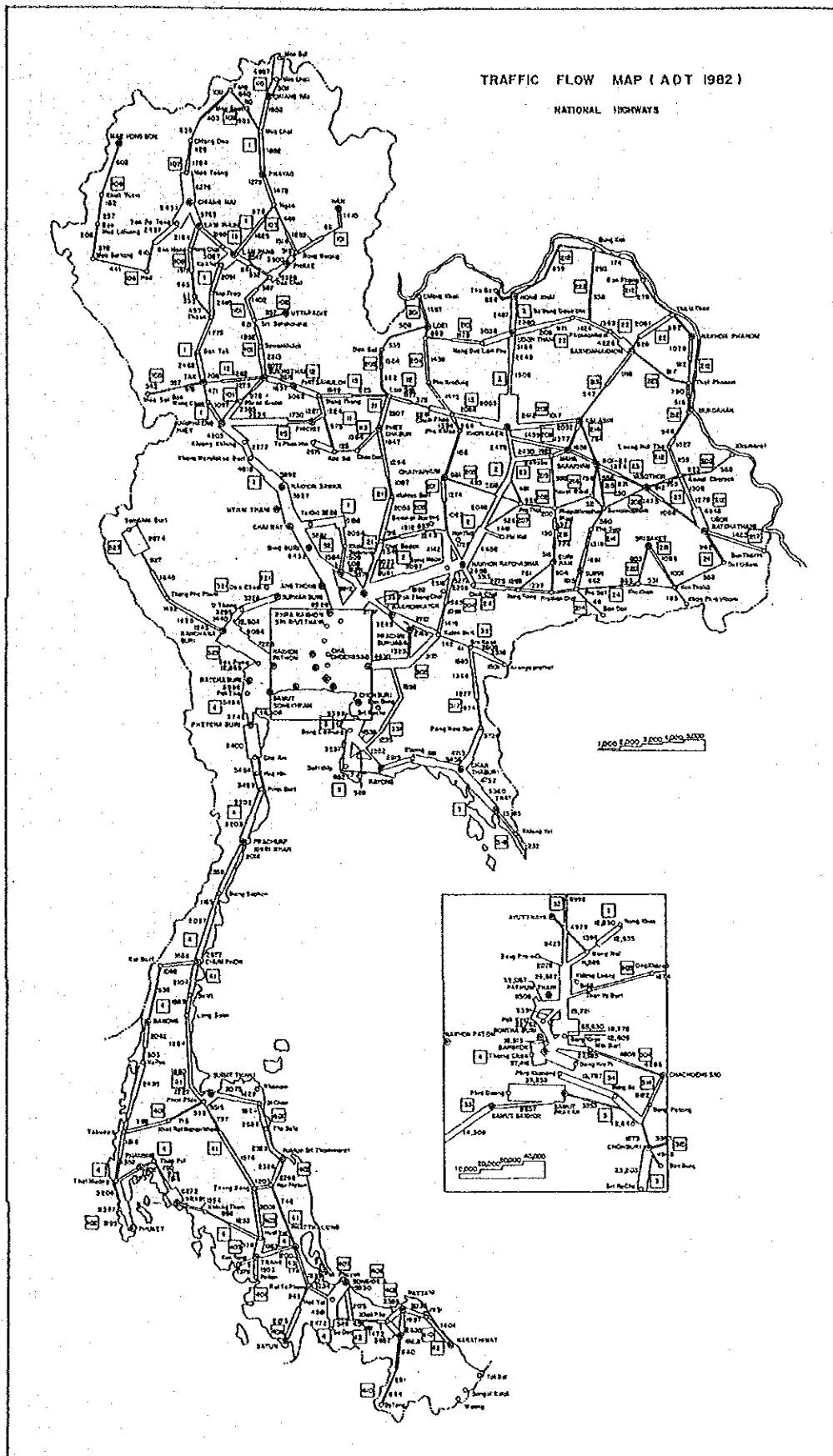


Traffic Volume on National Highways  
(Average Daily Traffic)

Location	Type of Vehicle	1978	1979	1980	1981	1982
Northern Region Route Number : 1 Control Section: 1500 Station Km : 336+163 Termini : Kamphaeng Phet	Passenger Car	1,613	911	838	859	1,049
	Light Bus and Light Truck	849	1,275	1,126	1,324	1,615
	Heavy Vehicle	1,200	1,273	1,177	1,370	1,539
	Total (Index)	4,869 (100)	3,459 (71)	3,141 (64)	3,553 (73)	4,203 (86)
	Motorcycle	N.A.	615	622	600	916
North Eastern Region Route Number : 2 Control Section: 0502 Station Km : 47+450 Termini : Phimai	Passenger Car	546	530	636	596	664
	Light Bus and Light Truck	806	908	912	1,173	1,381
	Heavy Vehicle	2,244	2,621	2,455	2,890	2,845
	Total (Index)	3,596 (100)	4,059 (113)	4,003 (111)	4,659 (130)	4,890 (136)
	Motorcycle	N.A.	458	339	325	360
Central Region Route Number : 1 Control Section: 0202 Station Km : 35+000 Termini : Rangsit	Passenger Car	9,769	9,727	8,503	9,030	9,625
	Light Bus and Light Truck	5,191	6,822	6,068	6,614	7,479
	Heavy Vehicle	9,514	11,397	10,625	11,358	11,558
	Total (Index)	24,474 (100)	27,946 (114)	25,196 (103)	27,002 (110)	28,662 (117)
	Motorcycle	N.A.	1,110	1,311	1,500	1,681
Southern Region Route Number : 4 Control Section: 1600 Station Km : 465+700 Termini : Siyak	Passenger Car	315	435	386	411	380
	Light Bus and Light Truck	399	503	522	455	847
	Heavy Vehicle	519	489	667	539	860
	Total (Index)	1,233 (100)	1,427 (116)	1,575 (128)	1,405 (114)	2,087 (169)
	Motorcycle	N.A.	378	358	305	517

Traffic Volume on the National Highways (Average Daily Traffic)



## Traffic Accidents in Thailand and Bangkok Metropolis

Description		1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Number of Accidents	Thailand	9,945	11,464	13,278	13,831	16,583	18,669	23,120	17,742	16,361	16,047
	Bangkok	4,492	5,942	6,721	7,965	10,482	11,680	12,045	11,190	11,802	9,794
	Bangkok per Thailand	0.68	0.52	0.51	0.58	0.63	0.63	0.52	0.63	0.72	0.61
Deaths	Thailand	3,098	2,928	2,503	3,764	2,545	3,952	8,365	4,493	2,760	3,091
	Bangkok	480	421	350	403	474	534	571	624	631	689
	Bangkok per Thailand	0.15	0.14	0.14	0.11	0.19	0.14	0.07	0.14	0.23	0.22
Casualties	Thailand	13,320	13,150	11,961	13,947	11,851	14,520	30,004	17,885	12,057	12,431
	Bangkok	3,205	3,361	3,401	4,031	5,225	5,378	5,603	5,209	5,441	4,382
	Bangkok per Thailand	0.24	0.26	0.28	0.29	0.44	0.37	0.19	0.29	0.45	0.35
Deaths per 100,000 population	Thailand	8	7	6	9	6	9	18	10	6	6
	Bangkok	12	10	8	9	10	11	11	12	12	13
	Bangkok per Thailand	1.50	1.43	1.33	1.00	1.67	1.22	0.61	1.20	2.00	2.17
Deaths per 10,000 vehicle (Excluding motorcycle)	Thailand	64	50	43	60	34	49	97	55	27	26
	Bangkok	19	14	13	13	14	14	14	14	13	12
	Bangkok per Thailand	0.30	0.22	0.30	0.22	0.41	0.29	0.14	0.25	0.48	0.46

Source : Research and Planning Division, Police Department

## Agencies Related to Road Traffic Safety Administration

Agency	Related Law	Major Activities
Department of Highways (DOH), Ministry of Communications.	Announcement of the Revolutionary Party, No. 295 (Highway Law)	<ol style="list-style-type: none"> <li>1. Planning, construction and maintenance of all National Highways and Provincial Highways.</li> <li>2. Planning, installation and maintenance of road safety facilities on National Highways and Provincial Highways.</li> <li>3. Investigation of traffic accidents which mainly caused damages to DOH properties</li> </ol>
Department of Land Transport (DLT), Ministry of Communications.	Transport Act (1979)	<ol style="list-style-type: none"> <li>1. Registration of commercial buses and trucks (Details are described in 2.5.2(1))</li> <li>2. Licensing for commercial vehicle operators and drivers.</li> <li>3. Issuance of driving license for commercial vehicle.</li> <li>4. Inspection of commercial vehicles.</li> <li>5. Road safety education for drivers and conductors related to commercial vehicles.</li> <li>6. Investigation of traffic accidents caused by commercial vehicles.</li> <li>7. Law enforcement related to the Transport Act (1979).</li> </ol>
Traffic Police Division (TPD), Police Department, Ministry of Interior.	Land Traffic Act (1979) Automobile Act (1979) Transport Act (1979)	<ol style="list-style-type: none"> <li>1. Maintaining some of traffic signals in Bangkok.</li> <li>2. Law enforcement related to the Land Traffic Act (1979), Automobile Act (1979) and Transport Act (1979) in Bangkok.</li> </ol>
Highway Police Division (HPD), Police Department, Ministry of Interior.	Land Traffic Act (1979) Automobile Act (1979) Transport Act (1979)	<ol style="list-style-type: none"> <li>1. Investigation of traffic accidents occurred on major Highways outside the municipal area.</li> <li>2. Law enforcement related to the Land Traffic Act (1979), Automobile Act (1979) and Transport Act (1979) on above mentioned Highways.</li> </ol>
Local Police Stations (LPs), Police Department, Ministry of Interior.	Land Traffic Act (1979) Automobile Act (1979) Transport Act (1979)	<ol style="list-style-type: none"> <li>1. Investigation of traffic accidents occurred on roads other than HPD responsibility.</li> <li>2. Law enforcement related to the Land Traffic Act (1979), Automobile Act (1979) and Transport Act (1979) on above mentioned roads.</li> </ol>
Licenses Division of Police Department (LDPD), Ministry of Interior.	Automobile Act (1979)	<ol style="list-style-type: none"> <li>1. Registration of vehicles other than DLT responsibility (Details are described in 2.5.2(1)).</li> <li>2. Inspection of above mentioned classes of vehicles.</li> <li>3. Issuance of driving license for above mentioned classes of vehicles.</li> </ol>
National Safety Council (NSC), Office of Prime Minister.	Act of the National Safety Council	<ol style="list-style-type: none"> <li>1. Promotion of road safety education for school pupils as well as general public.</li> <li>2. Collection of traffic accident data from related agencies.</li> </ol>
Ministry of Education (MOE)		<ol style="list-style-type: none"> <li>1. Promotion of road safety education.</li> <li>2. Supervision of driving schools.</li> </ol>

Agency	Related Law	Major Activities
Bangkok Metropolitan Administration (BMA) and Other Municipalities.	Announcement of the Revolutionary Party, No. 295 (Highway Law)	<ol style="list-style-type: none"> <li>1. Planning, construction and maintenance of municipal roads.</li> <li>2. Planning, installation and maintenance of road safety facilities on municipal roads.</li> </ol>
Office of the Committee for the Management of Road Traffic (OCMRT), Ministry of Interior.		<ol style="list-style-type: none"> <li>1. Planning of traffic signals and road safety facilities in major municipal areas including Bangkok.</li> </ol>

## Function of Divisions and Offices in DOH Related to Traffic Safety

Division and Office	Functions
1. Planning Division a. Programming and Highway System Section  b. Post-Project Evaluation Section	1. Establish feasibility study programme 2. Construction standardization 3. Conduct road inventory survey 1. Evaluation for benefit of post-project construction
2. Traffic Engineering Office a. Traffic Survey Section b. Traffic Research and Analysis Section  c. Traffic Planning Section  d. Traffic Design and Standardization Section	1. Conduct survey on traffic volume 1. Analyze data transferred from Traffic Survey Section 2. Analyze traffic accident data from Highway Field Division and HPD 1. Planning for the improvement of hazardous road sections 2. Evaluation of road improvements 1. Standardization of traffic safety devices 2. Supervision for installation of traffic safety devices on existing roads
3. Maintenance Division a. Project and Planning Section b. Evaluation and Standardization Section c. Highway Safety Engineering Section d. Weighing Station and Toll Gate Section	1. Establish short term and long term maintenance programme 1. Evaluation of the maintenance implementation 2. Standardization of maintenance methods 1. Installation of traffic signs and lightings 2. Production of traffic signs 1. Management of weighing stations
4. Design and Location Division a. Highway Design Section  b. Highway Survey Section	1. Geometric Design and Pavement Design 2. Design for the installation of lightings and traffic signals 1. Collection of roadside data 2. Preparation of profiles and cross-sections
5. Material & Research Division	1. Traffic Accident Research 2. Cooperated with other agencies for traffic safety campaigns
6. Office of Secretary a. Public Relations Section	1. Announce for accident on highways 2. Announce for flood on highways and construction highway
7. Highway Field Divisions a. Planning Section b. Survey and Design Section c. Traffic Sign Section d. District Offices	1. Collection of relevant data of road conditions 2. Planning of road maintenance 1. Collection of roadside data 2. Geometric Design and Pavement Design 1. Installation and maintenance of traffic signs, traffic signals, lightings and pavement markings 1. Maintenance of roads

Number of Driving Licenses Issued

	1975	1976	1977	1978	1979	1980	1981	1982
Thailand	495,054	561,890	474,855	578,464	1,131,768	354,553	443,888	617,560
Bangkok	223,236	207,160	226,578	230,988	252,999	143,798	162,488	220,188

Source : Licenses Division of Police Department



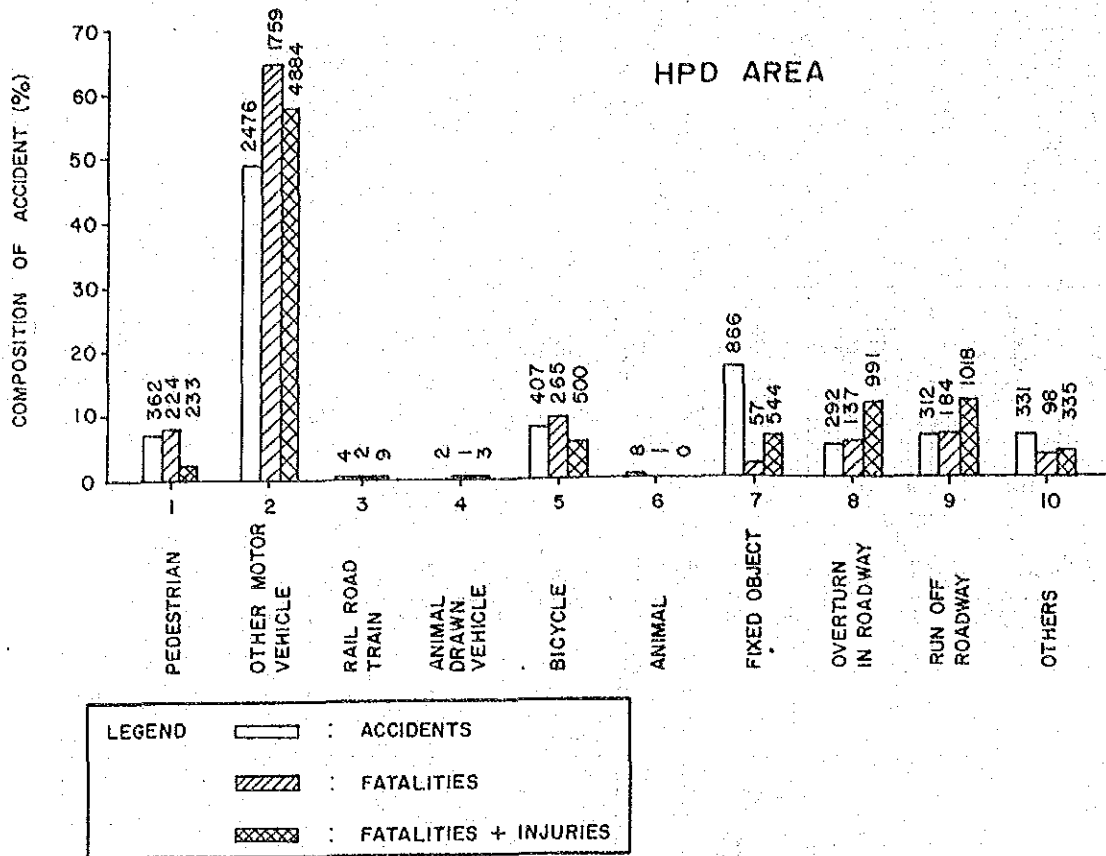


Accident Recording Form of LPs

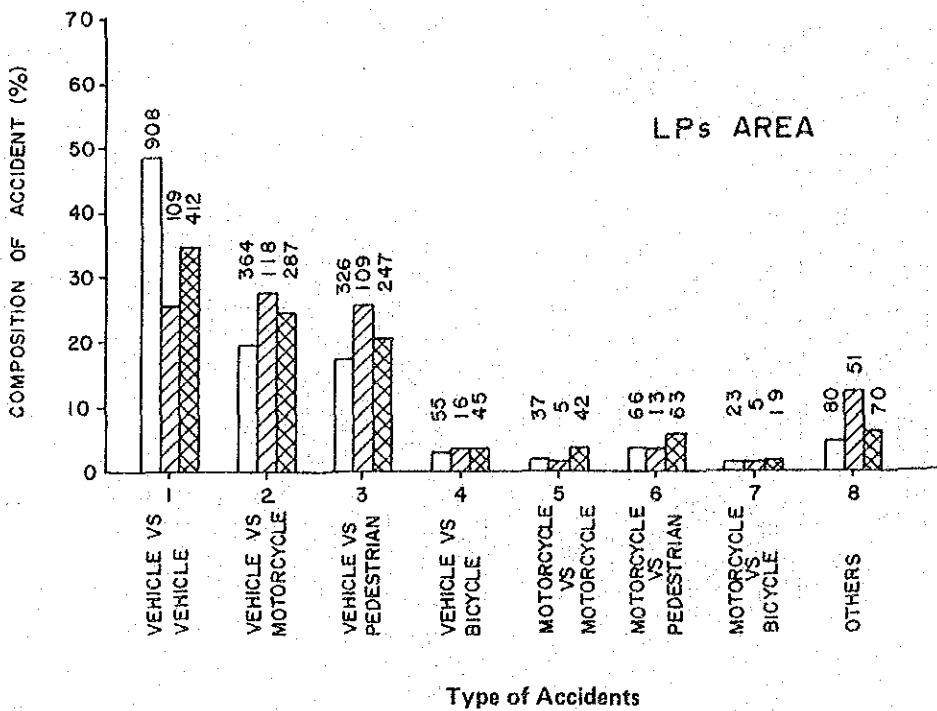
Complaint or Denunciation									
No...../.....			Name of Police Station.....						
To.....			Amphoe..... Changwat.....						
Case No.....									
Type of Case <input type="checkbox"/> Crime <input type="checkbox"/> Adult <input type="checkbox"/> Juvenile <input type="checkbox"/> Act of.....		Case:	Event Occured		Day	Date/Month/Year		Time	
			Date of Complaint						
Place	Specific Point of Event	Local Police Station	Alleged Offender		Casualty				
			persons	arrested offender	dead	serious injury	minor injury		
Cause of Action	Armanent		Q'ty	Vehicle			Q'ty		
Action	1. Registered gun 2. Illegal gun 3. War arms 4. Explosive material 5. Sharp object 6. Others			Car..... Boat..... Others					
	List of Property Damaged			Q'ty	Price	List of Property Returned			
.....Official No.			.....Signature of Inquiry Official (.....) Date.....						
For Inquiry Official Only Note ..... ..... .....Complainant .....Offender .....Official/writer									

