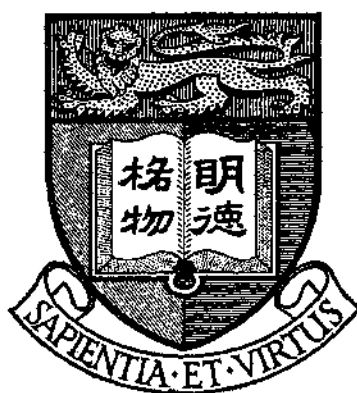


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7 1976

Data Record No. 231



A Review of Speed Limit on
Tai Po Road

Job No. 347

by

TO Kwok-shing

Chief Engineer: K.T. Kuo

June 1976

2055416

AKE

TP 22

Requested by: Commissioner of Police

Nature of Survey: Speed studies and classification counts of vehicles were carried out in March 1976 to assess the appropriate speed limit on Tai Po Road between the North Kowloon Magistracy and the junction with Ching Cheung Road. The study section is at present under 30 m.p.h. speed limit restriction except for a short weaving section near Ching Cheung Road which is derestricted. To the south of the study section the speed limit is 30 m.p.h. and to the north of it, the road is derestricted.

The location of the study section and the speed observation point are shown in FIG. 1.

The method of survey and criteria for determining appropriate speed limits are given in Technical Report No. 75 "A Review of Speed Limit on the Water-front Road" and are not repeated here.

Results of the Survey:

Traffic Flow and Speed Characteristics

Classification counts and traffic volumes measured at the observation point are shown in TABLE 1 together with the percentage sampled.

The average vehicle flows per hour during the survey were 425 northbound and 392 southbound.

The average proportions of heavy vehicles and P.L.B.'s were respectively 27% and 28% (both directions combined).

The average percentage of all vehicles travelling in platoon was 25.3%.

The speed characteristics by direction and vehicle type are summarised in TABLE 2. The results for all periods combined are illustrated in FIG. 2.

As the road is on grade, speeds in the southbound direction were slightly higher than that in the northbound direction.

The mean speeds of light vehicles ranged from 46.3 km/h (28.8 m.p.h.) to 54.9 km/h (34.1 m.p.h.) in the northbound direction and from 54.2 km/h (33.7 m.p.h.) to 58.1 km/h (36.1 m.p.h.) in the southbound direction.

During the survey, maximum speeds of 80 km/h (50 m.p.h.) northbound and 84 km/h (52 m.p.h.) southbound were recorded.

The mean speeds of heavy vehicles were 40.6 km/h (25.2 m.p.h.) northbound and 51.5 km/h (32.0 m.p.h.) southbound.

The 85th percentile speed of passenger car under free flowing conditions during off-peak periods were 64.7 km/h (40.2 m.p.h.) northbound and 64.9 km/h (40.3 m.p.h.) southbound.

The Road

The road comprises two carriageways with 2 lanes in the southbound direction for the entire study section and 3 lanes in the northbound direction from the North Kowloon Magistracy to the pedestrian bridge. Beyond the footbridge, the northbound carriageway reduces to 2 lanes.

At the observation point, the road is a dual two-lane carriageway, 7.3 m (24 ft.) wide each separated by a 1.8 m (6 ft.) central divider. Footpaths with widths of 1.8 m (6 ft.) on the east side and 2.4 m (8 ft.) on the west side are provided.

Both the horizontal and vertical alignments of the study section are compatible with driving speeds of up to 40 m.p.h.

The two horizontal curves between the North Kowloon Magistracy and the junction with Tai Woh Ping Road have radii of curvature of 130 m. (426 ft.) and 110 m. (361 ft.). The maximum gradient is 5.8%.

The Environment

The study section of Tai Po Road is situated on the hillside with virtually no development on either side of the road, apart from the North Kowloon Magistracy.

During the survey, parking and loading/unloading activities were negligible. However, boarding/alighting of public light buses were frequent at the North Kowloon Magistracy. Pedestrian movements along the footpaths of the study section were generally very light.

Street Lighting

Mercury street lighting to the standard of Group A3 of CP 1004 from the North Kowloon Magistracy to the Tai Woh Ping Flyover is provided. The remaining section near Ching Cheung Road is under sodium lighting to the standard of Group A2.

Accident Statistics

Between 1-1-1974 and 31-12-1975, there were only 10 injury accidents recorded on the study section of Tai Po Road, involving 12 casualties of which none was fatal.

The accident statistics for 1974 and 1975 are listed in TABLE 3.

The accident rate is 0.82 per million vehicle-kilometres (1.32 per million vehicle-miles) for all injury accidents based on a 2-year record between 1-1-1974 and 31-12-1975.

Comments and Recommendation:

Based on the 85th percentile speed of passenger cars under free flowing conditions and the criteria established in Technical Report No. 75 "A Review of Speed Limit on Waterfront Road", the appropriate speed limit for the section of Tai Po Road under study is 40 m.p.h. (64 km/h). However, the northern end of the study section joins Ching Cheung Road and Lung Cheung Road in the form of a weaving section. As the speed limits of the latter two roads will be reviewed in the near future, it is recommended that speed limits for these three roads be considered simultaneously.

TABLE 1 TRAFFIC FLOW AND VEHICLE CLASSIFICATION

Time of Day	Period of Observation	Bound	Traffic Flow						Hourly Flow Rate	Hourly Sample Rate	% Sampled
			Car	PLB	G/V	Bus	Total	% of Heavy Vehicle			
0800-0900	1 hr.	N	248	206	78	32	564	20	564	391	69
		S	280	114	90	32	516	24	516	432	84
1100-1200	1 hr.	N	178	82	116	16	392	34	392	263	67
		S	190	80	106	14	390	31	390	250	64
1200-1300	1 hr.	N	136	88	98	12	334	33	334	216	65
		S	132	140	22	14	308	12	308	210	68
1300-1400	1 hr.	N	166	114	112	16	408	31	408	215	53
		S	160	84	92	16	352	31	352	203	58

TABLE 2 SPEED OF VEHICLES

(A) Passenger Cars, Public Light Buses and Vans

PERIOD (hrs.)	Dirn Bound	Sample Size	% in Platoon	Speed in km/h (m.p.h.)					
				Min.	Ave.	Mode	Max.	85th Per- centile	S.D.
0800-0900	N	309	20	23 (14)	46.3 (28.8)	42.5 (26.4)	71 (44)	55.5 (34.5)	8.2 (5.1)
	S	334	48	32 (20)	56.0 (34.8)	51.2 (31.8)	80 (50)	63.4 (39.4)	6.6 (4.1)
1100-1200	N	181	17	32 (20)	48.9 (30.4)	43.9 (27.3)	71 (44)	57.8 (35.9)	7.9 (4.9)
	S	185	36	29 (18)	54.2 (33.7)	52.8 (32.8)	84 (52)	61.6 (38.3)	8.0 (5.0)
1200-1300	N	149	20	35 (22)	54.9 (34.1)	50.1 (31.1)	80 (50)	65.2 (40.5)	7.9 (4.9)
	S	146	16	42 (26)	58.1 (36.1)	53.4 (33.2)	74 (46)	66.0 (41.0)	7.2 (4.5)
1300-1400	N	148	16	29 (18)	51.3 (31.9)	49.2 (30.6)	77 (48)	61.6 (38.3)	9.3 (5.8)
	S	145	21	39 (24)	55.7 (34.6)	56.3 (35.0)	74 (46)	62.4 (38.8)	6.8 (4.2)

(B) All Goods Vehicles, Buses and Coaches

Direct- ion Bound	Period	Sample Size	% in Platoon	Speed in km/h (m.p.h.)					
				Min.	Ave.	Mode	Max.	85th Per- centile	S.D.
North	All	296	15	16 (10)	40.6 (25.2)	40.4 (25.1)	61 (38)	50.1 (31.1)	8.7 (5.4)
South	All	285	28	32 (20)	51.5 (32.0)	49.6 (30.8)	71 (44)	59.1 (36.7)	6.9 (4.3)

(C) Passenger Cars under Free Flowing Conditions

Direct- ion Bound	Period	Sample Size	Vehicle Flow/hr	Speed in km/h (m.p.h.)					
				Min.	Ave.	Mode	Max.	85th Per- centile	S.D.
North	Off- Peak	269	160	32 (20)	55.7 (34.6)	50.5 (31.4)	80 (50)	64.7 (40.2)	8.2 (5.1)
South	Off- Peak	267	161	29 (18)	56.0 (34.8)	53.6 (33.3)	84 (52)	64.9 (40.3)	8.2 (5.1)

Off-peak : 1100-1200
1200-1300
1300-1400

N - From Sham Shui Po to Shatin
S - From Shatin to Sham Shui Po

S.D. = Standard Deviation

TABLE 3 ACCIDENT STATISTICS

Period	No. of Injury Accidents	No. of Casualties			
		Fatal	Serious	Slight	Total
1-1-74 to 31-12-74	4	-	1	5	6
1-1-75 to 31-12-75	6	-	3	3	6
Total	10	-	4	8	12

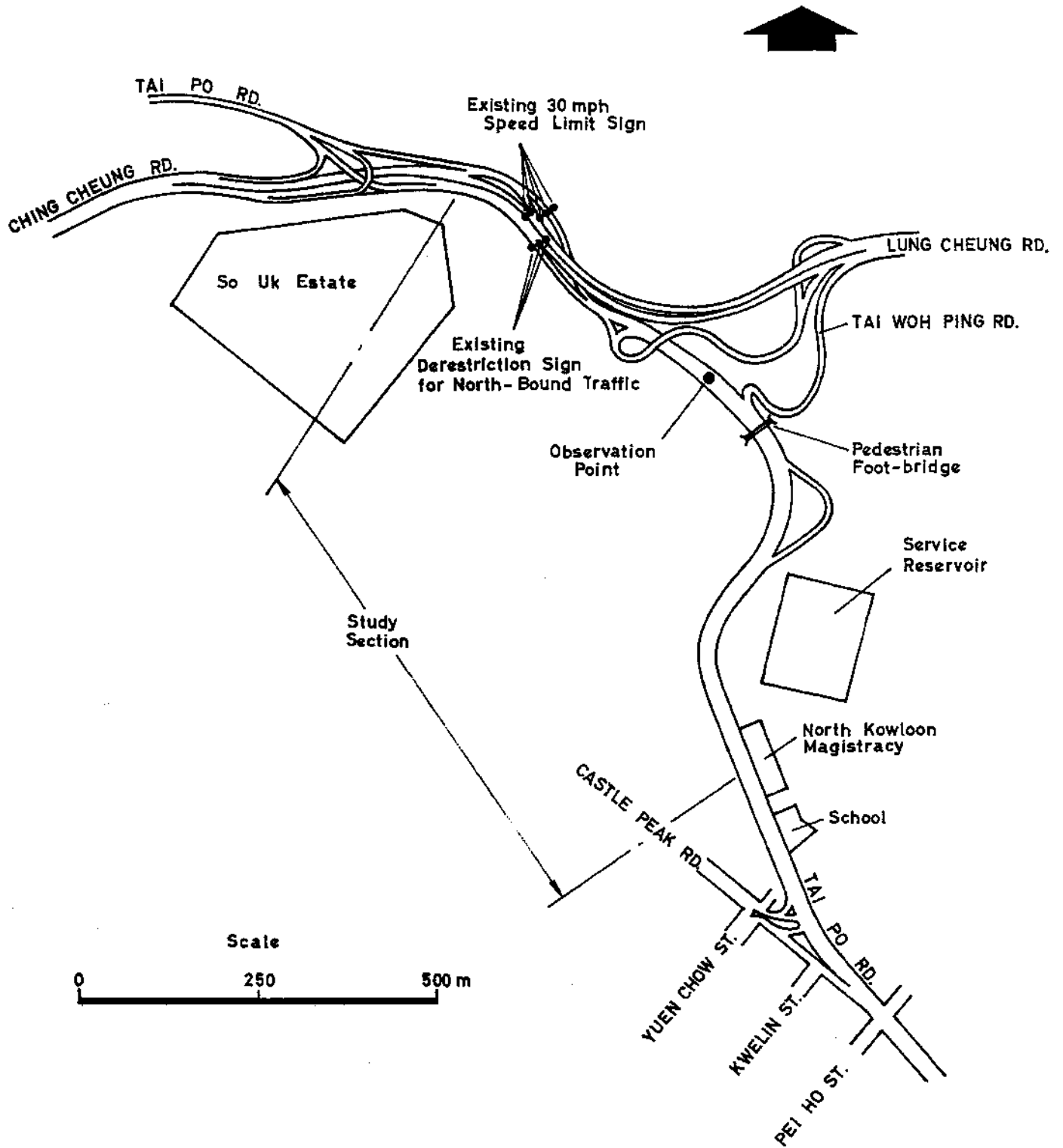
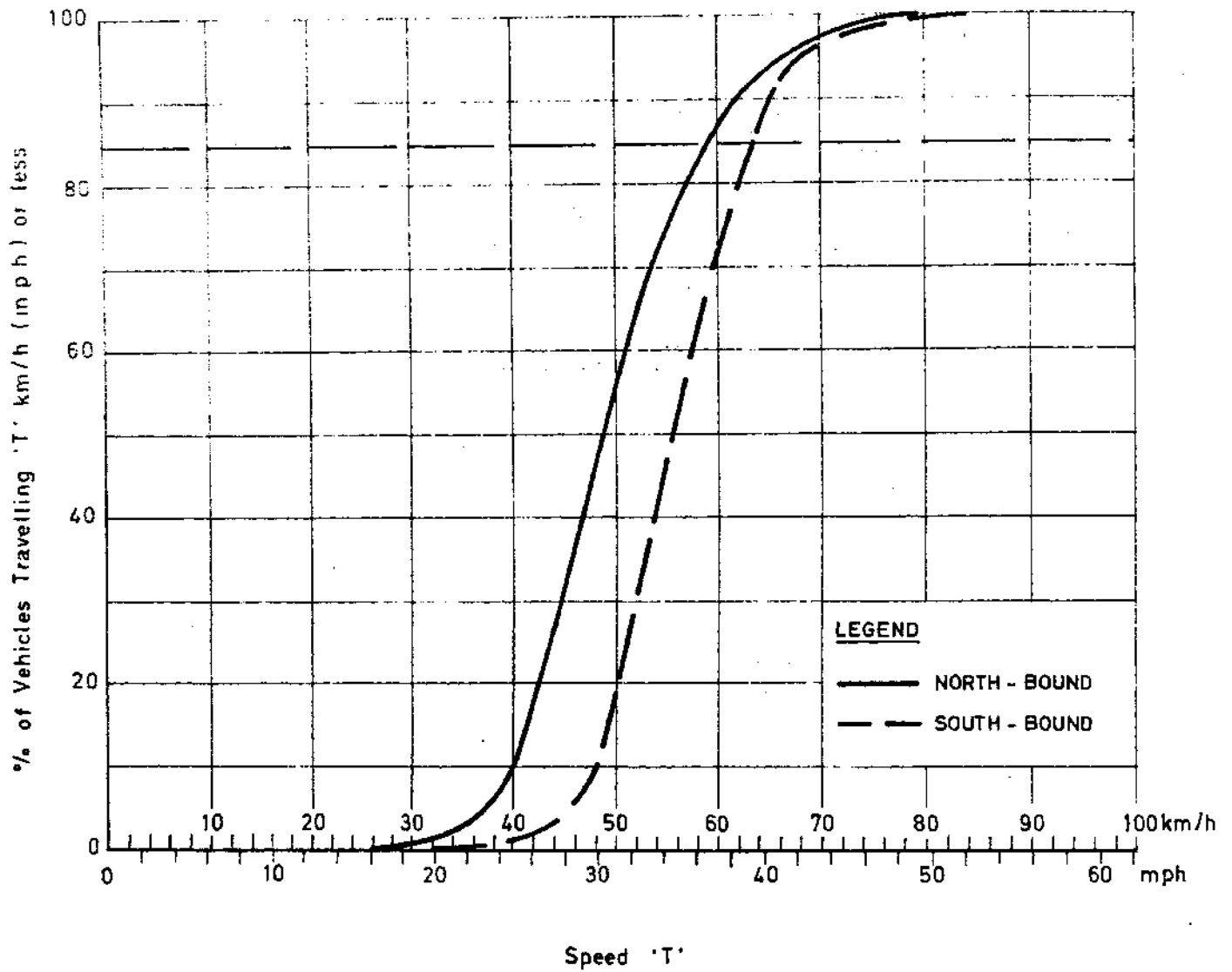
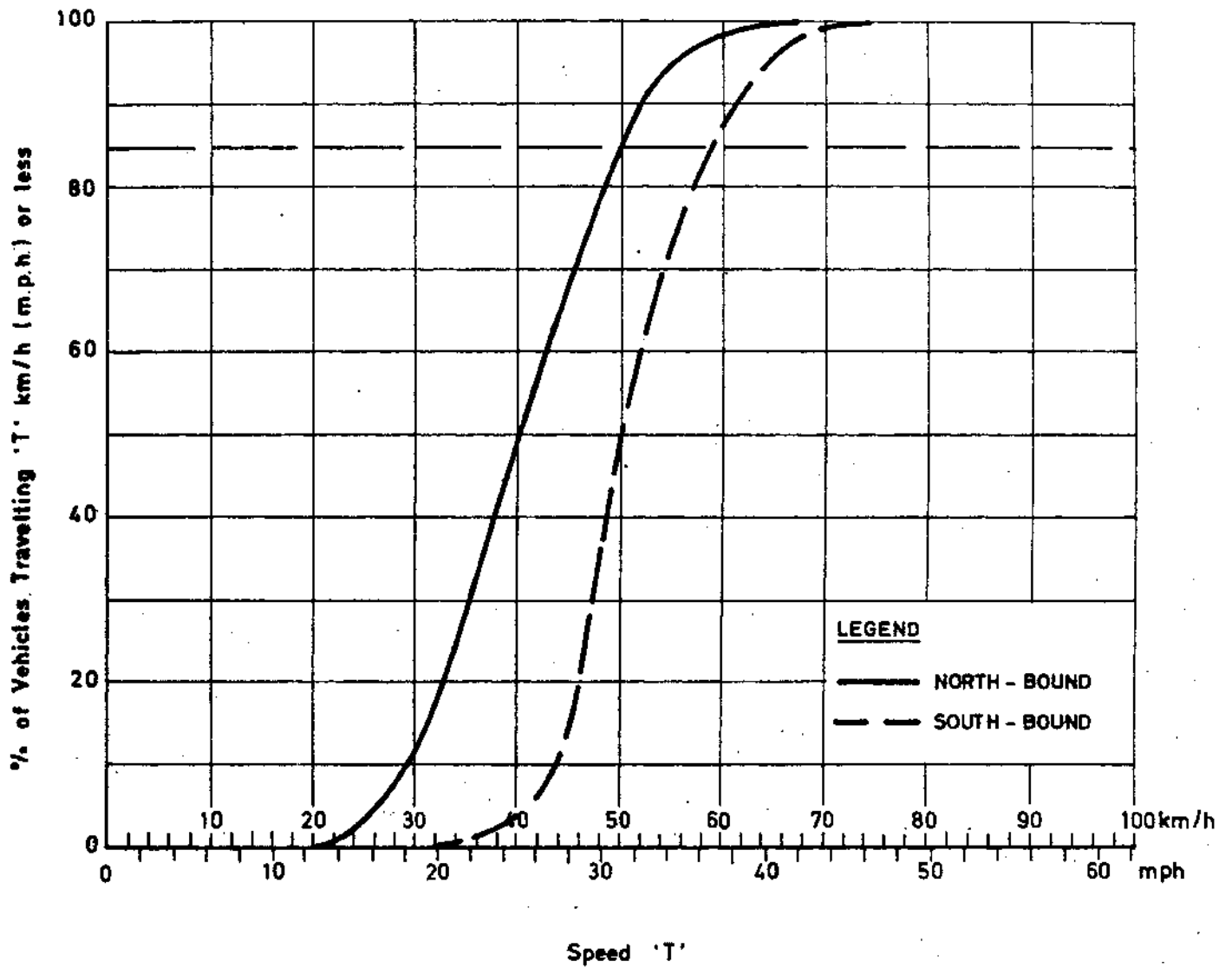


FIG. 1 PLAN



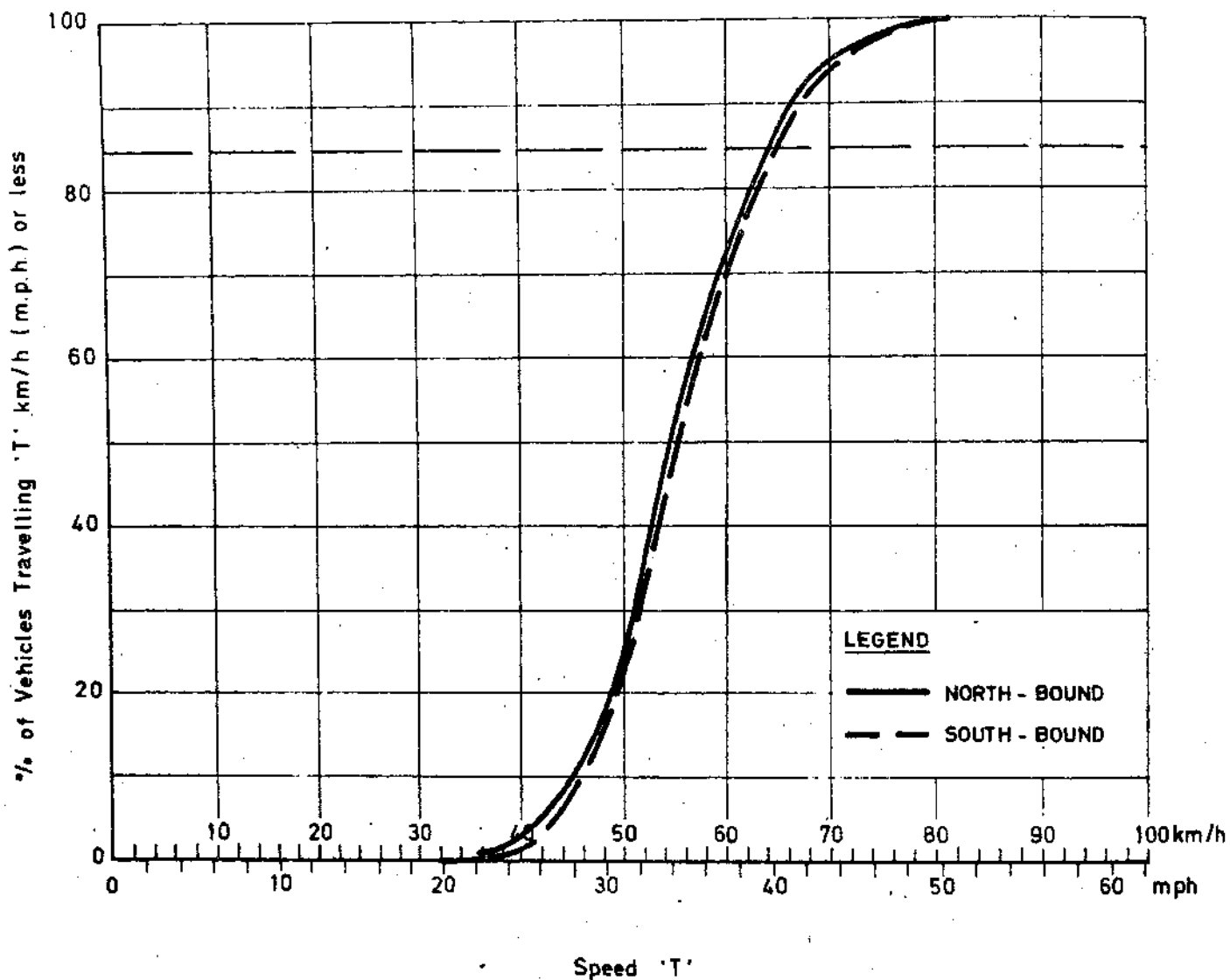
(A) Passenger Cars, Public Light Buses and Vans

FIG. 2 CUMULATIVE FREQUENCY CURVES



(B) Goods Vehicles, Buses and Coaches

FIG. 2 CUMULATIVE FREQUENCY CURVES
(Cont'd)



(C) Passenger Cars under Free Flowing Conditions

FIG. 2 CUMULATIVE FREQUENCY CURVES
(Cont'd)

TRAFFIC & TRANSPORT SURVEY DIVISION

PUBLIC WORKS DEPARTMENT

HONG KONG

- 2 SEP 1976

Data Record 232

Tram Travel Time and Delay
Study at Western Market



Job No. 26

by

CHUNG Tak-wah

Chief Engineer: K.T. Kuo

July 1976

Requested by: Commissioner for Transport

Purpose of Survey: To study the cause of the low tram journey speeds at Western Market, identified in Technical Report 220 as one of the seven locations where tram journey speeds were slower than 8 km/h (5 m.p.h.) and to see what measures could be taken to improve tram journey speeds in this location.

Nature of Survey: In the previous study reported in Technical Report 220, low tram journey speeds were observed for westbound trams between Stop 139 and 140 and eastbound trams between Stops 12 and 13 during peak and off-peak periods. The present survey was therefore designed to study the movement of trams around Des Voeux Road Central, Morrison Street, Connaught Road Central and Cleverly Street and the influence of vehicular traffic and other external factors on tram speeds in this area. Observations between 0700-0900 hour covered the morning peak, 1700-1900 hour: the evening peak and 1400-1600 hour: the off-peak.

Observers positioned on the footwalk recorded the registration number, times of arrival and departure at tram stops and other check points, and the stopped time and reasons for stopping on route for every tram that travelled in the study area during the study period. The reason for stopping was classified into similar categories as in the Sai Yin Pun survey reported in Data Record 228. Vehicle flow and delay was observed at the traffic light signals at the junctions of Connaught Road Central/Morrison Street and Connaught Road Central/Cleverly Street for comparison with tram delays at these locations. Due to the restricted staff availability only the traffic turning movements from Morrison Street to Connaught Road and those from Connaught Road Central to Cleverly Street were observed.

The survey was carried out on Wednesday 3rd December, 1975.

Site characteristics: Des Voeux Road Central and Connaught Road Central are two major parallel roads that carry east-west traffic between the Central District and the Western area of Hong Kong Island. The twin tram tracks which run along Des Voeux Road Central are diverted onto Connaught Road Central via Morrison Street (northbound) and Cleverly Street (southbound) to be continued further west. The tracks on Morrison Street and Cleverly Street run along the centre of the 7.6m (25 ft.) wide carriageway, having turned through a 90 degree angle at Des Voeux Road Central and Connaught Road Central. A 12m (40 feet) radius curve connects the tram track from Des Voeux Road Central to Morrison Street, Morrison Street to Connaught Road Central (westbound) and Cleverly Street to Des Voeux Road Central. A 18.3m (60 ft.) radius curve connects the track from Morrison Street to Connaught Road Central (eastbound) and Connaught Road Central to Cleverly Street.

Tram Stop 139 near the junction of Des Voeux Road Central and Morrison Street serves as an intermediate stop on tram routes to Whitty Street and Kennedy Town and as the terminal stop on routes to Western Market. Trams that terminate their journey at this stop could either shunt onto the other track to begin the eastward journey at Stop 13 or they could follow the loop via Morrison Street, Connaught Road Central and Cleverly Street to Stop 13.

Due to the high traffic volumes on Connaught Road Central, the entry of trams and other traffic from Morrison Street to Connaught Road Central and the right turn from Connaught Road Central to Cleverly Street were controlled by traffic light signals. At the Connaught Road Central/Cleverly Street junction the tram track on the western approach on Connaught Road Central was shared with the right-turning vehicular traffic lane. Hence trams and right-turning vehicles shared the green time on one signal phase. At the Connaught Road Central/Morrison Street junction left and right-turning trams from Morrison Street shared the green period with left and right-turning vehicles. Because of the close proximity of these two junctions (about 85m) the queue from one junction often obstruct movements at the other.

Land use in the locality is mixed commercial/residential. A busy market (Western Market) is located west of Morrison Street while on the opposite side is a busy commercial centre (Kai Tak Commercial Building). Goods vehicle loading/unloading activity is prohibited on Des Voeux Road Central and on Connaught Road Central upto a point just west of Morrison Street between 0700-1000 hour and 1600-1900 hour. Cleverly Street between Connaught Road Central and Des Voeux Road Central is a "No Waiting" area but there is no such restriction on Morrison Street.

The site characteristics are shown in FIGURE 1.

The Results:

The sectional average tram travel time and journey speeds during each hour of observation are indicated in TABLE 1 and the average delay (stopped time) in TABLE 2A to 2G.

The average eastbound journey speed between Stops 12 and 13 was slightly higher than the westbound speed between Stops 139 and 140, but the average speed in either direction was very low, well below 8 km/h (5 m.p.h.). This situation prevailed during the peak and off-peak periods, though peak period speeds were marginally higher.

Practically all the stopped time delay to westbound trams in the study area occurred on the section between Stop 139 and the junction of Connaught Road Central/Morrison Street. About 27% of the travel time on this section was taken up waiting during the red phase at the traffic light signal at Connaught Road Central/

Morrison Street junction. No delay was experienced during the green period indicating that at the time of survey this junction was never blocked. Other delays amounting to about 4% of the travel time were experienced as a result of right-turning movements at Des Voeux Road Central/Morrison Street junction, goods vehicles manoeuvring to park south of Western Market, and trams changing direction at Stop 139. The average running time (travel time minus stopped time) between Stop 139 and Connaught Road Central/Morrison Street junction was 48 seconds which indicated an average running speed of only 8 km/h (5 m.p.h.). Although practically no stopped time delay was experienced between Connaught Road Central/Morrison Street junction and Stop 140, a low average journey speed of about 8 km/h (5 m.p.h.) was maintained.

Eastbound trams experienced stopped time delay mainly on the section between Stop 12 and Connaught Road Central/Cleverly Street junction. On this section trams were stopped on average for 8 seconds during the red period at the Connaught Road Central/Morrison Street junction and 24 seconds at the Connaught Road Central/Cleverly Street junction. Slight delay was experienced at these junctions during the green period due to the junction exit being blocked momentarily in the off-peak period 1400-1600 hours and the evening peak 1700-1900 hours. The junction delays accounted for about 37% of the travel time between Stop 12 and Cleverly Street junction. The average running speed on this section was 9 km/h (5.6 m.p.h.). Hardly any stopped time delay was experienced beyond the junction of Connaught Road Central and Cleverly Street but still the average journey speed was low at 9.17 km/h (5.70 m.p.h.), the average running time being only marginally higher at 9.23 km/h (5.74 m.p.h.). The stopped time delay on this section which was less than 1% of the average travel time of 43 seconds occurred mainly due to trams queuing for passenger boarding and alighting at Stop 13. Interference from through traffic on Des Voeux Road Central at the uncontrolled junction with Cleverly Street was negligible.

Only half the number of trams that arrived at Stop 139 continued their journey west to Whitty Street and Kennedy Town. The others terminated their westward journey at Stop 139 and recommenced their eastward journey at Stop 13. The majority of these trams used the loop via Morrison Street, Connaught Road Central and Cleverly Street to turn around rather than change the position of the overhead electrical lead and switch over to the other track. The time taken to move from Stop 139 to Stop 13 via the loop was about 5 seconds shorter than in changing direction by changing the position of the overhead lead.

Vehicle flow and delay on Morrison Street and Cleverly Street at their junctions with Connaught Road Central are indicated in TABLE 3. The highest flow on the Morrison Street approach to the signalized junction occurred

between 1400-1500 hour in which period 242 vehicles and 81 trams were observed. This volume of traffic was less than half the approach capacity. Vehicle queues on this approach were longest between 1400-1600 hours. Although the average queue length in this period was two vehicles, the longest queue observed was 10 vehicles (including trams) which lasted for about half minute around 1445 hour. The average vehicle delay on this approach was longer than the average tram delay during each hour of observation. As with the trams, the longest vehicle delay occurred between 1400-1600 hours in the off-peak period.

At the junction of Connaught Road Central and Cleverly Street right-turning vehicle volumes on the western approach were largest between 0800-0900 hour. During this period the average queue length was 3 vehicles but queues of upto 8 vehicles were seen sporadically for short periods of about half minute. On a few occasions the vehicle queue was seen to extend beyond the Morrison Street junction but this situation lasted only 15 to 30 seconds each time. Similar to the observation at the Morrison Street/Connaught Road Central junction, the average delay per tram was smaller than the average delay per vehicle for each hour of observation.

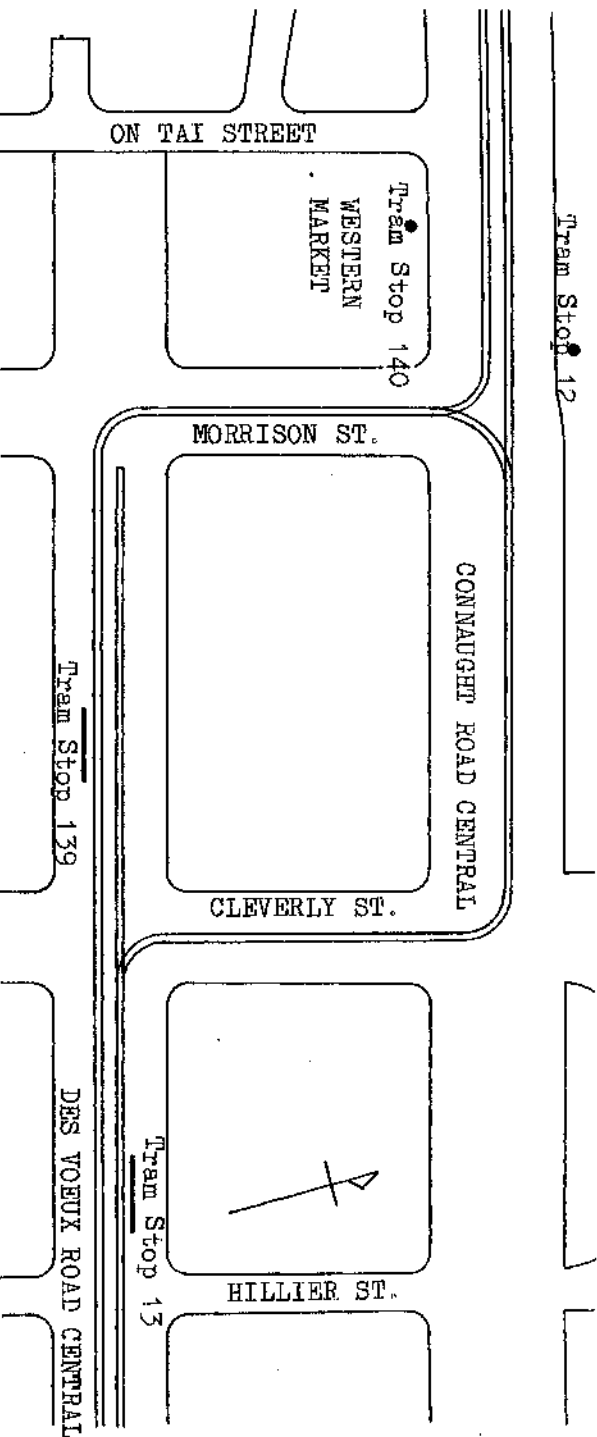
On the day of survey, conditions at the site were such that there was very little interference to the movement of trams from other vehicles or kerbside activity such as loading/unloading goods etc. This situation does not always prevail and it is known that on some days, kerbside activity at Western Market does influence tram speeds particularly in the afternoon. However, even in the absence of such interference tram journey speeds in this locality were very low, being less than 8 km/h (5 m.p.h.) both east and westbound.

It was observed that about 20% of westbound travel time between tram stops 139 and 140 was taken up waiting during the red period at the traffic light signal while in the opposite direction 25% of the travel time between Stops 12 and 13 was taken up at the approach to two traffic light signals. The elimination of this delay would increase the average westbound tram speed to about 7.8 km/h (4.8 m.p.h.) and average eastbound speed to about 8.8 km/h (5.5 m.p.h.). Although this amounts to a 25% increase of average journey speed, the speeds would still be very low due probably to the physical constraints at the site.

Between Stop 139 and 140 a westbound tram has to negotiate two 90° curves of 12m (40 ft.) radius within a very short distance of each other and the tram stops. Measurements taken at site showed that the free flow tram speed on these curves was 6.9 km/h (4.3 m.p.h.).

Because of the short distance from the tram stops to the curves, trams on this section did not accelerate to speeds much higher than what they could maintain on the curves even when they were not obstructed by traffic or other external influence. The speed that could be maintained on the curve therefore tends to control the tram journey speed on this section and for this reason tram speeds will remain low even if the external influence of traffic and traffic light signals were removed. Eastbound trams are similarly influenced as was seen from the low running speeds between Connaught Road Central/Cleverly junction and Stop 13 on which section there was no interference from other traffic or external influence such as traffic light signals.

TABLE 1 AVERAGE TRAM TRAVEL TIME AND SPEED AT WESTERN MARKET



BOUND	SECTION BETWEEN	DIS-TANCE km	AVERAGE TRAM TRAVEL	PERIOD OF DAY										ALL PERIOD	
				0700-0800	0800-0900	1400-1500	1500-1600	1700-1800	1800-1900						
WEST	Stop 139 and J/O Connaught Rd. C./Morrison Street	0.10	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	1.16 5.17 3.21	1.15 5.22 3.24	1.23 4.88 3.03	1.34 4.48 2.78	1.10 5.45 3.39	0.94 6.38 3.96	1.15 5.22 3.24					
	Stop 139 and Stop 140	0.05	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	0.27 11.10 6.90	0.37 8.11 5.04	0.35 8.57 5.33	0.39 7.69 4.78	0.40 7.50 4.66	0.38 7.89 4.90	0.36 8.33 5.18					
	J/O Connaught Rd. C./Morrison Street and Stop 140	0.15	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	1.42 6.34 3.94	1.52 5.92 3.68	1.58 5.70 3.54	1.74 5.17 3.21	1.51 5.96 3.70	1.32 6.82 4.24	1.51 5.96 3.70					
	Stop 12 and J/O Connaught Rd. C./Cleverly St.	0.13	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	0.97 8.04 5.00	1.46 5.34 3.32	1.46 5.34 3.32	1.57 4.97 3.09	1.52 5.13 3.19	1.74 4.48 2.78	1.47 5.31 3.30					
	Stop 12 and Stop 13	0.11	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	0.71 9.30 5.78	0.70 9.43 5.86	0.71 9.30 5.78	0.72 9.17 5.70	0.77 8.57 5.33	0.73 9.04 5.62	0.72 9.17 5.70					
EAST	J/O Connaught Rd. C./Cleverly Street and Stop 13	0.24	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	1.69 8.52 5.29	2.16 6.67 4.14	2.16 6.67 4.14	2.28 6.32 3.93	2.28 6.32 3.93	2.47 5.85 3.62	2.19 6.58 4.09					
	Stop 12 and Stop 13	0.31	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	2.66 6.99 4.34	2.85 6.53 4.06	3.07 6.06 3.77	2.89 6.44 4.00	2.76 6.74 4.19	3.07 6.06 3.76	2.89 6.44 4.00					
	Stop 139 and Stop 13	0.31	TIME (min.) SPEED (km/h) SPEED (m.p.h.)	2.66 6.99 4.34	2.85 6.53 4.06	3.07 6.06 3.77	2.89 6.44 4.00	2.76 6.74 4.19	3.07 6.06 3.76	2.89 6.44 4.00					

TABLE 2A AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 0700-0800 hour

SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent as travel time	
		Traffic light signal intersection		Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Pull-cart crossing	Pedestrians crossing	Total			
		Red Phase	Green Phase		Vehicles right-turn								Trams queuing ahead
			No exit ahead	Transit vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison St.	74 North-bound	14.8			1.2		3.4	1.7			21.1	69.6	30.3
J/O Connaught Rd.C./ Morrison St. and Tram Stop No. 140											0	16.2	0
Tram Stop No. 139 and Tram Stop No. 140	44 West-bound	14.8			1.2		3.4	1.7			21.1	85.8	24.6
Tram Stop No. 12 and J/O Connaught Rd.C./ Morrison St.	27 } 57 East-bound	4.9											
J/O Connaught Rd.C./ Morrison St. and J/O Connaught Rd.C./ Cleverly St.		14.0											
Tram Stop No. 12 and J/O Connaught Rd.C./ Cleverly St.		18.9									18.9	58.2	32.5
J/O Connaught Rd.C./ Cleverly St. and Tram Stop No. 13		0.6				0.6					0.6	42.6	1.4
Tram Stop No. 12 and Tram Stop No. 13		18.9				0.6					19.5	100.8	19.3

TABLE 2B AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 0800-0900 hour

SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS										Average tram travel time (in secs)	Percent as travel time
		Traffic light signal intersection			Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Pull-cart crossing	Pedestrians crossing	Total		
		Red Phase	Green Phase										
			No exit ahead	Transit vehicle	Vehicles right-turn	Trams queuing ahead							
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison St.	79 North-bound	14.6					4.9			19.5	69.0	28.3	
J/O Connaught Rd.C./ Morrison St. and Tram Stop No. 140					0.1					0.1	22.2	0.5	
Tram Stop No. 139 and Tram Stop No. 140	39 West-bound	14.6				0.1		4.9		19.6	91.2	21.5	
Tram Stop No. 12 and J/O Connaught Rd.C./ Morrison St.	42 East-bound	9.0											
J/O Connaught Rd.C./ Morrison St. and J/O Connaught Rd.C./ Cleverly St.		25.0											
Tram Stop No. 12 and J/O Connaught Rd. C./ Cleverly St.		34.0								34.0	87.6	38.8	
J/O Connaught Rd.C./ Cleverly St. and Tram Stop No. 13		0								0	42.0	0	
Tram Stop No. 12 and Tram Stop No. 13		34.0								34.0	129.6	26.2	

TABLE 2C AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 1400-1500 hour

SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent of travel time	
		Traffic light signal intersection		Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Pull-cart crossing	Pedestrians crossing	Total			
		Red Phase	Green Phase		Vehicles right-turn								Trams queueing ahead
			No exit ahead	Transit Vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison Street	81 North-bound	22.8					1.1	0.2	0.1		24.2	73.8	32.8
J/O Connaught Rd C./ Morrison St. and Tram Stop No. 140											0	21.0	0
Tram Stop No. 139 and Tram Stop No. 140		37 West-bound	22.8					1.1	0.2	0.1		24.2	94.8
Tram Stop 12 and J/O Connaught Rd.C/ Morrison St.	47 91 East-bound	7.4	0.4										
J/O Connaught Rd.C/ Morrison St. and J/O Connaught Rd.C/ Cleverly St.		22.5											
Tram Stop 12 and J/O Connaught Rd.C/ Cleverly St.		29.9	0.4								30.3	87.6	34.6
J/O Connaught Rd.C/ Cleverly St. and Tram Stop 13					0.1	0.4					0.5	42.6	1.2
Tram Stop No. 12 and Tram Stop No. 13		29.9	0.4		0.1	0.4					30.8	130.2	23.7

TABLE 2D AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 1500-1600 hour

SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent as travel time	
		Traffic light signal intersection		Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Pull-cart crossing	Pedestrians crossing	Total			
		Red Phase	Green Phase		Vehicles right-turn								Trams queuing ahead
			No exit ahead	Transit Vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison Street	74 North-bound	22.6			0.2		2.4	0.1			25.3	80.4	31.5
J/O Connaught Rd.C./ Morrison Street and Tram Stop No. 140	37 West-bound					0.2		0.1			0.3	23.4	1.3
Tram Stop No. 139 and Tram Stop No. 140		22.6			0.2	0.2	2.4	0.2			25.6	103.8	24.7
Tram Stop No. 12 and J/O Connaught Rd.C./ Morrison St.	31	9.7											
J/O Connaught Rd.C./ Morrison St. and J/O Connaught Rd.C./ Cleverly St.	68	28.1		0.2									
Tram Stop No. 12 and J/O Connaught Rd.C./ Cleverly St.		37.8		0.2							38.0	94.2	40.3
J/O Connaught Rd.C./ Cleverly St. and Tram Stop No. 13	East-bound					0.2					0.2	43.2	0.5
Tram Stop No. 12 and Tram Stop No. 13		37.8		0.2		0.2					38.2	137.4	27.8

