

Chapter 11

Intersection Studies



Intersection Studies

- Identification of crashes at intersections based on the specified county, dates, Y-line, and intersecting route combinations
- All route combinations must be entered
- All intersection studies are combination dependant
- Milepost information is not necessary to identify crashes at intersections

Standard Parameters

General Intersection Studies:

Date range = 5 years

Y-line = 150 feet

Fatal Intersection Studies:

Date range = 5 years

Y-line = 150 feet

(allows for broader information - especially on rural roads)

Pedestrian and/or Bicycle Intersection Studies:

Date range = 10 years

Y-line = 50 feet

(smaller subset of data; captures parallel crosswalk areas)

(can compare to HSIP safety warrants)

Standard Parameters (Cont.)

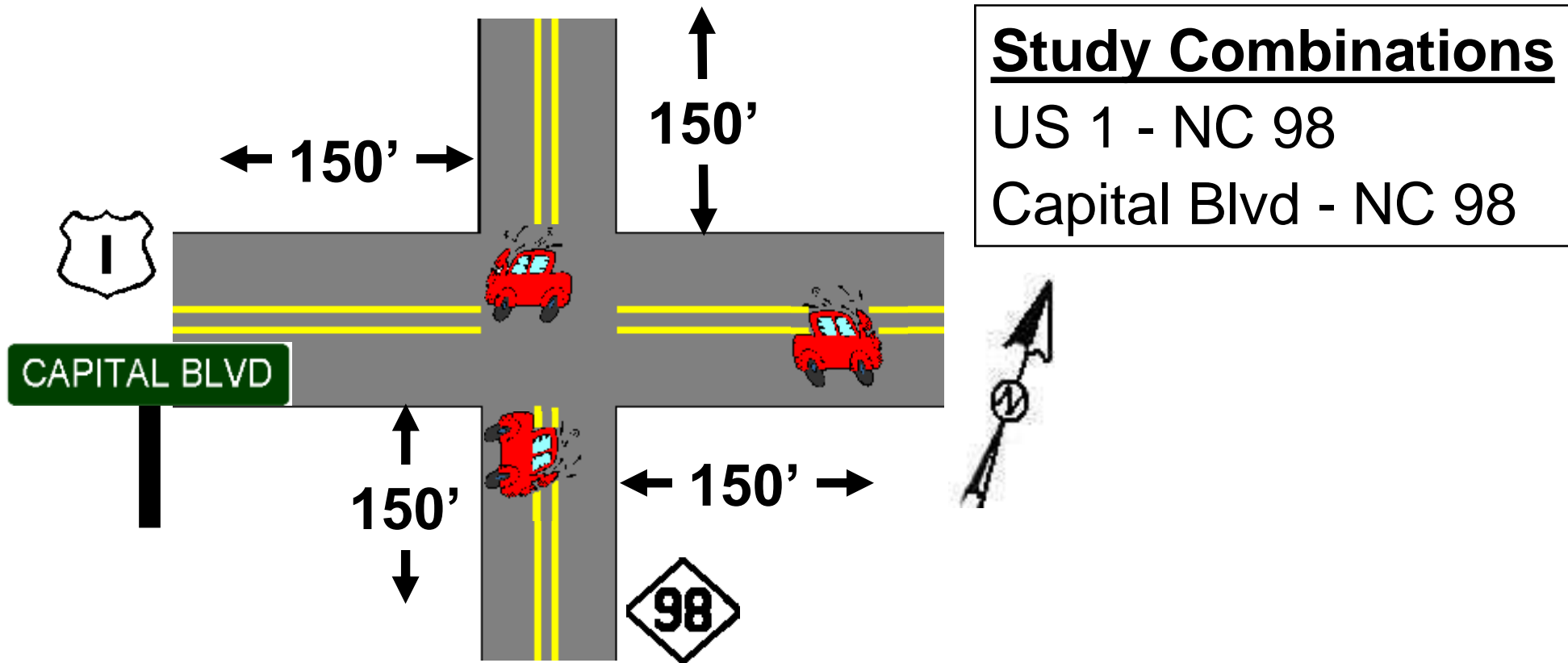
Highway Safety Improvement Program (HSIP) Intersection Studies:

Date range = 5 years

Y-line = 150 feet

(allows for a comparison with safety warrants)

Intersections - Combination Dependant



Study Combinations
 US 1 - NC 98
 Capital Blvd - NC 98

The following reported crashes would be included in a study of US 1/Capital Blvd and NC 98 (150 foot Y-Line):

<u>ON RD</u>	<u>FROM RD</u>	<u>FROM DIST</u>	<u>FROM DIR</u>
Capital Blvd	NC 98	0 ft	
NC 98	US 1	10 ft	S
US 1	NC 98	150 ft	E

