PROJECT REPORT

HIGHWAY SAFETY IMPROVEMENTS THROUGH UTILIZATION OF MERGED ACCIDENT AND ROADWAY DATA

Volume II

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INTRODUCTION

Volume I presents the project accomplishments in three sections entitled SYSTEM DESIGN, SYSTEM IMPLEMENTATION, and RECOMMENDATIONS.

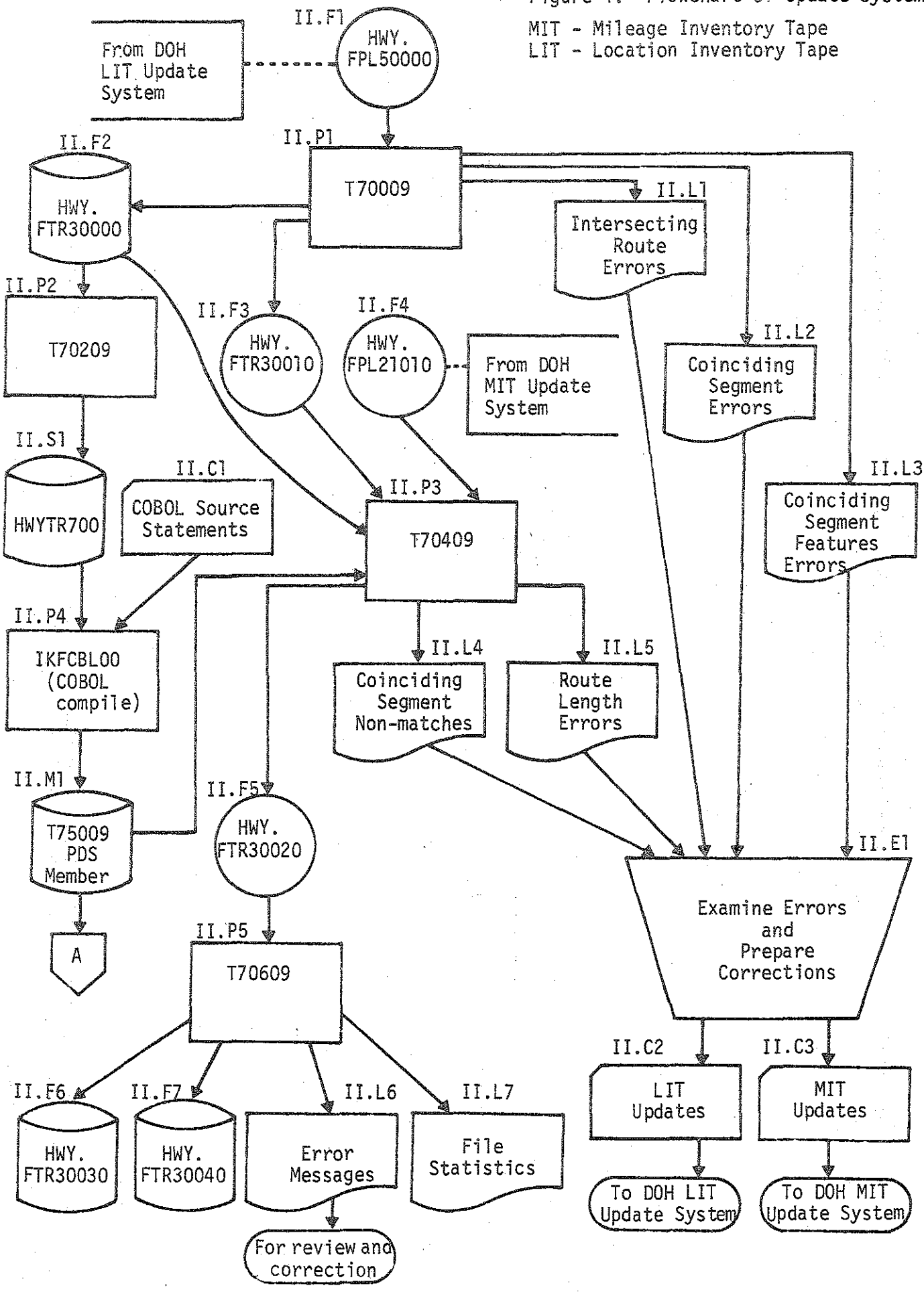
Volume II presents detailed user documentation in three main sections. The first section is entitled UPDATE SYSTEM and describes the update procedures for updating the system data files. The second section, OPERATIONAL SYSTEM, gives a detailed description of the computer programs in the Operational System and their interrelationships. The final section is entitled USER PROGRAMS and documents the user programs produced by HSRC as part of this project.

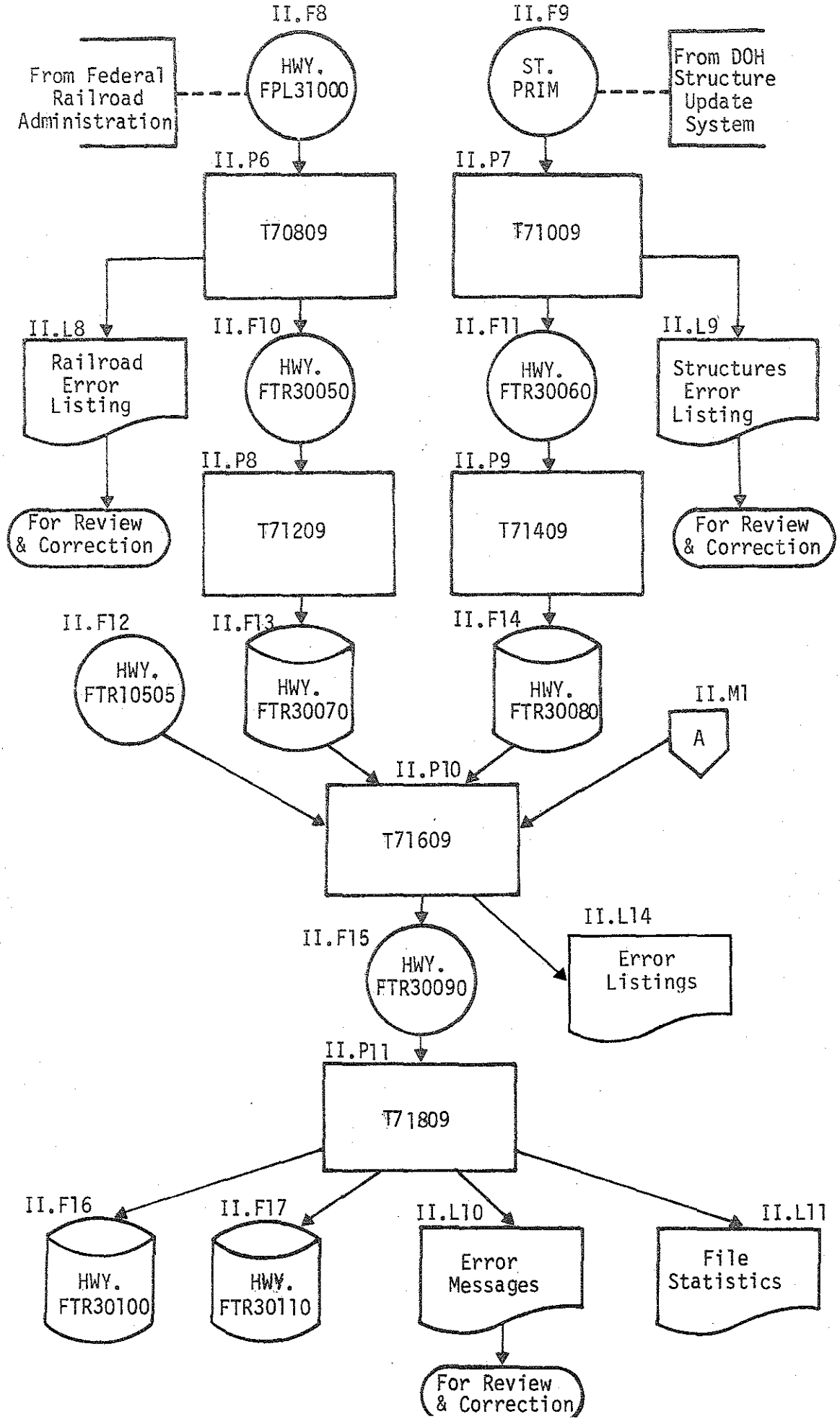
Update System

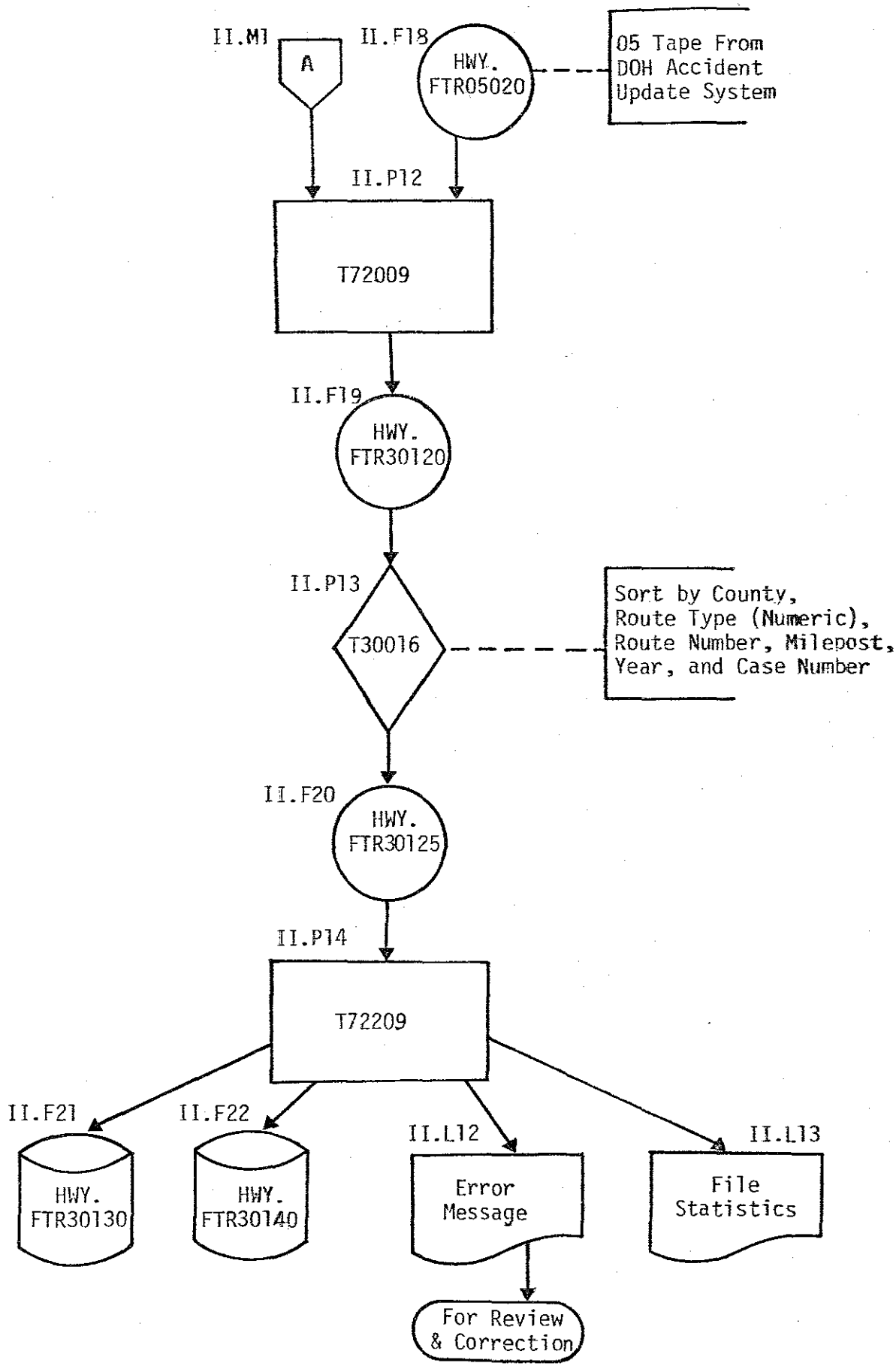
This section presents documentation of the Update System including program write-ups, file descriptions, JCL requirements and any special instructions pertinent to the usage of specific programs. The Update System flowchart (Figure 1) shows the relationship of various components within the system. Additionally, an initial section showing the data file and data file index organization is included.

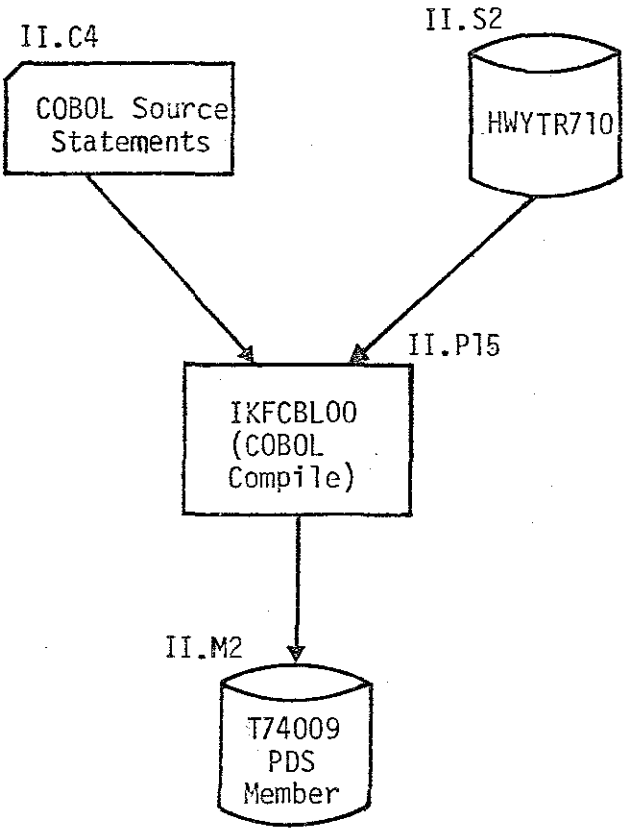
Figure 1. Flowchart of Update System.

MIT - Mileage Inventory Tape
LIT - Location Inventory Tape




II.F8
From Federal Railroad Administration
HWY. FPL31000
II.F9
ST. PRIM
From DOH Structure Update System
II.P6
T70809
II.P7
T71009
II.L8
Railroad Error Listing
II.F10
HWY. FTR30050
II.F11
HWY. FTR30060
II.L9
Structures Error Listing
For Review & Correction
II.P8
T71209
II.P9
T71409
For Review & Correction
II.F12
HWY. FTR10505
II.F13
HWY. FTR30070
II.F14
HWY. FTR30080
II.M1
A
II.P10
T71609
II.L14
Error Listings
II.F15
HWY. FTR30090
II.P11
T71809
II.F16
HWY. FTR30100
II.F17
HWY. FTR30110
II.L10
Error Messages
II.L11
File Statistics
For Review & Correction


II.M1
A
II.F18
HWY.
FTR05020
05 Tape From
DOH Accident
Update System
II.P12
T72009
II.F19
HWY.
FTR30120
II.P13
T30016
Sort by County,
Route Type (Numeric),
Route Number, Milepost,
Year, and Case Number
II.F20
HWY.
FTR30125
II.P14
T72209
II.F21
HWY.
FTR30130
II.F22
HWY.
FTR30140
II.L12
Error
Message
II.L13
File
Statistics
For Review
& Correction


II.C4
COBOL Source Statements
II.S2
HWYTR710
II.P15
IKFCBL00 (COBOL Compile)
II.M2
T74009 PDS Member

Data File and Data File Index Organizations - Files HWY.FTR30030, HWY.FTR30100, FTR30130; Indexes HWY.FTR30040, HWY.FTR30110, HWY.FTR30140

This section describes the organization of the system data files (Features, Segment Characteristics and Accident Files) and their indexes. Prime considerations in determining the structure and organization of the data files and their indexes were the minimization of core space required to contain the indexes, disk space needed to store the data files and the number of data accesses (channel activity) needed to retrieve data. Standardization of the files and indexes so a standard retrieval module could be used for entire system was also considered as a prime objective.

File organization. (see Figure 2)

Each data file is arranged by county, route, and milepost in a direct access disk file using a relative track data organization. A physical record consists of one track and may contain data for one or more county-routes. If a county-route's data are longer than one track, it will be continued on contiguous tracks.

As tracks are written during the file creation process, the amount of unused space on each track is recorded. When all data for a county-route have been assembled, the file creation program checks to see if it will fit in the unused portion of any previously written track. If it will, the proper track is retrieved, updated, and rewritten, with the unused space notation for that track changed accordingly. If it will not fit on any available track, the data are placed on a new track and its unused space recorded.

The input data are arranged so that the information for county-routes having the most data are processed first. This insures the optimal use of disk storage space by minimizing the amount of unused space on each track. However, there may still be some unused space on most tracks. To eliminate this unused space, it would be necessary to continue data for county-routes over track boundaries even when it could be contained on a single track. This would increase the size of the index required for each file and cause more data accesses to be made to retrieve a given block of data.

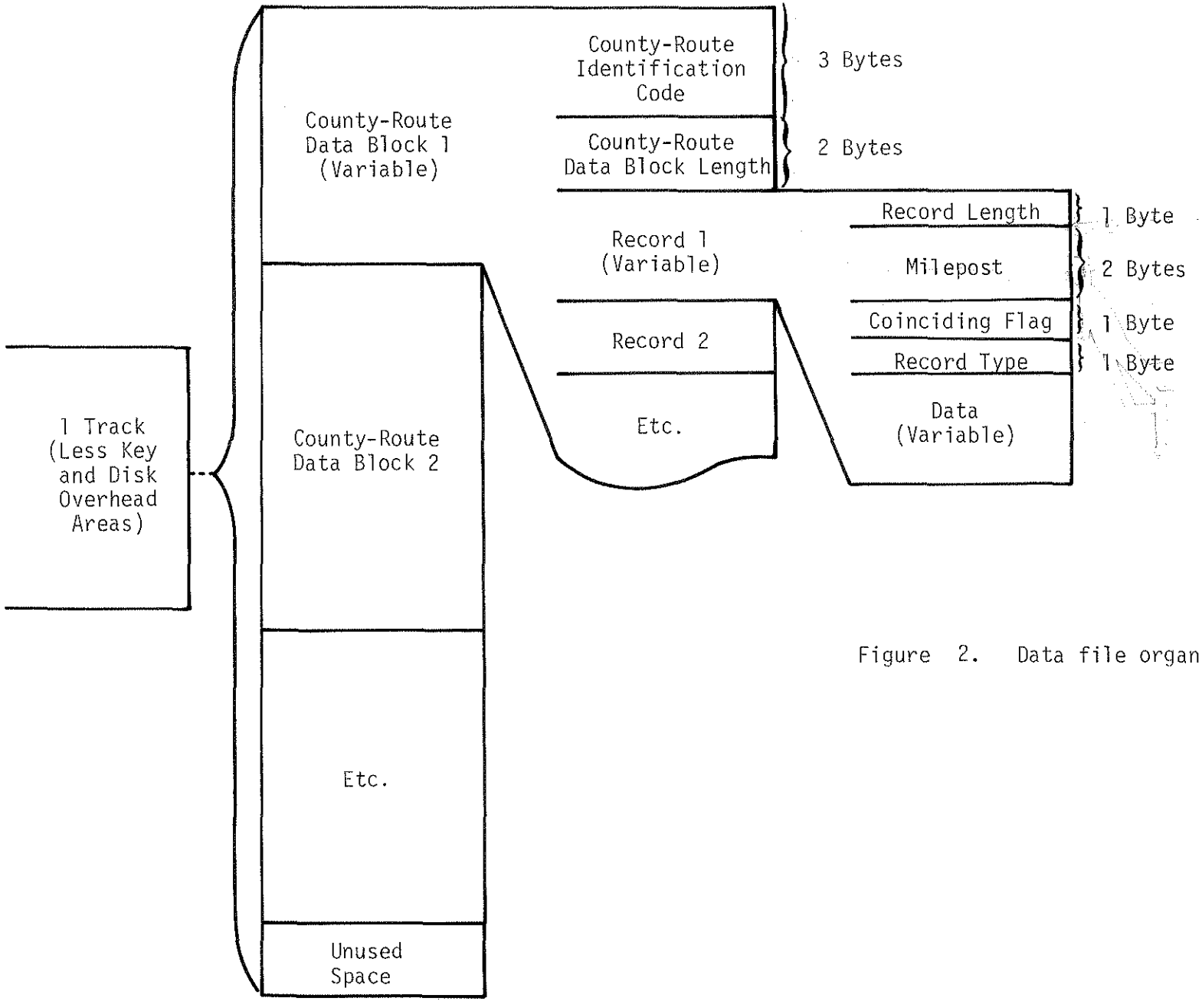


Figure 2. Data file organization.

Index organization. (see Figure 3)

To provide an efficient method for locating data and yet describe the data files thoroughly enough to provide efficient file access, it was necessary to structure the data file indexes in two levels. The first level contains one entry for each county-route identifier, the position of the first Level II entry for this county-route's data, and the number of Level II entries describing this data.

Level I is normally accessed using a binary search technique; however it is accessed sequentially for certain data requests (e.g., the request for all data on a certain county).

The second index level contains one entry for each county-route data block in the file the index describes (see Figure 2). Each Level II entry contains the ending milepost for the data in the block defined and the relative track number for the track containing the data block.

Using the Level II information, it is possible to go directly into the data files and retrieve the information for any county-route milepost on the file with only one disk access.

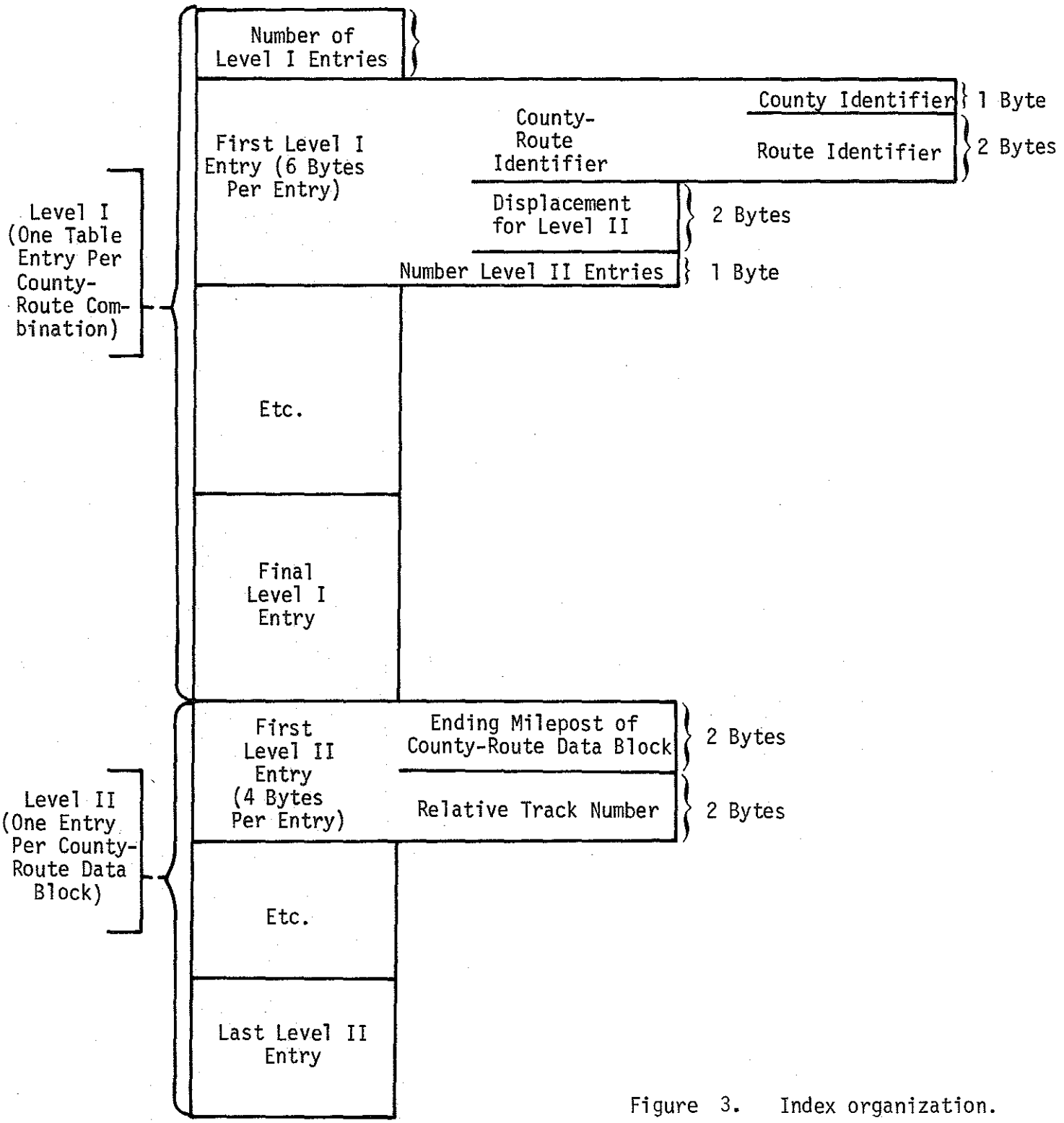


Figure 3. Index organization.

Individual write-ups with file descriptions for input and output follow for all programs of the Update System.

Please note that the callable modules COINRT (T75009) must be recompiled with current coinciding segment data prior to executing either T70409, T71609, or T72009. This requires the following sequence of steps:

1) Execute T70009 with new location inventory tape to generate new coinciding segment file.

2) Execute T70209 to convert coinciding segment file to COBOL source statement.

3) Compile T75009 with COB.SYSLIB DD statement to identify the library containing the member HWYTR700.

4) Execute all other programs of Update System.

SUBJECT: EDITLIT (T70009)

AUTHOR: Elizabeth Hamilton

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program processes the location inventory file (HWY.FPL50000) county by county and does the following:

1. Computes milepost for each record
2. Verifies that all intersections and section cards refer to inventoried county routes
3. Extracts the begin and end milepost of every coinciding route pair and then matches the two halves to create a coinciding segment record with unknown direction of mileposting
4. Uses the created coinciding segment records to extract all inventory records on the common section of pavement and determines direction of mileposting by sorting and matching the two extracts.

USAGE: I. Input

Location inventory File

The input data file is the planning version of the location inventory file prepared by the North Carolina Division of Highways (HWY.FPL50000) and is input through DDNAME = LITFILE.

```
// LITFILE DD UNIT=TAPE,VOL=SER=TAPENN,DSN=HWY.FTR50000,
//  DISP=OLD
```

II. OUTPUTS

A. Route Length File

The total length of every county route in this inventory is computed and output through DDNAME = ROUTES. A format of this file is attached.

```
// ROUTES DD DSN=HWY.FTR30010,DISP=(NEW,KEEP)
```

B. Coinciding Segment File

Information about coinciding segments is output through DDNAME = SEGFILE. A format of this file is attached.

```
// SEGFILE DD DSN=HWY.FTR30000,DISP=(NEW,KEEP)
```

C. Report of Unknown Routes

All routes mentioned on item cards and section cards in the input file which do not refer to inventoried county routes are listed through DDNAME = MSGS.

```
// MSGS DD SYSOUT=A,DCB=BLKSIZE=120
```

D. Report of Coinciding Segment Inconsistencies

In the determination of direction of mileposting, two descriptions of the coinciding segment are extracted from the input file and compared. Inventory records are matched on location and description and the percent match is computed for both forward and reverse directions. The direction of mileposting is assigned when percent match is at least 80%. Whenever the two descriptions of the segment differ, the mismatched records are listed through DDNAME = MATCH.

```
// MATCH DD SYSOUT=A,DCB=BLKSIZE=80
```

E. Error Messages

Any other messages are output through DDNAME = SYSOUT.

```
// SYSOUT DD SYSOUT=A
```

HWY.FPL50000

LOCATION INVENTORY (MILEPOST) FORMATS

1. Item Card - Interstate Routes
   US Routes
   NC Routes
   SR Routes
   Center of Town or City
   County Line
   State Line
   City Limits
2. Item Card - Bridge (Structures)
3. Item Card - Railroad
4. County Card - Begin and End
5. Route Card - Begin and End
6. Section Card - Coinciding Routes

ITEM CARD

Position	Description	Code
1-6	Identification Number	
7	Type Record - Item	I
8-12	Item Codes	
8	Item Identification Code	
	Interstate	1
	US	2
	NC	3
	Secondary Road	4
	Center of City or Town	5
	County Line	7
	State Line	8
	City Limit	9
9-12	Item Identification	
	Interstate, US and NC Routes Codes in Same Manner as Routes on Route Cards	
	Secondary Roads - Four Digit Secondary Road	
	Town City Limit or Center of City-Two Digit County Code Plus Two Digit Town Code	
	County Line - Two Digit County Code for Adjoining County Followed by Two Blanks	
	State Line - One Digit Code for Adjoining State Followed by Three Blanks	
	Georgia	6
	South Carolina	7
	Tennessee	8
	Virginia	9

Position	Description	Code
13-16	Distance to Next Item to Nearest Hundredth of Mile	
17	Direction to Next Item	
	North & East	5
	North & West	6
	South & East	7
	South & West	8
18	Intersection	
	Grade Separation - No Ramps	1
	Interchange	2
	At Grade Intersection - 3 Legs	3
	At Grade Intersection - 4 Legs	4
	At Grade Intersection - 5 Legs	5
19	Loop Condition	
	Yes if Item Loops & Intersects Route Again	Y
	No	N
20	Area	
	Rural	R
	Urban	U
	(This code is for the next Segment of Road as you Advance along Route)	

BRIDGE CARD

Position	Description	Code
1-6	Identification Number	
7	Type Record - Item	I
8-12	Item	
	Culvert	CLV
	Tunnel	TUN
	Bridge	BRG
	Overhead Sign	OS
	Pedestrian Overpass	PO
13-16	Distance to Next Item to Nearest Hundredth of Mile	
17-28	Bridge Number (from Bridge Record File)	
17	Type Code	
	RC Culvert	C
	Ferry (No Other Number)	F
	City Street (Overhead)	H
	Miscellaneous (Utilities, pipes, etc.)	M
	Pipe Culvert	P
	Railroad (Overhead)	R
	Sign (Overhead)	S
	Vehicular Tunnel	T
	Pedestrian Walkway (Overhead)	W
	Bridge	BLANK
18-21	Route Number	
22-24	County Number	
25-27	Bridge Number	

Position	Description	Code
28	Traffic Lane	
29-33	Route Number (Milepost Record)	
34	Traffic Lane (Milepost Record)	
35	Number of Times Same Bridge is Listed	
36-46	Description	
36	Over	O
	Under	U
37-46	Name or Route Number of Item Crossed	

RAILROAD CARD

Position	Description	Code
1-6	Identification Number	
7	Type Record - Item	I
8-12	Item - Railroad	RRD
13-16	Distance to Next Item to Nearest Hundredth of Mile	
17	Blank	
18-27	Railroad ID Number	
28	Blank	
29-33	Milepost Route	
34	Blank	
35	Number of Times the Same Crossing is Listed	
36	Blank	
37-46	Railroad Company	

NOTE: Positions 18-46 Not in Record at Present Time

COUNTY CARD

Position	Description	Code
1-6	Identification Number	
7	Type Record - County Card	C
8	Begin County	B
	End County	E
9-10	County Number	00-99
11-14	County Name - Four Letter Abbreviation	

SECTION CARD

Position	Description	Code
1-6	Identification Number	
7	Type Record - Section	S
8	Blank	
9	No Coinciding Routes for Preceding Section	N
9-13	1st Coinciding Route	
14-18	2nd Coinciding Route	
19-23	3rd Coinciding Route	
24-28	4th Coinciding Route	
29-33	5th Coinciding Route (Routes Coded Same as Positions 9-13 Route Card)	

ROUTE CARD

Position	Description	Code
1-6	Identification Number	
7	Route Card	R
8	Begin Route	B
	End Route	E
9-13	Route Number	
9	Route Type	
	Interstate	1
	US	2
	NC	3
10	Special Routes	
	Alternate or "A" Route	
	Business	+
	East (US 19E only)	2
	West (US 19W only)	4
11-13	Route Number	
	(Right justified with leading blanks)	
14-18	Beginning Milepost for Route (usually 00000)	

FILE NAME: Location Inventory (Milepost-Planning) DATE

RECORD: 50 RETENSION:

BLOCKING: 50000 BACKUP:

SEQUENCE:

Section Card			Item Card		
1		Identification Number	1		Identification Number
2			2		
3			3		
4			4		
5			5		
6			6		
7		Type Record	7		Type Record
8		Blank	8		Item
9		1st Coinciding Route	9		
10			10		
11			11		
12			12		
13			13		Distance
14		2nd Coinciding Route	14		
15			15		
16			16		
17			17		Direction
18			18		Intersection
19		3rd Coinciding Route	19		Loop
20			20		Area
21			21		
22			22		
23			23		
24		4th Coinciding Route	24		
25			25		
26			26		
27			27		
28			28		
29		5th Coinciding Route	29		
30			30		
31			31		
32			32		
33			33		
34			34		

FILE NAME: Location Inventory (Milepost-Planning) DATE

Section Card

35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	

Item Card

35	
36	
37	
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	

FILE NAME: Location Inventory (Milep st-Planning) DATE

RECORD: 50 RETENSION:

BLOCKING: 5000 BACKUP:

SEQUENCE:

Bridge Card					Railroad Card		
1		Identification Number			1		Identification Number
2					2		
3					3		
4					4		
5					5		
6					6		
7		Type Record			7		Type Record
8		Item			8		Item
9					9		
10					10		
11					11		
12					12		
13		Distance			13		Distance
14					14		
15					15		
16					16		
17		Type Code	Bridge Number		17		Railroad ID Number
18		Route			18		
19					19		
20					20		
21					21		
22		County Number			22		
23					23		
24					24		
25		Bridge Number			25		
26					26		
27					27		
28		NSEW-R			28		
29		Milepost Route			29		Milepost Route
30					30		
31					31		
32					32		
33					33		
34		NSEW-R			34		Blank

FILE _____ DATE _____

Bridge Card				Railroad			
35		Sequence Number		35		Sequence Number	
36		Over-Under		36		Blank	
37		Name or Route No.	Description	37		Railroad Company	
38				38			
39				39			
40				40			
41				41			
42				42			
43				43			
44				44			
45				45			
46				46			
47				47			
48				48			
49				49			
50				50			

FILE NAME: Location Inventory (Milepost-Planning) DATE

RECORD: 50 RETENTION:

BLOCKING: 5000 BACKUP:

SEQUENCE:

County Card

1		Identification Number
2		
3		
4		
5		
6		
7		Type Record
8		Begin or End
9		County Number
10		
11		County Name
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		

Route Card

1		Identification Number
2		
3		
4		
5		
6		
7		Type Record
8		Begin or End
9		Route Number
10		
11		
12		
13		
14		Begin Milepost
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		

Location Inventory (Milepost-Planning)

DATE

County Card		Route Card	
35		35	
36		36	
37		37	
38		38	
39		39	
40		40	
41		41	
42		42	
43		43	
44		44	
45		45	
46		46	
47		47	
48		48	
49		49	
50		50	

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File
PROJECT: Merge UNC.HSR.F292H

Purpose:

This file resulted from analysis of information on North Carolina Department of Transportation Location Inventory Tape. The purpose is to systematize the information about all coinciding routes. Each record refers to a pair of coinciding routes. If more than two routes are coinciding on the same roadway, then this file will have a record for each possible pair.

Sorting:

Records are sorted in ascending order by County, Lo Route, Lo Milepost, Hi Route

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File

POSITION	DESCRIPTION	VALUE
1-2	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey County "99"
3-6	Low Route	Zoned Decimal
(3)	Route Type	1 - Interstate 2 - US 3 - NC 4 - SR
(4)	Route Subtype	0 - Regular state highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(5-7)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number coded in position 4-7)
8-11	Low Milepost	Zoned decimal (hundredths of mile) Smallest milepost number on low order route that refers to this

(Continued on next page)

POSITION	DESCRIPTION	VALUE
8-11 continued		coinciding route segment
12-15	Coinciding Segment Length	Zoned Decimal Length in hundredths of mile that these two routes coincide
16-20 (15)	High Order Route Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
(17)	Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(18-20)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number in position 17-23)
21-24	High milepost	Zoned Decimal (hundredth of route) Smallest milepost number of high route milepost sequence that refers to this coinciding route segment
25-28	High Last Milepost	Zoned Decimal (hundredth of mile) Largest milepost of high route sequence that refers to this coinciding route segment
29	Direction of Mileposting	Character blank - Unknown S - Same direction for this pair R - Reverse direction for this pair (Only known for these coinciding pairs having common cards on Mileage Inventory File)
30	Length Error Flag	Character Blank - "Good data" L - Unequal segment lengths

DSN=HWY.FTR30010

PROGRAMMER: Hamilton
PROJECT: Merge UNC.HSR.F292H
KEY WORD: County Route Length File

Purpose:

This file contains one record for each county route inventoried on the North Carolina Department of Transportation Location Inventory Tape. (HWY.FPL50000)

POSITION	DESCRIPTION	VALUE
1-2	County Number	Zoned Decimal Beginning with Alamance Co. "00" North Carolina counties are numbered consecutively through Yancey County "99"
3-7	Route	Zoned Decimal
(3)	Route type	1 - Interstate 2 - US 3 - NC 4 - SR
(4)	Route subtype	0 - Regular state highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(5-7)	Route Number	leading zeroes
8-11	Route Length	Zoned Decimal Total length of county route in hundredths or miles
12	(Blank - future development)	

SUBJECT: BINTABLE (T70209)

AUTHOR: Elizabeth Hamilton

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program sorts the coinciding segment file and converts the information to a COBOL Source Library Dataset for input to the compile step on COINRT (T75009). The maximum number of coinciding segments allowed is 999.

USAGE:

I. Input

The coinciding segment file generated from the editing of the location inventory file (program EDITLIT - T70009) is input to this program through DDNAME = INPUT.

The following is an example DD statement for this file:

```
//INPUT DD UNIT=TAPE,VOL=SER=TAPENN,DISP=OLD,
//   DSN=HWY.FTR30000
```

II. Sort Files -- The IBM program product SM1. Sort is used to sort the input file.

a. The proper sort package is identified to the system by STEPLIB and SORTLIB, for example.

```
//STEPLIB DD DSN=SYS1.SM1.LINKLIB,DISP=SHR
//SORTLIB DD DSN=HWY.SORTLIB,DISP=SHR
```

b. Sort Message File

```
//SORTMSGS DD SYSOUT=A
```

c. Sort Work Files

```
//SORTWK01 DD UNIT=SYSDA,SPACE=(CYL,(10),,CONTIG)
//SORTWK02 DD UNIT=SYSDA,SPACE=(CYL,(10),,CONTIG)
//SORTWK03 DD UNIT=SYSDA,SPACE=(CYL,(10),,CONTIG)
```

III. OUTPUTS

a. Source Lib Dataset

The information in coinciding segment file is converted to Binary and stored in two tables (a detailed description of these tables is attached). This information is output in the form of COBOL source library statements to a Dataset to be used in the compile step of the COINRT program. (T75009)

This output is through DDNAME = SOURCE and consists of COBOL filler statements with value clauses.

```
//SOURCE DD DSN=DMV.MACLIB(HWYTR700),DISP=OLD
```

b. Processing Statistics

A count to the total number of coinciding segments processed is displayed on DDNAME = SYSOUT. The data definition statement needed is:

```
//SYSOUT DD SYSOUT=A
```

Example of Output:

Total-Count = NNNN.

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File
PROJECT: Merge UNC.HSR.F292H

Purpose:

This file resulted from analysis of information on North Carolina Department of Transportation Location Inventory Tape. The purpose is to systematize the information about all coinciding routes. Each record refers to a pair of coinciding routes. If more than two routes are coinciding on the same roadway, then this file will have a record for each possible pair.

Sorting:

Records are sorted in ascending order by County, Lo Route, Lo Milepost, Hi Route

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File

POSITION	DESCRIPTION	VALUE
1-2	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey County "99"
3-6	Low Route	Zoned Decimal
(3)	Route Type	1 - Interstate 2 - US 3 - NC 4 - SR
(4)	Route Subtype	0 - Regular state highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(5-7)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number coded in position 4-7)
8-11	Low Milepost	Zoned decimal (hundredths of mile) Smallest milepost number on low order route that refers to this

(Continued on next page)

POSITION	DESCRIPTION	VALUE
8-11 continued		coinciding route segment
12-15	Coinciding Segment Length	Zoned Decimal Length in hundredths of mile that these two routes coincide
16-20 (15)	High Order Route Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
(17)	Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(18-20)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number in position 17-23)
21-24	High milepost	Zoned Decimal (hundredth of route) Smallest milepost number of high route milepost sequence that refers to this coinciding route segment
25-28	High Last Milepost	Zoned Decimal (hundredth of mile) Largest milepost of high route sequence that refers to this coinciding route segment
29	Direction of Mileposting	Character blank - Unknown S - Same direction for this pair R - Reverse direction for this pair (Only known for these coinciding pairs having common cards on Mileage Inventory File)
30	Length Error Flag	Character Blank - "Good data" L - Unequal segment lengths

This partitioned data set member will reside on a source library such as DMV.MACLIB as COBOL source statements for copy into compile step of T75009. Described below is the contents of the COBOL value constant for a table entry.

Coinciding Segment Tables
Binary Format

Programmer=Hamilton
Researcher=Council
Project=N.C.Merge Project

Purpose: This structure contains information about coinciding segments for the State of North Carolina. This information is extracted from the Location Inventory file and must be updated whenever this file is changed.

This information can be used to determine the coinciding route status of a particular county, route, milepost.

For those entires with no length error and identified direction of mileposting, both the identity and position of coinciding routes can be determined.

This describes the table structure within T70209 work area. After these tables are completed, the information is converted to COBOL source statistics and written through DDNAME=SOURCE.

Structure Organization: This structure is internal to the working stroage of the program that prepares COBOL source library statements for the COINRTE module.

The structure consists of two tables. Information in Table 1 can be used for efficient access to the information in Table 2.

Table 1 contains an offset and count for each North Carolina county. The entire table is fixed length, 800 bytes total. For each county:

Position 1-4 Offset (or index of first entry for this county in table 2	USAGE IS INDEX
Position 5-8 Count of number of entries for this county in table 2	BINARY FULLWORD

If a county has no coinciding segment entries, both offset and count will be zero.

Table 2 is variable length (max # entries=999) Each entry refers to a coinciding route pair. Each entry is 14 bytes long and binary.

Entries in Table 2 are sorted on county, high route, milepost (positions 1 thru 5) in ascending order.

Each 14 byte entry in table 2 contains information about one route pair:

POSITION	DESCRIPTION	VALUE
1	County Number	Binary for 2 digit standard number 00 for Alamance Co. 99 for Yancey Co.
2-3	Route Number High Route	Binary for the 5 digit route number 1st digit route type 1 = Interstate 2 = US 3 = NC 4 = SR 5 = Other 2nd digit route subtype 0 = Normal listing 1 = Alternate 2 = Business 3 = North 4 = South 5 = East 6 = West 7 = Truck 8 = Spur 3rd-5th digit Route number, right justified leading zeroes.
4-5	Beginning Milepost On High Route	Binary for 4 digit milepost
6-7	Ending Milepost On high Route	Binary for 4 digit milepost
8-9	Route Number Low Route	(Values same as for High Route)
10-11	Beginning Milepost On Low Route	Binary for 4 digit milepost
12-13	Ending Milepost On low Route	Binary for 4 digit milepost
14	Flags Direction of Mileposting	High half byte 0 - Undetermined 1 - Same direction 2 - Reverse direction

SUBJECT: MITPACK (T70409)

AUTHOR: Elizabeth Hamilton

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program verifies that the length of routes inventoried on mileage inventory agree in length with routes on location inventory. It also verifies that the length, position, and direction of mileposting of common segments agree with the coinciding segment file (HWY.FTR30000). Error messages are printed whenever discrepancies are found.

As output, this program generates a binary formatted mileage segment characteristics file comprised of mileage, common, and gap records. Whenever possible, mileage information is included on both high and low order routes. Information located on the coinciding segment file is needed to choose the proper mileage records to include for common segments.

The Segment Characteristics file differs from the input file (HWY.FPL21010) as follows:

1. Selected variables have been extracted, recoded converted to binary and packed into variable length output records.

2. All "couplet" records have been eliminated. A couplet record is identified as all records with list control not = 1 and refers to situations, where the pavement for the opposite direction of travel has a different total length (e.g. a business route within a city may separate into two one-way streets of unequal lengths).

3. The information about both directions of travel has been combined into one record. There is a one-to-one correspondence between roadway descriptions and physical roadway segments.

4. Common card segments are expanded by including the appropriate mileage information for the common roadway.

USAGE:

I. Inputs

a. Mileage Inventory File

The input data file is the planning version of the Mileage Inventory File prepared by North Carolina Division of Highways (HWY.FPL21010) and is input through DDNAME = MITFILE, for example:

```
//MITFILE DD UNIT=TAPE,VOL=SER=TAPENN,DSN=HWY.FPL21010,
//  DISP=OLD
```

b. Coinciding Segment File

This file was generated by the program T70009 and contains information about every coinciding segment pair such as length, beginning milepost, route coinciding, etc. A format of this file is attached. This file is input through DDNAME = SEGMENT.

```
//SEGMENT DD DSN=HWY.FTR30000,DISP=OLD
```

C. Route Length File

This file was generated by the program T70009 and contains the total length computed for every county route inventoried on the location inventory file. A format of this file is attached. This file is input through DDNAME = RTFILE.

```
//RTFILE DD DSN=HWY.FTR30010,DISP=OLD
```

II. Outputs

a. Binary Formatted Segment Characteristics File

This output file is the input to the program (T70609) that constructs the direct access characteristics file (HWY.FTR30030) and its index (HWY.FTR30040).

This file is variable length and consists of four different length records.

1. Type "C" records contain common card information and are always twenty-five bytes in length. These records occur in pairs -- one preceeding and one following the additional records inserted to describe the common segment. The trailing type "C" record always has segment length equal zero.

2. Type "G" records contain Gap Card Information and are always eighteen bytes in length.

3. Type "M" records contain the descriptors of the pavement for both directions of travel. These records are thirty-nine bytes long when both directions of travel are identical in characteristics or one direction of travel is missing. A type "M" record is fifty-eight bytes long when the other direction of travel has different characteristics (unbalanced conditions).

Note -- this is one major difference from the input file. HWY.FPL21010 and results in a one-to-one correspondence between type "M" records and distinct physical segments of pavement.

Special Note -- records are input to the system with four separate records lengths but when retrieved from the system using program T73009, all type "M" records are padded to the maximum length of 58 bytes with Binary Zeroes.

This file is output through DDNAME = OUTPUT.

```
//OUTPUT DD DSN=HWY.FTR30020,UNIT=TAPE,DISP=(NEW,KEEP),
// VOL=SER=XXXX
```

b. Error Listing

The messages are output through the DDNAME = SYSOUT

```
//SYSOUT DD SYSOUT=A
```

FILE NO : HWY.FPL21010

FILE NAME : MILEAGE PRIMARY DATE 4-24-74

RECORD SIZE: 100 RETENSION: 1 YEAR

BLOCKING : 20 BACKUP : 1

QUENCE : IDENTIFICATION NO.

1		TYPE
2		IDENTIFICATION NUMBER
3		
4		
5		
6		
7		
8		COUNTY CODE
9		
10		ROUTE
11		
12		
13		
14		
15		LIST CONTROL
16		MILEPOST
17		
18		
19		
20		SECTION LENGTH
21		
22		
23		
24		INVENTORY CONTROL
25		TERMINAL DESCRIPTION
26		
27		
28		
29		
30		
31		
32		
33		
34		

FILE NAME: MILEAGE PRIMARY

DATE 4-24-74

35		STATE HIGHWAY SYSTEM	
36		DESIGNATED	F.A. SYSTEM
37		TRAVELED WAY	
38		FUNCTIONAL CLASSIFICATION	
39		FEDERAL DOMAIN	
40		HIGHWAY DIVISION	
41			
42		CITY OR TOWN	
43			
44		POPULATION GROUP	
45		TERRAIN	
46		SIGHT DISTANCE	
47			
48		AVERAGE HIGHWAY SPEED	
49			
50		PAVEMENT CONDITION	
51		DT	
52			
53		RIGHT OF WAY	
54			
55		ACCESS CONTROL AND DEVELOPMENT FACTORS	
56		SPEED LIMIT	
57			
58		YEAR OF TRANSACTION	
59			
60		TYPE OF TRANSACTION	
61			
62		NUMBER OF LANES	
63		SURFACE WIDTH	
64			
65		SURFACE TYPE	
66			
67		SHOULDER WIDTH LEFT	
68			
69		SHOULDER TYPE LEFT	
70		SHOULDER WIDTH RIGHT	
71			
72		SHOULDER TYPE RIGHT	

FILE NO.: FPL21000

FILE NAME: MILEAGE PRIMARY

DATE 4-24-74

73		
74		MEDIAN WIDTH
75		MEDIAN TYPE
76		
77		YEAR OF ADDITION
78		PERCENT OF TRUCKS
79		
80		DESIGN HOUR VOLUME
81		
82		
83		AVERAGE DAILY TRAFFIC
84		
85		
86		SKID SURFACE TEXTURE*
87		
88		AVERAGE SKID NUMBER*
89		
90		
91		BLANK
92		
93		
94		
95		DATE OF CHANGE OR ADD
96		
97		
98		
99		
100		

* Note: The program T70409 expects to find surface texture and average skid number in positions 86-89. These data items are not yet included in the 1977 file.

MILEAGE INVENTORY FILE

HWY.FPL21010

COLUMN		CODE
1	TYPE	
2-7	IDENTIFICATION NUMBER	
	Use an appropriate number that will place the record in the desired location. Right justified with leading zeros.	
8-9	COUNTY NUMBER	
	Beginning with Alamance County as "00", the counties will be numbered consecutively through Yancey County "99". (See supplement sheets for County codes)	
10	NUMBERED SYSTEM	
	Interstate	1
	US	2
	NC	3
	Secondary	4
	Non-System (Local City Streets)	5
	Non-System (State Parks)	6
	Non-System (Federal Domain)	7
	Projected	9
11-14	ROUTE NUMBER	
	Enter State highway route number, right justified with leading zeros. For Non-System Roads code as follows:	
	City Streets	CTY
	State Parks	SPK
	Blue Ridge Parkway	BRP
	Indian Reservations	IND
	Military Reservations	MIL
	National Forest Service	NFS
	National Park System	NPS
	For State highways that have a letter as part of the route number, code Col. 11 as follows:	
	Alternate	1
	North	3
	South	4
	East	5
	West	6
	Spur (or special condition)	7
	Truck	8
	Business	9

COLUMN		CODE
15	LIST CONTROL	
	Normal Listing Sequence	1
	Cards Listed at End of Route	2
	Additional Group Listed at End of Route	3
16-19	MILE POST	
	Code only the beginning card of the route or couplet.	
20-23	SECTION LENGTH	
	Code section length to the nearest hundredth of a mile	
24	INVENTORY CONTROL	
	In some cases it will be necessary to record data in each direction of travel in order to indicate unbalanced conditions. This column will be used to indicate the method of inventory and also to indicate common cards or gap cards for which inventory data is included elsewhere. The codes will be as follows:	
	Both Directions of Travel	1
	Northbound Only	2
	Southbound Only	3
	Eastbound Only	4
	Westbound Only	5
	Common Card	6
	Gap Card	7
	NOTE:	
	Common cards and Gap cards can use Columns 25-80 for appropriate message.	
	All couplets will be inventoried for each direction of travel.	
25-34	TERMINAL DESCRIPTION	
	Enter the route number, name of town, county name or other feature to which this section extends	

COLUMN		CODE
35	STATE HIGHWAY SYSTEM	
	Rural State Primary System	1
	Municipal State Primary Over 5,000	2
	Municipal State Primary Under 5,000	3
	Rural State Secondary System	4
	Municipal State Secondary Over 5,000	5
	Municipal State Secondary Under 5,000	6
	Local City Streets	7
	State Parks, etc.	8
	National Parks, Forest Rds, Reservations	9
	Projected	0
36	DESIGNATED FEDERAL-AID SYSTEM	
	Interstate, Rural	1
	Interstate, Urban	2
	Other FA Primary, Rural	3
	Other FA Primary, Urban (Type I)	4
	FA Secondary, Rural, State System	5
	FA Secondary, Urban, State System	6
	FA Secondary, Rural, Non-State	7
	FA Secondary, Urban, Non-State	8
	Federal Aid Urban ("M" System)	U
	FA Urban Type II (TOPICS)	T
	Projected - Use above codes	
37	"TRAVELED WAY" FEDERAL AID SYSTEM	
	Rural Interstate on Final Location and Traveled Way	1
	Urban Interstate on Final Location and Traveled Way	2
	Rural FA Primary Traveled Way	3
	Urban FA Primary Traveled Way (Type I)	4
	Urban FA Type II (TOPICS)	T
	Federal Aid Urban (M-System)	U
	Rural FA Secondary Traveled Way	5
	Urban FA Secondary Traveled Way	6
	Rural Non-Federal Aid	9
	Urban Non-Federal Aid	0
	Projected	Blank
38	FUNCTIONAL CLASSIFICATION	
	Rural Interstate	1
	Rural Interstate Traveled Way	Zone Punch
	Rural Principal Arterial (T/W)	3
	Rural Minor Arterial (T/W)	4
	Rural Major Collector (T/W)	6
	Rural Minor Collector (T/W)	7

COLUMN		CODE
	Rural Local (T/W)	8
	Urban Interstate	1
	Urban Interstate Traveled-Way	Zone Punch
	Urban Connecting Link of a Rural Principal Arterial	3
	Urban Connecting Link of a Rural Minor Arterial	4
	Other Urban Principal Arterial	5
	Urban Minor Arterial	6
	Urban Collector	7
	Urban Local	8
39	SPECIAL SYSTEMS (FEDERAL DOMAIN)	
	National Forest Highway System	1
	National Forest Development Roads and all other State System roads inside the boundaries of a National Forest	2
	National Parks - the Blue Ridge Parkway and all State System roads in National Parks	3
	National Parks - Service roads not on State System	4
	Indian Reservations - all roads both on and off the State System	5
	Bureau of Land Management	6
	Military Reservations - all roads both on and off the State System	7
	National Wildlife Refuge	8
	U.S. Corps of Engineers	9
	State Forests, Parks, Recreation Areas	Blank
40-41	HIGHWAY DIVISION	
	Code the appropriate highway division number (01 through 14)	
42-43	CITY OR TOWN	
	Code the municipal maintenance identification number for all incorporated municipalities	
44	POPULATION GROUP	
	Under 1,000 Population	1
	1,000 to 2,499	2
	2,500 to 4,999	3
	5,000 to 9,999	4
	10,000 to 24,999	5
	25,000 to 49,999	6
	50,000 to 99,999	7
	100,000 and Over	8

45 TERRAIN

Flat	1
Rolling	2
Mountainous	3

46-47 SIGHT DISTANCE

Code the percentage of the section length having 1,500 feet or more sight distance. Four lane facilities are blank.

48-49 AVERAGE HIGHWAY SPEED

This value is based on curve data and is defined in the HIGHWAY CAPACITY MANUAL - 1965. If there are no curves 3° or more, code 70. For sections having curves greater than 3°, compute as follows:

$$AHS = \frac{\Sigma(Tn \times Sn)}{L}$$

T = Length of Curve, S = Speed, L = Length of Section

SPEED	D
70	0-3°
65	3.1-4°
60	4.1-5°
55	5.1-6°

SPEED	D
50	6.1-7°
45	7.1-9°
40	9.1-12°
35	12.1-20°

SPEED	D
30	20.1-25°
25	25.1-30°
20	30.1-60°
15	Over 60°

Assume 0.15 mi. as length for each curve with remainder of section at 70 mph. Calculate weighed average speed for total section length.

If total length of curve @0.15 mi. exceeds total section length, divide total section length by total number of curves and use dividend for length of curve.

50 PAVEMENT CONDITION

Present Serviceability Index (PSI)

Excellent	E
Good	G
Fair	F
Poor	P

COLUMN		CODE
51-52	DT As defined in the Pavement Evaluation Survey - 1962.	
53-54	RIGHT OF WAY Code total R/W to the nearest ten feet. If inventory is in two directions, code half the total for each direction. If there is sufficient R/W beside a 2L section to construct parallel lanes, indicate this with a "Zone Punch" in Col. 53	
55	ACCESS CONTROL AND DEVELOPMENT FACTORS	
	No Control - No Interference	1
	Partial Control of Access	2
	Full Control of Access	3
	Central Business District	4
	Heavy Commercial Development	5
	Moderate Commercial Development	6
	Light Commercial Development or Heavy Residential	7
	Rural with Some Roadside Development	8
	Rural (Typical) with No Development	9
56-57	SPEED LIMIT Code the posted speed limit that is the most representative of the segment.	
58-59	YEAR OF TRANSACTION Enter the last two digits of the year, during which the section was last resurfaced, improved or classified	
60-61	TYPE OF TRANSACTION Enter the surface type that existed prior to the last resurface or	
	New Construction on New Location	NL
	New Construction on Existing Location	NC
	Transfer from One System to Another Including Private to Public	TR

COLUMN

CODE

62 NUMBER OF LANES

Enter the number of travel lanes provided by the surface width on this card. This may be the total for both directions or for only one direction depending on the method of inventory. If lane usage changes during the day, use the peak hour conditions.

63-64 SURFACE WIDTH

Enter the pavement width in feet or ditch to ditch if unpaved. This width may be for one direction of travel or the total for both directions depending on the method of inventory. For multi-lane undivided highways with turn lanes or mountable medians record edge to edge or face to face. Do not include median width as part of surface if highway is divided.

65-66 SURFACE TYPE

Primitive	A	00
Unimproved	B	10
Graded and Drained	C	20
Soil Surfaced	D	30
Gravel or Stone	E	41
Bituminous Surf. Treatm't on Topsoil	F-1	51
Bitum's Surf. Treatm't on Gravel or Stone	F-2	52
Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
Mixed Bituminous - Non-Rigid Base	G-1	60
Mixed Bituminous - Rigid Base	G-2	61
Bituminous Penetration - Non-Rigid Base	H-1	64
Bituminous Penetration-- Rigid Base	H-2	62
Bituminous Concrete	I-1	63
Sand Asphalt on P.C. Concrete	I-2	67
Sand Asphalt on Bituminous Concrete	I-3	66
Sand Asphalt on types other than 66 and 67	I-4	65
Portland Cement Concrete	J	70
Brick	K	80
Block	L	90
Hard Surfaced (Unclassified pavement type for Non-System Roads)		99

COLUMN		CODE
67-68	SHOULDER WIDTH LEFT	
	Enter the total usable shoulder width on the left in the direction of the inventory. For curbed section, code peak hour parking condition as follows:	
	No parking	NP
	Parallel parking	PP
	Angle parking	AP
	Leave blank for directional inventory coded in same direction as log.	
69	SHOULDER TYPE LEFT	
	Grass or Sod	1
	Gravel or Stone	2
	1'-0" to 2'-11" Paved	3
	3'-0" to 4'-11" Paved	4
	5'-0" to 6'-11" Paved	5
	7'-0" to 8'-11" Paved	6
	9'-0" to 9'-11" Paved	7
	10'-0" and Over	8
	Curb	9
70-71	SHOULDER WIDTH RIGHT	
	Enter the total usable shoulder width on the right in the direction of the inventory. For curbed sections, code peak hour parking condition as follows:	
	No parking	NP
	Parallel parking	PP
	Angle parking	AP
	Leave blank for directional inventory coded in opposite direction of log.	
72	SHOULDER TYPE RIGHT	
	Same as Col. 69	
73-74	MEDIAN WIDTH	
	Enter the total median width in feet for single card inventory. If directional inventory enter one-half of the median width for each direction. If the median width varies substantially enter the width that is "Most Applicable" to the section.	

COLUMN		CODE	CODE
	For medians over 99 feet, enter 99. For couplets (Code 8 in Col. 75) code as follows:		
	One Way Traffic		1W
	Two Way Traffic		2W
75	MEDIAN TYPE		
	Undivided Roadway		1
	Continuous Turn Lane		2
	Paved Mountable		3
	Barrier Curb or Wall		4
	Grass		5
	Soil or Stone		6
	Parkland, Business, etc.		7
	Couplet		8
76-77	YEAR OF ADDITION		
	Enter the year that this segment was added to or changed systems. (Secondary to Primary, Private to Public, etc.)		
78	PERCENT OF TRUCKS		
	0-4.99%		1
	5%-9.99%		2
	10% and Over		3
79-80	DHV		
	Enter the design hour volume as a percentage of ADT.		
81-85	ADT		
	Average Daily Traffic. Blank if not given		
86-92*	Blank field*		
93-100	DATE OF CHANGE OR ADD		

*Note: When skid number data is added to this file, the program T70409 expects the following positions and values:

86	SKID SURFACE TEXTURE	
	Enter the classification based on comparison to known standard textures.	
	Not stated	blank
	Smooth	1
	Fine textured, rounded	2
	Fine textured, gritty	3
	Coarse textured, rounded	4
	Coarse textured, gritty	5

COLUMN	
87-89	AVERAGE SKID NUMBER Enter the average skid number for this segment, one decimal place assumed, right justified with leading zeroes. Blank if not stated.
90-92	Blank field

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File
PROJECT: Merge UNC.HSR.F292H

Purpose:

This file resulted from analysis of information on North Carolina Department of Transportation Location Inventory Tape. The purpose is to systematize the information about all coinciding routes. Each record refers to a pair of coinciding routes. If more than two routes are coinciding on the same roadway, then this file will have a record for each possible pair.

Sorting:

Records are sorted in ascending order by County, Lo Route, Lo Milepost, Hi Route

DSN=HWY.FTR30000

PROGRAMMER: Hamilton
KEY WORD: Coinciding Segment File

POSITION	DESCRIPTION	VALUE
1-2	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey County "99"
3-6	Low Route	Zoned Decimal
(3)	Route Type	1 - Interstate 2 - US 3 - NC 4 - SR
(4)	Route Subtype	0 - Regular state highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(5-7)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number coded in position 4-7)
8-11	Low Milepost	Zoned decimal (hundredths of mile) Smallest milepost number on low order route that refers to this

(Continued on next page)

POSITION	DESCRIPTION	VALUE
8-11 continued		coinciding route segment
12-15	Coinciding Segment Length	Zoned Decimal Length in hundredths of mile that these two routes coincide
16-20 (15)	High Order Route Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
(17)	Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(18-20)	Route Number	leading zeroes (Note: State secondary routes have a four digit route number in position 17-23)
21-24	High milepost	Zoned Decimal (hundredth of route) Smallest milepost number of high route milepost sequence that refers to this coinciding route segment
25-28	High Last Milepost	Zoned Decimal (hundredth of mile) Largest milepost of high route sequence that refers to this coinciding route segment
29	Direction of Mileposting	Character blank - Unknown S - Same direction for this pair R - Reverse direction for this pair (Only known for these coinciding pairs having common cards on Mileage Inventory File)
30	Length Error Flag	Character Blank - "Good data" L - Unequal segment lengths

DSN=HWY.FTR30010

PROGRAMMER: Hamilton
PROJECT: Merge UNC.HSR.F292H
KEY WORD: County Route Length File

Purpose:

This file contains one record for each county route inventoried on the North Carolina Department of Transportation Location Inventory Tape. (HWY.FPL50000)

POSITION	DESCRIPTION	VALUE
1-2	County Number	Zoned Decimal Beginning with Alamance Co. "00" North Carolina counties are numbered consecutively through Yancey County "99"
3-7	Route	Zoned Decimal
(3)	Route type	1 - Interstate 2 - US 3 - NC 4 - SR
(4)	Route subtype	0 - Regular state highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West
(5-7)	Route Number	leading zeroes
8-11	Route Length	Zoned Decimal Total length of county route in hundredths or miles
12	(Blank - future development)	

HWY.FTR30020 and HWY.FTR30030

SEGMENT CHARACTERISTICS FILE

The Segment Characteristics File consists of three record types M, C and G containing four variable types M, E, C, and G. A description of these records and variables follows.

SEGMENT CHARACTERISTICS FILE FORMAT

Record Type M - Both Directions of Travel (either combined or separate coding)

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	M00	Record Length	Zoned Decimal Depends on Record Type** 39- for Record type M - combined direction 58- for Record type M - separate direction 25- for Common records type C 18- for Gap records type G
4-5	2	M01	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey Co. "99"
6-10			Route Number	Zoned Decimal
(6)	1	M02	System Number	1- Interstate 2- US 3- NC 4- SR
(7)	1	M03	Route subtype	Zoned Decimal 0- Regular State Highway 1- Alternate 2- Business 3- North 4- South 5- East 6- West 7- Spur (or special condition) 8- Truck .
(8-10)	3		Route number	Zoned Decimal Leading zeroes

Note: State Secondary routes have a 4-digit route number coded zoned decimal. in column 7-10.

*Converted Character Length - Length in bytes when converted to zone format.

**Type M records are input and stored with two different record lengths. The retrieval module pads the thirty-nine byte record to fifty-eight bytes using binary zeroes.