TABLE 2E AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 1700-1800 hour

SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent of travel time	
		Traffic light signal intersection			Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Full-cart crossing	Pedestrians crossing			Total
		Red Phase	Green Phase		Vehicles right-turn	Trams queueing ahead							
			No exit ahead	Transit Vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison Street	73 North-bound	19.7								19.7	66.0	29.8	
J/O Connaught Rd.C./ Morrison Street and Tram Stop No. 140	39 West-bound									0	24.0	0	
Tram Stop No. 139 and Tram Stop No. 140		19.7								19.7	90.0	21.9	
Tram Stop No. 12 and J/O Connaught Rd.C./ Morrison St.	69 East-bound	9.0	0.3										
J/O Connaught Rd.C./ Morrison St and J/O Connaught Rd.C./ Cleverly St.		23.8	0.1										
Tram Stop No. 12 and J/O Connaught Rd.C./ Cleverly St.		32.8	0.4							33.2	91.2	36.4	
J/O Connaught Rd.C./ Cleverly St. and Tram Stop No. 13					0.2					0.2	46.2	0.4	
Tram Stop No. 12 and Tram Stop No. 13		32.8	0.4		0.2					33.4	137.4	24.3	

TABLE 2F AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

Period: 1800-1900 hour

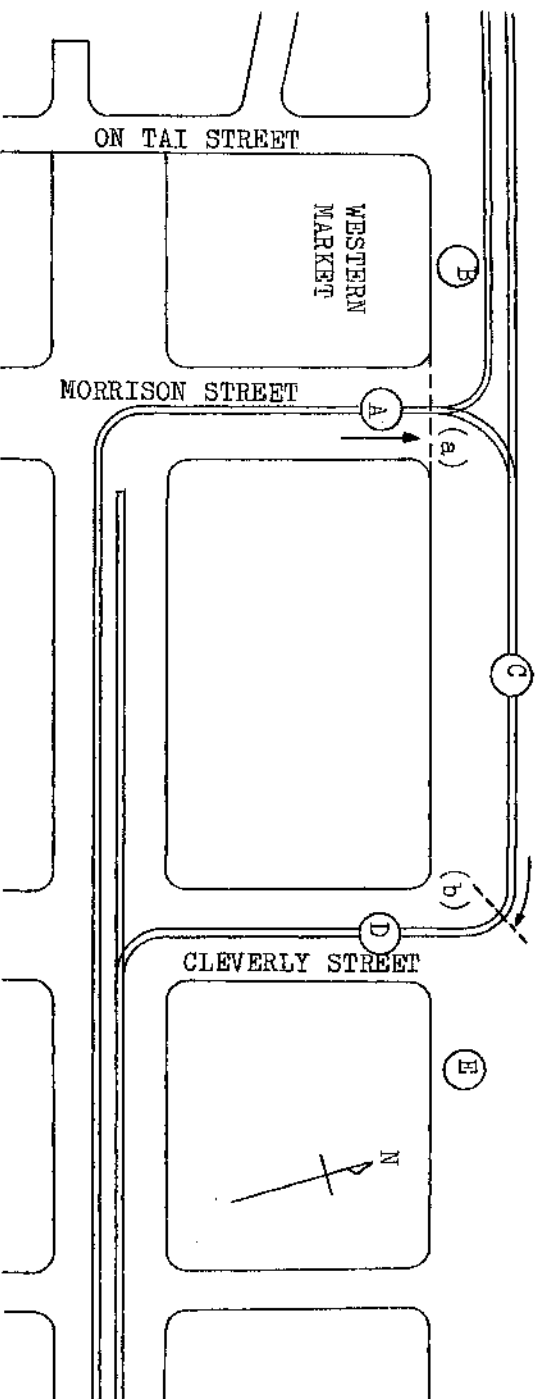
SECTION BETWEEN	No. of Trams and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent of travel time	
		Traffic light signal intersection			Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Pull-cart crossing	Pedestrian crossing			Total
		Red Phase	Green Phase		Vehicle right-turn	Trams queueing ahead							
			No exit ahead	Transit Vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./ Morrison Street	70 North-bound	15.4								15.4	56.4	27.3	
J/O Connaught Rd.C./ Morrison Street and Tram Stop No. 140	36 West-bound									0	22.8	0	
Tram Stop No. 139 and Tram Stop No. 140		15.4								15.4	79.2	19.4	
Tram Stop No. 12 and J/O Connaught Rd.C./ Morrison St.	38	8.5											
J/O Connaught Rd.C./ Morrison St. and J/O Connaught Rd.C./ Cleverly St.	72 East-bound	30.0		0.5									
Tram Stop No. 12 and J/O Connaught Rd.C./ Cleverly St.		38.5		0.5					0.1	39.1	104.4	37.5	
J/O Connaught Rd.C./ Cleverly St. and Tram Stop No. 13					0.1					0.1	43.8	0.2	
Tram Stop No. 12 and Tram Stop No. 13		38.5		0.5	0.1				0.1	39.2	148.2	26.5	

TABLE 26 AVERAGE TRAM DELAY TIMES AT WESTERN MARKET

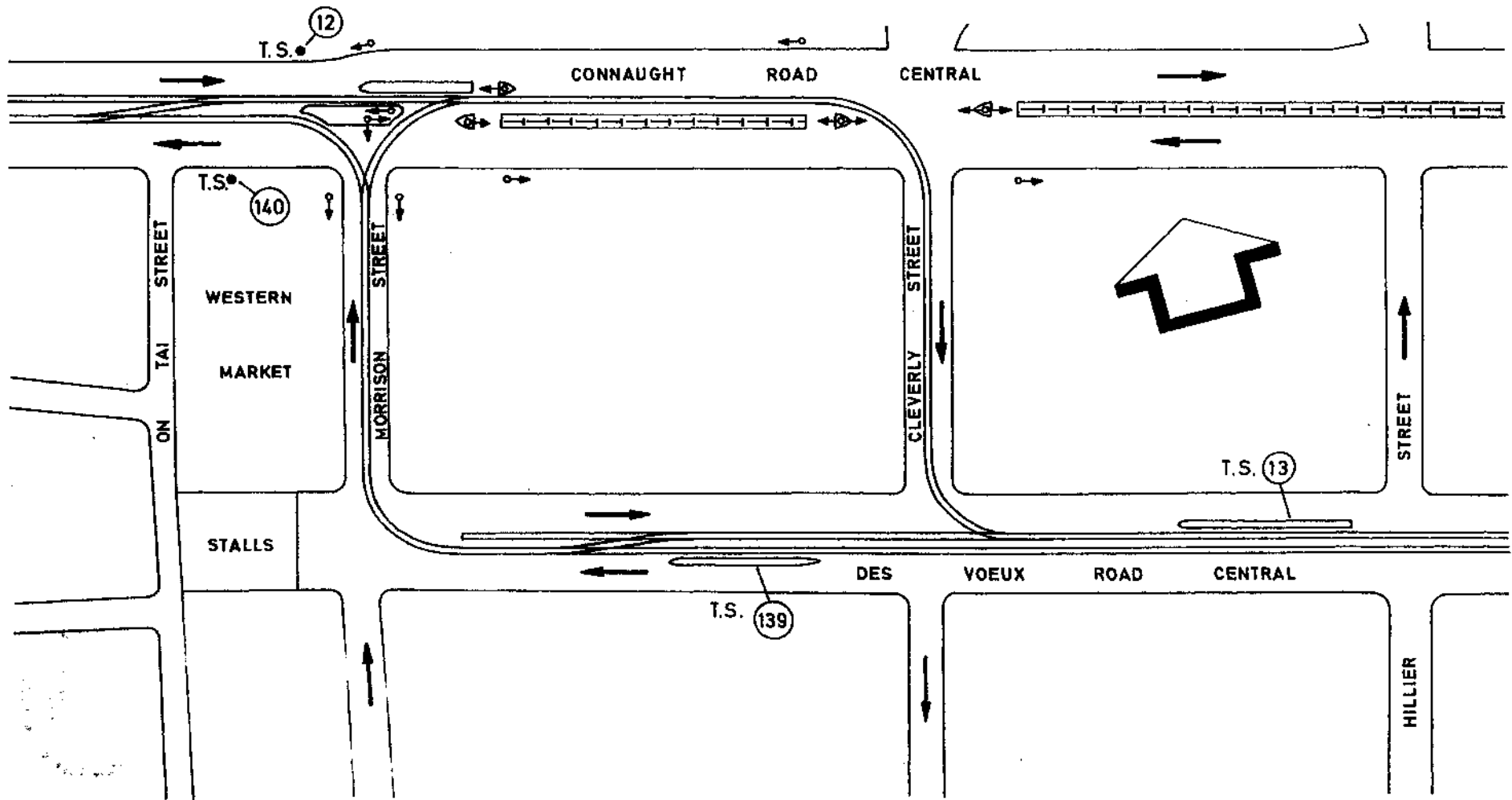
Period: All-Period

SECTION BETWEEN	No. of Tram and Direction	AVERAGE TRAM DELAY TIME IN SECONDS									Average tram travel time (in secs)	Percent of travel time	
		Traffic light signal intersection			Uncontrolled intersection	Tram Stop	Trams changing direction	Transit vehicles	Full-cart crossing	Pedestrians crossing			Total
		Red Phase	Green Phase		Vehicle: right-turn	Trams queuing ahead							
			No exit ahead	Transit Vehicle									
Tram Stop No. 139 and J/O Connaught Rd.C./Morrison St.	75 North-bound	18.4			0.2		1.2	1.2			21.0	69.0	30.4
J/O Connaught Rd.C./Morrison Street and Tram Stop No. 140	39 West-bound					0.1					0.1	21.6	0.5
Tram Stop No. 139 and Tram Stop No. 140		18.4			0.2	0.1	1.2	1.2			21.1	90.6	23.2
Tram Stop No. 12 and J/O Connaught Rd.C./Morrison St.	37	8.2											
Connaught Rd.C./Morrison St. and J/O Connaught Rd.C./Cleverly St.	73 East-bound	24.1	0.1	0.1									
Tram Stop No. 12 and J/O Connaught Rd.C./Cleverly St.		32.3	0.1	0.1							32.5	88.2	36.8
J/O Connaught Rd.C./Cleverly St. and Tram Stop No. 13					0.1	0.2					0.3	43.2	0.7
Tram Stop No. 12 and Tram Stop No. 13		32.3	0.1	0.1	0.1	0.2					32.8	131.4	25.0

TABLE 3 VEHICLE FLOW AND DELAY
 AT J/O CONNAUGHT ROAD CENTRAL/MORRISON STREET
 AND J/O CONNAUGHT ROAD CENTRAL/OLIVERLY STREET



HOUR	FLOW IN VEHICLE PER HOUR					Ave. delay per vehicle (in sec.) at approach		Total delay time (in sec.) at approach		Ave. Veh. Queue length over 15 second interval at approach	
	A to B	A to C	C to D	E to D	a	b	a	b	a	b	
0700-0800	66	64	143	28	16.6	20.1	2158	2874	0.6	0.8	
0800-0900	80	83	359	99	28.7	29.1	4678	10447	1.3	2.9	
1400-1500	108	134	230	160	32.7	34.4	7913	7912	2.2	2.2	
1500-1600	105	123	216	141	33.2	30.0	7570	6480	2.1	1.8	
1700-1800	103	94	201	106	25.6	28.7	5043	5769	1.4	1.6	
1800-1900	73	74	168	89	22.0	32.1	3234	5393	0.9	1.5	



LEGEND:

- T.S. } TRAM STOP
- T.S. } TRAM STOP REFERENCE NO.
- TRAFFIC ROUTING
- ▬▬▬ FENCING
- ⬮ TRAFFIC-LIGHT SIGNAL

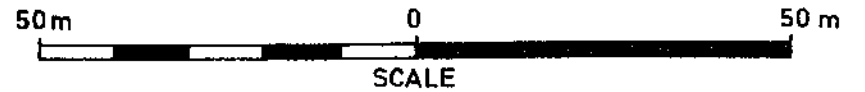


FIG. 1 SITE PLAN



TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

- 2 SEP 1976

Data Record No. 233



PARKING INVENTORY IN THE URBAN AREAS OF
HONG KONG ISLAND, KOWLOON AND NEW KOWLOON
- DECEMBER, 1975.

Job No. 98

by

/
LAW Chak-lam

Chief Engineer: K.T. Kuo

July 1976

Initiated by:

T.T.S.D.

Introduction:

The inventory of parking spaces in Hong Kong Island, Kowloon and New Kowloon is continuously updated and the inventory at the end of each year is published in the form of a Data Record. Data Record 208 and 212 provided inventories at December 1973 and 1974 respectively. This data record contains similar information updated to December 1975.

Result of the Survey:

Tables 1 and 2 list the parking space inventory in Hong Kong Island, Kowloon and New Kowloon respectively by T.T.S.D. zones and subzones. Tables 3 and 4 contain the summary by primary zone or district showing also the percentage of space distribution. Tables 5 and 6 list the off-street parking facilities open to the public including the government and private multi-storey and open air car parks with their charges and method of fee collection.

A total of 113 206 parking spaces was available at the end of December 1975, of which 48 153 were in Hong Kong Island and 65 053 in Kowloon and New Kowloon. This represents an increase of 3 898 (3.6%) parking spaces above the 1974 figure. The change in the total number of parking spaces in Hong Kong Island, Kowloon and New Kowloon in the last two years is shown below:-

<u>Year</u>	<u>Urban Area Total</u>			<u>Hong Kong Island</u>			<u>Kowloon and New Kowloon</u>		
	<u>No. of spaces</u>	<u>CHANGE</u>		<u>No. of spaces</u>	<u>CHANGE</u>		<u>No. of spaces</u>	<u>CHANGE</u>	
		<u>No.</u>	<u>%</u>		<u>No.</u>	<u>%</u>		<u>No.</u>	<u>%</u>
Dec., 73	100731	-	-	42984	-	-	57747	-	-
Dec., 74	109308	+8577	+8.51	46186	+3202	+7.45	63122	+5737	+9.31
Dec., 75	113206	+3898	+3.57	48153	+1967	+4.26	65053	+1931	+3.06

The growth in the total number of parking spaces in the urban area was smaller in 1975 than in 1974.

HONG KONG ISLAND

Of the 48 153 parking spaces in Hong Kong Island, 8 109 were on-street while 40 044 were located off-street. The on-street parking spaces included 1 476 motor cycle parking spaces, which increased in number from the 1 385 available in December 1974. Excluding the motor cycle parking spaces there were a total of 6 633 on-street parking spaces of which 3 270 were metered and 3 363 designated for private cars, goods vehicles, taxis etc.

In previous inventories on-street bus stops were included in the category of 'Other on-street designated' parking spaces. Although the kerb space at such locations is not available for the use of vehicles other than buses, this space is not available for parking buses and is therefore now excluded from the inventory. As a result the number of on-street designated parking spaces in the 'other' category was reduced by 282 in Hong Kong Island and 502 in Kowloon and New Kowloon.

The reduction of over 900 on-street parking spaces in Hong Kong Island in 1975 was partly due to the omission of the spaces at bus stops, but largely due to the elimination of several parking spaces designated for private cars. This reduction was most prominent in Wanchai (Zone 31, 32) and North Point (Zone 34). About 25% of these designated parking spaces were in fact not eliminated but metered instead, which accounts for the increase of 172 on-street metered parking spaces on the Island. The metering programmes implemented in Hong Kong Island in the past few years has resulted in increasing by about 25%, the number of on-street metered parking spaces that were available in 1972, and also restricting the type of meter to the $\frac{1}{2}$ hour new rate (\$2.00 per hour), 2 hour - maximum rate (\$1.00 per hour) and 2 hour - minimum rate (50¢ per hour). The use of dual coin meters and the 1, 4 and 10 hour meters were eliminated on Hong Kong Island.

The reduction in on-street parking facilities has however been offset by a much larger increase of 2 802 off-street parking spaces during the year. The opening of the Hang Lung Car Park (90 spaces) in Causeway Bay and the Guardian House Car Park (300 spaces) in Wanchai were the major contributors to the increase of 494 public off-street parking spaces during the year. New private developments particularly in Zones 21, 29 and 34 helped increase the off-street private parking spaces by 2 308 (+10%).

KOWLOON AND NEW KOWLOON

In Kowloon and New Kowloon there was a total of 65 053 parking spaces, 17 101 on-street and 47 952 off-street. The on-street parking spaces included 2 531 motor cycle parking spaces, which number had decreased from the 2 719 available in December 1974. Apart from the motor cycle parking spaces there were 6 948 metered and 7 622 designated on-street parking spaces.

Allowing for the omission of 502 parking spaces at bus stops previously included in the inventory, there was a reduction of 1 328 on-street parking spaces during the year. The reduction was primarily in South West Kowloon in Zones 51, 52, 55 and 56 and North West Kowloon Zones 71 and 73, in the 'designated passenger car' category. With the reduction in the number of on-street parking spaces it was necessary to make the remaining spaces available to more users, which resulted in an increase of about 32% in the number of on-street metered parking spaces.

The programme for metering on-street goods vehicle parking spaces that was initiated in Tai Kok Tsui in 1974, was extended to Tsim Sha Tsui, Yau Ma Tei, Mong Kok and To Kwa Wan. Also, in Tsim Sha Tsui on-street metered parking spaces were provided for public omnibuses to compensate

the loss of off-street facilities at Middle Road. The use of $\frac{1}{2}$ hour dual coin operated meters and the 10 hour meters were eliminated on-street and the number of 1 hour and 4 hour meters was considerably reduced. 2 hour dual coin operated meters were used at goods vehicle metered parking spaces and $\frac{1}{2}$ hour meters accepting only a dollar coin was used at the public omnibus spaces.

To compensate for the loss in on-street parking facilities several off-street garages were opened particularly in Primary Zones 5 and 8. These included the Hang Lung Car Park in Dundas Street (486 spaces), Odell Car Park in Lai Chi Kok Road (40 spaces), Hang Lung Car Park at Bute Street/Canton Road junction (1000 spaces) and Kowloon Railway Station Car Park (1 050 spaces). The number of off-street public parking spaces increased by 28% to a total of 11 812 at the end of 1975. The expansion of private developments provided an additional 1 385 (+4%) private off-street parking spaces during the year.

CHANGE IN PARKING CHARGES

Many changes were effected to the fare structure of the government operated multi-storey car parks with effect from the 30th November 1975. The eight government car parks were grouped in three categories (A, B and C) depending on the accessibility of the car park to the business district. While the cheap rate at all three categories was alike, the normal rate was scaled according to accessibility. This scaling of charges according to accessibility was a deviation from previous practice when charges at all government operated car parks were the same.

The Garden Road, Middle Road and Star Ferry Car Parks being the most accessible, were grouped in Category 'A' for which the normal rate was \$2.00 per hour. Murray Road, Rumsey Street, Yaumatei and City Hall Car Park were grouped in Category 'B' at which the normal rate of \$1.50 per hour was applicable. The car park at Hung Hom Railway Terminus which was

in Category 'C', being the least accessible had the lowest normal rate of \$1.00 per hour. The cheap rate at all car park was 50 cents per hour with a minimum charge of \$1.00. The cost of a monthly ticket at all car parks was \$400, a reduction of \$100 from the previous charge of \$500.

Changes were also effected to the hours during which the normal rate was applicable. In the past the normal rate at all government car parks was effective between 0800 and 1900 hour on weekdays and 0800 and 1400 hour on Saturdays. With effect from 30th November 1975 the normal rate at Category 'A' and 'B' car parks is effective between 0800 and 1800 hour on weekdays and 0800 and 1200 hour on Saturday. At the Category 'C' car park the normal rate is applicable only on weekdays between 0800 and 1800 hour, the cheap rate being applicable on Saturday.

In the past, if a motor vehicle was parked or removed from the car park or both parked and removed from the car park during the normal period, the normal rate would apply even during the cheap period. However, with the change in regulations the normal rate would apply only for the period of one hour or part thereof which is partly within the ordinary period and partly within the cheap period during the change from one period to the other.

The effect of the above change brings about a considerable saving in parking costs. While parking for a 24 hour period on a weekday would previously have cost \$83 at any government operated multi-storey car park, the current costs are \$27 at a Category 'A' car park, \$22 at Category 'B' and \$17 at Category 'C'.

The tabulation below summarises the charges at government operated multi-storey car parks since 30th November 1975. Charges at the off-street open air parking lots remains at \$5 per half day and \$10 per day on weekdays and Saturdays between 0800 and 1900 hour. The monthly charge has been reduced to \$400 as at the multi-storey car parks.

Charge per Hour

<u>Category</u>	<u>Location</u>	<u>Normal</u>	<u>Cheap</u>		
A	Garden Road (Hilton), Middle Road, Star Ferry	\$2.00	50¢	}	<u>Normal:</u> Weekday 0800-1800 hr. Saturday 0800-1200 hr.
B	Murray Road, Rumsey Street, Yau Ma Tei, City Hall	\$1.50	50¢		<u>Cheap:</u> Weekday 1800-0800 hr. Saturday 1200-2400 hr. Sunday & Public Holiday
C	Hung Hom Railway Terminus	\$1.00	50¢	}	<u>Normal:</u> Weekday 0800-1800 hr. <u>Cheap:</u> Weekday 1800-0800 hr. Saturday, Sunday, Public Holiday.

Metered parking charges remained the same as in the previous year except that the ½ hour (dual coin) and 10 hour (dual coin) type meter was completely eliminated and a few public omnibus metered spaces were introduced in Tsim Sha Tsui. The 1 hour (dual coin) and 4 hour type meter were eliminated in Hong Kong Island but a few were still available in Kowloon. These would also be phased out soon. The following types of parking meter were available at the end of December, 1975:-

<u>Meter Type</u>	<u>Coins Accepted</u>	<u>Parking Time Purchased</u>	<u>Charge per Hour (\$)</u>
<u>(a) Unclassified Meters - New Charging Rate</u>			
½ hr.	\$1.00	Not more than 30 min.	\$2.00
2 hr. (Max. Rate)	50¢	Not more than 30 min.	\$1.00
2 hr. (Min. Rate)	50¢	Not more than 1 hour.	50¢
<u>(b) Unclassified Meters - Old Charging Rate</u>			
1 hour	10¢	Not more than 12 min.	50¢
	50¢	Not more than 1 hour.	
2 hour	10¢	Not more than 24 min.	25¢
	50¢	Not more than 2 hours.	
4 hour	50¢	Not more than 2 hours	25¢
<u>(c) Goods Vehicle</u>			
2 hour	10¢	Not more than 24 mins.	25¢
	50¢	Not more than 2 hours	
<u>(d) Public Omnibus</u>			
½ hour	\$1.00	Not more than 30 min.	\$2.00

TABLE 1: PARKING SPACE INVENTORY IN H.K. ISLAND, December, 1975.

TTSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri.Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
011	121,122,123	0	0	0	0	0	7	0	33	2	0	58	42	58	100
012	121	0	0	0	0	0	0	0	20	0	62	89	20	151	171
Total Zone 01		0	0	0	0	0	7	0	53	2	62	147	62	209	271
021	123	113	0	0	0	3	0	0	45	0	815	608	161	1423	1584
022	123	0	0	0	0	0	31	0	87	8	626	6	126	632	758
Total Zone 02		113	0	0	0	3	31	0	132	8	1441	614	287	2055	2342
031	124	0	0	0	0	0	0	10	5	0	1999	676	15	2675	2690
Total Zone 03		0	0	0	0	0	0	10	5	0	1999	676	15	2675	2690
111	113,114	52	0	0	0	31	0	9	11	2	0	5	105	5	110
112	113,114		0	0	0	0	0	0	0	0	1089	25	0	1114	1114
113	121,122	36	0	0	41	6	0	6	42	4	0	124	135	124	259
114	113,114	22	0	0	17	4	0	9	0	6	124	40	58	164	222
115	113	28	0	0	0	16	0	0	0	0	0	0	44	0	44
116	113	0	0	0	62	5	0	0	11	7	0	165	85	165	250
Total Zone 11		138	0	0	120	62	0	24	64	19	1213	359	427	1572	1999
121	112,115,116	19	0	0	92	87	0	0	51	9	0	245	258	245	503
122	112,115,116	3	0	0	46	223	0	0	0	4	0	65	276	65	341
123	112	0	0	0	114	4	0	0	6	2	0	23	126	23	149
124	112	0	0	0	45	1	0	0	33	1	0	120	80	120	200
Total Zone 12		22	0	0	297	315	0	0	90	16	0	453	740	453	1193

TABLE 1: PARKING SPACE INVENTORY IN H.K. ISLAND, December, 1975. (Cont'd)

TTSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri.Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
131	111,141	0	0	0	10	6	0	10	0	1	0	531	27	531	558
132	111	0	0	0	47	108	0	0	14	7	40	24	176	64	240
Total Zone 13		0	0	0	57	114	0	10	14	8	40	555	203	595	798
211	122,142	0	0	0	41	3	0	0	30	1	0	3869	75	3869	3944
212	112,141	0	0	0	62	0	0	0	0	1	0	2044	63	2044	2107
213	142	0	0	0	16	0	0	0	0	0	0	231	16	231	247
Total Zone 21		0	0	0	119	3	0	0	30	2	0	6144	154	6144	6298
231	124,142,143 182	0	0	0	47	0	0	0	0	0	108	2424	47	2532	2579
Total Zone 23		0	0	0	47	0	0	0	0	0	108	2424	47	2532	2579
251	140,184		0	0	0	0	0	0	0	0	24	1319	0	1343	1343
Total Zone 25		0	0	0	0	0	0	0	0	0	24	1319	0	1343	1343
261	140,184	0	0	0	25	0	0	0	0	0	30	1018	25	1048	1073
Total Zone 26		0	0	0	25	0	0	0	0	0	30	1018	25	1048	1073
271	132,144	147	0	0	30	0	0	0	17	0	351	790	194	1141	1335
272	144,190	332	0	0	28	0	3	0	79	2	0	1537	444	1537	1981
Total Zone 27		479	0	0	58	0	3	0	96	2	351	2327	638	2678	3316

TABLE 1: PARKING SPACE INVENTORY IN H.K. ISLAND, December, 1975. (Cont'd)

TTSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri. Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
281	144,145	45	0	0	0	0	0	0	29	1	317	1034	75	1351	1426
Total Zone 28		45	0	0	0	0	0	0	29	1	317	1034	75	1351	1426
291	145,148	25	0	0	135	1	10	0	0	0	38	258	171	296	467
292	190 145,149	0	0	0	0	0	0	0	0	0	0	2107	0	2107	2107
Total Zone 29		25	0	0	135	1	10	0	0	0	38	2365	171	2403	2574
311	124,131, 132	463	0	0	0	16	17	0	85	2	0	288	583	288	871
312	131,	69	0	0	51	18	0	0	23	3	33	125	164	158	322
313	134	100	0	0	32	2	6	0	51	0	15	57	191	72	263
Total Zone 31		632	0	0	83	26	23	0	159	5	48	470	938	518	1456
321	131,132 133,146	347	0	0	33	23	10	13	145	1	0	121	572	121	693
322	132	101	0	0	0	0	0	0	8	0	300	155	109	455	564
323	132	43	0	0	0	0	4	0	22	1	0	22	70	22	92
324	135,146	34	0	0	0	0	0	0	0	0	166	62	34	228	262
Total Zone 32		525	0	0	33	23	14	13	175	2	466	360	785	826	1611
331	146	328	0	0	0	15	13	4	114	2	204	43	476	247	723
332	145,146 147,151	197	0	0	8	4	9	0	116	1	1086	425	335	1511	1846
Total Zone 33		525	0	0	8	19	22	4	230	3	1290	468	811	1758	2569
341	147,151	101	0	0	47	3	9	8	66	2	275	767	236	1042	1278
342	153	298	0	0	120	39	6	36	130	5	113	1303	634	1416	2050
343	154	104	0	0	10	26	2	0	31	2	34	530	175	564	739
344	151	69	0	0	0	14	0	0	0	0	0	875	83	875	958

TABLE 1: PARKING SPACE INVENTORY IN H.K. ISLAND, December, 1975. (Cont'd)

TTSD Sub- Zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri. Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
345	153	16	0	0	0	0	0	0	0	0	0	13	16	13	29
346	154	74	0	0	0	0	0	0	0	11	0	105	85	105	190
347	152,154	38	0	0	48	0	0	0	0	0	0	2373	86	2373	2459
Total	Zone 34	700	0	0	225	82	17	44	227	20	422	5966	1315	6388	7703
351	154,156,161	34	0	0	0	0	0	0	13	0	0	153	47	153	200
352	155	32	0	0	23	10	0	0	0	1	8	1647	66	1655	1721
Total	Zone 35	66	0	0	23	10	0	0	13	1	8	1800	113	1808	1921
361	161	0	0	0	188	16	0	26	55	7	55	234	292	289	581
362	155,161	0	0	0	6	9	0	14	38	19	0	170	86	170	256
Total	Zone 36	0	0	0	194	25	0	40	93	26	55	404	378	459	837
412	172	0	0	0	0	0	0	0	0	0	104	793	0	897	897
Total	Zone 41	0	0	0	0	0	0	0	0	0	104	793	0	897	897
421	173,175	0	0	0	395	47	12	48	58	1	813	1076	561	1889	2450
Total	Zone 42	0	0	0	395	47	12	48	58	1	813	1076	561	1889	2450
451	163	0	0	0	168	87	3	0	8	18	109	316	284	425	709
454	163,162	0	0	0	80	0	0	0	0	0	0	18	80	18	98
Total	Zone 45	0	0	0	248	87	3	0	8	18	109	334	364	443	807
Grand	Total	3270	0	0	2067	827	142	193	1476	134	8938	31106	8109	40044	48153

TABLE 2: PARKING SPACE INVENTORY IN KOWLOON AND NEW KOWLOON, December, 1975.

TTSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri.Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
511	211	157	27	6	0	0	17	0	36	2	68	230	245	298	543
512	211	0	0	0	0	0	0	0	0	0	1399	96	0	1495	1495
513	211	4	29	0	0	0	0	0	19	0	25	243	52	268	320
Total	Zone 51	161	56	6	0	0	17	0	55	2	1492	569	297	2061	2358
521	212, 214	125	3	2	0	0	0	0	12	1	910	72	143	985	1128
522	212, 214	488	6	14	6	0	10	0	88	2	0	168	614	168	782
523	213, 214	0	0	0	0	10	0	0	0	4	0	43	14	43	57
Total	Zone 52	613	9	16	6	10	10	0	100	7	910	286	771	1196	1967
531	212	15	0	0	0	0	6	0	0	0	0	109	21	109	130
532	226	10	0	0	0	0	0	0	8	0	16	810	18	826	844
Total	Zone 53	25	0	0	0	0	6	0	8	0	16	919	39	935	974
541	211, 225, 226	733	60	0	0	6	7	48	69	2	31	8	925	39	964
542	211, 225	95	0	0	4	0	0	0	0	1	105	301	100	406	506
543	225, 226	203	62	0	5	0	13	0	103	9	487	114	395	601	996
544	212	140	4	0	0	0	0	0	0	0	0	160	144	160	304
Total	Zone 54	1171	126	0	9	6	20	48	172	12	623	583	1564	1206	2770
551	223, 224, 225, 226	366	29	0	2	7	0	11	87	4	486	353	506	839	1345
552	222, 223, 224	658	33	0	0	0	6	14	132	2	88	91	845	179	1024
553	221, 222	459	0	0	117	58	7	34	220	5	1040	403	900	1443	2343

TABLE 2: PARKING SPACE INVENTORY IN KOWLOON AND NEW KOWLOON, December, 1975. (Cont'd)

TTSD Sub- zone	GOPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri. Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
554	223	0	0	0	0	0	0	0	0	0	35	0	0	35	35
Total	Zone 55	1483	62	0	119	65	13	59	439	11	1649	847	2251	2496	4747
561	221	125	434	0	45	63	0	0	128	10	193	352	805	545	1350
Total	Zone 56	125	434	0	45	63	0	0	128	10	193	352	805	545	1350
611	236	31	0	0	42	0	0	0	0	1	269	896	74	1165	1239
Total	Zone 61	31	0	0	42	0	0	0	0	1	269	896	74	1165	1239
621	232, 235, 236	213	0	0	188	0	0	0	53	1	0	4003	455	4003	4458
622	233, 234	61	0	0	84	0	2	0	0	2	54	1939	149	1993	2142
Total	Zone 62	274	0	0	272	0	2	0	53	3	54	5942	604	5996	6600
631	213, 243 244, 245	509	16	0	0	24	0	0	219	7	1090	451	775	1541	2316
632	245	23	0	0	0	0	0	9	10	0	0	128	42	128	170
633	243, 244	17	0	0	22	5	5	0	0	0	0	372	49	372	421
Total	Zone 63	549	16	0	22	29	5	9	229	7	1090	951	866	2041	2907
641	243, 241, 242	794	47	0	0	0	0	0	183	11	0	669	1035	669	1704
642	242, 244	172	141	0	7	7	0	0	47	3	104	390	377	494	871
643	242	121	100	0	0	0	0	6	28	2	0	503	257	503	760
Total	Zone 64	1087	288	0	7	7	0	6	258	16	104	1562	1669	1666	3335
711	265, 266, 267	0	0	0	187	105	15	36	55	21	0	43	419	43	462
712	265, 266, 267	0	0	0	472	110	0	12	173	4	78	8	771	86	857

TABLE 2: PARKING SPACE INVENTORY IN KOWLOON AND NEW KOWLOON, December, 1975. (Cont'd)

TMSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri. Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
713	262-268	0	0	0	465	44	0	8	53	3	0	204	573	204	777
714	263	0	0	0	118	16	0	4	32	13	0	124	188	124	305
715	263	0	0	0	8	0	0	0	0	0	161	26	8	187	195
Total	Zone 71	0	0	0	1250	275	15	60	313	39	239	405	1952	644	2596
721	268	0	0	0	429	4	0	0	0	3	0	414	435	414	850
722	267, 268	0	0	0	82	10	0	0	11	0	0	56	103	56	159
723	263	0	0	0	0	0	0	0	0	0	100	57	0	157	157
Total	Zone 72	0	0	0	511	14	0	0	11	3	100	527	539	627	1166
731	264	0	0	0	114	38	5	3	19	4	140	168	183	308	491
732	262	0	0	0	135	32	0	0	65	4	34	72	236	106	342
733	256, 261, 262, 264	0	0	0	256	219	0	48	49	4	47	614	576	661	1237
734	264	0	0	0	0	18	0	0	0	0	0	258	18	258	276
735	262	0	0	0	0	0	0	0	0	0	0	6	0	6	6
Total	Zone 73	0	0	0	505	307	5	51	133	12	221	1118	1013	1339	2352
741	255	0	0	0	0	0	0	0	0	0	0	4223	0	4223	4223
742	251, 253	0	0	0	0	0	0	0	0	0	32	520	0	552	552
Total	Zone 74	0	0	0	0	0	0	0	0	0	32	4743	0	4775	4775
811	231, 233 271, 272	0	0	0	545	20	0	0	89	4	40	2702	658	2742	3400
812	271, 272	0	0	0	189	0	0	0	45	1	0	207	235	207	442
813	271, 272, 282	0	0	0	197	0	0	0	0	0	0	3360	197	3360	3557
Total	Zone 81	0	0	0	931	20	0	0	134	5	40	6269	1090	6309	7399

TABLE 2: PARKING SPACE INVENTORY IN KOWLOON AND NEW KOWLOON, December, 1975. (Cont'd)

TSSD	Sub-zone	COPD	Tertiary	Date	ON-STREET					OFF-STREET					TOTAL	
					Metered			Designated		Other	Public	Private	One	Off-Street		
					P.S. Bus	P/C	G/V	Taxi	P.L.B.						M/C	
821		233,234,271	1A7	0	0	389	44	8	11	88	4	0	889	733	680	1,391
822		283,285	0	0	0	39	5	0	3	446	84	47	530	577	783	1,391
823		281,283	0	0	0	214	56	0	27	48	0	345	438	783	1,391	1,391
824		284	127	0	0	159	4	4	3	140	1	424	1,460	1,684	1,684	1,684
825		272,282	0	0	0	41	21	0	10	30	0	102	281	383	383	383
Total Zone 62					274	0	683	285	12	71	8	1,243	2,145	1,689	3,389	5,018
831		234,285	0	0	0	0	0	0	0	0	0	703	1,203	1,203	1,203	1,203
832		295	0	0	0	0	0	0	0	0	0	175	175	175	175	175
Total Zone 83					0	0	0	0	0	0	0	878	1,378	1,378	1,378	1,378
841		281,282	0	0	0	11	4	4	10	331	56	30	387	417	485	417
842		287	0	0	0	9	5	0	6	413	52	20	465	485	485	485
843		281	0	0	0	0	0	0	0	480	43	0	523	523	523	523
844		289	0	0	0	0	0	0	0	0	11	0	523	523	523	523
845		281	0	0	0	0	10	0	0	20	74	10	94	104	104	104
Total Zone 84					0	0	20	19	4	6	10	1	1,244	2,36	1,480	1,540
851		291,295	0	0	0	73	19	0	0	252	730	92	982	1,074	1,074	1,074
852		294	142	0	0	347	50	8	82	114	3	150	3054	3,800	3,800	3,800
853		292,293,296,297	0	0	0	0	0	0	0	0	16	0	746	800	800	800

TABLE 2: PARKING SPACE INVENTORY IN KOWLOON AND NEW KOWLOON, December, 1975. (Cont'd)

TTSD Sub- zone	COPD Tertiary Unit	ON-STREET									OFF-STREET		TOTAL		
		Metered			Designated						Public	Private	On- Street	Off- Street	Overall
		U/C	G/V	Pri.Bus	P/C	G/V	Taxi	P.L.B.	M/C	Others					
854	294,297	0	0	0	80	13	0	6	0	3	375	283	102	658	760
855	293	0	0	0	0	0	0	0	0	0	207	140	0	347	347
856	294	0	0	0	16	0	0	0	12	0	155	1204	28	1359	1387
857	295	0	0	0	305	449	0	0	66	2	214	1368	822	1582	2404
858	294	0	0	0	65	0	0	0	0	4	95	95	69	190	259
859	298	0	0	0	10	0	3	6	0	0	294	171	19	465	484
Total	Zone 85	142	0	0	896	531	11	94	192	12	1793	6911	1878	8704	10582
Grand	Total	5935	991	22	5318	1631	120	404	2531	149	11812	36140	17101	47952	65053

TABLE 3: PARKING INVENTORY IN HONG KONG ISLAND - DECEMBER, 1975
SUMMARY BY DISTRICT (PRIMARY ZONE) AND PARKING TYPE

Type of Parking		Parking Spaces										Total Urban Area	
		Central District Zone 0		Western District Zone 1		Mid-levels & Peak Zone 2		Eastern District Zone 3		Wah Fu Estate & Aberdeen Zone 4			
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Metered	<u>On-Street</u>												
	30-min (new rate)	21	0.40	0	0	31	0.17	129	0.80	0	0	181	0.38
	30-min (new rate) (For Private Bus)	0	0	0	0	0	0	0	0	0	0	0	0
	1-hr.	0	0	0	0	0	0	0	0	0	0	0	0
	2-hr. (old rate)	0	0	0	0	0	0	0	0	0	0	0	0
	2-hr. (max. rate)	86	1.62	34	0.85	296	1.59	1157	7.19	0	0	1573	3.27
	2-hr. (min. rate)	6	0.11	126	3.16	222	1.19	1162	7.22	0	0	1516	3.15
	2-hr. (old rate) (For Goods Vehicle)	0	0	0	0	0	0	0	0	0	0	0	0
4-hr.	0	0	0	0	0	0	0	0	0	0	0	0	
Designated	Passenger Car	0	0	474	11.88	384	2.06	566	3.52	643	15.48	2067	4.29
	Goods Vehicle	3	0.06	491	12.31	4	0.02	195	1.21	134	3.23	827	1.72
	Taxi	38	0.71	0	0	13	0.07	76	0.47	15	0.36	142	0.29
	P.L.B.	10	0.19	34	0.85	0	0	101	0.63	48	1.16	193	0.40
	Motor Cycle	190	3.58	168	4.21	155	0.83	897	5.57	66	1.58	1476	3.07
	Other	10	0.19	43	1.08	5	0.03	57	0.35	19	0.46	134	0.27
Total On-Street		364	6.86	1370	34.34	1110	5.96	4340	26.96	925	22.27	8109	16.84

TABLE 3: PARKING INVENTORY IN HONG KONG ISLAND - DECEMBER, 1975
SUMMARY BY DISTRICT (PRIMARY ZONE) AND PARKING TYPE
(Cont'd)

Type of Parking		Parking Spaces											
		Central District		Western District		Mid-levels & Peak Zone 2		Eastern District		Wah Fu Estate & Aberdeen Zone 4		Total Urban Area	
		Zone 0		Zone 1		Zone 2		Zone 3		Zone 4		No.	%
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Public	Off-street												
	Garage	2340	44.13	1017	25.49	400	2.15	1364	8.47	0	0	5121	10.64
	Lot	1162	21.91	236	5.91	468	2.52	925	5.75	1026	24.70	3817	7.93
Private	Garage	596	11.24	428	10.73	12221	65.67	5708	35.46	1167	28.09	20120	41.78
	Lot	841	15.86	939	23.53	4410	23.70	3760	23.36	1036	24.94	10986	22.81
Total Off-Street		4939	93.14	2620	65.66	17499	94.04	11757	73.04	3229	77.73	40044	83.16
Grand Total		5303	100	3990	100	18609	100	16097	100	4154	100	48153	100

TABLE 4: PARKING INVENTORY IN KOWLOON AND NEW KOWLOON - DECEMBER, 1975
SUMMARY BY DISTRICT (PRIMARY ZONE) & PARKING TYPE

Type of Parking		Parking Spaces									
		SW Kowloon Zone 5		SE Kowloon Zone 6		NW Kowloon Zone 7		NE Kowloon Zone 8		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%
Metered	<u>On-Street</u>										
	30-min (new rate)	158	1.12	48	0.34	0	0	0	0	206	0.32
	30-min (new rate) (For Public Bus)	22	0.16	0	0	0	0	0	0	22	0.03
	1-hr.	33	0.23	19	0.13	0	0	50	0.19	102	0.16
	2-hr. (old rate)	58	0.41	153	1.09	0	0	349	1.35	560	0.86
	2-hr. (max. rate)	2635	18.60	660	4.69	0	0	0	0	3295	5.07
	2-hr. (min. rate)	694	4.90	989	7.02	0	0	6	0.02	1689	2.60
	2-hr. (old rate) (For Goods Vehicles)	687	4.85	304	2.16	0	0	0	0	991	1.52
	4-hr.	0	0	72	0.51	0	0	11	0.04	83	0.13
Designated	Passenger Car	179	1.26	343	2.44	2266	20.81	2530	9.76	5318	8.17
	Goods Vehicle	144	1.01	36	0.26	596	5.47	855	3.30	1631	2.51
	Taxi	66	0.46	7	0.05	20	0.18	27	0.11	120	0.18
	P.L.B.	107	0.76	15	0.11	111	1.02	171	0.66	404	0.62
	Motor Cycle	902	6.37	540	3.83	457	4.20	632	2.44	2531	3.89
	Other	42	0.30	27	0.19	54	0.50	26	0.10	149	0.23
Total	On-Street	5727	40.43	3213	22.82	3504	32.18	4657	17.97	17101	26.29

TABLE 4: PARKING INVENTORY IN KOWLOON AND NEW KOWLOON - DECEMBER, 1975
SUMMARY BY DISTRICT (PRIMARY ZONE) AND PARKING TYPE (Cont'd)

Type of Parking		Parking Spaces									
		SW Kowloon Zone 5		SE Kowloon Zone 6		NW Kowloon Zone 7		NE Kowloon Zone 8		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%
Public	<u>Off-Street</u>										
	Garage	4291	30.29	1050	7.45	0	0	514	1.98	5855	9.00
	Lot	592	4.18	467	3.32	592	5.44	4306	16.62	5957	9.16
Private	Garage	1185	8.36	5437	38.61	4051	37.20	9422	36.35	20095	30.89
	Lot	2371	16.74	3914	27.80	2742	25.18	7018	27.08	16045	24.66
Total	<u>Off-Street</u>	8439	59.57	10868	77.18	7385	67.82	21260	82.03	47952	73.71
Grand	Total	14166	100	14081	100	10889	100	25917	100	65053	100

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC
HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
021	123	21	767		2.00	2.00	4.00	8.00	20.00	27.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr. Weekdays 1800-0800 hr. Saturdays 1200-2400 hr. Sundays & Holidays
					0.50	0.50	1.00	2.00	5.00				
022	123	01	432		2.00	2.00	4.00	8.00	20.00	27.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr. Weekdays 1800-0800 hr. Saturdays 1200-2400 hr. Sundays & Holidays
					0.50	0.50	1.00	2.00	5.00				
			194		1.50	1.50	3.00	6.00	15.00	22.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr. Weekdays 1800-0800 hr. Saturdays 0800-1200 hr. Sundays & Holidays
					0.50	0.50	1.00	2.00	5.00				
031	124	03		85	0.50	1.00	2.00	-	-	-	-	(Max. Rate) 2-hr. meter	0800-2400 hr.
				16	1.00	-	-	-	-	-	(New Rate) 1/2-hr. meter	0800-2400 hr.	
				12	1.00	-	-	-	-	-	(New Rate) 1/4-hr. Pri. Bus meter	0800-2400 hr. (For Private Bus)	

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
031	124	03	912	403	5.00	5.00	5.00	5.00	10.00	10.00*	400	Ticket	Weekdays & Saturdays 0800-1900 hr.
					1.50	1.50	3.00	6.00	15.00	22.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr.
					0.50	0.50	1.00	2.00	5.00			Ticket	Weekdays 1800-0800 hr. Saturdays 1200-2400 hr. Sundays & Holidays
031	124	07		415	5.00	5.00	5.00	5.00	10.00	10.00*	400	Ticket	Weekdays & Saturdays 0800-1900 hr.
112	114	01	905		1.50	1.50	3.00	6.00	15.00	22.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr.
					0.50	0.50	1.00	2.00	5.00				

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
112	114	02		93	0.50	1.00	2.00	-	-	-	-	(Max. Rate) 2-hr. meter	0800-2400 hr.
114	114	27	112	-	-	-	-	-	-	-	300 (large Vehicle)	Ticket	Whole Day
				-	-	-	-	-	-	-	250 (Small Vehicle)		
				-	-	-	-	-	-	-	400 (Double Spaces)		
231	124	05		47	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.
231	143	01		51	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
251	140	01		8	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr meter	0800-2400 hr.
271	144	02		9	0.50	0.50	1.00	-	-	-	-	(Min Rate) 2-hr meter	0800-2400 hr.
271	144	03		33	0.50	0.50	1.00	-	-	-	-	(Min Rate) 2-hr meter	0800-2400 hr.
271	144	04	203		2.00	2.00	2.00	4.00	10.00	24.00*	350 (reserved) 240 (non-reserved) 95 (taxi) 170 (Parking Period 0800-1800)	Ticket	Whole Day Whole Day Whole Day 0800-1800

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of	Class of Vehicle Hours
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month	Fee Collection	in which Charge Applicable
271	144	18	96		-	-	-	-	-	-	300	Ticket	Whole day
281	144	07	104		1.00	1.00	2.00	4.00	10.00	24.00*	-	Ticket	Whole day
312	131	53		27	0.50	0.50	1.00	-	-	-	-	(Min Rate) 2-hr meter	0800-2400 hr.
313	134	01		15	0.50	0.50	1.00	-	-	-	-	(Min Rate) 2-hr meter	0800-2400 hr
322	132	27	300		1.50	1.50	3.00	6.00	15.00	36.00*	350	Ticket	Whole day
324	135	01		79	0.50	0.50	1.00	-	-	-	-	(Min Rate) 2-hr meter	0800-2400 hr.

