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Introduction

Completing a traffic signal warrant analysis can be tedious and tiresome. The program *WinWarrants 2000* was developed to make completing signal warrants as easy as possible. *WinWarrants 2000* also provides the same easy interface in completing Multi-Way Stop Sign Warrants.

Data entered for both traffic signal and multi-way stop sign warrants are accomplished with a wizard interface. The data entry forms are organized in a logical manner that does not necessarily correspond with the order in the MUTCD. *WinWarrants 2000* provides the flexibility to allow the user to order the wizard's forms to meet their needs.

System Requirements

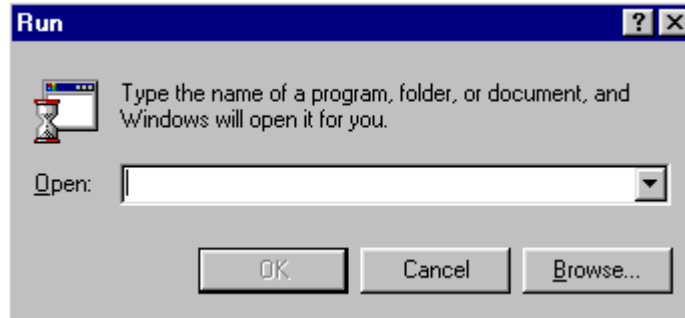
As with all Windows 95 / Windows 98 and Windows NT programs, the faster the CPU, and more RAM the better they will operate. This is true with the *WinWarrants 2000*. However, the following are the minimum requirements to successfully run the *WinWarrants 2000*.

- IBM PC Pentium
- Windows 95/98 or NT
- 16 Mb of RAM (32 Recommended)
- 6 Mb of hard disk space.

Installation

WinWarrants 2000 is distributed on a CD. Insert the CD and do the following:

- Click Start on the TaskBar
- Click Run. The following will appear.



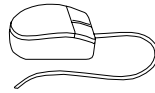
- Enter the drive where the CD is located (ie. D:\) and type SETUP.EXE, or click on Browse, locate the drive, and select SETUP.EXE.

The installation program will create the required folders; copy all the necessary files, and creates an entry under Programs.

Terminology

Most manuals have terms that are used throughout the program and the manual. *WinWarrants 2000* is no exception. There are terms that refer to the Windows environment and there are terms that refer to the traffic engineering elements of *WinWarrants 2000*.

Windows:



Using a Mouse:

A mouse provides an easy way to navigate through Windows programs. All mice have at least two (2) buttons, with some mice having three. In *WinWarrants 2000*, primarily utilizes the **left mouse button**. Therefore, whenever the manual refers to **clicking** the mouse, it means pressing the **left mouse button**.

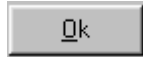
Forms:

The windows that are displayed in *WinWarrants 2000* are called forms. Forms consists of a title, which is displayed along the top, text, and fields. To navigate between fields, clicking on the field will transfer the focus to that particular field. Using a keyboard, pressing **T** will move to the next field, while simultaneously pressing **S T** will move to the previous field.

Hour	Volume E/W	Number of Gaps
1	0	0
2	0	0
3	0	0
4	0	0

The form show above has ten (10) fields; eight **Numeric Fields**, and two command **Button** fields (Cancel, and Ok)

Disable/Enable: A field can be enabled or disabled. An enabled field can have its value modified, or data entered/selected. When a field is disabled, the user cannot access it. A disabled field is typically displayed in light gray.

Buttons:

Button fields look like a raised button and contain text. Clicking a button will select the button.

There are two ways of selecting a button using the keyboard. They are:

- Move to the button field by pressing the **T** key until the button is highlighted. Once the button is highlighted, press **E**.
- While holding the **H** key down, press the key whose letter is underlined on the button. For the Ok button shown above, holding down the **H** key and pressing the **O** key, will select the Ok button.

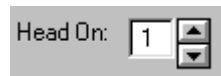
Text Fields:

Text fields are used to enter alphanumeric information. A typical text field in *WinWarrants 2000* is the name of the major street.

Information entered in a text box is accomplished in a similar manner as typing in a word processor. Similar keys are used to maneuver in the text field, such as arrow keys, insert key, and delete key.

Numeric Fields:

In the *WinWarrants 2000*, all numeric fields are integers. Only the digits, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0 are acceptable characters. Therefore, if another key is pressed, the program will ignore it.

Numeric Fields With Spinners:

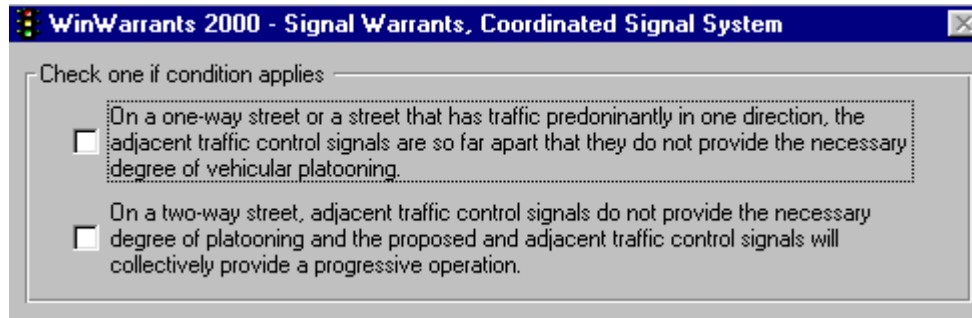
There are times when it is faster to change the value of a numeric field with a mouse and a spinner. A spinner located to the right of a numeric field. Clicking the up arrow will increment the value of the numeric field, whereas clicking the down arrow will decrement the value of the numeric field.

The number in the field also can be changed via the keyboard.

Check Boxes:

Check Box fields provide an easy method to choose multiple items. When a check box item is highlighted, the status, checked, or unchecked, can be toggled by two

methods. One is by clicking within the box with mouse, and the other is to press the space bar.

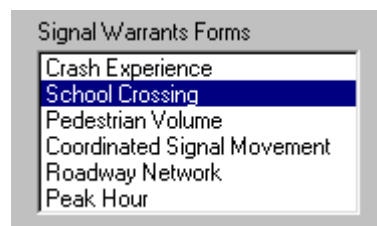


List Boxes:

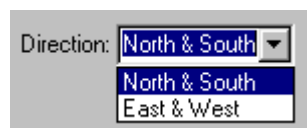
A list box is a rectangular box in which a list of items are displayed. When there are more items than can be displayed in the list box, a vertical scroll bar is displayed on the right hand side. To select an item in a list box, if the item is not currently displayed, click on the vertical scroll bar until the desired item is displayed in the list box. Using the mouse, move the mouse arrow to the desired item and click the mouse. The item will be highlighted. Clicking the **Ok** button located near the list box will select the highlighted item.

To highlight another item using the keyboard, use the **Z**, **Y**, **O**, and **N** keys.

The following is an example of a list box.



Drop Down Lists:



The Drop Down List field is used to select a choice from a list. Clicking on the down arrow will display the drop down list. Clicking on a particular item in the list will select that item.

If you are using the keyboard, once the field is in focus, using the **Z** and **Y** keys will scroll the items in the drop down list. Simultaneously pressing the **H** and

the Y will display the drop down list. Using the Z and Y keys, the appropriate item can be highlighted. Pressing the E key will select the highlighted item.

Date Fields:

A screenshot of a date input field. The field contains two slashes (//) and is followed by the text (MM/DD/YYYY) in parentheses. The field is highlighted with a grey background.

A date is entered using the number keys. **All four digits of the year are required**, therefore there will not be a problem with years after 2000. The date field can be considered to have three subfields linked together. The three subfields are:

- Month
- Day
- Year

Both the month and day subfields are two characters in length, whereas the year subfield is four characters in length. When a subfield is filled, the cursor will jump to the next subfield. Therefore, if the month or day is less than ten (10), entering a leading zero **then** the number, the cursor will automatically jump to the next subfield.

Running WinWarrants

When *WinWarrants 2000* is run, the program performs several housekeeping operations prior to displaying the **Main Menu**.

Once these housekeeping functions are completed, the *WinWarrants 2000*'s **Main Menu** is displayed. The following is the *WinWarrant*'s **Main Menu**.



WinWarrants 2000 has five (5) Main Menu headings; **Signals, Multi-Way Stop, Options, Help, and Exit**. Clicking on a heading will select the heading, or if the heading has options they will be displayed vertically underneath the heading.

The following are the Main Menu headings that have options and their respective options.

Signals

- New
- Edit
- Print
- Database

Multi-Way Stop

- New
- Edit
- Print
- Database

Help

Contents

Search for Help On ..

About WinWarrants

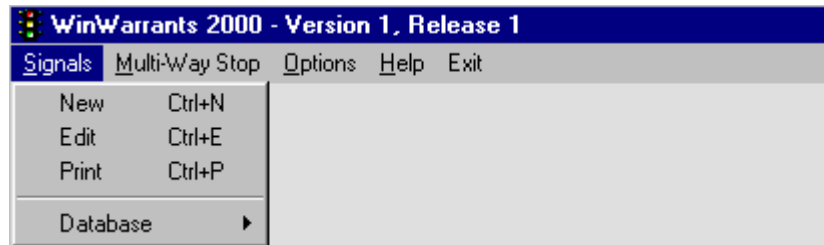
Print Order Form

The following sections of the manual will describe each module that can be accessed from the **Main Menu**.

Signals

The **Signals** menu option allows new Traffic Signal Warrants analysis to be performed, existing Traffic Signal Warrants to be modified, Traffic Signal Warrants to be printed, the database file, SIG2000.DBF, to be viewed, records marked for deletion, and the database to be compacted.

When the **Signals** menu option is chosen by either clicking on **Signals** or pressing **A S**, the **Signals** options are displayed. The following are the **Signals** options.



Signals – New:

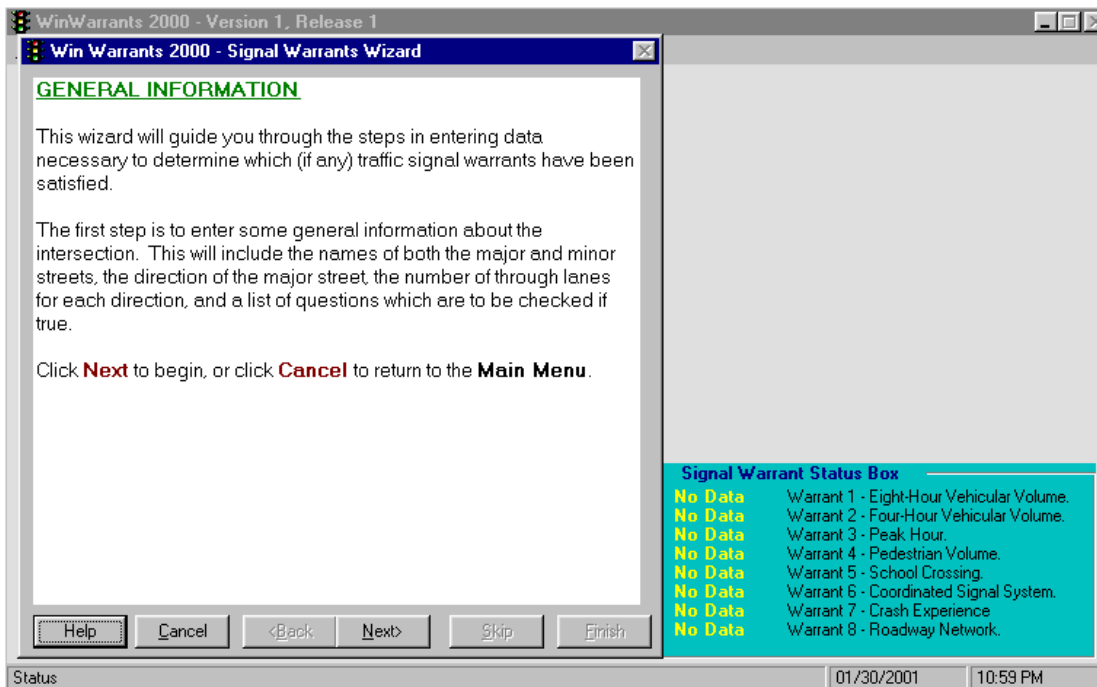
The **Signals-New** option's purpose is to perform a new Traffic Signal Warrant analysis. Prior to starting a new Traffic Signal Warrant analysis, pertinent data should be collected. The following is from the MUTCD.

“Entering study data may include the following:

- A. The number of vehicles entering the intersection in each hour from each approach during 12 hours of an average day. It is desirable that the hours selected contain the greatest percentage of the 24-hour traffic volume.
- B. Vehicular volumes for each traffic movement from each approach, classified by vehicle type (heavy trucks, passenger cars and light trucks, public-transit vehicles, and, in some locations, bicycles), during each 15-minute period of the 2 hours in the morning and 2 hours in the afternoon during which total traffic entering the intersection is the greatest.
- C. Pedestrian volume counts on each crosswalk during the same periods as the vehicular counts in Paragraph B above and during hours of highest pedestrian volume. Where young, elderly, and/or persons with physical or visual disabilities need special consideration, the pedestrians and their crossing times may be classified by general observation.
- D. Information about nearby facilities and activity centers that serve the young, elderly, and/or persons with disabilities, including requests from persons with disabilities for accessible crossing improvements at the location under study. These persons may not be adequately reflected in the pedestrian volume count if the

- absence of a signal restrains their mobility.
- E. The posted or statutory speed limit or the 85th – percentile speed on the uncontrolled approaches to the location.
 - F. A condition diagram showing details of the physical layout, including such features as intersection geometrics, channelization, grades, sight-distance restrictions, transit stops and routes, parking conditions, pavement markings, roadway lighting, driveways, nearby railroad crossings, distance to nearest traffic control signals, utility poles and fixtures, and adjacent land use.
 - G. A collision diagram showing crash experience by type, location, direction of movement, severity, weather, time of day, date, and day of week for at least 1 year.”

Once the **New** option has been chosen, the Traffic Signal Warrant Wizard is evoked. The following will appear.



The Traffic Signal Warrant Wizard is comprised of two components; the **Wizard Form** and the **Signal Warrant Status Box**.

The **Signal Warrant Status Box** displays the eight (8) traffic signal warrants, and their current status. The status can have three states, **No Data**, **Not Satisfied**, and **Satisfied**. As each form's data is completed any applicable warrant(s) will be calculated and their associated status will be updated.

The **Traffic Signal Wizard** form guides the user through the necessary data input to allow for the calculation of the traffic signal warrants.

The majority of the **Traffic Signal Wizard** form is comprised of a topic description that tells what the associated data entry form will consist of and what warrants use the data from that particular form. Along the bottom of the **Traffic Signal Wizard** form are six (6) command buttons. They are:

Help: Clicking Help will bring up help for the current form.

Cancel: Clicking Cancel will terminate the Traffic Signal Wizard and return to the Main Menu.

Back: Clicking Back will display the previous topic.

Next: Clicking Next will display the data entry form that corresponds to the current topic.

Skip: Clicking Skip will skip the current topic and display the next topic.

Finish: Clicking Finish will terminate the **Traffic Signal Wizard**, and allow the data entered to be stored into the Traffic Signal Database, and reports to be printed.

The Traffic Signal Wizard provides eight (8) data entry forms that will allow data entry. They are:

- General Information
- Volumes
- Peak Hour
- Pedestrian Information
- School Crossing
- Coordinated Signal Movement
- Crash Experience
- Roadway Network

Note: The first two data entry forms, **General Information** and **Volumes**, must be completed in the order listed. However, the remaining six (6) forms can be completed in any order. To change the order of the last six data entry forms, select **Options** from the **Main Menu**.

General Information:

Data Required:

- Names and directions of the Major and Minor Streets.

- Number of lanes in each direction of both Major and Minor Streets.
- 85th percentile of the Major Street
- Existing traffic control of study intersection.
- Other geometric features of the study intersection.

Warrants Fully Calculated:

- None

Warrants Depended on Data Entered:

- Warrant 1 – Eight-Hour Vehicular Volume
- Warrant 2 - Four-Hour Vehicular Volume
- Warrant 3 – Peak Hour
- Warrant 7 – Crash Experience
- Warrant 8 – Roadway Network

Description:

The **General Information** form, along with the **Volumes** form, is required to calculate the any traffic signal warrants. The following is an example of the **General Information** form:

The screenshot shows a dialog box titled "WinWarrants 2000 - Signal Warrants, General Information". It has two tabs: "Major Street" (selected) and "Minor Street". The "Major Street" tab contains the following fields:

- Name: [Text Input Field]
- Direction: [Dropdown Menu with "North & South" selected]
- Number of lanes in each direction: [Dropdown Menu with "1" selected]

Below these fields is a section titled "CHECK ALL THAT APPLIES" containing a list of checkboxes:

- 85th percentile speed greater than 40 M.P.H.
- A divided street with a median island that can be used for pedestrian refuge.
- Another traffic signal is located within 300 feet.
- A rural or suburban highway that enters or traverses a city.
- A major route on an official plan, such as a major street plan in an urban area traffic and transportation plan.
- Is part of street or highway system that serves as the principal network for through traffic flow.
- Intersection is in a built-up area of an isolated community having a population of less than 10,000.

At the bottom right of the dialog box are "Cancel" and "Ok" buttons.

The **General Information Form** contains a Tab field in which information regarding the Major Street can be entered, and information pertaining to the Minor Street. To move between the Major and Minor Street fields, click on the either “Major Street” or “Minor Street” tab.

The following is a description of the fields for the Major Street.

Name:

The name of the Major Street is entered here. The street name can up top to **30** characters.

Direction:

This is a drop down list field and is used in the reports and other forms. For simplicity, the only choices are: **North & South**, and **East & West**.

Number of Lanes in Each Direction:

This is a drop down list field. The number of lanes in each direction is important because it is used in the calculation of **Warrant 1**, **Warrant 2**, and **Warrant 3**.

85th Percentile Speed Greater Than 40 M.P.H.

This is a check box field. **Warrant 1**, **Warrant 2**, and **Warrant 3** are dependent on the status of this field.

A Divided Street With a Median Island that can be Used for Pedestrian Refuge.

This check box field is used in **Warrant 4, Pedestrian Volume**. If there is a median island that can be used as a pedestrian refuge, Warrant 4 is calculated different than if there is not a pedestrian refuge in the middle of the street.

Another Traffic Signal is Located Within 300 feet.

This check box field is also used in **Warrant 4, Pedestrian Volume** and, **Warrant 5, School Crossing**.

