

Individual junctions, Bradford (SPRUCE)

Although the 5 sampled junctions in Bradford are controlled with SPRUCE in a similar way to the junction groups, they are not related in a coordinated group but are actually individual junctions. As such, they are an important class of junctions in the TLP scheme, since approximately 33% of TLP junctions do not operate as part of a coordinated group (over 50% of Bradford junctions)

Table 1, Actual benefits of sampled Bradford junctions

District	Group	No. of Junctions	estimated benefits (secs)			actual benefits (secs)		
			AM	O/P	PM	AM	O/P	PM
Bradford	Killinghall Rd /Barkerend Rd	1	14	3	14	10	20	25
Bradford	Legrans La /Ingleby Rd	1	14	4	14	-1	9	28
Bradford	Oak Ln /Heaton Rd	1	9	2	9	1	9	7
Bradford	Kings Rd /Queens Rd	1	13	3	13	6	2	12
Bradford	Leeds Rd/Rushton Ave	1	4	1	4	6	4	-10
Total		34						

Individual junctions do not gain the benefit of having their improvements averaged with adjacent junctions, and so would be expected to exhibit more variability than a related group. This is in fact the case with these 5 junctions, as shown by the relative benefits given in Table 1:

- The overall actual benefits of the Killinghall/Barkerend Road junction are clearly greater than estimated – with 10s in the AM Peak and 25s in the PM compared with the estimated 14s, and significantly higher off peak benefits of 20s compared with 3s.
- The overall actual benefits of the Legrams Lane/Ingleby Rd junction are also greater, with clearly higher off peak benefits of 9s compared with 4s, but with the peak benefits being overall neutral - with benefits of -1s & 28s compared with 14s & 14s showing a strong PM bias.
- The actual benefits of the Oak Lane/Heaton Rd junction also appear higher (notably in the off peak), whereas the remaining two junctions (Kings Rd/Queens Rd & Leeds Rd/Rushton Ave), whilst still generally having positive benefits, are more difficult to relate to estimated values.

To get a better idea of the overall performance of these 5 junctions it is convenient to compare the BCRs of each junction, since BCRs take full account of the relative peak and off-peak benefits - see the table below (extracted from Table 2):

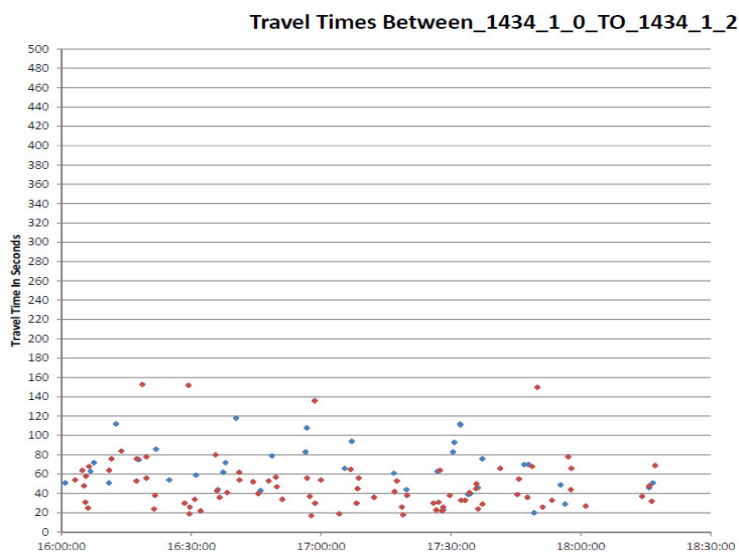
Junction	Estimated BCR	Actual BCR	% change
Killinghall Rd/Barkerend Rd	10.8	24.9	131
Legrans Lane/Ingleby Rd	9.9	11.3	14
Oak Lane/Heaton Rd	5.1	8.7	71
Kings Rd/Queens Rd	7.7	5.6	-27
Leeds Rd/Rushton Ave	3.7	3.6	-3
average	7.44	10.82	45

As can be seen there is significant variability between junctions. The 3 junctions at the top of the table all have higher actual BCRs than estimated BCRs – ranging from 14% to 131% higher, whilst the bottom 2 junctions have lower BCRs with values of -3% and -27%.

