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**URBAN TRANSPORT STUDY**  
**IN**  
**GREATER METROPOLITAN AREAS**  
**OF**  
**GEORGETOWN, BUTTERWORTH AND BUKIT MERTAJAM**  
**MALAYSIA**

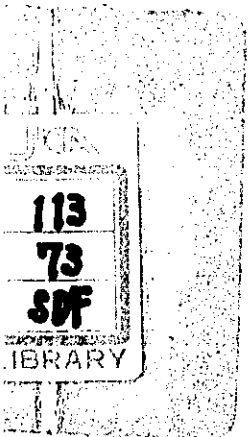
**FERRY SURVEY**

**TECHNICAL REPORT — 02**



**AUGUST, 1979**

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This report is a supplement to the main report of our study and it is written to meet the pressing demand for a technical report presently. Although this report fails to meet the requirement of a complete technical report, it may be rewritten in a more refined form for future use. This report section by section would be especially useful as a reference for various purposes, for example, manual of survey, data edition, explanation of methodology, detailed analysis, etc.

## FERRY SURVEY

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## Introduction

The purpose of this survey is to obtain information on passengers and vehicles using the ferry.

A 24 hour ferry service between Penang Island and the mainland is provided. Also it is the only means of public transport that links the island and mainland. This, therefore, is one of the most important transport systems in our study.

With this information, the nature of the trips of passengers and vehicles can be determined.

The results from the analysis of the data collected will be very useful in examining the existing conditions in marketing forecasts after the construction of the bridge.

This data can also be used to check the traffic volume in the same way as the screen-line survey.

## The Survey

The survey consists mainly of two parts:-

- a) Interviews with passengers and vehicles.
- b) Traffic counting of vehicles and passengers.

Besides this, other surveys as listed below were carried out at the same time.

- c) Departure time of ferry.
- d) Time spent waiting for ferry at Butterworth.
- e) Counting traffic volume of each ferry.

## Interviews

Drivers of vehicles and passengers on board the ferry were interviewed.

The supervisor and interviewers chose samples from the passengers and vehicles on the ferry according to the procedure in the survey manual and asked questions from the prepared questionnaire.

### a) Interview Time

The interview commenced at 7.00 a.m. and ended at 7.00 p.m. on 13th June at the same time as the cordon survey.

b) Contents

The purpose of the interview on vehicles users is to find out the

- i) Origin of the trip.
- ii) Destination of the trip.
- iii) Purpose of the trip.
- iv) Number of passengers in the vehicle.
- v) Types of commodities carried by the lorries and
- vi) Loading conditions.

The interview with the passengers is to discover the

- i) Origin of the trip.
- ii) Destination of the trip.
- iii) Purpose of the trip.
- iv) Means of transport before and after boarding the ferry.

A copy of the questionnaire is attached in the appendices; 'A' is the questionnaire for vehicles, and 'B' for passengers.

c) The Procedure.

There are ten ferries and these are classified into two types;

- i) 7 single deckers - for passengers, motor-vehicles and motorcycles
- ii) 3 double deckers - for motor-vehicles.

After one single decker and one double decker were selected for interviewing, the following number of persons began the survey.

- \* 2 Supervisors.
- \* 5 Assistant Supervisors.
- \* 5 Clerks.
- \* 14 Interviewers and
- \* 6 Policemen

The desirable sample size for each trip was determined as follows, but this schedule was not accomplished completely as a result of some interviewers having missed a ferry.



TABLE 1 SCHEDULE FOR INTERVIEWER

Type of vehicle/ passengers to be interviewed	Single deckers No. of interviewers	(No. of Samples)	Double deckers No. of interviewers	(No. of Samples)
Passengers	3	(10)	-	
Bicycles	1	( 5)	-	
Motorcycles	2	( 5)	-	
Cars/Taxis	3	( 6)	3	( 7)
Lorries/Buses			2	( 5)
<b>TOTAL</b>	<b>9</b>	<b>(26)</b>	<b>5</b>	<b>(12)</b>

These were 14 interviewers who were divided into 2 groups, group A and B. The interviews were done on both the out-going and in-coming trips of the selected ferries. Group A started at 7.00 a.m. and stopped after completing four trips, to and from Butterworth and Penang Island. A ferry journey from Butterworth to Penang Island is considered as one trip and likewise, from Penang Island to Butterworth is another. On completion of four trips by group A, group B took over for the same number of trips. This was repeated up to 7.00 p.m.

1-2 Traffic Counting

The volume of passengers and vehicles moving into the ferry terminals was counted at both sides. The vehicles counted were cars, buses, taxis medium lorries, heavy lorries, motorcycles, trishaws and bicycles. The passengers were divided into male and female.

a) Counting Duration

Traffic counting started at 6.00 a.m. and stopped at 10.00 p.m., (16 hours) on 13th June.

b) The Stations

2 stations were selected for traffic counting (vehicles and passengers)

- i) Pengkalan Raja Uda in Goergetown.
- ii) Pengkalan Sultan Hamid in Butterworth.

c) The Personnel

The persons involved in performing this task at each terminal were as follows:-

- i) 2 counters for passengers, (1 for male and 1 for female).
- ii) 1 counter for motorcycles, bicycles, handcarts and trishaws.
- iii) 1 counter for cars, taxis and vans.
- iv) 1 counter for medium lorries, heavy lorries, buses and others.

There were many separate gates for different types of vehicles that 5 counters were necessary for complete counting.

1-3

Others

a) Departure time of ferry

A specific time-table and a rotation shift chart of ferries is fixed by P.P.C. (Appendix C)

According to the time-table, the interval between the departure time of each ferry is approximately 30 minutes from 22.00 to 6.00 and 7 minutes in the day time.

In order that the service level of ferries can be estimated the actual interval between departure times is to be examined, so an additional survey was carried out at the same time. One recorder at the top of the wharf noted the time of departure and the name of the ferry. A sample of the survey sheet is attached in Appendix D.

b) Time spent waiting for ferry at Butterworth.

At Butterworth side the demand is greatest at peak time from early evening. After long queues are formed, especially during weekends and holidays.

This long waiting time for ferries is one of the factors for a decrease in the quality of their service. This survey was carried out for the purpose of obtaining data regarding the time spent waiting.

