TEST PROCEDURES AND DATA INPUT TECHNIQUES FOR SKID TESTING

by

Stephen N. Runkle
Highway Research Analyst

Virginia Highway Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia
Department of Highways and the University of Virginia)

Charlottesville, Virginia

April 1974
VHRC 73-R45

SUMMARY

The purpose of this report is to describe the system for obtaining and handling skid data, including skid testing procedures and data input procedures. While all testing devices used in Virginia are covered (other than the British portable tester), the emphasis is on those procedures to be followed in operating the new skid trailer being obtained by the Materials Division.

The testing procedures discussed include (1) the determination of test sites, (2) scheduling of testing, (3) the number of tests to obtain per site, and (4) the use of control site including the frequency of testing.

The discussion of data input procedures includes a description of the data elements collected during a skid test, the appropriate input forms to use, and coding techniques as outlined in Appendices A and B.

TEST PROCEDURES AND DATA INPUT TECHNIQUES FOR SKID TESTING

by

Stephen N. Runkle
Highway Research Analyst

INTRODUCTION

The Virginia Department of Highways principally through the Virginia Highway Research Council, has been collecting skid data for several years. Several testing devices have been utilized in collecting skid test data, including the stopping distance car, British portable tester, and, most recently, the skid trailer at the Research Council. In addition, the Department is obtaining a second skid trailer to be operated by the Materials Division for survey skid testing purposes. The great volumes of data generated by the skid trailer require that automated systems be developed if the data are to be most efficiently utilized. Automated processing is also necessary because the greatest utilization of skid test data requires that they be combined with data from the other large data bases such as pavement data, accident data, and traffic volume data. Work has been under way at the Research Council for some time to develop coordinated data bases for several purposes, including the storage, retrieval and integrated use of skid test data.

Also, the skid testing work done in the past has led to the development of various test procedures including the establishment of control sites, the number of tests to run per site, and the determination of what constitutes a test site.

PURPOSE AND SCOPE

The purpose of this report is to describe the overall system for obtaining and handling skid data. Included are discussions concerning testing procedures and data input procedures. Later reports will deal with outputs from the skid data system as well as outputs from integrated data systems. While all testing devices used in Virginia are covered (other than the British portable tester), the emphasis is on those procedures to be followed in operating the new skid trailer being obtained by the Materials Division. This report does not deal with the procedures used to manually reduce strip chart analog data to skid number form, or to convert stopping distance to skid numbers. Also, it does not cover the calibration procedures to be used with each testing device.

TESTING PROCEDURES

The general category of testing procedures can be broken down into several categories, each of which is discussed below. These include (1) the determination of test sites, (2) scheduling of testing, (3) the number of tests to obtain per site, and (4) the use of control sites including the frequency of testing.

Test Site Determination

General survey skid test data should be obtained on the basis of surface mix sections as determined from the automated pavement data system. This system is complete for all of the interstate and arterial systems, and a portion of the primary system. Annually, operators of skid testing equipment will receive an updated report of surface mix sections to assist them in their testing program.

Figure 1 shows surface mix sections for Rt. 33 in Rockingham County as obtained from the Staunton District report. As shown, each of the sections is located by beginning and ending milepoints. Notice also that a section includes lanes in one direction only. The term filler section as shown under special feature indicates this section of the route is not state maintained and thus should not be tested, or that this section overlaps another route in which case skid test data should be coded with the other route number. Either of these conditions is specified in the graphic logs or detailed pavement listings which will be available to the skid test crew.

As mentioned above, the pavement data system presently does not have complete information regarding mix types on the entire primary system. However, the system does indicate when the mix type is not specified. When testing is to be done where the mix type is not specified it will be the responsibility of the skid test vehicle operators to determine sites and provide basic information as input to the pavement data system. In essence, the operator will have to determine through visual examination of the roadway the limits (beginning and ending milepoints) of mixes and if possible the mix type. This is particularly true when mix types for an entire route are not specifiedas shown in Figure 2. The mix type and the section limits data should be submitted as input to the pavement data system as described in the Pavement Information Data System Code Manual. Of course, at times errors may be found in the information contained in the pavement data. In this event, it will be the responsibility of the operators to submit correct data to the pavement data system as prescribed in Corrections Procedures — Pavement Data Systems.*

---

* Also, there will be instances in which new pavements are encountered that are not in the pavement system. These sections likely will be included in the system as it is normally updated, but as added assurance it will be the responsibility of the skid trailer operators to indicate the location of new pavements and the fact that they are new.