For Warrant 4 the MUTCD states:

“The Pedestrian Volume signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the proposed traffic control signal will not restrict the progressive movement of traffic.”

For Warrant 5 the MUTCD states:

“The School Crossing signal warrant shall not be applied at locations where the distance to the nearest traffic control signal along the major street is less than 90 m (300 ft), unless the

proposed traffic control signal will not restrict the progressive movement of traffic.”

A Rural or Suburban Highway that Enters or Traverses a City.

This check box field is used in **Warrant 8, Roadway Network**. Warrant 8 has criteria that must be met and one of three additional conditions must also be met. This field is one of the three additional conditions.

A Major Route on an Official Plan, Such as a Major Street Plan in an Urban Area Traffic and Transportation Plan.

This check box field is also used in **Warrant 8, Roadway Network**. Warrant 8 has criteria that must be met and one of three additional conditions must also be met. This field is one of the three additional conditions.

Is Part of Street or Highway System that Serves as the Principal Network for Through Traffic Flow.

This check box field is also used in **Warrant 8, Roadway Network**. Warrant 8 has criteria that must be met and one of three additional conditions must also be met. This field is one of the three additional conditions.

Intersection is in a Built up Area of an Isolated Community Having a Population of Less Than 10,000.

This is a check box field. **Warrant 1, Warrant 2, and Warrant 3** are dependent on the status of this field.

The following is a description of the fields for the Minor Street.

Name:

The name of the Minor Street is entered here. The street name can up to 30 characters.

Number of Lanes in Each Direction:

This is a drop down list field. The number of lanes in each direction is important because it is used in the calculation of **Warrant 1, Warrant 2, and Warrant 3**.

Minor Street Controlled by Stop Signs:

This check box field is used in **Warrant 3**. If the minor street is not controlled by stop signs, **Warrant 3 is automatically not satisfied**.

Volumes:

Data Required:

- Date of the 24 hour traffic count.
- 24 hour traffic counts for both the Major and Minor Streets.

- 15 minute peak hour volumes for both Major and Minor Streets. (Optional)

Warrants Calculated:

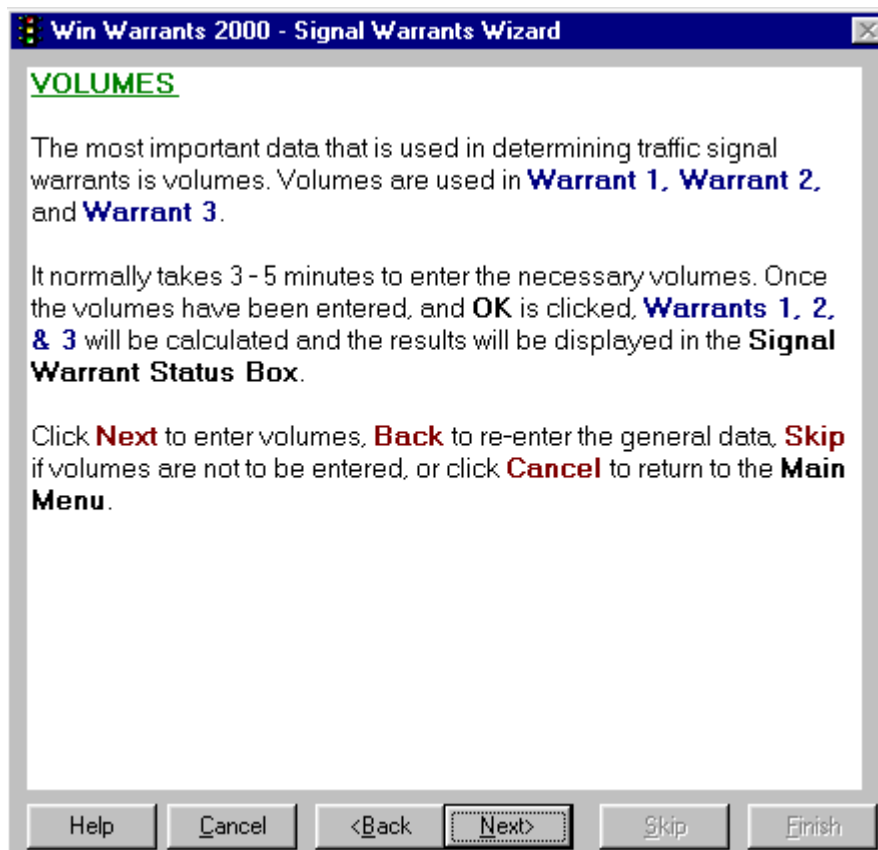
- Warrant 1 – Eight-Hour Vehicular Volume.
- Warrant 2 - Four-Hour Vehicular Volume
- Warrant 3 – Peak Hour

Warrants Depended on Data Entered:

- Warrant 7 – Crash Experience.

Description:

Once the **General Information Form** has been completed, the Signal Wizard will display the following:



The **Volumes Form** is one of the two required forms because many of the traffic signal warrants use the data entered.

At this point, clicking the buttons along the bottom of the Signal Wizard will perform the following actions:

<u>Button</u>	<u>Action</u>
Help:	Display the Volume's help topic.

- Cancel: Exit the entering of a New Signal Warrant analysis and return to the **Main Menu**.
- Back: Re-enter **General Information**.
- Next: Display the **Volumes Form**, and begin entering volumes.

After **Next** has been clicked, the **Volumes Form** will be displayed. The following is the **Volumes Form**.

The **Volumes Form** contains a Tab field in which the Major Street's volumes can be entered, and the Minor Street's volumes can also be entered. To move between the Major Street and Minor Street volumes, click on the either "Major Street" or "Minor Street" tab.

Along the bottom of the **Volumes Form** are five (5) command buttons. The following are the buttons and the action they perform

Button

Action

Help

Display the Volume's help topic.

Peak Hour – 15 Min

Fifteen (15) minute volumes for the peak hour can be entered and may be used when determining **Warrant 3 – Peak Hour**. Clicking Peak Hour-15 Min will display the following form:

WinWarrants 2000 - Signal Warrants, Peak Hour Volumes

Major Street		Minor Street	
15 Minute Period	Volume	15 Minute Period	Volume
1	0	1	0
2	0	2	0
3	0	3	0
4	0	4	0

Warrant 4-Peak Hour Warrant uses the **highest** hourly volume as part of the calculation. The highest hour can be **any four consecutive** 15-minute periods.

If the highest hour **does not** begin at the top of an hour then enter the four consecutive 15-minute periods on this form.

The major street is for **both** approaches and the minor street approach is for **one direction only**.

Cancel Ok

The four fifteen minute intervals can be for any four consecutive fifteen (15) minute intervals. **The same four fifteen minute interval must be used for both the Major Street and Minor Street.**

The Major Street volumes are the total of both approaches, whereas the Minor Street volumes are for one direction only.

Since entering volumes is the most time consuming and tedious of all the data entry, *WinWarrants 2000* provides many short cut keys and methods to make this task as painless as possible. Further on in the **Volumes** description are the short cut keys that can be used in the **Peak Hour 15 Minute Form**.

Once the volumes have been entered, click **Ok** and the values will be used in calculating **Warrant 3 – Peak Hour**.

Import Major	There are times when a study of an intersection requires both a Multi-Way Stop Sign Warrant and Traffic Signal Warrants to be completed. <u>Both warrants use the same volumes for the Major Street.</u> If a Multi-Way Stop Sign Warrant for the study intersection has been completed, clicking Import Major will find the Major Street volumes in the StopSigns database and insert them into the Major Street Volumes.
Cancel	The Signal Wizard will return to General Information where the process can be initiated again.
Ok	Once all the volumes have been entered, and Ok is clicked, calculations will be performed, and the description for the next form will be displayed. (A description on the calculation process is discussed further in this section).

The Major Street Tab has twenty-five (25) fields. They are:

Date of Count: This field is not used for any warrant calculation; however, it is required because it allows the user to know when the count data was taken. This may be important if the data is to be updated at a future date.

Major Street Volumes: There are twenty-four (24) hourly volumes that are to be entered. The volumes can range from 0 to 9,999. Since entering the hourly volumes is the most time consuming portion of the data entry for traffic signal warrants, several “hot key” have been defined to ease the data entry.

The following are the “hot keys”:

<u>Key</u>	<u>Action</u>
Y	Moves cursor to the next hour. At 11:00 p.m. the cursor will move to Midnight.
Z	Moves the cursor to the previous hour. At Midnight the cursor will move to 11:00 p.m.
C }	Moves the cursor to Midnight.
C ~	Moves the cursor to 11:00 p.m.
C d	Deletes all the volumes and moves the cursor to Midnight.
C r	Copies (repeats) the value for the previous hour into the current hour, and moves cursor to the next hour.
C 8	Copies the values in the current hour into all the hours.

Note: Several warrants use the 8th highest volume. If the user has only the 8th highest volume, then pressing Ctrl 8 will insert that value in all the hourly volumes so the various warrants can be calculated.

To enter the volumes on the **Minor Street**, click the tab, “**Minor Street**”. The following shows the fields associated with the Minor Street tab.

Major Street		Minor Street		Major Street		Minor Street	
TIME	VOLUME	TIME	VOLUME	TIME	VOLUME	TIME	VOLUME
Mid:	<input type="text"/>	6:00:	<input type="text"/>	Noon:	<input type="text"/>	6:00:	<input type="text"/>
1:00:	<input type="text"/>	7:00:	<input type="text"/>	1:00:	<input type="text"/>	7:00:	<input type="text"/>
2:00:	<input type="text"/>	8:00:	<input type="text"/>	2:00:	<input type="text"/>	8:00:	<input type="text"/>
3:00:	<input type="text"/>	9:00:	<input type="text"/>	3:00:	<input type="text"/>	9:00:	<input type="text"/>
4:00:	<input type="text"/>	10:00:	<input type="text"/>	4:00:	<input type="text"/>	10:00:	<input type="text"/>
5:00:	<input type="text"/>	11:00:	<input type="text"/>	5:00:	<input type="text"/>	11:00:	<input type="text"/>

ONE APPROACH
The highest volume of either approach can be used.

Buttons: Help, Peak Hour - 15 Min, Import Major, Cancel, Ok

The same short cut keys described in the Major Street fields can also be used in entering the Minor Street hourly volumes.

The Minor Street volumes are for only one approach and can be the highest volume for either approach for any given hour. The following is from the MUTCD.

“... On the minor street the higher volume shall not be required to be on the same approach during each of the 8 hours.”

Once the volumes for the Minor Street have been entered, clicking **Ok** will perform traffic signal warrant calculations based on the volumes entered.

Warrants Calculated:

Once **Ok** has been clicked, Warrants 1, Warrants 2, and Warrant 3 are calculated. A portion of Warrant 7 is also calculated.

Note: There are six (6) additional forms available in calculating traffic signal warrants. The order of these forms is not critical. The remaining six forms are presented in the default order. The order of these forms can be changed via **Options**.

Peak Hour:**Data Required:**

- Intersection geometrics (If the intersection is a “Tee”).
- Total delay on one approach on Minor Street during peak hour.
- Total entering volume during peak hour.
- Volume for Minor Street approach where delay was calculated.

Warrants Calculated:

- Warrant 3 – Peak Hour.

Description:

The MUTCD states:

“The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.”

The following is the Signal Wizard description for **Peak Hour**.

Win Warrants 2000 - Signal Warrants Wizard

PEAK HOUR

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street suffers undue delay when crossing the major street.

Depending on the geometrics, a specified total number of entering vehicles must be met, and the number vehicles on the study's minor street approach must be met.

Click **Next** to for **Peak Hour Warrant**, **Back** to re-enter the previous form, **Skip** to skip **Peak Hour Warrant**, or click **Cancel** to return to the **Main Menu**.

Buttons: Help, Cancel, <Back, Next>, Skip, Finish

Clicking **Next** will display the **Peak Hour Form**:

WinWarrants 2000 - Signals, Peak Hour

Study location is a "Tee" intersection:

Number of Vehicles-Hour Observed: 4

Total entering volume for study peak hour: 2189

Approach Volume on Minor Street where Vehicle-Hours was observed: 4

Buttons: Enter Peak Volumes, Cancel, Ok

The following are the data fields on the **Peak Hour Delay Form**:

Study location is a "Tee" intersection: This check box field when "checked" will reduce the threshold entering volumes from 800 vph to 650 vph.

Number of Vehicle-Hours Observed: This spinner field is where the number of vehicle-hours is entered.

Total entering volume for the study peak hour: The total entering number of vehicles recorded during the peak hour is entered here.

Note: Clicking “Enter Peak Volume” button will bring up the **Peak Hour Volumes Form** that will allow the peak hour volumes, in 15 minute intervals to be entered. The following is **Peak Hour Volumes Form**.

Once the volumes has been entered, and **Ok** clicked, the total entering volumes and the Approach Volume on Minor Street where Vehicle-Hours was observed will be calculated and inserted into the two data fields.

Approach Volumes on Minor Street where Vehicle-Hours was observed: The peak hour volume for the Minor Street, one direction only, is either entered here or the volume was inserted by the **Peak Hour Volumes Form**.

Once the appropriate data has been entered, clicking **Ok** will perform the Warrant 3 calculations. The **Traffic Signal Warrant Status Box** will be updated and the description of the next form to be completed will be displayed.

Pedestrian Information:Data Required:

- Four highest hours of pedestrian volumes.
- Number of qualifying gaps for each hour of the above volumes.

Warrants Calculated:

- Warrant 4 –Pedestrian Volume

Description:

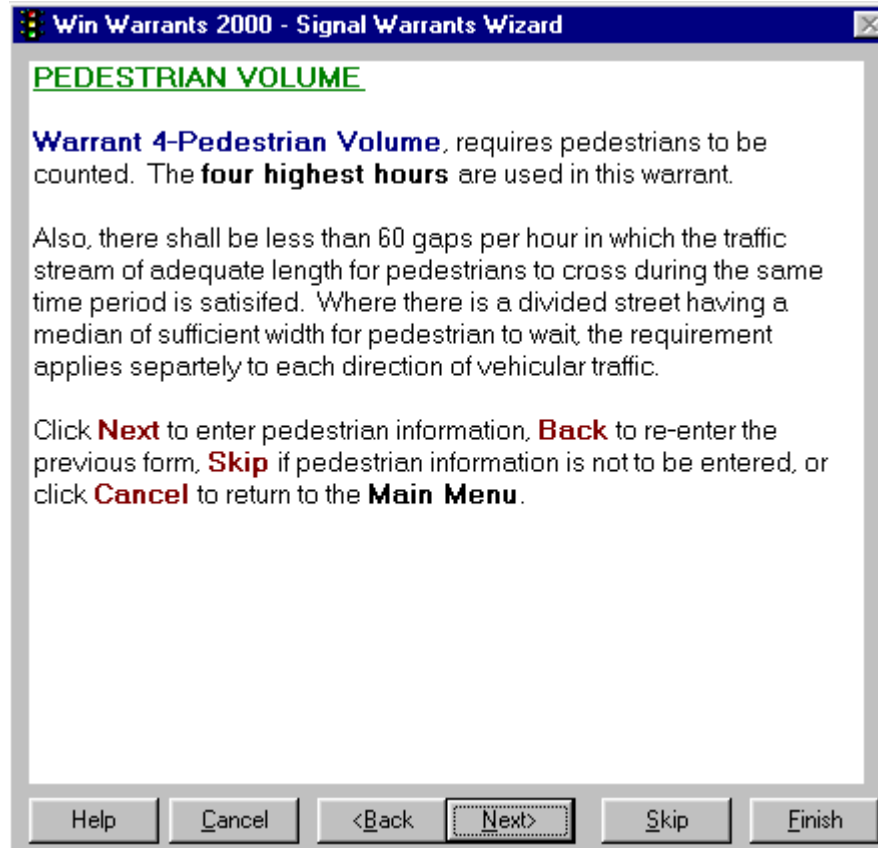
In order to calculate Warrant 4 – Minimum Pedestrian Volume, an extensive amount of field data needs to be gathered. The following is a portion of the requirements for Warrant 3 from the MUTCD which tells about the data that is needed to analyze this warrant.

“The need for a traffic control signal at an intersection or mid-block crossing shall be considered if an engineering study finds that both of the following criteria are met:

- A. The pedestrian volume crossing the major street at an intersection or mid-block location during an average day is 100 or more for each 4 hours or 190 or more during any 1 hour, and
- B. There are fewer than 60 gaps per hour in the traffic stream of adequate length to allow pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. ...”

The pedestrian counts, gaps, and whether the study location has an island that can be used as a refuge must be gathered prior to completing this form.

The following is the Signal Wizard description for **Pedestrian Information**.



Clicking **Next** will display the **Pedestrian Volume Form**.

WinWarrants 2000 - Signals, Pedestrian Volume

Pedestrian Volumes and Gaps

Hour	Volume E/W	Number of Gaps
1	0	0
2	0	0
3	0	0
4	0	0

Buttons: Cancel, Ok

Note: On the **General Information Form** there is a check box that asks if there is a median island that could be a refuge for pedestrians. If checked, the Pedestrian Information Form will display an additional column for pedestrian volumes, and an additional column for gaps. The pedestrian volumes and gaps would be directional.

The following are the data fields of the Pedestrian Information Form:

Hourly Pedestrian Volumes: The number of pedestrians that were observed during an hour. Four hours are required, unless one hour has 190 pedestrians.

Number of Gaps: The number of gaps of adequate length observed for the matching hour of pedestrian volume.

Once the pedestrian volumes and their corresponding gaps have been entered, and the appropriate check boxes, checked, if applicable, clicking **Ok** will perform the Warrant 4 calculations. The **Traffic Signal Warrant Status Box** will be updated and the description of the next form to be completed will be displayed.

School Crossing:

Data Required:

- Time of study, in minutes.
- Number of adequate gaps during the time period.
- Number students crossing during the highest hour.

Warrants Calculated:

- Warrant 5 – School Crossing.

