Blackpill Crossing

Summary

A procedure for linking the timing of the lights at the existing pedestrian and cyclist crossings at Blackpill is described. It would make the delay for motorists no longer than if there were a single crossing.

Introduction

The timing of the lights at the pedestrian crossing by the *Junction Café* is not linked to the lights at the cycle and pedestrian crossings to the north. This causes delays to the traffic which have led to complaints and letters in the *Evening Post*. These have proposed solutions ranging from a Bridge linking the Clyne Valley path to the foreshore to removal of a crossing.

This delay could be significantly reduced by phasing the lights and linking them in such a way that operation of the two crossings would cause no more delay than if there were one. This would involve replacing the existing control system for the lights by a more "intelligent" one. No other changes would be required.

Existing set up

Figure 1 shows the crossings at the two locations. There are lights on both sides of the road with lights on the central islands for the two pedestrian crossings: six in all. The pedestrian crossings are therefore two stage and the cycle single stage.

The phasings of these lights are not linked. Except when there is no traffic coming either way there is a significant wait after pressing the button before the green cross light appears. In the case of the cycle crossing this can be 35-40 seconds. The amber period for the carriageway lights is about 5 seconds. The green period for the cycle crossing is 20 ± 5 seconds.

The green period on the north crossing is so short as to allow barely enough time for a pedestrian to cross without getting stranded on the island and having to wait for the next green light.

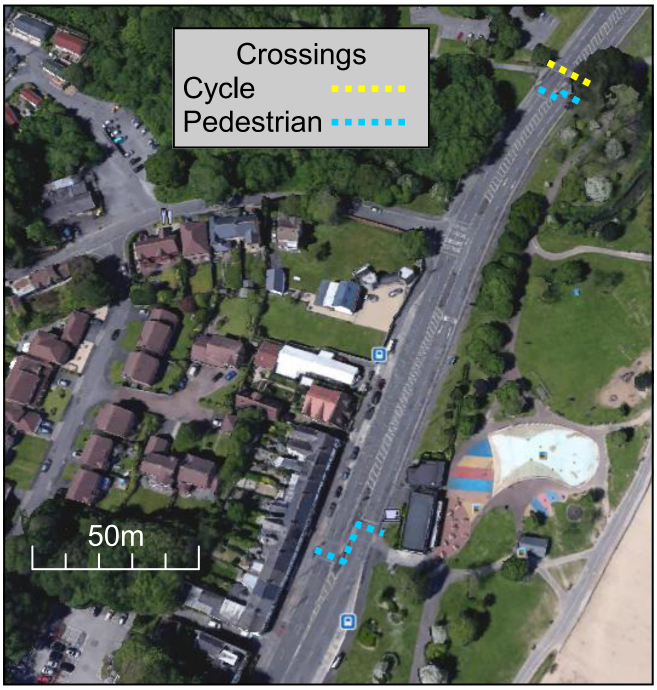

Figure 1 The crossings

Analysis

Both crossings are in a 30 mph zone. They are close to 200m apart. A vehicle travelling at 30 mph would therefore take approximately 15 seconds to pass between them .

The scheme involves phasing the lights so that those on the south pedestrian crossing of the west lane change a notional 15 seconds *before* the north cycle and pedestrian crossing lights, and those on the east lane 15 seconds *after* the northerly crossing lights.

Figure 2 illustrates how it would work. The ordinate represents distance and the abscissa time. The origin of the time axis corresponds to the pressing of a crossing button – at any of the six crossing points as they all initiate the sequence qt the same time.

The upper diagram relates to the west lane and the lower to the east. Inclined arrows indicate the flow of traffic: in the upper diagram west lane northbound traffic, in the lower diagram east lane southbound traffic. The slope of an arrow is proportional to the speed, ie the steeper the faster. The shaded area indicates when and where traffic is stopped by a red light, with the lighter shaded area relating to the amber phase. The full lines identify the cycle crossings and the broken lines the pedestrian. The dotted line in the upper diagram superimposes the broken (pedestrian) line from the lower diagram, and vice versa. The "Δ" identify times.

They have the following meaning. Brackets show realistic values.

- Δ_A = Road lights amber. (5 sec.)
- Δ_B = Period from end of crossing green to road lights changing to green. (15 sec.)
- Δ_D = Phase difference between S. and N. crossings. (15 sec.)
- Δ_G = Green period for crossings. (Same for all.) (35 sec.)
- Δ_R = Red period for crossings.
- Δ_{Rmin} = Minimum Δ_R. (50 sec.)
- Δ_N = Wait for north crossings.
- Δ_W = Wait for west (ped.) crossing.
- Δ_E = Wait for east (ped.) crossing.
- Δ_X = Additional wait if $\Delta_R = \Delta_{Rmin}$.

