A METHODOLOGY FOR PROACTIVE SIGNAL WARRANT ANALYSIS

PB99-119711

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16. Abstract

Typically, transportation agencies perform traffic signal studies only after the conditions have deteriorated to an unacceptable level, accidents have taken place and customer complaints have mounted (reactive policy.) By that time, problems have already begun to occur; unacceptable delays and accidents have been experienced for long periods of time before the problem is detected. Many of these problems would have been avoided if intersections with high probability to warrant a signal in the future could be identified in advance (proactive policy). This study produces a procedure to determine the intersections that will warrant a signal and the time the warrant will be met. A prioritized list of all intersections in the region (state, district, or county) show the need for traffic signals. The benefits from a proactive signal warrant model, introduced in this study, are:

(i) the need for a signal is identified before the situation deteriorates to the point of it needing to be reported,

(ii) lives are saved at intersections where a signal installation prevents accidents,

(iii) a prioritization scheme is developed so that accurate information on the signal timing installation can be given.

constituent satisfaction: a proactive practice of signal installation will decrease complaints, improve the agency's image and increase customers' satisfaction when an inquiry/request for a signal is received, the agency can refer to the list and respond to the caller with the rank of the intersection and the likely treatment.

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CHAPTER 1

INTRODUCTION

Typically transportation agencies perform traffic signal studies only when there is a need because of high traffic volumes, accidents, and/or customer complaints (reactive policy.) By this time, problems have already begun to occur; unacceptable delays and accidents have been experienced for long periods of time before the problem is detected. Many of these problems would have been avoided if intersections with high probabilities to warrant a signal in the future could be identified in advance (proactive policy).

1.1 Motivation

Currently, transportation agencies do not use any advanced detection methodologies in signal warrant analysis. They mainly react to prevailing conditions, typically long after the problems have occurred. To the best of our knowledge no established procedures have been developed in the literature to address proactive warrant analysis. A procedure will be developed that will identify when intersections need to be considered for a signal depending on warrants 1, 2, and 8 (from the Manual of Traffic Control Devices), number of complaints received, and the accident severity index. A

model will be built that uses input variables such as ADT (average daily traffic), accident history and complaint history. The model will output the intersections in a ranked list for signal installation depending on volumes, complaints, and accident severity. Detection of these intersections in a proactive way would enable transportation agencies to prevent many of these accidents and long delays before they occur. Moreover, it would reduce complaints and increase customer satisfaction.

Decisions about traffic control devices are based on systematic procedures that identify the locations where controls are needed. This allows transportation officials to respond to requests for control at specific locations. If all requests were complied with, there would be numerous unwarranted controls on public roads. This would result in high expenses, inconvenience, and even danger to road users. Responding with a 'no' to specific requests would be much easier and cause fewer problems if the officials could demonstrate the nationally accepted criteria their decision was based on.

Installing traffic signal controls has several advantages, some of these are:

- Orderly movement of traffic,
- Increase in traffic capacity of an intersection,
- Reduction in the number of certain types of accidents,
- Allowance of traffic to enter or cross heavy traffic,
- Allowance of continuous flow of traffic at a certain speed on major roadways.

However, installing unwarranted traffic signals can result in adverse traffic conditions, such as:

- Increased delay,

- Disobedience of signals,

- Diversions of traffic to less adequate roads,

- Increased rear-end type accident frequency.

Before a traffic signal is installed at a location, the first question to ask is whether or not a signal is needed. Traffic signals are considered to be the most restrictive control devices. Therefore, they should not be used unless less restrictive methods have been studied and do not provide enough control. The need for a traffic control signal at any particular location must be carefully evaluated in relation to the eleven signal warrants in the Manual on Uniform Traffic Control Devices (MUTCD). The MUTCD is the document that all public agencies in the United States must comply with regarding traffic control devices. This manual insures the uniformity of highway traffic control devices across the country. The MUTCD lists several engineering studies that need to be conducted to gather the information required for signal warrant evaluations. This information includes:

(I) number of vehicles entering the intersection in each hour for sixteen consecutive hours of an average day. These hours should include the highest volume hours of the day.

(ii) pedestrian volume counts for each crosswalk. These should be taken during the two peak traffic volume times, one in the morning for two hours and one for two hours in the evening. Counts should also be taken during the highest pedestrian volume hours.

(iii) 85th percentile speed for all vehicles on the uncontrolled approach.

(iv) conditions diagram showing the physical layout of the intersection, including distance to nearest signal, parking conditions, etc.

(v) collision diagram showing accident experience by type, severity, location, etc.

This is a large amount of data to be collected. However, much of this information is already available to ODOT employees through the ODOT mainframe computer system. Most of the information needed to study the volume warrants 1, 2, and 8 from the MUTCD is available. This is one reason for choosing to work with these specific warrants.

1.2 Contributions

This study will produce a procedure to determine the intersections that will warrant a signal and the time when the warrant will be met. A prioritized list of all intersections in the region (state, district, or county), will show the need for traffic signals. The benefits from a proactive signal warrant model are:

(I) the need for a signal will be identified before the situation deteriorates to the point of it needing to be reported,

(ii) a list in numeric order by counties and/or districts of which intersections have priority for the need of a signal,

(iii) the main goal of a transportation agency is to satisfy its customer (the road user); a proactive practice of signal installation will decrease complaints,

improve the agency's image and increase customers' satisfaction when an inquiry/request for a signal is received, the agency can refer to the list and respond to the caller with the rank of the intersection and the likely treatment.

1.3 Report Outline

In the next chapter we review the literature. This involves a description of warrants 1, 2, and 8. Chapter 2 also provides a brief description of the literature reviewed on topics including, warrants, traffic forecasting, growth rates, and accidents. The data collection stage is discussed in chapter 3. The data collection included reviewing past signal warrant studies and gathering needed database information from the mainframe at The Ohio Department of Transportation. It contains the information we collected to develop the method and why we focused on that specific information. Chapter 4 is the methodology used to combine all the information gathered in chapter 3 into a Paradox table. The information inputted into the Paradox table includes intersection logpoints, volumes, accidents, complaints, etc. Chapter 5 contains a description of how Paradox works. It also contains a description of the procedure for signal warrant analysis. Along with the description are the five programs written in Paradox. Chapter 6 is the description of all the program results. Future extensions to the research are described in Chapter 7.

CHAPTER 2

LITERATURE REVIEW

Signals can not be installed unless one or more signal warrants are met. The literature in this chapter and the data collection chapter describes the reasons for choosing to use the volume warrants. The first section of this chapter contains a description of warrant 1 "minimum vehicular volume", warrant 2 "interruption of continuous traffic", and warrant 8 "combination of warrants." This chapter also gives a brief description of the literature reviewed. This includes such topics as estimated ADT, traffic forecasting, continuous warrants, adjustments for demand models and traffic delay.

2.1 Warrant Review

For a signal to be installed it must meet at least one Warrant. Most traffic engineers use the volume warrants to determine if a signal should be installed. Warrants 1,2, and 8 are the volume warrants. The warrants are satisfied when the volumes given below occur for eight consecutive hours of an average day. The volumes given are for the total on both approaches of the major street and for the higher-volume approach of the minor street. An average day is a Tuesday, Wednesday, or Thursday representing the

normal traffic conditions repeatedly found at that location. These volumes are for the same 8 hours on each approach. During these 8 hours, the direction of higher volume on the minor street may be for one approach during some hours and the other approach for the rest of the time. When the 85th percentile speed of the major street traffic is greater than 40 mph or when the intersection is in an urban area or isolated community having a population less than 10,000, the warrant is 70% of the below mentioned requirements. (This is due to the fact that there is less platooning in rural areas.)

Warrant 1 Volumes:

Number of lanes on each approach		Vehicles per hour	Vehicles per hour
Major street	Minor street	on major street	on minor street
1	1	500	150
2 or more	1	600	150
2 or more	2 or more	600	200
1	2 or more	500	200

Warrant 2 Volumes:

Number of lanes on each approach		Vehicles per hour	Vehicles per hour
Major street	Minor street	on major street	on minor street
1	1	750	75
2 or more	1	900	75
2 or more	2 or more	900	150
1	2 or more	750	150

Warrant 2 is needed for intersections where the volumes are not quite as evenly distributed as they must be for Warrant 1. In Warrant 2, the major volumes needed are much larger than in Warrant 1; however, the minor street volumes needed are much less.

Warrant 8 Volumes:

This condition is for cases where no single warrant is met but where warrant one and two are satisfied at eighty percent (80%) or more of the values listed for each individual warrant.

2.2 Literature Review

Hawkins [1992] studied the history of traffic signals in the United States. The use of traffic signals began in 1914 in Cleveland, Ohio. At that time, there were no standard systems for their use. In 1924, a committee made the decision to have some uniformity in the color of the lenses used in traffic signals. Red was for stop, green for proceed, and yellow for caution. The first MUTCD (Manual of Uniform Traffic Control Devices) was published in 1935. This manual provided the first warrants for traffic signal installation. These warrants were minimum vehicular volume, heavy left turn, minimum pedestrian volume, coordinated movement, through highway, accident hazard, and combination of warrants. This manual was the first transportation manual to have a national acceptance. New signal warrants that had criteria for rural and urban areas were added in the 1948 MUTCD. The required volumes for Warrants 1 and 2 in the current MUTCD were established in 1961.

Todd [1989] believes one of the major sources of problems between highway departments and citizens is the installation of traffic lights. The public believes that signals are a symbol of safety. However, installing a light does not always reduce accidents. A traffic signal results in rear-end accidents occurring instead of the right angle accidents that occur without the signal. Engineers need to use the minimum degree of control to maintain the safety of the traveling public. Unfortunately, the pressure from the public drives some engineers to manipulate the volume traffic numbers until they meet a warrant. This is an incorrect procedure and we must not allow it to happen. Engineers need to learn to communicate with the public in a way that the public will understand.

Todd [1982] states that the topic of signal warrants is a controversy that is going to continue. The MUTCD has eleven warrants for traffic signals. Warrants 1 and 2 are the most frequently used and account for 70% of all the signals installed. However, warrants 1 and 2 have several flaws that keep coming back to haunt the traffic engineer trying to appease the public.

Flaw 1: No rationale exists as to why the warrants are based on an eight hour count.

Flaw 2: The warrants do not address the total amount of traffic entering an intersection. For example, they do not consider the case when both roads have a volume of 400 vehicles entering the intersection distributed equally between both directions.

The distribution does not meet a warrant; however the volume may meet a warrant if distributed differently.

Flaw 3: The 70% requirement for rural or high speed areas is not based on any study.

These controversies have been an ongoing topic of discussion for many years. Engineers should use their best judgement when the public comes asking questions and placing blame. The public should not be brushed aside with the response that they do not understand the warrants. No mathematical computation that the engineer can produce will convince the public that these traffic signal warrants make sense.

Clement [1981] agrees with Todd that there are several problems with signal warrants and it is time for a change. The warrants used most often today are Warrant 1, minimum vehicular volume warrant, and Warrant 2, interruption of continuous traffic warrant. These warrants are based on volumes being met for eight hours of an average day. However, the warrants should be used as a guide and the engineers judgement; based on factors such as roadway features, age of pedestrian, etc.; should be used in the final decision.

One basic complaint about these two warrants is that they do not account for the traffic patterns (such as right or left turns). A method to adjust this problem is the "Summation of Critical Movements." This method determines the levels of service of the intersections. It considers the movement of conflicting vehicles within the intersection being studied. Another complaint is the split of the volumes (such as right

and left turns). However, near capacity volume splits are also considered in the critical movements summation technique.

Clement believes existing warrants can be used for initial investigations and the levels of service calculations determined from the "Summation of Critical Movements" can determine the actual need. This is a simple method that can be easily understood by the public.

Sharp and Parsonson [1988] created a system called SCAD - Signal Complaint Aid for Dispatchers, to increase the efficiency of responding to signal malfunctions. SCAD is designed to provide the engineer's knowledge about the operation to a dispatcher who does not have the same in-depth knowledge. SCAD guides the dispatcher through situations by providing the questions that need to be asked of the person calling in the problem, contacting the correct person to fix the problem and giving the person the correct information.

SCAD is started as soon as the dispatcher is contacted with a complaint. The dispatcher starts the program and the first menu is a question about signal complaints. Based on the complaint type, a series of specific questions are asked. Some responses require additional questions and others do not. This system is designed to get the needed information and minimize the time in doing so.

The next step is for the program to run through a series of analyses. It compares the complaint with that specific signal's characteristics to determine which areas of the operation may be causing the complaint. The final step is a printout of the location and

description of the complaint, urgency, agencies to notify and the actions needed to fix the complaint.

Falcochio et. al. [1994] noticed many transportation departments' need to prioritize a list of locations that need improvement. One way to produce such a list is by weighing the multiple measures being analyzed. In Brooklyn a model was devised to rank locations by evaluating the severity of delay, the frequency of accidents, and the volume. Intersection stopped delay was calculated using the afternoon peak hour volume multiplied by the average delay for individual automobile operators. To find the severity of delay, the severity for each location was divided by the sum of the average delay for all intersections. Accident rates were calculated by dividing the number of annual accidents by the annual traffic volume for that location. To calculate the severity of the accidents, the accident rate for each location was divided by the sum of the average accident rate for all intersections. Volumes were used to calculate the importance factor. The importance factor was found with the following equation:

$$1 + \frac{\text{(Average Volume for Inter.}^{\circ}\text{ - Lowest Ave. Volume of Intersections)}}{\text{(Highest Ave. Volume of Intersections - Lowest Ave. Volume of Inters.)}}$$

These three factors were then weighted by importance and a final ranking was produced. This ranking allowed the transportation departments to focus their attention and money on the most important locations.

Beaton et.al. [1996] compares the stated choice analysis and the revealed preference analysis. In the stated choice analysis, several options or situations are presented to the commuter. The revealed preference analysis uses the observations of the actual behavior of the commuter in the past.

Saka [1993] studied the 'Post Calibration Adjustment of Travel Demand Models'. He stated that travel forecasting involves two steps. The first is developing the base year model. This model is produced from the traffic volumes from the base year. The second step is choosing the forecast year and, depending on the land use and socioeconomic data, modeling the travel demand for the forecast year.

Paquette, et.al. [1992] studied several ways to predict future traffic volumes on specified roadways. A wide variety of techniques are used ranging from complex computer programs to the simple method of growth factors. For urban roads the four-step modeling process is most often used and the uniform growth factor method is usually used in rural areas. The four step process consists of:

Step 1: Trip Generation - the goal of trip generation is to estimate the number of vehicle trips made in a specified area. The number of trips is broken into two categories - trip attraction and trip production. Trip productions are related to the home end of a trip, whereas trip attractions are related to employee, shopping, entertainment, etc.

Step 2: Trip Distribution - now that an estimate has been produced for trip attractions and trip productions, an idea must be formed on their origins and destinations.

A model such as the gravity model is used. The result of using this model is a trip table. This table gives the number of trips between each origin and destination in the specified area. Trip distribution is completed separately for each trip purpose.

Step 3: Modal Split - modes of transportation used between each origin and destination

Step 4: Traffic Assignment - determines the travel paths chosen between every origin and destination. The result is a network of roads with volume assignments made for each link. When this is used with future trips, the process shows how well the proposed growth will be handled.

The uniform growth factor method is the simplest. This method calculates a growth rate for an entire area. This can be expressed as $T = t * F$. Where:

T = future trips

t = base year trips

F = average area wide growth factor.

This is a very simple method but not always accurate. It assumes that the growth rate is consistent from year to year. This growth is predicted by recent growth trends in the traffic. However, one must be careful because past growth rates do not always reflect the future growth rates. The uniform growth factor is calculated to determine the annual change in the number of vehicles using a roadway.

ITE Technical Council Committee 6F-41 [1991] described a survey taken of many transportation highway agencies on the type of traffic forecasting they use. A survey was sent out to all 50 state highway departments with 41 of them responding. The results showed that highway agencies use a wide variety of methods to predict future traffic volumes. These methods range from complex computer models to trend lining of base year volumes. The four step modeling process, involving trip generation, trip distribution, modal split and traffic assignment, is used in many urban areas and the simpler method of growth factoring or trend lining of traffic counts is used in rural areas. However, most agencies are improving their current procedures and updating to more high-tech computerized methods.

Erhunmwunsee [1991] stated that knowing traffic volumes is important for traffic control planning. One aspect of the study in this report was to investigate whether shorter counts reduce the accuracy of the predicted annual flow. Shorter counts are more convenient and cost less than twenty-four hour counts. Once these short counts are produced they can be used in models that have factors for various things to find daily counts, monthly counts, and yearly counts. Compared to counts taken for much longer amounts of time (weeks), the results were accurate to within 10 percent. Obviously, the longer the length of count used in an estimate, the better the result. However, using the estimated AADT method, engineers can have a quick response to constituents' requests and save time, money, and staff.

2.3 Conclusion

In later sections of the research, it is shown how the warrants described above are used for the Proactive Signal Warrant Analysis. The literature that was extensively reviewed shows that no other research has been conducted for the "The Methodology for Proactive Signal Warrant Analysis". The literature reviewed included signal warrant history, current problems with the warrants, and traffic forecasting.

CHAPTER 3

DATA COLLECTION

The data collection included two separate procedures. The first procedure was gathering 100 past warrant studies to determine which warrants were met most often and which warrants to select. This is described in 3.1's 'Past Warrant Studies.' The second procedure dealt with gathering needed information from all sources. See sections 3.2 and 3.3. The information gathered included volumes, accident history, and number of complaints. This chapter also describes the database produced from all of the collected data.

3.1 Past Warrant Studies

The data collection task of the research began with finding a sample of the last 100 signal warrant studies performed on Ohio state highways. Samples of these studies are located in Appendix A. These studies were found in the files of the ODOT's Office of Traffic Engineering. One-hundred signal warrant studies were found and used to identify the following information:

(I) which signal warrants were met?

(ii) why were certain locations chosen to be studied?

Through the one-hundred sample signal locations, seven of the eleven warrants in the MUTCD (Manual of Uniform Traffic Control Devices) were met. The following are the percentages of times that each warrant was met:

Warrant 2 (Interruption of Continuous Traffic).....27%

Warrant 8 (Combination of Warrants).....23.4%

Warrant 1 (Minimum Vehicular Volume).....21.6%

Warrant 9 (Four Hour Peak).....10.8%

Warrant 11(Peak Hour Volume).....10.8%

Warrant 6 (Accident Experience).....4.0%

Warrant 10 (Peak Hour Delay).....1.8%

Because of the outcome of these percentages we focused the rest of our research on Warrants 1, 2, and 8, which all deal with the volumes of the major and minor roads. As a second criteria we used the accident warrant (Warrant 6). This warrant was chosen because it has the highest % of being met of the non-volume warrants and the data on accidents is readily available.

The next task in the data collection stage was to determine why these one-hundred locations were chosen to be studied. The majority (51%) of the studies were done because of proposed development (e.g., stores, restaurants, service stations, etc.). For proposed development, the ITE Trip Generation Manual was assumed to be used to predict the future trips based on new development.

In addition, we interviewed traffic engineers that are responsible for signal

installation. We obtained insight into exactly where ODOT stands with their signal warrant process. After talking with them we decided to focus the rest of this study on current intersections rather than proposed development. In beginning the procedure to produce our methodology, we determined that one county had sufficient information to produce our method. Therefore, we chose a county that included both urban areas and rural areas. Ashland County met all of our required needs; therefore, it was selected Ashland County is only being used as an example. This methodology can be applied to any area being studied.

3.2 Ohio Department of Transportation's Data Files

This study (using Ashland County as an example) included gathering large data files from The Ohio Department of Transportation's Office of Traffic Engineering. Many of these files are located on the mainframe computer system which is available to all employees of ODOT.

The first database which was studied was the signal inventory file. This file contains all the signals installed throughout Ohio. It also has information about the signals such as the type of controller, type of monitor, date of installation, number of phases, etc. From this database the only information needed for the research was the location of the signals and the type of signals at each of these locations.

The second database used was Destape. Destape includes such information as intersection, bridge, overpass and railroad locations. It also contains information on where routes begin and end , and enter and exit counties. Destape was used to gather the

following information: county, route, route suffix, log point, cross route and cross route suffix.

Road inventory was the third database used from ODOT. After speaking with several ODOT employees and discussing what was needed, the road inventory system was chosen over the volume file. Road inventory includes the number of lanes for the approaches whereas the volume file does not. The road inventory file also includes such information as volumes for the route and cross route, classification of the roadway, surface characteristics, road widths, etc. The number of lanes and the volumes were the information used from this database.

3.3 Accident Data Collection

Information was needed about the accidents occurring at the intersections in question. For this report, the intersections in Ashland County were the ones of interest. The federal law states that each state must maintain a system for all accidents that occur on the roads and streets in the state. The Ohio Department of Transportation has The Highway Safety Program - High Hazard Location System (HSP). Three years of accident data are used to calculate several values for each location: accident frequency, accident rate, delta-change (change in the number of accidents over time), EPDO (equivalent property damage only) rate, RSI (relative severity index), and density. Each location must meet a minimum value for at least one of these values to remain a candidate for HSP. HSP then calculates a priority index for each of these locations to determine overall rankings. These priority index values are then sorted in ascending order (with a

rank of 1 being the worst accident location in the state), giving the HSP hazard index rank for all locations.

Accident data for the period of January 1993 to December 1995 was obtained through the mainframe at The Ohio Department of Transportation. [The reason for using this time period was that not all of the accident information for after 1995 was available.] The information used from this file was the route logpoint and the location description. The location description stated whether the accident occurred at an intersection, was intersection related or if it was non-intersection related. The accidents we used were those that occurred at an intersection or were intersection related.

The number of injury and fatal accidents was obtained from the engineers in the area being studies that worked with the accident data. This information was needed to produce the accident severity index. Other important data collected from the engineers was the number of complaints received from their constituents. As mentioned earlier the main goal of transportation agencies is to satisfy their customers. One benefit from a proactive practice of signal installation is to decrease the number of complaints they receive.

The only information needed to determine which intersections meet warrants 1, 2, and 8 is the volume on the cross routes of the intersections. After speaking with ODOT employees and Franklin County Traffic Engineer, Michael Meeks, it was discovered that these volume counts are not available for all county and township routes. Therefore, the analysis on meeting volume warrants would only include the volumes on the major routes.

3.4 Database Table

The Destape, road inventory, and signal file information described above was downloaded from the mainframe into database files which were transferred into Paradox (a database for Windows.) Paradox was used for two reasons:

1) all districts in Ohio have easy access to Paradox, and

2) programs can be written in Paradox and easily run.

A final Paradox Table was manually produced which included the downloaded information, HSP ranking, and accident and complaint information. This table was named the "Ashland" data table. The Paradox table arranges the data in rows and columns. A horizontal row contains information about a particular item (e.g., an intersection.) This is called a record. Each column contains one category of the data that makes up the record. This is called a field. In the Ashland data table, fields one through six were created from information obtained from Destape. Columns seven through nine contain data that was obtained from the road inventory file. The information for columns ten and eleven was downloaded from the signal inventory file. The last five fields (twelve through sixteen) include accident and complaint information. The following is a description of each of these columns.

Column 1 - County

For this study only Ashland County information is needed.

Column 2 - Route

This is the state route or US route in question.

Column 3 - Route suffix

R is used for the regular routes, C is used for the connector routes.

Column 4 - Logpoint

Straight line mileage of the route in question is given to the nearest 0.01 miles.

Column 5 - Cross-route

The numeric name and/or the alphabetic name of the cross-route.

Column 6 - Cross-route logpoint

The straight line mileage of the route listed in column five approximated to the nearest 0.01 miles.

Column 7 - Lanes

The number of total lanes on the segment of highway in question.

Column 8 - ADT

The average daily traffic for the segment of the highway.

Column 9 - Cross-route ADT

The average daily traffic on the cross route (for locations where the data is available).

Column 10 - Signal

"Y" indicates a signal is present at the particular intersection.