The personnel involved were:

- \* One Supervisor
- \* Two Assistant Supervisors and

\* Eight Clerks.

The survey card was prepared as shown in Appendix E. and the survey was done in two days;

\* 13th June, Wednesday - 4.00 p.m. to 7.00 p.m.

\* 6th July, Friday - 3.00 p.m. to 8.00 p.m.

The survey procedure was as follows:-

Some of the surveyors chose samples from the end of the queue and handed a survey card each to record the time of arrival, while in front of the row, other surveyors recorded the actual time of departure from the driver when he entered the ferry.

The sample size was 5 to 15%. From these results the condition of waiting for ferry is estimated easily.

c) Counting traffic volume by each ferry.

This survey was carried out for two purposes.

i) to obtain data for the weekend.

ii) to know the condition of transport of each ferry.

This was done on 6th July, (Friday) in the following manner, 2 Assistant Supervisors and 7 counters were involved, at the top of the piers. They counted the number of arrivals and departures of the traffic. The survey sheet used for this survey is different from the former, shown in Appendix E to some extent. The survey began at 6.00 a.m. and ended at 10.00 p.m. as before; in order that the two sets of data can be compared.

2

### Result

The outline of the results obtained is mentioned hereafter.

2-1

### The Interview

The sample size for vehicle drivers was 1,200 while that for motorcycle drivers was 411. The sample ratio to the number counted was 14.2% for vehicles and 3.4% for motorcycles. Almost 1000 samples of passengers were collected and the sample ratio was 3.4%.

The number of the sample interviewed is illustrated in the following tables.

These data is now being processed by a computer and the detailed results will be commented upon in future.

TABLE 2a NO. OF SAMPLES FOR INTERVIEW - 1

DATE: 13TH JUNE 1979

DIRECTION: GEORGETOWN TO BUTTERWORTH

TIME	Total No. of vehicles counted	Total No. of vehicles drivers Interviewed	The Ratio (%)	Total No. of Light vehicles counted	Total No. of Light vehicles drivers Interviewed	The Ratio (%)
	-Motorcar -Taxis -Vans -Medium lorries -Heavy lorries			-Motorcycle -Bicycle -Trishaw -Handcart		
700- 800	376	33	8.8	1,241	10	0.8
800- 900	380	67	17.6	559	10	1.8
900-1000	444	44	9.9	317	20	6.3
1000-1100	417	76	18.2	358	30	8.4
1100-1200	391	39	10.0	369	17	4.6
1200-1300	281	66	23.5	338	13	3.9
1300-1400	275	50	18.2	340	27	7.9
1400-1500	357	53	14.8	550	10	1.8
1500-1600	378	46	12.2	435	34	7.8
1600-1700	349	68	19.5	350	5	1.4
1700-1800	318	37	11.6	510	19	3.7
1800-1900	218	30	13.8	431	24	5.6
<b>TOTAL</b>	<b>4,184</b>	<b>609</b>	<b>14.09</b>	<b>5,798</b>	<b>218</b>	<b>3.8</b>

TABLE 2b NO. OF SAMPLES FOR INTERVIEW - 2

DATE: 13TH JUNE 1979

DIRECTION: BUTTERWORTH TO GEORGETOWN

TIME	Total No. of vehicles counted	Total No. of vehicle drivers interviewed	The Ratio (%)	Total No. of light vehicles	Total No. of light vehicles interviewed	The Ratio (%)
	-Motorcars -Taxis -Vans -Medium lorries -Heavy lorries -Buses			-Motorcycle -Bicycle -Trishaw -Handcart		
700- 800	214	23	10.7	592	-	-
800- 900	225	35	15.5	332	-	-
900-1000	301	69	22.9	293	20	6.8
1000-1100	284	34	12.0	316	19	6.0
1100-1200	334	69	20.7	244	20	8.2
1200-1300	299	47	15.7	308	19	6.2
1300-1400	380	51	13.4	385	19	4.9
1400-1500	461	52	11.3	399	20	5.0
1500-1600	434	66	15.2	540	24	4.4
1600-1700	493	49	9.0	756	13	1.7
1700-1800	423	56	13.2	1,136	5	0.4
1800-1900	421	40	9.5	876	33	3.8
<b>TOTAL</b>	<b>4,269</b>	<b>591</b>	<b>13.8</b>	<b>6,177</b>	<b>192</b>	<b>3.1</b>

TABLE 2o NO. OF SAMPLES FOR INTERVIEW - 3

(Passengers)

Time	GEORGETOWN TO BUTTERWORTH			BUTTERWORTH TO GEORGETOWN		
	The total counted	The total interviewed	Ratio %	The total counted	The total interviewed	Ratio %
7.00-8.00	2,271	31	1.4	1,467	-	-
8.00	993	30	3.0	1,082	-	-
9.00	527	28	5.3	786	30	3.8
10.00	627	50	8.0	881	35	4.0
11.00	914	36	3.9	946	59	6.2
12.00	830	42	5.1	736	35	4.8
13.00	1,170	49	4.2	971	29	3.0
14.00	1,159	45	3.9	905	68	7.5
15.00	1,212	59	4.9	871	30	3.4
16.00	1,608	50	3.1	1,635	60	3.7
17.00	1,728	53	3.1	2,053	39	1.9
18.00-19.00	1,270	35	2.8	1,143	55	4.8
<b>TOTAL</b>	<b>14,309</b>	<b>517</b>	<b>3.6</b>	<b>13,476</b>	<b>440</b>	<b>3.3</b>

TRAFFIC COUNTINGa) Results of survey done on 13th June

The number of vehicles and passengers that were counted during the survey was 9,896 for motorvehicles, 14,645 for motorcycles and 33,411 for passengers. These passengers exclude persons in cars. The hourly flow by each vehicle-type are shown in the following tables.

