

REPUBLIC OF SINGAPORE

**SINGAPORE URBAN TRANSPORT
IMPROVEMENT STUDY (SUTIS)**

TECHNICAL REPORT No. 2

Existing Feeder Transport System and Demand



NOVEMBER 1988

Japan International Cooperation Agency

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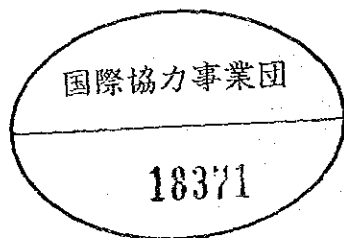
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1. INTRODUCTION

This paper discusses the existing feeder transport demand and services in Singapore. In addition to the already available information, the Study Team conducted a number of supplemental surveys on the above aspect. The major surveys are as follows:

- 1) 1980/81 HIS Data: The complete OD distribution of person trips based on the 1980/81 Home Interview Survey. This data gives a comprehensive picture of the travel pattern of residents by travel mode, trip purpose, time period of activities, and socio-economic characteristics, among others.
- 2) Limited Household Interview Surveys for Ang Mo Kio Residents: Two surveys were conducted; one in 1987 for Phase I Study and the other in 1988 for Phase II Study. Seven hundred thirty-one (731) and 1,078 household samples were collected in 1987 and 1988, respectively. These sample data provide comprehensive information on their socio-economic features, travel pattern, use of and opinion on the present feeder transport services and the opinion on present living environment in Ang Mo Kio new town.
- 3) PWD Officials Survey: Six hundred thirteen samples (613) in 1987 and 370 in 1988 were collected from PWD officials. The survey, comprising the following components of the questionnaire, provided information on island-wide feeder transport services.

Phase I Survey (1987)

- a) Personal and household information
- b) Trip information on a week day
- c) Assessment of feeder bus services

Phase II Survey (1988)

- a) Personal and household information
 - b) Trip information between home and office
 - c) Use and impact of the MRT
 - d) Perception on walking distance and time
- 4) Bus Survey at Ang Mo Kio Bus Interchange: Two surveys were conducted in 1987 and 1988, before and after the opening of the MRT. Four thousand six hundred (4,600) samples in 1987 and 2,600 samples in 1988 were collected by interviewing bus passengers at Ang Mo Kio bus interchange between 0600 and 2200 hours. These samples gave detailed information on their OD distribution, trip purpose, access means to bus, and others. The sample data were expanded by the bus passengers count data surveyed at the same time.

- 5) 1985 SBS Bus Passenger Survey: Singapore Bus Services (SBS) conducted the Bus Passenger Survey to obtain data for the MRT/Bus Integration Study in 1985. A similar survey was first conducted in 1982 as part of the Singapore Comprehensive Traffic Study (CTS). The 1985 survey was carried out in March and June 1985. A total of 268 bus services operated by SBS, TIBS, CSS, and Scheme B services were covered in this survey. Samples buses were selected based on bus frequencies and all passengers of these samples buses were surveyed. Approximately 459,000 samples (73%) out of 629,000 passengers aboard the surveyed buses were collected in the survey. The data was processed and expanded to build origin-destination matrices for the study. For the origin-destination OD (matrices), the entire survey area was subdivided into approximately 600 clusters and 100 districts. Bus passenger matrices for peak period (1645 to 1845 hours) and off peak period (14:30 to 1629 hours) were prepared. The Study Team was provided with the trip distribution of SBS bus passenger to/from and within four new towns, including Ang Mo Kio, Toa Payoh, Bedok, and Jurong Residential.
- 6) Orchard Area Pedestrian Survey: This survey was conducted for walk trips only. The number of pedestrians walking along Orchard and Scotts Roads was counted at selected survey points and about 1,800 sample pedestrians were interviewed. These sample data provided information on the profile of pedestrians walking distance and other related information.

A summary of existing surveys is given in Table 1.1. The details of the supplemental surveys on 2), 3), and 4) of the above are explained in separate technical reports.

Table 1.1
Summary of Existing Surveys

| Name of Survey | Survey Year | Survey Area | No. of Samples | Trip Type | No. of Traffic Zones | Available Information | | | |
|---|-------------|---|-------------------|-----------------------------|--------------------------------|-----------------------|--------------------------------------|------------------|------------|
| | | | | | | Expanded Trip OD | Time Period | Feeder Transport | |
| | | | | | | | | Usage | Assessment |
| 1980/81 HIS (IRIC) | 1980 | All areas of Singapore | 19,000 Households | Person Trips | 250 | Yes | All Time Periods | None | None |
| Limited HIS (PHD-JICA Study Team) | 1987 | Ang Mo Kio New Town | 731 Households | Person Trips | 60 + 16 sub-zones for AMK | Yes | All Time Periods | Yes | Yes |
| | 1988 | Ang Mo Kio New Town | 1,078 Households | Person Trips | 60 + 16 sub-zones for AMK | Yes | All Time Periods | Yes | None |
| Feeder Transport Survey for PHD Officials (PHD-JICA Study Team) | 1987 | For PHD Officials at ND/SIA Bldgs. only | 613 persons | Person Trips | 16 + 20 HDB new town | Yes | All Time Periods | Yes | None |
| | 1988 | For PHD officials at ND/SIA Bldgs. only | 370 persons | Persons Trips for Commuting | 16 + 20 HDB new town zones | None | For Commuting Trips Only | Yes | None |
| Bus Survey (PHD-JICA Study Team) | 1987 | Ang Mo Kio Bus Interchange | 4,560 persons | Bus Pass. Trips | 33 + 14 sub-zones for AMK | Yes | 16 Hours | None | None |
| | 1988 | Ang Mo Kio Bus Interchange | 2,621 persons | Bus Pass. Trips | 33 + 14 sub-zones for AMK | Yes | 16 Hours | None | None |
| Bus Passenger Survey (SBS) | 1985 | All areas of Singapore | 459,000 persons | Bus Pass. Trips | 600 clusters and 100 districts | Yes | Off-peak and evening peak hours only | None | None |
| Orchard Area Pedestrian Survey (PHD-JICA Study Team) | 1988 | Orchard Rd. and Scotts Rd. | 1,794 pedestrians | Walk Trip only | 14 zones | Yes | 15 Hours | None | None |

2 OVERALL TRAVEL DEMANDS

2.1 Island-Wide Person Trip Demand

The 1980/81 OD data were aggregated from the original 250 traffic zones to 46 new traffic zones. New traffic zones were established based on the boundary of HDB new towns. Each HDB new town represents a traffic zone. The zoning is shown in Figure 2.1 and the zone list of HDB new towns is shown in Table 2.1

- 1) Overall Travel Demand: As shown in Table 2.2, the 1980/81 OD data indicates that overall travel demand in terms of motorized persons trips is estimated daily to be 4.3 million /day. A trip is defined as a one-way journey for a particular purpose by motorized means (excluding bicycle trips). Among these trips, 17.2 percent or 0.7 million trips were for travel within the traffic zone or intra-zonal trips and 23.6 percent or 1.0 million trips for travel to/from the CBD comprising zones 1 and 2.

Table 2.3 shows daily person trips by travel mode. Fifty-four percent (54%) of all daily trips were made by bus, which was then the only public transport mode. For intra-zonal trips, the percentage of public transport is slightly less than that of private transport mode.

- 2) Characteristics of Inter-zonal Trips: The inter-zonal trips are classified into two; those to/from the CBD and the other among the non-CBD areas. The former is shown in Figure 2.2 while the latter in Figure 2.3. It is clear that there are considerable non-CBD related traffic, particularly along the following corridors:

- a) East Coast Corridor: between zone 13, zone 16 (Geylang) and zone 29 (Bedok), approximately 44,000-82,000 trips/day.
- b) West Coast Corridor: between zone 6 (Bukit Merah), zone 7 (Queenstown), and zone 8 and zone 17 (Clementi), 29,000-80,000 trips/day.
- c) Ang Mo Kio-Toa Payoh Corridor: between zone 11 (Jalan Besar), zone 12 (Toa Payoh), and zone 24 (Ang Mo Kio), 20,000-57,000 trips/day.

In addition to the above areas, travel demand between the adjoining zones along the above corridors are also significant.

- 3) Intra-zonal Trips: The level of intra-zonal traffic demand varies by zone. Table 2.3 shows the zones which have relatively higher percentages of intra-zonal traffic.

Figure 2.1

Location Map of Aggregated Zones

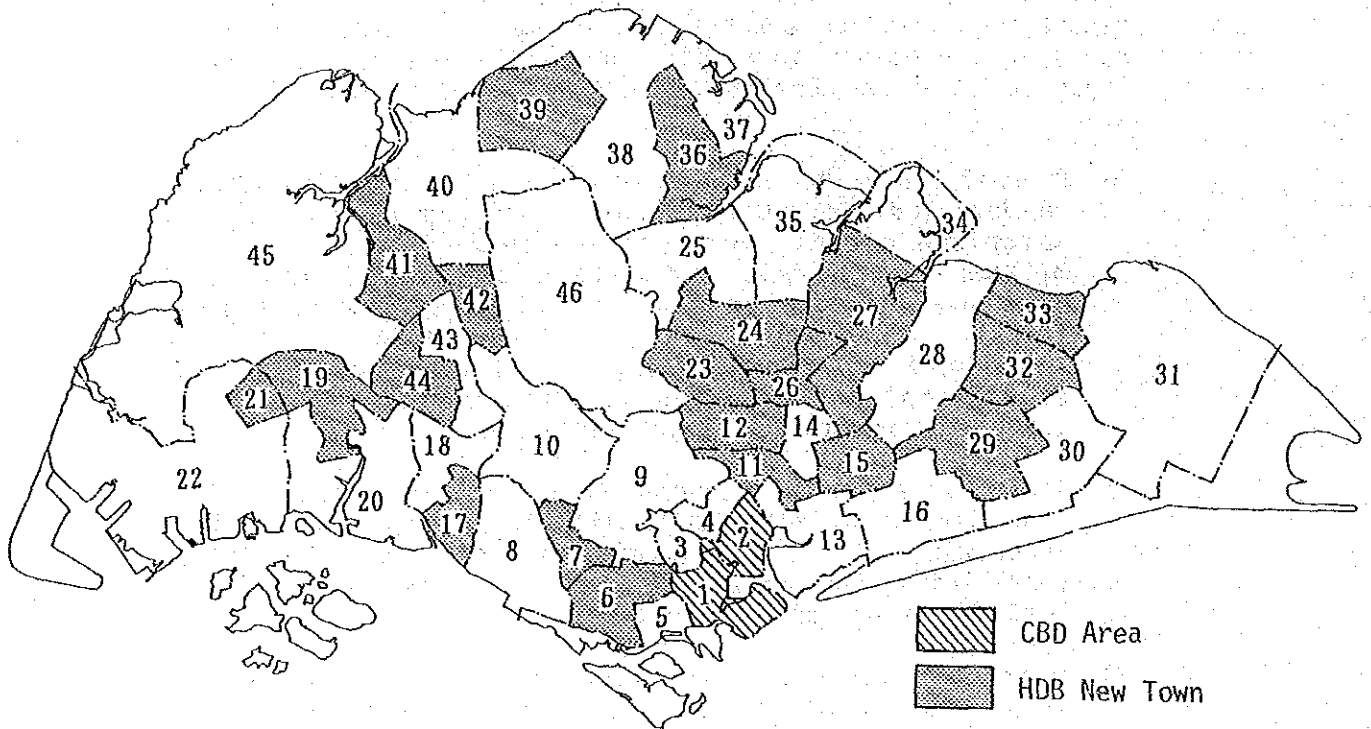


Table 2.1

Zone List of HDB New Towns

| Zone No. | Name of HDB New Town | Zone No. | Name of HDB New Town |
|----------|----------------------|----------|----------------------|
| 6 | Bukit Merah | 26 | Serangoon |
| 7 | Queenstown | 27 | Hougang |
| 11 | Jalan Besar | 29 | Bedok |
| 12 | Toa Payoh | 32 | Tampines |
| 15 | Geylang | 33 | Pasir Ris |
| 17 | Clementi | 36 | Yishun |
| 19 | Jurong East | 39 | Woodlands |
| 21 | Jurong West | 41 | Choa Chu Kang |
| 23 | Bishun | 42 | Bukit Panjang |
| 24 | Ang Mo Kio | 44 | Bukit Batok |

Table 2.2

Distribution of Trips by Purpose
and Area Category, 1980

No. of Trips (%)

| Area | Trip Purpose | | | | Total | % to Total |
|---------------------|---------------------|-------------------|-------------------|---------------------|----------------------|------------|
| | To Work & To School | Business | Private | To Home | | |
| Intra-zone | 189,732 (25.5) | 75,291 (10.1) | 184,134 (24.8) | 293,685 (39.5) | 742,842 (100.0) | (17.2) |
| To/From CBD | 324,676 (31.8) | 133,141 (13.1) | 206,488 (20.3) | 355,239 (34.8) | 1,019,544 (100.0) | (23.6) |
| To/From Other Areas | 831,044 (32.6) | 205,179 (8.0) | 389,127 (15.3) | 1,124,179 (44.1) | 2,549,529 (100.0) | (59.2) |

Source: Preliminary tabulation of the 1980/81 HIS

Table 2.3

Daily Person Trips by Mode

No. of Trips (%)

| Area | Mode of Travel | | | | Total | (%) |
|---------------------|---------------------|---------|---------------------|---------|----------------------|---------|
| | Public | (%) | Private | (%) | | |
| Intra-zone | 359,593 (48.4) | (15.4) | 383,249 (51.6) | (19.4) | 742,842 (100.0) | (17.2) |
| To/From the CBD | 520,915 (51.1) | (22.3) | 498,629 (48.9) | (25.2) | 1,019,544 (100.0) | (23.6) |
| To/From Other Areas | 1,451,414 (56.9) | (62.3) | 1,098,115 (43.1) | (43.1) | 2,549,529 (100.0) | (59.2) |

Source: Preliminary tabulation of the 1980/81 HIS.

Table 2.4

Intra-zonal Traffic Level of Selected Zones

| Zone No. | Area | Public | | Private | | Total | |
|-----------------------|-------------|------------------------|----------------------|------------------------|-----------------------|------------------------|----------------------|
| | | No. of Trip-ends (000) | % to Total Trip-ends | No. of Trip-ends (000) | % to Total Trip (000) | No. of Trip-ends (000) | % to Total Trip-ends |
| 1 | CBD | 35.2 | 10.4 | 46.1 | 14.6 | 81.3 | 12.4 |
| 2 | CBD | 34.4 | 13.7 | 33.1 | 12.7 | 67.5 | 13.2 |
| 6 | Bukit Merah | 100.0 | 26.2 | 52.5 | 22.5 | 152.5 | 25.0 |
| 7 | Queenstown | 55.5 | 20.7 | 23.7 | 14.0 | 79.2 | 18.1 |
| 9 | | 7.0 | 5.2 | 45.9 | 22.2 | 53.0 | 15.5 |
| 12 | Toa Payoh | 42.0 | 15.8 | 40.9 | 20.0 | 82.9 | 17.3 |
| 16 | | 60.7 | 26.6 | 90.1 | 34.6 | 150.8 | 31.0 |
| 19 | Jurong East | 37.2 | 28.0 | 24.8 | 30.0 | 62.0 | 28.5 |
| 24 | Ang Mo Kio | 82.8 | 30.5 | 44.4 | 24.7 | 127.2 | 27.2 |
| 29 | Bedok | 82.9 | 28.6 | 92.6 | 40.3 | 175.5 | 33.7 |
| Average Whole Country | | - | (19.2) | - | (15.4) | - | (17.2) |

Source: Analysis of 1980/81 HIS

Figure 2.2
 Distribution of Demand
 to/From the CBD

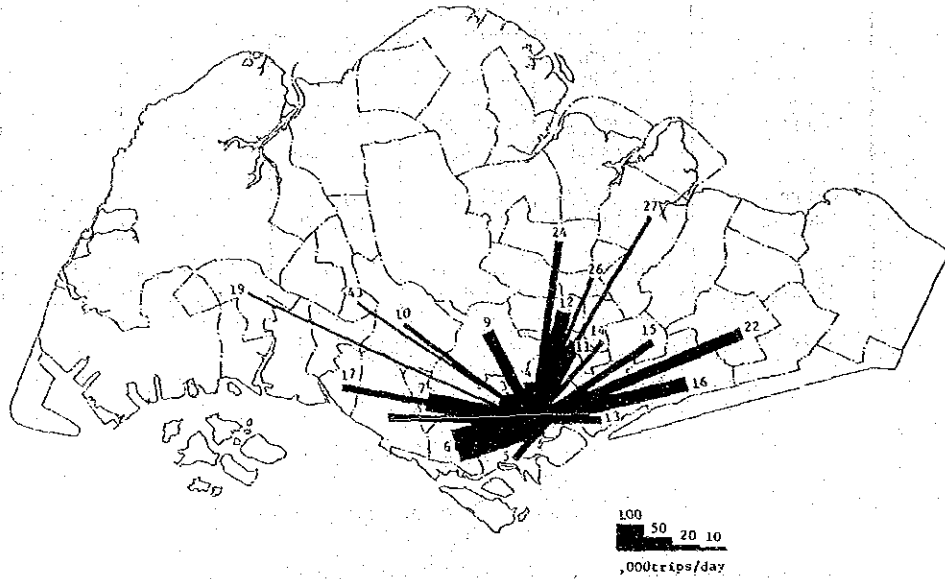
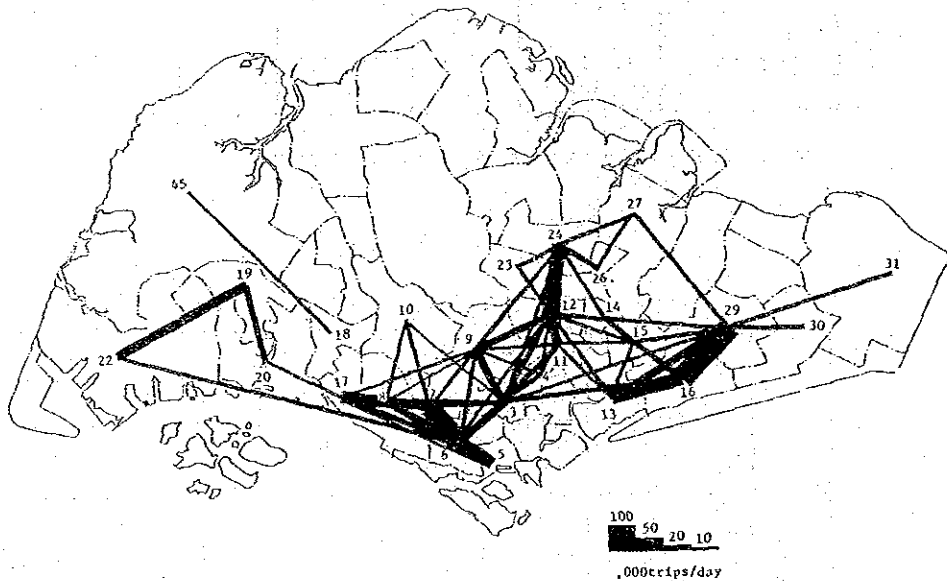


Figure 2.3
 Distribution of Demand
 among Areas
 (Excluding CBD)



Source: Worked out based on 1980/81 HIS

1/ movement with less than 10,000 trips/day is not shown.

2.2 Travel Demands of HDB New Towns

Table 2.5 shows the distribution of trips for four categories; namely, intra-zonal trips to/from adjoining zones, to/from the CBD, and to/from other zones. The first two categories are mostly for possible feeder transport demand, while the rest are mostly for trunk transport. In 1980, a total of 4.0 million trip-ends were generated and attracted in the 20 HDB new towns, which account for 47% of the total trip-ends.

