APPENDIX E

TRANSPORTATION STRUCTURES

The following list is a summary of transportation structures over the segment of I-70 that was undermined and impacted by subsidence.

Structure	Photo	I-70 Stationing	Straight Line Segment / Offset	Comment
Culvert		1226 + 48	0214 / 0747	Over chain pillars along south edge of Panel 4 South
Culvert	Photo E.2	217 + 22	0220 / 0692	Over chain pillars along north edge of Panel 4 South
Overhead sign structure	Photo E.1	221 + 73	0220 / 1144	
Overpass	Photo E.1	223 + 61	0220 / 1332	
		223 + 99	0220 / 1370	
Culvert	Photo E.3	230 + 25	0220 / 1996	

They are shown in Figure 2 where it is illustrated that these structures were all supported by chain pillars left in place after mining.

Straight Line Diagram

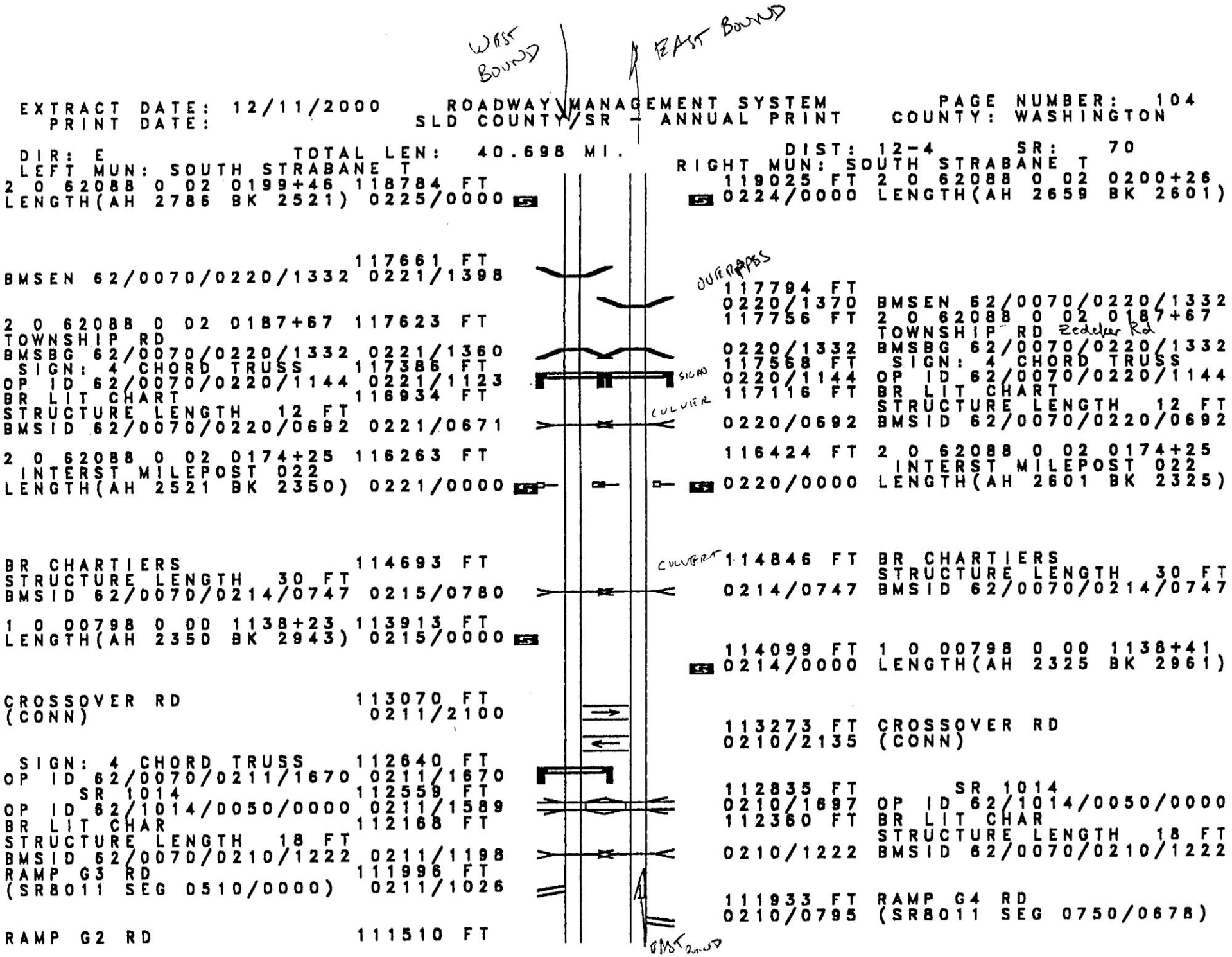
Washington
62

January 2001

This document was produced by the Pennsylvania Department of Transportation (Department) as an internal management tool for State maintained highways and is not to be used for other purposes. The printed information was compiled from the Department's computerized Roadway Management System (RMS) and is subject to change without notice. Use of any or all of the printed information for purposes other than those intended by the Department may not satisfy other accuracy and completeness requirements and the Department does not warrant that such printed information is accurate or complete.

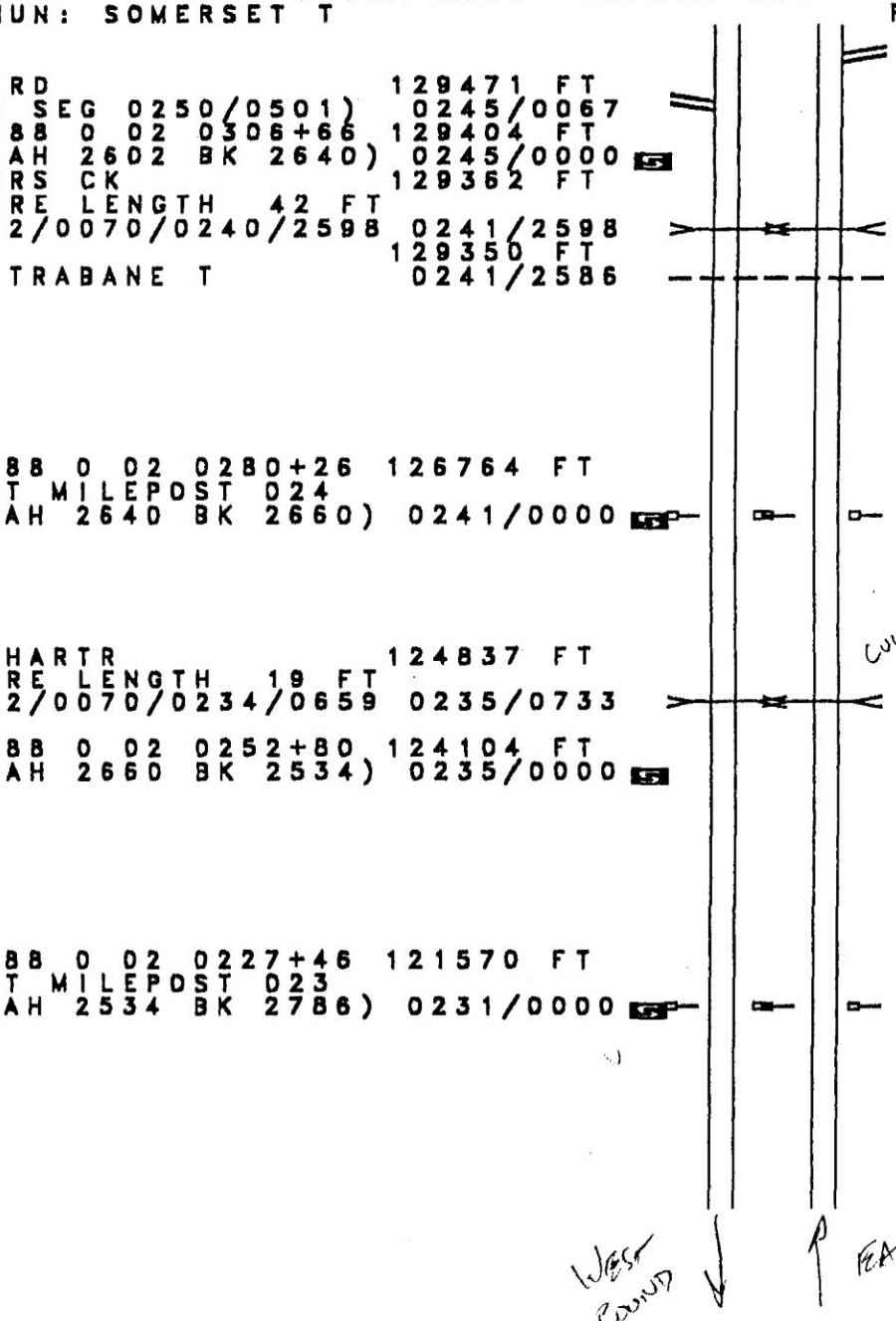
STRAIGHT LINE DIAGRAM (SLD) ANNUAL REFRESH ATTRIBUTE KEY PAGE 1 OF 2