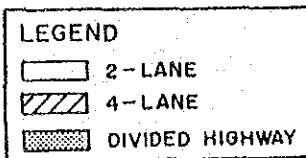
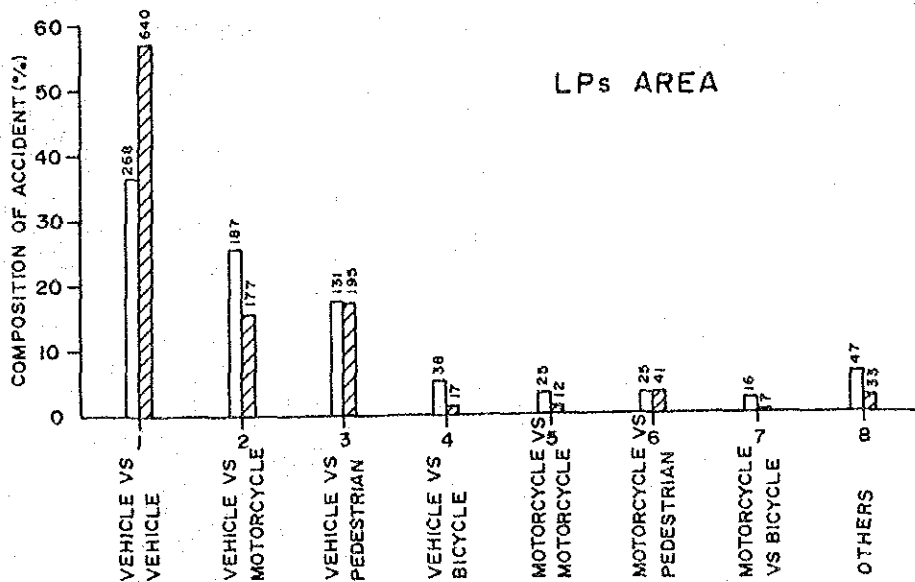
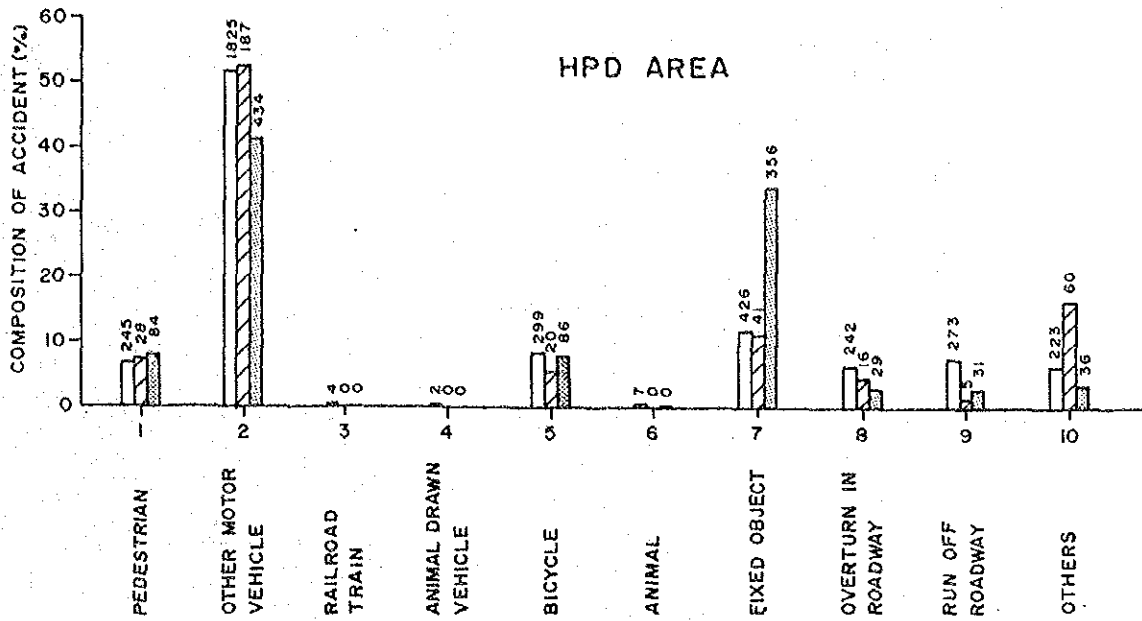
Collision Types and Codes Used by DOH

PEDESTRIAN	PEDAL CYCLIST	INTERSECTION	INTERSECTION	INTERSECTION	MANOEUVRING	ON PATH	OVERTAKING	CORNERING	OFF PATH	MISCELLANEOUS
01	11	21	31	41	51	61	71	81	91	
02	12	22	32	42	52	62	72	82	92	
03	13	23	33	43	53	63	73	83	93	
04	14	24	34	44	54	64	74	84	94	
05	15	25	35	45	55	65	75	85	95	
06	16	26	36	46	56	66	76	86	96	
07	17	27	37	47	57	67	77	87	97	
08	18	28	38	48	58	68	78	88	98	
09	19	29	39	49	59	69	79	89	99	
										OTHERS



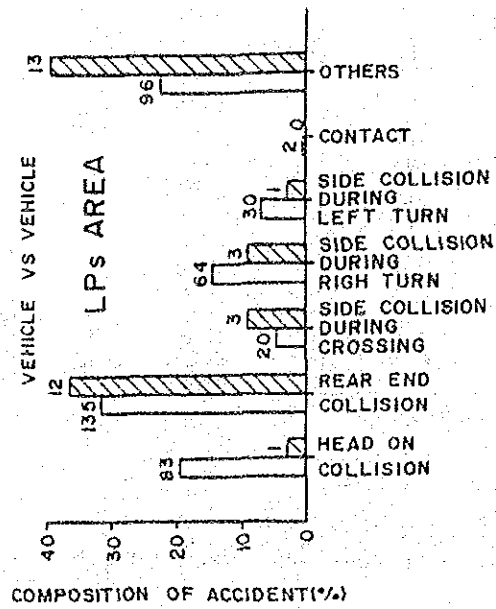
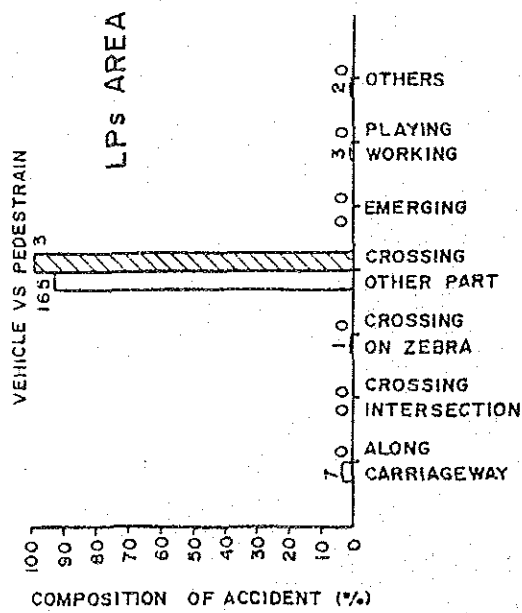
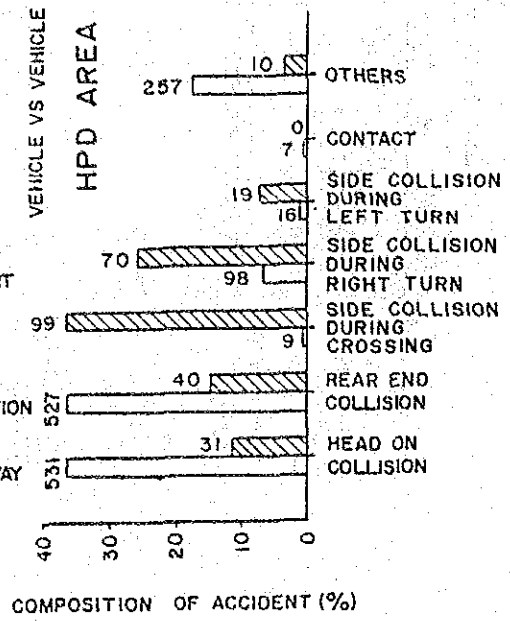
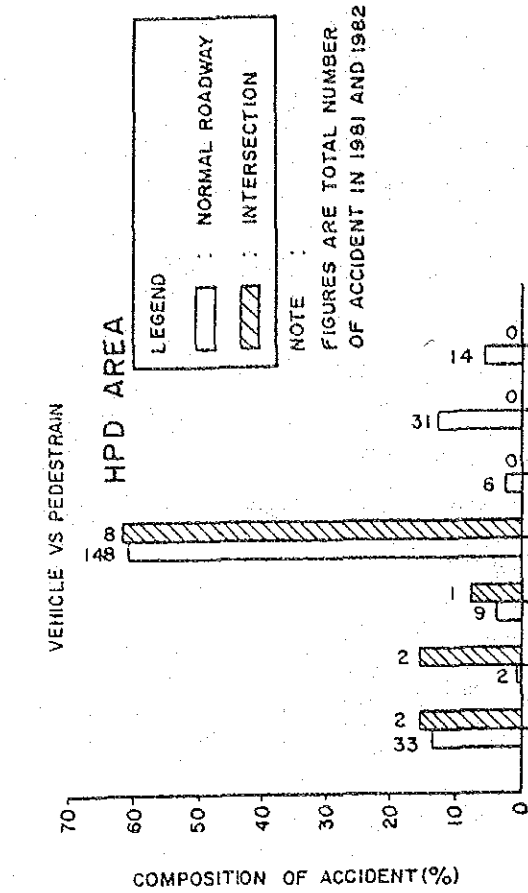
NOTE : FIGURES ARE TOTAL NUMBERS OF 1981 AND 1982



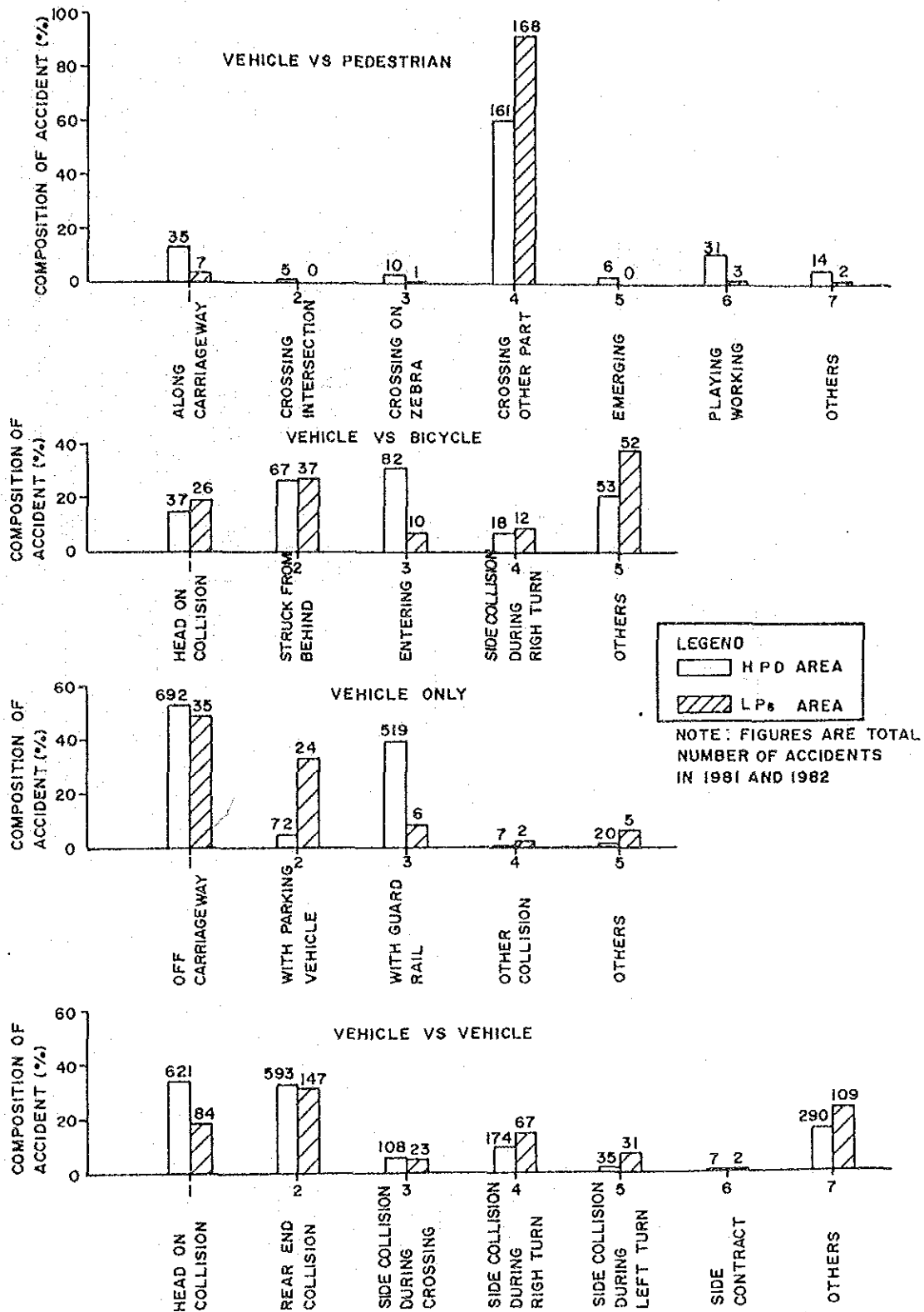


NOTE: FIGURES ARE TOTAL NUMBER OF ACCIDENT IN 1981 AND 1982

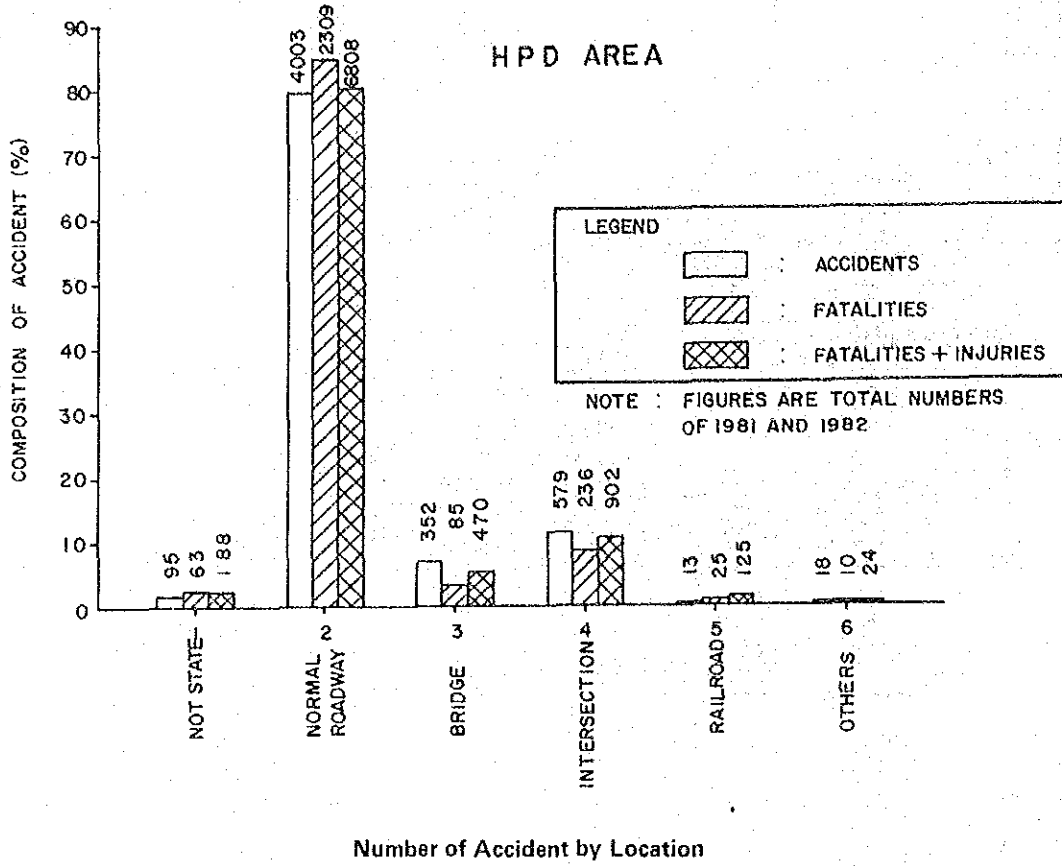
Number of Accidents by Type and Types of Highway