TABLE 3a. HOURLY FLOW OF FERRY TRAFFIC - 1

<u>FROM GEORGE TOWN</u>							13th JUNE 1979 (Wed.)					
TYPE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
TIME ZONE	Motorcars	Taxis	Van & Pick-Ups	Medium Size Lorries	Lorry With 3 Axles & Trailers	Buses	Sub - Total (1 - 6)	M/Cycles And Scooters	Trishaws	Bicycles	Sub - Total (7 - 9)	Passengers
6 - 7	154	1	6	7	0	1	168	567	0	202	769	1058
7 - 8	329	0	13	23	11	27	376	1009	0	232	1241	2271
8 - 9	313	1	23	37	6	3	380	475	0	84	559	993
9 -10	338	2	27	61	16	2	444	338	0	79	317	527
10-11	300	3	22	82	10	2	417	312	1	45	358	627
11-12	282	5	23	63	18	2	391	297	1	71	369	914
12-13	208	3	15	45	10	1	281	286	0	52	338	830
13-14	204	2	19	42	8	2	275	254	1	85	340	1170
14-15	251	5	35	47	19	11	357	398	0	152	550	1159
15-16	292	7	23	46	10	1	378	339	0	96	435	1212
16-17	290	1	16	34	8	3	349	268	0	82	350	1608
17-18	267	0	10	31	10	1	318	406	0	104	510	1728
18-19	181	1	7	22	7	2	218	383	0	48	431	1270
19-20	163	0	8	10	5	0	186	179	0	26	205	911
20-21	178	5	10	18	6	4	217	253	0	53	306	668
21-22	106	0	0	7	0	0	113	150	0	22	172	551
TOTAL	3,856	36	257	575	144	61	4,868	5,914	3	1,438	7,355	17,497

TABLE 3b. HOURLY FLOW OF FERRY TRAFFIC - 2.

FROM BUTTERWORTH

13th JUNE 1979  
(Wed.)

TYPE TIME ZONE	(1) MotorCars	(2) Taxis	(3) Van & Pick-Ups	(4) Medium Size Lorries	(5) Lorries With 3 Axles Textiles	(6) Buses	Sub - Total (1 - 6)	(7) M/Cycles And Scooters	(8) Trishaws	(9) Bicycles	Sub - Total (7 - 9)	(10) Passengers
6 - 7	46	1	1	15	15	0	78	274	0	127	401	966
7 - 8	152	4	10	35	5	0	214	482	0	110	592	1467
8 - 9	164	0	11	41	5	4	225	280	0	52	332	1082
9 -10	206	3	27	61	4	0	301	226	0	67	293	786
10-11	195	3	22	45	17	2	284	255	1	60	316	881
11-12	234	2	22	68	4	4	334	204	0	44	244	946
12-13	229	4	7	53	6	0	299	244	2	62	308	736
13-14	300	0	18	31	8	3	380	318	1	66	385	971
14-15	365	3	30	48	12	3	461	324	0	75	399	905
15-16	324	4	34	54	13	5	434	408	1	131	540	871
16-17	406	4	38	34	4	7	493	610	1	145	756	1635
17-18	363	12	17	21	6	4	423	951	1	184	1136	2053
18-19	487	2	15	17	0	0	421	715	0	161	876	1143
19-20	343	6	21	11	1	0	382	273	0	52	325	668
20-21	171	1	8	13	2	1	196	197	0	41	238	501
21-22	95	1	7	0	0	0	103	142	0	33	175	303
TOTAL	3,980	50	288	567	102	41	5,028	5,903	7	1,410	7,320	15,914



The frequency of ferry services is known from the results of the departure-time survey.

TABLE 4. THE FREQUENCY OF FERRY SERVICES (13.06. 79)

	from George Town			from Butterworth		
	Single Decker	Double Decker	Total	Single Decker	Double Decker	Total
6.00	6	0	6	6	2	8
7.00	9	3	12	10	5	15
8.00	7	5	12	9	4	13
9.00	11	4	15	10	4	14
10.00	10	4	13	9	4	13
11.00	9	4	13	9	4	13
12.00	8	3	11	8	5	13
13.00	9	5	14	9	4	13
14.00	10	4	14	9	5	14
15.00	10	5	15	11	5	16
16.00	10	5	15	9	4	13
17.00	11	4	15	10	5	15
18.00	7	3	10	10	4	14
19.00	5	5	10	7	4	11
20.00	5	2	7	5	6	11
21.00	6	5	11	7	3	10
<b>Total</b>	<b>133</b>	<b>61</b>	<b>194</b>	<b>137</b>	<b>69</b>	<b>206</b>