Description:

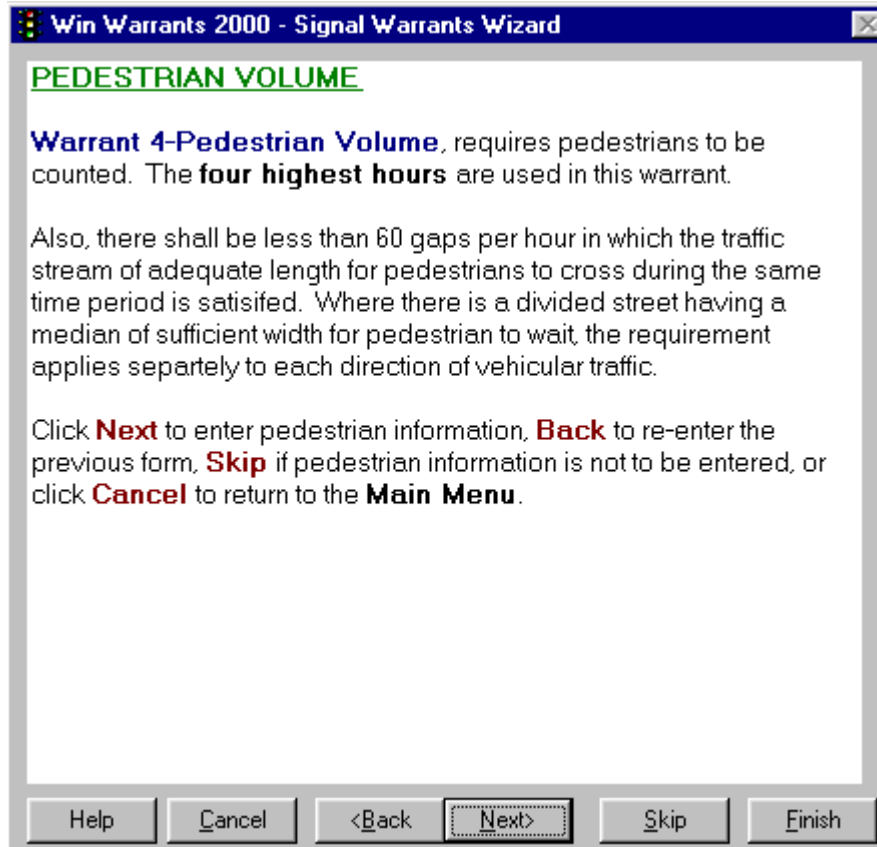
Warrant 5 – School Crossing requires the school crossing to be observed and the number of adequate gaps that occur during the study period to be recorded.

The following description of the data requirements is from the MUTCD:

“The need for a traffic control signal shall be considered when an engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at an established school crossing across the major street shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (see

Section 7A.03) and there are a minimum of 20 students during the highest crossing hour.”

The following is the Signal Wizard description for **School Crossing**.



Clicking **Next** will display the **School Crossing Form**:

The screenshot shows a dialog box titled "WinWarrants 2000 - Signals, School Crossing". It contains three data entry fields, each with a label and a text box: "The study time period in minutes." followed by a text box; "Number of adequate gaps during study time period." followed by a text box; and "Number of students crossing during highest hour:" followed by a text box. At the bottom of the dialog box are two buttons: "Cancel" and "Ok".

There are three (3) data fields on the **School Crossing Form**. The following are the three data fields on the **School Crossing Form**:

Study time period in minutes: Enter the time, to the nearest minute, in which the field study was conducted.

Number of adequate gaps during the study period: During the study period, the number of adequate gaps are recorded. This number is entered in this data field.

Number of students crossing during highest hour: Enter the number of students that cross the major street during the hour where the most number of students are crossing.

Once the study time period and gaps have been entered, clicking **Ok** will perform the Warrant 5 calculations. The **Traffic Signal Warrant Status Box** will be updated and the description of the next form to be completed will be displayed.

Coordinated Signal System:

Data Required:

- Knowledge of the signal system near the study location.
- Signal spacing between study location and nearest traffic signals.

Warrants Calculated:

- Warrant 6 – Coordinated Signal System

Description:

Warrant 6 – Progressive movement is one of two “catch all” warrants. There are very little data calculations for this warrant. The following is the requirements from the MUTCD.

“Progressive movements in a coordinated signal system sometimes necessitates installing traffic control signals at intersections where they would not otherwise be needed in order to maintain proper platooning of vehicles.

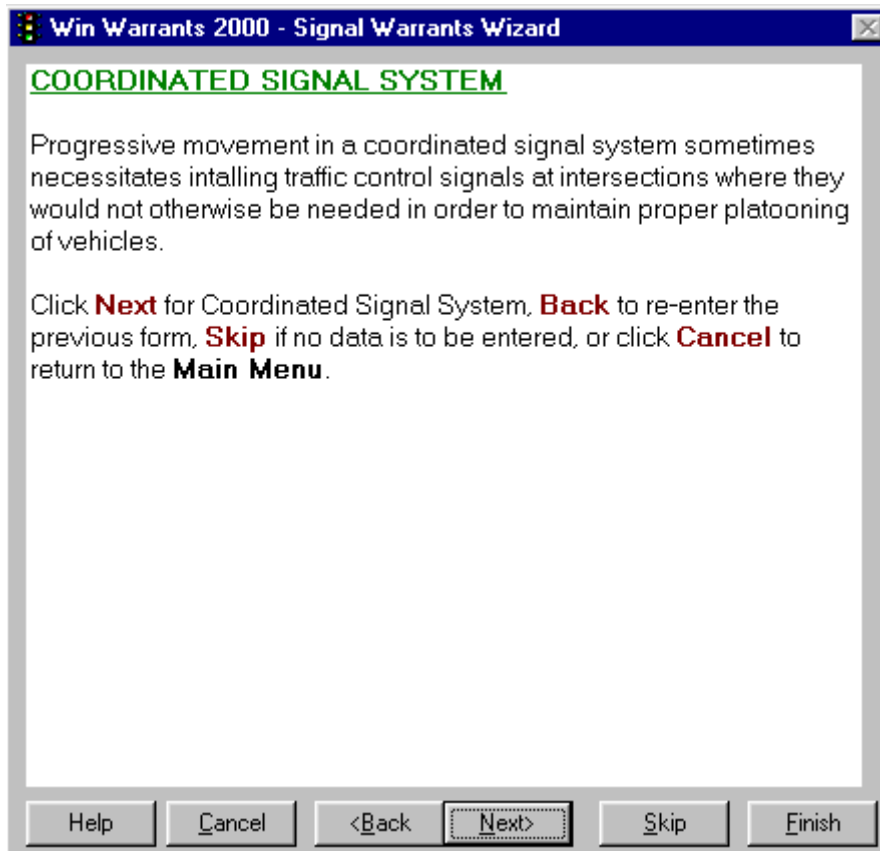
The need for a traffic control signal shall be considered if an engineering study finds that one of the following criteria is met:

- A. On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.
- B. On a two-way street, adjacent traffic signals do not provide the necessary degree of platooning and the

proposed and adjacent traffic control signals will collectively provided a progressive operation.

The Coordinated Signal System signal warrant should not be applied where the resultant spacing of traffic control signals would be less than 300 m (1,000 ft).”

The following is the Signal Wizard description for **Coordinated Signal System**.



Clicking **Next** will display the **Coordinated Signal System Form**:

WinWarrants 2000 - Signal Warrants, Coordinated Signal System

Check one if condition applies

On a one-way street or a street that has traffic predominantly in one direction, the adjacent traffic control signals are so far apart that they do not provide the necessary degree of vehicular platooning.

On a two-way street, adjacent traffic control signals do not provide the necessary degree of platooning and the proposed and adjacent traffic control signals will collectively provide a progressive operation.

Signal Spacing

There is another signal within 1,000 feet of study location.

Cancel Ok

The **Coordinated Signal System Form** has three (3) check box data fields. The first two check box data fields are an either/or check box combination. When one check box is “checked”, the other check box field will be disabled (grayed).

The third check box field is independent of the other two check box fields.

Once the appropriate check boxes have been “checked”, clicking **Ok** will perform the Warrant 65 calculations. The **Traffic Signal Warrant Status Box** will be updated and the description of the next form to be completed will be displayed.

Crash Experience:

Data Required:

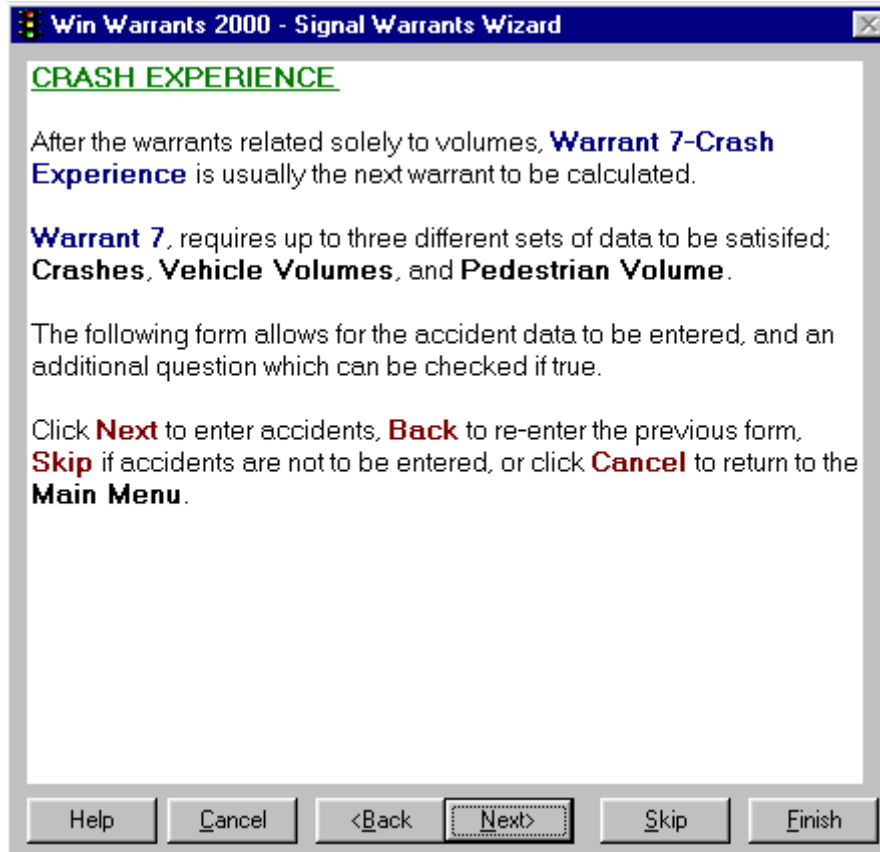
- Traffic crash history. Number of crashes in a twelve-month period, and the types of crash.

Warrants Calculated:

- Warrant 7 – Crash Experience

Description:

Volumes warrants are the most common warrants with Crash Experience a close second. The Signal Wizard displays the following when crashes are to be entered.



Clicking **Next** will display the Crash Form. The following is the Crashes Form.

WinWarrants 2000 - Signal Warrants, Crash Experience

Crash History

Beginning date of 12 month period: / / (MM/DD/YYYY)

Total Number of CORRECTABLE crashes in the 12 month period:

Type of Crashes: (Optional)

Right Angle: Head On: Other:

Rear End: Approach Turn:

Other Required Data

Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency.

Warrant 7 requires 5 or more reported correctible crashes within a 12 month period. The most common type of crashes are; right angle, rear end, head on, and approach turn.

The MUTCD for Warrant 7 states the following:

“The need for a traffic control signal shall be considered if an engineering study finds that **all** of the following criteria are met:

- A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency, and
- B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash, and
- C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80% columns of Condition A in Table 4C-1 (see Section

4C.02), or the vph in both of the 80% columns of Condition B in Table 4C-1 exists on the major street and on the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.”

This purpose of the **Crash Experience Form** is to enter the data to determine if the above criteria are satisfied.

Note: The **Volumes Form**, described earlier, calculates if volumes listed in the 80% columns of both Condition A and Condition B are satisfied and is used in determining if Warrant 7 is met.

The following are the fields found on the Accidents Form:

Beginning Date of Crashes: This field is the beginning date of the twelve (12) month period of the crash experience.

Total Number of Correctable Crahes: This spinner field is the number of **correctable** accidents that was **reported** during the twelve (12) month period specified in the previous field.

Note: The Type of Crash fields, the next five listed, is optional. The purpose of these fields is for data records.

Right Angle: Of the total number of correctable crashes, the number of which was right angle crashes.

Head On: Of the total number of correctable crashes, the number of which were head on crashes.

Rear End: Of the total number of correctable crashes, the number of which was rear end crashes.

Approach Turn: Of the total number of correctable crashes, the number of which were approach turn crashes. An approach turn crash is when two vehicles are traveling on the same road in opposite directions. One vehicle turns left in front of the other vehicle causing a crash.

Other: Of the total number of correctable crashes, the number of crashes which do not fit in any of the above categories.

Adequate Trial of Less Restrictive Remedies with Satisfactory Observance and Enforcement has Failed to Reduce the Crash History: If true, check it.

Once all of the fields have been completed, (the five Type of Crashes fields are optional) click **Ok**.

Once **Ok** has been clicked, **Warrant 7 – Crash Experience** will be calculated, almost. If the number of correctable crashes is five or more, and the check box is checked, the volume requirements will be analyzed and the Warrant 7 status will be updated at that time.

Once this calculation has been completed, the **Signal Warrant Status Box** will be updated.

Roadway Network:

Data Required:

- Total entering volume for a peak hour during an average day.
- Crystal ball to determine future volumes for the next five years.
- Total entering volume for 5 hours of a Saturday and/or Sunday.

Warrants Calculated:

- Warrant 8 – Roadway Network Warrant.

Description:

Warrant 8 – Roadway Network is one of two more subjective warrants. Not only is the existing entering volume needed, but also future volumes. This can be subjective based not only on growth rate, but projected development.

The following is the requirements from the MUTCD:

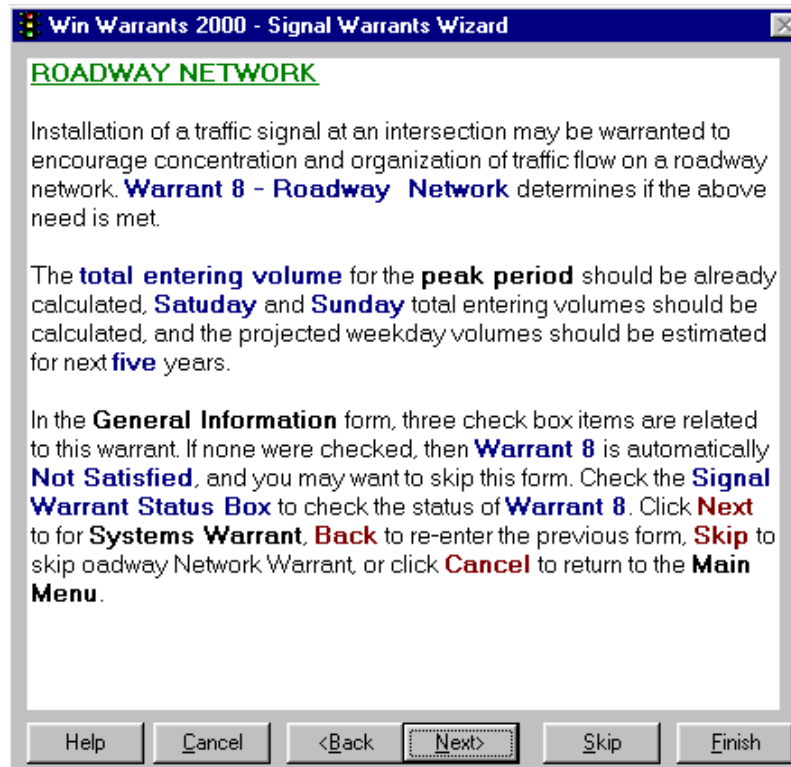
“The need for a traffic control signal shall be considered if an engineering study finds that the common intersection of two or more major routes meets one or both of the following criteria:

- A. The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday, or
- B. The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday).

A major route as used in this signal warrant shall have one or more of the following characteristics:

- A. It is part of the street or highway system that serves as the principal roadway network for through traffic flow, or
- B. It includes rural or suburban highways outside, entering, or traversing a city or
- C. It appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.”

The following is the Signal Wizard description for **Systems**.



Clicking **Next** will display the **Roadway Network Form**:

WinWarrants 2000 - Signals, Roadway Network

Check One of the Following if Applicable

The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday.

The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)

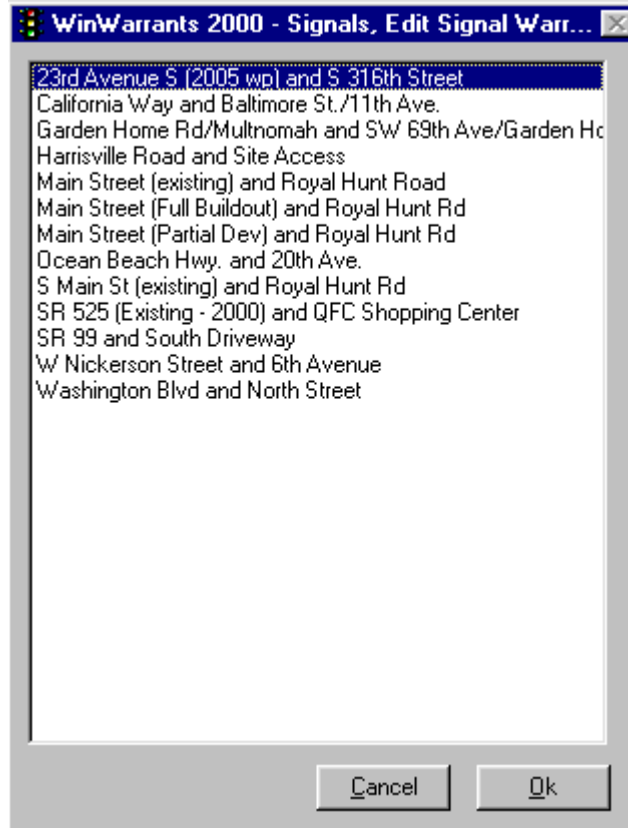
Cancel Ok

The description of each check box is self-explanatory. Once the appropriate check box has been “checked”, if any, clicking **Ok** will perform the Warrant 8 calculations. The **Traffic Signal Warrant Status Box** will be updated and the description of the next form to be completed will be displayed.

