Arizona Local Government Safety Project Analysis Model

User's Manual

SPR 504

Prepared by:

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MARCH 2002

Prepared for:

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PREFACE

This document is intended to accompany copies of the Arizona Local Government Safety Project Implementation Model (AzLGSP), distributed by the Arizona Transportation Research Center, Arizona Department of Transportation. The AzLGSP is intended to facilitate hazardous site identification on roads under local government (i.e. cities, towns, counties) jurisdictions. Users are provided with a self-extracting copy of the model (azlgsp-2.exe) and this document on floppy disk, and crash data reference files on CD.

Users are encouraged to report any problems discovered in the program to the ATRC. Any questions, comments or concerns should be directed to:

| John Semmens | jsemmens@dot.state.az.us | (602) 712-3137 |
|--------------|--------------------------|----------------|
| Jason Carey | jasoncarey@hotmail.com | (916) 482-1478 |

Users are encouraged to review this document prior to working with the AzLGSP model.

SOFTWARE INCLUDED

Each recipient has been provided with a floppy disk containing a copy of the Arizona LGSP model as a self-extracting archive "**azlgsp-2.exe**" and a copy of this document.

Each user has also been provided with a "CRASHDATA" CD containing 15 crash data files (one for each county) from 1995 to 2000. The crash data files are Microsoft Access 97 databases (*filename.mdb*) named according to county. For example, Apache County data are located in the file "Apache.mdb"

Note that the CD distibuted in the initial training session held on March 18, 2002 contains a beta version of the AzLGSP model. This version is fully functional, except for the export routines that send crash details to MS Excel. The CD version should be replaced with the version distributed on floppy disk.

After running azlgsp-2.exe, the Arizona LGSP model will be installed on the user's hard drive. The county data files can be left on the CD or copied to a local network, from which they can be accessed via the <u>Linked Table Manager</u> function. The <u>How To Load LGSP model</u> section illustrates the procedure for loading the Arizona LGSP model; and the <u>Getting Started</u> section discusses preparing the model for use.

Users more familiar with the LGSP model may wish to skip to instructions for a particular screen view with which they are working. For ease of reference, thumbnail view of the more common <u>screen views</u> are shown on the following page. Clicking on any of these screen pictures will take the reader to the section of this document discussing that particular screen.

STARTUP

| SPR 504: Local Government Traffic Safet | Mo | del Adjust crash costs | Cost ADJ |
|---|----|--|-----------------------------|
| Choose from the following options: | | Compact storage File | 2 |
| Create a list of hazardous sites: | 1 | This action allows the user to specify location parameters to generate a priority list of crash I | (+) and other locations |
| View reports for previously selected locations: | | | |
| a. Hazardous Location Summary List: | 2a | View a report summarizing crashes, fatalities, minimated costs by crash location | injuties and |
| b. Hazardous Location Record List | 2b | View a report that includes individual crash re- references for all data contained in Option 3a | cord |
| View crash record details for previous updates: | • | Choose from several reports that include all o details for one or more high incidence location | rash secord |
| Enter local safety project details: | 4 | Once the list of sites has been established, th pendix the user to enter specific project data high-priority location. | is acters Is targeting a |
| View a report of previously evaluated projects: | 5 | Select this action to see a benefit/cost analy entered in Option 4 | is of projects |

CompSiteTraffic

| nouse n (Primary) | RIVERSIDE | DR | Annual Crashes | 0.2 | |
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| Route B (Secondary) | CALIFORNIA | AV | Location ADT | Ū | |
| Route A (Primary) | | | Annual Crashes | | |
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| Traffic Safety Local Site Prioritization: Melevour selections in the fields below. Then press "Get Results" | Safety Project Details |
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LOC_DTL



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| Project Catego | ey Lane ad | Idition | | | - | |
| Crash Types | Annual | Reduction Factor | Total Reduction | Unit | Annual Benefit | |
| Fatal | 0.200 | 0.000 | 0.000 | \$2,600.000 | \$0 | 1. |
| Incap. Inj. | 0.000 | 0.000 | 0.000 | \$180,000 | 40 | PROJECT SUMMARY |
| Non-incap. Inj. | 0.000 | 0.000 | 0.000 | \$36,000 | \$0 | Total Annual Benefit \$ |
| Possible Int. | 0.000 | 0.000 | 0.000 | \$19.000 | \$0 | Total Annual Cost \$27,62 |
| PDO | 0.000 | 0.135 | 0.000 | \$2,000 | \$0 | Benefit/Cost Ratio 0.0 |
| | | | Total A | unnual Benefit | \$0 | BCR In Range? NO |
| | | Safety I | Project Cos | ts | 1 | |
| Total Construct | ion Cost | | | 2 | \$150,000 | RECORD > RECORD 4 |
| Project Life (Ye | ars) | | | | 20 | To sell them details as |
| Interest Rate | | | | | 10.0% | add other projects. |
| Capital Recover | y Factor | | | | 0.1175 | press this button: |
| Annual Construe | ction Cost | | | | \$17,525 | To create a final report |
| Net Annual Mai | ntenance C | Jro | | | \$10,000 | press this bullon: |
| Total Annual Pr | opect Cost | | | | \$27,525 | AL TO BE ALL AND ALL A |

INTRODUCTION

The Arizona Local Government Safety Project Model is a tool that can be used to facilitate the selection of hazardous roadway locations in local jurisdictions, to prioritize those locations by rational means, and to aid in the evaluation of potential spot treatments of safety hazards. However, the model is not intended to automate the entire decision-making process, and can not substitute for the analysis and judgment of a traffic engineer. While Arizona LGSP Model should prove to be a useful tool, particularly for jurisdictions with limited research budgets or capabilities, use of the model is *not mandatory*, and is subject to the preference of each jurisdiction.

The Arizona Local Government Safety Project Implementation Model (LGSP model) was created in MS Access 97. The model consists of a self-contained query and reporting database, and a supplemental database of crash records on CDROM. Running the model requires the following hardware and software:

- Microsoft Office 97 or newer: Access, Word and Excel programs
- MS Access must be loaded with the "Linked Table Manager" add-in
- CDROM drive or network access
- Approximately 32Mb RAM and 100Mb hard disk space

The model is computation-intensive, and will require a significant amount of time to run on machines with slower processors. On slower processors, it is particularly important that additional programs be closed while the update is being run. The amount of time required for a complete update of the model will vary with the power of the machine used, the speed of CDROM or network data transfer, and the size of the jurisdiction(s) being analyzed. It is recommended that smaller units of analysis (e.g. a single city rather than an entire county) be examined separately whenever possible.

MODEL OVERVIEW

The Arizona LGSP Model is basically divided into two processes. The first selects a subset of hazardous locations from one or more jurisdictions based on user-defined parameters. These locations are prioritized according to one of several measures of hazard or severity, and multiple reports are generated to summarize crash incidence, roadway and driver characteristics, and estimated costs associated with each location. The second component of the LGSP model prompts the user for possible safety treatments for one or more locations,

calculates the expected benefits for each project, and returns a benefit-cost analysis that follows HES eligibility guidelines.

The LPSG model stores crash location data until another update is run. Although the data stored takes up a substantial amount of hard disk space, storage facilitates the update process, providing faster access to jurisdiction-specific crash subsets and allowing the user to test alternate safety treatment scenarios without rerunning the model. The two-step procedure takes the following form:



After the user specifies site selection parameters, a series of queries are run on the database to extract, sort and aggregate jurisdictional crash records. From this procedure, a series of reports are generated. These reports identify the highest-priority site locations, summarize such information as the frequency, severity and cost of crashes at each location, provide specific details of roadway type, condition and relationships; vehicle actions, speeds and harmful events; and external factors such as weather. The LGSP model generates a report listing comparable sites for a specific location, allowing the user to perform statistical analyses of relative risk and regression-to-the-mean if needed. These data are also useful for before-and-after comparisons of treated and untreated locations. From various report outputs, it is expected that local traffic engineers will be able to identify target sites for mitigation.

Prior to input of safety project alternatives, it is assumed that each potential site will be subjected to greater study, identifying relevant information not provided by the LGSP model. Site engineering studies and surveys of prior treatments are necessary for determining feasibility of improvements at a treatment location. Onsite analysis provides the most reliable assessment of influential factors at a project location, and should identify far more site characteristics than an automated review of crash data. Although some degree of inference regarding potential safety improvements can often be made from the LGSP outputs, these reports are not intended to supplant a rigorous on-site evaluation.

Once the target sites have been evaluated, it is expected that one or more improvement projects will be identified as appropriate for the site conditions. At this point, projects can be entered in the LGSP model and evaluated in terms of

a benefit-cost analysis. Each project alternative is assigned expected levels of effectiveness for reducing crashes at the site location. Effectiveness measures (crash reduction factors) can be assigned by the user, or default values generated by the model can be used when available. The effectiveness measures are combined with crash frequency measures to yield an overall reduction in crashes of varying severity at each location. This reduction is then multiplied by the cost associated with a crash of that severity to yield an annual benefit. Annual project benefits are compared with the annualized costs of implementing the safety improvement to yield a benefit-cost ratio.