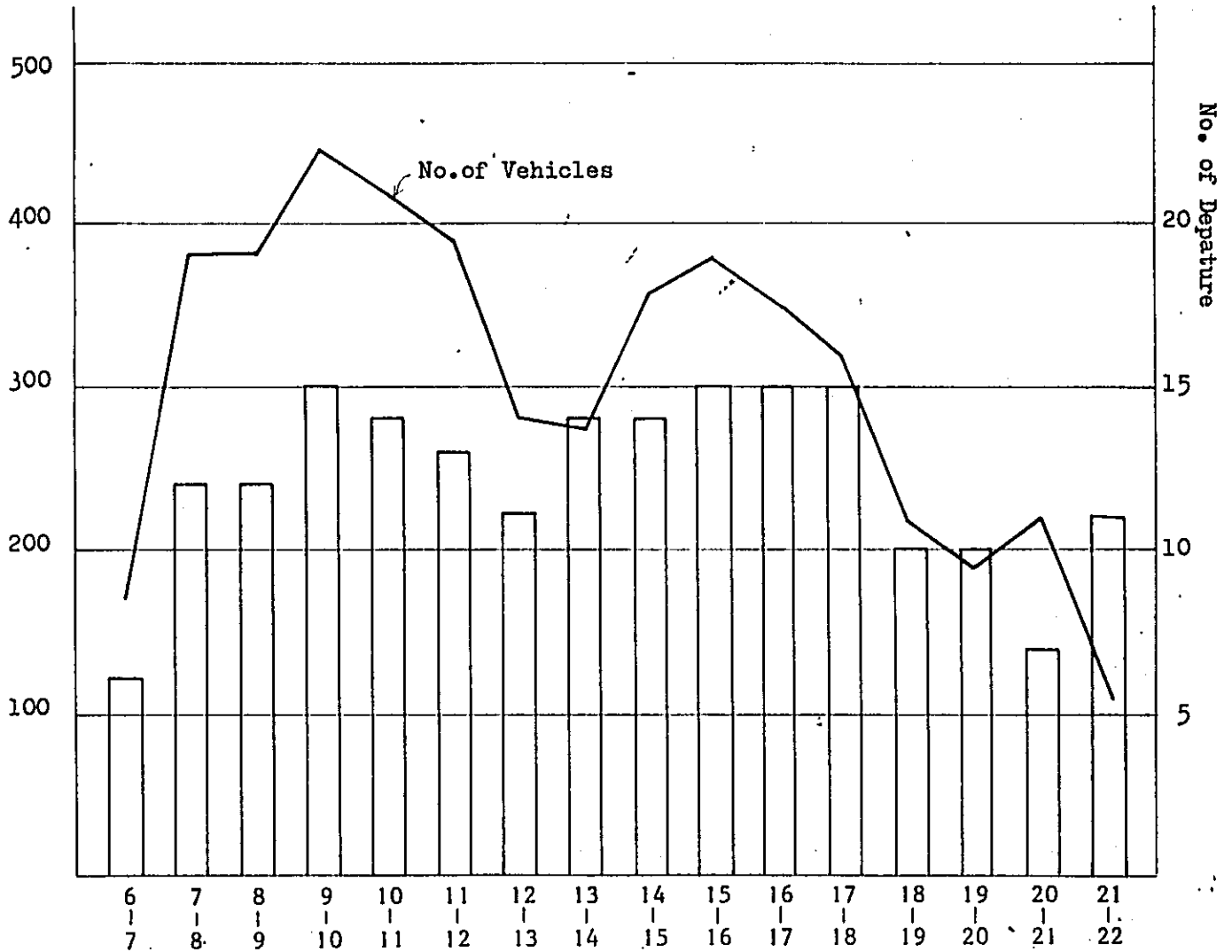
\* Excluding unloading Trips

Fig. 1. HOURLY FLOW OF VEHICLES AND  
FREQUENCY OF FERRIES - 1

From George Town to Butterworth

13th June, 1979.

No. of  
 Vehicles

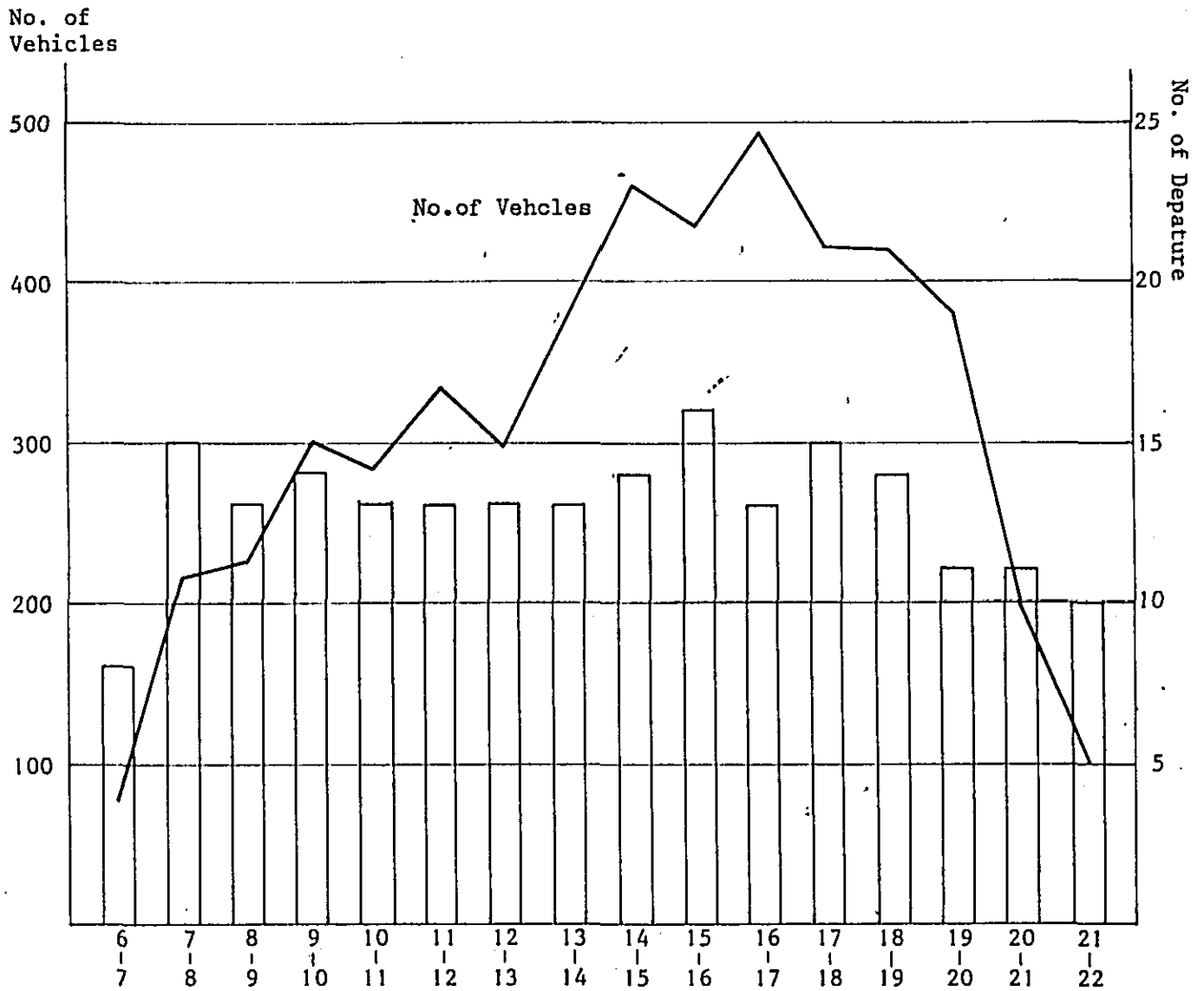


\* excluding motorcycles and  
 bicycles.

