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FREEWAY SURVEILLANCE DATA

H. J. Payne and E. D. Helfenbein

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Interim Report

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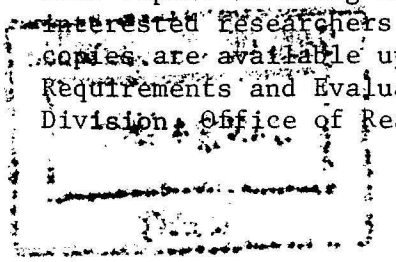

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16. Abstract

The development and testing of incident detection algorithms was based upon freeway surveillance data obtained from Los Angeles and Minneapolis. In the instance of Los Angeles data, data were in the form of samples of the sensor presence pulses fifteen times per second. For purposes of this study, these data were aggregated in the form of twenty-second averages, by lane, of occupancy and volume. Data obtained from Minneapolis were already aggregated in the form of thirty-second averages of occupancy and volume, usually averaged over all lanes at a sensor station. These aggregated data are available in the form of magnetic tapes. The organization and contents of these tapes are described here. The data include instances of malfunctioning sensors.

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1. INTRODUCTION

During Technology Service Corporation's contract with the Federal Highway Administration on the project "Development and Testing of Incident Detection Algorithms," a data base with over 200 freeway surveillance data sets was developed. This data base contains data obtained from the California Department of Transportation and the Minnesota Highway Department on the Los Angeles and Minneapolis freeway systems, respectively. The collection period ranges from January, 1974 to February, 1976.

The actual condensed data base described in this report consists of eight tapes: six tapes with Los Angeles data and two tapes with Minneapolis data. Both incident and incident-free data under a variety of weather conditions are included.

The data itself consists of vehicle count and averages of occupancy, volume, and speed. The averaging interval is twenty seconds updated every twenty seconds for the Los Angeles data and thirty seconds updated every thirty seconds for the Minneapolis data.

The data tapes are non-labeled, nine-track tapes with a density of 800 b.p.i. The tapes were created on a Varian 620/i minicomputer.

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2. LOS ANGELES DATA TAPES

2.1 LOS ANGELES TAPE FORMAT

Each Los Angeles data tape contains a sequence of data sets containing data for a specific collection period. Each data set contains three files:

1. Header block
2. Active lane sensor table
3. Data file

Each of these files is followed by an end-of-file mark.

2.1.1 Header Block

The header block is a 4096 EBCDIC character record. It contains essential information describing the collected data, including definition of the freeway segments, time period, weather conditions, pavement conditions, general traffic conditions and, in the instance of an incident, further detail regarding time of significant events, lanes affected and incident type.

The format of the header block is as follows:

Variable[1] Name	Beginning Character Location	Storage Allocation	Variable Definition
AVGINT	1	I5	Averaging interval (sec)
UPDINT	6	I5	Averaging update interval (sec). Twenty for L.A.
Data Set Code			
DATE	11	I6	DATE=YYMMDD
NI	17	I2	NI=Incident # for that day Non-incident numbering begins with 50
TRAFF	19	I1	Traffic levels, code 1 through 4 (See Table 1)
Time Interval			
STIME	20	I6	STIME=HHMMSS

[1]The variable name is shown here only for convenience to the reader; it is not needed to read the tapes.

Variable Name	Beginning Character Location	Storage Allocation	Variable Definition
Data Time Interval			
			HH=hour of day (hours numbered 0 to 23 MM=minute of the hour SS=second of the minute
ETIME	26	I6	ETIME=HHMMSS (see STIME variable description)
Data Freeway Region			
NSGMTS	32	I2	NSGMTS=number of freeway segments included in the data set
4 sets { AFFFWY(K)	34	A2	See description of incident location variables, K=1,2,...,NSGMTS
AFFDIR(K)		A1	
AFFUP(K)		I2	
AFFDWN(K)		I2	
Weather & Pavement Condition			
WETHER	62	A1	WETHER=C Clear L Light rain H Heavy rain
VISIBL	63	A1	S Sunny O Overcast F Foggy K Dark
RØAD	64	A1	ROAD= D Dry R Damp W Wet
Incident Location			
INCFWY	65	A2	INCFWY=Name of freeway on which incident occurred (see Table 1)

Variable Name	Beginning Character Location	Storage Allocation	Variable Definition
Incident Location			
INCDIR	67	A1	INCDIR=direction of traffic stream in which incident occurred
INCUP INCDWN	68 70	I2 I2	INCUP,INCDWN=upstream and downstream station numbers bounding incident
(SIGN)	72	A1,I2	Direction (A1), station (I2) of the sign
(CALLBOX)	75	A2,I3	Freeway, # (see Table 1)
PSTML	80	I5	Same
(LOOPSTA.)	85	A2,I2, A1	Freeway, station, direction
Incident Detection			
DETSRC	90	A1	DETSRC(Detection Source)= H Helicopter C CHP V VPU R Radio monitor S Computer
DETIME	91	I6	DETIME(Detection Time)=HHMMSS
Incident Verification			
VERSRC	97	A1	VERSRC (Verification Source)= H Helicopter C CHP V VPU
VERTIM	98	I6	VERTIM (Verification Time)=HHMMSS