Column 11 - Signal type

The type of signal installed at the location.

FA-fully actuated	SA-semi-actuated
FT-fixed time	FO-overhead flasher
FS-sign-mounted flasher	SS-stop sign flasher
SC-school flasher	

Column 12 - HSP listing

The HSP's rank for the intersection.

Column 13 - Accidents

Number of accidents that occurred for the three-year period between January 1992 and December 1995.

Column 14 - Injury and fatal accidents

Number of injury and fatal accidents occurring between January 1992 and December 1995.

Column 15 - Complaints

Number of complaints from the public over the past three years.

Column 16 - Severity Index

Calculated by the number of injury and fatality accidents in the last three years divided by the number of accidents over the same time period (field fourteen divided by field thirteen).

The organization of the printout includes column headings on each page with the intersection information on the following lines. Appendix B contains the entire Ashland data table.

The file to be used to produce a methodology for proactive signal warrant analysis is now complete with all the information available to us.

3.5 Conclusion

The data collection task was very extensive. Information was gathered from various sources (such as The Ohio Department of Transportation, The Ohio Highway Safety Program, and Ashland County) on volumes, accidents, complaints, etc. This information was then combined in a table to allow the procedure for analysis to be started.

CHAPTER 4

METHODOLOGY

This chapter describes the information needed and the steps that were taken to produce "A Methodology for Proactive Signal Warrant Analysis." The information gathered in Chapter 3 and used in the Methodology were the volumes (ADTs) on the major and minor routes, the accident information, and the complaint information.

4.1 Development of the Volume Analysis

Based on the assessment of data availability discussed in Chapter 3, we next developed the volume values that can be indicators of whether an unsignalized intersection potentially warrants a signal now or in the future.

As mentioned in Chapter 3 the volumes received from the databases are the ADT's (average daily traffic). ADT is the total volume of traffic during a specified time period (more than one day and less than one year) divided by the number of days in that time period. To meet the standards of the warrants 1, 2, and 8, the intersection must have a specified volume for eight consecutive hours of an average day. However, this information is not readily available to us. Therefore, calculations were done to determine the approximate ADT needed on all approaches to warrant signalization. It

was assumed from past experience and studies by engineers in District 3 that 52.5% of all the ADT (average daily traffic) occurs in the eight highest volume hours in a day. From this assumption the minimum ADT required to meet Warrants 1, 2, and 8 was found.

Table 4.1.

Example to Find Minimum ADT Requirements

Warrant 1 at 100% of its required volume.

Approach	No. of Lanes	Required Volume	Needed Hours	Required 8 Hr. Volume	Multiplied by 52.5%		Minimum ADT
Major	1	500	8	4000	7619	x 1	7600
Minor	1	150	8	1200	2286	x 2	4600

Table 4.2.

Approximate Minimum ADT for Warrant 1

Approach	No. of Lanes	100%	70%*
Major	1	7600	5320
Minor	1	4600	3220
Major	2 or more	9100	6370
Minor	1	4600	3220
Major	2 or more	9100	6370
Minor	2 or more	6000	4200
Major	1	7600	5320
Minor	2 or more	6000	4200

Table 4.3.

Approximate Minimum ADT for Warrant 2

Approach	No. of Lanes	100%	70%
Major	1	11400	7980
Minor	1	2300	1610
Major	2 or more	13700	9590
Minor	1	2300	1610
Major	2 or more	13700	9590
Minor	2 or more	3000	2100
Major	1	11400	7980
Minor	2 or more	3000	2100

Table 4.4.

Approximate Minimum ADT for Warrant 8

		80 % of Warrant 1		80 % of Warrant 2	
Approach	**No. of Lanes**	**100%**	**70%**	**100%**	**70%**
Major	1	7680	4260	9120	6380
Minor	1	3680	2580	1840	1290
Major	2 or more	7280	5100	10960	7670
Minor	1	3680	2580	1840	1290
Major	2 or more	7280	3100	10960	7670
Minor	2 or more	4800	3360	2400	1680
Major	1	7680	4260	9120	6380
Minor	2 or more	4800	3360	2400	1680

* The 70% columns are for the special cases listed under Warrants 1 and 2.

These ADT volumes are not to determine which intersections meet the volume warrants but rather to indicate which intersections deserve to have full blown engineering studies conducted.

4.2 Development of the Proactive Warrant Analysis Methodology

From the information collected and described above in section 4.1, the most important information was the volumes on the major and minor routes. When determining a priority ranking for intersection improvements (such as signal installation) several factors are taken into consideration. These factors include (ranked in order of importance) volumes, HSP accident ranking, complaint history, and finally the accident severity index information. Therefore, this is the order of importance we placed on these pieces of information when determining our methodology.

The methodology to produce a prioritized list of intersections goes through several steps:

Step 1:

If a signal is already installed at an intersection, the intersection receives a priority ranking of zero. We no longer need to work with these intersections because they have obviously already met a signal warrant.

Step 2:

The next step in the methodology is to determine which intersections have a high enough ADT (average daily traffic) volume on both the major and minor route that they meet the ADT requirements for a signal installation. If the minor route volume is not

available, then we base the decision just on the major route ADT. From the intersections that meet the ADT requirements, we determine if it is high on the HSP listing - having an HSP ranking of 1 to 350 (meaning it is a high hazard location as far as accidents are concerned.) If the intersection is high on the HSP listing then it is given a priority ranking of 1. If it is not in the top 350 on the HSP listing it is given a priority ranking of 2.

Step 3:

The intersections given a ranking of 1 are then sorted based on their number of complaints and accident severity index. If the intersection has a high number of complaints or a high accident severity index it is higher on the list among the intersections with a rank of 1 than those that have littler or no complaints and a low severity. The same is done with those intersections having a rank of 2. The result is a listing of the intersections with high volumes ranked depending on their complaint numbers and their accident severity. The ranking is in descending order by complaints and severity index.

Step 4:

This step is to find the intersections where the ADT is not quite high enough to warrant a signal but is very close or may meet the criteria if we use the 70% or 80% warrant requirements. The intersections used in this step are those having an ADT of greater than 5000 on the major route. We do not take into account the minor routes because no information is available on their volumes and at this point we are just estimating which locations may warrant a signal. We now move on to the second most

important criteria, the HSP ranking. If the intersections found in this step (Step 4) have an HSP ranking of 1 to 350 they are given a ranking of 3, and if not, they are assigned a ranking of 4.

Step 5:

This step is the same as step 3 except instead of dealing with the intersections ranked 1 or 2 we are working with the intersections ranked 3 or 4. The intersections are ranked depending on their number of complaints and accident severity index.

Step 6:

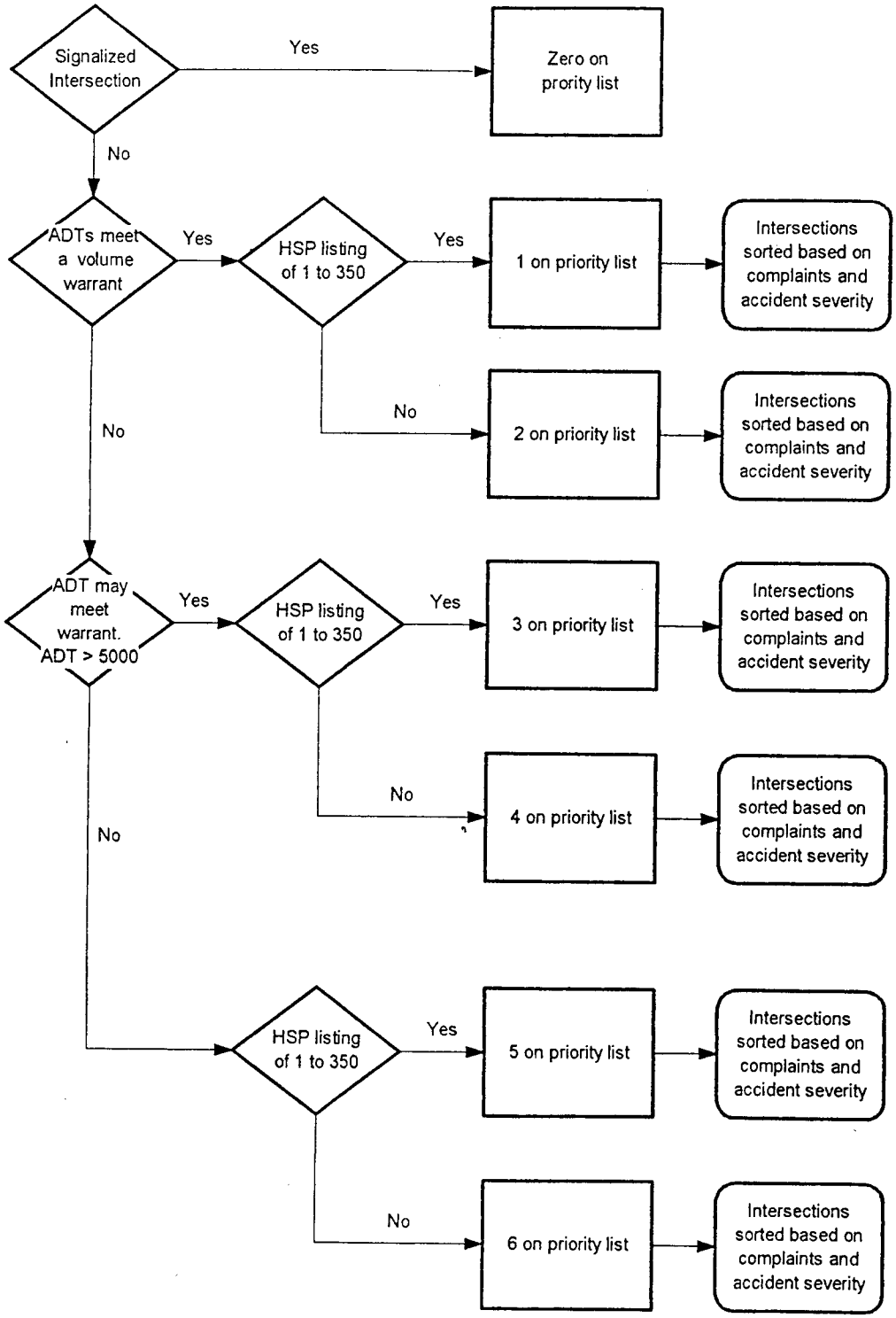
We now go back to working with the volume data. Step 6 is to determine all of those intersections that do not have a signal, do not meet a warrant, and are not close to meeting a warrant. All the intersections at this step have an ADT of less than 5000 on their major approaches. If the intersections have an HSP listing of 1 to 350 they are given a ranking of 5. The intersections without a listing in the top 350 are given a rank 6.

Step 7:

Those intersections with a rank of 5 are then sorted based on their number of complaints and accidents severity index. Intersections with a high number of complaints or severity index are listed first among those intersections with a ranking of 5. The same is done for those intersections with a ranking of 6.

Again all this prioritization was done based on the important aspects for traffic engineers. These aspects include (based on order of importance) volume, HSP ranking, number of complaints, and accident severity index. This methodology can be seen in the flowchart on the following page.

Flowchart of Methodology



4.4 Conclusion

A procedure has been developed to produce "A Methodology for Proactive Signal Warrant Analysis" based on the volumes, HSP accident ranking, number of complaints, and accident severity index. These four things are felt by many traffic engineers to be the most important aspects in providing safety on their roadways.

CHAPTER 5

IMPLEMENTATION

This chapter is a detailed description of the programs written in Paradox's ObjectPAL. Five steps are needed in writing a usable Paradox program. These steps are described in section 5.1 'Paradox Programming.' They are then implemented into the programs ADTsort, Sort, and Futuresort.

5.1 Paradox Programming

The program was written in ObjectPAL, the programming language for Borland's Paradox for Windows. PAL is a structured database programming language that allows the user to write sophisticated Paradox programs using statements, constants, and conventions used to control the Paradox for Windows environment.

There are five basic stages to developing a Paradox program:

(1) Define the features of the application. To create a program, the programmer must know what is given and what is required.

(2) Create the objects needed: tables, forms, etc. First the tables where the data is to be stored need to be created. This is described above in Chapter 4 - Methodology.

Then the form needs to be designed. This is the most important application because it is where the program is generated.

(3) Create ObjectPAL code and attach it to the appropriate objects. During this stage the program is written. The code is attached to the objects that the programmer wants the program to affect.

(4) Testing and adjusting the application. The program needs to be tested to verify that it is working correctly. Adjustments can be made as necessary.

(5) "Delivering" the application. Once the program has been completed to produce the desired results the application can be "delivered" to all those using the application. When an application is "delivered," unauthorized persons cannot change the code without authorization.

Once the intersections are ranked, traffic engineers knowledgeable with the area can determine which locations should have full warrant studies conducted. These studies can enable them to determine the actual volumes on both the major and minor approaches. The approximate ADT's listed in the Paradox file should NOT be used as a final count for a warrant analysis.

The first task was to create the form containing the programs (ADTsort, Futuresort, Sort, help, and cancel) built for the proactive methodology. Each of these programs has a push-button code attached to it. When the program buttons are clicked, the programmed action occurs. Paradox is triggered to execute an event when specific events happen. Here, when a button the code attached to it is executed. The basic code attached to all of our programs is:

method push-button

endmethod

This is because we want a particular code to execute when a certain button is clicked.

The third step in programming of ObjectPAL is to create the code and attach it to a specific object. Since all the code is attached to push-buttons the only thing to do in this step is to create the code. The code for each push-button is described below in sections 5.3, 5.4, 5.5, and 5.6.

The fourth step in programming ObjectPAL is to verify the program for correctness.

The final step in programming paradox is to "deliver" the application. The reason for delivering the application is so unauthorized persons cannot modify any of the design or ObjectPAL characteristics of the delivered form. To deliver an object with code attached to the form:

Select FORM - DELIVER

The delivered object contains the extension of .FDL on its file name.

5.2 ADTsort Program

The button "ADTsort," sorts the Ashland table by the ADT (average daily traffic) at each intersection. For the code to execute, the variables are first declared. Variables are declared by specifying a name and data type.

ObjectPAL does not require that the variables be defined. However, the code executes faster and there are fewer syntax errors when they are defined. After the

variables were defined, a new table was created so the sorted table would not replace the original table of data (the Ashland table.) The next step is to open a Tcursor in the table (in this case the Ashland data table). Tcursors are used to access tables the user is not to see. When the Tcursor is opened into a table it points to the first record. The Tcursor allows the programmer to manipulate the data in the table in many ways. In ADTsort the Tcursor was used to scan the Ashland data table and sort the data in descending order based on the average daily traffic at each intersection. The keywords 'sort' and 'endsort' must be used. First the table to be sorted must be declared. Then the specific fields to be sorted must be listed with an A or a D. (A for ascending order, and D for descending order.) Then the destination table is listed. This is the table into which the sorted data will be placed. The new table is then viewed and the program is ended with the endmethod command.

5.3 Sort Program

The push-button SORT is the main program in the Signal Warrant Analysis form. This program begins in the same way as the ADTsort program. First the variables are defined as Tcursors, tableviews, and tables. Then a new table is created so the new sorting procedure does not overwrite the original table.

The keyword 'scan' is used to process the contents of a table. Using scan, Paradox undergoes a set of ObjectPAL commands for each record of a table. The scan command requires three words: 1) scan, 2) for (what to scan the records for), 3) endscan (this ends the scan command once all the records in the table have been scanned.) When

scan is used as a command the Tcursor points to the first record in the table and if it matches the "for" conditions then the statements that follow are carried out. If the "for" statements are false, the Tcursor goes onto the next record and repeats the entire procedure. When this is done for all the records, the scan looped is exited and the Tcursor goes onto the next executable statement after the endscan command.

Thirteen scan/endscan methods are used in this program. They are listed below in the order in which they appear in the program. Each scan method searches through the original data table (Ashland.dbf) for the intersections which meet certain requirements. Once these intersections are found, they are inserted into a new table with a rank and a label. The Tcursor then moves back to the first record in the original table to begin the next scan command.

Scan Command No.1 - searches for intersections that already have a signal installed. They are assigned the title "Signal Installed" and a rank of 1.

Scan Commands No. 2, 3, and 4 - scan for intersections where the major and minor streets both meet the warrants (#1, 2, and 8) for a signal to be installed but a signal has not yet been installed. These intersections are given a rank of 2 (for warrant #1), 3 (for warrant #8), or a 4 (for warrant #2). They are labeled "Warrant 1 is met, Warrant 2 is met, or Warrant 8 is met."

Scan Commands No. 5, 6, and 7 - search for intersections where the major street meets the warrant requirements but volume information for the minor street is not available. The intersections must also be ranked in the top 350 of the HSP listing. The intersections that meet these requirements are assigned the rank of 5, 6 or 7 and are

assigned the labels of "1 may meet, HSP < 350", "2 may meet, HSP < 350", or "8 may meet, HSP < 350".

Scan Commands No. 8, 9, and 10 - search for intersections where the major street meets the warrant requirements but volume information for the minor street is not available. The intersections must also not be ranked in the 350 locations of the HSP listing. The intersections are ranked 8, 9 or 10 and are labeled "1 may meet, 2 may meet or 8 may meet."

Scan Command No. 11 - scans for major routes with a high enough volume that it may meet a warrant later. This command is also looking for intersections with an HSP ranking less than 350. These locations are given the rank of 11 and the title "May meet at a later date, HSP < 350."

Scan Command No. 12 - this command is the same as number 11, but the locations have an HSP accident ranking higher than 350. The locations found are given a rank of 12 and the label of "May meet at later date."

Scan Command No. 13 - inserts the rest of the records into the new table. The rank they are assigned is 13 and the label is "none."

The program then uses the sort command. The new table is now sorted by: 1) rank, 2) complaints, and 3)index (accident severity rating index). Once this table is sorted, the intersections are first listed by the rank assigned to them in the scan command loops. Then among the intersections with the same rank the intersections are sorted by the number of complaints received from the public and the accident severity rating index. This new sorted table is then viewed.

5.4 Futuresort Program

The Futuresort program has the exact same scan commands as the sort program except for two additional ones. The first addition scan command is the first scan command in the program. It forces the program to go through all the intersections in the original Ashland data table and calculate new ADTs. The present ADTs are used to calculate what the ADT will be on the major route and cross route for each intersection five years into the future. To calculate the future volumes an expected uniform growth factor was used. For this project the Ashland county uniform growth factor rate is 0.020. The second additional scan command is the last one of the program. It recalculates the original data table for the present ADTs. This was done so the original data in the Ashland data table always contains the present ADTs. This allows all three programs to be run again and again. This program will allow engineers to base their decisions for signal installations on projected traffic in the years to come.

5.5 Help and Cancel Programs

Help

The help push-button gives a short description of what the other buttons do. A brief description is given for ADTsort, Sort, and Futuresort.

ADTsort - sorts by the ADT

Sort - sorts by the intersections' needs for a signal

Futuresort - sorts by the intersections' needs for a signal in five years.

Cancel

The cancel push-button describes to the user how to exit the program. "To close the Signal Warrant Analysis Procedure - Go to File and Exit."

5.6 Conclusion

This chapter describes the three different programs that produce ranked lists of intersections based on their volumes, HSP ranking, complaints, and accident severity index. The Cancel and Help programs are also describes.

CHAPTER 6

APPLICATION OF THE MODEL TO THE ASHLAND COUNTY NETWORK

This chapter includes the results of the implementation to the Ashland County database. Section 6.1 describes the results received when 'ADTsort' is conducted. Section 6.2 describes the results from the 'Sort' program and 6.3 is a description of the outcomes from the 'Futuresort' push-button program.

6.1 ADTsort Results

The results from the ADTsort push-button show all the Ashland county intersections ranked in descending order by their average daily traffic count (ADT). The first intersection on the list is US 42 with an ADT of 13040. The ranking continues downwards to the four SR 604 intersections with an ADT of 390. The results of this program are in Appendix G.

6.2 Sort Results

Using the sort push-button program, results are produced according to the methodology described in Chapter 4. The first intersections listed are the ones with

signals already installed. In Ashland County this results in fourteen intersections. This is approximately four percent of the locations ranked.

The second group of intersections listed are the ones where both the major and the minor approaches meet Warrants 1, 2, or 8. There is one intersection in Ashland County where both the major and the minor approaches meet a warrant. The intersection of US 60 and SR 511 meets Warrant 2, Interruption on continuous traffic.

The next group of intersections listed are the locations where the major approach meets the minimum ADT's mentioned in 'Methodology' for Warrants 1, 2, or 8 and the intersection is ranked in the top 350 HSP locations. Ashland County has no locations that meet this criteria. However, it does have twenty-nine (approximately eight percent of this county's intersections) locations where the major approach ADT's meet Warrants 1, 2, or 8 and is NOT ranked in the top 350 of the HSP.

The intersections that are listed next are the ones that may meet a warrant soon but the minimum ADT's are not quite as high as needed to meet a warrant at the present time. These intersections have an ADT greater than 5000. There are thirteen (approximately four percent of Ashland's intersections) locations that may warrant a signal soon.

The rest of the intersections are those that do not meet Warrants 1, 2, or 8 and are not likely to meet these warrants in the near future. These locations have an ADT below 5000.

These results conclude that there are approximately forty-five locations that currently meet a warrant or may meet a warrant sometime soon. The results of the Sort program are in Appendix H.

6.3 Futuresort Results

The results obtained when the Futuresort program is run are in the same format as the Sort program results. Many of the intersections continue to be in the same "categories" as they were five years ago.

The signalized intersections are listed first. These are the same locations as those in the Sort results unless new signals have been installed since the program was last run.

The next group of intersections listed in the results are the ones where both the major and minor approaches meet a warrant. Only one intersection meets this criteria and it is the same one as in the sort results.

Intersections listed next are those where the major approach meets the minimum ADT needed but the minor approach does not meet the requirements or the data is not available to us. For the Futuresort program this includes thirty-one intersections. However, none of these intersections is ranked in the top 350 of the HSP list.

The next intersections listed are those that may meet a warrant soon but the ADTs are not as high as the requirements specify. These intersections have a ADT of greater than 5000. This includes fifteen of the intersections in the Ashland data base.

The rest of the intersections have an ADT less than 5000 and therefore do not meet Warrant 1, 2, or 8 nor are they likely to meet these warrants in the near future.

These results indicate that in the year 2001, if no other signals are installed and the growth continues as projected, forty-seven intersections will need further study and analysis for a signal to be installed. Appendix I contains these results.

6.4 Conclusions

This chapter contains descriptions of the results obtained from the ADTsort program, Sort program, and Futuresort program. As mentioned earlier, it should not be assumed that signals need to be installed at all or some of the top locations. A full signal warrant study (described in the literature review) will need to be conducted by the local traffic engineer on the top ranked locations. This ranked list gives the engineer an idea of which intersections need to be studies first. This is where an engineer's judgment is used based on his/her knowledge about the area to decide which locations need an analysis conducted.

CHAPTER 7

CONCLUDING REMARKS

This chapter contains the conclusion of the "The Methodology for Proactive Signal Warrant Analysis." It also describes the future research to be conducted to continue with the procedure already produced.

7.1 Summary of Findings

The "Methodology for Proactive Signal Warrant Analysis" study was conducted to determine if a procedure could be implemented in traffic departments to determine the intersections that currently warrant a signal based on volume and accident information and those that will meet the requirements for a signal soon.

It has been determined that such a procedure can be done. The information needed has been determined methodology of ranking the intersections. The information needed includes volumes, number of lanes, number of complaints, HSP listing and accident severity. However, this program has not been fully developed to run for all counties automatically. This particular procedure was performed on the above mentioned data collected for Ashland County. Ashland County was selected for use in

producing the Paradox program. The ADTsort, Sort and Futuresort programs written are easily run with just the click of the button and results are produced within seconds.