Fig. 2. HOURLY FLOW OF VEHICLES AND  
FREQUENCY OF FERRIES - 2

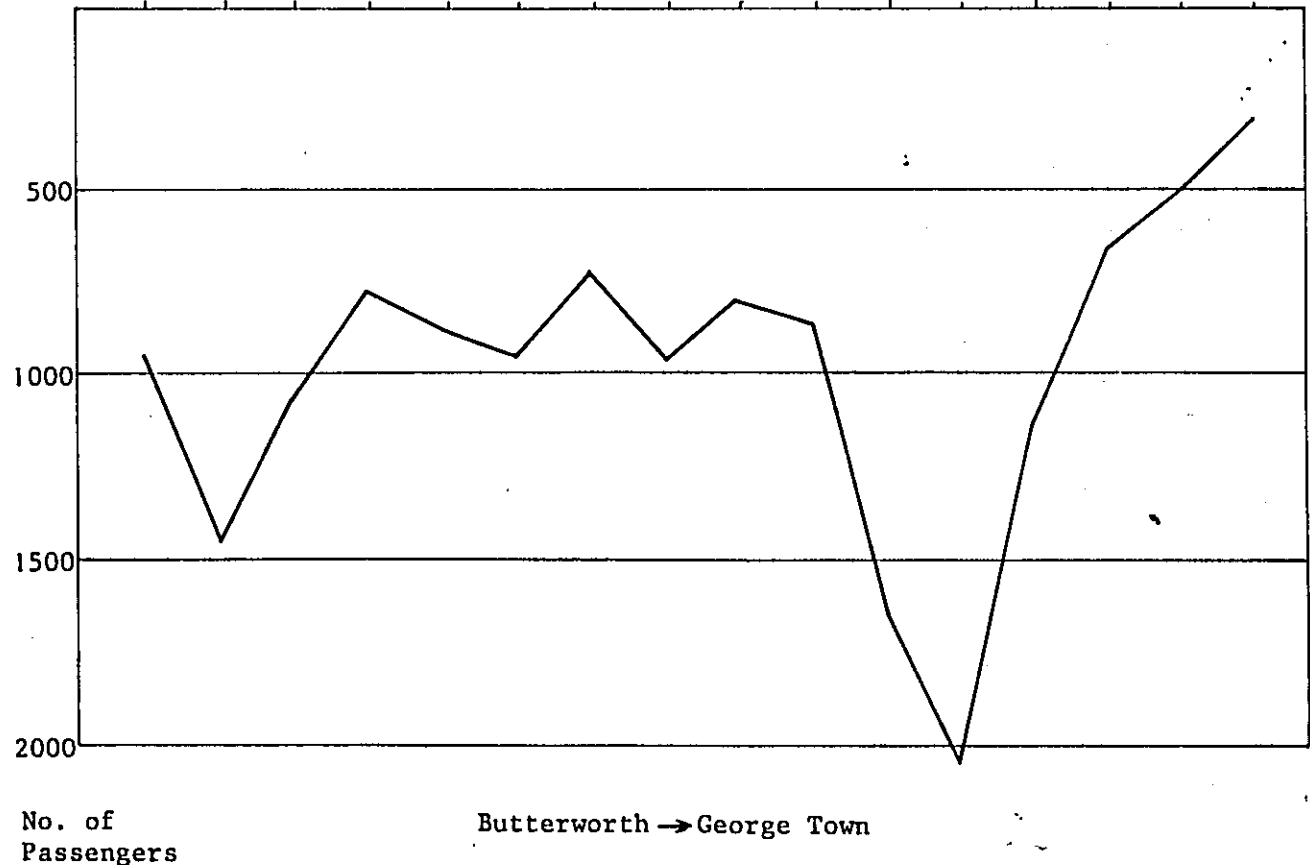
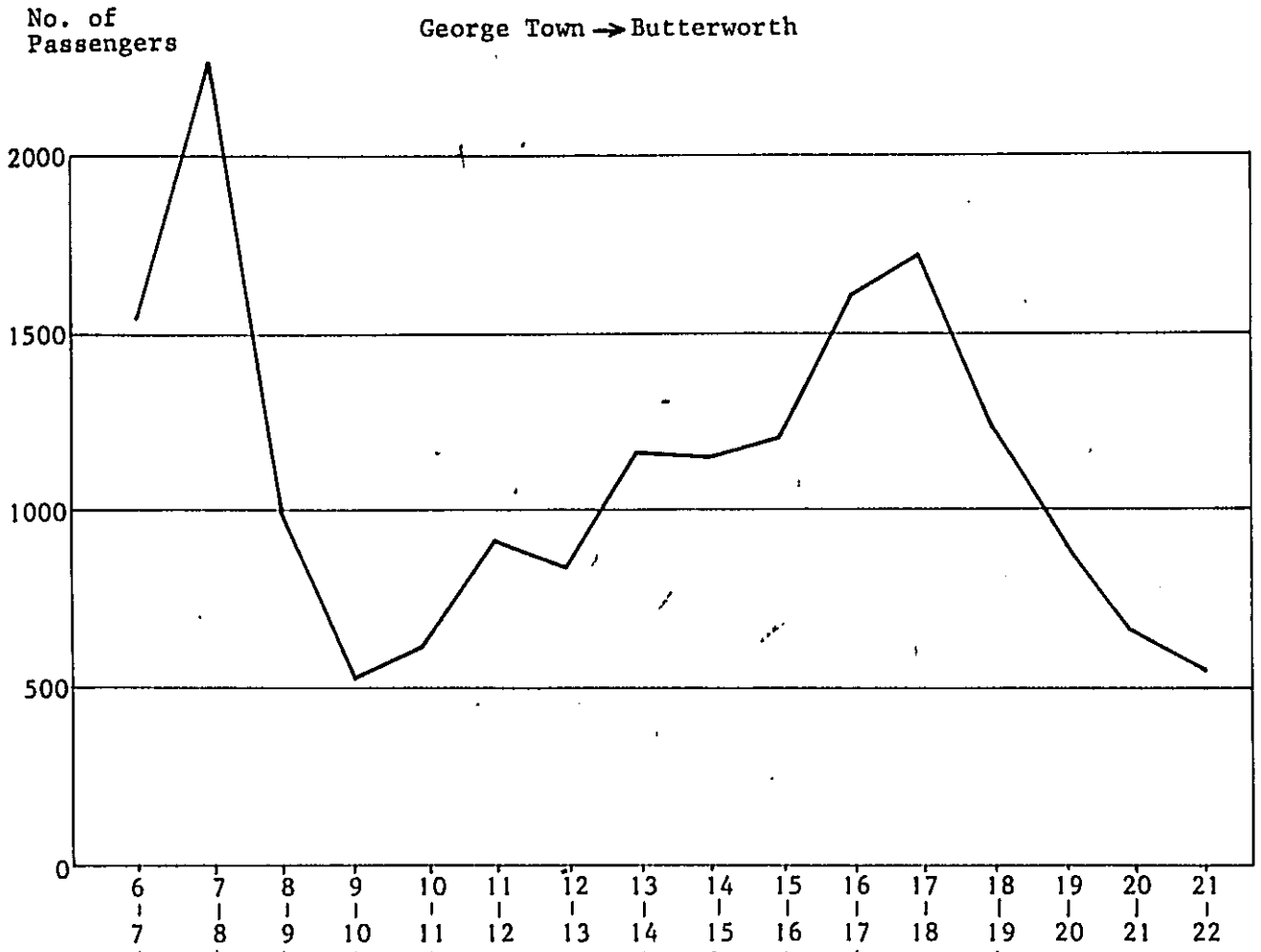
From Butterworth to George Town

