# Appendix Table 5.1.1 Format for Vehicle Owner Interview Survey (Passenger Vehicle)

## Vehicle-owner interview Survey

— Passenger Vehicle —

Survey day _____(month), _____ (day), ( _____ )

| Number | 2 | | | | | | Plate number | | Registered year |
|---|---|---|---|---|---|---|---|---|---|
| Owner's address | District | | Khoroo | | ★ | | Name of owner | | |
| | Address | | | | | | | | |

**1** Type of vehicle

| | |
|---|---|
| Passenger Car | 1 |
| Microbus | 2 |
| Private bus | 3 |

Apply a correct number

Model

**2** Type of ownership

| | |
|---|---|
| Private | 1 |
| Company | 2 |

Apply a correct number

Type of ownership

**3** Household size

(Only for private car owners)

**4** Occupation(Only for private car owners)

| | |
|---|---|
| Agriculture and cattle breeding | 1 |
| Company employee | 2 |
| Private business | 3 |
| Student | 4 |
| Unemployed | 5 |

Apply a correct number

**5** Type of industry that uses the vehicle (Only for company car owners)

| | | | |
|---|---|---|---|
| Agri, Forest, Fish | 1 | Finance insurance realestate | 7 |
| Mining | 2 | Transport communication | 8 |
| Construction | 3 | Electro, Gas, Water | 9 |
| Manufacture | 4 | Service | 10 |
| Wholesale | 5 | Public business | 11 |
| Retail | 6 | Others | 12 |

Apply a correct number

Industry

**6** Total distance traveled in the day

km

| | | |
|---|---|---|
| A | Meter before driving | |
| B | Meter after driving | |

Fill out the distance by kilometer.

★

**Last question**

Household monthly income

(Only for private car owners)

**7** Origin or destination

Please fill out in detail (street, address) When the area is unsure, write conspicuous buildings or stations nearby in ( ).

**8** Start time

What time the drivers left the origins for each drive. (Use 24:00 to fill out.)

**9** Destination time

What time the drivers arrived at the goals for each drive. (Use 24:00 to fill out)

**10** Trip distance

How long the distance, from origin to destination. (Fill out by kilometer)

**11** Trip purpose

| Purpose | Code |
|---|---|
| Commuting | 1 |
| Business (except going back to office) | 2 |
| Household, shopping | 3 |
| Society, Sightseeing, Leisure | 4 |
| Going back to office | 5 |
| Going home | 6 |

Apply a correct number

**12** Number of passenger

How many people were in the car? (Fill out the # of passenger including the driver)

**13** Parking Place

Where did the driver park?

| | |
|---|---|
| On street | 1 |
| Off street | 2 |

Apply a correct number

| | Origin or destination | Start time | Destination time | Trip distance | Trip purpose | # of passenger | Parking place |
|---|---|---|---|---|---|---|---|
| Where you were originally | City / District / Khoroo / Address / ( ) ★ | Fill in from the right | Fill in from the right | Fill in from the right | Fill in from the right | Fill in from the right | |
| 1st driving — Where you want | City / District / Khoroo / Address / ( ) 0 1 ★ | | | | | | |

※ Fill out on backside after 2nd time.

# Appendix Table 5.1.2 Format for Vehicle Owner Interview Survey (Goods Vehicle)

## Vehicle-owner interview survey

— Goods vehicle —

Survey day _____(month), _____ (day), ( _____ ).

| Number | 3 | | | | | | Plate number | | Registered year |
|---|---|---|---|---|---|---|---|---|---|
| Owner's address | District | | Khoroo | | ★ | | Name of owner | | |
| | Address | | | | | | | | |

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Type of vehicle<br>Smalltruck 1<br>Ordinary Truck 2<br>Trailer 3<br>Apply a correct number | Type of ownership<br>Private 1<br>Company 2<br>Apply a correct number | Type of industry that uses the vehicle.<br>Agri, Forest, Fish 1 / Finance insurance real estate 7<br>Mining 2 / Transport communication 8<br>Construction 3 / Electro, Gas, Water 9<br>Manufacture 4 / Service 10<br>Wholesale 5 / Public business 11<br>Retail 6 / Others 12<br>Apply a correct number | Total distance traveled in the day<br>km<br>A Meter before driving<br>B Meter after driving<br>Please full out the distance by kilometer. |
| Model | Type of ownership | Industry | ★ |

| Last question |
|---|
| Household monthly income<br>(Only for private car owners) |

| 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|
| Origin or destination<br>Please fill out in detail (street, address) When the area is unsure, write conspicuous buildings or stations nearby in ( ) | Start time<br>What time the drivers left the origins for each drive.<br>(Use 24:00 method to fill out.) | Destination time<br>What time the drivers arrived at the goals for each drive.<br>(Use 24:00 method to fill out) | Trip distance<br>How long the distance, from origin to destination.<br>(Fill out by kilometer) | Trip purpose<br>Commuting 1<br>Business (except going back to office) 2<br>Household, shopping 3<br>Society, Sight-seeing, Leisure 4<br>Going back to office 5<br>Going home 6<br>Please apply correct numbers. | Type of cargo<br>Empty 1<br>Agricultural Product 2<br>Minerals 3<br>Petroleum 4<br>Construction material 5<br>Chemicals and Fertilizer 6<br>Machinery 7<br>Consumer goods 8<br>Others 9<br>Please apply correct numbers. | Weight of cargo<br>(in t and kg)<br>When not sure, make a rough estimate. |

| | Origin or destination | Start time | Destination time | Trip distance | Trip purpose | Carrying cargo | Carrying weight of cargo |
|---|---|---|---|---|---|---|---|
| | | Fill in from the right | Fill in from the right | Fill in from the right | Fill in from the right | Fill in from the right | Fill in from the right |
| Where you were originally. | City / District / Khoroo / Address / ( ) ★ | | | | | | |
| 1st driving Where you went | City / District / Khoroo / Address / ( ) 0 1 ★ | | | | | | t Kg |

※ Fill out on backside after 2nd time.

## Appendix Table 5.1.3 Format for Cordon Line Survey

### Cordon Line Questionnaire

Road-side O-D Survey

☐☐ Month ☐☐ Day ☐

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Number | Survey Point | Direction | Time | Type of vehicle |
| Put straight number in order for each up, down and points. | Refer to the "Cordon Line Survey Point Table" | | | |
| 1 | | | | |

| Division | Code |
|---|---|
| Towards Ulaanbaatar | 1 |
| -Away from Ulaanbaatar | 2 |

| Time | |
|---|---|
| 5 | 13 |
| 6 | 14 |
| 7 | 15 |
| 8 | 16 |
| 9 | 17 |
| 10 | 18 |
| 11 | 19 |
| 12 | 20 |

| Type of vehicle | | Code |
|---|---|---|
| Passenger Vehicle | Passenger Car | 1 |
| | Microbus | 2 |
| | Bus | 3 |
| Truck | Ordinary Truck | 4 |
| | Heavy Truck | 5 |
| | Trailer | 6 |

| 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|
| Origin | Destination | Driving Purpose | # of Passenger | Type of Cargo | Carrying Cargo |
| Where are you from? | Where are you going? | What is your driving purpose? (Only for passenger vehicle) | How many is the passenger, including driver? | What type of cargo it carries (only truck type) | Weight of cargo in ton (only for truck) |
| City / District / Khoroo / Address | City / District / Khoroo / Address | | | | t |
| Conspicuous building | Conspicuous building | | | When can't classify immediately (Name of goods) | |
| Origin | Destination | | Person | | t |

| Driving Purpose | Code |
|---|---|
| Commuting | 1 |
| Business(except going back to office) | 2 |
| Household, shopping | 3 |
| Society, Sight-seeing, Leisure | 4 |
| Going back office | 5 |
| Going home | 6 |

| Type of Cargo | Code |
|---|---|
| Empty | 1 |
| Agricultural Product | 2 |
| Minerals | 3 |
| Petroleum | 4 |
| Construction material | 5 |
| Chemicals and Fertilizer | 6 |
| Machinery | 7 |
| Consumer goods | 8 |

# Appendix Table 5.1.4 Format for Axle Load Survey

Axle Load Survey

Survey station no. : Date : 1998, (month), (day),( )

Direction : Weather :

Time : From to ( th page out of pages) Researcher's Name :

| | Type of vehicle | Type of Cargo | Axle Load(ton) (From Front Axle) 1st axle | | Wheel base (m) | Axle Load(ton) 2nd axle | | Wheel base (m) | Axle Load(ton) 3rd axle | | Wheel base (m) | Axle Load(ton) 4th axle | | Wheel base (m) | Axle Load(ton) 5th axle | | Wheel base (m) | Axle Load(ton) 6th axle | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Left Side | Right Side | | Left Side | Right Side | | Left Side | Right Side | | Left Side | Right Side | | Left Side | Right Side | | Left Side | Right Side |
| 1 | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | |

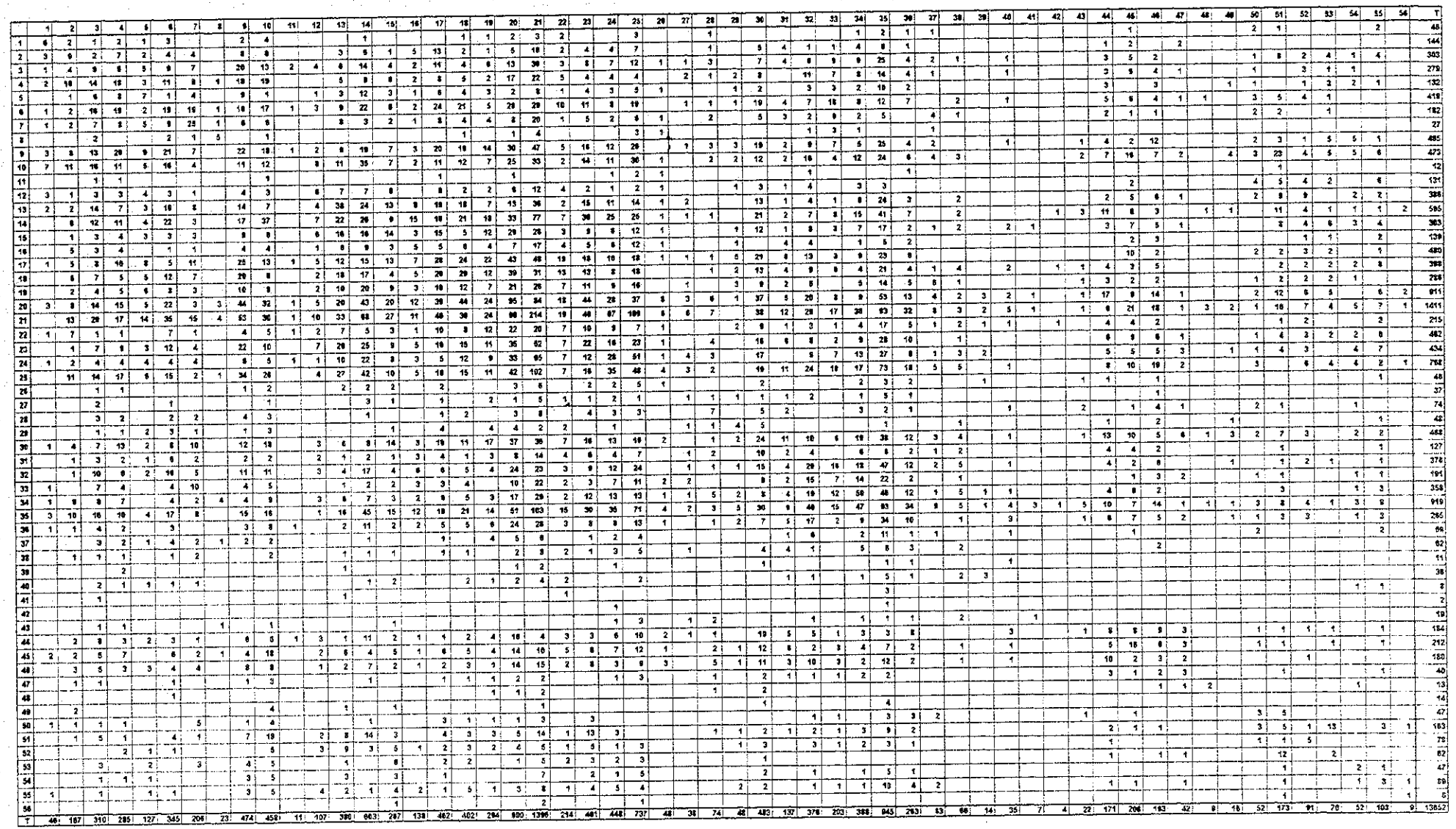
Type of vehicle

| 1. Ordinary Truck | 2. Heavy Truck | 3. Trailer |
|---|---|---|

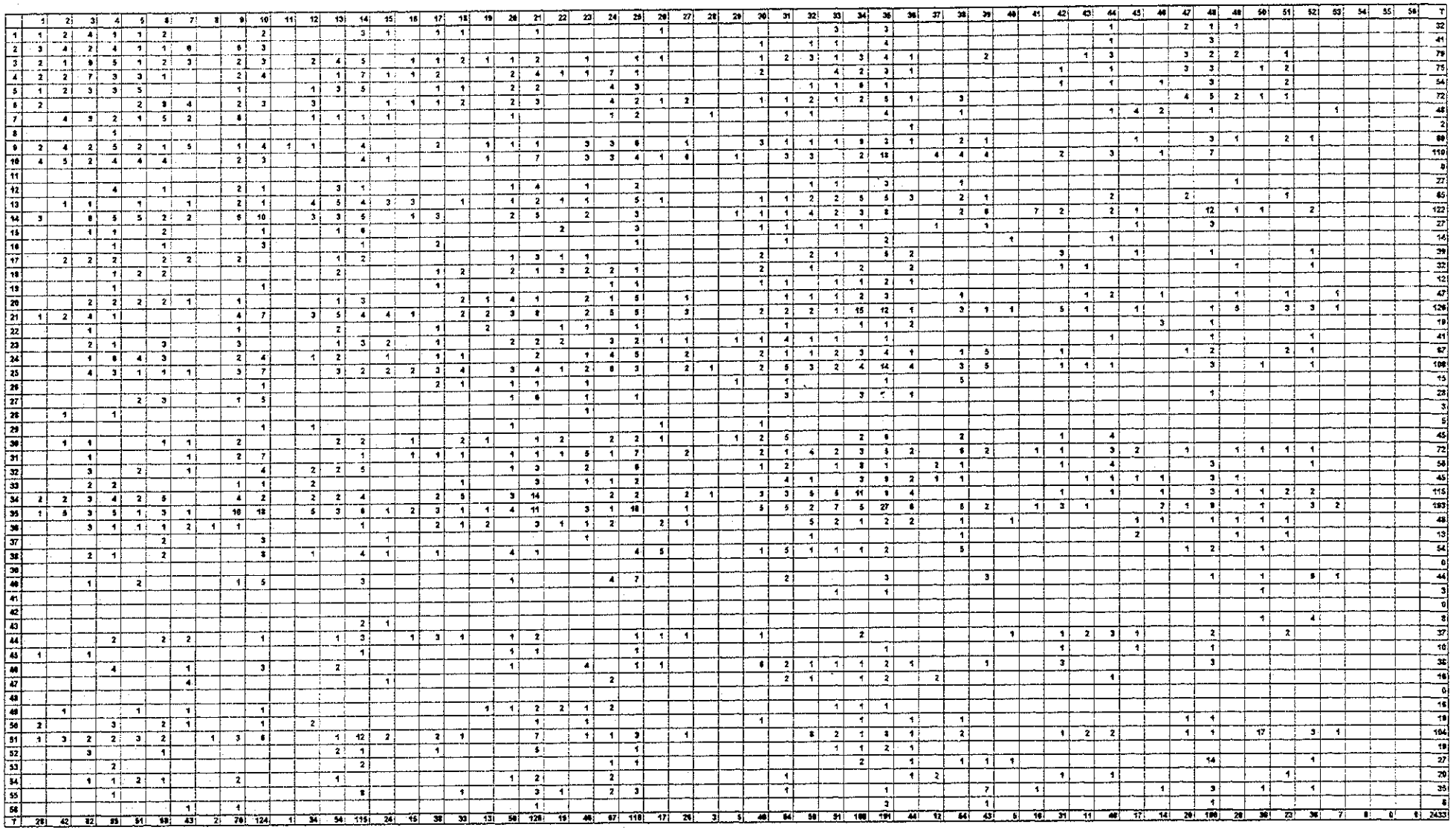
Type of Cargo

| | | | |
|---|---|---|---|
| 1 | Empty | 6 | Chemicals and Fertilizer |
| 2 | Agricultural Product | 7 | Machinery |
| 3 | Minerals | 8 | Consumer goods |
| 4 | Petroleum | 9 | Others |
| 5 | Construction material | | |

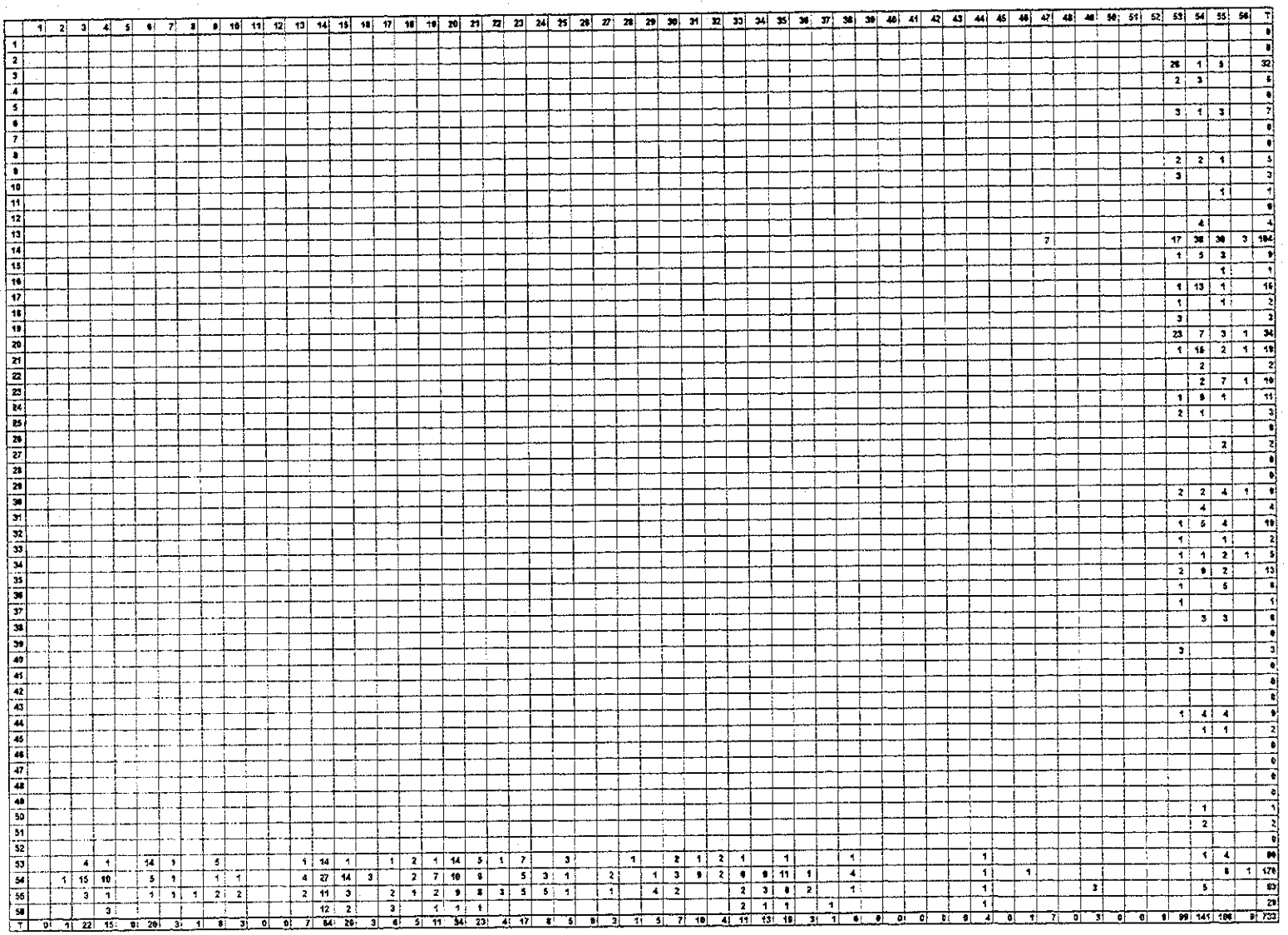
# Appendix Table 5.1.5 Sample O-D for Car – From Vehicle Owner Interview Survey



# Appendix Table 5.1.6 Sample O-D for Truck – From Vehicle Owner Interview Survey



## Appendix Table 5.1.7 Sample O-D for all Vehicles – From Cordon Line Survey



**Appendix Table 5.1.8 Traffic Volume at Screen Line Point ( SA-1)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 11 | 0 | 3 | 0 | 0 | 0 | 0 | 14 |
| 7:00 - 8:00 | 16 | 9 | 7 | 0 | 0 | 2 | 0 | 34 |
| 8:00 - 9:00 | 50 | 10 | 14 | 0 | 1 | 5 | 0 | 80 |
| 9:00 - 10:00 | 56 | 7 | 13 | 0 | 3 | 8 | 0 | 87 |
| 10:00 - 11:00 | 65 | 3 | 13 | 0 | 4 | 7 | 0 | 92 |
| 11:00 - 12:00 | 69 | 1 | 10 | 0 | 2 | 5 | 0 | 87 |
| 12:00 - 13:00 | 67 | 9 | 16 | 0 | 1 | 10 | 0 | 103 |
| 13:00 - 14:00 | 67 | 2 | 10 | 0 | 3 | 5 | 1 | 88 |
| 14:00 - 15:00 | 55 | 4 | 8 | 0 | 3 | 13 | 1 | 84 |
| 15:00 - 16:00 | 64 | 3 | 13 | 0 | 6 | 11 | 0 | 97 |
| 16:00 - 17:00 | 67 | 5 | 10 | 0 | 2 | 9 | 0 | 93 |
| 17:00 - 18:00 | 74 | 3 | 10 | 0 | 4 | 7 | 0 | 98 |
| 18:00 - 19:00 | 98 | 9 | 10 | 0 | 2 | 3 | 0 | 122 |
| 19:00 - 20:00 | 106 | 25 | 11 | 0 | 4 | 11 | 0 | 157 |
| 20:00 - 21:00 | 121 | 14 | 12 | 0 | 1 | 6 | 0 | 154 |
| 21:00 - 22:00 | 77 | 12 | 8 | 0 | 3 | 4 | 0 | 104 |
| Total | 1,063 | 116 | 168 | 0 | 39 | 106 | 2 | 1,494 |

**Appendix Table 5.1.9 Traffic Volume at Screen Line Point ( SA-2)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 98 | 11 | 33 | 2 | 7 | 8 | 0 | 159 |
| 7:00 - 8:00 | 176 | 32 | 75 | 17 | 10 | 18 | 1 | 329 |
| 8:00 - 9:00 | 462 | 65 | 93 | 15 | 17 | 49 | 3 | 704 |
| 9:00 - 10:00 | 509 | 47 | 84 | 13 | 25 | 57 | 1 | 736 |
| 10:00 - 11:00 | 555 | 44 | 77 | 13 | 23 | 67 | 1 | 780 |
| 11:00 - 12:00 | 525 | 29 | 59 | 9 | 26 | 68 | 0 | 716 |
| 12:00 - 13:00 | 478 | 30 | 94 | 14 | 28 | 89 | 0 | 733 |
| 13:00 - 14:00 | 481 | 50 | 74 | 18 | 27 | 68 | 3 | 721 |
| 14:00 - 15:00 | 446 | 36 | 75 | 12 | 40 | 53 | 1 | 663 |
| 15:00 - 16:00 | 462 | 35 | 79 | 20 | 34 | 77 | 6 | 713 |
| 16:00 - 17:00 | 484 | 40 | 78 | 15 | 25 | 65 | 1 | 708 |
| 17:00 - 18:00 | 554 | 75 | 87 | 16 | 31 | 75 | 9 | 847 |
| 18:00 - 19:00 | 641 | 47 | 90 | 16 | 17 | 57 | 2 | 870 |
| 19:00 - 20:00 | 670 | 90 | 61 | 12 | 29 | 43 | 3 | 908 |
| 20:00 - 21:00 | 663 | 68 | 54 | 8 | 24 | 46 | 0 | 863 |
| 21:00 - 22:00 | 503 | 61 | 63 | 10 | 18 | 39 | 1 | 695 |
| Total | 7,707 | 760 | 1,176 | 210 | 381 | 879 | 32 | 11,145 |