CAPABILITIES

The Arizona LGSP Model can accomplish the following tasks:

- Analyze multiple jurisdictions
- Limit crash records returned based on user-defined parameters
- Aggregate crash records based on distance from a specific location
- Provide total and annualized crash details, including:
 - Frequency/incidence
 - Units involved
 - Severity (highest observed for each record)
 - Severity (injuries for each person involved)
 - Estimated costs associated with crashes
 - Summary statistics for incidence measures
- Summarize crash details and limit details to a specific subset
- Provide a list of sites comparable to the chosen site of analysis
- Accept and analyze *user input* of traffic volumes at multiple sites
- Analyze multiple safety projects at a location
- Rank order project alternatives by cost effectiveness
- Format project details to supplement HES eligibility applications

LIMITATIONS

The Arizona LGSP Model does not do the following:

- Provide traffic data for a given site, though user inputs for these data can be analyzed
- Know the site history (i.e. which treatment alternatives have been evaluated or implemented in previous years)
- Automatically update crash cost estimates, though these can be modified by the user from the STARTUP page
- Automatically update the crash records file, though instructions for performing this action using an automated format are included in Appendix B

HOW TO LOAD

- 1. Insert the disk containing the azlgsp-2.exe file in the appropriate drive. This example uses drive letter E:\ For other drive locations, simply substitute the appropriate drive letter.
- 2. From the Windows desktop, select **START > RUN**
- 3. The following dialog box will be displayed.

| Run | ? × |
|---------------|---|
| <u> </u> | Type the name of a program, folder, document, or Internet resource, and Windows will open it for you. |
| <u>O</u> pen: | E:\azlgsp-2.exe |
| | OK Cancel <u>B</u> rowse |

- 4. Select "Browse" to choose the location of azlgsp-2.exe
- 5. A new dialog box will be displayed (see below). Select the drive used in Step 1. at the top of the page, choose the "azlgsp-2.exe" file, and press "Open."

| Browse | | | | ? × |
|------------------------|----------------|-------|-----|--------------|
| Look in: 🗟 | CRASHDATA (E:) | - 🗈 🧕 | 1 📩 | |
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| File <u>n</u> ame: | azlgsp-2.exe | | | <u>O</u> pen |
| Files of <u>type</u> : | Programs | • | ·] | Cancel |

6. The first dialog box should now read "Open: E:\azlgsp-2.exe". Press "OK" to load the model.

FILE LOCATIONS

Three files will be extracted to the user's hard drive, and a new folder will be created for these files at **C:\ADOT\SFTYMDL**.

DO NOT change this directory; the model will not work properly if the file locations are altered. After extracting, verify that all files exist in the new directory:

C:\ADOT\SFTYMDL\AzLGSP2.mde (operating version for Access 97) C:\ADOT\SFTYMDL\AzLGSP2.mdb (updatable version for conversion) C:\ADOT\SFTYMDL\SFTYDATA.mdb (storage file for query results)

The only difference between .mde and .mdb versions of the model is that the .mde format does not allow alterations to the macros and forms built into the model. It is recommended that users of MS Access 97 run the AzLGSP2.mde file to avoid any unintended changes to the file structure and routines.

Users of newer versions of MS Access may wish to convert the model to the newer version. Files with the .mde extension can not be converted to newer versions. In this case, the AzLGSP2.mdb file should be used. It is recommended that users of newer versions of Access create a new .mde file after converting.

If AzLGSP2.mdb is opened in Access 2000, the user will be asked whether or not to convert the file to Access 2000. Select "yes"/"ok" and Access will perform the conversion. Reopen the new file and select **Tools > Database Utilities > Make MDE** File to create a new .mde version of the model.

Rather than storing internally all jurisdictional data returned from the crash data CD, AzLGSP.mde sends these data to the SFTYDATA.mdb file. The data tables are linked to AzLGSP.mde, but do not increase the size of the file. Running the model again simply replaces the tables in the SFTYDATA.mdb file, without affecting the links in AzLGSP2.mde. If AzLGSP2.mdb is converted to Access 2000 (or later versions), it is recommended that SFTYDATA.mdb be opened and converted as well. Other than for conversion, or to fix occasional replacement errors, there should be no need to modify the SFTYDATA.mdb file.

GETTING STARTED

When opened, the LGSP model first displays two messages for the user. The first message box is a reminder that the CD containing crash records must be loaded for the model to function properly. Previously generated reports may be viewed without the CD, but no new analyses can be completed without the crash data files. Users that have stored crash data on a network drive may ignore this warning.

| Load CD | × |
|---------|---|
| 8 | Be sure that the CRASHDATA CD is loaded prior to input. |
| | <u>ОК</u> |

The next message that appears is a reminder to <u>compact</u> the database periodically. To compact the database, let the <u>STARTUP</u> screen (see below) load, and then

| Compact | database reminder. 🛛 🕅 |
|---------|--|
| ٩ | It is recommended that the database be COMPACTED after each use. |
| | <u> </u> |

NOTE: The first time the model is opened, the crash data tables will need to be updated before use. To update all linked tables, use the Linked Table Manager located in **Tools > Add-Ins >** <u>Linked Table Manager</u>.

The LGSP model should be accessed using the buttons shown on each screen whenever possible. For example, the "EXIT Program" button will close the database from the STARTUP screen, and other forms contain an "EXIT to Start" button that will return the user to the STARTUP screen. For additional discussion, see the <u>Basic Navigation</u> section.

STARTUP FORM

Once the database has been opened, and compacted or refreshed as necessary, the STARTUP view form will appear (Figure 7). This form provides an outline of the available procedures in the LGSP model, and will reappear at the end of each option procedure chosen.

Prior to selecting <u>options</u> from the STARTUP form, it is recommended that three procedures be followed to so that the model runs properly:

- i. Update the Linked Table Manager
- ii. <u>Compact</u> the AzLGSP and SFTYDATA databases
- iii. Verify that the <u>Crash Costs</u> used are current



From the STARTUP outline, the following choices can be made:

- Run the entire update and prioritization procedure to select potentially hazardous sites. This option also allows the results of a previous update to be re-sorted by new parameters. Pressing **Button 1** will open the <u>INPUTS</u> form.
- Buttons 2a and 2b open summary reports for the most recent run of the model. Button 2a opens the <u>PRIORITY LIST</u> report, which summarizes the top twenty-five hazard locations, sorted by the parameters selected in the previous update. Button 2b opens the <u>RECORD LIST</u> report for the locations summarized in the PRIORITY LIST. The RECORD LIST contains individual summaries for each crash record at a high-priority location.
- Button 3 is linked to multiple options for viewing and/or exporting crash record details. Pressing Button 3 opens the Location Details (<u>LOC_DTL</u>) form, in which additional options are presented.

- 4. **Button 4** opens the <u>Safety Project Details</u> form, used to input safety project ideas once sites and potential treatments have been identified.
- 5. **Button 5** opens the <u>Project Evaluation Report</u> containing an analysis of effectiveness and benefits versus costs for project entered in option 4.

DATABASE UTILITIES

Because many of the AzLGSP queries rewrite data tables, the file will grow each time it is run. Compacting the database will condense empty spaces (deleted tables), reducing the size of the file and improving performance.

To compact the AzLGSP file, select **Tools > Database Utilities > Compact Database** from the menubar, as illustrated in the following <u>figure</u>. After a brief period, the model will automatically re-open, ready for use.

In addition to compacting the AzLGSP file, the SFTYDATA.mdb file will need to be compacted regularly, as this file will grow with each iteration of the model. For compacting the SFTYDATA file, a **button** has been added to the STARTUP window in AzLGSP2, <u>circled</u> in the figure below. Simply press this button to compact the SFTYDATA.mdb file, saving hard disk space.

| 🔍 Mie | crosoft | Acces | s - [ST/ | ARTUP : | Form] | | | | | | | | | _ 8 × |
|----------|------------------|----------------|------------------|-------------------|-------------------|--|-----|-----------------------------|--|---|---|------------------------------|----------------|-------|
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| A | rizo | na 2 50/ | De | epar | tme | Spelling F7 | • | portat | ion | | EXIT Program Adjust | ₽. Foot | | |
| | Cho | ose | fror | n the | follo | Relationships Analyze Database Utilities | • | Conver <u>t</u> Dat | abase | | crash costs Compact storage file | ADJ | > | |
| 1. 2. | Crea Viev | ate a v rep | list o | of haz for pre | ardous eviousl | Securi <u>t</u> y Re <u>p</u> lication Start <u>u</u> p Run <u>M</u> acro | + | Compact Dai Repair Datal | tabase base ile | lows the user to s generate a priori | specity local ity list of cras | on(s) and h location | l other ns. | |
| | a. b. | Haza | ardou: ardou: | s Loca s Loca | tion Sur | ActiveX Controls Add-Ins Options | • | 2a 2b | View a report estimated cos View a report references fo | summarizing crass sts by crash locat that includes ind r all data containe | shes, fatalitie: ion. ividual crash ed in Option (| s, injuries record 3a. | and | |
| 3. | Viev | v cra | sh re | cord (| details | for previous up | oda | ites: 🕨 | Choose from details for one | several reports th e or more high-inc | at include all cidence locat | crash re ions. | cord | |
| 4. | Ente | er loc | al sa | fety p | project | details: | | 4 | Once the list permits the us high-priority lo | of sites has been ser to enter speci ocation. | established, fic project de | this actic tails targe | on eting a | |
| 5. | Viev | v a re | port | of pre | eviousl | y evaluated pro | oje | cts: 5 | Select this ac entered in Op | ction to see a ben otion 4. | iefit/cost ana | lysis of pi | rojects | |
| Form | View | | | | | | | | | | | N | UM | |

LINKED TABLE MANAGER

The first time the model is opened, the crash data tables will need to be updated before use. To update all linked tables, use the Linked Table Manager located in **Tools > Add-Ins > Linked Table Manager**.

| Microsoft Access - [STARTUP : Form] | | | | _ & × |
|---|--|--|---|----------------------------------|
| EB File Edit View Insert Format Records | Tools Window Help | | | <u>a</u> × |
| Arizona Departme | Spelling F7 AutoCorrect Office Links ► | portation | EXIT Program Adjust | |
| SFR 304. LOCAI GOVEI | Relationships | arety model | crash costs | ADJ |
| Choose from the follow | Analyze • | | Compact storage | 2 |
| 1. Create a list of hazardous | Database Utilities Security Replication Startyp | 1 This action al parameters to | rite lows the user to specify location generate a priority list of crast | on(s) and other h locations. |
| 2. View reports for previous | Run <u>M</u> acro | ns: | | |
| a. Hazardous Location Su | 🔭 ActiveX <u>C</u> ontrols | 2a View a report estimated cos | summarizing crashes, fatalitie: sts by crash location. | s, injuries and |
| b. Hazardous Location Re | Add-Ins | <u>A</u> dd-In Manager <u>D</u> atabase Splitter | hat includes individual crash all data contained in Option 3 | record 3a. |
| 3. View crash record details | for previous upda | Linked Table Manager S <u>w</u> itchboard Manager <u>P</u> artial Replica Wizard | everal reports that include all or more high-incidence locat | crash record ions. |
| 4. Enter local safety project | details: | 4 Once the list permits the us high-priority lo | of sites has been established, ser to enter specific project del Ication. | this action tails targeting a |
| 5. <u>View a report of previous</u> | y evaluated proje | cts: 5 Select this ac entered in Op | tion to see a benefit/cost ana ition 4. | lysis of projects |
| | | | | |
| | | | | |
| | | | | |
| Form View | | | | NUM |

This will open the <u>linked table dialog box</u> shown below. To link crash data from the county to be analyzed, press the "**Select All**" button and the check the box for "**Always prompt for new location**". These are highlighted on the dialog box below.