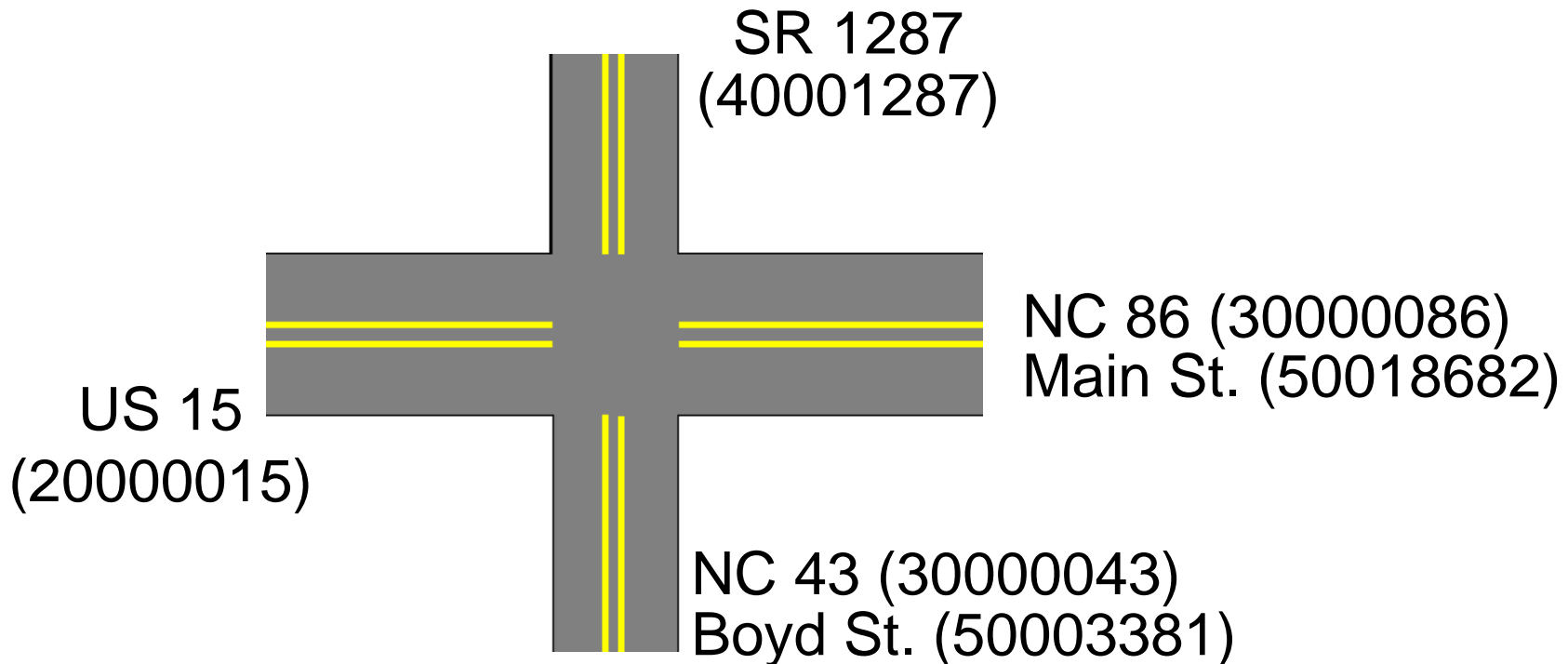
Intersection Identification

- Crashes at intersection locations are identified by route **COMBINATIONS** (not mileposts)!
- When performing an intersection study, it is necessary to determine all possible combinations of intersecting routes (therefore, it is important to know all of the possible names of routes).
- It is imperative to list every possible combination (no matter how unlikely).

Intersection Identification (Cont.)

- Get the mileposting for your intersecting routes (and all coinciding routes).
- Crashes are identified by route combinations
- Beware of loop locations – these group crashes under one intersection and it is the responsibility of the analyst to separate the crashes and identify which loop location each crash occurred at.

Intersection Combination Example

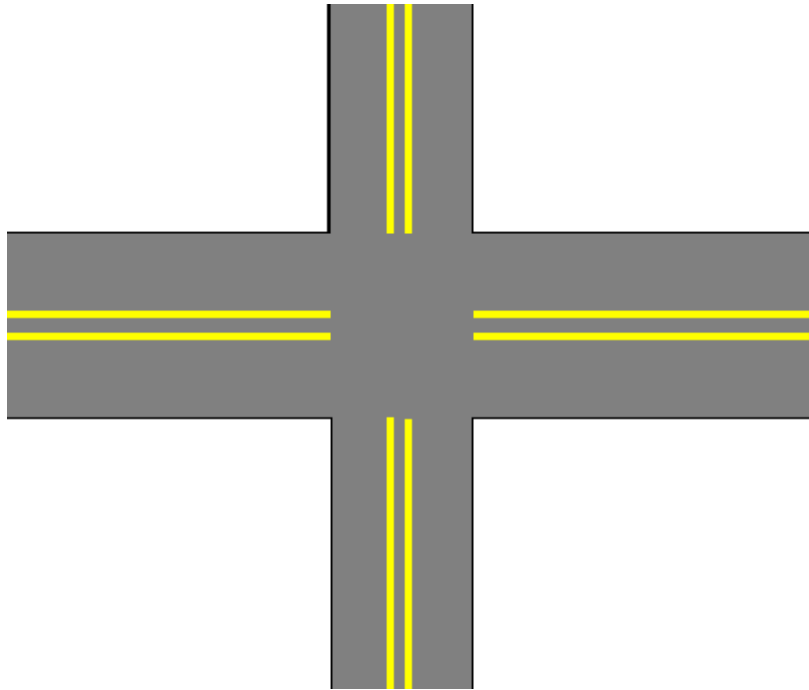


COMBINATIONS

- | | |
|------------------------|-------------------------|
| 1. 20000015 - 40001287 | 8. 40001287 - 30000043 |
| 2. 20000015 - 30000086 | 9. 40001287 - 50003381 |
| 3. 20000015 - 50018682 | 10. 30000086 - 30000043 |
| 4. 20000015 - 30000043 | 11. 30000086 - 50003381 |
| 5. 20000015 - 50003381 | 12. 50018682 - 30000043 |
| 6. 40001287 - 30000086 | 13. 50018682 - 50003381 |
| 7. 40001287 - 50018682 | |

Intersection Combination Exercise

US 401 (20000401)



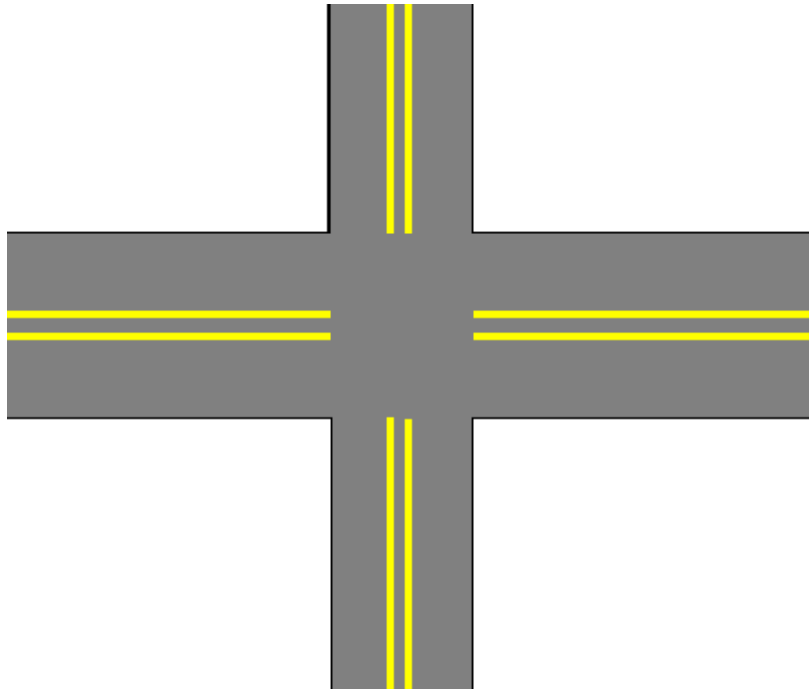
Old Wake Forest Rd
(50009210)

