Council, F.M., Dutt, A.K., Hunter, W.W., Leung, A., and Woody, N. (1977). Project Selection for Roadside Hazard Elimination, Vol. II: User Manual of Roadside Hazard Correction Problem. Chapel Hill NC: University of North Carolina Highway Safety Research Center.

PROJECT SELECTION FOR ROADSIDE HAZARDS ELIMINATION

VOLUME II

USER MANUAL OF ROADSIDE HAZARD CORRECTION PROGRAM

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April 1977

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In cooperation with the

U.S. Department of Transportation

Federal Highway Administration

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ACKNOWLEDGMENTS

The authors wish to express sincere appreciation to all DOH and HSRC personnel who have provided inputs and aid in this project. The following liaison committee members have provided valuable guidance to the efforts described in this manual and in the related Volume I: H. C. Rhudy, J. M. Lynch, F. J. Dodge, G. G. Grigg, Jr., L. B. Roberts, C. D. Adkins, M. L. Webster, K. W. Ivey, and W. H. Michie.

Special thanks are also expressed to HSRC staff members for their diligent efforts in the design and implementation of the RHCR system and in the production of this manual. These include Frank Roediger and Rebecca Stutts for assistance in editing the report and preparation of graphics, David Cole and Beth Leggett for data preparation and presentation, and Donna Suttles for typing the final draft of the manual.

CHAPTER 1 - INTRODUCTION

There exists in the Division of Highways (DOH) Traffic Engineering Branch a computer program entitled "Roadside Hazard Correction Ranking" (RHCR) which is designed to provide information to engineers concerning which of the many classes of roadside hazards should have a high priority for correction based on maximizing payoff. This document is the User Manual for this computer program. This manual is written for engineering personnel who may work with this computer program and as an aid to computer programmers in the Division of Highways who may be expected to make future modifications to the program.

The overall methodology on which the RHCR program is based was developed under a project entitled "Project Selection for Roadside Hazard Elimination." This methodology combines information on (1) North Carolina fixed object accidents, (2) roadside hazard counts, and (3) treatments, and enters this information into an economic analysis program. The outputs of the economic analysis program provide information for ranking roadside hazard correction projects by either the Net Discounted Present Value (or annual benefits) or the benefit/cost ratios. The basic accident information was taken from Division of Motor Vehicles and Division of Highways computer files; the hazard data were derived from DOH roadway characteristics and bridge files and from "Roadside Fixed Object Hazard Inventory" (Grigg, 1974); the treatment information was developed from a review of literature and before-after studies. A detailed explanation of the underlying assumptions and the resulting methodology development procedures is contained in the final project report, "Project Selection for the Elimination of Roadside Hazards, Volume I."

Because the computer program user needs to be familiar with these assumptions and methodologies in order to fully understand the meanings and benefits of the computer program outputs, it is recommended that the users familiarize themselves with the information in Volume I. Because the detailed explanation is presented in Volume I it will not be repeated in this user manual.

The program which computerizes this developed methodology is written in PL 1 language (F compiler). Printouts of each of the program modules can be found in the appendices to this manual.

The remaining chapters in this User Manual are aimed at providing a detailed description of the computer program and its operation. Chapter II presents (1) an overall flow chart for the entire program methodology, (2) detailed descriptions of inputs required from the user, (3) a description of inputs which are written into the program itself, and (4) a detailed description of the output tables produced by the program. Chapter III concerns the program operation itself and includes a step-by-step procedure to be followed when operating the program. Chapter IV concerns modifications to the computer program which might be either necessary or desirable in the future. Instruction is presented concerning the methods to be used in making such changes for each of the program modules. Chapter V, the final chapter, contains a description of error messages which users might encounter while operating the program. The last part of this User Manual is a series of appendices which provide reference material to the program user. These appendices will be described in later chapters.

CHAPTER 2 - INPUTS AND OUTPUTS

I. Overall Program Logic

As indicated above, the RHCR program combines information on accidents, hazards, and treatments, performs an economic analysis on this information, and outputs a series of tables through which these treatments can be ranked. The methodology for this entire process is illustrated in Figure 1. A detailed description of each of the inputs, programs, and outputs shown in Figure 1 will be provided in this chapter, in later chapters, and in the appendices. However, for clarity a less detailed overview of the entire program operations will be presented first.

Three decks of cards, the first containing accident information, the second containing hazard information, and the third containing treatment information, are merged by a matrix-building module or program into an input file or internal matrix in the computer. These three decks of cards are denoted as matrix input decks in the following discussion.

After the input file is built, a set of User Input Cards is entered. These cards contain information which the user must provide in a specified order each time the program is run. The first card in this input deck must contain specific economic inputs. The remaining cards indicate which of the rows within the previously described internal matrix are to be analyzed in this particular run. This second set of cards is called the hazard/treatment/roadway segment Analysis Request Cards. These cards allow the user to request specific hazard/treatment/segment combinations to be analyzed.

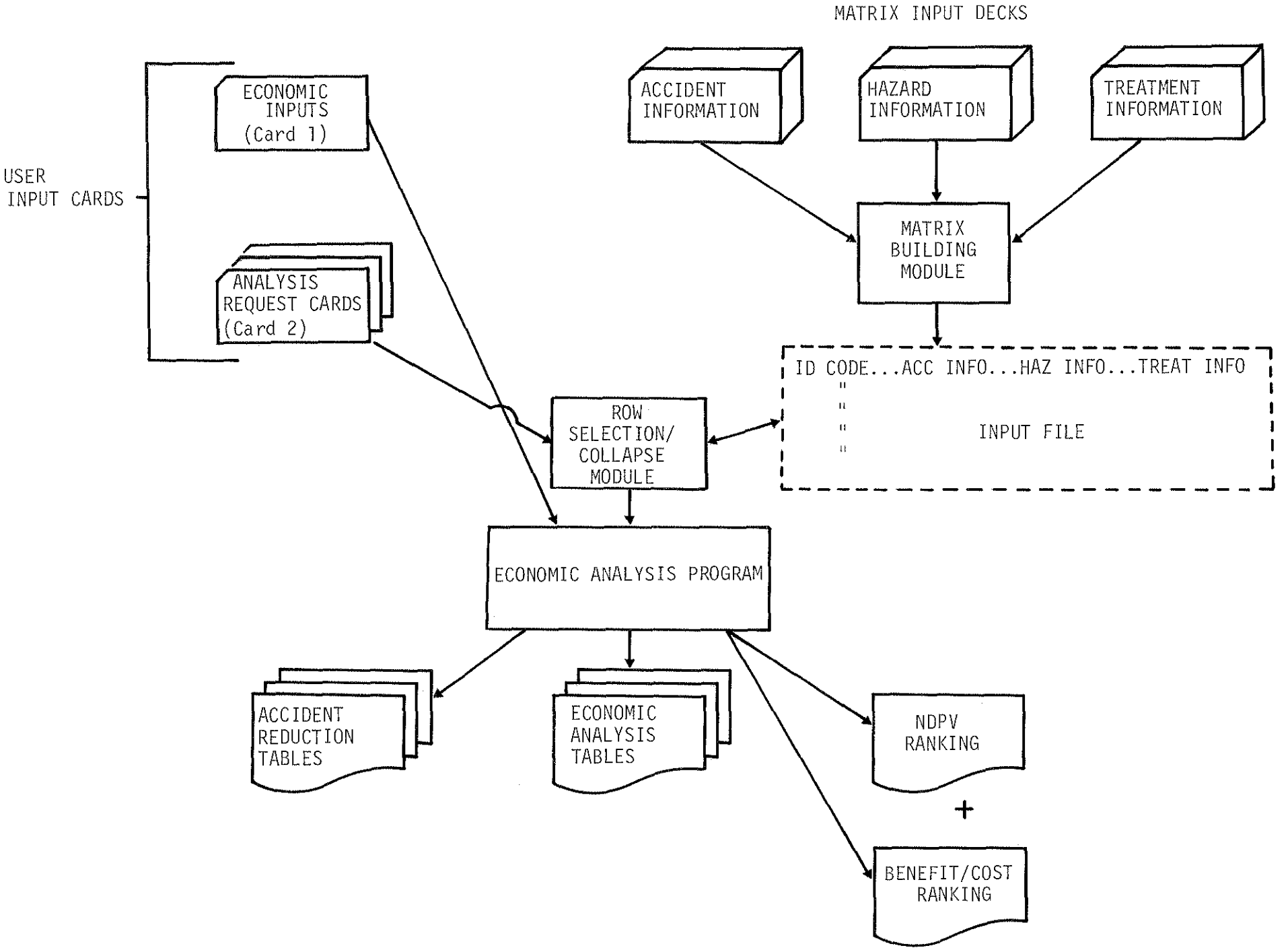


Figure 1. RHCR system components and flow.

These input cards activate an internal program called the "Row Selection/Collapse Module" which in turn extracts the proper rows from the previously described internal matrix and enters these rows (the rows which the user wishes to analyze) into the economic analysis program. The economic analysis program then analyzes the rows of the input matrix specified.

Upon completion of the analyses requested in a given computer run, the economic analysis program will output three different sets of tables. First, for each row of the input file analyzed (i.e., for each hazard/treatment/segment combination requested), the number of fatal, injury, and PDO accidents that is reduced by the treatment in each year of the program's life is presented in a table. A second table, which contains the economic analysis information for each row that is analyzed, presents the outputs concerning the development of the Net Discounted Present Value and the benefit/cost ratio.

Finally there are two summary tables that contain the outputs from the economic analysis tables. Thus, if 20 hazard/treatment/segment combinations are analyzed in a given run, these 20 combinations are ranked from highest to lowest based on the Net Discounted Present Value in one table and ranked by the benefit/cost ratios in the second summary table.

These outputs--the priority rankings based on NDPV and B/C ratios, the numbers of accidents which are reduced, and the individual economic analysis tables--can then serve as tools for the analyst to use in his choice of hazard correction programs.

The remainder of this chapter will present a more detailed explanation of each of these inputs and outputs. These descriptions will be in the same order as in the above overview description: (1) matrix inputs; (2) user inputs; and (3) accident reduction outputs, economic analysis table outputs, and priority ranking tables.

II. Matrix Input Decks

As noted earlier, one of the basic parts of the overall analysis program is the internal matrix (input file) which has to be built before a program run can be made. This file is built from the accident information cards, the hazard information cards, and the treatment information cards depicted in Figure 1. The user should note that these card decks are designed to be used without modification for many future runs. However, as will be explained later, if the user feels that some of the information on these cards needs updating or if new information needs to be added, these cards can be changed rather simply (see Chapter 4). There are 960 cards in each of the three decks. For 18 hazard/treatment/segment combinations, the number of hazards is, at present, unknown; therefore, only 942 combinations can be analyzed.

Accident Information Cards

The first deck of cards, the accident information cards, contains information on fixed-object collisions for each of many hazard/treatment/roadway segment combinations. Each accident information card describes one hazard (and one treatment) for one identifiable type of highway segment in the state. As explained in Volume I, this RHCR program is aimed at analyzing area-wide improvements rather than spot locations.

However, an attempt has been made to reduce these "areas" to the smallest possible size. Thus each segment of highway which is being analyzed is defined by the following variables:[1]

1. Location (urban or rural)
2. Area in the state (Coastal Plain, Piedmont, Mountainous Region)
3. Highway type (Interstate, U.S., N.C., secondary roads, city streets)
4. Number of lanes (2-lane, 4 or more lanes undivided, 4 or more lanes divided)

and in some cases the highway segment is further defined by:

5. Highway character (intersection, non-intersection)
6. Highway features (tangent section, curve section)
7. Median width (1-12 feet, 13-30 feet, 31-60 feet, 60+ feet)

The first 17 columns of each accident information card is an identification code--the code being determined by the hazard being analyzed, by the treatment proposed, and by the above variables related to highway segment. This identification code is composed of the following information in the columns specified:

1. Hazard Code (col. 1-2)
2. Treatment Code (col. 4-5)
3. Location Code (col. 7)
4. Area Code (col. 9)
5. Roadway Type Code (col. 11)
6. No. of Lanes Code (col. 13)

---

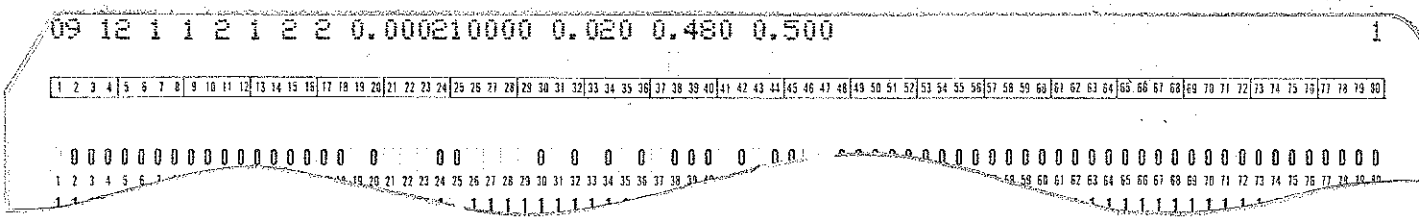
[1]The user should note that not all segments can be defined by all variables listed above (e.g., there is no information available for number of lanes in urban locations). For a listing of all possible valid hazard/treatment/segment combinations, see Table D.1 in Appendix D.

7. Roadway Character Code (col. 15)

8. Roadway Features Code (col. 17)

Information concerning the specific values for each of these codes is presented in Table 1 (See next page.)

For example, the accident information card shown below contains accident information for the specific hazard/treatment/segment combination coded in the first 17 columns.



This particular card refers to hazardous utility poles (value 09) which will be treated by making them breakaway (value 12). These hazardous poles are located in rural locations (value 1) in the coastal plains area (value 1) beside U.S. (value 2), two-lane (value 1) highway segments. These segments are further defined as non-intersection (value 2) roadway sections on curves (value 2).

The remaining data on each accident information card is the accident-related information for this particular hazard/treatment/segment combination. This information includes:

1. The predicted proportion of total statewide accidents which involve a vehicle striking a utility pole on the specified segment of roadway (col. 19-29).

2. The proportion of these utility pole crashes which are fatal crashes (col. 31-35).

3. The proportion of these utility pole crashes which are injury crashes (col. 37-41).

4. The proportion of these utility pole crashes which are PDO crashes (col. 43-47).

5. The card number (always punch a 1 in col. 80).

Table 1. Coding values for identification codes entered on matrix input cards.

HAZARDS (Columns 1-2)

Ø1	Bridge Ends
Ø2	Bridge Rails
Ø3	Guardrail End--Shoulder
Ø4	Guardrail End--Median
Ø5	Signs and Luminaires
Ø6	Trees
Ø7	Bridge Piers--Shoulder
Ø8	Bridge Piers--Median
Ø9	Utility Poles
1Ø	Cross-median Accidents

TREATMENTS (Columns 4-5)

Ø1	Bridge End Transition Guardrail
Ø2	Bridge Rail--Improved
Ø3	Guardrail Ends--BCT
Ø4	Guardrail Ends--Texas Twist Treatment
Ø5	Signs--Breakaway
Ø6	Trees--Removal
Ø7	Tree Removal (Stump Removed)
Ø8	Bridge Piers--CMB plus Guardrail
Ø9	Bridge Piers--Hidrocell Attenuator
1Ø	Bridge Piers--Fitch Attenuator
11	Bridge Piers--Steel Barrel Attenuator
12	Utility Poles--Breakaway
13	Utility Poles--Removal
14	Utility Poles--Relocate
15	Cross-median Accidents--CMB
16	Cross-median Accidents--Double Face Guardrail

LOCATION (Column 7)

1	Rural
2	Urban

AREA (Column 9)

1	Coastal Plain (Divisions 1, 2, 3, 4, 6)
2	Piedmont (Divisions 5, 7, 8, 9, 10, 12)
3	Mountains (Divisions 11, 13, 14)

HIGHWAY TYPE (Column 11)

Ø	Not Subclassified
1	Interstate
2	U.S.
3	N.C.
4	S.R. (Secondary Road)
5	C.S. (City Street)

Table 1. cont.

NUMBER OF LANES (Column 13)

Ø	Not Subclassified
1	2-lane
2	4 or more-undivided
3	4 or more-divided

ROADWAY CHARACTER (Column 15)

Ø	Not Subclassified
1	Intersection Location
2	Non-Intersection Location

ROADWAY FEATURE (Column 17)

Ø	Not Subclassified
1	Tangent
2	Curve
3	1'-12' Median
4	13'-30' Median
5	31'-60' Median
6	60' Median

In this particular example--it is estimated that 0.0021 of all the accidents in the state will be collisions with utility poles located on curved, non-intersection segments of two-lane U.S. highways in the rural parts of the Coastal Plain area. Of these accidents, 2 percent will be fatal, 48 percent will be injury, and 50 percent will be PDO accidents. (Again, the reader interested in how these estimates were derived should refer to Volume I.) Finally, column 80 contains the card number which indicates whether the card is an accident data card (code 1), a hazard data card (code 2), or a treatment data card (code 3).

Thus, as indicated earlier, the accident information deck consists of a set of cards like the one described above which present accident data for all possible segments, hazards, and treatments that are included in the overall analysis program.

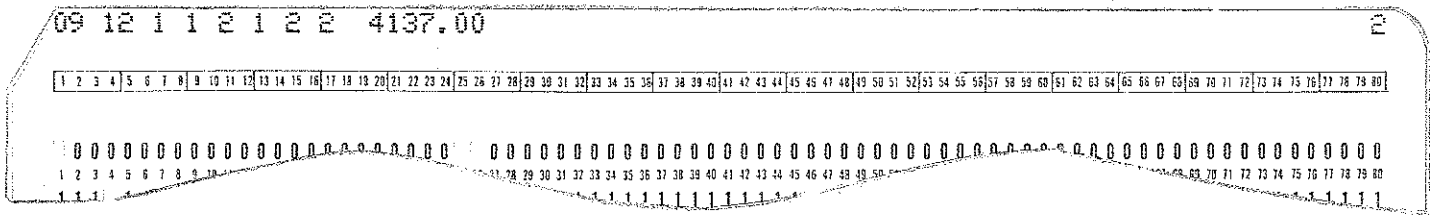
Hazard Information Cards

The second deck of matrix input cards gives information concerning the number of hazards for a given segment of roadway. There is one hazard information card for each of the accident information cards in the deck described previously. Just as with the accident information card, the first 17 columns of the hazard information card contains the identification code. Thus the proper hazard information card can be matched up with its companion accident information card by matching the codes. In addition, in columns 19-28, the hazard information card contains the number of hazards[1] for a particular hazard/treatment/segment combination. The card number (always a "2" for the hazards deck) is found in column 80.

---

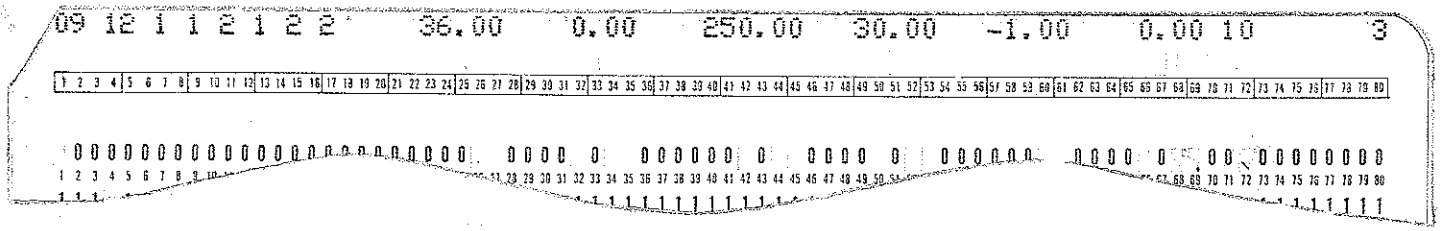
[1]The user should note that the hazard information given in this deck is an estimated count of the number of hazardous fixed objects (trees, utility poles, bridge ends, etc.) for all hazard classes except Hazard No. 12, which refers to Cross Median Accidents. In this case, the count of hazards is the number of hazardous miles of medians which could be treated.

For example, the hazard information card shown below again refers to the same hazardous utility poles on U.S. highways referred to above. Columns 19 through 28 indicate that there are 4137 hazardous utility poles which are found on these particular segments of roadways.



Treatment Information Cards

The third and final deck of matrix inputs contains the treatment information cards. Again, there is one treatment card for each hazard card and thus for each accident information card. Continuing with the utility pole example, a sample treatment card is shown below.



In addition to the identification code (columns 1-17), the treatment card contains the following information:

1. Treatment cost per hazard (col. 19-27)
2. Annual maintenance cost per hazard (col. 29-35)
3. Repair cost per crash (e.g. replacement of a breakaway pole or attenuator) (col. 37-45)

4. Estimated percentage reduction in fatal accident due to the treatment (col. 47-53)

5. Estimated percentage reduction in injury accidents (col. 55-61)

6. Estimated percentage reduction in PDO accidents (col. 63-69)

7. Service (or economic) life of the treatment (col. 71-72)

8. Card number (col. 80 - always a "3" for treatment cards)

For this example concerning hazardous utility poles on the U.S. highway segment described earlier, the card indicates that 1) it will cost $36 to make each pole breakaway; 2) maintenance costs are zero; 3) repair (replacement) cost for each accident-involved breakaway pole is $250; 4) making the hazardous poles breakaway will reduce fatal crashes involving utility poles by 30 percent, injury crashes will increase by one percent (a minus one percent reduction),[1] and PDO crashes involving utility poles will remain unchanged (a 0.00 percent reduction; and 5) the service life of the treatment is estimated to be 10 years.

Thus, the three cards described above contain the information necessary for an analysis of this particular hazard/treatment/segment combination. The three decks of matrix input cards contain this information for this and all other possible hazard/treatment/segment combinations. When combined, the data from cards 1, 2, 3 of a particular identification code form one row of the internal input matrix used in the computer program. A listing of the entire input matrix is presented in Appendix A.

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[1]The increase in injury crashes results from shifting fatal crashes into the injury category. Since the breakaway treatment does not remove any poles, the total number of crashes would not be expected to change. The crash severity, however, would change.

III. User Input Cards

As indicated above, the matrix input cards are designed for repeated future use without modification. Thus the same input cards can be run until the user feels that the data need updating or until new information needs to be added (e.g., a new hazard/treatment combination). In contrast to this procedure, the User Input Cards can be modified by the user each time the program is run. The user must make a determination of the inputs required, punch a set of cards, and enter these cards in order for the program to operate properly.

Card 1 - Economic Inputs

The first of the user input cards concerns specific economic inputs that the user must enter. These six inputs are:

1. Card Number - always enter a 1.

2. Annual Discount Rate - the estimated marginal borrowing rate (interest rate) for public investments for the time period during which the treatment is in effect. (Note: A 6 percent interest rate is entered as 0.06.)

3. Start Year - the calendar year during which the treatment(s) will be implemented. (Note: The Start Year used must be 1976 or later.)

4. Predicted Total Accidents - the predicted number of total reportable accidents that will occur statewide in the Start Year.

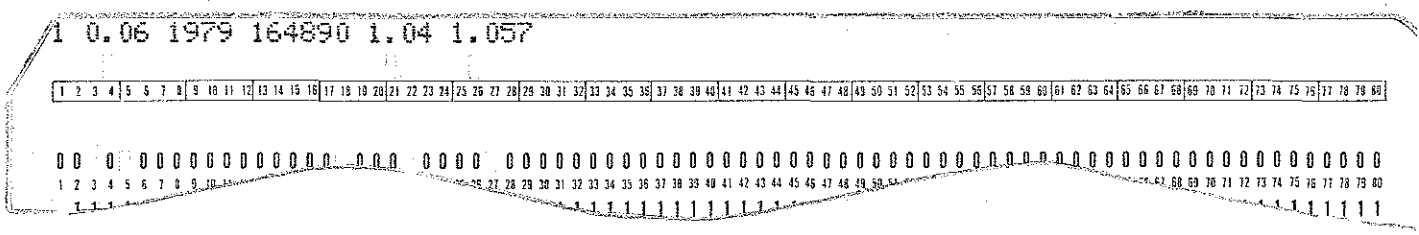
5. Traffic Growth Factor - the estimated annual rate of traffic growth during the life of the treatment. (Note: For 4 percent yearly increase, the traffic growth factor is entered as 1.04.)

6. Inflation Factor - the estimated yearly inflation rate during the life of the treatment. (Note: For a 5.7 percent yearly rate, the inflation factor is entered as 1.057.) Based on economic data, the following inflation factors are suggested:

Service Life	Estimated Average Inflation Rate	Inflation Factor
5	6.7%	1.067
10	5.7%	1.057
20	4.7%	1.047

However, because there is disagreement among engineering economists concerning the estimation and use of inflation factors, the user may wish to estimate a zero rate (enter 1.000).

A sample card 1 is shown below. The user must punch the above six economic inputs on the card in the order given above. Each input should be separated from the preceding one by one or more blanks.



In this example, the user is estimating that the treatment(s) will be implemented in 1979 when 164,890 accidents will occur statewide. He is further estimating that over the service life of the treatment after 1979, the annual cost of money for public investments will be 6 percent, annual traffic will grow at a 4 percent rate, and inflation will be at a rate of 5.7 percent per year.

Card 2 - Analysis Request Cards

The second set of user input cards which must be entered each time the program is run are the hazards/treatment/segment Analysis Request

Cards. These cards indicate to the program which rows of the internal matrix are to be analyzed (i.e., which hazard/treatment/segment combinations are of interest to the user).

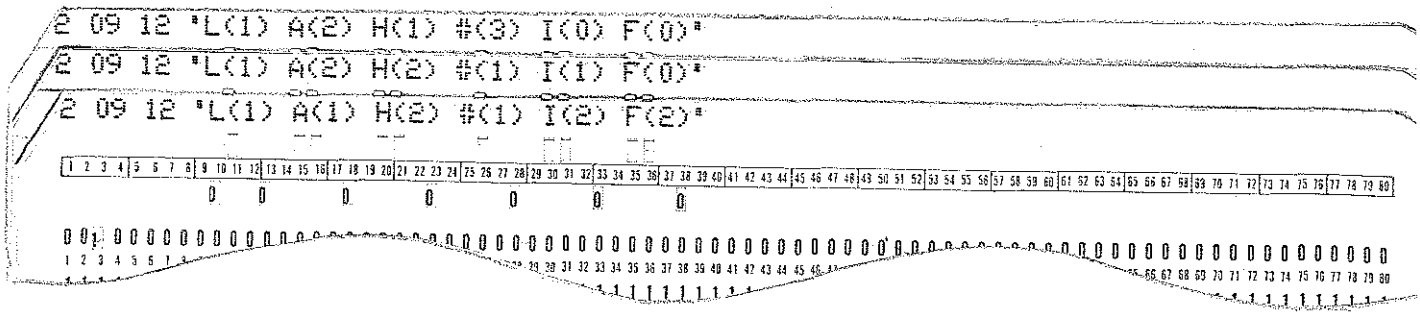
Request cards for individual combinations.

Basically one card is punched for this input set for each hazard/treatment/segment combination in which the user wishes to analyze. The input data which must be punched on each Request Card is a slightly modified form of the identification code for a particular combination. The required data are:

1. Card Number - always punch a 2
2. Hazard Number - punch 01 through 10
3. Treatment Number - punch 01 through 16
4. Location - punch L (location code desired)
5. Area - punch A (area code desired)
6. No. of lanes - punch # (lane code desired)
7. Roadway characteristic - punch I (characteristic code desired)
8. Roadway feature - punch F (feature code desired)

The codes enclosed in parentheses are identical to those used earlier as shown in Table 1. Each of the variables must be separated by one or more blanks and these must be a single quote (usually the upper case function of the "H" key) before the L (data) and after the last parenthesis of the feature code. The important points to remember are: 1) properly sequencing the first three inputs; 2) enclosing inputs 4 through 8 within single quotes; and 3) including a letter, a left parenthesis, a code, and a right parenthesis for inputs 4 through 8. (The use of this modified identification code format is

necessary because of the built-in ability to collapse rows, a computer capability that will be explained later.) Three example request cards are shown below.

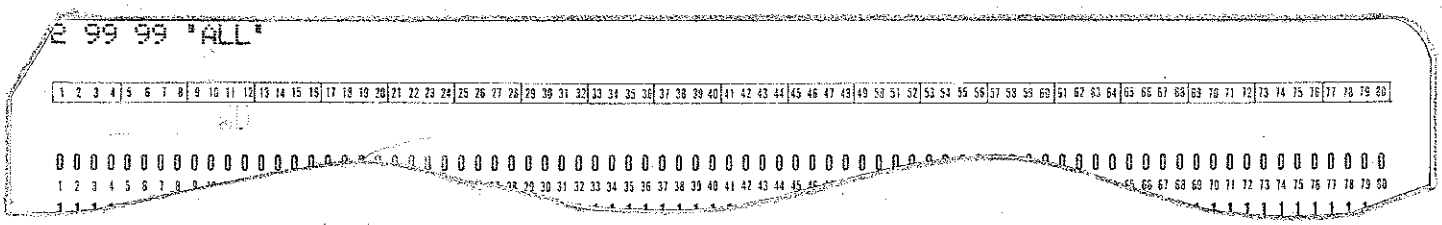


These three Request Cards indicate that the user wishes to have the RHCR program analyze three hazard/treatment/segment combinations. The first Request Card is for the hazardous utility pole example that was just discussed. The second card is also for a breakaway utility pole request, but is for a different area (area 2 rather than area 1) and different roadway characteristics and features (intersections rather than non-intersection curves). The third card is for an entirely different hazard, treatment, and roadway segment combination. (This card requests the row of the internal matrix concerning a transition guardrail treatment for hazardous bridge ends located on 4-lane divided rural interstate segments in area 2, the Piedmont section of the state.) Zero's are entered for roadway characteristics and features since the roadway segments for this particular hazard are not subcategorized by intersection/non-intersection or tangent/curve designations.

If the economic inputs card specified earlier and these three request cards are entered into the program, the program outputs will concern these three specific hazard/treatment/roadway section combinations. Comparisons between the three can be made. Obviously, comparisons of any number of hazard/treatment/roadway sections may be carried out in the same computer run as long as appropriate request cards are inputed.

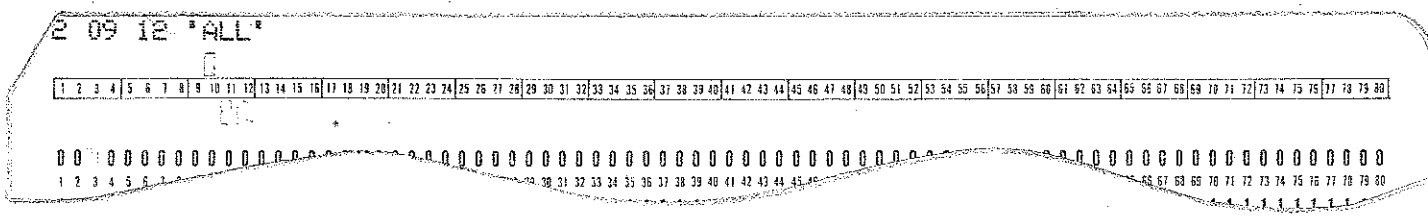
Request card for all possible combinations.

From the above description, it is apparent that one way of analyzing every possible hazard/treatment/segment combination found in the interval matrix would be to punch a card 2 for each identification code found in the accident information, hazard information, or treatment information deck (i.e., a set of 942 cards). However, the user does not need to go to this much effort. The row selection/collapse module briefly described earlier has been programmed to accept coded information which allows it either to run the entire matrix from one card or to collapse certain segments of the matrix from the information provided on a given card. For example, if the user wished to run every possible hazard/treatment/segment combination, the following request card (card 2) would be used:



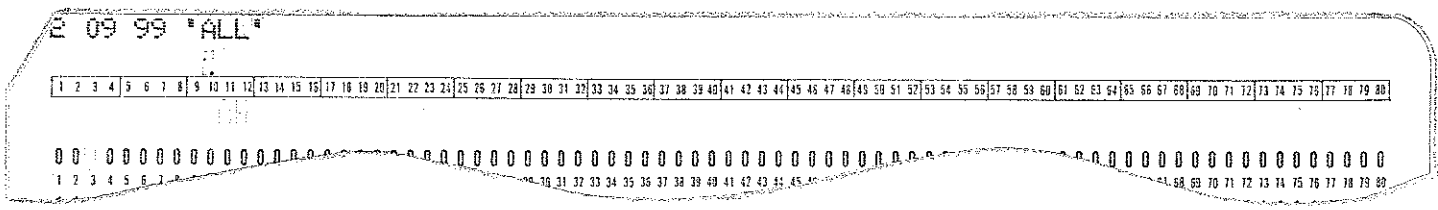
Request card for all segments of a given hazard/treatment combination.

The user may also wish to analyze all possible roadway segments for a given hazard/treatment. Rather than punching one card for each row referring to, for example, the breakaway utility poles combination, the user may simply use the following request card:



Request cards for all treatment and roadway segments for a given hazard.