S SEGMENT MARKER	AHEAD LEFT INTER STATE OWNED	RAILROAD CROSSING	INTERSTATE MILEPOST
T TURNBACK	AHEAD LEFT INTER NON-STATE	RAILROAD OVER-PASS	MFC BEGIN
N NULL	AHEAD RIGHT INTE STATE OWNED	OVER-PASS	MUNICIPAL BOUNDARY
UNDIVIDED HIGHWAY	AHEAD RIGHT INTE NON-STATE	BRIDGE END	VILLAGE BEGIN
PHYSICALLY DIVIDED	BACK LEFT INTER STATE OWNED	BRIDGE BEGIN	AH - LENGTH FORWARD TO NEXT SEGMENT BEGIN BK - LENGTH BACK WARD TO PREVIOUS SEGMENT BEGIN
PAINT DIVIDED	BACK LEFT INTER NON-STATE	TUNNEL	
INTERSECTION AHEAD	BACK RIGHT INTER STATE OWNED	SIGN STRUCTURE	MFC - MAINTENANCE FUNCTIONAL CLASS A = INTERSTATE B = EXPRESSWAY AND/OR PRINCIPLE ARTERIAL C = MINOR ARTERIAL D = COLLECTOR E = LOCAL ACCESS F = INTERCHANGE RAMP
INTERSECTION BACK	BACK RIGHT INTER NON-STATE	SIGN MOUNTED ON OVER-PASS	
REFERENCE AHEAD/BACK	T-LEFT INTERSEC STATE OWNED	RETAINING WALL	
DIVIDED CONNECTOR	T-LEFT INTERSEC NON-STATE	BRIDGE/CULVERT UNDER FILL	NULL AND TURNBACK SEGMENTS ARE DISPLAYED IN THE DEPARTMENT"S ROADWAY MANAGEMENT SYSTEM (RMS) AS 100 FEET IN LENGTH. ACTUAL SEGMENT AND SECTION LENGTHS MAY VARY SIGNIFICANTLY
CROSS INTERSEC STATE OWNED	T-RIGHT INTERSEC STATE OWNED	PIPE (STAMPP)	
CROSS INTERSEC NON-STATE	T-RIGHT INTERSEC NON-STATE	ROTARY INTERSEC	


