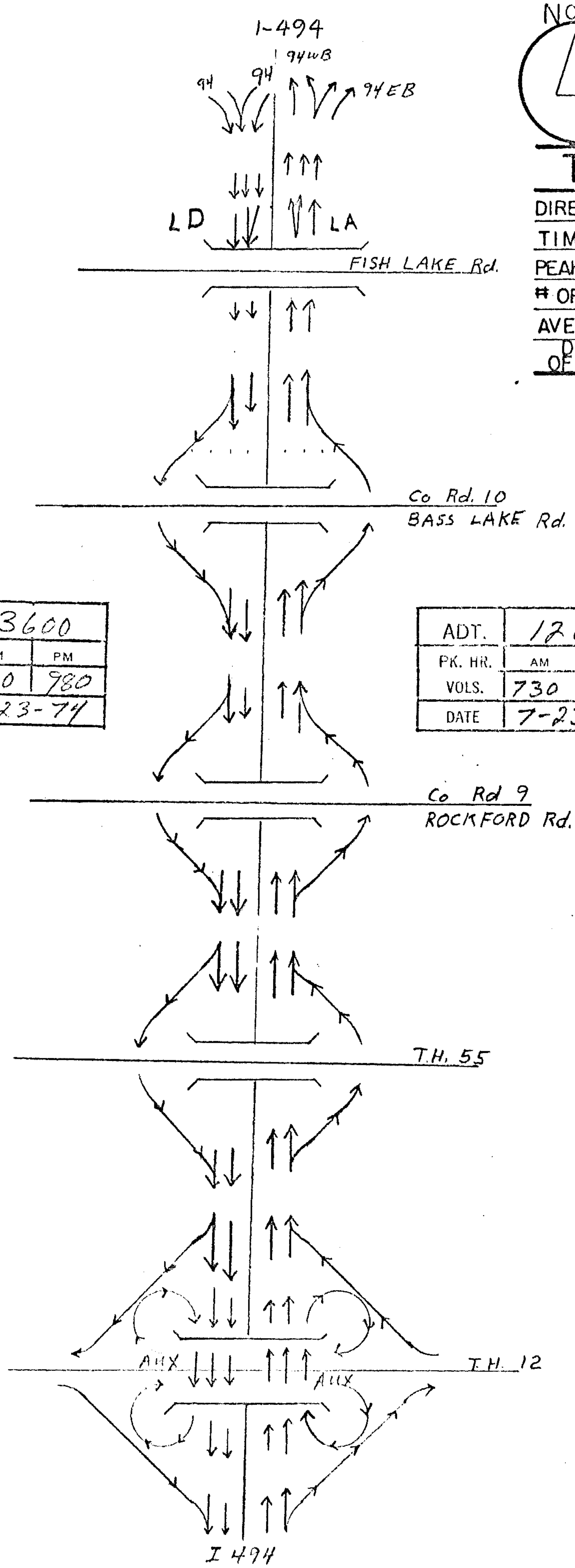
Direction	NBL	SBL
Length	5.7	5.7

Travel Time Data

DIRECTION	NBL		SBL	
TIME	Am	Pm	Am	Pm
PEAK HOUR	7:00-8:00	4:15-5:15	6:45-7:45	4:00-5
# OF RUNS	5	4	5	4
AVE SPEED	61	56	55	56
DATE OF RUNS	8-13-74	8-13-74	8-13-74	8-13-

Accident Data

YEAR	RATE	AVE RATE
1972	0.7	
1973	1.4	0.9
1974	0.7	



ADT.	13600	
PK. HR.	AM	PM
VOLS.	1760	980
DATE	7-23-74	

ADT.	12600	
PK. HR.	AM	PM
VOLS.	730	1660
DATE	7-23-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 12

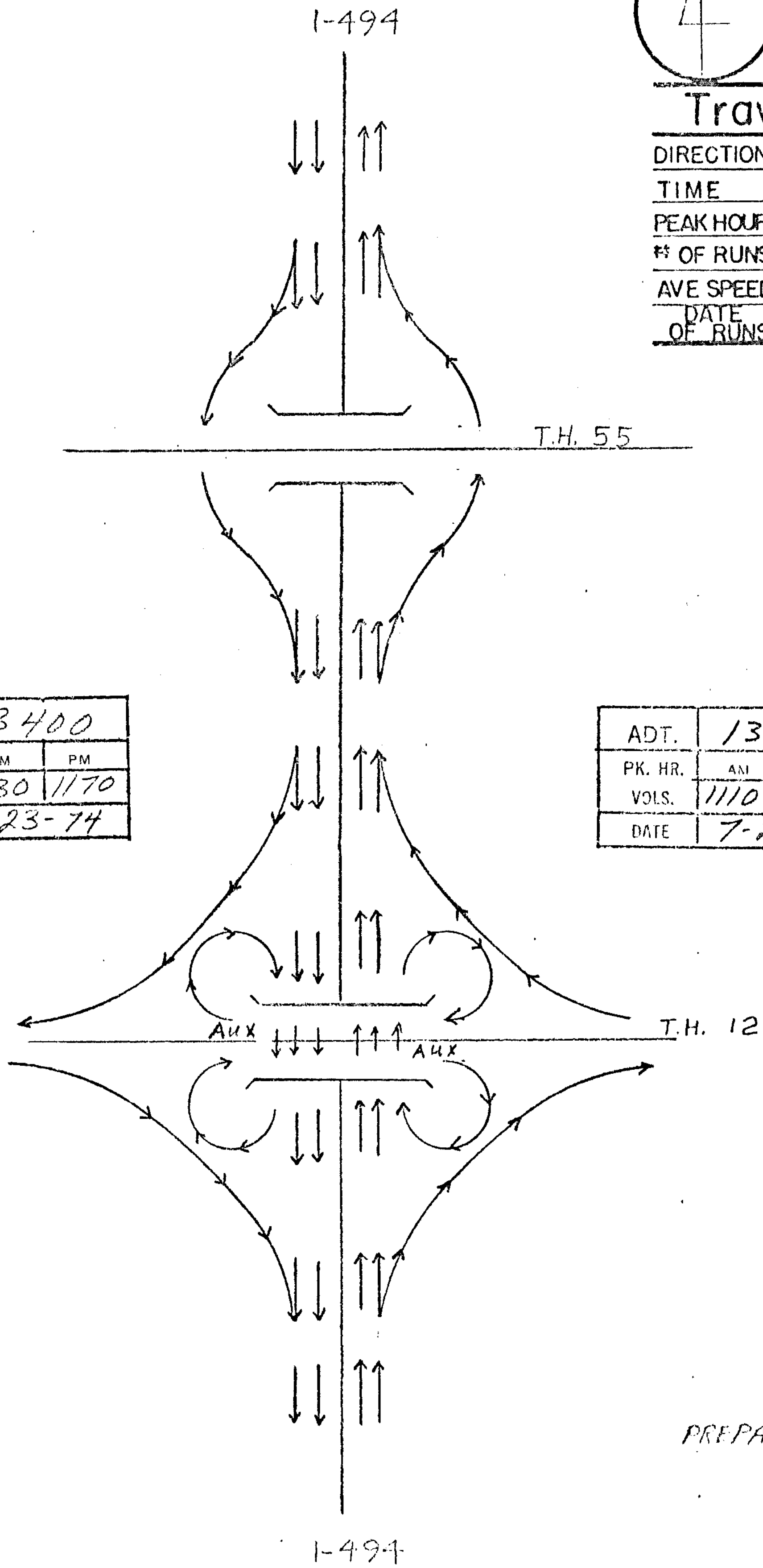
North	Route	From 55
	# 494	To 12
	Direction	NBL	S
	Length	2.8	2

Travel Time Dat

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:
# OF RUNS	5	4	6	
AVE SPEED	57	56	56	
DATE OF RUNS	8-13-74	8-13-74	8-13-74	8

Accident Dat

YEAR	RATE	AVE
1972	1.2	
1973	0.5	
1974	1.6	



ADT.	13400	
PK. HR. VOLS.	AM 1430	PM 1170
DATE	7-23-74	

ADT.	13 300	
PK. HR. VOLS.	AM 1110	PM 1490
DATE	7-23-74	

PREPARED SUMMER 197

NOTE: Sketch is not to s
Sketch shows app
interchange confi

Segment # 13

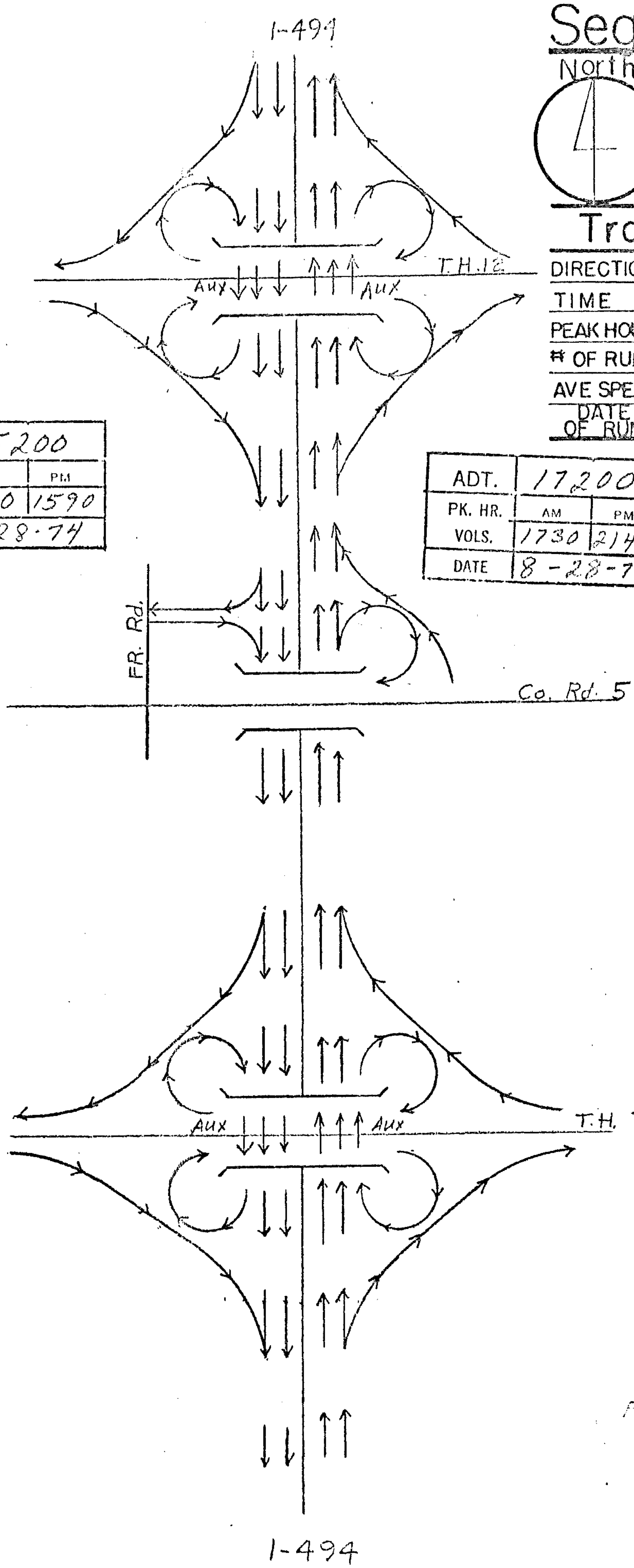
North	Route # 494	From 7	
		To 12	
	Direction	NBL	SBL
	Length	3.2	3.2

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:30-5:30	7:15-8:15	4:30-5:30
# OF RUNS	4	4	3	4
AVE SPEED	59	61	59	56
DATE OF RUNS	8-15-74	8-15-74	8-15-74	[illegible]

Accident Data

YEAR	RATE	AVE RATE
1972	1.5	
1973	1.1	1.2
1974	0.9	



ADT.	15200	
PK. HR.	AM	PM
VOLS.	1570	1590
DATE	8-28-74	

ADT.	17200	
PK. HR.	AM	PM
VOLS.	1730	2140
DATE	8-28-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale,
Sketch shows approx.
interchange configuration

Segment 14

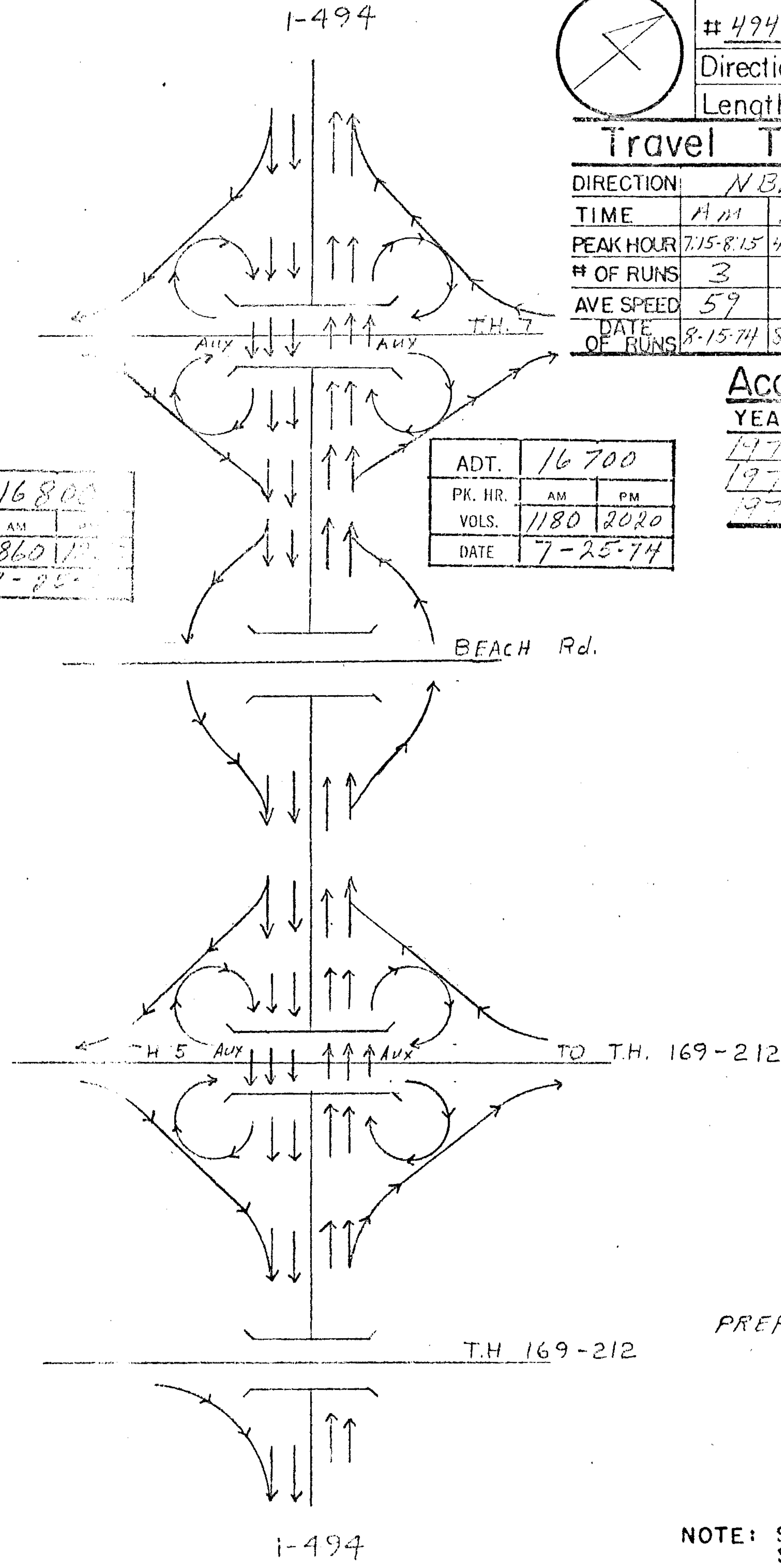
North	Route	169 & 21[illegible]	
	# 494	7	
	Direction	NBL	S[illegible]
	Length	0.6	0.[illegible]

Travel Tim[illegible] Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	P[illegible]
PEAK HOUR	7:15-8:15	4:30[illegible]	7:15-8:15	4:3[illegible]
# OF RUNS	3	4	3	[illegible]
AVE SPEED	59	57	57	5[illegible]
DATE OF RUNS	8-15-74	8-15-[illegible]	8-15-74	[illegible]

Acci[illegible]nt Data

YEAR	[illegible]ATE	AVE[illegible]
1972	0.4	
1973	1	0.[illegible]
1974	0.7	



ADT.	16800	
PK. HR.	AM	[illegible]
VOLS.	1860	[illegible]
DATE	7-25-[illegible]	

ADT.	16700	
PK. HR.	AM	PM
VOLS.	1180	2020
DATE	7-25-74	

PREPARED SUMMER [illegible]

NOTE: Sketch is not to sc[illegible]
Sketch shows appro[illegible]
int[illegible]change configu[illegible]

Segment # 15

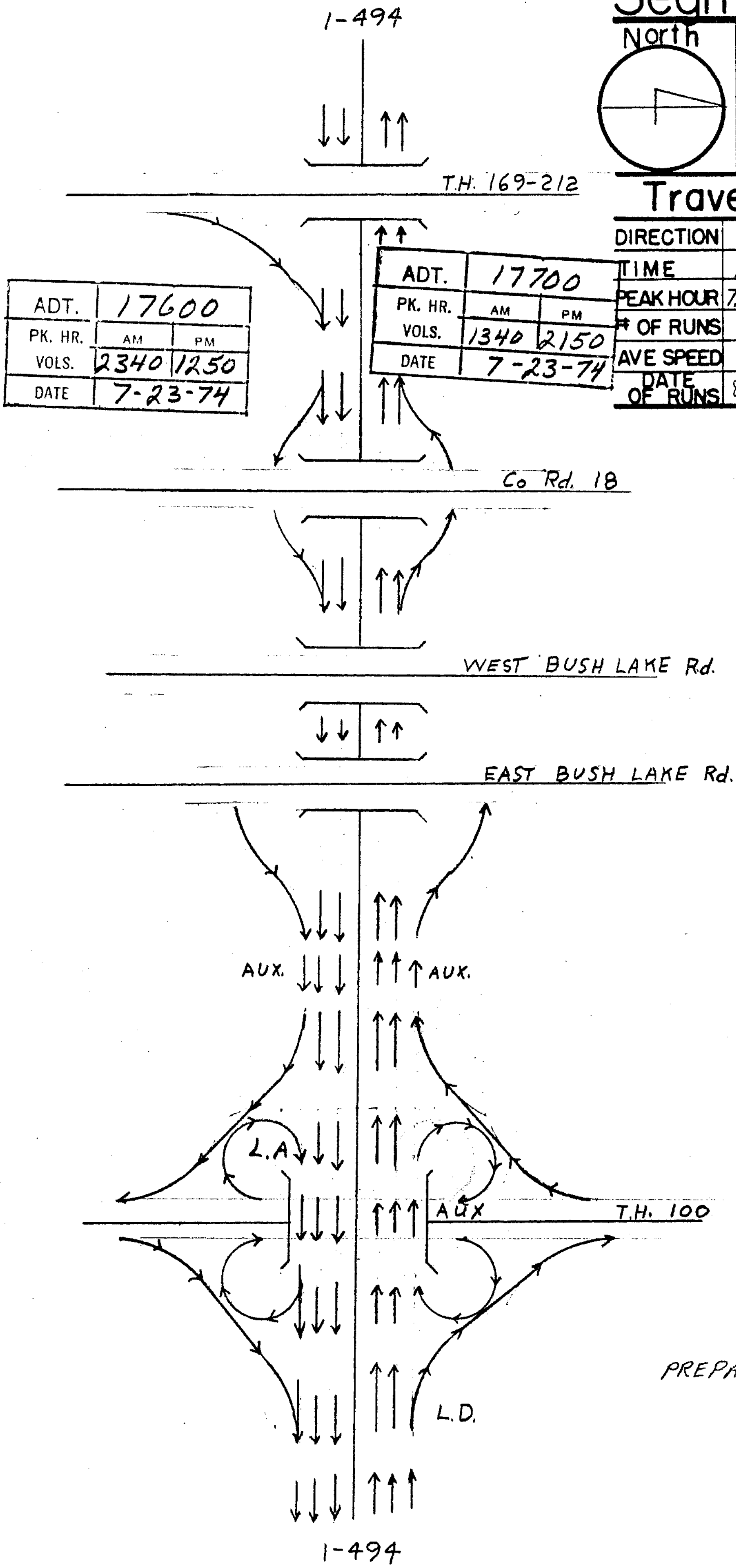
North	Route	From 100	
	# 494	To 169 & 212	
	Direction	EBL	WBL
	Length	3.8	3.8

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:15-5:15	7:15-8:15	4:15-5:15
# OF RUNS	4	4	3	4
AVE SPEED	55	59	57	56
DATE OF RUNS	8-20-74	8-20-74	8-20-74	8-20-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.3	
1973	2.4	1.6
1974	1.1	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 16

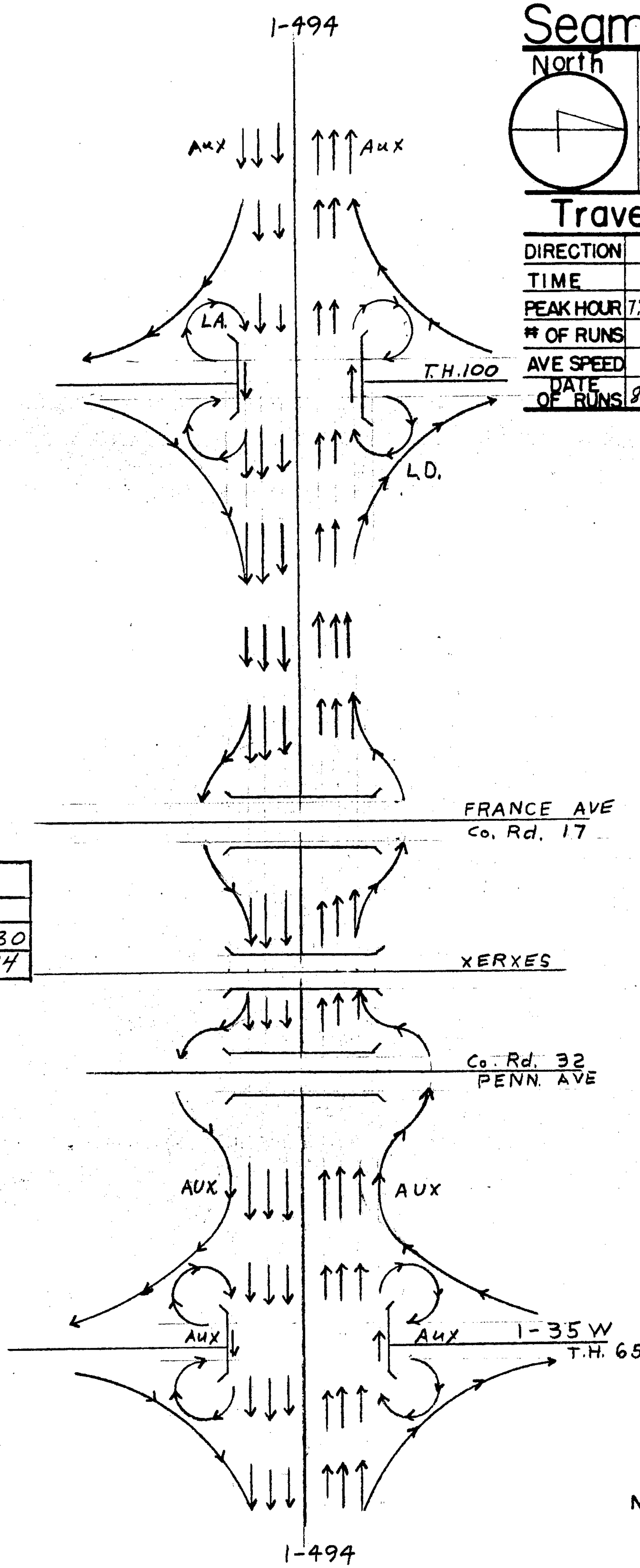
North	Route	From 35W	
	#494	To 100	
	Direction	EBL	WB[illegible]
	Length	2.6	2[illegible]

Travel Time Dat[a]

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	[illegible]
PEAK HOUR	7:15-8:15	4:15-5:15	7:15-8:15	4:3[illegible]
# OF RUNS	4	4	3	[illegible]
AVE SPEED	54	57	54	[illegible]
DATE OF RUNS	8-20-74	8-20-74	8-20-74	8-[illegible]

Accident Dat[a]

YEAR	RATE	AVE
1972	2.1	
1973	2.0	2[illegible]
1974	2.0	



ADT.	35100	
PK. HR.	AM	PM
VOLS.	3120	3230
DATE	7-23-74	

ADT.	33300	
PK. HR.	AM	PM
VOLS.	3220	3480
DATE	7-23-74	

PREPARED SUMMER [illegible]

NOTE: Sketch is not to s[illegible]
Sketch shows appr[illegible]
interchange config[illegible]

Segment # 17

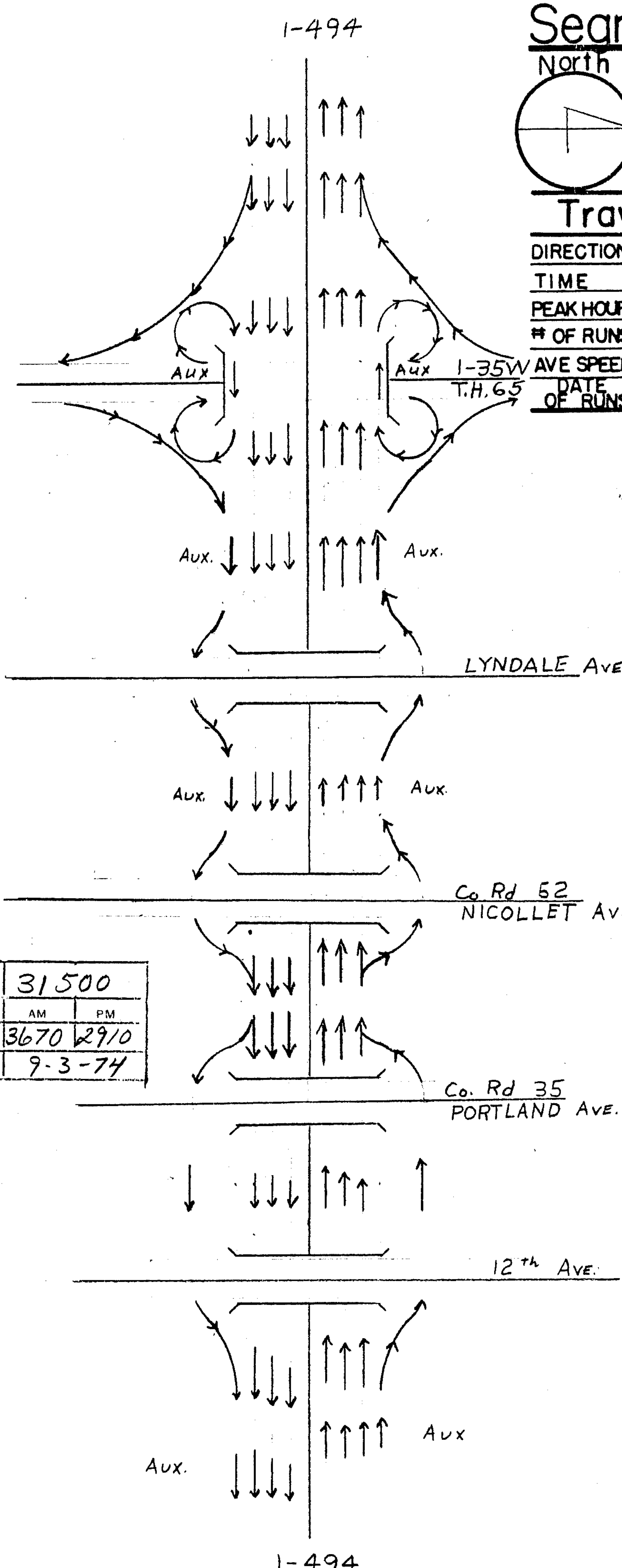
North	Route	From	35W	
	# 494	To	36	
	Direction		EBL	WBL
	Length		1.2	1.2

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:15-5:15	7:15-8:15	4:30-5:30
# OF RUNS	3	4	3	3
AVE SPEED	54	57	54	55
DATE OF RUNS	8-21-74	8-21-74	8-21-74	8-21-74

Accident Data

YEAR	RATE	AVE RATE
1972	2.1	
1973	2.9	2.5
1974	2.4	



ADT.	31500	
PK. HR. VOLS.	AM	PM
	3670	2910
DATE	9-3-74	

ADT.	31600	
PK. HR. VOLS.	AM	PM
	2780	3890
DATE	9-3-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 17 20

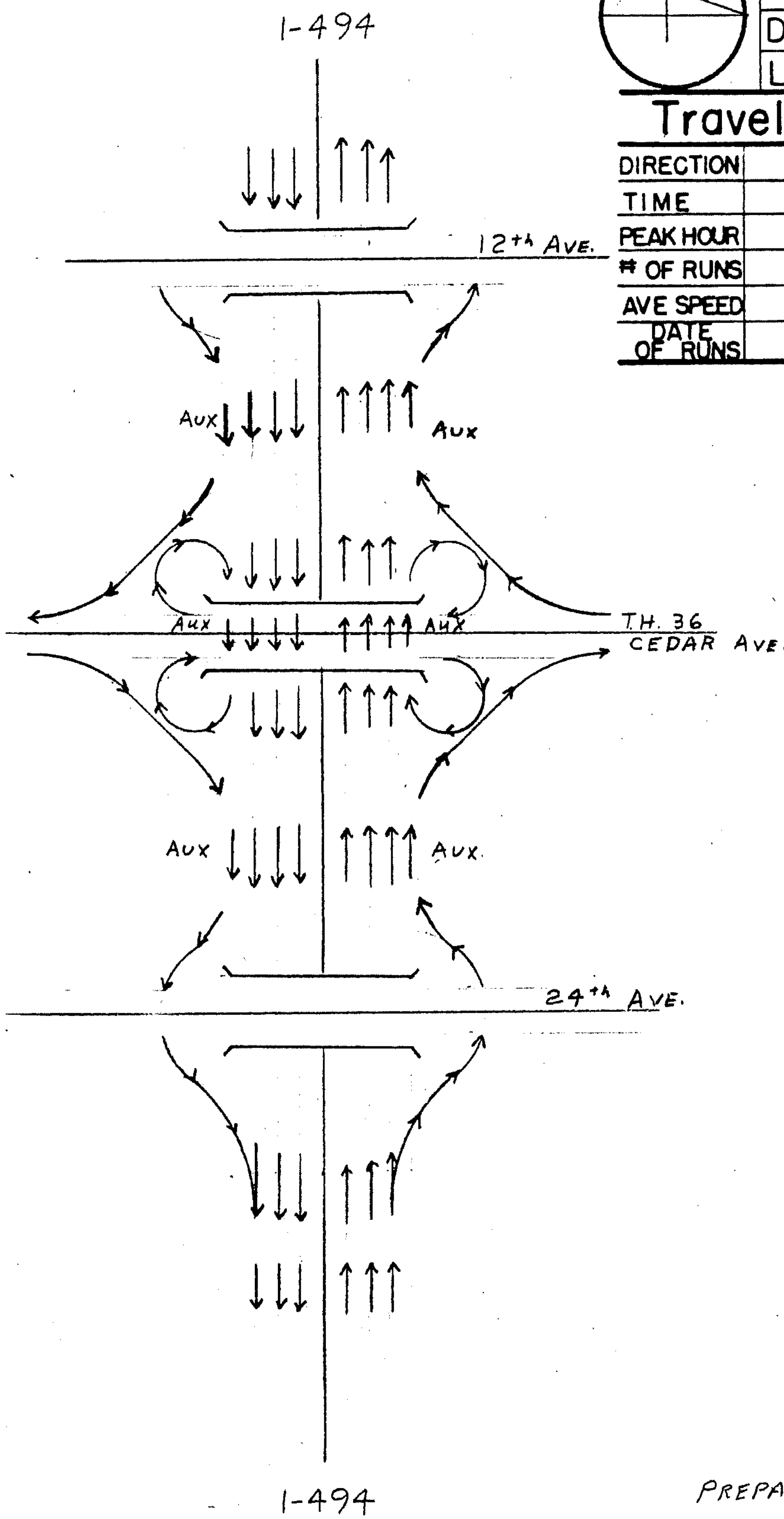
North	Route	From
	# 494	To
	Direction	
	Length	

Travel Time Dat

DIRECTION					
TIME					
PEAK HOUR					
# OF RUNS					
AVE SPEED					
DATE OF RUNS					

Accident .Da

YEAR	RATE	AVE



PREPARED SUMMER 19

NOTE: Sketch is not to
Sketch shows app
interchange confi

Segment # 18

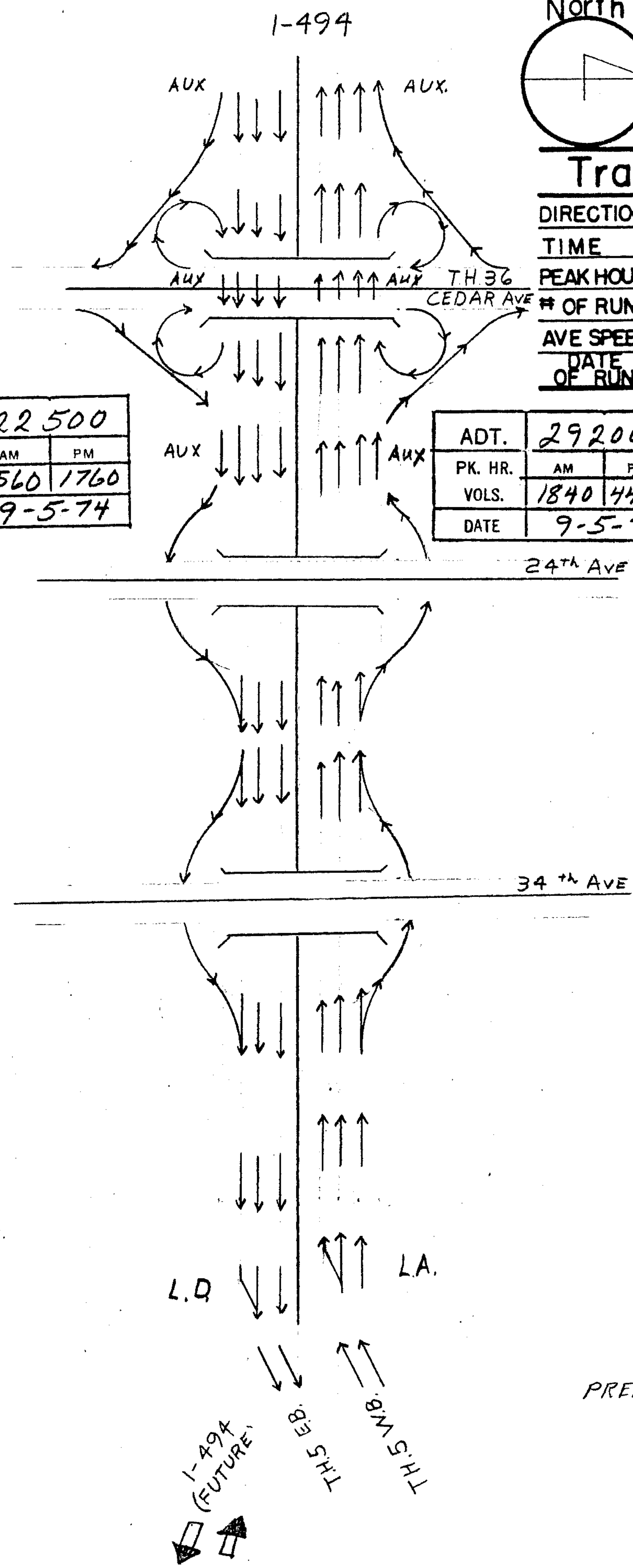
North	Route #494	From 34th AVE S.	
		To 36	
	Direction	EBL	WBL
	Length	1.2	1.2

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:15-5:15	7:15-8:15	4:30-5:30
# OF RUNS	3	4	3	3
AVE SPEED	55	57	54	56
DATE OF RUNS	8-21-74	8-21-74	8-21-74	8-21-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.1	1.4
1973	2.2	
1974	1.0	

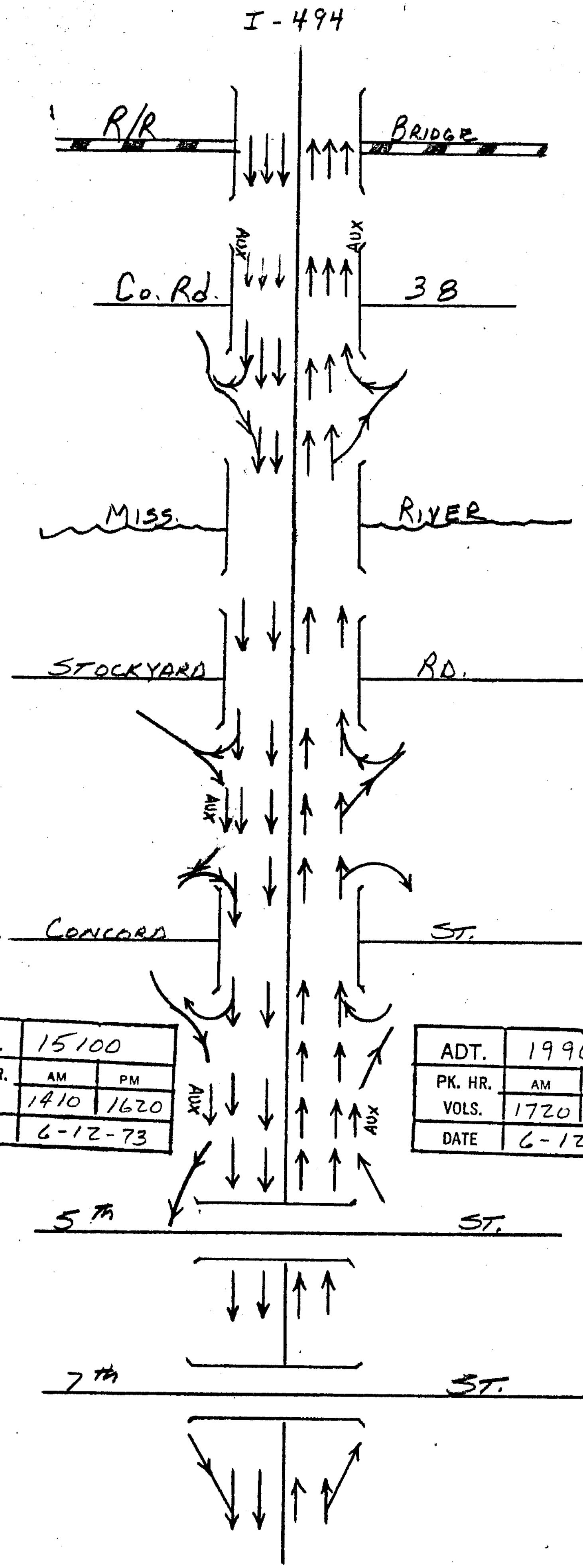


ADT.	22 500	
PK. HR. VOLS.	AM 3560	PM 1760
DATE	9-5-74	

ADT.	29200	
PK. HR. VOLS.	AM 1840	PM 4490
DATE	9-5-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.



