CITY OF YORK COUNCIL

ANNEX E

NETWORK MANAGEMENT

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Briefing Note

'Journey times and reliability of public transport

Background

This note has been prepared so as to inform the Traffic Congestion Ad-hoc Scrutiny Committee concerning the above topic.

Introduction

reliable
• **adjective** able to be relied on.
— DERIVATIVES **reliability** noun **reliably** adverb.

From this dictionary definition the term 'reliability' can clearly be seen to mean something that can be relied upon to do what is expected, to behave as expected – and in the case of a bus service to arrive and depart from a bus stop when expected. The reliability of any bus service is thus fundamentally to be measured by the ability of that bus service to keep to its published time table. For a user it is immaterial what that time table actually is. The measure of a customers ability to use that timetabled service solely relates to the ability of that service to stick to that timetable. Fundamentally users can and will tolerate a degree of late running but early running is, for a customer, the same as the vehicle never arriving.

A 100% reliable bus service will thus always run to its published time table. A service that is considered by the public to be reliable will be one that always arrives when the timetable says it will arrive or within a minute or so of that published time. In terms of that 'published time' this could either be as stated on a printed timetable or as is increasingly the case, as advised by in shelter real time information or direct to mobile phone text information (ie dynamic timetable data)

This paper examines how bus services within York perform relative to their printed and dynamic time tables. Of necessity the information is [a] a snapshot in time and [b] relative only to a proportion of services. Care must therefore be taken in drawing too general a set of conclusions. It must also be said, however, that there is nothing to suggest that the snapshot is atypical. The services examined in detail form the backbone of the public transport function in the city and thus

should also be representative in a broad sense of the performance of the rest of the services.

The services examined were:

2,**3**,4,6,**7,8**,**9**,10,11,12,18.

(Services in bold are Park and Ride services)

These services were selected because all are BLISS enabled. The surveys undertaken therefore had the dual purpose of comparing actual on street performance relative to the published timetable for each service and the actual arrival times as seen on street with the information being predicted by the BLISS software. This latter is the basis of the published arrival times at BLISS enabled bus stop displays (Passenger Information Panels (PIPS)), through the text system now under pre launch tests and on the web site (also under pre launch tests). Because of the labour intensive nature of the surveys only Services 2 and 10 were completely surveyed throughout the full day. Other services were sample surveyed on different days as resources became available. The information obtained is thus a collection of 'snapshots' rather than an attempt to provide comprehensive definitive information.

The BLISS system itself was used to monitor the number of BLISS enabled vehicles working on each service. As this is an electronic system the survey period here was over a continuous period of several days.

Discussion

Facts

Timetables.

Given that in any town or city in the country there is more traffic using the roads in the two peak hours journey times in those peak hours will be greater than off peak. The greater the volume of movement in the peak hours the slower will be the journeys. In York travel conditions in both peaks are such that the majority of junctions operate above their practical capacities and hence congestion is an ever present reality.
Anecdotal evidence suggests that the general public respond to these conditions by allowing extra time when travelling by car during the peak hours. It would therefore to be expected that bus services, which are clearly also affected by the same increase in traffic volumes, would operate a time table that anticipated peak hour delays both from increased vehicle use and from increased passenger patronage at such times (see 'dwell time' and 'access delays' below for an explanation of the linkage. In other words, all other factors being equal, in the peak hours the frequency of a service would reduce so as to allow for the extra delays and additional journey time would be built into the running.

For the services examined only one service displays this characteristic in its published timetable.

The above fact could be explained by one of the following:

- Additional buses are used during the peak hours
- The timetable is set so as to be correct during both peaks with drivers instructed out of peaks to observe timing points so as to ensure no early running
- The services concerned operate on routes dedicated to public transport at points where congestion is present, (ie Bus Lanes)
- The published data is not accurately reflecting how the operators run their service in practice

Clearly a combination is possible.