Variable Name	Beginning Character Location	Storage Allocation	Storage Definition
Incident Type			
INCTYP	104	A4	INCTYP=TCOL (See Table 1) =DISL =SPIL =GAWK =NOTH
NLDV	108	I2	NLDV=number of light duty vehicles (2 axles) involved
NLT	110	I2	NLT=Number of light trucks (3 or 4 axles) involved
NHT	112	I2	NHT=number of heavy trucks (5 or more axles) involved

Variable Name	Beginning Character Location	Storage Allocation	Storage Definition
Incident Scenario			
NEVNTS	114	I2	NEVNTS=number of events in incident scenario
GEOMETRY	116	I13, A20	Geometry of freeway at incident
INCTIM	149	I6	INCTIM=HHMMSS (Time of incident event)
(LANES)		I3I1	LANES is a sequence of zeros and ones, a one denoting presence of a vehicle. The sequence corresponds to freeway lanes as follows: M 1 2 3 4 5 6 S, On/off ramp, S, C_1 C_2 S where M denotes the median, the number denotes a freeway lane and S the right shoulder
COMMNT		A20	COMMNT=any 20 alpha-numeric characters used to clarify the nature of the event

Repeated 20 times.

Variable Name	Beginning Character Location	Storage Allocation	Storage Definition
Traffic Volume At Site			
NCOUNT	929	I2	NCOUNT=number of traffic counts =0 indicates traffic counts not available
(STARTM)	931	I6	Start time
STØPTM		I6	STØPTM=HHMMSS (Time at end of count interval)
DURATN		I3	
CØUNT		I4	COUNT=number of vehicles counted
Repeated 5 times.			
Lane Sensor Code Definition			
NOFWYS	1026	I2	NOFWYS=number of freeway segments, where a freeway segment is a freeway with direction
FWYS(8)	1028	8A2	
DIRS(8)	1044	8A1	
NLANTP	1052	I2	NLANTP=number of lane types
LNTPCD(20)	1054	20(A4)	LNTPCD=array of alphanumeric names of lane types corresponding to an integer code employed in the remainder of the data set
NOSENS	1134	I3	Number of sensors in original data tape
NOCOM	1137	I2	Number of comments
COM(K,J) K=1,7 J=1,20	1139	20 (6A10,A8)	Comments

Variable Name	Beginning Character Location	Storage Allocation	Storage Definition
FILLER	2498-4096		(BLANK)

The Header Block is terminated by an end of file mark.

Table 1. Incident data set characteristics definitions

TRAFFIC LEVEL

Traffic level 1 (5) - occupancy greater than 24%.

Traffic level 2 (6) - occupancy less than 24%, volume 1400 vehicles per lane per hour, or greater

Traffic level 3 (7) - occupancy less than 24%, volume between 700 and 1400 vehicles per lane per hour.

Traffic level 4 (8) - occupancy less than 24%, volume less than 700 vehicles per lane per hour.

INCIDENT TYPE

TCOL - traffic collision

DISL - disabled vehicle

GAWK - gawking

NOTH - nothing; false alarm

SPIL - spilled load

FREEWAY NUMBER

Freeway no. 1 - SME, Santa Monica Eastbound

Freeway no. 2 - SMW, Santa Monica Westbound

Freeway no. 3 - SDN, San Diego Northbound

Freeway no. 4 - SDS, San Diego Southbound

Freeway no. 5 - HAN, Harbor Northbound

Freeway no. 6 - HAS, Harbor Southbound

FREEWAY NAME

SM - Santa Monica

HA - Harbor

SD - San Diego

2.1.2 Active Lane Sensor Table (A.L.S.T)

The active lane sensor table consists of a series of logical records physically blocked 10 to 1. Each logical record contains 8 16-bit integers. Each 8 word logical record corresponds to each freeway lane sensor having data in the data file. The order of these logical records corresponds to the order of the data in each data record.

Any unused logical records at the end of the last block are filled with zeroes. An end-of-file mark follows the last block of the A.L.S.T.