WEST BOUND
EAST BOUND
EXTRACT DATE: 12/11/2000
PRINT DATE:
ROADWAY MANAGEMENT SYSTEM
SLD COUNTY/SR - ANNUAL PRINT
PAGE NUMBER: 104
COUNTY: WASHINGTON
DIR: E
TOTAL LEN: 40.698 MI.
DIST: 12-4
SR: 70
LEFT MUN: SOUTH STRABANE T
RIGHT MUN: SOUTH STRABANE T
2 0 62088 0 02 0199+46 118784 FT
LENGTH(AH 2786 BK 2521) 0225/0000
119025 FT 2 0 62088 0 02 0200+26
0224/0000 LENGTH(AH 2659 BK 2601)
117661 FT
BMSEN 62/0070/0220/1332 0221/1398
OVERPASS
117794 FT
0220/1370 BMSEN 62/0070/0220/1332
117756 FT 2 0 62088 0 02 0187+67
TOWNSHIP RD Zedeker Rd
2 0 62088 0 02 0187+67 117623 FT
TOWNSHIP RD
BMSBG 62/0070/0220/1332 0221/1360
SIGN: 4 CHORD TRUSS 117386 FT
OP ID 62/0070/0220/1144 0221/1123
BR LIT CHART 116934 FT
STRUCTURE LENGTH 12 FT
BMSID 62/0070/0220/0692 0221/0671
0220/1332 BMSBG 62/0070/0220/1332
117568 FT SIGN: 4 CHORD TRUSS
SIGN
0220/1144 OP ID 62/0070/0220/1144
117116 FT BR LIT CHART
CULVERT
STRUCTURE LENGTH 12 FT
0220/0692 BMSID 62/0070/0220/0692
116424 FT 2 0 62088 0 02 0174+25
INTERST MILEPOST 022
2 0 62088 0 02 0174+25
INTERST MILEPOST 022
LENGTH(AH 2521 BK 2350) 0221/0000
0220/0000 LENGTH(AH 2601 BK 2325)
BR CHARTIERS 114693 FT
STRUCTURE LENGTH 30 FT
BMSID 62/0070/0214/0747 0215/0780
CULVERT
114846 FT BR CHARTIERS
STRUCTURE LENGTH 30 FT
0214/0747 BMSID 62/0070/0214/0747
1 0 00798 0 00 1138+23 113913 FT
LENGTH(AH 2350 BK 2943) 0215/0000
114099 FT 1 0 00798 0 00 1138+41
0214/0000 LENGTH(AH 2325 BK 2961)
CROSSOVER RD 113070 FT
(CONN) 0211/2100
113273 FT CROSSOVER RD
0210/2135 (CONN)
SIGN: 4 CHORD TRUSS 112640 FT
OP ID 62/0070/0211/1670 0211/1670
SR 1014 112559 FT
OP ID 62/1014/0050/0000 0211/1589
BR LIT CHAR 112168 FT
STRUCTURE LENGTH 18 FT
BMSID 62/0070/0210/1222 0211/1198
RAMP G3 RD 111996 FT
(SR8011 SEG 0510/0000) 0211/1026
112835 FT SR 1014
0210/1697 OP ID 62/1014/0050/0000
112360 FT BR LIT CHAR
STRUCTURE LENGTH 18 FT
0210/1222 BMSID 62/0070/0210/1222
111933 FT RAMP G4 RD
0210/0795 (SR8011 SEG 0750/0678)
RAMP G2 RD 111510 FT
EAST BOUND

DIR: E TOTAL LEN: 40.698 Mi. DIST: 12-4 SR: 70

LEFT MUN: SOMERSET T RIGHT MUN: SOMERSET T



OS-2 (8-98)

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION
www.dot.state.pa.us
December 31, 2000

Pennsylvania County and Municipal Organizations

RE: Straight Line Diagram (SLD)
Annual Refresh of Data

Dear Pennsylvania Motorist:

Enclosed is the 2001 Pennsylvania Straight Line Diagram (SLD) for State Routes in your county. County SLD books are sent annually to all county courthouses, and county and municipal planning organizations in the Commonwealth.

Two useful features of the SLD book are the "attribute key," and the way the book is bound. The attribute key is located immediately behind the front cover and explains the meaning of the graphic symbols. The binding is done along the bottom edge rather than the top to provide continuity of the diagram. When flipping pages, the road can be followed across the top unbound edge where it continues at the bottom of the next page. The predominant State Route direction always runs from the bottom to the top of the page.

Also enclosed is a Customer Service Rating Form. Please take a few moments to fill out the survey, and return it to the address indicated. Thank you in advance for your input; we appreciate your cooperation and feedback. If you have any questions or comments, and would like to speak to me directly, please contact me by calling (717) 787-1153.