US 1 (20000001)
Capital Blvd (50004906)

COMBINATIONS

Intersection Combination Exercise

US 401 (20000401)



Old Wake Forest Rd
(50009210)

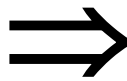
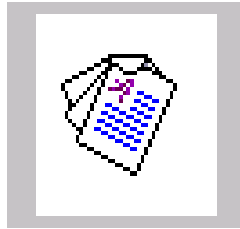
US 1 (20000001)
Capital Blvd (50004906)

COMBINATIONS

1. **20000401 - 20000001**
2. **20000401 - 50004906**
3. **20000401 - 50009210**
4. **20000001 - 50009210**
5. **50004906 - 50009210**

Intersection Study Screen

- Access the “Intersection Analysis Report” screen by selecting the following:



Intersection Study Report

- Consists of 3 tabs within the screen:
 - **Study Information** - allows for entry of general study information
 - **Road Identification** - allows the User to specify the road combinations
 - **Accident Adjustments** - allows the User to include or exclude crashes

Study Information Tab

TEAAS - Reports - Intersection Analysis

Edit Help

Study Information | Road Identification | Accident Adjustments

Save As

Study Area

Study Name Location Text

County Division Municipality

Y-Line Feet Begin Date End Date Years

ADT ADT Route K/A Coeff. B/C Coeff.

Log No. PH No. TIP No.

Request Information

Received Courier Service Requested By

Phone Phone Ext. Fax

Last Update

User ID

Date/Time

0 of 0

See Chapter 10
for information
on this screen.

Road Identification Tab

TEAAS - Reports - Intersection Analysis

Edit Help

Study Information Road Identification Accident Adjustments

Log No. []

Generate Fiche Generate Study

Road 1 (Fiche Road)

Lookup Validate Codes/Names

Table Input

[] [] Submit

Road Code Road Name

Intersection Road Combinations

Lookup Validate Codes/Names

Table Input

[] [] [] [] Submit

Road Name Road Code Road Code Road Name

0 of 0

Enter the “main” route and all coinciding routes and click the **“Validate Codes/Names”** button

Road “A” name

Road “A” 8-digit code

Road “B” name

Road “B” 8-digit code

Remember - use caution when using the “Lookup” button!

Road Combinations

1. At least one road combination must be specified!
2. To enter a combination of “A” and “B”...
 - For road “A”, enter a road name of up to 25 alphanumeric characters **OR** enter a valid 8-digit code.
 - For road “B”, enter a road name of up to 25 alphanumeric characters **OR** enter a valid 8-digit code.
 - Click the “**Submit**” button
 - Repeat this process to input additional combinations
3. Click the “**Validate Codes/Names**” button to determine the 8-digit codes for entries with only road names

Road Combinations (Cont.)

- **To delete a combination:**

- Highlight the row
- Click the “**Delete**” key

Remember - use caution
when using the “Lookup”
button!

- **To modify a combination:**

- Highlight the row
- Click the “**Enter**” key
- Edit record in the input section
- Click the “**Submit**” button

- **To identify local names for secondary roads:**

- Click the “**Lookup**” button
- Highlight the name of the roads you want to include
- Click the “**Include**” button
- Modify rows from included local names to show intersecting routes

Road Combinations Example

TEAS - Reports - Intersection Analysis

Edit Help

Study Information Road Identification Accident Adjustments

Log No.

Generate Fiche Generate Study

Road 1 (Fiche Road)

Lookup Validate Codes/Names

Table Input

Road Code	Road Name
30000032	NC 32
50032162	WASHINGTON
20000064	US 64
40001357	SR 1357

Intersection Road Combinations

Lookup Validate Codes/Names

Table Input

Road Name	Road Code	Road Code	Road Name
US 64	20000064	30000032	NC 32
US 64	20000064	50032162	WASHINGTON
US 64	20000064	40001357	SR 1357
NC 32	30000032	50032162	WASHINGTON
NC 32	30000032	40001357	SR 1357