DO NOT press "OK" yet. First, clear the check marks from the following tables shown in the dialog box:

- LOCATION
- LocationTable
- PRIORITY DETAIL
- PRIORITY LIST

- Table2d
- Table3
- Table4

Note that the tables are grouped alphabetically, with the first four appearing in the middle of the dialog box, and the last three appearing at the end. These seven tables should *always* be linked to C:\ADOT\SFTYMDL\SFTYDATA.mdb

| | Linked Table Manager | × |
|---|---|--------------------|
| | Select the linked tables to be updated: | ОК |
| | ▼ 📲 AGG (E:\LAPAZ.mdb) | |
| | ✓ → III AGGMTD (E:\LAPAZ.mdb) | Cancel |
| | ▼ 🚛 DIST (E:\LAPAZ.mdb) | |
| | ✓ → III JURIS (E:\LAPAZ.mdb) | <u>S</u> elect All |
| ſ | □ . IOCATION (C:\ADOT\SFTYMDL\SFTYDATA.mdb) | |
| J | $\square \bullet \blacksquare$ LocationTable (C:\ADOT\SFTYMDL\SFTYDATA.mdb) | Deselect All |
| | □ 🚛 PRIORITY DETAIL (C:\ADOT\SFTYMDL\SFTYDATA.mdb) | |
| L | □ 🚛 PRIORITY LIST (C:\ADOT\SFTYMDL\SFTYDATA.mdb) | |
| | ▼ ♦ 📰 REPMTD (E:\LAPAZ.mdb) | |
| | ▼ | |
| | ▼ . SMS03000 (E:\LAPAZ.mdb) | |
| | ✓ | |
| | ▼ 🚛 SMS05000 (E:\LAPAZ.mdb) | |
| | Always prompt for new location | |
| | | |

CLEAR CHECK BOXES!

After clearing the checkboxes for the seven reference tables located in C:\ADOT\SFTYMDL\SFTYDATA.mdb, press the "OK" button. A <u>new location</u> <u>dialog box</u> will appear.

| Select New Location of 01201 | ? × |
|--|----------------------------|
| Look in: 🔍 CRASHDATA (E:) 🔽 🗈 🔯 📧 🏢 📰 📰 🌌 | |
| APACHE.mdb PIMA.mdb COCHISE.mdb PINAL.mdb COCONINO.mdb SANTACRU.mdb GILA.mdb YAVAPAI.mdb GRAHAM.mdb YUMA.mdb GREENLEE.mdb YUMA.mdb MARICOPA.mdb MARICOPA.mdb MARICOPA.mdb NAVAJO.mdb | Open Cancel Advanced |
| Find files that match these search criteria: | Circle Manuel |
| | |
| Files of type: Microsoft Access (*.mdb) Image: Last modified: any time | Ne <u>w</u> Search |
| 15 file(s) found. | |

Because all linked files are located in the CRASHDATA file, the remaining tables will automatically be refreshed.

If any of the <u>seven tables</u> from C:\ADOT\SFTYMDL\SFTYDATA.mdb are included in the update (i.e. if the check boxes are not cleared from these tables), an update error will occur. The error will force the tables to be updated individually, rather than as a group. The "Select New Location" dialog box shown above will appear for each table in the update procedure. Pressing "Open" will only link one table at a time.

Because this process is very time-consuming, the best response is not to continue the update. Press "Cancel" to close the new location dialog box. Restart the Linked Table Manager, ensure that the tables from SFTYDATA.mdb are not selected (i.e. check boxes are cleared), and try the update again.

This process must also be completed each time a new crash data file is to be analyzed. For example, if the user wishes to replace "APACHE.mdb" (i.e. the Apache County data file) with a new file "YUMA.mdb," the tables must be refreshed with the new file name.

The crash data files have been subgrouped according to county level jurisdiction in order to improve the processing time of the LGSP model. Interested users may also obtain complete data for 5-year periods contained in a single file from the ATRC. However, use of the county-level databases is strongly encouraged, particularly for smaller counties, as these files reduce run time by 90 percent or more.

Once the reference files for the jurisdiction of interest have been updated in Linked Table Manager, the AzLGSP model will be ready to generate site reports. Closing the Linked Table Manager will return the user to the <u>STARTUP</u> page.

COST DATA

In addition to the five <u>STARTUP options</u> in the numerical outline, the user can also adjust the cost estimates for crashes of varying severity used in the benefit-cost analyses. This procedure should be done prior to running a new update. To access the crash costs page, press the "Cost ADJ" button circled on the <u>STARTUP</u> form shown above.

The COMPCOST form, shown below, will be opened. This form allows the user to adjust the average estimated *total* cost of a crash depending on the maximum severity observed. The format follows the HES eligibility guidelines used by the Arizona Department of Transportation. These figures are posted on the Internet, and are also available from ADOT Traffic and Engineering.



After adjusting crash costs as necessary, the "Exit" button (circled above) will return the user to the <u>STARTUP</u> page.

USING THE ARIZONA LGSP MODEL

This section will follow the procedures for a complete update from start to finish. Sections can be accessed from the <u>Quicklinks</u> list or the <u>Screen ID</u> links at the top of this document.

Pressing Button 1 on the STARTUP page opens the <u>INPUTS</u> form, which allows the user to specify criteria for selection of hazardous roadway sites. Each option is linked to a reference table, and the option selected is copied to the INPUTS table.

| File Edit View Insert Format Records Tools Window Help | 기 스 키 × |
|---|------------|
| M - □ ⊕ Q ♥ % ℡ € ダ ∽ % ♥ 2↓ X↓ 𝒴 ☜ ▽ ₩ ► ★ M 🛅 ៕ - Q | |
| Traffic Safety Local Site Prioritization: Make your selections in the fields below. Then press "Get Results" | |
| Jurisdiction Gila County T JURIS_D D400 | |
| Include sublevels? Ves No JURIS_A 1 | |
| Start Month 1 Start Year 1995 AGGMTD LOCINC | |
| End Month 12 End Year 1999 UB 100 | |
| Alcohol-related? No REPMITO TI | |
| Location Method Junction: All routes | |
| Aggregation Distance 100 ft. Re-Sort Existing Records (Dist) | |
| Reporting Method Total Incidents Re-Sort Existing Records (Rep) | |
| Run Prioritization Procedure: GET RESULTS Exit to Start page | |
| | |

INPUTS: CREATING A SITE LIST

To create a list of high-priority (i.e. hazardous) sites, the user must specify a jurisdiction of analysis. This can be a county, a city or town, or reservation. In checkbox below the **Jurisdiction** menu, the user can specify whether to include cities and towns in the county-level analysis. For example, to include all jurisdictions in Gila County, the **Include sublevels** option would be set to "Yes."

Start and end dates must be entered in numerical format. In most cases, no more than five complete years of data will fit on a crash data CDROM. However, if the program is run over a network, there is no limitation on the number of years of data that could be included on a server-based crash data file.

To exclude **alcohol-related** crashes, type "No" in the appropriate box. To include all crashes, type "Yes." The default value for this option is "No."

The **Location Method** menu provides four options for identifying a crash site, all of which rely on cross streets to identify the reference point.

- **Route** method limits a site to crashes occurring on one route at a junction
- Junction method aggregates all crashes at a junction regardless of route
- **Junction-related** refines "Junction" method to include only junction crashes classified as related to the junction and/or intersection
- Intersection-related refines "Junction" method to include only junction crashes specifically related to the intersection

After specifying the site identification method, the **aggregation distance** must be selected. Aggregation distance refers to the radius from the cross street reference within which crashes will be included at that site. For example, selecting "500 feet" will include all crashes referencing a particular junction that occurred *no more than* 500 feet from that junction.

Finally, the user must specify the **reporting method** criterion used to prioritize hazardous locations. Again, four options are provided:

- **Total Incidence** prioritizes sites by the number of crashes (of any severity) observed in the period of analysis
- **Total Fatalities** prioritizes sites by the number of fatalities observed at each site; crash counts are used to weight sites with no fatalities
- **Total Fatalities + Injuries** option filters injurious locations by ordinal measures of severity; crash counts are used to weight sites with no injuries
- Weighted by Severity option is similar to the "Total Fatalities + Injuries" option, except that the relative magnitude of severity in terms of crash costs is considered in place of ordinal mneasures

Once the user inputs have been specified, the **GET RESULTS** button will run the prioritization procedure (the TRAFSAF macro). This process can take anywhere

from 2 minutes to several hours, depending on the jurisdiction(s) selected an the speed of the computer used. When the TRAFSAF macro begins, the following message will be displayed:



Because the macro rewrites existing tables, the program will ordinarily verify that the previous information should be deleted. These verification messages will appear every few minutes while the model is running, and will stop the update until the user responds. By selecting the "YES" button, the delete warnings will be temporarily disabled while the TRAFSAF macro runs. This option speeds up the site identification procedure and allows the user to avoid constant monitoring of the update process. A notification message will still appear approximately halfway through the update to document progress thus far.

If the "YES" button is selected, the database windows will minimize and the LGSP model will appear inactive for some length of time. Again, it is *recommended that no other programs be run until the* <u>PRIORITY LIST</u> *report appears at the end of the update*.

MODIFYING RESULTS

After the initial run of the TRAFSAF macro, jurisdiction locations can be requeried for new aggregation distances or reporting methods without running the entire procedure again. The macro action buttons next to the <u>Aggregation</u> <u>Distance</u> and <u>Reporting Method</u> menus can be used to re-sort *existing* locations. The time savings from using this method is greater than 50 percent. For example, if "intersection-related" crashes for Quartzite were initially queried using a 500-foot aggregation distance and prioritized according to total fatalities, these data could be requeried using a 100-foot distance to determine which crashes occurred within the smaller radius from the intersection. Similarly, crashes at these sites could be re-prioritized according to different severity measures (e.g. total incidents, total number of persons harmed, etc.).