7.2 Future Research

Unfortunately, the programs are inadequate in the area of automatic file manipulation from The Ohio Department of Transportation's mainframe computer system. It is anticipated that this application will be expanded in the future to include an automated process. Future researchers will work with employees of ODOT who work with the files on the mainframe system. The information needed from Destape, road inventory, and the signal file can currently be found on the mainframe and downloaded manually into the Paradox format. The next step of the research would do this automatically with a simple command. This could occur at regular intervals depending on how often the traffic departments wanted updates of the information. Since most of this information seldom changes, once a year would probably be adequate for the downloading process. The engineers knowledgeable about the area's locations could easily enter the number of complaints concerning the intersection and the accident data. Once this information is stored into the Paradox table, it would not have to be changed until new data is acquired. When new information about accidents and complaints is received it could quickly be entered into the database and the system will always be kept up to date.

Another topic to address in the future research is using traffic assignment procedures to enhance the future volume data. Using Transcad, traffic assignments

could be used to get the flow on each link of the network being studied. These flows could then be downloaded from Transcad into the Paradox table used in the Methodology. This data would be closer to the actual volumes then a percentage growth applied throughout the area of study.

7.3 Conclusions

This proactive signal warrant analysis offers transportation officials a way to rank the intersections in their area. This allows them to handle complaints from the public in a quick and efficient manner. It also saves the engineer time in deciding which locations need full warrant studies. The engineer can look at the list and quickly determine by the ranking (based on volumes, accidents, and complaints) which intersections are problem locations.

APPENDIX A

SIGNAL WARRANT STUDIES

(2)

DEPARTMENT OF HIGHWAYS

SUMMARY OF ENGINEERING DATA

BUREAU OF TRAFFIC

COUNTY Hamilton

DATE 8-8-90

RSECTION OF SR-264 & South Road

5.82		S.R.			S.R. SOUTH ROAD			S.R. 264			S.R. 264			
LENGTH OF COUNT	FACTOR	APPROACH			SOUTH APPROACH			WEST APPROACH			EAST APPROACH			TOTAL
9 HRS	VAR				1436		1208		3699	1490		4315	1309	13,457
8-9 AM	PEAK				82		85		253	108		193	43	764
5-6 PM	PEAK				168		88		332	158		653	247	1,646

SPEED STUDY MADE ON S.R. 264 ON 9-17, 1990 1000 FT. ☐ N ☐ S ☒ E ☒ W OF SOUTH RD.

34-44

50 PERCENTILE SPEED 38 M.P.H. 85 PERCENTILE SPEED 42 M.P.H. PACE 36-46 M.P.H.

VEHICLES VIOLATING STOP SIGN TO 8 HRS. _____ APP. _____ (NUMBER) APP. _____ (NUMBER)

PEDESTRIANS CROSSED N. APP. _____, S. APP. _____, E. APP. _____, W. APP. _____, IN 8 HRS

REMARKS

DATE		LIGHT		ROAD CONDITION				TYPE OF ACCIDENT								NO. ACCD'S		
	TO	DAY	NIGHT	DRY	WET	ICY	NOT STATED	HEAD ON	ANG.	TURN	SIDE SWIPE	REAR END	PED.	MON COLL.	OTHER	NOT STATED	FATAL	NON FATAL	TOTAL
87	12-31-87		3	3					1	1		1					0	3	3
88	12-31-88	3		2	1			1	1			1					0	3	3
89	12-31-89	1	1	1	1				1			1					0	2	2
TOTAL		4	4	6	2			1	3	1		3					0	8	8

RKS: 1987 - 1 INJ 1988 - 2 INJ (1 ACCD) 1989 - 0 INJ

MPLIANCE WITH MINIMUM WARRANTS

RANTS	DESCRIPTION	STREET	NUMBER OF LANES FOR MOVING TRAFFIC ON EACH APPROACH				COMPLIANCE WITH WARRANTS		
		MAJOR	1	2	2	1			
		MINOR	1	1	2	2	100%	80%	70%
MUM VOL. LAR* ME	(a) Vehicle Volume, all approaches per hour on major street for any 8 hours, and	(a)	500	600	600	(500)	6 HRS	8 HRS	8 HRS
	(b) Vehicle Volume, per hour on higher-volume minor-street approach, for same 8 hours (one direction)	(b)	150	150	200	(200)	2 HRS	8 HRS	8 HRS
UPTION UOUS * FFIC	(a) Vehicle Volume on major street, per hour (total both approaches) for 8 hours, and	(a)	750	900	900	(750)	2 HRS	8 HRS	6 HRS
	(b) Vehicle Volume, on higher-volume minor-street approach, for same 8 hours (one direction only)	(b)	75	75	100	(100)	8 HRS	8 HRS	8 HRS
UM TRIAN * ME	(a) Vehicle Volume, on major street, per hour (total both approaches) enter the intersection for any 8 hours, or	(a)	600						
	(b) Vehicle Volume on major street which has a raised median island 4 ft. or more in width, per hour (total approaches) enter the intersection for any 8 hours, and	(b)	1000					NO	
	(c) Pedestrian Volume, crossing major street on the highest volume crosswalk, for the same 8 hours	(c)	150						
ESSIVE MENT	Installation which otherwise would not be warranted in order to maintain proper grouping of vehicles and effectively regulate group speed.	Yes (No)							
DENT ARD	(a) Adequate trial of less restrictive remedies with satisfactory observance and enforcement has failed to reduce the number of accidents, and	(a) Yes No							
	(b) Total reported accidents of types, susceptible to correction by a traffic signal, within 12 month period, involving personnel injury or property damage of $100 or more, and	(b) 5 (1)						NO	
	(c) Vehicle, interruption of traffic, or pedestrian warrant, and	(c) Not less than 80% of the minimum							
	(d) Will not disrupt progressive traffic flow.	(d) Yes No							
ATION NTS		Two or more of above Warrants satisfied to extent of 80%						YES	

DEPARTMENT OF HIGHWAYS

SUMMARY OF ENGINEERING DATA

BUREAU OF TRAFFIC

COUNTY Warren

DATE 2-6-89

ERSECTION OF US-22/3 & Landen Drive

LENGTH OF COUNT	FACTOR	S.R. LANDEN DR. NORTH APPROACH			S.R. LANDEN DR. SOUTH APPROACH			S.R. US-22/3 WEST APPROACH			S.R. US-22/3 EAST APPROACH			TOTAL
		←	↑	→	←	↑	→	←	↑	→	←	↑	→	
11 HRS	VAR	1229	142	1042	201	180	115	1163	5629	124	1042	5726	91	16,684
7-8AM	PEAK	85	2	25	20	8	6	36	227	4	46	579	4	1,042
5-6PM	PEAK	75	16	127	12	17	11	110	552	12	71	286	7	1,296

SPEED STUDY MADE ON S.R. 22/3 ON 2-7, 196 89 1000 FT. ☐ N ☐ S ☐ E ☐ W OF Landen Dr

50 PERCENTILE SPEED 42 46 M.P.H. 85 PERCENTILE SPEED 47 50 M.P.H. PACE 38-48 42-51 M.P.H.

VEHICLES VIOLATING STOP SIGN TO 8 HRS. _____ APP. _____ APP. _____
NUMBER NUMBER

PEDESTRIANS CROSSED N. APP. _____, S. APP. _____, E. APP. _____, W. APP. _____, IN 8 HRS

REMARKS

DATE		LIGHT		ROAD CONDITION				TYPE OF ACCIDENT									NO. ACCD'S		
	TO	DAY	NIGHT	DRY	WET	ICY	NOT STATED	HEAD ON	ANG.	TURN	SIDE SWIPE	REAR END	PED.	NON COLL.	OTHER	NOT STATED	FATAL	NON FATAL	TOTAL
85	12-31-85	2		2					2								0	2	2
86	12-31-86	2		2				1	1								0	2	2
87	12-31-87	1		1							1						0	1	1
TOTAL		5		5				1	3		1						0	5	5

ARKS: Signal Warrants Based On North Approach Being 2 Lanes With South App. Single Lane

MPLIANCE WITH MINIMUM WARRANTS

RRANTS	DESCRIPTION	STREET	NUMBER OF LANES FOR MOVING TRAFFIC ON EACH APPROACH				COMPLIANCE WITH WARRANTS 56%		
		MAJOR	1	2	2	1			
		MINOR	1	1	2	2	100%	80%	70%
IMUM CULAR VOLUME	(a) Vehicle Volume, all approaches per hour on major street for any 8 hours, and	(a)	(500)	600	600	500	11 HRS	11 HRS	11 HRS
	(b) Vehicle Volume, per hour on higher-volume minor-street approach, for same 8 hours (one direction)	(b)	(150)	150	200	(200)	2 HRS	8 HRS	6 HRS
RRUPTION OF TINUOUS RAFFIC	(a) Vehicle Volume on major street, per hour (total both approaches) for 8 hours, and	(a)	(750)	900	900	750	4 HRS	11 HRS	11 HRS
	(b) Vehicle Volume, on higher-volume minor-street approach, for same 8 hours (one direction only)	(b)	(75)	75	100	(100)	9 HRS	11 HRS	11 HRS
NIMUM ESTRIAN VOLUME	(a) Vehicle Volume, on major street, per hour (total both approaches) enter the intersection for any 8 hours, or	(a)	600						
	(b) Vehicle Volume on major street which has a raised median island 4 ft. or more in width, per hour (total approaches) enter the intersection for any 8 hours, and	(b)	1000					NO	
	(c) Pedestrian Volume, crossing major street on the highest volume crosswalk, for the same 8 hours	(c)	150						
GRESSIVE VEMENT	Installation which otherwise would not be warranted in order to maintain proper grouping of vehicles and effectively regulate group speed.	Yes (No)							
CCIDENT AZARD	(a) Adequate trial of less restrictive remedies with satisfactory observance and enforcement has failed to reduce the number of accidents, and	(a) Yes No							
	(b) Total reported accidents of types, susceptible to correction by a traffic signal, within 12 month period, involving personnel injury or property damage of $100 or more, and	(b) 5 (2)						NO	
	(c) Vehicle, interruption of traffic, or pedestrian warrant, and	(c) Not less than 80% of the minimum							
	(d) Will not disrupt progressive traffic flow.	(d) Yes No							
BINATION OF RRANTS		Two or more of above Warrants						YES	

APPENDIX B

ASHLAND DATA TABLE

ASHLAND COUNTY DATABASE

CNTY	RTE	SUF	LOG	CROSS_RTE	CRRTLOG	LANES	ADT	CRRTADT	SIGNAL	SIGTYPE	HSP	ACCI	INJ_FAT	C_R	ACC_INDEX
ASD	003	R	0000	OLD US 30 &NE VERMILION RD		2	1800	0	Y		0	0	0	0	0
ASD	003	R	0031	T3414		2	1800	0			0	0	0	0	0
ASD	003	R	0067	T3364		2	1800	0			0	0	0	0	0
ASD	003	R	0093	C0739		2	1800	0			0	0	0	0	0
ASD	003	R	0147	T3292		2	1800	0			0	0	0	0	0
ASD	003	R	0211	C0739		2	1800	0			0	0	0	0	0
ASD	003	R	0260	C3275		2	2243	0			0	1	1	0	1
ASD	003	R	0345	S0097R	0437	2	2815	930	Y	FA	0	3	0	1	0
ASD	003	R	0370	MOHICAN PARK ENTRANCE		2	2815	0			0	0	0	1	0
ASD	003	R	0446	T3044		2	3140	0			0	0	0	0	0
ASD	003	R	0633	S0039R & S0060R	0942	2	5950	3052			0	0	0	0	0
ASD	003	R	0633	S0060R	0051	2	5950	2600			0	0	0	0	0
ASD	003	R	0650	S0060	0068	2	4077	2600			0			0	0
ASD	003	R	0781	LONG LAKE		2	2020	0			0	0	0	0	0
ASD	030	R	0008	S0603R	0484	4	10761	970			411	18	10	2	0.55
ASD	030	R	0048	T1255		4	10300	0			0	0	0	0	0
ASD	030	R	0211	C1095		4	10300	0			0	1	0	0	0
ASD	030	R	0387	S0511R	0697	4	10621	2392			0	8	6	3	0.75
ASD	030	R	0782	T0555		4	10621	0			0	0	0	0	0
ASD	030	R	0843	C0030A		4	10621	0			0	1	0	1	0
ASD	030	R	0901	C2175		4	10500	0			0	3	2	0	0.67
ASD	030	R	0951	T0405		4	10500	0			0	1	1	0	1
ASD	030	R	1024	S0089R	0364	4	6710	1001			0	8	5	2	0.71
ASD	030	R	1174	C0175		4	6710	0			0	1	1	0	1
ASD	030	R	1329	C0015 and C0093		4	6710	0			0	0	0	0	0
ASD	039	R	0000	T1097 WEIL		2	1703	0			0	0	0	0	0
ASD	039	R	0040	C1075		2	1703	0			0	0	0	0	0
ASD	039	R	0157	S0511R	0000	2	1703	930			0	2	0	0	0
ASD	039	R	0185	T1037		2	1703	0			0	0	0	0	0
ASD	039	R	0238	T2606		2	1703	0			0	0	0	0	0
ASD	039	R	0398	S0095R	0146	2	2551	1830	Y	FS	0	5	3	4	0.6
ASD	039	R	0468	POTTERY		2	3050	0			0	1	0	0	0
ASD	039	R	0475	PLEASANT		2	3050	0			0	1	0	0	0
ASD	039	R	0497	C0917		2	3050	0			0	1	0	0	0
ASD	039	R	0570	T0857		2	3050	0			0	1	0	0	0
ASD	039	R	0672	T0749		2	3050	0			0	0	0	0	0

ASD	042	R	0041	T1688 WINSOR		2	12300	0			0	0	0	1	0
ASD	042	R	0065	T1419		2	12300	0			0	1	0	0	0
ASD	042	R	0078	T1455		2	12300	0			0	1	0	0	0
ASD	042	R	0101	S0603R	0754	2	13040	1200			0	5	0	3	0
ASD	042	R	0134	T1353		2	13040	0			0	1	1	0	1
ASD	042	R	0168	T1323 KENTWOOD		2	13040	0			0	1	0	0	0
ASD	042	R	0184	T1323 KENTWOOD		2	13040	0			0	0	0	0	0
ASD	042	R	0230	T1273		2	13040	0			0	1	0	0	0
ASD	042	R	0278	T1536		2	13040	0			0	0	0	0	0
ASD	042	R	0292	C1475		2	13040	0			0	3	3	0	1
ASD	042	R	0353	C0042ACLAREMONT		4	8387	0			0	2	0	0	0
ASD	042	R	0380	T1153 BANEY		4	4180	0			0	6	1	2	0.17
ASD	042	R	0463	C1095 MIFFLIN		2	4270	0			0	0	0	0	0
ASD	042	R	0543	C0995 KING		2	4270	0			0	8	2	0	0.25
ASD	042	R	0646	S0511C	0004	2	4270	0			0	2	0	0	0
ASD	042	R	0720	T0853 DAVIS		2	5950	0			0	6	5	1	0.83
ASD	042	R	0856	C1302		2	8560	0			0	11	9	2	0.82
ASD	042	R	0926	C0042BCLEVELAND		2	5020	0			0	0	0	0	0
ASD	042	R	0981	T0793		2	3906	0			0	2	1	0	0.5
ASD	042	R	1041	T0753		2	3906	0			0	1	0	0	0
ASD	042	R	1099	T1275		2	3906	0			0	1	0	0	0
ASD	042	R	1145	C0601 and T0653		2	3906	0			0	3	0	0	0
ASD	042	R	1197	T0593		2	3906	0			0	0	0	0	0
ASD	042	R	1234	T0553		2	3906	0			0	0	0	0	0
ASD	042	R	1244	T0543		2	3906	0			0	1	0	0	0
ASD	042	R	1340	S0089R	1215	2	2391	2106	Y	FO	67	14	8	4	0.57
ASD	042	R	1398	T1080		2	2391	0			0	0	0	0	0
ASD	042	R	1480	S0302R	0412	2	2391	1048			0	9	6	6	0.67
ASD	042	R	1490	S0604R	0000	2	2391	390			0	1	0	1	0
ASD	042	R	1583	T0251		4	2536	0			0	1	1	0	1
ASD	042	R	1705	C0175		4	2536	0			0	3	2	0	0.67
ASD	042	R	1756	T0133		4	2536	0			0	0	0	0	0
ASD	042	R	1795	T0810		4	2536	0			0	2	1	0	0.5
ASD	042	R	1804	T0101		4	2536	0			0	0	0	0	0
ASD	058	R	0371	T1184 EASTLAKE		2	3580	0			0	1	1	0	1
ASD	058	R	0385	C and T1175		2	3580	0			0	2	1	0	0.5
ASD	058	R	0385	T1175		2	3580	0			0	0	0	0	0
ASD	058	R	0490	T1102		2	3580	0			0	2	1	0	0.5
ASD	058	R	0553	T0803		2	3580	0			0	0	0	0	0
ASD	058	R	0586	C1175		2	3580	0			0	0	0	0	0

ASD	058	R	0606	T0783		2	2799	0			0	0	0	0	0
ASD	058	R	0615	T0974		2	2799	0			0	1	1	0	1
ASD	058	R	0629	T0954		2	2799	0			0	0	0	0	0
ASD	058	R	0635	S0302R	0885	2	2799	620			0	1	1	0	1
ASD	058	R	0645	T0944		2	2799	0			0	0	0	0	0
ASD	058	R	0659	C0801		2	2799	0			0	0	0	0	0
ASD	058	R	0774	T0852		2	2087	0			0	0	0	0	0
ASD	058	R	0833	T0782		2	2087	0			0	0	0	0	0
ASD	058	R	0941	T0700		2	2087	0			0	0	0	1	0
ASD	058	R	0960	T0673		2	2087	0			0	0	0	0	0
ASD	058	R	1050	C0601		2	2087	0			0	0	0	0	0
ASD	058	R	1072	C0620		2	2087	0			0	2	1	0	0.5
ASD	058	R	1230	S0089R	1860	2	3100	1730			0	4	3	4	0.75
ASD	058	R	1276	T0462		2	3100	0			0	1	0	0	0
ASD	058	R	1375	T0350		2	3741	0			0	0	0	0	0
ASD	058	R	1490	T0232 SCHOOL		2	3741	0			0	1	0	0	0
ASD	058	R	1494	T0232 CHURCH		2	3741	0			0	0	0	0	0
ASD	058	R	1519	T0212 MILL		2	3741	0			0	0	0	0	0
ASD	058	R	1578	T0150		2	3741	0			0	3	0	0	0
ASD	058	R	1683	C0040		2	4070	0			0	3	3	0	1
ASD	060	R	0120	T2812		2	1860	0			0	0	0	0	0
ASD	060	R	0124	T2802		2	1860	0			0	0	0	0	0
ASD	060	R	0240	T2724		2	1860	0			0	0	0	0	0
ASD	060	R	0312	C2575		2	1860	0			0	2	0	0	0
ASD	060	R	0390	T2475		2	1860	0			0	0	0	0	0
ASD	060	R	0444	T2474		2	1860	0			0	0	0	0	0
ASD	060	R	0512	S0095R	0703	2	1840	543			0	1	0	5	0
ASD	060	R	0550	C2404		2	1729	0			0	0	0	0	0
ASD	060	R	0650	C2302 and T2302		2	1729	0			0	0	0	0	0
ASD	060	R	0740	T0585		2	1729	0			0	0	0	0	0
ASD	060	R	0781	C2175		2	1729	0			0	1	0	0	0
ASD	060	R	0864	T0705		2	1729	0			0	0	0	0	0
ASD	060	R	0901	T2104		2	1729	0			0	0	0	0	0
ASD	060	R	0999	C0775		2	1729	0			0	0	0	0	0
ASD	060	R	1100	T1904		2	4310	0			0	1	0	0	0
ASD	060	R	1147	T1894		2	3730	0			0	0	0	0	0
ASD	060	R	1215	T1806	1215	2	3996	0			0	0	0	0	0
ASD	060	R	1270	C1754		2	3996	0			0	1	0	0	0
ASD	060	R	1312	T1714		2	3996	0			0	0	0	0	0
ASD	060	R	1322	T1714		2	3996	0			0	0	0	0	0

ASD	060	R	1413	C1610		2	3996	0			0	0	0	0	0
ASD	060	R	1435	C1610		2	3996	0			0	0	0	0	0
ASD	060	R	1438	C1600		2	3996	0			0	4	3	0	0.75
ASD	060	R	1479	C1775		2	3996	0	Y	FS	0	1	0	2	0
ASD	060	R	1561	T1504		2	7020	0			0	1	1	0	1
ASD	060	R	1596	S0511R	1151	2	8340	5130			0	2	2	1	1
ASD	060	R	1870	S0511	1425	2	6384	3080			0	0	0	0	0
ASD	060	R	1938	U0250R	1275	2	5610	4500			0	0	0	0	0
ASD	060	R	2715	C0500 and C1281		2	1488	0			0	1	1	0	1
ASD	060	R	2893	T0346		2	1488	0			0	0	0	0	0
ASD	060	R	3128	T0126		2	2340	0			0	0	0	0	0
ASD	060	R	3244	C0187 and C0016		2	2340	0			0	2	1	0	0.5
ASD	089	R	0000	S0095R	1072	2	650	590			0	0	0	0	0
ASD	089	R	0005	T2252		2	650	0			0	0	0	0	0
ASD	089	R	0105	T2150		2	650	0			0	0	0	0	0
ASD	089	R	0155	T2102		2	650	0			0	2	0	0	0
ASD	089	R	0263	C2000		2	650	0			0	0	0	0	0
ASD	089	R	0332	T1922		2	650	0			0	1	0	0	0
ASD	089	R	0643	T0395		2	1513	0			0	0	0	0	0
ASD	089	R	0701	C1600 and T1600		2	1513	0			0	1	0	1	0
ASD	089	R	0804	T1500		2	1513	0			0	0	0	0	0
ASD	089	R	1004	C1302		2	1830	0			0	2	0	0	0
ASD	089	R	1075	T1275		2	1830	0			0	0	0	0	0
ASD	089	R	1158	T1150		2	1830	0			0	0	0	0	0
ASD	089	R	1350	S0302R	0529	2	2106	1048			0	2	2	1	1
ASD	089	R	1419	T0902		2	2106	0			0	0	0	0	0
ASD	089	R	1620	C0700 and T0700		2	1730	0			0	0	0	0	0
ASD	089	R	1722	C0620		2	1730	0			0	3	3	0	1
ASD	089	R	1823	PINOAK		2	1730	0			0	0	0	0	0
ASD	095	R	0000	T1087 HARROD		2	1830	0			0	0	0	0	0
ASD	095	R	0069	C2786		2	1830	0			0	0	0	0	0
ASD	095	R	0111	C1075		2	1830	0			0	1	0	0	0
ASD	095	R	0246	C0967		2	940	0			0	0	0	0	0
ASD	095	R	0269	T2704		2	940	0			0	1	0	0	0
ASD	095	R	0381	C0775		2	543	0			0	4	3	0	0.75
ASD	095	R	0585	T0707		2	543	0			0	0	0	0	0
ASD	095	R	0601	T2475		2	543	0			0	0	0	0	0
ASD	095	R	0762	T2402		2	543	0			0	0	0	0	0
ASD	095	R	0845	T0505		2	543	0			0	0	0	0	0
ASD	095	R	0897	T0457		2	543	0			0	0	0	0	0