FIGURE 1

SURFACE MIX SECTION DIRECTION REPORT FOR THE STAUNTON DISTRICT MARCH 1, 1974

ROUTE 33 RESIDENCY OF HARRISONBURG COUNTY OF ROCKINGHAM SYSTEM - PRIMARY

DIRECTION NE	DIRECTION A	DIRECTION WS	MILE POINT RANGE	DIRECTION/LANE	HIGHWAY TYPE	SURFACE MIX TYPE	SPECIAL FEATURE	COMPLETION DATE
I			.00 TO .12	EAST-BOUND	TWO-LANE	P-3	NONE	
I			.12 TO 2.20	EAST-BOUND	THREE-LANE	S-5	NONE	1965
I			2.20 TO 8.00	EAST-BOUND	FOUR-LANE	S-5	NONE	1970
I			8.00 TO 8.81	EAST-BOUND	FOUR-LANE	S-5	NONE	1966
I			8.81 TO 9.13	EAST-BOUND	FOUR-LANE	S-5	NONE	1969
I			9.13 TO 15.84	EAST-BOUND	FOUR-LANE	S-5	NONE	1967
I			15.84 TO 18.38	EAST-BOUND	FOUR-LANE	MS-5	NONE	1972
I			18.38 TO 22.23	EAST-BOUND	FOUR-LANE	MS-5	NONE	1971
I			22.23 TO 24.59	EAST-BOUND	FOUR-LANE	NOT SPECIFIED	FILLER SECTION	
I			24.59 TO 37.58	EAST-BOUND	TWO-LANE	NOT SPECIFIED	NONE	
I			37.58 TO 45.76	EAST-BOUND	TWO-LANE	MI-2	LIMESTONE BLEND	1972
	I		.00 TO .12	WEST-BOUND	TWO-LANE	P-3	NONE	
	I		.12 TO 2.20	WEST-BOUND	THREE-LANE	S-5	NONE	1965
	I		2.20 TO 8.00	WEST-BOUND	FOUR-LANE	S-5	NONE	1970
	I		8.00 TO 8.88	WEST-BOUND	FOUR-LANE	S-5	NONE	1966
	I		8.88 TO 9.03	WEST-BOUND	FOUR-LANE	S-5	NONE	1969
	I		9.03 TO 9.35	WEST-BOUND	FOUR-LANE	S-5	NONE	1966
	I		9.35 TO 9.41	WEST-BOUND	FOUR-LANE	S-5	NONE	1969
	I		9.41 TO 11.50	WEST-BOUND	FOUR-LANE	S-5	NONE	1966
	I		11.50 TO 15.74	WEST-BOUND	FOUR-LANE	S-5	NONE	1967
	I		15.74 TO 18.38	WEST-BOUND	FOUR-LANE	MS-5	NONE	1972
	I		18.38 TO 18.40	WEST-BOUND	FOUR-LANE	S-1	NONE	1963
	I		18.40 TO 21.44	WEST-BOUND	FOUR-LANE	MS-5	NONE	1971
	I		21.44 TO 22.23	WEST-BOUND	FOUR-LANE	S-4	NONE	1959
	I		22.23 TO 24.59	WEST-BOUND	FOUR-LANE	NOT SPECIFIED	FILLER SECTION	
	I		24.59 TO 37.58	WEST-BOUND	TWO-LANE	NOT SPECIFIED	NONE	
	I		37.58 TO 45.76	WEST-BOUND	TWO-LANE	MI-2	LIMESTONE BLEND	1972

1700

FIGURE 2

SURFACE MIX SECTION DIRECTION REPORT FOR THE STAUNTON DISTRICT MARCH 1, 1974

ROUTE 11 RESIDENCY OF LEXINGTON COUNTY OF ROCKBRIDGE SYSTEM - PRIMARY

1701

DIRECTION NE A WS	MILE POINT RANGE	DIRECTION/LANE	HIGHWAY TYPE	SURFACE MIX TYPE	SPECIAL FEATURE	COMPLETION DATE
I	.00 TO 5.59	ALL-LANES	FOUR-LANE	NOT SPECIFIED	NONE	
I	5.59 TO 6.09	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	6.09 TO 15.46	ALL-LANES	FOUR-LANE	NOT SPECIFIED	NONE	
I	15.46 TO 15.69	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	15.69 TO 15.73	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	15.73 TO 15.83	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	15.83 TO 16.54	ALL-LANES	THREE-LANE	NOT SPECIFIED	FILLER SECTION	
I	16.54 TO 17.88	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	17.88 TO 19.09	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	19.09 TO 19.34	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	19.34 TO 24.61	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	24.61 TO 24.89	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	24.89 TO 25.46	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	25.46 TO 25.92	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	25.92 TO 26.07	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	26.07 TO 26.33	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	26.33 TO 26.37	ALL-LANES	FOUR-LANE	NOT SPECIFIED	NONE	
I	26.37 TO 29.69	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	29.69 TO 29.86	ALL-LANES	THREE-LANE	NOT SPECIFIED	NONE	
I	29.86 TO 31.59	ALL-LANES	TWO-LANE	NOT SPECIFIED	NONE	
I	31.59 TO 33.66	ALL-LANES	FOUR-LANE	NOT SPECIFIED	FILLER SECTION	

A bridge, when the surface is not the same as that of the adjacent pavement, constitutes a separate test site. Information on bridges does not presently exist in the pavement data system, but it will be easy for the operators to identify bridge sites when testing and code input information accordingly.

Scheduling of Testing

In general, testing can be broken down into routine survey testing and special site testing. Special site testing refers to sections of roadway of interest or concern such as locations having a high occurrence of wet pavement accidents or sections having some particular treatment for skid resistance, such as grooving.

With regard to routine survey testing, the normal procedure is to complete the testing on a given route for an entire county prior to testing on any other route. The most efficient testing procedure is to complete testing lane by lane for a long distance rather than testing all lanes site by site. The distance chosen may be the entire length of a route through a county or some shorter distance, but should be chosen to facilitate turning the skid testing equipment around. For example, on the interstate system the distance chosen would be dependent on the location of interchanges and/or open crossovers.

Once the distance to be tested is established, the operators should review the pavement information to determine the beginning and ending milepoints for all test sites (surface mix sections) within the distance chosen. Knowing the precise beginning and ending milepoints for each site before testing is important in order to ensure that skid tests are related to the correct pavement sites. Skid data will be related to pavement sites through the use of a computer by determining the county, route, and milepoint for the skid test and comparing these data to the same data for surface mix sections. Thus, all skid tests run on a given surface mix section must have milepoints greater than the beginning milepoint for the surface mix section and less than the ending milepoint. Tests falling exactly on the beginning or ending milepoint for a section cannot be related to a particular section. Since the operators will have the capability of setting the milepoint reading at any time, it should not be difficult to ensure that the conditions above above are met. Of course, it goes without saying that milepoint information for each test should be as correct as possible, i.e., it should correspond to that milepoint information shown in the graphic logs maintained by the Traffic and Safety Division.

As explained above, complete pavement data may not always be available. In this case the operator will have to review the distance to be tested and determine the site locations prior to testing.

Special site testing should be done to the extent possible during normal survey testing. When this is not possible, care should be taken to ensure that at least an entire site is tested. For instance, if a location is to be tested because of a high occurrence of wet pavement accidents, the operators should determine the limits of the surface mix section the accident location falls within and test the entire section.