Among the new towns, Bukit Merah, Jurong East, Ang Mo Kio and Bedok new towns have high percentages of intra-zonal trips because these new towns have large town centers and well-developed feeder bus service networks. On the other hand, Woodlands and Hougang new towns, for example, have smaller percentages of intra-zonal trips.

Trip demand level to/from the CBD seems to be inversely proportional to the distance from the CBD. For example, Bukit Merah, Jalan Besar, and Geylang new towns located near the CBD have higher percentages to/from the CBD, while Jurong East and West, Pasir Ris, Yishun, and Woodlands have smaller percentages.

Tables 2.6 and 2.7 show the breakdown of trips made by public and private modes of travel, respectively. Bukit Merah, Jurong East, Ang Mo Kio, and Bedok new towns also have higher percentages of intra-zonal trips for private mode. Table 2.8 shows the percentage share of public mode trips.

Table 2.9 shows the major trip distribution by HDB new town. It shows that large traffic flows concentrate in Ang Mo Kio, Toa Payoh, and Bedok new towns to/from other new towns. Among a number of new towns, there are significant traffic flows. The traffic flows to/from individual new towns are presented in Figure 2.4.

Table 2.5

Traffic Demand by Trip Characteristics in HDB New Town (All modes)

| New Town | Zone No. | (Total) | | | | | | Total |
|-------------------|----------|----------------------|-------------------------|------------------|---------------------|---------------------|------------------|------------------|
| | | For Feeder Transport | | | For Trunk Transport | | | |
| | | Intra-zonal Trips | To/From Adjoining Zones | Sub-total | To/From CBD | To/From Other Zones | Sub-total | |
| 1. Bukit Merah | 6 | 76,265 | 193,984 | 270,249 | 133,376 | 134,603 | 267,979 | 538,228 |
| 2. Queenstown | 7 | 39,587 | 138,918 | 178,505 | 70,345 | 149,045 | 219,390 | 397,895 |
| 3. Jalan Besar | 11 | 19,654 | 93,252 | 112,906 | 54,060 | 129,949 | 184,009 | 296,915 |
| 4. Toa Payoh | 12 | 41,437 | 93,877 | 135,314 | 60,557 | 241,157 | 301,714 | 437,028 |
| 5. Geylang | 15 | 4,999 | 79,465 | 84,464 | 32,702 | 64,548 | 97,250 | 181,714 |
| 6. Clementi | 17 | 7,435 | 58,231 | 65,666 | 24,584 | 125,390 | 149,974 | 215,640 |
| 7. Jurong East | 19 | 31,023 | 66,175 | 97,198 | 11,962 | 77,220 | 89,182 | 186,380 |
| 8. Jurong West | 21 | 764 | 7,819 | 8,583 | 272 | 3,092 | 3,364 | 11,947 |
| 9. Bishan | 23 | 3,773 | 37,191 | 40,964 | 7,228 | 32,670 | 39,898 | 80,862 |
| 10. Ang Mo Kio | 24 | 63,595 | 70,558 | 134,153 | 72,708 | 219,315 | 262,023 | 396,176 |
| 11. Serangoon | 26 | 7,293 | 53,120 | 60,413 | 12,527 | 40,796 | 58,071 | 118,484 |
| 12. Hougang | 27 | 16,676 | 53,158 | 69,834 | 12,527 | 72,447 | 84,974 | 154,808 |
| 13. Bedok | 29 | 87,755 | 122,413 | 210,168 | 45,094 | 176,588 | 221,682 | 431,850 |
| 14. Tampines | 32 | - | 1,981 | 1,981 | 872 | 2,246 | 3,118 | 5,099 |
| 15. Pasir Ris | 33 | 616 | 2,236 | 2,852 | 1,717 | 18,498 | 20,215 | 23,067 |
| 16. Yishun | 36 | 479 | 9,939 | 10,418 | 2,055 | 10,949 | 13,004 | 23,422 |
| 17. Woodlands | 39 | 5,036 | 14,071 | 19,107 | 1,292 | 36,072 | 37,364 | 56,471 |
| 18. Choa Chu Kang | 41 | 798 | 8,766 | 9,564 | 447 | 27,109 | 27,556 | 47,120 |
| 19. Bukit Panjang | 42 | 518 | 8,545 | 9,163 | 1,554 | 9,689 | 11,243 | 20,306 |
| 20. Bukit Batok | 44 | - | 1,163 | 1,163 | - | 2,967 | 2,967 | 4,130 |
| Total | | 407,703 | 1,124,862 | 1,532,565 | 520,627 | 1,574,350 | 2,094,977 | 3,627,542 |

Cont. Table 2.5

(%)

| New Town | Zone No. | Intra-zonal Trips | | | | | | Total |
|-------------------|----------|-------------------------|-------------|-------------|---------------------|-------------|-------------|--------------|
| | | To/From Adjoining Zones | Sub-total | To/From CBD | To/From Other Zones | Sub-total | | |
| 1. Bukit Merah | 6 | 14.6 | 36.0 | 50.2 | 24.8 | 25.0 | 49.8 | 100.0 |
| 2. Queenstown | 7 | 9.9 | 34.9 | 44.9 | 17.7 | 37.5 | 55.1 | 100.0 |
| 3. Jalan Besar | 11 | 6.6 | 31.4 | 38.0 | 18.2 | 43.8 | 62.0 | 100.0 |
| 4. Toa Payoh | 12 | 9.5 | 21.5 | 31.0 | 13.9 | 55.2 | 69.0 | 100.0 |
| 5. Geylang | 15 | 2.8 | 43.7 | 46.5 | 18.0 | 35.5 | 53.5 | 100.0 |
| 6. Clementi | 17 | 3.4 | 27.0 | 30.5 | 11.4 | 58.1 | 69.5 | 100.0 |
| 7. Jurong East | 19 | 16.6 | 35.5 | 52.2 | 6.4 | 41.4 | 47.8 | 100.0 |
| 8. Jurong West | 21 | 6.4 | 65.4 | 71.8 | 2.3 | 25.9 | 28.2 | 100.0 |
| 9. Bishan | 23 | 4.7 | 46.0 | 50.7 | 8.9 | 40.4 | 49.3 | 100.0 |
| 10. Ang Mo Kio | 24 | 16.0 | 17.8 | 33.9 | 10.8 | 55.4 | 66.1 | 100.0 |
| 11. Serangoon | 26 | 6.2 | 44.8 | 51.0 | 14.6 | 34.4 | 49.0 | 100.0 |
| 12. Hougang | 27 | 10.8 | 34.3 | 45.1 | 8.1 | 46.8 | 54.9 | 100.0 |
| 13. Bedok | 29 | 20.3 | 28.3 | 48.7 | 10.4 | 40.9 | 51.3 | 100.0 |
| 14. Tampines | 32 | - | 38.9 | 38.9 | 17.1 | 44.0 | 61.1 | 100.0 |
| 15. Pasir Ris | 33 | 2.7 | 9.7 | 12.4 | 7.4 | 80.2 | 87.6 | 100.0 |
| 16. Yishun | 36 | 2.0 | 42.4 | 44.5 | 8.8 | 46.7 | 55.5 | 100.0 |
| 17. Woodlands | 39 | 8.9 | 24.9 | 33.8 | 2.3 | 63.9 | 66.2 | 100.0 |
| 18. Choa Chu Kang | 41 | 1.7 | 39.8 | 41.5 | 9.4 | 57.5 | 58.5 | 100.0 |
| 19. Bukit Panjang | 42 | 2.6 | 42.1 | 44.6 | 7.7 | 47.7 | 55.4 | 100.0 |
| 20. Bukit Batok | 44 | - | 28.2 | 28.2 | - | 71.8 | 71.8 | 100.0 |
| Total | | 11.2 | 31.0 | 42.2 | 14.4 | 43.4 | 57.8 | 100.0 |

Source: Analysis of 1980/81

Table 2.6

Trip Demand by Trip Characteristics in HDB New Town (Public mode)

| Zone No. | Intra-zonal Trips | To/From | | To/From | | Sub-total | Total | No. of trips | |
|-------------------|-------------------|-----------------|-----------|---------|-------------|-----------|---------|--------------|-----------|
| | | Adjoining Zones | Sub-total | CBD | Other Zones | | | | |
| 1. Bukit Merah | 6 | | 50,004 | 111,717 | 161,721 | 84,852 | 85,133 | 169,985 | 331,706 |
| 2. Queenstown | 7 | | 27,756 | 81,958 | 109,714 | 37,766 | 89,868 | 129,681 | 239,395 |
| 3. Jalan Besar | 11 | | 6,189 | 61,844 | 68,033 | 37,766 | 70,559 | 108,325 | 176,358 |
| 4. Toa Payoh | 12 | | 20,996 | 56,991 | 77,987 | 34,148 | 133,194 | 167,342 | 245,329 |
| 5. Geylang | 15 | | 1,960 | 40,724 | 42,684 | 23,561 | 49,475 | 73,036 | 115,720 |
| 6. Clementi | 17 | | 5,014 | 29,361 | 34,375 | 14,343 | 74,475 | 88,818 | 123,193 |
| 7. Jurong East | 19 | | 18,613 | 48,116 | 66,729 | 4,507 | 44,010 | 48,517 | 115,246 |
| 8. Jurong West | 21 | | 358 | 5,874 | 6,232 | - | 2,142 | 2,142 | 8,374 |
| 9. Bishan | 23 | | 346 | 13,537 | 13,883 | 3,037 | 16,351 | 19,388 | 33,271 |
| 0. Ang Mo Kio | 24 | | 41,387 | 36,391 | 77,778 | 25,476 | 135,847 | 161,323 | 239,101 |
| 11. Serangoon | 26 | | 2,274 | 29,126 | 31,400 | 7,024 | 18,817 | 25,841 | 57,241 |
| 12. Hougang | 27 | | 12,609 | 28,592 | 41,201 | 6,026 | 36,353 | 42,379 | 83,580 |
| 13. Bedok | 29 | | 41,443 | 74,850 | 116,293 | 27,692 | 104,285 | 131,977 | 248,270 |
| 14. Tampines | 32 | | - | 540 | 540 | 228 | 1,034 | 1,262 | 1,802 |
| 15. Pasir Ris | 33 | | - | 1,332 | 1,332 | 876 | 12,052 | 12,928 | 14,260 |
| 16. Yishun | 36 | | 119 | 5,779 | 5,978 | 1,138 | 6,253 | 7,391 | 13,369 |
| 17. Woodlands | 41 | | 2,938 | 10,993 | 13,931 | 672 | 25,423 | 26,095 | 40,026 |
| 18. Choa Chu Kang | 42 | | - | 5,330 | 15,961 | 234 | 18,490 | 18,724 | 34,685 |
| 19. Bukit Panjang | 44 | | - | 894 | 894 | - | 636 | 636 | 1,530 |
| 20. Bukit Batok | | | | | | | | | |
| Total | | | 232,717 | 659,823 | 892,540 | 311,645 | 928,829 | 1,240,474 | 2,133,014 |

Cont. Table 2.6

(%)

| Zone No. | Intra-zonal Trips | To/From | | To/From | | Sub-total | Total | No. of trips | |
|-------------------|-------------------|-----------------|-----------|---------|-------------|-----------|-------|--------------|-------|
| | | Adjoining Zones | Sub-total | CBD | Other Zones | | | | |
| 1. Bukit Merah | 6 | | 15.1 | 33.7 | 48.8 | 25.6 | 25.7 | 51.2 | 100.0 |
| 2. Queenstown | 7 | | 11.6 | 34.2 | 45.8 | 16.6 | 37.5 | 54.2 | 100.0 |
| 3. Jalan Besar | 11 | | 3.5 | 35.1 | 38.6 | 21.4 | 40.0 | 61.4 | 100.0 |
| 4. Toa Payoh | 12 | | 8.6 | 23.2 | 31.8 | 13.9 | 54.3 | 68.2 | 100.0 |
| 5. Geylang | 15 | | 1.7 | 35.2 | 36.9 | 20.4 | 42.8 | 63.1 | 100.0 |
| 6. Clementi | 17 | | 4.1 | 23.8 | 27.9 | 11.6 | 60.5 | 72.1 | 100.0 |
| 7. Jurong East | 19 | | 16.2 | 41.8 | 57.9 | 3.9 | 38.2 | 42.1 | 100.0 |
| 8. Jurong West | 21 | | 4.3 | 70.1 | 74.4 | - | 25.6 | 25.6 | 100.0 |
| 9. Bishan | 23 | | 1.0 | 40.7 | 41.7 | 9.1 | 49.1 | 58.3 | 100.0 |
| 0. Ang Mo Kio | 24 | | 17.3 | 15.2 | 32.5 | 10.7 | 56.8 | 67.5 | 100.0 |
| 11. Serangoon | 26 | | 4.0 | 50.9 | 54.9 | 12.3 | 32.9 | 45.1 | 100.0 |
| 12. Hougang | 27 | | 15.1 | 34.2 | 49.3 | 7.2 | 43.5 | 50.7 | 100.0 |
| 13. Bedok | 29 | | 16.7 | 30.1 | 46.8 | 11.2 | 42.0 | 53.2 | 100.0 |
| 14. Tampines | 32 | | - | 30.0 | 30.0 | 12.7 | 57.4 | 70.0 | 100.0 |
| 15. Pasir Ris | 33 | | - | 9.3 | 9.3 | 6.1 | 84.5 | 90.7 | 100.0 |
| 16. Yishun | 36 | | 1.5 | 43.2 | 44.7 | 8.5 | 46.8 | 55.3 | 100.0 |
| 17. Woodlands | 39 | | 7.3 | 27.5 | 34.8 | 1.7 | 63.5 | 65.2 | 100.0 |
| 18. Choa Chu Kang | 41 | | 1.8 | 44.2 | 46.0 | 0.7 | 53.3 | 54.0 | 100.0 |
| 19. Bukit Panjang | 42 | | - | 55.6 | 55.6 | 2.4 | 42.0 | 44.4 | 100.0 |
| 20. Bukit Batok | 44 | | - | 58.4 | 58.4 | - | 41.6 | 41.6 | 100.0 |
| Total | | | 10.9 | 30.9 | 41.8 | 14.6 | 43.5 | 58.2 | 100.0 |

Table 2.7

Traffic Demand by Trip Characteristics in HDB New Town (Private mode)

| New Town | Zone No. | For Feeder Transport | | | For Trunk Transport | | | Total |
|-------------------|----------|----------------------|-------------------------|-----------|---------------------|---------------------|-----------|-----------|
| | | Intra-zonal Trips | To/From Adjoining Zones | Sub-total | To/From CBD | To/From Other Zones | Sub-total | |
| 1. Bukit Merah | 6 | 26,261 | 82,267 | 108,528 | 48,524 | 49,470 | 97,994 | 206,522 |
| 2. Queenstown | 7 | 11,831 | 55,960 | 68,791 | 30,532 | 59,177 | 89,709 | 158,500 |
| 3. Jalan Besar | 11 | 13,465 | 31,408 | 44,873 | 16,294 | 59,390 | 75,684 | 120,557 |
| 4. Toa Payoh | 12 | 20,441 | 36,886 | 57,327 | 26,409 | 107,963 | 134,372 | 191,699 |
| 5. Geylang | 15 | 3,039 | 38,741 | 41,780 | 9,141 | 15,073 | 24,214 | 65,994 |
| 6. Clementi | 17 | 2,421 | 28,870 | 31,291 | 10,241 | 50,915 | 61,156 | 92,447 |
| 7. Jurong East | 19 | 12,410 | 18,059 | 30,469 | 7,455 | 33,210 | 40,665 | 70,134 |
| 8. Jurong West | 21 | 406 | 1,945 | 2,351 | 272 | 950 | 1,222 | 3,573 |
| 9. Bishan | 23 | 3,427 | 23,654 | 27,081 | 4,191 | 16,319 | 20,510 | 47,591 |
| 10. Ang Mo Kio | 24 | 22,208 | 34,167 | 56,375 | 17,232 | 83,468 | 100,700 | 157,075 |
| 11. Serangoon | 26 | 5,019 | 23,994 | 29,013 | 10,251 | 21,979 | 32,230 | 61,243 |
| 12. Hougang | 27 | 4,067 | 24,566 | 28,633 | 6,501 | 36,094 | 42,595 | 71,228 |
| 13. Bedok | 29 | 46,312 | 47,563 | 93,875 | 17,402 | 72,303 | 89,705 | 183,580 |
| 14. Tampines | 32 | - | 1,441 | 1,441 | 644 | 1,212 | 1,856 | 3,297 |
| 15. Pasir Ris | 33 | 616 | 904 | 1,520 | 841 | 6,446 | 7,287 | 8,807 |
| 16. Yishun | 36 | 280 | 4,160 | 4,440 | 917 | 4,696 | 5,613 | 10,053 |
| 17. Woodlands | 39 | 2,098 | 3,078 | 5,176 | 620 | 10,649 | 11,269 | 16,445 |
| 18. Choa Chu Kang | 41 | 167 | 3,436 | 3,603 | 213 | 8,619 | 8,832 | 12,435 |
| 19. Bukit Panjang | 42 | 518 | 2,671 | 3,189 | 1,302 | 5,257 | 6,559 | 9,748 |
| 20. Bukit Batok | 44 | - | 269 | 269 | - | 2,331 | 2,331 | 2,600 |
| Total | | 174,986 | 465,039 | 640,025 | 208,982 | 645,521 | 854,503 | 1,494,528 |

Cont. Table 2.7

| New Town | Zone No. | For Feeder Transport | | | For Trunk Transport | | | Total |
|-------------------|----------|----------------------|-------------------------|-----------|---------------------|---------------------|-----------|-------|
| | | Intra-zonal Trips | To/From Adjoining Zones | Sub-total | To/From CBD | To/From Other Zones | Sub-total | |
| 1. Bukit Merah | 6 | 12.7 | 39.8 | 52.6 | 23.5 | 24.0 | 47.4 | 100.0 |
| 2. Queenstown | 7 | 7.5 | 35.9 | 43.4 | 19.3 | 37.3 | 56.6 | 100.0 |
| 3. Jalan Besar | 11 | 11.2 | 26.1 | 37.2 | 13.5 | 49.3 | 62.8 | 100.0 |
| 4. Toa Payoh | 12 | 10.7 | 19.2 | 29.9 | 13.8 | 56.3 | 70.1 | 100.0 |
| 5. Geylang | 15 | 4.6 | 58.7 | 63.3 | 13.9 | 22.8 | 36.7 | 100.0 |
| 6. Clementi | 17 | 2.6 | 31.2 | 33.8 | 11.1 | 15.1 | 26.2 | 100.0 |
| 7. Jurong East | 19 | 17.4 | 25.4 | 42.8 | 10.5 | 46.7 | 57.2 | 100.0 |
| 8. Jurong West | 21 | 11.4 | 54.4 | 65.8 | 7.6 | 26.6 | 34.2 | 100.0 |
| 9. Bishan | 23 | 7.2 | 49.7 | 56.9 | 8.8 | 34.3 | 43.1 | 100.0 |
| 10. Ang Mo Kio | 24 | 14.1 | 21.8 | 35.9 | 11.0 | 53.1 | 64.1 | 100.0 |
| 11. Serangoon | 26 | 8.2 | 39.2 | 47.4 | 16.7 | 35.9 | 52.6 | 100.0 |
| 12. Hougang | 27 | 5.7 | 34.5 | 40.2 | 9.1 | 50.7 | 59.8 | 100.0 |
| 13. Bedok | 29 | 25.2 | 25.9 | 51.1 | 9.5 | 39.4 | 48.9 | 100.0 |
| 14. Tampines | 32 | - | 43.7 | 43.7 | 19.5 | 36.8 | 56.3 | 100.0 |
| 15. Pasir Ris | 33 | 7.0 | 10.3 | 17.3 | 9.5 | 39.4 | 48.9 | 100.0 |
| 16. Yishun | 36 | 2.8 | 41.4 | 44.2 | 9.1 | 46.7 | 55.8 | 100.0 |
| 17. Woodlands | 39 | 12.8 | 18.7 | 31.5 | 3.8 | 64.8 | 68.5 | 100.0 |
| 18. Choa Chu Kang | 41 | 1.3 | 27.6 | 29.0 | 1.7 | 69.3 | 71.0 | 100.0 |
| 19. Bukit Panjang | 42 | 5.3 | 27.4 | 32.7 | 13.4 | 53.9 | 67.3 | 100.0 |
| 20. Bukit Batok | 44 | - | 10.3 | 10.3 | - | 89.7 | 89.7 | 100.0 |
| Total | | 11.7 | 31.1 | 42.8 | 14.0 | 43.2 | 57.2 | 100.0 |