ASD	095	R	0953	C2302		2	543	0			0	0	0	0	0
ASD	095	R	1026	S0179R	0527	2	543	1092			0	3	1	2	0.33
ASD	095	R	1124	T0257		2	590	0			0	1	1	0	1
ASD	095	R	1155	T0237		2	590	0			0	0	0	0	0
ASD	095	R	1243	T2150		2	590	0			0	0	0	0	0
ASD	095	R	1291	C2160		2	590	0			0	0	0	0	0
ASD	095	R	1296	T0075		2	590	0			0	0	0	0	0
ASD	095	R	1327	C0175		2	590	0			0	1	0	0	0
ASD	095	R	1343	C2160		2	590	0			0	0	0	0	0
ASD	095	R	1395	C0037		2	590	0			0	0	0	0	0
ASD	096	R	0050	T1453		2	2657	0			0	0	0	0	0
ASD	096	R	0075	T1443		2	2657	0			0	0	0	0	0
ASD	096	R	0151	C1353 and T1353		2	2657	0			0	1	0	0	0
ASD	096	R	0201	T1293		2	2657	0			0	0	0	0	0
ASD	096	R	0254	T1253		2	2657	0			0	0	0	0	0
ASD	096	R	0308	T1193		2	2657	0			0	0	0	0	0
ASD	096	R	0358	C1153 and T1153		2	3210	0			0	8	3	1	0.43
ASD	096	R	0404	WARD		2	3210	0			0	0	0	0	0
ASD	097	R	0000	T1099 COE		2	930	0			0	0	0	0	0
ASD	097	R	0058	T1059		2	930	0			0	0	0	0	0
ASD	097	R	0197	T3234		2	930	0			0	0	0	0	0
ASD	097	R	0332	MOHICAN PARK ENTRANCE		2	930	0			0	0	0	0	0
ASD	179	R	0052	T2650		2	998	0			0	1	0	0	0
ASD	179	R	0104	T2600		2	998	0			0	0	0	0	0
ASD	179	R	0133	C0037		2	998	0			0	1	0	0	0
ASD	179	R	0220	C2575		2	1100	0			0	0	0	0	0
ASD	179	R	0312	C2400		2	1100	0			0	0	0	0	0
ASD	179	R	0358	C0175		2	1100	0			0	0	0	0	0
ASD	179	R	0401	T0257		2	1092	0			0	0	0	0	0
ASD	179	R	0510	T2300		2	1092	0			0	0	0	0	0
ASD	179	R	0520	C0377		2	1092	0			0	1	0	0	0
ASD	179	R	0569	T2252		2	1092	0			0	0	0	0	0
ASD	179	R	0632	T0405		2	1092	0			0	0	0	0	0
ASD	179	R	0767	T2102		2	1092	0			0	0	0	0	0
ASD	179	R	0838	C2175		2	1092	0			0	1	0	0	0
ASD	179	R	0885	T0585		2	1090	0			0	1	0	0	0
ASD	179	R	0944	C2000		2	1219	0			0	0	0	0	0
ASD	179	R	0974	C0030A		2	1219	0			0	1	1	0	1
ASD	224	R	0000	T1601 and T0079		2	3090	0			0	1	0	0	0
ASD	224	R	0090	U0250R	0161	2	4120	2976	Y	FA	0	10	5	3	0.5

ASD	224	R	0140	T1461		2	4120	0			0	0	0	0	0
ASD	224	R	0214	T1381		2	4120	0			0	0	0	0	0
ASD	224	R	0221	S0060R	2992	2	4120	2340	Y	FO	0	4	3	1	0.75
ASD	224	R	0315	C1281 and T1281		2	4120	0			0	0	0	0	0
ASD	224	R	0411	C1181		2	4120	0			0	0	0	0	0
ASD	224	R	0424	C1171		2	4120	0			0	1	0	0	0
ASD	224	R	0469	T1101		2	4120	0			0	1	1	0	1
ASD	224	R	0572	T1031		2	4310	0			0	0	0	0	0
ASD	224	R	0668	T0931		2	4360	0			0	0	0	0	0
ASD	224	R	0681	S0511R	2535	2	4360	1209			0	4	3	0	0.75
ASD	224	R	0690	HIGHLAND LOCA		2	4360	0	Y	SC	0	0	0	0	0
ASD	224	R	0690	RUGGLES TROY SCHOOL		2	4360	0	Y	SC	0	0	0	0	0
ASD	224	R	0809	T0791		2	4430	0			0	1	1	0	1
ASD	224	R	0916	C0681		2	4430	0			0	2	2	0	1
ASD	224	R	1017	T0581		2	4430	0			0	1	0	0	0
ASD	224	R	1106	T0501 CHURCH		2	4347	0			0	0	0	0	0
ASD	224	R	1110			2	4347	0			0	0	0	0	0
ASD	224	R	1114	S0058R	1479	2	4347	3741	Y	FA	0	7	4	3	0.57
ASD	224	R	1130	T0481		2	4280	0			0	0	0	0	0
ASD	224	R	1224	T0391		2	4280	0			0	1	0	0	0
ASD	224	R	1322	C0281		2	4280	0			0	1	1	0	1
ASD	250	R	0000	T0079 and T1601		2	3310	0			0	1	0	0	0
ASD	250	R	0299	T0388		2	2976	0			0	1	1	0	1
ASD	250	R	0362	T0448		2	2976	0			0	1	1	0	1
ASD	250	R	0464	C0500		2	2976	0			0	1	0	0	0
ASD	250	R	0621	T0608		2	2976	0			0	4	1	0	0.25
ASD	250	R	0630	S0060R	2583	2	4560	1488			0	3	2	0	0.67
ASD	250	R	0726	HANEY		2	6360	0			0	0	0	0	0
ASD	250	R	0776	C0758		2	6360	0			0	4	1	1	0.25
ASD	250	R	0890	T0856		2	8250	0			0	0	0	0	0
ASD	250	R	0976	T0926		2	8250	0			0	1	1	0	1
ASD	250	R	1001	C0956		2	8250	0			0	2	2	0	1
ASD	250	R	1039	T0984		2	8250	0			0	0	0	0	0
ASD	250	R	1056	T1006		2	8250	0			0	0	0	0	0
ASD	250	R	1094	T1056		2	8250	0			0	0	0	0	0
ASD	250	R	1166	T1104		2	8250	0			0	0	0	0	0
ASD	250	R	1186	T1136		2	8250	0			0	1	0	0	0
ASD	250	R	1255	T1184 WESTLAKE		2	8250	0			0	1	0	0	0
ASD	250	R	1323	S0511RTROY	1494	2	5110	1200			0	1	1	0	1
ASD	250	R	1375	S0058R	0000	2	5949	1640			0	0	0	0	0

ASD	250	R	1700	MONTGOMERY SCHOOL		2	12010	0	Y	SC	0	0	0	0	0	0	0	0
ASD	250	R	1712	C1575		4	12009	0			0	10	4	1	0.4	0	0	0
ASD	250	R	1781	T0653		2	6321	0			0	10	2	1	0.2	0	0	0
ASD	250	R	1833	T0593		2	6321	0			0	3	3	0	1	0	0	0
ASD	250	R	1906	T0523		2	6170	0			0	1	0	0	0	0	0	0
ASD	250	R	1982	S0089R	0904	2	4610	1830			0	7	1	6	0.14	0	0	0
ASD	250	R	2081	T0355		2	4610	0			0	0	0	0	0	0	0	0
ASD	250	R	2180	C0251		2	4610	0			0	1	1	0	1	0	0	0
ASD	250	R	2281	C1302		2	4610	0			0	3	1	0	0.33	0	0	0
ASD	250	R	2295	C0175		2	4610	0			0	2	1	0	0.5	0	0	0
ASD	250	R	2367	T0063		2	4610	0			0	0	0	0	0	0	0	0
ASD	250	R	2373	T1400		2	4610	0			0	1	1	0	1	0	0	0
ASD	250	R	2432	T0035		2	4610	0			0	0	0	0	0	0	0	0
ASD	250	R	2459	T0245 and T0013		2	4610	0			0	0	0	0	0	0	0	0
ASD	302	R	0000	T0013 CAMP		2	660	0			0	1	1	0	1	0	0	0
ASD	302	R	0070	T0063		2	660	0			0	0	0	0	0	0	0	0
ASD	302	R	0184	C0175		2	660	0			0	1	1	0	1	0	0	0
ASD	302	R	0302	C0251 and T0251		2	660	0			0	0	0	0	0	0	0	0
ASD	302	R	0303	T1080		2	660	0			0	0	0	0	0	0	0	0
ASD	302	R	0630	T0553		2	1048	0			0	0	0	0	0	0	0	0
ASD	302	R	0682	C0601		2	1048	0			0	0	0	0	0	0	0	0
ASD	302	R	0776	T0203		2	1048	0			0	0	0	0	0	0	0	0
ASD	302	R	0783	T0713		2	1048	0			0	0	0	0	0	0	0	0
ASD	302	R	0870	NANKIN SCHOOL		2	1048	0	Y	SC	0	0	0	0	0	0	0	0
ASD	302	R	0872	T0773		2	1048	0			0	2	0	0	0	0	0	0
ASD	302	R	0878	T0783		2	1048	0			0	0	0	0	0	0	0	0
ASD	302	R	0891	T0813 WATER		2	620	0			0	2	0	0	0	0	0	0
ASD	302	R	0938	T0851 and T0964		2	620	0			0	0	0	0	0	0	0	0
ASD	302	R	1048	T0875		2	620	0			0	0	0	0	0	0	0	0
ASD	302	R	1090	S0511R	1819	2	1310	1200			0	2	2	0	1	0	0	0
ASD	302	R	1138	T0876		2	560	0			0	0	0	0	0	0	0	0
ASD	302	R	1322	T1101		2	560	0			0	1	0	0	0	0	0	0
ASD	430	R	0033	CHARLES MILL PARK DR ENT		2	1610	0			0	1	0	0	0	0	0	0
ASD	511	C	0000	S0511R	1141	2	4620	5130			0	0	0	0	0	0	0	0
ASD	511	R	0000	S0039R	0157	2	930	1703			0	0	0	0	0	0	0	0
ASD	511	R	0028	T2506		2	930	0			0	1	0	0	0	0	0	0
ASD	511	R	0062	T2466		2	930	0			0	0	0	0	0	0	0	0
ASD	511	R	0109	T1025		2	930	0			0	0	0	0	0	0	0	0
ASD	511	R	0171	T2375		2	930	0			0	0	0	0	0	0	0	0
ASD	511	R	0293	C2256		2	930	0			0	0	0	0	0	0	0	0

ASD	511	R	0294	C2256		2	930	0			0	0	0	0	0	
ASD	511	R	0347	T2206		2	930	0			0	1	1	0	1	
ASD	511	R	0394	T2156		2	930	0			0	0	0	0	0	
ASD	511	R	0405	C2075		2	930	0			0	1	0	0	0	
ASD	511	R	0453	T2104		2	930	0			0	0	0	0	0	
ASD	511	R	0488	T2104		2	930	0			0	2	1	0	0.5	
ASD	511	R	0611	C0030A		2	2392	0			0	4	2	2	0.5	
ASD	511	R	0693	C1904		2	2392	0			0	2	0	0	0	
ASD	511	R	0707	T1894		2	2392	0			0	0	0	0	0	
ASD	511	R	0792	T1806		2	2392	0			0	0	0	0	0	
ASD	511	R	0842	C1754	0964	2	2392	0			0	3	2	0	0.67	
ASD	511	R	0976	T1654		2	2450	0			0	0	0	0	0	
ASD	511	R	1027	C1600		2	2450	0			0	0	0	0	0	
ASD	511	R	1515	T1184		2	1200	0			0	0	0	0	0	
ASD	511	R	1518	T1184		2	1200	0			0	0	0	0	0	
ASD	511	R	1594	T1104		2	1200	0			0	2	2	0	1	
ASD	511	R	1694	T0975		2	1200	0			0	0	0	0	0	
ASD	511	R	1720	T0984		2	1200	0			0	0	0	0	0	
ASD	511	R	1748	T0964		2	1200	0			0	0	0	0	0	
ASD	511	R	1854	S0302R	1125	2	1100	560			0	0	0	0	0	
ASD	511	R	1974	T0754		2	1209	0			0	0	0	0	0	
ASD	511	R	2024	T0704		2	1209	0			0	0	0	0	0	
ASD	511	R	2101	C0620		2	1209	0			0	1	0	0	0	
ASD	511	R	2174	T0564		2	1209	0			0	0	0	0	0	
ASD	511	R	2258	C0500		2	1209	0			0	3	1	2	0.33	
ASD	511	R	2286	C0500		2	1209	0			0	1	1	1	1	
ASD	511	R	2330	T0462		2	1209	0			0	0	0	0	0	
ASD	511	R	2435	T0350		2	1209	0			0	0	0	0	0	
ASD	511	R	2527	T4053		2	1209	0			0	0	0	0	0	
ASD	511	R	2531	T4052		2	1209	0			0	1	0	0	0	
ASD	511	R	2634	T0150		2	1209	0			0	0	0	0	0	
ASD	511	R	2735	C0040		2	1209	0			0	3	2	0	0.67	
ASD	545	R	0102	T1443		2	860	0			0	0	0	0	0	
ASD	545	R	0132	C1008 and T1008		2	860	0			0	2	0	0	0	
ASD	545	R	0190	T0956		2	860	0			0	1	1	0	1	
ASD	545	R	0248	T0908		2	860	0			0	1	0	0	0	
ASD	545	R	0303	T0856		2	860	0			0	0	0	0	0	
ASD	545	R	0311	T0856		2	860	0			0	0	0	0	0	
ASD	545	R	0437	C0758		2	860	0			0	2	0	0	0	
ASD	545	R	0471	T1243		2	860	0			0	0	0	0	0	

ASD	598	R	0147	PLANT ENTRANCE					Y	FS	0	0	0	0	0		
ASD	603	R	0000	T2306 MOWERY		2	1170	0	Y		0	0	0	0	0		
ASD	603	R	0043	T1265		2	1170	0			0	0	0	0	0		
ASD	603	R	0062	T1225		2	1170	0			0	0	0	0	0		
ASD	603	R	0064	C2256		2	1170	0			0	0	0	0	0		
ASD	603	R	0240	C1217		2	1170	0			0	0	0	0	0		
ASD	603	R	0246	T2116		2	1170	0			0	0	0	0	0		
ASD	603	R	0256	T2156		2	1170	0			0	0	0	0	0		
ASD	603	R	0415	S0430R	0060	2	1839	1610			0	0	0	0	0		
ASD	603	R	0454	C1956		2	1839	0			0	0	0	0	0		
ASD	603	R	0533	T1875		2	970	0			0	4	0	0	0		
ASD	603	R	0637	C1808 CRIDER		2	970	0			0	0	0	0	0		
ASD	603	R	0659	T1335		2	1642	0			0	1	0	0	0		
ASD	603	R	0752	T1656		2	1642	0			0	0	0	0	0		
ASD	603	R	0821	T1596		2	1040	0			0	0	0	0	0		
ASD	603	R	0933	T1528		2	1040	0			0	0	0	0	0		
ASD	603	R	0968	C1475		2	1040	0			0	0	0	0	0		
ASD	603	R	1057	T1376		2	1040	0			0	0	0	0	0		
ASD	603	R	1071	C1356		2	1040	0			0	6	3	0	0.5		
ASD	603	R	1105	T1453		2	1040	0			0	0	0	0	0		
ASD	603	R	1144	T1308		2	1040	0			0	1	1	0	1		
ASD	603	R	1179	T1503 FAULK		2	1040	0			0	1	0	0	0		
ASD	604	R	0088	T0251		2	390	0			0	0	0	0	0		
ASD	604	R	0150	C0175		2	390	0			0	0	0	0	0		
ASD	604	R	0202	T0133		2	390	0			0	0	0	0	0		
ASD	604	R	0286	T0053		2	390	0			0	0	0	0	0		

APPENDIX C

ADTSORT PROGRAM

ADTsort Program

```
var                                                    ;define variables
        ashTC, newashTC          TCursor
        tvnewash                 tableview
        newTab                   table
endvar

method pushButton(var eventInfo Event)
        newTab = create "new.dbf"                      ;create a new table
                with    "CNTY"          :       "C3",
                        "RTE"           :       "C3",
                        "SUF"           :       "C1",
                        "LOG"           :       "C4",
                        "CROSS_RTE"     :       "C32",
                        "CRRTLOG"       :       "C4",
                        "LANES"         :       "C1",
                        "ADT"           :       "C6",
                        "CRRTADT"       :       "C6",
                        "SIGNAL"        :       "C1",
                        "SIGTYPE"       :       "C2",
                        "HSP"           :       "C3",
                        "ACCI"          :       "C2"
        endcreate

        ashTC.open("Ashland.dbf")                      ;open Ashland data table

        message("Sorting Database....Please Wait")

        sort "Ashland.dbf"
                on "ADT" D, "CRRTADT" D
                to "New.dbf"
        endsort

tvnewash.open ("New.dbf")                              ;view new table
endmethod
```

APPENDIX D

SORT PROGRAM

```
var                                  ;declaring the variables
        ashTC, newashTC, tempTC      TCursor
        tvnewash                     tableview
        newTab                       table
endvar

method pushButton(var eventInfo Event)    ;beginning of the pushbutton program

        newTab = create "new.dbf"         ;creating the table "new"
                        with    "CNTY"          : "C3",
                                "RTE"           : "C3",
                                "SUF"           : "C1",
                                "LOG"           : "C4",
                                "CROSS_RTE"     : "C32",
                                "CRRTLOG"       : "C4",
                                "LANES"         : "C1",
                                "ADT"           : "N6",
                                "CRRTADT"       : "N6",
                                "SIGNAL"        : "C1",
                                "SIGTYPE"       : "C2",
                                "HSP"           : "C3",
                                "ACCI"          : "C2",
                                "WARRANTS"      : "C40",
                                "COMPLAINTS"    : "C2",
                                "INDEX"         : "C5",
                                "RANK"          : "C2"
        endcreate

        ashTC.open("Ashland.dbf")                 ;opening the "Ashland" data table
                newashTC.open("new.dbf")          ;opening the "new" table

        message("Scanning Database....Please Wait")
        newashTC.edit()                           ;editing the "new" table
        ashTC.edit()                              ;editing the "Ashland" table
```

```
message("Scanning for Locations which Meet a Warrant")
scan ashTC for ashTC.Signal = "Y":          ;scanning for intersections with
                                                        signals
            newashTC.insertRecord()
            newashTC.copyRecord(ashTC)
            newashTC. WARRANTS = "Signal Installed"
            newashTC.RANK = "01"
endscan
ashTC.home()

message("Scanning for Locations which Meet a Warrant")

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
            ashTC.CRRTADT >=2300 and ashTC.Signal <> "Y") or
            (ashTC.lanes = 2 and ashTC.ADT >=11400 and
            ashTC.CRRTADT >= 2300 and ashTC.Signal <> "Y") :
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "Warrant 1 is met"
        newashTC.RANK = "02"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
            10960 and ashTC.CRRTADT >= 3680 and ashTC.Signal <> "Y")
            or (ashTC.lanes = 2 and ashTC.ADT < 11400 and ashTC.ADT
            >=9120 and ashTC.CRRTADT >= 3680 and ashTC.Signal <>
            "Y"):
        newashTC.insertRecord()
        newashTC.copyrecord(ashTC)
        newashTC.WARRANTS = "Warrant 8 is met"
        newashTC.RANK = "03"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC. ADT < 10960 and ashTC.ADT >=
            9100 and ashTC.CRRTADT >= 4600 and ashTC.Signal <> "Y") or
            ashTC.lanes = 2 and ashTC.ADT < 9120 and ashTC.ADT >=7600
            and ashTC.CRRTADT >= 4600 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "Warrant 2 is met"
        newashTC.RANK = "04"
```

```
endscan
ashTC.home()

message("Scanning for Locations which may meet a Warrant")
scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
                ashTC.CRRTADT < 2300 and ashTC.HSP > 0 and ashTC.HSP
                <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2 and
                ashTC.ADT >=11400 and ashTC.CRRTADT < 2300 and
                ashTC.HSP > 0 and ashTC.HSP <= 350 and ashTC.Signal <>
                "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "1 may meet, HSP < 350"
        newashTC.RANK = "05"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
                10960 and ashTC.CRRTADT < 3680 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 11400 and ashTC.ADT >=9120 and
                ashTC.CRRTADT < 3680 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyrecord(ashTC)
        newashTC.WARRANTS = "8 may meet, HSP < 350"
        newashTC.RANK = "06"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 10960 and ashTC.ADT >=
                9100 and ashTC.CRRTADT < 4600 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 9120 and ashTC.ADT >=7600 and
                ashTC.CRRTADT < 4600 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "2 may meet, HSP < 350"
        newashTC.RANK = "07"
endscan
ashTC.home()
```

```
scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
                ashTC.CRRTADT < 2300 and (ashTC.HSP < 1 or ashTC.HSP >
                350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2 and
                ashTC.ADT >=11400 and ashTC.CRRTADT < 2300 and
                (ashTC.HSP < 1 or ashTC.HSP > 350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "1 may meet"
        newashTC.RANK = "08"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
                10960 and ashTC.CRRTADT < 3680 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 11400 and ashTC.ADT >=9120 and
                ashTC.CRRTADT < 3680 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "8 may meet"
        newashTC.RANK = "09"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 10960 and ashTC.ADT >=
                9100 and ashTC.CRRTADT < 4600 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 9120 and ashTC.ADT >=7600 and
                ashTC.CRRTADT < 4600 and (ashTC.HSP < 1 or ashTC.HSP >
                350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "2 may meet"
        newashTC.RANK = "10"
endscan
ashTC.home()

message("Scanning for Locations which may Meet a Warrant at a Later Date")
scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 9100 and ashTC.ADT >=
                7100 and ashTC.HSP > 0 and ashTC.HSP <= 350 and
                ashTC.Signal <> "Y") or (ashTC.lanes = 2 and ashTC.ADT < 7600
                and ashTC.ADT >= 5600 and ashTC.HSP > 0 and ashTC.HSP <=
```

```
                350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "May meet at later date, HSP < 350"
        newashTC.RANK = "11"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 9100 and ashTC.ADT >=
                7100 and (ashTC.HSP < 1 or ashTC.HSP > 350) and ashTC.Signal
                <> "Y") or (ashTC.lanes = 2 and ashTC.ADT < 7600 and
                ashTC.ADT >= 5600 and (ashTC.HSP < 1 or ashTC.HSP > 350)
                and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "May meet at later date"
        newashTC.RANK = "12"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 7100 and ashTC.Signal <>
                "Y") or (ashTC.lanes = 2 and ashTC.ADT < 5600 and
                ashTC.Signal <> "Y") :
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "none"
        newashTC.RANK = "13"
endscan
ashTC.home()

message("Sorting the Data")
sort "new.dbf"                                  ;sorting the "new" table by rank,
        on "RANK", "COMPLAINTS" D, "INDEX" D    ;no. of complaints,
                                                 and accid. index
        to "temp.dbf"                           ;creating "temp" table
endsort

ashTC.endEdit()                                 ;ending of the edit process
newashTC.endEdit ()
ashTC.close()                                   ;closing the Ashland table
newashTC.close()                                ;closing the new table
tvnewash.open("temp.dbf")                       ;viewing the "temp" table
endmethod                                       ;end of program
```