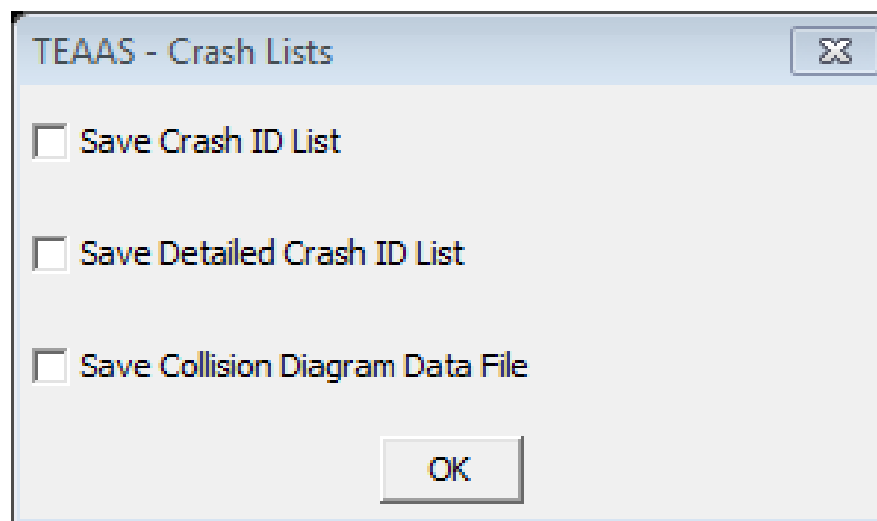
2 of 2

“Main” route and all coinciding routes

Combinations

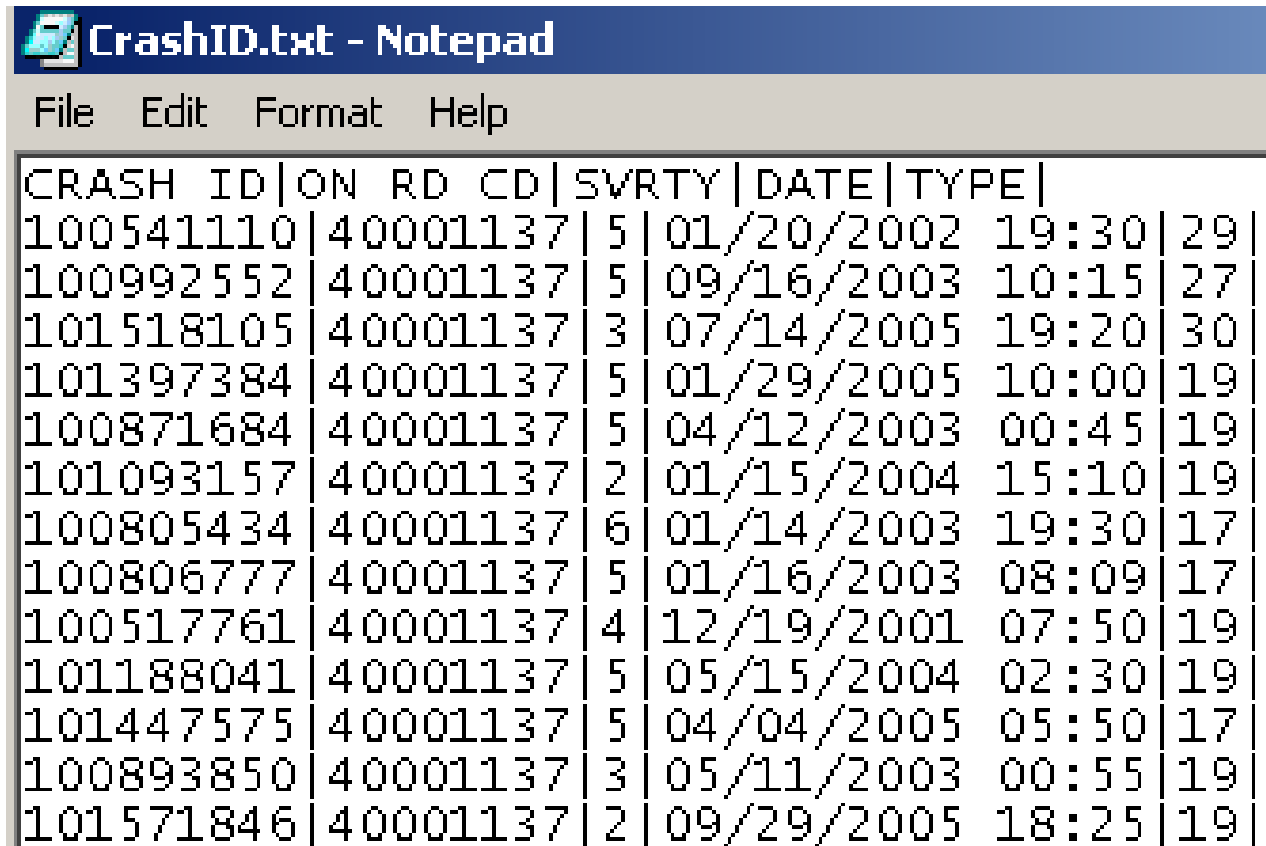
Road Identification Tab (Cont.)

- Click on the “**Generate Study**” button to run an intersection study based on the study criteria.
- A dialog box will prompt users to save a “Crash ID List” (crash level information) or a “Detailed Crash ID List” (person level information) or a “Collision Diagram Data File” (crash level information for a collision diagram). Select the output option (if desired) and click the “**OK**” button. If selected, this information will be saved as a text file.



Crash ID List

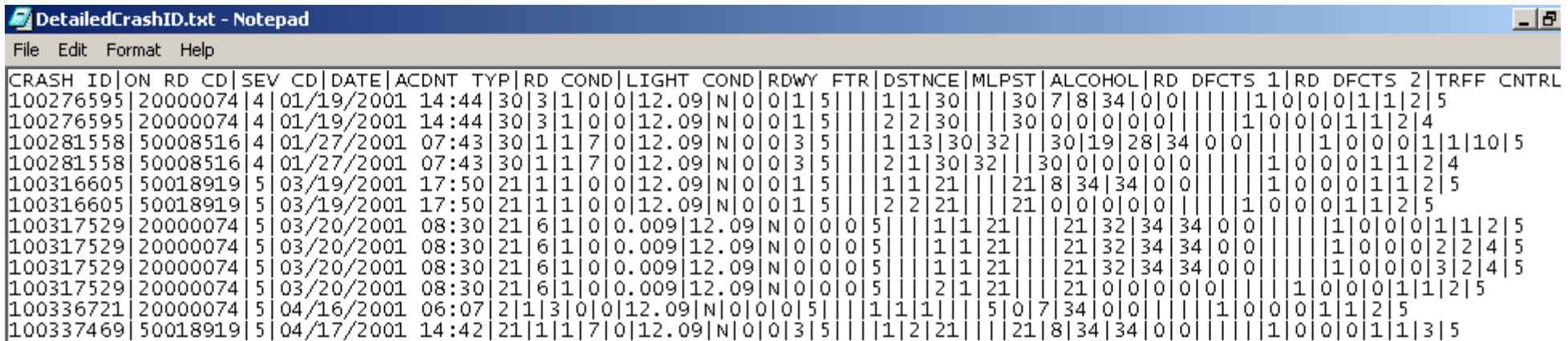
- This text file contains 5 columns of crash-level crash data.
- It may be imported into Excel or Access for further review.