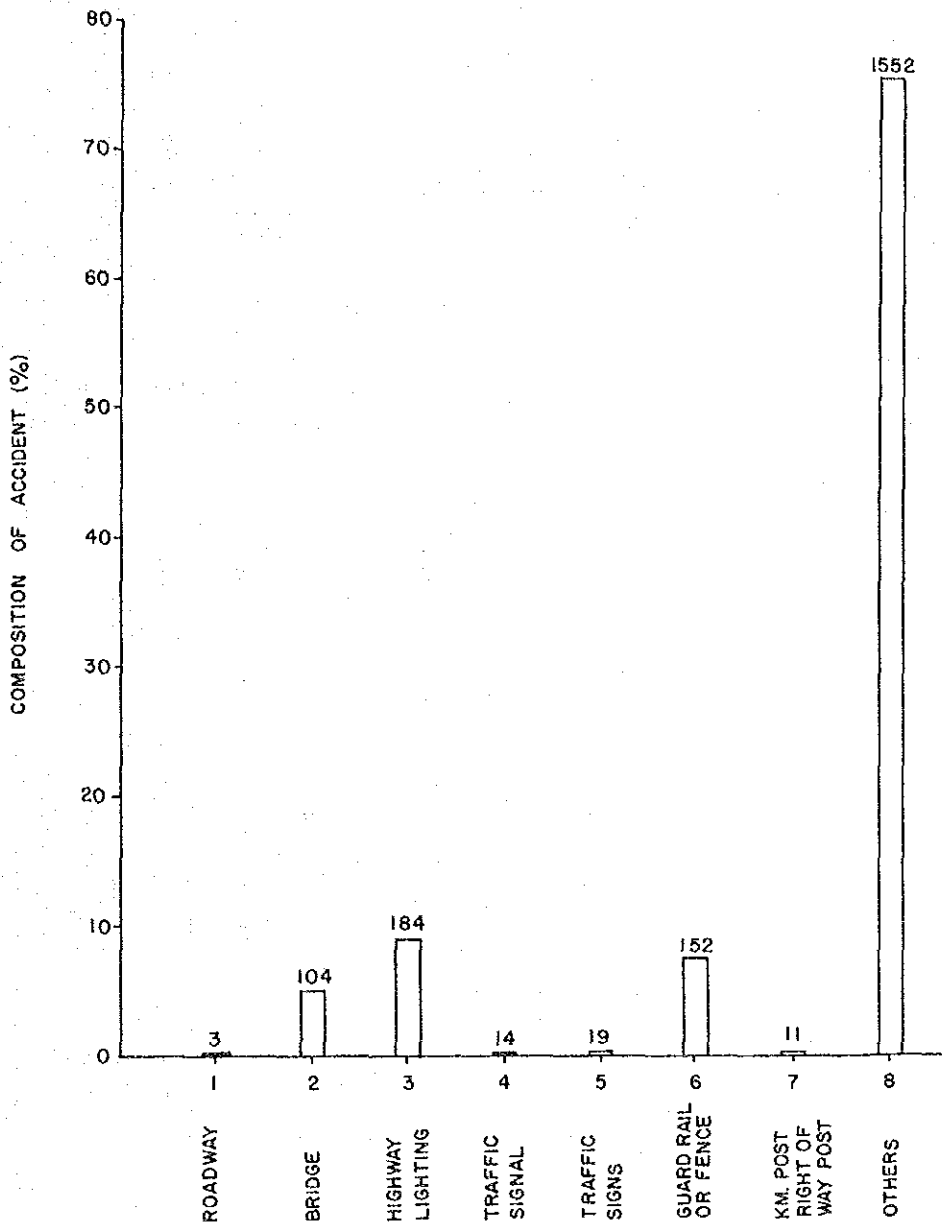


Number of Accidents by Collision Pattern and Location



Number of Accident by Collision Pattern



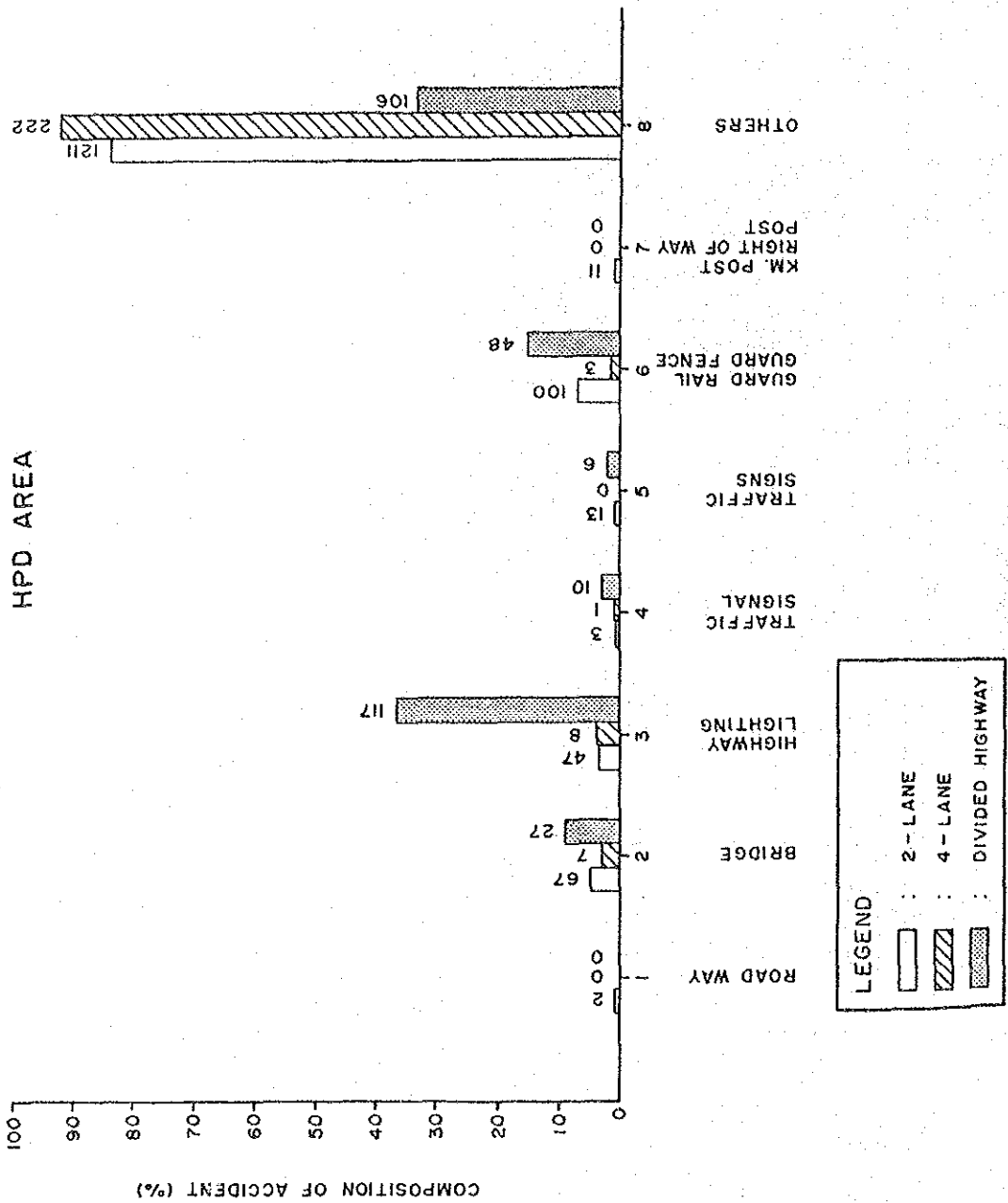


LEGEND  
 [ ] : HPD AREA

NOTE : FIGURES ARE TOTAL NUMBER OF ACCIDENT IN 1981 AND 1982

Number of Accident by DOH Property



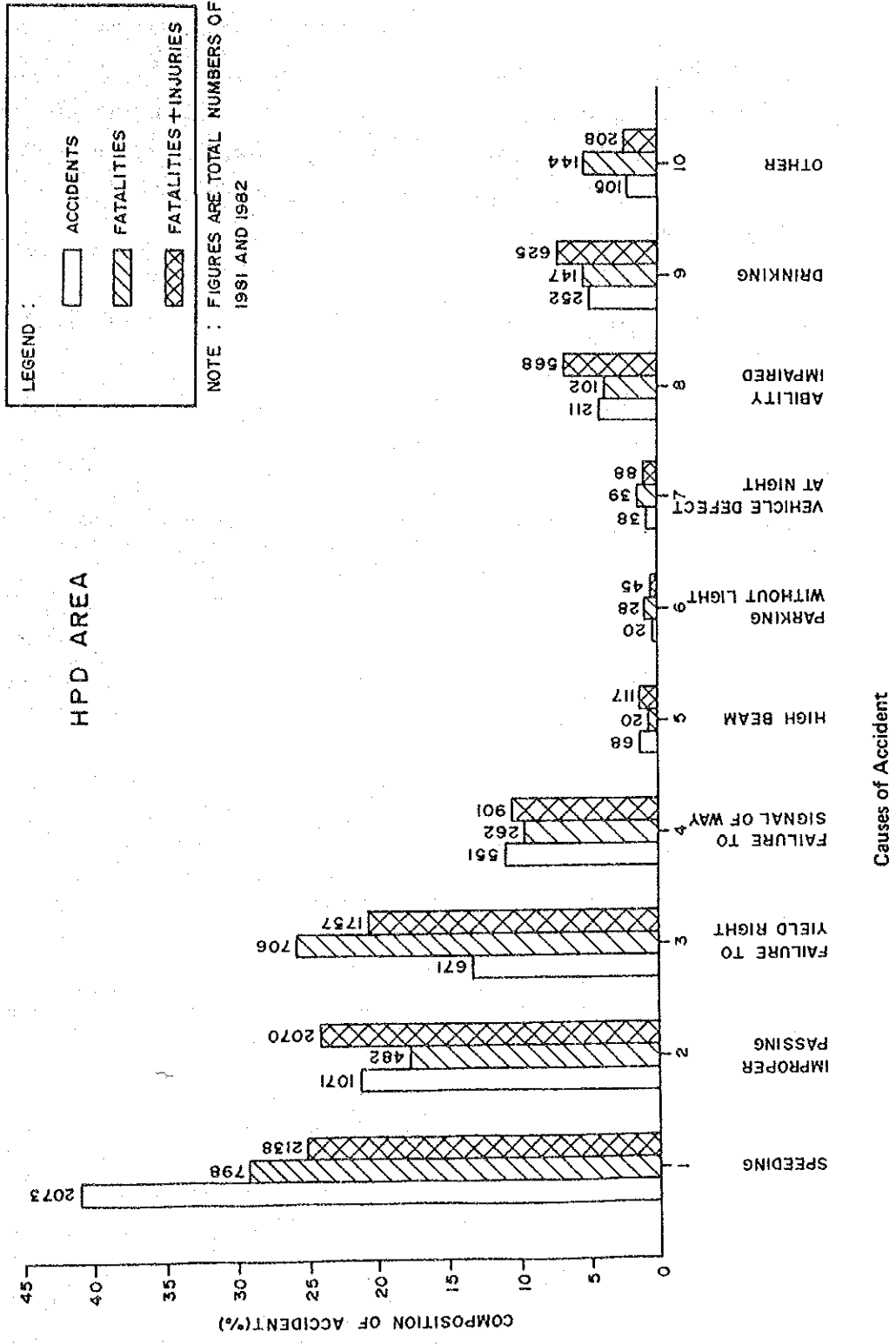


**LEGEND**

- : 2 - LANE
- ▨ : 4 - LANE
- ▩ : DIVIDED HIGHWAY

**NOTE :** FIGURES ARE TOTAL NUMBER OF ACCIDENTS IN 1981 AND 1982

**Number of Accident by Property Damage and Types of Highway**



Questionnaire to DOH engineer

All district offices (73) of DOH have been requested to fill in the following questionnaires (I and II) which were prepared to obtain the firsthand information on traffic safety from the engineers who are acquainted with roads conditions through their day-to-day maintenance and administration, as well as through contacts with the people in the communities in the vicinity of roads.

The items in the questionnaire cover mainly two subjects.

Roadway ... hazardous locations and their road conditions  
proposed countermeasures at the locations

Major intersection

... shape and degree of hazards  
proposed countermeasures

(I) Survey on Hazardous Road Sections

This survey is to list up road sections which have been found hazardous by the concerned district engineers. In this survey, the road sections are road segments between intersections (the definition of intersection in the Intersection Survey, is applied to this survey).

(1) Data No.

To give numbers in numerical order (1, 2, .....).

(2) Route No.

Route No. of the hazardous section. (Ex. 302)

(3) Location

The location of the hazardous section shall be indicated by Kilopost on DOH road (Ex. 30+000~32+210).

(4) Degree of Hazard

To put a circle (0) in an appropriate column. The degree of hazard shall be subjectively decided by the concerned district engineers.

(5) Number of Lane

To mark a circle (0) in an appropriate column. When the number of lane changes in the section, mark a circle (0) in the column corresponding to the representative lane-number over the section.

(6) Alignment

To put a circle (0) in an appropriate column.

Good : constructed to standard.

Poor : other than good.

(7) Abutting Land Use

To put a circle (0) in an appropriate column.

(8) Remark

If possible, to propose traffic safety plan(s) to remedy the existing deficiency(ies).

Hazardous Road Locations

(1) Data No.	(2) Route No.	(3) Location		(4) Degree of Hazard	(5) Number of lane		(6) Alignment				(7) Abutting Land Use		(8) Remark (proposal of safety treatment)			
		Control Section	Kilopost ( ~ )		2	4 or more	Horizontal	Vertical	Good	Poor	Good	Poor		Build up	Other	
				Very High												
				High												

(II) Intersection Survey

The intersections (inclusive of junctions) to be surveyed are those of which all legs have more than two (paved) lanes of carriageways (or more than 6 m wide paved-road).

(1) Data No.

To give numbers in numerical order (1, 2, .....).

(2) Road Type

DOH v.s. DOH : The intersection composed of two DOH roads.

DOH v.s. Other : The intersection composed of DOH road and other road.

To write route number of DOH roads in an appropriate column, no indication for roads other than DOH roads.

(3) Location

To write control section number of DOH road. When more than two DOH roads meet at the intersection, the control section on low-numbered DOH road.

The location of the intersection shall be indicated by Kilometer-post on DOH road. (Ex.52+060). When two DOH roads intersect, the kilometer-post on DOH road with low-numbered Route.

(4) Shape

The layout of the intersection shall be marked with a sign as defined as follows;

(+) : Cross-intersection

(0) : Roundabout

(T) : T-intersection

(Y) : Y-Junction

(5) No. of Lane

The number of lanes of carriageways which compose the intersection. When two DOH roads cross, the lane-number of low-numbered Route road shall be put in the "DOH Road" column.

(6) Existing Safety Treatment

To put a circle (0) in the appropriate column.

(7) Degree of Hazard

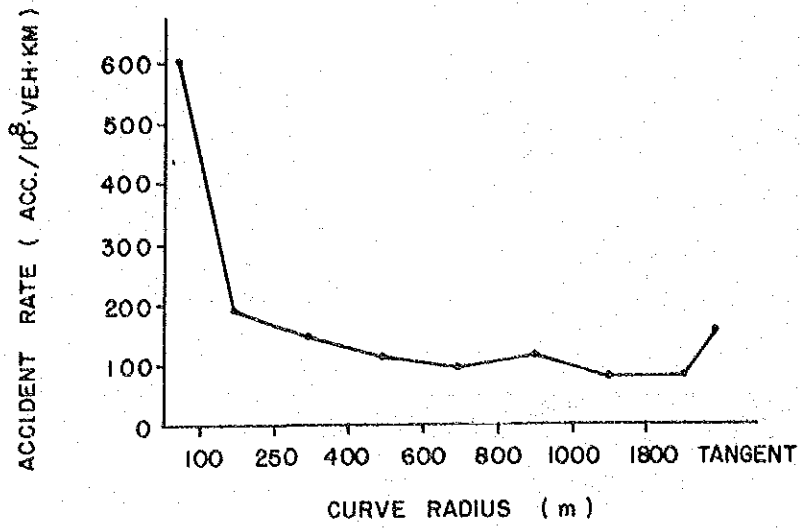
Based on an assessment by the concerned district engineers, to put a circle in the corresponding column.

(8) Remark

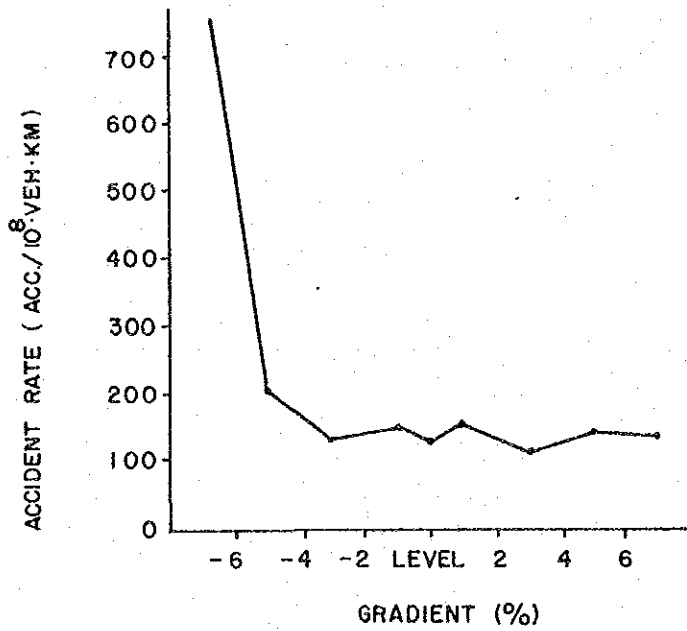
In case of a hazardous intersection, to propose desirable countermeasure(s) to remedy the intersection in terms of traffic safety, if possible.



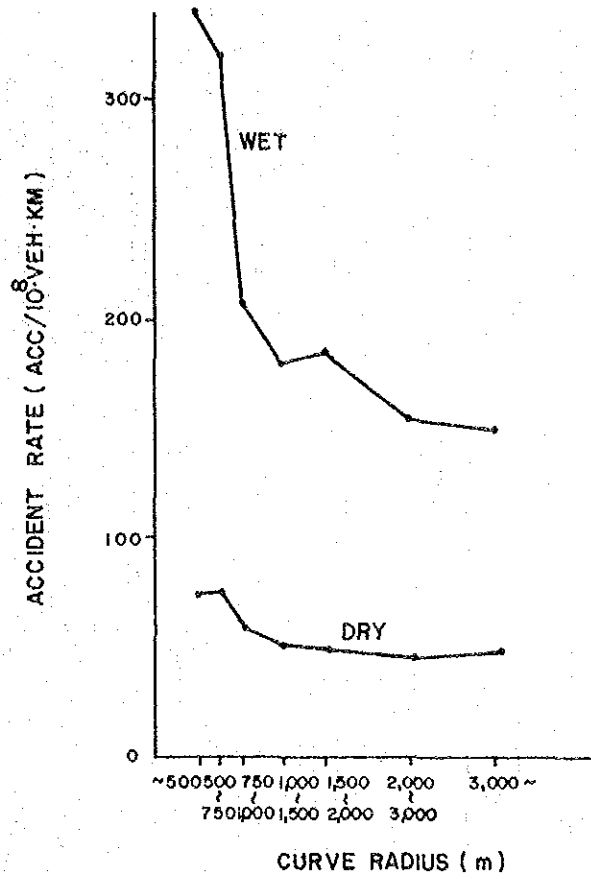




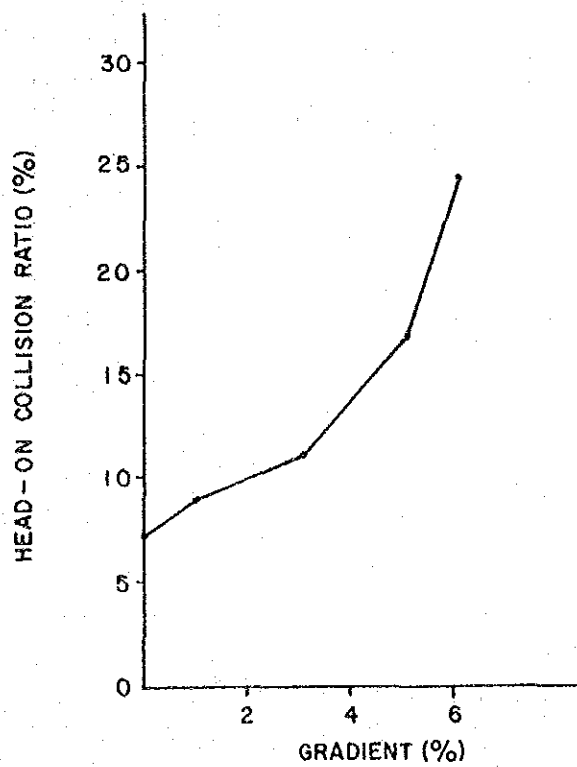
RELATION BETWEEN CURVE RADIUS AND ACCIDENT  
( ORDINARY ROAD, JAPAN )



RELATION BETWEEN GRADIENT AND ACCIDENT  
( ORDINARY ROAD, JAPAN )



RELATION BETWEEN CURVE RADIUS AND ACCIDENT  
(TOMEI EXPRESSWAY, JAPAN)



RELATION BETWEEN GRADIENT AND HEAD-ON COLLISION RATIO  
(ORDINARY ROAD, JAPAN)

Existing Condition of Safety Planning Section (f)

Section No.	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10
Location (Kilo Post)	Route 1 19+000-22+000	Route 1 29+500-32+500	Route 1 47+500-51+000	Route 32 52+500-69+500	Route 304 64+500-67+000	Route 323 79+500-80+000	Route 302 1+000-4+000	Route 306 1+200-2+000	Route 306 2+700-3+100	Route 306 13+000-15+000
Length (Km)	3.0	3.0	3.5	17.0	2.5	0.5	3.0	0.8	0.4	2.0
Land Use	Commercial Area	Residential Area	Agricultural Area	Agricultural Area	Residential Area	Residential Area	Commercial Area	Residential Area	Residential Area	Government Institution Utility Facility
Kind of Road Section	Uninterrupted Section	Uninterrupted Section	Uninterrupted Section	Uninterrupted Section	Uninterrupted Section	Channelized Intersection (Right and Left Turning Lanes)	Uninterrupted Section	Signalized Intersection	Uninterrupted Section	Uninterrupted Section
Lane	4 Lanes	4 Lanes	4 Lanes	2 Lanes	2 Lanes	4 Lanes (Right and Left Turning Lanes)	4 Lanes	2 Lanes	4 Lanes	2 Lanes
Division	Mounted up Median	Depressed Median	Mounted up Median	Undivided Road	Undivided Road	Mounted up Median	Undivided Road	Undivided Road	Undivided Road	Undivided Road
Horizontal Alignment	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight	SUB-Standard Curve	Straight
Vertical Alignment	Level	Level	Level	Level	Standard Vertical Alignment	Level	Level	Level	Level	Level
Surface	Good (Concrete)	Poor (Asphalt Concrete)	Good (Asphalt Concrete)	Good (Asphalt Concrete)	Poor (Asphalt Concrete)	Good (Asphalt Concrete)	Good	Poor	Poor	Good
Shoulder	Turn-out Lane	Poor (Paved)	Good (Paved)	Good (Unpaved)	Poor (Unpaved)	Good (Paved)	Poor (Unpaved)	Poor (Unpaved)	Poor (Unpaved)	Poor (Unpaved)
Others										
Marking	Insufficient	Insufficient	Insufficient	Good	Insufficient	Good	Insufficient	Insufficient	Insufficient	Insufficient
Lighting	Good	Good	Good	None	Insufficient	Good	Good	- do -	- do -	Good
Sign	Insufficient	Insufficient	Insufficient	Good	Insufficient	Good	Insufficient	A Few	Unstanding Curve Warning Sign	A Few
Guard Rail	-	None	Median	None	Few feet of Bridges	None	None	None	Outside	None
Side Walk	Both Side	None	None	Few	None	None	Partially	None	One Side	None
Pedestrian Crossing	A Few	Bridge (1)	None	None	Few	None	A Few	None (Erased)	None (Erased)	Some
Others			Median Opening for U-turn	Bus Bay, Guide Post	Guide Post	Guide Post	Guide Post	Guide Post	Delineator Road Stud	
Vehicle	Many Heavy Vehicle (25k) (18,000 Ve/day)	Many Heavy Vehicle (25k) (29,000 Ve/day)	Many Vehicle (25,000 Ve/day) Many Heavy Vehicle (40k) (45k) High Speed	Many Heavy Vehicle (40k) High Speed	Low Traffic Volume (4,800 Ve/day)	High Speed Many Right Turn Vehicle Many Heavy Vehicle (42k)	Many Vehicle (17,000 Ve/day)			High Speed
Pedestrian	Many People	Many People	Few	Few	Few	Few	Many People			Many People Crossing
Others							Many Parking Vehicle			

Existing Condition of Safety Planning (II)

Section No.	S 11		S 12	S 13	S 14	S 15	S 16	S 17
	Route 336 (Soi 37) 2+800-3+000	Route 336 (Soi 53) 4+050-4+250						
Location (Kilb Post)	Route 336 2+000-5+000	Route 336 (Soi 37) 2+800-3+000	Route 313 1-800-2-800	Route 11 97+300-97+800	Route 1141 1-000-1+800	Route 2 253+750-254+250	Route 2 254+500-255+000	Route 205 1+300-1+700
Length (Km)	4.0	0.2	1.0	0.5	0.8	0.5	0.5	0.4
Land Use	Commercial Area	Commercial Area	Industrial Area	Residential Area	Agricultural Area	Residential Area	Commercial Area	Agricultural Area
Kind of Road	Uninterrupted Section	Intersection	Uninterrupted Section	Signalized Intersection	Channelized Intersection	Channelized Intersection	Intersection	Uninterrupted Section
Lane	4 Lanes	4 Lanes	4 Lanes	4 Lanes	2 Lanes	2 Lanes	2 Lanes	4 Lanes
Division	Mounted up Median	Mounted up Median	Median (Transverse Concrete)	Undivided Road	Undivided Road	Divided Road	Divided Road	Undivided Road
Horizontal Alignment	Straight	Straight	Straight	Straight	Straight	Straight	Straight	Straight
Vertical Alignment	Level	Level	Level	Level	Level	Level	Level	Level
Surface	Good(Concrete)	Good(Concrete)	Good	Good(Concrete)	Good	Good(Asphalt)	Good(Asphalt)	Good(Asphalt Concrete)
Shoulder	Turn Out Lane	Turn Out Lane	Turn Out Lane	Good (Unpaved)	Good (Unpaved)	Poor (Unpaved)	Poor (Unpaved)	Poor (Unpaved)
Others								
Marking	Insufficient	Insufficient	Insufficient	Insufficient	Good(Partially erased)	Insufficient	Insufficient	Insufficient
Lighting	Good	Good	Insufficient	Good	Good	Good	Good	None
Sign	Insufficient	Insufficient	Insufficient	A Few	Good	Insufficient	Insufficient	A Few
Guard Rail	None	None	None	None	None	None	None	None
Side Walk	Both Side	Both Side	None	None	None	None	None	None
Pedestrian Crossing	Erased	Erased	A Few	A Few	None	None	Bridge (1)	None
Others	Bus Lane	Flashing Lamp Bus Lane	Bus Lane	Guide Post	Guide Post			
Vehicle	Many Vehicle (28,000ve/day)	Many Vehicle (28,000ve/day)	Many Vehicle (22,000ve/day) Vehicle*25%	Many Vehicle (28,000ve/day)	High Speed, Low Traffic Volume (3,500ve/day)	Many Samlor	Many Samlor	Low Traffic Volume(1,700 ve/day)
Pedestrian	Many People	Many People		A Few	A Few	Many People Crossing	Many People Crossing	A Few
Others								

Accident-Pattern Statistics for Safety Planning Section (1)