ADT.	15100	
PK. HR. VOLS.	AM	PM
	1410	1620
DATE	6-12-73	

ADT.	19900	
PK. HR. VOLS.	AM	PM
	1720	1810
DATE	6-12-73	

Segment # 19 1 of 2

North

Route # 494	From 7th AVE.	
	To T.H. 61	
Direction	EBL	WBL
Length	2.2	2.2

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-[illegible]
# OF RUNS	7	7	7	7
AVE SPEED	53	52	54	53
DATE OF RUNS	5-7-74	5-6-74	5-7-74	5-6-[illegible]

Accident Data

YEAR	RATE	AVE RA
1972	0.7	
1973	4.1	2.4
1974	2.4	

PREPARED SUMMER 197[illegible]

NOTE: Sketch is not to sca
Sketch shows approx
interchange configura

Segment # 19 2 OF 2

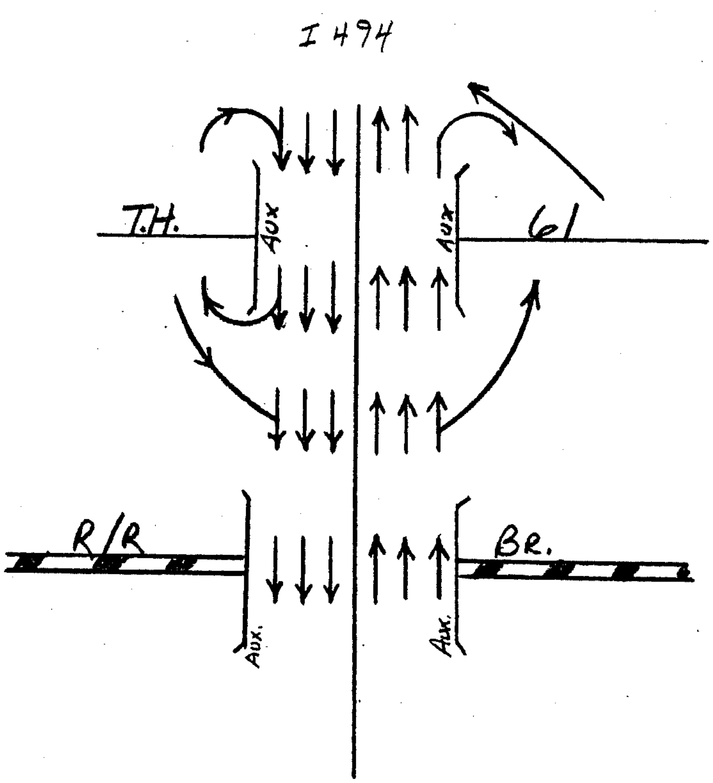
North	Route # 494	From	
		To	
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 20

North	Route	From 61	
	# 494	To 94 - 12	
	Direction	NBL	SBL
	Length	4.9	4.9

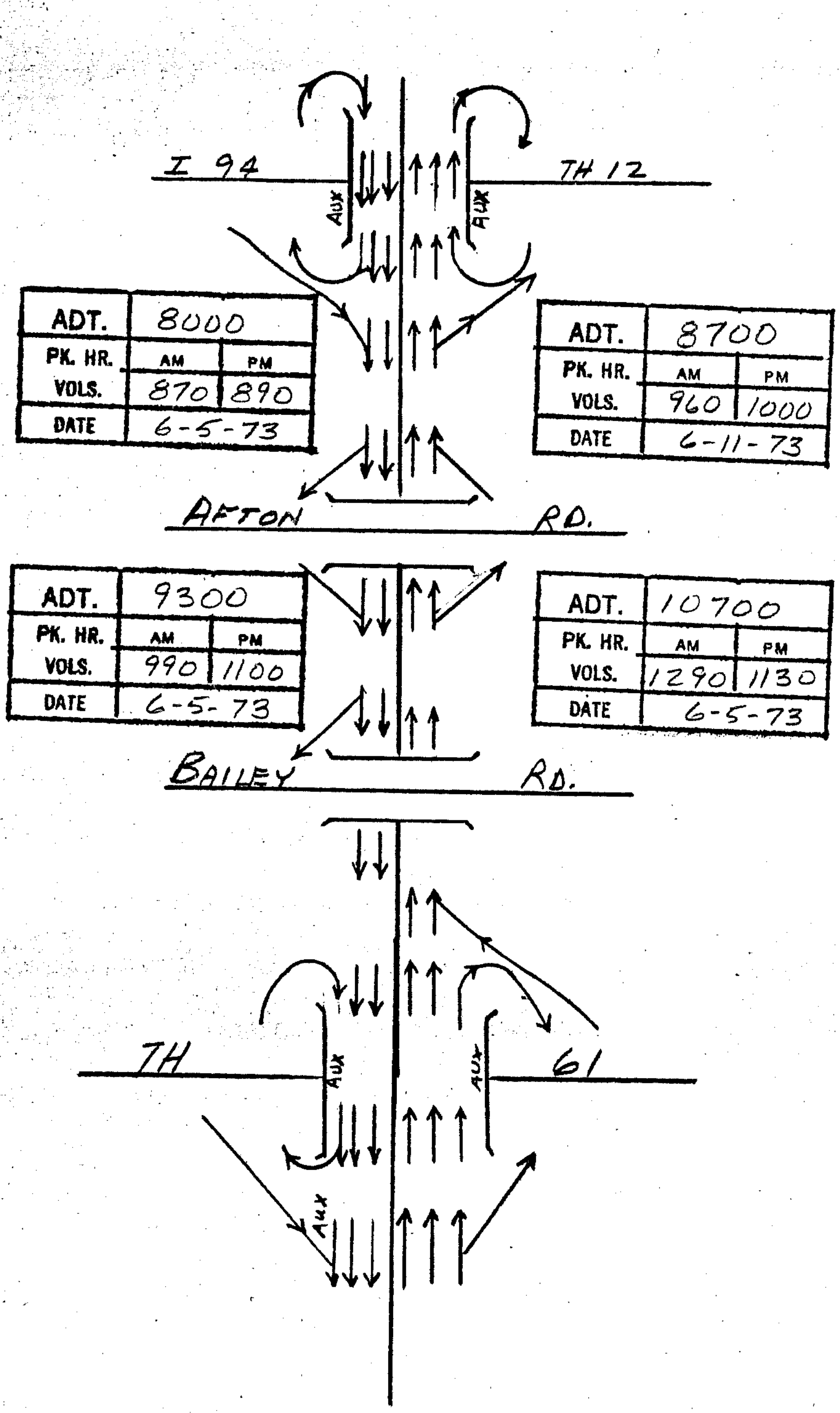
Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-
# OF RUNS	2	3	3	2
AVE SPEED	56	56	58	57
DATE OF RUNS	7-31-74	7-30-74	7-31-74	7-30

Accident Data

YEAR	RATE	AVE RA
1972	1.6	
1973	1.8	1.4
1974	0.9	

I-494



PREPARED SUMMER 197

NOTE: Sketch is not to sca
Sketch shows approx
interchange configura

Segment # 21

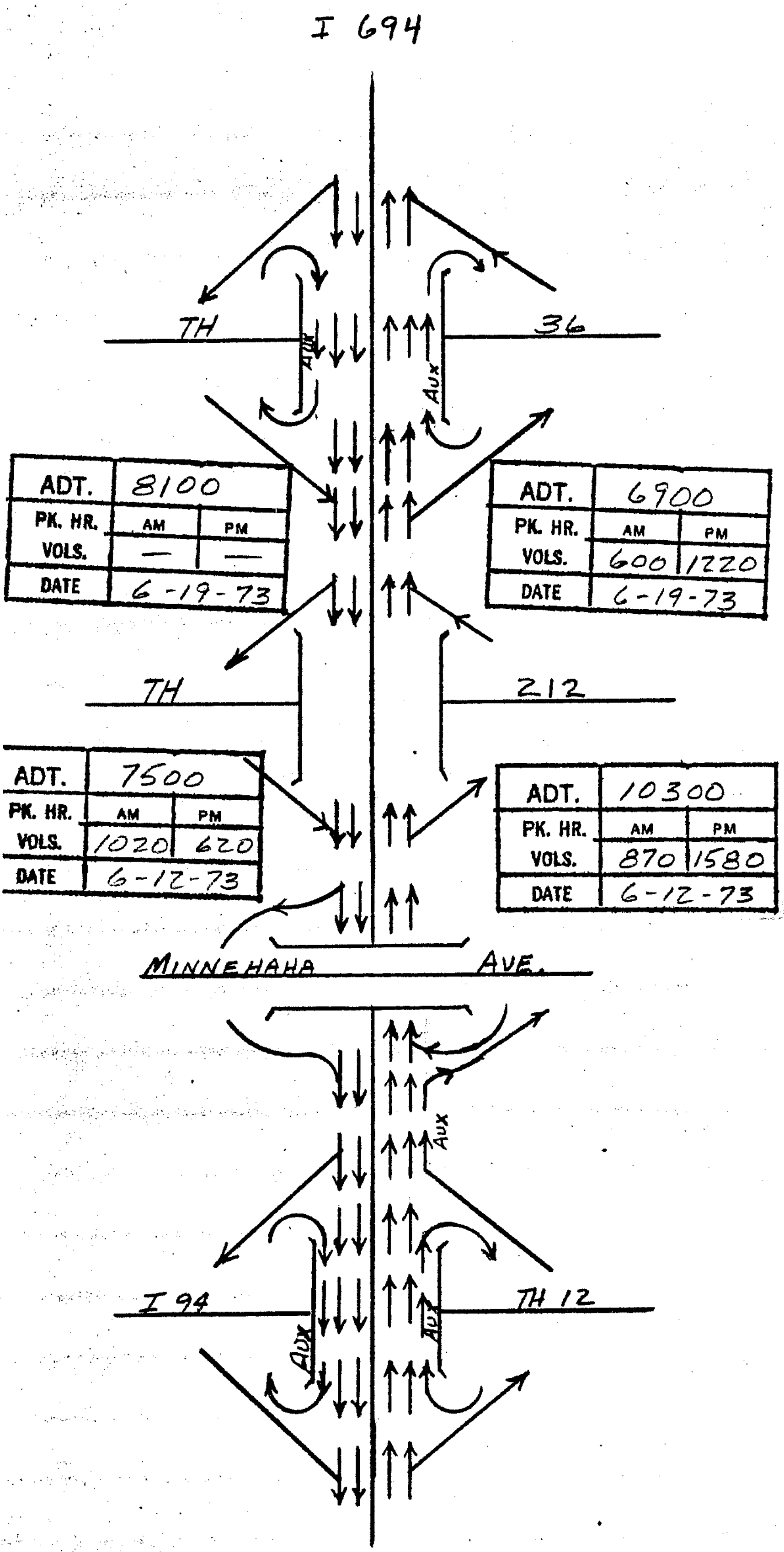
North	Route	From 94 & 12
	# 694	To 36
	Direction	NBL	SBL
	Length	5.7	5.7

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-5:15
# OF RUNS	2	3	3	2
AVE SPEED	58	57	54	57
DATE OF RUNS	7-31-74	7-30-74	7-31-74	7-30-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.3	
1973	0.7	0.9
1974	0.6	



ADT.	8100	
PK. HR.	AM	PM
VOLS.	—	—
DATE	6-19-73	

ADT.	6900	
PK. HR.	AM	PM
VOLS.	600	1220
DATE	6-19-73	

ADT.	7500	
PK. HR.	AM	PM
VOLS.	1020	620
DATE	6-12-73	

ADT.	10300	
PK. HR.	AM	PM
VOLS.	870	1580
DATE	6-12-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 22

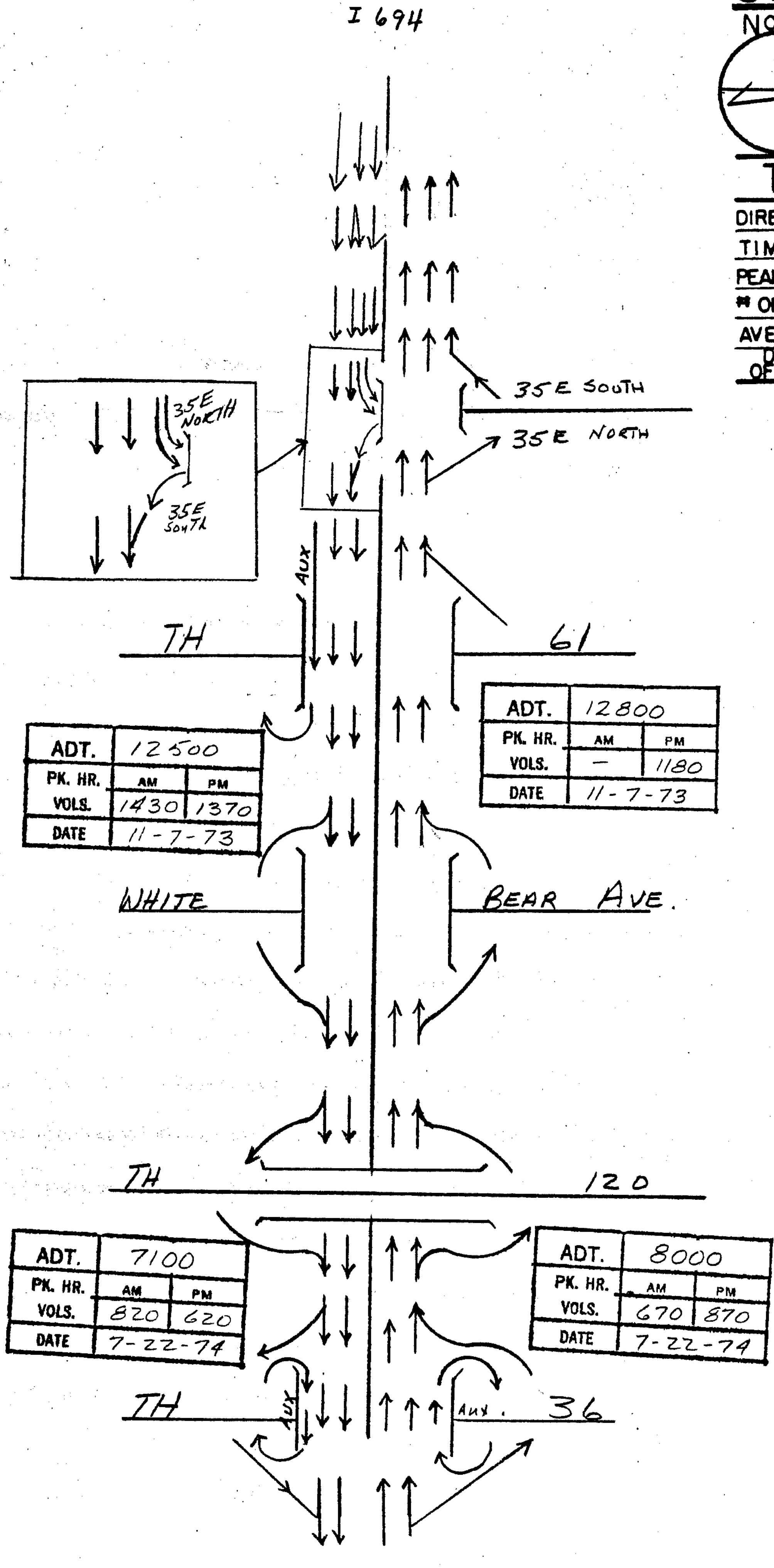
North	Route	From 36	
	# 694	To 35E	
	Direction	EBL	WB[L]
	Length	4.8	4.8

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	P[M]
PEAK HOUR	7:00-8:00	4:30-5:30	7:00-8:00	4:30-[...]
# OF RUNS	3	3	3	3
AVE SPEED	53	54	62	6[...]
DATE OF RUNS	8-6-74	8-5-74	8-6-74	8-5-[...]

Accident Data

YEAR	RATE	AVE RA[TE]
1972	1.0	
1973	0.7	1.1
1974	1.6	



ADT.	12500	
PK. HR.	AM	PM
VOLS.	1430	1370
DATE	11-7-73	

ADT.	12800	
PK. HR.	AM	PM
VOLS.	—	1180
DATE	11-7-73	

ADT.	7100	
PK. HR.	AM	PM
VOLS.	820	620
DATE	7-22-74	

ADT.	8000	
PK. HR.	AM	PM
VOLS.	670	870
DATE	7-22-74	

PREPARED SUMMER 19[...]

NOTE: Sketch is not to sca[le]
Sketch shows appro[...]
interchange configura[tion]

Segment # 23 1 of 2

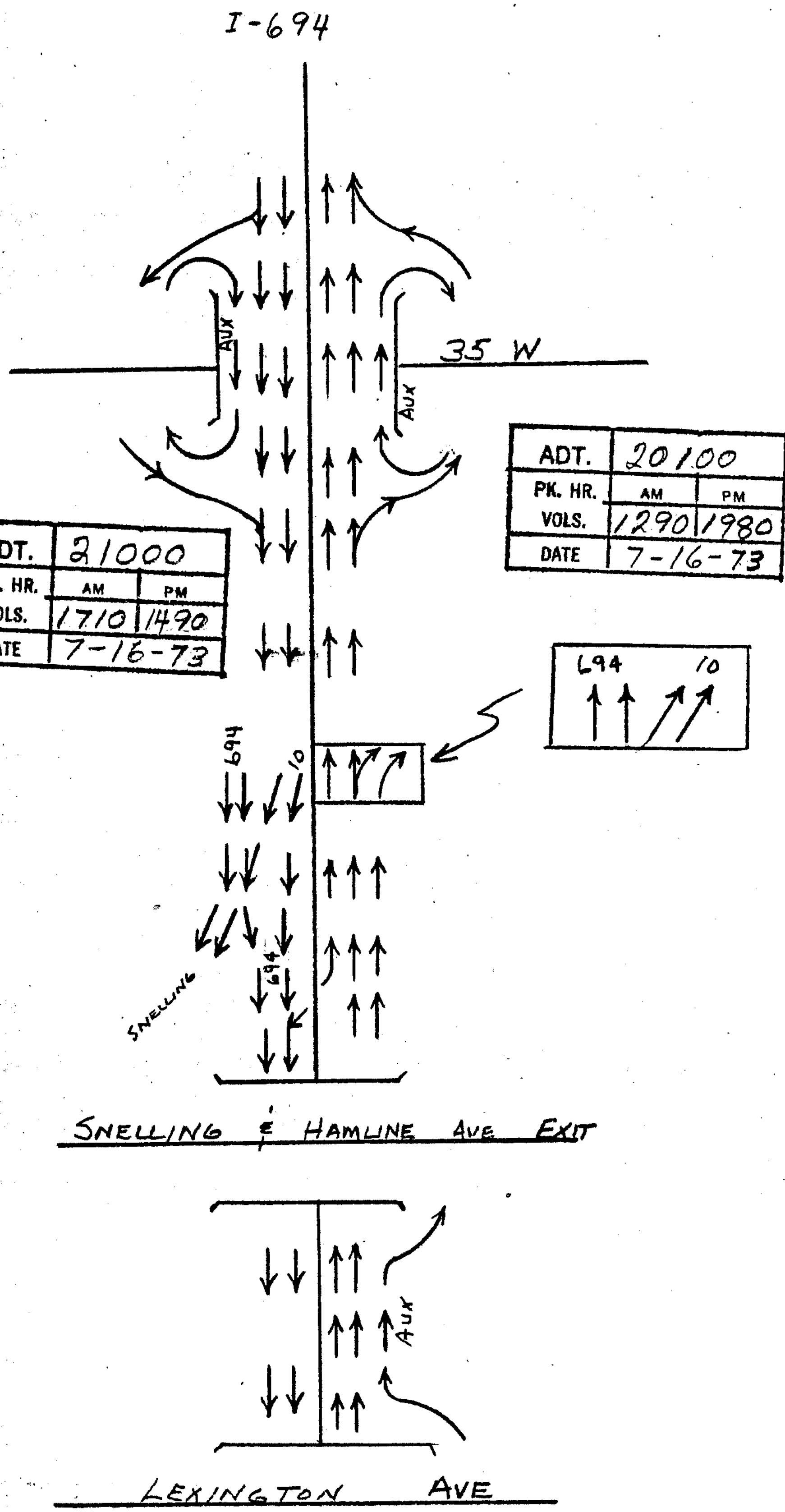
North	Route # 694	From 35E (E Jct)
		To 35W
	Direction	EBL / WBL
	Length	6.9 / 6.9

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:30-5:30	7:00-8:00	4:30-5:30
# OF RUNS	3	3	3	3
AVE SPEED	58	58	57	56
DATE OF RUNS	8-7-74	8-6-74	8-7-74	8-6-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.4	1.2
1973	1.1	
1974	1.1	



ADT.	21000	
PK. HR.	AM	PM
VOLS.	1710	1490
DATE	7-16-73	

ADT.	20100	
PK. HR.	AM	PM
VOLS.	1290	1980
DATE	7-16-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment 23 2 of 2

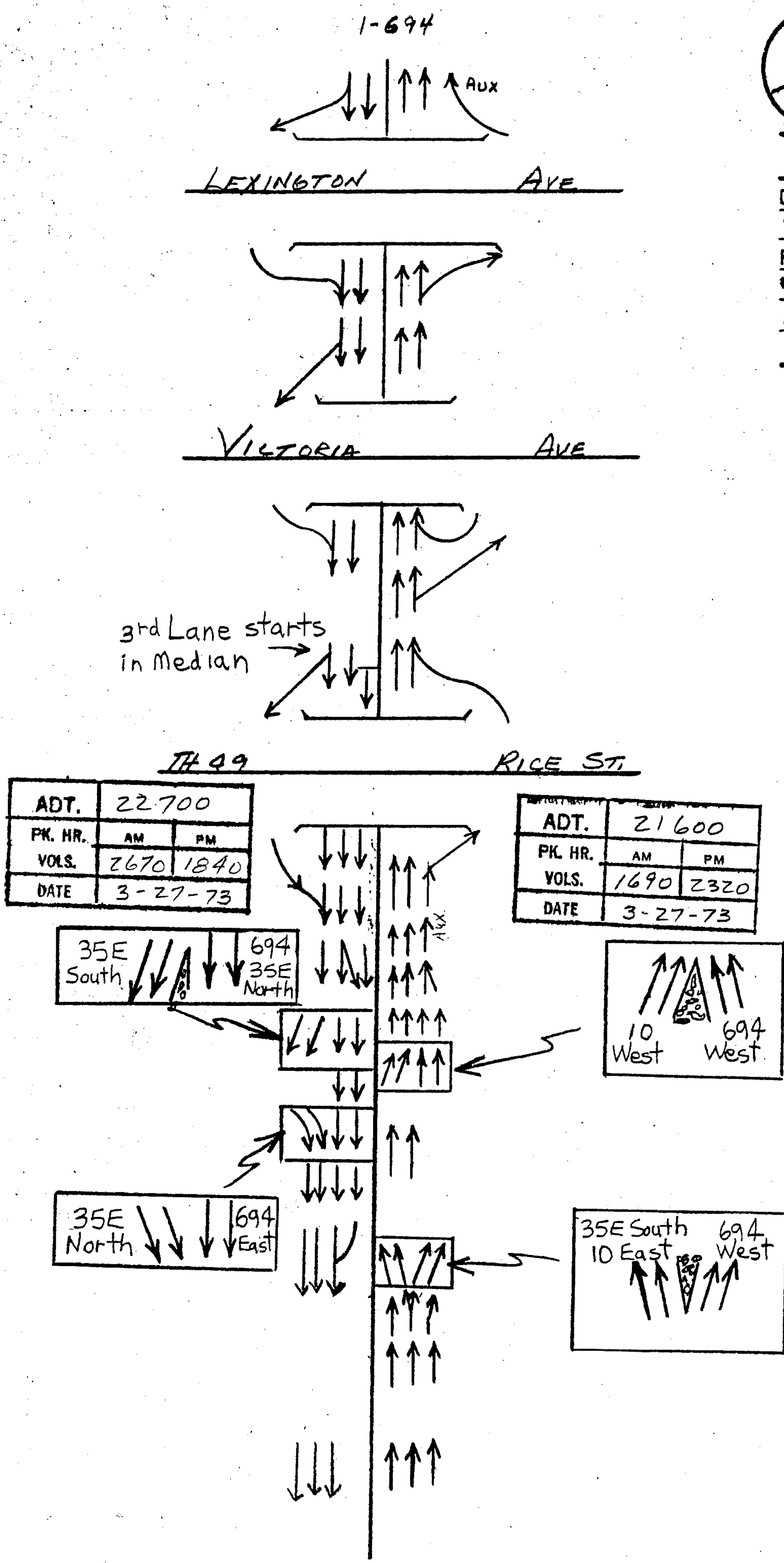
North	Route	From	
	#694	To	
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RA



PREPARED SUMMER 197

NOTE: Sketch is not to sc
Sketch shows appro
interchange configur

Segment 24

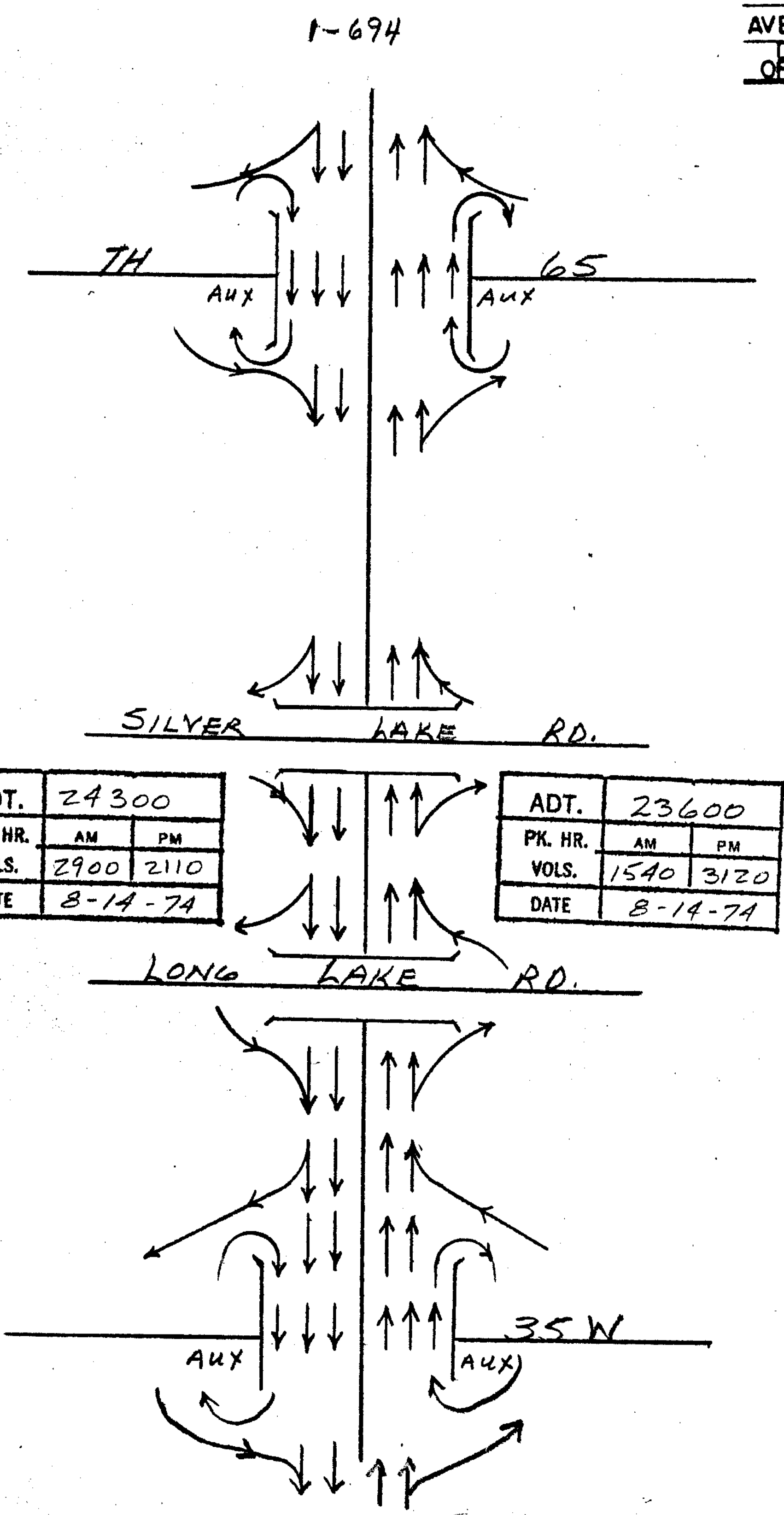
North	Route	From 35W	
	# 694	To TH 65	
	Direction	EBL	WBL
	Length	3.1	3.1

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:45-7:45	4:15-5:15	6:45-7:45	4:15-5:15
# OF RUNS	3	3	3	3
AVE SPEED	57	56	60	51
DATE OF RUNS	8-7-74	8-6-74	8-7-74	8-6-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.9	
1973	1.6	1.6
1974	1.2	



ADT.	24300	
PK. HR.	AM	PM
VOLS.	2900	2110
DATE	8-14-74	

ADT.	23600	
PK. HR.	AM	PM
VOLS.	1540	3120
DATE	8-14-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 25

1 OF

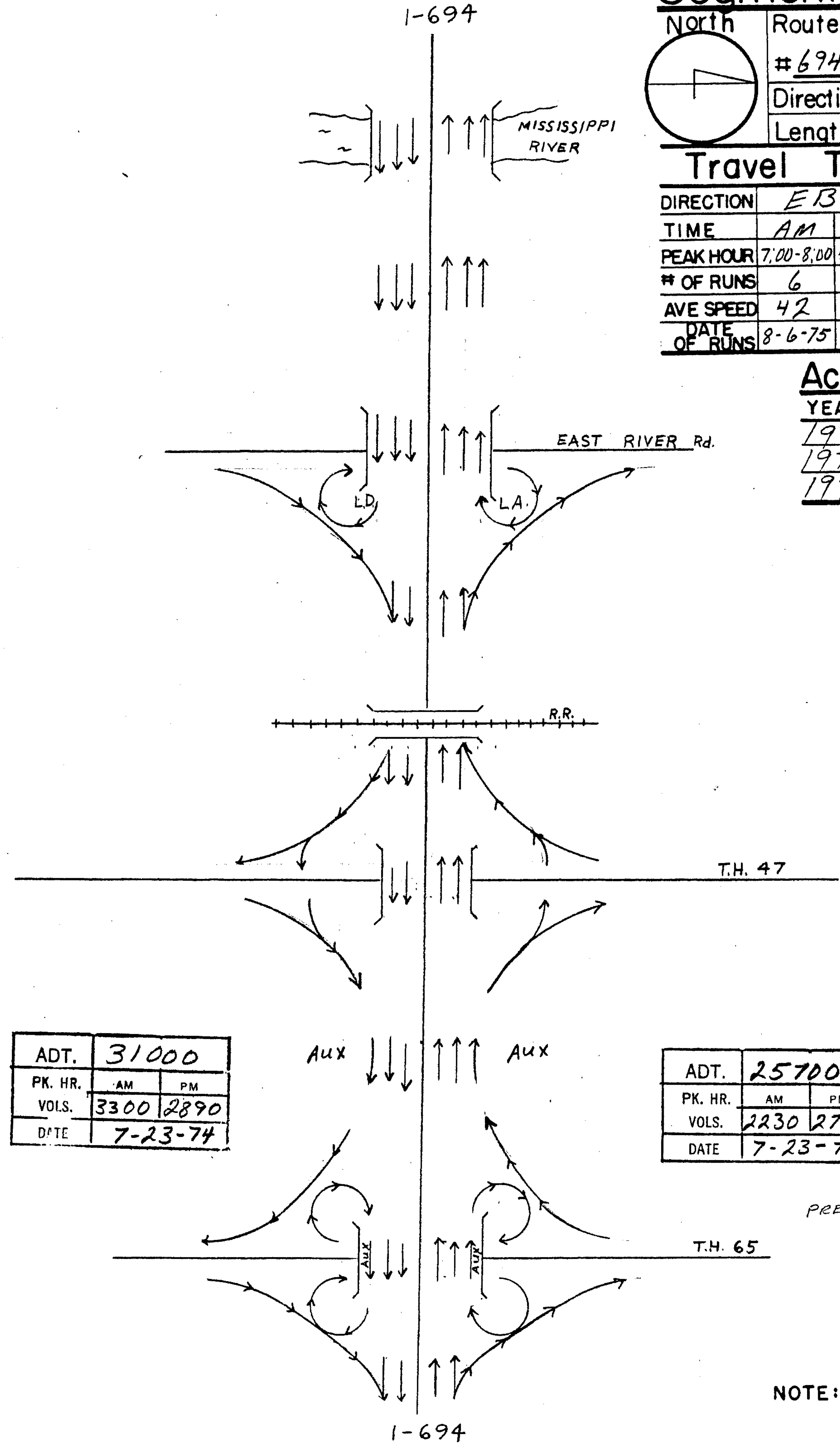
North	Route	From 65	
	# 694	To 169	
	Direction	EBL	W
	Length	1.9	1.