More information on State owned highways is available from your local PennDOT Engineering District Office. Additional copies of SLD documents can be purchased from the Publication Sales Store, P.O. Box 2028, Harrisburg, Pennsylvania 17105. Their phone number is (717) 787-6746.

Sincerely,

J. Michael Long

J. Michael Long, P.E.
Chief
Roadway Inventory and Testing Section
Roadway Management Division
Bureau of Maintenance and Operation

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
Bureau of Maintenance and Operations, Roadway Management Division

Location Referencing System (LRS) – Definitions, Uses & Testing

The Department's LRS, implemented in 1987, is the mechanism to designate the State highway network, to define roadway lengths, locations, and route connectivity, and to serve as the basis for the collection, storage, and integration of roadway information.

An LRS key is a unique series of numbers that identifies the location of each point or feature along a State route. The fourteen digit number is an integral part of the Roadway Management System (RMS) where roadway data is stored. 07/4016/0100/0857 is an example of an LRS key, which identifies County (CO) = 07, State Route (SR) = 4016, Segment (SEG) = 0100, and Offset = 0857.

County (CO)

Each of Pennsylvania's sixty-seven counties is identified by a number.

Name	#	Name	#	Name	#	Name	#
Adams	1	Clinton	18	Lackawanna	35	Potter	52
Allegheny	2	Columbia	19	Lancaster	36	Schuylkill	53
Armstrong	3	Crawford	20	Lawrence	37	Snyder	54
Beaver	4	Cumberland	21	Lebanon	38	Somerset	55
Bedford	5	Dauphin	22	Lehigh	39	Sullivan	56
Berks	6	Delaware	23	Luzerne	40	Susquehanna	57
Blair	7	Elk	24	Lycoming	41	Tioga	58
Bradford	8	Erie	25	McKean	42	Union	59
Bucks	9	Fayette	26	Mercer	43	Venango	60
Butler	10	Forest	27	Mifflin	44	Warren	61
Cambria	11	Franklin	28	Monroe	45	Washington	62
Cameron	12	Fulton	29	Montgomery	46	Wayne	63
Carbon	13	Greene	30	Montour	47	Westmoreland	64
Centre	14	Huntingdon	31	Northampton	48	Wyoming	65
Chester	15	Indiana	32	Northumberland	49	York	66
Clarion	16	Jefferson	33	Perry	50	Philadelphia	67
Clearfield	17	Juniata	34	Pike	51		

State Route (SR)

State Routes (SR's) are identified by four-digit numbers. SR numbers are assigned as follows:

1.	Traffic Routes: Routes designated as Interstates, US or PA Routes	0001-0999
2.	Quadrant Routes (Non-Traffic Routes)	1001-4999
3.	Relocated Traffic Routes	6000-6999
4.	Turned Back, Abandoned, or Null Routes	7000-7999
5.	Interchanges	8001-8999
6.	WYE's	9101-9199
7.	Rest Areas	9201-9299
8.	Truck Escape Ramps	9301-9399
9.	Others	9401-9499

Even/Odd Convention: Even numbers are typically given to SR's in the East/West direction, and odd numbers to SR's that run North/South. This convention applies to Interstate Routes (except those that are Beltways or Spurs), and Quadrant Routes. This convention may or may not apply to PA or US Traffic Routes.

Hierarchy: If two or more traffic routes occupy the same section of roadway, the SR number is based on the "higher" type route, according to the following hierarchy. If the traffic routes are the same hierarchy class, then the SR number is assigned the lower numbered traffic route (Figure 1).