Number of Tests Per Site

The normal number of tests to run in survey testing is five tests per lane per mile, with a minimum of five tests per lane. Thus, for the third surface mix section shown in Figure 1, which includes all lanes of Rt. 33 in the east direction (thus two lanes of a four lane highway), the number of tests would be 29 per lane (5.8 miles x 5 = 29). For the first section shown in Figure 1, five tests should be run in each lane even though the section is only 0.12 mile long.

As mentioned previously, bridges having surfaces different from that of the adjacent pavement constitute separate sites. For these bridge sites a minimum of three tests per lane should be run.

For special sites such as accident locations, a minimum of five tests per lane should be run over the area of interest plus any additional tests required to test the entire pavement site. For example, again referring to Figure 1, if the accident location was between milepoints 4.0 and 4.5 in the eastbound lanes, the total number of tests per lane would be determined as shown below.

(1) Tests in accident location between 4.0 and 4.5	=	5
(2) Tests in surface mix section between milepoints 2.20 and 4.0 (1.8 x 5)	=	9
(3) Tests in surface mix section between milepoints 4.50 and 8.00 (3.5 x 5)	=	17
		31

Control Sites

The use of control sites will be a routine part of all skid testing with trailers for several reasons, including the need:

(1) to determine variations in skid resistance due to seasonal or other environmental factors,

(2) to determine testing variability over long periods of time, and

(3) to help ensure the accuracy of the data.

The control sites can be broken down into two basic groups; those sites on a test loop and daily control sites. A group of sites composing a test loop (with perhaps a second group composing a secondary test loop) will be selected prior to the start of the survey skid testing program, and this test loop should be tested (5 tests per site) upon leaving or returning to the home base for the operators. Thus, the primary test loop will be near Lynchburg and will be tested each morning and afternoon during test days unless the crew remains overnight. On overnight trips the loop should be tested the morning of departure and the afternoon of return. Special codes will be utilized to identify test loop sections as explained in Appendix A.

Daily control sites will be utilized when the crew remains out overnight. When this occurs, one lane in the last surface mix section tested (other than a bridge) will be selected and coded as explained on page A-14 of Appendix A. The following morning the control site established the previous afternoon will be tested prior to the resumption of the normal survey testing. The same number of tests (minimum of 5) should be run on the daily control site each time it is tested.

DATA INPUT PROCEDURES

Figure 3 shows those items of information collected for each skid test. (Notice that the last two items are collected only for those tests run on the control loop.) A detailed description of what is required for each item and the correct coding technique is given in the "Skid Test Data System Code Manual", Appendix A. The correct procedure for data input will vary depending on the testing device used. The correct procedure for each device is discussed below.

Skid Test Car

Skid test data obtained utilizing the skid test car will be manually recorded using the skid test input Form DS-01 (Figure 4). This form allows for 36 skid tests provided the information requested on the first three lines remains constant. If more than 36 tests are recorded, a new input form is required with the three top lines filled in. A new input form is also required each time any of the information in any of the top three lines changes.

Columns	Item
1	District
2-3	Residency
4-5	County
6-9	Route Number
10-12	City/Town/County
13	Test Vehicle
14	Test Wheel
15-17	Calibration
18-19	Operators
20-25	Date of Test
26-27	Time of Test
28	Weather Condition
29-31	Air Temperature
32-34	Surface Temperature
35-36	Tread Depth
37	Direction
38	Lane
39	Data Type
40-43	Milepoint
44-46	Speed
47-49	Skid Number
50	Pavement Condition*
51-52	Time Since Last Rain*

* Required for test run on control loop only.

Figure 3. Skid test record layout.

VHRC Skid Trailer

Two methods of data collection are possible when using the Virginia Highway Research Council skid trailer. Data may be reduced manually from the strip chart, in which case input Form DS-01 would be used as discussed above. The second method of data collection involves the use of the analog to digital converter and paper tape unit that automatically records skid test information on punched paper tape. If the automatic data collection device is used, several items of data are manually set for recording on paper tape. The coding techniques for these several items are explained in the "Digital Data Recording System Code Manual", Appendix B.

DS-01

VIRGINIA DEPARTMENT OF HIGHWAYS

SKID DATA INPUT FORM

DISTRICT	RESIDENCY	COUNTY	ROUTE	CITY/TOWN	VEHICLE	WHEEL	CALIBRATION
1	2-3	4-5	6-9	10-12	13	14	15-17

OPERATORS	MONTH – DAY – YEAR	TIME	WEATHER	AIR TEMPERATURE	SURFACE TEMPERATURE
18-19	20-25	26-27	28	29-31	32-34

TREAD DEPTH	DIRECTION	LANE	DATA TYPE	PAVEMENT CONDITION	TIME SINCE LAST RAIN
35-36	37	38	39	50	51-52

NOTE: THE DATA CONTAINED ABOVE SHOULD BE DUPLICATED FOR EACH SET OF MILEPOINT, SPEED AND SKID NUMBER DATA BELOW AND ON THE REVERSE SIDE.

MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49
MILEPOINT	SPEED	SKID NO.	MILEPOINT	SPEED	SKID NO.
40-43	44-46	47-49	40-43	44-46	47-49

Figure 4. Form DS-01.

Materials Division Skid Trailer

On the new skid trailer to be operated by the Materials Division, milepoint, speed, and skid number will be automatically recorded in digital form on printed paper tape along with a test identification number. All other items shown in Figure 3 must be manually recorded on Form DS-02 (Figure 5) according to the coding instructions given in the "Skid Test Data System Code Manual" (Appendix A). After testing, Form DS-02 must be stapled to the printed tape with both the paper tape and Form DS-02 being identified by a tape identification number showing the last two digits of the year followed by the sequence number for that year. Sequence numbers will begin at 1 each January 1 and be utilized in ascending order for all tapes during the year. Whenever any of the items required on Form DS-02 changes, the current paper tape should be removed and a new form filled out to be submitted with the next paper tape.