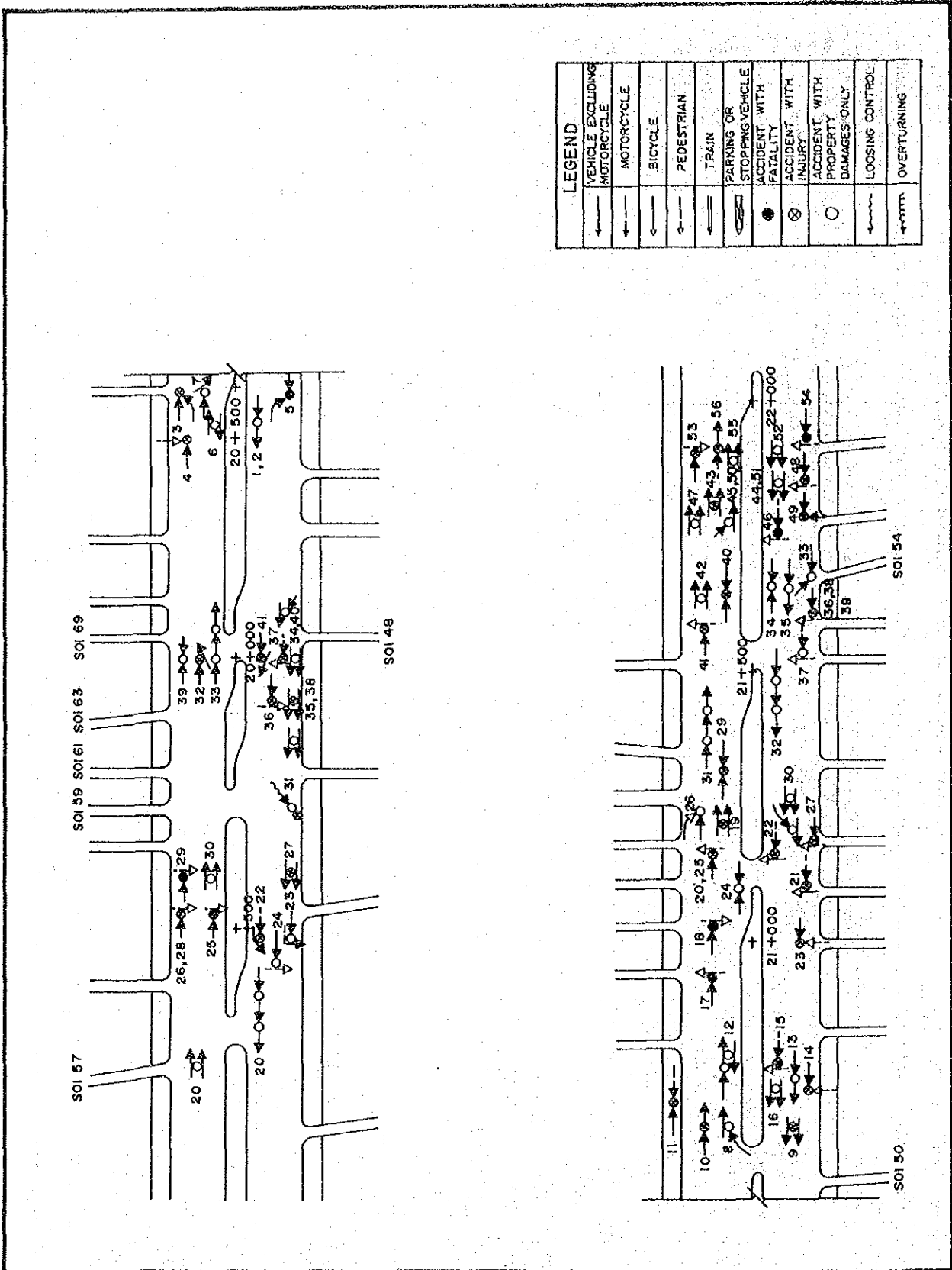
Section No.	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10
Location (Kilo Post)	Route 1	Route 1	Route 1	Route 32	Route 304	Route 323	Route 302	Route 306	Route 306	Route 306
	19-000-22+000	29-500-32+500	47-500-51+000	52+500-59+500	64+500-67+000	73+500-80-000	1-000-4+000	1-200-2+000	2-700-3+100	12+000-15+000
10. Vehicle vs. Pedestrian	44 (30.1)	16 (8.5)	4 (2.0)	2 (2.5)	0 (0.0)	0 (0.0)	35 (13.6)	4 (11.8)	2 (50.0)	23 (87.7)
11. Hit pedestrian walking along carriageway	0	2	0	1	0	0	1	1	0	1
12. Hit pedestrian crossing carriageway at intersection	0	0	0	0	0	0	0	0	0	0
13. Hit pedestrian crossing carriageway at crosswalk	0	0	0	0	0	0	0	0	0	0
14. Hit pedestrian crossing carriageway other than crosswalk	44	10	3	1	0	0	34	2	2	20
15. Hit pedestrian emerging on Carriageway	0	0	0	0	0	0	0	0	0	0
16. Hit pedestrian playing on carriageway	0	4	1	0	0	0	0	0	0	1
17. Others	0	0	0	0	0	0	0	0	0	1
20. Vehicle vs. Bicycle	3 (2.1)	2 (1.1)	2 (1.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.8)	1 (2.9)	0 (0.0)	1 (2.9)
21. Head on collision	1	0	0	0	0	0	0	0	0	0
22. Rear end collision	1	2	2	0	0	0	2	1	0	0
23. Side collision during crossing	1	0	0	0	0	0	0	0	0	1
24. Side collision during right turn	0	0	0	0	0	0	0	0	0	0
25. Side collision during left turn	0	0	0	0	0	0	0	0	0	0
26. Others	0	0	0	0	0	0	0	0	0	0
30. Vehicle only	4 (2.7)	35 (18.5)	63 (32.0)	11 (13.6)	0 (0.0)	1 (25.0)	16 (6.2)	9 (26.5)	0 (0.0)	1 (2.9)
31. Off carriageway	3	4	25	1	0	0	8	3	0	0
32. Collision with parked vehicle.	1	1	0	2	0	0	8	6	0	0
33. Collision with guard rail	0	29	36	8	0	1	0	0	0	0
34. Collision with electric pole	0	0	0	0	0	0	0	0	0	0
35. Collision with other objects	0	0	0	0	0	0	0	0	0	1
36. Others	0	1	2	0	0	0	0	0	0	0
40. Vehicle vs. Vehicle	94 (64.4)	54 (38.9)	51 (25.9)	37 (45.7)	5 (83.3)	3 (75.5)	204 (79.1)	20 (58.8)	2 (50.0)	9 (26.5)
41. Head on collision	15	9	3	14	2	0	44	5	1	6
42. Rear end collision	29	32	35	16	2	0	77	4	1	0
43. Side collision during crossing	4	4	2	2	0	3	6	2	0	1
44. Side collision during right turn	10	16	8	8	0	0	21	3	0	1
45. Side collision during left turn	10	1	0	0	0	0	18	0	0	0
46. Side contact	3	0	0	0	0	0	1	0	0	0
47. Others	23	2	3	5	1	0	37	6	0	1
50. Unknown	1 (0.7)	72 (38.1)	77 (39.1)	31 (38.3)	1 (16.7)	0 (0.0)	1 (0.4)	0 (0.0)	0 (0.0)	0 (0.0)
Total	146 (100)	189 (100)	197 (100)	81 (100)	6 (100)	4 (100)	258 (100)	34 (100)	4 (100)	34 (100)

Note : ( ) Composition

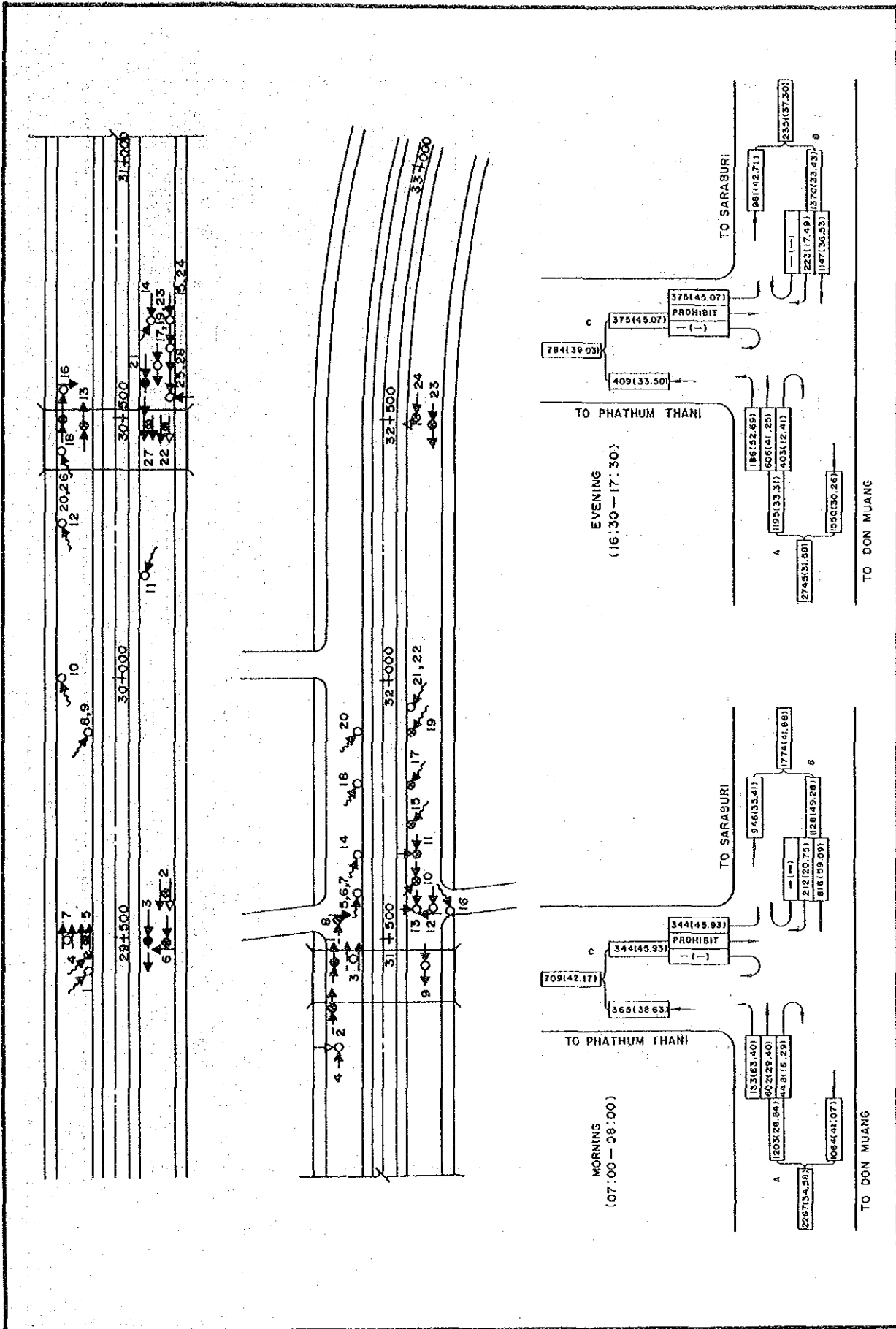
Accident-Pattern Statistics for Safety Planning Section (II)

Section No.	S 11		S 12		S 13		S 14		S 15		S 16		S 17	
	Route 336 2+000-5+000	Route 336 (30-37) 2+800-3+000	Route 336 4+050-4+250	Route 3113 1-800-2+800	Route 11 97+300-97+800	Route 1141 1+000-1+800	Route 2 253+750-254+250	Route 2 254+800-255+000	Route 205 1+300-1+700					
10. Vehicle vs. Pedestrian	53 (21.7)	8 (27.6)	11 (18.0)	15 (57.7)	1 (6.7)	1 (11.1)	2 (15.4)	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
11. Hit pedestrian walking along carriageway	1	0	1	0	0	0	0	0	0	0	0	0	0	0
12. Hit pedestrian crossing carriageway at intersection	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13. Hit pedestrian crossing carriage at crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14. Hit pedestrian crossing carriageway other than crosswalk	52	8	10	15	1	1	2	1	2	1	1	1	0	0
15. Hit pedestrian emerging on the carriageway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Hit pedestrian playing on carriageway	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17. Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20. Vehicle vs. Bicycle	6 (2.5)	1 (3.4)	3 (4.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (20.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (33.3)
21. Head on collision	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22. Rear end collision	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23. Side collision during crossing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24. Side collision during right turn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25. Side collision during left turn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26. Others	6	1	3	0	0	0	0	2	0	0	0	0	1	0
30. Vehicle only	15 (6.1)	5 (17.2)	4 (6.6)	1 (3.8)	1 (6.7)	0 (0.0)	2 (15.4)	1 (10.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
31. Off carriageway	5	2	2	1	1	0	0	0	0	0	0	0	0	0
32. Collision with parked vehicle	7	3	1	1	0	0	1	1	0	0	0	0	0	0
33. Collision with guard rail	3	0	1	0	0	0	1	0	0	0	0	0	0	0
34. Collision with electric pole	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35. Collision with other objects	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36. Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40. Vehicle vs. Vehicle	169 (69.3)	14 (48.3)	43 (70.5)	7 (26.9)	13 (86.7)	8 (88.9)	9 (69.2)	6 (60.0)	2 (66.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
41. Head on collision	4	0	0	2	1	1	1	1	1	1	1	1	1	1
42. Rear end collision	63	4	25	3	7	3	4	2	0	0	0	0	0	0
43. Side collision during crossing	14	3	3	0	4	3	1	0	0	0	0	0	0	0
44. Side collision during right turn	37	3	3	0	1	1	1	0	0	0	0	0	0	0
45. Side collision during left turn	6	1	1	0	0	0	1	1	0	0	0	0	0	0
46. Side contact	1	0	0	0	0	0	0	0	0	0	0	0	0	0
47. Others	44	3	11	2	0	0	1	1	0	0	0	0	0	0
50. Unknown	1 (0.4)	1 (3.4)	0 (0.0)	3 (11.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Total	244 (100)	29 (100)	61 (100)	26 (100)	15 (100)	9 (100)	13 (100)	10 (100)	3 (100)	3 (100)	3 (100)	3 (100)	3 (100)	3 (100)

Note : ( ) Composition

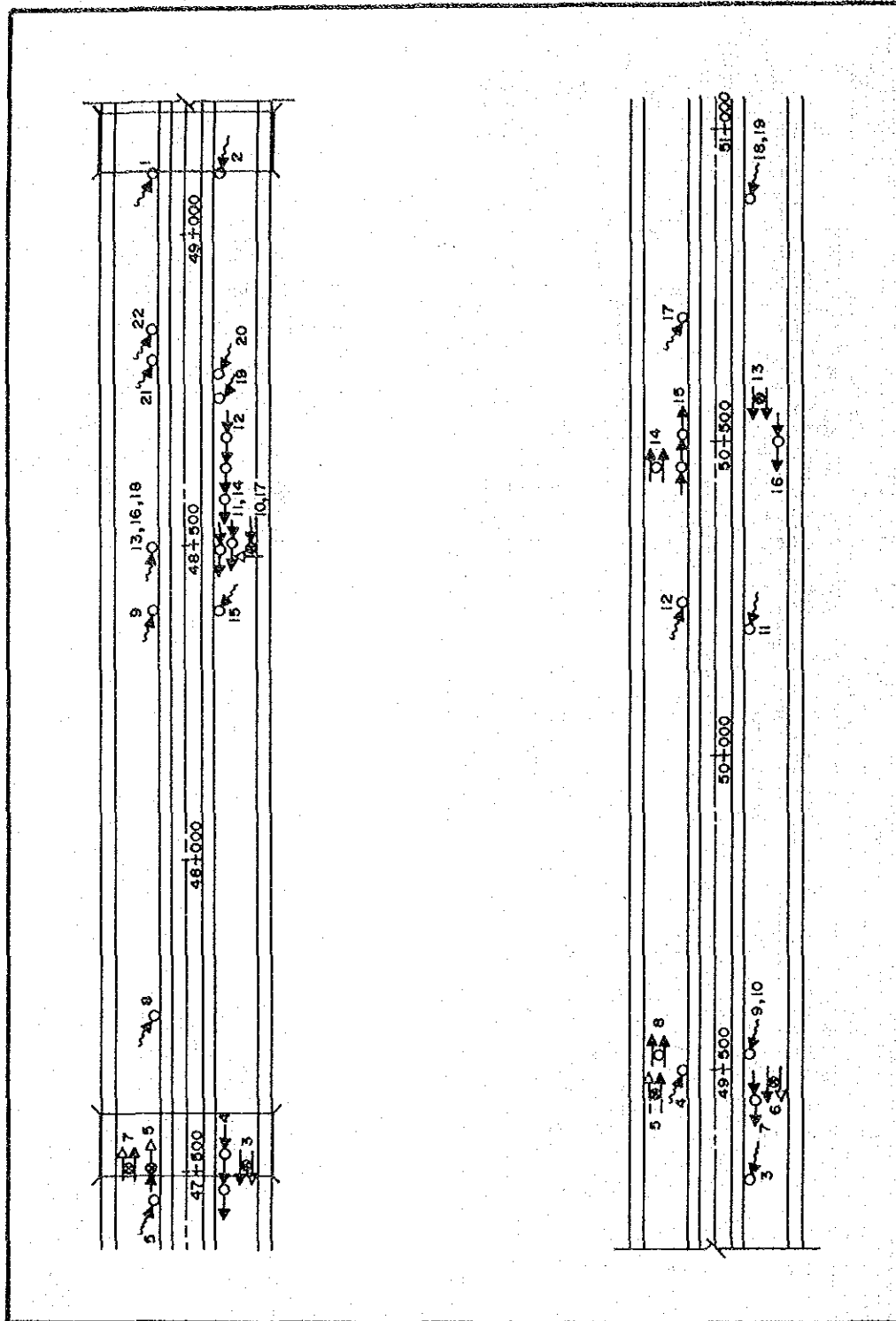


Collision Diagram ((1982) for Section 1 (Route 1, 19+00-22+00)

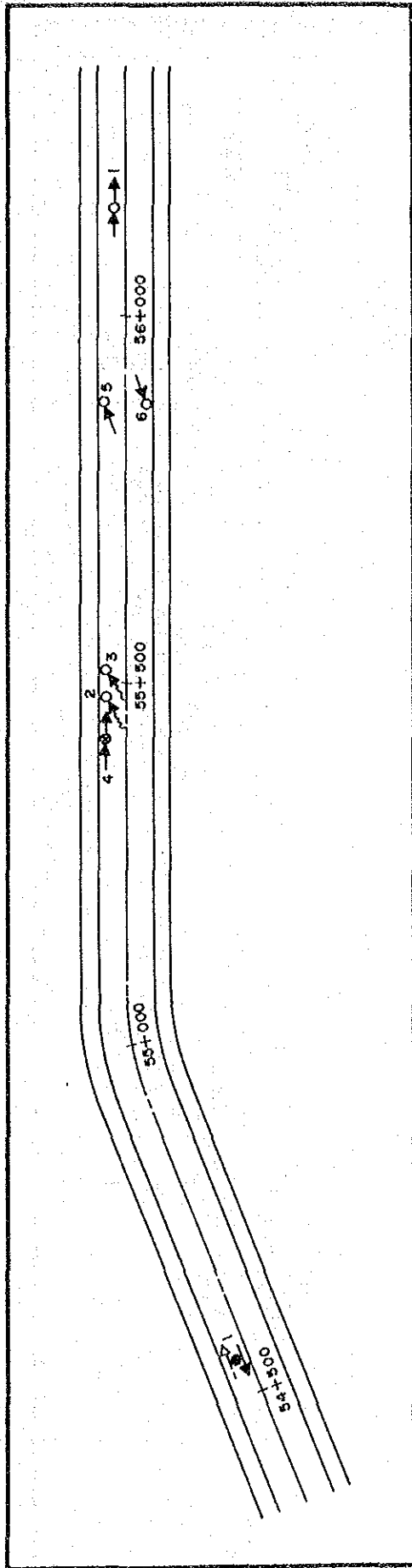


Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 2 (Route 1, 29+500-32+500)