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	P
PEAK HOUR	7:00-8:00	4:30-5:30	7:00-8:00	4:3
# OF RUNS	6	5	6	
AVE SPEED	42	45	53	4
DATE OF RUNS	8-6-75	8-6-75	8-6-75	8-

Accident Data

YEAR	RATE	AVE
1972	1.6	2.
1973	2.6	
1974	2.5	



ADT.	31000	
PK. HR. VOLS.	AM 3300	PM 2890
DATE	7-23-74	

ADT.	25700	
PK. HR. VOLS.	AM 2230	PM 2790
DATE	7-23-74	

PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows app
interchange confi

Segment #25 2 OF 2

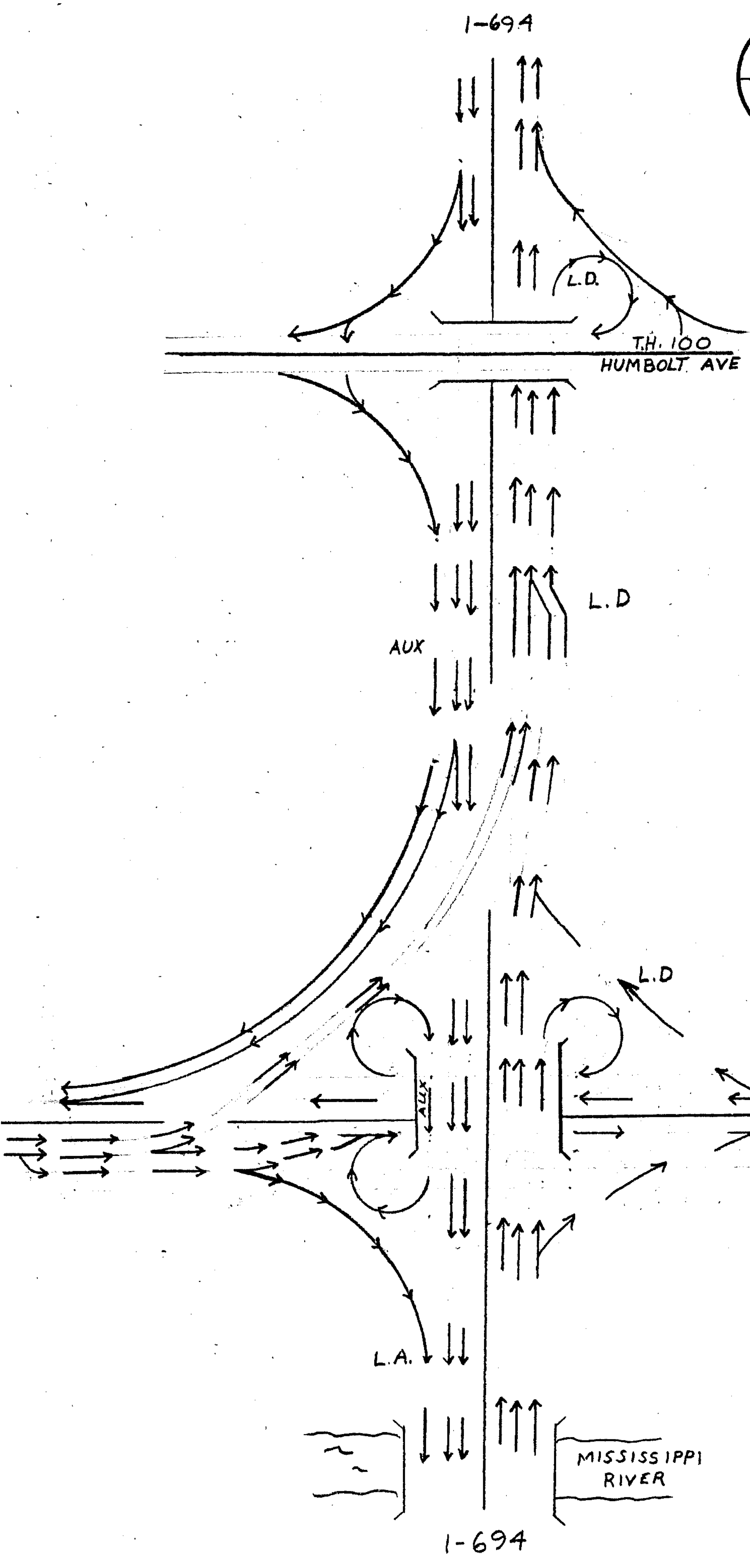
North	Route	From	
	#694	To	
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

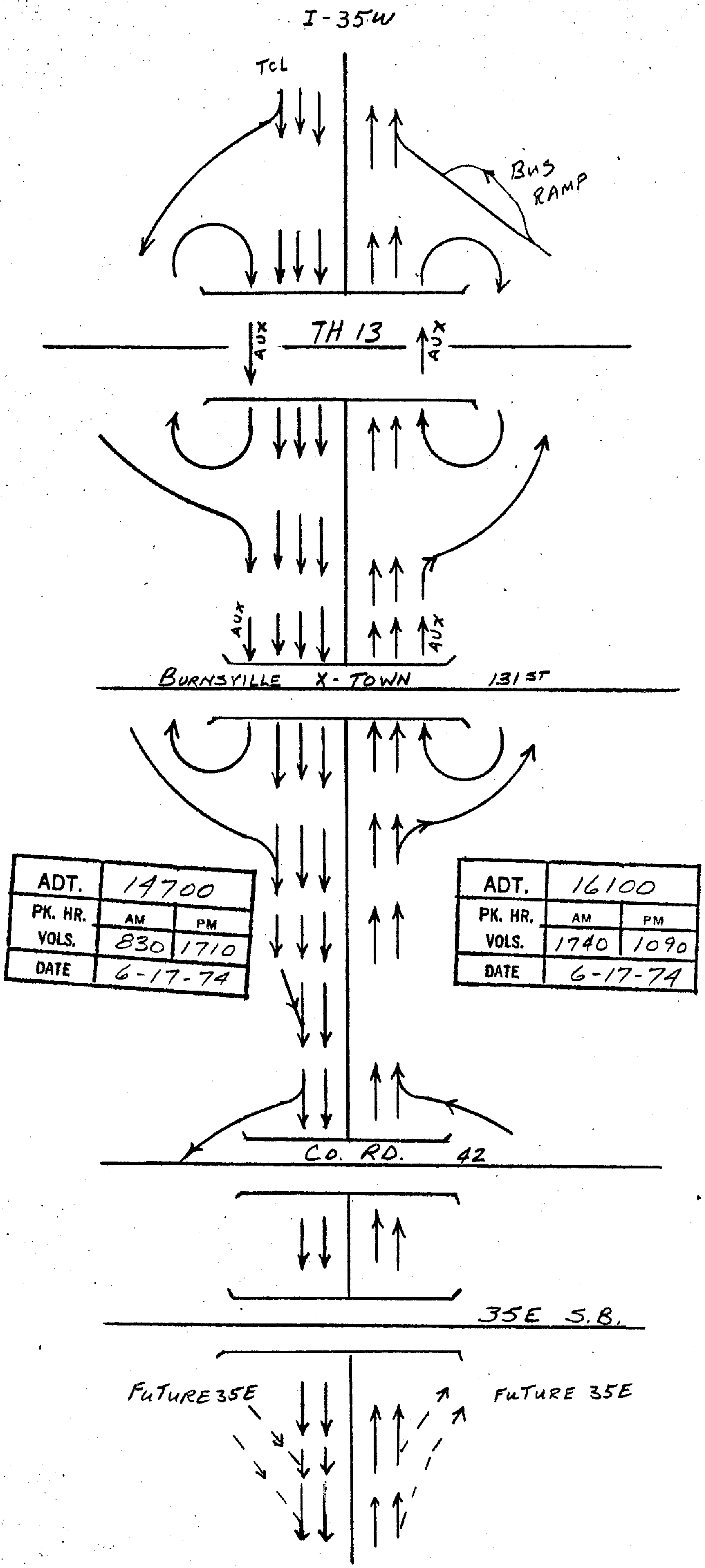
Accident Data

YEAR	RATE	AVE RATE



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration



ADT.	14700	
PK. HR. VOLS.	AM	PM
	830	1710
DATE	6-17-74	

ADT.	16100	
PK. HR. VOLS.	AM	PM
	1740	1090
DATE	6-17-74	

Segment # 26

North	Route	From 35E (Peo
	# 35W	To TH 13
	Direction	NBL	SBL
	Length	2.7	2.7

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:45-7:45	3:45-4:45	7:30-8:30	4:00-
# OF RUNS	65	4	*	4
AVE SPEED	29	58	55-60	5
DATE OF RUNS	10-73	10-73		4-

Accident Data

YEAR	RATE	AVE RA
1972	3.0	
1973	2.6	2.
1974	2.6	

* Actual runs not ma
No hindrance to fl
55-60 mph approx. s

PREPARED SUMMER 1975

NOTE: Sketch is not to sc
Sketch shows appro
interchange configu

Segment # 27

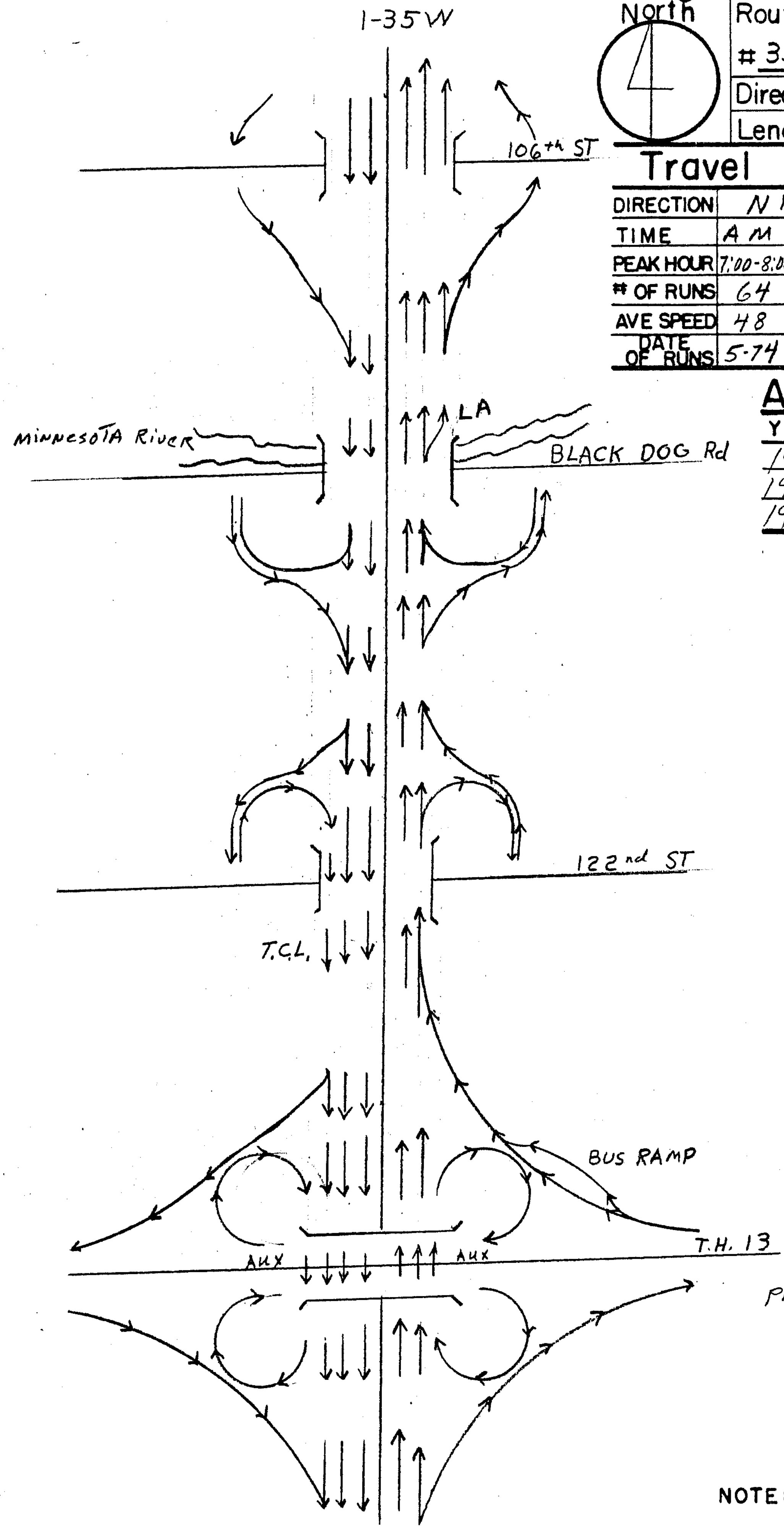
North	Route	From TH 13	
	# 35W	To I 494	
	Direction	NBL	SBL
	Length	6.1	6.1

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:30-5:30	7:15-8:15	4:00-5:00
# OF RUNS	64	6	7	72
AVE SPEED	48	55	55	40
DATE OF RUNS	5-74	5-74	10-73	5-74

Accident Data

YEAR	RATE	AVE RATE
1972	2.5	
1973	3.2	3.6
1974	5.0	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 27 2 OF

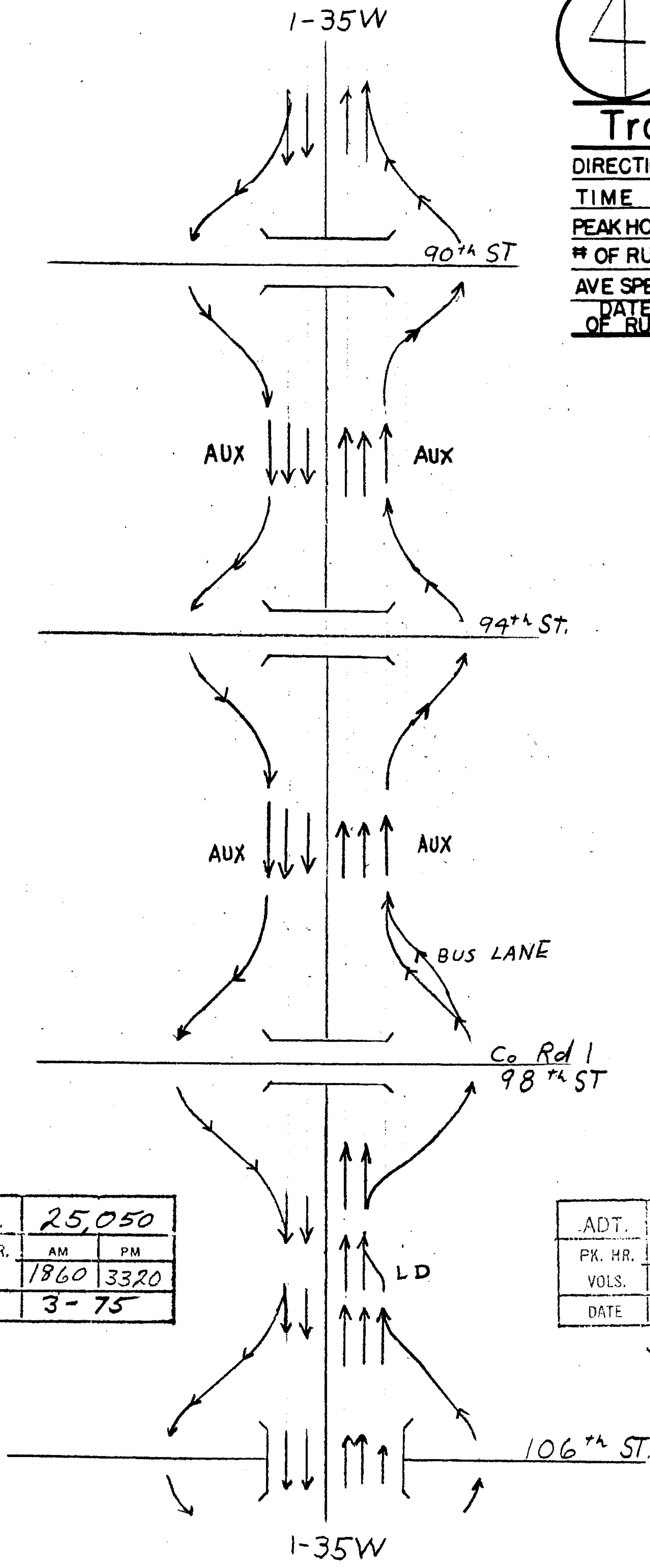
North	Route	From	
	# 35W	To	
	Direction		
	Length		

Travel Time Data

DIRECTION			
TIME			
PEAK HOUR			
# OF RUNS			
AVE SPEED			
DATE OF RUNS			

Accident Dat

YEAR	RATE	AVE



PREPARED SUMMER

ADT.	25,050	
PK. HR. VOLS.	AM	PM
	1860	3320
DATE	3-75	

ADT.	25,050	
PK. HR. VOLS.	AM	PM
	3160	1620
DATE	3-75	

SOURCE; 74 TRA
FLOW M
SYS. 70

50-50 SPLIT
IS ASSUMED

$ADT = \frac{ADT_2}{2}$

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment #27

3 OF 3

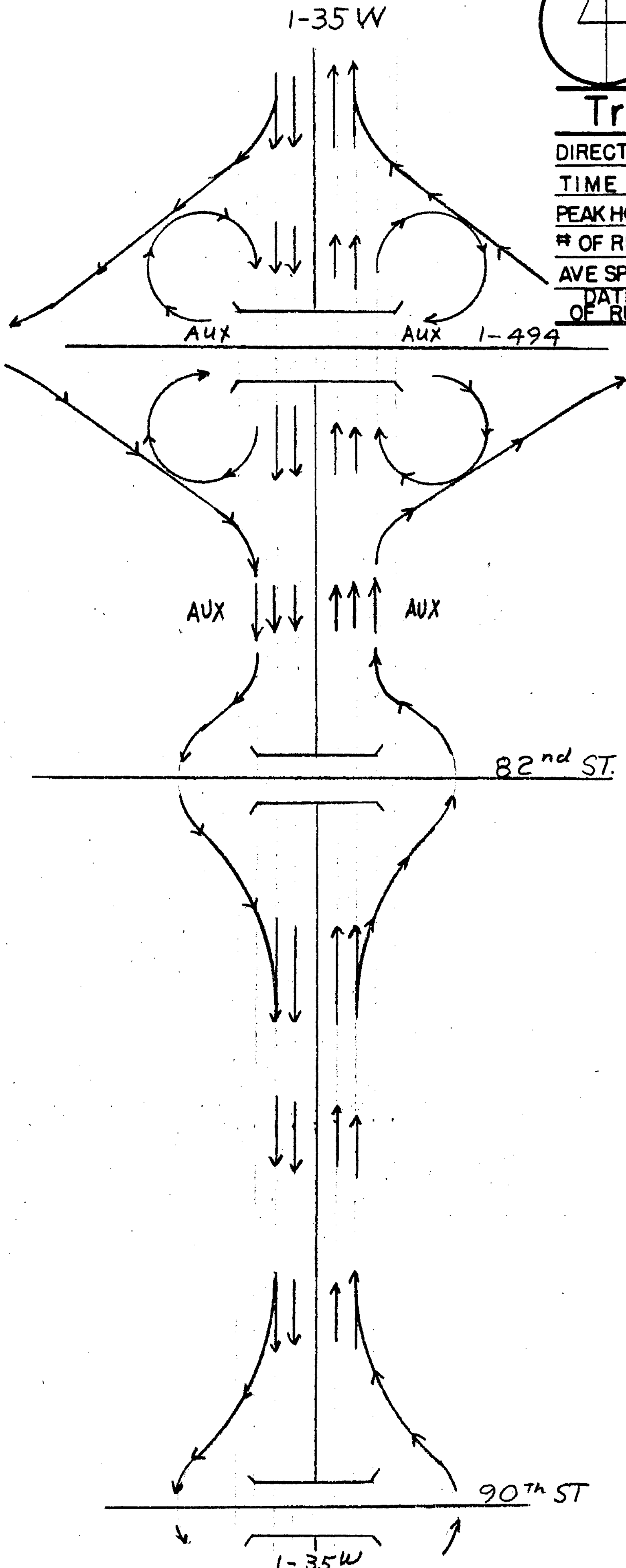
North	Route # 35W	From
		To
	Direction	
	Length	

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE



PREPARED SUMMER 1975

NOTE: Sketch is not to scale,
Sketch shows approx.
interchange configuration.

Segment # 28

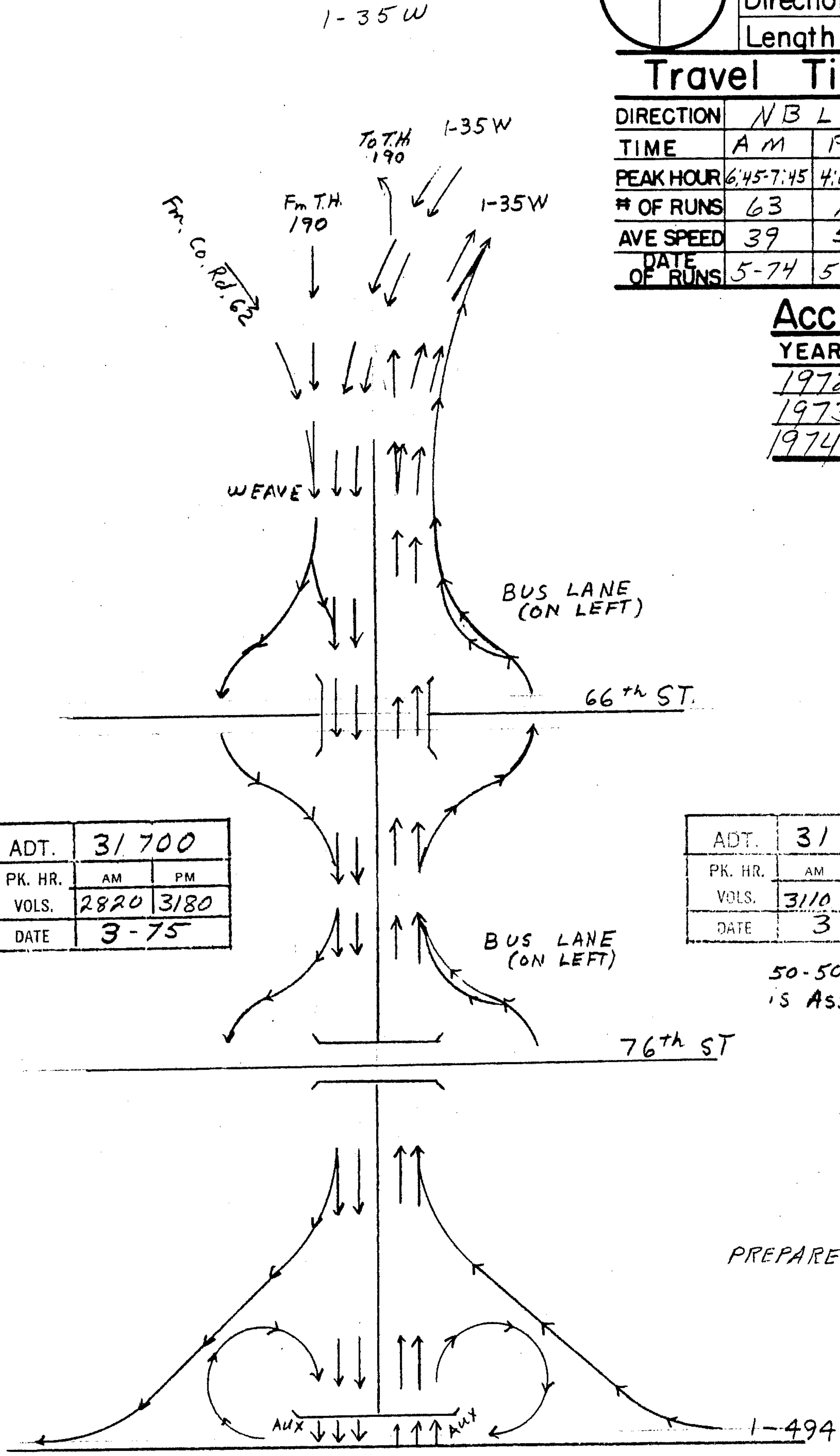
North	Route	From	494
	# 35W	To	62
	Direction	NBL	S
	Length	2.8	2

Travel Time Dat

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	6:45-7:45	4:00-5:00	7:15-8:15	4
# OF RUNS	63	10	6	
AVE SPEED	39	52	51	
DATE OF RUNS	5-74	5-74	5-74	5

Accident Dat

YEAR	RATE	AVE
1972	3.5	
1973	5.1	3
1974	2.1	



ADT.	31 700	
PK. HR. VOLS.	AM	PM
	2820	3180
DATE	3-75	

ADT.	31 700	
PK. HR. VOLS.	AM	PM
	3110	3100
DATE	3-75	

Sourc
74 Tra
Flow
Sys. 7

50-50 SPLIT is Assumed

ADT:
2

PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows app
interchange confi

Segment #29

North

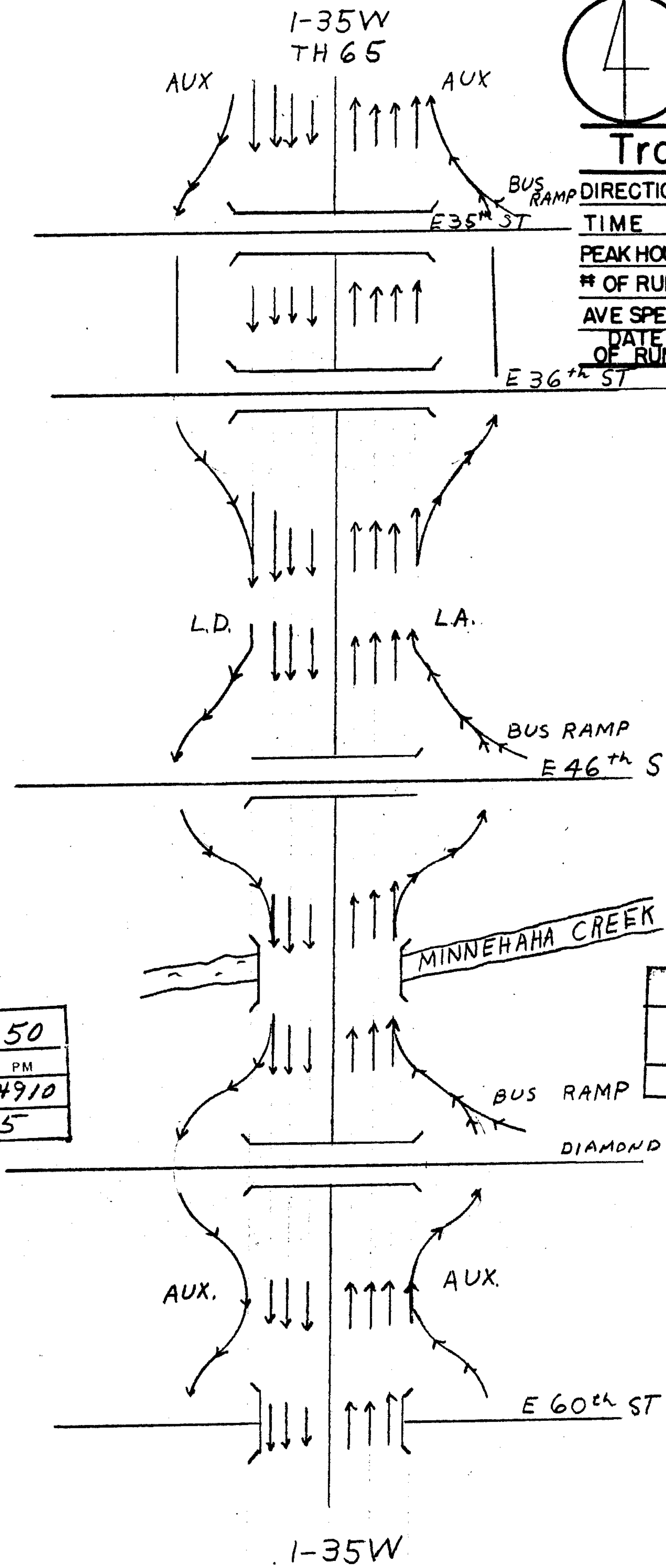
Route	From CO. RD. 62	
# 35W	To 94	
Direction	NBL	SBL
Length	5.8	5.8

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-5:00
# OF RUNS	61	10	7	61
AVE SPEED	48	55	51	33
DATE OF RUNS	4-75	10-73	4-75	10-73

Accident Data

YEAR	RATE	AVE RATE
1972	2.2	2.1
1973	2.3	
1974	1.8	



ADT.	52 650	
PK. HR.	AM	PM
VOLS.	3420	4910
DATE	3-75	

ADT.	52 650	
PK. HR.	AM	PM
VOLS.	5370	4150
DATE	3-75	

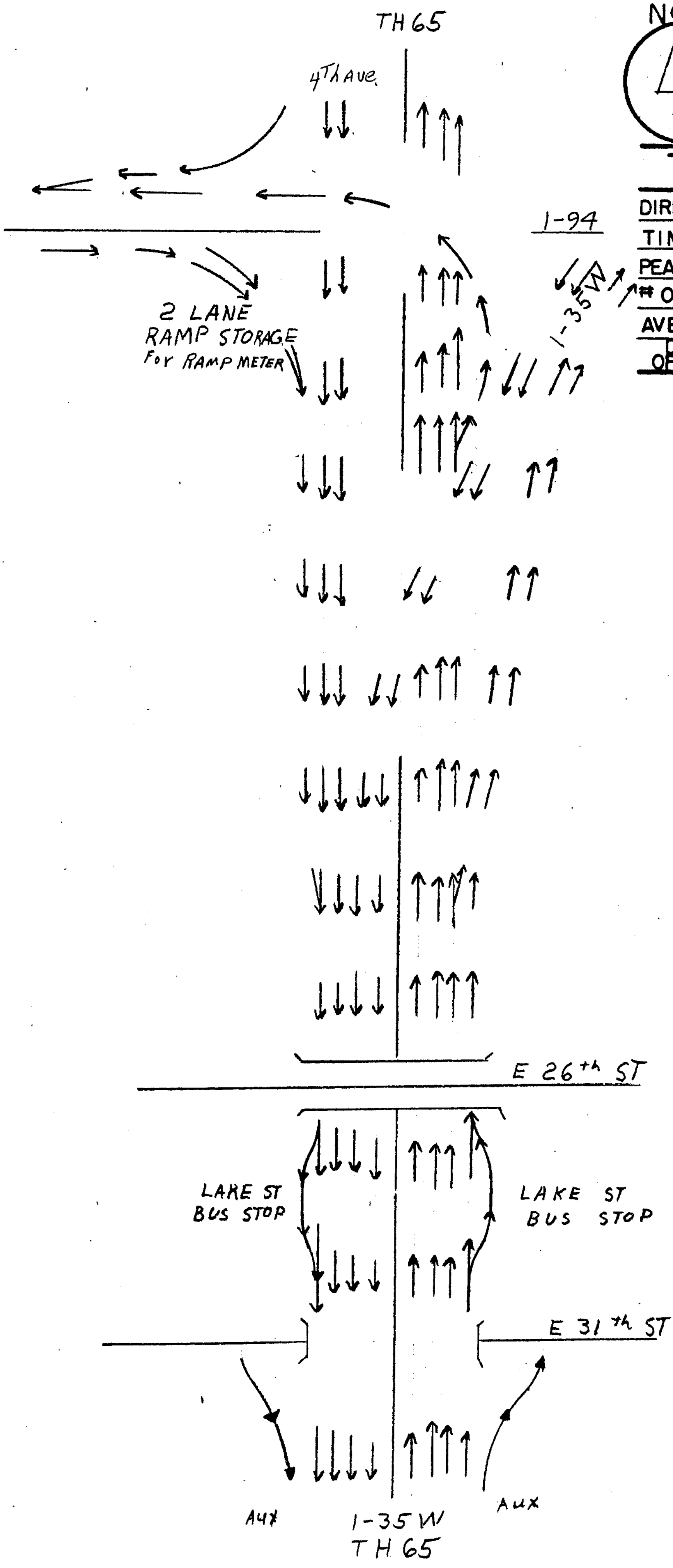
SOURCE; 74 TRAFFIC FLOW MAP Sys. 70

50-50 SPLIT is assumed

$ADT = \frac{ADT_2}{2}$

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration



Segment #29 2 OF

North	Route	From	
	# 35W	To	
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE

PREPARED SUMMER 19

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment #30 1 OF 2

North	Route	From 94	
	# 35W	To HENNEPIN	
	Direction	NBL	SBL
	Length	2.2	2.2

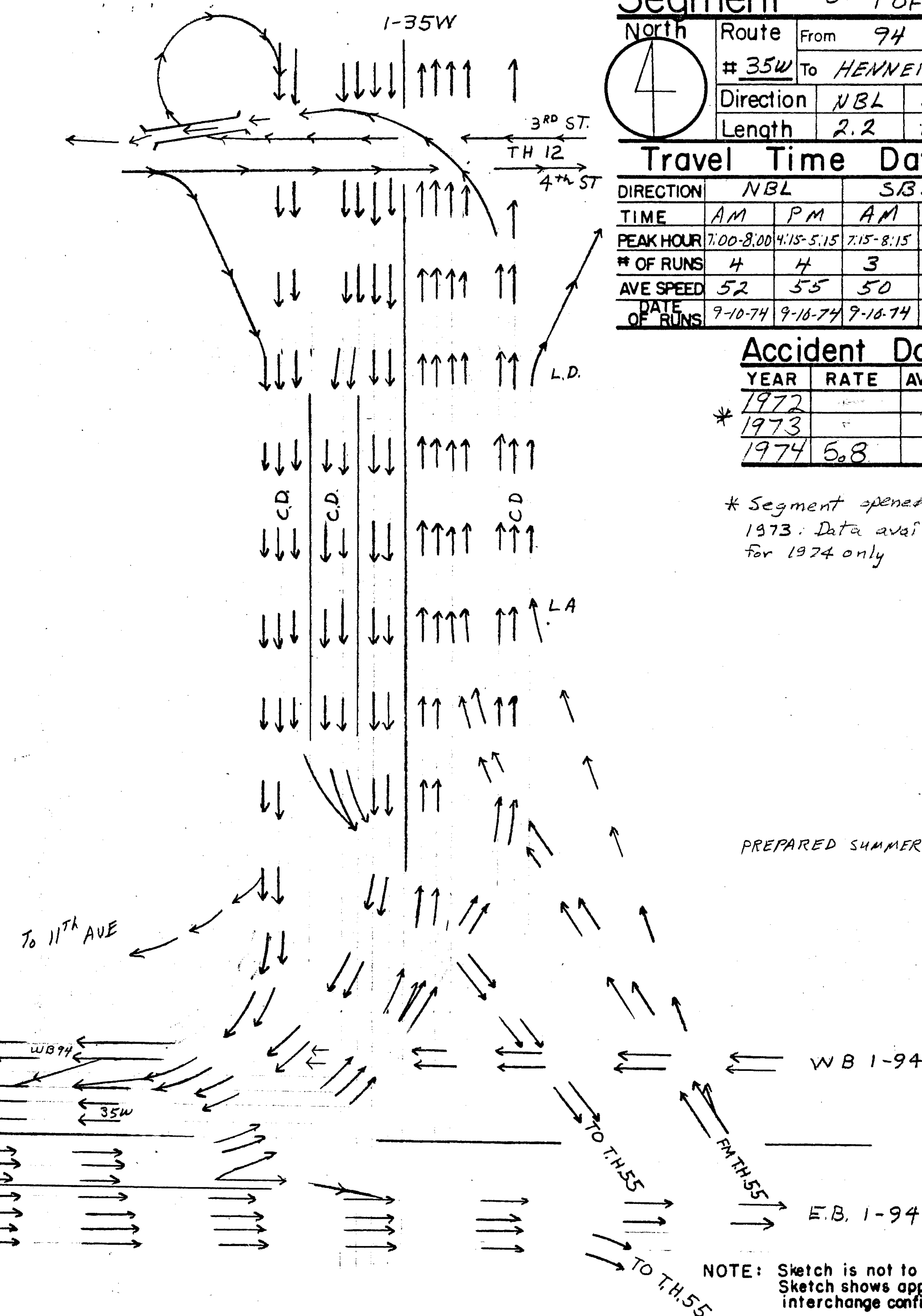
Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:15-8:15	4:00-5:00
# OF RUNS	4	4	3	4
AVE SPEED	52	55	50	54
DATE OF RUNS	9-10-74	9-16-74	9-16-74	9-10-74