POSITION	CCL	NAME	DESCRIPTION	VALUE
11-14	4	M04	Milepost	Zoned Decimal Accumulated distance from beginning of County Route in Hundredths of mile
15	1	M05	Coinciding Segment Flag	Zoned Decimal 0- No Coinciding routes 1- This is lowest numbered route and others are coinciding 2- This route is coinciding with one or more higher numbered routes
16	1	M06	Record Type	Character M- Inventory for both directions of travel or for principle direction only when unbalanced conditions
17-18	4	M07	Section Length	Binary Section length to nearest hundredth mile
19	1	M08	Information Control	High one bit of byte - binary 0- All information contained in position 1-39 because both directions of travel combined 1- Information contained in position 1-58 because each direction of travel separate
	1	M09	Inventory Control	Low three bits of high half byte - binary In some cases data is recorded in each direction of travel to indicate unbalanced conditions. This column of inventory. 1- Both directions of travel 2- Northbound only 3- Southbound only 4- Eastbound only 5- Westbound only
	1	M10	State Highway System	Low half byte - binary 1- Rural State Primary System 2- Municipal State Primary Over 5,000 3- Municipal State Primary Under 5,000 4- Rural State Secondary System

POSITION	CCL	NAME	DESCRIPTION	VALUE
				5- Municipal State Secondary Over 5,000 6- Municipal State Secondary Under 5,000 7- Local City Streets 8- State Parks, etc. 9- National Parks, Forest Rds, Reservation 0- Projected
20	2	M11	Designated Federal Aid System	High half byte - binary 0- Blank 1- Interstate, Rural 2- Interstate, Urban 3- Other FA Primary, Rural 4- Other FA Primary, Urban (Type 1) 5- FA Secondary, Rural, State System 6- FA Secondary, Urban, State System 7- FA Secondary, Rural, Non-State 8- FA Secondary, Urban, Non-State 9- Federal Aid Urban (M System) 10- FA Urban Type II (TOPICS) (Projected - Use above codes)
	2	M12	"Traveled Way" Federal Aid System	Low half byte - binary 0- Projected 1- Rural Interstate on Final Location and Traveled Way 2- Urban Interstate on Final Location and Traveled Way 3- Rural FA Primary Traveled Way 4- Urban FA Primary Traveled Way (Type 1 5- Rural FA Secondary Traveled Way 6- Urban FA Secondary Traveled Way 7- Rural Non-Federal Aid 8- Urban Non-Federal Aid 9- Federal Aid Urban (M-System) 10- Urban FA Type II (TOPICS)
21	2	M13	Functional Classification	High half byte - binary 1- Interstate 3- Rural Principal Arterial or Urban Connecting Link of a Rural Principal Arterial 4- Rural Minor Arterial or Urban Connecting Link of a Rural Minor Arterial 5- Other Urban Principal Arterial 6- Rural Major Collector or Urban Minor Arterial 7- Rural Minor Collector or Urban Collector 8- Local

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9- Interstate Traveled Way 10- (Value 3) Traveled Way 11- (Value 4) Traveled Way 12- (Value 5) Traveled Way 13- (Value 6) Traveled Way 14- (Value 7) Traveled Way 15- Local Traveled Way
	1	M14	Special Systems (Federal Domain)	Low half byte - binary 1- National Forest Highway System National Forest Development Roads and all other State System Roads Inside the Boundaries of a National Forest 2- National Parks - the Blue Ridge Parkway and all State System Roads in National Parks 3- National Parks - Service Roads not on State System 4- Indian Reservations - all Roads both on and off the State System 5- Bureau of Land Management 6- Military Reservations - All Roads both on and off the State System 7- National Wildlife Refuge 8- U.S. Corps of Engineers 9- State Forest, Parks, Recreation Areas 0- Blank or not Applicable
22	2	M15	Highway Division	High half byte - binary Appropriate highway division number (01 through 14)
	1	M16	Population Group	Low half byte - binary 0- Blank 1- Under 1,000 Population 2- 1,000 to 2,490 3- 2,500 to 4,999 4- 5,000 to 9,999 5- 10,000 to 24,999 6- 25,000 to 49,999 7- 50,000 to 99,999 8- 100,000 and Over
23	2	M17	City or Town	Binary Municipal maintenance identification number for all incorporated municipalities 00 - for rural

POSITION	CCL	NAME	DESCRIPTION	VALUE
24	1	M18	Median Type	High half byte - binary 1 - Undivided roadway 2 - Continuous turn lane 3 - Paved mountable 4 - Barrier curb or wall 5 - Grass 6 - Soil or stone 7 - Parkland, business, etc. 8 - Couplet
	1	M19	Total Number of Lanes	Low half byte - binary Total number of travel lanes provided by the surface width for this segment. If lane usage changes during the day, peak hour conditions are used. For separate directions of travel, this value is a sum of number of lanes for each direction of travel. If one direction is a couplet, this value computed by doubling the number of lanes for the non couplet direction.
25	3	M20	Total Surface Width	Binary Pavement width in feet or ditch to ditch, if unpaved, for both directions. If highway is divided, surface width does not include median width. For multi-lane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face. If one direction is couplet, total surface width is computed by doubling the surface width for the non couplet direction.
26	3	M21	Total Median Width	Binary If median width varies substantially, the width varies substantially, the width that is "most applicable" to the section is entered. 00-98 - Width feet 99 - More than 98 feet 100 - Blank 101 - One Way Traffic 102 - Two Way Traffic

POSITION	CCL	NAME	DESCRIPTION	VALUE
27 & 43	2	E01	Speed Limit	Binary Posted speed limit most representative of the segment
28 & 44	1	E02	Terrain	High half byte - binary 1 - Flat 2 - Rolling 3 - Mountainous
	1	E03	Pavement Condition	Low half byte - binary Present Serviceability Index (PSI) 1 - Excellent 2 - Good 3 - Fair 4 - Poor
29 & 45	1	E04	Access Control and Development Factors	High half byte - binary 1 - No Control - No Interference 2 - Partial Control of Access 3 - Full Control of Access 4 - Central Business District 5 - Heavy Commercial Development 6 - Moderate Commercial Development Light Commercial Development of 7 - Heavy Residential 8 - Rural with Some Roadside Development 9 - Rural (Typical) with No Development
	1	E05	Percent of Trucks	Low half byte - binary 0 - Blank 1 - 0-4.99% 2 - 5%-9.99% 3 - 10% and Over
30 & 46	1	E06	Shoulder Type Left	High half byte - binary 1 - Grass or Sod 2 - Gravel or Stone 3 - 1'-0" to 2' -11" Paved 4 - 3'-0" to 4' -11" Paved 5 - 5'-0" to 6' -11" Paved 6 - 7'-0" to 8' -11" Paved 7 - 9'-0" to 9' -11" Paved 8 - 10'-0" and Over

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9 - Curb 0 - Blank
	1	E07	Shoulder Type Right	Low half byte - binary Same as Shoulder Type Left
31 & 47	2	E08	Shoulder Width Left	Binary Total usable shoulder width on the left in the direction of the inventory. 0 - Blank 1 - 24 Code actual width in feet 25 - More than 24 feet For curbed section, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
32 & 48	2	E09	Shoulder Width Right	Binary Total usable shoulder width on the right in the direction of the inventory. 0 - Blank 1 to 24 Actual shoulder width in feet 25 - more than 24 feet For curbed sections, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
33-34 & 49-50	5	E10	Average Daily Traffic	Binary 0 if blank
35 & 51	2	E11	Year of Transaction	Binary Enter the last two digits of the year during which the section was last resurfaced, improved or classified. 0 if blank

POSITION	CCL	NAME	DESCRIPTION	VALUE
36 & 52	2	E12	Type of Transaction	Binary

Surface type that existed prior to the last resurface

1 - Primitive	A	00
2 - Unimproved	B	10
3 - Graded and Drained	C	20
4 - Soil surfaced	D	30
5 - Gravel or Stone	E	41
6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
7 - Bitum's Surf. Treatm't on Gravel or Stone	F-2	52
8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
9 - Mixed Bituminous - Non - Rigid Base	G-1	60
10 - Mixed Bituminous - Rigid Base	G-2	61
11 - Bituminous Penetration - Non-Rigid Base	H-1	64
12 - Bituminous Penetration - Rigid Base	H-2	62
13 - Bituminous Concrete	I-1	63
14 - Sand Asphalt on P.C. Concrete	I-2	67
15 - Sand Asphalt on Bituminous Concrete	I-3	66
16 - Sand Asphalt on Types other than 66 and 67	I-4	65
17 - Portland Cement Concrete	J	70
18 - Brick	K	80
19 - Block	L	90
20 - Hard Surfaced (Unclassified Pavement type for Non-System Roads		99

21 - New Construction on New Location

22 - New Construction on Existing Location

23 - Transfer from One System to Another Including Private to Public

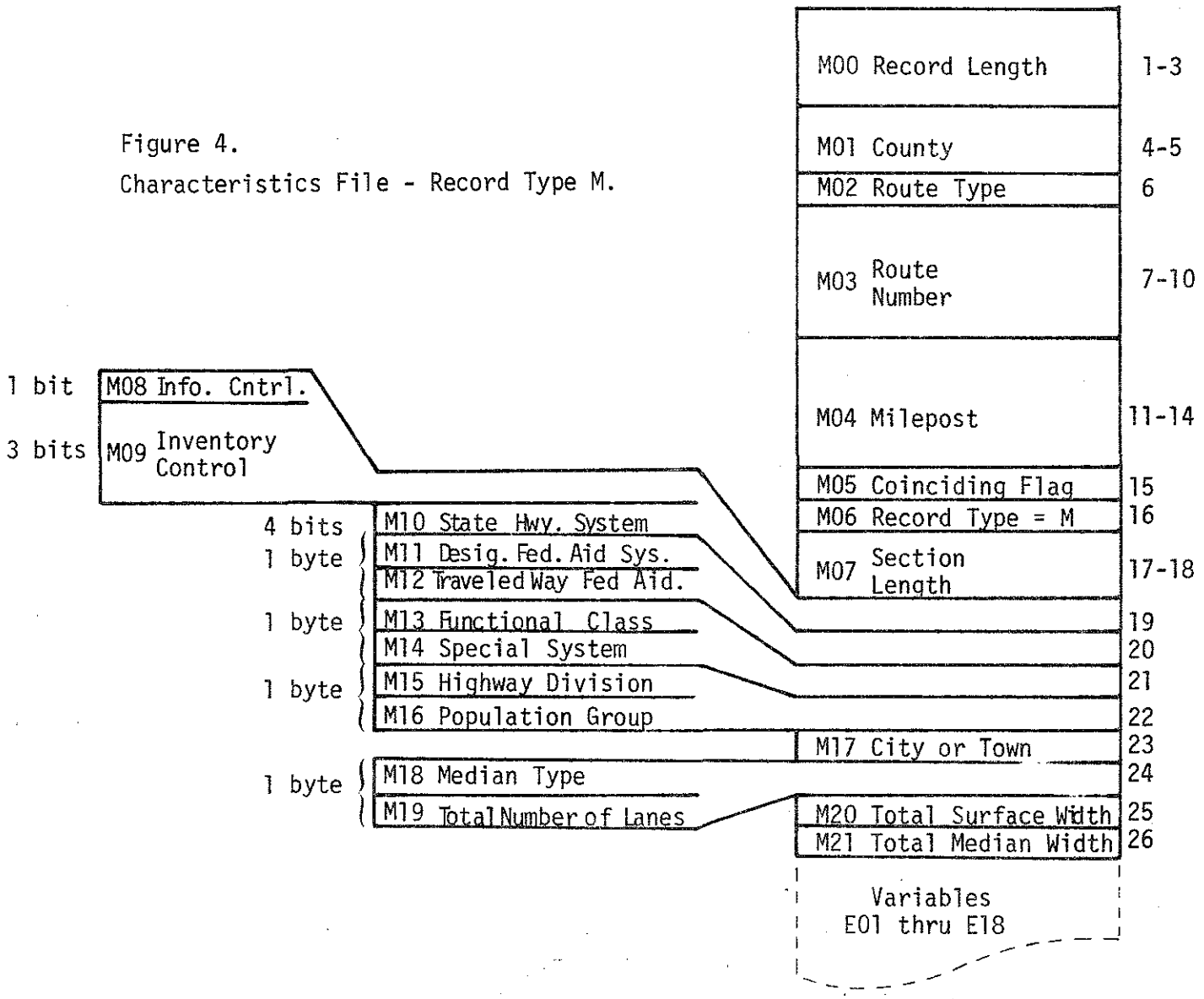
POSITION	CCL	NAME	DESCRIPTION	VALUE		
37 & 53	2	E13	Surface Type	Binary		
				1 - Primitive	A	00
				2 - Unimproved	B	10
				3 - Graded and Drained	C	20
				4 - Soil Surfaced	D	30
				5 - Gravel or Stone	E	41
				6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
				7 - Bitum's Surf. Treatm't on Gravel of Stone	F-2	52
				8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
				9 - Mixed Bituminous - Non-Rigid Base	G-1	60
				10 - Mixed Bituminous - Rigid Base	G-2	61
				11 - Bituminous Penetration Non-Rigid Base	H-1	64
				12 - Bituminous Penetration - Rigid Base	H-2	62
				13 - Bituminous Concrete	I-1	63
				14 - Sand Asphalt on P.C. Concrete	I-2	67
				15 - Sand Asphalt on Bituminous Concrete	I-3	66
				16 - Sand Asphalt on types other than 66 and 67	I-4	65
				17 - Portland Cement Concrete	J	70
				18 - Brick	K	80
				19 - Block	L	90
				20 - Hard Surfaced (Unclassified pavement type for Non-System Roads)		99
38 & 54	1	E14	Skid Surface Texture	High half byte - binary Classification based on comparison to known standard textures. 0 - if blank 1 - Smooth 2 - Fine textured rounded 3 - Fine textured gritty 4 - Coarse textured rounded 5 - Coarse textured gritty		

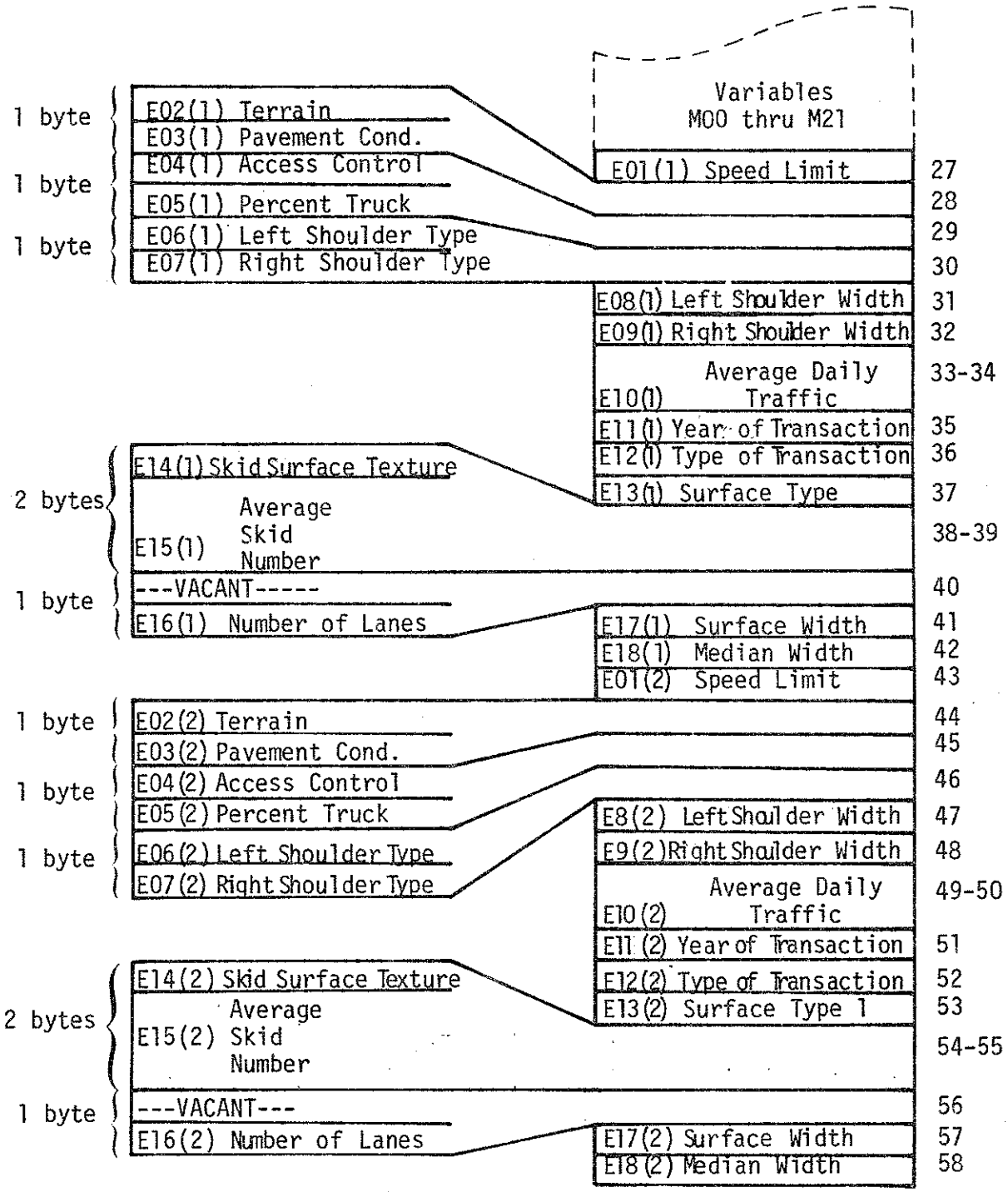
POSITION	CCL	NAME	DESCRIPTION	VALUE
38-39 & 54-55	3	E15	Average Skid Number	Low twelve bits of halfword - binary representation of 3-digit number with tenths position (Picture 99 V9) 0 - if blank
40 & 56*	1	E16	Number of lanes (Separate directions only)	Low half byte - binary Number of lanes provided by the surface width for one direction of travel only. If lanes usage changes during the day, peak hour conditions are used.
41 & 57*	3	E17	Surface Width (Separate directions only)	Binary Pavement width in feet or ditch to ditch, if unpaved, for one direction of travel only. If highway is divided, surface width does not include median width. For multilane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face.
42 & 58*	3	E18	Median Width (Separate directions only)	Binary Median width for one direction of travel is one half the total median width in feet. If median width varies substantially, the width that is "most applicable" to the section is used. 00 - 98 width in feet 99 - more than 98 feet 100 - Blank 101 - Oneway traffic 102 - Two Way Traffic

Note: Reference for Skid Values: NCHRP Report #37 "Tentative Skid-Resistance Requirements for Main Rural Highways" (1967) Pub. 1541

*These variables (E16, E17, and E18) are valid for record length 58 only. For record length 39, positions 40, 41, 42, 56, 57 and 58 will all contain binary zeroes.

Figure 4.
Characteristics File - Record Type M.




Variables
M00 thru M21
1 byte
E02(1) Terrain
E03(1) Pavement Cond.
1 byte
E04(1) Access Control
E05(1) Percent Truck
1 byte
E06(1) Left Shoulder Type
E07(1) Right Shoulder Type
E01(1) Speed Limit
27
28
29
30
E08(1) Left Shoulder Width
31
E09(1) Right Shoulder Width
32
E10(1) Average Daily Traffic
33-34
E11(1) Year of Transaction
35
E12(1) Type of Transaction
36
E13(1) Surface Type
37
2 bytes
E14(1) Skid Surface Texture
E15(1) Average Skid Number
38-39
1 byte
---VACANT-----
40
E16(1) Number of Lanes
E17(1) Surface Width
41
E18(1) Median Width
42
E01(2) Speed Limit
43
1 byte
E02(2) Terrain
44
E03(2) Pavement Cond.
45
1 byte
E04(2) Access Control
46
E05(2) Percent Truck
E8(2) Left Shoulder Width
47
1 byte
E06(2) Left Shoulder Type
E9(2) Right Shoulder Width
48
E07(2) Right Shoulder Type
E10(2) Average Daily Traffic
49-50
E11(2) Year of Transaction
51
E12(2) Type of Transaction
52
2 bytes
E14(2) Skid Surface Texture
E15(2) Average Skid Number
E13(2) Surface Type 1
53
54-55
1 byte
---VACANT---
56
E16(2) Number of Lanes
E17(2) Surface Width
57
E18(2) Median Width
58

SEGMENT CHARACTERISTICS FILE FORMAT

Record Types C - Common Begin and End Records

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	C00	Record Length	Zoned Decimal Depends on Record Type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	C01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey Co. "99"
6	1	C02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	C03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	C04	Milepost	Zoned Decimal Cumulative distance from beginning of county route Hundredths of mile

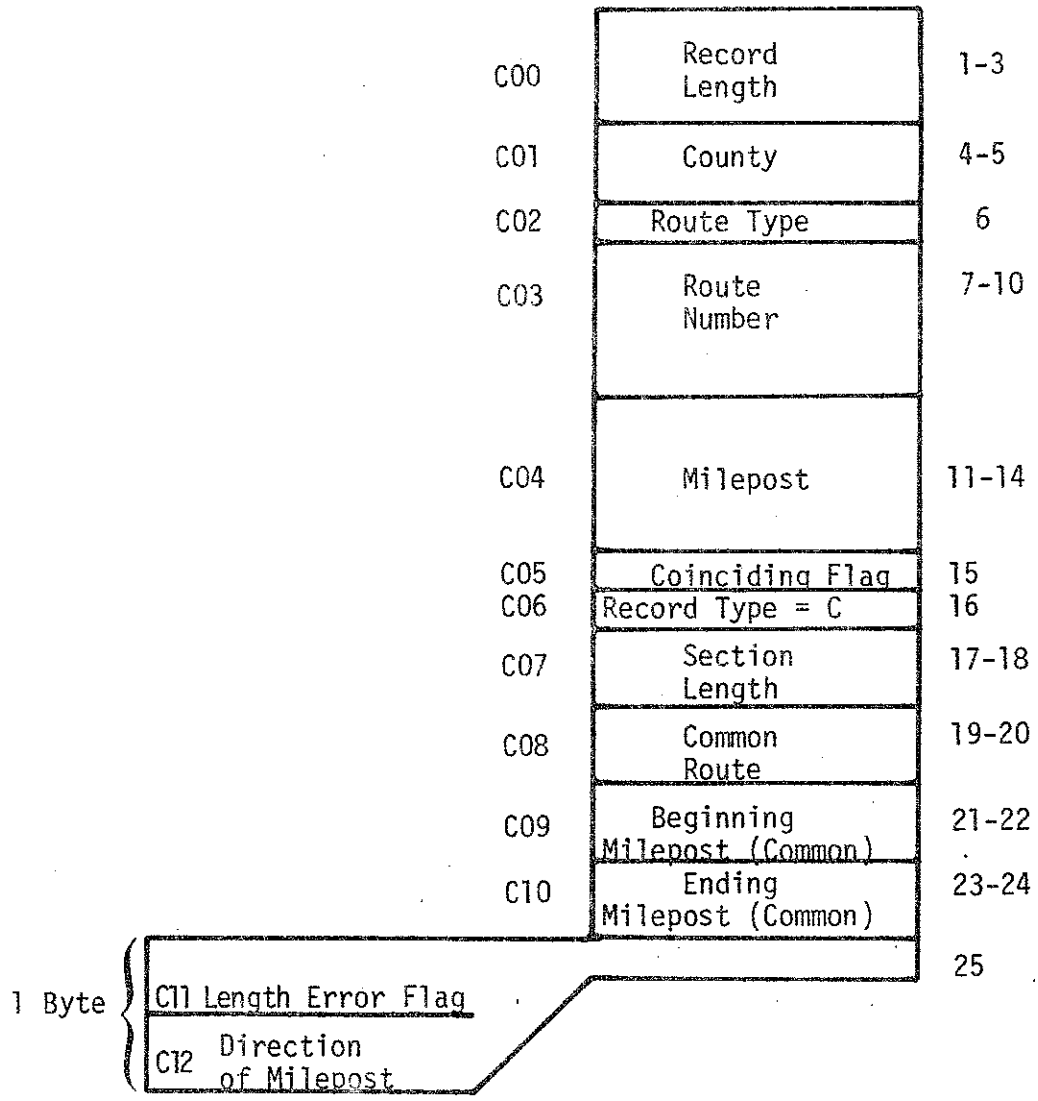
Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

* Converted Character Length - Length in bytes of data when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	C05	Coinciding Segment Flag	Zoned Decimal 0 - No coinciding routes 1 - Other routes coincide 2 - This route coincides
16	1	C06	Record Type	Zoned Decimal C - Common Record
17-18	4	C07	Section Length	Binary Section length to nearest hundredths of mile (always zero)
19-20	5	C08	Common Route Type & Number	Binary representation of 5-digit number
			Route type (digit 1)	1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
			Route Subtype (digit 2 for route type = 1, 2 or 3	0 - Regular 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Truck 8 - Spur or special condition
			Route Number (digit 3-5 for Route type = 1, 2 or 3)	Route Number, leading zeroes
			(digit 2-5 for Route type - 4)	Four digit route number
			(digit 2-5 for Route type = 5)	1000 - Blue Ridge Parkway 2000 - 3000 (reserved for city streets) 4000 - Forest Development Roads 5000 - Indian Reservations 6000 - Military Reservation 7000 - National Park System 8000 - State Parks 9000 - Wildlife Resource Commission

POSITION	CCL	NAME	DESCRIPTION	VALUE
21-22	4	C09	Begin Milepost on Common Route	Binary
23-24	4	C10	Ending Milepost on Common Route	Binary
25	1	C11	Length Error Flag	High half byte - binary 0 - No length error 1 - Length error in generation of coinciding segment
	1	C12	Direction of Mileposting	Low half byte - binary 0 - Not determined 1 - Same direction 2 - Reverse direction

Figure 5.
Characteristics File - Record Type C.



SEGMENT CHARACTERISTICS FILE FORMAT

Record Type G - Gap Record

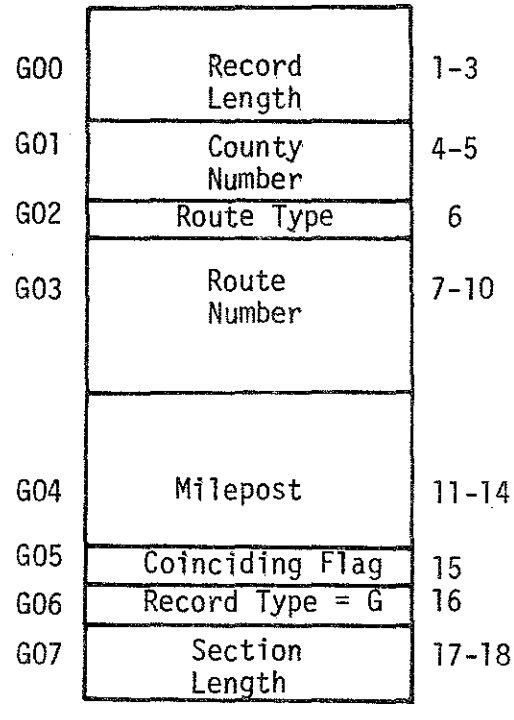
POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	G00	Record Length	Zoned Decimal Depends on Record type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	G01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey County "99"
6	1	G02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	G03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	G04	Milepost	Zoned Decimal Cumulative distance from beginning of county route. Hundredths of mile

Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

*Converted Character Length - Length of data in bytes when expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	G05	Coinciding Segment Flag	Zoned Decimal Ø - No coinciding routes 1 - Other routes coincide 2 - This route coincides
16	1	G06	Record type	Zoned Decimal G - Gap Record
17-18	4	G07	Section Length	Binary Section length to nearest hundredth mile

Figure 6.
Characteristics File - Record Type G.



SUBJECT: GENINDX (T70609)

AUTHOR: Dennis Ryan

DATE: June, 1977

PROGRAM TYPE: Batch Program

SOURCE LANGUAGE: COBOL

FUNCTION: Program generates a direct access disk file compatible with the Department of Transportation's Merged System. Produced during file creation is an index which allows retrieval of information on a county, route, milepost basis.

USAGE DESCRIPTION:

GENINDX must be supplied with an input file containing records with the 16 bytes standard header followed by the specific record information in packed format. These records are queued on a county route basis and then written onto a disk file whenever a new county route is initiated or whenever a full track of information has accumulated. As records are written to the disk file an index entry is created which specifies the relative track number and the county route and milepost range of the records contained on that track.

Maximum utilization of track space is accomplished by packing many county routes on each track whenever possible. Therefore sequential ordering of county-routes exists only through the information supplied in the index. However, should a county route require multiple tracks, these will be allocated in continuous order. At the end of the job step track utilization is display as printed output.

Input (File Description and JCL Requirements):

I. //INFILE1 DD formatted file input

Records for this file consist of a 16 byte standard header in character format, followed by a variable number of bytes representing the specific record type being described. The records are ordered on the keys, county, route, and milepost all of which are contained in the standard header.

STANDARD HEADER DESCRIPTION

ATTRIBUTE	ELEMENT NAME	DESCRIPTION
PIC 999	Length	Length is bytes of entire record.
PIC 99	County	County number (00-99).
PIC 99999	Route	Combined route type and number.
PIC 9999	Milepost	Milepost to nearest one-hundredth mile.
PIC X	Record-Type	Type of feature being described.
PIC 9	Coinciding-Flag	Coinciding route condition.

OUTPUT (File description and JCL Requirements)

I. //OUTFILE1 DD file index

File index is associated with the direct access file created from the formatted input file. This index describes the relative track location and milepost range of each county-route.

INDEX DESCRIPTION (COBOL SOURCE)

```
Ø1          INDEX-REC.

          Ø2  NUMBER-ENTRIES          COMP   PIC   S9(4).
          Ø2  BINARY-SEARCH-POINTERS  COMP   PIC   S9(4).
          Ø2  INDEX ENTRY OCCURS 95Ø TIMES,
            Ø3  COUNTY ROUTE                 PIC   XXX.
            Ø3  DISPLACEMENT                 PIC   XX.
            Ø3  NUMBER-TRACKS                PIC   X.

          Ø2  INFO-AREA OCCURS 1824 TIMES
            Ø3  HIGH-MILEPOST        COMP    PIC   S9(4).
            Ø3  RELATIVE-TRKNUM      COMP    PIC   S9(4).
```

II. //OUTFILE2 DD direct access file

The formatted input file is segmented into county routes and placed on a disk file accessed randomly by relative track number. The standard header for each record has been reduced to a four byte field containing record length, milepost, and record flag. Each block of information contains a five byte header field denoting county route and length of the block in bytes. This allows the access modules to handle blocking requirements.

Four Byte Header Information (COBOL SOURCE)

```
Ø1          RECORD HEADER.

          Ø2    LENGTH                 PIC   X.
          Ø2    MILEPOST        COMP   PIC   S9(4).
          Ø2    FLAG                   PIC   X.
```

Five Byte Block Header (COBOL SOURCE)

```
Ø1          BLOCK HEADER.

          Ø2    COUNTY-ROUTE           PIC   XXX.
          Ø2    DISPLACEMENT           PIC   XX.
```

HWY.FTR30020 and HWY.FTR30030

SEGMENT CHARACTERISTICS FILE

The Segment Characteristics File consists of three record types M, C and G containing four variable types M, E, C and G. A description of these records and variables follows.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

SEGMENT CHARACTERISTICS FILE FORMAT

Record Type M - Both Directions of Travel
(either combined or separate coding)

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	M00	Record Length	Zoned Decimal Depends on Record Type** 39- for Record type M - combined direction 58- for Record type M - separate direction 25- for Common records type C 18- for Gap records type G
4-5	2	M01	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey Co. "99"
6-10			Route Number	Zoned Decimal
(6)	1	M02	System Number	1- Interstate 2- US 3- NC 4- SR
(7)	1	M03	Route subtype	Zoned Decimal 0- Regular State Highway 1- Alternate 2- Business 3- North 4- South 5- East 6- West 7- Spur (or special condition) 8- Truck
(8-10)	3		Route number	Zoned Decimal Leading zeroes

Note: State Secondary routes have a 4-digit route number coded zoned decimal. in column 7-10.

*Converted Character Length - Length in bytes when converted to zone format.

**Type M records are input and stored with two different record lengths. The retrieval module pads the thirty-nine byte record to fifty-eight bytes using binary zeroes.

POSITION	CCL	NAME	DESCRIPTION	VALUE
11-14	4	M04	Milepost	Zoned Decimal Accumulated distance from beginning of County Route in Hundredths of mile
15	1	M05	Coinciding Segment Flag	Zoned Decimal 0- No Coinciding routes 1- This is lowest numbered route and others are coinciding 2- This route is coinciding with one or more higher numbered routes
16	1	M06	Record Type	Character M- Inventory for both directions of travel or for principle direction only when unbalanced conditions
17-18	4	M07	Section Length	Binary Section length to nearest hundredth mile
19	1	M08	Information Control	High one bit of byte - binary 0- All information contained in position 1-39 because both directions of travel combined 1- Information contained in position 1-58 because each direction of travel separate
	1	M09	Inventory Control	Low three bits of high half byte - binary In some cases data is recorded in each direction of travel to indicate unbalanced conditions. This column of inventory. 1- Both directions of travel 2- Northbound only 3- Southbound only 4- Eastbound only 5- Westbound only
	1	M10	State Highway System	Low half byte - binary 1- Rural State Primary System 2- Municipal State Primary Over 5,000 3- Municipal State Primary Under 5,000 4- Rural State Secondary System

POSITION	CCL	NAME	DESCRIPTION	VALUE
				5- Municipal State Secondary Over 5,000 6- Municipal State Secondary Under 5,000 7- Local City Streets 8- State Parks, etc. 9- National Parks, Forest Rds, Reservation 0- Projected
20	2	M11	Designated Federal Aid System	High half byte - binary 0- Blank 1- Interstate, Rural 2- Interstate, Urban 3- Other FA Primary, Rural 4- Other FA Primary, Urban (Type 1) 5- FA Secondary, Rural, State System 6- FA Secondary, Urban, State System 7- FA Secondary, Rural, Non-State 8- FA Secondary, Urban, Non-State 9- Federal Aid Urban (M System) 10- FA Urban Type II (TOPICS) (Projected - Use above codes)
	2	M12	"Traveled Way" Federal Aid System	Low half byte - binary 0- Projected 1- Rural Interstate on Final Location and Traveled Way 2- Urban Interstate on Final Location and Traveled Way 3- Rural FA Primary Traveled Way 4- Urban FA Primary Traveled Way (Type I) 5- Rural FA Secondary Traveled Way 6- Urban FA Secondary Traveled Way 7- Rural Non-Federal Aid 8- Urban Non-Federal Aid 9- Federal Aid Urban (M-System) 10- Urban FA Type II (TOPICS)
21	2	M13	Functional Classification	High half byte - binary 1- Interstate 3- Rural Principal Arterial or Urban Connecting Link of a Rural Principal Arterial 4- Rural Minor Arterial or Urban Connecting Link of a Rural Minor Arterial 5- Other Urban Principal Arterial 6- Rural Major Collector or Urban Minor Arterial 7- Rural Minor Collector or Urban Collector 8- Local

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9- Interstate Traveled Way 10- (Value 3) Traveled Way 11- (Value 4) Traveled Way 12- (Value 5) Traveled Way 13- (Value 6) Traveled Way 14- (Value 7) Traveled Way 15- Local Traveled Way
	1	M14	Special Systems (Federal Domain)	Low half byte - binary 1- National Forest Highway System National Forest Development Roads and all other State System Roads Inside the Boundaries of a National Forest 2- National Parks - the Blue Ridge Parkway and all State System Roads in National Parks 3- National Parks - Service Roads not on State System 4- Indian Reservations - all Roads both on and off the State System 5- Bureau of Land Management 6- Military Reservations - All Roads both on and off the State System 7- National Wildlife Refuge 8- U.S. Corps of Engineers 9- State Forest, Parks, Recreation Areas 0- Blank or not Applicable
22	2	M15	Highway Division	High half byte - binary Appropriate highway division number (01 through 14)
	1	M16	Population Group	Low half byte - binary 0- Blank 1- Under 1,000 Population 2- 1,000 to 2,490 3- 2,500 to 4,999 4- 5,000 to 9,999 5- 10,000 to 24,999 6- 25,000 to 49,999 7- 50,000 to 99,999 8- 100,000 and Over
23	2	M17	City or Town	Binary Municipal maintenance identification number for all incorporated municipalities 00 - for rural

POSITION	CCL	NAME	DESCRIPTION	VALUE
24	1	M18	Median Type	High half byte - binary 1 - Undivided roadway 2 - Continuous turn lane 3 - Paved mountable 4 - Barrier curb or wall 5 - Grass 6 - Soil or stone 7 - Parkland, business, etc. 8 - Couplet
	1	M19	Total Number of Lanes	Low half byte - binary Total number of travel lanes provided by the surface width for this segment. If lane usage changes during the day, peak hour conditions are used. For separate directions of travel, this value is a sum of number of lanes for each direction of travel. If one direction is a couplet, this value computed by doubling the number of lanes for the non couplet direction.
25	3	M20	Total Surface Width	Binary Pavement width in feet or ditch to ditch, if unpaved, for both directions. If highway is divided, surface width does not include median width. For multi-lane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face. If one direction is couplet, total surface width is computed by doubling the surface width for the non couplet direction.
26	3	M21	Total Median Width	Binary If median width varies substantially, the width varies substantially, the width that is "most applicable" to the section is entered. 00-98 - Width feet 99 - More than 98 feet 100 - Blank 101 - One Way Traffic 102 - Two Way Traffic

POSITION	CCL	NAME	DESCRIPTION	VALUE
27 & 43	2	E01	Speed Limit	Binary Posted speed limit most representative of the segment
28 & 44	1	E02	Terrain	High half byte - binary 1 - Flat 2 - Rolling 3 - Mountainous
	1	E03	Pavement Condition	Low half byte - binary Present Serviceability Index (PSI) 1 - Excellent 2 - Good 3 - Fair 4 - Poor
29 & 45	1	E04	Access Control and Development Factors	High half byte - binary 1 - No Control - No Interference 2 - Partial Control of Access 3 - Full Control of Access 4 - Central Business District 5 - Heavy Commercial Development 6 - Moderate Commercial Development Light Commercial Development of 7 - Heavy Residential 8 - Rural with Some Roadside Development 9 - Rural (Typical) with No Development
	1	E05	Percent of Trucks	Low half byte - binary 0 - Blank 1 - 0-4.99% 2 - 5%-9.99% 3 - 10% and Over
30 & 46	1	E06	Shoulder Type Left	High half byte - binary 1 - Grass or Sod 2 - Gravel or Stone 3 - 1'-0" to 2' -11" Paved 4 - 3'-0" to 4' -11" Paved 5 - 5'-0" to 6' -11" Paved 6 - 7'-0" to 8' -11" Paved 7 - 9'-0" to 9' -11" Paved 8 - 10'-0" and Over

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9 - Curb 0 - Blank
	1	E07	Shoulder Type Right	Low half byte - binary Same as Shoulder Type Left
31 & 47	2	E08	Shoulder Width Left	Binary Total usable shoulder width on the left in the direction of the inventory. 0 - Blank 1 - 24 Code actual width in feet 25 - More than 24 feet For curbed section, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
32 & 48	2	E09	Shoulder Width Right	Binary Total usable shoulder width on the right in the direction of the inventory. 0 - Blank 1 to 24 Actual shoulder width in feet 25 - more than 24 feet For curbed sections, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
33-34 & 49-50	5	E10	Average Daily Traffic	Binary 0 if blank
35 & 51	2	E11	Year of Transaction	Binary Enter the last two digits of the year during which the section was last resurfaced, improved or classified. 0 if blank

POSITION	CCL	NAME	DESCRIPTION	VALUE
36 & 52	2	E12	Type of Transaction	Binary

Surface type that existed prior to the last resurface

1 - Primitive	A	00
2 - Unimproved	B	10
3 - Graded and Drained	C	20
4 - Soil surfaced	D	30
5 - Gravel or Stone	E	41
6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
7 - Bitum's Surf. Treatm't on Gravel or Stone	F-2	52
8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
9 - Mixed Bituminous - Non - Rigid Base	G-1	60
10 - Mixed Bituminous - Rigid Base	G-2	61
11 - Bituminous Penetration - Non-Rigid Base	H-1	64
12 - Bituminous Penetration - Rigid Base	H-2	62
13 - Bituminous Concrete	I-1	63
14 - Sand Asphalt on P.C. Concrete	I-2	67
15 - Sand Asphalt on Bituminous Concrete	I-3	66
16 - Sand Asphalt on Types other than 66 and 67	I-4	65
17 - Portland Cement Concrete	J	70
18 - Brick	K	80
19 - Block	L	90
20 - Hard Surfaced (Unclassified Pavement type for Non-System Roads		99
21 - New Construction on New Location		
22 - New Construction on Existing Location		
23 - Transfer from One System to Another Including Private to Public		

POSITION	CCL	NAME	DESCRIPTION	VALUE		
37 & 53	2	E13	Surface Type	Binary		
				1 - Primitive	A	00
				2 - Unimproved	B	10
				3 - Graded and Drained	C	20
				4 - Soil Surfaced	D	30
				5 - Gravel or Stone	E	41
				6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
				7 - Bitum's Surf. Treatm't on Gravel of Stone	F-2	52
				8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
				9 - Mixed Bituminous - Non-Rigid Base	G-1	60
				10 - Mixed Bituminous - Rigid Base	G-2	61
				11 - Bituminous Penetration Non-Rigid Base	H-1	64
				12 - Bituminous Penetration - Rigid Base	H-2	62
				13 - Bituminous Concrete	I-1	63
				14 - Sand Asphalt on P.C. Concrete	I-2	67
				15 - Sand Asphalt on Bituminous Concrete	I-3	66
				16 - Sand Asphalt on types other than 66 and 67	I-4	65
				17 - Portland Cement Concrete	J	70
				18 - Brick	K	80
				19 - Block	L	90
				20 - Hard Surfaced (Unclassified pavement type for Non-System Roads)		99
38 & 54	1	E14	Skid Surface Texture	High half byte - binary Classification based on comparison to known standard textures. 0 - if blank 1 - Smooth 2 - Fine textured rounded 3 - Fine textured gritty 4 - Coarse textured rounded 5 - Coarse textured gritty		

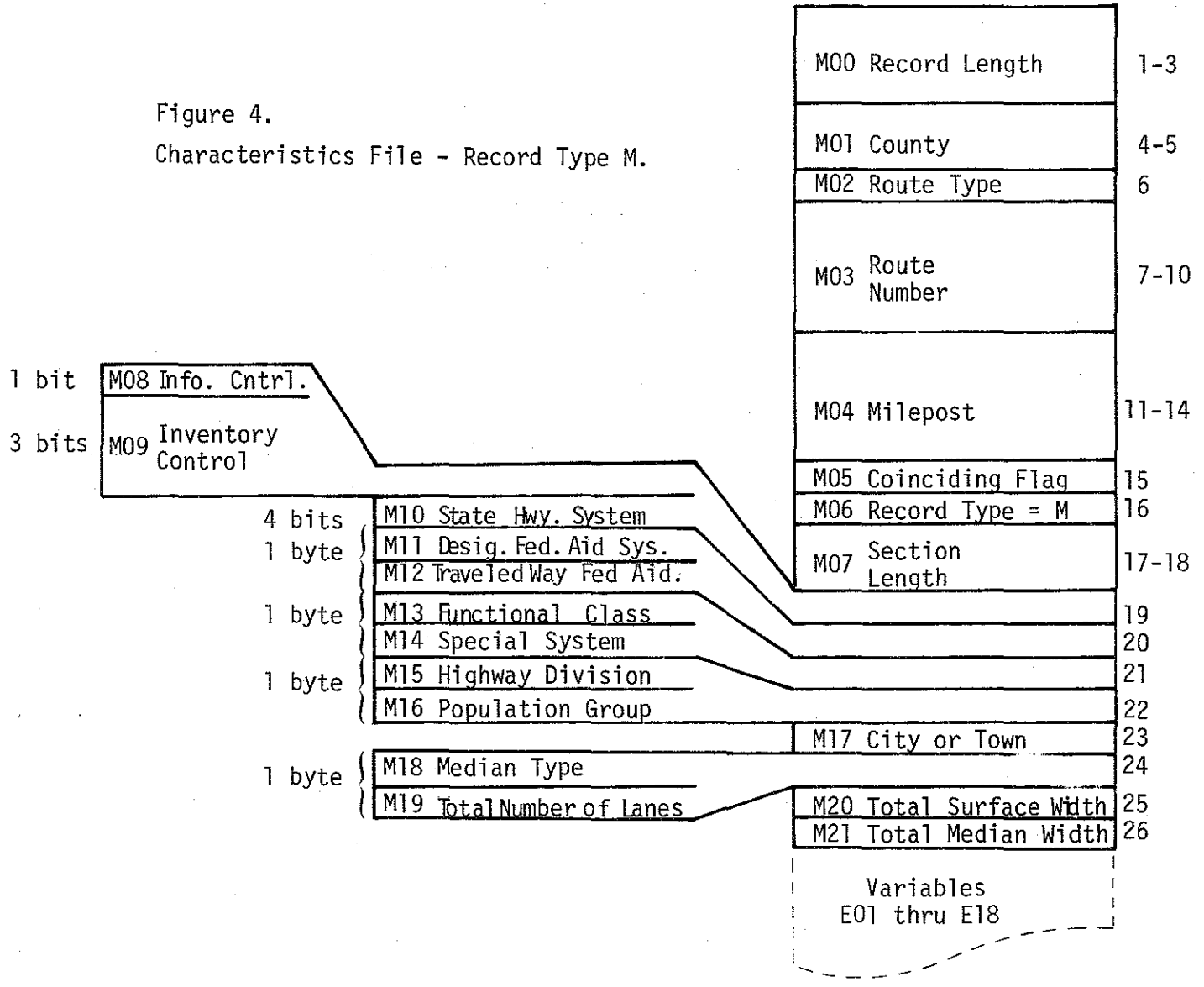
POSITION	CCL	NAME	DESCRIPTION	VALUE
38-39 & 54-55	3	E15	Average Skid Number	Low twelve bits of halfword - binary representation of 3-digit number with tenths position (Picture 99 V9) 0 - if blank

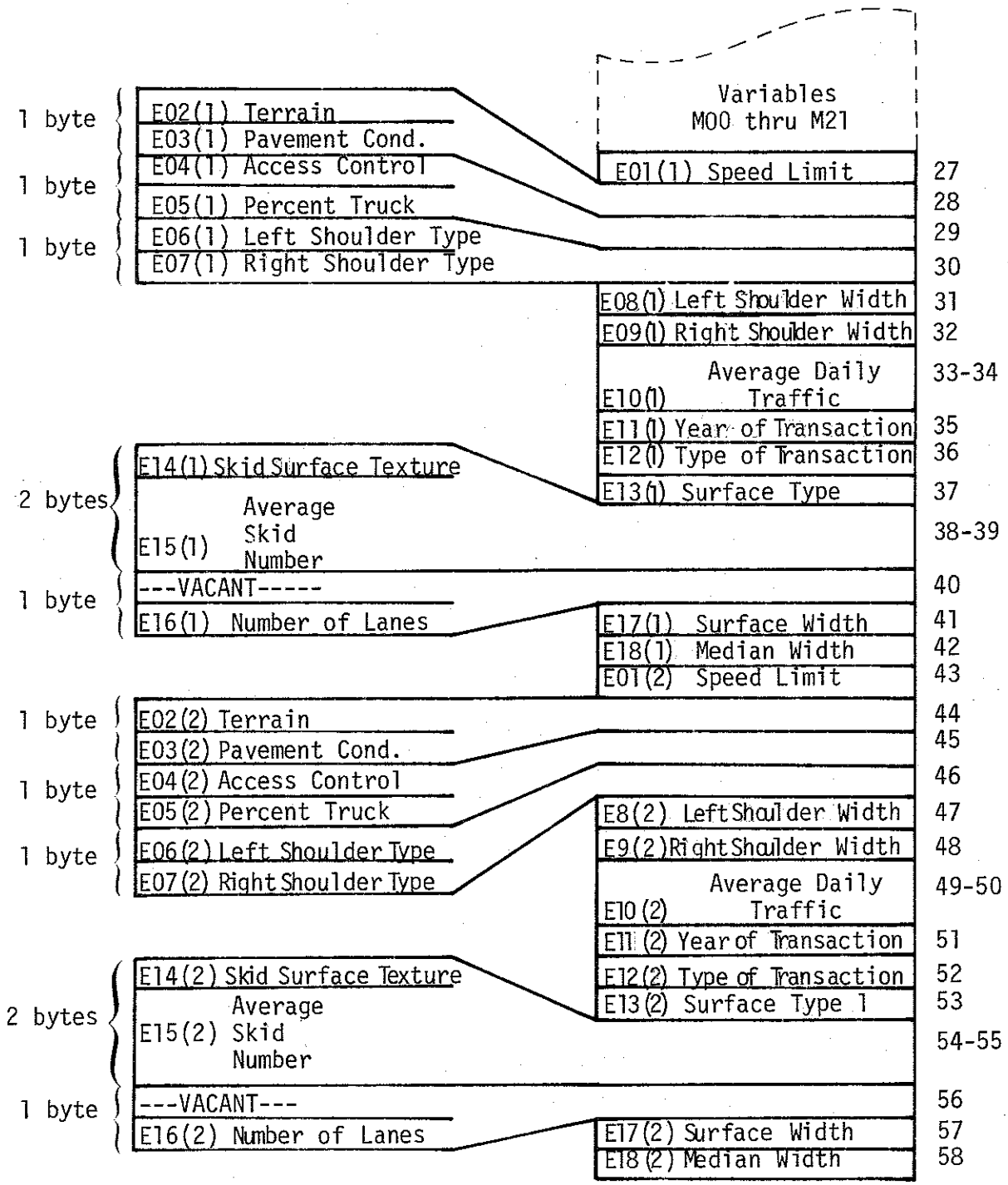
Note: Reference for Skid Values: NCHRP Report #37 "Tentative Skid-Resistance Requirements for Main Rural Highways" (1967) Pub. 1541

40 & 56*	1	E16	Number of lanes (Separate directions only)	Low half byte - binary Number of lanes provided by the surface width for one direction of travel only. If lanes usage changes during the day, peak hour conditions are used.
41 & 57*	3	E17	Surface Width (Separate directions only)	Binary Pavement width in feet or ditch to ditch, if unpaved, for one direction of travel only. If highway is divided, surface width does not include median width. For multilane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face.
42 & 58*	3	E18	Median Width (Separate directions only)	Binary Median width for one direction of travel is one half the total median width in feet. If median width varies substantially, the width that is "most applicable" to the section is used. 00 - 98 width in feet 99 - more than 98 feet 100 - Blank 101 - Oneway traffic 102 - Two Way Traffic

*These variables (E16, E17, and E18) are valid for record length 58 only. For record length 39, positions 40, 41, 42, 56, 57 and 58 will all contain binary zeroes.

Figure 4.
Characteristics File - Record Type M.




Variables
M00 thru M21
1 byte
E02(1) Terrain
E03(1) Pavement Cond.
1 byte
E04(1) Access Control
E05(1) Percent Truck
1 byte
E06(1) Left Shoulder Type
E07(1) Right Shoulder Type
E01(1) Speed Limit
27
28
29
30
E08(1) Left Shoulder Width
31
E09(1) Right Shoulder Width
32
E10(1) Average Daily Traffic
33-34
E11(1) Year of Transaction
35
E12(1) Type of Transaction
36
E13(1) Surface Type
37
2 bytes
E14(1) Skid Surface Texture
E15(1) Average Skid Number
38-39
1 byte
---VACANT-----
40
E16(1) Number of Lanes
41
E17(1) Surface Width
42
E18(1) Median Width
43
E01(2) Speed Limit
1 byte
E02(2) Terrain
44
E03(2) Pavement Cond.
45
1 byte
E04(2) Access Control
46
E05(2) Percent Truck
47
E8(2) Left Shoulder Width
1 byte
E06(2) Left Shoulder Type
48
E07(2) Right Shoulder Type
E9(2) Right Shoulder Width
E10(2) Average Daily Traffic
49-50
E11(2) Year of Transaction
51
E12(2) Type of Transaction
52
2 bytes
E14(2) Skid Surface Texture
E15(2) Average Skid Number
53
54-55
1 byte
---VACANT---
56
E16(2) Number of Lanes
57
E17(2) Surface Width
58
E18(2) Median Width

SEGMENT CHARACTERISTICS FILE FORMAT

Record Types C - Common Begin and End Records

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	C00	Record Length	Zoned Decimal Depends on Record Type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	C01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey Co. "99"
6	1	C02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	C03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	C04	Milepost	Zoned Decimal Cumulative distance from beginning of county route Hundredths of mile

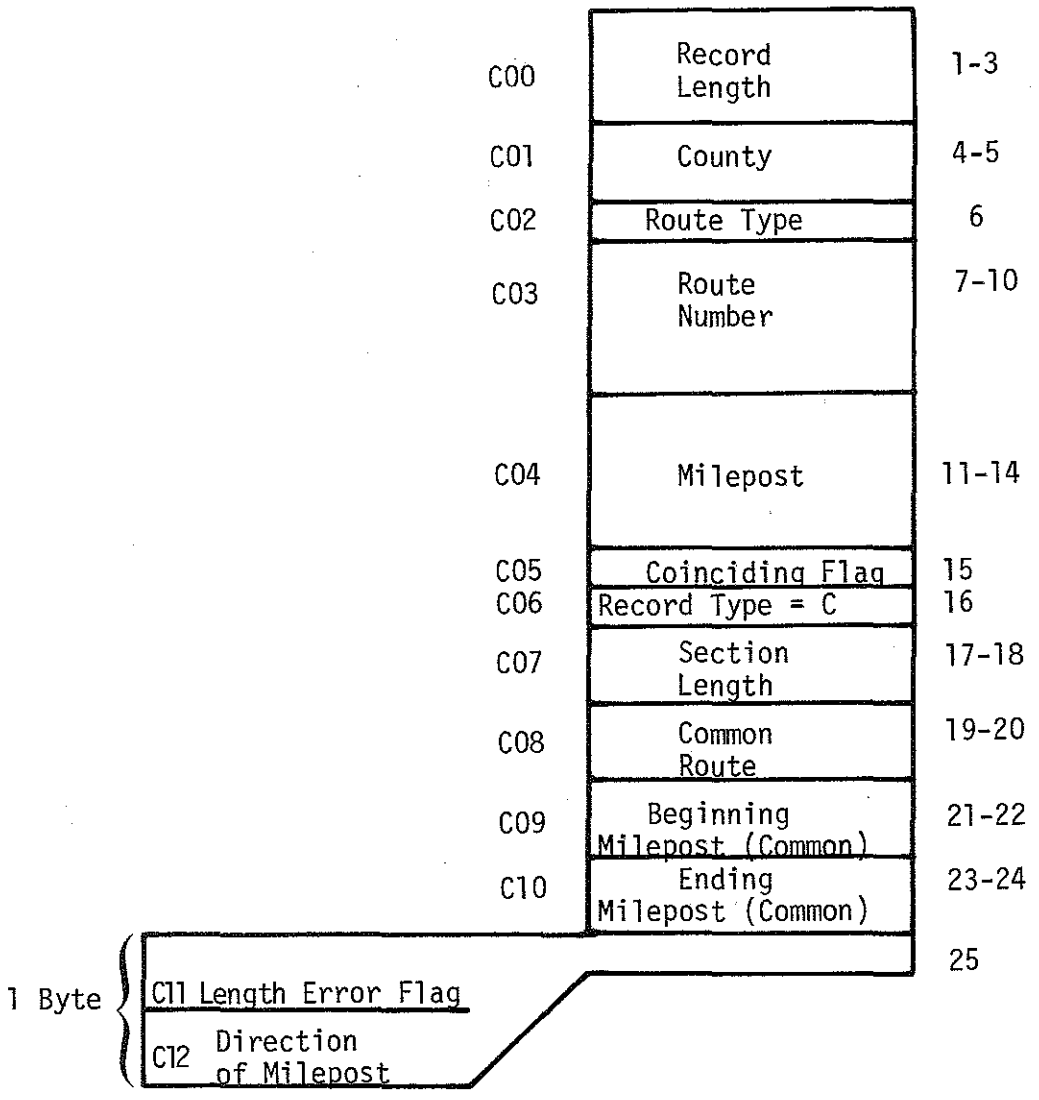
Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

* Converted Character Length - Length in bytes of data when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	C05	Coinciding Segment Flag	Zoned Decimal 0 - No coinciding routes 1 - Other routes coincide 2 - This route coincides
16	1	C06	Record Type	Zoned Decimal C - Common Record
17-18	4	C07	Section Length	Binary Section length to nearest hundredths of mile (always zero)
19-20	5	C08	Common Route Type & Number	Binary representation of 5-digit number
			Route type (digit 1)	1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
			Route Subtype (digit 2 for route type = 1, 2 or 3	0 - Regular 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Truck 8 - Spur or special condition
			Route Number (digit 3-5 for Route type = 1, 2 or 3)	Route Number, leading zeroes
			(digit 2-5 for Route type - 4)	Four digit route number
			(digit 2-5 for Route type = 5)	1000 - Blue Ridge Parkway 2000 - 3000 (reserved for city streets) 4000 - Forest Development Roads 5000 - Indian Reservations 6000 - Military Reservation 7000 - National Park System 8000 - State Parks 9000 - Wildlife Resource Commission

POSITION	CCL	NAME	DESCRIPTION	VALUE
21-22	4	C09	Begin Milepost on Common Route	Binary
23-24	4	C10	Ending Milepost on Common Route	Binary
25	1	C11	Length Error Flag	High half byte - binary 0 - No length error 1 - Length error in generation of coinciding segment
	1	C12	Direction of Mileposting	Low half byte - binary 0 - Not determined 1 - Same direction 2 - Reverse direction

Figure 5.
Characteristics File - Record File C.



SEGMENT CHARACTERISTICS FILE FORMAT

Record Type G - Gap Record

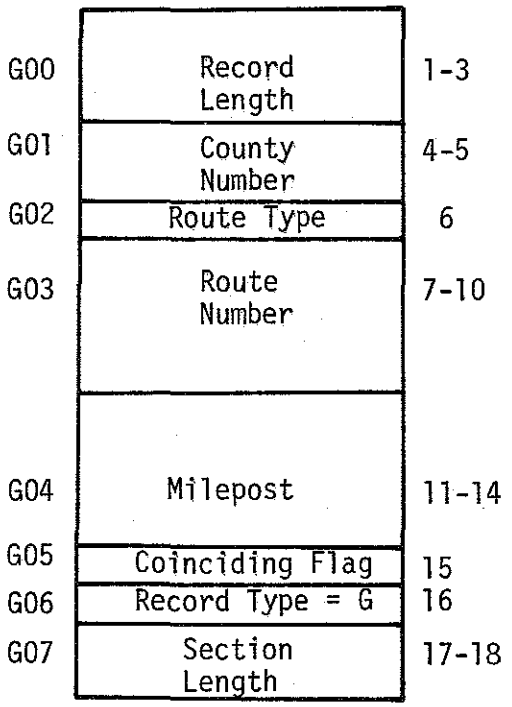
POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	G00	Record Length	Zoned Decimal Depends on Record type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	G01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey County "99"
6	1	G02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	G03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	G04	Milepost	Zoned Decimal Cumulative distance from beginning of county route. Hundredths of mile

Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

*Converted Character Length - Length of data in bytes when expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	G05	Coinciding Segment Flag	Zoned Decimal Ø - No coinciding routes 1 - Other routes coincide 2 - This route coincides
16	1	G06	Record type	Zoned Decimal G - Gap Record
17-18	4	G07	Section Length	Binary Section length to nearest hundredth mile

Figure 6.
Characteristics File - Record Type G.



SUBJECT: PACKRRD (T70809)

AUTHOR: Von Johnson

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: To produce a file of railroad crossing records in a packed binary format for use in supplementing railroad crossing data on the Location Inventory File.
This file will subsequently be loaded onto an indexed file (re. LOADRRD) for use in creating the Features File.

USAGE:

I. Input - The Federal Railroad Crossing Inventory file is input through DDNAME IN (format attached).

The following is an example DD statement for this file.

```
//IN DD UNIT=TAPE,VOL=SER=TAPENN,DISP=OLD,
// DSN=HWY.FPL31000
```

II. Outputs

A. A packed binary file of railroad crossing records (see attached format).

The following is an example DD statement for creating the file.

```
//OUT DD UNIT=TAPE,VOL=SER=TAPENN,
// DISP=(NEW,KEEP),DCB=(LRECL=20,BLKSIZE=4000,RECFM=FB),
// DSN=XXXX
```

B. Error Listing - The message is listed on one line and the record in error is displayed starting on the next line.

FOLLOWING REC HAS INVALID XING # - The record displayed starting on the next line had a crossing identification number that was either not numeric in the first six (6) positions or not alphabetic in the last (seventh) position.

The error listing is displayed using DDNAME SYSOUT

```
//SYSOUT DD SYSOUT=A
```

C. Processing Statistics

1. RECS IN - Total records read.
2. GOOD IN - Total records read minus records for crossing which have invalid numbers or are on non-public roads.
3. BAD IN - The number of records having bad crossing numbers.
4. RECS OUT - The number of records written on the output file, OUT.

FILE FORMAT
HWY.FPL31000
SECTION 1: ALL CROSSINGS

LOC	LEN	TYPE	DESCRIPTION
1	7	CH	Crossing number (6 digits & check character)
8	4	PD	Date sequence number (7 digits)
12	2	ZD	Numeric state code
14	2	PD	Numeric county code (3 digits)
16	3	PD	Numeric city code (4 digits)
19	1	ZD	Nearest city indicator (0-crossing in city, 1-crossing near city)
20	4	CH	Standard AAR railroad code
24	4	PD	Numeric timetable station code (6 digits)
28	8	CH	Railroad mile post
36	10	CH	Railroad ID number
46	7	CH	Highway number
53	20	CH	Street or road name
73	10	CH	County map reference number
83	14	CH	Railroad division or region
97	14	CH	Railroad subdivision or region
111	15	CH	Branch or line name
126	1	ZD	Pedestrian crossing type (0-not a pedestrian crossing, 1-at grade, 2-RR under, 3- RR over)
127	1	ZD	Private vehicle crossing location category (0-not a private vehicle crossing, 1-farm, 2-residential, 3-recreational, 4-industrial)
128	1	ZD	Private vehicle crossing type (0-not a private vehicle crossing, 5-at grade, 6-RR under, 7-RR over)

LOC	LEN	TYPE	DESCRIPTION
129	1	ZD	Private vehicle crossing protection type (0-none, 8-signs, 9-signals)
130	15	CH	Private vehicle crossing protection description
145	1	ZD	Public vehicle crossing type (0-not a public vehicle crossing, 1-at grade, 2-RR under, 3-RR over)
146	1	ZD	Continuation indicator (0-end of record, 1-153 more bytes in record)

SECTION 2: ONLY PUBLIC VEHICLE CROSSINGS AT GRADE

LOC	LEN	TYPE	DESCRIPTION
147	2	ZD	Number of daylight thru train movements
149	2	ZD	Number of daylight switching movements
151	2	ZD	Number of night thru train movements
153	2	ZD	Number of night switching movements
155	1	ZD	Less than 1 train movement per day? (0-no, 1-yes)
156	2	PD	Maximum time table speed of trains at crossing (3 digits)
158	2	PD	Minimum typical speed of trains at crossing (3 digits)
160	2	PD	Maximum typical speed of trains at crossing (3 digits)
162	1	ZD	Number of main tracks
163	2	ZD	Number of tracks other than main tracks
165	10	CH	Description of other tracks, if any
175	1	ZD	Does another railroad operate a separate track at crossing? (0-don't know, 1-yes, 2-no)
176	16	CH	AAR codes of railroads operating separate tracks at crossing (divided into four 4-byte codes)
192	1	ZD	Does another railroad operate over your track at crossing? (0-don't know, 1-yes, 2-no)
193	16	CH	AAR codes of railroads operating over your track at crossing (divided into four 4-byte codes)
209	1	ZD	Number of reflectorized crossbucks

LOC	LEN	TYPE	DESCRIPTION
210	1	ZD	Number of non-reflectorized crossbucks
211	1	ZD	Number of standard highway stop signs
212	1	ZD	Number of other stop signs
213	1	ZD	Number of other signs first type
214	10	CH	Description of other signs first type
224	1	ZD	Number of other signs, second type
225	10	CH	Description of other signs, second type
235	1	ZD	Number of red and white reflectorized gates
236	1	ZD	Number of other colored gates
237	1	ZD	Number of cantilevered flashing lights over traffic lane
238	1	ZD	Number of cantilevered flashing lights not over traffic lane
239	1	ZD	Number of mast-mounted flashing lights
240	1	ZD	Number of other flashing lights
241	9	CH	Description of other flashing lights
250	1	ZD	Number of highway traffic signals
251	1	ZD	Number of wigwags
252	1	ZD	Number of bells
253	20	CH	Description of special protection not train activated
273	1	ZD	Signs or signals present? (0-yes, 1-no)
274	1	ZD	Commercial power available? (0-don't know, 1-yes, 2-no)
275	1	ZD	Does crossing signal provide speed selection for trains? (0-don't know, 1-yes, 2-no, 3-not applicable)
276	1	ZD	Is track equipped with signals for train operation? (0-don't know, 1-yes, 2-no)
277	1	ZD	Type of development (0-don't know, 1-open space, 2-residential, 3-commercial, 4-industrial, 5-institutional)
278	1	ZD	Smallest crossing angle between road and track (0-don't know, 1-0 to 29 degrees, 2-30 to 59 degrees, 3-60 to 90 degrees)

LOC	LEN	TYPE	DESCRIPTION
279	1	ZD	Number of traffic lanes crossing railroad
280	1	ZD	Truck pullout lanes present? (0-don't know, 1-yes, 2-no)
281	1	ZD	Highway paved? (0-don't know, 1-yes, 2-no)
282	1	ZD	Pavement stoplines present? (0-no, 1-yes)
283	1	ZD	Pavement RR crossing symbol present? (0-no, 1-yes)
284	1	ZD	Pavement markings present? (0-yes, 1-no)
285	1	ZD	RR advance warning signs present? (0-don't know, 1-yes, 2-no)
286	1	ZD	Type of crossing surface (0-don't know, 1-sectional timber, 2-full wood plank, 3-asphalt, 4-concrete slab, 5-concrete pavement, 6-rubber, 7-metal sections, 8-other metal, 9-unconsolidated)
287	1	ZD	Does track run parallel to and within a street? (0-don't know, 1-yes, 2-no)
288	1	ZD	Is the highway at this crossing intersected by another highway within 75 feet of the crossing? (0-don't know, 1-yes, 2-no)
289	2	ZD	Highway system code
291	1	ZD	Is crossing on state highway system? (0-don't know, 1-yes, 2-no)
292	2	ZD	Functional classification of road over crossing
294	4	PD	Estimated present average daily traffic (AADT) (6 digits)
298	2	ZD	Estimated percentage of trucks in the traffic system

FILE FORMAT

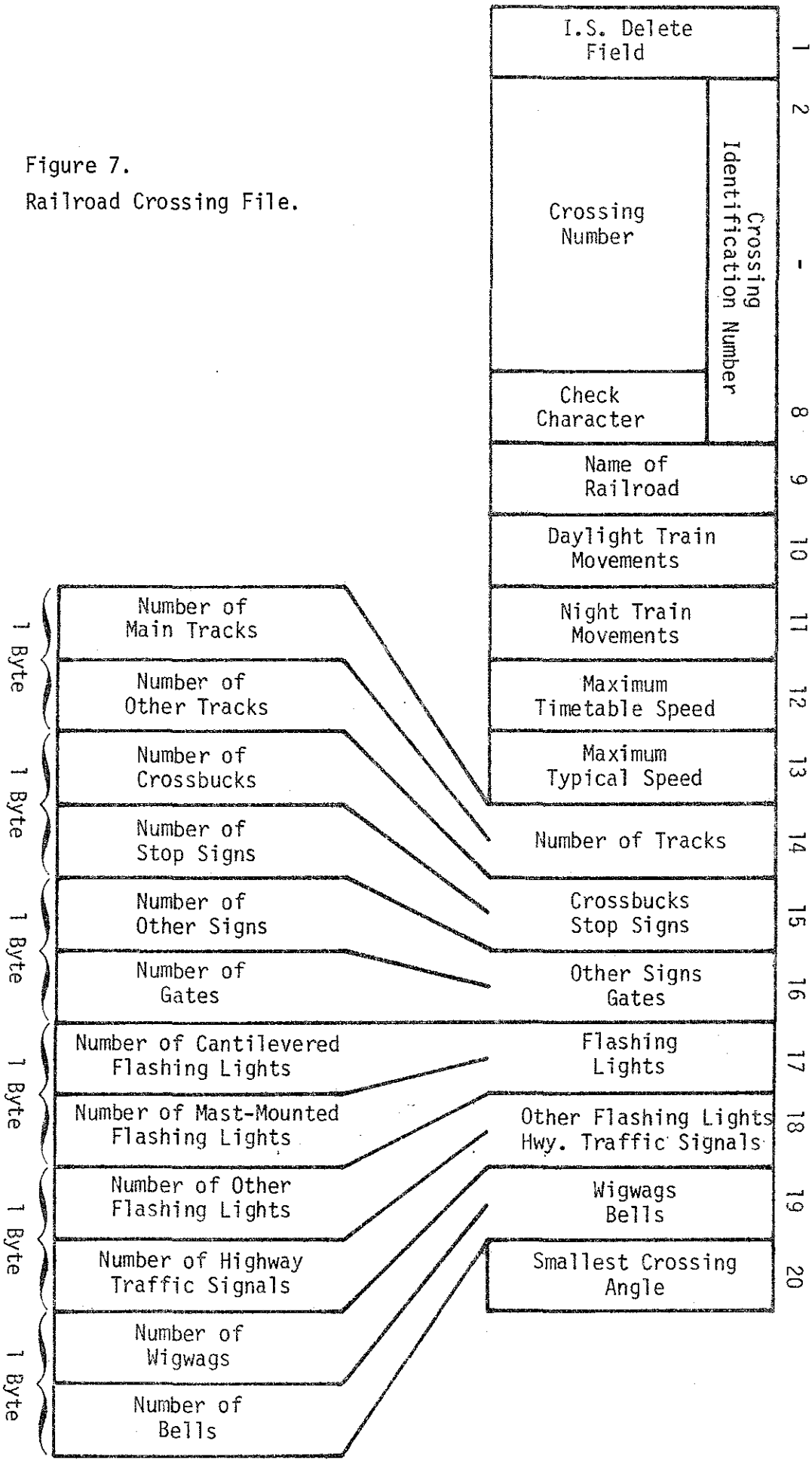
HWY.FTR30050 and HWY.FTR30070

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-8	Crossing Identification Number	
(2-7)	Crossing Number	Zoned Decimal
(8)	Check Character	Alphabetic
9	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad (AR) 2 - Aberdeen and Rockfish Railroad Co. (ARC) 3 - Atlantic and Western Railroad Co. (ATW) 4 - Beaufort & Morehead Railroad Co. (BM 5 - Cape Fear Railways Inc. (CFR) 6 - Cliffside Railroad (CLIF) 7 - Clinchfield Railroad Company (CRR) 8 - Department of Defense (DOD) 9 - Durham & Southern Railway Co. (DS) 10 - High Point, Thomasville & Denton Railroad (HPTD) 11 - Laurinburg & Southern Railroad Co. (LN) 12 - Lewisville & Nashville Railroad Co. (LRS) 13 - Norfolk, Franklin, & Danville Railroad Co. (NFD) 14 - Norfolk and Western Railway (NW) 15 - Seaboard Coastline Railroad Co. (SCL 16 - Southern Railway Company (SOU) 17 - Warrenton Railroad (WAR) 18 - Winston-Salem Southbound Railway (WS 19 - Yancey Railroad Co. (YAN)
10	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
11	Night Train Movements	Binary Actual number of movements 255 - Not stated
12	Maximum Timetable Speed	Binary Actual number of movements 255 - Not stated
13	Maximum Typical Speed	Binary Actual Speed 255 - 255 or greater

COLUMN	DESCRIPTION	VALUE
14	Number of Tracks	
	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - Not stated
	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
15	Crossbucks - Stop Signs	
	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
16	Other Signs - Gates	
	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not stated
17	Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

COLUMN	DESCRIPTION	VALUE
18	Other Flashing Lights - Highway Traffic Signals	
	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
19	Wigwags - Bells	
	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
20	Smallest Crossing Angle Between Road & Track	Binary 0 - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

Figure 7.
Railroad Crossing File.