**Appendix Table 5.1.10 Traffic Volume at Screen Line Point ( SA-3)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 140 | 8 | 15 | 0 | 5 | 9 | 0 | 177 |
| 7:00 - 8:00 | 317 | 45 | 32 | 14 | 6 | 32 | 0 | 446 |
| 8:00 - 9:00 | 670 | 82 | 53 | 18 | 12 | 81 | 0 | 916 |
| 9:00 - 10:00 | 941 | 138 | 37 | 25 | 27 | 132 | 2 | 1,302 |
| 10:00 - 11:00 | 867 | 167 | 39 | 15 | 43 | 143 | 1 | 1,275 |
| 11:00 - 12:00 | 898 | 160 | 30 | 18 | 35 | 132 | 1 | 1,274 |
| 12:00 - 13:00 | 1,018 | 154 | 46 | 16 | 31 | 121 | 5 | 1,391 |
| 13:00 - 14:00 | 1,018 | 140 | 25 | 18 | 42 | 114 | 13 | 1,370 |
| 14:00 - 15:00 | 1,377 | 176 | 50 | 23 | 48 | 150 | 6 | 1,830 |
| 15:00 - 16:00 | 1,286 | 167 | 35 | 16 | 60 | 161 | 4 | 1,729 |
| 16:00 - 17:00 | 1,040 | 157 | 38 | 15 | 32 | 126 | 10 | 1,418 |
| 17:00 - 18:00 | 1,233 | 189 | 50 | 21 | 41 | 152 | 3 | 1,689 |
| 18:00 - 19:00 | 1,153 | 156 | 50 | 15 | 33 | 127 | 6 | 1,540 |
| 19:00 - 20:00 | 1,119 | 136 | 45 | 14 | 31 | 86 | 2 | 1,433 |
| 20:00 - 21:00 | 1,057 | 90 | 32 | 8 | 26 | 74 | 4 | 1,291 |
| 21:00 - 22:00 | 1,108 | 126 | 24 | 6 | 19 | 44 | 2 | 1,329 |
| Total | 15,242 | 2,091 | 601 | 242 | 491 | 1,684 | 59 | 20,410 |

**Appendix Table 5.1.11 Traffic Volume at Screen Line Point ( SA-4)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 74 | 6 | 2 | 0 | 3 | 0 | 0 | 85 |
| 7:00 - 8:00 | 168 | 6 | 11 | 0 | 2 | 2 | 0 | 189 |
| 8:00 - 9:00 | 500 | 35 | 31 | 0 | 2 | 4 | 0 | 572 |
| 9:00 - 10:00 | 852 | 40 | 19 | 0 | 4 | 17 | 0 | 932 |
| 10:00 - 11:00 | 780 | 52 | 15 | 0 | 18 | 13 | 0 | 878 |
| 11:00 - 12:00 | 801 | 58 | 16 | 0 | 18 | 16 | 0 | 909 |
| 12:00 - 13:00 | 835 | 68 | 17 | 0 | 21 | 20 | 0 | 961 |
| 13:00 - 14:00 | 751 | 54 | 17 | 0 | 13 | 24 | 1 | 860 |
| 14:00 - 15:00 | 767 | 39 | 16 | 0 | 16 | 19 | 0 | 857 |
| 15:00 - 16:00 | 924 | 57 | 9 | 0 | 6 | 18 | 0 | 1,014 |
| 16:00 - 17:00 | 873 | 44 | 13 | 0 | 10 | 14 | 1 | 955 |
| 17:00 - 18:00 | 809 | 53 | 17 | 0 | 7 | 8 | 0 | 894 |
| 18:00 - 19:00 | 781 | 41 | 22 | 0 | 13 | 1 | 2 | 860 |
| 19:00 - 20:00 | 665 | 43 | 21 | 0 | 10 | 3 | 2 | 744 |
| 20:00 - 21:00 | 612 | 31 | 14 | 0 | 8 | 4 | 0 | 669 |
| 21:00 - 22:00 | 597 | 42 | 11 | 0 | 10 | 7 | 0 | 667 |
| Total | 10,789 | 669 | 251 | 0 | 161 | 170 | 6 | 12,046 |

**Appendix Table 5.1.12 Traffic Volume at Screen Line Point ( SA-5)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 239 | 17 | 30 | 11 | 1 | 1 | 0 | 299 |
| 7:00 - 8:00 | 502 | 47 | 122 | 41 | 9 | 1 | 0 | 722 |
| 8:00 - 9:00 | 1,120 | 69 | 153 | 57 | 13 | 5 | 0 | 1,417 |
| 9:00 - 10:00 | 1,621 | 86 | 145 | 58 | 27 | 3 | 0 | 1,940 |
| 10:00 - 11:00 | 1,630 | 122 | 120 | 51 | 29 | 11 | 0 | 1,963 |
| 11:00 - 12:00 | 1,778 | 132 | 121 | 52 | 33 | 11 | 0 | 2,127 |
| 12:00 - 13:00 | 1,640 | 182 | 152 | 61 | 40 | 16 | 0 | 2,091 |
| 13:00 - 14:00 | 1,710 | 135 | 145 | 64 | 52 | 9 | 0 | 2,115 |
| 14:00 - 15:00 | 1,775 | 165 | 149 | 60 | 35 | 14 | 0 | 2,198 |
| 15:00 - 16:00 | 1,678 | 151 | 137 | 79 | 32 | 7 | 0 | 2,084 |
| 16:00 - 17:00 | 1,761 | 141 | 112 | 56 | 36 | 10 | 0 | 2,116 |
| 17:00 - 18:00 | 1,940 | 142 | 132 | 68 | 19 | 9 | 0 | 2,310 |
| 18:00 - 19:00 | 1,765 | 168 | 134 | 53 | 33 | 7 | 0 | 2,160 |
| 19:00 - 20:00 | 1,573 | 123 | 126 | 39 | 21 | 5 | 0 | 1,887 |
| 20:00 - 21:00 | 1,544 | 64 | 88 | 27 | 12 | 2 | 0 | 1,737 |
| 21:00 - 22:00 | 1,341 | 94 | 103 | 22 | 12 | 3 | 0 | 1,575 |
| Total | 23,617 | 1,838 | 1,969 | 799 | 404 | 114 | 0 | 28,741 |

**Appendix Table 5.1.13 Traffic Volume at Screen Line Point ( SA-6)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 22 | 3 | 11 | 0 | 3 | 2 | 0 | 41 |
| 7:00 - 8:00 | 65 | 15 | 6 | 0 | 1 | 9 | 2 | 98 |
| 8:00 - 9:00 | 190 | 28 | 7 | 0 | 8 | 31 | 3 | 267 |
| 9:00 - 10:00 | 356 | 38 | 13 | 0 | 11 | 65 | 5 | 488 |
| 10:00 - 11:00 | 377 | 51 | 9 | 0 | 11 | 83 | 2 | 533 |
| 11:00 - 12:00 | 410 | 48 | 10 | 0 | 30 | 90 | 8 | 596 |
| 12:00 - 13:00 | 380 | 40 | 8 | 0 | 23 | 86 | 4 | 541 |
| 13:00 - 14:00 | 361 | 26 | 10 | 0 | 24 | 88 | 0 | 509 |
| 14:00 - 15:00 | 370 | 40 | 9 | 0 | 16 | 59 | 6 | 500 |
| 15:00 - 16:00 | 428 | 55 | 3 | 0 | 15 | 86 | 8 | 595 |
| 16:00 - 17:00 | 374 | 39 | 11 | 0 | 11 | 85 | 12 | 532 |
| 17:00 - 18:00 | 341 | 28 | 8 | 0 | 10 | 54 | 5 | 446 |
| 18:00 - 19:00 | 295 | 33 | 9 | 0 | 11 | 60 | 2 | 410 |
| 19:00 - 20:00 | 221 | 32 | 7 | 0 | 13 | 44 | 3 | 320 |
| 20:00 - 21:00 | 205 | 37 | 0 | 0 | 10 | 42 | 5 | 299 |
| 21:00 - 22:00 | 175 | 27 | 1 | 0 | 5 | 29 | 4 | 241 |
| Total | 4,570 | 540 | 122 | 0 | 202 | 913 | 69 | 6,416 |

**Appendix Table 5.1.14 Traffic Volume at Screen Line Point ( SB-1)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 48 | 5 | 11 | 0 | 0 | 4 | 0 | 68 |
| 7:00 - 8:00 | 111 | 10 | 12 | 0 | 0 | 15 | 0 | 148 |
| 8:00 - 9:00 | 119 | 10 | 17 | 0 | 2 | 29 | 0 | 177 |
| 9:00 - 10:00 | 87 | 7 | 12 | 0 | 1 | 24 | 5 | 136 |
| 10:00 - 11:00 | 60 | 6 | 7 | 0 | 7 | 35 | 1 | 116 |
| 11:00 - 12:00 | 71 | 9 | 8 | 0 | 3 | 54 | 0 | 145 |
| 12:00 - 13:00 | 62 | 9 | 10 | 0 | 1 | 38 | 0 | 120 |
| 13:00 - 14:00 | 66 | 6 | 10 | 0 | 5 | 48 | 0 | 135 |
| 14:00 - 15:00 | 73 | 10 | 8 | 0 | 2 | 34 | 1 | 128 |
| 15:00 - 16:00 | 64 | 8 | 9 | 0 | 4 | 39 | 3 | 127 |
| 16:00 - 17:00 | 77 | 7 | 10 | 0 | 3 | 39 | 1 | 137 |
| 17:00 - 18:00 | 83 | 13 | 13 | 0 | 2 | 35 | 0 | 146 |
| 18:00 - 19:00 | 107 | 14 | 11 | 0 | 1 | 49 | 2 | 184 |
| 19:00 - 20:00 | 82 | 14 | 15 | 0 | 4 | 37 | 1 | 153 |
| 20:00 - 21:00 | 89 | 9 | 10 | 0 | 2 | 22 | 4 | 136 |
| 21:00 - 22:00 | 75 | 11 | 9 | 0 | 1 | 26 | 1 | 123 |
| Total | 1,274 | 148 | 172 | 0 | 38 | 528 | 19 | 2,179 |

**Appendix Table 5.1.15 Traffic Volume at Screen Line Point ( SB-2)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 29 | 4 | 11 | 0 | 1 | 5 | 0 | 50 |
| 7:00 - 8:00 | 169 | 18 | 29 | 0 | 10 | 22 | 0 | 248 |
| 8:00 - 9:00 | 368 | 23 | 41 | 0 | 11 | 48 | 4 | 495 |
| 9:00 - 10:00 | 461 | 31 | 35 | 0 | 14 | 41 | 10 | 592 |
| 10:00 - 11:00 | 438 | 33 | 20 | 0 | 25 | 79 | 21 | 616 |
| 11:00 - 12:00 | 494 | 47 | 18 | 0 | 18 | 80 | 24 | 681 |
| 12:00 - 13:00 | 414 | 41 | 27 | 0 | 19 | 68 | 23 | 592 |
| 13:00 - 14:00 | 411 | 36 | 22 | 0 | 23 | 101 | 16 | 609 |
| 14:00 - 15:00 | 451 | 40 | 23 | 0 | 16 | 60 | 22 | 612 |
| 15:00 - 16:00 | 409 | 29 | 25 | 0 | 20 | 67 | 25 | 575 |
| 16:00 - 17:00 | 426 | 34 | 17 | 0 | 22 | 68 | 19 | 586 |
| 17:00 - 18:00 | 396 | 40 | 27 | 0 | 14 | 55 | 13 | 545 |
| 18:00 - 19:00 | 303 | 30 | 21 | 0 | 5 | 49 | 12 | 420 |
| 19:00 - 20:00 | 286 | 21 | 24 | 0 | 12 | 32 | 5 | 380 |
| 20:00 - 21:00 | 134 | 21 | 18 | 0 | 9 | 43 | 7 | 232 |
| 21:00 - 22:00 | 198 | 25 | 9 | 0 | 4 | 18 | 1 | 255 |
| Total | 5,387 | 473 | 367 | 0 | 223 | 836 | 202 | 7,488 |

**Appendix Table 5.1.16 Traffic Volume at Screen Line Point ( SB-3)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 15 | 5 | 1 | 0 | 0 | 0 | 0 | 21 |
| 7:00 - 8:00 | 21 | 1 | 1 | 0 | 2 | 0 | 0 | 25 |
| 8:00 - 9:00 | 72 | 10 | 5 | 0 | 1 | 4 | 0 | 92 |
| 9:00 - 10:00 | 158 | 18 | 1 | 0 | 4 | 18 | 0 | 199 |
| 10:00 - 11:00 | 182 | 16 | 1 | 0 | 5 | 19 | 1 | 224 |
| 11:00 - 12:00 | 108 | 18 | 0 | 0 | 8 | 9 | 2 | 145 |
| 12:00 - 13:00 | 118 | 11 | 1 | 0 | 3 | 15 | 0 | 148 |
| 13:00 - 14:00 | 127 | 21 | 3 | 0 | 7 | 12 | 2 | 172 |
| 14:00 - 15:00 | 106 | 19 | 0 | 0 | 14 | 13 | 4 | 156 |
| 15:00 - 16:00 | 141 | 21 | 0 | 0 | 11 | 11 | 2 | 186 |
| 16:00 - 17:00 | 179 | 23 | 0 | 0 | 4 | 13 | 6 | 225 |
| 17:00 - 18:00 | 124 | 12 | 0 | 0 | 12 | 17 | 2 | 167 |
| 18:00 - 19:00 | 93 | 12 | 1 | 0 | 2 | 10 | 2 | 120 |
| 19:00 - 20:00 | 63 | 9 | 2 | 0 | 0 | 3 | 1 | 78 |
| 20:00 - 21:00 | 46 | 6 | 2 | 0 | 1 | 1 | 3 | 59 |
| 21:00 - 22:00 | 31 | 9 | 0 | 0 | 0 | 0 | 1 | 41 |
| Total | 1,584 | 211 | 18 | 0 | 74 | 145 | 26 | 2,058 |

**Appendix Table 5.1.17 Traffic Volume at Screen Line Point ( SB-4)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 197 | 13 | 85 | 4 | 4 | 1 | 0 | 304 |
| 7:00 - 8:00 | 439 | 42 | 82 | 24 | 6 | 5 | 0 | 598 |
| 8:00 - 9:00 | 1,013 | 81 | 120 | 37 | 13 | 30 | 2 | 1,296 |
| 9:00 - 10:00 | 1,387 | 87 | 109 | 29 | 23 | 39 | 0 | 1,674 |
| 10:00 - 11:00 | 1,277 | 104 | 90 | 28 | 37 | 67 | 0 | 1,603 |
| 11:00 - 12:00 | 1,353 | 132 | 94 | 36 | 44 | 56 | 0 | 1,715 |
| 12:00 - 13:00 | 1,303 | 121 | 111 | 36 | 31 | 47 | 0 | 1,649 |
| 13:00 - 14:00 | 1,440 | 122 | 104 | 31 | 39 | 51 | 3 | 1,790 |
| 14:00 - 15:00 | 1,385 | 113 | 113 | 34 | 43 | 55 | 3 | 1,746 |
| 15:00 - 16:00 | 1,329 | 114 | 101 | 30 | 34 | 41 | 3 | 1,652 |
| 16:00 - 17:00 | 1,354 | 100 | 103 | 30 | 44 | 42 | 6 | 1,679 |
| 17:00 - 18:00 | 1,235 | 104 | 112 | 34 | 26 | 24 | 3 | 1,538 |
| 18:00 - 19:00 | 1,201 | 105 | 102 | 22 | 21 | 28 | 5 | 1,484 |
| 19:00 - 20:00 | 891 | 62 | 85 | 19 | 14 | 26 | 1 | 1,098 |
| 20:00 - 21:00 | 1,263 | 66 | 86 | 13 | 13 | 27 | 0 | 1,468 |
| 21:00 - 22:00 | 904 | 49 | 49 | 8 | 7 | 8 | 0 | 1,025 |
| Total | 17,971 | 1,415 | 1,546 | 415 | 399 | 547 | 26 | 22,319 |

**Appendix Table 5.1.18 Traffic Volume at Screen Line Point ( SB-5)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 12 | 3 | 0 | 0 | 0 | 0 | 0 | 15 |
| 7:00 - 8:00 | 11 | 4 | 2 | 0 | 0 | 1 | 0 | 18 |
| 8:00 - 9:00 | 36 | 2 | 0 | 0 | 1 | 0 | 0 | 39 |
| 9:00 - 10:00 | 52 | 4 | 4 | 0 | 0 | 16 | 0 | 76 |
| 10:00 - 11:00 | 42 | 5 | 0 | 0 | 2 | 4 | 0 | 53 |
| 11:00 - 12:00 | 65 | 5 | 0 | 0 | 0 | 12 | 0 | 82 |
| 12:00 - 13:00 | 49 | 4 | 0 | 0 | 1 | 9 | 0 | 63 |
| 13:00 - 14:00 | 53 | 2 | 1 | 0 | 3 | 6 | 0 | 65 |
| 14:00 - 15:00 | 36 | 5 | 1 | 0 | 3 | 4 | 0 | 49 |
| 15:00 - 16:00 | 60 | 6 | 0 | 0 | 0 | 5 | 0 | 71 |
| 16:00 - 17:00 | 41 | 4 | 0 | 0 | 1 | 3 | 0 | 49 |
| 17:00 - 18:00 | 45 | 3 | 0 | 0 | 1 | 8 | 1 | 58 |
| 18:00 - 19:00 | 56 | 5 | 5 | 0 | 4 | 2 | 0 | 72 |
| 19:00 - 20:00 | 45 | 1 | 0 | 0 | 3 | 3 | 0 | 52 |
| 20:00 - 21:00 | 67 | 6 | 3 | 0 | 0 | 4 | 0 | 80 |
| 21:00 - 22:00 | 44 | 6 | 1 | 0 | 1 | 0 | 0 | 52 |
| Total | 714 | 65 | 17 | 0 | 20 | 77 | 1 | 894 |

**Appendix Table 5.1.19 Traffic Volume at Screen Line Point ( SB-6)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 11 | 2 | 1 | 0 | 1 | 2 | 0 | 17 |
| 7:00 - 8:00 | 22 | 3 | 3 | 0 | 2 | 6 | 0 | 36 |
| 8:00 - 9:00 | 36 | 5 | 7 | 0 | 3 | 17 | 0 | 68 |
| 9:00 - 10:00 | 37 | 3 | 6 | 0 | 5 | 26 | 0 | 77 |
| 10:00 - 11:00 | 69 | 9 | 9 | 0 | 8 | 24 | 0 | 119 |
| 11:00 - 12:00 | 70 | 7 | 6 | 0 | 2 | 24 | 1 | 110 |
| 12:00 - 13:00 | 63 | 8 | 7 | 0 | 1 | 29 | 0 | 108 |
| 13:00 - 14:00 | 65 | 6 | 10 | 0 | 2 | 23 | 1 | 107 |
| 14:00 - 15:00 | 48 | 10 | 5 | 0 | 1 | 21 | 1 | 86 |
| 15:00 - 16:00 | 62 | 9 | 7 | 0 | 3 | 20 | 1 | 102 |
| 16:00 - 17:00 | 74 | 5 | 8 | 0 | 5 | 40 | 0 | 132 |
| 17:00 - 18:00 | 85 | 8 | 7 | 0 | 7 | 33 | 0 | 140 |
| 18:00 - 19:00 | 66 | 12 | 7 | 0 | 4 | 16 | 0 | 105 |
| 19:00 - 20:00 | 53 | 9 | 6 | 0 | 7 | 25 | 0 | 100 |
| 20:00 - 21:00 | 46 | 8 | 3 | 0 | 0 | 20 | 0 | 77 |
| 21:00 - 22:00 | 57 | 5 | 0 | 0 | 2 | 10 | 1 | 75 |
| Total | 864 | 109 | 92 | 0 | 53 | 336 | 5 | 1,459 |

**Appendix Table 5.1.20 Traffic Volume at Survey Point (CL-1)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 69 | 6 | 75 | 0 | 2 | 7 | 1 | 160 |
| 7:00 - 8:00 | 130 | 13 | 35 | 0 | 4 | 17 | 0 | 199 |
| 8:00 - 9:00 | 225 | 17 | 45 | 0 | 6 | 31 | 1 | 325 |
| 9:00 - 10:00 | 294 | 22 | 25 | 0 | 19 | 69 | 9 | 438 |
| 10:00 - 11:00 | 360 | 51 | 28 | 0 | 16 | 96 | 8 | 559 |
| 11:00 - 12:00 | 391 | 66 | 38 | 0 | 22 | 92 | 12 | 621 |
| 12:00 - 13:00 | 357 | 51 | 33 | 0 | 19 | 85 | 18 | 563 |
| 13:00 - 14:00 | 366 | 42 | 41 | 0 | 8 | 83 | 10 | 550 |
| 14:00 - 15:00 | 392 | 40 | 37 | 0 | 22 | 83 | 18 | 592 |
| 15:00 - 16:00 | 332 | 43 | 38 | 0 | 18 | 81 | 43 | 555 |
| 16:00 - 17:00 | 363 | 58 | 34 | 0 | 15 | 73 | 28 | 571 |
| 17:00 - 18:00 | 297 | 38 | 31 | 0 | 7 | 61 | 15 | 449 |
| 18:00 - 19:00 | 226 | 36 | 26 | 0 | 11 | 39 | 7 | 345 |
| 19:00 - 20:00 | 187 | 26 | 34 | 0 | 7 | 46 | 9 | 309 |
| 20:00 - 21:00 | 200 | 13 | 24 | 0 | 5 | 34 | 4 | 280 |
| 21:00 - 22:00 | 162 | 17 | 15 | 0 | 3 | 35 | 3 | 235 |
| Total | 4,351 | 539 | 559 | 0 | 184 | 932 | 186 | 6,751 |

**Appendix Table 5.1.21 Traffic Volume at Survey Point (CL-2)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 41 | 9 | 18 | 9 | 0 | 2 | 0 | 79 |
| 7:00 - 8:00 | 89 | 11 | 49 | 21 | 3 | 20 | 0 | 193 |
| 8:00 - 9:00 | 186 | 34 | 57 | 22 | 8 | 53 | 0 | 360 |
| 9:00 - 10:00 | 297 | 47 | 50 | 29 | 7 | 82 | 1 | 513 |
| 10:00 - 11:00 | 386 | 63 | 63 | 21 | 12 | 73 | 0 | 618 |
| 11:00 - 12:00 | 375 | 47 | 50 | 20 | 20 | 76 | 0 | 588 |
| 12:00 - 13:00 | 294 | 44 | 46 | 27 | 16 | 57 | 1 | 485 |
| 13:00 - 14:00 | 236 | 43 | 53 | 22 | 13 | 66 | 0 | 433 |
| 14:00 - 15:00 | 255 | 50 | 52 | 18 | 8 | 58 | 4 | 445 |
| 15:00 - 16:00 | 273 | 40 | 61 | 11 | 16 | 81 | 1 | 483 |
| 16:00 - 17:00 | 265 | 36 | 65 | 13 | 18 | 61 | 2 | 460 |
| 17:00 - 18:00 | 294 | 42 | 69 | 23 | 24 | 76 | 6 | 534 |
| 18:00 - 19:00 | 268 | 40 | 67 | 20 | 11 | 55 | 1 | 462 |
| 19:00 - 20:00 | 294 | 41 | 54 | 18 | 6 | 49 | 1 | 463 |
| 20:00 - 21:00 | 282 | 49 | 46 | 21 | 8 | 38 | 2 | 446 |
| 21:00 - 22:00 | 258 | 57 | 45 | 11 | 2 | 33 | 1 | 407 |
| Total | 4,093 | 653 | 845 | 306 | 172 | 880 | 20 | 6,969 |

**Appendix Table 5.1.22 Traffic Volume at Survey Point (CL-3)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 62 | 16 | 24 | 0 | 10 | 17 | 0 | 129 |
| 7:00 - 8:00 | 190 | 46 | 57 | 0 | 19 | 43 | 0 | 355 |
| 8:00 - 9:00 | 265 | 72 | 43 | 0 | 22 | 49 | 2 | 453 |
| 9:00 - 10:00 | 197 | 43 | 43 | 0 | 22 | 39 | 2 | 346 |
| 10:00 - 11:00 | 241 | 61 | 40 | 0 | 41 | 35 | 0 | 418 |
| 11:00 - 12:00 | 242 | 30 | 44 | 0 | 31 | 37 | 2 | 386 |
| 12:00 - 13:00 | 250 | 36 | 35 | 0 | 21 | 59 | 0 | 401 |
| 13:00 - 14:00 | 231 | 60 | 50 | 0 | 44 | 54 | 2 | 441 |
| 14:00 - 15:00 | 192 | 46 | 67 | 0 | 45 | 72 | 0 | 422 |
| 15:00 - 16:00 | 247 | 51 | 41 | 0 | 26 | 44 | 0 | 409 |
| 16:00 - 17:00 | 265 | 49 | 37 | 0 | 56 | 60 | 0 | 467 |
| 17:00 - 18:00 | 268 | 67 | 69 | 0 | 46 | 84 | 0 | 534 |
| 18:00 - 19:00 | 252 | 69 | 58 | 0 | 49 | 80 | 1 | 509 |
| 19:00 - 20:00 | 258 | 88 | 54 | 0 | 45 | 71 | 1 | 517 |
| 20:00 - 21:00 | 247 | 60 | 38 | 0 | 56 | 59 | 2 | 462 |
| 21:00 - 22:00 | 216 | 46 | 36 | 0 | 52 | 46 | 3 | 399 |
| Total | 3,623 | 840 | 736 | 0 | 585 | 849 | 15 | 6,648 |