13th June, 1979.



\* excluding motorcycles and bicycles.

Fig. 3. HOURLY FLOW OF FERRY PASSENGERS



b) Results of survey done on 6th. July.

In order to obtain data on the peak day of a week, the counting survey was carried out again on 6th. July. This result is mentioned hereafter.

Firstly, the results of 'counting' is shown in the following tables:

TABLE 5a. FERRY TRAFFIC - 1  
GEORGETOWN TO BUTTERWORTH 06.07.79.

TYPE TIME ZONE	NO OF VEHICLE							
	M/CAR TAXI	MEDIUM LORRY VAN	HEAVY LORRY	BUS	SUB-TOTAL	M/CYCLE TRISHAW BICYCLE	TOTAL	PASSENGER
6 - 7	85	5	7	0	97	380	477	845
7 - 8	281	15	18	5	319	1523	1842	2532
8 - 9	334	32	20	1	387	646	1033	1274
9 -10	281	40	25	-	346	457	803	582
10-11	294	62	30	2	388	339	727	899
11-12	272	71	44	2	389	380	769	1155
12-13	246	43	63	1	353	396	749	1355
13-14	251	50	26	-	327	447	774	1550
14-15	311	36	33	8	388	490	878	1431
15-16	308	29	26	2	365	495	860	1211
16-17	420	45	35	1	501	420	921	2094
17-18	375	47	44	2	468	541	1009	2136
18-19	424	19	18	2	463	548	1011	1507
19-20	415	25	15	5	460	341	801	1353
20-21	264	8	3	4	279	289	568	857
21-22	227	11	8	7	253	353	606	1043
TOTAL	4788	538	415	42	5783	8045	13828	21824

TABLE 5b. FERRY TRAFFIC - 2 BUTTERWORTH TO GEORGETOWN 06.07.79.

TYPE TIME ZONE	NO OF VEHICLE							PASSENGER
	M/CAR TAXI	MEDIUM LORRY	HEAVY LORRY VAN	BUS	SUB-TOTAL	M/CYCLE TRISHAW BICYCLE	TOTAL	
6 - 7	31	12	13	1	57	276	333	1500
7 - 8	138	6	29	10	183	648	831	1461
8 - 9	241	11	33	2	287	487	774	1056
9 -10	297	53	46	5	401	467	868	963
10-11	382	59	23	4	368	425	793	1158
11-12	430	68	23	4	525	438	963	1671
12-13	331	39	30	5	405	449	854	1332
13-14	376	45	26	1	448	387	835	1148
14-15	450	47	41	5	543	485	1028	1136
15-16	352	28	35	1	416	438	854	900
16-17	338	38	30	3	409	778	1187	1657
17-18	405	55	19	2	481	993	1474	2849
18-19	352	26	4	2	384	884	1268	921
19-20	476	20	6	-	502	695	1197	1562
20-21	221	12	5	-	238	364	602	715
21-22	155	11	2	-	168	243	411	482
TOTAL	4975	530	365	45	5915	8457	14372	20511

TABLE 6. NO. OF FERRY SERVICE

06.07.'79.

	DEPARTURE			ARRIVAL			BOTH DIRECTIONS		
	SINGLE DECKER	DOUBLE DECKER	TOTAL	SINGLE DECKER	DOUBLE DECKER	TOTAL	SINGLE DECKER	DOUBLE DECKER	TOTAL
	6	2	8	6	2	8	12	4	16
7.00	10	4	14	11	4	15	21	8	29
8.00	10	5	15	9	5	14	19	10	29
9.00	11	4	15	11	5	16	22	9	31
10.00	9	5	14	10	4	14	19	9	28
11.00	11	4	15	11	5	16	22	9	31
12.00	8	5	13	8	4	12	16	19	25
13.00	11	4	15	10	4	14	21	8	29
14.00	9	5	14	11	5	16	20	10	30
15.00	10	3	13	8	4	12	18	7	25
16.00	9	5	14	10	4	14	19	9	28
17.00	9	5	14	10	5	15	19	10	29
18.00	10	4	14	8	4	12	18	8	26
19.00	11	5	16	11	5	16	22	10	32
20.00	6	4	10	6	5	11	12	9	21
21.00-22.00	6	5	11	6	4	10	12	9	21
TOTAL	146	69	215	156	69	215	292	138	430

11,698 motor vehicles, 16,502 motorcycles and 42,335 passengers commute between Georgetown and Butterworth from 6.00a.m to 10.00p.m. The pattern of hourly flow is almost the same for week days; There are two peak hours, one at 0700 - 0800 hrs. and the other is at 1700 - 1800 hrs.

The largest peak volumes are.

1842 vehicles and 2532 passengers from Georgetown to Butterworth.

: 7.00 - 8.00

1474 vehicles and 2849 passengers from Butterworth to Georgetown.