In terms of the use of additional buses the BLISS system can identify how many buses are operating upon a particular route. This is however, subject to each of the buses operating that route being equipped with the necessary global positioning system and transmitter.

In terms of the use of timing points it would be expected that this system would eliminate any early running and thus on street surveys would not find any early running vehicles.

With regard to the use of Bus Lanes whilst York has some and these do allow buses to bypass the worst of congestion on a particular road, there are no services operating on wholly dedicated bus lanes and thus all experience traffic congestion typically with the city centre where it is of course at its worst.

External factors which would affect reliability

Public transport is clearly largely subject to the same congestion as other vehicles (the exception is of course where there are Bus Lanes). It is a fact that the degree of congestion within the city and on the core highway network, varies day to day and road to road. The variation is caused by a combination of factors amongst which are:

- Road works
- Holidays
- Time of year
- Weather
- Dwell time (ie length of time a bus is stationary at a stop, this being a function of the number of passengers getting on (or off) the bus at that stop)
- Access delays (ie the lost time in a journey which occurs because a bus has to physically stop at a bus stop and then regain its place in a stream of traffic.)

Irrespective of the actual mechanism it is logical to assume that the first four would act equally upon all traffic and thus buses would suffer no greater delays than ordinary traffic traveling on that road and at that particular time. If that is actually the case then the journey time for buses will be the same as for other traffic. In other words there are no special factors that could be influenced by the council that would advantage public transport over other vehicles on that specific route. Clearly if there were to be a series of road works on the route followed by a particular service this would have an impact.

Dwell times are a factor that are unique to public transport and are capable of influence to a degree through the design of the vehicles, the payment method and the clarity of information about payment contained on the stop. These delays can be allowed for in constructing the timetable and thus should have no significant influence upon bus reliability.

Access delays are also a factor unique to public transport and are capable of influence through decisions taken about the number and frequency of stops. The council is also able to assist by the use of bus boarders which effectively prevent the bus losing its place in the traffic flow when stopping to pick up passengers. Clearly this comes at the cost of additional delays to non public transport vehicles so in effect merely transfers the access delay from one vehicle to many. Access delays can also be allowed for in the design of a timetable.

Findings

Summary

- The comparison between observed on street bus arrivals and BLISS predicted arrivals was found to be close to 95%.

- Regularly during the week long survey period around 42% of all buses were not BLISS equipped on the routes that are provided with PIPS.

- There was evidence that extra buses were being put into service during the peak hours

- The comparison between timetabled arrival times and actual arrival times at surveyed stops both on and off peak showed significant variation between the two. On some services the variation was as much as 4 minutes early and 4 minutes late on a timetabled 10 minute frequency.

- The survey did not find any service that consistently met its published timetable throughout the day or even a substantial part of it.

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Detail

The attached graphs show for a randomly selected day (Wednesday 13 June) the survey results for Services 2 and 10 comparing how these services vary across the day as compared to their timetable. Service 2 operates the Rawcliffe Park and Ride route and thus is virtually exclusively confined to the main city area. Service 10 operates a route that runs across the city centre from Stamford Bridge to Poppleton. These two routes should therefore provide a snapshot of how buses function in the city and those where the potential for disruption on a longer distance route is higher. The graph has been produced by monitoring the journey time for each vehicle as it moves from terminus to terminus across the city. This was obtained by noting the start time of a journey and the vehicle fleet number and then matching that fleet number with recorded arrival times. It is clearly not possible to identify what was actually happening at each individual stop along the route from this information.

Wednesday 13 June was a day when rain was present all day. The rain was, however not particularly heavy. There were a number of road works ongoing within the city on that day but for the two services monitored intensively there were none on either route that had any impact upon the flow of traffic. Comparison of traffic flows around the city on that day with those on the previous Wednesday did not show any significant difference. There was also little difference between flows recorded on the Tuesday 12 when compared to those on the 13th. In other words there were no out of the ordinary events or conditions which might have directly impacted upon the bus services monitored which would have resulted in the results obtained being untypical of other days. In terms of Service 10 the bridge at Stamford Bridge reopened on the 29 May so this service had been operating normally for quite some while prior to the survey.