The format of the logical records is as follows:

Word Number	Definition
1	Freeway and direction - This is an integer pointer to the location in the 'FYWS' and 'DIRS' arrays (in the header) of the fwy segment and direction codes for this sensor (see Table 1).
2	Station number - the station number for this sensor (see Figure 1 for station locations).
3	Sensor type - an integer pointer to the location in the sensor code array ('LNTPCD') of this sensor's type.
4	Sensor number - This sensor's number in its sensor station. For mainline lane sensors, the numbering begins in the lane closest to the median and goes toward the right shoulder.
5	State - Represents the sensor status at the time data recording is initiated. 0=vehicle not present 1=vehicle present
6	Status - Represents the decimal value of the 3 status bits: M B A

Word Number	Definition
	The 'STATUS M' bit represents a machine generated malfunction code at the time data recording is initiated. The 'STATUS B' bit represents an operator generated malfunction code 0=flag not set 1=flag set The 'STATUS A' bit indicates whether the lane sensor was active at the time recording is initiated. 1=active 0=inactive
7-8	Unused

For freeway segments having an odd freeway number, the direction of traffic flow at station N is from station N to station N+1. For even numbered freeway segments, traffic flow is from station N to station N-1. The station numbering in the ALST is such that a particular sensor will always precede its downstream mate if such a downstream mate exists.

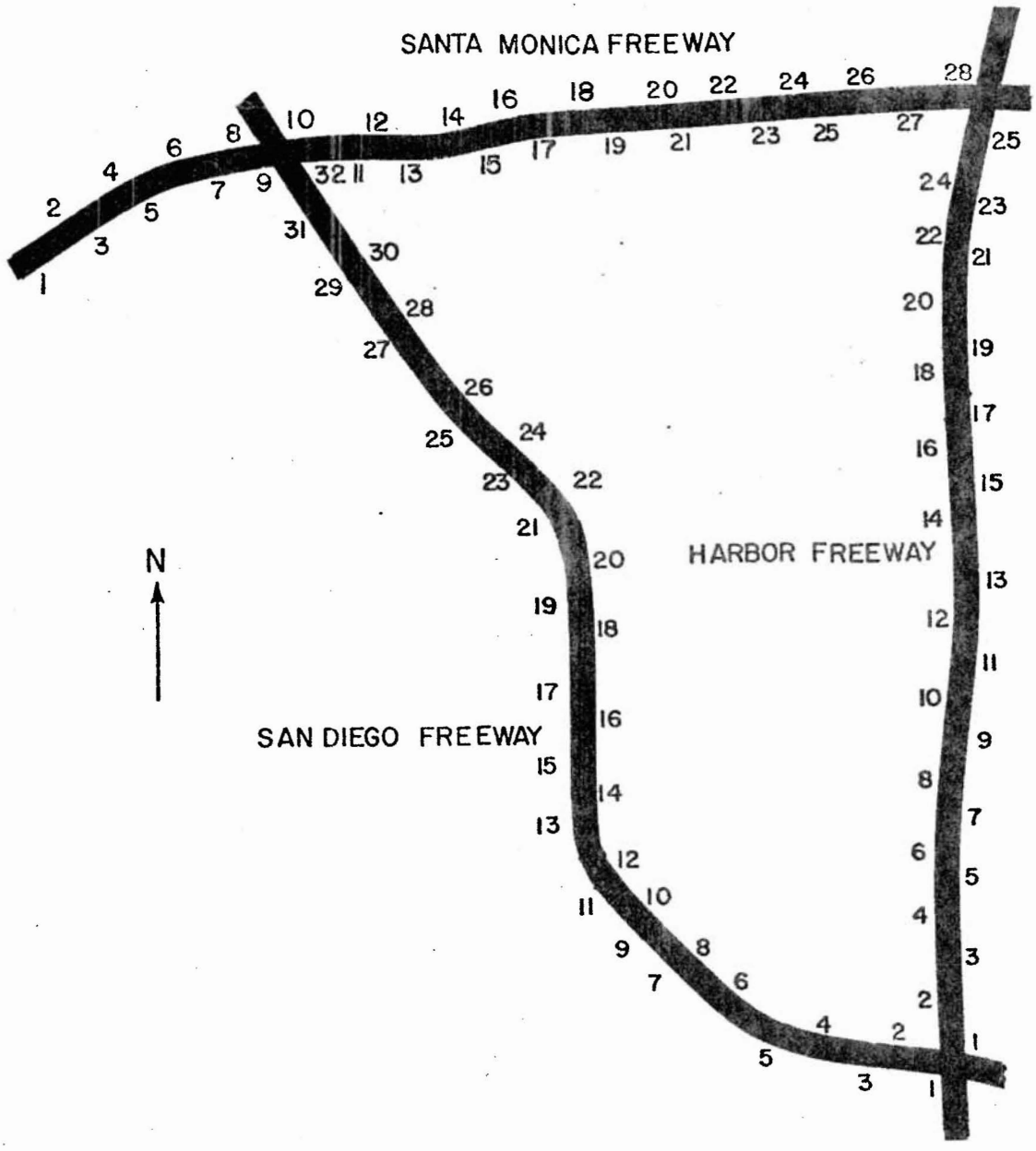

Figure 1. Los Angeles data collection site.