: 17.00 - 18.00

The index number of traffic volume by each time zone are shown as follows:-

TABLE 7. INDEX NUMBER OF HOURLY FLOW

Time- zone	Georgetown to Butterworth						Butterworth to Georgetown									
	Motor- Vehicle		Motor- cycle		Total		Passengers		Motor- vehicle		Motor- cycle		Total		Passengers	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
6 - 7	16	27	47	75	34	55	39	62	10	15	33	52	23	37	73	117
7 - 8	55	88	189	303	133	213	116	186	31	50	77	123	58	93	71	114
8 - 9	67	107	80	128	74	120	58	93	48	78	58	92	59	86	51	82
9 -10	60	96	57	91	58	93	27	43	68	108	55	88	60	97	47	75
10-11	67	107	42	67	53	84	41	66	62	100	50	80	55	88	56	90
11-12	67	107	47	76	56	89	53	85	89	142	52	83	67	107	81	130
12-13	61	98	49	79	54	87	62	99	68	110	53	85	59	95	65	104
13-14	57	90	56	89	56	90	71	114	76	121	46	73	58	93	56	90
14-15	67	107	61	97	63	102	66	105	92	147	57	92	72	114	55	89
15-16	63	101	62	98	62	100	55	89	70	113	52	83	59	95	44	70
16-17	87	139	52	84	67	107	96	154	69	111	92	147	83	132	81	129
17-18	81	129	67	108	73	117	98	157	81	130	117	188	103	164	139	122
18-19	80	128	68	109	73	117	69	110	65	104	105	167	88	141	45	72
19-20	80	127	42	68	58	93	62	99	85	136	82	131	83	133	76	122
20-21	48	77	35	57	41	66	39	63	40	64	43	69	42	67	35	56
21-22	44	70	44	70	44	70	48	76	28	45	29	46	29	46	23	38
Total	100	-	100	-	100	-	100	-	100	-	100	-	100	-	100	-
Average Volume	361(100)		503(100)		864(100)		1364(100)		370(100)		529(100)		898(100)		1282(100)	

A: the ratio to the total.

B: the ratio to the Average Volume.



C) Comparison of the two sets of Data.

The summary of the comparison of two sets of data, which was obtained on 13th June and on 6th July, is shown in the following table.

Regarding the total-number, the result of the latter survey is 12% to 33% larger than the former except in the case of buses.

Regarding the volume in peak hours, there are more significant differences between the two sets of data.

TABLE 8. COMPARISON OF TWO DATA

	A 13.06 (Wed)	B 06.07 (Fri)	B/A
* 16 hours flow (Both ways)			
Motorcars	8,467	9,763	1.15
Lorries	1,388	1,848	1.33
Buses	102	87	0.85
Sub Total	9,957	11,698	1.17
Motorcycles Bicycles	14,675	16,502	1.12
Total	24,632	28,200	1.14
Passengers	33,411	42,335	1.27
* peak hour (Georgetown to Butterworth) 7.00-8.00			
Motor Vehicles	1,241	1,842	1.48
Passengers	2,271	2,532	1.11
(Butterworth to Georgetown) 17.00-18.00			
Motor Vehicles	1,136	1,474	1.30
Passengers	2,053	2,849	1.39

2-3. Loading Condition.

The number of vehicles on the ferry depends on the demand for ferry space at that particular time, but there is some standard for single deckers and double deckers respectively.

Single Decker.

Case	Cars	Motorcycle
1	27-28	25 (1 chain)
2	24	50-60 (2 chain)
3	18	100 (3 chain)
4	10	130-140 (4 chain)
5	6	160-170 (5 chain)

Double Decker.

Top Deck	33 - 34 cars.
Bottom Deck	14 - 16 lorries.

The results are shown as follows:-

TABLE 9. SOME SAMPLES OF LOADING CONDITIONS  
Single Decker.

Sample	Motorcars	Lorries	Buses	M/cycle	Passengers	Remarks
A	6	1	-	164	205	max. for motor Car.
B	35	-	-	-	380	max. for motor Car.
C	10	-	-	192	434	max. for motorcycle & passenger.
D	23	2	-	83	305	
E	13	-	-	47	175	

Double Decker.

Sample	Upper deck		Lower deck			Total			Total
	Motorcar	Van, pick-up	Motorcar	Lorry	Bus	Motorcar	Lorry	Bus	
A	30	-	12	7	2	42	7	2	51
B	30	2	26	3	-	56	5	-	61
C	-	-	15	4	-	15	4	-	19
D	30	-	-	14	1	30	14	1	45
E	33	-	13	10	1	46	10	1	57

2-4 Time spent waiting for ferry.

The survey was carried out twice, on a Wednesday and a Friday.

The summary of the results is shown below:

TABLE 10a TIME SPENT WAITING FOR FERRY

13/6/79 (Wed)

Minutes Time	Minutes					Total
	0-5	6-10	11-15	16-20	21-25	
4.00 p.m.-5.00 p.m.	1	17	1			19
5.00 p.m.-6.00 p.m.	5	27	30	15	2	79
6.00 p.m.-7.00 p.m.				12	2	14
Total	6	44	31	27	4	112

\* Arrival time at the end of the queue

\*\* Sampling ratio for this survey is 5 to 15 per cent.

TABLE 10b TIME SPENT WAITING FOR FERRY

06/7/79 (Fri)

Arrival Time	Minutes								Total No. of vehicles	Average waiting time (mins)
	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-40		
3.00-3.29	1	4							5	6.0
3.30-4.00	1	1	14	16	3	1			36	15.1
4.00-4.29		2	7	4	17	4			34	19.1
4.30-5.00			1	9	18	6	1		35	21.6
5.00-5.29				6	22	7	1		36	22.4
5.30-6.00					19	21	4	1	45	25.6
6.00-6.29				2	11	19	2		34	25.1
6.30-7.00			5	13	10	2	3		33	20.0
7.00-7.29		6	12	8	4				30	13.7
7.30-8.00	2	3							5	5.0
Total	4	16	39	58	104	60	11	1	293	20.0

\* This figure shows the number of sample

\* The sampling ratio is 7.0 - 17.0 per cent.