File – Edit:

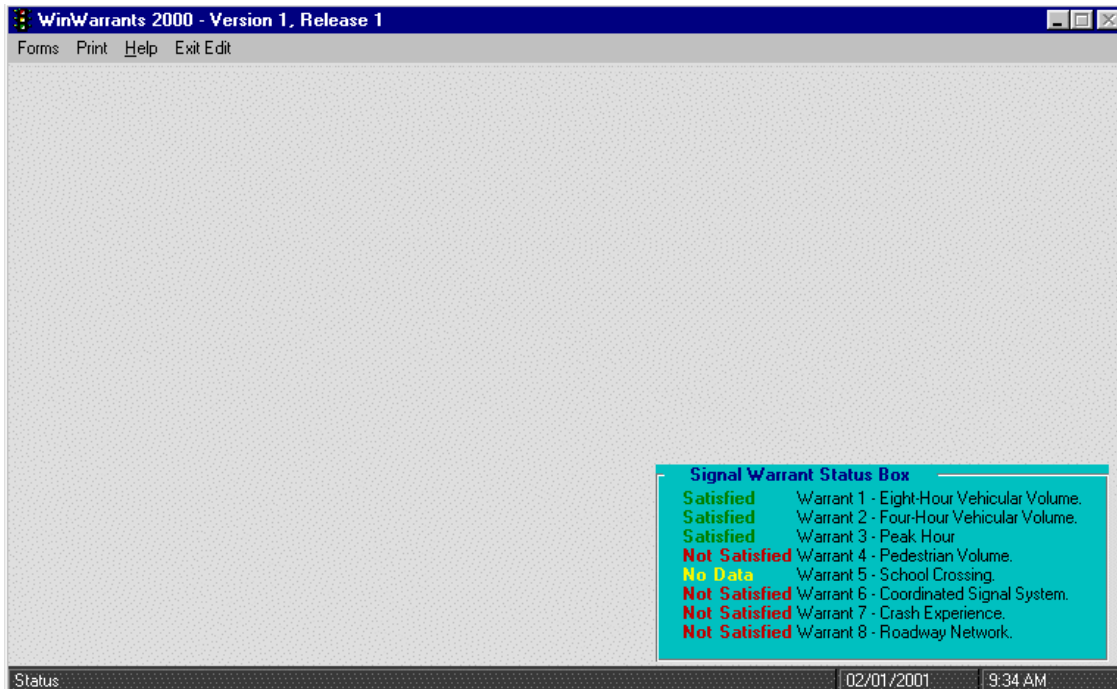
Traffic signal warrants can be saved and stored in the database file, **Sig2000.dbf**. The data can be edited, new warrants calculated, and the results printed.

Once the **Signals-Edit** option has been chosen from the **Main Menu** the **Edit Signal Warrants Form** is displayed. This form will display a list of all the intersections stored in the database file, **Sig2000.dbf**. The following is an example of the **Edit Signal Warrants Form**.



Use the mouse or the arrow keys to highlight the desired intersection. Clicking **Cancel** will return to the **Main Menu**.

Clicking **Ok** will read the information from the database file, **Sig2000.dbf**, and display the **Signal Warrants Status Box**.



The menu displayed at the top of the form is for the **Signal-Edit** options. The following are the **Signal-Edit** options.

Forms: The eight data entry forms which were discussed in detail in the section “**Signals-New**” can be accessed through this option. When Forms is selected, the following will be displayed.

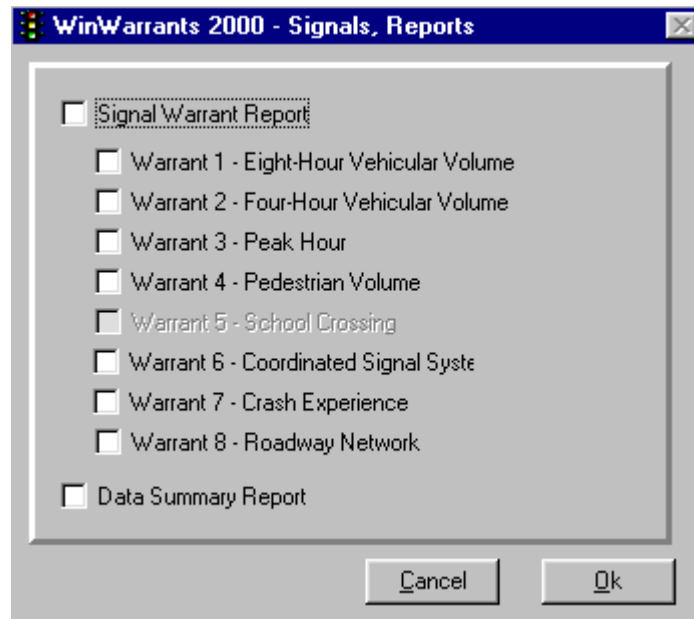


Each form can be displayed, data edited, and warrants re-calculated. **Ok** needs to be clicked for the warrants to be re-calculated.

Print:

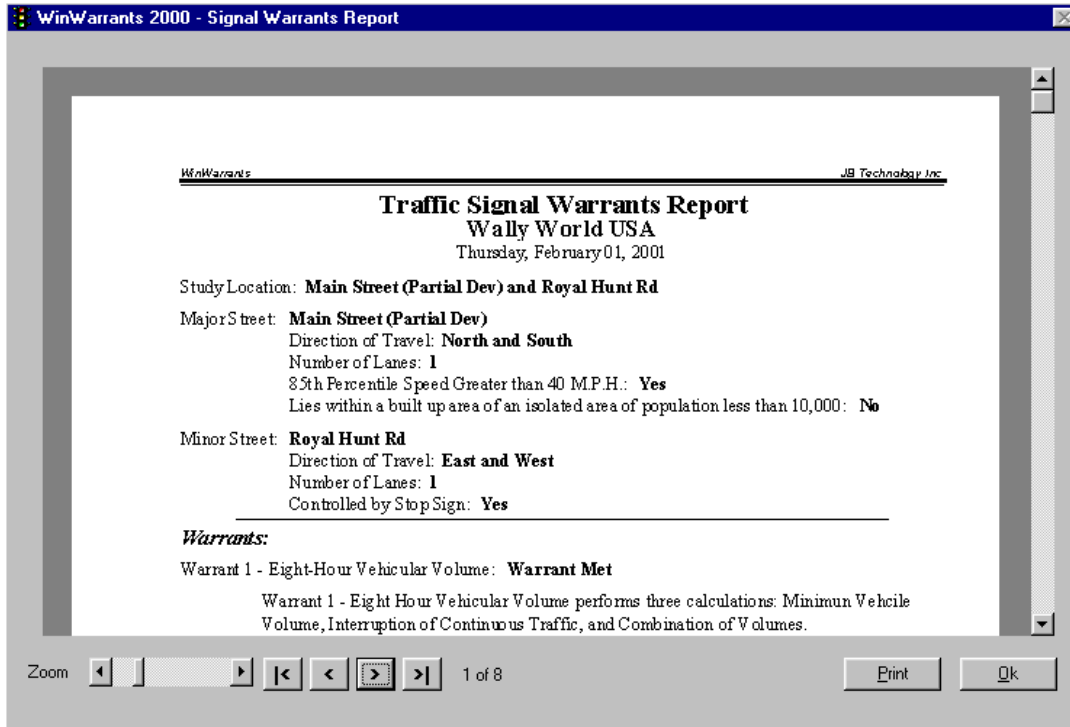
This menu option will print the reports associated with the Traffic Signal Warrant that is being edited.

Once Print has been selected, the **Signals, Report Form** will be displayed. The following is the **Signals, Report Form**:



Two reports are available, the **Signal Warrant Report** and **Data Summary Report**. *WinWarrants 2000* will allow only the warrants which have data entered to be enabled. If there has been no data entered for a particular warrant, that warrant's check box will be disabled (grayed) out.

Once the desired reports have been checked and **Ok** has been clicked, the **View Report Form** will be displayed. The following is an example of the **View Report Form**.



The report(s) will be automatically displayed in the view mode. Each page of the report can be viewed; the report can be zoomed, and printed.

The following are the controls that appear along the bottom of the **View Report Form** and their functions.

Control



Function

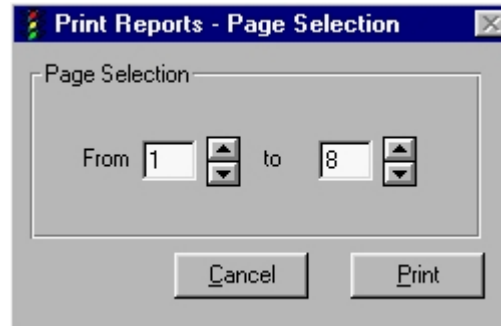
The **Zoom Control** allows the report to be zoomed in for a closer look for all the older folks, like me, or zoomed out. *WinWarrants 2000* was developed with the screen resolution of 600 x 800. If your monitor is set at another resolution, the zoom control will come in handy.



The **Paging Control**, the four buttons shown to the left, displays the different pages of the report. The leftmost button will display the first page. The button that looks like the “less than” sign will display the previous page of the report. The button that looks like the “greater than” sign displays the next page, and finally, the rightmost button will display the last page of the report.



The **Print** button will display the **Page Selection Form**, which allows a specified range of pages to be printed. The following is the **Page Selection Form**.



Once the page range is selected and **Print** is clicked, the report will be printed.

Exit Edit:

This menu option allows the edited data to be saved to the database and return to the **Main Menu**.

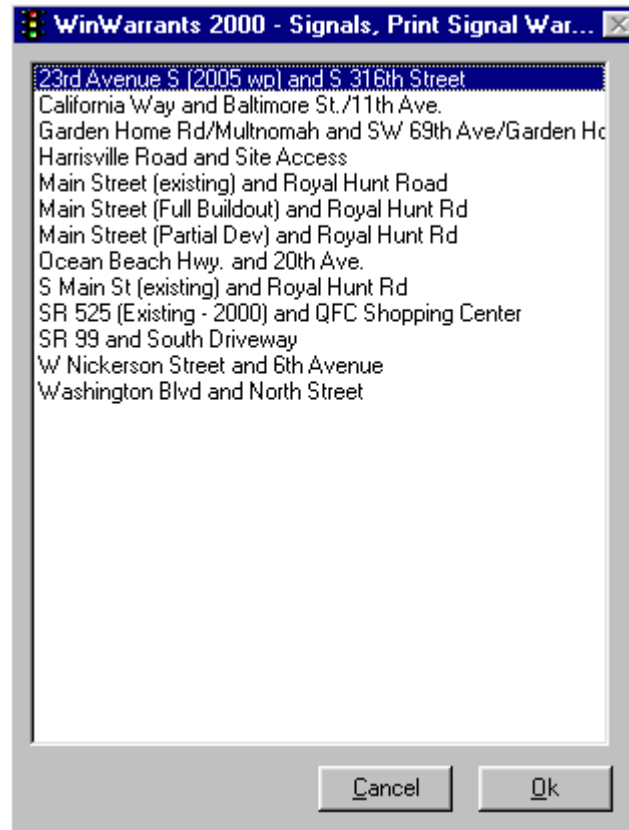
Once **Exit Edit** has been selected, a Yes/No Message Box will be displayed asking if the data should be saved to the database. Click either the **Yes** or **No** button. Clicking **Yes** will replace the database record with the edited data.

The **Main Menu** will then be displayed.

Signals – Print:

Traffic signal warrants can be saved and stored in the database file, **Sig2000.dbf**. The **Print** option retrieves a traffic signal warrant from the database, reports can be selected, viewed and printed.

Once the **Signals-Print** option has been chosen from the **Main Menu** the **Signals, Print Signal Warrants Form** is displayed. This form will display a list of all the intersections stored in the database file, **Sig2000.dbf**. The following is an example of the **Signals, Print Warrants Form**.



Once the desired intersection has been highlighted, click **Ok**. As described under **Edit-Print**, reports can be selected, the report viewed and/or printed.

Signals – Database:

Traffic signal warrants can be saved and stored in the database file, **Sig2000.dbf**. The **Database** option allows intersections to be marked for deletion, undelete an intersection mistakenly marked for deletion, compacts the database, and convert the data from WinWarrants (data stored in Signals.dbf).

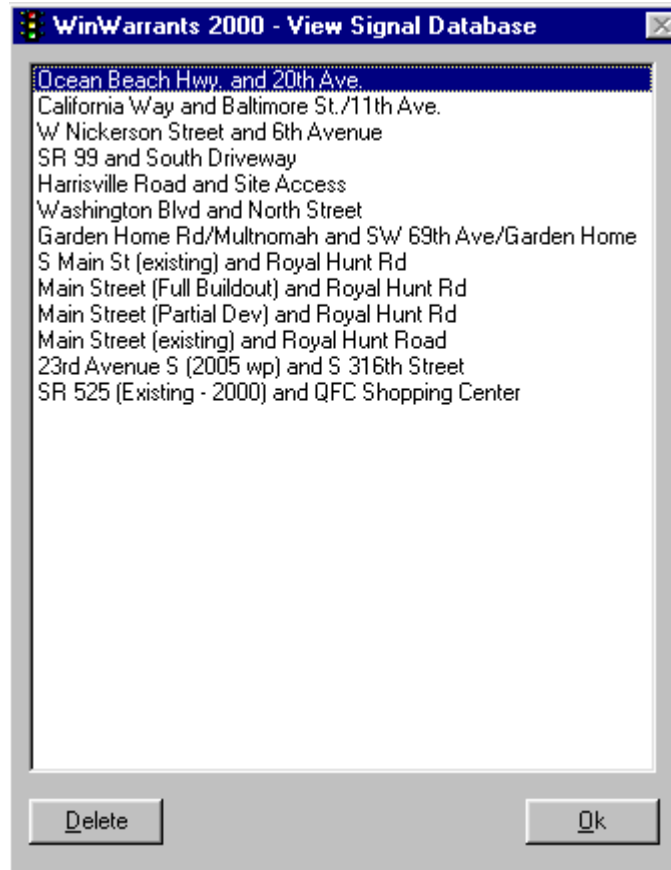
Database-View:

The **Database View** option displays the intersections that are in the database file, **Sig2000.dbf**, and allows any of those intersections to be marked for deletion.

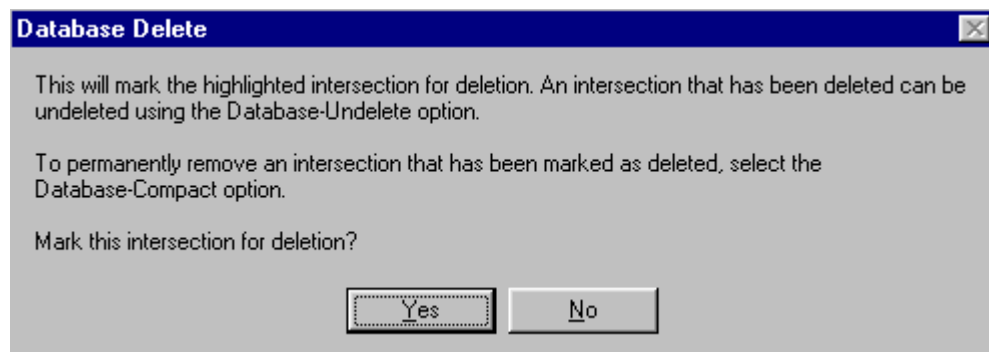
Note: An intersection that is marked for deletion is not physically deleted from the database. Therefore, an intersection that is marked for deletion can be undeleted via the **Database-Undelete** option.

To permanently delete an intersection, the intersection must first be marked for deletion. Compacting the database via the **Database-Compact** option will permanently delete the intersection.

Once **Database-View** option is chosen, the **View Signal Database Form** is displayed. The following is an example of the **View Signal Database Form**.



To mark an intersection for deletion, highlight the intersection and click **Delete**. Once **Delete** has been clicked, the following message box will be displayed.



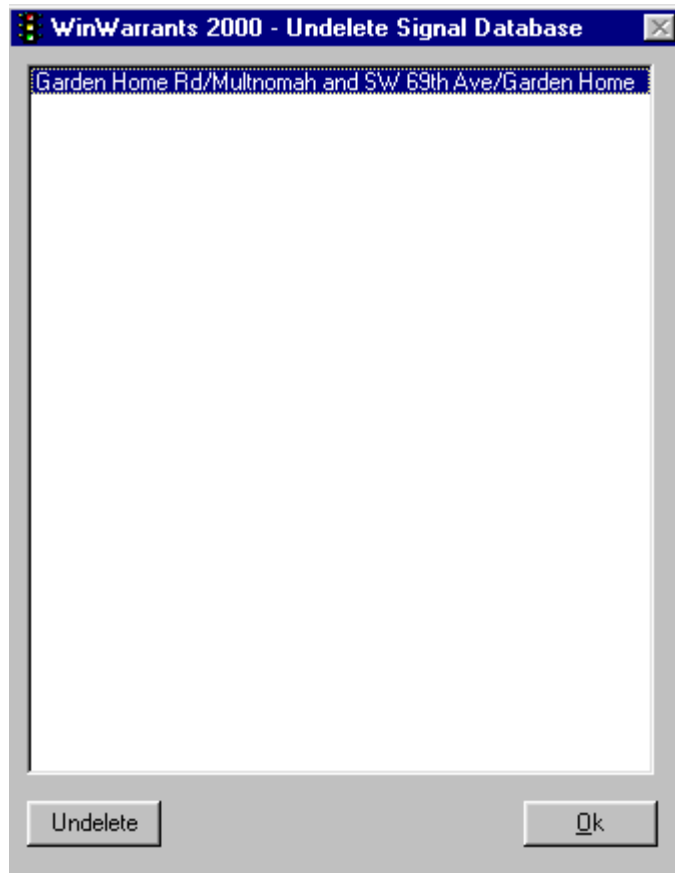
Clicking **Yes** will mark the intersection for deletion.

Once all the intersections that are to be marked for deletion have been selected and marked for deletion click the **View Signal Database Form's** Ok command button to return to the **Main Menu**.

Database-Undelete:

The **Database Undelete** option displays the intersections that have been marked for deletion.

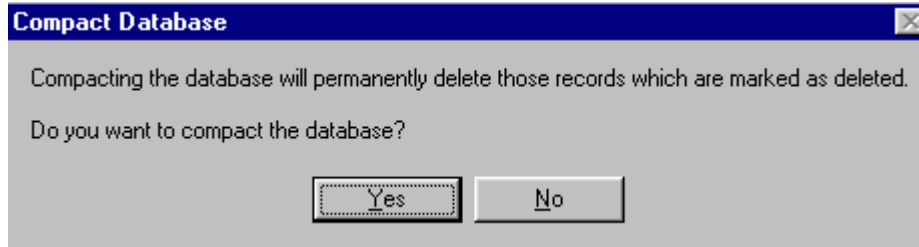
Once **Database-Undelete** option is chosen, the **Undelete Signal Database Form** is displayed. The following is an example of the **Undelete Signal Database Form**.



To undelete an intersection, highlight the intersection and click **Undelete**. Repeat this process until all the desired intersections have been undeleted. Clicking **Ok** will return to the **Main Menu**.

Database-Compact:

The **Database-Compact** option will permanently delete the intersections that have been marked for deletion. Once the Database-Compact option has been chosen, the following Yes/No Message Box will appear.