For certain hazards, there are multiple treatments which can be analyzed. For example, hazardous utility poles may be corrected by 1) making them breakaway (Treatment Code 12), 2) removing the poles and replacing them with underground cable (Treatment Code 13), or 3) relocating the poles more than 30' from the roadway (Treatment Code 14). If the user wishes to analyze all the possible roadway segments for all three treatments, he may enter the following request card:

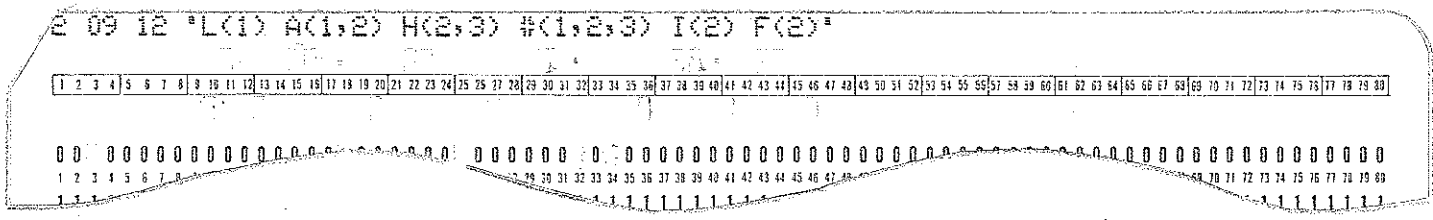


Request cards for summing over roadway segments within a given hazard/treatment combination.

An additional capability has been built into the overall RHCR program in the previously noted Row Collapse Module. This subprogram allows the user to sum over, or collapse, any of the codes which define roadway segments. (Specific algorithms used in these summations are presented in Appendix C.) To call the Row Collapse Module, the user must enter Request Cards similar to those previously described but with the codes which are to be combined listed with the appropriate sets of parentheses and separated by a comma.

For example, after analyzing the individual combinations for breakaway utility poles, the user may wish to combine all tangents and curves, all intersections and non-intersection segments, and all lane designations (2-lane, 4-lane undivided, 4-lane divided) for rural U.S. highways in Area 2. This would require that 12 rows of the internal matrix be combined into one row which refers to all rural, U.S. highway segments in Area 2. To accomplish this, the user should enter the following request card:

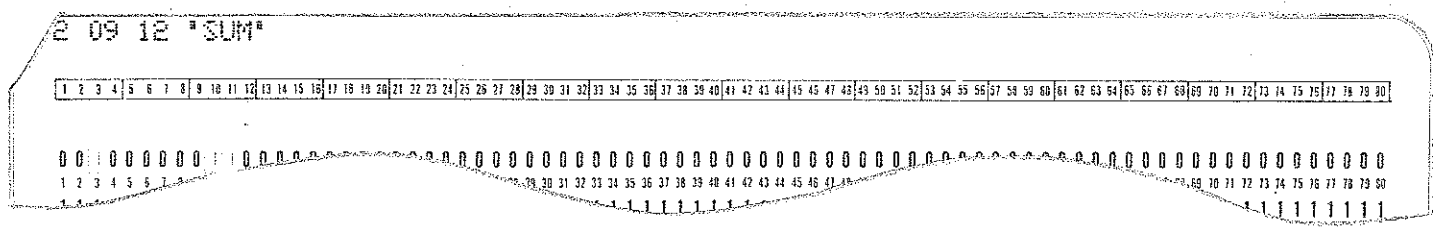
The Row Collapse Subprogram will handle virtually any logical segment. For example, it is possible to combine only certain categories (codes) within a segment identifier (e.g. combine 2-lane and 4-lane divided roadways). For example, the following Request Card is legitimate:



This request would result in a combined row containing information for all breakaway utility poles in rural locations in Areas 1 or 2 (but not Area 3) on all 2-lane, 4-lane undivided N.C. or U.S. roadways, but only those poles on non-intersection, curve segments.

Request card for summing over all segments within a hazard/treatment combination.

The final option available within the Row Collapse Module is called when the user wishes to sum over all rows (i.e., all roadway segments) within a given hazard/treatment combination. For example, if the user wishes to combine all rows concerning breakaway utility poles into one row, he would enter the following Request Card.



Just as in the previous case where rows were not summed over, any number of these Request Cards for collapsed rows may be analyzed in the same run. If requests are made which require summing rows which do not exist, an error message will be printed (e.g. summing 2-lane,

and 4-lane divided rural Interstate segments will result in an error message since there are no 2-lane rural Interstates). A more complete explanation of error messages is contained in Chapter 5.

The important points which must be remembered in using the Row Collapse capability are 1) collapsing is possible only within a hazard-treatment combination, and 2) the codes to be collapsed must be separated by a comma.

Summary of Possible Analysis Request Cards

For the convenience of the user, the following summary listing of example analysis request cards discussed in the above section is presented below:

1. To request an individual row:

```
2 09 12  'L(1)  A(1)  H(2)  #(1)  I(2)  F(2)'
```

2. To request all possible individual rows:

```
2 99 99  'ALL'
```

3. To request all individual rows for a given hazard/ treatment combination:

```
2 09 12  'ALL'
```

4. To request all individual rows within all treatments for a given hazard:

```
2 09 99  'ALL'
```

5. To sum over (collapse) specific rows within a given hazard/treatment combination:

```
2 09 12  'L(1)  A(2)  H(2) #(1,2,3)  I(1,2)  F(1,2)'
```

6. To sum over (collapse) all individual rows within a given hazard/treatment combination:

```
2 09 12 'SUM'
```

IV. System Outputs

There are four basic outputs from a computer run of the RHCR program. The first two types of output tables are printed for each hazard/treatment roadway segment combination that is analyzed. The final two tables summarize the information from the first sets of individual tables for all of the hazard/treatment/segment combinations in a given computer run. A description of these tables is presented below.

Table A. Accident Reduction Table.

The first output table for each request card submitted concerns the number of fatal, injury, and PDO accidents which are predicted to be reduced by the treatment for each year of the treatment's service life (Table 2). An example of one of these tables is shown on the next page. The user will note that four of the specific inputs from the user input card and three data items from the input matrix are listed at the top of Table A as a data check. These include 1) Start Year, predicted accidents, traffic growth rate and inflation factor, and 2) estimated percentage reductions in fatal, injury and PDO crashes. Under these seven inputs is a description of the hazard, the treatment, and the highway segment that is being analyzed. In the body of the table, the number of untreated accidents by severity, the number of treated accidents by severity, and the number of accidents reduced (the difference between the treated and untreated accidents) is shown for each year of the treatment's life. Again no reduction is shown for Year 0, the Start Year, since the treatment is implemented in Year 0 and thus cannot have an effect until Year 1. Finally, under the last year of the treatment service life, the total number of fatal, injury and PDO accidents reduced is given.

Table 2. ACCIDENT REDUCTION TABLE (A)

PREDICTED ACCIDENTS = 164889
TRAFFIC GROWTH RATE = 1.0400
INFLATION FACTOR = 1.0570

STARTING YEAR : 1979

% FAT. REDUCED = 29.99
% INJ. REDUCED = -1.00
% PDO REDUCED = 0.00

(09 12) UTILITY POLES — UTILITY POLES - BREAKAWAY

LOC(1) AREA(1) HWY(2) #LANES(1) INT(2) FEATURES(2)

YEAR	NUMBER OF UNTREATED ACCIDENTS			NUMBER OF TREATED ACCIDENTS			NUMBER OF ACCIDENTS REDUCED		
	FATAL	INJURY	PDO	FATAL	INJURY	PDO	FATAL	INJURY	PDO
0	0.69	16.62	17.31	0.00	0.00	0.00	0.00	0.00	0.00
1	0.72	17.29	18.01	0.50	17.46	18.01	0.22	-0.17	0.00
2	0.75	17.98	18.73	0.52	18.16	18.73	0.22	-0.18	0.00
3	0.78	18.70	19.48	0.55	18.88	19.48	0.23	-0.19	0.00
4	0.81	19.44	20.25	0.57	19.64	20.25	0.24	-0.19	0.00
5	0.84	20.22	21.06	0.59	20.42	21.06	0.25	-0.20	0.00
6	0.88	21.03	21.91	0.61	21.24	21.91	0.26	-0.21	0.00
7	0.91	21.87	22.78	0.64	22.09	22.78	0.27	-0.22	0.00
8	0.95	22.75	23.69	0.66	22.97	23.69	0.28	-0.23	0.00
9	0.99	23.66	24.64	0.69	23.89	24.64	0.30	-0.24	0.00
10	1.03	24.60	25.63	0.72	24.85	25.63	0.31	-0.25	0.00
						TOTAL :	2.59	-2.08	0.00

Table B. Economic Analysis Table

The second table which is printed for each of the hazard treatment analysis request cards submitted is the economic analysis table (Table 3). Since this table is perhaps the most important output of the entire RHCR program, a detailed description is presented in Volume I. In summary, the user should note that this economic table presents the results of a step by step calculation of the net discounted present value and the benefit/cost ratio. Under the table title, information identifying the hazard/treatment/segment being analyzed is presented, along with the number of hazards and Start Year. The Discount Rate being used is shown as part of the column heading "PWORTH FACTOR." Then, in the body of the table, for each year of the treatment's life, the accident reductions shown in Table A are converted to dollar amounts resulting in accident benefits. These benefits are then combined with the treatment cost, and annual repair costs and converted to a present worth value to result in a net cash flow. The net cash flow is then summed over the life of the project to result in a net discounted present value. The final column in the table, the cumulative balance column, indicates two things. First, the last entry in this column presents the net discounted present value for a given treatment. By observing where the cumulative balance changes from a minus to a plus the reader can also determine the year during which the accident benefits outweighed the treatment, maintenance and repair costs--the breakeven year.

The most important outputs of this table are summarized below the body of the table and include: 1) the NDPV, 2) the annual benefits, and 3) the benefit/cost ratio. The annual benefits is the dollar amount

which must be used when comparing treatments with different service lives. The amount is derived by multiplying Net Discounted Present Value by the appropriate Capital Recovery Factor.

As discussed in Volume I, the benefit/cost ratio is the ratio of benefits to costs where repair costs per collision are considered a negative accident benefit. There is much disagreement among economists on whether benefit/cost ratios formed in this manner can be used for ranking alternatives. These arguments should be understood by the user before such figures are used. A partial discussion is presented in Volume 1.

Summary Ranking Tables

Finally, two tables are presented which summarize information for all of the hazard/treatment/segment combinations analyzed in a given run. The first table presents a list of treatments ranked in priority order by annual benefit--the ranking that is considered most appropriate by highway economists. The second table presents a list of programs ranked by benefit/cost ratio. Tables 4 and 5 are examples of these summary tables.

Table 3. ECONOMIC ANALYSIS TABLE (B)

NUMBER OF HAZARDS = 4137.00 STARTING YEAR : 1979

(09 12) UTILITY POLES UTILITY POLES - BREAKAWAY

LOC(1) AREA(1) HWY(2) #LANES(1) INT(2) FEATURES(2)

YEAR	TREATMENT COST ($)	ANNUAL MAINT COST ($)	ANNUAL REPAIR COST ($)	ACCIDENT BENEFITS ($)	PWORTH FACTOR @.06	PWORTH OF BENEFITS ($)	PWORTH OF COSTS ($)	PWORTH OF NET CASH FLOW ($)	CUMULATIVE BALANCE ($)
0	148932	0	0	0	1.0000	0	148932	-148932	-148932
1	0	0	9505	34646	0.9434	23719	0	23719	-125213
2	0	0	10448	38086	0.8900	24597	0	24597	-100616
3	0	0	11486	41867	0.8396	25509	0	25509	-75107
4	0	0	12626	46024	0.7921	26454	0	26454	-48653
5	0	0	13879	50593	0.7473	27435	0	27435	-21218
6	0	0	15257	55616	0.7050	28451	0	28451	7233
7	0	0	16772	61137	0.6651	29505	0	29505	36738
8	0	0	18437	67207	0.6274	30599	0	30599	67337
9	0	0	20268	73880	0.5919	31733	0	31733	99070
10	0	0	22280	81214	0.5584	32909	0	32909	131979

THE NDPV = $ 131979

THE ANNUAL BENEFITS = $ 16734

BENEFIT / COST RATIO = 1.886168

Table 4. First 7 rows (of 282 rows with positive Net Discounted Present Value) of an example priority ranking.

Hazard/Treatment/Descriptors	Annual Benefits ($)	Benefit/Cost Ratio	Treatment Cost ($)
Bridge Ends - Transition Guardrail Rural, Area 2, Interstate, 4-Divided	4,732,718	80.79	599,400
Cross Median Accidents - CMB Rural, Area 2, Interstate, 4-Divided, 13-30 Median	3,406,513	5.78	8,390,975
Bridge Ends - Transition Guardrail Rural, Area 2, N.C., 2-Lane	3,332,026	15.47	2,326,350
Cross Median Accidents - Double Face Guardrail Rural, Area 2, Interstate, 4-Divided, 13-30 Median	2,506,764	5.03	6,293,231
Cross Median Accidents - Double Face Guardrail Rural, Area 1, U.S., 4-Divided, 31-60 Median	1,664,996	3.16	7,805,159
Cross Median Accidents - Double Face Guardrail Rural, Area 1, N.C., 4-Divided, 31-60 Median	1,498,036	8.52	2,014,055
Trees - Removal Urban, Area 2, C.S., Tangent	1,154,240	2.79	5,071,800

Table 5. First 7 rows (of 282 rows with positive Net Discounted Present Value) of an example priority ranking.

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Cross Median Accidents - CMB Rural, Area 2, Interstate, 4-Divided, 13-20 Median	3,406,513	5.78	8,390,975
Cross Median Accidents - Double Face Guardrail Rural, Area 2, Interstate, 4-Divided, 13-30 Median	2,506,764	5.03	6,293,231
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CHAPTER 3 - PROGRAM OPERATION

Chapters 1 and 2 have presented an overview of the roadside hazard correction ranking program and detailed information concerning the format and data required on certain input cards. This chapter will present the operation information necessary to run the RHCR program given that the input cards described earlier have been keypunched and are ready for entry into the program.

The RHCR program modules described in Figure 1 of Chapter 1 are organized into separate card decks for operational ease. These card decks, along with the matrix input decks and the user input cards, must be read into the computer in a certain sequence with appropriate sets of JCL (Job Control) cards. The sequence that should be used is depicted in Figure 2 on the next page.

As shown in Figure 2, the complete RHCR program contains six decks and six sets of JCL cards. Each set of JCL cards is numbered for reference purposes and the format for each set is shown in Figures 3 through Figure 5 at the end of this chapter. Set 1 of the JCL cards (Figure 3) is followed by Decks 1, 2 and 3--the accident information cards, hazard information cards, and treatment information cards discussed in Chapter 2. Because of the sort program which is incorporated in the system, these three decks may be submitted in any order or combined into one deck for submission. However, it is suggested that the decks be kept separately in ranked order to facilitate the possible modification described in Chapter 4.

These three decks of matrix input cards are followed by the second set of twelve JCL cards, a series which calls and executes a utility

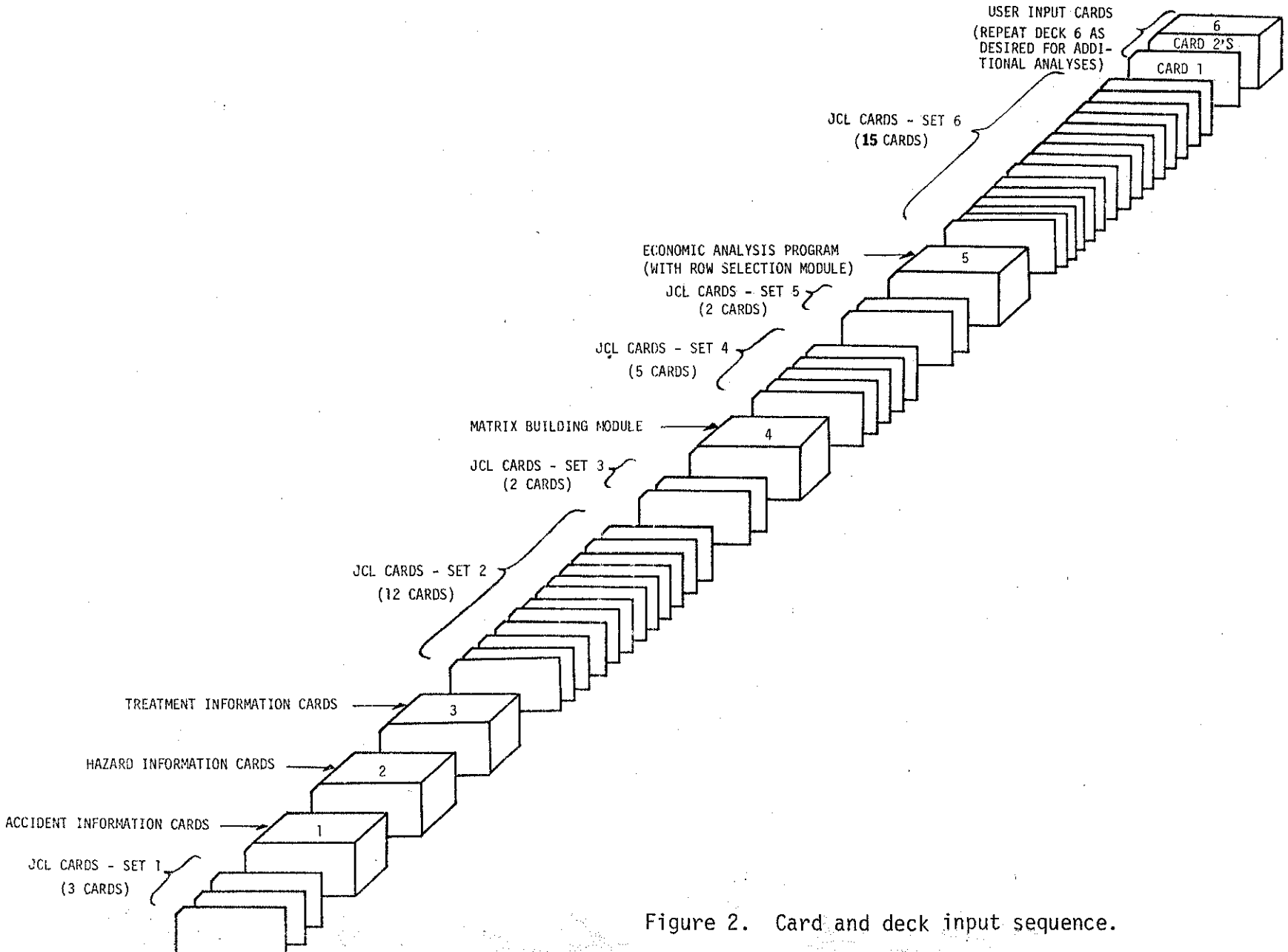


Figure 2. Card and deck input sequence.

sort program (Figure 3). These are followed by two additional JCL cards, (Figure 4) which initiate execution of the Matrix Building Module (Deck 4).

Set 4 and set 5 of the JCL cards (Figures 4 and 5) retain and pass the matrix and begin execution of the Economic Analysis Program labeled as Deck 5 in Figure 2. Set 6 of the JCL cards (Figure 5), which continues execution and storage of the analyses procedures and initiates a sorting procedure used in the ranking operation, is followed by the User Input Cards (Deck 6). As explained in Chapter 2, Deck 6 is composed on a Card 1 (Specific Economic Inputs) and one or more Card 2's (Analysis Request Cards). The user should note that this deck can be repeated as many times as desired for submission in the same computer run. Each time Deck 6 is repeated, there must be one Economic Input card (Card 1) and one or more Analysis Request Cards, with the card 1 preceding the associated card 2'(s). If more than one Deck 6 is entered in a given run, the summary tables presenting ranked combinations will combine information from all Deck 6's. Thus, as written, the ranking procedure will not output a ranked summary for each Deck 6. Specific Accident Reduction Tables and Economic Analysis Tables (Tables 2 and 3, Chapter 2) will be output for each combination requested in each Deck 6. Therefore, for cases where ranked information found in the Summary Tables is to be used extensively, it is suggested that the users submit only one Deck 6 in each analysis run.

Because discussions with the North Carolina Division of Highways personnel indicated that the RHCR program would not be run on a daily basis but would primarily be used during the budget fromation process, the delivered system is designed such that the entire set of decks shown in Figure 2 must be input for each set of analyses (with the exception of

SET 2

```
END
            80,1,A),FORMAT=CH
SORT FIELDS=(1,2,A,4,2,A,7,1,A,9,1,A,11,1,A,13,1,A,15,1,A,17,1,A,
//SYSIN DD *
//SORTWK03 DD UNIT=...,SPACE=...
//SORTWK02 DD UNIT=...,SPACE=...
//SORTWK01 DD UNIT=...,SPACE=...
//SORTLIB DD DISP=SHR,DSN=SYS1.SORTLIB
//SYSPRINT DD SYSOUT=A
//SYSOUT DD SYSOUT=A
//  DCB=(RECFM=FB,LRECL=80,BLKSIZE=....),VOL=SER=...
//SORTOUT DD UNIT=DISP=(NEW,KEEP),SPACE=...,DSN=...,
```

TREATMENT INFORMATION CARDS (DECK 3)

HAZARD INFORMATION CARDS (DECK 2)

ACCIDENT INFORMATION CARDS (DECK 1)

SET 1

```
//SORTIN DD *
//STEP1 EXEC SORT
//JOBNAME JOB ...
```

Figure 3. JCL cards used in Step 1 of RHCR program operation (JCL Card Sets 1 and 2).

SET 4

```
// DSN=...,VOL=SER=...
// DCB=(RECFM=FB,LRECL=114,BLKSIZE=....),SPACE=...,
//G.MATRX DD UNIT=DISK,DISP=(NEW,KEEP),
// DSN=...,VOL=SER=...
//G.INFILE DD UNIT=DISK,DISP=OLD,
```

MATRIX
BUILDING
MODULE
(Deck 4)

SET 3

```
//C.SYSIN DD *
//STEP2 EXEC PLFCLG
```

Figure 4. JCL cards used in Step 2 of RHCR program operation (JCL Card Sets 3 and 4).

ECONOMIC INPUTS
AND ANALYSIS
REQUEST CARDS
(DECK 6)

SET 6

```
//SYSIN DD *
// DCB=(RECFM=FB,LRECL=198,BLKSIZE=....)
// SPACE=...,VOL=SER=...,DSN=...,
//OUTFL DD UNIT=DISK,DISP=(NEW,KEEP),
// VOL=SER=...,DSN=...
//MATRX DD UNIT=DISK,DISP=OLD,
//    DSN=...,VOL=SER=...
//SORTIN DD UNIT=DISK,DISP=OLD,
//SORTWK03 DD UNIT=...,SPACE=...
//SORTWK02 DD UNIT=...,SPACE=...
//SORTWK01 DD UNIT=...,SPACE=...
//SORTLIB DD DISP=SHR,DSN=SYS1.SORTLIB
//SYSPRINT DD SYSOUT=A
//SYSOUT DD SYSOUT=A
//  EXEC PGM=*.STEP3.L.SYSLMOD
```

ECONOMIC ANALYSIS
PROGRAM
(DECK 5)

SET 5

```
//C.SYSIN DD *
//STEP3 EXEC PLFCL
```

Figure 5. JCL cards used in Step 3 of RHCR program operation (JCL Card Sets 5 and 6).

repeated Deck 6's). If the program were to be used more frequently all input data contained in Decks 1-3 could be stored data sets, the program decks could be stored as a load module, and repeated analysis requests could be run by simply inputting the final sets of cards--the economic analysis inputs and Analysis Request Cards.

CHAPTER 4 - MODIFYING THE RHCR PROGRAM

This chapter concerns the procedures which must be followed in modifying the components of the Roadside Hazard Correction Ranking (RHCR) program. As indicated in Chapter 3, the entire program is in the form of separate decks of cards. In general, to make changes in the overall program, one must simply make changes on individual cards in one or more of these decks. The following sections will discuss the correct procedures for making changes in (1) the matrix inputs and (2) the specific program modules themselves.

I. Modifying the Matrix Input Decks

The user will recall that each time a program run is made, the user input cards (i.e., the economic inputs card and the analysis request cards) must be changed by the user. As explained earlier, the matrix input cards are designed to run repeatedly without modification. However, these cards may be changed at the user's discretion. The two basic types of changes which might occur include (1) changing information on either accident, hazard, or treatment cards which is felt to be inaccurate (e.g., as the result of an updated inventory), or (2) adding new cards when additional hazards or treatments are identified for inclusion in the program.

Updating Existing Data

As explained in Chapter 2, the accident, hazard, and treatment information is contained on three separate decks of cards with one card in each deck for each roadway segment which can be analyzed (Decks 1, 2, and 3 in Figure 2). These inputs were designed as three separate decks in order to make modifying the inputs a relatively simple procedure.

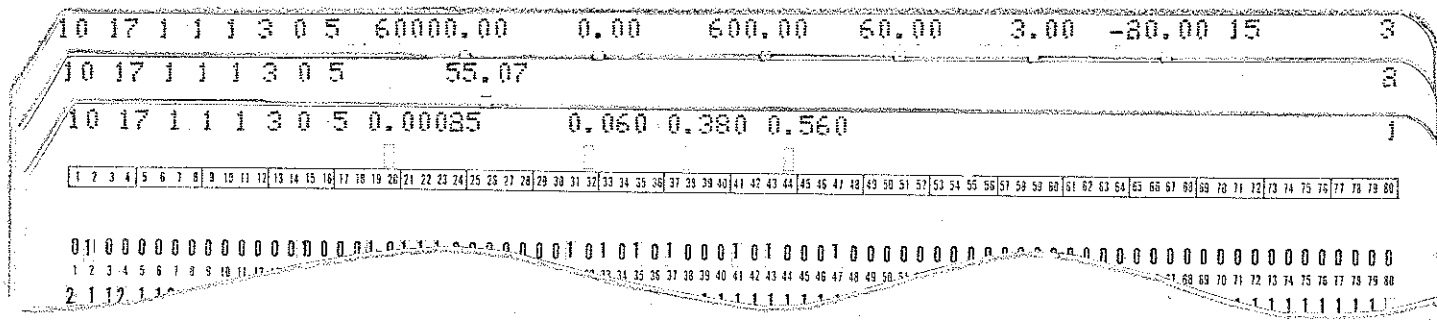
To modify data for any given roadway segment, the appropriate card in the appropriate deck is pulled, repunched, and reinserted in the deck. For example, if the number of hazards for a particular roadway segment is felt to be inaccurate, the hazards card with the appropriate identification code is pulled from Deck 2, the identification code is duplicated from the old card, the corrected number of hazards is punched, and the new card is inserted into the deck. The accident information and the treatment information for this particular segment of roadway would not have to be altered and these cards, therefore, would not have to be repunched. The user making changes in a card or cards in any of these three decks should refer to the formats presented in Chapter 2 for information concerning the columns in which specific information resides.

Adding Additional Hazard/Treatment Combinations

There may be times when the user wishes to add a new hazard/treatment combination to the existing combinations shown in Table 1. Two instances in which this might be necessary are: (1) if the user wishes to add a new treatment for a hazard that currently exists in the program (e.g., a flexible cable barrier for cross-median accidents), or (2) if the user wishes to define an entirely new hazard and, therefore, an entirely new treatment or treatments (e.g., hazardous ditch banks to be protected with guardrail). In both cases the user must first prepare a new set of accident information cards, hazard information cards, and treatment information cards for the new hazard/treatment/segment combination along with a new identification code, and second, must make certain changes in the Economic Analysis Program (deck 5).

The first step requires that estimates be made of each of the appropriate accident, hazard, and treatment variables, such as the proportion of total accidents which will involve striking a ditch bank, the number of hazardous ditch banks, the fatality, injury, and PDO reduction factors, the service life of the treatment, etc. These estimates must be made for each roadway segment which is to be analyzed. The formats of the new accident hazard and treatment information cards must be identical to the formats presented in Chapter 2. A proper identification code will be entered on each card in columns 1-17 and the accident, hazard, or treatment information will follow.

In the first example used above concerning flexible guardrail for treatment of cross-median accidents, the following three accident, hazard, and treatment cards must be punched. The user will note that



the hazard code previously associated with the cross-median accidents continues to be found in columns 1 and 2. However, a new treatment code, treatment 17, is found in columns 4 and 5. The remainder of the identification code depicts the particular segment of highway that is being considered and the identifiers must be coded exactly as they were in the existing program (see previous formats). These three cards refer to rural, interstate roadway in Area 1 of the state (Code 1 in columns

7, 9, 11). Similar sets of accident, hazard and treatment cards would have to be prepared for each other segment of roadway for which information is to be entered into the program.

Following preparation, all of the accident information cards are entered at the end of the existing accident information card deck (Deck 1), the hazard cards are entered at the end of the existing hazards card deck (Deck 2), and the treatment cards at the end of the treatment card deck (Deck 3). A subprogram which is an integral part of the system which will sort these new cards into their proper place in the overall matrix.

The second step in this two step procedure involves certain changes in the economic analysis program (Deck 5), changes which are required because of the lengths of certain computer "do-loops" in the program. As can be seen from the program listing in Appendix B, certain of the program steps are keyed with the following three codes in columns 2-10.

```
/* H,T */
/*  H  */
/*  T  */
```

The steps of the program, and thus the program codes, coded in this manner must be modified if new hazard and/or treatment codes are added to the matrix. All those lines which are coded with the first code above, the combined "H,T" code, must be changed if either a new hazard code or a new treatment code is added to the matrix. In addition, if a new hazard code is added, those lines coded with the second code must be modified (as in the second example given above). If a new treatment is added, all lines coded with the first and third codes must be changed, as would be the case in the current example involving median barrier.

The changes to be made involve parameters which indicate the total number of hazards (currently 10) and the total number of treatments (currently 16) in these steps. If not familiar with programming methodology, the user should ask for aid from a computer programmer to make these changes. Again, to make the actual changes in the program, all that is necessary is to pull the appropriate cards from the Economic Analysis Deck (Deck 5), repunch the cards with the proper values in the proper locations, and reinsert the cards in the deck.

If a new hazard is to be added to the RHCR program, the same basic procedure outlined above for a new treatment must be followed except that both a new hazard code and a new treatment code must be identified. For example, in the case concerning hazardous roadside ditch banks, the hazard code would become Hazard 11 and the treatment would become Treatment 17 (assuming that the flexible cable barrier had not been entered as an additional treatment for the cross-median accidents). Obviously the user must keep a list of proper hazard and treatment numbers so that he can assign correct hazard and treatment codes to the proper set of cards when modifications are made. Check procedures are programmed into the Matrix Building Module (Deck 4) which will check for duplicate identification codes and for missing cards for a given identification code. When such errors are found, an error message is printed.

Just as in the first example, estimates must be made of accident, hazard, and treatment variables associated with the roadside ditch banks, new matrix input cards must be punched and added to the existing decks, and the required changes in the Economic Analysis Program (Deck 5) must be made. Whereas only those program lines designated by a "/* H,T */" or a "/* T */" were modified in the first example, all lines (cards)

designated by "/* H,T */", "/* H */" and "/* T */" must be modified for this second example since a new hazard and treatment have been added to the RHCR program.

II. Changes in the Basic RHCR Program Modules

The modification procedures described above have referred to the decks labeled 1, 2, and 3 in Figure 2 (with related modifications in Deck 5, the Economic Analysis Program). There may be times when the user or a computer programmer associated with a user desires to change some of the basic statements in the program modules (Decks 4 or 5). Again, the necessary procedure would be to pull the card for the statement which needs to be modified, make the change, and insert the corrected card in the proper place in the deck.

The most likely place for such a change to be made in the current program would be within the Economic Analysis Program (Deck 5) in program statements referring to the cost of a fatal accident, an injury accident, or a PDO accident. These figures can be found in the Economic Analysis Program listing (Appendix B) below the following comment card:

/* Accident Cost */

The user will note that the costs currently used in the program are $133,637 for a fatal accident, $10,946 for an injury accident, and $743 for a PDO accident. If the user feels that these costs need to be modified, the user may pull these three cards from the program deck, make the appropriate changes on new cards, and reinsert the cards in the deck. [NOTE: If the dollar values are being updated to reflect changes in the Consumer Price Index data which occur after 1976, then the "1976" found at the end of these same statements should be changed

to the year for which the data are appropriate. For example, if these three costs figures are increased to appropriate amounts for, say, 1977 dollars based on documented changes in the Consumer Price Index, then the "1976" at the end of each of these cards should be changed to "1977." The year at the end of each of these statements refers to the base year for which the dollar values are calculated.]

Any other changes in the basic program module should only be made by a programmer who is familiar with the program itself. For questions concerning operation of the program or possible changes in the program, the user should call the authors of the manual at the Highway Safety Research Center [919-933-2202].

CHAPTER 5 - ERROR CODES

Chapter 2 describes the input cards required to execute the RHCR program. Since the program is fairly complex some error codes have been provided for the user's convenience. These error messages should help the user locate many of the more common problem areas quickly. It must be noted, however, that not all possible user errors could be analyzed by the RHCR program, and in such cases a system error will be generated causing a program interruption. This chapter discusses the error codes included in the RHCR program and appropriate user response.

