
Monograph:
Slapa, R. (1990) Car Travel Time Variability on Links of Two Urban Routes in Berlin (West): Methodology and Surveys. Working Paper. Institute of Transport Studies, University of Leeds , Leeds, UK.

Working Paper 305

Published paper

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May 1990

CAR TRAVEL TIME VARIABILITY ON LINKS OF TWO URBAN ROUTES IN BERLIN (WEST): Methodology and Surveys

R Slapa

ABSTRACT

This report describes the surveys conducted, and the methods employed, for a study of travel times on two routes, each of five links, in Berlin. The surveys were conducted in order to study the level of variability of travel time, to identify possible causes of variability, and to test the reliability with which vehicles equipped with LISB route guidance equipment could estimate the mean and distribution of route and link travel times. Travel times were recorded by registration number matching, from LISB records of equipped vehicles passing, and from manual and LISB-based records from two LISB-equipped survey vehicles. Potential explanatory variables recorded included flow, composition, turning movements, parking, and two congestion indicators. The study formed part of a larger project on fundamental aspects of dynamic route guidance systems.

CONTENTS

1. INTRODUCTION

1.1 General

This working paper is one of two describing a study of travel time variability on two main urban routes in Berlin, and is concerned with the methodology and surveys of the study. The first survey round was carried out in the second half in September 1989. A second survey is intended in Summer 1990 during the main school holiday period when traffic flow will be reduced. The objectives of the complete study were:

- to estimate the amount of travel time variability within short time periods and between time periods and between days
- to attempt to explain the observed variability
- to assess the reliability and consistency of link travel time predictions produced by cars equipped as part of the Route Guidance System (LISB).

The study itself forms part of a wider programme of research into the fundamental aspects of dynamic route guidance systems.

The study with which this report is concerned had its origins in earlier work carried out by the Institute for Transport Studies (Montgomery and May (1987), May, Bonsall and Marler (1989)).

1.2 Scope and Limitations of the Study

The project was concerned with measuring car travel times over links on two urban routes, with simultaneous recording of data on traffic flow, composition, on saturation and on obstruction of traffic at and leaving the junctions. All these items were measured as they were considered to be most likely causes of variation of link travel times.

The main limitation of the study is that it is concerned only with the off peak and afternoon peak period, and was also restricted to the North-South direction and to weekdays (Monday to Friday). The period of data collection for the surveys was 1330 to 1800 on Route 1 and 1300 to 1730 on Route 2 with a break of half an hour on each route.

2. DATA COLLECTED

2.1 Selection of Study Routes

In order to measure the amount of travel time variability of cars, sections of major urban routes were sought which had the following characteristics:

i) traffic signal control of major junctions, this being the most usual form of junction control in urban networks;
ii) mixed frontage, to represent the different nature of urban routes through different types of area;
iii) variation of link type but uniform geometry within links;
iv) substantial flow of vehicles equipped with the Route Guidance System.

Five routes were investigated in detail by field visits, in the North, East and South of Berlin (West). They were initially selected to include links with high flow where a substantial number of equipped vehicles could be expected. Most parts of these routes in practice had little variation in link type and frontage activity.

Finally two routes were selected, containing five consecutive links each, which most closely conformed to the above criteria. Survey Route 1 is a main tangential route in the eastern area of Berlin (West) running close to the wall from Müllerstraße/Fennstraße to Entlastungsstraße/Paul Löbe Straße with a total length of 2.93 km. This route typically has two lanes in the survey direction where parking is not permitted.

Survey Route 2 is an outbound radial in the South, leading from Thorwaldsenstraße/ Knausstraße to Röblingstraße/Attilastraße with a total length of 2.82 km. This route varies by type of link, including both one and two way roads with either one or two lanes in the survey direction.

On Route 1, most traffic passes through the whole route, whilst on Route 2 traffic patterns are more mixed, with substantial traffic streams leaving and entering the route in the survey direction. The surveyed routes are shown in a map in Figure 1. On both routes significant congestion can be observed in the afternoon peak, especially on the most southerly link on route 2 as the exit junction surveyed was mostly oversaturated caused by relatively short green phases. The links surveyed on route 1 vary in length between 0.2 km and 1.1 km with traffic flows of 65,000 ADT. The links on route 2 vary between 0.1 km and 1.0 km in length, with somewhat lower flows. Further link characteristics are outlined in more detail in Section 2.5.

2.2 Timing of Surveys

In view of the different traffic conditions which occur at different times of the year, it is intended to split the surveys into two different time periods. Whilst the survey in stage one was carried out in September 1989, the second stage of the survey will be conducted in Summer 1990 during school holidays. Traffic flow profiles have shown that traffic in Berlin is significantly lower in the summer holiday period. The periods surveyed were from Monday to Friday between

13:30 and 15:30\16:00 and 18:00 (Route 1)
13:00 and 15:00\15:30 and 17:30 (Route 2)