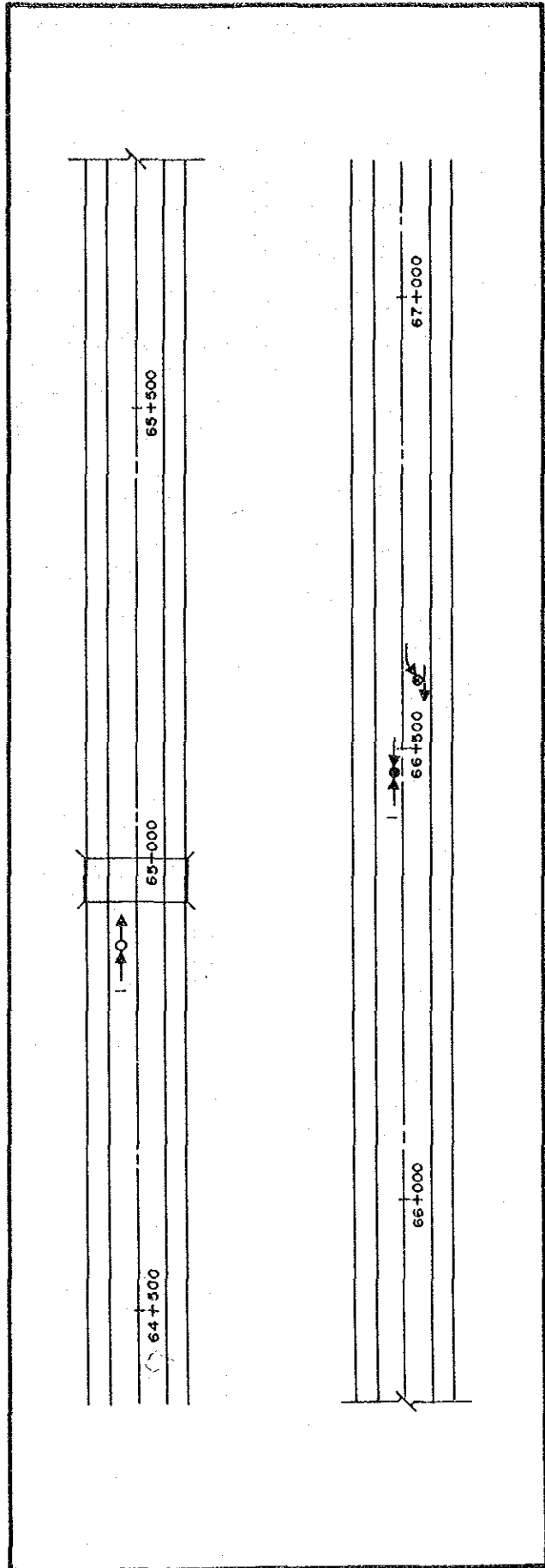




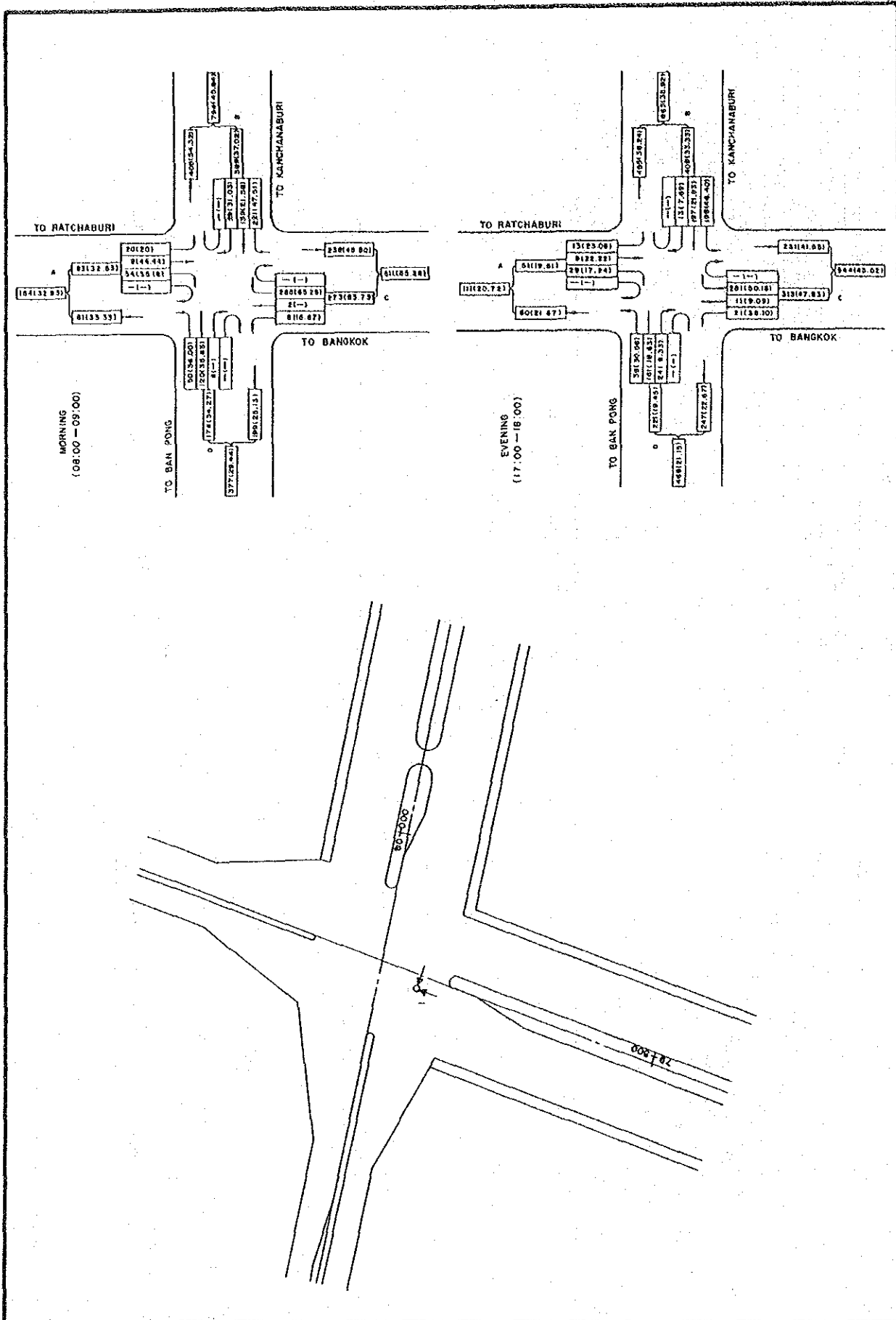
Collision Diagram (1982) for Section 3 (Route 1, 47+500-51+000)



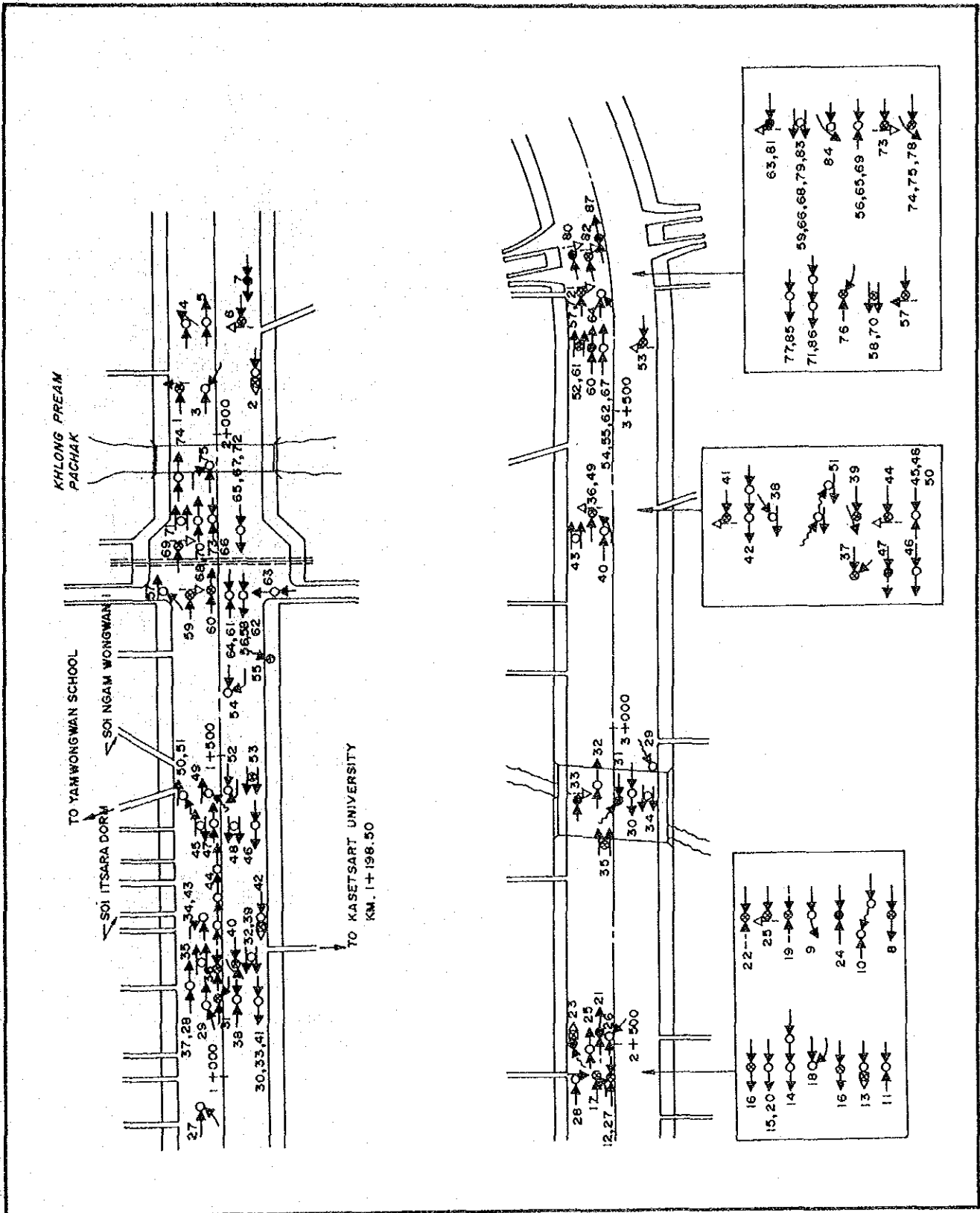
Collision Diagram (1982) for Section 4 (Route 32, 52+500-69+500)



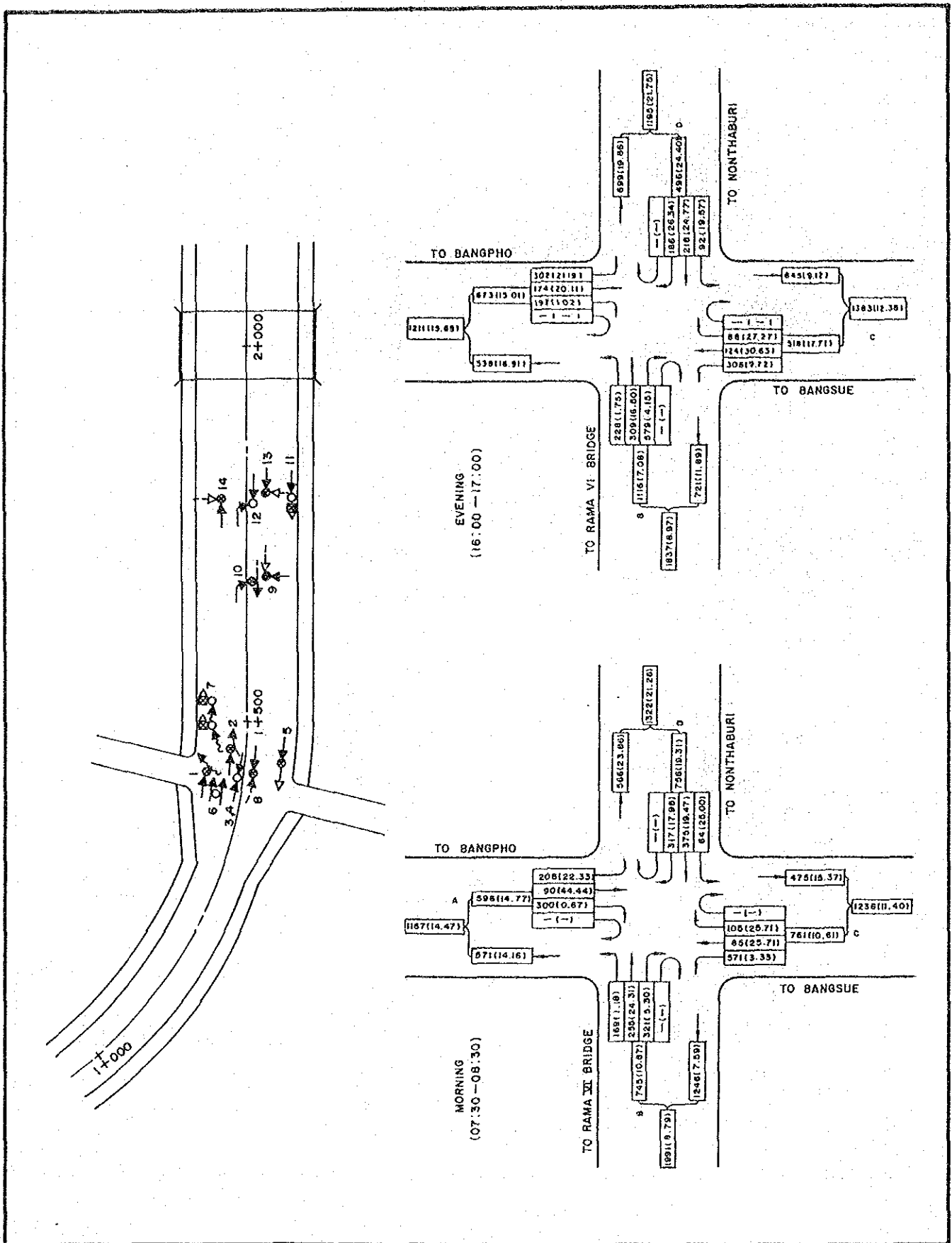
Collision Diagram (1982) for Section 5 (Route 304, 64+500-67+000)



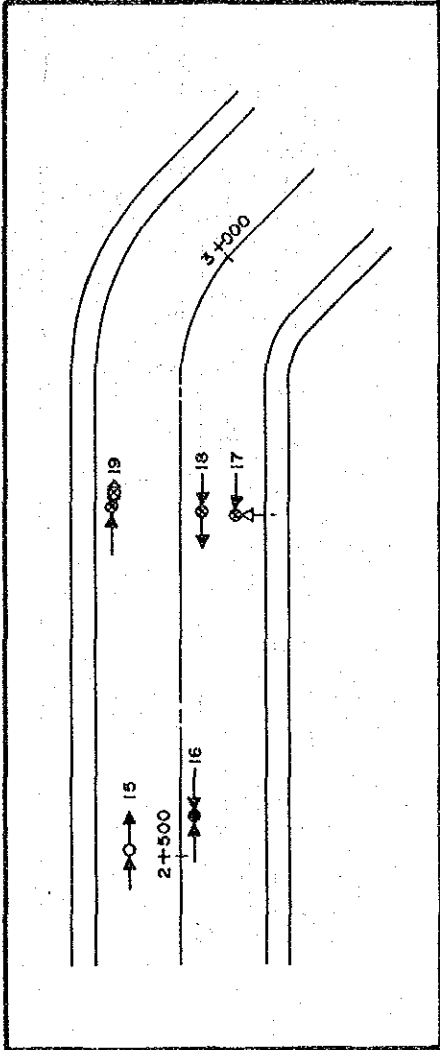
Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 6 (Route 323, 79+500-80+000)



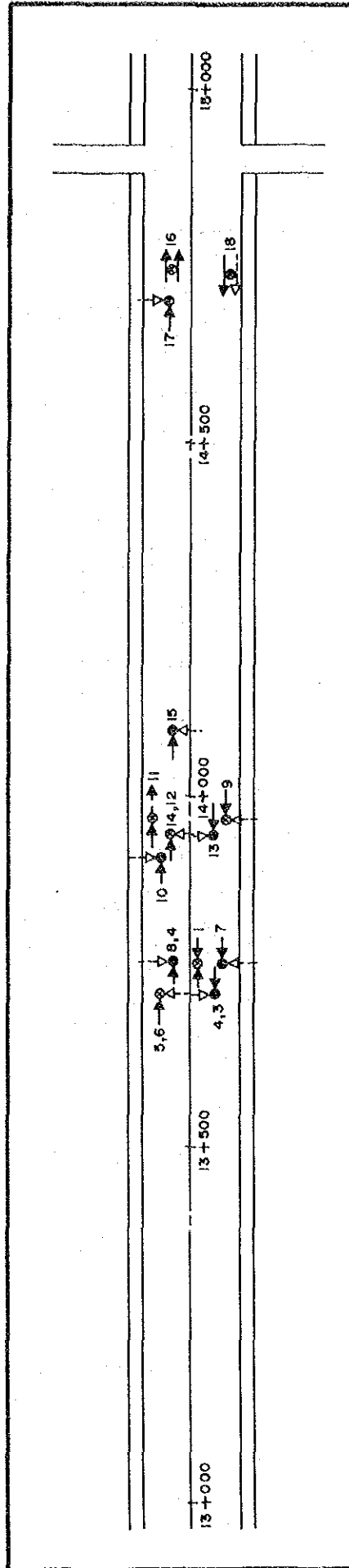
Collision Diagram (1982) for Section 7 (Route 302, 1+000-4+000)



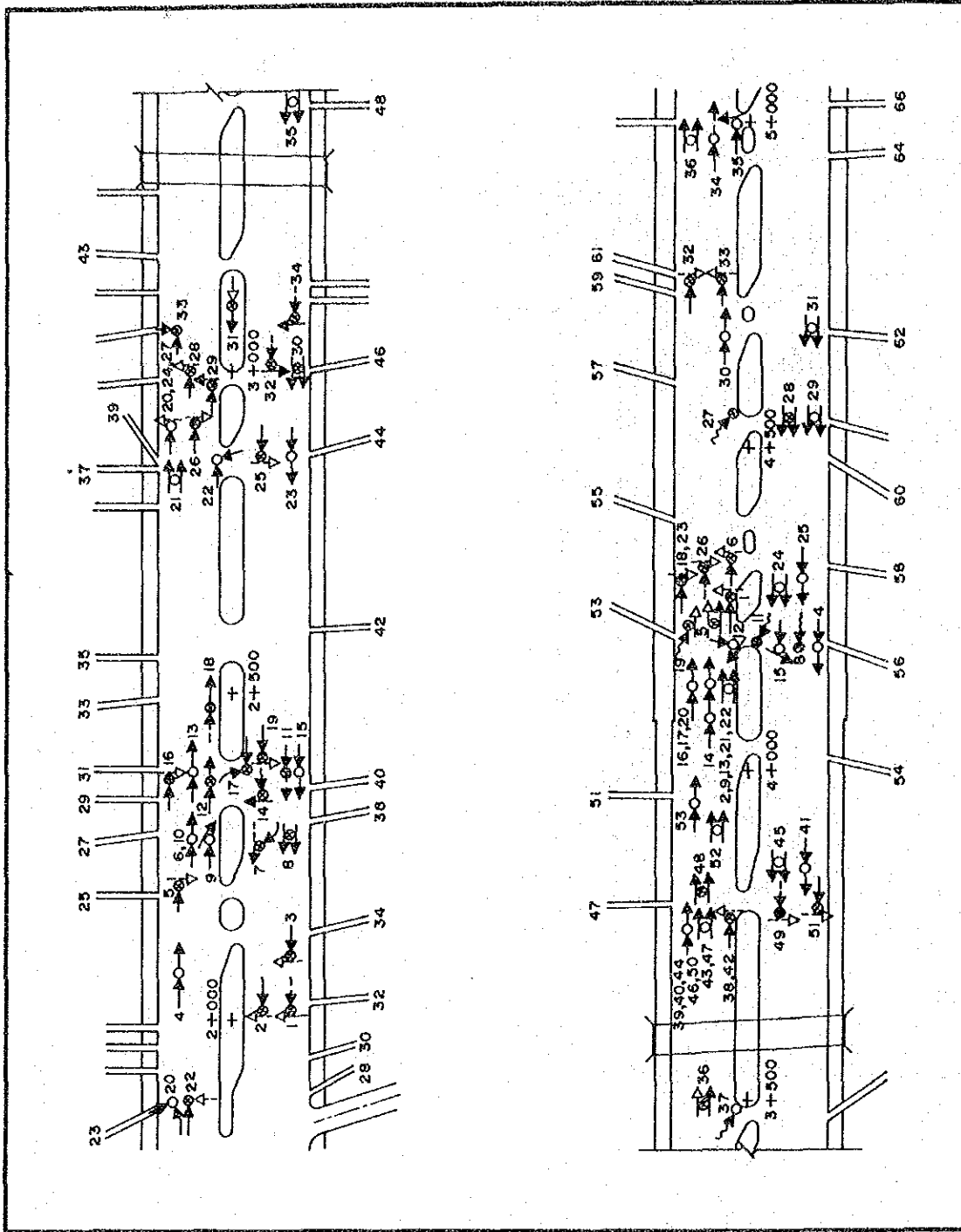
Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 8 (Route 306, 1+200-2+000)