SUBJECT: PACKSTR (T71009)

AUTHOR: Von Johnson

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: To produce a file of structure records in a packed binary format for use in supplementing the structure data on the Location Inventory File. This file will subsequently be loaded onto an indexed file (re. LOADSTR) for use in creating the Features File.

USAGE:

I. Input - The Structure Data Inventory file from Bridge Maintenance is input to this program through DDNAME-IN. The format for this file is attached.

The following is an example DD statement for this file:

```
//IN DD UNIT=TAPE,VOL=SER=TAPENN,DISP=OLD,
// DSN=HWY.STPRIM
```

II. Outputs

A. A packed binary file of structure records (see attached format).

The following is an example DD statement for creating the file:

```
//OUT DD UNIT=TAPE,VOL=SER=TAPENN,
// DISP=(NEW,KEEP),DSN=XXXXXXXX,
// DCB=(LRECL=43,BLKSIZE=4300,RECFM=FB)
```

B. Error Listing - The format of the error listing is as follows:

1-80	81-132
Record in Error	Error Message

The possible error messages and their associated meanings are:

Message	Meaning
:EXPECTING 1 CARD	- The current record to be processed should be a 1 card but is not.

Message	Meaning
:EOF WHILE READING 2 CARD	- An end of file condition was encountered while trying to read a 2 card.
:EXPECTING 2 CARD	- The current record to be processed should be a 2 card but is not.
:EOF WHILE READING 3 CARD	- An end of file condition was encountered while trying to read a 3 card.
:EXPECTING 3 CARD	- The current record to be processed should be a 3 card but is not.
:EOF WHILE READING 7 CARD	- An end of file condition was encountered while trying to read a 7 card.
:EXPECTING 7 CARD	- The current record to be processed should be a 7 card but is not.
:STRUC # DOES NOT MATCH	- The structure number for the current record being processed does not match the structure number for the current case being processed. This message can occur during the processing of records 2, 3, and 7. All previously stored records for the incomplete case plus the error record are printed.
:DUP STRUC #	- A duplicate structure number was encountered. All 4 cards for this number were in the file, however, only the 1 card is printed.

The error file is displayed using DDNAME SYSOUT.

```
//SYSOUT DD SYSOUT=A
```

C. Processing statistics (displayed on DDNAME SYSOUT after error listing)

1. RECORDS IN - Total records read
2. GOOD RECS IN - Good records processed
3. GOOD REC OUT - Total records written on the output file
4. DUPS DROPPED - Number of duplicate cases dropped

Since four (4) input records are processed to give one (1) output record:

GOOD RECS OUT X 4 = GOOD RECS IN

and

(GOOD REC OUT + DUPS DROPPED) X 4 = RECORDS IN

FILE FORMAT
ST.PRIM
STRUCTURE DATA INVENTORY

Card 1

Column 1 - Card Number 1

Column 2-13 - Structure Number
Type - P, S, W, H, F, T, M, C, R
Route - For Primary System only
A-B-Alt. or Bus. Route (Primary System only)
County Number - Primary and Secondary Systems - 2 digits
(00, 01, 02, 10, etc.)
Bridge Number - Primary and Secondary Systems
NSEW - Code if part of Bridge Number (else leave blank)

Do not code "0" in front of bridge numbers and county numbers

Column 14-17 - Date of Input

Column 18-19 - Division

Column 20-24 - Route on (Use the Hierarchy Route Number)
Type - 0 - No Route "Not Applicable"
1- Interstate
2- U.S.
3- N.C.
4- SR
5- City Street
6- Federal Lands Road (Parkway, etc.)
7- State Lands Road
8- Other
9- Assumed Future Route Number (For Invent. Purposes only)

Example: NC 137 - 30137
Code route in remaining columns

Column 25-29 - Route Under (Use the Hierarchy Route Number)
Else Code 0000

Column 30-31 - F.A. System on Structure

CODE	SYSTEM
00	Not Applicable
01	Interstate, Rural, Open to Traffic
02	Interstate, Urban, Open to Traffic
03	Other FA Primary, Rural
04	Other FA Primary, Urban
05	FA Secondary Rural, State Jurisdiction
06	FA Secondary Urban, State Jurisdiction
07	FA Secondary Rural, Local Jurisdiction
08	FA Secondary Urban, Local Jurisdiction
09	Other State Highways, Rural (Non-FA)
10	Other State Highways, Urban (Non-FA)
11	Local Rural Roads
12	Local City Roads
14	Federal-Aid Urban "M" System

Column 32-33 - F.A. System Under Structure
Code same as F.A. System on Structure
Code 00 - Not Applicable

Column 34-35 - Type of Service
The first digit is for the service on the bridge as follows:
1. Highway
2. Railroad
3. Pedestrian Exclusively
4. Highway - Railroad
5. Highway - Pedestrian
6. Overpass Structure at an interchange or Second Level of a multilevel interchange, ramps that create an interchange
7. Third Level (Interchange)
8. Fourth Level (Interchange)
9. Building or Plaza
0. Other

The second digit will indicate the type of service under the bridge:
1. Highway, with or without pedestrian
2. Railroad
3. Pedestrian Exclusively
4. Highway - Railroad
5. Waterway
6. Highway - Waterway
7. Railroads - Waterway
8. Highway - Waterway - Railroad
9. Navigatable Waterway
0. Other

Column 36 - Route Designtn on
0 - Not Applicable
1 - Mainline
2 - Alternate
3 - Bypass
4 - Spur
5 - Toll roads
6 - Business
7 - Ramp or Wye
8 - Service and/or unclassified frontage road
9 - Truck Route

Column 37 - Route Designtn Under
Code same as Route Designtn On

Column 38 - Area Classification (Code for the Road) Code "Urban" if bridge is in any city limits
1. Rural Paved
2. Urban
3. Rural Unpaved

Column 39-42 - Thru Lanes on Structure
Code the number of through lanes being carried by the structure as a two digit number. Also, code the total number of through lanes being crossed over by the structure as a two digit number. This will be a four digit field consisting of two subfields containing the two values. The codes should be right-justified in each of the subfields.

Example:

16 lanes on (double-level), 0 lanes under	Code 1600
8 lanes on, 12 lanes under (6 city streets)	0812

Column 43-47 - Structure Length
Code to the nearest foot

Column 48-49 - Number of main spans
If all spans are the same type code all as main spans

Column 50-52 - Length maximum span

Column 53-56 - Deck width
Record and code a four digit number to show the out-to-out width of the deck to the nearest tenth of a foot. If the structure is a through structure, the number to be coded will represent the lateral clearance between superstructure members. The measurement should be exclusive of flared areas for ramps, i.e., it should be the minimum or nominal width.

Column 57-60 - Bridge Clear Roadway (Actual)
Distance from curb to curb
Code 0000 or leave blank - Not applicable
(If bridge has median code distance from curb to curb of bridge)

Column 61-64 - Distance Between Rails
Code 0000 or leave blank - No rails

Column 65 - Sidewalks
0. No sidewalks
1. 3' sidewalk one side
2. 3' both sides
3. 5' one side
4. 5' both sides
5. 6' one side
6. 6' both sides
7. Sidewalk one side (other size than listed
8. Sidewalk both sides (other size than listed or combinations of listed sizes)

Column 66-68 - Structure Type Main Spans

TYPE OF STRUCTURE

1. Concrete
2. Concrete Continuous
3. Steel
4. Steel Continuous
5. Prestress Concrete
6. Prestress Concrete Continuous
7. Timber
8. Masonry
9. Aluminum, W.I. or C.I.
0. Other

01 - Slab
02 - Stringer/Multi-Beam or Girder
03 - Girder and Floorbeam System
04 - Tee Beam
05 - Box Beam or Girders - Multiple
06 - Box Beam or Girders - Single or spread
07 - Frame
08 - Orthotropic
09 - Truss - Deck
10 - Truss - Thru
11 - Arch - Deck
12 - Arch - Thru
13 - Suspension
14 - Stayed Girder
15 - Movable - Lift
16 - Movable - Bascule
17 - Movable - Swing
18 - Tunnel
19 - Culvert
00 - Other

Examples:

I-Beam Stringers	- 302
Continuous I-Beam Stringers	- 402
RCTG and RCDG	- 102
Prestress Slab BMD-14	- 501
Prestress Girders and BMD-13	- 502
Box or Arch Culvert	- 119

Column 69 - Type Floor Main Spans

0. Not applicable or leave blank
Code 0 if bridge or culvert is earth filled
1. Concrete
2. Prestressed Concrete
3. 3" Timber
4. 4" Timber
5. 2" Top and 3" Bottom Timber
6. 6" Timber
7. Timber (Thickness other than listed above)
8. Steel Plank
9. Other

Column 70-72 - Skew

Measured from line ahead. Code "VVV" for variable skew over 5^{o} difference
If skew is unknown leave columns blank

Column 73-76 - Year Built
Leave blank if date unknown
Record and code both the year of construction and latest year of major reconstruction of the structure. Code the last two digits of the years in which construction or reconstruction of the structure was completed. A code of "00" in the first two positions should be used for years 1900 and earlier.

Example:

Built 1928	No reconstruction	Code 2800
Built 1914	Reconstruction 1960	1460
Built 1898	Reconstruction 1948, 1964	0064

Column 77-78 - Bypass Detour Length
If a ground level bypass is available at the structure site for the route given in Item 5, record and code the detour length as zero. Otherwise, indicate the actual length to the nearest mile of the feasible detour to the nearest comparable structure. If the bridge is one of twin bridges and is not at an interchange, code 01 to indicate that the other twin bridge can be used as a temporary bypass. In other cases, indicate that actual length to the nearest mile of the detour length. The detour length should represent the total additional travel for a vehicle which would result from closing of the bridge. Code "99" for 99 miles or more.

Card 2

Column 1 - Card Number 2

Column 2-13 - Structure Number

Column 14 - Type floor approach spans
Use same code as for type floor main spans

Column 15-17 - Number Approach Spans (Different type design from main spans)
Leave blank - not applicable

Column 18-23 - Structure Type Approach Spans
Use same code as main span code
Leave blank - not applicable

Column 24 - Wearing Surface
0. Bridge or culvert is earth filled, not applicable
1. Concrete
2. Asphalt
3. Block
4. Open Grate
5. Timber Plank

Code for majority of bridge if more than one type of W.S.

Column 25-27 - Approach Width (Shoulder to Shoulder)
Code normal pavement width that approaches bridge plus shoulders. For dual bridges code distance from shoulder to shoulder across both lanes.
Leave blank if unknown

Column 28-30 - Approach Pavement Width
Actual approach pavement width
Leave blank if unknown

Column 31-58 - Substructure Types

TYPE CAP	COLUMNS, PILES, ETC.	FOOTING
0 - Not applicable	00 - Not applicable	0 - Not applicable
1 - Concrete cap	01 - Concrete columns	1 - Concrete footing
2 - Prestress concrete cap	02 - Concrete columns with web	2 - Concrete footing with prestressed concrete piles
3 - Steel cap	03 - Single concrete column (T)	3 - Concrete footing with precast concrete piles
4 - Timber cap	04 - Timber piles	4 - Concrete footing with timber
5 - Masonry cap	05 - Timber posts	5 - Concrete footing with steel H Piles
	06 - Steel H Piles	6 - Timber Sills
	07 - Square prestress concrete piles	7 - Masonry footing
	08 - Square precast concrete piles	8 - Natural rock footing
	09 - Octagonal prestress concrete piles	
	10 - Octagonal precast concrete piles	
	11 - Abutment type concrete wall	

COLUMNS, PILES, ETC.

12 - Mass concrete pier
13 - Masonry wall
14 - Timber piles with bulkhead boards
15 - Timber posts with bulkhead boards
16 - Steel H Piles with bulkhead boards
17 - Steel shell piles
18 - Round precast concrete piles

Exception codes for number of bents

AA = 200
BB = 250
CC = 300
DD = 350

Column 59-62 - Traffic Safety

CODE	MEANING
0	Inspected feature does not meet currently acceptable standards
1	Inspected feature meets currently acceptable standards

DIGIT POSITION	FEATURE INSPECTED
1st	Bridge railing
2nd	Transitions
3rd	Approach guardrail
4th	Approach guardrail terminal

Card 3

Column 1 - Card Number 3

Column 2-13 - Structure Number

Column 14-37 - Feature Intersected
Free style. Leave blank if (1) one route is intersected, (2) Waterway has no name
If more than one feature is intersected separate with commas recording highways first. Abbreviations may be used if necessary

Column 38 - Critical Defense Code

Column 39-51 - Improvements

Column 52-78 - Defense Highways

Card 7

Column 1 - Card Number 7

Column 2-13 - Structure Number

Column 14-19 - Date of last inspection, month, day, year

Column 20-25 - Condition Rating

Column 26-28 - Appraisal Rating

Column 29 - Design Load
0 - Below 10 tons
1 - H-10
2 - H-15
3 - HS-15
4 - H-20
5 - HS-20
6 - Pedestrian
7 - Between H-10 and H-15
8 - Other

Column 30-32 - Inventory Rating

LOAD CODES	CODE TONNAGE EXAMPLE CODE
1 - H Truck	H-10 - 110
2 - HS Truck	H-15 - 115
3 - Truck 2	H-20 - 120
4 - Truck 3	HS-15 - 227
5 - Truck 4	HS-20 - 236
6 - Truck 5	Pedestrian - 700
7 - Pedestrian	
8 - Gross Load Only	

Use analysis when available

Column 33-35 - Operating Rating

Column 36-41 - Posted Rating

Column 36-37 - Will show the type sign used or combinations used

Column 38-39 - Show tonnage for single vehicle in columns 40-41 for Trucks and Trailers. If a type 1 sign is used show the same tonnage for both.
If type 5 sign is used, show the correct tonnage called for in Column 38-39 and code "LM" in Column 40-41

Column 42 - Structure open or closed
If bridge is closed to all traffic, code C
If bridge is open to traffic, but is load posted, code P
If bridge is open to traffic with no load restrictions, code A

Column 43-46 - Minimum Vertical Clearance over Deck
The information to be recorded for this item is the actual minimum vertical clearance over the bridge roadway, to any superstructure restriction, to the nearest inch. When no superstructure restriction exists above the bridge roadway, the clearance is therefore unlimited and should be coded "9999".
A four digit number should be coded to represent feet and inches.

Column 47-50 - Minimum Horizontal Clearance under Bridge
Over 100 feet - code 9999
Leave blank - not applicable

Column 51-55 - Minimum Vertical Clearance under Bridge
Column 51 - "0" if only one minimum V.C. is needed
Column 51 - N or E if two minimum V. cl. are required
If a structure crosses one bound lane (N, S, E, or W) code only one clearance with "0" in Column 51
Leave blank - not applicable
Code a four digit number to represent in feet and inches the minimum Vertical clearance from the roadway or railroad track beneath the structure to the underside of the superstructure.

Column 56-60 - Minimum vertical clearance under Bridge for extra lanes (S, W)

Column 61-68 - Minimum lateral underclearance
Curbs and auxiliary lanes (CB/AUX) Columns 61 and 65:
"0" - without curbs
"1" - curbs or auxiliary lane
Leave blank if unknown

Right clearance Column 62-64
Code right minimum distance from edge of pavement to substructure unit. If railroad code minimum distance from center line track to substructure unit or to toe of slope steeper than three to one in both above cases.

Code 000 - not applicable
Leave blank if unknown

Left clearance (for divided highways only)
Columns 65-68
Code left minimum distance from edge pf pavement to substructure unit or any median barrier in median area only

Code 000 - not applicable
Code 999 - if there is no obstruction in median area
Leave blank if unknown

Column 69-70 - Estimated Remaining Life in Years

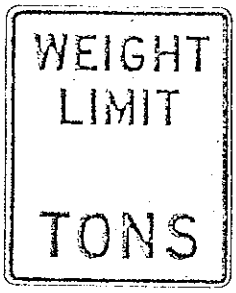
Column 71-76 - A.D.T. Volume on Structure

Column 77-78 - Year of A.D.T.

Column 79-80 - (%) of A.D.T. Commercial Volume (Primary Bridges)
Use A.D.T. on the structure
Leave blank if not applicable

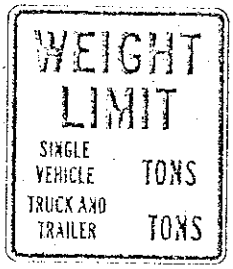
Figure 8. TYPE SIGNS
(Card Number 7--Columns 36 & 37)

TYPE 1



R12-1

TYPE 2

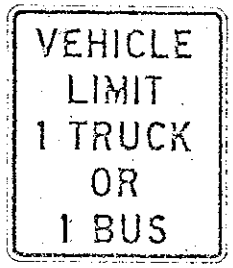


R12-20

TYPE 3

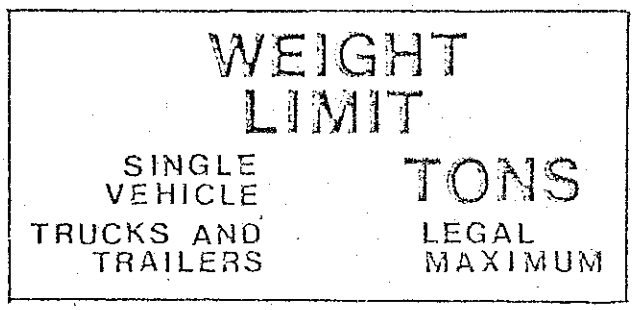
R12-21

TYPE 4



R12-22

TYPE 5



X-1101

FILE FORMAT

HWY.FTR30060 and HWY.FTR30080

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-13	Structure Number	
(2)	Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(3-5)	Route Number	Numeric - Right justified with leading spaces
(6)	Route Type	Ø - Normal A - Alternate B - Bypass
(7-9)	County Number	
(10-12)	Bridge Number	Numeric - Right justified with leading spaces
(13)	Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
14-17	Service Under Structure	
(14)	Road Class	(Values in binary in low half of byte-upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated

COLUMN	DESCRIPTION	VALUE
(15-16)	Road Number	Binary halfword Actual road number 9999 - Not stated
(17)	Service(s) Type	(Values in binary in low half of byte, upper half of byte not used) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated
18-21	Service on Structure	
(18)	Road Class	(Values in binary in low half of byte, upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated
(19-20)	Road Number	Binary Halfword Actual Road Number 9999 - Not stated
(21)	Service(s) Type	0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian exclusively 4 - Highway and railroad 5 - Highway and pedestrian 6 - Overpass structure at an interchange or second level of a multilevel interchange, ramps that create an interchange 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or plaza 15 - Not stated

COLUMN	DESCRIPTION	VALUE
22-23	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
24-25	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
26-29	Structure Length	Binary fullword - actual distance in feet (99999) 99999 - Not stated
30	Approach Alignment-Wearing Surface	
	Approach Alignment	High half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth fillen, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated

COLUMN	DESCRIPTION	VALUE
31-32	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
33	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
34-35	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
36-37	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
38	Total Lanes	
	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	Total Lanes Over	Low half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
39-40	Minimum Lateral Under-Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
41-42	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
43	Safety Adequacy	Two bits binary per item Items are described from high order to low order (i.e., left to right)
	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

COLUMN	DESCRIPTION	VALUE
	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

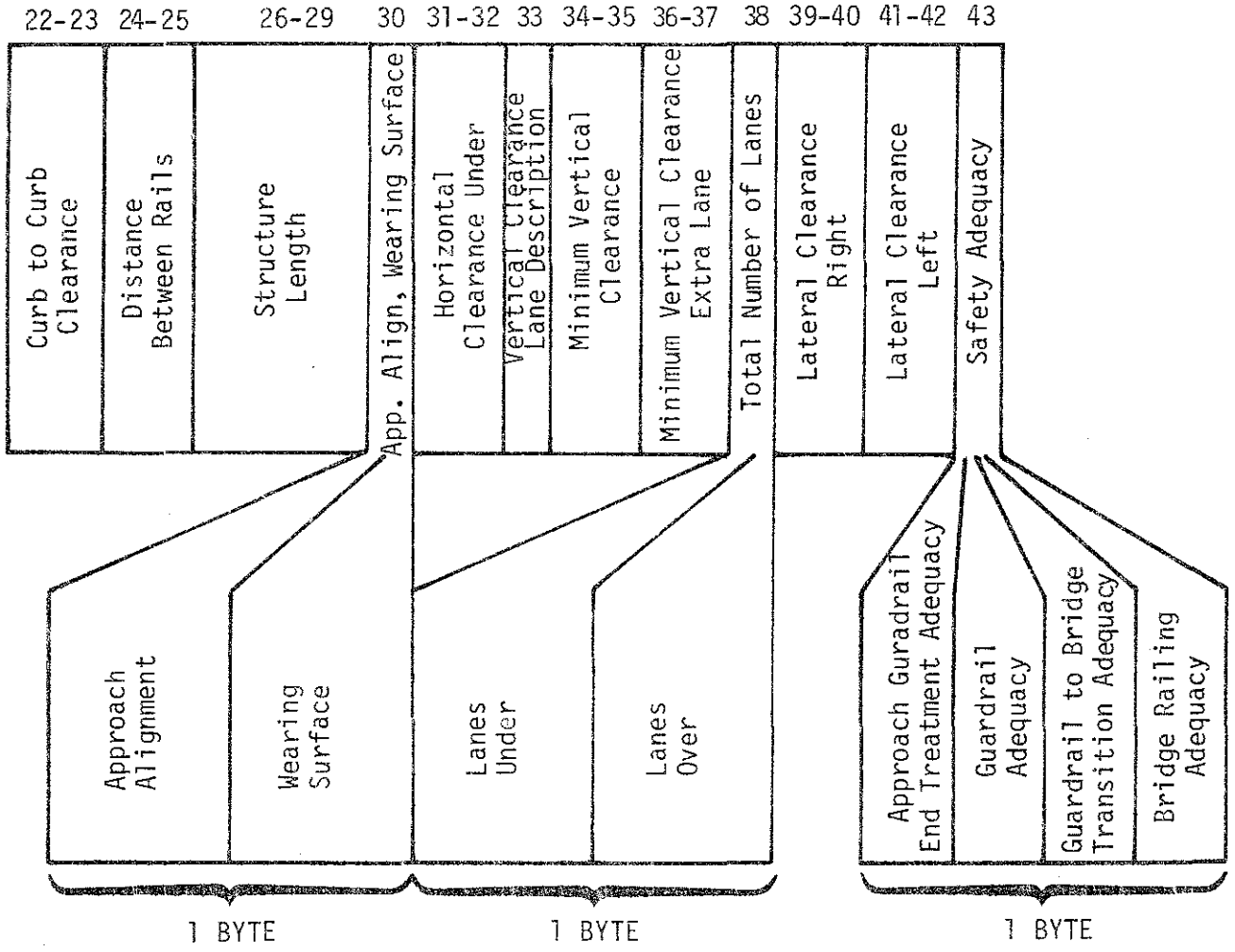
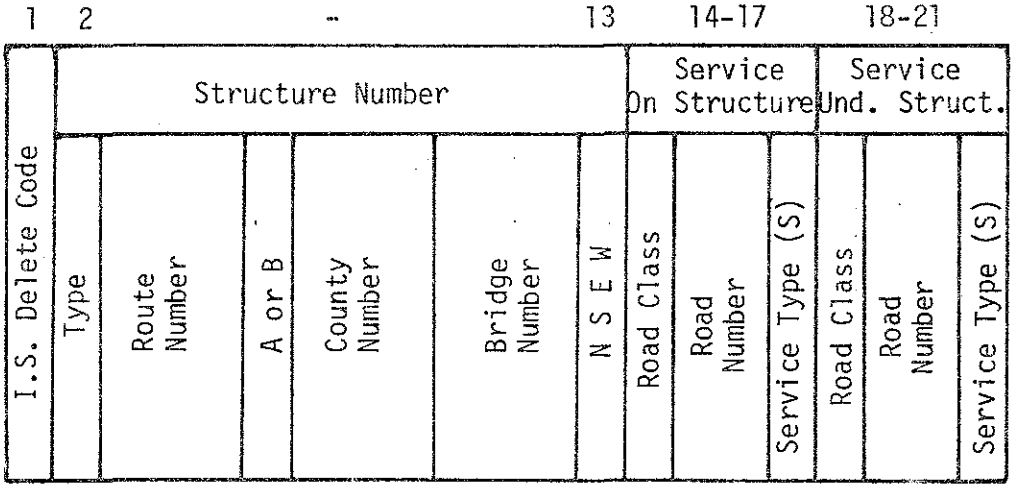


Figure 9.
Structure Number File.



SUBJECT: LOADRRD (T71209)

AUTHOR: Von Johnson

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: To produce an indexed data file from the binary structures file written by program PACKRRD. The output file from this program (LOADRRD) is an input to program GENFEAT. (T71609)

USAGE:

I. Input - The output file created by program PACKRRD is input to this program using DDNAME IN as below:

```
//IN DD UNIT=TAPE,VOL=SER=TAPENN,
// DISP=OLD,DSN=XXXX,DCB=(LRECL=20,
// BLKSIZE=6000,RECFM-FB)
```

II. Outputs

A. An indexed file of railroad crossing records accessable by using crossing number as a key.

The following is the DD statement (DDNAME=OUT) used to create an indexed file (QISAM) with 2 blocks per track on a 3330 disk.

```
//OUT DD UNIT=DISK,VOL=SER=XXXX,
// SPACE=(CYL,1),DISP=(NEW,KEEP),
// DSN=XXXX,DCB=(LRECL=20,BLKSIZE=6180,
// DSORG=IS,OPTCD=L)
```

B. Processing Statistics - Record counts as provided by the IBM sort are displayed.

III. SORT JCL - DD cards must be provided for DDNAMES SORTLIB, SORTWK01, SORTWK02, and SORTWK03.

FILE FORMAT

HWY.FTR30050 and HWY.FTR30070

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-8	Crossing Identification Number	
(2-7)	Crossing Number	Zoned Decimal
(8)	Check Character	Alphabetic
9	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad (AR) 2 - Aberdeen and Rockfish Railroad Co. (ARC) 3 - Atlantic and Western Railroad Co. (ATW) 4 - Beaufort & Morehead Railroad Co. (BMH) 5 - Cape Fear Railways Inc. (CFR) 6 - Cliffside Railroad (CLIF) 7 - Clinchfield Railroad Company (CRR) 8 - Department of Defense (DOD) 9 - Durham & Southern Railway Co. (DS) 10 - High Point, Thomasville & Denton Railroad (HPTD) 11 - Laurinburg & Southern Railroad Co. (LN) 12 - Lewisville & Nashville Railroad Co. (LRS) 13 - Norfolk, Franklin, & Danville Railroad Co. (NFD) 14 - Norfolk and Western Railway (NW) 15 - Seaboard Coastline Railroad Co. (SCL) 16 - Southern Railway Company (SOU) 17 - Warrenton Railroad (WAR) 18 - Winston-Salem Southbound Railway (WSS) 19 - Yancey Railroad Co. (YAN)
10	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
11	Night Train Movements	Binary Actual number of movements 255 - Not stated
12	Maximum Timetable Speed	Binary Actual number of movements 255 - Not stated
13	Maximum Typical Speed	Binary Actual Speed 255 - 255 or greater

COLUMN	DESCRIPTION	VALUE
14	Number of Tracks	
	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - Not stated
	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
15	Crossbucks - Stop Signs	
	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
16	Other Signs - Gates	
	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not stated
17	Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

COLUMN	DESCRIPTION	VALUE
18	Other Flashing Lights - Highway Traffic Signals	
	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
19	Wigwags - Bells	
	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
20	Smallest Crossing Angle Between Road & Track	Binary 0 - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

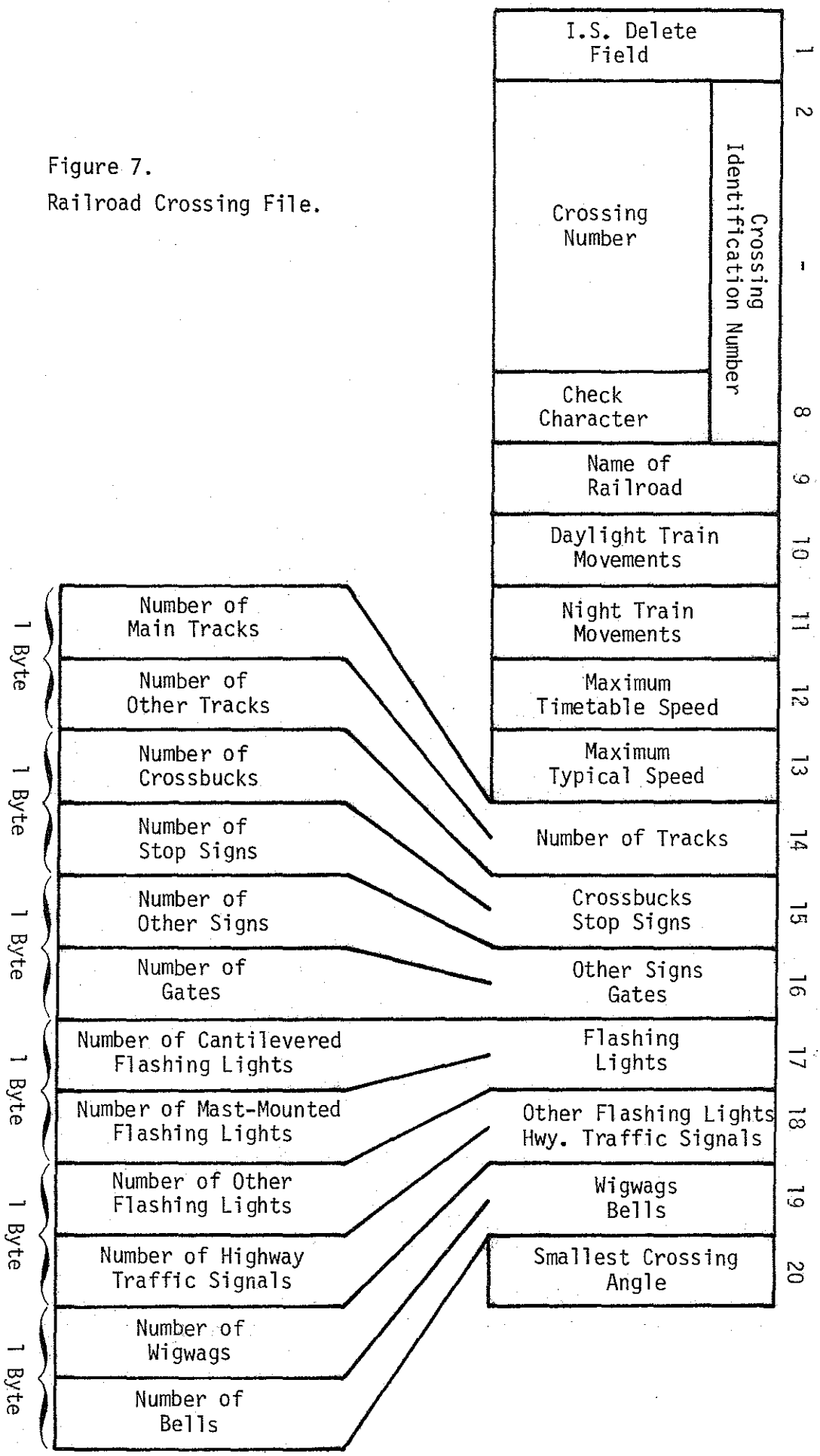


Figure 7.
Railroad Crossing File.

SUBJECT: LOADSTR (T71409)

AUTHOR: Von Johnson

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: To produce an indexed data file from the binary structures file written by program PACKSTR. The output file from this program (LOADSTR) is an input to program GENFEAT. (T71609)

USAGE:

I. Input - The output file created by program PACKSTR is input to this program using DDNAME IN as below.

```
//IN DD UNIT=TAPE,VOL=SER=TAPENN,DISP=OLD,
// DSN=XXXX,DCB=(LRECL=43,BLKSIZE=4300,
// RECFM=FB)
```

II. Outputs

A. An indexed file of structures accessable using structure number as a key.

The following is the DD statement (DDNAME=OUT) used to create an indexed file (QISAM) with 2 blocks per track on a 3330 disk.

```
//OUT DD UNIT=DISK,VOL=SER=XXXX,
// SPACE=(CYL,1),DISP=(NEW,KEEP),DSN=XXXX,
// DCB=(LRECL=43,BLKSIZE=6149,DSORG=IS,OPTCO=L)
```

B. Processing Statistics - Record Counts as provided by the IBM sort are displayed.

III. SORT JCL - DD cards must be provided for DDNAMES SORTLIB, SORTWK01, SORTWK02 and SORTWK03.

FILE FORMAT

HWY.FTR30060 and HWY.FTR30080

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-13	Structure Number	
(2)	Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(3-5)	Route Number	Numeric - Right justified with leading spaces
(6)	Route Type	Ø - Normal A - Alternate B - Bypass
(7-9)	County Number	
(10-12)	Bridge Number	Numeric - Right justified with leading spaces
(13)	Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
14-17	Service Under Structure	
(14)	Road Class	(Values in binary in low half of byte-upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated

COLUMN	DESCRIPTION	VALUE
(15-16)	Road Number	Binary halfword Actual road number 9999 - Not stated
(17)	Service(s) Type	(Values in binary in low half of byte, upper half of byte not used) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated
18-21	Service on Structure	
(18)	Road Class	(Values in binary in low half of byte, upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated
(19-20)	Road Number	Binary Halfword Actual Road Number 9999 - Not stated
(21)	Service(s) Type	0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian exclusively 4 - Highway and railroad 5 - Highway and pedestrian 6 - Overpass structure at an interchange or second level of a multilevel interchange, ramps that create an interchange 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or plaza 15 - Not stated

COLUMN	DESCRIPTION	VALUE
22-23	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
24-25	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
26-29	Structure Length	Binary fullword - actual distance in feet (99999) 99999 - Not stated
30	Approach Alignment-Wearing Surface	
	Approach Alignment	High half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth fillen, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated

COLUMN	DESCRIPTION	VALUE
31-32	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
33	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
34-35	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
36-37	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
38	Total Lanes	
	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	Total Lanes Over	Low half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
39-40	Minimum Lateral Under-Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
41-42	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
43	Safety Adequacy	Two bits binary per item Items are described from high order to low order (i.e., left to right)
	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

COLUMN	DESCRIPTION	VALUE
	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

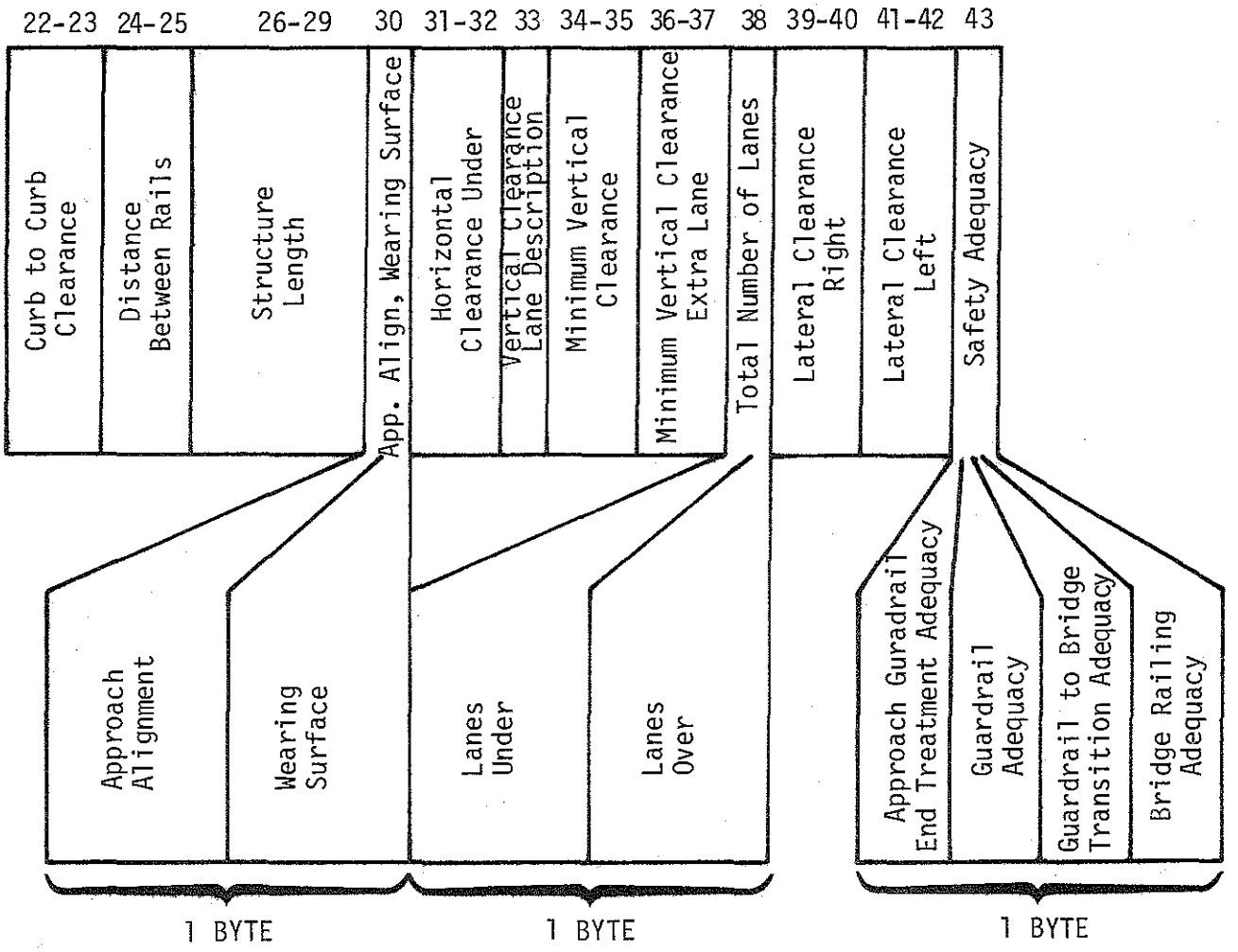
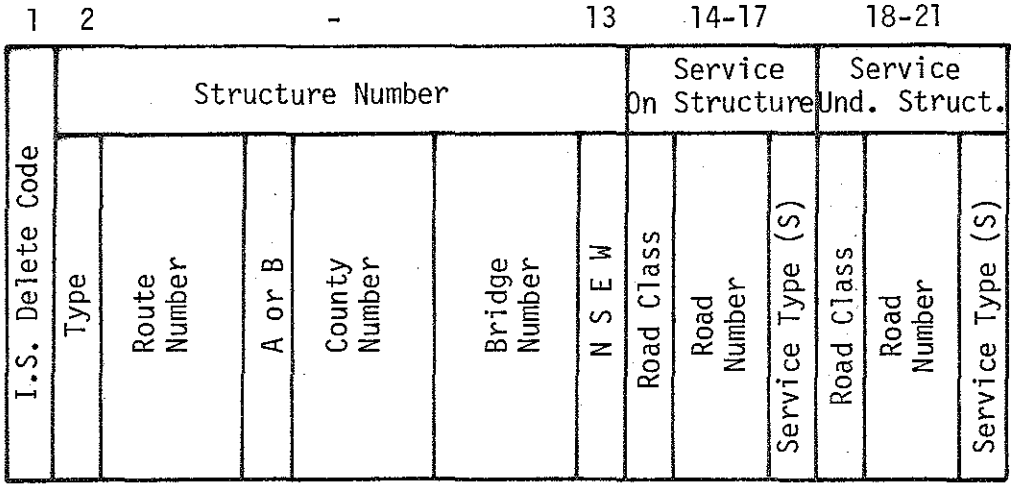


Figure 9.
Structure Number File.



SUBJECT: GENFEAT (T71609)

AUTHOR: Dennis Ryan

DATE: May, 1977

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: Program produces a features file formatted for input into the Department of Transportation Merged System.

USAGE:

By supplying GENFEAT with the proper input files, a formatted feature file will be produced which will provide a physical description of features occurring at points along a roadway. These points will be referenced by their location as determined by the county, route and milepost of each feature. Output will consist of a dataset, ordered sequentially by county, route, and milepost, describing these features. Also provided as output are diagnostic messages supplying the user with informtion concerning non-usable input data.

GENFEAT merges roadway feature information which exists on several files into one file of standard format.

I. Inputs

A. Location Inventory File (DDNAME=INFILE1)

This file consists of Traffic Engineering's Location Inventory Information as it presently exists. Features included are intersections, structures, railroad crossings, geographic boundaries such as city and county lines, and coinciding route end and begin points.

B. Structure File (DDNAME=INFILE2)

An indexed sequential file whose information is keyed by structure number. This file is used to supplement the structure information contained on the location inventory file. Detailed data describes the characteristics of each structure.

C. Railroad Crossing File (DDNAME=INFILE3)

A second indexed sequential file accessed by the key, railroad crossing number. This file supplements the railroad information contained on the location inventory file. Characteristics of each railroad crossing are described in detail.

II. Output

A. Features File (DDNAME=OUTFILE1)

Input files are collasped and formatted for output to the features file. Records for this file consist of a 16 byte standard header in character format followed by a variable number of bytes representing the different feature types in packed data representation. This file is ordered on the keys county, route, and milepost, all of which are contained in the standard header.

STANDARD HEADER DESCRIPTION

ATTRIBUTE	ELEMENT NAME	DESCRIPTION
PIC 999	Length	Length is bytes of entire record.
PIC 99	County	County number (00-99).
PIC 99999	Route	Combined route type and number.
PIC 9999	Milepost	Milepost to nearest one-hundredth mile.
PIC X	Record-Type	Type of feature being described.
PIC 9	Coinciding-Flag	Coinciding route condition.

B. Error Messages (DDNAME=PRNT1)

Printer displayed output listing structure numbers appearing on the location inventory file but not contained in the indexed sequential structure file.

C. Error Messages (DDNAME=PRNT2)

Printer displayed output listing railroad crossing numbers appearing on the location inventory file but not contained in the indexed sequential railroad crossing file.

D. Error Messages (DDNAME=PRNT3)

Printer displayed output listing location inventory reocrds containing invalid data values and therefore not included in the features file.

E. Error Messages (DDNAME=PRNT4)

Printer displayed output listing those location inventory section records for which no coinciding information exists. These records are considered invalid and do not appear in the features file.

Sample JCL:

```
// EXEC  PGM=F71609
// INFILE1 DD DSN=HWY.FTR10505,DISP=OLD
// INFILE2 DD DSN=HWY.FTR30050,DISP=OLD
// INFILE3 DD DSN=HWY.FTR30070,DISP=OLD

// OUTFILE1 DD DSN=HWY.FTR30090,DISP=(NEW,KEEP)
// PRNT1  DD  SYSOUT=A
// PRNT2  DD  SYSOUT=A
```

(Continued)

```
// PRNT3  DD  SYSOUT=A
// PRNT4  DD  SYSOUT=A
```

HWY.FTR10505

LOCATION INVENTORY FILE TRAFFIC ENGINEERING VERSION

This file describes the Interstate, US and NC routes in the state primary road system. The file sequence is County, Route and Milepost and contains the following records:

I. County Records denote the beginning or end of data for a county.

II. Route Records denotes the beginning or end of data for a particular route.

III. Section Records define segments of a route where it coincides with another route.

IV. Item Records describe individual items along the roadway.

The following types of Item Records are present in the file.

A. Intersection
B. Railroad Crossing
C. Structure
D. County Line
E. State Line
F. City Limit/Center of Town

COUNTY RECORD

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	C - County Record (Defines the beginning or end of data for the county described by the record)
8	Begin/End	B - Beginning of counties data E - End of counties data
9-10	County Number	Zoned decimal 00 - Alamance . . 99 - Yancey
11-14	County Name	Alphabetic (Abreviation of county name)
15-43	Unused	Blanks
44-49	Unused	000000 (Zeroes)
50-55	Unused	Blanks

COUNTY RECORD

1-6	File Sequence Number	51-55	Unused
7	Record Type		
8	Begin/End		
9-10	County Number		
11-14	County Name		
15-43	Unused		
44-49	Unused (000000)		
50	Unused		

ROUTE RECORD

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	R - Route Record (Defines the beginning or end of data for the route described by the record)
8	Begin/End	B - Beginning of routes data E - End or routes data
9-10	Route Type	Ib - Interstate US - US NC - NC SR - Secondary (b = blank)
11	Additional Route Descriptor	B - Business or alternate N - North E - East S - South W - West b - No additional description given (b = blank)
12-14	Route Number (Note: If 9-10 = "SR" Route Number will be found in 11-14 to accomodate the extra digit in the Route Number)	Zoned decimal with leading blanks
15-19	Beginning Milepost- Beginning milepost of route in county. (For route begin records only. Route end cards have spaces in this field.)	Zoned decimal with left zeroes (Spaces for route end records)
20-43	Unused	Spaces
44-49	Unused	000000 (Zeroes)
50-55	Unused	Blanks

ROUTE RECORD

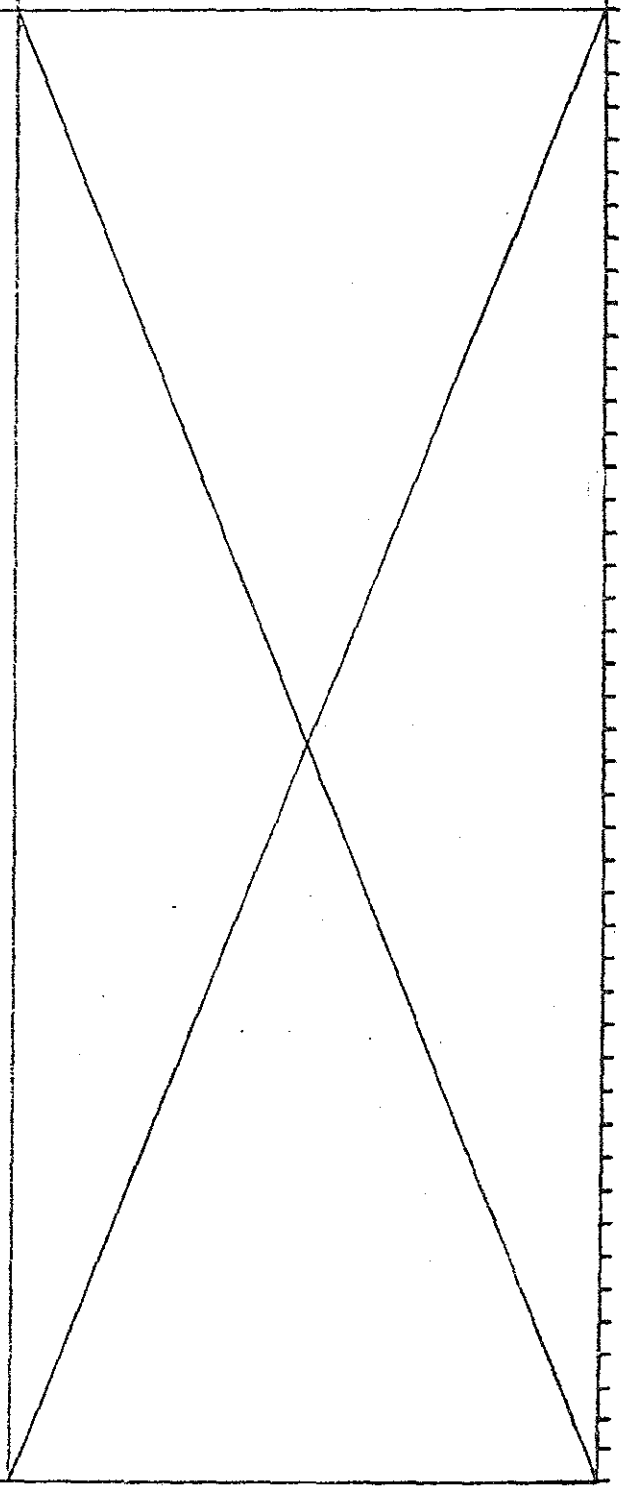
1-6	File Sequence Number	51-55	Unused
7	Record Type		
8	Begin/End		
9-10	Route Type		
11	Additional Route Descriptor		
12-14	Route Number		
15-19	Beginning Milepost		
20-43	Unused		
44-49	Unused (000000)		
50	Unused		

SECTION RECORD

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	S - Section record
8	Unused	Blank
9-14	First Coinciding Route	
9-10	Route Type	Ib - Interstate NC - NC US - US SR - Secondary NB - No coinciding route - (If this common record occurs as the last record before a route end record) Beginning of coinciding segment (If this section card occurs in any position other than the record before a route end record. (b = blank)
11-14	Route Number	Zoned decimal, right justified with leading spaces
15-20	Second Coinciding Route	Same format as First Coinciding Route Blank if not applicable.
21-26	Third Coinciding Route	Same format as First Coinciding Route Blank if not applicable.
27-32	Fourth Coinciding Route	Same format as First Coinciding Route Blank if not applicable.
33-38	Fifth Coinciding Route	Same format as First Coinciding Route Blank if not applicable.
39-43	Unused	Blanks
44-49	Cumulative Milepost (Cumulative from beginning of route in county)	Zoned Decimal (In hundredths of a mile, with leading zeroes.)
50-55	Unused	Blanks

SECTION RECORD

1-6	File Sequence Number		51-55 Unused
7	Record Type		
8	Unused		
9-10	Route Type	First Coinciding Route	
11-14	Route Number		
15-20	Second Coinciding Route		
21-26	Third Coinciding Route		
27-32	Fourth Conciding Route		
33-38	Fifth Coinciding Route		
39-43	Unused		
44-49	Cumulative Milepost		
50	Unused		



ITEM RECORDS

(Many types of roadway features are described by item records. One of six (6) different formats is used to describe an item depending upon the type of item being described.)

INTERSECTION TYPE, ITEM RECORD (1)

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned Decimal with left zeroes
7	Record Type	I - Item Record
8-13	Intersecting Roadway Description	
8-9	Intersecting Roadway Type	Ib - Interstate US - US NC - NC SR - Secondary (b = blank)
10-13	Intersecting Roadway Number	Zoned Decimal (Right justified with leading blanks)
14-17	Distance to Next Item	Zoned Decimal (In hundredth's of a mile, with leading zeroes)
18	Direction to Next Item	Zoned Decimal 5 - North and East 6 - North and West 7 - South and East 8 - South and West
19	Intersection Type	Zoned Decimal 1 - Grade Separation, No Ramp 2 - Intersection 3 - At Grade, 3 legs 4 - At Grade, 4 legs 5 - At Grade, 5 legs 6 - At Grade, 6 legs
20	Loop Condition	Y - Yes (Loops around and intersects route again) N - No
21	Area (All roadway outside corporate limits is considered rural. Code is for next segment as you advance along the route.)	R - Rural U - Urban
22-43	Unused	Blanks
44-49	Cumulative Milepost (Cumulative from beginning of route in county)	Zoned Decimal (In hundredths of a mile, with leading zeroes.)
50-55	Unused	Blanks

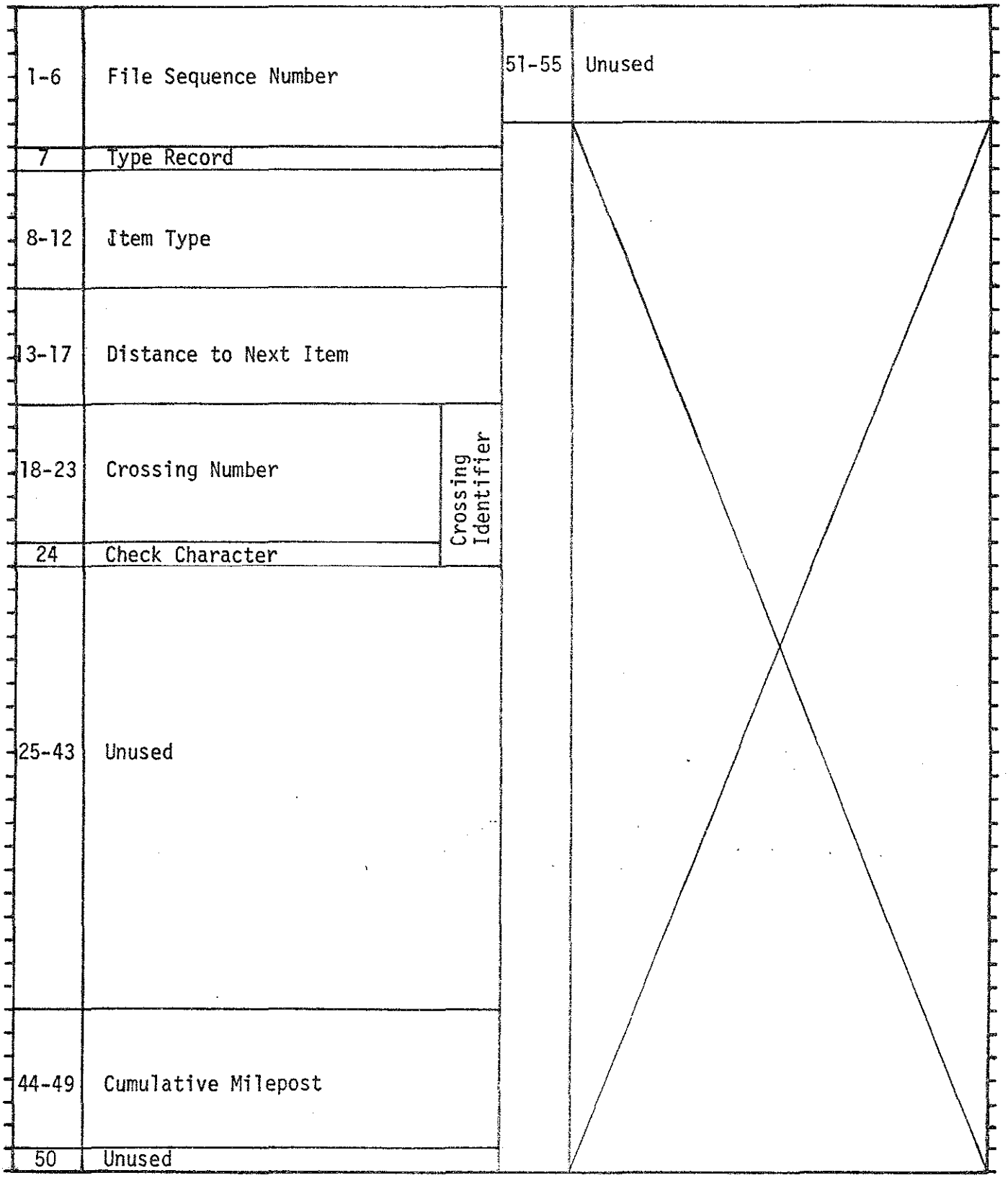
INTERSECTION TYPE, ITEM RECORD (1)

1-6	File Sequence Number		51-55 Unused
7	Record Type		
8-9	Intersecting Roadway Type	Intersecting Roadway Number	
10-13	Intersecting Roadway Number		
14-17	Distance to Next Item		
18	Direction to Next Item		
19	Intersection Type		
20	Loop Condition		
21	Area		
22-43	Unused		
44-49	Cumulative Milepost		
50	Unused		

RAILROAD CROSSING TYPE, ITEM RECORD (2)

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned Decimal, with left zeroes
7	Type Record	I - Item Record
8-12	Item Type	RRDbb = Railroad Crossing (b = blank)
13-17	Distance to next Item	Zoned Decimal (In hundredths of a mile with left zeroes)
18-24	Crossing Identifier	
18-23	Crossing Number	Zoned Decimal
24	Check Character	Alphabetic
25-43	Unused	Blanks
44-49	Cumulative Milepost	Zoned Decimal (In hundreths of a mile with left zeroes)
50-55	Unused	Blanks

RAILROAD CROSSING TYPE, ITEM RECORD (2)

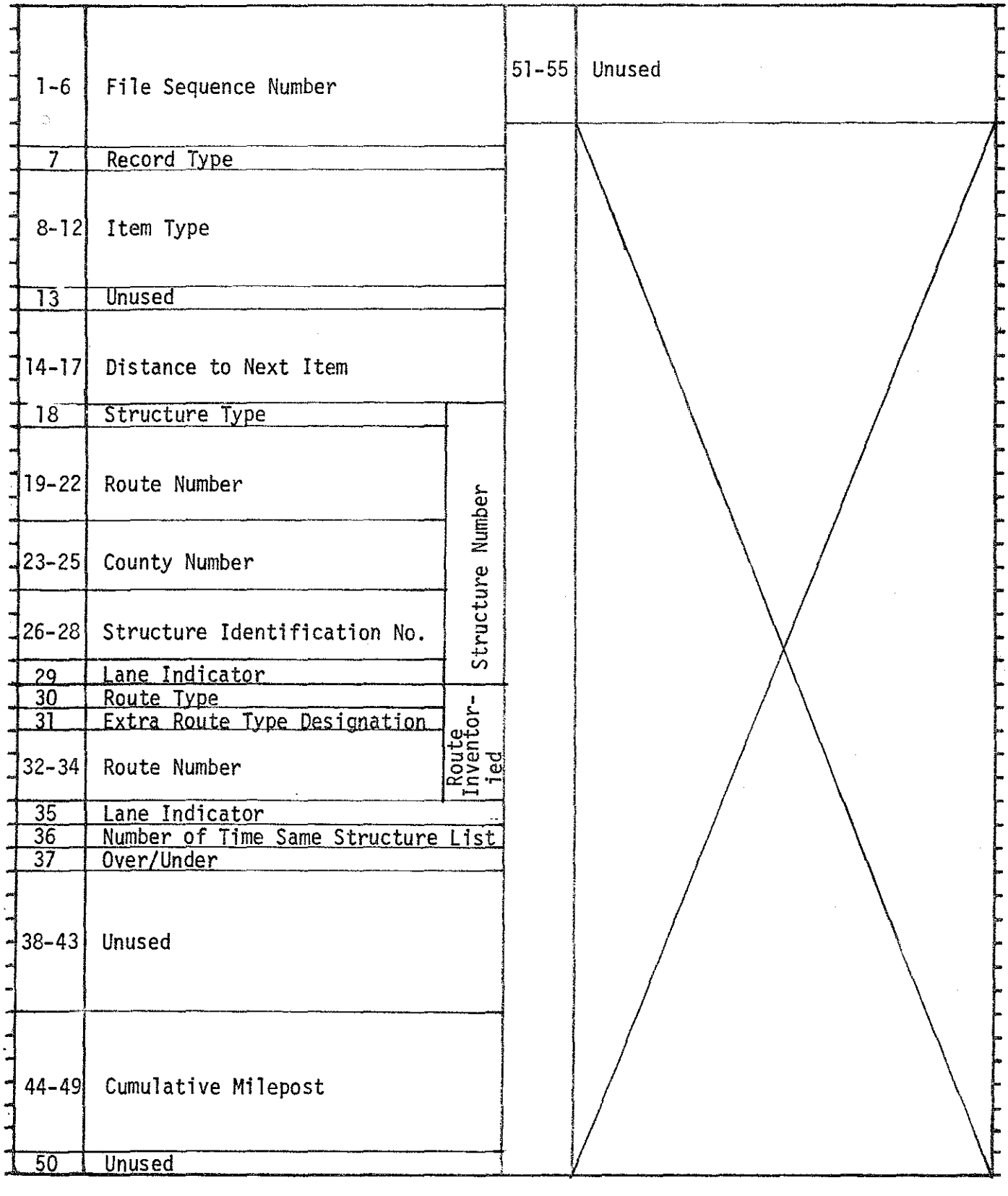


STRUCTURE TYPE, ITEM RECORD (3)

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	I - Item Record
8-12	Item Type	BRGbb - Bridge PObbb - Pedestrian overhead walk CLVbb - Culvert TUNbb - Tunnel OSbbb - Overhead sign (b = blank)
13	Unused	Zero (0)
14-17	Distance to Next Item	Zoned Decimal (In hundredths of a mile, left zero)
18-29	Structure Number	
18	Structure Type	b (blank) - Bridge C - RC Culvert F - Ferry H - City Street (Overhead) M - Misc. (Utilities, Pipes, etc.) P - Pipe Culvert R - Railroad (Overhead) S - Sign (Overhead) T - Vehicular Tunnel W - Pedestrian Walkway (overhead)
19-22	Route Number	Zoned decimal (Right justified, leading blanks. Route type is <u>not</u> included)
23-25	County Number	Zoned decimal (Right justified, leading blanks,)
26-28	Structure Identification Number	Zoned decimal (Right justified, leading blanks)
29	Lane Indicator (From Bridge Department)	b - Both lanes N - Northbound lane E - Eastbound lane S - Southbound lane W - Westbound lane
30-34	Route Inventoried	
30	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC

POSITION	DESCRIPTION	VALUE
31	Extra Route Type Designation	& - Alternate or Business 2 - East 4 - West
32-34	Route Number	Zoned Decimal (Right justified with leading spaces)
35	Lane Indicator (Compass direction to next item)	b - Both lanes N - Northbound lane E - Eastbound lane S - Southbound lane W - Westbound lane
36	Number of TimesSame Structure Listed	Zoned Decimal
37	Over/Under	O - Roadway passes over structure U - Roadway passes under structure
38-43	Unused	
44-49	Cumulative Milepost (Cumulative from beginning of route in county)	Zoned Decimal (In hundredths of a mile, with leading zeroes)
50-55	Unused	Blanks

STRUCTURE TYPE, ITEM RECORD (3)

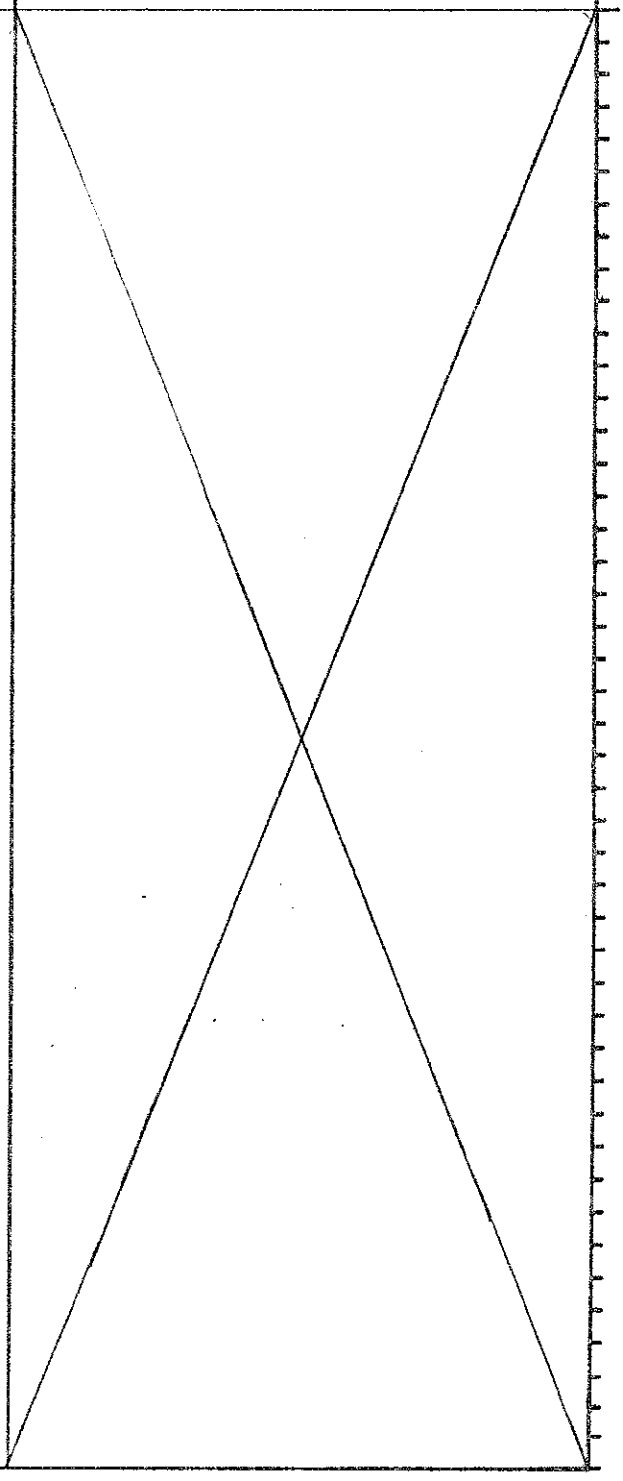


COUNTY LINE, ITEM RECORD (4)

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	I - Item Record
8	Item Type	7 - County Line
9-10	County Number	Zoned decimal
11-13	Unused	000 (Zeroes)
14-17	Distance to Next Item	Zoned decimal (In hundredths of a mile, left zero)
18	Direction to Next Item	Zoned decimal 5 - North and east 6 - North and west 7 - South and east 8 - South and west
19-20	Unused	Blanks
21	Area (All roadway outside corporate limits is considered rural. Code is for next segment as you advance along the route)	R - Rural U - Urban
22-43	Unused	Blanks
44-49	Cumulative Milepost (Cumulative from beginning of route in county)	Zoned decimal (In hundredths of a mile, with left zeroes)
50-55	Unused	Blanks

COUNTY LINE, ITEM RECORD (4)

1-6	File Sequence Number
7	Record Type
8	Item Type
9-10	County Number
11-13	Unused
14-17	Distance to Next Item
18	Direction to Next Item
19-20	Unused
21	Area
22-43	Unused
44-49	Cumulative Milepost
50	Unused
51-55	Unused



STATE LINE, ITEM RECORD (5)

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	I - Item Record
8	Item Type	8 - State line
9	State Number	Zoned decimal 6 - Georgia 7 - South Carolina 8 - Tennessee 9 - Virginia
10-13	Unused	0000 (Zeroes)
14-17	Distance to Next Item	Zoned decimal (In hundredths of a mile, with left zeroes)
18	Direction to Next Item	Zoned decimal 5 - North and east 6 - North and west 7 - South and east 8 - South and west
19-20	Unused	Blanks
21	Area (All roadway outside corporate limits is considered rural. Code is for next segment as you advance along the route.)	R - Rural U - Urban
22-43	Unused	Blanks
44-49	Cumulative Milepost	Zoned decimal (In hundredths of a mile, with left zeroes)
50-55	Unused	Blanks

STATE LINE, ITEM RECORD (5)

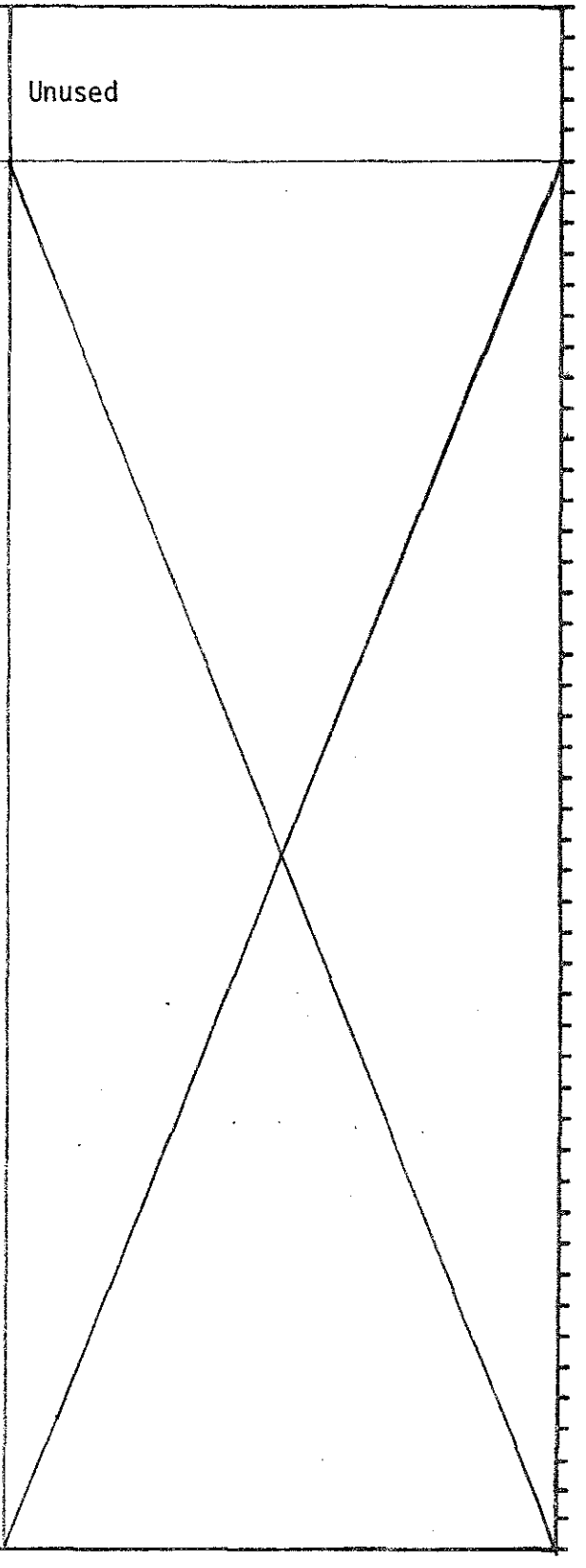
1-6	File Sequence Number
7	Record Type
8	Item Type
9	State Number
10-13	Unused
14-17	Distance to Next Item
18	Direction to Next Item
19-20	Unused
21	Area
22-43	Unused
44-49	Cumulative Milepost
50	Unused
51-55	Unused

CITY LIMIT/CENTER OF TOWN, ITEM RECORD 6

POSITION	DESCRIPTION	VALUE
1-6	File Sequence Number	Zoned decimal with left zeroes
7	Record Type	I - Item
8	Item Type	Zoned decimal 5 - Center of town 9 - City limit
9-10	County Number	Zoned decimal
11-12	City Number	Zoned decimal
13	Unused	0 (Zero)
14-17	Distance to Next Item	Zoned decimal (In hundredths of a mile, with left zeroes)
18	Direction to Next Item	Zoned decimal 5 - North and east 6 - North and west 7 - South and east 8 - South and west
19-20	Unused	Blanks
21	Area (All roadway outside corporate limits is considered rural. Code is for next segment as you advance along the route)	R - Rural U - Urban
22-43	Unused	Blanks
44-49	Cumulative Milepost	Zoned decimal (In hundredths of a mile, with left zeroes)
50-55	Unused	Blanks

CITY LIMIT/CENTER OF TOWN, ITEM RECORD 6

1-6	File Sequence Number
7	Record Type
8	Item Type
9-10	County Number
11-12	City Number
13	Unused
14-17	Distance to Next Item
18	Direction to Next Item
19-20	Unused
21	Area
22-43	Unused
44-49	Cumulative Milepost
50	Unused
51-55	Unused



FILE FORMAT

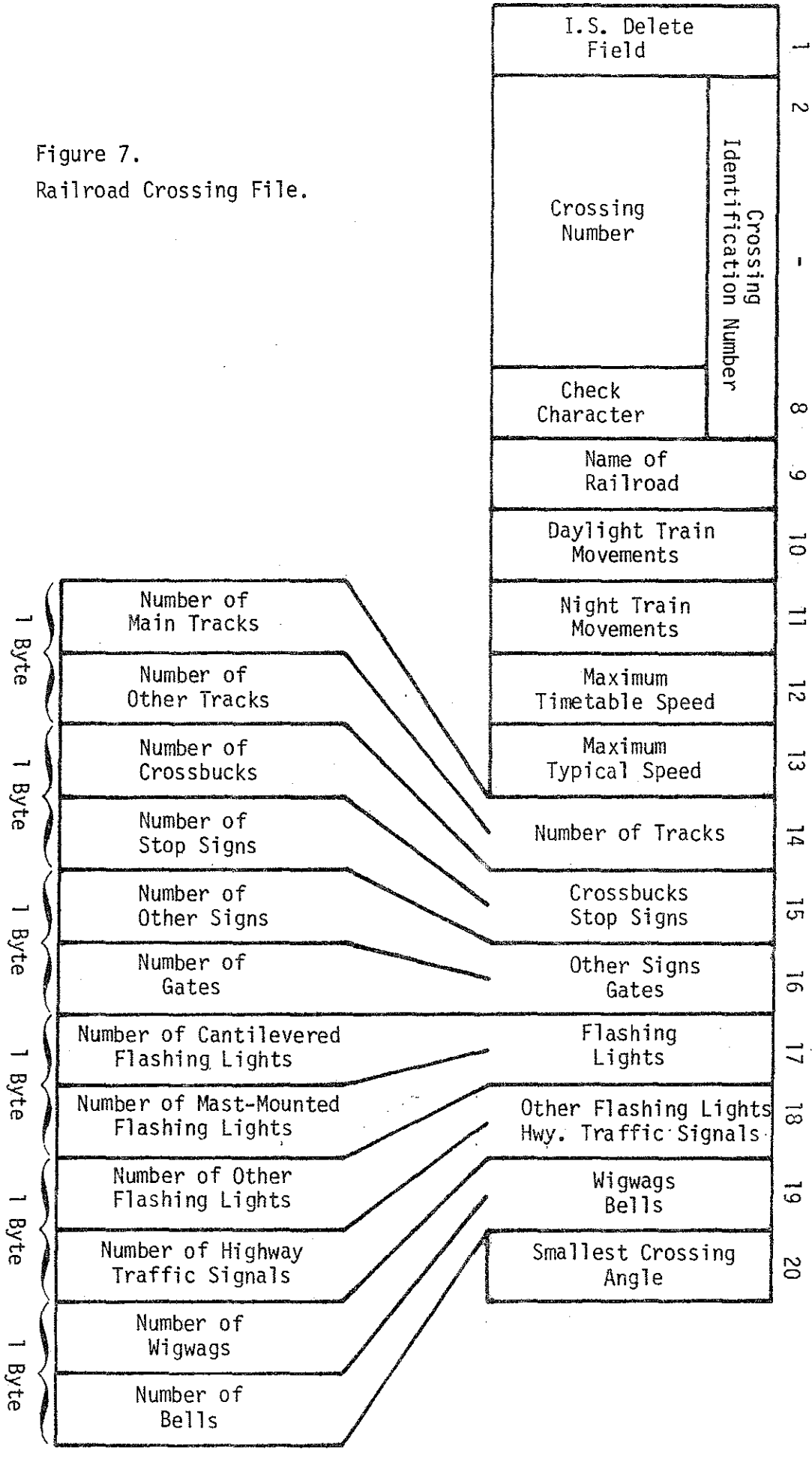
HWY.FTR30050 and HWY.FTR30070

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-8	Crossing Identification Number	
(2-7)	Crossing Number	Zoned Decimal
(8)	Check Character	Alphabetic
9	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad (AR) 2 - Aberdeen and Rockfish Railroad Co. (ARC) 3 - Atlantic and Western Railroad Co. (ATW) 4 - Beaufort & Morehead Railroad Co. (BM 5 - Cape Fear Railways Inc. (CFR) 6 - Cliffside Railroad (CLIF) 7 - Clinchfield Railroad Company (CRR) 8 - Department of Defense (DOD) 9 - Durham & Southern Railway Co. (DS) 10 - High Point, Thomasville & Denton Railroad (HPTD) 11 - Laurinburg & Southern Railroad Co. (LN) 12 - Lewisville & Nashville Railroad Co. (LRS) 13 - Norfolk, Franklin, & Danville Railroad Co. (NFD) 14 - Norfolk and Western Railway (NW) 15 - Seaboard Coastline Railroad Co. (SCL 16 - Southern Railway Company (SOU) 17 - Warrenton Railroad (WAR) 18 - Winston-Salem Southbound Railway (WS 19 - Yancey Railroad Co. (YAN)
10	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
11	Night Train Movements	Binary Actual number of movements 255 - Not stated
12	Maximum Timetable Speed	Binary Actual number of movements 255 - Not stated
13	Maximum Typical Speed	Binary Actual Speed 255 - 255 or greater

COLUMN	DESCRIPTION	VALUE
14	Number of Tracks	
	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - Not stated
	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
15	Crossbucks - Stop Signs	
	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
16	Other Signs - Gates	
	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not stated
17	Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

COLUMN	DESCRIPTION	VALUE
18	Other Flashing Lights - Highway Traffic Signals	
	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
19	Wigwags - Bells	
	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
20	Smallest Crossing Angle Between Road & Track	Binary 0 - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

Figure 7.
Railroad Crossing File.