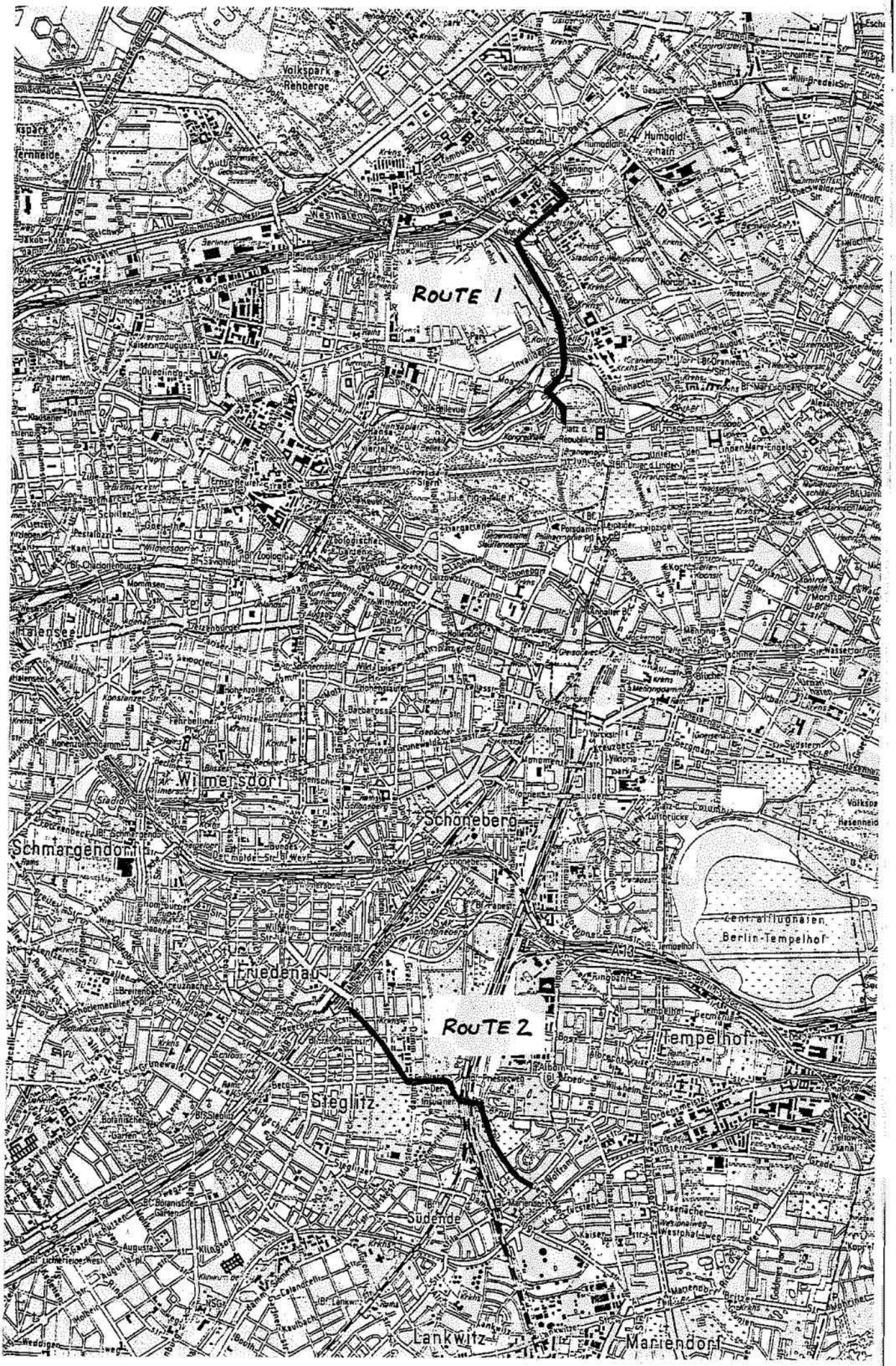


FIGURE 1 : SURVEYED ROUTES IN THE AREA OF BERLIN(WEST)

thus containing the afternoon peak and off peak period. Between the two two hour blocks a break of half an hour was provided to avoid loss of surveyors' concentration whilst working at highly polluted locations.

The surveys on Route 2 began half an hour earlier as the visibility tended to decrease in the late afternoon caused by the one hour change from Summer to Winter time. The weather conditions were clear, sunny and dry during the first week on route 1 whilst in the second week surveyed on route 2 the weather became colder and more cloudy including one rainy day on Tuesday 26 September.

2.3 Explanatory Variables

As the basis for the explanatory variables affecting car travel times and their variability the following data were collected:

i) traffic flows and turning movements entering the link at the most relevant intersections;
ii) traffic composition, as the presence of heavy vehicles might cause an increase of travel times;
iii) whether or not any exit from a junction was obstructed at any time during the cycle;
iv) whether a queue remained at a junction stop line at the end of the green phase, as an indicator of the degree of saturation;
v) recording of lanes blocked by parking vehicles within a specified distance from the stop line;
vi) recording of any other obstructions and incidents like accidents or road works.

Manual data collection techniques were used for the collection of these data by individual signal cycle. Further details are given in Section 3.4.

2.4 Travel Time Surveys

The objectives of the work required data to be collected on the distribution of travel times on links within short time periods, and so it was necessary to collect travel-time data by recording registration numbers and times of passing of a sample of cars at the upstream end of each link, with travel times subsequently being produced by matching the registration numbers at each location.

As an effective method for collecting this data and its analysis, Psion Organisers (small hand-held computers) were used. Further details are given in Section 3.1. In addition, two research vehicles were used in collaboration with the Institute of Traffic and Road Research at the Technical University of Berlin for collecting travel times simultaneously over the survey period. Both vehicles were equipped with the LISB Guidance System and were driven by the Institute's staff. The times of passing the upstream and downstream end of each link were manually recorded by a second in-vehicle observer using a synchronised stopwatch and a prepared list of recording locations. One of these vehicles was also equipped to measure time and space trajectories for each trip on both routes automatically. Further details are given in Section 3.2.

The reasons for using these two research vehicles as an additional source of travel time data were:

i) to test the reliability of link travel times derived by the LISB central computer from telegram data transmitted by each of those equipped vehicles;

ii) to test the consistency of link travel times derived by the Guidance System from the survey vehicles and from individual LISB-equipped vehicles;

iii) to obtain a substantial number of LISB-recorded travel times for the whole section on the two surveyed links, in order to assess the accuracy with which LISB could be used to estimate the mean and distribution of travel times.

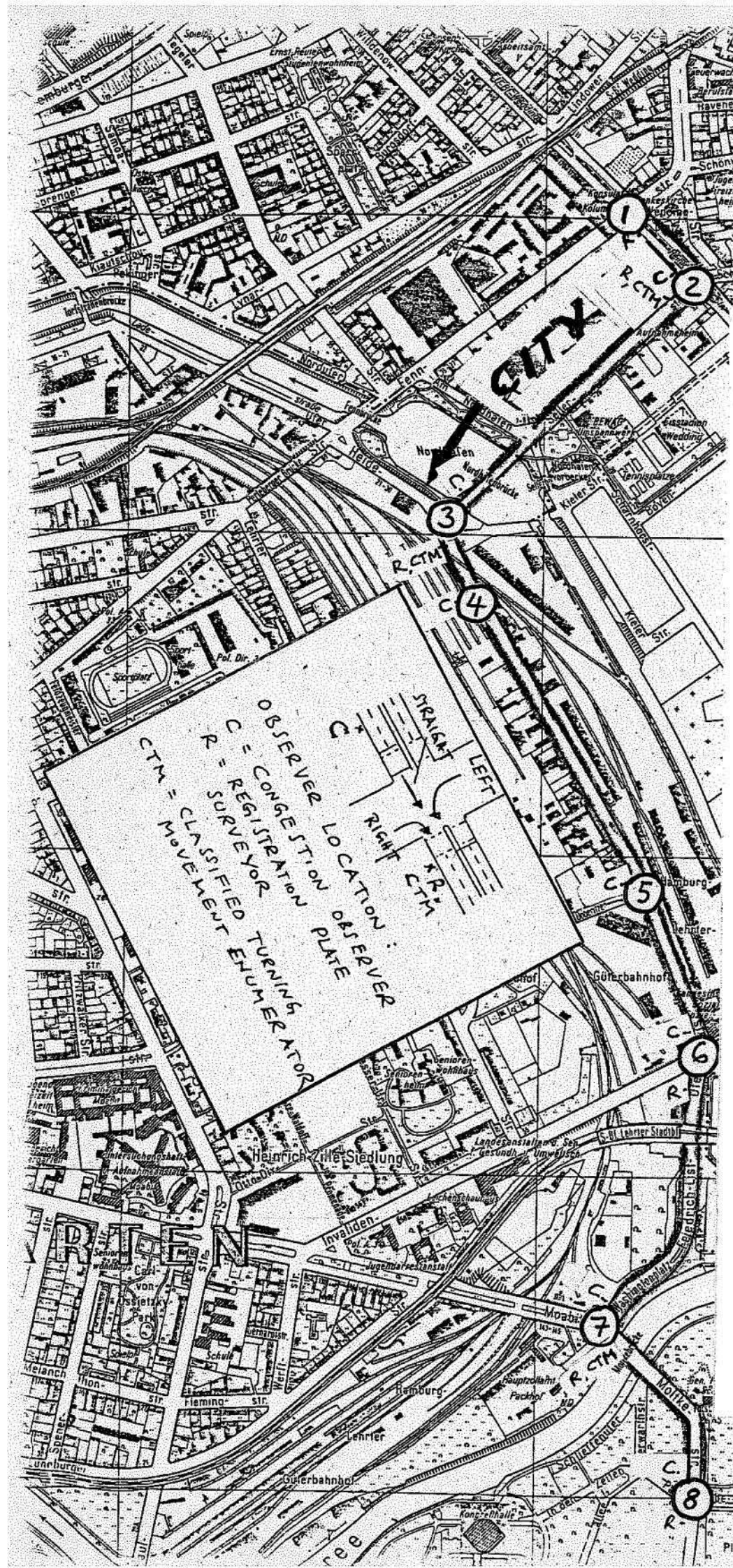
2.5 Survey Locations

The first stage of the survey study was conducted in the second half of September 1989. Figure 2 shows a map of route 1 with the locations where the different surveyors were placed for collecting number plate records, traffic flow and congestion data. This route had eight signalised junctions (numbered 1-8 on Figure 2), but was defined by five consecutive links for which travel times were analysed. These were between Junctions 1 and 2, 2 and 3, 3 and 6, 6 and 7, 7 and 8.