**Appendix Table 5.1.23 Traffic Volume at Survey Point (CL-4)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 16 | 1 | 6 | 0 | 1 | 3 | 0 | 27 |
| 7:00 - 8:00 | 32 | 4 | 19 | 0 | 2 | 3 | 0 | 60 |
| 8:00 - 9:00 | 68 | 7 | 18 | 0 | 4 | 9 | 1 | 107 |
| 9:00 - 10:00 | 53 | 11 | 20 | 0 | 6 | 3 | 1 | 94 |
| 10:00 - 11:00 | 80 | 11 | 18 | 0 | 3 | 21 | 0 | 133 |
| 11:00 - 12:00 | 65 | 10 | 15 | 0 | 7 | 20 | 3 | 120 |
| 12:00 - 13:00 | 67 | 4 | 18 | 0 | 4 | 12 | 0 | 105 |
| 13:00 - 14:00 | 64 | 5 | 14 | 0 | 2 | 15 | 1 | 101 |
| 14:00 - 15:00 | 50 | 5 | 18 | 0 | 3 | 20 | 0 | 96 |
| 15:00 - 16:00 | 75 | 5 | 14 | 0 | 5 | 25 | 0 | 124 |
| 16:00 - 17:00 | 58 | 7 | 9 | 0 | 2 | 28 | 2 | 106 |
| 17:00 - 18:00 | 95 | 8 | 15 | 0 | 2 | 28 | 1 | 149 |
| 18:00 - 19:00 | 99 | 11 | 13 | 0 | 5 | 19 | 0 | 147 |
| 19:00 - 20:00 | 106 | 13 | 12 | 0 | 3 | 21 | 2 | 157 |
| 20:00 - 21:00 | 87 | 10 | 7 | 0 | 3 | 11 | 0 | 118 |
| 21:00 - 22:00 | 125 | 8 | 9 | 0 | 1 | 13 | 1 | 157 |
| Total | 1,140 | 120 | 225 | 0 | 53 | 251 | 12 | 1,801 |

**Appendix Table 5.1.24 Traffic Volume at Survey Point (CL-5)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 120 | 7 | 2 | 0 | 1 | 2 | 0 | 132 |
| 7:00 - 8:00 | 257 | 11 | 14 | 0 | 9 | 5 | 0 | 296 |
| 8:00 - 9:00 | 495 | 29 | 11 | 0 | 14 | 27 | 0 | 576 |
| 9:00 - 10:00 | 620 | 53 | 3 | 0 | 24 | 33 | 0 | 733 |
| 10:00 - 11:00 | 604 | 37 | 7 | 0 | 16 | 23 | 0 | 687 |
| 11:00 - 12:00 | 527 | 45 | 1 | 0 | 14 | 33 | 0 | 620 |
| 12:00 - 13:00 | 557 | 32 | 5 | 0 | 28 | 24 | 0 | 646 |
| 13:00 - 14:00 | 521 | 29 | 5 | 0 | 20 | 22 | 0 | 597 |
| 14:00 - 15:00 | 575 | 47 | 4 | 0 | 19 | 29 | 0 | 674 |
| 15:00 - 16:00 | 441 | 22 | 1 | 0 | 21 | 30 | 0 | 515 |
| 16:00 - 17:00 | 505 | 29 | 6 | 0 | 16 | 29 | 0 | 585 |
| 17:00 - 18:00 | 550 | 29 | 13 | 0 | 11 | 18 | 0 | 621 |
| 18:00 - 19:00 | 686 | 47 | 8 | 0 | 19 | 19 | 0 | 779 |
| 19:00 - 20:00 | 612 | 34 | 3 | 0 | 14 | 11 | 0 | 674 |
| 20:00 - 21:00 | 519 | 30 | 2 | 0 | 19 | 15 | 0 | 585 |
| 21:00 - 22:00 | 543 | 32 | 2 | 0 | 14 | 9 | 0 | 600 |
| Total | 8,132 | 513 | 87 | 0 | 259 | 329 | 0 | 9,320 |

**Appendix Table 5.1.25 Traffic Volume at Survey Point (CL-6)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 255 | 9 | 18 | 3 | 0 | 3 | 0 | 288 |
| 7:00 - 8:00 | 331 | 38 | 57 | 56 | 12 | 6 | 0 | 500 |
| 8:00 - 9:00 | 738 | 39 | 89 | 48 | 6 | 9 | 1 | 930 |
| 9:00 - 10:00 | 632 | 53 | 56 | 40 | 15 | 10 | 0 | 806 |
| 10:00 - 11:00 | 826 | 65 | 44 | 45 | 27 | 10 | 0 | 1,017 |
| 11:00 - 12:00 | 716 | 80 | 54 | 46 | 29 | 14 | 0 | 939 |
| 12:00 - 13:00 | 727 | 110 | 99 | 49 | 64 | 24 | 0 | 1,073 |
| 13:00 - 14:00 | 638 | 90 | 72 | 56 | 45 | 5 | 0 | 906 |
| 14:00 - 15:00 | 497 | 50 | 47 | 43 | 18 | 8 | 0 | 663 |
| 15:00 - 16:00 | 476 | 67 | 51 | 37 | 57 | 13 | 0 | 701 |
| 16:00 - 17:00 | 803 | 72 | 57 | 31 | 41 | 14 | 0 | 1,018 |
| 17:00 - 18:00 | 741 | 66 | 66 | 42 | 27 | 13 | 0 | 955 |
| 18:00 - 19:00 | 888 | 79 | 66 | 34 | 48 | 13 | 0 | 1,128 |
| 19:00 - 20:00 | 893 | 79 | 49 | 23 | 47 | 3 | 0 | 1,094 |
| 20:00 - 21:00 | 872 | 72 | 67 | 22 | 47 | 6 | 0 | 1,086 |
| 21:00 - 22:00 | 838 | 61 | 71 | 26 | 40 | 4 | 0 | 1,040 |
| Total | 10,871 | 1,030 | 963 | 601 | 523 | 155 | 1 | 14,144 |

**Appendix Table 5.1.26 Traffic Volume at Survey Point (CL-7)**

| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 125 | 14 | 13 | 4 | 3 | 6 | 0 | 165 |
| 7:00 - 8:00 | 291 | 42 | 24 | 20 | 12 | 16 | 0 | 405 |
| 8:00 - 9:00 | 593 | 129 | 21 | 15 | 26 | 69 | 0 | 853 |
| 9:00 - 10:00 | 894 | 310 | 22 | 17 | 35 | 73 | 0 | 1,351 |
| 10:00 - 11:00 | 992 | 383 | 35 | 14 | 35 | 73 | 0 | 1,532 |
| 11:00 - 12:00 | 973 | 418 | 39 | 14 | 34 | 65 | 0 | 1,543 |
| 12:00 - 13:00 | 1,073 | 432 | 26 | 17 | 68 | 79 | 0 | 1,695 |
| 13:00 - 14:00 | 847 | 318 | 26 | 20 | 49 | 59 | 0 | 1,319 |
| 14:00 - 15:00 | 914 | 273 | 31 | 13 | 36 | 62 | 0 | 1,329 |
| 15:00 - 16:00 | 856 | 334 | 37 | 15 | 63 | 97 | 0 | 1,402 |
| 16:00 - 17:00 | 859 | 374 | 29 | 16 | 57 | 67 | 0 | 1,402 |
| 17:00 - 18:00 | 946 | 388 | 22 | 17 | 51 | 76 | 0 | 1,500 |
| 18:00 - 19:00 | 1,067 | 470 | 24 | 12 | 46 | 61 | 0 | 1,680 |
| 19:00 - 20:00 | 851 | 323 | 26 | 11 | 39 | 51 | 0 | 1,301 |
| 20:00 - 21:00 | 770 | 179 | 10 | 8 | 27 | 46 | 0 | 1,040 |
| 21:00 - 22:00 | 684 | 117 | 11 | 6 | 29 | 48 | 0 | 895 |
| Total | 12,735 | 4,504 | 396 | 219 | 610 | 948 | 0 | 19,412 |

**Appendix Table 5.1.27 Traffic Volume at Survey Point (CL-8)**

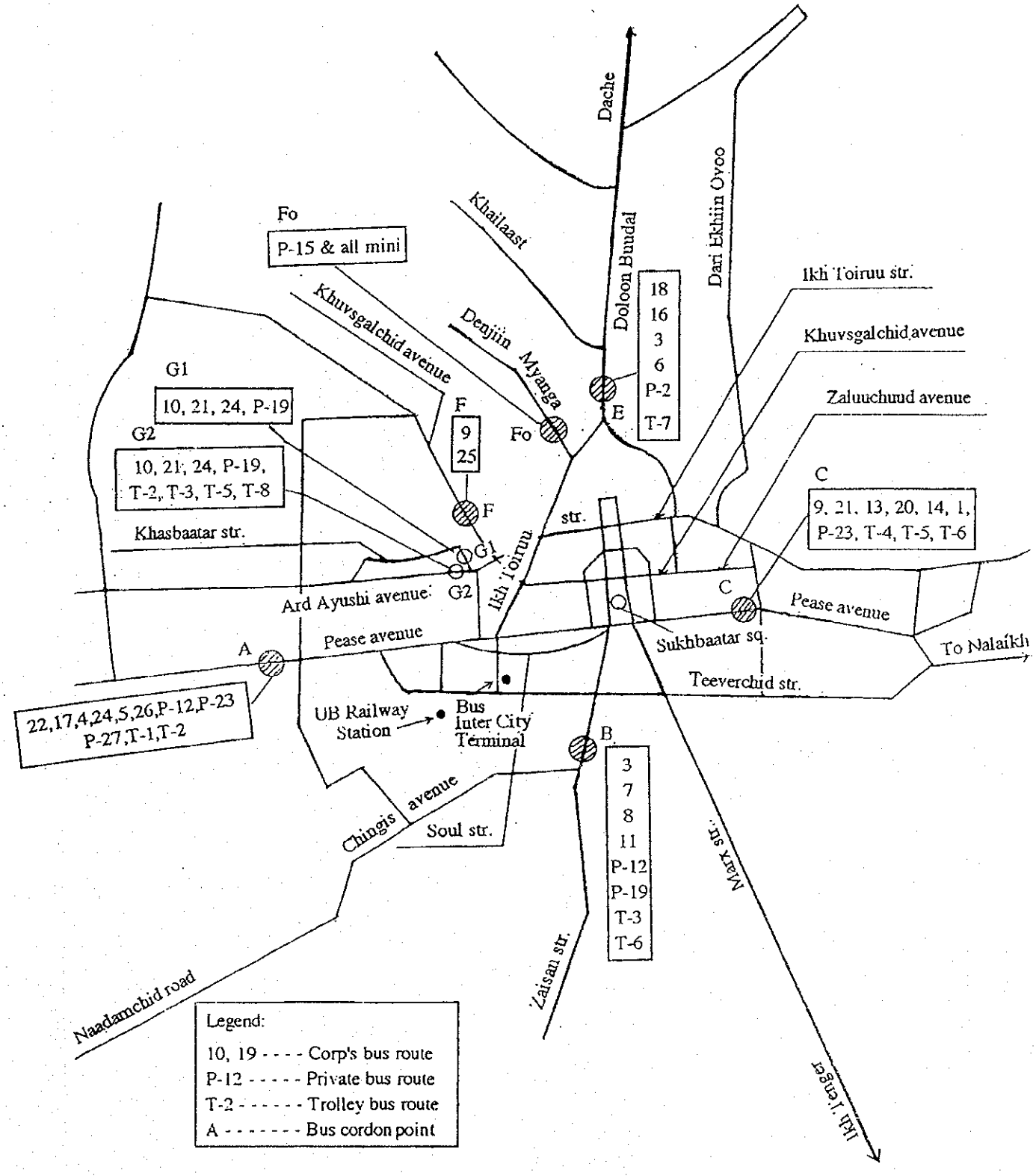
| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 88 | 9 | 16 | 0 | 1 | 2 | 0 | 116 |
| 7:00 - 8:00 | 169 | 15 | 57 | 0 | 3 | 20 | 0 | 264 |
| 8:00 - 9:00 | 372 | 60 | 83 | 0 | 10 | 36 | 1 | 562 |
| 9:00 - 10:00 | 769 | 113 | 74 | 0 | 21 | 55 | 1 | 1,033 |
| 10:00 - 11:00 | 1,064 | 171 | 71 | 0 | 40 | 73 | 4 | 1,423 |
| 11:00 - 12:00 | 934 | 188 | 65 | 0 | 46 | 86 | 0 | 1,319 |
| 12:00 - 13:00 | 903 | 143 | 72 | 0 | 49 | 59 | 6 | 1,232 |
| 13:00 - 14:00 | 936 | 152 | 79 | 0 | 36 | 71 | 1 | 1,275 |
| 14:00 - 15:00 | 1,029 | 159 | 80 | 0 | 54 | 85 | 1 | 1,408 |
| 15:00 - 16:00 | 907 | 141 | 74 | 0 | 50 | 71 | 1 | 1,244 |
| 16:00 - 17:00 | 933 | 125 | 66 | 0 | 39 | 68 | 0 | 1,231 |
| 17:00 - 18:00 | 831 | 104 | 56 | 0 | 38 | 52 | 0 | 1,081 |
| 18:00 - 19:00 | 909 | 142 | 73 | 0 | 37 | 82 | 0 | 1,243 |
| 19:00 - 20:00 | 865 | 106 | 57 | 0 | 25 | 51 | 0 | 1,104 |
| 20:00 - 21:00 | 718 | 76 | 49 | 0 | 26 | 28 | 0 | 897 |
| 21:00 - 22:00 | 554 | 36 | 43 | 0 | 9 | 18 | 0 | 660 |
| Total | 11,981 | 1,740 | 1,015 | 0 | 484 | 857 | 15 | 16,092 |

**Appendix Table 5.1.28 Traffic Volume at Survey Point (CL-9)**

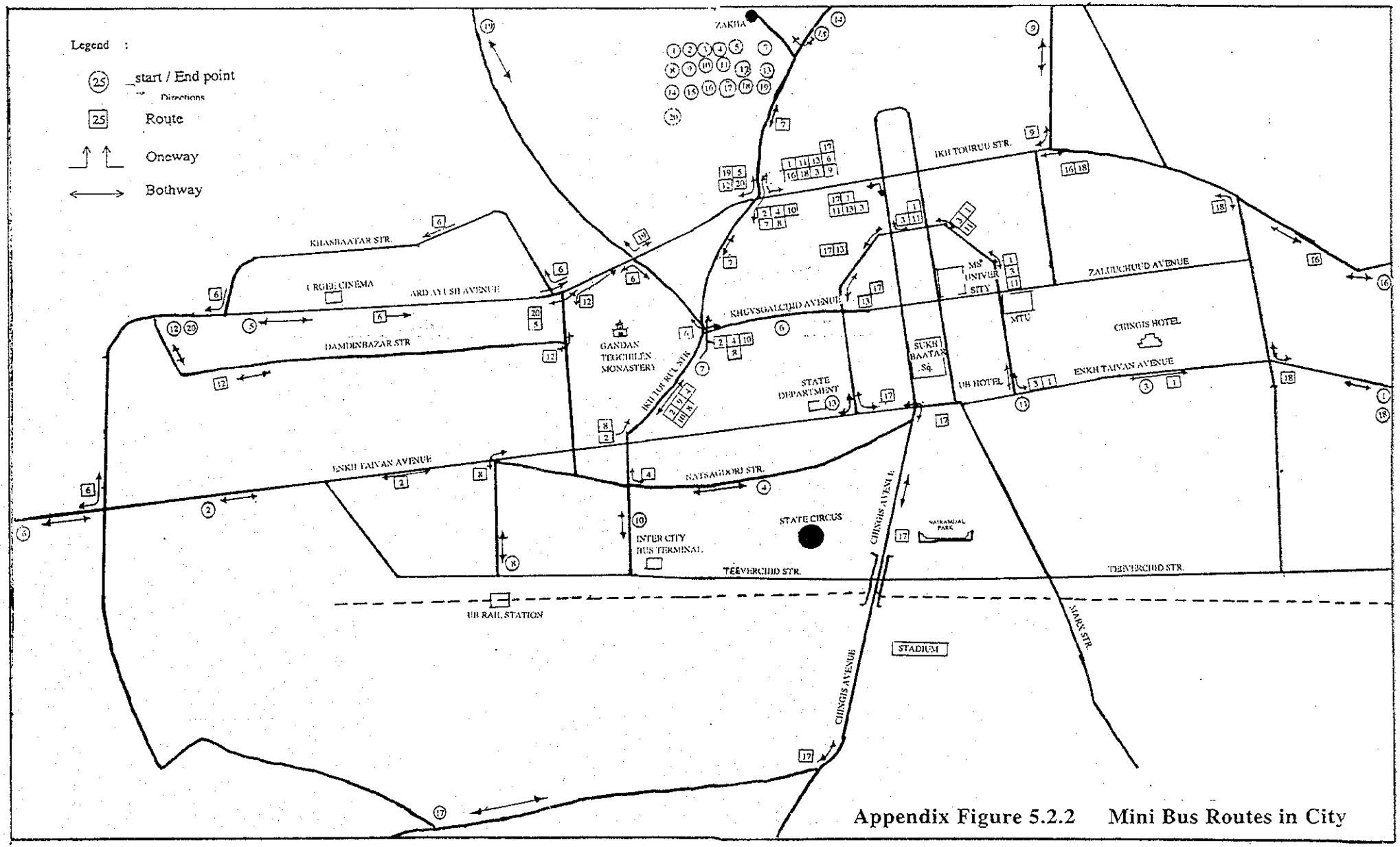
| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 126 | 27 | 25 | 0 | 1 | 2 | 0 | 181 |
| 7:00 - 8:00 | 201 | 23 | 43 | 0 | 5 | 12 | 0 | 284 |
| 8:00 - 9:00 | 229 | 33 | 52 | 0 | 6 | 9 | 0 | 329 |
| 9:00 - 10:00 | 240 | 33 | 51 | 0 | 13 | 27 | 0 | 364 |
| 10:00 - 11:00 | 268 | 39 | 47 | 0 | 6 | 21 | 1 | 382 |
| 11:00 - 12:00 | 230 | 43 | 38 | 0 | 9 | 37 | 0 | 357 |
| 12:00 - 13:00 | 205 | 39 | 46 | 0 | 7 | 13 | 0 | 310 |
| 13:00 - 14:00 | 211 | 34 | 45 | 0 | 9 | 18 | 0 | 317 |
| 14:00 - 15:00 | 229 | 35 | 46 | 0 | 10 | 26 | 0 | 346 |
| 15:00 - 16:00 | 212 | 45 | 46 | 0 | 7 | 19 | 0 | 329 |
| 16:00 - 17:00 | 243 | 48 | 46 | 0 | 5 | 19 | 1 | 362 |
| 17:00 - 18:00 | 266 | 41 | 47 | 0 | 7 | 23 | 0 | 384 |
| 18:00 - 19:00 | 250 | 42 | 46 | 0 | 9 | 15 | 0 | 362 |
| 19:00 - 20:00 | 277 | 50 | 48 | 0 | 11 | 21 | 0 | 407 |
| 20:00 - 21:00 | 243 | 40 | 37 | 0 | 2 | 16 | 0 | 338 |
| 21:00 - 22:00 | 152 | 20 | 18 | 0 | 4 | 6 | 0 | 200 |
| Total | 3,582 | 592 | 681 | 0 | 111 | 284 | 2 | 5,252 |

**Appendix Table 5.1.29 Traffic Volume at Survey Point (CL-10)**

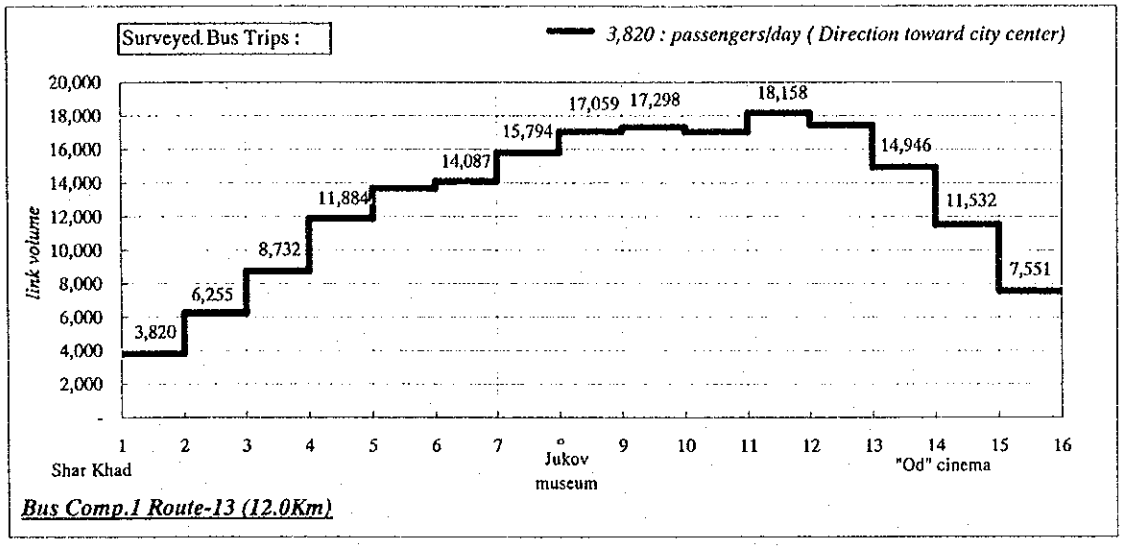
| | Vehicle Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time (hrs) | Car | Microbus | Bus | Trolley Bus | Small Truck | Ordinary Truck | Trailer | Total |
| 6:00 - 7:00 | 16 | 0 | 7 | 0 | 0 | 2 | 1 | 26 |
| 7:00 - 8:00 | 13 | 3 | 15 | 0 | 1 | 3 | 0 | 35 |
| 8:00 - 9:00 | 59 | 10 | 21 | 0 | 1 | 1 | 0 | 92 |
| 9:00 - 10:00 | 70 | 4 | 21 | 0 | 4 | 3 | 5 | 107 |
| 10:00 - 11:00 | 91 | 2 | 14 | 0 | 0 | 3 | 0 | 110 |
| 11:00 - 12:00 | 105 | 10 | 12 | 0 | 1 | 8 | 7 | 143 |
| 12:00 - 13:00 | 108 | 10 | 19 | 0 | 0 | 8 | 5 | 150 |
| 13:00 - 14:00 | 149 | 12 | 21 | 0 | 0 | 4 | 4 | 190 |
| 14:00 - 15:00 | 141 | 9 | 27 | 0 | 0 | 3 | 1 | 181 |
| 15:00 - 16:00 | 137 | 8 | 13 | 0 | 1 | 0 | 0 | 159 |
| 16:00 - 17:00 | 159 | 7 | 16 | 0 | 0 | 7 | 2 | 191 |
| 17:00 - 18:00 | 160 | 3 | 21 | 0 | 1 | 7 | 3 | 195 |
| 18:00 - 19:00 | 126 | 5 | 17 | 0 | 0 | 12 | 2 | 162 |
| 19:00 - 20:00 | 135 | 7 | 14 | 0 | 1 | 5 | 1 | 163 |
| 20:00 - 21:00 | 151 | 7 | 12 | 0 | 1 | 6 | 1 | 178 |
| 21:00 - 22:00 | 155 | 16 | 10 | 0 | 0 | 6 | 0 | 187 |
| Total | 1,775 | 113 | 260 | 0 | 11 | 78 | 32 | 2,269 |