FILE FORMAT

HWY.FTR30060 and HWY.FTR30080

COLUMN	DESCRIPTION	VALUE
1	Delete Field	Always hex 00
2-13	Structure Number	
(2)	Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(3-5)	Route Number	Numeric - Right justified with leading spaces
(6)	Route Type	Ø - Normal A - Alternate B - Bypass
(7-9)	County Number	
(10-12)	Bridge Number	Numeric - Right justified with leading spaces
(13)	Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
14-17	Service Under Structure	
(14)	Road Class	(Values in binary in low half of byte-upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated

COLUMN	DESCRIPTION	VALUE
(15-16)	Road Number	Binary halfword Actual road number 9999 - Not stated
(17)	Service(s) Type	(Values in binary in low half of byte, upper half of byte not used) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated
18-21	Service on Structure	
(18)	Road Class	(Values in binary in low half of byte, upper half byte not used) 0 - Not applicable 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - City street 6 - Federal lands road 7 - State lands road 8 - Other 9 - Assumed future route 15 - Not stated
(19-20)	Road Number	Binary Halfword Actual Road Number 9999 - Not stated
(21)	Service(s) Type	0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian exclusively 4 - Highway and railroad 5 - Highway and pedestrian 6 - Overpass structure at an interchange or second level of a multilevel interchange, ramps that create an interchange 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or plaza 15 - Not stated

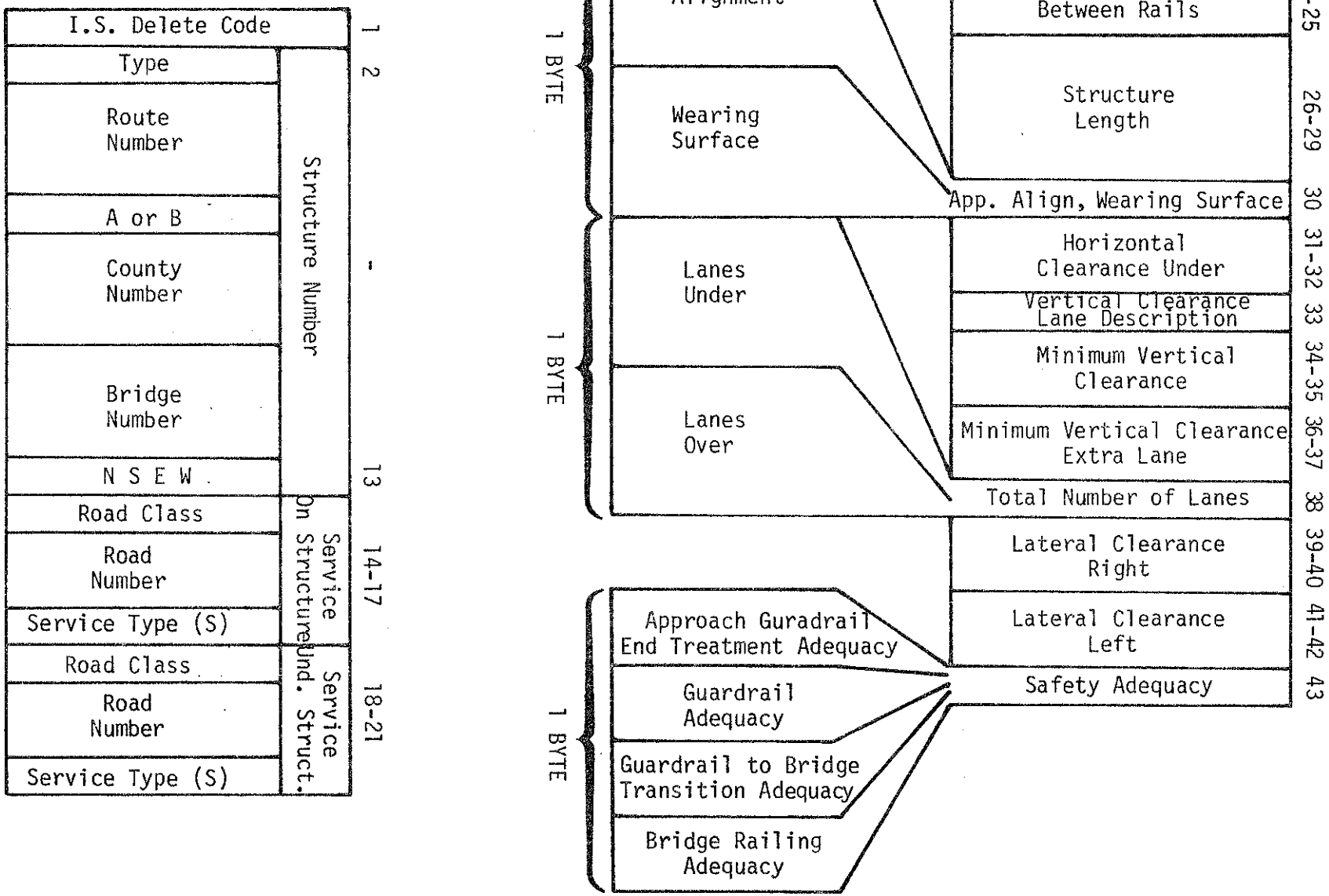
COLUMN	DESCRIPTION	VALUE
22-23	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
24-25	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
26-29	Structure Length	Binary fullword - actual distance in feet (99999) 99999 - Not stated
30	Approach Alignment-Wearing Surface	
	Approach Alignment	High half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth fillen, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated

COLUMN	DESCRIPTION	VALUE
31-32	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
33	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
34-35	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
36-37	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
38	Total Lanes	
	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	Total Lanes Over	Low half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
39-40	Minimum Lateral Under-Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
41-42	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
43	Safety Adequacy	Two bits binary per item Items are described from high order to low order (i.e., left to right)
	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

COLUMN	DESCRIPTION	VALUE
	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

Figure 9.

Structure Number File.



HWY.FTR30090 and HWY.FTR30100

ROADWAY FEATURES FILE

The Roadway Features File is comprised of five record types (I, B, R, L and S). A description of each record type follows.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

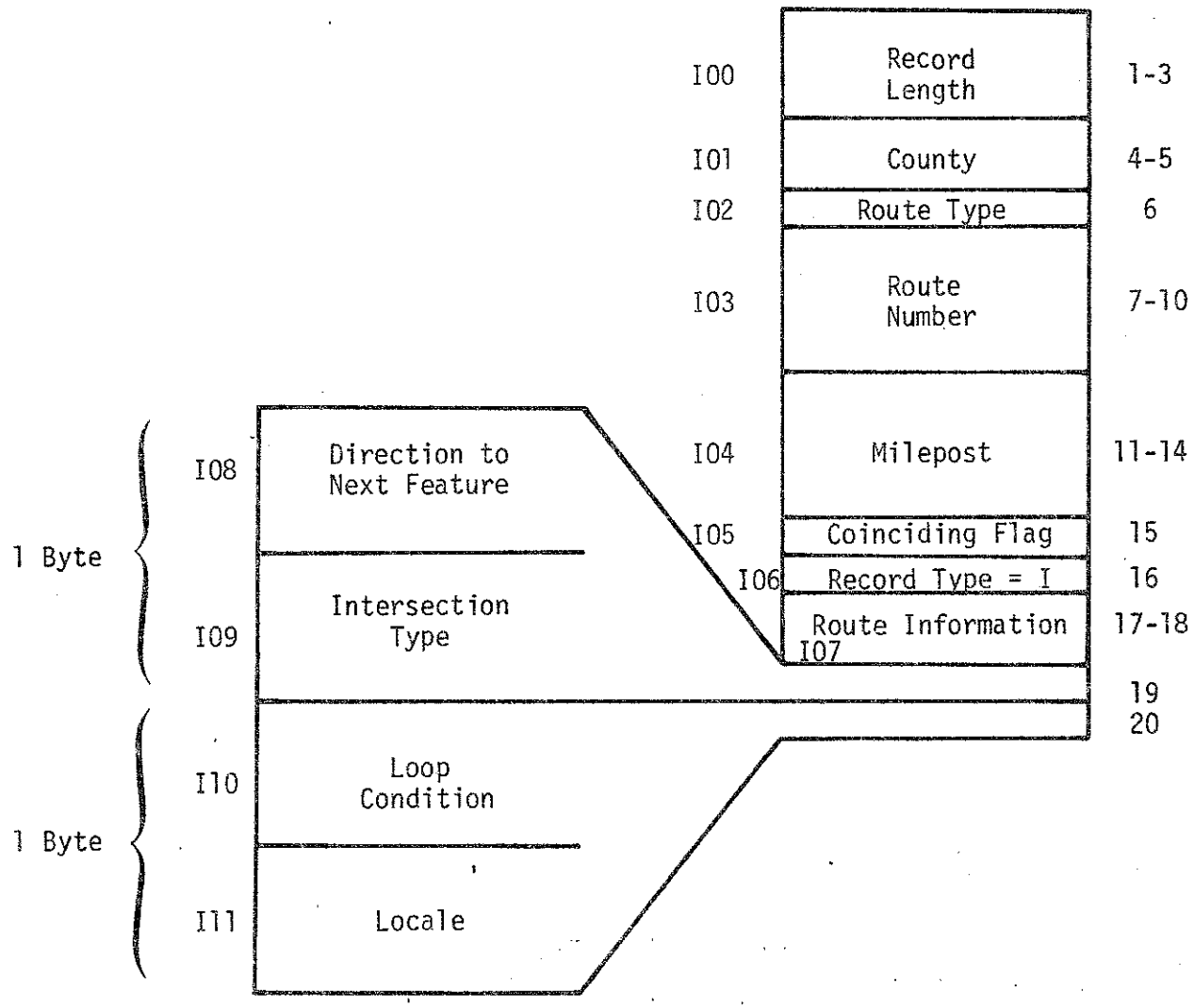
ROADWAY FEATURES FILE FORMAT
Record Type I - Intersection Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	I00	Record Length	Zoned Decimal
4-5	2	I01	County	Zoned Decimal (0-99)
6	1	I02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	I03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	I04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	I05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - This segment of roadway coincides with a lower numbered route
16	1	I06	Record Type	Zoned Decimal Type - 'I' for intersection record

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-18	5	I07	Intersecting Route Identification	5 decimal binary digits when converted from binary to zoned decimal. The high order decimal digit denotes the highway class 1 - Intersection 2 - US 3 - NC 4 - SR 5 - Non-system (Federal Division) The four low order digits represent the route number.
19	1	I08	Direction to Next Item	Binary; high order half of character Ø - Not stated 5 - North and East 6 - North and West 7 - South and East 8 - South and West
	1	I09	Intersection Type	Binary; low order half of character Ø - Not stated 1 - Grade separation; no ramps 2 - Interchange 3 - At grade intersection, 3 legs 4 - At grade intersection, 4 legs 5 - At grade intersection, 5 legs 6 - At grade intersection, 6 legs
20	1	I10	Loop Condition	Binary; high order half of character Ø - Not stated 1 - Loop condition 2 - No loop condition
	1	I11	Locale	Binary; low order half of character Ø - Not stated 1 - Rural 2 - Urban

Figure 10.
Features File - Record Type I.



ROADWAY FEATURES FILE

Record Type B - Structure Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	B00	Record Length	Zoned Decimal
4-5	2	B01	County	Zoned Decimal (0-99)
6	1	B02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	B03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	B04	Milepost	Zoned Decimal decimal assumed left 2 places.
15	1	B05	Coinciding Flag	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route.

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
16	1	B06	Record Type	Zoned Decimal Type = 'B' for structure record
17-28	12	B07	Structure Number	Alphanumeric
(17)			Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(18-20)			Route Number	Numeric - right justified with leading spaces
(21)			Route Type	Ø - Normal A - Alternate B - Bypass
(22-24)			County Number	
(25-27)			Bridge Number	Numeric - Right justified with leading spaces
(28)			Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
29-32			Intersecting Service Identification	
(29)	1	B08	Service Type Under/ On Indicator	Values in binary upper half of byte 0 - Service under structure 1 - Service on structure
(29)	2	B09	Road Class	Values in binary in lower half of byte 0 - Not applicable 1 - Interstate 2 - US 3 - NC 4 - SR 5 - City Street 6 - Federal Lands Road 7 - State Lands Road

(Cont')

POSITION	CCL	NAME	DESCRIPTION	VALUE
			Road Class	(Cont') 8 - Other 9 - Assumed future route 15 - Not stated
(30-31)	4	B10	Road Number	Binary halfword actual road number 9999 - Not stated
(32)	2	B11	Service Type	(When service type under/on indicator = Ø then position 32 values are as follows:) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian, exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated or (When service type under/on indicator = 1 then position 32 values are as follows:) 0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian Exclusively 4 - Highway and Railroad 5 - Highway and Pedestrian 6 - Overpass structure at an intersection or second level of a multi-level interchange, ramps that create an interchange. 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or Plaza 15 - Not stated
33-34	4	B12	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
35-36	4	B13	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
37-40	5	B14	Structure Length	Binary fullword-actual distance in feet (99999) 99999 - Not stated
41			Approach Alignment Wearing Surface	
	2	B15	Approach Alignment	High Half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	2	B16	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth filled, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated
42-43	4	B17	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
44	1	B18	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
45-46	4	B19	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
47-48	4	B20	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
49			Total Lanes	
	2	B21	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	2	B22	Total Lanes Over	Low half byte-binary 0-31 - Actual number of lanes 14 - 14 or more 15 - Not stated
50-51	4	B23	Minimum Lateral Under Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
52-53	4	B24	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
54			Safety Adequacy	Two bits binary per item. Items are described from high order to low order (i.e., left to right)
	1	B25	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B26	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
	1	B27	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B28	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

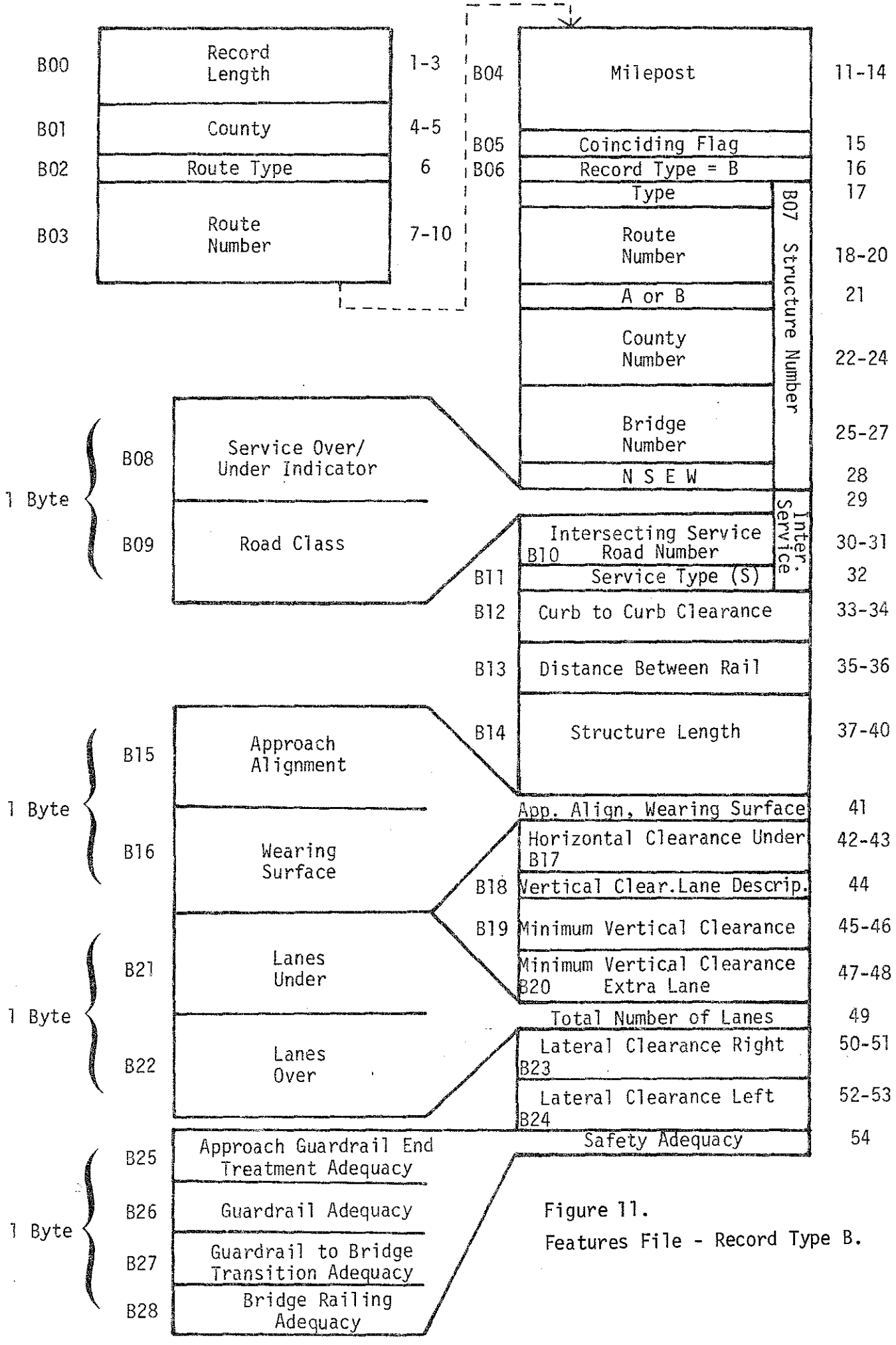


Figure 11.

Features File - Record Type B.

ROADWAY FEATURES FILE

Record Type R - Railroad Crossing Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	R00	Record Length	Zoned Decimal
4-5	2	R01	County	Zoned Decimal (0-99)
6	1	R02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	R03	Route Number	Zoned Decimal
(7)			Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	R04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	R05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	R06	Record Type	Zoned Decimal Type = 'R' for railroad crossing record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-23	6	R07	Railroad Crossing Number	Blank if not stated
(17-22)			Crossing Number	Zoned Decimal
(23)			Check Character	Alphabetic
24	2	R08	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad 2 - Aberdeen and Rockfish Railroad Co. 3 - Atlantic and Western Railroad Co. 4 - Beaufort & Morehead Railroad Co. 5 - Cape Fear Railways Inc. 6 - Cliffside Railroad 7 - Clinchfield Railroad Company 8 - Department of Defense 9 - Durham & Southern Railway Co. 10 - High Point, Thomasville & Denton Railroad 11 - Laurinburg & Southern Railroad Co. 12 - Lewisville & Nashville Railroad Co. 13 - Norfolk, Franklin, & Danville Railroad Co. 14 - Norfolk and Western Railway 15 - Seabord Coastline Railroad Co. 16 - Southern Railway Company 17 - Warrenton Railroad 18 - Winston-Salem Southbound Railway 19 - Yancey Railroad Co.
25	3	R09	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
26	3	R10	Night Train Movements	Binary Actual number of movements 255 - 255 or greater
27	3	R11	Maximum Time-table Speed	Binary Actual speed 255 - 255 or greater
28	3	R12	Maximum Typical Speed	Binary Actual speed 255 - 255 or greater

POSITION	CCL	NAME	DESCRIPTION	VALUE
29			Number of Tracks	
	2	R13	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - not stated
	2	R14	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
30			Crossbucks - Stop Sign	
	2	R15	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	2	R16	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
31			Other Signs - Gates	
	2	R17	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	2	R18	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not Stated
32			Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	2	R19	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	2	R20	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
33			Other Flashing Lights - Highway Traffic Signals	
	2	R21	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	2	R22	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
34			Wigwags - Bells	
	2	R23	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	2	R24	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
35	2	R25	Smallest Crossing Angle Between Road & Track	Binary Ø - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

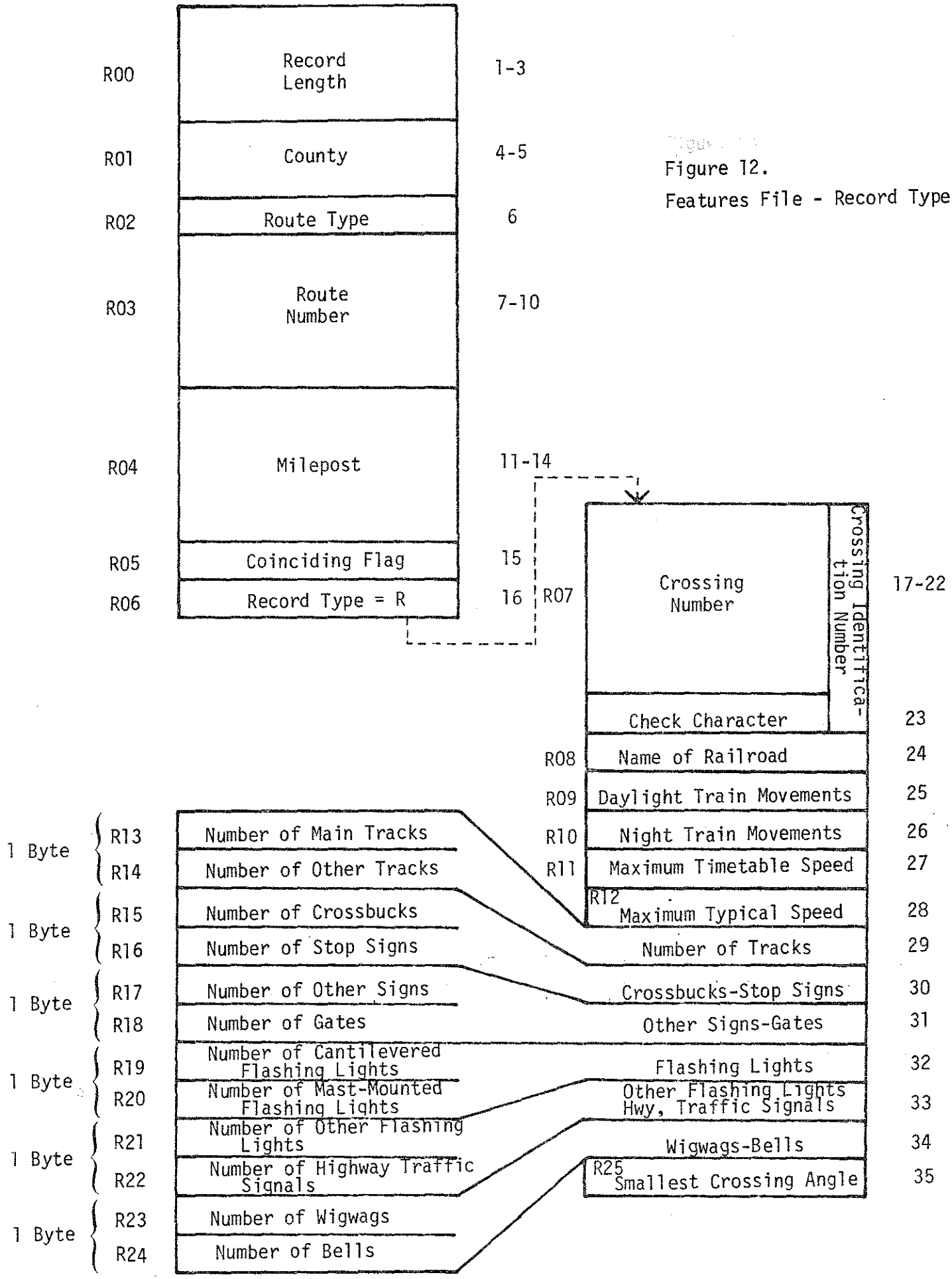


Figure 12.
Features File - Record Type R.

ROADWAY FEATURES FILE

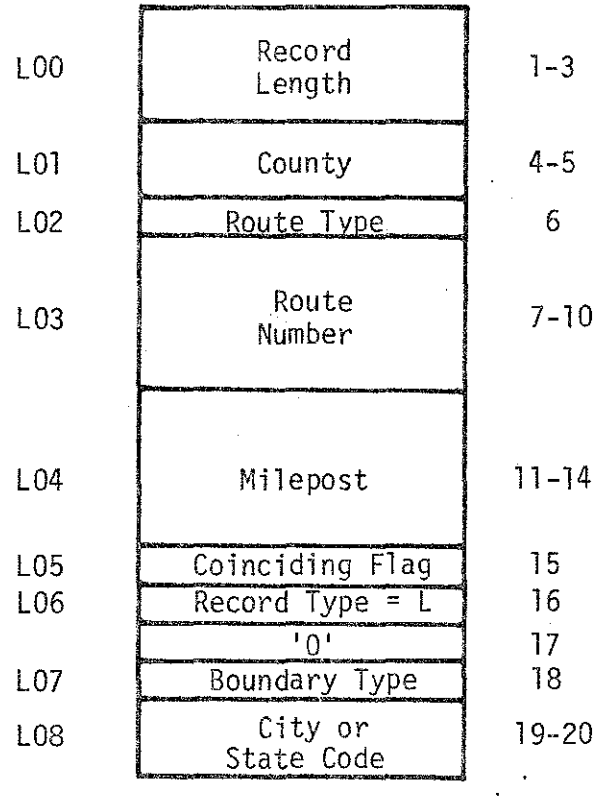
Record Type L - Political Boundary

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	L00	Record Length	Zoned Decimal
4-5	2	L01	County	Zoned Decimal (0-99)
6	1	L02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	L03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	L04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	L05	Coinciding Flag	Zoned decimal 0 - No coinciding routes 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route
16	1	L06	Record Type	Zoned decimal Type = 'L' for Political Boundary Record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17			Filler	Zoned decimal 0
18	1	L07	Boundary Type	Zoned decimal 7 - County line 8 - State line 9 - City line
19-20	2	L08	County, city, or State Code	Zoned decimal If boundary represented in a state line (8) the number reflects the adjacent state as follows: 60 - GA 70 - SC 80 - TN 90 - VA or If boundary represented is a county line, the number represented is the county number: 0-99 or If boundary is a city limit, the number represented is the city code: 0-99

Figure 13.
Features File - Record Type L.



ROADWAY FEATURES FILE

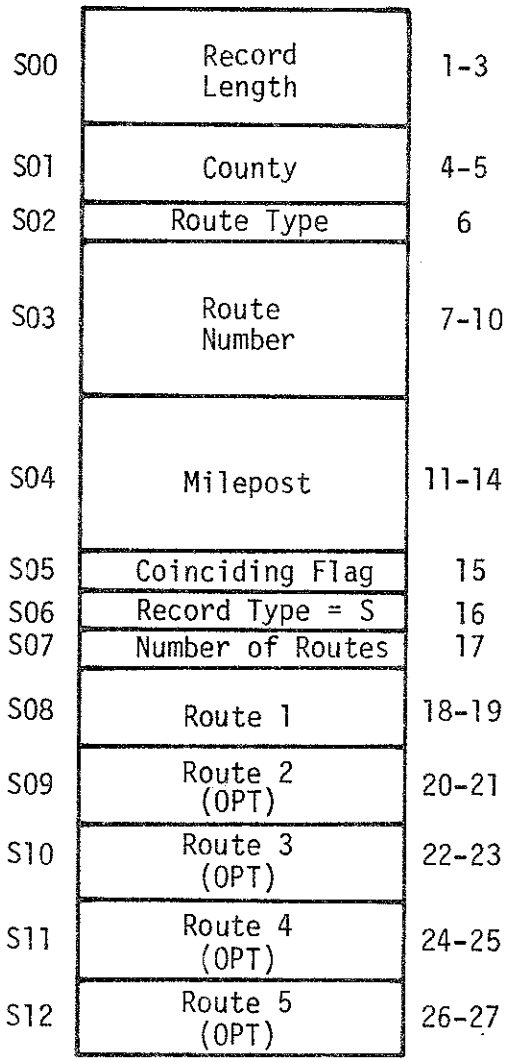
Record Type S - Section Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	S00	Record Length	Zoned Decimal
4-5	2	S01	County	Zoned Decimal (0-99)
6	1	S02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	S03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	S04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	S05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	S06	Record Type	Zoned Decimal Type = 'S' for section record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17	1	S07	Number of Coinciding Routes	Zoned Decimal
18-19	5	S08	Coinciding Route (1)	Binary Binary halfword containing the equivalent of 5 decimal digits. The high order digit represents the highway type as follows: 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other While the low order 4 digits are the highway number.
20-27	5	S09-S12	Multiple Coinciding Routes (2-5)	Binary, same codes as above, only present when necessary.

Figure 14.
Features File - Record Type S.



SUBJECT: GENINDX (T71809)

AUTHOR: Dennis Ryan

DATE: June, 1977

PROGRAM TYPE: Batch Program

SOURCE LANGUAGE: COBOL

FUNCTION: Program generates a direct access disk file compatible with the Department of Transportation's Merged System. Produced during file creation is an index which allows retrieval of information on a county, route, milepost basis.

USAGE DESCRIPTION:

GENINDX must be supplied with an input file containing records with the 16 bytes standard header followed by the specific record information in packed format. These records are queued on a county route basis and then written onto a disk file whenever a new county route is initiated or whenever a full track of information has accumulated. As records are written to the disk file an index entry is created which specifies the relative track number and the county route and milepost range of the records contained on that track.

Maximum utilization of track space is accomplished by packing many county routes on each track whenever possible. Therefore sequential ordering of county-routes exists only through the information supplied in the index. However, should a county route require multiple tracks, these will be allocated in continuous order. At the end of the job step track utilization is display as printed output.

Input (File Description and JCL Requirements):

I. //INFILE1 DD formatted file input

Records for this file consist of a 16 byte standard header in character format, followed by a variable number of bytes representing the specific record type being described. The records are ordered on the keys, county, route, and milepost all of which are contained in the standard header.

STANDARD HEADER DESCRIPTION

ATTRIBUTE	ELEMENT NAME	DESCRIPTION
PIC 999	Length	Length is bytes of entire record.
PIC 99	County	County number (00-99).
PIC 99999	Route	Combined route type and number.
PIC 9999	Milepost	Milepost to nearest one-hundredth mile.
PIC X	Record-Type	Type of feature being described.
PIC 9	Coinciding-Flag	Coinciding route condition.

OUTPUT (File description and JCL Requirements)

I. //OUTFILE1 DD file index

File index is associated with the direct access file created from the formatted input file. This index describes the relative track location and milepost range of each county-route.

INDEX DESCRIPTION (COBOL SOURCE)

```
01              INDEX-REC.

        02  NUMBER-ENTRIES          COMP    PIC    S9(4).
        02  BINARY-SEARCH-POINTERS  COMP    PIC    S9(4).
        02  INDEX ENTRY OCCURS 950 TIMES,
          03  COUNTY ROUTE                  PIC    XXX.
          03  DISPLACEMENT                  PIC    XX.
          03  NUMBER-TRACKS                 PIC    X.

        02  INFO-AREA OCCURS 1824 TIMES
          03  HIGH-MILEPOST         COMP    PIC    S9(4).
          03  RELATIVE-TRKNUM       COMP    PIC    S9(4).
```

II. //OUTFILE2 DD direct access file

The formatted input file is segmented into county routes and placed on a disk file accessed randomly by relative track number. The standard header for each record has been reduced to a four byte field containing record length, milepost, and record flag. Each block of information contains a five byte header field denoting county route and length of the block in bytes. This allows the access modules to handle blocking requirements.

Four Byte Header Information (COBOL SOURCE)

```
01              RECORD HEADER.

        02      LENGTH                   PIC    X.
        02      MILEPOST         COMP    PIC    S9(4).
        02      FLAG                     PIC    X.
```

Five Byte Block Header (COBOL SOURCE)

```
01              BLOCK HEADER.

        02      COUNTY-ROUTE             PIC    XXX.
        02      DISPLACEMENT             PIC    XX.
```

HWY.FTR30090 and HWY.FTR30100

ROADWAY FEATURES FILE

The Roadway Features File is comprised of five record types (I, B, R, L and S). A description of each record type follows.

ROADWAY FEATURES FILE FORMAT

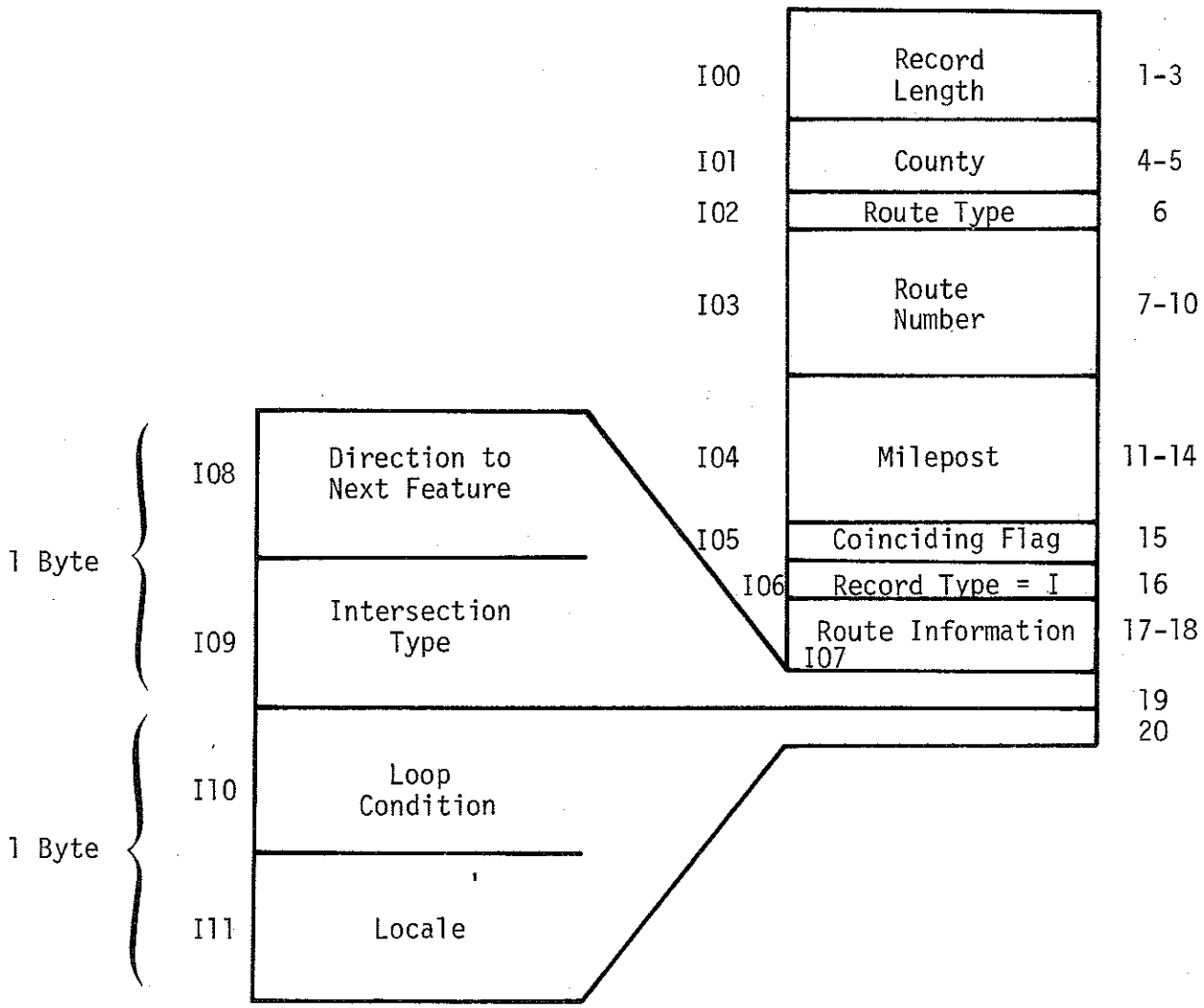
Record Type I - Intersection Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	I00	Record Length	Zoned Decimal
4-5	2	I01	County	Zoned Decimal (0-99)
6	1	I02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	I03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	I04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	I05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - This segment of roadway coincides with a lower numbered route
16	1	I06	Record Type	Zoned Decimal Type - 'I' for intersection record

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-18	5	I07	Intersecting Route Identification	5 decimal binary digits when converted from binary to zoned decimal. The high order decimal digit denotes the highway class 1 - Intersection 2 - US 3 - NC 4 - SR 5 - Non-system (Federal Division) The four low order digits represent the route number.
19	1	I08	Direction to Next Item	Binary; high order half of character Ø - Not stated 5 - North and East 6 - North and West 7 - South and East 8 - South and West
	1	I09	Intersection Type	Binary; low order half of character Ø - Not stated 1 - Grade separation; no ramps 2 - Interchange 3 - At grade intersection, 3 legs 4 - At grade intersection, 4 legs 5 - At grade intersection, 5 legs 6 - At grade intersection, 6 legs
20	1	I10	Loop Condition	Binary; high order half of character Ø - Not stated 1 - Loop condition 2 - No loop condition
	1	I11	Locale	Binary; low order half of character Ø - Not stated 1 - Rural 2 - Urban

Figure 10.
Features File - Record Type I.



ROADWAY FEATURES FILE

Record Type B - Structure Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	B00	Record Length	Zoned Decimal
4-5	2	B01	County	Zoned Decimal (0-99)
6	1	B02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	B03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	B04	Milepost	Zoned Decimal decimal assumed left 2 places.
15	1	B05	Coinciding Flag	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route.

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
16	1	B06	Record Type	Zoned Decimal Type = 'B' for structure record
17-28	12	B07	Structure Number	Alphanumeric
(17)			Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(18-20)			Route Number	Numeric - right justified with leading spaces
(21)			Route Type	Ø - Normal A - Alternate B - Bypass
(22-24)			County Number	
(25-27)			Bridge Number	Numeric - Right justified with leading spaces
(28)			Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
29-32			Intersecting Service Identification	
(29)	1	B08	Service Type Under/ On Indicator	Values in binary upper half of byte 0 - Service under structure 1 - Service on structure
(29)	2	B09	Road Class	Values in binary in lower half of byte 0 - Not applicable 1 - Interstate 2 - US 3 - NC 4 - SR 5 - City Street 6 - Federal Lands Road 7 - State Lands Road

(Cont')

POSITION	CCL	NAME	DESCRIPTION	VALUE
			Road Class	(Cont') 8 - Other 9 - Assumed future route 15 - Not stated
(30-31)	4	B10	Road Number	Binary halfword actual road number 9999 - Not stated
(32)	2	B11	Service Type	(When service type under/on indicator = Ø then position 32 values are as follows:) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian, exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated or (When service type under/on indicator = 1 then position 32 values are as follows:) 0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian Exclusively 4 - Highway and Railroad 5 - Highway and Pedestrian 6 - Overpass structure at an intersection or second level of a multi-level interchange, ramps that create an interchange. 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or Plaza 15 - Not stated
33-34	4	B12	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
35-36	4	B13	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
37-40	5	B14	Structure Length	Binary fullword-actual distance in feet (99999) 99999 - Not stated
41			Approach Alignment Wearing Surface	
	2	B15	Approach Alignment	High Half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	2	B16	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth filled, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated
42-43	4	B17	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
44	1	B18	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
45-46	4	B19	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
47-48	4	B20	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
49			Total Lanes	
	2	B21	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	2	B22	Total Lanes Over	Low half byte-binary 0-31 - Actual number of lanes 14 - 14 or more 15 - Not stated
50-51	4	B23	Minimum Lateral Under Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
52-53	4	B24	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
54			Safety Adequacy	Two bits binary per item. Items are described from high order to low order (i.e., left to right)
	1	B25	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B26	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
	1	B27	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B28	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

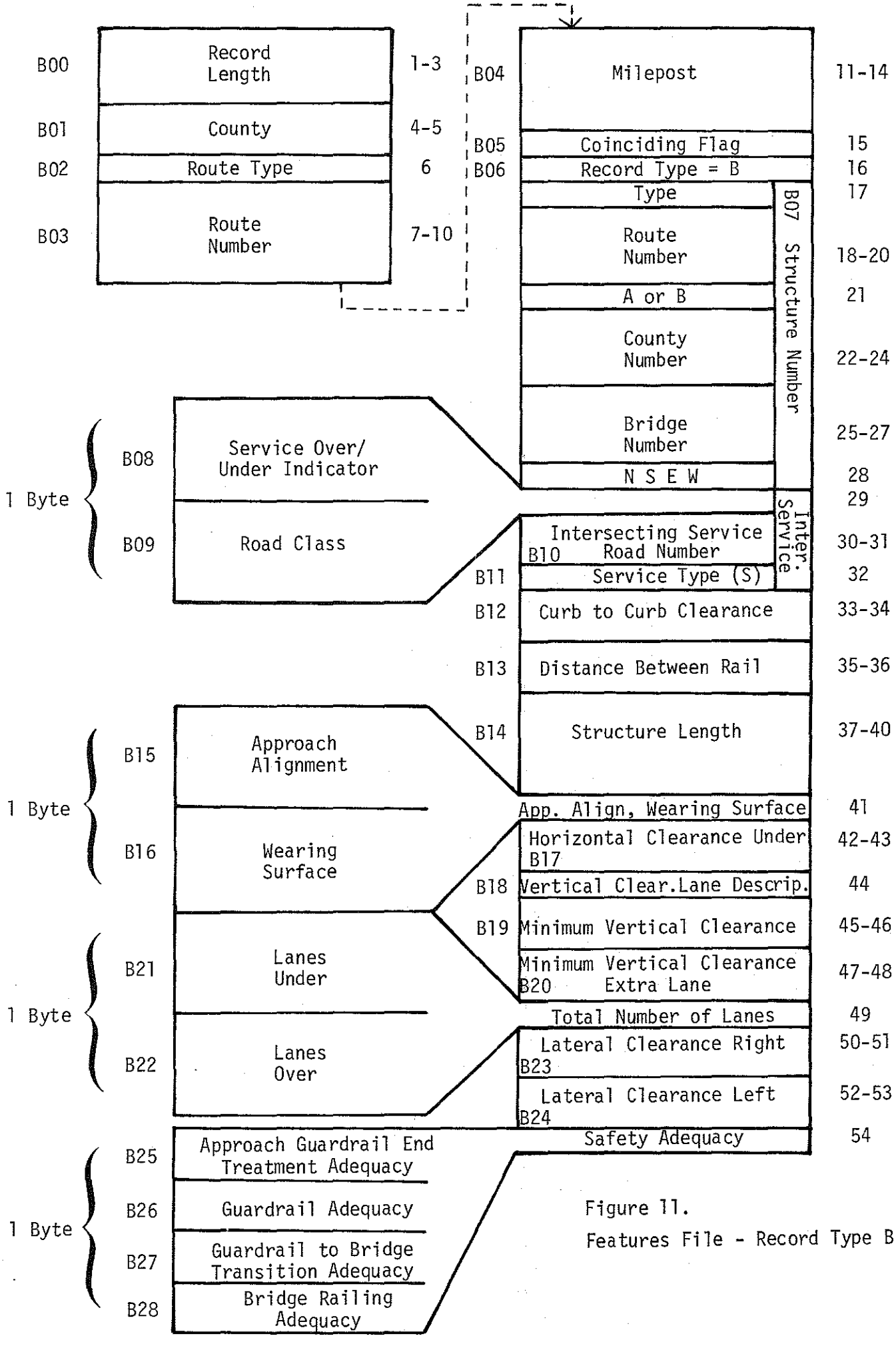


Figure 11.

Features File - Record Type B.

ROADWAY FEATURES FILE

Record Type R - Railroad Crossing Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	R00	Record Length	Zoned Decimal
4-5	2	R01	County	Zoned Decimal (0-99)
6	1	R02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	R03	Route Number	Zoned Decimal
(7)			Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	R04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	R05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	R06	Record Type	Zoned Decimal Type = 'R' for railroad crossing record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-23	6	R07	Railroad Crossing Number	Blank if not stated
(17-22)			Crossing Number	Zoned Decimal
(23)			Check Character	Alphabetic
24	2	R08	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad 2 - Aberdeen and Rockfish Railroad Co. 3 - Atlantic and Western Railroad Co. 4 - Beaufort & Morehead Railroad Co. 5 - Cape Fear Railways Inc. 6 - Cliffside Railroad 7 - Clinchfield Railroad Company 8 - Department of Defense 9 - Durham & Southern Railway Co. 10 - High Point, Thomasville & Denton Railroad 11 - Laurinburg & Southern Railroad Co. 12 - Lewisville & Nashville Railroad Co. 13 - Norfolk, Franklin, & Danville Railroad Co. 14 - Norfolk and Western Railway 15 - Seabord Coastline Railroad Co. 16 - Southern Railway Company 17 - Warrenton Railroad 18 - Winston-Salem Southbound Railway 19 - Yancey Railroad Co.
25	3	R09	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
26	3	R10	Night Train Movements	Binary Actual number of movements 255 - 255 or greater
27	3	R11	Maximum Time-table Speed	Binary Actual speed 255 - 255 or greater
28	3	R12	Maximum Typical Speed	Binary Actual speed 255 - 255 or greater

POSITION	CCL	NAME	DESCRIPTION	VALUE
29			Number of Tracks	
	2	R13	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - not stated
	2	R14	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
30			Crossbucks - Stop Sign	
	2	R15	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	2	R16	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
31			Other Signs - Gates	
	2	R17	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	2	R18	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not Stated
32			Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	2	R19	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	2	R20	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
33			Other Flashing Lights - Highway Traffic Signals	
	2	R21	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	2	R22	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
34			Wigwags - Bells	
	2	R23	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	2	R24	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
35	2	R25	Smallest Crossing Angle Between Road & Track	Binary Ø - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

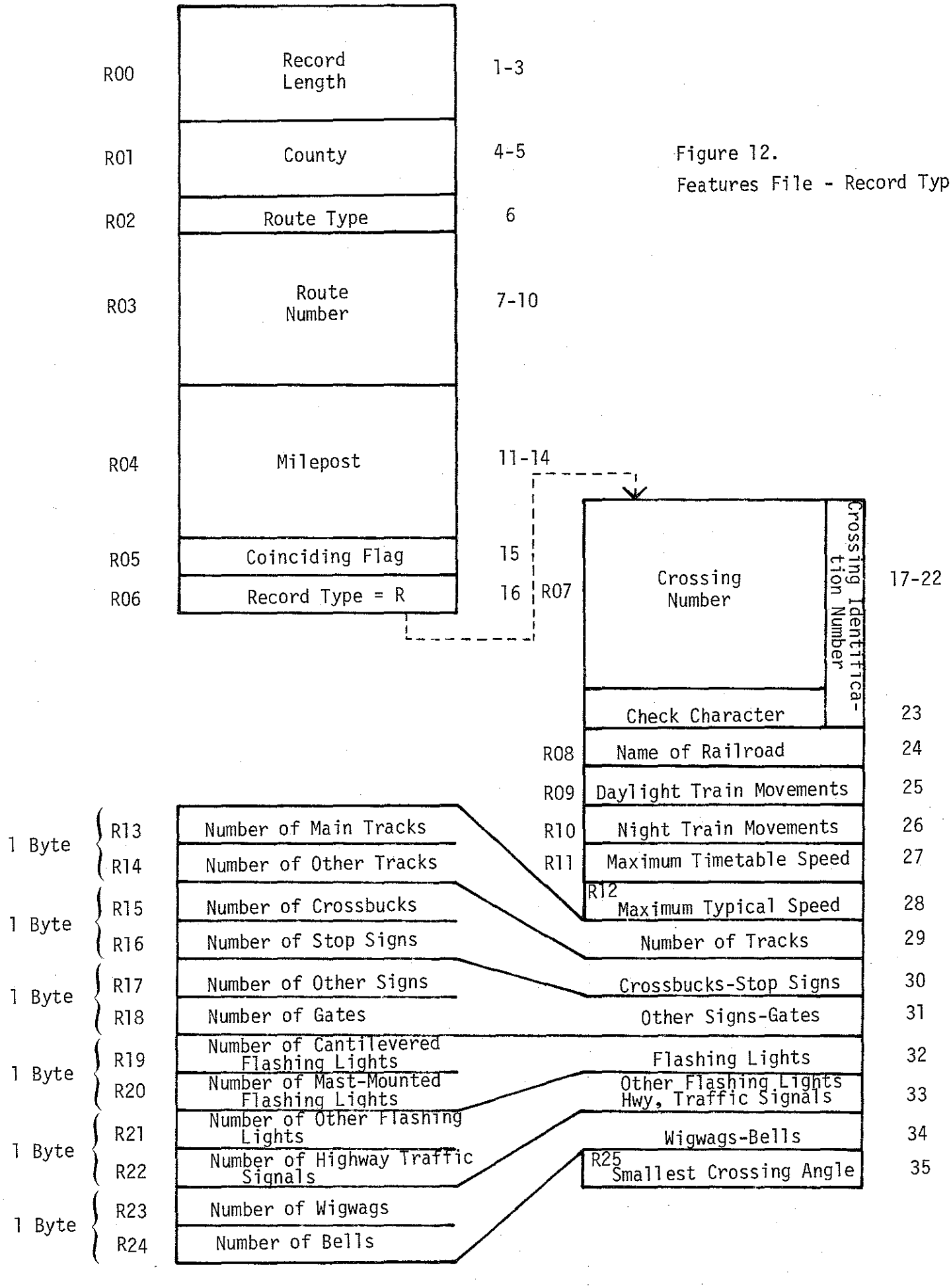


Figure 12.
Features File - Record Type R.

ROADWAY FEATURES FILE

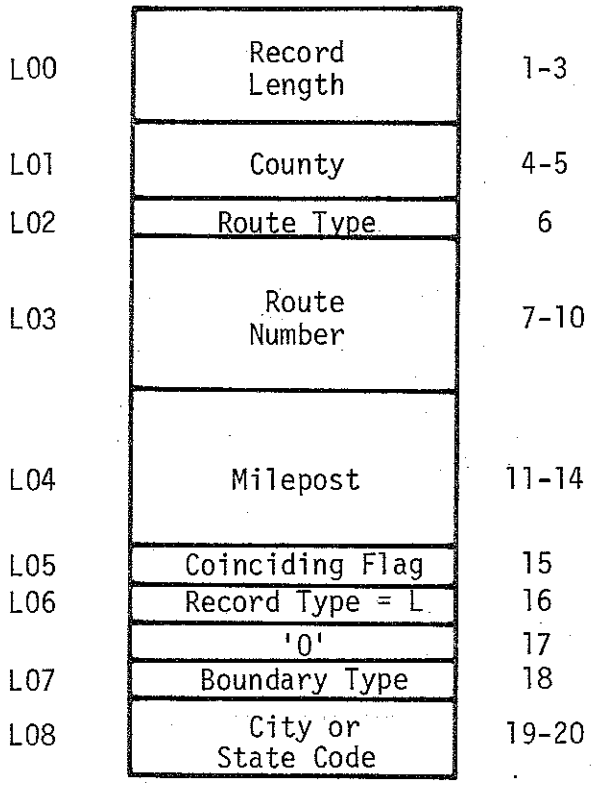
Record Type L - Political Boundary

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	L00	Record Length	Zoned Decimal
4-5	2	L01	County	Zoned Decimal (0-99)
6	1	L02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	L03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	L04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	L05	Coinciding Flag	Zoned decimal 0 - No coinciding route 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route
16	1	L06	Record Type	Zoned decimal Type = 'L' for Political Boundary Record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17			Filler	Zoned decimal 0
18	1	L07	Boundary Type	Zoned decimal 7 - County line 8 - State line 9 - City line
19-20	2	L08	County, city, or State Code	Zoned decimal If boundary represented in a state line (8) the number reflects the adjacent state as follows: 60 - GA 70 - SC 80 - TN 90 - VA or If boundary represented is a county line, the number represented is the county number: 0-99 or If boundary is a city limit, the number represented is the city code: 0-99

Figure 13.
Features File - Record Type L.



ROADWAY FEATURES FILE

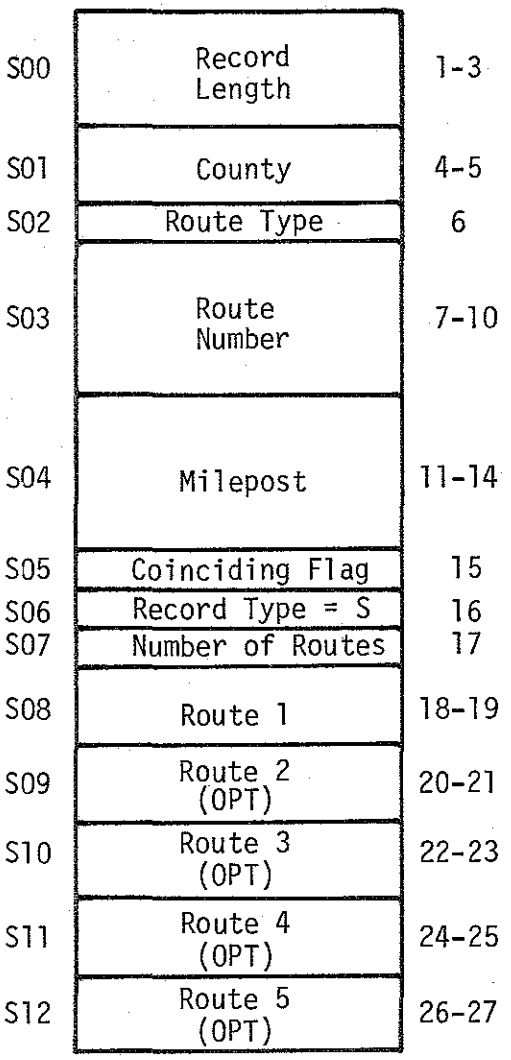
Record Type S - Section Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	S00	Record Length	Zoned Decimal
4-5	2	S01	County	Zoned Decimal (0-99)
6	1	S02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	S03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	S04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	S05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	S06	Record Type	Zoned Decimal Type = 'S' for section record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17	1	S07	Number of Coinciding Routes	Zoned Decimal
18-19	5	S08	Coinciding Route (1)	Binary Binary halfword containing the equivalent of 5 decimal digits. The high order digit represents the highway type as follows: 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other While the low order 4 digits are the highway number.
20-27	5	S09-S12	Multiple Coinciding Routes (2-5)	Binary, same codes as above, only present when necessary.

Figure 14.
Features File - Record Type S.



SUBJECT: PACKACC (T72009)

AUTHOR: Fischer

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program builds a disk format variable length accident file (1 record per accident) from the "Ø5" file for subsequent loading onto the disk using 'GENINDEX'. As the input records are converted, each variable used is verified for content.

USAGE:

I. Input

The current "05" file (DDNAME 'DOH'). The format for this file is attached.

II. Outputs

A. A packed binary file of accident records (see attached format) is written on file OUT. The following is an example DD statement for creating the file.

```
//OUT  DD UNIT=TAPE, VOL=SER=TAPENN,
// DISP=(NEW,KEEP),DSN=XXXX,
// DCB=(LRECL=210,BLKSIZE=6000,RECFM=VB)
```

B. Processing statistics (displayed on DDNAME SYSOUT)

INCOUNT - Total number of "Ø5" records read.

OUTCOUNT - Total compressed records out.

BAD-YR - Total "Ø5" records dropped because of a non-numeric YEAR.

BAD-RPT - Total "Ø5" records dropped because of a non-numeric report number.

FIRST-REC-MISSING - Total records dropped due to the first occurrence of new report number failing to have a sequence number of "1".

BAD-CNTY-CNT - Total records dropped because of a non-numeric or invalid county.

: HWY.FTR05020

FILE NAME : REPORT 05-CYCLE DATE 4-25-74

RECORD SIZE: 152 RETENSION: 3 MONTH

BLOCKING : 30 BACKUP : 2

QUENCE : CO., RT. INV., MP., REPORT, SEQ.

1		ROUTE INVENTORIED	
2			
3			
4			
5			
6			
7		MILEPOST	
8			
9			
10			
11		PLOT TYPE	
12		REFERENCE TYPE	
13		LOCATION TYPE	
14		SEQUENCE NUMBER	IDENTIFIERS
15			
16		TOTAL NUMBER OF RECORDS	
17			
18		REPORT NUMBER	
19			
20			
21			
22			
23			
24		MONTH	
25			
26		DATE OF MONTH	
27			
28		YEAR	
29			
30		DAY OF WEEK	
31		TIME OF DAY	
32			
33			
34			

FILE NAME: REPORT 05-CYCLE DATE 4-25-74

35	COUNTY	LOCATION
36		
37	CITY	
38		
39	ROAD ON	
40		
41		
42		
43		
44		
45	RAMP	
46	DISTANCE	
47		
48		
49	MILES OR FEET	
50	DIRECTION	
51		
52	REFERENCE POINT	
53		
54		
55		
56		
57		
58	TOWARD LOCATION	
59		
60		
61		
62		
63		
64	ACCIDENT TYPE	GENERAL
65		
66	PROPERTY DAMAGE	
67		
68		
69		
70		
71		
72	TOTAL FATALITIES	

FILE NAME: REPORT 05-CYCLE DATE 1-25-74

73		TOTAL FATALITIES (cont.)	INFORMATION
74		TOTAL CLASS 'A' INJURIES	
75			
76		TOTAL CLASS 'B' INJURIES	
77			
78		TOTAL CLASS 'C' INJURIES	
79			
80		LOCALITY	
81		LIGHT CONDITION	
82		WEATHER CONDITION	
83		TRAFFIC CONTROL	
84		TRAFFIC CONTROL CONDITION	
85		SPEED LIMIT	
86			
87		OBJECT STRUCK	
88			
89		ROAD FEATURE	
90		ROAD SURFACE	
91		ROAD DEFECTS	
92		ROAD CONDITION	
93		AGE OF DRIVER	DRIVER #1
94			
95		RACE AND SEX	
96			
97		PHYSICAL CONDITION	
98		SOBRIETY	
99		LICENSEE STATE	
100		LICENSE STATUS	
101		RESTRICTION ON LICENSE	
102		ARMED FORCES DRIVER	
103		CHARGES MADE	
104		VIOLATION INDICATED (FIRST)	
105			
106		VIOLATION INDICATED (SECOND)	
107			
108		VEHICLE TYPE	
109			
110		ADDITIONAL VEHICLE CODE	

FILE NAME: REPORT 05-CYCLE DATE 4-25-74

111		ESTIMATED SPEED	VEHICLE #1
112			
113		DIRECTION OF TRAVEL	
114		ROAD ON LOCATION	
115		VEHICLE MANEUVER	
116			
117		MISCELLANEOUS ACTION	
118		INITIAL POINT OF CONTACT	
119			
120		VEHICLE DEFECTS	
121		TOTAL OCCUPANTS	
122			
123		AGE OF DRIVER	DRIVER #2
124			
125		RACE AND SEX	
126			
127		PHYSICAL CONDITION	
128		SOBRIETY	
129		LICENSEE STATE	
130		LICENSE STATUS	
131		RESTRICTION ON LICENSE	
132		ARMED FORCES DRIVER	
133		CHARGES MADE	
134		VIOLATION INDICATED (FIRST)	
135			
136		VIOLATION INDICATED (SECOND)	
137			
138		VEHICLE TYPE	VEHICLE #2
139			
140		ADDITIONAL VEHICLE CODE	
141		ESTIMATED VEHICLE SPEED	
142			
143		DIRECTION OF TRAVEL	
144		ROAD ON LOCATION	
145		VEHICLE MANEUVER	
146			
147		MISCELLANEOUS ACTION	
148		INITIAL POINT OF CONTACT	

FILE NO.: FTR05020

FILE NAME: REPORT 05-CYCLE

DATE 4-25-74

149		INITIAL POINT OF CONTACT (cont)	
150		VEHICLE DEFECTS	
151		TOTAL OCCUPANTS	
152			

N. C. DEPARTMENT OF TRANSPORTATION AND HIGHWAY SAFETY

ADP DEPARTMENT - HIGHWAY

TRAFFIC ENGINEERING

FTR05020
REPORT 05-CYCLE

Column 1-6 — Route Inventoried

Column 7-10 — Milepost

Column 11 — Plot Type

V - Valid
I - Invalid
D - Directional Plot
R - Reference Plot

Column 12 — Reference Type

N - Normal
B - Base
R - Reference
M - Multiple

Column 13 — Location Type

R - Roadway
I - Intersection
P - Proximity
Y - Y-Line
B - Bridge
T - Train
O - Ramp and Service Roads

Column 14-15 — Sequence Number

Record number in a sequence

Column 16-17 — Total Number of Records in Sequence

PRIOR TO 1993 FIELD IS BLANK

Column 18-23 — Report Number

Column 24-25

Month

01 - January
02 - February
03 - March
04 - April
05 - May
06 - June
07 - July
08 - August
09 - September
10 - October
11 - November
12 - December

Column 26-27

Date of Month

Numerically self code from 01 to 31.