APPENDIX E

FUTURESORT PROGRAM

```
var                                                    ;define variables
        ashTC, newashTC, tempTC          TCursor
        tvnewash                         tableview
        newTab                           table
endvar

method pushButton(var eventInfo Event)

        newTab = create "new.dbf"                      ;create new table
                with    "CNTY"                  :"C3",
                        "RTE"                   :"C3",
                        "SUF"                   :"C1",
                        "LOG"           :"C4",
                        "CROSS_RTE"             :"C32",
                        "CRRTLOG"               :"C4",
                        "LANES"                 :"C1",
                        "ADT"                   :"N10",
                        "CRRTADT"               :"N10",
                        "SIGNAL"                :"C1",
                        "SIGTYPE"               :"C2",
                        "HSP"                   :"C3",
                        "ACCI"                  :"C2",
                        "WARRANTS"              :"C35",
                        "COMPLAINTS"            :"C2",
                        "INDEX"                 : "C5",
                        "RANK"                  :"C2"
        endcreate

        ashTC.open("Ashland.dbf")
        ;open Ashland table
        newashTC.open("New.dbf")
        ;open New table
        message("Scanning Database....Please Wait")
        ashTC.edit()
        newashTC.edit ()
```

```
message("Creating New Volumes for Major and Minor Routes")

scan ashTC for ashTC.ADT > 0:
                ashTC.ADT = ashTC.ADT * 1.103   ;calculating future volumes
                ashTC.CRRTADT = ashTC.CRRTADT * 1.103
endscan
ashTC.home()

message("Scanning for Locations which Meet a Warrant")
scan ashTC for ashTC.Signal = "Y":          ;scanning for intersections with
                                                        signals
                newashTC.insertRecord()
                newashTC.copyRecord(ashTC)
                newashTC. WARRANTS = "Signal Installed"
                newashTC.RANK = "01"
endscan
ashTC.home()

message("Scanning for Locations which Meet a Warrant")

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
                ashTC.CRRTADT >=2300 and ashTC.Signal <> "Y") or
        (ashTC.lanes = 2 and ashTC.ADT >=11400 and
        ashTC.CRRTADT >= 2300 and ashTC.Signal <> "Y") :
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "Warrant 1 is met"
        newashTC.RANK = "02"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
                10960 and ashTC.CRRTADT >= 3680 and ashTC.Signal <> "Y")
                or (ashTC.lanes = 2 and ashTC.ADT < 11400 and ashTC.ADT
                >=9120 and ashTC.CRRTADT >= 3680 and ashTC.Signal <>
                "Y"):
        newashTC.insertRecord()
        newashTC.copyrecord(ashTC)
        newashTC.WARRANTS = "Warrant 8 is met"
        newashTC.RANK = "03"
endscan
ashTC.home()
```

```
scan ashTC for (ashTC.lanes = 4 and ashTC. ADT < 10960 and ashTC.ADT >=
                9100 and ashTC.CRRTADT >= 4600 and ashTC.Signal <> "Y")
                or ashTC.lanes = 2 and ashTC.ADT < 9120 and ashTC.ADT
                >=7600 and ashTC.CRRTADT >= 4600 and ashTC.Signal <>
                "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "Warrant 2 is met"
        newashTC.RANK = "04"
endscan
ashTC.home()

message("Scanning for Locations which may meet a Warrant")
scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
                ashTC.CRRTADT < 2300 and ashTC.HSP > 0 and ashTC.HSP
                <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2 and
                ashTC.ADT >=11400 and ashTC.CRRTADT < 2300 and
                ashTC.HSP > 0 and ashTC.HSP <= 350 and ashTC.Signal <>
                "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "1 may meet, HSP < 350"
        newashTC.RANK = "05"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
                10960 and ashTC.CRRTADT < 3680 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 11400 and ashTC.ADT >=9120 and
                ashTC.CRRTADT < 3680 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyrecord(ashTC)
        newashTC.WARRANTS = "8 may meet, HSP < 350"
        newashTC.RANK = "06"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 10960 and ashTC.ADT >=
                9100 and ashTC.CRRTADT < 4600 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 9120 and ashTC.ADT >=7600 and
```

```
                ashTC.CRRTADT < 4600 and ashTC.HSP > 0 and
                ashTC.HSP <= 350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "2 may meet, HSP < 350"
        newashTC.RANK = "07"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT >= 13700 and
                ashTC.CRRTADT < 2300 and (ashTC.HSP < 1 or ashTC.HSP >
                350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2 and
                ashTC.ADT >=11400 and ashTC.CRRTADT < 2300 and
                (ashTC.HSP < 1 or ashTC.HSP > 350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "1 may meet"
        newashTC.RANK = "08"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 13700 and ashTC.ADT >=
                10960 and ashTC.CRRTADT < 3680 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 11400 and ashTC.ADT >=9120 and
                ashTC.CRRTADT < 3680 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyrecord(ashTC)
        newashTC.WARRANTS = "8 may meet"
        newashTC.RANK = "09"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 10960 and ashTC.ADT >=
                9100 and ashTC.CRRTADT < 4600 and (ashTC.HSP < 1 or
                ashTC.HSP > 350) and ashTC.Signal <> "Y") or (ashTC.lanes = 2
                and ashTC.ADT < 9120 and ashTC.ADT >=7600 and
                ashTC.CRRTADT < 4600 and (ashTC.HSP < 1 or ashTC.HSP >
                350) and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "2 may meet"
```

```
        newashTC.RANK = "10"
endscan
ashTC.home()

message("Scanning for Locations which may Meet a Warrant at a Later Date")
scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 9100 and ashTC.ADT >=
                7100 and ashTC.HSP > 0 and ashTC.HSP <= 350 and
                ashTC.Signal <> "Y") or (ashTC.lanes = 2 and ashTC.ADT < 7600
                and ashTC.ADT >= 5600 and ashTC.HSP > 0 and ashTC.HSP <=
                350 and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "May meet at later date, HSP < 350"
        newashTC.RANK = "11"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 9100 and ashTC.ADT >=
                7100 and (ashTC.HSP < 1 or ashTC.HSP > 350) and ashTC.Signal
                <> "Y") or (ashTC.lanes = 2 and ashTC.ADT < 7600 and
                ashTC.ADT >= 5600 and (ashTC.HSP < 1 or ashTC.HSP > 350)
                and ashTC.Signal <> "Y"):
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "May meet at later date"
        newashTC.RANK = "12"
endscan
ashTC.home()

scan ashTC for (ashTC.lanes = 4 and ashTC.ADT < 7100 and ashTC.Signal <>
                "Y") or (ashTC.lanes = 2 and ashTC.ADT < 5600 and
                ashTC.Signal <> "Y") :
        newashTC.insertRecord()
        newashTC.copyRecord(ashTC)
        newashTC.WARRANTS = "none"
        newashTC.RANK = "13"
endscan
ashTC.home()

message("Sorting the Data")
sort "new.dbf"                                  ;sorting the "new" table by rank,
        on "RANK", "COMPLAINTS" D, "INDEX" D    ;no. of complaints,
                                                and accid. index
```

```
                to "temp.dbf"                          ;creating "temp" table
        endsort

scan ashTC for ashTC.ADT > 0:
                ashTC.ADT = ashTC.ADT / 1.103
                ashTC.CRRTADT = ashTC.CRRTADT / 1.103
endscan

ashTC.endEdit()
newashTC.endEdit ()
ashTC.close()
                        ;close Ashland table
newashTC.close()
                        ;close new table
tvnewash.open("temp.dbf")
        ;view newly sorted table
endmethod
```

APPENDIX F

HELP AND CANCEL PROGRAMS

```
method pushButton(var eventInfo Event)

        msgInfo("Information on Other Buttons","ADTsort - sorts by the ADT, Futuresort
                - sorts by the intersections' need for a signal in five years, Sort - sorts by
                the intersections' need for a signal")

endmethod
```

Cancel Program

```
method pushButton(var eventInfo Event)

        msgInfo("Cancel Information", "To close the Signal Warrant Analysis procedure -
                Go to File and Exit")

endmethod
```

APPENDIX G

ADTSORT RESULTS

ADT SORT OF ASHLAND COUNTY DATA

CNTY	RTE	SUF	LOG	CROSS_RTE	CRRTLOG	LANES	ADT	CRRTADT	SIGNAL	SIGTYPE	HSP	ACCI	INJ_FAT	C_R	ACC_INDEX
ASD	042	R	0101	S0603R	0754	2	013040	001200			0	5	0	3	0
ASD	042	R	0292	C1475		2	013040				0	3	3	0	1
ASD	042	R	0134	T1353		2	013040				0	1	1	0	1
ASD	042	R	0168	T1323 KENTWOOD		2	013040				0	1	0	0	0
ASD	042	R	0184	T1323 KENTWOOD		2	013040				0	0	0	0	0
ASD	042	R	0230	T1273		2	013040				0	1	0	0	0
ASD	042	R	0278	T1536		2	013040				0	0	0	0	0
ASD	042	R	0078	T1455		2	012300				0	1	0	0	0
ASD	042	R	0065	T1419		2	012300				0	1	0	0	0
ASD	042	R	0041	T1688 WINSOR		2	012300				0	0	0	1	0
ASD	250	R	1700	MONTGOMERY SCHOOL		2	012010		Y	SC	0	0	0	0	0
ASD	250	R	1712	C1575		4	012009				0	10	4	1	0.4
ASD	030	R	0008	S0603R	0484	4	010761	000970			411	18	10	2	0.55
ASD	030	R	0387	S0511R	0697	4	010621	002392			0	8	6	3	0.75
ASD	030	R	0782	T0555		4	010621				0	0	0	0	0
ASD	030	R	0843	C0030A		4	010621				0	1	0	1	0
ASD	030	R	0901	C2175		4	010500				0	3	2	0	0.67
ASD	030	R	0951	T0405		4	010500				0	1	1	0	1
ASD	030	R	0048	T1255		4	010300				0	0	0	0	0
ASD	030	R	0211	C1095		4	010300				0	1	0	0	0
ASD	042	R	0856	C1302		2	008560				0	11	9	2	0.82
ASD	042	R	0353	C0042ACLAREMONT		4	008387				0	2	0	0	0
ASD	060	R	1596	S0511R	1151	2	008340	005130			0	2	2	1	1
ASD	250	R	0890	T0856		2	008250				0	0	0	0	0
ASD	250	R	0976	T0926		2	008250				0	1	1	0	1
ASD	250	R	1255	T1184 WESTLAKE		2	008250				0	1	0	0	0
ASD	250	R	1186	T1136		2	008250				0	1	0	0	0
ASD	250	R	1001	C0956		2	008250				0	2	2	0	1
ASD	250	R	1094	T1056		2	008250				0	0	0	0	0
ASD	250	R	1039	T0984		2	008250				0	0	0	0	0
ASD	250	R	1056	T1006		2	008250				0	0	0	0	0
ASD	250	R	1166	T1104		2	008250				0	0	0	0	0
ASD	060	R	1561	T1504		2	007020				0	1	1	0	1
ASD	030	R	1024	S0089R	0364	4	006710	001001			0	8	5	2	0.71
ASD	030	R	1329	C0015 and C0093		4	006710				0	0	0	0	0
ASD	030	R	1174	C0175		4	006710				0	1	1	0	1

ASD	060	R	1870	S0511	1425	2	006384	003080			0	0	0	0	0
ASD	250	R	0776	C0758		2	006360				0	4	1	1	0.25
ASD	250	R	0726	HANEY		2	006360				0	0	0	0	0
ASD	250	R	1781	T0653		2	006321				0	10	2	1	0.2
ASD	250	R	1833	T0593		2	006321				0	3	3	0	1
ASD	250	R	1906	T0523		2	006170				0	1	0	0	0
ASD	003	R	0633	S0039R & S0060R	0942	2	005950	003052			0	0	0	0	0
ASD	003	R	0633	S0060R	0051	2	005950	002600			0	0	0	0	0
ASD	042	R	0720	T0853 DAVIS		2	005950				0	6	5	1	0.83
ASD	250	R	1375	S0058R	0000	2	005949	001640			0	0	0	0	0
ASD	060	R	1938	U0250R	1275	2	005610	004500			0	0	0	0	0
ASD	250	R	1323	S0511RTROY	1494	2	005110	001200			0	1	1	0	1
ASD	042	R	0926	C0042BCLEVELAND		2	005020				0	0	0	0	0
ASD	511	C	0000	S0511R	1141	2	004620	005130			0	0	0	0	0
ASD	250	R	1982	S0089R	0904	2	004610	001830			0	7	1	6	0.14
ASD	250	R	2081	T0355		2	004610				0	0	0	0	0
ASD	250	R	2180	C0251		2	004610				0	1	1	0	1
ASD	250	R	2281	C1302		2	004610				0	3	1	0	0.33
ASD	250	R	2295	C0175		2	004610				0	2	1	0	0.5
ASD	250	R	2367	T0063		2	004610				0	0	0	0	0
ASD	250	R	2373	T1400		2	004610				0	1	1	0	1
ASD	250	R	2459	T0245 and T0013		2	004610				0	0	0	0	0
ASD	250	R	2432	T0035		2	004610				0	0	0	0	0
ASD	250	R	0630	S0060R	2583	2	004560	001488			0	3	2	0	0.67
ASD	224	R	0809	T0791		2	004430				0	1	1	0	1
ASD	224	R	0916	C0681		2	004430				0	2	2	0	1
ASD	224	R	1017	T0581		2	004430				0	1	0	0	0
ASD	224	R	0681	S0511R	2535	2	004360	001209			0	4	3	0	0.75
ASD	224	R	0668	T0931		2	004360				0	0	0	0	0
ASD	224	R	0690	HIGHLAND LOCA		2	004360		Y	SC	0	0	0	0	0
ASD	224	R	0690	RUGGLES TROY SCHOOL		2	004360		Y	SC	0	0	0	0	0
ASD	224	R	1114	S0058R	1479	2	004347	003741	Y	FA	0	7	4	3	0.57
ASD	224	R	1106	T0501 CHURCH		2	004347				0	0	0	0	0
ASD	224	R	1110			2	004347				0	0	0	0	0
ASD	060	R	1100	T1904		2	004310				0	1	0	0	0
ASD	224	R	0572	T1031		2	004310				0	0	0	0	0
ASD	224	R	1130	T0481		2	004280				0	0	0	0	0
ASD	224	R	1224	T0391		2	004280				0	1	0	0	0
ASD	224	R	1322	C0281		2	004280				0	1	1	0	1
ASD	042	R	0463	C1095 MIFFLIN		2	004270				0	0	0	0	0
ASD	042	R	0543	C0995 KING		2	004270				0	8	2	0	0.25

ASD	042	R	0646	S0511C	0004	2	004270				0	2	0	0	0
ASD	042	R	0380	T1153 BANEY		4	004180				0	6	1	2	0.17
ASD	224	R	0090	U0250R	0161	2	004120	002976	Y	FA	0	10	5	3	0.5
ASD	224	R	0221	S0060R	2992	2	004120	002340	Y	FO	0	4	3	1	0.75
ASD	224	R	0424	C1171		2	004120				0	1	0	0	0
ASD	224	R	0411	C1181		2	004120				0	0	0	0	0
ASD	224	R	0315	C1281 and T1281		2	004120				0	0	0	0	0
ASD	224	R	0214	T1381		2	004120				0	0	0	0	0
ASD	224	R	0469	T1101		2	004120				0	1	1	0	1
ASD	224	R	0140	T1461		2	004120				0	0	0	0	0
ASD	003	R	0650	S0060	0068	2	004077	002600			0			0	0
ASD	058	R	1683	C0040		2	004070				0	3	3	0	1
ASD	060	R	1312	T1714		2	003996				0	0	0	0	0
ASD	060	R	1215	T1806	1215	2	003996				0	0	0	0	0
ASD	060	R	1270	C1754		2	003996				0	1	0	0	0
ASD	060	R	1479	C1775		2	003996		Y	FS	0	1	0	2	0
ASD	060	R	1322	T1714		2	003996				0	0	0	0	0
ASD	060	R	1413	C1610		2	003996				0	0	0	0	0
ASD	060	R	1435	C1610		2	003996				0	0	0	0	0
ASD	060	R	1438	C1600		2	003996				0	4	3	0	0.75
ASD	042	R	0981	T0793		2	003906				0	2	1	0	0.5
ASD	042	R	1041	T0753		2	003906				0	1	0	0	0
ASD	042	R	1099	T1275		2	003906				0	1	0	0	0
ASD	042	R	1145	C0601 and T0653		2	003906				0	3	0	0	0
ASD	042	R	1197	T0593		2	003906				0	0	0	0	0
ASD	042	R	1244	T0543		2	003906				0	1	0	0	0
ASD	042	R	1234	T0553		2	003906				0	0	0	0	0
ASD	058	R	1578	T0150		2	003741				0	3	0	0	0
ASD	058	R	1519	T0212 MILL		2	003741				0	0	0	0	0
ASD	058	R	1494	T0232 CHURCH		2	003741				0	0	0	0	0
ASD	058	R	1490	T0232 SCHOOL		2	003741				0	1	0	0	0
ASD	058	R	1375	T0350		2	003741				0	0	0	0	0
ASD	060	R	1147	T1894		2	003730				0	0	0	0	0
ASD	058	R	0586	C1175		2	003580				0	0	0	0	0
ASD	058	R	0371	T1184 EASTLAKE		2	003580				0	1	1	0	1
ASD	058	R	0385	C and T1175		2	003580				0	2	1	0	0.5
ASD	058	R	0385	T1175		2	003580				0	0	0	0	0
ASD	058	R	0490	T1102		2	003580				0	2	1	0	0.5
ASD	058	R	0553	T0803		2	003580				0	0	0	0	0
ASD	250	R	0000	T0079 and T1601		2	003310				0	1	0	0	0
ASD	096	R	0404	WARD		2	003210				0	0	0	0	0

ASD	096	R	0358	C1153 and T1153		2	003210				0	8	3	1	0.43
ASD	003	R	0446	T3044		2	003140				0	0	0	0	0
ASD	058	R	1230	S0089R	1860	2	003100	001730			0	4	3	4	0.75
ASD	058	R	1276	T0462		2	003100				0	1	0	0	0
ASD	224	R	0000	T1601 and T0079		2	003090				0	1	0	0	0
ASD	039	R	0672	T0749		2	003050				0	0	0	0	0
ASD	039	R	0570	T0857		2	003050				0	1	0	0	0
ASD	039	R	0497	C0917		2	003050				0	1	0	0	0
ASD	039	R	0475	PLEASANT		2	003050				0	1	0	0	0
ASD	039	R	0468	POTTERY		2	003050				0	1	0	0	0
ASD	250	R	0621	T0608		2	002976				0	4	1	0	0.25
ASD	250	R	0464	C0500		2	002976				0	1	0	0	0
ASD	250	R	0362	T0448		2	002976				0	1	1	0	1
ASD	250	R	0299	T0388		2	002976				0	1	1	0	1
ASD	003	R	0345	S0097R	0437	2	002815	000930	Y	FA	0	3	0	1	0
ASD	003	R	0370	MOHICAN PARK ENTRANCE		2	002815				0	0	0	1	0
ASD	058	R	0635	S0302R	0885	2	002799	718.58			0	1	1	0	1
ASD	058	R	0606	T0783		2	002799				0	0	0	0	0
ASD	058	R	0615	T0974		2	002799				0	1	1	0	1
ASD	058	R	0629	T0954		2	002799				0	0	0	0	0
ASD	058	R	0645	T0944		2	002799				0	0	0	0	0
ASD	058	R	0659	C0801		2	002799				0	0	0	0	0
ASD	096	R	0050	T1453		2	002657				0	0	0	0	0
ASD	096	R	0075	T1443		2	002657				0	0	0	0	0
ASD	096	R	0151	C1353 and T1353		2	002657				0	1	0	0	0
ASD	096	R	0201	T1293		2	002657				0	0	0	0	0
ASD	096	R	0254	T1253		2	002657				0	0	0	0	0
ASD	096	R	0308	T1193		2	002657				0	0	0	0	0
ASD	039	R	0398	S0095R	0146	2	002551	001830	Y	FS	0	5	3	4	0.6
ASD	042	R	1583	T0251		4	002536				0	1	1	0	1
ASD	042	R	1756	T0133		4	002536				0	0	0	0	0
ASD	042	R	1705	C0175		4	002536				0	3	2	0	0.67
ASD	042	R	1804	T0101		4	002536				0	0	0	0	0
ASD	042	R	1795	T0810		4	002536				0	2	1	0	0.5
ASD	511	R	1027	C1600		2	002450				0	0	0	0	0
ASD	511	R	0976	T1654		2	002450				0	0	0	0	0
ASD	511	R	0792	T1806		2	002392				0	0	0	0	0
ASD	511	R	0707	T1894		2	002392				0	0	0	0	0
ASD	511	R	0611	C0030A		2	002392				0	4	2	2	0.5
ASD	511	R	0693	C1904		2	002392				0	2	0	0	0
ASD	511	R	0842	C1754	0964	2	002392				0	3	2	0	0.67

ASD	042	R	1490	S0604R	0000	2	002391	452.01			0	1	0	1	0
ASD	042	R	1340	S0089R	1215	2	002391	002106	Y	FO	67	14	8	4	0.57
ASD	042	R	1480	S0302R	0412	2	002391	001048			0	9	6	6	0.67
ASD	042	R	1398	T1080		2	002391				0	0	0	0	0
ASD	060	R	3244	C0187 and C0016		2	002340				0	2	1	0	0.5
ASD	060	R	3128	T0126		2	002340				0	0	0	0	0
ASD	003	R	0260	C3275		2	002243				0	1	1	0	1
ASD	089	R	1350	S0302R	0529	2	002106	001048			0	2	2	1	1
ASD	089	R	1419	T0902		2	002106				0	0	0	0	0
ASD	058	R	0960	T0673		2	002087				0	0	0	0	0
ASD	058	R	0941	T0700		2	002087				0	0	0	1	0
ASD	058	R	1050	C0601		2	002087				0	0	0	0	0
ASD	058	R	0833	T0782		2	002087				0	0	0	0	0
ASD	058	R	0774	T0852		2	002087				0	0	0	0	0
ASD	058	R	1072	C0620		2	002087				0	0	0	0	0
ASD	003	R	0781	LONG LAKE		2	002020				0	2	1	0	0.5
ASD	060	R	0390	T2475		2	001860				0	0	0	0	0
ASD	060	R	0444	T2474		2	001860				0	0	0	0	0
ASD	060	R	0312	C2575		2	001860				0	0	0	0	0
ASD	060	R	0124	T2802		2	001860				0	2	0	0	0
ASD	060	R	0240	T2724		2	001860				0	0	0	0	0
ASD	060	R	0120	T2812		2	001860				0	0	0	0	0
ASD	060	R	0512	S0095R	0703	2	001840	629.34			0	0	0	0	0
ASD	603	R	0415	S0430R	0060	2	001839	001610			0	1	0	5	0
ASD	603	R	0454	C1956		2	001839				0	0	0	0	0
ASD	095	R	0069	C2786		2	001830				0	0	0	0	0
ASD	095	R	0000	T1087 HARROD		2	001830				0	0	0	0	0
ASD	089	R	1158	T1150		2	001830				0	0	0	0	0
ASD	089	R	1075	T1275		2	001830				0	0	0	0	0
ASD	089	R	1004	C1302		2	001830				0	0	0	0	0
ASD	095	R	0111	C1075		2	001830				0	2	0	0	0
ASD	003	R	0000	OLD US 30 &NE VERMILION RD		2	001800		Y		0	1	0	0	0
ASD	003	R	0067	T3364		2	001800				0	0	0	0	0
ASD	003	R	0031	T3414		2	001800				0	0	0	0	0
ASD	003	R	0211	C0739		2	001800				0	0	0	0	0
ASD	003	R	0147	T3292		2	001800				0	0	0	0	0
ASD	003	R	0093	C0739		2	001800				0	0	0	0	0
ASD	089	R	1722	C0620		2	001730				0	3	3	0	1
ASD	089	R	1620	C0700 and T0700		2	001730				0	0	0	0	0
ASD	089	R	1823	PINOAK		2	001730				0	0	0	0	0
ASD	060	R	0650	C2302 and T2302		2	001729				0	0	0	0	0