There are three primary sources of error: (1) error in building the input matrix, (2) errors in the User Input Cards and (3) selection of a hazard/treatment/segment combination for which no estimates are available. A detailed discussion of each of these follows.

I. Error in Building the Internal Matrix

As described in Chapters 2 and 3, the internal matrix is built from three decks of cards--accident, hazard and treatment information cards. To build this matrix all three types of cards must be included for each different hazard/treatment/segment combination. The following message will be generated if one of the conditions below is raised:

1. Any of the three cards is missing for a particular hazard/treatment/segment,
2. If there is an unacceptable character in any of the cards,
3. If there is a duplicate identification code or card.

Message 1.

```
01 01 1 1 1 3 0 0 0.000450000 0.080 0.470 0.450 \\  55.00  20.00  -50.00 15
01 01 1 1 2 1 0 0 0.000067540 0.110 0.410 0.480 \\  55.00  20.00  -50.00 15
01 01 1 1 2 2 0 0 0.000002950 0.030 0.220 0.750 \\  55.00  20.00  -50.00 15
01 01 1 1 2 3 0 0 0.000022510 0.060 0.440 0.500 \\  55.00  20.00  -50.00 15
01 01 1 1 3 1 0 0 0.000101930 0.090 0.300 0.610 \\  55.00  20.00  -50.00 15
01 01 1 1 3 2 0 0 0.000003110 0.030 0.220 0.750 \\  55.00  20.00  -50.00 15
01 01 1 1 3 3 0 0 0.000018020 0.030 0.320 0.650 \\  55.00  20.00  -50.00 15
01 01 1 1 4 1 0 0 0.000346580 0.110 0.605 0.285 \\  55.00  20.00  -50.00 15

ERROR IN THE INPUT CARDS
THE MATRIX FILE WAS NOT BUILT
PLEASE CORRECT THE MISTAKES AND RUN THE JOB AGAIN
THE FOLLOWING IDENTIFICATION CODE HAS DUPLICATE OR MISSING
  CARDS OR HAS AN ACCEPTABLE CHARACTER
01 01 1 2 2 1 0 0 0.000049250 0.390 0.410 0.200
01 01 1 2 1 3 0 0     108.00
```

In this case the matrix was built up to the hazard/treatment/segment code indicated, but when the program attempted to match data for Area (2) on U.S. roads, there was a problem of missing data. As indicated by the first line under the error message, the computer found the appropriately coded accident information. However, as indicated by the bottom line, when the computer searched for the companion hazard information, it found hazard data with a non-matching identification code--the correct hazard card was missing. When the complete input matrix is built the following message will be generated: "Input Matrix Successfully Built."

II. Errors in User Input Cards

Following is a list and brief explanation of error message for incorrect user input cards. For all these error codes the user should carefully examine the input cards making sure that they are in the prescribed format described in Chapter 3 and then resubmit the job.

Message 2.

```
CAN'T IDENTIFY ONE OF THE VARIABLES
    HAZARD 07  TREATMENT  08  COMBINATION L(2) A(3) H(1) X(0) I(0) F(0)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.


   INPUT CARD
HAZARD = 07  TREATMENT = 08
CODES = L(2) A(3) H(1) X(0) I(0) F(0)
```

In the request above the user had typed in "X" (instead of #) as one of the variables with a value Ø on card 2. The program has printed out the input card for the user to study.

Message 3.

```
VALUES OUT OF RANGE FOR FEATURES
     HAZARD 01  TREATMENT  01 COMBINATION L(1) A(1) H(1) #(0) I(3) F(9)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.


  INPUT CARD
HAZARD = 01    TREATMENT = 01
CODES = L(1) A(1) H(1) #(3) I(0) F(9)
```

The message above refers to an out-of-range value for one of the variables. In this case for road features [F(9)] a value of 9 was punched, while the maximum valid code is 6.

Message 4.

```
ALL VARIABLES NEED VALUES
    HAZARD 02 TREATMENT 02 COMBINATION L(2) A(1) H(5) #(0) I(0) F 0)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.


  INPUT CARD
HAZARD = 02  TREATMENT = 02
CODES = L(2) A(1) H(5) #(0) I(0) F 0)
```

This message was generated because the left parenthesis for the road feature variable F was missing. The same error condition will be activated if no value is specified for any variable in the location code.

Message 5.

```
ALL VARIABLES MUST BE SPECIFIED
    HAZARD 02 TREATMENT 02 COMBINATION L(2) A(1) H(5) #(0) I(0)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.


  INPUT CARD
HAZARD = 02  TREATMENT = 02
CODES = L(2) A(1) H(5) #(0) I(0)
```

In the request above the road features (F) variable was missing.

Message 6.

```
ERROR IN VALUE LIST FOR AREA
     HAZARD 02 TREATMENT 02 COMBINATION L(2) A(K,2) H(5) #(0) I(0) F(0)

CHECK INPUT CARD BELOW AND APPROPRIATE MAIRIX ROW IN USER MANUAL APPENDIX A.


  INPUT CARD
HAZARD = 02  TREATMENT = 02
 CODES = L(2) A(K,2) H(5) #(0) I(0) F(0)
```

An error in the value listing for an area generated the error message above. If one of the other roadway segment codes had such an error, it would be listed in a similar format in the message.

Message 7.

```
 PLEASE CHECK YOUR INPUT CARDS
 CARD NUMBER = 3
```

As described in Chapter 3 the RHCR program expects the first request card to be identified by the number 1 as the first entry on the card. This message was generated when the number 3 was punched instead of 1. The user must note, however, that if in the example above a 2 were punched instead of 1 then the program would mistake this card for card 2 and generate a systems error (i.e., a Card 1 must always precede one or more Card 2's).

Message 8.

If in a request the user specifies a starting year less than 1976 (since 1976 is the base year used for calculating the value of money) then the following code will be generated, where STYR shows the starting year requested (1973 in this case).

```
ERROR IN THE INPUT CARD

ACC= 1.64889000000000000E+05        GWTH=1.03999999999999999E+00
ANNR= 5.99999999999999999E-02          STYR= 1.97300000000000000E+03

CARD#=2        HAZ=02        TRTMT=02
```

In addition to the errors above, the user could make other mistakes in the User Input cards for which the RHCP does not have in-built error codes. For example, if in input card 1 the user keypunches an alphabetic instead of a numeric character, or if an economic parameter is missing, a standard conversion error would be generated and the program terminated. As before, in all such system errors, the user should check the input cards for the format described in Chapters 2 and 3 and resubmit the request.

III. Selection of an Improper Row in Matrix

In this section a slightly different class of error codes are discussed. These codes are generated not because of any syntax error in the User Input Cards but because of some inherent characteristics of the RHCP.

Message 9.

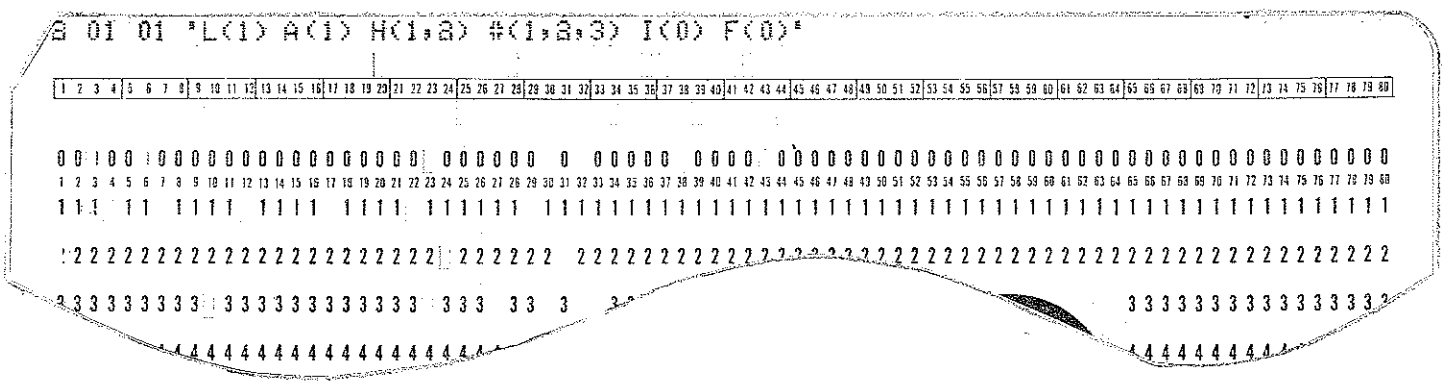
```
MISSING ROW                0101111200
    HAZARD 01 TREATMENT 01 COMBINATION L(1) A(1) H(1) #(2) I(0) F(0)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.

  INPUT CARD
HAZARD = 01  TREATMENT = 01
CODES = L(1) A(1) H(1) #(2) I(0) F(0)
```

The message was generated because the matrix does not contain any data on 2-lane Interstates. The user should refer to Tables D-1, Appendix D or to Appendix A to confirm if the row specified exists in the matrix.

As described in Chapter 2, there will be times when the user wishes to call the Row Collapse Module and combine certain location data for an economic analysis run. For example, the user may wish to combine all lane combinations within Interstate and U.S. roadway segments (i.e., sum all Interstate and U.S. segments). The following request card would be the input:



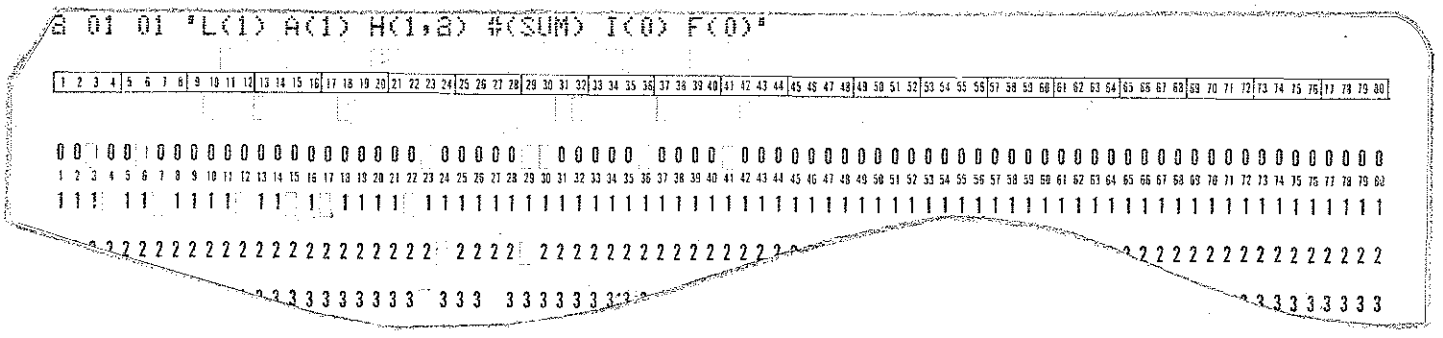
This card would generate the following error message.

Message 9.

```
MISSING ROW          0101111100
    HAZARD 01 TREATMENT 01 COMBINATION L(1) A(1) H(1,2) #(1,2,3) I(0)

CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.
  INPUT CARD
HAZARD = 01  TREATMENT = 01
CODES = L(1) A(1) H(1,2) #(1,2,3) I(0) F(0)
```

As the reader can verify from Table D-1, Appendix D, or Appendix A this error will have occurred because the matrix does not contain any data for 2-lane or 4-lane undivided Interstates and the Row Collapse Module attempted to find these non-existent rows to include in the collapsed row. Because the user may wish to analyze the above combination even though certain rows do not exist, an error override has been provided in the RHCR program. To activate this override, the following request card is used.



The "sum" command within parenthesis will allow the program to collapse all available rows while disregarding those that do not exist. This command should not be used until the user understands which rows are not available.

Message 10.

Even in some cases where the "sum" command is used an error message will be generated. This occurs when no rows are found to be included in the combined request. In the message shown below, the user wanted to analyze cross-median accidents treated with double-faced guardrails in rural areas on secondary roads. However, no such estimates are available since there are no 4-lane divided secondary roadways and thus no medians.

```
NO MATCHES FOUND
    HAZARD 10 TREATMENT 16 COMBINATION L(1) A(SUM) H(4) #(SUM) I(SUM) F(SUM)
CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.

   INPUT CARD
HAZARD = 10  TREATMENT = 16
CODES = L(1) A(SUM) H(4) #(SUM) I(SUM) F(SUM)
```

Message 11.

```
ERROR-DIVISION BY ZERO ATTEMPTED
CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.

  INPUT CARD
HAZARD = 03  TREATMENT = 03
CODES = L(2) A(3) H(2,3) F(0) #(0) I(0)
```

In the request above, an attempt was made to combine rows for which the combined predicted accident proportions were zero. This same message will be printed if the individual row that the user wishes to analyze has zero accidents predicted.

Message 12.

In some cases no estimates were available for the number of hazards. If any of these rows are selected in an individual or summed combination, the following message will be generated.

```
ERROR-NO ESTIMATE OF HAZARDS
CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.

  INPUT CARD
HAZARD = 02  TREATMENT = 02
CODES = L(2) A(1) H(5) #(0) I(0) F(0)
```

Again, if a collapsed row is being requested, this error may be overridden by use of the "sum" command. Here, the rows without any estimates of hazards are neglected and the analysis is continued. For the user's convenience, a warning is printed for each row neglected in such a combination on the top left-hand corner of Table A and the user should confirm this from the appropriate rows in the input matrix (Appendix A).

IV. Summary

For the convenience of the user a list of the messages discussed in this section is presented below.

APPENDIX A

Complete Listing of Input Matrix
(See last two pages for coding values)

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
01	01	1	1	1	3	0	0	0.000450000	0.080	0.470	0.450	34.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	2	1	0	0	0.000067540	0.110	0.410	0.480	739.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	2	2	0	0	0.000002950	0.030	0.220	0.750	33.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	2	3	0	0	0.000022510	0.060	0.440	0.500	56.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	3	1	0	0	0.000101930	0.090	0.300	0.610	1707.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	3	2	0	0	0.000003110	0.030	0.220	0.750	9.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	3	3	0	0	0.000018020	0.030	0.320	0.650	10.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	1	4	1	0	0	0.000346580	0.110	0.605	0.285	3202.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	1	3	0	0	0.000580000	0.275	0.325	0.400	108.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	2	1	0	0	0.000049250	0.390	0.410	0.200	461.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	2	2	0	0	0.000000490	0.050	0.350	0.600	66.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	2	3	0	0	0.000073160	0.220	0.460	0.320	149.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	3	1	0	0	0.001131130	0.100	0.425	0.475	1193.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	24.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	3	3	0	0	0.000001860	0.150	0.300	0.550	13.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	2	4	1	0	0	0.000536640	0.052	0.648	0.300	7495.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	1	3	0	0	0.000250000	0.100	0.200	0.700	181.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	2	1	0	0	0.000063320	0.200	0.500	0.300	602.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	45.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	2	3	0	0	0.000024620	0.050	0.550	0.400	43.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	3	1	0	0	0.000063390	0.080	0.820	0.100	836.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	9.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	3	3	0	0	0.000000870	0.030	0.500	0.470	2.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	1	3	4	1	0	0	0.000000020	0.000	0.450	0.550	5902.00	1950.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	1	1	0	0	0	0.000130000	0.100	0.500	0.400	10.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	110.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	98.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	1	5	0	0	0	0.000013000	0.050	0.350	0.600	-999999.99	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	2	1	0	0	0	0.000024000	0.100	0.500	0.400	67.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	2	2	0	0	0	0.000013000	0.050	0.450	0.500	355.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	2	3	0	0	0	0.000000000	0.000	0.000	0.000	180.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	2	5	0	0	0	0.000062500	0.050	0.350	0.600	-999999.99	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	3.00	5550.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	188.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	3	3	0	0	0	0.000000000	0.000	0.000	0.000	57.00	3820.00	0.00	400.00	55.00	20.00	-50.00	15
01	01	2	3	5	0	0	0	0.000033750	0.050	0.350	0.600	-999999.99	3820.00	0.00	400.00	55.00	20.00	-50.00	15
02	02	1	1	1	3	0	0	0.000047260	0.000	0.241	0.759	17374.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	2	1	0	0	0.000082080	0.000	0.390	0.610	184367.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	2	2	0	0	0.000005030	0.000	0.150	0.850	11041.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	2	3	0	0	0.000033500	0.000	0.225	0.775	65334.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	3	1	0	0	0.000065000	0.000	0.280	0.720	214213.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	3	2	0	0	0.000000900	0.000	0.150	0.850	931.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	3	3	0	0	0.000010800	0.000	0.275	0.825	5890.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	1	4	1	0	0	0.000326250	0.020	0.220	0.760	366460.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	1	3	0	0	0.000120510	0.000	0.290	0.710	68377.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	2	1	0	0	0.000046060	0.000	0.390	0.610	64870.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	2	2	0	0	0.000000520	0.000	0.300	0.700	8269.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	2	3	0	0	0.000083750	0.000	0.425	0.575	60517.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	3	1	0	0	0.000120000	0.000	0.290	0.710	123793.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	3946.00	25.00	0.00	50.00	15.00	5.00	-3.00	20

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
02	02	1	2	3	3	0	0	0.000001400	0.000	0.350	0.650	3492.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	2	4	1	0	0	0.000652500	0.020	0.380	0.600	530167.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	1	3	0	0	0.000049620	0.000	0.350	0.650	50206.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	2	1	0	0	0.000078730	0.100	0.375	0.525	56860.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	4845.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	2	3	0	0	0.000030150	0.025	0.335	0.640	19141.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	3	1	0	0	0.000035000	0.040	0.300	0.660	59025.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	1252.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	745.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	1	3	4	1	0	0	0.000217500	0.025	0.275	0.700	291485.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	1	1	0	0	0	0.000023830	0.000	0.300	0.700	5666.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	1	2	0	0	0	0.000030330	0.000	0.300	0.700	47450.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	1	3	0	0	0	0.000260000	0.000	0.300	0.700	13356.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	1	5	0	0	0	0.000016960	0.000	0.100	0.900	-999999.99	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	2	1	0	0	0	0.000047660	0.000	0.300	0.700	37255.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	2	2	0	0	0	0.000030330	0.000	0.300	0.700	64710.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	2	3	0	0	0	0.000000000	0.000	0.000	0.000	20708.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	2	5	0	0	0	0.000156500	0.000	0.100	0.900	-999999.99	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	713.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	3	2	0	0	0	0.000030330	0.000	0.300	0.700	33836.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	3	3	0	0	0	0.000000000	0.000	0.000	0.000	4919.00	25.00	0.00	50.00	15.00	5.00	-3.00	20
02	02	2	3	5	0	0	0	0.000049480	0.000	0.300	0.700	-999999.99	25.00	0.00	50.00	15.00	5.00	-3.00	20
03	03	1	1	1	3	0	0	0.000020000	0.000	0.590	0.410	291.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	2	1	0	0	0.000009200	0.000	0.550	0.450	1264.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	2	2	0	0	0.000000910	0.000	0.250	0.750	32.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	2	3	0	0	0.000006500	0.000	0.280	0.720	277.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	3	1	0	0	0.000006000	0.000	0.500	0.500	1251.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	3	2	0	0	0.000000700	0.000	0.250	0.750	7.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	3	3	0	0	0.000000900	0.000	0.300	0.700	33.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	1	4	1	0	0	0.000012000	0.000	0.500	0.500	552.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	1	3	0	0	0.000050000	0.000	0.550	0.450	724.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	2	1	0	0	0.000011500	0.000	0.550	0.450	965.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	2	2	0	0	0.000001700	0.000	0.280	0.720	32.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	2	3	0	0	0.000024000	0.000	0.580	0.420	415.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	3	1	0	0	0.000011000	0.000	0.650	0.350	1015.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	3	2	0	0	0.000000137	0.000	0.500	0.500	16.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	3	3	0	0	0.000000400	0.000	0.400	0.600	26.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	2	4	1	0	0	0.000000675	0.000	0.500	0.500	721.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	1	3	0	0	0.000009000	0.000	0.200	0.800	353.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	2	1	0	0	0.000033000	0.171	0.484	0.345	790.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	2	2	0	0	0.000002150	0.000	0.490	0.510	31.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	2	3	0	0	0.000022500	0.051	0.454	0.494	152.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	3	1	0	0	0.000025000	0.200	0.390	0.410	444.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	3	2	0	0	0.000000400	0.000	0.500	0.500	8.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	3	3	0	0	0.000000500	0.050	0.400	0.550	4.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	1	3	4	1	0	0	0.000021000	0.000	0.450	0.550	237.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	9.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	99.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	20.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	1	5	0	0	0	0.000006200	0.000	0.500	0.500	1181.00	350.00	0.00	350.00	55.00	25.00	-15.00	15

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
03	03	2	2	1	0	0	0	0.000030000	0.000	0.200	0.800	126.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	2	2	0	0	0	0.000006400	0.000	0.300	0.700	142.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	2	3	0	0	0	0.000000000	0.000	0.000	0.000	33.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	2	5	0	0	0	0.000300000	0.000	0.400	0.600	2599.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	4.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	56.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	2	3	3	0	0	0	0.000000000	0.000	0.000	0.000	7.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	03	3	2	2	0	0	0	0.000022000	0.000	0.400	0.600	52.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
03	04	1	1	1	0	0	0	0.000020000	0.000	0.590	0.410	291.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	2	0	0	0	0.000009200	0.000	0.550	0.450	1264.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	2	0	0	0	0.000000910	0.000	0.250	0.750	32.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	3	0	0	0	0.000006500	0.000	0.280	0.720	277.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	3	1	0	0	0.000006000	0.000	0.500	0.500	1251.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	3	2	0	0	0.000007700	0.000	0.250	0.750	7.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	3	3	0	0	0.000009900	0.000	0.300	0.700	33.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	1	4	1	0	0	0.000012000	0.000	0.500	0.500	552.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	1	3	0	0	0.000050000	0.000	0.550	0.450	724.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	2	1	0	0	0.000011500	0.000	0.550	0.450	965.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	2	2	0	0	0.000001700	0.000	0.280	0.720	32.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	2	3	0	0	0.000024000	0.000	0.580	0.420	415.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	3	1	0	0	0.000011000	0.000	0.650	0.350	1015.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	3	2	0	0	0.000001137	0.000	0.500	0.500	16.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	3	3	0	0	0.000000400	0.000	0.400	0.600	26.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	2	4	1	0	0	0.000000675	0.000	0.500	0.500	721.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	1	3	0	0	0.000009000	0.000	0.200	0.800	353.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	2	1	0	0	0.000033000	0.171	0.484	0.345	790.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	2	2	0	0	0.000021500	0.000	0.490	0.510	31.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	2	3	0	0	0.000022500	0.051	0.454	0.494	152.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	3	1	0	0	0.000025000	0.200	0.390	0.410	444.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	3	2	0	0	0.000000400	0.000	0.500	0.500	8.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	3	3	0	0	0.000005500	0.050	0.400	0.550	4.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	1	3	4	1	0	0	0.000021000	0.000	0.450	0.550	237.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	9.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	99.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	20.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	1	5	0	0	0	0.000006200	0.000	0.500	0.500	1181.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	2	1	0	0	0	0.000030000	0.000	0.200	0.800	126.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	2	2	0	0	0	0.000006400	0.000	0.300	0.700	142.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	2	3	0	0	0	0.000000000	0.000	0.000	0.000	33.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	2	5	0	0	0	0.000300000	0.000	0.400	0.600	2599.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	4.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	55.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	3	3	0	0	0	0.000000000	0.000	0.000	0.000	7.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	2	3	5	0	0	0	0.000022000	0.000	0.400	0.600	52.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
03	04	3	1	1	0	0	0	0.000017370	0.070	0.600	0.330	125.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	1	1	0	0	0	0.000010420	0.120	0.600	0.280	184.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	1	2	0	0	0	0.000000000	0.120	0.600	0.280	22.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	1	3	0	0	0	0.000016220	0.070	0.600	0.330	310.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	2	1	3	0	0	0.000032430	0.120	0.600	0.280	277.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	2	2	3	0	0	0.000009270	0.120	0.600	0.280	17.00	350.00	0.00	350.00	55.00	25.00	-15.00	15

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
04	03	1	3	1	3	0	0	0.000008110	0.070	0.600	0.330	151.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	3	2	3	0	0	0.000016220	0.120	0.600	0.280	102.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	1	3	3	3	0	0	0.000008110	0.120	0.600	0.280	2.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	1	1	3	0	0	0.000000000	0.000	0.000	0.000	10.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	1	2	3	0	0	0.000000000	0.000	0.000	0.000	67.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	1	3	3	0	0	0.000000000	0.000	0.000	0.000	6.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	1	5	3	0	0	0.000000000	0.000	0.000	0.000	450.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	2	1	3	0	0	0.000012830	0.010	0.240	0.750	153.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	2	2	3	0	0	0.000011790	0.050	0.450	0.500	165.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	2	3	3	0	0	0.000007860	0.010	0.490	0.500	22.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	2	5	3	0	0	0.000017020	0.000	0.500	0.500	1151.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	3	1	3	0	0	0.000000000	0.000	0.000	0.000	4.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	3	2	3	0	0	0.000000000	0.000	0.000	0.000	32.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	03	2	3	5	3	0	0	0.000008120	0.000	0.500	0.500	195.00	350.00	0.00	350.00	55.00	25.00	-15.00	15
04	04	1	1	1	3	0	0	0.000017370	0.070	0.600	0.330	125.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	1	2	3	0	0	0.000010420	0.120	0.600	0.280	184.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	1	3	3	0	0	0.000000000	0.120	0.600	0.280	22.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	2	1	3	0	0	0.000016220	0.070	0.600	0.330	310.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	2	2	3	0	0	0.000032430	0.120	0.600	0.280	277.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	2	3	3	0	0	0.000009270	0.120	0.600	0.280	17.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	3	1	3	0	0	0.000008110	0.070	0.600	0.330	151.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	3	2	3	0	0	0.000016220	0.120	0.600	0.280	102.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	1	3	3	3	0	0	0.000008110	0.120	0.600	0.280	2.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	1	1	3	0	0	0.000000000	0.000	0.000	0.000	10.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	1	2	3	0	0	0.000000000	0.000	0.000	0.000	67.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	1	3	3	0	0	0.000000000	0.000	0.000	0.000	6.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	1	5	3	0	0	0.000000000	0.000	0.000	0.000	450.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	2	1	3	0	0	0.000012830	0.010	0.240	0.750	153.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	2	2	3	0	0	0.000011790	0.050	0.450	0.500	165.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	2	3	3	0	0	0.000007860	0.010	0.490	0.500	22.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	2	5	3	0	0	0.000017020	0.000	0.500	0.500	1151.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	3	1	3	0	0	0.000000000	0.000	0.000	0.000	4.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	3	2	3	0	0	0.000000000	0.000	0.000	0.000	32.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
04	04	2	3	5	3	0	0	0.000008120	0.000	0.500	0.500	195.00	300.00	0.00	300.00	55.00	25.00	-15.00	15
05	05	1	1	1	3	0	1	0.000110000	0.000	0.395	0.605	290.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	1	3	0	2	0.000014500	0.000	0.282	0.718	32.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	1	0	1	0.000310000	0.012	0.218	0.770	594.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	1	0	2	0.000240000	0.015	0.270	0.715	149.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	2	0	1	0.000017000	0.000	0.145	0.855	138.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	2	0	2	0.000012000	0.000	0.230	0.770	24.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	3	0	1	0.000170000	0.002	0.167	0.831	215.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	2	3	0	2	0.000129000	0.003	0.242	0.755	24.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	1	0	1	0.000330000	0.007	0.031	0.682	707.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	1	0	2	0.000177000	0.025	0.420	0.555	200.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	2	0	1	0.000016000	0.000	0.188	0.812	37.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	2	0	2	0.000008100	0.000	0.277	0.723	6.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	3	0	1	0.000051000	0.011	0.238	0.751	40.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	3	3	0	2	0.000027000	0.050	0.215	0.635	4.00	100.00	0.00	110.00	68.00	24.00	-14.00	5

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
05	05	1	1	4	1	0	1	0.000250000	0.000	0.400	0.600	1243.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	1	4	1	0	2	0.000235000	0.030	0.480	0.490	414.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	1	3	0	1	0.000200000	0.000	0.410	0.590	639.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	1	3	0	2	0.000040000	0.000	0.230	0.770	160.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	1	0	1	0.000300000	0.005	0.200	0.795	426.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	1	0	2	0.000150000	0.015	0.270	0.715	142.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	2	0	1	0.000030000	0.000	0.142	0.858	126.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	2	0	2	0.000015000	0.000	0.200	0.800	35.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	3	0	1	0.000250000	0.003	0.167	0.830	287.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	2	3	0	2	0.000130000	0.007	0.232	0.761	72.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	1	0	1	0.000360000	0.012	0.243	0.745	515.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	1	0	2	0.000335000	0.035	0.495	0.470	221.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	2	0	1	0.000009050	0.000	0.425	0.575	73.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	2	0	2	0.000009500	0.000	0.675	0.325	21.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	3	0	1	0.000012100	0.000	0.210	0.790	27.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	3	3	0	2	0.000010000	0.000	0.429	0.571	7.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	4	1	0	1	0.000625000	0.006	0.340	0.654	1297.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	2	4	1	0	2	0.000700000	0.007	0.343	0.650	865.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	1	3	0	1	0.000035000	0.000	0.240	0.760	292.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	1	3	0	2	0.000030000	0.000	0.280	0.720	98.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	1	0	1	0.000155000	0.000	0.190	0.810	163.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	1	0	2	0.000102000	0.000	0.300	0.700	302.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	2	0	1	0.000010000	0.000	0.300	0.700	93.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	2	0	2	0.000005300	0.000	0.300	0.700	62.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	3	0	1	0.000047000	0.000	0.200	0.800	99.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	2	3	0	2	0.000030000	0.000	0.280	0.720	33.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	1	0	1	0.000086000	0.000	0.200	0.800	97.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	1	0	2	0.000040000	0.000	0.250	0.750	225.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	2	0	1	0.000000000	0.000	0.000	0.000	30.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	2	0	2	0.000000000	0.000	0.000	0.000	20.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	3	0	1	0.000004000	0.000	0.300	0.700	4.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	3	3	0	2	0.000001900	0.000	0.300	0.700	1.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	4	1	0	1	0.000119000	0.000	0.300	0.700	177.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	1	3	4	1	0	2	0.000132000	0.000	0.320	0.680	533.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	1	0	0	1	0.000013500	0.000	0.250	0.750	22.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	1	0	0	2	0.000000000	0.000	0.000	0.000	7.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	2	0	0	1	0.000061000	0.000	0.390	0.610	1786.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	2	0	0	2	0.000040000	0.000	0.120	0.880	407.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	3	0	0	1	0.000041500	0.000	0.200	0.800	1102.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	3	0	0	2	0.000007800	0.000	0.100	0.900	269.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	5	0	0	1	0.000420000	0.000	0.250	0.750	7123.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	1	5	0	0	2	0.000145000	0.000	0.370	0.630	1257.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	1	0	0	1	0.000110000	0.040	0.250	0.710	319.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	1	0	0	2	0.000051000	0.000	0.270	0.730	106.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	2	0	0	1	0.000145000	0.025	0.450	0.525	2435.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	2	0	0	2	0.000040000	0.000	0.300	0.700	643.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	3	0	0	1	0.000034000	0.000	0.400	0.600	1502.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	3	0	0	2	0.000030000	0.000	0.550	0.450	471.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	5	0	0	1	0.001150000	0.005	0.270	0.725	12235.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	2	5	0	0	2	0.000550000	0.005	0.300	0.695	2160.00	100.00	0.00	110.00	68.00	24.00	-14.00	5