Column 28-29

Year

Year of accident. Code 00 if not stated.

Column 30

Day of Week

1 - Monday
2 - Tuesday
3 - Wednesday
4 - Thursday
5 - Friday
6 - Saturday
7 - Sunday

Column 31-34 Time of Day

Military Time is used for time of day.

2400	- 12:00 am (midnight)
0001-0059	- 12:01 - 12:59 am
0100-0159	- 1:00 - 1:59 am
0200-0259	- 2:00 - 2:59 am
0300-0359	- 3:00 - 3:59 am
0400-0459	- 4:00 - 4:59 am
0500-0559	- 5:00 - 5:59 am
0600-0659	- 6:00 - 6:59 am
0700-0759	- 7:00 - 7:59 am
0800-0859	- 8:00 - 8:59 am
0900-0959	- 9:00 - 9:59 am
1000-1059	- 10:00 - 10:59 am
1100-1159	- 11:00 - 11:59 am
1200-1259	- 12:00 - 12:59 pm (noon)
1300-1359	- 1:00 - 1:59 pm
1400-1459	- 2:00 - 2:59 pm
1500-1559	- 3:00 - 3:59 pm
1600-1659	- 4:00 - 4:59 pm
1700-1759	- 5:00 - 5:59 pm
1800-1859	- 6:00 - 6:59 pm
1900-1959	- 7:00 - 7:59 pm
2000-2059	- 8:00 - 8:59 pm
2100-2159	- 9:00 - 9:59 pm
2200-2259	- 10:00 - 10:59 pm
2300-2359	- 11:00 - 11:59 pm

Column 35-36 County

Use present established county code for the county in which the accident occurred. (Alamance County code '00', Yancey County code '99')

Column 37-38 City

Code the City or Town in which the accident occurr or code '00' if accident occurred in rural area.

Column 39-44 On Road

Highway class will be coded in Columns 39-40

I - Interstate
US- United States
NC- North Carolina
SR- Secondary Road

Route direction will be coded in Column 41.

B - Business - Alternate

On Road (cont)
N - North
E - East
S - South
W - West or blank if no route direction.
Route or road number is coded in Column 42-44.

If the highway class is SR the road number is coded in Columns 41-44.

If the accident on road occurred on private property or a city street the codes will be in Column 39-44. See Street Name Listing for proper codes.

Column 45 — Ramp or Service Road for on Road

R - Ramp
S - Service Road or blank if not stated

Column 46-48 — Distance

Code 000 if accident occurred within the intersection. Code the distance from the nearest intersection of a numbered route or county line. For distances less than 0.10 mile code in feet.

Column 49 — Miles or Feet

M - Miles
F - Feet

Column 50-51 — Direction

Use alphabetic codes, N, E, S, W, NE, NW, SE, SW.

Column 52-57 — Reference Point

For highway class I, US, NC and SR see Column 39-44 for codes.
When Column 52 is coded as:
7 - you are referenced to a County line - Column 53-54 will have the County code.
8 - you are referenced to a State line. Column 53 codes will be:

6 - Georgia
7 - South Carolina
8 - Tennessee
9 - Virginia - Column 54-57 code zeroes.

If the accident occurred on a city street the codes will be in Column 52-57. See street name listing for proper codes.

Column 58-63 — Toward Location

For highway class I, US, NC, and SR see Columns 39-44 for codes.
When Column 58 is coded as:
- 7 - your toward location is a County line - Column 59-60 will have the County code.
- 8 - your toward location is a State line. Column 59 codes will be:
  - 6 - Georgia
  - 7 - South Carolina
  - 8 - Tennessee
  - 9 - Virginia - Column 60-63 code zero.
- 9 - your toward location is a city limit. Column 59-60 - County code
  61-62 - City code

When not stated - Code 'NS' in Column 58-59.

Column 64-65 — Accident Type

01 - Ran off road - right
02 - Ran off road - left
03 - Ran off road - straight ahead
04 - Non-collision in road - overturned
05 - Non-collision in road - other in road
06 - Pedestrian
07 - Parked vehicle
08 - Train
09 - Bicycle
10 - Animal
11 - Fixed Object
12 - Other Object
13 - Rear end - stop or slow
14 - Rear end - turn
15 - Left turn - same roadway
16 - Left turn - cross traffic
17 - Right turn - same roadway
18 - Right turn - cross traffic
19 - Head on
20 - Sideswipe
21 - Angle
22 - Backing
23 - Other motor vehicle in traffic

Column 66-71 — Property Damage

Total property damage rounded to nearest dollar.

Column 72-73 — Total Fatalities

Total fatalities for this accident.

Column 74-75 — Total 'A' Class Injuries
Total 'A' class injuries for this accident.

Column 76-77 — Total 'B' Class Injuries
Total 'B' class injuries for this accident.

Column 78-79 — Total 'C' Class Injuries
Total 'C' class injuries for this accident.

Column 80 — Locality

1 - Business
2 - Residential
3 - School and Playground
4 - Open Country

Column 81 — Light Condition

1 - Daylight
2 - Dusk
3 - Dawn
4 - Darkness (street lighted)
5 - Darkness (street not lighted)

Column 82 — Weather Condition

1 - Clear
2 - Cloudy
3 - Raining
4 - Snowing
5 - Fog
6 - Sleet or Hail

Column 83 — Traffic Control

1 - Stop Sign
2 - Yield Sign
3 - Stop and Go Signal
4 - Flashing Signal with Stop Sign
5 - Flashing Signal without Stop Sign
6 - R.R. Gate and Flasher
7 - R.R. Flasher
8 - Officer
9 - Other Device
0 - No Control present or not stated

Column 84 — Traffic Control Condition

1 - Not operating
2 - Not visible
3 - Not operating and not visible

Column 85-86

Speed Limit
Road or Highway speed limit.

Column 87-88

Object Struck

01 - Tree
02 - Utility Pole
03 - Fence or Fence Post
04 - Guardrail or Guard Post in Median
05 - Guardrail or Guard Post on Shoulder
06 - Bridge
07 - Underpass
08 - Traffic Island, Curb, or Median
09 - Sign or Sign Post
10 - Animal
11 - Ditch Bank
12 - Parked Vehicle
13 - Pedestrian
14 - Other Object
15 - None

NOTE:

All accidents occurring after March, 1976 will have an Object Struck code for each vehicle. Vehicle One's code will be in Column 87 and Vehicle Two's code in Column 88.

A - Tree
B - Utility
C - Fence or Fence Post
D - Guardrail or Guard Post in Median
E - Guardrail or Guard Post on Shoulder
F - Bridge
G - Underpass
H - Traffic Island, Curb, or Median
I - Sign or Sign Post
J - Animal
K - Ditch Bank
L - Parked Vehicle
M - Pedestrian
N - Other Object
O - None

Column 89

Road Feature

1 - Bridge or Underpass
2 - Driveway
3 - Alley Intersection
4 - Intersection of Two Roadways
5 - Non-Intersection Median Crossover
6 - End or Beginning of Divided Highway
7 - Other

Column 90 — Road Surface

1 - Concrete
2 - Smooth Asphalt
3 - Coarse Asphalt
4 - Gravel
5 - Dirt or Sand
6 - Other

Column 91 — Road Defect

1 - Loose material on surface
2 - Holes, deep ruts
3 - Low shoulders
4 - Soft shoulders
5 - Other defects
6 - Road under construction
7 - No defects

Column 92 — Road Condition

1 - Dry
2 - Wet
3 - Oily
4 - Muddy
5 - Snowy
6 - Icy

Column 93-94 — Age of Driver — Vehicle #1 Driver
Numerically Self Coding.

Column 95-96 — Race and Sex — Vehicle #1 Driver

WM - White Male
WF - White Female
NM - Negro Male
NF - Negro Female
IM - Indian Male
IF - Indian Female
OM - Other Male
OF - Other Female
W - White
I - Indian
N - Negro
O - Other
M - Male
F - Female
NS - if both are not stated
OW - driverless vehicle

Column 97 — Physical Condition — Vehicle #1 Driver

1 - Ill
2 - Fatigued
3 - Asleep
4 - Other physical impairment
5 - Restriction not complied with
6 - Normal
7 - Condition not known

Column 98 — Sobriety — Vehicle #1 Driver

1 - Had not been drinking
2 - Drinking - ability impaired
3 - Drinking - unable to determine impairment
4 - Unknown

Vehicle #1 Driver

Column 99 — Licensed State

1 - Learners Permit - NC
2 - Learners Permit - Other State
3 - Learners Permit - State not stated
4 - NC license
5 - Other state license
6 - Pedestrian or Bicyclist
0 - Not stated
7 - Not licensed

Column 100 — Licensee Status — Vehicles #1 Driver

1 - NC Operator
2 - NC Chauffeur
3 - Both

Column 101 — Restrictions on License — Vehicle #1 Driver

1 - Corrective Lenses
2 - 45 mph speed limit
3 - daylight driving only
4 - corrective lenses and 45 mph speed limit
5 - corrective lenses, 45 mph speed limit & daylight driving only
6 - corrective lenses and daylight driving only
7 - 45 mph speed limit and daylight driving only
8 - no restrictions
9 - restriction (not stated)

Column 102 — Armed Forces Driver — Vehicle #1 Driver

1 - Yes
2 - No

Column 103 — Charges Made — Vehicles #1 Driver

1 - Yes
2 - No

Column 104-105 — Violation Indicated (First) — Vehicle #1 Driver

01 - No violation indicated
02 - Excessive speed
03 - Yield violation
04 - Left of center
05 - Passing violation
06 - Stop sign or yield sign violation
07 - Traffic signal violation
08 - Safe movement violation
09 - Too close
10 - Improper turn
11 - Improper or no signal
12 - Improper parking location
13 - Other improper driving

Column 106-107 — Violation Indicated (Second) — Vehicle #1 Driver

See Column 104-105 for codes.

Column 108-109 — Vehicle Type — Vehicle #1

01 - Two or four door sedan (pass. veh.)
02 - Two or four door sedan and house trailer
03 - Passenger car and trailer
04 - Station Wagon (passenger)
05 - Station Wagon (truck)
06 - Commercial Bus
07 - School Bus
08 - Activitiy Bus
09 - Truck with two axles
10 - Truck with two axles and trailer
11 - Truck with three axles
12 - Truck with three axles and trailer
13 - Truck tractor and semi-trailer
14 - Taxicab
15 - Farm Equipment
16 - Farm Tractor
17 - Motorcycle
18 - Motor Scooter or Motor Bike
19 - Ambulance
20 - Bicyclist
21 - Recreational Vehicle, Self-Contained
22 - "Camper" mounted on 2 axle truck
23 - Camper mounted on 2 axle truck-trailer
24 - Other Motor Vehicle
25 - Pedestrian
26 - Not Stated

Column 110 — Additional Vehicle Code — Vehicle #1

M - Military
E - Emergency Vehicle
S - State Owned
P - Other Publicly Owned

Column 111-112 — Estimated Speed — Vehicle #1

Self Coding will always have something when a vehicle is involved.

Column 113 — Direction of Travel for Vehicle 1

N - North
E - East
W - West
S - South

Column 114 — Road on Location — Vehicle #1

1 - 1st road
2 - 2nd road
3 - Neither Road

Column 115-116 Vehicle Maneuver Vehicle #1

01 - Stopped in travel lane
02 - Parked out of travel lane
03 - Parked in travel lane
04 - Going straight ahead
05 - Changing lanes or merging
06 - Passing
07 - Making right turn
08 - Making left turn
09 - Making U turn
10 - Backing
11 - Slowing or stopping
12 - Starting in roadway
13 - Parking
14 - Leaving parked position
15 - Other

Column 117 Miscellaneous Action Vehicle #1

1 - Avoiding pedestrian
2 - Avoiding other wheeled vehicle
3 - Avoiding fixed object
4 - Avoiding animal
5 - Fire or mechanical failure
6 - Fell from vehicle
7 - Driverless moving vehicle
8 - Skidded out of control
9 - Pushing or towing vehicles (do not include trailer)
0 - Vehicle parked on private property
- - Vehicle legally parked
& - Vehicle & Driver Inf. omitted

Column 118-119 Initial Point of Contact Vehicle #1

01 - front right
02 - front center
03 - front left
04 - front left corner
05 - front left side
06 - center left side
07 - rear left side
08 - rear left corner
09 - trunk
10 - back window
11 - top
12 - windshield
13 - hood
14 - rear left
15 - rear center
16 - rear right
17 - rear right corner
18 - rear right side
19 - center right side
20 - front right side
21 - front right corner
22 - underneath front
23 - underneath center
24 - underneath rear
25 - unspecified

Column 120 — Vehicle Defects — Vehicle #1

1 - Vehicle is defective
2 - No defects detected
3 - Not known if defective

Column 121-122 — Total Occupants — Vehicle #1
Number shown or blank for not stated.

Column 123-124 — Age of Driver — Vehicle #2 Driver
Numerically self coding

Column 125-126 — Race and Sex — Vehicle #2 Driver
See Column 95-96 for codes.

Column 127 — Physical Condition — Vehicle #2 Driver
See Column 97 for codes

Column 128 — Sobriety — Vehicle #2 Driver
See Column 98 for codes

Column 129 — Licensee State — Vehicle #2 Driver
See Column 99 for codes.

Column 130 — Licensee Status — Vehicle #2 Driver
See Column 100 for codes.

Column 131 — Restriction on License — Vehicle #2 Driver
See Column 101 for codes.

Column 132 — Armed Forces Driver — Vehicle #2 Driver

1 - Yes
2 - No

Column 133 — Charges Made — Vehicle #2 Driver

1 - Yes
2 - No

Column 134-135 — Violation Indicated (First) — Vehicle #2 Driver
See Column 104-105 for codes.

Column 136-137 — Violation Indicated (Second) — Vehicle #2 Driver
See Column 104-105 for codes.

Column 138-139 Vehicle Type Vehicle #2
See Column 108-109 for codes.

Column 140 Additional Vehicle Code Vehicles #2
See Column 110 for codes.

Column 141-142 Estimated Speed Vehicle #2
Self Coding.

Column 143 Direction of Travel for Vehicle 2
See Column 113 for codes.

Column 144 Road on Location Vehicle #2
See Column 114 for codes.

Column 145-146 Vehicle Maneuver Vehicle #2
See Column 115-116 for codes.
If this accident involves a pedestrian you will code the pedestrian action here.

01 - Crossing at intersection
02 - Crossing not at intersection
03 - Coming from behind parked vehicle
04 - Walking with traffic
05 - Walking against traffic
06 - Getting on or off vehicle
07 - Standing in road
08 - Walking in road
09 - Playing in road
10 - Lying in road
11 - Other
12 - Not in road
13 - Walking to or from stopped school bus

Column 147 Miscellaneous Action Vehicle #2
See Column 117 for codes.

Column 148-149 Initial Point of Contact Vehicle #2
See Column 118-119 for codes.

Column 150 Vehicle Defects Vehicle #2
See Column 120 for codes.

Column 151-152 Total Occupants Vehicle #2
Number shown or blank for not stated.

Leave columns blank if the information is not stated.

HWY.FTR30120 and HWY.FTR30130

ACCIDENT FILE

Record types A and V.

ACCIDENT FILE Description

Accident Variables

NAME	DESCRIPTION	CCL*	VALUE
AØ	Record Length	3	Zoned Decimal Actual record length
A1	County	2	Alphabetical Order 00 - Alamance, etc.
A2	Route Number	5	Zoned Decimal - Standard 5 digit route code (as on Roadway Features file)
A3	Milepost	4	4 characters, decimal assumed left 2.
A4	Report Number	8	8 characters; the high order 2 characters contain the year followed by a six digit sequential number
A5	City Code	3	00 - 99
A6	Total Property Damage	6	Total dollar amount
A7	Month	2	1 = January, etc. 12 = December
A8	Plot Type	1	0 = Not stated 1 = Valid 2 = Invalid 3 = Direction Plot 4 = Reference Plot
A9	Reference Type	1	0 = Not stated 1 = Normal 2 = Base 3 = Reference 4 = Multiple
A10	Location Type	1	0 = Not stated 1 = Roadway 2 = Intersection 3 = Proximity 4 = y line 5 = Bridge 6 = Train 7 = Ramp & Service Road

*Converted Character Length - Length of data in bytes when it is expanded.

NAME	DESCRIPTION	CCL	VALUE
A11	Ramp	1	0 = Not stated 1 = Not applicable 2 = Ramp 3 = Service Road
A12	Day of Month	2	0 = Not stated 1 through 31
A13	Day of Week	1	0 = Not stated 1 = Monday; etc. 7 = Sunday
A14	Road On	5	First Digit 0 = Not stated 1 = Interstate 2 = US 3 = NC 4 = SR Last 4 digits = Road number
A15	Direction of Travel	1	0 = Not stated 1 = North 2 = Northeast 3 = East 4 = Northwest 5 = South 6 = Southeast 7 = West 8 = Southwest
A16	Time of Day	4	2400 = Midnight 0001-0059 = 12:01 12:59 am etc 2300-2359 = 11:00 11:59 pm 2400 = NS
A17	Alcohol Control	1	0 = Not stated or unknown 1 = No alcohol involvement 2 = Alcohol involved
A18	Accident Type	2	00 = Not stated 01 = Ran off road - right 02 = Ran off road - left 03 = Ran off road - straight 04 = Non-collision in road-overturned 05 = Non-collision in road-other in road 06 = Pedestrian 07 = Parked vehicle 08 = Train 09 = Bicycle 10 = Animal

(Cont' on following page)

NAME	DESCRIPTION	CCL	VALUE
A18	Accident Type (Cont')		11 = Fixed object 12 = Other object 13 = Rear end-stop or slow 14 = Rear end-turn 15 = Left turn same roadway 16 = Left turn cross traffic 17 = Right turn same roadway 18 = Right turn cross traffic 19 = Head on 20 = Sideswipe 21 = Angle 22 = Backing 23 = Other MV in traffic
A19	Locality	1	0 = Not stated 1 = Business 2 = Residential 3 = School or Playground 4 = Open Country
A20	Total Fatalities	2	0-13 14 = 14 or more 15 = Not stated
A21	Total A Injured	2	0-13 14 = 14 or more 15 = Not stated
A22	Total B Injured	2	0-13 14 = 14 or more 15 = Not stated
A23	Total C Injured	2	0-13 14 = 14 or more 15 = Not stated
A24	Light Condition	1	0 = Not stated 1 = Daylight 2 = Dusk 3 = Dawn 4 = Darkness (Street lights) 5 = Darkness (Street not lighted)
A25	Weather	1	0 = Not stated 1 = Clear 2 = Cloudy 3 = Rainy 4 = Snowy 5 = Fog 6 = Sleet or Hail

NAME	DESCRIPTION	CCL	VALUE
A26	Traffic Control Condition	1	0 = Not stated 1 = Not operating 2 = Not visible 3 = Not operating and not visible
A27	Traffic Control	1	0 = Not control present or not stated 1 = Stop sign 2 = Yield sign 3 = Stop and go signal 4 = Flashing signal w/stop sign 5 = Flashing signal w/o stop sign 6 = RR gate and flasher 7 = RR flasher 8 = Officer 9 = Other Device
A28	Number of Vehicles Stored in Record	2	1-15
A29	Road Feature	1	0 = Not stated 1 = Bridge or underpass 2 = Driveway 3 = Alley intersection 4 = Intersection of 2 roadways 5 = Non-Intersection median crossover 6 = End or beginning of divided highway 7 = Other
A30	Road Surface	1	0 = Not stated 1 = Concrete 2 = Smooth asphalt 3 = Coarse alphalt 4 = Gravel 5 = Dirt or sand 6 = Other
A31	Road Defects	1	0 = Not stated 1 = Loose material on surface 2 = Holes, deep ruts 3 = Low shoulders 4 = Soft shoulders 5 = Other defects 6 = Road under construction 7 = No defects
A32	Road Condition	1	0 = Not stated 1 = Dry 2 = Wet 3 = Oily 4 = Muddy 5 = Snowy 6 = Icy

NAME	DESCRIPTION	CCL	VALUE
A33	Speed Limit	3	Coded in miles per hour, 255 is not stated
A34	Coinciding Route Flag	1	0 = No coinciding routes at accident site 1 = Another route coinciding 2 = Roadway segment coincides with a lower numbered route.
A35	Record Type	1	Character Value = 'A'
A36	Distance to Reference Point	4	Binary High order digit = 1; the following 3 digits denote feet from reference point. High order digit = Ø; the following 3 digit denote miles and hundredth of miles from the reference point.
A37	Reference Point Type	1	Binary 0 = Point is valid intersection 1 = Point is not a valid intersection
A38	Reference Point	6	Binary If A37 = 0 then the 5 leftmost digits of A38 are the numeric road number (10085) = I-85. If A37 = 1 then the six digits may be a street name etc. '000000' is not given or not stated.
A39	Year of Accident	2	Binary

Vehicle File Description

Vehicle Variables

NAME	DESCRIPTION	CCL	VALUE
V1	Driver Age	3	Age in years 0 - 126; 127 = Not stated
V2	Driver Race	1	0 = Not stated 1 = White 2 = Negro 3 = Indian 4 = Other
V3	Driver Sex	1	0 = Not stated 1 = Female 2 = Male
V4	Restrictions	1	0 = Not stated 1 = Corrective lenses 2 = 45 mph speed limit 3 = Daylight driving only 4 = Corrective lenses & 45 mph limit 5 = Corrective lenses, 45 mph speed limit and daylight driving only 6 = Corrective lenses daylight driving only 7 = 45 mph speed limit and daylight driving only 8 = No restrictions 9 = Restriction (Not stated)
V5	Physical Condition	1	0 = Not stated 1 = Ill 2 = Fatigued 3 = Asleep 4 = Other physical impairment 5 = Restriction not complied with 6 = Normal 7 = Condition not known
V6	Sobriety	1	0 = Not stated 1 = Unknown 2 = Had not been drinking 3 = Drinking, unable to determine impairment 4 = Drinking, ability impaired
V7	License Type	1	0 = Not stated 1 = Learners permit - NC 2 = Learners permit - other 3 = Learners permit, state not stated 4 = NC license 5 = Other state license 6 = Pedestrian or bicyclist 7 = Not licensed.

NAME	DESCRIPTION	CCL	VALUE
V8	License Status	1	0 = Not stated 1 = NC operator 2 = NC chauffeur 3 = Both
V9	Vehicle Type	2	0 = Not stated 1 = Two or four door sedan (pass veh.) 2 = Two or four door sedan and house trailer 3 = Passenger car and trailer 4 = Station wagon (passenger) 5 = Station wagon (truck) 6 = Commercial bus 7 = School bus 8 = Activity bus 9 = Truck w/2 axles 10 = Truck w/2 axles and trailer 11 = Truck w/3 axles 12 = Truck w/3 axles and trailer 13 = Truck tractor and semi-truck 14 = Taxicab 15 = Farm equipment 16 = Farm tractor 17 = Motorcycle 18 = Motor scooter or motor bike 19 = Ambulance 20 = Bicyclist 21 = Recreational vehicle self-contained 22 = Camper on 2 axle truck 23 = Camper mounted on 2 axle truck 24 = Other motor vehicle 25 = Pedestrian
V10	Armed Forces Driver	1	0 = Not stated 1 = Yes 2 = No
V11	Vehicle Number	2	1-15 as indicated on the accident report
V12	Additional Vehicle Code	1	0 = Not stated 1 = Military 2 = Emergency vehicle 3 = State owned 4 = Other publically owned
V13	Estimated Speed	3	Estimated speed at impact 0-126, 127 = Not stated
V14	Charges Made	1	0 = Not stated 1 = Yes 2 = No
V15	Total Occupants	2	0-14; 15 not stated

NAME	DESCRIPTION	CCL	VALUE
V16	Road on Location	1	0 = Not stated 1 = 1st road 2 = 2nd road 3 = Neither road
V17	Vehicle Maneuver	2	0 = Not stated 1 = Stopped in travel lane 2 = Parked out of travel lane 3 = Parked in travel lane 4 = Going straight ahead 5 = Changing lane or merging 6 = Passing 7 = Making right turn 8 = Making left turn 9 = Making U turn 10 = Backing 11 = Slowing or stopping 12 = Starting in roadway 13 = Parking 14 = Leaving parked position 15 = Other
V18	Miscellaneous Action	2	0 = Not stated 1 = Avoiding a pedestrian 2 = Avoiding other wheeled vehicle 3 = Avoiding fixed object 4 = Avoiding animal 5 = Fire or mechanical failure 6 = Fell from vehicle 7 = Driverless, moving vehicle 8 = Skidded out of control 9 = Pushing or towing vehicle 10 = Vehicle parked on private property 11 = Vehicle legally parked 12 = Vehicle and driver information omitted
V19	Point of Contact	2	0 = Not stated 1 = Front right 2 = Front center 3 = Front left 4 = Front left corner 5 = Front left side 6 = Center left side 7 = Rear left side 8 = Rear left corner 9 = Trunk 10 = Back window 11 = Top 12 = Windshield 13 = Hood 14 = Rear left 15 = Rear center 16 = Rear right

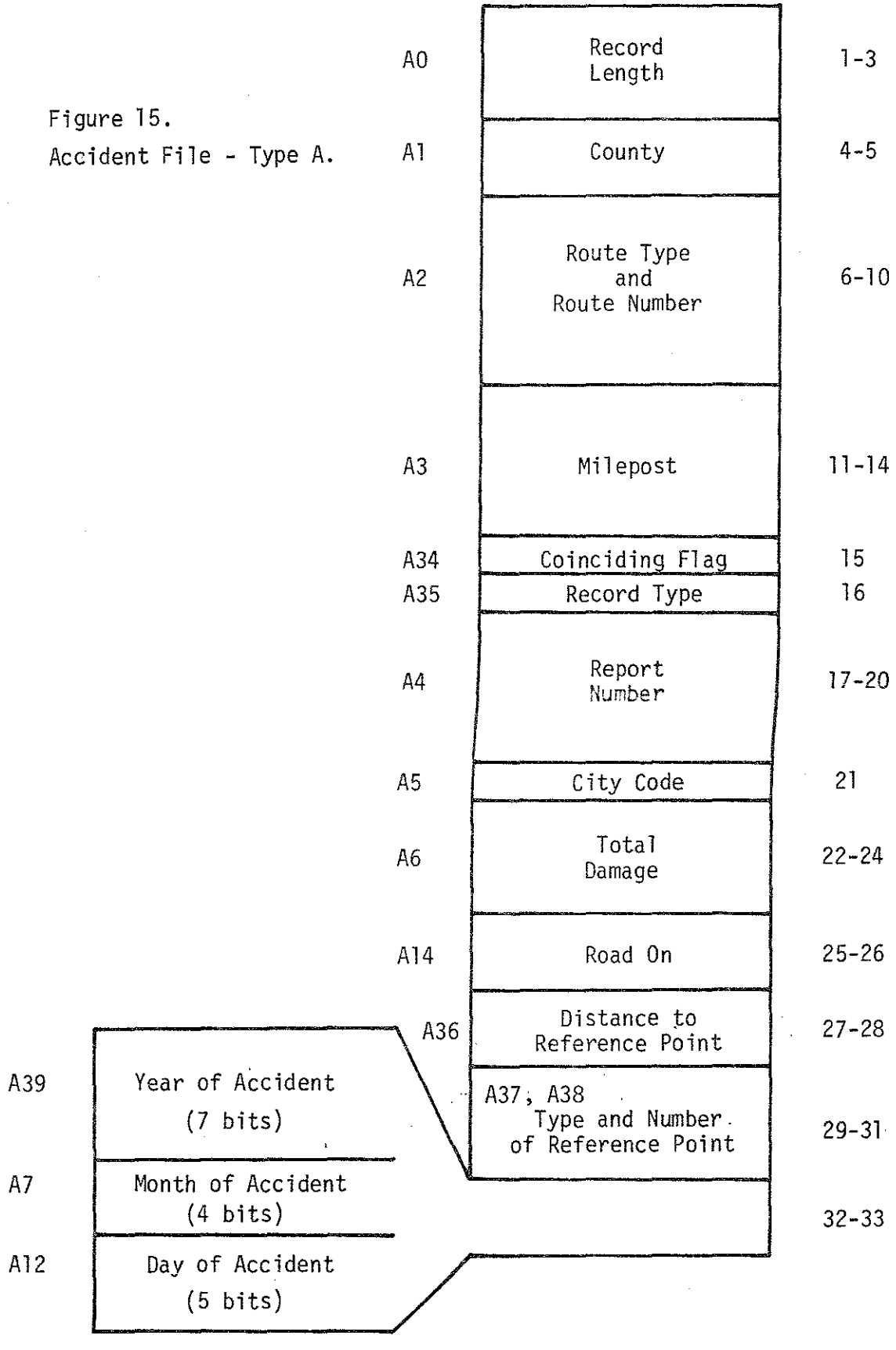
(Cont' on following page)

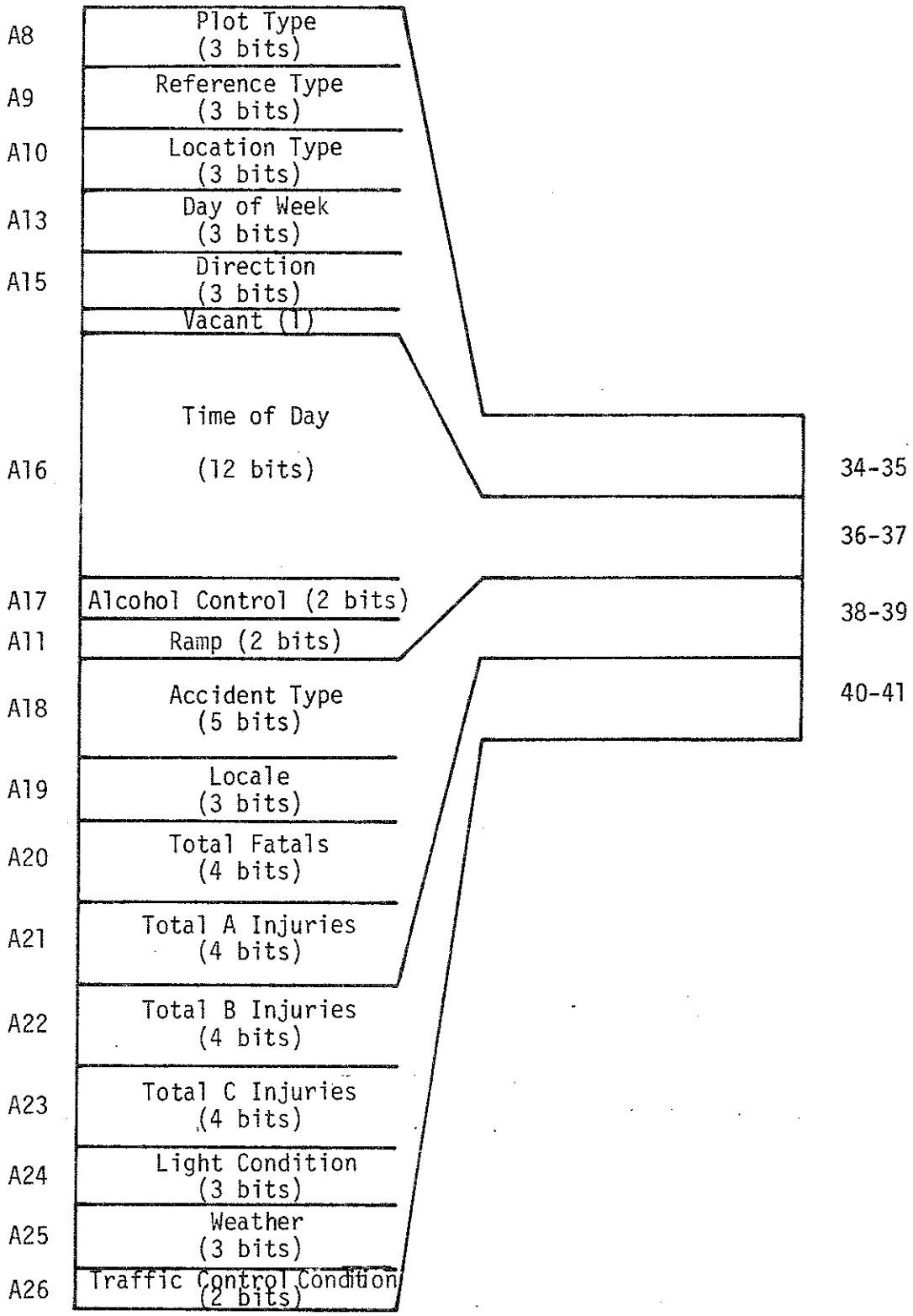
NAME	DESCRIPTION	CCL	VALUE
V19	Point of Contact (Cont')		17 = Rear right corner 18 = Rear right side 19 = Center right side 20 = Front right side 21 = Front right corner 22 = Underneath front 23 = Underneath center 24 = Underneath rear 25 = Unspecified
V20	Vehicle Defects	1	0 = Not stated 1 = Vehicle in defensive 2 = No defects detected 3 = Not known if defective
V21	Direction of Travel	1	0 = Not stated 1 = North 2 = East 3 = West 4 = South
V22	Object Struck	2	0 = Not stated 1,16 = None 2,17 = Tree 3,18 = Utility pole 4,19 = Fence or fence post 5,20 = Guardrail or guard post in median 6,21 = Guardrail or guard post on shoulder 7,22 = Bridge 8,23 = Underpass 9,24 = Traffic island or curb, median 10,25 = Sign or sign post 11,26 = Animal 12,27 = Ditch bank 13,28 = Parked vehicle 14,29 = Pedestrian 15,30 = Other object
	(Note: Prior to April '75, the object struck codes were collected on an accident oriented basis. At that time object struck became vehicle oriented. The values 16-30 reflect the old accident oriented codes while codes 0-15 reflect the new vehicle oriented codes.)		
V23	Violation Indicated	2	00 = Not stated 01 = No violation indicated 02 = Excessive speed 03 = Yield violation 04 = Left of center 05 = Passing violation 06 = Stop sign or yield sign violation

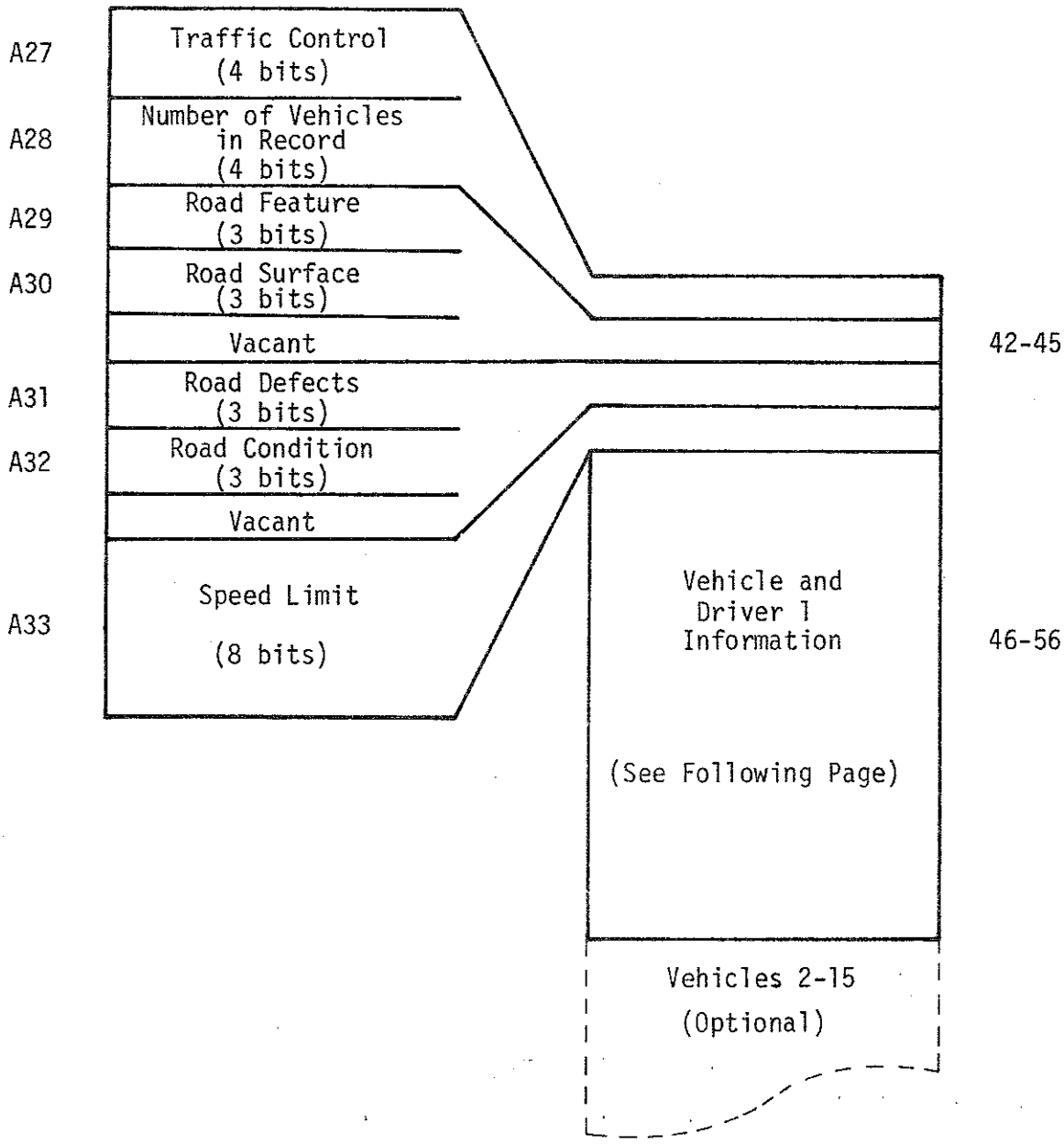
(Cont' on following page)

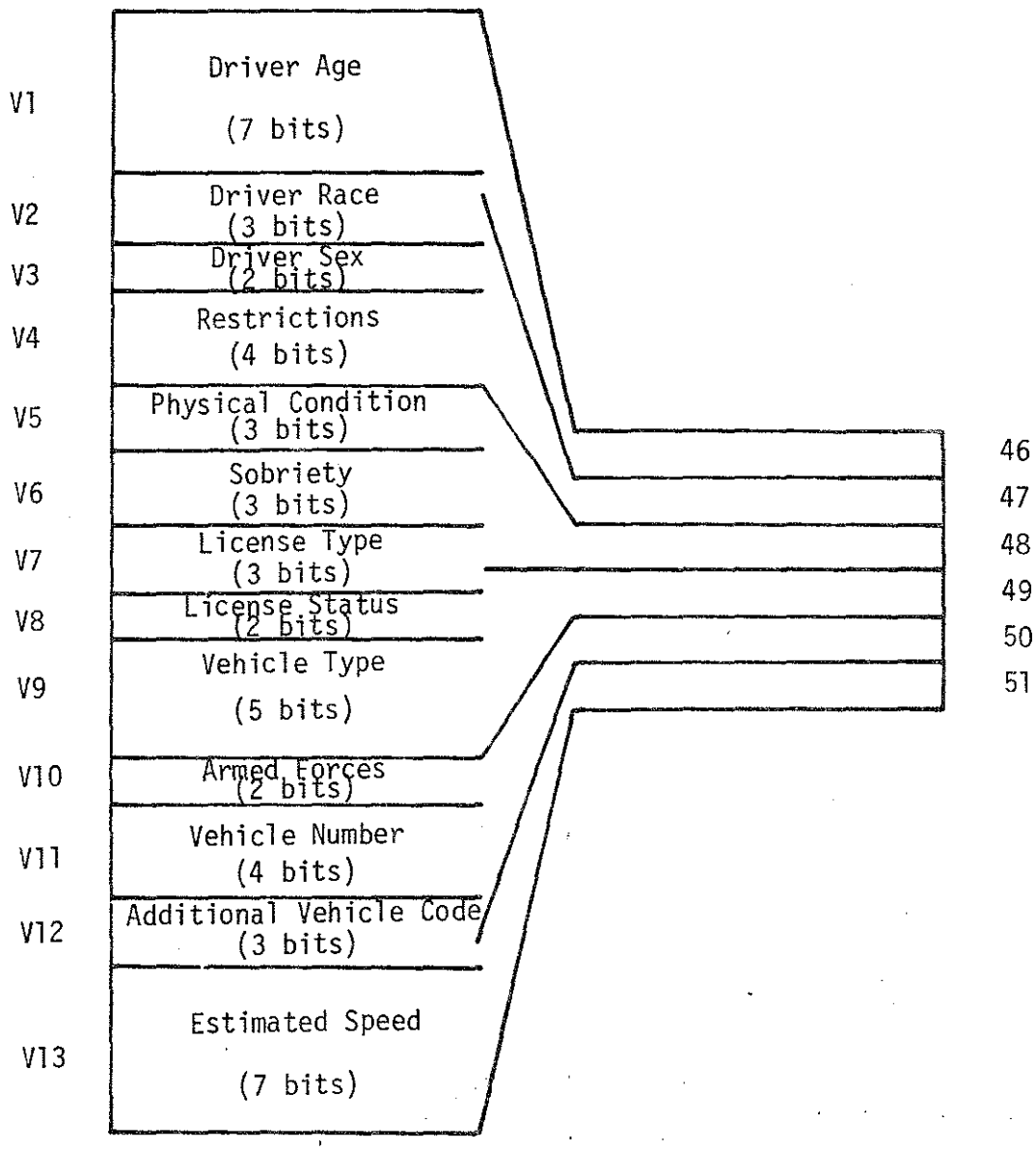
NAME	DESCRIPTION	CCL	VALUE
V23	Violation Indicated (Cont')		07 = Traffic signal violation 08 = Safe movement violation 09 = Too close 10 = Improper turn 11 = Improper or no signal 12 = Improper parking location 13 = Other improper driving
V24	Violation Indicated Second	2	Same codes as above

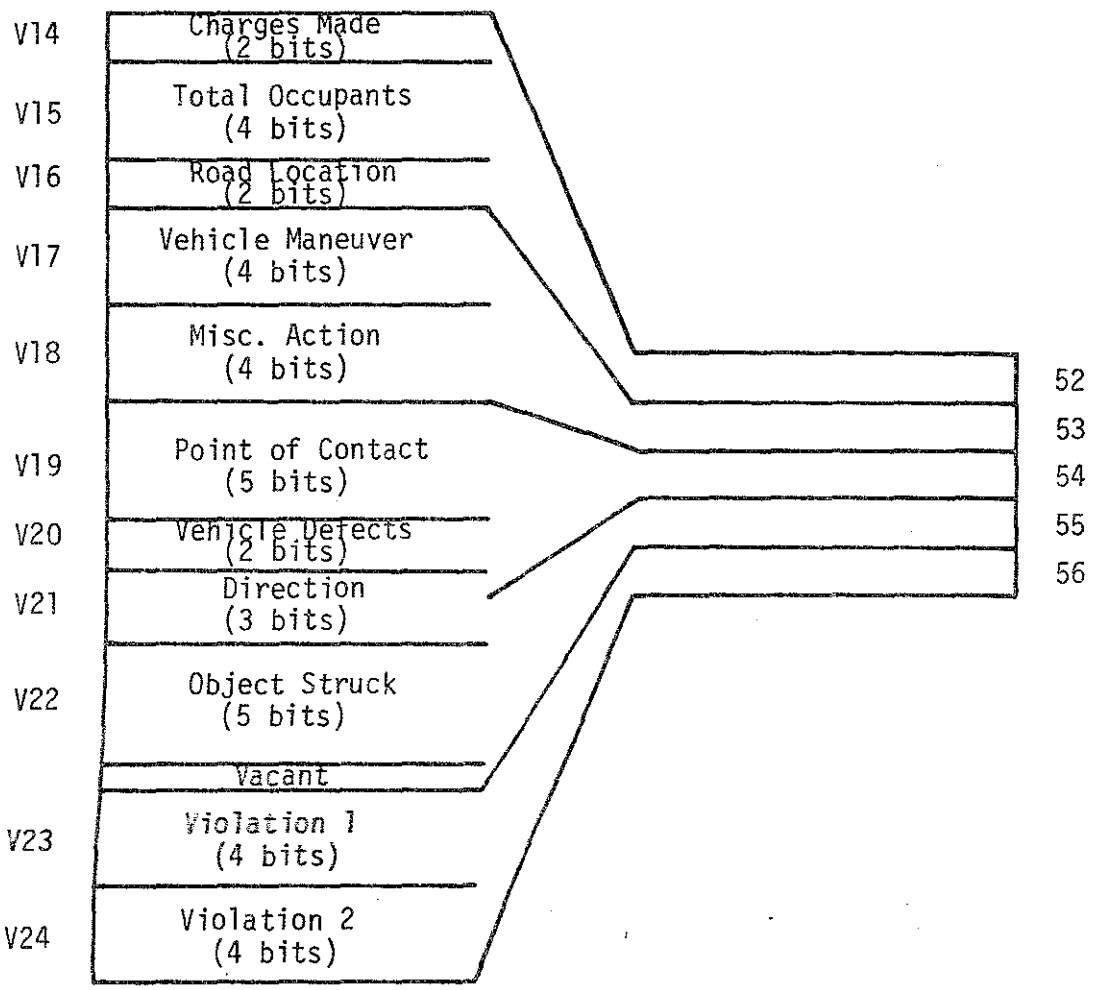
Figure 15.
Accident File - Type A.




A8
Plot Type
(3 bits)
A9
Reference Type
(3 bits)
A10
Location Type
(3 bits)
A13
Day of Week
(3 bits)
A15
Direction
(3 bits)
Vacant (1)
A16
Time of Day
(12 bits)
A17
Alcohol Control (2 bits)
A11
Ramp (2 bits)
A18
Accident Type
(5 bits)
A19
Locale
(3 bits)
A20
Total Fatals
(4 bits)
A21
Total A Injuries
(4 bits)
A22
Total B Injuries
(4 bits)
A23
Total C Injuries
(4 bits)
A24
Light Condition
(3 bits)
A25
Weather
(3 bits)
A26
Traffic Control Condition
(2 bits)
34-35
36-37
38-39
40-41


A27
Traffic Control
(4 bits)
A28
Number of Vehicles
in Record
(4 bits)
A29
Road Feature
(3 bits)
A30
Road Surface
(3 bits)
Vacant
42-45
A31
Road Defects
(3 bits)
A32
Road Condition
(3 bits)
Vacant
A33
Speed Limit
(8 bits)
Vehicle and
Driver 1
Information
46-56
(See Following Page)
Vehicles 2-15
(Optional)


V1
Driver Age
(7 bits)
V2
Driver Race
(3 bits)
V3
Driver Sex
(2 bits)
V4
Restrictions
(4 bits)
V5
Physical Condition
(3 bits)
V6
Sobriety
(3 bits)
V7
License Type
(3 bits)
V8
License Status
(2 bits)
V9
Vehicle Type
(5 bits)
V10
Armed Forces
(2 bits)
V11
Vehicle Number
(4 bits)
V12
Additional Vehicle Code
(3 bits)
V13
Estimated Speed
(7 bits)
46
47
48
49
50
51


V14
Charges Made
(2 bits)
V15
Total Occupants
(4 bits)
V16
Road Location
(2 bits)
V17
Vehicle Maneuver
(4 bits)
V18
Misc. Action
(4 bits)
V19
Point of Contact
(5 bits)
V20
Vehicle Defects
(2 bits)
V21
Direction
(3 bits)
V22
Object Struck
(5 bits)
Vacant
V23
Violation 1
(4 bits)
V24
Violation 2
(4 bits)
52
53
54
55
56

SUBJECT: GENINDX (T72209)

AUTHOR: Dennis Ryan

DATE: June, 1977

PROGRAM TYPE: Batch Program

SOURCE LANGUAGE: COBOL

FUNCTION: Program generates a direct access disk file compatible with the Department of Transportation's Merged System. Produced during file creation is an index which allows retrieval of information on a county, route, milepost basis.

USAGE DESCRIPTION:

GENINDX must be supplied with an input file containing records with the 16 bytes standard header followed by the specific record information in packed format. These records are queued on a county route basis and then written onto a disk file whenever a new county route is initiated or whenever a full track of information has accumulated. As records are written to the disk file an index entry is created which specifies the relative track number and the county route and milepost range of the records contained on that track.

Maximum utilization of track space is accomplished by packing many county routes on each track whenever possible. Therefore sequential ordering of county-routes exists only through the information supplied in the index. However, should a county route require multiple tracks, these will be allocated in continuous order. At the end of the job step track utilization is display as printed output.

Input (File Description and JCL Requirements):

I. //INFILE1 DD formatted file input

Records for this file consist of a 16 byte standard header in character format, followed by a variable number of bytes representing the specific record type being described. The records are ordered on the keys, county, route, and milepost all of which are contained in the standard header.

STANDARD HEADER DESCRIPTION

ATTRIBUTE	ELEMENT NAME	DESCRIPTION
PIC 999	Length	Length is bytes of entire record.
PIC 99	County	County number (00-99).
PIC 99999	Route	Combined route type and number.
PIC 9999	Milepost	Milepost to nearest one-hundredth mile.
PIC X	Record-Type	Type of feature being described.
PIC 9	Coinciding-Flag	Coinciding route condition.

OUTPUT (File description and JCL Requirements)

I. //OUTFILE1 DD file index

File index is associated with the direct access file created from the formatted input file. This index describes the relative track location and milepost range of each county-route.

INDEX DESCRIPTION (COBOL SOURCE)

```
Ø1          INDEX-REC.

    Ø2   NUMBER-ENTRIES          COMP    PIC    S9(4).
    Ø2   BINARY-SEARCH-POINTERS  COMP    PIC    S9(4).
    Ø2   INDEX ENTRY OCCURS 95Ø TIMES,
      Ø3   COUNTY ROUTE                  PIC    XXX.
      Ø3   DISPLACEMENT                  PIC    XX.
      Ø3   NUMBER-TRACKS                 PIC    X.

    Ø2   INFO-AREA OCCURS 1824 TIMES
      Ø3   HIGH-MILEPOST         COMP    PIC    S9(4).
      Ø3   RELATIVE-TRKNUM       COMP    PIC    S9(4).
```

II. //OUTFILE2 DD direct access file

The formatted input file is segmented into county routes and placed on a disk file accessed randomly by relative track number. The standard header for each record has been reduced to a four byte field containing record length, milepost, and record flag. Each block of information contains a five byte header field denoting county route and length of the block in bytes. This allows the access modules to handle blocking requirements.

Four Byte Header Information (COBOL SOURCE)

```
Ø1          RECORD HEADER.

    Ø2     LENGTH                   PIC    X.
    Ø2     MILEPOST          COMP   PIC    S9(4).
    Ø2     FLAG                     PIC    X.
```

Five Byte Block Header (COBOL SOURCE)

```
Ø1          BLOCK HEADER.

    Ø2     COUNTY-ROUTE             PIC    XXX.
    Ø2     DISPLACEMENT             PIC    XX.
```

HWY.FTR30120 and HWY.FTR30130

ACCIDENT FILE

Record Types A and V.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

ACCIDENT FILE Description

Accident Variables

NAME	DESCRIPTION	CCL*	VALUE
AØ	Record Length	3	Zoned Decimal Actual record length
A1	County	2	Alphabetical Order 00 - Alamance, etc.
A2	Route Number	5	Zoned Decimal - Standard 5 digit route code (as on Roadway Features file)
A3	Milepost	4	4 characters, decimal assumed left 2.
A4	Report Number	8	8 characters; the high order 2 characters contain the year followed by a six digit sequential number
A5	City Code	3	00 - 99
A6	Total Property Damage	6	Total dollar amount
A7	Month	2	1 = January, etc. 12 = December
A8	Plot Type	1	0 = Not stated 1 = Valid 2 = Invalid 3 = Direction Plot 4 = Reference Plot
A9	Reference Type	1	0 = Not stated 1 = Normal 2 = Base 3 = Reference 4 = Multiple
A10	Location Type	1	0 = Not stated 1 = Roadway 2 = Intersection 3 = Proximity 4 = y line 5 = Bridge 6 = Train 7 = Ramp & Service Road

*Converted Character Length - Length of data in bytes when it is expanded.

NAME	DESCRIPTION	CCL	VALUE
A11	Ramp	1	0 = Not stated 1 = Not applicable 2 = Ramp 3 = Service Road
A12	Day of Month	2	0 = Not stated 1 through 31
A13	Day of Week	1	0 = Not stated 1 = Monday; etc. 7 = Sunday
A14	Road On	5	First Digit 0 = Not stated 1 = Interstate 2 = US 3 = NC 4 = SR Last 4 digits = Road number
A15	Direction of Travel	1	0 = Not stated 1 = North 2 = Northeast 3 = East 4 = Northwest 5 = South 6 = Southeast 7 = West 8 = Southwest
A16	Time of Day	4	2400 = Midnight 0001-0059 = 12:01 12:59 am etc 2300-2359 = 11:00 11:59 pm 2400 = NS
A17	Alcohol Control	1	0 = Not stated or unknown 1 = No alcohol involvement 2 = Alcohol involved
A18	Accident Type	2	00 = Not stated 01 = Ran off road - right 02 = Ran off road - left 03 = Ran off road - straight 04 = Non-collision in road-overturned 05 = Non-collision in road-other in road 06 = Pedestrian 07 = Parked vehicle 08 = Train 09 = Bicycle 10 = Animal

(Cont' on following page)

NAME	DESCRIPTION	CCL	VALUE
A18	Accident Type (Cont')		11 = Fixed object 12 = Other object 13 = Rear end-stop or slow 14 = Rear end-turn 15 = Left turn same roadway 16 = Left turn cross traffic 17 = Right turn same roadway 18 = Right turn cross traffic 19 = Head on 20 = Sideswipe 21 = Angle 22 = Backing 23 = Other MV in traffic
A19	Locality	1	0 = Not stated 1 = Business 2 = Residential 3 = School or Playground 4 = Open Country
A20	Total Fatalities	2	0-13 14 = 14 or more 15 = Not stated
A21	Total A Injured	2	0-13 14 = 14 or more 15 = Not stated
A22	Total B Injured	2	0-13 14 = 14 or more 15 = Not stated
A23	Total C Injured	2	0-13 14 = 14 or more 15 = Not stated
A24	Light Condition	1	0 = Not stated 1 = Daylight 2 = Dusk 3 = Dawn 4 = Darkness (Street lights) 5 = Darkness (Street not lighted)
A25	Weather	1	0 = Not stated 1 = Clear 2 = Cloudy 3 = Rainy 4 = Snowy 5 = Fog 6 = Sleet or Hail

NAME	DESCRIPTION	CCL	VALUE
A26	Traffic Control Condition	1	0 = Not stated 1 = Not operating 2 = Not visible 3 = Not operating and not visible
A27	Traffic Control	1	0 = Not control present or not stated 1 = Stop sign 2 = Yield sign 3 = Stop and go signal 4 = Flashing signal w/stop sign 5 = Flashing signal w/o stop sign 6 = RR gate and flasher 7 = RR flasher 8 = Officer 9 = Other Device
A28	Number of Vehicles Stored in Record	2	1-15
A29	Road Feature	1	0 = Not stated 1 = Bridge or underpass 2 = Driveway 3 = Alley intersection 4 = Intersection of 2 roadways 5 = Non-Intersection median crossover 6 = End or beginning of divided highway 7 = Other
A30	Road Surface	1	0 = Not stated 1 = Concrete 2 = Smooth asphalt 3 = Coarse alphalt 4 = Gravel 5 = Dirt or sand 6 = Other
A31	Road Defects	1	0 = Not stated 1 = Loose material on surface 2 = Holes, deep ruts 3 = Low shoulders 4 = Soft shoulders 5 = Other defects 6 = Road under construction 7 = No defects
A32	Road Condition	1	0 = Not stated 1 = Dry 2 = Wet 3 = Oily 4 = Muddy 5 = Snowy 6 = Icy

NAME	DESCRIPTION	CCL	VALUE
A33	Speed Limit	3	Coded in miles per hour, 255 is not stated
A34	Coinciding Route Flag	1	0 = No coinciding route at accident site 1 = Another route coincides 2 = Roadway segment coincides with a lower numbered route.
A35	Record Type	1	Character Value = 'A'
A36	Distance to Reference Point	4	Binary High order digit = 1; the following 3 digits denote feet from reference point. High order digit = Ø; the following 3 digit denote miles and hundredth of miles from the reference point.
A37	Reference Point Type	1	Binary 0 = Point is valid intersection 1 = Point is not a valid intersection
A38	Reference Point	6	Binary If A37 = 0 then the 5 leftmost digits of A38 are the numeric road number (10085) = I-85. If A37 = 1 then the six digits may be a street name etc. '000000' is not given or not stated.
A39	Year of Accident	2	Binary

Vehicle File Description

Vehicle Variables

NAME	DESCRIPTION	CCL	VALUE
V1	Driver Age	3	Age in years 0 - 126; 127 = Not stated
V2	Driver Race	1	0 = Not stated 1 = White 2 = Negro 3 = Indian 4 = Other
V3	Driver Sex	1	0 = Not stated 1 = Female 2 = Male
V4	Restrictions	1	0 = Not stated 1 = Corrective lenses 2 = 45 mph speed limit 3 = Daylight driving only 4 = Corrective lenses & 45 mph limit 5 = Corrective lenses, 45 mph speed limit and daylight driving only 6 = Corrective lenses daylight driving only 7 = 45 mph speed limit and daylight driving only 8 = No restrictions 9 = Restriction (Not stated)
V5	Physical Condition	1	0 = Not stated 1 = Ill 2 = Fatigued 3 = Asleep 4 = Other physical impairment 5 = Restriction not complied with 6 = Normal 7 = Condition not known
V6	Sobriety	1	0 = Not stated 1 = Unknown 2 = Had not been drinking 3 = Drinking, unable to determine impairment 4 = Drinking, ability impaired
V7	License Type	1	0 = Not stated 1 = Learners permit - NC 2 = Learners permit - other 3 = Learners permit, state not stated 4 = NC license 5 = Other state license 6 = Pedestrian or bicyclist 7 = Not licensed.