1. Interstates
2. U.S. Routes
3. PA Routes
4. Quadrant Routes

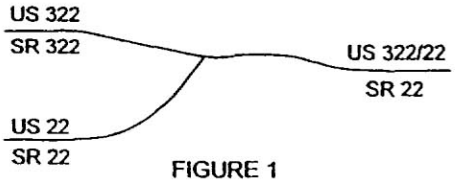


FIGURE 1

Other Numbering Conventions:

1. The first digit of a quadrant route is based on which quadrant of the county the route is located, as shown in the following diagram (Figure 2).
2. The last three digits of a Relocated Traffic Route are the same as the Traffic Route that was relocated.
3. Interchanges are numbered sequentially. Odd numbers are given to interchanges along SR's in the North/South direction; even numbers are given to interchanges along SR's in the East/West direction (Figure 3).
4. WYE's are given odd numbers if the connecting SR is odd numbered, and even numbers if the connecting SR is even numbered.
5. Rest Areas or Truck Escape Ramps are given odd numbers if they connect to the Southbound or Westbound side of an SR, and even numbers if they connect to the Northbound or Eastbound side.

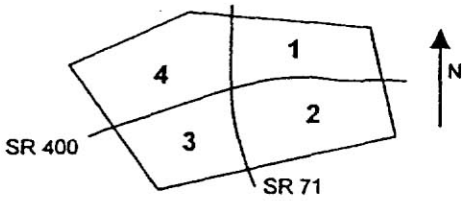


FIGURE 2

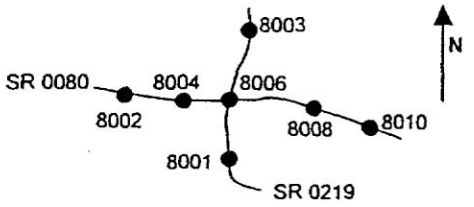


FIGURE 3

Segment (SEG)

State routes are divided into segments, which are approximately one-half mile long, and are identified by a four-digit number. Segment begin and end points are placed at physical features where possible. Segment numbers increase in the North or East direction, and typically by 10's (Figure 4). Segments are even numbered on undivided roadways, and in the Northbound or Eastbound direction of divided roadways. Segments are odd numbered in the Southbound or Westbound direction of divided roadways (Figure 5). Interstate segments are associated with the mile posts (Figure 6).

Undivided Roadways

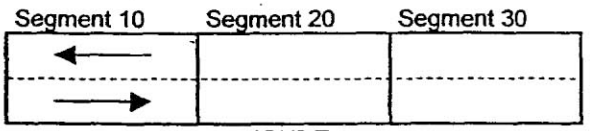


FIGURE 4

Divided Roadways

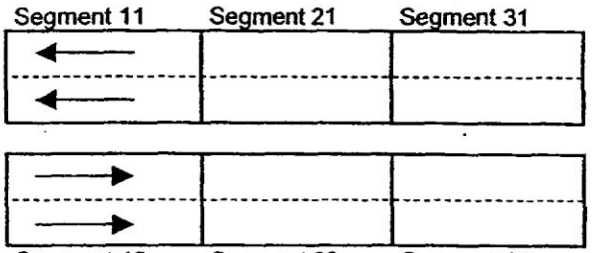


FIGURE 5

Interstate Roadways

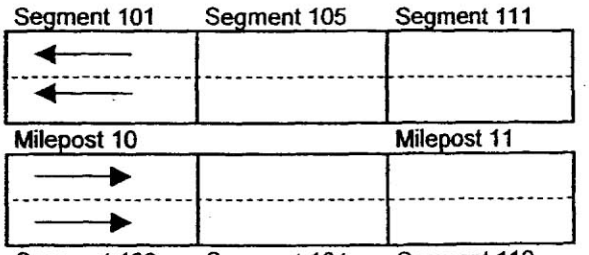


FIGURE 6

Turned Back, Abandoned, and Null Segments are given numbers in the range of 7000-7999. For two coincident State routes, the route with "lower" hierarchy is "nulled."

Segment numbering restarts on Traffic Routes at County boundaries, except Interstates (Figure 7).