CRASH ID	ON RD CD	SVRTY	DATE	TYPE		
100541110	40001137	5	01/20/2002	19:30	29	
100992552	40001137	5	09/16/2003	10:15	27	
101518105	40001137	3	07/14/2005	19:20	30	
101397384	40001137	5	01/29/2005	10:00	19	
100871684	40001137	5	04/12/2003	00:45	19	
101093157	40001137	2	01/15/2004	15:10	19	
100805434	40001137	6	01/14/2003	19:30	17	
100806777	40001137	5	01/16/2003	08:09	17	
100517761	40001137	4	12/19/2001	07:50	19	
101188041	40001137	5	05/15/2004	02:30	19	
101447575	40001137	5	04/04/2005	05:50	17	
100893850	40001137	3	05/11/2003	00:55	19	
101571846	40001137	2	09/29/2005	18:25	19	

Detailed Crash ID List

- This text file contains 43 columns of person-level crash data.
- It may be imported into Excel or Access for further review.



DetailedCrashID.txt - Notepad

File Edit Format Help

CRASH ID	ON RD CD	SEV CD	DATE	ACDNT TYP	RD COND	LIGHT COND	RDWY	FTR	DSTNCE	MLPST	ALCOHOL	RD DFCTS 1	RD DFCTS 2	TRFF CNTRL		
100276595	20000074	4	01/19/2001	14:44	30 3	1 0 0	12.09	N 0 0	1 5		1 1 30		30 7 8 34 0 0		1 0 0 0 1 1 2 5	
100276595	20000074	4	01/19/2001	14:44	30 3	1 0 0	12.09	N 0 0	1 5		2 2 30		30 0 0 0 0 0		1 0 0 0 1 1 2 4	
100281558	50008516	4	01/27/2001	07:43	30 1	1 7 0	12.09	N 0 0	3 5		1 13 30 32		30 19 28 34 0 0		1 0 0 0 1 1 10 5	
100281558	50008516	4	01/27/2001	07:43	30 1	1 7 0	12.09	N 0 0	3 5		2 1 30 32		30 0 0 0 0 0		1 0 0 0 1 1 2 4	
100316605	50018919	5	03/19/2001	17:50	21 1	1 0 0	12.09	N 0 0	1 5		1 1 21		21 8 34 34 0 0		1 0 0 0 1 1 2 5	
100316605	50018919	5	03/19/2001	17:50	21 1	1 0 0	12.09	N 0 0	1 5		2 2 21		21 0 0 0 0 0		1 0 0 0 1 1 2 5	
100317529	20000074	5	03/20/2001	08:30	21 6	1 0 0	0.009	12.09	N 0 0	0 5		1 1 21		21 32 34 34 0 0		1 0 0 0 1 1 2 5
100317529	20000074	5	03/20/2001	08:30	21 6	1 0 0	0.009	12.09	N 0 0	0 5		1 1 21		21 32 34 34 0 0		1 0 0 0 2 2 4 5
100317529	20000074	5	03/20/2001	08:30	21 6	1 0 0	0.009	12.09	N 0 0	0 5		1 1 21		21 32 34 34 0 0		1 0 0 0 3 2 4 5
100317529	20000074	5	03/20/2001	08:30	21 6	1 0 0	0.009	12.09	N 0 0	0 5		2 1 21		21 0 0 0 0 0		1 0 0 0 1 1 2 5
100336721	20000074	5	04/16/2001	06:07	2 1 3	0 0	12.09	N 0 0	0 5		1 1 1		5 0 7 34 0 0		1 0 0 0 1 1 2 5	
100337469	50018919	5	04/17/2001	14:42	21 1	1 1 7 0	12.09	N 0 0	3 5		1 2 21		21 8 34 34 0 0		1 0 0 0 1 1 3 5	

Collision Diagram Data File

- This text file contains 22 columns of crash-level data.
- It may be imported into the semi-automated collision diagram program for development of a collision diagram.

```
CollisionDiagramData_20120702.txt - Notepad
File Edit Format View Help
"CRSH_ID","CNTY_NBR","MLPST_NBR","NBR_UNT_CNT","FRM_RD_CD","RD_ON_CD","DSTNC_MILE_FRM_RD_QTY","DRCTN_FRM_RD_CD","ACDNT_DT_TM","SVRTY_CD","ACC_
"102145595","10","1.181","2","50003816","50005727",".028","S","09/21/2007 18:21","2","30","2","1","1","0","35","10","10","8","19","E","1"
"102145595","10","1.181","2","50003816","50005727",".028","S","09/21/2007 18:21","2","30","2","1","1","0","35","35","25","4","0","S","2"
"102489971","10","1.181","1","50003816","50005727",".028","S","12/15/2008 02:08","5","19","2","2","4","13","30","25","25","5","30","S","1"
"101998960","10","1.19","2","50003816","50005727",".019","S","03/30/2007 17:20","5","21","2","1","1","0","35","35","35","4","20","S","1"
"101998960","10","1.19","2","50003816","50005727",".019","S","03/30/2007 17:20","5","21","2","1","1","0","35","30","30","11","0","S","2"
"102115999","10","1.19","1","50003816","50005727",".019","S","08/17/2007 00:07","4","1","2","1","4","0","30","30","30","4","32","S","1"
"101939993","10","1.209","3","50003816","50005727","0","","01/12/2007 17:58","4","14","2","1","4","0","30","10","5","4","0","S","3"
"102145000","10","1.209","2","50003816","50005727","0","","09/20/2007 16:01","5","21","3","1","1","0","30","30","30","4","20","S","1"
"102145000","10","1.209","2","50003816","50005727","0","","09/20/2007 16:01","5","21","3","1","1","0","30","30","1","0","S","2"
"102389264","10","1.209","1","50003816","50005727","0","","08/06/2008 15:16","5","1","2","1","1","0","30","30","30","8","26","E","1"
"102524985","10","1.209","2","50003816","50005727","0","","01/27/2009 13:01","5","21","2","1","1","13","35","20","20","4","20","N","1"
"102524985","10","1.209","2","50003816","50005727","0","","01/27/2009 13:01","5","21","2","1","1","13","35","1","0","N","2"
"102575981","10","1.209","2","50003816","50005727","0","","04/08/2009 18:48","5","21","2","1","1","0","30","35","30","4","8","N","1"
"102575981","10","1.209","2","50003816","50005727","0","","04/08/2009 18:48","5","21","2","1","1","0","30","1","0","N","2"
"102992628","10","1.21","2","50001446","50005727",".019","E","10/14/2010 08:22","5","30","2","1","1","1","1","30","20","15","5","8","N","1"
"102992628","10","1.21","2","50001446","50005727",".019","E","10/14/2010 08:22","5","30","2","1","1","1","1","30","30","30","16","32","N","2"
"102411856","10","1.229","1","50001446","50005727","0","","09/11/2008 02:12","3","19","2","1","4","0","30","25","15","4","23","N","1"
"102786727","10","1.229","2","50001446","50005727","0","","01/18/2010 08:01","4","23","2","2","1","1","1","30","30","30","8","9","SW","1"
"102786727","10","1.229","2","50001446","50005727","0","","01/18/2010 08:01","4","23","2","2","1","1","1","30","5","5","4","0","N","2"
"102894975","10","1.229","2","50001446","50005727","0","","06/09/2010 22:26","5","24","2","1","4","1","35","13","13","8","19","W","1"
"102894975","10","1.229","2","50001446","50005727","0","","06/09/2010 22:26","5","24","2","1","4","1","35","35","22","4","0","N","2"
"102393149","10","1.276","2","50001446","50005727",".047","N","08/25/2008 16:12","4","21","2","1","1","0","35","30","25","11","8","N","1"
```