2.1.3 Data File

The data file consists of data records with data averaged over consecutive 20 second intervals. Each record has the following form:

```
Word #:     1        2        3   4   5   6      7   8   9   10
        ITIME(1), ITIME(2) [KNT,OCC,VOL,SPD], [KNT, OCC, VOL, SPD]
                           Data for first      Data for second
                           sensor in ALST      sensor

Word #:  ... (4*n)-1 (4*n) (4*n)+1 (4*n)+2
         --- [KNT     OCC    VOL      SPD]

              Data for n^th sensor in ALST
```

ITIME(1) and ITIME(2) are used to compute the time in milliseconds from midnight at which the 20 second average ended. This time can be computed as follows:

```
TIME = 32768.0 * FLOAT(ITIME(1)) + FLOAT(ITIME(2))
```

This representation was necessary since the maximum integer size on a 16 bit machine is 32767.

ITIME(1) and ITIME(2) are followed by a four word data group for each sensor:

Word Number	Definition
1	KNT - the number of vehicular crossings during the 20-second averaging interval.
2	OCC - the percentage of the 20-second averaging interval during which the sensor was occupied. This value is scaled up by 100 (Range: 0 to 10,000 corresponding to 0 to 100%)
3	VOL - the average volume in vehicles/lane/hour
4	SPD - (VOL/OCC)*1000. To obtain an actual speed value (M.P.H.). This figure must be multiplied by a vehicle length factor (e.g., .356) and divided by 10.

The n^{th} data group corresponds to the n^{th} sensor in the A.L.S.T.

The length of each data record is 4*N+2 16-bit integers where N is the number of sensors in the A.L.S.T.

The data file is followed by an end-of-file mark.

2.2 CONTENTS OF LOS ANGELES DATA TAPES

Table 2 contains a directory for the six Los Angeles data tapes. CDT1 through CDT4 contain incident data, CDT5 contains incident-free data, and CDT6 contains data from sensors believed to be malfunctioning.

Table 2. Los Angeles condensed data tape (CDT) directory.

INCIDENT DATA

CDT-1

1. 740522-03
2. 740522-04
3. 740524-01
4. 740524-02
5. 740528-02
6. 740529-02
7. 740403-01
8. 740403-02
9. 740404-01
10. 740426-02
11. 740426-06
12. 740515-02
13. 740515-03
14. 740521-01
15. 740521-02
16. 740530-03
17. 740605-01
18. 741008-01
19. 741008-02
20. 741008-03
21. 741008-04
22. 741008-05
23. 741008-06
24. 741009-01
25. 741009-02
26. 741009-03
27. 741010-02
28. 741010-03
29. 741010-04
30. 740329-02
31. 740401-01

CDT-2

1. 740313-03
2. 740424-02
3. 740528-04
4. 740530-04
5. 740603-01
6. 740314-02
7. 740703-02
8. 740712-01
9. 740730-01
10. 740830-01
11. 741011-05
12. 741011-06
13. 741011-07
14. 740725-01
15. 741007-10
16. 741007-11
17. 741007-12
18. 741007-14
19. 741007-15
20. 741007-16
21. 741007-17
22. 741009-04
23. 741007-19
24. 740515-01
25. 740530-01
26. 740322-03
27. 740401-01
28. 740607-01
29. 740624-01
30. 740624-02
31. 740625-01
32. 741002-01
33. 741007-01
34. 741007-02
35. 741007-03
36. 741007-04
37. 741007-06
38. 741007-07

CDT-3

1. 741010-05
2. 741010-06
3. 741010-07
4. 741010-08
5. 741011-01
6. 741011-02
7. 741011-04
8. 740321-02
9. 741114-02
10. 741009-06
11. 741205-02
12. 741205-03
13. 741205-05
14. 741205-07
15. 741205-08
16. 750123-01
17. 750123-02
18. 740123-03
19. 750123-05
20. 740401-02
21. 740322-01
22. 740619-01
23. 740617-01
24. 750227-01
25. 740322-02
26. 740312-01
27. 740313-01
28. 740424-03
29. 740606-03
30. 740613-01
31. 740613-02
32. 740329-01
33. 740326-03
34. 740325-02
35. 740401-03
36. 740424-01
37. 740422-01
38. 740416-03
39. 740426-05

Table 2 (Continued)

Incident Data

CDT-4

1. 740523-01
2. 740523-02
3. 740523-03
4. 740523-04
5. 740523-05
6. 740523-06
7. 740522-01
8. 740522-02
9. 740524-03
10. 740313-02
11. 740426-01
12. 740419-01
13. 740524-04

Incident-Free Data

CDT-5

1. 740423-50
2. 740423-54
3. 740423-58
4. 740423-59
5. 740904-50
6. 740904-51
7. 740904-52
8. 740904-53
9. 740904-54
10. 740904-55
11. 740904-56
12. 740904-57
13. 740904-58
14. 740904-59
15. 740904-60
16. 740904-62
17. 740904-63
18. 740904-64
19. 740423-53
20. 740904-65
21. 740423-51
22. 740423-56
23. 740423-57

Malfunction Data

CDT-6

1. 740329-01
2. 740515-03
3. 740605-01
4. 740606-03
5. 740725-01
6. 740730-01
7. 740830-01

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3. MINNEAPOLIS DATA TAPES

3.1 MINNEAPOLIS TAPE FORMAT

Each Minneapolis data tape contains a sequence of data set containing data for a specific collection period for the entire surveillance system. Each data set contains three files:

1. Header block
2. Active lane sensor table
3. Data file

Each of these files is followed by an end-of-file mark.