To re-query existing data, simply change one of the Distance or Reporting parameters in the menus on the <u>STARTUP</u> page. Then press the "Re-sort existing records" button for the category changed. A new <u>PRIORITY LIST</u> will be generated using the new parameters.

No other changes should be made prior to running these procedures. For example, changing the Location Method will cause the program to return invalid and/or incomplete data. These options are intended to facilitate the examination

of existing data for a variety of scenarios, and should only be used after a full update procedure has been completed.

VIEWING RESULTS

When the TRAFSAF macro has finished running, the **PRIORITY LIST** report will be displayed. If an update has already been completed, the PRIORITY LIST report can also be accessed by pressing **Button 2a** on the STARTUP menu. As shown in the following figure, the PRIORITY LIST summarizes the results of the local site prioritization procedure, returning the twenty-five most hazardous locations as defined in the user inputs section. Locations are ranked by jurisdiction in descending order of importance as specified in the "Reporting Method" option. Crash incidence and severity measures are included for each location.

| osoft Access | - [PRIC | ORITYLOCAT | ION LIST | | | | | | | | | | | |
|-------------------|---------|--------------|----------|-------------|-------------|---------------|-------------|----------------|----------------|--------------|---------------|--------------|---------------------|----------------------|
| e Edit View | Loois y | | | 77777 | | - 14c | | | | | | | | |
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| Priority I | Loca | tion Sun | mary | 7 Lis | t | | | | | | | | | |
| | | | | | | | | | | | | | | |
| lurisdiction G | obe | | | Start \ | 'ear | 1995 E | nd Yea | r 1999 | , | Sorted | lby: To | al Crash | 25 | |
| Primary Route | Sff× | Secondary Ro | ute Sff× | Avg Dist | Ma× Dist | Total Crsh | Ann Crsh | Total Units | Units/ Crsh | Fatal Obs | lnjury Obs | Avg Svrty | Total Crash Cost | Annual Crash Cost |
| AILT OM | ST | BROAD | ST | 15 | 26.0 | 35 | 7.0 | 67 | 19 | 0 | 22 | 1.7 | \$1,003,000 | \$200,600 |
| YCAMORE | ST | HILL | ST | 175 | 61.0 | 26 | 52 | 50 | 19 | 0 | 3 | 12 | \$264,000 | \$52,800 |
| SH | ST | 3RD | ST | 8.1 | 46.0 | 23 | 4.6 | 46 | 2.0 | 0 | 14 | 1.6 | \$648,000 | \$129,600 |
| ΠL | ST | ASH | ST | 73 | 76.0 | 20 | 4.0 | 40 | 2.0 | 0 | 17 | 1.6 | \$244,000 | \$48,800 |
| EDAR | ST | BROAD | ST | 13.2 | 61.0 | 19 | 3.8 | 35 | 1.8 | 0 | 11 | 1.6 | \$352,000 | \$70,400 |
| YCAMORE | ST | BROAD | ST | 8.6 | 46.0 | 18 | 3.6 | 30 | 1.7 | 0 | 7 | 1.6 | \$206,000 | \$41,200 |
| SH | ST | 7TH | ST | 35.6 | 950 | 14 | 2.8 | 27 | 19 | 0 | 12 | 19 | \$503,000 | \$100,600 |
| IGH | ST | ASH | ST | 69 | 60.0 | 13 | 2.6 | 24 | 18 | 0 | 8 | 1.7 | \$306,000 | \$61,200 |
| MIT OM | ST | HACKNEY | AV | 7.4 | 30.0 | 12 | 2.4 | 24 | 2.0 | 0 | 5 | 12 | \$.58,000 | \$11,600 |
| UIZ CANYON | RD | JESSE HAVES | ST | 7.6 | 30.0 | 12 | 2.4 | 21 | 1.8 | 0 | 1 | 1.1 | \$41,000 | \$8,200 |
| OUTH | ST | ASH | ST | 15.0 | 78.0 | 11 | 22 | 22 | 2.0 | 0 | 10 | 2.0 | \$336,000 | \$67,200 |
| ROAD | ST | BLAKE | ST | 20.4 | 90.0 | 11 | 22 | 27 | 25 | 0 | 18 | 19 | \$446,000 | \$89,200 |
| NURPHY | ST | BROAD | ST | 21.7 | 93.0 | 10 | 2.0 | 18 | 18 | 0 | 6 | 2.0 | \$444,000 | \$88,800 |
| IAST | ST | ASH | ST | 12.1 | 60.0 | 10 | 2.0 | 21 | 2.1 | 0 | 10 | 19 | \$300,000 | \$60,000 |
| ROAD | ST | BAILEY | ST | 26.4 | 94.0 | 9 | 1.8 | 18 | 2.0 | 0 | 8 | 19 | \$154,000 | \$30,800 |
| E SQUITE | ST | BROAD | ST | 213 | 62.0 | 8 | 1.6 | 12 | 15 | 2 | 4 | 23 | \$2,716,000 | \$543,200 |
| đanday, April 02, | 2001 | | | | | | | | | Pag | el of 2 | | | |
| <u>। ।</u> | F FI | • | | | | | | | | | | | | |

The PRIORITY LIST report can be printed or closed from the preview screen, but can not be modified. Closing the report returns the user to the STARTUP menu. If greater detail is required for the location summary, **Option 2b** can be run to open the **Priority Location Record List**. This report contains the same site location references as the Priority List, but each individual crash record is represented along with costs for each crash sorted by year of analysis.

The Priority Location Record List is also useful for gathering any additional data that may be required. Because crashes are indexed according to record number, a list of records provides a simple means of identifying items of interest. However, the record list report does not provide substantially different information than the Priority List report, and is intended only as a supplemental reference to be used as needed. Because the record list report can be quite long (e.g. records for Gila County locations shown in Figure 11 take up 19 pages), it is recommended that printing be done from the file menu (File > Print) and then specific page numbers selected for printing.

| 🔦 Microsof | t Access - [| Record L | ist for I | Priorit | y Locat | ions] | | | | | | _ 8 × |
|------------|-----------------------------|-------------------|----------------|---------|---------|----------|-------------|-----------|--------------|-------------|--------------|-------|
| 📰 Eile Ed | lit <u>V</u> iew <u>T</u> o | ols <u>W</u> indo | w <u>H</u> elp | | | | | | | | | a × |
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| | | | | | | | | <u> </u> | | | | |
| P | riority I | Locati | ion R | Leco | rd L | ist | | | | | | |
| Gi | obe | | | | | | | | | | | |
| P | rimary Rte | ASH | | | ST | | | | | | | |
| S | econdary Rte |]3RD | | | ST | | | Average D | listance: 8] | ER. | | |
| - | YEAR | RECORD | Units | Fatal | Injured | Distance | Cost Yr 1 | Cost Yr 2 | Cost Yr 3 | Cost Yr 4 | Cost Yr 5 | |
| | 1995 | 03532 <i>5</i> 74 | 2 | 0 | 0 | 0 | \$2,000 | \$0 | \$0 | \$ 0 | \$0 | |
| | 1995 | 03772669 | 2 | 0 | 0 | 13 | \$2,000 | \$0 | \$0 | \$0 | \$0 | |
| | 1995 | 03772706 | 2 | 0 | 0 | 4 | \$2,000 | \$0 | \$0 | \$0 | \$0 | |
| | 1996 | 04360240 | 2 | 0 | 1 | 0 | \$0 | \$180,000 | \$0 | \$0 | \$0 | |
| | 1996 | 04572570 | 2 | 0 | 3 | 0 | \$0 | \$19,000 | \$0 | \$0 | \$0 | |
| | 1997 | 04903462 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$2,000 | \$0 | \$0 | |
| | 1997 | 0.9053064 | 2 | 0 | 1 | 45 | \$0 | \$0 | \$19,000 | \$0 | \$0 | |
| | 1997 | 05121506 | 2 | 0 | 0 | 12 | \$0 | \$0 | \$2,000 | \$0 | \$0 | |
| | 1997 | 05351452 | 2 | 0 | 1 | 0 | \$0 | \$0 | \$19,000 | \$0 | \$0 | |
| | 1997 | 05541430 | 2 | 0 | 1 | 3 | \$0 | \$0 | \$19,000 | \$0 | \$0 | |
| | 1998 | 0.5660171 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$0 | \$2,000 | \$0 | |
| | 1998 | 06083331 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$0 | \$2,000 | \$0 | |
| | 1998 | 06462752 | 2 | 0 | 0 | 16 | \$0 | \$0 | \$0 | \$2,000 | \$0 | |
| | 1999 | 06571383 | 2 | 0 | 0 | 30 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 06932634 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 06932636 | 2 | 0 | 0 | 9 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 06932638 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 06941586 | 2 | 0 | 5 | -6 | \$0 | \$0 | \$0 | \$0 | \$180,000 | |
| | 1999 | 07383107 | 2 | 0 | 0 | 0 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 074 10460 | 2 | 0 | 0 | -46 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| | 1999 | 074 10497 | 2 | 0 | 0 | -3 | \$0 | \$0 | \$0 | \$0 | \$2,000 | |
| _ | 1999 | 07451368 | 2 | 0 | 0 | 0 | \$ 0 | \$0 | \$0 | \$ 0 | \$2,000 | |
| м | anday, April 02 | , 2001 | | | | | | | | | Page 1 of 19 | |
| Page: 📧 🧃 | 1 | FI 4 | | | | | | | | | | |
| Ready | | | | | | | | | | | | NUM |

As in the case of the Priority List report, closing the Priority Location Record List will return the user to the <u>STARTUP</u> menu. In the case of a complete update, the next step would be the examination of individual crash details for one or more locations.

BASIC NAVIGATION

It is strongly recommended that buttons included on forms (e.g. <u>STARTUP</u>, <u>INPUTS</u>, <u>SITE DETAILS</u>, <u>PROJECT DETAILS</u> and <u>PROJECT EVALUATION</u>) be used to move between screens. These forms all contain buttons to move between records, perform update functions, and return to the previous or STARTUP form.

All forms can also be closed using the lower "X" (close form) box in the top right hand corner of the form. Closing a form in this manner will return the user to the STARTUP screen. This procedure can be used to close a blank form in the event that the user has omitted data prior to running a query. For further discussion, refer to the <u>ERROR: NO DATA</u> discussion for incomplete safety project entries.