For both graphs the actual performance should be close to the dotted grey line representing the time table as this is the journey time that the bus company has decided that the particular service should take to get from terminus to terminus. Where the actual line rises above this the service was running late. Below it was running early.

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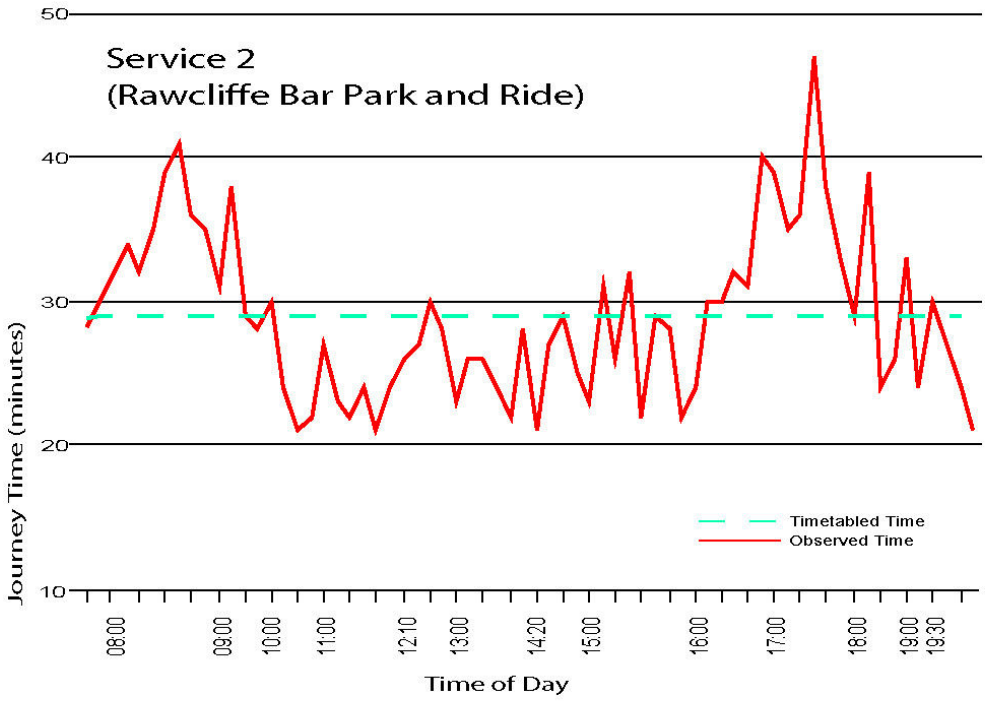
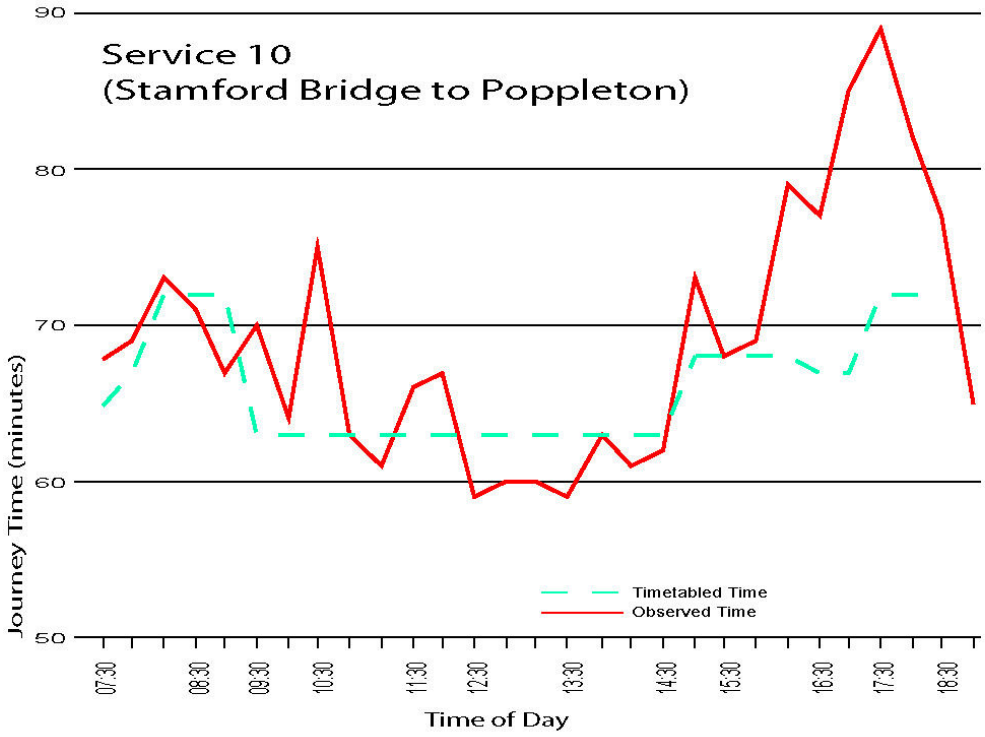