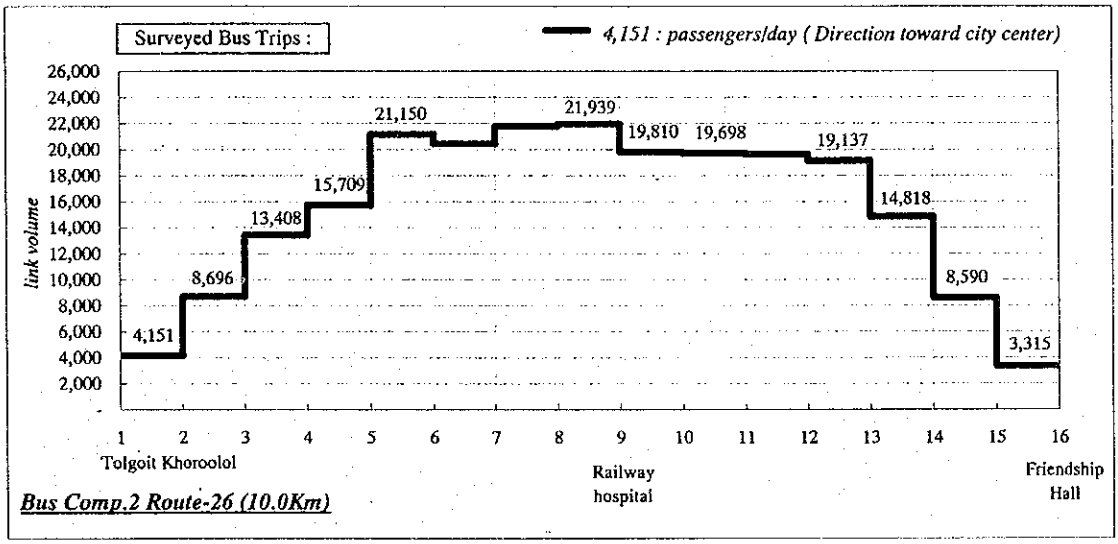


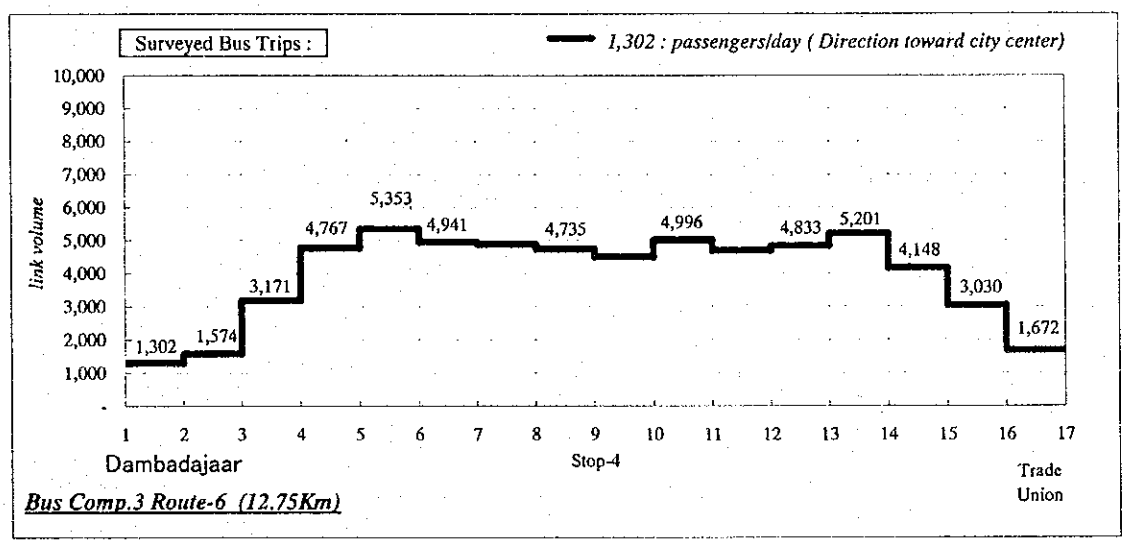

**Appendix Figure 5.2.1 Cordon Points of Survey for Buses and Boarded Passengers**



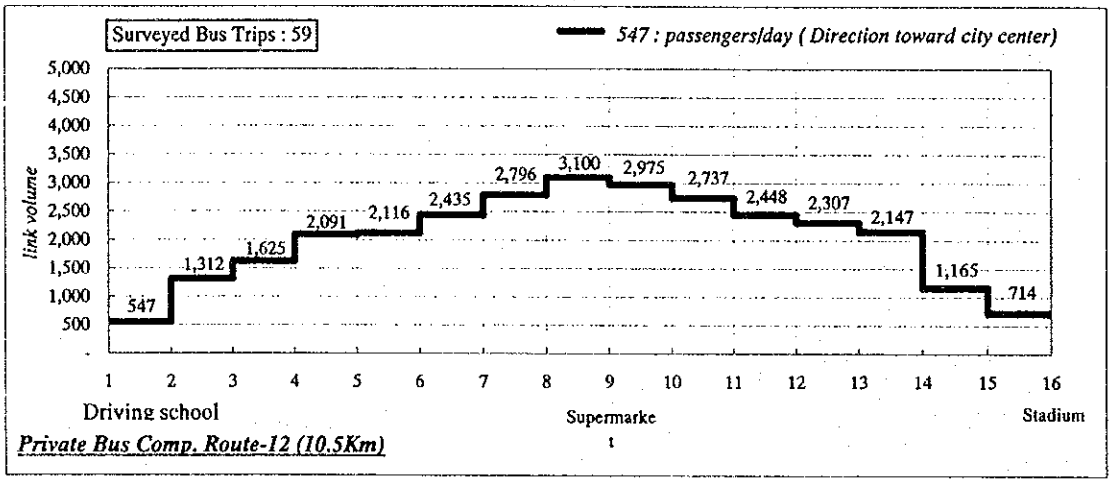

**Appendix Figure 5.2.2 Mini Bus Routes in City**

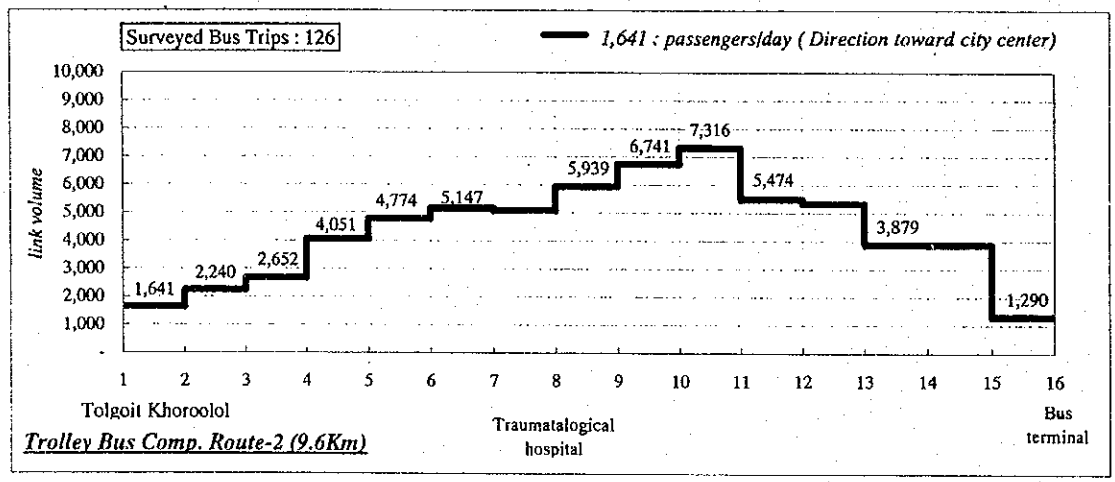



**Appendix Figure 5.2.3 (1) Passenger Volume by Bus Stop, 1998**




Appendix Figure 5.2.3 (2) Passenger Volume by Bus Stop, 1998

## Appendix Table 5.2.1 Buses on Route and Trips (In City)

| No | Company Name | No | Route Name | Distance km | Working Day | | | | | Holiday | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | AM 8:00 | 14:00 | PM 19:00 | 21:00 | Prog. trips | AM 8:00 | 14:00 | PM 19:00 | 21:00 | Prog. trips |
| 1 | BC-1 | 3 | Power Station-3 ~ 7 | 27.5 | 10 | 6 | 6 | 5 | 106.5 | 7 | 5 | 6 | 4 | 70.5 |
| 2 | | 7 | Zaisan | 16.0 | 6 | 4 | 4 | 4 | 107.5 | 4 | 4 | 4 | 4 | 71.0 |
| 3 | | 9 | Zuragt ~ Sansar | 15.5 | 8 | 5 | 5 | 4 | 127.0 | 6 | 5 | 6 | 4 | 100.0 |
| 4 | | 11 | Airport ~ Ard cinema | 38.0 | 8 | 6 | 6 | 6 | 87.0 | 4 | 4 | 4 | 4 | 46.0 |
| 5 | | 13 | Sharkhad ~ "Od"cinema | 24.0 | 20 | 16 | 16 | 10 | 239.0 | 16 | 11 | 14 | 10 | 181.5 |
| 6 | | 16 | Khailaast ~ Ped. Univ. | 18.0 | 10 | 7 | 7 | 6 | 164.5 | 8 | 7 | 8 | 6 | 124.0 |
| 7 | | 18 | Chingeltei ~ Ped. | 23.5 | 8 | 6 | 6 | 5 | 107.0 | 6 | 5 | 5 | 5 | 76.5 |
| 8 | | 22 | Airport ~ Yalalt cinema | 39.5 | 6 | 6 | 6 | 4 | 57.5 | 4 | 3 | 4 | 3 | 38.5 |
| 9 | | 25 | Bayankhoshuu ~ | 18.0 | 8 | 7 | 7 | 6 | 135.0 | 7 | 6 | 7 | 5 | 100.0 |
| Sub total | | | | 220. | 84 | 63 | 63 | 50 | 1131.0 | 62 | 50 | 58 | 45 | 808.0 |
| 10 | BC-2 | 4 | Baruun naran ~ | 29.0 | 16 | 12 | 14 | 10 | 169.0 | 13 | 8 | 10 | 8 | 144.5 |
| 11 | | 5 | Bayankhoshuu ~ Sup. | 22.4 | 8 | 6 | 7 | 6 | 100.0 | 6 | 5 | 6 | 4 | 74.0 |
| 12 | | 8 | Yarmag ~ Ped. Univ | 28.8 | 16 | 10 | 12 | 10 | 208.0 | 13 | 8 | 10 | 8 | 156.5 |
| 13 | | 10 | Baruun khuree ~ Sansar | 16.0 | 12 | 10 | 12 | 8 | 225.0 | 10 | 7 | 8 | 6 | 163.0 |
| 14 | | 17 | Orbit ~ Supermarket-1 | 24.0 | 5 | 4 | 5 | 3 | 61.5 | 5 | 4 | 5 | 4 | 55.0 |
| 15 | | 24 | Power Station-4 ~ Yalalt | 28.0 | 5 | 4 | 4 | 3 | 55.0 | 5 | 3 | 4 | 3 | 51.0 |
| 16 | | 26 | Tolgoit khoroolol ~ Ped. | 20.0 | 22 | 14 | 22 | 12 | 345.0 | 18 | 13 | 15 | 10 | 265.0 |
| Sub total | | | | 168. | 84 | 60 | 76 | 52 | 1163.5 | 70 | 48 | 58 | 43 | 909.0 |
| 17 | BC-3 | 1 | Ulaankhuaran ~ TUPalace | 16.5 | 6 | 4 | 4 | 3 | 100.0 | 5 | 3 | 4 | 2 | 75.0 |
| 18 | | 6 | Dambadarjaa ~ TUPalace | 25.5 | 10 | 7 | 8 | 5 | 119.0 | 7 | 6 | 6 | 5 | 78.5 |
| 19 | | 14 | Uliastai ~ Sukhbaatar | 22.0 | 6 | 4 | 5 | 3 | 78.0 | 5 | 3 | 4 | 3 | 61.0 |
| 20 | | 20 | Dari ekhi ~ Railway | 26.0 | 10 | 7 | 8 | 5 | 131.0 | 7 | 6 | 6 | 6 | 88.0 |
| 21 | | 21 | Baruun khuree ~ | 17.5 | 10 | 6 | 7 | 4 | 159.5 | 6 | 4 | 5 | 4 | 91.5 |
| Sub total | | | | 107. | 42 | 28 | 32 | 20 | 587.5 | 30 | 22 | 25 | 20 | 394 |
| 22 | TBC | 1 | Brick Plant ~ TUPalace | 18.2 | 12 | 10 | 10 | 5 | 165.0 | 11 | 8 | 8 | 4 | 130.5 |
| 23 | | 2 | Tolgoit khoroolol ~ | 19.2 | 12 | 10 | 10 | 6 | 145.0 | 10 | 8 | 8 | 4 | 111.5 |
| 24 | | 3 | Baruun Khuree~Veh. | 17.9 | 8 | 4 | 4 | 3 | 94.0 | 6 | 3 | 3 | 3 | 71.0 |
| 25 | | 4 | Botanical garden ~ | 20.8 | 15 | 10 | 10 | 5 | 157.5 | 15 | 10 | 10 | 6 | 151.5 |
| 26 | | 5 | BaruunKhuree ~ Officer's | 22.0 | 10 | 8 | 8 | 4 | 112.0 | 10 | 7 | 7 | 4 | 130.0 |
| 27 | | 6 | Veh.Repair Ent. ~Officer's | 17.5 | 8 | 5 | 5 | 3 | 114.5 | 4 | 2 | 2 | 2 | 56.5 |
| 28 | | 7 | Doloon buudal ~ Raiway | 16.6 | 8 | 5 | 5 | 3 | 101.5 | 9 | 7 | 7 | 4 | 113.0 |
| 29 | | 8 | BaruunKhuree ~ Officer's | 19.0 | 12 | 8 | 8 | 4 | 140.5 | 10 | 8 | 8 | 4 | 110.0 |
| Sub total | | | | 151. | 85 | 60 | 60 | 33 | 1030.0 | 75 | 53 | 53 | 31 | 874.0 |
| Total of Government Enterprise | | | | 646. | 295 | 211 | 231 | 155 | 3912 | 237 | 173 | 194 | 139 | 2985 |
| 30 | Urga | 19 | Power Station-3 ~ Baruun | 16.0 | 12 | 8 | 8 | 8 | 216 | 6 | 6 | 6 | 6 | 110 |
| 31 | MZT | 15 | Denjiin myanga ~ Railway | 13.0 | 8 | | 6 | 3 | 98.5 | 6 | | 6 | 3 | 60 |
| 32 | MZT | 27 | Songinokhairkhan ~ SB | 28.3 | 4 | | 4 | | 47 | 2 | | 2 | | 20 |
| 33 | Burd | 2 | Doloon buudal ~ Sharkhad | 32.0 | 4 | | 4 | | 36.5 | 5 | | 5 | | 41.5 |
| 34 | Saru | 12 | Driving School ~ Stadium | 21.0 | 8 | | 8 | 4 | 86 | 4 | | 4 | 3 | 46 |
| 35 | KhA | 23 | Bayankhoshuu ~ | 36.0 | 16 | 16 | 16 | 10 | 125 | 10 | 8 | 8 | 6 | 74 |
| Total of Private Companies | | | | 146. | 52 | 24 | 46 | 25 | 609 | 33 | 14 | 31 | 18 | 351.5 |
| Total | | | | 793. | 347 | 235 | 277 | 180 | 4521 | 270 | 187 | 225 | 157 | 3336.5 |

Source: Transport Coordination Dept.(May, 1998)

## Appendix Table 5.2.2 Minibus Passengers

| No. | Company | Name of Route | km | Bus trips a weekday | Passengers a weekday | Pss-km a weekday |
|---|---|---|---|---|---|---|
| 1 | Eriin khiimori | Market of Bayanzurkh dist.~Zakh | 16 | 120 | 2400 | 38400 |
| 2 | | Khoroolol-10 ~ Zakh | 11 | 68 | 1360 | 14960 |
| 3 | Toson | Khoroolol-13 ~ Zakh | 16 | 170 | 3400 | 54400 |
| 4 | Sutai Buyant | Market Dalai eji ~ Zakh | 10 | 137 | 2740 | 27400 |
| 5 | | Khoroolol-3,4 ~ Zakh | 8 | 186 | 3720 | 37200 |
| 6 | | Mark "hangai"~Kh-lol-3,4~Yalalt | 20.2 | 90 | 1800 | 36360 |
| 7 | Munkhdari | Supermarket-1 ~ Zakh | 6 | 102 | 2040 | 12240 |
| 8 | Zendmene | Railway Station ~ Zakh | 15 | 36 | 720 | 10800 |
| 9 | Dul trade | Khailaast ~ Zakh | 8 | 120 | 2400 | 19200 |
| 10 | Mungun ochi | Bus Terminal ~ Zakh | 10 | 132 | 2640 | 26400 |
| 11 | Uran Batjav | Hospital No.1 ~ Zakh | 10 | 50 | 1000 | 10000 |
| 12 | | Traum Hosp~Damdinbazar str ~Zakh | 10 | 90 | 1800 | 18000 |
| 13 | Munkh tas | State Department Store ~ Zakh | 8 | 54 | 1080 | 8640 |
| 14 | Altan tsugts | Dambadarjaa ~ Zakh | 14 | 80 | 1600 | 22400 |
| 15 | | Chingeltei ~ Zakh | 12 | 112 | 2240 | 26880 |
| 16 | EBIA | Tsaiz market ~ Zakh | 14 | 90 | 1800 | 25200 |
| 17 | MZTEKh | Vehicle Repair Enterprise ~ Zakh | 16 | 120 | 2400 | 38400 |
| 18 | | Officer's Palace~Zakh | 18 | 30 | 600 | 10800 |
| 19 | Tumnii negdel | Bayankhoshuu ~ Zakh | 16 | 210 | 4200 | 67200 |
| 20 | | Traum Hosp~Ayush str ~Zakh | 12 | 50 | 1000 | 12000 |
| TOTAL | | | 250.2 | 2047 | 40940 | 516880 |

Source: TCD (May, 1998)
Notes: Assuming 10 person in average on both ways
All mini buses are to/from Central Zakh

## Appendix Table 5.2.3 Passengers to Satellite Villages

| No. | Company | Name of Route | km | Bus trips a weekday | Passengers a weekday | Pass-km a weekday |
|---|---|---|---|---|---|---|
| 1 | BC-3 | Kinostudio – Gachuurt | 4 | 6 | 360 | 14400 |
| 2 | Urgamal-ZM | Vehicle repair enterprise – Ulziit | 5 | 2 | 120 | 6000 |
| 3 | Sutai Buyant | Airport – Biocombinat | 1 | 60 | 3600 | 54000 |
| 4 | MKhAEJNKh | Officer's Palace – Khonkhor (Nalaikh) | 4 | 3 | 180 | 8010 |
| 5 | Mon-kara | Intercity Bus Terminal – Poultry Farm | 7 | 4 | 240 | 17760 |
| 6 | Mon. Sh. Trans | UB – Nalaikh – UB | 7 | 22 | 1320 | 9504 |
| Total | | | 29 | 97 | 5820 | 109674 |

Source: TCD (May 1998)
Notes: The average passengers per bus are assumed at 30 persons per bus on both ways

## Appendix Table 5.2.4 Inter-city Buses in 1997

| No. | Route Name | Company Name | Distance km | Nos of round trips | One way fee per person | Nos of Passenger | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | All | In which | |
| | | | | | | | From UB | To UB |
| 1 | UB~Tsetserleg khot (Arkh)~UB | Mongol Shuudan Tra | 493 | 225 | 5,920 | 8,554 | 5,132 | 3,422 |
| 2 | UB~Battsengel (Arkh)~UB | Mungun Murun | 393 | 45 | 4,720 | 1,734 | 1,041 | 693 |
| 3 | UB~Jargalant (Arkh)~UB | Nalaikh Tuul tuv | 572 | 24 | 7,060 | 1,190 | 714 | 476 |
| 4 | UB~Khairkhan (Arkh)~UB | Nalaikh Tuul tuv | 746 | 15 | 5,710 | 570 | 370 | 200 |
| 5 | UB~Khasaat (Arkh)~UB | Nalaikh Tuul tuv | 328 | 81 | 3,940 | 3,074 | 1,845 | 1,229 |
| 6 | UB~Ulziit (Arkh)~UB | Ankhdagchi ochi | 375 | 49 | 4,500 | 1,885 | 1,131 | 754 |
| 7 | UB~Ugiinuur (Arkh)~UB | Auto service | 353 | 74 | 4,240 | 2,833 | 1,700 | 1,133 |
| 8 | UB'Erdenemandal (Arkh)~UB | Mungun Murun | 510 | 50 | 6,120 | 1,936 | 1,162 | 774 |
| 9 | UB~Tstserleg som (Arkh)~UB | Ankhdagchi ochi | 557 | 27 | 6,680 | 1,044 | 626 | 418 |
| 10 | UB~Bayankhongor (Bu)~UB | Teever zuuchlal (Bn) | 630 | 166 | 7,560 | 6,334 | 3,780 | 2,554 |
| 11 | UB~Buregkhangai (Bu)~UB | Mungun Murun | 259 | 2 | 7,760 | 61 | 25 | 36 |
| 12 | UB~Bayannuur (Bu)~UB | Mungun Murun | 196 | 80 | 2,350 | 3,067 | 1,840 | 1,227 |
| 13 | UB~Gurvanbulag (Bu)~UB | Mongol Shuudan Tra | 276 | 87 | 3,310 | 3,326 | 1,996 | 1,330 |
| 14 | UB~Dashinchilen (Bu)~UB | Mungun Murun | 226 | 84 | 2,710 | 3,205 | 1,923 | 1,282 |
| 15 | UB~Khishig-Undur (Bu)~UB | Mongol Shuudan Tra | 299 | 66 | 3,590 | 2,541 | 1,525 | 1,016 |
| 16 | UB~Altai khot (Go)~UB | Mungun Murun | 1,001 | 160 | 12,010 | 6,082 | 2,846 | 3,236 |
| 17 | UB~Choibalsan (Dt)~UB | Mungun Murun | 655 | 187 | 7,860 | 7,116 | 4,269 | 2,847 |
| 18 | UB~Mandalgobi (Du)~UB | Mungun Murun | 260 | 169 | 3,120 | 6,441 | 3,864 | 2,577 |
| 19 | UB~Erdenedalai (Du)~UB | Mungun Murun | 275 | 93 | 3,300 | 3,551 | 2,131 | 1,420 |
| 20 | UB~Uliastai (Za)~UB | Mungun Murun | 1,029 | 97 | 12,350 | 3,699 | 2,219 | 1,480 |
| 21 | UB~Arvaikheer (Ub)~UB | Trans. Depart. of UB | 430 | 408 | 5,160 | 15,504 | 9,423 | 6,081 |
| 22 | UB~Bat-Ulziit (Ub)~UB | Khan Kharaatsai | 454 | 31 | 5,450 | 1,190 | 713 | 477 |
| 23 | UB~Bayan-Undur (Ub)~UB | Khan Kharaatsai | 331 | 45 | 3,970 | 1,708 | 1,025 | 683 |
| 24 | UB~Kharkhorin (Ub)~UB | Ankhdagchi ochi | 365 | 170 | 4,380 | 6,462 | 3,880 | 2,582 |
| 25 | UB~Khujirt (Ub)~UB | Khan Kharaatsai | 422 | 148 | 5,060 | 5,636 | 3,382 | 2,254 |
| 26 | UB~Dalanzadgad (Um)~UB | Mungun Murun | 553 | 82 | 6,840 | 3,142 | 1,885 | 1,257 |
| 27 | UB~Baruun-Urt (Su)~UB | Mungun Murun | 560 | 218 | 6,920 | 8,289 | 4,973 | 3,316 |
| 28 | UB~Murun (Khu)~UB | Mungun Murun | 671 | 172 | 8,250 | 6,552 | 3,931 | 3,621 |
| 29 | UB~Undurkhaan (Khe)~UB | Auto ayan | 331 | 208 | 4,120 | 7,918 | 4,799 | 3,119 |
| 30 | UB~Batshireet (Khe)~UB | Mungun Murun | 413 | 22 | 5,150 | 842 | 470 | 372 |
| 31 | UB~Binder (Khe)~UB | Mungun Murun | 407 | 33 | 5,080 | 1,277 | 766 | 511 |
| 32 | UB~Darkhan (Da)~UB | Auto ayan | 219 | 656 | 2,400 | 34,156 | 19,293 | 14,863 |
| 33 | UB~Esenzuil, Burd (Ub)~UB | Arvin zam | 345 | 64 | 4,290 | 2,459 | 1,475 | 984 |
| 34 | UB~Khangai (Arkh)~UB | Munkhdari | 683 | 7 | 8,300 | 281 | 141 | 140 |
| 35 | UB~Tsahir (Arkh)~UB | Munkhdari | 704 | 32 | 8,650 | 1,235 | 741 | 494 |
| 36 | UB~Adaatsag (Du)~UB | Mintrans | 213 | 44 | 2,400 | 1,675 | 1,005 | 670 |
| 37 | UB~Baganuur~UB | Base No.33, Baganu | 138 | 447 | 1,610 | 17,018 | 10,212 | 6,806 |
| 38 | UB~Zuunmod (Tu)~UB | Mintrans | 45 | 8,045 | 500 | 160,910 | 96,546 | 64,364 |
| 39 | UB~Altanbulag (Tu)~UB | Regional company | 52 | 281 | 620 | 10,703 | 6,422 | 4,281 |
| 40 | UB~Bayantsogt (Tu)~UB | Mungun Murun | 91 | 147 | 1,050 | 5,589 | 3,353 | 2,236 |
| 41 | UB~Bornuur (Tu)~UB | Mungun Murun | 98 | 84 | 1,130 | 4,413 | 2,647 | 1,766 |
| 42 | UB~Buren (Tu)~UB | Mungun Murun | 201 | 45 | 2,350 | 1,747 | 1,048 | 699 |
| 43 | UB~Delgerkhaan (Tu)~UB | Regional company | 263 | 74 | 3,050 | 2,815 | 1,689 | 1,126 |
| 44 | UB~Jargalant (Tu)~UB | Tav | 135 | 143 | 1,600 | 7,469 | 4,481 | 2,988 |
| 45 | UB~Jargalant Zagdal (Tu)~UB | Tuv Zagdal | 160 | 80 | 1,850 | 3,046 | 1,827 | 1,219 |
| 46 | UB~Zaamar (Tu)~UB | Nalaikh Tuul tuv | 170 | 95 | 2,000 | 3,669 | 2,201 | 1,468 |
| 47 | UB~Zaamar Tsagaanbulag (Tu) | Mongol Shuudan Tra | 221 | 87 | 2,600 | 3,320 | 1,992 | 1,328 |
| 48 | UB~Zaluuchuud (Tu)~UB | Mungun Murun | 177 | 93 | 2,050 | 3,556 | 2,134 | 1,422 |
| 49 | UB~Nukhurlul (Tu)~UB | Mintrans | 85 | 106 | 1,000 | 4,035 | 2,421 | 1,614 |
| 50 | UB~October (Tu)~UB | Mungun Murun | 160 | 91 | 1,850 | 3,465 | 2,079 | 1,386 |
| 51 | UB~Undurshireet (Tu)~UB | Mungun Murun | 188 | 132 | 2,150 | 5,046 | 3,027 | 2,019 |
| 52 | UB~Ugtaal (Tu)~UB | Mongol Shuudan Tra | 152 | 127 | 1,800 | 4,857 | 2,914 | 1,943 |
| 53 | UB~Erdenesant (Tu)~UB | Mongol Shuudan Tra | 219 | 167 | 2,550 | 6,356 | 3,814 | 2,542 |
| 54 | UB~Bayanjargalan (Tu)~UB | Arvin zam | 138 | 58 | 1,600 | 2,218 | 1,330 | 888 |
| Total in 1997 | | | 19,227 | 14,423 | 232,590 | 416,801 | 248,178 | 169,623 |

Source: Transport Department, Ministry of Infrastructure Development (June, 1998)

Notes: Trips between UB and Nalaikh are in Table 5.2.7.