Accident Adjustments Tab

- Allows users to edit (add or delete) crashes.
- Click the **“Generate Lists”** button to populate the data.

The screenshot shows the TEAAS - Reports - Intersection Analysis software interface. The window title is "TEAAS - Reports - Intersection Analysis". The menu bar includes "Edit" and "Help". The toolbar contains icons for file operations and analysis. The main area is divided into several sections:

- Study Information | Road Identification | Accident Adjustments** (selected tab)
- Log No.** (input field)
- Generate Lists** (button) - Annotated as **“Generate Lists” button**
- Generate Study** (button)
- Included Accidents** (table) - Annotated as **“Included Accidents” table**
- Table Input** (input field) with **Submit** (button)
- Include additional accidents by entering the CrashID number here, using the Include button to the left, or by importing a list.** (text)
- Import List** (button)
- Sort** (button)
- Fiche Minus Study Accidents List** (table) - Annotated as **“Fiche Minus Study Accidents List” table**
- These accidents appear in the Fiche Report, but do not currently appear in the study. Select those you want to include.** (text)
- Include <** (button)
- Study Accidents List** (table) - Annotated as **“Study Accidents List” table**
- These accidents appear in the study based on given criteria. Select those that you want to exclude from the study.** (text)
- Exclude >** (button)
- Excluded Accidents** (table) - Annotated as **“Excluded Accidents” table**
- These accidents initially appeared in the study, but will be excluded from the next generated study.** (text)

The bottom of the window shows a status bar with navigation arrows and the text "0 of 0".

Included Accidents

Crashes added to the study by:

- 1) Including crashes from the
“Fiche Minus Study Accidents” table
- 2) Entering a Crash ID into the
“Table Input” section and
clicking the **“Submit”** button
- 3) Clicking the **“Import List”** button to import a text file containing Crash IDs
- 4) TEAAS will check all added crashes to ensure they are within the date range of the study.

The screenshot shows a web interface titled "Included Accidents". On the left is a table with a header "CrashID" and an empty body. On the right is a "Table Input" section containing a text input field and a "Submit" button. Below this is instructional text: "Include additional accidents by entering the CrashID number here, using the Include button to the left, or by importing a list." At the bottom right are two buttons: "Import List" and "Sort".

To remove crashes from this table:

Highlight the Crash ID and click the **“Delete”** key (multiple records may be highlighted using the **“Ctrl”** or **“Shift”** keys)

Fiche Minus Study Accidents List

- Crashes appearing in this table are contained within the fiche report but have not been included in the study.

Fiche Minus Study Accidents List

These accidents appear in the Fiche Report, but do not currently appear in the study. Select those you want to include.

CrashID
96000576
96001510
96003594
96005150
96005763
96005764
96007897
96009765
96011815

Include ◀

- To include crashes from this table into study:
 - Highlight the Crash ID
 - Click the “**Include**” button
 - Highlight multiple records using the “**Ctrl**” or “**Shift**” keys.

Study Accidents List

- Crashes appearing in this table are in the study but may or may not be on the fiche report.

Study Accidents List

CrashID
96012587
96019588
96022369
96041755
96044495
96051308
96051843
96095531

These accidents appear in the study based on given criteria. Select those that you want to exclude from the study.

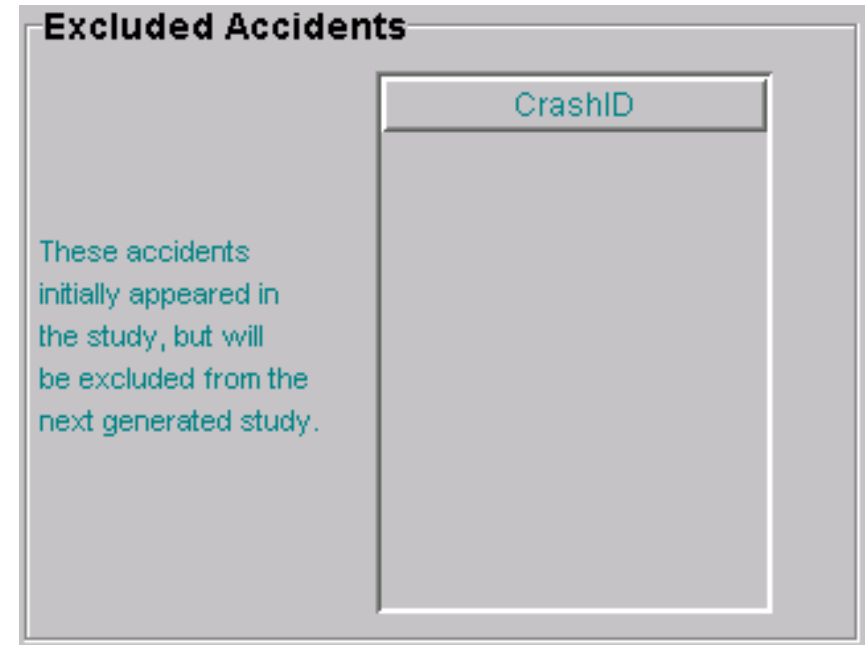
Exclude ▶

- To exclude crashes from the study:
 - Highlight the Crash ID and click the “**Exclude**” button
 - Highlight multiple records with the “**Ctrl**” or “**Shift**” keys

(Excluded crashes are moved to the “Excluded Accidents” table.)