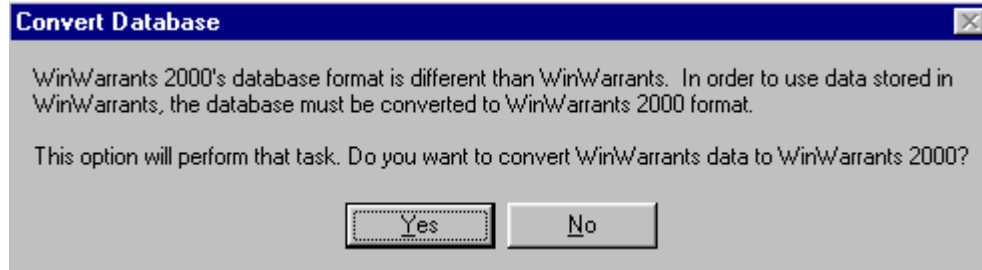
Clicking **Yes** will compact the database, **Sig2000.dbf**, and return to the **Main Menu**. Clicking **No** will return to the **Main Menu** without compacting the database.

Note: Compacting the database will produce a database that is smaller in size and *WinWarrants 2000* will operate faster.

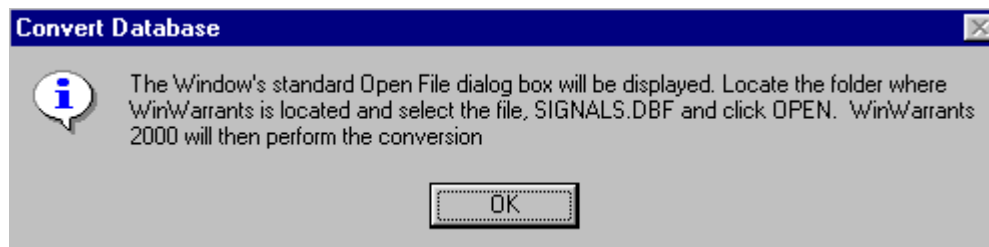
Database-Convert:

The **Database-Convert** option will allow those users of WinWarrants to transfer their data from its database, **Signals.dbf** to *WinWarrants 2000*'s database, **Sig2000.dbf**.

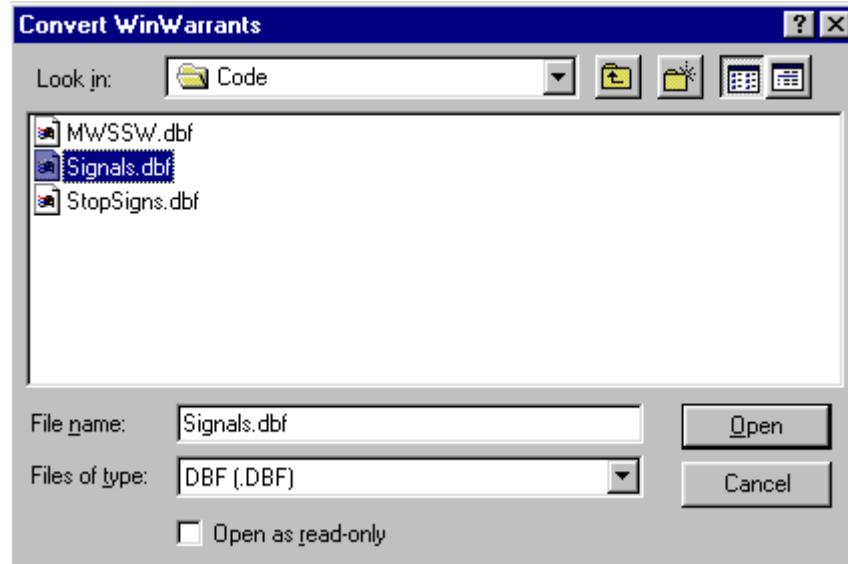
Once the **Database-Convert** option has been selected the following will be displayed:



Clicking **No** will return to the **Main Menu**. Clicking **Yes** will display the following message box.



Once **OK** has been clicked, the Window Open File Dialog box will be displayed. The following is an example of this dialog box.



As shown in the above example, highlight the file **Signals.dbf** and click **Open** to begin the conversion process. Clicking **Cancel** will return to the **Main Menu**.

Once the conversion has been completed, a message box will be displayed indicating the process has been completed, and the *WinWarrants 2000* will return to the **Main Menu**.

Multi-Way Stop

The Multi-Way Stop menu option allows new Multi-Way Stop Warrant analysis to be performed, existing Multi-Way Stop Warrant to be modified, Multi-Way Stop Warrant to be printed, the database file, STOP2000.DBF, to be viewed, records marked for deletion, and the database compacted.

The MUTCD lists the following conditions in which can be met to warrant a multi-way stop sign.

- A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of traffic control signal.
- B. A crash problem, as indicated by five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right- and left-turn collisions as well as right-angle collisions.
- C. Minimum volumes:
 1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day, and
 2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to the minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, but
 3. If the 85th-percentile approach speed of the major-street traffic exceeds 65 km/h (40 mph), the minimum vehicular volume warrants are 70 percent of the above values.
- D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are all satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

Other criteria that may be considered in an engineering study include:

- A. The need to control left-turn conflicts.
- B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes.
- C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to safely negotiate the intersection unless cross traffic is also required to stop.

- D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.”

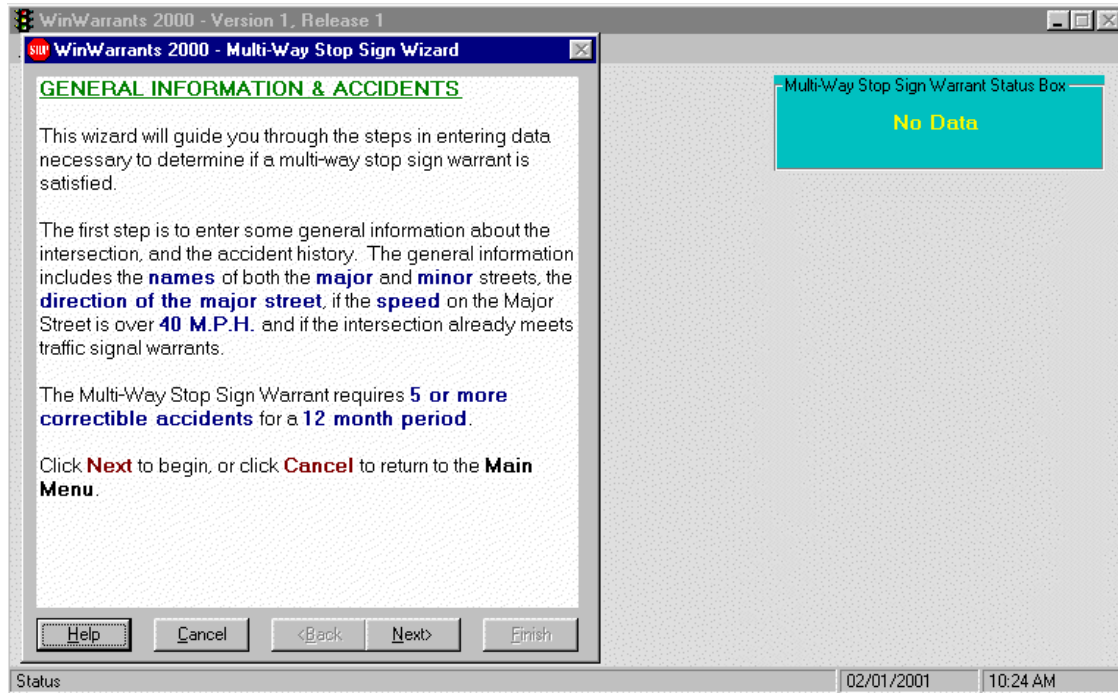
When the **Multi-Way Stop** menu option is chosen by either clicking on **Multi-Way Stop** or pressing **A m**, the **Multi-Way Stop** options are displayed. The following are the **Multi-Way Stop** options.



The **Multi-Way-New** option’s purpose is to perform a new Multi-Way Stop Sign Warrant analysis. Prior to starting a new Multi-Way Stop Sign Warrant analysis, pertinent data should be collected. The following information is required to complete a Multi-Way Stop Sign Warrant analysis.

- The 85th percentile speed on the Major Street.
- Number of correctable collisions during a twelve-month period.
- Hourly traffic counts for total entering volume for a twenty-four hour period.
- Average delay of Minor Street vehicles.

Once the **New** option has been chosen, the Multi-Way Stop Sign Warrant Wizard is evoked. The following will appear.



The Multi-Way Stop Sign Warrant Wizard is comprised of two components; the **Wizard Form** and the **Multi-Way Stop Sign Warrant Status Box**.

The **Multi-Way Stop Sign Warrant Status Box** displays the current status of the Multi-Way Stop Sign Warrant. The status can have three states, **No Data**, **Not Satisfied**, and **Satisfied**. As each form's data is completed the warrant status will be calculated and the status will be updated.

The **Multi-Way Stop Sign Wizard** form guides the user through the necessary data input to allow for the calculation of the Multi-Way Stop Sign warrants.

The majority of the **Multi-Way Stop Sign Wizard** form is comprised of a topic description that tells what associated data will be required for the associated data entry form. Along the bottom of the **Multi-Way Stop Sign Wizard** form are six (6) command buttons. They are:

Help: Clicking Help will bring up help for the current form.

Cancel: Clicking Cancel will terminate the Multi-Way Stop Sign Wizard and return to the **Main Menu**.

Back: Clicking Back will display the previous topic.

Next: Clicking Next will display the data entry form that corresponds to the current topic.

Skip: Clicking Skip will skip the current topic and display the next topic.

Finish: Clicking Finish will terminate the **Multi-Way Stop Sign Wizard**, and allow the data entered to be stored into the Multi-Way Stop Sign Database, and reports to be printed.

The Multi-Way Stop Sign Wizard provides two (2) data entry forms that will allow data entry. They are:

- General Information
- Volumes

General Information:

Data Required:

- Names of the Major and Minor Streets.
- Direction of the Major Street.
- 85th percentile of the Major Street
- Traffic crash history. Number of crashes in a twelve month period, and the types of crashes.

Description:

Information regarding the intersection, speeds, and crash history is entered in the **General Information Form**. The following is an example of the **General Information Form**:

WinWarrants 2000 - Stop Signs, General Information & Crashes

Major Street Minor Street Crashes

Name: Direction: North & South ▾

CHECK ALL THAT APPLIES

- 85th percentile speed greater than 40 M.P.H.
- A traffic signal is warranted and urgently needed.
- Need to control left-turn conflicts
- Need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes.
- Locations where a road user, after stopping, cannot see conflicting traffic and is not able to safely negotiate the intersection unless conflicting cross traffic is also required to stop
- An intersection of two residential neighborhood collector (through) streets of similar design and characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

Cancel Ok

The **General Information Form** contains a Tab field in which information regarding the Major Street can be entered, information pertaining to the Minor Street, and Crash history. To move between the **Major**, **Minor Street**, and **Crashes** fields, click on the either “Major Street”, “Minor Street”, or “Crashes” tab.

The following is a description of the fields for the Major Street.

Name:

The name of the Major Street is entered here. The street name can up top to 30 characters.

Direction:

The Direction field is a drop down list. This field is used only for reporting purposes.

85th Percentile Speed Greater Than 40 M.P.H.

This is a check box field. If the 85th percentile speed is greater than 40 M.P.H., the requirements for the minimum vehicular volume is reduced by 70 percent.

A Traffic Signal is Warranted and Urgently Needed.

This is a check box field. If checked, then the Multi-Way Stop Sign warrant is automatically satisfied.

Need to Control Left-Turn Conflicts.

This is a check box field. If checked, then the Multi-Way Stop Sign warrant is automatically satisfied.

Need to Control Vehicle/Pedestrian Conflicts Near Locations That Generate High Pedestrian Volumes.

This is a check box field. If checked, then the Multi-Way Stop Sign warrant is automatically satisfied.

Locations Where a Road User, After Stopping, Cannot See Conflicting Traffic and is Not Able To Safely Negotiate the Intersection Unless Conflicting Cross Traffic is Also Required to Stop.

This is a check box field. If checked, then the Multi-Way Stop Sign warrant is automatically satisfied.

An Intersection of Two Residential Neighborhood Collector (through) Streets of Similar Design and Characteristics Where Multi-Way Stop Control Would Improve Traffic Operational Characteristics of the Intersection.

This is a check box field. If checked, then the Multi-Way Stop Sign warrant is automatically satisfied.

Note: The MUTCD states that the last four options may be considered in an engineering study. *WinWarrants 2000* assumes that if any of the last four options have been checked that an engineering study has been performed and documented.

The following is a description of the fields for the Minor Street.

Name:

The name of the Minor Street is entered here. The street name can up to 30 characters.

The following are the fields when the “Crashes” tab is clicked.

WinWarrants 2000 - Stop Signs, General Information & Crashes

Major Street Minor Street **Crashes**

Beginning date of 12 month period (MM/DD/YYYY)

Total Number of CORRECTABLE crashes in the 12 month period.

Type of Crashes: (Optional)

Right Angle: Approach Turn:

Head On: Other:

Multi-Way stop sign warrants requires 5 or more correctible crashes within a 12 month period. The most common types include right and left turn crashes as well as right angle crashes.

Cancel Ok

The following is a description of the fields for the Crashes.

Beginning Date of Crashes: This field is the beginning date of the twelve (12) month period of the crash experience.

Total Number of Correctable Crashes: This spinner field is the number of **correctable** crashes that was **reported** during the twelve (12) month period specified in the previous field.

Note: The Type of Crashes fields, the next four listed, is optional. The purpose of these fields is for data records.

Right Angle: Of the total number of correctable crashes, the number of which was right angle crashes.

Head On: Of the total number of correctable crashes, the number of which were head on crashes.

Approach Turn: Of the total number of correctable crashes, the number of which were approach turn crashes. An approach turn crash is when two vehicles are traveling on the same road in opposite directions. One vehicle turns left in front of the other vehicle causing a crash.

Other: Of the total number of correctable crashes, the number of crashes that do not fit in any of the above categories.

Note: The data fields on the **Major** and **Minor** tabs **are** required. However, the accident history **is not required.**

Once all the pertinent data has been entered click **Ok**. *WinWarrants 2000* will check to make sure the required data has been entered. If a required piece of data has not been entered, a message box will be displayed and the data can be entered.

If crash information has been entered, the Multi-Way Stop Sign Warrant Status Box will be updated.

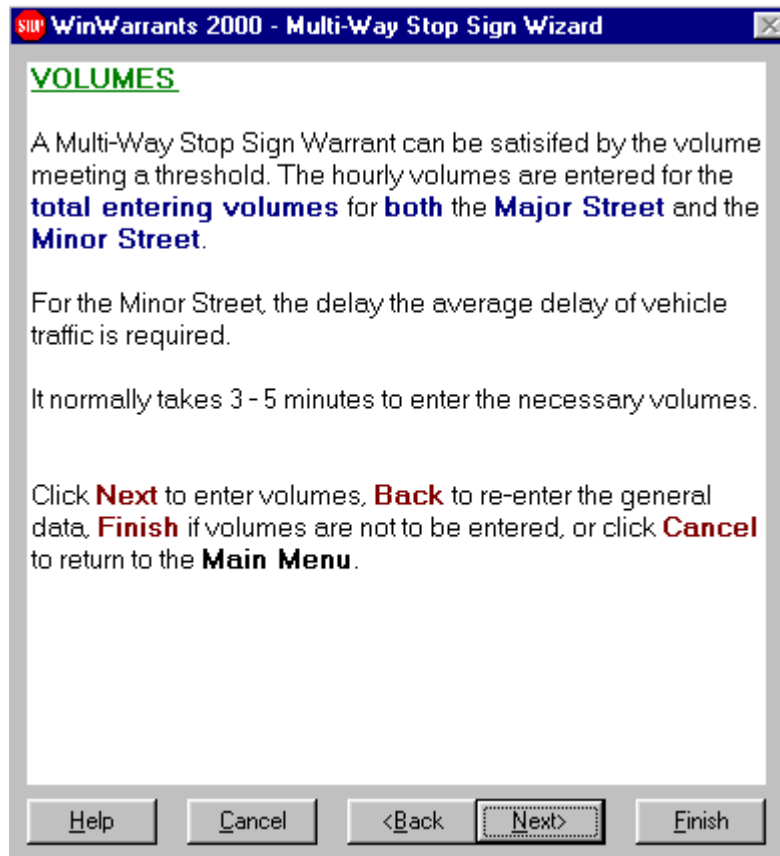
Volumes:

Data Required:

- Date of the 24 hour traffic count.
- 24 hour traffic counts for both the Major and Minor Streets.
- Average delay during the peak hour.

Description:

Once the **General Information Form** has been completed, the Signal Wizard will display the following:



One of the criteria to determine if a Multi-Way Stop Sign is warranted are volumes. The **Volumes Form** is not required.

At this point, the following clicking the buttons will perform the following actions:

<u>Button</u>	<u>Action</u>
Help:	Display the Volume's help topic which may aid the user in entering volumes.
Cancel:	Exit the entering of a New Multi-Way Stop Sign Warrant analysis and return to the Main Menu.
Back:	Re-enter General Information .
Next:	Display the Volumes Form , and begin entering volumes.

After **Next** has been clicked, the **Volumes Form** will be displayed. The following is the **Volumes Form**.

The **Volumes Form** contains a Tab field in which the Major Street’s volumes can be entered, and the Minor Street’s volumes can also be entered. To move between the Major and Minor Street volumes, click on the either “Major Street” or “Minor Street” tab.

Along the bottom of the **Volumes Form** are four (4) command buttons. The following are the buttons and the action they perform

<u>Button</u>	<u>Action</u>
Help	Display the Volume’s help topic that may aid the user in entering volumes.
Import Major	There are times when a study of an intersection requires both a Multi-Way Stop Sign Warrant and Traffic Signal Warrants are to be completed. <u>Both warrants use the same volumes for the Major Street.</u> If a Traffic Signal Warrant for the study intersection has been completed, clicking Import Major will find the

Major Street volumes in the Signals database and insert them into the Major Street Volumes.

- Cancel The Multi-Way Stop Sign Wizard will return to **General Information** where the process can be initiated again.
- Ok Once all the volumes have been entered, and **Ok** is clicked, Multi-Way Stop Sign volume calculations will be performed, the status box will be updated, and you will be asked if the data is to be saved to the database.