Hazard	Treatment	Rural/Urban	Area Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
05	05	2	3 1	0	0	1	0.000006500	0.040	0.250	0.710	9.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 1	0	0	2	0.000000000	0.000	0.000	0.000	3.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 2	0	0	1	0.000021000	0.000	0.100	0.900	867.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 2	0	0	2	0.000009000	0.450	0.100	0.450	403.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 3	0	0	1	0.000011500	0.040	0.250	0.710	285.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 3	0	0	2	0.000007000	0.400	0.150	0.450	154.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 5	0	0	1	0.000210000	0.000	0.470	0.530	2896.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
05	05	2	3 5	0	0	2	0.000070000	0.000	0.130	0.870	1010.00	100.00	0.00	110.00	68.00	24.00	-14.00	5
06	06	1	1 1	3	0	1	0.000107000	0.080	0.325	0.595	117.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 1	3	0	2	0.000007200	0.000	0.385	0.615	13.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	1	0	1	0.000450000	0.070	0.555	0.375	44613.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	1	0	2	0.000275000	0.090	0.525	0.385	11153.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	2	0	1	0.000011000	0.000	0.370	0.630	573.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	2	0	2	0.000006000	0.000	0.335	0.665	101.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	3	0	1	0.000081000	0.058	0.487	0.455	2580.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 2	3	0	2	0.000051000	0.080	0.445	0.475	287.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	1	0	1	0.000580000	0.070	0.562	0.368	184464.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	1	0	2	0.000410000	0.080	0.595	0.325	52028.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	2	0	1	0.000005500	0.000	0.290	0.710	151.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	2	0	2	0.000004000	0.000	0.320	0.680	27.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	3	0	1	0.000016300	0.000	0.542	0.458	590.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 3	3	0	2	0.000012500	0.000	0.575	0.425	66.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 4	1	0	1	0.001080000	0.045	0.565	0.390	274491.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	1 4	1	0	2	0.001550000	0.048	0.587	0.365	424830.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 1	3	0	1	0.000120000	0.020	0.671	0.309	258.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 1	3	0	2	0.000019000	0.000	0.350	0.650	65.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	1	0	1	0.000510000	0.025	0.465	0.510	31936.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	1	0	2	0.000350000	0.035	0.470	0.495	10645.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	2	0	1	0.000019000	0.019	0.441	0.540	525.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	2	0	2	0.000013000	0.020	0.457	0.515	148.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	3	0	1	0.000150000	0.005	0.475	0.520	3441.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 2	3	0	2	0.000105000	0.007	0.483	0.510	860.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	1	0	1	0.000890000	0.038	0.477	0.485	134308.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	1	0	2	0.000850000	0.051	0.494	0.455	57560.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	2	0	1	0.000008100	0.000	0.525	0.475	307.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	2	0	2	0.000008200	0.000	0.554	0.446	86.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	3	0	1	0.000015100	0.000	0.656	0.344	413.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 3	3	0	2	0.000015100	0.000	0.681	0.319	103.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 4	1	0	1	0.002170000	0.015	0.513	0.472	330353.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	2 4	1	0	2	0.003600000	0.037	0.536	0.427	886902.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 1	3	0	1	0.000013000	0.000	0.650	0.350	118.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 1	3	0	2	0.000001750	0.000	0.300	0.700	39.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	1	0	1	0.000359000	0.015	0.465	0.520	12200.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	1	0	2	0.000645000	0.030	0.482	0.488	22658.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	2	0	1	0.000007150	0.028	0.665	0.307	387.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	2	0	2	0.000012000	0.055	0.668	0.277	258.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	3	0	1	0.000014200	0.000	0.375	0.625	1183.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 2	3	0	2	0.000025100	0.000	0.400	0.600	395.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 3	1	0	1	0.000300000	0.051	0.429	0.520	25180.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3 3	1	0	2	0.000490000	0.031	0.429	0.540	58754.00	30.00	0.00	0.00	50.00	25.00	-20.00	10

Hazard	Treatment	Rural/Urban	Area Type	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
06	06	1	3	3	2	0	1	0.000003900	0.000	0.130	0.870	125.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3	3	2	0	2	0.000006500	0.000	0.140	0.860	84.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3	3	3	0	1	0.000000510	0.000	0.380	0.620	50.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3	3	3	0	2	0.000000900	0.000	0.400	0.600	18.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3	4	1	0	1	0.000671000	0.004	0.435	0.561	182085.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	1	3	4	1	0	2	0.001810000	0.028	0.444	0.528	546254.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	1	0	0	1	0.000013000	0.000	0.500	0.500	8.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	1	0	0	2	0.000000000	0.000	0.000	0.000	3.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	2	0	0	1	0.000012500	0.000	0.300	0.700	5265.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	2	0	0	2	0.000021500	0.000	0.150	0.850	1210.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	3	0	0	1	0.000055000	0.000	0.600	0.400	6690.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	3	0	0	2	0.000000000	0.000	0.000	0.000	1629.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	5	0	0	1	0.000850000	0.010	0.540	0.450	130554.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	1	5	0	0	2	0.000275000	0.015	0.535	0.450	23040.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	1	0	0	1	0.000017500	0.000	0.500	0.500	122.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	1	0	0	2	0.000010000	0.000	0.300	0.700	41.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	2	0	0	1	0.000061000	0.000	0.240	0.760	7049.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	2	0	0	2	0.000029000	0.000	0.800	0.200	1870.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	3	0	0	1	0.000065000	0.000	0.600	0.400	9225.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	3	0	0	2	0.000022000	0.000	0.550	0.450	2870.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	5	0	0	1	0.002400000	0.015	0.525	0.460	169060.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	2	5	0	0	2	0.001550000	0.010	0.565	0.425	29835.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	1	0	0	1	0.000000000	0.000	0.000	0.000	4.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	1	0	0	2	0.000000000	0.000	0.000	0.000	1.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	2	0	0	1	0.000031000	0.000	0.680	0.320	2578.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	2	0	0	2	0.000034000	0.000	0.250	0.750	1201.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	3	0	0	1	0.000011000	0.000	0.650	0.350	1757.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	3	0	0	2	0.000015500	0.000	0.350	0.650	934.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	5	0	0	1	0.000460000	0.020	0.480	0.500	53429.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	06	2	3	5	0	0	2	0.000500000	0.000	0.450	0.550	17996.00	30.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	1	3	0	1	0.000107000	0.080	0.325	0.595	117.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	1	3	0	2	0.000007200	0.000	0.385	0.615	13.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	1	0	1	0.000450000	0.070	0.555	0.375	44613.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	1	0	2	0.000275000	0.090	0.525	0.385	11153.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	2	0	1	0.000011000	0.000	0.370	0.630	573.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	2	0	2	0.000006000	0.000	0.335	0.665	101.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	3	0	1	0.000081000	0.058	0.487	0.455	2580.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	2	3	0	2	0.000051000	0.080	0.445	0.475	287.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	1	0	1	0.000580000	0.070	0.562	0.368	184464.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	1	0	2	0.000410000	0.080	0.595	0.325	52028.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	2	0	1	0.000005500	0.000	0.290	0.710	151.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	2	0	2	0.000004000	0.000	0.320	0.680	27.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	3	0	1	0.000016300	0.000	0.542	0.458	590.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	3	3	0	2	0.000012500	0.000	0.575	0.425	66.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	4	1	0	1	0.001080000	0.045	0.565	0.390	274491.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	1	4	1	0	2	0.001550000	0.048	0.587	0.365	424830.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2	1	3	0	1	0.000120000	0.020	0.671	0.309	258.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2	1	3	0	2	0.000019000	0.000	0.350	0.650	65.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2	2	1	0	1	0.000510000	0.025	0.465	0.510	31936.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2	2	1	0	2	0.000350000	0.035	0.470	0.495	10645.00	60.00	0.00	0.00	50.00	25.00	-20.00	10

Hazard	Treatment	Rural/Urban	Area Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
06	07	1	2 2	2	0	1	0.000019000	0.019	0.441	0.540	525.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 2	2	0	2	0.000013000	0.028	0.457	0.515	148.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 2	3	0	1	0.000150000	0.005	0.475	0.520	3441.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 2	3	0	2	0.000105000	0.007	0.483	0.510	860.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	1	0	1	0.000890000	0.038	0.477	0.485	134308.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	1	0	2	0.000850000	0.051	0.494	0.455	57560.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	2	0	1	0.000008100	0.000	0.525	0.475	307.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	2	0	2	0.000008200	0.000	0.554	0.446	86.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	3	0	1	0.000015100	0.000	0.656	0.344	413.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 3	3	0	2	0.000015100	0.000	0.681	0.319	103.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 4	1	0	1	0.002170000	0.015	0.513	0.472	330353.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	2 4	1	0	2	0.003600000	0.037	0.536	0.427	886902.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 1	3	0	1	0.000013000	0.000	0.650	0.350	118.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 1	3	0	2	0.000001750	0.000	0.300	0.700	39.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	1	0	1	0.000359000	0.015	0.465	0.520	12200.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	1	0	2	0.000645000	0.030	0.482	0.488	22658.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	2	0	1	0.000007150	0.028	0.665	0.307	387.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	2	0	2	0.000012800	0.055	0.668	0.277	258.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	3	0	1	0.000014200	0.000	0.375	0.625	1183.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 2	3	0	2	0.000025100	0.000	0.400	0.600	395.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	1	0	1	0.000300000	0.051	0.429	0.520	25180.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	1	0	2	0.000490000	0.031	0.429	0.540	58754.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	2	0	1	0.000003900	0.000	0.130	0.870	125.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	2	0	2	0.000006500	0.000	0.140	0.860	84.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	3	0	1	0.000000510	0.000	0.380	0.620	50.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 3	3	0	2	0.000000900	0.000	0.400	0.600	18.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 4	1	0	1	0.000671000	0.004	0.435	0.561	182085.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	1	3 4	1	0	2	0.001810000	0.028	0.444	0.528	546254.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 1	0	0	1	0.000013000	0.000	0.500	0.500	8.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 1	0	0	2	0.000000000	0.000	0.000	0.000	3.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 2	0	0	1	0.000012500	0.000	0.300	0.700	5265.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 2	0	0	2	0.000021500	0.000	0.150	0.850	1210.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 3	0	0	1	0.000055000	0.000	0.600	0.400	6690.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 3	0	0	2	0.000000000	0.000	0.000	0.000	1629.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 5	0	0	1	0.000850000	0.010	0.540	0.450	130554.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	1 5	0	0	2	0.000275000	0.015	0.535	0.450	23040.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 1	0	0	1	0.000017500	0.000	0.500	0.500	122.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 1	0	0	2	0.000010000	0.000	0.300	0.700	41.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 2	0	0	1	0.000061000	0.000	0.240	0.760	7049.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 2	0	0	2	0.000029000	0.000	0.800	0.200	1870.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 3	0	0	1	0.000065000	0.000	0.600	0.400	9225.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 3	0	0	2	0.000022000	0.000	0.550	0.450	2870.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 5	0	0	1	0.002400000	0.015	0.525	0.460	169060.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	2 5	0	0	2	0.001550000	0.010	0.565	0.425	29835.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 1	0	0	1	0.000000000	0.000	0.000	0.000	4.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 1	0	0	2	0.000000000	0.000	0.000	0.000	1.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 2	0	0	1	0.000031000	0.000	0.680	0.320	2578.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 2	0	0	2	0.000034000	0.000	0.250	0.750	1201.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 3	0	0	1	0.000011000	0.000	0.650	0.350	1757.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3 3	0	0	2	0.000015500	0.000	0.350	0.650	934.00	60.00	0.00	0.00	50.00	25.00	-20.00	10

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
06	07	2	3	5	0	0	1	0.000460000	0.020	0.480	0.500	53429.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
06	07	2	3	5	0	0	2	0.000500000	0.000	0.450	0.550	17996.00	60.00	0.00	0.00	50.00	25.00	-20.00	10
07	08	1	1	1	3	0	0	0.000022800	0.050	0.465	0.485	69.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	2	1	0	0	0.000004000	0.020	0.500	0.480	16.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	2	2	0	0	0.000000000	0.000	0.000	0.000	5.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	2	3	0	0	0.000000000	0.000	0.000	0.000	13.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	3	1	0	0	0.000008000	0.020	0.500	0.480	10.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	3	2	0	0	0.000000000	0.000	0.000	0.000	5.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	1	4	1	0	0	0.000007700	0.030	0.500	0.470	23.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	1	3	0	0	0.000022800	0.450	0.350	0.200	112.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	2	1	0	0	0.000022800	0.000	0.500	0.500	90.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	2	2	0	0	0.000000000	0.000	0.000	0.000	29.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	2	3	0	0	0.000022800	0.000	0.500	0.500	78.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	3	1	0	0	0.000005800	0.020	0.500	0.480	41.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	3	3	0	0	0.000001250	0.030	0.470	0.500	6.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	2	4	1	0	0	0.000015400	0.000	0.500	0.500	99.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	1	3	0	0	0.000010300	0.000	0.650	0.350	111.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	2	1	0	0	0.000022800	0.200	0.200	0.600	18.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	6.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	2	3	0	0	0.000001940	0.030	0.470	0.500	19.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	3	1	0	0	0.000000000	0.000	0.000	0.000	26.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	2.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	1	3	4	1	0	0	0.000000000	0.000	0.000	0.000	126.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	6.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	22.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	8.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	1	5	0	0	0	0.000019200	0.000	0.550	0.450	-999999.99	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	2	1	0	0	0	0.000021500	0.200	0.300	0.500	225.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	2	2	0	0	0	0.000029600	0.100	0.600	0.300	174.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	2	3	0	0	0	0.000006460	0.100	0.600	0.300	42.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	2	5	0	0	0	0.000034300	0.000	0.450	0.550	-999999.99	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	18.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	21.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	3	3	0	0	0	0.000007300	0.000	0.500	0.500	0.00	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	08	2	3	5	0	0	0	0.000000000	0.000	0.000	0.000	-999999.99	6000.00	0.00	350.00	60.00	40.00	-150.00	20
07	09	1	1	1	3	0	0	0.000022800	0.050	0.465	0.485	69.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	2	1	0	0	0.000004000	0.020	0.500	0.480	16.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	2	2	0	0	0.000000000	0.000	0.000	0.000	5.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	2	3	0	0	0.000000000	0.000	0.000	0.000	13.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	3	1	0	0	0.000008000	0.020	0.500	0.480	10.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	3	2	0	0	0.000000000	0.000	0.000	0.000	5.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	1	4	1	0	0	0.000007700	0.030	0.500	0.470	23.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	1	3	0	0	0.000022800	0.450	0.350	0.200	112.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	2	1	0	0	0.000022800	0.000	0.500	0.500	90.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	2	2	0	0	0.000000000	0.000	0.000	0.000	29.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	2	3	0	0	0.000022800	0.000	0.500	0.500	78.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
07	09	1	2	3	1	0	0	0.000005800	0.020	0.500	0.480	41.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	3	3	0	0	0.000001250	0.030	0.470	0.500	6.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	2	4	1	0	0	0.000015400	0.000	0.500	0.500	99.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	1	3	0	0	0.000010300	0.000	0.650	0.350	111.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	2	1	0	0	0.000022800	0.200	0.200	0.600	18.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	6.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	2	3	0	0	0.000001940	0.030	0.470	0.500	19.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	3	1	0	0	0.000000000	0.000	0.000	0.000	26.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	2.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	1	3	4	1	0	0	0.000000000	0.000	0.000	0.000	126.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	6.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	22.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	8.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	1	5	0	0	0	0.000019200	0.000	0.550	0.450	-999999.99	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	2	1	0	0	0	0.000021500	0.200	0.300	0.500	225.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	2	2	0	0	0	0.000029600	0.100	0.600	0.300	174.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	2	3	0	0	0	0.000006460	0.100	0.600	0.300	42.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	2	5	0	0	0	0.000034300	0.000	0.450	0.550	-999999.99	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	18.00	12000.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	21.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	3	3	0	0	0	0.000007300	0.000	0.500	0.500	8.00	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	09	2	3	5	0	0	0	0.000000000	0.000	0.000	0.000	-999999.99	16580.00	0.00	500.00	75.00	60.00	-300.00	10
07	10	1	1	1	3	0	0	0.000022800	0.050	0.465	0.485	69.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	2	1	0	0	0.000004000	0.020	0.500	0.480	16.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	2	2	0	0	0.000000000	0.000	0.000	0.000	5.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	2	3	0	0	0.000000000	0.000	0.000	0.000	13.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	3	1	0	0	0.000004000	0.020	0.500	0.480	10.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	3	2	0	0	0.000000000	0.000	0.000	0.000	5.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	1	4	1	0	0	0.000007700	0.030	0.500	0.470	23.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	1	3	0	0	0.000022000	0.450	0.350	0.200	112.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	2	1	0	0	0.000022800	0.000	0.500	0.500	90.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	2	2	0	0	0.000000000	0.000	0.000	0.000	29.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	2	3	0	0	0.000022800	0.000	0.500	0.500	78.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	3	1	0	0	0.000005800	0.020	0.500	0.480	41.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	3	3	0	0	0.000001250	0.030	0.470	0.500	6.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	2	4	1	0	0	0.000015400	0.000	0.500	0.500	99.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	1	3	0	0	0.000010300	0.000	0.650	0.350	111.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	2	1	0	0	0.000022800	0.200	0.200	0.600	18.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	6.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	2	3	0	0	0.000001940	0.030	0.470	0.500	19.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	3	1	0	0	0.000000000	0.000	0.000	0.000	26.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	2.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	1	3	4	1	0	0	0.000000000	0.000	0.000	0.000	126.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	6.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	22.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
07	10	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	8.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	1	5	0	0	0	0.000019200	0.000	0.550	0.450	-999999.99	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	2	1	0	0	0	0.000021500	0.200	0.300	0.500	225.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	2	2	0	0	0	0.000029600	0.100	0.600	0.300	174.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	2	3	0	0	0	0.000006460	0.100	0.600	0.300	42.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	2	5	0	0	0	0.000034300	0.000	0.450	0.550	-999999.99	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	18.00	5000.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	21.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	3	3	0	0	0	0.000007300	0.000	0.500	0.500	8.00	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	10	2	3	5	0	0	0	0.000000000	0.000	0.000	0.000	-999999.99	6910.00	0.00	800.00	75.00	60.00	-300.00	10
07	11	1	1	1	3	0	0	0.000022800	0.050	0.465	0.485	69.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	2	1	0	0	0.000004000	0.020	0.500	0.480	16.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	2	2	0	0	0.000000000	0.000	0.000	0.000	5.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	2	3	0	0	0.000000000	0.000	0.000	0.000	13.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	3	1	0	0	0.000008000	0.020	0.500	0.480	10.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	3	2	0	0	0.000000000	0.000	0.000	0.000	5.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	1	4	1	0	0	0.000007700	0.030	0.500	0.470	23.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	1	3	0	0	0.000022800	0.450	0.350	0.200	112.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	2	1	0	0	0.000022800	0.000	0.500	0.500	90.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	2	2	0	0	0.000000000	0.000	0.000	0.000	29.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	2	3	0	0	0.000022800	0.000	0.500	0.500	78.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	3	1	0	0	0.000005800	0.020	0.500	0.480	41.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	3	3	0	0	0.000001250	0.030	0.470	0.500	6.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	2	4	1	0	0	0.000015400	0.000	0.500	0.500	99.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	1	3	0	0	0.000010300	0.000	0.650	0.350	111.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	2	1	0	0	0.000022800	0.200	0.200	0.600	18.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	2	2	0	0	0.000000000	0.000	0.000	0.000	6.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	2	3	0	0	0.000001940	0.030	0.470	0.500	19.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	3	1	0	0	0.000000000	0.000	0.000	0.000	26.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	3	2	0	0	0.000000000	0.000	0.000	0.000	3.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	2.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	1	3	4	1	0	0	0.000000000	0.000	0.000	0.000	126.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	1	1	0	0	0	0.000000000	0.000	0.000	0.000	6.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	1	2	0	0	0	0.000000000	0.000	0.000	0.000	22.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	1	3	0	0	0	0.000000000	0.000	0.000	0.000	8.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	1	5	0	0	0	0.000019200	0.000	0.550	0.450	-999999.99	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	2	1	0	0	0	0.000021500	0.200	0.300	0.500	225.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	2	2	0	0	0	0.000029600	0.100	0.600	0.300	174.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	2	3	0	0	0	0.000006460	0.100	0.600	0.300	42.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	2	5	0	0	0	0.000034300	0.000	0.450	0.550	-999999.99	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	3	1	0	0	0	0.000000000	0.000	0.000	0.000	18.00	8500.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	3	2	0	0	0	0.000000000	0.000	0.000	0.000	21.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	3	3	0	0	0	0.000007300	0.000	0.500	0.500	8.00	11750.00	0.00	700.00	75.00	60.00	-300.00	10
07	11	2	3	5	0	0	0	0.000000000	0.000	0.000	0.000	-999999.99	11750.00	0.00	700.00	75.00	60.00	-300.00	10
08	08	1	1	1	3	0	0	0.000022800	0.020	0.480	0.500	34.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	1	2	3	0	0	0.000013100	0.100	0.600	0.300	7.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	1	3	3	0	0	0.000003400	0.100	0.600	0.300	1.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	2	1	3	0	0	0.000021700	0.140	0.560	0.300	56.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
08	08	1	2	2	3	0	0	0.000022200	0.300	0.400	0.300	39.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	2	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	3	1	3	0	0	0.000006900	0.000	0.590	0.410	55.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	3	2	3	0	0	0.000000000	0.000	0.000	0.000	8.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	08	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	12000.00	0.00	350.00	60.00	40.00	-150.00	20
08	09	1	1	1	3	0	0	0.000022800	0.020	0.480	0.500	34.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	1	2	3	0	0	0.000013100	0.100	0.600	0.300	7.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	1	3	3	0	0	0.000003400	0.100	0.600	0.300	1.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	2	1	3	0	0	0.000021700	0.140	0.560	0.300	56.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	2	2	3	0	0	0.000022200	0.300	0.400	0.300	39.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	2	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	3	1	3	0	0	0.000006900	0.000	0.590	0.410	55.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	3	2	3	0	0	0.000000000	0.000	0.000	0.000	8.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	09	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	24000.00	0.00	500.00	75.00	60.00	-300.00	10
08	10	1	1	1	3	0	0	0.000022800	0.020	0.480	0.500	34.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	1	2	3	0	0	0.000013100	0.100	0.600	0.300	7.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	1	3	3	0	0	0.000003400	0.100	0.600	0.300	1.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	2	1	3	0	0	0.000021700	0.140	0.560	0.300	56.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	2	2	3	0	0	0.000022200	0.300	0.400	0.300	39.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	2	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	3	1	3	0	0	0.000006900	0.000	0.590	0.410	55.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	3	2	3	0	0	0.000000000	0.000	0.000	0.000	8.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	10	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	10000.00	0.00	800.00	75.00	60.00	-300.00	10
08	11	1	1	1	3	0	0	0.000022800	0.020	0.480	0.500	34.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	1	2	3	0	0	0.000013100	0.100	0.600	0.300	7.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	1	3	3	0	0	0.000003400	0.100	0.600	0.300	1.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	2	1	3	0	0	0.000021700	0.140	0.560	0.300	56.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	2	2	3	0	0	0.000022200	0.300	0.400	0.300	39.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	2	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	3	1	3	0	0	0.000006900	0.000	0.590	0.410	55.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	3	2	3	0	0	0.000000000	0.000	0.000	0.000	8.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
08	11	1	3	3	3	0	0	0.000000000	0.000	0.000	0.000	1.00	17000.00	0.00	700.00	75.00	60.00	-300.00	10
09	12	1	1	1	3	1	0	0.000000000	0.000	0.000	0.000	6.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	1	3	2	1	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	1	1	0	0.000072000	0.050	0.028	0.670	3651.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	1	2	1	0.000310000	0.005	0.320	0.675	16549.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	1	2	2	0.000210000	0.020	0.480	0.500	4137.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	2	1	0	0.000017600	0.000	0.620	0.380	182.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	2	2	1	0.000027500	0.000	0.330	0.670	876.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	2	2	2	0.000020500	0.000	0.425	0.575	155.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	3	1	0	0.000038500	0.000	0.740	0.260	64.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	3	2	1	0.000050500	0.010	0.365	0.625	324.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	2	3	2	2	0.000042000	0.050	0.545	0.405	36.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	1	1	0	0.000080000	0.000	0.560	0.440	7236.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	1	2	1	0.000220000	0.020	0.500	0.480	29629.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	1	2	2	0.000175000	0.052	0.508	0.440	8357.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	2	1	0	0.000000000	0.000	0.000	0.000	51.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	2	2	1	0.000017500	0.000	0.590	0.410	229.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	2	2	2	0.000015000	0.000	0.625	0.375	40.00	36.00	0.00	250.00	30.00	-1.00	0.00	10

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	12	1	1	3	3	1	0	0.000009000	0.000	0.850	0.150	17.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	3	2	1	0.000012500	0.078	0.332	0.590	83.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	3	3	2	2	0.000010000	0.175	0.350	0.475	9.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	4	1	1	0	0.000125000	0.030	0.410	0.560	23570.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	4	1	2	1	0.000390000	0.000	0.395	0.605	100171.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	1	4	1	2	2	0.000460000	0.046	0.474	0.480	33391.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	1	3	1	0	0.000000000	0.000	0.000	0.000	16.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	1	3	2	1	0.000040000	0.080	0.180	0.740	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	1	1	0	0.000800000	0.000	0.535	0.465	4088.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	1	2	1	0.000290000	0.025	0.405	0.570	10871.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	1	2	2	0.000275000	0.018	0.452	0.530	3624.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	2	1	0	0.000008500	0.000	0.385	0.615	266.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	2	2	1	0.000023000	0.000	0.355	0.645	737.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	2	2	2	0.000021000	0.000	0.400	0.600	208.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	3	1	0	0.000030000	0.000	0.320	0.680	140.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	3	2	1	0.000042000	0.040	0.490	0.470	397.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	2	3	2	2	0.000040000	0.040	0.555	0.405	99.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	1	1	0	0.000175000	0.000	0.585	0.415	7705.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	1	2	1	0.000490000	0.035	0.338	0.627	20289.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	1	2	2	0.000485000	0.035	0.535	0.430	8695.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	2	1	0	0.000000000	0.000	0.000	0.000	148.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	2	2	1	0.000012500	0.000	0.225	0.775	436.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	2	2	2	0.000010500	0.000	0.385	0.615	123.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	3	1	0	0.000008500	0.000	0.400	0.600	18.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	3	2	1	0.000000000	0.000	0.000	0.000	54.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	3	3	2	2	0.000000000	0.000	0.000	0.000	14.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	4	1	1	0	0.000520000	0.008	0.442	0.550	43055.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	4	1	2	1	0.001150000	0.006	0.429	0.565	97181.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	2	4	1	2	2	0.001580000	0.020	0.495	0.485	64788.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	1	3	1	0	0.000000000	0.000	0.000	0.000	8.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	1	3	2	1	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	1	1	0	0.000075500	0.000	0.225	0.775	3651.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	1	2	1	0.000150000	0.008	0.452	0.540	4046.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	1	2	2	0.000145000	0.008	0.442	0.550	7515.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	2	1	0	0.000000000	0.000	0.900	0.100	279.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	2	2	1	0.000017500	0.000	0.710	0.290	529.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	2	2	2	0.000017500	0.000	0.705	0.295	353.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	3	1	0	0.000013500	0.000	0.720	0.280	56.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	3	2	1	0.000009500	0.000	0.265	0.735	133.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	2	3	2	2	0.000007500	0.000	0.250	0.750	44.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	1	1	0	0.000057500	0.000	0.110	0.890	2889.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	1	2	1	0.000085000	0.000	0.500	0.500	3948.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	1	2	2	0.000100000	0.000	0.400	0.600	9213.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	2	1	0	0.000000000	0.000	0.000	0.000	68.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	2	2	1	0.000000000	0.000	0.000	0.000	184.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	2	2	2	0.000000000	0.000	0.000	0.000	123.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	3	1	0	0.000000000	0.000	0.000	0.000	2.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	3	3	2	1	0.000000000	0.000	0.000	0.000	7.00	36.00	0.00	250.00	30.00	-1.00	0.00	10

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	12	1	3	3	3	2	2	0.000000000	0.000	0.000	0.000	2.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	4	1	1	0	0.000125000	0.000	0.333	0.667	12123.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	4	1	2	1	0.000255000	0.006	0.384	0.610	13806.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	1	3	4	1	2	2	0.000400000	0.016	0.384	0.600	41419.00	36.00	0.00	250.00	30.00	-1.00	0.00	10
09	12	2	1	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	1	0	2	1	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	1	0	2	2	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	2	0	1	0	0.000073000	0.000	0.400	0.600	4182.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	2	0	2	1	0.000112000	0.025	0.300	0.675	7196.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	2	0	2	2	0.000012000	0.030	0.590	0.380	1692.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	3	0	1	0	0.000030000	0.000	0.500	0.500	3247.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	3	0	2	1	0.000032000	0.030	0.320	0.650	5290.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	3	0	2	2	0.000004500	0.030	0.590	0.380	1300.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	5	0	1	0	0.001250000	0.006	0.414	0.580	56086.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	5	0	2	1	0.001850000	0.015	0.515	0.470	68602.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	1	5	0	2	2	0.000365000	0.000	0.525	0.475	12107.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	1	0	1	0	0.000011000	0.000	0.250	0.750	5.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	1	0	2	1	0.000013000	0.000	0.300	0.700	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	1	0	2	2	0.000039000	0.000	0.300	0.700	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	2	0	1	0	0.000094000	0.050	0.400	0.550	6479.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	2	0	2	1	0.000170000	0.050	0.450	0.500	8001.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	2	0	2	2	0.000051500	0.000	0.600	0.400	2133.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	3	0	1	0	0.000034000	0.000	0.200	0.800	4667.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	3	0	2	1	0.000071000	0.070	0.480	0.450	6872.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	3	0	2	2	0.000055000	0.000	0.400	0.600	2187.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	5	0	1	0	0.003290000	0.005	0.455	0.540	75695.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	5	0	2	1	0.006810000	0.005	0.505	0.490	92587.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	2	5	0	2	2	0.002400000	0.005	0.545	0.450	16339.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	1	0	2	1	0.000006500	0.000	0.300	0.700	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	1	0	2	2	0.000000000	0.000	0.000	0.000	0.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	2	0	1	0	0.000028000	0.000	0.200	0.800	3015.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	2	0	2	1	0.000065000	0.000	0.500	0.500	3207.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	2	0	2	2	0.000034000	0.000	0.600	0.400	1508.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	3	0	1	0	0.000030000	0.000	0.300	0.700	941.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	3	0	2	1	0.000064000	0.000	0.350	0.650	1424.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	3	0	2	2	0.000044000	0.000	0.550	0.450	771.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	5	0	1	0	0.000490000	0.015	0.385	0.600	26418.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	5	0	2	1	0.000950000	0.015	0.485	0.500	28446.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	12	2	3	5	0	2	2	0.000460000	0.000	0.430	0.570	9570.00	36.00	0.00	550.00	30.00	-1.00	0.00	10
09	13	1	1	1	3	1	0	0.000000000	0.000	0.000	0.000	6.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	1	3	2	1	0.000000000	0.000	0.000	0.000	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	1	1	0	0.000072000	0.050	0.028	0.670	3651.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	1	2	1	0.000310000	0.005	0.320	0.675	16549.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	1	2	2	0.000210000	0.020	0.480	0.500	4137.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	2	1	0	0.000007600	0.000	0.620	0.380	182.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	2	2	1	0.000027500	0.000	0.330	0.670	876.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	2	2	2	0.000020500	0.000	0.425	0.575	155.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1	2	3	1	0	0.000030500	0.000	0.740	0.260	64.00	435.00	0.00	0.00	38.00	-1.50	0.00	20

Hazard	Treatment	Rural/Urban	Area Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	13	1	1 2	3	2	1	0.000058500	0.010	0.365	0.625	324.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 2	3	2	2	0.000042000	0.050	0.545	0.405	36.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	1	1	0	0.000080000	0.000	0.560	0.440	7236.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	1	2	1	0.000220000	0.020	0.500	0.480	29629.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	1	2	2	0.000175000	0.052	0.508	0.440	8357.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	2	1	0	0.000000000	0.000	0.000	0.000	51.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	2	2	1	0.000017500	0.000	0.590	0.410	229.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	2	2	2	0.000015000	0.000	0.625	0.375	40.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	3	1	0	0.000009000	0.000	0.850	0.150	17.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	3	2	1	0.000012500	0.078	0.332	0.590	83.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 3	3	2	2	0.000010000	0.175	0.350	0.475	9.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 4	1	1	0	0.000125000	0.030	0.410	0.560	23570.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 4	1	2	1	0.000390000	0.000	0.395	0.605	100171.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	1 4	1	2	2	0.000460000	0.046	0.474	0.480	33391.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 1	3	1	0	0.000000000	0.000	0.000	0.000	16.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 1	3	2	1	0.000040000	0.080	0.180	0.740	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	1	1	0	0.000800000	0.000	0.535	0.465	4088.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	1	2	1	0.000290000	0.025	0.405	0.570	10871.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	1	2	2	0.000275000	0.018	0.452	0.530	3624.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	2	1	0	0.000008500	0.040	0.385	0.615	266.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	2	2	1	0.000023000	0.000	0.355	0.645	737.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	2	2	2	0.000021000	0.000	0.400	0.600	208.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	3	1	0	0.000030000	0.000	0.320	0.680	140.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	3	2	1	0.000042000	0.040	0.490	0.470	397.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 2	3	2	2	0.000040000	0.040	0.555	0.405	99.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	1	1	0	0.000175000	0.000	0.585	0.415	7705.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	1	2	1	0.000490000	0.035	0.338	0.627	20289.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	1	2	2	0.000485000	0.035	0.535	0.430	8695.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	2	1	0	0.000000000	0.000	0.000	0.000	148.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	2	2	1	0.000012500	0.000	0.225	0.775	436.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	2	2	2	0.000010500	0.000	0.385	0.615	123.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	3	1	0	0.000008500	0.000	0.400	0.600	18.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	3	2	1	0.000000000	0.000	0.000	0.000	54.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 3	3	2	2	0.000000000	0.000	0.000	0.000	14.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 4	1	1	0	0.000520000	0.008	0.442	0.550	43055.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 4	1	2	1	0.001150000	0.006	0.429	0.565	97181.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	2 4	1	2	2	0.001580000	0.020	0.495	0.485	64700.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 1	3	1	0	0.000000000	0.000	0.000	0.000	0.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 1	3	2	1	0.000000000	0.000	0.000	0.000	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	1	1	0	0.000075500	0.000	0.225	0.775	3651.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	1	2	1	0.000150000	0.008	0.452	0.540	4046.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	1	2	2	0.000145000	0.008	0.442	0.550	7515.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	2	1	0	0.000008000	0.000	0.900	0.100	279.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	2	2	1	0.000017500	0.000	0.710	0.290	529.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	2	2	2	0.000017500	0.000	0.705	0.295	353.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	3	1	0	0.000013500	0.000	0.720	0.280	56.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	3	2	1	0.000009500	0.000	0.265	0.735	133.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3 2	3	2	2	0.000007500	0.000	0.250	0.750	44.00	930.00	0.00	0.00	38.00	-1.50	0.00	20