DS-02

VIRGINIA DEPARTMENT OF HIGHWAYS

SKID DATA INPUT FORM

TAPE NUMBER_____

DISTRICT	RESIDENCY	COUNTY	ROUTE	CITY/TOWN	VEHICLE	WHEEL	CALIBRATION
1	2-3	4-5	6-9	10-12	13	14	15-17

OPERATORS	MONTH – DAY – YEAR	TIME	WEATHER	AIR TEMPERATURE	SURFACE TEMPERATURE
18-19	20-25	26-27	28	29-31	32-34

TREAD DEPTH	DIRECTION	LANE	DATA TYPE	PAVEMENT CONDITION	TIME SINCE LAST RAIN
35-36	37	38	39	50	51-52

Figure 5. Form DS-02.

APPENDIX A

SKID TEST DATA SYSTEM
CODE MANUAL FOR SURVEY DATA

by

Stephen N. Runkle
Highway Research Analyst

Virginia Highway Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia
Department of Highways and the University of Virginia)

Charlottesville, Virginia

March 1974

INTRODUCTION

The purpose of the data system for which this manual was prepared is to provide information regarding the slipperiness of pavements in Virginia's highway network. The system is designed to handle data obtained with any of the several skid testing devices used by the Virginia Department of Highways.

There may be instances for which the manual provides no code. For example, a new employee not yet assigned a code may be assigned to operate the skid testing equipment. When no code is provided, the person recording the data should attach a note indicating what the data are and that no code exists. It will be the responsibility of the Materials Division to provide new codes as needed, to update the code manual accordingly, and to notify the Data Processing Division of the new codes.

Code the district, residency, and county as indicated below.

District (column 1)

District	Code
Bristol	1
Salem	2
Lynchburg	3
Richmond	4
Suffolk	5
Fredericksburg	6
Culpeper	7
Staunton	8

Residency (columns 2-3)

District	Residency	Code
Bristol	Wise	01
	Abingdon	03
	Lebanon	04
	Tazewell	06
	Wytheville	08
	Jonesville	58
Salem	Hillsville	09
	Christiansburg	11
	Martinsville	12
	Rocky Mount	13
	Salem	14
	Bedford	16

District	Residency	Code
Lynchburg	Chatham	17
	Halifax	18
	Dillwyn	19
	Appomattox	20
	Amherst	22
Richmond	South Hill	23
	Amelia	24
	Petersburg	25
	Chesterfield	26
	Sandston	27
	Ashland	28
Suffolk	Franklin	31
	Waverly	32
	Suffolk	33
	Norfolk	34
	Williamsburg	35
	Accomac	36
Fredericksburg	Saluda	37
	Warsaw	39
	Fredericksburg	40
	Bowling Green	41
Culpeper	Louisa	42
	Charlottesville	43
	Culpeper	45
	Warrenton	46
	Fairfax	47
	Manassas	48
	Leesburg	49
Staunton	Lexington	50
	Staunton-Verona	53
	Harrisonburg	54
	Edinburg	55
	Luray	56

County (columns 4-5)

County	Code	County	Code
Arlington	00	Greene	39
Accomac	01	Greensville	40
Albemarle	02	Halifax	41
Alleghany	03	Hanover	42
Amelia	04	Henrico	43
Amherst	05	Henry	44
Appomattox	06	Highland	45
Augusta	07	Isle of Wight	46
Bath	08	James City	47
Bedford	09	King George	48
Bland	10	King & Queen	49
Botetourt	11	King William	50
Brunswick	12	Lancaster	51
Buchanan	13	Lee	52
Buckingham	14	Loudoun	53
Campbell	15	Louisa	54
Caroline	16	Lunenburg	55
Carroll	17	Madison	56
Charles City	18	Mathews	57
Charlotte	19	Mecklenburg	58
Chesterfield	20	Middlesex	59
Clarke	21	Montgomery	60
Craig	22	Nansemond	61
Culpeper	23	Nelson	62
Cumberland	24	New Kent	63
Dickenson	25	Northampton	65
Dinwiddie	26	Northumberland	66
Essex	28	Nottoway	67
Fairfax	29	Orange	68
Fauquier	30	Page	69
Floyd	31	Patrick	70
Fluvanna	32	Pittsylvania	71
Franklin	33	Powhatan	72
Frederick	34	Prince Edward	73
Giles	35	Prince George	74
Gloucester	36	Prince William	76
Goochland	37	Pulaski	77
Grayson	38	Rappahannock	78

County	Code	County	Code
Richmond	79	Stafford	89
Roanoke	80	Surry	90
Rockbridge	81	Sussex	91
Rockingham	82	Tazewell	92
Russell	83	Warren	93
Scott	84	Washington	95
Shenandoah	85	Westmoreland	96
Smyth	86	Wise	97
Southampton	87	Wythe	98
Spotsylvania	88	York	99

Note: For the cities shown below use the county codes indicated.

City	County Code
Virginia Beach	75
Hampton	27
Newport News	94
Norfolk	64
Portsmouth	64
Chesapeake	64

Route Number (columns 6-9)

Record the standard route number as shown in the graphic log. When two routes are in the same physical location, i.e., overlapping routes, record the predominate route as shown in the graphic log. The predominate route is the one for which the information is recorded in the graphic log, with blank spaces appearing in the log for the other routes.

Prefixes for special routes, such as alternate routes, should be coded in column six as shown below.

Route Type	Code
Alternate	A
Bypass	B
Commercial (business)	C
Alternate Y	Y
Z	Z
Interstate	I

When testing the control loop code L in Column 6, and code the site number in Columns 7-9. Thus, site 1 on the control loop should be coded L001. Obviously, it will be necessary to assign site identification numbers to all control loop sites.

City/Town/County (columns 10-12)

For commercial routes only, record the appropriate city or town three digit code as shown below. For noncommercial routes, record the appropriate two digit county code (shown above) in the last two columns, and record zero in the first column.