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
331	146	24	204		2.00	2.00	4.00	8.00	20.00	48.00*	400 (whole day) 250 (0900-1700) 100 (Govt. servant 0900-1700)	Ticket	Whole day 0900-1700 hr. 0900-1700 hr.
332	146	10	800		2.00	2.00	4.00	8.00	20.00	48.00*	300 500 (fixed space)	Ticket	Whole day
332	146	13	90		2.00	2.00	4.00	8.00	20.00	48.00*	300 500 (fixed space)	Ticket	Whole day

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
332	146	14		36	0.50	1.00	2.00	-	-	-	-	(Max. Rate) 2-hr. meter	0800-2400 hr.
332	147	02		108	0.50	1.00	2.00	-	-	-	-	(Max. Rate) 2-hr. meter	0800-2400 hr.
332	151	33		25	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.
341	151	20	101		1.50	1.50	2.50	4.50	10.50	24.50*	180	Ticket	whole day
				169	1.50	1.50	2.50	4.50	10.50	24.50*	200		

* includes overnight charge

TABLE 5: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

HONG KONG ISLAND URBAN AREAS

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
341	151	32		5	0.50	1.00	2.00	-	-	-	-	(Max. Rate) 2-hr. meter	0800-2400 hr.
342	153	06		31	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.
				16	0.50	1.00	2.00	-	-	-	(Max. Rate) 2-hr meter		
343	154	13		25	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr meter	0800-2400 hr.
				9	1.00	-	-	-	-	-	(New Rate) $\frac{1}{2}$ -hr meter		
421	173	65		63	1.50	1.50	3.00	6.00	15.00	36.00*	150	Ticket	Private Car Only
					5.00	5.00	10.00	20.00	50.00	120.00*	-		Goods Vehicle private bus
TOTAL			5389	1611									

* includes overnight charge

TABLE 6: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC

KOWLOON AND NEW KOWLOON

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
511	211	25		12	1.00	-	-	-	-	-	-	(New Rate) ½-hr Pri. Bus Meter	0800-2400 hr. (For Private Bus Only)
511	211	31		5	1.00	-	-	-	-	-	-	(New Rate) ½-hr meter	0800-2400 hr.
512	211	21	1399		2.00	2.00	4.00	8.00	20.00	27.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr.
					0.50	0.50	1.00	2.00	5.00				Weekdays 1800-0800 hr. Saturdays 1200-2400 hr. Sundays & Holidays
521	214	10	910		2.00	2.00	4.00	8.00	20.00	27.00*	400	Ticket	Weekdays 0800-1800 hr. Saturdays 0800-1200 hr.
					0.50	0.50	1.00	2.00	5.00				Weekdays 1800-0800 hr. Saturdays 1200-2400 hr. Sundays & Holidays
542	225	72		63	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.
543	225	07		71	0.20	0.30	0.50	1.00	2.50	-	-	(Old Rate) 2-hr. G.V. meter	0800-2400 hr.

TABLE 6: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

KOWLOON AND NEW KOWLOON

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
543	225	32	326		1.50	1.50	3.00	6.00	15.00	22.00*	400	Ticket	Weekdays 0800-1800 Saturdays 0800-1200
					0.50	0.50	1.00	2.00	5.00	Weekdays 1800-0800 Saturdays 1200-2400 Sundays & Holidays			
551	224	26	486		1.50	1.50	3.00	6.00	15.00	31.00*	300	Ticket	0700-2100 hr. 2100-0700 hr.
					1.00	1.00	2.00	4.00	10.00				
552	224	06	88		2.00	2.00	2.00	4.00	10.00	27.50*	300-400	Ticket	0100-1800 hr. 1800-0100 hr.
					3.00	3.00	3.00	6.00	15.00				

* includes overnight charge

TABLE 6: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

KOWLOON AND NEW KOWLOON



Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
553	221	39	40		2.00	2.00	4.00	8.00	20.00	36.00*	400	Ticket	0600-1800 hr.
					1.00	1.00	2.00	4.00	10.00	1800-0600 hr.			
553	221	71	1000		1.00	1.00	2.00	4.00	10.00	19.00*	180	Ticket	0700-2100 hr.
					0.50	0.50	1.00	2.00	5.00	2100-0700 hr.			
561	221	95		60	0.20	0.30	0.50	1.00	2.50	-	-	(Old Rate)	0800-2400 hr. (For G.V. only)
				109	5.00	5.00	5.00	5.00	10.00	10.00	400	2-hr G.V. meter	Weekdays & Saturdays 0800-1900 hr.

* includes overnight charge

TABLE 6: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

KOWLOON AND NEW KOWLOON

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	CENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
611	236	16		90	0.50	0.50	1.00	2.00	5.00	12.00*	110-150	Ticket	Private Car
				12	0.70	0.70	1.40	2.80	7.00	16.80*	110-150		Light Goods Vehicle
				13	1.00	1.00	2.00	4.00	10.00	24.00*	200-330		Heavy G.V./Light Bus
622	234	17		40	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr. meter	0800-2400 hr.
631	213	01	1050		1.00	1.00	2.00	4.00	10.00	17.00*	400	Ticket	Weekdays 0800-1800 Saturdays 0800-1200
					0.50	0.50	1.00	2.00	5.00				Weekdays 1800-0800 Saturdays 1200-2400 Sundays & Holidays
642	242	36		98	0.50	0.50	1.00	-	-	-	-	(Min. Rate) 2-hr meter	0800-2400 hr.

* includes overnight charge



TABLE 6: OFF-STREET PARKING CHARGE AND METHOD OF FEE COLLECTION
IN PARKING FACILITIES OPEN TO THE PUBLIC (Cont'd)

KOWLOON AND NEW KOWLOON

Block Designation			No. of Spaces		Parking Charge \$							Method of Fee Collection	Class of Vehicle Hours in which Charge Applicable
TTSD	COPT	GENSUS	Garage	Lot	30 min	1 hr	2 hrs	4 hrs	10 hrs	All Day	Month		
824	284	13	450		2.00	2.00	2.00	4.00	10.00	24.00*	200	Ticket	Whole day
824	284	23		84	0.20	0.30	0.50	-	-	-	-	(Old rate) 2-hr meter	0800-2400 hr.
831	286	02		500	1.50	1.50	3.00	9.00	29.00	85.00*	-	Ticket	whole day
851	291	02		36	2.00	2.00	4.00	8.00	20.00	-	50-70 80-120	Ticket	whole day
			64										
852	294	02		16	0.20	0.30	0.50	-	-	-	-	(Old Rate) 2 hr. meter	0800-2400 hr.
852	294	38		5	0.30	0.50	-	-	-	-	-	1 hr. meter	0800-2400 hr.
TOTAL			5813	1214									

* includes overnight charge

TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

- 1 SEP 1976

Data Record No. 284



Tram Travel Time and Delay Study
in the
Central District

Job No. 28

by

YAU Loi-hay

Chief Engineer: K.T. Kuo

July 1976

Requested by: Commissioner for Transport

Purpose of Survey: To study the cause of the low tram journey speeds on Des Voeux Road Central between Gilman Street and Pedder Street, identified in Technical Report 220 as one of the seven locations where speeds were slower than 8 km/h (5 m.p.h.). To also examine what measures could be taken to improve tram speeds at this location.

Nature of Survey: The survey was designed to cover the morning and evening peak periods and two off-peak periods. Site observations indicated that these would best be represented by the periods 0800-1000, 1100-1300, 1400-1600 and 1700-1900 hours.

The survey area covered the eastbound carriageway of Des Voeux Road Central between Tram Stop 15 and Pedder Street and the westbound carriageway between Pedder Street and Tram Stop 137 as indicated in FIG. 1. The movement of every tram that ran on these sections during the selected hours of study was observed from observation points along the footwalk. The time duration and reason for each tram being stopped was recorded. The time at which each tram passed predetermined check points was observed from which the journey time and speed could be computed.

Vehicular turning movements at the Des Voeux Road/Douglas Street junction (uncontrolled) and vehicle queues at this junction and at the traffic light signals at Pedder Street junction were observed for comparison with tram delays. Because of staff limitation

turning movements were not observed at the other junctions.

Observations were made of the utilisation of the group of bus stops between Pottinger Street and Douglas Street and its effect on tram delays.

Site Characteristics:

The junction of Des Voeux Road Central and Pedder Street forms the hub of vehicular and pedestrian movement in Central District. The heavy flow of vehicles on Pedder Street and Des Voeux Road Central and the high pedestrian volumes that cross these roads imposes a heavy demand on the capacity of this junction to accommodate all movements. Time-sharing by traffic light signals minimises pedestrian and vehicular conflict. However, because of the high vehicular and pedestrian flows considerable delay is experienced.

Des Voeux Road Central west of Pedder Street permits two directional vehicular flow. The 17 m (56 ft.) carriageway is divided into three sub-standard traffic lanes in each direction the outer lane being shared with the tram track. The 1.53 m (5 ft.) sheltered tram islands at Stops 15, 16, 136 and 137 reduce the carriageway width at these locations to two traffic lanes in one direction. Between Pedder Street and Jubilee Street, clearway restrictions are imposed in both directions from 0700 to 1000 hour and 1600 to 1900 hour. Public light buses are prohibited from using Des Voeux Road Central.

Traffic light signals are installed at the junctions with Jubilee Street, Queen Victoria Street and Pottinger Street, which cross Des Voeux Road Central. The T-junction at Douglas Street is uncontrolled. Jubilee Street and Queen Victoria Street junctions

are designated box-junctions to prevent junction blockage.

Vehicles turning right from Des Voeux Road eastbound into Jubilee Street need wait in the outer lane for a gap in westbound traffic and could therefore delay trams during the green periods. At Queen Victoria Street junction the signal phasing is such that vehicles right turning into Des Voeux Road would not interfere with tram movements in the green period. At the uncontrolled junction at Douglas Street vehicles right turning from Des Voeux Road westbound could delay trams in both directions; Pottinger Street southbound from Connaught Road Central is for buses only with left turning movement into Des Voeux Road. Pottinger Street northbound from Queen's Road Central permits right turning movement into Des Voeux Road Central. The turning movements at this junction do not interfere with tram movements in the green period.

Two bus stops serving cross harbour Routes 101, 104, 105, and 111 are located on the eastbound carriageway of Des voeux Road Central between Queen Victoria Street and Pottinger Street. Three bus stops serving CMB Routes 5, 5A, 5B, 10, 11, 17 and 25 are located between Pottinger Street and Douglas Street. On the westbound carriageway two bus stops serving Routes 5A, 5B, 10, 101, 104, 105 and 111 are located between Theatre Lane and Chiu Lung Street.

The site conditions at the time of survey are shown in FIG. 1.

The Results:

Traffic volumes at the junction of Des Voeux Road Central and Douglas Street are shown in TABLE 1. Eastbound vehicle volumes were generally about three times the westbound volumes probably because of the additional facility available for westbound traffic along Queen's Road Central. West of Douglas Street the average hourly vehicle volume excluding trams was about 660 eastbound and 200 westbound. Tram volumes were fairly balanced in the two directions with an average hourly flow of 84 eastbound and 86 westbound. About 67% of the eastbound vehicular traffic consisted of private cars, taxis and hire cars while in the opposite direction only 33% of the traffic stream was composed of these vehicles, the rest being buses, trams and goods vehicles. Right turning movements from Des Voeux Road Central westbound to Douglas Street were heavy during the off-peak period between 1100 and 1600 hours, nearly half the westbound vehicles between 1500 and 1600 hours, right turning into Douglas Street.

Although the proportion of buses in the westbound traffic stream was high, due to the larger eastbound vehicular flow the average number of eastbound buses per hour was about twice the number westbound. Eastbound bus headways ranged from about 33 seconds during the evening peak between 1800 and 1900 hours to about 51 seconds at midday between 1200 and 1300 hours. During the same periods the westbound headways were 49 seconds and 60 seconds respectively. Due to the short headways the eastbound inner traffic lane was invariably occupied by buses. Some 44 buses were observed stopping each hour to board and alight passengers at the 3 bus stops between Pottinger Street and Douglas

Street. As a result, the inner traffic lane was not available to other traffic for about 23 seconds in each minute. Also, buses and other vehicles overtaking buses that were stopped at the bus stops often cut into the other traffic lanes interfering with both vehicular and tram movements. Eastbound traffic lanes were congested particularly during the off-peak periods when clearway restriction was relaxed as could be seen from the large vehicle queues on the approaches to the Douglas Street and Pedder Street junctions as indicated in TABLE 2. During this period the average eastbound vehicle on the Des Voeux Road approach to Pedder Street junction was delayed by more than a minute with the delay on the approach to Douglas Street junction being slightly less. Traffic delays were considerably smaller between 0800 and 0900 hours and between 1800 and 1900 hours particularly on the approach to Douglas Street junction. The clearway restriction imposed between 0700 and 1000 hours and 1600 and 1900 hours could probably be the reason for the lesser level of congestion experienced during these periods.

The sectional average tram journey time and speed during each hour of observation is shown in TABLE 3. The average tram stopped time delay classified by the cause of delay is shown in TABLES 4A to 4I.

Eastbound trams maintained an average all period (0800-1900 hours) journey speed of 6.48 km/h (4.03 m.p.h.) between Stops 15 and 16 and a speed of 6.32 km/h (3.93 m.p.h.) between Stop 16 and Pedder Street junction. Journey speed was highest between 0800 and 0900 hours and lowest between 1500 and 1600 hours, at which times average speeds of

10 km/h (6.21 m.p.h.) and 4.23 km/h (2.63 m.p.h.) respectively were maintained between Stops 15 and 16. The average journey speed maintained during the same hours between Stop 16 and Pedder Street junction was 8.28 km/h (5.14 m.p.h.) and 5.22 km/h (3.24 m.p.h.) respectively. Apart from the period 0800-0900 hours, average eastbound tram journey speeds were generally below 8 km/h (5 m.p.h.).

Higher journey speeds were maintained by westbound trams particularly between Stops 136 and 137. The average all period (0800-1900 hours) journey speed between Pedder Street junction and Stop 136 was 8.89 km/h (5.52 m.p.h.) while that between Stops 136 and 137 was 9.44 km/h (5.87 m.p.h.). Although journey speeds were again fastest during 0800-0900 hours, equally high speeds were observed in the evening during 1700-1900 hours. Between Pedder Street junction and Stop 136 the average speed dropped to 4.59 km/h (2.85 m.p.h.) between 1500 and 1600 hours. However, between Stops 136 and 137 the average journey speed during each hour of observation exceeded 8 km/h (5 m.p.h.), the lowest being 8.42 km/h (5.23 m.p.h.) between 1100 and 1200 hours. The low speed of 4.59 km/h (2.85 m.p.h.) observed between Pedder Street and Stop 136 during 1500-1600 hours was due to the large number of vehicles which turned right into Douglas Street during the hour delaying westbound trams by standing on the tram track, waiting for an opportunity to turn.

In TABLE 3 tram running speeds are shown within brackets alongside each journey speed. A large difference between the journey speed and the corresponding running speed would indicate that tram delay is essentially a stopped time delay which has been quantified. When journey speed is slow, a small difference

between journey speed and running speed would indicate that the larger portion of the delay is due to the slow movement of trams resulting from traffic congestion and other vehicular interference which does not necessarily halt the tram, and has therefore not been quantified. This characteristic is particularly noticeable for eastbound trams between Pottinger Street and Stop 16, on which section running speed was very slow, sometimes as low as 4.1 km/h (2.6 m.p.h.), which is even slower than the average walking speed in Hong Kong. The running speed of westbound trams was usually high around 13 km/h (8 m.p.h.) except between Pedder Street and Stop 136 during 1500-1600 hours, when much interference was experienced due to vehicles right-turning into Douglas Street. The average running speed on this section at the time was only 5.6 km/h (3.5 m.p.h.). In the same hour the average running speed on the adjacent section between Stops 136 and 137 was as high as 21.6 km/h (13.5 m.p.h.) indicating the adverse effect of the right turning movement into Douglas Street.

The average duration a tram was stopped on its journey through the study area for reasons other than boarding/alighting passengers, varied with the traffic conditions and traffic control measures on the different sections of Des Voeux Road. Eastbound trams passed through three sets of traffic light signals on their journey between Stop 15 and Pottinger Street. As a result, the average stopped time delay on this section during the red period of the traffic light signal was high, about 44% of the journey time. It varied from about 38% during 0800-0900 hours to about 59% during 1500-1600 hours. Vehicles turning right from Des Voeux Road

Central eastbound into Jubilee Street did cause delays to both eastbound and westbound trams during the green period. The delay was however very small and therefore of little concern. Of more concern was the delay caused to trams during the green period by vehicles ahead of them delaying to move because of congestion. This type of delay occurred in the off-peak period between 1100 and 1600 hours and was most prevalent between Queen Victoria Street and Pottinger Street. In fact during the 1500-1600 hours an average delay of 11 seconds per tram was observed, at which time congestion ahead of Pottinger Street junction was also prevalent.

Total stopped time delay was much less between Pottinger Street and Stop 16, the all period (0800-1900 hours) average being 15% of travel time, with a minimum of 2% during 0800-0900 hours and a maximum of 23% during 1100-1200 hour. However, as mentioned previously tram running speed on this section was low due to the slow movement possible because of traffic congestion, particularly in the off-peak period. Traffic congestion contributed to more than half the stopped time delay on this section, being about 16 seconds per tram during the 1500-1600 hour. Vehicles right turning into Douglas Street also contributed to about 25% of the delay to eastbound trams by not being able to complete the turning manoeuvre without obstruction. Although nearly 44 buses stopped each hour to board and alight passengers at the three bus stops between Pottinger Street and Douglas Street, the effect on tram stopped time was minimal. However, the fact that the inner traffic lane was used for such activity for about 23 seconds every minute would naturally

have partially contributed to the traffic congestion on this section.

Between Stop 16 and Pedder Street junction, all stopped time delay to trams was due to the traffic light signal at Pedder Street. This junction was under police control during 0838-0924 hours and 1719-1755 hours. Stopped time delay on the red period was about 35% of the total travel time while that on the green period was about 4%. Delay on the green period occurred mainly due to off-peak congestion at the approach to the junction caused by picking up and setting down activity particularly of taxis. With the traffic light signals in operation a tram was not stopped for more than 39 seconds but under police control there were many occasions when a tram was stopped for over one minute. While the average delay per tram on this section varied from 10 to 27 seconds, the average delay per vehicle was much longer, between 25 and 79 seconds.

Stopped time delay to westbound trams was generally small between Pedder Street and Stop 136. It varied from about 1% of the journey time during 1800-1900 hours to about 21% during 1100-1200 hours. The major cause of delay on this section was the vehicles right turning into Douglas Street. These vehicles stayed on the tram track until there was a gap in the eastbound traffic lanes to enable them to complete the turning manoeuvre.

On the section between Stops 136 and 137, trams travelled through three sets of traffic light signals at which they were stopped on average for about 40 seconds.

Practically all the delay at the traffic light signals was during the red period, the delay on the green period due to right turning vehicles at Jubilee Street being minimal. Unlike the eastbound trams that experienced delay due to traffic congestion on this section, westbound trams were not unduly delayed for this reason.

Comments:

Stopped time delay to trams was largest at traffic light signals during the red period. When compared with vehicle delay at traffic signals, the delay per tram was smaller. A similar effect was also observed at the other sites investigated. Because of the higher passenger occupancy of trams and the large number of traffic light signals along the tram route, the provision of tram priority at traffic light signals could result in beneficial person travel time savings. However, the fact that the traffic light signal timing has been designed on a time sharing concept to meet the heavy vehicular and pedestrian demands at several junctions often close to each other, detailed investigation of the practicability of introducing such priority provision would be required. The scope of the present study was inadequate to evaluate the benefits of such provision and no definite recommendation could be made in this respect.

Apart from the stopped time delay at traffic light signals, trams were also delayed by vehicles right turning into Douglas Street and also due to traffic congestion during the non-clearway hours particularly between Pottinger Street and Pedder Street.

As the delay resulting from the slow movement of trams could not be measured, only part of the delay due to congestion and right turning vehicles was quantified. Its effect is however emphasized by the fact that eastbound tram running speed between Pottinger Street and Stop 16 was about walking speed during the non-clearway period. It is therefore recommended that if tram journey speed is to be improved in the study area the right turning movement from Des Voeux Road Central into Douglas Street will need to be prohibited and clearway restrictions to be imposed in the eastbound carriageway between Pottinger Street and Pedder Street between 0700 and 1900 hours.

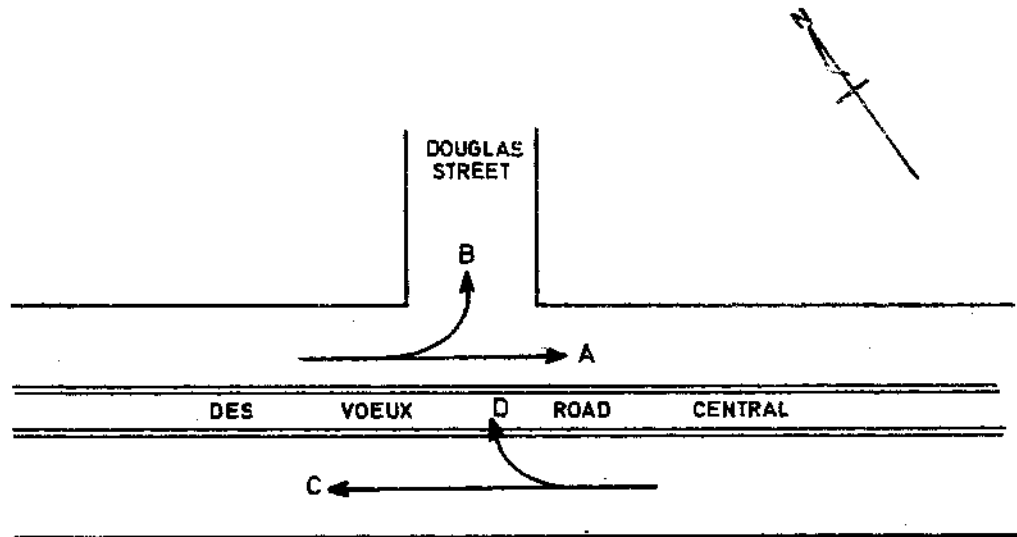
On 7th April, 1976, vehicles other than franchised buses and trams were prohibited on Des Voeux Road Central between Bank Street and Queen Victoria Street to facilitate construction of the Metro. This prohibition automatically eliminates the right turning movement at Douglas Street junction. Observations made a week after the introduction of this prohibition indicated that between 1500 and 1600 hour the average eastbound tram journey speed was 11.09 km/h (6.89 m.p.h.) between Pottinger Street and Stop 16 and 6.96 km/h (4.32 m.p.h.) between Stop 16 and Pedder Street. The corresponding speed during the survey was 3.35 km/h (2.08 m.p.h.) and 5.22 km/h (3.24 m.p.h.) respectively. As the eastbound traffic volume remained unchanged (before 758; after 760) the improved speed could be attributed to the prohibition of the right turn.

The average westbound journey speed observed between Pedder Street and stop 136 after the prohibition was 13.95 km/h (8.67 m.p.h.)

between 1400 and 1500 hours. The corresponding speed during the survey was 8.73 km/h (5.42 m.p.h.). This increase could be due to the absence of the right turning movement to Douglas Street as well as the reduction in the traffic volume from 523 to 132 vehicles in the hour.

TABLE 1 TRAFFIC FLOW AT THE DES VOEUX ROAD CENTRAL/DOUGLAS STREET JUNCTION

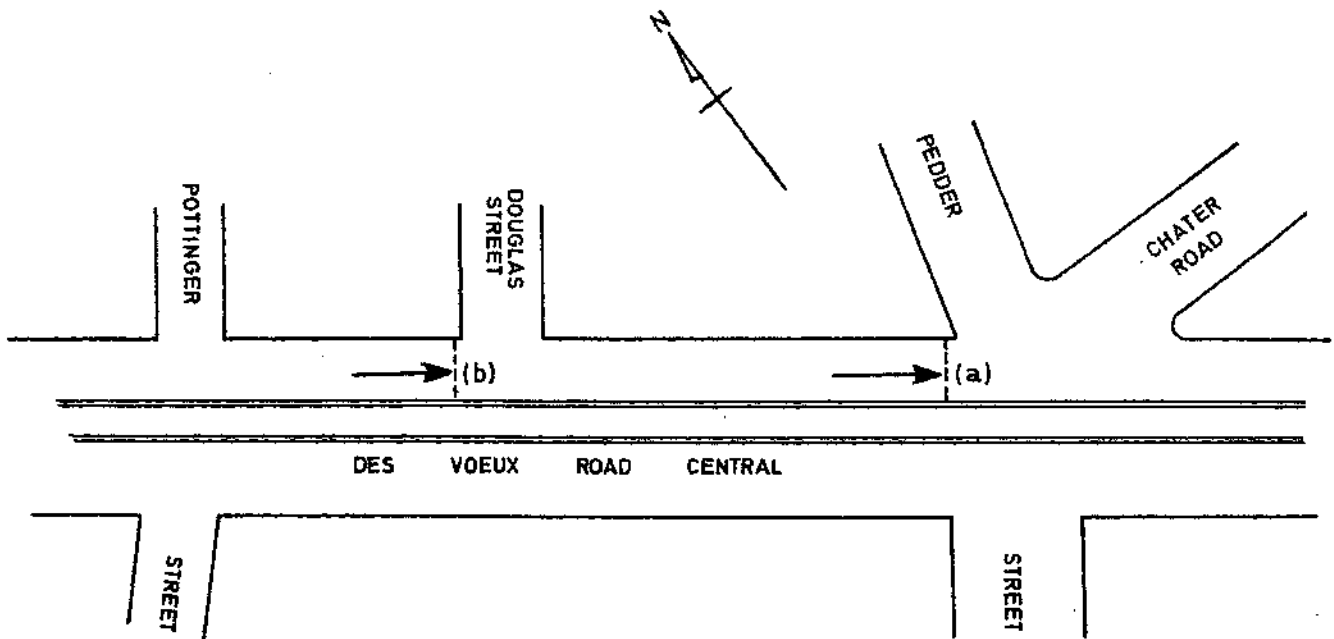
Surveyed on 28-11-1975



HOUR	EAST BOUND			WEST BOUND		
	A		B	C		D
	Tram (No.)	Other Vehicles (No.)	Vehicles (No.)	Tram (No.)	Other Vehicle (No.)	Vehicles (No.)
0800 - 0900	96	521	20	92	152	46
0900 - 1000	81	741	49	97	258	84
1100 - 1200	89	672	79	91	251	188
1200 - 1300	82	712	49	81	165	148
1400 - 1500	80	653	56	77	247	204
1500 - 1600	81	613	64	85	228	210
1700 - 1800	90	486	120	89	129	58
1800 - 1900	71	413	80	76	110	53

TABLE 2 VEHICLE FLOW AND DELAY ALONG DES VOEUX ROAD CENTRAL

Surveyed on 28-11-1975



HOUR	Vehicle Flow (NO.) at Approach		Average Delay Per Vehicle (Sec.) at Approach		Average Vehicle Queue Length at Approach	
	a	b	a	b	a	b
0800 - 0900	617	637	25	2	4	0
0900 - 1000	822	871	55	12	13	3
1100 - 1200	761	840	73	68	16	16
1200 - 1300	794	843	69	53	15	12
1400 - 1500	733	789	70	53	14	12
1500 - 1600	694	758	79	79	15	17
1700 - 1800	576	696	61	27	10	5
1800 - 1900	484	564	36	2	5	0

TABLE 3 AVERAGE TRAVEL TIME AND SPEED ALONG DES VOYER ROAD CENTRAL

Section between	Bound	Distance (km.)	Average Train Travel	Period of Day										All Period
				0800 - 0900	0900 - 1000	1100 - 1200	1200 - 1300	1400 - 1500	1500 - 1600	1700 - 1800	1800 - 1900			
Tram Stop No. 15 and J/o Pottinger Street		0.21	Time (min.) Speed (km/h) Speed (m.p.h.)	1.17 10.77 (47.6) 6.69 (11.0)	1.23 10.24 (47.4) 6.36 (10.9)	1.53 8.24 (47.0) 5.12 (10.6)	1.38 9.13 (45.9) 5.67 (9.9)	1.35 9.33 (46.4) 5.80 (10.2)	2.46 5.12 (16.6) 3.18 (10.4)	1.41 8.94 (45.9) 5.56 (9.9)	1.22 10.33 (46.8) 6.42 (10.5)	1.50 8.40 (45.8) 5.22 (9.9)		
				0.93 9.03 (9.2) 5.61 (5.8)	1.20 7.00 (7.3) 4.35 (4.5)	2.01 4.18 (5.4) 2.60 (3.4)	2.09 4.02 (4.7) 2.50 (3.0)	1.90 4.42 (5.2) 2.75 (3.2)	2.51 3.35 (4.1) 2.08 (2.6)	1.96 4.29 (5.0) 2.67 (3.2)	1.44 5.83 (6.3) 3.62 (4.0)	1.74 4.83 (5.6) 3.00 (3.5)		
J/o Pottinger Street and Tram Stop No. 16	West	0.14	Time (min.) Speed (km/h) Speed (m.p.h.)	2.10 10.00 (48.9) 5.21 (8.1)	2.43 8.64 (41.2) 5.37 (7.0)	3.54 5.93 (9.1) 3.68 (5.7)	3.47 6.05 (8.2) 3.76 (5.1)	3.25 6.46 (8.8) 4.01 (5.6)	4.97 4.23 (7.5) 2.63 (4.7)	3.37 6.23 (8.6) 3.87 (5.3)	2.66 7.89 (40.1) 4.90 (6.3)	3.24 6.48 (9.2) 4.03 (5.7)		
				0.58 8.28 (41.9) 5.14 (7.4)	0.75 6.40 (40.4) 3.98 (6.7)	0.70 6.86 (43.6) 4.26 (8.5)	0.73 6.58 (44.3) 4.09 (8.9)	0.90 5.33 (9.7) 3.31 (6.0)	0.92 5.22 (10.1) 3.24 (6.3)	0.83 5.78 (41.9) 3.59 (7.4)	0.73 6.58 (40.5) 4.09 (6.6)	0.76 6.32 (41.6) 3.93 (7.2)		
Tram Stop No. 16 and J/a Peddar Street		0.08	Time (min.) Speed (km/h) Speed (m.p.h.)	0.75 12.80 (43.5) 7.95 (8.4)	0.79 12.15 (43.3) 7.55 (8.3)	1.45 6.62 (8.4) 4.11 (5.2)	0.92 10.43 (42.6) 6.48 (7.9)	1.10 8.73 (40.4) 5.42 (6.5)	2.09 4.59 (5.6) 2.85 (3.5)	0.81 11.85 (43.0) 7.36 (8.1)	0.77 12.47 (42.6) 7.75 (7.9)	1.08 8.89 (40.3) 5.52 (6.2)		
				0.31 11.01 (45.6) 6.84 (9.7)	2.02 9.21 (44.0) 5.72 (8.7)	2.21 8.42 (42.2) 5.23 (7.6)	2.00 9.30 (45.1) 5.78 (9.4)	2.18 8.53 (43.3) 5.30 (8.3)	1.72 10.81 (41.6) 6.72 (13.5)	1.93 9.64 (44.9) 5.99 (9.3)	1.95 9.54 (45.0) 5.93 (9.4)	1.97 9.44 (44.8) 5.87 (9.2)		

Notes () Indicates running speed.

TABLE 4B AVERAGE TRAM DELAY TIMES ALONG DES VOEUX ROAD CENTRAL
 Period: 0900 hr. to 1000 hr.

Section between	Number of Trams Passing	Average Tram Delay Times in Seconds										Average Travel Time (Sec)	Percent of Travel Time				
		At Traffic Light Signal		At Traffic Light Signal		During Red Period	Under Police Controlled	At Traffic Light Signal		Vehicle Right-turn at Junction	Traffic Congestion			Vehicle Diverted to Tram Track Due to Bus at Bus Stop	Pedestrian Crossing	Approach to Tram Stop	Total
		During Red Period	Under Police Controlled	Vehicle Right-turn	Congestion			Vehicle Right-turn at Junction	Vehicle Right-turn at Junction								
Tram Stop No. 15 and J/o Pottinger Street	86	29.7		0.5	0.1										50.3	73.6	46.1
J/o Pottinger Street and Tram Stop No. 16	81							0.5		1.4	0.7	0.2	0.3	3.7	72.9	46.3	
Tram Stop No. 15 and Tram Stop No. 16	81	29.7		0.5	0.1			0.5		1.4	0.7	0.2	0.3	33.4	145.8	22.9	
Tram Stop No. 16 and J/o Pedder Street	84	13.2	2.4											17.0	45.0	37.8	
J/o Pedder Street and Tram Stop No. 136	96								1.9		0.1	0.2	1.9	4.1	47.4	8.6	
Tram Stop No. 136 and Tram Stop No. 137	97	38.2		0.1	0.6								2.3	41.2	121.2	34.0	

TABLE 4C AVERAGE TRAM DELAY TIMES ALONG DIES WORK ROAD CENTRAL
 Period: 1100 hr. to 1200 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds							Total	Average Travel Time (Sec)	Percent as Travel Time		
			At Traffic Light Signal		At Uncontrolled Junction		Vehicle at Right-turn		Pedestrian Crossing					
			Under Police Controlled	During Green Period	Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop	Approach to Tram Stop						
Tram Stop No. 15 and 3/o Pottinger Street		93	42.1		0.7	4.3			0.1		47.2	91.8	51.4	
		72					7.1	16.9	1.1	0.3	1.7	27.1	120.6	22.5
		89	42.1		0.7	4.3	7.1	16.9	1.1	0.4	1.7	74.3	212.4	35.0
Tram Stop No. 16 and 3/o Pedder Street		90	18.5			2.4					20.9	12.0	43.3	
		85					17.6	0.3	0.1		0.4	18.4	87.0	21.1
Tram Stop No. 136 and Tram Stop No. 137	West	91	40.5		0.1						0.6	41.2	132.6	31.1

TABLE 4D AVERAGE TRAM DELAY TIMES ALONG BUS VEHICLE ROAD CORRELAL
 Period: 1200 hr. to 1300 hr.
 Average Tram Delay Times in Seconds

Section between	Bound	Number of Trams Passing	At Traffic Light Signal			Vehicle Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop	Pedestrian Crossing	Approach to Tram Stop	Total	Average Travel Time (Sec)	Percent as Travel Time	
			During Red Period	Under Police Controlled	During Green Period									Vehicle Right-turn
Tram Stop No. 15 and J/o Pottinger Street		77	33.5		0.2	1.5					35.2	82.8	42.5	
J/o Pottinger Street and Tram Stop No. 16	East	81					5.2	6.3	1.0	0.3	6.2	19.0	125.4	15.2
Tram Stop No. 15 and Tram Stop No. 16	East	82	33.5		0.2	1.5		6.3	1.0	0.3	6.2	54.2	208.2	26.0
Tram Stop No. 16 and J/o Peddar Street		84	21.2			2.4						23.6	43.8	53.9
J/o Peddar Street and Tram Stop No. 136	West	80					7.3	0.6		0.1	1.3	9.3	55.2	16.8
Tram Stop No. 136 and Tram Stop No. 137		81	43.2			0.5					3.0	46.7	120.0	38.9

TABLE 4E AVERAGE TRAM DELAY TIMES ALONG DIES ROAD CENTRAL
 Periods: 1400 hr. to 1500 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds						Total	Average Travel Time (Sec)	Percent as Travel Time		
			During Red Period	At Traffic Light Signal		Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop				Pedestrian Crossing	Approach to Tram Stop
				Under Police Controlled	During Green Period								
Down Stop No. 15 and 2/o Pottinger Street	East	81	34.1	0.2	0.4					34.7	81.0	42.8	
2/o Pottinger Street and Down Stop No. 16		79				3.0	10.3	1.1	0.2	1.7	16.3	114.0	14.3
Down Stop No. 15 and Down Stop No. 16		60	34.1	0.2	0.4	3.0	10.3	1.1	0.2	1.7	51.0	195.0	26.2
Down Stop No. 16 and 3/o Peddar Street	West	81	21.9		2.4					24.3	54.0	45.0	
3/o Peddar Street and Down Stop No. 136		73				9.5				10.3	66.0	15.6	
Down Stop No. 136 and Down Stop No. 137		77	40.9		3.3				0.6	2.1	46.9	130.8	35.9

TABLE 4F AVERAGE TRAM DELAY TIMES ALONG DES VOUEX ROAD CENTRAL
 Period: 1500 hr. to 1600 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds							Average Travel Time (Sec)	Percent as Travel Time				
			At Traffic Light Signal			Vehicle Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop	Pedestrian Crossing			Approach to Tram Stop	Total		
			During Red Period	Under Police Controlled	During Green Period Vehicle Right-turn									Congestion	
Tram Stop No. 15 and J/o Pottinger Street		70	87.4		1.3	13.4							102.1	147.6	69.2
J/o Pottinger Street and Tram Stop No. 16		85					9.4	15.5	1.3		0.1	1.8	28.1	150.6	18.7
Tram Stop No. 15 and Tram Stop No. 16	East	81	87.4		1.3	13.4	9.4	15.5	1.3		0.1	1.8	130.2	298.2	43.7
Tram Stop No. 16 and J/o Pedder Street		81	22.9			3.7					0.1		26.7	55.2	48.4
J/o Pedder Street and Tram Stop No. 136		85					17.5	0.6				4.4	22.5	125.4	17.9
Tram Stop No. 136 and Tram Stop No. 137	West	85	46.9			2.7			0.1			2.0	51.7	103.2	50.1

TABLE 40 AVERAGE TRAM DELAY TIMES ALONG DCS POINT ROAD CORridor
 Period: 1700 hr. to 1800 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds					Pedestrian Crossing	Approach to Tram Stop	Total	Average Travel Time (Sec)	Percent as Travel Time
			At Traffic Light Signal		Vehicle Right-turn at Uncontrolled Junction		Traffic Congestion					
			During Red Period	Under Police Controlled	During Green Period	Vehicle Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop				
Tram Stop No. 15 and Pottlander Street		87	36.2		0.7					37.0	84.6	43.7
Tram Stop No. 15 and Pottlander Street	East	87				0.1	4.9	0.4	0.1	12.1	117.6	15.0
Tram Stop No. 16 and Pottlander Street	East	90	36.2		0.7	0.1	4.9	0.4	0.1	12.1	202.2	27.0
Tram Stop No. 16 and Pottlander Street		90	9.1	15.5	0.9					25.5	49.8	51.2
Tram Stop No. 136 and Pottlander Street	West	89				2.0	0.4		0.2	1.6	48.6	8.6
Tram Stop No. 136 and Pottlander Street		89	37.2						0.3	3.0	115.8	35.3

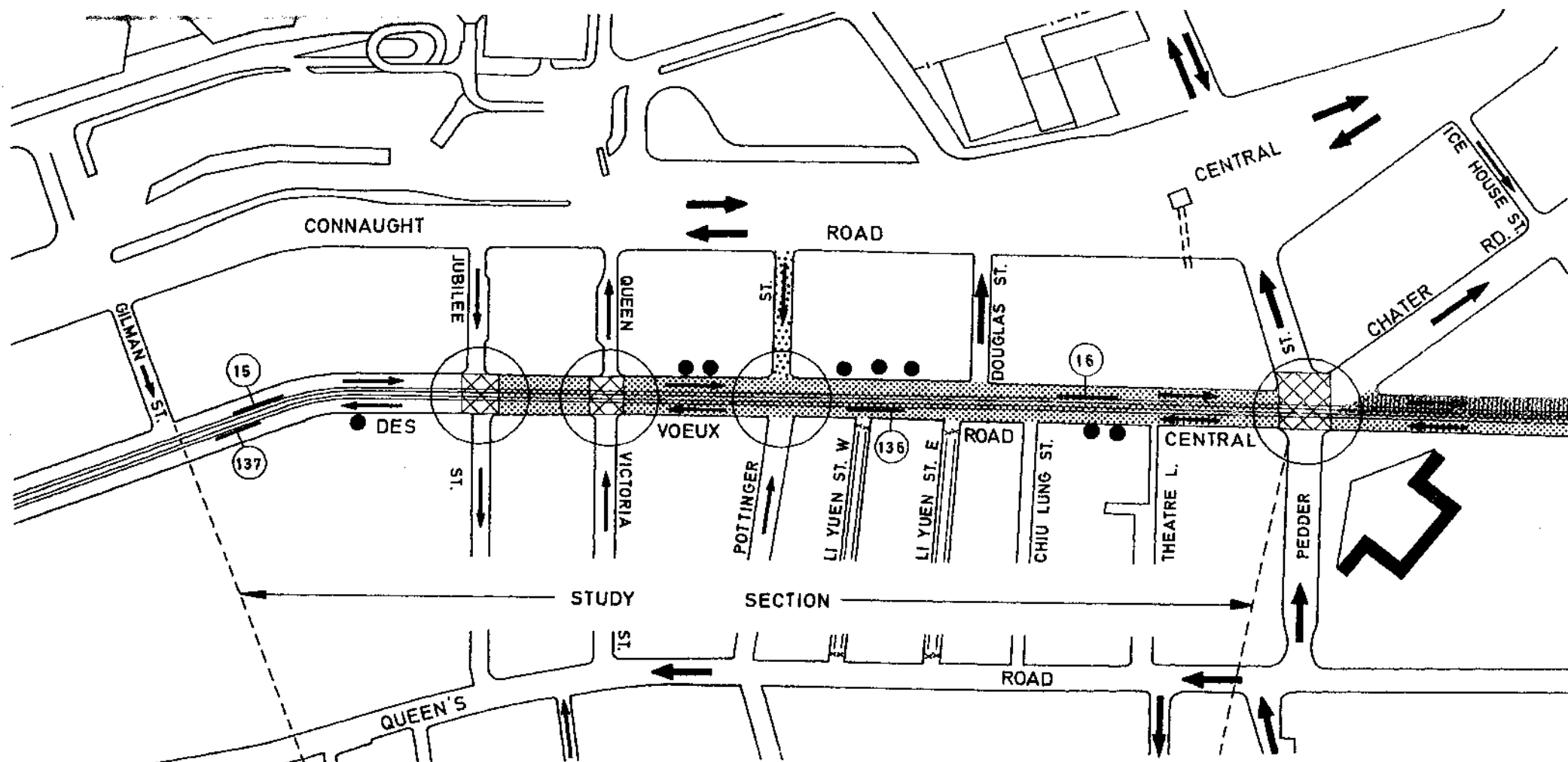
TABLE 46 AVERAGE TRAM DELAY TIMES ALONG DUES VOYER ROAD CENTRAL
 Period: 1800 hr. to 1900 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds							Average Travel Time (Sec)	Percent as Travel Time				
			During Red Period	At Traffic Light Signal		Congestion	Vehicle Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop			Pedestrian Crossing	Approach to Tram Stop		
				Under Polls Controlled	During Green Period Vehicle Right-turn										
Tram Stop No. 15 and J/o Pottinger Street		66	28.1									28.1	73.2	38.4	
J/o Pottinger Street and Tram Stop No. 16	East	67				0.8	0.1					6.1	7.0	8.1	
Tram Stop No. 15 and Tram Stop No. 16	East	71	28.1			0.8	0.1					6.1	35.1	159.6	22.0
Tram Stop No. 16 and J/o Pedlar Street		72	15.6			0.8							16.4	43.8	37.4
J/o Pedlar Street and Tram Stop No. 136	West	75					0.2	0.1					0.3	46.2	0.6
Tram Stop No. 136 and Tram Stop No. 137		76	39.2									3.2	42.5	117.0	36.3

TABLE A1 AVERAGE TRAM DELAY TIMES ALONG DIX ROAD ROAD CORNER

Period: All-Period

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds							Average Travel Time (Sec)	Percent as Travel Time				
			During Red Period	At Traffic Light Signal		Congestion	Vehicle Right-turn at Uncontrolled Junction	Traffic Congestion	Vehicle Diverted to Tram Track Due to Bus at Bus Stop			Pedestrian Crossing	Approach to Tram Stop	Total	
				Under Police Controlled	During Green Period										
Tram Stop No. 15 and 3/o Pettiniger Street		81	39.1		0.4	2.4						41.9	90.0	46.6	
3/o Pettiniger Street and Tram Stop No. 16		80					3.2	6.9	0.7				15.4	104.4	14.8
Tram Stop No. 15 and Tram Stop No. 16	East	83	39.1		0.4	2.4	3.2	6.9	0.7				57.3	194.4	29.5
Tram Stop No. 16 and 3/o Pedlar Street		85	15.8		2.9	1.8							20.5	45.6	45.0
3/o Pedlar Street and Tram Stop No. 136		84					7.0	0.3					8.9	54.8	13.7
Tram Stop No. 136 and Tram Stop No. 138	West	86	39.3		0.1	0.9							42.6	138.2	36.0



LEGEND:











-  ALL VEHICLES (EXCEPT FRANCHISED BUSES) NO STOPPING ZONE DAILY FROM 7a.m. TO 10a.m. & FROM 4p.m. TO 7p.m.
-  PROHIBITED ALL VEHICLES EXCEPT FRANCHISED BUSES & GOODS VEHICLES UNLESS AUTHORIZED IN WRITING BY COMMISSIONER FOR TRANSPORT
-  TRAFFIC ROUTING
-  'BUS ONLY' LANE
-  TRAFFIC LIGHT SIGNAL
-  BOX JUNCTION
-  TRAM STOP REFERENCE NO.
-  BUS-STOP
-  TRAM ISLAND
-  HAWKER OBSTRUCTION



FIG. 1 LAYOUT OF STUDY SECTION



TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

13 OCT 1976

Data Record No. 235



Tram Travel Time and Delay Study
at Kennedy Town Terminus

by

CHUNG Tak-wah

Ag. Chief Engineer: PANG Hau-chung

September 1976

Requested by:

Commissioner for Transport

Purpose of Survey:

The survey was carried out to study the cause of the low tram speed at the approaches to the Kennedy Town Terminus on Cadogan Street and the adjacent sections of Catchick Street, Belcher's Street and Davis Street, identified in T.T.S.D. Technical Report 220 as one of the locations where the tram journey speed was slower than 8 km/h (5 m.p.h.) and to also investigate measures that could be taken to improve tram speed at this location.