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	13	1	3	3	1	1	0	0.000057500	0.000	0.110	0.890	2089.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	1	2	1	0.000065000	0.000	0.500	0.500	3948.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	1	2	2	0.000100000	0.000	0.400	0.600	9213.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	2	1	0	0.000000000	0.000	0.000	0.000	68.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	2	1	1	0.000000000	0.000	0.000	0.000	184.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	2	2	0	0.000000000	0.000	0.000	0.000	123.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	2	2	1	0.000000000	0.000	0.000	0.000	2.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	3	1	0	0.000000000	0.000	0.000	0.000	7.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	3	3	2	0	0.000000000	0.000	0.000	0.000	2.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	4	1	1	0	0.000125000	0.000	0.333	0.667	12123.00	435.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	1	3	4	1	2	0	0.000255000	0.006	0.384	0.610	13806.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	0	1	0	0.000400000	0.016	0.384	0.600	41419.00	930.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	0	2	0	0.000000000	0.000	0.000	0.000	0.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	1	1	0	0.000000000	0.000	0.000	0.000	0.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	1	2	0	0.000000000	0.000	0.000	0.000	0.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	2	1	0	0.000073000	0.000	0.400	0.600	4182.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	1	2	2	0	0.000112000	0.025	0.300	0.675	7196.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	2	0	1	0	0.000012000	0.030	0.590	0.380	1692.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	2	0	2	0	0.000030000	0.000	0.500	0.500	3247.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	3	0	1	0	0.000032000	0.030	0.320	0.650	5290.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	3	0	2	0	0.000004500	0.030	0.590	0.380	1300.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	5	0	1	0	0.001250000	0.006	0.414	0.580	56086.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	5	0	2	1	0.001850000	0.015	0.515	0.470	68602.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	1	5	0	2	2	0.000365000	0.000	0.525	0.475	12107.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	1	0	1	0	0.000011000	0.000	0.250	0.750	5.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	1	0	2	1	0.000013000	0.000	0.300	0.700	0.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	1	0	2	2	0.000039000	0.000	0.300	0.700	0.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	2	0	1	0	0.000094000	0.050	0.400	0.550	6479.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	2	0	2	1	0.000170000	0.050	0.450	0.500	8001.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	2	0	2	2	0.000051500	0.050	0.450	0.500	2133.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	3	0	1	0	0.000034000	0.000	0.200	0.800	4657.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	3	0	2	1	0.000071000	0.070	0.430	0.450	6872.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	3	0	2	2	0.000055000	0.000	0.400	0.600	2187.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	5	0	1	0	0.003290000	0.005	0.455	0.540	75695.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	5	0	2	1	0.006810000	0.005	0.505	0.490	92587.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	2	5	0	2	2	0.002400000	0.005	0.545	0.450	16339.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	1	0	2	1	0.000006500	0.000	0.300	0.700	0.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	1	0	2	2	0.000044000	0.000	0.550	0.450	771.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	2	0	1	0	0.000490000	0.015	0.385	0.600	26418.00	850.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	2	0	2	1	0.000950000	0.015	0.485	0.500	28446.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	2	0	2	2	0.000460000	0.000	0.430	0.570	9570.00	1600.00	0.00	0.00	38.00	-1.50	0.00	20
09	13	2	3	5	0	2	2	0.000000000	0.000	0.000	0.000	6.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	14	1	1	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	1	1	0	0.000072000	0.050	0.028	0.670	3651.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	1	2	1	0.000310000	0.005	0.320	0.675	16549.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	1	2	2	0.000210000	0.020	0.480	0.500	4137.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	2	1	0	0.000007600	0.000	0.620	0.380	182.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	2	2	1	0.000027500	0.000	0.330	0.670	876.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	2	2	2	0.000020500	0.000	0.425	0.575	155.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	3	1	0	0.000038500	0.000	0.740	0.260	64.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	3	2	1	0.000058500	0.010	0.365	0.625	324.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	2	3	2	2	0.000042000	0.050	0.545	0.405	36.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	1	1	0	0.000080000	0.000	0.560	0.440	7236.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	1	2	1	0.000220000	0.020	0.500	0.480	29629.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	1	2	2	0.000175000	0.052	0.508	0.440	8357.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	2	1	0	0.000000000	0.000	0.000	0.000	51.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	2	2	1	0.000017500	0.000	0.590	0.410	229.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	2	2	2	0.000015000	0.000	0.625	0.375	40.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	3	1	0	0.000009000	0.000	0.850	0.150	17.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	3	2	1	0.000012500	0.078	0.332	0.590	83.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	3	3	2	2	0.000010000	0.175	0.350	0.475	9.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	4	1	1	0	0.000125000	0.030	0.410	0.560	23570.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	4	1	2	1	0.000390000	0.000	0.395	0.605	100171.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	1	4	1	2	2	0.000460000	0.046	0.474	0.480	33391.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	1	3	1	0	0.000000000	0.000	0.000	0.000	16.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	1	3	2	1	0.000040000	0.080	0.180	0.740	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	1	1	0	0.000800000	0.000	0.535	0.465	4088.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	1	2	1	0.000290000	0.025	0.405	0.570	10871.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	1	2	2	0.000275000	0.018	0.452	0.530	3624.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	2	1	0	0.000008500	0.000	0.385	0.615	266.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	2	2	1	0.000023000	0.000	0.355	0.645	737.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	2	2	2	0.000021000	0.000	0.400	0.600	208.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	3	1	0	0.000030000	0.000	0.320	0.680	140.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	3	2	1	0.000042000	0.040	0.490	0.470	397.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	2	3	2	2	0.000040000	0.040	0.555	0.405	99.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	1	1	0	0.000175000	0.000	0.585	0.415	7705.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	1	2	1	0.000490000	0.035	0.338	0.627	20289.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	1	2	2	0.000485000	0.035	0.535	0.430	8695.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	2	1	0	0.000000000	0.000	0.000	0.000	140.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	2	2	1	0.000012500	0.000	0.225	0.775	436.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	2	2	2	0.000010500	0.000	0.385	0.615	123.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	3	1	0	0.000008500	0.000	0.400	0.600	18.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	3	2	1	0.000000000	0.000	0.000	0.000	54.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	3	3	2	2	0.000000000	0.000	0.000	0.000	14.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	4	1	1	0	0.000520000	0.008	0.442	0.550	43055.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	4	1	2	1	0.001150000	0.006	0.429	0.565	97181.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	2	4	1	2	2	0.001580000	0.020	0.495	0.485	64788.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	1	3	1	0	0.000000000	0.000	0.000	0.000	8.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	1	3	2	1	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	1	3	2	2	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	1	1	0	0.000075500	0.000	0.225	0.775	3651.00	375.00	0.00	200.00	32.00	-1.70	0.00	20

Hazard	Treatment	Rural/Urban	Area Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	14	1	3	2	1	2	1	0.000150000	0.008	0.452	0.540	4046.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	1	2	2	0.000145000	0.008	0.442	0.550	7515.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	2	1	0	0.000008000	0.000	0.900	0.100	279.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	2	2	1	0.000017500	0.000	0.710	0.290	529.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	2	2	2	0.000017500	0.000	0.705	0.295	353.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	3	1	0	0.000013500	0.000	0.720	0.280	56.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	3	2	1	0.000009500	0.000	0.265	0.735	133.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	2	3	2	2	0.000007500	0.000	0.250	0.750	44.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	1	1	0	0.000057500	0.000	0.110	0.890	2889.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	1	2	1	0.000085000	0.000	0.500	0.500	3948.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	1	2	2	0.000100000	0.000	0.400	0.600	9213.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	2	1	0	0.000000000	0.000	0.000	0.000	68.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	2	2	1	0.000000000	0.000	0.000	0.000	184.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	2	2	2	0.000000000	0.000	0.000	0.000	123.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	3	1	0	0.000000000	0.000	0.000	0.000	2.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	3	2	1	0.000000000	0.000	0.000	0.000	7.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	3	3	2	2	0.000000000	0.000	0.000	0.000	2.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	4	1	1	0	0.000125000	0.000	0.333	0.667	12123.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	4	1	2	1	0.000255000	0.006	0.384	0.610	13806.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	1	3	4	1	2	2	0.000400000	0.016	0.384	0.600	41419.00	375.00	0.00	200.00	32.00	-1.70	0.00	20
09	14	2	1	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	1	0	2	1	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	1	0	2	2	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	2	0	1	0	0.000073000	0.000	0.400	0.600	4182.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	2	0	2	1	0.000112000	0.025	0.300	0.675	7196.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	2	0	2	2	0.000012000	0.030	0.590	0.380	1692.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	3	0	1	0	0.000030000	0.000	0.500	0.500	3247.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	3	0	2	1	0.000032000	0.030	0.320	0.650	5290.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	3	0	2	2	0.000004500	0.030	0.590	0.380	1300.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	5	0	1	0	0.001250000	0.006	0.414	0.580	56086.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	5	0	2	1	0.001850000	0.015	0.515	0.470	68602.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	1	5	0	2	2	0.000365000	0.000	0.525	0.475	12107.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	1	0	1	0	0.000011000	0.000	0.250	0.750	5.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	1	0	2	1	0.000013000	0.000	0.300	0.700	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	1	0	2	2	0.000039000	0.000	0.300	0.700	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	2	0	1	0	0.000094000	0.050	0.400	0.550	6479.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	2	0	2	1	0.000170000	0.050	0.450	0.500	8001.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	2	0	2	2	0.000051500	0.000	0.600	0.400	2133.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	3	0	1	0	0.000034000	0.000	0.200	0.800	4667.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	3	0	2	1	0.000071000	0.070	0.480	0.450	6872.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	3	0	2	2	0.000055000	0.000	0.400	0.600	2107.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	5	0	1	0	0.003290000	0.005	0.455	0.540	75695.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	5	0	2	1	0.006810000	0.005	0.505	0.490	92587.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	2	5	0	2	2	0.002400000	0.005	0.545	0.450	16339.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	1	0	1	0	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	1	0	2	1	0.000006500	0.000	0.300	0.700	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	1	0	2	2	0.000000000	0.000	0.000	0.000	0.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	2	0	1	0	0.000028000	0.000	0.200	0.800	3015.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	2	0	2	1	0.000065000	0.000	0.500	0.500	3207.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	2	0	2	2	0.000034000	0.000	0.600	0.400	1508.00	375.00	0.00	500.00	32.00	-1.70	0.00	20

Hazard	Treatment	Rural/Urban	Area Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
09	14	2	3	3	0	1	0	0.000030000	0.000	0.300	0.700	941.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	3	0	2	1	0.000064000	0.000	0.350	0.650	1424.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	3	0	2	2	0.000044000	0.000	0.550	0.450	771.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	5	0	1	0	0.000490000	0.015	0.385	0.600	26418.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	5	0	2	1	0.000950000	0.015	0.485	0.500	28446.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
09	14	2	3	5	0	2	2	0.000460000	0.000	0.430	0.570	9570.00	375.00	0.00	500.00	32.00	-1.70	0.00	20
10	00	1	1	1	3	0	6	0.000080000	0.100	0.450	0.560	28.28	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	1	2	3	0	6	0.000250000	0.000	0.590	0.590	35.37	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	1	3	3	0	6	0.000050000	0.050	0.850	0.550	5.45	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	2	1	3	0	6	0.000095000	0.080	0.410	0.550	86.45	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	2	2	3	0	6	0.000100000	0.000	0.090	0.575	38.02	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	2	3	3	0	6	0.000000000	0.000	0.000	0.950	3.73	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	3	1	3	0	6	0.000032500	0.000	0.250	0.580	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	3	2	3	0	6	0.000030000	0.000	0.400	0.515	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0
10	00	1	3	3	3	0	6	0.000000000	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
10	15	1	1	1	3	0	3	0.000000000	0.000	0.000	0.000	0.00	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	1	1	3	0	4	0.000310000	0.030	0.360	0.610	41.51	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	1	2	3	0	3	0.000270000	0.020	0.330	0.650	19.77	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	1	2	3	0	4	0.000725000	0.035	0.335	0.630	95.67	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	1	3	3	0	3	0.000014000	0.020	0.330	0.650	1.51	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	1	3	3	0	4	0.000185000	0.000	0.225	0.775	11.37	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	2	1	3	0	3	0.000030000	0.040	0.330	0.630	0.00	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	2	1	3	0	4	0.000700000	0.100	0.420	0.480	79.46	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	2	2	3	0	3	0.000500000	0.036	0.349	0.615	28.76	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	2	2	3	0	4	0.001520000	0.000	0.385	0.615	156.49	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	2	3	3	0	3	0.000035000	0.000	0.250	0.750	3.94	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	2	3	3	0	4	0.000150000	0.000	0.410	0.590	11.93	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	3	1	3	0	3	0.000015000	0.000	0.150	0.850	18.71	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	3	1	3	0	4	0.000170000	0.000	0.180	0.820	23.86	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	3	2	3	0	3	0.000165000	0.015	0.315	0.670	21.40	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	3	2	3	0	4	0.000280000	0.000	0.590	0.410	25.31	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	15	1	3	3	3	0	3	0.000020000	0.010	0.320	0.670	2.38	105600.00	0.00	0.00	90.00	10.00	-10.00	20
10	15	1	3	3	3	0	4	0.000000000	0.000	0.000	0.000	1.76	105600.00	0.00	0.00	85.00	5.00	-25.00	20
10	16	1	1	1	3	0	3	0.000000000	0.000	0.000	0.000	0.00	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	1	1	3	0	4	0.000310000	0.030	0.360	0.610	41.51	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	1	1	3	0	5	0.000250000	0.060	0.380	0.560	55.07	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	1	2	3	0	3	0.000270000	0.020	0.330	0.650	19.77	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	1	2	3	0	4	0.000725000	0.035	0.335	0.630	95.67	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	1	2	3	0	5	0.000650000	0.085	0.325	0.590	98.55	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	1	3	3	0	3	0.000014000	0.020	0.330	0.650	1.51	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	1	3	3	0	4	0.000185000	0.000	0.225	0.775	11.37	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	1	3	3	0	5	0.000125000	0.300	0.150	0.550	25.43	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	2	1	3	0	3	0.000030000	0.040	0.330	0.630	0.00	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	2	1	3	0	4	0.000700000	0.100	0.420	0.480	79.46	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	2	1	3	0	5	0.000650000	0.050	0.400	0.550	144.31	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	2	2	3	0	3	0.000500000	0.036	0.349	0.615	28.76	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	2	2	3	0	4	0.001520000	0.000	0.385	0.615	156.49	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	2	2	3	0	5	0.000370000	0.041	0.384	0.575	150.58	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	2	3	3	0	3	0.000035000	0.000	0.250	0.750	3.94	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	2	3	3	0	4	0.000150000	0.000	0.410	0.590	11.93	79200.00	0.00	500.00	85.00	5.00	-30.00	15

Hazard	Treatment	Rural/Urban	Area	Road Type	Number of Lanes	Road Character.	Road Feature	Proportion of Total Accidents	Proportion of Fatalities	Proportion of Injuries	Proportion of PDO	Number of Hazards	Treatment Cost Per Hazard	Maint. Cost Per Hazard	Repair Cost Per Crash	Fatality Reduction %	Injury Reduction %	PDO Reduction %	Service Life
10	16	1	3	3	3	0	5	0.000025000	0.000	0.050	0.950	14.77	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	1	3	0	3	0.000015000	0.000	0.150	0.850	18.71	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	3	1	3	0	4	0.000170000	0.000	0.180	0.820	23.86	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	1	3	0	5	0.000270000	0.000	0.340	0.580	83.16	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	2	3	0	3	0.000165000	0.015	0.315	0.670	21.40	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	3	2	3	0	4	0.000280000	0.000	0.590	0.410	25.31	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	2	3	0	5	0.000450000	0.020	0.465	0.515	88.05	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	3	3	0	3	0.000020000	0.010	0.320	0.670	2.38	79200.00	0.00	500.00	75.00	2.00	-28.00	15
10	16	1	3	3	3	0	4	0.000000000	0.000	0.000	0.000	1.76	79200.00	0.00	500.00	85.00	5.00	-30.00	15
10	16	1	3	3	3	0	5	0.000020000	0.000	1.000	0.000	0.36	79200.00	0.00	500.00	85.00	5.00	-30.00	15

Table A-1. Coding values for identification codes entered on matrix input cards.

HAZARDS (Columns 1-2)

- Ø1 Bridge Ends
- Ø2 Bridge Rails
- Ø3 Guardrail End--Shoulder
- Ø4 Guardrail End--Median
- Ø5 Signs and Luminaires
- Ø6 Trees
- Ø7 Bridge Piers--Shoulder
- Ø8 Bridge Piers--Median
- Ø9 Utility Poles
- 1Ø Cross-median Accidents

TREATMENTS (Columns 4-5)

- Ø1 Bridge End Transition Guardrail
- Ø2 Bridge Rail--Improved
- Ø3 Guardrail Ends--BCT
- Ø4 Guardrail Ends--Texas Twist Treatment
- Ø5 Signs--Breakaway
- Ø6 Trees--Removal
- Ø7 Tree Removal (Stump Removed)
- Ø8 Bridge Piers--CMB plus Guardrail
- Ø9 Bridge Piers--Hidrocell Attenuator
- 1Ø Bridge Piers--Fitch Attenuator
- 11 Bridge Piers--Steel Barrel Attenuator
- 12 Utility Poles--Breakaway
- 13 Utility Poles--Removal
- 14 Utility Poles--Relocate
- 15 Cross-median Accidents--CMB
- 16 Cross-median Accidents--Double Face Guardrail

LOCATION (Column 7)

- 1 Rural
- 2 Urban

AREA (Column 9)

- 1 Coastal Plain (Divisions 1, 2, 3, 4, 6)
- 2 Piedmont (Divisions 5, 7, 8, 9, 10, 12)
- 3 Mountains (Divisions 11, 13, 14)

HIGHWAY TYPE (Column 11)

- Ø Not Subclassified
- 1 Interstate
- 2 U.S.
- 3 N.C.
- 4 S.R. (Secondary Road)
- 5 C.S. (City Street)

Table A-1. cont.

NUMBER OF LANES (Column 13)

Ø Not Subclassified
1 2-lane
2 4 or more-undivided
3 4 or more-divided

ROADWAY CHARACTER (Column 15)

Ø Not Subclassified
1 Intersection Location
2 Non-Intersection Location

ROADWAY FEATURE (Column 17)

Ø Not Subclassified
1 Tangent
2 Curve
3 1'-12' Median
4 13'-30' Median
5 31'-60' Median
6 60' Median