Source: Analysis of 1980/81 HLS

Table 2.8
Share of Public Mode Trips

| New Town | Zone No. | For Feeder Transport | | | For Trunk Transport | | | Total |
|-------------------|----------|----------------------|-------------------------|-----------|---------------------|---------------------|-----------|-------|
| | | Intra-zonal Trips | To/From Adjoining Zones | Sub-total | To/From CBD | To/From Other Zones | Sub-total | |
| 1. Bukit Merah | 6 | 65.6 | 57.6 | 59.8 | 63.6 | 63.2 | 63.4 | 61.6 |
| 2. Queenstown | 7 | 70.1 | 59.0 | 61.5 | 56.6 | 60.3 | 59.1 | 60.2 |
| 3. Jalan Besar | 11 | 31.5 | 66.3 | 60.3 | 69.9 | 54.3 | 58.9 | 59.4 |
| 4. Toa Payoh | 12 | 50.7 | 60.7 | 57.6 | 56.4 | 55.2 | 55.5 | 56.1 |
| 5. Geylang | 15 | 39.2 | 51.2 | 50.5 | 72.0 | 76.6 | 75.1 | 63.7 |
| 6. Clementi | 17 | 67.4 | 50.4 | 52.3 | 58.3 | 59.4 | 59.2 | 57.1 |
| 7. Jurong East | 19 | 60.0 | 72.7 | 68.7 | 37.7 | 57.0 | 54.4 | 61.8 |
| 8. Jurong West | 21 | 46.9 | 75.1 | 72.6 | 0.0 | 69.3 | 63.7 | 70.1 |
| 9. Bishan | 23 | 9.2 | 36.4 | 33.9 | 42.0 | 50.0 | 48.6 | 41.1 |
| 10. Ang Mo Kio | 24 | 65.1 | 51.5 | 58.0 | 59.7 | 61.9 | 61.6 | 60.4 |
| 11. Serangoon | 26 | 31.2 | 54.8 | 52.0 | 40.7 | 45.1 | 44.5 | 48.3 |
| 12. Hougang | 27 | 75.6 | 53.6 | 59.0 | 48.1 | 50.2 | 49.9 | 54.0 |
| 13. Bedok | 29 | 47.2 | 61.1 | 55.3 | 61.4 | 59.1 | 59.5 | 57.5 |
| 14. Tampines | 32 | - | 27.3 | 27.3 | 26.1 | 46.0 | 40.5 | 35.3 |
| 15. Pasir Ris | 33 | 0.0 | 59.6 | 46.7 | 51.0 | 65.2 | 64.0 | 61.8 |
| 16. Yishun | 36 | 41.5 | 60.1 | 57.4 | 55.4 | 57.1 | 56.8 | 57.1 |
| 17. Woodlands | 39 | 58.3 | 78.1 | 72.9 | 52.0 | 70.5 | 69.8 | 70.9 |
| 18. Choa Chu Kang | 41 | 79.1 | 81.7 | 81.6 | 52.3 | 65.2 | 67.9 | 73.6 |
| 19. Bukit Panjang | 42 | 0.0 | 68.7 | 64.8 | 16.2 | 45.7 | 41.7 | 52.0 |
| 20. Bukit Batok | 44 | - | 76.9 | 76.9 | - | 21.4 | 21.4 | 37.0 |
| Total | | 57.0 | 58.7 | 58.2 | 59.9 | 59.0 | 59.2 | 58.8 |

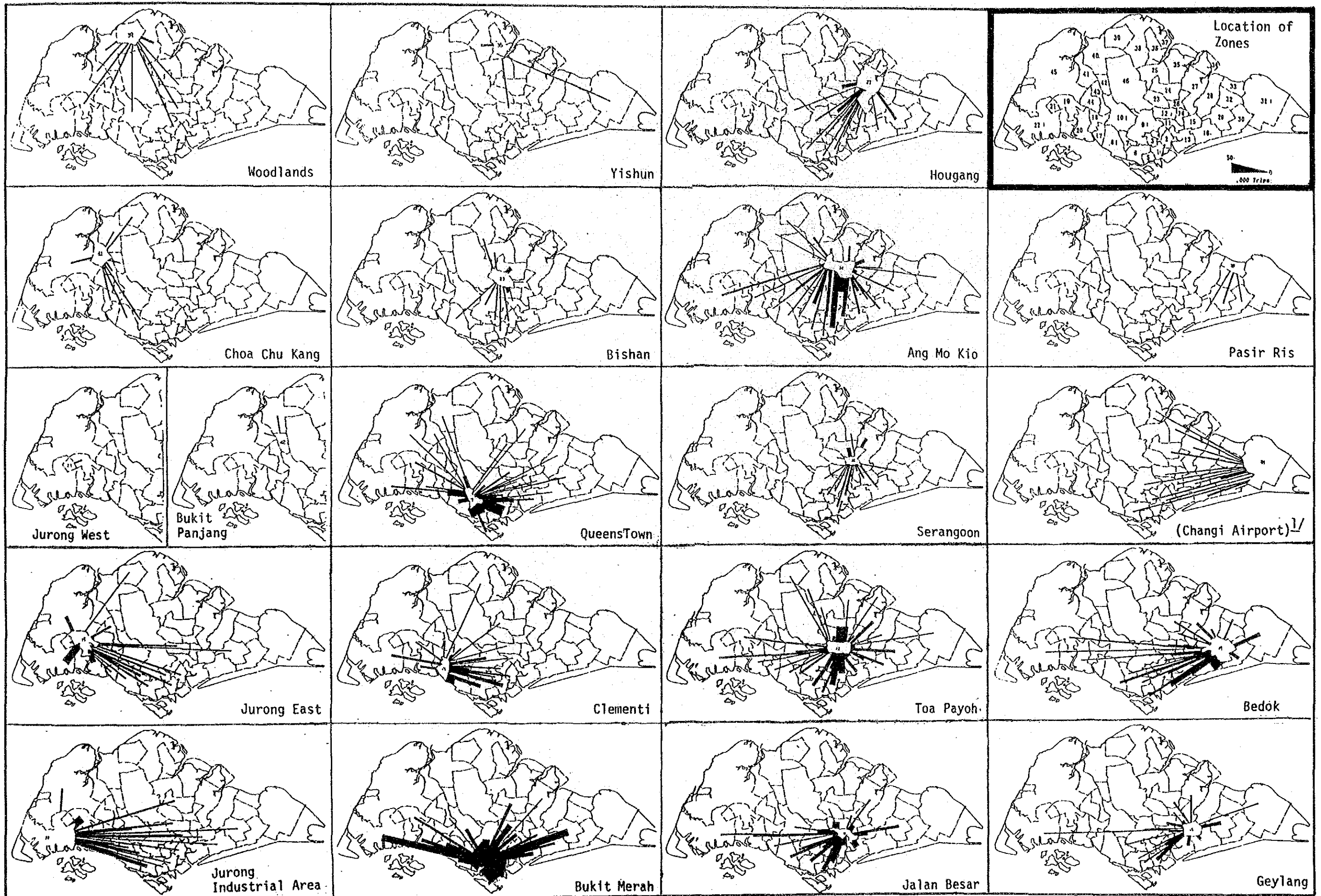
Source: Analysis of 1980/81 HIS

Table 2.9
Major Trip Distribution by HDB New Town

| New Town | Zone No. | Zones with large proportion of trips between (% to total inter-zonal trips) | | |
|-------------------|----------|---|---------------------|----------------------------|
| | | 1st | 2nd | 3rd |
| 1. Bukit Merah | 6 | 1 CBD (21.7) | 7 Queenstown (17.2) | 5 (19.1) |
| 2. Queenstown | 7 | 6 Bukit Merah (22.2) | 1 CBD (14.0) | 17 Clementi (9.5) |
| 3. Jalan Besar | 11 | 2 CBD (12.5) | 12 Toa Payoh (12.0) | 24 Ang Mo Kio (7.3) |
| 4. Toa Payoh | 12 | 24 Ang Mo Kio (14.4) | 3 Jalan Besar (8.4) | 2 CBD (8.0) |
| 5. Geylang | 15 | 29 Bedok (19.1) | 1 CBD (9.9) | 14 (9.1) |
| 6. Clementi | 17 | 8 (19.4) | 7 Queenstown (16.3) | 1 CBD (9.1) |
| 7. Jurong East | 19 | 22 Jurong Industries (23.5) | 20 (15.4) | 45 (9.6) |
| 8. Jurong West | 21 | 19 Jurong East (23.3) | 45 (16.2) | 20 (5.9) |
| 9. Bishan | 23 | 24 Ang Mo Kio (23.3) | 12 Toa Payoh (16.2) | 2 CBD (5.0) |
| 10. Ang Mo Kio | 24 | 12 Toa Payoh (17.2) | 2 CBD (7.3) | 11 Jalan Besar (6.1) |
| 11. Serangoon | 26 | 24 Ang Mo Kio (16.6) | 27 Hougang (14.3) | 2 CBD (9.7) |
| 12. Hougang | 27 | 24 Ang Mo Kio (12.5) | 25 Serangoon (11.5) | 12 Toa Payoh (10.8) |
| 13. Bedok | 29 | 16 (24.0) | 13 (9.6) | 1 CBD (8.0) |
| 14. Tampines | 32 | - | - | - |
| 15. Pasir Ris | 33 | 29 Bedok (22.1) | 30 (13.3) | 16 (8.7) |
| 16. Yishun | 36 | 38 (37.8) | 31 (9.2) | 12 Toa Payoh (8.7) |
| 17. Woodlands | 39 | 38 (15.9) | 40 (11.4) | 43 (6.4) |
| 18. Choa Chu Kang | 41 | 45 (14.0) | 40 (9.6) | 43 (9.4) |
| 19. Bukit Panjang | 42 | 40 (20.1) | 41 (16.4) | 22 Jurong Industries (8.4) |
| 20. Bukit Batok | 44 | - | - | - |

Source: Analysis of 1980/81 HIS

Figure 2.4 Distribution of Traffic Demand to/from New Towns, 1980
(Public and Private Modes)



Source: Preliminary Analysis Of 1080 HIS 1/ : not New Town

3. FEEDER BUS PASSENGER TRAFFIC DEMANDS

3.1 Bus Passenger Traffic Demand in Selected New Towns

Bus passenger OD data derived from the 1985 Bus Passenger Survey conducted and summarized by SBS for 52 traffic sectors are shown in Tables 3.1, 3.2, 3.3, and 3.4 for Ang Mo Kio, Toa Payoh, Jurong residential, and Bedok new towns, respectively. As the original data covered only evening peak period (1430 to 1629 hours), these data were expanded to estimate daily passenger traffic volume based on bus time tables and the results of a bus survey at Ang Mo Kio bus interchange. The distribution of the daily traffic is illustrated in Figures 3.1, 3.2, 3.3, and 3.4 for the selected new towns. The characteristics are briefly explained as follows:

- 1) Bus passenger traffic mostly distributes along or near the major transport corridors where the new town belongs.
- 2) Although the CBD is a common major destination of traffic, other movements are also significant.

The level of feeder bus passenger traffic is estimated simply based on the following formula:

$$\text{Feeder bus passenger trips} = T_i + T_e \times A$$

where,

T_i = Intra-zonal bus passenger trips

T_e = Inter-zonal bus passenger trips

A = Rate of feeder bus utilization (0.415)

T_i and T_e are derived from Tables 3.1, 3.2, 3.3, and 3.4, while A from "Feeder Transport Survey for PWD Officials," which is 41.5% in average.

Table 3.5 gives the estimated feeder bus passenger traffic demand for Ang Mo Kio, Toa Payoh, Jurong Residential and Bedok new towns.

Table 3.1

SBS Bus Passenger Traffic Distribution for Ang Mo Kio New Twon, 1985

| Sector No. | Sector Name | Peak | | Off-Peak | | All Day | | All Day From/To |
|------------|--------------------|-------|------|----------|------|---------|-------|-----------------|
| | | From | To | From | To | From | To | |
| 1 | Yishun | 231 | 330 | 127 | 151 | 1323 | 1467 | 2790 |
| 2 | Ang Mo Kio | 6934 | - | 3811 | - | 36734 | - | 36734 |
| 3 | Bishan | 739 | 520 | 321 | 313 | 3185 | 3137 | 6322 |
| 4 | Toa Payoh | 1452 | 1025 | 561 | 585 | 5843 | 5987 | 11830 |
| 5 | Balestier | 525 | 262 | 277 | 162 | 2449 | 1759 | 4208 |
| 6 | Orchard | 1423 | 307 | 582 | 296 | 5222 | 3506 | 8728 |
| 7 | Shenton Way | 1760 | 136 | 376 | 94 | 4152 | 2460 | 6612 |
| 8 | Chinatown | 1845 | 375 | 628 | 343 | 5988 | 4278 | 10266 |
| 9 | Pasir Ris | - | - | - | - | 0 | 0 | 0 |
| 10 | Tampines | 36 | 97 | 8 | 33 | 181 | 331 | 512 |
| 11 | Bedok | 353 | 334 | 119 | 171 | 1401 | 1713 | 3114 |
| 12 | Kampong Ubi | 6 | 4 | 2 | - | 22 | 10 | 32 |
| 13 | Bendemeer | 1327 | 571 | 463 | 344 | 4676 | 3962 | 8638 |
| 14 | Bukit Merah | 180 | 96 | 57 | 46 | 618 | 552 | 1170 |
| 15 | Tiong Bahru | 78 | 71 | 46 | 38 | 425 | 377 | 802 |
| 16 | Alexandra | 85 | 48 | 23 | 10 | 271 | 193 | 464 |
| 17 | Jurong Residential | 124 | 98 | 91 | 37 | 768 | 444 | 1212 |
| 18 | Clementi | 212 | 169 | 169 | 73 | 1395 | 819 | 2214 |
| 19 | Jurong Industrial | 359 | 51 | 79 | 29 | 884 | 584 | 1468 |
| 20 | Bukit Batok | 51 | 16 | 12 | 9 | 139 | 121 | 260 |
| 21 | Caicuoogang | 15 | 11 | - | - | 26 | 26 | 52 |
| 22 | Changi Airport PTB | 64 | 10 | 38 | 21 | 302 | 200 | 502 |
| 23 | Changi Airport CC | 17 | - | - | 3 | 17 | 35 | 52 |
| 24 | Upper Changi | 43 | 41 | 5 | 2 | 114 | 96 | 210 |
| 25 | Geylang/Changi | 562 | 395 | 230 | 195 | 2337 | 2127 | 4464 |
| 26 | East Coast | 120 | 73 | 84 | 42 | 697 | 445 | 1142 |
| 27 | Marina | - | - | - | - | 0 | 0 | 0 |
| 28 | Telok Blangah | 340 | 132 | 156 | 66 | 1408 | 868 | 2276 |
| 29 | Pasir Panjang | 128 | 11 | 30 | 4 | 319 | 163 | 482 |
| 30 | Ayer Rajah | 85 | 3 | 36 | 7 | 304 | 130 | 434 |
| 31 | Pandan/Teban | 24 | 21 | 9 | 13 | 99 | 123 | 222 |
| 32 | Woodlands | 169 | 219 | 100 | 122 | 988 | 1120 | 2108 |
| 33 | Sungai Kadut | 22 | - | 1 | 7 | 28 | 64 | 92 |
| 34 | Zhenghua | - | - | - | - | 0 | 0 | 0 |
| 35 | Bukit Timah | 797 | 175 | 353 | 135 | 3090 | 1782 | 4872 |
| 36 | Lornie/Adam | 167 | 52 | 62 | 41 | 591 | 465 | 1056 |
| 37 | Ulu Pandan | 242 | 79 | 102 | 53 | 933 | 639 | 1572 |
| 38 | Punggol | 15 | 11 | 3 | 7 | 44 | 68 | 112 |
| 39 | Jalan Kayu | 230 | 121 | 51 | 66 | 657 | 747 | 1404 |
| 40 | Hougang | 489 | 487 | 259 | 210 | 2530 | 2236 | 4766 |
| 41 | Serangoon Town | 453 | 526 | 330 | 292 | 2959 | 2731 | 5690 |
| 42 | Paya Lebar Road | 594 | 154 | 184 | 59 | 1852 | 1102 | 2954 |
| 43 | Aljunied | 198 | 87 | 75 | 30 | 735 | 465 | 1200 |
| 44 | Potong Pasir | 127 | 83 | 56 | 35 | 546 | 420 | 966 |
| 45 | Tampines Road | 17 | 7 | 1 | 4 | 30 | 48 | 78 |
| 46 | Sembawang | 824 | 987 | 435 | 497 | 4421 | 4793 | 9214 |
| 47 | Lim Chu Kang | 87 | 10 | 21 | 3 | 223 | 115 | 338 |
| 48 | MacPherson | 77 | 58 | 18 | 16 | 243 | 231 | 474 |
| 49 | Commonwealth | 147 | 115 | 47 | 43 | 544 | 520 | 1064 |
| 50 | Paya Lebar Airport | 103 | 2 | 19 | 4 | 219 | 129 | 348 |
| 51 | Mandai | 22 | 26 | 14 | 4 | 132 | 72 | 204 |
| 52 | Tohmsn Road | 397 | 83 | 183 | 59 | 1578 | 834 | 2412 |
| | Total | 24295 | 8489 | 10654 | 4774 | 103642 | 54494 | 158136 |

Peak Period : 1645 to 1844 hours
Off-Peak Period : 1430 to 1629 hours

Source: SBS Bus Passenger Survey (1985)