3.1.1 Header

The format of the Minneapolis header blocks is identical to that of Los Angeles, with the following exceptions.

1) The averaging interval AVGINT and the update interval UPDINT are both 30 seconds.

2) The incident numbering (NI in the data set code) begins with 31 for incidents and 71 for non-incidents.

3) The "Data Freeway Region" information (characters 32 to 61) is blank since all Minneapolis data sets contain data from the same freeway regions.

4) The "Incident Scenario" is the last group of data in the header. In this section, NEVNTS (characters 114 and 115) is blank. There is a maximum of 6 events in the incident scenario. Characters 383 to 4096 are blank.

3.1.2 Active Lane Sensor Table (A.L.S.T.)

The Minneapolis data active lane sensor table consists of 153 logical records physically blocked 10 to 1, i.e., there are 10 logical records in each physical record. Each logical record contains 8 16-bit integers. Each 8 word logical record corresponds to a lane sensor having data in the data file. The order of these logical records corresponds to the order of the data in each data record.

The last 7 logical records in the 16th block are filled with zeroes. An end-of-file mark follows this block.

The format of each logical record is as follows:

Word Number	Definition
1	Freeway number - either 35 or 94 for Interstate 35 or Interstate 94.

Word Number	Definition
2	Sensor number
3	Sensor type - always equals 1, i.e., lane sensor
4	NLANES - number of freeway lanes composing this sensor
5	Filler (equals 0)
6	Status - equals 1 since all sensors are active
7,8	Filler (equals 0)

The first 72 sensors in the A.L.S.T. are for I35. These sensors are multiple lane sensors, i.e., they include more than one lane. The actual number of lanes in a particular sensor is the 4th word in the A.L.S.T. record for that sensor. The sensor numbering is from 1 to 72.

The 81 remaining sensors in the A.L.S.T. (73 to 153) are for I94. These are all single lane sensors. The sensor numbering for these sensors is from 1 to 81.

Table 3 can be used to find the down- (or up-) stream mate for a particular sensor. Table 4 shows the correspondence between the sensor numbering on the data tapes and the actual numbering used by the Minnesota Highway Department. The sensor locations for I-35 can be seen in Figure 2.

Table 3. Minneapolis Upstream-Downstream Stations

TSC STATION NO.	UPSTREAM STATION	DOWNSTREAM STATION
3501S	-	3502S
3502S	3501S	3504S
3503S	-	3504S
3504S	3502S	3505S
3505S	3504S	3506S
3506S	3505S	3507S
3507S	3506S	3508S
3508S	3507S	3509S
3509S	3508S	3510S
3510S	3509S	3511S
3511S	3510S	3512S
3512S	3511S	3513S
3513S	3512S	3514S
3514S	3513S	3515S
3515S	3514S	3518S
3516S	3515S	-
3517S	-	3519S
3518S	3515S	3519S
3519S	3518S	3521S
3520S	3519S	-
3521S	3519S	3523S
3522S	-	3523S
3523S	3521S	3524S
3524S	3523S	3525S
3525S	3524S	3526S
3526S	3525S	3527S
3527S	3526S	3528S
3528S	3527S	3529S
3529S	3528S	3530S
3530S	3529S	3531S
3531S	3530S	3532S
3532S	3531S	3533S
3533S	3532S	3534S
3534S	3533S	-
3535N	-	3536N
3536N	3535N	3537N
3537N	3536N	3538N
3538N	3537N	3539N
3539N	3538N	3540N

Table 3 (Cont.)

TSC STATION NO.	UPSTREAM STATION	DOWNSTREAM STATION
3540N	3539N	3541N
3541N	3540N	3542N
3542N	3541N	3543N
3543N	3542N	3544N
3544N	3543N	3545N
3545N	3544N	3546N
3546N	3545N	3552N
3547N	3545N	-
3548N	-	3549N
3549N	3548N	3550N
3550N	3549N	3551N
3551N	3550N	3553N
3552N	3546N	3554N
3553N	3551N	3554N
3554N	3552N	3556N
3555N	3554N	-
3556N	3554N	3559N
3557N	-	3558N
3558N	3551N	3559N
3559N	3556N	3560N
3560N	3559N	3561N
3561N	3560N	3562N
3562N	3561N	3563N
3563N	3562N	3564N
3564N	3563N	3564N
3565N	3564N	3566N
3566N	3565N	3567N
3567N	3566N	3568N
3568N	3567N	3569N
3569N	3568N	3571N
3570N	3569N	-
3571N	3569N	3572N
3572N	3571N	-
9401W	-	9406W
9402W	-	9407W
9403W	-	9408W
9404W	-	9408W
9405W	-	9409W
9406W	9401W	9410W
9407W	9402W	9411W
9408W	9403W	9412W
9409W	9405W	9413W

Table 3 (Cont.)