Traffic flows were only collected at locations 2, 3 and 7 where main traffic streams were entering and joining the link in survey direction. The traffic lights at points 4 and 5 operate with semi-actuated signal control mostly showing green. Only if pedestrians or vehicles from the minor road are demanding to cross the main road do the signals change to red for the main directions. At both locations congestion observers were placed, recording the time when the signals went to red.

Route 2 also included eight junctions and was also defined by five consecutive routes between Junctions 7 and 6, 6 and 5, 5 and 4, 4 and 2 and 2 and 1. A map of this survey route is shown in Figure 3. Traffic flow data was collected at locations 7, 5^1, 4 and 2. Junction 5^1 is not signalised but substantial flow is entering the survey link from the north direction of Rubenstraße. Also, this junction is defined by nodes in the LISB network. Traffic lights at Junction 3 operate with semi-actuated signal control showing mostly green as described before for junctions 4 and 5 on route 1.

Link characteristics of each of the five links on both surveyed routes are shown in Tables 1 and 2. Further details about signal program data at the surveyed signalised intersections are specified in Table 3 and 4. Signal cycles change from 70s in the off peak to 90s in the afternoon peak on Route 1, and from 60s to 70s on Route 2. The times of change are indicated in the tables. Table 5 provides the codes used to describe the links in future analysis.



1 Müller/Fenn Str

2 Muller/Seller Str

3 Heidestr/Nord-Hafenbrucke

4 Heidestr/Container-Hafen (an der Fußgangerampe)

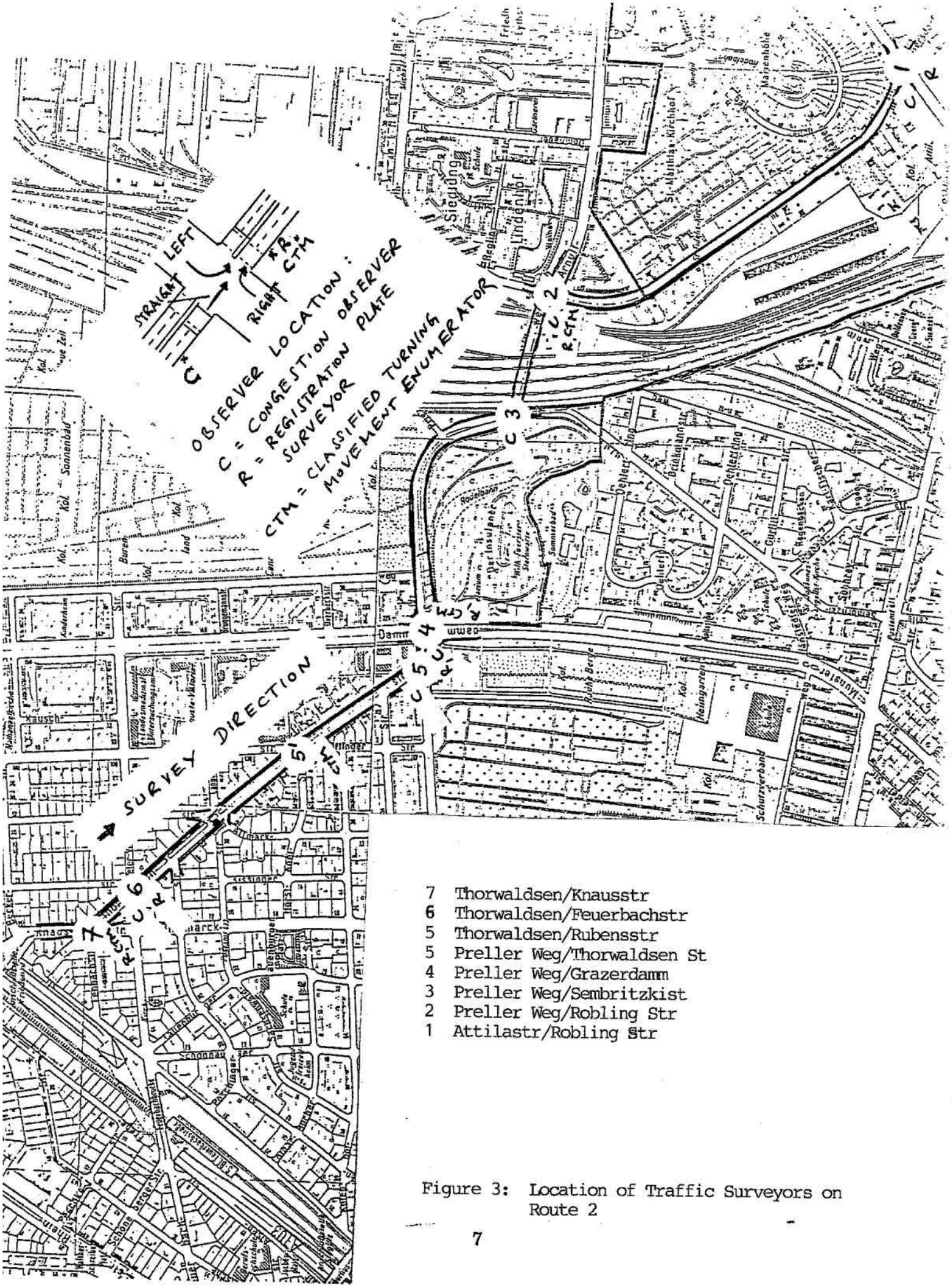
5 Heidestr/Döberitzer Str (an der Fußgängerampel)

6 Heidestr/Invalidenstr

7 Alt Moabit/Moltkesbrücke

8 Entlastungsstr/ Paul Löbe Str

FIGURE 2 : LOCATION OF TRAFFIC SURVEYORS ON ROUTE 1



7 Thorwaldsen/Knausstr
6 Thorwaldsen/Feuerbachstr
5 Thorwaldsen/Rubensstr
5 Preller Weg/Thorwaldsen St
4 Preller Weg/Grazerdamm
3 Preller Weg/Sembritzkist
2 Preller Weg/Robling Str
1 Attilastr/Robling Str