Table 3.2

SBS Bus Passenger Traffic Distribution for Toa Payoh

| Sector No. | Sector Name | Peak | | Off-Peak | | All Day | | All Day From/To |
|------------|--------------------|-------|------|----------|------|---------|-------|-----------------|
| | | From | To | From | To | From | To | |
| 1 | Yishun | 26 | 2 | 9 | - | 82 | 28 | 110 |
| 2 | Ang Mo Kio | 1011 | 1423 | 585 | 561 | 5944 | 5800 | 11744 |
| 3 | Bishan | 503 | 245 | 122 | 133 | 1480 | 1546 | 3026 |
| 4 | Toa Payoh | 3953 | - | 2353 | - | 22024 | - | 22024 |
| 5 | Balestier | 729 | 633 | 442 | 357 | 4014 | 3504 | 7518 |
| 6 | Orchard | 1398 | 410 | 714 | 335 | 6092 | 3818 | 9910 |
| 7 | Shenton Way | 1753 | 65 | 275 | 94 | 3468 | 2382 | 5850 |
| 8 | Chinatown | 1582 | 548 | 741 | 409 | 6576 | 4584 | 11160 |
| 9 | Pasir Ris | - | - | - | - | 0 | 0 | 0 |
| 10 | Tampines | 36 | 157 | 16 | 63 | 289 | 571 | 860 |
| 11 | Bedok | 294 | 343 | 139 | 196 | 1471 | 1813 | 3284 |
| 12 | Kampong Ubi | - | 1 | 3 | 4 | 19 | 25 | 44 |
| 13 | Bendemeer | 1683 | 1002 | 816 | 599 | 7581 | 6279 | 13860 |
| 14 | Bukit Merah | 204 | 154 | 62 | 67 | 730 | 760 | 1490 |
| 15 | Tiong Bahru | 87 | 78 | 13 | 37 | 243 | 387 | 630 |
| 16 | Alexandra | 102 | 114 | 78 | 34 | 684 | 420 | 1104 |
| 17 | Jurong Residential | 147 | 287 | 92 | 123 | 986 | 1172 | 2158 |
| 18 | Clementi | 172 | 140 | 89 | 76 | 846 | 768 | 1614 |
| 19 | Jurong Industrial | 347 | 50 | 130 | 27 | 1177 | 559 | 1736 |
| 20 | Bukit Batok | 142 | 125 | 42 | 41 | 519 | 513 | 1032 |
| 21 | Caicuoang | 30 | 14 | 5 | 4 | 74 | 68 | 142 |
| 22 | Changi Airport PTB | 76 | 44 | 56 | 28 | 456 | 288 | 744 |
| 23 | Changi Airport CC | 33 | - | - | - | 33 | 33 | 66 |
| 24 | Upper Changi | 25 | 27 | 25 | 2 | 202 | 64 | 266 |
| 25 | Geylang/Changi | 643 | 557 | 296 | 272 | 2976 | 2832 | 5808 |
| 26 | East Coast | 336 | 219 | 189 | 103 | 1689 | 1173 | 2862 |
| 27 | Marina | - | - | - | - | 0 | 0 | 0 |
| 28 | Telok Blangah | 357 | 109 | 133 | 70 | 1264 | 886 | 2150 |
| 29 | Pasir Panjang | 171 | 17 | 44 | 24 | 452 | 332 | 784 |
| 30 | Ayer Rajah | 120 | 5 | 20 | 29 | 245 | 299 | 544 |
| 31 | Pandan/Teban | 15 | 36 | 13 | 24 | 129 | 195 | 324 |
| 32 | Woodlands | 48 | 18 | 18 | 11 | 174 | 132 | 306 |
| 33 | Sungai Kadut | 22 | 2 | 1 | - | 30 | 24 | 54 |
| 34 | Zhenghua | - | - | 0 | - | 0 | 0 | 0 |
| 35 | Bukit Timah | 787 | 324 | 415 | 183 | 3601 | 2209 | 5810 |
| 36 | Lornie/Adam | 171 | 42 | 46 | 27 | 489 | 375 | 864 |
| 37 | Ulu Pandan | 202 | 103 | 133 | 82 | 1103 | 797 | 1900 |
| 38 | Punggol | 6 | 6 | 3 | 8 | 30 | 60 | 90 |
| 39 | Jalan Kayu | 141 | 52 | 30 | 47 | 373 | 475 | 848 |
| 40 | Hougang | 243 | 269 | 147 | 182 | 1394 | 1604 | 2998 |
| 41 | Serangoon Town | 304 | 392 | 258 | 195 | 2244 | 1866 | 4110 |
| 42 | Paya Lebar Road | 393 | 65 | 141 | 55 | 1304 | 788 | 2092 |
| 43 | Aljunied | 482 | 255 | 189 | 105 | 1871 | 1367 | 3238 |
| 44 | Potong Pasir | 62 | 181 | 41 | 107 | 489 | 885 | 1374 |
| 45 | Tampines Road | 3 | 8 | - | 3 | 11 | 29 | 40 |
| 46 | Sembawang | 224 | 196 | 40 | 70 | 660 | 840 | 1500 |
| 47 | Lim Chu Kang | 58 | 9 | 11 | 2 | 133 | 79 | 212 |
| 48 | MacPherson | 304 | 410 | 90 | 141 | 1254 | 1560 | 2814 |
| 49 | Commonwealth | 221 | 160 | 78 | 83 | 849 | 879 | 1728 |
| 50 | Paya Lebar Airport | 130 | 7 | 9 | 6 | 191 | 173 | 364 |
| 51 | Mandai | 25 | 36 | 9 | 18 | 115 | 169 | 284 |
| 52 | Tohson Road | 130 | 28 | 19 | 19 | 272 | 272 | 544 |
| | Total | 19931 | 9368 | 9180 | 5056 | 88332 | 55682 | 144014 |

Peak Period : 1645 to 1844 hours

Off-Peak Period : 1430 to 1629 hours

Source: SBS Bus Passenger Survey (1985)

Table 3.3

SBS Bud Passenger Traffic Distribution for Jurong Residential, 1985

| Sector No. | Sector Name | Peak | | Off-Peak | | All Day | | All Day |
|------------|--------------------|-------|------|----------|------|---------|-------|---------|
| | | From | To | From | To | From | To | From/To |
| 1 | Yishun | 1 | - | 4 | - | 25 | 1 | 26 |
| 2 | Ang Mo Kio | 98 | 124 | 37 | 91 | 444 | 768 | 1212 |
| 3 | Bishan | 41 | 24 | 25 | 13 | 215 | 143 | 358 |
| 4 | Toa Payoh | 287 | 147 | 123 | 92 | 1172 | 986 | 2158 |
| 5 | Balestier | 39 | 39 | 18 | 23 | 186 | 216 | 402 |
| 6 | Orchard | 545 | 216 | 328 | 152 | 2729 | 1673 | 4402 |
| 7 | Shenton Way | 706 | 62 | 293 | 87 | 2526 | 1290 | 3816 |
| 8 | Chinatown | 1015 | 238 | 415 | 215 | 3743 | 2543 | 6286 |
| 9 | Pasir Ris | - | - | - | - | 0 | 0 | 0 |
| 10 | Tampines | 21 | 24 | 11 | 15 | 111 | 135 | 246 |
| 11 | Bedok | 66 | 82 | 32 | 69 | 340 | 562 | 902 |
| 12 | Kampong Ubi | - | - | - | - | 0 | 0 | 0 |
| 13 | Bendemeer | 296 | 130 | 93 | 106 | 984 | 1062 | 2046 |
| 14 | Bukit Merah | 552 | 378 | 385 | 259 | 3240 | 2484 | 5724 |
| 15 | Tiong Bahru | 51 | 118 | 53 | 89 | 487 | 703 | 1190 |
| 16 | Alexandra | 200 | 143 | 80 | 88 | 823 | 871 | 1694 |
| 17 | Jurong Residential | 4808 | - | 3382 | - | 29908 | - | 29908 |
| 18 | Clementi | 1105 | 904 | 591 | 481 | 5555 | 4895 | 10450 |
| 19 | Jurong Industrial | 4045 | 642 | 1481 | 522 | 13573 | 7819 | 21392 |
| 20 | Bukit Batok | 289 | 445 | 134 | 212 | 1538 | 2006 | 3544 |
| 21 | Caicoogang | 35 | 31 | 9 | 27 | 120 | 228 | 348 |
| 22 | Changi Airport PTB | 13 | 6 | 11 | 3 | 85 | 37 | 122 |
| 23 | Changi Airport CC | 6 | - | - | - | 6 | 6 | 12 |
| 24 | Upper Changi | 24 | 11 | 6 | 4 | 71 | 59 | 130 |
| 25 | Geylang/Changi | 127 | 80 | 83 | 32 | 705 | 399 | 1104 |
| 26 | East Coast | 71 | 59 | 31 | 22 | 316 | 262 | 578 |
| 27 | Marina | - | - | - | - | 0 | 0 | 0 |
| 28 | Telok Blangah | 389 | 165 | 263 | 119 | 2132 | 1268 | 3400 |
| 29 | Pasir Panjang | 414 | 90 | 124 | 61 | 1248 | 870 | 2118 |
| 30 | Ayer Rajah | 440 | 61 | 85 | 49 | 1011 | 795 | 1806 |
| 31 | Pandan/Teban | 389 | 524 | 169 | 285 | 1927 | 2623 | 4550 |
| 32 | Woodlands | 172 | 143 | 122 | 116 | 1047 | 1011 | 2058 |
| 33 | Sungai Kadut | 67 | 16 | 7 | 12 | 125 | 155 | 280 |
| 34 | Zhenghua | - | - | 0 | - | 0 | 0 | 0 |
| 35 | Bukit Timah | 1286 | 495 | 968 | 384 | 7589 | 4085 | 11674 |
| 36 | Lornie/Adam | 54 | 24 | 6 | 3 | 114 | 96 | 210 |
| 37 | Ulu Pandan | 195 | 117 | 160 | 90 | 1272 | 852 | 2124 |
| 38 | Punggol | - | 2 | - | - | 2 | 2 | 4 |
| 39 | Jalan Kayu | 17 | 4 | - | 7 | 21 | 63 | 84 |
| 40 | Hougang | 31 | 38 | 16 | 10 | 165 | 129 | 294 |
| 41 | Serangoon Town | 10 | 34 | 5 | 6 | 74 | 80 | 154 |
| 42 | Paya Lebar Road | 20 | 8 | 4 | 15 | 52 | 118 | 170 |
| 43 | Aljunied | 43 | 10 | 8 | 16 | 101 | 149 | 250 |
| 44 | Potong Pasir | 9 | 2 | 10 | 4 | 71 | 35 | 106 |
| 45 | Tampines Road | 2 | 5 | - | 0 | 7 | 7 | 14 |
| 46 | Sembawang | 55 | 45 | 12 | 28 | 172 | 268 | 440 |
| 47 | Lim Chu Kang | 222 | 300 | 61 | 133 | 888 | 1320 | 2208 |
| 48 | MacPherson | 73 | 24 | 28 | 27 | 265 | 259 | 524 |
| 49 | Commonwealth | 587 | 375 | 276 | 261 | 2618 | 2528 | 5146 |
| 50 | Paya Lebar Airport | 39 | 5 | - | - | 44 | 44 | 88 |
| 51 | Mandai | 5 | 4 | 2 | 4 | 21 | 33 | 54 |
| 52 | Tohmason Road | 3 | 3 | - | - | 6 | 6 | 12 |
| | Total | 18963 | 6397 | 9951 | 4232 | 89874 | 45944 | 135818 |

Peak Period : 1645 to 1844 hours

Off-Peak Period : 1430 to 1629 hours

Source: SBS Bus Passenger Survey (1985)

Table 3.4

SBS Bus Passenger Traffic Distribution for Bedok, 1985

| Sector No. | Sector Name | Peak | | Off-Peak | | All Day | | All Day From/To |
|------------|--------------------|-------|------|----------|------|---------|-------|-----------------|
| | | From | To | From | To | From | To | |
| 1 | Yishun | 5 | 2 | 9 | - | 61 | 7 | 68 |
| 2 | Ang Mo Kio | 330 | 353 | 171 | 118 | 1709 | 1391 | 3100 |
| 3 | Bishan | 15 | 27 | 15 | - | 132 | 42 | 174 |
| 4 | Toa Payoh | 347 | 299 | 193 | 133 | 1804 | 1444 | 3248 |
| 5 | Balestier | 287 | 73 | 143 | 73 | 1218 | 798 | 2016 |
| 6 | Orchard | 1124 | 301 | 411 | 324 | 3891 | 3369 | 7260 |
| 7 | Shenton Way | 1807 | 81 | 494 | 99 | 4852 | 2482 | 7334 |
| 8 | Chinatown | 2373 | 577 | 965 | 517 | 8740 | 6052 | 14792 |
| 9 | Pasir Ris | - | - | - | - | 0 | 0 | 0 |
| 10 | Tampines | 616 | 1211 | 356 | 757 | 3963 | 6369 | 10332 |
| 11 | Bedok | 7857 | - | 4630 | - | 43494 | - | 43494 |
| 12 | Kampong Ubi | 17 | 24 | - | 2 | 41 | 53 | 94 |
| 13 | Bendemeer | 735 | 329 | 297 | 183 | 2846 | 2162 | 5008 |
| 14 | Bukit Merah | 180 | 88 | 71 | 52 | 694 | 580 | 1274 |
| 15 | Tiong Bahru | 15 | 38 | 14 | 15 | 137 | 143 | 280 |
| 16 | Alexandra | 199 | 60 | 83 | 33 | 757 | 457 | 1214 |
| 17 | Jurong Residential | 78 | 66 | 69 | 31 | 558 | 330 | 888 |
| 18 | Clementi | 138 | 49 | 82 | 29 | 679 | 361 | 1040 |
| 19 | Jurong Industrial | 211 | 43 | 68 | 25 | 662 | 404 | 1066 |
| 20 | Bukit Batok | 31 | 10 | - | 11 | 41 | 107 | 148 |
| 21 | Caicuoang | 27 | 1 | - | - | 28 | 28 | 56 |
| 22 | Changi Airport PTB | 258 | 86 | 189 | 84 | 1478 | 848 | 2326 |
| 23 | Changi Airport CC | 258 | 29 | 57 | 41 | 629 | 533 | 1162 |
| 24 | Upper Changi | 663 | 550 | 1367 | 295 | 9415 | 2983 | 12398 |
| 25 | Geylang/Changi | 3116 | 2025 | 1397 | 1038 | 13523 | 11369 | 24892 |
| 26 | East Coast | 1701 | 1453 | 128 | 891 | 3922 | 8500 | 12422 |
| 27 | Marina | - | - | - | - | 0 | 0 | 0 |
| 28 | Telok Blangah | 366 | 138 | 113 | 57 | 1182 | 846 | 2028 |
| 29 | Pasir Panjang | 247 | 32 | 59 | 29 | 633 | 453 | 1086 |
| 30 | Ayer Rajah | 72 | 5 | 42 | 5 | 329 | 107 | 436 |
| 31 | Pandan/Teban | 9 | 18 | 8 | 10 | 75 | 87 | 162 |
| 32 | Woodlands | 21 | 1 | 15 | 15 | 112 | 112 | 224 |
| 33 | Sungai Kadut | 9 | 8 | - | - | 17 | 17 | 34 |
| 34 | Zhenghua | - | - | - | - | 0 | 0 | 0 |
| 35 | Bukit Timah | 171 | 36 | 101 | 25 | 813 | 357 | 1170 |
| 36 | Lornie/Adam | 12 | 7 | 9 | 12 | 73 | 91 | 164 |
| 37 | Ulu Pandan | 171 | 35 | 52 | 19 | 518 | 320 | 838 |
| 38 | Punggol | 19 | 5 | 3 | 2 | 42 | 36 | 78 |
| 39 | Jalan Kayu | 106 | 17 | 16 | 10 | 219 | 183 | 402 |
| 40 | Hougang | 166 | 135 | 92 | 56 | 853 | 637 | 1490 |
| 41 | Serangoon Town | 91 | 87 | 45 | 33 | 448 | 376 | 824 |
| 42 | Paya Lebar Road | 588 | 157 | 167 | 75 | 1747 | 1195 | 2942 |
| 43 | Aljunied | 117 | 41 | 45 | 31 | 428 | 344 | 772 |
| 44 | Potong Pasir | 7 | 20 | 15 | 16 | 117 | 123 | 240 |
| 45 | Tampines Road | 36 | 61 | 6 | 20 | 133 | 217 | 350 |
| 46 | Sembawang | 72 | 46 | 11 | 18 | 184 | 226 | 410 |
| 47 | Lim Chu Kang | 27 | 2 | 2 | 6 | 41 | 65 | 106 |
| 48 | MacPherson | 154 | 96 | 28 | 27 | 418 | 412 | 830 |
| 49 | Commonwealth | 238 | 91 | 76 | 36 | 785 | 545 | 1330 |
| 50 | Paya Lebar Airport | 68 | 5 | 27 | 7 | 235 | 115 | 350 |
| 51 | Mandai | 8 | - | 1 | - | 14 | 8 | 22 |
| 52 | Tohmason Road | 7 | 11 | - | 2 | 18 | 30 | 48 |
| | Total | 25170 | 8829 | 12142 | 5262 | 114708 | 57714 | 172422 |

Peak Period : 1645 to 1844 hours

Off-Peak Period : 1430 to 1629 hours

Source: SBS Bus Passenger Survey (1985)