TSC STATION NO.	UPSTREAM STATION	DOWNSTREAM STATION
9410W	9406W	9414W
9411W	9407W	9415W
9412W	9408W	9416W
9413W	9409W	9417W
9414W	9410W	9420W
9415W	9411W	9421W
9416W	9412W	9422W
9417W	9413W	9419W
0418W	9417W	-
9419W	9417W	-
9420W	9414W	9423W
9421W	9415W	9424W
9422W	9416W	9425W
9423W	9420W	9426W
9424W	9421W	9427W
9425W	9422W	9428W
9426W	9423W	9429W
9427W	9424W	9430W
9428W	9425W	9431W
9429W	9426W	9432W
9430W	9427W	9433W
9431W	9428W	9434W
9432W	9429W	9435W
9433W	9430W	9436W
9434W	9431W	9437W
9435W	9432W	9438W
9436W	9433W	9439W
9437W	9434W	9440W
9438W	9435W	9441W
9439W	9436W	9442W
9440W	9437W	9443W
9441W	9438W	9444W
9442W	9439W	9445W
9443W	9440W	9446W
9444W	9441W	-
9445W	9442W	-
9446W	9443W	-
9447E	-	9453E
9448E	-	9454E
9449E	-	9452E
9450E	-	9453E
9451E	-	9454E

Table 3 (Cont.)

TSC STATION NO.	UPSTREAM STATION	DOWMSTREAM STATION
9452E	9449E	9455E
9453E	9450E	9456E
9454E	9451E	9457E
9455E	9452E	9458E
9456E	9453E	9459E
9457E	9454E	9460E
9458E	9455E	9461E
9459E	9456E	9462E
9460E	9457E	9463E
9461E	9458E	9464E
9462E	9459E	9465E
9463E	9460E	9466E
9464E	9461E	9467E
9465E	9462E	9468E
9466E	9463E	9469E
9467E	9464E	9470E
9468E	9465E	9471E
9469E	9466E	9472E
9470E	9467E	9473E
9471E	9468E	9474E
9472E	9469E	9475E
9473E	9470E	9476E
9474E	9471E	9477E
9475E	9472E	9478E
9476E	9473E	-
9477E	9474E	-
9478E	9475E	-
9479E	-	-
9480E	-	-
9481E	-	-

Table 4. Minneapolis Data Station Directory

Minneapolis Station No.		TSC Station No.	No. Lanes
001	(012S)	3501S	2
002	(020S)	3502S	3
003	(020SM)	3503S	2
004	(026S)	3504S	4
005	(028S)	3505S	4
006	(031S)	3506S	4
007	(035S)	3507S	4
008	(038S)	3508S	4
009	(042S)	3509S	3
010	(046S)	3510S	3
011	(050S)	3511S	3
012	(051S)	3512S	3
013	(053S)	3513S	3
014	(055S)	3514S	3
015	(060S)	3515S	3
016	(061SX)	3516S	1
017	(061SM)	3517S	1
018	(061S)	3518S	2
019	(062S)	3519S	3
020	(063SX)	3520S	2
021	(063S)	3521S	2
022	(063SM)	3522S	2
023	(066S)	3523S	2
024	(070S)	3524S	2
025	(073S)	3525S	2
026	(076S)	3526S	2
027	(078S)	3527S	2
028	(082S)	3528S	2
029	(086S)	3529S	2
030	(090S)	3530S	2
031	(094S)	3531S	2
032	(098S)	3532S	2
033	(102S)	3533S	2
034	(106S)	3534S	2
035	(106N)	3535N	3
036	(102N)	3536N	2
037	(098N)	3537N	2
038	(094N)	3538N	2
039	(090N)	3539N	2
040	(086N)	3540N	2
041	(082N)	3541N	2

Table 4 (Cont.)

Minneapolis Station No.		TSC Station No.	No. Lanes
042	(078N)	3542N	2
043	(076N)	3543N	2
044	(073N)	3544N	2
045	(070N)	3545N	2
046	(066N)	3546N	2
047	(063NX)	3547N	2
048	(623E)	3548N	2
049	(622E)	3549N	2
050	(621E)	3550N	2
051	(063E)	3551N	2
052	(063N)	3552N	2
053	(062EM)	3553N	1
054	(062N)	3554N	3
055	(061NX)	3555N	1
056	(061N)	3556N	2
057	(620W)	3557N	2
058	(061NM)	3558N	1
059	(060N)	3559N	3
060	(055N)	3560N	3
061	(053N)	3561N	3
062	(050N)	3562N	3
063	(046N)	3563N	3
064	(042N)	3564N	4
065	(038N)	3565N	4
066	(035N)	3566N	4
067	(031N)	3567N	4
068	(028N)	3568N	4
069	(026N)	3569N	4
070	(020NX)	3570N	2
071	(020N)	3571N	3
072	(016N)	3572N	2
073	(016W1)	9401W	1
074	(016W2)	9402W	1
075	(016W3)	9403W	1
076	(941WM1)	9404W	1
077	(941WM2)	9405W	1
078	(942W1)	9406W	1
079	(942W2)	9407W	1
080	(942W3)	9408W	1
081	(942W4)	9409W	1
082	(943W1)	9410W	1
083	(943W2)	9411W	1
084	(943W3)	9412W	1
085	(943W4)	9413W	1
086	(944W1)	9414W	1
087	(944W2)	9415W	1
088	(944W3)	9416W	1