Nature of Survey:

The survey was designed to observe the movement of trams that travelled westbound between Stop No. 150 on Catchick Street through Davis Street and Belcher's Street to the Kennedy Town Terminus at Cadogan Street and then eastbound from the terminus to Stop No. 2 on Catchick Street near Smithfield Road. The observations were made at suitable locations on the footwalk along the route during the morning peak (0700-0900 hrs.), the evening peak (1700-1900 hrs.) and an off-peak period (1000-1200 hrs.).

Journey speed on pre-selected sections was obtained by observing the registration number and time at which a tram passed predetermined check points. Stopped time delay was obtained by direct observation of the time each tram was stopped on its journey through the survey area. The reason for the delay was also obtained by direct observation and classified according to predetermined headings as indicated in the tabulations that follow.

As PLB boarding/alighting activity on Davis Street is likely to interfere with tram movement, the PLB arrival and departure rate was observed during the survey period at the unauthorised stand on Davis Street, from which the average PLB waiting time and queue length were computed. PLB's that did not stop to board or alight passengers along Davis Street were not included in the observations. All vehicular movements (including trams) were observed on Catchick Street between Smithfield Road and Davis Street and at the intersections of Belcher's Street with Davis Street and Cadogan Street.

The survey was carried out on Tuesday, 21st October, 1975.

Site Characteristics:

The twin tram track running through Kennedy Town is located along Catchick Street which has a 9.1 m (30 ft.) carriageway. Turnaround of trams at the Kennedy Town Terminus is negotiated via a rectangular loop in a clockwise direction along Davis Street, Belcher's Street and Cadogan Street. The terminus is on Cadogan Street outside the wholesale vegetable market. The track on Davis Street is joined to that on Catchick Street and Belcher's Street by 12.2 m (40 ft.) radius curves while that on Cadogan Street is joined to Catchick Street and Belcher's Street by 18.3 m (60 ft.) radius curves. Because Catchick Street, Davis Street and Belcher's Street are all relatively narrow, the tram track along Davis Street cuts diagonally across the carriageway and therefore exerts a squeezing effect at both ends of the street where the distance between the track and kerb is only 2.7 m (9.0 ft.).

A westbound tram, when approaching the terminus, passes through two sets of traffic light signals, one at the Davis Street/Belcher's Street junction, the other at Belcher's Street/Cadogan Street junction. The Catchick Street/Davis Street junction and the Catchick Street/Cadogan Street junction are uncontrolled.

Traffic flow on Belcher's Street is two-directional while the section of Catchick Street between Cadogan Street and Davis Street is one-way eastbound. The sections of Davis Street and Cadogan Street between Belcher's Street and Catchick Street are one-way in the southbound direction and the northbound direction respectively.

On-street loading/unloading lorry parking spaces are designated along the eastern kerb on Cadogan Street to service the wholesale market. Goods loaded to lorries parked at this location are transported from the market in push-carts which interfere with the movement of trams and other vehicles on Cadogan Street.

The bus stop located on Davis Street near Hau Wo Street is used by C.M.B. Route 21 "Kennedy Town-Felix Villas" which operates on a 12-minute scheduled frequency in the morning and evening peak period and a 24-minute off-peak frequency.

Land use in the area is mixed with godowns and factories located around Catchick Street; hawker stalls at North Street, Smithfield Road and Hau Wo Street; wholesale market and abattoir on Cadogan Street; high rise residential development including two public housing estates south of Belcher's Street; and commercial residential development along Belcher's Street. This leads to feverish on-street activity resulting in severe congestion at times.

The layout of the site is shown in FIGURE 1.

Results:

TABLE 1 shows the directional hourly traffic volumes in the study area. Tram volumes were low as only trams to Kennedy Town Terminus passed through the survey area. Vehicle volumes were also low probably because of capacity limitations east of Kennedy Town.

Due to the presence of godowns, factories, the abattoir and the wholesale market in the vicinity, goods vehicles constituted the largest proportion (40%) of the traffic composition on Catchick Street. Peak goods vehicle movements occurred between 0800 and 0900 hours at which time 67% of the eastbound traffic consisted of goods vehicles. In the same hour 54% of westbound traffic were PLB's which operated at about 26 second headways. Peak PLB movement occurred between 0700 and 0800 hours when the average headway was only 22 seconds. PLB's constituted 26% of the average hourly two directional traffic composition on Catchick Street while private cars were only 15% and trams 8%. Trams operated in the area at an average headway of about 3 minutes.

During the morning peak and off-peak period westbound PLB's travelled along Catchick Street discharging passengers along the way, particularly west of North Street. The PLB's queued along Davis Street between Catchick Street and Belcher's Street to board passengers prior to travelling east. The eastward journey was made via Belcher's Street. The pattern changed slightly in the evening peak at which time many PLB's travelled west along Belcher's Street joining the vehicle queue on Davis Street via Cadogan Street.

Throughout the day, PLB's queued along Davis Street for boarding/alighting passengers converting the eastern kerbside into an unofficial on-street terminus. The queue lengths and waiting times observed during the morning and evening peak periods and the morning off-peak period are shown in TABLE 2. The average length of the PLB queue was 8 vehicles occupying about 49 m (160 ft.) of kerb space. The queue length varied from a minimum of a single vehicle to as many as 21 vehicles. As a single lane on Davis Street between Catchick Street and Belcher's Street cannot accommodate more than 10 to 11 PLB's the long queues recorded in TABLE 2 would naturally indicate conditions when double parking of PLBs was observed. This was prominent between 0730 and 0830 hours, 1015 and 1200 hours and 1815 and 1900 hours. Particularly at these times the PLBs occupied even the area allocated on Davis Street for the on-street bus stop for CMB Route 21.

A PLB waited in the queue along Davis Street on average for 4.5 minutes to board passengers before commencing its eastbound journey. The waiting time was generally lower prior to 0800 hours as vehicles filled in more quickly because of the high demand from passengers commuting to Central and other eastward locations. The off-peak waiting time was higher, and reached a maximum of 11 minutes between 1030 and 1045 hours. On average about 110 PLBs moved along the queue each hour.

On Cadogan Street the loading/unloading of goods vehicles was permitted along the eastern kerb between 0900 and 1800 hours. 7 vehicles could be parked at a time at this location. However, more than the permitted number of goods vehicles were observed parked on this section of street even before 0700 hour. Double parking of lorries was prominent between 0700 and 0900 hours and between 1100 and 1200 hours with triple parking occurring at times between 0700 and 0900 hours. Lorries that parked between 0700 and 0800 hours were observed to park on average for about 72 minutes while those that joined the queue after 0800 hours parked for a shorter duration of about 40 minutes. These parking durations were both in excess of the permitted loading/unloading period of 30 minutes in the hour. Goods loaded onto the parked lorries in Cadogan Street were conveyed from the market in push carts across the tram track thus interrupting the movement of trams.

Although no goods vehicle parking spaces or loading/unloading bays were designated on Catchick Street, several lorries were parked on-street serving the factories and godowns in the area. Several hand carts were also observed on this street conveying goods from Smithfield Pier to the wholesale market. The goods vehicle and push-cart activity had the effect of slowing the tram journey speed on this section particularly in the morning.

The sectional hourly average tram travel time and speed during the survey period are shown in TABLE 3. The average tram delay (stopped time) classified by cause is given in TABLES 4A to 4C.

Tram travel speed was generally slow, below 8 km/h (5 m.p.h.), in the survey area except in the evening when a speed of 12.5 km/h (7.7 m.p.h.) was observed on Catchick Street. Travel speed was slowest on Davis Street, the all period average being only 1.95 km/h (1.21 m.p.h.). The highest hourly average travel speed measured on Davis Street was only 3.5 km/h (2.17 m.p.h.) while the lowest was 1.27 km/h (0.79 m.p.h.). These speeds were observed between 1700 and 1800 hours and between 0700 and 0800 hours respectively.

During 0700 to 0800 hours a tram took over 3 minutes to travel along the 67 m (220 ft.) length of Davis Street between Catchick Street and Belcher's Street. On entering Davis Street at the junction of Catchick Street a tram made very slow progress being stopped along the way through several cycles of the traffic light signals at the Belcher's Street junction. Stopped time delay during the red period of the traffic light signal contributed to about 55% of the travel time while another 19% occurred during the green period.

Due to the skew in the tram track alignment on Davis Street any vehicle that occupied the inner lane within about 37 m (120 ft.) from Belcher's Street junction would prevent movement of a tram that followed behind. PLB's that queued in the inner lane to board passengers were observed, between 0700 and 1800 hours, to delay the average tram for about 13 seconds in the green period of the traffic light signal cycle. The highest hourly average delay (21.7 seconds) occurred during 0700-0800 hours while the lowest (1.7 seconds) was during 1700-1800 hours. As previously mentioned double parking of PLBs

was observed at times. Vehicles that followed PLBs had to cut across the tram track in attempting to turn into Belcher's Street and, in the process, stopped trams during the green period. The delay so caused was classified as delay due to transit vehicles and average 4.3 seconds per tram between 1700 and 1900 hours, with a high hourly average of 10.4 seconds between 0700 and 0800 hours, and a low average of 1.5 seconds between 1700 and 1800 hours.

PLBs that could not join the queue on Davis Street were observed to stop along the northern kerb on Belcher's Street just east of Davis Street to board passengers. This interrupted the eastbound vehicular flow on Belcher's Street causing the blockage of the Belcher's Street/Davis Street junction and at times even the Belcher's Street/Cadogan Street junction. As a result, between 0700 and 1900 hours, a tram was stopped on average for 6.5 seconds on Davis Street because the exit to Belcher's Street was not clear during the green period. Congestion at the Belcher's Street/Davis Street junction was heavy in the morning causing an average delay of 19.6 seconds during 0800-0900 hours, while conditions were much improved in the evening when the average delay was as low as 0.8 seconds during 1700-1800 hours.

In the morning between 0700 and 0800 hours the congestion of eastbound traffic on Belcher's Street extended up to the junction of Belcher's Street and Cadogan Street interfering with tram movement into Cadogan Street during the green period. The average tram delay in this hour was 14.5 seconds. Similar blockage did not occur during the rest of the day.

However, goods vehicles parked along the eastern kerb on Cadogan Street interfered with the right turning movement of trams from Belcher's Street into Cadogan Street causing an all period average delay of 3.6 seconds. Though the delay was shorter in the evening, it occurred during each hour of observation.

Between 0700 and 0800 hours goods vehicles were also parked on the western side of Cadogan Street for loading goods. Such activity caused an average delay of 14.8 seconds per tram. In the same period, because of peak hour passenger boarding activity at the tram terminus a queue of trams was observed at the terminus causing an average tram delay of 45.6 seconds.

Hand carts used for moving goods from the wholesale market to lorries parked along the eastern kerb on Cadogan Street interrupted the movement of trams whose travel path they crossed. Such interruption occurred through the morning and was highest between 0700 and 0800 hours in which period the average delay per tram was 11 seconds.

The stopped time delay to trams on Catchick Street was small, of the order of 6% to 9% of travel time, when considering the overall period 0700 to 1900 hours. Half the delay to westbound trams was caused by hand carts conveying goods along and across Catchick Street while half the eastbound tram delay was caused by parked goods vehicles. Delay arising from these and other sources was highest between 1000 and 1100 hours and averaged 26 seconds per tram.

Although the stopped time delay was small, tram travel speed and running speed were relatively low, about 8 km/h (5 m.p.h.). This would indicate that although trams were not often stopped on this section, movement was slow due to interference from hand carts and parked lorries.

Comment:

The major causes of the low tram speeds on the approaches to the Kennedy Town Terminus could be attributed to (a) PLB boarding activity on Davis Street and Belcher's Street, (b) goods vehicle loading and unloading activity on Cadogan Street and Catchick Street. Of these, only the goods vehicle loading and unloading activity along the eastern kerb of Cadogan Street was legal, provided no lorries were double parked and the parking duration did not exceed 30 minutes in an hour. Strict enforcement of the 'Road Traffic Regulations' would theoretically eliminate the on-street illegal activity. However, in practice it would not be so straightforward because of the heavy demand for public transport due to the high density residential development in the area and the need for goods vehicle loading facilities to service the wholesale market and the large number of small factories in the area.

In order to relieve the traffic congestion prevailing in this area, the following measures are suggested:

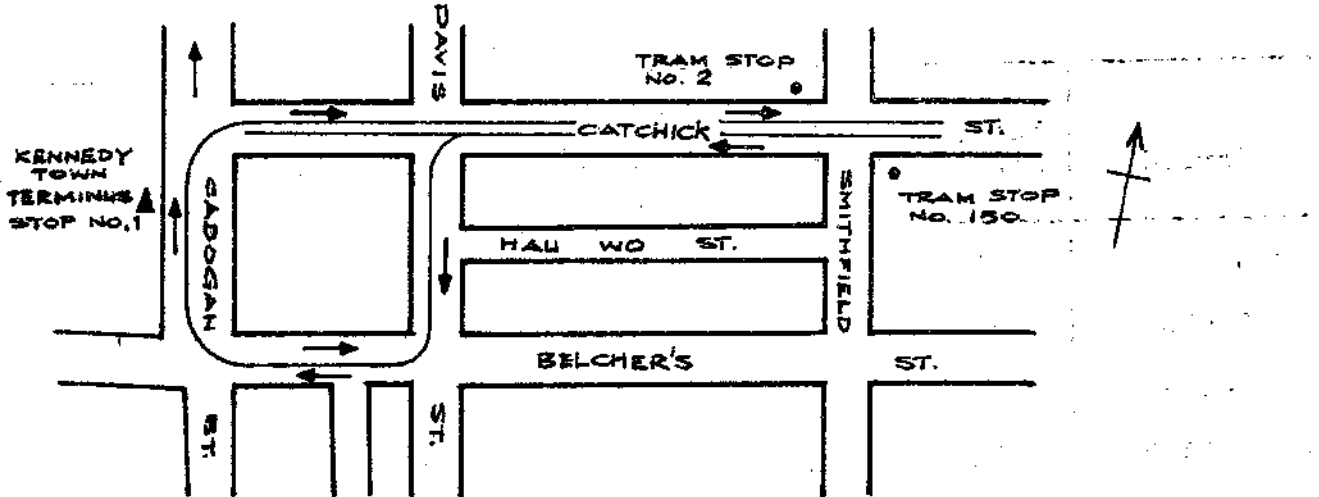
(a) the open air car park west of Sai See Street be used entirely as a lorry park and the goods vehicle loading/unloading facilities on Cadogan Street between Catchick Street and Belcher's Street be eliminated. Storage of empty baskets etc, should not be permitted within the lorry park.

(b) a PLB stand be provided along the eastern kerb on Cadogan Street between Catchick Street and Belcher's Street. As Cadogan Street is about 16.5 m (54 ft.) wide and the distance from the eastern kerb to the tram track is about 11 m (36 ft.), double parking of PLBs could be tolerated.

(c) Clearway restrictions be implemented between 0700 and 1900 hours on Davis Street between Catchick Street and Belcher's Street, and on Belcher's Street between Cadogan Street and Smithfield Road.

(d) Belcher's Street between Cadogan Street and Davis Street be made one-way westbound.

TABLE 1 TRAFFIC FLOW AT KENNEDY TOWN



VEHICLES OTHER THAN TRAM

Street	Section between	Bound	Hour Beginning					
			07	08	10	11	17	18
Catchick Street	Smithfield and Davis Street	East	109	286	186	193	196	161
		West	252	244	216	217	216	183
	Combined	361	530	402	410	412	344	
	Davis Street and Cadogan Street	East	92	291	190	199	239	218
Davis Street	Catchick Street and Belcher's Street	South	245	259	229	230	261	252
Cadogan Street	Catchick Street and Belcher's Street	North	112	218	180	185	242	229
Belcher's St.	Davis Street and Cadogan Street	East	239	207	167	171	182	178
		West	308	300	366	409	375	349
	Combined	547	507	533	580	557	527	

TRAMS

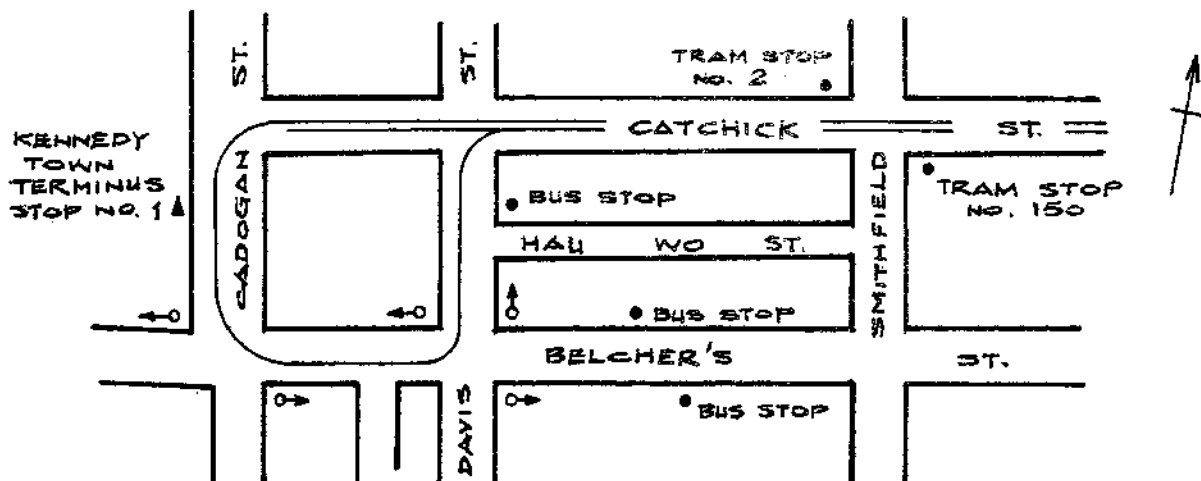
East	21	14	16	13	20	24
West	21	15	16	12	20	25

TABLE 2 PUBLIC LIGHT BUS WAITING TIME & QUEUE LENGTHAT DAVIS STREET

Period	Number Arrived	Number Departed	Waiting Time (Min.)		Queue Length (No. of vehicles)		
			Max.	Mean	Max.	Min.	Mean
0700-0715	27	25	3	1.4	5	1	3
0715-0730	34	32	4	2.5	8	3	6
0730-0745	38	31	6	3.4	13	4	9
0745-0800	31	33	9	5.3	14	8	11
0800-0815	42	34	8	5.1	21	8	13
0815-0830	31	42	7	5.1	17	8	13
0830-0845*	25	27	4	2.4	7	1	4
0845-0900*	38	36	7	3.0	13	2	7
1000-1015	28	27	6	3.6	9	3	7
1015-1030	28	25	8	5.4	12	5	8
1030-1045	25	24	11	7.1	16	8	12
1045-1100	27	23	9	6.3	16	8	12
1100-1115	22	31	9	6.9	18	6	12
1115-1130	33	29	7	5.5	16	9	11
1130-1145	30	29	8	6.2	15	9	12
1145-1200	28	27	8	5.5	14	7	11
1700-1715	19	16	6	3.3	7	2	4
1715-1730	21	18	6	4.1	9	2	5
1730-1745	14	20	5	2.6	7	1	3
1745-1800	17	14	6	4.0	7	2	4
1800-1815	23	23	5	3.6	7	3	6
1815-1830	22	20	8	5.7	10	7	8
1830-1845	31	28	8	5.5	12	8	10
1845-1900	21	23	7	4.9	10	6	9

*POLICE CONTROL OVER J/O DAVIS STREET AND BELCHER'S STREET

TABLE 3 AVERAGE TRAM TRAVEL TIME AND SPEED AT KENNEDY TOWN



BOUND	SECTION BETWEEN	DISTANCE IN km	AVERAGE TRAM TRAVEL	PERIOD OF DAY						ALL PERIOD
				0700 - 0800	0800 - 0900	1000 - 1100	1100 - 1200	1700 - 1800	1800 - 1900	
WEST	TRAM STOP 150 AND J/o CATCHICK ST./DAVIS ST.	0.14	TIME (mins)	1.11	1.02	1.82	1.19	0.78	0.91	1.09
			SPEED (km/h)	7.57	8.24	5.68	7.06	10.77	9.23	7.71
			SPEED (mph)	4.70	5.12	3.44	4.39	6.69	5.74	4.79
	J/o CATCHICK ST./DAVIS ST. AND J/o BELCHER'S ST./DAVIS ST.	0.07	TIME (mins)	3.30	2.28	2.29	2.17	1.20	1.71	2.15
			SPEED (km/h)	1.27	1.84	1.83	1.94	3.50	2.46	1.95
			SPEED (mph)	0.79	1.14	1.14	1.21	2.17	1.53	1.21
	J/o BELCHER'S ST./DAVIS ST. AND KENNEDY TOWN TERMINUS	0.14	TIME (mins)	3.48	1.68	1.22	1.35	0.96	1.01	1.62
			SPEED (km/h)	2.41	5.00	6.89	6.22	8.75	8.32	5.19
			SPEED (mph)	1.50	3.11	4.28	3.86	5.44	5.17	3.22
	TRAM STOP 150 AND KENNEDY TOWN TERMINUS	0.35	TIME (mins)	7.89	4.98	5.03	4.71	2.94	3.63	4.86
			SPEED (km/h)	2.66	4.22	4.17	4.46	7.14	5.79	4.32
			SPEED (mph)	1.65	2.62	2.59	2.77	4.44	3.60	2.68
EAST	KENNEDY TOWN TERMINUS AND TRAM STOP 2	0.23	TIME (mins)	1.81	1.73	2.31	1.61	1.06	1.21	1.62
			SPEED (km/h)	7.62	7.98	5.97	8.57	13.02	11.40	8.52
			SPEED (mph)	4.73	4.96	3.71	5.33	8.09	7.08	5.29

TABLE 4B AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: 0800-0900 Hr.

SECTION BETWEEN	BOUND (NO. OF TRAMS)	AVERAGE TRAM DELAY TIME IN SECONDS													Average Tram travel time (in sec.)	Percent as tram travel time			
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedestrian Crossing	Transit Vehicle	Goods Vehicles-loading & unloading	P.L.B.-boarding & alighting	Long queue of vehicle ahead	Pull-cart crossing			Total		
		Red Phase	Green Phase				Vehicle R-turn	Tram queueing ahead											
P.L.B. boarding & alighting	no exit ahead	Transit Vehicle	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn	Vehicle R-turn					
Stop No. 150 and J/o Catchick St./ Davis St.	(15) WEST						0.2										1.8	61.2	2.9
J/o Catchick St./ Davis St. and J/o Belcher's St./ Davis St.		85.0	9.2	19.6	4.4												118.2	136.8	86.4
J/o Belcher's St./ Davis St. and Stop No. 1		9.2				3.8		1.8			2.1			2.1	1.4		20.4	100.8	20.2
Stop No. 150 and Stop No. 1		94.2	9.2	19.6	4.4	3.8	0.2	1.8			2.1		1.6	2.1	1.4		140.4	298.8	47.0
Stop No. 1 and Stop No. 2	(14) EAST						1.5			0.1	3.1			1.8		6.5	103.8	6.3	

TABLE 4C. AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: 1000-1100 Hr.

SECTION BETWEEN	Bound (No. of trams)	AVERAGE TRAM DELAY TIME IN SECONDS													Average tram travel time (in sec.)	Percent as tram travel time	
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedestrian Crossing	Transit Vehicle	Goods Vehicle loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Full-cart crossing			Total
		Red Phase	Green Phase				Vehicle R-turn	Tram queueing ahead									
P.L.B. boarding & alighting	no exit ahead	Transit Vehicle	Vehicle R-turn	Tram queueing ahead	Pedestrian Crossing	Transit Vehicle	Goods Vehicle loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Full-cart crossing	Total						
Stop No. 150 and J/o Catchick St./ Davis St.	(16) WEST					2.2				5.3				18.2	26.7	91.2	28.2
J/o Catchick St./ Davis St. and J/o Belcher's St./ Davis St.		63.8	11.1	2.5	3.3									80.7	137.4	58.7	
J/o Belcher's St./ Davis St. and Stop No. 1		2.0				5.7				0.4				1.3	9.4	73.2	12.8
Stop No. 150 and Stop No. 1		65.8	11.1	2.5	3.3	5.7	2.2			5.7				19.5	115.8	301.8	38.4
Stop No. 1 and Stop No. 2	(16) EAST					3.2	0.3		1.1	16.2			5.6	26.4	138.6	19.0	

TABLE 4D AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: 1100-1200 Hr.

SECTION BETWEEN	Bound (No. of trams)	AVERAGE TRAM DELAY TIME IN SECONDS													Average tram travel time (in sec.)	Percent as tram travel time				
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedestrian Crossing	Transit Vehicle	Goods Vehicles loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Pull-cart crossing			Total			
		Red Phase	Green Phase				Vehicle R-turn	Tram queueing ahead												
			P.L.B. boarding & alighting	no exit ahead	Transit Vehicle	Vehicle R-turn														
Stop No. 150 and J/o Catchick St./ Davis St.	(12) WEST															0.5	0.5	71.4	0.7	
J/o Catchick St./ Davis St. and J/o Belcher's St./ Davis St.		67.6	14.1	1.1	2.8												85.6	130.2	65.7	
J/o Belcher's St./ Davis St. and Stop No. 1		9.0				3.5		2.9									4.1	19.5	81.0	24.1
Stop No. 150 and Stop No. 1		76.6	14.1	1.1	2.8	3.5		2.9									4.6	105.6	282.6	37.4
Stop No. 1 and Stop No. 2	(13) EAST						0.4										2.7	3.1	96.6	3.2

TABLE 4E AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: 1700-1800 Hr.

SECTION BETWEEN	Bound (No. of trams)	AVERAGE TRAM DELAY TIME IN SECONDS													Average tram travel time (in sec.)	Percent as tram travel time	
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedestrian Crossing	Transit Vehicle	Goods Vehicles loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Pull-cart Crossing			Total
		Red Phase	F.L.B. boarding & alighting	no exit ahead	Transit Vehicle	Vehicle R-turn	Vehicle R-turn	Tram queueing ahead									
Stop No. 150 and J/o Catchick St./ Davis St.	(20) WEST							0.1				0.5			0.6	46.8	1.3
J/o Catchick St./ Davis St. and J/o Belcher's St./ Davis St.		33.1	1.7	0.8	1.5									37.1	72.0	51.5	
J/o Belcher's St./ Davis St. and Stop No. 1		1.9				2.6									4.5	57.6	7.8
Stop No. 150 and Stop No. 1		35.0	1.7	0.8	1.5	2.6		0.1					0.5		42.2	176.4	23.9
Stop No. 1 and Stop No. 2	(20) EAST						0.1								0.1	63.6	0.2

TABLE 4F AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: 1800-1900 Hr.

SECTION BETWEEN	Bound (No. of trams)	AVERAGE TRAM DELAY TIME IN SECONDS													Average tram travel time (in sec.)	Percent as tram travel time	
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedes-trian Crossing	Transit Vehicle	Goods vehicles loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Pull-cart crossing			Total
		Red Phase	P.L.B. boarding & alighting	no exit ahead	Transit Vehicle	Veh-icle R-turn	Vehicles R-turn	Tram queueing ahead									
Stop No. 150 and J/o Catchick St./ Davis St.	(25) WEST						0.1		0.1		2.4	0.5			3.1	54.6	5.7
J/o Catchick St./ Davis St. and J/o Belcher's St./Davis St.		49.1	19.2	1.4	2.5										72.2	102.6	70.4
J/o Belcher's St./Davis St. and Stop No. 1		0.9				1.9		0.1	0.4	0.4					3.7	60.6	6.1
Stop No. 150 and Stop No. 1		50.0	19.2	1.4	2.5	1.9	0.1	0.1	0.5	0.4	2.4	0.5			79.0	217.8	36.3
Stop No. 1 and Stop No. 2	(24) EAST													0.4	0.4	72.6	0.6

Table 4G AVERAGE TRAM DELAY TIME AT KENNEDY TOWN

Period: All-Period

SECTION BETWEEN	Bound (No. of trams)	AVERAGE TRAM DELAY TIME IN SECONDS														Average tram travel time (in sec.)	Percent as tram travel time
		Traffic light signal intersection					Uncontrolled intersection	Tram Stop	Pedestrian Crossing	Transit Vehicle	Goods Vehicles loading & unloading	P.L.B. boarding & alighting	Long queue of vehicle ahead	Pull-cart crossing	Total		
		Red Phase	Green Phase				Vehicles R-turn	Tram queueing ahead									
			P.L.B. boarding & alighting	No exit ahead	Transit Vehicle	Vehicle R-turn											
Stop No. 150 and J/o Catchick St./ Davis St.	(109) WEST					0.6			1.1	0.5	0.7		2.7	5.6	63.6	8.8	
J/o Catchick St./ Davis St. and J/o Belcher's St./ Davis St.		70.8	13.3	6.5	4.3									94.9	128.4	73.9	
J/o Belcher's St./ Davis St. and Stop No. 1		6.0		2.9		3.6		9.8	0.1	0.4	3.0	0.5	1.3	3.1	30.7	98.4	31.1
Stop No. 150 and Stop No. 1		76.8	13.3	9.4	4.3	3.6	0.6	9.8	0.1	1.5	3.5	1.2	1.3	5.8	131.2	290.4	45.2
Stop No. 1 and Stop No. 2	(108) EAST					0.7		0.1	0.3	2.8			2.1	6.0	95.4	6.3	

LEGEND:

- TS1 TRAM STOP REFERENCE NO.
- BS BUS STOP
- ⊕ TRAFFIC LIGHT SIGNAL
- TRAFFIC ROUTING
- ▨ HAWKERS

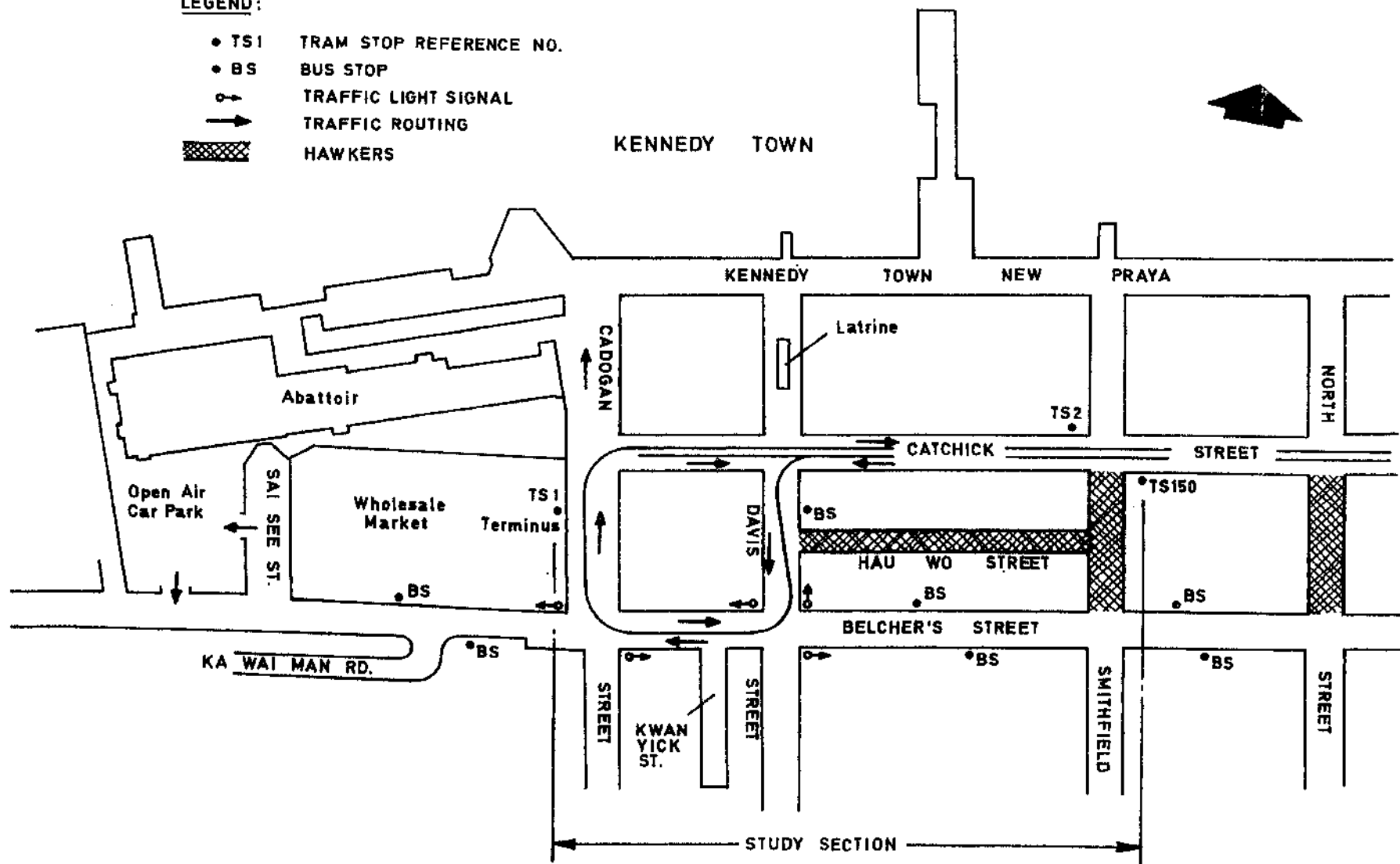


FIG. 1 SITE PLAN

SCALE 1 : 2500



TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

Data Record No. 236

15 SEP 1976

TRAM TRAVEL TIME AND DELAY STUDY
AT NORTH POINT NEAR STATE THEATRE

Job No. 26

by

WONG Kwok-leung

Chief Engineer: K.T. Kuo

July 1976

Requested by:

Commissioner for Transport

Purpose of Survey:

In T.T.S.D. Technical Report 220, King's Road between Boat Street and North Point Road was identified as one of the locations where tram travel speed was below 8 km/h (5 m.p.h.). The low travel speed was observed during the evening peak period between 1700 and 1900 hours. The purpose of the survey documented herein was to observe and quantify the source of the tram delay and to seek remedial measures that would improve tram speed in the area.

Nature of Survey:

As the low tram speed occurred only during the evening peak period, the survey was confined to the period 1700 to 1900 hours. During this period the movement of every eastbound tram between tram stop Nos. 33 and 34 and every westbound tram between tram stop Nos. 118 and 119 was followed by observers stationed at the pre-selected locations on the footways.

The registration number and time of every tram which passed the tram stops and intermediate check points were recorded. The tram journey time and speed was then computed. When a tram was stopped for any reason other than boarding or alighting passengers, the stopped duration and reason were recorded. The average stopped-time delay classified by cause of delay was thus computed.

Vehicular turning movements at the junctions of King's Road/Fortress Hill Road/Power Street and King's Road/Cheung Hong Street/Tin Chong Street were also measured.

The survey was carried out on 31st October, 1975.

Site Characteristics:

The section of King's Road between Oil Street and North Point Road has a 23.2 metre (76 feet) wide carriageway divided into six traffic lanes, three in each direction. The outer traffic lanes are shared with trams that travel east-west on tracks that occupy about 3.7 metres (12 feet) in the middle of King's Road. The width of the inner traffic lanes is restricted at the tram islands which serve as intermediate stops for boarding/alighting passengers. King's Road takes a sharp bend between Fortress Hill Road and Cheung Hong Street restricting the visibility of westbound traffic on this section.

At the traffic light signal controlled junction of King's Road/Fortress Hill Road/Power Street, eastbound vehicles turning right from King's Road into Fortress Hill Road would wait in the outer lane for a gap in westbound traffic before commencing the turn. As a result, an eastbound tram could be stopped at this junction even during the green period by a right turning vehicle. Westbound trams were not exposed to similar delays at this junction as westbound vehicles could not turn right into Power Street which was one-way southbound.

Eastbound and westbound trams experienced similar delays by right turning vehicles at the uncontrolled junction of King's Road/Cheung Hong Street/Tin Chong Street. At the traffic light signal controlled junction of King's Road/North View Street/North Point Road, only westbound trams were exposed to delay by right turning vehicles as eastbound vehicles could not turn right because North View Street was one-way northbound.

At the time of the survey public light buses were restricted from picking up and setting down passengers along the westbound carriageway of King's Road between North View Street and a point approximately 63 metres (206 feet) to the west of Fortress Hill Road during the hours 0700 to midnight. Similar restrictions were effective on the eastbound carriageway east of North Point Road.

Land use along King's Road is mixed commercial/residential with some industrial activities also. Several residential developments exist in close proximity of King's Road to the south.

The layout of the survey location is shown in FIGURE 1.

Results of Survey:

The vehicle turning movements at the junction of King's Road/Fortress Hill Road/Power Street are indicated in TABLE 1 while those at the junction of King's Road/Cheung Hong Street/Tin Chong Street are shown in TABLE 2.

The average hourly eastbound vehicular flow on King's Road was 1740 while the westbound flow was 1530. There were nearly twice as many vehicles that turned right at the uncontrolled junction from King's Road eastbound into Cheung Hong Street than at the traffic light signal controlled junction of King's Road and Fortress Hill Road. The number of westbound vehicles that turned right from King's Road was very small, occurring only at the uncontrolled junction as no right turning movement was permitted at the traffic light controlled junction. The effect of these right turning vehicles on tram delay is discussed later.

The average hourly tram travel time and speed from one tram stop to the other is given in TABLE 3. Also included in the tabulation is the average tram running speed. The average tram delay classified according to the cause of delay is given in TABLE 4A to 4C.

The average journey speed of an eastbound tram between tram stop Nos. 33 and 34 during the evening peak was 5.96 km/h (3.7 m.p.h.) slightly higher than the 5.1 km/h (3.2 m.p.h.) observed in December 1974. The average speed between 1700 and 1800 hours was about 50% faster than the average speed between 1800 and 1900 hours. During the same period the average journey speed of a westbound tram measured between tram stop Nos. 118 and 119 was 11.1 km/h (6.9 m.p.h.) also slightly higher than the 10 km/h (6.2 m.p.h.) speed observed previously.

While the average stopped time delay for an eastbound tram was about 37% of the journey time, only 13% of the journey time of a westbound tram was expended in stopped time delay. Eastbound trams experienced most delay at the approach to the traffic light signal controlled junction of King's Road/Fortress Hill Road/Power Street. At this junction, vehicles turning right from King's Road into Fortress Hill Road had to wait until the westbound traffic flow eased to make the turn. Because of the heavy westbound flow the discharge of right turning vehicles was low, causing long delays not only to the vehicles turning right but also to eastbound trams which shared the outer lane with these vehicles.

It was observed during the survey that practically every eastbound tram was stopped at the junction even when the traffic light displayed green, because of a right turning vehicle stopped ahead. As a result, during the evening peak, an eastbound tram was delayed on average for 18.7 seconds during the green display of the traffic light signal. The delay during the green period often continued through the red period with many a tram being stopped through more than one red period. Therefore, the average delay during the red period was 34.9 seconds, about 50% of the total stopped time delay experienced between tram stop Nos. 33 and 34. Only about 16% of the trams that were stopped on the red display of the traffic light signal did not have a vehicle stopped ahead of it.