ASD	060	R	0550	C2404		2	001729				0	0	0	0	0
ASD	060	R	0781	C2175		2	001729				0	1	0	0	0
ASD	060	R	0864	T0705		2	001729				0	0	0	0	0
ASD	060	R	0901	T2104		2	001729				0	0	0	0	0
ASD	060	R	0999	C0775		2	001729				0	0	0	0	0
ASD	060	R	0740	T0585		2	001729				0	0	0	0	0
ASD	039	R	0157	S0511R	0000	2	001703	000930			0	2	0	0	0
ASD	039	R	0238	T2606		2	001703				0	0	0	0	0
ASD	039	R	0000	T1097 WEIL		2	001703				0	0	0	0	0
ASD	039	R	0040	C1075		2	001703				0	0	0	0	0
ASD	039	R	0185	T1037		2	001703				0	0	0	0	0
ASD	603	R	0752	T1656		2	001642				0	0	0	0	0
ASD	603	R	0659	T1335		2	001642				0	1	0	0	0
ASD	430	R	0033	CHARLES MILL PARK DR ENT		2	001610				0	1	0	0	0
ASD	089	R	0804	T1500		2	001513				0	0	0	0	0
ASD	089	R	0701	C1600 and T1600		2	001513				0	1	0	1	0
ASD	089	R	0643	T0395		2	001513				0	0	0	0	0
ASD	060	R	2893	T0346		2	001488				0	0	0	0	0
ASD	060	R	2715	C0500 and C1281		2	001488				0	1	1	0	1
ASD	302	R	1090	S0511R	1819	2	001310	001200			0	2	2	0	1
ASD	179	R	0974	C0030A		2	001219				0	1	1	0	1
ASD	179	R	0944	C2000		2	001219				0	0	0	0	0
ASD	511	R	2286	C0500		2	001209				0	1	1	1	1
ASD	511	R	2330	T0462		2	001209				0	0	0	0	0
ASD	511	R	2258	C0500		2	001209				0	3	1	2	0.33
ASD	511	R	2435	T0350		2	001209				0	0	0	0	0
ASD	511	R	2527	T4053		2	001209				0	0	0	0	0
ASD	511	R	2101	C0620		2	001209				0	1	0	0	0
ASD	511	R	2174	T0564		2	001209				0	0	0	0	0
ASD	511	R	2531	T4052		2	001209				0	1	0	0	0
ASD	511	R	2634	T0150		2	001209				0	0	0	0	0
ASD	511	R	2024	T0704		2	001209				0	0	0	0	0
ASD	511	R	1974	T0754		2	001209				0	0	0	0	0
ASD	511	R	2735	C0040		2	001209				0	3	2	0	0.67
ASD	511	R	1748	T0964		2	001200				0	0	0	0	0
ASD	511	R	1720	T0984		2	001200				0	0	0	0	0
ASD	511	R	1694	T0975		2	001200				0	0	0	0	0
ASD	511	R	1594	T1104		2	001200				0	2	2	0	1
ASD	511	R	1518	T1184		2	001200				0	0	0	0	0
ASD	511	R	1515	T1184		2	001200				0	0	0	0	0
ASD	603	R	0246	T2116		2	001170				0	0	0	0	0

ASD	603	R	0256	T2156		2	001170				0	0	0	0	0
ASD	603	R	0240	C1217		2	001170				0	0	0	0	0
ASD	603	R	0064	C2256		2	001170				0	0	0	0	0
ASD	603	R	0000	T2306 MOWERY		2	001170		Y		0	0	0	0	0
ASD	603	R	0043	T1265		2	001170				0	0	0	0	0
ASD	603	R	0062	T1225		2	001170				0	0	0	0	0
ASD	511	R	1854	S0302R	1125	2	001100	649.04			0	0	0	0	0
ASD	179	R	0220	C2575		2	001100				0	0	0	0	0
ASD	179	R	0358	C0175		2	001100				0	0	0	0	0
ASD	179	R	0312	C2400		2	001100				0	0	0	0	0
ASD	179	R	0520	C0377		2	001092				0	1	0	0	0
ASD	179	R	0510	T2300		2	001092				0	0	0	0	0
ASD	179	R	0767	T2102		2	001092				0	0	0	0	0
ASD	179	R	0632	T0405		2	001092				0	0	0	0	0
ASD	179	R	0401	T0257		2	001092				0	0	0	0	0
ASD	179	R	0569	T2252		2	001092				0	0	0	0	0
ASD	179	R	0838	C2175		2	001092				0	1	0	0	0
ASD	179	R	0885	T0585		2	001090				0	1	0	0	0
ASD	302	R	0878	T0783		2	001048				0	0	0	0	0
ASD	302	R	0870	NANKIN SCHOOL		2	001048		Y	SC	0	0	0	0	0
ASD	302	R	0783	T0713		2	001048				0	0	0	0	0
ASD	302	R	0630	T0553		2	001048				0	0	0	0	0
ASD	302	R	0682	C0601		2	001048				0	0	0	0	0
ASD	302	R	0776	T0203		2	001048				0	0	0	0	0
ASD	302	R	0872	T0773		2	001048				0	2	0	0	0
ASD	603	R	1144	T1308		2	001040				0	1	1	0	1
ASD	603	R	1179	T1503 FAULK		2	001040				0	1	0	0	0
ASD	603	R	1105	T1453		2	001040				0	0	0	0	0
ASD	603	R	1071	C1356		2	001040				0	6	3	0	0.5
ASD	603	R	1057	T1376		2	001040				0	0	0	0	0
ASD	603	R	0968	C1475		2	001040				0	0	0	0	0
ASD	603	R	0933	T1528		2	001040				0	0	0	0	0
ASD	603	R	0821	T1596		2	001040				0	0	0	0	0
ASD	179	R	0133	C0037		2	000998				0	1	0	0	0
ASD	179	R	0052	T2650		2	000998				0	1	0	0	0
ASD	179	R	0104	T2600		2	000998				0	0	0	0	0
ASD	603	R	0533	T1875		2	000970				0	4	0	0	0
ASD	603	R	0637	C1808 CRIDER		2	000970				0	0	0	0	0
ASD	095	R	0269	T2704		2	000940				0	1	0	0	0
ASD	095	R	0246	C0967		2	000940				0	0	0	0	0
ASD	511	R	0000	S0039R	0157	2	000930	001703			0	0	0	0	0

ASD	511	R	0062	T2466		2	000930				0	0	0	0	0
ASD	097	R	0197	T3234		2	000930				0	0	0	0	0
ASD	097	R	0058	T1059		2	000930				0	0	0	0	0
ASD	097	R	0000	T1099 COE		2	000930				0	0	0	0	0
ASD	511	R	0405	C2075		2	000930				0	1	0	0	0
ASD	511	R	0028	T2506		2	000930				0	1	0	0	0
ASD	097	R	0332	MOHICAN PARK ENTRANCE		2	000930				0	0	0	0	0
ASD	511	R	0293	C2256		2	000930				0	0	0	0	0
ASD	511	R	0171	T2375		2	000930				0	0	0	0	0
ASD	511	R	0453	T2104		2	000930				0	0	0	0	0
ASD	511	R	0488	T2104		2	000930				0	2	1	0	0.5
ASD	511	R	0394	T2156		2	000930				0	0	0	0	0
ASD	511	R	0109	T1025		2	000930				0	0	0	0	0
ASD	511	R	0347	T2206		2	000930				0	1	1	0	1
ASD	511	R	0294	C2256		2	000930				0	0	0	0	0
ASD	545	R	0132	C1008 and T1008		2	000860				0	2	0	0	0
ASD	545	R	0102	T1443		2	000860				0	0	0	0	0
ASD	545	R	0303	T0856		2	000860				0	0	0	0	0
ASD	545	R	0311	T0856		2	000860				0	0	0	0	0
ASD	545	R	0190	T0956		2	000860				0	1	1	0	1
ASD	545	R	0437	C0758		2	000860				0	2	0	0	0
ASD	545	R	0471	T1243		2	000860				0	0	0	0	0
ASD	545	R	0248	T0908		2	000860				0	1	0	0	0
ASD	302	R	0000	T0013 CAMP		2	000660				0	1	1	0	1
ASD	302	R	0070	T0063		2	000660				0	0	0	0	0
ASD	302	R	0184	C0175		2	000660				0	1	1	0	1
ASD	302	R	0302	C0251 and T0251		2	000660				0	0	0	0	0
ASD	302	R	0303	T1080		2	000660				0	0	0	0	0
ASD	089	R	0000	S0095R	1072	2	000650	683.81			0	0	0	0	0
ASD	089	R	0155	T2102		2	000650				0	2	0	0	0
ASD	089	R	0332	T1922		2	000650				0	1	0	0	0
ASD	089	R	0263	C2000		2	000650				0	0	0	0	0
ASD	089	R	0105	T2150		2	000650				0	0	0	0	0
ASD	089	R	0005	T2252		2	000650				0	0	0	0	0
ASD	302	R	0891	T0813 WATER		2	000620				0	2	0	0	0
ASD	302	R	0938	T0851 and T0964		2	000620				0	0	0	0	0
ASD	302	R	1048	T0875		2	000620				0	0	0	0	0
ASD	095	R	1155	T0237		2	000590				0	0	0	0	0
ASD	095	R	1243	T2150		2	000590				0	0	0	0	0
ASD	095	R	1291	C2160		2	000590				0	0	0	0	0
ASD	095	R	1296	T0075		2	000590				0	0	0	0	0

ASD	095	R	1327	C0175			2	000590				0	1	0	0	0	
ASD	095	R	1343	C2160			2	000590				0	0	0	0	0	
ASD	095	R	1395	C0037			2	000590				0	0	0	0	0	
ASD	095	R	1124	T0257			2	000590				0	1	1	0	1	
ASD	302	R	1138	T0876			2	000560				0	0	0	0	0	
ASD	302	R	1322	T1101			2	000560				0	1	0	0	0	
ASD	095	R	1026	S0179R		0527	2	000543	001092			0	3	1	2	0.33	
ASD	095	R	0381	C0775			2	000543				0	4	3	0	0.75	
ASD	095	R	0585	T0707			2	000543				0	0	0	0	0	
ASD	095	R	0601	T2475			2	000543				0	0	0	0	0	
ASD	095	R	0762	T2402			2	000543				0	0	0	0	0	
ASD	095	R	0845	T0505			2	000543				0	0	0	0	0	
ASD	095	R	0897	T0457			2	000543				0	0	0	0	0	
ASD	095	R	0953	C2302			2	000543				0	0	0	0	0	
ASD	604	R	0088	T0251			2	000390				0	0	0	0	0	
ASD	604	R	0150	C0175			2	000390				0	0	0	0	0	
ASD	604	R	0202	T0133			2	000390				0	0	0	0	0	
ASD	604	R	0286	T0053			2	000390				0	0	0	0	0	
ASD	598	R	0147	PLANT ENTRANCE						Y	FS	0	0	0	0	0	

APPENDIX H

SORT RESULTS

SORTED ASHLAND DATA

CNTY	RTE	SUF	LOG	CROSS_RTE	CRRTLOG	LANES	ADT	CRRTADT	SIGNAL	SIGTYPE	HSP	ACCI	WARRANTS	COMPLAINTS	INDEX	RANK
ASD	039	R	0398	S0095R	0146	2	002551	001830	Y	FS	0	5	Signal Installed	4	0.6	01
ASD	039	R	0398	S0095R	0146	2	002551	001830	Y	FS	0	5	Signal Installed	4	0.6	01
ASD	042	R	1340	S0089R	1215	2	002391	002106	Y	FO	67	14	Signal Installed	4	0.57	01
ASD	042	R	1340	S0089R	1215	2	002391	002106	Y	FO	67	14	Signal Installed	4	0.57	01
ASD	224	R	1114	S0058R	1479	2	004347	003741	Y	FA	0	7	Signal Installed	3	0.57	01
ASD	224	R	1114	S0058R	1479	2	004347	003741	Y	FA	0	7	Signal Installed	3	0.57	01
ASD	224	R	0090	U0250R	0161	2	004120	002976	Y	FA	0	10	Signal Installed	3	0.5	01
ASD	224	R	0090	U0250R	0161	2	004120	002976	Y	FA	0	10	Signal Installed	3	0.5	01
ASD	060	R	1479	C1775		2	003996		Y	FS	0	1	Signal Installed	2	0	01
ASD	060	R	1479	C1775		2	003996		Y	FS	0	1	Signal Installed	2	0	01
ASD	224	R	0221	S0060R	2992	2	004120	002340	Y	FO	0	4	Signal Installed	1	0.75	01
ASD	224	R	0221	S0060R	2992	2	004120	002340	Y	FO	0	4	Signal Installed	1	0.75	01
ASD	003	R	0345	S0097R	0437	2	002815	000930	Y	FA	0	3	Signal Installed	1	0	01
ASD	003	R	0345	S0097R	0437	2	002815	000930	Y	FA	0	3	Signal Installed	1	0	01
ASD	603	R	0000	T2306 MOWERY		2	001170		Y		0	0	Signal Installed	0	0	01
ASD	598	R	0147	PLANT ENTRANCE					Y	FS	0	0	Signal Installed	0	0	01
ASD	302	R	0870	NANKIN SCHOOL		2	001048		Y	SC	0	0	Signal Installed	0	0	01
ASD	250	R	1700	MONTGOMERY SCHOOL		2	012010		Y	SC	0	0	Signal Installed	0	0	01
ASD	224	R	0690	RUGGLES TROY SCHOOL		2	004360		Y	SC	0	0	Signal Installed	0	0	01
ASD	224	R	0690	HIGHLAND LOCA		2	004360		Y	SC	0	0	Signal Installed	0	0	01
ASD	003	R	0000	OLD US 30 &NE VERMILION RD		2	001800		Y		0	0	Signal Installed	0	0	01
ASD	003	R	0000	OLD US 30 &NE VERMILION RD		2	001800		Y		0	0	Signal Installed	0	0	01
ASD	603	R	0000	T2306 MOWERY		2	001170		Y		0	0	Signal Installed	0	0	01
ASD	598	R	0147	PLANT ENTRANCE					Y	FS	0	0	Signal Installed	0	0	01
ASD	302	R	0870	NANKIN SCHOOL		2	001048		Y	SC	0	0	Signal Installed	0	0	01
ASD	250	R	1700	MONTGOMERY SCHOOL		2	012010		Y	SC	0	0	Signal Installed	0	0	01
ASD	224	R	0690	RUGGLES TROY SCHOOL		2	004360		Y	SC	0	0	Signal Installed	0	0	01
ASD	224	R	0690	HIGHLAND LOCA		2	004360		Y	SC	0	0	Signal Installed	0	0	01
ASD	060	R	1596	S0511R	1151	2	008340	005130			0	2	Warrant 2 is met	1	1	04
ASD	042	R	0101	S0603R	0754	2	013040	001200			0	5	1 may meet	3	0	08
ASD	042	R	0041	T1688 WINSOR		2	012300				0	0	1 may meet	1	0	08
ASD	042	R	0292	C1475		2	013040				0	3	1 may meet	0	1	08
ASD	042	R	0134	T1353		2	013040				0	1	1 may meet	0	1	08
ASD	042	R	0278	T1536		2	013040				0	0	1 may meet	0	0	08
ASD	042	R	0230	T1273		2	013040				0	1	1 may meet	0	0	08
ASD	042	R	0184	T1323 KENTWOOD		2	013040				0	0	1 may meet	0	0	08

ASD	042	R	0168	T1323 KENTWOOD		2	013040				0	1	1 may meet	0	0	08
ASD	042	R	0078	T1455		2	012300				0	1	1 may meet	0	0	08
ASD	042	R	0065	T1419		2	012300				0	1	1 may meet	0	0	08
ASD	250	R	1712	C1575		4	012009				0	10	8 may meet	1	0.4	09
ASD	030	R	0387	S0511R	0697	4	010621	002392			0	8	2 may meet	3	0.75	10
ASD	042	R	0856	C1302		2	008560				0	11	2 may meet	2	0.82	10
ASD	030	R	0008	S0603R	0484	4	010761	000970			411	18	2 may meet	2	0.55	10
ASD	030	R	0843	C0030A		4	010621				0	1	2 may meet	1	0	10
ASD	030	R	0951	T0405		4	010500				0	1	2 may meet	0	1	10
ASD	250	R	0976	T0926		2	008250				0	1	2 may meet	0	1	10
ASD	250	R	1001	C0956		2	008250				0	2	2 may meet	0	1	10
ASD	030	R	0901	C2175		4	010500				0	3	2 may meet	0	0.67	10
ASD	250	R	1255	T1184 WESTLAKE		2	008250				0	1	2 may meet	0	0	10
ASD	250	R	1186	T1136		2	008250				0	1	2 may meet	0	0	10
ASD	250	R	1166	T1104		2	008250				0	0	2 may meet	0	0	10
ASD	250	R	1094	T1056		2	008250				0	0	2 may meet	0	0	10
ASD	250	R	1056	T1006		2	008250				0	0	2 may meet	0	0	10
ASD	250	R	1039	T0984		2	008250				0	0	2 may meet	0	0	10
ASD	250	R	0890	T0856		2	008250				0	0	2 may meet	0	0	10
ASD	030	R	0782	T0555		4	010621				0	0	2 may meet	0	0	10
ASD	030	R	0211	C1095		4	010300				0	1	2 may meet	0	0	10
ASD	030	R	0048	T1255		4	010300				0	0	2 may meet	0	0	10
ASD	042	R	0720	T0853 DAVIS		2	005950				0	6	May meet at later date	1	0.83	12
ASD	250	R	0776	C0758		2	006360				0	4	May meet at later date	1	0.25	12
ASD	250	R	1781	T0653		2	006321				0	10	May meet at later date	1	0.2	12
ASD	060	R	1561	T1504		2	007020				0	1	May meet at later date	0	1	12
ASD	250	R	1833	T0593		2	006321				0	3	May meet at later date	0	1	12
ASD	003	R	0633	S0060R	0051	2	005950	002600			0	0	May meet at later date	0	0	12
ASD	042	R	0353	C0042ACLAREMONT		4	008387				0	2	May meet at later date	0	0	12
ASD	003	R	0633	S0039R & S0060R	0942	2	005950	003052			0	0	May meet at later date	0	0	12
ASD	060	R	1870	S0511	1425	2	006384	003080			0	0	May meet at later date	0	0	12
ASD	060	R	1938	U0250R	1275	2	005610	004500			0	0	May meet at later date	0	0	12
ASD	250	R	0726	HANEY		2	006360				0	0	May meet at later date	0	0	12
ASD	250	R	1375	S0058R	0000	2	005949	001640			0	0	May meet at later date	0	0	12
ASD	250	R	1906	T0523		2	006170				0	1	May meet at later date	0	0	12
ASD	042	R	1480	S0302R	0412	2	002391	001048			0	9	none	6	0.67	13
ASD	250	R	1982	S0089R	0904	2	004610	001830			0	7	none	6	0.14	13
ASD	060	R	0512	S0095R	0703	2	001840	000543			0	1	none	5	0	13
ASD	058	R	1230	S0089R	1860	2	003100	001730			0	4	none	4	0.75	13
ASD	030	R	1024	S0089R	0364	4	006710	001001			0	8	none	2	0.71	13
ASD	511	R	0611	C0030A		2	002392				0	4	none	2	0.5	13

ASD	095	R	1026	S0179R	0527	2	000543	001092			0	3	none	2	0.33	13
ASD	511	R	2258	C0500		2	001209				0	3	none	2	0.33	13
ASD	042	R	0380	T1153 BANEY		4	004180				0	6	none	2	0.17	13
ASD	511	R	2286	C0500		2	001209				0	1	none	1	1	13
ASD	089	R	1350	S0302R	0529	2	002106	001048			0	2	none	1	1	13
ASD	096	R	0358	C1153 and T1153		2	003210				0	8	none	1	0.43	13
ASD	003	R	0370	MOHICAN PARK ENTRANCE		2	002815				0	0	none	1	0	13
ASD	058	R	0941	T0700		2	002087				0	0	none	1	0	13
ASD	089	R	0701	C1600 and T1600		2	001513				0	1	none	1	0	13
ASD	042	R	1490	S0604R	0000	2	002391	000390			0	1	none	1	0	13
ASD	224	R	1322	C0281		2	004280				0	1	none	0	1	13
ASD	250	R	0299	T0388		2	002976				0	1	none	0	1	13
ASD	250	R	0362	T0448		2	002976				0	1	none	0	1	13
ASD	545	R	0190	T0956		2	000860				0	1	none	0	1	13
ASD	089	R	1722	C0620		2	001730				0	3	none	0	1	13
ASD	042	R	1583	T0251		4	002536				0	1	none	0	1	13
ASD	058	R	0371	T1184 EASTLAKE		2	003580				0	1	none	0	1	13
ASD	250	R	1323	S0511RTROY	1494	2	005110	001200			0	1	none	0	1	13
ASD	058	R	0615	T0974		2	002799				0	1	none	0	1	13
ASD	095	R	1124	T0257		2	000590				0	1	none	0	1	13
ASD	058	R	0635	S0302R	0885	2	002799	000620			0	1	none	0	1	13
ASD	250	R	2180	C0251		2	004610				0	1	none	0	1	13
ASD	250	R	2373	T1400		2	004610				0	1	none	0	1	13
ASD	302	R	0000	T0013 CAMP		2	000660				0	1	none	0	1	13
ASD	030	R	1174	C0175		4	006710				0	1	none	0	1	13
ASD	003	R	0260	C3275		2	002243				0	1	none	0	1	13
ASD	603	R	1144	T1308		2	001040				0	1	none	0	1	13
ASD	302	R	0184	C0175		2	000660				0	1	none	0	1	13
ASD	179	R	0974	C0030A		2	001219				0	1	none	0	1	13
ASD	224	R	0469	T1101		2	004120				0	1	none	0	1	13
ASD	302	R	1090	S0511R	1819	2	001310	001200			0	2	none	0	1	13
ASD	060	R	2715	C0500 and C1281		2	001488				0	1	none	0	1	13
ASD	224	R	0809	T0791		2	004430				0	1	none	0	1	13
ASD	224	R	0916	C0681		2	004430				0	2	none	0	1	13
ASD	058	R	1683	C0040		2	004070				0	3	none	0	1	13
ASD	511	R	1594	T1104		2	001200				0	2	none	0	1	13
ASD	511	R	0347	T2206		2	000930				0	1	none	0	1	13
ASD	224	R	0681	S0511R	2535	2	004360	001209			0	4	none	0	0.75	13
ASD	095	R	0381	C0775		2	000543				0	4	none	0	0.75	13
ASD	060	R	1438	C1600		2	003996				0	4	none	0	0.75	13
ASD	042	R	1705	C0175		4	002536				0	3	none	0	0.67	13

ASD	250	R	0630	S0060R	2583	2	004560	001488			0	3	none	0	0.67	13
ASD	511	R	2735	C0040		2	001209				0	3	none	0	0.67	13
ASD	511	R	0842	C1754	0964	2	002392				0	3	none	0	0.67	13
ASD	058	R	1072	C0620		2	002087				0	2	none	0	0.5	13
ASD	250	R	2295	C0175		2	004610				0	2	none	0	0.5	13
ASD	042	R	0981	T0793		2	003906				0	2	none	0	0.5	13
ASD	603	R	1071	C1356		2	001040				0	6	none	0	0.5	13
ASD	511	R	0488	T2104		2	000930				0	2	none	0	0.5	13
ASD	060	R	3244	C0187 and C0016		2	002340				0	2	none	0	0.5	13
ASD	058	R	0490	T1102		2	003580				0	2	none	0	0.5	13
ASD	058	R	0385	C and T1175		2	003580				0	2	none	0	0.5	13
ASD	042	R	1795	T0810		4	002536				0	2	none	0	0.5	13
ASD	250	R	2281	C1302		2	004610				0	3	none	0	0.33	13
ASD	250	R	0621	T0608		2	002976				0	4	none	0	0.25	13
ASD	042	R	0543	C0995 KING		2	004270				0	8	none	0	0.25	13
ASD	302	R	0303	T1080		2	000660				0	0	none	0	0	13
ASD	302	R	0630	T0553		2	001048				0	0	none	0	0	13
ASD	302	R	1138	T0876		2	000560				0	0	none	0	0	13
ASD	302	R	0682	C0601		2	001048				0	0	none	0	0	13
ASD	302	R	0776	T0203		2	001048				0	0	none	0	0	13
ASD	302	R	0783	T0713		2	001048				0	0	none	0	0	13
ASD	302	R	0872	T0773		2	001048				0	2	none	0	0	13
ASD	302	R	0878	T0783		2	001048				0	0	none	0	0	13
ASD	302	R	0891	T0813 WATER		2	000620				0	2	none	0	0	13
ASD	302	R	0938	T0851 and T0964		2	000620				0	0	none	0	0	13
ASD	302	R	1048	T0875		2	000620				0	0	none	0	0	13
ASD	224	R	0315	C1281 and T1281		2	004120				0	0	none	0	0	13
ASD	224	R	1106	T0501 CHURCH		2	004347				0	0	none	0	0	13
ASD	179	R	0885	T0585		2	001090				0	1	none	0	0	13
ASD	179	R	0944	C2000		2	001219				0	0	none	0	0	13
ASD	224	R	0000	T1601 and T0079		2	003090				0	1	none	0	0	13
ASD	224	R	0140	T1461		2	004120				0	0	none	0	0	13
ASD	224	R	0214	T1381		2	004120				0	0	none	0	0	13
ASD	224	R	0411	C1181		2	004120				0	0	none	0	0	13
ASD	224	R	0424	C1171		2	004120				0	1	none	0	0	13
ASD	224	R	0572	T1031		2	004310				0	0	none	0	0	13
ASD	224	R	0668	T0931		2	004360				0	0	none	0	0	13
ASD	224	R	1017	T0581		2	004430				0	1	none	0	0	13
ASD	302	R	0302	C0251 and T0251		2	000660				0	0	none	0	0	13
ASD	224	R	1110			2	004347				0	0	none	0	0	13
ASD	224	R	1130	T0481		2	004280				0	0	none	0	0	13