## Appendix Table 5.2.5 Passengers and Trips by Route, Surveyed in May, 1998

| Corp. | Route | Km r.t. | Bus trips surveyed r.t. | Passengers Both ways | Pass-km a weekday | Average ride distance of pass |
|---|---|---|---|---|---|---|
| 1 | 3 | 27.5 | 109 | 31,688 | 152,562 | 4.8 |
| | 7 | 16.0 | 91 | 18,508 | 78,794 | 4.3 |
| | 11 | 38.0 | 87 | 15,059 | 143,914 | 9.6 |
| | 13 | 24.0 | 216 | 53,851 | 295,334 | 5.5 |
| | 16 | 18.0 | 151 | 32,004 | 104,070 | 3.3 |
| | 18 | 23.5 | 86 | 25,954 | 89,776 | 3.5 |
| | 22 | 39.5 | 53 | 17,394 | 152,334 | 8.8 |
| | 25 | 18.0 | 129 | 30,537 | 112,490 | 3.7 |
| | 9 | 15.5 | 129 | 37,235 | 81,656 | 2.2 |
| Sub-tot | (9) | 220.0 | 1051 | 262,230 | 1,210,930 | 4.6 |
| 2 | 4 | 29.0 | 179 | 37,418 | 186,228 | 5.0 |
| | 5 | 22.4 | 79 | 15,853 | 91,518 | 5.8 |
| | 8 | 28.8 | 164 | 38,419 | 151,246 | 3.9 |
| | 10 | 16.0 | 211 | 53,412 | 139,240 | 2.6 |
| | 17 | 24.0 | 52 | 9,620 | 38,460 | 4.0 |
| | 24 | 28.0 | 53 | 7,392 | 34,974 | 4.7 |
| | 26 | 20.0 | 312 | 74,290 | 312,944 | 4.2 |
| Sub-tot | (7) | 168.2 | 1050 | 236,404 | 954,610 | 4.0 |
| 3 | 1 | 16.5 | 45 | 6,565 | 20,922 | 3.2 |
| | 6 | 25.5 | 86 | 19,718 | 203,064 | 10.3 |
| | 14 | 22.0 | 54 | 14,060 | 45,254 | 3.2 |
| | 20 | 26.0 | 85 | 8,902 | 63,440 | 7.1 |
| | 21 | 17.5 | 103 | 22,347 | 74,494 | 3.3 |
| Sub-tot | (5) | 107.5 | 373 | 71,592 | 407,174 | 5.7 |
| Private | 2 | 32.0 | 15 | 2,995 | 25,736 | 8.6 |
| | 12 | 21.0 | 59 | 7,498 | 42,704 | 5.7 |
| | 15 | 13.0 | 100 | 9,504 | 32,248 | 3.4 |
| | 19 | 16.0 | 49 | 12,706 | 24,296 | 1.9 |
| | 23 | 36.0 | 151 | 30,234 | 190,772 | 6.3 |
| | 27 | 28.3 | 16 | 2,022 | 7,730 | 3.8 |
| Sub-tot | (6) | 146.3 | 390 | 64,959 | 323,486 | 5.0 |
| Trolley | 1 | 18.2 | 130 | 25,258 | 98,112 | 3.9 |
| | 2 | 19.2 | 126 | 28,408 | 83,722 | 2.9 |
| | 3 | 17.9 | 67 | 7,930 | 23,412 | 3.0 |
| | 4 | 20.8 | 114 | 28,791 | 104,262 | 3.6 |
| | 5 | 22.0 | 75 | 23,595 | 79,680 | 3.4 |
| | 6 | 17.5 | 89 | 16,604 | 62,578 | 3.8 |
| | 7 | 16.6 | 85 | 13,700 | 46,072 | 3.4 |
| | 8 | 19.0 | 97 | 29,099 | 91,476 | 3.1 |
| Sub-tot | (8) | 151.2 | 783 | 173,385 | 589,314 | 3.4 |
| Total | (35) | 793.2 | 3,647 | 808,570 | 3,485,514 | 4.4 |

Source: TCD and Study team, May, 1998

# Appendix Table 5.2.6 Passengers on and off by Bus Stop, 1998

(on Selected Route for example)

( in persons)

| BUS COMPANY - 1 (Route No. 13) Daily Volume (one direction) | | | | |
|---|---|---|---|---|
| Start | Total on | Total off | Link | Bus stop link |
| 1 | 3820 | 0 | | |
| | | | 3820 | 1-2 |
| 2 | 2590 | 155 | | |
| | | | 6255 | 2-3 |
| 3 | 3086 | 609 | | |
| | | | 8732 | 3-4 |
| 4 | 3880 | 728 | | |
| | | | 11884 | 4-5 |
| 5 | 2543 | 758 | | |
| | | | 13669 | 5-6 |
| 6 | 1636 | 1218 | | |
| | | | 14087 | 6-7 |
| 7 | 2048 | 340 | | |
| | | | 15795 | 7-8 |
| 8 | 1265 | 0 | | |
| | | | 17060 | 8-9 |
| 9 | 692 | 454 | | |
| | | | 17298 | 9-10 |
| 10 | 1522 | 1779 | | |
| | | | 17041 | 10-11 |
| 11 | 1892 | 776 | | |
| | | | 18157 | 11-12 |
| 12 | 728 | 1439 | | |
| | | | 17446 | 12-13 |
| 13 | 1224 | 3725 | | |
| | | | 14945 | 13-14 |
| 14 | 0 | 3414 | | |
| | | | 11531 | 14-15 |
| 15 | 0 | 3981 | | |
| | | | 7550 | 15-16 |
| 16 | 0 | 7551 | | |
| Total | 26926 | 26926 | | |

| BUS COMPANY - 2 (Route No. 26) Daily Volume (one direction) | | | | |
|---|---|---|---|---|
| Start | Total on | Total off | Link vol | Bus stop link |
| 1 | 4151 | 0 | | |
| | | | 4151 | 1-2 |
| 2 | 4545 | 0 | | |
| | | | 8696 | 2-3 |
| 3 | 5386 | 674 | | |
| | | | 13408 | 3-4 |
| 4 | 3871 | 1570 | | |
| | | | 15709 | 4-5 |
| 5 | 5441 | 0 | | |
| | | | 21150 | 5-6 |
| 6 | 1965 | 2692 | | |
| | | | 20423 | 6-7 |
| 7 | 1908 | 561 | | |
| | | | 21770 | 7-8 |
| 8 | 2243 | 2076 | | |
| | | | 21937 | 8-9 |
| 9 | 2246 | 4374 | | |
| | | | 19809 | 9-10 |
| 10 | 1850 | 1963 | | |
| | | | 19696 | 10-11 |
| 11 | 1572 | 1627 | | |
| | | | 19641 | 11-12 |
| 12 | 1234 | 1740 | | |
| | | | 19135 | 12-13 |
| 13 | 506 | 4825 | | |
| | | | 14816 | 13-14 |
| 14 | 225 | 6452 | | |
| | | | 8589 | 14-15 |
| 15 | 0 | 5276 | | |
| | | | 3313 | 15-16 |
| 16 | 0 | 3315 | | |
| Total | 37145 | 37145 | | |

| BUS COMPANY - 3 (Route No. 6) Daily Volume (one direction) | | | | |
|---|---|---|---|---|
| Start | Total on | Total off | Link vo | Bus stop link |
| 1 | 1302 | 0 | | |
| | | | 1302 | 1-2 |
| 2 | 326 | 54 | | |
| | | | 1574 | 2-3 |
| 3 | 1759 | 163 | | |
| | | | 3170 | 3-4 |
| 4 | 1737 | 141 | | |
| | | | 4766 | 4-5 |
| 5 | 619 | 33 | | |
| | | | 5352 | 5-6 |
| 6 | 206 | 618 | | |
| | | | 4940 | 6-7 |
| 7 | 119 | 174 | | |
| | | | 4885 | 7-8 |
| 8 | 65 | 217 | | |
| | | | 4733 | 8-9 |
| 9 | 130 | 369 | | |
| | | | 4494 | 9-10 |
| 10 | 608 | 108 | | |
| | | | 4994 | 10-11 |
| 11 | 163 | 478 | | |
| | | | 4679 | 11-12 |
| 12 | 1151 | 999 | | |
| | | | 4831 | 12-13 |
| 13 | 749 | 380 | | |
| | | | 5200 | 13-14 |
| 14 | 174 | 1227 | | |
| | | | 4147 | 14-15 |
| 15 | 271 | 1390 | | |
| | | | 3028 | 15-16 |
| 16 | 478 | 1835 | | |
| | | | 1671 | 16-17 |
| 17 | 0 | 1672 | | |
| Total | 9859 | 9859 | | |

| PRIVATE BUS COM (Route No. 12) Daily Volume (one direction) | | | | |
|---|---|---|---|---|
| Start | Total on | Total off | Link vo | Bus stop link |
| 1 | 547 | 0 | | |
| | | | 547 | 1-2 |
| 2 | 764 | 0 | | |
| | | | 1311 | 2-3 |
| 3 | 313 | 0 | | |
| | | | 1624 | 3-4 |
| 4 | 466 | 0 | | |
| | | | 2090 | 4-5 |
| 5 | 47 | 22 | | |
| | | | 2115 | 5-6 |
| 6 | 344 | 25 | | |
| | | | 2434 | 6-7 |
| 7 | 542 | 182 | | |
| | | | 2794 | 7-8 |
| 8 | 395 | 91 | | |
| | | | 3098 | 8-9 |
| 9 | 88 | 213 | | |
| | | | 2973 | 9-10 |
| 10 | 47 | 285 | | |
| | | | 2735 | 10-11 |
| 11 | 0 | 288 | | |
| | | | 2447 | 11-12 |
| 12 | 0 | 141 | | |
| | | | 2306 | 12-13 |
| 13 | 0 | 160 | | |
| | | | 2146 | 13-14 |
| 14 | 44 | 1027 | | |
| | | | 1163 | 14-15 |
| 15 | 150 | 600 | | |
| | | | 713 | 15-16 |
| 16 | 0 | 714 | | |
| Total | 3748 | 3748 | | |

| TROLLEY COMPANY (Rt No. 2) Daily Volume (one direction) | | | | |
|---|---|---|---|---|
| Start | Total on | Total off | Link vo | Bus stop link |
| 1 | 1641 | 0 | | |
| | | | 1641 | 1-2 |
| 2 | 599 | 0 | | |
| | | | 2240 | 2-3 |
| 3 | 537 | 124 | | |
| | | | 2653 | 3-4 |
| 4 | 1539 | 140 | | |
| | | | 4052 | 4-5 |
| 5 | 933 | 210 | | |
| | | | 4775 | 5-6 |
| 6 | 637 | 264 | | |
| | | | 5148 | 6-7 |
| 7 | 280 | 350 | | |
| | | | 5078 | 7-8 |
| 8 | 1617 | 754 | | |
| | | | 5941 | 8-9 |
| 9 | 1447 | 645 | | |
| | | | 6743 | 9-10 |
| 10 | 1337 | 762 | | |
| | | | 7318 | 10-11 |
| 11 | 1042 | 2884 | | |
| | | | 5476 | 11-12 |
| 12 | 1469 | 1610 | | |
| | | | 5335 | 12-13 |
| 13 | 397 | 1850 | | |
| | | | 3882 | 13-14 |
| 14 | 731 | 746 | | |
| | | | 3867 | 14-15 |
| 15 | 0 | 2574 | | |
| | | | 1293 | 15-16 |
| 16 | 0 | 1290 | | |
| Total | 14204 | 14204 | | |

**Appendix Table 5.2.7 Revenue Statement of Bus Corporations, January - June, 1998**

(Tug '000)

| Specification | Corp 1 | Corp 2 | Corp 3 | Trolleys | Total |
|---|---|---|---|---|---|
| 1 Revenue | 1,186,601 | 1,009,876 | 385,082 | 943,816 | 3,525,375 |
| 1.1 Operation | 1,084,078 | 1,009,876 | 385,082 | 890,899 | 3,369,935 |
| 1.2 Others | 102,523 | 0 | | 52,917 | 155,440 |
| 2 Costs | 1,600,930 | 1,209,563 | 558,903 | 1,234,710 | 4,604,106 |
| 2.1 Operation | 1,557,651 | 985,301 | 552,076 | 916,690 | 4,011,718 |
| a. Wage | 278,972 | 294,129 | 129,425 | 290,182 | 992,708 |
| b. Fuel | 380,546 | 419,641 | 181,364 | 27,991 | 1,009,542 |
| c. Tires | 45,964 | 27,841 | 19,676 | 40,973 | 134,454 |
| d. Spair parts | 129,048 | 120,101 | 122,481 | 187,051 | 558,681 |
| e. Depr. funds | 442,507 | 123,589 | 21,276 | 370,493 | 957,865 |
| f. Others | 280,614 | | 77,854 | | 358,468 |
| 2.2 Others | 43,279 | 224,262 | 6,827 | 318,020 | 592,388 |
| 3 Surplus (- for Def | -414,329 | -199,687 | -173,821 | -290,894 | -1,078,731 |

Source: TCD, November 1998

## Appendix Table 9.2.1 (1) Growth of Bus Trips & Pass, 1998-2020

| | a | b | c | d | e | 1.54<br>g | h | 1.540<br>k | (per day)<br>l |
|---|---|---|---|---|---|---|---|---|---|
| | Rt No. | Yr | Zones | Popul. 1) | Ratio of Pop | Round trips 2) | Ratio of g. growth | pass 3) both ways | Ratio of k. growth |
| 1 | 3 | 1998 | 13,14,15,17,19,23, | 189615 | | 109 | | 31688 | |
| | | 2020 | 22,30,28,31,44,39 | 201335 | 1.06 | 147 | 1.345 | 42725 | 1.348 |
| 2 | 7 | 1998 | 17,19,18,20,23,28,29,30 | 96473 | | 91 | | 18508 | |
| | | 2020 | | 99900 | 1.04 | 119 | 1.312 | 24337 | 1.315 |
| 3 | 11 | 1998 | 45,44,31,30,28,26, | 142765 | | 87 | | 15059 | |
| | | 2020 | 23,22,19,17,18,20 | 153500 | 1.08 | 119 | 1.362 | 20560 | 1.365 |
| 4 | 13 | 1998 | 3,4,5,6,7,9,10,19, | 166284 | | 216 | | 53851 | |
| | | 2020 | 22,20,23,24 | 251360 | 1.51 | 414 | 1.915 | 103368 | 1.920 |
| 5 | 16 | 1998 | 13,14,15,17,19,20,18 | 134556 | | 151 | | 17394 | |
| | | 2020 | | 117635 | 0.87 | 167 | 1.108 | 19310 | 1.110 |
| 6 | 18 | 1998 | 13,14,15,17,19,20,18 | 134553 | | 86 | | 30537 | |
| | | 2020 | | 117635 | 0.87 | 95 | 1.108 | 33901 | 1.110 |
| 7 | 25 | 1998 | 32,14,16,18,20,23 | 90884 | | 129 | | 37235 | |
| | | 2020 | | 99900 | 1.10 | 180 | 1.392 | 51973 | 1.396 |
| 8 | 22 | 1998 | 45,44,39,40,42,41,38, | 169910 | | 53 | | 32004 | |
| | | 2020 | 37,36,35,25,24,23,20 | 264100 | 1.55 | 104 | 1.969 | 63168 | 1.974 |
| 9 | 9 | 1998 | 5,16,15,9,10,17,19,18,20 | 121098 | | 129 | | 25954 | |
| | | 2020 | | 137400 | 1.13 | 185 | 1.437 | 37394 | 1.441 |
| 10 | 4 | 1998 | 34,37,36,35,25,24,20 | 139169 | | 179 | | 37418 | |
| | | 2020 | | 180600 | 1.30 | 294 | 1.644 | 61660 | 1.648 |
| 11 | 5 | 1998 | 32,33,36,35,25 | 117211 | | 79 | | 15853 | |
| | | 2020 | | 147500 | 1.26 | 126 | 1.594 | 25333 | 1.598 |
| 12 | 8 | 1998 | 44,31,30,28,26,23,22, | 108492 | | 164 | | 38419 | |
| | | 2020 | 19,20,17,18 | 145200 | 1.34 | 278 | 1.695 | 65292 | 1.699 |
| 13 | 10 | 1998 | 21,24,18,17,9,19,20 | 140299 | | 211 | | 53412 | |
| | | 2020 | | 154800 | 1.10 | 295 | 1.398 | 74834 | 1.401 |
| 14 | 17 | 1998 | 34,37,36,35,25,24,20,23 | 160561 | | 52 | | 9620 | |
| | | 2020 | | 212000 | 1.32 | 87 | 1.673 | 16129 | 1.677 |
| 15 | 24 | 1998 | 38,40,37,36,35,25, | 222163 | | 53 | | 7392 | |
| | | 2020 | 24,23,20,18,21 | 305500 | 1.38 | 92 | 1.742 | 12908 | 1.746 |
| 16 | 26 | 1998 | 36,35,25,24,23,22, | 241888 | | 312 | | 74290 | |
| | | 2020 | 19,17,18,20,21 | 238600 | 0.99 | 390 | 1.250 | 93053 | 1.253 |
| 17 | 1 | 1998 | 21,24,20,23,22,19, | 230588 | | 45 | | 6565 | |
| | | 2020 | 10,9,7,6,4,3 | 319260 | 1.38 | 79 | 1.754 | 11542 | 1.758 |
| 18 | 6 | 1998 | 12,13,14,15,5,17,9, | 197942 | | 86 | | 19718 | |
| | | 2020 | 19,22,20,23,24 | 191635 | 0.97 | 105 | 1.226 | 24241 | 1.229 |
| 19 | 14 | 1998 | 1,2,4,6,7,9,10,19,22 | 89384 | | 54 | | 8902 | |
| | | 2020 | | 201630 | 2.26 | 154 | 2.858 | 25499 | 2.864 |
| 20 | 20 | 1998 | 12,3,5,9,10,6,7, | 159474 | | 85 | | 14060 | |
| | | 2020 | 19,22,23,24,25 | 237160 | 1.49 | 160 | 1.884 | 26551 | 1.888 |
| 21 | 21 | 1998 | 21,24,23,20,19,22,9,10,7 | 179407 | | 103 | | 22347 | |
| | | 2020 | | 223800 | 1.25 | 163 | 1.580 | 35398 | 1.584 |
| 22 | 2 | 1998 | 3,4,6,5,9,15,17,14,13 | 166953 | | 15 | | 2995 | |
| | | 2020 | | 193495 | 1.16 | 22 | 1.468 | 4408 | 1.472 |
| 23 | 12 | 1998 | 35,25,38,31,30,28 | 80496 | | 59 | | 7498 | |
| | | 2020 | | 135700 | 1.69 | 126 | 2.136 | 16051 | 2.141 |
| 24 | 15 | 1998 | 24,22,23,10 | 225368 | | 50 | | 4752 | |
| | | 2020 | | 127050 | 0.56 | 79 | 1.590 | 7573 | 1.594 |
| | 15' | 1998 | 25,24,23,20,22, | 149641 | | 50 | | 4752 | |
| | | 2020 | 19,9,10,6,7, | 193760 | 1.29 | 82 | 1.640 | 7813 | 1.644 |
| 25 | 19 | 1998 | 31,30,28,26,22,23,20, | 209018 | | 49 | | 12706 | |
| | | 2020 | 18,21,25,35,38,27 | 273000 | 1.31 | 81 | 1.655 | 21073 | 1.659 |
| 26 | 23 | 1998 | 32,33,36,35,25,24, | 224789 | | 151 | | 30234 | |
| | | 2020 | 20,23,19,22,9,10,7 | 299600 | 1.33 | 255 | 1.688 | 51169 | 1.692 |
| 27 | 27 | 1998 | 33,36,35,25,24,20, | 163079 | | 16 | | 2022 | |
| | | 2020 | 23,19,22 | 198000 | 1.21 | 25 | 1.538 | 3117 | 1.542 |
| 28 | T1 | 1998 | 32,33,36,35,25,24 | 136316 | | 130 | | 25258 | |
| | | 2020 | | 171100 | 1.26 | 207 | 1.590 | 40257 | 1.594 |
| 29 | T2 | 1998 | 36,35,25,21,20,24 | 184384 | | 126 | | 28408 | |
| | | 2020 | | 208300 | 1.13 | 180 | 1.431 | 40752 | 1.435 |
| 30 | T3 | 1998 | 21,20,23,22,19, | 148747 | | 67 | | 7930 | |
| | | 2020 | 28,30,31 | 163600 | 1.10 | 93 | 1.393 | 11075 | 1.397 |
| 31 | T4 | 1998 | 4,6,7,9,10,19,22,21, | 218875 | | 114 | | 28791 | |
| | | 2020 | 23,24,25 | 284229 | 1.30 | 188 | 1.645 | 47476 | 1.649 |
| 32 | T5 | 1998 | 21,20,23,19,22,9, | 198628 | | 75 | | 23595 | |
| | | 2020 | 10,6,7,4 | 263610 | 1.33 | 126 | 1.681 | 39764 | 1.685 |
| 33 | T6 | 1998 | 4,6,7,9,10,22,19,23, | 124195 | | 89 | | 16604 | |
| | | 2020 | 28,30,31 | 210110 | 1.69 | 191 | 2.143 | 35670 | 2.148 |
| 34 | T7 | 1998 | 13,14,15,18,20,21,23,24 | 224235 | | 85 | | 13699 | |
| | | 2020 | | 187745 | 0.84 | 90 | 1.061 | 14565 | 1.063 |
| 35 | T8 | 1998 | 21,16,14,18,15,17, | 230820 | | 97 | | 29099 | |
| | | 2020 | 5,9,10,6,7,4 | 220242 | 0.95 | 117 | 1.209 | 35257 | 1.212 |
| | | | | | | Total '98 | 3647 | | 808569 |
| | | | | | | '20 | 5616 | 1.540 | 1245196 |

Notes:
1) Pop. in 1998 and 2020 are from the framework of the study.
2) 1998 figures are by Surveys in May 1998
3) Total of bothways. Adjusted to 1.54.

**Appendix Table 9.2.1 (2) Growth of Bus Trips & Pass to Satellite Villages, 1998-2020**

| Buses to Satellite | a Route No. | b Yr | c Zones | d Popul. 1) | e Ratio of Pop | g Round trips | h 2) Rnd trips 98 & 20 | k Pass 3) bothways | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1998 | 6,7,4,2,1,50 | 54504 | | 6 | 6 | 300 | |
| | | 2020 | | 108610 | 1.99 | 14 | 10 | 520 | 1.73 |
| 2 | 2 | 1998 | 31,30,44,45,46 | 51902 | | 2 | 2 | 100 | |
| | | 2020 | | 107700 | 2.08 | 5 | 4 | 182 | 1.82 |
| 3 | 3 | 1998 | 45,47 | 11964 | | 77 | 77 | 3850 | |
| | | 2020 | | 22200 | 1.86 | 163 | 124 | 6210 | 1.61 |
| 4 | 4 | 1998 | 6,7,4,2,51 | 74596 | | 4 | 4 | 200 | |
| | | 2020 | | 150630 | 2.02 | 9 | 7 | 352 | 1.76 |
| 5 | 5 | 1998 | 23,24,25,35,36, | 124522 | | 5 | 5 | 250 | |
| | | 2020 | 40,45,48 | 191500 | 1.54 | 9 | 7 | 335 | 1.34 |
| 6 | 6 | 1998 | 23,20,19,22,9,10, | 156257 | | 22 | 22 | 1120 | |
| | | 2020 | 6,7,4,2,51 | 222930 | 1.43 | 36 | 27 | 1364 | 1.22 |
| | | | | | | 116 | 116 | 5820 | |
| | | | | | 1.70 | 235 | 179 | 8963 | 1.54 |
| | | | | | | 179 | 1.54 | 1.54 | |
| | | | | | | | | | 1.54 |

Notes: 1) Pop. in 1998 and 2020 are from the socio framework of the study.

2) Figures for 1998 are from TCD of the city

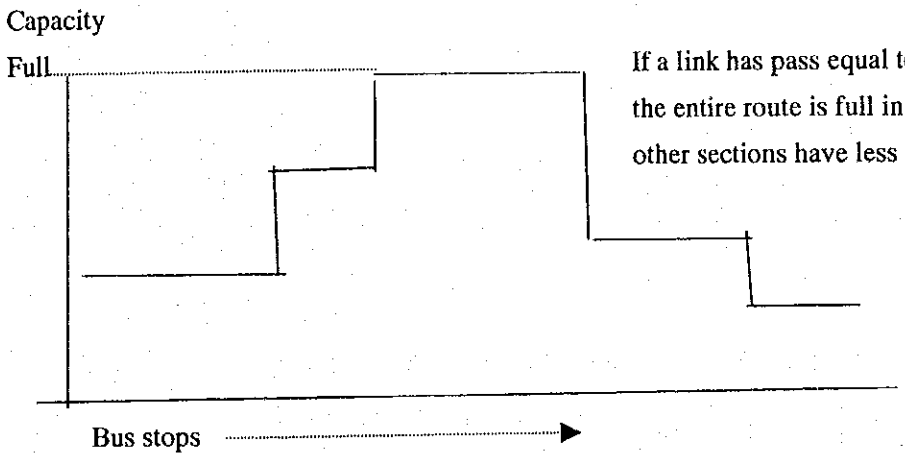
3) Assuming 25 persons ber bus in average. Total of both directions.

4) The ratio of the total is adjusted to the growth of the overall total, 1.54

**Appendix Table 9.2.2 Capacity of Bus & Trolleys**

1) It was found through the surveys in May'98 that there were many buses in full of passengers on roads in central urban area, while their initial start peoples are far less than the nominal capacity. In order to determine the avreaged passengers on buses, the following analysis is conducted:

2) If a bus stop link has passengers at full capacity, it is assumed the route is in full although there are links not reaching the capacity level.




If a link has pass equal to the capacity the entire route is full in capa, though other sections have less passengers.