Accident Data

YEAR	RATE	AVE RATE
* 1972		
1973		
1974	5.8	

* Segment opened in 1973: Data available for 1974 only



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment #30

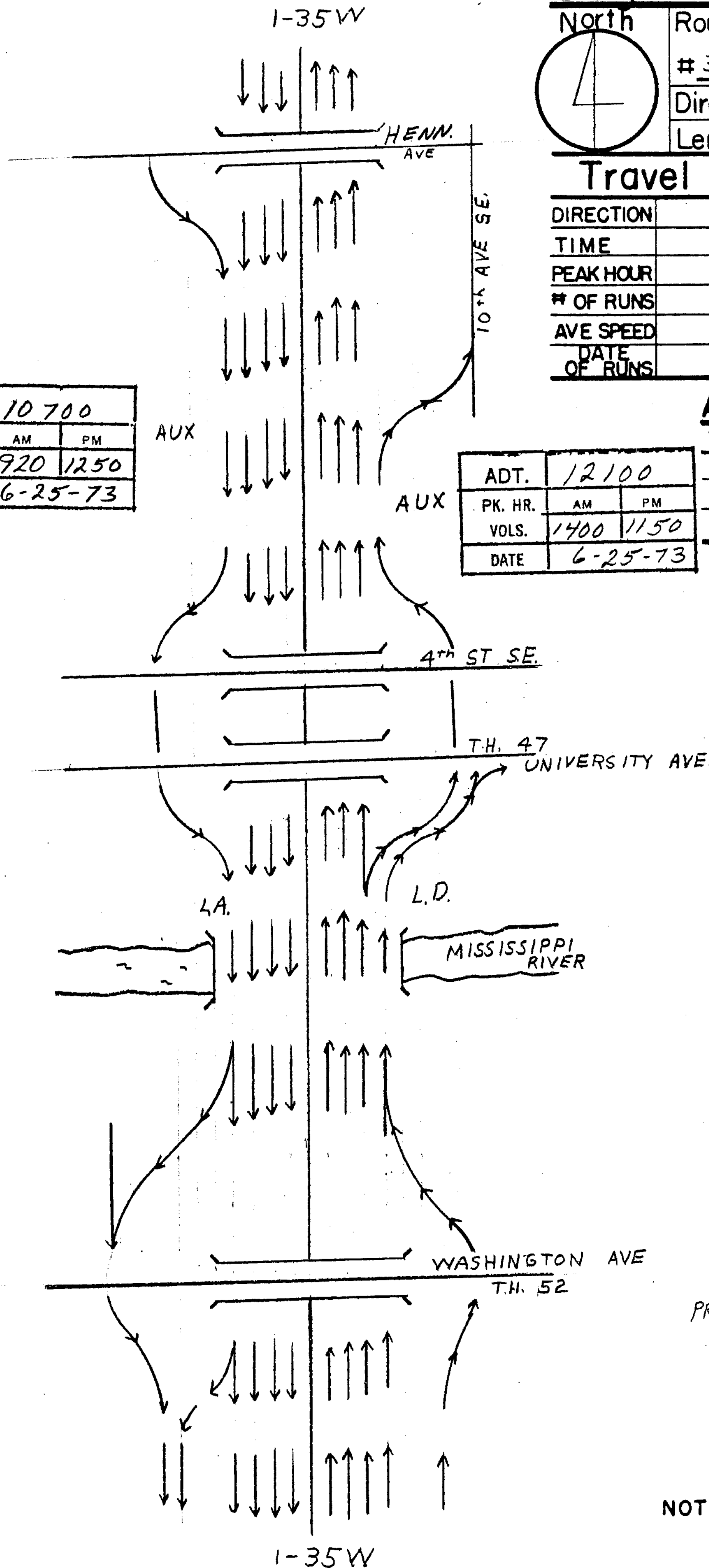
North	Route	From		
	# 35W	To		
	Direction			
	Length			

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE



ADT.	10 700	
PK. HR.*	AM	PM
VOLS.	920	1250
DATE	6-25-73	

ADT.	12100	
PK. HR.	AM	PM
VOLS.	1400	1150
DATE	6-25-73	

PREPARED SUMMER 1

NOTE: Sketch is not to s
Sketch shows app
interchange config

Segment # 31

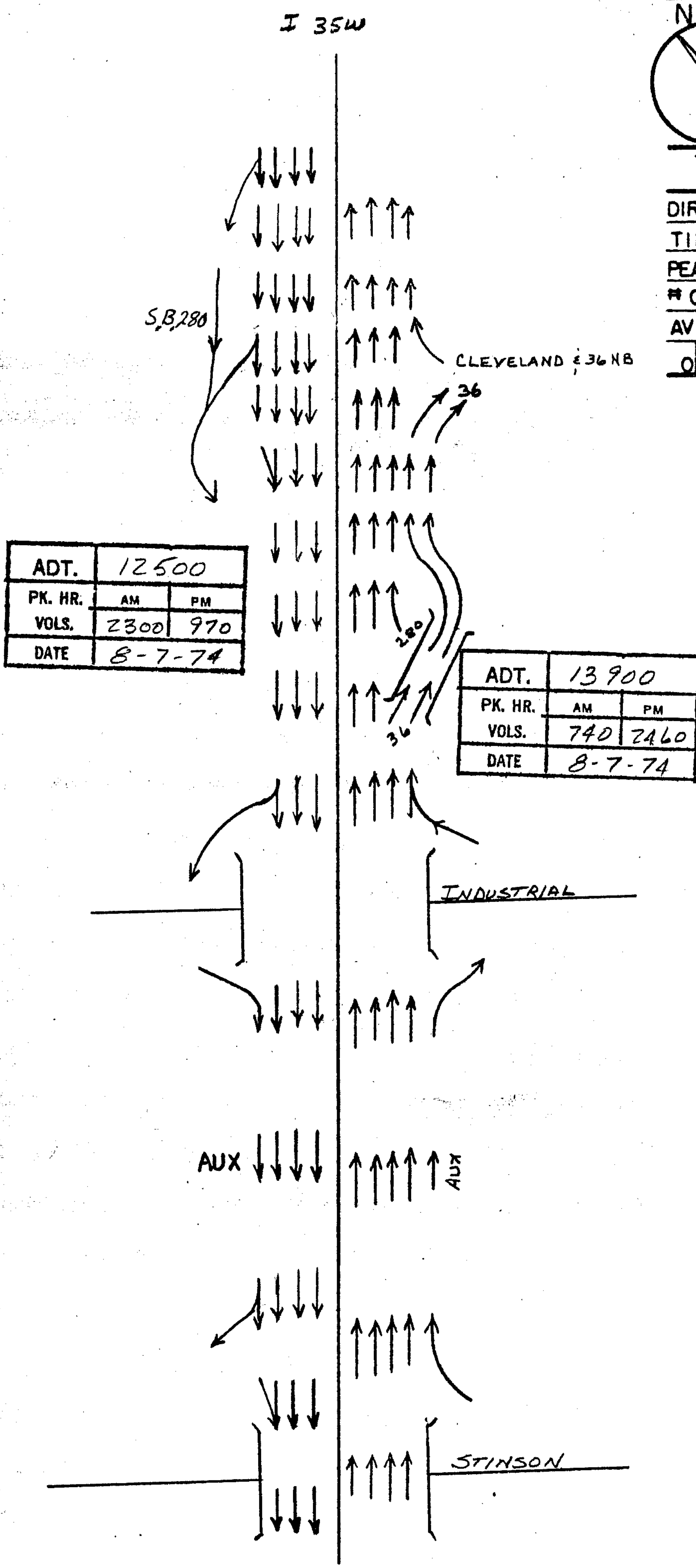
North	Route	From STINSON BLV.	
	# 35W	To TH 280	
	Direction	NBL	SBL
	Length	1.3	1.3

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:30-7:30	4:15-5:15	6:30-7:30	4:15-5:15
# OF RUNS	3	3	4	3
AVE SPEED	55	52	64	62
DATE OF RUNS	9-5-74	8-28-74	9-5-74	8-28-74

Accident Data

YEAR	RATE	AVE RATE
1972	—	
1973	—	
1974	1.8	



ADT.	12500	
PK. HR. VOLS.	AM 2300	PM 970
DATE	8-7-74	

ADT.	13900	
PK. HR. VOLS.	AM 740	PM 2460
DATE	8-7-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 32

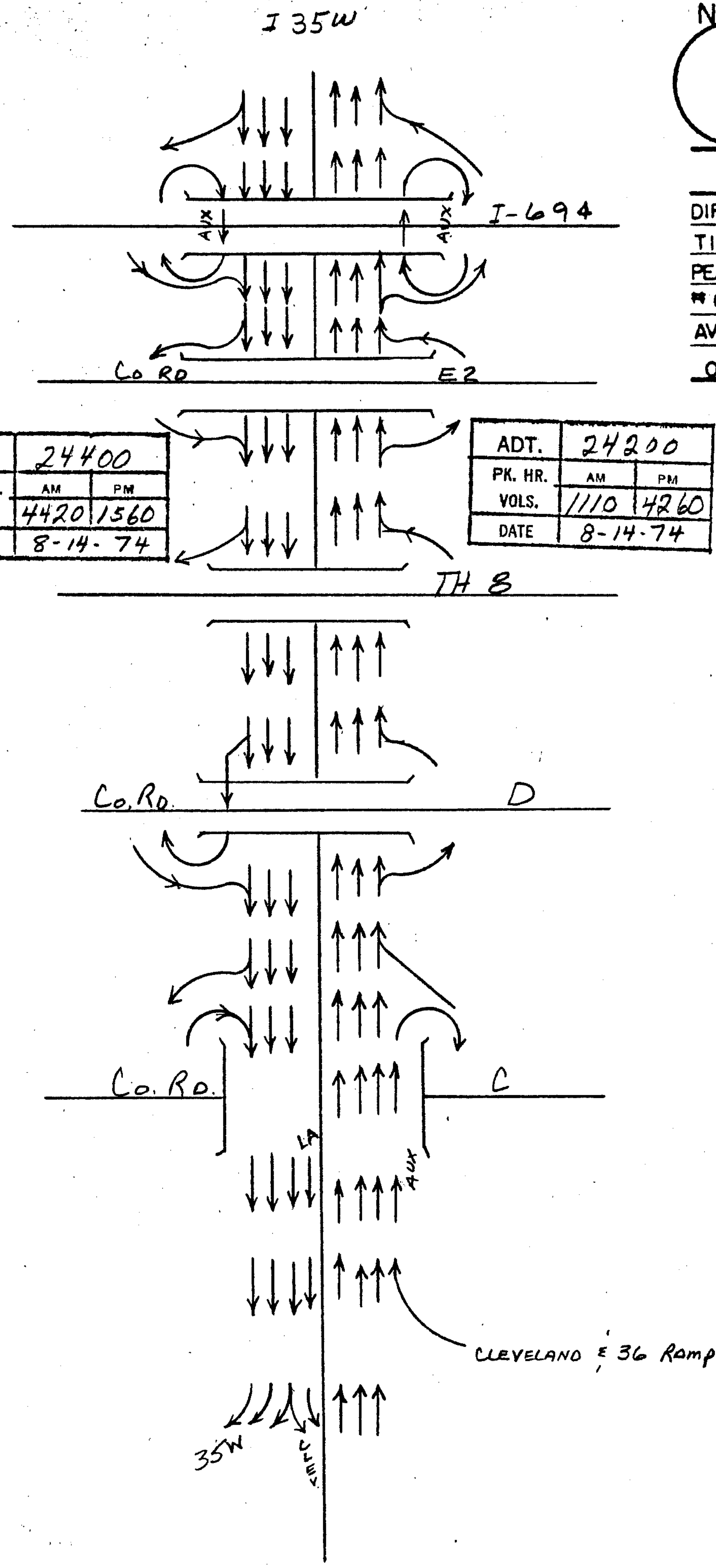
North	Route	From 280	
	# 35W	To 694	
	Direction	NBL	SB
	Length	4.8	4.8

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	P
PEAK HOUR	6:30-7:30	4:15-5:15	6:30-7:30	4:15-
# OF RUNS	3	3	4	3
AVE SPEED	57	56	56	5
DATE OF RUNS	8-27-74	8-22-74	8-27-74	8-

Accident Data

YEAR	RATE	AVER
1972	1.5	
1973	1.5	1.
1974	1.0	



ADT.	24400	
PK. HR.	AM	PM
VOLS.	4420	1560
DATE	8-14-74	

ADT.	24200	
PK. HR.	AM	PM
VOLS.	1110	4260
DATE	8-14-74	

PREPARED SUMMER 1

NOTE: Sketch is not to sc
Sketch shows appr
interchange configu

Segment # 33 1 of 2

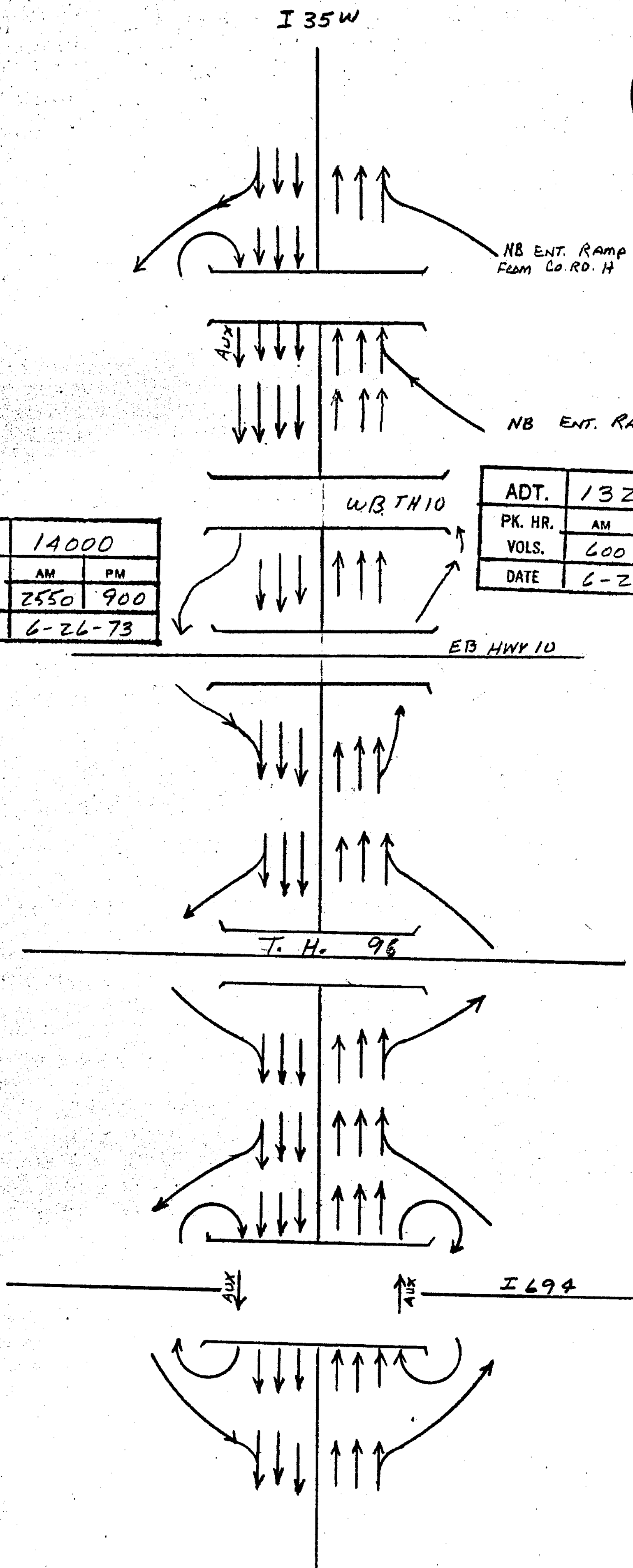
North	Route	From 694	
	# 35W	To 95TH AVE NE	
	Direction	NBL	SBL
	Length	5.3	5.3

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:30-7:30	4:15-5:15	6:30-7:30	4:15-5:15
# OF RUNS	4	5	5	5
AVE SPEED	61	58	59	58
DATE OF RUNS	8-27-74	8-22-74	8-27-74	8-22-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.9	2.0
1973	2.4	
1974	1.7	



ADT.	14000	
PK. HR.	AM	PM
VOLS.	2550	900
DATE	6-26-73	

ADT.	13200	
PK. HR.	AM	PM
VOLS.	600	2180
DATE	6-26-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 33 2 of

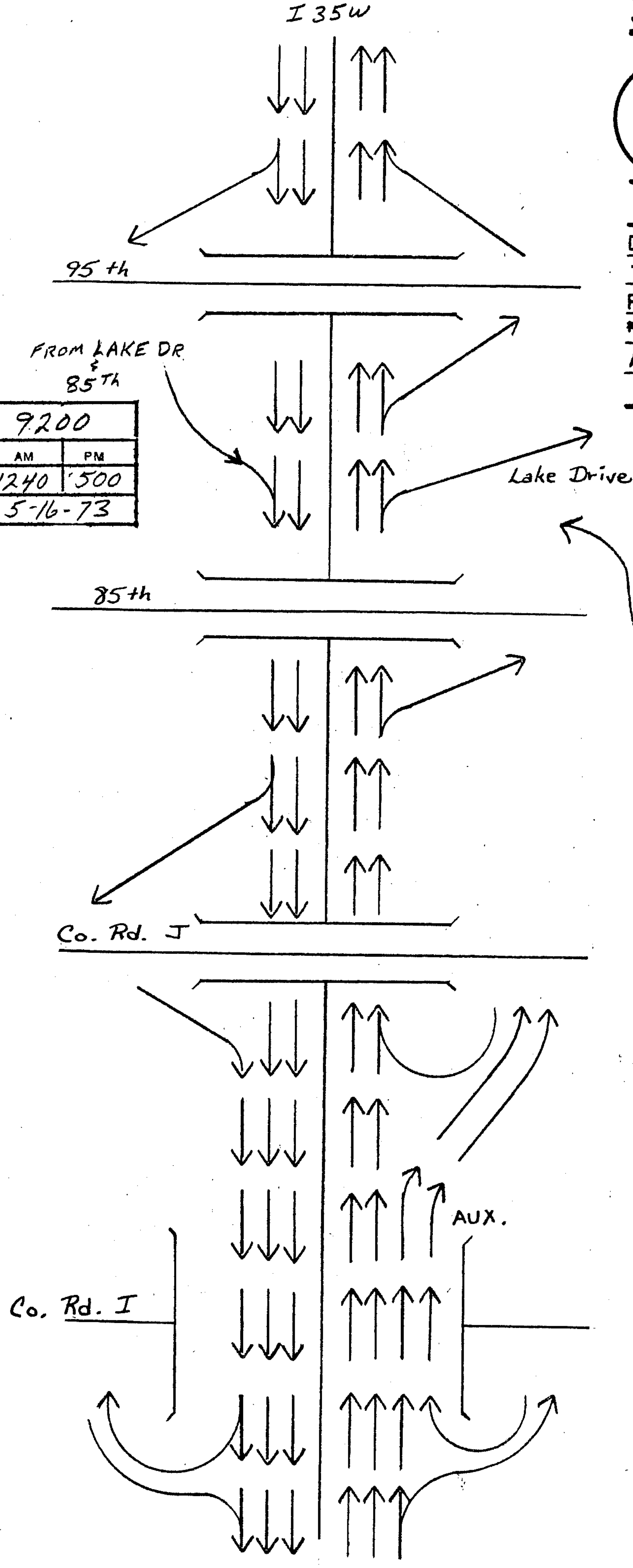
North	Route	From
	# 35W	To
	Direction	
	Length	

Travel Time Data

DIRECTION			
TIME			
PEAK HOUR			
# OF RUNS			
AVE SPEED			
DATE OF RUNS			

Accident Data

YEAR	RATE	AVE



ADT.	9200	
PK. HR. VOLS.	AM 1240	PM 500
DATE	5-16-73	

ADT.	8500	
PK. HR. VOLS.	AM 330	PM 1030
DATE	5-16-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to sca
Sketch shows appro
interchange configura

Segment # 34

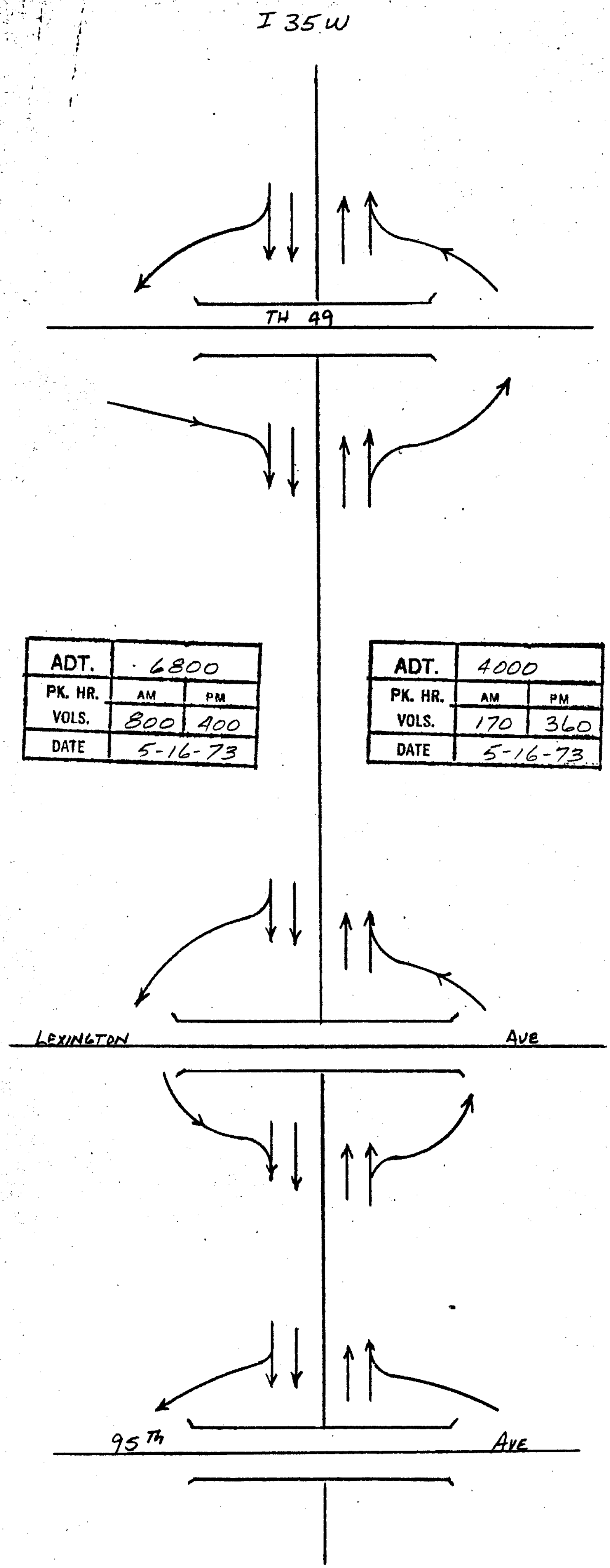
North	Route	From 95TH AVE.	
	# 35W	To T.H. 49	
	Direction	NBL	SBL
	Length	4.5	4.5

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:30-7:30	4:15-5:15	6:30-7:30	4:15-5:15
# OF RUNS	2	3	2	2
AVE SPEED	60	59	56	64
DATE OF RUNS	8-9-74	8-8-74	8-9-74	8-8-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.4	
1973	1.6	1.5
1974	1.4	



ADT.	6800	
PK. HR. VOLS.	AM	PM
	800	400
DATE	5-16-73	

ADT.	4000	
PK. HR. VOLS.	AM	PM
	170	360
DATE	5-16-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 35

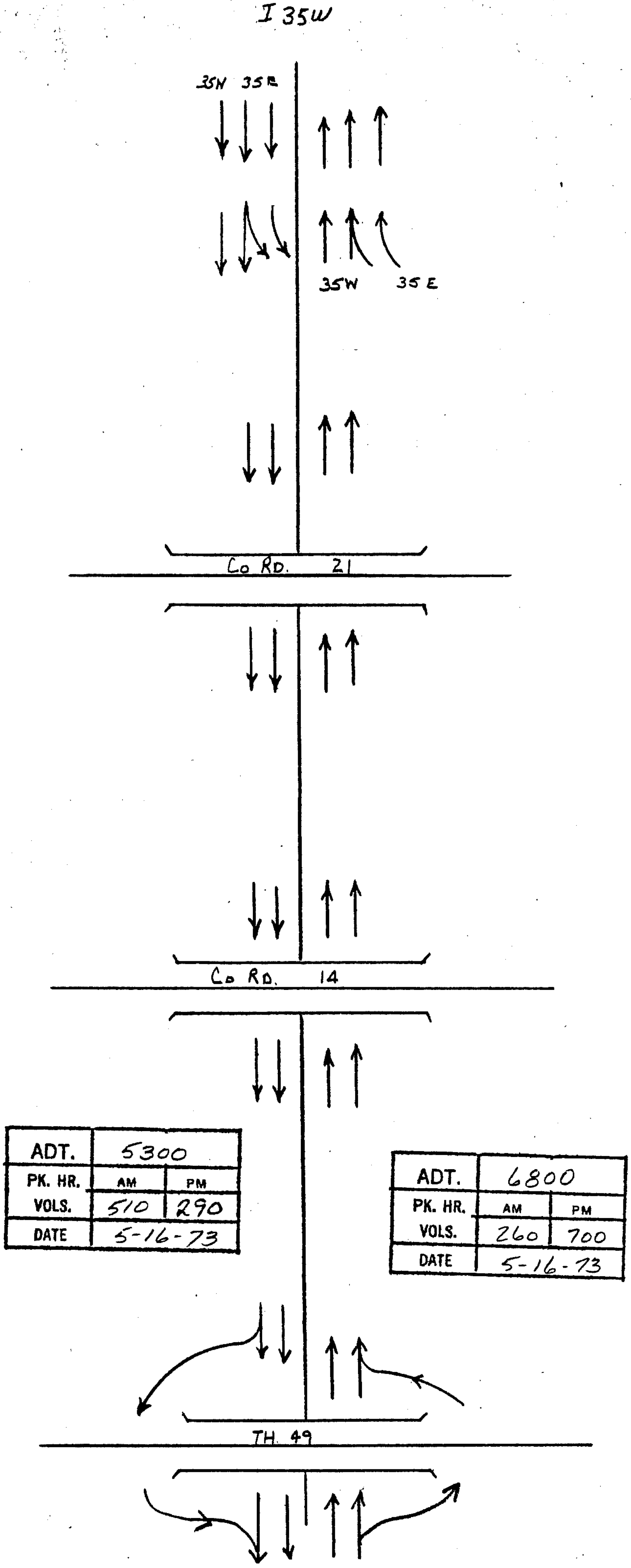
North	Route	From TH 49	
	# 35W	To 35E-35W	
	Direction	NBL	SBL
	Length	5.3	5.3

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:30-7:30	4:15-5:15	6:30-7:30	4:15
# OF RUNS	2	3	3	2
AVE SPEED	62	60	63	6
DATE OF RUNS	8-9-74	8-8-74	8-9-74	8-8

Accident Data

YEAR	RATE	AVER
1972	0.5	
1973	0.4	0.4
1974	0.4	



ADT.	5300	
PK. HR. VOLS.	AM 510	PM 290
DATE	5-16-73	

ADT.	6800	
PK. HR. VOLS.	AM 260	PM 700
DATE	5-16-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment # 36

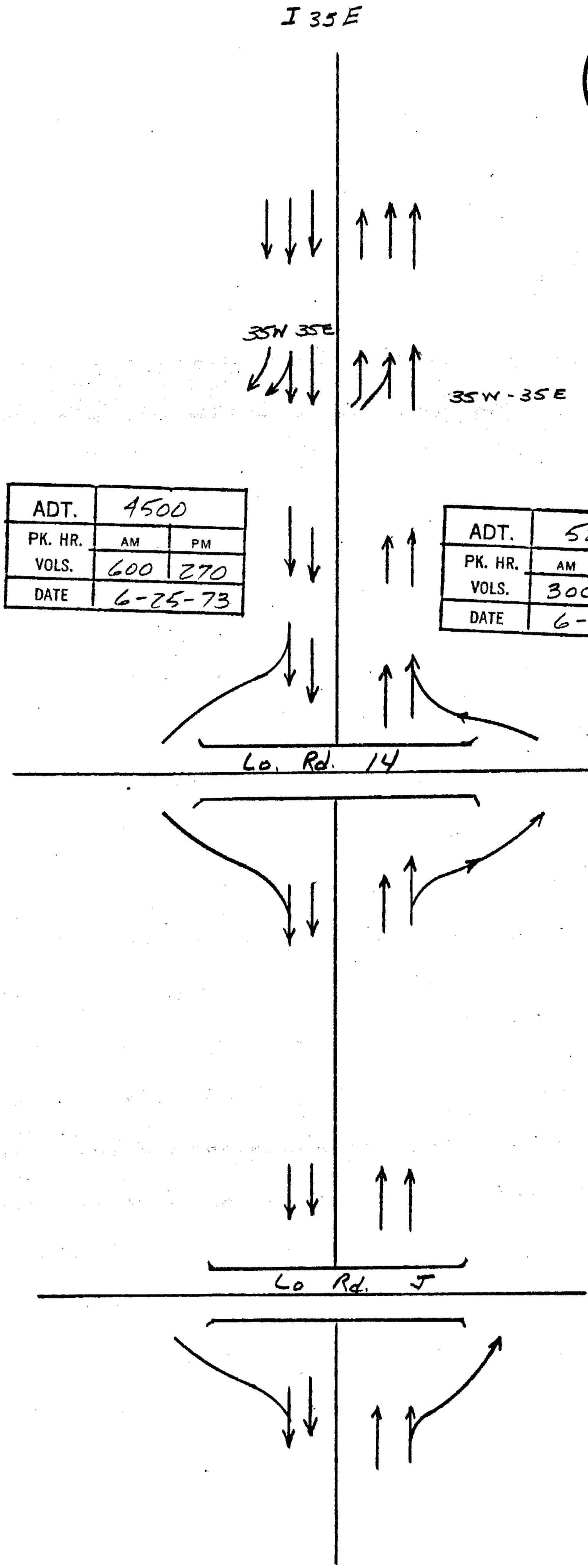
North	Route # 35E	From Co. Rd. J	
		To 35W	
	Direction	NBL	SBL
	Length	7.0	7.0

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	6:45-7:45	4:30-5:30	6:45-7:45	4:30-5:3
# OF RUNS	2	3	3	2
AVE SPEED	64	59	63	58
DATE OF RUNS	8-13-74	8-12-74	8-13-74	8-12-74

Accident Data

YEAR	RATE	AVE RATE
1972	0.4	
1973	0.8	0.5
1974	0.4	



ADT.	4500	
PK. HR. VOLS.	AM	PM
	600	270
DATE	6-25-73	

ADT.	5200	
PK. HR. VOLS.	AM	PM
	300	750
DATE	6-25-73	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale. Sketch shows approx. interchange configuratio

Segment # 37

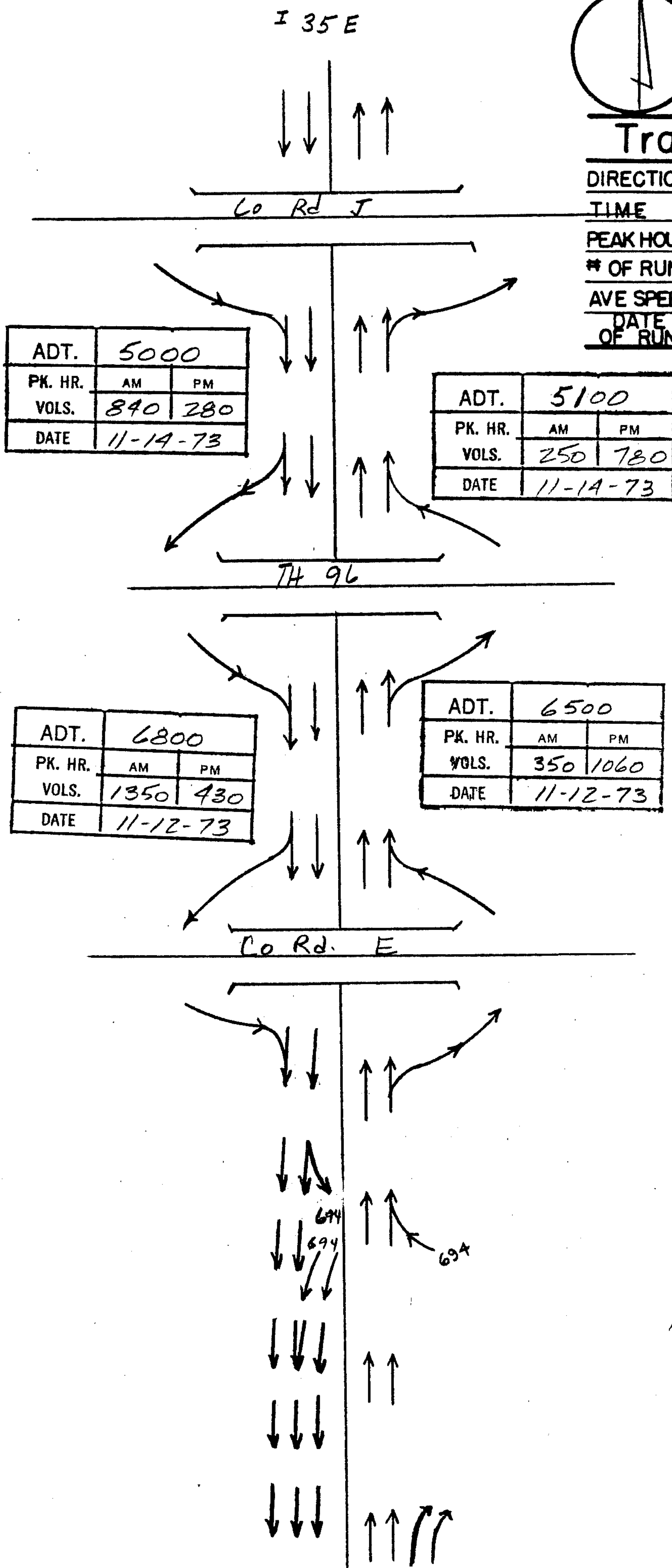
North	Route	From E. JcT.
	# 35E	To Co. Rd. J
	Direction	NBL
	Length	6.3

Travel Time Dat

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	7:15-8:15	4:30-5:30	7:15-8:15	4
# OF RUNS	2	3	3	
AVE SPEED	60	59	64	
DATE OF RUNS	8-23-74	8-20-74	8-23-74	3

* Accident Da

YEAR	RATE	AVE
1972	1.3	
1973	1.2	1
1974	.4	



ADT.	5000	
PK. HR.	AM	PM
VOLS.	840	280
DATE	11-14-73	

ADT.	5100	
PK. HR.	AM	PM
VOLS.	250	780
DATE	11-14-73	

ADT.	6800	
PK. HR.	AM	PM
VOLS.	1350	430
DATE	11-12-73	

ADT.	6500	
PK. HR.	AM	PM
VOLS.	350	1060
DATE	11-12-73	

* Note: Accident
applies to sectio
from E. Jct 694
Co. Rd. 14 (next
interchange north
Co. Rd. J)

PREPARED SUMMER 19

NOTE: Sketch is not to s
Sketch shows app
interchange config

Segment # 38.