ASD	224	R	1224	T0391		2	004280				0	1	none	0	0	13
ASD	250	R	0000	T0079 and T1601		2	003310				0	1	none	0	0	13
ASD	250	R	0464	C0500		2	002976				0	1	none	0	0	13
ASD	250	R	2081	T0355		2	004610				0	0	none	0	0	13
ASD	250	R	2367	T0063		2	004610				0	0	none	0	0	13
ASD	250	R	2432	T0035		2	004610				0	0	none	0	0	13
ASD	250	R	2459	T0245 and T0013		2	004610				0	0	none	0	0	13
ASD	302	R	0070	T0063		2	000660				0	0	none	0	0	13
ASD	179	R	0838	C2175		2	001092				0	1	none	0	0	13
ASD	603	R	0415	S0430R	0060	2	001839	001610			0	0	none	0	0	13
ASD	511	R	2634	T0150		2	001209				0	0	none	0	0	13
ASD	545	R	0102	T1443		2	000860				0	0	none	0	0	13
ASD	545	R	0132	C1008 and T1008		2	000860				0	2	none	0	0	13
ASD	545	R	0248	T0908		2	000860				0	1	none	0	0	13
ASD	545	R	0303	T0856		2	000860				0	0	none	0	0	13
ASD	545	R	0311	T0856		2	000860				0	0	none	0	0	13
ASD	545	R	0437	C0758		2	000860				0	2	none	0	0	13
ASD	545	R	0471	T1243		2	000860				0	0	none	0	0	13
ASD	603	R	0043	T1265		2	001170				0	0	none	0	0	13
ASD	603	R	0062	T1225		2	001170				0	0	none	0	0	13
ASD	603	R	0064	C2256		2	001170				0	0	none	0	0	13
ASD	603	R	0240	C1217		2	001170				0	0	none	0	0	13
ASD	603	R	0246	T2116		2	001170				0	0	none	0	0	13
ASD	603	R	0256	T2156		2	001170				0	0	none	0	0	13
ASD	511	R	2531	T4052		2	001209				0	1	none	0	0	13
ASD	603	R	0454	C1956		2	001839				0	0	none	0	0	13
ASD	603	R	0533	T1875		2	000970				0	4	none	0	0	13
ASD	603	R	0637	C1808 CRIDER		2	000970				0	0	none	0	0	13
ASD	603	R	0659	T1335		2	001642				0	1	none	0	0	13
ASD	603	R	0752	T1656		2	001642				0	0	none	0	0	13
ASD	603	R	0821	T1596		2	001040				0	0	none	0	0	13
ASD	603	R	0933	T1528		2	001040				0	0	none	0	0	13
ASD	603	R	0968	C1475		2	001040				0	0	none	0	0	13
ASD	603	R	1057	T1376		2	001040				0	0	none	0	0	13
ASD	603	R	1105	T1453		2	001040				0	0	none	0	0	13
ASD	603	R	1179	T1503 FAULK		2	001040				0	1	none	0	0	13
ASD	604	R	0088	T0251		2	000390				0	0	none	0	0	13
ASD	604	R	0150	C0175		2	000390				0	0	none	0	0	13
ASD	604	R	0202	T0133		2	000390				0	0	none	0	0	13
ASD	302	R	1322	T1101		2	000560				0	1	none	0	0	13
ASD	511	R	0792	T1806		2	002392				0	0	none	0	0	13

ASD	430	R	0033	CHARLES MILL PARK DR ENT		2	001610					0	1	none	0	0	13
ASD	511	C	0000	S0511R	1141	2	004620	005130				0	0	none	0	0	13
ASD	511	R	0000	S0039R	0157	2	000930	001703				0	0	none	0	0	13
ASD	511	R	0028	T2506		2	000930					0	1	none	0	0	13
ASD	511	R	0062	T2466		2	000930					0	0	none	0	0	13
ASD	511	R	0109	T1025		2	000930					0	0	none	0	0	13
ASD	511	R	0171	T2375		2	000930					0	0	none	0	0	13
ASD	511	R	0293	C2256		2	000930					0	0	none	0	0	13
ASD	511	R	0294	C2256		2	000930					0	0	none	0	0	13
ASD	511	R	0394	T2156		2	000930					0	0	none	0	0	13
ASD	511	R	0405	C2075		2	000930					0	1	none	0	0	13
ASD	511	R	0453	T2104		2	000930					0	0	none	0	0	13
ASD	511	R	0693	C1904		2	002392					0	2	none	0	0	13
ASD	511	R	0707	T1894		2	002392					0	0	none	0	0	13
ASD	511	R	2527	T4053		2	001209					0	0	none	0	0	13
ASD	511	R	0976	T1654		2	002450					0	0	none	0	0	13
ASD	511	R	1027	C1600		2	002450					0	0	none	0	0	13
ASD	511	R	1515	T1184		2	001200					0	0	none	0	0	13
ASD	511	R	1518	T1184		2	001200					0	0	none	0	0	13
ASD	511	R	1694	T0975		2	001200					0	0	none	0	0	13
ASD	511	R	1720	T0984		2	001200					0	0	none	0	0	13
ASD	511	R	1748	T0964		2	001200					0	0	none	0	0	13
ASD	511	R	1854	S0302R	1125	2	001100	000560				0	0	none	0	0	13
ASD	511	R	1974	T0754		2	001209					0	0	none	0	0	13
ASD	511	R	2024	T0704		2	001209					0	0	none	0	0	13
ASD	511	R	2101	C0620		2	001209					0	1	none	0	0	13
ASD	511	R	2174	T0564		2	001209					0	0	none	0	0	13
ASD	511	R	2330	T0462		2	001209					0	0	none	0	0	13
ASD	511	R	2435	T0350		2	001209					0	0	none	0	0	13
ASD	089	R	1075	T1275		2	001830					0	0	none	0	0	13
ASD	058	R	1494	T0232 CHURCH		2	003741					0	0	none	0	0	13
ASD	058	R	0385	T1175		2	003580					0	0	none	0	0	13
ASD	058	R	0553	T0803		2	003580					0	0	none	0	0	13
ASD	058	R	0586	C1175		2	003580					0	0	none	0	0	13
ASD	058	R	0606	T0783		2	002799					0	0	none	0	0	13
ASD	058	R	0629	T0954		2	002799					0	0	none	0	0	13
ASD	058	R	0645	T0944		2	002799					0	0	none	0	0	13
ASD	058	R	0659	C0801		2	002799					0	0	none	0	0	13
ASD	058	R	0774	T0852		2	002087					0	0	none	0	0	13
ASD	058	R	0833	T0782		2	002087					0	0	none	0	0	13
ASD	058	R	0960	T0673		2	002087					0	0	none	0	0	13

ASD	058	R	1050	C0601		2	002087				0	0	none	0	0	13
ASD	058	R	1276	T0462		2	003100				0	1	none	0	0	13
ASD	058	R	1375	T0350		2	003741				0	0	none	0	0	13
ASD	058	R	1490	T0232 SCHOOL		2	003741				0	1	none	0	0	13
ASD	042	R	1804	T0101		4	002536				0	0	none	0	0	13
ASD	058	R	1519	T0212 MILL		2	003741				0	0	none	0	0	13
ASD	058	R	1578	T0150		2	003741				0	3	none	0	0	13
ASD	060	R	0120	T2812		2	001860				0	0	none	0	0	13
ASD	060	R	0124	T2802		2	001860				0	0	none	0	0	13
ASD	060	R	0240	T2724		2	001860				0	0	none	0	0	13
ASD	060	R	0312	C2575		2	001860				0	2	none	0	0	13
ASD	060	R	0390	T2475		2	001860				0	0	none	0	0	13
ASD	060	R	0444	T2474		2	001860				0	0	none	0	0	13
ASD	060	R	0550	C2404		2	001729				0	0	none	0	0	13
ASD	060	R	0650	C2302 and T2302		2	001729				0	0	none	0	0	13
ASD	060	R	0740	T0585		2	001729				0	0	none	0	0	13
ASD	060	R	0781	C2175		2	001729				0	1	none	0	0	13
ASD	060	R	0864	T0705		2	001729				0	0	none	0	0	13
ASD	060	R	0901	T2104		2	001729				0	0	none	0	0	13
ASD	060	R	0999	C0775		2	001729				0	0	none	0	0	13
ASD	060	R	1100	T1904		2	004310				0	1	none	0	0	13
ASD	039	R	0468	POTTERY		2	003050				0	1	none	0	0	13
ASD	003	R	0031	T3414		2	001800				0	0	none	0	0	13
ASD	003	R	0067	T3364		2	001800				0	0	none	0	0	13
ASD	003	R	0093	C0739		2	001800				0	0	none	0	0	13
ASD	003	R	0147	T3292		2	001800				0	0	none	0	0	13
ASD	003	R	0211	C0739		2	001800				0	0	none	0	0	13
ASD	003	R	0446	T3044		2	003140				0	0	none	0	0	13
ASD	003	R	0650	S0060	0068	2	004077	002600			0		none	0	0	13
ASD	003	R	0781	LONG LAKE		2	002020				0	0	none	0	0	13
ASD	030	R	1329	C0015 and C0093		4	006710				0	0	none	0	0	13
ASD	039	R	0000	T1097 WEIL		2	001703				0	0	none	0	0	13
ASD	039	R	0040	C1075		2	001703				0	0	none	0	0	13
ASD	039	R	0157	S0511R	0000	2	001703	000930			0	2	none	0	0	13
ASD	039	R	0185	T1037		2	001703				0	0	none	0	0	13
ASD	039	R	0238	T2606		2	001703				0	0	none	0	0	13
ASD	042	R	1756	T0133		4	002536				0	0	none	0	0	13
ASD	039	R	0475	PLEASANT		2	003050				0	1	none	0	0	13
ASD	039	R	0497	C0917		2	003050				0	1	none	0	0	13
ASD	039	R	0570	T0857		2	003050				0	1	none	0	0	13
ASD	039	R	0672	T0749		2	003050				0	0	none	0	0	13

ASD	042	R	0463	C1095 MIFFLIN		2	004270				0	0	none	0	0	13
ASD	042	R	0646	S0511C	0004	2	004270				0	2	none	0	0	13
ASD	042	R	0926	C0042BCLEVELAND		2	005020				0	0	none	0	0	13
ASD	042	R	1041	T0753		2	003906				0	1	none	0	0	13
ASD	042	R	1099	T1275		2	003906				0	1	none	0	0	13
ASD	042	R	1145	C0601 and T0653		2	003906				0	3	none	0	0	13
ASD	042	R	1197	T0593		2	003906				0	0	none	0	0	13
ASD	042	R	1234	T0553		2	003906				0	0	none	0	0	13
ASD	042	R	1244	T0543		2	003906				0	1	none	0	0	13
ASD	042	R	1398	T1080		2	002391				0	0	none	0	0	13
ASD	179	R	0767	T2102		2	001092				0	0	none	0	0	13
ASD	096	R	0404	WARD		2	003210				0	0	none	0	0	13
ASD	095	R	0953	C2302		2	000543				0	0	none	0	0	13
ASD	095	R	1155	T0237		2	000590				0	0	none	0	0	13
ASD	095	R	1243	T2150		2	000590				0	0	none	0	0	13
ASD	095	R	1291	C2160		2	000590				0	0	none	0	0	13
ASD	095	R	1296	T0075		2	000590				0	0	none	0	0	13
ASD	095	R	1327	C0175		2	000590				0	1	none	0	0	13
ASD	095	R	1343	C2160		2	000590				0	0	none	0	0	13
ASD	095	R	1395	C0037		2	000590				0	0	none	0	0	13
ASD	096	R	0050	T1453		2	002657				0	0	none	0	0	13
ASD	096	R	0075	T1443		2	002657				0	0	none	0	0	13
ASD	096	R	0151	C1353 and T1353		2	002657				0	1	none	0	0	13
ASD	096	R	0201	T1293		2	002657				0	0	none	0	0	13
ASD	096	R	0254	T1253		2	002657				0	0	none	0	0	13
ASD	096	R	0308	T1193		2	002657				0	0	none	0	0	13
ASD	095	R	0897	T0457		2	000543				0	0	none	0	0	13
ASD	097	R	0000	T1099 COE		2	000930				0	0	none	0	0	13
ASD	097	R	0058	T1059		2	000930				0	0	none	0	0	13
ASD	097	R	0197	T3234		2	000930				0	0	none	0	0	13
ASD	097	R	0332	MOHICAN PARK ENTRANCE		2	000930				0	0	none	0	0	13
ASD	179	R	0052	T2650		2	000998				0	1	none	0	0	13
ASD	179	R	0104	T2600		2	000998				0	0	none	0	0	13
ASD	179	R	0133	C0037		2	000998				0	1	none	0	0	13
ASD	179	R	0220	C2575		2	001100				0	0	none	0	0	13
ASD	179	R	0312	C2400		2	001100				0	0	none	0	0	13
ASD	179	R	0358	C0175		2	001100				0	0	none	0	0	13
ASD	179	R	0401	T0257		2	001092				0	0	none	0	0	13
ASD	179	R	0510	T2300		2	001092				0	0	none	0	0	13
ASD	179	R	0520	C0377		2	001092				0	1	none	0	0	13
ASD	179	R	0569	T2252		2	001092				0	0	none	0	0	13

ASD	179	R	0632	T0405		2	001092				0	0	none	0	0	13
ASD	060	R	1147	T1894		2	003730				0	0	none	0	0	13
ASD	089	R	0643	T0395		2	001513				0	0	none	0	0	13
ASD	060	R	1215	T1806	1215	2	003996				0	0	none	0	0	13
ASD	060	R	1270	C1754		2	003996				0	1	none	0	0	13
ASD	060	R	1312	T1714		2	003996				0	0	none	0	0	13
ASD	060	R	1322	T1714		2	003996				0	0	none	0	0	13
ASD	060	R	1413	C1610		2	003996				0	0	none	0	0	13
ASD	060	R	1435	C1610		2	003996				0	0	none	0	0	13
ASD	060	R	2893	T0346		2	001488				0	0	none	0	0	13
ASD	060	R	3128	T0126		2	002340				0	0	none	0	0	13
ASD	089	R	0000	S0095R	1072	2	000650	000590			0	0	none	0	0	13
ASD	089	R	0005	T2252		2	000650				0	0	none	0	0	13
ASD	089	R	0105	T2150		2	000650				0	0	none	0	0	13
ASD	089	R	0155	T2102		2	000650				0	2	none	0	0	13
ASD	089	R	0263	C2000		2	000650				0	0	none	0	0	13
ASD	089	R	0332	T1922		2	000650				0	1	none	0	0	13
ASD	095	R	0845	T0505		2	000543				0	0	none	0	0	13
ASD	089	R	0804	T1500		2	001513				0	0	none	0	0	13
ASD	089	R	1004	C1302		2	001830				0	2	none	0	0	13
ASD	089	R	1158	T1150		2	001830				0	0	none	0	0	13
ASD	089	R	1419	T0902		2	002106				0	0	none	0	0	13
ASD	089	R	1620	C0700 and T0700		2	001730				0	0	none	0	0	13
ASD	089	R	1823	PINOAK		2	001730				0	0	none	0	0	13
ASD	095	R	0000	T1087 HARROD		2	001830				0	0	none	0	0	13
ASD	095	R	0069	C2786		2	001830				0	0	none	0	0	13
ASD	095	R	0111	C1075		2	001830				0	1	none	0	0	13
ASD	095	R	0246	C0967		2	000940				0	0	none	0	0	13
ASD	095	R	0269	T2704		2	000940				0	1	none	0	0	13
ASD	095	R	0585	T0707		2	000543				0	0	none	0	0	13
ASD	095	R	0601	T2475		2	000543				0	0	none	0	0	13
ASD	095	R	0762	T2402		2	000543				0	0	none	0	0	13

APPENDIX I

FUTURESORT RESULTS

FUTURESORT PROGRAM RESULTS

CNTY	RTE	SUF	LOG	CROSS_RTE	CRRTLOG	LANES	ADT	CRRTADT	SIGNAL	SIGTYPE	HSP	ACCI	WARRANTS	COMPLAINTS	INDEX	RANK
ASD	039	R	0398	S0095R	0146	2	2814	2018	Y	FS	0	5	Signal Installed	4	0.6	01
ASD	042	R	1340	S0089R	1215	2	2637	2323	Y	FO	67	14	Signal Installed	4	0.57	01
ASD	224	R	1114	S0058R	1479	2	4795	4126	Y	FA	0	7	Signal Installed	3	0.57	01
ASD	224	R	0090	U0250R	0161	2	4544	3283	Y	FA	0	10	Signal Installed	3	0.5	01
ASD	060	R	1479	C1775		2	4408	0	Y	FS	0	1	Signal Installed	2	0	01
ASD	224	R	0221	S0060R	2992	2	4544	2581	Y	FO	0	4	Signal Installed	1	0.75	01
ASD	003	R	0345	S0097R	0437	2	3105	1026	Y	FA	0	3	Signal Installed	1	0	01
ASD	003	R	0000	OLD US 30 &NE VERMILION RD		2	1985	0	Y		0	0	Signal Installed	0	0	01
ASD	224	R	0690	HIGHLAND LOCA		2	4809	0	Y	SC	0	0	Signal Installed	0	0	01
ASD	224	R	0690	RUGGLES TROY SCHOOL		2	4809	0	Y	SC	0	0	Signal Installed	0	0	01
ASD	250	R	1700	MONTGOMERY SCHOOL		2	13247	0	Y	SC	0	0	Signal Installed	0	0	01
ASD	302	R	0870	NANKIN SCHOOL		2	1156	0	Y	SC	0	0	Signal Installed	0	0	01
ASD	598	R	0147	PLANT ENTRANCE					Y	FS	0	0	Signal Installed	0	0	01
ASD	603	R	0000	T2306 MOWERY		2	1291	0	Y		0	0	Signal Installed	0	0	01
ASD	060	R	1596	S0511R	1151	2	9199	5658			0	2	Warrant 8 is met	1	1	03
ASD	042	R	0101	S0603R	0754	2	14383	1324			0	5	1 may meet	3	0	08
ASD	042	R	0041	T1688 WINSOR		2	13567	0			0	0	1 may meet	1	0	08
ASD	042	R	0134	T1353		2	14383	0			0	1	1 may meet	0	1	08
ASD	042	R	0292	C1475		2	14383	0			0	3	1 may meet	0	1	08
ASD	042	R	0065	T1419		2	13567	0			0	1	1 may meet	0	0	08
ASD	042	R	0078	T1455		2	13567	0			0	1	1 may meet	0	0	08
ASD	042	R	0168	T1323 KENTWOOD		2	14383	0			0	1	1 may meet	0	0	08
ASD	042	R	0184	T1323 KENTWOOD		2	14383	0			0	0	1 may meet	0	0	08
ASD	042	R	0230	T1273		2	14383	0			0	1	1 may meet	0	0	08
ASD	042	R	0278	T1536		2	14383	0			0	0	1 may meet	0	0	08
ASD	030	R	0387	S0511R	0697	4	11715	2638			0	8	8 may meet	3	0.75	09
ASD	042	R	0856	C1302		2	9442	0			0	11	8 may meet	2	0.82	09
ASD	030	R	0008	S0603R	0484	4	11869	1070			411	18	8 may meet	2	0.55	09
ASD	250	R	1712	C1575		4	13246	0			0	10	8 may meet	1	0.4	09
ASD	030	R	0843	C0030A		4	11715	0			0	1	8 may meet	1	0	09
ASD	030	R	0951	T0405		4	11582	0			0	1	8 may meet	0	1	09
ASD	030	R	0901	C2175		4	11582	0			0	3	8 may meet	0	0.67	09
ASD	030	R	0211	C1095		4	11361	0			0	1	8 may meet	0	0	09
ASD	030	R	0048	T1255		4	11361	0			0	0	8 may meet	0	0	09
ASD	030	R	0782	T0555		4	11715	0			0	0	8 may meet	0	0	09
ASD	060	R	1561	T1504		2	7743	0			0	1	2 may meet	0	1	10
ASD	250	R	0976	T0926		2	9100	0			0	1	2 may meet	0	1	10

ASD	250	R	1001	C0956		2	9100	0			0	2	2 may meet	0	1	10		
ASD	250	R	1094	T1056		2	9100	0			0	0	2 may meet	0	0	10		
ASD	250	R	1186	T1136		2	9100	0			0	1	2 may meet	0	0	10		
ASD	250	R	1166	T1104		2	9100	0			0	0	2 may meet	0	0	10		
ASD	250	R	1255	T1184 WESTLAKE		2	9100	0			0	1	2 may meet	0	0	10		
ASD	250	R	1039	T0984		2	9100	0			0	0	2 may meet	0	0	10		
ASD	250	R	0890	T0856		2	9100	0			0	0	2 may meet	0	0	10		
ASD	042	R	0353	C0042ACLAREMONT		4	9251	0			0	2	2 may meet	0	0	10		
ASD	250	R	1056	T1006		2	9100	0			0	0	2 may meet	0	0	10		
ASD	030	R	1024	S0089R	0364	4	7401	1104			0	8	May meet at later date	2	0.71	12		
ASD	042	R	0720	T0853 DAVIS		2	6563	0			0	6	May meet at later date	1	0.83	12		
ASD	250	R	0776	C0758		2	7015	0			0	4	May meet at later date	1	0.25	12		
ASD	250	R	1781	T0653		2	6972	0			0	10	May meet at later date	1	0.2	12		
ASD	030	R	1174	C0175		4	7401	0			0	1	May meet at later date	0	1	12		
ASD	250	R	1323	S0511RTROY	1494	2	5636	1324			0	1	May meet at later date	0	1	12		
ASD	250	R	1833	T0593		2	6972	0			0	3	May meet at later date	0	1	12		
ASD	003	R	0633	S0060R	0051	2	6563	2868			0	0	May meet at later date	0	0	12		
ASD	030	R	1329	C0015 and C0093		4	7401	0			0	0	May meet at later date	0	0	12		
ASD	003	R	0633	S0039R & S0060R	0942	2	6563	3366			0	0	May meet at later date	0	0	12		
ASD	060	R	1870	S0511	1425	2	7042	3397			0	0	May meet at later date	0	0	12		
ASD	060	R	1938	U0250R	1275	2	6188	4964			0	0	May meet at later date	0	0	12		
ASD	250	R	0726	HANEY		2	7015	0			0	0	May meet at later date	0	0	12		
ASD	250	R	1375	S0058R	0000	2	6562	1809			0	0	May meet at later date	0	0	12		
ASD	250	R	1906	T0523		2	6806	0			0	1	May meet at later date	0	0	12		
ASD	042	R	1480	S0302R	0412	2	2637	1156			0	9	none	6	0.67	13		
ASD	250	R	1982	S0089R	0904	2	5085	2018			0	7	none	6	0.14	13		
ASD	060	R	0512	S0095R	0703	2	2030	599			0	1	none	5	0	13		
ASD	058	R	1230	S0089R	1860	2	3419	1908			0	4	none	4	0.75	13		
ASD	511	R	0611	C0030A		2	2638	0			0	4	none	2	0.5	13		
ASD	511	R	2258	C0500		2	1334	0			0	3	none	2	0.33	13		
ASD	095	R	1026	S0179R	0527	2	599	1204			0	3	none	2	0.33	13		
ASD	042	R	0380	T1153 BANEY		4	4611	0			0	6	none	2	0.17	13		
ASD	089	R	1350	S0302R	0529	2	2323	1156			0	2	none	1	1	13		
ASD	511	R	2286	C0500		2	1334	0			0	1	none	1	1	13		
ASD	096	R	0358	C1153 and T1153		2	3541	0			0	8	none	1	0.43	13		
ASD	089	R	0701	C1600 and T1600		2	1669	0			0	1	none	1	0	13		
ASD	058	R	0941	T0700		2	2302	0			0	0	none	1	0	13		
ASD	042	R	1490	S0604R	0000	2	2637	430			0	1	none	1	0	13		
ASD	003	R	0370	MOHICAN PARK ENTRANCE		2	3105	0			0	0	none	1	0	13		
ASD	042	R	1583	T0251		4	2797	0			0	1	none	0	1	13		
ASD	095	R	1124	T0257		2	651	0			0	1	none	0	1	13		