Excluded Accidents

- Can only be populated by excluding crashes from the “Study Accidents List” table



- To delete crashes from this panel
 - Highlight the Crash ID
 - Click the “**Delete**” key
 - Highlight multiple records using the “**Ctrl**” or “**Shift**” keys

Intersection Studies - Steps

- 1) Determine the location and reason for the study
 - Review maps
 - Run feature report(s)
 - Determine all Intersection Combinations
 - Determine or calculate traffic volumes (AADTs)
- 2) Enter study criteria
- 3) Generate a fiche report
- 4) Generate the initial study
- 5) Evaluate the fiche report and compare it with the initial study to determine if any crashes need to be added or deleted
- 6) Add or delete crashes on the study in the “Accident Adjustments” tab
- 7) Generate the final study

Intersection Study Example

Suppose you perform an intersection study on the intersection of US 64 at NC 32 in Washington County from 1/1/1996 through 12/31/1999 with a Y-Line of 150 feet.

Step A - Review maps (county, city, traffic volumes, etc.)

Step B - Run features report(s)



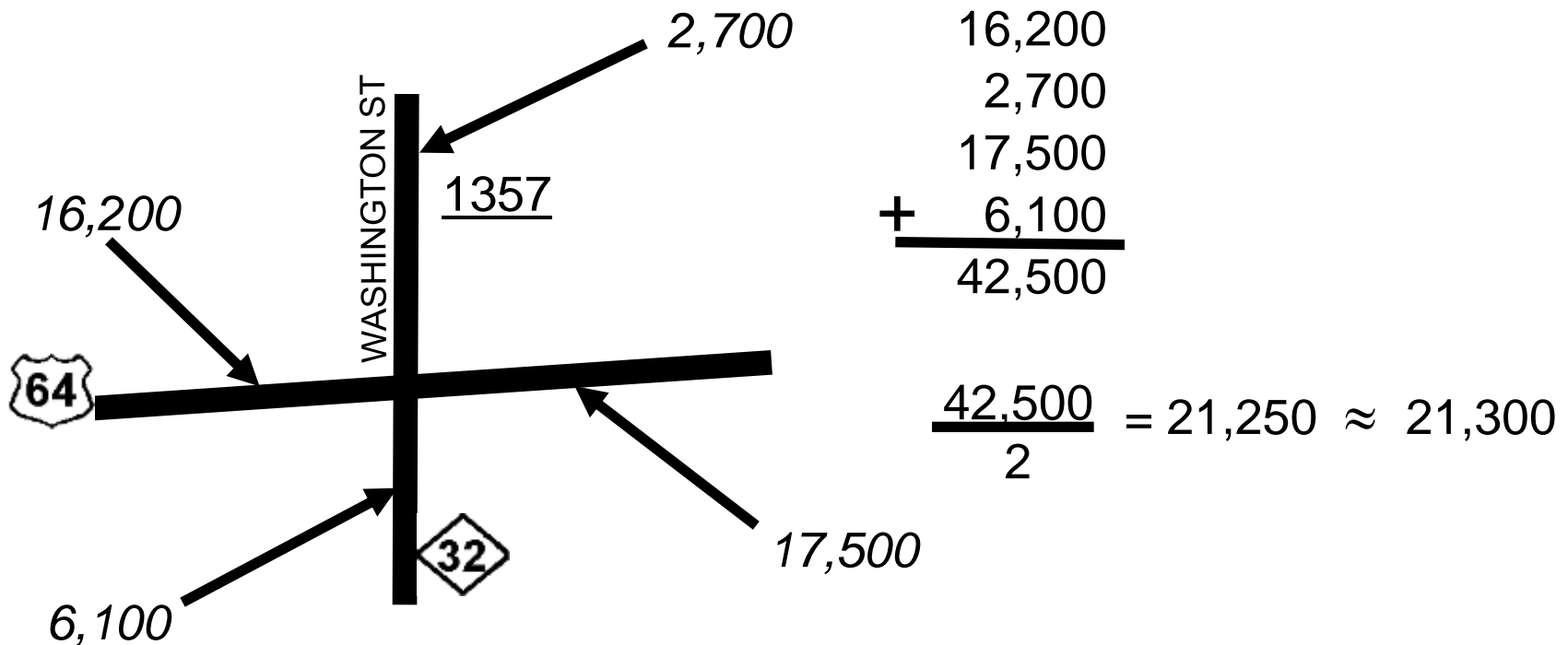
Hint: after reviewing maps and other information it was determined that the northern leg of the US 64/NC 32 intersection is SR 1357 (Washington Street). Therefore, these two additional roads must be considered when the intersection combinations are developed.

Intersection Study Example (Cont.)

Step C - Determine the intersection combinations

US 64 - WASHINGTON
US 64 - SR 1357
US 64 - NC 32
NC 32 - WASHINGTON
NC 32 - SR 1357

Step D - Calculate the AADT



Intersection Study Example (Cont.)

Step E - Click on the “**New**” icon

Step F - Enter known study information

Step G - Go to the “Road Identification” tab

Step F

TEAS Reports - Intersection Analysis

Study Information | Road Identification | Accident Adjustments

Save As

Study Area

Study Name: JROMWASHUS64NC32 Location Text: US 64 at NC 32

County: WASHINGTON Division: 1 Municipality: All and Rural

Y-Line Feet: 150 Begin Date: 01/01/1996 End Date: 12/31/1999 Years: 4

ADT: 21300 ADT Route: K/A Coeff.: 76.8 B/C Coeff.: 8.4

Log No. PH No. TIP No.

Request Information

Received: Courier Service: Requested By:

Phone: Phone Ext. Fax:

Last Update

User ID: from Date/Time: 18 July 2001 02:48 PM

2 of 2

Intersection Study Example (Cont.)