Figure 3: Location of Traffic Surveyors on Route 2

Table 1: Link Characteristics of Route 1

Link No	Length (km)	From (up-stream)	To (down-stream)	No of Lanes	Permitted* Movement	Other Features
1	0.184	1	2	3	all	No parking permitted, bus stop, residential area with shopping, 3 lanes in each direction divided, 2 right turn lanes in main survey direction at downstream end.
2	0.658	2	3	2	straight, right	No parking permitted, but parking at right angle across kerb, two lanes in each direction undivided, small (minor) entries/exits on right hand side.
3a	0.264	3	4	2	straight, right	Parking permitted, railway crossing (50 m ahead of 3), two lanes (not marked) in each direction, undivided, semi-actuated signal control at downstream end.
3b	0.393	4	5	2	straight, right	Parking permitted, petrol station right side, small minor entries/exists on right and left hand side, in each direction undivided, semi-actuated signal control at downstream end.
3c	0.454	5	6	2	all	Parking permitted, petrol station right side, small (minor) entries/exits right hand side, two lanes (not marked) in each direction. Link 3 in total length: 1.110 km, industrial area.
4	0.576	6	7	2	left, right	Parking permitted, bus stop, main survey direction turns left at end, two lanes in each direction partly divided partly undivided.
5	0.397	7	8	2	straight,	Parking permitted, two lanes in each direction, partly divided and partly undivided, open space (Tiergarten).

* at downstream end

Table 2: Link Characteristics of Route 2

Link No	Length (km)	From (up-stream)	To (down-stream)	No of Lanes	Permitted* Movement	Other Features
1	0.127	7	6	2	all	Parking permitted on right and also on left side; two-way divided, residential area.
2a	0.467	6	5[1]	1	all	Parking permitted on right kerbside, not signalised, two-way divided.
2b	0.325	5[1]	5	1	straight, right	Parking permitted on right kerbside, two-way divided.
3	0.080	5	4	5	all	No parking permitted, traffic actuated control but with constant settings in (straight) survey direction. Two-way divided.
4a	0.400	4	3	2	straight, right	Bus lane, no parking permitted from 1500 to 1800, semi-actuated control, two-way divided.
4b	0.440	3	2	2	all	No parking permitted, main survey direction on right at downstream end, two-way undivided.
5	0.987	2	1	1	all	No parking permitted, bus stop at downstream end, two-way undivided.

* at downstream end

Table 3: Details of Signal Programme Data - Route 1

Junction	Signal Cycle(s)	Green Time(s) +		Time of Day	Day of Week
1	70	15(↳)		1300-1500	MON-FRI
	70	17(↳)		1500-1530/1730-1830	
	90	25(↳)		1530-1730	
2	70	23(↴)		1300-1500	MON-WED
				1300-1400	THU
				1300-1330	FRI
	70	28(↴)		1500-1530/1730-1830	MON-WED
				1400-1500/1730-1830	THU
				1330-1430/1730-1830	FRI
	90	44(↴)		1530-1730	MON-WED
				1500-1730	THU
				1430-1730	FRI
3	70	40	{	1300-1500	MON-WED
			a{	1300-1430	THU
			{	1300-1330	FRI
	90	58	{	1500-1800	MON-WED
			b{	1430-1800	THU
			{	1330-1800	FRI
4	70	35*)		as a above	
	90	59*)		as b above	
5	70	47*)		as a above	
	90	67*)		as b above	
6	70	36		as a above	
	90	51		as b above	
7	70	38		as a above	
	90	53		as b above	
8	70	41		as a above	
	90	60		as b above	

*) only if demand in minor direction

+) green time relates to main survey direction

Table 4: Details of Signal Programme Data - Route 2

Junction	Signal Cycle(s)	Green Time(s)+		Time of Day	Day of Week
7	60	20		1300-1800	MON-FRI
6	60	28		1300-1800	MON-FRI
5	60	20	a{	1300-1500	MON-THU
			a{	1300-1430	FRI
	70	25	b{	1500-1800	MON-THU
			b{	1430-1800	FRI
4	60	20		as a above	
	70	24		as b above	
3	60	33*)		as a above	
	70	40*)		as b above	
2	60	34		as a above	
	70	44		as b above	
1	60	14		as a above	
	70	21		as b above	

*) only if demand in minor direction
+) green time relates to main survey direction

Table 5: Link Codes

Route 1

Link No	Junctions	Code
1	1-2	MS
2	2-3	HN
3	3-6	HI
4	6-7	AM
5	7-8	EP

Route 2

Link No	Junctions	Code
1	7-6	TF
2	6-5	PT
3	5-4	PG
4	4-2	PR
5	2-1	AR

3. DATA COLLECTION METHODS

3.1 Travel Time Data Collection using Static Observers

Travel time data was mainly collected by using 'Psion Organisers' hand held computers. This method was found to be very useful as described and used in several surveys (eg. Bonsall et al (1988), May, Bonsall, Marler (1988)).

For the surveys Psion Organisers were used with 32k RAM. The Psions were loaded with software produced at the Institute for Transport Studies, designed for the capture and automatic timing (to the nearest second) of vehicle registration numbers.

Number plates of cars registered in Germany have normally up to 7 items including letters and numbers, as for example B-K7549, B-CD375 or B-OD25. Letters in front are specifying the area of Germany where the car is registered; B indicates the city of Berlin (West).

The number plates were recorded by using the last four alphanumeric characters only, which can have from 2 to 4 digits; 4-digits are the most common format for cars in Berlin (West).

The 4-item registration number was entered into the Psion via the keyboard and the time recorded as a specified key was pressed.

Three special character keys were programmed to enter the registration number into the machine according to whether the car had entered the link from the right, from straight ahead or from the left.

The data file thus created in the Psion consisted of a header line with the date and location typed in before the start of the survey, followed by the data lines each of which gave the time, registration number and direction symbol.

It was found that the Psion 32k RAM could hold in its memory between 2400 and 3000 registration numbers in the format described. This was always sufficient for a four hour period of daily data collection at the surveyed junctions.

On the observations only light vehicles were considered, excluding taxis. To maximise the sample size of matchings furthermore only specified car colours were considered with priority given to white cars. When no white cars were available red cars were recorded. A previous pilot in Berlin had shown that these two colours were the most frequent ones, with the number of white cars exceeding that of red cars by a ratio of 3 to 2.

Irrespective of the method used, the registration number surveyor was instructed to stand at a specified location 15-20 metres downstream of the junction, as this was found to be the best location to see the registration plates of vehicles coming straight or joining the route from the left or the right. It also normally avoided the problems which would have occurred of getting an accurate time for cars moving slowly in a queue upstream of the junction. Surveyors were instructed to enter the registration number as close as possible to the time the car actually passed the specified point.

In practice this was difficult to do in heavy and continuous traffic and numbers were often entered up to about 3 seconds late. However, this effect was similar for

all locations so the resulting errors are probably small. With this approach, travel times on a link included junction delays at the downstream junction.

The instructions issued to the surveyors collecting registration numbers are given in Appendix 1.

3.2 Travel Time Data Collection using Moving Observers

The method of travel time data collection by using two moving research vehicles has been already outlined in Section 2.4.