Table 4 (Cont.)

Minneapolis Station No.		TSC Station No.	No. Lanes
089	(944W4)	9417W	1
090	(944WX1)	9418W	1
091	(944WX2)	9419W	1
092	(944W11)	9420W	1
093	(944W12)	9421W	1
094	(944W13)	9422W	1
095	(945W1)	9423W	1
096	(945W2)	9424W	1
097	(945W3)	9425W	1
098	(945W21)	9426W	1
099	(945W22)	9427W	1
100	(945W23)	9428W	1
101	(945W31)	9429W	1
102	(945W32)	9430W	1
103	(945W33)	9431W	1
104	(946W1)	9432W	1
105	(946W2)	9433W	1
106	(946W3)	9434W	1
107	(946W11)	9435W	1
108	(946W12)	9436W	1
109	(946W13)	9437W	1
110	(946W21)	9438W	1
111	(946W22)	9439W	1
112	(946W23)	9440W	1
113	(946W31)	9441W	1
114	(946W32)	9442W	1
115	(946W33)	9443W	1
116	(946W41)	9444W	1
117	(946W42)	9445W	1
118	(946W43)	9446W	1
119	(947EM1)	9447E	1
120	(947EM2)	9448E	1
121	(947E1)	9449E	1
122	(947E2)	9450E	1
123	(947E3)	9451E	1
124	(946E1)	9452E	1
125	(946E2)	9453E	1
126	(946E3)	9454E	1
127	(946E11)	9455E	1
128	(946E12)	9456E	1
129	(946E13)	9457E	1
130	(946E21)	9458E	1

Table 4 (Cont.)

Minneapolis Station No.		TSC Station No.	No. Lanes
131	(946E22)	9459E	1
132	(946E23)	9460E	1
133	(946E31)	9461E	1
134	(946E32)	9462E	1
135	(946E33)	9463E	1
136	(946E41)	9464E	1
137	(946E42)	9465E	1
138	(946E43)	9466E	1
139	(945E1)	9467E	1
140	(945E2)	9468E	1
141	(945E3)	9469E	1
142	(945E21)	9470E	1
143	(945E22)	9471E	1
144	(945E23)	9472E	1
145	(944E1)	9473E	1
146	(944E2)	9474E	1
147	(944E3)	9475E	1
148	(944E21)	9476E	1
149	(944E22)	9477E	1
150	(944E23)	9478E	1
151	(944EM1)	9479E	1
152	(944EM2)	9480E	1
153	(944EM)	9481E	1