The Major Street Tab has twenty-five (25) fields. They are:

Date of Count: This field is not used for the warrant calculation; however, it is required because it allows the user to know when the count data was taken. This may be important if the data is to be updated at a future date.

Major Street Volumes: There are twenty-four (24) hourly volumes that are to be entered. The volumes can range from 0 to 9,999. Since entering the hourly volumes is the most time consuming portion of the data entry for multi-way stop sign warrant, several “hot keys” have been defined to ease the data entry.

The following are the “hot keys”:

<u>Key</u>	<u>Action</u>
Y	Moves cursor to the next hour. At 11:00 p.m. the cursor will move to Midnight.
Z	Moves the cursor to the previous hour. At Midnight the cursor will move to 11:00 p.m.
C }	Moves the cursor to Midnight.
C ~	Moves the cursor to 11:00 p.m.
C d	Deletes all the volumes and moves the cursor to Midnight.
C r	Copies (repeats) the value for the previous hour into the current hour, and moves cursor to the next hour.

To enter the volumes on the **Minor Street**, click the tab, “**Minor Street**”. The following shows the fields associated with the Minor Street tab.

WinWarrants 2000 - Multi-Way Stop Signs, Volumes

Major Street **Minor Street**

Average delay during maximum hour: (Seconds)

TIME	VOLUME	TIME	VOLUME	TIME	VOLUME	TIME	VOLUME
12:00:	<input type="text"/>	6:00:	<input type="text"/>	Noon:	<input type="text"/>	6:00:	<input type="text"/>
1:00:	<input type="text"/>	7:00:	<input type="text"/>	1:00:	<input type="text"/>	7:00:	<input type="text"/>
2:00:	<input type="text"/>	8:00:	<input type="text"/>	2:00:	<input type="text"/>	8:00:	<input type="text"/>
3:00:	<input type="text"/>	9:00:	<input type="text"/>	3:00:	<input type="text"/>	9:00:	<input type="text"/>
4:00:	<input type="text"/>	10:00:	<input type="text"/>	4:00:	<input type="text"/>	10:00:	<input type="text"/>
5:00:	<input type="text"/>	11:00:	<input type="text"/>	5:00:	<input type="text"/>	11:00:	<input type="text"/>

Total Entering Volumes, Including Vehicles, Pedestrians, and Bicycles.

Help Import Major Cancel Ok

The same short cut keys described in the Major Street fields can also be used in entering the Minor Street hourly volumes.

The Minor Street Tab has twenty-five (25) fields. They are:

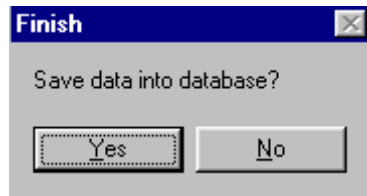
Average Delay During Peak Hour: As the description indicates, the average delay, in seconds, that each vehicle occurs is to be entered in this field. The following is from the MUTCD:

“.. with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour, ..”

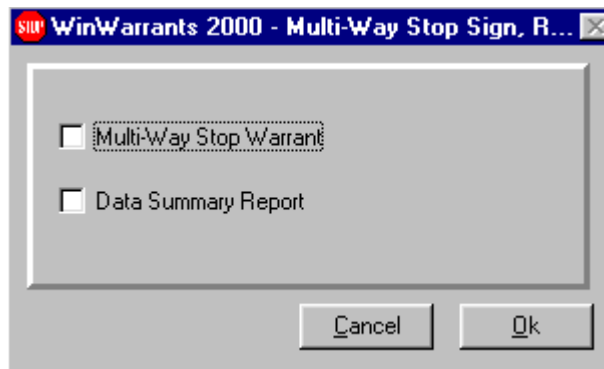
Minor Street Volumes: There are twenty-four (24) hourly volumes that are to be entered. The volumes can range from 0 to 9,999. The same “hot keys” that can be used entering the Major Street volumes are applicable when entering the Minor Street Volumes.

Note: Whereas the Minor Street volumes are for only one approach in the Traffic Signal Warrants, the volumes are the **TOTAL ENTERING** volumes for the Multi-Way Stop Sign Warrant.

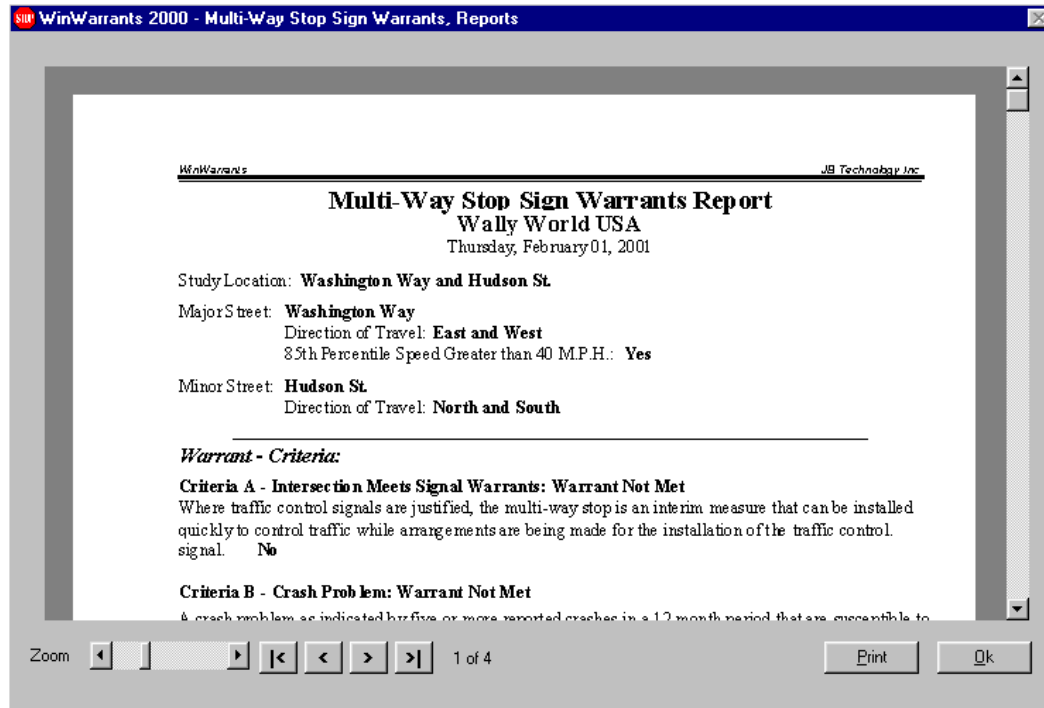
Once the volumes for the Minor Street have been entered, clicking **Ok** will perform the multi-way stop sign warrant calculations based on the volumes entered and the following Yes/No Message Box will be displayed.



Clicking **Yes** will save the information entered into the database file, **Stop2000.dbf**. After clicking either Yes or No, *WinWarrants 2000* will display another Yes/No Message Box which asks if reports are to be printed. Clicking **No** will return to the **Main Menu**. Clicking **Yes** will display the following form.



Once the desired report have been checked and Ok is clicked, the **View Report Form** will be displayed. The following is an example of the **View Report Form**.



The report will be automatically displayed in the view mode. Each page of the report can be viewed; the report can be zoomed, and printed.

The following are the controls that appear along the bottom of the **View Report Form** and their functions.

Control



Function

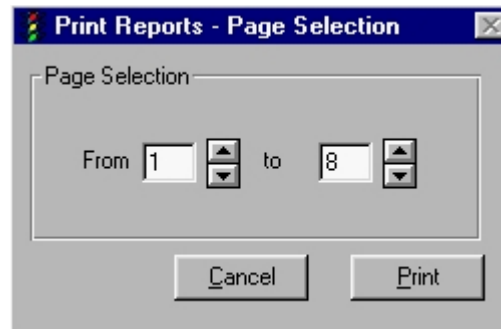
The **Zoom Control** allows the report to be zoomed in for a closer look for all the older folks, like me, or zoomed out. *WinWarrants 2000* was developed with the screen resolution of 600 x 800. If your monitor is set at another resolution, the zoom control will come in handy.



The **Paging Control**, the four buttons shown to the left, allows the display of the different pages of the report. The leftmost button will display the first page. The button that looks like the “less than” sign will display the previous page of the report. The button that looks like the “greater than” sign displays the next page, and finally, the rightmost button will display the last page of the report.



The **Print** button will display the **Page Selection Form** that allows a specified range of pages to be printed. The following is the **Page Selection Form**.



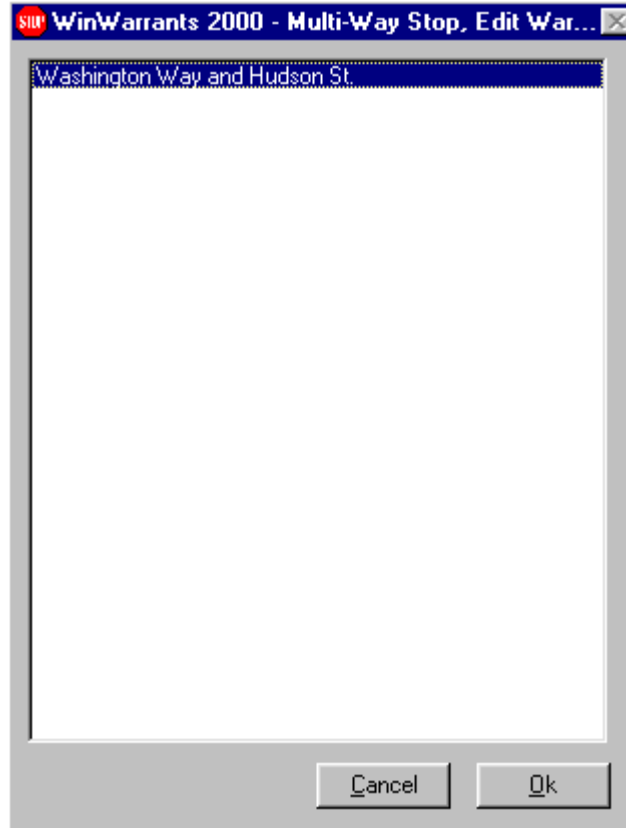
Once the page range is selected and **Print** is clicked, the report will be printed.

Once the reports have been viewed/printed, clicking **Ok** will return to the **Main Menu**.

Multi-Way Stop – Edit:

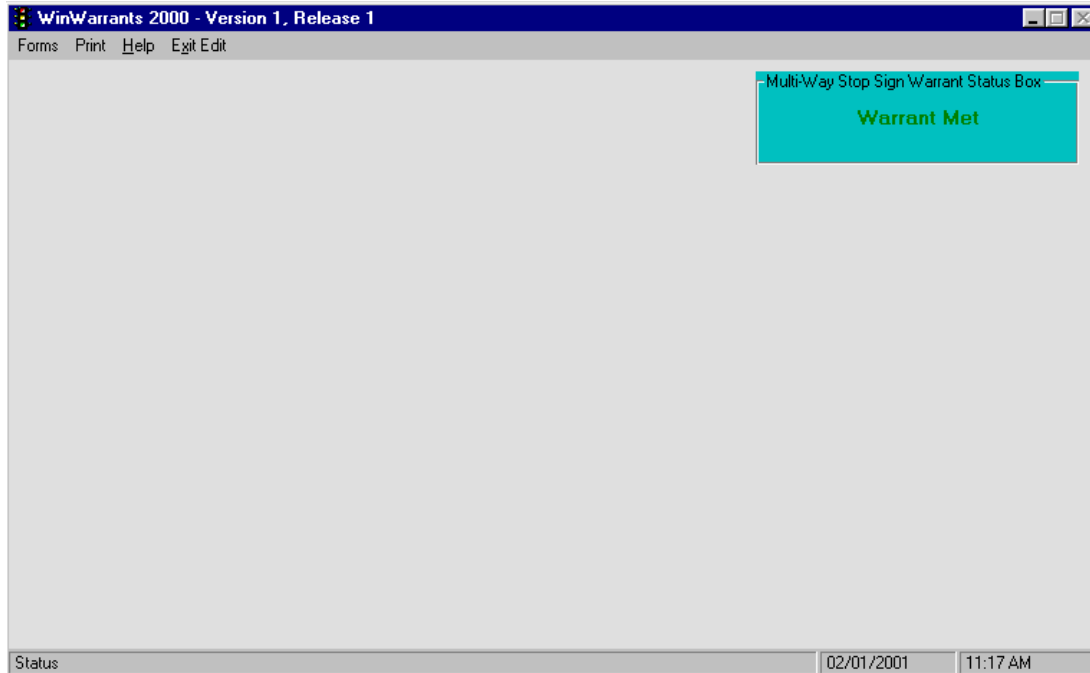
Multi-Way Stop Sign warrants can be saved and stored in the database file, **Stop2000.dbf**. The data can be edited, the warrant recalculated, and the results printed.

Once the **Multi-Way Stop-Edit** option has been chosen from the **Main Menu** the **Multi-Way Stop, Edit Warrants Form** is displayed. This form will display a list of all the intersections stored in the database file, **Stop2000.dbf**. The following is an example of the **Multi-Way Stop, Edit Warrants Form**.



Use the mouse or the arrow keys to highlight the desired intersection. Clicking **Cancel** will return to the **Main Menu**.

Clicking **Ok** will read the information from the database file, **StopSigns.dbf**, and display the **Multi-Way Stop Sign Warrants Status Box**.



The menu displayed at the top of the form is for the **Multi-Way Stop Sign-Edit** options. The following are the **Multi-Way Stop Sign-Edit** options.

Forms: The two data entry forms that were discussed earlier can be accessed through this option. When **Forms** is selected, the following will be displayed.

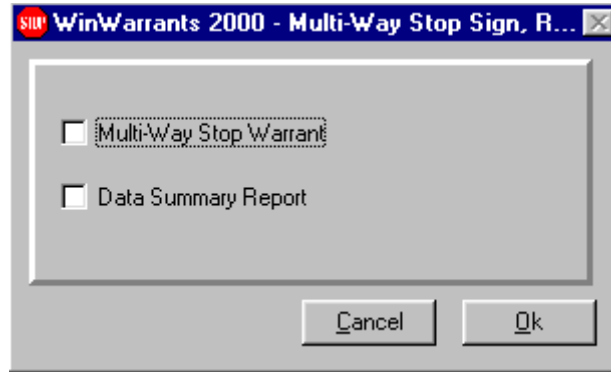


Each form can be displayed, data edited, and the warrant recalculated. **Ok** needs to be clicked for the warrants to be recalculated.

Print:

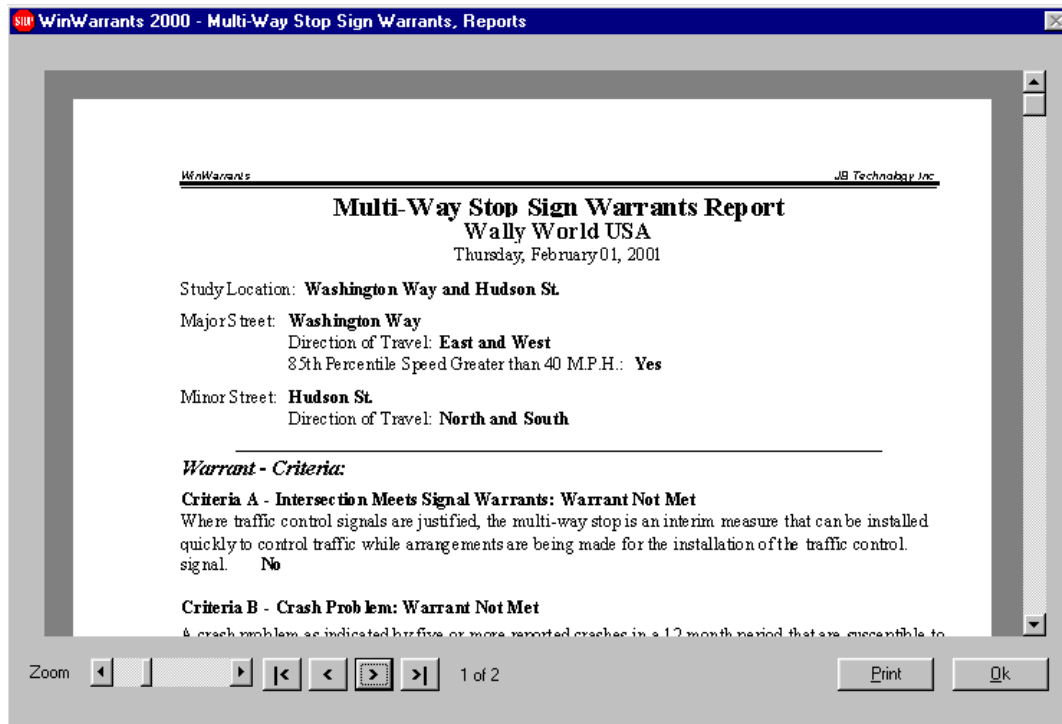
This menu option will print the reports associated with the Multi-Way Stop Sign Warrant that is being edited.

Once **Print** has been selected, the **Multi-Way Stop Sign, Report Form** will be displayed. The following is the **Multi-Way Stop Sign, Report Form**:



Two reports are available, the **Multi-Way Stop Warrant Report** and **Data Summary Report**.

Once the desired report have been checked and Ok is clicked, the **View Report Form** will be displayed. The following is an example of the **View Report Form**.



The report will be automatically displayed in the view mode. Each page of the report can be viewed; the report can be zoomed, and printed.

The following are the controls that appear along the bottom of the View Report Form and their functions.

Control

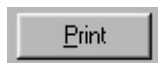


Function

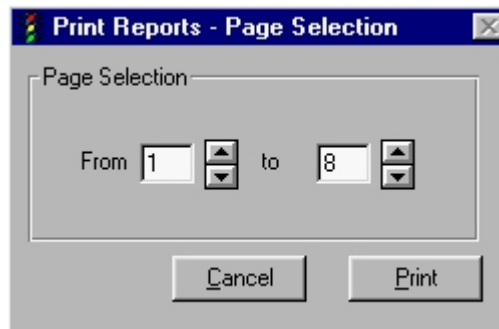
The **Zoom Control** allows the report to be zoomed in for a closer look for all the older folks, like me, or zoomed out. *WinWarrants 2000* was developed with the screen resolution of 600 x 800. If your monitor is set at another resolution, the zoom control will come in handy.



The **Paging Control**, the four buttons shown to the left, allows the display of the different pages of the report. The leftmost button will display the first page. The button that looks like the “less than” sign will display the previous page of the report. The button that looks like the “greater than” sign displays the next page, and finally, the rightmost button will display the last page of the report.