The vehicles were cruising around on a circuit on each route during the whole survey period. The locations of the start and end of each journey are shown in Figures 4 and 5 which represent the surveyed part of the LISB network. The start and end points coincided with LISB beacons, to maximise the data collected. The beacons passed at the beginning and end of each journey are numbered as follows:

1005 or 1033	-	7042	Route 1 in survey direction
7043	-	1005 or 1033	Route 1 in opposite direction
13106	-	16045 or 16066	Route 2 in survey direction
16045 or 16066	-	13106	Route 2 in opposite direction

Whilst number plate records were only collected at six of the eight specified junctions within each link section on both routes, the moving vehicle observers were recording the passing times at all of the eight junctions shown in Figures 2 and 3. Additionally, some junctions were also considered beyond the end of Route 1 in the survey direction, where the surveys were extended by TUB. This was undertaken in order to obtain travel time data for both main links at beacon intersection 17026, which has flow and occupancy detectors. The number of journeys was between 9 and 11 for each vehicle within a daily survey period of 4 hours which represents one journey per 15 minutes at least.

3.3 Traffic Flow Data Collection

Traffic flow data was only collected at those downstream junctions where relevant traffic streams are leaving or entering the surveyed link section.

Surveyors were issued with clipboard, survey forms to record classified turning movements, pencil and synchronised digital watch, plus transparent polythene bag for rainy conditions. The surveyor stood just downstream of the junction, close to the location of the registration number surveyor, as this was the place where the turning movements and vehicle classes could most easily be seen without visual obstructions from large vehicles in a slow moving or stationary junction queue.

The surveyor recorded the number of vehicles in two classes: light or medium, and heavy. Heavy vehicles were all those with a gross vehicle weight of more than 7.5T; these were transport vehicles, lorries and buses. Light and medium vehicles were all those under 7.5T. Motorcycles were not counted. Vehicles were recorded separately as travelling straight, or turning left or right out of the downstream end of the previous link. The unit of recording was one cycle. The surveyor recorded, to the nearest second, the start of green from the upstream link, and then entered a symbol in the 'left', 'right' or 'straight' box on the form according to whether the vehicle was light/medium or heavy. At the start of the next green the process was repeated on the next line of the form.

The instructions for the surveyors and the forms used are given in Appendix 2.