Although the number of eastbound vehicles on King's Road which turned right at the uncontrolled junction of King's Road/Cheung Hong Street was nearly twice the number that turned right at the signal controlled junction of King's Road/Fortress Hill Road, the average delay to eastbound trams was much smaller, only 3.4 seconds. This is probably due to the greater difficulty experienced in finding a gap in the surge flow at the signalized junction than in the random flow at the uncontrolled junction. Unlike at the signalized junction where practically every tram was delayed even during the green period, only about 20% of the trams were delayed at the uncontrolled junction by a right turning vehicle.

Considerable delay was experienced by eastbound trams at the approach to tram stop No. 34. Being the last stop on King's Road serving tram

routes to North Point, stop No. 34 handles a large number of alighting passengers particularly in the evening peak. There are also a fair number of passengers that board at this stop on trams heading for Shaukiwan.

Due to restriction that were in force at the time of the survey to PLB's boarding and alighting passengers on the eastbound carriageway of King's Road east of North Point Road, much of this activity occurred between Tin Chong Street and North Point Road. As a result, the kerbside lane was occupied mostly by public light buses during the evening peak. Because of the restricted availability of the kerbside lane for through traffic and the delay to trams at tram stop No. 34, a long queue of trams and other vehicles formed intermittently on the approach to the tram stop particularly between 1800 and 1900 hours. At times the queue extended even beyond the junction of King's Road/Tin Chong Street and for about one minute between 1815 and 1830 hours, up to ten trams were observed in the queue. About 20% of the trams that travelled between 1700 and 1800 hours were delayed on the approach to tram stop No. 34 because of boarding/alighting activity at the tram stop. This proportion increased to about 75% during the period 1800 to 1900 hours. The resulting average delay per tram was about 2 seconds between 1700 and 1800 hours and 24 seconds between 1800 and 1900 hours.

As previously mentioned west-bound trams maintained considerably higher journey speeds than the eastbound trams because the stopped time delay experienced was considerably less. Because of the very small number of vehicles turning right from King's Road to North Point Road at this traffic light

signal controlled junction, no trams were delayed during the green period although the right turning vehicles did stand on the tram track awaiting the turn. About 50% of the west-bound trams that travelled between 1700 and 1800 hours were stopped at this junction during the red period of the traffic signal, the average delay per tram being 6.1 seconds. Between 1800 and 1900 hours the proportion of trams stopped was about 60% and the average delay 7.0 seconds.

At the uncontrolled junction of King's Road/Tin Chong Street, the average delay per tram by vehicles turning right from King's Road into Tin Chong Street was only about 1 second because right turning vehicular movements were very light. The majority of trams went through this junction without delay.

No right turning manoeuvre was permitted from King's Road into Power Street at the signal controlled junction of King's Road/Fortress Hill Road/Power Street. Therefore, westbound trams did not experience any delay during the green period. About 63% of the westbound trams that travelled through this junction between 1700 and 1900 hours were stopped during the red period for an average duration of 7 seconds per tram.

Comments:

To improve traffic conditions on King's Road, a traffic management scheme was introduced on 18th March 1976 controlling turning movements at the junctions of King's Road/Fortress Hill Road, King's Road/Oil Street and Oil Street/Electric Road. The right turning manoeuvre from King's Road into Fortress Hill Road, which caused long tram delays at this junction, was prohibited. Vehicles could enter Fortress Hill Road by making a left turn from King's Road into Tin Chong Street and then via Electric Road and Power Street. The traffic signal cycle length

was increased to 71 seconds with a 12% increase in the effective green time for east-west traffic on King's Road. Subsequent observations during the period 1700 to 1800 hour indicated that the average eastbound tram journey speed between tram stop Nos. 33 and 34 had increased from 7.53 km/h (4.68 m.p.h.) observed during the survey to 11.03 km/h (6.85 m.p.h.) due to the elimination of the delay from the right turning manoeuvre and also due to the increased effective green time. The increase in the average westbound tram journey speed between tram stop Nos. 118 and 119 was much more modest, from 11.15 km/h (6.93 m.p.h.) to 11.59 km/h (7.20 m.p.h.)

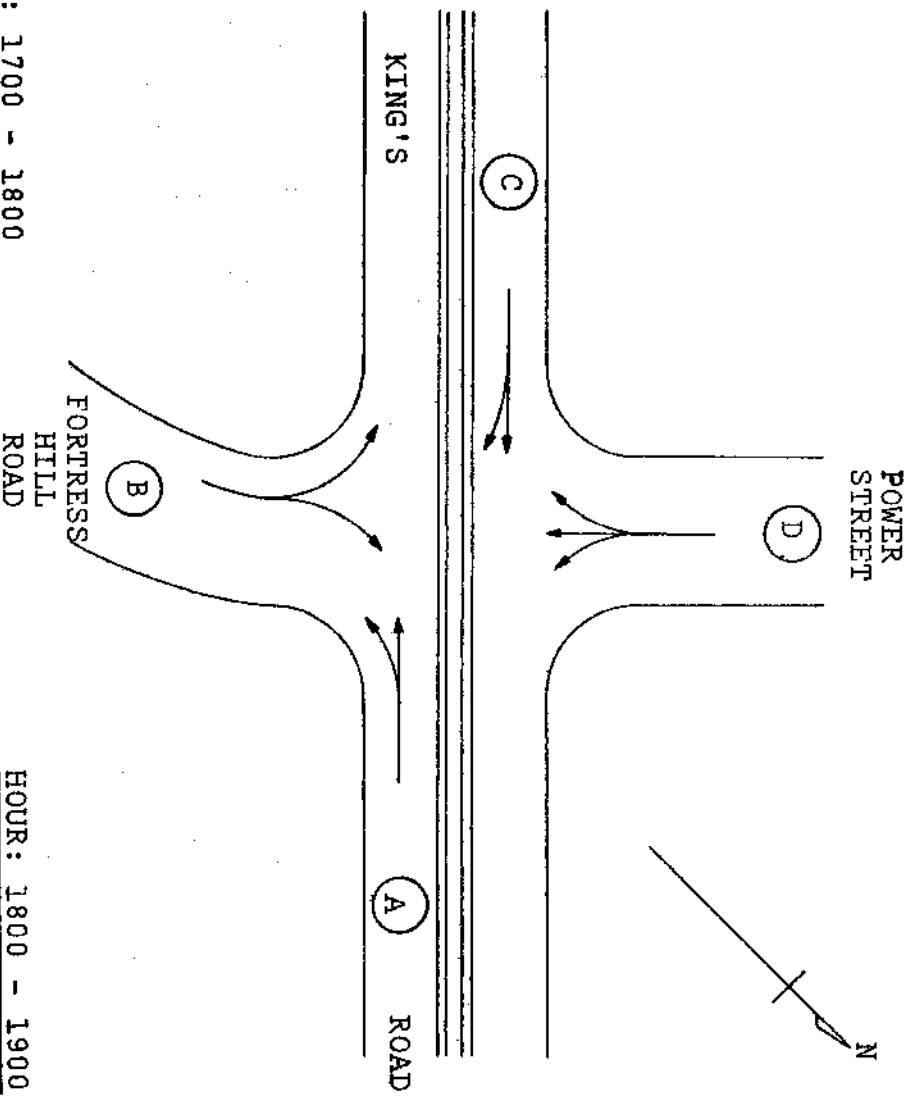
In this and other surveys of a similar nature carried out in Central District, West Point, Western Market and Kennedy Town, it was observed that the average delay per tram was largest during the red period of a traffic light signal. The introduction of the traffic light signals at the junction of King's Road/Oil Street could therefore increase the tram delay at this junction, and thus reduce the advantage gained at the junction of King's Road/Fortress Hill Road. As this junction was not included in the survey, no 'before' and 'after' measurements are available to quantify this effect.

The tram delay on the approach to tram stop No. 34 between 1800 and 1900 hours was due to a combination of the heavy passenger alightings at this stop and the traffic congestion due to public light buses. Re-siting the tram stop east of North Point Road would eliminate the delay but would inconvenience a large number of passengers as they would have to alight further away at stop No. 35. It would increase the distance from tram stop No. 33 and would also require re-positioning of stop No. 38. As the delay occurs

for less than an hour in the evening peak period, resiting the stop is not advocated in view of the inconvenience to a large number of passengers.

The delay at this location could however be reduced by improving traffic flow conditions, which could be achieved by restricting public light bus boarding and alighting activities. It is therefore suggested that the present restriction on King's Road between North Point Road and east of Shu Kuk Street be extended further west up to Tin Chong Street,

TABLE 1 - VEHICLE TURNING MOVEMENT(EXCL. TRAMS)
AT J/O KING'S ROAD/FORTRESS HILL ROAD/POWER STREET

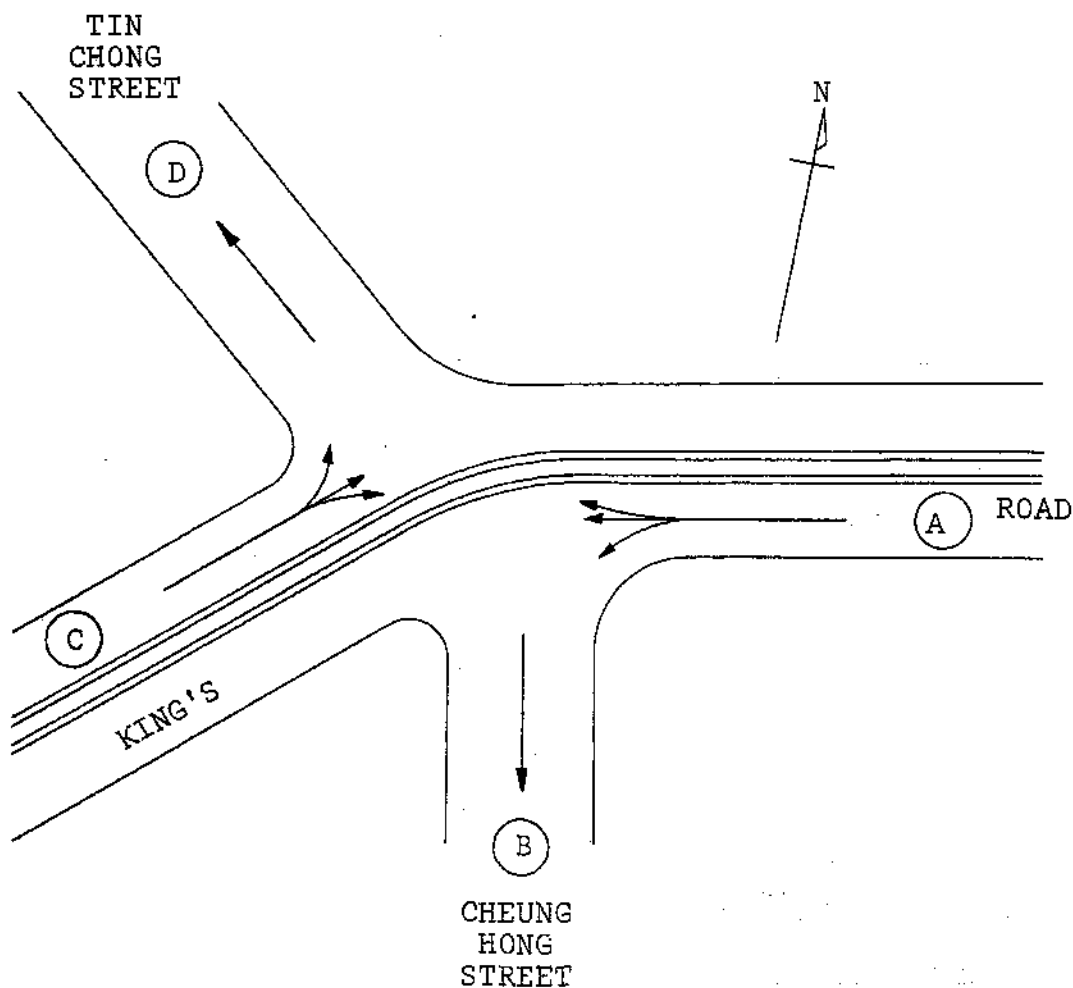


HOUR: 1700 - 1800

HOUR: 1800 - 1900

<u>DESTINATION</u>					<u>DESTINATION</u>								
A	B	C	D	Total	A	B	C	D	Total				
<u>ORIGIN</u>					<u>ORIGIN</u>								
A	-	97	1660	-	1757	A	-	105	1401	-	1506		
B	186	-	92	-	278	B	220	-	76	-	296		
C	1767	98	-	-	1865	C	1717	61	-	-	1778		
D	37	141	403	-	581	D	31	124	419	-	574		
Total 1990 336					2155	-	4481	Total 1968		290	1896	-	4154

TABLE 2 - VEHICLE TURNING MOVEMENT (EXCL. TRAMS)
AT J/O KING'S ROAD/CHEUNG HONG STREET/TIN CHONG STREET

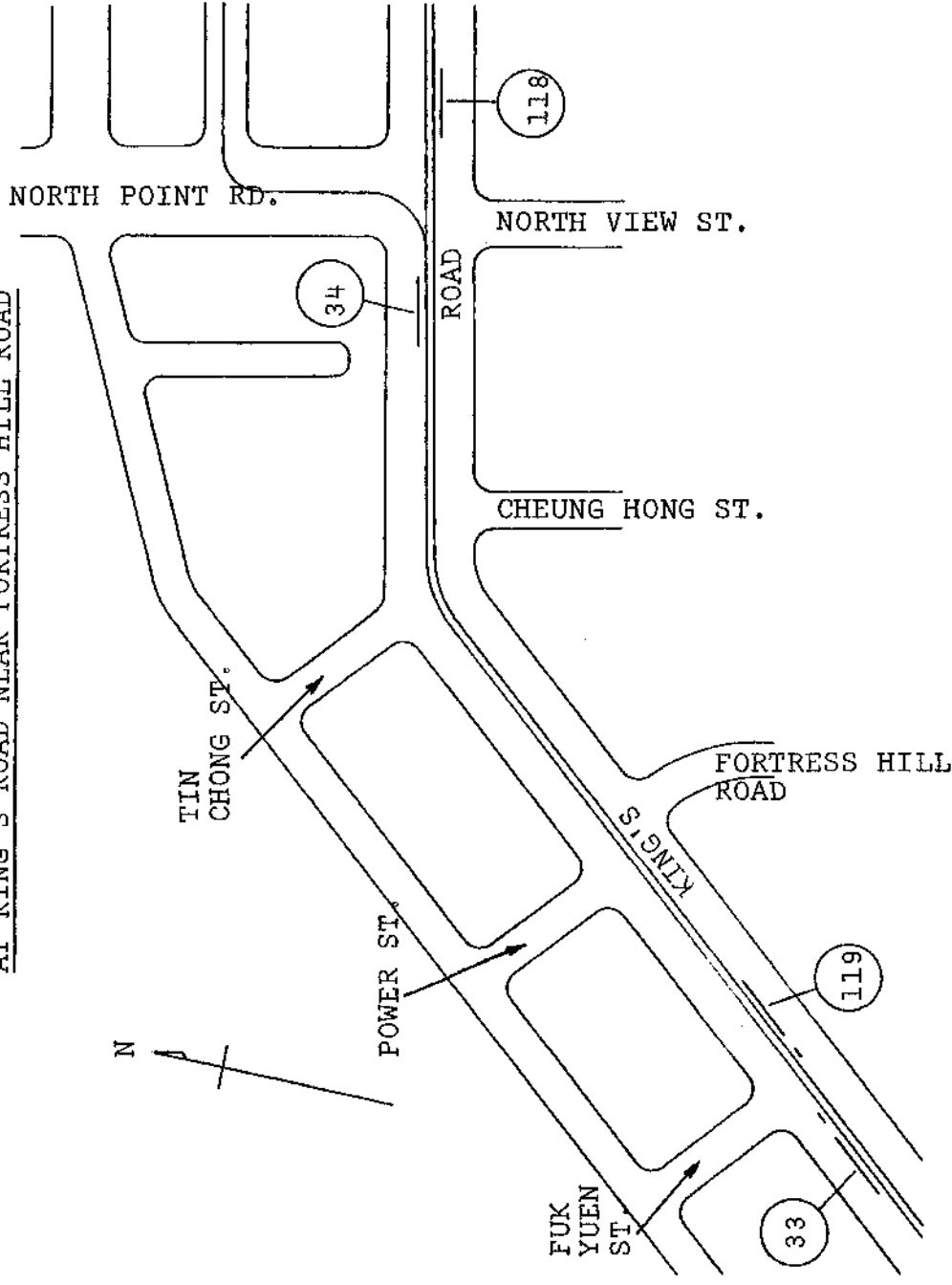


HOUR: 1700 - 1800

HOUR: 1800 - 1900

	<u>DESTINATION</u>					Total		<u>DESTINATION</u>					Total
	A	B	C	D				A	B	C	D		
<u>ORIGIN</u>	A	-	127	1757	15	1899		A	-	129	1506	6	1641
	B	-	-	-	-	-	<u>ORIGIN</u>	B	-	-	-	-	-
	C	1674	165	-	151	1990		C	1654	173	-	141	1968
	D	-	-	-	-	-		D	-	-	-	-	-
	Total	1674	292	1757	166	3889		Total	1654	302	1506	147	3609

TABLE 3 - AVERAGE TRAM TRAVEL TIME AND SPEED AT KING'S ROAD NEAR FORTRESS HILL ROAD



BOUND	SECTION BETWEEN	DISTANCE (km)	AVERAGE TRAM TRAVEL	PERIOD		
				1700-1800	1800-1900	Average 1700-1900
EAST	TRAM STOP NO. 33		TIME(min.)	2.71 (1.79)	4.06 (2.56)	3.42 (2.16)
	AND	0.34	SPEED(km/h)	7.53 (11.40)	5.02 (7.97)	5.96 (9.44)
	TRAM STOP NO. 34		SPEED(m.p.h.)	4.68 (7.08)	3.12 (4.95)	3.70 (5.86)
WEST	TRAM STOP NO. 118		TIME(min.)	1.83 (1.61)	1.85 (1.58)	1.84 (1.60)
	AND	0.34	SPEED(km/h)	11.15 (12.67)	11.03 (12.91)	11.09 (12.75)
	TRAM STOP NO. 119		SPEED(m.p.h.)	6.93 (7.87)	6.85 (8.02)	6.89 (7.92)

Note: () indicates running time and speed
i.e. journey time minus delay

TABLE 4 AVERAGE TRAM DELAY TIMES AT KING'S ROAD

(A) PERIOD : 1700-1800 HOUR

SECTION BETWEEN	BOUND & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY TIMES IN SECONDS							AVERAGE TRAM TRAVEL TIMES (IN SEC.)	PERCENT AS TRAVEL TIME	
		AT SIGNAL CONTROLLED JUNCTION		AT UNCONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT VEHICLE	PEDESTRIAN CROSSING			TOTAL
		DURING RED PERIOD	GREEN PERIOD VEHICLE R-TURN	VEHICLE R-TURN	LONG VEHICLE QUEUE AHD.						
TRAM STOP NO. 33 AND J/O KING'S ROAD/POWER STREET.	EAST (57)	31.1	17.0						48.1		
J/O KING'S ROAD/POWER STREET AND J/O KING'S ROAD/CHEUNG HONG ST.				2.7	0.1				2.8		
J/O KING'S ROAD/CHEUNG HONG ST. AND TRAM STOP NO. 34		1.5				2.1	0.6		4.2		
TRAM STOP NO. 33 AND TRAM STOP NO. 34		32.6	17.0	2.7	0.1	2.1	0.6		55.1	162.6	33.9
TRAM STOP NO. 118 AND J/O KING'S RD./CHEUNG HONG ST.	WEST (58)	6.1		1.4					7.5		
J/O KING'S RD./CHEUNG HONG ST. AND J/O KING'S RD./FORTRESS HILL RD.		5.7						0.1	5.8		
J/O KING'S RD./FORTRESS HILL RD. AND TRAM STOP NO. 119						0.1			0.1		
TRAM STOP NO. 118 AND TRAM STOP NO. 119		11.8		1.4		0.1		0.1	13.4	109.8	12.2

TABLE 4 AVERAGE TRAM DELAY TIMES AT KING'S ROAD (cont'd)

(B) PERIOD : 1800-1900 HOUR






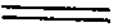
SECTION BETWEEN	BOUND & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY TIMES IN SECONDS							AVERAGE TRAM TRAVEL TIMES (IN SEC.)	PERCENT AS TRAVEL TIME	
		AT SIGNAL CONTROLLED JUNCTION		AT UNCONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT VEHICLE	PEDESTRIAN CROSSING			TOTAL
		DURING RED PERIOD	GREEN PERIOD VEHICLE R-TURN	VEHICLE R-TURN	LONG VEHICLE QUEUE AHD.						
TRAM STOP NO. 33 AND J/o KING'S RD./POWER STREET.	EAST (64)	37.3	19.8					57.1			
J/o KING'S RD./POWER STREET AND J/o KING'S RD./CHEUNG HONG ST.				3.9	3.6			7.5			
J/o KING'S RD./CHEUNG HONG ST. AND TRAM STOP NO. 34		5.3				20.2		25.5			
TRAM STOP NO. 33 AND TRAM STOP NO. 34		42.6	19.8	3.9	3.6	20.2		90.1	243.6	37.0	
TRAM STOP NO. 118 AND J/o KING'S RD./CHEUNG HONG ST.	WEST (61)	7.0		0.7				7.7			
J/o KING'S RD./CHEUNG HONG ST. AND J/o KING'S RD./FORTRESS HILL RD.		8.0						8.0			
J/o KING'S RD./FORTRESS HILL RD. AND TRAM STOP NO. 119						0.3		0.3			
TRAM STOP NO. 118 AND TRAM STOP NO. 119		15.0		0.7		0.3		16.0	111.0	14.4	

TABLE 4 AVERAGE TRAM DELAY TIMES AT KING'S ROAD (cont'd)

(C) PERIOD : 1700-1900 HOUR

SECTION BETWEEN	BOUND & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY TIMES IN SECONDS								AVERAGE TRAM TRAVEL TIMES (IN SEC.)	PERCENT AS TRAVEL TIME
		AT SIGNAL CONTROLLED JUNCTION		AT UNCONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT VEHICLE	PEDESTRIAN CROSSING	TOTAL		
		DURING RED PERIOD	GREEN PERIOD VEHICLE R-TURN	VEHICLE R-TURN	LONG VEHICLE QUEUE AHD.						
TRAM STOP NO. 33 AND J/o KING'S RD./POWER STREET.	EAST (61)	34.9	18.7						53.6		
J/o KING'S RD./POWER STREET AND J/o KING'S RD./CHEUNG HONG ST.				3.4	2.0				5.4		
J/o KING'S RD./CHEUNG HONG St. AND TRAM STOP NO. 34		3.7				12.8	0.2		16.7		
TRAM STOP NO. 33 AND TRAM STOP NO. 34		38.6	18.7	3.4	2.0	12.8	0.2		75.7	205.2	36.9
TRAM STOP NO. 118 AND J/o KING'S RD./CHEUNG HONG ST.	WEST (59)	6.6		1.0					7.6		
J/o KING'S RD./CHEUNG HONG ST. AND J/o KING'S RD./FORTRESS HILL RD.		6.9							6.9		
J/o KING'S RD./FORTRESS HILL RD. AND TRAM STOP NO. 119						0.2			0.2		
TRAM STOP NO. 118 AND TRAM STOP NO. 119		13.5		1.0		0.2			14.7	110.4	13.3

LEGEND:

-  TRAM ISLAND
-  TRAM STOP REFERENCE NO.
-  B.S. BUS STOP
-  TRAFFIC SIGNAL
-  TRAFFIC ROUTING
-  TRAMWAY

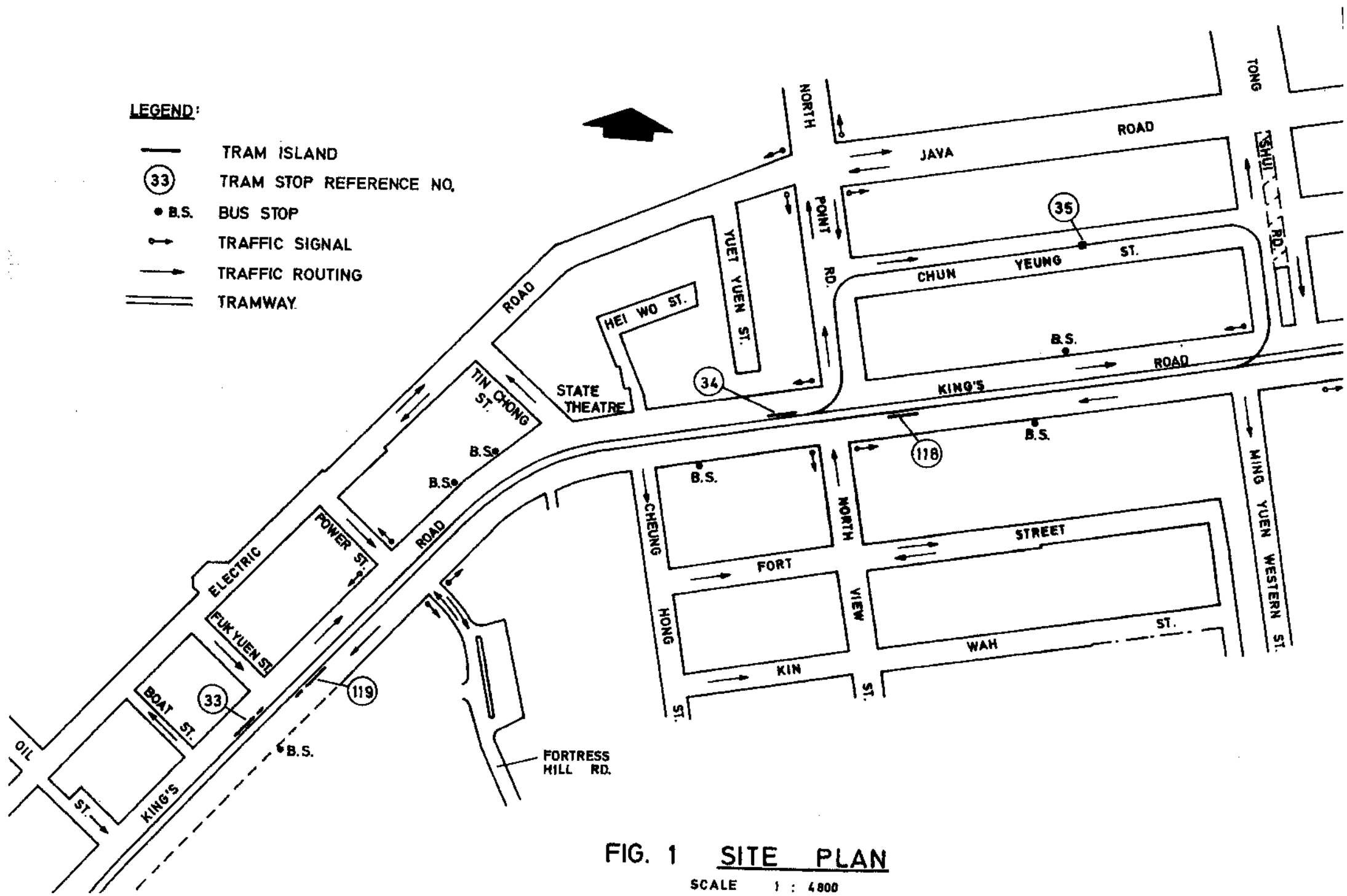


FIG. 1 SITE PLAN

SCALE 1 : 4800



TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

- 4 1976

Data Record 237



TRAM TRAVEL TIME AND DELAY STUDY
AT NORTH POINT NEAR SHU KUK STREET

Job No. 26

by

WONG Kwok-leung

Chief Engineer: K.T. Kuo

August 1976

Requested by:

Commissioner for Transport

Purpose of Survey:

The purpose of the study was to examine the reason for the low tram speed observed on King's Road between Tong Shui Road and Tin Chiu Street. This section of road was identified in Technical Report 220 as one of the seven locations where tram journey speeds were lower than 8 km/h (5 m.p.h.). The study also examined what measures would be required to improve tram speed at that location.

Nature of Survey:

As given in Technical Report 220, the average tram journey speeds between tram stops nos. 38 and 39 eastbound and between nos. 115 and 117 westbound were generally higher than 8 km/h (5 m.p.h.) except during the evening peak period when the average speed in either direction was less than this value. The present survey was therefore designed to observe in greater detail the movement of every tram between these stops during the period 1700 to 1900 hours. The tram registration number, time of arrival and departure at stops and pre-selected check points, the stopped time and reason for stopping were recorded from suitable locations along the footways.

Vehicular turning movements at the traffic signal junctions at Shu Kuk Street and Kam Hong Street were also measured.

The survey was carried out on 30th October, 1975 during the evening peak period from 1700 to 1900 hours.

Site Characteristics:

The carriageway on King's Road between Tong Shui Road and Tin Chiu Street is 23.2 metres (76 feet) wide and is divided into three traffic lanes in each direction. Tram tracks occupy the centre 3.7 metres (12 feet) width of King's Road and as such the outer traffic lanes are shared by trams and other vehicular traffic. The widths of the outer lanes are reduced at tram stops nos. 38, 39, 115 and 117 by the tram islands.

The junctions of King's Road/Shu Kuk Street, King's Road/Kam Hong Street and King's Road/Tin Chiu Street are controlled by traffic light signals. At the junction of King's Road/Shu Kuk Street westbound traffic on King's Road turning right into Shu Kuk Street must wait in the outer lane for a gap in the eastbound traffic stream to complete the right turn. The early cut-off of the eastbound traffic helps clear the right turning vehicles in each cycle. As the outer lane is shared with westbound trams, a right turning vehicle could cause tram delay while waiting to make the right turn. Eastbound trams are not exposed to such delays as eastbound traffic on King's Road cannot turn right into Shu Kuk Street.

At the junction of King's Road/Kam Hong Street, eastbound trams are similarly delayed by eastbound vehicles waiting on the outer lane to turn right into Kam Hong Street. The sequence of operation of the traffic light signals does not provide for an early cut-off of westbound traffic and hence eastbound trams could be delayed beyond one cycle.

Traffic on King's Road is not permitted to turn right at the junction of King's Road/Tin Chiu Street and hence trams do not experience delay during the green period by right-turning vehicles.

Public light bus boarding and alighting restrictions on King's Road were effective at the time of survey from a point east of North Point Road to about midway between Shu Kuk Street and Kam Hong Street.

The layout of the site is shown in FIGURE 1.

Results of Survey:

The east-west vehicle flow (excluding trams) on King's Road and the right turning volumes at Shu Kuk Street and Kam Hong Street junctions are given in TABLE 1. The eastbound volume on King's Road was much smaller than the volume on the adjacent section west of North Point Road. The difference in westbound volumes on the adjacent sections was very little. Right turning volumes were of the same order as that observed at the junction of King's Road/Fortress Hill Road.

The hourly average journey time and speed between tram stops are given in TABLE 2. The average delay per tram classified according to the cause of delay is given by the hour in TABLES 3A to 3C.

Eastbound trams maintained an average journey speed of 10.72 km/h (6.66 m.p.h.) with westbound trams maintaining a similar speed of 10.78 km/h (6.70 m.p.h.). Due probably to the larger volume of westbound traffic, westbound trams maintained a slightly lower running speed of 13.85 km/h (8.61 m.p.h.) than the eastbound tram speed of 14.80 km/h (9.20 m.p.h.).

Eastbound trams experienced slightly longer stopped time delay than westbound trams, the stopped time delay contributing to 28% and 22% respectively of the journey time. About 88% of the stopped time delay in each direction occurred at traffic light signals during the red period.

At the junction of King's Road/Kam Hong Street about 40% of the eastbound trams were stopped by vehicles turning right from King's Road eastbound into Kam Hong Street for periods ranging from 1 to 16 seconds during the green period of the traffic signal at this junction. Between 1700 and 1900 hour, the average delay per tram due to right turning vehicles was 3.4 seconds, about 10% of the stopped time delay.

At the junction of King's Road/Shu Kuk Street, vehicles turning right from King's Road westbound into Shu Kuk Street stopped about 25% of the westbound trams during the green period of traffic light signal at this junction. Although the proportion of trams that were stopped was less than at Kam Hong Street junction, the stopped duration was longer ranging from 3 to 33 seconds. The longer delay duration was probably due to more green time at this junction. Between 1700 and 1900 hours, the average delay per tram due to right turning vehicles was 3.7 seconds, about 12% of the stopped time delay.

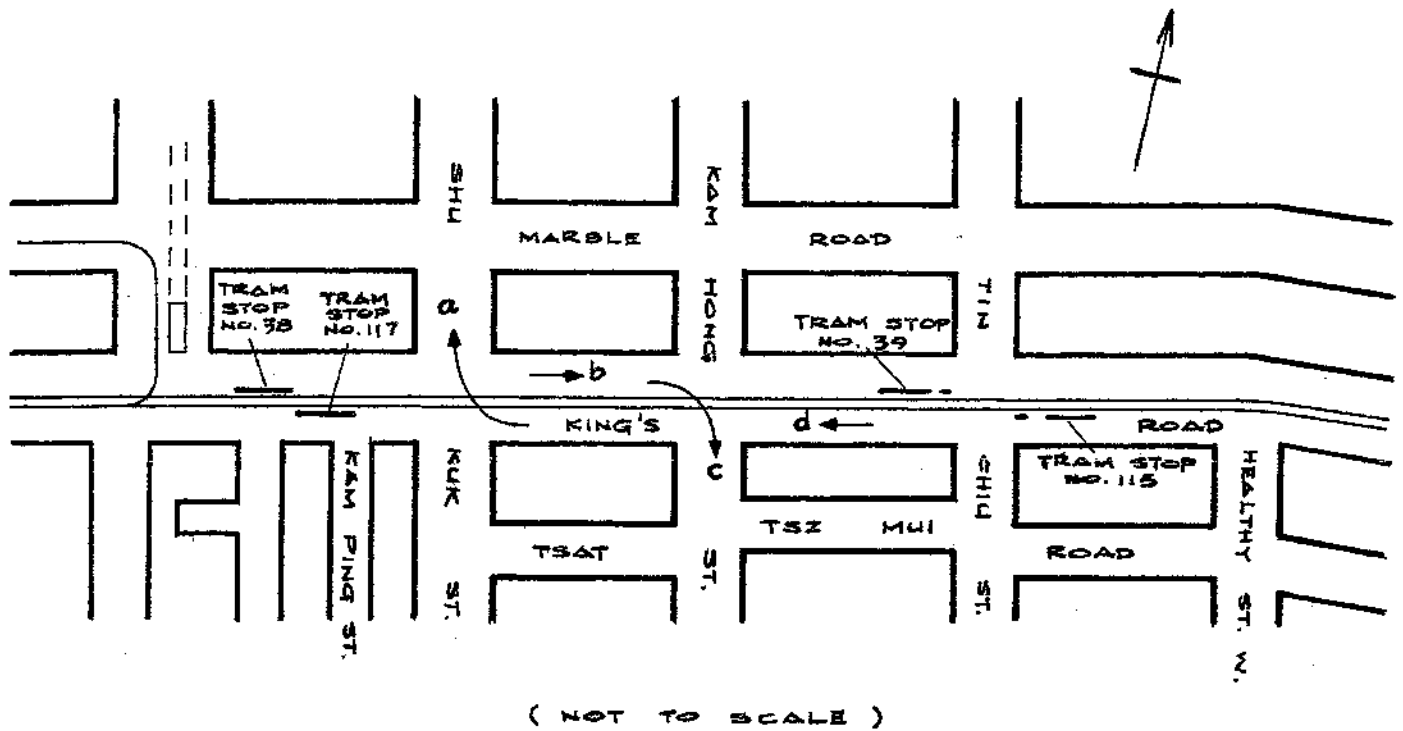
Comment:

Tram journey speed during the evening peak period observed during the survey was remarkably higher than that observed in December, 1974. Eastbound speed showed an increase of about 40% from 7.6 km/h to 10.7 km/h while westbound speed was increased by about 96% from 5.5 km/h to 10.8 km/h. The increase in eastbound

speed could be attributed to a 46% reduction in delay at intersections and a 20% reduction in running time between tram stops no. 38 and 39. The phenomenal increase in westbound speed was due to a 66% reduction in delay at intersections and a 38% reduction in running time between tram stops no. 115 and 117. The reduction in the delay at intersections is due partly to the elimination of the 15.68 seconds delay per eastbound tram and 39.33 seconds delay per westbound tram experienced in 1974 between 1700 to 1900 hours, at which time the junction of King's Road/Shu Kuk Street was controlled by a police officer.

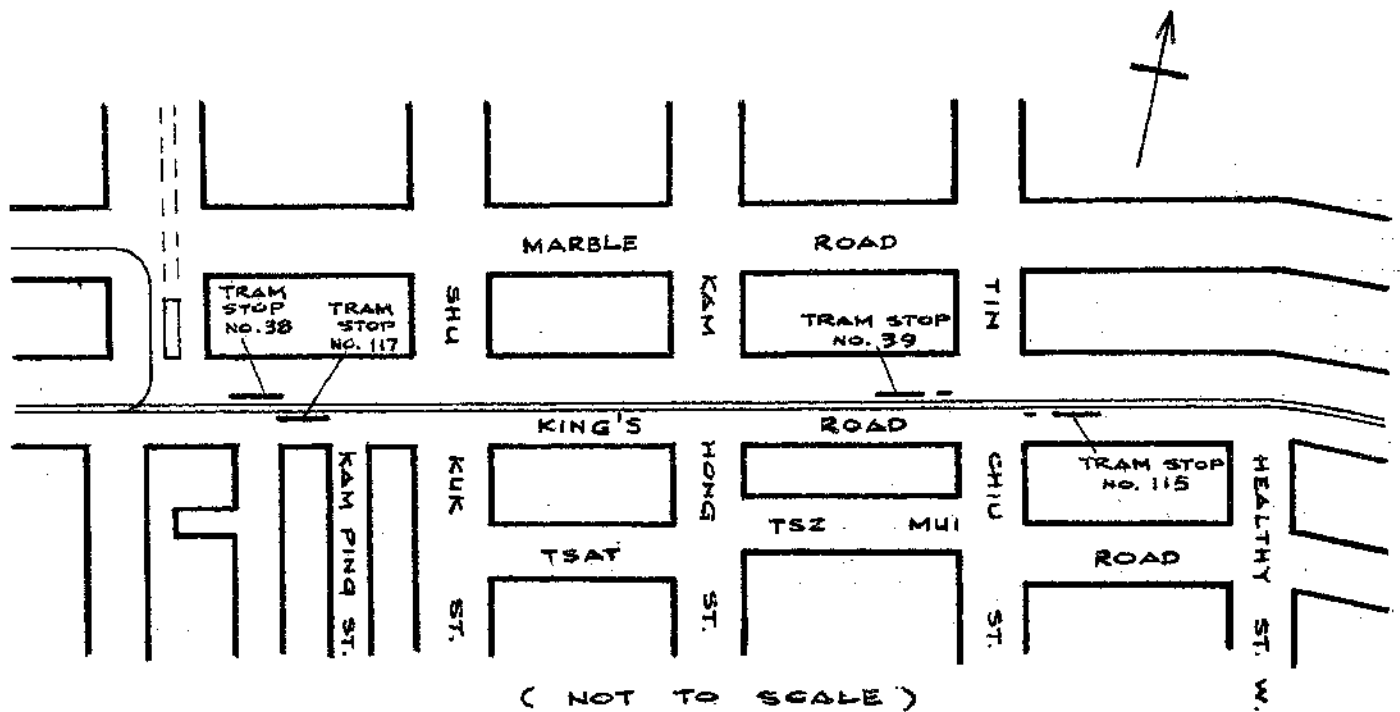
Since 24th October, 1975, the P.L.B. clearway on the eastbound carriageway of King's Road has been extended eastwards by some 33 metres to end in front of 443, King's Road i.e. further away from the Shu Kuk Street junction. This measure has effectively eliminated the long queue of P.L.B.s from blocking the Shu Kuk Street junction thus resulting in less delay to trams caused by right turning vehicles as compared with the 1974 survey (Technical Report 220).

TABLE 1 VEHICLE FLOWS AND TURNING MOVEMENTS ON KING'S ROAD



HOUR	VEHICLE FLOW (EXCLUDING TRAMS)			
	a	b	c	d
1700-1800	70	1105	88	1501
1800-1900	65	1100	111	1285

TABLE 2 AVERAGE TRAM TRAVEL TIME AND SPEED ON KING'S ROAD



BOUND	SECTION BETWEEN	DISTANCE IN km	AVERAGE TRAM TRAVEL	PERIOD OF DAY		
				1700-1800	1800-1900	ALL PERIOD 1700-1900
EAST	TRAM STOP NO.38 AND TRAM STOP NO.39	0.37	TIME (min.)	2.09 (1.51)	2.04 (1.48)	2.07 (1.50)
			SPEED (km/h)	10.62 (14.70)	10.88 (15.00)	10.72 (14.80)
			SPEED (m.p.h.)	6.60 (9.13)	6.76 (9.32)	6.66 (9.20)
WEST	TRAM STOP NO.115 AND TRAM STOP NO.117	0.39	TIME (min.)	2.15 (1.63)	2.20 (1.76)	2.17 (1.69)
			SPEED (km/h)	10.88 (14.36)	10.64 (13.30)	10.78 (13.85)
			SPEED (m.p.h.)	6.76 (8.92)	6.61 (8.26)	6.70 (8.61)

Note: () indicates running time and speed

TABLE 3(A) AVERAGE TRAM DELAY TIMES ALONG KING'S ROAD

Period: 1700 hr. to 1800 hr.

SECTION BETWEEN	DIRECTION & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY TIMES IN SECONDS					AVERAGE TRAM TRAVEL TIMES (IN SECOND)	PERCENT AS TRAVEL TIME
		AT SIGNAL CONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT VEHICLE	TOTAL		
		RED PERIOD	GREEN PERIOD VEHICLE RIGHT TURN					
TRAM STOP NO. 38 AND J/O KING'S ROAD/SHU KUK STREET	EAST (36)	11.5				11.5		
J/O KING'S ROAD/SHU KUK STREET AND J/O KING'S ROAD/KAM HONG STREET		19.7	3.9			23.6		
J/O KING'S ROAD/KAM HONG STREET AND TRAM STOP NO. 39						0		
TRAM STOP NO. 38 AND TRAM STOP NO. 39		31.2	3.9			35.1	125.4	28.0
TRAM STOP NO. 115 AND J/O KING'S ROAD/TIN CHIU STREET	WEST (37)	11.1				11.1		
J/O KING'S ROAD/TIN CHIU STREET AND J/O KING'S ROAD/KAM HONG STREET		5.6				5.6		
J/O KING'S ROAD/KAM HONG STREET AND J/O KING'S ROAD/SHU KUK STREET		11.4	3.0		0.1	14.5		
J/O KING'S ROAD/SHU KUK STREET AND TRAM STOP NO. 117						0		
TRAM STOP NO. 115 AND TRAM STOP NO. 117		28.1	3.0		0.1	31.2	129.0	24.2

TABLE 3(B) AVERAGE TRAM DELAY TIMES ALONG KING'S ROAD

Period: 1800 hr. to 1900 hr.

SECTION BETWEEN	DIRECTION & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY TIMES IN SECONDS					AVERAGE TRAM TRAVEL TIMES IN SECONDS	PERCENT AS TRAVEL TIME
		AT SIGNAL CONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT VEHICLE	TOTAL		
		RED PERIOD	GREEN PERIOD VEHICLE RIGHT TURN					
TRAM STOP NO. 38 AND J/O KING'S ROAD/SHU KUK STREET	EAST (37)	12.5	0.5			13.0		
J/O KING'S ROAD/SHU KUK STREET AND J/O KING'S ROAD/KAM HONG STREET		16.9	2.8		0.2	19.9		
J/O KING'S ROAD/KAM HONG STREET AND TRAM STOP NO. 39				0.5		0.5		
TRAM STOP NO. 38 AND TRAM STOP NO. 39		29.4	3.3	0.5	0.2	33.4	122.4	27.3
TRAM STOP NO. 115 AND J/O KING'S ROAD/TIN CHIU STREET		6.7				6.7		
J/O KING'S ROAD/TIN CHIU STREET AND J/O KING'S ROAD/KAM HONG STREET	8.3				8.3			
J/O KING'S ROAD/KAM HONG STREET AND J/O KING'S ROAD/SHU KUK STREET	WEST (33)	7.1	4.6			11.7		
J/O KING'S ROAD/SHU KUK STREET AND TRAM STOP NO. 117						0		
TRAM STOP NO. 115 AND TRAM STOP NO. 117		22.1	4.6			26.7	132.0	20.2

TABLE 3(C) AVERAGE TRAM DELAY TIMES ALONG KING'S ROAD

Period: 1700 hr. to 1900 hr.