However, the average percentage change, which is the value which would be quoted if these junctions were in a related group, is 45%. This is clearly a substantial improvement.

The benefits can also be displayed graphically, and this is done below in the form of a trigger scatter plot selected for the Killinghall Rd/Barkerend Rd junction:

Chart 1. Trigger scatter plot for the Killinghall Rd/Barkerend Rd junction, PM Peak (outbound)



Being an individual junction there are no obvious 'patterns' in the scatter plots to indicate improved coordination.

Despite this, the 'after' (red) plots can be seen to be generally lower than the 'before' (blue) plots.

The mean benefit derived from this before and after data is 25s.

An alternative representation of this data is shown in the relative frequency graph of Chart 2. These graphs provide a better understanding of the relative bus travel times, and enables a test to be carried out which gives a measure of the proportion of buses which suffer 'higher levels of delay'.

Despite this being an individual junction with no opportunity to benefit from better coordination between junctions, the chart clearly shows that 'after' bus travel times (red) are more represented in the lower values of travel time than 'before' travel times (blue). This is consistent with the priority logic giving selected buses 'green extensions' which tend to reduce the higher vales of bus delay.

Chart 2. Relative frequency graph for Killinghall Rd/Barkerend Rd, PM Peak (outbound)

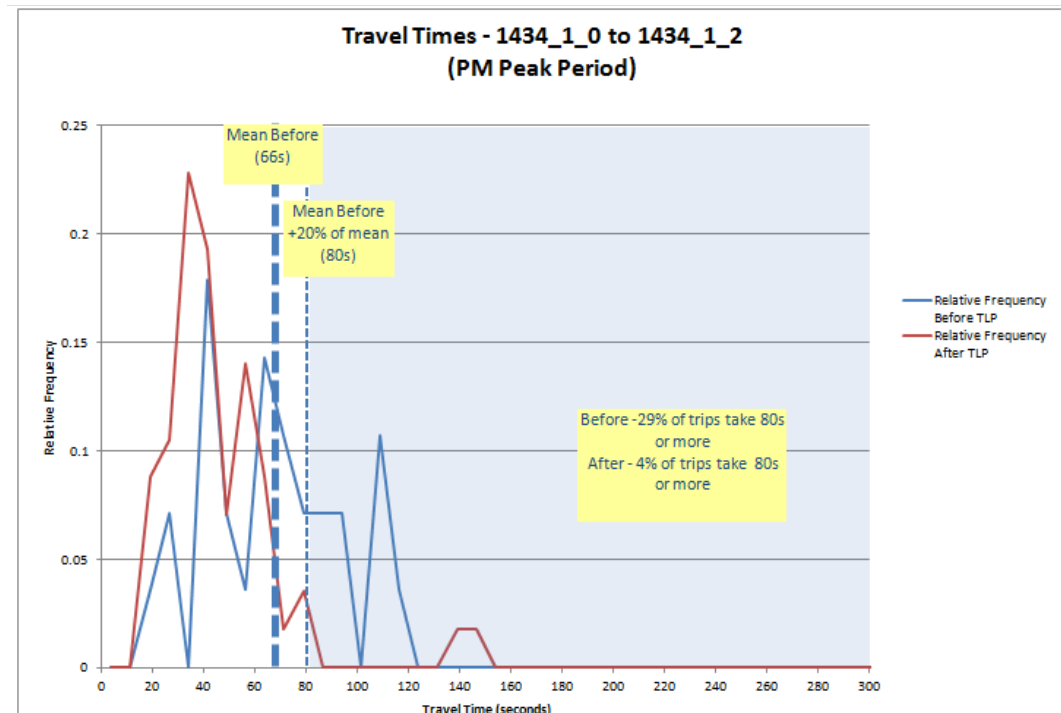


Chart 2 illustrates this effect in the higher values of travel time. The chart shows a shaded area indicating those buses which take longer than 'the mean plus 20%' to travel through the network, this being effectively a test of those buses which suffer 'higher levels of delay'. For this junction this value is 80s, which is typical for a well trafficked individual junction. The chart shows that the number of buses exceeding this value (i.e. those with 'higher levels of delay') fall dramatically from 29% in the 'before' situation to only 4% in the 'after' situation.