Figure 3.1

SBS Bus Passenger Traffic
Distribution to/from Ang Mo Kio
New Town, 1985

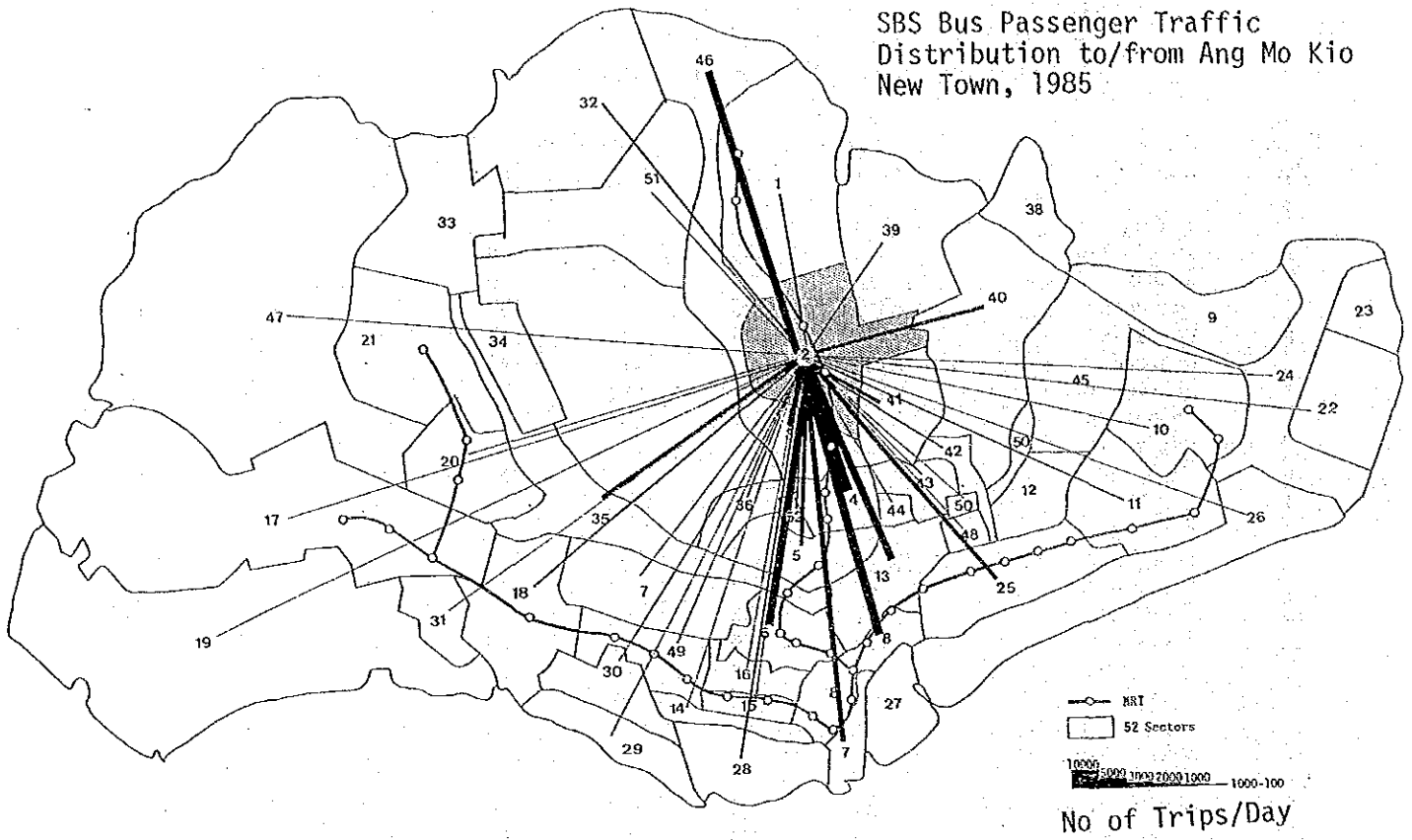
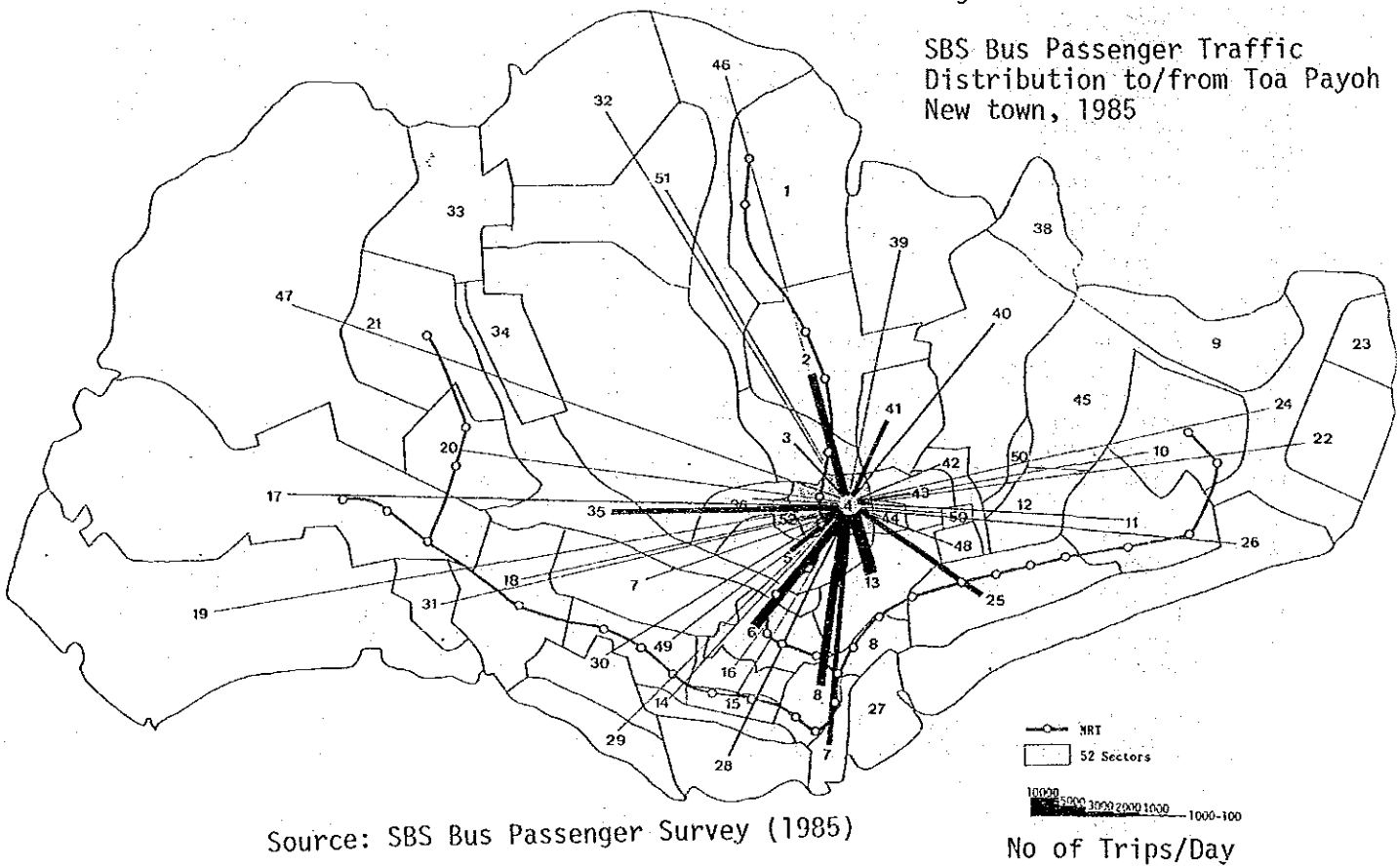


Figure 3.2

SBS Bus Passenger Traffic
Distribution to/from Toa Payoh
New town, 1985



Source: SBS Bus Passenger Survey (1985)

Figure 3.3

SBS Bus Passenger Traffic
Distribution to/from Jurong Residential
1985

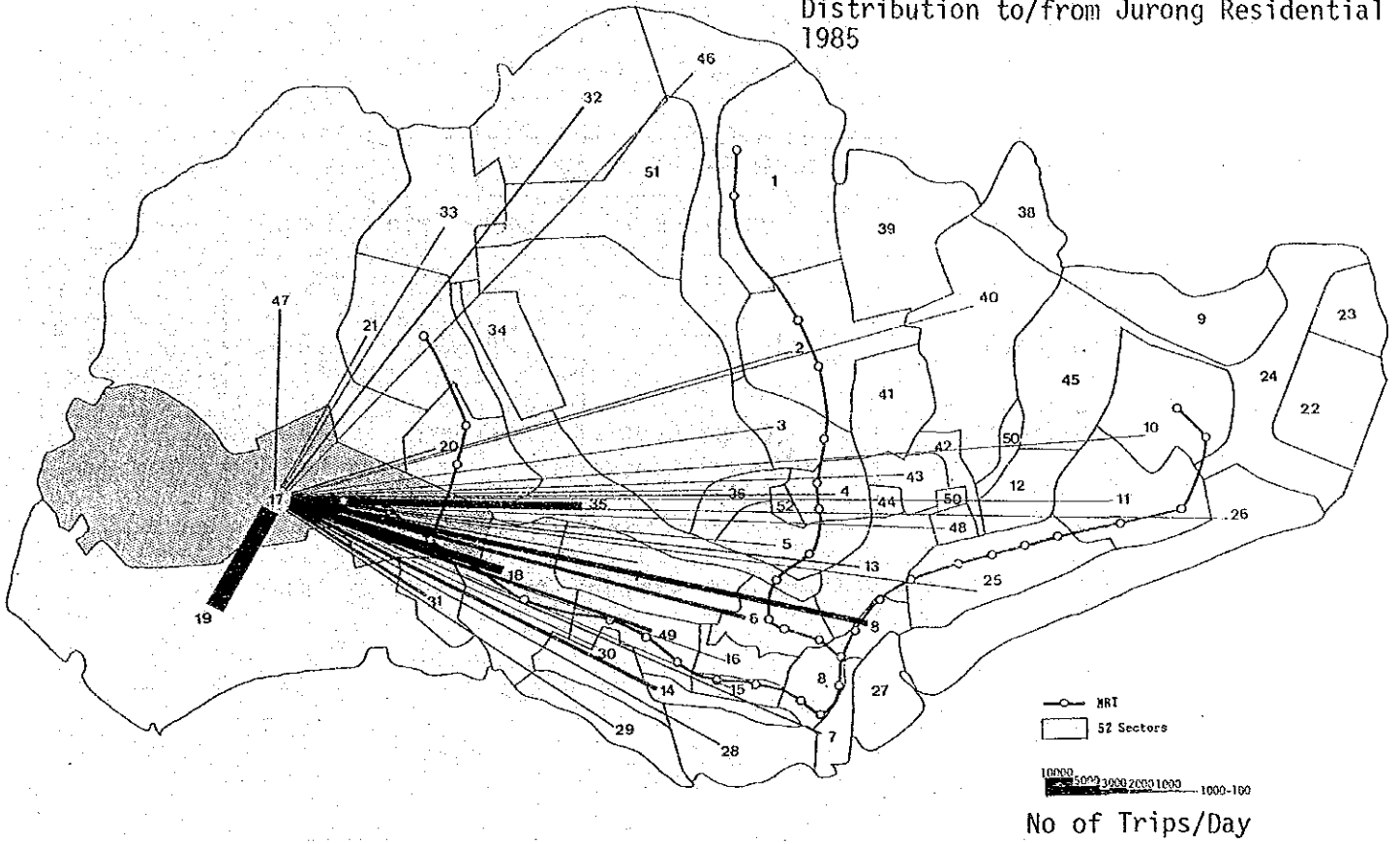
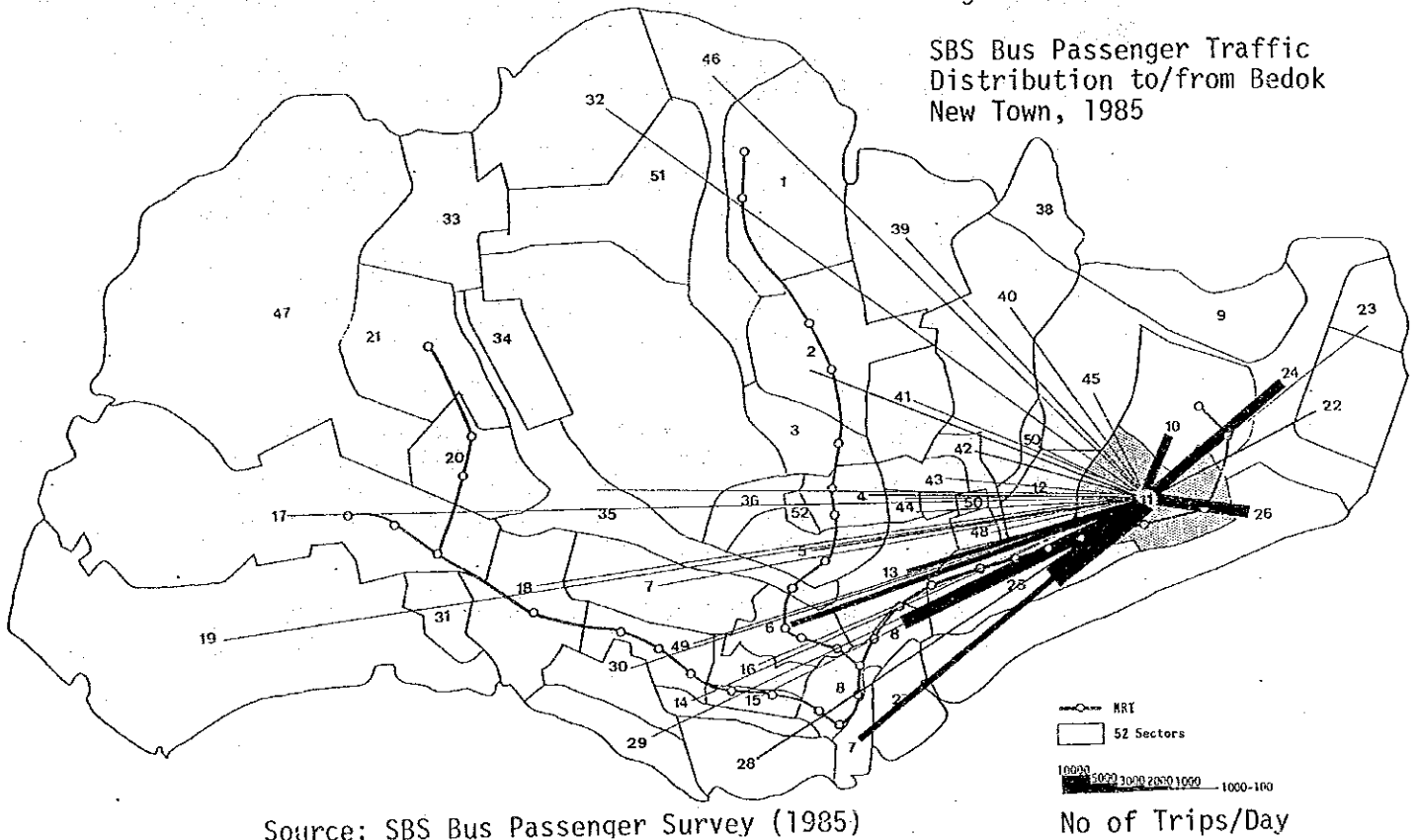


Figure 3.4

SBS Bus Passenger Traffic
Distribution to/from Bedok
New Town, 1985



Source: SBS Bus Passenger Survey (1985)

Table 3.5
Feeder Bus Traffic Demand

| New Town | Feeder Bus Passenger Traffic | | Total |
|--------------------|------------------------------|-------------|--------|
| | Intra-zonal Trip | Feeder Trip | |
| Ang Mo Kio | 36,734 | 50,382 | 87,116 |
| Toa Payoh | 22,024 | 50,626 | 72,650 |
| Jurong Residential | 29,908 | 43,953 | 73,861 |
| Bedok | 43,494 | 53,505 | 96,999 |

Source: Estimated based on 1985 bus survey data of SBS

3.2 Feeder Bus Passenger Traffic Demand in Ang Mo Kio New Town

Further analysis was made on Ang Mo Kio new town, using the data derived from the bus survey conducted at Ang Mo Kio bus interchange and from the HIS for residents in Ang Mo Kio new town.

3.2.1 Bus Services in Ang Mo Kio New Town

Ang Mo Kio new town is served by 7 feeder bus services, 6 of which originate and terminal to/from Ang Mo Kio bus interchange, while the remaining one plies between Ang Mo Kio depot and industrial parks, as shown in Table 3.6. Figure 3.5 shows these feeder bus routes and the number of bus traffic on major road sections. Figure 3.6 shows the number of bus passenger on these bus services based on SBS bus information.

As for trunk bus services in Ang Mo Kio new town, 16 trunk bus services serve to/from Ang Mo Kio bus interchange and the other 15 services pass through the new town area. The characteristics of these trunk bus services are shown in Table 3.7. As part of these trunk bus services is often used as feeder transport for other trunk modes.

Figure 3.7 shows the total bus traffic on the major road sections.

Table 3.6

Feeder Bus Service in Ang Mo Kio New Town

| Service No. | Service Name | Round Trip Distance (km) | No. of Stops Served | Round Trip Running Time (min) | Average Speed (km/hr) | Scheduled Trips/Day | Frequency Peak/Off-peak (min) | No. of Buses Allocated | Daily Cash Rides in 1987 |
|-------------------------------|-------------------------------------|--------------------------|---------------------|-------------------------------|-----------------------|---------------------|-------------------------------|------------------------|--------------------------|
| 261 | AMK Interchange - Industrial Park 1 | 5.13 | 14 | 28 | 11.0 | 332 | 2.5/4.0 | 10 | 19,210 |
| 262 | AMK Interchange - AMK Ave. 2 | 9.23 | 23 | 40 | 13.8 | 143 | 8.0/8.5 | 6 | 9,837 |
| 263 | AMK Depot - Industrial Park 2 | 14.95 | 42 | 59 | 15.2 | 143 | 5.0/8.5 | 10 | 10,648 |
| 265 | AMK Interchange - AMK Ave. 10 | 5.65 | 14 | 28 | 12.1 | 218 | 3.0/5.5 | 7 | 12,050 |
| 266 | AMK Interchange - AMK Ave. 4/5 | 7.64 | 17 | 32 | 14.3 | 219 | 3.0/5.0 | 9 | 18,106 |
| 267 | AMK Interchange - Industrial Park 2 | 7.00 | 16 | 26 | 16.2 | 177 | 2.5/7.0 | 7 | 8,451 |
| 269 | AMK Interchange - AMK St. 61 | 5.60 | 15 | 24 | 14.0 | 288 | 3.5/6.0 | 8 | 11,535 |
| Total of 7 services (Average) | | 55.20 (7.89) | 141 (20) | (33.9) | (14.0) | 1,460 (209) | (3.4/5.9) | 57 (8.0) | 89,837 (12,834) |

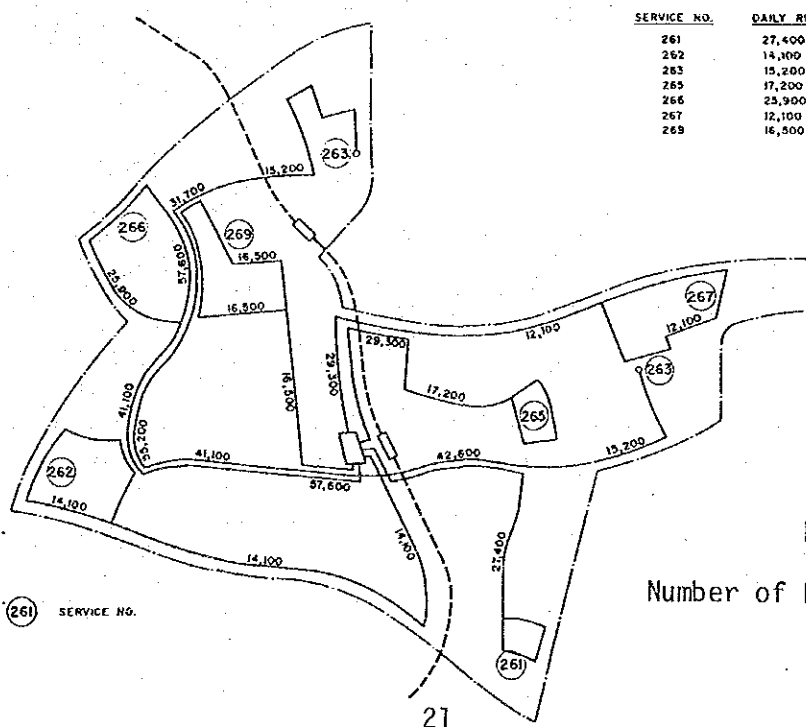
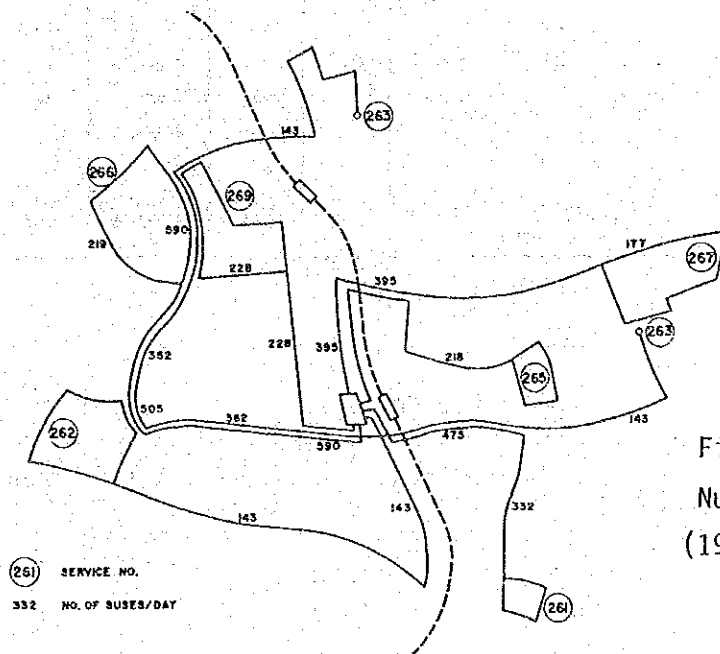