SECTION BETWEEN	DIRECTION & NO. OF TRAMS PASSING	AVERAGE TRAM DELAY IN SECONDS					AVERAGE TRAM TRAVEL TIMES (IN SECOND)	PERCENT AS TRAVEL TIME
		AT SIGNAL CONTROLLED JUNCTION		APPROACH TO TRAM STOP	TRANSIT TO VEHICLE	TOTAL		
		RED PERIOD	GREEN PERIOD VEHICLE RIGHT TURN					
TRAM STOP NO. 38 AND J/O KING'S ROAD/SHU KUK STREET	EAST (36)	12.0	0.3			12.3		
J/O KING'S ROAD/SHU KUK STREET AND J/O KING'S ROAD/KAM HONG STREET		18.3	3.4		0.1	21.8		
J/O KING'S ROAD/KAM HONG STREET AND TRAM STOP NO. 39				0.3		0.3		
TRAM STOP NO. 38 AND TRAM STOP NO. 39		30.3	3.7	0.3	0.1	34.4	124.2	27.7
TRAM STOP NO. 115 AND J/O KING'S ROAD/TIN CHIU STREET	WEST (35)	9.0				9.0		
J/O KING'S ROAD/TIN CHIU STREET AND J/O KING'S ROAD/KAM HONG STREET		6.9				6.9		
J/O KING'S ROAD/KAM HONG STREET AND J/O KING'S ROAD/SHU KUK STREET		9.4	3.7			13.1		
J/O KING'S ROAD/SHU KUK STREET AND TRAM STOP NO. 117						0		
TRAM STOP NO. 115 AND TRAM STOP NO. 117		11.3	3.7			29.0	130.2	22.3

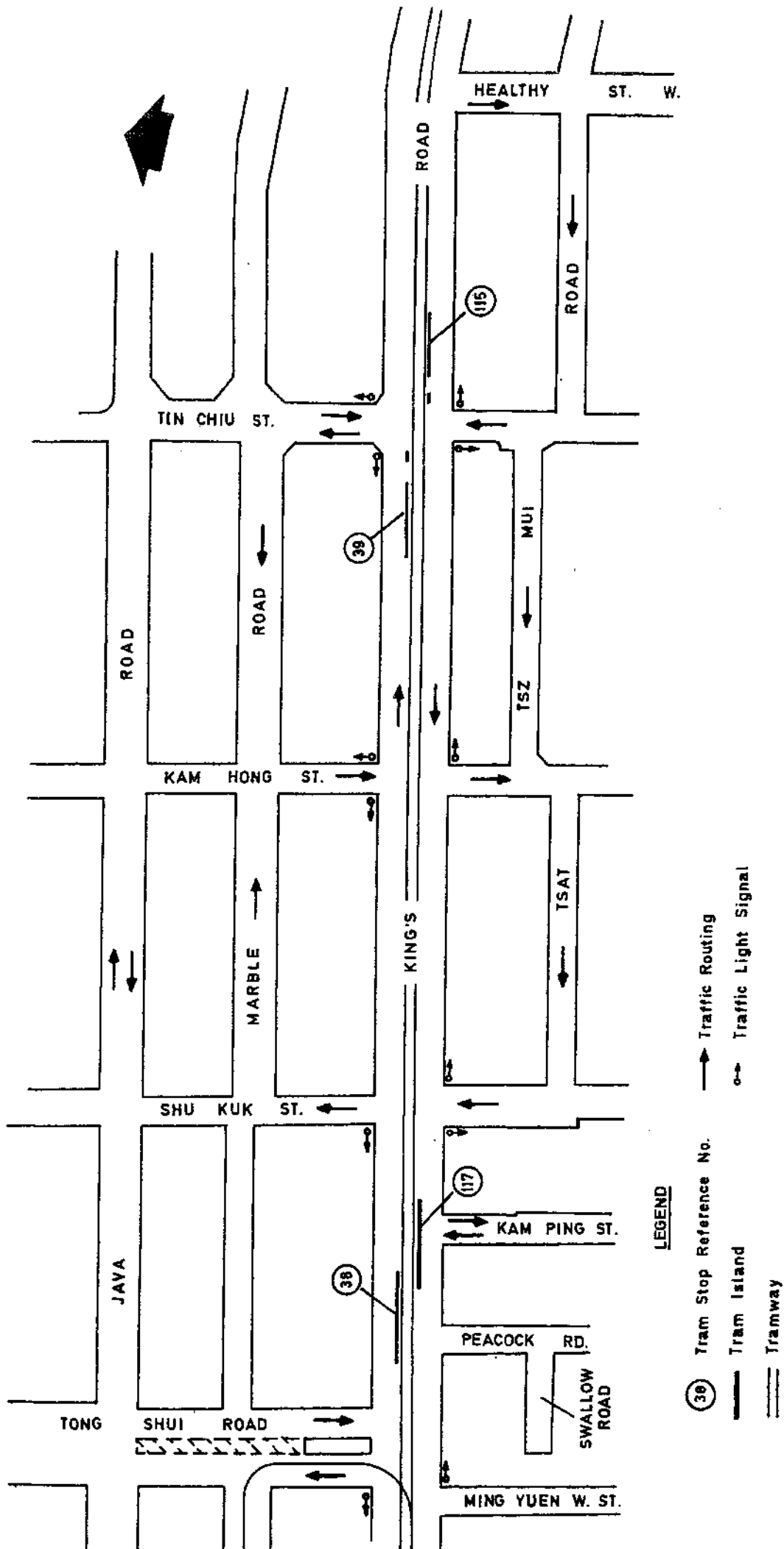


FIG. 1 SITE PLAN

SCALE 1 : 2400



TRAFFIC & TRANSPORT SURVEY DIVISION

PUBLIC WORKS DEPARTMENT

HONG KONG

13 OCT 1976

Data Record 238

Tram Travel Time and Delay

Study at Causeway Bay



Job No. 26

by

YAU Loi-hay

Ag. Chief Engineer: PANG Hau-chung

September 1976

Requested by: Commissioner for Transport

Purpose of Survey: To study the cause of the low tram journey speeds on Hennessy Road between Canal Road West and Yee Wo Street. Identified in Technical Report 220 as one of the seven locations where speeds were slower than 8 km/h (5 m.p.h.).

Nature of Survey: The survey was designed to cover the morning and evening peak periods and two off-peak periods. Site observations indicated that these would best be represented by the periods 0800-1000, 1200-1400, 1500-1600 and 1700-1900 hours.

The survey area covered the eastbound carriageway of Hennessy Road between Stops 26 and 27 and westbound carriageway between Stops 123 and 124 as well as the section of Percival Street southbound from Hennessy Road to Stop 151 as indicated in FIGURE 1. The movement of every tram that ran on these sections of tramway during the selected hours of study was observed from preselected locations along the footway. The times at which each tram passed predetermined check points were recorded from which the journey time and speed were computed. The time duration that each tram was stopped on its journey other than for boarding and alighting passengers and the cause for the delay were also recorded. These observations excluded delay resulting from acceleration, deceleration and slow movement caused by congestion as these are very difficult to measure. Vehicular turning movements at the Hennessy Road/Percival Street junction and vehicle queues at this junction were observed for comparison with tram delays. The survey was carried out on Wednesday, 5th November, 1975.

Subsequent to the above survey, traffic management scheme aimed to provide adequate time for pedestrians to cross Hennessy Road in safety at the junction of Hennessy Road/Percival Street was implemented on 6th January, 1976. The scheme introduced a pedestrian phase in the traffic signal cycle to assist pedestrians crossing Hennessy Road, and prohibited vehicle turning movements from Percival Street to Hennessy Road. Also, to improve traffic conditions at the junctions of Canal Road East and Canal Road West with Hennessy Road, all right turning movements at those junctions were prohibited from 15th January 1976.

To study the effect of these changes on tram journey speeds the observations made previously were repeated on 5th March 1976. This data record presents the comparative results of observations of tram speeds and delays 'before' and 'after' the introduction of the traffic management scheme.

Site Characteristics:

Hennessey Road, at its junction with Percival Street, has a two-way carriageway 24 m (78 ft) wide. The tram tracks are sited at the centre of the carriageway and hence share the two outermost lanes with other traffic, particularly right turning vehicles. The traffic light signals at this junction provide a separate phase for the eastbound and westbound traffic movement on Hennessey Road and southbound on Percival Street. Therefore, right turning vehicles that occupy the outer lane on which the tram track lies could complete the turn without interference from opposing traffic. Thus right turning vehicles would not delay trams during the green period unless their number is so large that they cannot all be discharged during the green period and are delayed through the red period as well. Westbound trams that left turn into Percival Street could secure priority to turn during the red period by the operation of a manual controller which displays a 'T' signal.

For the safety of the large number of pedestrians that cross Hennessey Road at its junction with Percival Street, on 6th January 1976 a pedestrian phase was introduced in the signal cycle to coincide with the southbound traffic phase, the cycle duration being extended from 69 seconds to 83 seconds. To avoid vehicle-pedestrian conflict vehicle turning movements from Percival Street to Hennessey Road were prohibited.

Though the junction of Hennessey Road/Yee Wo Street/Great George Street was also controlled by traffic light signals, all traffic movements on Hennessey Road were through movements. The tram island at Stop 123 (westbound) extends upto the traffic light signal at this junction, forming a physical barrier to discourage motorists using the tram track at this location.

Prior to 15th January 1976 right turning vehicular movements were permitted at the uncontrolled junction of Hennessey Road/Canal Road. The prohibition of right turning movements at this junction after 15th January 1976 was introduced to improve traffic flow in the area.

The mixed commercial and residential development that fronts Hennessy Road produces heavy vehicular and pedestrian activities. A busy market on Canal Road just south of Hennessy Road and several cinemas and shops on this section of Hennessy Road add to these activities. Hennessy Road also carries a large proportion of the east-west traffic along the northern shoreline which is a mixture of trams, buses, lorries, PLB's, cars and motor cycles. The site characteristics are shown in FIGURE 1.

Results:

The hourly vehicular movements at the junction of Hennessy Road and Percival Street are given in TABLE 1.

On average about 1360 vehicles per hour were observed westbound and 870 vehicles eastbound. About 36% of the westbound vehicles turned right into Percival Street but only about 11% of the eastbound turned right into Percival Street.

Westbound trams averaged about 71 per hour and eastbound about 94. About 25% of the eastbound trams turned right into Percival Street and about 14% of the westbound turned left into Percival Street.

Hardly any change was observed in the number of vehicles and trams in both the east and the west bound directions after the traffic management scheme at the Hennessy Road/Percival Street junction was introduced.

However, with the elimination of the turning movements from Percival Street into Hennessy Road 34% reduction in the southbound volume was observed although the through movement on Percival Street itself increased by 21%.

The observed traffic volume on each approach was within its actual capacity and ranged from 48% in the southbound direction to 86% in the westbound direction.

At the junction of Hennessy Road with Canal Road (East and West) right-turning vehicular movements were light. On average about 140 vehicles per hour were observed turning right from Hennessy Road eastbound into Canal Road East and about 50 vehicles per hour from Canal Road West into Hennessy Road eastbound. The other turning movements were very small, each being under 10 vehicles per hour. All right turning movements at this junction were prohibited after 15th January 1976 and were therefore not existing in the 'after' study.

Kerbside boarding/alighting of PLB and taxi passengers and loading/unloading of goods vehicles was observed during the survey. However, this activity did not interfere with tram movement in the study location although it caused delay to other vehicles. TABLE 2 gives the average tram journey time and speed during each hour of observation. TABLES 3A to 3H show the average stopped time delay classified by cause of delay. All tabulations indicate the 'before' and 'after' values for comparison.

The all period journey speed maintained by eastbound trams between Stop Nos. 26 and 27 was 7.97 km/h (4.95 mph) before the traffic management scheme and 7.82 km/h (4.86 mph) after. Practically all the delay on this section occurred between Stop No. 26 and Percival Street junction, this too resulting from delay during the red period of the traffic light signal. Hardly any delay was observed between Percival Street and Stop No. 27 and hence an all period speed of 10.83 km/h (6.73 mph) was maintained on this section. A higher speed was maintained during the morning peak period (0800-0900 hr.) than in the evening peak (1700-1900 hr.) or the off-peak period.

Practically all the delay experienced by eastbound trams occurred at the traffic light signal at the junction of Hennessy Road/Percival Street. About half the time taken to travel from Stop No. 26 through this junction was spent waiting at the traffic light signal during the red period. Practically every tram that passed through this junction experienced the delay. Because of the signal phasing arrangement right turning vehicles did not delay trams during the green period as the right turn could be completed without interference from oncoming westbound traffic. However, trams turning right into Percival Street were delayed at times by westbound trams turning left into Percival Street on the tram priority signal. This delay was of little consequence as only 14 out of 170 trams experienced the delay which did not exceed 8 seconds whenever it occurred.

A westbound tram travelling between Stop Nos. 123 and 124 passed through two sets of traffic light signals, one at Yee Wo Street junction and the other at Percival Street. Therefore, a westbound tram experienced a longer intersection delay (63.2 secs) and slower journey speed of 6.60 km/h (4.1 mph) than a eastbound tram. The average delay experienced during the red display of the traffic light signal at Yee Wo Street was 10 seconds

and at Percival Street 48 seconds. Tram delay during the green display was experienced at Percival Street junction because trams turning left into Percival Street must wait for the 'T' signal before proceeding and must also force their way through the westbound traffic stream. The average delay so caused was 6 seconds per tram i.e. one tenth the total delay. Westbound trams experienced very little delay beyond Percival Street junction and as a result maintained an average journey speed of 10.8 km/h (6.7 mph) between Percival Street and Stop No. 124. Very little change was observed in westbound tram journey speed with the introduction of the traffic management scheme at Percival Street and at Canal Road junctions.

TABLE 4 shows the hourly vehicle flow and delay at the junction of Hennessy Road and Percival Street. There was not much variation in the hourly volume in either direction but the westbound flow was regularly larger than the eastbound flow by more than a third.

Vehicle delay was largest in the evening between 1800 and 1900 hour, because of the high boarding and alighting activity in the area at the time. At lunch time too the delay was rather high, over a minute per vehicle. The lower morning delay was probably due to the presence of policemen discouraging PLB's, taxis and pak-pais waiting in the kerbside lane for passengers. Police presence was observed for most part of the 'after' survey to check infringement of the turning prohibition from Percival Street into Hennessy Road. This was probably the reason for the lesser average delay per vehicle observed in the 'after' study.

The average delay per eastbound vehicle during the survey period was 52 seconds in the 'before' survey and 46 seconds in the 'after' survey. At the junction of Hennessy Road and Percival Street the average vehicle delay was not much different to the average tram delay, this being observed at 48 seconds and 51 seconds respectively. Westbound delay was 61 seconds and 46 seconds for vehicles and 54 seconds and 60 seconds for trams.

A paired comparison t-test was carried out to examine the difference between the observed averages in the 'before' and 'after' studies indicate no significant difference between the two studies for all sections.

Comment:

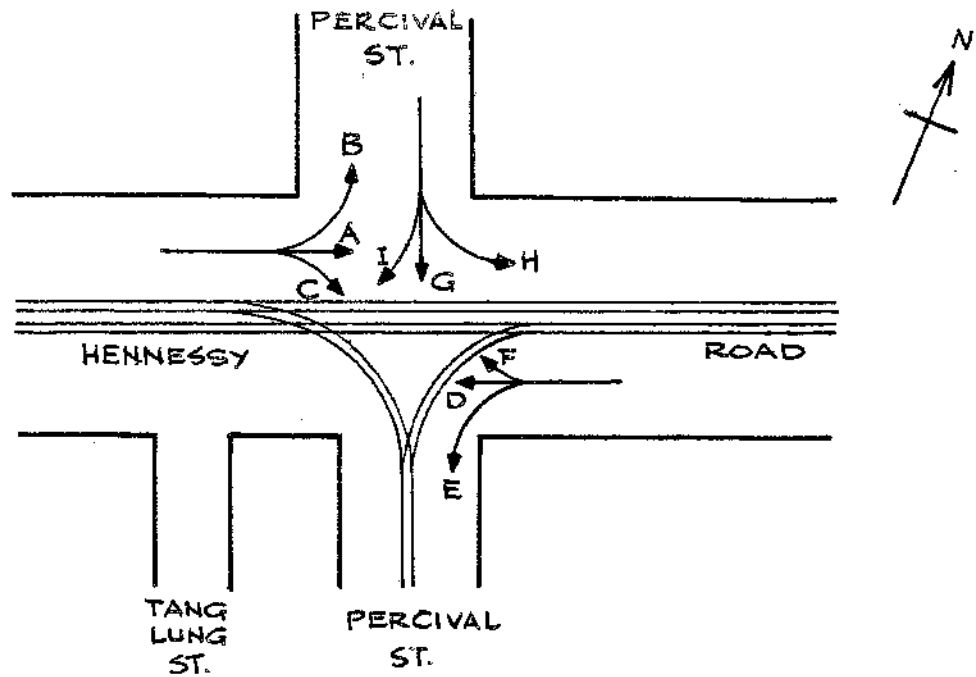
The all day average eastbound tram speed was just below 8 km/h (5 mph) while the westbound speed was even lower. As the traffic management scheme at Percival Street/Hennessy Road junction was designed primarily to improve the safety of pedestrians crossing Hennessy Road through the inclusion of a pedestrian phase in the traffic light signals cycle, no significant change was observed in the tram speeds 'before' and 'after' the implementation of the scheme. However, tram delay was increased slightly because of the loss in effective green time.

Considering that practically all the delay to trams on the section under observation occurred during the red period of the traffic light signal, any improvement in tram speeds on this section would only result from a reduction in delay at the traffic light signal. This could best be achieved by segregating the vehicle and pedestrian movement across Hennessy Road from that along Hennessy Road. Such a measure would also reduce considerably the delay experienced at this junction by other vehicles, which at the time of survey was about 30 vehicle hours per hour. The average delay experienced by people travelling by all modes of transport on Hennessy Road as a result of the vehicles being stopped during the red display of the traffic light signals is estimated to be 380 person hours per hour.

The reduction, if not the elimination of this delay could result in much benefit.

Because of severe physical restrictions of site segregation of vehicular movement across Hennessy Road at this junction would not be possible unless by directing such movement to other locations. Segregation of pedestrian movement by provision of an overhead crossing is also difficult because of space restrictions, but appears practicable with restraint. More detailed examination may be required of the rather complex pattern of traffic movement in the area and the feasibility and practicability of introducing such measures to reduce delay and thereby improve tram speeds on this section of Hennessy Road.

TABLE 1 VEHICLE TURNING MOVEMENTS AT THE HENNESSY ROAD/PERCIVAL STREET JUNCTION



HOUR	No. of Vehicles												
	EAST BOUND					WEST BOUND					SOUTH BOUND		
	A		E	C		D		E	F	G	H	I	
	Tram	Vehi- cular	Vehi- cular	Tram	Vehi- cular	Tram	Vehi- cular	Tram	Vehi- cular	Vehi- cular	Vehi- cular	Vehi- cular	Vehi- cular
0800-0900	67 (73)	648 (648)	23 (26)	25 (25)	78 (93)	69 (68)	863 (766)	8 (8)	41 (42)	619 (589)	172 (232)	70 (-)	145 (-)
0900-1000	75 (74)	727 (744)	34 (24)	26 (25)	111 (107)	59 (70)	633 (796)	10 (11)	36 (38)	493 (391)	227 (338)	78 (-)	103 (-)
1200-1300	65 (70)	753 (756)	47 (40)	26 (24)	86 (104)	59 (56)	798 (847)	12 (8)	70 (53)	507 (454)	268 (372)	101 (-)	139 (-)
1300-1400	66 (65)	740 (771)	48 (40)	27 (22)	88 (88)	57 (69)	778 (911)	11 (13)	54 (50)	460 (446)	273 (386)	139 (-)	103 (-)
1500-1600	74 (71)	783 (769)	58 (39)	22 (19)	106 (91)	49 (68)	761 (850)	16 (7)	64 (64)	477 (457)	333 (347)	120 (-)	108 (-)
1700-1800	75 (68)	741 (709)	42 (46)	22 (23)	89 (95)	62 (64)	855 (832)	12 (9)	40 (47)	517 (534)	324 (364)	125 (-)	149 (-)
1800-1900	63 (75)	746 (771)	35 (32)	22 (20)	112 (93)	53 (63)	860 (899)	11 (10)	67 (46)	514 (489)	373 (350)	121 (-)	140 (-)

Note: Figures in brackets indicate 'after study' results.

TABLE 2 AVERAGE TRAM TRAVEL TIME AND SPEED ALONG HENNESSY ROAD

Section between	Bound	Distance (km)	Average Tram Travel	Period of Day							All Period
				0800-0900	0900-1000	1200-1300	1300-1400	1500-1600	1700-1800	1800-1900	
Tram Stop No. 26 and J/O Percival Street	EAST	0.21	Time (min) Speed (km/h) Speed (m.p.h.)	1.68(1.43) 7.50(8.51) 4.66(5.29)	1.73(2.07) 7.28(6.09) 4.52(3.78)	1.91(1.79) 6.60(7.04) 4.10(4.37)	1.86(1.86) 6.77(6.77) 4.21(4.21)	2.13(2.08) 5.92(6.06) 3.68(3.77)	1.78(2.11) 7.08(5.97) 4.40(3.71)	1.70(2.09) 7.41(6.03) 4.60(3.75)	1.84(1.95) 6.85(6.46) 4.26(4.01)
J/O Percival Street and Tram Stop No. 27		0.13	Time (min) Speed (km/h) Speed (m.p.h.)	0.58(0.55) 13.45(14.18) 8.36(8.81)	0.58(0.66) 13.45(11.82) 8.36(7.34)	0.64(0.60) 12.19(13.00) 7.57(8.08)	0.73(0.70) 10.68(11.14) 6.64(6.92)	0.76(0.70) 10.26(11.14) 6.38(6.92)	0.79(0.66) 9.87(11.82) 6.13(7.34)	0.93(0.74) 8.39(10.54) 5.21(6.55)	0.72(0.66) 10.83(11.82) 6.73(7.34)
Tram Stop No. 26 and Tram Stop No. 27		0.34	Time (min) Speed (km/h) Speed (m.p.h.)	2.26(2.03) 9.03(10.05) 5.61(6.24)	2.31(2.73) 8.87(7.47) 5.49(4.64)	2.55(2.39) 8.00(8.54) 4.97(5.31)	2.59(2.56) 7.88(7.97) 4.90(4.95)	2.89(2.78) 7.06(7.34) 4.39(4.56)	2.57(2.77) 7.94(7.36) 4.93(4.57)	2.63(2.83) 7.76(7.21) 4.82(4.48)	2.56(2.61) 7.97(7.82) 4.95(4.86)
Tram Stop No. 123 and J/O Percival Street	WEST	0.23	Time (min) Speed (km/h) Speed (m.p.h.)	2.13(2.52) 6.48(5.48) 4.03(3.41)	1.82(2.62) 7.58(5.27) 4.71(3.27)	2.32(2.09) 5.95(6.60) 3.70(4.10)	2.37(2.73) 5.82(5.05) 3.62(3.14)	2.66(2.34) 5.19(5.90) 3.22(3.67)	2.74(2.23) 5.04(6.19) 3.13(3.85)	2.85(2.56) 4.78(5.39) 2.97(3.35)	2.42(2.46) 5.70(5.61) 3.54(3.49)
J/O Percival Street and Tram Stop No. 124		0.11	Time (min) Speed (km/h) Speed (m.p.h.)	0.52(0.53) 12.69(12.45) 7.89(7.74)	0.55(0.65) 12.00(10.15) 7.46(6.31)	0.56(0.54) 11.79(12.22) 7.33(7.59)	0.67(0.68) 9.85(9.71) 6.12(6.03)	0.76(0.76) 8.68(8.68) 5.39(5.39)	0.60(0.60) 11.00(11.00) 6.84(6.84)	0.65(0.65) 10.15(10.15) 6.31(6.31)	0.61(0.63) 10.82(10.48) 6.72(6.51)
Tram Stop No. 123 and Tram Stop No. 124		0.34	Time (min) Speed (km/h) Speed (m.p.h.)	2.65(3.05) 7.70(5.53) 4.78(4.16)	2.37(3.27) 8.51(6.24) 5.35(3.88)	2.89(2.63) 7.08(7.76) 4.40(4.82)	3.04(3.41) 6.71(5.98) 4.17(3.72)	3.42(3.10) 5.96(6.58) 3.70(4.09)	3.34(2.83) 6.11(7.21) 3.80(4.48)	3.54(3.21) 5.76(6.36) 3.58(3.95)	3.03(3.09) 6.73(6.60) 4.18(4.10)
Percival Street J/O Hennessy Road and Tram Stop No. 151	SOUTH	0.08	Time (min) Speed (km/h) Speed (m.p.h.)	0.45(0.37) 10.67(12.97) 6.63(8.06)	0.48(0.44) 10.00(10.91) 6.21(6.78)	0.52(0.43) 9.23(11.16) 5.74(6.93)	0.52(0.53) 9.23(9.06) 5.74(5.63)	0.52(0.45) 9.23(10.67) 5.74(6.63)	0.48(0.47) 10.00(10.21) 6.21(6.34)	0.57(0.51) 8.42(9.41) 5.23(5.85)	0.51(0.46) 9.41(10.43) 5.85(6.48)

Note: Figures in brackets indicates 'after study' results

TABLE 3A AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 0800 hr. to 0900 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time
			At Traffic Light Signal			Uncontrolled	Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop	Total		
			During Red Phase	During Green Phase								
				Tram Left-turn	Vehicle Right-turn	Vehicle Right-turn						
Tram Stop No. 26 and J/O Percival Street	East	99 (103)	41.0 (32.1)	0.2		0.4	0.3 (0.5)	0.1 (0.9)		42.0 (33.5)	100.8 (88.8)	41.7 (37.7)
J/O Percival Street and Tram Stop No. 27								0.5 (0.1)	0.5 (0.3)	34.8 (33.0)	1.4 (0.9)	
Tram Stop No. 26 and Tram Stop No. 27			41.0 (32.1)	0.2		0.4	0.3 (0.5)	0.1 (1.1)	0.5 (0.1)	42.5 (33.8)	135.6 (121.8)	31.3 (27.8)
Tram Stop No. 123 and J/O Percival Street	West	78 (74)	50.8 (54.5)	2.6 (7.0)						53.4 (61.5)	127.8 (151.2)	41.8 (40.7)
J/O Percival Street and Tram Stop No. 124								0.5 (0.6)	0.5 (0.6)	31.2 (31.8)	1.6 (1.9)	
Tram Stop No. 123 and Tram Stop No. 124			50.8 (54.5)	2.6 (7.0)					0.5 (0.6)	53.9 (62.1)	159.0 (183.0)	33.9 (33.9)
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	33 (33)							0.2 (0.2)	0.2 (0.2)	27.0 (22.2)	0.7 (0.9)

Note: Figures in brackets indicates 'after study'

TABLE 3B AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 0900 hr. to 1000 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time
			At Traffic Light Signal			Uncontrolled	Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop	Total		
			During Red Phase	During Green Phase		Vehicle Right-turn						
				Tram Left-turn	Vehicle Right-turn							
Tram Stop No. 26 and J/O Percival Street	East	97 (101)	43.8 (53.9)		0.1	0.3	0.1 (0.1)	0.5		44.8 (54.0)	103.8 (124.2)	43.2 (43.5)
J/O Percival Street and Tram Stop No. 27							0.1	0.3 (0.7)	0.4 (0.7)	34.8 (39.6)	1.1 (1.8)	
Tram Stop No. 26 and Tram Stop No. 27			43.8 (53.9)		0.1	0.3	0.1 (0.1)	0.6	0.3 (0.7)	45.2 (54.7)	138.6 (163.8)	32.6 (33.4)
Tram Stop No. 123 and J/O Percival Street	West	69 (81)	36.1 (82.4)	1.7 (9.7)	0.1					37.9 (92.1)	109.2 (157.2)	34.7 (58.6)
J/O Percival Street and Tram Stop No. 124								0.4 (0.5)	0.4 (0.5)	33.0 (39.0)	1.2 (1.3)	
Tram Stop No. 123 and Tram Stop No. 124			36.1 (82.4)	1.7 (9.7)	0.1				0.4 (0.5)	38.3 (92.6)	142.2 (196.2)	26.9 (47.2)
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	36 (36)							0.4	0.4 (0)	28.8 (26.4)	1.4 (0)

Note: Figures in brackets indicates 'after study'

TABLE 3C AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 1200 hr. to 1300 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time	
			At Traffic Light Signal			Uncontrolled	Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop	Total			
			During Red Phase	During Green Phase		Vehicle Right-turn							
				Tram Left-turn	Vehicle Right-turn								
Tram Stop No. 26 and J/O Percival Street	East	93 (96)	40.3 (44.7)	0.1		0.4	0.1 (0.1)		(0.4)	40.9 (45.2)	114.6 (107.4)	35.7 (42.1)	
J/O Percival Street and Tram Stop No. 27								1.7 (0.2)	1.7 (0.2)	38.4 (36.0)	4.4 (0.6)		
Tram Stop No. 26 and Tram Stop No. 27			40.3 (44.7)	0.1		0.4	0.1 (0.1)		(0.4)	1.7 (0.2)	42.6 (45.4)	153.0 (143.4)	27.8 (31.7)
Tram Stop No. 123 and J/O Percival Street	West	71 (64)	68.3 (50.8)	10.3 (0.8)	0.1					78.7 (51.6)	139.2 (125.4)	56.5 (41.1)	
J/O Percival Street and Tram Stop No. 124									0.3 (0.2)	0.3 (0.2)	33.6 (32.4)	0.9 (0.6)	
Tram Stop No. 123 and Tram Stop No. 124			68.3 (50.8)	10.3 (0.8)	0.1					0.3 (0.2)	79.0 (51.8)	172.8 (157.8)	45.7 (32.8)
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	38 (32)								0.8 (0.5)	0.8 (0.5)	31.2 (25.8)	2.6 (1.9)

Note: Figures in brackets indicates 'after study'

TABLE 3D AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 1300 hr. to 1400 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time
			At Traffic Light Signal			Uncontrolled Vehicle Right-turn	Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop	Total		
			During Red Phase	During Green Phase								
				Tram Left-turn	Vehicle Right-turn							
Tram Stop No. 26 and J/O Percival Street	East	97 (87)	54.5 (51.5)				0.3 (0.3)	(0.4)		54.8 (52.2)	111.6 (111.6)	49.1 (46.8)
J/O Percival Street and Tram Stop No. 27								2.1 (1.3)	2.1 (1.5)	43.8 (42.0)	4.8 (3.6)	
Tram Stop No. 26 and Tram Stop No. 27			54.5 (51.5)				0.3 (0.3)	(0.6)	2.1 (1.3)	56.9 (53.7)	155.4 (153.6)	36.6 (35.0)
Tram Stop No. 123 and J/O Percival Street	West	72 (87)	58.3 (77.1)	6.8 (8.7)						65.1 (85.8)	142.2 (163.8)	45.8 (52.4)
J/O Percival Street and Tram Stop No. 124								2.9 (3.4)	2.9 (3.4)	40.2 (40.8)	7.2 (8.3)	
Tram Stop No. 123 and Tram Stop No. 124			58.3 (77.1)	6.8 (8.7)					2.9 (3.4)	68.0 (89.2)	182.4 (204.6)	37.3 (43.6)
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	38 (35)							0.1 (1.7)	0.1 (1.7)	31.2 (31.8)	0.3 (5.3)

Note: Figures in brackets indicates 'after study'

TABLE 3E AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 1500 hr. to 1600 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time	
			At Traffic Light Signal			Uncontrolled	Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop	Total			
			During Red Phase	During Green Phase		Vehicle Right-turn							
				Tram Left-turn	Vehicle Right-turn								
Tram Stop No. 26 and J/O Percival Street		95 (92)	59.2 (53.8)		0.1	0.2	0.3 (0.4)				59.8 (54.2)	127.8 (124.8)	46.8 (43.4)
J/O Percival Street and Tram Stop No. 27	East								2.7 (2.1)	2.7 (2.1)	45.6 (42.0)	5.9 (5.0)	
Tram Stop No. 26 and Tram Stop No. 27			59.2 (53.8)		0.1	0.2	0.3 (0.4)		2.7 (2.1)	62.5 (56.3)	173.4 (166.8)	36.0 (33.8)	
Tram Stop No. 123 and J/O Percival Street	West	70 (74)	58.4 (61.8)	6.4 (2.6)							64.8 (64.4)	159.6 (140.4)	40.6 (45.9)
J/O Percival Street and Tram Stop No. 124							0.1 (0.1)		5.1 (6.2)	5.1 (6.3)	45.6 (45.6)	11.2 (13.8)	
Tram Stop No. 123 and Tram Stop No. 124			58.4 (61.8)	6.4 (2.6)			0.1 (0.1)		5.1 (6.2)	69.9 (70.7)	205.2 (186.0)	34.1 (38.0)	
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	38 (26)							2.9 (0.2)	2.9 (0.2)	31.2 (27.0)	9.3 (0.7)	

Note: Figures in brackets indicates 'after study'

TABLE 3F AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 1700 hr. to 1800 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec).	Percent as Travel Time	
			At Traffic Light Signal			Uncontrolled		Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop			Total
			During Red Phase	During Green Phase		Vehicle Right-turn							
				Tram Left-turn	Vehicle Right-turn								
Tram Stop No. 26 and J/O Percival Street	East	91 (89)	50.7 (61.7)	0.2 (0.1)	0.5	0.1	(0.1)	(0.2)	51.5 (62.1)	106.8 (126.6)	48.2 (49.1)		
J/O Percival Street and Tram Stop No. 27								2.1 (0.3)	2.1 (2.0)	47.4 (39.6)	4.4 (5.1)		
Tram Stop No. 26 and Tram Stop No. 27				50.7 (61.7)	0.2 (0.1)	0.5	0.1	(0.1)	(0.5)	53.6 (64.1)	154.2 (166.2)	34.8 (38.6)	
Tram Stop No. 123 and J/O Percival Street	West	74 (70)	58.9 (61.3)	4.3 (2.9)					63.2 (64.2)	164.4 (133.8)	38.4 (48.0)		
J/O Percival Street and Tram Stop No. 124							(0.1)		1.2 (0.2)	1.2 (0.3)	36.0 (36.0)	3.3 (0.8)	
Tram Stop No. 123 and Tram Stop No. 124				58.9 (61.3)	4.3 (2.9)			(0.1)		64.4 (64.5)	200.4 (169.8)	32.1 (33.0)	
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	34 (32)							0.6 (0.3)	0.6 (0.3)	28.8 (28.2)	2.1 (1.1)	

Note: Figures in brackets indicates 'after study'

TABLE 30 AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: 1800 hr. to 1900 hr.

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time	
			At Traffic Light Signal			Uncontrolled		Pedestrian Crossing	Transit Vehicle	Approach to Tram Stop			Total
			During Red Phase	During Green Phase		Vehicle Right-turn							
				Tram Left-turn	Vehicle Right-turn								
Tram Stop No. 26 and J/O Percival Street	East	86 (96)	46.3 (58.7)			0.5		0.2		47.0 (58.9)	102.0 (125.4)	46.1 (47.0)	
J/O Percival Street and Tram Stop No. 27								0.4 (0.1)	3.0 (1.4)	3.4 (1.5)	55.8 (44.4)	6.1 (3.4)	
Tram Stop No. 26 and Tram Stop No. 27			46.3 (58.7)			0.5		0.6 (0.1)	3.0 (1.4)	50.4 (60.4)	157.8 (169.8)	31.9 (35.6)	
Tram Stop No. 123 and J/O Percival Street	West	64 (73)	73.1 (70.9)	8.3 (3.9)						81.4 (74.8)	173.4 (153.6)	46.9 (48.7)	
J/O Percival Street and Tram Stop No. 124								0.2 (0.1)	0.2 (0.1)	39.0 (39.0)	0.5 (0.3)		
Tram Stop No. 123 and Tram Stop No. 124			73.1 (70.9)	8.3 (3.9)					0.2 (0.1)	81.6 (74.9)	212.4 (192.6)	38.4 (38.9)	
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	33 (30)							2.5 (0.7)	2.3 (0.7)	34.2 (30.6)	6.7 (2.3)	

Note: Figures in brackets indicates 'after study'

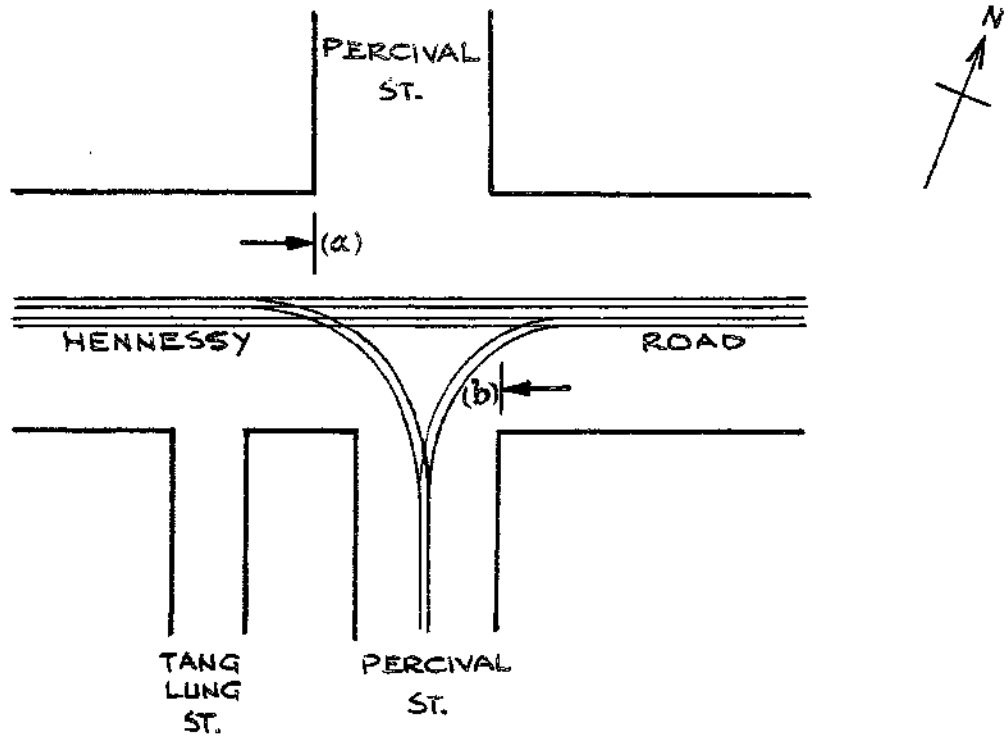
TABLE 3H AVERAGE TRAM DELAY TIMES ALONG HENNESSY ROAD

Period: All Period

Section between	Bound	Number of Trams Passing	Average Tram Delay Times in Seconds								Average Tram Travel Time (sec)	Percent as Travel Time		
			At Traffic Light Signal						Pedestrian Crossing	Transit Vehicle			Approach to Tram Stop	Total
			During Red Phase	During Green Phase		Vehicle Right-turn								
				Tram Left-turn	Vehicle Right-turn									
Tram Stop No. 26 and J/O Percival Street	East	94 (95)	48.3 (50.6)	0.1		0.4	0.2 (0.2)	0.1 (0.3)		49.1 (51.1)	110.4 (117.0)	44.5 (43.7)		
J/O Percival Street and Tram Stop No. 27								0.1 (0.1)	1.8 (1.0)	1.9 (1.1)	43.2 (39.6)	4.4 (2.8)		
Tram Stop No. 26 and Tram Stop No. 27			48.3 (50.6)	0.1		0.4	0.2 (0.2)	0.2 (0.4)	1.8 (1.0)	51.0 (52.2)	153.6 (156.6)	33.2 (33.3)		
Tram Stop No. 123 and J/O Percival Street	West	71 (75)	57.5 (66.4)	5.7 (5.4)						63.2 (71.8)	145.2 (147.6)	43.5 (43.6)		
J/O Percival Street and Tram Stop No. 124									1.4 (1.7)	1.4 (1.7)	36.6 (37.8)	3.8 (4.5)		
Tram Stop No. 123 and Tram Stop No. 124			57.5 (66.4)	5.7 (5.4)					1.4 (1.7)	64.6 (73.5)	181.8 (185.4)	35.5 (39.6)		
Percival Street J/O Hennessy Road and Tram Stop No. 151	South	36 (32)							1.7 (0.5)	1.7 (0.5)	30.6 (27.6)	5.6 (1.8)		

Note: Figures in brackets indicates 'after study'

TABLE 4 VEHICLE FLOW AND DELAY AT THE HENNESSY ROAD/PERCIVAL STREET JUNCTION



HOUR	Vehicle Flow (No.) at Approach		Average Delay Per Vehicle (sec) at Approach		Average Number of Vehicles Stopped at Approach	
	a	b	a	b	a	b
0800 - 0900	848 (865)	1402 (1473)	39.6 (31.8)	45.6 (33.6)	9 (8)	18 (14)
0900 - 1000	870 (974)	1211 (1306)	42.6 (40.8)	40.2 (39.6)	10 (11)	14 (14)
1200 - 1300	956 (994)	1357 (1418)	48.0 (38.4)	51.0 (35.4)	13 (11)	19 (14)
1300 - 1400	962 (986)	1290 (1489)	63.0 (49.2)	73.8 (55.2)	17 (14)	27 (23)
1500 - 1600	884 (989)	1247 (1446)	49.2 (46.2)	57.0 (45.0)	12 (13)	20 (18)
1700 - 1800	920 (941)	1397 (1486)	46.2 (52.8)	57.6 (51.0)	12 (14)	22 (21)
1800 - 1900	952 (991)	1369 (1507)	73.8 (58.8)	100.2 (57.6)	19 (16)	38 (24)

Note: Figures in brackets indicates 'after study'

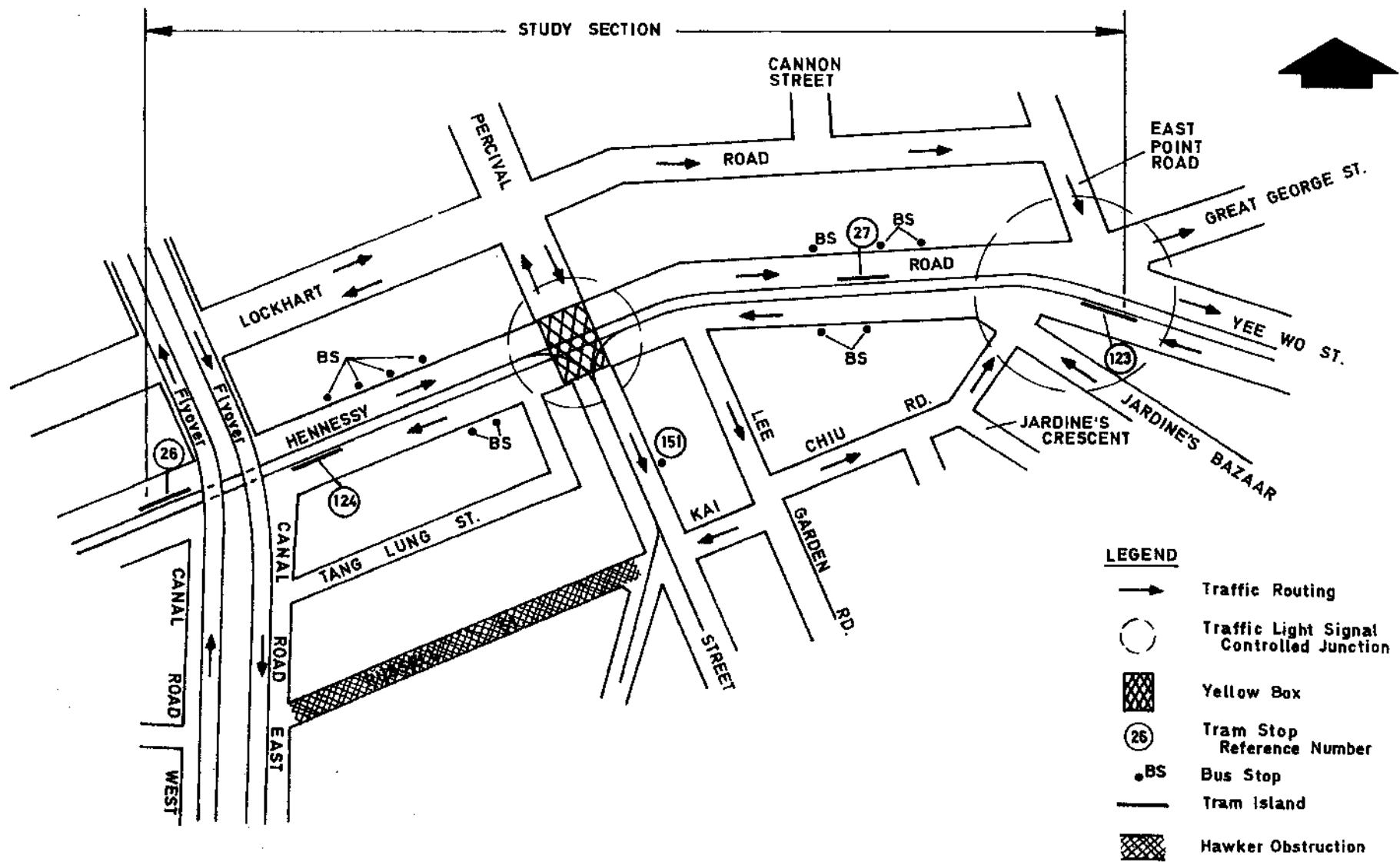


FIG. 1 SITE PLAN

SCALE 1 : 2 500

TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

- 4 OCT 1976
Data Record No. 239



Traffic Counts - Disruption of
K.C.R. Service

Job No. 481

by

YU Shu-yee

Ag. Chief Engineer: PANG Hau-chung

September, 1976.