3) The tabulation shown under is conducted with routes toward the city center in one day

A= (number of bus trips) *( the averaged capacity of a bus at 77 pass) * (route length km)

B= Passenger-km calculated by OD data of the route in a day. But the passenger-km is recalculated after adjusting the volumes in all links with a ratio of the link where the max pass volume is made equal to the capacity. If the max pass on the link is equal to the capa, then adjust factor is "0".

C = B/A

Studying the available data of 16 selected routes showed:

A=1,120,000 capacity-km B=554,300 passenger-km

C= 0.49. 77*0.49 = 37

It means the route has 37 passengers per bus-km base on the current on and off pattern. The figure of 37 persons is used to find the status of assumed over-flowed passengers.

Appendix Table 9.3.1 Vehicle Purchase Plan (case 1)

| Year | Corp.1 | Corp.2 | Corp.3 | Trolley Co | | Privates | Buses | Trolleys | Total | Pub Buses |
|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | | | 26 | 32 | | | 26 | 32 | 58 | 26 |
| 2001 | | 71 | | | | | 71 | | 71 | 71 |
| 2002 | | | 43 | 49 | | 50 | 93 | 49 | 142 | 43 |
| **Total Ph 1** | **0** | **71** | **69** | **81** | **0** | **50** | **190** | **81** | **271** | **140** |
| 2005 | | | 29 | 41 | | 18 | 47 | 41 | 88 | 29 |
| 2006 | 100 | 57 | | | | | 157 | 0 | 157 | 157 |
| 2007 | | | | 12 | | 0 | 0 | 12 | 12 | 0 |
| **Total Ph 2** | **100** | **57** | **29** | **53** | **0** | **18** | **204** | **53** | **257** | **186** |
| 2009 | | | 26 | | | | 26 | 0 | 26 | 26 |
| 2010 | | 71 | | | | | 71 | 0 | 71 | 71 |
| 2011 | | 0 | 43 | | | 50 | 93 | 0 | 93 | 43 |
| 2012 | | | | 32 | | | 0 | 32 | 32 | 0 |
| Tot. Ph 3-1 | 0 | 71 | 69 | 32 | 0 | 50 | 190 | 32 | 222 | 140 |
| 2014 | | | 29 | 49 | | 18 | 47 | 49 | 96 | 29 |
| 2015 | 100 | 57 | | | | | 157 | | 157 | 157 |
| 2017 | | | | 41 | | | 0 | 41 | 41 | 0 |
| 2018 | | | 26 | | | | 26 | | 26 | 26 |
| Tot. Ph 3-2 | 100 | 57 | 55 | 90 | 0 | 18 | 230 | 90 | 320 | 212 |
| **Total Ph 3** | **100** | **128** | **124** | **122** | **0** | **68** | **420** | **122** | **542** | **352** |
| **Total 1-3** | **200** | **256** | **222** | **256** | **0** | **136** | **814** | **256** | **1070** | **678** |
| | | | | | | | Total | 1070 | | |

Appendix Table 9.3.2 Vehicle Purchase Plan (case 2)

| Year | Corp.1 | Corp.2 | Corp.3 | Trolley Co | Buses for trolleys | Privates | Buses | Trolleys | Total | Pub Buses |
|---|---|---|---|---|---|---|---|---|---|---|
| 2000 | | | 26 | 16 | 15 | | 41 | 16 | 57 | 41 |
| 2001 | | 71 | | | | | 71 | 0 | 71 | 71 |
| 2002 | | | 43 | 49 | | 50 | 93 | 49 | 142 | 43 |
| **Total Ph 1** | **0** | **71** | **69** | **65** | **15** | **50** | **205** | **65** | **270** | **155** |
| 2005 | | | 29 | 0 | | 18 | 47 | 0 | 47 | 29 |
| 2006 | 100 | 57 | 0 | | | 0 | 157 | 0 | 157 | 157 |
| 2007 | | | | 0 | 36 | | 36 | 0 | 36 | 36 |
| **Total Ph 2** | **100** | **57** | **29** | **0** | **36** | **18** | **240** | **0** | **240** | **222** |
| 2009 | | | 26 | | 15 | | 41 | 0 | 41 | 41 |
| 2010 | | 71 | | | | | 71 | 0 | 71 | 71 |
| 2011 | | 0 | 43 | | | 50 | 93 | 0 | 93 | 43 |
| 2012 | | | | | | | 0 | | | |
| Tot. Ph 3-1 | 0 | 71 | 69 | 0 | 15 | 50 | 205 | 0 | 205 | 155 |
| 2014 | | | 29 | 0 | 31 | 18 | 78 | 0 | 78 | 60 |
| 2015 | 100 | 57 | | | 36 | | 193 | 0 | 193 | 193 |
| 2016 | | | | | | | 0 | | 0 | 0 |
| 2018 | | | 26 | | 15 | | 41 | 0 | 41 | 41 |
| Tot. Ph 3-2 | 100 | 57 | 55 | 0 | 82 | 18 | 312 | 0 | 312 | 294 |
| **Total Ph 3** | **100** | **128** | **124** | **0** | **97** | **68** | **517** | **0** | **517** | **449** |
| **Total 1-3** | **200** | **256** | **222** | **65** | **148** | **136** | **962** | **65** | **1027** | **826** |
| | | | | | | 936 | Total | 1027 | | |

* Appendix Table 9.3.3 Reduced Overflowed Passengers, Case 1and Case 2

| | | Case 1 Service in km/day | | | Differences | Case 2 Service in km/day | | | Differences |
|---|---|---|---|---|---|---|---|---|---|
| | Year | Bus&tro-km per day Case 1 a=b+c | Bus-km b | Trol-km c | Case1 vs Case0 Reduced over-flowed pass Case1 from Case 0 | Bus&tro-km per day Case 2 a=b+c | Bus-km b | Trol-km c | Case2 vs Case0 Reduced overflowed pass Case2 from Case 0 |
| 1 | 1998 | 104,944 | 89,726 | 15,218 | 0 | 104,944 | 89,726 | 15,218 | 0 |
| 2 | 1999 | 93,491 | 79,382 | 14,109 | 6269 | 93,491 | 79,382 | 14,109 | 6269 |
| 3 | 2000 | 92,941 | 77,250 | 15,691 | 122451 | 94,278 | 81,206 | 13,073 | 133700 |
| 4 | 2001 | 111,236 | 95,763 | 15,473 | 311400 | 112,574 | 99,719 | 12,855 | 322649 |
| 5 | 2002 | 132,488 | 113,452 | 19,036 | 661233 | 133,606 | 117,188 | 16,418 | 670634 |
| 6 | 2003 | 128,826 | 110,826 | 18,000 | 642021 | 130,090 | 114,563 | 15,527 | 652645 |
| 7 | 2004 | 119,576 | 101,794 | 17,782 | 626438 | 120,839 | 105,530 | 15,309 | 637062 |
| 8 | 2005 | 130,188 | 109,870 | 20,318 | 789896 | 126,541 | 111,677 | 14,864 | 759227 |
| 9 | 2006 | 141,062 | 121,034 | 20,027 | 1177027 | 135,542 | 124,551 | 10,991 | 1130609 |
| 10 | 2007 | 138,627 | 117,727 | 20,900 | 1165724 | 140,417 | 130,517 | 9,900 | 1180783 |
| 11 | 2008 | 134,093 | 114,011 | 20,082 | 1127599 | 136,256 | 126,802 | 9,455 | 1145792 |
| 12 | 2009 | 133,503 | 113,712 | 19,791 | 1122640 | 135,944 | 126,635 | 9,309 | 1143165 |
| 13 | 2010 | 136,202 | 116,521 | 19,682 | 1145338 | 138,752 | 129,443 | 9,309 | 1166781 |
| 14 | 2011 | 137,958 | 119,095 | 18,864 | 1160103 | 140,661 | 131,797 | 8,864 | 1182832 |
| 15 | 2012 | 136,646 | 116,910 | 19,736 | 1149069 | 135,767 | 129,085 | 6,682 | 1141677 |
| 16 | 2013 | 132,217 | 112,589 | 19,627 | 1111821 | 131,447 | 124,765 | 6,682 | 1105346 |
| 17 | 2014 | 135,472 | 114,881 | 20,591 | 1139194 | 134,484 | 134,484 | 0 | 1130892 |
| 18 | 2015 | 141,334 | 121,034 | 20,300 | 1188494 | 140,638 | 140,638 | 0 | 1182639 |
| 19 | 2016 | 137,918 | 117,727 | 20,191 | 1159762 | 138,239 | 138,239 | 0 | 1162463 |
| 20 | 2017 | 133,757 | 114,011 | 19,745 | 1124771 | 134,523 | 134,523 | 0 | 1131218 |
| 21 | 2018 | 134,285 | 113,712 | 20,573 | 1129214 | 134,356 | 134,356 | 0 | 1129813 |
| 22 | 2019 | 130,022 | 109,449 | 20,573 | 1093368 | 129,639 | 129,639 | 0 | 1090148 |
| 23 | 2020 | 126,599 | 106,471 | 20,127 | 1064579 | 126,441 | 126,441 | 0 | 1063256 |
| | Total | 2,943,384 | 2,506,948 | 436,436 | 20,218,409 | 2,949,471 | 2,760,908 | 188,564 | 20,269,598 |

## Appendix Table 9.3.4 (1) Cost Benefit Analysis of Case 1

Vehicle Replacement in the Current Corporation Pattern

| Case 1 | | a | | b | c | d | e | f |
|---|---|---|---|---|---|---|---|---|
| | | Bus run cost 0.595 per km 1) Tot cost/day | Trol run 0.667 per km 1) Tot cost/day | Bus 100000 Trolley 130000 Eco.Cost $ | Saved car-km Case 1 0.075 trip dist 4.4km 2 prs/car 2) | Input Cost of Bus, trolleys and run cost of them Cost /yr | Econ Ben. of car use in the cost of car-km Savings/yr | Net savings of replacement Net savings/yr |
| 1 | 1998 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 1999 | 0 | 0 | 0 | 1032 | 0 | 0 | 0 |
| 3 | 2000 | 45964 | 10466 | 6760000 | 20164 | 25381728 | 6654131 | -18727597 |
| 4 | 2001 3) | 56979 | 10320 | 2378000 | 51278 | 24586860 | 16921806 | -7665054 |
| 5 | 2002 | 67504 | 12697 | 22770000 | 108885 | 49236386 | 35932126 | -13304260 |
| 6 | 2003 | 65942 | 12006 | 0 | 105722 | 25722745 | 34888124 | 9165379 |
| 7 | 2004 | 60567 | 11860 | 0 | 103156 | 23901216 | 34041322 | 10140106 |
| 8 | 2005 | 65373 | 13552 | 0 | 130072 | 26045200 | 42923823 | 16878623 |
| 9 | 2006 | 72015 | 13358 | 27290000 | 193821 | 55463309 | 63960939 | 8497630 |
| 10 | 2007 | 70047 | 13940 | 0 | 191960 | 27715933 | 63346745 | 35630812 |
| 11 | 2008 | 67837 | 13395 | 0 | 185682 | 26806280 | 61274980 | 34468700 |
| 12 | 2009 | 67659 | 13201 | 2600000 | 184865 | 29283561 | 61005466 | 31721905 |
| 13 | 2010 | 69330 | 13128 | 0 | 188603 | 27210979 | 62238941 | 35027962 |
| 14 | 2011 | 70861 | 12582 | 20560000 | 191034 | 48096289 | 63041268 | 14944979 |
| 15 | 2012 | 69561 | 13164 | 0 | 189217 | 27299393 | 62441689 | 35142296 |
| 16 | 2013 | 66991 | 13091 | 0 | 183084 | 26427063 | 60417575 | 33990511 |
| 17 | 2014 | 68354 | 13734 | 0 | 187591 | 27089105 | 61905038 | 34815933 |
| 18 | 2015 | 72015 | 13540 | 0 | 195709 | 28233339 | 64584065 | 36350726 |
| 19 | 2016 | 70047 | 13467 | 34700000 | 190978 | 62259855 | 63022719 | 762864 |
| 20 | 2017 | 67837 | 13170 | 0 | 185216 | 26732243 | 61121276 | 34389032 |
| 21 | 2018 | 67659 | 13722 | 0 | 185948 | 26855647 | 61362725 | 34507078 |
| 22 | 2019 | 65122 | 13722 | 0 | 180045 | 26018654 | 59414817 | 33396163 |
| 23 | 2020 | 63350 | 13425 | 0 | 175304 | 25335851 | 57850382 | 32514531 |
| | Total | 1391015 | 271542 | 117058000 | 3329365 | 665701637 | 1098349956 | 432648319 |
| | | | | | | | B/C ratio 10% | 1.40 |
| | | | | | case 1 | | EIRR | 0.32 |

Note: 1) Bus run cost excludes cost of depretiation & a half of interest since the vehicle input cost is shown separately in c.

2) In cost savings, car run cost per km is assumed at 1/2 of the normal VOC of $0.1497 since it would be a joint ride with the car owner and 2 persons. 0.1497 * 1/2 = 0.075/km.

3) Wire lines on streets need rehabilitation works which is supposed to cover 2/3 of the wired sections 30km, the cost is approximated at $2,378,000.

## Appendix Table 9.3.4 (2) Cost Benefit Analysis of Case 2

Vehicle Replacement with Staged Reduction of Trolleys

| Case 2 | | a | | b | c | d | e | f |
|---|---|---|---|---|---|---|---|---|
| | | Bus run cost 0.595 per km 1) Tot cost/day | Trol run cos 0.667 per km Tot cost/day | Bus 100000 Trolley 130000 Eco.Cost $ | Saved car-km Case 1 vs 0 0.75/km trip dist 4.4km 2 prs/car 2) | Input Cost of Bus, trolleys and run cost of them Cost /yr | Savings in car use in the cost of car-km Savings/yr | Net savings of replacement Net savings/yr |
| 0 | 1998 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1999 | 0 | | 0 | 0 | 0 | 0 | 0 |
| 2 | 2000 | 48317 | 8720 | 6180000 | 22016 | 25002183 | 7265418 | -17736765 |
| 3 | 2001 3) | 59333 | 8574 | 1427000 | 53131 | 23836315 | 17533093 | -6303222 |
| 4 | 2002 | 69727 | 10951 | 22770000 | 110433 | 49393688 | 36442986 | -12950702 |
| 5 | 2003 | 68165 | 10357 | 0 | 107471 | 25912063 | 35465450 | 9553387 |
| 6 | 2004 | 62790 | 10211 | 0 | 104905 | 24090534 | 34618648 | 10528114 |
| 7 | 2005 | 66448 | 9914 | 0 | 125022 | 25199486 | 41257231 | 16057746 |
| 8 | 2006 | 74108 | 7331 | 24000000 | 186177 | 50874753 | 61438524 | 10563771 |
| 9 | 2007 | 77658 | 6603 | 0 | 194440 | 27806191 | 64165055 | 36358864 |
| 10 | 2008 | 75447 | 6306 | 0 | 188678 | 26978579 | 62263612 | 35285032 |
| 11 | 2009 | 75348 | 6209 | 0 | 188245 | 26913768 | 62120820 | 35207052 |
| 12 | 2010 | 77019 | 6209 | 0 | 192134 | 27465198 | 63404146 | 35938948 |
| 13 | 2011 | 78419 | 5912 | 20500000 | 194777 | 48329397 | 64276367 | 15946970 |
| 14 | 2012 | 76806 | 4457 | 0 | 188000 | 26816599 | 62039960 | 35223361 |
| 15 | 2013 | 74235 | 4457 | 0 | 182017 | 25968281 | 60065695 | 34097414 |
| 16 | 2014 | 80018 | 0 | 0 | 186224 | 26406031 | 61453936 | 35047905 |
| 17 | 2015 | 83680 | 0 | 0 | 194745 | 27614298 | 64265897 | 36651599 |
| 18 | 2016 | 82252 | 0 | 31200000 | 191423 | 58343189 | 63169500 | 4826311 |
| 19 | 2017 | 80041 | 0 | 0 | 186278 | 26413626 | 61471611 | 35057985 |
| 20 | 2018 | 79942 | 0 | 0 | 186046 | 26380830 | 61395287 | 35014456 |
| 21 | 2019 | 77135 | 0 | 0 | 179515 | 25454656 | 59239829 | 33785173 |
| 22 | 2020 | 75233 | 0 | 0 | 175086 | 24826749 | 57778522 | 32951773 |
| | Total | 1542121 | 106211 | 106077000 | 3336762 | 650026415 | 1101131585 | 451105171 |
| | | 0 | 0 | 0 | 0 | 0 | B/C ratio 10% | 1.44 |
| | | 0 | 0 | 0 | case 2 | 0 | EIRR | 0.339 |

Notes: 1) Bus run cost excludes cost of depretiation & a half of interest since the vehicle input cost is sho

2) In cost savings, car run cost per km is assumed at 1/2 of the normal VOC, $0.1497/km, since it a joint ride with the car owner and 2 persons. 0.1497 * 1/2 = 0.075/km.

3) Wire lines on streets need rehabilitation works which is supposed to cover a half of the wired sections 18km, the cost is approximated at $1427000.
Currently, the total length is 40km in roads, of which 4.5 km is supposed to be phased out in 2001. A half of the remaining 36 km, 18 km, is thought the subject of rehabilitation.

## Appendix Table 9.4.1 Trolley Trips on Routes 3 and 6

No.3 Baruun Khuree ⇔ Veh. Rep. Assigned 8 trolleys, 9 km oneway

| Hour | Baruun Khuree → Veh. Rep.Ent | | | Baruun Khuree ← Ve. Rep.Ent | | |
|---|---|---|---|---|---|---|
| | Vehicles | Op. Trips | Cancelled | Vehicles | Op. Trips | Cancelled |
| 7 | 7 | 7 | | 7 | 7 | |
| 8 | 8 | 8 | | 8 | 8 | |
| 9 | 8 | 7 | 1 | 8 | 8 | |
| 10 | 8 | 7 | | 8 | 6 | |
| 11 | 8 | 4 | 2 | 8 | 6 | 1 |
| 12 | 8 | 6 | 1 | 8 | 5 | 2 |
| 13 | 8 | 8 | | 8 | 6 | 2 |
| 14 | 8 | 6 | 2 | 8 | 6 | 2 |
| 15 | 8 | 7 | | 8 | 7 | 1 |
| 16 | 7 | 7 | | 7 | 6 | |
| 17 | 7 | 6 | 1 | 7 | 7 | |
| 18 | 7 | 5 | 1 | 7 | 4 | 1 |
| 19 | 3 | 2 | | 4 | 5 | |
| 20 | 3 | 2 | 1 | 3 | 3 | |
| 21 | 2 | 0 | 2 | 2 | 1 | 1 |
| Total | 8 - 2 | 82 | 11 | 8 - 2 | 85 | 10 |
| | | 93 | | | 95 | |

| | | | |
|---|---|---|---|
| Round Trips (r.t.) | | | % of Actual/ Schedule = 89% |
| Actual | 167 | 83.5 r.t. | Cancelled r.t. 11+10=21, 21/2=10.5 |
| Actual | 83.5/8 | 10.4 r.t./ veh | Scheduled r.t.= 83.5+10.5=94 |

No.6 Officers' Club ⇔ Veh. Rep. Assigned 8 trolleys, 8.8 km oneway

| Hour | Officers' Club→ Veh. Rep.Ent | | | Officers' Club ← Veh. Rep.Ent | | |
|---|---|---|---|---|---|---|
| | Vehicles | Op. Trips | Canselled | Vehicles | Op. Trips | Canselled |
| 7 | 8 | 7 | 1 | 8 | 9 | |
| 8 | 8 | 9 | | 8 | 8 | 1 |
| 9 | 8 | 8 | 1 | 8 | 5 | 2 |
| 10 | 8 | 5 | 2 | 8 | 6 | 3 |
| 11 | 8 | 7 | 2 | 8 | 9 | 1 |
| 12 | 8 | 7 | 1 | 8 | 7 | 1 |
| 13 | 8 | 8 | 1 | 8 | 7 | 1 |
| 14 | 8 | 8 | 1 | 8 | 8 | 1 |
| 15 | 8 | 10 | | 8 | 9 | |
| 16 | 8 | 9 | | 8 | 9 | |
| 17 | 7 | 7 | | 7 | 7 | |
| 18 | 4 | 5 | 1 | 6 | 4 | |
| 19 | 3 | 3 | | 3 | 3 | |
| 20 | 3 | 3 | | 3 | 4 | |
| 21 | 3 | 4 | | 3 | 3 | |
| Total | 8 - 3 | 100 | 10 | 8 - 3 | 98 | 10 |
| Scheduled total | | 110 | | | 108 | |

| | | | |
|---|---|---|---|
| Round Trips (r.t.) | | | (% of Actual/ Schedule = 91%) |
| Actual 198 | | 99 r.t. | Cancelled trips: 10+10=10 r.t. |
| Actual | 99/8= | 12.4 r.t. / veh | Scheduled r.t.=99+10=109 r.t. |

Source : TCD and Trolley Corp. (November, 1998). Data are on September 18, 1998

Notes: Number of assigned vehicles differs among the hours.

## Appendix Table 9.4.2 Hourly Changes in Travel Speed of Trolley Routes 3 and 6

| Trolley No.3 Baruun Khuree ----Veh.Repair Entrance. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Hour | *7-* | *8-* | *9-* | *10-* | *11-* | *12-* | *13-* | *14-* | *15-* |
| BK to VRE | 20.3 | 19.8 | 19.4 | 17.6 | 18.4 | 18.1 | 19.5 | 20.4 | 19.4 |
| VRE to BK | 21.1 | 20.6 | 21.5 | 18.8 | 18.7 | 18.4 | 19.8 | 19.3 | 16.7 |
| Trolley No 6 Officers' Club---- Veh Repair Entrance | | | | | | | | | |
| Hour | *7-* | *8-* | *9-* | *10-* | *11-* | *12-* | *13-* | *14-* | *15-* |
| OfC to VRE | 21.6 | 20.8 | 24.4 | 23.4 | 22.4 | 23.1 | 24 | 24.5 | 20.8 |
| VRE to OfC | 23.3 | 20.7 | 19.4 | 17.9 | 17.3 | 20 | 17.3 | 20.7 | 21.5 |

(km/Hr, the average of hourly data on Sept.18 (F),1998

| Trolley No.3 Baruun Khuree ----Veh.Repair Entrance. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Hour | *16-* | *17-* | *18-* | *19-* | *20-* | *21-* | Avr. | | Trips |
| BK to VRE | 18.8 | 18.3 | 18 | 19 | 18 | | 19.3 | all | 82 |
| VRE to BK | 19.3 | 18.5 | 17.5 | 17.6 | 15.7 | 20.8 | 19.6 | 19.5 | 85 |
| Trolley No 6 Officers' Club---- Veh Repair Entrance | | | | | | | | | |
| Hour | *16-* | *17-* | *18-* | *19-* | *20-* | *21-* | Avr. | | Trips |
| OfC to VRE | 20.9 | 20.9 | 21 | 21.7 | 21.1 | 19.9 | 22.5 | all | 110 |
| VRE to OfC | 22.3 | 21.9 | 19.2 | 21.3 | 21.2 | 27.3 | 20.6 | 21.6 | 108 |

Notes: Of C means bus stop Officers' Club. VRE means bus stop Vehicle Repair Entrance. BK means bus stop Baruun Khuree.

Souce: TCD (November 13, 1998)

* Appendix Table 9.4.3 Cost Benefit Analysis of Phase 1 in Case 2

Vehicle Replacement with Staged Reduction of Trolleys Phase 1 up to 2005

| | Case 2 | | a | | b | c | d | e | f |
|---|---|---|---|---|---|---|---|---|---|
| | | | Bus run cost $0.595 per km 1) | Trol run cost $0.667 per km | Bus 100,000 Trolley 130,000 | Saved car-km Case 1 vs 0 0.75/km trip dist 4.4km | Input Cost of Bus, trolleys and run cost of them | Savings in car use in the cost of car-km | Net savings of replacement |
| | | | Tot cost/day | Tot cost/day | Eco.Cost $ | 2 prs/car 2) | Cost /yr | Savings/yr | Net savings/yr |
| 0 | 1998 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| 1 | 1999 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 2000 | | 51,901 | 9,556 | 14,670,000 | 13,959 | 34,950,811 | 4,606,508 | -30344303 |
| 3 | 2001 | 3) | 64,130 | 9,593 | 1,427,000 | 64,284 | 25,755,427 | 21,213,720 | -4541707 |
| 4 | 2002 | | 70,876 | 8,829 | 1,311,720 | 94,429 | 27,614,224 | 31,161,635 | 3547411 |
| 5 | 2003 | | 64,463 | 10,423 | 0 | 99,350 | 24,712,574 | 32,785,521 | 8072947 |
| 6 | 2004 | | 61,845 | 10,217 | 0 | 97,513 | 23,780,457 | 32,179,177 | 8398720 |
| 7 | 2005 | | 67,653 | 6,397 | 0 | 124,663 | 24,436,483 | 41,138,888 | 16702406 |
| 8 | 2006 | | 73,975 | 6,136 | 21,400,000 | 183,388 | 47,836,713 | 60,518,117 | 12681404 |
| 9 | 2007 | | 82,020 | 5,348 | 6,200,000 | 201,985 | 35,031,432 | 66,655,124 | 31623691 |
| 10 | 2008 | | 80,266 | 5,348 | 0 | 197,903 | 28,252,615 | 65,308,060 | 37055445 |
| 11 | 2009 | | 78,972 | 5,087 | 0 | 194,350 | 27,739,536 | 64,135,604 | 36396067 |
| 12 | 2010 | | 81,750 | 5,027 | 0 | 200,689 | 28,636,198 | 66,227,403 | 37591205 |
| 13 | 2011 | | 82,193 | 5,027 | 13,500,000 | 201,721 | 42,282,456 | 66,567,784 | 24285328 |
| 14 | 2012 | | 79,841 | 4,821 | 6,000,000 | 195,820 | 33,938,369 | 64,620,460 | 30682090 |
| 15 | 2013 | | 77,627 | 4,821 | 0 | 190,667 | 27,207,771 | 62,920,161 | 47896907 |
| 16 | 2014 | | 76,802 | 4,821 | 0 | 188,747 | 26,935,508 | 62,286,532 | 35351024 |
| 17 | 2015 | 4) | | | | | | 52,344 | 52,344 |
| 18 | 2016 | | | | | | | | |
| 19 | 2017 | | | | | | | | |
| 20 | 2018 | | | | | | | | |
| 21 | 2019 | | | | | | | | |
| 22 | 2020 | | | | | | | | |
| | Total | | 1,094,312 | 101,451 | 64,508,720 | 2,249,469 | 459,110,575 | 742,377,038 | 295,450,980 |
| | | | | | | | | B/C ratio 10% | 1.39 |
| | | | | | | case 2 | | EIRR | 32% |

Notes:

1) Bus run cost excludes cost of depretiation & a half of interest since the vehicle input cost is shown separately.