Service 2
(Rawcliffe Bar Park and Ride)
Journey Time (minutes)
50
40
30
20
10
Timetabled Time
Observed Time
08:00
09:00
10:00
11:00
12:10
13:00
14:20
15:00
16:00
17:00
18:00
19:00
19:30
Time of Day


Service 10
(Stamford Bridge to Poppleton)
Journey Time (minutes)
90
80
70
60
50
Timetabled Time
Observed Time
07:30
08:30
09:30
10:30
11:30
12:30
13:30
14:30
15:30
16:30
17:30
18:30
Time of Day

It will be seen that:

Service 2

- there is no variation in timetable journey time throughout the day – ie the line is horizontal
- journey times increase by up to12 minutes in the morning peak and up to 19 minutes in the evening peak. This represents a 41% and 65% variation respectively increase on the timetable that customers will be reliant upon. This means that customers in these peaks will have a significantly reduced chance of their bus arriving when timetabled
- in the off peak journey times are consistently below the timetable requirement and at times complete their journey some 8 minutes earlier than planned (27%). This means that customers will have a good chance that they will miss their bus because it has run early.
- for approximately 4 hours in the period 8am to 6pm the service ran later than the timetable, for the balance of the period (6hours) the service ran mainly earlier than timetabled

Service 10

- the timetabled journey time varies throughout the day and attempts to mimic the actual variation in journey times. Throughout some parts of the day the relationship is good.
- the timetable variation has a good correlation with the actual running times during the morning peak but is poor in the evening peak with journey times increasing by up to 17 minutes (23%)
- in the off peak the correlation is inconsistent with vehicles running up to 12 minutes (19%) late or 4 minutes (6%) early
- for approximately 4 hours in the period 8am to 6pm the service ran later than the timetable but that late running occurred inconsistently across the day. For 2 hours or so in the middle of the day the service ran early.

Conclusions

Whilst a great deal more work would be required to reach any firm conclusion the evidence appears to point towards timetabling issues in respect of the significant early running that has been observed. This cannot be attributed to any external factors. Again it appears that some late running issues on services may also be addressed through a a different approach to timetabling. Both measures should improve bus reliability – as in terms of a bus will be more likely to arrive when advertised to do so.

The bus passenger information system provided by BLISS provides accurate information. That information is, however only in regard to approximately 66% of the buses operating the monitored services as the bus operator is running unfitted units although there are now plans in place to equip all buses with the required equipment. This means that customers using the PIPS will perceive the information being

provided as being unreliable (as it is a mixture of actual times and timetabled times, these being largely not adhered to by the buses themselves).