District	County	Route*	City/Town	Code
Bristol	Wise	C023	Pound	285
	Wise	C023	Wise	329
	Scott	C023	Gate City	221
	Scott	C058	Gate City	221
	Washington	C091	Glade Spring	222
	Scott	C421	Gate City	221
	Tazewell	C460	Cedar Bluff	184
	Tazewell	C460	Richlands	148

1715

District	County	Route*	City/Town	Code
Salem	Franklin	C220	Rocky Mount	157
	Henry	C220	Ridgeway	290
	Bedford	C297	Bedford	141
	Bedford	C460	Bedford	141
	Montgomery	C460	Christiansburg	154
	Montgomery	C460	Blacksburg	150
Lynchburg	Charlotte	C015	Keysville	248
	Pittsylvania	C029	Chatham	187
	Pittsylvania	C029	Danville	108
	Campbell	C029	Lynchburg	118
	Amherst	C029	Amherst	163
	Nelson	C029	Lovingston	
	Charlotte	C360	Keysville	248
	Appomattox	C460	Pamplin City	277
	Prince Edward	C460	Pamplin City	277
Richmond	Brunswick	C058	Lawrenceville	251
	Hanover	C360	Mechanicsville	
	Amelia	C360	Amelia	
	Nottoway	C360	Burkeville	181
	Nottoway	C460	Burkeville	181
Suffolk	Accomac	C013	Accomac, Onley	160
	Northampton	C013	Eastville	214
	Northampton	C013	Cheriton	188
	Northampton	C013	Exmore	217
		C013	Virginia Beach, Norfolk, and Chesapeake	122
		C017	Portsmouth	124
		C058	Virginia Beach	134
Fredericksburg	Spottsylvania	C001	Fredericksburg	111
	Spottsylvania	C017	Fredericksburg	111
	Stafford	C017	Fredericksburg	111
	Caroline	C301	Bowling Green	171

District	County	Route*	City/Town	Code
Culpeper	Loudoun	C015	Leesburg	253
	Fauquier	C015	Warrenton	156
	Culpeper	C015	Culpeper	204
	Orange	C020	Orange	275
	Albemarle	C029	Charlottesville	104
	Madison	C029	Madison	256
	Culpeper	C029	Culpeper	204
	Fauquier	C211	Warrenton	156
	Rappahannock	C211	Washington	322
	Albemarle	C250	Charlottesville	104
	Rappahannock	C522	Washington	322
Staunton	Augusta	C011	Staunton	132
	Rockbridge	C011	Lexington	117
	Rockingham	C033	Elkton	216
	Rockingham	C042	Dayton	206
	Page	C211	Luray	154

Test Vehicle (column 13)

Code the test vehicle used as shown below.

Test Vehicle	Code
Virginia Highway Research Council Skid Trailer	0
Virginia Highway Research Council Skid Car	1
British Portable Tester	2
Virginia Department of Highways Skid Trailer	3

Test Wheel (column 14)

When the test vehicle is the Virginia Highway Research Council Skid Trailer code 1 if the test wheel is the left wheel, and code 2 if the test wheel is the right wheel.

For all other test vehicles code 1.

Calibration (columns 15-17)

For the test vehicles for which no calibration is used code 000. For the test vehicles for which calibrations are necessary code the last digit of the year the calibration was performed in column 15, and the number of the calibration for that year in columns 16 and 17. For instance, the twenty-fifth calibration performed for the Virginia Highway Research Council skid trailer during 1972 would be coded 225.

Operators (columns 18-19)

Column 18 should contain a code for the equipment operator, and column 19 should contain a code for the test data recorder. Listed below are codes for personnel who may normally use the skid testing equipment.

Person	Code
D. W. Hill	0
C. W. Payne	1
S. Blackwell	2
F. Huckstep	3
B. Breeden	4
Henderson	5
Sturgel	6
Miscellaneous	9

Thus, the following examples would apply:

Equipment Operator	Test Data Recorder	Code
D. W. Hill	C. W. Payne	01
C. W. Payne	S. Blackwell	12
C. W. Payne	C. W. Payne	11

Date of Test (columns 20-25)

Columns 20 and 21 should contain the month coded as shown below. Columns 22 and 23 should contain the day of the month, and columns 24 and 25 should contain the last two digits of the year.

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

Examples:

Date of Completion	Coded
March 1, 1972	030172
November 25, 1972	112572

Time (columns 26-27)

Time to the nearest hour in military time should be recorded in columns 26 and 27 as shown below. When the time is exactly equal to a half hour, code the next highest hour. Changes in time should only be noted when testing for a new surface mix section begins.

Hour	Code
1:00 a.m.	01
2:00 a.m.	02
3:00 a.m.	03
4:00 a.m.	04
5:00 a.m.	05
6:00 a.m.	06
7:00 a.m.	07
8:00 a.m.	08
9:00 a.m.	09
10:00 a.m.	10
11:00 a.m.	11
12:00 m.	12
1:00 p.m.	13
2:00 p.m.	14
3:00 p.m.	15
4:00 p.m.	16
5:00 p.m.	17
6:00 p.m.	18
7:00 p.m.	19
8:00 p.m.	20
9:00 p.m.	21
10:00 p.m.	22
11:00 p.m.	23
12:00 p.m.	24

Examples:

Time	Code
10:35 a.m.	11
8:10 a.m.	08
1:45 p.m.	14
2:30 p.m.	15

Weather (column 28)

The ambient weather condition at the time of the test should be recorded in column 28 using the codes shown below.

Weather Condition	Code
Unspecified	0
Clear	1
Cloudy	2
Foggy	3
Misting	4
Raining	5
Snowing	6
Sleeting	7
Smoke-Dust	8

Air Temperature (columns 29-31)

Air temperature in degrees fahrenheit should be recorded in columns 29-31.

Examples:	Temperature	Code
	75°	075
	39°	039
	102°	102

Surface Temperature (columns 32-34)

Surface temperature in degrees fahrenheit should be recorded in columns 32-34.

Examples:	Temperature	Code
	90°	090
	98°	098
	110°	110

Tread Depth (columns 35-36)

The average tread groove depth on the test wheels should be recorded in columns 35 and 36. Code 00 for the British Portable Tester.