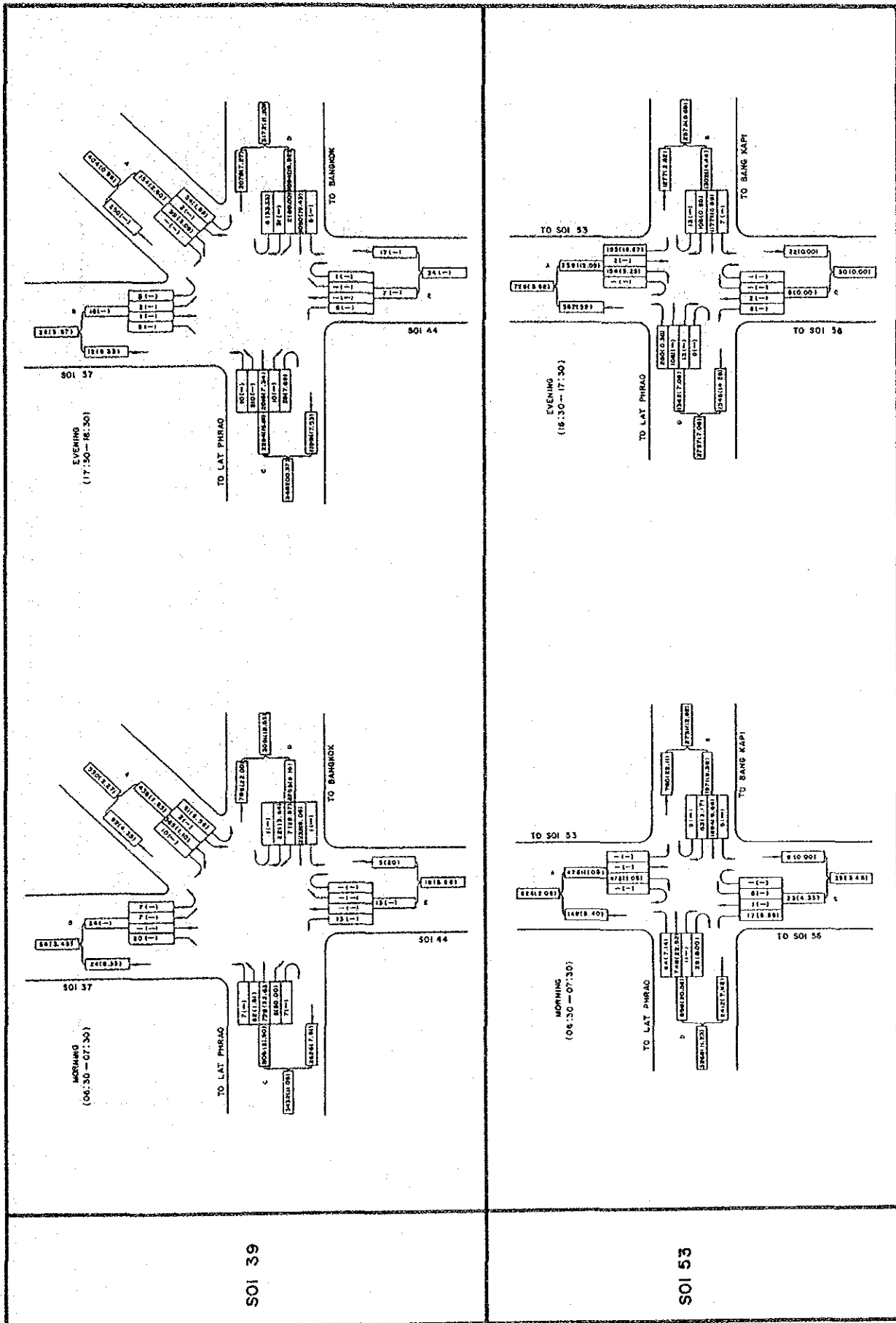
Collision Diagram (1982) for Section 9 (Route 306 2+700-3+100)



Collision Diagram (1982) for Section 10 (Route 306, 13+000-15+000)

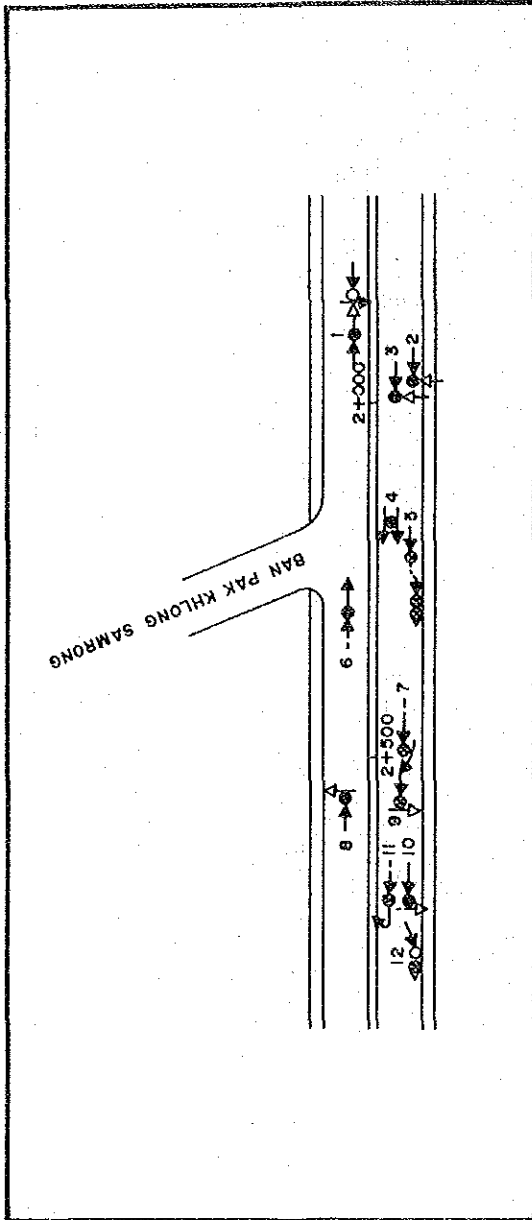


Collision Diagram (1982) for Section 11 (Route 11, 2+000-5+000)

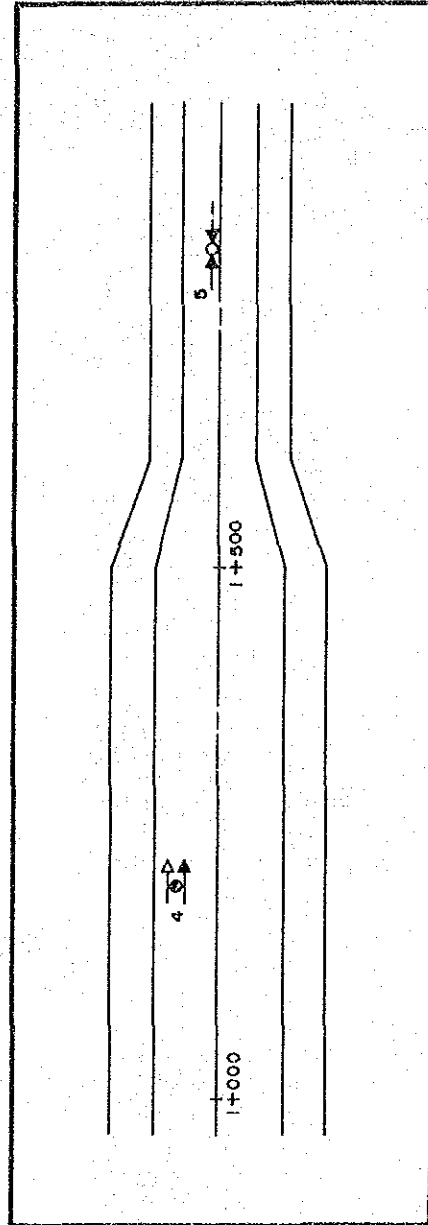


Turning Movement for Section 11 (Soi 39 and Soi 53)

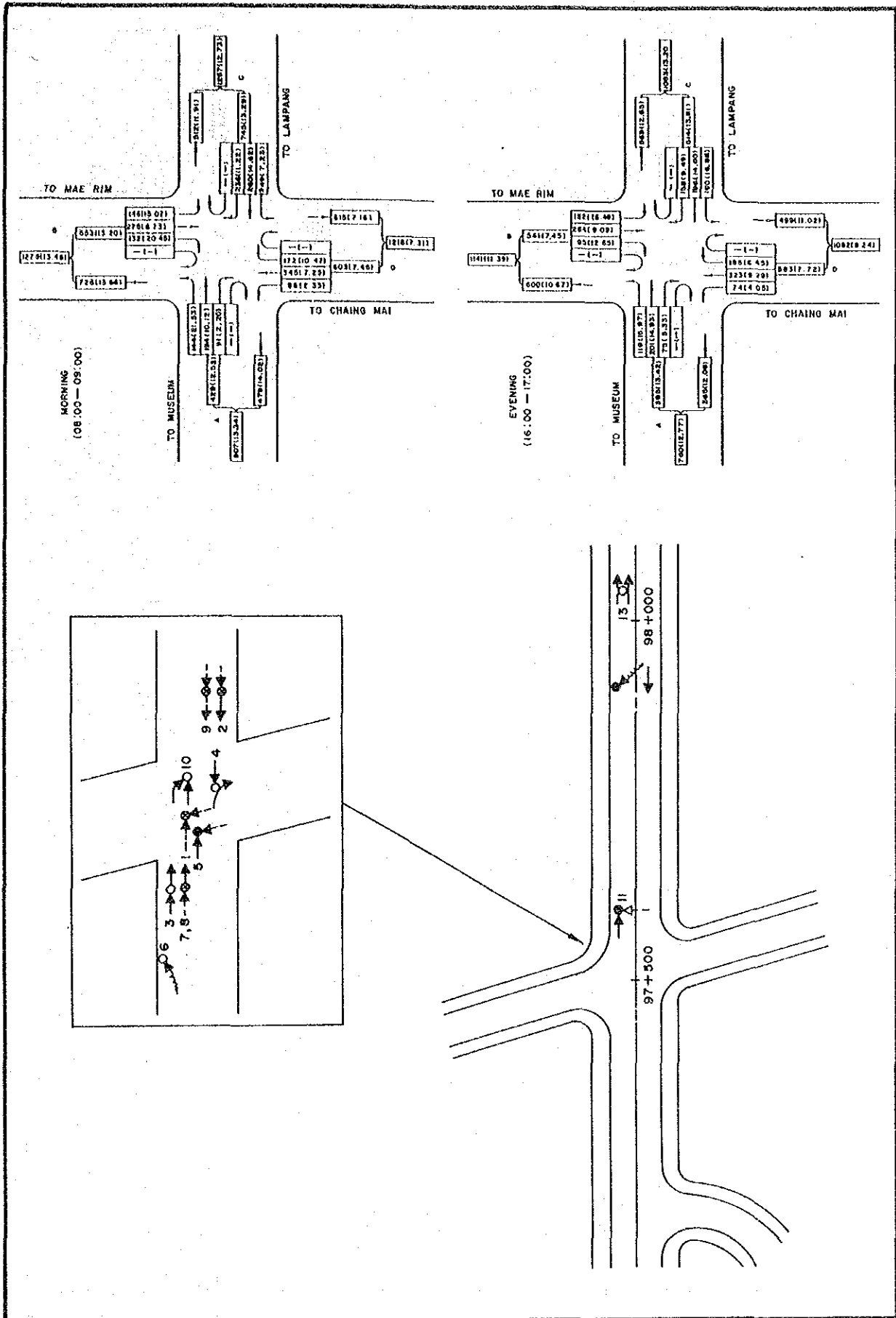




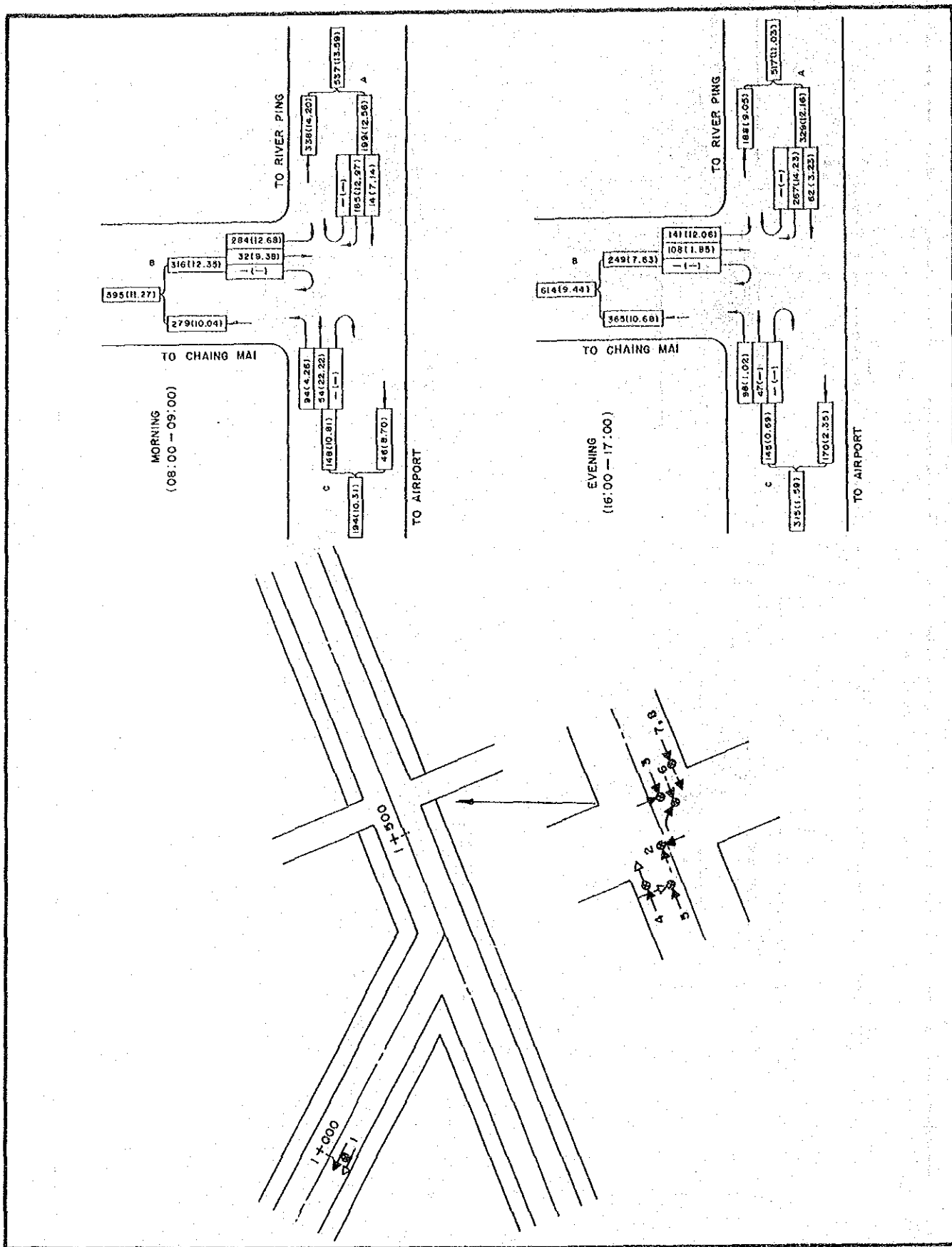
Collision Diagram (1982) for Section 12 (Route 3113, 1+800-2+800)



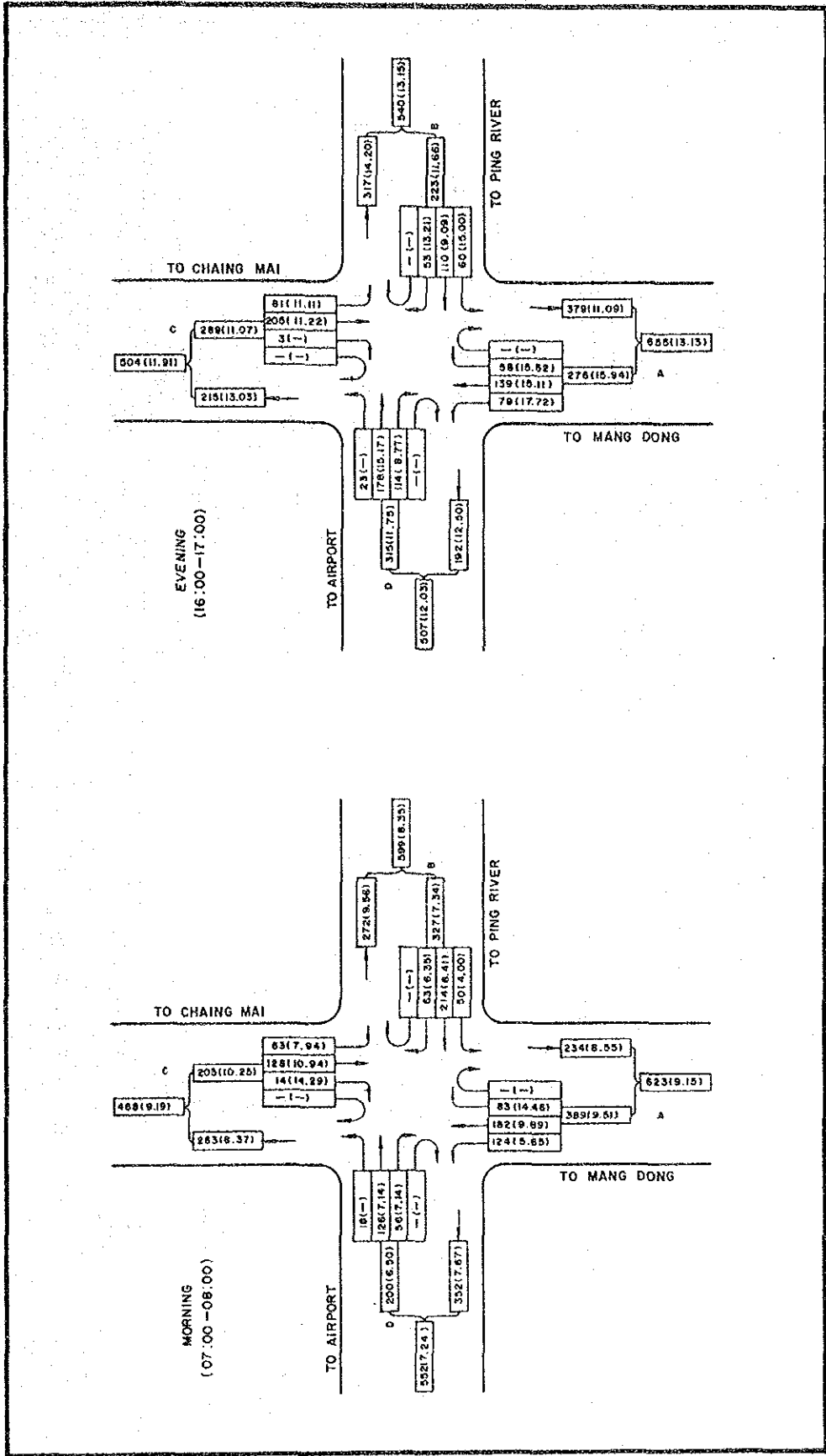
Collision Diagram (1982) for Section 17 (Route 205, 1+300-1+700)



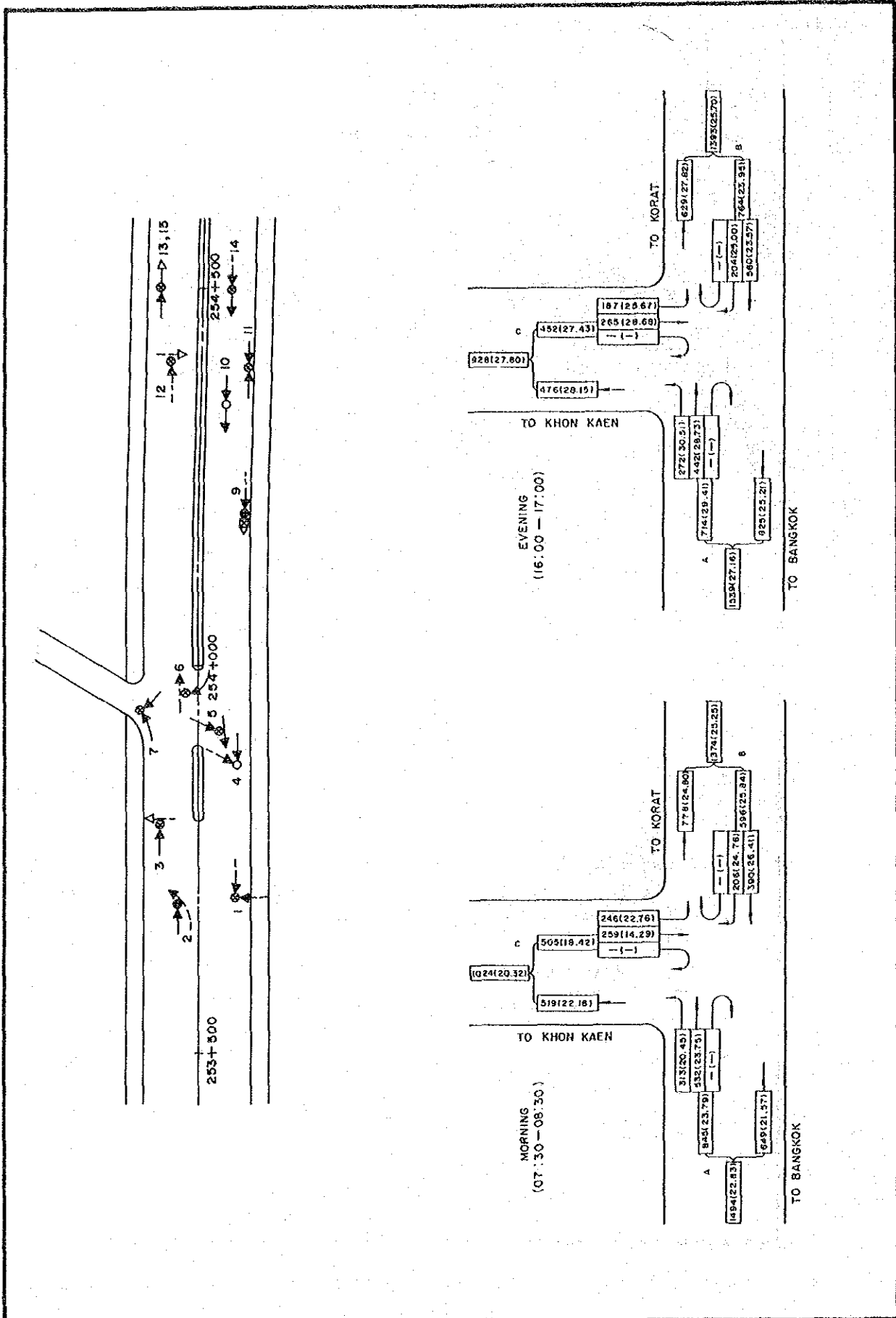
Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 13 (Route 11, 97+300-87+800)