ASD	545	R	0190	T0956		2	949	0			0	1	none	0	1	13
ASD	250	R	0362	T0448		2	3283	0			0	1	none	0	1	13
ASD	250	R	0299	T0388		2	3283	0			0	1	none	0	1	13
ASD	058	R	0635	S0302R	0885	2	3087	684			0	1	none	0	1	13
ASD	250	R	2180	C0251		2	5085	0			0	1	none	0	1	13
ASD	224	R	1322	C0281		2	4721	0			0	1	none	0	1	13
ASD	058	R	0371	T1184 EASTLAKE		2	3949	0			0	1	none	0	1	13
ASD	058	R	0615	T0974		2	3087	0			0	1	none	0	1	13
ASD	302	R	0184	C0175		2	728	0			0	1	none	0	1	13
ASD	179	R	0974	C0030A		2	1345	0			0	1	none	0	1	13
ASD	302	R	0000	T0013 CAMP		2	728	0			0	1	none	0	1	13
ASD	302	R	1090	S0511R	1819	2	1445	1324			0	2	none	0	1	13
ASD	603	R	1144	T1308		2	1147	0			0	1	none	0	1	13
ASD	003	R	0260	C3275		2	2474	0			0	1	none	0	1	13
ASD	511	R	1594	T1104		2	1324	0			0	2	none	0	1	13
ASD	058	R	1683	C0040		2	4489	0			0	3	none	0	1	13
ASD	060	R	2715	C0500 and C1281		2	1641	0			0	1	none	0	1	13
ASD	511	R	0347	T2206		2	1026	0			0	1	none	0	1	13
ASD	224	R	0469	T1101		2	4544	0			0	1	none	0	1	13
ASD	224	R	0809	T0791		2	4886	0			0	1	none	0	1	13
ASD	224	R	0916	C0681		2	4886	0			0	2	none	0	1	13
ASD	089	R	1722	C0620		2	1908	0			0	3	none	0	1	13
ASD	250	R	2373	T1400		2	5085	0			0	1	none	0	1	13
ASD	095	R	0381	C0775		2	599	0			0	4	none	0	0.75	13
ASD	060	R	1438	C1600		2	4408	0			0	4	none	0	0.75	13
ASD	224	R	0681	S0511R	2535	2	4809	1334			0	4	none	0	0.75	13
ASD	511	R	2735	C0040		2	1334	0			0	3	none	0	0.67	13
ASD	511	R	0842	C1754	0964	2	2638	0			0	3	none	0	0.67	13
ASD	250	R	0630	S0060R	2583	2	5030	1641			0	3	none	0	0.67	13
ASD	042	R	1705	C0175		4	2797	0			0	3	none	0	0.67	13
ASD	042	R	0981	T0793		2	4308	0			0	2	none	0	0.5	13
ASD	060	R	3244	C0187 and C0016		2	2581	0			0	2	none	0	0.5	13
ASD	603	R	1071	C1356		2	1147	0			0	6	none	0	0.5	13
ASD	058	R	1072	C0620		2	2302	0			0	2	none	0	0.5	13
ASD	250	R	2295	C0175		2	5085	0			0	2	none	0	0.5	13
ASD	058	R	0490	T1102		2	3949	0			0	2	none	0	0.5	13
ASD	511	R	0488	T2104		2	1026	0			0	2	none	0	0.5	13
ASD	042	R	1795	T0810		4	2797	0			0	2	none	0	0.5	13
ASD	058	R	0385	C and T1175		2	3949	0			0	2	none	0	0.5	13
ASD	250	R	2281	C1302		2	5085	0			0	3	none	0	0.33	13
ASD	042	R	0543	C0995 KING		2	4710	0			0	8	none	0	0.25	13

ASD	250	R	0621	T0608		2	3283	0			0	4	none	0	0.25	13
ASD	302	R	0938	T0851 and T0964		2	684	0			0	0	none	0	0	13
ASD	302	R	0303	T1080		2	728	0			0	0	none	0	0	13
ASD	302	R	1138	T0876		2	618	0			0	0	none	0	0	13
ASD	302	R	1048	T0875		2	684	0			0	0	none	0	0	13
ASD	302	R	0776	T0203		2	1156	0			0	0	none	0	0	13
ASD	302	R	0891	T0813 WATER		2	684	0			0	2	none	0	0	13
ASD	302	R	0878	T0783		2	1156	0			0	0	none	0	0	13
ASD	302	R	0872	T0773		2	1156	0			0	2	none	0	0	13
ASD	302	R	0783	T0713		2	1156	0			0	0	none	0	0	13
ASD	302	R	0630	T0553		2	1156	0			0	0	none	0	0	13
ASD	302	R	0682	C0601		2	1156	0			0	0	none	0	0	13
ASD	302	R	1322	T1101		2	618	0			0	1	none	0	0	13
ASD	224	R	1017	T0581		2	4886	0			0	1	none	0	0	13
ASD	179	R	0885	T0585		2	1202	0			0	1	none	0	0	13
ASD	179	R	0944	C2000		2	1345	0			0	0	none	0	0	13
ASD	224	R	0000	T1601 and T0079		2	3408	0			0	1	none	0	0	13
ASD	224	R	0140	T1461		2	4544	0			0	0	none	0	0	13
ASD	224	R	0214	T1381		2	4544	0			0	0	none	0	0	13
ASD	224	R	0315	C1281 and T1281		2	4544	0			0	0	none	0	0	13
ASD	224	R	0411	C1181		2	4544	0			0	0	none	0	0	13
ASD	224	R	0424	C1171		2	4544	0			0	1	none	0	0	13
ASD	224	R	0572	T1031		2	4754	0			0	0	none	0	0	13
ASD	224	R	0668	T0931		2	4809	0			0	0	none	0	0	13
ASD	302	R	0302	C0251 and T0251		2	728	0			0	0	none	0	0	13
ASD	224	R	1106	T0501 CHURCH		2	4795	0			0	0	none	0	0	13
ASD	224	R	1110			2	4795	0			0	0	none	0	0	13
ASD	224	R	1130	T0481		2	4721	0			0	0	none	0	0	13
ASD	224	R	1224	T0391		2	4721	0			0	1	none	0	0	13
ASD	250	R	0000	T0079 and T1601		2	3651	0			0	1	none	0	0	13
ASD	250	R	0464	C0500		2	3283	0			0	1	none	0	0	13
ASD	250	R	2081	T0355		2	5085	0			0	0	none	0	0	13
ASD	250	R	2367	T0063		2	5085	0			0	0	none	0	0	13
ASD	250	R	2432	T0035		2	5085	0			0	0	none	0	0	13
ASD	250	R	2459	T0245 and T0013		2	5085	0			0	0	none	0	0	13
ASD	302	R	0070	T0063		2	728	0			0	0	none	0	0	13
ASD	179	R	0838	C2175		2	1204	0			0	1	none	0	0	13
ASD	603	R	0415	S0430R	0060	2	2028	1776			0	0	none	0	0	13
ASD	511	R	2634	T0150		2	1334	0			0	0	none	0	0	13
ASD	545	R	0102	T1443		2	949	0			0	0	none	0	0	13
ASD	545	R	0132	C1008 and T1008		2	949	0			0	2	none	0	0	13

ASD	545	R	0248	T0908		2	949	0			0	1	none	0	0	13		
ASD	545	R	0303	T0856		2	949	0			0	0	none	0	0	13		
ASD	545	R	0311	T0856		2	949	0			0	0	none	0	0	13		
ASD	545	R	0437	C0758		2	949	0			0	2	none	0	0	13		
ASD	545	R	0471	T1243		2	949	0			0	0	none	0	0	13		
ASD	603	R	0043	T1265		2	1291	0			0	0	none	0	0	13		
ASD	603	R	0062	T1225		2	1291	0			0	0	none	0	0	13		
ASD	603	R	0064	C2256		2	1291	0			0	0	none	0	0	13		
ASD	603	R	0240	C1217		2	1291	0			0	0	none	0	0	13		
ASD	603	R	0246	T2116		2	1291	0			0	0	none	0	0	13		
ASD	603	R	0256	T2156		2	1291	0			0	0	none	0	0	13		
ASD	511	R	2531	T4052		2	1334	0			0	1	none	0	0	13		
ASD	603	R	0454	C1956		2	2028	0			0	0	none	0	0	13		
ASD	603	R	0533	T1875		2	1070	0			0	4	none	0	0	13		
ASD	603	R	0637	C1808 CRIDER		2	1070	0			0	0	none	0	0	13		
ASD	603	R	0659	T1335		2	1811	0			0	1	none	0	0	13		
ASD	603	R	0752	T1656		2	1811	0			0	0	none	0	0	13		
ASD	603	R	0821	T1596		2	1147	0			0	0	none	0	0	13		
ASD	603	R	0933	T1528		2	1147	0			0	0	none	0	0	13		
ASD	603	R	0968	C1475		2	1147	0			0	0	none	0	0	13		
ASD	603	R	1057	T1376		2	1147	0			0	0	none	0	0	13		
ASD	603	R	1105	T1453		2	1147	0			0	0	none	0	0	13		
ASD	603	R	1179	T1503 FAULK		2	1147	0			0	1	none	0	0	13		
ASD	604	R	0088	T0251		2	430	0			0	0	none	0	0	13		
ASD	604	R	0150	C0175		2	430	0			0	0	none	0	0	13		
ASD	604	R	0202	T0133		2	430	0			0	0	none	0	0	13		
ASD	430	R	0033	CHARLES MILL PARK DR ENT		2	1776	0			0	1	none	0	0	13		
ASD	511	R	0792	T1806		2	2638	0			0	0	none	0	0	13		
ASD	511	C	0000	S0511R	1141	2	5096	5658			0	0	none	0	0	13		
ASD	511	R	0000	S0039R	0157	2	1026	1878			0	0	none	0	0	13		
ASD	511	R	0028	T2506		2	1026	0			0	1	none	0	0	13		
ASD	511	R	0062	T2466		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0109	T1025		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0171	T2375		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0293	C2256		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0294	C2256		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0394	T2156		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0405	C2075		2	1026	0			0	1	none	0	0	13		
ASD	511	R	0453	T2104		2	1026	0			0	0	none	0	0	13		
ASD	511	R	0693	C1904		2	2638	0			0	2	none	0	0	13		
ASD	511	R	0707	T1894		2	2638	0			0	0	none	0	0	13		

ASD	511	R	2527	T4053		2	1334	0			0	0	none	0	0	13	
ASD	511	R	0976	T1654		2	2702	0			0	0	none	0	0	13	
ASD	511	R	1027	C1600		2	2702	0			0	0	none	0	0	13	
ASD	511	R	1515	T1184		2	1324	0			0	0	none	0	0	13	
ASD	511	R	1518	T1184		2	1324	0			0	0	none	0	0	13	
ASD	511	R	1694	T0975		2	1324	0			0	0	none	0	0	13	
ASD	511	R	1720	T0984		2	1324	0			0	0	none	0	0	13	
ASD	511	R	1748	T0964		2	1324	0			0	0	none	0	0	13	
ASD	511	R	1854	S0302R	1125	2	1213	618			0	0	none	0	0	13	
ASD	511	R	1974	T0754		2	1334	0			0	0	none	0	0	13	
ASD	511	R	2024	T0704		2	1334	0			0	0	none	0	0	13	
ASD	511	R	2101	C0620		2	1334	0			0	1	none	0	0	13	
ASD	511	R	2174	T0564		2	1334	0			0	0	none	0	0	13	
ASD	511	R	2330	T0462		2	1334	0			0	0	none	0	0	13	
ASD	511	R	2435	T0350		2	1334	0			0	0	none	0	0	13	
ASD	089	R	1823	PINOAK		2	1908	0			0	0	none	0	0	13	
ASD	058	R	1519	T0212 MILL		2	4126	0			0	0	none	0	0	13	
ASD	058	R	0553	T0803		2	3949	0			0	0	none	0	0	13	
ASD	058	R	0586	C1175		2	3949	0			0	0	none	0	0	13	
ASD	058	R	0606	T0783		2	3087	0			0	0	none	0	0	13	
ASD	058	R	0629	T0954		2	3087	0			0	0	none	0	0	13	
ASD	058	R	0645	T0944		2	3087	0			0	0	none	0	0	13	
ASD	058	R	0659	C0801		2	3087	0			0	0	none	0	0	13	
ASD	058	R	0774	T0852		2	2302	0			0	0	none	0	0	13	
ASD	058	R	0833	T0782		2	2302	0			0	0	none	0	0	13	
ASD	058	R	0960	T0673		2	2302	0			0	0	none	0	0	13	
ASD	058	R	1050	C0601		2	2302	0			0	0	none	0	0	13	
ASD	058	R	1276	T0462		2	3419	0			0	1	none	0	0	13	
ASD	058	R	1375	T0350		2	4126	0			0	0	none	0	0	13	
ASD	058	R	1490	T0232 SCHOOL		2	4126	0			0	1	none	0	0	13	
ASD	058	R	1494	T0232 CHURCH		2	4126	0			0	0	none	0	0	13	
ASD	058	R	0385	T1175		2	3949	0			0	0	none	0	0	13	
ASD	058	R	1578	T0150		2	4126	0			0	3	none	0	0	13	
ASD	060	R	0120	T2812		2	2052	0			0	0	none	0	0	13	
ASD	060	R	0124	T2802		2	2052	0			0	0	none	0	0	13	
ASD	060	R	0240	T2724		2	2052	0			0	0	none	0	0	13	
ASD	060	R	0312	C2575		2	2052	0			0	2	none	0	0	13	
ASD	060	R	0390	T2475		2	2052	0			0	0	none	0	0	13	
ASD	060	R	0444	T2474		2	2052	0			0	0	none	0	0	13	
ASD	060	R	0550	C2404		2	1907	0			0	0	none	0	0	13	
ASD	060	R	0650	C2302 and T2302		2	1907	0			0	0	none	0	0	13	

ASD	060	R	0740	T0585		2	1907	0			0	0	none	0	0	13
ASD	060	R	0781	C2175		2	1907	0			0	1	none	0	0	13
ASD	060	R	0864	T0705		2	1907	0			0	0	none	0	0	13
ASD	060	R	0901	T2104		2	1907	0			0	0	none	0	0	13
ASD	060	R	0999	C0775		2	1907	0			0	0	none	0	0	13
ASD	060	R	1100	T1904		2	4754	0			0	1	none	0	0	13
ASD	060	R	1147	T1894		2	4114	0			0	0	none	0	0	13
ASD	039	R	0475	PLEASANT		2	3364	0			0	1	none	0	0	13
ASD	003	R	0031	T3414		2	1985	0			0	0	none	0	0	13
ASD	003	R	0067	T3364		2	1985	0			0	0	none	0	0	13
ASD	003	R	0093	C0739		2	1985	0			0	0	none	0	0	13
ASD	003	R	0147	T3292		2	1985	0			0	0	none	0	0	13
ASD	003	R	0211	C0739		2	1985	0			0	0	none	0	0	13
ASD	003	R	0446	T3044		2	3463	0			0	0	none	0	0	13
ASD	003	R	0650	S0060	0068	2	4497	2868			0		none	0	0	13
ASD	003	R	0781	LONG LAKE		2	2228	0			0	0	none	0	0	13
ASD	039	R	0000	T1097 WEIL		2	1878	0			0	0	none	0	0	13
ASD	039	R	0040	C1075		2	1878	0			0	0	none	0	0	13
ASD	039	R	0157	S0511R	0000	2	1878	1026			0	2	none	0	0	13
ASD	039	R	0185	T1037		2	1878	0			0	0	none	0	0	13
ASD	039	R	0238	T2606		2	1878	0			0	0	none	0	0	13
ASD	039	R	0468	POTTERY		2	3364	0			0	1	none	0	0	13
ASD	042	R	1804	T0101		4	2797	0			0	0	none	0	0	13
ASD	039	R	0497	C0917		2	3364	0			0	1	none	0	0	13
ASD	039	R	0570	T0857		2	3364	0			0	1	none	0	0	13
ASD	039	R	0672	T0749		2	3364	0			0	0	none	0	0	13
ASD	042	R	0463	C1095 MIFFLIN		2	4710	0			0	0	none	0	0	13
ASD	042	R	0646	S0511C	0004	2	4710	0			0	2	none	0	0	13
ASD	042	R	0926	C0042BCLEVELAND		2	5537	0			0	0	none	0	0	13
ASD	042	R	1041	T0753		2	4308	0			0	1	none	0	0	13
ASD	042	R	1099	T1275		2	4308	0			0	1	none	0	0	13
ASD	042	R	1145	C0601 and T0653		2	4308	0			0	3	none	0	0	13
ASD	042	R	1197	T0593		2	4308	0			0	0	none	0	0	13
ASD	042	R	1234	T0553		2	4308	0			0	0	none	0	0	13
ASD	042	R	1244	T0543		2	4308	0			0	1	none	0	0	13
ASD	042	R	1398	T1080		2	2637	0			0	0	none	0	0	13
ASD	042	R	1756	T0133		4	2797	0			0	0	none	0	0	13
ASD	179	R	0767	T2102		2	1204	0			0	0	none	0	0	13
ASD	097	R	0000	T1099 COE		2	1026	0			0	0	none	0	0	13
ASD	095	R	1155	T0237		2	651	0			0	0	none	0	0	13
ASD	095	R	1243	T2150		2	651	0			0	0	none	0	0	13

ASD	095	R	1291	C2160		2	651	0			0	0	none	0	0	13	
ASD	095	R	1296	T0075		2	651	0			0	0	none	0	0	13	
ASD	095	R	1327	C0175		2	651	0			0	1	none	0	0	13	
ASD	095	R	1343	C2160		2	651	0			0	0	none	0	0	13	
ASD	095	R	1395	C0037		2	651	0			0	0	none	0	0	13	
ASD	096	R	0050	T1453		2	2931	0			0	0	none	0	0	13	
ASD	096	R	0075	T1443		2	2931	0			0	0	none	0	0	13	
ASD	096	R	0151	C1353 and T1353		2	2931	0			0	1	none	0	0	13	
ASD	096	R	0201	T1293		2	2931	0			0	0	none	0	0	13	
ASD	096	R	0254	T1253		2	2931	0			0	0	none	0	0	13	
ASD	096	R	0308	T1193		2	2931	0			0	0	none	0	0	13	
ASD	096	R	0404	WARD		2	3541	0			0	0	none	0	0	13	
ASD	095	R	0953	C2302		2	599	0			0	0	none	0	0	13	
ASD	097	R	0058	T1059		2	1026	0			0	0	none	0	0	13	
ASD	097	R	0197	T3234		2	1026	0			0	0	none	0	0	13	
ASD	097	R	0332	MOHICAN PARK ENTRANCE		2	1026	0			0	0	none	0	0	13	
ASD	179	R	0052	T2650		2	1101	0			0	1	none	0	0	13	
ASD	179	R	0104	T2600		2	1101	0			0	0	none	0	0	13	
ASD	179	R	0133	C0037		2	1101	0			0	1	none	0	0	13	
ASD	179	R	0220	C2575		2	1213	0			0	0	none	0	0	13	
ASD	179	R	0312	C2400		2	1213	0			0	0	none	0	0	13	
ASD	179	R	0358	C0175		2	1213	0			0	0	none	0	0	13	
ASD	179	R	0401	T0257		2	1204	0			0	0	none	0	0	13	
ASD	179	R	0510	T2300		2	1204	0			0	0	none	0	0	13	
ASD	179	R	0520	C0377		2	1204	0			0	1	none	0	0	13	
ASD	179	R	0569	T2252		2	1204	0			0	0	none	0	0	13	
ASD	179	R	0632	T0405		2	1204	0			0	0	none	0	0	13	
ASD	060	R	1215	T1806	1215	2	4408	0			0	0	none	0	0	13	
ASD	089	R	0804	T1500		2	1669	0			0	0	none	0	0	13	
ASD	060	R	1270	C1754		2	4408	0			0	1	none	0	0	13	
ASD	060	R	1312	T1714		2	4408	0			0	0	none	0	0	13	
ASD	060	R	1322	T1714		2	4408	0			0	0	none	0	0	13	
ASD	060	R	1413	C1610		2	4408	0			0	0	none	0	0	13	
ASD	060	R	1435	C1610		2	4408	0			0	0	none	0	0	13	
ASD	060	R	2893	T0346		2	1641	0			0	0	none	0	0	13	
ASD	060	R	3128	T0126		2	2581	0			0	0	none	0	0	13	
ASD	089	R	0000	S0095R	1072	2	717	651			0	0	none	0	0	13	
ASD	089	R	0005	T2252		2	717	0			0	0	none	0	0	13	
ASD	089	R	0105	T2150		2	717	0			0	0	none	0	0	13	
ASD	089	R	0155	T2102		2	717	0			0	2	none	0	0	13	
ASD	089	R	0263	C2000		2	717	0			0	0	none	0	0	13	

ASD	089	R	0332	T1922		2	717	0			0	1	none	0	0	13	
ASD	089	R	0643	T0395		2	1669	0			0	0	none	0	0	13	
ASD	095	R	0897	T0457		2	599	0			0	0	none	0	0	13	
ASD	089	R	1004	C1302		2	2018	0			0	2	none	0	0	13	
ASD	089	R	1075	T1275		2	2018	0			0	0	none	0	0	13	
ASD	089	R	1158	T1150		2	2018	0			0	0	none	0	0	13	
ASD	089	R	1419	T0902		2	2323	0			0	0	none	0	0	13	
ASD	089	R	1620	C0700 and T0700		2	1908	0			0	0	none	0	0	13	
ASD	095	R	0000	T1087 HARROD		2	2018	0			0	0	none	0	0	13	
ASD	095	R	0069	C2786		2	2018	0			0	0	none	0	0	13	
ASD	095	R	0111	C1075		2	2018	0			0	1	none	0	0	13	
ASD	095	R	0246	C0967		2	1037	0			0	0	none	0	0	13	
ASD	095	R	0269	T2704		2	1037	0			0	1	none	0	0	13	
ASD	095	R	0585	T0707		2	599	0			0	0	none	0	0	13	
ASD	095	R	0601	T2475		2	599	0			0	0	none	0	0	13	
ASD	095	R	0762	T2402		2	599	0			0	0	none	0	0	13	
ASD	095	R	0845	T0505		2	599	0			0	0	none	0	0	13	

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