To navigate reports (e.g. <u>Priority List</u>, <u>Priority Records</u>, <u>Crash Details</u>), use options on the lower menu bar to manipulate the report. The report can be resized, printed, closed or exported to other MS Office programs from this menu bar. These options are highlighted in blue on the figure below.

× 6. 8

| 🔍 Microsoft Access - [PRIORITY LOCAT | ION | LIST] | |
|--------------------------------------|-----|-------|---|
| E File Edit View Tools Window Help | | | |
| | F | Close | l |

| Jurisdiction G | obe | | | Start \ | 'ear | 1995 E | nd Yea | r 1999 | , | Sorteo | iby: Tot | al Crashe | 25 | |
|----------------|------|--------------|----------|-------------|-------------|---------------|-------------|------------------------|----------------|--------------|---------------|--------------|---------------------|----------------------|
| Primary Route | Sff× | Secondary Ro | ute Sff× | Avg Dist | Ma× Dist | Total Crsh | Ann Crsh | Total Unit <i>s</i> | Units/ Crsh | Fatal Obs | lnjury Obs | Avg Svrty | Total Crash Cost | Annual Crash Cost |
| WILLOW | ST | BROAD | ST | 15 | 26.0 | 35 | 7.0 | 67 | 19 | 0 | 22 | 1.7 | \$1,003,000 | \$200,600 |
| SYCAMORE | ST | HILL | ST | 175 | 61.0 | 26 | 52 | 50 | 19 | 0 | 3 | 12 | \$264,000 | \$52,800 |
| ASH | ST | 3RD | ST | 8.1 | 46.0 | 23 | 4.6 | 46 | 2.0 | 0 | 14 | 1.6 | \$648,000 | \$129,600 |
| HILL | ST | ASH | ST | 73 | 76.0 | 20 | 4.0 | 40 | 2.0 | 0 | 17 | 1.6 | \$244,000 | \$48,800 |
| CEDAR | ST | BROAD | ST | 13.2 | 61.0 | 19 | 3.8 | 35 | 1.8 | 0 | 11 | 1.6 | \$352,000 | \$70,400 |
| SYCAMORE | ST | BROAD | ST | 8.6 | 46.0 | 18 | 3.6 | 30 | 1.7 | 0 | 7 | 1.6 | \$206,000 | \$41,200 |
| ASH | ST | 7TH | ST | 35.6 | 950 | 14 | 2.8 | 27 | 19 | 0 | 12 | 19 | \$503,000 | \$100,600 |
| HIGH | ST | ASH | ST | 69 | 60.0 | 13 | 2.6 | 24 | 1.8 | 0 | 8 | 1.7 | \$306,000 | \$61,200 |
| WILLOW | ST | HACKNEY | AV | 7.4 | 30.0 | 12 | 2.4 | 24 | 2.0 | 0 | 5 | 12 | \$.58,000 | \$11,600 |
| RUIZ CANYON | RD | JESSE HAVES | ST | 7.6 | 30.0 | 12 | 2.4 | 21 | 1.8 | 0 | 1 | 1.1 | \$41,000 | \$8,200 |
| SOUTH | ST | ASH | ST | 150 | 78.0 | 11 | 22 | 22 | 2.0 | 0 | 10 | 2.0 | \$336,000 | \$67,200 |
| BROAD | ST | BLAKE | ST | 20.4 | 90.0 | 11 | 22 | 27 | 25 | 0 | 18 | 19 | \$446,000 | \$89,200 |
| MURPHY | ST | BROAD | ST | 21.7 | 93.0 | 10 | 2.0 | 18 | 1.8 | 0 | 6 | 2.0 | \$444,000 | \$88,800 |
| EAST | ST | ASH | ST | 12.1 | 60.0 | 10 | 2.0 | 21 | 2.1 | 0 | 10 | 19 | \$300,000 | \$60,000 |
| BROAD | ST | BAILEY | ST | 26.4 | 94.0 | 9 | 1.8 | 18 | 2.0 | 0 | 8 | 19 | \$154,000 | \$30,800 |
| MESQUITE | ST | BROAD | ST | 213 | 62.0 | 8 | 1.6 | 12 | 15 | 2 | 4 | 23 | \$2,716,000 | \$543.200 |

In most cases, if a form or report does not display, open or close properly, simply <u>compacting</u> or closing the database will solve the problem.

CRASH SITE DETAILS

Pressing **Button 3** (marked with an arrow) on the <u>STARTUP</u> menu takes the model user to the **Record Details** form shown in below. Several viewing options are available for individual crash records.

| 🔦 Microsof | ft Access - | [LOC_DTL] | | | | | | |
|-----------------------------|-----------------------------|--|---------------------|----------------------|-----------|----------|--|-----|
| ∬ <u>F</u> ile <u>E</u> dit | <u>V</u> iew <u>I</u> nsert | F <u>o</u> rmat <u>R</u> ecords <u>T</u> | ools <u>W</u> indov | v <u>H</u> elp | | | | 퇴지 |
| 3. Cra | sh Rec | ord Details: | Choos | e from the f | ollowing | g opt | ions: | |
| a. Viev | v a repo | rt of crash rec | ord deta | ails for: | | | | |
| i. | All Prior | ity List Location | s: | | | 2 | | |
| ii. | All Fata | lities at Priority I | List Locat | ions : | | 2 | | |
| iii. | A Speci | fic Location (cho | oose from | the list below): | | | | |
| | Location | RUIZ CANYON BROAD | RD ST | JESSE HAYES BLAKE | ST ST | | Details for each crash : | |
| | 43534.6302 | LONGHORN | RD | COLCORD | RD | | Summary of | |
| | | EAST | ST | ASH | ST | | location details : | |
| | | BROAD | ST | BAILEY | ST | - 1 | Comparison site list and statistics : | |
| | | WILLOW | ST | NAK | ST | <u> </u> | | |
| b. Exp | ort crasl | n record detail | ls to MS | Excel for furt | ther anal | ysis: | | |
| i. | Export D | Details for All Pri | iority List | Locations : | | 2 | | |
| ii. | Export D | Details for Speci | fic Locati | on 1.c.: | | 2 | Exit to Start page | • |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Form View | | | | | | | | NUM |

The most complete data are available by selecting the "Details for each crash" option for all Priority List locations (a.i.), all locations where fatal crashes occurred (a.ii.), or a specific location chosen from the Priority List (a.iii.). These options will create one-page reports for each crash record, listing recorded details on roadway, driver, incident and vehicle characteristics. A <u>sample report</u> is shown below.

Additional procedures that can be run from this page include creating a one-page <u>summary</u> of all crashes at a particular location, <u>exporting</u> crash details to an Excel spreadsheet (useful for Pivot Table reports and other custom summaries), and generating a <u>list of other sites</u> in the jurisdiction with similar characteristics. The latter procedure can be used to include <u>traffic counts</u> in the comparitive analysis.

| 🔦 Microsoft A | ccess - [Fatal | Crash Detail | s] | | | | | | | _ 8 × |
|-------------------|-------------------------------------|---------------------|----------------|-------------------|-------------------|------------------|--------------|-----------------------|---------|-------|
| E <u>File</u> dit | <u>V</u> iew <u>T</u> ools <u>W</u> | /indow <u>H</u> elp | | | | | | | | _ 8 × |
| | | 75% | Close | w. A | 8 64 - | 2 | | | | |
| | | | | | | 4 | | | | |
| | | Priority L | ocation | s: Fatal C | 'r ash | Details | | | | - |
| | | JURIS | Globe | | YEA | .R 1995 | | | | |
| | | RTE_A | MESQUITE | | | ST | RECOR | 03551001 | 1 | |
| | | RTE_B | BROAD | | | ST | | | _ | |
| | | ON_NAME | BROAD | | | DISTANCE | 0 | | | |
| | | COLL_MANN | Angle | | | DAYLIGHT | Darbness | | | |
| | | INTSEC_REL | Intersection I | Related | | JUNC | Intersection | ı | | |
| | | FHE | Collision wif | h ofher Matar Veh | icle | TRAF_WAY | Roadwayd | illey | | |
| | | SCENE | hwe stigate d | | | WEATHER | Cloudy | | | |
| | | NO NVEH_DES | Same as First | t Harmful Event | | OWNER | Unbnown | | | |
| | | ALIGN | Straight Roa | | | GRADE | Downgrad | | | |
| | | LO CA LE | Urban | LA NE Lan | el | R_CONTROL | Non-Contr | alled Access | | |
| | | R_CHAR | Two-WaySti | iped Center Line | | R_COND | Not Report | ed, No Unusual Cond | litions | |
| | | R_SURF | Asphalt. | | | R_SPECLOC | Not. Report | ed, None | | |
| | | R_SURFCOIND | Not. Reporte d | i, No Umisial Con | ditions | R_TERRAIN | ншу | | | |
| | | Control 1 Type | Stop Sign | | | Control 1 Oper | Functional | | | |
| | | Control 2 Type | Striping | | | Control 2 Oper | Functional | | | |
| | | UNIT_NUM | 1 | Unit Speed | 25 | Posted Speed | 25 | Safe Speed | 0 | |
| | | PHE | Other | | | SUB_HE | Collisionv | vifh Other Fixed Obje | đ | |
| | | UNIT_A CT | Going Straigh | nt Ahead | | Travel Direction | W | | | |
| | | PHYS_1 | No Apparent | Defects | | PHYS_2 | Not Report | ed | | |
| | | VIOL_1 | Faile dto Vie | ld Right-Of-Why | | VIOL_2 | Not Report | ed | | |
| | | VISION | Not Obscuree | 1 | | VEH_DM G | Disabling | | | |
| | | VEH_SKID | Skilding | | | VEH_STOP | Vehicle in | Motian | | |
| | | DEFECT_1 | Defective Br | abes | | DEFECT_2 | no defin for | now | | |
| | | UNIT_NUM | 2 | Unit Speed | 25 | Posted Speed | 25 | Safe Speed | 25 | • |
| Page: K K | 1 1 | <u> </u> | | | | | | | | |
| Ready | | | | | | | | | | NUM |

EXPORTING DATA

Due to the number of crashes at many sites, the detail reports can be tedious to examine, particularly in the case of option a.i. "All Priority List locations." Items b.i. and b.ii. are intended to facilitate the use of the information contained in the detail reports. Selecting either of these buttons will automatically export crash details to an Excel spreadsheet. The export options have been pre-formatted to simplify analysis (e.g. record subtotaling by route, harmful event(s), etc.), and will automatically write to the following location:

C:\ADOT\SFTYMDL\SFTYPROJ.XLS

Note that the data transfer takes less than two minutes, but the spreadsheet will not automatically open. The following dialog box will appear as a reminder of the export file location when one of the b. options is chosen.

| Export Data 🛛 🛛 🕅 |
|---|
| This action will export crash details to a new spreadsheet at c:\ADOT\SFTYMDL |
| OK I |

In addition to the crash details export capability, the LGSP model can also produce a summary of many crash details for a single location. This option can be accessed by pressing the "<u>Summary of Location Details</u>" button after choosing a location in option iii. The summary report form will be generated after a run-time of approximately two minutes.