2) In cost savings, car run cost per km is assumed at 1/2 of the normal VOC, $0.1497/km (0.1497*1/2=0.075), since it would be a joint ride with the car owner, and 2 persons per ride for 4.4 km is assumed.

3) Wire lines on streets need rehabilitation works which is supposed to cover a half of the wired sections 18km, the cost is approximated at $1427000. (See Table 9.3.5)
Currently, the total length is 40km in roads, of which 4.5 km is supposed to be phased out in 2001. A half of the remaining 36 km, 18 km, is thought the subject of rehabilitation.

4) The replacement costs in the years of Phase 2 are put in since it is difficult to separate the impact of Phase 1 and Phase 2 on passengers as they are shown in total. Accordingly, cost in proportion to the use years beyond 2015 are reduced in the form of the benefit in 2015

*

Appendix Table 9.4.4 Service km & Effects, Phase 1 of Case 2

| | | Case 2 Service in km/day | | | Differences Case2 vs Case0 |
|---|---|---|---|---|---|
| | Year | bus&tro-km per day Case 2 a=b+c | bus-km b | Trol-km c | Reduced overflowed pass Case2 from Case 0 |
| 1 | 1998 | 106,761 | 91,015 | 15,745 | 0 |
| 2 | 1999 | 101,822 | 87,440 | 14,382 | 0 |
| 3 | 2000 | 101,555 | 87,228 | 14,327 | 84770 |
| 4 | 2001 | 122,163 | 107,781 | 14,382 | 390381 |
| 5 | 2002 | 132,356 | 119,119 | 13,236 | 573445 |
| 6 | 2003 | 123,969 | 108,342 | 15,627 | 603328 |
| 7 | 2004 | 119,259 | 103,941 | 15,318 | 592170 |
| 8 | 2005 | 123,293 | 113,702 | 9,591 | 757049 |
| 9 | 2006 | 133,527 | 124,327 | 9,200 | 1113671 |
| 10 | 2007 | 145,867 | 137,848 | 8,018 | 1226606 |
| 11 | 2008 | 142,919 | 134,901 | 8,018 | 1201817 |
| 12 | 2009 | 140,353 | 132,726 | 7,627 | 1180241 |
| 13 | 2010 | 144,931 | 137,394 | 7,536 | 1218735 |
| 14 | 2011 | 145,676 | 138,139 | 7,536 | 1224999 |
| 15 | 2012 | 141,414 | 134,187 | 7,227 | 1189164 |
| 16 | 2013 | 137,693 | 130,466 | 7,227 | 1157874 |
| 17 | 2014 | 136,307 | 129,079 | 7,227 | 1146214 |
| 18 | 2015 | 0 | 0 | 0 | 0 |
| 19 | 2016 | 0 | 0 | 0 | 0 |
| 20 | 2017 | 0 | 0 | 0 | 0 |
| 21 | 2018 | 0 | 0 | 0 | 0 |
| 22 | 2019 | 0 | 0 | 0 | 0 |
| 23 | 2020 | 0 | 0 | 0 | 0 |
| | Total | 2,199,863 | 2,017,636 | 182,227 | 13,660,465 |

## Appendix Table 11.1 List of Materials and Data Collected

| No | Name | Form | Size | Number of page | Original or Copy | Publishing organ | Purchase or Provided by | User |
|---|---|---|---|---|---|---|---|---|
| | **Collected Data** | | | | | | | |
| 1 | New List of Concrete bridge in UB City | Paper | A-4 | 2 | Copy | UB City | UB City | Mr. Takai |
| 2 | New List of Roads & Streets in UB City | Paper | A-4 | 3 | Copy | UB City | UB City | Mr. Takai |
| 3 | Underground & open Drainage Line (existing / planning) in UB City | Map | A-1 | 3 | Painted | UB City | UB City | Mr. Takai |
| 4 | Underground pipe in UB City | Map | A-1 | 1 | Printed | UB City | UB City | Mr. Takai |
| 6 | Traffic Accidents Data in 1997 | Paper | A-4 | 1 | Copy | Traffic Police | Traffic Police | Mr. Takai |
| 7 | Traffic Regulation | Book | B-5 | 30 | Printed | Traffic Police | Traffic Police | Mr. Takai |
| 8 | Meteorogy and Hydrogy Data | Paper | A-4 | 15 | Copy | Meteorogical office | Purchase | Mr. Takahashi |
| 9 | Study on Water Supply System in UB and surroundings (data book) | paper | A-4 | 162 | Printed | JICA | UB City | Mr. Sino<br>Mr. Takahashi |
| 10 | Type and Price of Imported Fuel | Paper | A-4 | 2 | Copy | NIC | NIC | Mr. Kosaka |
| 11 | Construction Material Price | Paper | A-4 | 2 | Copy | MID | R/D | Mr. Kosaka |
| | **Collected Report** | | | | | | | |
| 1 | UB city Master Plan(1987) | | A-3,4 | 700 | Original | USSR | UB City | Mr. Ito |
| 2 | Road master plan in UB up to 2010 (1993) | | A-3,4 | 200 | Original | UB City | UB City | Mr. Ito |
| 3 | Feasibility Study of selected Road Maintenance Treatment & Short Section Improvement of Unpaved Road<br>June 1997 | Final Report | A-4 | 160 | Copy | World Bank Transport Rehabilitation Project (Roads) | R/D | Mr. Kosaka<br>Mr. Katyyar |
| 4 | Road Master Plan & Feasibility Study<br>Phase I - Report | Report | A-4 | 218 | Copy | ADB<br>Nov., 1993 | R/D | Mr. Katyyar |
| 5 | Road Master Plan & Feasibility Study<br>Phase II – Parts 2B:Nalaih~Choir Road | Report | A-4 | 76 | Copy | ADB<br>Oct. 1994 | R/D | Mr. Kosaka |
| 6 | Ulaanbatar Airport Feasibility Study<br>Final Report Volume 1 | Report | A-4 | 7 | Copy | ADB<br>Feb., 1993 | UB City | Mr. Ito |
| 7 | Highway Network Development in the Asian Republics | Report | A-4 | 243 | Copy | United Nations<br>1996 | R/D | Mr. Katyyar |
| 8 | Technical Assistance to the Southern Republics of the CIS and Georgia.<br>Road Maintenance<br>Phase I: Materials, Plant and Standard | Report | A-4 | 108 | Copy | Tacis<br><br>Feb., 1998 | R/D | Mr. Takai |

| No | Name | Form | Size | Number of page | Original or Copy | Publishing organ | Purchase or Provided by | User |
|---|---|---|---|---|---|---|---|---|
| 9 | Ditto | Report | A-4 | 140 | Copy | Tacis Mar., 1998 | R/D | Mr. Takai |
| 10 | Transport rehabilitation Project Combined urban Transport and Road Transport Projects | Final Report | A-4 | 181 | Copy | International Development Association, 1997 | UB City | Mr. Horie |
| 11 | Feasibility Study on rehabilitation Project of Mongolian Railway | Paper | A-4 | 300 | Printed | JICA | M/R | Mr. Takai |
| | **Collected Standard and Estimation** | | | | | | | |
| 1 | Construction Standard and Regulation Bridges and Pipe culverts | Book | A-4 | 199 | Printing | R/D, 1997 | Purchase | Mr. Takai |
| 2 | Construction Standard and Regulation Bridges and Pipe culverts | Book | A-4 | 199 | Copy | Goostroy USSR , 1988 | R/D | Mr. Takai |
| 3 | City Construction Planning and Building of Urban and Rural Settlements | Book | A-4 | 56 | Copy | Ulaanbaatar City, 1989 | UB City | Mr. Takai |
| 4 | Estimation for road construction<br>road maintenance<br>bridge and culvert | Book | A-4 | 111<br>98<br>164 | Printing | Road Department And Auto Zam 1995 | Purchase | Mr. Kosaka |
| | **Collected Statistical data** | | | | | | | |
| 1 | Statistics book (April.1998) | Book | A-4 | 99 | Printing | National statistical office | Purchase | Mr. Katiyar |
| 2 | Statistical yearbook (1996) | Book | A-5 | 167 | Printing | Statistics office | Purchase | Mr. Katyyar |
| 3 | Statistical yearbook (1997) | Book | A-5 | 287 | Printing | Statistics office | Purchase | Mr. Katyyar |
| | **Collected Map** | | | | | | | |
| 1 | UB City (scale ; 1/5,000) | Map | B-2 | 34 | Original | State Geodesy Office | Ditto (rent payment) | Mr. Takai Mr. Takahashi |
| 2 | UB City (scale ; 1/2,000) | Map | B-2 | 8 | Original | Above | Ditto | Above |
| 3 | UB City (scale ; 1/25,000) | Map | B-2 | 4 | Original | Above | Ditto | Above |
| 4 | UB City (scale; 1/500,000) | Map | B-2 | 1 | Original | Above | Purchase | Mr. Kaneda |
| | **Others** | | | | | | | |
| 1 | Mongolia foreign investment trade and tourism | Book | A-4 | 60 | Printing | L. DONDOG | Purchase | Mr. Katyyar |

## Appendix Table 16.1 Summary of Quantity

### Road

| Design Type | No. | Name of Road (Road Length km) | Exist Width(m) (Exist Lane) | Design Lane | New/Widening/Improve Type: Width | Repair Condition:Width | Dimension of Embankment/Cut | Remark |
|---|---|---|---|---|---|---|---|---|
| A:New Construction | 3 | Tolgoit~Sonsgolon (0.413) | | 4 | B:New | | Bank H=1.0m | |
| | 5 | West Naran~Ard Ayush (3.006) | | 4 | B:New | | Bank L=0.72km,H=2.1m<br>Cut L=1.91km,H=3.8m | Slope Protect. for Cut,22300m2 |
| | 6 | South of TV~N/Rd.88 (0.391) | | 2 | B':New | | Bank L= o.11 km,H=1.0m<br>Cut L=0.28km,H=1.3m | Slope Protect. for Cut,1200m2 |
| | 12 | Stadium~New Market (3.120) | | 4 | B:New | | Bank L=3.06km,H=1.8m | |
| | 14-1 | South Tolgoit (0.346) | | 4 | B:New | | Bank H=1.5m | |
| | 17' | Teeverchid SW Ext. (0.710=o.5+bridge0.21) | | 4 | B:New | | Bank L=0.29km,H=3.8m | |
| C:Widening/ Improvement | 2 | N/W Tolgoit (3.627) | 2+10+2 (2) | 4 | F:As.9.0m wide,Wa8.0m wide | 3: 10.0m width | Bank Width15m,H=1.5m | |
| | 6' | N/Rd.88~IS11 (0.454) | 4+9+4 (2) | 2 | G:As.1.5m wide,Wa8.0m wide | 3: 9.0m width | Cut L=0.2km,Width4m, H=0.5m | |
| | 8<br>9' | South of PS4 -5.942 | 3+7+3 (2) | 4 | F:As.11.0m wide,Wa8.0m wide | 1: 7.0m width | Bank Width16.0m,H=1.8m | |
| | 14-2 | South Tolgoit (1.671) | 2+9+2 (2) | 4 | F:As.9.0m wide,Wa8.0m wide | 3: 9.0m width | Bank Width16.0m,H=1.6m | |
| | 17 | Teeverchid (8.368) | 2+7+2 (2) | 4 | F:As.11.0m wide,Wa8.0m wide | 3: 7.0m width | Bank Width16.5m,H=1.2m | |
| | 17" | Dund Gol Riverside Rd. (1.000) | 2+7.5+2 | 4 | F:As.10.5m wide,Wa8.0m wide | 2: 7.5m width | Bank Width16.5m,H=1.0m | Widening Bank Bank=600m3 |
| D:Repair | 10 | Ajilchin Str.2(1.096) | 3+7+3 | 2 | --- | 2: 7.0m width | --- | |

Note: B,C-,D:Type of Road Section, As.: Asphalt Pavement, wide:widening, Wa:Side Walk, Condition:Road Rating 1~4, Slope Protect: by Mortar Shooting

### Pipe Culvert

| Design Type | No. | Name of Road (Road Length km) | Exist Width(m) (Exist Lane) | Design Lane | Pipe Culvert (Diameter*No.*Length)(m) | Remark |
|---|---|---|---|---|---|---|
| A:New Construction | 3 | Tolgoit~Sonsgolon (0.413) | | 4 | D1.0*1*35, D1.5*2*35, | |
| | 5 | West Naran~Ard Ayush (3.006) | | 4 | ------ | |
| | 6 | South of TV~N/Rd.88 (0.391) | | 2 | --- | |
| | 12 | Stadium~New Market (3.120) | | 4 | D1.5*2*35, D1.0*1*35, D1.0*2*35 | |
| | 14-1 | South Tolgoit (0.346) | | 4 | D2.0*2*45 | |
| | 17' | Teeverchid SW Ext. (0.710=o.5+bridge0.21) | | 4 | --- | |
| C:Widening/ Improvement | 2 | N/W Tolgoit (3.627) | 2+10+2 (2) | 4 | D1.0*2*18, D1.5*1*18, D3.0*1*18, D3.0*1*18, D2.0*1*18, D1.0*1*18 | |
| | 6' | N/Rd.88~IS11 (0.454) | 4+9+4 (2) | 2 | --- | |
| | 8 | South of PS4 (5.942) | 3+7+3 (2) | 4 | ----- | |
| | 14-2 | South Tolgoit (1.671) | 2+9+2 (2) | 4 | D1.0*2*18 | |
| | 17 | Teeverchid (8.368) | 2+7+2 (2) | 4 | D1.0*2*18 | |
| | 17" | Dund Gol Riverside Rd. (1.000) | 2+7.5+2 | 4 | ----- | |
| D:Repair | 10 | Ajilchin Str.2(1.096) | 3+7+3 | 2 | --- | |

Note: D: Diameter of Pipe Culvert, D1.0 &D2.0--Concrete Pipe, D3.0--Corrugated Metal Pipe

Appendix Table 17.1 List of Equipment Supplied by "The Project for Road Construction Utilizing Rock Asphalt in Mongolia"

| Equipment | Spec. | Model | Nos. |
|---|---|---|---|
| 1 Bulldozer with ripper | 32ton | D155A-3 | 1 |
| 2 Bulldozer with ripper | 21ton | D85A-21 | 2 |
| 3 Bulldozer | 15ton | D65E-12 | 1 |
| 4 Motor Grader | 3.7 m | GD511A-1 | 2 |
| 5 Back hoe | 1.4 M3 | 330 | 1 |
| 6 Back hoe | 0.6 M3 | 320 | 6 |
| 7 Tractor shovel | 21 ton | 938F | 2 |
| 8 Tractor shovel | 12 ton | 910F | 2 |
| 9 Crawler drill | Hydraulic 180 kg | HCR9-DS | 1 |
| 10 Hydraulic breaker | Hydraulic 1300 kg | H-10XB | 1 |
| 11 Tire roller | 10 ton | CP201 | 2 |
| 12 Vibration roller | 10 ton | CA251 | 1 |
| 13 Macadam roller | 10 ton | CS12 | 2 |
| 14 Asphalt finisher | 2.4 - 4.5m | NF130V-DM | 1 |
| 15 Electric Generator | 45 KVA | SD6-60S | 5 |
| 16 Concrete mixer | 0.5 M3 | PSM-18HE-PL | 1 |
| 17 Vibratory compactor | 110 kg | LE-110 | 2 |
| 18 Vibratory compactor | 90 kg | LE-90 | 4 |
| 19 Hand breaker | 30 kg | PDS265-414 | 4 |
| 20 Air compressor | 7M3/min | PDS265 | 1 |
| 21 Small equipment | | | 2 |
| 22 Truck mounted asphalt sprayer | 20 - 30 litre/min | FK615HAL | 1 |
| 23 Hand cart type asphalt sprayer | 25 litre/min | TES200 | 1 |
| 24 Hand guide type vibration roller | 0.6 ton | LP650 | 1 |
| 25 Radio communication | | | 1 |
| 26 Laboratory field testing equipment | | | 1 |
| 27 Dump truck | 11 ton | KY220H | 29 |
| 28 Water lorry | 6000 liter | FF3HJSA | 2 |
| 29 Fuel lorry | 6000 liter | FF3HJSA | 2 |
| 30 Truck with crane | 8 t/2.9 t | FH224SA | 1 |
| 31 Truck crane | 25 ton | TL-250E | 1 |
| 32 Trailer | 30 ton | SS633SA | 1 |
| 33 Vehicle carring explosive | 1 ton | HZJ75LP | 1 |
| 34 Mobile workshop | | NZ227SA | 2 |
| 35 Dump truck | 4 ton | BU211L | 1 |
| 36 Double cab pick-up truck | 1.5 ton | BU100L | 1 |
| 37 Vehicle for test & patrol | | RZH114L | 2 |
| 38 Crusher Plant | 90 ton/hr | PGJ-6 | 1 |
| 39 Crusher Plant | 30 ton/hr | PFJ-4 | 1 |
| 40 Asphalt Plant | 30 t/hr | NR600BR | 1 |
| | | Total | 95 |

## Appendix Table 21.1.4 Equipment List of the Companies

| No | Euipment | ASBI | | | BAT ZAM | | | GAN GUUR | | | KHUCHIT ZAM | | | UB- ZAM ZASVAR | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Model | Spec. | Unit | Model | Spec. | Unit | Model | Spec. | Unit | Model | Spec. | Unit | Model | Spec. | Unit |
| 1 | Bulldozer | DZ-117 | 130HP | 2 | T-130 | N.A. | 1 | DZ-117 | 130HP | 1 | T-130 | | 1 | | | |
| 2 | Motor grader | DZ-122 | 180 HP | 2 | DZ-122 | 180 HP | 1 | | | | DZ-557 | | 2 | DZ- 122 | 180 HP | 1 |
| 3 | Back hoe | EO-3322 | 0.5m3 | 2 | EO3322 | 0.5 m3 | 1 | EO-3322 | 0.5 m3 | 2 | EO-3322 | 0.5m3 | 1 | EO 3322 | 0.5m3 | 1 |
| | | EO-2621 | 0.25 m3 | 1 | | | | EO-10011 | 11 m3 | 1 | | | | EO 2621 | 0.25m3 | 1 |
| | | EO-5122 | 1.6 m3 | 1 | | | | | | | | | | | | |
| 4 | Macadam rol | DU-47 | 5 ton | 2 | DU-47 | 5 ton | 1 | | | | DU - 47 | 5 ton | 1 | DU - 47 | 6 ton | 4 |
| | | DU-48 | 10 ton | 1 | DU-48 | 10 ton | 1 | | | | DU - 48 | 10 ton | 1 | | | |
| 5 | Tire roller | DU-16 | 16 ton | 1 | | | | DU-16 | 16 ton | 1 | DU - 16 | 16 ton | 1 | | | |
| 6 | Concrete mix | SB-92 | 4 m3 | 1 | | | | KAMAZ 56 | 4.5 m3 | 1 | | | | | | |
| 7 | Crane | KS-4561 | 16 ton | 1 | | | | KS-4561 | 16 ton | 2 | KRAZ-256 | 20 ton | 1 | KS 2561 | 6.3 ton | 1 |
| | | KS-2561 | 5 ton | 1 | | | | KRAZ-256 | 20 ton | 1 | | | | | | |
| | | | | | | | | KS - 5363 | 25 ton | 1 | | | | | | |
| 8 | Scraper | DZ-357 | 8 m3 | 2 | | | | | | | DZ-357 | 8 m3 | 4 | | | |
| 9 | Dump truck | KRAZ 17-4 | 12 ton | 4 | ZIL 4505 | 6 ton | 5 | | | | ZIL-4505 | 6 ton | 3 | ZIL 4505 | 6 ton | 7 |
| | | MAZ 504 | 10 ton | 1 | | | | MAZ-529 | 12 ton | 1 | KRAZ-256 | 20 ton | 3 | ZIL 555 | 5 ton | 1 |
| | | ZIL 4505 | 6 ton | 1 | | | | ZIL-155 | 5 ton | 6 | | | | MAZ 5541 | 9.5 ton | 2 |
| | | ZIL 555 | 5 ton | 5 | | | | | | | | | | | | |
| | | KAMAZ 55 | 10 ton | 3 | | | | | | | | | | | | |
| 10 | Semi trailer | | 40ton | 1 | | | | T-20 | 20 ton | 1 | T-20 | 20ton | 1 | PAZ 5208 | 20 ton | 1 |
| | | | 20ton | 1 | | | | | | | | | | | | |
| 11 | Water lorry | KO-001 | 6 ton | 2 | KO-02 | 6 ton | 1 | | | | KO- 01 | 6 ton | 1 | | | |
| 12 | Compressor | PR-10 | 110 HP | 1 | PR-10 | 110 HP | 1 | PR-10 | 110 HP | 1 | PR - 10 | 110 HP | 1 | PR 10 | 110HP | 3 |
| 13 | Tractor | MTZ 50 | 50 HP | 1 | YUMZ-6 | | 1 | | | | MTZ-510 | | 1 | DT 75 | 75 HP | 1 |
| 14 | Cutter | | | | | | | SMJ-216 | 40 mm | 1 | | | | | | |
| 15 | Vibrator | | | | | | | IY - 47 | N.A. | 4 | | | | | | |
| 16 | Truck | GAZ-53 | 4 ton | 1 | GAZ-53 | 4ton | 1 | ZIL-130 | 6 ton | 3 | ZIL - 130 | 6 ton | 1 | GAZ 53 | 4 ton | 1 |
| | | ZIL 130 | 6 ton | 1 | | | | GAZ-53 | 4 ton | 1 | | | | ZIL 130 | 6.5 ton | 1 |
| 17 | Car | UAZ 469 | 7 people | 1 | | | 1 | Moskvich1 | 4 people | 1 | UAZ-469 | 4 people | 1 | UAZ 469 | 5 people | 1 |
| | | | | | | | | AUDI-100 | 4 people | 1 | NISSAN | | 1 | | | |
| | | | | | | | | UAZ 469 | 7 people | 1 | | | | | | |
| 18 | Portable generator | | | | | | | JES-60 | 60 kw | 1 | | | | | | |
| 19 | Lathe | | | | | | | N.A. | N.A. | 1 | | | | | | |
| 20 | Field vibrator | | | | | | | IV-112 | N.A. | 3 | | | | | | |
| 21 | Concrete pressure | | | | | | | S-250 | N.A. | 1 | | | | | | |
| 22 | Dryer | | | | | | | | | | | | | | | |
| 23 | Sand gravel sieve | | | | | | | | | 4 | | | | | | |
| 24 | Cones | | | | | | | | | 6 | | | | | | |
| 25 | Cubes | | | | | | | | | 12 | | | | | | |
| 26 | Reinforsed bulk | | | | | | | | | 5 | | | | | | |
| 27 | Micro bus | UAZ 452 | 12 people | 1 | | | | UAZ-452 | 12 peopl | 1 | PAZ-672 | | 1 | UAZ 452 | 12 people | 1 |
| 28 | Electric gene | DS - 60 | 60 kw | 3 | | | | | | | | | | | | |
| 29 | Asphalt finish | DS - 126 | | 2 | | | 1 | | | | DS 126 | | 1 | DS 195 | 60ton/ h | 1 |
| 30 | Portable welc | SAK | | 1 | | | | | | | | | | SB-100 | 3806 | 1 |
| 31 | Station welding | | | | | | | | | | | | | TD 300 | 3806 | 1 |
| 32 | Asphalt spreader | | | | | | | | | | | | 1 | | | |
| 33 | Trailer | | | | | | | | | | | axle 1 | 3 | | | |
| | | | | | | | | | | | | axle 2 | 2 | | | |
| | TOTAL | | | 47 | | | 16 | | | 65 | | | 33 | | | 30 |

## Appendix 22.1 Fund Management of City's Bus and Trolley Companies

As it is known already, the public transport system in UB has been functioning well, but the public companies are suffering from substantial revenue shortages. In the first half of 1998, the deficit was Tug –1078 million.($-1.3 million). Under those circumstances, ambitious actions are necessary to overcome the financial crisis.