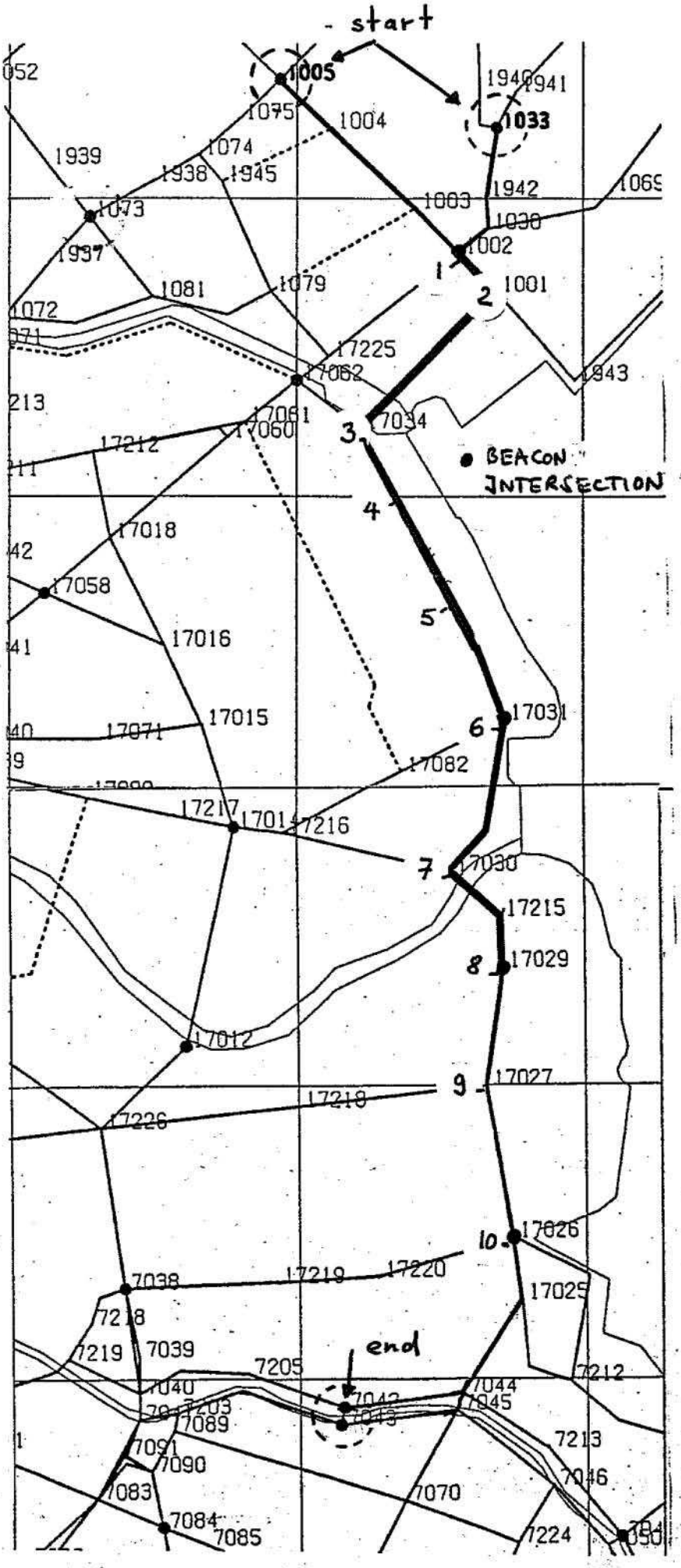


FIGURE 4 : CIRCUIT OF RESEARCH VEHICLES ON ROUTE 1 WITH PART OF THE LISB NETWORK

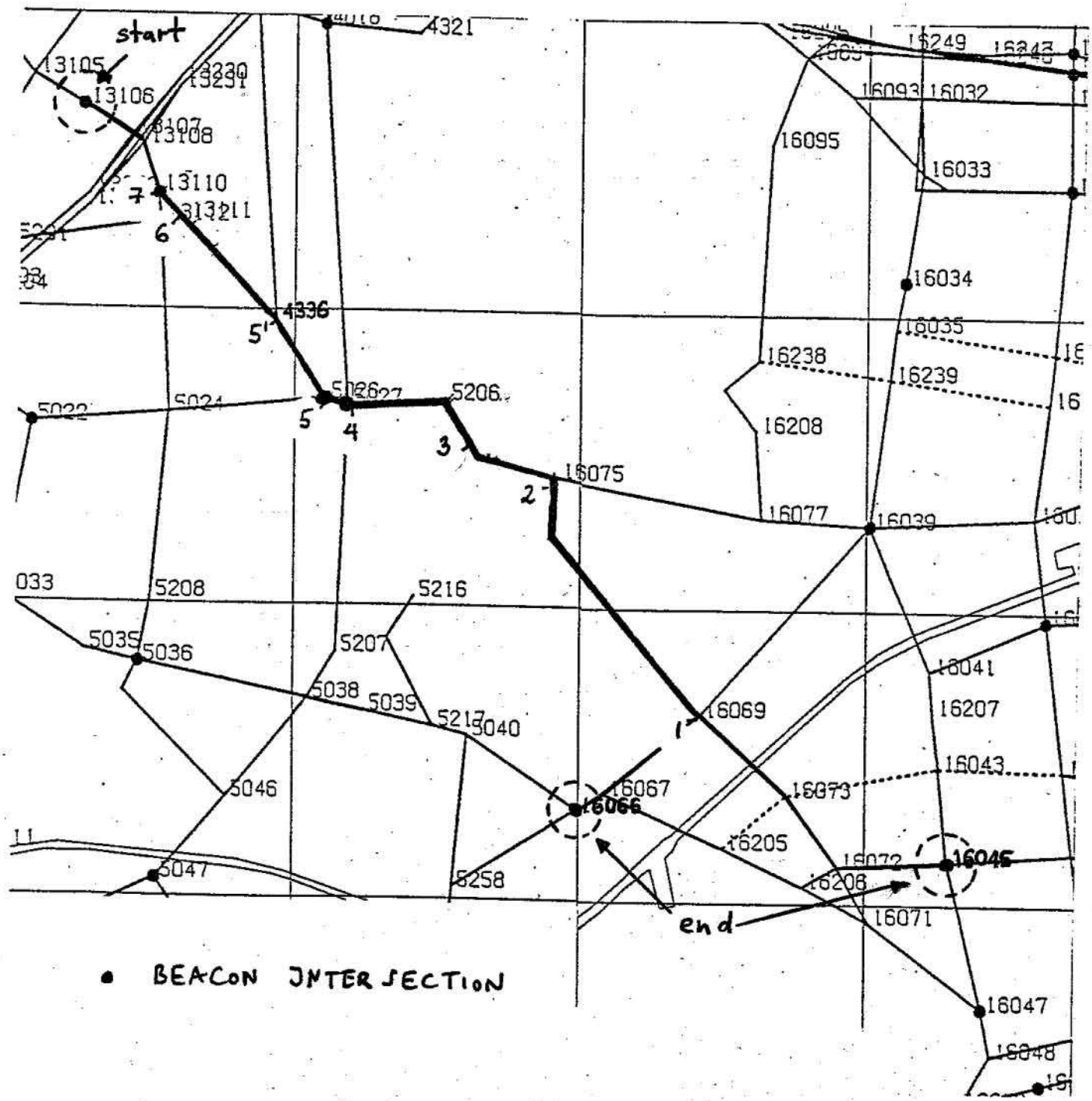


FIGURE 5 : CIRCUIT OF RESEARCH VEHICLES ON ROUTE 2 WITH PART OF THE LISB NETWORK

On Route 1 three junctions were identified where a relevant change of traffic flow could be expected whilst on Route 2 four junctions were selected to record flow data.

3.4 Congestion Data Collection

At the most important junctions information was collected on four items believed to be likely to influence travel times. These were whether or not any exit from the junction (left, straight or right) was obstructed at any time during the green period. Normally, this blocking was due to traffic backing up on the downstream link or on the roads to left or right or, in the case of right-turners, to obstruction from crossing pedestrians as their lights show green simultaneously. The second item recorded was whether or not a queue remained at the stop-line in the main survey direction during the first 3 seconds of red. The third item was the presence of parked vehicles, both upstream and downstream within 50m of the stop-line. The final item of data recorded was the occurrence and duration of any incident in or close to the junction, which could affect travel times, such as accidents or road works. All these items were recorded in appropriate boxes on the form. Each line on the form related to a single cycle of the lights. Also, the beginning and end of green time was recorded to the nearest second, using a synchronised stopwatch. The surveyor was located 20m upstream of the stop-line.

At locations 4 and 5 on Route 1 and at Junction 3 on Route 2, where the traffic lights operate with semi-actuated signal control, the duties of the surveyors were slightly modified. Traffic lights on the main road normally show green and only when pedestrians or vehicles from the minor road wish to cross (5 to 15 times per hour) is the green interrupted. At these locations the surveyors made their statements on the form every minute, as the lights showed green continuously. If green was interrupted the time of the signal change was recorded with an estimation of the number of vehicles stopped.

The instructions and standard forms used for this part of the survey are given in Appendix 3.

3.5 Day-to-Day Supervision and Organisation

A supervisor was allocated the task of day-to-day preparation of the survey materials, checking on survey personnel, standing-in in case of absence, collecting equipment and completed forms, etc, and keeping a record of general traffic conditions, weather and personnel deployment and problems. The supervisor had the duty of preparing all clipboards with the correct number of forms and ensuring all equipment (pencils, watches, etc) was present and operating correctly. It was his duty also to check the digital watches every evening and ensure they were synchronised (it was found that some watches could 'drift' by a few seconds per day). On Fridays, he had to ensure that each surveyor had a slip showing his or her duty in the coming week, with a map of the location and information on public transport access. He was also required to keep time records for the survey personnel.

Each survey day, the supervisor arrived at the section of route to be surveyed about an hour before the survey began. He always used a push bike for riding down the links, which was found to be very useful considering the relatively short length of both routes and their parking restrictions.

Surveyors were instructed to be in position between 15 and 30 minutes before the start of the survey (eg 1300-1315 on Route 1). At 1300, the supervisor would be at

the most northerly point to receive the prepared Psion Organisers. He would then ride south and hand out the appropriate equipment (Psion Organisers, stopwatches and forms) to the surveyors at all of the specified locations. The last one was normally reached 5 minutes before the survey began.

During the survey period he would then spend most of the time visiting each location to check on the surveyors' work, ensuring that items were being correctly recorded and that form headings were complete and correct.

Before the end of the survey period the supervisor rode to the most northerly point and collected the equipment from each location by riding down the route. Surveyors were instructed to wait where they were to have their data and equipment collected.

After all data was collected the supervisor went to the Institute of Traffic and Road Research at TUB to download the data recorded with the Psion Organisers. After this process the Psion Organisers were cleared and set up with the survey codes for the next survey day. Every second day the batteries of the Psions were changed, and also the internal clocks of all machines were synchronised again.

3.6 Personnel, Pilot Surveys and Training

The observer personnel were recruited from students with the help of the Students' Job Service (TUSMA) at Technical University of Berlin. There was no difficulty in finding and selecting the necessary number of 16 students. These students were invited to a meeting at the Institute where general information about the survey methods and background were given and discussed. The prepared instruction lists and general notes about the surveys were handed out to the surveyors explaining the different duties of the job on the survey tasks. After this, the students were selected for their different functions on the job as registration number plate surveyor, congestion and traffic flow enumerator.

Two pilot surveys were conducted each for one hour at the intersections of Route 1 to ensure surveyors' familiarisation with the equipment and the local traffic conditions, and also to test the survey methods.

The first pilot was conducted on 12 September with only the congestion and traffic flow enumerators whilst the second pilot was held on 15 September with only the crew of the registration number plate surveyors. The analyses of the data collected showed a sufficient rate of matched vehicles when only white and red cars were considered as a sample of traffic flow.