SUMMARY RESULTS

The Location Detail Summary Report subtotals a number of crash details for the chosen location, and return such information as crash counts per route, average distances from the reference junction, average vehicle speeds and posted speed limits.

| ٩, | 💫 Microsoft Access - [LOCATION DETAIL SUMMARY] | | | | | | | | | |
|----|--|--|---------------------|--------------------------------|--|--------------------------|--------|--|--|--|
| E | ile <u>E</u> dit <u>V</u> iew | Insert Format <u>R</u> ecords <u>T</u> ools <u>V</u> | ⊻indow <u>H</u> elp | | | | 립 시 | | | |
| | Locati | ion Detail Sum | nary R | Report | Print this report | Exit to Start page | ^ | | | |
| | Jurisdiction | Globe | | Number of Crash | nes 8 | | | | | |
| | Route A | MESQUITE | ST | Route B BRC | JAD S1 | | | | | |
| | Crashes On Route | BROAD | 8 | Location Dist Averages 21.8 | ance PostedSpd UnitSpd 33 20.83 13.33 | SafeSpd 6.25 | | | | |
| | Subtotals | s for Observed Crash | Characte | ristics: | | | | | | |
| | Intersection Relation | No Relationship Intersection Related Alley Intersection | 3 3 2 | Traffic Way | Roadway/Alley Roadside | 7 1 | | | | |
| | Alignment | Not Reported Straight Roa | 7 | Roadway Character | Two-Way Striped Center Line Not Reported | 7 1 | | | | |
| | Grade | Downgrade Level | 5 3 | Collision Manner | Single Vehicle Rear-End Angle | 4 2 2 | | | | |
| | First Harmful Event | Collision with other Motor Vehicle Collision with Motor Vehicle Parked Collision with Other Fixed Object | 4 3 1 | Prior Harmful Event | Other No Improper Driving Unknown | 7 4 1 | | | | |
| | Unit Action | Going Straight Ahead Making Left Tum Backing Unknown | 6 A 2 2 1 V | Violation | No Improper Driving Followed Too Closely Failed to Yield Right-Of-Way Unknown | 4 <u>4</u> 2 1 | | | | |
| | Special Location | Not Reported, None Pedestrian Crosswalk/Striped Pedestrian Crosswalk/Not Striped | 6 1 1 | Vehicle Motion | Vehicle in Motion | 12 | - | | | |
| Fo | rm View | | | | | | NUM | | | |
| | | | | | | | | | | |

This form can be printed in a one-page layout by selecting the print option at the top of the screen. It should be noted that counts for different variables will not always match the number of crashes. This occurs because some variables are

recorded for each vehicle (e.g. unit action and violation), while others pertain to the site (e.g. traffic way and grade).

COMPARISON SITE LIST

The final option available for crash location detail reporting is the **Comparison Site List**, also located in section a.iii. The Comparison Site List report returns a summary of additional sites in a jurisdiction that have similar characteristics to the site location being analyzed. This report is intended to facilitate before-andafter comparisons between treated and untreated locations, and to provide basic statistics for estimating regression-to-the-mean potential at a given site.

Selection Criteria

The Comparative Site List identifies other locations in the jurisdiction that match the following criteria from the reference location:

- junction and intersection relationships
- traffic way and roadway characterisitics
- special locations (e.g. pedestrian crosswalks)
- traffic control devices
- maximum posted speed

Depending on the characteristics of the reference location, the number of sites returned can range from none to several hundred. The Comparative Site List generates summary statistics (average annual crash incidence and standard deviation) for *all* sites in the report. Analysis of any location subsets is left to the user of the model.

Two different Comparison Site List reports can be generated. The only difference between them is that one report contains crash rate data using average daily traffic (ADT) counts entered by the user. When the Comparison Site List button is selected in details section iii., a message box will appear, asking whether the user would like to include traffic count data. If the "No" button is pressed, no further action is required. A summary list of related crash locations is generated (see <u>Comparative Sites Report A</u> – No Traffic Data).



If the "Yes" button is pressed, another message box will appear, this time asking whether traffic counts need to be added or modified. If traffic counts have already been entered, pressing "No" will open the Comparison Site List containing ADT counts, crash rates for each location and summary statistics for the crash rates measurements (see <u>Comparative Sites Report B</u> – Traffic Data).

Note that crash rates are expressed in terms of annual crashes per 10,000 passing vehicles.



TRAFFIC COUNTS

Pressing "Yes" on the second dialog box will open the Comparative Sites Traffic form shown below. This form allows the model user to enter average daily traffic counts for any or all locations in the comparison site report. Average daily traffic counts can be based on any period, but must reflect *daily* figures. The LGSP calculates annual crash rates per 10,000 passing/entering vehicles using the following formula:

AnnualCrashRate = AnnualCrashes * ADT * 365 / 10,000

| 🔍 Microsoft Access - [CompSiteT | raffic] | | | | | | _ 8 × |
|---------------------------------------|--|---------------|----------------|------------------|----|----------|-------|
| Eile Edit View Insert Format Re | cords <u>T</u> ools <u>W</u> indow <u>H</u> elp | | | | | | ٩× |
| Enter average da locations and the | ily traffic counts for one n press the "Get Report" | Get Report | 2 | Exit to Start | ₽• | <u>*</u> | |
| Route A (Primary) | WILLOW | ST | Annual Crashes | 8.0 | | | |
| Route B (Secondary) | BROAD | ST | Location ADT | 142 | | | |
| Route A (Primary) | ASH | ST | Annual Crashes | 5.2 | | | |
| Route B (Secondary) | 3RD | ST | Location ADT | 126 | | | |
| Route A (Primary) | HILL | ST | Annual Crashes | 4.4 | | | |
| Route B (Secondary) | ASH | ST | Location ADT | 103 | | | |
| Route A (Primary) | нібн | ST | Annual Crashes | 2.8 | | | |
| Route B (Secondary) | ASH | ST | Location ADT | 98 | | | |
| Route A (Primary) | WILLOW | ST | Annual Crashes | 2.6 | | | |
| Route B (Secondary) | HACKNEY | AV | Location ADT | Ū | | | |
| Route A (Primary) | BROAD | ST | Annual Crashes | 2.4 | | | |
| Route B (Secondary) | BLAKE | ST | Location ADT | 0 | | | |
| Route A (Primary) | MURPHY | ST | Annual Crashes | 2.0 | | | |
| Route B (Secondary) | BROAD | ST | Location ADT | 0 | | | |
| Route A (Primary) | WILLOW | ST | Annual Crashes | 1.6 | | | |
| Form View | IUAK | ет | Location ADT | n | | NUM | |

Note that it is not necessary to enter traffic counts for all sites. The LGSP model calculates crash rate statistics based only on the sites for which traffic counts have been entered. Leaving some sites blank will not affect the calculation of

statistical outputs (comparison sites average and standard deviation). However, the more sites for which traffic counts are included, the more reliable the forecast.

WARNING Crash data will only be stored for the location most recently selected in the Record Details Form. Changing the location and then choosing to enter traffic data will *delete* traffic data for the previous location. *Printing or copying traffic data is strongly recommended prior to analyzing a new site*.

Once traffic counts have been entered, pressing the "Get Report" button in the <u>Comparative Sites Traffic</u> form will open the Comparison Site List that includes traffic-adjusted crash rates. Refer to the following page for illustrations of the two Comparison Site reports. Closing either Comparative Site List will return the user to the <u>STARTUP</u> menu.

To recount the traffic-related and non-traffic-related comparison options, select Option 3 from the STARTUP menu, then press the Comparison Site List button in <u>Record Details</u> Form section iii. At the first message box, press "No" to view the report that does not contain traffic data. Press "Yes" to continue to the second message box. At the second message box, press "No" to view the report containing previously entered traffic data. Press "Yes" to modify traffic data in the Traffic Data Input form.

Comp Site Report: No Traffic

| Microsoft Access - [CO | MP_REPO | RT] | | | | | | | | | |
|--------------------------|-------------------------|---------------------|-------|-----------|-------------------|--------------------|------------------|----------------|------------------|-----------|--|
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| Componenting | - C:4 - T | | 1 | Selection | Jurisdiction | Junction | Inter Rel | ation. Trat | fic Way, Rdwy | | |
| Comparauv | e Site i | ceport | | Criteria: | Characterist | lics, Specia | I Location | (s), Traffic | Control(s), Spe | ed | |
| Jurisdiction Globe | | | | Sortec | iby: Total | l C ras hes | | | | | |
| Primary Route | Sffx | Secondary Route | Sffx | Crashes | Annual Crashes | Total Units | Units / Drash | Total Fatal | Total Injured | | |
| WILLOW | ST | BROAD | ST | 40 | 80 | 77 | 19 | 0 | 29 | | |
| ASH | ST | 3RD | ST | 26 | 52 | 51 | 2.0 | 0 | 18 | | |
| HILL | ST | ASH | ST | 22 | 4.4 | 43 | 2.0 | 0 | 17 | | |
| HIGH | ST | ASH | ST | 14 | 2.8 | 25 | 1.8 | 0 | 9 | | |
| WILLOW | ST | HACKNEY | AV | 13 | 2.6 | 27 | 2.1 | 0 | 7 | | |
| BROAD | ST | BLAKE | ST | 12 | 2.4 | 29 | 2.4 | 0 | 19 | | |
| MURPHY | ST | BROAD | ST | 10 | 2.0 | 18 | 1.8 | 0 | 6 | | |
| SANTEE | ST | BROAD | ST | 8 | 1.6 | 14 | 1.8 | 0 | 1 | | |
| WILLOW | ST | OAK | ST | 8 | 1.6 | 11 | 1.4 | 0 | 6 | | |
| LANE | ST | BROAD | ST | 7 | 1.4 | 14 | 2.0 | 0 | 5 | | |
| WILLOW | ST | CEDAR | ST | 5 | 1.0 | 9 | 1.8 | 0 | 3 | | |
| WILLOW | ST | MESQUITE | ST | 4 | 0.8 | 9 | 23 | 0 | 3 | | |
| BROAD | ST | BERAUTTI | ST | 4 | 0.8 | 9 | 23 | 0 | 5 | | |
| WILLOW | ST | EUCLID | ST | 3 | 0.6 | 4 | 13 | 0 | 0 | | |
| WILLOW | ST | PINAL | ST | 2 | 0.4 | 4 | 2.0 | 0 | 0 | | |
| BROAD | ST | 0060 | | 2 | 0.4 | 3 | 15 | 0 | 1 | | |
| | | | | | | | | | | | |
| Wednesday, April 04, 200 | 01 | | | | | | | | Pa | ge 1 of 2 | |
| | | | | | | | | | | | |
| eady | | | | | | | | | | | |