Table 3.6 Trunk Bus Service in Ang Mo Kio New Town

1) Services to/from Ang Mo Kio Bus Interchange

| Service No. | Service Name (Destination) | Round Trip Distance (km) | No. of Stops Served | Round Trip Running Time (min) | Average Speed (km/hr) | Scheduled Trips/Day | Frequency Peak/Off-peak (min) | No. of Buses Allocated | Bus Type | Daily Cash Rides in 1987 |
|--------------------------------|----------------------------|--------------------------|---------------------|-------------------------------|-----------------------|---------------------|-------------------------------|------------------------|----------|--------------------------|
| 22 | Tampines | 34.55 | 81 | 123 | 16.9 | 202 | 9.5/11.0 | 14 | SD | New Service |
| 24 | Changi Airport PTB | 50.79 | 94 | 144 | 21.2 | 182 | 4.0/7.0 | 29 | SD | 21,754 |
| 25 | Bedok | 29.47 | 94 | 100 | 17.7 | 463 | 3.0/5.0 | 28 | DD | 25,806 |
| 74 | Clementi | 38.64 | 91 | 120 | 19.3 | 257 | 5.0/8.5 | 21 | DD | 8,783 |
| 130 | Shenton Way | 32.13 | 77 | 130 | 14.8 | 207 | 7.5/11.0 | 15 | SD | 11,861 |
| 132 | Bukit Merah | 36.13 | 80 | 127 | 17.1 | 214 | 8.0/10.5 | 16 | DD | 10,848 |
| 133 | Marina Centre | 27.12 | 62 | 107 | 15.2 | 304 | 5.0/8.0 | 21 | DD | 11,031 |
| 134 | New Bridge Road | 25.12 | 65 | 108 | 14.0 | 271 | 5.5/8.5 | 20 | DD | 10,942 |
| 135 | Marine Parade | 33.37 | 76 | 131 | 15.3 | 226 | 7.5/10.0 | 16 | DD | 10,469 |
| 136 | Upper Serangoon road | 23.94 | 56 | 88 | 16.3 | 122 | 5.5/9.5 | 17 | SD | 6,508 |
| 159 | Toa Payoh | 15.36 | 26 | 63 | 14.6 | 164 | 5.5/7.0 | 10 | DD | 10,558 |
| 162 | Sims Avenue | 25.21 | 53 | 95 | 15.9 | 112 | 7.5/9.5 | 11 | DD | 5,690 |
| 165 | Jurong | 50.90 | 112 | 148 | 20.6 | 262 | 4.5/12.0 | 25 | DD | 13,499 |
| 166 | Labrador | 41.85 | 106 | 152 | 16.5 | 197 | 8.5/13.0 | 16 | DD | 11,711 |
| 168 | Orchard Road | 23.33 | 57 | 85 | 16.5 | 146 | 6.0/7.5 | 14 | SD | 9,635 |
| 169 | Woodlands | 45.55 | 97 | 110 | 24.8 | 354 | 4.5/10.0 | 26 | SD | (23,157) |
| Total of 16 services (Average) | | 533.46 (33.34) | 1,203 (75) | 1,831 (114) | (17.5) | 3,683 (230) | (5.5/8.8) | 299 (19) | | 192,252 (12,016) |

Source: SBS

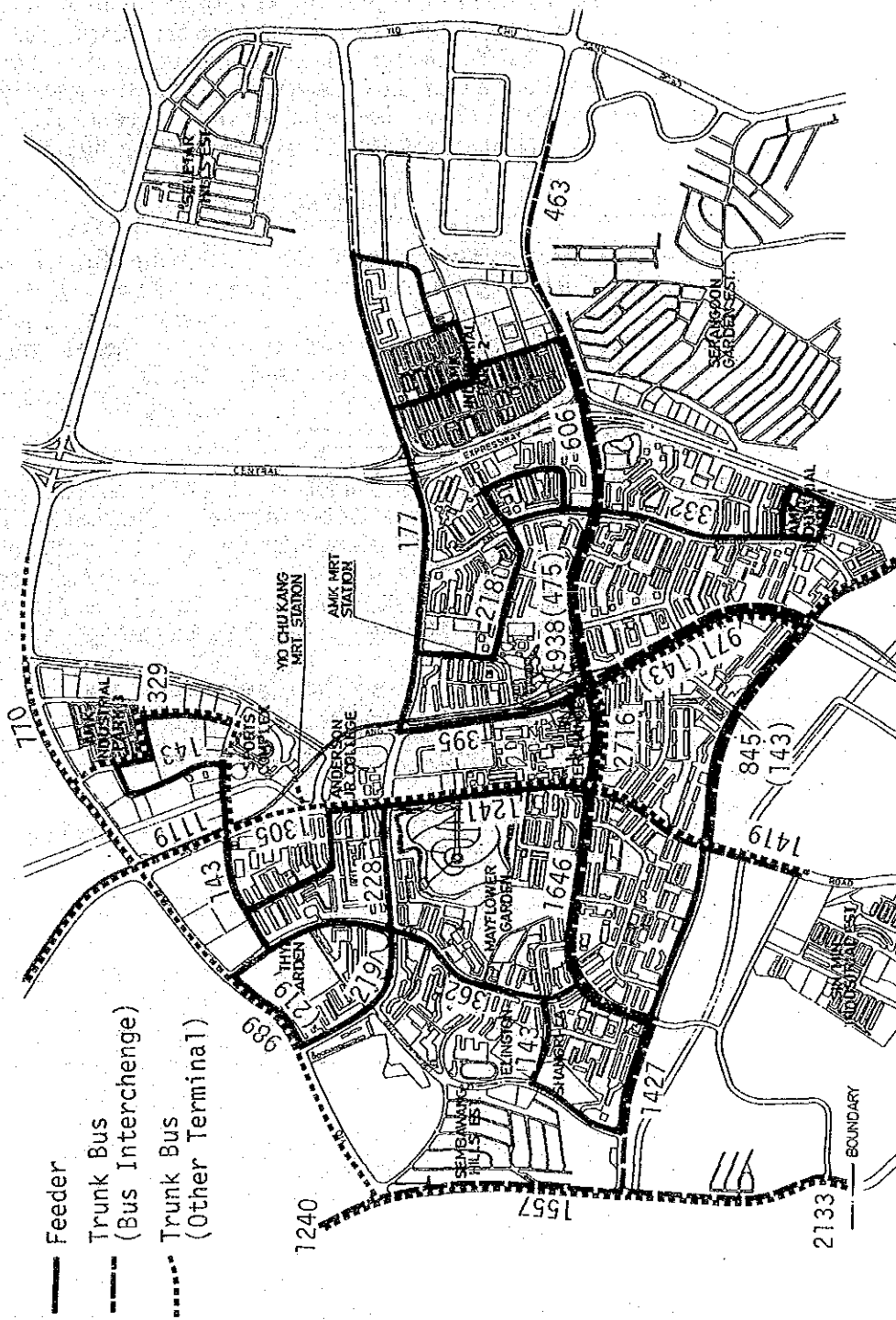
2) Services relevant to Ang Mo Kio New Town

| Road Name | Service No. | Service Name | Round Trip Distance (km) | No. of Stops Served | Round Trip Running Time (min) | Average Speed (km/hr) | Scheduled Trips/Day | Frequency Peak/Off-peak (min) | No. of Buses Allocated | Bus Type | Daily Cash Rides in 1987 |
|------------------------|-------------------------|--------------------------------------|--------------------------|---------------------|-------------------------------|-----------------------|---------------------|-------------------------------|------------------------|----------|--------------------------|
| 1. MK Ave. 6 | 73 | Yio Chu Kang MRT St. - Toa Payoh | 30.17 | 74 | 100 | 18.1 | 186 | 9.0/12.0 | 11 | SD | 5,571 |
| | 850 | Yishun - Bukit Merah | 53.27 | 120 | 148 | 21.6 | 279 | 5.5/9.5 | 27 | | 19,456 |
| | 851 | Yishun - Bukit Merah | 47.39 | 110 | 138 | 20.6 | 260 | 5.5/9.5 | 23 | | 17,365 |
| | 852 | Yishun - Jurong | 64.74 | 142 | 164 | 23.7 | 256 | 6.5/10.5 | 25 | | 15,589 |
| | 853 | Yishun - Geylang | 39.50 | 82 | 118 | 19.6 | 218 | 7.5/10.5 | 16 | | 10,034 |
| | 551 | Yio Chu Kang MRT St. - Yishun | 16.70 | 14 | 39 | 25.7 | 106 | 5.0/10.0 | 8 | | (249) |
| Sub-total | 6 Services | | 250.77 | 542 | 707 | | 1,305 | 6.2/10.3 | 110 | | 68,262 |
| 2. MK Ave. 3 | (853) | Yishun - Geylang | | | | | (218) | (7.5/10.5) | | | |
| 3. MK Ave. 8 | (853) | Yishun - Geylang | | | | | (218) | (7.5/10.5) | | | |
| 4. MK Ave. 9 St. 63/64 | (73) | Yio Chu Kang MRT - Toa Payoh | | | | | (186) | (9.0/12.0) | | | |
| With MK Total | | | | | | | 1,305 | (6.2/10.3) | | | 68,262 |
| 5. MK Ave. 1 | 105 | Serangoon - Clementi | 48.10 | 98 | 141 | 20.5 | 193 | (10.0/12.0) | 15 | SD | New Service |
| 6. Yio Chu Kang Rd. | 71 | Geylang - Old Upper Thomson | 35.17 | 93 | 118 | 17.9 | 126 | (9.5/15.5) | 9 | SD | 3,368 |
| | (73) | Yio Chu Kang MRT - Toa Payoh | | | | | (186) | (9.0/12.0) | | | |
| | 163 | Jalan Kayu - World Trade Centre | 49.11 | 125 | 163 | 18.1 | 191 | 8.5/12.0 | 18 | SD | 6,570 |
| | 854 | Yishun - Bedok | 44.25 | 105 | 120 | 22.1 | 267 | 6.5/9.5 | 19 | | 10,629 |
| Sub-total | 3 Services (4 Services) | | 128.53 (42.8) | 323 (108) | (134) | (19.2) | 594 (770) 195 | (7.9/11.9) | 46 (15) | | 20,567 (6,856) |
| 7. Upper Thomson Road | 137 | Toa Payoh - Singapore Zoo | 38.99 | 82 | 93 | 25.2 | 79 | (12.0/13.5) | 8 | SD | 4,503 |
| | 160 | Admiralty Rd W - Crawford St. | 47.42 | 121 | 124 | 22.9 | 215 | 7.5/13.5 | 18 | | 9,370 |
| | 161 | Seribawang Rd. End - Shenton Way | 51.53 | 127 | 132 | 23.4 | 192 | 8.0/14.0 | 17 | | 8,120 |
| | 164 | Seribawang Rd. End - New Bridge Rd. | 49.05 | 126 | 124 | 23.7 | 199 | 8.5/13.5 | 15 | | 7,686 |
| | 167 | Admiralty Rd. W - World Trade Centre | 60.30 | 152 | 154 | 23.5 | 201 | 7.5/12.5 | 19 | | 13,223 |
| | (71) | Geylang - Old Upper Thomson | | | | | [126] | [9.5/15.5] | | | |
| | (163) | Jalan Kayu - World Trade Centre | | | | | [191] | [8.5/12.0] | | | |
| Sub-total | | | 247.29 (49.46) | 608 (122) | (125) | (23.7) | 686 (1,203) (177) | (8.4/13.4) | 77 (15) | | 42,902 (8,580) |
| Out Bound MK Total | | | | | | | 1,470 (1,973) | | | | |

Source: SBS

Figure 3.7

Bus Service in Ang Mo Kio New Town



3.2.2 Feeder Bus Passenger Traffic at Ang Mo Kio Bus Interchange

1) Bus Traffic

Ang Mo Kio bus interchange serves 22 bus services comprising 16 trunk services and 6 feeder services/ Table 3.8 shows the total number of arriving/departing buses for these trunk and feeder bus services. Approximately 6,600 buses depart and arrive to/from the bus interchange a day, out of which 2,200 buses or 33.5% are feeder buses.

2) Number of Boarding and Alighting Passengers

Table 3.9 shows the number of boarding and alighting passengers at Ang Mo Kio bus interchange. A total of 155,000 boarding and alighting passengers were counted for both trunk and feeder services in 1988. Among them, 47% constitute passenger trips for feeder buses.

3) Bus Passenger Traffic by Time Period

Table 3.10 shows the bus passenger traffic during peak and off-peak hours at the bus interchange. Approximately 20% of daily passenger trip concentrate during morning peak hours (0630 to 0830) at the bus interchange. The peak ratio of feeder bus passenger trip during morning peak hours is higher than that of trunk bus passenger trips.

Table 3.11 shows the hourly bus passenger traffic at the bus interchange. Peak ratio of bus passenger trips is 11.1% for boarding passengers and 10.8% for alighting passengers at 0700 - 0759 hours.

Figure 3.8 shows the feeder bus passenger traffic at 15 minutes interval for 16 survey hours.

4) Trip Characteristics of Bus Passengers

Table 3.12 shows the trip purposes of bus passengers for both residents and non-residents of Ang Mo Kio new town, based on the expanded data of interview survey for bus boarding passengers. It shows that 58.3% of bus boarding passengers are residents of the new town.

The main trip purpose of bus passengers are "to work" and "to home", even in off-peak hours.

5) Transfer Passengers

Table 3.13 shows the modal transfer characteristics of bus passengers at Ang Mo Kio bus interchange. For passengers who took trunk bus services, feeder bus is the major previous mode (35%) and for passengers who took feeder bus services, trunk bus is also the major previous mode (42%). Transfer passengers from the MRT to feeder bus represent 21% of the total boarding passengers for feeder bus.

Table 3.8

Number of Arriving/Departing Buses by Type of Service

| Type of Bus Service | No. of Buses (%) | | |
|---------------------|--------------------------|----------------------------------|---------------|
| | Number of Arriving Buses | Number of Departing Buses | Total |
| Trunk Service | 2,182 (66.7) | 2,178 (66.2) [2,275] (65.3) | 4,360 (66.5) |
| Feeder Service | 1,090 (33.3) | 1,111 (33.8) [1,210] (34.7) | 2,201 (33.5) |
| Total | 3,272 (100.0) | 3,289 (100.0) | 6,561 (100.0) |

Note: [] Bus traffic surveyed in 1987
Source: SUTIS Bus Survey (1988)

Table 3.9

Number of Boarding/Alighting Passengers

| Type of Bus Service | 1988 Survey | | 1987 Survey | | | |
|---------------------|----------------|----------------|-----------------|----------------|----------------|-----------------|
| | Boarding | Alighting | Total | Boarding | Alighting | Total |
| Trunk Service | 43,652 (52.3) | 37,760 (53.0) | 81,412 (52.6) | 47,447 (56.4) | 39,742 (54.6) | 87,189 (55.6) |
| Feeder Service | 39,892 (47.7) | 33,470 (47.0) | 73,362 (47.4) | 36,665 (43.6) | 33,059 (45.4) | 156,913 (44.4) |
| Total | 83,544 (100.0) | 71,230 (100.0) | 154,774 (100.0) | 84,112 (100.0) | 72,801 (100.0) | 156,913 (100.0) |

Source: SUTIS Bus Survey (1988)

Table 3.10

Bus Passenger Traffic During Peak and Off-peak Hours

| | No. of passengers (%) | | | | | | | | |
|--------------------|-----------------------|-----------|-------|----------------|-----------|-------|----------|-----------|--------|
| | Trunk Services | | | Feeder Service | | | Total | | |
| | Boarding | Alighting | Total | Boarding | Alighting | Total | Boarding | Alighting | Total |
| Morning Peak | 10430 | 6398 | 16828 | 6851 | 8087 | 14938 | 17281 | 14185 | 31466 |
| Evening Peak | 6795 | 7029 | 13824 | 8960 | 5729 | 14689 | 15755 | 12758 | 28513 |
| Afternoon Off-peak | 4398 | 4622 | 9020 | 4798 | 3558 | 8356 | 9196 | 8180 | 17376 |
| Others | 22029 | 19711 | 41740 | 19280 | 16096 | 35376 | 41309 | 35807 | 77116 |
| All Day | 43652 | 37760 | 81412 | 39892 | 33470 | 73362 | 83544 | 71230 | 154774 |
| Morning Peak | 23.9 | 16.9 | 20.7 | 17.2 | 24.2 | 20.4 | 20.7 | 20.3 | 20.5 |
| Evening Peak | 15.6 | 18.6 | 17.0 | 22.5 | 17.1 | 20.0 | 18.9 | 17.9 | 18.4 |
| Afternoon Off-peak | 10.1 | 12.2 | 11.1 | 12.0 | 10.6 | 11.1 | 11.0 | 11.5 | 11.2 |
| Others | 50.5 | 52.2 | 51.3 | 48.3 | 48.1 | 48.2 | 49.4 | 50.3 | 49.8 |
| All Day | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Morning Peak | 62.0 | 38.0 | 100.0 | 45.9 | 54.1 | 100.0 | 54.4 | 45.6 | 100.0 |
| Evening Peak | 19.2 | 50.8 | 100.0 | 61.0 | 39.0 | 100.0 | 55.3 | 44.7 | 100.0 |
| Afternoon Off-peak | 48.8 | 51.2 | 100.0 | 57.4 | 42.6 | 100.0 | 52.9 | 47.1 | 100.0 |
| Others | 52.8 | 47.2 | 100.0 | 51.5 | 48.5 | 100.0 | 53.6 | 46.4 | 100.0 |
| All Day | 53.6 | 46.4 | 100.0 | 51.4 | 48.6 | 100.0 | 51.0 | 49.0 | 100.0 |

Note: Morning Peak : 0630 - 0830 Hours
Evening Peak : 1645 - 1845 Hours
Afternoon Peak : 1730 - 1930 Hours
Afternoon Peak : 1430 - 1630 hours

Source: SUTIS Bus Survey (1988)

Table 3.11

Boarding and Alighting Passengers by Time Period, 1988

| Time Period | Boarding Passengers | | | | Alighting Passengers | | | |
|-------------|---------------------|----------------|--------|-------|----------------------|----------------|--------|-------|
| | Trunk Service | Feeder Service | Total | % | Trunk Service | Feeder Service | Total | % |
| 0600 - 0659 | 5,088 | 2,036 | 7,124 | 8.5 | 2,105 | 3,298 | 5,403 | 7.6 |
| 0700 - 0759 | 5,243 | 4,053 | 9,296 | 11.1 | 3,483 | 4,242 | 7,725 | 10.8 |
| 0800 - 0859 | 2,866 | 1,772 | 4,638 | 5.6 | 2,034 | 2,401 | 4,435 | 6.2 |
| 0900 - 0959 | 1,597 | 1,118 | 2,715 | 3.2 | 1,354 | 1,629 | 2,983 | 4.2 |
| 1000 - 1059 | 1,358 | 1,483 | 2,841 | 3.4 | 1,178 | 1,538 | 2,716 | 3.8 |
| 1100 - 1159 | 1,639 | 1,617 | 3,256 | 3.9 | 1,619 | 1,392 | 3,011 | 4.2 |
| 1200 - 1259 | 2,011 | 2,208 | 4,219 | 5.1 | 1,833 | 2,054 | 3,887 | 5.5 |
| 1300 - 1359 | 2,503 | 2,345 | 4,848 | 5.8 | 2,656 | 1,746 | 4,402 | 6.2 |
| 1400 - 1459 | 2,208 | 2,118 | 4,326 | 5.2 | 2,097 | 1,522 | 3,619 | 5.1 |
| 1500 - 1559 | 2,298 | 2,558 | 4,856 | 5.8 | 2,346 | 1,951 | 4,297 | 6.0 |
| 1600 - 1659 | 2,275 | 2,416 | 4,691 | 5.6 | 2,095 | 1,309 | 3,404 | 4.8 |
| 1700 - 1759 | 3,404 | 3,821 | 7,225 | 8.6 | 3,250 | 2,708 | 5,958 | 8.4 |
| 1800 - 1859 | 3,743 | 4,871 | 8,614 | 10.3 | 4,274 | 2,806 | 7,080 | 9.9 |
| 1900 - 1959 | 3,428 | 2,914 | 6,342 | 7.6 | 3,697 | 2,157 | 5,854 | 8.2 |
| 2000 - 2059 | 1,949 | 2,157 | 4,106 | 4.9 | 2,004 | 1,675 | 3,679 | 5.2 |
| 2100 - 2159 | 2,042 | 2,266 | 4,308 | 5.2 | 1,720 | 1,042 | 2,762 | 3.9 |
| Total | 43,652 | 39,392 | 83,544 | 100.0 | 37,760 | 33,4700 | 71,230 | 100.0 |