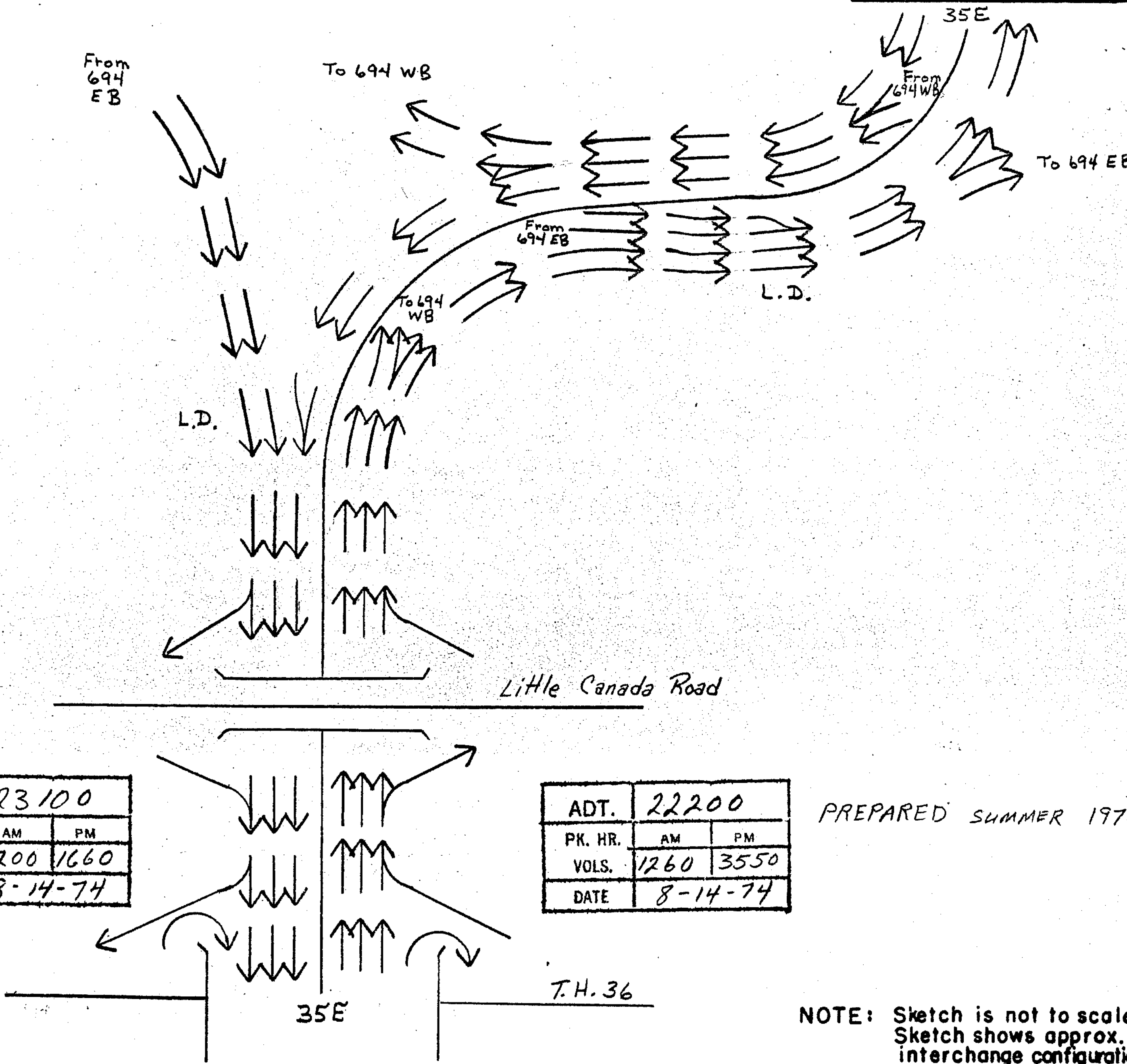
North	Route	From TH 36	
	# 35E	To W. JcT 694	
	Direction	NBL	SBL
	Length	1.43	1.43

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:15-8:15	4:30-5:30	7:15-8:15	4:30-5:30
# OF RUNS	4	4	4	4
AVE SPEED	57	57	50	48
DATE OF RUNS	8-23-75	8-20-75	8-23-75	8-20-75

Accident Data

YEAR	RATE	AVE RATE
1972	2.1	
1973	2.6	2.2
1974	1.9	



DT.	23100	
HR.	AM	PM
LS.	3200	1660
TE	8-14-74	

ADT.	22200	
PK. HR.	AM	PM
VOLS.	1260	3550
DATE	8-14-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 39 1 oF 2

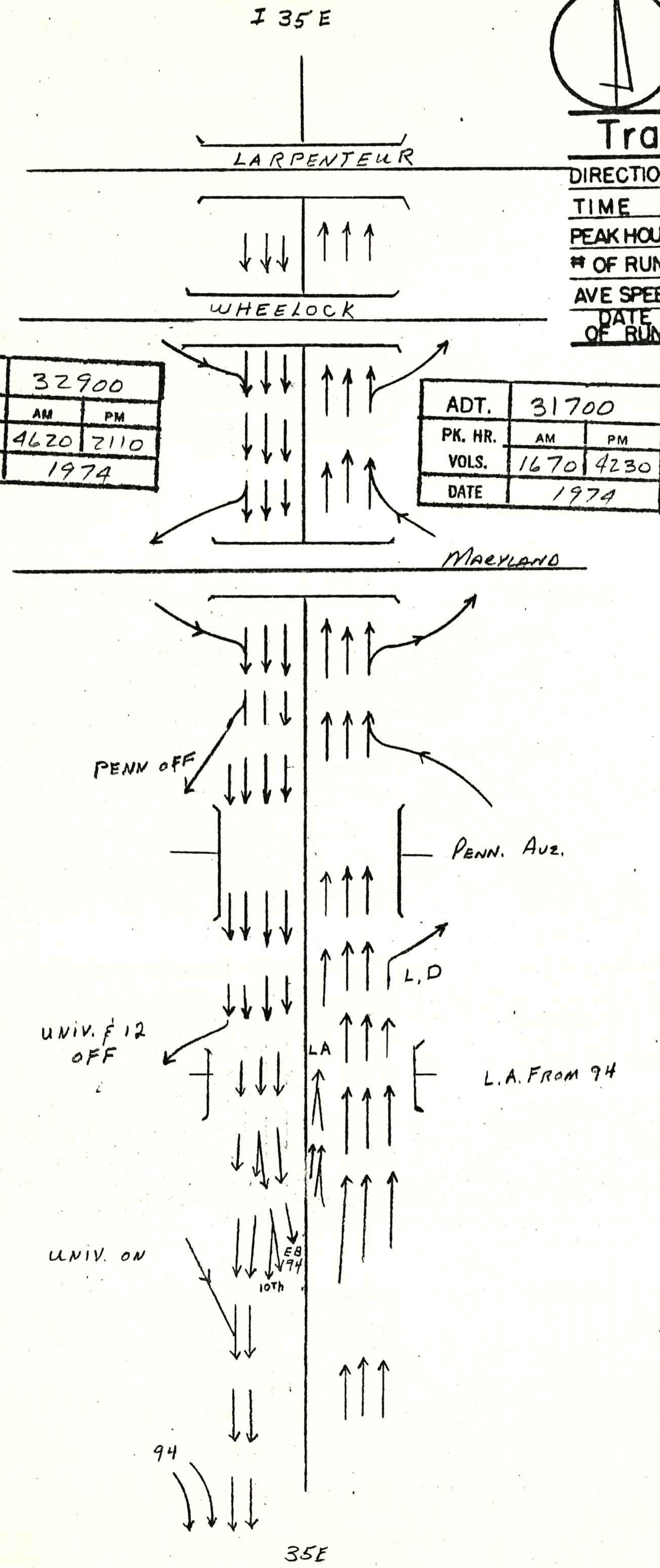
North	Route #35E	From	I 94	
		To	TH 36	
	Direction		NBL	SBL
	Length		4.1	4.1

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-
# OF RUNS	4	3	6	3
AVE SPEED	56	53	54	56
DATE OF RUNS	6-13-75	6-18-75	6-13-75	6-18

Accident Data

YEAR	RATE	AVERA
1972	2.6	
1973	2.4	2.
1974	1.9	



ADT.	32900	
PK. HR.	AM	PM
VOLS.	4620	2110
DATE	1974	

ADT.	31700	
PK. HR.	AM	PM
VOLS.	1670	4230
DATE	1974	

PREPARED SUMMER 19

NOTE: Sketch is not to sc
Sketch shows appr
interchange configu

Segment # 39 2 of 2

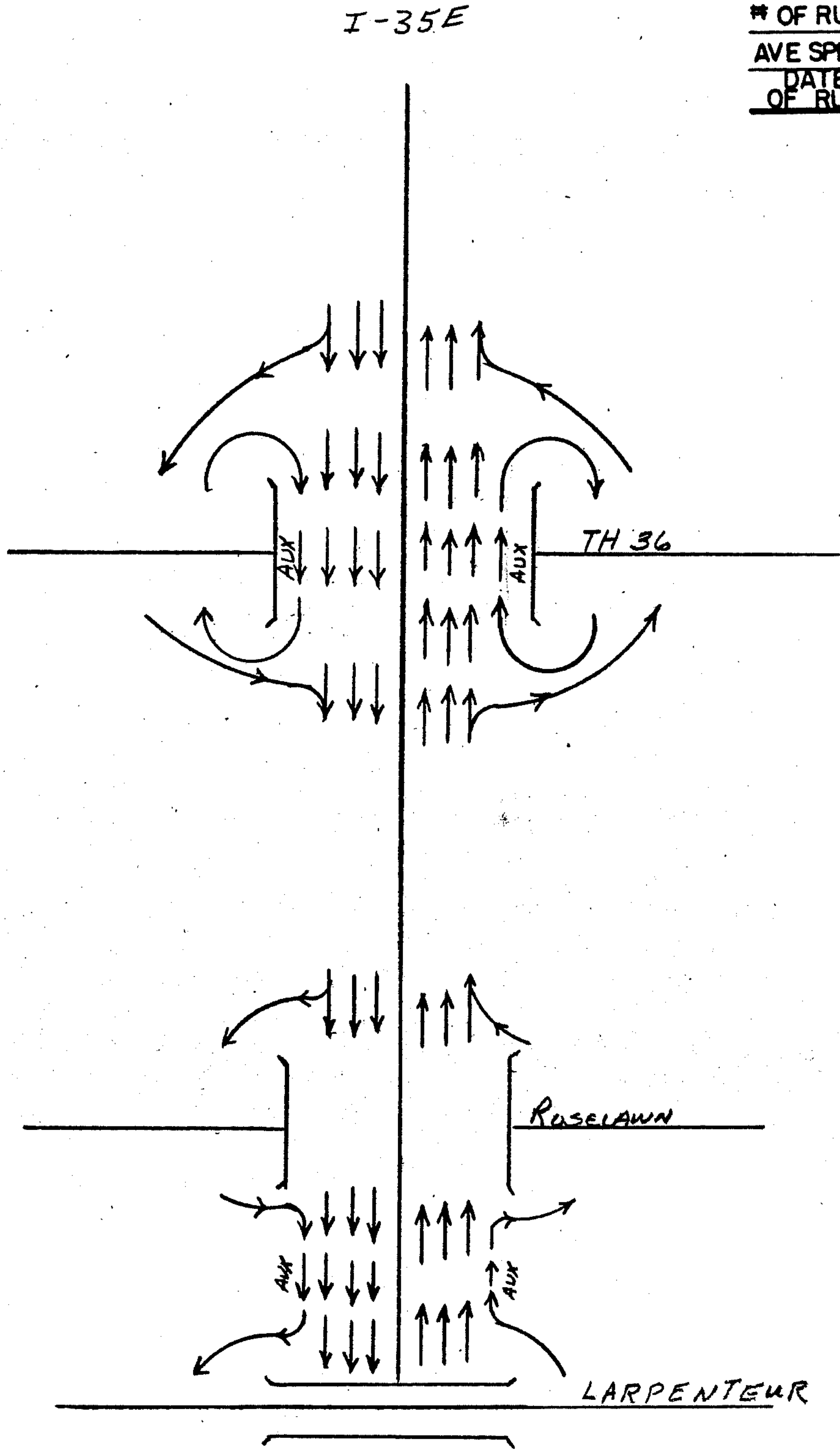
North	Route	From	
	# 35E	To	
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 40

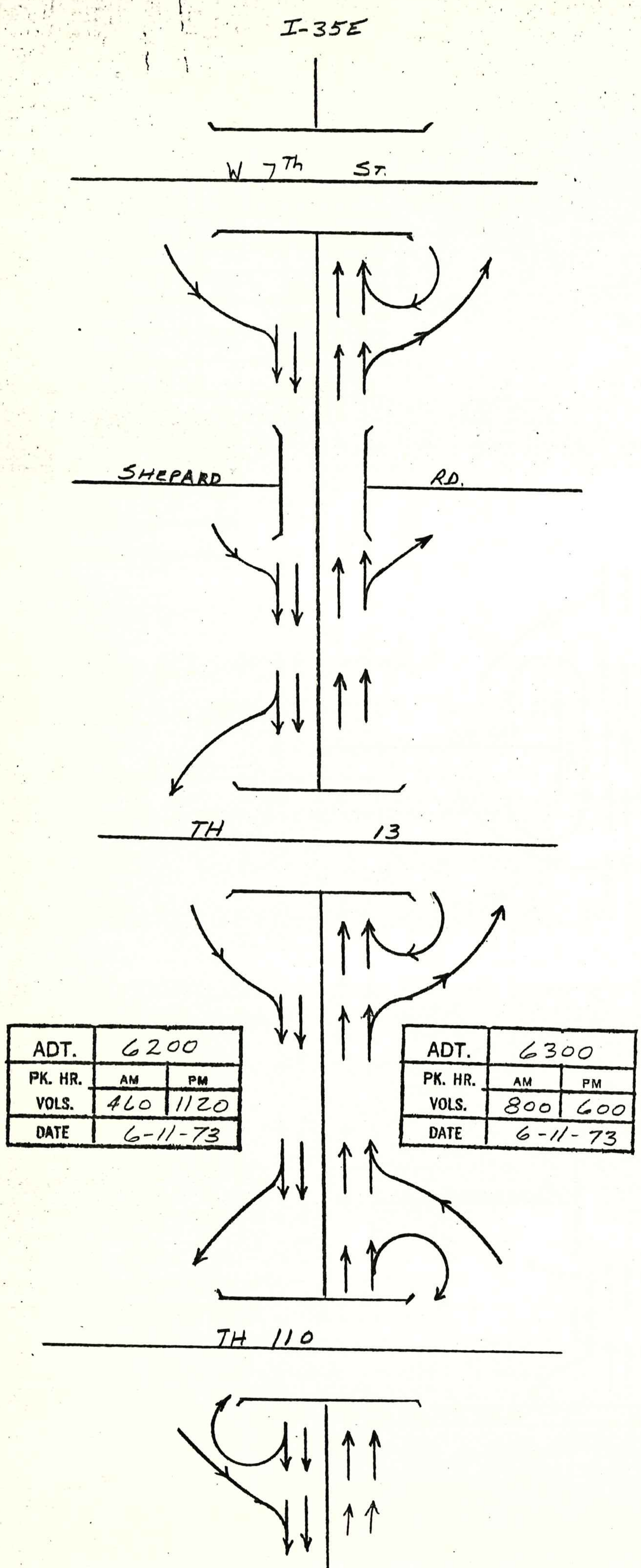
North	Route	From TH 110	
	#35E	To W 7Th ST.	
	Direction	NBL	SBL
	Length	2.5	2.5

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-
# OF RUNS	7	6	7	7
AVE SPEED	46	46	53	54
DATE OF RUNS	8-8-74	8-7-74	8-8-74	8-7

Accident Data

YEAR	RATE	AVE RA
1972	1.8	
1973	1.3	1.
1974	2.4	



ADT.	6200	
PK. HR. VOLS.	AM 460	PM 1120
DATE	6-11-73	

ADT.	6300	
PK. HR. VOLS.	AM 800	PM 600
DATE	6-11-73	

PREPARED SUMMER 1

NOTE: Sketch is not to sc
Sketch shows appr
interchange configu

Segment # 41

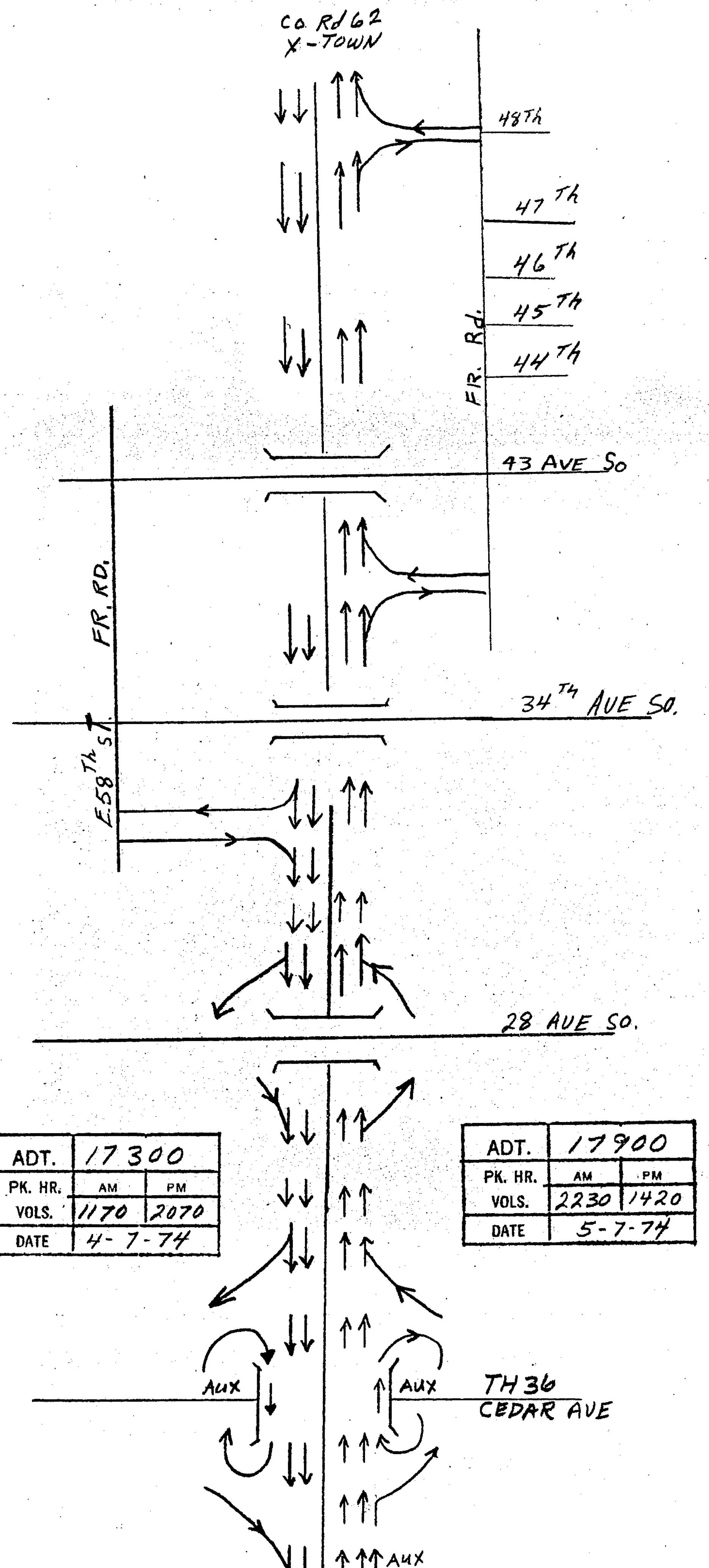
North	Route # 62	From TH 36	
		To 46Th AVE SO	
	Direction	EBL	WBL
	Length	2.0	2.0

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:15-8:15	4:00-5:00
# OF RUNS	3	3	3	3
AVE SPEED	52	52	55	59
DATE OF RUNS	10-73	10-73	10-73	10-73

Accident Data

YEAR	RATE	AVE RATE
1972	0.6	
1973	1.5	0.9
1974	0.5	



ADT.	17300	
PK. HR.	AM	PM
VOLS.	1170	2070
DATE	4-7-74	

ADT.	17900	
PK. HR.	AM	PM
VOLS.	2230	1420
DATE	5-7-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 42

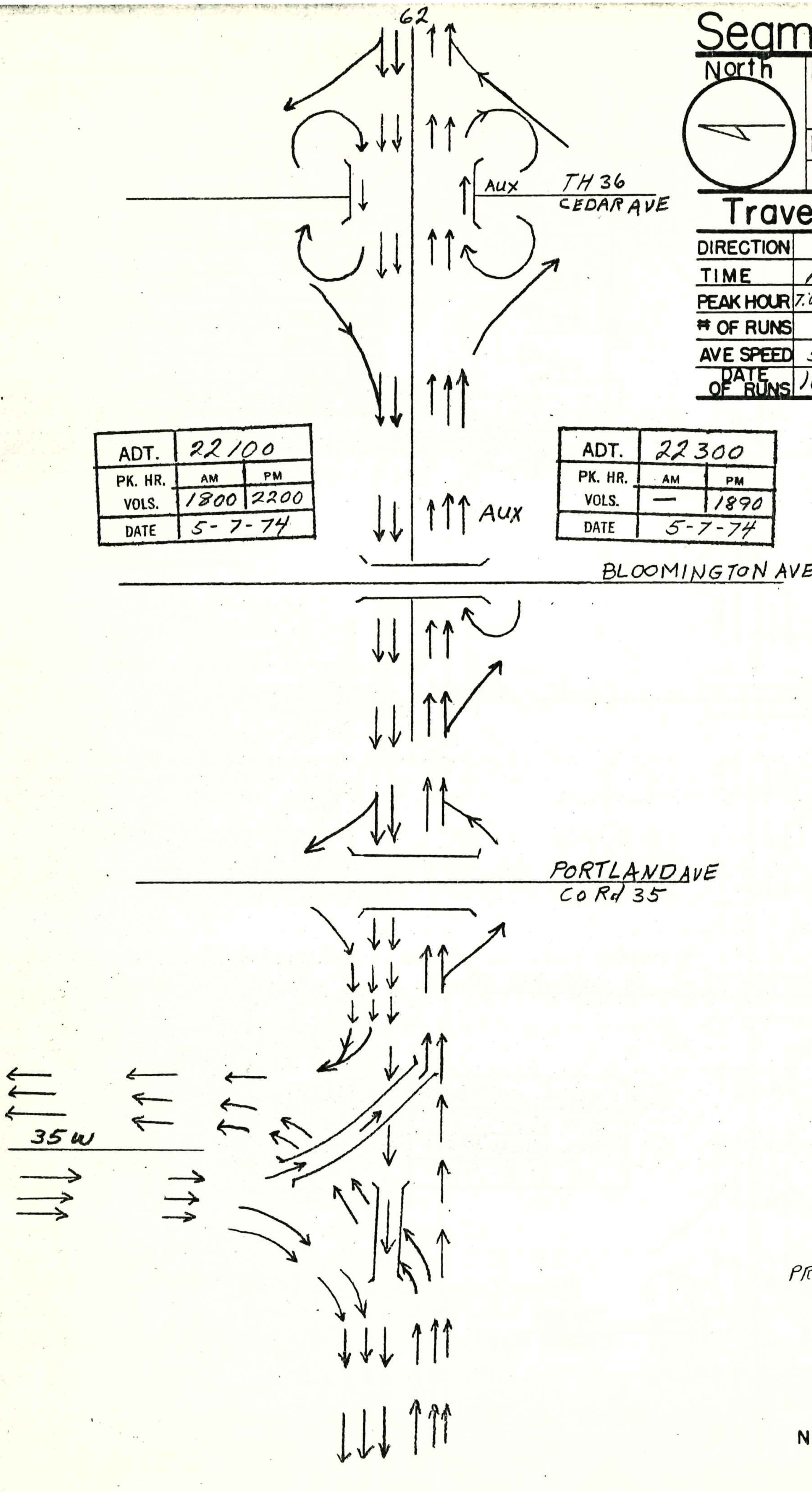
North	Route # 62	From 35W	
		To 36	
	Direction	EBL	W
	Length	1.5	1.

Travel Time Dat

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	P
PEAK HOUR	7:00-8:00	4:00-5:00	7:15-8:15	4:
# OF RUNS	3	4	3	
AVE SPEED	53	57	60	5
DATE OF RUNS	10-73	10-73	10-73	1

Accident Dat

YEAR	RATE	AVE
1972	2.5	
1973	2 6	2
1974	1.9	



PREPARED SUMMER 19

NOTE: Sketch is not to sc
Sketch shows appr
interchange configu

Segment # 43 1 OF 3

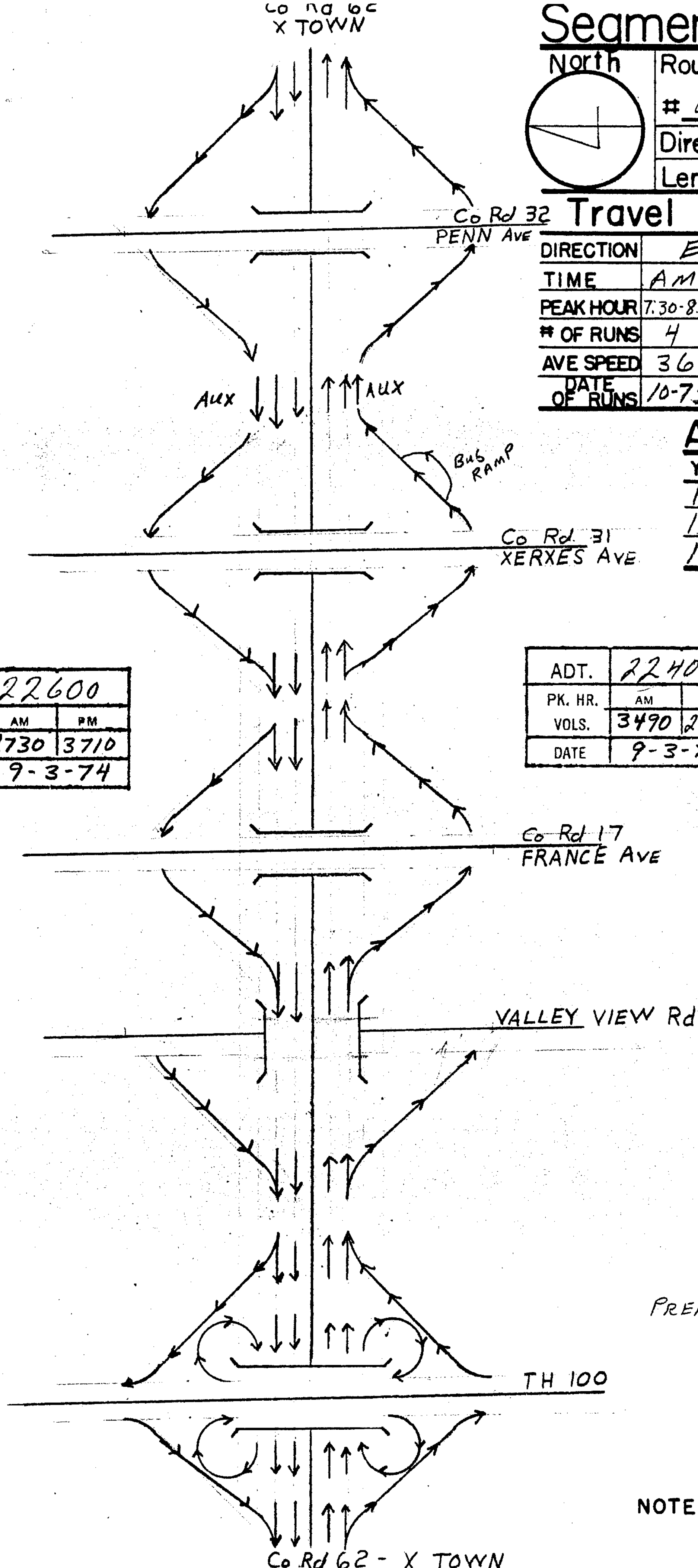
North	Route	From 100	
	# 62	To 35W E. Jct	
	Direction	EBL	WBL
	Length	3.8	3.8

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:30-8:30	4:45-5:45	7:30-8:30	4:30-5:30
# OF RUNS	4	3	3	4
AVE SPEED	36	48	32	58
DATE OF RUNS	10-73	10-73	10-73	10-73

Accident Data

YEAR	RATE	AVE RATE
1971	2.7	
1972	2.2	2.0
1973	1.2	



ADT.	22600	
PK. HR.	AM	PM
VOLS.	2730	3710
DATE	9-3-74	

ADT.	22400	
PK. HR.	AM	PM
VOLS.	3490	2850
DATE	9-3-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 43 2 OF

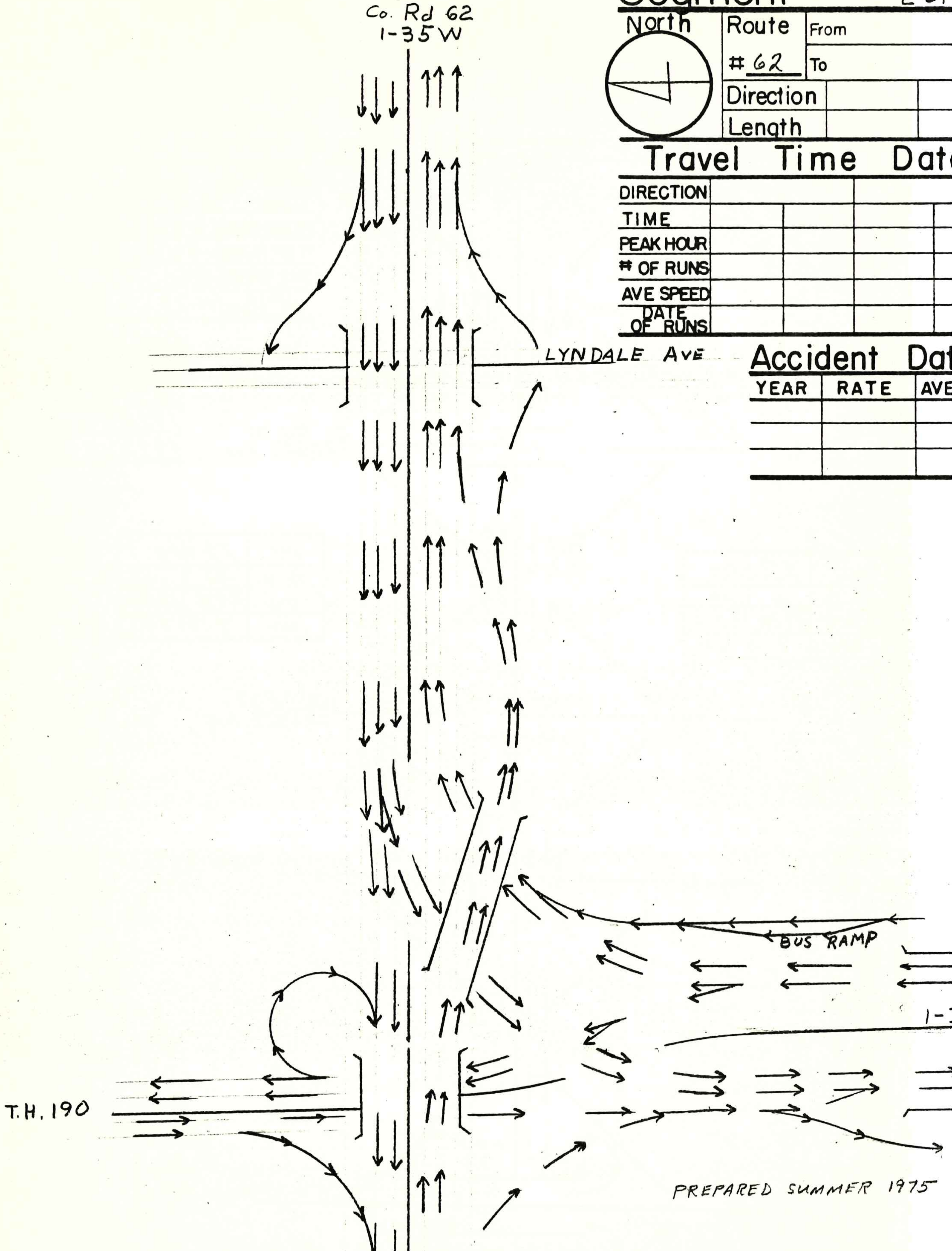
North	Route	From	
	# 62	To	
	Direction		
	Length		

Travel Time Dat

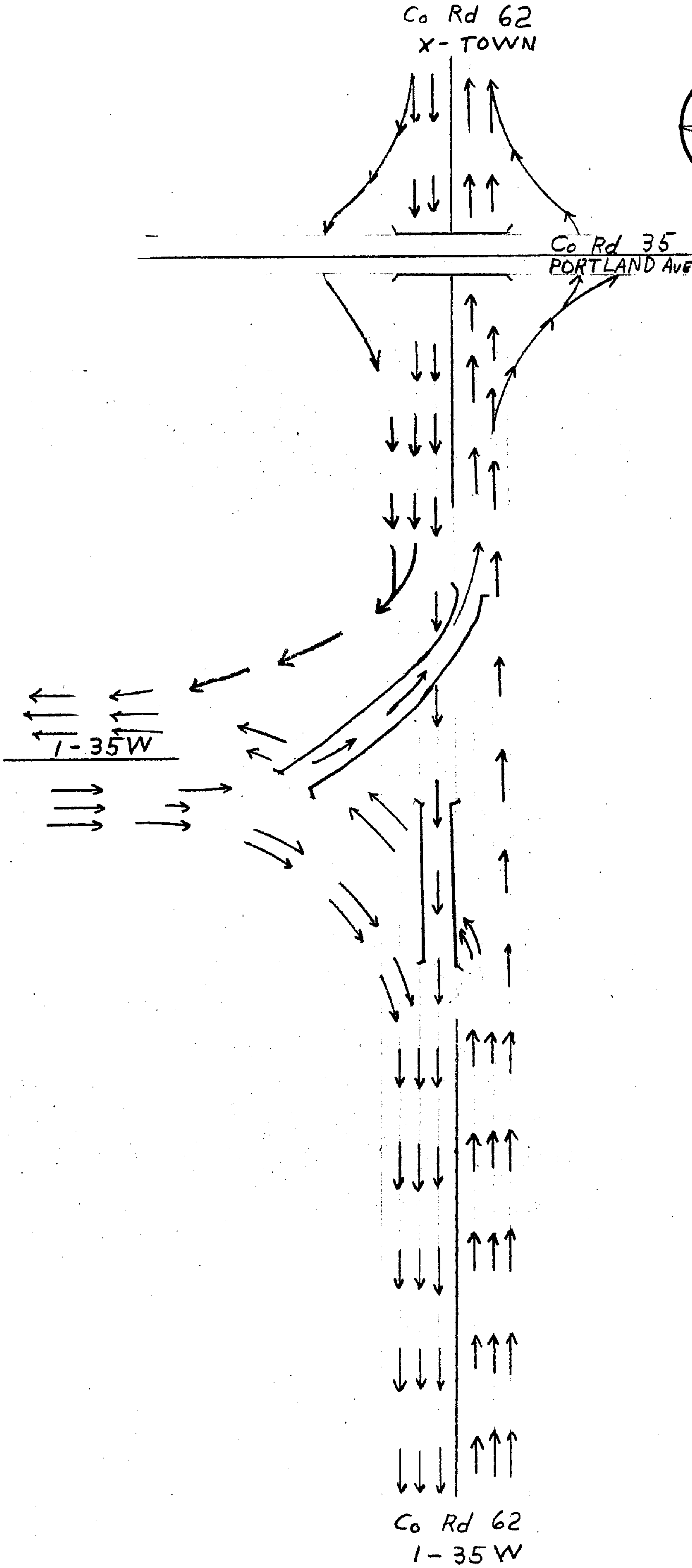
DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Dat

YEAR	RATE	AVE



NOTE: Sketch is not to s
Sketch shows app
interchange config



Segment # 43 3 OF 3

North	Route	From
	# 62	To
	Direction		
	Length		

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuratio

Segment # 44

North	Route	From TH 100
	# 62	To CSAH 61
	Direction	EBL | W
	Length	3.5 | 3

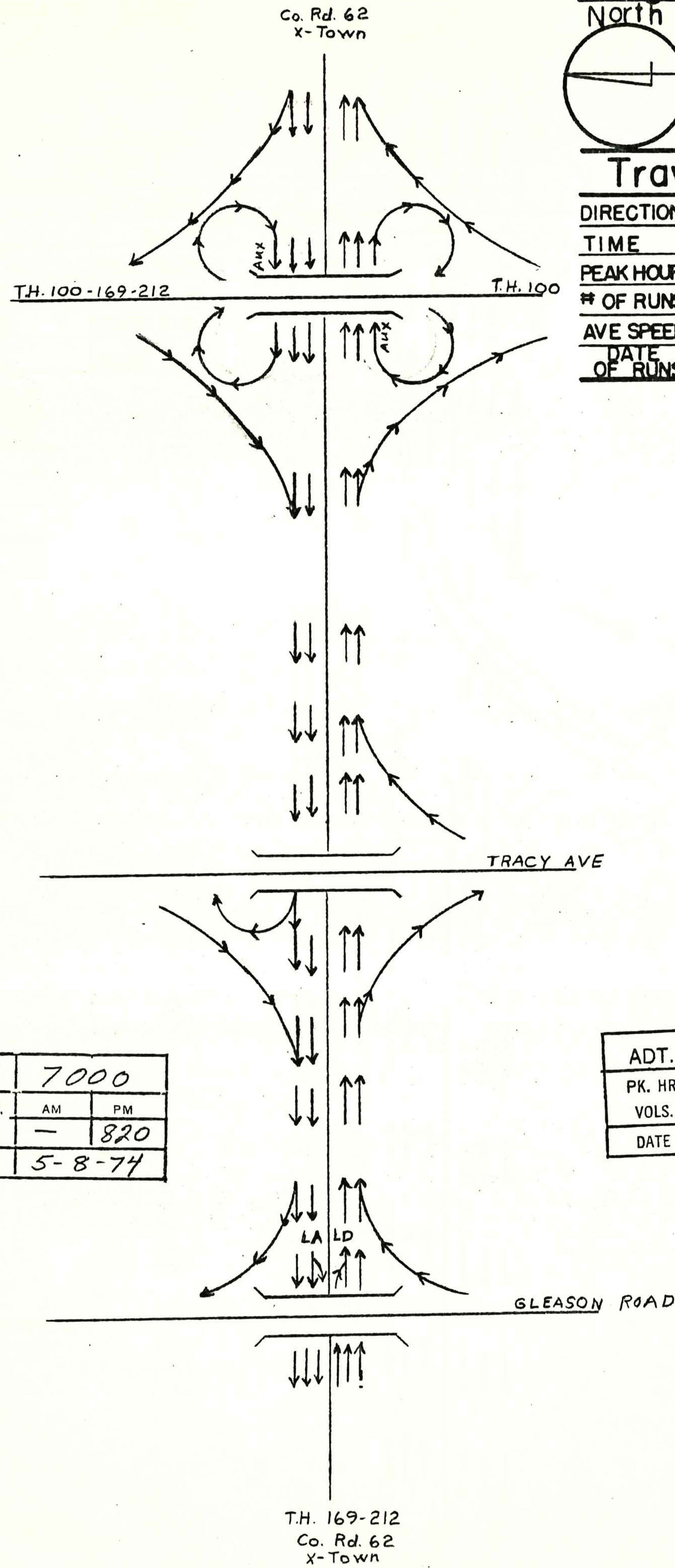
Travel Time Dat

DIRECTION	EBL		WB
TIME	AM	PM	AM
PEAK HOUR	7:30-8:30	4:30-5:30	7:30-8:30
# OF RUNS	3	4	3
AVE SPEED	60	61	59
DATE OF RUNS	10-73	10-73	10-73

Accident Da

	YEAR	RATE	AV
*	1971	1.6	
	1972	1.3	
	1973	2.5	

* ACCIDENT DATA
FOR CSAH 18
T.H. 100 ONLY.