APPENDIX B

Program Listings

```
C***                                                                    BULT   0
    BUILTFL:  PROC OPTIONS(MAIN);                                       BULT  10
                                                                        BULT  20
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * */    BULT  30
        /* THIS PROGRAM BUILT THE MATRIX INPUT FILE                */    BULT  40
        /* THE FILE WHICH WILL BE UTILIZED BY                      */    BULT  50
        /*    THE ECONOMIC ANALYSIS PROGRAM                        */    BULT  60
        /* THREE DECKS OF CARDS ARE SORTED BY THE                  */    BULT  70
        /*    IDENTIFICATION CODES AND THE CARD NUMBER             */    BULT  80
        /*    IN THE FOLLOWING SEQUENCE                            */    BULT  90
        /*    (1) THE ACCIDENT INFORMATION CARDS                   */    BULT 100
        /*    (2) THE HAZARD INFORMATION CARDS, AND                */    BULT 110
        /*    (3) THE TREATMENT INFORMATION CARDS                  */    BULT 120
        /* THE PROGRAM CHECK FOR DUPLICATE CARDS,                  */    BULT 130
        /*    MISSING CARDS AS WELL AS UNACCEPTABLE                */    BULT 140
        /*    CHARACTERS                                           */    BULT 150
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * */    BULT 160
                                                                        BULT 170
            DCL 1 RECORD,                                               BULT 180
                  2 ID          CHAR(18),                               BULT 190
                  2 PROP        CHAR(30),                               BULT 200
                  2 #HAZ        CHAR(11),                               BULT 210
                  2 TRT$        CHAR(55),                               BULT 220
                1 REC,                                                  BULT 230
                  2 FILLER1     CHAR(79),                               BULT 240
                  2 CARD#       PIC '9',                                BULT 250
                1 REC1,                                                 BULT 260
                  2 ID1         CHAR(18),                               BULT 270
                  2 PROP1       CHAR(30),                               BULT 280
                  2 FILLER2     CHAR(32),                               BULT 290
                1 REC2,                                                 BULT 300
                  2 ID2         CHAR(18),                               BULT 310
                  2 #HAZ1       CHAR(11),                               BULT 320
                  2 FILLER3     CHAR(51),                               BULT 330
                1 REC3,                                                 BULT 340
                  2 ID3         CHAR(18),                               BULT 350
                  2 TRT$1       CHAR(55),                               BULT 360
                  2 FILLER4     CHAR(7),                                BULT 370
               DEFREC     CHAR(80) DEFINED REC,                        BULT 380
               DEFREC1    CHAR(80) DEFINED REC1,                       BULT 390
               DEFREC2    CHAR(80) DEFINED REC2,                       BULT 400
               DEFREC3    CHAR(80) DEFINED REC3,                       BULT 410
               N1  CHAR(11) INIT  (' 0123456789'),                      BULT 420
               N2  CHAR(12) INIT (' .0123456789'),                      BULT 430
               N3  CHAR(13) INIT(' -.0123456789'),                      BULT 440
               (#N,#R,#M) BIN FIXED (31),                               BULT 450
               INFILE FILE INPUT,                                       BULT 460
               MATRX FILE OUTPUT;                                       BULT 470
                                                                        BULT 480
            ON ENDFILE(INFILE) GO TO OUT_1;                             BULT 490
```

```
          #N,#R,#M=0;                                                    BULT 500
          REC1,REC2,REC3=' ';                                            BULT 510
                                                                         BULT 520
READIN:   READ FILE(INFILE) INTO (REC);                                  BULT 530
                                                                         BULT 540
          /* MOVE CARD 1 TO REC1,CARD 2 TO REC2,CARD 3 TO REC3 */        BULT 550
          IF CARD# = 1 THEN DEFREC1=DEFREC;                              BULT 560
          IF CARD# = 2 THEN DEFREC2=DEFREC;                              BULT 570
          IF CARD# = 3 THEN DEFREC3=DEFREC;                              BULT 580
                                                                         BULT 590
          #M=#M+1;              /* NO. OF INPUT CARDS */                 BULT 600
          #N=#N+1;              /* SET UP 3 CARDS FOR CHECKING */        BULT 610
          IF #N ¬= 3 THEN GO TO READIN;                                  BULT 620
                                                                         BULT 630
          /* MATCH REC1, REC2 AND REC3 IDENTIFICATION */                 BULT 640
          IF ID1 =  ID2   & ID2 = ID3 THEN DO;                           BULT 650
                                                                         BULT 660
              /* MOVE REC1, REC2 AND REC3 DATA TO MATRIX */              BULT 670
              ID=ID1;                                                    BULT 680
              PROP=PROP1;                                                BULT 690
              #HAZ=#HAZ1;                                                BULT 700
              TRT$=TRT$1;                                                BULT 710
                                                                         BULT 720
              /* CHECK FOR ILLEGAL CHARACTERS */                         BULT 730
              IF VERIFY (ID    ,N1) ¬= 0 THEN GO TO OUT_3;               BULT 740
              IF VERIFY (PROP  ,N2) ¬= 0 THEN GO TO OUT_3;               BULT 750
              IF VERIFY (#HAZ  ,N3) ¬= 0 THEN GO TO OUT_3;               BULT 760
              IF VERIFY (TRT$  ,N3) ¬= 0 THEN GO TO OUT_3;               BULT 770
                                                                         BULT 780
              /* WRITE MATRIX ROW TO FILE */                             BULT 790
              WRITE FILE(MATRX)  FROM(RECORD);                           BULT 800
              PUT EDIT (ID,PROP,#HAZ,TRT$)                               BULT 810
                  (COL(1),(4) A);                                        BULT 820
              #N=0;                                                      BULT 830
              REC1,REC2,REC3=' ';                                        BULT 840
              #R=#R+1;          /* NO. OF MATRIX ROWS */                 BULT 850
              GO TO READIN;                                              BULT 860
          END;                                                           BULT 870
                                                                         BULT 880
          ELSE DO;                                                       BULT 890
              /* ERROR MESSAGES */                                       BULT 900
OUT_3:        PUT SKIP;                                                  BULT 910
              PUT SKIP(1) LIST ('ERROR IN THE INPUT CARDS ');            BULT 920
              PUT SKIP(1) LIST ('THE MATRIX FILE WAS NOT BUILT');        BULT 930
              PUT SKIP(1) EDIT ('PLEASE CORRECT THE MISTAKES ',          BULT 940
                  ' AND RUN THE JOB AGAIN') (COL(1),(2) A);              BULT 950
              PUT SKIP(1) EDIT ('THE FOLLOWING IDENTIFICATION',          BULT 960
                  ' CODE HAS DUPLICATE OR MISSING CARDS OR ',            BULT 970
                  'HAS AN UNACCEPTABLE CHARACTER')                       BULT 980
                  (COL(1),(3) A);                                        BULT 990
```

```
            PUT EDIT (ID1,PROP1,FILLER2)                                    BULT1000
                (COL(1),(3) A);                                             BULT1010
            PUT EDIT (ID2,#HAZ1,FILLER3)                                    BULT1020
                (COL(1),(3) A);                                             BULT1030
            PUT EDIT (ID3,TRT$1,FILLER4)                                    BULT1040
                (COL(1),(3) A);                                             BULT1050
            GO TO OUT_2;                                                    BULT1060
        END;                                                                BULT1070
                                                                            BULT1080
        /* MATRIC FILE WAS BUILT */                                         BULT1090
OUT_1:  PUT SKIP(2) EDIT('CONGRATULATIONS, THE MATRIX WAS BUILT ',          BULT1100
            'SUCCESSFULLY') (COL(1),(2) A);                                 BULT1110
        PUT SKIP(2) EDIT ('TOTAL NUMBER OF MATRIX ROWS = ',#R)              BULT1120
            (COL(1),A,F(4));                                                BULT1130
                                                                            BULT1140
OUT_2:  PUT SKIP(2) EDIT ('TOTAL NUMBER OF INPUT CARDS = ',#M)              BULT1150
            (COL(1),A,F(4));                                                BULT1160
                                                                            BULT1170
        END BUILTFL;                                                        BULT1180
```

```
HAZARD: PROC OPTIONS (MAIN);                                          00000050
      /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00000060
      /* THIS PROGRAM PRODUCES ECONOMIC ANALYSIS TABLES.              */ 00000070
      /* VARIABLES ARE SEPARATED BY AT LEAST 1 SPACE.                */ 00000080
      /* THERE ARE TWO TYPES OF INPUT CARDS.                         */ 00000090
      /* CARD# -- 1                                                  */ 00000100
      /* ANNR  -- ANNUAL INTEREST RATE (10% = 0.1)                    */00000110
      /* STRY  -- YEAR TREATMENT IS IMPLEMENTED                      */ 00000120
      /* ACC   -- NO. OF PREDICTED ACCIDENTS IN START YEAR           */ 00000130
      /* GWTH  -- RATE OF TRAFFIC GROWTH (5% = 1.05)                 */ 00000140
      /* INFF  -- INFLATION FACTOR (4% = 1.04)                       */ 00000150
      /* CARD# -- 2                                                  */ 00000160
      /* HAZ   -- HAZARD CODES (1-10), 99 - FOR ALL HAZARDS        */  00000170
      /*          IF CHANGES OCCUR PLEASE MODIFY CARDS CODED 'H'     */ 00000180
      /* TRTMT -- TREATMENT CODES (0-16), 99 - FOR ALL TREATMENTS    */ 00000190
      /*          IF CHANGES OCCUR PLEASE MODIFY CARDS CODED 'T'     */ 00000200
      /* CODES -- 'ALL' - SELECT ALL THE CORRESPONDING HAZARDS       */ 00000210
      /*                  AND TREATMENTS MATRIX ROWS                 */ 00000220
      /*          'SUM' - COMBINE ALL THE SELECTED HAZARDS AND       */ 00000230
      /*                  TREATMENTS MATRIX ROWS                     */ 00000240
      /*      (1) 'L(SUM A( 2,3)H(1, 2,4,5)#(2 )  I(SUM)F(3,6,4)'    */ 00000250
      /*      (2) 'A(SUM)L(SUM)H(SUM)#(SUM)I(SUM) F(1)'              */ 00000260
      /*      (3) ' #(2 ) L (  2)  F( 6 ) A ( 3) I (0) H(5)'         */ 00000270
      /*          (1) (2) & (3) ARE EXAMPLES OF REQUESTS TO          */ 00000280
      /*          COMBINE MATRIX ROWS OR TO SELECT ONE MATRIX ROW    */ 00000290
      /*          L - LOCATION       (1-2)                           */ 00000300
      /*          A - AREA           (1-3)                           */ 00000310
      /*          H - HIGHWAY TYPE   (0-5)                           */ 00000320
      /*          # - # OF LANE      (0-3)                           */ 00000330
      /*          I - ROAD CHARACTER (0-2)                           */ 00000340
      /*          F - ROAD FEATURE   (0-7)                           */ 00000350
      /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00000360
                                                                      00000370
/* H */ DCL (TITLEA (10)  CHAR(25) VAR INIT(  /* TITLE FOR HAZARD */  00000380
          'BRIDGE ENDS',                                              00000390
          'BRIDGE RAILS',                                             00000400
          'GUARDRAIL END - SHOULDER',                                 00000410
          'GUARDRAIL END - MEDIAN',                                   00000420
          'SIGNS AND LUMINAIRES',                                     00000430
          'TREES',                                                    00000440
          'BRIDGE PIERS - SHOULDER',                                  00000450
          'BRIDGE PIERS - MEDIAN',                                    00000460
          'UTILITY POLES',                                            00000470
          'CROSS MEDIAN ACCIDENTS'),                                  00000480
/* H */       /* ADD NEW HAZARD TITLE HERE */                       00000490
                                                                      00000500
                          /* TITLE FOR TREATMENT */                   00000510
/* T */       TITLEB (0:16)  CHAR(35) VAR INIT(                       00000520
          '    ',          /* BLANKS FOR NO TREATMENT */             00000530
          'BRIDGE END TRANSITION GUARDRAIL',                          00000540
```

```
            'BRIDGE RAIL IMPROVED',                                          00000550
            'GUARDRAIL ENDS - BCT',                                          00000560
            'GUARDRAIL END - TEXAS TWIST TRTMENT',                           00000570
            'SIGNS - BREAKAWAY',                                             00000580
            'TREES - REMOVAL',                                               00000590
            'TREES - (STUMP REMOVED)',                                       00000600
            'BRIDGE PIERS - CMB AND GUARDRAIL',                              00000610
            'BRIDGE PIERS - HYDROCELL ATTENUATOR',                           00000620
            'BRIDGE PIERS - FITCH ATTENUATORS',                              00000630
            'BRIDGE PIERS - STEEL BARREL ATTNTS.',                           00000640
            'UTILITY POLES - BREAKAWAY',                                     00000650
            'UTILITY POLES - REMOVAL',                                       00000660
            'UTILITY POLES - RELOCATE',                                      00000670
            'CROSSMEDIAN ACCIDENTS - CMB',                                   00000680
            'CROSSMEDIAN ACC. -DOUBLE FACE GDRL.'),                          00000690
/* T */     /* ADD NEW TREATMENT TITLE HERE */                               00000700
                                                                             00000710
            LOCAT (2)  CHAR(8) INIT(       /* TITLE FOR LOCATION */          00000720
            'RURAL   ',                                                      00000730
            'URBAN   '),                                                     00000740
                                                                             00000750
            AREA# (3)  CHAR(10)INIT(       /* TITLE FOR AREA */              00000760
            'AREA(1)   ',                                                    00000770
            'AREA(2)   ',                                                    00000780
            'AREA(3)   '),                                                   00000790
                                                                             00000800
            HGHWY (0:5) CHAR(13) INIT(     /* TITLE FOR HIGHWAY */           00000810
            '            ',                                                  00000820
            'INTERSTATE  ',                                                  00000830
            'U.S.        ',                                                  00000840
            'N.C.        ',                                                  00000850
            'S.R.        ',                                                  00000860
            'C.S.        '),                                                 00000870
                                                                             00000880
            LANE (0:3) CHAR(10) INIT(      /* TITLE FOR # OF LANE */        00000890
            '          ',                                                    00000900
            '2-LANE    ',                                                    00000910
            '4-UNDIV   ',                                                    00000920
            '4-DIV     '),                                                   00000930
                                                                             00000940
            ROAD (0:2) CHAR(19)  INIT(     /* TITLE FOR ROAD CHAR */        00000950
            '                  ',                                            00000960
            'INTERSECTION      ',                                            00000970
            'NON-INTERSECTION  '),                                           00000980
                                                                             00000990
            FEATURE  (0:7) CHAR(15) INIT( /* TITLE FOR RD FEATURE */        00001000
            '               ',                                               00001010
            'TANGENT        ',                                               00001020
            'CURVE          ',                                               00001030
            '1-12 MEDIAN    ',                                               00001040
```

```
          '13-30 MEDIAN    ',                                          00001050
          '31-60 MEDIAN    ',                                          00001060
          '60 +   MEDIAN   '),                                         00001070
          TITLEC CHAR(100) VAR);                                       00001080
                                                                       00001090
        DCL (                                                          00001100
          (BFAT,BINJ,BPDO,AFAT,AINJ,APDO,RFAT,RINJ,RPDO)               00001110
          FLOAT (16),                                                  00001120
          (PWF,IMP$,TRT$,#HAZ,MAINT$,MT$,FAT$,INJ$,PDO$,INFF,          00001130
          ANNR,REPCT$,REP$,AVB$,PWB$,PWCT$,PWNCF$,CRFC,                00001140
          CB,CPWB,CPWCT,AC,BC) FLOAT (16),                             00001150
          ERR BIN FIXED,                                               00001160
          EOF_MAT  BIT(1),                                             00001170
          NUMBER CHAR(10) INIT ('0123456789'),                         00001180
          NUM    CHAR(2)  INIT ('12'),                                 00001190
          CARD# PIC '9',                                               00001200
          CCARD# CHAR (1) DEFINED  CARD#,                              00001210
          HAZ          PIC '99',                                       00001220
          CHAZ   CHAR (2) DEFINED  HAZ,                                00001230
          TRTMT        PIC '99',                                       00001240
          CTRTMT CHAR (2) DEFINED  TRTMT,                              00001250
          CODES CHAR(80) VAR,                                          00001260
          (SUMRFAT,SUMRINJ,SUMRPDO) FLOAT (16),                        00001270
          (HAZD,TRMT)          PIC '99',                               00001280
          (LO,AR,HWY,LA,RD,FT)   PIC '9',                              00001290
          (FARF,INRF,PDRF) FLOAT(16),                                  00001300
/* H,T */ X(22,2) BIN FIXED(15) INIT(1,1, 2,2, 3,3, 3,4, 4,3,          00001310
                4,4, 5,5, 6,6, 6,7, 7,8, 7,9, 7,10, 7,11,              00001320
                8,8, 8,9, 8,10, 8,11, 9,12, 9,13, 9,14,                00001330
                10,15, 10,16),                                         00001340
          (STYR,#ACC,ACCP,ACC,SVL,ACCFAT,ACCINJ,ACCPDO,GWTH,CPIFAT,    00001350
          FATRF,INJRF,PDORF) FLOAT (16)                                00001360
         );                                                            00001370
                                                                       00001380
        DCL (                                                          00001390
          MATRX FILE INPUT,                                            00001400
          OUTFL FILE OUTPUT,                                           00001410
          NAME1  CHAR(27),                                             00001420
          TITLES CHAR(35) VAR,                                         00001430
          #N             BIN FIXED (31) INIT (0),                      00001440
          #C             BIN FIXED (31) INIT (0),                      00001450
          1 REC,                                                       00001460
            2 HD         PIC '99',                                     00001470
            2 TR         PIC '99',                                     00001480
            2 TITLE_A    CHAR(25),                                     00001490
            2 TITLE_B    CHAR(35),                                     00001500
            2 TITLE_C    CHAR(100),                                    00001510
            2 AC_R       PIC 'S(11)9',                                 00001520
            2 BC_R       PIC 'S(6)9V(6)9',                             00001530
            2 IMP$_R     PIC '(9)9',                                   00001540
```

```
          AC_NUM DEFINED REC POSITION(166) PIC '(11)9',                 00001550
          BC_NUM DEFINED REC POSITION(178) PIC '(6)9V(6)9'              00001560
         );                                                             00001570
                                                                        00001580
       ON ERROR BEGIN;                                                  00001590
              IF ONCODE > 79 & ONCODE < 90 THEN DO;                     00001591
                  PUT SKIP LIST                                         00001592
                   ('*** CANNOT OPEN ONE OF THE FILES ***');            00001593
                  GO TO FINI;                                           00001594
                  END;                                                  00001595
              PUT SKIP LIST('SOMETHING AWRY WITH INPUT CARDS');         00001600
              PUT SKIP DATA(CARD#,ANNR,STYR,ACC,GWTH,INFF);             00001610
              PUT SKIP DATA(HAZ,TRTMT,CODES);                           00001620
              GO TO CHECK_C;                                            00001630
              END;                                                      00001640
                                                                        00001650
       ON ENDFILE(SYSIN) GO TO OUT_GOOD;                                00001660
       ON ENDFILE(MATRX) BEGIN;                                         00001670
         EOF_MAT = '1'B;                                                00001680
         END;                                                           00001690
                                                                        00001700
          OPEN FILE(MATRX);                                             00001710
          ANNR,STYR,ACC,GWTH,INFF=0;                                    00001720
                                                                        00001730
CHECK_C:  GET LIST (CARD#);                                             00001740
          EOF_MAT = '0'B;                                               00001750
                                                                        00001760
          /* CHECK CARD NO. */                                          00001770
          IF VERIFY (CCARD#,NUM) ¬= 0 THEN DO;                          00001780
               PUT PAGE LIST ('PLEASE CHECK YOUR INPUT CARDS');         00001790
               PUT SKIP(3) LIST ('CARD NUMBER = ',CARD#);               00001800
               GO TO  OUT_GOOD;                                         00001810
               END;                                                     00001820
                                                                        00001830
          IF CARD# = 1 THEN DO;                                         00001840
              GET LIST (ANNR,STYR,ACC,GWTH,INFF);                       00001850
              GO TO CHECK_C;                                            00001860
              END;                                                      00001870
                                                                        00001880
          IF CARD# = 2 THEN                                             00001890
CARD2:    DO;                                                           00001900
            GET LIST (HAZ,TRTMT,CODES);                                 00001910
            #C = #C + 1;       /* NO. OF REQUESTS */                    00001920
                                                                        00001930
            /* CHECK FOR START YEAR, TRMT CODE  AND HAZARD CODE */      00001940
            IF STYR < 1976 THEN GO TO MESSAGE;                          00001950
            IF VERIFY  (CTRTMT,NUMBER) ¬= 0 THEN GO TO MESSAGE;         00001960
            IF VERIFY (CHAZ, NUMBER) ¬= 0 THEN GO TO MESSAGE;           00001970
            IF HAZ = 99 & TRTMT ¬= 99 THEN GO TO MESSAGE;               00001980
            IF HAZ ¬= 99 & TRTMT = 99 & CODES ¬= 'ALL' THEN             00001990
                     GO TO MESSAGE;                                     00002000
                                                                        00002010
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00002020
     /* SELECT  ALL THE HAZARDS AND THEIR CORRESPONDING               */ 00002030
     /* TREATMENTS AND PRODUCE TABLES                                 */ 00002040
```

```
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00002050
                                                                            00002060
           IF HAZ = 99 & TRTMT= 99 & CODES = 'ALL' THEN DO;                 00002070
             CLOSE FILE(MATRX);                                             00002080
             OPEN FILE(MATRX);                                              00002090
READ_1:      GET FILE(MATRX) LIST      /* GET MATRIX ROW */                 00002100
                 (HAZD,TRMT,LO,AR,HWY,LA,RD,FT,ACCP,ACCFAT,                 00002110
                 ACCINJ,ACCPDO,#HAZ,TRT$,MT$,REP$,FATRF,INJRF,              00002120
                 PDORF,SVL);                                                00002130
             IF EOF_MAT THEN GO TO CHECK_C;  /* CHECK ENDFILE */            00002140
             TITLEC = LOCAT(LO) || AREA#(AR) || HGHWY(HWY) ||               00002150
                 LANE(LA) || ROAD(RD) || FEATURE(FT);                       00002160
             PUT PAGE;                                                      00002170
             CALL TABLES;                                                   00002180
             GO TO READ_1;                                                  00002190
             END;                                                           00002200
                                                                            00002210
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00002220
     /* SELECT A PARTICULAR HAZARD AND A PARTICULAR TREATMENT             */ 00002230
     /* AND PRODUCE TABLES                                                */ 00002240
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00002250
                                                                            00002260
           IF HAZ ¬= 99 & TRTMT ¬= 99 & CODES = 'ALL' THEN DO;              00002270
             CLOSE FILE(MATRX);                                             00002280
             OPEN FILE (MATRX);                                             00002290
READ_2:      GET FILE(MATRX) LIST      /* GET MATRIX ROW */                 00002300
                 (HAZD,TRMT,LO,AR,HWY,LA,RD,FT,ACCP,ACCFAT,                 00002310
                 ACCINJ,ACCPDO,#HAZ,TRT$,MT$,REP$,FATRF,INJRF,              00002320
                 PDORF,SVL);                                                00002330
             IF EOF_MAT THEN GO TO CHECK_C;   /* CHECK ENDFILE */           00002340
             IF HAZ = HAZD & TRTMT = TRMT THEN DO;                          00002350
                TITLEC=LOCAT(LO) || AREA#(AR) || HGHWY(HWY) ||              00002360
                 LANE(LA) || ROAD(RD) || FEATURE(FT);                       00002370
                PUT PAGE;                                                   00002380
                CALL TABLES;                                                00002390
                END;                                                        00002400
             IF HAZD > HAZ THEN GOTO CHECK_C;                               00002410
             GO TO READ_2;                                                  00002420
             END;                                                           00002430
                                                                            00002440
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00002450
     /* SELECT A PARTICULAR HAZARD AND PRODUCE TABLES                     */ 00002460
     /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */ 00002470
                                                                            00002480
           IF HAZ ¬= 99 & TRTMT = 99 & CODES = 'ALL' THEN DO;               00002490
                CLOSE FILE(MATRX);                                          00002500
                OPEN FILE (MATRX);                                          00002510
READ_3:         GET FILE(MATRX) LIST   /* GET MATRIX ROW */                 00002520
                      (HAZD,TRMT,LO,AR,HWY,LA,RD,FT,ACCP,ACCFAT,            00002530
                      ACCINJ,ACCPDO,#HAZ,TRT$,MT$,REP$,FATRF,               00002540
```

```
                    INJRF,PDORF,SVL);                                    00002550
                  IF EOF_MAT THEN GO TO CHECK_C; /* CHECK ENDFILE */     00002560
                  IF HAZ = HAZD THEN DO;                                 00002570
                    TITLEC=LOCAT(LO) || AREA#(AR) || HGHWY(HWY) ||       00002580
                        LANE(LA) || ROAD(RD) || FEATURE(FT);             00002590
                    PUT PAGE;                                            00002600
                    CALL TABLES;                                         00002610
                    END;                                                 00002620
                  IF HAZD > HAZ THEN GO TO CHECK_C;                      00002630
                  GO TO READ_3;                                          00002640
                  END;                                                   00002650
                                                                         00002660
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00002670
        /* SELECT   ALL THE HAZARDS AND THEIR CORRESPONDING             */ 00002680
        /* TREATMENTS AND PRODUCE  COMBINED TABLES                      */ 00002690
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00002700
                                                                         00002710
              IF HAZ = 99 & TRTMT = 99 & CODES ¬= 'ALL' THEN DO;         00002720
/* H,T */         DO II = 1 TO 22;                                       00002730
                    HAZ = X(II,1);                                       00002740
                    TRTMT = X(II,2);                                     00002750
                    HAZD = HAZ;                                          00002760
                    TRMT = TRTMT;                                        00002770
                    CALL COMBINE (HAZ,TRTMT,CODES);                      00002780
                    IF ERR  = 0 THEN CALL TABLES;                        00002790
                    END;                                                 00002800
                  GO TO CHECK_C;                                         00002810
                  END;                                                   00002820
                                                                         00002830
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00002840
        /* SELECT A PARTICULAR HAZARD AND A PARTICULAR TREATMENT        */ 00002850
        /* AND PRODUCE COMBINED TABLES                                  */ 00002860
        /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00002870
                                                                         00002880
              IF HAZ ¬= 99 & TRTMT ¬= 99 & CODES ¬= 'ALL' THEN DO;       00002890
                   HAZD = HAZ;                                           00002900
                   TRMT = TRTMT;                                         00002910
                   CALL COMBINE (HAZ,TRTMT,CODES);                       00002920
                   IF ERR = 0 THEN CALL TABLES;                          00002930
                   GO TO CHECK_C;                                        00002940
                   END;                                                  00002950
                                                                         00002960
            END CARD2;                                                   00002970
                                                                         00002980
                /* ERROR MESSAGES */                                     00002990
   MESSAGE:     PUT PAGE LIST ('ERROR IN THE INPUT CARD');               00003000
                PUT SKIP(3) DATA (ANNR,STYR,ACC,GWTH,INFF);              00003010
                PUT SKIP(3) DATA (CARD#,HAZ,TRTMT,CODES);                00003020
                GO TO CHECK_C;                                           00003030
                                                                         00003040
```

```
OUT_GOOD: PUT PAGE LIST ('NUMBER OF TABLES = ',#N);                    00003050
          PUT SKIP(3) LIST ('NUMBER OF REQUESTS = ',#C);               00003060
          CLOSE FILE(OUTFL);                                           00003070
                                                                       00003080
          NAME1=' SORT FIELDS=(165,12,CH,A) ';                         00003090
          TITLES='RANKING BY ANNUAL BENEFITS (NDPV)';                  00003100
          CALL SUMTAB(TITLES,NAME1);                                   00003110
                                                                       00003120
          NAME1=' SORT FIELDS=(177,13,CH,A) ';                         00003130
          TITLES='RANKING BY BENEFIT / COST RATIO';                    00003140
          CALL SUMTAB(TITLES,NAME1);                                   00003150
                                                                       00003160
1       /* ..................... SUBROUTINE  ..................... */ 00003170
                                                                       00003180
TABLES:   PROC;                                                        00003190
          /* * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00003200
          /* THIS SUBROUTINE CALCULATE AND PRINT TWO TABLES       */  00003210
          /*         (1) ACCIDENT REDUCTION TABLE, AND            */  00003220
          /*         (2) ECONOMIC ANALYSIS TABLE                  */  00003230
          /* * * * * * * * * * * * * * * * * * * * * * * * * * * *  */ 00003240
                                                                       00003250
               /* * * * * * * * * * * * * * * * */                     00003260
TABLEA:        /* ACCIDENT REDUCTION TABLE (A) */                      00003270
               /* * * * * * * * * * * * * * * * */                     00003280
                                                                       00003290
          /* CHECKING FOR ZERODIVIDE ETC. */                           00003300
          ON ZERODIVIDE GO TO END_2;                                   00003310
          IF TRMT = 0 THEN GO TO END_0;                                00003320
          IF #HAZ < 0 THEN GO TO END_1;                                00003330
          IF #HAZ = 0 THEN GO TO END_2;                                00003340
          IF ACCP = 0 THEN GO TO END_2;                                00003350
                                                                       00003360
               /* TITLE HEADING FOR TABLE (A) */                       00003370
          PUT SKIP(2) EDIT ('ACCIDENT REDUCTION TABLE (A)')            00003380
              (COL(46),A);                                             00003390
          PUT SKIP(2) EDIT ('PREDICTED ACCIDENTS = ',ACC,              00003400
              'STARTING YEAR : ',STYR,                                 00003410
              '% FAT. REDUCED = ',ROUND(FATRF,2))                      00003420
              (COL(7),A,F(6,0),COL(49),A,F(4),                         00003430
              COL(87),A,P'---9V.99');                                  00003440
          PUT SKIP(1) EDIT ('TRAFFIC GROWTH RATE = ',GWTH,             00003450
              '% INJ. REDUCED = ',ROUND(INJRF,2))                      00003460
              (COL(7),A,F(6,4),                                        00003470
              COL(87),A,P'---9V.99');                                  00003480
          PUT SKIP(1) EDIT ('INFLATION FACTOR    = ',INFF,             00003490
              '% PDO  REDUCED = ',ROUND(PDORF,2))                      00003500
              (COL(7),A,F(6,4),                                        00003510
              COL(87),A,P'---9V.99');                                  00003520
          PUT SKIP(2) EDIT ('(',HAZD,TRMT,')',TITLEA(HAZD),            00003530
              TITLEB(TRMT))                                            00003540
```

```
        (COL(7),A,P'99',X(1),P'99',A,COL(21),A,COL(66),A);      00003550
      PUT SKIP(2) EDIT (TITLEC)                                 00003560
        (COL(21),A);                                            00003570
      PUT SKIP(4) EDIT ('YEAR',                                 00003580
        'NUMBER OF UNTREATED ACCIDENTS',                        00003590
        'NUMBER OF TREATED ACCIDENTS',                          00003600
        'NUMBER OF ACCIDENTS REDUCED') (COL(7),A,               00003610
         COL(15),A,COL(50),A,COL(84),A);                        00003620
      PUT SKIP(2) EDIT  ('FATAL','INJURY','PDO',                00003630
        'FATAL','INJURY','PDO','FATAL','INJURY','PDO')          00003640
        (COL(16),A,COL(26),A,COL(40),A,                         00003650
        COL(50),A,COL(60),A,COL(74),A,COL(84),A,                00003660
        COL(94),A,COL(108),A);                                  00003670
      PUT SKIP (4);                                             00003680
                                                                00003690
      BFAT,BINJ,BPDO,AFAT,AINJ,APDO,RFAT,RINJ,RPDO=0;           00003700
      SUMRFAT, SUMRINJ, SUMRPDO=0;                              00003710
                                                                00003720
      #ACC  = (ACCP * ACC);  /*  NUMBER OF ACCIDIENTS  */       00003730
                                                                00003740
      /* ACCIDENT REDUCTION FACTORS */                          00003750
      FARF  = (1 - FATRF/100);                                  00003760
      INRF  = (1 - INJRF/100);                                  00003770
      PDRF  = (1 - PDORF/100);                                  00003780
                                                                00003790
ACC_CNT: DO I  = 0 TO SVL;                                      00003800
         IF I = 0 THEN DO;                                      00003810
            BFAT= (ACCFAT * #ACC);                              00003820
            BINJ = (ACCINJ * #ACC);                             00003830
            BPDO = (ACCPDO * #ACC);                             00003840
            GO TO PRT;                                          00003850
            END;                                                00003860
                                                                00003870
         /* NUMBER OF UNTREATED ACCIDENTS  */                   00003880
         BFAT =  BFAT * (GWTH ) ;                               00003890
         BINJ =  BINJ * (GWTH ) ;                               00003900
         BPDO =  BPDO * (GWTH ) ;                               00003910
                                                                00003920
         /* NUMBER OF TREATED ACCIDENTS */                      00003930
         AFAT = BFAT * FARF ;                                   00003940
         AINJ = BINJ * INRF ;                                   00003950
         APDO = BPDO * PDRF ;                                   00003960
                                                                00003970
         /* NUMBER OF ACCIDENTS REDUCED */                      00003980
         RFAT = BFAT - AFAT;                                    00003990
         RINJ = BINJ - AINJ;                                    00004000
         RPDO = BPDO - APDO;                                    00004010
                                                                00004020
         /* TOTAL NUMBER OF ACCIDENTS REDUCED */                00004030
         SUMRFAT = SUMRFAT + RFAT ;                             00004040
```

```
            SUMRINJ = SUMRINJ + RINJ ;                                    00004050
            SUMRPDO = SUMRPDO + RPDO ;                                    00004060
                                                                          00004070
            /* PRINT ACCIDENT REDUCTION TABLE */                          00004080
PRT:        PUT SKIP(1) EDIT (I,ROUND(BFAT,2),ROUND(BINJ,2),              00004090
               ROUND(BPDO,2),ROUND(AFAT,2),ROUND(AINJ,2),                 00004100
               ROUND(APDO,2),ROUND(RFAT,2),ROUND(RINJ,2),                 00004110
               ROUND(RPDO,2))                                             00004120
               (COL(7),F(2),X(3),(3) ((3) (F(9,2),X(2)),X(1)));           00004130
         END ACC_CNT;                                                     00004140
                                                                          00004150
            /* PRINT TOTAL ACCIDENT REDUCTION */                          00004160
            PUT SKIP(1) EDIT ( (32) '-') (COL(79),A);                     00004170
            PUT SKIP(1) EDIT ('TOTAL :',ROUND(SUMRFAT,2),                 00004180
                ROUND(SUMRINJ,2),ROUND(SUMRPDO,2))                        00004190
                (COL(70),A,COL(80),(3) (F(9,2),X(2)));                    00004200
                                                                          00004210
              /* * * * * * * * * * * * * * * * * */                      00004220
TABLEB:       /* ECONOMIC ANALYSIS TABLE (B) */                           00004230
              /* * * * * * * * * * * * * * * * * */                      00004240
                                                                          00004250
         /* TITLE HEADING FOR TABLE (B) */                                00004260
         PUT PAGE;                                                        00004270
         PUT SKIP(1) EDIT ('ECONOMIC ANALYSIS TABLE (B)')                 00004280
             (COL(46),A);                                                 00004290
         PUT SKIP(2) EDIT ('NUMBER OF HAZARDS = ',ROUND(#HAZ,2),          00004300
             'STARTING YEAR : ',STYR)                                     00004310
             (COL(6),A,P'ZZZZZZ9V.99',COL(49),A,F(4));                    00004320
         PUT SKIP(3) EDIT ('(',HAZD,TRMT,')',TITLEA(HAZD),                00004330
             TITLEB(TRMT))                                                00004340
             (COL(6),A,P'99',X(1),P'99',A,COL(21),A,COL(66),A);           00004350
         PUT SKIP(2) EDIT (TITLEC)                                        00004360
             (COL(21),A);                                                 00004370
         PUT SKIP(3) EDIT ('YEAR','TREATMENT','ANNUAL',                   00004380
             'ANNUAL','ACCIDENT','PWORTH',' PWORTH OF',                   00004390
             'PWORTH OF','PWORTH OF','CUMULATIVE')                        00004400
             (COL(6),(10) (A,X(3)));                                      00004410
         PUT SKIP(1) EDIT ('COST','MAINT','REPAIR',                       00004420
             'BENEFITS','FACTOR',' BENEFITS','COSTS',                     00004430
             'NET CASH','BALANCE')                                        00004440
             (COL(16),A,X(5),A,X(4),(3) (A,X(3)),X(1),                    00004450
             A,X(6),A,X(5),A,X(4),A);                                     00004460
         PUT SKIP(1) EDIT ('COST','COST','FLOW')                          00004470
             (COL(26),A,COL(35),A,COL(91),A);                             00004480
         PUT SKIP(1) EDIT ('($)','($)','($)','($)','@',                  00004490
             ANNR,'($)','($)','($)','($)')                                00004500
             (COL(16),A,COL(26),A,COL(35),A,COL(45),A,                    00004510
             COL(55),A,F(3,2),COL(67),A,COL(79),A,                        00004520
             COL(91),A,COL(103),A);                                       00004530
         PUT SKIP(3);                                                     00004540
```

```
                                                                    00004550
        CB,CPWB,CPWCT=0;                                            00004560
        PWF = 1.0;                  /* PWORTH FACTOR */             00004570
        IMP$ = TRT$ * #HAZ;         /* TREATMENT COST */            00004580
        IMP$_R = IMP$;                                              00004590
                                                                    00004600
             /* ADJUSTED CPIFAT  */                                 00004610
        IF INFF = 1.0 THEN DO;                                      00004620
           CPIFAT = 1.0;                                            00004630
           GO TO CAL;                                               00004640
           END;                                                     00004650
                                                                    00004660
        IF STYR < 1982 THEN CPIFAT = 1.067;                         00004670
        IF STYR > 1981 & STYR < 1987 THEN CPIFAT = 1.057;           00004680
        IF STYR > 1986 THEN CPIFAT = 1.047;                         00004690
                                                                    00004700
             /* ACCIDENTS COST */                                   00004710
CAL:    FAT$=133637 * ((CPIFAT) ** (STYR - 1976));                  00004720
        INJ$= 10946 * ((CPIFAT) ** (STYR - 1976));                  00004730
        PDO$=   743 * ((CPIFAT) ** (STYR - 1976));                  00004740
                                                                    00004750
FIG:  DO I = 0 TO SVL;                                              00004760
        IF I > 0 THEN DO;                                           00004770
           MT$ = MT$ * INFF;                                        00004780
           REP$ = REP$ * INFF;                                      00004790
           FAT$ = FAT$ * INFF;                                      00004800
           INJ$ = INJ$ * INFF;                                      00004810
           PDO$ = PDO$ * INFF;                                      00004820
           END;                                                     00004830
                                                                    00004840
        IF I=0 THEN MAINT$=0;     /* ANNUAL MAINTENANCE COST */     00004850
             ELSE MAINT$=MT$ * #HAZ;                                00004860
                                                                    00004870
        IF I = 0 THEN DO;                                           00004880
             AFAT,AINJ,APDO,RFAT,RINJ,RPDO=0;                       00004890
             BFAT = (ACCFAT * #ACC);                                00004900
             BINJ = (ACCINJ * #ACC);                                00004910
             BPDO = (ACCPDO * #ACC);                                00004920
             END;                                                   00004930
                                                                    00004940
        ELSE DO;                                                    00004950
             /* NO. OF UNTREATED ACCIDENTS */                       00004960
             BFAT = BFAT * (GWTH ) ;                                00004970
             BINJ = BINJ * (GWTH ) ;                                00004980
             BPDO = BPDO * (GWTH ) ;                                00004990
                                                                    00005000
             /* NO. OF TREATED ACCIDENTS */                         00005010
             AFAT = BFAT * FARF;                                    00005020
             AINJ = BINJ * INRF ;                                   00005030
             APDO = BPDO * PDRF ;                                   00005040
```

```
                                                                    00005050
        /* NO. OF ACCIDENTS REDUCED */                              00005060
        RFAT = BFAT - AFAT ;                                        00005070
        RINJ = BINJ - AINJ ;                                        00005080
        RPDO = BPDO - APDO ;                                        00005090
        END ;                                                       00005100
                                                                    00005110
    REPCT$ = REP$ * (AFAT + AINJ +                                  00005120
         APDO);          /* ANNUAL REPAIR COST */                   00005130
    AVB$ = RFAT * FAT$ + RINJ * INJ$ +                              00005140
         RPDO * PDO$;    /* ACCIDENT BENEFITS */                    00005150
    PWB$ = (AVB$ - REPCT$) * PWF;  /* PWORTH OF BENEFITS */         00005160
    PWCT$ =(IMP$ + MAINT$) * PWF;  /* PWORTH OF COST */             00005170
    PWNCF$ = PWB$ - PWCT$;   /* PWORTH OF NET CASH FLOW */          00005180
    CB = CB + PWNCF$;          /*  CUMULATIVE BALANCE */            00005190
                                                                    00005200
    /* PRINT ECONOMIC ANALYSIS TABLE */                             00005210
    PUT EDIT (I,ROUND(IMP$,0),ROUND(MAINT$,0),                      00005220
        ROUND(REPCT$,0),ROUND(AVB$,0),ROUND(PWF,4),                 00005230
        ROUND(PWB$,0),ROUND(PWCT$,0),ROUND(PWNCF$,0),               00005240
        ROUND(CB,0)) (COL(7),F(2),X(4),F(9),                        00005250
        (2) (X(2),F(7)),X(3),F(8),X(3),F(6,4),X(3),                 00005260
        (3) (F(10),X(2)),F(11));                                    00005270
                                                                    00005280
    IMP$=0;                                                         00005290
    PWF = PWF / (1 + ANNR);          /* INFLATE PWF */              00005300
    CPWB = CPWB + PWB$;                                             00005310
    CPWCT = CPWCT + PWCT$;                                          00005320
END FIG;                                                            00005330
                                                                    00005340
    SVL = SVL + 1;                                                  00005350
    CRFC = (ANNR * ((1 + ANNR) ** SVL)) /                           00005360
         (((1 + ANNR) ** SVL) - 1);                                 00005370
    AC = CRFC * CB;       /* ANNUAL BENEFITS */                     00005380
    BC = CPWB / CPWCT;  /* BENEFIT / COST RATIO */                  00005390
                                                                    00005400
    PUT SKIP(3) EDIT ('THE NDPV = $',ROUND(CB,0))                   00005410
        (COL(48),A,F(11));                                          00005420
    PUT SKIP(2) EDIT ('THE ANNUAL BENEFITS = $',ROUND(AC,0))        00005430
        (COL(37),A,F(11));                                          00005440
    PUT SKIP(2) EDIT ('BENEFIT  / COST RATIO = ',                   00005450
        ROUND(BC,6)) (COL(35),A,F(12,6));                           00005460
                                                                    00005470
    /* FOR SUMMARY TABLE */                                         00005480
    HD = HAZD;                                                      00005490
    TR = TRMT;                                                      00005500
    TITLE_A = TITLEA(HAZD);                                         00005510
    TITLE_B = TITLEB(TRMT);                                         00005520
    TITLE_C = TITLEC;                                               00005530
    AC_R    = AC;                                                   00005540
```

```
            BC_R    = BC;                                                   00005550
            /* COMPLEMENT FOR SORTING PURPOSES */                           00005560
            IF AC >= 0 THEN AC_NUM=10000000000 - AC_NUM;                    00005570
          IF BC >= 0 THEN BC_NUM=1000000. - BC_NUM;                         00005580
            WRITE FILE(OUTFL) FROM (REC);                                   00005590
                                                                            00005600
            #N = #N + 1;                                                    00005610
            GO TO END_TABLES;                                               00005620
                                                                            00005630
            /* ERROR MESSAGES */                                            00005640
  END_0:                                                                    00005650
            PUT SKIP LIST                                                   00005660
                ('ERROR - TREATMENT INFORMATION NOT AVAILABLE');            00005670
            GO TO END_3;                                                    00005680
  END_1:                                                                    00005690
            PUT SKIP LIST ('ERROR - NO ESTIMATE OF HAZARDS');               00005700
            GO TO END_3;                                                    00005710
  END_2:                                                                    00005720
            PUT SKIP LIST ('ERROR - DIVISION BY ZERO ATTEMPTED ');          00005730
  END_3:                                                                    00005740
            PUT SKIP(1) EDIT ('CHECK INPUT CARD BELOW AND',                 00005750
                ' APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A.')       00005760
                   (COL(1),(2) A);                                          00005770
            PUT SKIP(3) LIST ('INPUT CARD');                                00005780
            PUT SKIP(1) EDIT  ('CARD NO = ',CARD#,                          00005790
                '  HAZARD = ',HAZ,'  TREATMENT = ',TRTMT)                   00005800
                (COL(1),(6) A);                                             00005810
            PUT SKIP(1) EDIT  ('CODES = ',CODES)                            00005820
                (COL(1),(2) A);                                             00005830
END_TABLES:                                                                 00005840
            END TABLES;                                                     00005850
                                                                            00005860
                                                                            00005870
1       /* ..................... SUBROUTINE ..................... */       00005880
  COMBINE: PROC(HAZ, TRTMT, CODES);                                         00005890
  /* THIS SUBROUTINE DECODES THE USER'S COMBINATION INPUT, MATCHES */       00005900
  /* THE PROPER VARIABLE CODES WITH THE MATRIX AND RETURNS A SINGLE*/       00005910
  /* COMBINED ROW, AN ERROR FLAG, AND A TITLE                      */       00005920
                                                                            00005930
  /* EXAMPLE OF EXPECTED FORMAT FOR CODES:                         */       00005940
  /*  VARIABLE ID        VALUE LIST                                */       00005950
  /*          |               |                                     */       00005960
  /*          |               |                                     */       00005970
  /*          |             /---/                                   */       00005980
  /* ' #(2 ) L (1, 2 )    F(3,6,4)  A(2,3) I (0) H(5) '            */       00005990
                                                                            00006000
  DCL( (HAZ, TRTMT) PIC'99',          /* HAZARD & TREATMENT CODES */        00006010
      CODES CHAR(80) VAR);  /* INPUT COMBINATION CODES */                   00006020
  DCL (#PP,#PF,#PI,#PDO,#NHZ,#TCOST,#MCOST,#RCOST,#RCST_N,#ERF,#IRF,        00006030
       #PRF) FLOAT(16);                                                     00006040
```

```
        /* USED TO CALCULATE SUMS IN THE COMBINING */                    00006050
DCL (                                                                    00006060
CBN CHAR(81) VAR, /* DE-BLANKED COPY OF INPUT STRING */                  00006070
NUMBRS CHAR(10) INIT('0123456789'),  /* FOR CONVERTING # TO LETTER */    00006080
ID BIN FIXED(15), /* ID # ASSIGNED TO THE VARIABLES ... IN THIS ORDER    00006090
                  LOC,AREA,HIGHWAY,#LANES,INTERSECTION,FEATURES ...      00006100
                  (LOCATION IS 1, ... , FEATURES IS 7)            */     00006110
(I, J, K, L, M, N) BIN FIXED(15),   /* LOOP COUNTERS */                  00006120
VAR_ID CHAR(7) INIT('LAH#IF'),  /* USED TO ASSIGN THE NUMERIC ID */      00006130
ENDLST BIN FIXED(15), /* USED TO POINT TO A RIGHT PAREN -               00006140
                  WHICH IS ASSUMED TO BE THE END OF A VALUES LIST */     00006150
MAX (6) BIN FIXED INIT(2,3,5,3,2,6), /* MAX VALUES FOR EACH VARIABLE,    00006160
                                        USED TO RANGE CHECK */           00006170
SAVEM (0:9) BIN FIXED(15),  /* SAVE VALUES HERE - 1 MEANS VALUE FOUND    00006180
                                        0 MEANS NOT FOUND  */            00006190
TITLE (6) CHAR(8) VAR INIT('LOC','AREA','HWY','#LANES',                  00006200
  'INT','FEATURES'),   /* USED TO GENERATE THE TITLE */                  00006210
/*  GENERATED ROW INPUT      */                                          00006220
ISHORT_ID CHAR(4) DEFINED MT,                                            00006230
INPUT_ID CHAR(10) DEFINED MT,                                            00006240
1 MT,                                                                    00006250
   2 HAZRD PIC'99',                                                      00006260
   2 TREATMT PIC'99',                                                    00006270
   2 LOCTN PIC'9',                                                       00006280
   2 AREA PIC'9',                                                        00006290
   2 HIGHWY PIC'9',                                                      00006300
   2 #LANES PIC'9',                                                      00006310
   2 INTERS PIC'9',                                                      00006320
   2 FEATUR PIC'9',                                                      00006330
/* MATRIX ROW INPUT (ID) */                                              00006340
MSHORT_ID CHAR(4) DEFINED RMT,                                           00006350
MROW_ID CHAR(10) DEFINED RMT,                                            00006360
1 RMT,                                                                   00006370
   2 HAZRD PIC'99',                                                      00006380
   2 TREATMT PIC'99',                                                    00006390
   2 LOCTN PIC'9',                                                       00006400
   2 AREA PIC'9',                                                        00006410
   2 HIGHWY PIC'9',                                                      00006420
   2 #LANES PIC'9',                                                      00006430
   2 INTERS PIC'9',                                                      00006440
   2 FEATUR PIC'9',                                                      00006450
 /*  MATRIX MATCHES TO BE COMBINED */                                    00006460
1 ROWS_TO_BE_COMBINED,                                                   00006470
   2 PP FLOAT(16),  /*  PREDICTED PROPORTION OF ACCIDENTS */            00006480
   2 PF FLOAT(16),  /* PROPORTION FATAL */                               00006490
   2 PI FLOAT(16),  /*  PROPORTION INJURY */                            00006500
   2 PDO FLOAT(16), /* PROPORTION PROPERTY DAMAGE ONLY */                00006510
   2 NHZ FLOAT(16), /* # OF HAZARDS */                                   00006520
   2 TCOST FLOAT(16), /* TREATMENT COST PER HAZARD */                    00006530
   2 MCOST FLOAT(16), /* MAINTENANCE COST PER HAZARD */                  00006540
```

```
    2 RCOST FLOAT(16), /* REPAIR COST PER HAZARD */                          00006550
    2 FRF FLOAT(16), /* FATAL REDUCTION FACTOR */                           00006560
    2 IRF FLOAT(16), /* INJURY REDUCTION FACTOR */                          00006570
    2 PRF FLOAT(16), /* PDO REDUCTION FACTOR */                             00006580
    2 SL  FLOAT(16), /* SERVICE LIFE */                                     00006590
  #MATCHS BIN FIXED(31),   /*  # OF MATCHES TO MATRIX */                    00006600
  VAR(6,7) BIN FIXED(15), /* SAVE THE VALUES FOR EACH VARIABLE --          00006610
                                VAR( VARIABLE, VALUE)  */                  00006620
  MISSING CHAR(8) VAR, /* FLAG FOR CHOOSING WHETHER TO CALL A MISSING      00006630
                          ROW AN ERROR                                  */ 00006640
  COUNT(6) BIN FIXED(15));  /* KEEP TRACK OF # VALUES FOR EACH VAR */      00006650
  PUT PAGE;                                                                00006660
  ON ZERODIVIDE BEGIN;                                                     00006670
             PUT SKIP LIST ('ERROR - DIVISION BY ZERO ATTEMPTED ');        00006680
             GO TO OUT_1;                                                  00006690
             END;                                                          00006700
                                                                           00006710
                                                                           00006720
  /*.................. SUB SUBROUTINE ..................................*/ 00006730
PARSLST: PROC(VALUS);                                                      00006740
  /* THIS SUBROUTINE IS PASSED THE VALUE LIST, AND IT INTERPRETS AND      00006750
      STORES THE VALUES                                                 */00006760
  DCL VALUS CHAR(80) VAR;                                                  00006770
   DCL ( H BIN FIXED(15),                                                  00006780
         VALUE CHAR(80) VAR, VALS CHAR(81) VAR);                           00006790
                                                                           00006800
   SAVEM = 0;  /* INIT SAVEM TO SAY 'NO VALUES FOUND' */                   00006810
                                                                           00006820
  /* IF 'SUM' SPECIFIED FOR VALUES, RETURN ALL VALUES FOR THIS VAR */      00006830
   IF VALUS = 'SUM' THEN                                                   00006840
                    DO;                                                    00006850
                    DO H = 0 TO MAX (ID);                                  00006860
                    SAVEM (H) = 1;                                         00006870
                    END;                                                   00006880
                    IF ID < 3 THEN SAVEM (0) = 0;                          00006890
                   MISSING = 'NO ERROR';                                   00006900
                    GOTO EXIT_PARS;                                        00006910
                    END;                                                   00006920
                                                                           00006930
   /* SHOULD HAVE BEEN PASSED A VALUE LIST, WITH NO PARENTHESES LEFT */    00006940
   H = 1;                                                                  00006950
   VALS = VALUS || '*'; /* MAKE SURE WE FIND END */                        00006960
   /* EXTRACT VALUES, RECORD THEM IN 'SAVEM' */                            00006970
 VAL_LOOP: DO WHILE(H < LENGTH(VALS));                                     00006980
   VALUE = '';                                                             00006990
   /* FIND A VALUE */                                                     00007000
     DO WHILE(INDEX(NUMBRS,SUBSTR(VALS,H,1)) ¬= 0);                        00007010
     VALUE = VALUE || SUBSTR(VALS,H,1);                                    00007020
     H = H + 1;                                                            00007030
     END;                                                                  00007040
```

```
   /* CHECK FOR OUT OF RANGE */                                          00007050
   IF LENGTH(VALUE) ¬= 1 THEN                                           00007060
     DO; ERR = 1;                                                       00007070
         GOTO EXIT_PARS;                                                00007080
     END;                                                               00007090
   /* SAVE IN SAVEM -- THIS TAKES CARE OF DUPLICATES & EFFECTIVELY      00007100
      SORTS THE VALUES                                              */  00007110
   SAVEM( INDEX(NUMBRS,VALUE)-1 ) = 1;                                  00007120
   /* DELETE COMMAS */                                                  00007130
   DO WHILE(SUBSTR(VALS,H,1) = ',');                                    00007140
   H = H + 1;                                                           00007150
   END;                                                                 00007160
 END VAL_LOOP;                                                          00007170
 EXIT_PARS:                                                             00007180
END PARSLST;                                                            00007190
                                                                        00007200
                                                                        00007210
 /*................. SUB SUBROUTINE ..................................*/ 00007220
 SUM_UP: PROC;                                                          00007230
 /* THIS SUBROUTINE KEEPS A RUNNING TOTAL FOR THE COMBINED ROWS */     00007240
 #PP = #PP + PP;                                                        00007250
 #NHZ = #NHZ + NHZ;                                                     00007260
 #PF = #PF + (PP*PF);                                                   00007270
 #PI = #PI + (PP*PI);                                                   00007280
 #PDO = #PDO + (PP*PDO);                                                00007290
 #TCOST = #TCOST + (NHZ*TCOST);                                         00007300
 #MCOST = #MCOST + (NHZ*MCOST);                                         00007310
 #RCOST = #RCOST + PP*(PF*FRF + PI*IRF + PDO*PRF);                      00007320
 #RCST_N = #RCST_N + RCOST * PP * (PF*FRF + PI*IRF + PDO*PRF);          00007330
 #FRF = #FRF + (PP*PF*FRF);                                             00007340
 #IRF = #IRF + (PP*PI*IRF);                                             00007350
 #PRF = #PRF + (PP*PDO*PRF);                                            00007360
 END SUM_UP;                                                            00007370
                                                                        00007380
                                                                        00007390
 /*................. SUB SUBROUTINE ..................................*/ 00007400
 MATCH_SUM: PROC;                                                       00007410
  /*  THIS SUB DOES MATCHS FOR THE CASE CODES = 'SUM'  --  ONLY NEED*/  00007420
 /*  TO MATCH TRMT & HAZ, & DON'T CARE IF A A ROW IS MISSING         */ 00007430
 DO WHILE(MSHORT_ID ¬> ISHORT_ID);                                      00007440
 IF MSHORT_ID = ISHORT_ID THEN                                          00007450
    DO;                                                                 00007460
    #MATCHS = #MATCHS + 1;                                              00007470
    IF NHZ < 0 THEN DO;                                                 00007480
              IF MISSING = 'ERROR' THEN DO;                             00007490
                 PUT SKIP LIST('ERROR - NO ESTIMATE OF HAZARDS');       00007500
                 GO TO OUT_1;                                           00007510
                 END;                                                   00007520
              ELSE                                                      00007530
                 PUT SKIP LIST('WARNING - NO ESTIMATE OF HAZARDS');     00007540
```

```
            END;                                                          00007550
      ELSE DO;                                                            00007560
            IF #MATCHS = 1 THEN SVL=SL;                                   00007570
            CALL SUM_UP;                                                  00007580
            END;                                                          00007590
      END;                                                                00007600
   GET FILE(MATRX)                                                        00007610
               LIST(RMT.HAZRD, RMT.TREATMT, RMT.LOCTN, RMT.AREA,          00007620
               RMT.HIGHWY, RMT.#LANES, RMT.INTERS, RMT.FEATUR,            00007630
               PP, PF, PI, PDO, NHZ, TCOST, MCOST, RCOST, FRF,            00007640
               IRF, PRF, SL);                                             00007650
   IF EOF_MAT THEN MSHORT_ID = '9999';                                    00007660
   END;                                                                   00007670
   END_MATCH:                                                             00007680
   END MATCH_SUM;                                                         00007690
                                                                          00007700
1  /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */  00007710
   /* * * *****       STEP  ONE       ***** * * */                       00007720
   /* DECODE THE USER'S INSTRUCTIONS                  */                 00007730
                                                                          00007740
   /* DE-BLANK THE FIELD */                                               00007750
   CBN = '';                                                              00007760
   DO J = 1 TO LENGTH(CODES);                                             00007770
   IF SUBSTR(CODES, J, 1) ¬= ' ' THEN CBN = CBN || SUBSTR(CODES, J,1);    00007780
   END;                                                                   00007790
   /* IF 'SUM' SPECIFIED, READ ALL ROWS FOR TRMT & HAZ, DON'T WORRY       00007800
     ABOUT MISSING ROWS                                              */   00007810
   IF CBN = 'SUM' THEN GOTO STEP2;                                        00007820
   CBN = CBN || '*';   /*  ENSURE THAT WE FIND THE END */                 00007830
   COUNT = 0;   /* INIT SO CAN VERIFY ALL VAR'S SPECIFIED */              00007840
   EOF_MAT = '0'B;                                                        00007850
   ERR = 0;                                                               00007860
   MISSING = 'ERROR';                                                     00007870
                                                                          00007880
 PARS_LOOP: DO WHILE(CBN ¬= '*');                                         00007890
    /* IDENTIFY VARIABLE */                                               00007900
    ID = INDEX(VAR_ID, SUBSTR(CBN,1,1));                                  00007910
    IF ID = 0 THEN                                                        00007920
       DO; PUT FILE(SYSPRINT) SKIP                                        00007930
           LIST('CAN''T IDENTIFY ONE OF THE VARIABLES');                  00007940
           ERR = 1;                                                       00007950
           GOTO OUT;                                                      00007960
       END;                                                               00007970
    /* FIND END OF VALUE LIST */                                          00007980
    ENDLST = INDEX(CBN,')');                                              00007990
    IF ENDLST = 0 THEN                                                    00008000
       DO; PUT FILE(SYSPRINT) SKIP                                        00008010
           LIST('MISSING RIGHT PARENTHESIS IN VALUE LIST');               00008020
           ERR = 1;                                                       00008030
           GOTO OUT;                                                      00008040
```

```
      END;                                                          00008050
    /* DECODE VALUE LIST, SAVE VALUES IN ARRAY 'SAVEM' */           00008060
    CALL PARSLST (SUBSTR(CBN,3,(ENDLST-3)));                        00008070
    IF ERR = 1 THEN                                                 00008080
       DO; PUT FILE(SYSPRINT) SKIP                                  00008090
           EDIT('ERROR IN VALUE LIST FOR ',TITLE(ID)) (COL(1),A,A);  00008100
           GOTO OUT;                                                00008110
       END;                                                         00008120
    /* CHECK VALUE RANGES */                                        00008130
        /* HIGH BOUND */                                           00008140
    DO J = (MAX(ID) + 1) TO 9;                                      00008150
    IF SAVEM (J) > 0 THEN                                           00008160
       DO; PUT FILE(SYSPRINT) SKIP                                  00008170
           EDIT('VALUES OUT OF RANGE FOR ', TITLE(ID)) (COL(1),A,A);00008180
           ERR = 1;                                                 00008190
           GOTO OUT;                                                00008200
       END;                                                         00008210
    END;                                                            00008220
        /* LOW  BOUND */                                           00008230
    IF ID < 3 & SAVEM (0) > 0 THEN                                  00008240
       DO; PUT FILE(SYSPRINT) SKIP                                  00008250
           EDIT('VALUES OUT OF RANGE FOR ', TITLE(ID)) (COL(1),A,A);00008260
           ERR = 1;                                                 00008270
           GOTO OUT;                                                00008280
       END;                                                         00008290
   /* STORE REAL VALUES IN ARRAY VAR & COUNT THEIR NUMBER (K) */    00008300
    K = 1;                                                          00008310
    DO J = 0 TO MAX (ID);                                           00008320
    IF SAVEM (J) > 0 THEN                                           00008330
       DO; VAR(ID, K) = J;                                          00008340
           K = K + 1;                                               00008350
       END;                                                         00008360
    END;                                                            00008370
   /* CHECK FOR NO VALUES FOUND */                                  00008380
    IF K < 2 THEN                                                   00008390
       DO; PUT FILE(SYSPRINT) SKIP                                  00008400
           LIST('ALL VARIABLES NEED VALUES');                       00008410
           ERR = 1;                                                 00008420
           GOTO OUT;                                                00008430
       END;                                                         00008440
    COUNT (ID) = K - 1;                                             00008450
    /* CHOP OFF CBN SO THAT A NEW VARIABLE SHOULD BE IN COL 1 */    00008460
    DO WHILE(SUBSTR(CBN,ENDLST,1) = ')');                           00008470
    ENDLST = ENDLST + 1;                                            00008480
    END;                                                            00008490
    CBN = SUBSTR(CBN,ENDLST);                                       00008500
END PARS_LOOP;                                                      00008510
   /* CHECK TO MAKE SURE ALL VARIABLES WERE SPECIFIED */            00008520
   DO J = 1 TO 6;                                                   00008530
   IF COUNT (J) = 0 THEN                                            00008540
```

```
                DO; PUT FILE(SYSPRINT) SKIP                                    00008550
                LIST('ALL VARIABLES MUST BE SPECIFIED');                       00008560
                ERR = 1;                                                       00008570
                GOTO OUT;                                                      00008580
                END;                                                           00008590
  END;                                                                         00008600
                                                                               00008610
                                                                               00008620
                                                                               00008630
  /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */  00008640
  /* * * *****       STEP  TWO       ***** * * */                            00008650
STEP2:                                                                         00008660
  /*  TRY TO MATCH TO MATRIX */                                                00008670
  /*   REWIND MATRIX TO BEGINNING */                                           00008680
  CLOSE FILE(MATRX); OPEN FILE(MATRX);                                         00008690
                                                                               00008700
  #PP, #NHZ, #PF, #PI, #PDO, #TCOST, #MCOST, #RCOST, #RCST_N = 0;              00008710
  #FRF, #IRF, #PRF = 0;                                                        00008720
  MT.HAZRD = HAZ; MT.TREATMT = TRTMT; #MATCHS = 0;                             00008730
  GET FILE(MATRX) LIST(RMT.HAZRD, RMT.TREATMT, RMT.LOCTN, RMT.AREA,            00008740
                  RMT.HIGHWY, RMT.#LANES, RMT.INTERS, RMT.FEATUR,              00008750
                   PP,PF,PI,PDO,NHZ,TCOST,MCOST,RCOST,                         00008760
                   FRF,IRF,PRF,SL);                                            00008770
  IF CBN = 'SUM' THEN DO;  CALL MATCH_SUM;                                     00008780
                           GOTO STEP3;                                         00008790
                           END;                                                00008800
  /* GENERATE ROWS TO BE COMBINED */                                           00008810
  DO I = 1 TO COUNT (1);                                                       00008820
            MT.LOCTN = VAR(1, I);                                              00008830
    DO J = 1 TO COUNT (2);                                                     00008840
            MT.AREA = VAR(2,J);                                                00008850
      DO K = 1 TO COUNT(3);                                                    00008860
            MT.HIGHWY = VAR(3, K);                                             00008870
        DO L = 1 TO COUNT(4);                                                  00008880
            MT.#LANES = VAR(4,L);                                              00008890
          DO M = 1 TO COUNT (5);                                               00008900
            MT.INTERS = VAR(5, M);                                             00008910
            DO N = 1 TO COUNT (6);                                             00008920
            MT.FEATUR = VAR(6, N);                                             00008930
                                                                               00008940
            /* MATCH THIS TO MATRIX */                                         00008950
            DO WHILE(MROW_ID < INPUT_ID);                                      00008960
            GET FILE(MATRX)                                                    00008970
                  LIST(RMT.HAZRD, RMT.TREATMT, RMT.LOCTN, RMT.AREA,            00008980
                  RMT.HIGHWY, RMT.#LANES, RMT.INTERS, RMT.FEATUR,              00008990
                  PP, PF, PI, PDO, NHZ, TCOST, MCOST, RCOST, FRF,              00009000
                  IRF, PRF, SL);                                               00009010
            IF EOF_MAT THEN MROW_ID = '9999999999';                            00009020
            END;                                                               00009030
                                                                               00009040
```

```
            IF MROW_ID = INPUT_ID THEN                                    00009050
                 DO;                                                      00009060
                 #MATCHS = #MATCHS + 1;                                   00009070
                 IF NHZ < 0 THEN DO;                                      00009080
                      IF MISSING = 'ERROR' THEN DO;                       00009090
                         PUT SKIP LIST                                    00009100
                         ('ERROR - NO ESTIMATE OF HAZARDS');              00009110
                         GO TO OUT_1;                                     00009120
                         END;                                             00009130
                      ELSE PUT SKIP LIST                                  00009140
                         ('WARNING - NO ESTIMATE OF HAZARDS');            00009150
                      END;                                                00009160
                 ELSE DO;                                                 00009170
                      IF #MATCHS = 1 THEN SVL=SL;                         00009180
                      CALL SUM_UP;                                        00009190
                      END;                                                00009200
                 END;                                                     00009210
            ELSE IF MISSING = 'ERROR' THEN DO;                            00009220
                 PUT FILE(SYSPRINT) SKIP                                  00009230
                 LIST ('MISSING ROW ',INPUT_ID);                          00009240
                 ERR = 1;                                                 00009250
                 GOTO OUT;                                                00009260
                 END;                                                     00009270
            END;                                                          00009280
          END;                                                            00009290
        END;                                                              00009300
      END;                                                                00009310
    END;                                                                  00009320
  END;                                                                    00009330
                                                                          00009340
                                                                          00009350
  /* * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * */  00009360
  /* * * *****        STEP  THREE        ***** * * */                     00009370
  /* FINISH CHECKING, COMBINING,  GENERATE TITLE              */          00009380
  /* CHECK TO SEE IF ANY MATCHS WERE FOUND -- ERROR IF NOT */             00009390
STEP3:                                                                    00009400
  IF #MATCHS = 0 THEN                                                     00009410
     DO; PUT FILE(SYSPRINT) SKIP                                          00009420
     LIST('NO MATCHES FOUND');                                            00009430
     ERR = 1;                                                             00009440
     GOTO OUT;                                                            00009450
     END;                                                                 00009460
  /*  COMPLETE COLLAPSING */                                              00009470
  ACCP = #PP;                                                             00009480
  ACCFAT = #PF/#PP;                                                       00009490
  ACCINJ = #PI/#PP;                                                       00009500
  ACCPDO = #PDO/#PP;                                                      00009510
  TRT$ = #TCOST/#NHZ;                                                     00009520
  MT$ = #MCOST/#NHZ;                                                      00009530
  REP$ = #RCST_N/#RCOST;                                                  00009540
```

```
   IF #PF = 0 THEN FATRF = 0;                                          00009550
   ELSE FATRF = #FRF/#PF;                                              00009560
   IF #PI = 0 THEN INJRF = 0;                                          00009570
   ELSE INJRF = #IRF/#PI;                                              00009580
   IF #PDO = 0 THEN PDORF = 0;                                         00009590
   ELSE PDORF = #PRF/#PDO;                                             00009600
   #HAZ = #NHZ;                                                        00009610
                                                                       00009620
   /* GENERATE TITLE  */                                              00009630
   IF CBN = 'SUM' THEN DO; TITLEC = 'SUM'; GOTO OUT; END;              00009640
   TITLEC = '';                                                        00009650
   DO K = 1 TO 6;                                                      00009660
   /* PICK UP VARIABLE NAME, 1ST VALUE */                             00009670
   /* THE STUFF BEGINNING 'SUBSTR' ONLY MAKES THE NUMBER IN 'VAR'     00009680
      A LETTER                                                   */    00009690
   TITLEC = TITLEC || TITLE(K) || '(' ||                               00009700
          SUBSTR(NUMBRS, VAR(K,1) + 1, 1);                             00009710
     DO L = 2 TO COUNT (K);                                            00009720
     /* ADD REMAINING VALUES */                                        00009730
     TITLEC = TITLEC || ',' ||                                         00009740
          SUBSTR(NUMBRS, VAR(K,L) + 1, 1);                             00009750
     END;                                                              00009760
   /* FINISH AND SPACE */                                             00009770
   TITLEC = TITLEC || ')' || ' ';                                      00009780
   END;                                                                00009790
   IF MISSING = 'NO ERROR' THEN TITLEC = '** ' || TITLEC;              00009800
                                                                       00009810
OUT:                                                                   00009820
   IF ERR = 1 THEN PUT FILE(SYSPRINT) SKIP                             00009830
                   EDIT('HAZARD ',HAZ,'  TREATMENT ',TRTMT,            00009840
                   '  COMBINATION ',CODES) (COL(5),(6) A);             00009850
              ELSE GO TO OUT_2;                                        00009860
   OUT_1:                                                              00009870
              PUT SKIP(1) EDIT                                         00009880
                  ('CHECK INPUT CARD BELOW AND APPROPRIATE',           00009890
                   ' MATRIX ROW IN USER MANUAL APPENDIX A')            00009900
                      (COL(1), (2) A);                                 00009910
              PUT SKIP(3) LIST ('INPUT CARD');                         00009920
              PUT SKIP(1) EDIT ('HAZARD = ',HAZ,'   TREATMENT = ',     00009930
                  TRTMT)                                               00009940
                  (COL(1),(4) A);                                      00009950
              PUT SKIP(1) EDIT ('CODES = ',CODES)                      00009960
                  (COL(1),(2) A);                                      00009970
              ERR=1;                                                   00009980
   OUT_2:                                                              00009990
   END COMBINE;                                                        00010000
                                                                       00010010
                                                                       00010020
1        /* ..................... SUBROUTINE  ..................... */ 00010030
                                                                       00010040
```

```
SUMTAB:      PROC(TITLES,NAME1);                                    00010050
             /* * * * * * * * * * * * * * * * * * * * * * * *  */   00010060
             /* THIS SUBROUTINE PRINT TWO SUMMARY TABLES */         00010070
             /*    (1) RANKING BY ANNUAL BENEFITS (NDPV)  */        00010080
             /*    (2) RANKING BY BENEFIT / COST RATIO    */        00010090
             /* * * * * * * * * * * * * * * * * * * * * * * *  */   00010100
                                                                    00010110
             DCL IHESRTC ENTRY(CHAR(27),CHAR(28),FIXED BIN(31),     00010120
                 FIXED BIN(31),ENTRY),                              00010130
                 IHESARC ENTRY(FIXED BIN(31)),                      00010140
                 TAB_A  ENTRY,                                      00010150
                 TITLES CHAR(35) VAR,                               00010160
                 NAME1  CHAR(27),                                   00010170
                 (MM,KK)        BIN FIXED (31),                     00010180
                 J              BIN FIXED,                          00010190
                 RETURN_CODE FIXED BIN(31);                         00010200
                                                                    00010210
                 J=0;                                               00010220
                 KK,MM=0;                                           00010230
                 CALL IHESRTC (NAME1,   /* SORT SUBROUTINE */       00010240
                    ' RECORD TYPE=F,LENGTH=(198) ',                 00010250
                    25000,RETURN_CODE,TAB_A);                       00010260*
                                                                    00010270
TAB_A:       PROC(REC_A);                                           00010280
                                                                    00010290
             IF J = 0 THEN DO;                                      00010300
                /* TITLE FOR SUMMARY TABLE */                       00010310
                PUT PAGE;                                           00010320
                PUT SKIP EDIT (TITLES)                              00010330
                    (COL(42),A);                                    00010340
                PUT SKIP(3) EDIT ('RANK ',                          00010350
                    'TITLE (HAZARD,TREATMENT ETC.)',                00010360
                    'ANNUAL','BENEFIT  /','TREATMENT')              00010370
                    (COL(1),A,COL(14),A,COL(83),A,COL(97),A,        00010380
                    COL(111),A);                                    00010390
                PUT SKIP EDIT ('BENEFITS','COST RATIO','COST($)')   00010400
                    (COL(82),A,COL(97),A,COL(112),A);               00010410
                PUT SKIP EDIT ((119)'-') (COL(1),A);                00010420
                PUT SKIP(1);                                        00010430
                J=1;                                                00010440
                END;                                                00010450
                                                                    00010460
             DCL (                                                  00010470
                  REC_A CHAR(198),                                  00010480
                  1 INREC DEFINED REC_A,                            00010490
                   2 HD       PIC '99',                            00010500
                   2 TR       PIC '99',                            00010510
                   2 HAZD     CHAR(25),                            00010520
                   2 TRMT     CHAR(35),                            00010530
                   2 PART1    CHAR(50),                            00010540
```