4. REFERENCES

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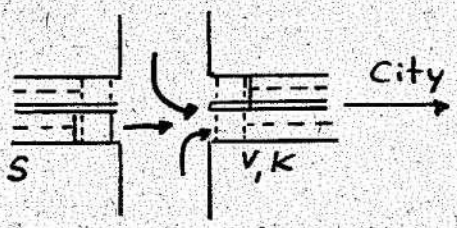
APPENDIX 1: GENERAL INSTRUCTIONS TO THE SURVEYORS

Allgemeine Hinweise für das Meßpersonal :

0. Beobachtungsstandorte :



S = Staubeobachter

V = Verkehrsmengenzähler

K = Kennzeichenerfasser

1. Wetterfeste Kleidung mitbringen, da die Untersuchungen auch durchgeführt werden, falls es regnet

2. Immer pünktlich am Beobachtungsort erscheinen (d.h.,gewöhnlich 30 Minuten vor dem eigentlichen Meßbeginn). da die Ausgabe der PSION-Computer..Stoppuhren immer zwischen 7.00 - 7.20 erfolgt

3. Immer darauf achten, daß ihr alle Meßinstrumente (PSION,Stoppuhren, Beobachtungs/Zähllisten, Bleistift) ausgehändigt bekommt und ausreichend ausgerüstet seid.

4. Die allgemeinen Angaben im Header der jeweiligen Zähllisten immer vollständig ausfüllen (am besten vor Beginn der Messung)

5. Dauer der Messungen.....

6. Nach Ende der Messung jeden Tag abgeben :

   - ausgefüllte Zähllisten

   - Stoppuhren } da diese wieder synchronisiert ,entladen
   - PSION -Computer } werden müssen, Batteriewechsel

7. Am Ende der Woche erkundigen bzw. sicher sein,an welchen Standorten sich die Beobachter am nächsten Montag einzufinden haben

8. Immer angeben,in welchen Zeitintervallen eventuell Fehler beim Messen aufgetreten sind,.. Probleme während der Beobachtung ?? ..mögliche Abhilfe ??

9. Falls ihr aus irgendwelchen Gründen nicht anwesend sein könnt, dann ist es immer <u>wichtig</u> den Einsatzleiter zu informieren

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INSTRUCTIONS TO SURVEYORS

COLLECTING REGISTRATION NUMBERS

Kennzeichenerfassung mit dem PSION-Computer :

1. Die Hinweise solltet ihr sorgfältig durchlesen und immer bei euch haben !

2. Immer pünktlich am jeweiligen Meßort erscheinen, d.h., 30 Min. vor dem offiziellen Meßbeginn (z.B. 7.00 Uhr). Der Einsatz - leiter wird immer zwischen 7.00 - 7.25 Uhr an den Standorten erscheinen und die vorbereiteten Computer austeilen. Bevor er wieder weiterfährt, checken , ob der PSION-ORGANISER aufnahme- bereit ist.....'On'-Taste drücken..es erscheint dann die Frage 'Do you want to start survey ?'(Willst Du mit der Messung be - ginnen ?)...'N'-Taste drücken = No, der Computer fällt dann in den Schlaf, bis er wieder gebraucht wird.

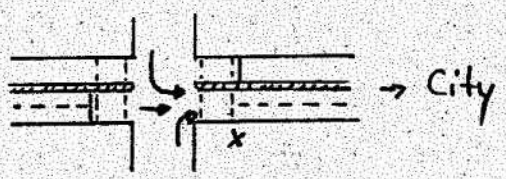
3. 5 Minuten vor Meßbeginn (z.B. um 7.25 Uhr, ggf. Kollegen mit der Stoppuhr fragen) den Computer aufwecken.....'On' -Taste drücken....es erscheint wieder die Frage 'Do you want to start survey ?.....'Y'-Taste = Yes drücken. Danach erscheint die Frage 'Regno?' (= Kennzeichenerfassung ?). Zu diesem Zeitpunkt sollt ihr euren Beobachtungscode eingeben (siehe Liste)...z.B. ..MS25SE...und danach die markierte 'K'-Taste (rechts unten) drücken.

   Achtung ! : Bei der Eingabe von Buchstaben immer gleichzeitig 'SHIFT'-Taste (links unten) drücken.
   Falls der Beobachtungscode falsch eingegeben wurde
   1. 'K'-Taste drücken
   2. Richtigen Code eingeben
   3. Erneut 'K'-Taste drücken

   Mit der Kennzeicheneingabe nicht früher als z.B.7.25 und nicht später als 7.30 Uhr beginnen.

   Achtung ! : Der Computer fällt automatisch in den Schlaf (An - zeige erlischt auf dem display), wenn er ein paar Minuten nicht benutzt wurde. Falls dies gelegent - lich auftreten sollte, kann man ihn mit der 'ON' - Taste wieder aufwecken bzw. betriebsbereit machen.

4. Der Beobachtungsstandort am jeweiligen Knotenpunkt liegt immer hinter der Kreuzung (ca.10-20m,z.B.Ende des Fußgängerüberwegs)



Nicht Kennzeichen eingeben, solange die Fahrzeuge an der LSA noch stehen,sondern erst dann, wenn sie anfahren und tatsäch - lich den Meßquerschnitt passieren werden. Dazu ist das Kenn - zeichen einzugeben und beim Durchqueren des Querschnitts (Fuß- gängerüberweg) eine der drei markierten (Zeit) -Tasten zu drücken.

5. Immer nur die letzten 4 Ziffern des Kfz-Kennzeichens eingeben,

z.B...B - A 9698.....=> 9698
B - CD 375.....=> 375
B - OD 26.....=> 26

} danach eine der entsprechenden ↳ ↱ → Tasten drücken !

6. Welche Fahrzeuge sollen registriert werden ?

- N u r P k w ,aber keine Taxis und Fahrzeuge mit ausländischen Kennzeichen

- Zwecks einheitlicherer Erfassung werden nur Pkw's registriert, die eine bestimmte Farbe haben !

=> Unbedingt *alle weißen Pkw*, die den Querschnitt passieren.
Weiß bedeutet wirklich weiß und nicht beige,cremefarben, grau.
Weiße Pkw mit farbigen Dächern..Streifen..Aufdrücken..,.zählen als weiß und werden registriert.
Falls ihr nicht sicher seid, ob ein Pkw tatsächlich weiß ist, dann registriert diesen trotzdem,aber auch nur dann,wenn wirklich kein anderer-tatsächlich weißer-Pkw in Sicht ist.

T i p : Schaut euch die Pkw (so weit möglich) an, die an der Signalanlage zum Halten kommen, um abzuschätzen, welche Pkw-Farben den Querschnitt passieren werden.

=> falls keine weißen Fahrzeuge in einem Signalumlauf auftreten sollten-und auch nur dann!-, sollen *alle roten Pkw* registriert werden.

7. Falls mehrere weiße Pkw hintereinander den Meßquerschnitt passieren, dann versucht, so viel wie möglich davon zu registrieren. Es ist jedoch besser, ein oder zwei Kfz auszulassen, um zu große Ungenauigkeiten beim Registrieren zu vermeiden.

8. Die Kennzeichen-Nummer wird durch die Bedienung der passenden Ziffern-Tasten eingegeben. Die drei (Zeit)-Tasten befinden sich oben rechts und sind markiert.

Die Fahrzeuge aus der Geradeausrichtung treten in der Regel immer zu bestimmten Zeitpunkten innerhalb der Signalumlaufzeit auf während Einbieger von Links und Rechts hingegen relativ unregelmäßig auftreten. Das kann die Kennzeichenerfassung erleichtern (insbesondere, wo Links -bzw. Rechtseinbiegen nicht erlaubt oder nicht möglich ist)

9. Sofort, wenn ihr eine der ↳ ↱ → -Tasten gedrückt habt, ist der aktuelle Zeitpunkt, zu dem das Fahrzeug den Querschnitt (Fußgängerüberweg) passiert hat, automatisch gespeichert.
Daher, drückt sofort die richtige Taste, nachdem ihr das Kennzeichen eingegeben habt.