NAME	DESCRIPTION	CCL	VALUE
V8	License Status	1	0 = Not stated 1 = NC operator 2 = NC chauffeur 3 = Both
V9	Vehicle Type	2	0 = Not stated 1 = Two or four door sedan (pass veh.) 2 = Two or four door sedan and house trailer 3 = Passenger car and trailer 4 = Station wagon (passenger) 5 = Station wagon (truck) 6 = Commercial bus 7 = School bus 8 = Activity bus 9 = Truck w/2 axles 10 = Truck w/2 axles and trailer 11 = Truck w/3 axles 12 = Truck w/3 axles and trailer 13 = Truck tractor and semi-truck 14 = Taxicab 15 = Farm equipment 16 = Farm tractor 17 = Motorcycle 18 = Motor scooter or motor bike 19 = Ambulance 20 = Bicyclist 21 = Recreational vehicle self-contained 22 = Camper on 2 axle truck 23 = Camper mounted on 2 axle truck 24 = Other motor vehicle 25 = Pedestrian
V10	Armed Forces Driver	1	0 = Not stated 1 = Yes 2 = No
V11	Vehicle Number	2	1-15 as indicated on the accident report
V12	Additional Vehicle Code	1	0 = Not stated 1 = Military 2 = Emergency vehicle 3 = State owned 4 = Other publically owned
V13	Estimated Speed	3	Estimated speed at impact 0-126, 127 = Not stated
V14	Charges Made	1	0 = Not stated 1 = Yes 2 = No
V15	Total Occupants	2	0-14; 15 not stated

NAME	DESCRIPTION	CCL	VALUE
V16	Road on Location	1	0 = Not stated 1 = 1st road 2 = 2nd road 3 = Neither road
V17	Vehicle Maneuver	2	0 = Not stated 1 = Stopped in travel lane 2 = Parked out of travel lane 3 = Parked in travel lane 4 = Going straight ahead 5 = Changing lane or merging 6 = Passing 7 = Making right turn 8 = Making left turn 9 = Making U turn 10 = Backing 11 = Slowing or stopping 12 = Starting in roadway 13 = Parking 14 = Leaving parked position 15 = Other
V18	Miscellaneous Action	2	0 = Not stated 1 = Avoiding a pedestrian 2 = Avoiding other wheeled vehicle 3 = Avoiding fixed object 4 = Avoiding animal 5 = Fire or mechanical failure 6 = Fell from vehicle 7 = Driverless, moving vehicle 8 = Skidded out of control 9 = Pushing or towing vehicle 10 = Vehicle parked on private property 11 = Vehicle legally parked 12 = Vehicle and driver information omitted
V19	Point of Contact	2	0 = Not stated 1 = Front right 2 = Front center 3 = Front left 4 = Front left corner 5 = Front left side 6 = Center left side 7 = Rear left side 8 = Rear left corner 9 = Trunk 10 = Back window 11 = Top 12 = Windshield 13 = Hood 14 = Rear left 15 = Rear center 16 = Rear right

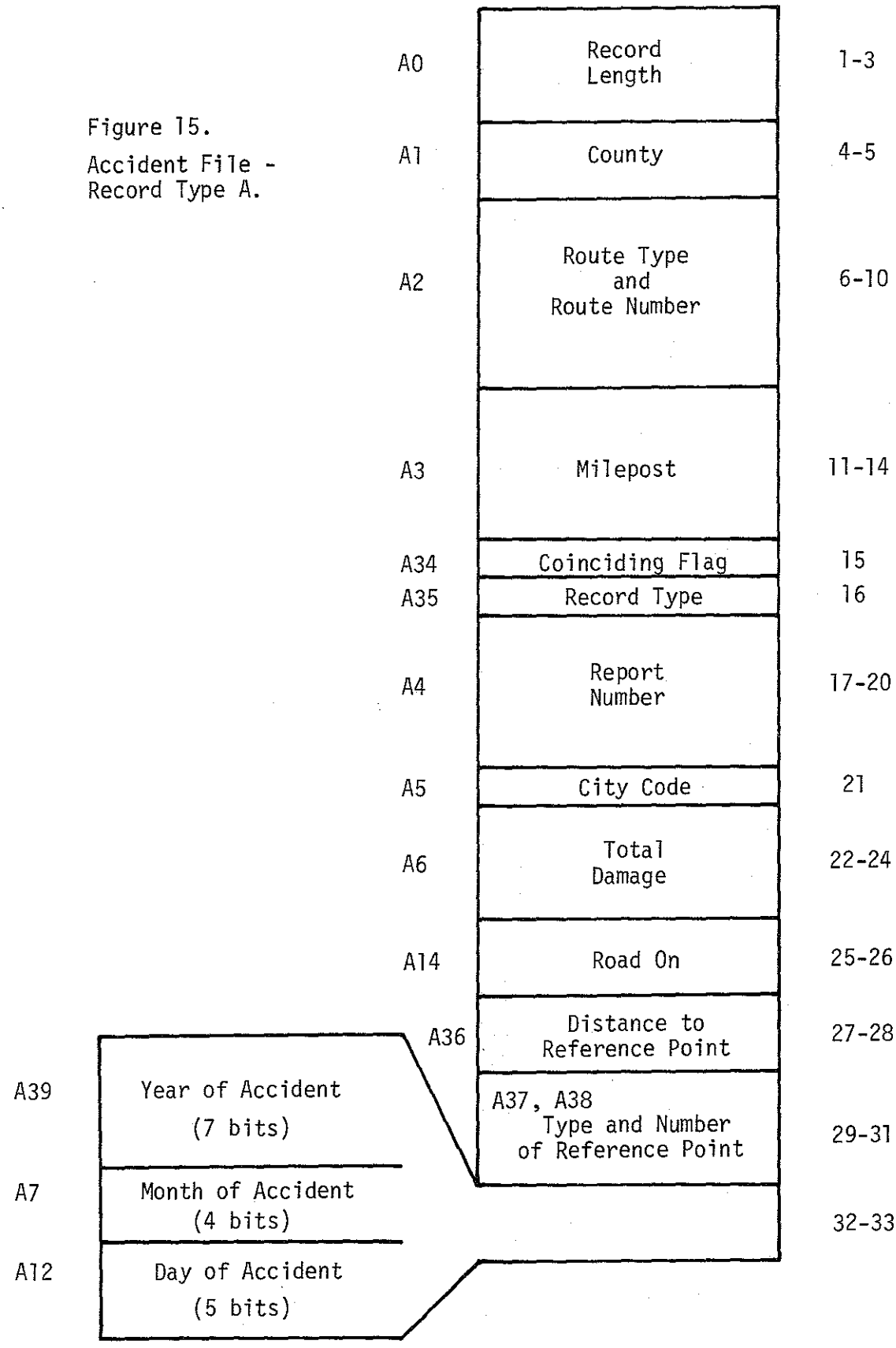
(Cont' on following page)

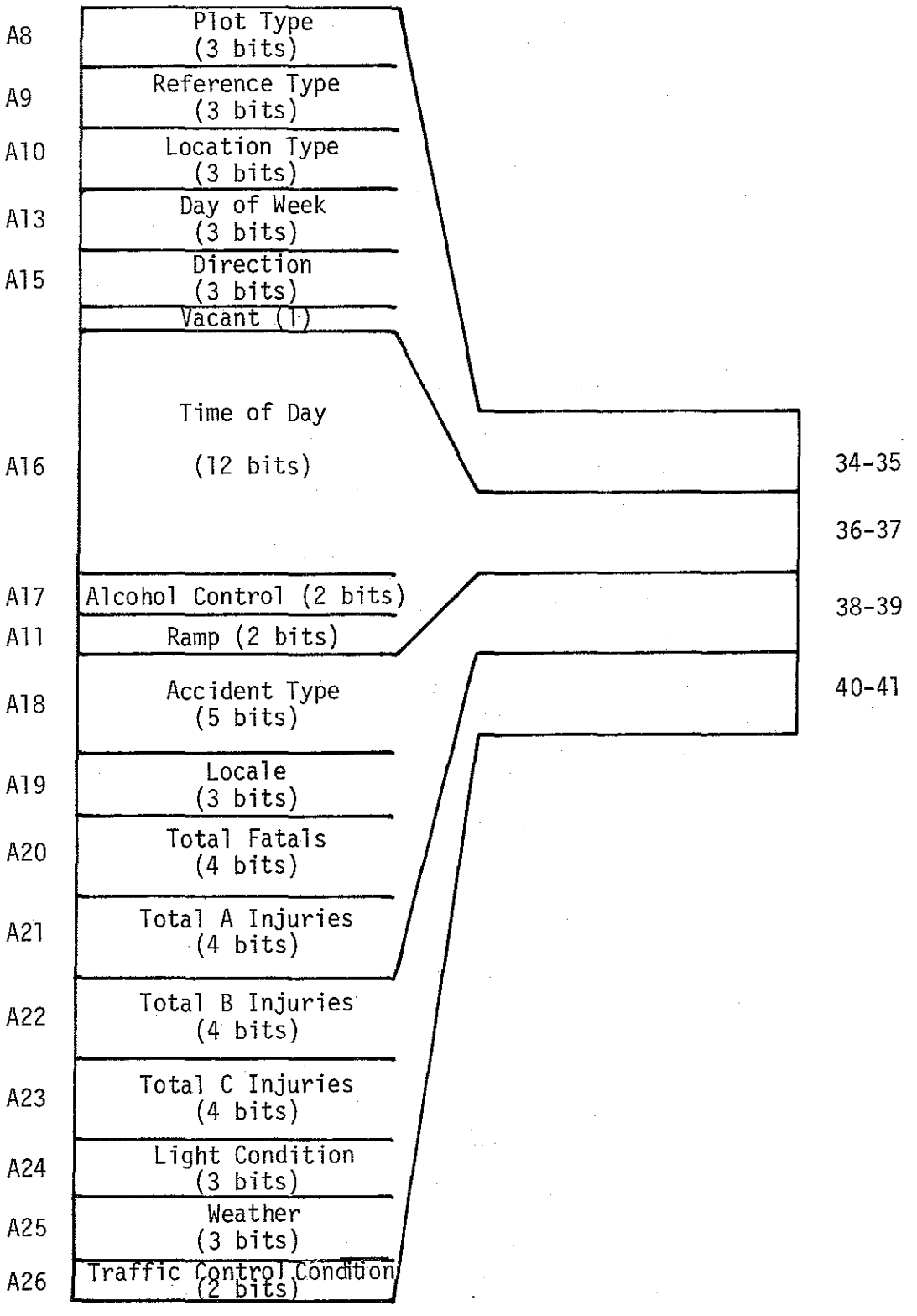
NAME	DESCRIPTION	CCL	VALUE
V19	Point of Contact (Cont')		17 = Rear right corner 18 = Rear right side 19 = Center right side 20 = Front right side 21 = Front right corner 22 = Underneath front 23 = Underneath center 24 = Underneath rear 25 = Unspecified
V20	Vehicle Defects	1	0 = Not stated 1 = Vehicle in defensive 2 = No defects detected 3 = Not known if defective
V21	Direction of Travel	1	0 = Not stated 1 = North 2 = East 3 = West 4 = South
V22	Object Struck	2	0 = Not stated 1,16 = None 2,17 = Tree 3,18 = Utility pole 4,19 = Fence or fence post 5,20 = Guardrail or guard post in median 6,21 = Guardrail or guard post on shoulder 7,22 = Bridge 8,23 = Underpass 9,24 = Traffic island or curb, median 10,25 = Sign or sign post 11,26 = Animal 12,27 = Ditch bank 13,28 = Parked vehicle 14,29 = Pedestrian 15,30 = Other object
	(Note: Prior to April '75, the object struck codes were collected on an accident oriented basis. At that time object struck became vehicle oriented. The values 16-30 reflect the old accident oriented codes while codes 0-15 reflect the new vehicle oriented codes.)		
V23	Violation Indicated	2	00 = Not stated 01 = No violation indicated 02 = Excessive speed 03 = Yield violation 04 = Left of center 05 = Passing violation 06 = Stop sign or yield sign violation

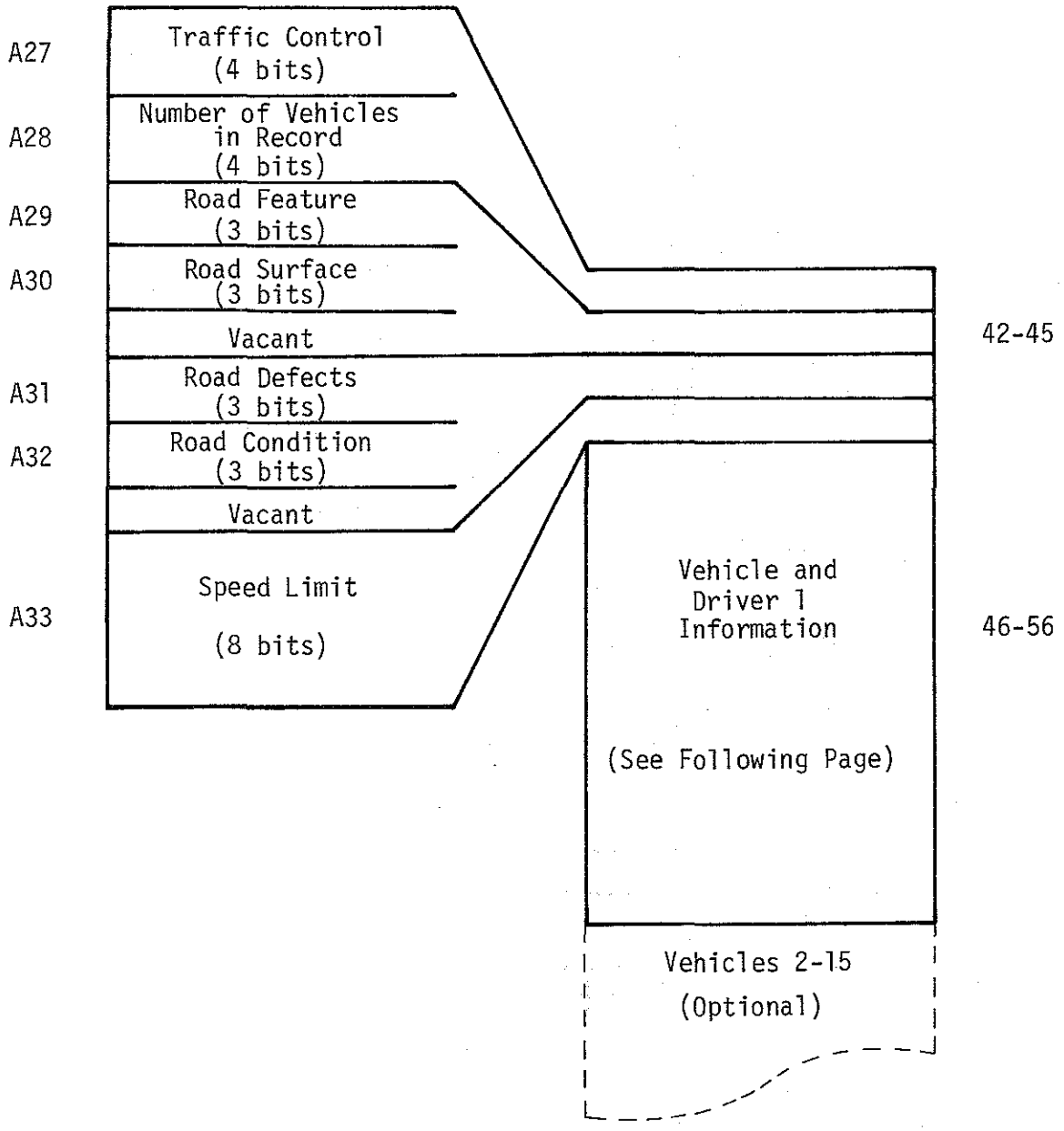
(Cont' on following page)

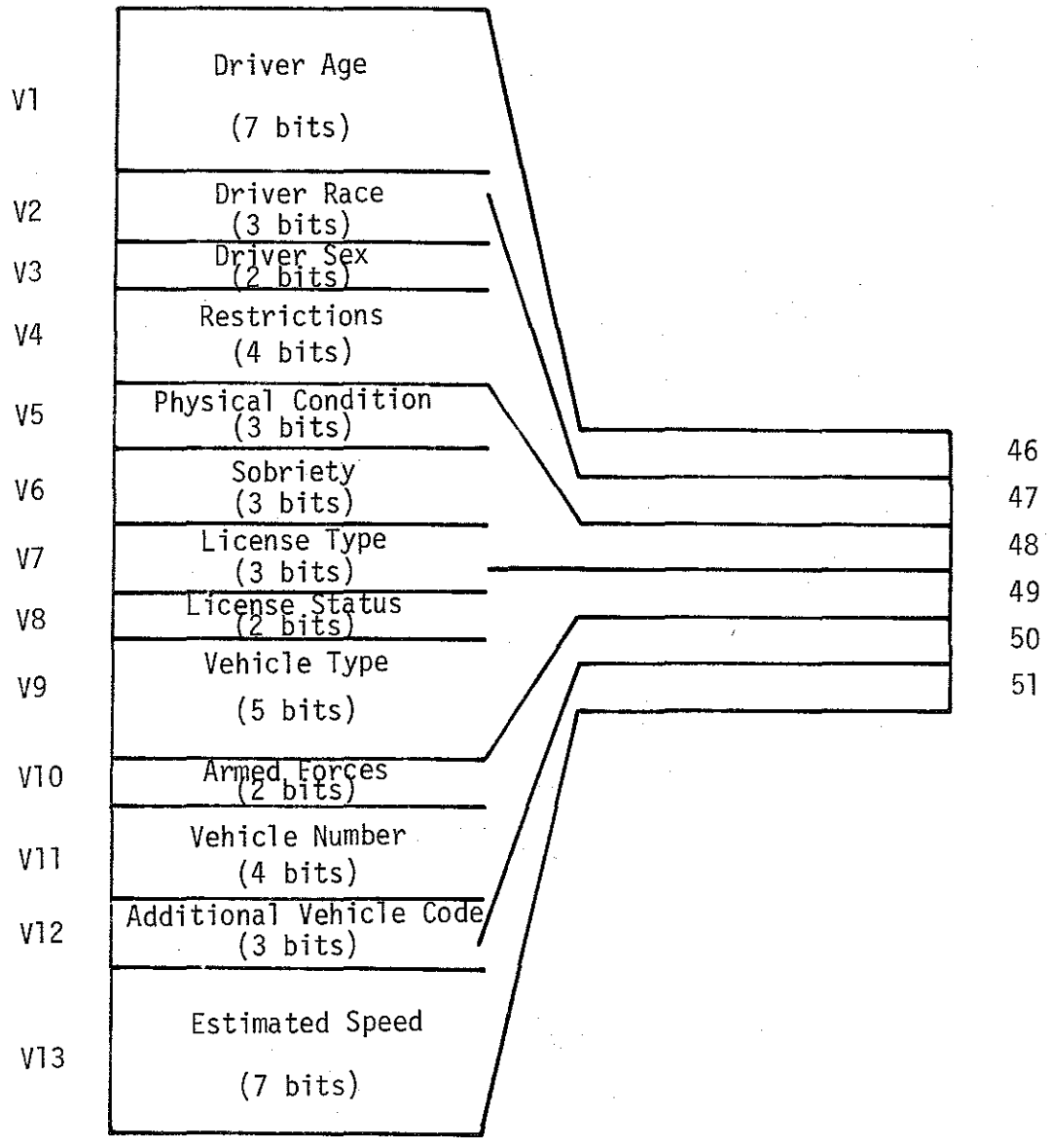
NAME	DESCRIPTION	CCL	VALUE
V23	Violation Indicated (Cont')		07 = Traffic signal violation 08 = Safe movement violation 09 = Too close 10 = Improper turn 11 = Improper or no signal 12 = Improper parking location 13 = Other improper driving
V24	Violation Indicated Second	2	Same codes as above

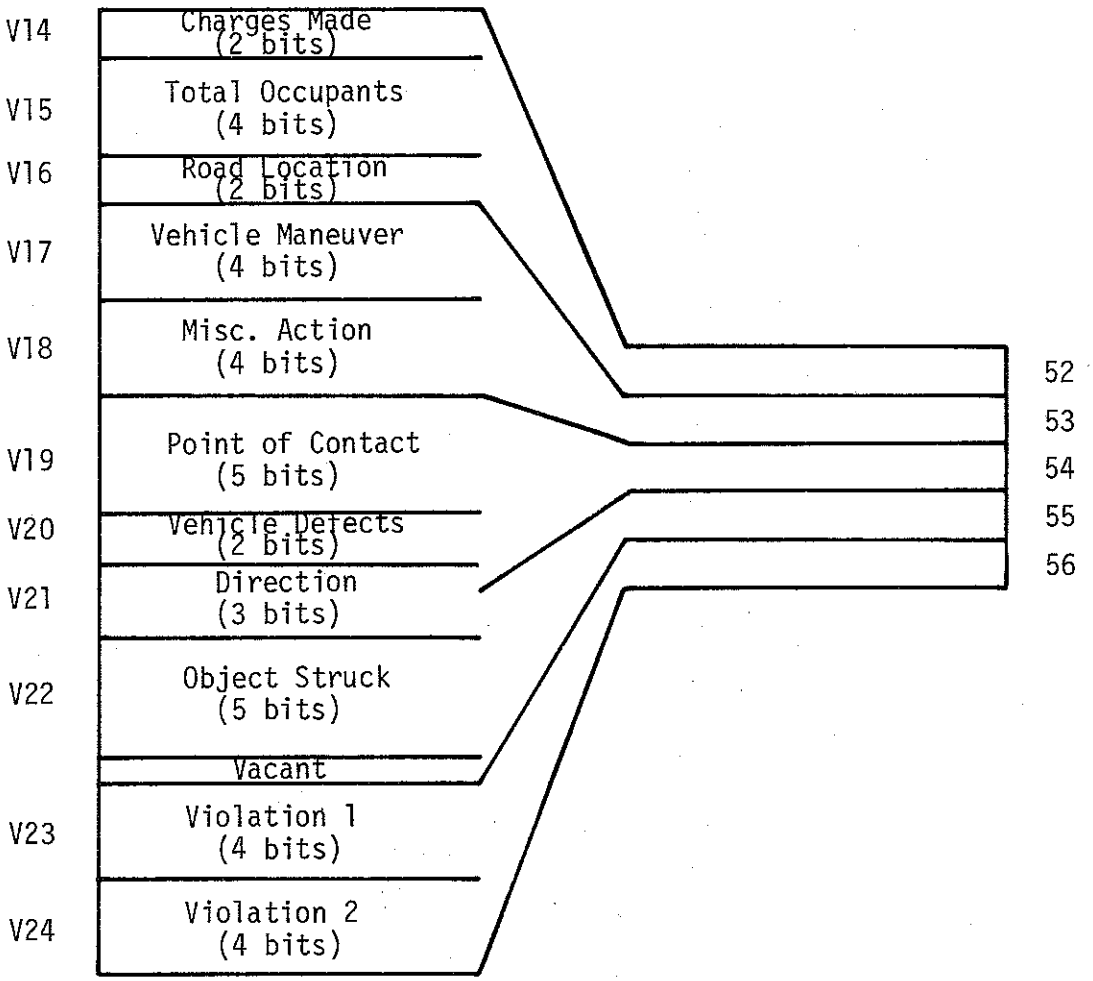
Figure 15.
Accident File - Record Type A.




A8
Plot Type (3 bits)
A9
Reference Type (3 bits)
A10
Location Type (3 bits)
A13
Day of Week (3 bits)
A15
Direction (3 bits)
Vacant (1)
A16
Time of Day (12 bits)
A17
Alcohol Control (2 bits)
A11
Ramp (2 bits)
A18
Accident Type (5 bits)
A19
Locale (3 bits)
A20
Total Fatals (4 bits)
A21
Total A Injuries (4 bits)
A22
Total B Injuries (4 bits)
A23
Total C Injuries (4 bits)
A24
Light Condition (3 bits)
A25
Weather (3 bits)
A26
Traffic Control Condition (2 bits)
34-35
36-37
38-39
40-41


A27
Traffic Control
(4 bits)
A28
Number of Vehicles
in Record
(4 bits)
A29
Road Feature
(3 bits)
A30
Road Surface
(3 bits)
Vacant
42-45
A31
Road Defects
(3 bits)
A32
Road Condition
(3 bits)
Vacant
A33
Speed Limit
(8 bits)
Vehicle and
Driver 1
Information
46-56
(See Following Page)
Vehicles 2-15
(Optional)


V1
Driver Age
(7 bits)
V2
Driver Race
(3 bits)
V3
Driver Sex
(2 bits)
V4
Restrictions
(4 bits)
V5
Physical Condition
(3 bits)
V6
Sobriety
(3 bits)
V7
License Type
(3 bits)
V8
License Status
(2 bits)
V9
Vehicle Type
(5 bits)
V10
Armed Forces
(2 bits)
V11
Vehicle Number
(4 bits)
V12
Additional Vehicle Code
(3 bits)
V13
Estimated Speed
(7 bits)
46
47
48
49
50
51


V14
Charges Made
(2 bits)
V15
Total Occupants
(4 bits)
V16
Road Location
(2 bits)
V17
Vehicle Maneuver
(4 bits)
V18
Misc. Action
(4 bits)
V19
Point of Contact
(5 bits)
V20
Vehicle Defects
(2 bits)
V21
Direction
(3 bits)
V22
Object Struck
(5 bits)
Vacant
V23
Violation 1
(4 bits)
V24
Violation 2
(4 bits)
52
53
54
55
56

Operational System

This section presents detailed documentation of the Operational System on a program by program basis. This includes program write-ups, file descriptions, JCL requirements and any special instructions or considerations pertinent to the usage of particular programs. A flowchart of the Operational System (Figure 4) shows pictorially the association of the various system components. Since program BSORT(T75809) was a pre-existing HSRC user module, it is not included on the flowchart; however, it would be classed as an auxiliary module.

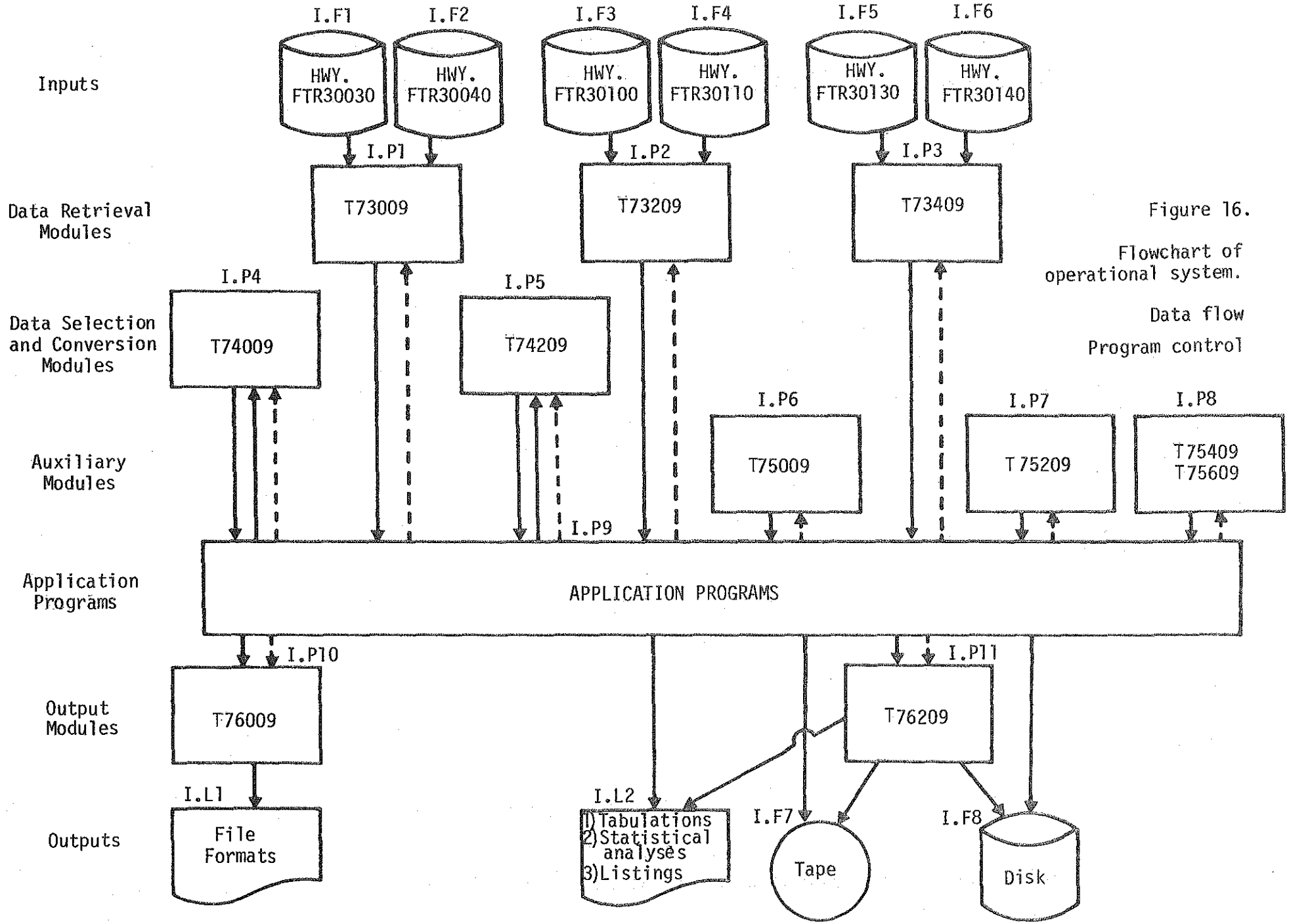


Figure 16.

Flowchart of operational system.

Data flow

Program control

SUBJECT: RETCHAR (T73009)

AUTHOR: Dennis Ryan

DATE: May, 1977

PROGRAM TYPE: CALLABLE MODULE

SOURCE LANGUAGE: COBOL

FUNCTION: To return to the calling program a record from the Merge System's Roadway Characteristics file. Actual locations of segments to be examined are specified through a parameter supplied by the calling program.

USAGE: I. Inputs

Characteristics Index (DDNAME CHARINDX)
Characteristics File (DDNAME CHARDAF)

II. Calling Sequence

A. 01 PARAM1.

```
02  County                  PIC  XX.
02  Route                   PIC  XXXXX.
02  Low-Milepost            PIC  9999.
02  High-Milepost           PIC  9999.
02  Communication-Flag      PIC  9.
```

B. 01 CHARACTERISTICS-RECORD

```
02  STANDARD-HEADER.

  03  Length                PIC  999.
  03  County                PIC  99.
  03  Route                 PIC  99999.
  03  Milepost              PIC  9999.
  03  Coinciding-Flag       PIC  9.
  03  Record-Type           PIC  X.

02  TRAILER-INFORMATION     PIC X (53).
```

One COBOL statement is necessary to obtain one characteristics record:

```
CALL 'T73009' USING PARAM1 CHARACTERISTICS-RECORD.
```

PARAM1 contains the information supplied to the called module which will locate characteristic segments on a specified roadway. Using the county, route, and milepost range to define a roadway segment RETCHAR will return the first characteristics record of that segment. Subsequent calls will return subsequent characteristics records occurring on the roadway segment as long as such records are present.

Whenever the values of PARAM1 are changed by the calling program, RETCHAR will assume that a new roadway segment is being defined and will return the first record in that segment.

Unlike the features and accident files, characteristics records do not occur at spots along a roadway. Instead, each characteristics record will describe a varying length segment of roadway composed of consistent characteristics. A new record will reflect changes in roadway conditions.

At all times RETCHAR will communicate the present processing status to the calling program via the variable COMMUNICATION-FLAG, contained in PARAM1. Should characteristics information for a segment be exhausted, or invalid parameter data be passed to RETCHAR, the COMMUNICATION-FLAG will reflect that condition as described below.

Characteristics records will be returned to the calling program in the storage area defined by the variable CHARACTERISTICS-RECORD. The first 16 bytes will be the standard record header in character format. Following these 16 bytes will be the packed characteristics record as it exists on the characteristics file; however, records inventoried in one direction only will contain LOW-VALUES following the returned records. These LOW-VALUE POSITIONS correspond to variables of records which show two directions of travel.

USAGE CONSIDERATIONS:

I. COMMUNICATION-FLAG values returned to calling program:

	VALUES
0	Returning characteristics record for specified segment.
1	Records exhausted for specified segment.
2	Invalid parameter data specified by calling program.
3	No information for requested county-route
4	No characteristics records present in requested milepost range

II. Segment Access Definition

The user may elect to access the files in the normal manner by specifying a county, a route, and a low and a high milepost. The user may, however elect to examine all records associated with a portion of the county route field. This is accomplished by placing an 'X' in the appropriate position of the county route field. In order to override the milepost range restrictions use values of 0000 and 9999 for the low milepost and high milepost respectively.

Examples:

1) Examine all characteristics occurring on Interstate roadways in Alamance County. PARAM1 would have the values:

(Continued)

COUNTY	00
ROUTE	1XXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0

2) Examine all characteristics occurring on Interstate 85 between mileposts 0 and 15.00:

COUNTY	XX
ROUTE	10085
LOW-MILEPOST	0000
HIGH-MILEPOST	1500
COMMUNICATION-FLAG	0

3) Examine all characteristics records contained in the file:

COUNTY	XX
ROUTE	XXXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0

III. JCL Requirements:

The calling module is responsible for providng two JCL cards which will supply RETCHAR with the characteristics file index and the characteristics direct access file:

```
// CHARINDX          DD          DSN=HWY.FTR30040,DISP=SHR
// CHARDAF           DD          DSN=HWY.FTR30030,DISP=SHR
```

HWY.FTR30020 and HWY.FTR30030

SEGMENT CHARACTERISTICS FILE

The Segment Characteristics File consists of three record types M, C and G containing four variable types (M, E, C and G). A description of these records and variables follows.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

SEGMENT CHARACTERISTICS FILE FORMAT

Record Type M - Both Directions of Travel
(either combined or separate coding)

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	M00	Record Length	Zoned Decimal Depends on Record Type** 39- for Record type M - combined direction 58- for Record type M - separate direction 25- for Common records type C 18- for Gap records type G
4-5	2	M01	County Number	Zoned Decimal Beginning with Alamance Co. as "00" counties are numbered consecutively through Yancey Co. "99"
6-10			Route Number	Zoned Decimal
(6)	1	M02	System Number	1- Interstate 2- US 3- NC 4- SR
(7)	1	M03	Route subtype	Zoned Decimal 0- Regular State Highway 1- Alternate 2- Business 3- North 4- South 5- East 6- West 7- Spur (or special condition) 8- Truck
(8-10)	3		Route number	Zoned Decimal Leading zeroes

Note: State Secondary routes have a 4-digit route number coded zoned decimal. in column 7-10.

*Converted Character Length - Length in bytes when converted to zone format.

**Type M records are input and stored with two different record lengths. The retrieval module pads the thirty-nine byte record to fifty-eight bytes using binary zeroes.

POSITION	CCL	NAME	DESCRIPTION	VALUE
11-14	4	M04	Milepost	Zoned Decimal Accumulated distance from beginning of County Route in Hundredths of mile
15	1	M05	Coinciding Segment Flag	Zoned Decimal 0- No Coinciding routes 1- This is lowest numbered route and others are coinciding 2- This route is coinciding with one or more higher numbered routes
16	1	M06	Record Type	Character M- Inventory for both directions of travel or for principle direction only when unbalanced conditions
17-18	4	M07	Section Length	Binary Section length to nearest hundredth mile
19	1	M08	Information Control	High one bit of byte - binary 0- All information contained in position 1-39 because both directions of travel combined 1- Information contained in position 1-58 because each direction of travel separate
	1	M09	Inventory Control	Low three bits of high half byte - binary In some cases data is recorded in each direction of travel to indicate unbalanced conditions. This column of inventory. 1- Both directions of travel 2- Northbound only 3- Southbound only 4- Eastbound only 5- Westbound only
	1	M10	State Highway System	Low half byte - binary 1- Rural State Primary System 2- Municipal State Primary Over 5,000 3- Municipal State Primary Under 5,000 4- Rural State Secondary System

POSITION	CCL	NAME	DESCRIPTION	VALUE
				5- Municipal State Secondary Over 5,000 6- Municipal State Secondary Under 5,000 7- Local City Streets 8- State Parks, etc. 9- National Parks, Forest Rds, Reservation 0- Projected
20	2	M11	Designated Federal Aid System	High half byte - binary 0- Blank 1- Interstate, Rural 2- Interstate, Urban 3- Other FA Primary, Rural 4- Other FA Primary, Urban (Type 1) 5- FA Secondary, Rural, State System 6- FA Secondary, Urban, State System 7- FA Secondary, Rural, Non-State 8- FA Secondary, Urban, Non-State 9- Federal Aid Urban (M System) 10- FA Urban Type II (TOPICS) (Projected - Use above codes)
	2	M12	"Traveled Way" Federal Aid System	Low half byte - binary 0- Projected 1- Rural Interstate on Final Location and Traveled Way 2- Urban Interstate on Final Location and Traveled Way 3- Rural FA Primary Traveled Way 4- Urban FA Primary Traveled Way (Type I 5- Rural FA Secondary Traveled Way 6- Urban FA Secondary Traveled Way 7- Rural Non-Federal Aid 8- Urban Non-Federal Aid 9- Federal Aid Urban (M-System) 10- Urban FA Type II (TOPICS)
21	2	M13	Functional Classification	High half byte - binary 1- Interstate 3- Rural Principal Arterial or Urban Connecting Link of a Rural Principal Arterial 4- Rural Minor Arterial or Urban Connecting Link of a Rural Minor Arterial 5- Other Urban Principal Arterial 6- Rural Major Collector or Urban Minor Arterial 7- Rural Minor Collector or Urban Collector 8- Local

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9- Interstate Traveled Way 10- (Value 3) Traveled Way 11- (Value 4) Traveled Way 12- (Value 5) Traveled Way 13- (Value 6) Traveled Way 14- (Value 7) Traveled Way 15- Local Traveled Way
	1	M14	Special Systems (Federal Domain)	Low half byte - binary 1- National Forest Highway System National Forest Development Roads and all other State System Roads Inside the Boundaries of a National Forest 2- National Parks - the Blue Ridge Parkway and all State System Roads in National Parks 3- National Parks - Service Roads not on State System 4- Indian Reservations - all Roads both on and off the State System 5- Bureau of Land Management 6- Military Reservations - All Roads both on and off the State System 7- National Wildlife Refuge 8- U.S. Corps of Engineers 9- State Forest, Parks, Recreation Areas 0- Blank or not Applicable
22	2	M15	Highway Division	High half byte - binary Appropriate highway division number (01 through 14)
	1	M16	Population Group	Low half byte - binary 0- Blank 1- Under 1,000 Population 2- 1,000 to 2,490 3- 2,500 to 4,999 4- 5,000 to 9,999 5- 10,000 to 24,999 6- 25,000 to 49,999 7- 50,000 to 99,999 8- 100,000 and Over
23	2	M17	City or Town	Binary Municipal maintenance identification number for all incorporated municipalities 00 - for rural

POSITION	CCL	NAME	DESCRIPTION	VALUE
24	1	M18	Median Type	High half byte - binary 1 - Undivided roadway 2 - Continuous turn lane 3 - Paved mountable 4 - Barrier curb or wall 5 - Grass 6 - Soil or stone 7 - Parkland, business, etc. 8 - Couplet
	1	M19	Total Number of Lanes	Low half byte - binary Total number of travel lanes provided by the surface width for this segment. If lane usage changes during the day, peak hour conditions are used. For separate directions of travel, this value is a sum of number of lanes for each direction of travel. If one direction is a couplet, this value computed by doubling the number of lanes for the non couplet direction.
25	3	M20	Total Surface Width	Binary Pavement width in feet or ditch to ditch, if unpaved, for both directions. If highway is divided, surface width does not include median width. For multi-lane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face. If one direction is couplet, total surface width is computed by doubling the surface width for the non couplet direction.
26	3	M21	Total Median Width	Binary If median width varies substantially, the width varies substantially, the width that is "most applicable" to the section is entered. 00-98 - Width feet 99 - More than 98 feet 100 - Blank 101 - One Way Traffic 102 - Two Way Traffic

POSITION	CCL	NAME	DESCRIPTION	VALUE
27 & 43	2	E01	Speed Limit	Binary Posted speed limit most representative of the segment
28 & 44	1	E02	Terrain	High half byte - binary 1 - Flat 2 - Rolling 3 - Mountainous
	1	E03	Pavement Condition	Low half byte - binary Present Serviceability Index (PSI) 1 - Excellent 2 - Good 3 - Fair 4 - Poor
29 & 45	1	E04	Access Control and Development Factors	High half byte - binary 1 - No Control - No Interference 2 - Partial Control of Access 3 - Full Control of Access 4 - Central Business District 5 - Heavy Commercial Development 6 - Moderate Commercial Development Light Commercial Development of 7 - Heavy Residential 8 - Rural with Some Roadside Development 9 - Rural (Typical) with No Development
	1	E05	Percent of Trucks	Low half byte - binary 0 - Blank 1 - 0-4.99% 2 - 5%-9.99% 3 - 10% and Over
30 & 46	1	E06	Shoulder Type Left	High half byte - binary 1 - Grass or Sod 2 - Gravel or Stone 3 - 1'-0" to 2' -11" Paved 4 - 3'-0" to 4' -11" Paved 5 - 5'-0" to 6' -11" Paved 6 - 7'-0" to 8' -11" Paved 7 - 9'-0" to 9' -11" Paved 8 - 10'-0" and Over

POSITION	CCL	NAME	DESCRIPTION	VALUE
				9 - Curb 0 - Blank
	1	E07	Shoulder Type Right	Low half byte - binary Same as Shoulder Type Left
31 & 47	2	E08	Shoulder Width Left	Binary Total usable shoulder width on the left in the direction of the inventory. 0 - Blank 1 - 24 Code actual width in feet 25 - More than 24 feet For curbed section, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
32 & 48	2	E09	Shoulder Width Right	Binary Total usable shoulder width on the right in the direction of the inventory. 0 - Blank 1 to 24 Actual shoulder width in feet 25 - more than 24 feet For curbed sections, peak hour parking condition is coded as follows: 26 - No parking 27 - Parallel parking 28 - Angle parking
33-34 & 49-50	5	E10	Average Daily Traffic	Binary 0 if blank
35 & 51	2	E11	Year of Trans-action	Binary Enter the last two digits of the year during which the section was last resurfaced, improved or classified. 0 if blank

POSITION	CCL	NAME	DESCRIPTION	VALUE
36 & 52	2	E12	Type of Transaction	Binary

Surface type that existed prior to the last resurface

1 - Primitive	A	00
2 - Unimproved	B	10
3 - Graded and Drained	C	20
4 - Soil surfaced	D	30
5 - Gravel or Stone	E	41
6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
7 - Bitum's Surf. Treatm't on Gravel or Stone	F-2	52
8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
9 - Mixed Bituminous - Non - Rigid Base	G-1	60
10 - Mixed Bituminous - Rigid Base	G-2	61
11 - Bituminous Penetration - Non-Rigid Base	H-1	64
12 - Bituminous Penetration - Rigid Base	H-2	62
13 - Bituminous Concrete	I-1	63
14 - Sand Asphalt on P.C. Concrete	I-2	67
15 - Sand Asphalt on Bituminous Concrete	I-3	66
16 - Sand Asphalt on Types other than 66 and 67	I-4	65
17 - Portland Cement Concrete	J	70
18 - Brick	K	80
19 - Block	L	90
20 - Hard Surfaced (Unclassified Pavement type for Non-System Roads		99

21 - New Construction on New Location

22 - New Construction on Existing Location

23 - Transfer from One System to Another Including Private to Public

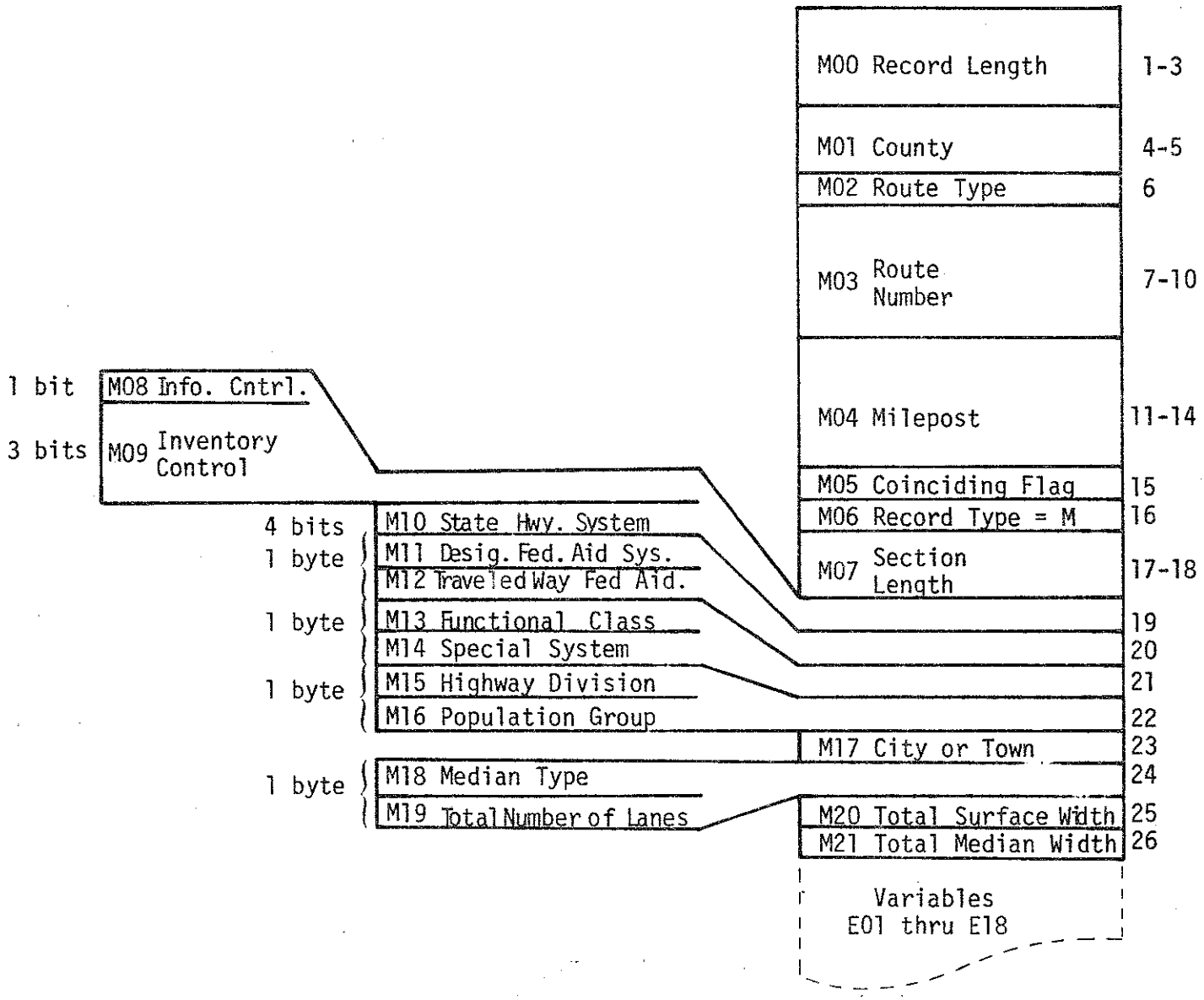
POSITION	CCL	NAME	DESCRIPTION	VALUE		
37 & 53	2	E13	Surface Type	Binary		
				1 - Primitive	A	00
				2 - Unimproved	B	10
				3 - Graded and Drained	C	20
				4 - Soil Surfaced	D	30
				5 - Gravel or Stone	E	41
				6 - Bituminous Surf. Treatm't on Topsoil	F-1	51
				7 - Bitum's Surf. Treatm't on Gravel of Stone	F-2	52
				8 - Bitum's Surf. Treatm't on Water Bound Macadam	F-3	54
				9 - Mixed Bituminous - Non-Rigid Base	G-1	60
				10 - Mixed Bituminous - Rigid Base	G-2	61
				11 - Bituminous Penetration Non-Rigid Base	H-1	64
				12 - Bituminous Penetration - Rigid Base	H-2	62
				13 - Bituminous Concrete	I-1	63
				14 - Sand Asphalt on P.C. Concrete	I-2	67
				15 - Sand Asphalt on Bituminous Concrete	I-3	66
				16 - Sand Asphalt on types other than 66 and 67	I-4	65
				17 - Portland Cement Concrete	J	70
				18 - Brick	K	80
				19 - Block	L	90
				20 - Hard Surfaced (Unclassified pavement type for Non-System Roads)		99
38 & 54	1	E14	Skid Surface Texture	High half byte - binary Classification based on comparison to known standard textures. 0 - if blank 1 - Smooth 2 - Fine textured rounded 3 - Fine textured gritty 4 - Coarse textured rounded 5 - Coarse textured gritty		

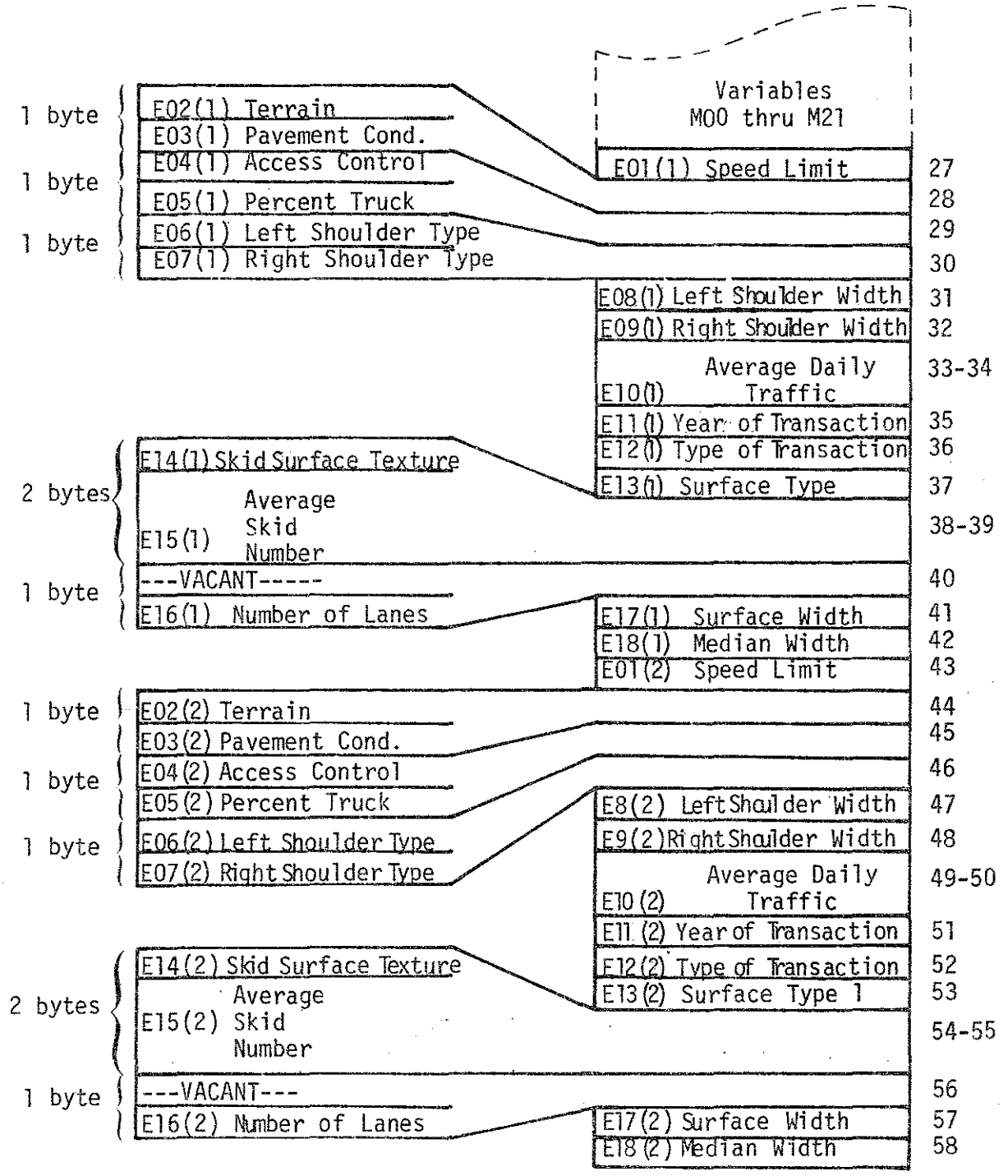
POSITION	CCL	NAME	DESCRIPTION	VALUE
38-39 & 54-55	3	E15	Average Skid Number	Low twelve bits of halfword - binary representation of 3-digit number with tenths position (Picture 99 V9) 0 - if blank
40 & 56*	1	E16	Number of lanes (Separate directions only)	Low half byte - binary Number of lanes provided by the surface width for one direction of travel only. If lanes usage changes during the day, peak hour conditions are used.
41 & 57*	3	E17	Surface Width (Separate directions only)	Binary Pavement width in feet or ditch to ditch, if unpaved, for one direction of travel only. If highway is divided, surface width does not include median width. For multilane undivided highways with turn lanes or mountable medians, surface width is from edge to edge or face to face.
42 & 58*	3	E18	Median Width (Separate directions only)	Binary Median width for one direction of travel is one half the total median width in feet. If median width varies substantially, the width that is "most applicable" to the section is used. 00 - 98 width in feet 99 - more than 98 feet 100 - Blank 101 - Oneway traffic 102 - Two Way Traffic

Note: Reference for Skid Values: NCHRP Report #37 "Tentative Skid-Resistance Requirements for Main Rural Highways" (1967) Pub. 1541

*These variables (E16, E17, and E18) are valid for record length 58 only. For record length 39, positions 40, 41, 42, 56, 57 and 58 will all contain binary zeroes.

Figure 4.
Characteristis File - Record Type M.




Variables
M00 thru M21
1 byte
E02(1) Terrain
E03(1) Pavement Cond.
1 byte
E04(1) Access Control
E05(1) Percent Truck
1 byte
E06(1) Left Shoulder Type
E07(1) Right Shoulder Type
E01(1) Speed Limit 27
28
29
30
E08(1) Left Shoulder Width 31
E09(1) Right Shoulder Width 32
E10(1) Average Daily Traffic 33-34
E11(1) Year of Transaction 35
E12(1) Type of Transaction 36
E13(1) Surface Type 37
2 bytes
E14(1) Skid Surface Texture
E15(1) Average Skid Number 38-39
1 byte
---VACANT-----
E16(1) Number of Lanes
40
E17(1) Surface Width 41
E18(1) Median Width 42
E01(2) Speed Limit 43
1 byte
E02(2) Terrain
E03(2) Pavement Cond.
1 byte
E04(2) Access Control
E05(2) Percent Truck
1 byte
E06(2) Left Shoulder Type
E07(2) Right Shoulder Type
44
45
46
E8(2) Left Shoulder Width 47
E9(2) Right Shoulder Width 48
E10(2) Average Daily Traffic 49-50
E11(2) Year of Transaction 51
E12(2) Type of Transaction 52
E13(2) Surface Type 1 53
2 bytes
E14(2) Skid Surface Texture
E15(2) Average Skid Number 54-55
1 byte
---VACANT---
E16(2) Number of Lanes
56
E17(2) Surface Width 57
E18(2) Median Width 58

SEGMENT CHARACTERISTICS FILE FORMAT

Record Types C - Common Begin and End Records

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	C00	Record Length	Zoned Decimal Depends on Record Type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	C01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey Co. "99"
6	1	C02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	C03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	C04	Milepost	Zoned Decimal Cumulative distance from beginning of county route Hundredths of mile

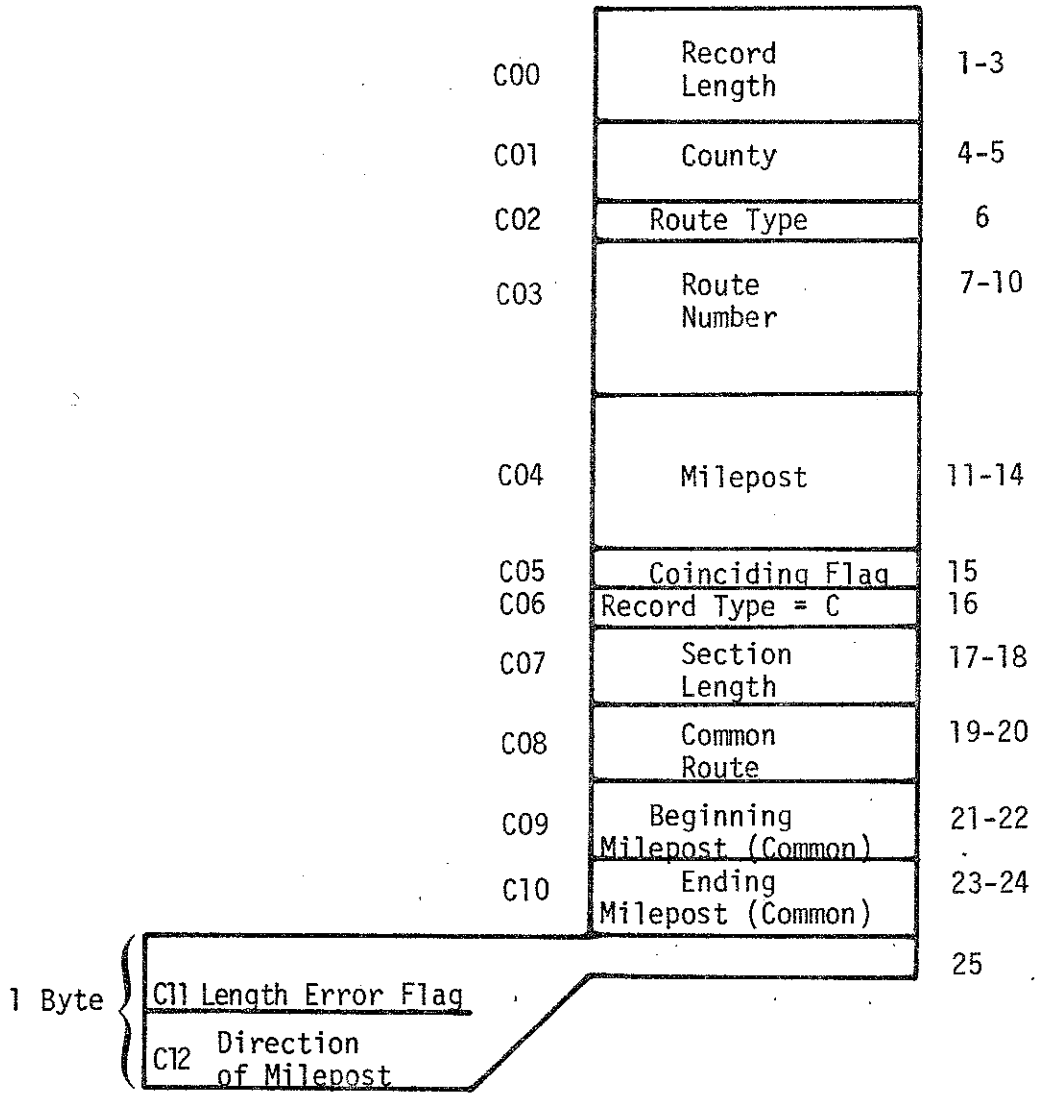
Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

* Converted Character Length - Length in bytes of data when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	C05	Coinciding Segment Flag	Zoned Decimal 0 - No coinciding routes 1 - Other routes coinciding 2 - This route coincides
16	1	C06	Record Type	Zoned Decimal C - Common Record
17-18	4	C07	Section Length	Binary Section length to nearest hundredths of mile (always zero)
19-20	5	C08	Common Route Type & Number	Binary representation of 5-digit number
			Route type (digit 1)	1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
			Route Subtype (digit 2 for route type = 1, 2 or 3	0 - Regular 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Truck 8 - Spur or special condition
			Route Number (digit 3-5 for Route type = 1, 2 or 3)	Route Number, leading zeroes
			(digit 2-5 for Route type - 4)	Four digit route number
			(digit 2-5 for Route type = 5)	1000 - Blue Ridge Parkway 2000 - 3000 (reserved for city streets) 4000 - Forest Development Roads 5000 - Indian Reservations 6000 - Military Reservation 7000 - National Park System 8000 - State Parks 9000 - Wildlife Resource Commission

POSITION	CCL	NAME	DESCRIPTION	VALUE
21-22	4	C09	Begin Milepost on Common Route	Binary
23-24	4	C10	Ending Milepost on Common Route	Binary
25	1	C11	Length Error Flag	High half byte - binary 0 - No length error 1 - Length error in generation of coinciding segment
	1	C12	Direction of Mileposting	Low half byte - binary 0 - Not determined 1 - Same direction 2 - Reverse direction

Figure 5.
Characteristics File - Record Type C.



SEGMENT CHARACTERISTICS FILE FORMAT

Record Type G - Gap Record

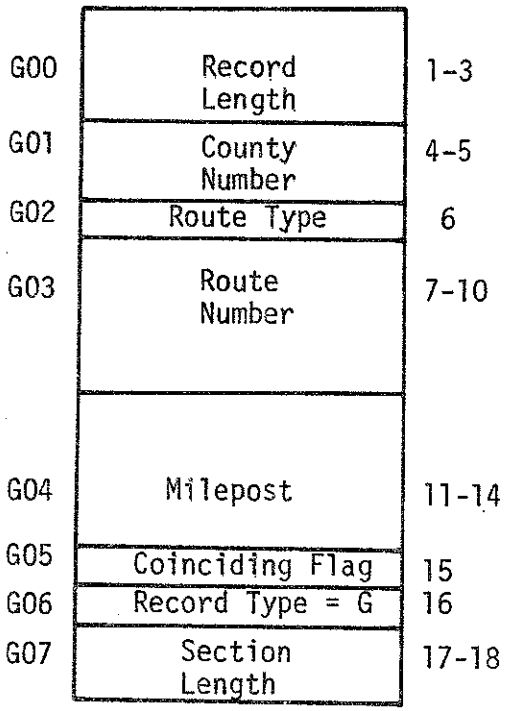
POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	G00	Record Length	Zoned Decimal Depends on Record type 39 - for Record type M (Directions comb.) 58 - for Record type M (Separate) 25 - for Common records type C 18 - for Gap records type G
4-5	2	G01	County Number	Zoned Decimal Beginning with Alamance Co. as "ØØ" counties will be numbered consecutively through Yancey County "99"
6	1	G02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR
7-10	4	G03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 1 - Alternate 2 - Business 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	G04	Milepost	Zoned Decimal Cumulative distance from beginning of county route. Hundredths of mile

Note: State Secondary roads have a 4-digit route number coded zoned decimal in column 7-10.

*Converted Character Length - Length of data in bytes when expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
15	1	G05	Coinciding Segment Flag	Zoned Decimal Ø - No coinciding routes 1 - Other routes coincide 2 - This route coincides
16	1	G06	Record type	Zoned Decimal G - Gap Record
17-18	4	G07	Section Length	Binary Section length to nearest hundredth mile

Figure 6.
Characteristics File - Record Type G.



SUBJECT: RETFEAT (T73209)

AUTHOR: Dennis Ryan

DATE: May, 1977

PROGRAM TYPE: CALLABLE MODULE

SOURCE LANGUAGE: COBOL

FUNCTION: To return to the calling program a record from the Merge System's Feature file. Feature locations are specified through a parameter supplied by the calling program.

USAGE:

I. Data Elements Necessary to call Module (COBOL SOURCE)

A. 01 PARAM1.

```
02  County              PIC XX.
02  Route               PIC XXXXX.
02  Low-Milepost        PIC 9999.
02  High-Milepost       PIC 9999.
02  Communication-Flag  PIC 9 VALUE Ø.
```

B. 01 FEATURE-RECORD

```
02  STANDARD-HEADER.

    03  Length           PIC 999.
    03  County           PIC 99.
    03  Route            PIC 99999.
    03  Milepost         PIC 9999.
    03  Coinciding-Flag  PIC 9.
    03  Record-Type      PIC X.

02  TRAILER-INFORMATION  PIC X (53).
```

II. CALLING SEQUENCE

One COBOL statement is necessary to obtain one features record:

```
CALL 'T73209' USING PARAM1 FEATURE-RECORD.
```

PARAM1 contains the information supplied to the called module which will locate features on a roadway segment. Using the county, route, and milepost range to define a roadway segment RETFEAT will return the first features record of that segment. Subsequent calls will return subsequent feature records occurring on the roadway segment as long as such records are present.

Whenever the values of PARAM1 are changed by the calling program, RETFEAT will assume that a new roadway segment is being defined and will return the first record in that segment. Milepost values will be accurate to one-hundredth of a mile, whith an implied decimal point 2 places left.

At all times RETFEAT will communicate the present processing status to the calling program via the variable COMMUNICATION-FLAG, contained in PARAM1. Where features information for a segment is exhausted, or invalid parameter data be passed to RETFEAT, the COMMUNICATION-FLAG will reflect those conditions.

Features records will be returned to the calling program in the storage area defined by the variable FEATURE-RECORD. The first 16 bytes will be the standard record header in character format. Following these 16 bytes will be the packed feature reocrd as it resides on disk.

USAGE CONSIDERATIONS:

I. COMMUNICATION-FLAG values returned to calling program:

COMMUNICATION-FLAG	VALUES
0	Returning features record for specified segment.
1	Records exhausted for specified segment.
2	Invalid parameter data specified by calling program.
3	No information for requested county-route.
4	No features records present in requested milepost range.

II. JCL Requirements:

The calling module is responsible for providing two JCL cards which will supply RETFEAT with the features file index and the features direct access file:

```
// FEATINDX          DD              DSN=HWY.FTR30110,DISP=SHR
// FEATDAF           DD              DSN=HWY.FTR30100,DISP=SHR
```

III. Overriding Roadway Segment Definitions

A. Explanation: The calling program may elect to examine all records associated with a portion of the county route field. This is accomplished by placing an 'X' in the appropriate position of the county route field indicating that all values for that character position will be accident. In order to override the milepost range restrictions use values of 0000 and 9999 for the low milepost and high milepost respectively in order to accept every possible value for the milepost.

B. EXAMPLE:

1) Access all features occurring on Interstate roadways in Alamance County. PARAM1 would have the values:

COUNTY	00
ROUTE	1XXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0

2) Access all features occurring on Interstate 85 between mileposts 0 and 15.00:

COUNTY	XX
ROUTE	10085
LOW-MILEPOST	0000
HIGH-MILEPOST	1500
COMMUNICATION-FLAG	0

3) Access all feature records contained in the file:

COUNTY	XX
ROUTE	XXXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0

HWY.FTR30090 and HWY.FTR30100

ROADWAY FEATURES FILE

The Roadway Features File is comprised of five record types (I, B, R, L and S). A description of each record type follows.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

ROADWAY FEATURES FILE FORMAT

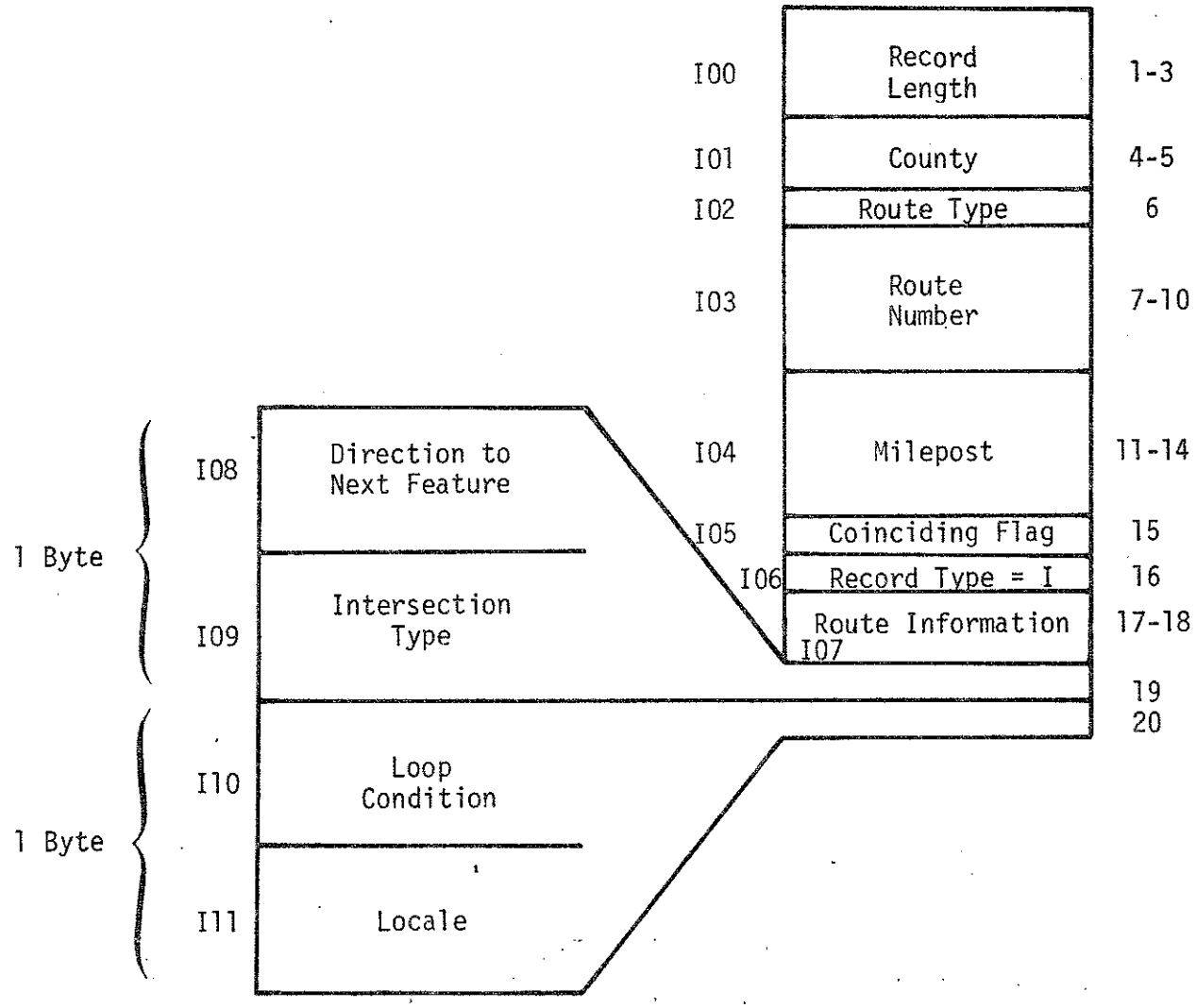
Record Type I - Intersection Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	I00	Record Length	Zoned Decimal
4-5	2	I01	County	Zoned Decimal (0-99)
6	1	I02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	I03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	I04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	I05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - This segment of roadway coincides with a lower numbered route
16	1	I06	Record Type	Zoned Decimal Type - 'I' for intersection record

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-18	5	I07	Intersecting Route Identification	5 decimal binary digits when converted from binary to zoned decimal. The high order decimal digit denotes the highway class 1 - Intersection 2 - US 3 - NC 4 - SR 5 - Non-system (Federal Division) The four low order digits represent the route number.
19	1	I08	Direction to Next Item	Binary; high order half of character Ø - Not stated 5 - North and East 6 - North and West 7 - South and East 8 - South and West
	1	I09	Intersection Type	Binary; low order half of character Ø - Not stated 1 - Grade separation; no ramps 2 - Interchange 3 - At grade intersection, 3 legs 4 - At grade intersection, 4 legs 5 - At grade intersection, 5 legs 6 - At grade intersection, 6 legs
20	1	I10	Loop Condition	Binary; high order half of character Ø - Not stated 1 - Loop condition 2 - No loop condition
	1	I11	Locale	Binary; low order half of character Ø - Not stated 1 - Rural 2 - Urban

Figure 10.
Features File - Record Type I.



ROADWAY FEATURES FILE

Record Type B - Structure Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	B00	Record Length	Zoned Decimal
4-5	2	B01	County	Zoned Decimal (0-99)
6	1	B02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	B03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	B04	Milepost	Zoned Decimal decimal assumed left 2 places.
15	1	B05	Coinciding Flag	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route.

*Converted Character Length - Length of data in bytes when it is expanded.

POSITION	CCL	NAME	DESCRIPTION	VALUE
16	1	B06	Record Type	Zoned Decimal Type = 'B' for structure record
17-28	12	B07	Structure Number	Alphanumeric
(17)			Type	Ø - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall
(18-20)			Route Number	Numeric - right justified with leading spaces
(21)			Route Type	Ø - Normal A - Alternate B - Bypass
(22-24)			County Number	
(25-27)			Bridge Number	Numeric - Right justified with leading spaces
(28)			Roadway On	Ø - Only 1 roadway N - Northbound roadway E - Eastbound roadway S - Southbound roadway W - Westbound roadway
29-32			Intersecting Service Identification	
(29)	1	B08	Service Type Under/ On Indicator	Values in binary upper half of byte 0 - Service under structure 1 - Service on structure
(29)	2	B09	Road Class	Values in binary in lower half of byte 0 - Not applicable 1 - Interstate 2 - US 3 - NC 4 - SR 5 - City Street 6 - Federal Lands Road 7 - State Lands Road

(Cont')

POSITION	CCL	NAME	DESCRIPTION	VALUE
			Road Class	(Cont') 8 - Other 9 - Assumed future route 15 - Not stated
(30-31)	4	B10	Road Number	Binary halfword actual road number 9999 - Not stated
(32)	2	B11	Service Type	(When service type under/on indicator = Ø then position 32 values are as follows:) 0 - Other 1 - Highway, with or without pedestrian 2 - Railroad 3 - Pedestrian, exclusively 4 - Highway, railroad 5 - Waterway 6 - Highway, waterway 7 - Railroad(s), waterway 8 - Highway, waterway, railroad 9 - Navigable waterway 15 - Not stated or (When service type under/on indicator = 1 then position 32 values are as follows:) 0 - Other 1 - Highway 2 - Railroad 3 - Pedestrian Exclusively 4 - Highway and Railroad 5 - Highway and Pedestrian 6 - Overpass structure at an intersection or second level of a multi-level interchange, ramps that create an interchange. 7 - Third level (interchange) 8 - Fourth level (interchange) 9 - Building or Plaza 15 - Not stated
33-34	4	B12	Curb to Curb Clearance	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
35-36	4	B13	Distance Between Rails	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
37-40	5	B14	Structure Length	Binary fullword-actual distance in feet (99999) 99999 - Not stated
41			Approach Alignment Wearing Surface	
	2	B15	Approach Alignment	High Half byte-binary 0 - Immediate replacement necessary to put back in service 1 - Immediate repair necessary to put back in service 2 - Basically intolerable condition requiring high priority of replacement 3 - Basically intolerable condition requiring high priority or repair 4 - Condition meeting minimum tolerable limits to be left in place as is 5 - Condition somewhat better than minimum adequacy to tolerate being left in place as is 6 - Condition equal to present minimum criteria 7 - Condition better than present minimum criteria 8 - Conditions equal to present desirable criteria 9 - Conditions superior to present desirable criteria 15 - Not applicable or not stated
	2	B16	Wearing Surface	Low half byte-binary 0 - Bridge or culvert is earth filled, not applicable 1 - Concrete 2 - Asphalt 3 - Block 4 - Open grate 5 - Timber plank 15 - Not stated
42-43	4	B17	Minimum Horizontal Clearance Under Bridge	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
44	1	B18	Minimum Vertical Clearance Lane Description	Zoned decimal 1 - Only one present 2 - Northbound and southbound lanes 3 - Eastbound and westbound lanes 9 - Not stated
45-46	4	B19	Minimum Vertical Clearance	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
47-48	4	B20	Minimum Vertical Clearance Extra Lane	Binary halfword-actual distance in inches 1287 - 100 feet or more 9999 - Not stated
49			Total Lanes	
	2	B21	Total Lanes Under	High half byte-binary 0-13 - Actual number of lanes 14 - 14 or more 15 - Not stated
	2	B22	Total Lanes Over	Low half byte-binary 0-31 - Actual number of lanes 14 - 14 or more 15 - Not stated
50-51	4	B23	Minimum Lateral Under Clearance Right	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
52-53	4	B24	Minimum Lateral Under Clearance Left	Binary halfword-actual distance in feet and tenths of feet (999V9) 9999 - Not stated
54			Safety Adequacy	Two bits binary per item. Items are described from high order to low order (i.e., left to right)
	1	B25	Approach Guardrail End Treatment Adequacy	High two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B26	Guardrail Adequacy	Low two bits of high half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
	1	B27	Guardrail to Bridge Transition Adequacy	High two bits of low half byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated
	1	B28	Bridge Railing Adequacy	Low two bits of byte-binary 0 - Does not meet currently acceptable standards 1 - Meets currently acceptable standards 2 - Not coded 3 - Not stated

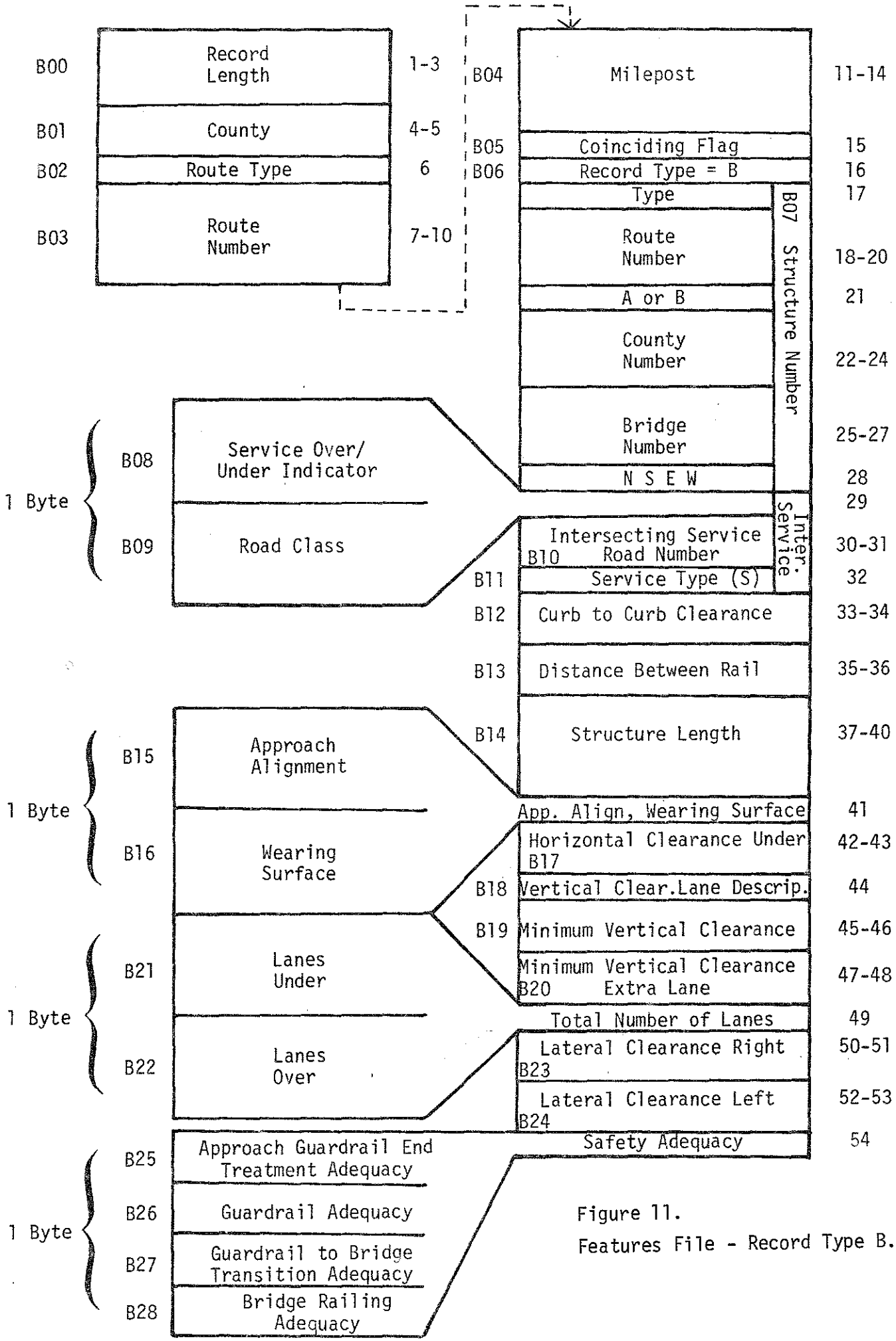


Figure 11.