The **Print** button will display the **Page Selection Form** that allows a specified range of pages to be printed. The following is the **Page Selection Form**.



Once the page range is selected and **Print** is clicked, the report will be printed.

Exit Edit:

This menu option allows the edited data to be saved to the database and return to the **Main Menu**.

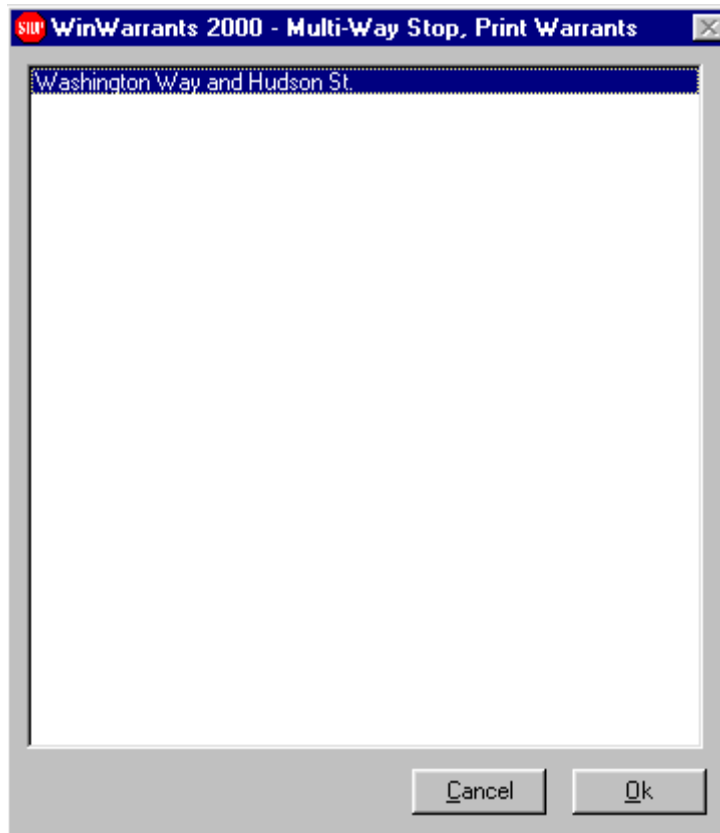
Once **Exit Edit** has been selected, a Yes/No Message Box will be displayed asking if the data should be saved to the database. Click either the **Yes** or **No** button. Clicking **Yes** will replace the database record with the edited data.

The **Main Menu** will then be displayed.

Multi-Way Stop – Print:

Multi-Way Stop Sign warrants can be saved and stored in the database file, **Stop2000.dbf**. The **Print** option retrieves a multi-way stop sign warrant from the database. Reports can be selected, viewed and printed.

Once the **Multi-Way Stop-Print** option has been chosen from the **Main Menu** the **Multi-Way Stop, Print Warrants Form** is displayed. This form will display a list of all the intersections stored in the database file, **Stop2000.dbf**. The following is an example of the **Multi-Way Stop, Print Warrants Form**.



Once the desired intersection has been highlighted click **Ok**. As described under **Edit-Print**, reports can be selected, the report viewed and/or printed.

Multi-Way Stop – Database:

Multi-Way Stop Sign warrants can be saved and stored in the database file, **Stop2000.dbf**. The **Database** option allows intersections to be marked for deletion, undelete intersection mistakenly marked for deletion, and the database can be compacted.

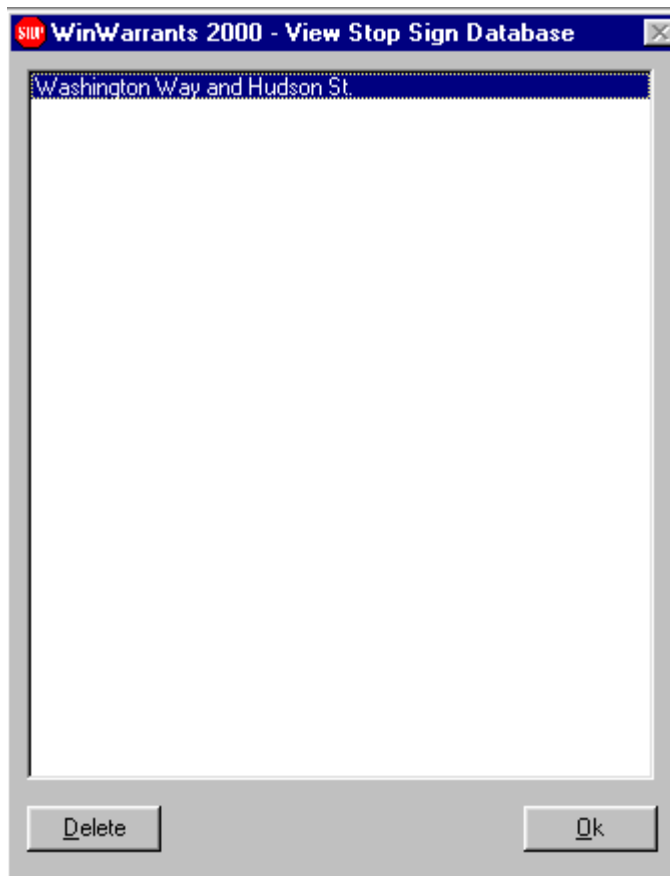
Database-View:

The **Database View** option displays the intersections that are in the database file, **Stop2000.dbf**, and allows any of those intersections to be marked for deletion.

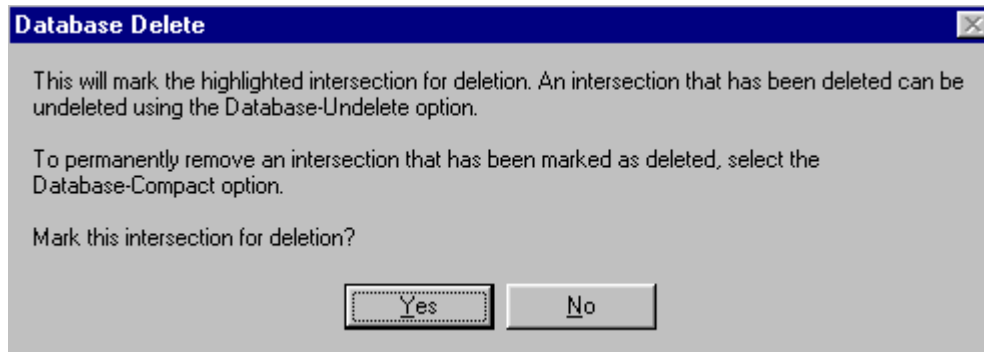
Note: An intersection that is marked for deletion is not physically deleted from the database. Therefore, an intersection that is marked for deletion can be undeleted via the **Database-Undelete** option.

To permanently delete an intersection, the intersection must first be marked for deletion, and then the database is compacted via the **Database-Compact** option.

Once **Database-View** option is chosen, the **View Stop Sign Database Form** is displayed. The following is an example of the **View Stop Sign Database Form**.



To mark an intersection for deletion, highlight the file and click **Delete**. Once **Delete** has been clicked, the following message box will be displayed.



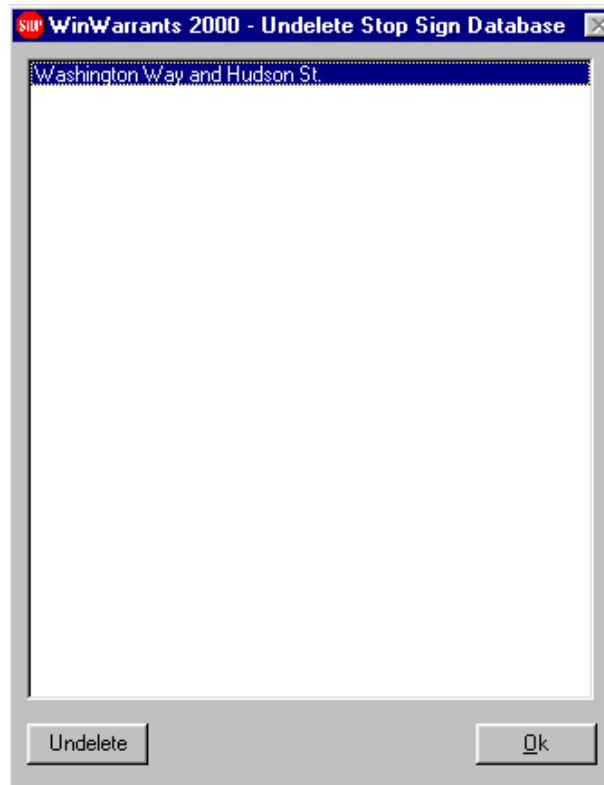
Clicking **Yes** will mark the intersection for deletion.

Once all the intersections which are to be marked for deletion have been selected and marked for deletion, click the **View Multi-Way Stop Sign Database Form's** Ok command button to return to the **Main Menu**.

Database-Undelete:

The **Database Undelete** option displays the intersections that have been marked for deletion.

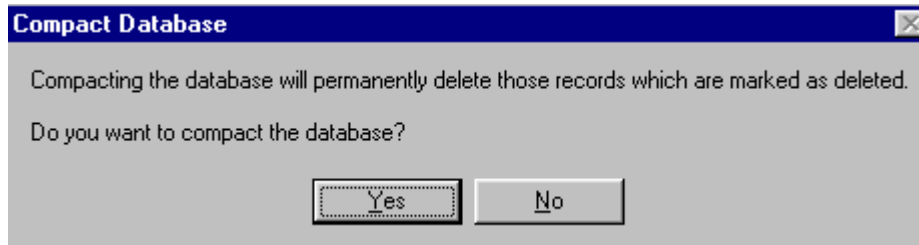
Once **Database-Undelete** option is chosen, the **Undelete Stop Sign Database Form** is displayed. The following is an example of the **Undelete Stop Sign Database Form**.



To undelete an intersection, highlight the intersection and click **Undelete**. Repeat this process until all the desired intersections have been undeleted. Clicking **Ok** will return to the **Main Menu**.

Database-Compact:

The **Database-Compact** option will permanently delete the intersections that have been marked for deletion. Once the **Database-Compact** option has been chosen, the following Yes/No Message Box will appear.



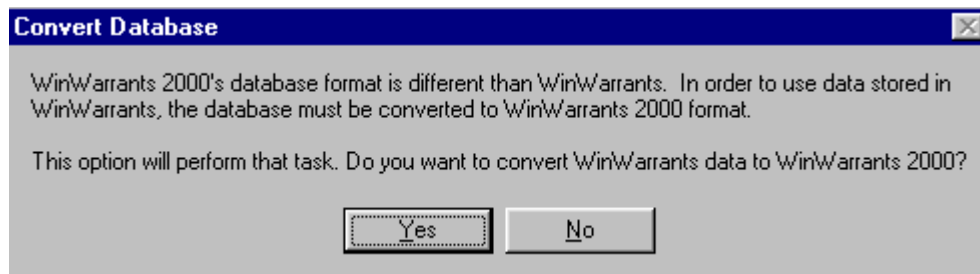
Clicking **Yes** will compact the database, **Stop2000.dbf**, and return to the **Main Menu**. Clicking **No** will return to the **Main Menu** without compacting the database.

Note: Compacting the database will produce a database that is smaller in size and *WinWarrants2000* will operate faster.

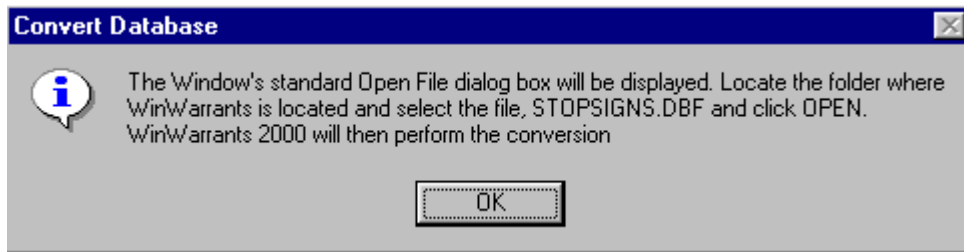
Database-Convert:

The **Database-Convert** option will allow those users of WinWarrants to transfer their data from its database, **Stopsigns.dbf** to *WinWarrants 2000's* database, **Stop2000.dbf**.

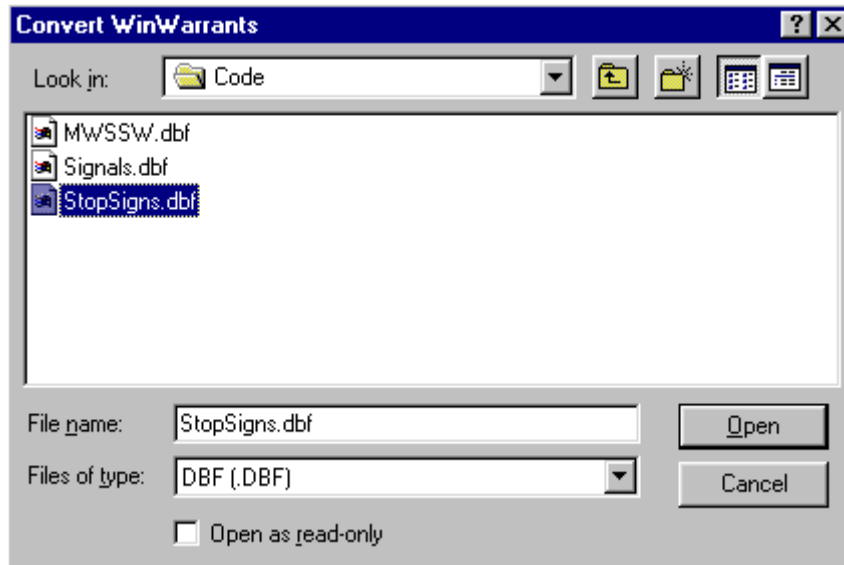
Once the **Database-Convert** option has been selected the following will be displayed:



Clicking **No** will return to the **Main Menu**. Clicking **Yes** will display the following message box.



Once **OK** has been clicked, the Window Open File Dialog box will be displayed. The following is an example of this dialog box.



As shown in the above example, highlight the file **StopSigns.dbf** and click **Open** to begin the conversion process. Clicking **Cancel** will return to the **Main Menu**.

Once the conversion has been completed, a message box will be displayed indicating the process has been completed, and the *WinWarrants 2000* will return to the **Main Menu**.

Options

The **Options** menu option has two functions; storage of the agency's/company's name that is to appear on the reports, and ability to alter the order of the traffic signal warrant forms. Once **Options** has been chosen the **Options Form** will be displayed. The following is the **Options Form**.

WinWarrants 2000 - Options

Agency/Company's Name: Wally World USA

Traffic Signal Warrants - Forms Order

Signal Warrants Forms

- Peak Hour
- Pedestrian Volume
- School Crossing
- Coordinated Signal Movement
- Crash Experience
- Roadway Network

Up

Down

NOTES:

The traffic signal warrants has seven forms in which data is to be entered. The first two forms, **GENERAL INFORMATION** and **VOLUMES**, must be the first two forms, therefore they are not shown in the list above.

The order of remaining forms can be varied to meet the users needs.

Highlight the form to be moved and using the **UP** and **DOWN** command button move the form to the desired order.

Click **Ok** will save the changes.

Cancel OK

The Agency/Company's Name is a text box field. Enter the name of the agency or company in this field.

When completing a new traffic signal warrant, there is a series of forms in which data is entered. The **General Information**, and **Volumes Forms** must be the first two forms for many traffic signal warrants are based on their data.

The data for the remaining six forms can be entered in any order. The order in which they appear is determined by the order the forms appear on the **Options Form**.

To change the order of the forms, highlight the form that is to have its order modified and click on either the **Up** or **Down** command button.

Once the agency/company's name is entered and the desired order of the traffic signal warrants forms have been arranged, clicking **Ok** will store this information for future use and *WinWarrants 2000* will return to the **Main Menu**.

Clicking **Cancel** will return to the **Main Menu** and disregard any changes that were made.

Help

The help system included in the *WinWarrants 2000* is aimed at providing the user with majority of the information contained in this manual.

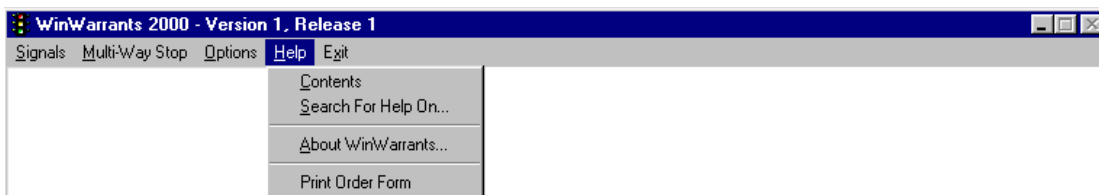
While in any field, pressing **!** will bring up help for that particular field. Once help has been invoked, the help system contents can be displayed and the information contained in this manual is available.

Note: The help system is dynamic. It is designed to answer any questions that may arise while using the *WinWarrants*. Your feedback is important. If an area of the help system needs to be expanded, then please tell us, so the help system can be modified.

Contact JB Technology Inc. with your suggestions by **E-Mail** at **jbtech@pacifier.com**, or **Fax** at **(360) 887-3410** with your suggestions.

When the help system is modified, it will be posted on the JB Technology's web page where it can be downloaded. The JB Technology's web page address is: **http://www.jbtinc.com**

When **Help** is selected from the **Main Menu**, the following options are displayed.



Help contains four (4) options, **Contents**, **Search For Help On...**, **About Collision Record System**, and **Print Order Form**.

The following will discuss each of the options:

Contents:

WinWarrants 2000 help contents is the equivalent to the index of this manual.