*See note on page B-26.

```
                2 PART2    CHAR(50),                                    00010550
                2 BEN      PIC 'S(11)9',                                00010560
                2 RAT      PIC 'S(6)9V(6)9',                            00010570
                2 COST     PIC '(9)9',                                  00010580
               BEN_NUM  DEFINED REC_A POSITION(166) PIC '(11)9',        00010590
               RAT_NUM  DEFINED REC_A POSITION(178) PIC '(6)9V(6)9'     00010600
              );                                                        00010610
                                                                        00010620
             /* COMPLEMENT FOR PRINTING */                              00010630
             IF BEN >= 0 THEN BEN_NUM=100000000000 - BEN_NUM;           00010640
             IF RAT >= 0 THEN RAT_NUM=1000000.0000 - RAT_NUM;           00010650
             MM = MM + 1;      /* NO. OF ROWS */                        00010660
                                                                        00010670
             /* PRINT SUMMARY TABLE */                                  00010680
             PUT SKIP(2) EDIT (MM,'(',HD,TR,')',HAZD,TRMT,BEN,RAT,      00010690
               COST)                                                    00010700
               (COL(1),F(4),X(1),A,P'99',X(1),P'99',A,                  00010710
               COL(14),A,COL(40),A,COL(78),P'(11)-9',                   00010720
               COL(94),P'(5)-9V.(6)9',COL(111),P'(8)Z9');               00010730
             PUT SKIP EDIT (PART1) (COL(14),A);                         00010740
             PUT SKIP EDIT (PART2) (COL(14),A);                         00010750
             KK = KK + 1;      /* NO. OF ROWS PER PAGE */               00010760
                                                                        00010770
             IF KK > 9  THEN DO;                                        00010780
                KK = 0;                                                 00010790
                J = 0;    /* SET UP TITLE FOR NEW PAGE */               00010800
                END;                                                    00010810
                                                                        00010820
             CALL IHESARC(4);                                           00010830
             RETURN;                                                    00010840
                                                                        00010850
             END TAB_A;                                                 00010860
                                                                        00010870
          END SUMTAB;                                                   00010880
                                                                        00010890
FINI:     END HAZARD;                                                   00010900
```

*Technical Note

Appendix B, page B-25, line 00010260

In specifying the required core size the following points should be kept in mind:

1. For OS-MVT II systems, 25,000 bytes core size for the sort routine is adequate.

2. For OS-VS systems, this size must be at least 28,000 bytes.

For other systems, the user should consult the local systems programming staff.

APPENDIX C

Algorithms Used in Row-Collapse Module

Appendix C presents the formulae used by the row selection/collapse module to combine the accident, hazard and treatment data from two or more rows of the matrix when an appropriate request is made. The request card formats to be used in such requests are explained in Chapter 2.

Let A_r = proportion of total accidents predicted for row r

F_r = proportion of fatal accidents predicted for row r

I_r = proportion of injury accidents predicted for row r

PDO_r = proportion of property damage accidents predicted for row r

NHZ_r = number of hazards in row r

$TCOST_r$ = treatment cost/hazard for row r

$MCOST_r$ = maintenance cost/hazard for row r

$RCOST_r$ = repair cost/crash for row r

FRF_r = fatal accident reduction factor for row r

IRF_r = injury accident reduction factor for row r

PRF_r = property damage accident reduction factor for row r

Let {R} be the set of rows that need to be combined for a certain collapse request and assume that all the rows exist in the matrix. (If the rows do not exist, error messages explained in Chapter 5 will be generated.) Then

$$A. = \sum_{r \epsilon R} A_r \qquad (1)$$

and

$$NHZ. = \sum_{r \epsilon R} NHZ_r \qquad (2)$$

where $A_.$ is proportion of accidents predicted and $NHZ_.$ is the total number of hazards for combined set of rows {R}.

Similarly, the combined predicted proportions of fatal injury and property damage accidents can be determined for the set of rows {R}.

$$F_. = \frac{\sum_{r\epsilon R} (F_r)(A_r)}{\sum_{r\epsilon R} A_r} \tag{3}$$

$$I_. = \frac{\sum_{r\epsilon R} (I_r)(A_r)}{\sum_{r\epsilon R} A_r} \tag{4}$$

$$PDO_. = \frac{\sum_{r\epsilon R} (PDO_r)(A_r)}{\sum_{r\epsilon R} A_r} \tag{5}$$

The combined treatment and maintenance cost is a function of the number of hazards in each row. Therefore, a weighted mean using the number of hazards as weights was derived. Hence

$$TCOST_. = \frac{\sum_{r\epsilon R} (NHZ_r)(TCOST_r)}{\sum_{r\epsilon R} NHZ_r} \tag{6}$$

and

$$MCOST_. = \frac{\sum_{r\epsilon R} (NHZ_r)(MCOST_r)}{\sum_{r\epsilon R} NHZ_r} \tag{7}$$

The repair cost for a combined set of rows, however, is a function of the total number of accidents <u>after</u> the treatment has been installed. Therefore,

$$RCOST. = \frac{\sum_{r\epsilon R} A_r[(F_r)(FRF_r)+(I_r)(IRF_r)+(PDO_r)(PRF_r)]RCOST_r}{\sum_{r\epsilon R} A_r[(F_r)(FRF_r)+(I_r)(IRF_r)+(PDO_r)(PRF_r)]} \quad (8)$$

Finally, the combined fatal, injury and property damage accident reduction factors are given by the following expressions.

$$FRF. = \frac{\sum_{r\epsilon R} (A_r)(F_r)(FRF_r)}{\sum_{r\epsilon R} (A_r)(F_r)} \quad (9)$$

$$IRF. = \frac{\sum_{r\epsilon R} (A_r)(I_r)(IRF_r)}{\sum_{r\epsilon R} (A_r)(I_r)} \quad (10)$$

$$PRF. = \frac{\sum_{r\epsilon R} (A_r)(PDO_r)(PRF_r)}{\sum_{r\epsilon R} (A_r)(PRF_r)} \quad (11)$$

However, for the above expressions, if F., I. and PDO. in expressions (3), (4), or (5) is equal to zero then the corresponding reduction factors (equations (9), (10), (11)) are automatically set to zero by the program. This avoids a considerable number of zero-divide errors for those hazards causing only injury or property damage accidents.