Source: SUTIS Bus Survey (1988)

Figure 3.8

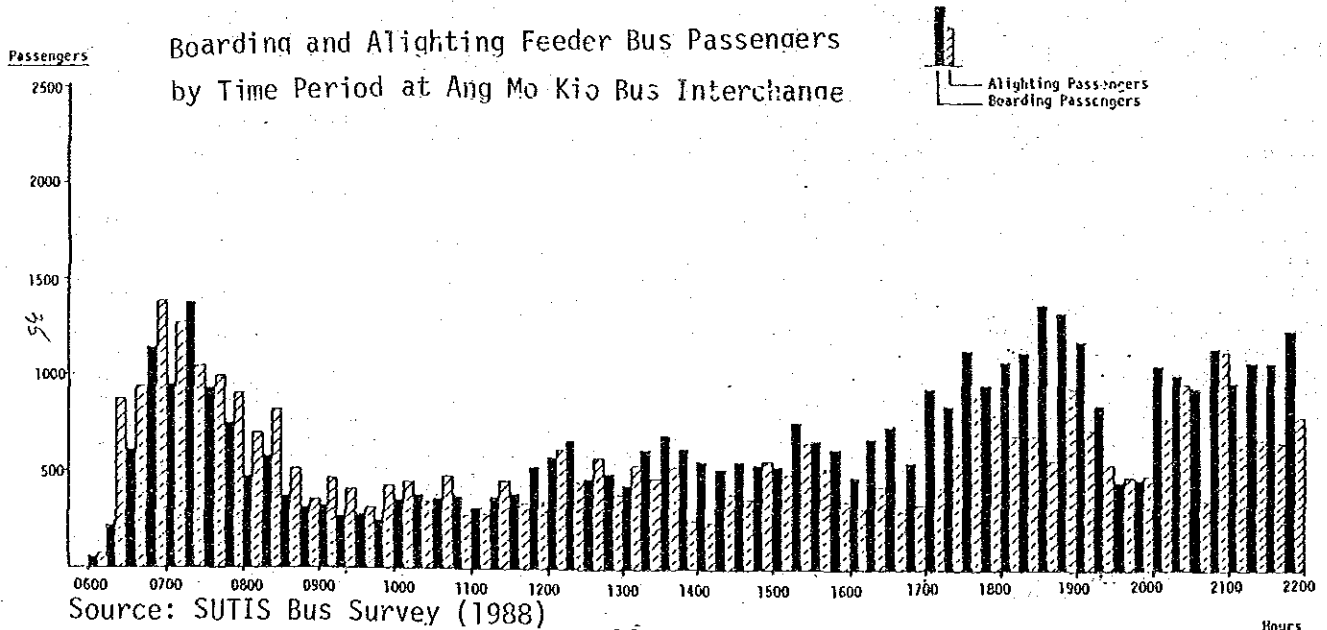


Table 3.12

Trip Purpose for Residents and Non-residents Passengers

| | | Trip Purpose | | | | | To Home | Not Known | Total |
|---------------|--------------|--------------|-----------|-----------|---------------|---------|---------|-----------|--------------|
| | | To Work | To School | Part Work | Prsnal Busnes | Private | | | |
| Residents | Morning Peak | 5915 | 3734 | 62 | 219 | 188 | 788 | 59 | 10965 |
| | Evening Peak | 256 | 55 | 12 | 373 | 375 | 6782 | - | 7883 |
| | Off Peak | 5027 | 3051 | 225 | 2930 | 2994 | 15358 | 243 | 29828 |
| | subtotal | 11198 | 6840 | 329 | 3522 | 3557 | 22928 | 302 | 18676 (58.3) |
| Non Residents | Morning Peak | 3471 | 1904 | 98 | 333 | 25 | 187 | 133 | 6151 |
| | Evening Peak | 494 | 118 | 35 | 601 | 931 | 5653 | 40 | 7872 |
| | Off Peak | 3971 | 1042 | 538 | 2191 | 2227 | 10081 | 493 | 20543 |
| | subtotal | 7936 | 3064 | 671 | 3125 | 3183 | 15921 | 666 | 34566 (41.4) |
| Not Known | Morning Peak | 81 | 44 | - | - | - | - | 43 | 168 |
| | Evening Peak | - | - | - | - | - | - | - | - |
| | Off Peak | 23 | - | 29 | - | - | - | 65 | 117 |
| | subtotal | 104 | 44 | 29 | - | - | - | 108 | 285 (0.3) |
| Total | Morning Peak | 9467 | 5682 | 160 | 552 | 213 | 975 | 235 | 17284 |
| | Evening Peak | 750 | 173 | 77 | 974 | 1306 | 12435 | 40 | 15755 |
| | Off Peak | 9021 | 4093 | 792 | 5121 | 3221 | 25439 | 801 | 30488 |
| | subtotal | 19238 | 9948 | 1029 | 6647 | 6740 | 38849 | 1076 | 83527 (100) |

(%)

| | | Trip Purpose | | | | | To Home | Not Known | Total |
|---------------|--------------|--------------|-----------|-----------|---------------|---------|---------|-----------|-------|
| | | To Work | To School | Part Work | Prsnal Busnes | Private | | | |
| Residents | Morning Peak | 53.9 | 34.1 | 0.6 | 2.0 | 1.7 | 7.2 | 0.5 | 100.0 |
| | Evening Peak | 3.2 | 0.7 | 0.5 | 1.7 | 1.8 | 86.0 | - | 100.0 |
| | Off Peak | 16.9 | 10.2 | 0.8 | 9.8 | 10.0 | 51.5 | 0.8 | 100.0 |
| | subtotal | 23.0 | 14.1 | 0.7 | 7.2 | 7.3 | 47.1 | 0.6 | 100.0 |
| Non Residents | Morning Peak | 56.4 | 31.0 | 1.6 | 5.4 | 0.4 | 3.0 | 2.2 | 100.0 |
| | Evening Peak | 6.3 | 1.5 | 0.4 | 7.6 | 11.8 | 71.8 | 0.5 | 100.0 |
| | Off Peak | 19.3 | 5.1 | 2.6 | 10.7 | 10.8 | 49.1 | 2.4 | 100.0 |
| | subtotal | 23.0 | 8.9 | 1.9 | 9.0 | 9.2 | 46.1 | 1.9 | 100.0 |
| Not Known | Morning Peak | 48.2 | 26.2 | - | - | - | - | 25.6 | 100.0 |
| | Evening Peak | - | - | - | - | - | - | - | - |
| | Off Peak | 19.7 | - | 24.8 | - | - | - | 35.6 | 100.0 |
| | subtotal | 36.5 | 15.1 | 10.2 | - | - | - | 37.9 | 100.0 |
| Total | Morning Peak | 54.8 | 32.9 | 0.9 | 3.2 | 1.2 | 5.6 | 1.4 | 100.0 |
| | Evening Peak | 4.8 | 1.1 | 0.5 | 6.2 | 8.3 | 78.9 | 0.3 | 100.0 |
| | Off Peak | 17.9 | 6.1 | 1.6 | 10.1 | 10.3 | 30.4 | 1.6 | 100.0 |
| | subtotal | 23.0 | 11.9 | 1.2 | 8.0 | 8.1 | 46.5 | 1.3 | 100.0 |

Source: SUTIS Bus Survey (1988)

Table 3.13

Transfer Passengers at Ang Mo Kio Bus Interchange

| | Passengers who take Trunk Bus Service | | | | | | | Passengers who take Feeder Bus Service | | | | | | | |
|--------------------|---------------------------------------|--------------|---------------|--------------|------------|------------|--------------|--|--------------|---------------|--------------|--------------|-----------|-----------|--------------|
| | Residents | | Non Residents | | Not Known | | Total | Residents | | Non Residents | | Not Known | | Total | Next |
| | Previous | Next | Previous | Next | Previous | Next | | Previous | Next | Previous | Next | Previous | Next | | |
| Walk | 6112 | 17026 | 2355 | 17943 | - | 125 | 8467 | 34996 | 4938 | 25890 | 603 | 10837 | - | 5541 | 36737 |
| Bicycle | 63 | - | 7 | - | - | - | 70 | - | - | - | - | - | - | - | - |
| Motorcycle | 9 | - | - | 38 | - | - | 9 | 38 | - | - | 62 | - | - | 62 | - |
| Car | 141 | - | 516 | 29 | - | - | 657 | 29 | 152 | - | 36 | - | - | 208 | - |
| Car-pool passenger | - | 34 | - | - | - | - | - | 24 | - | - | - | - | - | - | - |
| Taxi | 14 | - | 320 | - | - | - | 234 | - | 70 | - | 74 | - | - | 144 | - |
| Van/Pick-up/Truck | 31 | 52 | 108 | - | - | - | 129 | 52 | - | - | 17 | - | - | 17 | - |
| MRT | 992 | 29 | 3346 | - | - | - | 4339 | 28 | 4953 | - | 3230 | - | - | 8213 | - |
| Feeder Bus | 10134 | 1543 | 5158 | 2154 | 126 | - | 15409 | 3697 | 6957 | 201 | 1146 | 579 | - | 3103 | 1189 |
| Trunk Bus | 2918 | 1218 | 9892 | 1510 | 52 | 23 | 12852 | 2751 | 9938 | 196 | 6620 | 234 | - | 16564 | 430 |
| Scheme B/CSS | - | 38 | 66 | 39 | - | - | 66 | 66 | 36 | - | - | - | - | 36 | - |
| School/Company bus | - | 24 | 135 | 29 | - | - | 138 | 53 | 66 | - | - | - | - | 66 | - |
| Others | - | - | 23 | 21 | - | - | 23 | 21 | - | 22 | - | 44 | - | - | 72 |
| Not Known | 395 | 122 | 956 | 1015 | 65 | 94 | 1249 | 1897 | 723 | 922 | 96 | 195 | 43 | 43 | 1106 |
| Total | 30731 | 26753 | 28677 | 23677 | 242 | 242 | 43652 | 43652 | 27943 | 27943 | 11829 | 11829 | 43 | 43 | 39875 |

| | Passengers who take Trunk Bus Service | | | | | | | Passengers who take Feeder Bus Service | | | | | | | |
|--------------------|---------------------------------------|--------------|---------------|--------------|--------------|--------------|--------------|--|--------------|---------------|--------------|--------------|--------------|--------------|--------------|
| | Residents | | Non Residents | | Not Known | | Total | Residents | | Non Residents | | Not Known | | Total | Next |
| | Previous | Next | Previous | Next | Previous | Next | | Previous | Next | Previous | Next | Previous | Next | | |
| Walk | 23.5 | 22.1 | 16.4 | 22.7 | - | 51.7 | 19.4 | 80.2 | 17.7 | 92.7 | 5.1 | 21.2 | - | 12.9 | 72.1 |
| Bicycle | 0.3 | - | 0.0 | - | - | - | 0.2 | - | - | - | - | - | - | - | - |
| Motorcycle | 0.0 | - | - | 0.2 | - | - | 0.0 | 0.1 | - | - | 0.5 | - | - | 0.2 | - |
| Car | 0.7 | - | 2.3 | 0.1 | - | - | 1.5 | 0.1 | 0.6 | - | 0.2 | - | - | 0.5 | - |
| Car-pool passenger | - | 0.1 | - | - | - | - | - | 0.1 | - | - | - | - | - | - | - |
| Taxi | 0.1 | - | 1.0 | - | - | - | 0.5 | - | 0.3 | - | 0.6 | - | - | 0.4 | - |
| Van/Pick-up/Truck | 0.1 | 0.3 | 0.5 | - | - | - | 0.3 | 0.1 | - | - | 0.1 | - | - | 0.0 | - |
| MRT | 4.2 | 0.1 | 14.8 | - | - | - | 9.9 | 0.1 | 17.8 | - | 27.2 | - | - | 26.6 | - |
| Feeder Bus | 48.3 | 7.4 | 22.7 | 9.5 | 51.7 | - | 35.3 | 3.5 | 24.9 | 3.2 | 2.6 | 4.3 | - | 20.3 | 1.7 |
| Trunk Bus | 14.1 | 5.9 | 43.6 | 6.7 | 21.2 | 9.5 | 29.5 | 6.3 | 35.6 | 0.7 | 55.7 | 2.0 | - | 41.5 | 1.1 |
| Scheme B/CSS | - | 0.1 | 0.3 | 0.2 | - | - | 0.2 | 0.2 | 0.3 | - | - | - | - | 0.2 | - |
| School/Company bus | - | 0.1 | 0.6 | 0.1 | - | - | 0.3 | 0.1 | 0.2 | - | - | - | - | 0.2 | - |
| Others | - | - | 0.1 | 0.1 | - | - | 0.1 | 0.0 | - | 0.1 | - | 0.4 | - | - | 0.2 |
| Not Known | 1.6 | 3.8 | 3.8 | 4.5 | 26.9 | 38.8 | 2.9 | 4.3 | 2.6 | 3.3 | 0.3 | 1.6 | 100.0 | 100.0 | 2.2 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: SUTIS Bus Survey (1988)

3.2.3 Feeder Bus Passenger Demand for Residents of Ang Mo Kio New Town

Table 3.14 and 3.15 show the transfer pattern of trips made by residents of Ang Mo Kio new town for intra-town trips and inter-town trips (from new town to outside only). Table 3.14 shows that 51% of motorized intra-town trips use feeder bus. This is equivalent to 19.1 of total intra-town trips, including walk and bicycle only.

Table 3.15 shows that 29% of motorized inter-town trips from the new town to outside use feeder bus and 92% are used for feeder transport of MRT, trunk bus, and other public and private modes.

The total feeder bus demand of Ang Mo Kio new town is estimated as shown in Table 3.16.

Table 3.14

Transfer Pattern for Intra-Town Trips

| Trunk Mode | | Feeder Mode (To/From) | No. of Trips | % | % of Motorized Trips | % of Total Trips |
|-----------------------|------------------------|--------------------------|-----------------|-------|----------------------------|------------------------|
| Public Mode | MRT | - | 342 | 30.4 | 0.5 | 0.2 |
| | | Trunk Bus | 144 | 12.8 | 0.2 | 0.1 |
| | | Feeder Bus | 638 | 56.8 | 1.0 | 0.4 |
| | | Sub-Total | 1,124 | 100.0 | 1.7 | 0.6 |
| | Trunk Bus | - | 3,827 | 51.5 | 5.8 | 2.2 |
| | | Trunk Bus | 640 | 8.6 | 1.0 | 0.4 |
| | | School/Company Bus | 71 | 1.0 | 0.1 | 0.0 |
| | | Feeder Bus | 2,897 | 38.9 | 4.4 | 1.6 |
| | | Sub-Total | 7,435 | 100.0 | 11.2 | 4.2 |
| | School/ Company Bus | - | 16,308 | 99.5 | 24.6 | 9.2 |
| Feeder Bus | | 78 | 0.5 | 0.1 | 0.1 | |
| | Sub-Total | 16,386 | 100.0 | 24.7 | 9.3 | |
| Feeder Bus | - | 25,306 | 84.3 | 38.1 | 14.3 | |
| | Feeder Bus | 4,725 | 15.7 | 7.1 | 2.7 | |
| | Sub-Total | 30,031 | 100.0 | 45.2 | 17.0 | |
| Others | - | 1,101 | | 1.7 | 0.6 | |
| | Public Mode Total | - | 56,077 | | 84.4 | 31.8 |
| Private Mode | Car | - | 7,586 | | 11.4 | 4.3 |
| | Taxi | - | 818 | | 1.2 | 0.5 |
| | Motorcycle | - | 1,948 | | 2.9 | 1.1 |
| | Private Mode Total | | 10,352 | | 15.6 | 5.9 |
| Motorized Trips Total | | | 66,429 | | 100.0 | 37.7 |
| Walk and Bicycle | | | 110,002 | | - | 62.3 |
| Grand Total | | | 176,431 | | - | 100.0 |
| Feeder Bus Total | | | 33,644 | | 50.6 | 19.1 |

Source: SUTIS HIS (1988)

Table 3.15

Transfer Pattern for Inter-Town Trips (From Town to Outside Only)

| Trunk Mode | | Feeder Mode (From) | No. of Trips | % | % of Motorized Trips | % of Total Trips |
|-----------------------|--------------------|--------------------|--------------|-------|----------------------|------------------|
| Public Mode | MRT | - | 10,826 | 54.2 | 10.5 | 10.2 |
| | | Trunk Bus | 500 | 2.5 | 0.5 | 0.1 |
| | | Feeder Bus | 8,203 | 41.1 | 7.9 | 7.8 |
| | | Car | 353 | 1.8 | 0.3 | 0.3 |
| | | Car pool | 77 | 0.4 | 0.1 | 0.1 |
| | | Sub-Total | 19,959 | 100.0 | 19.3 | 18.9 |
| | Trunk Bus | - | 28,838 | 50.8 | 22.1 | 21.6 |
| | | Trunk Bus | 2,925 | 6.5 | 2.8 | 2.8 |
| | | Feeder Bus | 19,025 | 42.4 | 18.4 | 18.0 |
| | | Car pool | 125 | 0.3 | 0.1 | 0.1 |
| | Sub-Total | 44,913 | 100.0 | 43.4 | 42.5 | |
| School/ Company Bus | - | 9,288 | 97.6 | 9.0 | 8.8 | |
| | Feeder Bus | 231 | 2.4 | 0.2 | 0.2 | |
| | Sub-Total | 9,519 | 100.0 | 9.2 | 9.0 | |
| Scheme B | - | 244 | | 0.2 | 0.2 | |
| Feeder Bus | - | 2,082 | 82.9 | 2.0 | 2.0 | |
| | Feeder Bus | 428 | 17.1 | 0.4 | 0.4 | |
| | Sub-Total | 2,510 | 100.0 | 2.4 | 2.4 | |
| Others | - | 2,801 | | 2.7 | 2.6 | |
| | Public Mode Total | - | 79,946 | | 77.3 | 75.6 |
| Private Mode | Car | - | 14,960 | 99.3 | 14.5 | 14.1 |
| | | Feeder Bus | 113 | 0.7 | 0.1 | 0.5 |
| | | Sub-Total | 15,073 | 100.0 | 14.6 | 14.2 |
| | Car pool | - | 519 | 86.9 | 0.5 | 0.5 |
| | | Feeder Bus | 78 | 13.1 | 0.1 | 0.1 |
| | | Sub-Total | 597 | 100.0 | 0.6 | 0.6 |
| | Taxi | - | 1,022 | | 1.0 | 1.0 |
| Motorcycle | - | 6,756 | | 6.5 | 6.4 | |
| | Private Mode Total | | 23,448 | | 22.7 | 22.2 |
| Motorized Trips Total | | | 103,394 | | 100.0 | 97.7 |
| Walk and Bicycle | | | 2,387 | | | 2.3 |
| Grand Total | | | 105,781 | | | 100.0 |
| Feeder Bus Total | | | 30,160 | | 29.2 | 28.5 |

Source: SUTIS HIS (1988)

Table 3.16

Feeder Bus Traffic of Ang Mo Kio New Town

| | Mode | | Residents | Non-Residents | Total |
|------------------------|-----------------|----------------------------|-----------|---------------|---------|
| Inter-Town Trips | Between | MRT | 16,400 | 9,300 | 25,700 |
| | Feeder | Trunk Bus | 37,600 | 21,000 | 58,600 |
| | Bus | School/ Company Bus | 400 | 200 | 600 |
| | and | Car | 200 | 300 | 500 |
| | | Car pool | 200* | 300 | 500 |
| | | Sub-Total | 54,800 | 30,900 | 85,700 |
| | Feeder Bus only | Feeder Bus only | 4,700 | 2,900 | 7,600 |
| | | Transfer Bet. Feeder Buses | 1,000 | 600 | 1,600 |
| | | Sub-Total | 5,700 | 3,500 | 9,200 |
| | | Total | 60,500 | 34,400 | 94,900 |
| Intra-town Trips Total | | | 33,800 | 9,650 | 43,450 |
| Total | | | 94,300 | 44,050 | 138,350 |

Source: Estimated by the Study Team based on the 1988 SUTIS HIS and other valuable information.