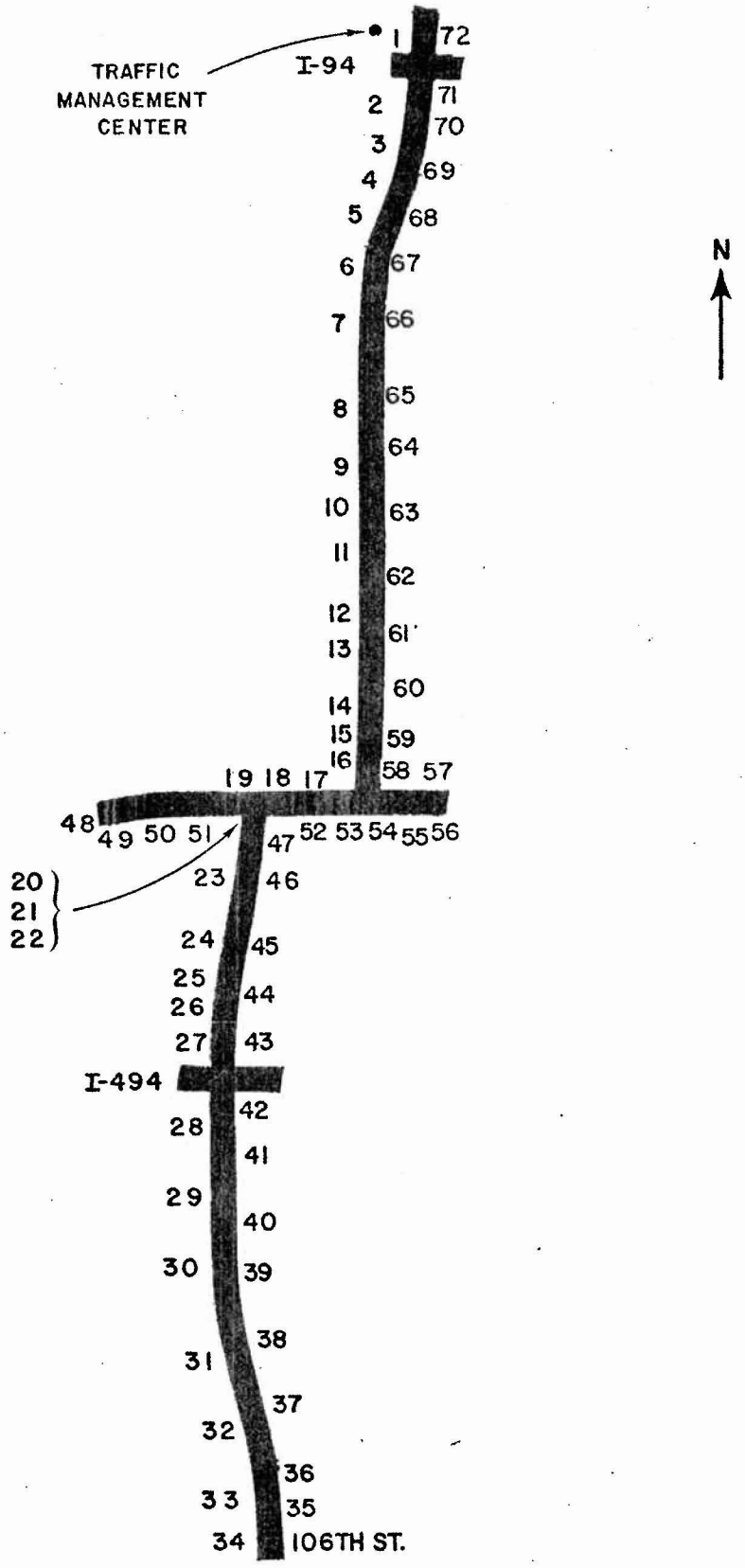

Figure 2. Minneapolis data collection site. (I-35)

3.1.3 Data File

The data file consists of data records with data averaged over consecutive 30 second intervals. Each record has the following format:

```
WORD #:      1        2        3   4   5   6     7   8   9   10

        ITIME(1)  ITIME(2) [KNT  OCC VOL SPD], [KNT OCC VOL SPD]
                                 Data for first       Data for 2nd sensor
                                 sensor in A.L.S.T.   in A.L.S.T.

    . . .  611   612   613   614
          [KNT   OCC   VOL   SPD]

           Data for 153rd sensor
           in A.L.S.T.
```

ITIME (1) and ITIME(2) are used to compute the time in milliseconds from midnight at which the 30 second average ended. This time can be computed as follows: TIME=32768.0*FLOAT(ITIME(1))+FLOAT(ITIME(2))

ITIME(1) and ITIME(2) are followed by a four word data group for each sensor:

Word # in Group	Definition
1	KNT - the number of vehicular crossings during the 30-second interval. For multiple lane sensors, this is the raw count for all lanes.
2	OCC - the percentage of the 30-second interval during which the sensor was occupied. This is an average value per lane. This value is scaled up by 100. (Range: 0 to 10,000 corresponding to 0 to 100%.)
3	VOL - average volume in vehicles/lane/hour
4	SPD - (VOL/OCC)*1000. To obtain an actual speed value this figure must be multiplied by a vehicle length factor (i.e., .356) and divided by 10. Represents average speed per lane in m.p.h.

The data file is followed by an end-of-file mark.

3.2 CONTENTS OF MINNEAPOLIS DATA TAPES

Table 5 contains a directory for the Minneapolis data tapes.

Table 5. Minneapolis condensed data tape (CDT) directory.

INCIDENT DATA
CDT-7

1. 741003-31
2. 741003-32
3. 741007-31
4. 741007-32
5. 741007-33
6. 741007-34
7. 741010-31
8. 741011-31
9. 741014-31
10. 741016-31
11. 741022-31
12. 741022-32
13. 741023-31
14. 741025-31
15. 741025-32
16. 741028-31
17. 741028-32
18. 741031-31
19. 741127-31
20. 741212-31
21. 741213-31
22. 741230-31
23. 750102-31
24. 750102-32
25. 750102-33
26. 750102-34
27. 750106-31
28. 750108-31
29. 750108-32
30. 750108-33
31. 750108-34
32. 750113-31
33. 750113-32
34. 750114-31
35. 750114-32
36. 750114-33
37. 750114-34
38. 750116-31
39. 750116-32

NON-INCIDENT DATA
CDT-8

1. 741024-71
2. 741231-71
3. 750103-71
4. 750103-72
5. 750107-71
6. 750109-71
7. 750110-71
8. 750110-72

GPO 907-382