ADT.	7000	
PK. HR. VOLS.	AM	PM
	—	820
DATE	5-8-74	

ADT.	6500	
PK. HR. VOLS.	AM	PM
	720	1760
DATE	5-8-74	

PREPARED SUMME

NOTE: Sketch is not to
Sketch shows ap
interchange conf

Segment # 44 2 of 2

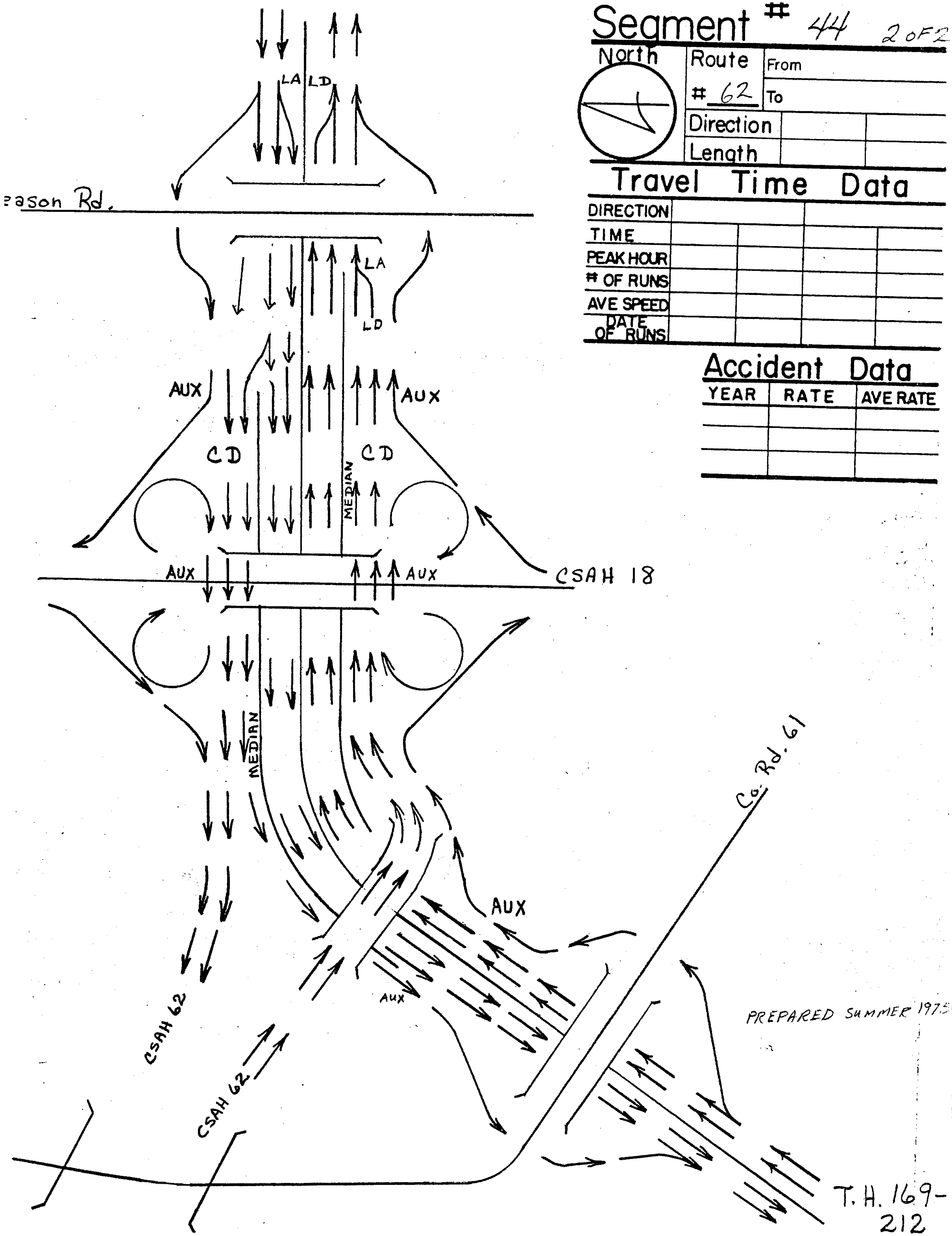
North	Route # 62	From		
		To		
	Direction			
	Length			

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 45

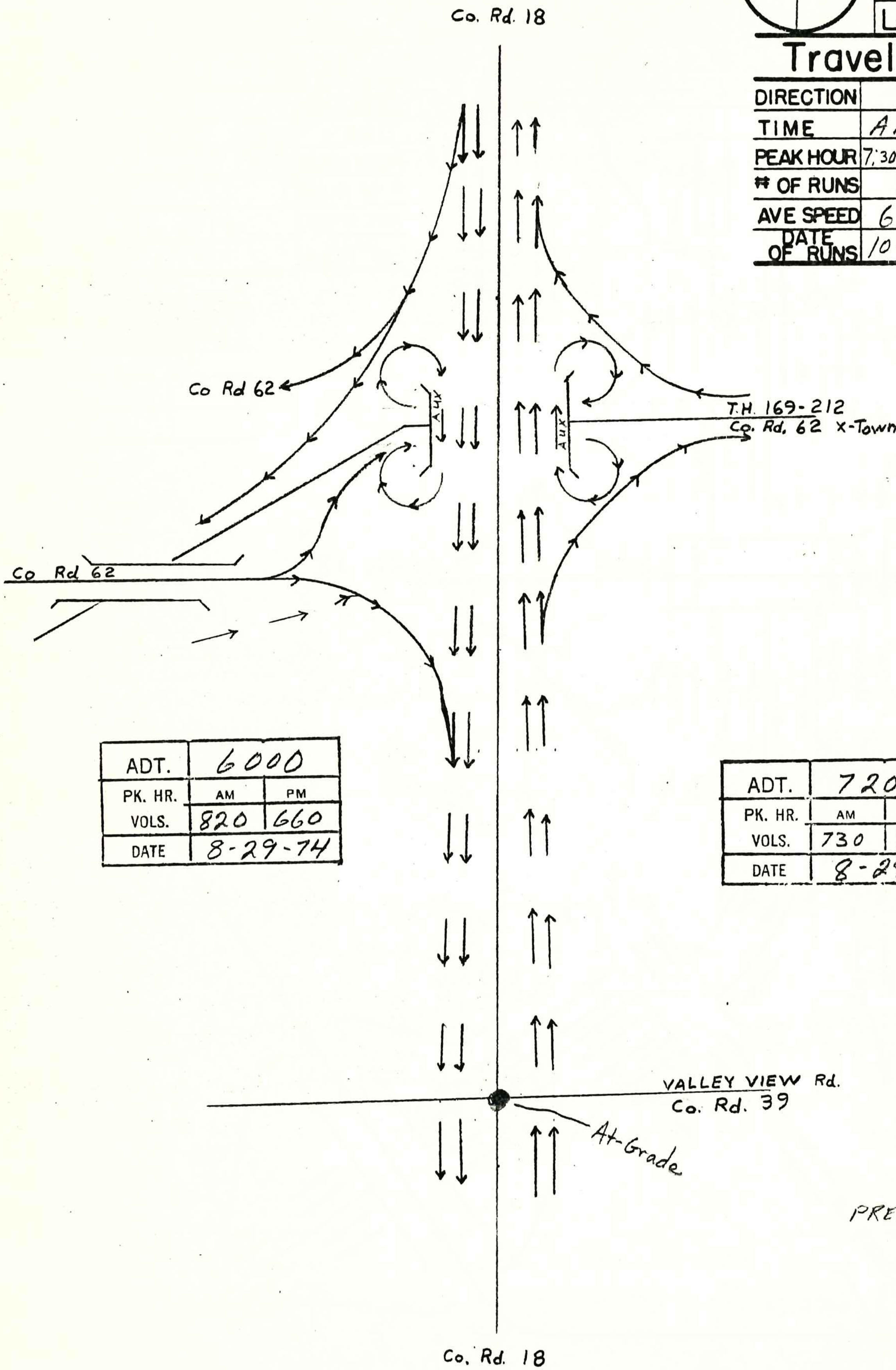
North	Route	From C.S.A.H. 3	
	# 18	To C.S.A.H. 6	
	Direction	NBL	S
	Length	1.1	1

Travel Time Dat

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	7:30-8:30	4:45-5:45	7:45-8:45	4.
# OF RUNS	3	3	3	
AVE SPEED	62	61	62	
DATE OF RUNS	10-73	10-73	10-73	1

Accident Dat

YEAR	RATE	AVE
1972	1.8	
1973	1.9	
1974	0.8	



ADT.	6000	
PK. HR. VOLS.	AM 820	PM 660
DATE	8-29-74	

ADT.	7200	
PK. HR. VOLS.	AM 730	PM 940
DATE	8-29-74	

PREPARED SUMMER 19

NOTE: Sketch is not to s
Sketch shows app
interchange confi

Segment # 46 1 OF 2

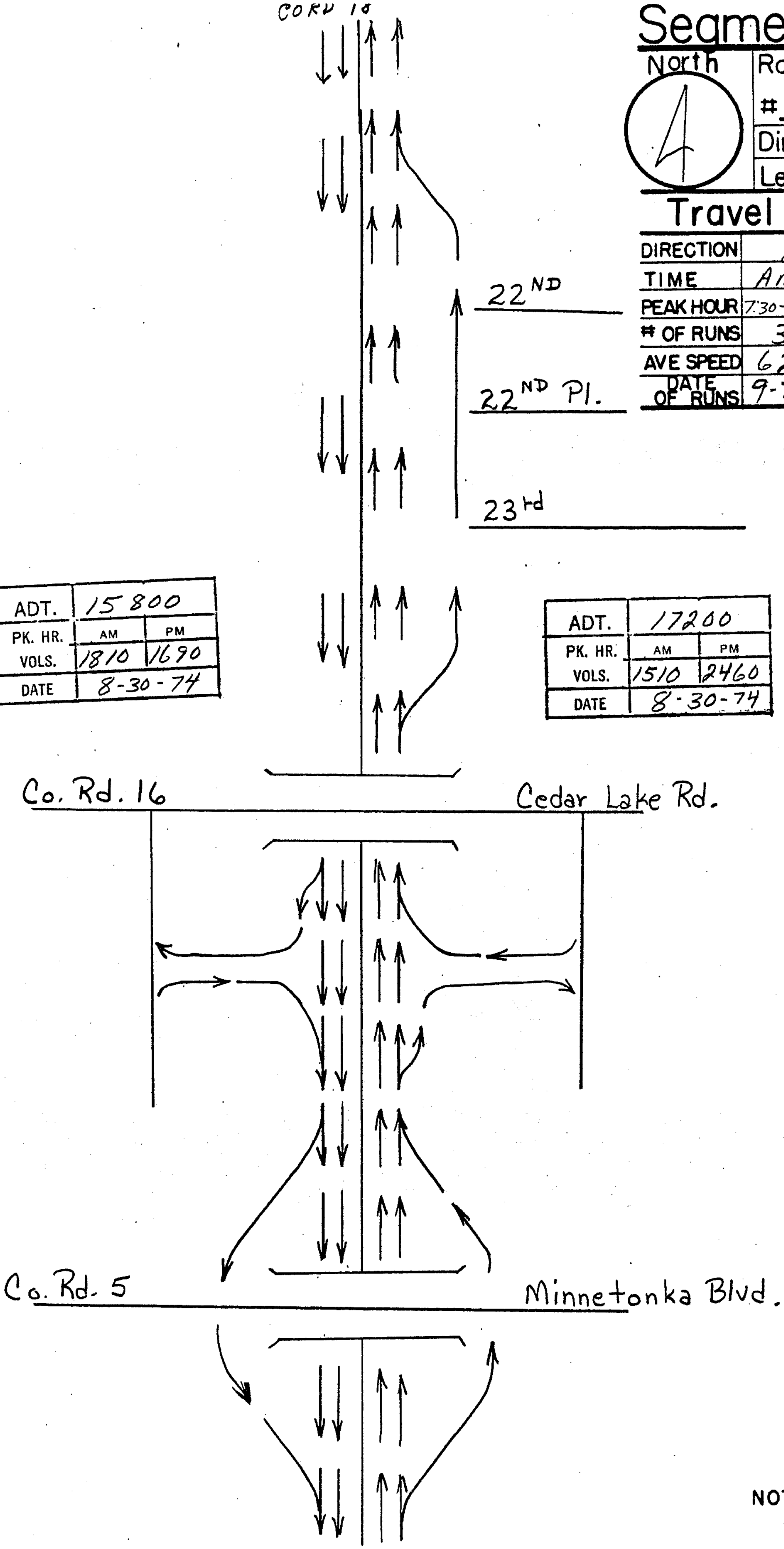
North	Route # 18	From CO. RD. 5	
		To 12	
	Direction	NBL	SBL
	Length	1.9	1.9

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:30-8:30	4:30-5:30	7:00-8:00	4:00-5:00
# OF RUNS	3	4	3	4
AVE SPEED	62	61	59	59
DATE OF RUNS	9-73	9-73	9-73	9-73

Accident Data

YEAR	RATE	AVE RATE
1971	1.3	
1972	1.3	1.7
1973	2.6	



ADT.	15800	
PK. HR. VOLS.	AM 1810	PM 1690
DATE	8-30-74	

ADT.	17200	
PK. HR. VOLS.	AM 1510	PM 2460
DATE	8-30-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 46 2

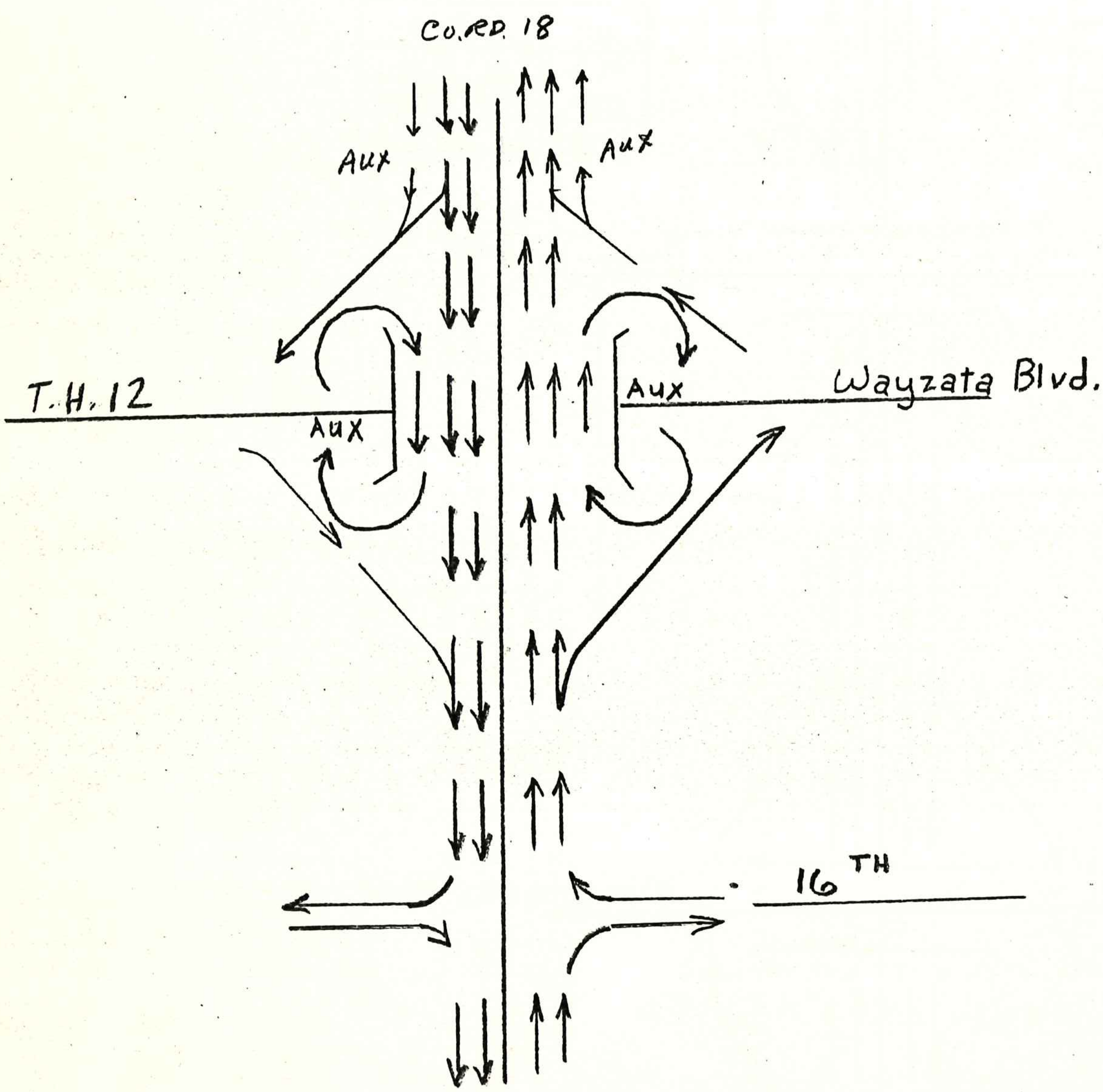
North	Route	From
	# 18	To
	Direction	
	Length	

Travel Time Dat

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Dat

YEAR	RATE	AVE



PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment # 47

North

Route # 18	From 12
	To 55

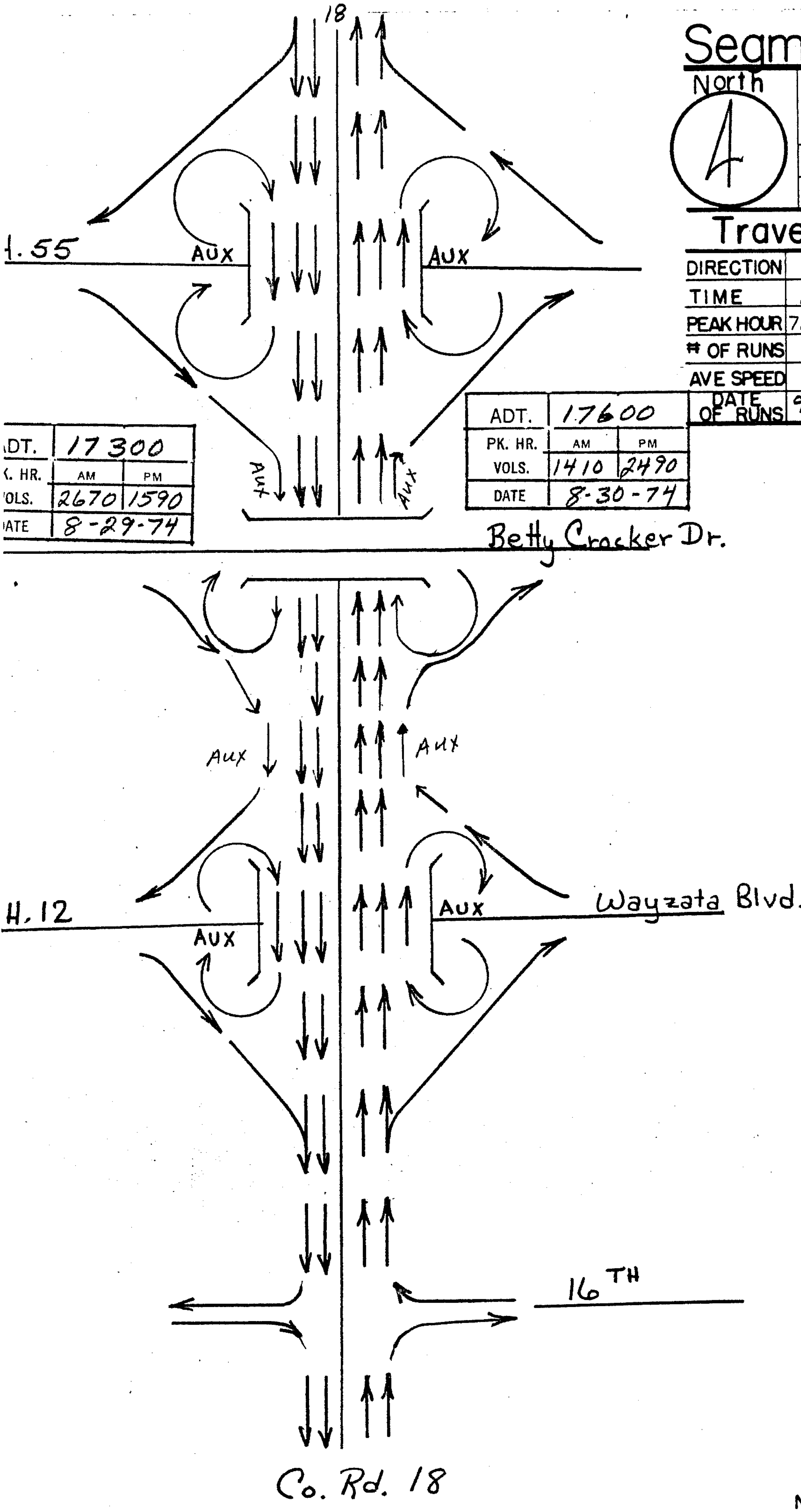
Direction	NBL	SBL
Length	0.7	0.7

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:00-5:00	7:00-8:00	4:00-5:00
# OF RUNS	3	3	3	3
AVE SPEED	59	62	58	62
DATE OF RUNS	9-24-73	9-24-73	9-24-73	9-24-73

Accident Data

YEAR	RATE	AVE RATE
1971	2.5	2.4
1972	2.6	
1973	2.2	



ADT.	17300	
PK. HR.	AM	PM
VOLS.	2670	1590
DATE	8-29-74	

ADT.	17600	
PK. HR.	AM	PM
VOLS.	1410	2490
DATE	8-30-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 48

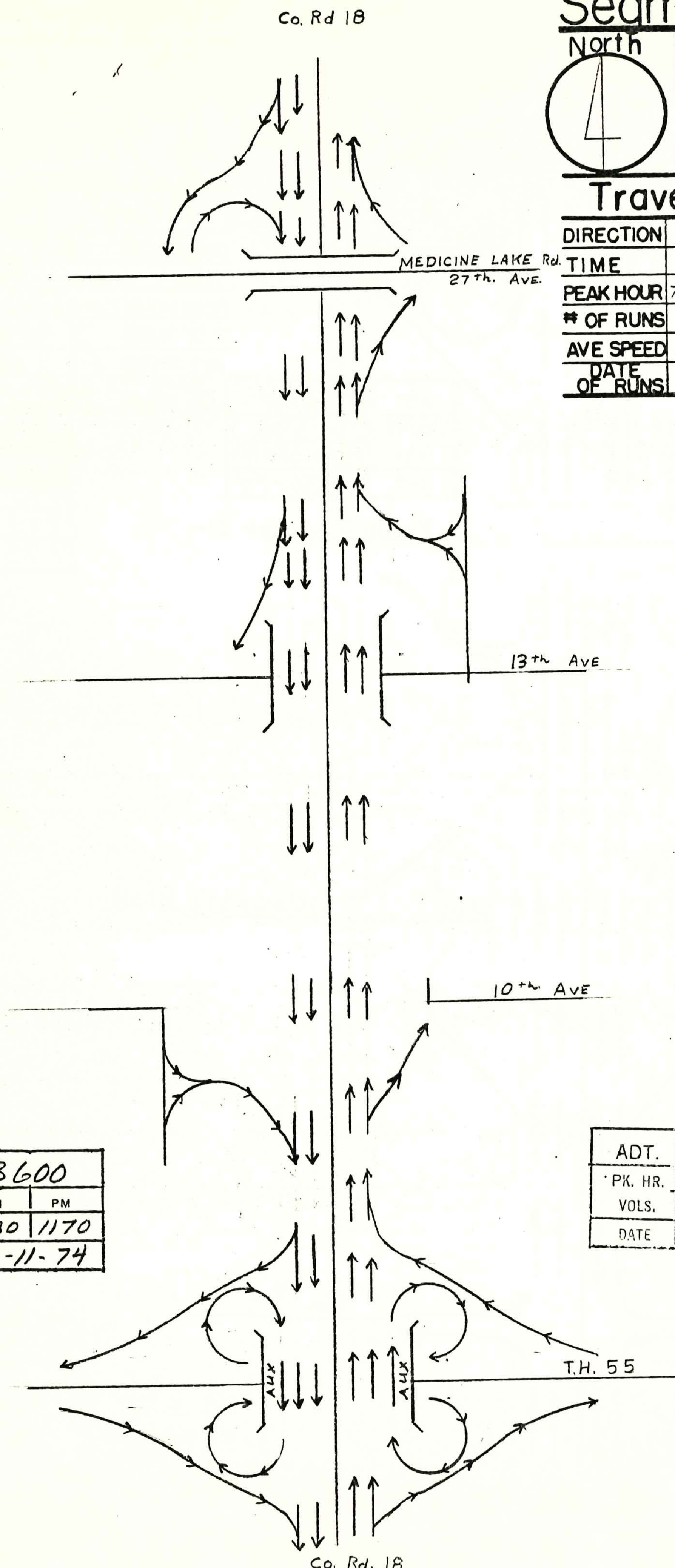
North	Route	From 55	
	# 18	To 63 Rd AV...	
	Direction	NBL	S...
	Length	6.0	6...

Travel Time Dat...

DIRECTION	NBL		SBL...	
TIME	AM	PM	AM	
PEAK HOUR	7:15-8:15	4:15-5:15	7:00-8:00	4...
# OF RUNS	3	3	3	
AVE SPEED	69	45	37	...
DATE OF RUNS	1974	1974	1974	...

Accident Da...

YEAR	RATE	AV...
1971	3.0	
1972	2.4	2...
1973	2.0	



ADT.	13600	
PK. HR.	AM	PM
VOLS.	2730	1170
DATE	6-11-74	

ADT.	13600	
PK. HR.	AM	PM
VOLS.	1010	2350
DATE	6-11-74	

PREPARED SUMMER

NOTE: Sketch is not to...
Sketch shows ap...
interchange con...

Segment # 48

North

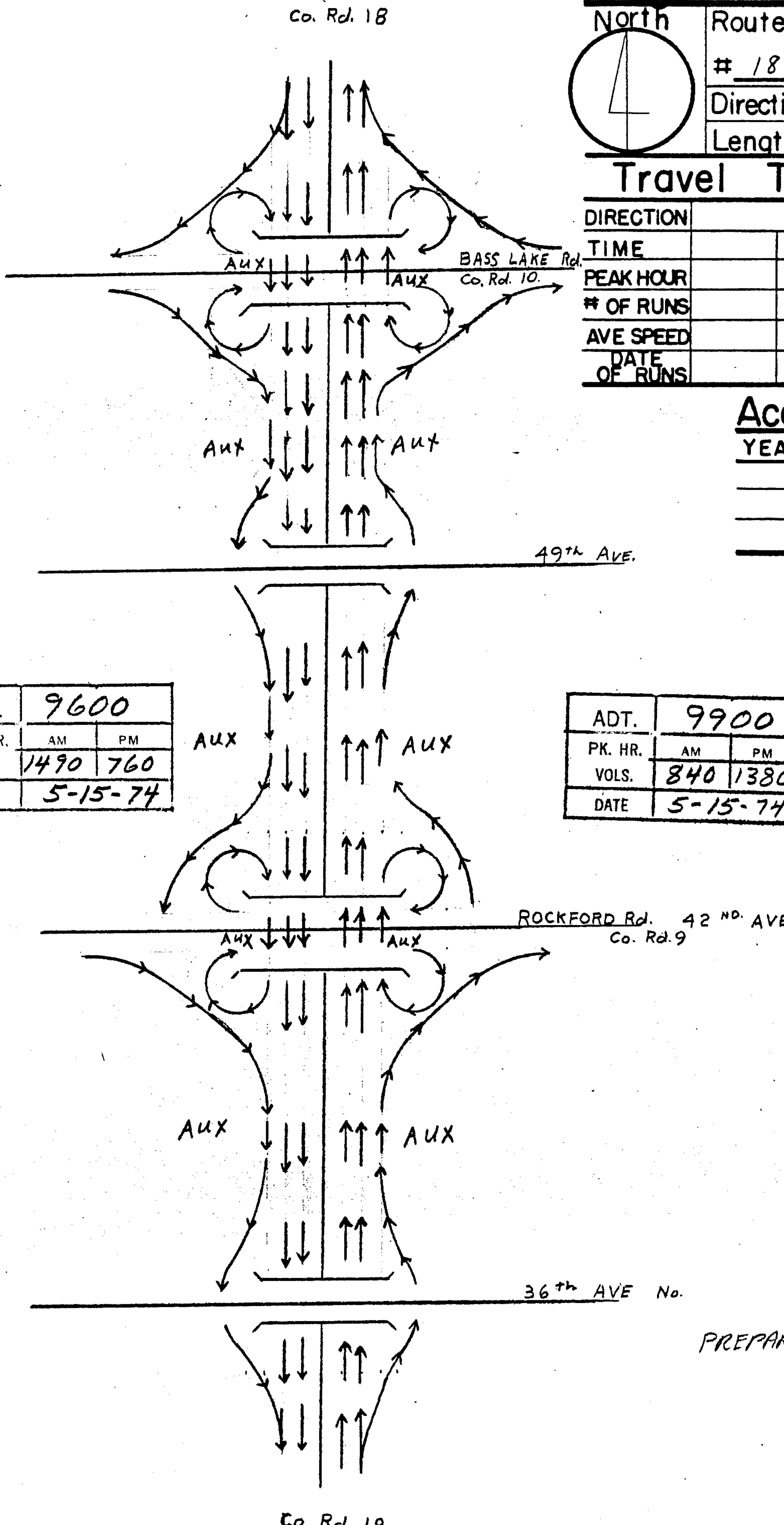
Route	From
# 18	To
Direction	
Length	

Travel Time Data

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE



ADT.	9600	
PK. HR.	AM	PM
VOLS.	1490	760
DATE	5-15-74	

ADT.	9900	
PK. HR.	AM	PM
VOLS.	840	1380
DATE	5-15-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.