### 2.1 Conditions

- The period of analysis is 12 years from 1999-2010. The result is summarized in present values (PV).
- Discount rate is 12% per annum in financial terms.
- Passengers and revenues will increase 2% per annum.
- Prices are of June 1998 and $1=Tug 838.5

### 2.2 Revenue and Expenditure in 1998

From the record of the first half of 1998, the total of the year is estimated as:

| | | |
|---|---|---|
| Revenue | Tug 3525 *2 = | Tug 7050 million =$8.4 million |
| Expenditure | Tug 4604*2 = | Tug 9208 million=$10.98 million |
| Deficit | Tug 1078*2 = | - Tug 2156 million = -$2.6 million |

### 2.3 Actions and forecasts

Financial resources should be explored in the following way:

(1) To reduce the cost by raising labor productivity by companies themselves. They have to make efforts to reduce the cost by 5 %, f in Table 4(1).

(2) Non-qualified free riders including non-paying school children 7-17 years old should be eliminated in efforts to increase the revenue by 5 %、b in Table 4(1).

(3) To increase the fare as follows, c in Table 4(1)

1999 - Tug 100 per ride
2000 - 04 Tug 150 per ride
2005 - 10 Tug 200 pr ride

(4) City should compensate the loss of revenue to the bus companies caused by policies of education for students and welfare for aged and handicapped persons. The loss of revenue by discount and free ride with ID card are assumed at 10% of the paid passengers for years 2000-10, d in Table 4(1).

(5) If the above actions are difficult to be implemented, another option is to reduce the number of buses to be replaced, 150 in 2002-03 planned in this feasibility study. The reduced buses should be covered by private participants. Basic policy of privatization is to give advantages to tho.

who have been worked in bus companies, because of their experiences on route operation. But this is not necessary in this financial revision example as the actions (1) – (4) will result in better prospect as it is mentioned below.

## 2.3 Conclusion

The forecast is shown in Table 4. Combined Actions (1)-(4) for revenue increase in years 1999-10 will result in a sum of Tug 98,628 million in PV in Table 4 (1). While annual expenditures of sum in Tug 66,080 in PV and vehicle replacement cost of Tug 13,916 are Tug 79,996 million PV as shown in (2) of the table. Consequently the balance is Tug 18,632 million or $22.2 million in PV.

The fund of $22.2million in PV (equivalent to $31.2million in prices of '98) for vehicle replacement and operation should be managed by a loan from aid agencies. The loan amount can be managed for paying back in the following years up to 2010 as estimated balances in +plus value continue in most years in total of Tug 31,276 million (equivalent to $37.3 million in PV), as it is shown in Table 4 (2). Financial consequences of the actions described here indicate a simplified example, but these kinds of actions are absolutely necessary to sustain public transport in Ulaanbaatar.

**Table 4 A Restructure Plan of City Bus and Trolley (Tug million of '98)**

(1)

| | Year | a Revenue Traff Grow 1.02 | b Action 0. 1.05 | c Action 2. 1.5 & 2.0 | d Rev 1-3 Action 3 10% | e Expenditures. Traff Grow 1.02 | f Action 1 -0.5% | g Revenue, in d PV at 12% 1.12 | h Expenditures, PV f. 1.12 | I Balance/Yr in PV |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1999 | 7050 | 7403 | 7403 | 7403 | 9208 | 8748 | 7403 | 8748 | -1345 |
| 1 | 2000 | 7191 | 7551 | 11326 | 12458 | 9392 | 8923 | 11124 | 7967 | 3157 |
| 2 | 2001 | 7335 | 7702 | 11552 | 12708 | 9580 | 9101 | 10130 | 7255 | 2875 |
| 3 | 2002 | 7482 | 7856 | 11783 | 12962 | 9772 | 9283 | 9226 | 6607 | 2618 |
| 4 | 2003 | 7631 | 8013 | 12019 | 13221 | 9967 | 9469 | 8402 | 6018 | 2385 |
| 5 | 2004 | 7784 | 8173 | 12259 | 13485 | 10166 | 9658 | 7652 | 5480 | 2172 |
| 6 | 2005 | 7939 | 8336 | 16673 | 18340 | 10370 | 9851 | 9292 | 4991 | 4301 |
| 7 | 2006 | 8098 | 8503 | 17006 | 18707 | 10577 | 10048 | 8462 | 4545 | 3917 |
| 8 | 2007 | 8260 | 8673 | 17346 | 19081 | 10789 | 10249 | 7707 | 4139 | 3567 |
| 9 | 2008 | 8425 | 8847 | 17693 | 19463 | 11004 | 10454 | 7018 | 3770 | 3249 |
| 10 | 2009 | 8594 | 9024 | 18047 | 19852 | 11225 | 10663 | 6392 | 3433 | 2959 |
| 11 | 2010 | 8766 | 9204 | 18408 | 20249 | 11449 | 10877 | 5821 | 3127 | 2694 |
| 12 | Total | 94555 | 99283 | 171517 | 187928 | 123499 | 117324 | 98628 | 66080 | 32548 |

Tug' million 32,548

($ million 38.8)

Notes for Actions

1. Cost reduction by 5% and reduce delete non-qualified free riders by 5%.
2. Increase the ticket price in 2 stages
   In 1999 at the current rate
   In 2000-04 Tug 100 to Tug 150
   In 2005-10 Tug 150 to Tug 200
3. Receive compensation from City for free ride (5% is assumed) of aged persons and for discount fare for school children (5% is assumed). In total +Rev. 10% is tabulated.

(2) (Tug million '98)

| | Year | g<br>Revenue, d<br>PV at 12%<br>1.12 | h<br>Expend., f<br>0<br>1.12 | hp<br>Veh.<br>replac cost<br>23 | ht | I<br>g-ht<br>Balance/Yr<br>in PV |
|---|---|---|---|---|---|---|
| 0 | 1999 | 7403 | 8748 | | 8748 | -1345 |
| 1 | 2000 | 11124 | 7967 | | 7967 | 3157 |
| 2 | 2001 | 10130 | 7255 | | 7255 | 2875 |
| 3 | 2002 | 9226 | 6607 | 13916 | 20523 | -11298 |
| 4 | 2003 | 8402 | 6018 | | 6018 | 2385 |
| 5 | 2004 | 7652 | 5480 | | 5480 | 2172 |
| 6 | 2005 | 9292 | 4991 | | 4991 | 4301 |
| 7 | 2006 | 8462 | 4545 | | 4545 | 3917 |
| 8 | 2007 | 7707 | 4139 | | 4139 | 3567 |
| 9 | 2008 | 7018 | 3770 | | 3770 | 3249 |
| 10 | 2009 | 6392 | 3433 | | 3433 | 2959 |
| 11 | 2010 | 5821 | 3127 | | 3127 | 2694 |
| 12 Total | | 98628 | 66080 | 13916 | 79996 | 18632 |

PV of Veh $ 23.317/1.12^3=16.6 Tug' million 18632

Tug 16.6*838.5=13916 $ million 22.2

+value in sum 31,276 Tg

-value in sum12,634 Tg

balance in + 18,632 Tg

## Appendix 22.2 Road Fund Management

### 1.1 General

The feasibility study shows the economic viability of selected road projects. However, the implementation seems impossible because of non-availability of fund in city budget. Under the circumstances, a fund management plan is developed under ambitious assumptions.

- Actions are proposed to increase tax revenues from road users; 1) Fuel tax and 2) Annual vehicle registration fee.
- Determine the cost of selected priority projects and that of annual road maintenance.
- Forecast the proposed revenue and costs for years from 1999 to 2010 and see the result in present value (PV). In the forecast, conditions and assumptions are stated below.

### 1.2 Conditions

- Prices are as of July 1998, US$ 1.= Tug. 838.5. Traffic and revenue increase 3% p.a.
- Annual maintenance cost is approximated at $5.0 per m2 in financial terms. The total road length is 158km, which is serving bus and trolley bus daily. 158km x 10m x 1000m x $5 = $7.9 million.
- Project cost is shown in financial prices.

| Central Route | Teeverchid | Fly-over | Total |
|---|---|---|---|
| $5.6 million | $17.0 million | $2.4 million | $25.0 million |

- Annual discount rate in financial terms is assumed at 12 % per annum.
- Administration cost associated with road user taxes is deducted by 10 % from the calculated tax revenues.
- Increases in road user taxes are assumed in Table 2. They are put in 3 staged as in the columns g and d of the following Table 3 (2).

| | |
|---|---|
| 2000 | No changes in tax rates, fuel tax Tug 33/L and vehicle tax Tug 30,000 per year |
| 2001-03 | Fuel tax increases to Tug 66/L and vehicle tax to Tug 72000 per year |
| 2004-07 | Fuel tax increases to Tug 120/L and vehicle tax to Tug 100,000 per year |
| 2008-10 | Fuel tax increases to Tug 150/L and vehicle tax to Tug 150,000 per year |

### 1.3 Revenue and Cost forecast

Costs of projects in total of $25 million and the annual maintenance of $ 7.9 million are shown in Table 1 and assumed revenue increases in 11 years, 00-10, are shown in Table 2. Annual cost, revenue and balance under the above conditions in current prices and in present values are shown

in (1)-(3) of Table 3. Table 3 shows that, if actions to increase revenues are materialized in 2000-10, the following results can be realized:

(1) Total

| | |
|---|---|
| PV of Expenditure in projects and maintenance, h | $ 70.59 million |
| PV of increased revenue of road user taxes, l | $ 74.63 million |
| PV of the balance, m | $ 4.04 million |
| (2) and (3) Divided into Projects and Revenue | |
| 1) Projects | |
| PV of the expenditure in Projects | $18.06 million |
| PV of the revenue supposed to cover the cost, m | $18.06 million |
| PV of the balance | $ 0 |
| 2) Road maintenance | |
| PV of the expenditure on Maintenance | $52.54 million |
| PV of the revenue supposed to cover the cost | $56.57 million |
| PV of the balance | $ 4.04 million |

## 1.4 Conclusion

The PVs of the Total indicate that the revenue in 11 years is $ 74.63, the cost is $70.59 and the balance is $+4.04 million. However, if the streams are divided into 1) Projects and 2) Road Maintenance, the following results are forecasted:

1) Projects

It is difficult to split the revenue just for covering the project cost. The equivalent amount of the financial project cost is allocated for PV of the project revenue. That is $18.06 million in PV. It is the same as the cost, resulting in no remaining in balance in PV.

2) Road maintenance

The revenue is tabulated in l of Table 3 (2) in PV where the total is found $83.74. But, since the amount allocated for the projects of $18.06 is deducted, the remaining revenue is $74.63-18.06=$56.57 million of PV. The result is $4.04 million in PV will remain if fees on user charges are increased as supposed here. for the years 2000-10.

In the case of total, the revenue is $143.20 (PV of $74.63million), the cost is $111.90 (PV of $70.59million) and the balance is $4.04million in PV. As shown in Table 3 (3), the first 5 years have shortages in revenue in PV at -$18.03million to cover the cost of projects and annual maintenance. $18.03million in PV is equivalent to $25million in current prices of 1998. It means a loan from aid agencies is necessary to cover the shortage of $18.03million in PV, which is equivalent to $25million in the prices of 1998. Since the surplus revenue beyond 2005 is tabulated to increase every year with a total of $22.08 million in PV, the loan can be paid back in 2010 from the generated road revenues. This is a conclusion of simplified assumptions.

**Table 1 Costs of Projects and Road maintenance**

| Project Name | $ Fin Cost in million | Road Maint | $ Fin Cost in million |
|---|---|---|---|
| Central Route Improve | 5.6 | Rds used by | |
| Teeberchid Rd Widening | 17.0 | bus & trolley | 7.90 |
| East Cross Rd. Fly-over Const. | 2.40 | | |

**Table 2 Proposed Revenue Increase Plan**

| Item | | Quontity | Current Tax rate Tug/litre | Current Revenue Tug mil. | Target Plan in 2010 Tax rate Tug/litre | Target Plan in 2010 Revenue Tug mil. |
|---|---|---|---|---|---|---|
| -1 Fuels | Vehicle in UB | 36000 | | | | |
| | Consumption litre per year | 2000 | 33 | 2376 | 180 | 12960 |
| | | $ million | | 2.83 | | 15.46 |
| -2 Vehicle | Annual tax | | 30,000 | 1080 | 150000 | 5.40 |
| | | $ million | | 1.29 | | 6.44 |

Notes: The administration cost is assumed at 10%, which is in j of (2) in Table 3.
: Registered vehicles are 36000 un 1998 and 2020. Increases in vehicle registration is incorporated in k of Table 3 (2).

## Table 3 Comparison of Cost and Revenue of Roads in UB

(1) ($ million '98)

| | | Financial Cost of Selected Projects and Annual Road Maintenance, 2000-2010 in prices of 1993 | | | | | | Cost Break Down in PV in 2000-2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Year | a Central Av. | b Teeverchid | c Fly-over East Cross Rd | d Rd Maint Cost 158 km | e=f+g Total Necessary Fin Cost | f | g | h=I+j Cost in PV discount at 1.12 | I Cost in PV Project | j Cost in PV Rd Maint |
| 0 | 2000 | | | | 7.9 | 7.90 | | | 7.90 | 0.00 | 7.90 |
| 1 | 2001 | 0.56 | 1.7 | 0.40 | 7.9 | 10.56 | | | 9.43 | 2.38 | 7.05 |
| 2 | 2002 | 1.96 | 5.1 | 0.70 | 7.9 | 15.66 | | | 12.48 | 6.19 | 6.30 |
| 3 | 2003 | 3.08 | 5.1 | 0.70 | 7.9 | 16.78 | | | 11.50 | 5.87 | 5.62 |
| 4 | 2004 | | 5.1 | 0.60 | 7.9 | 13.60 | | | 8.64 | 3.62 | 5.02 |
| 5 | 2005 | | | | 7.9 | 7.90 | | | 4.48 | 0.00 | 4.48 |
| 6 | 2006 | | | | 7.9 | 7.90 | | | 4.00 | 0.00 | 4.00 |
| 7 | 2007 | | | | 7.9 | 7.90 | | | 3.57 | 0.00 | 3.57 |
| 8 | 2008 | | | | 7.9 | 7.90 | | | 3.19 | 0.00 | 3.19 |
| 9 | 2009 | | | | 7.9 | 7.90 | | | 2.85 | 0.00 | 2.85 |
| 10 | 2010 | | | | 7.9 | 7.90 | | | 2.54 | 0.00 | 2.54 |
| | Total | 5.6 | 17 | 2.40 | 86.9 | 111.90 | | | 70.59 | 18.06 | 52.54 |

(2) (in $million)

| | Year | g Rvenue of fuel tax | h Revenue of Veh.tax | I Revenue total | j Admi cost -10% | k Growth in Veh. 3% | l PV revenue 12% |
|---|---|---|---|---|---|---|---|
| 0 | 2000 | 2.83 | 1.29 | 4.12 | 3.71 | 3.82 | 3.82 |
| 1 | 2001 | 5.67 | 3.09 | 8.76 | 7.88 | 8.12 | 7.25 |
| 2 | 2002 | 5.67 | 3.09 | 8.76 | 7.88 | 8.12 | 6.47 |
| 3 | 2003 | 5.67 | 3.09 | 8.76 | 7.88 | 8.12 | 5.78 |
| 4 | 2004 | 10.30 | 4.29 | 14.594 | 13.13 | 13.53 | 8.60 |
| 5 | 2005 | 10.30 | 4.29 | 14.594 | 13.13 | 13.53 | 7.68 |
| 6 | 2006 | 10.30 | 4.29 | 14.594 | 13.13 | 13.53 | 6.85 |
| 7 | 2007 | 10.30 | 4.29 | 14.594 | 13.13 | 13.53 | 6.12 |
| 8 | 2008 | 15.46 | 6.44 | 21.9 | 19.71 | 20.30 | 8.20 |
| 9 | 2009 | 15.46 | 6.44 | 21.9 | 19.71 | 20.30 | 7.32 |
| 10 | 2010 | 15.46 | 6.44 | 21.9 | 19.71 | 20.30 | 6.54 |
| | Total | 107.436 | 47.0 | 154.5 | 139.0 | 143.20 | 74.63 |

(3) (in $million)

| | Year | Total cost in PV h | Total Revenue in PV l | Balance Rev- ost in PV m | Remarks in PV million |
|---|---|---|---|---|---|
| 0 | 2000 | 7.90 | 3.82 | -4.08 | |
| 1 | 2001 | 9.43 | 7.25 | -2.18 | |
| 2 | 2002 | 12.48 | 6.47 | -6.01 | |
| 3 | 2003 | 11.50 | 5.78 | -5.72 | Shortages in funds |
| 4 | 2004 | 8.64 | 8.60 | -0.04 | -18.03 |
| 5 | 2005 | 4.48 | 7.68 | 3.20 | |
| 6 | 2006 | 4.00 | 6.85 | 2.85 | |
| 7 | 2007 | 3.57 | 6.12 | 2.55 | |
| 8 | 2008 | 3.19 | 8.20 | 5.01 | |
| 9 | 2009 | 2.85 | 7.32 | 4.47 | Surplus in funds |
| 10 | 2010 | 2.54 | 6.54 | 4.00 | 22.08 |
| | Total | 70.59 | 74.63 | 4.04 | Remain +4.04 |

**Appendix Table 22.3 Local Proper Nouns**

| | |
|---|---|
| Aimaq (prefecture). | 県 |
| Duuregs | 行政区 |
| Khoroo | 行政小区 |
| Khoroolol | 通称アパート区 |
| Ger | モンゴル独特のフェルトの移動テントハウス |
| Sukhbaatar Square | 市の中央広場 |
| Peace Avenue:<br>Enkh Taivan Street | 市の中心通り　東西を結ぶ4車線から6車線道路 |
| Trade Union Street | |
| Buudal, | 市内東北部の地名 |
| Sansar, | 市内東北から中北部のあたりの地名 |
| Ulaan khuaran, | 市内中北部の地名 |
| Nogoon-nuur (lake), | セルベ河岸道路に入る道路の右にある調整地 |
| Bayankhoshuu | トルゴイットの北のゲル部落一帯をさす地名 |
| Bogd Khan Mountain | ボグド山 |
| Peak Tsetsee Gun | ボグド山塊最高峰 2268m |
| Khentii mountain | ヘンテイ山脈：シベリアからモンゴルに連なる山脈 |
| Tuul River | トーラ河:市の南部を東から西に流れる幅数十 m の河 |
| Selbe River | セルベ川：UB市中心を北から南に流れる川<br>普段は水量がほとんどない |
| Dundgol Rivers | ドントゴル川：Selbe River は鉄道を越えると直角に西に曲がり名前を変える |
| Uliastai river | ウリアスタイ川<br>:セルベ川のさらに東の谷を南北に流れる |
| Tolgoit river | トルゴイット川<br>市内西部にある川であるが年間ほとんど空川 |
| Quaternary | 第4紀 |
| Recent | 地質現世 |
| Alluvial | 地質沖積世 |
| diluvial | 洪積世 |
| aquifer | 滞水層 |
| Flora and fauna | 植物　動物 |
| Mammals, birds and reptiles | 哺乳類　鳥類　爬虫類 |
| Stipa, | 稲科 |
| Carex, | カヤツブリ科 |
| Arenaria | ナデシコ科 |
| Artemisia, | キク科 |
| Chenopodium | アカザ科 |
| Populus, | ヤナギ（ポプラ）科 |
| Ulmus, | ニレ科 |
| Larix, | マツ科 |
| Salix | ヤナギ科 |
| Caragana | マメ科 |
| Biosphere Reserves | 生物保護区 |
| International Coordinating Council | 国際調整委員会 |
| Program on Man and the Biosphere | 人類生物保護プログラム |

## Appendix Table 22.4 List of Minutes of Meeting

| No. | Date | Attendance | Place | Item |
|---|---|---|---|---|
| 2 | Jan 13,98 | Japanes Advisory Committee, JICA, and Stady Team | Tokyo JICA | Submission of the Inception Report |
| 3 | Jan 23(21),98 | Steering Committee, Study Team & Japanese Advisory Committee | MOID | Explanation of Inception report for the Master Plan study on I & R of road network in UB |
| 4 | Jan 26,98 | UB Mayor's office & Study Team | PCI | Sustainable Development Plans & others |
| 5 | Jan 27,98 | Traffic Police Department,UB Mayor's office & Study Team | UB Mayor's office | Request data & maps of UB city |
| 6 | Jan 28,98 | Traffic Police Department, UB Mayor's office and Study Team, | Traffic Police Department | Relational matters of the Study Concerning the Traffic Police |
| 7 | Jan 29,98 | Department of Construction & Architecture, Road Department and Study Team | Department of Construction & Architecture | On regional development plan of Mongolia |
| 8 | Feb 2,98 | UB Mayor's office, Road Department and Study Team | UB Mayor's office | Meeting was held to see & select the maps with scales of 1:5000, 10000, 25000, 50000 |
| 9 | Feb 2,98 | UB Mayor's office, Road Department & Study Team | UB Mayor's office | Meeting was held to see & select the maps with scales of 1:25000,50000,100000 |
| 10 | Feb 6,98 | UB Mayor's office & Study Team | Geodesic Off. | Request for lending of maps |
| 11 | Feb 9,98 | UB Mayor's office & Study Team | UB Mayor's office | Request for data |
| 12 | Feb 9,98 | Road Department & Study Team | Road Department | Request for maps |
| 13 | Feb 12,98 | UB City Mayor & Study Team | UB Mayor's office room | Percipitation in UB |
| 14 | Feb 19,98 | Embassy of Japan & Study Team | Embassy of Japan | Greeting & Reporting |
| 15 | Feb 20,98 | Road Department & Study Team | Road Department | Selection of subcontractor |
| 16 | Feb 25,98 | UB Mayor's office & Study Team | UB Mayor's office | Request for data |
| 17 | Feb 25,98 | Road Department, Study Team & UB Mayor's office | UB Mayor's office | Selection of subcontractor |
| 18 | Feb 26,98 | Road Department & Study Team | Road Department | Selection of subcontractor |
| 19 | Mar 2,98 | Road Department & Study Team | Road Department | Foreign assistance & selection of subcontractor |
| 20 | Mar 3,98 | UB Mayor's office & Study Team | UB Mayor's office | Confirmation of road study routs |
| 21 | Mar 3,98 | Traffic Police Department & Study Team | Traffic Police Department | Accident on intersections & their locations |
| 22 | Mar 4,98 | Bus Company & Study Team | Bus Company | Accident on intersections & their locations |
| 23 | Mar 4,98 | UB Mayor's office & Study Team | UB Mayor's office | Request for study data |
| 24 | Mar 9,98 | UB Mayor's office & Study Team | UB Mayor's office | Public Transport |
| 25 | Mar 9,98 | UB Mayor's office & Study Team | UB Mayor's office | City Development Framework |
| 26 | Mar 10,98 | UB Mayor's office & Study Team | UB Mayor's office | A long term Urban Development Concept |
| 27 | Mar 12,98 | Road Department & Study Team | Road Department | Explanation of the current progress of the study |
| 28 | Mar 17,98 | UB Mayor's office, Road Department, MOID & Study Team | MOID | Progress report of the Master Plan on I & R of Road Network in UB |
| 29 | Apr 20,98 | JICA & Study Team | Tokyo JICA | Japanese Advisory Committee Meeting |
| 30 | May 6,98 | JICA & Study Team | Tokyo JICA | Report of 1st stage study & Proposal of land using |
| 31 | May 14,98 | Ministry of Nature Environment & Study Team | Ministry of Nature Environment | IEE and EIA |
| 32 | May 18,98 | Steering Committee & Study Team | MOID | UB road Feasibility Study |
| 33 | July 15,98 | UB city Environmental Protection | UB Mayor's | Greeting |

| | | | | |
|---|---|---|---|---|
| | | Bureau & Study Team | office | |
| 34 | July 15,98 | Ministry of Nature Environment & Study Team | Ministry of Nature Environment | Introduction of an environmental expert |
| 35 | July 20,98 | Steering Committee & Study Team | MOID | Reporting & Discussion of the study progress with Steering Committee |
| 36 | July 22,98 | Central Laboratory Environmental Monitoring, Road Department & Study Team | Central Laboratory Environmental Monitoring | Inspection & Hearing |
| 37 | July 23,98 | UB Mayor's office, Road Department, Ministry of Justice & Study Team | UB Mayor's office | The round table meeting (Social economic environment) |
| 38 | July 28,98 | UB Mayor's office, Ministry of Nature Environment, Road Department, & Study Team | UB Mayor's office | The round table meeting (Socialeconomic Environment) |
| 39 | Aug 5,98 | Central Laboratory Environmental Monitoring, JERM Co.,ltd & Study Team | Central Laboratory Environmental Monitoring | Inspection & Hearing for EIA |
| 40 | Aug 10 98 | JICA & Study Team | Tokyo JICA | Japanese Advisory Committee Meeting |
| 41 | Aug 31,98 | Steering Committee & Study Team | MOID | Candidate for FS & others |
| 42 | Oct 6, 98 | JICA & Study Team | Tokyo JICA | Japanese Advisory Committee Meeting |
| 43 | Oct 20,98 | Steering Committee, Japanese Advisory Committee & Study Team | MOID | On Interim Report |
| 44 | Jan14,98 | JICA & Study Team | Tokyo JICA | Japanese Advisory Committee Meeting |
| 45 | Jan26,99 (25) | Steering Committee, Japanese Advisory Committee & Study Team | UB Mayor's office | Submission and Discussion of the Draft Final Report |

Remarks:

| | |
|---|---|
| SC | Steering Committee |
| JICA | Japan International Cooperation Agency |
| ST | Study Team |
| JAC | Japan Advisory Committee |
| UB | Ulaanbaatar City Government |
| RD | Road Department |
| MID | Ministry Infrastructure Development |
| MNE | Ministry of Nature Environment |
| MJ | Ministry of Justice |