Appendix

- A. Interview Questionnaire for Drivers.
- B. Interview Questionnaire for Passengers.
- C. Time Table
- D. Record of Depature Time.
- E. Survey Card for Waiting Time.
- F. Ferry Traffic Count (2) Sheet.





Appendix C Time Table

JADUAL WAKTU PENYKHIDMATAN PERI  
(from Georgetown) SURUHANJAYA PELABUHAN PULAU PINANG

MASA BERTOLAK DARI PENKALAN SULTAN ABDUL MALIM UDA									
Bil.	Feri Penuapang/Kenderaan						Feri Kenderaan		
	B	D	F	A	C	E	J	K	L
1	0600	0607		0621	0628		0630	0650	
2	0642	0649	0656	*0703	*0710	0717	0710	0730	0740
3	0724	0731	0738	0745	0752	0759	0750	0810	0820
4	0806	0813	0820	0827	0834	0841	0830	0850	0900
5	0848	0855	0902	0909	0916	0923	0910	0930	0940
6	0930	0937	0944	0951	0958	1005	0950	1010	1020
7	1012	1019	1026	1033	1040	1047	1030	1050	1100
8	1054	1101	1108	1115	1122	1129	1110	1130	1140
9	1136	1143	1150	1157	1204	1211	1150	1210	1220
10	1218	1225	1232	1239	1246	1253	1230	1250	1300
11	1300	1307	1314	1321	1328	1335	1310	1330	1340
12	1342	1349	1356	1403	1410	1417	*1350	1410	1420
13	1424	1431	1438	1445	1452	1459	1430	1450	*1500
14	*1506	*1513	1520	1527	1534	1541	1510	1530	1540
15	1548	1555	1602	1609	1616	1623	1550	1610	1620
16	1630	1637	1644	1651	1658	1705	1630	1650	1700
17	1712	1719	1726	1733	1740	1747	1710	1730	1740
18	1754	1801	1808	1815	1822	1829	1750	1810	1820
19	1836	1843	1850	1857	1904	1911	1830	1850	1900
20	1918	1925	1932	1939	1946	1953	1910	1930	1940
21	2000	2007	2014	2021	2028	2035	1950	2010	2020
22	2042	2049	2056	2103	2110	2117	2030	2050	2100
23	2124	2131	2138	2145	2152	2159	*2110	2130	2140
24	2206	2213		2220	2227				2220
25	*2250	*2300		2310	2320				
26	2330	2340		2350	2400				
27	0015	0030		0045	0100				
28	0120			0140					
29	0200			0230					
30	0300	B atau D		0330	A atau C				
31	0400			0430					
32	0500			0530					

(from Butterworth)


JADUAL WAKTU PENYKHIDMATAN PERI  
SURUHANJAYA PELABUHAN PULAU PINANG


MASA BERTOLAK DARI PENKALAN SULTAN ABDUL MALIM										
Catitan	Bil.	Feri Penuapang/Kenderaan					Feri Kenderaan			Catitan
		A	C	E	B	D	F	K	L	
	1	0600	0607		0621	0628		0630		0650
	2	0642	0649		*0703	*0710	0717	0710	0720	0730
	3	0724	0731	0738	0745	0752	0759	0750	0800	0810
	4	0806	0813	0820	0827	0834	0841	0830	0840	0850
	5	0848	0855	0902	0909	0916	0923	0910	0920	0930
	6	0930	0937	0944	0951	0958	1005	0950	1000	1010
	7	1012	1019	1026	1033	1040	1047	1030	1040	1050
	8	1054	1101	1108	1115	1122	1129	1110	1120	1130
	9	1136	1143	1150	1157	1204	1211	1150	1200	1210
	10	1218	1225	1232	1239	1246	1253	1230	1240	1250
	11	1300	1307	1314	1321	1328	1335	1310	1320	1330
	12	1342	1349	1356	1403	1410	1417	*1350	1400	1410
	13	1424	1431	1438	1445	1452	1459	1430	1440	1450
	14	*1506	*1513	*1520	1527	1534	1541	1510	1520	1530
	15	1548	1555	1602	1609	1616	1623	1550	1600	1610
	16	1630	1637	1644	1651	1658	1705	1630	1640	1650
	17	1712	1719	1726	1733	1740	1747	1710	1720	1730
	18	1754	1801	1808	1815	1822	1829	1750	1800	1810
	19	1836	1843	1850	1857	1904	1911	1830	1840	1850
	20	1918	1925	1932	1939	1946	1953	1910	1920	1930
	21	2000	2007	2014	2021	2028	2035	1950	2000	2010
	22	2042	2049	2056	2103	2110	2117	2030	2040	2050
	23	2124	2131	2138	2145	2152	2159	2110	2120	2130
	24	2206	2213	2220	2227				2200	
	25	*2250	*2300		2310	2320				
	26	2330	2340		2350	2400				
	27	0015	0030		0045	0100				
	28	0120			0140					
	29	0200			0230					
	30	0300			0330					
	31	0400			0430					
	32	0500			0530					





Appendix E Survey Card for Waiting Time.

	<p>YUNIT PERANCANG EKONOMI NEGERI PEJABAT SETIAUSAHA KERAJAAN, BANGUNAN TUANKU SYED PUTRA, PETI SURAT 3006 PULAU PINANG. Talipon: Pulau Pinang 64461 Taligeram: SECSTATE, PULAU PINANG</p>			
<p>Kepada sesiapa yang berkenaan, Kami sekarang sedang menjalankan kajian keatas kenderaan-kenderaan yang menaiki feri. Sila kembalikan kad ini kepada pemungut yang berada di pintu masuk ke feri. Terima kasih.</p>				
<table border="1"><tr><td></td><td></td><td></td></tr></table>				

	<p>YUNIT PERANCANG EKONOMI NEGERI PEJABAT SETIAUSAHA KERAJAAN, BANGUNAN TUANKU SYED PUTRA, PETI SURAT 3006 PULAU PINANG. Talipon: Pulau Pinang 64461 Taligeram: SECSTATE, PULAU PINANG</p>			
<p>To whom it may concern, We are carrying out a ferry survey. Please hand this card to the collector who will be at the entrance to the ferry. Thank you.</p>				
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