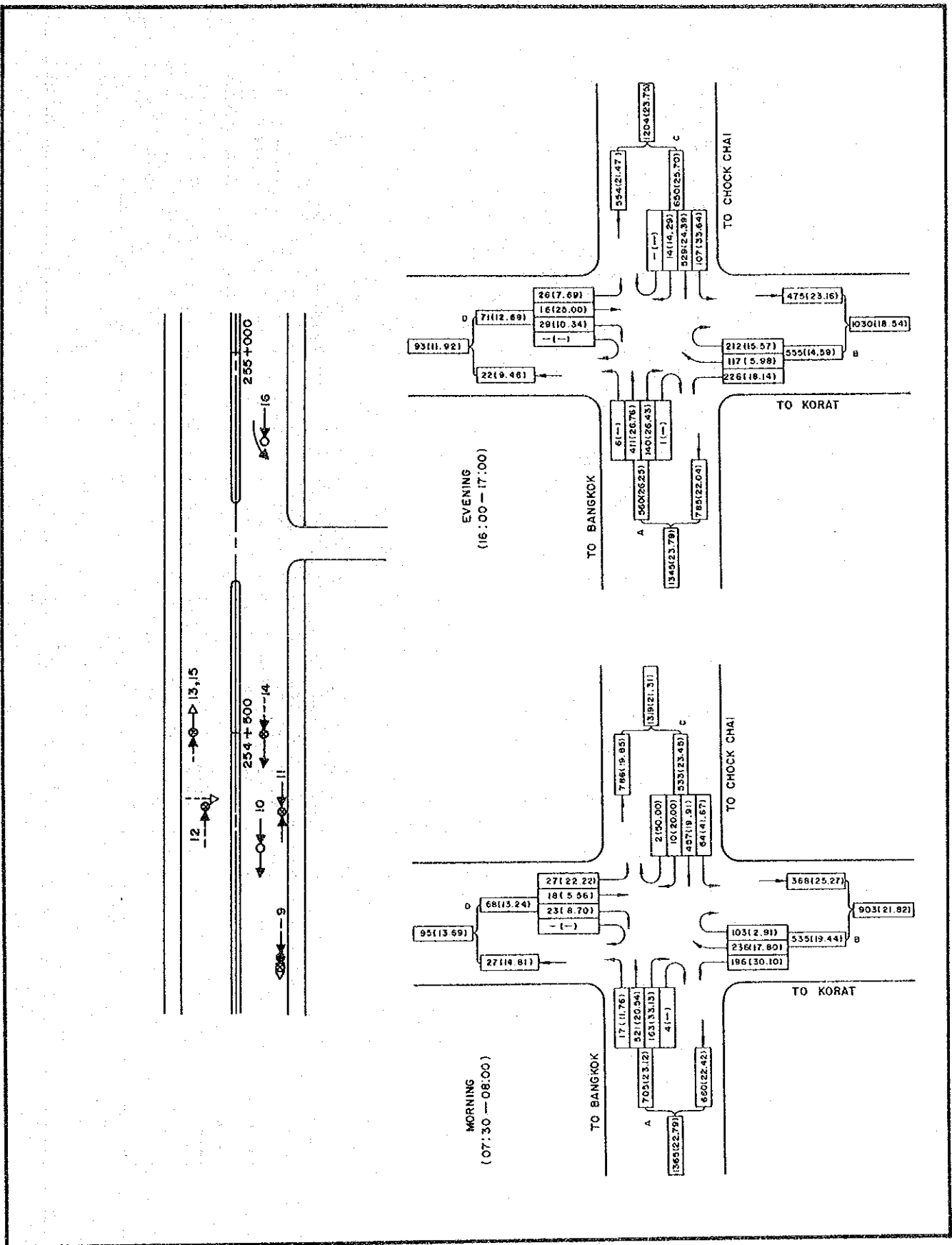
Collision Diagram (1962) and Turning Movement (Peak hour) for Section 14 (Route 1141, 1+000, 1+800)



Turning Movement (Peak Hour) for Section 14 (Route 1141, 1+000-1+800)



Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 15 (Route 2, 253+750-254+250)



Collision Diagram (1982) and Turning Movement (Peak Hour) for Section 16 (Route 2, 254+500-255+000)

## Form for Traffic Accident Survey

TRAFFIC ACCIDENT RECORD											
Date:.....	Day:.....	Time:.....	Weather: <input type="checkbox"/> Fine <input type="checkbox"/> Cloudy <input type="checkbox"/> Rainy <input type="checkbox"/> Foggy								
Route No.:.....		Location:.....									
Type of Accident:	<input type="checkbox"/> Vehicle VS Vehicle <input type="checkbox"/> Vehicle VS Bicycle	<input type="checkbox"/> Vehicle VS Pedestrian <input type="checkbox"/> Vehicle itself									
Number of Pedestrian Involved in Accident: .....	No. of Casualties: <input type="checkbox"/> Killed ..... <input type="checkbox"/> Injured .....										
Type of Vehicle:	<table border="1"> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table> (Fill in Vehicle Code Number)										
1. Bicycle	4. Light Bus	7. Heavy Truck (more than 6 wheels)									
2. Motorcycle	5. Light Truck	8. Trailer or others									
3. Passenger Car	6. Heavy Bus										
Property Damaged:	<input type="checkbox"/> Vehicle <input type="checkbox"/> Public Utility (e.g. electric pole, traffic sign .....) <input type="checkbox"/> Others .....										
Police Investigation:	<input type="checkbox"/> Investigation and Record <input type="checkbox"/> No Investigation <input type="checkbox"/> Investigation but No Official Record										
Cause of Accident:	<input type="checkbox"/> Over Speed Limit <input type="checkbox"/> Parking in Darkness, No Signal <input type="checkbox"/> Overtaking in Narrow Area <input type="checkbox"/> Vehicle Defects <input type="checkbox"/> Immediate Crossing <input type="checkbox"/> Sleepy <input type="checkbox"/> Failure to Yield Signal in Parking, Deceleration or Turning <input type="checkbox"/> Drunken <input type="checkbox"/> High Beam from other Direction Vehicle <input type="checkbox"/> Others .....										
Location Map											

Result of Traffic Accident Survey (1)

	Route 1 (48-49)		Route 306 (2.9-3.2)		Route 306 (13.5-14)		Route 336 (Sd. 39)		Route 336 (Sd. 53)		Route 1141 (1-1.45)		Route 1141 (1.45-1.7)	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Number of Accident	5	3	6	3	6	2	13	5	18	11	11	5	7	3
Fatality	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Injury	0	1	7	3	6	0	3	1	2	1	8	3	3	3
Property Damages Only	5	3	0	1	2	2	11	6	18	10	4	2	3	1
Weather Condition	5	3	5	2	5	0	13	4	18	10	7	5	4	2
Police Investigation	2	1	2	0	2	0	3	1	3	2	0	0	3	2
Type of Accident	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vehicle Type	1	1	4	1	2	1	13	4	17	11	4	2	6	3
Property Damaged	5	2	5	3	6	2	13	5	18	11	6	4	4	3
Cause of Accident	2	0	2	0	1	0	0	1	1	4	6	1	0	0
Accident Pattern	1	1	3	1	2	0	0	0	0	0	0	0	2	0



## Result of Traffic Accident Survey (If)

Number of Traffic Accident by Day (Before Improvement)								
Month	Date	Route 1	Route 308		Route 336		Route 1141	
		48+000 -49+000	2+800 -3+200	13+600 -14+000	Soi 39	Soi 53	1+100 -1+480	1+450 -1+700
December 1983	1	-	-	(1,0,1)	(1,0,0)	-	-	-
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	(2,0,2)	-
	4	-	-	-	-	-	-	-
	5	-	-	-	-	(1,0,0)	-	-
	6	-	-	-	-	-	-	(1,0,0)
	7	-	-	-	-	-	-	-
	8	-	-	-	-	(1,0,0)	-	(1,0,1)
	9	-	-	-	-	(1,0,0)	-	(2,0,2)
	10	-	-	(1,0,1)	(1,0,0)	(1,0,0)	-	-
	11	-	-	(1,0,1)	(1,0,0)	(1,0,0)	-	-
	12	-	-	(1,0,2)	-	-	-	-
	13	-	(1,0,1)	-	-	-	-	(2,0,0)
	14	-	-	-	(1,0,2)	-	-	-
	15	-	-	-	-	-	-	-
	16	-	-	-	-	(1,0,0)	-	-
	17	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-
	19	-	-	-	-	(1,0,0)	(1,0,1)	-
	20	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-
	22	-	-	(1,0,1)	-	-	(1,0,1)	-
	23	-	-	-	-	-	-	(1,0,0)
	24	-	(1,0,1)	-	(1,0,0)	-	-	-
	25	-	-	-	(2,0,0)	(1,0,0)	-	-
	26	-	-	-	-	(1,0,1)	(1,0,0)	-
	27	-	-	-	-	-	(3,0,2)	-
	28	-	-	-	-	(1,0,0)	-	-
	29	-	(1,0,1)	-	-	(1,0,0)	-	-
	30	-	-	-	-	-	-	-
	31	-	-	-	-	(1,0,1)	-	-
January 1984	1	-	-	-	-	(1,0,0)	-	-
	2	-	-	-	(1,0,0)	-	-	-
	3	-	-	-	-	(1,0,0)	-	-
	4	-	-	-	-	-	-	-
	5	(1,0,0)	-	-	-	-	-	-
	6	(1,0,0)	-	-	-	-	-	-
	7	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-
	10	-	-	-	-	-	(1,0,0)	-
	11	-	-	-	-	-	-	-
	12	(1,0,0)	-	-	-	-	-	-
	13	-	-	-	-	-	-	-
	14	-	-	-	(1,0,0)	-	-	-
	15	-	-	-	-	(1,0,0)	-	-
	16	-	(3,0,4)	-	-	-	(1,0,1)	-
	17	-	-	-	-	-	-	-
	18	(1,0,0)	-	-	-	-	-	-
	19	-	-	-	-	-	-	-
	20	-	-	-	-	(1,0,1)	-	-
	21	-	-	-	(1,0,0)	-	-	-
	22	-	-	-	-	-	(1,0,1)	-
	23	-	-	(1,0,0)	-	-	-	-
	24	-	-	-	-	-	-	-
	25	-	-	-	(1,0,0)	-	-	-
	26	-	-	-	-	(1,0,0)	-	-
	27	(1,0,0)	-	-	-	-	-	-
	28	-	-	-	-	(1,0,0)	-	-
	29	-	-	-	-	-	-	-
	30	-	-	-	(1,0,0)	(1,0,0)	-	-
	31	-	-	-	-	-	-	-

Note ; ( No. of, No. of, No. of )  
 { Accident Fatalities Injuries }

## Result of Traffic Accident Survey (III)

Number of Traffic Accident by Day (After Improvement)								
Month	Date	Route 1	Route 306		Route 336		Route 1141	
		48+000 -49+000	2+000 -3+200	13+600 -14+000	Soi 39	Soi 53	1+100 -1+450	1+450 -1+700
April 1984	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-
	6	-	-	-	-	-	(1,0,0)	(1,0,0)
	7	-	-	-	-	-	-	-
	8	-	-	(1,0,1)	-	-	-	-
	9	(1,0,0)	-	-	-	-	-	-
	10	-	-	-	-	-	-	-
	11	-	-	(1,0,1)	-	-	-	(1,0,1)
	12	-	-	-	-	-	-	-
	13	-	-	-	-	-	(1,0,1)	-
	14	-	-	-	-	-	(1,0,0)	-
	15	-	-	-	-	-	-	-
	16	-	-	-	(1,0,0)	-	-	(1,0,1)
	17	-	-	-	-	-	-	-
	18	-	-	-	-	-	-	-
	19	-	-	-	-	(1,0,0)	(1,0,0)	(1,0,0)
	20	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	(1,0,2)
	23	-	-	-	-	-	-	-
	24	-	-	-	-	-	(1,0,0)	-
	25	-	-	-	-	-	-	-
	26	-	-	-	-	-	-	-
	27	-	-	-	-	-	(1,0,1)	-
	28	-	-	-	-	-	(1,0,0)	-
	29	-	-	-	-	-	-	-
	30	-	-	-	-	-	-	-
	31	-	-	-	-	-	-	-
May 1984	1	-	-	-	-	-	-	-
	2	-	-	-	-	-	-	-
	3	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-
	8	-	-	-	-	(1,0,0)	-	-
	9	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-
	11	-	-	-	-	-	(1,0,1)	-
	12	-	-	-	-	-	(1,0,0)	-
	13	(1,0,0)	-	-	-	-	-	-
	14	-	-	-	-	-	-	-
	15	-	-	-	-	-	-	-
	16	-	-	-	-	(1,0,0)	-	-
	17	-	-	-	(1,0,0)	(1,0,0)	-	-
	18	-	-	-	(2,0,1)	-	-	-
	19	-	-	-	-	-	-	-
	20	-	-	-	-	-	-	-
	21	-	-	-	-	-	-	-
	22	-	-	-	-	-	-	-
	23	(1,0,1)	(1,0,1)	-	-	-	(1,0,1)	-
	24	-	-	-	-	-	-	-
	25	-	-	-	-	-	(1,0,0)	-
	26	-	-	-	-	-	-	-
	27	-	-	-	-	-	-	-
	28	-	-	-	-	-	(1,0,0)	-
	29	-	-	-	-	-	-	-
	30	-	-	-	-	-	(1,0,0)	-
	31	-	-	-	-	-	-	-

Note : ( No.of, No.of , No. of )  
( Accident Fatalities Injuries )

Survey Items for Traffic Behaviour Survey

Improvement Type	Location (Kilometer Post)	Before-survey		After-survey		Survey Items	
		Date	Hours	Date	Hours	Survey conducted by Video Tape Recorder	Survey conducted by Event Oscillograph
Improvement of Lane Line Marking	Route 1 (48+000-49+000)	25/01/1984 (Wed)	15:00-17:00	21/03/1984 (Wed)	15:00-17:00	Vehicle Movement	Running Speed
Improvement of a Sub-standard Curve by Visual Guidance	Route 306 (2+800-3+200)	07/12/1983 (Wed)	14:00-16:00	14/03/1984 (Wed)	14:00-16:00	Vehicle Movement	Running Speed Approach Speed
	Route 306 (13+500-14+000)	07/02/1984 (Tues)	21:00-23:00	27/03/1984 (Tues)	21:00-23:00	Vehicle Movement (By Observer)	Running Speed Approach Speed
Safeguard of Pedestrian	Route 306 (13+500-14+000)	08/12/1983 (Thur)	16:00-18:00	29/05/1984 (Thur)	16:00-18:00	Vehicle Movement Pedestrian Movement	Running Speed
Improvement of Turning Traffic by Signalization	Route 336 Soi 39	29/11/1983 (Tues)	15:00-17:00	20/03/1984 (Tues)	15:00-17:00	Vehicle Movement Pedestrian Movement	Running Speed Head Distance
	Soi 53	30/11/1983 (Wed)	15:00-17:00	21/03/1984 (Wed)	15:00-17:00	Vehicle Movement Pedestrian Movement	Running Speed Head Distance
Intersection Improvement by Channelization	Route 1141 (1+100-1+700)	02/12/1983 (Fri)	14:00-16:00	16/03/1984 (Fri)	14:00-16:00	Vehicle Movement	Running Speed

**Result of Traffic Behaviour Survey (I)**  
**(Route 1, Improvement of Lane Line Marking)**

	Invasion onto Lane Line	Vehicle Type			Interference to Vehicle on Abutting Lane					Sample Number	Conflicts Number	Reduction Rate
		Heavy Vehicle	Light Vehicle	Total	No. Vehicle	None	Stop	Speed Down	Lane Shift			
Before Improvement	None	187	35	202		202	0	0	0	300	92	0.62
	Deeply	6	12	18	6	10	0	2	0			
	Moderately	5	6	11		8	0	0	3			
	Slightly	58	11	69		69	0	0	0			
After Improvement	None	170	82	252		252	0	0	0	300	35	
	Deeply	14	13	27	13	14	0	0	0			
	Moderately	14	0	14		14	0	0	0			
	Slightly	7	0	7		7	0	0	0			

**Result of Traffic Behaviour Survey (II)**










**(Route 306, Improvement of a Sub-Standard Curve by Visual Guidance)**

	Invasion onto Lane Line (or Center Line)	Travelling Lane		Vehicle Type			Interference to Vehicle on Abutting Lane (or Opposite Lane)					Sample Number	Conflicts Number	Reduction Rate
		1st	2nd	Heavy Vehicle	Light Vehicle	Total	No. Vehicle	None	Stop	Speed Down	Lane Shift			
Before Improvement	None	22	136	22	136	168		158	0	0	0	300	131	0.59
	Deeply	12	7	0	19	19	11	3	0	0	5			
	Moderately	5	17	0	22	22		22	0	0	0			
	Slightly	17	84	22	79	101		101	0	0	0			
After Improvement	None	68	160	20	206	226		226	0	0	0	300	54	
	Deeply	48	0	7	41	48	20	26	0	1	1			
	Moderately	13	0	1	12	13		13	0	0	0			
	Slightly	13	0	0	13	13		13	0	0	0			

**Result of Traffic Behaviour Survey (III)**  
**(Route 336, Improvement of Turning Traffic by Signalization)**

	Vehicle Type	Case of Conflict												Con-flicts Number	Total Number of Con-flicts	Reduction Rate				
		North			South			East			West									
		Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn	Left Turn	Thru	Right Turn							
Route 336 (Sol 39)	Before Improvement	Heavy Vehicle	0	0	0	0	0	0	0	0	1	0	0	0	37					
		Light Vehicle	0	1	27	0	0	0	0	0	4	0	0	4						
		Total	0	1	27	0	0	0	0	0	5	0	0	4						
	After Improvement	Heavy Vehicle	0	0	0	0	0	0	0	0	0	0	0	0				8		
		Light Vehicle	0	0	0	0	0	0	0	0	1	0	3	4						
		Total	0	0	0	0	0	0	0	0	1	0	3	4						
Route 336 (Sol 53)	Before Improvement	Heavy Vehicle	0	0	3	0	0	0	0	0	0	0	0	2	29	66	0.80			
		Light Vehicle	0	0	15	0	0	0	0	2	3	0	0	4						
		Total	0	0	18	0	0	0	0	2	3	0	0	6						
	After Improvement	Heavy Vehicle	0	0	0	0	0	0	0	0	0	0	1	0				5	13	
		Light Vehicle	0	0	0	0	0	1	0	1	2	1	1	0						
		Total	0	0	0	0	0	1	0	1	2	1	2	0						

**Result of Traffic Behaviour Study (IV)**  
**(Route 1141, Intersection Improvement by Channelization)**

	Vehicle Type	From Chiang Mai				From Air Port				From Route 1141				Sample Number	Conflicts Number	Reduction Rate
		Free				Free				Free						
Before Improvement	Heavy Vehicle	0	1	3	1	1	0	3	1	3	1	9	0	300	200	0.51
	Light Vehicle	35	16	38	29	45	2	4	19	16	19	38	16			
	Total	35	17	41	30	46	2	7	20	19	20	47	16			
After Improvement	Heavy Vehicle	1	1	1	1	0	0	0	1	4	0	2	1	300	99	
	Light Vehicle	98	7	23	4	27	0	0	10	71	0	43	5			
	Total	99	8	24	5	27	0	0	11	75	0	45	6			

Result of Traffic Behaviour Survey (V)  
(Route 306, Safeguard of Pedestrian)

	Crossing Movement (I)	Crossing Location		Number of Pedestrian in Group		Crossing Movement(II)		Interference to Vehicle on Carriageway				Sample Number	Conflicts Number	Reduction Rate
		On Zebra	Other Part	1	2 or more	Stop on Road Side	Stop on Carriageway	None	Stop	Speed Down	Lane Shift			
Before Improvement	Run	72	22	61	33	72	28	50	11	33	0	300	44	0.48
	Walk	189	17	61	145	195	119	11	86	127	2			
After Improvement	Run	115	92	138	69	185	136	184	0	23	0	300	23	
	Walk	90	3	6	88	93	91	14	38	40	1			

Result of Traffic Behaviour Survey (VI)  
(Route 336, Safeguard of Pedestrian)

	Crossing Movement (I)	Crossing Location		Number of Pedestrian in Group		Crossing Movement(II)		Interference to Vehicle on Carriageway				Sample Number	Conflicts Number	Total Number of Conflicts	Reduction Rate
		On Zebra	Other Part	1	2 or more	Stop on Road Side	Stop on Carriageway	None	Stop	Speed Down	Lane Shift				
Route 336 (Soi 39)	Before Improvement	Run	109	23	64	67	131	105	97	4	30	0	150	34	
		Walk	19	0	4	15	19	19	0	19	0	0			
	After Improvement	Run	23	12	23	12	33	12	12	20	3	0	150	15	
		Walk	103	12	54	61	5	3	3	106	6	0			
Route 336 (Soi 33)	Before Improvement	Run	0	100	81	19	99	61	80	0	20	0	150	20	54
		Walk	0	80	21	29	52	46	28	0	22	0			
	After Improvement	Run	31	10	15	26	41	16	5	31	5	0	150	10	
		Walk	104	5	73	36	93	57	0	109	0	0			

Result of User Opinion Survey (I)  
(for Vehicular Traffic)

Safety Measure		Improvement of Lane Line Marking	Improvement of a Sub-standard Curve by Visual Guidance	Improvement of Turning Traffic by Signalization	Intersection Improvement by Channelization				
Location (Kilometer Post)		Route 1 (48+000-49+000)	Route 306 (2+900-3+200)	Route 336 (2+000-5+000)	Route 1141 (1+000-1+450)				
Number of Sample		240	303	455	106				
Sample Driver	Professional Driver	166 (69%)	177 (58%)	178 (39%)	33 (31%)				
	Others	74 (31%)	126 (42%)	277 (61%)	73 (69%)				
Vehicle Type	Bicycle	0 (0%)	0 (0%)	0 (0%)	14 (13%)				
	Motor-cycle	11 (5%)	52 (17%)	70 (15%)	50 (47%)				
	Light Vehicle	89 (37%)	196 (65%)	363 (80%)	38 (36%)				
	Heavy Vehicle	140 (58%)	55 (18%)	22 (5%)	4 (49%)				
User Opinion		Visibility of Lane Line Marking		Visibility of Curve Section		Visibility of Traffic Signal		Smooth Driving	
		Improve	Not Improve	Improve	Not Improve	Good	Bad	Improve	Not Improve
		235 (98%)	5 (2%)	303 (100%)	0 (0%)	247 (54%)	208 (46%)	76 (72%)	30 (28%)
		Smooth Driving		Smooth Driving		Turning Movement at Intersection			
		Improve	Not Improve	Improve	Not Improve	Improve	Not Improve		
		215 (90%)	25 (10%)	303 (100%)	0 (0%)	332 (73%)	123 (27%)		
		General Evaluation		General Evaluation		Safety Driving			
		Good	Bad	Good	Bad	Improve	Not Improve		
		212 (88%)	28 (12%)	303 (100%)	0 (0%)	154 (34%)	301 (66%)		
						General Evaluation			
Good	Bad								
				261 (57%)	194 (43%)				

Result of User Opinion Survey (II)  
(for Pedestrian)

Safety Measures		Safeguard of Pedestrian	Installation of Traffic Signal for Pedestrian			
Location (Kilometer Post)		Route 306 (13+500-14+000)	Route 336 (2+000-5+000)			
Number of Sample		381	560			
Sample Pedestrian	Male	Adult	131 (34%)	186 (33%)		
		Child	96 (25%)	76 (14%)		
	Female	Adult	96 (25%)	211 (38%)		
		Child	58 (16%)	81 (15%)		
User Opinion		Safety of Crossing		Visibility of Pedestrian Signal		
		Improve	Not Improve	Good	Bad	
		362 (95%)	19 (5%)	381 (68%)	179 (32%)	
		X		Safety of Crossing		
				Improve	Not Improve	
				502 (90%)	58 (10%)	
		X		General Evaluation		
				Good	Bad	
		357 (64%)	203 (36%)			



Number of Sections and Improvement Work Types by DOH

Improvement Type	Number of Sections
1. Overlay	21
2. Patching	35
3. Seal Coat	8
4. Geometric Improvement	30
5. Installation of Guard Rail	5
6. Shoulder Improvement	7
7. Installation of Street Lighting & Traffic Signal	3
8. Installation of Signal	3
9. Installation of Street Lighting	9
10. Installation of Traffic Sign & Guide Post	1
11. Installation of Flashing Light	4
Total	126

Note: The number of sections are for three years from 1979 to 1981.