APPENDIX D

Listing of Valid Hazard/Treatment/Segment Combinations

Table D.1. Valid combinations for rural locations.

HAZARD	TREATMENT	RURAL LOCATIONS														ROAD FEATURE							
		AREA			HIGHWAY TYPE				# OF LANES				ROAD CHARACTER				TANGENT	CURVE		1-12'	13-30'	31-60'	61+
		1	2	3	I	US	NC	SR	2[1]	4U	4D[2]		I	NI									
01 Bridge Ends	01 Bridge End Transition Guardrail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
02 Bridge Rails	02 Bridge Rail - Improved	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
03 Guardrail-end Shoulder	03 Guardrail-end - BCT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
	04 Guardrail-end - Texas Twist	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
04 Guardrail-end Median	03 Guardrail-end - BCT	✓	✓	✓	✓	✓	✓				✓												
	04 Guardrail-end - Texas Twist	✓	✓	✓	✓	✓	✓				✓												
05 Signs	05 Signs - Breakaway	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓					
06 Trees	06 Trees - Removal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓					
	07 Tree Removal (Stump)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓						✓	✓					
07 Bridge Piers-Shoulder	08 Bridge Pier - CMB + Guardrail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
	09 Bridge Pier - Water Filled Cushions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
	10 Bridge Pier - Sand Filled Cells	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
	11 Bridge Pier - Steel Barrel	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓												
08 Bridge Piers-Median	08 Bridge Pier - CMB + Guardrail	✓	✓	✓	✓	✓	✓				✓												
	09 Bridge Pier - Water Filled Cushions	✓	✓	✓	✓	✓	✓				✓												
	10 Bridge Pier - Sand Filled Cells	✓	✓	✓	✓	✓	✓				✓												
	11 Bridge Pier - Steel Barrel	✓	✓	✓	✓	✓	✓				✓												
09 Utility Poles	12 Utility Pole - Breakaway	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓					
	13 Utility Pole - Removal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓					
	14 Utility Pole - Relocate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓			✓	✓					
10 Cross Median Accidents	15 Cross Median Accidents - CMB	✓	✓	✓	✓	✓	✓				✓									✓	✓	✓	
	16 Cross Median Accidents - Double Face Guardrail	✓	✓	✓	✓	✓	✓				✓									✓	✓	✓	

[1]All secondary roads (SR) are 2-lane roadways.

[2]All interstate highways (I) are 4-lane highways.

Table D.1. (Cont.) Valid combinations for urban locations.

HAZARD	TREATMENT	URBAN LOCATIONS														ROAD FEATURE							
		AREA			HIGHWAY TYPE				# OF LANES				ROAD CHARACTER										
		1	2	3	I	US	NC	CS		2[1]	4U	4D[2]		I	NI		TANGENT	CURVE		1-12'	13-30'	31-60'	61+
01 Bridge Ends	01 Bridge End Transition Guardrail	✓	✓	✓	✓	✓	✓	✓															
02 Bridge Rails	02 Bridge Rail - Improved	✓	✓	✓	✓	✓	✓	✓															
03 Guardrail-end Shoulder	03 Guardrail-end - BCT	✓	✓	✓	✓	✓	✓	✓															
	04 Guardrail-end - Texas Twist	✓	✓	✓	✓	✓	✓	✓															
04 Guardrail-end Median	03 Guardrail-end - BCT	✓	✓	✓	✓	✓	✓	✓															
	04 Guardrail-end - Texas Twist	✓	✓	✓	✓	✓	✓	✓															
05 Signs	05 Signs - Breakaway	✓	✓	✓	✓	✓	✓	✓									✓	✓					
06 Trees	06 Trees - Removal	✓	✓	✓	✓	✓	✓	✓									✓	✓					
	07 Tree Removal (Stump)	✓	✓	✓	✓	✓	✓	✓									✓	✓					
07 Bridge Piers-Shoulder	08 Bridge Pier - CMB + Guardrail	✓	✓	✓	✓	✓	✓	✓															
	09 Bridge Pier - Water Filled Cushions	✓	✓	✓	✓	✓	✓	✓															
	10 Bridge Pier - Sand Filled Cells	✓	✓	✓	✓	✓	✓	✓															
	11 Bridge Pier - Steel Barrel	✓	✓	✓	✓	✓	✓	✓															
08 Bridge Piers-Median	08 Bridge Pier - CMB + Guardrail																						
	09 Bridge Pier - Water Filled Cushions																						
	10 Bridge Pier - Sand Filled Cells																						
	11 Bridge Pier - Steel Barrel																						
09 Utility Poles	12 Utility Pole - Breakaway	✓	✓	✓	✓	✓	✓	✓						✓	✓		✓	✓					
	13 Utility Pole - Removal	✓	✓	✓	✓	✓	✓	✓						✓	✓		✓	✓					
	14 Utility Pole - Relocate	✓	✓	✓	✓	✓	✓	✓						✓	✓		✓	✓					
10 Cross Median Accidents	15 Cross Median Accidents - CMB																						
	16 Cross Median Accidents - Double Face Guardrail																						

[1]All secondary roads (SR) are 2-lane roadways.

[2]All interstate highways (I) are 4-lane divided highways.

APPENDIX E

Example Analysis Procedure

As an aid to the user, Appendix E presents an example of an analysis procedure using the RHCP.

Situation

The user wishes to obtain information concerning the relative accident related benefits of implementing the following four hazard correction projects. This information is to be used in budgeting decisions:

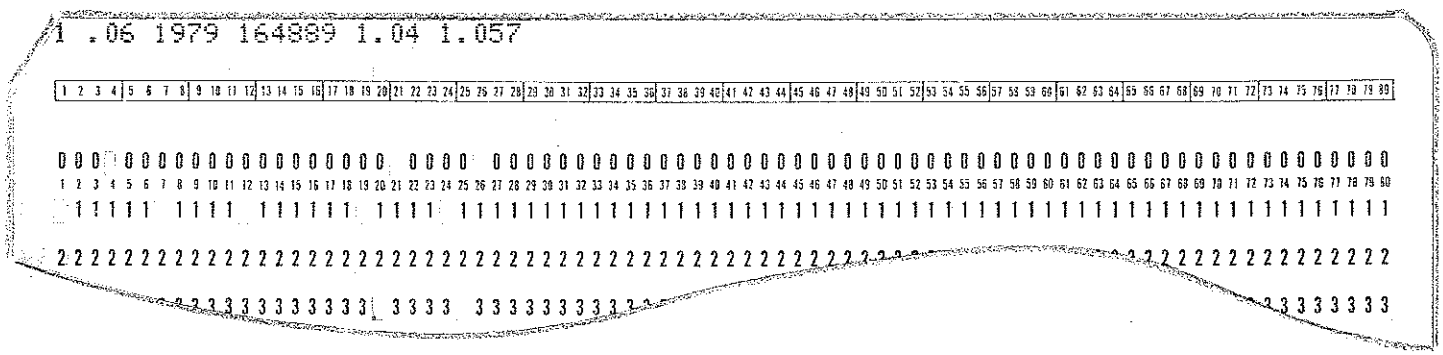
1. Providing breakaway cable terminals on guardrail ends on shoulders in rural 4-lane divided Interstates in Area (1).
2. Making sign supports breakaway on tangent segments of city streets in urban areas in Area (2).
3. Making utility poles breakaway on tangent and curve segments of rural U.S. and N.C. routes on a statewide basis.
4. Removing trees on curves in Area (2) on rural Interstate and U.S. routes.

These treatments are planned for installation in 1979 with a projected total of 164,889 accidents and an accident growth rate of 4 percent, an inflation factor of 5.7 percent, and an interest rate of 6 percent over the life of the treatments.

User Input Cards

Card 1

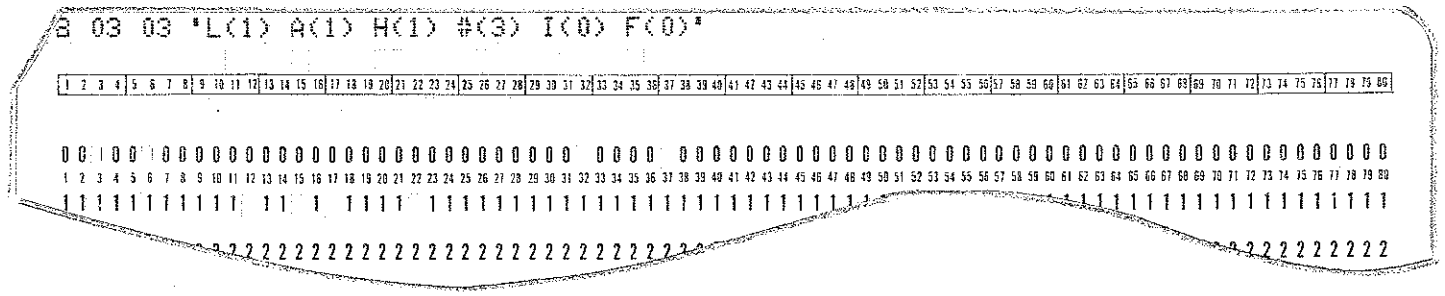
From the economic and traffic data above, card 1 is punched as shown below. The user should refer to Chapter 2, page 13 for a description of the format required.



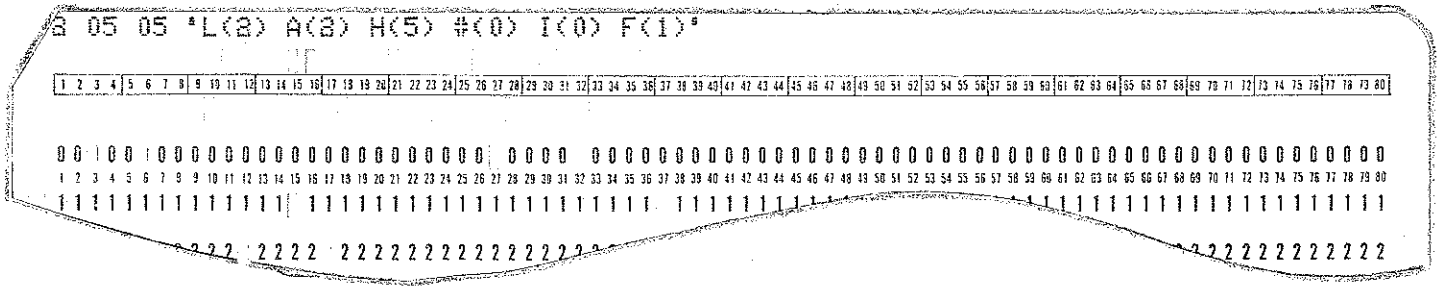
Card 2

Referring to Table 1, Chapter 2 and coding instructions on page 15, the following request cards are punched.

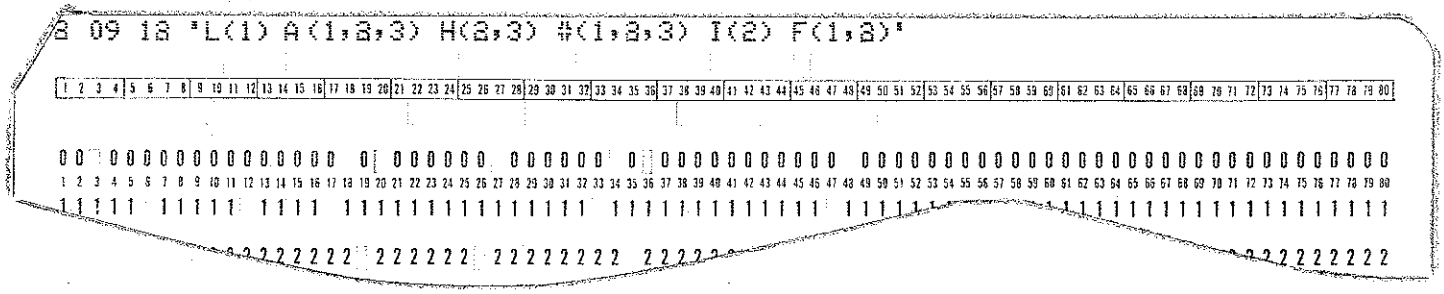
Request 1



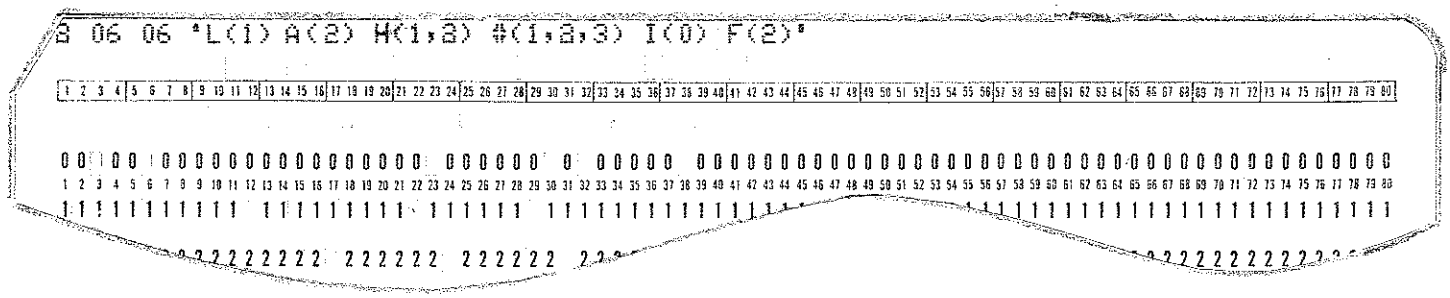
Request 2



Request 3



Request 4

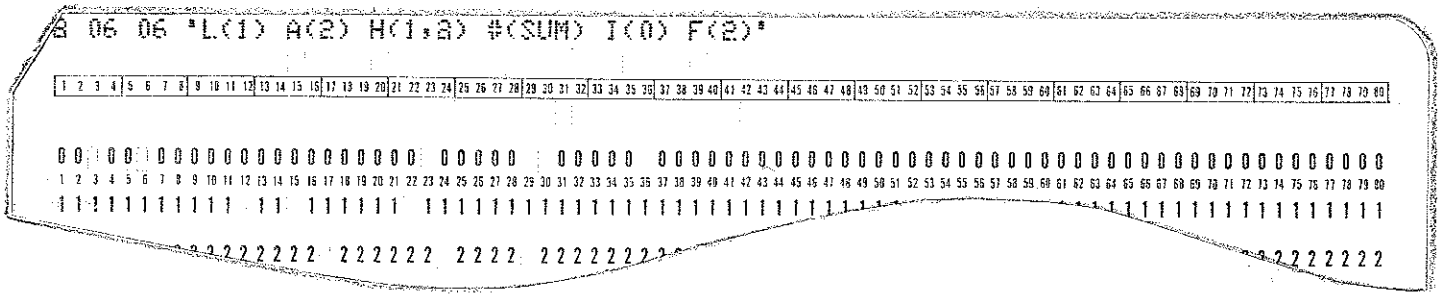


On submitting these requests along with the rest of the cards described in Chapter 3, Figure 2, three sets of tables, corresponding to the first three requests are printed while the fourth request generated the following error message.

```
MISSING ROW                0606121102
    HAZARD 06  TREATMENT 06  COMBINATION L(1) A(2) H(1,2) #(1,2,3) I(0) F(2)
CHECK INPUT CARD BELOW AND APPROPRIATE MATRIX ROW IN USER MANUAL APPENDIX A

INPUT CARD
HAZARD = 06    TREATMENT = 06
CODES = L(1) A(2) H(1,2) #(1,2,3) I(0) F(2)
```

Referring to Table D.1 in Appendix D, the user can observe that no data exists for 2-lane and 4-lane undivided Interstates. By referring to Chapter 5 and using the card below, the user can suppress the error message. Since the summary tables on the computer printout would not have included the fourth request, the user should then



resubmit the job including all four of the request cards. Tables E.1 - E.4 are the economic analysis results for the individual requests while Tables E.5 and E.6 show the four alternative programs ranked in descending order by annual benefits and benefit-cost ratio, respectively.

Table E-1. ACCIDENT REDUCTION TABLE (A)

PREDICTED ACCIDENTS = 164889
TRAFFIC GROWTH RATE = 1.0400
INFLATION FACTOR = 1.0570

STARTING YEAR : 1979

% FAT. REDUCED = 0.00
% INJ. REDUCED = 24.99
% PDO REDUCED = -14.99

(03 03) GUARDRAIL END - SHOULDER GUARDRAIL ENDS - BCT

LOC(1) AREA(1) HWY(1) #LANES(3) INT(0) FEATURES(0)

YEAR	NUMBER OF UNTREATED ACCIDENTS			NUMBER OF TREATED ACCIDENTS			NUMBER OF ACCIDENTS REDUCED		
	FATAL	INJURY	PDO	FATAL	INJURY	PDO	FATAL	INJURY	PDO
0	0.00	1.95	1.35	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	2.02	1.41	0.00	1.52	1.62	0.00	0.51	-0.21
2	0.00	2.10	1.46	0.00	1.58	1.68	0.00	0.53	-0.22
3	0.00	2.19	1.52	0.00	1.64	1.75	0.00	0.55	-0.23
4	0.00	2.28	1.58	0.00	1.71	1.82	0.00	0.57	-0.24
5	0.00	2.37	1.65	0.00	1.78	1.89	0.00	0.59	-0.25
6	0.00	2.46	1.71	0.00	1.85	1.97	0.00	0.62	-0.26
7	0.00	2.56	1.78	0.00	1.92	2.05	0.00	0.64	-0.27
8	0.00	2.66	1.85	0.00	2.00	2.13	0.00	0.67	-0.28
9	0.00	2.77	1.92	0.00	2.08	2.21	0.00	0.69	-0.29
10	0.00	2.88	2.00	0.00	2.16	2.30	0.00	0.72	-0.30
11	0.00	3.00	2.08	0.00	2.25	2.39	0.00	0.75	-0.31
12	0.00	3.12	2.16	0.00	2.34	2.49	0.00	0.78	-0.32
13	0.00	3.24	2.25	0.00	2.43	2.59	0.00	0.81	-0.34
14	0.00	3.37	2.34	0.00	2.53	2.69	0.00	0.84	-0.35
15	0.00	3.50	2.44	0.00	2.63	2.80	0.00	0.88	-0.37
						TOTAL :	0.00	10.13	-4.22

Table E-2 (cont.) ECONOMIC ANALYSIS TABLE (B)

NUMBER OF HAZARDS = 291.00 STARTING YEAR : 1979

(03 03) GUARDRAIL END - SHOULDER GUARDRAIL ENDS - BCT

LOC(1) AREA(1) HWY(1) #LANES(3) INT(0) FEATURES(0)

YEAR	TREATMENT COST ($)	ANNUAL MAINT COST ($)	ANNUAL REPAIR COST ($)	ACCIDENT BENEFITS ($)	PWORTH FACTOR @.06	PWORTH OF BENEFITS ($)	PWORTH OF COSTS ($)	PWORTH OF NET CASH FLOW ($)	CUMULATIVE BALANCE ($)
0	101850	0	0	0	1.0000	0	101850	-101850	-101850
1	0	0	1160	6909	0.9434	5424	0	5424	-96426
2	0	0	1275	7595	0.8900	5625	0	5625	-90802
3	0	0	1401	8349	0.8396	5833	0	5833	-84969
4	0	0	1541	9178	0.7921	6049	0	6049	-78919
5	0	0	1693	10089	0.7473	6273	0	6273	-72646
6	0	0	1862	11090	0.7050	6506	0	6506	-66140
7	0	0	2046	12191	0.6651	6747	0	6747	-59393
8	0	0	2250	13402	0.6274	6997	0	6997	-52396
9	0	0	2473	14732	0.5919	7256	0	7256	-45140
10	0	0	2718	16195	0.5584	7525	0	7525	-37615
11	0	0	2988	17803	0.5268	7804	0	7804	-29811
12	0	0	3285	19570	0.4970	8093	0	8093	-21717
13	0	0	3611	21513	0.4688	8393	0	8393	-13324
14	0	0	3970	23649	0.4423	8704	0	8704	-4620
15	0	0	4364	25997	0.4173	9027	0	9027	4406

THE NDPV = $ 4406

THE ANNUAL BENEFITS = $ 436

BENEFIT / COST RATIO = 1.043264

Table E-2. ACCIDENT REDUCTION TABLE (A)

PREDICTED ACCIDENTS = 164889 STARTING YEAR : 1979 % FAT. REDUCED = 67.99
TRAFFIC GROWTH RATE = 1.0400 % INJ. REDUCED = 23.99
INFLATION FACTOR = 1.0570 % PDO REDUCED = -13.99

(05 05) SIGNS AND LUMINAIRES SIGNS - BREAKAWAY

LOC(2) AREA(2) HWY(5) #LANES(0) INT(0) FEATURES(1)

YEAR	NUMBER OF UNTREATED ACCIDENTS			NUMBER OF TREATED ACCIDENTS			NUMBER OF ACCIDENTS REDUCED		
	FATAL	INJURY	PDO	FATAL	INJURY	PDO	FATAL	INJURY	PDO
0	0.95	51.20	137.48	0.00	0.00	0.00	0.00	0.00	0.00
1	0.99	53.25	142.98	0.32	40.47	162.99	0.67	12.78	-20.02
2	1.03	55.38	148.69	0.33	42.09	169.51	0.70	13.29	-20.82
3	1.07	57.59	154.64	0.34	43.77	176.29	0.73	13.82	-21.65
4	1.11	59.89	160.83	0.35	45.52	183.34	0.75	14.37	-22.52
5	1.15	62.29	167.26	0.37	47.34	190.68	0.78	14.95	-23.42
						TOTAL :	3.63	69.22	-108.42

Table E-2 (cont.) ECONOMIC ANALYSIS TABLE (B)

NUMBER OF HAZARDS = 12235.00 STARTING YEAR : 1979

(05 05) SIGNS AND LUMINAIRES SIGNS - BREAKAWAY

LOC(2) AREA(2) HWY(5) #LANES(0) INT(0) FEATURES(1)

YEAR	TREATMENT COST ($)	ANNUAL MAINT COST ($)	ANNUAL REPAIR COST ($)	ACCIDENT BENEFITS ($)	PWORTH FACTOR @.06	PWORTH OF BENEFITS ($)	PWORTH OF COSTS ($)	PWORTH OF NET CASH FLOW ($)	CUMULATIVE BALANCE ($)
0	1223500	0	0	0	1.0000	0	1223500	-1223500	-1223500
1	0	0	23693	275563	0.9434	237613	0	237613	-985887
2	0	0	26045	302921	0.8900	246418	0	246418	-739468
3	0	0	28631	332995	0.8396	255550	0	255550	-483919
4	0	0	31473	366054	0.7921	265020	0	265020	-218899
5	0	0	34598	402396	0.7473	274840	0	274840	55941

THE NDPV = $ 55941

THE ANNUAL BENEFITS = $ 11376

BENEFIT / COST RATIO = 1.045722

Table E-3. ACCIDENT REDUCTION TABLE (A)

PREDICTED ACCIDENTS = 164889
TRAFFIC GROWTH RATE = 1.0400
INFLATION FACTOR = 1.0570

STARTING YEAR : 1979

% FAT. REDUCED = 29.99
% INJ. REDUCED = -1.00
% PDO REDUCED = 0.00

(09 12) UTILITY POLES UTILITY POLES - BREAKAWAY

LOC(1) AREA(1,2,3) HWY(2,3) #LANES(1,2,3) INT(2) FEATURES(1,2)

YEAR	NUMBER OF UNTREATED ACCIDENTS			NUMBER OF TREATED ACCIDENTS			NUMBER OF ACCIDENTS REDUCED		
	FATAL	INJURY	PDO	FATAL	INJURY	PDO	FATAL	INJURY	PDO
0	12.63	241.54	296.47	0.00	0.00	0.00	0.00	0.00	0.00
1	13.14	251.20	308.33	9.20	253.71	308.33	3.94	-2.51	0.00
2	13.67	261.25	320.66	9.57	263.86	320.66	4.10	-2.61	0.00
3	14.21	271.70	333.49	9.95	274.42	333.49	4.26	-2.72	0.00
4	14.78	282.57	346.83	10.35	285.39	346.83	4.43	-2.83	0.00
5	15.37	293.87	360.70	10.76	296.81	360.70	4.61	-2.94	0.00
6	15.99	305.63	375.13	11.19	308.68	375.13	4.80	-3.06	0.00
7	16.63	317.85	390.14	11.64	321.03	390.14	4.99	-3.18	0.00
8	17.29	330.57	405.74	12.10	333.87	405.74	5.19	-3.31	0.00
9	17.98	343.79	421.97	12.59	347.23	421.97	5.39	-3.44	0.00
10	18.70	357.54	438.85	13.09	361.12	438.85	5.61	-3.58	0.00
						TOTAL :	47.33	-30.16	0.00

Table E-3 (cont.) ECONOMIC ANALYSIS TABLE (B)

NUMBER OF HAZARDS = 132068.00 STARTING YEAR : 1979

(09 12) UTILITY POLES UTILITY POLES - BREAKAWAY

LOC(1) AREA(1,2,3) HWY(2,3) #LANES(1,2,3) INT(2) FEATURES(1,2)

YEAR	TREATMENT COST ($)	ANNUAL MAINT COST ($)	ANNUAL REPAIR COST ($)	ACCIDENT BENEFITS ($)	PWORTH FACTOR @.06	PWORTH OF BENEFITS ($)	PWORTH OF COSTS ($)	PWORTH OF NET CASH FLOW ($)	CUMULATIVE BALANCE ($)
0	4754448	0	0	0	1.0000	0	4754448	-4754448	-4754448
1	0	0	150951	641107	0.9434	462411	0	462411	-4292037
2	0	0	165937	704756	0.8900	479547	0	479547	-3812490
3	0	0	182412	774724	0.8396	497317	0	497317	-3315173
4	0	0	200521	851639	0.7921	515746	0	515746	-2799428
5	0	0	220429	936189	0.7473	534858	0	534858	-2264570
6	0	0	242313	1029134	0.7050	554678	0	554678	-1709892
7	0	0	266370	1131307	0.6651	575232	0	575232	-1134660
8	0	0	292815	1243623	0.6274	596548	0	596548	-538112
9	0	0	321886	1367089	0.5919	618654	0	618654	80542
10	0	0	353843	1502814	0.5584	641579	0	641579	722122

THE NDPV = $ 722122

THE ANNUAL BENEFITS = $ 91560

BENEFIT / COST RATIO = 1.151883

Table E-4. ACCIDENT REDUCTION TABLE (A)

PREDICTED ACCIDENTS = 164889
TRAFFIC GROWTH RATE = 1.0400
INFLATION FACTOR = 1.0570

STARTING YEAR : 1979

% FAT. REDUCED = 49.99
% INJ. REDUCED = 24.99
% PDO REDUCED = -20.00

(06 06) TREES

TREES - REMOVAL

** LOC(1) AREA(2) HWY(1,2) #LANES(0,1,2,3) INT(0) FEATURES(2)

YEAR	NUMBER OF UNTREATED ACCIDENTS			NUMBER OF TREATED ACCIDENTS			NUMBER OF ACCIDENTS REDUCED		
	FATAL	INJURY	PDO	FATAL	INJURY	PDO	FATAL	INJURY	PDO
0	2.20	37.56	40.54	0.00	0.00	0.00	0.00	0.00	0.00
1	2.29	39.07	42.16	1.14	29.30	50.59	1.14	9.77	-8.43
2	2.38	40.63	43.84	1.19	30.47	52.61	1.19	10.16	-8.77
3	2.48	42.25	45.60	1.24	31.69	54.72	1.24	10.56	-9.12
4	2.57	43.94	47.42	1.29	32.96	56.91	1.29	10.99	-9.48
5	2.68	45.70	49.32	1.34	34.28	59.18	1.34	11.43	-9.86
6	2.79	47.53	51.29	1.39	35.65	61.55	1.39	11.88	-10.26
7	2.90	49.43	53.34	1.45	37.07	64.01	1.45	12.36	-10.67
8	3.01	51.41	55.48	1.51	38.56	66.57	1.51	12.85	-11.10
9	3.13	53.46	57.70	1.57	40.10	69.24	1.57	13.37	-11.54
10	3.26	55.60	60.00	1.63	41.70	72.01	1.63	13.90	-12.00
						TOTAL :	13.74	117.26	-101.23

Table E-4 (cont.) ECONOMIC ANALYSIS TABLE (B)

NUMBER OF HAZARDS = 11718.00 STARTING YEAR : 1979

(06 06) TREES TREES - REMOVAL

** LOC(1) AREA(2) HWY(1,2) #LANES(0,1,2,3) INT(0) FEATURES(2)

YEAR	TREATMENT COST ($)	ANNUAL MAINT COST ($)	ANNUAL REPAIR COST ($)	ACCIDENT BENEFITS ($)	PWORTH FACTOR @.06	PWORTH OF BENEFITS ($)	PWORTH OF COSTS ($)	PWORTH OF NET CASH FLOW ($)	CUMULATIVE BALANCE ($)
0	351540	0	0	0	1.0000	0	351540	-351540	-351540
1	0	0	0	325618	0.9434	307187	0	307187	-44353
2	0	0	0	357945	0.8900	318570	0	318570	274217
3	0	0	0	393482	0.8396	330375	0	330375	604592
4	0	0	0	432547	0.7921	342618	0	342618	947209
5	0	0	0	475490	0.7473	355314	0	355314	1302523
6	0	0	0	522697	0.7050	368481	0	368481	1671004
7	0	0	0	574590	0.6651	382135	0	382135	2053139
8	0	0	0	631635	0.6274	396296	0	396296	2449435
9	0	0	0	694344	0.5919	410981	0	410981	2860416
10	0	0	0	763279	0.5584	426211	0	426211	3286627

THE NDPV = $ 3286627

THE ANNUAL BENEFITS = $ 416721

BENEFIT / COST RATIO = 10.349226

Summary Tables

Table E.5 shows the four programs ranked by annual benefits, while Table E.6 shows the programs ranked by benefit-cost ratio. While in this case both tables ranked the programs in the same order, this is not always the case. When differences exist, current economic thinking would recommend relying more heavily on the annual benefits ranking.

From Tables 5 and 6 the user can observe that project (4) - removing trees on curves in Area (2) on rural Interstate and U.S. routes - has the highest return, while project (1) - providing breakaway cable terminals on guardrail ends on shoulders in rural 4-lane divided Interstates in Area (1) - has the lowest returns. All four projects are shown to pay off and to have benefit-cost ratios greater than 1.00. If sufficient funds existed, all four projects could be implemented with at least some indication that each safety dollar spend would result in at least one dollar of accident related benefit. If only limited funds exist, the administrator now has an indicator of vehicle project(s) which will provide the greatest return for his investment.

Table E-5.

RANKING BY ANNUAL BENEFITS (NDPV)

RANK	TITLE (HAZARD,TREATMENT ETC.)		ANNUAL BENEFITS	BENEFIT / COST RATIO	TREATMENT COST ($)
1 (06 06)	TREES ** LOC(1) AREA(2) HWY(1,2) #LANES(0,1,2,3) INT(0) FEATURES(2)	TREES - REMOVAL	416721	10.349226	351540
2 (09 12)	UTILITY POLES LOC(1) AREA(1,2,3) HWY(2,3) #LANES(1,2,3) INT(2) FEATURES(1,2)	UTILITY POLES - BREAKAWAY	91559	1.151883	4754448
3 (05 05)	SIGNS AND LUMINAIRES LOC(2) AREA(2) HWY(5) #LANES(0) INT(0) FEATURES(1)	SIGNS - BREAKAWAY	11376	1.045722	1223500
4 (03 03)	GUARDRAIL END - SHOULDER LOC(1) AREA(1) HWY(1) #LANES(3) INT(0) FEATURES(0)"	GUARDRAIL ENDS - BCT	436	1.043264	101850

Table E-6.

RANKING BY BENEFIT / COST RATIO

RANK	TITLE (HAZARD,TREATMENT ETC.)		ANNUAL BENEFITS	BENEFIT / COST RATIO	TREATMENT COST($)
1 (06 06)	TREES ** LOC(1) AREA(2) HWY(1,2) #LANES(0,1,2,3) INT(0) FEATURES(2)	TREES - REMOVAL	416721	10.349226	351540
2 (09 12)	UTILITY POLES LOC(1) AREA(1,2,3) HWY(2,3) #LANES(1,2,3) INT(2) F EATURES(1,2)	UTILITY POLES - BREAKAWAY	91559	1.151883	4754448
3 (05 05)	SIGNS AND LUMINAIRES LOC(2) AREA(2) HWY(5) #LANES(0) INT(0) FEATURES(1)	SIGNS - BREAKAWAY	11376	1.045722	1223500
4 (03 03)	GUARDRAIL END - SHOULDER LOC(1) AREA(1) HWY(1) #LANES(3) INT(0) FEATURES(0)	GUARDRAIL ENDS - BCT	436	1.043264	101850