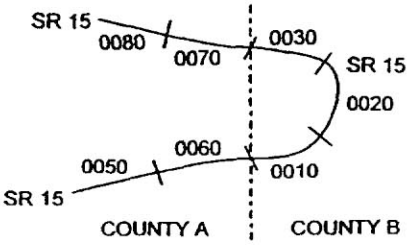


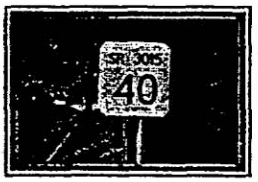
FIGURE 7

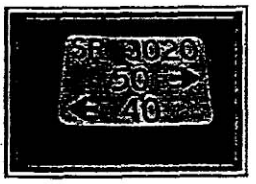
Offset

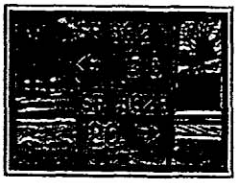
The offset, a subdivision of the segment, is the distance (in feet) from the beginning of the segment, expressed as a four-digit number. Offsets are measured in the increasing segment direction.

Segment Markers

Segment markers, which allow for easy identification of the LRS location on the State highway system, indicate the State route and segment number at the point that each segment is entered. If the beginning of a segment occurs at a physical feature, then the point of reference is at the physical feature and not the sign. At intersections, signs are used to identify beginning or ending State routes or segments.







Users of the LRS

Locations of all intersections, structures, and other points of interest are field verified and inventoried in the RMS. This information can be displayed on Straight Line Diagrams (SLD's) which can be viewed in the RMS, or hardcopy form. SLD books are refreshed and printed annually for distribution to the Department's District and County offices, as well as to many external entities.

A list of those within the Department that use the LRS to identify locations in the RMS and in the field includes personnel from the following organizations: Pavement Testing, County Maintenance, Traffic, Design, Surveys, Construction, Bridge, Permits, Crash Review, Planning and Programming, Posted & Bonded Roads, Tort Liability, and Emergency Management.

Users outside the Department include: County & Municipal governments, County 911, Planning Commissions, Federal Highway Administration, State & Local Police, Local Emergency Management, Delivery Services (UPS, Fed Ex, etc.), Fire Departments, Utility Companies, Contractors, and Consultants.

Without segment markers located in the field, all of these users would have to rely solely on the SLD, which would be extremely cumbersome at best, and impossible for some.

Verification, QA & QC

In order to assure that LRS information is indicated properly in the RMS, on SLD's, and in the field, LRS Quality Assurance (QA) and Quality Commitment (QC) programs are performed each year. The Bureau of Maintenance and Operations, Roadway Management Division, Roadway Inventory & Testing Section (RITS) performs all Statewide QC testing. Field verification and QA is also performed by RITS, except in Engineering Districts 2-0, 11-0, and 12-0, where it is done "in-house." Each Engineering District is responsible for its own LRS completeness and maintenance with respect to the RMS.

Twenty percent of each county is field tested annually as part of the QA program, and five percent of each county is tested for the annual QC program. The goal of the QC program is to maintain at least 90% accuracy between the RMS and the actual field locations of highway features. Annual QC ratings are developed and reported to the Engineering Districts.

Field testing is performed by two-person teams (a permanent employee that operates the test, and a temporary employee that drives the device) with the use of vans equipped with an on-board computer and a Data Measurement Subsystem. Testing is typically performed during the months of April through November.

Vehicle location and roadway features are displayed on the van's computer screen in SLD format, and the software accepts operator inputs verifying or modifying roadway feature locations, as well as comments. Though the system can function at greater speed, test speeds are typically less than 25 mph to ensure accuracy.

There are five categories of information that is verified and/or modified:

1. State Route Length
2. Segment Length
3. Roadway Geometry (lane count, pavement & shoulder types & widths)
4. Intersecting Feature Location (intersections & bridges)
5. Segment Marker Location

Photo E.1 View looking north at overhead sign (Segment 0220/Offset 1144) and Zediker Station Rd. overpass (Segment 0220/Offset 1370).

Photo E.2 View looking SE through reinforced concrete box culvert (Segment 0200/Offset 0692).

Photo E.3 View looking NE through reinforced concrete box culvert (Segment 0234/Offset 0659) under fill.