Segment # 48

3

North

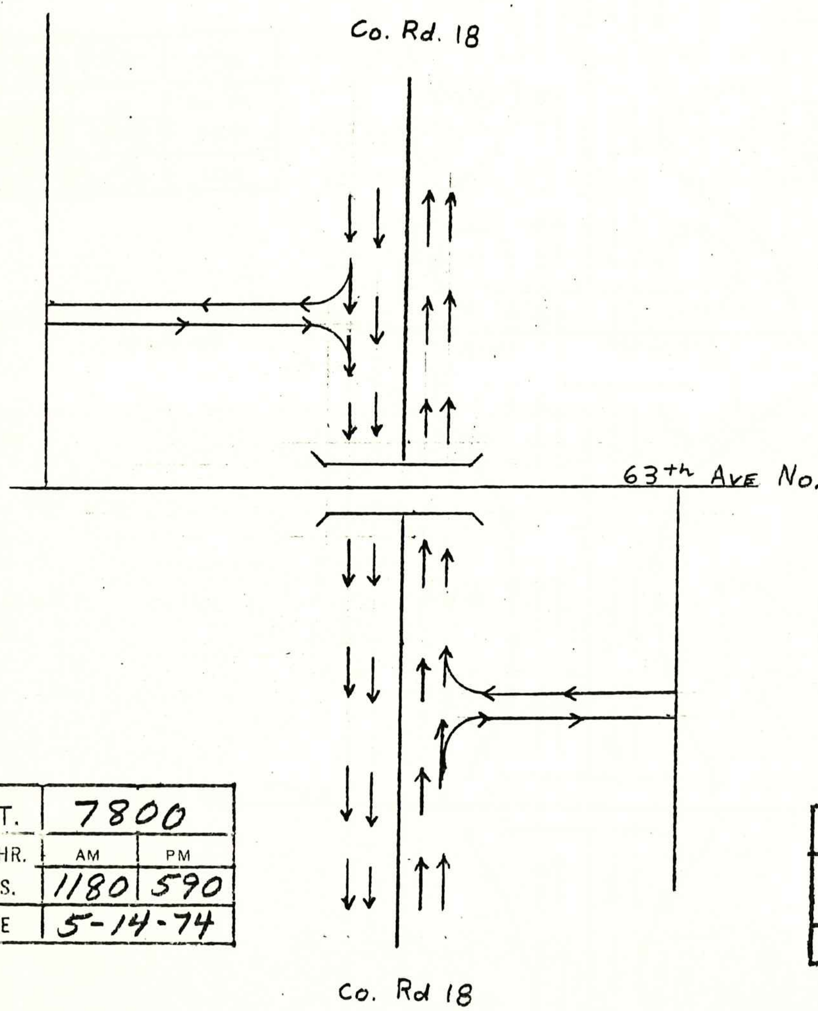
Route	From		
# 18	To		
Direction			
Length			

Travel Time Dat

DIRECTION				
TIME				
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Dat

YEAR	RATE	AVE



PREPARED SUMMER

ADT.	7800	
PK. HR.	AM	PM
VOLS.	1180	590
DATE	5-14-74	

ADT.	7900	
PK. HR.	AM	PM
VOLS.	720	1220
DATE	5-14-74	

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment # 49

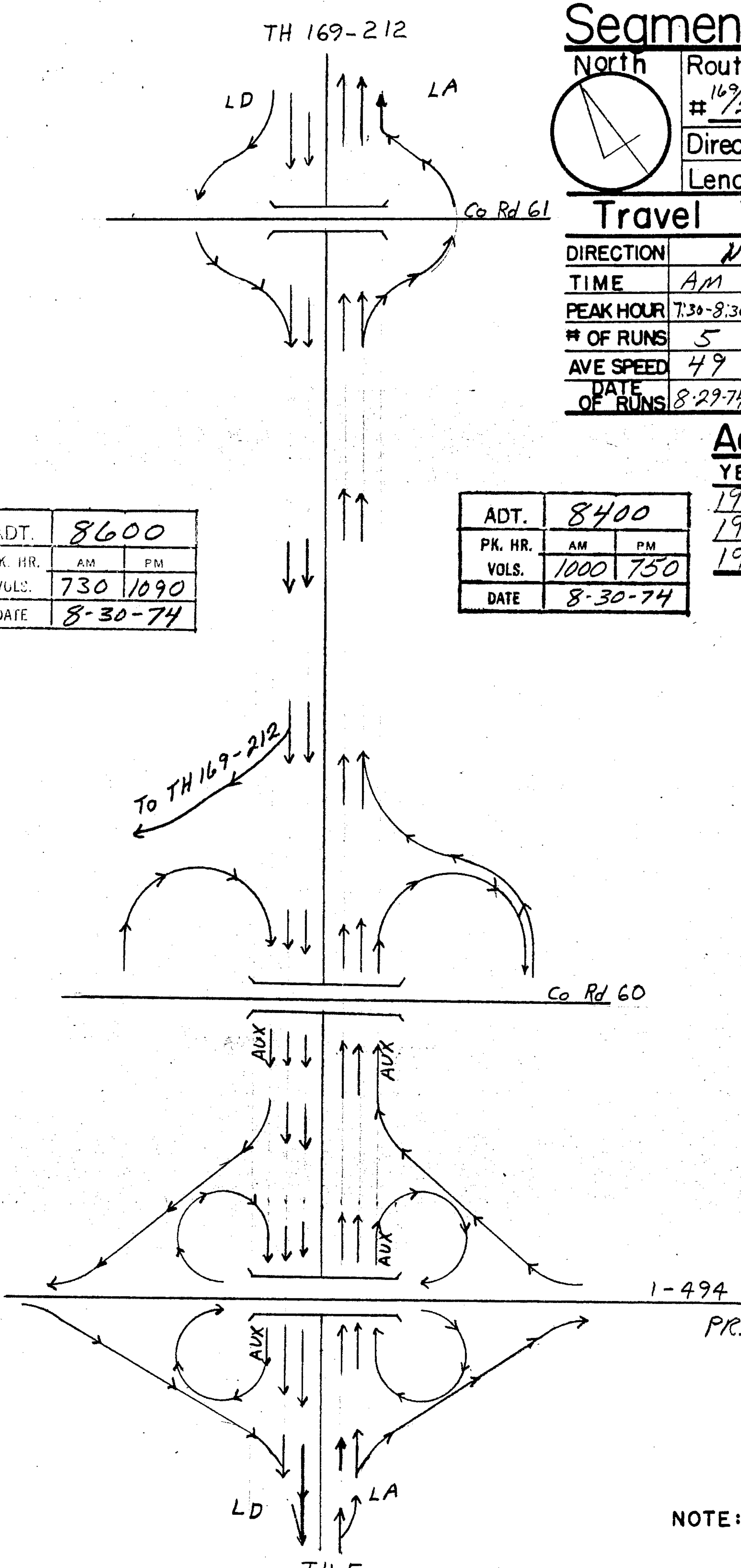
North	Route # 169/212	From	494
		To	62
	Direction	NBL	SBL
	Length	2.3	2.3

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:30-8:30	4:30-5:30	7:30-8:30	4:30-5:30
# OF RUNS	5	5	5	5
AVE SPEED	49	50	50	51
DATE OF RUNS	8-29-74	8-29-74	8-29-74	8-29-74

Accident Data

YEAR	RATE	AVE RATE
1972	2.4	2.4
1973	1.9	
1974	2.8	



ADT.	8600	
PK. HR. VOLS.	AM	PM
	730	1090
DATE	8-30-74	

ADT.	8400	
PK. HR. VOLS.	AM	PM
	1000	750
DATE	8-30-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 50

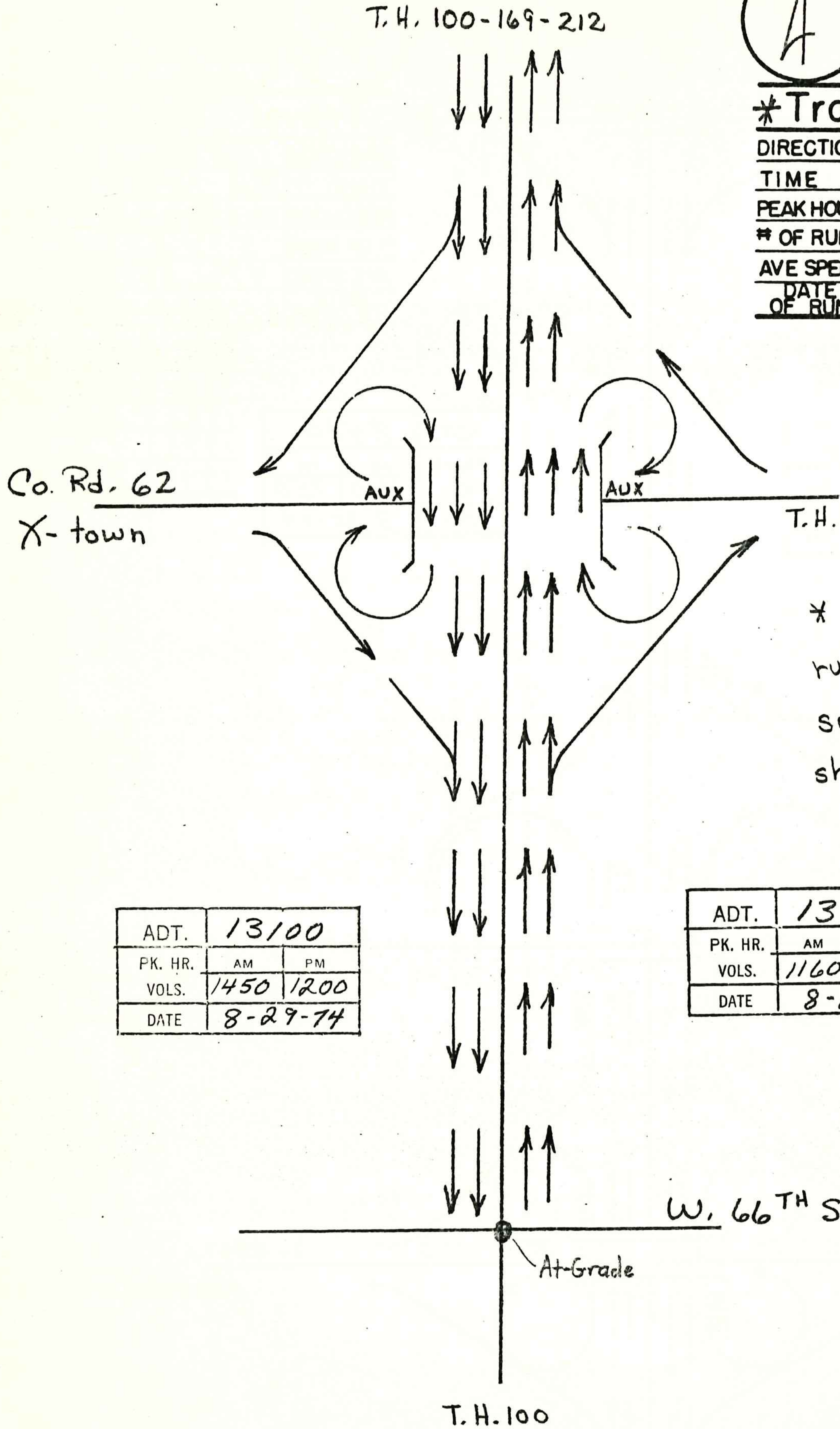
North	Route	From 66 Th ST	
A	# 100	To 62	
	Direction	NBL	S
	Length	0.4	0

*Travel Time Dat

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	7:30-8:30	4:30-5:30	7:30-8:30	4.
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Dat

YEAR	RATE	AVE
1972	4.8	
1973	4.6	5
1974	8.0	



ADT.	13100	
PK. HR. VOLS.	AM 1450	PM 1200
DATE	8-29-74	

ADT.	13800	
PK. HR. VOLS.	AM 1160	PM 1550
DATE	8-29-74	

* Note: Travel time runs not made on th segment due to it short length

PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment # 51

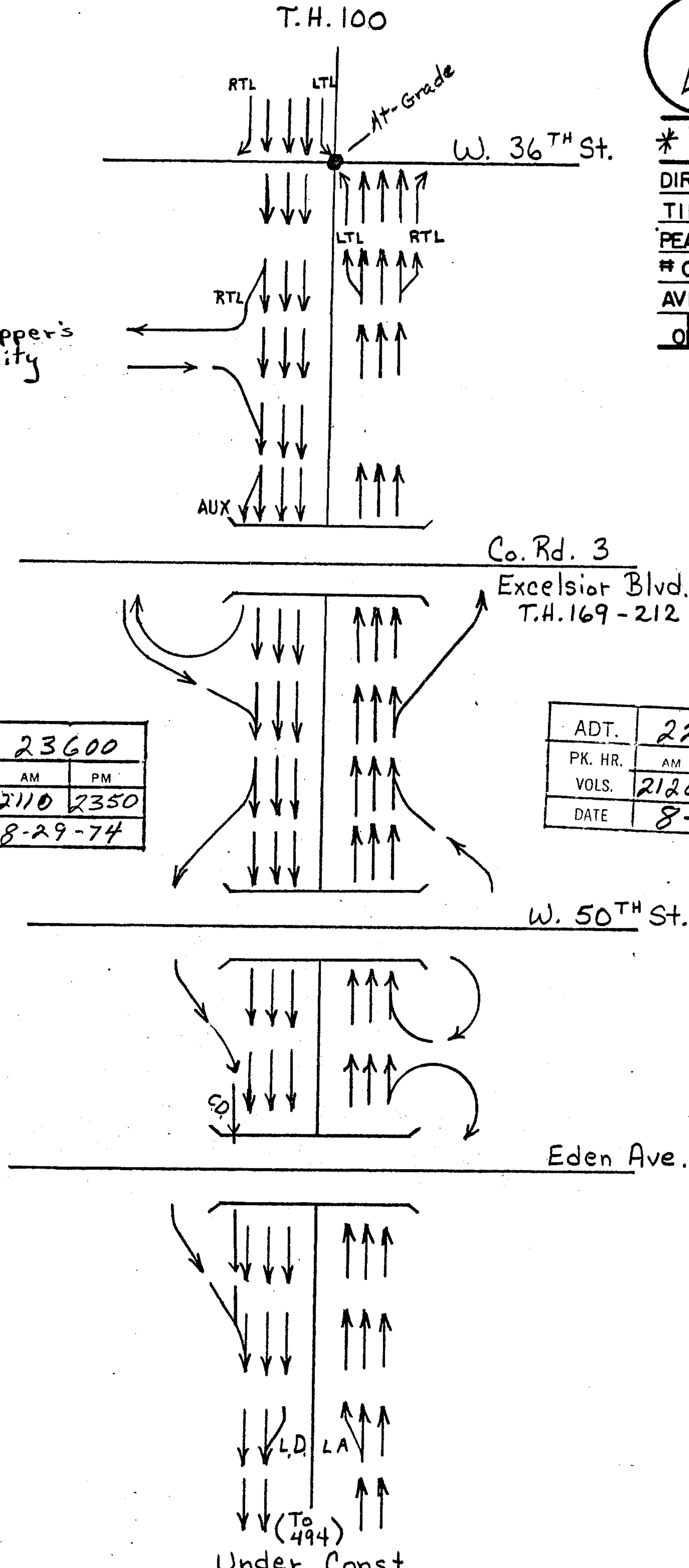
North	Route # 100	From 50Th ST. W.	
		To 36Th ST. W.	
	Direction	NBL	SBL
	Length	1.8	1.8

* Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:30-8:30	4:30-5:30	7:30-8:30	4:30-5:30
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE
1972	4.1	
1973	2.9	3.4
1974	3.1	



ADT.	23600	
PK. HR.	AM	PM
VOLS.	2110	2350
DATE	8-29-74	

ADT.	22800	
PK. HR.	AM	PM
VOLS.	2120	2030
DATE	8-29-74	

* Note: Travel time runs not made on this segment due to its short length

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 52

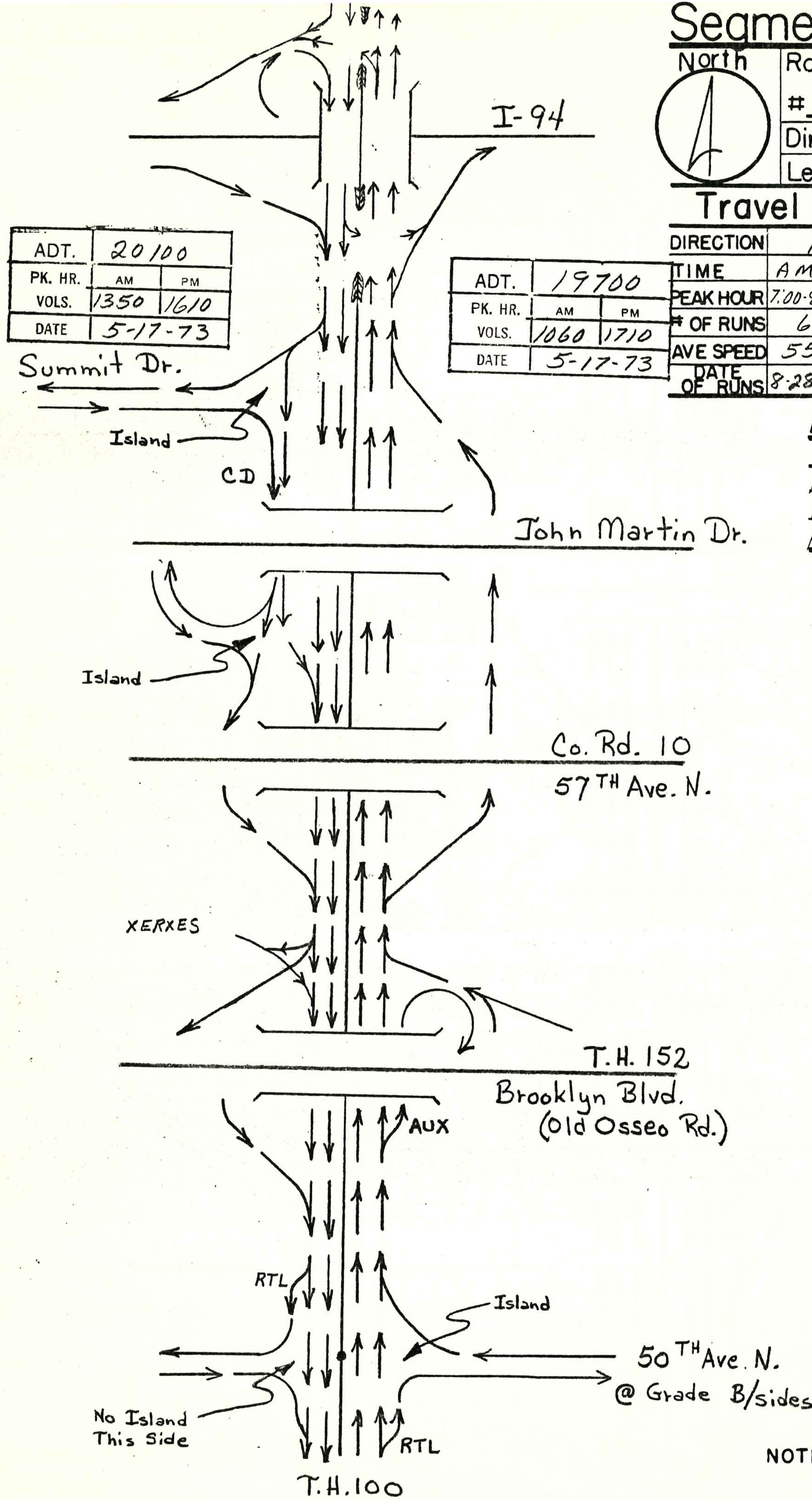
North	Route	From 50TH AVE	
	# 100	To 94	
	Direction	NBL	S
	Length	2.2	2.

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	P
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:1
# OF RUNS	6	6	6	
AVE SPEED	55	54	56	
DATE OF RUNS	8-28-74	8-28-74	8-28-74	8-

Accident Data

YEAR	RATE	AVER
1972	4.5	
1973	4.0	3.
1974	3.0	



ADT.	20100	
PK. HR. VOLS.	AM 1350	PM 1610
DATE	5-17-73	

ADT.	19700	
PK. HR. VOLS.	AM 1060	PM 1710
DATE	5-17-73	

PREPARED SUMMER

NOTE: Sketch is not to sc
Sketch shows appro
interchange configur

Segment 53

North	Route # 12	From TYROL TRAIL To 169	
	Direction	EBL	WBL
	Length	2.2	2.2

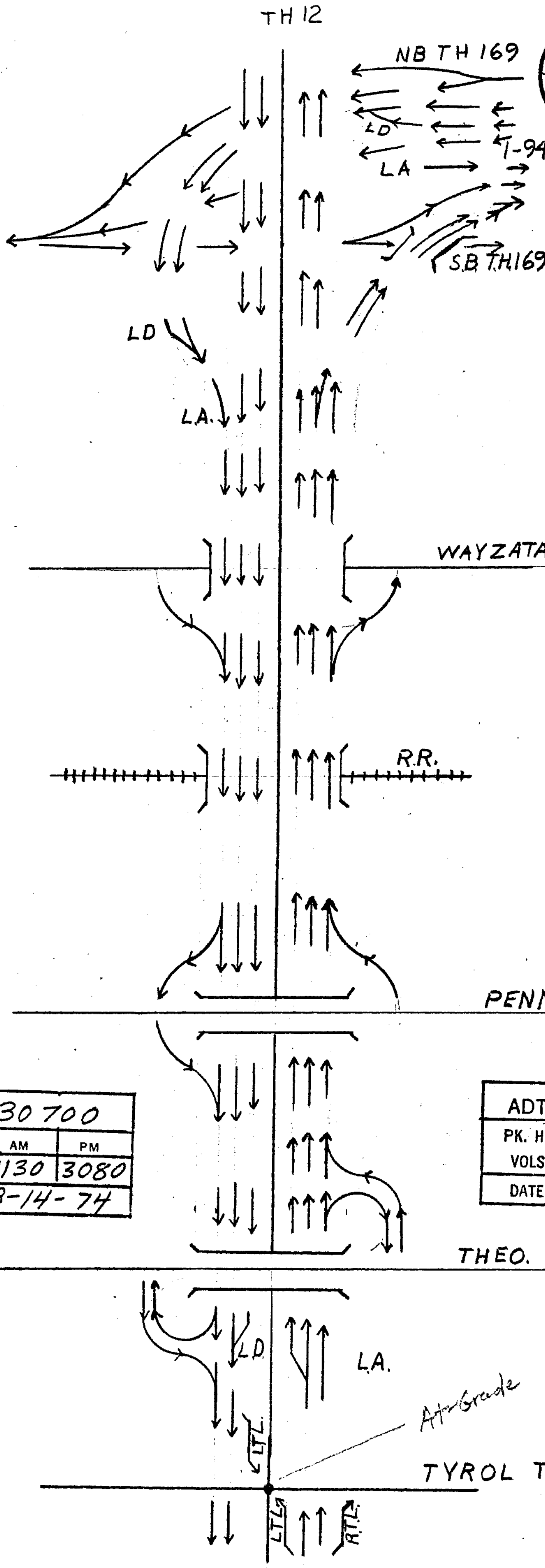
Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:15-8:15	4:00-5:
# OF RUNS	4	4	3	4
AVE SPEED	44	52	48	44
DATE OF RUNS	9-5-74	9-5-74	9-5-74	9-5-7

* Accident Data

YEAR	RATE	AVE RATE

* No accident data or computer runs on this segment.



ADT.	30 700	
PK. HR. VOLS.	AM 2130	PM 3080
DATE	8-14-74	

ADT.	31 900	
PK. HR. VOLS.	AM 3940	PM 2590
DATE	8-14-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 54

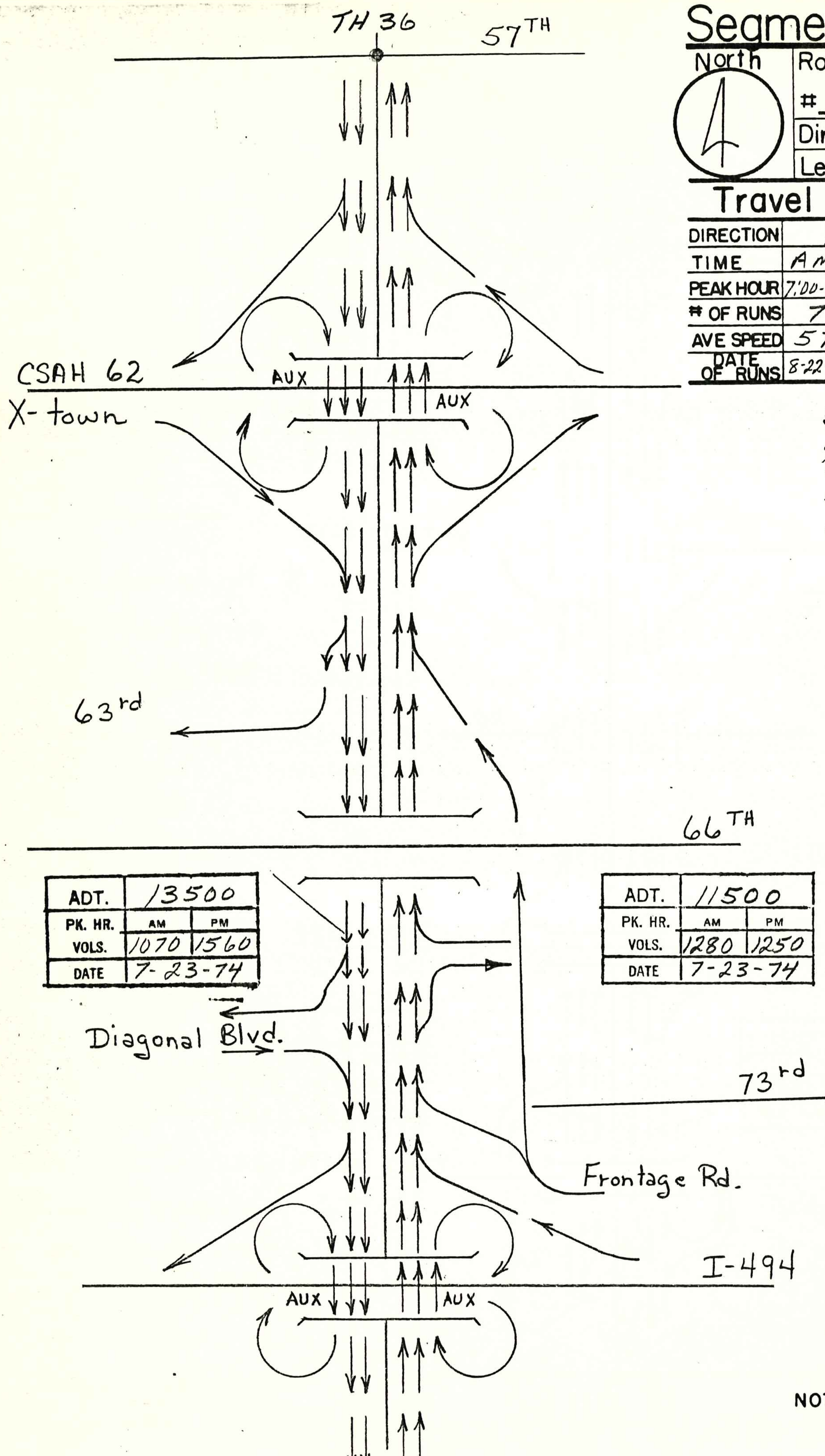
North	Route # 36	From 494	
		To 57th ST	
	Direction	NBL	S…
	Length	2.6	2…

Travel Time Dat…

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	…
PEAK HOUR	7:00-8:00	4:15-5:15	7:15-8:15	4.…
# OF RUNS	7	6	6	…
AVE SPEED	57	55	59	…
DATE OF RUNS	8-22-74	8-22-74	8-22-74	8…

Accident Dat…

YEAR	RATE	AVE…
1972	1.0	
1973	0.6	0…
1974	1.2	



ADT.	13500	
PK. HR.	AM	PM
VOLS.	1070	1560
DATE	7-23-74	

ADT.	11500	
PK. HR.	AM	PM
VOLS.	1280	1250
DATE	7-23-74	

PREPEARED SUMM…

NOTE: Sketch is not to s…
Sketch shows app…
interchange config…

Segment #55

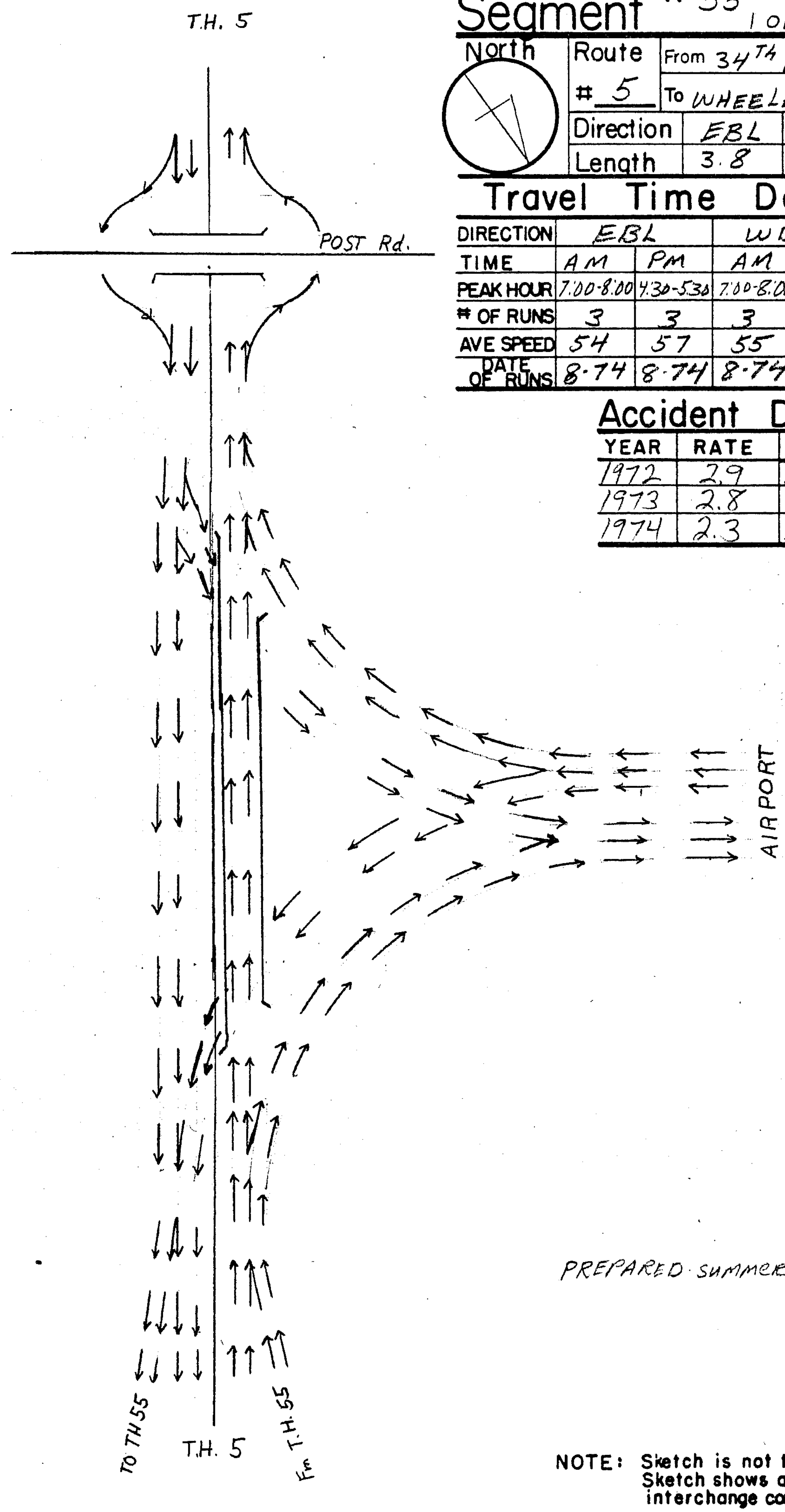
North	Route # 5	From 34TH AVE S.	
		To WHEELER ST.	
	Direction	EBL	WBL
	Length	3.8	3.8

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:30-5:30	7:00-8:00	4:00-5:00
# OF RUNS	3	3	3	3
AVE SPEED	54	57	55	57
DATE OF RUNS	8-74	8-74	8-74	8-74

Accident Data

YEAR	RATE	AVE RATE
1972	2.9	2.7
1973	2.8	
1974	2.3	



PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 55
2 OF

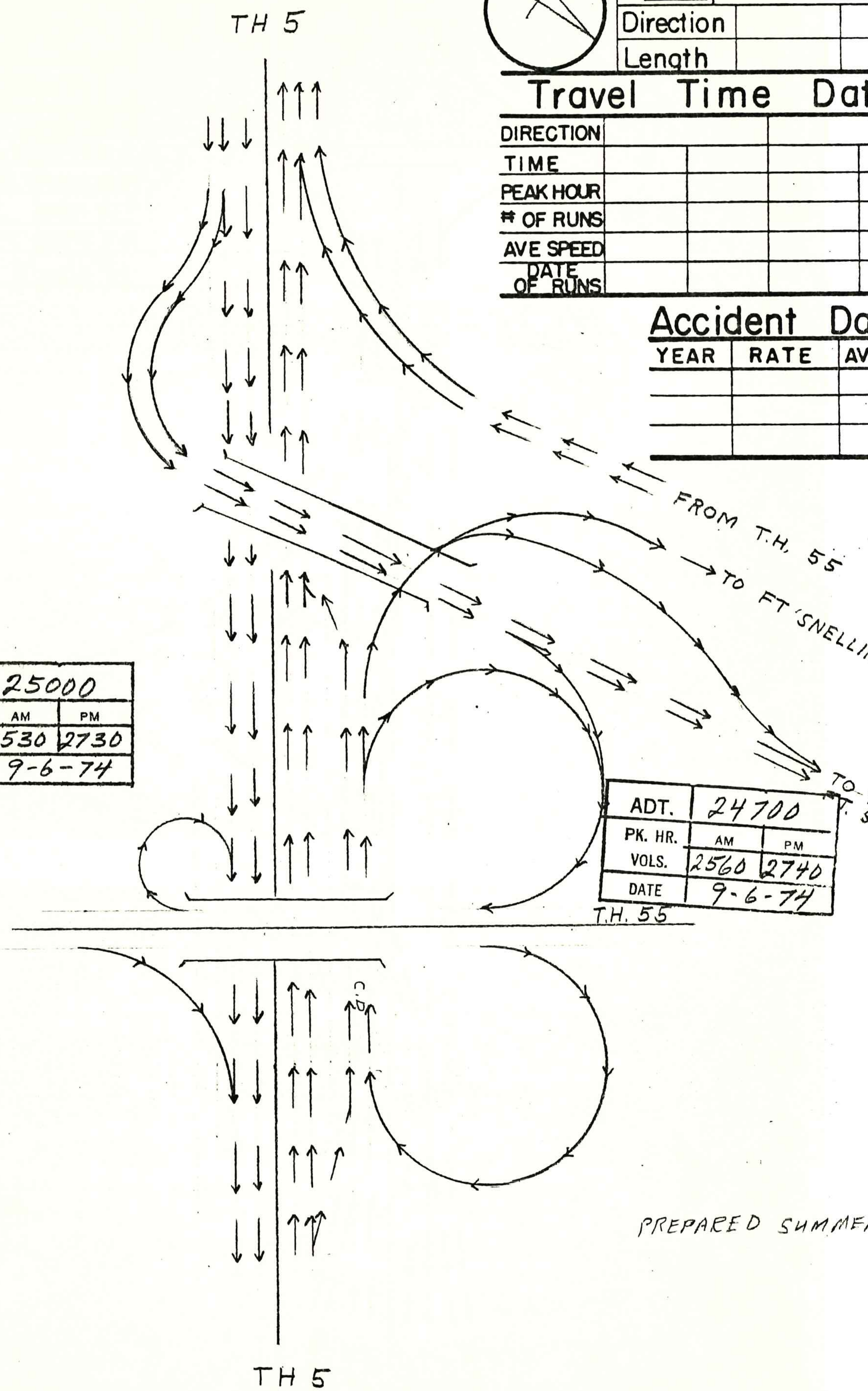
North	Route	From
	# 5	To
	Direction	
	Length	

Travel Time Dat

DIRECTION			
TIME			
PEAK HOUR			
# OF RUNS			
AVE SPEED			
DATE OF RUNS			

Accident Da

YEAR	RATE	AV



ADT.	25000	
PK. HR. VOLS.	AM	PM
	2530	2730
DATE	9-6-74	

ADT.	24700	
PK. HR. VOLS.	AM	PM
	2560	2740
DATE	9-6-74	

PREPARED SUMMER

NOTE: Sketch is not to
Sketch shows app
interchange confi

Segment # 56

North	Route # 55	From 13	
		To 62	
	Direction	NBL	SBL
	Length	1.8	1.8

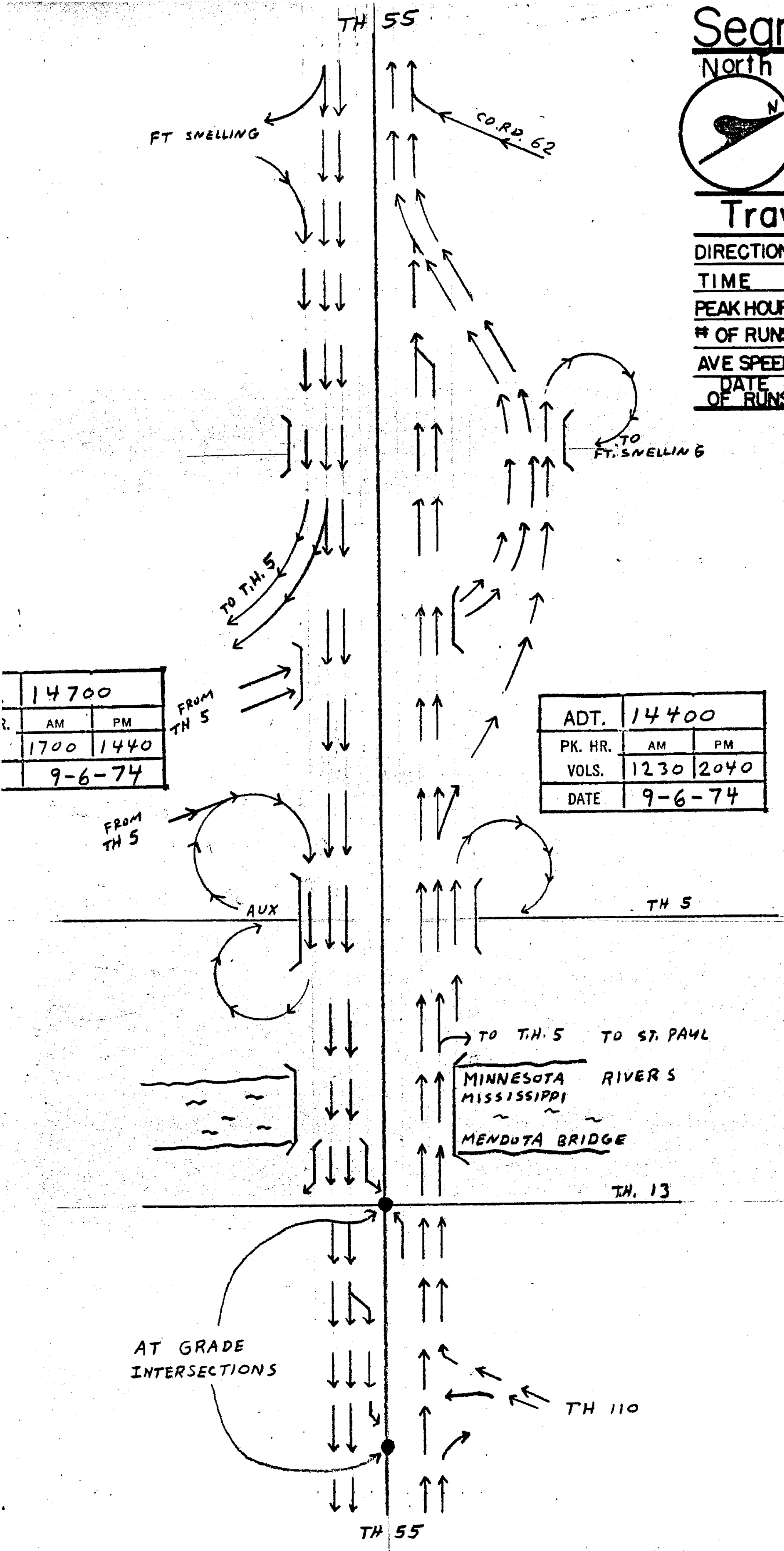
Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:30-5:30	7:00-8:00	4:30-5:3[illegible]
# OF RUNS	9	6	7	6
AVE SPEED	30.1	15.0	27.1	30.8
DATE OF RUNS	10-73	10-73	10-73	10-73

*Accident Data

YEAR	RATE	AVE RATE
1972		
1973		
1974	4.3	4.3

*ACCIDENT DATA IS AVAILABLE FOR 1974 ONLY AND COVERS CSAH 62 TO WEST END MENDOTA BRIDGE ONLY.