Comp Site Report: Traffic

| Microsoft Access - [COMP_REPORT] | _ 8 × |
|-------------------------------------|-------|
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| | |

| Jurisdiction Cade | | | | Sorted by: Total Crashes | | | | | | | |
|---------------------------|------|-----------------|------|--------------------------|-------------------|----------------|------------------|----------------|------------------|------------|------------------|
| Primary Route | Sffx | Secondary Route | Sffx | Crashes | Annual Crashes | Total Units | Units / Crash | Total Fatal | Total Injured | Loc ADT | Ann Crsh Rate |
| WILLOW | ST | BROAD | ST | 40 | 8.0 | 77 | 19 | 0 | 29 | 85 | 2 <i>5</i> 786 |
| ASH | ST | 3RD | ST | 26 | 52 | 51 | 2.0 | 0 | 18 | 96 | 1.4840 |
| HILL | ST | ASH | ST | 22 | 4.4 | 43 | 2.0 | 0 | 17 | 73 | 1.6513 |
| HIGH | ST | ASH | ST | 14 | 2.8 | 25 | 1.8 | 0 | 9 | 66 | 1.1623 |
| WILLOW | ST | HACKNEY | AV | 13 | 2.6 | 27 | 2.1 | 0 | 7 | 22 | 3.2379 |
| BROAD | ST | BLAKE | ST | 12 | 2.4 | 29 | 2.4 | 0 | 19 | | 0 |
| MURPHY | ST | BROAD | ST | 10 | 2.0 | 18 | 1.8 | 0 | 6 | | 0 |
| SANTEE | ST | BROAD | ST | 8 | 1.6 | 14 | 1.8 | 0 | 1 | | 0 |
| WILLOW | ST | OAK | ST | 8 | 1.6 | 11 | 1.4 | 0 | 6 | | 0 |
| LANE | ST | BROAD | ST | 7 | 1.4 | 14 | 2.0 | 0 | 5 | | 0 |
| WILLOW | ST | CEDAR | ST | 5 | 1.0 | 9 | 1.8 | 0 | 3 | | 0 |
| WILLOW | ST | MESQUITE | ST | 4 | 0.8 | 9 | 23 | 0 | 3 | | 0 |
| BROAD | ST | BERAUTTI | ST | 4 | 0.8 | 9 | 23 | 0 | 5 | | 0 |
| WILLOW | ST | EUCLID | ST | 3 | 0.6 | 4 | 13 | 0 | 0 | | 0 |
| WILLOW | ST | PINAL | ST | 2 | 0.4 | 4 | 2.0 | 0 | 0 | | 0 |
| BROAD | ST | 0060 | | 2 | 0.4 | 3 | 15 | 0 | 1 | | 0 |
| Wednesday, April 04, 2001 | | | | | | | | | | Page | ⊵lof2 |
| | T | | | | | | | | | | |
| | | | | | | | | | | | |

SAFETY PROJECT SELECTION

In most cases, additional studies and site analyses will be required before proceeding to Option 4: Input of Potential Projects. The Priority List and various detail reports provide a means of identifying hazardous sites and enough additional information to form hypotheses about the appropriate site treatments. However, these details do not supplant the need for on-site evaluation(s) by local traffic engineers. Once a field evaluation has been performed for one or more hazardous sites identified in Options 1 - 3, it is assumed that several potential safety treatments will have been identified for these locations. Option 4 provides an input form for potential safety projects, which can then be evaluated in terms of expected effectiveness and associated benefits versus project costs.

PROJECT DETAILS FORM

Pressing **Button 4** on the STARTUP menu opens the **Safety Project Details** form. Any number of safety projects can be evaluated from this page. However, each project must be assigned a unique "Project Number" identifier prior to analysis. It is recommended that the "Alternatives" fields also be used to distinguish between multiple possibilities at the same location. A site location must be selected from the "Project Location" menu – omitting this step will cause the project data to be ignored, and a blank error form to appear when the sites are evaluated (see <u>NO DATA ERROR</u> below).

| Microsoft Access - [Safety Project Details] Ilie Edit View Tocert Format Records Tools Window Help | · 문·· |
|---|--|
| Safety Project Details | |
| Project Number: test 2 Alternative Number: 2 L00 Alternatives at location? 2 PR0 | JD <u>9114677025</u> J_D <u>37</u> |
| Project Location: WILLOW ST BROAD ST St SYCAMORE ST HILL ST Total Const ASH ST 3RD ST Total Const HILL ST ASH ST Annual Mai CEDAR ST BROAD ST Project Life SYCAMORE ST BROAD ST Interest Ra | apject costs and lifecycle: ruction Cost \$95,000 Intenance Cost (Net) \$0 (Duration) in Years 0 te - Capital Recovery 8 % |
| On Route: Broad From MP: 0 To MP: 0 Project Type: Project tereduction Sight distance improvement Image: Sight distance improvement Project Description: Incap. Inj. test 2 Non-incap Possible In PD0 | ffectiveness (expected in crashes of each type): |
| Use the right arrow key to add additional projects (records) PREVIOUS NEXT RECORD Kait to Start page Form View | te these projects and expected benefit/cost ratio, button: |

The remaining inputs for a preliminary project assessment are listed below. Note that some fields are required inputs, while others may be left blank.

On Route: specify which route at the project location will receive the safety treatment

Project Type: select from the menu of 76 different project types organized by seven broad project classes; an "other safety improvements" category is also provided in the event that none of the available types are suitable; this field is used to assign default values for project life cycle and estimated effectiveness (*required*)

Project Description: enter a brief but specific description of the safety treatment; this field will help discern multiple treatments at the same site and is included in the <u>Project Evaluation</u> report

Total Construction Cost: enter the total estimated implementation cost of the project; do *not* annualize this figure – the model will perform this calculation (required)

Annual Maintenance Cost: enter the annual cost (if any) of operating or maintaining the treatment; only include costs that are not reflected in the "Total Construction Cost;" for example, include the annual cost of periodic repairs to crash cushions after construction

Project Life: enter the expected life span of the safety improvement in whole years; the model will assign default values based on the Project Type; this field is only required if defaults are not available for the Project Type selected

Interest Rate: enter the interest rate used to annualize costs by calculating capital recovery factors; as in all term-based financing, the higher the interest rate, the more expensive the project; the model currently uses a range from 8 percent to 16 percent per HES guidelines

Project Effectiveness: enter expected crash/accident reduction factors for crashes of each severity class; this field is not required for the preliminary analysis – when available, the LGSP model will assign default values if these fields are left as "0"; note that the final estimate of effectiveness is the responsibility of the model user, but these figures can be adjusted in the next step

When entering multiple projects, use the "Next Record" and "Previous Record" arrow buttons to move from screen to screen. For example, after entering Project #1, press the "Next Record" button to view a blank screen in which Project #2 can then be entered. To edit Project #1, simply press the "Previous Record" button to back up one input screen. Once all projects have been entered, press the "Evaluate" button in the bottom right corner of the screen. This will activate a Project Evaluation macro, and after several minutes (generally less than three) the Project Evaluation Form will be displayed.

SAFETY PROJECT ANALYSIS

Project benefits are annualized using historical crash rates, crash cost figures and effectiveness parameters. It should be noted that, regardless of estimated effectiveness, the benefits associated with a safety improvement will be constrained by average incidence rates for each type of crash. Annual benefits are calculated by multiplying the annual crash rate by the reduction factor to yield a "Total Annual Reduction," which is then multiplied by the estimated cost of each type (i.e. severity) of crash to yield the "Annual Benefit" estimate. Safety project costs are annualized in a similar manner.

Depending on the interest rate and life cycle of the safety improvement, an appropriate capital recovery factor is assigned. The capital recovery factor is multiplied by the total construction cost to yield an annual construction and/or implementation cost. Annual maintenance costs are then added to the annualized construction costs to calculate the "Total Annual Project Cost."

The "Total Annual Benefit" and "Total Annual Cost" figures are compared in the "Project Summary" section on the right side of the form. Dividing total annual benefits by total annual costs returns a project benefit-cost ratio. If this figure is greater than 1.0, the project is within the range required for HES funding eligibility. However, this does not imply that projects are automatically eligible for

HES funds. A completed application must be submitted and approved prior to funding.