3.2.4 Distribution of Bus Passenger Trips in Ang Mo Kio New Town

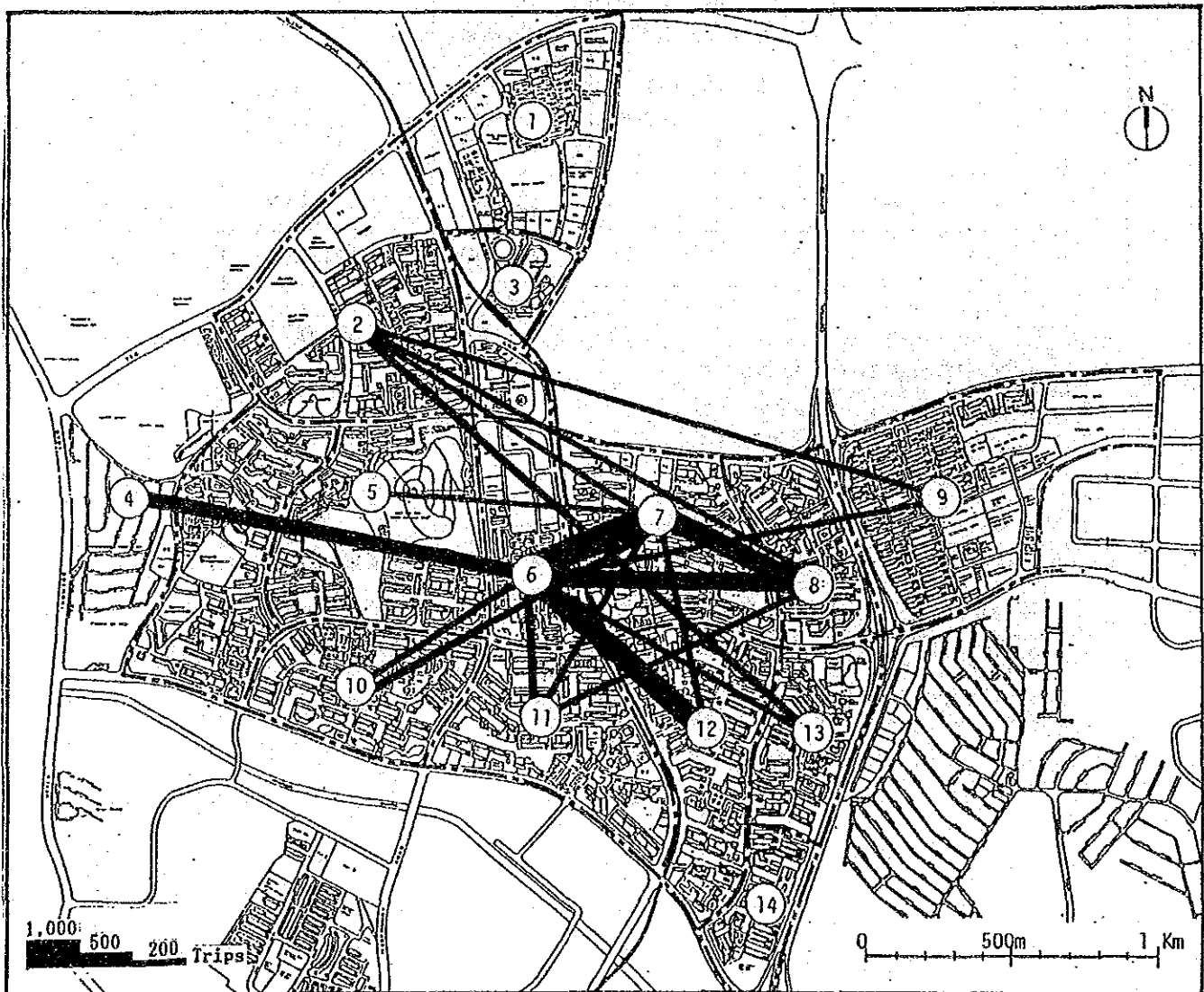
Table 3.17 and Figure 3.9 show the distribution of bus passenger trips using the bus interchange and moving within Ang Mo Kio new town. Heavy concentration of traffic is seen between the town center and the rest of the areas.

Table 3.17

Distribution of Intra-New Town Bus Passenger Trips
Using Bus Interchange in Ang Mo Kio New Town

| | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | Total |
|-------------------|----|-----|----|-----|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|---------------|
| 01 Industrial | - | 15 | - | 10 | - | - | - | - | - | - | - | - | - | 169 | 25 |
| 02 | | 304 | - | 47 | - | - | 282 | 202 | 266 | 56 | 33 | 165 | 389 | 169 | 2,630 |
| 03 Sports Complex | | | - | 16 | 31 | - | 88 | 39 | 38 | 15 | - | 85 | 15 | - | 362 |
| 04 | | | | 184 | 129 | 638 | 168 | 126 | 125 | - | 131 | 136 | 112 | - | 1,900 |
| 05 | | | | | - | - | 209 | 98 | 76 | 42 | - | 120 | 87 | 91 | 1,215 |
| 06 Town Centre | | | | | | 166 | 1,121 | 763 | 250 | 286 | 345 | 911 | 793 | 54 | 6,172 |
| 07 | | | | | | | 242 | 269 | 221 | 365 | 280 | 385 | 120 | 16 | 3,766 |
| 08 | | | | | | | | 374 | 176 | 336 | 329 | 186 | 27 | 61 | 2,986 |
| 09 Industrial | | | | | | | | | 382 | 101 | 176 | 175 | 110 | - | 2,124 |
| 10 | | | | | | | | | | 6 | 108 | 191 | 152 | 126 | 1,814 |
| 11 | | | | | | | | | | | - | 77 | 73 | 76 | 1,684 |
| 12 | | | | | | | | | | | | 316 | 123 | - | 2,870 |
| 13 | | | | | | | | | | | | | 30 | - | 2,060 |
| 14 Industrial | | | | | | | | | | | | | | - | 699 |
| Total | | | | | | | | | | | | | | | 30,308 |

Source: SUTIS Bus Survey (1987)



4. EXISTING FEEDER BUS SYSTEM

4.1 Overall Bus System

Bus services in Singapore are provided by Singapore Bus Services (SBS), Trans-island Bus Services (TIBS), City Shuttle Services (CSS), Scheme A and Scheme B. SBS and TIBS are publicly owned, while the others are privately-owned and operated. The services consist of trunk services and feeder services. The former mainly provide direct routes to cover major traffic generating sources, which also cater for short distance trips along the routes. Feeder bus services are short distance services operated mainly in new towns and industrial areas for passenger collection, distribution, and local travel.

SBS provides 218 services, including 77 feeder services and 4 weekend services. TIBS provides 22 services, including 8 feeder services in Woodlands and Yishun new towns, and 14 trunk services. CSS provides several services between housing estates and the CBD. Besides these bus services, supplementary bus services are operated during peak hours, such as school buses and privately hired coaches, called Scheme A and B. Scheme A provides contract services for commuters, while Scheme B provides shuttle services between residential areas and the CBD or industrial area. Air-conditioned bus services are also provided by 2 bus operators. The outline of bus services in Singapore is shown in Table 4.1

Table 4.1
Outline of Bus Services in Singapore

| | No. of Routes | No. of Buses Owned | No. of Bus Trips per Day | Bus Ridership | |
|--|--|---------------------|--------------------------|-------------------|----------------|
| | | | | Million/yr | 000/day |
| Public Bus | SBS ^{1/} 218 (Trunk=141 Feeder=77) | 2,289 ^{4/} | 33,760 | 843 ^{2/} | 2,310 |
| | TIBS ^{1/} 22 (Trunk=14 Feeder=8) | 329 | 4,450 | 86 | 235 |
| | CSS ^{2/} 9 | 113 | 750 | 22 ^{3/} | 75 |
| | Scheme B ^{2/} 37 | 444 | 640 | 8 ³ | 26.5 |
| Air-Conditioned Bus Service (Downtown) | 4 | 28 | - | - | - |
| Total | 290 | 3,203 | 39,600 | 959 | 2,646.5 |

Source: ROV Annual Report
SBS Minibus Guide 1986, Comprehensive Traffic Study, Phase A

^{1/} Based on 1987 Data

^{2/} Based on 1986 Data

^{3/} Based on 1980 Data

^{4/} The number represents buses 12 years and below, as of 30 September 1987.

As shown in Figure 4.1, the route structure of trunk services is very extensive. SBS alone operates a total round trip distance of about 5,200 kms for trunk services. The characteristics of the route structure are as follows:

- 1) Major traffic generating sources (residential and employment areas) are linked by more than one bus service with slightly different routes.
- 2) Trunk routes are, however, particularly concentrated in the CBD. As shown in Table 4.2, 95 out of 137 trunk routes or about 70% of the total ply the roads in the CBD.

Table 4.2

Location of Trunk Bus Routes

| Route Type | No. of Routes | % to Total |
|-------------------------|---------------|------------|
| To/from the CBD | 50 | 36.5 |
| Passing-through the CBD | 45 | 32.8 |
| Others | 42 | 30.7 |
| Total | 137 | 100.0 |

Source: Worked out based on SBS Data

- 3) The route length of trunk bus services varies, as shown in Table 4.3. Those with short lengths serve the adjoining areas of the CBD and major HDB new towns. Average route length (round trip distance) is approximately 38 kms.

Table 4.3

Distribution of Route Length (Round Trip Distance) for SBS Trunk Bus Services

| Round Trip Distance (kms) | No. of Routes | % to Total |
|---------------------------|---------------|------------|
| 10 or less | 4 | 2.9 |
| 11 20 | 19 | 13.9 |
| 21 30 | 23 | 16.8 |
| 31 40 | 32 | 23.4 |
| 41 50 | 30 | 21.9 |
| 51 60 | 18 | 13.1 |
| Over 61 | 11 | 8.0 |
| Total | 137 | 100.0 |

Source: Worked out based on SBS Data

Trunk bus and feeder bus routes are supplemental structures as clearly seen in Figure 4.1, wherein bus interchanges play significant roles. There are, at present, 11 bus interchanges

mainly provided in new towns. Passengers can transfer on the same covered platform between trunk and feeder buses.

Both feeder and trunk bus services in Singapore are also provided by two major public transport operators: SBS and TIBS. As shown in Table 4.4, records show 84 services of which 65 operate in HDB new towns, while 19 run in the other areas, including Jurong Industrial Area and HDB estates. Details of feeder bus operation are shown in Appendix 4.A.

The total round trip distance of feeder bus routes is 658 kms of which 445 kms or 68% are operated in HDB new towns. With the exception of Jurong industrial area which has a longer route length, the average route length (round trip) of the feeder bus routes is 7.8 kms.

Table 4.4

Feeder Bus Services in Singapore

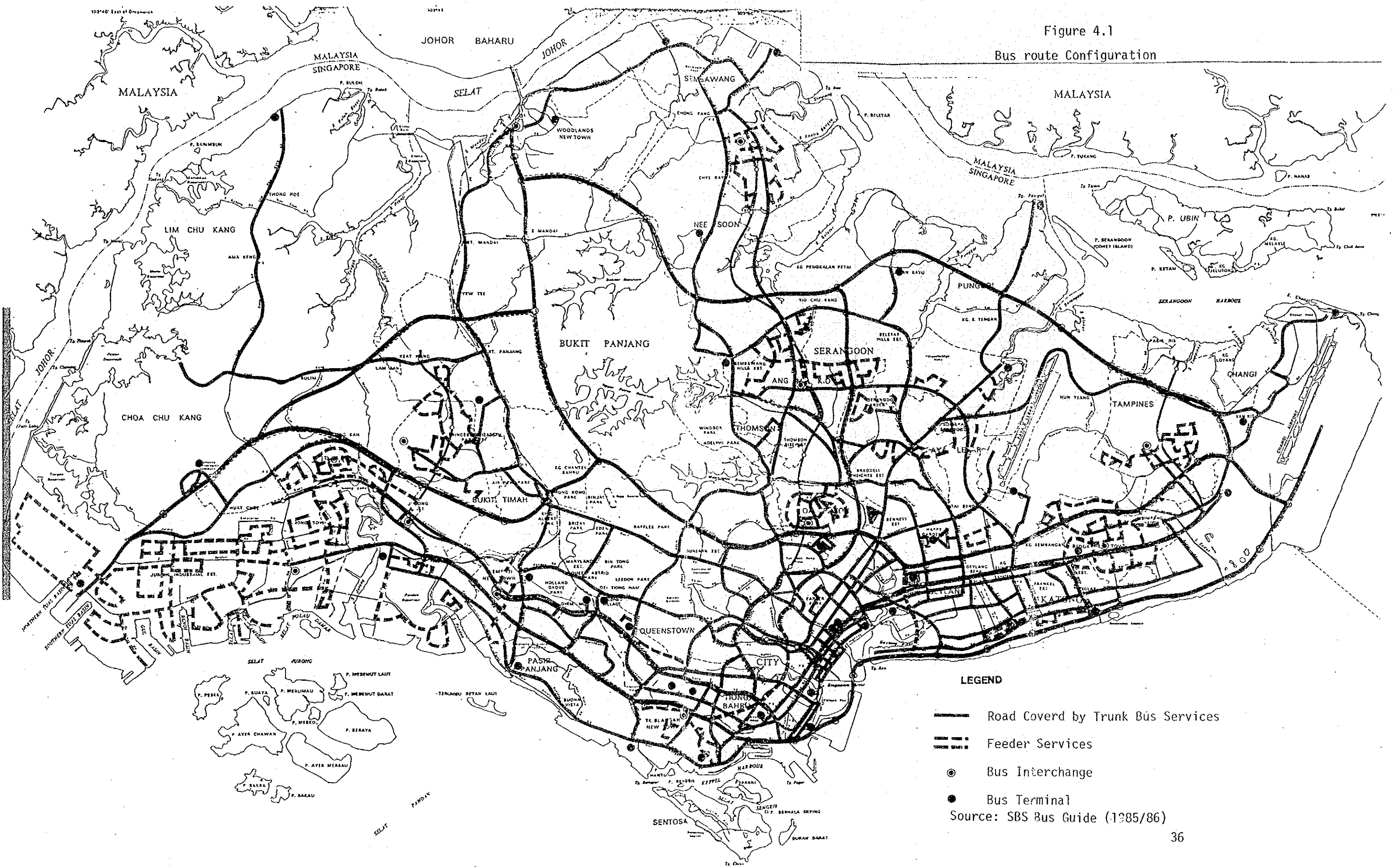
| Service Area | No. of Routes | Total Round Trip Distance (kms) | Average Round Trip Distance (kms) | Bus Stop | |
|-------------------|---------------|---------------------------------|-----------------------------------|-----------|---------------------|
| | | | | Total No. | Average Spacing (m) |
| HDB New Towns | 65 | 445 | 6.8 | 1,068 | 420 |
| Jurong Ind'l Area | 10 | 156 | 15.6 | 270 | 580 |
| HDB Estates | 2 | 15 | 7.5 | 39 | 380 |
| Other Areas | 7 | 42 | 6.0 | 109 | 380 |
| Total | 84 | 658 | 7.8 | 1,497 | 440 |

Source: SBS

Typical type of bus services for new towns is a combination of trunk bus service and feeder service via bus interchange. The former provide inter-area town services. These new towns, however, are not always served by the above type of bus service as shown in Table 4.5. Only 12 out of 20 new towns are provided with bus interchanges and 15 with feeder bus services.

Figure 4.1

Bus route Configuration



LEGEND

- Road Covered by Trunk Bus Services
- - - Feeder Services
- ⊙ Bus Interchange
- Bus Terminal

Source: SBS Bus Guide (1985/86)

Table 4.5
Bus Services for HDB New Towns

| New Town | Present Population (as of '86) : 000 | Planned Population : 000 | No. of MRT Stations | No. of Bus Inter- change | No. of Bus Services | | | |
|------------------|--|-----------------------------|---------------------------|-----------------------------------|---------------------|------------|-----------------|------------|
| | | | | | Feeder | Trunk | Pass- Though | Total |
| 1. Ang Mo Kio | 183 | 188 | 2 | 1 | 7 | 16 | 2 | 25 |
| 2. Bedok | 201 | 217 | 2 | 1 | 10 | 16 | 7 | 33 |
| 3. Bukit Batok | 97 | 106 | 2 | 1 | 4 | - | 10 | 14 |
| 4. Bishan | 45 | 84 | 1 | - | - | 1 | 6 | 7 |
| 5. Bukit Merah | 218 | 231 | 2 | 1 | 5 | 10 | 21 | 36 |
| 6. Choa Chu Kang | 14 | 133 | 1 | - | - | - | 2 | 2 |
| 7. Clementi | 89 | 95 | 1 | 1 | 4 | 9 | 15 | 28 |
| 8. Geylang | 131 | 142 | 2 | - | 1 | 12 | 43 | 55 |
| 9. Hougang | 109 | 156 | - | 1 | 5 | 4 | 8 | 17 |
| 10. Jalan Besar | 136 | 142 | 1 | - | - | - | - | - |
| 11. Jurong East | 73 | 80 | 1 | 1 | 4 | 7 | 4 | 15 |
| 12. Jurong West | 132 | 247 | 2 | 1 | 6 | 16 | 2 | 24 |
| 13. Pasir Ris | 1 | 136 | 1 | - | - | - | 2 | 2 |
| 14. Queenstown | 127 | 154 | 2 | - | 2 | 16 | 11 | 29 |
| 15. Serangoon | 50 | 80 | - | - | 2 | 8 | 3 | 13 |
| 16. Tampines | 137 | 249 | 2 | 1 | 4 | 5 | 3 | 12 |
| 17. Toa Payoh | 152 | 168 | 2 | 1 | 5 | 19 | 1 | 25 |
| 18. Woodlands | 86 | 251 | - | 1 | 2 | 3 | 3 | 8 |
| 19. Yishun | 163 | 228 | 1 | 1 | 5 | 2 | 5 | 12 |
| 20. Bukit Panjan | 36 | 114 | - | - | - | - | 6 | 6 |
| Total | 2,180 | 3,201 | 25 | 12 | 65 | 144 | 154 | 365 |

Source: Worked out based on the Bus Map of 1985.

The remaining 5 new towns are not served by feeder bus services, either because trunk bus services are still at the early stage of development (Bishan, Choa Chu Kang, Pasir Ris, and Bukit Batok new towns). Even the new towns with feeder bus services, there are considerable number of bus services which pass through the new towns.