	14700	
	AM	PM
	1700	1440
	9-6-74	

ADT.	14400	
PK. HR. VOLS.	AM	PM
	1230	2040
DATE	9-6-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 57

North	Route # 55	From 24 ST. E.	
		To 94	
	Direction	NBL	S
	Length	0.6	0

* Travel Time Data

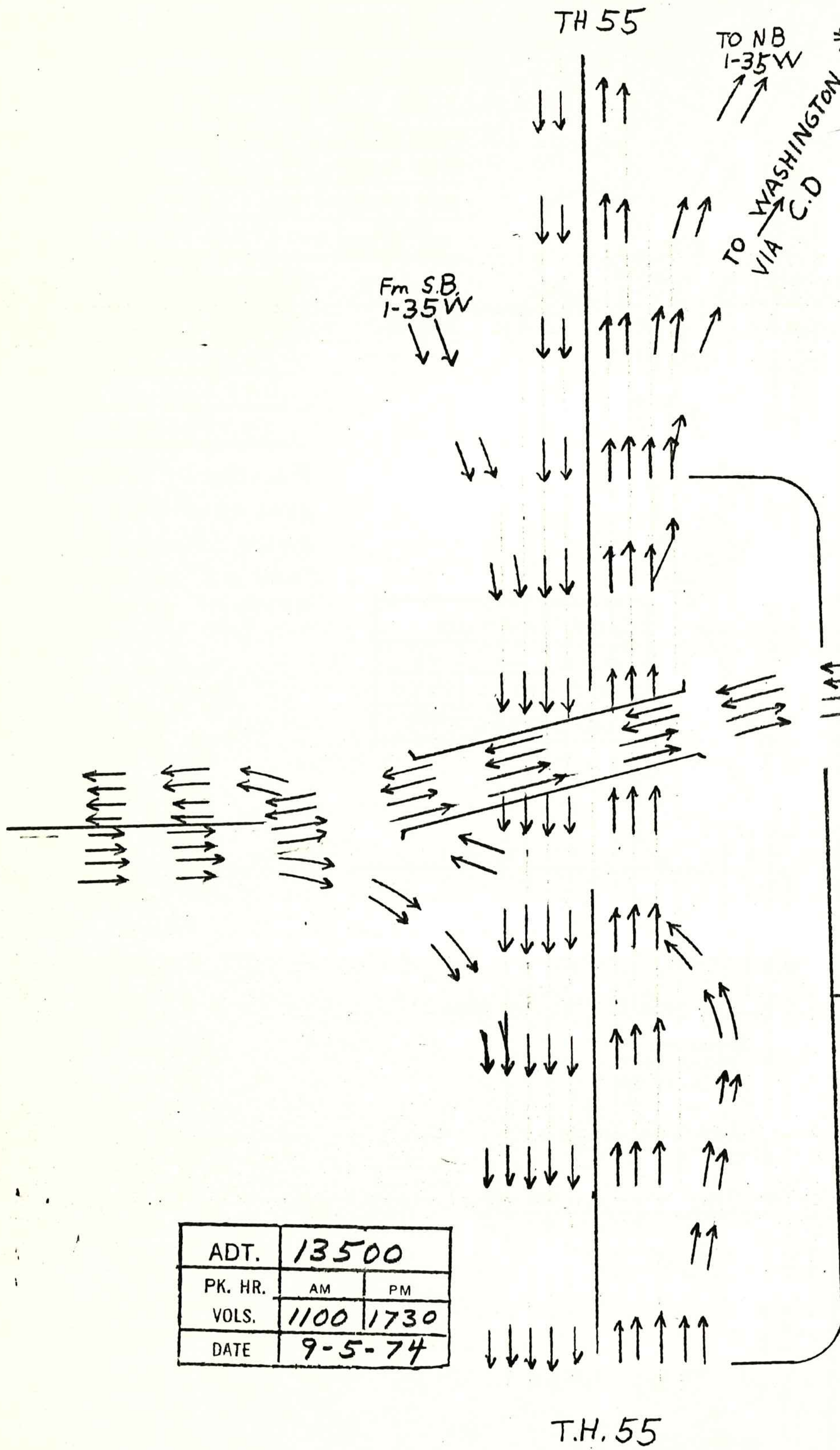
DIRECTION	NBL		SBL	
TIME	AM	PM	AM	
PEAK HOUR	7:15-8:15	3:45-4:45	7:15-8:15	4:3
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

** Accident Data

YEAR	RATE	AVE

* Note: Travel time runs not made on segment due to short len

** No accident data computer runs o this segment.



ADT.	13500	
PK. HR.	AM	PM
VOLS.	1100	1730
DATE	9-5-74	

TH 55

LANES INPL. BUT NOT USED AS SHOWN BECAUSE OF CONSTRUCTION ENDING @ FRANKLIN

ADT.	12500	
PK. HR.	AM	PM
VOLS.	1630	1130
DATE	9-5-74	

PREPARED SUMMER

NOTE: Sketch is not to
Sketch shows ap
interchange conf

Segment # 58

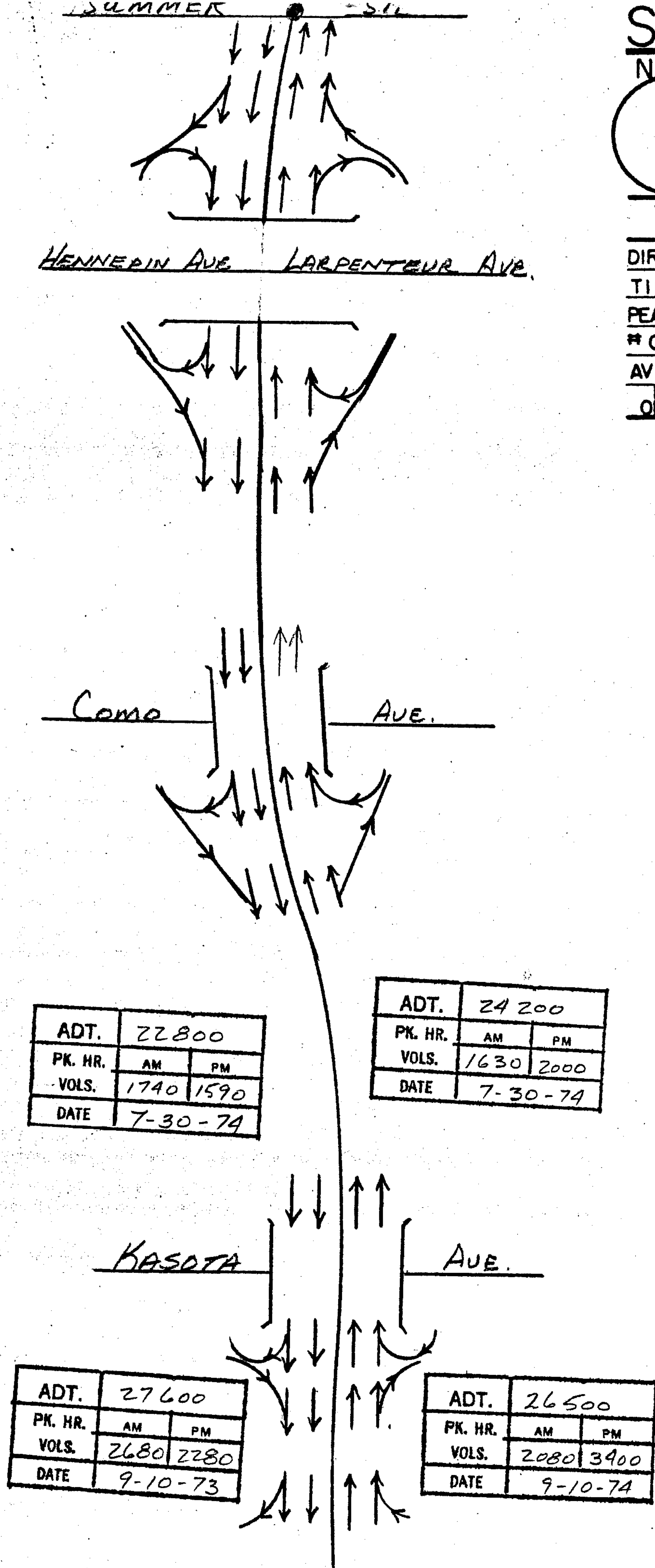
North	Route # 280	From I-94	
		To SUMMER ST.	
	Direction	NBL	SBL
	Length	2.7	2.7

Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-5:15
# OF RUNS	4	4	4	3
AVE SPEED	54	48	54	52
DATE OF RUNS	11-13-74	9-4-74	11-13-74	9-13-74

Accident Data

YEAR	RATE	AVE RATE



ADT.	22800	
PK. HR. VOLS.	AM	PM
	1740	1590
DATE	7-30-74	

ADT.	24200	
PK. HR. VOLS.	AM	PM
	1630	2000
DATE	7-30-74	

ADT.	27600	
PK. HR. VOLS.	AM	PM
	2680	2280
DATE	9-10-73	

ADT.	26500	
PK. HR. VOLS.	AM	PM
	2080	3400
DATE	9-10-74	

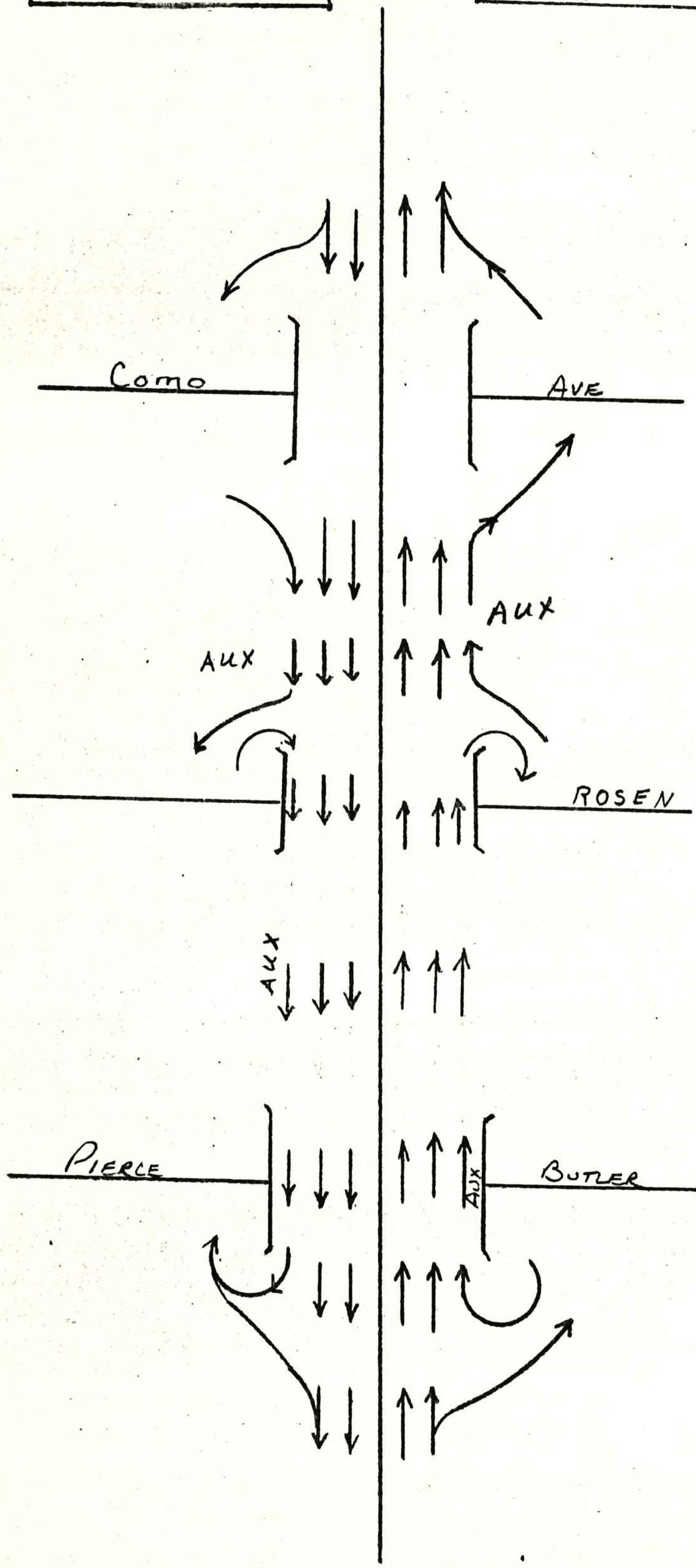
PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

ADT.	16600	
PK. HR.	AM	PM
VOLS.	1600	1210
DATE	8-5-74	

TH51

ADT.	16800	
PK. HR.	AM	PM
VOLS.	860	2300
DATE	8-5-74	



Segment # 59

North	Route	From PIERCE BUT
	# 51	To MIDWAY PKW
	Direction	NBL / SB
	Length	0.8 / 0.8

* Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	P
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

* Accident Data

YEAR	RATE	AVER

* Accident rates and tra time data unavailable this short freeway section. Speeds are in 45-55 mph range

PREPARED SUMMER

NOTE: Sketch is not to sc
Sketch shows appro
interchange configu

Segment # 60

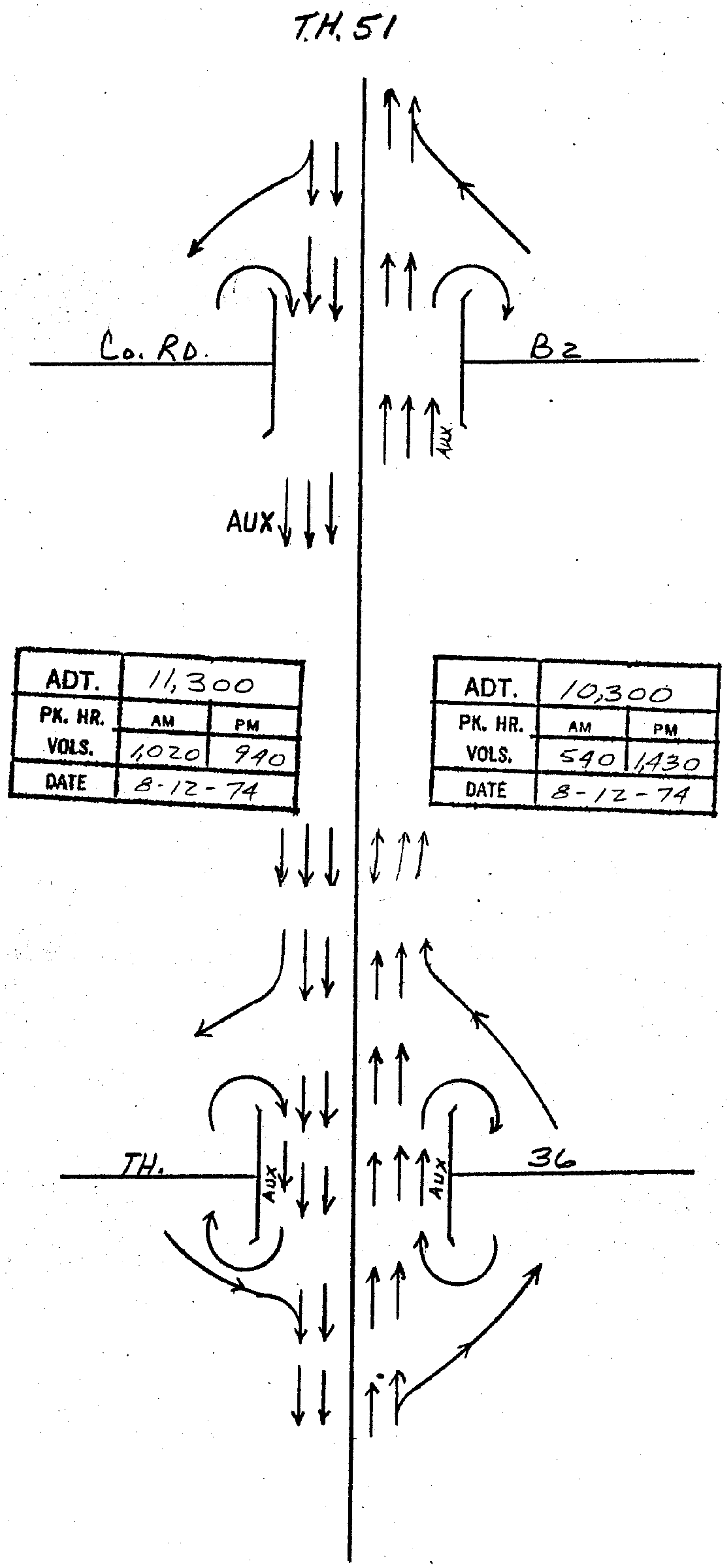
North	Route	From Co. Rd. B	
	# TH. 51	To Oakcrest Ave	
	Direction	NBL	SBL
	Length	0.7	0.7

* Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

* Accident Data

YEAR	RATE	AVE RATE



ADT.	11,300	
PK. HR. VOLS.	AM	PM
	1,020	940
DATE	8-12-74	

ADT.	10,300	
PK. HR. VOLS.	AM	PM
	540	1,430
DATE	8-12-74	

* Travel time data and accident data not gathered due to short length of freeway segment.

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment # 61

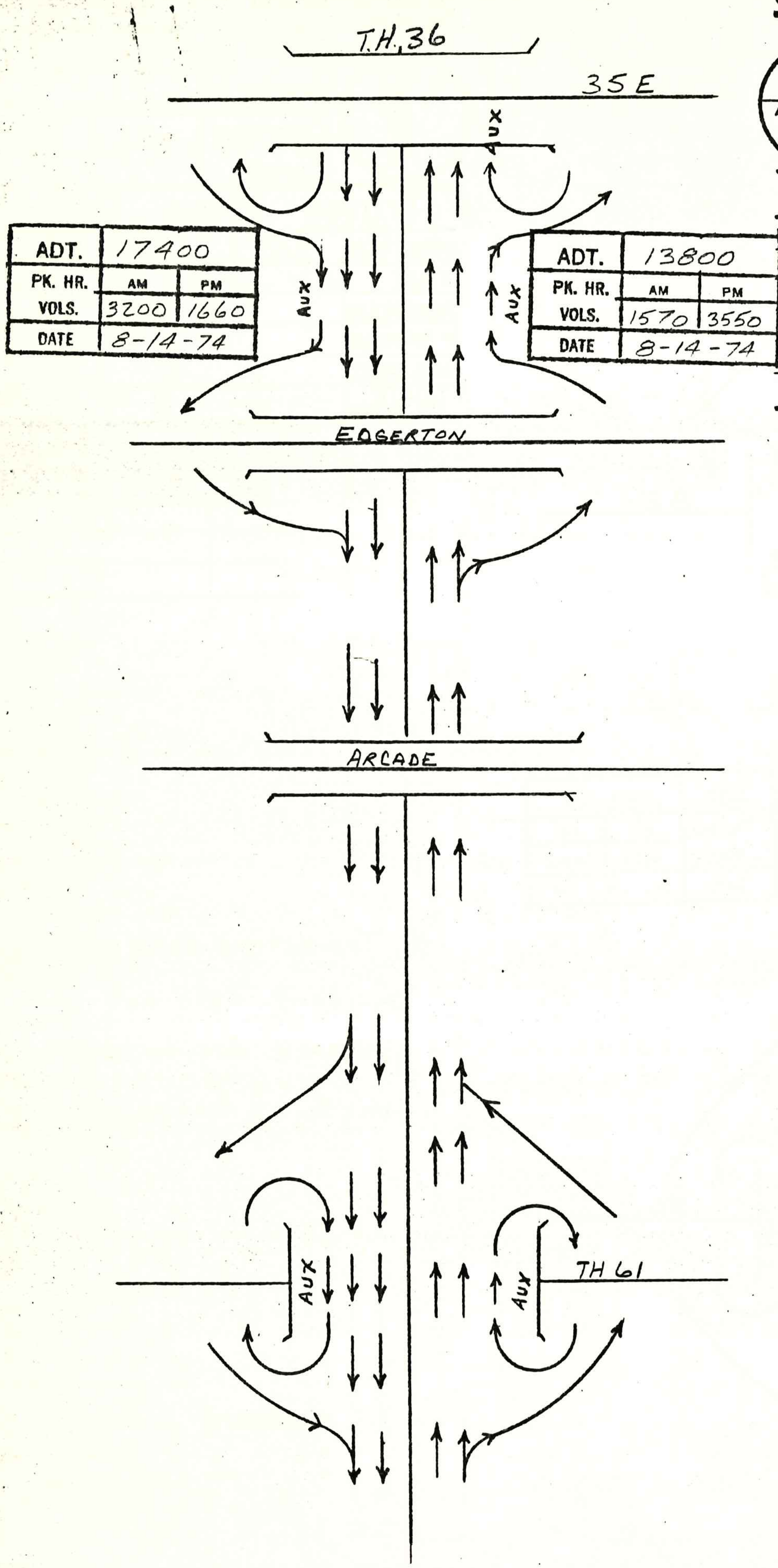
North	Route	From 61	
	# 36	To 10 & 35E	
	Direction	EBL	WB…
	Length	1.7	1.…

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	P…
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15…
# OF RUNS	3	3	3	3…
AVE SPEED	58	58	54	5…
DATE OF RUNS	8-29-74	8-26-74	8-29-74	8-…

Accident Data

YEAR	RATE	AVER…
1972	1.0	
1973	0.8	…
1974	1.0	



ADT.	17400	
PK. HR.	AM	PM
VOLS.	3200	1660
DATE	8-14-74	

ADT.	13800	
PK. HR.	AM	PM
VOLS.	1570	3550
DATE	8-14-74	

PREPARED Summer

NOTE: Sketch is not to sc…
Sketch shows appro…
interchange configur…

Segment # 62 1 oF 2

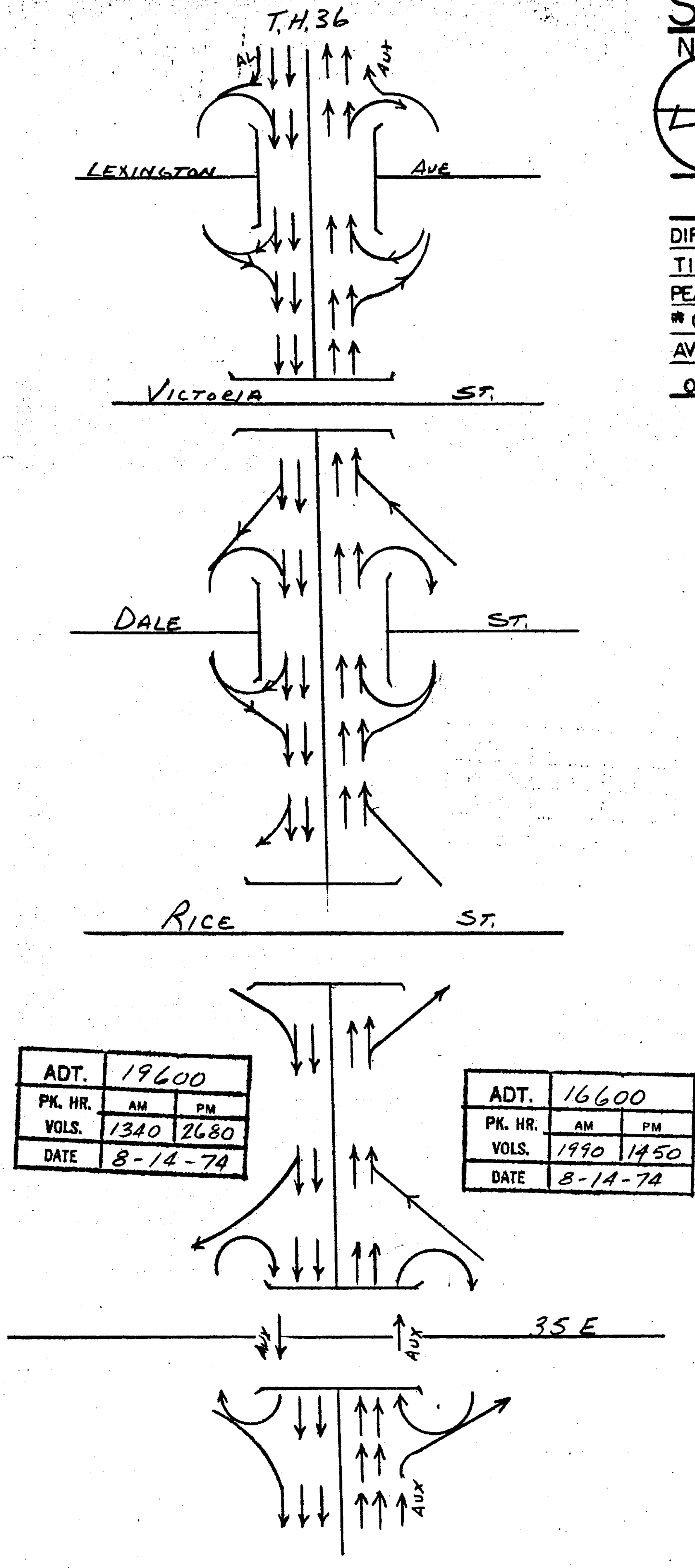
North	Route # 36	From 10 & 35E	
		To 35W	
	Direction	EBL	WBL
	Length	5.1	5.1

Travel Time Data

DIRECTION	EBL		WBL	
TIME	AM	PM	AM	PM
PEAK HOUR	7:00-8:00	4:15-5:15	7:00-8:00	4:15-5:15
# OF RUNS	3	3	3	3
AVE SPEED	56	55	53	53
DATE OF RUNS	8-29-74	8-26-74	8-29-74	8-26-74

Accident Data

YEAR	RATE	AVE RATE
1972	1.6	1.5
1973	1.7	
1974	1.2	



ADT.	19600	
PK. HR. VOLS.	AM	PM
	1340	2680
DATE	8-14-74	

ADT.	16600	
PK. HR. VOLS.	AM	PM
	1990	1450
DATE	8-14-74	

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration

Segment 62 2 oF

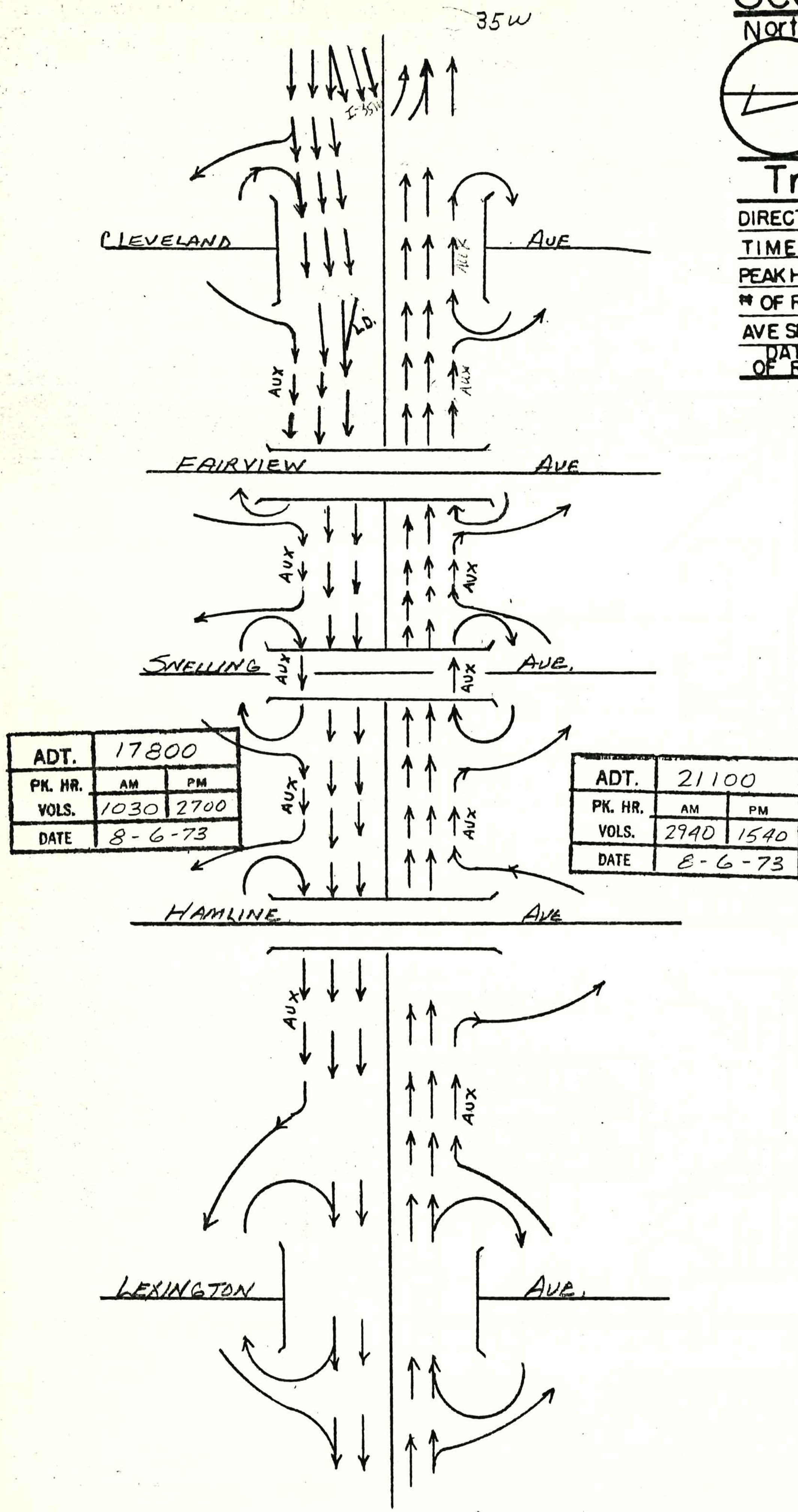
North	Route	From	
	# 36	To	
	Direction		
	Length		

Travel Time Data

DIRECTION			
TIME			
PEAK HOUR			
# OF RUNS			
AVE SPEED			
DATE OF RUNS			

Accident Data

YEAR	RATE	AVE



PREPARED SUMMER

NOTE: Sketch is not to s
Sketch shows appr
interchange config

Segment # 63

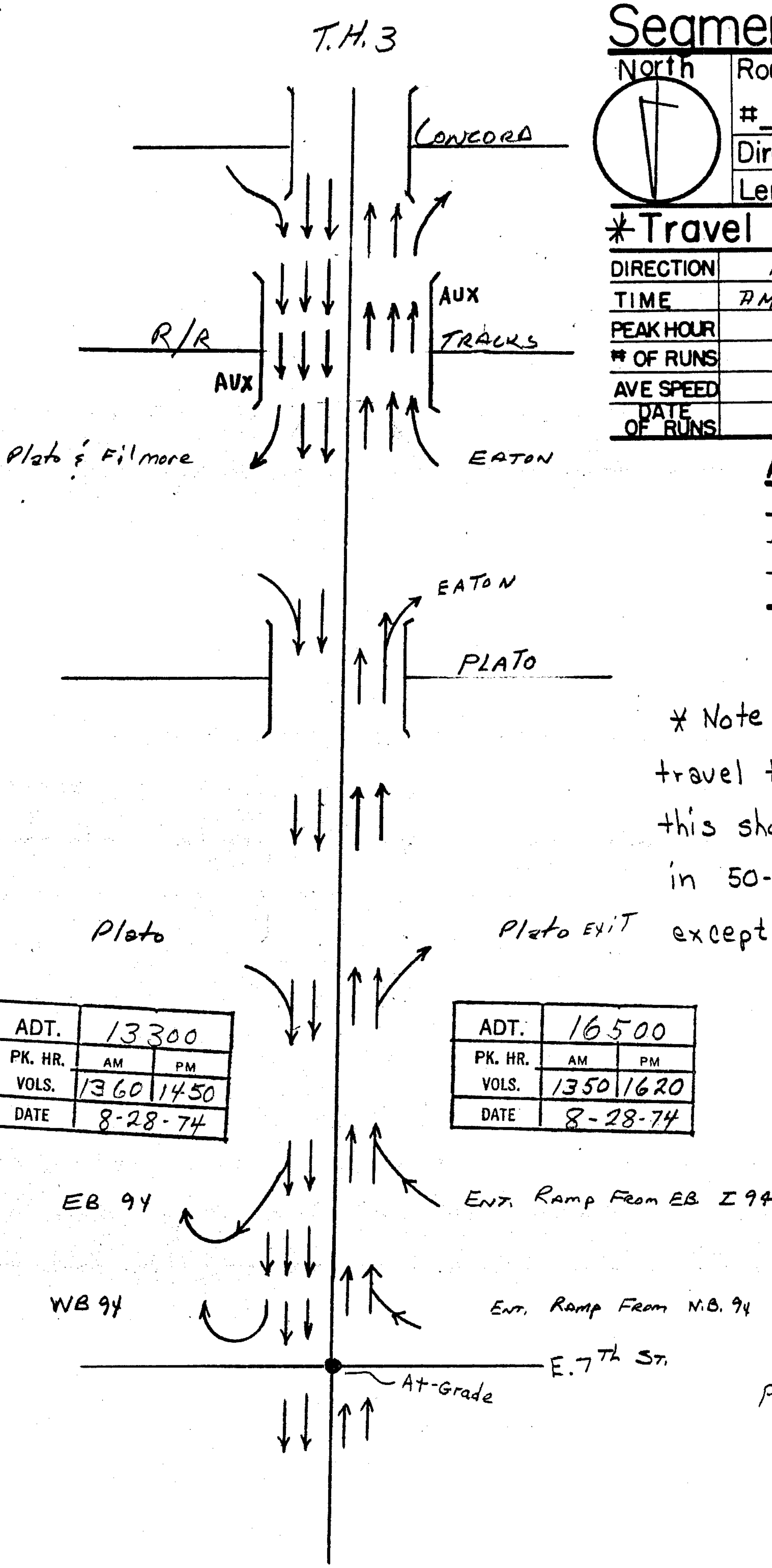
North	Route # 3	From E 7th ST.	
		To CONCORD ST	
	Direction	NBL	SBL
	Length	2.0	2.0

*Travel Time Data

DIRECTION	NBL		SBL	
TIME	AM	PM	AM	PM
PEAK HOUR				
# OF RUNS				
AVE SPEED				
DATE OF RUNS				

Accident Data

YEAR	RATE	AVE RATE
1972	0.7	0.5
1973	0.7	
1974	0.04	



ADT.	13300	
PK. HR.	AM	PM
VOLS.	1360	1450
DATE	8-28-74	

ADT.	16500	
PK. HR.	AM	PM
VOLS.	1350	1620
DATE	8-28-74	

* Note: No formal travel time runs made for this short section, speeds in 50-55 mph range except near end pts.

PREPARED SUMMER 1975

NOTE: Sketch is not to scale, Sketch shows approx. interchange configuration.