Examples:	Average Tread Depth	Code
	0.27 inch	27
	0.09 inch	09

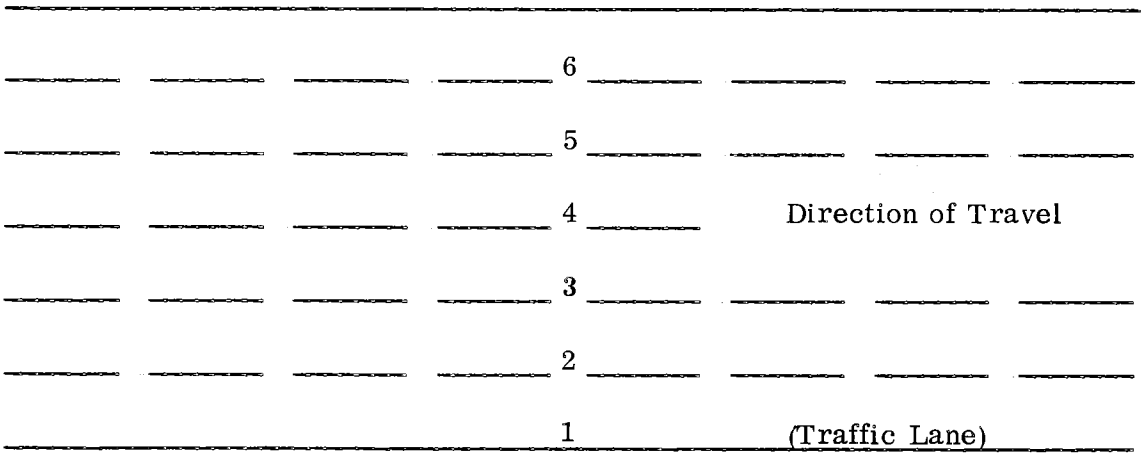
Direction (column 37)

Direction refers to the direction of the lane for which data are being recorded and should be coded in column 37 as shown below.

Direction	Code
North	1
South	2
East	3
West	4
Express Lane	5

Lane (column 38)

When there is more than one lane of travel in any given direction and data pertain to one of those lanes only, then code that lane as shown in the diagram below.



For express lanes or the middle lane of a three lane highway (lanes in which the direction of travel may change periodically) code a 5 in the Direction column and the appropriate lane number in the Lane column facing away from the zero milepoint.

When testing on a two-lane highway, code the lane as 1 with the appropriate direction code.

Type of Data (column 39)

Data type refers to the particular location from which the data were obtained and should be coded in column 39 as shown below.

Location	Code
Main line of highway	0
Bridge	3
Daily Control Site (Series of 1st Tests)	X
Daily Control Site (Series of 2nd Tests)	Y
Test Loop Data	L

Milepoint (columns 40-43)

The milepoint location of the test should be recorded to the nearest one-hundredth mile in columns 40-43. It is not necessary to record the decimal point. The milepoint recorded should be identical to the one shown for the same location in the graphic log.

Examples: Milepoint	Code
0.00	0000
0.50	0050
1.51	0151
10.00	1000
11.55	1155

Speed (columns 44-46)

The speed of the test vehicle at the time of the test should be recorded in columns 40-42 to the nearest one-tenth mph. It is not necessary to record the decimal point. Speed for the British Portable Tester should be recorded as 000.

Examples:	Vehicle Speed	Code
	40.0 mph	400
	40.5 mph	405
	42.1 mph	421

Skid Number (columns 47-49)

The skid number (coefficient of friction x 100) to the nearest whole number should be recorded in columns 43-45.

Examples:	Skid Number	Code
	45	045
	60	060
	105	105

Pavement Condition (column 50)

When testing the control loop code the pavement condition as shown below.

Condition	Code
Dry	1
Damp	2
Wet (water flowing on surface)	3

Leave column 50 blank for normal survey testing.

Time Since Last Rain (columns 51-52)

When testing the control loop code the time since the last rain (since last wet surface condition) at the site being tested correct to the nearest day. Leave columns 51-52 blank for normal survey testing.

If the pavement condition is coded as 3, the time since the last rain should be coded as 000.

APPENDIX B

VIRGINIA HIGHWAY RESEARCH COUNCIL SKID RESISTANCE MEASUREMENT VEHICLE DIGITAL DATA RECORDING SYSTEM CODE MANUAL

by

Frederick L. Huckstep
Research Assistant

Virginia Highway Research Council
(A Cooperative Organization Sponsored Jointly by the Virginia Department of Highways and the University of Virginia)

Charlottesville, Virginia

April 1974

INTRODUCTION

The purpose of this manual is to provide information as to the proper codes to be used to input data into the digital data recording system on the Virginia Highway Research Council's skid trailer. The codes provided should encompass all situations which may arise, and are consistent with those used in other data systems employed by the Virginia Department of Highways. The codes and recording sequence are intended for testing accident sites and for survey testing, and may be extensively modified for research projects where the ability to record special data is required.

The codes are in the sequence in which they are to be recorded, and a brief description of the data required is given for each data set that must be inputted. Also indicated are items of data which are automatically entered for each skid test.

County (columns 1-2)

The appropriate two digit number for the county as shown below should be placed in columns 1 and 2.