## Accident Reduction Rates by Safety Device (Roading)

Safety Devices	Data A			Data B			Data C			Data D		
	Before	After	Reduction Rate	Before	After	Reduction Rate	Before	After	Reduction Rate	Before	After	Reduction Rate
Traffic Signal for Pedestrian	-	-	-	1,170	587	50	-	-	-	136	85	38
Crosswalk	110	84	24	3,936	2,667	32	2,039	1,277	37	-	-	-
Overpass	70	33	53	-	-	-	439	203	54	137	96	30
Sidewalk	4	1	75	-	-	-	92	51	45	-	-	-
Guardfence	1,337	541	60	-	-	-	5,037	2,976	41	-	-	-
Lighting	1,506	1,333	12	-	-	-	5,837	4,154	29	-	-	-
Curve Mirror	121	41	66	-	-	-	678	215	68	-	-	-
Median Island	4	1	75	-	-	-	3,422	2,765	19	-	-	-
Edge Line	106	78	26	-	-	-	337	242	28	67	38	43
Traffic Sign	-	-	-	2,616	2,278	13	259	113	56	-	-	-
Restriction of Parking	-	-	-	-	-	-	5,696	4,394	23	-	-	-
Restriction of Speed	-	-	-	-	-	-	1,533	1,211	21	-	-	-
Restriction of Overtaking	-	-	-	-	-	-	1,246	935	25	-	-	-

Accident Reduction Rates by Safety Device (Intersection)

Safety Devices	Data A			Data B			Data C			Data D			Data E		
	Before	After	Reduction Rate	Before	After	Reduction Rate	Before	After	Reduction Rate	Before	After	Reduction Rate	Before	After	Reduction Rate
Traffic Signal	473	260	45	6,216	4,290	31	4,612	2,412	48	-	-	-	-	-	-
Lighting	-	-	-	-	-	-	-	-	-	48	30	38*	-	-	-
Channelization	109	57	48	-	-	-	-	-	-	-	-	-	-	-	-
Improvement of Skid Resistance	36	11	69	-	-	-	1,325	565	57	-	-	-	-	-	-
Stop Control	-	-	-	-	-	-	853	343	60	-	-	-	230	65	72

Note ; \* Only vehicle vs. pedestrian

Reference;

- M. Koshi "Traffic Accident Reduction Policies by Safety Devices"

Traffic Engineering Vo.15 No.2

Data A 1966, Metropolitan Police Board

Data B 1967, Metropolitan Police Board

Data C 1964, Prime Minister Office

Data D Others

- Japan Traffic Engineering Society "Traffic Accident Reduction Policies on Roadway and Intersection", 1975

Data E 1973, Saitama Prefecture

Material for expanding the number of accidents from  
6 Changwats to All Roads in the LPs Area

(Basic Data)

1. Number of casualties of all roads in LPs area by  
Police Department (without Bangkok area)

	(A) <u>6 Changwats</u>	(B) <u>Thailand</u>	<u>A/B</u>	
Fatal (persons)	191	1,163	0.16	} 0.20
Injury (persons)	506	2,276	0.22	
No. of Accident	402	2,082	0.20	

(For Information)

2. Number of casualties of HPD area by Highway Police

	(A) <u>6 Changwats</u>	(B) <u>Thailand</u>	<u>A/B</u>	
Fatal (persons)	408	1,652	0.25	} 0.25
Injury (persons)	1,173	4,749	0.25	
No. of Accident	763	3,211	0.24	

3. Population and number of registered vehicle  
without Bangkok area

	(A) <u>6 Changwats</u>	(B) <u>Thailand</u>	<u>A/B</u>
Population (thousands persons)	6,080	42,665	0.14
Car (hundreds veh.)	1,047	4,591	0.23

4. Size of accident data in 6 Changwats

(1) for DOH road on Major Municipality

645 casualties

(2) for all road

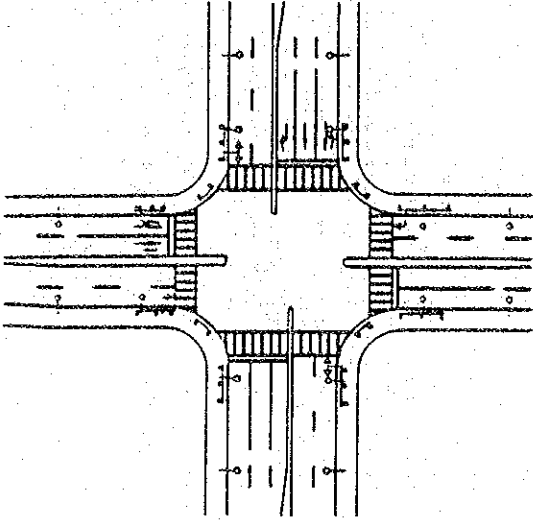
697 casualties

$$(1)/(2) = 0.93$$

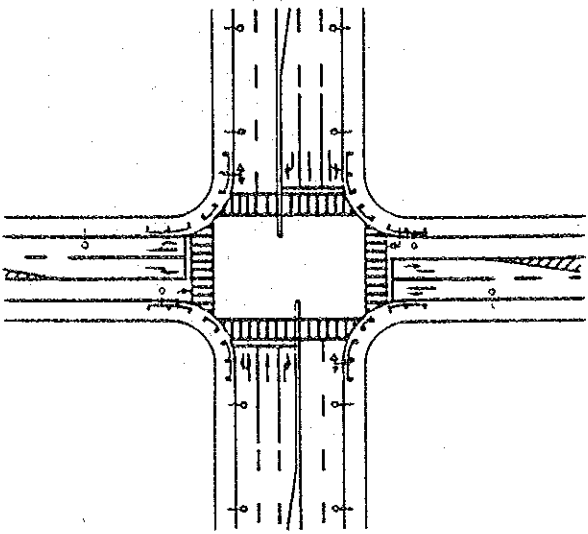
The gathering rate of accidents on DOH roads is more than 93% though the number of casualties (697) includes accidents which occurred in other than DOH roads. The number of accidents in DOH roads on major municipality corrected by the Team are assumed to occupy the majority of accidents in DOH roads.

5. Expanding Factor

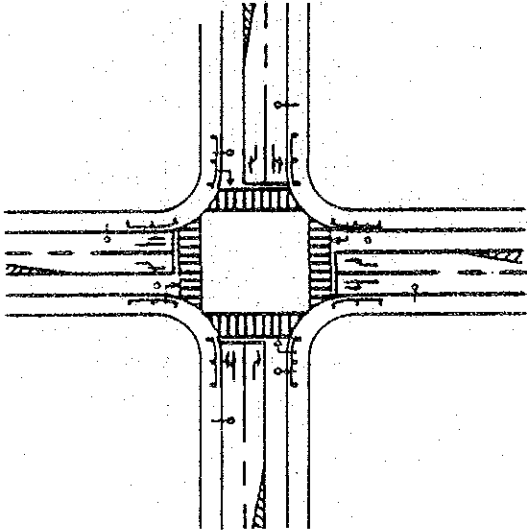
According to above information, the rate of the number of casualties in 6 Changwats to the whole country could be assumed twenty(20) percent. Then, the expanding factor of 5 is set in this study.



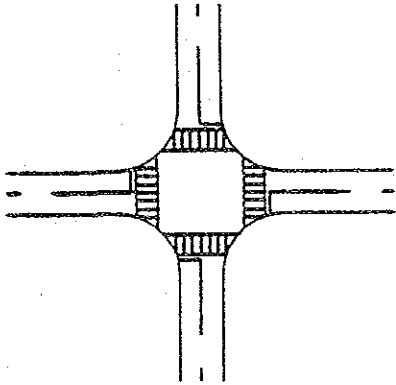
I-1 4 Lanes x 4 Lanes



I-2 4 Lanes x 2 Lanes



I-3 2 Lanes x 2 Lanes  
(In Case of High  
Traffic Volume)



I-4 2 Lanes x 2 Lanes  
(In Case of Low  
Traffic Volume)

LEGEND:

- ⊙ : Lighting
- ==== : Guardfence
- : Traffic Signal

Schematic Drawings for Intersection

Quantity of Safety Devices by Road Type

Road Type		Roadway										Intersection			
Safety Device	Unit	RT-1	RC-2	RT-3	RC-4	RT-5	RC-6	I-1	I-2	I-3	I-4				
Marking	m <sup>2</sup>	1,400	1,400	1,400	1,400	765	900	480	570	530	250				
Traffic Sign	set	2		2				4	4	4	4				
Warning Regulator	set	6	6	6	6	6	6	32	32	28	28				
Delineator 1)	p	150/25	200/76	75/12	100/38	75/12	100/38	-	-	-	-				
Raised Pavement Marker	p	-	-	160	233	-	233	-	-	-	-				
Median	m	-	-	1,000	1,000	-	-	4	2						
Intersection	L														
Guardfence	m	1,000	1,000	500	500	500	500	120	120	-	-				
Crosswalk	m	30		30		15		95	70	65	50				
Lighting															
Roadway	l.m	1,000	1,000	1,000	1,000		500								
Intersection	set							1	1	1	1				
Traffic Signal	set							1	1						
Large Scale	set														
Medium Scale	set														
Right-turn Lane	L							1	1	1	1				
Sidewalk	m	2,000	2,000	2,000	2,000	2,000	2,000	1,200	1,200	1,200	1,200				
Pedestrian Overpass	set	1		1											

Note ; 1) Figure of right side of slash line shows the number of delineator to be attached to the guardfence.

Amount of Safety Devices of Remedy Works

Road Type		Roadway										Intersection				
Safety Device	Unit	RT-1	RC-2	RT-3	RC-4	RT-5	RC-6	Total	I-1	I-2	I-3	I-4	Total			
Marking	m <sup>2</sup>	137,200	23,800	88,200	15,400	292,230	61,200	618,030	12,000	13,680	22,260	36,750	84,690			
	set	196		126				322	100	96	168	588	952			
Traffic Sign	set	588	102	378	66	2,292	408	3,834	800	768	1,176	4,116	6,860			
Regulator																
Delineator with post	p	14,330	2,110	4,610	680	27,960	4,210	53,900								
Raised Pavement Marker	p			6,048	1,537		15,844	23,429								
Median	m			25,200	4,400			29,600								
Intersection	L								100	481)	2)					
Guardfence	m	14,700	17,000	4,725	5,500	28,650	34,000	104,575	3,000	2,880	5,040		10,920			
Crosswalk	m	2,940		1,890		2,865		7,695	2,375	1,680	2,730	7,350	14,135			
Roadway	l.m	14,700	17,000	9,450	11,000		17,000	69,150								
Lighting	set								25	24	42		91			
Intersection																
Traffic Signal	set								25	24			49			
Large Scale																
Medium Scale	set										42		42			
Right-turn Lane	L								25	24	42		91			
Sidewalk	m	58,800	10,200	25,200	4,400	76,400	13,600	188,600	9,000	5,760	5,040		19,800			
Pedestrian Overpass	set	59		38				97								

Note; 1),2) The quantity of painted island is transferred to the quantity of marking.



Cost Estimation by Road Type

Unit : Million Baht

Safety Device	Road Type		Roadway										Intersection				Grand Total
	Unit	Unit Cost 1)	RT-1	RC-2	RT-3	RC-4	RT-5	RC-6	Total	I-1	I-2	I-3	I-4	Total			
			280	6.7	24.7	4.3	81.8	17.1	173.0	3.4	3.8	6.2	10.3	23.7			
Marking	m <sup>2</sup>	280	38.4	6.7	24.7	4.3	81.8	17.1	173.0	3.4	3.8	6.2	10.3	23.7	196.7		
Guide	set	2,875	0.6	0.4					1.0	0.3	0.5	1.7	2.8	3.8			
Traffic Sign	set	1,970	1.2	0.2	0.7	0.1	4.5	0.8	7.5	1.6	1.5	2.3	8.1	13.5	21.0		
Regulator																	
Delineator	P	392	5.6	0.8	1.8	0.3	11.0	1.7	21.2						21.2		
Raised Pavement Marker	P	1,160			7.0	1.8		18.4	27.2						27.2		
Roadway	M	520			13.1	2.3			15.4						15.4		
Intersection	L	58,000								5.8	2.8			8.6	8.6		
Guardfence	M	900	13.2	15.3	4.3	5.0	25.8	30.6	94.2	2.7	2.6	4.5		9.8	104.0		
Crosswalk	M	560	1.6		1.1		1.6		4.3	1.3	0.9	1.5	4.1	7.8	12.1		
Roadway	l.m.	935	13.7	15.9	8.8	10.3		15.9	64.6						64.6		
Intersection	set	0.22M								5.5	5.3	9.2		20.0	20.0		
Traffic	Large Scale	set	0.58M							14.5	13.9			28.4	28.4		
Signal	Medium Scale	set	0.53M									22.3		22.3	22.3		
Right-turn Lane	L	0.36M								9.0	8.6	15.1		32.7	32.7		
Sidewalk	M	1,058	62.2	10.8	26.7	4.7	80.8	14.3	199.5	9.5	6.1	5.3		20.9	220.4		
Pedestrian Overpass	set	1.68M	99.1		63.8				162.9						162.9		
Total			235.6	49.7	152.4	28.8	205.5	98.8	770.8	53.6	45.8	66.9	24.2	190.5	961.3		
No. of Section			98	17	63	11	382	68	639	25	24	42	147	238			
Total/No. of Section			2.40	2.92	2.42	2.62	0.54	1.57	1.21	2.03	1.80	1.49	0.16	0.76			

Note 1) ; The basic data for the unit cost are presented in Appendix 8.5 (2).

## Unit Cost for Remedy Works as of 1985 F.Y.

Unit : Baht

Items		Unit	Unit Cost				Remarks
			Material	Instal- lation <sup>1)</sup>	Over- head <sup>2)</sup>	Total	
Pavement Marking	Ordinary Paint	m <sup>2</sup>	28.5	20.0	14.5	63.0	
			60.5	20.0	24.0	104.5	Reflectorized
	Thermoplas- tic paint	m <sup>2</sup>	180.0	33.5	64.0	277.5	Reflectorized
Traffic Sign	Guide	set	1,716.0	496.0	663.5	2,875.5	
	Warning	set	1,227.5	289.5	455.0	1,971.5	
	Regulatory	set	1,227.5	289.5	455.0	1,971.5	
Delineator		p	207.0	95.0	90.5	392.5	with Guidepost
Raised Pavement Marker		p	850.0	45.0	268.5	1,163.5	
Guardfence		m	627.0	67.0	208.0	902.0	Auto Guard
Traffic Signal	Large Scale	set				0.58M	
	Medium Scale	set				0.53M	
Pedestrian Bridge		set				1.68M	21.0m length
Pavement	Carriageway	m <sup>2</sup>	278.0	20.0	89.5	387.5	
	Shoulder	m <sup>2</sup>	65.0	5.5	21.0	91.5	
Embankment		m <sup>3</sup>	86.0	11.0	29.0	126.0	
Curb		m	129.0	54.0	55.0	238.0	
Back Fill		m <sup>3</sup>	66.0	11.0	23.0	100.0	
Sodding		m <sup>2</sup>	4.5	3.5	2.5	10.5	
Raised Bar		m	40.5	5.5	14.0	60.0	
Lighting	Intersection	set				0.22M	8-poles
	Roadway	m				935	30m spacing
Pavement of Sidewalk		m <sup>2</sup>	45.0	36.0	24.5	105.5	
Curb Gutter		m	197.0	83.0	84.0	364.0	

1) including labour cost

2) overhead cost is estimated as 30% of direct cost

## Conditions of Estimation to Replacement and Maintenance for Safety Devices

Safety Device	Durable Year	Replacement and Maintenance
Marking	3 - years	replace every 3 years
Traffic Sign	7 - years	replace every 7 years
Delineator	do	do
Raised Pavement Marker	do	do
Guardfence	10 - years	2% of installation cost per annum
Crosswalk	1 - year	replace every 1 year
Lighting	10 - years	10% of installation cost per annum
Traffic Signal	10 - years	do
Pedestrian Overpass	50 years	3% of installation cost per annum
Median, Right-turn Lane, Sidewalk	-	-

Accident Reduction Rate by Road Type

Road Type	Roadway						Intersection					
	Divided 4-lanes		Undivided 4-lanes		2-lanes		4-lanes x 4-lanes	4-lanes x 2-lanes	2-lanes x 2-lanes	High Traf- Low Traf- fic Volume		
	Tangent	Curve	Tangent	Curve	Tangent	Curve	Tangent	Curve	I - 1	I - 2	I - 3	I - 4
	RT-1	RC-2	RT-3	RC-4	RT-5	RC-6	I - 1	I - 2	I - 3	I - 4	I - 3	I - 4
Safety Devices												
Marking	30	30	30	30	30	30	30	30	30	30	30	30
Traffic Sign	15	15	15	15	15	15	15	15	15	15	15	15
Delineator and Raised Pavement Marker	50 (35)	50 (35)	50	50	50 (35)	50	50	50				
Median			20	20								
Guardfence	40	40	40	40	40	40	40	40	40	40	40	40
Crosswalk	30		30		30		30		30	30	30	30
Lighting	30	30	30	30	30	30	30	30	30	30	30	30
Traffic Signal									50	50	50	50
Right-turn Lane									50	50	50	50
Sidewalk	45	45	45	45	45	45	45	45	45	45	45	45
Pedestrian Overpass	55		55		55		55					
Judgement	45	50	50	55	40	50	50	50	50	50	50	30

Note ( ); 35% shown in the parentheses in above table indicate the reduction rate when only delineator is installed on divided 4-lane roadway (tangent and curve sections) and 2-lane roadway (tangent sections) in the macroscopic remedy works plan.

## Number of Accident and Casualty Reduced

Road Type		Road Type No.	Number of Casualties	Accident Reduction Rate	Reduction Number of Casualties	Remarks
Roadway	Divided 4-lanes	RT - 1	1,405	45	632	
		RC - 2	366	50	183	
	Undivided 4-lanes	RT - 3	861	50	431	
		RC - 4	225	55	124	
	2-lanes	RT - 5	3,680	40	1,472	
		RC - 6	983	45	442	
	Sub - Total		7,520	-	3,284	Sub-Total Reduction Rate 0.44
Intersection	4-lanes x 4-lanes	I - 1	153	50	77	
	4-lanes x 2-lanes	I - 2	130	50	65	
	2-lanes xx High Traffic Volume	I - 33	235	50	118	
	2-lanes Low Traffic Volume	I - 4	814	30	244	
	Sub - Total		1,332	-	504	Sub-Total Reduction Rate 0.37
	Grand Total		8,852	-	3,788	Total Reduction Rate 0.43









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