PROJECT EVALUATION FORM

The Project Evaluation Form contains a preliminary benefit-cost analysis and associated estimates of effectiveness for each project entered in the Project Details form. Projects are displayed individually, and may be viewed by using the "Next Record" and "Previous Record" buttons. As shown in the figure below, each project view contains a summary of project number, type, class, location and description.

| Project Number Project Locatio an | n WILLOW d BROAD | 2 | S1 | On Ra From Milep | post 0 To Milepost 0 | |
|---|-------------------------|---------------------|--------------------|---------------------|--------------------------|-------------------------------|
| Project Class | INTERS | ECTIONS & IN | TERCHANG | ES | Project Det | tails test 2 |
| Project Catego | ry Sight di | stance improve | ement | | | |
| | | Safety Pr | oject Bene | fits | | |
| Crash Types | Annual Average | Reduction Factor | Total Reduction | Unit Cost | Annual Benefit | |
| Fatal | 0.000 | 0.280 | 0.000 | \$2,600,000 | \$0 | |
| Incap. Inj, | 0.800 | 0.215 | 0.172 | \$180,000 | \$30,960 | PROJECT SUMMARY |
| Non-incap. Inj. | 1.200 | 0.215 | 0.258 | \$36,000 | \$9,288 | Total Annual Benefit \$44,677 |
| Possible Inj. | 0.600 | 0.215 | 0.129 | \$19,000 | \$2,451 | Total Annual Cost \$14,155 |
| PDO | 4.600 | 0.215 | 0.989 | \$2,000 | \$1,978 | Benefit/Cost Ratio 3.15 |
| | | | Total A | nnual Benefit | \$44,677 | BCR In Range? YES |
| | | Safety F | roject Cos | ts | | |
| Total Constructi | ion Cost | | | | \$95,000 | RECORD RECORD |
| Project Life (Ye | ars) . | | | | 10 | To add these details as |
| nterest Rate | | | | | 8.0% | add other projects, |
| Capital Recover | y Factor . | | | | 0.1490 | press this button: |
| Annual Construc | ction Cost . | | | \$14,155 | To create a final report | |
| Net Annual Mair | ntenance C | ost | | \$0 | for existing projects, Z | |
| Total Annual Pr | oject Cost _. | | | \$14,155 | | |

Once the evaluation procedure has been run, the user has the option of editing existing projects and/or adding new projects or creating a final <u>Project Evaluation</u> <u>Report</u>. These options can be chosen via the buttons located in the bottom right corner of the Project Evaluation Form. If the "Edit/Add" button is selected, the user will be returned to the Safety <u>Project Details</u> form. If the "Report" button is chosen, the model creates the report shown in the following section (<u>STARTUP</u> <u>Option 5</u>).

ERROR WARNING: NO DATA

If the Project Evaluation form is a blank screen (see <u>figure</u> below), the user has not specified a site location in the Project Details form. Close the Evaluation form by clicking lower "X" (close window) button, shown in the figure below. This will close the current form and return to the STARTUP form. Select Option 4 to return to the PROJEC



PROJECT EVALUATION REPORT

The Safety Project Evaluation report can be accessed through the previous step, or by selecting Option 5 from the <u>STARTUP</u> menu. This report contains the same data as the Project Evaluation form, formatted for printing. A Project Evaluation report should be accompanied by the <u>Priority List</u>, <u>Location Details</u> and/or the <u>Detail Summary</u>, as well as the <u>Comparative Sites</u> report.

Additional data are required for HES applications. The LGSP model outputs can be used to support an application, but traffic, engineering and historical treatment analyses are also required for an HES program application.

| 🔦 Microsoft Access - [Proj | ect Evaluation Re | port] | | | | | | |
|----------------------------------|---|---------------------|---------------------|---------------------|------------------|-------------------|---|----------------|
| Eile Edit View Tools | <u>M</u> indow <u>H</u> elp | | | | | | | ^코 × |
| | 75% - | Close 🕅 🐺 , | - 💼 🌤 | - ? | | | | |
| | | | | | | | | - |
| Safety Project Evaluation Report | | | | | | | | |
| | PROJECT NUMBER | test 1 | Date | 4/2/01 | Alternative | | | |
| | Primary Route | FLORENCE | | | BL3 | | | |
| | Secondary Route | COLORADO | | | ST | | | |
| | Project On Route | Florence | | From MP | 0 To MP | | | |
| | Safety Project I |)etails | | | | | • | |
| | Project Class | ROADSIDE IM | ROVEMENTS | | | | • | |
| | Project Category | Ve getation/obsta | cle removal | | | | | |
| | Project Description | Relocate utilityp | ole | | | | | |
| | Benefit/Cost Ratio | 18.9936 | , j | Annual Benefit: | \$113 | 3,202 | | |
| | BCR In Range? | YES | , k | Annual Cost: | \$5 | 5,960 | | |
| | Safety Project I | Senefits | | | | | | |
| | Crash Type | Annual Incidence | Reduction Factor | Annual Reduction | Severity Cost | Annual Benefit | • | |
| | Fatal | 0.0000 | 30.0% | 0.0000 | \$2,600,000 | \$0 |] | - |
| | Incapi, Injuny | 0.4000 | 29.5% | 0.1180 | \$180,000 | \$21,240 |] | |
| | Non-incap, Injury | 6.0000 | 29.5% | 1.7700 | \$36,000 | \$63,720 |] | |
| | Posisible Injury | 3.6000 | 29.5% | 1.0620 | \$19,000 | \$20,178 |] | |
| | Property Dmg. Only | 12.6000 | 32.0% | 4.0320 | \$2,000 | \$8,064 |] | |
| | | | | Total An | nual Benefit | \$113,202 |] | |
| | Safety Project Costs | | | | | | | |
| | Assumptions: Total Construction Cost \$40,000 | | | | | | | |
| | Capital Recovery Fac | tor 0.149 | Annual | Construction C | • | \$5,960 | | |
| | Interest Rate | 8.0% | Annual | Maint, Cost | | \$0 | | |
| | Project Life (Years) | 10 | Annual | Project Cost | | \$5,960 | | - |
| Page: III I I IIII | • | | | | | | | Þ |
| Ready | | | | | | | | NUM |

Use of the LGSP model need not be confined to spot treatment analyses. However, the availability of funding for spot improvements makes it likely that these projects will be the primary focus for most LGSP users. In cases where treatments are limited in scope or area of influence, it is recommended that multiple iterations of the model be run using different aggregation distances. For example, while a guardrail installation may conceivably affect a large stretch of highway, the relocation of a utility pole has a much more concentrated impact area. Whereas an aggregation of crash data within a 500-foot radius may be appropriate for the guardrail evaluation, a radius of 100 feet or less may be more appropriate for the utility pole. These analyses can be reassessed from the inputs form (select Option 1) to save update time.

TRAFSAF MACRO: SITE IDENTIFICATION PROCEDURE

The LGSP model returns prioritized local crash sites and relevant details based on a number of user inputs. Data are grouped and manipulated according to a series of Access queries that run upon activation of the TRAFSAF macro. A <u>flowchart</u> delineating the order of macro procedures is provided on the following pages.

Activation of the TRAFSAF macro from the <u>INPUTS</u> form will follow the steps shown in the <u>table</u> below. For each step, the purpose of the procedure and the data elements involved are identified. Tables are indicated with a "T:" prefix, queries by the "Q:" prefix.

The following tables shown in the "Type" column of the <u>TRAFSAF query table</u> are outputs that AzLGSP writes to the SFTYDATA.mdb file:

LOCATION LOCATION TABLE PRIORITY LIST PRIORITY DETAIL TABLE 2D TABLE 3 TABLE 4

ERRORS

In rare cases, certain combinations of input parameters will generate a run time error. An example that occurred during an update for Parker (LaPaz County) using the 500-foot aggregation distance is shown below.



The overflow error stops the transfer of data to SFTYDATA.mdb and required that the TRAFSAF macro be halted before completion. The following dialog box will appear to prompt that the TRAFSAF macro be halted.

| Action Failed | ? × |
|-----------------------------|----------|
| Macro Name: | Sten |
| TRAFSAF | |
| Condition: | |
| True | Continue |
| Action Name: | |
| OpenQuery | |
| Arguments: | |
| Step5, Datasheet, Read Only | |
| J | |

Halting the macro is not a problem in itself. After pressing the "Halt" button in the previous dialog box, the program will display the following screen:



Click on the STARTUP:Form bar circled in the figure above. This will reopen the <u>STARTUP</u> page. From the STARTUP page, proceed to <u>INPUTS</u> (Option #1) and change the aggregation distance and/or reporting method for the jurisdiction. Re-run the model using the new site selection parameters and the problem should be resolved.

ARIZONA LGSP MODEL TRAFSAF CLASSIFICATION QUERY

| Query | Purpose | Elements | Туре |
|---------------|---|---|----------------------|
| Step1 | Translate inputs to proper jurisdiction(s) | T: INPUTS; T:JURIS | Select |
| Step1b | Return all crashes identified in Step1 jurisdiction | Q: Step1; T:SMS06000 | T: LOCATION |
| Step1c1 | Assign unique identifier (On_Road) | T:LOCATION; T:SMS13000 | Select |
| Step1c2 | Assign unique identifier (At_Road) | T:LOCATION; T:SMS13000 | Select |
| Step2 | Return incident-level details for all crashes in T: LOCATION | T:LOCATION; T:SMS01000; T:SMS05000; Q:Step1c1; Q:Step1c2 | T: LocationTable |
| Step2a | Filter locations by Reference Method and Aggregation Distance | T:LocationTable; T:INPUTS | Select |
| Step2b | Restrict Step2a results by Alcohol delimiter; summarize records | Q:Step2a; T:SMS08000 | T: Table2d |
| Step3 | Return incident-level results for filtered records for T:LocationTable, limited by month and year filter | T:LocationTable; T:Table2d; T:INPUTS | T: Table3 |
| Step4 | Return unit and person details for Table3 records, add crash cost estimates by maximum injury | T:Table3; T:SMS08000; T:SMS10000; T:SMS12000; T:COMPCOST | T: Table4 |
| Step4a | Aggregate and annualize Table4 | T:Table4; T:INPUTS | Select |
| Step4a2 | Return Step4a maximum values | Q:Step4a | Select |
| Step5 | Create a priority list of locations, sorted by user preference | T:Table3; T:Table4; T:INPUTS; T:JURIS; Q:Step4a; Q:Step4a2 | T: PRIORITY LIST |
| Step6 | Join and summarize all details for each incident in T:PRIORITYLIST | T:PRIORITYLIST; T:Table3; T:Table4; T:SMS04000 | T:PRIORITY DETAIL |
| DETAIL RPT | Add descriptor fields to T: PRIORITY DETAIL | T:Priority Detail; T:LocationTable; Q:01000; Q:05000; Q:07000-1; Q:07000-2;Q:08000; Q:12000; Q:08000-1; Q:08000-2; Q:12000-1 | T: P_DETAILRPT |

Arizona LGSP "TRAFSAF" Macro Flowchart





TRAFSAF Macro Flowchart (Continued)