Features File - Record Type B.

ROADWAY FEATURES FILE

Record Type R - Railroad Crossing Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	R00	Record Length	Zoned Decimal
4-5	2	R01	County	Zoned Decimal (0-99)
6	1	R02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	R03	Route Number	Zoned Decimal
(7)			Route Subtype	0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	R04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	R05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	R06	Record Type	Zoned Decimal Type = 'R' for railroad crossing record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17-23	6	R07	Railroad Crossing Number	Blank if not stated
(17-22)			Crossing Number	Zoned Decimal
(23)			Check Character	Alphabetic
24	2	R08	Name of Railroad	Binary 0 - Not stated 1 - Alexander Railroad 2 - Aberdeen and Rockfish Railroad Co. 3 - Atlantic and Western Railroad Co. 4 - Beaufort & Morehead Railroad Co. 5 - Cape Fear Railways Inc. 6 - Cliffside Railroad 7 - Clinchfield Railroad Company 8 - Department of Defense 9 - Durham & Southern Railway Co. 10 - High Point, Thomasville & Denton Railroad 11 - Laurinburg & Southern Railroad Co. 12 - Lewisville & Nashville Railroad Co. 13 - Norfolk, Franklin, & Danville Railroad Co. 14 - Norfolk and Western Railway 15 - Seabord Coastline Railroad Co. 16 - Southern Railway Company 17 - Warrenton Railroad 18 - Winston-Salem Southbound Railway 19 - Yancey Railroad Co.
25	3	R09	Daylight Train Movements	Binary Actual number of movements 255 - Not stated
26	3	R10	Night Train Movements	Binary Actual number of movements 255 - 255 or greater
27	3	R11	Maximum Time-table Speed	Binary Actual speed 255 - 255 or greater
28	3	R12	Maximum Typical Speed	Binary Actual speed 255 - 255 or greater

POSITION	CCL	NAME	DESCRIPTION	VALUE
29			Number of Tracks	
	2	R13	Number of Main Tracks	High half byte - Binary Actual number of tracks 15 - not stated
	2	R14	Number of Other Tracks	Low half byte - Binary Actual number of tracks 14 - 14 or more 15 - Not stated
30			Crossbucks - Stop Sign	
	2	R15	Number of Crossbucks	High half byte - Binary Actual number of crossbucks 14 - 14 or more 15 - Not stated
	2	R16	Number of Stop Signs	Low half byte - Binary Actual number of stop signs 14 - 14 or more 15 - Not stated
31			Other Signs - Gates	
	2	R17	Number of Other Signs	High half byte - Binary Actual number of other signs 14 - 14 or more 15 - Not stated
	2	R18	Number of Gates	Low half byte - Binary Actual number of gates 14 - 14 or more 15 - Not Stated
32			Cantilevered Flashing Lights - Mast Mounted Flashing Lights	
	2	R19	Number of Cantilevered Flashing Lights	Actual number of cantilevered flashing lights High half byte - Binary 14 - 14 or more 15 - Not stated
	2	R20	Number of Mast-Mounted Flashing Lights	Actual number of mast-mounted flashing lights Low half byte - Binary 15 - Not stated

POSITION	CCL	NAME	DESCRIPTION	VALUE
33			Other Flashing Lights - Highway Traffic Signals	
	2	R21	Number of Other Flashing Lights	High half byte - Binary Actual number of other flashing lights 15 - Not stated
	2	R22	Number of Highway Traffic Signals	Low half byte - Binary Actual number of highway traffic signals 15 - Not stated
34			Wigwags - Bells	
	2	R23	Number of Wigwags	High half byte - Binary Actual number of wigwags 15 - Not stated
	2	R24	Number of Bells	Low half byte - Binary Actual number of bells 15 - Not stated
35	2	R25	Smallest Crossing Angle Between Road & Track	Binary Ø - Unknown 1 - Ø-29 degrees 2 - 30-59 degrees 3 - 60-90 degrees 15 - Not stated

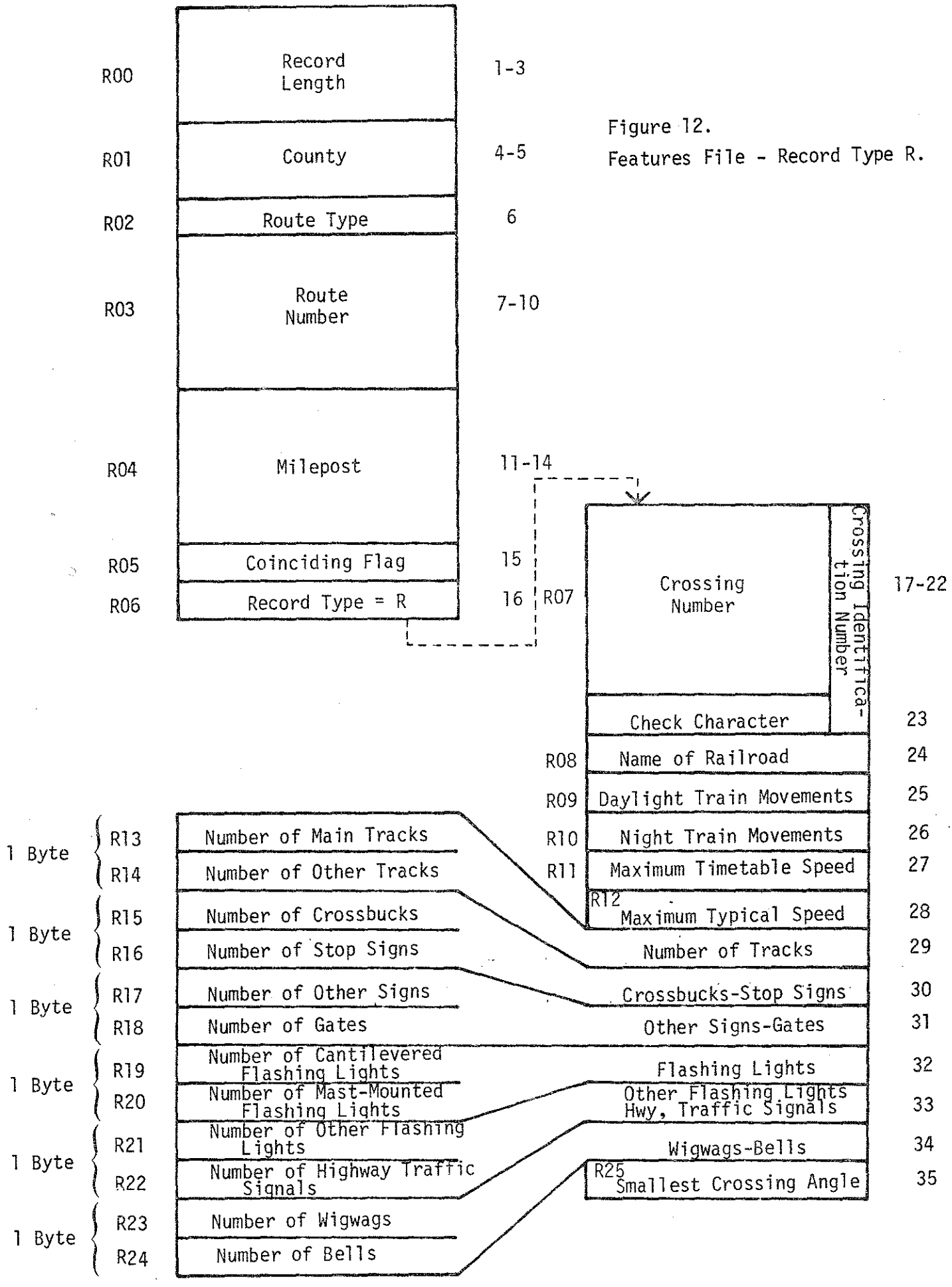


Figure 12.
Features File - Record Type R.

ROADWAY FEATURES FILE

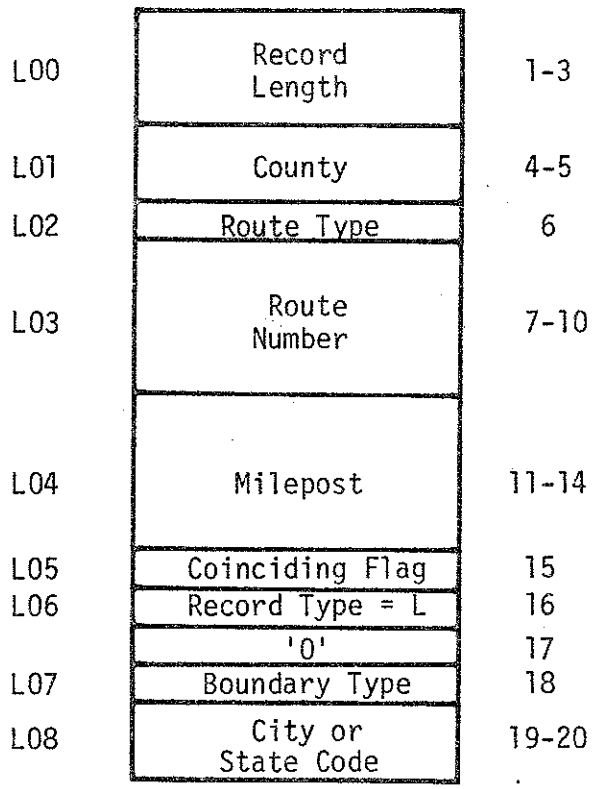
Record Type L - Political Boundary

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	L00	Record Length	Zoned Decimal
4-5	2	L01	County	Zoned Decimal (0-99)
6	1	L02	Route Type	Zoned Decimal 1 - Interstate 2 - US 3 - NC 4 - SR 5 - Other
7-10	4	L03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or Alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	L04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	L05	Coinciding Flag	Zoned decimal 0 - No coinciding routes 1 - Another route coincides 2 - Roadway segment coincides with a lower numbered route
16	1	L06	Record Type	Zoned decimal Type = 'L' for Political Boundary Record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17			Filler	Zoned decimal 0
18	1	L07	Boundary Type	Zoned decimal 7 - County line 8 - State line 9 - City line
19-20	2	L08	County, city, or State Code	Zoned decimal If boundary represented in a state line (8) the number reflects the adjacent state as follows: 60 - GA 70 - SC 80 - TN 90 - VA or If boundary represented is a county line, the number represented is the county number: 0-99 or If boundary is a city limit, the number represented is the city code: 0-99

Figure 13.
Features File - Record Type L.



ROADWAY FEATURES FILE

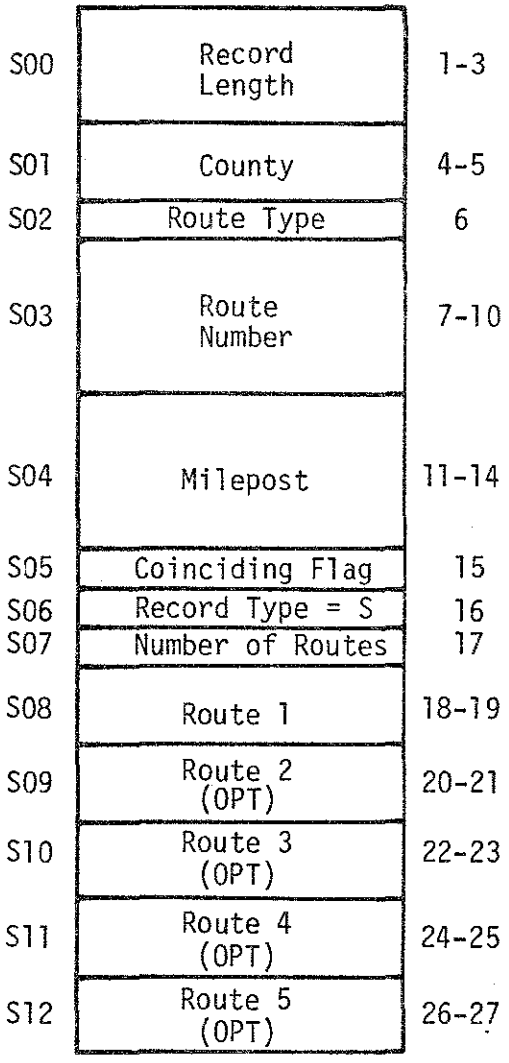
Record Type S - Section Record

POSITION	CCL*	NAME	DESCRIPTION	VALUE
1-3	3	S00	Record Length	Zoned Decimal
4-5	2	S01	County	Zoned Decimal (0-99)
6	1	S02	Route Type	Zoned Decimal 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other
7-10	4	S03	Route Number	
(7)			Route Subtype	Zoned Decimal 0 - Regular State Highway 2 - Business or alternate 3 - North 4 - South 5 - East 6 - West 7 - Spur (or special condition) 8 - Truck
(8-10)			Route Number	Zoned Decimal Leading zeroes
11-14	4	S04	Milepost	Zoned Decimal decimal assumed left 2 places
15	1	S05	Coinciding Flags	Zoned Decimal 0 - No coinciding routes 1 - Another route coincides 2 - Segment of roadway coincides with a lower numbered route.
16	1	S06	Record Type	Zoned Decimal Type = 'S' for section record

*Converted Character Length - Length of data in bytes when it is converted.

POSITION	CCL	NAME	DESCRIPTION	VALUE
17	1	S07	Number of Coinciding Routes	Zoned Decimal
18-19	5	S08	Coinciding Route (1)	Binary Binary halfword containing the equivalent of 5 decimal digits. The high order digit represents the highway type as follows: 1 - Interstate 2 - U.S. 3 - N.C. 4 - SR 5 - Other While the low order 4 digits are the highway number.
20-27	5	S09-S12	Multiple Coinciding Routes (2-5)	Binary, same codes as above, only present when necessary.

Figure 14.
Features File - Record Type S.



SUBJECT: RETACC (T73409)

AUTHOR: Dennis Ryan

DATE: May, 1977

PROGRAM TYPE: CALLABLE MODULE

SOURCE LANGUAGE: COBOL

FUNCTION: To return to the calling program a record from the Merge System's Accident Report file. Accident locations to be accessed are specified through a parameter supplied by the calling program.

USAGE:

I. Data Elements Necessary to call Module (COBOL SOURCE)

A. 01 PARAM1.

```
02  County              PIC  XX.
02  Route               PIC  XXXXX.
02  Low-Milepost        PIC  9999.
02  High-Milepost       PIC  9999.
02  Communication-Flag  PIC  9, VALUE Ø.
02  Orientation Flag    PIC  X.
```

B. 01 ACCIDENT-RECORD

```
02  STANDARD-HEADER.

    03  Length          PIC  999.
    03  County          PIC  99.
    03  Route           PIC  99999.
    03  Milepost        PIC  9999.
    03  Coinciding-Flag PIC  9.
    03  Record-Type     PIC  X.

02  TRAILER-INFORMATION, PIC X (194).
```

II. CALLING SEQUENCE

One COBOL statement is necessary to obtain one accident record:

```
CALL 'T73409' USING PARAM1 ACCIDENT-RECORD.
```

PARAM1 contains the information supplied to the called module which will determine accident locations on a specified roadway. Using the county, route, and milepost range to define a roadway segment RETACC will return the first accident record of that segment. Subsequent calls will return subsequent accident records occurring on the roadway segment as long as such records are present.

Also included in PARAM1 is the ORIENTATION-FLAG, which specifies the mode that accident information will be returned to the calling program. If ORIENTATION-FLAG is assigned the value 'A', information will be returned in accident mode. This consists of the 39 accident variables and the 24 vehicle variables for 15 vehicles. Should less than 15 vehicles be involved in the accident, the remaining vehicle fields will be assigned null values. If ORIENTATION-FLAG contains the value 'V' RETACC will return information in vehicle mode, consisting of the 39 accident variables and only 1 set of vehicle variables. Therefore an accident involving 2 vehicles would return 1 record padded with 13 null vehicles in accident mode and 2 records (One per vehicle per call) in vehicle mode.

Whenever the values of PARAM1 are changed by the calling program, RETACC will assume that a new roadway segment is being defined and will return the first record in that segment. Milepost values will be accurate to one-hundredth of a mile, with an implied decimal point.

At all times RETACC will communicate the present processing status to the calling program via the variable COMMUNICATION-FLAG, contained in PARAM1. Should accident information for a segment be exhausted, or invalid parameter data be passed to RETACC, the COMMUNICATION-FLAG will reflect that condition.

Accident records will be returned to the calling program in the storage area defined by the variable ACCIDENT-RECORD. The first 16 bytes will be the standard record header in character format. Following these 16 bytes will be the packed accident record as it exists on the accident file.

USAGE CONSIDERATIONS:

I. COMMUNICATION-FLAG values returned to calling program:

COMMUNICATION-FLAG	VALUES
0	Returning accident record for specified segment.
1	Records exhausted for specified segment.
2	Invalid parameter data specified by calling program.
3	No information for requested county-route.
4	No accident records present in requested milepost range.

II. JCL Requirements:

The calling module is responsible for providing two JCL cards which will supply RETACC with the accident file index and the accident direct access file:

// ACCINDX	DD	location of accident index
// ACCDAF	DD	location of accident direct access file

III. Overriding Roadway Segment Definitions

A. Explanation: The calling program may elect to examine all records associated with a portion of the county route field. This is accomplished by placing an 'X' in the appropriate position of the county route field. In order to override the milepost range restrictions use values of 0000 and 9999 for the low milepost and high milepost respectively.

B. EXAMPLE:

1) Examine all accident records occurring on Interstate roadways in Alamance County. PARAM1 would have the values:

COUNTY	00
ROUTE	1XXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0
ORIENTATION-FLAG	A

2) Examine all accidents in vehicle mode occurring on Interstate 85 between mileposts 0 and 15.00:

COUNTY	XX
ROUTE	10085
LOW-MILEPOST	0000
HIGH-MILEPOST	1500
COMMUNICATION-FLAG	0
ORIENTATION-FLAG	V

3) Examine all accident records contained in the file:

COUNTY	XX
ROUTE	XXXXX
LOW-MILEPOST	0000
HIGH-MILEPOST	9999
COMMUNICATION-FLAG	0
ORIENTATION-FLAG	A

HWY.FTR30120 and HWY.FTR30130

ACCIDENT FILE

Record Types A and V.

On system files HWY.FTR30030, HWY.FTR30100 and HWY.FTR30130 the first sixteen (16) bytes of each record are compressed to five (5) bytes as follows:

POSITION	DESCRIPTION
1	Record Length - Binary
2-3	Milepost - Binary
4	Coinciding Flag - Character
5	Record Type - Character

County, Route Type and Route number are all derived from the block header information.

These five (5) bytes are never of concern to the user since all retrieval modules expand them to the standard sixteen byte configuration before the user receives the records.

ACCIDENT FILE Description

Accident Variables

NAME	DESCRIPTION	CCL*	VALUE
AØ	Record Length	3	Zoned Decimal Actual record length
A1	County	2	Alphabetical Order 00 - Alamance, etc.
A2	Route Number	5	Zoned Decimal - Standard 5 digit route code (as on Roadway Features file)
A3	Milepost	4	4 characters, decimal assumed left 2.
A4	Report Number	8	8 characters; the high order 2 characters contain the year followed by a six digit sequential number
A5	City Code	3	00 - 99
A6	Total Property Damage	6	Total dollar amount
A7	Month	2	1 = January, etc. 12 = December
A8	Plot Type	1	0 = Not stated 1 = Valid 2 = Invalid 3 = Direction Plot 4 = Reference Plot
A9	Reference Type	1	0 = Not stated 1 = Normal 2 = Base 3 = Reference 4 = Multiple
A10	Location Type	1	0 = Not stated 1 = Roadway 2 = Intersection 3 = Proximity 4 = y line 5 = Bridge 6 = Train 7 = Ramp & Service Road

*Converted Character Length - Length of data in bytes when it is expanded.

NAME	DESCRIPTION	CCL	VALUE
A11	Ramp	1	0 = Not stated 1 = Not applicable 2 = Ramp 3 = Service Road
A12	Day of Month	2	0 = Not stated 1 through 31
A13	Day of Week	1	0 = Not stated 1 = Monday; etc. 7 = Sunday
A14	Road On	5	First Digit 0 = Not stated 1 = Interstate 2 = US 3 = NC 4 = SR Last 4 digits = Road number
A15	Direction of Travel	1	0 = Not stated 1 = North 2 = Northeast 3 = East 4 = Northwest 5 = South 6 = Southeast 7 = West 8 = Southwest
A16	Time of Day	4	2400 = Midnight 0001-0059 = 12:01 12:59 am etc 2300-2359 = 11:00 11:59 pm 2400 = NS
A17	Alcohol Control	1	0 = Not stated or unknown 1 = No alcohol involvement 2 = Alcohol involved
A18	Accident Type	2	00 = Not stated 01 = Ran off road - right 02 = Ran off road - left 03 = Ran off road - straight 04 = Non-collision in road-overturned 05 = Non-collision in road-other in road 06 = Pedestrian 07 = Parked vehicle 08 = Train 09 = Bicycle 10 = Animal

(Cont' on following page)

NAME	DESCRIPTION	CCL	VALUE
A18	Accident Type (Cont')		11 = Fixed object 12 = Other object 13 = Rear end-stop or slow 14 = Rear end-turn 15 = Left turn same roadway 16 = Left turn cross traffic 17 = Right turn same roadway 18 = Right turn cross traffic 19 = Head on 20 = Sideswipe 21 = Angle 22 = Backing 23 = Other MV in traffic
A19	Locality	1	0 = Not stated 1 = Business 2 = Residential 3 = School or Playground 4 = Open Country
A20	Total Fatalities	2	0-13 14 = 14 or more 15 = Not stated
A21	Total A Injured	2	0-13 14 = 14 or more 15 = Not stated
A22	Total B Injured	2	0-13 14 = 14 or more 15 = Not stated
A23	Total C Injured	2	0-13 14 = 14 or more 15 = Not stated
A24	Light Condition	1	0 = Not stated 1 = Daylight 2 = Dusk 3 = Dawn 4 = Darkness (Street lights) 5 = Darkness (Street not lighted)
A25	Weather	1	0 = Not stated 1 = Clear 2 = Cloudy 3 = Rainy 4 = Snowy 5 = Fog 6 = Sleet or Hail

NAME	DESCRIPTION	CCL	VALUE
A26	Traffic Control Condition	1	0 = Not stated 1 = Not operating 2 = Not visible 3 = Not operating and not visible
A27	Traffic Control	1	0 = Not control present or not stated 1 = Stop sign 2 = Yield sign 3 = Stop and go signal 4 = Flashing signal w/stop sign 5 = Flashing signal w/o stop sign 6 = RR gate and flasher 7 = RR flasher 8 = Officer 9 = Other Device
A28	Number of Vehicles Stored in Record	2	1-15
A29	Road Feature	1	0 = Not stated 1 = Bridge or underpass 2 = Driveway 3 = Alley intersection 4 = Intersection of 2 roadways 5 = Non-Intersection median crossover 6 = End or beginning of divided highway 7 = Other
A30	Road Surface	1	0 = Not stated 1 = Concrete 2 = Smooth asphalt 3 = Coarse alphalt 4 = Gravel 5 = Dirt or sand 6 = Other
A31	Road Defects	1	0 = Not stated 1 = Loose material on surface 2 = Holes, deep ruts 3 = Low shoulders 4 = Soft shoulders 5 = Other defects 6 = Road under construction 7 = No defects
A32	Road Condition	1	0 = Not stated 1 = Dry 2 = Wet 3 = Oily 4 = Muddy 5 = Snowy 6 = Icy

NAME	DESCRIPTION	CCL	VALUE
A33	Speed Limit	3	Coded in miles per hour, 255 is not stated
A34	Coinciding Route Flag	1	0 = No coinciding routes at accident site 1 = Another route coinciding 2 = Roadway segment coincides with a lower numbered route.
A35	Record Type	1	Character Value = 'A'
A36	Distance to Reference Point	4	Binary High order digit = 1; the following 3 digits denote feet from reference point. High order digit = Ø; the following 3 digit denote miles and hundredth of miles from the reference point.
A37	Reference Point Type	1	Binary 0 = Point is valid intersection 1 = Point is not a valid intersection
A38	Reference Point	6	Binary If A37 = 0 then the 5 leftmost digits of A38 are the numeric road number (10085) = I-85. If A37 = 1 then the six digits may be a street name etc. '000000' is not given or not stated.
A39	Year of Accident	2	Binary

Vehicle File Description

Vehicle Variables

NAME	DESCRIPTION	CCL	VALUE
V1	Driver Age	3	Age in years 0 - 126; 127 = Not stated
V2	Driver Race	1	0 = Not stated 1 = White 2 = Negro 3 = Indian 4 = Other
V3	Driver Sex	1	0 = Not stated 1 = Female 2 = Male
V4	Restrictions	1	0 = Not stated 1 = Corrective lenses 2 = 45 mph speed limit 3 = Daylight driving only 4 = Corrective lenses & 45 mph limit 5 = Corrective lenses, 45 mph speed limit and daylight driving only 6 = Corrective lenses daylight driving only 7 = 45 mph speed limit and daylight driving only 8 = No restrictions 9 = Restriction (Not stated)
V5	Physical Condition	1	0 = Not stated 1 = Ill 2 = Fatigued 3 = Asleep 4 = Other physical impairment 5 = Restriction not complied with 6 = Normal 7 = Condition not known
V6	Sobriety	1	0 = Not stated 1 = Unknown 2 = Had not been drinking 3 = Drinking, unable to determine impairment 4 = Drinking, ability impaired
V7	License Type	1	0 = Not stated 1 = Learners permit - NC 2 = Learners permit - other 3 = Learners permit, state not stated 4 = NC license 5 = Other state license 6 = Pedestrian or bicyclist 7 = Not licensed.

NAME	DESCRIPTION	CCL	VALUE
V8	License Status	1	0 = Not stated 1 = NC operator 2 = NC chauffeur 3 = Both
V9	Vehicle Type	2	0 = Not stated 1 = Two or four door sedan (pass veh.) 2 = Two or four door sedan and house trailer 3 = Passenger car and trailer 4 = Station wagon (passenger) 5 = Station wagon (truck) 6 = Commercial bus 7 = School bus 8 = Activity bus 9 = Truck w/2 axles 10 = Truck w/2 axles and trailer 11 = Truck w/3 axles 12 = Truck w/3 axles and trailer 13 = Truck tractor and semi-truck 14 = Taxicab 15 = Farm equipment 16 = Farm tractor 17 = Motorcycle 18 = Motor scooter or motor bike 19 = Ambulance 20 = Bicyclist 21 = Recreational vehicle self-contained 22 = Camper on 2 axle truck 23 = Camper mounted on 2 axle truck 24 = Other motor vehicle 25 = Pedestrian
V10	Armed Forces Driver	1	0 = Not stated 1 = Yes 2 = No
V11	Vehicle Number	2	1-15 as indicated on the accident report
V12	Additional Vehicle Code	1	0 = Not stated 1 = Military 2 = Emergency vehicle 3 = State owned 4 = Other publically owned
V13	Estimated Speed	3	Estimated speed at impact 0-126, 127 = Not stated
V14	Charges Made	1	0 = Not stated 1 = Yes 2 = No
V15	Total Occupants	2	0-14; 15 not stated

NAME	DESCRIPTION	CCL	VALUE
V16	Road on Location	1	0 = Not stated 1 = 1st road 2 = 2nd road 3 = Neither road
V17	Vehicle Maneuver	2	0 = Not stated 1 = Stopped in travel lane 2 = Parked out of travel lane 3 = Parked in travel lane 4 = Going straight ahead 5 = Changing lane or merging 6 = Passing 7 = Making right turn 8 = Making left turn 9 = Making U turn 10 = Backing 11 = Slowing or stopping 12 = Starting in roadway 13 = Parking 14 = Leaving parked position 15 = Other
V18	Miscellaneous Action	2	0 = Not stated 1 = Avoiding a pedestrian 2 = Avoiding other wheeled vehicle 3 = Avoiding fixed object 4 = Avoiding animal 5 = Fire or mechanical failure 6 = Fell from vehicle 7 = Driverless, moving vehicle 8 = Skidded out of control 9 = Pushing or towing vehicle 10 = Vehicle parked on private property 11 = Vehicle legally parked 12 = Vehicle and driver information omitted
V19	Point of Contact	2	0 = Not stated 1 = Front right 2 = Front center 3 = Front left 4 = Front left corner 5 = Front left side 6 = Center left side 7 = Rear left side 8 = Rear left corner 9 = Trunk 10 = Back window 11 = Top 12 = Windshield 13 = Hood 14 = Rear left 15 = Rear center 16 = Rear right

(Cont' on following page)

NAME	DESCRIPTION	CCL	VALUE
V19	Point of Contact (Cont')		17 = Rear right corner 18 = Rear right side 19 = Center right side 20 = Front right side 21 = Front right corner 22 = Underneath front 23 = Underneath center 24 = Underneath rear 25 = Unspecified
V20	Vehicle Defects	1	0 = Not stated 1 = Vehicle in defensive 2 = No defects detected 3 = Not known if defective
V21	Direction of Travel	1	0 = Not stated 1 = North 2 = East 3 = West 4 = South
V22	Object Struck	2	0 = Not stated 1,16 = None 2,17 = Tree 3,18 = Utility pole 4,19 = Fence or fence post 5,20 = Guardrail or guard post in median 6,21 = Guardrail or guard post on shoulder 7,22 = Bridge 8,23 = Underpass 9,24 = Traffic island or curb, median 10,25 = Sign or sign post 11,26 = Animal 12,27 = Ditch bank 13,28 = Parked vehicle 14,29 = Pedestrian 15,30 = Other object
	(Note: Prior to April '75, the object struck codes were collected on an accident oriented basis. At that time object struck became vehicle oriented. The values 16-30 reflect the old accident oriented codes while codes 0-15 reflect the new vehicle oriented codes.)		
V23	Violation Indicated	2	00 = Not stated 01 = No violation indicated 02 = Excessive speed 03 = Yield violation 04 = Left of center 05 = Passing violation 06 = Stop sign or yield sign violation

(Cont' on following page)

NAME	DESCRIPTION	CCL	VALUE
V23	Violation Indicated (Cont')		07 = Traffic signal violation 08 = Safe movement violation 09 = Too close 10 = Improper turn 11 = Improper or no signal 12 = Improper parking location 13 = Other improper driving
V24	Violation Indicated Second	2	Same codes as above

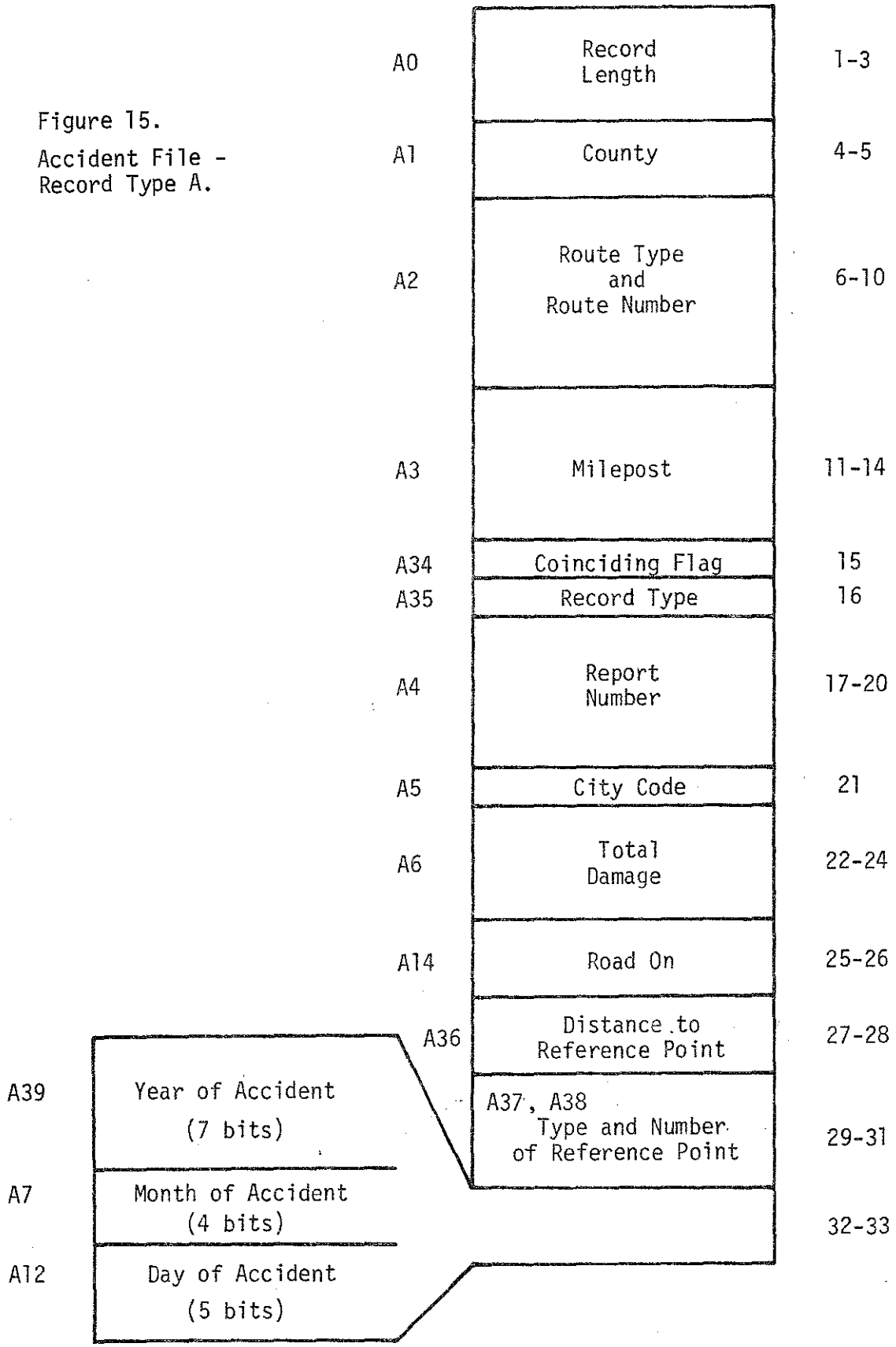
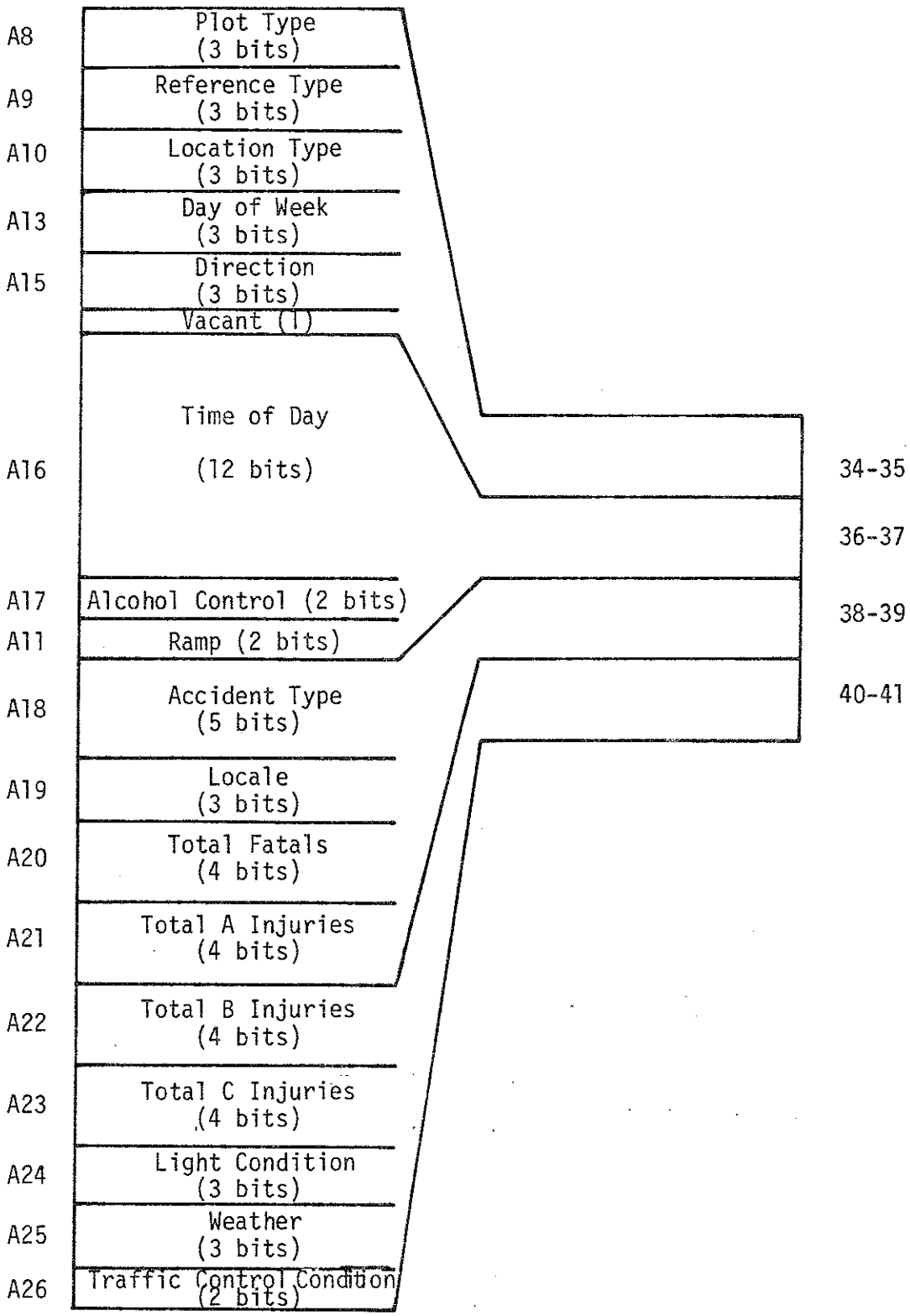
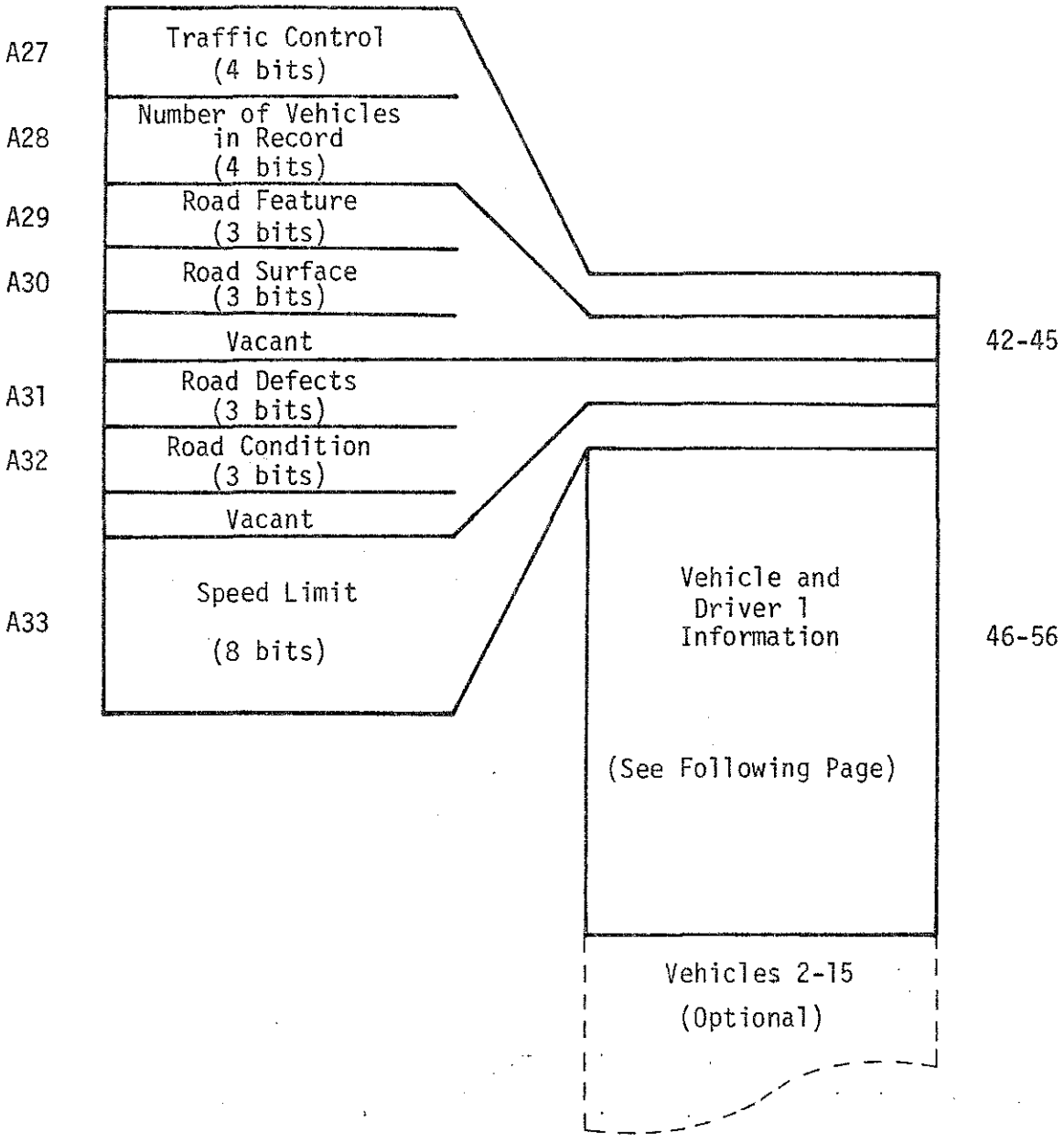
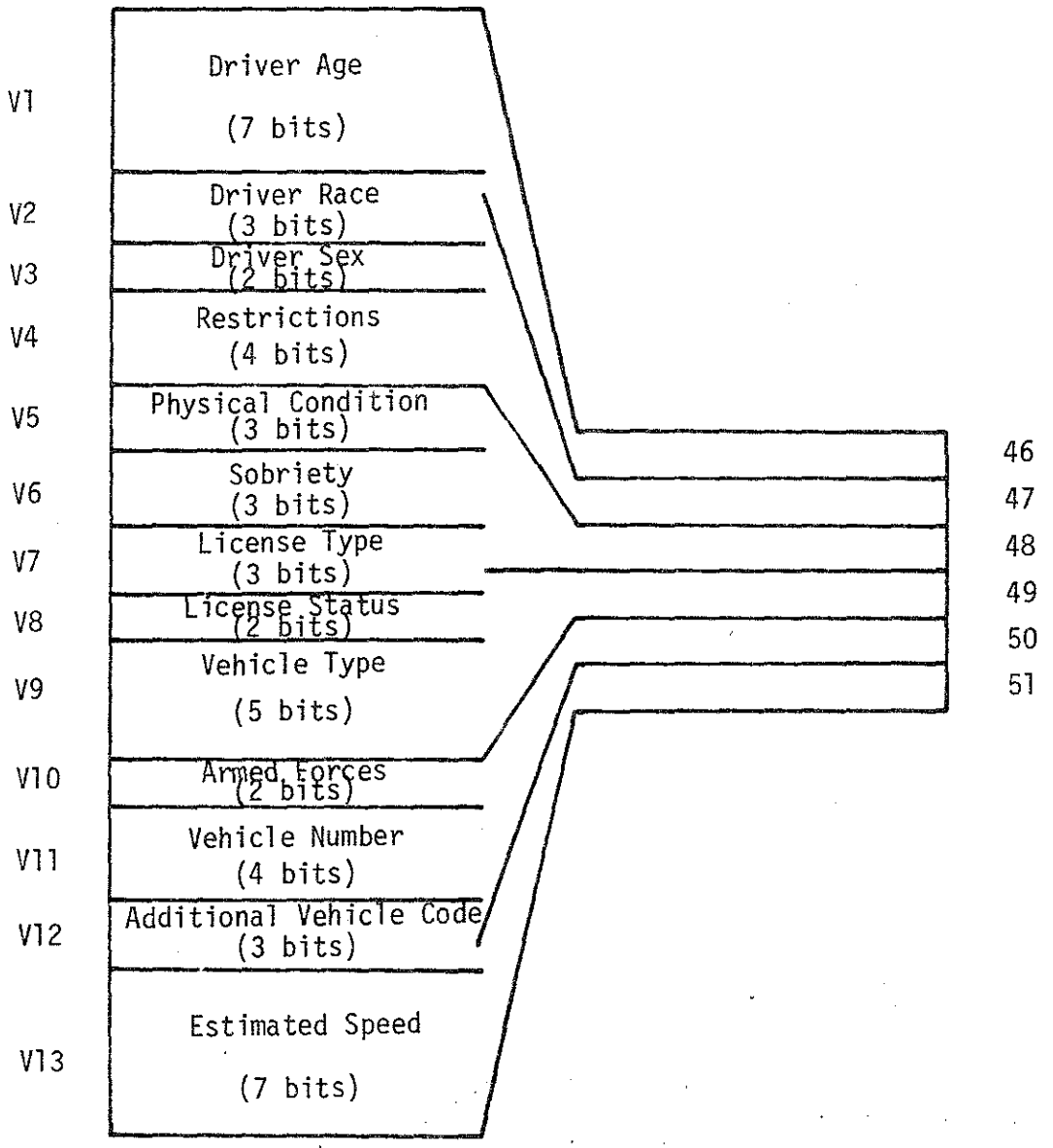


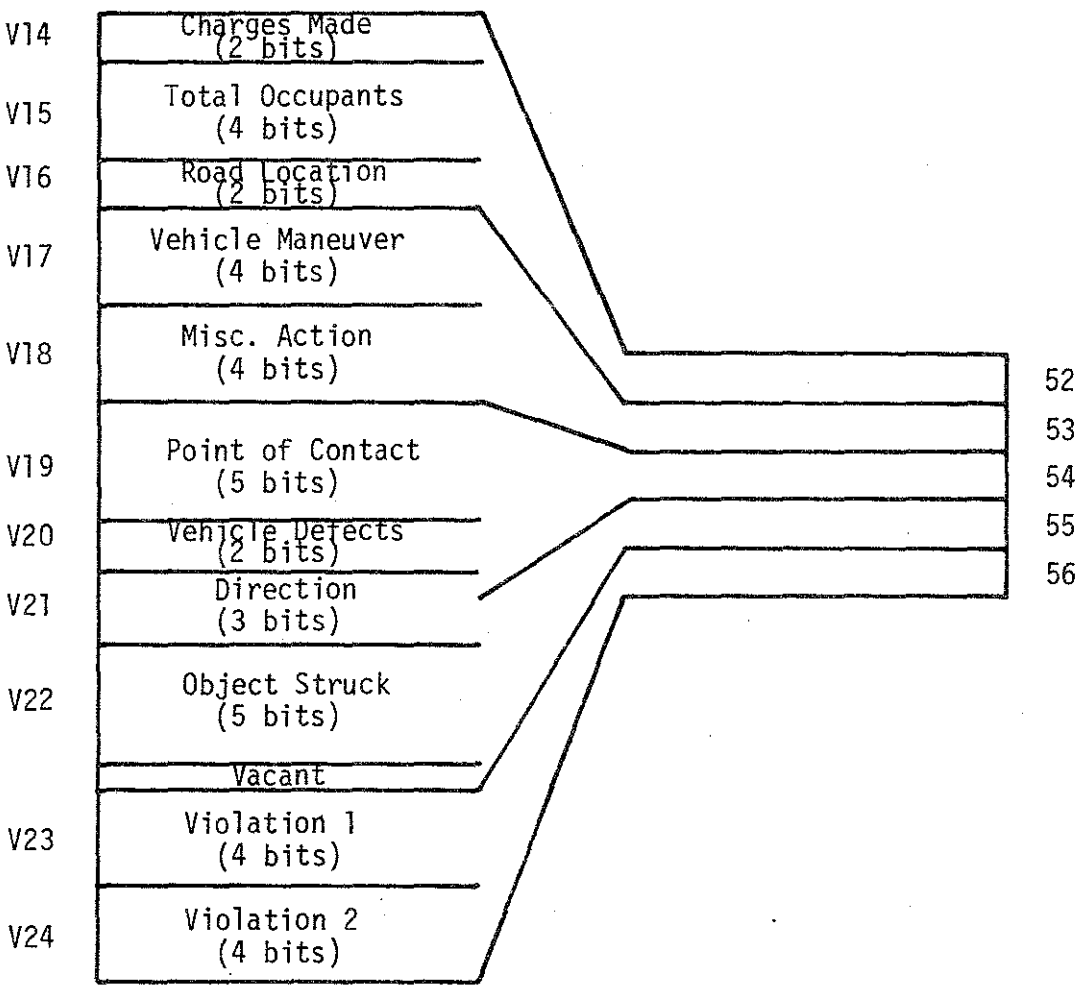
Figure 15.

Accident File - Record Type A.


A8
Plot Type
(3 bits)
A9
Reference Type
(3 bits)
A10
Location Type
(3 bits)
A13
Day of Week
(3 bits)
A15
Direction
(3 bits)
Vacant (1)
A16
Time of Day
(12 bits)
A17
Alcohol Control (2 bits)
A11
Ramp (2 bits)
A18
Accident Type
(5 bits)
A19
Locale
(3 bits)
A20
Total Fatals
(4 bits)
A21
Total A Injuries
(4 bits)
A22
Total B Injuries
(4 bits)
A23
Total C Injuries
(4 bits)
A24
Light Condition
(3 bits)
A25
Weather
(3 bits)
A26
Traffic Control Condition
(2 bits)
34-35
36-37
38-39
40-41


A27
Traffic Control
(4 bits)
A28
Number of Vehicles
in Record
(4 bits)
A29
Road Feature
(3 bits)
A30
Road Surface
(3 bits)
Vacant
42-45
A31
Road Defects
(3 bits)
A32
Road Condition
(3 bits)
Vacant
A33
Speed Limit
(8 bits)
Vehicle and
Driver 1
Information
46-56
(See Following Page)
Vehicles 2-15
(Optional)


V1
Driver Age
(7 bits)
V2
Driver Race
(3 bits)
V3
Driver Sex
(2 bits)
V4
Restrictions
(4 bits)
V5
Physical Condition
(3 bits)
V6
Sobriety
(3 bits)
V7
License Type
(3 bits)
V8
License Status
(2 bits)
V9
Vehicle Type
(5 bits)
V10
Armed Forces
(2 bits)
V11
Vehicle Number
(4 bits)
V12
Additional Vehicle Code
(3 bits)
V13
Estimated Speed
(7 bits)
46
47
48
49
50
51


V14
Charges Made
(2 bits)
V15
Total Occupants
(4 bits)
V16
Road Location
(2 bits)
V17
Vehicle Maneuver
(4 bits)
V18
Misc. Action
(4 bits)
V19
Point of Contact
(5 bits)
V20
Vehicle Defects
(2 bits)
V21
Direction
(3 bits)
V22
Object Struck
(5 bits)
Vacant
V23
Violation 1
(4 bits)
V24
Violation 2
(4 bits)
52
53
54
55
56

SUBJECT: BLDESC (T74009)

AUTHOR: Fischer

PROGRAM TYPE: Callable Module

SOURCE LANGUAGE: COBOL

PURPOSE: This module builds a binary data description table (format attached) containing one entry for each input variable mentioned in INPUT-ARRAY from a zoned format master descriptor table (see attached format) and places it in the designated WORKING-STORAGE area of the calling program for subsequent use by 'T74209' and 'T76009'.

USAGE:

I. Data elements necessary to call module:

A. INPUT-ARRAY - An input character string containing (in ORDER) a one character error flag which should initially be set to zero by the user, a one character field designating whether the desired records are one per accident or one per vehicle, ('A' for accident; 'V' for vehicle; may be left blank if accident records are not involved) and a string of variable names separated by commas, denoting the architecture of the records to be formed. All elements are enclosed by a leading and a trailing asterisk.

B. BINTAB - An area defined in the user program large enough to contain the binary data description table (see attached format). The number of bytes acquired is computed as follows: (number of elements x 33) + 8.

II. Example: (Given in COBOL)

A. DATA DIVISION

```
Ø  INPUT-ARRAY  PIC X(21)  VALUE '*OAC1,S2,A3,A6,V1(2)*'.

Ø  BINTAB  PIC X(173).
```

B. PROCEDURE DIVISION

To build a binary data description table for subsequent use by the system, it is necessary to issue the following call:

```
CALL 'T74009' USING INPUT-ARRAY BINTAB.
```

Upon execution of the call the module will extract the zoned format entries for the variable named in INPUT-ARRAY from the master data description entry list and formulate a binary data description table as described above in the user program.

III. Error Considerations

After executing the call to 'BLDESC' the error flag (set to zero by the user prior to the call) should be tested. If this flag is non-zero, an error has been detected in the input string of variable. The error can be one of two things:

(1) The proper format for variable selection has not been adhered to, or

(2) The variable requested cannot be located in the master description table.

In either case, BINTAB will not contain valid information.

IV. Program size - BLDESC requires 10776 bytes of storage.

MASTER DATA DESCRIPTION
ELEMENT FORMAT
HWYTR710

This partitioned data set member will reside on a source library such as DMV.MACLIB as COBOL source statements so that it may be changed using interactive facilities (e.g., ROSCOE). Described below is the contents of the COBOL VALUE constant for a table entry.

POSITION	DESCRIPTION	CONTENTS
1-3	Data Element Name	Zoned character ANN where NN = ØØ-99 with left zeroes
4-5	Data Element Qualifier 1	Zoned decimal ØØ-99 for use when a data element has multiple occurrences within a record. (e.g., The data element vehicle make occurs once for every vehicle described in the accident. Therefore to access the vehicle make variable for a particular vehicle it is necessary to utilize the subscript)
6-7	Data Element Qualifier 2	Zoned decimal ØØ-99 used to qualify a data element which has multiple occurrences. (e.g., a particular occupant position in a certain vehicle). Normally used in conjunction with Data Element Qualifier 1.
8	Data Type	Zoned decimal 1 - Binary character where the binary value of variable is stored as some number of characters such as 1,2,3 or 4 characters. 2 - Bit data where variable values are stored as some number of bits. 3 - Character data

POSITION	DESCRIPTION	CONTENTS
9-11	Displacement	Zoned decimal Displacement of the data element in the source record based on a zero origin
12-13	Decoded Variable Length	Zoned decimal Output field length in character for converted values.
14-15	Left Shift Length	Zoned decimal For type II data only represents the number of bits on the left side of the imbedded variable.
16-17	Data Element Length	Zoned decimal For type I, III data represents the length of the data field in character before conversion. For type II only; represents the length of the data field in bits.
18-19	Right Shift Length	Zoned decimal For type II data only; represents the number of bits on the right side of the imbedded variable.

DATA
MASTER DESCRIPTION TABLE.
(HWY.FTR710)

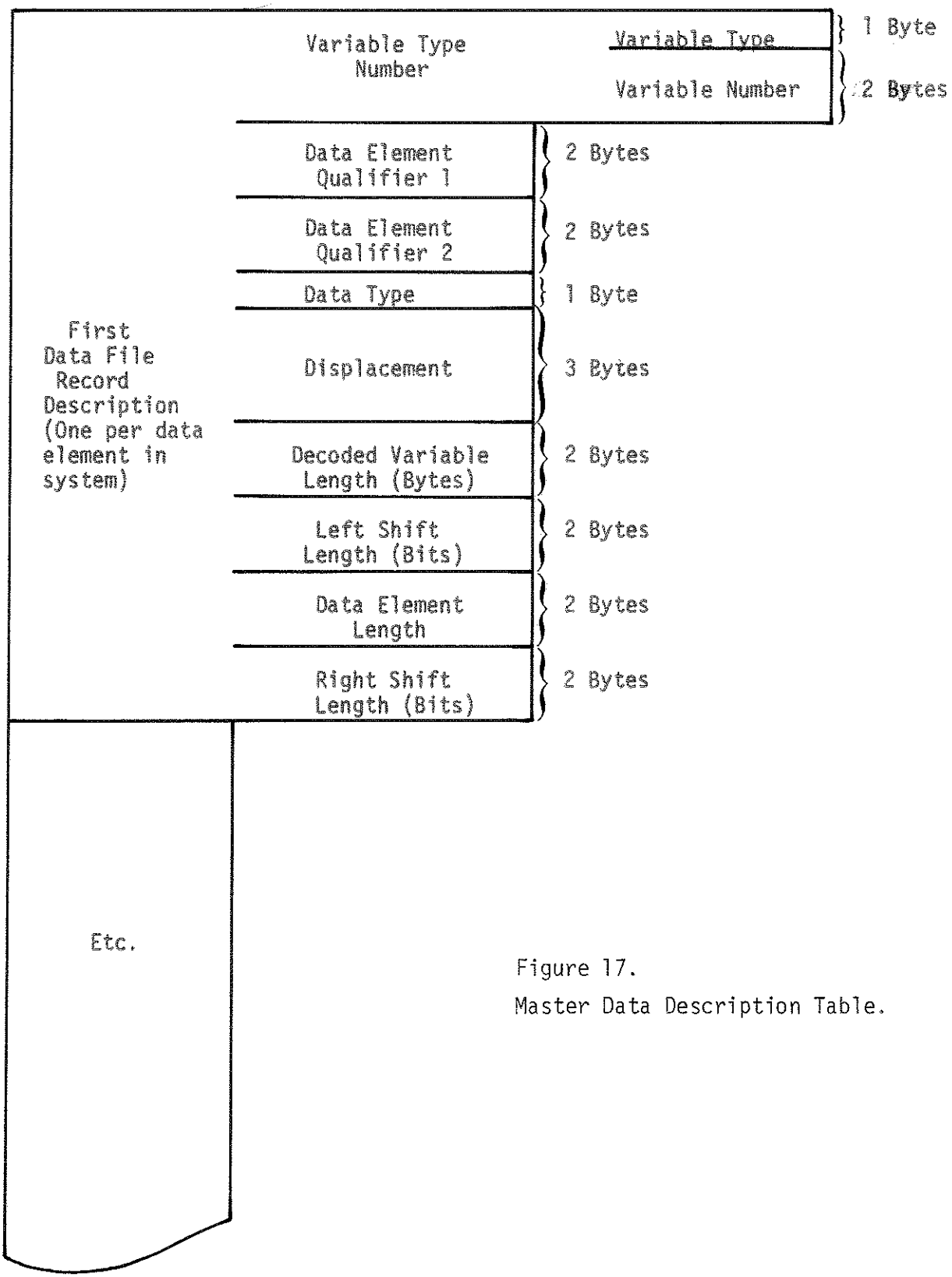


Figure 17.
Master Data Description Table.

Binary Data Description Table

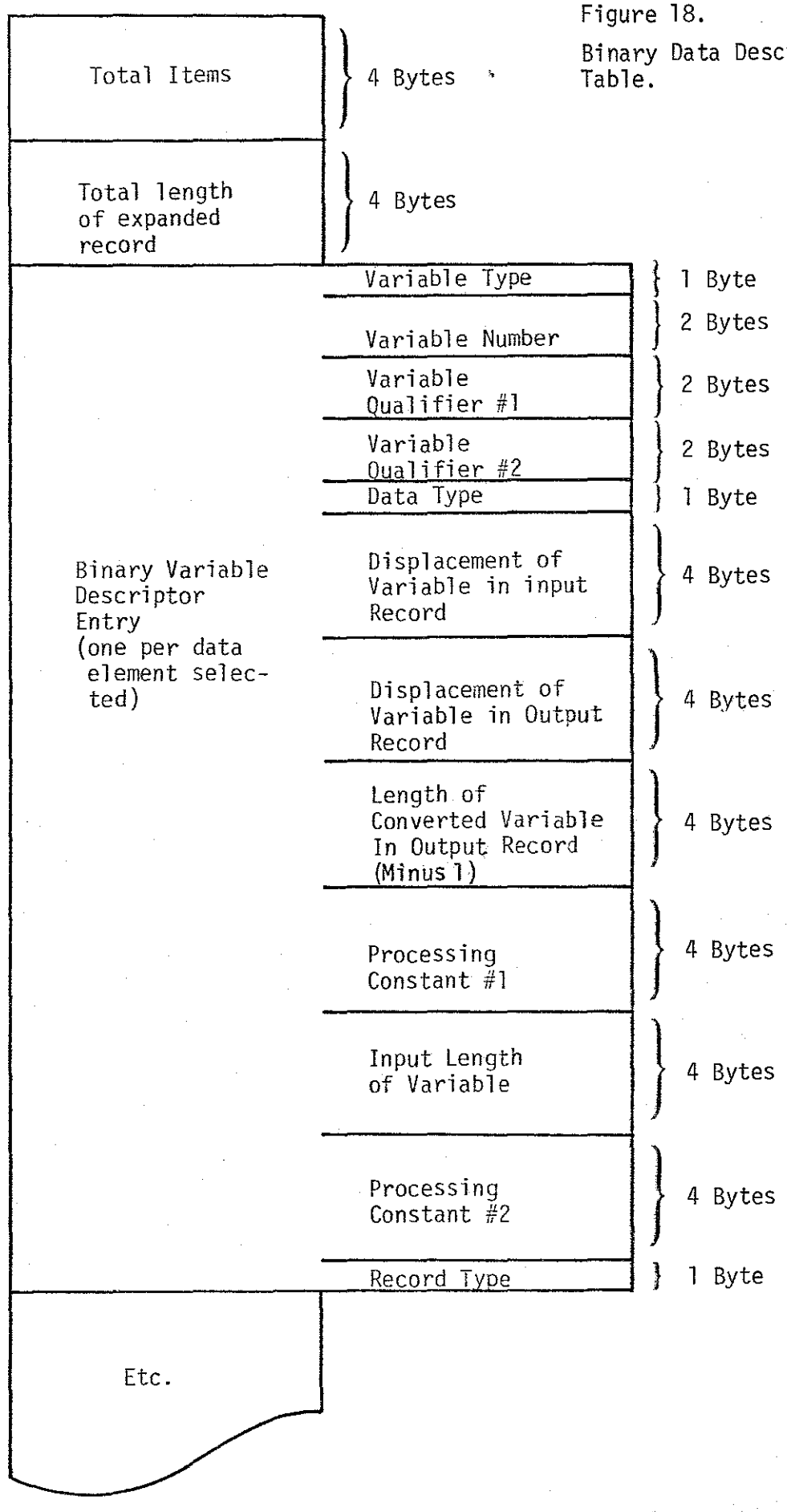
POSITION	DESCRIPTION	VALUE
1-4	Number of Items in Table	Binary fullword
5-8	Total length of record described by below items	Binary fullword
9-41	Data Description Entries (1 for each declared variable)	
(9)	Variable Type	A - Accident variable B - Structure variable C - Common segment variable E - Roadway variable G - Gap record variable I - Intersection variable L - Political boundary variable M - Characteristic variable R - Railroad crossing variable S - Section record variable V - Vehicle variable
(10-11)	Variable Number	Zoned decimal
(12-15)	Variable Qualifiers	Zoned decimal
(16)	Data Type	Zoned decimal 1 = binary byte 2 = bit data 3 = alphanumeric character data
(17-20)	Input Location of variable (zero origin)	Binary fullword
(21-24)	Location of variable in user specified record (zero origin)	Binary fullword
(25-28)	Output length of specified variable (minus 1)	Binary fullword
(29-32)	Processing Constant #1 (used by T74209) When data type is 1 or 2 value is (output length - 1 *16) + 7. When data type = 3 value is the actual output length	Binary fullword

POSITION	DESCRIPTION	VALUE
(33-36)	Length of the input variable minus 1 for type 1 and type 3 data, or number of bits if type 2 data.	Binary fullword
(37-40)	Processing Constant #2 (used by T74209) When data type is 1 value is ((24 - (variable input length - 1)) *8) When data type is 2 value is the number of bits on the high order side of the binary field in which the variable resides. When data type is 3 constant contains binary zeroes and is not used.	Binary fullword
(41)	Record type for use of program #T74209.	Alphanumeric character A - Accident record (Note: Both A and V variables are physically located in the type A record. Type A records comprise the entire accident file. (HWY.FTR30130) B - Structure record C - Common record G - Gap record I - Intersection record L - Political boundary record M - Mileage characteristic record (Note: contains both M and E type records) R - Railroad crossing record S - Section record Note: The features file (HWY.FTR30100) is comprised of record types B,C,G,I,L,R, and S. The mileage characteristic file (HWY.FTR30030) is comprised of record types M and E, while the accident file (HWY.FTR30130) contains record types A and V.
42-74	Data Description Entry for the second mentioned	

POSITION	DESCRIPTION	VALUE
42 Continued	variable, same codes as above. Each mentioned variable will be associated with a 33 character field as described above.	

Figure 18.

Binary Data Description Table.



SUBJECT: EXCONCAT (See also BLDESC) (T74209)

AUTHOR: Von Johnson

PROGRAM TYPE: Callable Module

SOURCE LANGUAGE: Assembler

PURPOSE: To expand selected variables in input records from a compressed form into a zoned decimal format while concatenating them into a single string.