10. Wenn ein Kennzeichen falsch eingegeben wurde, dann drückt die entsprechende ↳ ↱ → -Taste trotzdem. Danach ist das richtige Kennzeichen einzugeben und die markierte 'K'-Taste (unten rechts zu drücken, wodurch eine Korrektur erfolgt. Solche Korrekturen jedoch nur dann vornehmen, wenn ausreichend Zeit vorhanden ist und keine weiteren weißen Pkw vorbeikommen.
Falls richtiges Kennzeichen und falsche ↳ ↱ → -Taste bedient wurde, dann ist das Kennzeichen erneut einzugeben und die richtige ↳ ↱ → -Tasten zu drücken.

Achtung : Nur dann Korrekturen vornehmen, wenn der Fehler bei der z u l e t z t vorgenommenen Kfz-Eingabe gemacht wurde. Versucht nicht Fehler zu bereinigen, die ihr bei vorhergehenden früheren Kfz-Daten gemacht habt !

11. Ihr werdet bemerken, daß der Computer einen Piepton von sich gibt, nachdem ihr vier Ziffern eingegeben habt, zur Erinnerung/Kontrolle, daß 4 Ziffern maximal eingegeben werden sollen. (nicht immer zu hören, bei lauten Verkehrsgeräuschen)

12. Bei Regen ist der Computer in die durchsichtige Plastikfolie zu legen, so daß das ganze Gerät umhüllt ist.

13. Bei Eingabe der Kennzeichenziffern die Tasten fest drücken. Erst nach vollständiger Eingabe des gesamten Kennzeichens die Richtigkeit im Display anschauen und überprüfen bevor ihr eine der drei ↳ ↱ → -Tasten drückt.

14. Beendet die Eingabe um ..... und macht für ..... Minuten Pause.
Erneuter Beginn der Messung um .....
Kurz davor den Computer wieder mit der 'ON'-Taste aufwecken und wie zuvor Kennzeichen + (Zeit)-Tasten bedienen.

Ende der Messungen um .....
Der PSION-Computer schaltet sich automatisch aus

15. Warten bis der Einsatzleiter am Beobachtungsstandort eintrifft Aushändigung der Geräte sowie eventuelle Probleme bei der Datenaufnahme dem Einsatzleiter mitteilen.

16. Innerhalb der Woche von Montag bis Freitag immer am gleichen Ort zur gleichen Zeit erscheinen. Am Freitag kurz vergewissern wo jeder Einzelne am nächsten kommenden Montag zu erscheinen hat.

Ausrüstung : -PSION - Computer
-Regenhülle
-Liste mit Hinweisen zur Messung und Beobachtungs codes der Knotenpunkte
-Armbanduhr (vom Beobachter mitzubringen und eventuell mit den Stau/Verkehrsmengenzählern bezüglich der Uhrzeit überprüfen)

APPENDIX 2: INSTRUCTIONS AND SURVEY FORM FOR CLASSIFIED TURNING MOVEMENT SURVEYORS

Verkehrsmengenzählung für jeden Signalumlauf

ORT	DATUM	BEOBACHTER	WETTER
Müllerstr./Sellerstr.	25.9.		trocken

LINKSEINBIEGER →		RECHTSEINBIEGER ↱		VON GERADEAUS →		GRÜNBEGINN BEZ. AUF GER →		
PKW	LKW	PKW	LKW	PKW	LKW	STD	MIN	SEK
				𝍸 𝍸 𝍸 𝍸 𝍸 II	III	07	45	18
II		𝍸 I		𝍸 𝍸 𝍸 III	𝍸		46	28
III	I	III	I	𝍸 𝍸 𝍸 II	I		47	38

- Standort des Beobachters : ca. 10-20m hinter der Kreuzung in gleicher Höhe, wo die Kennzeichen erfaßt werden.

- Unterscheidung bezüglich der Einbiegerichtung :

  ↳ von Links , ↱ von Rechts , → von Geradeaus

- Unterscheidung bezüglich der Fahrzeugart :

  Pkw (Lieferwagen, Kleintransporter, Pkw+Anhänger)

  Lkw (Transporter >7.5to, Busse, Sattelschlepper)

- Motorräder..Mofas werden nicht registriert

- Notieren des Zeitpunkts wann Grünbeginn..bezogen auf Fahrzeuge, die aus der Geradeausrichtung kommen. Da das Signal vom Beobachter jedoch nicht unmittelbar eingesehen werden kann, entweder den Zeitpunkt notieren, wann die Fahrzeuge an der Haltlinie anfahren oder den Grünbeginn für die Gegenrichtung eintragen

APPENDIX 3: INSTRUCTIONS AND SURVEY FORM FOR CONGESTION DATA SURVEYORS

Staubeobachtung für jeden Signalumlauf

ORT			DATUM			BEOBACHTER			WETTER		
Hallerstr./Sellerstr.			25.9.						trocken		
GRÜN-BEGINN			GRÜN-ENDE			STAU WÄHREND DER GRÜNZEIT			PARKEN IN 2. SPUR		HALTENDE FAHRZEUGE BEI GRÜNENDE	ANDERE STÖR-EINFLÜSSE IM VERKEHRSABLAUF
STD	MIN	SEK	STD	MIN	SEK	↰	↑	↱	50m vor	50m hinter		
07	45	18	07	45	50		X				X	
	46	28		47	00					X		
	47	38		48	10							

- Standort des Beobachters : ca. 25m vor der Haltlinie

- Grünbeginn eintragen

- Grünende eintragen (insbesondere, wenn die Dauer der Grünzeit nicht regelmäßig ist)

- Stau während der Grünzeit :
  Fortlaufend beobachten, ob eine oder mehrere Fahrspuren blockiert sind. z.B., wenn Stau..Stop&Go - Verkehr auftritt, so daß Fahrzeuge zum Halten kommen und/oder sehr langsam fahren (zähflüssiger Verkehr), dann ist dies einzutragen (x).
  Kein Stau, wenn Fahrzeuge kontinuierlich -ohne Behinderung- den Knotenpunkt passieren.

- Parken in 2.Spur :
  Wenn Fahrzeuge in der Fahrspur anhalten und kurzfristig parken (sogenanntes Parken in 2.Reihe) jeweils 50m vor und hinter der Kreuzung, dann entsprechend eintragen (x)

- Haltende Fahrzeuge bei Grünende :
  Wenn das Signal auf Rot schaltet, beobachten, ob Fahrzeuge zum Halten kommen und entsprechend eintragen (x)

- Andere Störungen im Verkehrsablauf :
  Alle Behinderungen, die zusätzlich den Verkehrsablauf beeinflussen (z.B. Straßenreinigungsfahrzeuge...Rettungsfahrzeuge mit Blaulicht Ausfall der Signalanlage Wartungsarbeiten..etc.)

- Vorbereitung zur Erfassung des Grünzeitbeginns für den nächsten Signalumlauf