Step I



Study Information Road Identification Accident Adjustments

Log No. []

Generate Fiche Generate Study

Road 1 (Fiche Road)

Lookup Validate Codes/Names

Table Input

[] [] Submit

Road Code	Road Name
30000032	NC 32
50032162	WASHINGTON
20000064	US 64
40001357	SR 1357

Intersection Road Combinations

Lookup Validate Codes/Names

Table Input

[] [] [] [] Submit

Road Name	Road Code	Road Code	Road Name
-----------	-----------	-----------	-----------

2 of 2

Step H

Step H - Enter the fiche roads

(All the roads that you want to look for crashes on)

Step I - Generate and save the fiche report

Intersection Study Example (Cont.)

Step J - Enter all the road combinations

Step K - Generate the initial study

Step L - Save the list of Crash IDs or the data file (optional)

Step M - Save or print the initial study

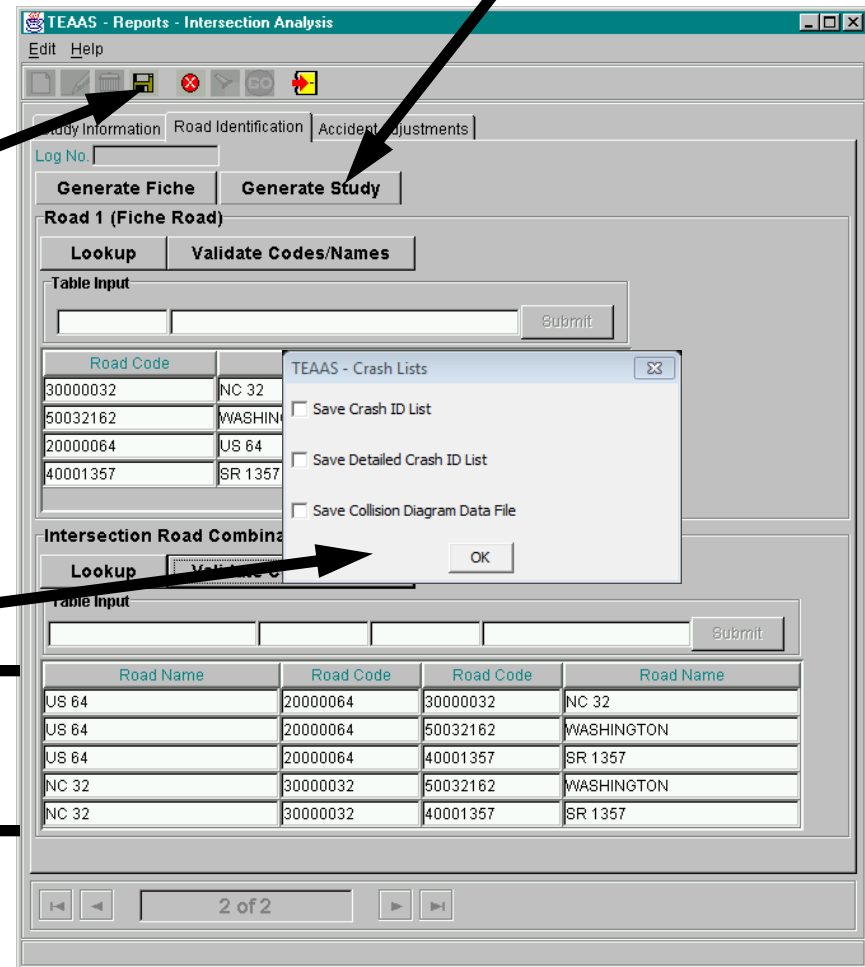
Step N - Save your study

Step K

Step N

Step L

Step J



Intersection Study Example (Cont.)

Step O - Compare the initial study with the fiche report to identify any crashes that need to be added or deleted. Individual crashes may need to be reviewed to make a more accurate decision.

Crashes to be added

97068719

99106308

Crashes to be deleted

96095531

98044473

98122774

98244134

99024746

99113754

Note - this step may actually take a considerable amount of time depending on the number of identified crashes. For training purposes, only the results of this step are shown.

Intersection Study Example (Cont.)

Step P - Click on the “**Modify**” icon

Step Q - Go to the “Accident Adjustments” tab

TEA Reports - Intersection Analysis

Study Information | Road Identification | **Accident Adjustments**

Save As

Study Area

Study Name: DTHARPEWASHUS64NC32 Location Text: US 64 at NC 32

County: WASHINGTON Division Municipality: 1 All and Rural

Y-Line Feet: 150 Begin Date: 01/01/1996 End Date: 12/31/1999 Years: 4

ADT: 19900 ADT Route: K/A Coeff.: 76.8 B/C Coeff.: 8.4

Log No.: PH No.: TIP No.:

Request Information

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Last Update

User ID: jddtrain Date/Time: 15 November 2000 01:23 PM

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Intersection Study Example (Cont.)

Step R - Click the “**Generate Lists**” button

Step S - Highlight the crashes to be added in the “Fiche Minus Study Accidents List” then click the “**Include**” button

Step T - Highlight the crashes to be deleted in the “Study Accidents List” then click the “**Exclude**” button

Step U - Click the “**Generate Study**” button to run the final study

The screenshot shows the TEAAS Reports - Intersection Analysis software interface. The interface is divided into several sections:

- Generate Lists**: Contains a table with columns 'CrashID' and 'Crash'.
- Generate Study**: Contains a 'Table Input' section with a 'submit' button and an 'Import List' button.
- Fiche Minus Study Accidents List**: Contains a list of 'CrashID' values and an 'Include' button.
- Study Accidents List**: Contains a list of 'CrashID' values and an 'Exclude' button.
- Excluded Accidents**: Contains a list of 'CrashID' values.

Annotations with arrows point to specific elements:

- Step R** points to the **Generate Lists** button.
- Step U** points to the **Generate Study** button.
- Step S** points to the **Include** button in the 'Fiche Minus Study Accidents List' section.
- Step T** points to the **Exclude** button in the 'Study Accidents List' section.

At the bottom of the window, there is a status bar showing '2 of 2'.