Initiated by: Traffic & Transport Survey Division

Background of Survey: As a result of the 70-year-old railway bridge across Shing Mun River at Tai Wai being badly damaged by flood waters in a rainstorm on 25th August 1976, the K.C.R. Service between Kowloon and Sha Tin was suspended from the same date to Tuesday 31st August 1976. It resumed operation on Wednesday, 1st September 1976 with a "Shuttle Train Service"*. This service shuttles between Kowloon Station and a temporary train station at Tai Wai south of the damaged railway bridge. Between Tai Wai and Sha Tin Station, train passengers are transported by shuttle buses.

Object of Survey: To ascertain whether there are any changes in both vehicle and passenger movements between Kowloon and Sha Tin as a result of the disruption of the K.C.R. service.

Organisation of Survey: The survey covers conditions before and after the introduction of the "Shuttle Train Service" and consists of the following parts:

- a) 16-hour vehicle classification and occupancy counts on both Tai Po Road and Lion Rock Tunnel Road.
- b) Measurement of hourly variation of traffic flows by automatic counters on both Tai Po Road and Lion Rock Tunnel Road.
- c) Measurement of train passenger journey times between Mong Kok and University Stations on the shuttle train service.
- d) Enumeration of train passengers boarding and alighting at Tai Wai temporary train station.

* A copy of public notice to this effect issued by K.C.R. is attached in Appendix A for reference.

Part "a" was carried out on 3 weekdays, viz., Tuesday 31st Aug., Thursday 2nd Sept. and Monday 6th Sept. The first two days were school summer holidays while the last day was after the beginning of school term for nearly all schools. Part "b" covered the whole week from 31st August to 6th September. Parts "c" and "d" were carried out on 6th September only.

Apart from the above field observations, information was also extracted from K.C.R. and T.T.S.D. records which indicate conditions prior to the disruption of the K.C.R. service.

Site Conditions:

(1) On Tai Po Road, the survey point for both manual counts and automatic recording was located south of Carlton Hotel. On Lion Rock Tunnel Road it was chosen at the southern approach to the Tunnel. FIGURE 1 shows the locations of these survey points.

(2) To facilitate the movements of shuttle buses the following traffic arrangements were introduced with effect from 1st September 1976 in the Tai Wai area by Transport Department.

1. Shing Ho Road was re-routed one-way southbound.
2. Section of Tsuen Nam Road between Shing Ho Road and Tai Wai Road was re-routed one-way westbound; and
3. Tai Wai Road was re-routed one-way northbound.

Details of traffic and shuttle bus routings are shown in FIGURE 2.

(3) In Tai Wai, the temporary train station is located south of the damaged railway bridge, east of the junction of Tsuen Nam Road/Tai Wai Road. A section of the existing railway tracks was converted to form a passenger platform. A temporary staircase was constructed to connect this platform to the temporary shuttle bus stop at Tsuen Nam Road. Detailed layout of this station is shown in FIGURE 3 and pictures illustrating conditions of the damaged railway bridge and passenger movements at this station are given in FIGURES 6 to 9.

(4) At Sha Tin a lay-by located about 50 meters from Sha Tin station is reserved for shuttle buses to pick up and set down K.C.R. passengers. Between the station and the lay-by, passengers were guided by queue-rails. FIGURE 4 shows the layout of the station, and FIGURE 10 illustrates conditions of passenger movements there.

Results of Survey:

I. "No Train Service" vs "Shuttle Train Service (A)" - Measurements for both conditions were taken during school summer vacation.

(1) Vehicle Movements

On Tai Po Road, the 16-hour traffic was slightly higher with no train service than with the shuttle train service, being 16338 and 15578 respectively.

On Lion Rock Tunnel Road, no significant difference in vehicle movements between the two conditions was observed.

Tables 1a and 1b show hourly vehicle flows on Tai Po Road and Lion Rock Tunnel Road respectively.

Comparison of 16-hour vehicle flows on the two roads combined between the two conditions are as follows:-

Conditions	MODE OF TRANSPORT								
	Private Car	Taxi	Goods Vehicle	Public Transport			Other	Total	
				Bus	PLB	Total			
No Train Service	13294 44.2%	1703 5.6%	8535 28.4%	954 3.2%	3497 11.6%	4451 14.8%	2115 7.0%	30098 100.0%	
Shuttle Train Service(A)	13082 44.6%	1539 5.2%	8656 29.5%	861 2.9%	3237 11.1%	4098 14.0%	1958 6.7%	29333 100.0%	
Difference (No Train - Shuttle)	No.	+212	+164	-121	+93	+260	+353	+157	+765
	as % of Shuttle	1.6	10.7	1.4	10.8	8.0	8.6	8.0	2.6

Hourly variation of vehicle flows on both Tai Po Road and Lion Rock Tunnel Road measured during the week from 31st August to 6th September are attached in Appendices B-1 to B-7 for reference.

(2) Passenger Movements on Roads

On Tai Po Road with no train service the 16-hour passenger movements by "van and coach" increased by 22% while passengers by bus increased by 13%. The total road passenger volume with no train service increased by 7%.

On Lion Rock Tunnel Road slight increase in daily passenger movements were also recorded with no train service. The increase was more significant for "van and coach" and taxis, being 26% and 23% higher respectively.

Tables 2a and 2b show hourly passenger movements in Tai Po Road and Lion Rock Tunnel Road respectively.

Comparison of 16-hour passenger movements on both Tai Po Road and Lion Rock Tunnel Road combined under the two conditions are summarized as follows:

Condition	MODE OF TRANSPORT								
	Private Car	Taxi	Van & Coach	Public transport			Other	Total	
				Bus	PLB	Total			
No Train Service	28823 19.5%	4966 3.4%	8214 5.5%	41812 28.2%	44235 29.9%	86047 58.1%	19978 13.5%	148028 100.0%	
Shuttle Train Service (A)	27896 20.0%	4185 3.0%	6612 4.7%	39215 28.0%	42802 30.5%	82017 58.5%	19365 13.8%	140075 100.0%	
Difference (No Train - Shuttle)	No.	+927	+781	+1602	+2597	+1433	+4030	+613	+7953
	as % of Shuttle	3.3	18.7	24.2	6.6	3.3	4.9	3.2	5.7

(3) Comparison of Total Passenger Movements

Comparison of daily passenger volumes by train and by road under the two conditions are summarized briefly as follows:-

	<u>By KCR</u>	<u>By Road</u>	<u>Total</u>
No Train Service	-	148 028	148 028
Shuttle Train Service (A)	10 800	140 075	150 875
Difference (No Train Service - Shuttle)	-10 800	+7 953	-2 847
(No Train Service as % of Shuttle)	100	5.7	1.9

From the above table it can be seen that with no train service, the total passenger volume by road was about 8000 higher than that with shuttle train service, both conditions being during school summer vacation. The combined passenger movement (both by KCR and road) in this corridor dropped by about 2850 with no train service than with shuttle train service. This decrease in passenger trips was probably due to a reduction in recreational trips brought about by the inconvenience of having no train service.

II. "Normal Train Service" vs
"Shuttle Train Service (B)" -
Field observations on
"Shuttle Train Service (B)"
were carried out after
schools re-opened after
summer vacation. Data for
"Normal Train Service" was
based on counts carried
out on a typical weekday
in May 1976 before school
summer vacation.

(1) Vehicle Movements

The 16-hour daily
vehicle flow on Tai Po
Road with the shuttle
train service was 16290,
being 16% higher than
the figure of 14086 with
normal train service.
With the shuttle train
service, taxi, goods
vehicle and private car
traffic increased most
significantly, being 48%,
26% and 12% higher
respectively.

On Lion Rock Tunnel
Road, the 16-hour vehicle
flow was also significantly
higher with the shuttle
train service, being 13596
against 11397, representing
a 22% increase. With the
shuttle train service,
goods vehicle and taxi
traffic had the most
significant increases,
being 75% and 59%
respectively.

Tables 3a and 3b
tabulate hourly vehicle
flows on Tai Po Road and
Lion Rock Tunnel Road
respectively.

Comparison of 16-hour
flows on the two roads
combined under the two
conditions are as follows:

Condition	MODE OF TRANSPORT								
	Private Car	Taxi	Goods Vehicle	Public transport			Other	Total	
				Bus	PLB	Total			
Normal Train Service	12884 50.6%	1126 4.4%	5784 22.7%	708 2.8%	3173 12.4%	3881 15.2%	1808 7.1%	25483 100.0%	
Shuttle Train Service (B)	13840 45.8%	1726 5.7%	8386 27.7%	812 2.7%	3476 11.5%	4288 14.2%	2006 6.6%	30246 100.0%	
Difference (Normal Shuttle)	No.	-956	-600	-2602	-104	-303	-407	-198	-4763
	as % of Shuttle	6.9	34.8	31.0	12.8	8.7	9.5	9.9	15.7

(2) Passenger Movements on Roads

On Tai Po Road, the 16-hour passenger volume with the shuttle train service was 90316, being 14% higher than the figure of 79175 with normal train service. Private car, PLB and bus passengers increased by 7.5%, 14% and 24% respectively while taxi passengers although small in number increased by 40%.

On Lion Rock Tunnel Road, the situation was similar. The 16-hour passenger volume with the shuttle service was 60070 against 52943 with normal train service, indicating a 13.5% increase. P.L.B. and goods vehicle passengers increased most significantly, being 75% and 56% respectively.

Goods vehicle passengers were mainly people engaged in transporting goods between Kowloon and Fo Tan where a temporary cargo loading/unloading centre was set up subsequent to the disruption of the K.C.R. service. Increases in taxi and bus passengers were also considerable, being 45% and 20% respectively.

Tables 4a and 4b show hourly passenger volumes on Tai Po Road and Lion Rock Tunnel Road respectively.

Comparison of 16-hour passenger volumes by mode of transport under the two conditions are as follows:

Condition	MODE OF TRANSPORT								
	Private Car	Taxi	Van & Coach	Public transport			Other	Total	
				Bus	PLB	Total			
Normal Train Service	27697 21.0%	3116 2.4%	11385 8.6%	34389 26.0%	40995 31.0%	75384 57.0%	14536 11.0%	132118 100.0%	
Shuttle Train Service (B)	28437 19.0%	4421 2.9%	9525 6.3%	41624 27.7%	47267 31.4%	88891 59.1%	19112 12.7%	150386 100.0%	
Difference (Normal - Shuttle)	No.	-740	-1305	+1860	-7235	-6272	-13507	-4576	-18268
	as % of Shuttle	2.6	29.5	19.5	17.4	13.3	15.2	23.9	12.1

(3) Train Passengers

Table 5 compares train passenger volumes with normal train service and with shuttle train service. With the shuttle train service, the daily train passenger volume travelling towards N.T. dropped by 58% from 15870 to 6558 and those travelling towards Kowloon by 49% from 12583 to 6686. The combined total volume decreased by 53% from 28453 to 13244.

(4) Comparison of Total Passenger Movements

Comparison of daily passenger volumes by train and by road under the two conditions can be summarized briefly as follows:

	<u>By KCR</u>	<u>By Road</u>	<u>Total</u>
Normal Train Service	28453	132118	160571
Shuttle Train Service(B)	13244	150386	163630
Diff- erence (Nor- mal - Shut- tle)	No. +15209 as % of Shu- ttle	-18268 12.1%	-3059 1.9%
	114.8%		

From the above table it will be seen that the shuttle train service has brought a loss of daily train passengers of about 15000 while road passengers increased by about 18000 of which 4300 were due to increase in goods vehicle passengers,

presumably resulting from an increase in goods vehicle trips required to transport goods between Kowloon and Fo Tan where a temporary cargo handling centre was set up subsequent to the disruption of the K.C.R. service.

(5) Train Passenger Journey Times

Table 6 shows train passenger journey times between Mong Kok Station and University Station with normal train service and shuttle train service. With shuttle train service, travelling from Mong Kok Station to University Station required 28 mins. more during a.m. peak, 43.5 mins. more during off-peak and 19 min. more during evening peak. The corresponding figures for travelling in the opposite direction were 19.5 mins., 18.5 mins and 26.5 mins. respectively. These extra times were mainly spent in waiting for trains.

III. Comparison of Total Passenger Volumes under Various Conditions

The daily total passenger movements in the Kowloon-Shatin corridor under four different conditions are illustrated graphically in FIGURE 5 and summarized as follows:

	<u>By Road</u>	<u>By Train</u>	<u>Total</u>
Normal Train Service May 1976 (Before Summer Vacation)	132118	28453	160571
No Train Service 31.8.1976 (Summer Vacation)	148028	-	148028
Shuttle Train Service (A) 2.9.1976 (Summer Vacation)	140075	10800	150875
Shuttle Train Service (B) 6.9.1976 (After Summer Vacation)	150386	13244	163630

From the above table, the following points are noted:

- (1) Train passengers accounted for 8% to 18% of the total passengers in this corridor.
- (2) During school session, K.C.R. with the shuttle train service suffered a loss of about 15000 passengers. Road passengers increased by about 18000 of which 4300 were goods vehicle passengers.
- (3) During summer vacation, the suspension of train service caused an increase of road passengers by about 8000.
- (4) Under the condition of shuttle train service, re-opening of schools caused an increase in both train and road passenger movements in this corridor by about 12800 of which 10300 were road passengers and 2500 were train passengers.

Table 1a Vehicle Flow on Tai Po Road near Carlton Hotel
 "No Train Service" Vs "Shuttle Train Service (A)"
 (Weekday During School Summer Vacation)

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shuttle
07	73	60	554	456	78	64	274	226	174	143	28	32	38	29	1219	1001
08	45	45	551	549	53	53	316	316	341	341	49	49	36	28	1391	1381
09	67	70	320	338	52	55	248	261	309	326	19	20	28	34	1043	1104
10	62	50	362	226	67	69	222	174	485	463	10	46	31	26	1239	1054
11	36	59	220	364	31	36	157	146	515	423	13	10	23	25	995	1063
12	51	43	198	319	37	48	154	143	352	392	11	10	29	23	832	978
13	36	18	266	227	72	36	210	169	348	365	31	13	28	21	991	849
14	65	20	400	275	22	51	169	182	361	415	26	25	23	21	1066	989
15	51	49	355	303	36	18	184	178	389	383	15	22	25	23	1055	976
16	24	65	346	350	29	33	219	154	446	355	34	28	35	27	1133	1012
17	50	23	382	446	80	60	221	232	383	393	30	32	43	30	1189	1216
18	71	46	377	415	42	63	197	292	260	338	58	21	36	31	1041	1206
19	47	30	434	357	40	45	284	270	215	142	40	15	37	29	1097	888
20	57	36	324	295	46	44	256	161	119	137	17	4	27	24	846	701
21	49	47	249	237	31	47	198	137	76	118	4	18	27	25	634	629
22	37	37	268	245	52	37	146	142	41	12	5	10	18	18	567	531
Total	821	698	5606	5402	768	759	3455	3183	4814	4776	390	346	484	414	16338	15578

Table 1b Vehicle Flow on Lion Rock Tunnel Road

"No Train Service" Vs "Shuttle Train Service (A)"

(Weekday During School Summer Vacation)

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle
07	8	10	449	583	44	57	16	21	96	123	28	36	31	28	672	858
08	26	25	588	572	26	25	0	0	375	363	57	55	28	38	1100	1078
09	34	36	402	428	51	54	0	0	301	319	96	102	33	29	917	968
10	18	24	406	405	54	43	0	5	330	347	14	33	32	24	854	881
11	14	12	433	397	56	72	0	0	306	367	18	24	22	26	849	898
12	0	11	427	379	82	41	0	0	197	271	18	41	34	25	758	768
13	26	16	477	406	79	28	5	0	235	233	52	32	31	30	905	745
14	26	9	527	524	31	31	5	4	301	305	52	27	32	32	974	932
15	14	26	509	482	19	55	0	4	322	272	39	38	39	29	942	906
16	15	49	427	504	15	57	12	0	384	309	70	28	28	29	951	976
17	27	26	573	570	82	48	0	9	362	340	55	83	27	29	1126	1105
18	13	19	660	670	116	51	0	0	218	190	30	33	31	28	1068	991
19	24	21	578	556	89	64	4	4	113	132	28	0	30	26	866	803
20	19	20	471	464	78	45	0	0	96	165	19	15	20	21	703	730
21	5	26	379	338	53	61	0	0	57	96	24	0	28	28	546	567
22	7	15	382	402	60	48	0	7	28	48	28	4	24	25	529	549
Total	276	345	7688	7680	935	780	42	54	3721	3880	628	569	470	447	13760	13755

Table 2a Passenger Movements on Tai Po Road near Carlton Hotel

"No Train Service" Vs "Shuttle Train Service(A)"

(Weekday During School Summer Vacation)

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shuttle
07	84	69	1175	967	218	180	3683	3367	364	300	101	83	1602	1296	7227	6262
08	49	49	1203	1201	140	139	4024	4465	776	775	518	516	1427	1263	8137	8408
09	71	75	605	638	95	100	2809	3290	615	648	48	50	1323	1528	5566	6329
10	83	60	707	450	155	156	2574	2263	1043	900	263	670	1083	792	5908	5291
11	36	68	452	605	81	64	2024	2035	1035	742	18	214	840	808	4486	4536
12	55	43	389	645	88	100	1841	1819	755	659	22	10	823	807	3973	4083
13	41	18	497	383	205	98	2416	2043	733	748	102	67	1003	776	4997	4133
14	65	25	787	512	74	106	2030	2321	821	730	78	41	803	672	4658	4407
15	61	58	702	477	82	40	2232	1870	876	726	26	254	867	756	4846	4181
16	29	70	665	621	71	70	2579	2124	827	719	218	140	1149	912	5538	4656
17	60	23	714	820	221	167	2873	2951	890	792	532	223	1581	1235	6871	6211
18	92	51	796	943	159	182	2653	4222	607	769	1031	220	1498	1564	6836	7951
19	58	38	954	728	109	98	4327	3856	492	311	161	79	1490	1183	7591	6293
20	68	40	637	649	137	113	3281	2237	245	311	52	4	1013	862	5433	4216
21	54	47	490	538	90	99	2639	1718	170	208	18	18	745	793	4206	3421
22	42	41	607	540	136	110	1793	1828	99	78	10	37	521	504	3208	3138
Total	948	775	11380	10717	2061	1822	43778	42409	10348	9416	3198	2626	17768	15751	89481	83516

Table 2b Passenger Movements on Lion Rock Tunnel Road
 "No Train Service" Vs "Shuttle Train Service (A)"
 (Weekday During School Summer Vacation)

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle	No Train	Shut- tle
07	8	10	896	1160	135	175	175	227	207	268	181	341	1828	2021	3430	4202
08	39	38	1041	1010	61	59	0	0	1168	1133	117	145	1680	2595	4106	5000
09	40	42	884	939	153	163	0	0	646	686	460	711	1940	1656	4123	4197
10	23	29	795	977	149	116	0	5	615	631	162	284	1175	979	2919	3021
11	14	16	916	780	136	211	0	0	535	685	97	56	1278	1150	2976	2898
12	0	11	935	890	298	158	0	0	413	766	151	845	1310	1042	3107	3712
13	42	24	1068	932	230	80	5	0	623	570	504	185	1399	1394	3871	3185
14	36	9	1166	1193	94	102	78	35	505	661	462	102	1508	1313	3849	3415
15	14	30	1201	1047	29	166	0	17	701	566	257	213	1420	1241	3622	3280
16	19	65	954	980	73	163	138	0	904	654	1672	126	1455	1412	5215	3400
17	32	26	1236	1181	266	126	0	30	842	684	643	675	1651	1785	4670	4507
18	17	23	1440	1532	381	157	0	0	562	407	32	162	2274	2043	4706	4324
19	36	30	1555	1264	327	145	61	60	238	307	72	0	1932	1807	4221	3613
20	19	20	1110	1143	249	165	0	0	186	350	23	75	1174	1159	2761	2912
21	5	39	1074	951	158	210	0	0	111	223	132	39	1048	1068	2528	2530
22	7	22	1172	1200	166	167	0	19	75	149	51	7	972	799	2443	2363
Total	351	434	17443	17179	2905	2363	457	393	8331	8740	5016	3986	24044	23464	58547	56559

Table 3a Vehicle Flow on Tai Fo Road near Carlton Hotel
 "Normal Train Service" Vs "Shuttle Train Service(B)"

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle
07	24	57	506	729	43	151	217	350	149	123	16	38	24	25	979	1473
08	10	60	748	535	25	79	232	292	236	288	40	63	18	23	1309	1340
09	45	41	328	334	41	69	140	330	272	344	64	41	24	25	914	1184
10	30	43	333	416	51	60	158	195	238	291	51	17	17	24	878	1046
11	29	18	233	327	33	18	121	138	337	436	41	9	20	21	814	967
12	42	29	319	316	42	29	145	149	195	315	21	20	17	19	781	877
13	32	31	244	307	41	41	197	179	298	342	28	15	20	21	860	936
14	31	32	334	353	40	54	162	176	347	402	17	14	19	20	950	1051
15	54	61	272	264	33	80	174	179	344	501	67	28	18	22	962	1135
16	49	51	307	285	20	36	164	159	307	346	49	21	23	22	919	920
17	22	53	467	477	36	44	213	198	271	250	13	20	17	25	1039	1067
18	35	52	431	577	79	96	288	275	233	274	50	39	21	26	1137	1339
19	43	45	208	387	61	41	386	265	135	257	12	16	21	25	866	1036
20	27	33	252	301	50	40	146	176	128	157	14	14	18	24	635	745
21	46	38	193	247	23	47	194	152	57	132	6	0	22	23	541	639
22	19	22	249	241	19	62	149	116	32	67	19	9	15	18	502	535
Total	538	666	5424	6096	637	947	3086	3329	3579	4525	508	364	314	363	14086	16290

Note: Data for "Normal Train Service" was based on a typical weekday count in May 1976

Table 3b Vehicle Flow on Lion Rock Tunnel Road
 "Normal Train Service" Vs "Shuttle Train Service(B)"

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle
07	20	43	483	422	40	109	0	14	85	71	25	66	26	33	679	758
08	34	12	676	697	14	49	0	8	301	389	14	81	25	28	1064	1264
09	6	29	420	429	34	72	0	0	149	343	28	72	26	38	663	983
10	0	18	408	402	22	45	0	0	194	325	50	10	24	32	698	832
11	13	14	298	369	18	37	0	5	257	351	18	32	24	21	628	829
12	9	22	423	359	23	13	0	0	86	276	78	44	23	22	642	736
13	21	9	419	440	16	57	5	4	144	245	54	48	26	27	685	830
14	28	24	428	453	45	68	0	4	256	314	17	24	25	32	799	919
15	19	8	519	411	28	42	0	4	180	334	9	30	26	30	781	859
16	28	8	447	559	19	16	5	4	214	292	56	49	25	28	794	956
17	25	24	593	762	4	42	29	6	103	298	42	36	26	25	822	1193
18	5	37	715	755	19	37	19	21	111	182	33	62	26	29	928	1123
19	12	26	512	501	72	51	12	9	66	149	12	35	23	32	709	803
20	11	12	396	442	63	54	11	50	34	108	17	21	22	23	554	710
21	0	16	375	385	50	32	0	11	8	123	50	37	23	27	506	631
22	22	0	348	358	22	55	6	7	17	61	6	27	24	22	445	530
Total	253	302	7460	7744	489	779	87	147	2205	3861	509	674	394	449	11397	13956

Note: Data for "Normal Train Service " was based on a typical weekday count in May 1976

Table 4a Passenger Movements on Tai Po Road near Carlton Hotel
 "Normal Train Service" Vs "Shuttle Train Service(B)"

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle
07	28	57	1125	1746	87	435	3039	5172	422	270	43	1311	1274	1415	6018	10406
08	15	71	1528	973	69	176	3198	4056	651	599	128	606	1039	1310	6628	7791
09	57	41	569	637	87	183	1678	4068	626	847	1637	586	980	1205	5634	7567
10	30	50	605	506	102	119	2016	2788	572	641	532	46	536	801	4393	4951
11	33	18	382	592	54	46	1630	1699	661	918	391	18	594	798	3745	4089
12	46	33	536	543	120	58	1731	1890	461	514	154	91	747	840	3795	3969
13	32	41	464	583	151	82	2359	2208	638	644	156	30	958	989	4758	4577
14	35	50	689	588	70	109	1954	2510	804	922	35	63	643	661	4230	4903
15	70	61	542	439	66	184	2248	2320	816	966	733	80	557	848	5032	4898
16	49	56	626	538	41	87	2148	2081	700	799	409	46	1139	1014	5112	4621
17	36	61	982	961	116	105	2848	2960	542	509	18	48	955	1177	5497	5821
18	50	74	932	1200	154	275	4305	4066	461	602	99	807	1251	1601	7252	8625
19	55	57	435	685	227	98	5021	3975	288	485	55	53	1118	1374	7199	6727
20	27	40	539	597	128	110	1860	2408	275	282	32	165	619	1111	3480	4713
21	68	47	376	512	74	109	2281	1857	102	256	6	0	692	884	3500	3665
22	26	22	461	504	84	98	1747	1569	84	120	32	71	369	609	2803	2993
Total	657	779	10791	11604	1630	2274	40063	45627	8103	9374	4460	4021	13471	16637	79175	90316

Note: Data for "Normal Train Service" was based on a typical weekday count in May 1976.

Table 4b Passenger Movements on Lion Rock Tunnel Road
 "Normal Train Service" Vs "Shuttle Train Service (B)"

Hour Beginning	Motor Cycle		Private Car		Taxi		P.L.B.		Goods Veh.		Van & Coach		Bus		Total	
	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle	Normal	Shuttle
07	25	66	1022	1057	140	327	0	213	254	237	319	896	1943	2548	3703	5344
08	38	16	1274	1402	24	154	0	122	1101	1216	24	673	1746	2110	4207	5693
09	6	39	861	798	98	168	0	0	453	838	407	379	1071	2119	2896	4341
10	0	18	834	791	39	122	0	0	453	624	514	86	1251	1456	3091	3097
11	18	23	577	776	53	82	0	5	515	685	22	41	928	923	2113	2535
12	9	35	956	793	68	44	0	0	232	517	2389	561	1138	1106	4792	3056
13	32	9	916	986	48	148	16	35	391	554	889	917	1358	1636	3650	4285
14	28	28	1047	943	145	175	0	24	574	636	28	60	1160	1510	2982	3376
15	19	11	1140	935	85	125	0	57	342	703	52	129	1303	1209	2941	3169
16	33	12	1077	1074	47	36	56	4	438	588	1398	93	1527	1458	4576	3265
17	33	24	1765	1645	21	119	375	77	222	567	590	137	1979	1642	4985	4211
18	5	46	1758	1608	70	124	214	261	209	418	56	1106	2002	2354	4314	5917
19	18	43	1173	1201	193	124	96	55	150	354	12	73	1051	2066	2693	3916
20	11	12	812	1002	194	145	92	650	75	198	98	37	860	1145	2142	3189
21	0	21	891	919	183	107	0	86	25	278	116	213	836	934	2051	2558
22	39	0	803	903	78	147	83	51	28	143	11	103	765	771	1807	2118
Total	314	403	16906	16833	1486	2147	932	1640	5462	8556	6925	5504	20918	24987	52943	60070

Note: Data for "Normal Train Service" was based on a typical weekday count in May 1976.

Table 5 Comparison of Weekday Train Passenger Volumes Crossing Tai Wai
 "Normal Train Service" Vs "Shuttle Train Service (B)"

UP TRAIN			DOWN TRAIN		
Train No.	Normal	Shuttle	Train No.	Normal	Shuttle
2	0	cancelled	1	562	1365(96)
4	1203	83(2)	3	729	cancelled
6	1361	418(6)	5	1238	903(184)
8	629	cancelled	7	905	297(35)
10	1526	851(19)	9	802	249(40)
12	1115	215(6)	11	141	cancelled
14	1057	198(0)	13	416	177(16)
18	633	180(8)	15	344	188(14)
20	607	187(4)	17	856	520(20)
22	1120	217(14)	21	1660	618(13)
24	565	829(54)	23	671	276(12)
26	387	259(19)	25	547	188(30)
28	935	276(15)	27	653	267(23)
30	1049	430(35)	29	962	446(11)
32	435	575(47)	31	683	637(20)
34	806	567(59)	33	719	293(16)
36	1173	826(45)	35	205	127(15)
38	542	167(14)	37	126	70(7)
42	581	167(5)	39	276	31(5)
44	146	113(14)	41	88	34(5)
UP TRAIN TOTAL	15870	6558(366)	DOWN TRAIN TOTAL	12583	6686(562)

Notes: (1) Figures in brackets are passengers generated from/destined for Tai Wai.

(2) Figures for "Normal Train Service" were derived from K.C.R. record for April 1976.

Table 6 Comparison of Train Passenger Journey Times(in Minutes)
between Mong Kok Station and University Station
 "Normal Train Service" Vs "Shuttle Train Service (B)"

	UP TRAIN				Normal Train Service	DOWN TRAIN				Normal Train Service
	<u>Shuttle Train Service</u>			Total		<u>Shuttle Train Service</u>			Total	
	<u>On Train</u>	<u>On Bus</u>	<u>*Waiting</u>			<u>On Train</u>	<u>On Bus</u>	<u>*Waiting</u>		
A.M. Peak	15.5	5.5	26	47	19	15.5	7	19	41.5	22
Off Peak	15.5	7	40	62.5	19	15.5	7	18	40.5	22
P.M. Peak	15.5	6.5	17	39	20	15.5	7	26	48.5	22

*Includes walking time at Tai Wai/Sha Tin of about 2 minutes.

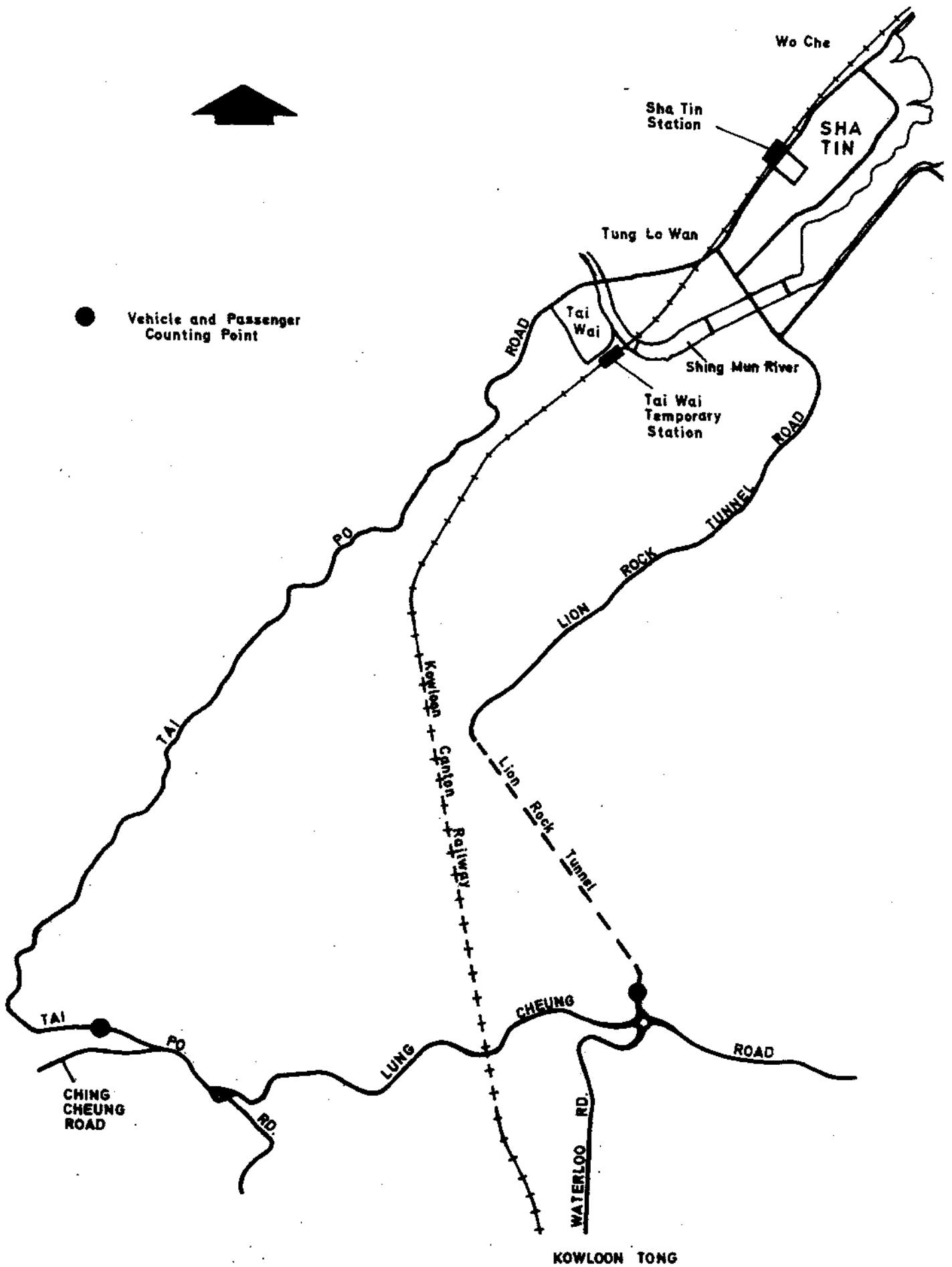


FIG. 1 SITE PLAN

SCALE 1 : 25 000

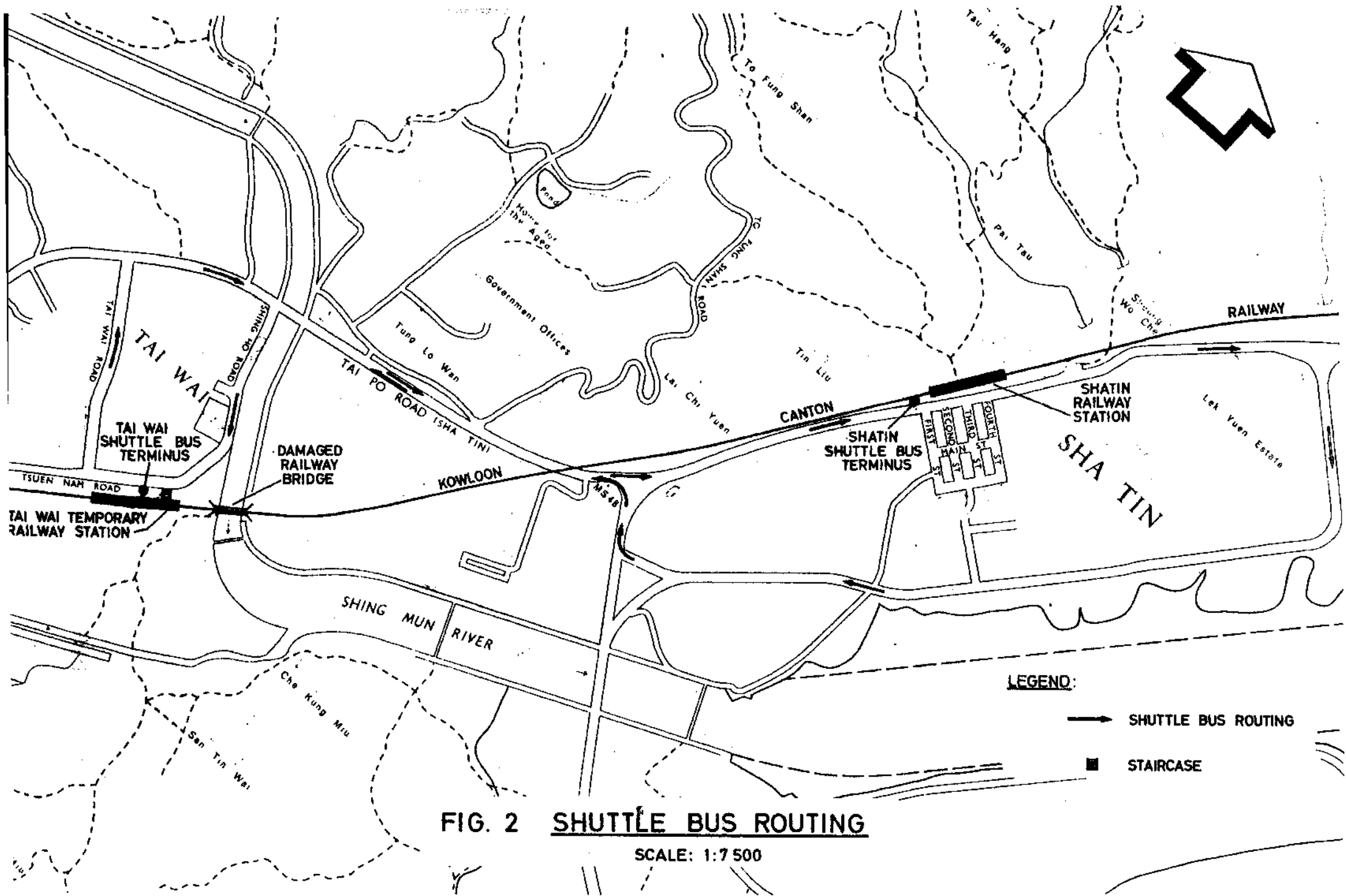
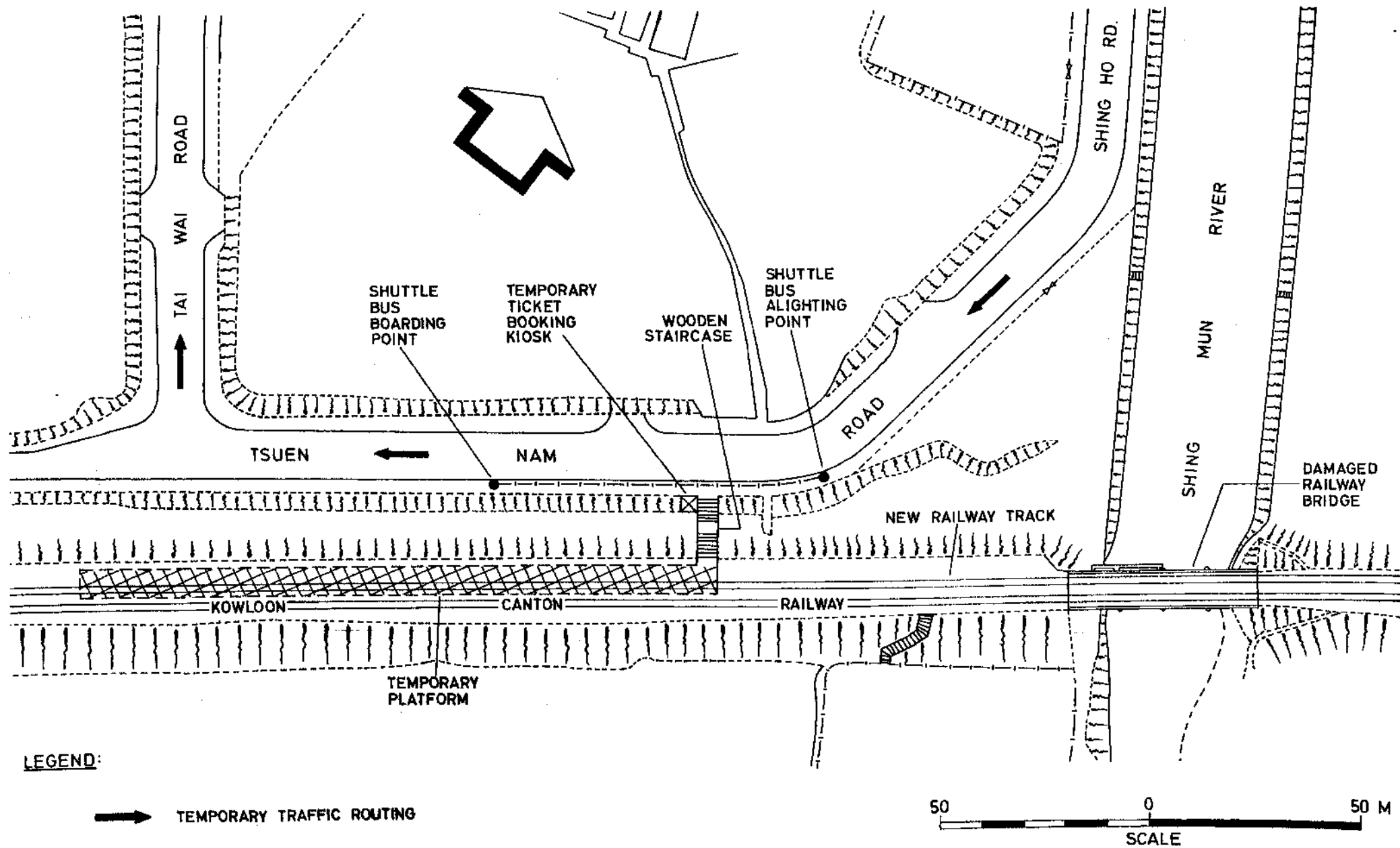