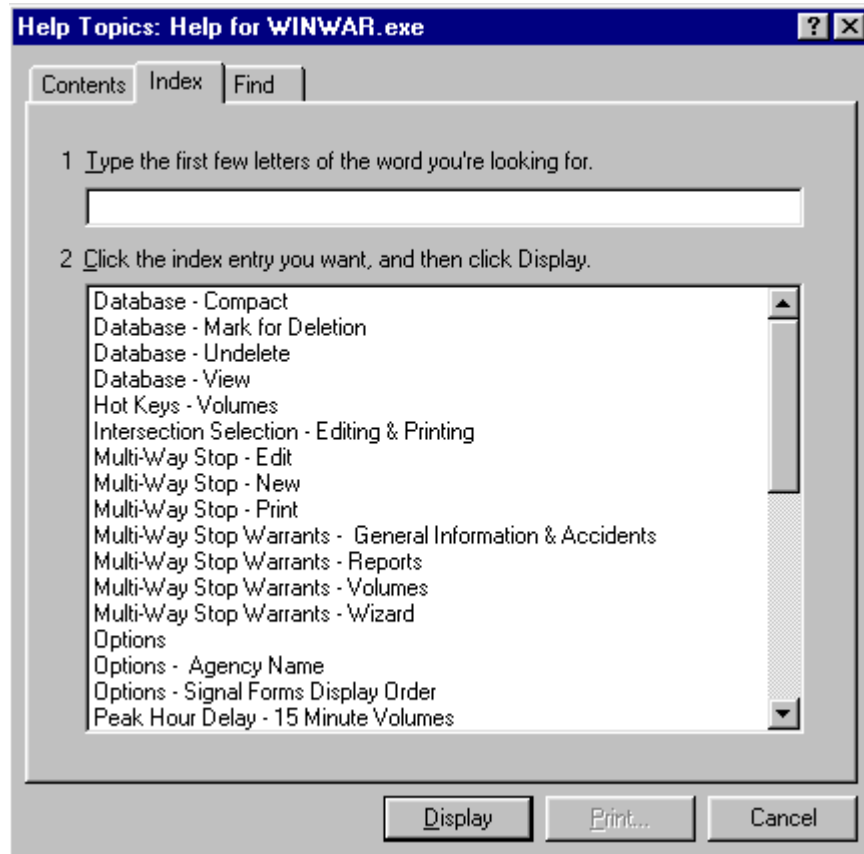
The following is the form which is displayed when selecting **Contents**:



Each major topic is displayed as a book. Highlighting a book and clicking **Open** will display the chapters in the book. Each chapter is displayed as a page with a “?” in the middle. Clicking **Display** will display its associated help contents.

Search For Help On....:

This help option is used when a help particular topic is desired. Selecting this option will bring up the following form:

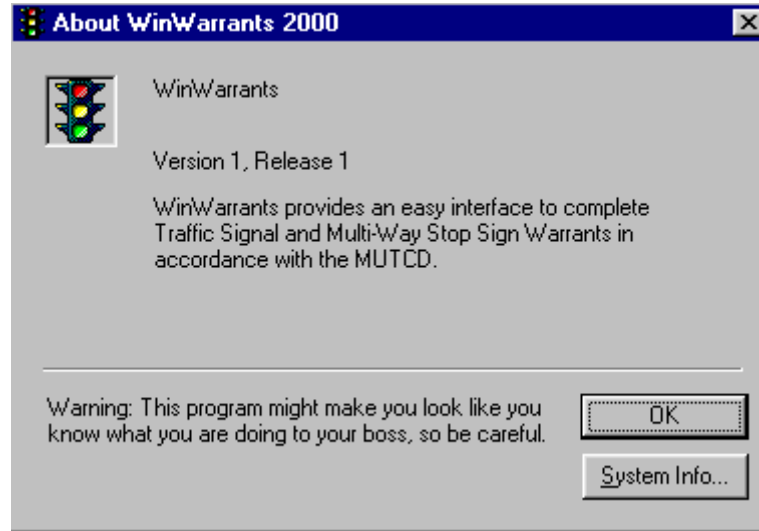


A word or phrase to search for is entered in the text field and pressing **E** will try to find a match with the word/phrases listed below. If a match is found, the word/phrase will be highlighted.

Once the word/phrase has been found, and highlighted, click **Display**, and the help topic is displayed.

About WinWarrants 2000 System:

This option is just a way to advertise the program. When this option is selected, the following form will be displayed:



Clicking **System Info** will bring up Microsoft's System Information window, and information about your PC will be displayed.

When finished with this window, click **Ok** and the program will return to the **Main Menu**.

Print Order Form

This menu option will print out an order form to the printer. Once the order form has been printed, the program will return to the **Main Menu**

Exit

When you have had enough of this program, click on **Exit** and the program will terminate.

Appendix A

WinWarrants provides several reports.

The following are the sample reports found in this appendix:

- Traffic Signal Warrants Report
- Traffic Signal Data Summary Report
- Multi-Way Stop Sign Warrant Report
- Multi-Way Stop Sign Summary Report

Traffic Signal Warrants Report

Wally World USA

Thursday, February 01, 2001

Study Location: **Ocean Beach Hwy. and 20th Ave.**

Major Street: **Ocean Beach Hwy.**

Direction of Travel: **North and South**

Number of Lanes: **2**

85th Percentile Speed Greater than 40 M.P.H.: **No**

Lies within a built up area of an isolated area of population less than 10,000: **No**

Minor Street: **20th Ave.**

Direction of Travel: **East and West**

Number of Lanes: **1**

Controlled by Stop Sign: **Yes**

Warrants:

Warrant 1 - Eight-Hour Vehicular Volume: **Warrant Met**

Warrant 1 - Eight Hour Vehicular Volume performs three calculations: Minimum Vehicle Volume, Interruption of Continuous Traffic, and Combination of Volumes.

The eighth highest volume is used in this calculation. The hourly volumes are sorted by both the Major Street and the Minor Street. Below, Study-Major indicates the volumes when sorted by the Major Street. Study-Minor indicates the volumes sorted by the Minor Street.

Minimum Vehicular Volume

Number of hours volumes met or exceeded criteria: **7**

	Major Street (Veh. Per Hr)	Minor Street (Veh. Per Hr)
Minimum	600	150
Study-Major	734	123
Study-Minor	710	147

Interruption of Continuous Traffic

Number of hours volumes met or exceeded criteria: **4**

	Major Street (Veh. Per Hr)	Minor Street (Veh. Per Hr)
Minimum	900	75
Study-Major	734	123
Study-Minor	710	147

Traffic Signal Warrants Report (cont.)

Thursday, February 01, 2001

Warrant 1 - Eight-Hour Vehicular Volume: (cont.)

70% of Minimum Vehicular Volume or Interruption of Continuous Traffic

If the 85th-percentile speed on the Major Street exceeds 40 mph OR if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, then 70% columns in Table 4C-1 may be used in place of the 100% columns.

85th Percentile Speed Greater than 40 M.P.H.: **No**

Lies within a built up area of an isolated area of population less than 10,000: **No**

Eight Hour Volume - 70%

Number of hours volumes met or exceeded criteria: **N/A**

	Major Street (Veh. Per Hr)	Minor Street (Veh. Per Hr)
Minimum	420	105
Study-Major	N/A	N/A
Study-Minor	N/A	N/A

Interruption of Continuous Traffic - 70%

Number of hours volumes met or exceeded criteria: **N/A**

	Major Street (Veh. Per Hr)	Minor Street (Veh. Per Hr)
Minimum	630	53
Study-Major	N/A	N/A
Study-Minor	N/A	N/A

80% of Minimum Vehicular Volume AND Interruption of Continuous Traffic

If the volumes listed in the 80% columns of BOTH Minimum Vehicular Volume AND the volumes listed in the 80% columns of Interruption of Continuous Traffic are less than the eighth highest volumes then Warrant 1 is met.

Minimum Vehicular Volume

Number of hours volumes met or exceeded criteria: **8**

	Major Street (Veh. Per Hr)	Minor Street (Veh. Per Hr)
Minimum	480	120
Study-Major	734	123
Study-Minor	710	147

Traffic Signal Warrants Report (cont.)

Thursday, February 01, 2001

Warrant 1 - Eight-Hour Vehicular Volume: (cont.)

Interruption of Continuous Traffic

Number of hours volumes met or exceeded criteria: **8**

	(Major Street)	(Minor Street)
Minimum	720	60
Study-Major	734	123
Study-Minor	710	147

Warrant 2 - Four-Hour Vehicular Volume: **Warrant Met**

The Four-Hour Vehicle Volume Warrant compares the hourly volumes to either Figure 4C-1, or Figure 4C-2. If four or more hours lie above the curve, then this warrant is satisfied.

Graph used: **Figure 4C-1. Warrant 2 - Four-Hour Vehicular Volume.**

Curve used: **2 or More Lanes & 1 Lane**

Number of hours meeting criteria: **5**

Warrant 3 - Peak Hour: **Warrant Met**

One of the two conditions must be met for the Peak Hour Warrant to be satisfied.

One condition of the Peak-Hour Volume Warrant compares the highest hourly volume to either Figure 4C-3, or Figure 4C-4. If the peak hour, whether sorted by the Major Street or the Minor Street, lies above the curve, then this warrant is satisfied.

Graph used: **Figure 4C-3, Peak Hour**

Curve used: **2 or More Lanes & 1 Lane**

Peak Hour Volume met criteria: **Yes**

Warrant 4 - Pedestrian Volume Warrant must meet the following two conditions:

1. Pedestrian volume crossing the Major Street if greater than 100 for each of any 4 hours, or at least 190 for any 1 hour.

Minimum hourly pedestrian volume: **0**

Peak hourly pedestrian volume: **0**

Criteria Met: **No**

2. For the hours recorded above, there are less than 60 gaps per hour.

Largest gap observed: **0**

Criteria met: **No**

Traffic Signal Warrants Report (cont.)

Thursday, February 01, 2001

Warrant 6 - Coordinated Signal System: **Warrant Not Met**

Is there another traffic signal within 1,000 feet: **Yes**

On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning and speed system: **No**

On a two-way street, adjacent signals do not provide the necessary degree of platooning and speed control and the proposed and adjacent signals could constitute a progressive signal system: **No**

Warrant 7 - Crash Experience: **Warrant Not Met**

Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency: **Yes**

Number of accidents in a 12 month period (5 or more required): **4**

If the above two conditions are met, then one of the following conditions must be met.

1. 80% of Condition A from Table 4C-1: **Yes**
2. 80% of Condition B from Table 4C-1: **Yes**
3. 80% of Pedestrian Volume Warrant: **Yes**

Warrant 8 - Roadway Network: **Warrant Not Met**

The intersection has a total existing, or immediately projected, entering volume of at least 1,000 vehicles per hour of a typical weekday and has 5-year projected traffic volumes, based on an engineering study, that meet one or more of Warrants 1, 2, and 3 during an average weekday. **No**

The intersection has a total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday). **No**

Note: If one of the above was answered yes, then one of the following also must be answered yes.

1. Part of the street or highway system that serves as the principal network for through traffic flow: **No**
2. It includes rural or suburban highways outside, entering or traversing a city: **No**
3. It appears as a major route on an official plan such as a major street plan in an urban area traffic and transportation study: **Yes**

Traffic Signal Warrant Summary Report

Wally World USA

Thursday, February 01, 2001

<u>Warrant</u>	<u>Status</u>
Warrant 1 - Eight-Hour Vehicular Volume.	Warrant Met
Warrant 2 - Four-Hour Vehicular Volume.	Warrant Met
Warrant 3 - Peak Hour.	Warrant Met
Warrant 4 - Pedestrian Volume.	Not Satisfied
Warrant 6 - Coordinated Signal System.	Not Satisfied
Warrant 7 - Crash Experience.	Not Satisfied
Warrant 8 - Roadway Network.	Not Satisfied

Traffic Signal Warrant Data Report

Wally World USA

Thursday, February 01, 2001

Study Location: **Ocean Beach Hwy. and 20th Ave.**

Major Street: **Ocean Beach Hwy.**

Direction of Travel: **North and South**

Number of Lanes: **2**

85th Percentile Speed Greater than 40 M.P.H.: **No**

Lies within a built up area of an isolated area of population less than 10,000: **No**

A divided street with a median island that can be used for pedestrian refuge: **Yes**

Another traffic signal is within 300 feet: **No**

A rural or suburban highway that enters or traverses a city: **No**

A major route of an official plan, such as a major street plan in an urban area traffic and transportation plan: **Yes**

Is part of street or highway system that serves as the principal network for through traffic flow: **No**

Minor Street: **20th Ave.**

Direction of Travel: **East and West**

Number of Lanes: **1**

Controlled by Stop Sign: **Yes**

Traffic Volumes:

Count Date: **Wednesday, December 16, 1998**

Ocean Beach Hwy.(Major Street) - Total Entering Volumes

<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>
Mid	86	8	734	4	968
1	55	9	658	5	1,090
2	40	10	656	6	842
3	33	11	710	7	612
4	33	Noon	930	8	439
5	123	1	865	9	403
6	323	2	882	10	243
7	520	3	952	11	122

15 Minute Peak Hour Volumes:

Ocean Beach Hwy.

<u>Interval</u>	<u>Volume</u>
0	0
15	0
30	0
45	0

20th Ave.

<u>Interval</u>	<u>Volume</u>
0	0
15	0
30	0
45	0

Traffic Signal Warrant Data Report (cont.)

Thursday, February 01, 2001

Traffic Volumes (cont.):

20th Ave.(Minor Street) - Volumes for One Approach

<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>
Mid	14	8	123	4	198
1	11	9	111	5	152
2	10	10	140	6	166
3	6	11	147	7	113
4	5	Noon	203	8	88
5	15	1	235	9	62
6	36	2	175	10	38
7	73	3	170	11	27

Pedestrian Volumes:

Pedominant pedestrian crossing speed is less than 3.5 ft/sec: **No**

Coordinated traffic signal on each side of study location: **No**

<u>Hour</u>	<u>Volume</u> <u>East</u>	<u>Number of</u> <u>Gaps</u>	<u>Hour</u>	<u>Volume</u> <u>West</u>	<u>Number of</u> <u>Gaps</u>
1	25	56	1	0	0
2	150	75	2	0	0
3	85	25	3	0	0
4	25	54	4	0	0

School Crossing:

The study time in minutes: **60**

Number of adequate gaps during the study time period: **25**

Number of students crossing during highest hour: **0**

Crash Experience:

Beginning date of 12 month period: **Dec 15 1998**

Total number of correctible crashes during 12 month period: **4**

Type of Crashes: Right Angle: 0 Read End: 0 Approach Turn: 0
Head On: 0 Other: 0

Adequate trial of less restrictive remedies with satisfactorious observance and enforcement has failed to reduce the crash frequency: **Yes**

Traffic Signal Warrant Data Report (cont.)

Thursday, February 01, 2001

Peak Hour:

Is the study location a "Tee" intersection: **No**

Number of Vehicle-Hours observed: **2**

Total entering volume for study peak hour: **587**

Approach volume on minor street where Vehicle-Hours was observed: **2**

Peak Hour Volumes:

Ocean Beach Hwy.
(Both Approaches)

20th Ave.
(Separate Approaches)

<u>Interval</u>	<u>Volume</u>	<u>Interval</u>	<u>Volume</u>	<u>Interval</u>	<u>Volume</u>
0	0	0	0	0	0
15	0	15	0	15	0
30	0	30	0	30	0
45	0	45	0	45	0

Date Data Stored in Database: Friday, January 26, 2001

Multi-Way Stop Sign Warrants Report

Wally World USA

Thursday, February 01, 2001

Study Location: **Washington Way and Hudson St.**

Major Street: **Washington Way**

Direction of Travel: **East and West**

85th Percentile Speed Greater than 40 M.P.H.: **No**

Minor Street: **Hudson St.**

Direction of Travel: **North and South**

Warrant - Criteria:

Criteria A - Intersection Meets Signal Warrants: Warrant Not Met

Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal. **No**

Criteria B - Crash Problem: Warrant Not Met

A crash problem as indicated by five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right- and left-turn collisions as well as right-angle collisions.

Number of crashes in a 12 month period: **4**

Criteria C - Minimum Volumes: Warrant Not Met

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day.

Number of hours criteria met: **16**

2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour.

Highest hour average delay: **0**

Numer of hours criteria met: **0**

3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the above values.

Numer of hours criteria met: **0**

Multi-Way Stop Sign Warrants Report (cont.)

Thursday, February 01, 2001

Criteria C - Minimum Volumes: Warrant Not Met

When no single criterion is satisfied, but where Criteria B, C.1 and C.2 are all satisfied to 80% of the minimum values.

1. 80% of Crash Problem Met: **Yes**
2. 80% of Major Street Volume Met: **Yes**
Number of hours volumes met or exceeded criteria: **17**
3. 80% of Minor Street Volume Met: **No**
Number of hours volumes met or exceeded criteria: **0**

Criteria D - Options: Warrant Not Met

The following criteria may be considered when performing an engineering study.

1. The need to control left-turn conflicts: **No**
2. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes: **No**
3. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to safely negotiate the intersection unless conflicting cross traffic is also required to stop: **No**
3. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection. **No**

Multi-Way Stop Warrant Data Report

Wally World USA

Thursday, February 01, 2001

Study Location: **Washington Way and Hudson St.**

Major Street: **Washington Way**

Direction of Travel: **East and West**

85th Percentile Speed Greater than 40 M.P.H.: **No**

Minor Street: **Hudson St.**

Direction of Travel: **North and South**

Crash Experience:

Beginning date of 12 month period: **January 1, 1999**

Total number of correctible crashes during 12 month period: **4**

Type of Crashes:	Right Angle: 3	Head On: 0	
	Approach Turn: 1	Other: 0	

Traffic Volumes and Average Vehicle Delay:

Count Date: **January 1, 1999**

Washington Way(Major Street) - Total Entering Volumes

<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>
Mid	86	8	734	4	968
1	55	9	658	5	1,090
2	40	10	656	6	842
3	33	11	710	7	612
4	33	Noon	930	8	439
5	123	1	865	9	403
6	323	2	882	10	243
7	520	3	952	11	122

Hudson St.(Minor Street) - Total Entering Volumes

<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>	<u>Time</u>	<u>Volume</u>
Mid	14	8	123	4	198
1	11	9	111	5	152
2	10	10	140	6	166
3	6	11	147	7	113
4	5	Noon	203	8	88
5	15	1	235	9	62
6	36	2	175	10	38
7	73	3	170	11	27

Average Vehicle Delay on Minor Street during maximum hour. (Sec/Veh): **0**

Multi-Way Stop Warrant Data Report (cont.)

Thursday, February 01, 2001

Other Criteria:

A traffic signal is warranted and urgently needed. **No**

Need to control left-turn conflicts: **No**

Need to control vehicle/pedestrian conflicts near locations the generate high pedestrian volumes: **No**

Locations where a road user, after stopping, cannot see conflicting traffic and is not able to safely negotiate the intersection unless conflicting cross traffic is also required to stop: **No**

An intersection of two residential neighborhood collector (through) streets similar design and characteristics where multi-way stop control would improve traffic operational characteristics of the intersection: **No**

Appendix B

If you have questions that need to be answered, you can contact JB Technology Inc the following ways:

- E-Mail: jbtech@pacifier.com
- Fax: (360) 887-3410
- Telephone: (360) 887-3442

JB Technology will respond to you as soon as possible.