County	Code	County	Code
Arlington	00	Greene	39
Accomac	01	Greensville	40
Albemarle	02	Halifax	41
Alleghany	03	Hanover	42
Amelia	04	Henrico	43
Amherst	05	Henry	44
Appomattox	06	Highland	45
Augusta	07	Isle of Wight	46
Bath	08	James City	47
Bedford	09	King George	48
Bland	10	King & Queen	49
Botetourt	11	King William	50
Brunswick	12	Lancaster	51
Buchanan	13	Lee	52
Buckingham	14	Loudoun	53
Campbell	15	Louisa	54
Caroline	16	Lunenburg	55
Carroll	17	Madison	56
Charles City	18	Mathews	57
Charlotte	19	Mecklenburg	58
Chesterfield	20	Middlesex	59
Clarke	21	Montgomery	60
Craig	22	Nansemond	61
Culpeper	23	Nelson	62
Cumberland	24	New Kent	63
Dickenson	25	Northampton	65
Dinwiddie	26	Northumberland	66
Essex	28	Nottoway	67
Fairfax	29	Orange	68
Fauquier	30	Page	69
Floyd	31	Patrick	70
Fluvanna	32	Pittsylvania	71
Franklin	33	Powhatan	72
Frederick	34	Prince Edward	73
Giles	35	Prince George	74

County	Code	County	Code
Gloucester	36	Prince William	76
Goochland	37	Pulaski	77
Grayson	38	Rappahannock	78
Richmond	79	Stafford	89
Roanoke	80	Surry	90
Rockbridge	81	Sussex	91
Rockingham	82	Tazewell	92
Russell	83	Warren	93
Scott	84	Washington	95
Shenandoah	85	Westmoreland	96
Smyth	86	Wise	97
Southampton	87	Wythe	98
Spotsylvania	88	York	99

Note: For the cities shown below use the county codes indicated.

City	County Code
Virginia Beach	75
Hampton	27
Newport News	94
Norfolk	64
Portsmouth	64
Chesapeake	64

Route (columns 3-6)

The county numbers shown in the graphic log should be recorded in columns 4, 5, and 6. When two routes are the same, i.e., overlapping routes, code the predominate route as shown in the graphic log.

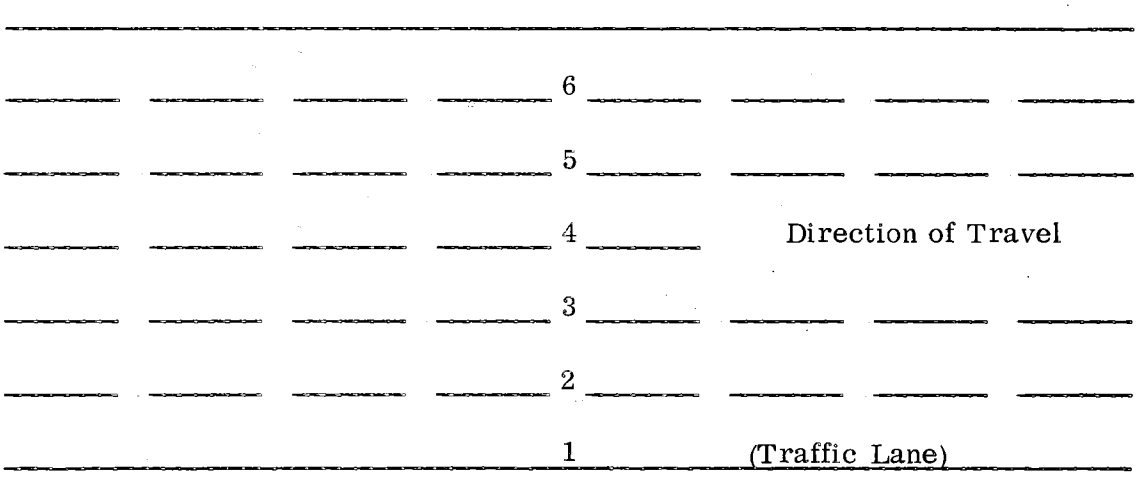
Prefixes for special routes should be coded in column 3 as shown below.

Route Type	Code
Alternate	1
Bypass	2
Commercial (Business)	3
Alternate Y	4
Z	5
Interstate	6

When testing the control loop code 9 in column 3, and code the site number in columns 4-6. Thus, site 1 on the control loop should be coded 9001.

Traffic Lane (column 7)

When there is more than one lane of travel in any given direction, code the lane tested as shown in the diagram below.



For express lanes or the middle lane of a three lane highway (lanes in which the direction of travel may change periodically) code a 5 in the Direction column and the appropriate lane number in the Lane column facing away from the zero milepoint.

When testing on a two-lane highway, code the lane as 1 with the appropriate direction code.

Traffic Direction (column 8)

The digit, as shown below, representing the direction of travel should be placed in column 8.

Direction	Code
North	1
South	2
East	3
West	4
Express Lanes	5

Operators (columns 9-10)

Column 9 should contain a code for the driver, and column 10 should contain a code for the test data recorder. Codes are shown below for individuals most likely to be involved in skid testing.

Person	Code
Hill	0
Payne	1
Blackwell	2
Huckstep	3
Breeden	4
Henderson	5
Sturgel	6
Miscellaneous	9

Date of Test (columns 11-16)

Columns 11 and 12 should contain the month coded as shown below. Columns 13 and 14 should contain the day of the month, and columns 15 and 16 should contain the last two digits of the year.

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

Examples:

Date of Completion	Coded
March 1, 1972	030172
November 25, 1972	112572

Time (columns 17-20)

The time of the test is automatically coded in columns 17-20.

End of Word Code (column 21)

An end of word code is automatically entered in column 21 for each skid test.

Weather (column 22)

A one digit code as shown below should be used to indicate the weather conditions during the testing period.

Weather Condition	Code
Unspecified	0
Clear	1
Cloudy	2
Foggy	3
Misting	4
Raining	5
Snowing	6
Sleeting	7
Smoke-Dust	8

Air Temperature (columns 23-24)

Code air temperature in degrees centigrade (nearest degree) in columns 23 and 24.

Surface Temperature (columns 25-26)

Code surface temperature in degree centigrade (nearest degree) in columns 25 and 26.

Left Tire Tread Depth (columns 27-28)

Code the average left wheel tread depth correct to the nearest one-hundredth inch in columns 27 and 28.

Right Tire Tread Depth (columns 29-30)

Code the average right wheel tread depth correct to the nearest one-hundredth inch in columns 29 and 30.

Test Code (column 31)

In order to reject any faulty records when evaluating the punched tape, the digit 4 should be inputted in column 31. The test code will change only at the beginning of a new year, when it will become the last digit in the year.