FIG. 2 SHUTTLE BUS ROUTING

SCALE: 1:7 500



**FIG. 3 LAYOUT OF TAI WAI TEMPORARY RAILWAY STATION
(SOUTH TERMINUS FOR SHUTTLE BUSES)**

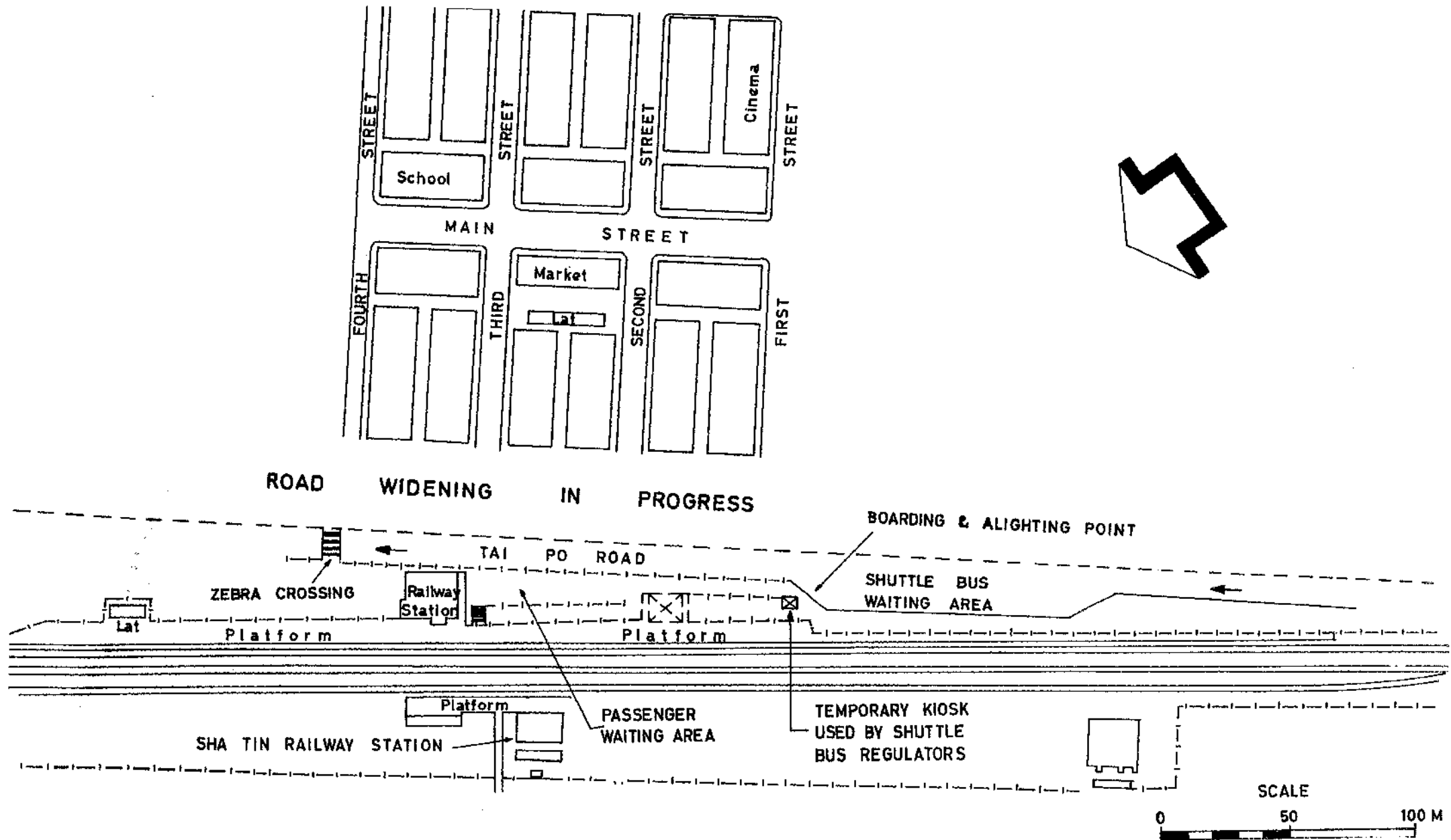


FIG. 4 LAYOUT OF SHA TIN RAILWAY STATION
(NORTH TERMINUS FOR SHUTTLE BUSES)

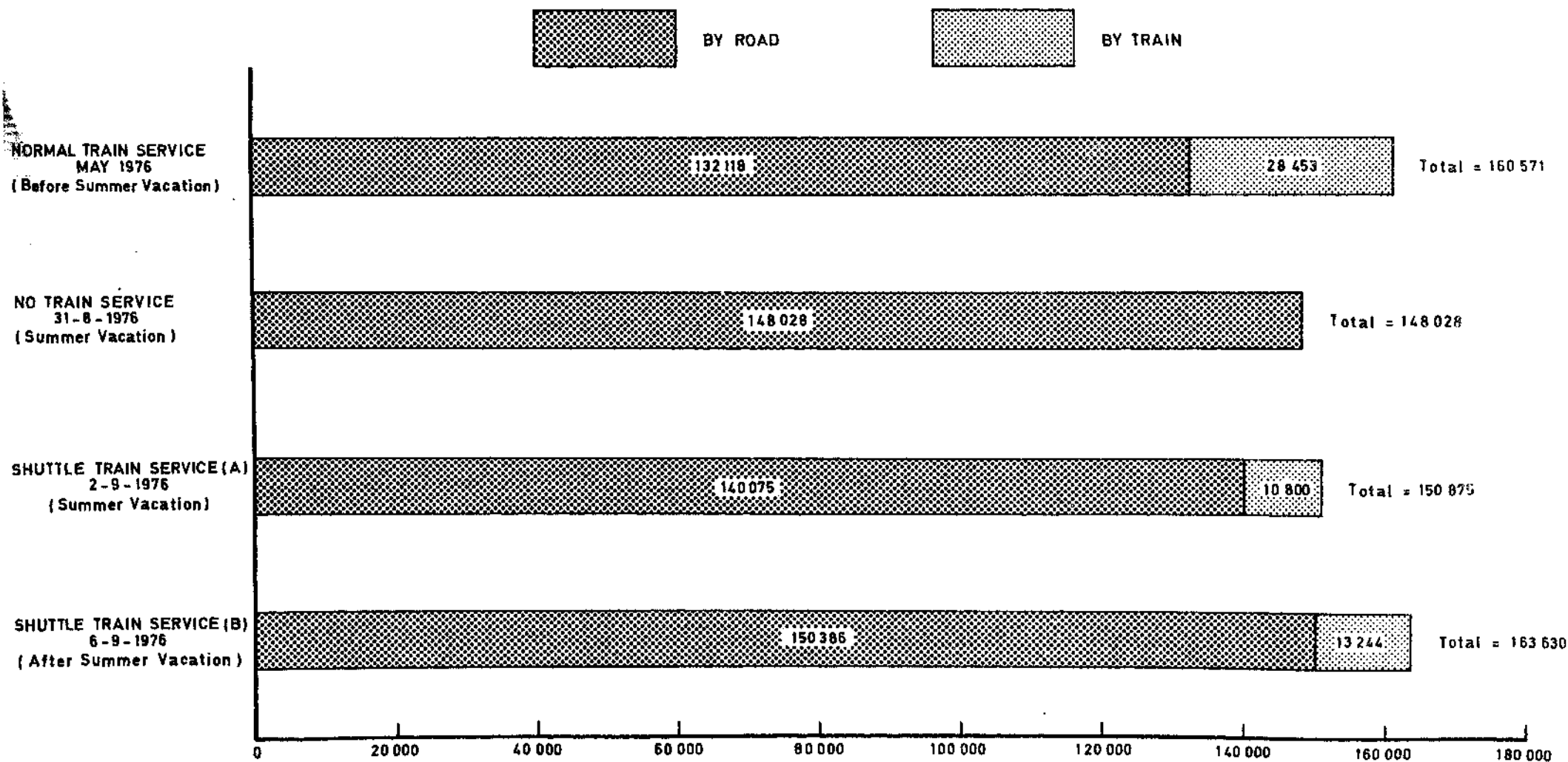


FIG. 5 COMPARISON OF TOTAL PASSENGER VOLUMES UNDER VARIOUS CONDITIONS

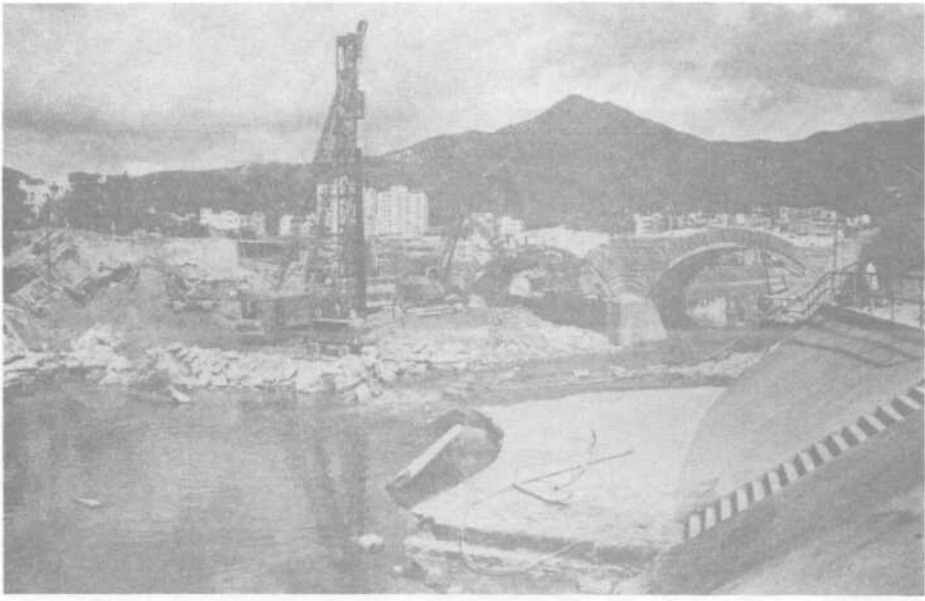


FIG. 6 GENERAL VIEW SHOWING THE DAMAGED SHING MUN RAILWAY BRIDGE



FIG. 7 GENERAL VIEW SHOWING PASSENGERS WALKING ON THE TEMPORARY PLATFORM AT TAI WAI STATION

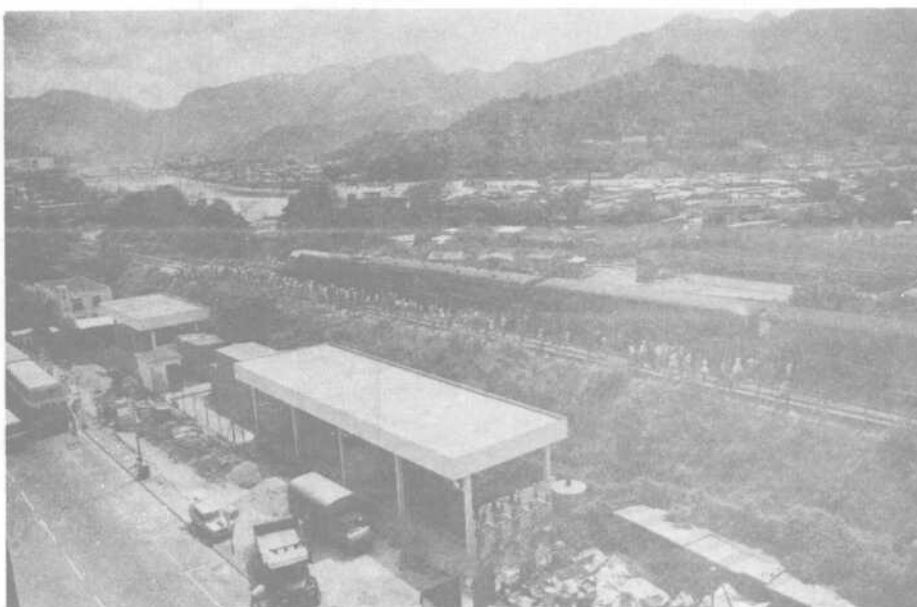


FIG. 8 OVERHEAD VIEW SHOWING PASSENGERS AT TRANSFER (FROM TRAIN TO SHUTTLE BUSES) AT TAI WAI TEMPORARY STATION



FIG. 9 OVERHEAD VIEW SHOWING PASSENGERS USING TEMPORARY STAIRCASE TO BOARD SHUTTLE BUSES AT TAI WAI STATION

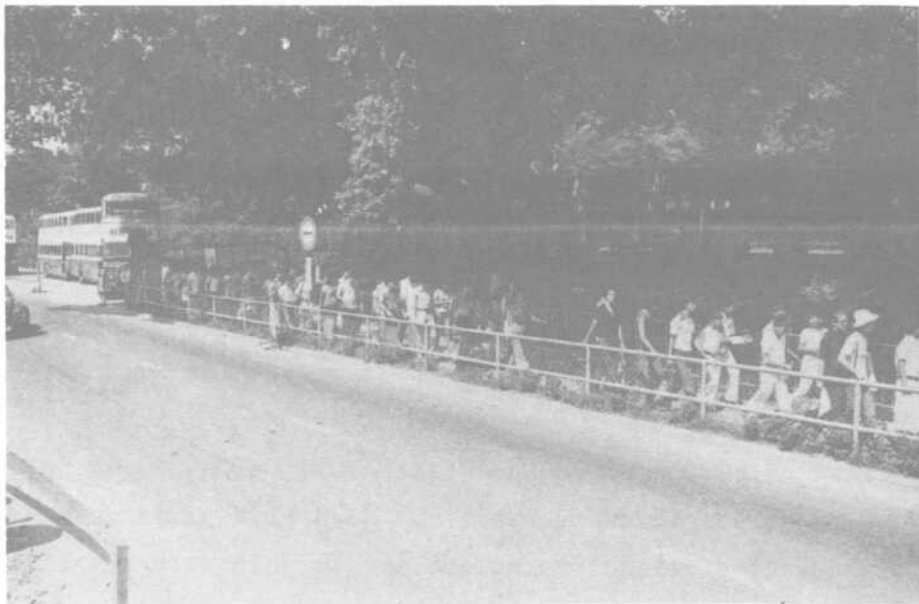


FIG. 10 GENERAL VIEW SHOWING PASSENGERS
WALKING TO SHATIN STATION AFTER
ALIGHTING SHUTTLE BUSES

APPENDIX A

KOWLOON-CANTON RAILWAY (BRITISH SECTION)

N O T I C E

On and from Wednesday, 1st September, 1976, until further notice, shuttle train services will be maintained between Kowloon and Mile 6, near Tai Wai, where connecting bus services, free of charge for railway passengers, will also be provided for conveying passengers to and from Shatin station to link with trains.

As far as possible, trains between Shatin and Lo Wu will run according to the existing timetable for weekdays while trains between Kowloon and Tai Wai will run according to the following timetable including on Sundays and public holidays:

Departures from Kowloon

A.M.	6.00	7.06	8.03	8.44	9.25	10.26	11.25
P.M.	12.20	1.25	2.18	3.20	4.08	5.20	5.58
	6.49	7.49	9.10	9.49			

Departures from Tai Wai

A.M.	7.02	7.59	8.40	9.21	10.06	11.06	
P.M.	12.00	1.00	2.10	3.00	4.00	4.48	5.54
	6.45	7.45	8.45	9.45	10.30		

(Subject to change and cancellation without notice)

Notes to passengers:

- (1) On arrival at Tai Wai, passengers are requested to walk through coaches to the front so as to alight on the temporary wooden platform.
- (2) Please take care when walking down the wooden stairway.
- (3) In front of the stairway, K.M.B. buses hired by the K.C.R. are parked at the road side for the exclusive use of railway passengers.
- (4) Passengers are requested to produce their tickets on demand by Railway staff before boarding the buses.
- (5) At Shatin station buses will stop at the bus bay to the south of the station building.
- (6) Train Nos. 34, 36 and 38 scheduled in the existing timetable will leave Shatin at 18.45, 19.30 and 20.49 hours respectively.

Date: 30th August, 1976.

APPENDIX B-1

HOURLY VARIATION OF TRAFFIC FLOWS ON

TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 31-8-76

Day: Tuesday *

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	384	459	843	394	195	589	1432
04							
05							
06	295	306	601	145	99	244	845
07	576	643	1219	353	319	672	1891
08	571	820	1391	636	464	1100	2491
09	476	567	1043	565	352	917	1960
10	651	588	1239	516	338	854	2093
11	451	544	995	481	368	849	1844
12	351	481	832	428	330	758	1590
13	464	527	991	461	444	905	1896
14	496	570	1066	507	467	974	2040
15	539	516	1055	478	464	942	1997
16	575	558	1133	481	470	951	2084
17	574	615	1189	463	663	1126	2315
18	449	592	1041	513	555	1068	2109
19	564	533	1097	448	418	866	1963
20	443	403	846	336	367	703	1549
21	323	311	634	283	263	546	1180
22	266	301	567	257	272	529	1096
23	190	238	428	221	207	428	856
24 Hr. Total	8638	9572	18210	7966	7055	15021	33231

* Train Service between Kowloon and Sha Tin suspended.

APPENDIX B-2

HOURLY VARIATION OF TRAFFIC FLOWS ON
TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 1-9-76

Day: Wednesday *

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	378	452	830	405	201	606	1436
04							
05							
06	291	302	593	149	102	251	844
07	568	634	1202	363	328	691	1893
08	563	809	1372	654	477	1131	2503
09	469	559	1028	581	362	943	1971
10	642	580	1222	531	348	879	2101
11	445	536	981	495	379	874	1855
12	346	474	820	440	339	779	1599
13	435	458	893	403	395	798	1691
14	427	579	1006	467	469	936	1942
15	517	508	1025	482	469	951	1976
16	601	525	1126	411	460	871	1997
17	520	648	1168	482	569	1051	2219
18	550	567	1117	504	517	1021	2138
19	465	641	1106	430	607	1037	2143
20	362	403	765	363	321	684	1449
21	324	289	613	287	336	623	1236
22	267	289	556	247	306	553	1109
23	238	247	485	235	178	413	898
24 Hr. Total	8408	9500	17908	7929	7163	15092	33000

*"Shuttle Train Service"between Kowloon and Sha Tin introduced.

APPENDIX B-3

HOURLY VARIATION OF TRAFFIC FLOWS ON
TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 2-9-76

Day: Thursday

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	405	425	830	446	251	697	1527
04							
05							
06	233	263	496	138	97	235	731
07	434	567	1001	348	510	858	1859
08	580	801	1381	593	485	1078	2459
09	501	603	1104	585	383	968	2072
10	474	580	1054	526	355	881	1935
11	572	491	1063	509	389	898	1961
12	511	467	978	385	383	768	1746
13	422	427	849	392	353	745	1594
14	428	561	989	476	456	932	1921
15	476	500	976	502	404	906	1882
16	443	569	1012	460	516	976	1988
17	620	596	1216	454	651	1105	2321
18	566	640	1206	449	542	991	2197
19	403	485	888	407	396	803	1691
20	357	344	701	336	394	730	1431
21	334	295	629	258	309	567	1196
22	228	303	531	264	285	549	1080
23	223	223	446	246	192	438	884
24 Hr. Total	8210	9140	17350	7774	7351	15125	32475

APPENDIX B-4

HOURLY VARIATION OF TRAFFIC FLOWS ON

TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 3-9-76

Day: Friday

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	440	477	917	441	227	668	1585
04							
05							
06	288	310	598	142	106	248	846
07	543	722	1265	315	321	636	1901
08	575	839	1414	565	501	1066	2480
09	704	437	1141	618	373	991	2132
10	516	554	1070	596	379	975	2045
11	578	504	1082	459	390	849	1931
12	448	478	926	361	341	702	1628
13	443	497	940	434	369	803	1743
14	472	542	1014	434	440	874	1888
15	428	538	966	447	502	949	1915
16	431	549	980	445	455	900	1880
17	497	663	1160	531	629	1160	2320
18	591	587	1178	479	525	1004	2182
19	464	518	982	436	481	917	1899
20	320	420	740	340	334	674	1414
21	323	304	627	312	255	567	1194
22	220	296	516	282	271	553	1069
23	220	252	472	236	201	437	909
24 Hr. Total	8501	9487	17988	7873	7100	14973	32961

APPENDIX B-5

HOURLY VARIATION OF TRAFFIC FLOWS ON
TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 4-9-76

Day: Saturday

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	459	442	901	432	228	660	1561
04							
05							
06	274	306	580	137	115	252	832
07	548	647	1195	317	308	625	1820
08	425	747	1172	600	444	1044	2216
09	522	548	1070	574	361	935	2005
10	570	527	1097	598	395	993	2090
11	384	522	906	489	467	956	1862
12	425	471	896	464	427	891	1787
13	475	422	897	557	471	1028	1925
14	400	475	875	640	496	1136	2011
15	513	627	1140	837	529	1366	2506
16	467	617	1084	639	521	1160	2244
17	685	644	1329	536	598	1134	2463
18	523	695	1218	450	665	1115	2333
19	478	561	1039	453	508	961	2000
20	407	440	847	377	405	782	1629
21	328	333	661	329	396	725	1386
22	315	384	699	332	356	688	1387
23	171	314	485	327	208	535	1020
24 Hr. Total	8369	9722	18091	9088	7898	16986	35077

APPENDIX B-6

HOURLY VARIATION OF TRAFFIC FLOWS ON
TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 5-9-76

Day: Sunday

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	477	597	1074	555	361	916	1990
04							
05							
06	311	292	603	165	127	292	895
07	451	461	912	286	184	470	1382
08	518	614	1132	528	339	867	1999
09	629	539	1168	665	322	987	2155
10	625	633	1258	723	422	1145	2403
11	601	644	1245	837	541	1378	2623
12	538	585	1123	745	416	1161	2284
13	566	597	1163	690	498	1188	2351
14	578	576	1154	765	635	1400	2554
15	523	637	1160	819	666	1485	2645
16	532	657	1189	561	705	1266	2455
17	487	742	1229	527	796	1323	2552
18	434	669	1103	453	818	1271	2374
19	357	566	923	415	637	1052	1975
20	322	508	830	347	566	913	1743
21	324	438	762	330	500	830	1592
22	268	356	624	322	348	670	1294
23	185	215	400	285	212	497	897
24 Hr. Total	8726	10326	19052	10018	9093	19111	38163

APPENDIX B-7

HOURLY VARIATION OF TRAFFIC FLOWS ON
TAI PO ROAD & LION ROCK TUNNEL ROAD

Date: 6-9-76

Day: Monday

Hour Beginning	Tai Po Road			Lion Rock Tunnel Road			Combined Total
	N/B	S/B	Comb	N/B	S/B	Comb	
00							
01							
02							
03	426	463	889	415	197	612	1501
04							
05							
06	346	330	676	163	124	287	963
07	656	817	1473	402	356	758	2231
08	538	802	1340	707	557	1264	2604
09	536	648	1184	619	364	983	2167
10	491	555	1046	512	320	832	1878
11	482	485	967	445	384	829	1796
12	395	482	877	347	389	736	1613
13	458	478	936	452	378	830	1766
14	495	556	1051	458	461	919	1970
15	557	578	1135	480	379	859	1994
16	398	522	920	476	480	956	1876
17	509	558	1067	541	652	1193	2260
18	683	656	1339	486	637	1123	2462
19	474	562	1036	400	403	803	1839
20	355	390	745	396	314	710	1455
21	316	323	639	306	325	631	1270
22	253	282	535	279	251	530	1065
23	209	217	426	199	171	370	796
24 Hr. Total	8577	9704	18281	8083	7142	15225	33506

TRAFFIC & TRANSPORT SURVEY DIVISION
PUBLIC WORKS DEPARTMENT
HONG KONG

13 OCT 1976
Data Record No. 240



Experimental Reservation for Trams
in Causeway Road

by

YAN Chi-ming

Ag. Chief Engineer: PANG Hau-chung

September 1976

Requested by:

Chief Engineer, Traffic
Engineering (Hong Kong)

Purpose of Survey:

The need for tramway reserves with a view to improving journey times and consequently their carrying capacity had from time to time been raised by the Hong Kong Tramways Co. and discussed at meetings of the Standing Conference on Road Use (SCRU). Locations at which the implementation of such a proposal was practicable, have been identified and discussed at SCRU.

In SCRU Paper 3/76 dated 4th June 1976 it was proposed to establish an experimental reservation for trams in Causeway Road between Shelter Street and Hing Fat Street by the use of double white line carriageway markings to ascertain the benefits that might accrue from such a scheme. The paper was discussed at the SCRU 70th Meeting when it was decided to proceed with the experimental scheme as proposed in the Paper, with the proviso that the area between the double white lines be designated by the Commissioner for Transport a "tram only" lane.

Survey Site:

FIGURE 1 illustrates the conditions at the site.

The proposed experimental tramway reserve is on a straight section of Causeway Road on the southern perimeter of Victoria Park, extending from near Shelter Street to the junction of Hing Fat Street. The tram tracks cover about 5 m (16 ft) of the middle of the carriageway which is about 24.5 m (81 ft) wide. A broken white line

lane marking ran the length of this section on either side of the tram track in the before study and was replaced by double white lines in the after study.

An island type tram stop is located near the middle of the experimental section for eastbound trams. A traffic light signalled pedestrian crossing is also provided adjacent to the tramstop. Eastbound bus stops are located in a lay-bye near the tram stop while the westbound bus stops are along the kerb and further away from the tram stop. The kerbside bus stop does not interfere with westbound traffic as the carriage-way is sufficiently wide, about 10 m (33 ft), to cope with the volume of traffic.

Although a traffic light controlled pedestrian crossing has been provided for the safety of pedestrians, there is no physical barrier to prevent pedestrians from crossing elsewhere along the road.

Method of Survey:

The significance of the double white lines is enumerated in the Road Traffic (Roads and Signs) Regulation 7B(1) which requires that the driver of a vehicle shall keep his vehicle at all times to the left of the continuous line nearest to his vehicle and ensure that the vehicle or part thereof is not over or does not cross either continuous line. The provision of double white lines on either side of the tram tracks therefore legally excludes the right of other vehicles using the tram reserve, though it does not do so physically.

The study was designed to observe tram journey speed and delay 'before' and 'after' the double white lines were marked and also the incidents of vehicles crossing partially or completely within the tramway reserve. Pedestrian behaviour was also observed by counting the number of pedestrians that used the pedestrian crossing and those that crossed elsewhere along the section of road under study. For those pedestrians who did not use the pedestrian crossing, the observation differentiated between those who did influence trams to slow down on approaching them, and others who did not.

For the purpose of the study the area was divided into two sections at the pedestrian crossing. All observations were made within each section by observers suitably positioned along the footwalk.

The journey time of every tram that passed through the section was measured by observing the time at which it crossed certain pre-selected check points. Averaging the journey time during the hour and knowing the distance between check points, the average journey speed during each hour could be obtained.

Tram delay was obtained by direct measurement of the time duration in which each tram was stopped for whatever reason other than to allow passengers to board or alight at the tram stop. Tram delay was classified according to the cause of delay.

Before the double white lines were marked, broken white lines delineated the outer traffic lanes which were shared with trams. Each incident of a vehicle that crossed the broken white line was observed and classified according to whether the vehicle was completely or partially within the lane. It was also noted whether or not the incident influenced the movement of a tram. The observations were repeated after the double white lines were marked.

The hourly directional flow of vehicular traffic was also observed before and after the double white lines were marked to ascertain any change in volume.

The 'before' survey was carried out on Monday 12th July 1976 and after adequate time was allowed for motorists to get accustomed to the double white lines, the 'after' survey was carried out on Tuesday, 10th August 1976.

Results:

TRAFFIC FLOW

The hourly variation in traffic flow is given in TABLE 1.

The total number of trams observed in the 'after' study was very nearly the same as that observed before the double white lines were marked.

Changes in the volume of other vehicles were also slight, a decrease of 2% westbound and 4% eastbound. Traffic volumes were therefore not affected by the provision of the tramway reserve. Therefore, any changes observed in other characteristics would not be influenced by a change in traffic volume.

Although the number of eastbound and westbound trams was balanced, other eastbound vehicles were twice as large in number as those westbound, probably because part of the westbound vehicles used Tung Lo Wan Road (which is one-way westbound between Causeway Road and Moreton Terrace) instead of Causeway Road. On average, there were about 62 trams per hour in each direction with a peak eastbound flow of 75 trams per hour and slightly lesser peak westbound flow of 73 trams per hour.

Peak eastbound vehicular flow (other than trams) was 1737 vehicles per hour, equivalent to about 2378 pcu per hour based on the vehicle classification observed at the traffic census station C 44 on Causeway Road west of Hing Fat Street. This volume was about two-third the eastbound capacity, indicating satisfactory eastbound traffic flow conditions. As westbound traffic volumes were much smaller and the westbound carriageway slightly wider, westbound traffic flow conditions were better. As there was little change in traffic volume after the tramway reserve was introduced traffic flow conditions were equally good during the 'after' survey.

TRAM JOURNEY TIME AND SPEED

The tram journey time and speed during each hour is given in TABLE 2.

In the eastbound direction, an all period average tram speed of 21 km/h (13 mph) was recorded between Shelter Street and the tram stop before the tramway reserve was introduced and the speed being found to increase only very slightly to 21.7 km/h (13.5 mph) with the tramway reserve. The corresponding tram speeds on the section between the tram stop and Hing Fat Street were 19.2 km/h (11.9 mph) and 17.2 km/h (10.7 mph). These slightly lower speeds resulted from the two traffic light signals on the section. Westbound tram speeds over the whole length were also equally high at 21.7 km/h (13.5 mph) and 22.8 km/h (14.2 mph), 'before' and 'after' the introduction of the reserve.

The highest average speed in any hour in both the 'before' and 'after' surveys was 26 km/h (16.2 mph) maintained by eastbound trams between Shelter Street and the tram stop during 1600 to 1700 hour. The differences in tram speed observed in the 'before' and 'after' studies were marginal and not statistically significant. Because of the relatively high speed normally maintained at this location, the introduction of the tramway reserve did not help improve tram speed to a significant extent.

TRAM DELAY

All stopped-time delay to westbound trams occurred on the red display of the traffic light signal. The resulting average delay per tram was 4.24 seconds in the 'before' survey and 2.84 seconds in the 'after' survey. Eastbound trams passed through two sets of traffic light signals and naturally the delay per tram was higher in this direction, 5.78 seconds 'before' and 4.12 seconds 'after'. Eastbound trams were also delayed on the approach to the tram stop due to the tram ahead engaged in loading and unloading passengers and also due to some track cleaning at the time of survey. The stopped time delay due to these causes was however very small, only 0.3% of the total delay in the 'before' survey and 1.5% in the 'after' survey. Trams did not experience any stopped-time delay influenced by other traffic or pedestrians and hence the introduction of the tramway reserve at this location did not reduce delay of this kind.

OBSERVANCE OF THE DOUBLE WHITE LINES BY MOTORISTS

A summary of the number of incidents of vehicles that crossed partially or completely onto the tramway reserve is given in TABLE 3.

Although the marking of double white lines did not eliminate the intrusion of the tramway reserve by other vehicles, the number of such incidents was reduced from 405 to 183 (-55%) eastbound and 357 to 73 (-80%) westbound. The

reduction was more pronounced in cases of complete intrusion than those that partially intruded the reserve. The number of incidents of east-bound vehicles running completely within the reserve decreased from 203 to 26 (-87%) and those partially within from 202 to 157 (-22%). The corresponding figures for westbound vehicles were 67 to 12 (-82%) and 290 to 61 (-79%).

Incidents of vehicles crossing the double white lines were not classified by vehicle type but general observation was that they were mainly by public light buses and motor cycles. About 70% of the eastbound incidents occurred on the section of road just beyond the traffic lights, where vehicles starting off at the traffic lights tended to encroach the reserve when overtaking slow moving vehicles. The effect on tram movement of vehicles encroaching partially or completely within the tramway reserve was insignificant, as the vehicle volume was low and geometrics on this section of roadway provided adequate freedom of movement to drivers to avoid conflict with trams.

PEDESTRIAN MOVEMENTS

Victoria Park generates a large volume of pedestrian traffic along the section of roadway under observation. The pedestrian movements across Causeway Road are given in TABLE 4.

Although a traffic light signal controlled pedestrian crossing is provided for the safety of pedestrians, over one-third of the pedestrians who crossed Causeway Road within the study area did so outside the pedestrian crossing. Of those pedestrians who did not use the crossing, a large number crossed the road between Shelter Street and the pedestrian crossing, probably because of the presence of the westbound bus stops on this section. However, a larger number of incidents of pedestrians influencing the speed of trams was observed on the other section, i.e. between the pedestrian crossing and Hing Fat Street.

Unlike with vehicles, the marking of double white lines does not legally prohibit pedestrians from entering the tramway reserve. Hence the proportion of pedestrians who crossed the reserve remained generally unchanged, 36% 'before' and 39% 'after'. However, the proportion of incidents of pedestrians causing trams to slow down on approaching them was reduced from 5% to zero for the road section between Shelter Street and the crossing, and 11% to 5% for the other section. In absolute values this meant a reduction from 126 incidents 'before' to 35 incidents 'after', a decrease of 73%.

Comment:

Roadway geometrics and traffic conditions at this site were such that the movement of trams were not usually influenced by other traffic and hence, even without the tramway reserve tram journey speed was relatively high. Also, whatever stopped-time delay that trams encountered on this section of road occurred

at the traffic light signals and the approach to the tram stop. Hence, the introduction of the tramway reserve on this section had an insignificant effect on improving tram journey times.

Although the use of double white lines was intended to eliminate the encroachment of vehicles onto the tramway reserve, this was not found to be entirely successful. However, the number of such incidents was noticeably reduced particularly in respect of complete encroachment onto the reserve. Wider publicity of the scheme and stricter enforcement of its legal requirements may improve observance.

Table 1 Vehicle Flow

Hour Beginn- ing	E-bound				W-bound				Total veh. (including trams)	
	Tram		Other Vehicles		Tram		Other Vehicles		before	afttet
	before	after	before	after	before	after	before	after		
08	62	65	1146	1159	64	67	689	564	1961	1855
09	66	59	1330	1326	66	73	660	634	2122	2092
10	58	54	1333	1277	60	54	599	705	2050	2090
11	68	64	1311	1261	62	56	723	659	2164	2040
12	56	49	1549	1478	66	66	780	644	2451	2237
13	67	64	1503	1310	57	52	725	735	2352	2161
14	58	56	1345	1307	67	66	693	728	2163	2157
15	70	61	1453	1366	56	52	723	685	2302	2164
16	45	69	1517	1542	60	66	699	790	2321	2467
17	75	67	1737	1649	51	66	746	771	2609	2553
18	62	72	1685	1576	72	61	832	813	2651	2522
Total	687	680	15,909	15,251	681	679	7,869	7,728	25,146	24,338

N.B. 1. Vehicle flow does not include motor cycles.

2. Hereinafter "before" refers to figures in before study, and "after" in after study.

Table 2 Average Tram Journey Time & Speed

*TS = Tram Stop

() indicates journey speed in mph

Hour Beginning	Average Journey time/speed	E-bound				W-bound			
		Pt. A to TS* 0.13 km(0.08 mile)		TS to Pt. B 0.25 km(0.16 mile)		Pt. A to Pt. B 0.38 km(0.24 mile)		Pt. B to Pt. A 0.38 km(0.24 mile)	
		before	after	before	after	before	after	before	after
08	Time in min. Speed in km/h (mph)	0.38 20.5 (12.7)	0.38 20.5 (12.7)	0.76 19.7 (12.2)	0.77 19.5 (12.1)	1.14 20.0 (12.4)	1.15 19.8 (12.3)	1.01 22.6 (14.0)	1.01 22.6 (14.0)
09	Time in min. Speed in km/h (mph)	0.38 20.5 (12.7)	0.36 21.7 (13.5)	0.79 19.0 (11.8)	0.82 18.3 (11.3)	1.17 19.5 (12.1)	1.18 19.3 (12.0)	1.14 20.0 (12.4)	1.10 20.7 (12.9)
10	Time in min. Speed in km/h (mph)	0.34 22.9 (14.2)	0.29 26.9 (16.8)	0.80 18.8 (11.7)	0.81 18.5 (11.5)	1.14 20.0 (12.4)	1.10 20.7 (12.9)	1.09 20.9 (13.0)	1.07 21.3 (13.2)
11	Time in min. Speed in km/h (mph)	0.35 22.3 (13.9)	0.35 22.3 (13.9)	0.71 21.1 (13.1)	0.86 17.4 (10.8)	1.06 21.5 (13.4)	1.21 18.8 (11.7)	1.06 21.5 (13.4)	0.98 23.3 (14.4)
12	Time in min. Speed in km/h (mph)	0.44 17.7 (11.0)	0.35 22.3 (13.9)	0.70 21.4 (13.3)	0.99 15.2 (9.4)	1.14 20.0 (12.4)	1.34 17.0 (10.6)	1.01 22.6 (14.0)	0.99 23.0 (14.3)
13	Time in min. Speed in km/h (mph)	0.40 19.5 (12.1)	0.39 20.0 (12.5)	0.76 19.7 (12.2)	0.94 16.0 (9.9)	1.16 19.7 (12.2)	1.33 17.1 (10.6)	1.16 19.7 (12.2)	0.90 25.3 (15.7)
14	Time in min. Speed in km/h (mph)	0.34 22.9 (14.2)	0.31 25.2 (15.7)	0.86 17.4 (10.8)	0.88 17.0 (10.6)	1.20 19.0 (11.8)	1.19 19.2 (11.9)	0.97 23.5 (14.6)	0.94 24.3 (15.1)
15	Time in min. Speed in km/h (mph)	0.35 22.3 (13.9)	0.38 20.5 (12.8)	0.85 17.6 (10.9)	0.75 20.0 (12.4)	1.20 19.0 (11.8)	1.13 20.2 (12.5)	1.01 22.6 (14.0)	1.07 21.3 (13.2)
16	Time in min. Speed in km/h (mph)	0.30 26.0 (16.2)	0.30 26.0 (16.2)	0.82 18.3 (11.4)	0.87 17.2 (10.7)	1.12 20.4 (12.7)	1.17 19.5 (12.0)	1.11 20.5 (12.7)	1.04 21.9 (13.6)
17	Time in min. Speed in km/h (mph)	0.37 21.1 (13.1)	0.36 21.7 (13.5)	0.83 18.1 (11.2)	0.99 15.2 (9.4)	1.20 19.0 (11.8)	1.35 16.9 (10.5)	0.99 23.0 (14.3)	0.92 24.8 (15.4)
18	Time in min. Speed in km/h (mph)	0.37 21.1 (13.1)	0.40 19.5 (12.2)	0.70 21.4 (13.3)	0.88 17.0 (10.6)	1.07 21.3 (13.2)	1.28 17.8 (11.1)	1.01 22.6 (14.0)	1.00 22.8 (14.2)
All Period	Time in min. Standard deviation in min. Speed in km/h (mph)	0.37 0.09 21.1 (13.1)	0.36 0.11 21.7 (13.5)	0.78 0.16 19.2 (11.9)	0.87 0.21 17.2 (10.7)	1.15 - 19.8 (12.3)	1.22 - 18.7 (11.6)	1.05 0.24 21.7 (13.5)	1.00 0.23 22.8 (14.2)

Table 3 Incidents of Vehicles Running on Train Tracks

Hour Beginning	E-bound						W-bound					
	completely within*		partially within**		Total		completely within*		partially within**		Total	
	before	after	before	after	before	after	before	after	before	after	before	after
08	13	2	14	3	27	5	6	0	15	5	21	5
09	19	2	15	10	34	12	7	0	29	3	36	3
10	18	4	29	19	47	23	1	0	21	3	22	3
11	14	0	13	22	27	22	3	0	23	1	26	1
12	9	5	27	45	36	50	7	0	23	3	30	3
13	13	0	12	7	25	7	11	0	17	3	28	3
14	27	0	13	0	40	0	6	2	15	3	21	5
15	15	3	8	2	23	5	4	5	55	22	59	27
16	21	4	16	17	37	21	6	1	22	8	28	9
17	45	1	38	16	83	17	12	1	44	7	56	8
18	9	5	17	16	26	21	4	3	26	3	30	6
All Period	203	26	202	157	405	183	67	12	290	61	357	73

* "completely within" means the vehicle is completely inside the reserve

** "partially within" means the vehicle is partially inside the reserve.

N.B. For "before", the markings means the broken white line lane markings; for "after", it means the double white line carriageway markings.

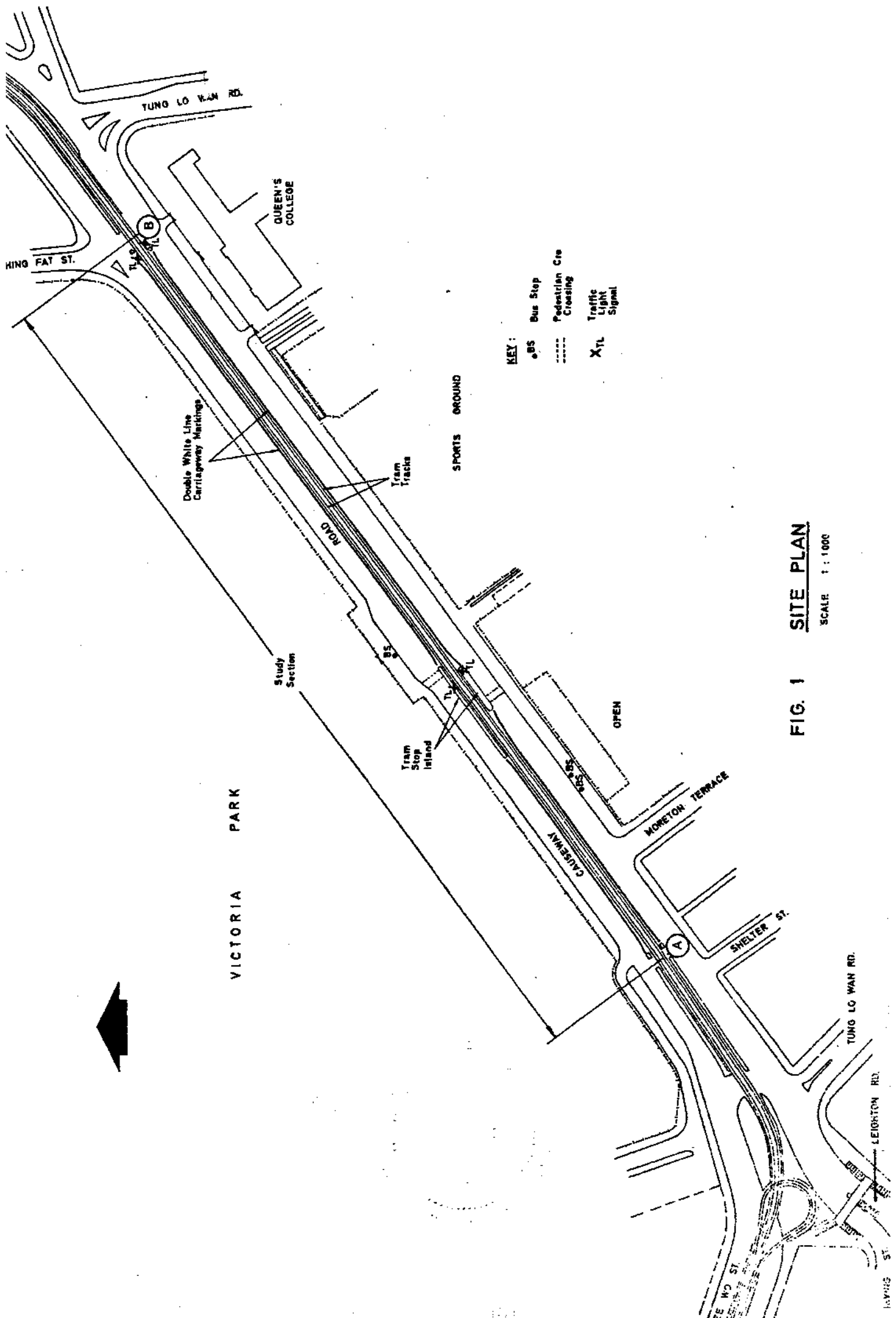
Table 4 Pedestrian Movement

Hour Beginning	Section of road					
	From Shelter Street to pedestrian crossing		From pedestrian crossing to Hing Fat Street		on the pedestrian crossing*	
	before	after	before	after	before	after
08	132 (10)	137 (0)	193 (17)	173 (9)	388	342
09	75 (3)	141 (0)	95 (7)	49 (2)	305	355
10	87 (0)	139 (0)	46 (15)	61 (7)	250	303
11	98 (10)	137 (0)	53 (9)	43 (12)	268	270
12	129 (8)	132 (0)	45 (2)	35 (0)	253	297
13	34 (0)	82 (0)	55 (15)	39 (3)	273	277
14	45 (4)	53 (0)	47 (19)	42 (2)	188	268
15	86 (0)	126 (0)	43 (0)	34 (6)	279	255
16	98 (1)	151 (0)	52 (8)	53 (15)	200	327
17	99 (4)	141 (0)	48 (10)	54 (0)	278	276
18	66 (2)	193 (0)	42 (10)	109 (0)	254	361
Total	949 (5)	1432 (0)	719 (11)	692 (5)	2936	3331

N.B. 1. The table gives the number of pedestrians crossing the road in both directions.

* The figures include people using the pedestrian crossing to get on the trams.

() gives the proportion of those pedestrians not using that cause the trams to be slowed down on approaching them.



KEY:

- BS Bus Stop
- Pedestrian Crossover
- X TL Traffic Light Signal

FIG. 1 SITE PLAN

SCALE 1 : 1000