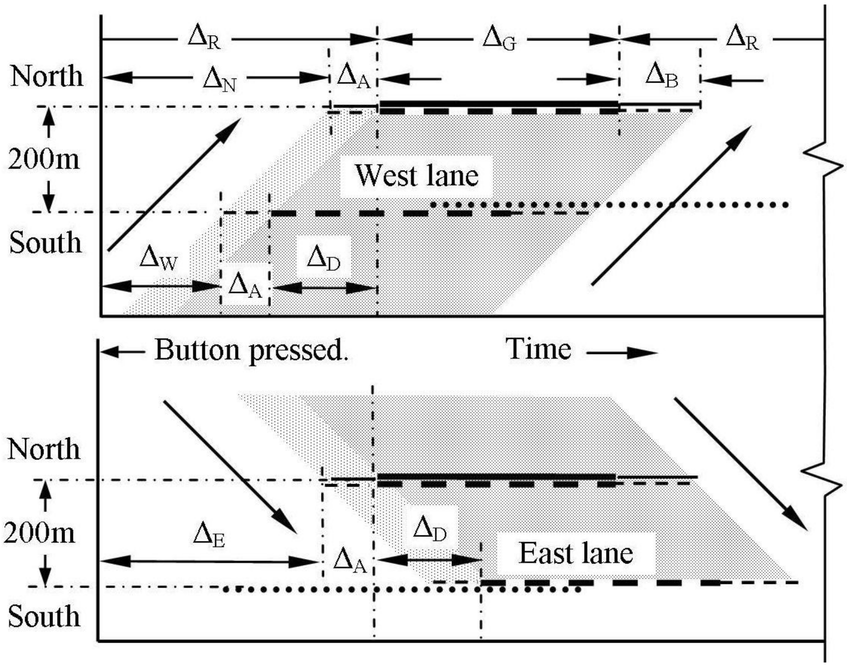

Figure 2. How it works

Top diagram relates to S-N traffic, lower to N-S.

Note that the green period for road traffic is $\Delta_R - \Delta_A - \Delta_B$. (≥30 sec.)

The length of wait (from pressing any button) will be longer if the crossing red phase has not reached its minimum, Δ_{Rmin}, and will be different for each crossing as will be explained

Δ_X will be zero if the crossing red phase has lasted longer than the minimum when a button is pressed. Otherwise Δ_X will be the time remaining for the red phase to reach the minimum, Δ_{Rmin}. With Δ_X established then for all cases:

$$\Delta_N = \Delta_X + \Delta_A + \Delta_D \qquad (1)$$

$$\Delta_W = \Delta_X + \Delta_A \qquad (2)$$

$$\Delta_E = \Delta_X + \Delta_A + 2\Delta_D \qquad (3)$$

From which it can be seen that longer waits are involved at the north and east lane crossings than at the west lane.

The following examples apply the theory. The bracketed values above are used in all of them.

Example 1.

A person arrives at the north crossing – they could be a cyclist or a walker and crossing either way, it would make no difference – and finding the crossing light red they press the button. More than 50 seconds has passed since it was last green so their wait time is the minimum, $\Delta_X = 0$ and their wait is given by equation (1) as 0+5+15 = 20 seconds.

They later return to cross the same crossing but this time they just miss the green light by, let's suppose, 8 seconds so that the red phase has not yet reached its minimum (Δ_{Rmin}) of 50 seconds. Δ_X will therefore be 50−8 = 42 seconds, so they now have to wait 42+20 = 62 seconds before they get the green light.

Example 2.

A pedestrian arrives at the west south crossing to cross from west to east. They arrive after the minimum crossing red phase has passed so that they only have to wait for the road amber phase, Δ_A, before they get a green light. By equation (2) this is 5 seconds. Suppose they take 12 seconds to cross the west lane. Because of the phase difference between the west and east lanes they have to wait $2\Delta_D$ − 12 = 30−12 = 18 seconds on the island before the lights for the east lane turn green.

Example 3.

This time a pedestrian arrives at the east south crossing to cross from east to west. 34 seconds have passed since the end of the last green phase so they have to wait longer than the minimum. Δ_X is now 50−34 = 16 seconds, so that by equation (3) their wait time is 16+5+2*15 = 51 seconds by which time the lights for the west lane have changed to red. (The west lane lights change $2\Delta_D$ = 30 seconds before the east.) They then press the button on the island.

Suppose it took them14 seconds from starting to cross the east lane to pressing the button. The west lane red phase will then be $14 + 2\Delta_D - \Delta_G$ = 14+30−35 = 9 seconds under way, so that Δ_X = 50−9 = 41 seconds. They will therefore have to wait 41+5 = 46 seconds (by equation 2) before they can start to cross the west lane.

Comments

Linking the lights at these crossings in this way would overcome the existing problem which results from the independent operation of the south and north crossings. The delay for motorists would be no more than if there were just one crossing.

There would also be modest improvements for both cyclists and pedestrians at the north crossing, as Example 1 illustrates. Also for pedestrians at the south crossing, particularly if crossing from west as illustrated by Example 2. If crossing from east to west a wait at the central island is probably inevitable (Example 3.), but even this can be avoided if the green crossing phase (Δ_G) is long enough to allow sufficient overlap of the west and east green phases for a pedestrian to reach the island before the west lane light changes to red. A Δ_G value of 40 seconds would provide a 10 second overlap. At least this would be required.

A problem not addressed in this note is that of a pedestrian getting stranded on the island on the north crossing due to the lights changing when or before they reach it. The existing green light phase (Δ_G) of around 20 seconds is not long enough for a slow walker to cross both lanes. This can be addressed by making this longer (The 35 seconds used in the examples should be sufficient.) together with a sufficiently long delay (Δ_B) between the end of the crossing green phase and the road lights changing to green. The 15 seconds used in the examples, while sufficient for a cyclist to cross both lanes or a pedestrian to cross one, could leave a slow pedestrian stranded on the island.

As no changes to the surface structure of the crossing would be required the cost would just be that of changing the traffic light control system. (This may or may not involve replacing the lights themselves.)

While improving the flow of motor traffic through Blackpill this can be expected to, at least at busy times, transfer the bottleneck elsewhere, especially to Mumbles. There is therefore a question as to whether our Active Travel promoting council should be supporting such a measure! Insofar as it also provides some improvement for pedestrians and cyclists perhaps they should.

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