City/Town (columns 32-34)

If the testing occurs within a city or town or on a commercial route, the appropriate code, as indicated below, should be recorded in columns 56 to 58, otherwise these columns all should contain zero. When testing on a state maintained noncommercial route within a city the county should be inputted.

District	County	Route*	City/Town	Code
Bristol	Wise	C023	Pound	285
	Wise	C023	Wise	329
	Scott	C023	Gate City	221
	Scott	C058	Gate City	221
	Washington	C091	Glade Spring	222
	Scott	C421	Gate City	221
	Tazewell	C460	Cedar Bluff	184
	Tazewell	C460	Richlands	148
Salem	Franklin	C220	Rocky Mount	157
	Henry	C220	Ridgeway	290
	Bedford	C297	Bedford	141
	Bedford	C460	Bedford	141
	Montgomery	C460	Christiansburg	154
	Montgomery	C460	Blacksburg	150

District	County	Route*	City/Town	Code
Lynchburg	Charlotte	C015	Keysville	248
	Pittsylvania	C029	Chatham	187
	Pittsylvania	C029	Danville	108
	Campbell	C029	Lynchburg	118
	Amherst	C029	Amherst	163
	Nelson	C029	Lovingston	
	Charlotte	C360	Keysville	248
	Appomattox	C460	Pamplin City	277
	Prince Edward	C460	Pamplin City	277
Richmond	Brunswick	C058	Lawrenceville	251
	Hanover	C360	Mechanicsville	
	Amelia	C360	Amelia	
	Nottoway	C360	Burkeville	181
	Nottoway	C460	Burkeville	181
Suffolk	Accomac	C013	Accomac, Onley	160
	Northampton	C013	Eastville	214
	Northampton	C013	Cheriton	188
	Northampton	C013	Exmore	217
		C013	Virginia Beach, Norfolk, and Chesapeake	122
		C017	Portsmouth	124
		C058	Virginia Beach	134
Fredericksburg	Spotsylvania	C001	Fredericksburg	111
	Spotsylvania	C017	Fredericksburg	111
	Stafford	C017	Fredericksburg	111
	Caroline	C301	Bowling Green	171
Culpeper	Loudoun	C015	Leesburg	253
	Fauquier	C015	Warrenton	156
	Culpeper	C015	Culpeper	204
	Orange	C020	Orange	275
	Albemarle	C029	Charlottesville	104
	Madison	C029	Madison	256
	Culpeper	C029	Culpeper	204
	Fauquier	C211	Warrenton	156
	Rappahannock	C211	Washington	322
	Albemarle	C250	Charlottesville	104
	Rappahannock	C522	Washington	322

District	County	Route*	City/Town	Code
Staunton	Augusta	C011	Staunton	132
	Rockbridge	C011	Lexington	117
	Rockingham	C033	Elkton	216
	Rockingham	C042	Dayton	206
	Page	C211	Luray	159

Speed (columns 35-37)

The test speed is automatically entered in columns 35-37 for each skid test run.

Milepoint (columns 38-41)

The milepoint location of each skid test is automatically recorded in columns 38-41.

End of Word Code (column 42)

An end of word code is automatically entered in column 42 for each skid test.

Left Wheel Skid Force (columns 43-46)

When testing with the left wheel the left wheel skid force is automatically entered in columns 43-46.

Right Wheel Skid Force (columns 47-50)

When testing with the right wheel the right wheel skid force is automatically entered in columns 47-50.

Pavement Condition (column 51)

When testing the control loop code the pavement condition as shown below.

Condition	Code
Dry	1
Damp	2
Wet (water flowing on surface)	3

Leave column 51 blank for normal survey testing.

Time Since Last Rain (columns 52-53)

When testing the control loop code the time since the last rain (since last wet surface condition) at the site being tested correct to the nearest day. Leave columns 52-53 blank for normal survey testing.

If the pavement condition is coded as 3 the time since the last rain should be coded as 000.

Open (columns 54-55)

Columns 54 and 55 are left open for future use. Do not code columns 54 and 55.

Data Type (column 56)

The type of highway feature tested should be coded as shown below.

Data Type	Code
Main line of highway	0
Bridge	2
Daily Control Sites (1st Tests)	7
Daily Control Sites (2nd Tests)	8
Test Loop Data	9

District (column 57)

Code the appropriate district as shown below.

District	Code
Bristol	1
Salem	2
Lynchburg	3
Richmond	4
Suffolk	5
Fredericksburg	6
Culpeper	7
Staunton	8

Residency (columns 58-59)

Code the appropriate residency in columns 58 and 59 as shown below.

District	Residency	Code
Bristol	Wise	01
	Abingdon	03
	Lebanon	04
	Tazewell	06
	Wytheville	08
	Jonesville	58
Salem	Hillsville	09
	Christiansburg	11
	Martinsville	12
	Rocky Mount	13
	Salem	14
	Bedford	16
Lynchburg	Chatham	17
	Halifax	18
	Dillwyn	19
	Appomattox	20
	Amherst	22

District	Residency	Code
Richmond	South Hill	23
	Amelia	24
	Petersburg	25
	Chesterfield	26
	Sandston	27
	Ashland	28
Suffolk	Franklin	31
	Waverly	32
	Suffolk	33
	Norfolk	34
	Williamsburg	35
	Accomac	36
Fredericksburg	Saluda	37
	Warsaw	39
	Fredericksburg	40
	Bowling Green	41
Culpeper	Louisa	42
	Charlottesville	43
	Culpeper	45
	Warrenton	46
	Fairfax	47
	Manassas	48
	Leesburg	49
Staunton	Lexington	50
	Staunton-Verona	53
	Harrisonburg	54
	Edinburg	55
	Luray	56

Calibration (columns 60-62)

Column 60 should contain the last digit of the year in which the calibration was performed. Columns 61 and 62 should contain the calibration number, assigned when the calibration was performed. For example, the tenth calibration performed in 1973, should be coded 310.

End of Word Code (column 63)

An end of word code is automatically entered in column 63 for each skid test.

End of Record Code (column 64)

An end of record code is automatically entered in column 64 for each skid test.