USAGE:

I. Data Elements Necessary to Call Module

A. DATA-DESCR-TAB- A data field containing the output from module BLDESC. This output consists of two fullwords containing the number of variables and the total output string length respectively followed by thirty-three bytes of data for each variable to be decoded and concatenated.

B. OUTPUT-STRING- An area sufficiently large to contain the decoded output.

C. INPUT1...INPUT20- One to twenty input areas containing the records to be decoded and concatenated.

II. Example: (Given in COBOL)

A. DATA DIVISION

```
01 DATA-DESCR-TAB PIC X(338)
   (The above area contains space for describing
    10 variables.)

01 OUTPUT-STRING PIC X(NNN).

01 INPUT1 PIC X(NNN).

01 INPUT2 PIC X(NNN).

01 INPUT3 PIC X(NNN).
```

B. PROCEDURE DIVISION

COBOL statements necessary to utilize this module are as follows:

```
CALL 'T74209' USING
DATA-DESCR-TAB OUTPUT-STRING
INPUT1 INPUT2 INPUT3
```

The result of the execution of the above statement is that binary format data elements from INPUT1 INPUT2 and INPUT3 will be expanded into a character format and concatenated in the area OUTPUT-STRING in the sequence they are specified in the data description table (DATA-DESCR-TAB) created by module BLDESC.

PROCESSING LOGIC: (Refer to FLOWCHART for logic flow)

Each time the module is called all elements of the data description table (DATA-DESCR-TAB) are processed sequentially. For each element, the correct input is determined and the data described by that table element is converted and added into the OUTPUT-STRING immediately to the right of the data described by the previous table element. Variables defined in the DATA-DESCR-TAB which are not contained in any input area listed are skipped and their respective positions in OUTPUT-STRING are left unchanged.

COMMENTS:

I. To obtain a data description table (DATA-DESCR-TAB) for use in executing EXCONCAT it is necessary to call BLDESC.

II. This module is reentrant and may be called using different data description tables within the same calling program.

III. The space required for EXCONCAT is 380 bytes.

IV. The module determines the proper input area for a data element by examining byte 16 of each input area. Therefore, if byte 16 of an input area is changed to a non-significant character, no conversion for those elements needing that area will take place and the OUTPUT-STRING space for these elements will remain unchanged.

V. Efficiency Considerations

A. To optimize processing, this module checks the data source of each table element with the one just processed and eliminates searching the input areas except when the data source changes. Therefore, it is more efficient to group all elements from the same source together.

B. If information from a single record of one data source is concatenated with information from several different records of another data source (e.g., data from one segment characteristics record is merged with data from all accident records for that segment), it is more

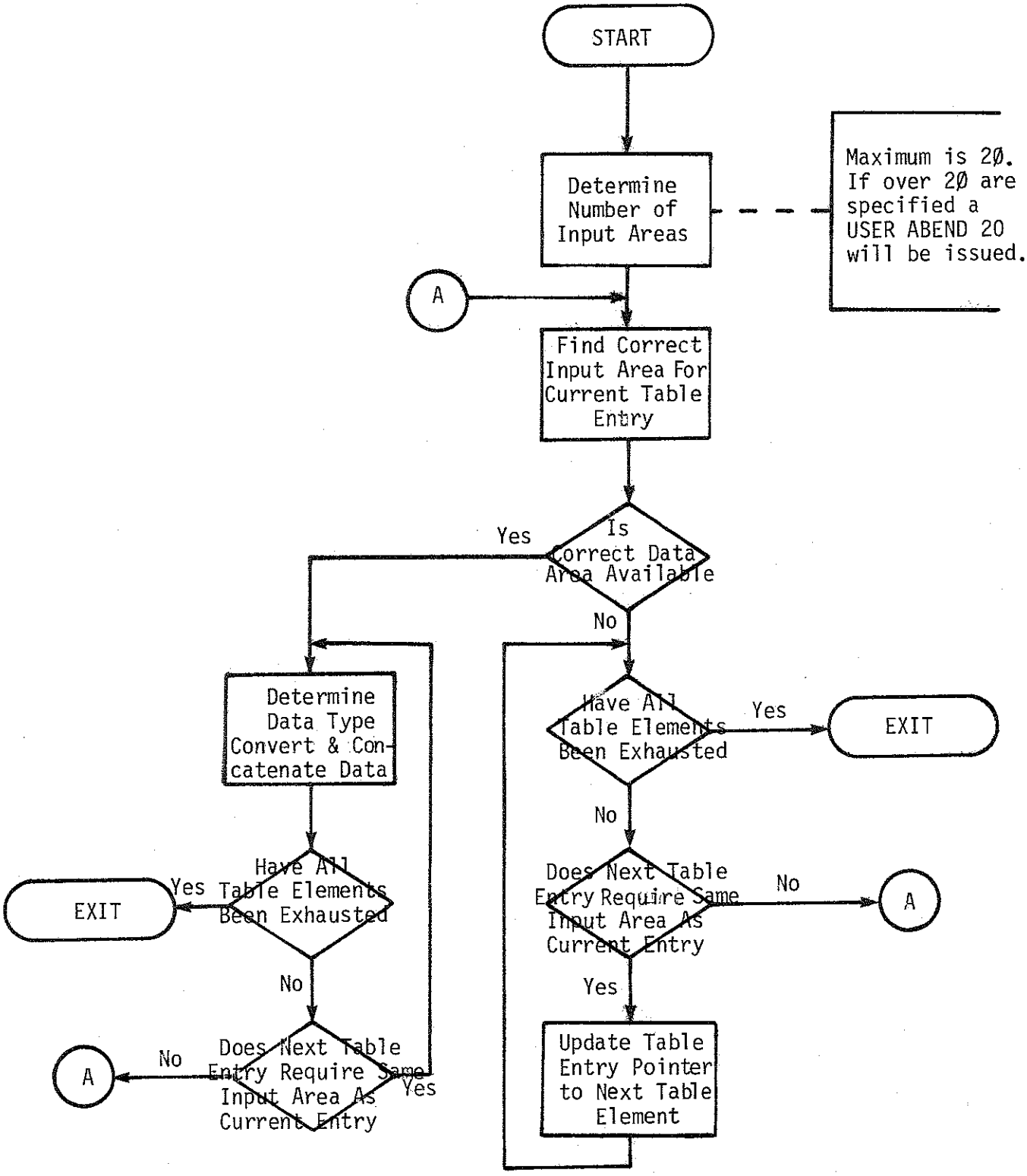
efficient to alter byte 16 of the single records input area (as described in IV above) after the first conversion so that its data will not be converted but once. If this is done, data elements from that source will be skipped in the conversion and the elements converted in the last call with byte 16 containing a valid code will remain unchanged.

ABEND CONDITION:

A USER ABEND 20 will be issued if more than 20 input areas are specified.

Figure 19.

EXCONCAT FLOWCHART



Binary Data Description Table

POSITION	DESCRIPTION	VALUE
1-4	Number of Items in Table	Binary fullword
5-8	Total length of record described by below items	Binary fullword
9-41	Data Description Entries (1 for each declared variable)	
(9)	Variable Type	A - Accident variable B - Structure variable C - Common segment variable E - Roadway variable G - Gap record variable I - Intersection variable L - Political boundary variable M - Characteristic variable R - Railroad crossing variable S - Section record variable V - Vehicle variable
(10-11)	Variable Number	Zoned decimal
(12-15)	Variable Qualifiers	Zoned decimal
(16)	Data Type	Zoned decimal 1 = binary byte 2 = bit data 3 = alphanumeric character data
(17-20)	Input Location of variable (zero origin)	Binary fullword
(21-24)	Location of variable in user specified record (zero origin)	Binary fullword
(25-28)	Output length of specified variable (minus 1)	Binary fullword
(29-32)	Processing Constant #1 (used by T74209) When data type is 1 or 2 value is (output length - 1 *16) + 7. When data type = 3 value is the actual output length	Binary fullword

POSITION	DESCRIPTION	VALUE
(33-36)	Length of the input variable minus 1 for type 1 and type 3 data, or number of bits if type 2 data.	Binary fullword
(37-40)	Processing Constant #2 (used by T74209) When data type is 1 value is ((24 - (variable input length - 1)) *8) When data type is 2 value is the number of bits on the high order side of the binary field in which the variable resides. When data type is 3 constant contains binary zeroes and is not used.	Binary fullword
(41)	Record type for use of program #T74209.	Alphanumeric character A - Accident record (Note: Both A and V variables are physically located in the type A record. Type A records comprise the entire accident file. (HWY.FTR30130) B - Structure record C - Common record G - Gap record I - Intersection record L - Political boundary record M - Mileage characteristic record (Note: contains both M and E type records) R - Railroad crossing record S - Section record Note: The features file (HWY.FTR30100) is comprised of record types B,C,G,I,L,R, and S. The mileage characteristic file (HWY.FTR30030) is comprised of record types M and E, while the accident file (HWY.FTR30130) contains record types A and V.
42-74	Data Description Entry for the second mentioned	

POSITION	DESCRIPTION	VALUE
42 Continued	variable, same codes as above. Each mentioned variable will be associated with a 33 character field as described above.	

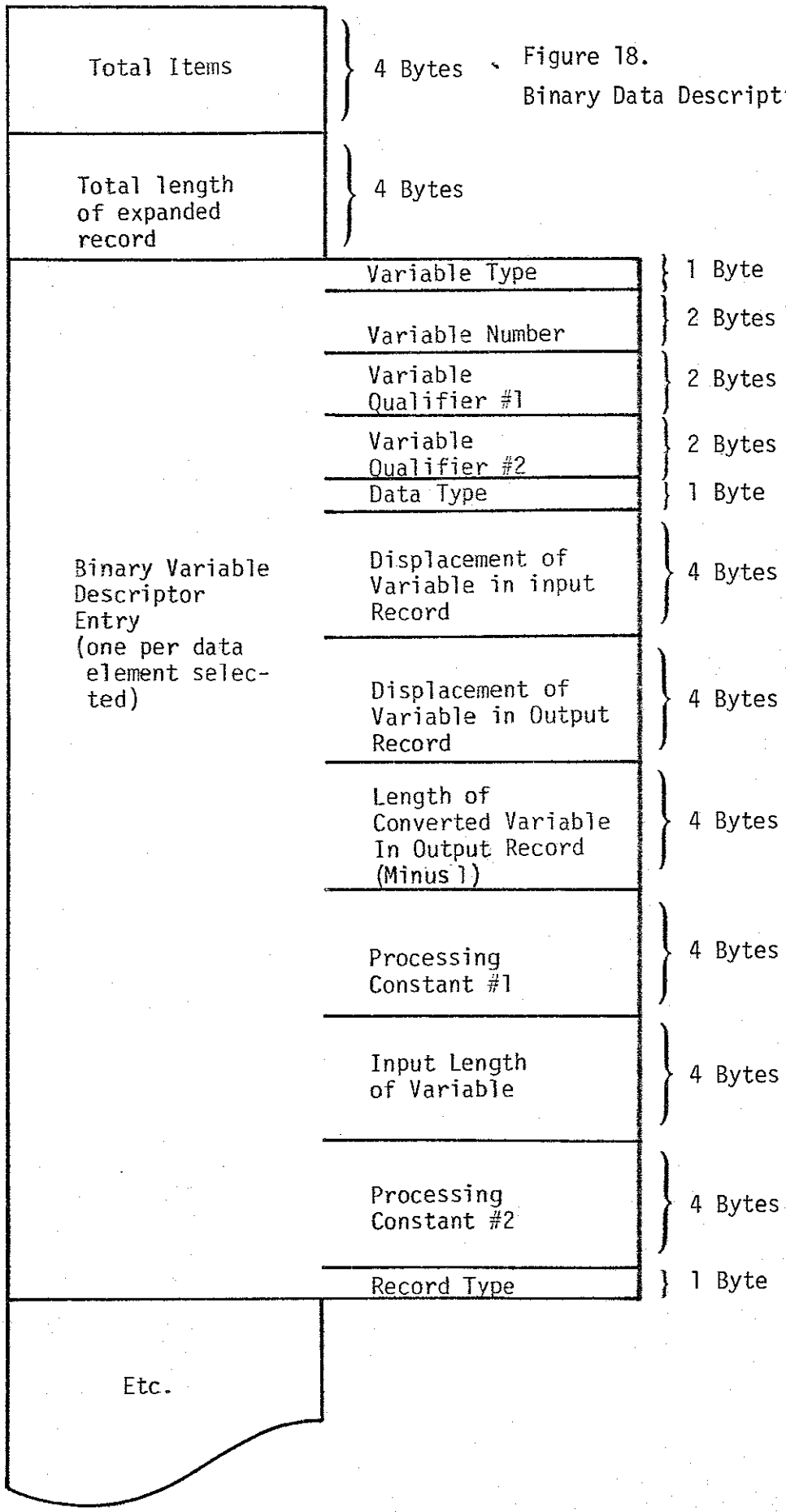


Figure 18.
Binary Data Description Table.

SUBJECT: COINRTE (T75009)

AUTHOR: Elizabeth Hamilton

PROGRAM TYPE: Callable Module

SOURCE LANGUAGE: COBOL

PURPOSE: To assign a value to the coinciding flag byte in standard header (the 15th byte) indicating whether this county route is common with any other routes at the designated milepost.

To obtain a list of all the common routes and their corresponding mileposts as a user selectable option.

USAGE: I. Data Elements Necessary to Call Module

A. STANDARD-HEADER

A sixteen byte field containing the county number, route number and milepost number.
Coinciding number is the 15th byte and will always be changed.

B. FLAGS

A two byte data item containing the error flag and the no list option flag.

C. ROUTE-LIST

A data item, 46 bytes in length, which contains the number of coinciding routes and a list of these routes with corresponding milepost. A maximum of five coinciding routes is assumed.
This data item can be omitted when NOLIST-OPTION = 1.

II. Example: (Given in COBOL)

A. DATA DIVISION

```
01 STANDARD-HEADER
   02 FILLER                PIC X(3)
   02 COUNTY-NUM            PIC 99.
   02 ROUTE-NUM             PIC 9(5).
   02 MILEPOST              PIC 9(4).
   02 COINCIDING-FLAG       PIC 9.
   02 FILLER                PIC X.
```

```
01 FLAGS.
   02 ERROR-FLAG              PIC 9.
   02 NOLIST-OPTION           PIC 9.

01 ROUTE-LIST
   02 ROUTE-COUNT             PIC 9.
   02 ROUTES OCCURS 5 TIMES.
      03 ROUTE-NUM            PIC 9(5).
      03 MILEPOST             PIC 9(4).
```

B. PROCEDURE DIVISION.

List Option:

```
MOVE ZERO TO NOLIST-OPTION.
CALL 'T75009 ' USING STANDARD-HEADER FLAGS ROUTE-LIST.
```

No List Option:

```
MOVE 1 TO NOLIST-OPTION.
CALL 'T75009 ' USING STANDARD-HEADER FLAGS.
```

C. JCL - Standard JCL Conventions are used.

III. Interpretation

The user must supply the county number, route number and milepost number in STANDARD-HEADER and set NOLIST-OPTION before calling this module.

ERROR-FLAG
- 0 - Valid input parameters
- 1 - Invalid input parameters
  (for example, if route type 5 or if county number, route number, or milepost number are <u>not</u> numeric.)

COINCIDING-FLAG
- 0 - No coinciding routes
- 1 - This is the highest order route and others are coinciding.
- 2 - This route is coinciding with one or more higher routes.

NOLIST-OPTION
- 1 - Do <u>not</u> output the coinciding routes and mileposts.
- 0 - Output the coinciding routes and mileposts.

For NOLIST-OPTION = 1, the ROUTE-LIST parameter will not be used or changed.
Otherwise, NOLIST-OPTION is assigned value 0 and ROUTE-LIST contains the following:

1) ROUTE-COUNT -- the number of coinciding routes.

2) A list of route number and milepost for every route that is common. This list is sorted in ascending order by route number (i.e., highest order route will always be first). If the system does not have sufficient information to compute milepost, one of two error values are possible:
   9999 Direction of mileposting is unknown to system.
   9998 Milepost range data in system is flagged as inaccurate.

For coinciding flag = 0 (meaning there are no coinciding routes) ROUTE-LIST will contain all zeroes.

SUBJECT: ACNTYRT (T75209)

AUTHOR: Elizabeth Hamilton

DATE: July 1977

PROGRAM TYPE: Callable Module with Parameters

SOURCE LANGUAGE: COBOL

PURPOSE: To conduct the standard five digit numeric encoding of route number to the standard six character alphanumeric encoding.

USAGE:

I. Data Elements Necessary to Call Module

A. ROUTE-NUMBER

A five digit (zone decimal) route number. Route type is the first digit, the subtype is the second digit and the route number is the third through fifth digits, right justified with leading zero.

B. ROUTE-CHAR.

The six character name equivalent to ROUTE-NUMBER.

C. ERROR-FLAG

A one byte data item indicating when ROUTE-NUM was invalid.

II. Example: (Given in COBOL)

A. DATA DIVISION.

```
01  ROUTE-NUMBER              PIC 9(5).

01  ROUTE-CHAR.
     05 ROUTE-CHAR-TYPE       PIC XX
     05 SEC-ROUTE-NUMBER      PIC X(4).
     05 PRIM-ROUTE-DESC
            REDEFINES SEC-ROUTE-NUMBER.
        10 SUBTYPE            PIC X.
        10 PRIM-ROUTE-NVM     PIC X(3).

01  ERROR-FLAG                PIC 9.
```

B. PROCEDURE DIVISION.

```
CALL 'T75209'  USING ROUTE-NUMBER
    ROUTE-CHAR ERROR-FLAG.
```

III. Interpretation

The user must supply a value for ROUTE-NUMBER before calling this module. ROUTE-CHAR and ERROR-FLAG are returned to calling program.

ERROR-FLAG

0	Valid input parameter
1	Non-numeric value for ROUTE-NUMBER
2	First digit of ROUTE-NUMBER is invalid as a route type

ROUTE-CHAR-TYPE

(first two characters of ROUTE-CHAR)

Ib	Interstate
US	Federal highway
NC	North Carolina primary route
SR	North Carolina secondary route

SUBTYPE

(third character of ROUTE-CHAR)

space	Regular routing
A	Alternate
B	Business
N	North
S	South
E	East
W	West
*	Spur (or special condition)
T	Truck
?	Unknown type

IV. JCL

Standard JCL conventions are used.

SUBJECT: CNTYRT (T75409, T75609)

AUTHOR: Rena Headen

PROGRAM TYPE: Subroutine

SOURCE LANGUAGE: COBOL

PURPOSE: The program uses the standard 6 character alphanumeric highway designation and the county that the highway is resident in to return to the user the 3 character binary identifier used in the merge system. In addition, the program replaces the six character alphanumeric highway designator with the 5 digit numeric code used by Planning and Research Branch.

USAGE:

I. Input:

This subroutine has two entry points depending on the operation(s) desired. Each entry point requires a different input.

For 'T75409' the program expects to find the standard 6 character route designator used by traffic engineering and the county in which this route resides.

For 'T75609' the program expects to find the 5 digit route designated used by the Planning and Research Branch, left justified, along with the county in which the route resides.

II. Output:

This subroutine provides 2 levels of output depending on the entry point selected by the user.

For 'T75409' the program converts the six character route designator (US 301) to a 5 digit numeric representation (20301). This numeric designator replaces the 6 character input string with the 5 digit numeric string. The program also outputs the 3 character binary representation of the county route where the first character contains the county number, (0-99) and the last 2 characters contain the binary representation of the numeric route designation.

III. Example of Usage (b = blank)

A. CNTYRT (T75409)

```
Ø1  COUNTY        PIC 99 VALUE Ø.(ALAMANCE)
Ø1  ACNTY-RT.     PIC X(6) VALUE 'Ibbb85'
Ø1  BCNTY-RT.
    Ø2  BCNTY   PIC X.
    Ø2  BROUTE  PIC XX.
```

Procedure Division.

Call 'T75409' using county ACNTY-RT BCNTY-RT.

Subsequent to the call the values are as follows:

ACNTY-RT contains 10085
BCNTY-RT contains hexadecimal '002765'

B. NCNTYRT (T75609)

```
Ø1  COUNTY  PIC 99 VALUE Ø.
Ø1  ACNTY-RT  PIC  X(6) VALUE '10085b'.
Ø1  BCNTY-RT.
    Ø2  BCNTY PIC X
    Ø2  BROUTE PIC XX.
```

Procedure Division

Call ' T75609' using county ACNTY-RT BCNTY-RT.

Subsequent to the call to NCNTYRT ACNTY-RT will be unchanged while BCNTY-RT will contain hexadecimal '002765'.

With either entry point, the program validates the input, and will set BCNTY-RT to zoned zeroes (hexadecimal 'FOFOFO') if input is not valid.

IV. Interpretation (b = blank)

Alphabetic Route Type	Numeric Route Type
Ib	1
bI	1
US	2
NC	3
SR	4

Alphabetic Route Subtype (1st character of the 4 character route code)	Numeric Route Subtype (1st digit of the 4 digit route code)
A (Alternate)	1
B (Business)	2
N (North)	3
S (South)	4
E (East)	5
W (West)	6
7 (Spur)	7
8 (Truck)	8
b	Ø

SUBJECT: BSORT (T75809)

AUTHOR: Von Johnson

PROGRAM TYPE: Callable Module

SOURCE LANGUAGE: Assembler

PURPOSE: To sort elements within a table which is specified in a calling program into ascending sequence on sort keys specified by the same calling program.

USAGE:

I. Data elements necessary to call module.

A. TABLE - The name of the area in the calling program where the information to be sorted is stored.

B. ENTRY-LENGTH - The length of one (1) element in TABLE represented as a fullword.

C. ENTRY-COUNT - The number of elements contained in TABLE fullword, signed, binary format.

D. DISPLACEMENT - The displacement into a element of the beginning of the most major sort key in a fullword, signed, binary format.

E. LENGTH - The length of the most major key in a fullword, signed, binary format.

Note: DISPLACEMENT AND LENGTH - May be repeated in pairs up to five (5) times with the fields getting less major each time they are repeated.

II. Example: (Given in COBOL)

A. DATA DIVISION

```
01 TABLE.
   02 TABLE-ENTRY OCCURS NNNN TIMES DEPENDING ON ENTRY-COUNT.
      03 MAJOR-SEQ PIC X(6).
      03 MINOR-SEQ PIC X(3).

01 PASSER COMP SYNC.
   02 ENTRY-LENGTH PIC S9(8) VALUE +13.
   02 DISPLACEMENT1 PIC S9(8) VALUE +1.
   02 LENGTH1 PIC S9(8) VALUE +6.
   02 DISPLACEMENT2 PIC S9(8) VALUE +11.
   02 LENGTH2 PIC S9(8) VALUE +3.
   02 ENTRY-COUNT PIC S9(8) VALUE ZEROES.
```

Note: ENTRY-COUNT is set to the number of elements (occurrences of TABLE-ENTRY) contained in table.

B. PROCEDURE DIVISION

BSORT may be used any number of times within the same program.

1. To sort the array TABLE (refer to A above) into ascending sequence on MAJOR-SEQ the following COBOL statement is required.

   CALL 'T75809' USING TABLE, ENTRY-LENGTH, ENTRY-COUNT, DISPLACEMENT1, LENGTH1.

2. To sort array TABLE into ascending with MAJOR-SEQ as the major sort key and MINOR-SEQ as the minor sort key, the following COBOL statement is required.

   CALL 'T75809' USING TABLE, ENTRY-LENGTH, ENTRY-COUNT, DISPLACEMENT1, LENGTH1, DISPLACEMENT2, LENGTH2.

3. The generalized form of the CALL required is as follows:

   CALL 'T75809' USING TABLE, ENTRY-LENGTH, ENTRY-COUNT, DISPLACEMENT1, LENGTH1, ..., DISPLACEMENT5, LENGTH5.

LIMITATIONS:

I. One element of table may not exceed 256 bytes.
II. No more than 5 sort keys may be specified.
III. Parameters ENTRY-LENGTH, ENTRY-COUNT, DISPLACEMENT1, LENGTH1,... etc. must all be fullword, signed, binary numbers.
IV. At least two (2) table elements must exist for BSORT to give the expected results.

USER ABEND CODES:

CODE	MEANING
01	No sort keys were provided for the sort.
02	A parameter has been omited in the calling program.
03	Too many sort keys have been used in the calling program.

EFFICIENCY CONSIDERATIONS:

I. When possible arrange sort keys in the order which you desire to sort them and specify them as one sort key rather than two or three, etc. (e.g. if you desire your sort keys to be VAR001, VAR003, VAR002, VAR004, major to minor, move them to the table entry in that order and sort as one key rather than separately).

SUBJECT: FORMAT (T76009)

AUTHOR: Rena Headen

PROGRAM TYPE: Callable Module

SOURCE LANGUAGE: COBOL

PURPOSE: To produce a format listing containing the variable names, respective lengths of the variables, and their respective locations within a record described by the binary descriptor table used as input to the program. (See BLDESC-T74009)

USAGE:

I. Input.

The program has one input argument, that is a binary descriptor table as described in the attached format.

II. Output.

The program provides a user format listing on SYSOUT of the record being described by the binary data description table.

EXAMPLE:

Variable Name	POSITION	LENGTH	TYPE
A01	1-2	2	AN
A05	3-5	3	N
A06	6-11	6	N
A09	12	1	N
A02	13-17	5	AN
A03	18-21	4	AN
A14	22-26	5	N
A37	27	1	N
A38	28-33	6	N
A04	34-41	8	N
A39	42-43	2	N
A07	44-45	2	N
A12	46-47	2	N
A16	48-51	4	N
A13	52	1	N
A20	53-54	2	N
A21	55-56	2	N
A22	57-58	2	N
A23	59-60	2	N
V03 (01)	61	1	N
C04	62-65	4	AN

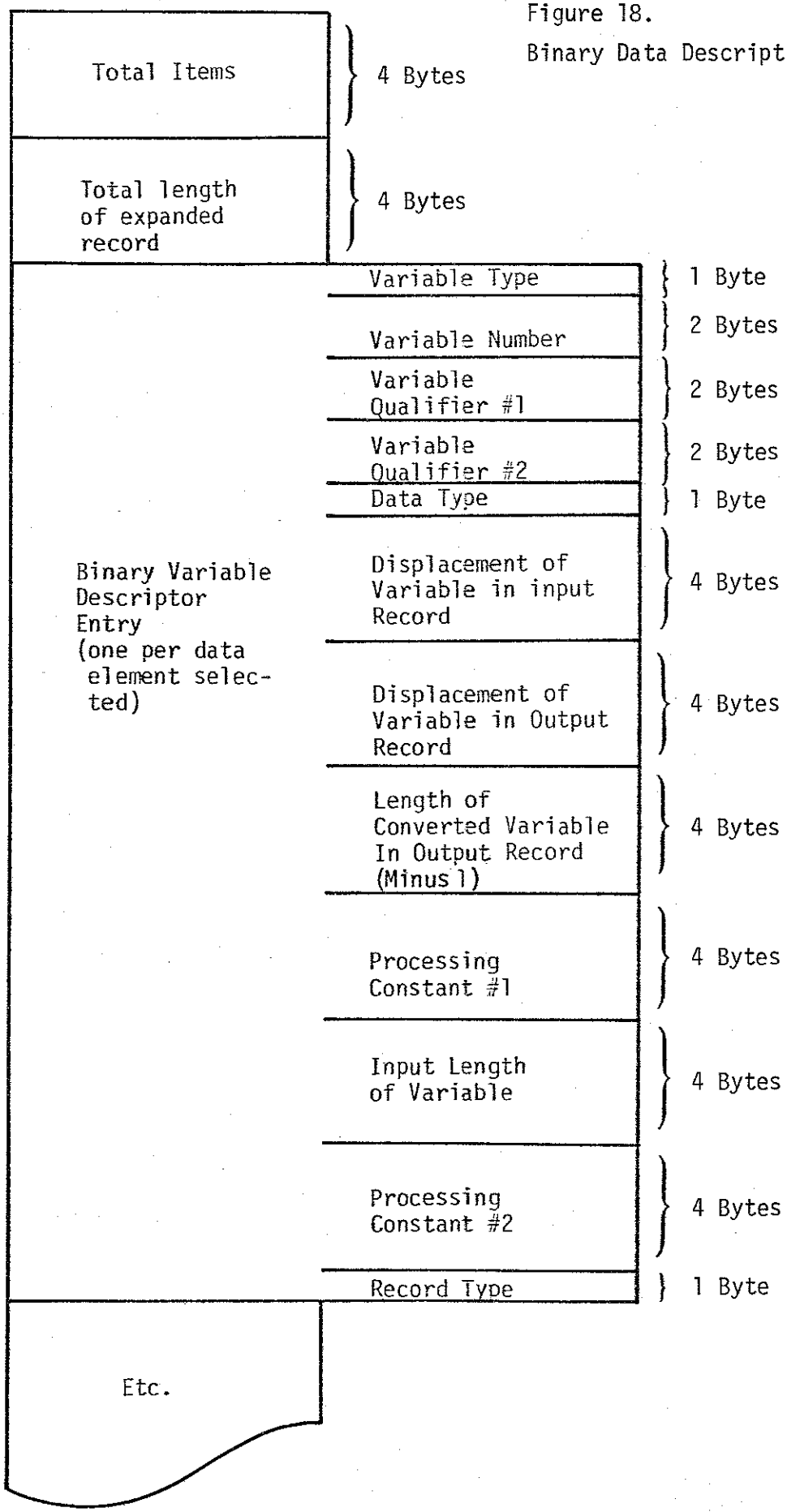
Binary Data Description Table

POSITION	DESCRIPTION	VALUE
1-4	Number of Items in Table	Binary fullword
5-8	Total length of record described by below items	Binary fullword
9-41	Data Description Entries (1 for each declared variable)	
(9)	Variable Type	A - Accident variable B - Structure variable C - Common segment variable E - Roadway variable G - Gap record variable I - Intersection variable L - Political boundary variable M - Characteristic variable R - Railroad crossing variable S - Section record variable V - Vehicle variable
(10-11)	Variable Number	Zoned decimal
(12-15)	Variable Qualifiers	Zoned decimal
(16)	Data Type	Zoned decimal 1 = binary byte 2 = bit data 3 = alphanumeric character data
(17-20)	Input Location of variable (zero origin)	Binary fullword
(21-24)	Location of variable in user specified record (zero origin)	Binary fullword
(25-28)	Output length of specified variable (minus 1)	Binary fullword
(29-32)	Processing Constant #1 (used by T74209) When data type is 1 or 2 value is (output length - 1 *16) + 7. When data type = 3 value is the actual output length	Binary fullword

POSITION	DESCRIPTION	VALUE
(33-36)	Length of the input variable minus 1 for type 1 and type 3 data, or number of bits if type 2 data.	Binary fullword
(37-40)	Processing Constant #2 (used by T74209) When data type is 1 value is ((24 - (variable input length - 1)) *8) When data type is 2 value is the number of bits on the high order side of the binary field in which the variable resides. When data type is 3 constant contains binary zeroes and is not used.	Binary fullword
(41)	Record type for use of program #T74209.	Alphanumeric character A - Accident record (Note: Both A and V variables are physically located in the type A record. Type A records comprise the entire accident file. (HWY.FTR30130) B - Structure record C - Common record G - Gap record I - Intersection record L - Political boundary record M - Mileage characteristic record (Note: contains both M and E type records) R - Railroad crossing record S - Section record Note: The features file (HWY.FTR30100) is comprised of record types B,C,G,I,L,R, and S. The mileage characteristic file (HWY.FTR30030) is comprised of record types M and E, while the accident file (HWY.FTR30130) contains record types A and V.
42-74	Data Description Entry for the second mentioned	

POSITION	DESCRIPTION	VALUE
42 Continued	variable, same codes as above. Each mentioned variable will be associated with a 33 character field as described above.	

Figure 18.
Binary Data Description Table.



SUBJECT: WRITER (T76209)

AUTHOR: Von Johnson

PROGRAM TYPE: Callable Module

PURPOSE: To write fixed blocked files of any proper LRECL-BLKSIZE configuration, as defined by information supplied through linkage parameters or on a DD card at run time.

USAGE:

I. Data Elements Necessary to Call Module

A. CLOSE-FLAG - A one byte alphanumeric field which is set to 'C' when the output file is to be closed. If module is called with any value other than 'C', the module assumes that a record is to be written. No record is written during a call for which CLOSE-FLAG equals 'C'.

B. OUTPUT-STRING - A data item of any format which contains the data to be written.

C. RECORD-LENGTH (optional) - A fullword binary data element containing the LRECL of the records to be written. If RECORD-LENGTH is not used, the length is determined by the LRECL coded for file ZONEOUT. This will normally but not necessarily be equivalent to the length of OUTPUT-STRING.

D. MAX-BLOCK (optional) - A fullword binary data element containing the maximum allowable blocksize for file ZONEOUT. If the MAX-BLOCK parameter is used for the initial call to WRITER, the actual BLKSIZE for the file will be returned to the user program in this area (during the initial call only).

II. Example: (Given in COBOL)

A. DATA DIVISION

```
01  CLOSE-FLAG PIC X VALUE 'X'.
01  OUTPUT-STRING PIC X(23) VALUE '12345678901234567890123'.
01  RECORD-LENGTH PIC S9(8)
      COMP SYNC VALUE +23.
01  MAX-BLOCK PIC S9(8)
      COMP SYNC VALUE  +6400.
```

B. PROCEDURE DIVISION

1. Setting up the output file and writing the initial records.

Characteristics of the output file ZONEOUT are determined during the first call to the module WRITER. ZONEOUT is also opened and the first record written to the file during the initial call. Note that CLOSE-FLAG must not be equal to 'C' except for closing the file. Two separate ways to initiate the output file ZONEOUT are available.

a. When the LRECL and BLKSIZE have been predetermined by the programmer, the following form of the call may be used:

```
CALL 'T76209' USING CLOSE-FLAG OUTPUT-STRING
```

If this form is used on the initial call, the LRECL and BLKSIZE information is picked up from the ZONEOUT DD card and therefore must be coded as below:

```
//ZONEOUT DD UNIT=DISK,VOL=SER=XXXXXX,
//   DISP=(NEW,KEEP),DSN=XXXX,
// DCB=(LRECL=25,BLKSIZE=2500),SPACE=(TRK,N)

//ZONEOUT DD SYSOUT=A,DCB=(LRECL=23,BLKSIZE=23)
```

If the first DD statement is used with the call above and the values of CLOSE-FLAG and OUTPUT-STRING are those in IIA., the data written will be "12345678901234567890123XX" where XX = the first two bytes of core immediately following the field OUTPUT-LENGTH. This feature will allow extra space to be left in records for later addition or padding where the LRECL is less than an acceptable minimum.

b. WRITER will set the LRECL and BLKSIZE if the following form of the call is used:

```
CALL 'T76209' USING CLOSE-FLAG OUTPUT-STRING
   RECORD-LENGTH MAX-BLOCK
```

When this form is used the LRECL is set to the value of RECORD-LENGTH and BLKSIZE is set to the largest value not exceeding MAX-BLOCK which is evenly divisible by RECORD-LENGTH. LRECL and BLKSIZE information coded on DD statement ZONEOUT will be ignored; however, other DD parameters such as UNIT must still be coded.

Once the LRECL and BLKSIZE have been set in the DCB the area MAX-BLOCK is set to the actual BLKSIZE used.

If the call above is made using the variables as defined in IIA, the LRECL for ZONEOUT will be set to 23 and the BLKSIZE will be set to 6394. After the initial call, the value of MAX-BLOCK will also be equal to 6394.

Programming note: When a data description table is obtained by calling module BLDESC, the second fullword of the table contains the length of the decoded data string and may be used directly to provide the LRECL for this module. Therefore, it is possible to create an output file without actually knowing the LRECL and BLKSIZE beforehand. A format for the file can be listed by calling module FORMAT and the LRECL and BLKSIZE obtained by displaying RECORD-LENGTH and MAX-BLOCK after the initial call.

2. Writing subsequent output records

To write a record, the CLOSE-FLAG can be any value except 'C'. Subsequent calls where the CLOSE-FLAG is not equal to 'C' cause the data contained in OUTPUT-STRING to be written to file ZONEOUT.

COBOL statements necessary to write records are as follow:

```
CALL 'T76209' USING CLOSE-FLAG OUTPUT-STRING
```

The longer form may also be used, however, the last two parameters are ignored for all calls except the initial one.

3. Closing the output file.

Since no records are written during the call to close the file the second linkage parameter (OUTPUT-STRING) is not necessary and may, but does not have to be eliminated. To close the file the CLOSE-FLAG must be set to 'C'.

COBOL statements necessary to close the output file are as follows:

```
MOVE 'C' TO CLOSE-FLAG
CALL ' T76209'USING CLOSE-FLAG
```

LIMITATIONS

I. The maximum output LRECL for the module is 1000 bytes.

II. The module is not reentrant. Once the file is closed it cannot be reopened during the same execution of the program. Issuing a call in the write record format under these conditions will have the effect of writing to a file after it has been closed. The limitation was imposed to guard against overwriting output files.

Note: Limitations I and II can be readily overcome with very minor program modifications.

COMMENTS

I. JCL requirements:

Normal DD parameters such as UNIT, VOL=SER=,DSN,DISP must be provided for file ZONEOUT (DDNAME=ZONEOUT) for either form of call. If the file is initialized using the short form of the call (i.e., CALL 'T76209' USING CLOSE-FLAG OUTPUT-STRING) the DCB parameters LRECL and BLKSIZE must also be coded. If these parameters are coded for ZONEOUT when it is initialized using the long form of the call (i.e., CALL 'T76209' USING CLOSE-FLAG OUTPUT-STRING RECORD-LENGTH MAX-BLOCK) they will be ignored.

II. DCB parameters coded in the module are:

```
DDNAME=ZONEOUT,
 DSORG=PS,
 MACRF=PM,
 RECFM=FB.
```

LRECL and BLKSIZE must be provided as described in the USAGE section above.

III. The space (core) required for this module is 312 bytes.

User Programs

This section presents documentation on the three user programs (T77009, T77209, T77409) produced under this project.

PROGRAM WRITE-UP
RURAL PRIMARY HIGH ACCIDENT CONCENTRATION

SUBJECT: Sliding Scale (T77009)

AUTHOR: Elizabeth Hamilton

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program selects variable length high accident segments on the rural primary highways system and summarizes roadway characteristics and accident statistics. In addition, the user may specify a listing of selected accident cases directly below appropriate concentration segment. The program uses a technique called "sliding scale" whereby a minimum segment length is placed on the computerized mileposted plot of the roadway and is then moved until specified accident criteria are met. This program allows for a variety of flexible parameters to be used in the concentration calculations including the options to exclude Y line accidents based on distance and to exclude accidents occurring within a specified distance of intersection.

USAGE: I. Inputs

A. Parameter cards

The program expects two parameter cards input through DDNAME = READER. Parameter Card "A" contains selected options and limit values used in concentration calculations. Parameter card "B" selects counties to be analyzed and determines whether individual accidents will be listed.

The specifications for these parameter cards areattached. Parameters are input through DDNAME = READER.

```
//READER DD *
```

B. Mileage Characteristics File

This program uses values from the mileage characteristics file to locate homogeneous segments and to describe certain characteristics or critical segment listing. The RETCHAR module (T73009) used to retrieve from system characteristics file requires that the characteristics file be identified through DDNAME = CHARDAF and the corresponding index through DDNAME = CHARINDX.

```
//CHARDAF DD DSN=HWY.FTR30030,DISP=OLD
//CHARINDX DD DSN=HWY.FTR30040,DISP=OLD
```

C. Features File

When the user requests elimination of road segments near intersections, this program uses the RETFEAT module (T73209) to retrieve intersection records from the features file. This module expects the features file through DDNAME=FEATDAF and its index through DDNAME=FEATINDX

```
//FEATDAF DD DSN=HWY.FTR30100
//FEATINDX DD DSN=HWY.FTR30110
```

D. Accident File

The RETACC module (T73409) used to retrieve data from the system accident file expects the accident file through DDNAME=ACCDAF and its index through DDNAME=ACCINDX.

```
//ACCDAF DD DSN=HWY.FTR30130,DISP=OLD
//ACCINDX DD DSN=HWY.FTR30140,DISP=OLD
```

II. Output

A report of all segments defined as critical by the input parameters is output through DDNAME=PRINTER.

```
//PRINTER DD SYSOUT=A
```

PROGRAM OPERATION

This program consists of three basic parts.

1. Driver portion - reads and validates parameter cards
   - prepares and prints report headings
   - Supervises flow of control to other portions
   - determines which countries are analyzed

2. Homogeneous Segment Module

   - process a single route
   - builds global table containing ADT for every rural segment
   - build global table of homogeneous segments
     A homogeneous segment is a continuous length of rural pavement with same
     number of lanes
     access control divided/undivided
     If the user requests elimination of intersections, gaps are created where intersection occur.

3. Sliding Scale module

First all accidents occurring on a homogeneous segment of the current county route are checked for date.

All those occurring within the outer time period and end dates are placed in table. Y line accidents with distance greater

than specified are eliminated. Evaluation is done at this time about whether it is a selected type accident and whether it occurred within the inner time period.

Once all accidents on homogeneous segment have been placed in table, the segment is analyzed by a sliding scale technique.

When the slide portion is evaluated and not critical, the slide is advanced to a new position overlapping the previous segment. The head of slide is moved to the larger of a) milepost of next accident or b) previous head position plus slide increment.

When the slide portion is critical, the current slide position is lengthened by advancing the head of slide forward by specified slide increment. When the segment becomes non-critical or a limit is reached (maximum segment, end of homogeneous pavement, gap with no accidents, etc) finally this segment is reported and, if requested, individual cases are listed.

A. Program Specifications

1. Time Period

a. The time periods specified run from the first day of the "start month" up to, but not including the first day of the "end month".

b. When the inner period is used, the warrant criteria for accidents occurring during its time limit must also be met before a segment will be incremented.

2. Physical Boundary Consideration

a. Homogeneous roadway segments are bounded by:

County Line
City Line
Change in roadway classification

Valid classes are 2ØØ, 3ØØ, 4UØ, 4DN, 4DP, and 4DF
(see parameter card for codes)

Intersections - Secondary and/or Primary
This is an optional feature.

b. Segments are also bounded by a maximum length.

c. Segments may also be stopped when a specified number of increments have been made to the length without outer period accident being encountered within the added length. This additional parameter is used only on outer time period accidents.

3. Roadway Segments

a. Segments begin at the starting milepost of a route and extend to its end.

b. A segment, other than the starting one for a route, will be moved as described in sliding scale module.

c. Accidents occurring on a segment include both the beginning and ending mileposts of the segment.

4. Calculations

a. Exposure (E) is calculated in 100 million vehicle miles.

$$E = \frac{ADT * 365 * TIME\ (YEARS) * LENGTH(MILES)}{100{,}000{,}000}$$

When a sliding segment extends beyond the Roadway File's mile-posted segment and the ADT changes, a summing of the individual exposures will be performed and this value will be used in rate calculations for the sliding segment. An '*' will appear beside the ADT printed for those segments where the summing technique is used.

b. Calculated Accident Rate (R)

$$R = \frac{\text{No. Accidents}}{E}$$

c. Critical Accident Rate (R_c)

$$R_c = r_a + K\left(\sqrt{\frac{r_a}{E}}\right) + \frac{.5}{E}$$

r_a - The State Average for the particular Roadway class.

K - K-value for selected Confidence Limit

99.5%	2.576
97.5%	1.960
95.0%	1.645
90.0%	1.282

5. Warrant Criteria

a. To begin incrementing a segment the warrant criterion(s) must be met. Incrementing will continue so long as the warrant criterion(s) are still met and no physical boundary has been reached.

(1) When minimum accidents / mile is given on the parameter card, the criterion used is that the calculated accidents / mile for the segment after adjusting to annual value must equal or exceed the given parameter value.

(2) When the Confidence Limit is given on the parameter card, the criterion used is that the calculated accident rate (R) must equal or exceed the calculated critical accident rate (R_c).

B. Input

1. Parameter Card 'A'

Column			
1	Card Type	Code an 'A' to designate first parameter card.	Required
2-15	Outer Period		Required
2-3	Begin Month	Starting month: 01-12	Required
4-5	Begin Year	Starting year: 71-99	Required
6-7	End Month	End month: 01-12	Required
8-9	End Year	End year: 71-99	Required
10-12	Confidence Limit	Selected Confidence Limit 99.5, 97.5, 95,0., or 90.0	Optional
13-15	Min.Acc/Mile	Minimum accidents per mile to be used as warrant criteria 00.1-99.9	Optional
16-29	Inner Period		Optional
16-17	Begin Month	Starting month: 01-12	Required
18-19	Begin Year	Starting year: 71-99	Required
20-21	End Month	End Month: 01-12	Required
22-23	End Year	End year: 71-99	Required
24-26	Confidence Limit	Selected Confidence Limit 99.5, 97.5, 95.0, or 90.0	Optional
27-29	Min.Acc/Mile	Minimum accidents per mile to be used as warrant criteria 00.1-99.9	Optional
30-31	Max. No. of Increments	Maximum number of delta increments allowed without encountering another accident. 00-99	Optional
32-33	Sliding Scale Segment Increment	Length of increment value for a segment. .01-.99	Required
34-36	Min. Segment Length	Minimum segment length 0.01-9.99	Required
37-39	Max. Segment Length	Maximum segment length 0.01-9.99	Required

Column			
40-42	Primary Intersection no. of feet for exclusion	Distance in feet to exclude from segmentations at primary intersections. 001-999	Optional
43-45	Secondary Intersection No. of feet for exclusion	Distance in feet to exclude from segmentations at secondary intersections 001-999	Optional
46	Accident Type	Selected Accident Type T - Total accidents F - Fatal accidents I - Non-fatal injury accidents N - Night accidents W - Wet accidents R - Run off road accidents	Required
47	Highway Type	Selected Highway Type P - All primary routes I - Interstate routes (I) U - Federal routes (US) N - State routes (NC)	Required
48-77	State Average	Code State averages for critical accident rates for each of the 6 roadway types. 000.01-999.99	Optional
48-52	2 Lane Roadway (2ØØ)		Required
53-57	3 Lane Roadway (3ØØ)		Required
58-62	4 or More Lanes, Undivided (4UØ)		Required
63-67	4 or More Lanes, Divided, No Access Control (4DN)		Required
68-72	4 or More Lanes, Divided, Partial Access Control (4DP)		Required
73-77	4 or More Lanes, Divided, Full Access Control (4DF)		Required
78-80	Y Line No. of feet maximum	Distance in feet, include all Y line accident, with distance less than given value	Optional

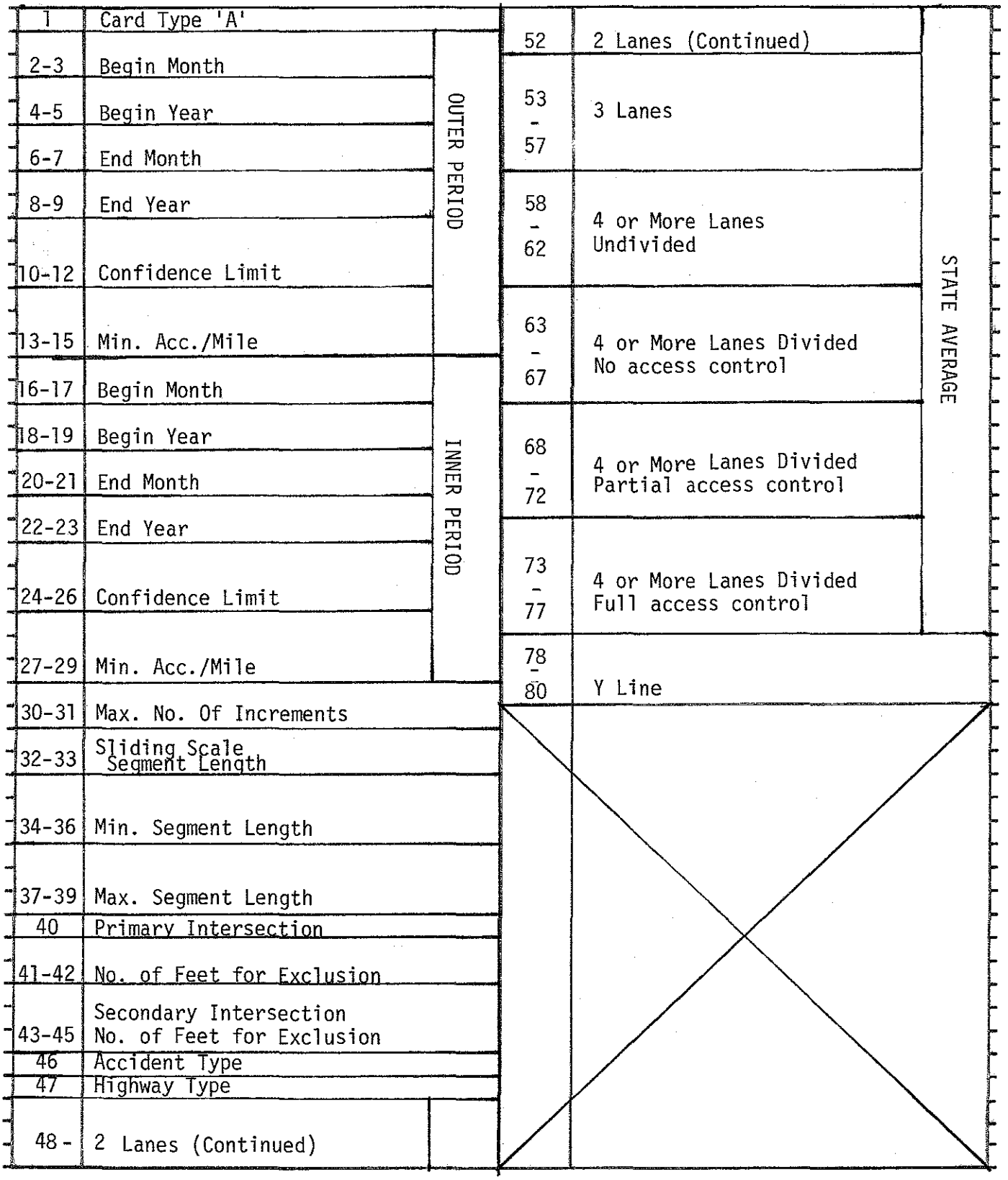
NOTE: Leading zeroes are required.
Decimal points are <u>not</u> to be coded. They are only implied.

2. Parameter Card 'B'

Column			
1	Card Type	Code a 'B' to designate second parameter card.	Required
2	Accident List	Code 'L' when individual accident listing is desired	Optional
3-80	County Code	Code the selected county codes. You may select from 1 to 39 different counties. Codes must be listed in numerical order.	Required

NOTE: When an entire statewide run is desired code the word STATEWIDE in columns 3-11 and leave columns 12-80 blank.

Figure 20.
Sliding Scale Parameter Cards.



1	Card Type 'B'		
2	Accident List	51-52	
3-4	County Code 1		
5-6	County Code 2		
	Etc.		
		75-76	County Code 37
		77-78	County Code 38
		79-80	County Code 39

C. Output

1. Each page will be numbered consecutively and this number will appear in upper right hand corner on line 1.

2. The date the listing was produced will be given on line 2 in upper left hand corner.

3. On either side of the heading, the values supplied by the parameter card will be printed.

   - Outer Period's Confidence Limit and Min. Acc/Mile
   - Outer Period's limit on number of increments made to a segment without finding additional accidents
   - Inner Period's Confidence Limit and Min. Acc/Mile
   - Segment's minimum and maximum length
   - Scale increment value
   - Primary and Secondary Intersection distance to be excluded

   Those parameters not selected for an individual run will be left blank.

4. The Highway Type selected will be printed on line 4. The selectable types are: 'PRIMARY', 'INTERSTATE', 'FEDERAL', and 'STATE'.

5. The Accident Type selected will be printed on line 5. The selectable types are: 'TOTAL ACCIDENTS', 'FATAL ACCIDENTS' 'NON-FATAL INJURY ACCIDENTS', 'WET ACCIDENTS', 'NIGHT ACCIDENTS', and RUN-OFF ROAD ACCIDENTS'.

6. The Outer Time Period will appear on line 7 in the center of the page.

7. The Inner Time Period will appear on line 8 in the center of the page. If an inner period is not selected, this line will be blank.

8. The county code and name will appear on line 11 to the right side.

9. A single line of segment information will consist of the following:

   a. Route number

   b. Roadway class - Lanes, Divided, Access Control

      Code values are:

      Lanes - L

      '2' - 2 lanes
      '3' - 3 lanes
      '4' - 4 or more lanes

Divided - D

'U' - Undivided Highway
'D' - Divided Highway

Access Control - C

'N' - No access control
'P' - Partial access control
'F' - Full access control

c. Milepost From gives starting milepost for segment.

d. Milepost Thru given ending milepost which is included in segment.

e. Length is the length of segment.

f. ADT given Average Daily Traffic for segment.

g. Outer Period

(1) Total Acc given total number of all accidents occurring within outer time period for the segment.

(2) Select Acc gives total number of all selected type accidents occurring within outer time period for the segment.

(3) Acc per mile-yr. gives the calculated annual accident per mile frequency of selected type accidents.

(4) Cal Acc Rate gives calculated accident rate for segment.

(5) Critical Acc Rate gives calculated critical accident rate for segment.

h. Inner Period

The columns under the Inner Period contains the same calculated information for accidents occurring within its specified period as did the Outer Period columns. If an Inner Period is not requested, these columns will be left blank.

10. When accident listing option is request, an individual line of accident information will consist of the following:

a. Report Number of accident
b. Milepost number of accident
c. Road-On code
d. Distance to nearest intersection or county line.
e. Dir - direction
f. Refer. Road - Reference road for accident
g. Date accident occurred

h. Day of the week accident occurred
i. Time accident occurred
j. Injury total by class

F - Fatal injury total
A - Class A injury total
B - Class B injury total
C - Class C injury total

k. Property Damage amount
l. Acc Type - Accident Type code
m. Obj. Hit - Object Struck code
n. No. Veh. - Number of vehicles involved in accident report. Pedestrians and bicycles are not included.
o. Conditions

Rd - Road condition code
Wea - Weather condition code
Lt - Light condition code

p. Drink Invol. - Whether drinking was reported for any driver involved in the accident.

SUBJECT: INTERSECT (T77209)

AUTHOR: Fischer

PROGRAM TYPE Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE:

The intersect program is used to cluster accidents about a point on the roadway. The program lists selected characteristic information, then optionally lists some descriptive statistics on each accident, and optionally lists some summary statistics about all the accidents clustered about that point. The point on the roadway can be specified by the user as an intersection, railroad crossing, bridge, pipe culvert, sign, pedestrian walkway, city street, overhead sign, ferry, tunnel, miscellaneous, reinforced concrete culvert, or retaining wall as specified in a user generated parameter.

USAGE:

I. Input.

The program required seven input files:

1 Mileposted accident file(HWY.FTR30130),DDnameACCDAF
2 Mileposted accident index(HWY.FTR30140),DDnameACCINDX
3 Mileposted mileage inventory file(HWY.FTR30030),DDnameCHARDAF
4 Mileposted mileage inventory infex(HWY.FTR30040),DDnameCHARINDX
5 Mileposted features file(HWY.FTR30100),DDnameFEATDAF
6 Mileposted features index(HWY.FTR30110),DDnameFEATINDX
*7 User parameter file DDnamePARM

*(Note: A separate PARM record is input for each roadway segment and/or feature to be analyzed. There is no program limit to the number of parameter records to be input for a given run. See Features Parameter File Format for specific information on parameter records.

II. Output.

The program outputs a printer listing
(DDNAME=OUTFILE),
reflecting the options specified in the parameter file.

III. JCL

```
//EXEC PGM=T77209, REGION=178K
//SYSOUT DD SYSOUT=A
//OUTFILE DD SYSOUT=A
//CHARINDX DD DSN=HWY.FTR30040,DISP=SHR
//CHARDAF  DD DSN=HWY.FTR30030,DISP=SHR
//FEATINDX DD DSN=HWY.FTR30110,DISP=SHR
//FEATDAF  DD DSN=HWY.FTR30100,DISP=SHR
//ACCINDX  DD DSN=HWY.FTR30140,DISP=SHR
```

(Cont' on following page)

```
//ACCDAF    DD DSN=HWY.FTR30130,DISP=SHR
//PARM      DD *
             parameter cards as desired
```

IV. Error Conditions.

'ACCIDENT VARIABLE NOT AVAILABLE'

Explanation: The program makes use of certain accident variables in the course of the features analysis. The information on these variables is obtained from the master descriptor table each time the program is run through the use of 'BLDESC'. If changes have been made regarding the accident variables in the master description table such that some of the variables needed by the program are not present in the master descriptor table, the program will output the above message on 'OUTFILE' and go to normal termination.

'MILEAGE VARIABLE NOT AVAILABLE'

A needed mileage variable is not available to the program for the same reason outlined above.

'BAD-PARM-CARD'

A parameter item provided to the program an erroneous code. The parameter card in error is displayed to the right of the message.

'ERROR IN ACC SPECIFICATION'

Probable system error. Denotes an error where the county, route and milepost from a retrieved "Feature" record generates an invalid county route and milepost calling sequence when used for subsequent accident record retrieval.

Features: Parameter File Format

POSITION	VALUE
1-2	County of Road Segment to be Scanned 00 = Alamance 99 = Yancey 'XX' if all counties are desired
3	Route Type of Road Segment 1 = Interstate 2 = US highway 3 = NC highway 4 = SR road 'X'= All route types
4-7	Route Number - Actual route number or 'XXXX' if all numbers desired
8-11	Beginning Milepost The lower limit milepost of the roadway segment to be scanned (exclusive). This field must be numeric. 0000 always defines the beginning point of a county route. Coded in miles and hundredths of miles. Decimal point is assumed left 2 places.
12-15	Ending Milepost The upper limit milepost of the segment of roadway to be scanned (inclusive). Coded same as above.
16-19	Tolerance Must be numeric or assumed to be Ø. Contains the number of miles and hundredths of miles on each side of a point inside of which accidents will be analyzed for that point.
20-23	Threshold Number Must be numeric or assumed to be Ø. Number of accidents necessary for the program to output the analysis for a given feature.
24	List Indicator Set to 1 for the listing of each individual accident, left blank for no listing.

POSITION	VALUE
25	Summary Indicator Set to 1 to obtain summary output. Left blank to omit summary information
26-27	Year to begin analysis Must be numeric or assumed to be Ø.
28-29	Month to Begin analysis
30-31	Year to End Analysis Same as above
32-33	Month to End Analysis Same as above.
34	Y-Line Indicator Set to 'y' if y-line accidents are to be included in the analysis, blank if y-line accidents are to be excluded.
35-38	Y-Line Distance Radius within which y line accidents will be included in the analysis. Coded in feet, supply leading zeroes. Zero assumed if left blank.
39	Type of Feature Used to Define Points for Analysis I - Intersection B - Bridge P - Pipe culvert S - Sign W - Pedestrian walkway H - City street overhead sign F - Ferry T - Tunnel M - Miscellaneous C - Reinforced concrete culvert R - Retaining wall X - Railroad crossing

PROGRAM: MERGE (T77409)

AUTHOR: Dennis Ryan

PROGRAM TYPE: Executable Program

SOURCE LANGUAGE: COBOL

PURPOSE: This program is designed to merge data across file boundaries within the DOH system into a fixed length character format record for subsequent listing or analysis.

USAGE:

1. Inputs

   A. Accident File Index (DD NAME ACCINDX)
   B. Features File Index (DD NAME FEATINDX)
   C. Mileage File Index (DD NAME CHARINDX)
   D. Direct Access Accident File (DD NAME ACCDAF)
   E. Direct Access Features File (DD NAME FEATDAF)
   F. Direct Access Mileage File (DD NAME CHARDAF)
   G. Parameter File (DD NAME PARMFILE)

2. Outputs

   A. Error Message File (DD NAME ERRFILE)
   B. User Specified Output File (DD NAME ZONEOUT)
      blocksize = the nearest multiple of record length
      < 19000
   C. Format of the resultant output record (DD NAME SYSOUT)

3. Parameter Statements

   All parameter cards contain a 'parameter type' portion (COLS 1-15) and an 'information field' (COLS 16-80). Formats are as follows:

   A. Edit Parameter (optional)

1-15	'EDIT'	Left justified
		Must appear first in parameter file when present. Causes the program to syntax check the parameters, but not process the data.

B. PRI-RECTYPE Parameter (1 required)

1-15	'PRI-RECTYPE'	Left justified
16		Record type A - accident record B - bridge record R - railroad crossing record S - coinciding segment record I - intersection record L - line information record G - gap record C - common record M - mileage record

C. SEC-RECTYPE Parameter (optional)

1-15	'SEC-RECTYPE'	Left justified
16	Secondary record type	Same type codes as above. May appear only once in a parameter deck
17	Blank	
18-21	Tolerence (± distance)	0-9999 Coded in miles and hundredths of miles. Denotes the radius around the primary point which constitues a match.

D. SUBSET-SEGMENT Parameter (optional)
Maximum of 50. Controls which primary records are read by county-route LO and Hi milepost

1-15	'SUBSET-SEGMENT'	Left justified
16-17	County	County for subset
18-22	Route	Route for subset in standard numeric format (i.e. 10085 or 20301)
24-27		Low milepost limit for subset, coded in miles and hundredths of miles.
29-32		High-milepost limit for subset, coded in miles and hundredths of miles.

E. Orientation Parameter (optional)
When accident variables are specified, this parameter describes whether the accident file is to be accessed in accident or vehicle mode. (i.e. one record per vehicle or one record per accident).

1-15	'ORIENTATION'	Left justified
16	A - accident mode V - vehicle mode	

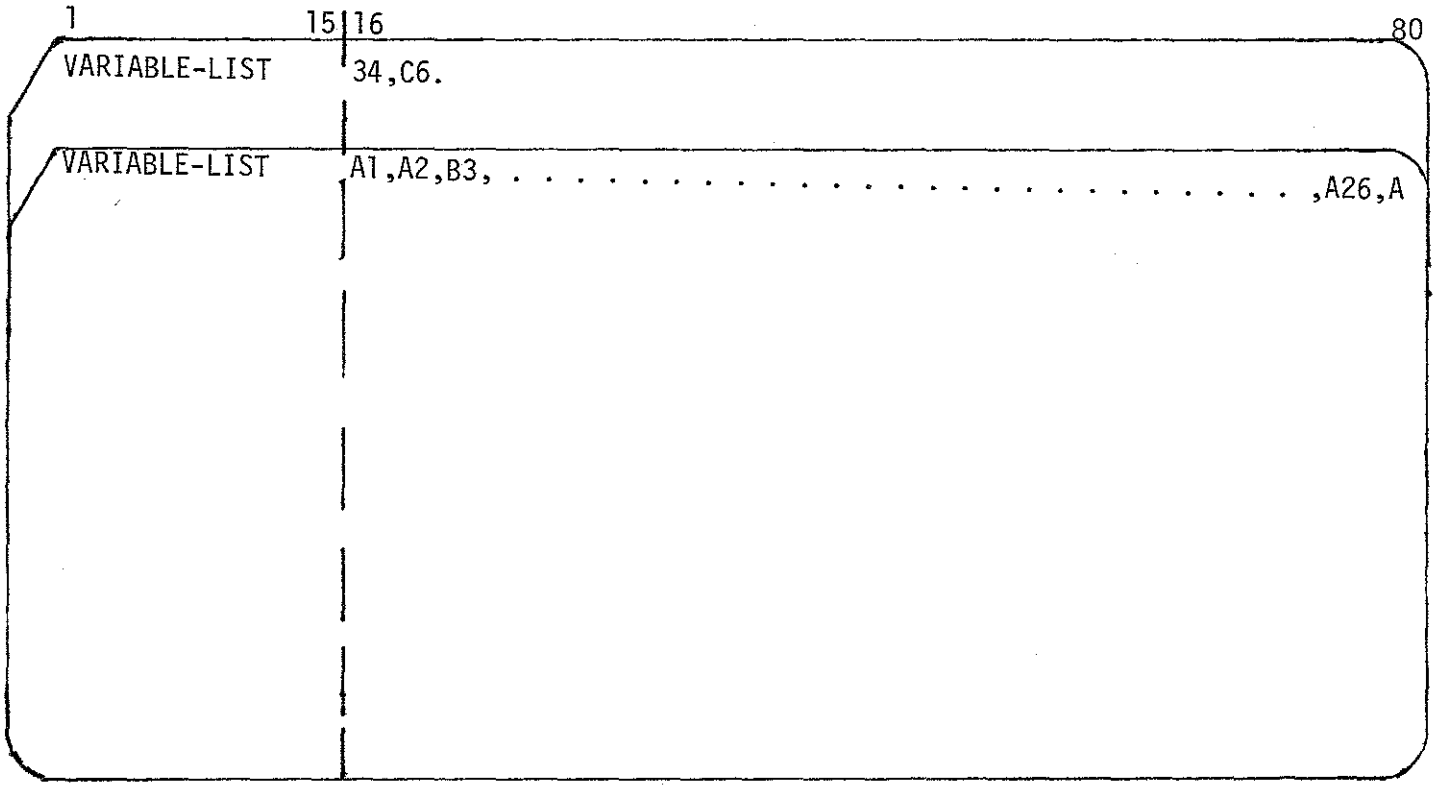
F. PROCESS-TYPE Parameter (optional)

1-15	'PROCESS-TYPE'	Left justified
16		Ø - no merged record will be output for a primary record unless all specified input information is present. Ø is the default value.
		1 - a merged output record will be produced for each primary record located. When secondary information is not available, these variables will contain blanks.

G. VARIABLE-LIST Parameter (required)

1-15	'VARIABLE-LIST'	Left justified
		Maximum of two cards
16-80		Contains the variable names for the merge process. All variable names are separated by commas. No imbedded blanks are permitted.
		If more than 1 card is necessary, the list should proceed through column 80 of Variable-List card (1) and begin in COL 16 of Variable-List card (2) with no imbedded blanks.

Example



G. END Parameter (required)

1-15	'END'	Denotes the end of the parameter deck. Must be the last card in the deck.

4. User Considerations and Restrictions

A. No more than 5 variable types can be specified for a run.

B. The user must specify a primary file. This file will be the file governed by the SUBSET-SEGMENT parameter.

C. Only 1 variable type may be specified in the primary file. The remaining variable types found for that file may not be specified for any other file.

D. The user may optionally specify a secondary record type, and a radius around the primary point (i.e. $\pm$ .10 miles). This feature allows the user to match all accidents occurring within in $\pm$ .10 miles from a bridge, for example.

E. Auxillary records are selected using the secondary milepost described under (D). This allows, for example, that once a bridge accident is located, the characteristics of the roadway at the point of the accident would be selected not necessarily those at the point of the bridge.

F. Accident information (A and V type variables) must be specified as either the primary or secondary file.

5. JCL Example:

```
//    EXEC      PGM=T77409
//ZONEOUT   DD  DSN=XXX,DISP=(NEW,KEEP),UNIT=XXX,DCB=XXX
//ERRFILE   DD  SYSOUT=A
//ACCINDX   DD  DSN=HWY.FTR30140
//ACCDAF    DD  DSN=HWY.FTR30130
//FEATINDX  DD  DSN=HWY.FTR30110
//FEATDAF   DD  DSN=HWY.FTR30100
//CHARINDX  DD  DSN=HWY.FTR30040
//CHARDAF   DD  DSN=HWY.FTR30030
//PARMFILE  DD *
 COL 1              COL16
   PRI-RECTYPE        B
   VARIABLE-LIST      B1,B7,M4,M6,M7,E3(1).
   SUBSET-SEGMENT     0010085 0000 9999
   END
  //
```

Sample Output

```
PRI-RECTYPE     B

VARIABLE-LIST   B1,B7,M4,M6,M7,E3(1),E13(1).

SUBSET-SEGMENT  0010085 0000 9999

WARNING:  -END- PARAMETER WAS
OMITTED FROM PARAMETER LIST.

PARAMETER PROCESSING COMPLETE

** MERGE PROCESS COMPLETE ***

NUMBER OF OUTPUT RECORDS:
000010

LOGOCAL RECORD LENGTH (BYTES)
00040

OUTPUT BLOCKSIZE      (BYTES)
19000
```